STATE OF CONNECTICUT
CONNECTICUT SITING COUNCIL

IN RE:	:	
	:	
A PETITION FOR A DECLARATORY RULING ON THE NEED TO OBTAIN A SITING COUNCIL CERTIFICATE FOR THE PROPOSED MODIFICATION OF AN EXISTING WIRELESS TELECOMMUNICATIONS FACILITY AT OIL MILL RD (Structure 6063A), WATERFORD CONNECTICUT	:	PETITION NO. ____
	:	May 23, 2024

PETITION FOR A DECLARATORY RULING:
INSTALLATION HAVING NO
SUBSTANTIAL ADVERSE ENVIRONMENTAL EFFECT

I. Introduction

Pursuant to Section 6409(a) of the Middle Class Tax Relief and Job Creation Act of 2012, codified at 47 U.S.C. §1455(a) ("Section 6409(a)") and the October 21, 2014 Report and Order (FCC-14-533) issued by the Federal Communications Commission ("FCC") (the "FCC Order"), Dish Wireless LLC ("Dish") hereby petitions the Connecticut Siting Council (the "Council") for a declaratory ruling that the proposed modifications to the existing tower at Oil Mill Rd, Waterford Connecticut ("Property") constitutes an Eligible Facilities Request ("EFR") under the FCC Order.

II. Existing Facility

The Existing Facility is located on an approximately 22-acre parcel, the parcel is owned by John W & Suzanne M Lane and the tower is owned by CL&P d/b/a Eversource Energy. The Facility consists of an 85-foot electric transmission pole (#6063A) with a 10-foot extension. The pole is installed on a 2.5-foot foundation making the total overall height 97.5-feet. **Attachment 1** contains the owner's authorization permitting Dish to file this Petition. The Facility was originally approved for use by the Council on November 5, 2009, Petition No. 919 as documented in **Attachment 2**. **Please note the foundation was not captured in the original Petition No. 919, showing the overall height of 97.5-feet.

III. Dish Facility

Dish's proposed modification to its facility is illustrated on the plans submitted as **Attachment 3**. Dish proposes to extend the height of the existing transmission pole by 2-feet, to a total height of approximately 99.5-feet above ground level (AGL). No Generator or backup power is proposed at this time. Installation of Dish's facility will take approximately one (1) week to complete. Construction will take place Monday through Friday, 8am-5pm, or as required to complete within the appropriate outage window.

Dish Planned Installation:

Install New:

(3) Commscope FFVV-65B-R2 antenna @ 96.5ft RAD
(3) Samsung RF4450t-71A @ 96.5ft RAD
(3) Samsung RF4451d-70A @ 96.5ft RAD
(1) Raycap RDIDC-9181-PF-48 @ 96.5ft RAD
(1) 1-1/4" Hybrid Line

Installation of Dish's facility will cost approximately $50,000. Dish will fund this installation.

Dish has confirmed that the modified facility is capable of supporting the additional antennas and other changes to the tower mounted equipment, as documented in the Structural Analysis Report annexed hereto as **Attachment 4**.

IV. The Proposed Modification Will Not Have A Substantial Adverse Environmental Effect

1. Physical Environmental Effects

The modification of Dish's Facility will not involve a significant alteration to the physical and environmental characteristics of the Property.

2. Visual Effects

Given the overall height of the existing transmission pole is 97.5-feet AGL (overall height includes 2.5-foot foundation), Dish's proposed extension of *2-feet* with antenna mounted at the 96.5-foot RAD would have a minimal visual impact. The existing transmission pole structure and will have a minimal visual impact when viewed from the public right-of-way or adjacent private properties.

3. FCC Compliance

Radio frequency ("RF") emissions resulting from Dish's proposed modification of the Existing Facility will be well below the standards adopted by the Federal Communications Commission ("FCC"). Included in **Attachment 6** is a Radio Frequency Emissions Analysis Report prepared by Fox Hill Telecom. This report confirms that the modified facility will operate well within the RF emission standards established by the FCC.

V. Notice to the Municipality, Property Owner and Abutting Landowners

On May 24, 2024, a copy of this Petition was sent to Rob Brule, First Selectman and Jonathan Mullen, Planning Director for the Town of Waterford. A notice of Dish's intent to file this Petition was also sent to the owners of land that may be considered to abut the Property. Included in Attachment 5 is a sample abutter's letter and the list of those abutting landowners who were sent notice. To date no responses have been received from the abutting properties.

VI. Conclusion

Based on the information provided above, the Petitioners respectfully requests that the Council issue a determination in the form of a declaratory ruling that the 2-foot extension of the existing transmission pole at the Property will not have a substantial adverse environmental effect and does not require the issuance of a Certificate of Environmental Compatibility and Public Need pursuant to § 16-50k of the General Statutes.

Respectfully submitted,

Victoria Masse
Northeast Site Solutions
Agent for Dish Wireless
(860) 306- 2326
victoria@northeastsitesolutions.com

Attachments

Cc: Rob Brule, First Selectman
Town of Waterford
15 Rope Ferry Road
Waterford, CT 06385

Jonathan Mullen, Planning Director
Town of Waterford
15 Rope Ferry Road
Waterford, CT 06385

CL&P d/b/a Eversource Energy (Tower Owner)
PO BOX 270
Hartford, CT 06141

John W & Suzanne M Lane (Property Owner)
71 Oil Mill Road
Waterford CT 06385

ATTACHMENT 1

EVERSOURCE ENERGY

56 Prospect Street,
Hartford, CT 06103

P.O. Box 270
Hartford, CT 06141-0270
(860) 665-5000

May 18, 2024

Mr. Chuck Regulbuto
Northeast Site Solutions
5 Melrose Dr
Farmington CT 06032

RE: Dish Site BOBOS00935A, Old Mill Rd, Waterford, CT, Eversource Structure 6063A

Mr. Regulbuto:

Based on our reviews of the site drawings, the structural analysis and foundation review provided by Centek Engineering, along with a third-party review performed by Paul J. Ford and Company, we accept the proposed modification.

Please work with Christopher Gelinas of Eversource Real Estate to process the site lease amendment. Please do not hesitate to contact us with questions or concerns. Christopher can be contacted at 860-665-2008, and I can be contacted at (860) 728-4862.

Sincerely,

Masie Hartt

Masie Hartt
Transmission Line Engineering

Ref: 2024-0301 - BOBOS00935A - Structural Analysis Rev3 (23009.10)
2024-0517 - BOBOS00935A - Mount Analysis Rev0 (23009.10)
2024-0517_ BOBOS00935A DISH Wireless - Rev1 CDs (S&S)-1 (23009.10)

ATTACHMENT 2

Petition No. 919
MetroPCS
Oil Mill Road, Waterford
Staff Report
November 5, 2009

On October 13, 2009, the Connecticut Siting Council (Council) received a Petition (Petition) from MetroPCS Massachusetts, LLC (MetroPCS) for a Declaratory Ruling that No Certificate of Environmental Compatibility and Public Need is Required for the proposed co-location on an approved Connecticut Light and Power Company (CL&P) transmission structure at Waterford Substation.

Specifically, MetroPCS seeks to extend an existing 85-foot CL&P monopole transmission structure by 10-feet and install six panel antennas at the 92-foot 6-inch level of the structure. The total height of the facility with appurtenances would not exceed 95 feet. A structural analysis sealed by a Professional Engineer has certified that the tower is structurally adequate to support the proposed loading. The maximum worst-case power density would be approximately 5.6 percent of the applicable limit.

MetroPCS also seeks to install two Modcell equipment cabinets, two battery cabinets, and one PPC cabinet on a new 9-foot by 15-foot concrete pad within a new 10-foot by 16-foot fenced compound. The compound would be located outside of the substation and on the northwest corner of CL&P's property. The fencing would match the fencing of Waterford Substation with a 7-foot chain link fence with a foot of barbed wire.

MetroPCS had considered co-locating at an existing T-Mobile power-mount facility approximately 66 feet to the northeast. However, the transmission line associated with such facility is energized, and it would be difficult to obtain an outage to perform the installation. In addition, such structure is located in an easement and would result in significantly higher compensation costs for MetroPCS. Such structure also has a pipe mount which may not have sufficient structural capacity to support two carriers.

The Petition was field reviewed by Council member James J. Murphy, Jr. and Michael Perrone of the Council staff on October 29, 2009. The following individuals also attended the field review: Attorney Christopher B. Fisher from Cuddy and Feder LLP representing MetroPCS; Dick W. Man from MetroPCS; James Fitzgerald representing MetroPCS; Girish Behal from CL&P; John Chalmers from CL&P; and Mark Wujtewicz, Town Planner, Town of Waterford.

The site is currently being developed as Waterford Substation. The nearest residence is approximately 600 feet to the northeast. The existing transmission line with the T-Mobile facility has structures approximately 92.5 feet tall. The incremental visual impact is not expected to be significant given that this is a developed site and the extended structure would only be a few feet higher at 95 feet.

Notice was provided to the abutting property owners on October 9, 2009 with a deadline for reply on October 20, 2009. One abutter contacted the applicant to confirm that the MetroPCS proposal would remain within CL&P's property. There were no objections. The Town of Waterford was noticed on or about the time of filing the Petition. The Town's only concern was access to MetroPCS' facility from Oil Mill Road. Upon consultation with the Town and CL&P, MetroPCS will not install access to its facility. MetroPCS would use the parking area of the substation and walk to the site. This approach is satisfactory to all parties involved.

71 OIL MILL ROAD

Location	71 OIL MILL ROAD	**Mblu**	88/ / 5479/ /
Acct#	00503300	**Owner**	LANE JOHN W & M SUZANNE
Assessment	$274,570	**Appraisal**	$392,240
PID	5479	**Building Count**	1

Current Value

Appraisal			
Valuation Year	**Improvements**	**Land**	**Total**
2022	$231,820	$160,420	$392,240

Assessment			
Valuation Year	**Improvements**	**Land**	**Total**
2022	$162,270	$112,300	$274,570

Parcel Addreses

Additional Addresses
No Additional Addresses available for this parcel

Owner of Record

Owner	LANE JOHN W & M SUZANNE	**Sale Price**	$0
Co-Owner		**Certificate**	
		Book & Page	0233/0211
		Sale Date	04/18/1977
		Instrument	00

Ownership History

Ownership History					
Owner	**Sale Price**	**Certificate**	**Book & Page**	**Instrument**	**Sale Date**
LANE JOHN W & M SUZANNE	$0		0233/0211	00	04/18/1977

Building Information

Building 1 : Section 1

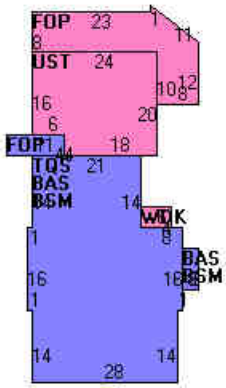
Year Built: 1875
Living Area: 2,065
Replacement Cost: $282,247
Building Percent Good: 67

Building Attributes	
Field	**Description**
Style	Cape
Model	Residential
Grade:	C+
Stories	1.75
Occupancy	1
Exterior Wall 1	Clapboard
Exterior Wall 2	
Roof Structure	Gable
Roof Cover	Arch Shingles
Interior Wall 1	Drywall
Interior Wall 2	
Interior Flr 1	Hardwood
Interior Flr 2	
Heat Fuel	Oil
Heat Type:	Hot Water
AC %	0
Total Bedrooms:	4
Full Bthrms:	2
Half Baths:	0
Extra Fixtures	0
Total Rooms:	9
Bath Style:	Average
Kitchen Style:	Average
Num Kitchens	1
Fireplace(s)	1
Extra Opening(s)	0
Gas Fireplace(s)	0
% Attic Fin	0
LF Dormer	40
Foundation	Stone/Brick
Bsmt Gar(s)	0
Bsmt %	100
SF FBM	0.00
SF Rec Rm	0

Building Photo

(https://images.vgsi.com/photos/WaterfordCTPhotos//\00\01\44\57.jpg)

Building Layout



(https://images.vgsi.com/photos/WaterfordCTPhotos//Sketches/5479_5479

Building Sub-Areas (sq ft)			Legend
Code	**Description**	**Gross Area**	**Living Area**
BAS	First Floor	1,190	1,190
TQS	Three Quarter Story	1,166	875
BSM	Basement	1,190	0
FOP	Open Porch	358	0
UST	Unfinished Utility Area	456	0
WDK	Deck	24	0
		4,384	2,065

Fin Bsmt Qual	
Bsmt Access	Hatchway

Extra Features

Extra Features	Legend
No Data for Extra Features	

Land

Land Use

Use Code	101
Description	Res Dwelling
Zone	RU120
Neighborhood	300
Alt Land Appr	No
Category	

Land Line Valuation

Size (Acres)	22
Frontage	1000
Depth	0
Assessed Value	$112,300
Appraised Value	$160,420

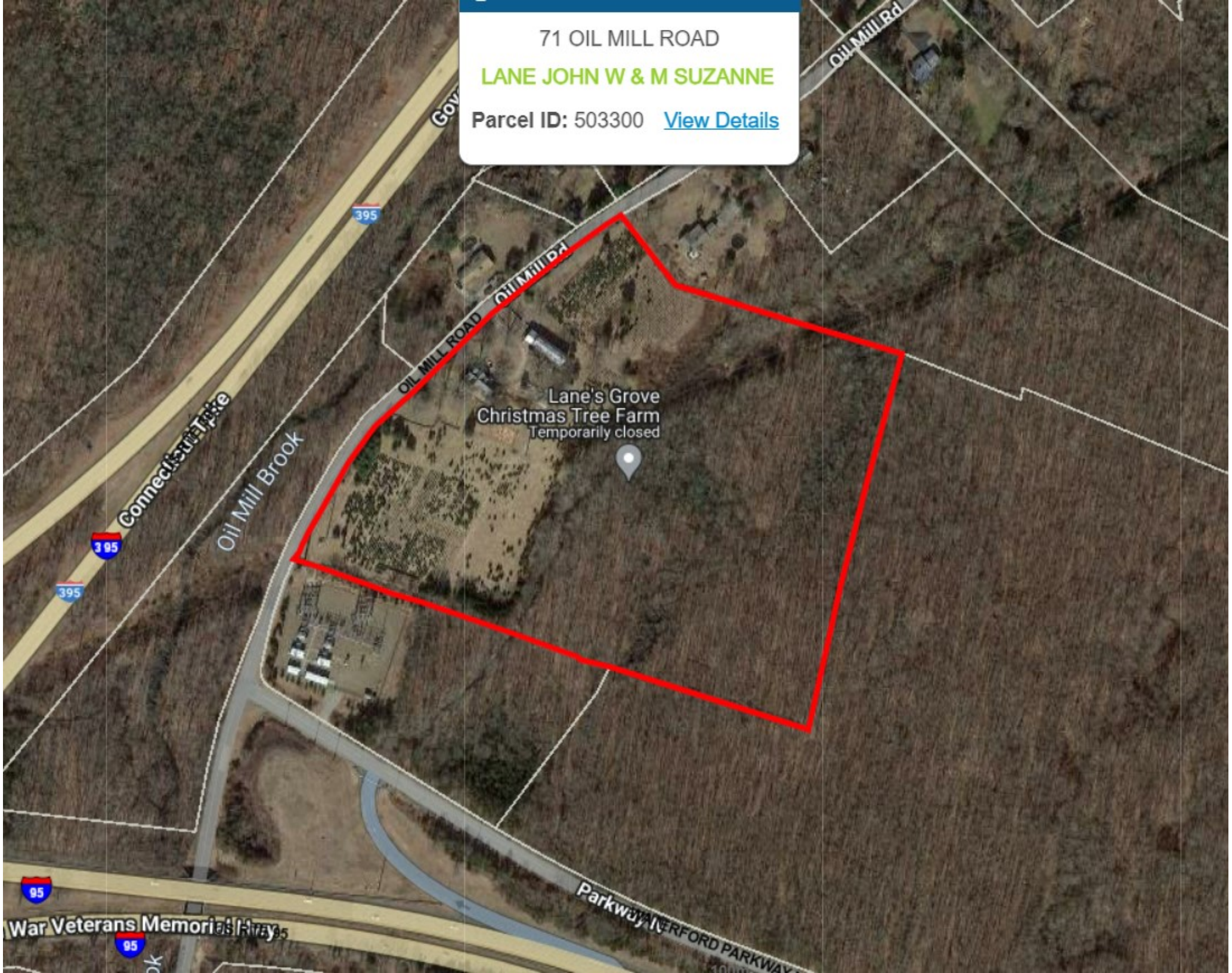
Outbuildings

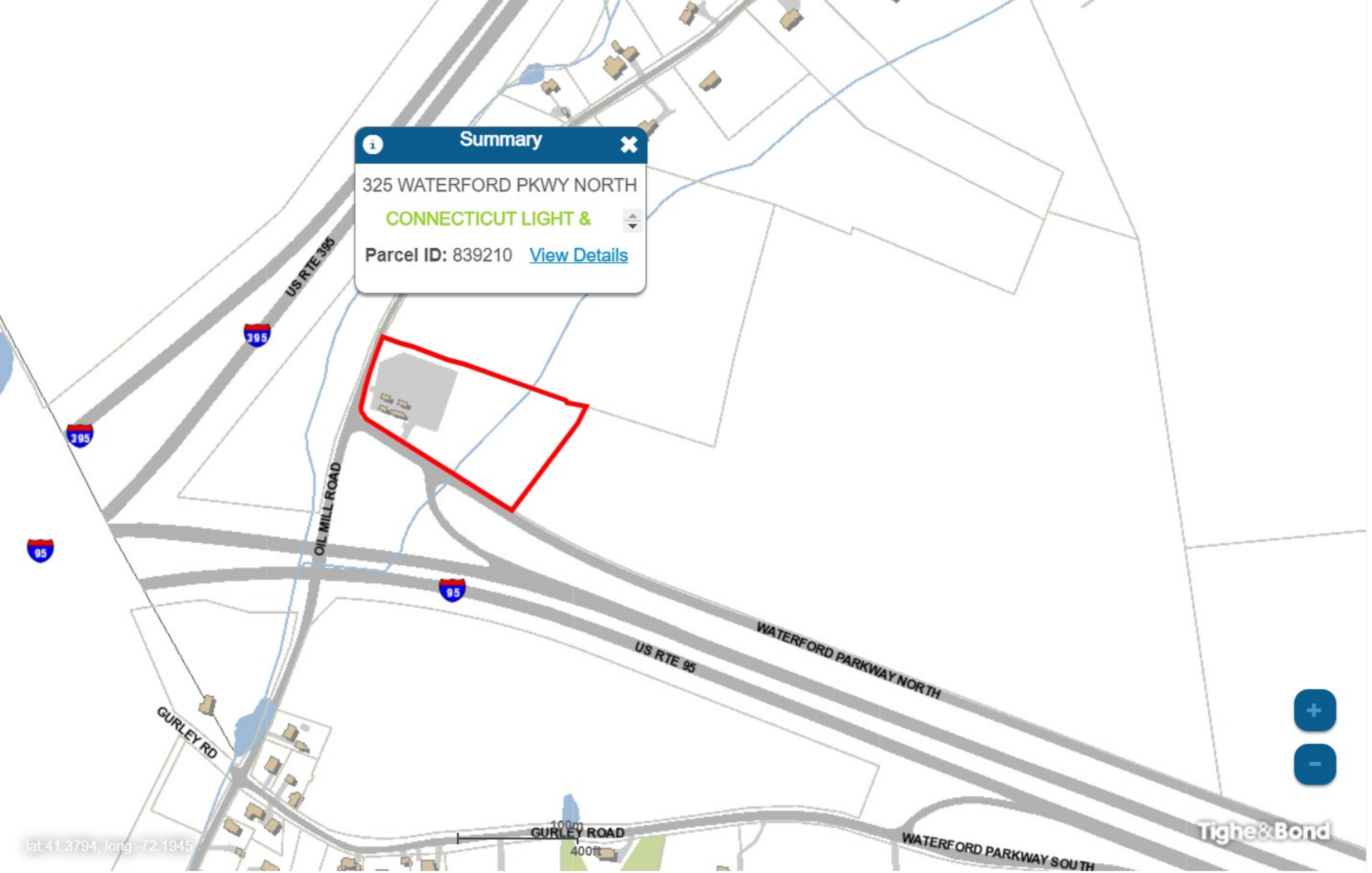
Outbuildings						Legend
Code	**Description**	**Sub Code**	**Sub Description**	**Size**	**Value**	**Bldg #**
FGR1	Garage	FR	Frame	480.00 S.F.	$6,240	1
PLT	Poultry House	FR	Frame	216.00 S.F.	$1,620	1
FOP	Porch			49.00 S.F.	$740	1
SHD1	Shed	FR	Frame	720.00 S.F.	$5,400	1
SHD1	Shed	FR	Frame	372.00 S.F.	$2,790	1
BRN2	1S Barn W/Loft	FR	Frame	1728.00 S.F.	$25,920	1

Valuation History

Appraisal			
Valuation Year	**Improvements**	**Land**	**Total**
2023	$231,820	$160,420	$392,240
2022	$231,820	$160,420	$392,240

Assessment			
Valuation Year	**Improvements**	**Land**	**Total**
2023	$162,270	$112,300	$274,570
2022	$162,270	$112,300	$274,570


71 OIL MILL ROAD
LANE JOHN W & M SUZANNE
Parcel ID: 503300 View Details
OIL MILL ROAD
Oil Mill Rd
Lane's Grove
Christmas Tree Farm
Temporarily closed
Oil Mill Brook
Connecticut Turke
395
95
War Veterans Memorial Hwy
Parkway N


Summary
325 WATERFORD PKWY NORTH
CONNECTICUT LIGHT &
Parcel ID: 839210 View Details
US RTE 395
395
OIL MILL ROAD
95
WATERFORD PARKWAY NORTH
US RTE 95
GURLEY RD
GURLEY ROAD
100m
400ft
WATERFORD PARKWAY SOUTH
Tighe&Bond
lat:41.3794, long:-72.1945

ATTACHMENT 3

DISH Wireless L.L.C. SITE ID:

BOBOS00935A

EVERSOURCE STR. #6063A

DISH Wireless L.L.C. SITE ADDRESS:

69 OIL MILL ROAD
WATERFORD, CT 06385

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 (3) PROPOSED ANTENNA MOUNT FRAMES (1 PER SECTOR).
- 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 A 8' x 6' CONCRETE PAD TO ACCOMMODATE THE PROPOSED EQUIPMENT PLATFORM
- INSTALL (1) CABLE ICE BRIDGE ROUTED FROM EQUIPMENT TO TOWER
- INSTALL (1) PROPOSED 5' x 7' STEEL EQUIPMENT PLATFORM
- INSTALL (1) PROPOSED PPC CABINET
- INSTALL (1) PROPOSED EQUIPMENT CABINET
- INSTALL (1) PROPOSED POWER CONDUIT
- INSTALL (1) PROPOSED TELCO CONDUIT
- INSTALL (1) PROPOSED TELCO-FIBER BOX
- INSTALL (1) PROPOSED GPS UNIT
- INSTALL (1) PROPOSED SAFETY SWITCH (IF REQUIRED)
- INSTALL (1) PROPOSED FIBER NID (IF REQUIRED)
- INSTALL (1) PROPOSED 200A RATED UTILITY METER

SITE PHOTO

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:	CONNECTICUT LIGHT & POWER
ADDRESS:	69 OIL MILL RD WATERFORD, CT 06385
SITE TYPE:	TOWER
COUNTY:	NEW LONDON
LATITUDE (NAD 83):	41° 22' 36.82" N
LONGITUDE (NAD 83):	72° 11' 22.73" W
ZONING JURISDICTION:	RU120
ZONING CODE:	201
PARCEL NUMBER:	8983
OCCUPANCY GROUP:	N/A
CONSTRUCTION TYPE:	N/A
POWER COMPANY:	EVERSOURCE
TELEPHONE COMPANY:	TBD

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
SITE ACQUISITION:	DAVID GOODFELLOW (860) 305-3841
CONSTRUCTION MANAGER:	CHAD WILCOX (860) 573-2758
RF ENGINEER:	IRENE RANGEL (312) 929-9086

DIRECTIONS

DIRECTIONS FROM BRADLEY AIRPORT TO 69 OIL MILL ROAD, WATERFORD CT, 06385

1. HEAD NORTHWEST ON BRADLEY INTL AIRPORT. GO FOR 0.03 MI.
2. KEEP RIGHT ONTO BRADLEY INTL AIRPORT TOWARD DEPARTURES A. GO FOR 0.7 MI..
3. CONTINUE STRAIGHT AHEAD. GO FOR 0.3 MI.
4. CONTINUE ON BRADLEY FIELD CONN TOWARD I-91/CT-20. GO FOR 0.2 MI.
5. KEEP RIGHT TOWARD CT-20/I-91. GO FOR 0.1 MI.
6. CONTINUE ON BRADLEY FIELD CONN. GO FOR 0.5 MI.
7. CONTINUE ON CT-20 E (BRADLEY FIELD CONN). GO FOR 3.2 MI.
8. TAKE THE EXIT TOWARD HARTFORD ONTO I-91 S (RICHARD P HORAN MEMORIAL HWY). GO FOR 1.3 MI.
9. KEEP RIGHT ONTO I-91 S (RICHARD P HORAN MEMORIAL HWY) TOWARD I-91. GO FOR 8.5 MI.
10. TAKE THE LEFT EXIT ONTO I-84 E (BULKELEY BRG). GO FOR 0.6 MI.
11. TAKE EXIT 55 TOWARD NORWICH/NEW LONDON ONTO CT-2 E. GO FOR 23.8 MI.
12. TAKE EXIT 19 TOWARD CT-11/NEW LONDON ONTO CT-11 S. GO FOR 4.3 MI.
13. TAKE EXIT 5 TOWARD WITCH MEADOW ROAD. GO FOR 0.3 MI.
14. TURN LEFT ONTO WITCH MEADOW RD. GO FOR 1.0 MI.
15. TURN RIGHT ONTO HARTFORD RD (CT-85) TOWARD SALEM. GO FOR 1.9 MI.
16. TAKE THE 2ND EXIT FROM ROUNDABOUT ONTO NEW LONDON RD (CT-85 S). GO FOR 7.7 MI.
17. TURN RIGHT ONTO WAY HILL RD. GO FOR 0.5 MI.
18. TURN LEFT ONTO OIL MILL RD. GO FOR 1.2 MI.
19. 69 OIL MILL RD WATERFORD, CT 06385-4028 WILL BE ON THE LEFT.

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 — CHRISTOPHER F. CENTORE — No. 16694 — LICENSED PROFESSIONAL ENGINEER

DRAWN BY:	CHECKED BY:	APPROVED BY:
BSP	TJR	

RFDS REV #: 0 – 10/04/2023

CONSTRUCTION DOCUMENTS

SUBMITTALS

REV	DATE	DESCRIPTION
A	11/15/23	ISSUED FOR CLIENT REVIEW
0	03/28/24	ISSUED FOR CONSTRUCTION
1	05/09/24	ISSUED FOR CONSTRUCTION
2	05/17/24	REVISED PER CLIENT COMMENTS

CENTEK PROJECT NUMBER
23009.10

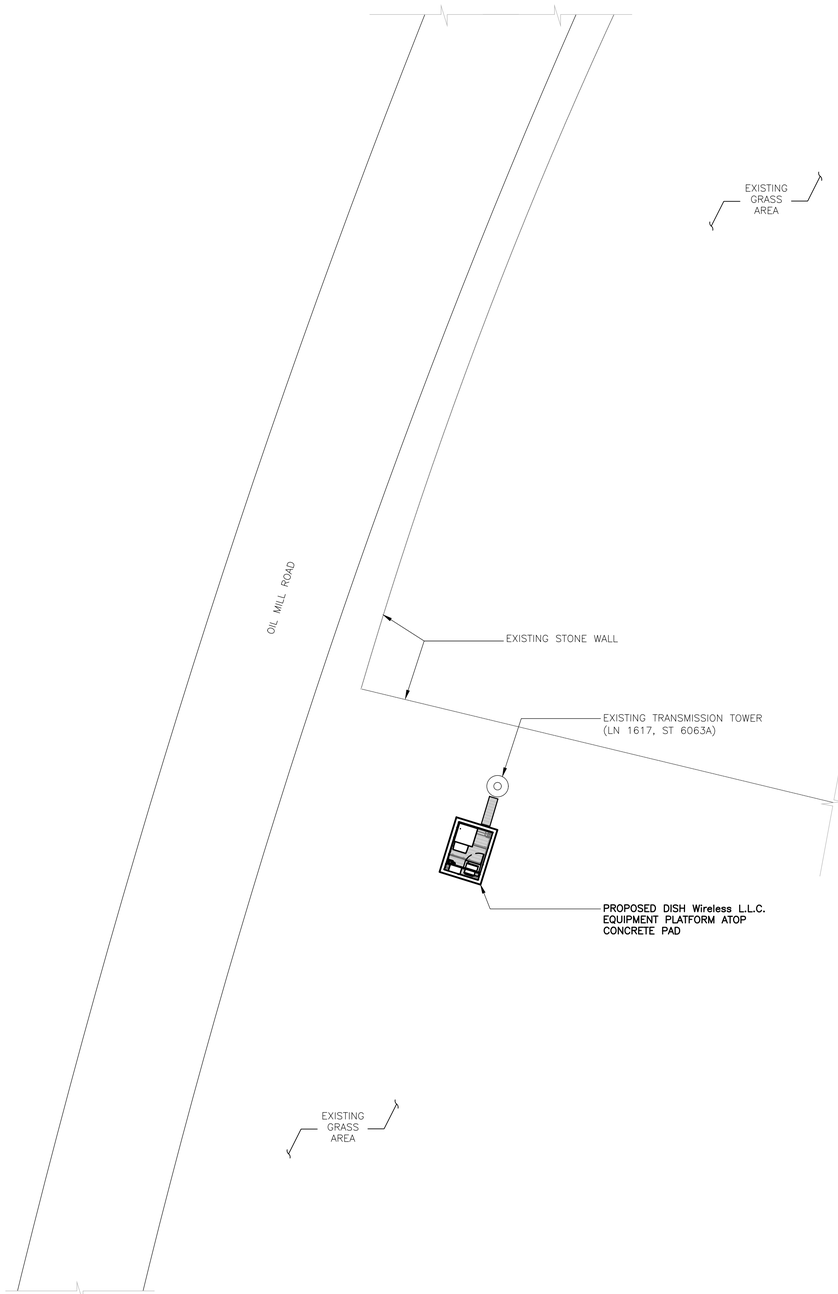
DISH Wireless L.L.C.
PROJECT INFORMATION

BOBOS00935A
69 OIL MILL RD
WATERFORD, CT 06385

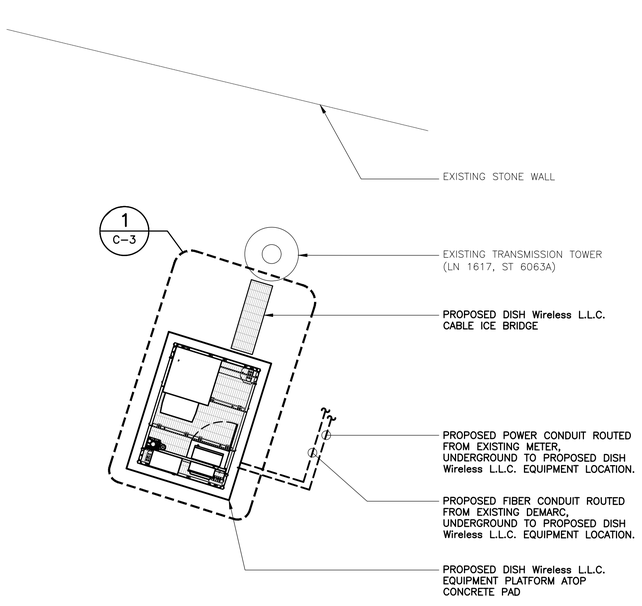
SHEET TITLE
TITLE SHEET

SHEET NUMBER
T-1

AERIAL VIEW PLAN | NO SCALE | 2



OVERALL SITE PLAN | 10' 0 10' 20' (1"=10') | 1



ENLARGED SITE PLAN | 4' 2' 0 4' 8' (1/4"=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

STATE OF CONNECTICUT
OFFICE OF CERTIFICATE
No. 16694
LICENSED
PROFESSIONAL ENGINEER

DRAWN BY:	CHECKED BY:	APPROVED BY:
BSP	TJR	

RFDS REV #: 0 – 10/04/2023

CONSTRUCTION DOCUMENTS

SUBMITTALS

REV	DATE	DESCRIPTION
A	11/15/23	ISSUED FOR CLIENT REVIEW
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1	05/09/24	ISSUED FOR CONSTRUCTION
2	05/17/24	REVISED PER CLIENT COMMENTS

CENTEK PROJECT NUMBER
23009.10

DISH Wireless L.L.C.
PROJECT INFORMATION

BOBOS00935A
69 OIL MILL RD
WATERFORD, CT 06385

SHEET TITLE
OVERALL SITE PLAN

SHEET NUMBER
C-1

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..

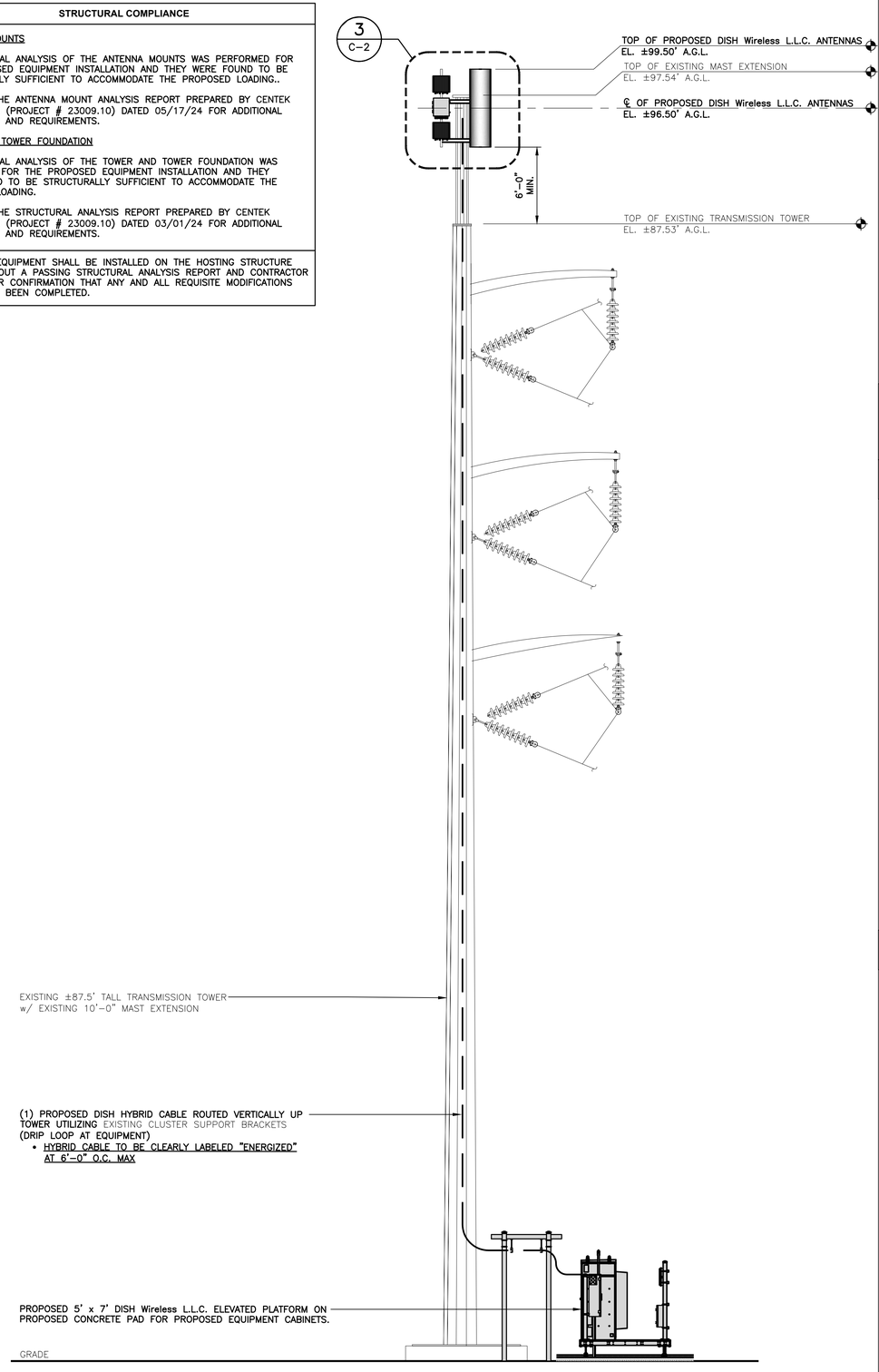
REFER TO THE ANTENNA MOUNT ANALYSIS REPORT PREPARED BY CENTEK ENGINEERING (PROJECT # 23009.10) DATED 05/17/24 FOR ADDITIONAL INFORMATION AND REQUIREMENTS.

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 (PROJECT # 23009.10) DATED 03/01/24 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.

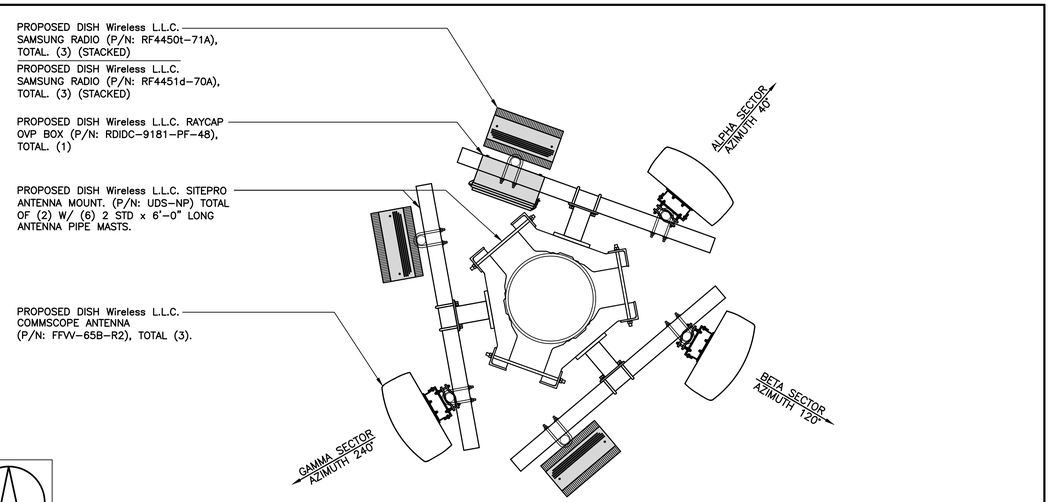


TOWER ELEVATION

5' 2.5' 0 5' 10'
1"=5'-0"

1"= 5'-0"

1

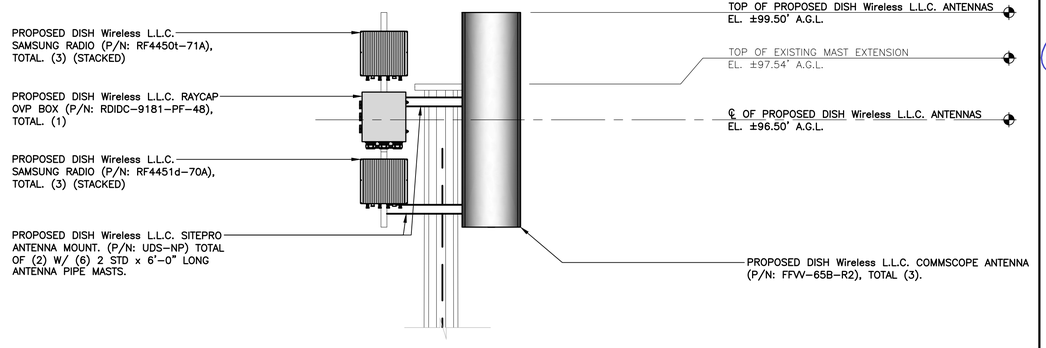


ALPHA/BETA/GAMMA SECTOR TYP.

ANTENNA CONFIGURATION PLAN

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

2



ANTENNA PLAN ELEVATION

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

3

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	COMMSCOPE – FFVV-65B-R2	n70, n71, n66	72.0" x 19.6"	40°	96'-6"	CU12PSM6P4XXX_4AWG APPROX. 140FT
BETA	B1	PROPOSED	COMMSCOPE – FFVV-65B-R2	n70, n71, n66	72.0" x 19.6"	120°	96'-6"	
GAMMA	C1	PROPOSED	COMMSCOPE – FFVV-65B-R2	n70, n71, n66	72.0" x 19.6"	240°	96'-6"	

SECTOR	POSITION	RRH + OVP	
		MANUFACTURER – MODEL NUMBER	TECHNOLOGY
ALPHA	A1	SAMSUNG – RF4450t-71A	n71
	A1	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
ALPHA	RAYCAP – RDIDC-9181-PF-48 (OVP BOX)		

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

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

4

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BSP	TJR	

RFDS REV #: 0 – 10/04/2023

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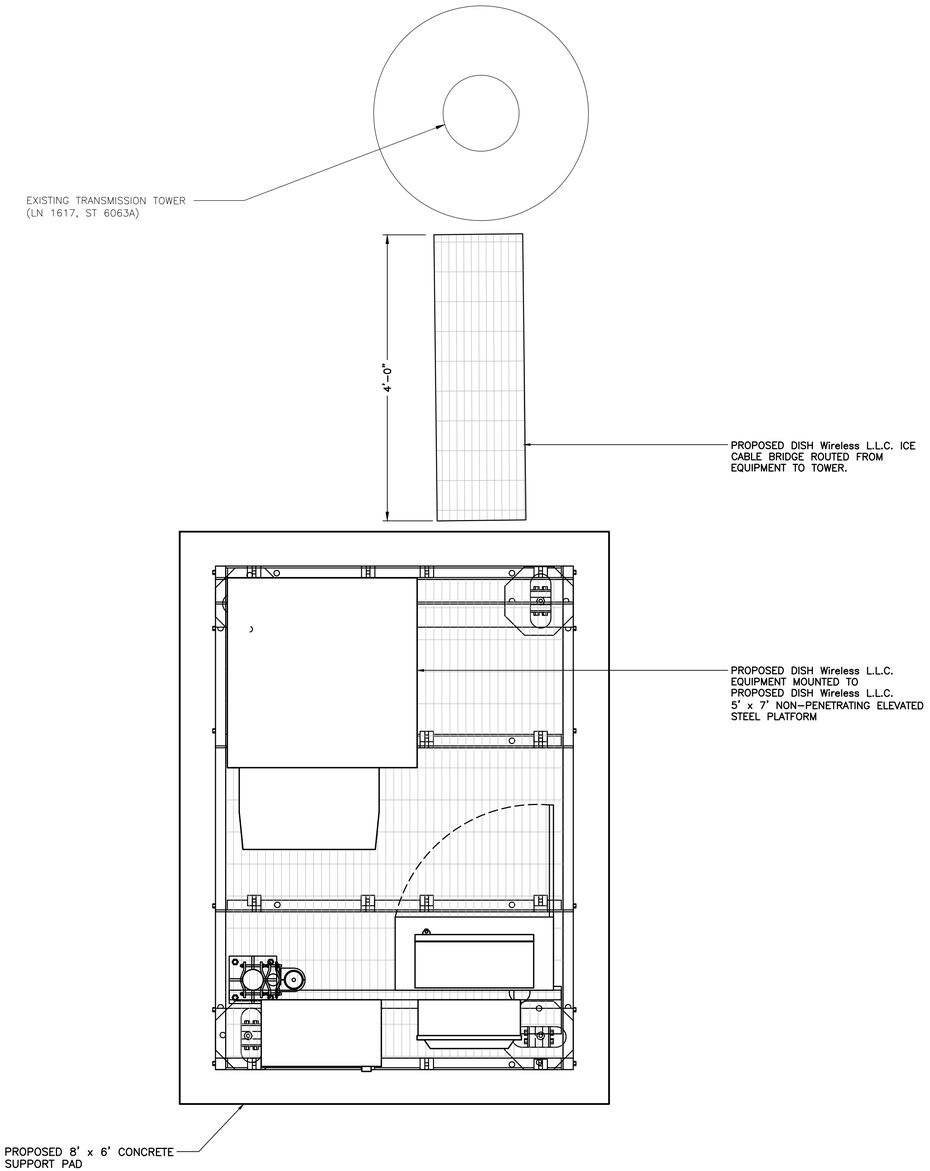
CENTEK PROJECT NUMBER
23009.10

DISH Wireless L.L.C.
PROJECT INFORMATION

BOBOS00935A
69 OIL MILL RD
WATERFORD, CT 06385

SHEET TITLE
ELEVATION, ANT. LAYOUT AND SCHEDULE

SHEET NUMBER
C-2

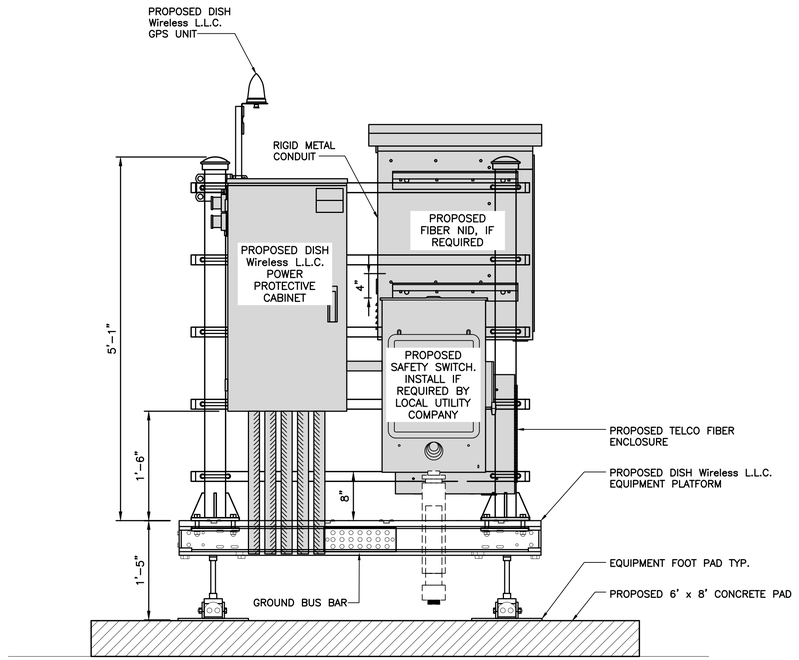


PROPOSED EQUIPMENT PLAN

12" 6" 0 1' 2' 3' 4' 5' 6' 7'
3/8"=1'-0"

1

NOTE:
CONSULT WITH DISH CM FOR CABINETS, H-FRAME POSTS AND UNISTRUT PLACEMENTS.



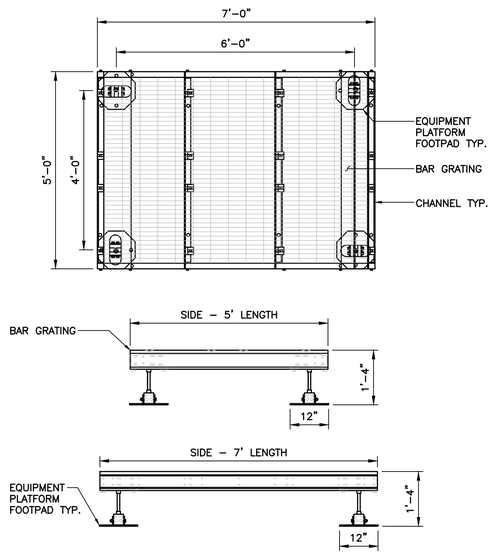
EQUIPMENT ELEVATION

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"



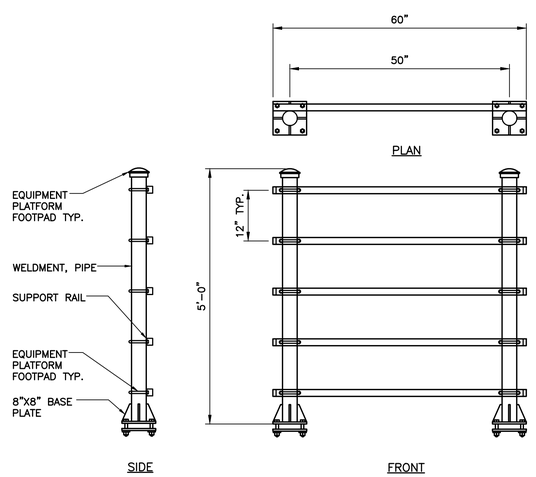
PLATFORM DETAIL

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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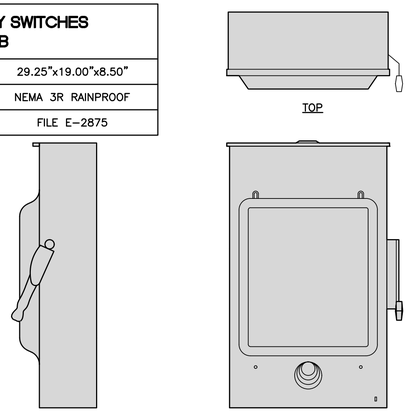
WATERFORD, CT 06385

SHEET TITLE
EQUIPMENT PLATFORM AND H-FRAME DETAILS

SHEET NUMBER
C-3

SQUARE D SAFETY SWITCHES D224NRB

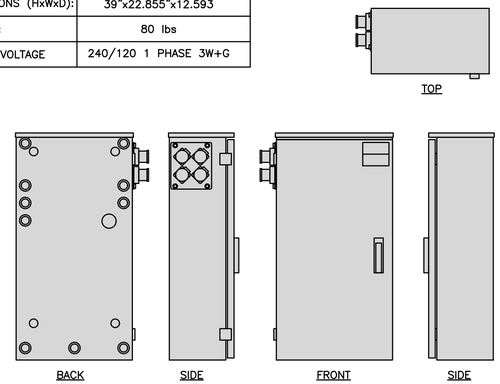
ENCLOSURE DIM (HxWxD)	29.25"x19.00"x8.50"
ENCLOSURE TYPE	NEMA 3R RAINPROOF
UL LISTED	FILE E-2875



SAFETY SWITCH DETAIL | NO SCALE | 1

RAYCAP PPC RDIAC-2465-P-240-MTS

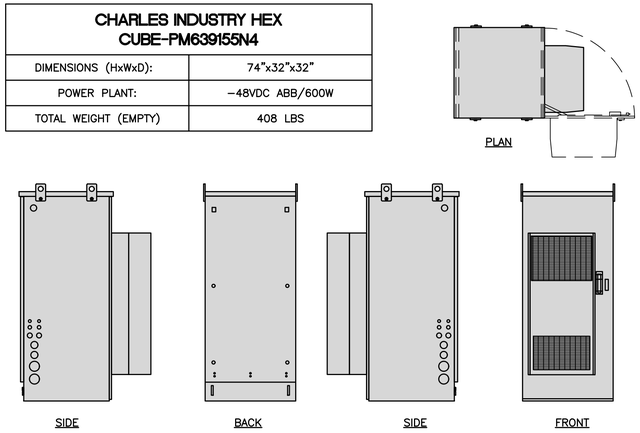
ENCLOSURE DIMENSIONS (HxWxD):	39"x22.855"x12.593
WEIGHT:	80 lbs
OPERATING AC VOLTAGE	240/120 1 PHASE 3W+G



POWER PROTECTIVE CABINET DETAIL | NO SCALE | 2

CHARLES INDUSTRY HEX CUBE-PM639155N4

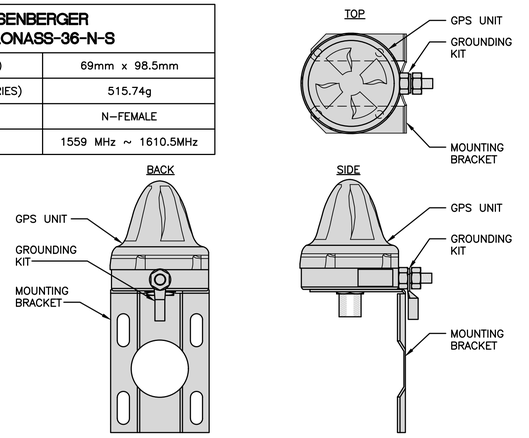
DIMENSIONS (HxWxD):	74"x32"x32"
POWER PLANT:	-48VDC ABB/600W
TOTAL WEIGHT (EMPTY)	408 LBS



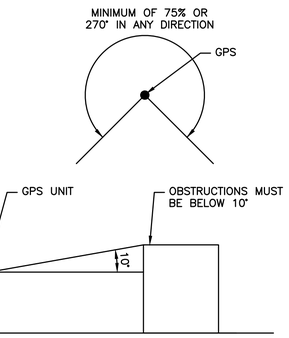
CABINET DETAIL | NO SCALE | 3

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



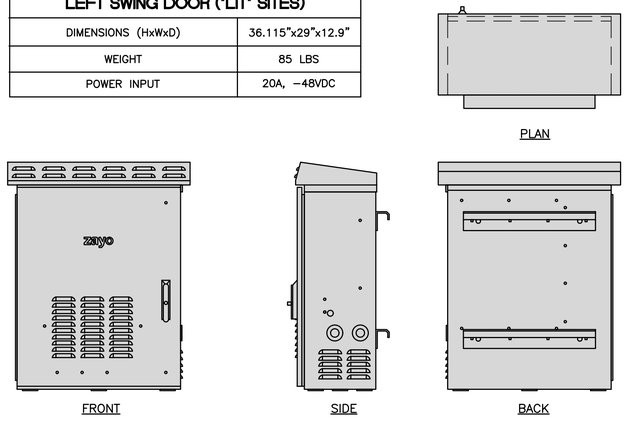
GPS DETAIL | NO SCALE | 4



GPS MINIMUM SKY VIEW REQUIREMENTS | NO SCALE | 5

ZAYO 5RU CABINET LEFT SWING DOOR ("LIT" SITES)

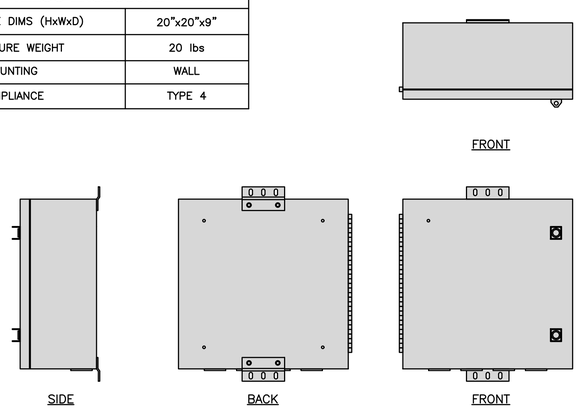
DIMENSIONS (HxWxD)	36.115"x29"x12.9"
WEIGHT	85 LBS
POWER INPUT	20A, -48VDC



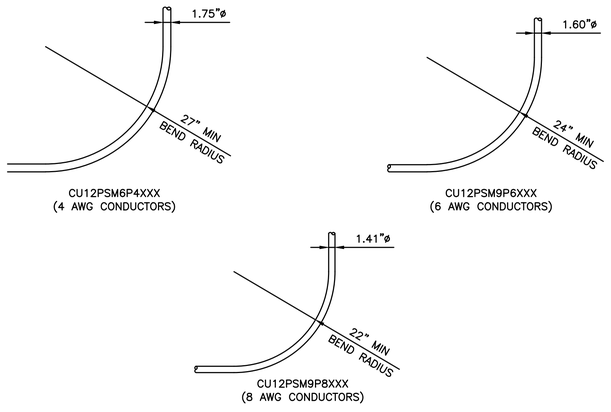
FIBER NID ENCLOSURE DETAIL | NO SCALE | 6

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

NOT USED | NO SCALE | 9

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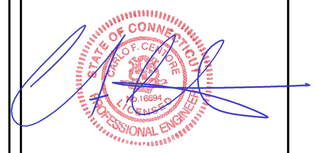

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BSP	TJR	

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23009.10

DISH Wireless L.L.C.
PROJECT INFORMATION

BOBOS00935A
69 OIL MILL RD
WATERFORD, CT 06385

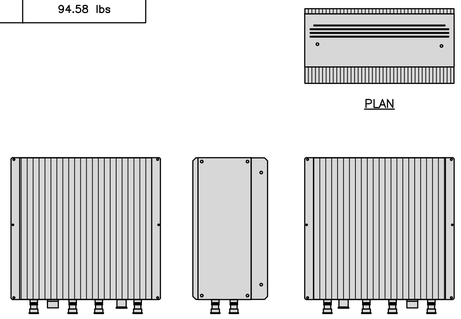
SHEET TITLE
TYPICAL EQUIPMENT DETAILS

SHEET NUMBER
C-4

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

NOTE:

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

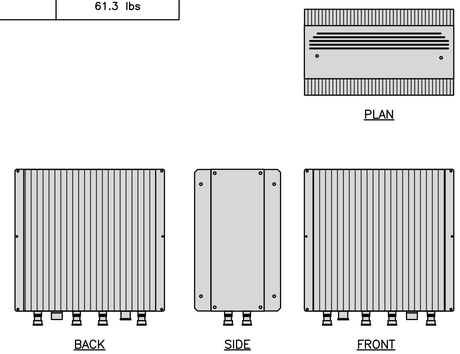


RRH DETAIL | NO SCALE | 1

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

NOTE:

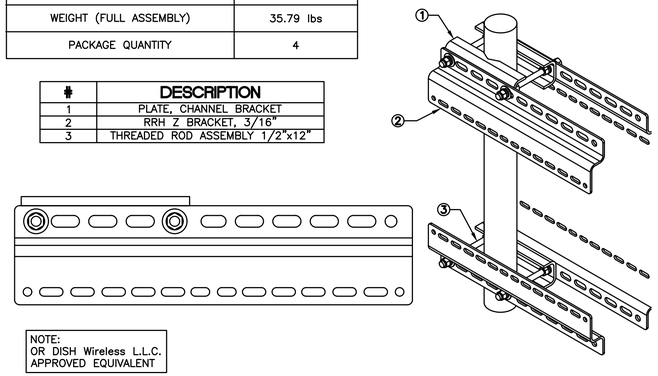
ALL VISIBLE RRH'S SHALL BE WRAPPED IN CONCEALFAB MMW VINYL FILM WRAP (PART #900864-99 OR APPROVED EQUAL



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

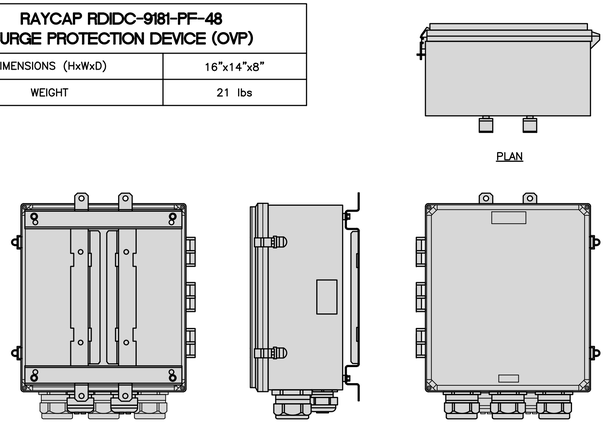
#	DESCRIPTION
1	PLATE, CHANNEL BRACKET
2	RRH Z BRACKET, 3/16"
3	THREADED ROD ASSEMBLY 1/2"x12"



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

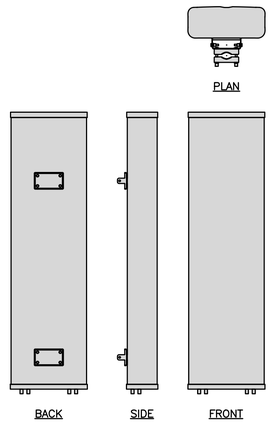


SURGE PROTECTION DEVICE DETAIL (OVP) | NO SCALE | 4

COMMSCOPE FFVV-65B-R2	
DIMENSIONS (HxWxD)	72"x19.6"x7.8"
WEIGHT	70.5 lbs
WEIGHT WITH BRACKETS	84.169 lbs

NOTE:

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



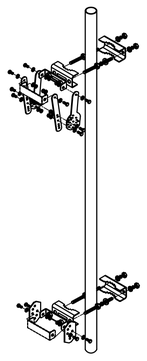
ANTENNA DETAIL | NO SCALE | 5

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

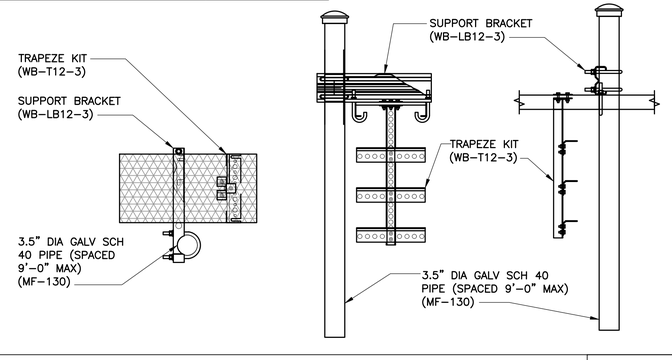
NOTE:
OR DISH Wireless L.L.C. APPROVED EQUIVALENT



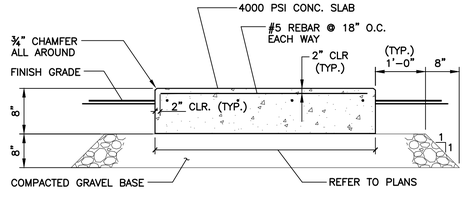
ANTENNA BRACKET DETAIL | NO SCALE | 6

COMMSCOPE: WB-K110-B WAVEGUIDE BRIDGE KIT	
DIMENSIONS (HxL)	160"x10'
WEIGHT/VOLUME	325 lbs
CABLE RUN (QTY)	12

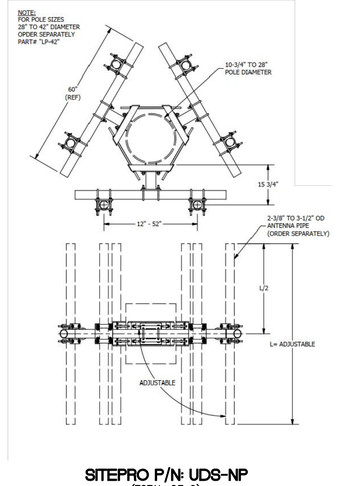
INCLUDED PRODUCTS:	WB-T12-3 TRAPEZE KIT, 3 RUNGS
	WB-LB12-3 SUPPORT BRACKET
	MF-130 DIRECT BURIAL PIPE COLUMN, 13'-4"



ICE-BRIDGE DETAIL | NO SCALE | 7



CONCRETE PAD DETAIL | NO SCALE | 8



SITEPRO P/N: UDS-NP
(TOTAL OF 2)

ANTENNA FRAME DETAIL | NO SCALE | 9

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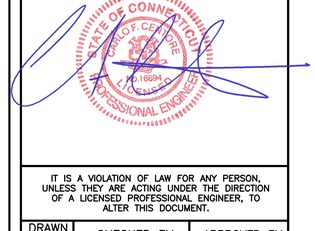

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69 OIL MILL RD
WATERFORD, CT 06385

SHEET TITLE
TYPICAL EQUIPMENT DETAILS

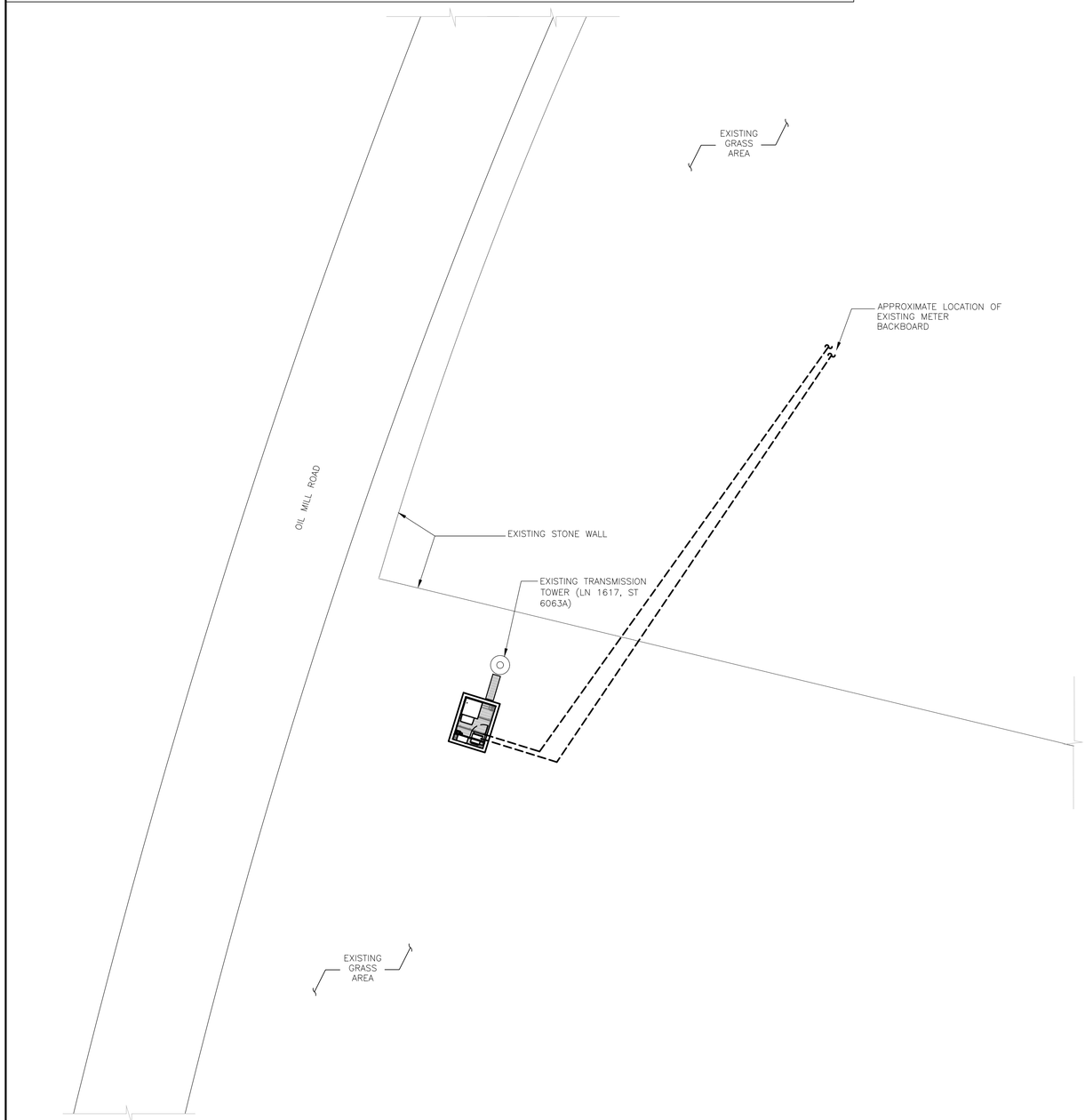
SHEET NUMBER
C-5

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 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.
4. KEEP UTILITY ALIGNMENTS UNTIL FIBER AND POWER DESIGNS ARE COMPLETED, THEN VERIFY AND MODIFY AS NECESSARY.
5. EMBED FBR, PWER AND GND IN RESPECTIVE UTILITY LINES/CONDUITS.

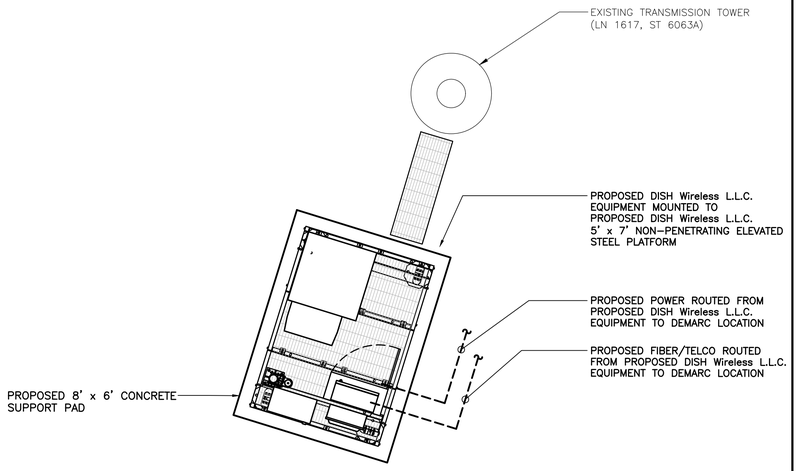
NOTE

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



SITE PLAN | 10' 0 10' 20' (1"=10') | 1

AERIAL VIEW PLAN | NO SCALE | 2



PROPOSED EQUIPMENT PLAN | 4' 2' 0 4' 8' (1/4"=1'–0") | 3

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DRAWN BY:	CHECKED BY:	APPROVED BY:
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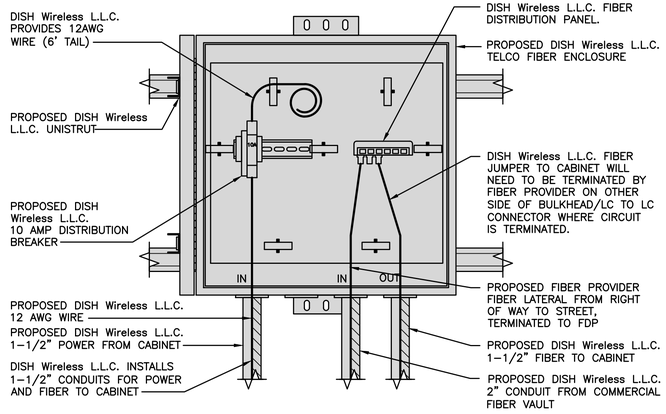
SHEET TITLE
ELECTRICAL AND FIBER ROUTING PLAN WITH NOTES

SHEET NUMBER
E-1

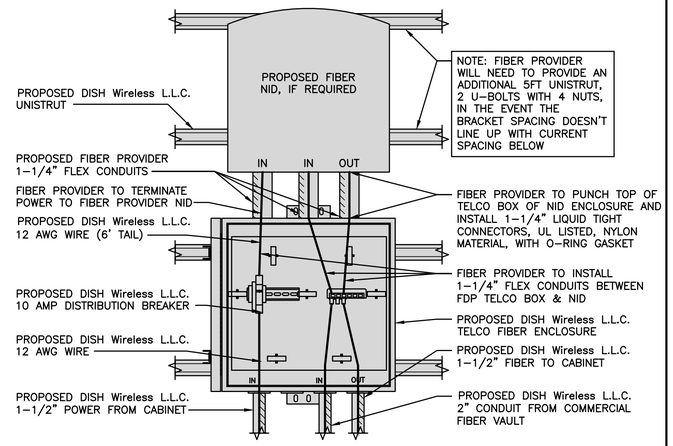
DC POWER WIRING SHALL BE COLOR CODED AT EACH END FOR IDENTIFYING +24V AND −48V CONDUCTORS. RED MARKINGS SHALL IDENTIFY +24V AND BLUE MARKINGS SHALL IDENTIFY −48V.

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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BSP	TJR	

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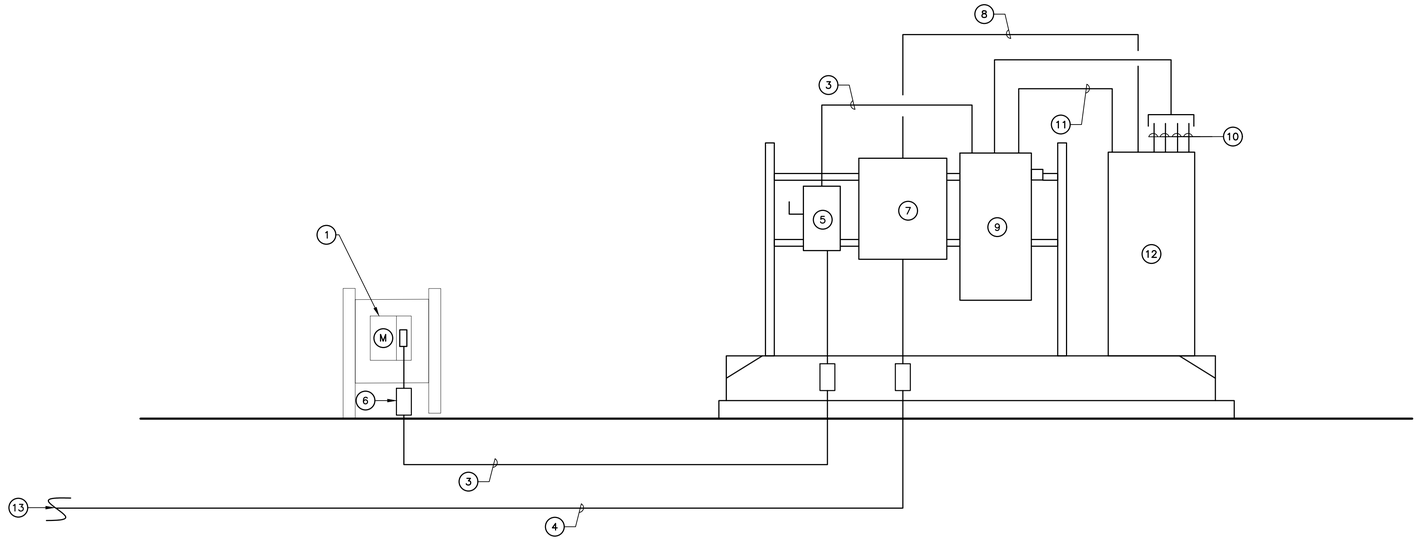
CENTEK PROJECT NUMBER
23009.10

DISH Wireless L.L.C.
PROJECT INFORMATION

BOBOS00935A
69 OIL MILL RD
WATERFORD, CT 06385

SHEET TITLE
TELCO CABINET DETAILS

SHEET NUMBER
E-2



RISER NOTES

1. EXISTING 200A, METER SOCKET TO REMAIN. INSTALL NEW 200A, SINGLE PHASE, 240V RATED UTILITY METER WITH 200A/2P CIRCUIT BREAKER IN AVAILABLE POSITION. ALL EQUIPMENT TO BE UTILITY APPROVED.
2. EXISTING EQUIPMENT TO REMAIN.
3. (3) 3/0 AWG, (1) #6 AWG GROUND, 2" CONDUIT.
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, 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. ROUTED TO EXISTING FIBER DEMARC. CONTRACTOR TO 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:

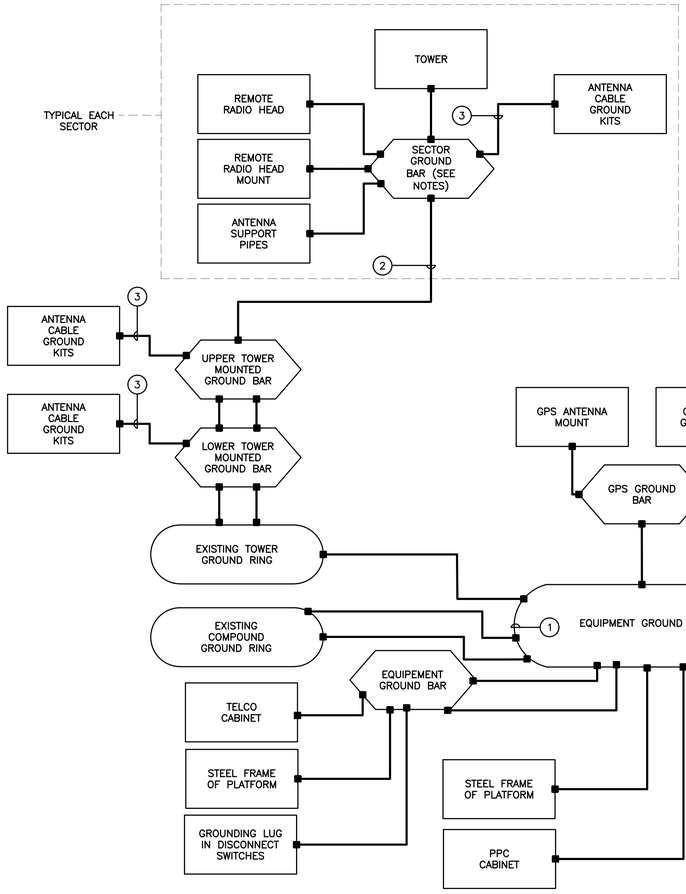
A) PPC SHALL BE 200A, 120/240V, SINGLE PHASE, 3W, 65 KAIC, 200A MCB, 24 POSITION, NEMA 3R ENCLOSURE, LAMINATED ENGRAVED BAKELITE NAMEPLATE, COPPER EQUIPMENT GROUND KIT, INSULATED COPPER SOLID NEUTRAL BAR.

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

DIRECTORY	WIRE & CONDUIT	WATTS LOAD L1	WATTS LOAD L2	CKT.	AMPS	L1 Y L2 Y	AMPS	CKT.	WATTS LOAD L1	WATTS LOAD 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. ALL SECTOR GROUND BARS SHALL BE BONDED TOGETHER WITH #2 AWG SOLID TINNED BCW.
4. BOND ALL EQUIPMENT CABINETS AND BATTERY CABINETS TO GROUND PER MANUFACTURER'S SPECIFICATIONS.
5. ALL BONDS TO TOWER SHALL BE MADE IN STRICT ACCORDANCE WITH SPECIFICATIONS OF TOWER MANUFACTURER OR STRUCTURAL ENGINEER.
6. REFER TO GROUNDING PLAN FOR LOCATION OF GROUNDING DEVICES.
7. REFER TO ALL ELECTRICAL AND GROUNDING DETAILS.
8. COORDINATE ALL TOWER MOUNTED EQUIPMENT WITH OWNER.
9. ALL TOWER MOUNTED AMPLIFIERS AND ASSOCIATED EQUIPMENT SHALL BE BONDED TO THE SECTOR GROUND BAR PER MANUFACTURER'S SPECIFICATIONS.
10. ALL GROUNDING SHALL BE IN ACCORDANCE WITH NEC AND OWNER'S REQUIREMENTS.
11. COORDINATE WITH TOWER OWNER BEFORE INSTALLING ANY GROUNDING ELEMENTS ON TOWER OR BONDING TO EXISTING TOWER GROUND RING.

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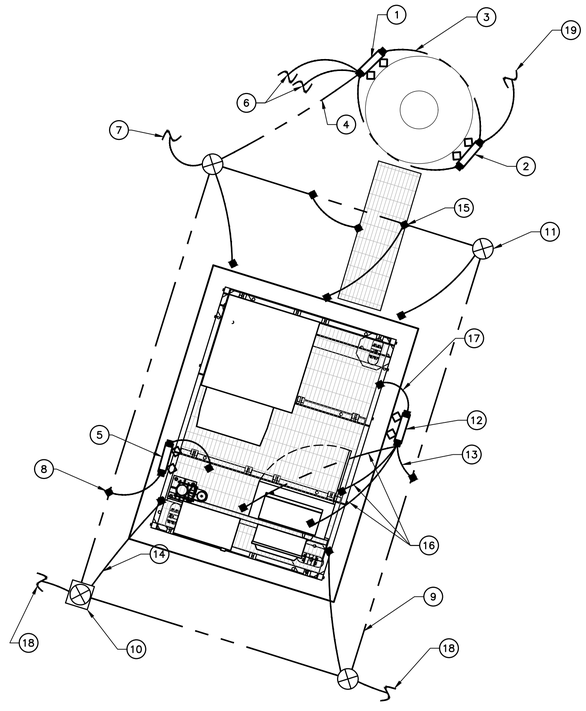
23009.10

DISH Wireless L.L.C.
PROJECT INFORMATION

BOBOS00935A
69 OIL MILL RD
WATERFORD, CT 06385

SHEET TITLE
ELECTRICAL RISER, PANEL SCHEDULE, AND SCHEMATIC

SHEET NUMBER
E-3

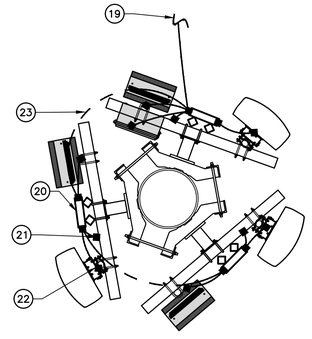


COMPOUND GROUNDING PLAN | NO SCALE | 1

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 BAR TO GROUND ROD.
5. GPS GROUND BAR.
6. CONNECT LOWER TOWER MOUNTED GROUND BAR TO EXISTING TOWER GROUND RING TYP. 2 LEADS.
7. BOND EQUIPMENT GROUND RING TO TOWER GROUND RING.
8. BOND GPS GROUND BAR TO EQUIPMENT 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 PLATFORM TO GROUNDING RING (TYP. EACH CORNER OF GROUND RING).
15. BOND EQUIPMENT CABINETS TO GROUND BAR 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. CONNECT EQUIPMENT GROUND RING TO EXISTING COMPOUND GROUND RING. CONTRACTOR TO VERIFY LOCATION COMPOUND GROUND RING IN FIELD.
19. CONNECT UPPER TOWER MOUNTED GROUND BAR TO SECTOR GROUND BAR TYP.
20. SECTOR GROUND BAR TYP.
21. BOND SECTOR GROUND BAR TO TOWER. (TYP)
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.

GROUNDING PLAN NOTES | NO SCALE | 2



ANTENNA GROUNDING PLAN | NO SCALE | 3

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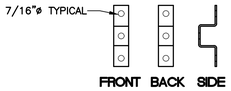
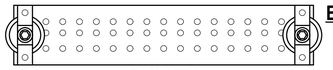
PROJECT INFORMATION

BOBOS00935A
69 OIL MILL RD
WATERFORD, CT 06385

SHEET TITLE
COMPOUND/ANTENNA GROUNDING PLAN AND NOTES

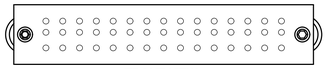
SHEET NUMBER
G-1





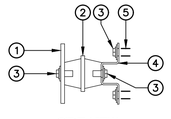
BRACKET FOR GROUND BAR-DIMENSIONS

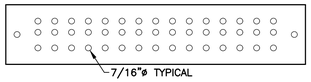
SCALE: 1/8"= 1'-0"



TYPICAL GROUND BAR ASSEMBLY

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





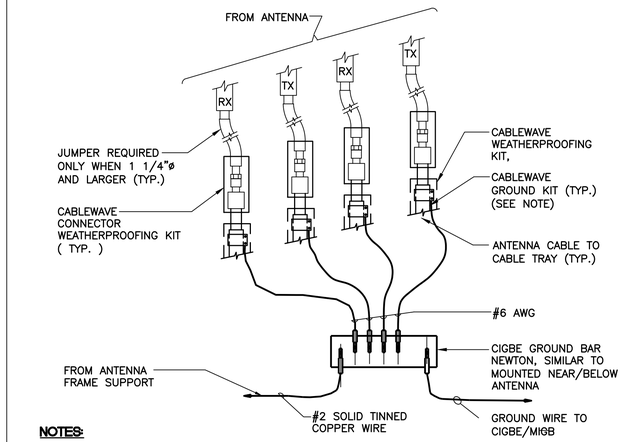
TYPICAL GROUND BAR - DIMENSIONS

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.

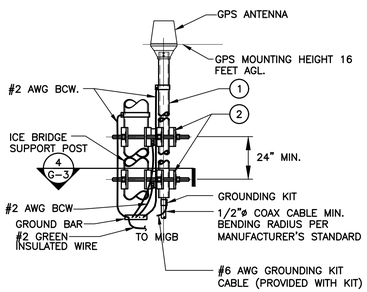
MASTER/EQUIPMENT GROUND BAR DETAIL | NO SCALE | 1



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

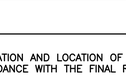


GPS ANTENNA MOUNTING BRACKET

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

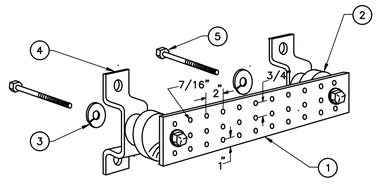


4 / G-3 SECTION NOT TO SCALE

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.

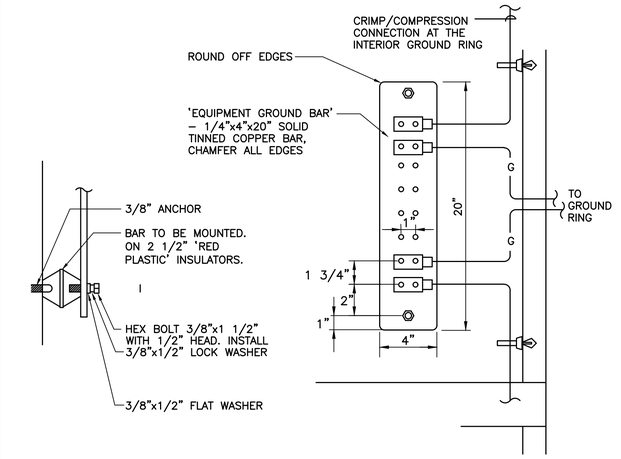
GPS GROUNDING/MOUNTING BRACKET DETAIL | NO SCALE | 4



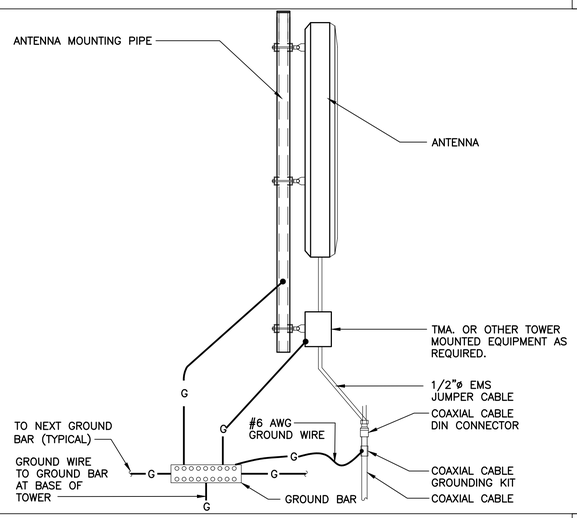
NOTES

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.

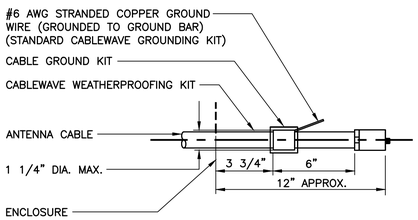
GROUND BAR DETAIL | NO SCALE | 5



EQUIPMENT GROUND BAR DETAIL | NO SCALE | 6



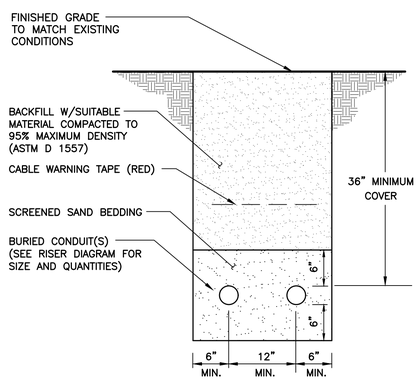
TYPICAL ANTENNA GROUNDING DETAIL | NO SCALE | 7



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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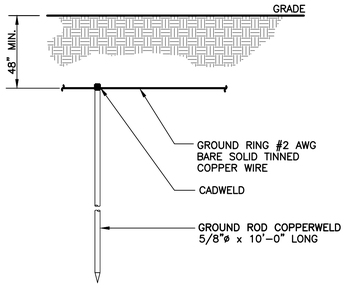
WATERFORD, CT 06385

SHEET TITLE
TYPICAL GROUNDING DETAILS

SHEET NUMBER
G-2

NOTES:

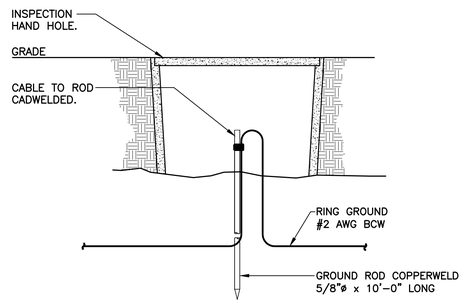
1. USE GROUND PLATE DETAIL IF 10 FT. GROUND ROD DEPTH CANNOT BE ACHIEVED DUE TO LEDGE CONDITION OR IF EXISTING TOWER FOUNDATION IS ENCOUNTERED.



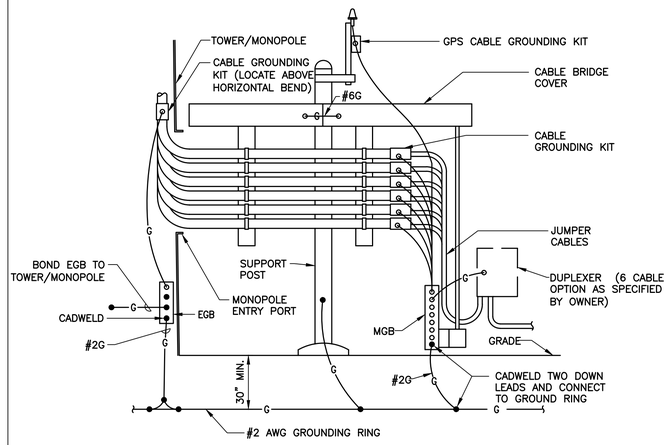
GROUND ROD DETAIL | NO SCALE | 1

NOTES:

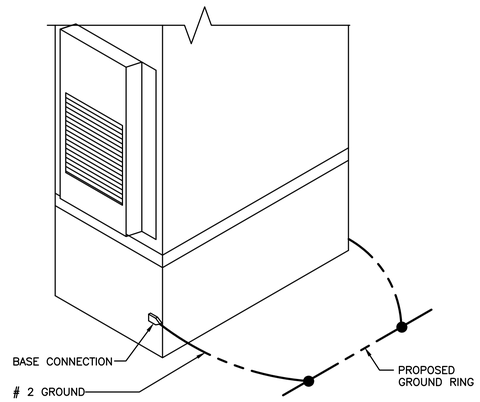
1. INSPECTION HAND HOLE MAY BE CONCRETE OR PVC AND SHALL BE A MINIMUM OF 12" DIA x 18" DEEP.



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

dish wireless.

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DRAWN BY:	CHECKED BY:	APPROVED BY:
BSP	TJR	

RFDS REV #: 0 – 10/04/2023

CONSTRUCTION DOCUMENTS

SUBMITTALS

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A	11/15/23	ISSUED FOR CLIENT REVIEW
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1	05/09/24	ISSUED FOR CONSTRUCTION
2	05/17/24	REVISED PER CLIENT COMMENTS

CENTEK PROJECT NUMBER
23009.10

DISH Wireless L.L.C.
PROJECT INFORMATION

BOBOS00935A
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WATERFORD, CT 06385

SHEET TITLE
TYPICAL GROUNDING DETAILS

SHEET NUMBER
G-3

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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CENTEK PROJECT NUMBER
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DISH Wireless L.L.C.
PROJECT INFORMATION

BOBOS00935A
69 OIL MILL RD
WATERFORD, CT 06385

SHEET TITLE
ELECTRICAL SPECIFICATIONS

SHEET NUMBER
G-4

CENTEK 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 DESIGN SPEED: 105 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.

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BSP	TJR	

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CENTEK PROJECT NUMBER
23009.10

DISH Wireless L.L.C.
PROJECT INFORMATION

BOBOS00935A
69 OIL MILL RD
WATERFORD, CT 06385

SHEET TITLE
CENTEK NOTES AND SPECIFICATIONS

SHEET NUMBER
GN-1

LEGEND

EXOTHERMIC CONNECTION

MECHANICAL CONNECTION

BUSS BAR INSULATOR

CHEMICAL ELECTROLYTIC GROUNDING SYSTEM

TEST CHEMICAL ELECTROLYTIC GROUNDING SYSTEM

EXOTHERMIC WITH INSPECTION SLEEVE

GROUNDING BAR

GROUND ROD

TEST GROUND ROD WITH INSPECTION SLEEVE

SINGLE POLE SWITCH

DUPLEX RECEPTACLE

DUPLEX GFCI RECEPTACLE

FLUORESCENT LIGHTING FIXTURE (2) TWO LAMPS 48–T8

SMOKE DETECTION (DC)

EMERGENCY LIGHTING (DC)

SECURITY LIGHT W/PHOTOCELL LITHONIA ALXW
LED–1–25A400/51K–SR4–120–PE–DDBTXD

CHAIN LINK FENCE

WOOD/WROUGHT IRON FENCE

WALL STRUCTURE

LEASE AREA

PROPERTY LINE (PL)

SETBACKS

ICE BRIDGE

CABLE TRAY

WATER LINE

UNDERGROUND POWER

UNDERGROUND TELCO

OVERHEAD POWER

OVERHEAD TELCO

UNDERGROUND TELCO/POWER

ABOVE GROUND POWER

ABOVE GROUND TELCO

ABOVE GROUND TELCO/POWER

WORKPOINT

SECTION REFERENCE

DETAIL REFERENCE

ABBREVIATIONS

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

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DRAWN BY:	CHECKED BY:	APPROVED BY:
BSP	TJR	

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CONSTRUCTION DOCUMENTS

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CENTEK PROJECT NUMBER
23009.10

DISH Wireless L.L.C.
PROJECT INFORMATION

BOBOS00935A
69 OIL MILL RD
WATERFORD, CT 06385

SHEET TITLE
LEGEND AND ABBREVIATIONS

SHEET NUMBER
GN-1.1

SIGN TYPES

TYPE	COLOR	COLOR CODE PURPOSE
INFORMATION	GREEN	**"INFORMATIONAL SIGN"** TO NOTIFY OTHERS OF SITE OWNERSHIP & CONTACT NUMBER AND POTENTIAL RF EXPOSURE.
NOTICE	BLUE	**"NOTICE BEYOND THIS POINT"** RF FIELDS BEYOND THIS POINT MAY EXCEED THE FCC GENERAL PUBLIC EXPOSURE LIMIT. OBEY ALL POSTED SIGNS AND SITE GUIDELINES FOR WORKING IN RF ENVIRONMENTS. IN ACCORDANCE WITH FEDERAL COMMUNICATIONS COMMISSION RULES ON RADIO FREQUENCY EMISSIONS 47 CFR–1.1307(b)
CAUTION	YELLOW	**"CAUTION BEYOND THIS POINT"** RF FIELDS BEYOND THIS POINT MAY EXCEED THE FCC GENERAL PUBLIC EXPOSURE LIMIT. OBEY ALL POSTED SIGNS AND SITE GUIDELINES FOR WORKING IN RF ENVIRONMENTS. IN ACCORDANCE WITH FEDERAL COMMUNICATIONS COMMISSION RULES ON RADIO FREQUENCY EMISSIONS 47 CFR–1.1307(b)
WARNING	ORANGE/RED	**"WARNING BEYOND THIS POINT"** RF FIELDS AT THIS SITE EXCEED FCC RULES FOR HUMAN EXPOSURE. FAILURE TO OBEY ALL POSTED SIGNS AND SITE GUIDELINES FOR WORKING IN RF ENVIRONMENTS COULD RESULT IN SERIOUS INJURY. IN ACCORDANCE WITH FEDERAL COMMUNICATIONS COMMISSION RULES ON RADIO FREQUENCY EMISSIONS 47 CFR–1.1307(b)

SIGN PLACEMENT:

- RF SIGNAGE PLACEMENT SHALL FOLLOW THE RECOMMENDATIONS OF AN EXISTING EME REPORT, CREATED BY A THIRD PARTY PREVIOUSLY AUTHORIZED BY DISH Wireless L.L.C.
- INFORMATION SIGN (GREEN) SHALL BE LOCATED ON EXISTING DISH Wireless L.L.C EQUIPMENT.
  A) IF THE INFORMATION SIGN IS A STICKER, IT SHALL BE PLACED ON EXISTING DISH Wireless L.L.C EQUIPMENT CABINET.
  B) IF THE INFORMATION SIGH IS A METAL SIGN IT SHALL BE PLACED ON EXISTING DISH Wireless L.L.C H–FRAME WITH A SECURE ATTACH METHOD.
- IF EME REPORT IS NOT AVAILABLE AT THE TIME OF CREATION OF CONSTRUCTION DOCUMENTS; PLEASE CONTACT DISH Wireless L.L.C. CONSTRUCTION MANAGER FOR FURTHER INSTRUCTION ON HOW TO PROCEED.

NOTES:

1. FOR DISH Wireless L.L.C. LOGO, SEE DISH Wireless L.L.C. DESIGN SPECIFICATIONS (PROVIDED BY DISH Wireless L.L.C.)
2. SITE ID SHALL BE APPLIED TO SIGNS USING "LASER ENGRAVING" OR ANY OTHER WEATHER RESISTANT METHOD (DISH Wireless L.L.C. APPROVAL REQUIRED)
3. TEXT FOR SIGNAGE SHALL INDICATE CORRECT SITE NAME AND NUMBER AS PER DISH Wireless L.L.C. CONSTRUCTION MANAGER RECOMMENDATIONS.
4. CABINET/SHELTER MOUNTING APPLICATION REQUIRES ANOTHER PLATE APPLIED TO THE FACE OF THE CABINET WITH WATER PROOF POLYURETHANE ADHESIVE
5. ALL SIGNS WILL BE SECURED WITH EITHER STAINLESS STEEL ZIP TIES OR STAINLESS STEEL TECH SCREWS
6. ALL SIGNS TO BE 8.5"x11" AND MADE WITH 0.04" OF ALUMINUM MATERIAL

INFORMATION

This is an access point to an area with transmitting antennas.

Obey all signs and barriers beyond this point.
Call the DISH Wireless L.L.C. NOC at 1-866-624-6874

Site ID: _____

THIS SIGN IS FOR REFERENCE PURPOSES ONLY

NOTICE

Transmitting Antenna(s)

Radio frequency fields beyond this point MAY *EXCEED* the FCC Occupational exposure limit.

Obey all posted signs and site guidelines for working in radio frequency environments.

Call the DISH Wireless L.L.C. NOC at 1-866-624-6874 prior to working beyond this point.

Site ID: _____

dish

THIS SIGN IS FOR REFERENCE PURPOSES ONLY

⚠ CAUTION

Transmitting Antenna(s)

Radio frequency fields beyond this point MAY *EXCEED* the FCC Occupational exposure limit.

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dish

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dish

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RF SIGNAGE

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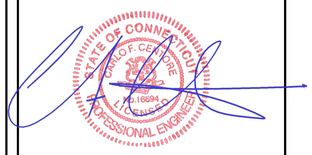

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DISH Wireless L.L.C.
PROJECT INFORMATION

BOBOS00935A
69 OIL MILL RD
WATERFORD, CT 06385

SHEET TITLE
DISH RF SIGNAGE

SHEET NUMBER
GN-1.2

SITE ACTIVITY REQUIREMENTS:

1. NOTICE TO PROCEED – NO WORK SHALL COMMENCE PRIOR TO CONTRACTOR RECEIVING A WRITTEN NOTICE TO PROCEED (NTP) AND THE ISSUANCE OF A PURCHASE ORDER. PRIOR TO ACCESSING/ENTERING THE SITE YOU MUST CONTACT THE DISH Wireless L.L.C. AND TOWER OWNER NOC & THE DISH Wireless L.L.C. AND TOWER OWNER CONSTRUCTION MANAGER.
2. "LOOK UP" – DISH Wireless L.L.C. AND TOWER OWNER SAFETY CLIMB REQUIREMENT:

   THE INTEGRITY OF THE SAFETY CLIMB AND ALL COMPONENTS OF THE CLIMBING FACILITY SHALL BE CONSIDERED DURING ALL STAGES OF DESIGN, INSTALLATION, AND INSPECTION. TOWER MODIFICATION, MOUNT REINFORCEMENTS, AND/OR EQUIPMENT INSTALLATIONS SHALL NOT COMPROMISE THE INTEGRITY OR FUNCTIONAL USE OF THE SAFETY CLIMB OR ANY COMPONENTS OF THE CLIMBING FACILITY ON THE STRUCTURE. THIS SHALL INCLUDE, BUT NOT BE LIMITED TO: PINCHING OF THE WIRE ROPE, BENDING OF THE WIRE ROPE FROM ITS SUPPORTS, DIRECT CONTACT OR CLOSE PROXIMITY TO THE WIRE ROPE WHICH MAY CAUSE FRICTIONAL WEAR, IMPACT TO THE ANCHORAGE POINTS IN ANY WAY, OR TO IMPEDE/BLOCK ITS INTENDED USE. ANY COMPROMISED SAFETY CLIMB, INCLUDING EXISTING CONDITIONS MUST BE TAGGED OUT AND REPORTED TO YOUR DISH Wireless L.L.C. AND DISH Wireless L.L.C. AND TOWER OWNER POC OR CALL THE NOC TO GENERATE A SAFETY CLIMB MAINTENANCE AND CONTRACTOR NOTICE TICKET.
3. PRIOR TO THE START OF CONSTRUCTION, ALL REQUIRED JURISDICTIONAL PERMITS SHALL BE OBTAINED. THIS INCLUDES, BUT IS NOT LIMITED TO, BUILDING, ELECTRICAL, MECHANICAL, FIRE, FLOOD ZONE, ENVIRONMENTAL, AND ZONING. AFTER ONSITE ACTIVITIES AND CONSTRUCTION ARE COMPLETED, ALL REQUIRED PERMITS SHALL BE SATISFIED AND CLOSED OUT ACCORDING TO LOCAL JURISDICTIONAL REQUIREMENTS.
4. ALL CONSTRUCTION MEANS AND METHODS; INCLUDING BUT NOT LIMITED TO, ERECTION PLANS, RIGGING PLANS, CLIMBING PLANS, AND RESCUE PLANS SHALL BE THE RESPONSIBILITY OF THE GENERAL CONTRACTOR RESPONSIBLE FOR THE EXECUTION OF THE WORK CONTAINED HEREIN, AND SHALL MEET ANSI/ASSE A10.48 (LATEST EDITION); FEDERAL, STATE, AND LOCAL REGULATIONS; AND ANY APPLICABLE INDUSTRY CONSENSUS STANDARDS RELATED TO THE CONSTRUCTION ACTIVITIES BEING PERFORMED. ALL RIGGING PLANS SHALL ADHERE TO ANSI/ASSE A10.48 (LATEST EDITION) AND DISH Wireless L.L.C. AND TOWER OWNER STANDARDS, INCLUDING THE REQUIRED INVOLVEMENT OF A QUALIFIED ENGINEER FOR CLASS IV CONSTRUCTION, TO CERTIFY THE SUPPORTING STRUCTURE(S) IN ACCORDANCE WITH ANSI/TIA–322 (LATEST EDITION).
5. ALL SITE WORK TO COMPLY WITH DISH Wireless L.L.C. AND TOWER OWNER INSTALLATION STANDARDS FOR CONSTRUCTION ACTIVITIES ON DISH Wireless L.L.C. AND TOWER OWNER TOWER SITE AND LATEST VERSION OF ANSI/TIA–1019–A–2012 "STANDARD FOR INSTALLATION, ALTERATION, AND MAINTENANCE OF ANTENNA SUPPORTING STRUCTURES AND ANTENNAS."
6. IF THE SPECIFIED EQUIPMENT CAN NOT BE INSTALLED AS SHOWN ON THESE DRAWINGS, THE CONTRACTOR SHALL PROPOSE AN ALTERNATIVE INSTALLATION FOR APPROVAL BY DISH Wireless L.L.C. AND TOWER OWNER PRIOR TO PROCEEDING WITH ANY SUCH CHANGE OF INSTALLATION.
7. ALL MATERIALS FURNISHED AND INSTALLED SHALL BE IN STRICT ACCORDANCE WITH ALL APPLICABLE CODES, REGULATIONS AND ORDINANCES. CONTRACTOR SHALL ISSUE ALL APPROPRIATE NOTICES AND COMPLY WITH ALL LAWS, ORDINANCES, RULES, REGULATIONS AND LAWFUL ORDERS OF ANY PUBLIC AUTHORITY REGARDING THE PERFORMANCE OF THE WORK. ALL WORK CARRIED OUT SHALL COMPLY WITH ALL APPLICABLE MUNICIPAL AND UTILITY COMPANY SPECIFICATIONS AND LOCAL JURISDICTIONAL CODES, ORDINANCES AND APPLICABLE REGULATIONS.
8. THE CONTRACTOR SHALL INSTALL ALL EQUIPMENT AND MATERIALS IN ACCORDANCE WITH MANUFACTURER'S RECOMMENDATIONS UNLESS SPECIFICALLY STATED OTHERWISE.
9. THE CONTRACTOR SHALL CONTACT UTILITY LOCATING SERVICES INCLUDING PRIVATE LOCATES SERVICES PRIOR TO THE START OF CONSTRUCTION.
10. ALL EXISTING ACTIVE SEWER, WATER, GAS, ELECTRIC AND OTHER UTILITIES WHERE ENCOUNTERED IN THE WORK, SHALL BE PROTECTED AT ALL TIMES AND WHERE REQUIRED FOR THE PROPER EXECUTION OF THE WORK, SHALL BE RELOCATED AS DIRECTED BY CONTRACTOR. EXTREME CAUTION SHOULD BE USED BY THE CONTRACTOR WHEN EXCAVATING OR DRILLING PIERS AROUND OR NEAR UTILITIES. CONTRACTOR SHALL PROVIDE SAFETY TRAINING FOR THE WORKING CREW. THIS WILL INCLUDE BUT NOT BE LIMITED TO A) FALL PROTECTION B) CONFINED SPACE C) ELECTRICAL SAFETY D) TRENCHING AND EXCAVATION E) CONSTRUCTION SAFETY PROCEDURES.
11. ALL SITE WORK SHALL BE AS INDICATED ON THE STAMPED CONSTRUCTION DRAWINGS AND DISH PROJECT SPECIFICATIONS, LATEST APPROVED REVISION.
12. CONTRACTOR SHALL KEEP THE SITE FREE FROM ACCUMULATING WASTE MATERIAL, DEBRIS, AND TRASH AT THE COMPLETION OF THE WORK. IF NECESSARY, RUBBISH, STUMPS, DEBRIS, STICKS, STONES AND OTHER REFUSE SHALL BE REMOVED FROM THE SITE AND DISPOSED OF LEGALLY.
13. ALL EXISTING INACTIVE SEWER, WATER, GAS, ELECTRIC AND OTHER UTILITIES, WHICH INTERFERE WITH THE EXECUTION OF THE WORK, SHALL BE REMOVED AND/OR CAPPED, PLUGGED OR OTHERWISE DISCONTINUED AT POINTS WHICH WILL NOT INTERFERE WITH THE EXECUTION OF THE WORK, SUBJECT TO THE APPROVAL OF DISH Wireless L.L.C. AND TOWER OWNER, AND/OR LOCAL UTILITIES.
14. THE CONTRACTOR SHALL PROVIDE SITE SIGNAGE IN ACCORDANCE WITH THE TECHNICAL SPECIFICATION FOR SITE SIGNAGE REQUIRED BY LOCAL JURISDICTION AND SIGNAGE REQUIRED ON INDIVIDUAL PIECES OF EQUIPMENT, ROOMS, AND SHELTERS.
15. THE SITE SHALL BE GRADED TO CAUSE SURFACE WATER TO FLOW AWAY FROM THE CARRIER'S EQUIPMENT AND TOWER AREAS.
16. THE SUB GRADE SHALL BE COMPACTED AND BROUGHT TO A SMOOTH UNIFORM GRADE PRIOR TO FINISHED SURFACE APPLICATION.
17. THE AREAS OF THE OWNERS PROPERTY DISTURBED BY THE WORK AND NOT COVERED BY THE TOWER, EQUIPMENT OR DRIVEWAY, SHALL BE GRADED TO A UNIFORM SLOPE, AND STABILIZED TO PREVENT EROSION AS SPECIFIED ON THE CONSTRUCTION DRAWINGS AND/OR PROJECT SPECIFICATIONS.
18. CONTRACTOR SHALL MINIMIZE DISTURBANCE TO EXISTING SITE DURING CONSTRUCTION. EROSION CONTROL MEASURES, IF REQUIRED DURING CONSTRUCTION, SHALL BE IN CONFORMANCE WITH THE LOCAL GUIDELINES FOR EROSION AND SEDIMENT CONTROL.
19. THE CONTRACTOR SHALL PROTECT EXISTING IMPROVEMENTS, PAVEMENTS, CURBS, LANDSCAPING AND STRUCTURES. ANY DAMAGED PART SHALL BE REPAIRED AT CONTRACTOR'S EXPENSE TO THE SATISFACTION OF OWNER.
20. CONTRACTOR SHALL LEGALLY AND PROPERLY DISPOSE OF ALL SCRAP MATERIALS SUCH AS COAXIAL CABLES AND OTHER ITEMS REMOVED FROM THE EXISTING FACILITY. ANTENNAS AND RADIOS REMOVED SHALL BE RETURNED TO THE OWNER'S DESIGNATED LOCATION.
21. CONTRACTOR SHALL LEAVE PREMISES IN CLEAN CONDITION. TRASH AND DEBRIS SHOULD BE REMOVED FROM SITE ON A DAILY BASIS.
22. NO FILL OR EMBANKMENT MATERIAL SHALL BE PLACED ON FROZEN GROUND. FROZEN MATERIALS, SNOW OR ICE SHALL NOT BE PLACED IN ANY FILL OR EMBANKMENT.

GENERAL NOTES:

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

   CONTRACTOR:GENERAL CONTRACTOR RESPONSIBLE FOR CONSTRUCTION

   CARRIER:DISH Wireless L.L.C.

   TOWER OWNER:TOWER OWNER
2. THESE DRAWINGS HAVE BEEN PREPARED USING STANDARDS OF PROFESSIONAL CARE AND COMPLETENESS NORMALLY EXERCISED UNDER SIMILAR CIRCUMSTANCES BY REPUTABLE ENGINEERS IN THIS OR SIMILAR LOCALITIES. IT IS ASSUMED THAT THE WORK DEPICTED WILL BE PERFORMED BY AN EXPERIENCED CONTRACTOR AND/OR WORKPEOPLE WHO HAVE A WORKING KNOWLEDGE OF THE APPLICABLE CODE STANDARDS AND REQUIREMENTS AND OF INDUSTRY ACCEPTED STANDARD GOOD PRACTICE. AS NOT EVERY CONDITION OR ELEMENT IS (OR CAN BE) EXPLICITLY SHOWN ON THESE DRAWINGS, THE CONTRACTOR SHALL USE INDUSTRY ACCEPTED STANDARD GOOD PRACTICE FOR MISCELLANEOUS WORK NOT EXPLICITLY SHOWN.
3. THESE DRAWINGS REPRESENT THE FINISHED STRUCTURE. THEY DO NOT INDICATE THE MEANS OR METHODS OF CONSTRUCTION. THE CONTRACTOR SHALL BE SOLELY RESPONSIBLE FOR THE CONSTRUCTION MEANS, METHODS, TECHNIQUES, SEQUENCES, AND PROCEDURES. THE CONTRACTOR SHALL PROVIDE ALL MEASURES NECESSARY FOR PROTECTION OF LIFE AND PROPERTY DURING CONSTRUCTION. SUCH MEASURES SHALL INCLUDE, BUT NOT BE LIMITED TO, BRACING, FORMWORK, SHORING, ETC. SITE VISITS BY THE ENGINEER OR HIS REPRESENTATIVE WILL NOT INCLUDE INSPECTION OF THESE ITEMS AND IS FOR STRUCTURAL OBSERVATION OF THE FINISHED STRUCTURE ONLY.
4. NOTES AND DETAILS IN THE CONSTRUCTION DRAWINGS SHALL TAKE PRECEDENCE OVER GENERAL NOTES AND TYPICAL DETAILS. WHERE NO DETAILS ARE SHOWN, CONSTRUCTION SHALL CONFORM TO SIMILAR WORK ON THE PROJECT, AND/OR AS PROVIDED FOR IN THE CONTRACT DOCUMENTS. WHERE DISCREPANCIES OCCUR BETWEEN PLANS, DETAILS, GENERAL NOTES, AND SPECIFICATIONS, THE GREATER, MORE STRICT REQUIREMENTS, SHALL GOVERN. IF FURTHER CLARIFICATION IS REQUIRED CONTACT THE ENGINEER OF RECORD.
5. SUBSTANTIAL EFFORT HAS BEEN MADE TO PROVIDE ACCURATE DIMENSIONS AND MEASUREMENTS ON THE DRAWINGS TO ASSIST IN THE FABRICATION AND/OR PLACEMENT OF CONSTRUCTION ELEMENTS BUT IT IS THE SOLE RESPONSIBILITY OF THE CONTRACTOR TO FIELD VERIFY THE DIMENSIONS, MEASUREMENTS, AND/OR CLEARANCES SHOWN IN THE CONSTRUCTION DRAWINGS PRIOR TO FABRICATION OR CUTTING OF ANY NEW OR EXISTING CONSTRUCTION ELEMENTS. IF IT IS DETERMINED THAT THERE ARE DISCREPANCIES AND/OR CONFLICTS WITH THE CONSTRUCTION DRAWINGS THE ENGINEER OF RECORD IS TO BE NOTIFIED AS SOON AS POSSIBLE.
6. PRIOR TO THE SUBMISSION OF BIDS, THE BIDDING CONTRACTOR SHALL VISIT THE CELL SITE TO FAMILIARIZE WITH THE EXISTING CONDITIONS AND TO CONFIRM THAT THE WORK CAN BE ACCOMPLISHED AS SHOWN ON THE CONSTRUCTION DRAWINGS. ANY DISCREPANCY FOUND SHALL BE BROUGHT TO THE ATTENTION OF CARRIER POC AND TOWER OWNER.
7. ALL MATERIALS FURNISHED AND INSTALLED SHALL BE IN STRICT ACCORDANCE WITH ALL APPLICABLE CODES, REGULATIONS AND ORDINANCES. CONTRACTOR SHALL ISSUE ALL APPROPRIATE NOTICES AND COMPLY WITH ALL LAWS, ORDINANCES, RULES, REGULATIONS AND LAWFUL ORDERS OF ANY PUBLIC AUTHORITY REGARDING THE PERFORMANCE OF THE WORK. ALL WORK CARRIED OUT SHALL COMPLY WITH ALL APPLICABLE MUNICIPAL AND UTILITY COMPANY SPECIFICATIONS AND LOCAL JURISDICTIONAL CODES, ORDINANCES AND APPLICABLE REGULATIONS.
8. UNLESS NOTED OTHERWISE, THE WORK SHALL INCLUDE FURNISHING MATERIALS, EQUIPMENT, APPURTENANCES AND LABOR NECESSARY TO COMPLETE ALL INSTALLATIONS AS INDICATED ON THE DRAWINGS.
9. THE CONTRACTOR SHALL INSTALL ALL EQUIPMENT AND MATERIALS IN ACCORDANCE WITH MANUFACTURER'S RECOMMENDATIONS UNLESS SPECIFICALLY STATED OTHERWISE.
10. IF THE SPECIFIED EQUIPMENT CAN NOT BE INSTALLED AS SHOWN ON THESE DRAWINGS, THE CONTRACTOR SHALL PROPOSE AN ALTERNATIVE INSTALLATION FOR APPROVAL BY THE CARRIER AND TOWER OWNER PRIOR TO PROCEEDING WITH ANY SUCH CHANGE OF INSTALLATION.
11. CONTRACTOR IS TO PERFORM A SITE INVESTIGATION, BEFORE SUBMITTING BIDS, TO DETERMINE THE BEST ROUTING OF ALL CONDUITS FOR POWER, AND TELCO AND FOR GROUNDING CABLES AS SHOWN IN THE POWER, TELCO, AND GROUNDING PLAN DRAWINGS.
12. THE CONTRACTOR SHALL PROTECT EXISTING IMPROVEMENTS, PAVEMENTS, CURBS, LANDSCAPING AND STRUCTURES. ANY DAMAGED PART SHALL BE REPAIRED AT CONTRACTOR'S EXPENSE TO THE SATISFACTION OF DISH Wireless L.L.C. AND TOWER OWNER
13. CONTRACTOR SHALL LEGALLY AND PROPERLY DISPOSE OF ALL SCRAP MATERIALS SUCH AS COAXIAL CABLES AND OTHER ITEMS REMOVED FROM THE EXISTING FACILITY. ANTENNAS REMOVED SHALL BE RETURNED TO THE OWNER'S DESIGNATED LOCATION.
14. CONTRACTOR SHALL LEAVE PREMISES IN CLEAN CONDITION. TRASH AND DEBRIS SHOULD BE REMOVED FROM SITE ON A DAILY BASIS.

dish wireless.

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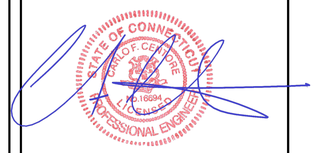

DRAWN BY:	CHECKED BY:	APPROVED BY:
BSP	TJR	

RFDS REV #: 0 – 10/04/2023

CONSTRUCTION DOCUMENTS

SUBMITTALS

REV	DATE	DESCRIPTION
A	11/15/23	ISSUED FOR CLIENT REVIEW
0	03/28/24	ISSUED FOR CONSTRUCTION
1	05/09/24	ISSUED FOR CONSTRUCTION
2	05/17/24	REVISED PER CLIENT COMMENTS

CENTEK PROJECT NUMBER
23009.10

DISH Wireless L.L.C.
PROJECT INFORMATION

BOBOS00935A
69 OIL MILL RD
WATERFORD, CT 06385

SHEET TITLE
DISH GENERAL NOTES

SHEET NUMBER
GN-1.3

CONCRETE, FOUNDATIONS, AND REINFORCING STEEL:

1. ALL CONCRETE WORK SHALL BE IN ACCORDANCE WITH THE ACI 301, ACI 318, ACI 336, ASTM A184, ASTM A185 AND THE DESIGN AND CONSTRUCTION SPECIFICATION FOR CAST–IN–PLACE CONCRETE.
2. UNLESS NOTED OTHERWISE, SOIL BEARING PRESSURE USED FOR DESIGN OF SLABS AND FOUNDATIONS IS ASSUMED TO BE 1000 psf.
3. ALL CONCRETE SHALL HAVE A MINIMUM COMPRESSIVE STRENGTH (f'c) OF 3000 psi AT 28 DAYS, UNLESS NOTED OTHERWISE. NO MORE THAN 90 MINUTES SHALL ELAPSE FROM BATCH TIME TO TIME OF PLACEMENT UNLESS APPROVED BY THE ENGINEER OF RECORD. TEMPERATURE OF CONCRETE SHALL NOT EXCEED 90°f AT TIME OF PLACEMENT.
4. CONCRETE EXPOSED TO FREEZE–THAW CYCLES SHALL CONTAIN AIR ENTRAINING ADMIXTURES. AMOUNT OF AIR ENTRAINMENT TO BE BASED ON SIZE OF AGGREGATE AND F3 CLASS EXPOSURE (VERY SEVERE). CEMENT USED TO BE TYPE II PORTLAND CEMENT WITH A MAXIMUM WATER–TO–CEMENT RATIO (W/C) OF 0.45.
5. ALL STEEL REINFORCING SHALL CONFORM TO ASTM A615. ALL WELDED WIRE FABRIC (WWF) SHALL CONFORM TO ASTM A185. ALL SPLICES SHALL BE CLASS "B" TENSION SPLICES, UNLESS NOTED OTHERWISE. ALL HOOKS SHALL BE STANDARD 90 DEGREE HOOKS, UNLESS NOTED OTHERWISE. YIELD STRENGTH (Fy) OF STANDARD DEFORMED BARS ARE AS FOLLOWS:

   #4 BARS AND SMALLER 40 ksi

   #5 BARS AND LARGER 60 ksi
6. THE FOLLOWING MINIMUM CONCRETE COVER SHALL BE PROVIDED FOR REINFORCING STEEL UNLESS SHOWN OTHERWISE ON DRAWINGS:
   - CONCRETE CAST AGAINST AND PERMANENTLY EXPOSED TO EARTH 3"
   - CONCRETE EXPOSED TO EARTH OR WEATHER:
   - #6 BARS AND LARGER 2"
   - #5 BARS AND SMALLER 1–1/2"
   - CONCRETE NOT EXPOSED TO EARTH OR WEATHER:
   - SLAB AND WALLS 3/4"
   - BEAMS AND COLUMNS 1–1/2"
7. A TOOLED EDGE OR A 3/4" CHAMFER SHALL BE PROVIDED AT ALL EXPOSED EDGES OF CONCRETE, UNLESS NOTED OTHERWISE, IN ACCORDANCE WITH ACI 301 SECTION 4.2.4.

ELECTRICAL INSTALLATION NOTES:

1. ALL ELECTRICAL WORK SHALL BE PERFORMED IN ACCORDANCE WITH THE PROJECT SPECIFICATIONS, NEC AND ALL APPLICABLE FEDERAL, STATE, AND LOCAL CODES/ORDINANCES.
2. CONDUIT ROUTINGS ARE SCHEMATIC. CONTRACTOR SHALL INSTALL CONDUITS SO THAT ACCESS TO EQUIPMENT IS NOT BLOCKED AND TRIP HAZARDS ARE ELIMINATED.
3. WIRING, RACEWAY AND SUPPORT METHODS AND MATERIALS SHALL COMPLY WITH THE REQUIREMENTS OF THE NEC.
4. ALL CIRCUITS SHALL BE SEGREGATED AND MAINTAIN MINIMUM CABLE SEPARATION AS REQUIRED BY THE NEC.

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

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

5. EACH END OF EVERY POWER PHASE CONDUCTOR, GROUNDING CONDUCTOR, AND TELCO CONDUCTOR OR CABLE SHALL BE LABELED WITH COLOR–CODED INSULATION OR ELECTRICAL TAPE (3M BRAND, 1/2" PLASTIC ELECTRICAL TAPE WITH UV PROTECTION, OR EQUAL). THE IDENTIFICATION METHOD SHALL CONFORM WITH NEC AND OSHA.
6. ALL ELECTRICAL COMPONENTS SHALL BE CLEARLY LABELED WITH LAMICOID TAGS SHOWING THEIR RATED VOLTAGE, PHASE CONFIGURATION, WIRE CONFIGURATION, POWER OR AMPACITY RATING AND BRANCH CIRCUIT ID NUMBERS (i.e. PANEL BOARD AND CIRCUIT ID'S).
7. PANEL BOARDS (ID NUMBERS) SHALL BE CLEARLY LABELED WITH PLASTIC LABELS.
8. TIE WRAPS ARE NOT ALLOWED.
9. ALL POWER AND EQUIPMENT GROUND WIRING IN TUBING OR CONDUIT SHALL BE SINGLE COPPER CONDUCTOR (#14 OR LARGER) WITH TYPE THHW, THWN, THWN–2, XHHW, XHHW–2, THW, THW–2, RHW, OR RHW–2 INSULATION UNLESS OTHERWISE SPECIFIED.
10. SUPPLEMENTAL EQUIPMENT GROUND WIRING LOCATED INDOORS SHALL BE SINGLE COPPER CONDUCTOR (#6 OR LARGER) WITH TYPE THHW, THWN, THWN–2, XHHW, XHHW–2, THW, THW–2, RHW, OR RHW–2 INSULATION UNLESS OTHERWISE SPECIFIED.
11. POWER AND CONTROL WIRING IN FLEXIBLE CORD SHALL BE MULTI–CONDUCTOR, TYPE SOOW CORD (#14 OR LARGER) UNLESS OTHERWISE SPECIFIED.
12. POWER AND CONTROL WIRING FOR USE IN CABLE TRAY SHALL BE MULTI–CONDUCTOR, TYPE TC CABLE (#14 OR LARGER), WITH TYPE THHW, THWN, THWN–2, XHHW, XHHW–2, THW, THW–2, RHW, OR RHW–2 INSULATION UNLESS OTHERWISE SPECIFIED.
13. ALL POWER AND GROUNDING CONNECTIONS SHALL BE CRIMP–STYLE, COMPRESSION WIRE LUGS AND WIRE NUTS BY THOMAS AND BETTS (OR EQUAL). LUGS AND WIRE NUTS SHALL BE RATED FOR OPERATION NOT LESS THAN 75° C (90° C IF AVAILABLE).
14. RACEWAY AND CABLE TRAY SHALL BE LISTED OR LABELED FOR ELECTRICAL USE IN ACCORDANCE WITH NEMA, UL, ANSI/IEEE AND NEC.
15. ELECTRICAL METALLIC TUBING (EMT), INTERMEDIATE METAL CONDUIT (IMC), OR RIGID METAL CONDUIT (RMC) SHALL BE USED FOR EXPOSED INDOOR LOCATIONS.
16. ELECTRICAL METALLIC TUBING (EMT) OR METAL–CLAD CABLE (MC) SHALL BE USED FOR CONCEALED INDOOR LOCATIONS.
17. SCHEDULE 40 PVC UNDERGROUND ON STRAIGHTS AND SCHEDULE 80 PVC FOR ALL ELBOWS/90s AND ALL APPROVED ABOVE GRADE PVC CONDUIT.
18. LIQUID–TIGHT FLEXIBLE METALLIC CONDUIT (LIQUID–TITE FLEX) SHALL BE USED INDOORS AND OUTDOORS, WHERE VIBRATION OCCURS OR FLEXIBILITY IS NEEDED.
19. CONDUIT AND TUBING FITTINGS SHALL BE THREADED OR COMPRESSION–TYPE AND APPROVED FOR THE LOCATION USED. SET SCREW FITTINGS ARE NOT ACCEPTABLE.
20. CABINETS, BOXES AND WIRE WAYS SHALL BE LABELED FOR ELECTRICAL USE IN ACCORDANCE WITH NEMA, UL, ANSI/IEEE AND THE NEC.
21. WIREWAYS SHALL BE METAL WITH AN ENAMEL FINISH AND INCLUDE A HINGED COVER, DESIGNED TO SWING OPEN DOWNWARDS (WIREMOLD SPECMATE WIREWAY).
22. SLOTTED WIRING DUCT SHALL BE PVC AND INCLUDE COVER (PANDUIT TYPE E OR EQUAL).
23. CONDUITS SHALL BE FASTENED SECURELY IN PLACE WITH APPROVED NON–PERFORATED STRAPS AND HANGERS. EXPLOSIVE DEVICES (i.e. POWDER–ACTUATED) FOR ATTACHING HANGERS TO STRUCTURE WILL NOT BE PERMITTED. CLOSELY FOLLOW THE LINES OF THE STRUCTURE, MAINTAIN CLOSE PROXIMITY TO THE STRUCTURE AND KEEP CONDUITS IN TIGHT ENVELOPES. CHANGES IN DIRECTION TO ROUTE AROUND OBSTACLES SHALL BE MADE WITH CONDUIT OUTLET BODIES. CONDUIT SHALL BE INSTALLED IN A NEAT AND WORKMANLIKE MANNER. PARALLEL AND PERPENDICULAR TO STRUCTURE WALL AND CEILING LINES. ALL CONDUIT SHALL BE FISHED TO CLEAR OBSTRUCTIONS. ENDS OF CONDUITS SHALL BE TEMPORARILY CAPPED FLUSH TO FINISH GRADE TO PREVENT CONCRETE, PLASTER OR DIRT FROM ENTERING. CONDUITS SHALL BE RIGIDLY CLAMPED TO BOXES BY GALVANIZED MALLEABLE IRON BUSHING ON INSIDE AND GALVANIZED MALLEABLE IRON LOCKNUT ON OUTSIDE AND INSIDE.
24. EQUIPMENT CABINETS, TERMINAL BOXES, JUNCTION BOXES AND PULL BOXES SHALL BE GALVANIZED OR EPOXY–COATED SHEET STEEL. SHALL MEET OR EXCEED UL 50 AND BE RATED NEMA 1 (OR BETTER) FOR INTERIOR LOCATIONS AND NEMA 3 (OR BETTER) FOR EXTERIOR LOCATIONS.
25. METAL RECEPTACLE, SWITCH AND DEVICE BOXES SHALL BE GALVANIZED, EPOXY–COATED OR NON–CORRODING; SHALL MEET OR EXCEED UL 514A AND NEMA OS 1 AND BE RATED NEMA 1 (OR BETTER) FOR INTERIOR LOCATIONS AND WEATHER PROTECTED (WP OR BETTER) FOR EXTERIOR LOCATIONS.
26. NONMETALLIC RECEPTACLE, SWITCH AND DEVICE BOXES SHALL MEET OR EXCEED NEMA OS 2 (NEWEST REVISION) AND BE RATED NEMA 1 (OR BETTER) FOR INTERIOR LOCATIONS AND WEATHER PROTECTED (WP OR BETTER) FOR EXTERIOR LOCATIONS.
27. THE CONTRACTOR SHALL NOTIFY AND OBTAIN NECESSARY AUTHORIZATION FROM THE CARRIER AND/OR DISH Wireless L.L.C. AND TOWER OWNER BEFORE COMMENCING WORK ON THE AC POWER DISTRIBUTION PANELS.
28. THE CONTRACTOR SHALL PROVIDE NECESSARY TAGGING ON THE BREAKERS, CABLES AND DISTRIBUTION PANELS IN ACCORDANCE WITH THE APPLICABLE CODES AND STANDARDS TO SAFEGUARD LIFE AND PROPERTY.
29. INSTALL LAMICOID LABEL ON THE METER CENTER TO SHOW "DISH Wireless L.L.C.".
30. ALL EMPTY/SPARE CONDUITS THAT ARE INSTALLED ARE TO HAVE A METERED MULE TAPE PULL CORD INSTALLED.

dish wireless.
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CONSTRUCTION DOCUMENTS

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CENTEK PROJECT NUMBER
23009.10

DISH Wireless L.L.C.
PROJECT INFORMATION

BOBOS00935A
69 OIL MILL RD
WATERFORD, CT 06385

SHEET TITLE
DISH GENERAL NOTES

SHEET NUMBER
GN-1.4

GROUNDING NOTES:

1. ALL GROUND ELECTRODE SYSTEMS (INCLUDING TELECOMMUNICATION, RADIO, LIGHTNING PROTECTION AND AC POWER GES'S) SHALL BE BONDED TOGETHER AT OR BELOW GRADE, BY TWO OR MORE COPPER BONDING CONDUCTORS IN ACCORDANCE WITH THE NEC.
2. THE CONTRACTOR SHALL PERFORM IEEE FALL-OF-POTENTIAL RESISTANCE TO EARTH TESTING (PER IEEE 1100 AND 81) FOR GROUND ELECTRODE SYSTEMS, THE CONTRACTOR SHALL FURNISH AND INSTALL SUPPLEMENTAL GROUND ELECTRODES AS NEEDED TO ACHIEVE A TEST RESULT OF 5 OHMS OR LESS.
3. THE CONTRACTOR IS RESPONSIBLE FOR PROPERLY SEQUENCING GROUNDING AND UNDERGROUND CONDUIT INSTALLATION AS TO PREVENT ANY LOSS OF CONTINUITY IN THE GROUNDING SYSTEM OR DAMAGE TO THE CONDUIT AND PROVIDE TESTING RESULTS.
4. METAL CONDUIT AND TRAY SHALL BE GROUNDED AND MADE ELECTRICALLY CONTINUOUS WITH LISTED BONDING FITTINGS OR BY BONDING ACROSS THE DISCONTINUITY WITH #6 COPPER WIRE UL APPROVED GROUNDING TYPE CONDUIT CLAMPS.
5. METAL RACEWAY SHALL NOT BE USED AS THE NEC REQUIRED EQUIPMENT GROUND CONDUCTOR. STRANDED COPPER CONDUCTORS WITH GREEN INSULATION, SIZED IN ACCORDANCE WITH THE NEC, SHALL BE FURNISHED AND INSTALLED WITH THE POWER CIRCUITS TO BTS EQUIPMENT.
6. EACH CABINET FRAME SHALL BE DIRECTLY CONNECTED TO THE MASTER GROUND BAR WITH GREEN INSULATED SUPPLEMENTAL EQUIPMENT GROUND WIRES, #6 STRANDED COPPER OR LARGER FOR INDOOR BTS; #2 BARE SOLID TINNED COPPER FOR OUTDOOR BTS.
7. CONNECTIONS TO THE GROUND BUS SHALL NOT BE DOUBLED UP OR STACKED BACK TO BACK CONNECTIONS ON OPPOSITE SIDE OF THE GROUND BUS ARE PERMITTED.
8. ALL EXTERIOR GROUND CONDUCTORS BETWEEN EQUIPMENT/GROUND BARS AND THE GROUND RING SHALL BE #2 SOLID TINNED COPPER UNLESS OTHERWISE INDICATED.
9. ALUMINUM CONDUCTOR OR COPPER CLAD STEEL CONDUCTOR SHALL NOT BE USED FOR GROUNDING CONNECTIONS.
10. USE OF 90° BENDS IN THE PROTECTION GROUNDING CONDUCTORS SHALL BE AVOIDED WHEN 45° BENDS CAN BE ADEQUATELY SUPPORTED.
11. EXOTHERMIC WELDS SHALL BE USED FOR ALL GROUNDING CONNECTIONS BELOW GRADE.
12. ALL GROUND CONNECTIONS ABOVE GRADE (INTERIOR AND EXTERIOR) SHALL BE FORMED USING HIGH PRESS CRIMPS.
13. COMPRESSION GROUND CONNECTIONS MAY BE REPLACED BY EXOTHERMIC WELD CONNECTIONS.
14. ICE BRIDGE BONDING CONDUCTORS SHALL BE EXOTHERMICALLY BONDED OR BOLTED TO THE BRIDGE AND THE TOWER GROUND BAR.
15. APPROVED ANTIOXIDANT COATINGS (i.e. CONDUCTIVE GEL OR PASTE) SHALL BE USED ON ALL COMPRESSION AND BOLTED GROUND CONNECTIONS.
16. ALL EXTERIOR GROUND CONNECTIONS SHALL BE COATED WITH A CORROSION RESISTANT MATERIAL.
17. MISCELLANEOUS ELECTRICAL AND NON-ELECTRICAL METAL BOXES, FRAMES AND SUPPORTS SHALL BE BONDED TO THE GROUND RING, IN ACCORDANCE WITH THE NEC.
18. BOND ALL METALLIC OBJECTS WITHIN 6 ft OF MAIN GROUND RING WITH (1) #2 BARE SOLID TINNED COPPER GROUND CONDUCTOR.
19. GROUND CONDUCTORS USED FOR THE FACILITY GROUNDING AND LIGHTNING PROTECTION SYSTEMS SHALL NOT BE ROUTED THROUGH METALLIC OBJECTS THAT FORM A RING AROUND THE CONDUCTOR, SUCH AS METALLIC CONDUITS, METAL SUPPORT CLIPS OR SLEEVES THROUGH WALLS OR FLOORS. WHEN IT IS REQUIRED TO BE HOUSED IN CONDUIT TO MEET CODE REQUIREMENTS OR LOCAL CONDITIONS, NON-METALLIC MATERIAL SUCH AS PVC CONDUIT SHALL BE USED. WHERE USE OF METAL CONDUIT IS UNAVOIDABLE (i.e., NONMETALLIC CONDUIT PROHIBITED BY LOCAL CODE) THE GROUND CONDUCTOR SHALL BE BONDED TO EACH END OF THE METAL CONDUIT.
20. ALL GROUNDS THAT TRANSITION FROM BELOW GRADE TO ABOVE GRADE MUST BE #2 BARE SOLID TINNED COPPER IN 3/4" NON-METALLIC, FLEXIBLE CONDUIT FROM 24" BELOW GRADE TO WITHIN 3" TO 6" OF CAD-WELD TERMINATION POINT. THE EXPOSED END OF THE CONDUIT MUST BE SEALED WITH SILICONE CAULK. (ADD TRANSITIONING GROUND STANDARD DETAIL AS WELL).
21. BUILDINGS WHERE THE MAIN GROUNDING CONDUCTORS ARE REQUIRED TO BE ROUTED TO GRADE, THE CONTRACTOR SHALL ROUTE TWO GROUNDING CONDUCTORS FROM THE ROOFTOP, TOWERS, AND WATER TOWERS GROUNDING RING, TO THE EXISTING GROUNDING SYSTEM, THE GROUNDING CONDUCTORS SHALL NOT BE SMALLER THAN 2/0 COPPER. ROOFTOP GROUNDING RING SHALL BE BONDED TO THE EXISTING GROUNDING SYSTEM, THE BUILDING STEEL COLUMNS, LIGHTNING PROTECTION SYSTEM, AND BUILDING MAIN WATER LINE (FERROUS OR NONFERROUS METAL PIPING ONLY). DO NOT ATTACH GROUNDING TO FIRE SPRINKLER SYSTEM PIPES.

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

NSS NORTHEAST SITE SOLUTIONS
Turnkey Wireless Development

CENTEK engineering
Centered on Solutions℠
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Branford, CT 06405
www.CentekEng.com

DRAWN BY:	CHECKED BY:	APPROVED BY:
BSP	TJR	

RFDS REV #: 0 – 10/04/2023

CONSTRUCTION DOCUMENTS

SUBMITTALS

REV	DATE	DESCRIPTION
A	11/15/23	ISSUED FOR CLIENT REVIEW
0	03/28/24	ISSUED FOR CONSTRUCTION
1	05/09/24	ISSUED FOR CONSTRUCTION
2	05/17/24	REVISED PER CLIENT COMMENTS

CENTEK PROJECT NUMBER
23009.10

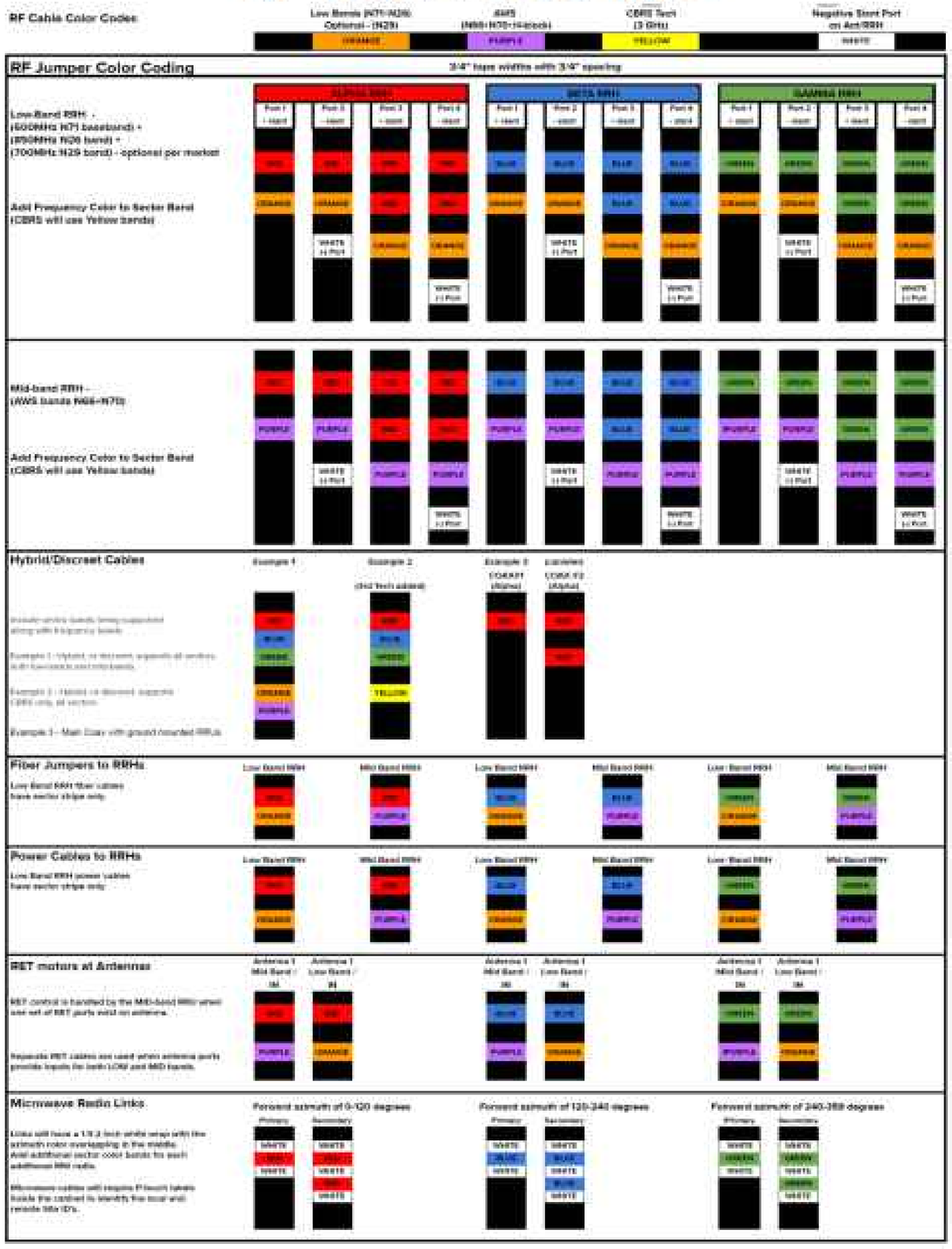
DISH Wireless L.L.C.
PROJECT INFORMATION

BOBOS00935A
69 OIL MILL RD
WATERFORD, CT 06385

SHEET TITLE
DISH GENERAL NOTES

SHEET NUMBER
GN-1.5

RF COLOR CODING



dish wireless.

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DRAWN BY:	CHECKED BY:	APPROVED BY:
BSP	TJR	

RFDS REV #: 0 – 10/04/2023

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23009.10

DISH Wireless L.L.C.
PROJECT INFORMATION

BOBOS00935A
69 OIL MILL RD
WATERFORD, CT 06385

SHEET TITLE
RF CABLE COLOR CODES

SHEET NUMBER
RF-1

ATTACHMENT 4

CENTEK engineering

Centered on Solutions℠

Structural Analysis of Antenna Mast and Pole

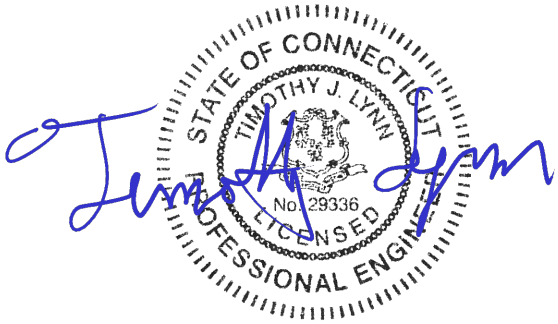
Dish Site Ref: BOBOS00935A

Eversource Structure No. 6063A
85' Electric Transmission Pole

Oil Mill Road
Waterford, CT

CENTEK Project No. 23009.10

~~Date: October 10, 2023~~
Rev 3: March 1, 2024



Max Stress Ratio = 94%

Prepared for:

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

Table of Contents

Introduction

The purpose of this report is to analyze the antenna mast and 85' utility pole located on Oil Mill Road in Waterford, CT for the proposed antenna and equipment installation by Dish.

The existing/proposed loads consist of the following:

- **DISH (Proposed):**

  Antennas: Three (3) Commscope FFVV-65B-R2 panel antennas, three (3) Samsung RF4450t-71A RRUs, three (3) Samsung RF4451d-70A RRUs and one (1) Raycap RDIDC-9181-PF-48 OVP mounted one two (2) dual mount assemblies (SitePro p/n UDS-NP) with a RAD center elevation of 96.5-ft above grade level (94-ft above tower base).
  Coax Cables: One (1) 1-1/4" ∅ hybrid cable mounted to the exterior of the pole/mast.

Primary Assumptions Used in the Analysis

- ASCE Manual No. 48-19, "Design of Steel Transmission Pole Structures", defines steel stresses for evaluation of the utility pole.
- All utility tower members are adequately protected to prevent corrosion of steel members.
- All proposed antenna mounts are modeled as listed above.
- All coaxial cable will be installed within the antenna mast unless specified otherwise.
- Antenna mast will be properly installed and maintained.
- No residual stresses exist due to incorrect pole erection.
- All bolts are appropriately tightened providing the necessary connection continuity.
- All welds conform to the requirements of AWS D1.1.
- Antenna mast and utility pole will be in plumb condition.
- Utility pole was properly installed and maintained and all members were properly designed, detailed, fabricated, and installed and have been properly maintained since erection.
- Any deviation from the analyzed loading will require a new analysis for verification of structural adequacy.

Analysis

The existing antenna mast consisting of a 12-in x 10.0-ft long SCH. 40 pipe (O.D. = 12.75") connected at the top of the existing tower was analyzed for its ability to resist loads prescribed by the TIA-222H standard. Section 5 of this report details these gravity and lateral wind loads. NESC prescribed loads were also applied to the mast in order to obtain reactions needed for analyzing the utility pole structure. These loads are developed in Section 7 of this report. Load cases and combinations used in RISA-3D for TIA-222-H loading and for NESC/NU loading are listed in report Sections 6 and 8, respectively.

Design Basis

Our analysis was performed in accordance with the 2021 International Building Code as modified by the 2022 CT State Building Code; ASCE 48-19, "Design of Steel Transmission Pole Structures", NESC C2-2023 and Eversource Design Criteria.

- UTILITY POLE ANALYSIS

  The purpose of this analysis is to determine the adequacy of the existing utility structure to support the proposed antenna loads. The loading and design requirements were analyzed in accordance with the EVERSOURCE Design Criteria Table, NESC C2-2023 ~ Construction Grade B, and ASCE Manual No. 48-19, "Design Of Steel Transmission Pole Structures".

  Load cases considered:

  Load Case 1: NESC Heavy
  Wind Pressure..…….. 4.0 psf
  Radial Ice Thickness…..…….. 0.5"
  Vertical Overload Capacity Factor……. 1.50
  Wind Overload Capacity Factor……. 2.50
  Wire Tension Overload Capacity Factor…… 1.65

  Load Case 2: NESC Extreme
  Wind Speed..……. 120 mph (1)
  Radial Ice Thickness…..…….. 0"

  Load Case 3: NESC Extreme Ice w/ Wind
  Wind Pressure..…….. 6.4 psf
  Radial Ice Thickness…..…….. 0.75"
  Vertical Overload Capacity Factor……. 1.0
  Wind Overload Capacity Factor……. 1.0

  Note 1: NESC C2-2023, Section25, Rule 250C: Extreme Wind Loading, 1.25 x Gust Response Factor (wind speed: 3-second gust)

- MAST ASSEMBLY ANALYSIS

  Mast, appurtenances and connections to the utility tower were analyzed and designed in accordance with TIA-222-H and AISC standards.

  Load cases considered:

  Load Case 1:
  Wind Speed……... 140 mph (2022 CSBC Appendix-P)
  Radial Ice Thickness…..…….. 0"

  Load Case 2:
  Wind Pressure..……. 50 mph wind pressure
  Radial Ice Thickness…..…….. 1.0"

R e s u l t s

- MAST ASSEMBLY

The pipe mast was determined to be structurally **adequate**.

Component	Stress Ratio (percentage of capacity)	Result
12" Sch. 40	31.7%	**PASS**
Connection to Tower	79.7%	**PASS**

- UTILITY POLE

This analysis finds that the subject utility pole is adequate to support the antenna mast and related appurtenances. The pole stresses meet the requirements set forth by the ASCE 48-19, "Design of Steel Transmission Pole Structures" for the applied NESC Heavy and Extreme load cases. The detailed analysis results are provided in Section 9 of this report. The analysis results are summarized as follows:

A maximum usage of **89.46%** occurs in the utility pole under the **NESC Heavy** loading condition.

POLE SECTION:

The utility pole was found to be structurally **adequate**.

Tower Section	Elevation	Stress Ratio (% of capacity)	Result
Tube Number 2	0.00' -45.00' (ATB)	89.46%	**PASS**
Base Plate	-	85.02%	**PASS**

- FOUNDATION AND ANCHORS

The existing foundation consists of a 8-ft ∅ x 26-ft long reinforced concrete caisson. The base of the tower is connected to the foundation by means of (20) 2.25"∅, ASTM A615-75 anchor bolts embedded into the concrete foundation structure. Foundation information was obtained from NUSCO drawing # 01087-60001.

BASE REACTIONS:

From PLS-Pole analysis based on NESC/EVERSOURCE prescribed loads.

Load Case	Shear	Axial	Moment
NESC Heavy Wind	94.07 kips	57.80 kips	5902.77 ft-kips
NESC Extreme Wind	86.11 kips	34.23 kips	5266.09 ft-kips
NESC Extreme Ice w/ Wind	75.77 kips	48.61 kips	4783.30 ft-kips

Note 1 – 10% increase will be applied to tower base reactions per OTRM 051

ANCHOR BOLTS:

The anchor bolts were found to be structurally **adequate**.

Tower Component	Design Limit	Stress Ratio (% of capacity)	Result
Anchor Bolts	Tension	94.1%	**PASS**

FOUNDATION:

The foundation with the proposed modifications was found to be within allowable limits.

Foundation	Design Limit	Proposed Loading (1)	Result
Reinforced Concrete Caisson	Moment Capacity	66.9%	**PASS**
	Shear Capacity	61.4%	**PASS**

Note 1: 10% increase to be applied to the above tower base reactions for foundation verification per OTRM 051.

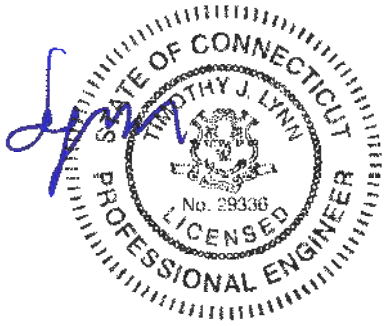
Conclusion

This analysis shows that the subject utility pole and antenna mast **are adequate** to support the proposed equipment upgrade.

The analysis is based, in part on the information provided to this office by Eversource and Dish. 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 are performed, results obtained, and recommendations made 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 ~ RISA-3D

RISA-3D Structural Analysis Program is an integrated structural analysis and design software package for buildings, bridges, tower structures, etc.

Modeling Features:

- Comprehensive CAD-like graphic drawing/editing capabilities that let you draw, modify and load elements as well as snap, move, rotate, copy, mirror, scale, split, merge, mesh, delete, apply, etc.
- Versatile drawing grids (orthogonal, radial, skewed)
- Universal snaps and object snaps allow drawing without grids
- Versatile general truss generator
- Powerful graphic select/unselect tools including box, line, polygon, invert, criteria, spreadsheet selection, with locking
- Saved selections to quickly recall desired selections
- Modification tools that modify single items or entire selections
- Real spreadsheets with cut, paste, fill, math, sort, find, etc.
- Dynamic synchronization between spreadsheets and views so you can edit or view any data in the plotted views or in the spreadsheets
- Simultaneous view of multiple spreadsheets
- Constant in-stream error checking and data validation
- Unlimited undo/redo capability
- Generation templates for grids, disks, cylinders, cones, arcs, trusses, tanks, hydrostatic loads, etc.
- Support for all units systems & conversions at any time
- Automatic interaction with RISASection libraries
- Import DXF, RISA-2D, STAAD and ProSteel 3D files
- Export DXF, SDNF and ProSteel 3D files

Analysis Features:

- Static analysis and P-Delta effects
- Multiple simultaneous dynamic and response spectra analysis using Gupta, CQC or SRSS mode combinations
- Automatic inclusion of mass offset (5% or user defined) for dynamic analysis
- Physical member modeling that does not require members to be broken up at intermediate joints
- State of the art 3 or 4 node plate/shell elements
- High-end automatic mesh generation — draw a polygon with any number of sides to create a mesh of well-formed quadrilateral (NOT triangular) elements.
- Accurate analysis of tapered wide flanges - web, top and bottom flanges may all taper independently
- Automatic rigid diaphragm modeling
- Area loads with one-way or two-way distributions
- Multiple simultaneous moving loads with standard AASHTO loads and custom moving loads for bridges, cranes, etc.
- Torsional warping calculations for stiffness, stress and design
- Automatic Top of Member offset modeling
- Member end releases & rigid end offsets
- Joint master-slave assignments
- Joints detachable from diaphragms
- Enforced joint displacements
- 1-Way members, for tension only bracing, slipping, etc.

- 1-Way springs, for modeling soils and other effects
- Euler members that take compression up to their buckling load, then turn off.
- Stress calculations on any arbitrary shape
- Inactive members, plates, and diaphragms allows you to quickly remove parts of structures from consideration
- Story drift calculations provide relative drift and ratio to height
- Automatic self-weight calculations for members and plates
- Automatic subgrade soil spring generator

Graphics Features:

- Unlimited simultaneous model view windows
- Extraordinary “true to scale” rendering, even when drawing
- High-speed redraw algorithm for instant refreshing
- Dynamic scrolling stops right where you want
- Plot & print virtually everything with color coding & labeling
- Rotate, zoom, pan, scroll and snap views
- Saved views to quickly restore frequent or desired views
- Full render or wire-frame animations of deflected model and dynamic mode shapes with frame and speed control
- Animation of moving loads with speed control
- High quality customizable graphics printing

Design Features:

- Designs concrete, hot rolled steel, cold formed steel and wood
- ACI 1999/2002, BS 8110-97, CSA A23.3-94, IS456:2000,EC 2-1992 with consistent bar sizes through adjacent spans
- Exact integration of concrete stress distributions using parabolic or rectangular stress blocks
- Concrete beam detailing (Rectangular, T and L)
- Concrete column interaction diagrams
- Steel Design Codes: AISC ASD 9th, LRFD 2nd & 3rd, HSS Specification, CAN/CSA-S16.1-1994 & 2004, BS 5950-1-2000, IS 800-1984, Euro 3-1993 including local shape databases
- AISI 1999 cold formed steel design
- NDS 1991/1997/2001 wood design, including Structural Composite Lumber, multi-ply, full sawn
- Automatic spectra generation for UBC 1997, IBC 2000/2003
- Generation of load combinations: ASCE, UBC, IBC, BOCA, SBC, ACI
- Unbraced lengths for physical members that recognize connecting elements and full lengths of members
- Automatic approximation of K factors
- Tapered wide flange design with either ASD or LRFD codes
- Optimization of member sizes for all materials and all design codes, controlled by standard or user-defined lists of available sizes and criteria such as maximum depths
- Automatic calculation of custom shape properties
- Steel Shapes: AISC, HSS, CAN, ARBED, British, Euro, Indian, Chilean
- Light Gage Shapes: AISI, SSMA, Dale / Incor, Dietrich, Marino\WARE
- Wood Shapes: Complete NDS species/grade database
- Full seamless integration with RISAFoot (Ver 2 or better) for advanced footing design and detailing
- Plate force summation tool

Results Features:

- Graphic presentation of color-coded results and plotted designs
- Color contours of plate stresses and forces with quadratic smoothing, the contours may also be animated
- Spreadsheet results with sorting and filtering of: reactions, member & joint deflections, beam & plate forces/stresses, optimized sizes, code designs, concrete reinforcing, material takeoffs, frequencies and mode shapes
- Standard and user-defined reports
- Graphic member detail reports with force/stress/deflection diagrams and detailed design calculations and expanded diagrams that display magnitudes at any dialed location
- Saved solutions quickly restore analysis and design results.

GENERAL DESCRIPTION OF STRUCTURAL ANALYSIS PROGRAM ~ PLS-POLE

PLS-POLE provides all of the capabilities a structural engineer requires to design transmission, substation or communications structures. It does so using a simple easy to use graphical interface that rests upon our time tested finite element engine. Regardless of whether you want to model a simple wood pole or a guyed steel X-Frame; PLS-POLE can handle the job simply, reliably and efficiently.

Modeling Features:

- Structures are made of standard reusable components that are available in libraries. You can easily create your own libraries or get them from a manufacturer
- Structure models are built interactively using interactive menus and graphical commands
- Automatic generation of underlying finite element model of structure
- Steel poles can have circular, 4, 6, 8, 12, 16, or 18-sided, regular, elliptical or user input cross sections (flat-to-flat or tip-to-tip orientations)
- Steel and concrete poles can be selected from standard sizes available from manufacturers
- Automatic pole class selection
- Cross brace position optimizer
- Capability to specify pole ground line rotations
- Capability to model foundation displacements
- Can optionally model foundation stiffness
- Guys are easily handled (modeled as exact cable elements in nonlinear analysis)
- Powerful graphics module (members color-coded by stress usage)
- Graphical selection of joints and components allows graphical editing and checking
- Poles can be shown as lines, wire frames or can be rendered as 3-d polygon surfaces

Analysis Features:

- Automatic distribution of loads in 2-part suspension insulators (v-strings, horizontal vees, etc.)
- Design checks for ASCE, ANSI/TIA/EIA 222 (Revisions F and G) or other requirements
- Automatic calculation of dead and wind loads
- Automated loading on structure (wind, ice and drag coefficients) according to:
    - ASCE 74-1991
    - NESC 2002
    - NESC 2007
    - IEC 60826:2003
    - EN50341-1:2001 (CENELEC)
    - EN50341-3-9:2001 (UK NNA)
    - EN50341-3-17:2001 (Portugal NNA)
    - ESAA C(b)1-2003 (Australia)
    - TPNZ (New Zealand)
    - REE (Spain)
    - EIA/TIA 222-F
    - ANSI/TIA 222-G
    - CSA S37-01
- Automated microwave antenna loading as per EIA/TIA 222-F and ANSI/TIA 222-G
- Detects buckling by nonlinear analysis

Results Features:

- Detects buckling by nonlinear analysis
- Easy to interpret text, spreadsheet and graphics design summaries
- Automatic determination of allowable wind and weight spans
- Automatic determination of interaction diagrams between allowable wind and weight spans
- Automatic tracking of part numbers and costs

Criteria for Design of PCS Facilities On or Extending Above Metal Electric Transmission Towers & Analysis of Transmission Towers Supporting PCS Masts (1)

Introduction

This criteria is the result from an evaluation of the methods and loadings specified by the separate standards, which are used in designing telecommunications towers and electric transmission towers. That evaluation is detailed elsewhere, but in summary; the methods and loadings are significantly different. This criteria specifies the manner in which the appropriate standard is used to design PCS facilities including masts and brackets (hereafter referred to as "masts"), and to evaluate the electric transmission towers to support PCS masts. The intent is to achieve an equivalent level of safety and security under the extreme design conditions expected in Connecticut and Massachusetts.

ANSI Standard TIA-222-H covering the design of telecommunications structures specifies LRFD design approach. This approach applies the loads from extreme weather loading conditions, and designs the structure so that it does not exceed code defined percentage of failure strength.

ANSI Standard C2-2023 (National Electrical Safety Code) covering the design of electric transmission metal structures is based upon an ultimate strength/yield stress design approach. This approach applies a multiplier (overload capacity factor) to the loads possible from extreme weather loading conditions, and designs the structure so that it does not exceed its ultimate strength (yield stress).

Each standard defines the details of how loads are to be calculated differently. Most of the Eversource effort in "unifying" both codes was to establish what level of strength each approach would provide, and then increasing the appropriate elements of each to achieve a similar level of security under extreme weather loadings.

Two extreme weather conditions are considered. The first is an extreme wind condition (hurricane) based upon a 1700-year recurrence for TIA-22-H risk category III and a 100-year recurrence for NESC Grade B. The second is a winter condition combining wind and ice loadings.

The following sections describe the design criteria for any PCS mast extending above the top of an electric transmission tower, and the analysis criteria for evaluating the loads on the transmission tower from such a mast from the lower portions of such a mast, and loads on the pre-existing electric lower portions of such a mast, and loads on the pre-existing electric transmission tower and the conductors it supports.

Note 1: Prepared from documentation provide from Eversource.

P C S M a s t

The PCS facility (mast, external cable/trays, including the initial and any planned future support platforms, antennas, etc. extending the full height above the top level of the electric transmission structure) shall be designed in accordance with the provisions of TIA 222-H:

E L E C T R I C T R A N S M I S S I O N T O W E R

The electric transmission tower shall be analyzed using yield stress theory in accordance with the attached table titled “Eversource Design Criteria”. This specifies uniform loadings (different from the TIA loadings) on the each of the following components of the installed facility:

- PCS mast for its total height above ground level, including the initial and planned future support platforms, antennas, etc. above the top of an electric transmission structure.
- Conductors are related devices and hardware.
- Electric transmission structure. The loads from the PCS facility and from the electric conductors shall be applied to the structure at conductor and PCS mast attachment points, where those load transfer to the tower.

The uniform loadings and factors specified for the above components in the table are based upon the National Electrical Safety Code 2023 Edition Extreme Wind (Rule 250C), Combined Ice and Wind (Rule 250B-Heavy) & Combined Extreme Ice and Wind (Rule 250D) Loadings. These provide equivalent loadings compared to TIA and its loads and factors with the exceptions noted above. (Note that the NESC does not require the projected wind surfaces of structures and equipment to be increased by the ice covering.)

In the event that the electric transmission tower is not sufficient to support the additional loadings of the PCS mast, reinforcement will be necessary to upgrade the strength of the overstressed members.

Attachment A
Eversource Design Criteria

		Attachment A ES Design Criteria	Basic Wind Speed	Pressure	Height Factor	Gust Factor	Load or Stress Factor	Force Coef. - Shape Factor
			V (MPH)	Q (PSF)	Kz	Gh		
Ice Condition	TIA/EIA	Antenna Mount	TIA	TIA (0.75Wi)	TIA	TIA	TIA, Section 3.1.1.1 disallowed for connection design	TIA
	NESC Heavy	Tower/Pole Analysis with antennas extending above top of Tower/Pole (Yield Stress)	-----	4	1	1	2.5	1.6 Flat Surfaces 1.3 Round Surfaces
		Tower/Pole Analysis with antennas below top of Tower/Pole (on two faces)	-----	4	1	1	2.5	1.6 Flat Surfaces 1.3 Round Surfaces
		Conductors:	Conductor Loads Provided by ES					
High Wind Condition	TIA/EIA	Antenna Mount	85	TIA	TIA	TIA	TIA, Section 3.1.1.1 disallowed for connection design	TIA
	NESC Extreme Wind	Tower/Pole Analysis with antennas extending above top of Tower/Pole	For wind speed use OTRM 060 Map 1, Rule 250C: Extreme Wind Loading Apply a 1.25 x Gust Response Factor to all telecommunication equipment projected above top of tower/pole and apply a 1.0 x Gust Response Factor to the tower/pole structure					1.6 Flat Surfaces 1.3 Round Surfaces
		Tower/Pole Analysis with antennas below top of Tower/Pole	For wind speed use OTRM 060 Map 1, Rule 250C: Extreme Wind Loading Height above ground is based on overall height to top of tower/pole					1.6 Flat Surfaces 1.3 Round Surfaces
		Conductors:	Conductor Loads Provided by ES					
NESC Extreme Ice with Wind Condition*		Tower/Pole Analysis with antennas extending above top of Tower/Pole	For wind speed use OTRM 060 Map 1, Rule 250D: Extreme Ice with Wind Loading 4 PSF Wind Load 1.25 x Gust Response Factor Apply a 1.25 x Gust Response Factor to all telecommunication equipment projected above top of tower/pole and apply a 1.0 x Gust Response Factor to the tower/pole structure					1.6 Flat Surfaces 1.3 Round Surfaces
		Tower/Pole Analysis with antennas below top of Tower/Pole	For wind speed use OTRM 060 Map 1, Rule 250D: Extreme Ice with Wind Loading 4 PSF Wind Load Height above ground is based on overall height to top of tower/pole					1.6 Flat Surfaces 1.3 Round Surfaces
		Conductors:	Conductor Loads Provided by ES					
		*Only for structures installed after 2007						

determined from NESC applied loading conditions (not TIA Loads) on the structure and mount as specified below, and shall include the wireless communication mast and antenna loads per NESC criteria)

The strength reduction factor obtained from the field investigation shall be applied to the members or connections that are showing signs of deterioration from their original condition With the written approval of Eversource Transmission Line Engineering on a case by case the existing structures may be analyzed initially using the current NESC code, then it is permitted to use the original design code with the original conductor load should the existing tower fail the current NESC code.

The structure shall be analyzed using yield stress theory in accordance with Attachment A, "Eversource Design Criteria." This specifies uniform loadings (different from the TIA loadings) on each of the following components of the installed facility:

a) Wireless communication mast for its total height above ground level, including the initial and any planned future equipment (Support Platforms, Antennas, TMA's etc.) above the top of an electric transmission structure.

b) Conductors and related devices and hardware (wire loads will be provided by Eversource).

c) Electric Transmission Structure

i) The loads from the wireless communication equipment components based on NESC and Eversource Criteria in Attachment A, and from the electric conductors shall be applied to the structure at conductor and wireless communication mast attachment points, where those loads transfer to the tower. ii)

ii) Shape Factor Multiplier:

NESC Structure Shape	Cd
Polyround (for polygonal steel poles)	1.3
Flat	1.6
Open Lattice	3.2
Pole with Coaxial Cable	See Below Table

iii) When Coaxial Cables are mounted alongside the pole structure, the shape multiplier shall be:

Mount Type	Cable Cd	Pole Cd
Coaxial Cables on outside periphery (One layer)	1.45	1.45
Coaxial Cables mounted on stand offs	1.6	1.6

d) The uniform loadings and factors specified for the above components in Attachment A, "Eversource Design Criteria" are based upon the National Electric Safety Code 2007 Edition Extreme Wind (Rule 250C) and Combined Ice and Wind (Rule 250B-Heavy) Loadings. These provide equivalent loadings compared to the TIA and its loads and factors with the exceptions noted above.

Northeast Utilities System

				Page	of
Job :	Waterford Substation	**Spec. Number**	T08-13	**Sheet**	of
Description:	85' Steel Poles DE on Column on Conc Fnd	**Computed by**	JM	**Date**	9/21/23
		Checked by	GJO	**Date**	

INPUT DATA

TOWER ID: 6063A

Structure Height (ft) : 85

Wind Zone : SE Coastal CT (red)

Wind Speed : 120 mph

Tower Type : ○ Suspension ◉ Strain

Extreme Wind Model : New Build

Shield Wire Properties:

	BACK	AHEAD
NAME =	*19 #10*	*19 #10*
DESCRIPTION =	-	-
STRANDING =	19/10 Al Weld	19/10 Al Weld
DIAMETER =	0.509 in	0.509 in
WEIGHT =	0.449 lb/ft	0.449 lb/ft

Conductor Properties:

	BACK	AHEAD		
NAME =	*LAPWING*	*LAPWING*		
Number of Conductors per phase: 1	1590.000 45/7 ACSR	1590.000 45/7 ACSR	1	Number of Conductors per phase
DIAMETER =	1.504 in	1.504 in		
WEIGHT =	1.790 lb/ft	1.790 lb/ft		

Insulator Weight = 200 lbs

Broken Wire Side = AHEAD SPAN

Horizontal Line Tensions:

	BACK		AHEAD	
	Shield	Conductor	Shield	Conductor
NESC HEAVY =	5,500	11,400	2,500	5,500
EXTREME WIND =	5,200	13,200	2,400	6,500
LONG. WIND =	5,200	13,200	2,400	6,500
250D COMBINED =	7,800	15,300	3,800	7,800
NESC W/O OLF =	5,500	11,400	2,500	5,500
60 DEG F NO WIND =	2,000	5,700	800	2,700

Line Geometry:

					SUM
LINE ANGLE (deg) =	BACK:	55	AHEAD:	55	**110**
WIND SPAN (ft) =	BACK:	600	AHEAD:	300	**900**
WEIGHT SPAN (ft) =	BACK:	800	AHEAD:	400	**1,200**

Northeast Utilities System

				Page	of
Job :	Waterford Substation	**Spec. Number**	T08-13	**Sheet**	of
Description:	85' Steel Poles DE on Column on Conc Fnd	**Computed by**	JM	**Date**	9/21/23
		Checked by	GJO	**Date**	

WIRE LOADING AT ATTACHMENTS

TOWER ID: 6063A

Wind Span =	900	ft	Broken Wire Span =	AHEAD SPAN
Weight Span =	1,200	ft	Type of Insulator Attachment =	STRAIN
Total Angle =	110	degrees		

1. NESC RULE 250B Heavy Loading:

	INTACT CONDITION			BROKEN WIRE CONDITION		
	Horizontal	Longitudinal	Vertical	Horizontal	Longitudinal	Vertical
Shield Wire =	11,945 lb	2,839 lb	1,937 lb	8,188 lb	5,205 lb	1,292 lb
Conductor =	24,720 lb	5,584 lb	6,065 lb	16,660 lb	10,789 lb	3,943 lb

2. NESC RULE 250C Transverse Extreme Wind Loading:

	Horizontal	Longitudinal	Vertical
Shield Wire =	7,753 lb	1,606 lb	539 lb
Conductor =	20,649 lb	3,843 lb	2,548 lb

3. NESC RULE 250C Longitudinal Extreme Wind Loading:

	Horizontal	Longitudinal	Vertical
Shield Wire =	6,226 lb	1,606 lb	539 lb
Conductor =	16,137 lb	3,843 lb	2,548 lb

4. NESC RULE 250D Extreme Ice & Wind Loading:

	Horizontal	Longitudinal	Vertical
Shield Wire =	10,255 lb	2,294 lb	2,791 lb
Conductor =	19,974 lb	4,302 lb	6,285 lb

5. NESC RULE 250B w/o OLF's

	Horizontal	Longitudinal	Vertical
Shield Wire =	7,006 lb	1,721 lb	1,292 lb
Conductor =	14,595 lb	3,384 lb	4,043 lb

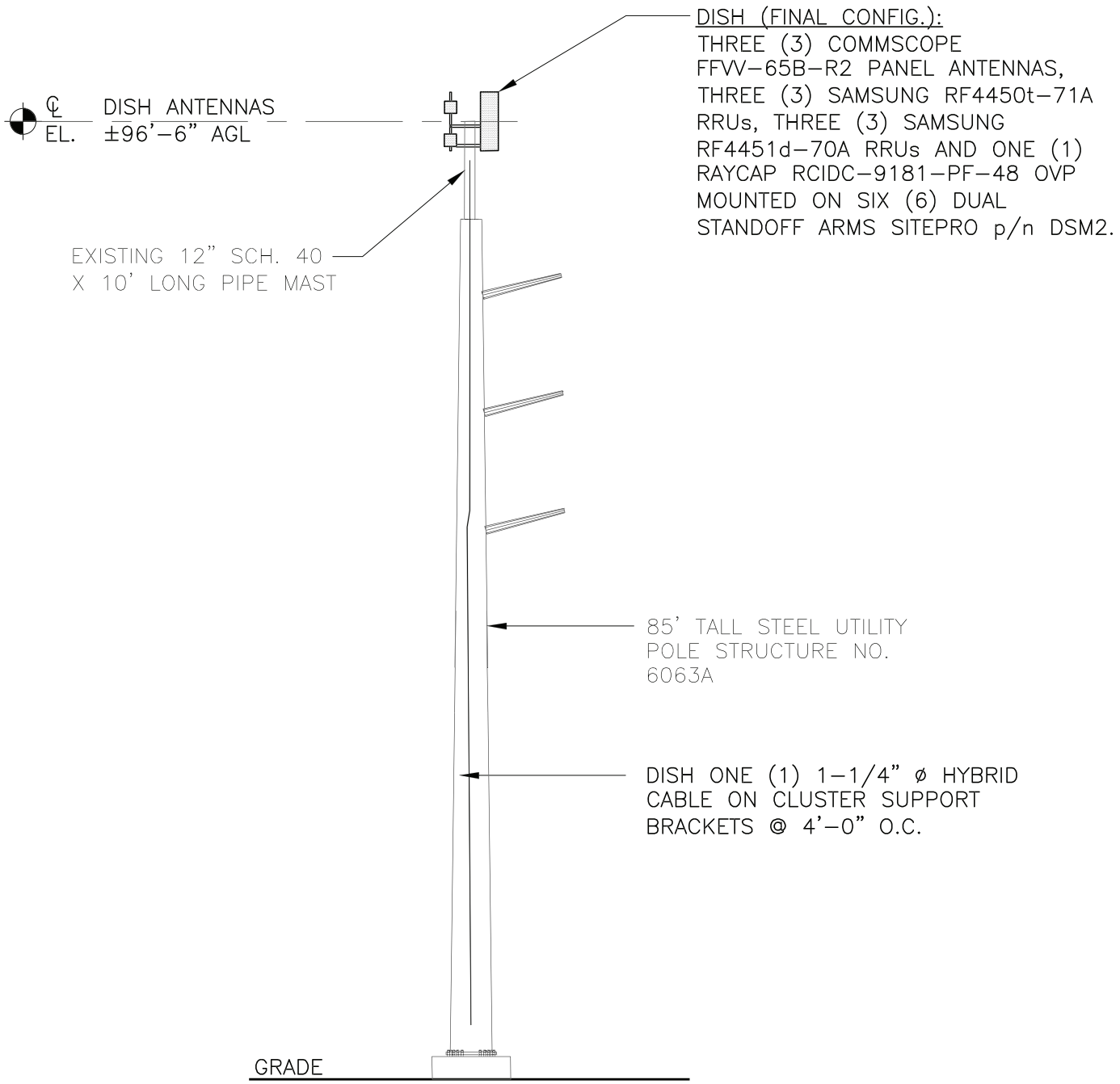
6. 60 Deg. F, No Wind

	Horizontal	Longitudinal	Vertical
Shield Wire =	2,294 lb	688 lb	539 lb
Conductor =	6,881 lb	1,721 lb	2,548 lb

7. Construction

	Horizontal	Longitudinal	Vertical
Shield Wire =	3,440 lb	1,032 lb	808 lb
Conductor =	10,321 lb	2,581 lb	3,822 lb

NOTE: All loads include required overload factors (OLF's).



1
SK–1

TOWER ELEVATION

SCALE: NOT TO SCALE

REVISIONS		
00	10/10/23	CONSTRUCTION
01	12/11/23	CONSTRUCTION
02	2/20/24	CONSTRUCTION

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BOBOS00935A
STRUCTURE 6063A

OIL MILL ROAD
WATERFORD, CT

PROJECT NO:	23009.10
DRAWN BY:	TJL
CHECKED BY:	CFC
SCALE:	AS NOTED
DATE:	10/10/23

TOWER ELEVATION

SK-1

DWG. 1 OF 1

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Subject: Loads on Mast - Structure 6063A

Location: Waterford, CT

Rev. 2: 2/20/24

Prepared by: T.J.L. Checked by: C.F.C.
Job No. 23009.10

Development of Design Heights, Exposure Coefficients, and Velocity Pressures Per TIA-222-H

Wind Speeds

Basic Wind Speed	$V := 140$	mph	(User Input - 2022 CSBC Appendix P)
Basic Wind Speed with Ice	$V_i := 50$	mph	(User Input per Annex B of TIA-222-H)
Basic Wind Speed Service Loads	$V_{Ser} := 60$	mph	(User Input - TIA-222-H Section 2.8.3)

Input

Structure Type =	Structure_Type := Pole		(User Input)
Structure Category =	SC := III		(User Input)
Exposure Category =	Exp := C		(User Input)
Structure Height =	$h := 85$	ft	(User Input)
Height to Center of Antennas =	$z_{ant} := 96.5$	ft	(User Input)
Height to Center of Mast =	$z_{Mast1} := 92$	ft	(User Input)
Radial Ice Thickness =	$t_i := 1.0$	in	(User Input per Annex B of TIA-222-H)
Radial Ice Density =	Id := 56.00	pcf	(User Input)
Topograpic Factor =	$K_{zt} := 1.0$		(User Input)
Shielding Factor for Appurtenances =	$K_a := 1.0$		(User Input)
Ground Elevation Factor =	$K_e = 0.996$		(User Input)
Gust Response Factor =	$G_H := 1.35$		(User Input - Section 2.6.9.4 of TIA-222-H)

Output

Wind Direction Probability Factor =

$$K_d := \begin{cases} 0.95 & \text{if Structure\_Type = Pole} \\ 0.85 & \text{if Structure\_Type = Lattice} \end{cases} = 0.95$$

(Per Table 2-2 of TIA-222-H)

Importance Factors =

$$I_{ice} := \begin{cases} 0 & \text{if SC = 1} \\ 1.00 & \text{if SC = 2} \\ 1.15 & \text{if SC = 3} \\ 1.25 & \text{if SC = 4} \end{cases} = 1.15$$

(Per Table 2-3 of TIA-222-H)

Wind Direction Probability Factor (Service) = $K_{dSer} := 0.85$ (Per Section 2.8.3 of TIA-222-H)

$K_{iz} := \left(\frac{z_{ant}}{33}\right)^{0.1} = 1.113$

$t_{izant} := t_i \cdot I_{ice} \cdot K_{iz} \cdot K_{zt}^{0.35} = 1.28$

VelocityPressure Coefficient Antennas =

$Kz_{ant} := 2.01\left(\left(\frac{z_{ant}}{zg}\right)\right)^{\frac{2}{\alpha}} = 1.256$

VelocityPressure w/o Ice Antennas =

$qz_{ant} := 0.00256 \cdot K_{zt} \cdot K_e \cdot K_d \cdot Kz_{ant} \cdot V^2 = 59.614$

VelocityPressure with Ice Antennas =

$qz_{ice.ant} := 0.00256 \cdot K_{zt} \cdot K_e \cdot K_d \cdot Kz_{ant} \cdot V_i^2 = 7.604$

VelocityPressure Service =

$qz_{ant.Ser} := 0.00256 \cdot K_{zt} \cdot K_e \cdot K_{dSer} \cdot Kz_{ant} \cdot V_{Ser}^2 = 9.797$

$K_{izMast1} := \left(\frac{z_{Mast1}}{33}\right)^{0.1} = 1.108$

$t_{izMast1} := t_i \cdot I_{ice} \cdot K_{iz} \cdot K_{zt}^{0.35} = 1.28$

VelocityPressure Coefficient Mast =

$Kz_{Mast1} := 2.01\left(\left(\frac{z_{Mast1}}{zg}\right)\right)^{\frac{2}{\alpha}} = 1.244$

VelocityPressure w/o Ice Mast =

$qz_{Mast1} := 0.00256 \cdot K_{zt} \cdot K_e \cdot K_d \cdot Kz_{Mast1} \cdot V^2 = 59.018$

VelocityPressure with Ice Mast =

$qz_{ice.Mast1} := 0.00256 \cdot K_{zt} \cdot K_e \cdot K_d \cdot Kz_{Mast1} \cdot V_i^2 = 7.528$

VelocityPressure Service =

$qz_{Mast1.Ser} := 0.00256 \cdot K_{zt} \cdot K_e \cdot K_{dSer} \cdot Kz_{Mast1} \cdot V_{Ser}^2 = 9.699$

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Subject:	Loads on Mast - Structure 6063A
Location:	Waterford, CT
Rev. 2: 2/20/24	Prepared by: T.J.L. Checked by: C.F.C. Job No. 23009.10

Development of Wind & Ice Load on Mast

Mast Data: (Pipe 12 Sch. 40) (User Input)

Mast Shape =	Round		(User Input)
Mast Diameter =	$D_{mast} := 12.75$	in	(User Input)
Mast Length =	$L_{mast} := 10$	ft	(User Input)
Mast Thickness =	$t_{mast} := 0.375$	in	(User Input)
Mast Aspect Ratio =	$Ar_{mast} := \frac{12 L_{mast}}{D_{mast}} = 9.4$		
Mast Force Coefficient =	$Ca_{mast} = 0.85$		

Gravity Loads (without ice)

Weight of the mast =	Self Weight	**(Computed internally by Risa-3D)**	plf	**BLC 1**

Gravity Loads (ice only)

Ice Area per Linear Foot =	$Ai_{mast} := \frac{\pi}{4}\left[\left(D_{mast} + t_{izMast1}\cdot 2\right)^2 - D_{mast}^2\right] = 56.4$		sq in	
Weight of Ice on Mast =	$W_{ICEmast} := Id\cdot\frac{Ai_{mast}}{144} = 22$		plf	**BLC 3**

Wind Load (with ice)

Mast Projected Surface Area w/ Ice =	$AICE_{mast} := \frac{\left(D_{mast} + 2\cdot t_{izMast1}\right)}{12} = 1.276$		sf/ft	
Total Mast Wind Force w/ Ice =	$qz_{ice.Mast1}\cdot G_H\cdot Ca_{mast}\cdot AICE_{mast} = 11$		plf	**BLC 4**

Wind Load (without ice)

Mast Projected Surface Area =	$A_{mast} := \frac{D_{mast}}{12} = 1.063$		sf/ft	
Total Mast Wind Force =	$qz_{Mast1}\cdot G_H\cdot Ca_{mast}\cdot A_{mast} = 72$		plf	**BLC 5**

Wind Load (Service)

Total Mast Wind Force Service Loads =	$qz_{Mast1.Ser}\cdot G_H\cdot Ca_{mast}\cdot A_{mast} = 12$		plf	**BLC 6**

Development of Wind & Ice Load on Antennas

Antenna Data:

Antenna Model =	Commscope FFVV-65B-R2			
Antenna Shape =	Flat		(User Input)	
Antenna Height =	$L_{ant} := 71.969$	in	(User Input)	
Antenna Width =	$W_{ant} := 19.606$	in	(User Input)	
Antenna Thickness =	$T_{ant} := 7.756$	in	(User Input)	
Antenna Weight =	$WT_{ant} := 70$	lbs	(User Input)	
Number of Antennas =	$N_{ant} := 3$		(User Input)	
Antenna Aspect Ratio =	$Ar_{ant} := \frac{L_{ant}}{W_{ant}} = 3.7$			
Antenna Force Coefficient =	$Ca_{ant} = 1.25$			

Gravity Load (without ice)

Weight of All Antennas =	$WT_{ant} \cdot N_{ant} = 210$	lbs	**BLC 2**

Gravity Loads (ice only)

cu in

Volume of Each Antenna =	$V_{ant} := L_{ant} \cdot W_{ant} \cdot T_{ant} = 1 \times 10^4$	cu in	
Volume of Ice on Each Antenna =	$V_{ice} := \left(L_{ant} + 2 \cdot t_{izant}\right)\left(W_{ant} + 2 \cdot t_{izant}\right) \cdot \left(T_{ant} + 2 \cdot t_{izant}\right) - V_{ant} = 6100$		
Weight of Ice on Each Antenna =	$W_{ICEant} := \frac{V_{ice}}{1728} \cdot Id = 198$	lbs	
Weight of Ice on All Antennas =	$W_{ICEant} \cdot N_{ant} = 593$	lbs	**BLC 3**

Wind Load (with ice)

Surface Area for One Antenna w/ Ice =	$SA_{ICEant} := \frac{\left(L_{ant} + 2 \cdot t_{izant}\right) \cdot \left(W_{ant} + 2 \cdot t_{izant}\right)}{144} = 11.5$	sf	
Antenna Projected Surface Area w/ Ice =	$A_{ICEant} := SA_{ICEant} \cdot N_{ant} = 34.4$	sf	
Total Antenna Wind Force w/ Ice =	$Fi_{ant} := qz_{ice.ant} \cdot G_H \cdot Ca_{ant} \cdot K_a \cdot A_{ICEant} = 442$	lbs	**BLC 4**

Wind Load (without ice)

Surface Area for One Antenna =	$SA_{ant} := \frac{L_{ant} \cdot W_{ant}}{144} = 9.8$	sf	
Antenna Projected Surface Area =	$A_{ant} := SA_{ant} \cdot N_{ant} = 29.4$	sf	
Total Antenna Wind Force =	$F_{ant} := qz_{ant} \cdot G_H \cdot Ca_{ant} \cdot K_a \cdot A_{ant} = 2962$	lbs	**BLC 5**

Wind Load (Service)

Total Antenna Wind Force Service Loads =	$F_{ant.Ser} := qz_{ant.Ser} \cdot G_H \cdot Ca_{ant} \cdot K_a \cdot A_{ant} = 487$	lbs	**BLC 6**

Development of Wind & Ice Load on Antennas

Antenna Data:

Antenna Model =	Samsung RF4450t-71A			
Antenna Shape =	Flat		(User Input)	
Antenna Height =	$L_{ant} := 16.5$	in	(User Input)	
Antenna Width =	$W_{ant} := 15$	in	(User Input)	
Antenna Thickness =	$T_{ant} := 11$	in	(User Input)	
Antenna Weight =	$WT_{ant} := 100$	lbs	(User Input)	
Number of Antennas =	$N_{ant} := 3$		(User Input)	
Antenna Aspect Ratio =	$Ar_{ant} := \frac{L_{ant}}{W_{ant}} = 1.1$			
Antenna Force Coefficient =	$Ca_{ant} = 1.2$			

Gravity Load (without ice)

Weight of All Antennas =	$WT_{ant} \cdot N_{ant} = 300$	lbs	**BLC 2**

Gravity Loads (ice only)

cu in

Volume of Each Antenna =	$V_{ant} := L_{ant} \cdot W_{ant} \cdot T_{ant} = 2723$	cu in	
Volume of Ice on Each Antenna =	$V_{ice} := \left(L_{ant} + 2 \cdot t_{izant}\right)\left(W_{ant} + 2 \cdot t_{izant}\right) \cdot \left(T_{ant} + 2 \cdot t_{izant}\right) - V_{ant} = 1816$		
Weight of Ice on Each Antenna =	$W_{ICEant} := \frac{V_{ice}}{1728} \cdot Id = 59$	lbs	
Weight of Ice on All Antennas =	$W_{ICEant} \cdot N_{ant} = 177$	lbs	**BLC 3**

Wind Load (with ice)

Surface Area for One Antenna w/ Ice =	$SA_{ICEant} := \frac{\left(L_{ant} + 2 \cdot t_{izant}\right) \cdot \left(W_{ant} + 2 \cdot t_{izant}\right)}{144} = 2.3$	sf	
Antenna Projected Surface Area w/ Ice =	$A_{ICEant} := SA_{ICEant} \cdot N_{ant} = 7$	sf	
Total Antenna Wind Force w/ Ice =	$Fi_{ant} := qz_{ice.ant} \cdot G_H \cdot Ca_{ant} \cdot K_a \cdot A_{ICEant} = 86$	lbs	**BLC 4**

Wind Load (without ice)

Surface Area for One Antenna =	$SA_{ant} := \frac{L_{ant} \cdot W_{ant}}{144} = 1.7$	sf	
Antenna Projected Surface Area =	$A_{ant} := SA_{ant} \cdot N_{ant} = 5.2$	sf	
Total Antenna Wind Force =	$F_{ant} := qz_{ant} \cdot G_H \cdot Ca_{ant} \cdot K_a \cdot A_{ant} = 498$	lbs	**BLC 5**

Wind Load (Service)

Total Antenna Wind Force Service Loads =	$F_{ant.Ser} := qz_{ant.Ser} \cdot G_H \cdot Ca_{ant} \cdot K_a \cdot A_{ant} = 82$	lbs	**BLC 6**

Development of Wind & Ice Load on Antennas

Antenna Data:

Antenna Model =	Samsung RF4451d-70A			
Antenna Shape =	Flat		(User Input)	
Antenna Height =	$L_{ant} := 15$	in	(User Input)	
Antenna Width =	$W_{ant} := 15$	in	(User Input)	
Antenna Thickness =	$T_{ant} := 8.9$	in	(User Input)	
Antenna Weight =	$WT_{ant} := 70$	lbs	(User Input)	
Number of Antennas =	$N_{ant} := 3$		(User Input)	
Antenna Aspect Ratio =	$Ar_{ant} := \frac{L_{ant}}{W_{ant}} = 1.0$			
Antenna Force Coefficient =	$Ca_{ant} = 1.2$			

Gravity Load (without ice)

Weight of All Antennas =	$WT_{ant} \cdot N_{ant} = 210$	lbs	**BLC 2**

Gravity Loads (ice only)

			cu in
Volume of Each Antenna =	$V_{ant} := L_{ant} \cdot W_{ant} \cdot T_{ant} = 2003$	cu in	
Volume of Ice on Each Antenna =	$V_{ice} := \left(L_{ant} + 2 \cdot t_{izant}\right)\left(W_{ant} + 2 \cdot t_{izant}\right) \cdot \left(T_{ant} + 2 \cdot t_{izant}\right) - V_{ant} = 1532$		
Weight of Ice on Each Antenna =	$W_{ICEant} := \frac{V_{ice}}{1728} \cdot Id = 50$	lbs	
Weight of Ice on All Antennas =	$W_{ICEant} \cdot N_{ant} = 149$	lbs	**BLC 3**

Wind Load (with ice)

Surface Area for One Antenna w/ Ice =	$SA_{ICEant} := \frac{\left(L_{ant} + 2 \cdot t_{izant}\right) \cdot \left(W_{ant} + 2 \cdot t_{izant}\right)}{144} = 2.1$	sf	
Antenna Projected Surface Area w/ Ice =	$A_{ICEant} := SA_{ICEant} \cdot N_{ant} = 6.4$	sf	
Total Antenna Wind Force w/ Ice =	$Fi_{ant} := qz_{ice.ant} \cdot G_H \cdot Ca_{ant} \cdot K_a \cdot A_{ICEant} = 79$	lbs	**BLC 4**

Wind Load (without ice)

Surface Area for One Antenna =	$SA_{ant} := \frac{L_{ant} \cdot W_{ant}}{144} = 1.6$	sf	
Antenna Projected Surface Area =	$A_{ant} := SA_{ant} \cdot N_{ant} = 4.7$	sf	
Total Antenna Wind Force =	$F_{ant} := qz_{ant} \cdot G_H \cdot Ca_{ant} \cdot K_a \cdot A_{ant} = 453$	lbs	**BLC 5**

Wind Load (Service)

Total Antenna Wind Force Service Loads =	$F_{ant.Ser} := qz_{ant.Ser} \cdot G_H \cdot Ca_{ant} \cdot K_a \cdot A_{ant} = 74$	lbs	**BLC 6**

Development of Wind & Ice Load on Antennas

Antenna Data:

Antenna Model =	Raycap RDIDC-9181-PF-48		
Antenna Shape =	Flat		(User Input)
Antenna Height =	$L_{ant} := 18.97$	in	(User Input)
Antenna Width =	$W_{ant} := 16.20$	in	(User Input)
Antenna Thickness =	$T_{ant} := 9.64$	in	(User Input)
Antenna Weight =	$WT_{ant} := 25$	lbs	(User Input)
Number of Antennas =	$N_{ant} := 1$		(User Input)
Antenna Aspect Ratio =	$Ar_{ant} := \frac{L_{ant}}{W_{ant}} = 1.2$		
Antenna Force Coefficient =	$Ca_{ant} = 1.2$		

Gravity Load (without ice)

Weight of All Antennas =	$WT_{ant} \cdot N_{ant} = 25$	lbs	**BLC 2**

Gravity Loads (ice only)

			cu in
Volume of Each Antenna =	$V_{ant} := L_{ant} \cdot W_{ant} \cdot T_{ant} = 2963$	cu in	
Volume of Ice on Each Antenna =	$V_{ice} := \left(L_{ant} + 2 \cdot t_{izant}\right)\left(W_{ant} + 2 \cdot t_{izant}\right) \cdot \left(T_{ant} + 2 \cdot t_{izant}\right) - V_{ant} = 1966$		
Weight of Ice on Each Antenna =	$W_{ICEant} := \frac{V_{ice}}{1728} \cdot Id = 64$	lbs	
Weight of Ice on All Antennas =	$W_{ICEant} \cdot N_{ant} = 64$	lbs	**BLC 3**

Wind Load (with ice)

Surface Area for One Antenna w/ Ice =	$SA_{ICEant} := \frac{\left(L_{ant} + 2 \cdot t_{izant}\right) \cdot \left(W_{ant} + 2 \cdot t_{izant}\right)}{144} = 2.8$	sf	
Antenna Projected Surface Area w/ Ice =	$A_{ICEant} := SA_{ICEant} \cdot N_{ant} = 2.8$	sf	
Total Antenna Wind Force w/ Ice =	$Fi_{ant} := qz_{ice.ant} \cdot G_H \cdot Ca_{ant} \cdot K_a \cdot A_{ICEant} = 35$	lbs	**BLC 4**

Wind Load (without ice)

Surface Area for One Antenna =	$SA_{ant} := \frac{L_{ant} \cdot W_{ant}}{144} = 2.1$	sf	
Antenna Projected Surface Area =	$A_{ant} := SA_{ant} \cdot N_{ant} = 2.1$	sf	
Total Antenna Wind Force =	$F_{ant} := qz_{ant} \cdot G_H \cdot Ca_{ant} \cdot K_a \cdot A_{ant} = 206$	lbs	**BLC 5**

Wind Load (Service)

Total Antenna Wind Force Service Loads =	$F_{ant.Ser} := qz_{ant.Ser} \cdot G_H \cdot Ca_{ant} \cdot K_a \cdot A_{ant} = 34$	lbs	**BLC 6**

Development of Wind & Ice Load on Antennas

Mount Data:

Mount Type:	SitePro Dual Mount Assembly UDS-NP(x2) w/ (6) 2 Std. x 6'-0" pipe masts.		
Mount Shape =	Flat		(User Input)
Mount Projected Surface Area =	$CaAa := 16.9$	sf	(User Input)
Mount Projected Surface Area w/ Ice =	$CaAa_{ice} := 29.7$	sf	(User Input)
Mount Weight =	$WT_{mnt} := 844$	lbs	(User Input)
Mount Weight w/ Ice =	$WT_{mnt.ice} := 1337$	lbs	

Gravity Loads (without ice)

Weight of All Mounts = $WT_{mnt} = 844$ lbs **BLC 2**

Gravity Loads (ice only)

Weight of Ice on All Mounts = $WT_{mnt.ice} - WT_{mnt} = 493$ lbs **BLC 3**

Wind Load (with ice)

Total Mount Wind Force = $Fi_{mnt} := qz_{ice.ant} \cdot G_H \cdot CaAa_{ice} = 305$ lbs **BLC 4**

Wind Load (without ice)

Total Mount Wind Force = $F_{mnt} := qz_{ant} \cdot G_H \cdot CaAa = 1360$ lbs **BLC 5**

Wind Load (Service)

Total Mount Wind Force = $Fi_{mnt} := qz_{ant.Ser} \cdot G_H \cdot CaAa = 224$ lbs **BLC 6**

Total Pipe Length = $TPL := 6 \cdot ft \cdot 6 = 36\,ft$

Total Antenna Length = $TAL := 72 \cdot in \cdot 3 + 16.5 \cdot in \cdot 3 + 15 \cdot in \cdot 3 = 25.875\,ft$

Exposed Pipe Area = $ExPA := (TPL - TAL)2.375 \cdot in = 2.004\,ft^2$

CaAa = $1.2 \cdot ExPA + (3.5 \cdot in) \cdot 60 \cdot in \cdot 6 \cdot 1.2 + 4 \cdot in \cdot 12 \cdot in \cdot 6 \cdot 2.0 = 16.905\,ft^2$

Exposed Pipe Area (with Ice) = $ExPA := (TPL - TAL)\left(2.375 \cdot in + 2 \cdot t_{izant} \cdot in\right) = 4.164\,ft^2$

CaAa (with ice) = $1.2 \cdot ExPA + \left(3.5in + 2 \cdot t_{izant} \cdot in\right) \cdot 60 \cdot in \cdot 6 \cdot 1.2 + \left(4 \cdot in + 2 \cdot t_{izant} \cdot in\right) \cdot 12 \cdot in \cdot 6 \cdot 2.0 = 29.7\,ft^2$

Mount Weight = $356 \cdot lb \cdot 2 + 3.66 \cdot plf \cdot 6 \cdot ft \cdot 6 = 844\,lb$

Weight of ice =

$$\left[\left[\left(2.375 \cdot in + 2 \cdot t_{izant} \cdot in\right)^2 - (2.375 \cdot in)^2\right] \cdot \frac{\pi}{4} \cdot 72 \cdot in \cdot 6 + \left[\left(3.5 \cdot in + 2 \cdot t_{izant} \cdot in\right)^2 - (3.5 \cdot in)^2\right] \cdot \frac{\pi}{4} \cdot 60 \cdot in \cdot 6 + \left[\left(4 \cdot in + 2 \cdot t_{izant} \cdot in\right)^2 - (4 \cdot in)^2\right] \cdot 12 \cdot in \cdot 6\right] \cdot (ld \cdot pcf) = 493\,lbf$$

Development of Wind & Ice Load on Coax Cables

Cable Data:

Type =	1-1/4" Hybrid Cable		
Shape =	Round		(User Input)
Coax Outside Diameter =	$D_{coax} := 1.6$	in	(User Input)
Coax Cable Length =	$L_{coax} := 10$	ft	(User Input)
Weight of Coax per foot =	$Wt_{coax} := 2.35$	plf	(User Input)
Total Number of Coax =	$N_{coax} := 1$		(User Input)
No. of Coax Projecting Outside Face of PCS Mast =	$NP_{coax} := 1$		(User Input)

Coax aspect ratio, $Ar_{coax} := \frac{(L_{coax} \cdot 12)}{D_{coax}} = 75$

Coax Cable Force Factor Coefficient = $Ca_{coax} = 1.2$

Gravity Loads (without ice)

Weight of all cables w/o ice: $WT_{coax} := Wt_{coax} \cdot N_{coax} = 2$ plf **BLC 2**

Gravity Loads (ice only)

Ice Area per Linear Foot = $Ai_{coax} := \frac{\pi}{4}\left[\left(D_{coax} + 2 \cdot t_{izMast1}\right)^2 - D_{coax}^2\right] = 11.6$ sq in

Ice Weight All Coax per foot = $WTi_{coax} := N_{coax} \cdot Id \cdot \frac{Ai_{coax}}{144} = 5$ plf **BLC 3**

Wind Load (with ice)

Coax projected surface area w/ Ice = $AICE_{coax} := \frac{\left(NP_{coax} \cdot D_{coax} + 2 \cdot t_{izMast1}\right)}{12} = 0.3$ sf/ft

Total Coax Wind Force w/ Ice = $Fi_{coax} := Ca_{coax} \cdot qz_{ice.Mast1} \cdot G_H \cdot AICE_{coax} = 4$ plf **BLC 4**

Wind Load (without ice)

Coax projected surface area = $A_{coax} := \frac{\left(NP_{coax} D_{coax}\right)}{12} = 0.1$ sf/ft

Total Coax Wind Force = $F_{coax} := Ca_{coax} \cdot qz_{Mast1} \cdot G_H \cdot A_{coax} = 13$ plf **BLC 5**

Wind Load (Service)

Total Coax Wind Force Service Loads = $F_{coax} := Ca_{coax} \cdot qz_{Mast1.Ser} \cdot G_H \cdot A_{coax} = 2$ plf **BLC 6**

Model Settings

Number of Reported Sections	5
Number of Internal Sections	100
Member Area Load Mesh Size (in^2)	144
Consider Shear Deformation	Yes
Consider Torsional Warping	Yes
Approximate Mesh Size (in)	12
Transfer Forces Between Intersecting Wood Walls	Yes
Increase Wood Wall Nailing Capacity for Wind Loads	Yes
Include P-Delta for Walls	Yes
Optimize Masonry and Wood Walls	No
Maximum Number of Iterations	3
Single	No
Multiple (Optimum)	Yes
Maximum	No

Global Axis corresponding to vertical direction	Y
Convert Existing Data	Yes
Default Global Plane for z-axis	XZ
Plate Local Axis Orientation	Nodal

Hot Rolled Steel	AISC 14th (360-10): LRFD
Stiffness Adjustment	Yes (Iterative)
Notional Annex	None
Connections	AISC 14th (360-10): ASD
Cold Formed Steel	AISI 1999: ASD
Stiffness Adjustment	Yes (Iterative)
Wood	AF&PA NDS-91/97: ASD
Temperature	< 100F
Concrete	ACI 318-02
Masonry	ACI 530-05: ASD
Aluminum	AA ADM1-05: ASD
Structure Type	Building
Stiffness Adjustment	Yes (Iterative)
Stainless	AISC 14th (360-10): ASD
Stiffness Adjustment	Yes (Iterative)

Analysis Methodology	PCA Load Contour Method
Parme Beta Factor	0.65

Compression Stress Block	Rectangular Stress Block
Analyze using Cracked Sections	Yes
Leave room for horizontal rebar splices (2*d bar spacing)	Yes
List forces which were ignored for design in the Detail Report	Yes

Column Min Steel	1
Column Max Steel	8
Rebar Material Spec	ASTM A615
Warn if beam-column framing arrangement is not understood	No
Number of Shear Regions	4
Region 2 & 3 Spacing Increase Increment (in)	4

Code	UBC 1997

Model Settings (Continued)

Occupancy Cat	4
Seismic Zone	3
Base Elevation (ft)	
Include the weight of the structure in base shear calcs	No
C_a	0.36
C_v	0.54
T Z (sec)	
T X (sec)	
C_tZ	0.035
C_tX	0.035
R Z	8.5
R X	8.5
Ω_0Z	1
Ω_0X	1
ρ Z	1
ρ X	1

Hot Rolled Steel Properties

	Label	E [ksi]	G [ksi]	Nu	Therm. Coeff. [1e⁵°F⁻¹]	Density [k/ft³]	Yield [ksi]	Ry	Fu [ksi]	Rt
1	A36 Gr.36	29000	11154	0.3	0.65	0.49	36	1.5	58	1.2
2	A572 Gr.50	29000	11154	0.3	0.65	0.49	50	1.1	65	1.2
3	A992	29000	11154	0.3	0.65	0.49	50	1.1	65	1.2
4	A500 Gr.42	29000	11154	0.3	0.65	0.49	42	1.3	58	1.1
5	A500 Gr.46	29000	11154	0.3	0.65	0.49	46	1.2	62	1.1
6	A53 Gr. B	29000	11154	0.3	0.65	0.49	35	1.5	60	1.2

Hot Rolled Steel Section Sets

	Label	Shape	Type	Design List	Material	Design Rule	Area [in²]	Iyy [in⁴]	Izz [in⁴]	J [in⁴]
1	Mast	PIPE_12.0	Column	Pipe	A500 Gr.42	Typical	13.7	262	262	523

Hot Rolled Steel Design Parameters

	Label	Shape	Length [ft]	Channel Conn.	a [ft]	Function
1	M1	Mast	10	N/A	N/A	Lateral

Member Primary Data

	Label	I Node	J Node	Section/Shape	Type	Design List	Material	Design Rule
1	M1	BOTCONNECTION	TOPMAST	Mast	Column	Pipe	A500 Gr.42	Typical

Node Coordinates

	Label	X [ft]	Y [ft]	Z [ft]	Detach From Diaphragm
1	BOTCONNECTION	0	0	0	
2	TOPMAST	0	10	0	

Node Boundary Conditions

	Node Label	X [k/in]	Y [k/in]	Z [k/in]	X Rot [k-ft/rad]	Y Rot [k-ft/rad]	Z Rot [k-ft/rad]
1	BOTCONNECTION	Reaction	Reaction	Reaction	Reaction	Reaction	Reaction

Member Point Loads (BLC 2 : Weight of Appurtenances)

	Member Label	Direction	Magnitude [k, k-ft]	Location [(ft, %)]
1	M1	Y	-0.21	9
2	M1	Y	-0.3	9
3	M1	Y	-0.21	9
4	M1	Y	-0.025	9
5	M1	Y	-0.844	9

Member Point Loads (BLC 3 : Weight of Ice Only)

	Member Label	Direction	Magnitude [k, k-ft]	Location [(ft, %)]
1	M1	Y	-0.593	9
2	M1	Y	-0.177	9
3	M1	Y	-0.149	9
4	M1	Y	-0.064	9
5	M1	Y	-0.493	9

Member Point Loads (BLC 4 : TIA Wind with Ice)

	Member Label	Direction	Magnitude [k, k-ft]	Location [(ft, %)]
1	M1	X	0.442	9
2	M1	X	0.086	9
3	M1	X	0.079	9
4	M1	X	0.035	9
5	M1	X	0.305	9

Member Point Loads (BLC 5 : TIA Wind)

	Member Label	Direction	Magnitude [k, k-ft]	Location [(ft, %)]
1	M1	X	2.962	9
2	M1	X	0.498	9
3	M1	X	0.453	9
4	M1	X	0.206	9
5	M1	X	1.36	9

Member Point Loads (BLC 6 : Service Wind)

	Member Label	Direction	Magnitude [k, k-ft]	Location [(ft, %)]
1	M1	X	0.487	9
2	M1	X	0.082	9
3	M1	X	0.074	9
4	M1	X	0.034	9
5	M1	X	0.224	9

Member Distributed Loads (BLC 2 : Weight of Appurtenances)

	Member Label	Direction	Start Magnitude [k/ft, F, ksf, k-ft/ft]	End Magnitude [k/ft, F, ksf, k-ft/ft]	Start Location [(ft, %)]	End Location [(ft, %)]
1	M1	Y	-0.002	-0.002	0	6

Member Distributed Loads (BLC 3 : Weight of Ice Only)

	Member Label	Direction	Start Magnitude [k/ft, F, ksf, k-ft/ft]	End Magnitude [k/ft, F, ksf, k-ft/ft]	Start Location [(ft, %)]	End Location [(ft, %)]
1	M1	Y	-0.022	-0.022	0	%100
2	M1	Y	-0.005	-0.005	0	6

Member Distributed Loads (BLC 4 : TIA Wind with Ice)

	Member Label	Direction	Start Magnitude [k/ft, F, ksf, k-ft/ft]	End Magnitude [k/ft, F, ksf, k-ft/ft]	Start Location [(ft, %)]	End Location [(ft, %)]
1	M1	X	0.011	0.011	0	%100
2	M1	X	0.004	0.004	0	6

Member Distributed Loads (BLC 5 : TIA Wind)

	Member Label	Direction	Start Magnitude [k/ft, F, ksf, k-ft/ft]	End Magnitude [k/ft, F, ksf, k-ft/ft]	Start Location [(ft, %)]	End Location [(ft, %)]
1	M1	X	0.072	0.072	0	%100
2	M1	X	0.013	0.013	0	6

Member Distributed Loads (BLC 6 : Service Wind)

	Member Label	Direction	Start Magnitude [k/ft, F, ksf, k-ft/ft]	End Magnitude [k/ft, F, ksf, k-ft/ft]	Start Location [(ft, %)]	End Location [(ft, %)]
1	M1	X	0.012	0.012	0	%100
2	M1	X	0.002	0.002	0	6

Basic Load Cases

	BLC Description	Category	Y Gravity	Point	Distributed
1	Self Weight	None	-1		
2	Weight of Appurtenances	None		5	1
3	Weight of Ice Only	None		5	2
4	TIA Wind with Ice	None		5	2
5	TIA Wind	None		5	2
6	Service Wind	None		5	2

Load Combinations

	Description	Solve	P-Delta	BLC	Factor	BLC	Factor	BLC	Factor	BLC	Factor
1	1.2D + 1.0W	Yes	Y	1	1.2	2	1.2	5	1		
2	0.9D + 1.0W	Yes	Y	1	0.9	2	0.9	5	1		
3	1.2D +1.0Di + 1.0Wi	Yes	Y	1	1.2	2	1.2	3	1	4	1
4	1.0D + 1.0WService	Yes	Y	1	1	2	1	6	1		

Envelope Node Reactions

	Node Label		X [k]	LC	Y [k]	LC	Z [k]	LC	MX [k-ft]	LC	MY [k-ft]	LC	MZ [k-ft]	LC
0	BOTCONNECTION	max	-1.033	4	4.207	3	0	4	0	4	0	4	53.194	1
1		min	-6.277	1	1.86	2	0	1	0	1	0	1	8.752	4
2	Totals:	max	-1.033	4	4.207	3	0	4						
3		min	-6.277	1	1.86	2	0	1						

Envelope Node Displacements

	Node Label		X [in]	LC	Y [in]	LC	Z [in]	LC	X Rotation [rad]	LC	Y Rotation [rad]	LC	Z Rotation [rad]	LC
0	BOTCONNECTION	max	0	2	0	2	0	4	0	4	0	4	0	4
1		min	0	4	0	3	0	1	0	1	0	1	0	1
2	TOPMAST	max	0.477	1	-0.001	2	0	4	0	4	0	4	-9.144e-4	4
3		min	0.079	4	-0.001	3	0	1	0	1	0	1	-5.558e-3	1

Envelope AISC 14TH (360-10): LRFD Member Steel Code Checks

	Member	Shape	Code Check	Loc[ft]	LC	Shear Check	Loc[ft]	LC	phi*Pnc [k]	phi*Pnt [k]	phi*Mn y-y [k-ft]	phi*Mn z-z [k-ft]	Cb	Eqn
0	M1	PIPE_12.0	0.317	0	1	0.04	0	1	494.456	517.86	169.155	169.155	1	H1-1b

Node Reactions

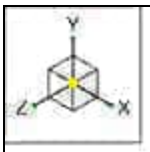
	LC	Node Label	X [k]	Y [k]	Z [k]	MX [k-ft]	MY [k-ft]	MZ [k-ft]
0	1	BOTCONNECTION	-6.277	2.481	0	0	0	53.194
1	1	Totals:	-6.277	2.481	0			
2	1	COG (ft):	X: 0	Y: 8.063	Z: 0			

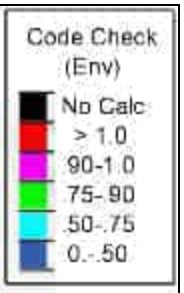
Node Reactions

	LC	Node Label	X [k]	Y [k]	Z [k]	MX [k-ft]	MY [k-ft]	MZ [k-ft]
0	2	BOTCONNECTION	-6.277	1.86	0	0	0	53.182
1	2	Totals:	-6.277	1.86	0			
2	2	COG (ft):	X: 0	Y: 8.063	Z: 0			

Node Reactions

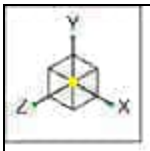
	LC	Node Label	X [k]	Y [k]	Z [k]	MX [k-ft]	MY [k-ft]	MZ [k-ft]
0	3	BOTCONNECTION	-1.081	4.207	0	0	0	9.159
1	3	Totals:	-1.081	4.207	0			
2	3	COG (ft):	X: 0	Y: 8.196	Z: 0			

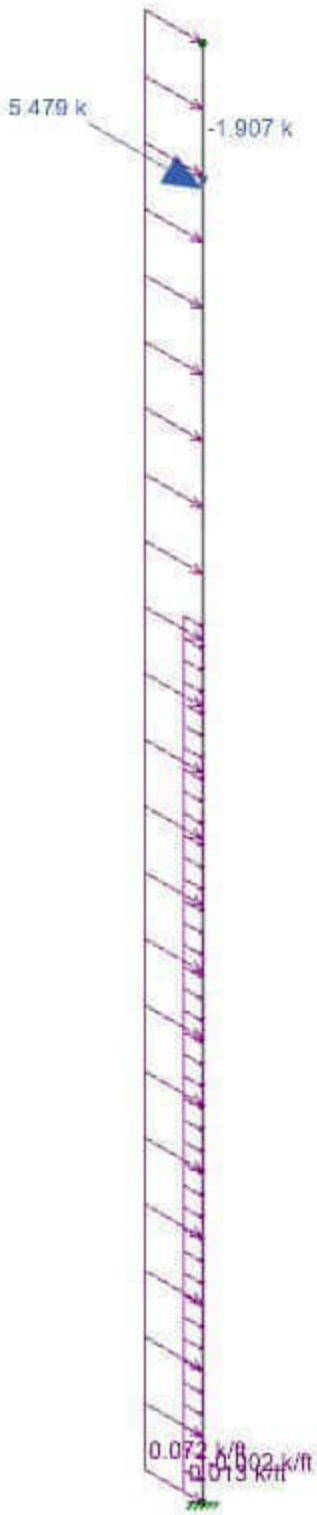




Member Code Checks Displayed (Enveloped)
Envelope Only Solution

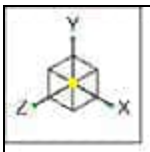
RISA	CENTEK Engineering, I…	Strcuture #6063A - Mast	SK-8
	TJL		TIA.r3d
	23009.10 / Dish BOBOS…		





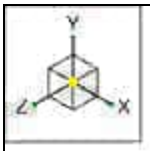
Loads: LC 1, 1.2D + 1.0W

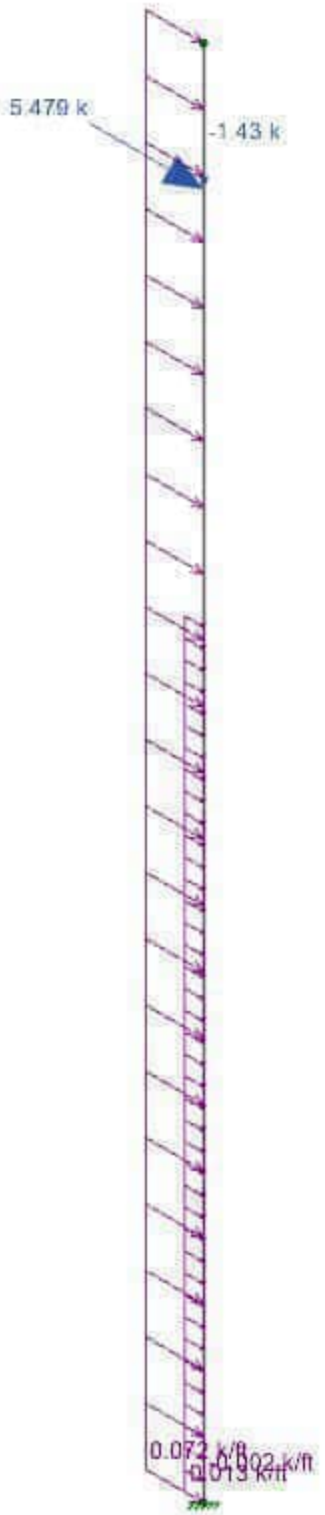
RISA	CENTEK Engineering, I…	Strcuture #6063A - Mast	SK-1
	TJL		TIA.r3d
	23009.10 / Dish BOBOS…		



Results for LC 1, 1.2D + 1.0W
Reaction and Moment Units are kips and kip-ft

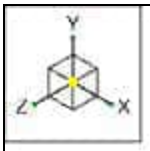
IRISA	CENTEK Engineering, I…	Strcuture #6063A - Mast	SK-5
	TJL		TIA.r3d
	23009.10 / Dish BOBOS…		





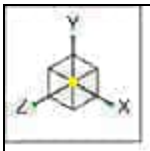
Loads: LC 2, 0.9D + 1.0W

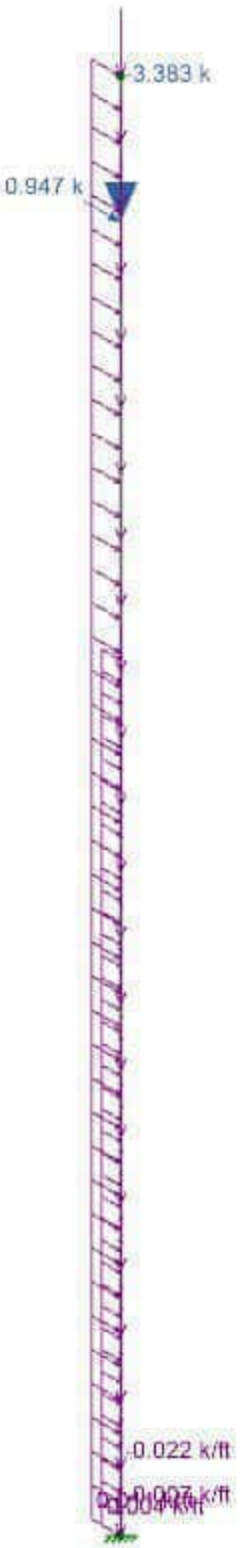
RISA	CENTEK Engineering, I…	Strcuture #6063A - Mast	SK-2
	TJL		TIA.r3d
	23009.10 / Dish BOBOS…		



Results for LC 2, 0.9D + 1.0W
Reaction and Moment Units are kips and kip-ft

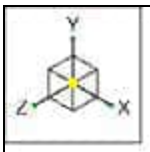
RISA	CENTEK Engineering, I…	Strcuture #6063A - Mast	SK-6
	TJL		TIA.r3d
	23009.10 / Dish BOBOS…		





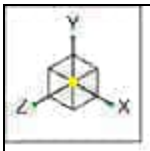
Loads: LC 3, 1.2D +1.0Di + 1.0Wi

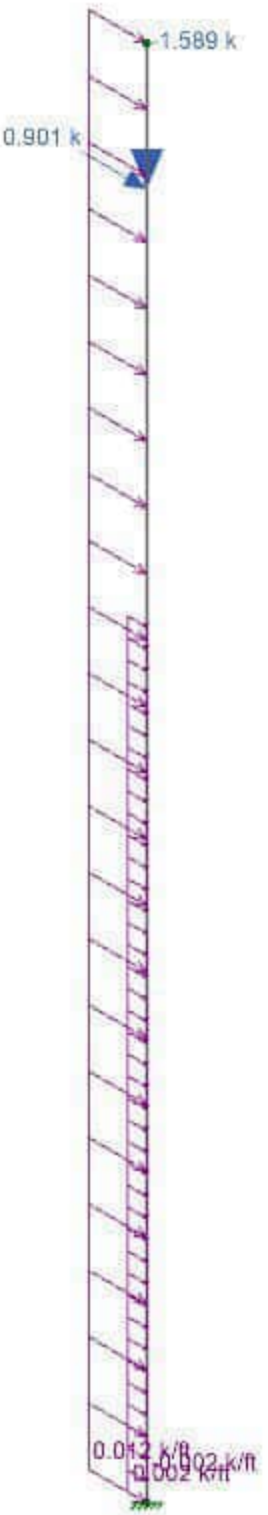
RISA	CENTEK Engineering, I…	Strcuture #6063A - Mast	SK-3
	TJL		TIA.r3d
	23009.10 / Dish BOBOS…		



Results for LC 3, 1.2D +1.0Di + 1.0Wi
Reaction and Moment Units are kips and kip-ft

RISA	CENTEK Engineering, I…	Strcuture #6063A - Mast	SK-7
	TJL		TIA.r3d
	23009.10 / Dish BOBOS…		



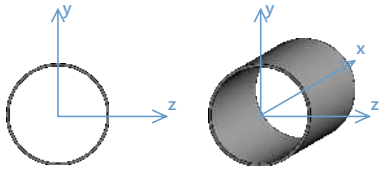


Loads: LC 4, 1.0D + 1.0WService

RISA	CENTEK Engineering, I…	Strcuture #6063A - Mast	SK-4
	TJL		TIA.r3d
	23009.10 / Dish BOBOS…		

Detail Report: M1

Load Combination: LC 4: 1.0D + 1.0WService **Code check:** 0.054 (axial/bending)



Input Data

Shape:	PIPE_12.0	**I Node:**	BOTCONNECTION
Member Type:	Column	**J Node:**	TOPMAST
Length (ft):	10	**I Release:**	Fixed
Material Type:	Hot Rolled Steel	**J Release:**	Fixed
Design Rule:	Typical	**I Offset:**	N/A
Internal Sections:	97	**J Offset:**	N/A
Design Code:	AISC 14th (360-10): LRFD	**T/C Only:**	Both Way

Material Properties

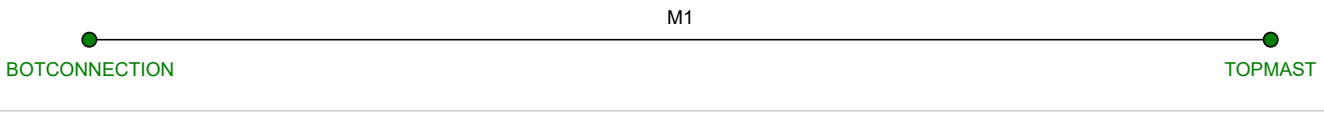
Material:	A500 Gr.42	**Therm. Coeff. (/1E5 F):**	0.65	**F_u (ksi):**	58
E (ksi):	29000	**Density (k/ft^3):**	0.49	**R_t:**	1.1
G (ksi):	11154	**F_y (ksi):**	42		
Nu:	0.3	**R_y:**	1.3		

Shape Properties

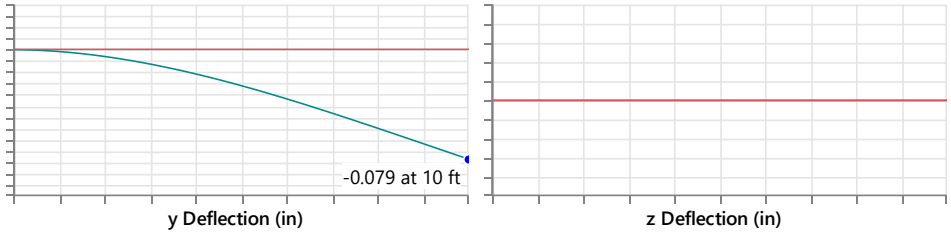
d (in):	12.75	**Area (in^2):**	13.7	**I_{zz} (in^4):**	262
t (in):	0.349	**J (in^4):**	523		
Z (in^3):	53.7	**I_{yy} (in^4):**	262		

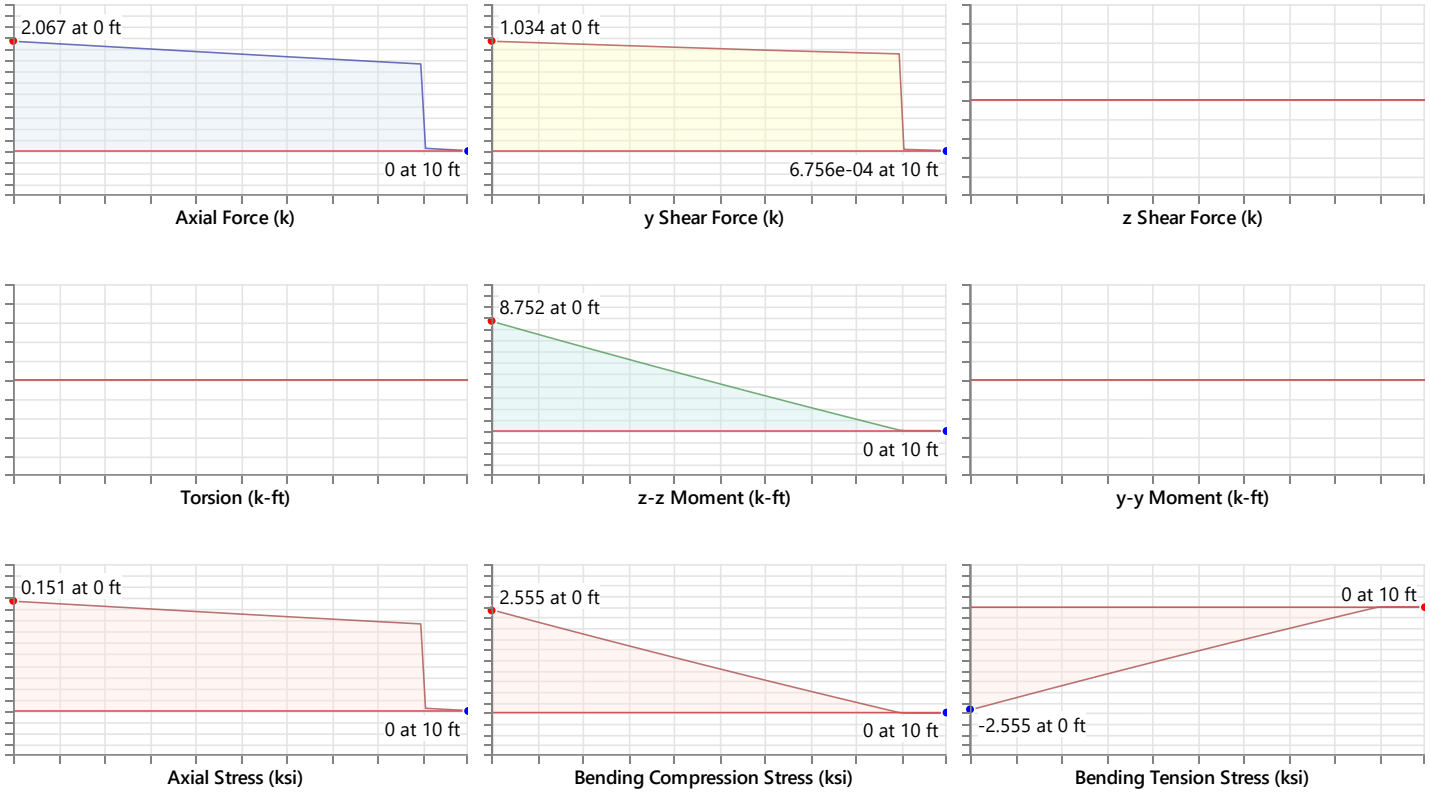
Design Properties

$L_{b\ y\text{-}y}$ (ft):	10	**$K_{y\text{-}y}$:**	1	**Max Defl Ratio:**	L/1528
$L_{b\ z\text{-}z}$ (ft):	10	**$K_{z\text{-}z}$:**	1	**Max Defl Location:**	10
$L_{comp\ top}$ (ft):	10	**y sway:**	No	**Span:**	N/A
$L_{comp\ bot}$ (ft):	10	**z sway:**	No	**τ_b:**	1
L_{torque} (ft):	10	**Function:**	Lateral		
C_b:	1	**Seismic DR:**	None		



Diagrams:





AISC 14th (360-10): LRFD Code Check

Limit State	Required	Available	Unity Check	Result
Applied Loading - Bending/Axial	-	-	-	-
Applied Loading - Shear + Torsion	-	-	-	-
Axial Tension Analysis	0 k	517.86 k	-	-
Axial Compression Analysis	2.067 k	494.456 k	-	-
Flexural Analysis	8.752 k-ft	169.155 k-ft	-	-
Shear Analysis	1.034 k	155.358 k	**0.007**	**PASS**
Bending & Axial Interaction Check (UC Bending Max)	-	-	**0.054**	**PASS**
Torsional Analysis	0 k-ft	159.338 k-ft	**0**	**PASS**

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Subject:	Flange Bolts and Flangeplate Analysis
Location:	Waterford, CT
Rev. 2: 2/20/24	Prepared by: T.J.L. Checked by: C.F.C. Job No. 23009.10

Flange Bolt and Flange Plate Analysis:

Input Data:

Tower Reactions:

Overturning Moment =	OM := 53.2·ft·kips	(Input From Risa3D)
Shear Force =	Shear := 6.3·kips	(Input From Risa3D)
Axial Force =	Axial := 1.9·kips	(Input From Risa3D)

Flange Bolt Data:

Use ASTM A325

Number of Flange Bolts =	N := 12	(User Input)
Diameter of Bolt Circle =	D_{bc} := 30·in	(User Input)
Bolt Minimum Tensile Strength =	F_{ub} := 120·ksi	(User Input)
Bolt Modulus =	E := 29000·ksi	(User Input)
Diameter of Flange Bolts =	D := 0.75·in	(User Input)
Threads per Inch =	n := 10	(User Input)

Flange Plate Data:

Use ASTM A36

Plate Yield Strength =	Fy_{bp} := 36·ksi	(User Input)
Flange Plate Thickness =	t_{bp} := 1·in	(User Input)
Flange Plate Diameter =	D_{bp} := 33·in	(User Input)
Outer Pole Diameter =	D_{pole} := 12.75·in	(User Input)

Configuration 1 - 5 Bolts Above Bend Line:

Geometric Layout Data:

Distance from Bolts to Centroid of Pole:

Radius of Bolt Circle =: $R_{bc} := \frac{D_{bc}}{2} = 15 \cdot in$

Distance to Bolts = $i := 1 .. N$

$$d_i := \left| \begin{array}{l} \theta \leftarrow 2 \cdot \pi \cdot \left(\frac{i}{N} \right) \\ d \leftarrow R_{bc} \cdot \sin(\theta) \end{array} \right.$$

$d_1 = 7.50 \cdot in$ $d_7 = -7.50 \cdot in$

$d_2 = 12.99 \cdot in$ $d_8 = -12.99 \cdot in$

$d_3 = 15.00 \cdot in$ $d_9 = -15.00 \cdot in$

$d_4 = 12.99 \cdot in$ $d_{10} = -12.99 \cdot in$

$d_5 = 7.50 \cdot in$ $d_{11} = -7.50 \cdot in$

$d_6 = 0.00 \cdot in$ $d_{12} = -0.00 \cdot in$

Critical Distances For Bending in Plate:

Outer Pole Radius = $R_{pole} := \frac{D_{pole}}{2} = 6.375 \cdot in$

Moment Arms of Bolts about Neutral Axis = $MA_i := if\left(d_i \geq R_{pole}, d_i - R_{pole}, 0in\right)$

$MA_1 = 1.12 \cdot in$ $MA_7 = 0.00 \cdot in$

$MA_2 = 6.62 \cdot in$ $MA_8 = 0.00 \cdot in$

$MA_3 = 8.63 \cdot in$ $MA_9 = 0.00 \cdot in$

$MA_4 = 6.62 \cdot in$ $MA_{10} = 0.00 \cdot in$

$MA_5 = 1.12 \cdot in$ $MA_{11} = 0.00 \cdot in$

$MA_6 = 0.00 \cdot in$ $MA_{12} = 0.00 \cdot in$

Effective Width of Flangeplate for Bending = $B_{eff} := .8 \cdot 2 \cdot \sqrt{\left(\frac{D_{bp}}{2}\right)^2 - \left(\frac{D_{pole}}{2}\right)^2} = 24.3 \cdot in$

Flange Bolt Analysis:

Calculated Flange Bolt Properties:

Polar Moment of Inertia = $I_p := \sum_i \left(d_i\right)^2 = 1.35 \times 10^3 \cdot in^2$

Gross Area of Bolt = $A_g := \frac{\pi}{4} \cdot D^2 = 0.442 \cdot in^2$

Net Area of Bolt = $A_n := \frac{\pi}{4} \cdot \left(D - \frac{0.9743 \cdot in}{n}\right)^2 = 0.334 \cdot in^2$

Net Diameter = $D_n := \frac{2 \cdot \sqrt{A_n}}{\sqrt{\pi}} = 0.653 \cdot in$

Radius of Gyration of Bolt = $r := \frac{D_n}{4} = 0.163 \cdot in$

Section Modulus of Bolt = $S_x := \frac{\pi \cdot D_n^3}{32} = 0.027 \cdot in^3$

Check Flange Bolt Tension Force:

Maximum Tensile Force = $T_{Max} := OM \cdot \frac{R_{bc}}{I_p} - \frac{Axial}{N} = 6.9 \cdot kips$

Maximum Shear Force = $V_{Max} := \frac{Shear}{N} = 0.5 \cdot kips$

Design Tensile Strength = $\Phi R_{nt} := \left(0.75 \cdot F_{ub} \cdot A_n\right) = 30.1 \cdot kips$

Bolt Tension % of Capacity = $\frac{T_{Max}}{\Phi R_{nt}} = 23.04 \cdot \%$

Condition1 = $Condition1 := if\left(\frac{T_{Max}}{\Phi R_{nt}} \le 1.00, "OK", "Overstressed"\right)$

Condition1 = "OK"

Design Shear Strength = $\Phi R_{nv} := \left(0.75 \cdot 0.35 \cdot F_{ub} \cdot A_g\right) = 13.9 \cdot kips$

Condition2 = $Condition2 := if\left[\left(\frac{V_{Max}}{\Phi R_{nv}}\right)^2 + \left(\frac{T_{Max}}{\Phi R_{nt}}\right)^2 \le 1.00, "OK", "Overstressed"\right]$

Condition2 = "OK"

Flange Plate Analysis:

Force from Bolts = $C_i := \frac{OM \cdot d_i}{I_p} + \frac{Axial}{N}$

$C_1 = 3.7 \cdot kips$ $C_7 = -3.4 \cdot kips$

$C_2 = 6.3 \cdot kips$ $C_8 = -6.0 \cdot kips$

$C_3 = 7.3 \cdot kips$ $C_9 = -6.9 \cdot kips$

$C_4 = 6.3 \cdot kips$ $C_{10} = -6.0 \cdot kips$

$C_5 = 3.7 \cdot kips$ $C_{11} = -3.4 \cdot kips$

$C_6 = 0.2 \cdot kips$ $C_{12} = 0.2 \cdot kips$

Maximum Bending Stress in Plate =

$$f_{bp} := \sum_i \frac{4 \cdot C_i \cdot MA_i}{\left(B_{eff} \, t_{bp}^{\,2}\right)} = 25.3 \cdot ksi$$

Allowable Bending Stress in Plate = $F_{bp} := 0.9 \cdot Fy_{bp} = 32.4 \cdot ksi$

Plate Bending Stress % of Capacity = $\frac{f_{bp}}{F_{bp}} = 78.2 \cdot \%$

Condition3 = $Condition3 := if\left(\frac{f_{bp}}{F_{bp}} < 1.00, "Ok", "Overstressed"\right)$

Condition3 = "Ok"

Configuration 2 - 4 Bolts Above Bend Line:

Geometric Layout Data:

Distance from Bolts to Centroid of Pole:

$d_1 := 14.5in$ $d_2 := 10.6in$ $d_3 := 3.9in$ (User Input)

Critical Distances For Bending in Plate: (User Input)

$ma_1 := 8.1in$ $ma_2 := 4.2in$

Effective Width of Baseplate for Bending = $B_{eff} := 24.3in$ (User Input)

Flange Bolt Analysis:

Calculated Flange Bolt Properties:

Polar Moment of Inertia = $I_p := \left[\left(d_1\right)^2 \cdot 4 + \left(d_2\right)^2 \cdot 4 + \left(d_3\right)^2 \cdot 4\right] = 1351.3 \cdot in^2$

Check Flange Bolt Tension Force:

Maximum Tensile Force = $T_{Max} := OM \cdot \frac{d_1}{I_p} - \frac{Axial}{N} = 6.7 \cdot kips$

Maximum Shear Force = $V_{Max} := \frac{Shear}{N} = 0.5 \cdot kips$

Design Tensile Strength = $\Phi R_{nt} := \left(0.75 \cdot F_{ub} \cdot A_n\right) = 30.1 \cdot kips$

Bolt Tension % of Capacity = $\frac{T_{Max}}{\Phi R_{nt}} = 22.23 \cdot \%$

Condition1 = $Condition1 := if\left(\frac{T_{Max}}{\Phi R_{nt}} \le 1.00, "OK", "Overstressed"\right)$

Condition1 = "OK"

Design Shear Strength = $\Phi R_{nv} := \left(0.75 \cdot 0.35 \cdot F_{ub} \cdot A_g\right) = 13.9 \cdot kips$

Condition2 = $Condition2 := if\left[\left(\frac{V_{Max}}{\Phi R_{nv}}\right)^2 + \left(\frac{T_{Max}}{\Phi R_{nt}}\right)^2 \le 1.00, "OK", "Overstressed"\right]$

Condition2 = "OK"

Flange Plate Analysis:

Force from Bolts =

$$C_1 := \frac{OM \cdot d_1}{I_p} + \frac{Axial}{N} = 7.009 \cdot kips$$

$$C_2 := \frac{OM \cdot d_2}{I_p} + \frac{Axial}{N} = 5.166 \cdot kips$$

Applied Bending Stress in Plate =

$$f_{bp} := \frac{4 \cdot \left(2C_1 \cdot ma_1 + 2C_2 \cdot ma_2\right)}{B_{eff} \cdot t_{bp}^{\,2}} = 25.83 \cdot ksi$$

Allowable Bending Stress in Plate =

$$F_{bp} := 0.9 \cdot Fy_{bp} = 32.4 \cdot ksi$$

Plate Bending Stress % of Capacity =

$$\frac{f_{bp}}{F_{bp}} = 79.7 \cdot \%$$

Condition2= =

$$Condition2 := if\left(\frac{f_{bp}}{F_{bp}} < 1.00, "Ok", "Overstressed"\right)$$

Condition2 = "Ok"

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Subject: NESC - Loads

Location: Waterford, CT

Rev. 3: 2/29/24

Prepared by: T.J.L Checked by: C.F.C.
Job No. 23009.10

Basic Components

Heavy Wind Pressure =	$p := 4.00 \cdot psf$		(User Input NESC 2023 Figure 250-1 & Table 250-1)
Basic Windspeed =	$V := 120$	mph	(User Input)
Radial Ice Thickness =	$Ir := 0.50 \cdot in$		(User Input NESC 2023 Figure 250-1 & Table 250-1)
Radial Ice Density =	$Id := 56.0\ pcf$		(User Input)

Factors for Extreme Wind Calculation

Top of Mast =	$TME := 97.5$	ft	(User Input)
Multiplier Gust Response Factor =	$m := 1.25$		(User Input - Only for NESC Extreme wind case)
Velocity Pressure Coefficient =	$Kz := 2.01 \cdot \left(\frac{TME}{900}\right)^{\frac{2}{9.5}} = 1.259$		(NESC 2023 Table 250-2)
Turbulence Intensity Constant =	$C_{exp} := 0.2$		(NESC 2023 Table 250-3)
Integral Length Scale of Turbulence Constant =	$L_s := 220$		(NESC 2023 Table 250-3)
Effective Height =	$z_s := 0.67 \cdot TME = 65.325$		(NESC 2023 Table 250-3)
Turbulence Intensity =	$I_z := C_{exp} \cdot \left(\frac{33}{z_s}\right)^{\frac{1}{6}} = 0.178$		(NESC 2023 Table 250-3)
Response Term =	$B_t := \left(\frac{1}{\left(1 + \left(0.56 \cdot \frac{z_s}{L_s}\right)\right)}\right)^{0.5} = 0.926$		(NESC 2023 Table 250-3)
Gust Response Factor =	$Grf := \frac{\left(1 + \left(4.61 \cdot I_z \cdot B_t\right)\right)}{\left(1 + 6.1 \cdot I_z\right)} = 0.844$		(NESC 2023 Table 250-3)
Wind Pressure =	$qz := 0.00256 \cdot Kz \cdot V^2 \cdot Grf \cdot psf = 39.1 \frac{lb}{ft^2}$		(NESC 2023 Section 250.C.1)

NESC Extreme Ice w/ Wind Components

Heavy Wind Pressure =	$p_{ex} := 6.4 \cdot psf$	(User Input NESC 2023 Figure 250-3 & Table 250-4)
Radial Ice Thickness =	$Ir_{ex} := 0.75 \cdot in$	(User Input NESC 2023 Figure 250-3)

Shape Factors

Shape Factor for Round Members =	$Cd_R := 1.3$	(User Input)
Shape Factor for Flat Members =	$Cd_F := 1.6$	(User Input)
Shape Factor for Open Lattice =	$Cd_{OL} := 3.2$	(User Input)
Shape Factor for Coax Cables Attached to Pole =	$Cd_{coax} := 1.6$	(User Input)

Overload Factors

Overload Factors for Wind Loads:

NESC Heavy Loading =	**2.5**	(User Input)	Apply in Risa-3D Analysis
NESC Extreme Loading =	**1.0**	(User Input)	Apply in Risa-3D Analysis
NESC Extreme Ice w/ Wind Loading =	**1.0**	(User Input)	Apply in Risa-3D Analysis

Overload Factors for Vertical Loads:

NESC Heavy Loading =	**1.5**	(User Input)	Apply in Risa-3D Analysis
NESC Extreme Loading =	**1.0**	(User Input)	Apply in Risa-3D Analysis
NESC Extreme Ice w/ Wind Loading =	**1.0**	(User Input)	Apply in Risa-3D Analysis

Development of Wind & Ice Load on Mast

Mast Data: (Pipe 12. Sch. 40)

Mast Shape =	*Round*	(User Input)
Mast Diameter =	$D_{mast} := 12.75 \cdot in$	(User Input)
Mast Length =	$L_{mast} := 10 \cdot ft$	(User Input)
Mast Thickness =	$t_{mast} := 0.375 \cdot in$	(User Input)

Gravity Loads (without ice)

Weight of the Mast = Self Weight **(Computed internally by Risa-3D)** **BLC 1**

Gravity Loads (ice only)

Ice Area per Linear Foot = $Ai_{mast} := \frac{\pi}{4} \cdot \left(\left(D_{mast} + Ir \cdot 2 \right)^2 - {D_{mast}}^2 \right) = 0.1\ ft^2$ sq in

Weight of Ice on Mast = $W_{ICEmast} := Id \cdot Ai_{mast} = 8\ \frac{lb}{ft}$ **BLC 3**

Gravity Loads (Extreme ice only)

Extreme Ice Area per Linear Foot = $Ai_{mast} := \frac{\pi}{4} \cdot \left(\left(D_{mast} + Ir_{ex} \cdot 2 \right)^2 - {D_{mast}}^2 \right) = 0.2\ ft^2$ sq in

Weight of Extreme Ice on Mast = $W_{ICEmast} := Id \cdot Ai_{mast} = 12\ \frac{lb}{ft}$ **BLC 4**

Wind Load (NESE Heavy)

Mast Projected Surface Area w/ Ice = $AICE_{mast} := \left(D_{mast} + 2 \cdot Ir \right) = 1.146\ ft$ (per ft)

Total Mast Wind Force w/ Ice = $p \cdot Cd_{coax} \cdot AICE_{mast} = 7\ \frac{lb}{ft}$ **BLC 5**

Wind Load (NESC Extreme)

Mast Projected Surface Area = $A_{mast} := D_{mast} = 1.063\ ft$ (per ft)

Total Mast Wind Force (Above Structure) = $qz \cdot Cd_{coax} \cdot A_{mast} \cdot m = 83\ \frac{lb}{ft}$ **BLC 6**

Wind Load (NESE Extreme Ice w/ Wind)

Mast Projected Surface Area w/ Ice = $AICE_{mast} := \left(D_{mast} + 2 \cdot Ir_{ex} \right) = 1.188\ ft$ (per ft)

Total Mast Wind Force w/ Ice = $p_{ex} \cdot Cd_{coax} \cdot AICE_{mast} \cdot m = 15\ \frac{lb}{ft}$ **BLC 7**

Development of Wind & Ice Load on Antennas

Antenna Data:

Antenna Model =	Commscope FFVV-65B-R2	
Antenna Shape =	Flat	(User Input)
Antenna Height =	$L_{ant} := 71.969 \cdot in$	(User Input)
Antenna Width =	$W_{ant} := 19.606 \cdot in$	(User Input)
Antenna Thickness =	$T_{ant} := 7.756 \cdot in$	(User Input)
Antenna Weight =	$WT_{ant} := 70 \cdot lb$	(User Input)
Number of Antennas =	$N_{ant} := 3$	(User Input)

Gravity Load (without ice)

Weight of All Antennas = $Wt_{ant1} := WT_{ant} \cdot N_{ant} = 210\ lb$ **BLC 2**

Gravity Load (ice only)

Volume of Each Antenna = $V_{ant} := L_{ant} \cdot W_{ant} \cdot T_{ant} = 10944\ in^3$

Volume of Ice on Each Antenna = $V_{ice} := (L_{ant} + 2 \cdot Ir) \cdot (W_{ant} + 2 \cdot Ir) \cdot (T_{ant} + 2 \cdot Ir) - V_{ant} = 2222\ in^3$

Weight of Ice on Each Antenna = $W_{ICEant} := V_{ice} \cdot Id = 72\ lb$

Weight of Ice on All Antennas = $Wt_{ice.ant1} := W_{ICEant} \cdot N_{ant} = 216\ lb$ **BLC 3**

Gravity Load (Extreme ice only)

Volume of Extreme Ice on Each Antenna = $V_{ice.ex} := (L_{ant} + 2 \cdot Ir_{ex}) \cdot (W_{ant} + 2 \cdot Ir_{ex}) \cdot (T_{ant} + 2 \cdot Ir_{ex}) - V_{ant} = 3409\ in^3$

Weight of Extreme Ice on Each Antenna = $W_{ICE.exant} := V_{ice.ex} \cdot Id = 110\ lb$

Weight of Extreme Ice on All Antennas = $Wt_{ice.ex.ant1} := W_{ICE.exant} \cdot N_{ant} = 331\ lb$ **BLC 4**

Wind Load (NESC Heavy)

Surface Area for One Antenna w/ Ice = $SA_{ICEant} := (L_{ant} + 2 \cdot Ir) \cdot (W_{ant} + 2 \cdot Ir) = 10.4\ ft^2$

Antenna Projected Surface Area w/ Ice = $A_{ICEant} := SA_{ICEant} \cdot N_{ant} = 31.3\ ft^2$

Total Antenna Wind Force w/ Ice = $Fi_{ant1} := p \cdot Cd_F \cdot A_{ICEant} = 200\ lb$ **BLC 5**

Wind Load (NESC Extreme)

Surface Area for One Antenna = $SA_{ant} := L_{ant} \cdot W_{ant} = 9.8\ ft^2$

Antenna Projected Surface Area = $A_{ant} := SA_{ant} \cdot N_{ant} = 29.4\ ft^2$

Total Antenna Wind Force = $F_{ant1} := qz \cdot Cd_F \cdot A_{ant} \cdot m = 2301\ lb$ **BLC 6**

Wind Load (NESC Extreme Ice w/ Wind)

Surface Area for One Antenna w/ Extreme Ice = $SA_{ICE.exant} := (L_{ant} + 2 \cdot Ir_{ex}) \cdot (W_{ant} + 2 \cdot Ir_{ex}) = 10.8\ ft^2$

Antenna Projected Surface Area w/ Extreme Ice = $A_{ICE.exant} := SA_{ICE.exant} \cdot N_{ant} = 32.3\ ft^2$

Total Antenna Wind Force w/ Extreme Ice = $Fi_{ex.ant1} := p_{ex} \cdot Cd_F \cdot A_{ICE.exant} \cdot m = 414\ lb$ **BLC 7**

Development of Wind & Ice Load on Antennas

Antenna Data:

Antenna Model =	Samsung RF4450t-71A	
Antenna Shape =	Flat	(User Input)
Antenna Height =	$L_{ant} := 16.5 \cdot in$	(User Input)
Antenna Width =	$W_{ant} := 15 \cdot in$	(User Input)
Antenna Thickness =	$T_{ant} := 11 \cdot in$	(User Input)
Antenna Weight =	$WT_{ant} := 100 \cdot lb$	(User Input)
Number of Antennas =	$N_{ant} := 3$	(User Input)

Gravity Load (without ice)

Weight of All Antennas =	$Wt_{ant2} := WT_{ant} \cdot N_{ant} = 300\ lb$	BLC 2

Gravity Load (ice only)

Volume of Each Antenna =	$V_{ant} := L_{ant} \cdot W_{ant} \cdot T_{ant} = 2723\ in^3$	
Volume of Ice on Each Antenna =	$V_{ice} := (L_{ant} + 2 \cdot Ir) \cdot (W_{ant} + 2 \cdot Ir) \cdot (T_{ant} + 2 \cdot Ir) - V_{ant} = 637\ in^3$	
Weight of Ice on Each Antenna =	$W_{ICEant} := V_{ice} \cdot Id = 21\ lb$	
Weight of Ice on All Antennas =	$Wt_{ice.ant2} := W_{ICEant} \cdot N_{ant} = 62\ lb$	BLC 3

Gravity Load (Extreme ice only)

Volume of Extreme Ice on Each Antenna =	$V_{ice.ex} := (L_{ant} + 2 \cdot Ir_{ex}) \cdot (W_{ant} + 2 \cdot Ir_{ex}) \cdot (T_{ant} + 2 \cdot Ir_{ex}) - V_{ant} = 990\ in^3$	
Weight of Extreme Ice on Each Antenna =	$W_{ICE.exant} := V_{ice.ex} \cdot Id = 32\ lb$	
Weight of Extreme Ice on All Antennas =	$Wt_{ice.ex.ant2} := W_{ICE.exant} \cdot N_{ant} = 96\ lb$	BLC 4

Wind Load (NESC Heavy)

Surface Area for One Antenna w/ Ice =	$SA_{ICEant} := (L_{ant} + 2 \cdot Ir) \cdot (W_{ant} + 2 \cdot Ir) = 1.9\ ft^2$	
Antenna Projected Surface Area w/ Ice =	$A_{ICEant} := SA_{ICEant} \cdot N_{ant} = 5.8\ ft^2$	
Total Antenna Wind Force w/ Ice =	$Fi_{ant2} := p \cdot Cd_F \cdot A_{ICEant} = 37\ lb$	BLC 5

Wind Load (NESC Extreme)

Surface Area for One Antenna =	$SA_{ant} := L_{ant} \cdot W_{ant} = 1.7\ ft^2$	
Antenna Projected Surface Area =	$A_{ant} := SA_{ant} \cdot N_{ant} = 5.2\ ft^2$	
Total Antenna Wind Force =	$F_{ant2} := qz \cdot Cd_F \cdot A_{ant} \cdot m = 404\ lb$	BLC 6

Wind Load (NESC Extreme Ice w/ Wind)

Surface Area for One Antenna w/ Extreme Ice =	$SA_{ICE.exant} := (L_{ant} + 2 \cdot Ir_{ex}) \cdot (W_{ant} + 2 \cdot Ir_{ex}) = 2.1\ ft^2$	
Antenna Projected Surface Area w/ Extreme Ice =	$A_{ICE.exant} := SA_{ICE.exant} \cdot N_{ant} = 6.2\ ft^2$	
Total Antenna Wind Force w/ Extreme Ice =	$Fi_{ex.ant2} := p_{ex} \cdot Cd_F \cdot A_{ICE.exant} \cdot m = 79\ lb$	BLC 7

Development of Wind & Ice Load on Antennas

Antenna Data:

Antenna Model =	Samsung RF4451d-70A	
Antenna Shape =	Flat	(User Input)
Antenna Height =	$L_{ant} := 15 \cdot in$	(User Input)
Antenna Width =	$W_{ant} := 15 \cdot in$	(User Input)
Antenna Thickness =	$T_{ant} := 8.9 \cdot in$	(User Input)
Antenna Weight =	$WT_{ant} := 70 \cdot lb$	(User Input)
Number of Antennas =	$N_{ant} := 3$	(User Input)

Gravity Load (without ice)

Weight of All Antennas = $Wt_{ant3} := WT_{ant} \cdot N_{ant} = 210\ lb$ **BLC 2**

Gravity Load (ice only)

Volume of Each Antenna = $V_{ant} := L_{ant} \cdot W_{ant} \cdot T_{ant} = 2003\ in^3$

Volume of Ice on Each Antenna = $V_{ice} := (L_{ant} + 2 \cdot Ir) \cdot (W_{ant} + 2 \cdot Ir) \cdot (T_{ant} + 2 \cdot Ir) - V_{ant} = 532\ in^3$

Weight of Ice on Each Antenna = $W_{ICEant} := V_{ice} \cdot Id = 17\ lb$

Weight of Ice on All Antennas = $Wt_{ice.ant3} := W_{ICEant} \cdot N_{ant} = 52\ lb$ **BLC 3**

Gravity Load (Extreme ice only)

Volume of Extreme Ice on Each Antenna = $V_{ice.ex} := (L_{ant} + 2 \cdot Ir_{ex}) \cdot (W_{ant} + 2 \cdot Ir_{ex}) \cdot (T_{ant} + 2 \cdot Ir_{ex}) - V_{ant} = 829\ in^3$

Weight of Extreme Ice on Each Antenna = $W_{ICE.exant} := V_{ice.ex} \cdot Id = 27\ lb$

Weight of Extreme Ice on All Antennas = $Wt_{ice.ex.ant3} := W_{ICE.exant} \cdot N_{ant} = 81\ lb$ **BLC 4**

Wind Load (NESC Heavy)

Surface Area for One Antenna w/ Ice = $SA_{ICEant} := (L_{ant} + 2 \cdot Ir) \cdot (W_{ant} + 2 \cdot Ir) = 1.8\ ft^2$

Antenna Projected Surface Area w/ Ice = $A_{ICEant} := SA_{ICEant} \cdot N_{ant} = 5.3\ ft^2$

Total Antenna Wind Force w/ Ice = $Fi_{ant3} := p \cdot Cd_F \cdot A_{ICEant} = 34\ lb$ **BLC 5**

Wind Load (NESC Extreme)

Surface Area for One Antenna = $SA_{ant} := L_{ant} \cdot W_{ant} = 1.6\ ft^2$

Antenna Projected Surface Area = $A_{ant} := SA_{ant} \cdot N_{ant} = 4.7\ ft^2$

Total Antenna Wind Force = $F_{ant3} := qz \cdot Cd_F \cdot A_{ant} \cdot m = 367\ lb$ **BLC 6**

Wind Load (NESC Extreme Ice w/ Wind)

Surface Area for One Antenna w/ Extreme Ice = $SA_{ICE.exant} := (L_{ant} + 2 \cdot Ir_{ex}) \cdot (W_{ant} + 2 \cdot Ir_{ex}) = 1.9\ ft^2$

Antenna Projected Surface Area w/ Extreme Ice = $A_{ICE.exant} := SA_{ICE.exant} \cdot N_{ant} = 5.7\ ft^2$

Total Antenna Wind Force w/ Extreme Ice = $Fi_{ex.ant3} := p_{ex} \cdot Cd_F \cdot A_{ICE.exant} \cdot m = 73\ lb$ **BLC 7**

Development of Wind & Ice Load on Antennas

Antenna Data:

Antenna Model =	Raycap RDIDC-9181-PF-48		
Antenna Shape =	Flat	(User Input)	
Antenna Height =	$L_{ant} := 18.97 \cdot in$	(User Input)	
Antenna Width =	$W_{ant} := 16.20 \cdot in$	(User Input)	
Antenna Thickness =	$T_{ant} := 9.64 \cdot in$	(User Input)	
Antenna Weight =	$WT_{ant} := 25 \cdot lb$	(User Input)	
Number of Antennas =	$N_{ant} := 1$	(User Input)	
Gravity Load (without ice)			
Weight of All Antennas =	$Wt_{ant4} := WT_{ant} \cdot N_{ant} = 25\ lb$		**BLC 2**
Gravity Load (ice only)			
Volume of Each Antenna =	$V_{ant} := L_{ant} \cdot W_{ant} \cdot T_{ant} = 2963\ in^3$		
Volume of Ice on Each Antenna =	$V_{ice} := (L_{ant} + 2 \cdot Ir) \cdot (W_{ant} + 2 \cdot Ir) \cdot (T_{ant} + 2 \cdot Ir) - V_{ant} = 692\ in^3$		
Weight of Ice on Each Antenna =	$W_{ICEant} := V_{ice} \cdot Id = 22\ lb$		
Weight of Ice on All Antennas =	$Wt_{ice.ant4} := W_{ICEant} \cdot N_{ant} = 22\ lb$		**BLC 3**
Gravity Load (Extreme ice only)			
Volume of Extreme Ice on Each Antenna =	$V_{ice.ex} := (L_{ant} + 2 \cdot Ir_{ex}) \cdot (W_{ant} + 2 \cdot Ir_{ex}) \cdot (T_{ant} + 2 \cdot Ir_{ex}) - V_{ant} = 1074\ in^3$		
Weight of Extreme Ice on Each Antenna =	$W_{ICE.exant} := V_{ice.ex} \cdot Id = 35\ lb$		
Weight of Extreme Ice on All Antennas =	$Wt_{ice.ex.ant4} := W_{ICE.exant} \cdot N_{ant} = 35\ lb$		**BLC 4**
Wind Load (NESC Heavy)			
Surface Area for One Antenna w/ Ice =	$SA_{ICEant} := (L_{ant} + 2 \cdot Ir) \cdot (W_{ant} + 2 \cdot Ir) = 2.4\ ft^2$		
Antenna Projected Surface Area w/ Ice =	$A_{ICEant} := SA_{ICEant} \cdot N_{ant} = 2.4\ ft^2$		
Total Antenna Wind Force w/ Ice =	$Fi_{ant4} := p \cdot Cd_F \cdot A_{ICEant} = 15\ lb$		**BLC 5**
Wind Load (NESC Extreme)			
Surface Area for One Antenna =	$SA_{ant} := L_{ant} \cdot W_{ant} = 2.1\ ft^2$		
Antenna Projected Surface Area =	$A_{ant} := SA_{ant} \cdot N_{ant} = 2.1\ ft^2$		
Total Antenna Wind Force =	$F_{ant4} := qz \cdot Cd_F \cdot A_{ant} \cdot m = 167\ lb$		**BLC 6**
Wind Load (NESC Extreme Ice w/ Wind)			
Surface Area for One Antenna w/ Extreme Ice =	$SA_{ICE.exant} := (L_{ant} + 2 \cdot Ir_{ex}) \cdot (W_{ant} + 2 \cdot Ir_{ex}) = 2.5\ ft^2$		
Antenna Projected Surface Area w/ Extreme Ice =	$A_{ICE.exant} := SA_{ICE.exant} \cdot N_{ant} = 2.5\ ft^2$		
Total Antenna Wind Force w/ Extreme Ice =	$Fi_{ex.ant4} := p_{ex} \cdot Cd_F \cdot A_{ICE.exant} \cdot m = 32\ lb$		**BLC 7**

Development of Wind & Ice Load on Antenna Mounts

Mount Data:

Mount Type =	(2) SitePro Dual Mount Assemblies (UDS-NP) w/ (6) 2 Std. x 6'-0" pipe masts.			
Mount Shape =	Flat	(User Input)		
Mount Projected Surface Area =	$CdAa := 17.2 \cdot sf$	(User Input)		
Mount Projected Surface Area w/ Ice =	$CdAa_{ice} := 22.3 \cdot sf$	(User Input)		
Mount Projected Surface Area w/ Extreme Ice =	$CdAa_{ice.ex} := 24.9 \cdot sf$	(User Input)		
Mount Weight =	$WT_{mnt} := 844 \cdot lb$	(User Input)		
Mount Weight w/ Ice =	$WT_{mnt.ice} := 1002 \cdot lb$	(User Input)		
Mount Weight w/ Extreme Ice =	$WT_{mnt.ice.ex} := 1097 \cdot lb$	(User Input)		
Gravity Loads (without ice)				
Weight of All Mounts =	$Wt_{mnt1} := WT_{mnt} = 844\ lb$		lbs	**BLC 2**
Gravity Load (ice only)				
Weight of Ice on All Mounts =	$Wt_{ice.mnt1} := (WT_{mnt.ice} - WT_{mnt}) = 158\ lb$		lbs	**BLC 3**
Gravity Load (Extreme ice only)				
Weight of Extreme Ice on All Mounts =	$Wt_{ice.ex.mnt1} := (WT_{mnt.ice.ex} - WT_{mnt}) = 253\ lb$		lbs	**BLC 4**
Wind Load (NESC Heavy)				
Total Mount Wind Force w/ Ice =	$Fi_{mnt1} := p \cdot CdAa_{ice} = 89\ lb$		lbs	**BLC 5**
Wind Load (NESC Extreme)				
Total Mount Wind Force =	$F_{mnt1} := qz \cdot CdAa \cdot m = 842\ lb$		lbs	**BLC 6**
Wind Load (NESC Extreme Ice w/ Wind)				
Total Mount Wind Force w/ Extreme Ice =	$Fi_{ex.mnt1} := p_{ex} \cdot CdAa_{ice.ex} \cdot m = 199\ lb$		lbs	**BLC 7**

Total Pipe Length =	$TPL := 6 \cdot ft \cdot 6 = 36\ ft$
Total Antenna Length =	$TAL := 72 \cdot in \cdot 3 + 16.5 \cdot in \cdot 3 + 15 \cdot in \cdot 3 = 25.875\ ft$
Exposed Pipe Area =	$ExPA := (TPL - TAL) \cdot 2.375 \cdot in = 2.004\ ft^2$
CaAa =	$1.3 \cdot ExPA + (3.5 \cdot in) \cdot 60 \cdot in \cdot 6 \cdot 1.3 + 4 \cdot in \cdot 12 \cdot in \cdot 6 \cdot 1.6 = 17.18\ ft^2$
Exposed Pipe Area (with Ice) =	$ExPA := (TPL - TAL) \cdot (2.375 \cdot in + 2 \cdot lr) = 2.848\ ft^2$
CaAa (with ice) =	$1.3 \cdot ExPA + (3.5 \cdot in + 2 \cdot lr) \cdot 60 \cdot in \cdot 6 \cdot 1.3 + (4 \cdot in + 2 \cdot lr) \cdot 12 \cdot in \cdot 6 \cdot 1.6 = 22.3\ ft^2$
Exposed Pipe Area (with Extreme Ice) =	$ExPA := (TPL - TAL) \cdot (2.375 \cdot in + 2 \cdot lr_{ex}) = 3.27\ ft^2$
CaAa (with Extreme ice) =	$1.3 \cdot ExPA + (3.5 \cdot in + 2 \cdot lr_{ex}) \cdot 60 \cdot in \cdot 6 \cdot 1.3 + (4 \cdot in + 2 \cdot lr_{ex}) \cdot 12 \cdot in \cdot 6 \cdot 1.6 = 24.9\ ft^2$
Mount Weight =	$356 \cdot lb \cdot 2 + 3.66 \cdot plf \cdot 6 \cdot ft \cdot 6 = 844\ lb$

$$\left(((2.375 \cdot in + 2 \cdot lr)^2 - (2.375 \cdot in)^2) \cdot \frac{\pi}{4} \cdot 72 \cdot in \cdot 6 + ((3.5 \cdot in + 2 \cdot lr)^2 - (3.5 \cdot in)^2) \cdot \frac{\pi}{4} \cdot 60 \cdot in \cdot 6 + ((4 \cdot in + 2 \cdot lr)^2 - (4 \cdot in)^2) \cdot 12 \cdot in \cdot 6\right) \cdot (ld) = 158\ lb$$

$$\left(((2.375 \cdot in + 2 \cdot lr_{ex})^2 - (2.375 \cdot in)^2) \cdot \frac{\pi}{4} \cdot 72 \cdot in \cdot 6 + ((3.5 \cdot in + 2 \cdot lr_{ex})^2 - (3.5 \cdot in)^2) \cdot \frac{\pi}{4} \cdot 60 \cdot in \cdot 6 + ((4 \cdot in + 2 \cdot lr_{ex})^2 - (4 \cdot in)^2) \cdot 12 \cdot in \cdot 6\right) \cdot (ld) = 253\ lb$$

Development of Wind & Ice Load on Coax Cables

Coax Cable Data:

Coax Type =	1-1/4" Hybrid Cable		
Shape =	*Round*	(User Input)	
Coax Outside Diameter =	$D_{coax} := 1.6 \cdot in$	(User Input)	
Coax Cable Length =	$L_{coax} := 10 \cdot ft$	(User Input)	
Weight of Coax per foot =	$Wt_{coax} := 2.35 \cdot plf$	(User Input)	
Total Number of Coax =	$N_{coax} := 1$	(User Input)	
No. of Coax Projecting Outside Face of Member =	$NP_{coax} := 1$	(User Input)	
Gravity Loads (without ice)			
Weight of all cables w/o ice =	$WT_{coax} := Wt_{coax} \cdot N_{coax} = 2 \frac{lb}{ft}$		**BLC 2**
Gravity Load (ice only)			
Ice Area per Linear Foot =	$Ai_{coax} := \frac{\pi}{4} \cdot \left(\left(D_{coax} + 2 \cdot Ir \right)^2 - {D_{coax}}^2 \right) = 3.3\ in^2$		
Ice Weight All Coax per foot =	$WTi_{coax} := N_{coax} \cdot Id \cdot Ai_{coax} = 1 \frac{lb}{ft}$		**BLC 3**
Gravity Load (Extreme ice only)			
Extreme Ice Area per Linear Foot =	$Ai_{coax} := \frac{\pi}{4} \cdot \left(\left(D_{coax} + 2 \cdot Ir_{ex} \right)^2 - {D_{coax}}^2 \right) = 5.5\ in^2$		
Extreme Ice Weight All Coax per foot =	$WTi_{coax} := N_{coax} \cdot Id \cdot Ai_{coax} = 2 \frac{lb}{ft}$		**BLC 4**
Wind Load (NESC Heavy)			
Coax projected surface area w/ Ice =	$AICE_{coax} := NP_{coax} \cdot \left(D_{coax} + 2 \cdot Ir \right) = 2.6\ in$		
Total Coax Wind Force w/ Ice =	$Fi_{coax} := p \cdot Cd_{coax} \cdot AICE_{coax} = 1 \frac{lb}{ft}$		**BLC 5**
Wind Load (NESC Extreme)			
Coax projected surface area =	$A_{coax} := \left(NP_{coax} \cdot D_{coax} \right) = 1.6\ in$		
Total Coax Wind Force (Above NU Structure) =	$F_{coax} := qz \cdot Cd_{coax} \cdot A_{coax} \cdot m = 10 \frac{lb}{ft}$		**BLC 6**
Wind Load (NESC Extreme Ice w/ Wind)			
Coax projected surface area w/ Ice =	$AICE_{coax} := NP_{coax} \cdot \left(D_{coax} + 2 \cdot Ir_{ex} \right) = 3.1\ in$		
Total Coax Wind Force w/ Ice =	$Fi_{coax} := p_{ex} \cdot Cd_{coax} \cdot AICE_{coax} \cdot m = 3 \frac{lb}{ft}$		**BLC 7**

Model Settings

Number of Reported Sections	5
Number of Internal Sections	100
Member Area Load Mesh Size (in^2)	144
Consider Shear Deformation	Yes
Consider Torsional Warping	Yes
Approximate Mesh Size (in)	12
Transfer Forces Between Intersecting Wood Walls	Yes
Increase Wood Wall Nailing Capacity for Wind Loads	Yes
Include P-Delta for Walls	Yes
Optimize Masonry and Wood Walls	No
Maximum Number of Iterations	3
Single	No
Multiple (Optimum)	Yes
Maximum	No

Global Axis corresponding to vertical direction	Y
Convert Existing Data	Yes
Default Global Plane for z-axis	XZ
Plate Local Axis Orientation	Nodal

Hot Rolled Steel	AISC 14th (360-10): LRFD
Stiffness Adjustment	Yes (Iterative)
Notional Annex	None
Connections	AISC 14th (360-10): ASD
Cold Formed Steel	AISI 1999: ASD
Stiffness Adjustment	Yes (Iterative)
Wood	AF&PA NDS-91/97: ASD
Temperature	< 100F
Concrete	ACI 318-02
Masonry	ACI 530-05: ASD
Aluminum	AA ADM1-05: ASD
Structure Type	Building
Stiffness Adjustment	Yes (Iterative)
Stainless	AISC 14th (360-10): ASD
Stiffness Adjustment	Yes (Iterative)

Analysis Methodology	PCA Load Contour Method
Parme Beta Factor	0.65

Compression Stress Block	Rectangular Stress Block
Analyze using Cracked Sections	Yes
Leave room for horizontal rebar splices (2*d bar spacing)	Yes
List forces which were ignored for design in the Detail Report	Yes

Column Min Steel	1
Column Max Steel	8
Rebar Material Spec	ASTM A615
Warn if beam-column framing arrangement is not understood	No
Number of Shear Regions	4
Region 2 & 3 Spacing Increase Increment (in)	4

Code	UBC 1997

Model Settings (Continued)

Occupancy Cat	4
Seismic Zone	3
Base Elevation (ft)	
Include the weight of the structure in base shear calcs	No
C_a	0.36
C_v	0.54
T Z (sec)	
T X (sec)	
C_tZ	0.035
C_tX	0.035
R Z	8.5
R X	8.5
Ω_0Z	1
Ω_0X	1
ρ Z	1
ρ X	1

Hot Rolled Steel Properties

	Label	E [ksi]	G [ksi]	Nu	Therm. Coeff. [1e⁵°F⁻¹]	Density [k/ft³]	Yield [ksi]	Ry	Fu [ksi]	Rt
1	A36 Gr.36	29000	11154	0.3	0.65	0.49	36	1.5	58	1.2
2	A572 Gr.50	29000	11154	0.3	0.65	0.49	50	1.1	65	1.2
3	A992	29000	11154	0.3	0.65	0.49	50	1.1	65	1.2
4	A500 Gr.42	29000	11154	0.3	0.65	0.49	42	1.3	58	1.1
5	A500 Gr.46	29000	11154	0.3	0.65	0.49	46	1.2	62	1.1
6	A53 Gr. B	29000	11154	0.3	0.65	0.49	35	1.5	60	1.2

Hot Rolled Steel Section Sets

	Label	Shape	Type	Design List	Material	Design Rule	Area [in²]	Iyy [in⁴]	Izz [in⁴]	J [in⁴]
1	Mast	PIPE_12.0	Column	Pipe	A500 Gr.42	Typical	13.7	262	262	523

Hot Rolled Steel Design Parameters

	Label	Shape	Length [ft]	Channel Conn.	a [ft]	Function
1	M1	Mast	10	N/A	N/A	Lateral

Member Primary Data

	Label	I Node	J Node	Section/Shape	Type	Design List	Material	Design Rule
1	M1	BOTCONNECTION	TOPMAST	Mast	Column	Pipe	A500 Gr.42	Typical

Node Coordinates

	Label	X [ft]	Y [ft]	Z [ft]	Detach From Diaphragm
1	BOTCONNECTION	0	0	0	
2	TOPMAST	0	10	0	

Node Boundary Conditions

	Node Label	X [k/in]	Y [k/in]	Z [k/in]	X Rot [k-ft/rad]	Y Rot [k-ft/rad]	Z Rot [k-ft/rad]
1	BOTCONNECTION	Reaction	Reaction	Reaction	Reaction	Reaction	Reaction

Member Point Loads (BLC 2 : Weight of Appurtenances)

	Member Label	Direction	Magnitude [k, k-ft]	Location [(ft, %)]
1	M1	Y	-0.21	9
2	M1	Y	-0.3	9
3	M1	Y	-0.21	9
4	M1	Y	-0.025	9
5	M1	Y	-0.844	9

Member Point Loads (BLC 3 : Weight of Ice Only on Struct)

	Member Label	Direction	Magnitude [k, k-ft]	Location [(ft, %)]
1	M1	Y	-0.216	9
2	M1	Y	-0.062	9
3	M1	Y	-0.052	9
4	M1	Y	-0.022	9
5	M1	Y	-0.158	9

Member Point Loads (BLC 4 : Weight of Extreme Ice Only)

	Member Label	Direction	Magnitude [k, k-ft]	Location [(ft, %)]
1	M1	Y	-0.331	9
2	M1	Y	-0.096	9
3	M1	Y	-0.081	9
4	M1	Y	-0.035	9
5	M1	Y	-0.253	9

Member Point Loads (BLC 5 : NESC Heavy Wind on Structure)

	Member Label	Direction	Magnitude [k, k-ft]	Location [(ft, %)]
1	M1	X	0.2	9
2	M1	X	0.037	9
3	M1	X	0.034	9
4	M1	X	0.015	9
5	M1	X	0.089	9

Member Point Loads (BLC 6 : NESC Extreme Wind on Structure)

	Member Label	Direction	Magnitude [k, k-ft]	Location [(ft, %)]
1	M1	X	2.301	9
2	M1	X	0.404	9
3	M1	X	0.367	9
4	M1	X	0.167	9
5	M1	X	0.842	9

Member Point Loads (BLC 7 : NESC Extreme Ice w/ Wind on Stru)

	Member Label	Direction	Magnitude [k, k-ft]	Location [(ft, %)]
1	M1	X	0.414	9
2	M1	X	0.079	9
3	M1	X	0.073	9
4	M1	X	0.032	9
5	M1	X	0.199	9

Member Distributed Loads (BLC 2 : Weight of Appurtenances)

	Member Label	Direction	Start Magnitude [k/ft, F, ksf, k-ft/ft]	End Magnitude [k/ft, F, ksf, k-ft/ft]	Start Location [(ft, %)]	End Location [(ft, %)]
1	M1	Y	-0.002	-0.002	0	6

Member Distributed Loads (BLC 3 : Weight of Ice Only on Struct)

	Member Label	Direction	Start Magnitude [k/ft, F, ksf, k-ft/ft]	End Magnitude [k/ft, F, ksf, k-ft/ft]	Start Location [(ft, %)]	End Location [(ft, %)]
1	M1	Y	-0.008	-0.008	0	%100
2	M1	Y	-0.001	-0.001	0	6

Member Distributed Loads (BLC 4 : Weight of Extreme Ice Only)

	Member Label	Direction	Start Magnitude [k/ft, F, ksf, k-ft/ft]	End Magnitude [k/ft, F, ksf, k-ft/ft]	Start Location [(ft, %)]	End Location [(ft, %)]
1	M1	Y	-0.012	-0.012	0	%100
2	M1	Y	-0.002	-0.002	0	6

Member Distributed Loads (BLC 5 : NESC Heavy Wind on Structure)

	Member Label	Direction	Start Magnitude [k/ft, F, ksf, k-ft/ft]	End Magnitude [k/ft, F, ksf, k-ft/ft]	Start Location [(ft, %)]	End Location [(ft, %)]
1	M1	X	0.007	0.007	0	%100
2	M1	X	0.001	0.001	0	6

Member Distributed Loads (BLC 6 : NESC Extreme Wind on Structure)

	Member Label	Direction	Start Magnitude [k/ft, F, ksf, k-ft/ft]	End Magnitude [k/ft, F, ksf, k-ft/ft]	Start Location [(ft, %)]	End Location [(ft, %)]
1	M1	X	0.083	0.083	0	%100
2	M1	X	0.01	0.01	0	6

Member Distributed Loads (BLC 7 : NESC Extreme Ice w/ Wind on Stru)

	Member Label	Direction	Start Magnitude [k/ft, F, ksf, k-ft/ft]	End Magnitude [k/ft, F, ksf, k-ft/ft]	Start Location [(ft, %)]	End Location [(ft, %)]
1	M1	X	0.015	0.015	0	%100
2	M1	X	0.003	0.003	0	6

Basic Load Cases

	BLC Description	Category	Y Gravity	Point	Distributed
1	Self Weight (Mast)	None	-1		
2	Weight of Appurtenances	None		5	1
3	Weight of Ice Only on Struct	None		5	2
4	Weight of Extreme Ice Only	None		5	2
5	NESC Heavy Wind on Structure	None		5	2
6	NESC Extreme Wind on Structure	None		5	2
7	NESC Extreme Ice w/ Wind on Stru	None		5	2

Load Combinations

	Description	Solve	P-Delta	BLC	Factor	BLC	Factor	BLC	Factor	BLC	Factor
1	NESC Heavy Wind on PCS Structure	Yes	Y	1	1.5	2	1.5	3	1.5	5	2.5
2	NESC Extreme Wind on PCS Structure	Yes	Y	1	1	2	1	6	1		
3	NESC Extreme Ice w/ Wind on PCS Structure	Yes	Y	1	1	2	1	4	1	7	1

Node Reactions

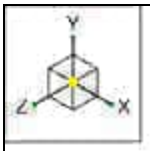
	LC	Node Label	X [k]	Y [k]	Z [k]	MX [k-ft]	MY [k-ft]	MZ [k-ft]
0	1	BOTCONNECTION	-1.128	3.995	0	0	0	9.371
1	1	Totals:	-1.128	3.995	0			
2	1	COG (ft):	X: 0	Y: 8.139	Z: 0			

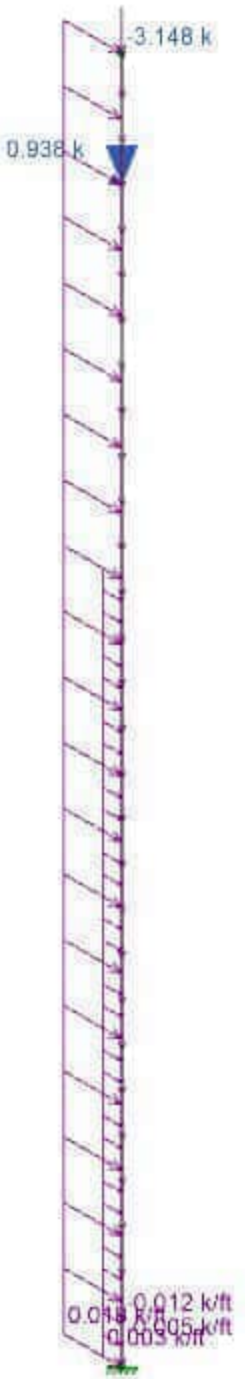
Node Reactions

	LC	Node Label	X [k]	Y [k]	Z [k]	MX [k-ft]	MY [k-ft]	MZ [k-ft]
0	2	BOTCONNECTION	-4.971	2.067	0	0	0	41.091
1	2	Totals:	-4.971	2.067	0			
2	2	COG (ft):	X: 0	Y: 8.063	Z: 0			

Node Reactions

	LC	Node Label	X [k]	Y [k]	Z [k]	MX [k-ft]	MY [k-ft]	MZ [k-ft]
0	3	BOTCONNECTION	-0.965	2.995	0	0	0	7.986
1	3	Totals:	-0.965	2.995	0			
2	3	COG (ft):	X: 0	Y: 8.169	Z: 0			





Loads: LC 1, NESC Heavy Wind on PCS Structure

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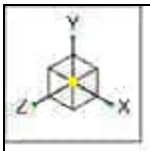
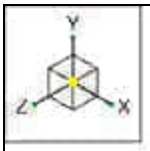
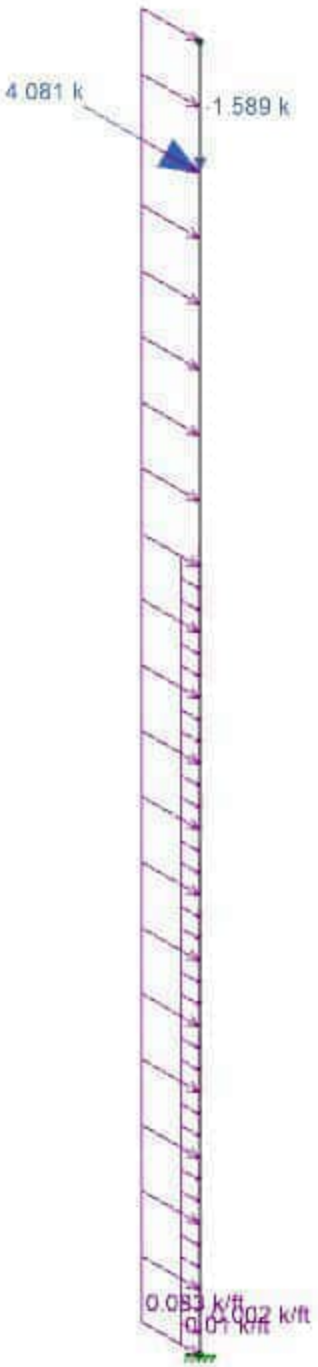
	TJL		NESC.r3d
	23009.10 / Dish BOBOS…		



Results for LC 1, NESC Heavy Wind on PCS Structure
Reaction and Moment Units are kips and kip-ft

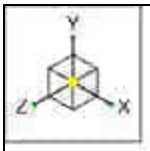
RISA	CENTEK Engineering, Inc.	Structure # 6063A - Mast	
	TJL		NESC.r3d
	23009.10 / Dish BOBOS…		





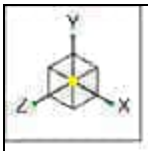
Loads: LC 2, NESC Extreme Wind on PCS Structure

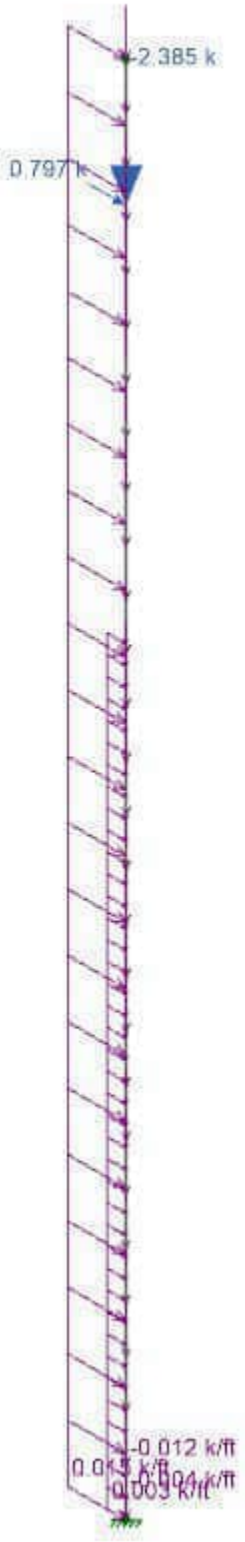
RISA	CENTEK Engineering, Inc.	Structure # 6063A - Mast	
	TJL		NESC.r3d
	23009.10 / Dish BOBOS…		



Results for LC 2, NESC Extreme Wind on PCS Structure
Reaction and Moment Units are kips and kip-ft

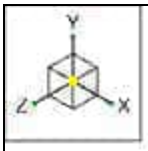
RISA	CENTEK Engineering, Inc.	Structure # 6063A - Mast	
	TJL		NESC.r3d
	23009.10 / Dish BOBOS…		





Loads: LC 3, NESC Extreme Ice w/ Wind on PCS Structure

RISA	CENTEK Engineering, Inc.	Structure # 6063A - Mast	
	TJL		NESC.r3d
	23009.10 / Dish BOBOS0…		



Results for LC 3, NESC Extreme Ice w/ Wind on PCS Structure
Reaction and Moment Units are kips and kip-ft

RISA	CENTEK Engineering, Inc.	Structure # 6063A - Mast	
	TJL		NESC.r3d
	23009.10 / Dish BOBOS0…		

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

Subject: Coax Cable on Pole

Location: Waterford, CT

Rev. 2: 2/20/24

Prepared by: T.J.L Checked by: C.F.C.
Job No. 23009.10

Coax Cable on Pole

Coaxial Cable Span	$Coax_{Span} := 10 \cdot ft$		(User Input)
Heavy Wind Pressure =	$p := 4 \cdot psf$		(User Input NESC 2023 Figure 250-1 & Table 250-1)
Radial Ice Thickness =	$Ir := 0.5 \cdot in$		(User Input NESC 2023 Figure 250-1 & Table 250-1)
Extreme Ice w/ Wind Pressure =	$p_{ex} := 6.4 \cdot psf$		(User Input NESC 2023 Figure 250-3 & Table 250-4)
Extreme Radial Ice Thickness =	$Ir_{ex} := 0.75 \cdot in$		(User Input NESC 2023 Figure 250-3)
Radial Ice Density =	$Id := 56 \cdot pcf$		(User Input)
Basic Windspeed =	$V := 120$	mph	(User Input)
Height to Top of Coax Above Grade =	$TC := 85$	ft	(User Input)
Multiplier Gust Response Factor =	$m := 1.00$		(User Input - Only for NESC Extreme wind case)
Velocity Pressure Coefficient =	$Kz := 2.01 \cdot \left(\frac{0.67 \cdot TC}{900}\right)^{\frac{2}{9.5}} = 1.124$		(NESC 2023 Table 250-2)
Turbulence Intensity Constant =	$C_{exp} := 0.2$		(NESC 2023 Table 250-3)
Integral Length Scale of Turbulence Constant =	$L_s := 220$		(NESC 2023 Table 250-3)
Effective Height =	$z_s := 0.67 \cdot TC = 56.95$		(NESC 2023 Table 250-3)
Turbulence Intensity =	$I_z := C_{exp} \cdot \left(\frac{33}{z_s}\right)^{\frac{1}{6}} = 0.183$		(NESC 2023 Table 250-3)
Response Term =	$B_t := \left(\frac{1}{\left(1 + \left(0.56 \cdot \frac{z_s}{L_s}\right)\right)}\right)^{0.5} = 0.935$		(NESC 2023 Table 250-3)
Gust Response Factor =	$Grf := \frac{\left(1 + \left(4.61 \cdot I_z \cdot B_t\right)\right)}{\left(1 + 6.1 \cdot I_z\right)} = 0.845$		(NESC 2023 Table 250-3)
Wind Pressure =	$qz := 0.00256 \cdot Kz \cdot V^2 \cdot Grf = 35$	psf	(NESC 2023 Section 250.C.1)
Diameter of Coax Cable =	$D_{coax} := 1.6 \cdot in$		(User Input)
Weight of Coax Cable =	$W_{coax} := 2.35 \cdot plf$		(User Input)
Number of Coax Cables =	$N_{coax} := 1$		(User Input)
Number of Projected Coax Cables =	$NP_{coax} := 1$		(User Input)

CENTEK engineering
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63-2 North Branford Road P: (203) 488-0580
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Subject: Coax Cable on Pole

Location: Waterford, CT

Rev. 2: 2/20/24

Prepared by: T.J.L Checked by: C.F.C.
Job No. 23009.10

Shape Factor =	$Cd_{coax} := 1.6$	*(User Input)*
Overload Factor for NESC Heavy Wind Transverse Load =	$OF_{HWT} := 2.5$	*(User Input)*
Overload Factor for NESC Heavy Wind Vertical Load =	$OF_{HWV} := 1.5$	*(User Input)*
Overload Factor for NESC Extreme Wind Transverse Load =	$OF_{EWT} := 1.0$	*(User Input)*
Overload Factor for NESC Extreme Wind Vertical Load =	$OF_{EWV} := 1.0$	*(User Input)*
Overload Factor for NESC Extreme Ice w/ Wind Transverse Load =	$OF_{EIT} := 1.0$	*(User Input)*
Overload Factor for NESC Extreme Ice w/ Wind Vertical Load =	$OF_{EIV} := 1.0$	*(User Input)*
Projected width without Ice =	$A := \langle NP_{coax} \cdot D_{coax} \rangle = 1.6\ in$	
Projected width with Ice =	$A_{ice} := \langle NP_{coax} \cdot D_{coax} + 2 \cdot Ir \rangle = 2.6\ in$	
Projected width with Extreme Ice =	$A_{ice.ex} := \langle NP_{coax} \cdot D_{coax} + 2 \cdot Ir_{ex} \rangle = 3.1\ in$	
Ice Area per Liner Ft =	$Ai_{coax} := \frac{\pi}{4} \cdot \left(\left(D_{coax} + 2 \cdot Ir \right)^2 - {D_{coax}}^2 \right) = 0.023\ ft^2$	
Weight of Ice on All Coax Cables =	$W_{ice} := Ai_{coax} \cdot Id \cdot N_{coax} = 1.283\ plf$	
Extreme Ice Area per Liner Ft =	$Ai_{coax.ex} := \frac{\pi}{4} \cdot \left(\left(D_{coax} + 2 \cdot Ir_{ex} \right)^2 - {D_{coax}}^2 \right) = 0.038\ ft^2$	
Weight of Extreme Ice on All Coax Cables =	$W_{ice.ex} := Ai_{coax.ex} \cdot Id \cdot N_{coax} = 2.153\ plf$	

Heavy Wind Vertical Load =

$$Heavy\_WInd_{Vert} := \overrightarrow{\left(\left(N_{coax} \cdot W_{coax} + W_{ice} \right) \cdot Coax_{Span} \cdot OF_{HWV} \right)}$$

Heavy Wind Transverse Load =

$$Heavy\_Wind_{Trans} := \overrightarrow{\left(p \cdot A_{ice} \cdot Cd_{coax} \cdot Coax_{Span} \cdot OF_{HWT} \right)}$$

$Heavy\_WInd_{Vert} = 54\ lb$ $Heavy\_Wind_{Trans} = 35\ lb$

Extreme Wind Vertical Load =

$$Extreme\_Wind_{Vert} := \overrightarrow{\left(N_{coax} \cdot W_{coax} \cdot Coax_{Span} \cdot OF_{EWV} \right)}$$

Extreme Wind Transverse Load =

$$Extreme\_Wind_{Trans} := \overrightarrow{\left(\left(qz \cdot psf \cdot A \cdot Cd_{coax} \right) \cdot Coax_{Span} \cdot OF_{EWT} \right)}$$

$Extreme\_Wind_{Vert} = 24\ lb$ $Extreme\_Wind_{Trans} = 75\ lb$

Extreme Ice w/ Wind Vertical Load =

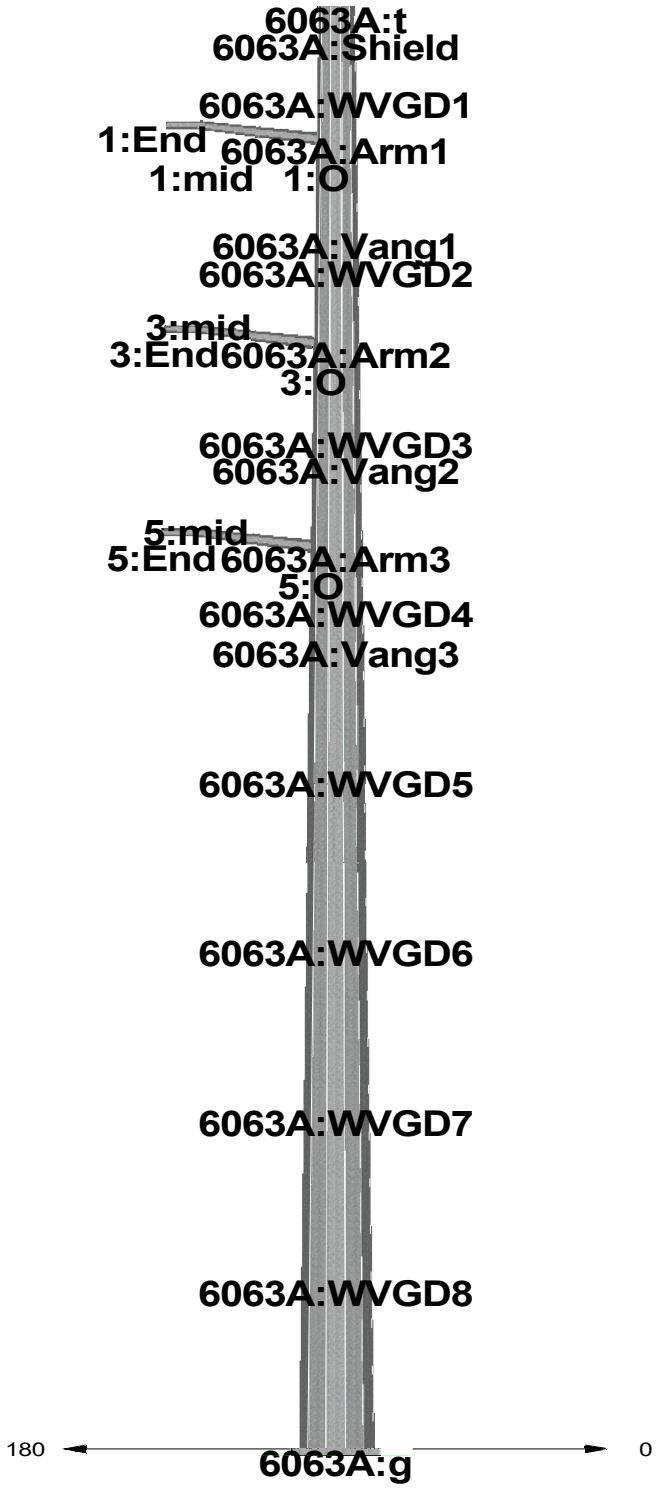
$$Extreme\_Ice_{Vert} := \overrightarrow{\left(\left(N_{coax} \cdot W_{coax} + W_{ice.ex} \right) \cdot Coax_{Span} \cdot OF_{EIV} \right)}$$

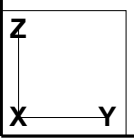
Extreme Ice w/ Wind Transverse Load =

$$Extreme\_Ice_{Trans} := \overrightarrow{\left(p_{ex} \cdot A_{ice.ex} \cdot Cd_{coax} \cdot Coax_{Span} \cdot OF_{EIT} \right)}$$

$Extreme\_Ice_{Vert} = 45\ lb$ $Extreme\_Ice_{Trans} = 26\ lb$

Centek Engineering Inc, Project: "cl&p structure # 6063A"
PLS-POLE Version 18.01, 3:55:43 PM Wednesday, December 6, 2023
Undeformed geometry displayed





10 (ft)

Project Name : 23009.10 - Waterford
Project Notes: Eversource # 6063A/ Dish BOBOS00935A
Project File : J:\Jobs\2300900.WI\10_BOBOS00935A\05_Structural\Tower Analysis\Backup Documentation\Rev (3)\Calcs\PLS-Pole\cl&p structure # 6063A.pol
Date run : 9:43:46 AM Friday, March 1, 2024
by : PLS-POLE Version 18.01
Licensed to : Centek Engineering Inc

Successfully performed nonlinear analysis

The model has 0 warnings.

Loads from file: J:\Jobs\2300900.WI\10_BOBOS00935A\05_Structural\Tower Analysis\Backup Documentation\Rev (3)\Calcs\PLS-Pole\cl&p # 6063A.lca

*** Analysis Results:

Maximum element usage is 89.46% for Steel Pole "6063A" in load case "NESC Heavy"
Maximum insulator usage is 41.44% for Clamp "12" in load case "NESC Extreme"

Foundation Design Forces For All Load Cases:

Note: loads are factored.

Load Case	Foundation Description	Axial Force (kips)	Shear Force (kips)	Resultant Force (kips)	Bending Moment (ft-k)	Foundation Usage %
NESC Heavy	6063A:g	57.80	94.07	110.40	5902.77	0.00
NESC Extreme	6063A:g	34.23	86.11	92.66	5266.09	0.00
NESC Extreme Ice	6063A:g	48.61	75.77	90.02	4783.30	0.00

Summary of Joint Support Reactions For All Load Cases:

Load Case	Joint Label	Long. Force (kips)	Tran. Force (kips)	Vert. Force (kips)	Shear Force (kips)	Tran. Moment (ft-k)	Long. Moment (ft-k)	Bending Moment (ft-k)	Vert. Moment (ft-k)	Found. Usage %
NESC Heavy	6063A:g	-19.59	-92.00	-57.80	94.07	5766.45	-1261.29	5902.77	-0.04	0.00
NESC Extreme	6063A:g	-13.13	-85.10	-34.23	86.11	5193.95	-868.69	5266.09	-0.02	0.00
NESC Extreme Ice	6063A:g	-15.20	-74.23	-48.61	75.77	4681.70	-980.65	4783.30	-0.02	0.00

Summary of Tip Deflections For All Load Cases:

Note: positive tip load results in positive deflection

Load Case	Joint Label	Long. Defl. (in)	Tran. Defl. (in)	Vert. Defl. (in)	Resultant Defl. (in)	Long. Rot. (deg)	Tran. Rot. (deg)	Twist (deg)
NESC Heavy	6063A:t	7.55	33.94	-0.77	34.78	0.70	-3.11	-0.00
NESC Extreme	6063A:t	5.48	30.56	-0.61	31.05	0.56	-2.82	-0.00
NESC Extreme Ice	6063A:t	5.89	27.70	-0.51	28.33	0.55	-2.54	-0.00

Tubes Summary:

Pole Label	Tube Num.	Weight (lbs)	Load Case	Maximum Usage %	Resultant Moment (ft-k)
6063A	1	6254	NESC Heavy	71.43	1701.94

6063A 2 12548 NESC Heavy 89.46 5902.77

*** Overall summary for all load cases - Usage = Maximum Stress / Allowable Stress

Summary of Steel Pole Usages:

Steel Pole Label	Maximum Usage %	Load Case	Height AGL (ft)	Segment Number	Weight (lbs)
6063A	89.46	NESC Heavy	2.5	25	23196.9

Summary of Tubular Davit Usages:

Tubular Davit Label	Maximum Usage %	Load Case	Height AGL (ft)	Segment Number	Weight (lbs)
1	1.53	NESC Heavy	77.4	1	113.1
3	1.53	NESC Heavy	65.4	1	113.1
5	1.53	NESC Heavy	53.4	1	113.1

*** Maximum Stress Summary for Each Load Case

Summary of Maximum Usages by Load Case:

Load Case	Maximum Usage %	Element Label	Element Type
NESC Heavy	89.46	6063A	Steel Pole
NESC Extreme	79.24	6063A	Steel Pole
NESC Extreme Ice	72.48	6063A	Steel Pole

Summary of Steel Pole Usages by Load Case:

Load Case	Maximum Usage %	Steel Pole Label	Height AGL (ft)	Segment Number
NESC Heavy	89.46	6063A	2.5	25
NESC Extreme	79.24	6063A	2.5	25
NESC Extreme Ice	72.48	6063A	2.5	25

Summary of Base Plate Usages by Load Case:

Load Case	Pole Label	Bend Line #	Length (in)	Vertical Load (kips)	X Moment (ft-k)	Y Moment (ft-k)	Bending Stress (ksi)	Bolt Moment Sum (ft-k)	# Bolts Acting On Bend Line	Max Bolt Load For Bend Line (kips)	Minimum Plate Thickness (in)	Usage %
NESC Heavy	6063A	11	22.691	53.403	5766.445	-1261.293	42.511	214.363	4	229.048	3.688	85.02
NESC Extreme	6063A	11	22.691	29.837	5193.946	-868.695	36.931	186.226	4	201.455	3.438	73.86
NESC Extreme Ice	6063A	11	22.691	44.211	4681.700	-980.651	34.332	173.120	4	185.364	3.315	68.66

Summary of Tubular Davit Usages by Load Case:

Load Case	Maximum Usage %	Tubular Davit Label	Height AGL (ft)	Segment Number
NESC Heavy	1.53	5	53.4	1

NESC Extreme	1.00	5	53.4	1
NESC Extreme Ice	1.02	5	53.4	1

Summary of Insulator Usages:

Insulator Label	Insulator Type	Maximum Usage %	Load Case	Weight (lbs)
1	Clamp	26.06	NESC Heavy	0.0
2	Clamp	26.06	NESC Heavy	0.0
3	Clamp	26.06	NESC Heavy	0.0
4	Clamp	0.08	NESC Extreme	0.0
5	Clamp	0.08	NESC Extreme	0.0
6	Clamp	0.08	NESC Extreme	0.0
7	Clamp	0.08	NESC Extreme	0.0
8	Clamp	0.08	NESC Extreme	0.0
9	Clamp	0.08	NESC Extreme	0.0
10	Clamp	0.08	NESC Extreme	0.0
11	Clamp	0.08	NESC Extreme	0.0
12	Clamp	41.44	NESC Extreme	0.0
13	Clamp	40.24	NESC Extreme	0.0

*** Weight of structure (lbs):

Weight of Tubular Davit Arms:	339.4
Weight of Steel Poles:	23196.9
Total:	23536.3

*** End of Report

```
**************************************************************************
*                                                                        *
*                              PLS-POLE                                  *
*                    POLE AND FRAME ANALYSIS AND DESIGN                  *
*                Copyright Power Line Systems 1999-2023                  *
*                                                                        *
**************************************************************************

Project Name : 23009.10 - Waterford
Project Notes: Eversource # 6063A/ Dish BOBOS00935A
Project File : J:\Jobs\2300900.WI\10_BOBOS00935A\05_Structural\Tower Analysis\Backup Documentation\Rev (3)\Calcs\PLS-Pole\cl&p structure # 6063A.pol
Date run     : 9:43:45 AM Friday, March 1, 2024
by           : PLS-POLE Version 18.01
Licensed to  : Centek Engineering Inc

Successfully performed nonlinear analysis

The model has 0 warnings.
```

```
Modeling options:
  Offset Arms from Pole/Mast:   Yes
  Offset Braces from Pole/Mast: Yes
  Offset Guys from Pole/Mast:   Yes
  Offset Posts from Pole/Mast:  Yes
  Offset Strains from Pole/Mast:  Yes
  Use Alternate Convergence Process: No
  Steel poles and tubular arms checked with ASCE/SEI 48-05


Default Modulus of Elasticity for Steel = 29000.00 (ksi)
Default Weight Density for Steel = 490.00 (lbs/ft^3)
```

Steel Pole Properties:

Steel Pole Property	Stock Length Number	Default Embedded	Base Plate	Shape	Tip Diameter	Base Diameter	Taper	Default Drag	Tubes	Modulus of Elasticity	Weight Density	Shape At	Strength Check	Distance From	Ultimate Trans.	Ultimate Texture

Label	Length (ft)	Long. Load (ft)				Coef. (in)	Override (in)	Override (in/ft)		Override (ksi)	Override (lbs/ft^3)	Base	Type	Tip (ft)	Load (kips)	Load (kips)
6063A	6063A	85.00	0	Yes	12F	26.12	53.25	0	1.6	2 tubes	0	0	Calculated	0.000	0.0000	0.0000 Galvanized Steel

Steel Tubes Properties:

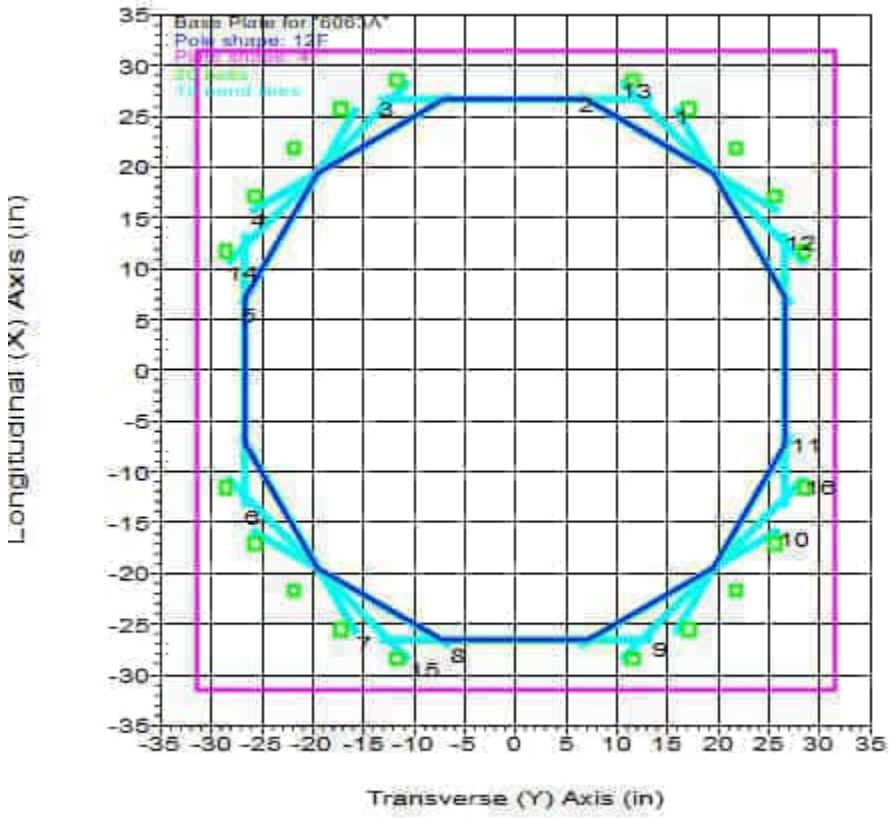
Pole Property	Tube No.	Length (ft)	Thickness (in)	Lap Length (ft)	Lap Factor	Lap Gap or Butt Offset (in)	Yield Stress (ksi)	Moment Cap. Override (ft-k)	Tube Weight (lbs)	Center of Gravity (ft)	Calculated Taper (in/ft)	Tube Top Diameter (in)	Tube Bot. Diameter (in)	1.5x Lap Length (ft)	Diam. Actual Overlap (ft)
6063A	1	45.83	0.375	5.830	0.000	0.000	65.000	0.000	6254	24.64	0.32800	26.12	41.15	5.050	5.830
6063A	2	45	0.5625	0.000	0.000	0.000	65.000	0.000	12548	23.72	0.32800	38.49	53.25	0.000	0.000

Base Plate Properties:

Pole Property	Plate Diam. (in)	Plate Shape	Plate Thick. (in)	Plate Weight (lbs)	Bend Line Length Override (in)	Hole Diam. (in)	Hole Shape	Steel Density (lbs/ft^3)	Steel Yield Stress (ksi)	Bolt Diam. (in)	Bolt Pattern Diam. (in)	Num. Of Bolts	Bolt Cage X Inertia (in^4)	Bolt Cage Y Inertia (in^4)
6063A	62.880	4F	4.000	4395	0.000	0.000		490.00	50.000	2.250	61.630	20	37736.55	37736.55

Base Plate Bolt Coordinates for Property "6063A":

Bolt X Coord.	Bolt Y Coord.	Bolt Angle (deg)
0.3781	0.9249	0
0.5557	0.8316	0
0.7071	0.7071	0
0.8316	0.5557	0
0.9249	0.3781	0



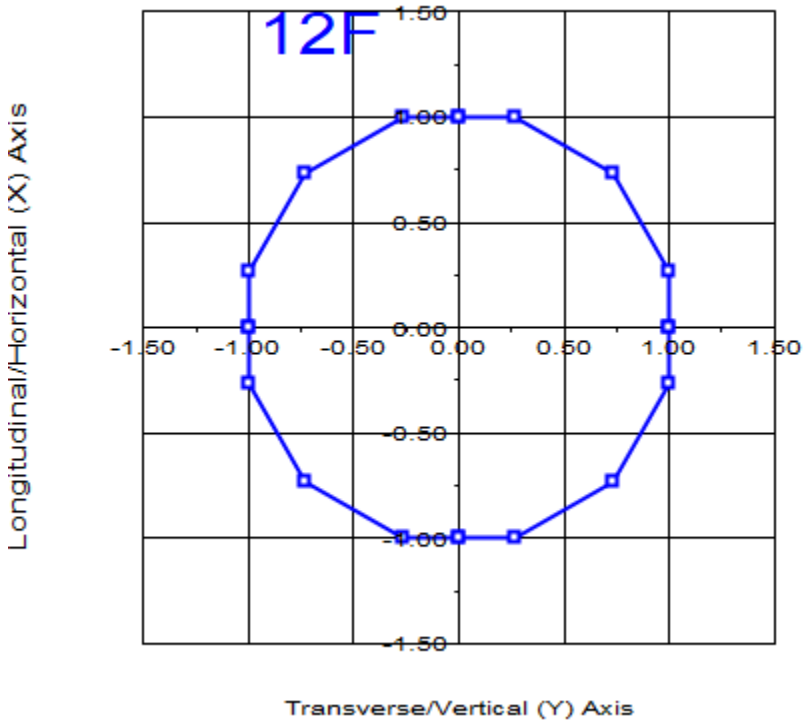
Steel Pole Connectivity:

Pole Label	Tip Joint	Base Joint	X of Base (ft)	Y of Base (ft)	Z of Base (ft)	Inclin. About X (deg)	Inclin. About Y (deg)	Property Set	Attach. Labels	Base Connect	Embed % Override	Embed C. Override (ft)
6063A			0	0	0	0	0	6063A 15 labels			0.00	0

Relative Attachment Labels for Steel Pole "6063A":

Joint Label	Distance From Origin/Top Joint (ft)	Global Z of Attach (ft)
6063A:Arm1	7.75	0.00
6063A:Arm2	19.75	0.00
6063A:Arm3	31.75	0.00
6063A:WVGD1	0.00	80.00
6063A:WVGD2	0.00	70.00

6063A:WVGD3	0.00	60.00
6063A:WVGD4	0.00	50.00
6063A:WVGD5	0.00	40.00
6063A:WVGD6	0.00	30.00
6063A:WVGD7	0.00	20.00
6063A:WVGD8	0.00	10.00
6063A:Shield	1.00	0.00
6063A:Vang1	13.33	0.00
6063A:Vang2	25.33	0.00
6063A:Vang3	37.33	0.00



Pole Steel Properties:

Warning: Capacities and usages printed in splices are listed for the inner tube except at the splice top which uses the outer tube. ??

Element Label	Joint Label	Joint Position	Rel. Dist. (ft)	Outer Diam. (in)	Area (in^2)	T-Moment Inertia (in^4)	L-Moment Inertia (in^4)	D/t	W/t Max.	Fy (ksi)	Fa Min. (ksi)	T-Moment Capacity (ft-k)	L-Moment Capacity (ft-k)
6063A	6063A:t	6063A:t Ori	0.00	26.12	31.04	2633.99	2633.99	0.00	16.0	65.00	65.00	1092.45	1092.45
6063A	6063A:Shield	6063A:Shield End	1.00	26.45	31.44	2735.94	2735.94	0.00	16.2	65.00	65.00	1120.66	1120.66
6063A	6063A:Shield	6063A:Shield Ori	1.00	26.45	31.44	2735.94	2735.94	0.00	16.2	65.00	65.00	1120.66	1120.66
6063A	6063A:WVGD1	6063A:WVGD1 End	5.00	27.76	33.02	3170.03	3170.03	0.00	17.2	65.00	65.00	1237.10	1237.10
6063A	6063A:WVGD1	6063A:WVGD1 Ori	5.00	27.76	33.02	3170.03	3170.03	0.00	17.2	65.00	65.00	1237.10	1237.10

6063A	6063A:Arm1	6063A:Arm1 End	7.75	28.66	34.11	3493.66	3493.66	0.00	17.8	65.00	65.00	1320.49	1320.49
6063A	6063A:Arm1	6063A:Arm1 Ori	7.75	28.66	34.11	3493.67	3493.67	0.00	17.8	65.00	65.00	1320.49	1320.49
6063A	#6063A:0	Tube 1 End	10.54	29.58	35.21	3843.79	3843.79	0.00	18.5	65.00	65.00	1407.88	1407.88
6063A	#6063A:0	Tube 1 Ori	10.54	29.58	35.21	3843.79	3843.79	0.00	18.5	65.00	65.00	1407.88	1407.88
6063A	6063A:Vang1	6063A:Vang1 End	13.33	30.49	36.31	4216.55	4216.55	0.00	19.1	65.00	65.00	1498.06	1498.06
6063A	6063A:Vang1	6063A:Vang1 Ori	13.33	30.49	36.31	4216.55	4216.55	0.00	19.1	65.00	65.00	1498.06	1498.06
6063A	6063A:WVGD2	6063A:WVGD2 End	15.00	31.04	36.97	4450.80	4450.80	0.00	19.5	65.00	65.00	1553.38	1553.38
6063A	6063A:WVGD2	6063A:WVGD2 Ori	15.00	31.04	36.97	4450.80	4450.80	0.00	19.5	65.00	65.00	1553.38	1553.38
6063A	6063A:Arm2	6063A:Arm2 End	19.75	32.60	38.85	5164.18	5164.18	0.00	20.6	65.00	65.00	1716.22	1716.22
6063A	6063A:Arm2	6063A:Arm2 Ori	19.75	32.60	38.85	5164.18	5164.18	0.00	20.6	65.00	65.00	1716.22	1716.22
6063A	#6063A:1	Tube 1 End	22.38	33.46	39.89	5589.26	5589.26	0.00	21.2	65.00	65.00	1809.69	1809.69
6063A	#6063A:1	Tube 1 Ori	22.38	33.46	39.89	5589.27	5589.27	0.00	21.2	65.00	65.00	1809.69	1809.69
6063A	6063A:WVGD3	6063A:WVGD3 End	25.00	34.32	40.93	6037.06	6037.06	0.00	21.8	65.00	65.00	1905.63	1905.63
6063A	6063A:WVGD3	6063A:WVGD3 Ori	25.00	34.32	40.93	6037.06	6037.06	0.00	21.8	65.00	65.00	1905.63	1905.63
6063A	6063A:Vang2	6063A:Vang2 End	25.33	34.43	41.06	6094.99	6094.99	0.00	21.9	65.00	65.00	1917.87	1917.87
6063A	6063A:Vang2	6063A:Vang2 Ori	25.33	34.43	41.06	6094.99	6094.99	0.00	21.9	65.00	65.00	1917.87	1917.87
6063A	#6063A:2	Tube 1 End	28.54	35.48	42.33	6677.95	6677.95	0.00	22.7	65.00	65.00	2038.95	2038.95
6063A	#6063A:2	Tube 1 Ori	28.54	35.48	42.33	6677.95	6677.95	0.00	22.7	65.00	65.00	2038.95	2038.95
6063A	6063A:Arm3	6063A:Arm3 End	31.75	36.53	43.60	7296.94	7296.94	0.00	23.4	65.00	65.00	2163.74	2163.74
6063A	6063A:Arm3	6063A:Arm3 Ori	31.75	36.53	43.60	7296.95	7296.95	0.00	23.4	65.00	65.00	2163.74	2163.74
6063A	6063A:WVGD4	6063A:WVGD4 End	35.00	37.60	44.88	7961.47	7961.47	0.00	24.2	65.00	65.00	2293.86	2293.86
6063A	6063A:WVGD4	6063A:WVGD4 Ori	35.00	37.60	44.88	7961.47	7961.47	0.00	24.2	65.00	65.00	2293.86	2293.86
6063A	6063A:Vang3	6063A:Vang3 End	37.33	38.36	45.81	8461.93	8461.93	0.00	24.7	65.00	65.00	2389.48	2389.48
6063A	6063A:Vang3	6063A:Vang3 Ori	37.33	38.36	45.81	8461.93	8461.93	0.00	24.7	65.00	65.00	2389.48	2389.48
6063A	#6063A:3	SpliceT End	40.00	39.24	46.86	9060.70	9060.70	0.00	25.4	65.00	65.00	2501.46	2501.46
6063A	#6063A:3	SpliceT Ori	40.00	39.24	46.86	9060.70	9060.70	0.00	25.4	65.00	65.00	2501.46	2501.46
6063A	6063A:WVGD5	6063A:WVGD5 End	45.00	40.13	71.56	14342.96	14342.96	0.00	16.4	65.00	65.00	3871.96	3871.96
6063A	6063A:WVGD5	6063A:WVGD5 Ori	45.00	40.13	71.56	14342.96	14342.96	0.00	16.4	65.00	65.00	3871.96	3871.96
6063A	#6063A:4	SpliceB End	45.83	40.40	72.06	14641.02	14641.02	0.00	16.6	65.00	65.00	3925.79	3925.79
6063A	#6063A:4	SpliceB Ori	45.83	40.40	72.06	14641.02	14641.02	0.00	16.6	65.00	65.00	3925.79	3925.79
6063A	#6063A:5	Tube 2 End	50.42	41.91	74.78	16362.18	16362.18	0.00	17.3	65.00	65.00	4229.85	4229.85
6063A	#6063A:5	Tube 2 Ori	50.42	41.91	74.78	16362.19	16362.19	0.00	17.3	65.00	65.00	4229.85	4229.85
6063A	6063A:WVGD6	6063A:WVGD6 End	55.00	43.41	77.50	18213.22	18213.22	0.00	18.0	65.00	65.00	4545.26	4545.26
6063A	6063A:WVGD6	6063A:WVGD6 Ori	55.00	43.41	77.50	18213.23	18213.23	0.00	18.0	65.00	65.00	4545.26	4545.26
6063A	#6063A:6	Tube 2 End	60.00	45.05	80.46	20385.40	20385.40	0.00	18.8	65.00	65.00	4902.14	4902.14
6063A	#6063A:6	Tube 2 Ori	60.00	45.05	80.46	20385.40	20385.40	0.00	18.8	65.00	65.00	4902.14	4902.14
6063A	6063A:WVGD7	6063A:WVGD7 End	65.00	46.69	83.43	22723.76	22723.76	0.00	19.6	65.00	65.00	5272.51	5272.51
6063A	6063A:WVGD7	6063A:WVGD7 Ori	65.00	46.69	83.43	22723.76	22723.76	0.00	19.6	65.00	65.00	5272.51	5272.51
6063A	#6063A:7	Tube 2 End	70.00	48.33	86.40	25234.44	25234.44	0.00	20.3	65.00	65.00	5656.38	5656.38
6063A	#6063A:7	Tube 2 Ori	70.00	48.33	86.40	25234.45	25234.45	0.00	20.3	65.00	65.00	5656.38	5656.38
6063A	6063A:WVGD8	6063A:WVGD8 End	75.00	49.97	89.36	27923.58	27923.58	0.00	21.1	65.00	65.00	6053.73	6053.73
6063A	6063A:WVGD8	6063A:WVGD8 Ori	75.00	49.97	89.36	27923.58	27923.58	0.00	21.1	65.00	65.00	6053.73	6053.73
6063A	#6063A:8	Tube 2 End	80.00	51.61	92.33	30797.28	30797.28	0.00	21.9	65.00	65.00	6464.57	6464.57
6063A	#6063A:8	Tube 2 Ori	80.00	51.61	92.33	30797.28	30797.28	0.00	21.9	65.00	65.00	6464.57	6464.57
6063A	6063A:g	6063A:g End	85.00	53.25	95.29	33861.68	33861.68	0.00	22.7	65.00	65.00	6888.91	6888.91

Tubular Davit Properties:

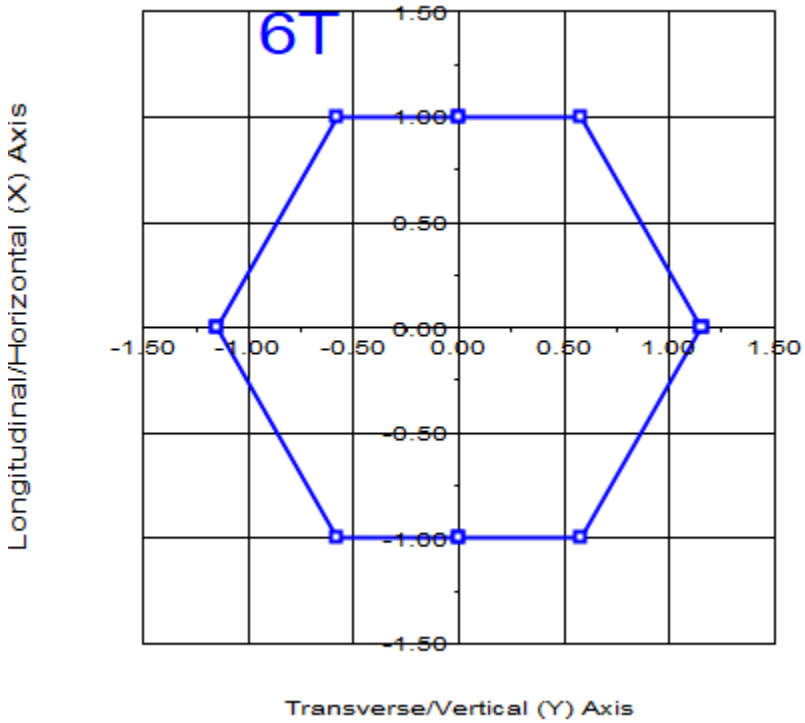
Davit Property Label	Stock Number	Steel Shape	Thickness Diameter or Depth (in)	Base Diameter or Depth (in)	Tip Diameter (in)	Taper (in/ft)	Drag Coef.	Modulus of Elasticity (ksi)	Geometry	Strength Check Type	Vertical Capacity (lbs)	Tension Capacity (lbs)	Compres. Capacity (lbs)	Long. Capacity (lbs)	Yield Stress (ksi)	Weight Density Override (lbs/ft^3)	Steel Texture Shape At End
1027362	1027362	6T	0.1875	7.52	4.5	0	1.3	29000	2 points	Calculated	0	0	0	0	65	0	

Intermediate Joints for Davit Property "1027362":

Joint Label	Horz. Offset (ft)	Vert. Offset (ft)
mid	6.75	-0.75
End	8.75	-0.75

Tubular Davit Arm Connectivity:

Davit Label	Attach Label	Davit Property Set	Azimuth (deg)
1	6063A:Arm1	1027362	180
3	6063A:Arm2	1027362	180
5	6063A:Arm3	1027362	180



Tubular Davit Arm Steel Properties:

Element Label	Joint Label	Joint Position	Rel. Dist.	Outer Diam.	Area	V-Moment Inertia	H-Moment Inertia	D/t	W/t Max.	Fy	Fa Min.	V-Moment Capacity	H-Moment Capacity

			(ft)	(in)	(in^2)	(in^4)	(in^4)		(ksi)	(ksi)	(ft-k)	(ft-k)
1	1:O	Origin	0.00	7.52	4.76	35.59	35.59	0.00 17.4	65.00	65.00	44.40	51.27
1	#1:0	End	3.40	6.35	4.00	21.17	21.17	0.00 13.8	65.00	65.00	31.26	36.09
1	#1:0	Origin	3.40	6.35	4.00	21.17	21.17	0.00 13.8	65.00	65.00	31.26	36.09
1	1:mid	End	6.79	5.19	3.25	11.29	11.29	0.00 10.2	65.00	65.00	20.42	23.58
1	1:mid	Origin	6.79	5.19	3.25	11.29	11.29	0.00 10.2	65.00	65.00	20.42	23.58
1	1:End	End	8.79	4.50	2.80	7.25	7.25	0.00 8.1	65.00	65.00	15.11	17.45
3	3:O	Origin	0.00	7.52	4.76	35.59	35.59	0.00 17.4	65.00	65.00	44.40	51.27
3	#3:0	End	3.40	6.35	4.00	21.17	21.17	0.00 13.8	65.00	65.00	31.26	36.09
3	#3:0	Origin	3.40	6.35	4.00	21.17	21.17	0.00 13.8	65.00	65.00	31.26	36.09
3	3:mid	End	6.79	5.19	3.25	11.29	11.29	0.00 10.2	65.00	65.00	20.42	23.58
3	3:mid	Origin	6.79	5.19	3.25	11.29	11.29	0.00 10.2	65.00	65.00	20.42	23.58
3	3:End	End	8.79	4.50	2.80	7.25	7.25	0.00 8.1	65.00	65.00	15.11	17.45
5	5:O	Origin	0.00	7.52	4.76	35.59	35.59	0.00 17.4	65.00	65.00	44.40	51.27
5	#5:0	End	3.40	6.35	4.00	21.17	21.17	0.00 13.8	65.00	65.00	31.26	36.09
5	#5:0	Origin	3.40	6.35	4.00	21.17	21.17	0.00 13.8	65.00	65.00	31.26	36.09
5	5:mid	End	6.79	5.19	3.25	11.29	11.29	0.00 10.2	65.00	65.00	20.42	23.58
5	5:mid	Origin	6.79	5.19	3.25	11.29	11.29	0.00 10.2	65.00	65.00	20.42	23.58
5	5:End	End	8.79	4.50	2.80	7.25	7.25	0.00 8.1	65.00	65.00	15.11	17.45

*** Insulator Data

Clamp Properties:

Label	Stock Number	Holding Capacity (lbs)	Hardware Capacity (lbs)	Notes
Fict		1e+05	0	

Clamp Insulator Connectivity:

Clamp Label	Structure And Tip Attach	Property Set	Min. Required Vertical Load (uplift) (lbs)
1	6063A:Vang1	Fict	No Limit
2	6063A:Vang2	Fict	No Limit
3	6063A:Vang3	Fict	No Limit
4	6063A:WVGD1	Fict	No Limit
5	6063A:WVGD2	Fict	No Limit
6	6063A:WVGD3	Fict	No Limit
7	6063A:WVGD4	Fict	No Limit
8	6063A:WVGD5	Fict	No Limit
9	6063A:WVGD6	Fict	No Limit
10	6063A:WVGD7	Fict	No Limit
11	6063A:WVGD8	Fict	No Limit
12	6063A:t	Fict	No Limit
13	6063A:Shield	Fict	No Limit

Material List Options:
Show Parts: YES
Decompose Assemblies: NO
Show Assemblies: YES

Material List

Stock Number	Item Description	Quantity	Unit of Measure
1027362	Tubular Davit property: 1027362	3.00	Each
6063A	Steel Pole property: 6063A	1.00	Each

*** Loads Data

Loads from file: J:\Jobs\2300900.WI\10_BOBOS00935A\05_Structural\Tower Analysis\Backup Documentation\Rev (3)\Calcs\PLS-Pole\cl&p # 6063A.lca

Insulator dead and wind loads are already included in the point loads printed below.

Loading Method Parameters:

Structure Height Summary (used for calculating wind/ice adjust with height):
  Z of ground for wind height adjust   0.00 (ft) and structure Z coordinate that will be put on the centerline ground profile in PLS-CADD.
  Ground elevation shift   0.00 (ft)
  Z of ground with shift   0.00 (ft)
  Z of structure top (highest joint)   85.00 (ft)
  Structure height   85.00 (ft)
  Structure height above ground   85.00 (ft)

Vector Load Cases:

Load Case Description	Dead Load Factor	Wind Area Factor	Ice Thick. (in)	Temperature Density (lbs/ft^3)	SF for Steel Tubular Poles and Towers	SF for Poles Deflection Check	SF for Wood Arms Deflection % or (ft)	SF for Conc. Poles Ult. Limit	SF for Conc. First Crack	SF for Conc. Zero Tens.	SF for Guys and Cables	SF for Tubular Arms	SF for Non Insuls.	SF For Braces Hardware	SF for Found.	Point Loads	Wind/Ice Model	Trans. Longit. Wind Pressure (psf)	Ice Wind Pressure (psf)
NESC Heavy	1.5000	2.5000	0.000	0.0	1.00000	0.6500	0.0000	1.0000	0.0000	1.0000	1.0000	1.0000	1.0000	0.0000	1.0000	14 loads	Wind on All	4	0
NESC Extreme	1.0000	1.0000	0.000	0.0	1.00000	0.6500	0.0000	1.0000	0.0000	1.0000	1.0000	1.0000	1.0000	0.0000	1.0000	14 loads	NESC 2023	36.9	0
NESC Extreme Ice	1.0000	1.0000	0.000	0.0	1.00000	0.6500	0.0000	1.0000	0.0000	1.0000	1.0000	1.0000	1.0000	0.0000	1.0000	14 loads	Wind on All	6.4	0

Point Loads for Load Case "NESC Heavy":

Joint Label	Vertical Load (lbs)	Transverse Load (lbs)	Longitudinal Load (lbs)	Load Comment
6063A:Shield	1937	11945	2839	Shield
6063A:Vang1	6065	24720	5584	Conductor
6063A:Vang2	6065	24720	5584	Conductor
6063A:Vang3	6065	24720	5584	Conductor
6063A:WVGD1	54	35	0	Coax Cables
6063A:WVGD2	54	35	0	Coax Cables
6063A:WVGD3	54	35	0	Coax Cables
6063A:WVGD4	54	35	0	Coax Cables
6063A:WVGD5	54	35	0	Coax Cables
6063A:WVGD6	54	35	0	Coax Cables
6063A:WVGD7	54	35	0	Coax Cables
6063A:WVGD8	54	35	0	Coax Cables
6063A:t	3995	1128	9371	Antennas
6063A:Shield	0	0	-9371	Antennas

Point Loads for Load Case "NESC Extreme":

Joint Label	Vertical Load (lbs)	Transverse Load (lbs)	Longitudinal Load (lbs)	Load Comment
6063A:Shield	539	7753	1606	Shield
6063A:Vang1	2548	20649	3843	Conductor
6063A:Vang2	2548	20649	3843	Conductor
6063A:Vang3	2548	20649	3843	Conductor
6063A:WVGD1	24	75	0	Coax Cables
6063A:WVGD2	24	75	0	Coax Cables
6063A:WVGD3	24	75	0	Coax Cables
6063A:WVGD4	24	75	0	Coax Cables
6063A:WVGD5	24	75	0	Coax Cables
6063A:WVGD6	24	75	0	Coax Cables
6063A:WVGD7	24	75	0	Coax Cables
6063A:WVGD8	24	75	0	Coax Cables
6063A:t	2067	4971	41091	Antennas
6063A:Shield	0	0	-41091	Antennas

Detailed Pole Loading Data for Load Case "NESC Extreme":

Notes: Does not include loads from equipment, arms, guys, braces, etc. or user input loads.
Wind load is calculated for the undeformed shape of a pole.

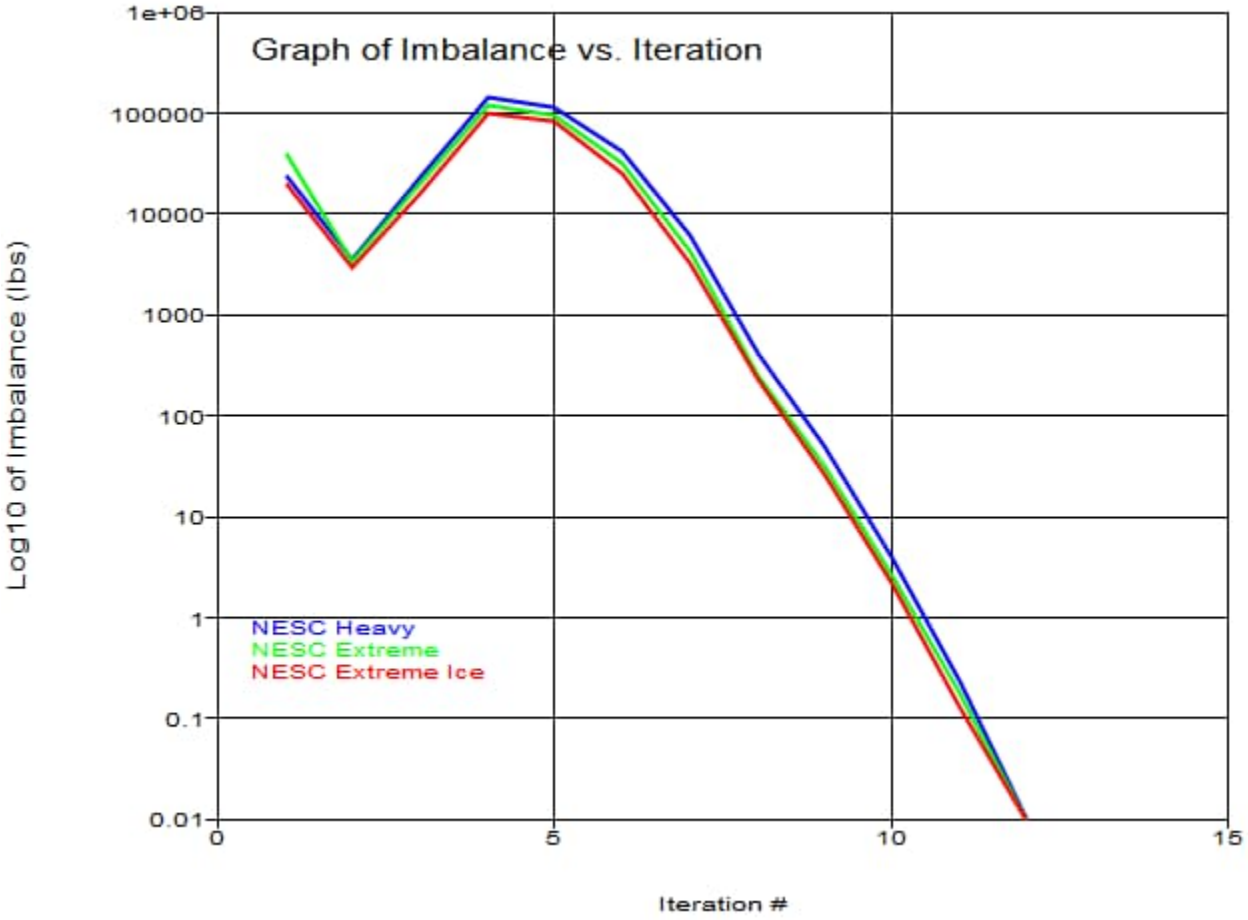
Pole Label	Top Joint	Bottom Joint	Section Top Z (ft)	Section Bottom Z (ft)	Section Average Elevation (ft)	Outer Diameter (in)	Reynolds Number	Drag Coef.	Adjusted Wind Pressure (psf)	Adjusted Ice Thickness (in)	Pole Vert. Load (lbs)	Pole Wind Load (lbs)	Pole Ice Vertical Load (lbs)	Pole Ice Wind Load (lbs)	Tran. Wind Load (lbs)	Long. Wind Load (lbs)
6063A	6063A:t	6063A:Shield	85.00	84.00	84.50	26.284	2.33e+06	1.000	35.01	0.00	106.30	76.69	0.00	0.00	76.69	0.00
6063A	6063A:Shield	6063A:WVGD1	84.00	80.00	82.00	27.104	2.4e+06	1.000	35.01	0.00	438.67	316.32	0.00	0.00	316.32	0.00
6063A	6063A:WVGD1	6063A:Arm1	80.00	77.25	78.63	28.211	2.5e+06	1.000	35.01	0.00	314.08	226.35	0.00	0.00	226.35	0.00
6063A	6063A:Arm1		77.25	74.46	75.86	29.120	2.58e+06	1.000	35.01	0.00	329.05	237.04	0.00	0.00	237.04	0.00
6063A		6063A:Vang1	74.46	71.67	73.06	30.035	2.66e+06	1.000	35.01	0.00	339.52	244.49	0.00	0.00	244.49	0.00
6063A	6063A:Vang1	6063A:WVGD2	71.67	70.00	70.84	30.766	2.73e+06	1.000	35.01	0.00	208.24	149.91	0.00	0.00	149.91	0.00
6063A	6063A:WVGD2	6063A:Arm2	70.00	65.25	67.63	31.819	2.82e+06	1.000	35.01	0.00	612.82	440.97	0.00	0.00	440.97	0.00
6063A	6063A:Arm2		65.25	62.63	63.94	33.029	2.93e+06	1.000	35.01	0.00	351.69	252.96	0.00	0.00	252.96	0.00
6063A		6063A:WVGD3	62.63	60.00	61.31	33.890	3e+06	1.000	35.01	0.00	360.96	259.55	0.00	0.00	259.55	0.00
6063A	6063A:WVGD3	6063A:Vang2	60.00	59.67	59.84	34.374	3.05e+06	1.000	35.01	0.00	46.03	33.10	0.00	0.00	33.10	0.00
6063A	6063A:Vang2		59.67	56.46	58.07	34.955	3.1e+06	1.000	35.01	0.00	455.43	327.37	0.00	0.00	327.37	0.00
6063A		6063A:Arm3	56.46	53.25	54.86	36.008	3.19e+06	1.000	35.01	0.00	469.30	337.23	0.00	0.00	337.23	0.00
6063A	6063A:Arm3	6063A:WVGD4	53.25	50.00	51.63	37.067	3.28e+06	1.000	35.01	0.00	489.28	351.48	0.00	0.00	351.48	0.00
6063A	6063A:WVGD4	6063A:Vang3	50.00	47.67	48.84	37.982	3.36e+06	1.000	35.01	0.00	359.52	258.21	0.00	0.00	258.21	0.00
6063A	6063A:Vang3		47.67	45.00	46.34	38.802	3.44e+06	1.000	35.01	0.00	420.97	302.27	0.00	0.00	302.27	0.00
6063A		6063A:WVGD5	45.00	40.00	42.50	39.685	3.52e+06	1.000	35.01	0.00	2006.48	578.93	0.00	0.00	578.93	0.00
6063A	6063A:WVGD5		40.00	39.17	39.59	40.266	3.57e+06	1.000	35.01	0.00	341.22	97.51	0.00	0.00	97.51	0.00
6063A			39.17	34.59	36.88	41.154	3.65e+06	1.000	35.01	0.00	1145.57	550.53	0.00	0.00	550.53	0.00
6063A		6063A:WVGD6	34.59	30.00	32.29	42.658	3.78e+06	1.000	35.01	0.00	1187.86	570.65	0.00	0.00	570.65	0.00
6063A	6063A:WVGD6		30.00	25.00	27.50	44.230	3.92e+06	1.000	35.01	0.00	1343.75	645.23	0.00	0.00	645.23	0.00
6063A		6063A:WVGD7	25.00	20.00	22.50	45.870	4.06e+06	1.000	35.01	0.00	1394.22	669.16	0.00	0.00	669.16	0.00
6063A	6063A:WVGD7		20.00	15.00	17.50	47.510	4.21e+06	1.000	35.01	0.00	1444.68	693.08	0.00	0.00	693.08	0.00
6063A		6063A:WVGD8	15.00	10.00	12.50	49.150	4.35e+06	1.000	35.01	0.00	1495.15	717.01	0.00	0.00	717.01	0.00
6063A	6063A:WVGD8		10.00	5.00	7.50	50.790	4.5e+06	1.000	35.01	0.00	1545.61	740.93	0.00	0.00	740.93	0.00
6063A		6063A:g	5.00	0.00	2.50	52.430	4.64e+06	1.000	35.01	0.00	1596.08	764.86	0.00	0.00	764.86	0.00

Point Loads for Load Case "NESC Extreme Ice":

Joint Label	Vertical Load (lbs)	Transverse Load (lbs)	Longitudinal Load (lbs)	Load Comment
6063A:Shield	2791	10255	2294	Shield
6063A:Vang1	6285	19974	4302	Conductor
6063A:Vang2	6285	19974	4302	Conductor
6063A:Vang3	6285	19974	4302	Conductor
6063A:WVGD1	45	26	0	Coax Cables
6063A:WVGD2	45	26	0	Coax Cables
6063A:WVGD3	45	26	0	Coax Cables
6063A:WVGD4	45	26	0	Coax Cables
6063A:WVGD5	45	26	0	Coax Cables
6063A:WVGD6	45	26	0	Coax Cables
6063A:WVGD7	45	26	0	Coax Cables
6063A:WVGD8	45	26	0	Coax Cables
6063A:t	2995	965	7986	Antennas
6063A:Shield	0	0	-7986	Antennas

*** Analysis Results:

Maximum element usage is 89.46% for Steel Pole "6063A" in load case "NESC Heavy"
Maximum insulator usage is 41.44% for Clamp "12" in load case "NESC Extreme"



*** Analysis Results for Load Case No. 1 "NESC Heavy" - Number of iterations in SAPS 12

Equilibrium Joint Positions and Rotations for Load Case "NESC Heavy":

Joint Label	X-Displ (ft)	Y-Displ (ft)	Z-Displ (ft)	X-Rot (deg)	Y-Rot (deg)	Z-Rot (deg)	X-Pos (ft)	Y-Pos (ft)	Z-Pos (ft)
6063A:g	0	0	0	0.0000	0.0000	0.0000	0	0	0
6063A:t	0.6292	2.828	-0.06391	-3.1058	0.7044	-0.0009	0.6292	2.828	84.94
6063A:Shield	0.6169	2.774	-0.06236	-3.1058	0.7039	-0.0008	0.6169	2.774	83.94

6063A:WVGD1	0.5679	2.558	-0.05617	-3.0948	0.6980	-0.0006	0.5679	2.558	79.94
6063A:Arm1	0.5345	2.409	-0.05195	-3.0774	0.6921	-0.0005	0.5345	2.409	77.2
6063A:Vang1	0.4678	2.112	-0.04358	-3.0237	0.6768	-0.0004	0.4678	2.112	71.63
6063A:WVGD2	0.4481	2.024	-0.04113	-3.0015	0.6710	-0.0003	0.4481	2.024	69.96
6063A:Arm2	0.3932	1.778	-0.0344	-2.9092	0.6485	-0.0002	0.3932	1.778	65.22
6063A:WVGD3	0.3351	1.518	-0.02752	-2.7696	0.6157	-0.0002	0.3351	1.518	59.97
6063A:Vang2	0.3316	1.502	-0.02712	-2.7597	0.6134	-0.0002	0.3316	1.502	59.64
6063A:Arm3	0.2655	1.204	-0.01975	-2.5286	0.5605	-0.0001	0.2655	1.204	53.23
6063A:WVGD4	0.2345	1.064	-0.01653	-2.3877	0.5287	-0.0001	0.2345	1.064	49.98
6063A:Vang3	0.2134	0.9686	-0.01445	-2.2792	0.5042	-0.0001	0.2134	0.9686	47.66
6063A:WVGD5	0.1511	0.6867	-0.008857	-1.9163	0.4229	-0.0000	0.1511	0.6867	39.99
6063A:WVGD6	0.08551	0.3893	-0.004034	-1.4675	0.3231	-0.0000	0.08551	0.3893	30
6063A:WVGD7	0.0381	0.1737	-0.001403	-0.9836	0.2161	0.0000	0.0381	0.1737	20
6063A:WVGD8	0.009594	0.04382	-0.0003136	-0.4896	0.1073	0.0000	0.009594	0.04382	10
1:O	0.5353	2.411	0.01216	-3.0774	0.6921	-0.0005	0.5353	1.217	77.26
1:mid	0.5486	2.461	0.3715	-3.0538	0.6922	-0.0005	0.5486	-5.484	78.37
1:End	0.5499	2.464	0.4781	-3.0529	0.6922	-0.0005	0.5499	-7.481	78.48
3:O	0.394	1.78	0.03453	-2.9092	0.6485	-0.0002	0.394	0.4218	65.28
3:mid	0.4063	1.827	0.3743	-2.8856	0.6485	-0.0002	0.4063	-6.282	66.37
3:End	0.4075	1.829	0.4749	-2.8847	0.6485	-0.0002	0.4075	-8.279	66.47
5:O	0.2661	1.205	0.0474	-2.5286	0.5605	-0.0001	0.2661	-0.317	53.3
5:mid	0.2763	1.245	0.3426	-2.5049	0.5606	-0.0001	0.2763	-7.028	54.34
5:End	0.2772	1.247	0.43	-2.5040	0.5606	-0.0001	0.2772	-9.026	54.43

Joint Support Reactions for Load Case "NESC Heavy":

Joint Label	X Force (kips)	X Usage %	Y Force (kips)	Y Usage %	H-Shear Usage %	Z Force (kips)	Comp. Usage %	Uplift Usage %	Result. Force (kips)	Result. Usage %	X Moment (ft-k)	X-M. Usage %	Y Moment (ft-k)	Y-M. Usage %	H-Bend-M Usage %	Z Moment (ft-k)	Z-M. Usage %	Max. Usage %
6063A:g	-19.59	0.0	-92.00	0.0	0.0	-57.80	0.0	0.0	110.40	0.0	5766.45	0.0	-1261.3	0.0	0.0	-0.04	0.0	0.0

Detailed Steel Pole Usages for Load Case "NESC Heavy":

Element Label	Joint Label	Joint Position	Rel. Dist. (ft)	Trans. Defl. (in)	Long. Defl. (in)	Vert. Defl. (in)	Trans. Mom. (Local Mx) (ft-k)	Long. Mom. (Local My) (ft-k)	Tors. Mom. (ft-k)	Axial Force (kips)	Tran. Shear (kips)	Long. Shear (kips)	P/A (ksi)	M/S. (ksi)	V/Q. (ksi)	T/R. (ksi)	Res. (ksi)	Max. Usage %	At Pt.
6063A	6063A:t	Origin	0.00	33.94	7.55	-0.77	-0.00	-0.00	0.0	-3.89	1.36	-9.42	-0.13	0.00	0.62	0.00	1.08	1.7	1
6063A	6063A:Shield	End	1.00	33.29	7.40	-0.75	1.36	-9.42	0.0	-3.89	1.36	-9.42	-0.12	0.23	0.59	0.00	1.08	1.7	2
6063A	6063A:Shield	Origin	1.00	33.29	7.40	-0.75	1.36	-9.42	-0.0	-5.67	13.51	-2.92	-0.18	0.55	0.87	0.00	1.68	2.6	5
6063A	6063A:WVGD1	End	5.00	30.69	6.81	-0.67	55.38	-21.09	-0.0	-5.67	13.51	-2.92	-0.17	3.21	0.17	0.00	3.39	5.2	2
6063A	6063A:WVGD1	Origin	5.00	30.69	6.81	-0.67	55.38	-21.09	0.0	-6.29	13.70	-2.92	-0.19	3.21	0.17	0.00	3.41	5.2	2
6063A	6063A:Arm1	End	7.75	28.91	6.41	-0.62	93.05	-29.13	0.0	-6.29	13.70	-2.92	-0.18	4.96	0.17	0.00	5.16	7.9	2
6063A	6063A:Arm1	Origin	7.75	28.91	6.41	-0.62	92.17	-29.13	0.0	-6.94	13.84	-2.93	-0.20	4.92	0.17	0.00	5.13	7.9	2
6063A	Tube 1	End	10.54	27.12	6.01	-0.57	130.77	-37.31	0.0	-6.94	13.84	-2.93	-0.20	6.50	0.16	0.00	6.70	10.3	2
6063A	Tube 1	Origin	10.54	27.12	6.01	-0.57	130.77	-37.31	0.0	-7.45	13.97	-2.94	-0.21	6.50	0.16	0.00	6.72	10.3	2
6063A	6063A:Vang1	End	13.33	25.34	5.61	-0.52	169.75	-45.50	0.0	-7.45	13.97	-2.94	-0.21	7.89	0.16	0.00	8.10	12.5	2
6063A	6063A:Vang1	Origin	13.33	25.34	5.61	-0.52	169.75	-45.50	0.0	-12.55	39.08	-8.60	-0.35	7.89	0.47	0.00	8.28	12.7	2
6063A	6063A:WVGD2	End	15.00	24.29	5.38	-0.49	235.01	-59.85	0.0	-12.55	39.08	-8.60	-0.34	10.50	0.46	0.00	10.87	16.7	2
6063A	6063A:WVGD2	Origin	15.00	24.29	5.38	-0.49	235.01	-59.85	0.0	-13.26	39.27	-8.60	-0.36	10.50	0.46	0.00	10.89	16.8	2
6063A	6063A:Arm2	End	19.75	21.34	4.72	-0.41	421.54	-100.70	0.0	-13.26	39.27	-8.60	-0.34	16.99	0.44	0.00	17.35	26.7	2
6063A	6063A:Arm2	Origin	19.75	21.34	4.72	-0.41	420.64	-100.69	0.0	-14.21	39.46	-8.60	-0.37	16.95	0.44	0.00	17.34	26.7	2
6063A	Tube 1	End	22.38	19.76	4.37	-0.37	524.21	-123.28	0.0	-14.21	39.46	-8.60	-0.36	20.01	0.42	0.00	20.38	31.4	2
6063A	Tube 1	Origin	22.38	19.76	4.37	-0.37	524.21	-123.27	0.0	-14.80	39.58	-8.61	-0.37	20.01	0.42	0.00	20.40	31.4	2
6063A	6063A:WVGD3	End	25.00	18.21	4.02	-0.33	628.11	-145.86	0.0	-14.80	39.58	-8.61	-0.36	22.76	0.41	0.00	23.13	35.6	2
6063A	6063A:WVGD3	Origin	25.00	18.21	4.02	-0.33	628.11	-145.86	0.0	-15.18	39.69	-8.61	-0.37	22.76	0.41	0.00	23.14	35.6	2
6063A	6063A:Vang2	End	25.33	18.02	3.98	-0.33	641.21	-148.70	0.0	-15.18	39.69	-8.61	-0.37	23.08	0.41	0.00	23.46	36.1	2

6063A	6063A:Vang2	Origin	25.33	18.02	3.98	-0.33	641.21	-148.69	0.0	-20.42	64.75	-14.25	-0.50	23.08	0.68	0.00	23.61	36.3	2
6063A	Tube 1	End	28.54	16.19	3.57	-0.28	849.06	-194.45	0.0	-20.42	64.75	-14.25	-0.48	28.73	0.66	0.00	29.23	45.0	2
6063A	Tube 1	Origin	28.54	16.19	3.57	-0.28	849.07	-194.43	0.0	-21.26	64.89	-14.25	-0.50	28.73	0.66	0.00	29.25	45.0	2
6063A	6063A:Arm3	End	31.75	14.45	3.19	-0.24	1057.37	-240.17	0.0	-21.26	64.89	-14.25	-0.49	33.70	0.64	0.00	34.20	52.6	2
6063A	6063A:Arm3	Origin	31.75	14.45	3.19	-0.24	1056.44	-240.15	0.0	-22.30	65.04	-14.25	-0.51	33.67	0.64	0.00	34.20	52.6	2
6063A	6063A:WVGD4	End	35.00	12.77	2.81	-0.20	1267.82	-286.45	0.0	-22.30	65.04	-14.25	-0.50	38.10	0.62	0.00	38.61	59.4	2
6063A	6063A:WVGD4	Origin	35.00	12.77	2.81	-0.20	1267.83	-286.42	0.0	-23.14	65.19	-14.24	-0.52	38.10	0.62	0.00	38.63	59.4	2
6063A	6063A:Vang3	End	37.33	11.62	2.56	-0.17	1419.72	-319.60	0.0	-23.14	65.19	-14.24	-0.51	40.95	0.61	0.00	41.47	63.8	2
6063A	6063A:Vang3	Origin	37.33	11.62	2.56	-0.17	1419.73	-319.58	0.0	-28.92	90.23	-19.87	-0.63	40.95	0.85	0.00	41.61	64.0	2
6063A	SpliceT	End	40.00	10.38	2.29	-0.15	1660.64	-372.63	0.0	-28.92	90.23	-19.87	-0.62	45.75	0.83	0.00	46.39	71.4	2
6063A	SpliceT	Origin	40.00	10.38	2.29	-0.15	1660.65	-372.58	0.0	-31.04	90.41	-19.86	-0.66	45.75	0.83	0.00	46.43	71.4	2
6063A	6063A:WVGD5	End	45.00	8.24	1.81	-0.11	2112.68	-471.88	0.0	-31.04	90.41	-19.86	-0.43	37.59	0.55	0.00	38.03	58.5	2
6063A	6063A:WVGD5	Origin	45.00	8.24	1.81	-0.11	2112.69	-471.84	0.0	-33.08	90.58	-19.86	-0.46	37.59	0.55	0.00	38.06	58.6	2
6063A	SpliceB	End	45.83	7.91	1.74	-0.10	2187.87	-488.32	0.0	-33.08	90.58	-19.86	-0.46	38.39	0.54	0.00	38.86	59.8	2
6063A	SpliceB	Origin	45.83	7.91	1.74	-0.10	2187.87	-488.29	0.0	-34.38	90.70	-19.85	-0.48	38.39	0.54	0.00	38.88	59.8	2
6063A	Tube 2	End	50.42	6.19	1.36	-0.07	2603.72	-579.29	0.0	-34.38	90.70	-19.85	-0.46	42.40	0.52	0.00	42.87	65.9	2
6063A	Tube 2	Origin	50.42	6.19	1.36	-0.07	2603.73	-579.23	0.0	-36.48	90.88	-19.83	-0.49	42.40	0.52	0.00	42.89	66.0	2
6063A	6063A:WVGD6	End	55.00	4.67	1.03	-0.05	3020.40	-670.14	0.0	-36.48	90.88	-19.83	-0.47	45.76	0.50	0.00	46.24	71.1	2
6063A	6063A:WVGD6	Origin	55.00	4.67	1.03	-0.05	3020.41	-670.07	0.0	-38.80	91.09	-19.80	-0.50	45.76	0.50	0.00	46.27	71.2	2
6063A	Tube 2	End	60.00	3.25	0.71	-0.03	3475.86	-769.08	0.0	-38.80	91.09	-19.80	-0.48	48.82	0.48	0.00	49.31	75.9	2
6063A	Tube 2	Origin	60.00	3.25	0.71	-0.03	3475.88	-769.01	0.0	-41.26	91.27	-19.77	-0.51	48.82	0.48	0.00	49.34	75.9	2
6063A	6063A:WVGD7	End	65.00	2.08	0.46	-0.02	3932.21	-867.88	0.0	-41.26	91.27	-19.77	-0.49	51.34	0.47	0.00	51.84	79.8	2
6063A	6063A:WVGD7	Origin	65.00	2.08	0.46	-0.02	3932.22	-867.82	0.0	-43.86	91.47	-19.74	-0.53	51.34	0.47	0.00	51.88	79.8	2
6063A	Tube 2	End	70.00	1.18	0.26	-0.01	4389.56	-966.52	0.0	-43.86	91.47	-19.74	-0.51	53.42	0.45	0.00	53.93	83.0	2
6063A	Tube 2	Origin	70.00	1.18	0.26	-0.01	4389.57	-966.47	0.0	-46.47	91.62	-19.70	-0.54	53.42	0.45	0.00	53.96	83.0	2
6063A	6063A:WVGD8	End	75.00	0.53	0.12	-0.00	4847.69	-1064.98	0.0	-46.47	91.62	-19.70	-0.52	55.11	0.43	0.00	55.64	85.6	2
6063A	6063A:WVGD8	Origin	75.00	0.53	0.12	-0.00	4847.70	-1064.94	0.0	-49.22	91.81	-19.66	-0.55	55.11	0.43	0.00	55.67	85.6	2
6063A	Tube 2	End	80.00	0.13	0.03	-0.00	5306.72	-1163.24	0.0	-49.22	91.81	-19.66	-0.53	56.49	0.42	0.00	57.03	87.7	2
6063A	Tube 2	Origin	80.00	0.13	0.03	-0.00	5306.73	-1163.22	0.0	-51.99	91.95	-19.62	-0.56	56.49	0.42	0.00	57.06	87.8	2
6063A	6063A:g	End	85.00	0.00	0.00	0.00	5766.44	-1261.29	0.0	-51.99	91.95	-19.62	-0.55	57.60	0.40	0.00	58.15	89.5	2

Detailed Tubular Davit Arm Usages for Load Case "NESC Heavy":

Element Label	Joint Label	Joint Position	Rel. Dist. (ft)	Trans. Defl. (in)	Long. Defl. (in)	Vert. Defl. (in)	Vert. Mom. (ft-k)	Horz. Mom. (ft-k)	Tors. Mom. (ft-k)	Axial Force (kips)	Vert. Shear (kips)	Horz. Shear (kips)	P/A (ksi)	M/S. (ksi)	V/Q. (ksi)	T/R. (ksi)	Res. (ksi)	Max. Usage %	At Pt.
1	1:O	Origin	0.00	28.93	6.42	0.15	-0.68	0.01	0.0	-0.02	0.13	-0.00	-0.00	0.99	0.00	0.00	0.99	1.5	1
1	#1:0	End	3.40	29.23	6.50	2.31	-0.24	0.00	0.0	-0.02	0.13	-0.00	-0.01	0.50	0.00	0.00	0.50	0.8	1
1	#1:0	Origin	3.40	29.23	6.50	2.31	-0.24	0.00	0.0	-0.01	0.06	-0.00	-0.00	0.50	0.00	0.00	0.50	0.8	1
1	1:mid	End	6.79	29.53	6.58	4.46	-0.03	0.00	0.0	-0.01	0.06	-0.00	-0.00	0.10	0.00	0.00	0.10	0.2	1
1	1:mid	Origin	6.79	29.53	6.58	4.46	-0.03	0.00	0.0	-0.00	0.02	-0.00	-0.00	0.10	0.00	0.00	0.10	0.2	1
1	1:End	End	8.79	29.56	6.60	5.74	-0.00	0.00	0.0	-0.00	0.02	-0.00	-0.00	0.00	0.01	0.00	0.02	0.0	3
3	3:O	Origin	0.00	21.36	4.73	0.41	-0.68	0.01	0.0	-0.02	0.13	-0.00	-0.00	0.99	0.00	0.00	1.00	1.5	1
3	#3:0	End	3.40	21.64	4.80	2.46	-0.24	0.00	0.0	-0.02	0.13	-0.00	-0.01	0.50	0.00	0.00	0.50	0.8	1
3	#3:0	Origin	3.40	21.64	4.80	2.46	-0.24	0.00	0.0	-0.01	0.06	-0.00	-0.00	0.50	0.00	0.00	0.50	0.8	1
3	3:mid	End	6.79	21.92	4.88	4.49	-0.03	0.00	0.0	-0.01	0.06	-0.00	-0.00	0.10	0.00	0.00	0.10	0.2	1
3	3:mid	Origin	6.79	21.92	4.88	4.49	-0.03	0.00	0.0	-0.00	0.02	-0.00	-0.00	0.10	0.00	0.00	0.10	0.2	1
3	3:End	End	8.79	21.95	4.89	5.70	-0.00	0.00	0.0	-0.00	0.02	-0.00	-0.00	0.00	0.01	0.00	0.02	0.0	3
5	5:O	Origin	0.00	14.46	3.19	0.57	-0.68	0.01	0.0	-0.02	0.13	-0.00	-0.00	0.99	0.00	0.00	1.00	1.5	1
5	#5:0	End	3.40	14.70	3.25	2.34	-0.24	0.00	0.0	-0.02	0.13	-0.00	-0.01	0.50	0.00	0.00	0.50	0.8	1
5	#5:0	Origin	3.40	14.70	3.25	2.34	-0.24	0.00	0.0	-0.01	0.06	-0.00	-0.00	0.50	0.00	0.00	0.50	0.8	1
5	5:mid	End	6.79	14.94	3.32	4.11	-0.03	0.00	0.0	-0.01	0.06	-0.00	-0.00	0.10	0.00	0.00	0.10	0.2	1
5	5:mid	Origin	6.79	14.94	3.32	4.11	-0.03	0.00	0.0	-0.00	0.02	-0.00	-0.00	0.10	0.00	0.00	0.10	0.2	1
5	5:End	End	8.79	14.96	3.33	5.16	-0.00	0.00	0.0	-0.00	0.02	-0.00	-0.00	0.00	0.01	0.00	0.02	0.0	3

Summary of Clamp Capacities and Usages for Load Case "NESC Heavy":

Clamp Label	Force (kips)	Input Holding Capacity (kips)	Factored Holding Capacity (kips)	Holding Usage %	Input Hardware Capacity (kips)	Factored Hardware Capacity (kips)	Hardware Usage %	Max. Usage %
1	26.058	100.00	100.00	26.06	0.00	0.00	0.00	26.06
2	26.058	100.00	100.00	26.06	0.00	0.00	0.00	26.06
3	26.058	100.00	100.00	26.06	0.00	0.00	0.00	26.06
4	0.064	100.00	100.00	0.06	0.00	0.00	0.00	0.06
5	0.064	100.00	100.00	0.06	0.00	0.00	0.00	0.06
6	0.064	100.00	100.00	0.06	0.00	0.00	0.00	0.06
7	0.064	100.00	100.00	0.06	0.00	0.00	0.00	0.06
8	0.064	100.00	100.00	0.06	0.00	0.00	0.00	0.06
9	0.064	100.00	100.00	0.06	0.00	0.00	0.00	0.06
10	0.064	100.00	100.00	0.06	0.00	0.00	0.00	0.06
11	0.064	100.00	100.00	0.06	0.00	0.00	0.00	0.06
12	10.249	100.00	100.00	10.25	0.00	0.00	0.00	10.25
13	13.751	100.00	100.00	13.75	0.00	0.00	0.00	13.75

*** Analysis Results for Load Case No. 2 "NESC Extreme" - Number of iterations in SAPS 12

Equilibrium Joint Positions and Rotations for Load Case "NESC Extreme":

Joint Label	X-Displ (ft)	Y-Displ (ft)	Z-Displ (ft)	X-Rot (deg)	Y-Rot (deg)	Z-Rot (deg)	X-Pos (ft)	Y-Pos (ft)	Z-Pos (ft)
6063A:g	0	0	0	0.0000	0.0000	0.0000	0	0	0
6063A:t	0.4565	2.547	-0.05068	-2.8171	0.5583	-0.0032	0.4565	2.547	84.95
6063A:Shield	0.4467	2.498	-0.04942	-2.8169	0.5561	-0.0031	0.4467	2.498	83.95
6063A:WVGD1	0.4084	2.301	-0.0444	-2.8048	0.5390	-0.0024	0.4084	2.301	79.96
6063A:Arm1	0.3828	2.167	-0.041	-2.7870	0.5273	-0.0020	0.3828	2.167	77.21
6063A:Vang1	0.3325	1.898	-0.03426	-2.7327	0.5040	-0.0013	0.3325	1.898	71.64
6063A:WVGD2	0.3179	1.818	-0.0323	-2.7107	0.4967	-0.0012	0.3179	1.818	69.97
6063A:Arm2	0.2776	1.597	-0.02692	-2.6227	0.4733	-0.0008	0.2776	1.597	65.22
6063A:WVGD3	0.2355	1.362	-0.02146	-2.4921	0.4437	-0.0005	0.2355	1.362	59.98
6063A:Vang2	0.2329	1.347	-0.02114	-2.4830	0.4417	-0.0005	0.2329	1.347	59.65
6063A:Arm3	0.1856	1.08	-0.01533	-2.2707	0.3988	-0.0003	0.1856	1.08	53.23
6063A:WVGD4	0.1636	0.9541	-0.0128	-2.1426	0.3742	-0.0002	0.1636	0.9541	49.99
6063A:Vang3	0.1487	0.8687	-0.01117	-2.0442	0.3558	-0.0002	0.1487	0.8687	47.66
6063A:WVGD5	0.105	0.616	-0.006804	-1.7173	0.2960	-0.0001	0.105	0.616	39.99
6063A:WVGD6	0.05923	0.3495	-0.003049	-1.3155	0.2247	-0.0000	0.05923	0.3495	30
6063A:WVGD7	0.02632	0.1561	-0.001019	-0.8828	0.1496	-0.0000	0.02632	0.1561	20
6063A:WVGD8	0.006614	0.03944	-0.0002032	-0.4401	0.0741	0.0000	0.006614	0.03944	10
1:O	0.3833	2.168	0.01707	-2.7870	0.5273	-0.0020	0.3833	0.9741	77.27
1:mid	0.393	2.213	0.3432	-2.7716	0.5273	-0.0020	0.393	-5.732	78.34
1:End	0.3938	2.215	0.4398	-2.7709	0.5273	-0.0020	0.3938	-7.729	78.44
3:O	0.2781	1.598	0.03523	-2.6227	0.4733	-0.0008	0.2781	0.2399	65.29
3:mid	0.2867	1.639	0.3421	-2.6073	0.4733	-0.0008	0.2867	-6.469	66.34
3:End	0.2875	1.641	0.4331	-2.6066	0.4733	-0.0008	0.2875	-8.467	66.43
5:O	0.186	1.081	0.04498	-2.2707	0.3988	-0.0003	0.186	-0.4413	53.29
5:mid	0.1931	1.116	0.3106	-2.2552	0.3988	-0.0003	0.1931	-7.156	54.31
5:End	0.1936	1.117	0.3893	-2.2546	0.3988	-0.0003	0.1936	-9.155	54.39

Joint Support Reactions for Load Case "NESC Extreme":

Joint Label	X Force (kips)	X Usage %	Y Force (kips)	Y Usage %	H-Shear Usage %	Z Force (kips)	Comp. Usage %	Uplift Usage %	Result. Force (kips)	Result. Usage %	X Moment (ft-k)	X-M. Usage %	Y Moment (ft-k)	Y-M. Usage %	H-Bend-M Usage %	Z Moment (ft-k)	Z-M. Usage %	Max. Usage %
6063A:g	-13.13	0.0	-85.10	0.0	0.0	-34.23	0.0	0.0	92.66	0.0	5193.95	0.0	-868.7	0.0	0.0	-0.02	0.0	0.0

Detailed Steel Pole Usages for Load Case "NESC Extreme":

Element Label	Joint Label	Joint Position	Rel. Dist. (ft)	Trans. Defl. (in)	Long. Defl. (in)	Vert. Defl. (in)	Trans. Mom. (Local Mx) (ft-k)	Long. Mom. (Local My) (ft-k)	Tors. Mom. (ft-k)	Axial Force (kips)	Tran. Shear (kips)	Long. Shear (kips)	P/A (ksi)	M/S. (ksi)	V/Q. (ksi)	T/R. (ksi)	Res. (ksi)	Max. Usage %	At Pt.
6063A	6063A:t	Origin	0.00	30.56	5.48	-0.61	-0.00	-0.00	0.0	-1.47	5.09	-41.11	-0.05	0.00	2.70	0.00	4.67	7.2	1
6063A	6063A:Shield	End	1.00	29.97	5.36	-0.59	5.09	-41.11	0.0	-1.47	5.09	-41.11	-0.05	0.30	2.66	0.00	4.62	7.1	1
6063A	6063A:Shield	Origin	1.00	29.97	5.36	-0.59	5.09	-41.11	-0.0	-2.29	13.09	-1.63	-0.07	2.46	0.82	0.00	2.91	4.5	4
6063A	6063A:WVGD1	End	5.00	27.61	4.90	-0.53	57.43	-47.64	-0.0	-2.29	13.09	-1.63	-0.07	4.04	0.58	0.00	4.23	6.5	3
6063A	6063A:WVGD1	Origin	5.00	27.61	4.90	-0.53	57.43	-47.64	0.0	-2.69	13.45	-1.64	-0.08	4.04	0.59	0.00	4.25	6.5	3
6063A	6063A:Arm1	End	7.75	26.00	4.59	-0.49	94.42	-52.14	0.0	-2.69	13.45	-1.64	-0.08	5.28	0.57	0.00	5.45	8.4	3
6063A	6063A:Arm1	Origin	7.75	26.00	4.59	-0.49	93.85	-52.14	0.0	-3.12	13.70	-1.64	-0.09	5.26	0.59	0.00	5.45	8.4	3
6063A	Tube 1	End	10.54	24.38	4.29	-0.45	132.08	-56.72	0.0	-3.12	13.70	-1.64	-0.09	6.80	0.09	0.00	6.89	10.6	2

6063A	Tube 1	Origin	10.54	24.38	4.29	-0.45	132.08	-56.72	0.0	-3.46	13.96	-1.64	-0.10	6.80	0.09	0.00	6.90	10.6	2
6063A	6063A:Vang1	End	13.33	22.77	3.99	-0.41	171.02	-61.30	0.0	-3.46	13.96	-1.64	-0.10	8.13	0.09	0.00	8.23	12.7	2
6063A	6063A:Vang1	Origin	13.33	22.77	3.99	-0.41	171.02	-61.30	0.0	-5.27	34.91	-5.51	-0.15	8.13	0.30	0.00	8.29	12.8	2
6063A	6063A:WVGD2	End	15.00	21.82	3.82	-0.39	229.33	-70.50	0.0	-5.27	34.91	-5.51	-0.14	10.39	0.29	0.00	10.54	16.2	2
6063A	6063A:WVGD2	Origin	15.00	21.82	3.82	-0.39	229.33	-70.50	0.0	-5.74	35.30	-5.51	-0.16	10.39	0.29	0.00	10.55	16.2	2
6063A	6063A:Arm2	End	19.75	19.16	3.33	-0.32	396.98	-96.67	0.0	-5.74	35.30	-5.51	-0.15	16.02	0.28	0.00	16.17	24.9	2
6063A	6063A:Arm2	Origin	19.75	19.16	3.33	-0.32	396.39	-96.67	0.0	-6.38	35.66	-5.51	-0.16	15.99	0.28	0.00	16.17	24.9	2
6063A	Tube 1	End	22.38	17.73	3.07	-0.29	490.01	-111.14	0.0	-6.38	35.66	-5.51	-0.16	18.67	0.27	0.00	18.84	29.0	2
6063A	Tube 1	Origin	22.38	17.73	3.07	-0.29	490.01	-111.14	0.0	-6.78	35.93	-5.51	-0.17	18.67	0.27	0.00	18.85	29.0	2
6063A	6063A:WVGD3	End	25.00	16.34	2.83	-0.26	584.31	-125.61	0.0	-6.78	35.93	-5.51	-0.17	21.08	0.27	0.00	21.25	32.7	2
6063A	6063A:WVGD3	Origin	25.00	16.34	2.83	-0.26	584.31	-125.61	0.0	-7.03	36.15	-5.51	-0.17	21.08	0.27	0.00	21.26	32.7	2
6063A	6063A:Vang2	End	25.33	16.17	2.80	-0.25	596.24	-127.43	0.0	-7.03	36.15	-5.51	-0.17	21.36	0.26	0.00	21.54	33.1	2
6063A	6063A:Vang2	Origin	25.33	16.17	2.80	-0.25	596.24	-127.42	0.0	-8.94	57.07	-9.38	-0.22	21.36	0.45	0.00	21.60	33.2	2
6063A	Tube 1	End	28.54	14.53	2.50	-0.22	779.45	-157.52	0.0	-8.94	57.07	-9.38	-0.21	26.19	0.44	0.00	26.42	40.6	2
6063A	Tube 1	Origin	28.54	14.53	2.50	-0.22	779.45	-157.51	0.0	-9.52	57.41	-9.38	-0.22	26.19	0.44	0.00	26.43	40.7	2
6063A	6063A:Arm3	End	31.75	12.96	2.23	-0.18	963.73	-187.61	0.0	-9.52	57.41	-9.38	-0.22	30.46	0.42	0.00	30.69	47.2	2
6063A	6063A:Arm3	Origin	31.75	12.96	2.23	-0.18	963.13	-187.59	0.0	-10.23	57.76	-9.38	-0.23	30.44	0.42	0.00	30.69	47.2	2
6063A	6063A:WVGD4	End	35.00	11.45	1.96	-0.15	1150.83	-218.06	0.0	-10.23	57.76	-9.38	-0.23	34.27	0.41	0.00	34.50	53.1	2
6063A	6063A:WVGD4	Origin	35.00	11.45	1.96	-0.15	1150.84	-218.05	0.0	-10.79	58.13	-9.37	-0.24	34.27	0.41	0.00	34.51	53.1	2
6063A	6063A:Vang3	End	37.33	10.42	1.78	-0.13	1286.28	-239.89	0.0	-10.79	58.13	-9.37	-0.24	36.74	0.40	0.00	36.98	56.9	2
6063A	6063A:Vang3	Origin	37.33	10.42	1.78	-0.13	1286.28	-239.87	0.0	-13.10	79.13	-13.23	-0.29	36.74	0.57	0.00	37.04	57.0	2
6063A	SpliceT	End	40.00	9.31	1.59	-0.11	1497.55	-275.20	0.0	-13.10	79.13	-13.23	-0.28	40.83	0.55	0.00	41.12	63.3	2
6063A	SpliceT	Origin	40.00	9.31	1.59	-0.11	1497.56	-275.17	0.0	-14.55	79.57	-13.23	-0.31	40.83	0.55	0.00	41.15	63.3	2
6063A	6063A:WVGD5	End	45.00	7.39	1.26	-0.08	1895.41	-341.31	0.0	-14.55	79.57	-13.23	-0.20	33.35	0.36	0.00	33.56	51.6	2
6063A	6063A:WVGD5	Origin	45.00	7.39	1.26	-0.08	1895.41	-341.29	0.0	-15.92	79.99	-13.23	-0.22	33.35	0.36	0.00	33.58	51.7	2
6063A	SpliceB	End	45.83	7.10	1.21	-0.08	1961.80	-352.27	0.0	-15.92	79.99	-13.23	-0.22	34.04	0.36	0.00	34.27	52.7	2
6063A	SpliceB	Origin	45.83	7.10	1.21	-0.08	1961.80	-352.25	0.0	-16.81	80.30	-13.23	-0.23	34.04	0.36	0.00	34.28	52.7	2
6063A	Tube 2	End	50.42	5.56	0.94	-0.05	2329.99	-412.89	0.0	-16.81	80.30	-13.23	-0.22	37.50	0.35	0.00	37.73	58.1	2
6063A	Tube 2	Origin	50.42	5.56	0.94	-0.05	2329.99	-412.85	0.0	-18.25	80.84	-13.22	-0.24	37.50	0.35	0.00	37.75	58.1	2
6063A	6063A:WVGD6	End	55.00	4.19	0.71	-0.04	2700.63	-473.46	0.0	-18.25	80.84	-13.22	-0.24	40.43	0.34	0.00	40.67	62.6	2
6063A	6063A:WVGD6	Origin	55.00	4.19	0.71	-0.04	2700.64	-473.43	0.0	-19.83	81.48	-13.21	-0.26	40.43	0.34	0.00	40.69	62.6	2
6063A	Tube 2	End	60.00	2.92	0.49	-0.02	3108.05	-539.48	0.0	-19.83	81.48	-13.21	-0.25	43.13	0.32	0.00	43.38	66.7	2
6063A	Tube 2	Origin	60.00	2.92	0.49	-0.02	3108.05	-539.45	0.0	-21.51	82.09	-13.20	-0.27	43.13	0.32	0.00	43.40	66.8	2
6063A	6063A:WVGD7	End	65.00	1.87	0.32	-0.01	3518.49	-605.45	0.0	-21.51	82.09	-13.20	-0.26	45.38	0.31	0.00	45.64	70.2	2
6063A	6063A:WVGD7	Origin	65.00	1.87	0.32	-0.01	3518.50	-605.42	0.0	-23.28	82.78	-13.19	-0.28	45.38	0.31	0.00	45.66	70.2	2
6063A	Tube 2	End	70.00	1.06	0.18	-0.01	3932.40	-671.36	0.0	-23.28	82.78	-13.19	-0.27	47.26	0.30	0.00	47.53	73.1	2
6063A	Tube 2	Origin	70.00	1.06	0.18	-0.01	3932.40	-671.33	0.0	-25.08	83.41	-13.18	-0.29	47.26	0.30	0.00	47.55	73.2	2
6063A	6063A:WVGD8	End	75.00	0.47	0.08	-0.00	4349.44	-737.21	0.0	-25.08	83.41	-13.18	-0.28	48.82	0.29	0.00	49.11	75.5	2
6063A	6063A:WVGD8	Origin	75.00	0.47	0.08	-0.00	4349.45	-737.19	0.0	-26.96	84.12	-13.16	-0.30	48.82	0.29	0.00	49.13	75.6	2
6063A	Tube 2	End	80.00	0.12	0.02	-0.00	4770.07	-802.99	0.0	-26.96	84.12	-13.16	-0.29	50.13	0.28	0.00	50.42	77.6	2
6063A	Tube 2	Origin	80.00	0.12	0.02	-0.00	4770.07	-802.98	0.0	-28.86	84.78	-13.14	-0.31	50.13	0.28	0.00	50.44	77.6	2
6063A	6063A:g	End	85.00	0.00	0.00	0.00	5193.95	-868.69	0.0	-28.86	84.78	-13.14	-0.30	51.20	0.27	0.00	51.51	79.2	2

Detailed Tubular Davit Arm Usages for Load Case "NESC Extreme":

Element Label	Joint Label	Joint Position	Rel. Dist. (ft)	Trans. Defl. (in)	Long. Defl. (in)	Vert. Defl. (in)	Vert. Mom. (ft-k)	Horz. Mom. (ft-k)	Tors. Mom. (ft-k)	Axial Force (kips)	Vert. Shear (kips)	Horz. Shear (kips)	P/A (ksi)	M/S. (ksi)	V/Q. (ksi)	T/R. (ksi)	Res. (ksi)	Max. Usage %	At Pt.
1	1:O	Origin	0.00	26.02	4.60	0.20	-0.44	0.00	0.0	-0.01	0.08	-0.00	-0.00	0.64	0.00	0.00	0.65	1.0	1
1	#1:0	End	3.40	26.29	4.66	2.16	-0.16	0.00	0.0	-0.01	0.08	-0.00	-0.00	0.32	0.00	0.00	0.33	0.5	1
1	#1:0	Origin	3.40	26.29	4.66	2.16	-0.16	0.00	0.0	-0.01	0.04	-0.00	-0.00	0.32	0.00	0.00	0.33	0.5	1
1	1:mid	End	6.79	26.55	4.72	4.12	-0.02	0.00	0.0	-0.01	0.04	-0.00	-0.00	0.07	0.00	0.00	0.07	0.1	1
1	1:mid	Origin	6.79	26.55	4.72	4.12	-0.02	0.00	0.0	-0.00	0.01	-0.00	-0.00	0.07	0.00	0.00	0.07	0.1	1
1	1:End	End	8.79	26.58	4.73	5.28	-0.00	0.00	0.0	-0.00	0.01	-0.00	-0.00	0.00	0.01	0.00	0.01	0.0	3
3	3:O	Origin	0.00	19.18	3.34	0.42	-0.44	0.00	0.0	-0.01	0.08	-0.00	-0.00	0.65	0.00	0.00	0.65	1.0	1
3	#3:0	End	3.40	19.43	3.39	2.27	-0.16	0.00	0.0	-0.01	0.08	-0.00	-0.00	0.33	0.00	0.00	0.33	0.5	1

3	#3:0	Origin	3.40	19.43	3.39	2.27	-0.16	0.00	0.0	-0.01	0.04	-0.00	-0.00	0.33	0.00	0.00	0.33	0.5	1
3	3:mid	End	6.79	19.67	3.44	4.11	-0.02	0.00	0.0	-0.01	0.04	-0.00	-0.00	0.07	0.00	0.00	0.07	0.1	1
3	3:mid	Origin	6.79	19.67	3.44	4.11	-0.02	0.00	0.0	-0.00	0.01	-0.00	-0.00	0.07	0.00	0.00	0.07	0.1	1
3	3:End	End	8.79	19.70	3.45	5.20	-0.00	0.00	0.0	-0.00	0.01	-0.00	-0.00	0.00	0.01	0.00	0.01	0.0	3
5	5:O	Origin	0.00	12.97	2.23	0.54	-0.44	0.00	0.0	-0.01	0.08	-0.00	-0.00	0.65	0.00	0.00	0.65	1.0	1
5	#5:0	End	3.40	13.18	2.27	2.14	-0.16	0.00	0.0	-0.01	0.08	-0.00	-0.00	0.33	0.00	0.00	0.33	0.5	1
5	#5:0	Origin	3.40	13.18	2.27	2.14	-0.16	0.00	0.0	-0.01	0.04	-0.00	-0.00	0.33	0.00	0.00	0.33	0.5	1
5	5:mid	End	6.79	13.39	2.32	3.73	-0.02	0.00	0.0	-0.01	0.04	-0.00	-0.00	0.07	0.00	0.00	0.07	0.1	1
5	5:mid	Origin	6.79	13.39	2.32	3.73	-0.02	0.00	0.0	-0.00	0.01	-0.00	-0.00	0.07	0.00	0.00	0.07	0.1	1
5	5:End	End	8.79	13.41	2.32	4.67	-0.00	0.00	0.0	-0.00	0.01	-0.00	-0.00	0.00	0.01	0.00	0.01	0.0	3

Summary of Clamp Capacities and Usages for Load Case "NESC Extreme":

Clamp Label	Force (kips)	Input Holding Capacity (kips)	Factored Holding Capacity (kips)	Holding Usage %	Input Hardware Capacity (kips)	Factored Hardware Capacity (kips)	Hardware Usage %	Max. Usage %
1	21.158	100.00	100.00	21.16	0.00	0.00	0.00	21.16
2	21.158	100.00	100.00	21.16	0.00	0.00	0.00	21.16
3	21.158	100.00	100.00	21.16	0.00	0.00	0.00	21.16
4	0.079	100.00	100.00	0.08	0.00	0.00	0.00	0.08
5	0.079	100.00	100.00	0.08	0.00	0.00	0.00	0.08
6	0.079	100.00	100.00	0.08	0.00	0.00	0.00	0.08
7	0.079	100.00	100.00	0.08	0.00	0.00	0.00	0.08
8	0.079	100.00	100.00	0.08	0.00	0.00	0.00	0.08
9	0.079	100.00	100.00	0.08	0.00	0.00	0.00	0.08
10	0.079	100.00	100.00	0.08	0.00	0.00	0.00	0.08
11	0.079	100.00	100.00	0.08	0.00	0.00	0.00	0.08
12	41.442	100.00	100.00	41.44	0.00	0.00	0.00	41.44
13	40.243	100.00	100.00	40.24	0.00	0.00	0.00	40.24

*** Analysis Results for Load Case No. 3 "NESC Extreme Ice" - Number of iterations in SAPS 12

Equilibrium Joint Positions and Rotations for Load Case "NESC Extreme Ice":

Joint Label	X-Displ (ft)	Y-Displ (ft)	Z-Displ (ft)	X-Rot (deg)	Y-Rot (deg)	Z-Rot (deg)	X-Pos (ft)	Y-Pos (ft)	Z-Pos (ft)
6063A:g	0	0	0	0.0000	0.0000	0.0000	0	0	0
6063A:t	0.4912	2.308	-0.04277	-2.5437	0.5522	-0.0006	0.4912	2.308	84.96
6063A:Shield	0.4815	2.264	-0.04174	-2.5436	0.5518	-0.0006	0.4815	2.264	83.96
6063A:WVGD1	0.4431	2.087	-0.03759	-2.5343	0.5469	-0.0004	0.4431	2.087	79.96
6063A:Arm1	0.417	1.965	-0.03477	-2.5194	0.5420	-0.0004	0.417	1.965	77.22
6063A:Vang1	0.3647	1.722	-0.02918	-2.4736	0.5295	-0.0002	0.3647	1.722	71.64
6063A:WVGD2	0.3493	1.65	-0.02754	-2.4548	0.5248	-0.0002	0.3493	1.65	69.97
6063A:Arm2	0.3064	1.449	-0.02304	-2.3775	0.5068	-0.0002	0.3064	1.449	65.23
6063A:WVGD3	0.2611	1.236	-0.01845	-2.2614	0.4807	-0.0001	0.2611	1.236	59.98
6063A:Vang2	0.2583	1.223	-0.01818	-2.2533	0.4789	-0.0001	0.2583	1.223	59.65
6063A:Arm3	0.2067	0.9798	-0.01326	-2.0624	0.4372	-0.0001	0.2067	0.9798	53.24
6063A:WVGD4	0.1825	0.8657	-0.01111	-1.9465	0.4121	-0.0000	0.1825	0.8657	49.99
6063A:Vang3	0.1661	0.7881	-0.009725	-1.8574	0.3930	-0.0000	0.1661	0.7881	47.66
6063A:WVGD5	0.1176	0.5585	-0.005986	-1.5602	0.3294	-0.0000	0.1176	0.5585	39.99
6063A:WVGD6	0.06652	0.3164	-0.002764	-1.1937	0.2515	-0.0000	0.06652	0.3164	30
6063A:WVGD7	0.02963	0.1411	-0.0009924	-0.7995	0.1681	0.0000	0.02963	0.1411	20
6063A:WVGD8	0.00746	0.03559	-0.00024	-0.3977	0.0835	0.0000	0.00746	0.03559	10
1:O	0.4175	1.966	0.01772	-2.5194	0.5420	-0.0004	0.4175	0.7722	77.27
1:mid	0.4273	2.006	0.3125	-2.5037	0.5421	-0.0004	0.4273	-5.939	78.31
1:End	0.4281	2.008	0.3998	-2.5030	0.5421	-0.0004	0.4281	-7.937	78.4
3:O	0.3069	1.45	0.0333	-2.3775	0.5068	-0.0002	0.3069	0.09193	65.28
3:mid	0.316	1.487	0.3114	-2.3617	0.5068	-0.0001	0.316	-6.621	66.31
3:End	0.3168	1.489	0.3938	-2.3611	0.5068	-0.0001	0.3168	-8.62	66.39
5:O	0.2071	0.9808	0.04152	-2.0624	0.4372	-0.0001	0.2071	-0.5414	53.29
5:mid	0.2147	1.012	0.2827	-2.0466	0.4372	-0.0001	0.2147	-7.26	54.28
5:End	0.2152	1.013	0.3541	-2.0460	0.4372	-0.0001	0.2152	-9.259	54.35

Joint Support Reactions for Load Case "NESC Extreme Ice":

Joint Label	X Force (kips)	X Usage %	Y Force (kips)	Y Usage %	H-Shear Usage %	Z Force (kips)	Comp. Uplift Usage %	Result. Usage %	Result. Force (kips)	Result. Usage %	X Moment (ft-k)	X-M. Usage %	Y Moment (ft-k)	Y-M. Usage %	H-Bend-M Usage %	Z Moment (ft-k)	Z-M. Usage %	Max. Usage %
6063A:g	-15.20	0.0	-74.23	0.0	0.0	-48.61	0.0	0.0	90.02	0.0	4681.70	0.0	-980.6	0.0	0.0	-0.02	0.0	0.0

Detailed Steel Pole Usages for Load Case "NESC Extreme Ice":

Element Label	Joint Label	Joint Position	Rel. Dist. (ft)	Trans. Defl. (in)	Long. Defl. (in)	Vert. Defl. (in)	Trans. Mom. (Local Mx) (ft-k)	Long. Mom. (Local My) (ft-k)	Tors. Mom. (ft-k)	Axial Force (kips)	Tran. Shear (kips)	Long. Shear (kips)	P/A (ksi)	M/S. (ksi)	V/Q. (ksi)	T/R. (ksi)	Res. (ksi)	Max. Usage %	At Pt.
6063A	6063A:t	Origin	0.00	27.70	5.89	-0.51	-0.00	-0.00	0.0	-2.93	1.11	-8.02	-0.09	0.00	0.53	0.00	0.92	1.4	1
6063A	6063A:Shield	End	1.00	27.17	5.78	-0.50	1.11	-8.02	0.0	-2.93	1.11	-8.02	-0.09	0.19	0.50	0.00	0.91	1.4	2
6063A	6063A:Shield	Origin	1.00	27.17	5.78	-0.50	1.11	-8.02	-0.0	-5.59	11.55	-2.35	-0.18	0.46	0.75	0.00	1.45	2.2	5
6063A	6063A:WVGD1	End	5.00	25.04	5.32	-0.45	47.30	-17.43	-0.0	-5.59	11.55	-2.35	-0.17	2.73	0.14	0.00	2.91	4.5	2
6063A	6063A:WVGD1	Origin	5.00	25.04	5.32	-0.45	47.30	-17.42	0.0	-6.01	11.67	-2.36	-0.18	2.73	0.14	0.00	2.92	4.5	2
6063A	6063A:Arm1	End	7.75	23.58	5.00	-0.42	79.39	-23.90	0.0	-6.01	11.67	-2.36	-0.18	4.22	0.14	0.00	4.41	6.8	2
6063A	6063A:Arm1	Origin	7.75	23.58	5.00	-0.42	78.80	-23.90	0.0	-6.45	11.76	-2.36	-0.19	4.19	0.14	0.00	4.39	6.8	2
6063A	Tube 1	End	10.54	22.12	4.69	-0.38	111.60	-30.49	0.0	-6.45	11.76	-2.36	-0.18	5.53	0.13	0.00	5.72	8.8	2

6063A	Tube 1	Origin	10.54	22.12	4.69	-0.38	111.60	-30.49	0.0	-6.78	11.84	-2.36	-0.19	5.53	0.13	0.00	5.73	8.8	2
6063A	6063A:Vang1	End	13.33	20.66	4.38	-0.35	144.63	-37.08	0.0	-6.78	11.84	-2.36	-0.19	6.71	0.13	0.00	6.90	10.6	2
6063A	6063A:Vang1	Origin	13.33	20.66	4.38	-0.35	144.63	-37.08	0.0	-12.44	32.13	-6.72	-0.34	6.71	0.36	0.00	7.08	10.9	2
6063A	6063A:WVGD2	End	15.00	19.80	4.19	-0.33	198.28	-48.30	0.0	-12.44	32.13	-6.72	-0.34	8.84	0.36	0.00	9.20	14.1	2
6063A	6063A:WVGD2	Origin	15.00	19.80	4.19	-0.33	198.28	-48.30	0.0	-12.92	32.25	-6.73	-0.35	8.84	0.36	0.00	9.21	14.2	2
6063A	6063A:Arm2	End	19.75	17.39	3.68	-0.28	351.47	-80.25	0.0	-12.92	32.25	-6.73	-0.33	14.13	0.34	0.00	14.47	22.3	2
6063A	6063A:Arm2	Origin	19.75	17.39	3.68	-0.28	350.87	-80.24	0.0	-13.56	32.36	-6.73	-0.35	14.10	0.34	0.00	14.46	22.3	2
6063A	Tube 1	End	22.38	16.09	3.40	-0.25	435.81	-97.90	0.0	-13.56	32.36	-6.73	-0.34	16.60	0.33	0.00	16.95	26.1	2
6063A	Tube 1	Origin	22.38	16.09	3.40	-0.25	435.81	-97.90	0.0	-13.95	32.44	-6.73	-0.35	16.60	0.33	0.00	16.96	26.1	2
6063A	6063A:WVGD3	End	25.00	14.83	3.13	-0.22	520.96	-115.55	0.0	-13.95	32.44	-6.73	-0.34	18.83	0.32	0.00	19.17	29.5	2
6063A	6063A:WVGD3	Origin	25.00	14.83	3.13	-0.22	520.96	-115.55	0.0	-14.22	32.51	-6.73	-0.35	18.83	0.32	0.00	19.18	29.5	2
6063A	6063A:Vang2	End	25.33	14.67	3.10	-0.22	531.69	-117.77	0.0	-14.22	32.51	-6.73	-0.35	19.09	0.32	0.00	19.44	29.9	2
6063A	6063A:Vang2	Origin	25.33	14.67	3.10	-0.22	531.69	-117.76	0.0	-19.96	52.76	-11.08	-0.49	19.09	0.53	0.00	19.60	30.1	2
6063A	Tube 1	End	28.54	13.18	2.78	-0.19	701.04	-153.33	0.0	-19.96	52.76	-11.08	-0.47	23.66	0.51	0.00	24.15	37.1	2
6063A	Tube 1	Origin	28.54	13.18	2.78	-0.19	701.04	-153.32	0.0	-20.52	52.84	-11.07	-0.48	23.66	0.51	0.00	24.16	37.2	2
6063A	6063A:Arm3	End	31.75	11.76	2.48	-0.16	870.65	-188.87	0.0	-20.52	52.84	-11.07	-0.47	27.68	0.50	0.00	28.16	43.3	2
6063A	6063A:Arm3	Origin	31.75	11.76	2.48	-0.16	870.03	-188.85	0.0	-21.22	52.92	-11.07	-0.49	27.66	0.50	0.00	28.16	43.3	2
6063A	6063A:WVGD4	End	35.00	10.39	2.19	-0.13	1042.02	-224.83	0.0	-21.22	52.92	-11.07	-0.47	31.23	0.48	0.00	31.72	48.8	2
6063A	6063A:WVGD4	Origin	35.00	10.39	2.19	-0.13	1042.03	-224.82	0.0	-21.78	53.01	-11.06	-0.49	31.23	0.48	0.00	31.73	48.8	2
6063A	6063A:Vang3	End	37.33	9.46	1.99	-0.12	1165.55	-250.59	0.0	-21.78	53.01	-11.06	-0.48	33.53	0.47	0.00	34.02	52.3	2
6063A	6063A:Vang3	Origin	37.33	9.46	1.99	-0.12	1165.55	-250.58	0.0	-27.89	73.23	-15.40	-0.61	33.53	0.66	0.00	34.16	52.6	2
6063A	SpliceT	End	40.00	8.44	1.78	-0.10	1361.08	-291.70	0.0	-27.89	73.23	-15.40	-0.60	37.40	0.65	0.00	38.01	58.5	2
6063A	SpliceT	Origin	40.00	8.44	1.78	-0.10	1361.09	-291.68	0.0	-29.30	73.33	-15.39	-0.63	37.40	0.65	0.00	38.04	58.5	2
6063A	6063A:WVGD5	End	45.00	6.70	1.41	-0.07	1727.71	-368.64	0.0	-29.30	73.33	-15.39	-0.41	30.66	0.42	0.00	31.08	47.8	2
6063A	6063A:WVGD5	Origin	45.00	6.70	1.41	-0.07	1727.71	-368.62	0.0	-30.67	73.43	-15.39	-0.43	30.66	0.42	0.00	31.10	47.8	2
6063A	SpliceB	End	45.83	6.43	1.35	-0.07	1788.65	-381.39	0.0	-30.67	73.43	-15.39	-0.43	31.31	0.42	0.00	31.74	48.8	2
6063A	SpliceB	Origin	45.83	6.43	1.35	-0.07	1788.66	-381.38	0.0	-31.54	73.49	-15.38	-0.44	31.31	0.42	0.00	31.75	48.9	2
6063A	Tube 2	End	50.42	5.03	1.06	-0.05	2125.60	-451.89	0.0	-31.54	73.49	-15.38	-0.42	34.52	0.41	0.00	34.95	53.8	2
6063A	Tube 2	Origin	50.42	5.03	1.06	-0.05	2125.60	-451.86	0.0	-32.93	73.59	-15.36	-0.44	34.52	0.40	0.00	34.97	53.8	2
6063A	6063A:WVGD6	End	55.00	3.80	0.80	-0.03	2462.99	-522.30	0.0	-32.93	73.59	-15.36	-0.42	37.22	0.39	0.00	37.65	57.9	2
6063A	6063A:WVGD6	Origin	55.00	3.80	0.80	-0.03	2462.99	-522.26	0.0	-34.49	73.71	-15.35	-0.45	37.22	0.39	0.00	37.67	58.0	2
6063A	Tube 2	End	60.00	2.64	0.56	-0.02	2831.53	-598.99	0.0	-34.49	73.71	-15.35	-0.43	39.67	0.38	0.00	40.11	61.7	2
6063A	Tube 2	Origin	60.00	2.64	0.56	-0.02	2831.54	-598.95	0.0	-36.12	73.80	-15.32	-0.45	39.67	0.38	0.00	40.13	61.7	2
6063A	6063A:WVGD7	End	65.00	1.69	0.36	-0.01	3200.55	-675.57	0.0	-36.12	73.80	-15.32	-0.43	41.69	0.36	0.00	42.13	64.8	2
6063A	6063A:WVGD7	Origin	65.00	1.69	0.36	-0.01	3200.55	-675.54	0.0	-37.86	73.92	-15.30	-0.45	41.69	0.36	0.00	42.15	64.8	2
6063A	Tube 2	End	70.00	0.96	0.20	-0.01	3570.15	-752.03	0.0	-37.86	73.92	-15.30	-0.44	43.34	0.35	0.00	43.78	67.4	2
6063A	Tube 2	Origin	70.00	0.96	0.20	-0.01	3570.15	-752.01	0.0	-39.60	74.01	-15.27	-0.46	43.34	0.35	0.00	43.80	67.4	2
6063A	6063A:WVGD8	End	75.00	0.43	0.09	-0.00	3940.17	-828.37	0.0	-39.60	74.01	-15.27	-0.44	44.69	0.34	0.00	45.14	69.4	2
6063A	6063A:WVGD8	Origin	75.00	0.43	0.09	-0.00	3940.18	-828.35	0.0	-41.43	74.11	-15.25	-0.46	44.69	0.34	0.00	45.16	69.5	2
6063A	Tube 2	End	80.00	0.11	0.02	-0.00	4310.74	-904.58	0.0	-41.43	74.11	-15.25	-0.45	45.78	0.32	0.00	46.23	71.1	2
6063A	Tube 2	Origin	80.00	0.11	0.02	-0.00	4310.74	-904.57	0.0	-43.27	74.19	-15.22	-0.47	45.78	0.32	0.00	46.25	71.2	2
6063A	6063A:g	End	85.00	0.00	0.00	0.00	4681.70	-980.65	0.0	-43.27	74.19	-15.22	-0.45	46.65	0.31	0.00	47.11	72.5	2

Detailed Tubular Davit Arm Usages for Load Case "NESC Extreme Ice":

Element Label	Joint Label	Joint Position	Rel. Dist. (ft)	Trans. Defl. (in)	Long. Defl. (in)	Vert. Defl. (in)	Vert. Mom. (ft-k)	Horz. Mom. (ft-k)	Tors. Mom. (ft-k)	Axial Force (kips)	Vert. Shear (kips)	Horz. Shear (kips)	P/A (ksi)	M/S. (ksi)	V/Q. (ksi)	T/R. (ksi)	Res. (ksi)	Max. Usage %	At Pt.
1	1:O	Origin	0.00	23.60	5.01	0.21	-0.45	0.00	0.0	-0.01	0.09	-0.00	-0.00	0.66	0.00	0.00	0.66	1.0	1
1	#1:0	End	3.40	23.83	5.07	1.98	-0.16	0.00	0.0	-0.01	0.09	-0.00	-0.00	0.33	0.00	0.00	0.33	0.5	1
1	#1:0	Origin	3.40	23.83	5.07	1.98	-0.16	0.00	0.0	-0.01	0.04	-0.00	-0.00	0.33	0.00	0.00	0.33	0.5	1
1	1:mid	End	6.79	24.07	5.13	3.75	-0.02	0.00	0.0	-0.01	0.04	-0.00	-0.00	0.07	0.00	0.00	0.07	0.1	1
1	1:mid	Origin	6.79	24.07	5.13	3.75	-0.02	0.00	0.0	-0.00	0.01	-0.00	-0.00	0.07	0.00	0.00	0.07	0.1	1
1	1:End	End	8.79	24.09	5.14	4.80	-0.00	0.00	0.0	-0.00	0.01	-0.00	-0.00	0.00	0.01	0.00	0.01	0.0	3
3	3:O	Origin	0.00	17.40	3.68	0.40	-0.45	0.00	0.0	-0.01	0.09	-0.00	-0.00	0.66	0.00	0.00	0.67	1.0	1
3	#3:0	End	3.40	17.62	3.74	2.07	-0.16	0.00	0.0	-0.01	0.09	-0.00	-0.00	0.33	0.00	0.00	0.33	0.5	1

3	#3:0	Origin	3.40	17.62	3.74	2.07	-0.16	0.00	0.0	-0.01	0.04	-0.00	-0.00	0.33	0.00	0.00	0.33	0.5	1
3	3:mid	End	6.79	17.84	3.79	3.74	-0.02	0.00	0.0	-0.01	0.04	-0.00	-0.00	0.07	0.00	0.00	0.07	0.1	1
3	3:mid	Origin	6.79	17.84	3.79	3.74	-0.02	0.00	0.0	-0.00	0.01	-0.00	-0.00	0.07	0.00	0.00	0.07	0.1	1
3	3:End	End	8.79	17.86	3.80	4.73	-0.00	0.00	0.0	-0.00	0.01	-0.00	-0.00	0.00	0.01	0.00	0.01	0.0	3
5	5:O	Origin	0.00	11.77	2.49	0.50	-0.45	0.00	0.0	-0.01	0.09	-0.00	-0.00	0.66	0.00	0.00	0.67	1.0	1
5	#5:0	End	3.40	11.96	2.53	1.95	-0.16	0.00	0.0	-0.01	0.09	-0.00	-0.00	0.33	0.00	0.00	0.34	0.5	1
5	#5:0	Origin	3.40	11.96	2.53	1.95	-0.16	0.00	0.0	-0.01	0.04	-0.00	-0.00	0.33	0.00	0.00	0.33	0.5	1
5	5:mid	End	6.79	12.14	2.58	3.39	-0.02	0.00	0.0	-0.01	0.04	-0.00	-0.00	0.07	0.00	0.00	0.07	0.1	1
5	5:mid	Origin	6.79	12.14	2.58	3.39	-0.02	0.00	0.0	-0.00	0.01	-0.00	-0.00	0.07	0.00	0.00	0.07	0.1	1
5	5:End	End	8.79	12.16	2.58	4.25	-0.00	0.00	0.0	-0.00	0.01	-0.00	-0.00	0.00	0.01	0.00	0.01	0.0	3

Summary of Clamp Capacities and Usages for Load Case "NESC Extreme Ice":

Clamp Label	Force (kips)	Input Holding Capacity (kips)	Factored Holding Capacity (kips)	Holding Usage %	Input Hardware Capacity (kips)	Factored Hardware Capacity (kips)	Hardware Usage %	Max. Usage %
1	21.377	100.00	100.00	21.38	0.00	0.00	0.00	21.38
2	21.377	100.00	100.00	21.38	0.00	0.00	0.00	21.38
3	21.377	100.00	100.00	21.38	0.00	0.00	0.00	21.38
4	0.052	100.00	100.00	0.05	0.00	0.00	0.00	0.05
5	0.052	100.00	100.00	0.05	0.00	0.00	0.00	0.05
6	0.052	100.00	100.00	0.05	0.00	0.00	0.00	0.05
7	0.052	100.00	100.00	0.05	0.00	0.00	0.00	0.05
8	0.052	100.00	100.00	0.05	0.00	0.00	0.00	0.05
9	0.052	100.00	100.00	0.05	0.00	0.00	0.00	0.05
10	0.052	100.00	100.00	0.05	0.00	0.00	0.00	0.05
11	0.052	100.00	100.00	0.05	0.00	0.00	0.00	0.05
12	8.584	100.00	100.00	8.58	0.00	0.00	0.00	8.58
13	12.056	100.00	100.00	12.06	0.00	0.00	0.00	12.06

*** Overall summary for all load cases - Usage = Maximum Stress / Allowable Stress

Summary of Steel Pole Usages:

Steel Pole Label	Maximum Usage %	Load Case	Height AGL (ft)	Segment Number	Weight (lbs)
6063A	89.46	NESC Heavy	2.5	25	23196.9

Base Plate Results by Bend Line:

Pole Label	Load Case	Bend Line #	Start X (ft)	Start Y (ft)	End X (ft)	End Y (ft)	Length (in)	Bending Stress (ksi)	Bolt Mom. Sum (ft-k)	# Bolts Acting	Bolt Max Load (kips)	Min Plate Thickness (in)	Actual Thickness (in)	Usage %
6063A	NESC Heavy	1	2.167	1.311	0.529	2.257	22.691	31.418	158.429	4	191.886	3.171	4.000	62.84
6063A	NESC Heavy	2	2.257	0.529	1.311	2.167	22.691	17.926	90.392	4	162.197	2.395	4.000	35.85
6063A	NESC Heavy	3	2.219	-1.127	2.219	1.127	27.054	4.417	26.557	2	-127.729	1.189	4.000	8.83
6063A	NESC Heavy	4	1.311	-2.167	2.257	-0.529	22.691	32.787	165.332	4	-211.473	3.239	4.000	65.57
6063A	NESC Heavy	5	0.529	-2.257	2.167	-1.311	22.691	41.437	208.947	4	-223.707	3.641	4.000	82.87
6063A	NESC Heavy	6	-1.127	-2.219	1.127	-2.219	27.054	10.667	64.129	2	-223.707	1.848	4.000	21.33
6063A	NESC Heavy	7	-2.167	-1.311	-0.529	-2.257	22.691	30.344	153.013	4	-186.546	3.116	4.000	60.69
6063A	NESC Heavy	8	-2.257	-0.529	-1.311	-2.167	22.691	16.852	84.976	4	-156.857	2.322	4.000	33.70
6063A	NESC Heavy	9	-2.219	1.127	-2.219	-1.127	27.054	4.417	26.557	2	133.069	1.189	4.000	8.83
6063A	NESC Heavy	10	-1.311	2.167	-2.257	0.529	22.691	33.861	170.748	4	216.814	3.292	4.000	67.72
6063A	NESC Heavy	11	-0.529	2.257	-2.167	1.311	22.691	42.511	214.363	4	229.048	3.688	4.000	85.02
6063A	NESC Heavy	12	1.127	2.219	-1.127	2.219	27.054	10.945	65.799	2	229.048	1.871	4.000	21.89
6063A	NESC Heavy	13	2.375	0.873	0.873	2.375	25.484	18.671	105.736	5	191.886	2.444	4.000	37.34
6063A	NESC Heavy	14	0.873	-2.375	2.375	-0.873	25.484	28.096	159.111	5	-223.707	2.998	4.000	56.19
6063A	NESC Heavy	15	-2.375	-0.873	-0.873	-2.375	25.484	17.867	101.181	5	-186.546	2.391	4.000	35.73
6063A	NESC Heavy	16	-0.873	2.375	-2.375	0.873	25.484	28.900	163.665	5	229.048	3.041	4.000	57.80
6063A	NESC Extreme	1	2.167	1.311	0.529	2.257	22.691	29.291	147.702	4	175.861	3.062	4.000	58.58
6063A	NESC Extreme	2	2.257	0.529	1.311	2.167	22.691	17.652	89.009	4	150.970	2.377	4.000	35.30
6063A	NESC Extreme	3	2.219	-1.127	2.219	1.127	27.054	3.979	23.921	2	-106.326	1.128	4.000	7.96
6063A	NESC Extreme	4	1.311	-2.167	2.257	-0.529	22.691	28.027	141.327	4	-185.602	2.995	4.000	56.05
6063A	NESC Extreme	5	0.529	-2.257	2.167	-1.311	22.691	36.331	183.200	4	-198.472	3.410	4.000	72.66
6063A	NESC Extreme	6	-1.127	-2.219	1.127	-2.219	27.054	9.655	58.048	2	-198.472	1.758	4.000	19.31
6063A	NESC Extreme	7	-2.167	-1.311	-0.529	-2.257	22.691	28.691	144.676	4	-172.878	3.030	4.000	57.38
6063A	NESC Extreme	8	-2.257	-0.529	-1.311	-2.167	22.691	17.051	85.983	4	-147.986	2.336	4.000	34.10
6063A	NESC Extreme	9	-2.219	1.127	-2.219	-1.127	27.054	3.979	23.921	2	109.310	1.128	4.000	7.96
6063A	NESC Extreme	10	-1.311	2.167	-2.257	0.529	22.691	28.627	144.353	4	188.586	3.027	4.000	57.25
6063A	NESC Extreme	11	-0.529	2.257	-2.167	1.311	22.691	36.931	186.226	4	201.455	3.438	4.000	73.86
6063A	NESC Extreme	12	1.127	2.219	-1.127	2.219	27.054	9.811	58.981	2	201.455	1.772	4.000	19.62
6063A	NESC Extreme	13	2.375	0.873	0.873	2.375	25.484	17.764	100.599	5	175.861	2.384	4.000	35.53
6063A	NESC Extreme	14	0.873	-2.375	2.375	-0.873	25.484	24.360	137.953	5	-198.472	2.792	4.000	48.72
6063A	NESC Extreme	15	-2.375	-0.873	-0.873	-2.375	25.484	17.315	98.055	5	-172.878	2.354	4.000	34.63
6063A	NESC Extreme	16	-0.873	2.375	-2.375	0.873	25.484	24.809	140.498	5	201.455	2.818	4.000	49.62
6063A	NESC Extreme Ice	1	2.167	1.311	0.529	2.257	22.691	25.708	129.631	4	156.472	2.868	4.000	51.42
6063A	NESC Extreme Ice	2	2.257	0.529	1.311	2.167	22.691	14.836	74.813	4	132.668	2.179	4.000	29.67
6063A	NESC Extreme Ice	3	2.219	-1.127	2.219	1.127	27.054	3.586	21.562	2	-102.095	1.071	4.000	7.17
6063A	NESC Extreme Ice	4	1.311	-2.167	2.257	-0.529	22.691	26.337	132.806	4	-170.710	2.903	4.000	52.67
6063A	NESC Extreme Ice	5	0.529	-2.257	2.167	-1.311	22.691	33.443	168.636	4	-180.943	3.271	4.000	66.89
6063A	NESC Extreme Ice	6	-1.127	-2.219	1.127	-2.219	27.054	8.658	52.052	2	-180.943	1.665	4.000	17.32
6063A	NESC Extreme Ice	7	-2.167	-1.311	-0.529	-2.257	22.691	24.818	125.148	4	-152.051	2.818	4.000	49.64
6063A	NESC Extreme Ice	8	-2.257	-0.529	-1.311	-2.167	22.691	13.947	70.329	4	-128.246	2.113	4.000	27.89

6063A	NESC Extreme Ice	9	-2.219	1.127	-2.219	-1.127	27.054	3.586	21.562	2	106.517	1.071	4.000	7.17
6063A	NESC Extreme Ice	10	-1.311	2.167	-2.257	0.529	22.691	27.226	137.289	4	175.132	2.952	4.000	54.45
6063A	NESC Extreme Ice	11	-0.529	2.257	-2.167	1.311	22.691	34.332	173.120	4	185.364	3.315	4.000	68.66
6063A	NESC Extreme Ice	12	1.127	2.219	-1.127	2.219	27.054	8.888	53.435	2	185.364	1.686	4.000	17.78
6063A	NESC Extreme Ice	13	2.375	0.873	0.873	2.375	25.484	15.341	86.878	5	156.472	2.216	4.000	30.68
6063A	NESC Extreme Ice	14	0.873	-2.375	2.375	-0.873	25.484	22.628	128.148	5	-180.943	2.691	4.000	45.26
6063A	NESC Extreme Ice	15	-2.375	-0.873	-0.873	-2.375	25.484	14.675	83.107	5	-152.051	2.167	4.000	29.35
6063A	NESC Extreme Ice	16	-0.873	2.375	-2.375	0.873	25.484	23.294	131.918	5	185.364	2.730	4.000	46.59

Summary of Tubular Davit Usages:

Tubular Davit Label	Maximum Usage %	Load Case	Height AGL (ft)	Segment Number	Weight (lbs)
1	1.53	NESC Heavy	77.4	1	113.1
3	1.53	NESC Heavy	65.4	1	113.1
5	1.53	NESC Heavy	53.4	1	113.1

*** Maximum Stress Summary for Each Load Case

Summary of Maximum Usages by Load Case:

Load Case	Maximum Usage %	Element Label	Element Type
NESC Heavy	89.46	6063A	Steel Pole
NESC Extreme	79.24	6063A	Steel Pole
NESC Extreme Ice	72.48	6063A	Steel Pole

Summary of Steel Pole Usages by Load Case:

Load Case	Maximum Usage %	Steel Pole Label	Height AGL (ft)	Segment Number
NESC Heavy	89.46	6063A	2.5	25
NESC Extreme	79.24	6063A	2.5	25
NESC Extreme Ice	72.48	6063A	2.5	25

Summary of Base Plate Usages by Load Case:

Load Case	Pole Label	Bend Line #	Length (in)	Vertical Load (kips)	X Moment (ft-k)	Y Moment (ft-k)	Bending Stress (ksi)	Bolt Moment Sum (ft-k)	# Bolts Acting On Bend Line	Max Bolt Load For Bend Line (kips)	Minimum Plate Thickness (in)	Usage %
NESC Heavy	6063A	11	22.691	53.403	5766.445	-1261.293	42.511	214.363	4	229.048	3.688	85.02
NESC Extreme	6063A	11	22.691	29.837	5193.946	-868.695	36.931	186.226	4	201.455	3.438	73.86
NESC Extreme Ice	6063A	11	22.691	44.211	4681.700	-980.651	34.332	173.120	4	185.364	3.315	68.66

Summary of Tubular Davit Usages by Load Case:

Load Case	Maximum Usage %	Tubular Davit Label	Height AGL (ft)	Segment Number
NESC Heavy	1.53	5	53.4	1
NESC Extreme	1.00	5	53.4	1
NESC Extreme Ice	1.02	5	53.4	1

Summary of Insulator Usages:

Insulator Label	Insulator Type	Maximum Usage %	Load Case	Weight (lbs)
1	Clamp	26.06	NESC Heavy	0.0
2	Clamp	26.06	NESC Heavy	0.0
3	Clamp	26.06	NESC Heavy	0.0
4	Clamp	0.08	NESC Extreme	0.0
5	Clamp	0.08	NESC Extreme	0.0
6	Clamp	0.08	NESC Extreme	0.0
7	Clamp	0.08	NESC Extreme	0.0
8	Clamp	0.08	NESC Extreme	0.0
9	Clamp	0.08	NESC Extreme	0.0
10	Clamp	0.08	NESC Extreme	0.0
11	Clamp	0.08	NESC Extreme	0.0
12	Clamp	41.44	NESC Extreme	0.0
13	Clamp	40.24	NESC Extreme	0.0

Loads At Insulator Attachments For All Load Cases:

Load Case	Insulator Label	Insulator Type	Structure Attach Label	Structure Attach Load X (kips)	Structure Attach Load Y (kips)	Structure Attach Load Z (kips)	Structure Attach Load Res. (kips)
NESC Heavy	1	Clamp	6063A:Vang1	5.584	24.720	6.065	26.058
NESC Heavy	2	Clamp	6063A:Vang2	5.584	24.720	6.065	26.058
NESC Heavy	3	Clamp	6063A:Vang3	5.584	24.720	6.065	26.058
NESC Heavy	4	Clamp	6063A:WVGD1	0.000	0.035	0.054	0.064
NESC Heavy	5	Clamp	6063A:WVGD2	0.000	0.035	0.054	0.064
NESC Heavy	6	Clamp	6063A:WVGD3	0.000	0.035	0.054	0.064
NESC Heavy	7	Clamp	6063A:WVGD4	0.000	0.035	0.054	0.064
NESC Heavy	8	Clamp	6063A:WVGD5	0.000	0.035	0.054	0.064
NESC Heavy	9	Clamp	6063A:WVGD6	0.000	0.035	0.054	0.064
NESC Heavy	10	Clamp	6063A:WVGD7	0.000	0.035	0.054	0.064
NESC Heavy	11	Clamp	6063A:WVGD8	0.000	0.035	0.054	0.064
NESC Heavy	12	Clamp	6063A:t	9.371	1.128	3.995	10.249
NESC Heavy	13	Clamp	6063A:Shield	-6.532	11.945	1.937	13.751
NESC Extreme	1	Clamp	6063A:Vang1	3.843	20.649	2.548	21.158
NESC Extreme	2	Clamp	6063A:Vang2	3.843	20.649	2.548	21.158
NESC Extreme	3	Clamp	6063A:Vang3	3.843	20.649	2.548	21.158
NESC Extreme	4	Clamp	6063A:WVGD1	0.000	0.075	0.024	0.079
NESC Extreme	5	Clamp	6063A:WVGD2	0.000	0.075	0.024	0.079
NESC Extreme	6	Clamp	6063A:WVGD3	0.000	0.075	0.024	0.079
NESC Extreme	7	Clamp	6063A:WVGD4	0.000	0.075	0.024	0.079
NESC Extreme	8	Clamp	6063A:WVGD5	0.000	0.075	0.024	0.079
NESC Extreme	9	Clamp	6063A:WVGD6	0.000	0.075	0.024	0.079
NESC Extreme	10	Clamp	6063A:WVGD7	0.000	0.075	0.024	0.079
NESC Extreme	11	Clamp	6063A:WVGD8	0.000	0.075	0.024	0.079
NESC Extreme	12	Clamp	6063A:t	41.091	4.971	2.067	41.442
NESC Extreme	13	Clamp	6063A:Shield	-39.485	7.753	0.539	40.243
NESC Extreme Ice	1	Clamp	6063A:Vang1	4.302	19.974	6.285	21.377
NESC Extreme Ice	2	Clamp	6063A:Vang2	4.302	19.974	6.285	21.377
NESC Extreme Ice	3	Clamp	6063A:Vang3	4.302	19.974	6.285	21.377
NESC Extreme Ice	4	Clamp	6063A:WVGD1	0.000	0.026	0.045	0.052
NESC Extreme Ice	5	Clamp	6063A:WVGD2	0.000	0.026	0.045	0.052

NESC Extreme Ice	6	Clamp	6063A:WVGD3	0.000	0.026	0.045	0.052
NESC Extreme Ice	7	Clamp	6063A:WVGD4	0.000	0.026	0.045	0.052
NESC Extreme Ice	8	Clamp	6063A:WVGD5	0.000	0.026	0.045	0.052
NESC Extreme Ice	9	Clamp	6063A:WVGD6	0.000	0.026	0.045	0.052
NESC Extreme Ice	10	Clamp	6063A:WVGD7	0.000	0.026	0.045	0.052
NESC Extreme Ice	11	Clamp	6063A:WVGD8	0.000	0.026	0.045	0.052
NESC Extreme Ice	12	Clamp	6063A:t	7.986	0.965	2.995	8.584
NESC Extreme Ice	13	Clamp	6063A:Shield	-5.692	10.255	2.791	12.056

Overturning Moments For User Input Concentrated Loads:

Moments are static equivalents based on central axis of 0,0 (i.e. a single pole).

Load Case	Total Tran. Load (kips)	Total Long. Load (kips)	Total Vert. Load (kips)	Transverse Overturning Moment (ft-k)	Longitudinal Overturning Moment (ft-k)	Torsional Moment (ft-k)
NESC Heavy	87.513	19.591	24.559	5536.987	-1247.439	0.000
NESC Extreme	75.271	13.135	10.442	4797.164	-863.930	0.000
NESC Extreme Ice	71.350	15.200	25.001	4528.351	-970.783	0.000

*** Weight of structure (lbs):
Weight of Tubular Davit Arms: 339.4
Weight of Steel Poles: 23196.9
Total: 23536.3

*** End of Report

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Subject:	Anchor Bolt Analysis Pole #6063A
Location:	Waterford, CT
Rev. 1: 12/6/23	Prepared by: T.J.L. Checked by: C.F.C. Job No. 23009.10

Anchor Bolt Analysis:

Input Data:

Bolt Force:

Maximum Tensile Force =	$T_{Max} := 229 \cdot kips$	(User Input from PLS-Pole)
Maximum Shear Force at Base =	$V_{base} := 94 \cdot kips$	(User Input from PLS-Pole)

Anchor Bolt Data:

Use AST MA615 Grade 75

Number of Anchor Bolts =	$N := 20$	(User Input)
Bolt "Column" Distance =	$l := 3.0 \cdot in$	(User Input)
Bolt Ultimate Strength =	$F_u := 100 \cdot ksi$	(User Input)
Bolt Yeild Strength=	$F_y := 75 \cdot ksi$	(User Input)
Bolt Modulus =	$E := 29000 \cdot ksi$	(User Input)
Diameter of Anchor Bolts =	$D := 2.25 \cdot in$	(User Input)
Threads per Inch =	$n := 4.5$	(User Input)

Anchor Bolt Analysis:

Stress Area of Bolt = $A_s := \frac{\pi}{4} \cdot \left(D - \frac{0.9743 \cdot in}{n}\right)^2 = 3.248 \cdot in^2$

Maximum Shear Force per Bolt = $V_{Max} := \frac{V_{base}}{N} = 4.7 \cdot kips$

Shear Stress per Bolt = $f_v := \frac{V_{Max}}{A_s} = 1.4 \times 10^3 psi$

Tensile Stress Permitted = $F_t := 0.75 \cdot F_u = 75 \cdot ksi$

Shear Stress Permitted = $F_v := 0.35 F_u = 35 \cdot ksi$

Permitted Axial Tensile Stress in Conjuction with Shear = $F_{tv} := F_t \cdot \sqrt{1 - \left(\frac{f_v}{F_v}\right)^2} = 74.94 \cdot ksi$

Bolt Tension % of Capacity = $\frac{T_{Max}}{F_{tv} \cdot A_s} = 94.1 \cdot \%$

Condition1 = $Condition1 := if\left(\frac{T_{Max}}{F_{tv} \cdot A_s} \le 1.00, "OK", "Overstressed"\right)$

Condition1 = "OK"

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Subject: CAISSON FOUNDATION -POLE # 6063A

Location: Waterford, CT

Prepared by: TJL Checked by: C.F.C.
Job No. 23009.10

Rev. 2: 2/20/24

Caisson Foundation:

Input Data:

Shear Force =	S := 94.1·1.1k = 103.5·k	*USER INPUT-FROM PLS-Pole*
Overturning Moment =	M := 5903·1.1ft·k = 6493·ft·k	*USER INPUT-FROM PLS-Pole*
Applied Axial Load =	A1 := 57.8·1.1k = 63.58·k	*USER INPUT-FROM PLS-Pole*
Bending Moment =	M_u := 7045ft·k	*USER INPUT--FROM LPILE*
Moment Capacity =	M_n := 11696ft·k	*USER INPUT--FROM LPILE*
Max Shear =	V_u := 691083·lb	*USER INPUT--FROM LPILE*
Foundation Diameter =	d := 8.0ft	*USER INPUT*
Overall Length of Caisson =	L_c := 26.0ft	*USER INPUT*
Depth From Top of Caisson to Grade =	L_{pag} := 1.5ft	*USER INPUT*
Number of Rebar =	n := 36	*USER INPUT*
Area of Rebar =	Ar := 1.56in^2	*USER INPUT*
Rebar Yield Strength =	fy := 60ksi	*USER INPUT*
Concrete Comp Strength =	f'c := 5000 psi	*USER INPUT*
Area of Shear Reinforcement =	A_v := 0.62in^2	*USER INPUT = (2)*(Area of #5) per 11.4.7.3*
Spacing of Shear Reinforcement =	s := 6in	

Check Moment Capacity:

Bending Strength Reduction Factor = $\phi := 0.9$

$$\frac{M_u}{\phi \cdot M_n} = 66.9 \cdot \%$$

BendingCheck := if($\phi \cdot M_n \geq M_u$, "OK" , "NO GOOD")

BendingCheck = "OK"

Check Shear Capacity:

Shear Strength Reduction Factor = $\phi := 0.75$

Area of Concrete Pier = $A_c := \frac{1}{4} \cdot \pi \cdot d^2 = 7238 \cdot in^2$

Nominal Shear Strength by Concrete = $V_c := 2 \cdot \sqrt{f'c} \cdot psi \cdot A_c = 1024 \cdot kips$

Nominal Shear Strength by Steel = $V_s := \frac{(A_v \cdot fy \cdot 0.8 \cdot d)}{s} = 476 \cdot kips$

Nominal Shear Strength = $\phi V_n := \phi \cdot (V_c + V_s) = 1125 \cdot kips$

ShearCheck := if($\phi V_n \geq V_u$, "OK" , "NO GOOD")

ShearCheck = "OK"

$$\frac{V_u}{\phi V_n} = 61.4 \cdot \%$$

Units:

Angular

$rad \equiv 1$ $\quad deg \equiv \pi \cdot \frac{rad}{180}$

Weight

$lb \equiv lbf$

$kips \equiv 1000 \cdot lb$ $\quad k \equiv kips$

$tons \equiv 2000 \cdot lb$

Unit Weight

$plf \equiv \frac{lb}{ft}$ $\quad klf \equiv \frac{kips}{ft}$

Pressure

$psf \equiv \frac{lb}{ft^2}$ $\quad psi \equiv \frac{lb}{in^2}$

$ksf \equiv \frac{kips}{ft^2}$ $\quad ksi \equiv \frac{kips}{in^2}$

Density

$pcf \equiv \frac{lb}{ft^3}$

V.u < 1/2ϕV.c Shear strength provided by steel was ignored.

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LPile for Windows, Version 2022-12.010

Analysis of Individual Piles and Drilled Shafts
Subjected to Lateral Loading Using the p-y Method

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\Jobs\2300900.WI\10_BOBOS00935A\05_Structural\Tower Analysis\Backup Documentation\Rev (2)\Calcs\L-Pile\

Name of input data file:
6063A Caisson Analysis.lp12d

Name of output report file:
6063A Caisson Analysis.lp12o

Name of plot output file:
6063A Caisson Analysis.lp12p

Name of runtime message file:
6063A Caisson Analysis.lp12r

Date and Time of Analysis

Date: February 20, 2024 Time: 11:55:15

Problem Title

BOBOS00935A - Structure # 6063A

Job Number:

Client:

Engineer:

Description:

Program Options and Settings

Computational Options:
- Conventional Analysis

Engineering Units Used for Data Input and Computations:
- US Customary System Units (pounds, feet, inches)

Analysis Control Options:

- Maximum number of iterations allowed	=	1000
- Deflection tolerance for convergence	=	1.0000E-05 in
- Maximum allowable deflection	=	100.0000 in
- Number of pile increments	=	100

Loading Type and Number of Cycles of Loading:
- Static loading specified

- Use of p-y modification factors for p-y curves not selected
- Analysis uses layering correction (Method of Georgiadis)
- No distributed lateral loads are entered
- Loading by lateral soil movements acting on pile not selected
- Input of shear resistance at the pile tip not selected
- Input of moment resistance at the pile tip not selected
- Compute pile-head foundation stiffness matrix
- Push-over analysis of pile not selected
- Buckling analysis of pile not selected

Output Options:
- Output files use decimal points to denote decimal symbols.
- Values of pile-head deflection, bending moment, shear force, and soil reaction are printed for full length of pile.
- Printing Increment (nodal spacing of output points) = 8
- No p-y curves to be computed and reported for user-specified depths
- Print using wide report formats

Pile Structural Properties and Geometry

Number of pile sections defined = 1
Total length of pile = 26.000 ft
Depth of ground surface below top of pile = 1.5000 ft

Pile diameters used for p-y curve computations are defined using 2 points.

p-y curves are computed using pile diameter values interpolated with depth over the length of the pile. A summary of values of pile diameter vs. depth follows.

Point No.	Depth Below Pile Head feet	Pile Diameter inches
1	0.000	96.0000
2	26.000	96.0000

Input Structural Properties for Pile Sections:

Pile Section No. 1:

Section 1 is a round drilled shaft, bored pile, or CIDH pile
Length of section = 26.000000 ft
Shaft Diameter = 96.000000 in

Control Data for Pile-head Stiffness Computations

Computation Method 0 - Use loads from Load Case 1

Number of K-matrix points to generate = 10
Point distribution method = logarithmic distribution

Soil and Rock Layering Information

The soil profile is modelled using 1 layers

Layer 1 is sand, p-y criteria by Reese et al., 1974

Distance from top of pile to top of layer	=	1.500000 ft
Distance from top of pile to bottom of layer	=	26.000000 ft
Effective unit weight at top of layer	=	98.496000 pcf
Effective unit weight at bottom of layer	=	98.496000 pcf
Friction angle at top of layer	=	30.000000 deg.
Friction angle at bottom of layer	=	30.000000 deg.
Subgrade k at top of layer	=	90.000000 pci
Subgrade k at bottom of layer	=	90.000000 pci

(Depth of the lowest soil layer extends 0.000 ft below the pile tip)

Summary of Input Soil Properties

Layer Num.	Soil Type Name (p-y Curve Type)	Layer Depth ft	Effective Unit Wt. pcf	Angle of Friction deg.	kpy pci
1	Sand	1.5000	98.4960	30.0000	90.0000
	(Reese, et al.)	26.0000	98.4960	30.0000	90.0000

Static Loading Type

Static loading criteria were used when computing p-y curves for all analyses.

Pile-head Loading and Pile-head Fixity Conditions

Number of loads specified = 1

Load No.	Load Type	Condition 1	Condition 2	Axial Thrust Force, lbs	Compute Top y vs. Pile Length	Run Analysis
1	1	V = 103500. lbs	M = 77916000. in-lbs	63580.	No	Yes

V = shear force applied normal to pile axis
M = bending moment applied to pile head
y = lateral deflection normal to pile axis
S = pile slope relative to original pile batter angle
R = rotational stiffness applied to pile head
Values of top y vs. pile lengths can be computed only for load types with specified shear loading (Load Types 1, 2, and 3).
Thrust force is assumed to be acting axially for all pile batter angles.

Computations of Nominal Moment Capacity and Nonlinear Bending Stiffness

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Axial thrust force values were determined from pile-head loading conditions

Number of Pile Sections Analyzed = 1

Pile Section No. 1:

Dimensions and Properties of Drilled Shaft (Bored Pile):

Length of Section	=	26.000000 ft
Shaft Diameter	=	96.000000 in
Concrete Cover Thickness (to edge of long. rebar)	=	3.295327 in
Number of Reinforcing Bars	=	36 bars
Yield Stress of Reinforcing Bars	=	60000. psi
Modulus of Elasticity of Reinforcing Bars	=	29000000. psi

Gross Area of Shaft	=	7238. sq. in.
Total Area of Reinforcing Steel	=	56.160000 sq. in.
Area Ratio of Steel Reinforcement	=	0.78 percent
Edge-to-Edge Bar Spacing	=	6.259648 in
Maximum Concrete Aggregate Size	=	0.750000 in
Ratio of Bar Spacing to Aggregate Size	=	8.35
Offset of Center of Rebar Cage from Center of Pile	=	0.0000 in

Axial Structural Capacities:

Nom. Axial Structural Capacity = 0.85 Fc Ac + Fy As	=	33893.395 kips
Tensile Load for Cracking of Concrete	=	-3515.520 kips
Nominal Axial Tensile Capacity	=	-3369.600 kips

Reinforcing Bar Dimensions and Positions Used in Computations:

Bar Number	Bar Diam. inches	Bar Area sq. in.	X inches	Y inches
1	1.410000	1.560000	43.999673	0.00000
2	1.410000	1.560000	43.331219	7.640463
3	1.410000	1.560000	41.346168	15.048774
4	1.410000	1.560000	38.104834	21.999836
5	1.410000	1.560000	33.705705	28.282444
6	1.410000	1.560000	28.282444	33.705705
7	1.410000	1.560000	21.999836	38.104834
8	1.410000	1.560000	15.048774	41.346168
9	1.410000	1.560000	7.640463	43.331219
10	1.410000	1.560000	0.00000	43.999673
11	1.410000	1.560000	-7.64046	43.331219
12	1.410000	1.560000	-15.04877	41.346168
13	1.410000	1.560000	-21.99984	38.104834
14	1.410000	1.560000	-28.28244	33.705705
15	1.410000	1.560000	-33.70570	28.282444
16	1.410000	1.560000	-38.10483	21.999836
17	1.410000	1.560000	-41.34617	15.048774
18	1.410000	1.560000	-43.33122	7.640463
19	1.410000	1.560000	-43.99967	0.00000
20	1.410000	1.560000	-43.33122	-7.64046
21	1.410000	1.560000	-41.34617	-15.04877
22	1.410000	1.560000	-38.10483	-21.99984
23	1.410000	1.560000	-33.70570	-28.28244
24	1.410000	1.560000	-28.28244	-33.70570
25	1.410000	1.560000	-21.99984	-38.10483
26	1.410000	1.560000	-15.04877	-41.34617
27	1.410000	1.560000	-7.64046	-43.33122
28	1.410000	1.560000	0.00000	-43.99967
29	1.410000	1.560000	7.640463	-43.33122
30	1.410000	1.560000	15.048774	-41.34617

31	1.410000	1.560000	21.999836	-38.10483
32	1.410000	1.560000	28.282444	-33.70570
33	1.410000	1.560000	33.705705	-28.28244
34	1.410000	1.560000	38.104834	-21.99984
35	1.410000	1.560000	41.346168	-15.04877
36	1.410000	1.560000	43.331219	-7.64046

NOTE: The positions of the above rebars were computed by LPile

Minimum spacing between any two bars not equal to zero = 6.260 inches
between bars 22 and 23.

Ratio of bar spacing to maximum aggregate size = 8.35

Concrete Properties:

Compressive Strength of Concrete	=	5000. psi
Modulus of Elasticity of Concrete	=	4030509. psi
Modulus of Rupture of Concrete	=	-530.33009 psi
Compression Strain at Peak Stress	=	0.002109
Tensile Strain at Fracture of Concrete	=	-0.0001150
Maximum Coarse Aggregate Size	=	0.750000 in

Number of Axial Thrust Force Values Determined from Pile-head Loadings = 1

Number	Axial Thrust Force kips
1	63.580

Definitions of Run Messages and Notes:

C = concrete in section has cracked in tension.
Y = stress in reinforcing steel has reached yield stress.
T = ACI 318 criteria for tension-controlled section met, tensile strain in reinforcement exceeds 0.005 while simultaneously compressive strain in concrete more than 0.003. See ACI 318-14, Section 21.2.3.
Z = depth of tensile zone in concrete section is less than 10 percent of section depth.

Bending Stiffness (EI) = Computed Bending Moment / Curvature.
Position of neutral axis is measured from edge of compression side of pile.
Compressive stresses and strains are positive in sign.
Tensile stresses and strains are negative in sign.

Axial Thrust Force = 63.580 kips

Bending Curvature rad/in.	Bending Moment in-kip	Bending Stiffness kip-in2	Depth to N Axis in	Max Comp Strain in/in	Max Tens Strain in/in	Max Conc Stress ksi	Max Steel Stress ksi	Run Msg
3.12500E-07	6576.	2.10424E+10	53.7180706	0.00001679	-0.00001321	0.0785773	0.4563700	
6.25000E-07	13123.	2.09962E+10	50.8672605	0.00003179	-0.00002821	0.1482132	0.8610691	
9.37500E-07	19640.	2.09495E+10	49.9170353	0.00004680	-0.00004320	0.2173532	1.2657694	
0.00000125	26128.	2.09026E+10	49.4419493	0.00006180	-0.00005820	0.2859971	1.6704707	
0.00000156	32587.	2.08556E+10	49.1569180	0.00007681	-0.00007319	0.3541451	2.0751729	
0.00000188	39016.	2.08086E+10	48.9669137	0.00009181	-0.00008819	0.4217969	2.4798759	
0.00000219	45416.	2.07616E+10	48.8312105	0.0001068	-0.000103	0.4889528	2.8845799	
0.00000250	45416.	1.81664E+10	24.0118711	0.00006003	-0.000180	0.2750662	-4.975539	C
0.00000281	45416.	1.61479E+10	23.6742639	0.00006658	-0.000203	0.3045402	-5.625018	C
0.00000313	45416.	1.45331E+10	23.3996702	0.00007312	-0.000227	0.3338575	-6.274905	C
0.00000344	45416.	1.32119E+10	23.1698804	0.00007965	-0.000250	0.3630025	-6.925303	C
0.00000375	45416.	1.21110E+10	22.9792724	0.00008617	-0.000274	0.3920713	-7.575604	C
0.00000406	45416.	1.11793E+10	22.8188063	0.00009270	-0.000297	0.4210638	-8.225809	C
0.00000438	45416.	1.03808E+10	22.6820246	0.00009923	-0.000321	0.4499799	-8.875918	C
0.00000469	45416.	9688761239.	22.5641939	0.0001058	-0.000344	0.4788194	-9.525930	C
0.00000500	45416.	9083213661.	22.4568277	0.0001123	-0.000368	0.5074714	-10.176560	C
0.00000531	45416.	8548906975.	22.3625607	0.0001188	-0.000391	0.5360435	-10.827118	C
0.00000563	45416.	8073967699.	22.2793867	0.0001253	-0.000415	0.5645399	-11.477575	C
0.00000594	45416.	7649022030.	22.2055557	0.0001318	-0.000438	0.5929607	-12.127931	C
0.00000625	45416.	7266570929.	22.1396680	0.0001384	-0.000462	0.6213056	-12.778185	C

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0.8175884    -17.327099 C
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0.0001147 135809. 1184161744. 15.8107896 0.0018133 -0.009197
4.8617590 -60.000000 CY
0.0001172 136072. 1161145966. 15.7229569 0.0018425 -0.009407
4.8829792 -60.000000 CY
0.0001197 136298. 1138785745. 15.6347262 0.0018713 -0.009619
4.9021095 -60.000000 CY
0.0001222 136478. 1116956734. 15.5446858 0.0018994 -0.009831
4.9191348 -60.000000 CY
0.0001247 136651. 1095944969. 15.4580745 0.0019274 -0.010043
4.9345219 -60.000000 CY
0.0001272 136805. 1075616046. 15.3717903 0.0019551 -0.010255
4.9481836 -60.000000 CY
0.0001297 136958. 1056060675. 15.2918602 0.0019832 -0.010467
4.9602808 -60.000000 CY
0.0001322 137109. 1037234740. 15.2147174 0.0020112 -0.010679
4.9708002 -60.000000 CY
0.0001347 137260. 1019097499. 15.1408338 0.0020393 -0.010891
4.9797279 -60.000000 CY
0.0001372 137409. 1001611158. 15.0701656 0.0020674 -0.011103
4.9870501 -60.000000 CY
0.0001522 138237. 908331013. 14.6831437 0.0022346 -0.012375
4.9901933 -60.000000 CY
0.0001672 138980. 831285080. 14.3652708 0.0024017 -0.013648
4.9867724 -60.000000 CY
0.0001822 139543. 765932874. 14.0938295 0.0025677 -0.014922
4.9904398 -60.000000 CY

```
 0.0001972       139891.    709432822.    13.8394685     0.0027290     -0.016201
4.9979699    -60.000000 CY
 0.0002122       140171.    660599333.    13.6118137     0.0028883     -0.017482
4.9788129    60.0000000 CY
 0.0002272       140434.    618142452.    13.4220957     0.0030493     -0.018761
4.9981180    60.0000000 CYT
 0.0002422       140623.    580637008.    13.2861702     0.0032177     -0.020032
4.9722394    60.0000000 CYT
 0.0002572       140796.    547446487.    13.1728833     0.0033879     -0.021302
4.9930008    60.0000000 CYT
 0.0002722       140946.    517825657.    13.0831251     0.0035611     -0.022569
4.9933483    60.0000000 CYT
 0.0002872       141055.    491161530.    13.0094967     0.0037362     -0.023834
4.9695679    60.0000000 CYT
 0.0003022       141055.    466781227.    13.0721274     0.0039502     -0.025060
4.9977906    60.0000000 CYT


-------------------------------------------------------------------------------
   Summary of Results for Nominal Moment Capacity for Section 1
-------------------------------------------------------------------------------

Moment values interpolated at maximum compressive strain = 0.003
or maximum developed moment if pile fails at smaller strains.

 Load           Axial Thrust        Nominal Mom. Cap.      Max. Comp.      Max.
Tens.
  No.              kips                 in-kip               Strain
Strain
 ----         ---------------     -----------------     ------------
------------
   1               63.580            140353.593           0.00300000
-0.01836897

Note that the values of moment capacity in the table above are not
factored by a strength reduction factor (phi-factor).

In ACI 318, the value of the strength reduction factor depends on whether
the transverse reinforcing steel bars are tied hoops (0.65) or spirals (0.75).

The above values should be multiplied by the appropriate strength reduction
factor to compute ultimate moment capacity according to ACI 318,
or the value required by the design standard being followed.

The following table presents factored moment capacities and corresponding
bending stiffnesses computed for common resistance factor values used for
reinforced concrete sections.

Axial     Resist.       Nominal        Nominal     Ult. (Fac)    Ult. (Fac)   Bend.
Stiff.
Load      Factor       Ax. Thrust    Moment Cap    Ax. Thrust    Moment Cap    at
```

Ult Mom No.		kips	in-kips	kips	in-kips	kip-in^2
1	0.65	63.580000	140354.	41.327000	91230.	3.3404E+09
1	0.75	63.580000	140354.	47.685000	105265.	3.2108E+09
1	0.90	63.580000	140354.	57.222000	126318.	2.0629E+09

Computed Values of Pile Loading and Deflection
for Lateral Loading for Load Case Number 1

Pile-head conditions are Shear and Moment (Loading Type 1)

Shear force at pile head = 103500.0 lbs
Applied moment at pile head = 77916000.0 in-lbs
Axial thrust load on pile head = 63580.0 lbs

Depth X	Deflect. y	Bending Moment	Shear Force	Slope S	Total Stress	Bending Stiffness	Soil Res. Es*H	Soil Spr. Lat. Load	Distrib. p
feet	inches	in-lbs	lbs	radians	psi*	lb-in^2	lb/inch	lb/inch	lb/inch
0.00	7.0711	7.79E+07	103500.	-0.03436	0.00	3.36E+12	0.00	0.00	0.00
2.0800	6.2208	8.06E+07	102440.	-0.03377	0.00	3.36E+12	-296.932	1191.	0.00
4.1600	5.3855	8.30E+07	80435.	-0.03316	0.00	3.35E+12	-1498.	6943.	0.00
6.2400	4.5656	8.44E+07	26358.	-0.03254	0.00	3.35E+12	-2852.	15590.	0.00
8.3200	3.7614	8.41E+07	-62459.	-0.03191	0.00	3.35E+12	-4270.	28334.	0.00
10.4000	2.9727	8.11E+07	-182240.	-0.03129	0.00	3.35E+12	-5205.	43705.	0.00
12.4800	2.1991	7.49E+07	-319025.	-0.03071	0.00	3.36E+12	-5690.	64583.	0.00
14.5600	1.4393	6.52E+07	-463200.	-0.03019	0.00	3.38E+12			

```
-5818.    100894.       0.00
   16.6400     0.6914   5.19E+07   -603440.   -0.02975       0.00   3.41E+12
-5229.    188751.       0.00
   18.7200   -0.04797   3.55E+07   -690957.   -0.02957       0.00   2.08E+13
892.1031    464196.       0.00
   20.8000     -0.786   1.96E+07   -573968.   -0.02954       0.00   2.09E+13
6466.    205430.       0.00
   22.8800     -1.523   7519493.   -384476.   -0.02952       0.00   2.10E+13
8667.    142075.       0.00
   24.9600     -2.260    881533.   -142071.   -0.02952       0.00   2.10E+13
10789.    119175.       0.00

* This analysis computed pile response using nonlinear moment-curvature rela-
  tionships. Values of total stress due to combined axial and bending stresses
  are computed only for elastic sections only and do not equal the actual
  stresses in concrete and steel. Stresses in concrete and steel may be inter-
  polated from the output for nonlinear bending properties relative to the
  magnitude of bending moment developed in the pile.

* Soil Spring is estimated using space increment for printing, H.


Output Summary for Load Case No. 1:

Pile-head deflection             =     7.07107687 inches
Computed slope at pile head      =     -0.0343576 radians
Maximum bending moment           =      84542759. inch-lbs
Maximum shear force              =       -691083. lbs
Depth of maximum bending moment  =     7.02000000 feet below pile head
Depth of maximum shear force     =    18.46000000 feet below pile head
Number of iterations             =            136
Number of zero deflection points =              1
Pile deflection at ground        =     6.45644847 inches


--------------------------------------------------------------------------------
            Summary of Pile-head Responses for Conventional Analyses
--------------------------------------------------------------------------------

Definitions of Pile-head Loading Conditions:

Load Type 1: Load 1 = Shear, V, lbs, and Load 2 = Moment, M, in-lbs
Load Type 2: Load 1 = Shear, V, lbs, and Load 2 = Slope, S, radians
Load Type 3: Load 1 = Shear, V, lbs, and Load 2 = Rot. Stiffness, R, in-lbs/rad.
Load Type 4: Load 1 = Top Deflection, y, inches, and Load 2 = Moment, M, in-lbs
Load Type 5: Load 1 = Top Deflection, y, inches, and Load 2 = Slope, S, radians


Load Load               Load                  Axial    Pile-head  Pile-head  Max
Shear Max Moment
Case Type   Pile-head    Type     Pile-head   Loading  Deflection  Rotation    in
```

Pile No.	in Pile 1	Load 1	2	Load 2	lbs	inches	radians	lbs in-lbs
1	V, lb	103500.	M, in-lb	7.79E+07	63580.	7.0711	-0.03436	-691083. 8.45E+07

Maximum pile-head deflection = 7.0710768699 inches
Maximum pile-head rotation = -0.0343575662 radians = -1.968544 deg.

Computed Pile-head Stiffness Matrix Values
K[2,2], K[2,3], K[3,2], K[3,3] for Pile Head

Computations are based on the pile-head loads defined in Load Case 1

The K[2,2] and K[3,2] stiffnesses are computed using the specified pile-head shear force and rotation (Type 2) pile-head condition.

K[2,2] = abs(Shear Reaction/Top y) K[3,2] = abs(Moment Reaction/Top y)

Pile-Top Deflection inches	Pile-Top Rotation radians	Pile-Top Shear Reac. lbs	Pile-Top Mom. Reac. in-lbs	K[2,2] V/y lb/in.	K[3,2] M/y in-lb/in.
0.0041481	0.00000	10350.	2034221.	2495100.	490394607.
0.0153870	0.00000	38391.	7545431.	2495019.	490375961.
0.0219664	0.00000	54794.	10768798.	2494441.	490239996.
0.0266359	0.00000	66432.	13055635.	2494069.	490151076.
0.0302591	0.00000	75459.	14829321.	2493764.	490078049.
0.0332205	0.00000	82835.	16278419.	2493484.	490011207.
0.0357249	0.00000	89071.	17503556.	2493247.	489954565.
0.0378945	0.00000	94473.	18564783.	2493048.	489906836.
0.0398085	0.00000	99238.	19500829.	2492879.	489866366.
0.0415208	0.00000	103500.	20338124.	2492725.	489829544.

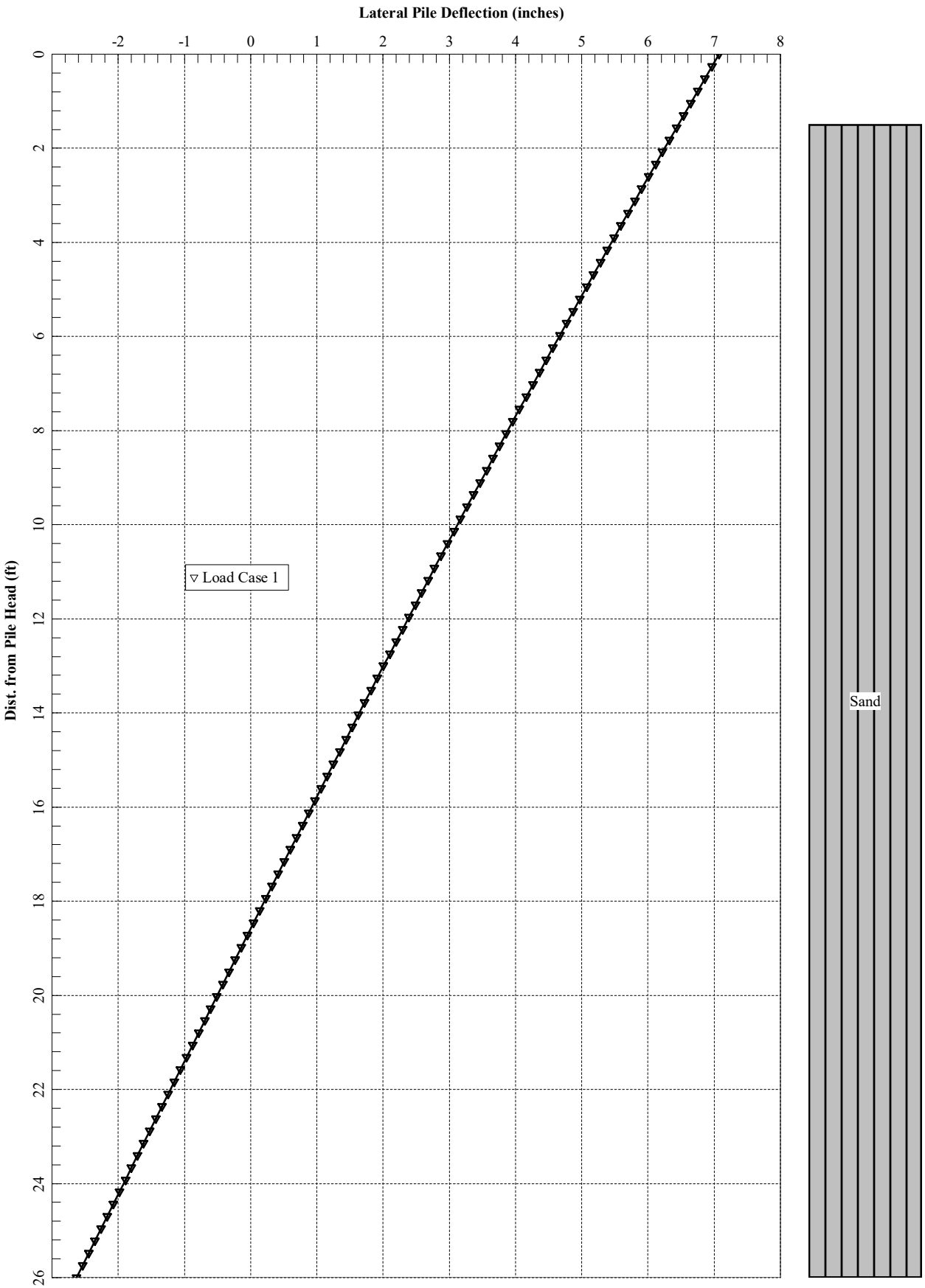
The K[2,3] and K[3,3] stiffnesses are computed using the specified deflection and moment (Type 4) pile-head condition.

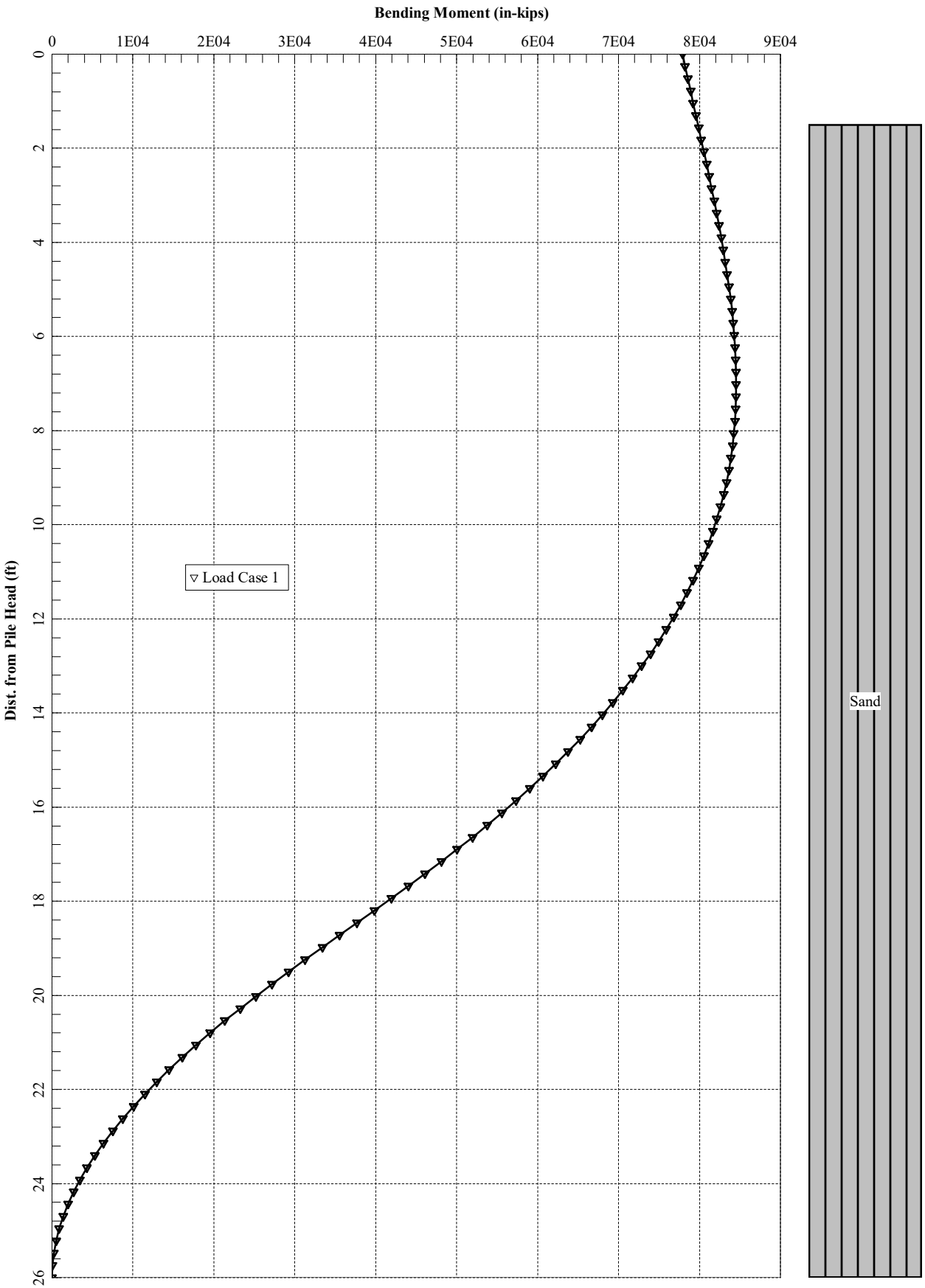
K[2,3] = abs(Shear Force/Top Rotation) K[3,3] = abs(Moment/Top Rotation)

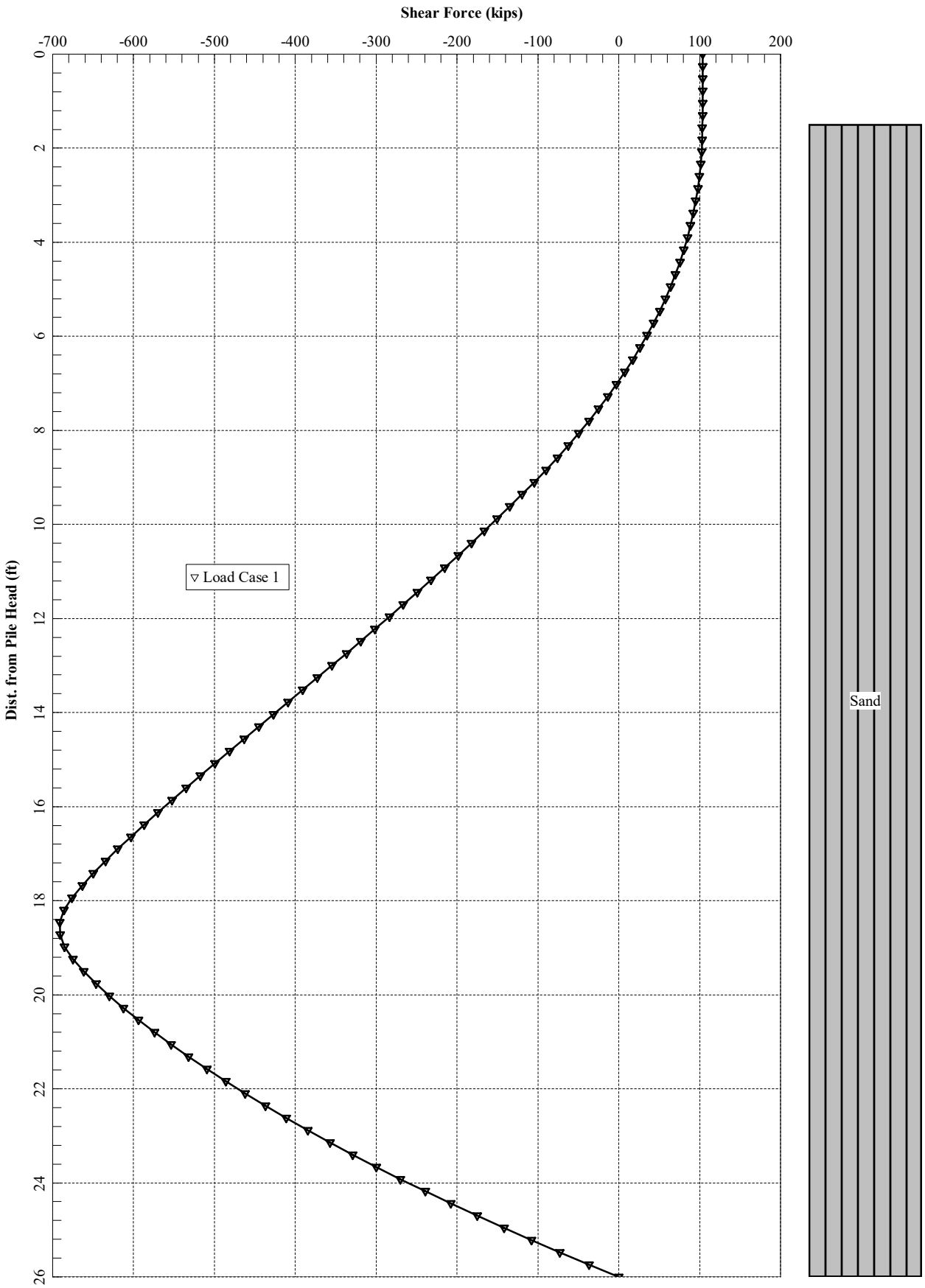
Pile-Top Deflection inches	Pile-Top Rotation radians	Pile-Top Shear Reac. lbs	Pile-Top Mom. Reac. in-lbs	K[2,3] V/rot. lb/rad	K[3,3] M/rot. in-lb/rad
0.00000	0.00006913	33898.	7791600.	490363672.	1.12714E+11

0.00000	0.0002570	125747.	28901148.	489367124.	1.12474E+11
0.00000	0.0003672	179484.	41249442.	488746900.	1.12325E+11
0.00000	0.0006474	218284.	50010696.	337172236.	7.72489E+10
0.00000	0.0009960	251184.	56806452.	252182529.	5.70323E+10
0.00000	0.0012389	279026.	62358990.	225213156.	5.03325E+10
0.00000	0.0014338	303098.	67053593.	211396612.	4.67667E+10
0.00000	0.0015930	324106.	71120243.	203456902.	4.46456E+10
0.00000	0.0017202	342363.	74707283.	199026651.	4.34298E+10
0.00000	0.0018226	358303.	77916000.	196594471.	4.27511E+10

The analysis ended normally.


Lateral Pile Deflection (inches)
-2
-1
0
1
2
3
4
5
6
7
8
Dist. from Pile Head (ft)
0
2
4
6
8
10
12
14
16
18
20
22
24
26
▽ Load Case 1
Sand


Bending Moment (in-kips)
0
1E04
2E04
3E04
4E04
5E04
6E04
7E04
8E04
9E04
Dist. from Pile Head (ft)
0
2
4
6
8
10
12
14
16
18
20
22
24
26
▽ Load Case 1
Sand


Shear Force (kips)
-700
-600
-500
-400
-300
-200
-100
0
100
200
Dist. from Pile Head (ft)
0
2
4
6
8
10
12
14
16
18
20
22
24
26
▽ Load Case 1
Sand

RF DESIGN SHEET

Issue Date	10/4/2023
Revision	0

RFDS Status	Preliminary
Created By	Rangel, Irene

SITE INFORMATION	
DISH Site Number	BOBOS00935A
DISH Site Name	
Prequal Asset ID	
AOI	BOS
PEA	7
Latitude	41.3769
Longitude	-72.1896
Address	69 Oil Mill Rd
City	Waterford
State	CT
ZIP Code	06385
County	New London
Rad Center (ft)	95
RAD Confirmed	***No Confirmed RAD***
Structure Type	Utility Transmission Tower

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)	/
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.)	
Type	Steel Platform
Baseband Cabinet	Charles(Amphenol)-H/EX
Dimensions (in)	32" x 32.1" x 74"
Baseband	gNB-CU
Generator Required	
Make/Model	

DESIGN COMMENTS
Preliminary RFDS version, not to be used for construction. To be updated as needed

RF EQUIPMENT INFORMATION

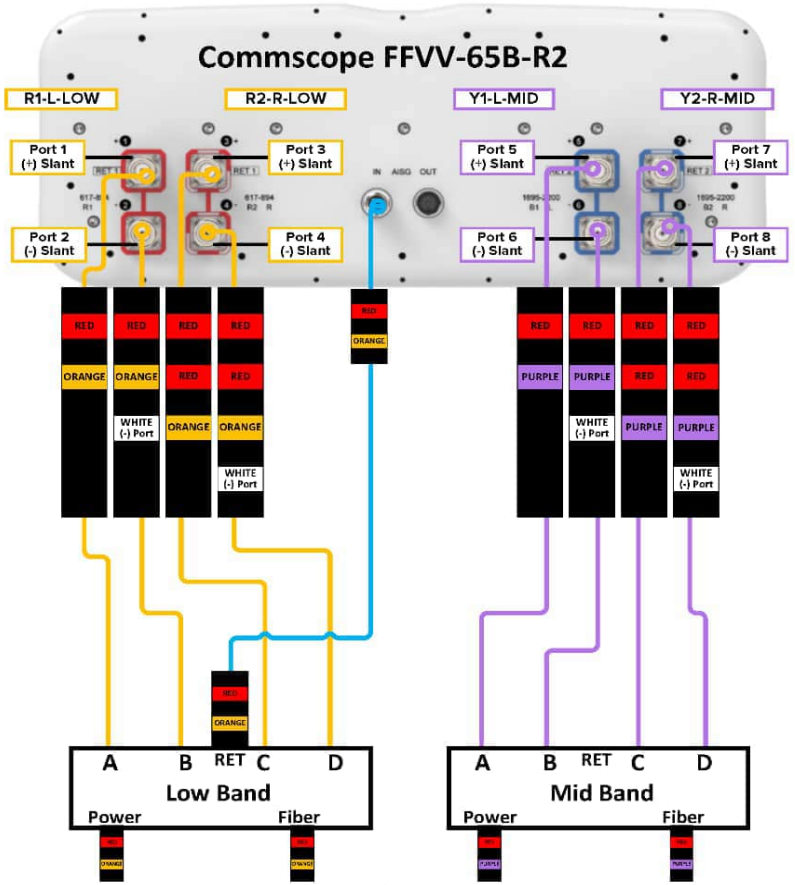
Issue Date/Revision	10/4/2023	**Revision:**	0	**Latitude**	41.3769
Site ID	BOBOS00935A			**Prequal Asset ID**	
Site Address	69 Oil Mill Rd, Waterford CT 06385			**SOW / RF**	
Structure Type	Utility Transmission Tower			**Comments**	Dish proposes to place 3 antennas, 6 RRUs, 1 junction box(s), and 1 (power/hybrid) cable(s), at the 95 foot RAD. Dish will require a lease area for ground equipment. Preliminary RFDS version, not to be used for construction. To be updated as needed
sectors >20' apart?	No	***Confirmed RAD?***	***No Confirmed RAD*** 95		

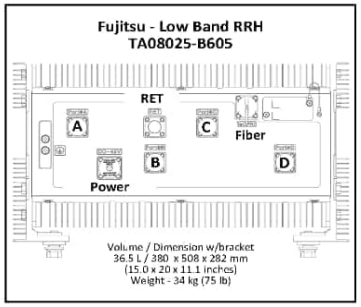
Longitude -72.1896

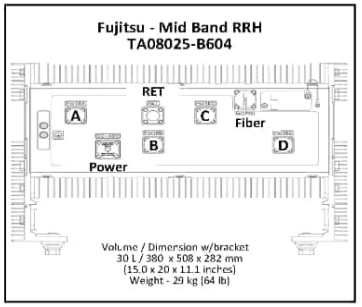
	Sector 1 (alpha)			Sector 2 (beta)			Sector 3 (gamma)		
ANTENNA									
Antenna Mount Position	**1**	**2**	**3**	**1**	**2**	**3**	**1**	**2**	**3**
Antenna ID		1			2			3	
Manufacturer		Commscope			Commscope			Commscope	
Model Number		FFVV-65B-R2			FFVV-65B-R2			FFVV-65B-R2	
Dimensions H x W x D (in)		72.0" x 19.6" 7.8"			72.0" x 19.6" 7.8"			72.0" x 19.6" 7.8"	
Weight (lbs.)		70.8			70.8			70.8	
TX Power Output (watts)		40000			40000			40000	
ERP (dBm)		76.02			76.02			76.02	
RAD Centerline Height (ft.)		95			95			95	
Azimuths (True North)		40°			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	125								
OTHER EQUIPMENT									
Type of Equipment									
Manufacturer									
Model Number									
Dimensions H x W x D (in)									
Weight (lbs.)									
Equipment Location									
Quantity									

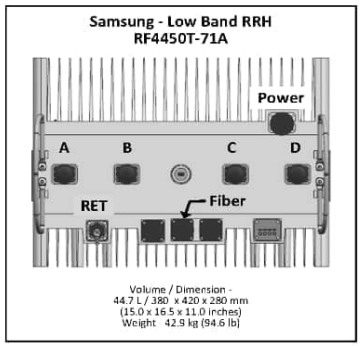
Frequencies	**n29**	**n66**	**n70**	**n71**
Downlink (TX)	-	|2160 - 2165| |2180 - 2200|	|1995 - 2020|	|632 - 652|
Uplink (RX)	-	|1760 - 1765|	|1695 - 1710|	|678 - 698|

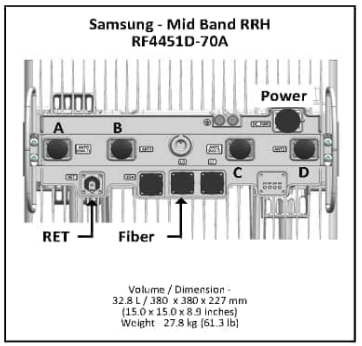
PLUMBING DIAGRAM ANTENNA











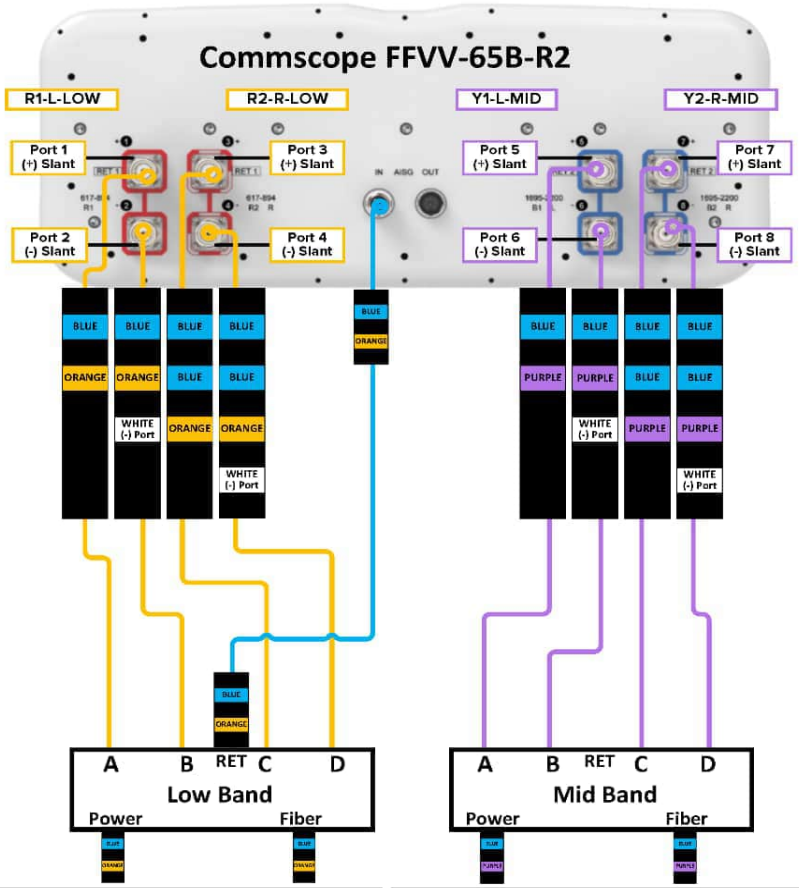
Wireless Engineering	ALPHA SECTOR (1 Antenna) RRU AND ANTENNA RF CABLING CONFIGURATION		
	Commscope FFVV-65B-R2 - 8 Port - 6ft LOW/MID Radios LOW Band RET cable		
Chuck Iversen	SIZE:	CAGE CODE: 50HD6	DWG NAME: FFVV-65B-R2-Commscope-6ft_ALPHA
20 - Sept – 2022	SCALE: None	SHEET: 1 OF 1	REV: 1

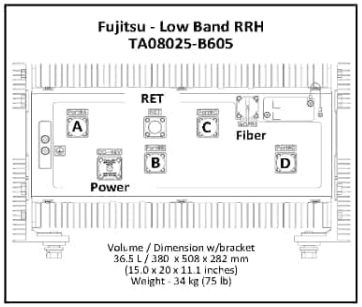
Dimensions		Mechanical Specifications	
Length	1828 mm | 72.0 in	And Loading at Velocity, frontal	685 N @ 150 km/h | 154.0 lbf @ 150 km/h
Width	498 mm | 19.6 in	And Loading at Velocity, lateral	232 N @ 150 km/h | 52.2 lbf @ 150 km/h
Depth	197 mm | 7.8 in	And Loading at Velocity, rear	564 N @ 150 km/h | 126.8 lbf @ 150 km/h
		And Loading at Velocity, maximum	880 N @ 150 km/h | 198.0 lbf @ 150 km/h
		And Speed, maximum	241 km/h | 150 mph
		Packaging and Weights	
		Length, packed	2030 mm | 79.1 in
		Width, packed	658 mm | 23.9 in
		Depth, packed	352 mm | 13.9 in
		Net Weight, without mounting kit	32.1 kg | 70.8 lb
		Weight, gross	44.5 kg | 98.1 lb

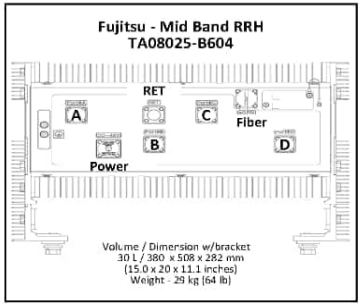
- Refer to the color coding chart for RF Cables
- Check RRH SFPs are 'I-temp' rated, (industrial-temp range)
- RF Connector recommended torque: 50 inch-lbs.
- RET connector recommended torque: 4.3-8.6 inch-lbs.
- Weatherproof boots required on all RF jumpers.
- RET cables require self-sealing tape.
- Protect unused ports with weather-sealing caps.
- **When COBE 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.**

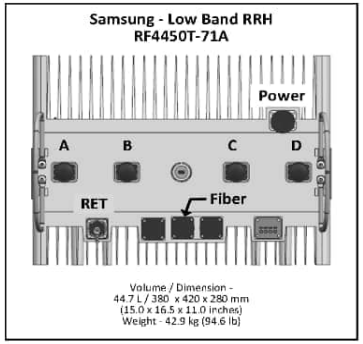
Sector Color Bands	Frequency Color Bands	Main Coax
ALPHA SECTOR	LOW BAND (LB)	RET Cable
BETA SECTOR	MID BAND (MB)	RF Jumper - Low Band
GAMMA SECTOR	FUTURE	RF Jumper - Mid Band

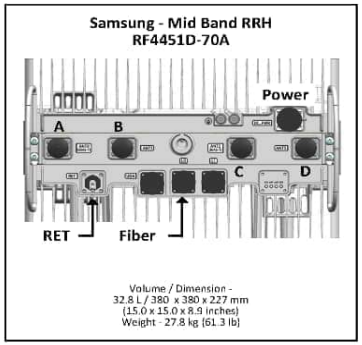
PLUMBING DIAGRAM ANTENNA











Wireless Engineering

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

Commscope FFVV-65B-R2 - 8 Port - 6ft
LOW/MID Radios
LOW Band RET cable

	SIZE	CAGE CODE	DWG NAME	REV
Chuck Iversen		50HD6	FFVV-65B-R2-Commscope-6ft_BETA	1
20 - Sept – 2022	SCALE None		SHEET 1 OF 1	

Dimensions

Length	1828 mm | 72.0 in
Width	498 mm | 19.6 in
Depth	197 mm | 7.8 in

Mechanical Specifications

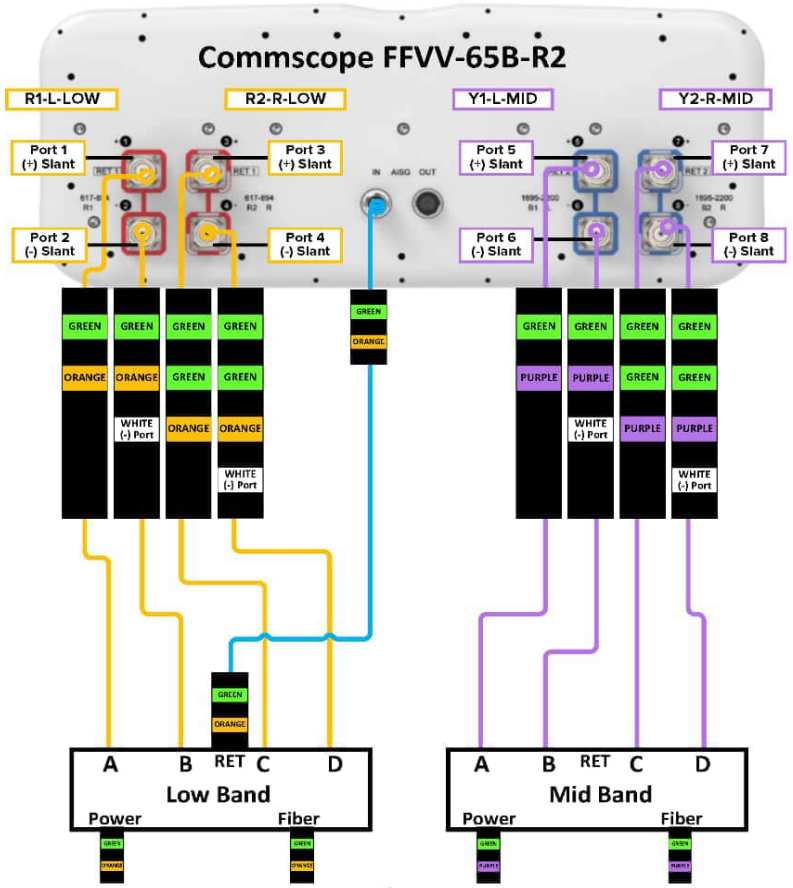
Length, packed	2010 mm | 79.1 in
Width, packed	606 mm | 23.9 in
Depth, packed	352 mm | 13.9 in
Net Weight, without mounting kit	32.1 kg | 70.8 lb
Weight, gross	44.5 kg | 98.1 lb

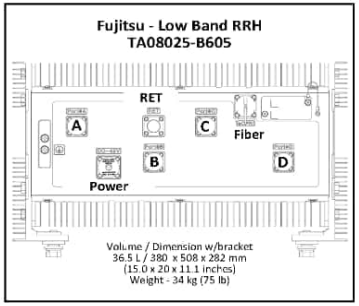
Packaging and Weights

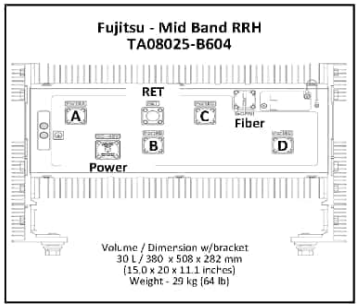
- Refer to the color coding chart for RF Cables
- Check RRH SFPs are 'Hotemp' rated. (industrial-temp range)
- RF Connector recommended torque: 50 inch-lbs.
- RET connector recommended torque: 4.3-8.6 inch-lbs.
- Weatherproof boots required on all RF jumpers.
- RET cables require self-sealing tape.
- 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.**

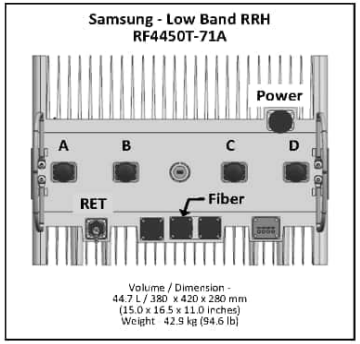
Sector Color Bands	Frequency Color Bands	Main Coax
ALPHA SECTOR	LOW BAND (LB)	RET Cable
BETA SECTOR	MID BAND (MB)	RF Jumper - Low Band
GAMMA SECTOR	FUTURE	RF Jumper - Mid Band

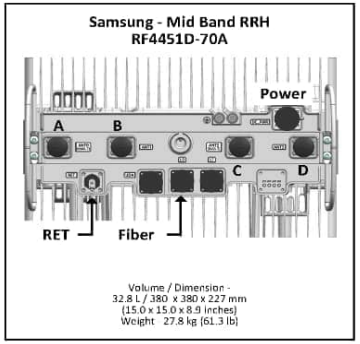
PLUMBING DIAGRAM ANTENNA











Wireless Engineering

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

Commscope FFVV-65B-R2 - 8 Port - 6ft
LOW/MID Radios
LOW Band RET cable

	SIZE	CAGE CODE	DWG NAME	REV
Chuck Iversen		50HD6	FFVV-65B-R2-Commscope-6ft_GAMMA	1
20 - Sept – 2022	SCALE None		SHEET 1 OF 1	

Dimensions

Length	1828 mm | 72.0 in
Width	498 mm | 19.6 in
Depth	197 mm | 7.8 in

Mechanical Specifications

Axial Loading at Velocity, frontal	685 N @ 150 km/h | 154.0 lbf @ 150 km/h
Axial Loading at Velocity, lateral	232 N @ 150 km/h | 52.2 lbf @ 150 km/h
Axial Loading at Velocity, rear	184 N @ 150 km/h | 126.8 lbf @ 150 km/h
Axial Loading at Velocity, maximum	889 N @ 150 km/h | 199.8 lbf @ 150 km/h
Wind Speed, maximum	241 km/h | 150 mph

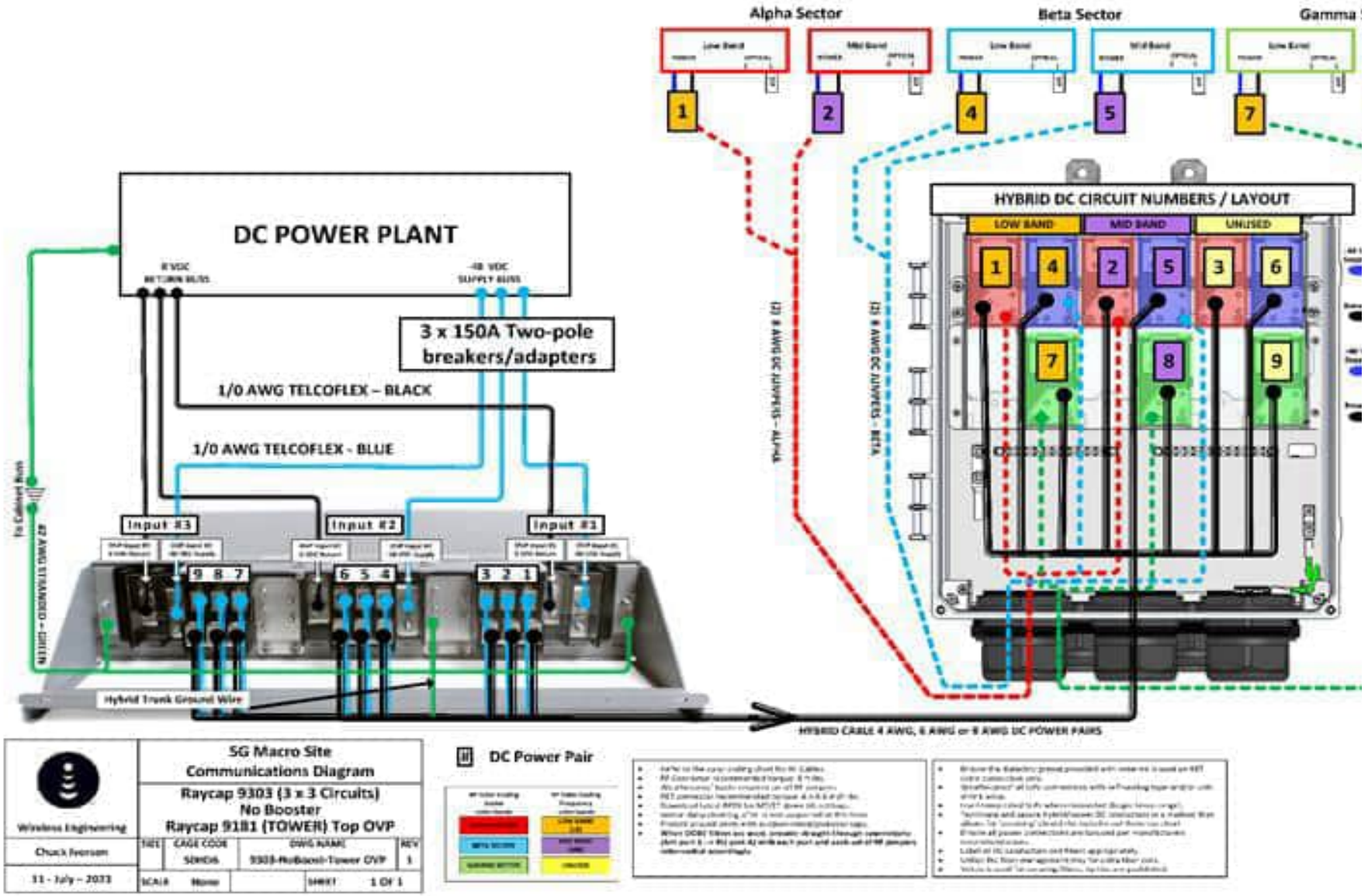
Packaging and Weights

Length, packed	2030 mm | 79.1 in
Width, packed	608 mm | 23.9 in
Depth, packed	352 mm | 13.9 in
Net Weight, without mounting kit	32.1 kg | 70.8 lb
Weight, gross	44.5 kg | 98.1 lb

- 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

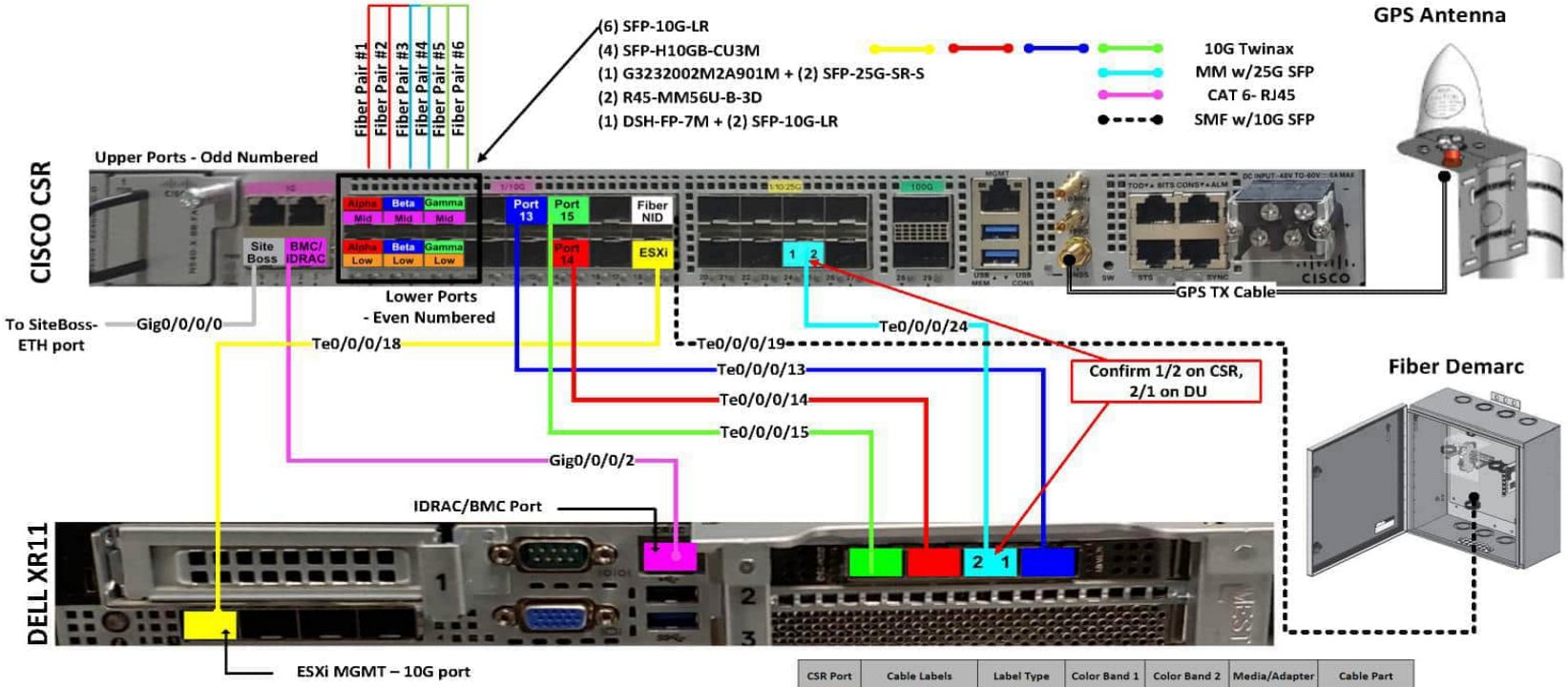
PLUMBING DIAGRAM OVP



Wireless Engineering	SG Macro Site Communications Diagram Raycap 9303 (3 x 3 Circuits) No Booster Raycap 9181 (TOWER) Top OVP			
Chuck Iverson	SIZE	CAGE CODE	DWG NAME	REV
		5RHD6	9303-NoBoost-Tower OVP	1
11 - July - 2023	SCALE None		SHEET 1 OF 1	

DC Power Pair

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	

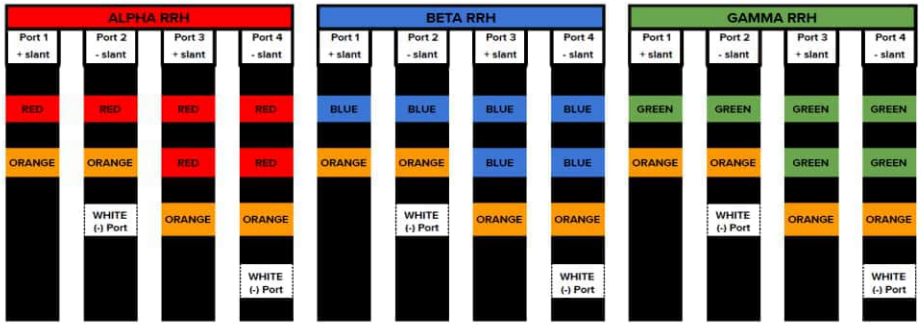
RF COLOR CODING

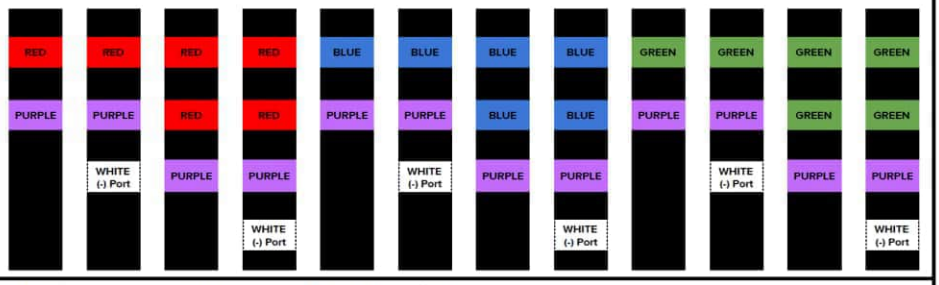
RF Cable Color Codes

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

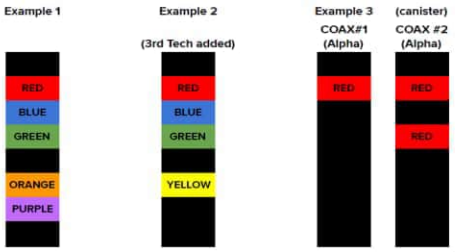
RF Jumper Color Coding

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



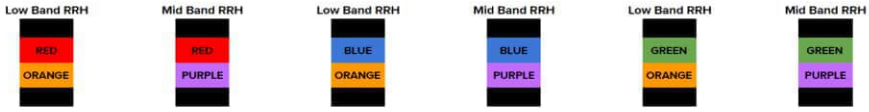


Hybrid/Discreet Cables



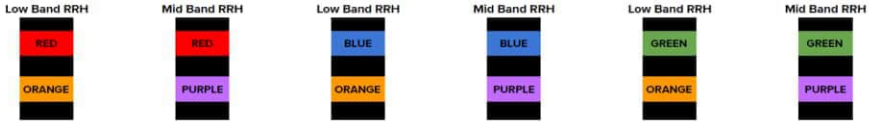
Fiber Jumpers to RRHs

Low Band RRH fiber cables have sector stripe only



Power Cables to RRHs

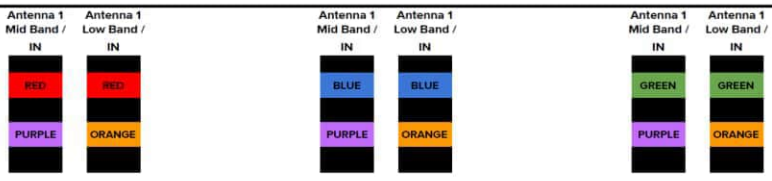
Low Band RRH power cables have sector stripe only



RET motors at Antennas

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

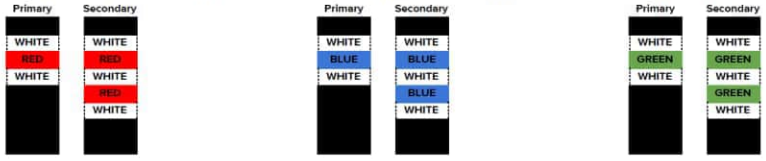
Separate RET cables are used when antenna ports provide inputs for both LOW and MID bands.



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.



FFVV-65B-R2

8-port sector antenna, 4x 617-894 and 4x 1695-2200 MHz, 65° HPBW, 2x RET

- Antenna includes 2×Single Column X-Pol Arrays for 617-894MHz and 2×Single Column X-Pol Arrays for 1695-2200MHz

General Specifications

Antenna Type	Sector
Band	Multiband
Color	Light Gray (RAL 7035)
Grounding Type	RF connector inner conductor and body grounded to reflector and mounting bracket
Performance Note	Outdoor usage
Radome Material	Fiberglass, UV resistant
Reflector Material	Aluminum
RF Connector Interface	4.3-10 Female
RF Connector Location	Bottom
RF Connector Quantity, mid band	4
RF Connector Quantity, low band	4
RF Connector Quantity, total	8

Remote Electrical Tilt (RET) Information

RET Hardware	CommRET v2
RET Interface	8-pin DIN Female | 8-pin DIN Male
RET Interface, quantity	1 female | 1 male
Input Voltage	10–30 Vdc
Internal RET	Low band (1) | Mid band (1)
Power Consumption, active state, maximum	10 W
Power Consumption, idle state, maximum	2 W

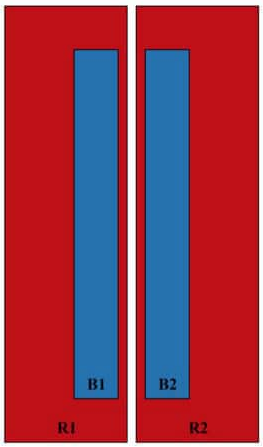
Dimensions

Width	498 mm | 19.606 in
Depth	197 mm | 7.756 in

FFVV-65B-R2

Length	1828 mm | 71.969 in
Net Weight, antenna only	28.6 kg | 63.052 lb

Array Layout



Array ID	Frequency (MHz)	RF Connector	RET (SRET)	AISG No.	AISG RET UID
R1	617-894	1 - 2	1	AISG1	CPxxxxxxxxxxxxxxR1
R2	617-894	3 - 4			
B1	1695-2200	5 - 6	2	AISG1	CPxxxxxxxxxxxxxxB1
B2	1695-2200	7 - 8			

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

Port Configuration

Electrical Specifications

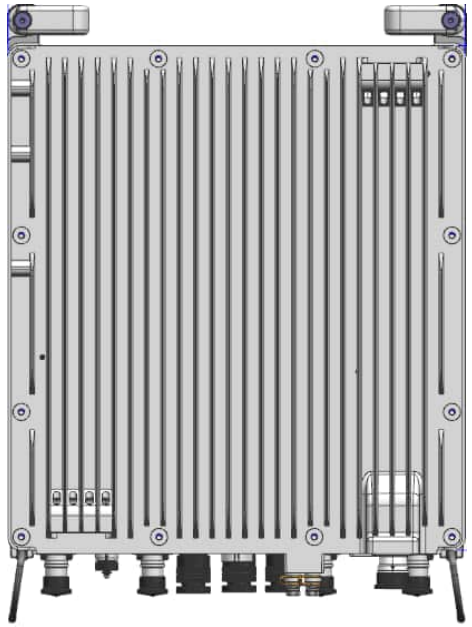
Impedance	50 ohm
Operating Frequency Band	1695 – 2200 MHz | 617 – 894 MHz
Polarization	±45°
Total Input Power, maximum	900 W @ 50 °C

Electrical Specifications

	R1,R2	R1,R2	B1,B2	B1,B2

Macro AWS3/AWS4 4T4R 320W RU

SAMSUNG

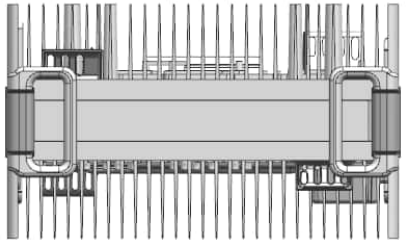


RF4451D-70A

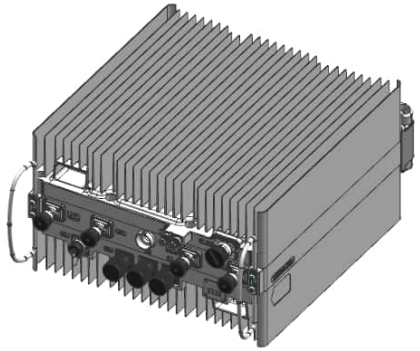
Item		Specification SFG-ARR3KM01DI	
Air Technology		5G NR	
Band / Duplex		n66/FDD	n70/FDD
OFR		DL: 2,110-2,200 MHz UL: 1,710-1,780 MHz	DL: 1,995-2,020 MHz UL: 1,695-1,710 MHz
IBW		90 MHz (DL) / 70 MHz (UL)	25 MHz (DL) / 15 MHz (UL)
OBW		45 MHz (DL) / 25 MHz (UL)	25 MHz (DL) / 15 MHz (UL)
Carrier configuration	Ch. BW	NR: 5/10/15/20/30 MHz	NR: 5/10/15/20/25 MHz
	# of carriers per band	Max 3CC	Max 2CC
	# of carriers (per unit)	Max 4CC	
	NB-IoT	Not support	
TRX path configuration		4T4R	
Conductive power		240W	160W
		Total 320W	
EVM		3.5 % (256 QAM)	
Modulation		256 QAM (1024 QAM with 1 – 2 dB power back-off)	
Ref. sensitivity		-104.9 dBm @ 1RX (15 kHz SCS, 25 RB, room temp), -104.9 dBm (all temp)	
Unwanted emission	3GPP	38.104 Cat. A	
	Local regulation	FCC 47 CFR 27.53	FCC 47 CFR 27.53
Function split		7-2x (eCPRI)	
Cascade		Support (3 steps)	
Optic interface		20/40 km, 10/25 Gbps x 2 Ports, Duplex or Bi-di	
Input voltage		- 48 VDC (-36 to -58 VDC)	
Power consumption (w/o ALD)		1,187 W @ 100 % room temp. 1,268 W @ 100% load, all temperature	
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)	
Operating temperature		-40(-40) to +55 ℃ (131 ℉) (w/ solar load), wind speed(1m/s)	
Cooling scheme		Natural convection	
Installation		Pole, Wall, Side-by-side (Max. 2 radios), back to back	
# of antenna port		4 Ports	
UDA		RX 4 EA	
ALD		AISG 2.0/3.0 (RET / TMA)	
Bias-T		2 Ports (First and third port)	
Misc. features		Spectrum analyzer (TX / RX), RB blanking in n70 (RB blanking in n66 is under analysis)	

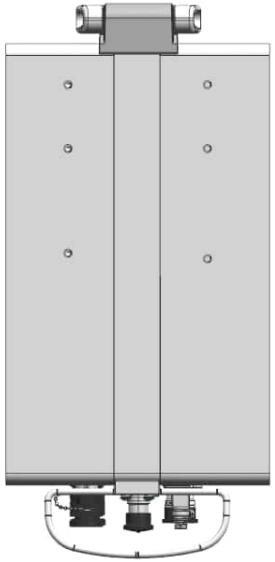
1. RRU Specification (AWS3/AWS4 4T4R 320W RU)

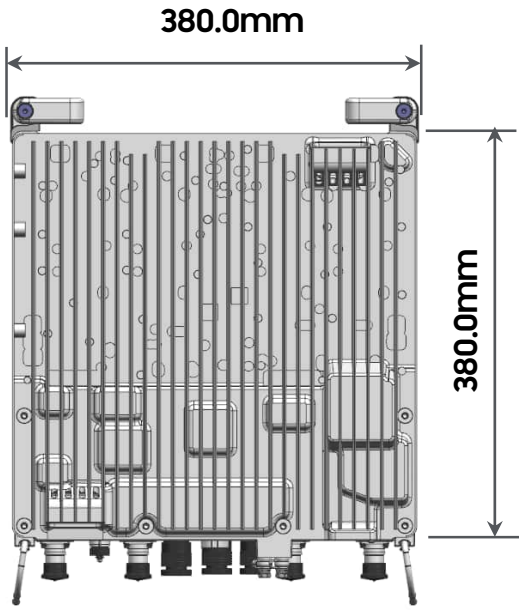
Volume / Dimension	32.8 L / 380 x 380 x 227 mm (15.0 x 15.0 x 8.9 inches)
Weight	27.8 kg (61.3 lb)

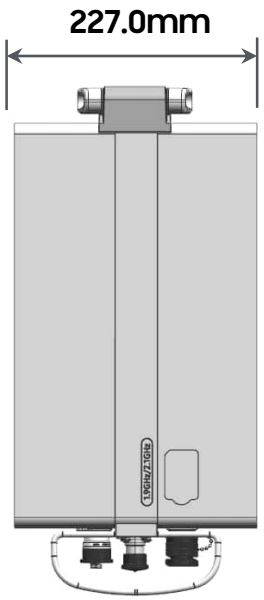


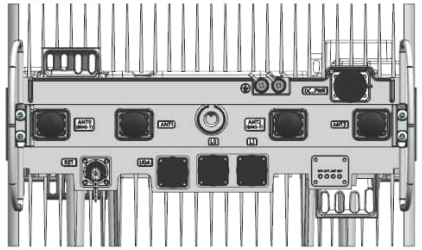
SFG-ARR3KM01DI





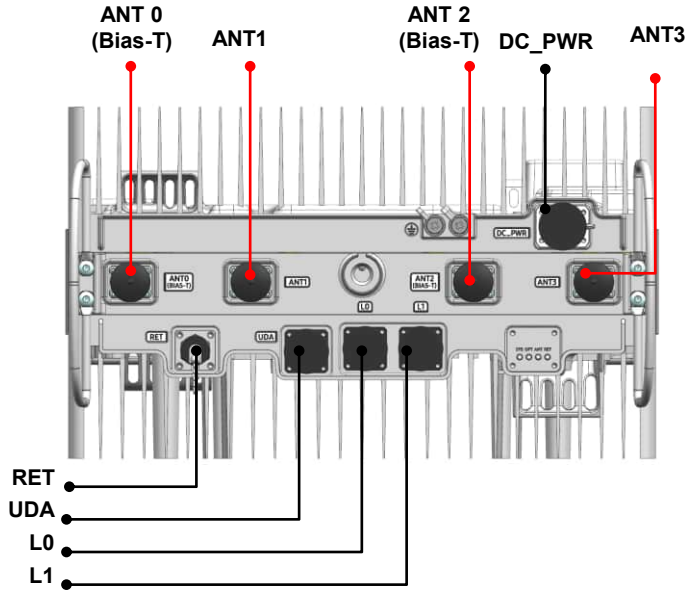






External I/O Ports

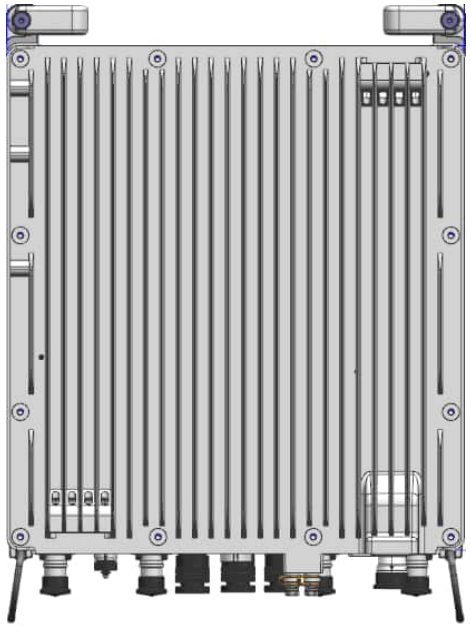
SFG-ARR3KM01DI



Port	Interface	Connector Type	Port #
PWR	-48VDC	2pins Push-pull type, Male (outer)	1 Port
RET	AISG 2.0 (3.0 HW ready)	8 pin circular connector	1 Port
UDA	Open/Close (4 RX)	RJ45 Jack(inner) Push pull type(outer)	1 Port
L0~L1	10/25 Gbps (Optic port)	SFP+/SFP28 (inner) Push-pull type (outer)	2 Port
ANT 0~3	TX/RX RF AISG 2.0/3.0 Bias-T	4.3-10, Female	4 Port
SYS, OPT, ANT, RET	Status LED (4ea)	-	-

DISH TRIBAND 4T4R 280W RU

SAMSUNG



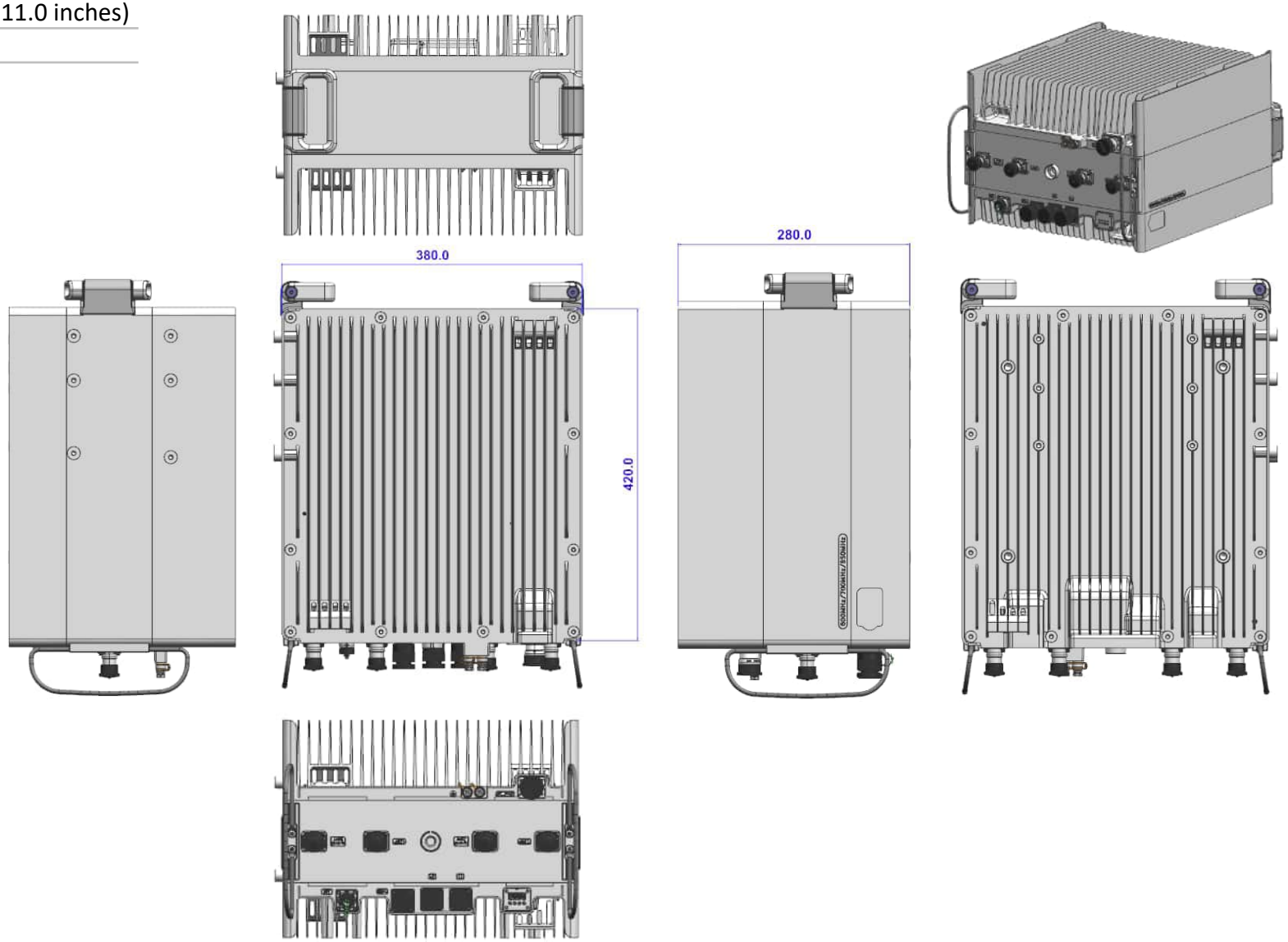
RF4450T-71A

Item		Specification SFG-ARR3J601DI		
Air Technology		NR		
Band / Duplex		n71/FDD	n29/FDD	n26/FDD
OFR		DL: 617 MHz - 652 MHz, UL: 663-698 MHz	DL: 718 - 728 MHz UL : N/A	DL: 863 – 869 MHz, UL: 818 - 824 MHz
IBW		35 MHz (DL) / 35 MHz (UL)	10 MHz (DL)	6 MHz (DL) / 6 MHz (UL)
OBW		35 MHz (DL) / 35 MHz (UL)	10 MHz (DL)	6MHz (DL) / 6 MHz (UL)
Carrier configuration	Ch. BW	NR: 5/10/15/20 MHz	NR: 5/10 MHz	NR: 5 MHz
	# of carriers per band	2 CC	2 CC	1 CC
	# of carriers (per unit)	5CC		
	NB-IoT	3 CC		
TRX path configuration		4T4R		
Conductive power		240W dynamic power sharing		40W
EVM		3.5 % (256 QAM)		
Modulation		256 QAM (1024 QAM with 1 – 2 dB power back-off)		
Ref. sensitivity		-104.9 dBm @ 1RX (15 kHz SCS, 25 RB, room temp), -104.9 dBm (all temp)		
Unwanted emission	3GPP	38.104 Cat. A	38.104 Cat. A	38.104 Cat. A
	Local regulation	FCC 47 CFR 27.53	FCC 47 CFR 27.53	FCC 47 CFR22.917
	Operator's request	N/A	N/A	DISH requirement for public safety
Function split		7-2x (eCPRI)		
Cascade		Support (3 steps)		
Optic interface		10/20/40 km, 10/25 Gbps x 2 Ports, Duplex or Bi-di		
Input voltage		-48 V DC (-36 to -58 V DC)		
Power consumption (w/o ALD)		1,205 W @ 100 % room temperature, 1302 W @ 100% load over all temperature		
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)		
Operating temperature		-40 to +55 ℃ (-40 to131 ℉) (w solar load), wind speed(1m/s)		
Cooling scheme		Natural convection		
Installation		Pole, Wall, Side-by-side (Max. 2 radios), back to back		
# of antenna port		4 Ports		
UDA		RX 4 EA		
ALD		AISG 2.0/3.0 (RET / TMA)		
Bias-T		2 Ports (First and third port)		
Misc. features		Spectrum analyzer (TX / RX), PIM detection and mitigation		

RU Dimensioning

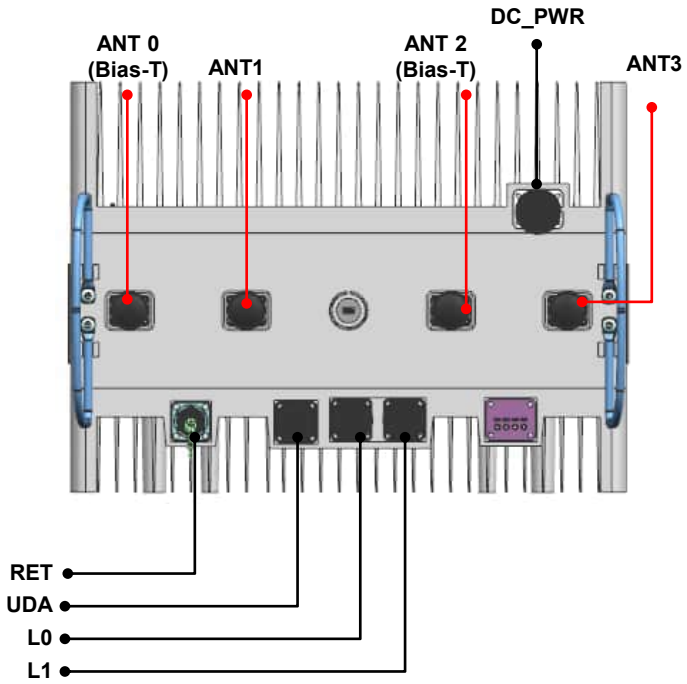
SFG-ARR3J601DI

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



External I/O Ports

SFG-ARR3J601DI



Port	Interface	Connector Type	Port #
PWR	-48VDC	2pins Push-pull type, Male (outer)	1 Port
RET	AISG 2.0 (3.0 HW ready)	8 pin circular connector	1 Port
UDA	Open/Close (4 RX)	RJ45 Jack(inner) Push pull type(outer)	1 Port
L0~L1	10/25 Gbps (Optic port)	SFP+/SFP28 (inner) Push-pull type (outer)	2 Port
ANT 0~3	TX/RX RF AISG 2.0/3.0 Bias-T	4.3-10, Female	4 Port
SYS, OPT, ANT, RET	Status LED (4ea)	-	-

DATA SHEET

Base/Tower/Rooftop Solution for RRH Applications

RDIDC-9181-PF-48

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

Features

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

Benefits

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

Strikesorb 30-V1-2CFV

SPECIFICATIONS

Base/Tower Solution for RRH Applications

RDIDC-9181-PF-48

Electrical

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

Mechanical

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

Optional Product Configurations

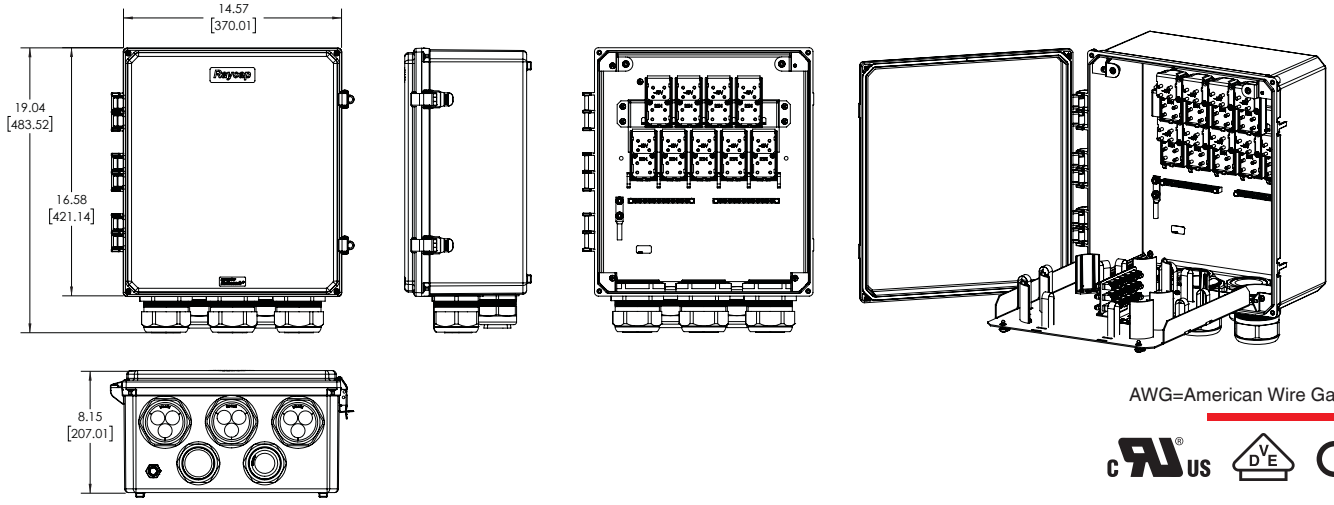
Bridge Kit (required for base unit when pairing with HCS 1.0 legacy cable) Order Part #: RTMDC-5634-WB-KIT

Standards Compliance & Certifications

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

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

Product Diagram

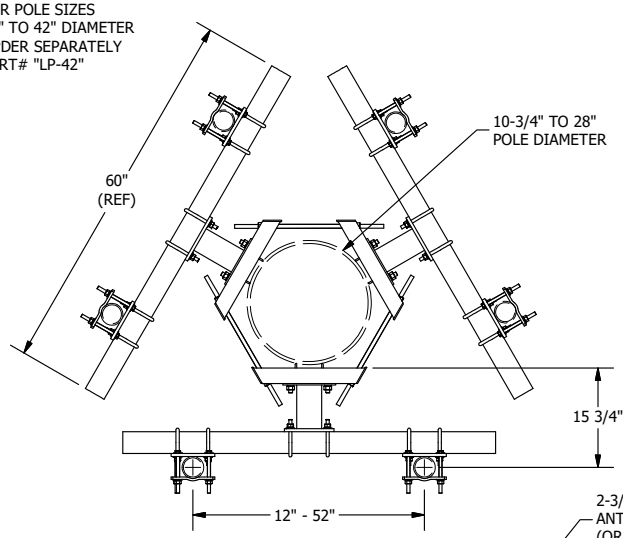


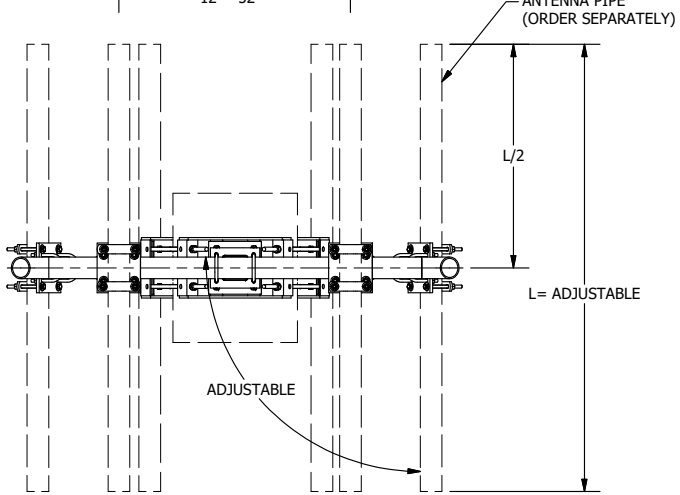
AWG=American Wire Gauge

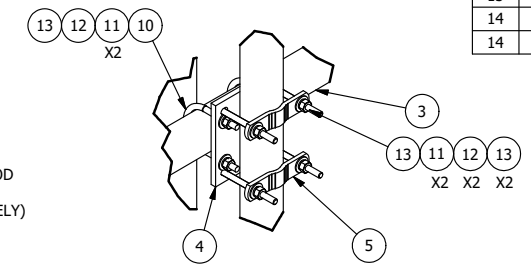
Raycap

www.raycap.com

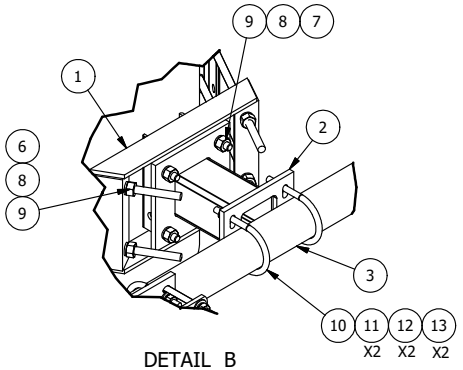
NOTE:
FOR POLE SIZES
28" TO 42" DIAMETER
OPDER SEPARATELY
PART# "LP-42"



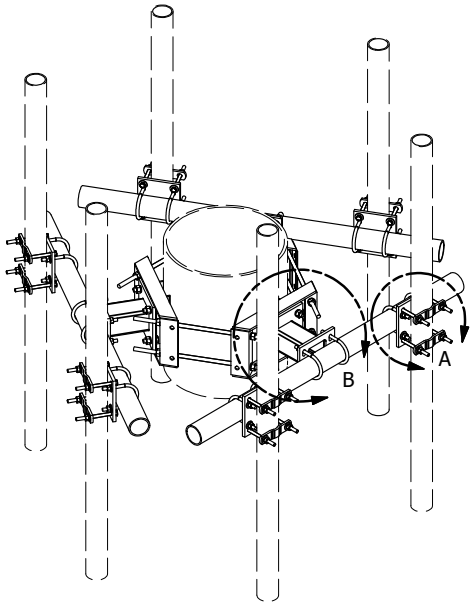




DETAIL A



DETAIL B



PARTS LIST

ITEM	QTY	PART NO.	PART DESCRIPTION	LENGTH	UNIT WT.	NET WT.
1	3	X-UGLM	MINI RING MOUNT WELDMENT		21.67	65.00
2	3	X-WWM01	8" STAND-OFF ARM / WALL MOUNT		18.12	54.37
3	3	P360	3-1/2" X 60" SCH 40 GALVANIZED PIPE	60 in	37.97	113.90
4	6	SCX7	CROSSOVER PLATE	8 in	7.55	45.29
5	12	X-115765	5" V-CLAMP		1.02	12.22
6	6	G58R-14	5/8" x 14" THREADED ROD (HDG.)	14 in	1.22	7.32
6	6	G58R-24	5/8" x 24" THREADED ROD (HDG.)	24 in	2.09	12.54
7	12	G5802	5/8" x 2" HDG HEX BOLT GR5	2 in	0.27	3.26
8	24	G58LW	5/8" HDG LOCKWASHER		0.03	0.63
9	24	G58NUT	5/8" HDG HEAVY 2H HEX NUT		0.13	3.12
10	18	X-UB1358	1/2" X 3-5/8" x 5-1/2" X 3" U-BOLT	5 1/2 in	0.77	13.90
11	84	G12FW	1/2" HDG USS FLATWASHER		0.03	2.86
12	60	G12LW	1/2" HDG LOCKWASHER		0.01	0.83
13	60	G12NUT	1/2" HDG HEAVY 2H HEX NUT		0.07	4.30
14	24	G12065	1/2" x 6-1/2" HDG HEX BOLT GR5 FULL THREAD	6 1/2 in	0.41	9.83
14	24	G12045	1/2" x 4.5" HDG HEX BOLT GR5 FULL THREAD	4 1/2 in	0.30	7.15
					TOTAL WT. #	355.71

TOLERANCE NOTES

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

REV	DESCRIPTION OF REVISIONS	CPD	BY	DATE
A	REDRAWN IN INV.		KC8	8/27/2012

REVISION HISTORY

DESCRIPTION
DUAL ANTENNA POLE MOUNT ASSEMBLY
15-3/4" STANDOFF
10-3/4" TO 28" MONOPOLE DIAMETER

SITE PRO 1 — A valmont COMPANY

Engineering Support Team: 1-888-753-7446

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

CPD NO.	DRAWN BY	ENG. APPROVAL	PART NO.
	BMC 1/24/2011		UDS-NP

CLASS	SUB	DRAWING USAGE	CHECKED BY	DWG. NO.
81	01	CUSTOMER	CEK 8/27/2012	UDS-NP

CENTEK engineering

Centered on Solutions℠

Structural Analysis of Antenna Mast and Pole

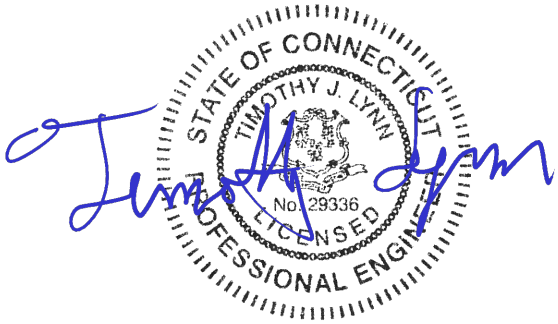
Dish Site Ref: BOBOS00935A

Eversource Structure No. 6063A
85' Electric Transmission Pole

Oil Mill Road
Waterford, CT

CENTEK Project No. 23009.10

~~Date: October 10, 2023~~
Rev 3: March 1, 2024



Max Stress Ratio = 94%

Prepared for:

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

CENTEK engineering

Centered on Solutions℠

Structural Analysis Report

Antenna Mount Analysis

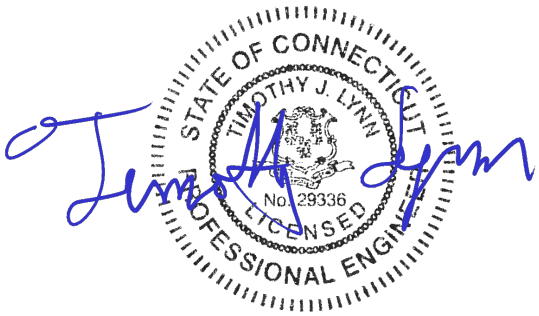
Dish Site #: BOBOS00935A

Oil Mill Road
Waterford, CT

Centek Project No. 23009.10

~~Date: October 25, 2023~~
Rev 1: May 17, 2024

Max Stress Ratio = 53%



Prepared for:

Northeast Site Solutions
5 Melrose Road
Farmington, CT 06032

Table of Contents

CENTEK engineering

Centered on Solutions℠

May 17, 2024

Mr. Chuck Regulbuto
Northeast Site Solutions
5 Melrose Road
Farmington, CT 06032

Re: Structural Letter ~ Antenna Mount
Dish – Site Ref: BOBOS00935A
Oil Mill Road
Waterford, CT

Centek Project No. 23009.10

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 two (2) dual antenna mount assemblies (SitePro P/N: UDS-NP) and six (6) 2 std. x 6'-0" long antenna pipe masts** 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:**
  Dual Mounts: Three (3) Commscope FFVV-65B-R2 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 Dual Mount Assemblies with a RAD center elevation of 96.5-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 140 mph for Waterford 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

RF DESIGN SHEET

Issue Date	10/4/2023
Revision	0

RFDS Status	Preliminary
Created By	Rangel, Irene

SITE INFORMATION	
DISH Site Number	BOBOS00935A
DISH Site Name	
Prequal Asset ID	
AOI	BOS
PEA	7
Latitude	41.3769
Longitude	-72.1896
Address	69 Oil Mill Rd
City	Waterford
State	CT
ZIP Code	06385
County	New London
Rad Center (ft)	95
RAD Confirmed	***No Confirmed RAD***
Structure Type	Utility Transmission Tower

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)	/
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.)	
Type	Steel Platform
Baseband Cabinet	Charles(Amphenol)-H/EX
Dimensions (in)	32" x 32.1" x 74"
Baseband	gNB-CU
Generator Required	
Make/Model	

DESIGN COMMENTS
Preliminary RFDS version, not to be used for construction. To be updated as needed

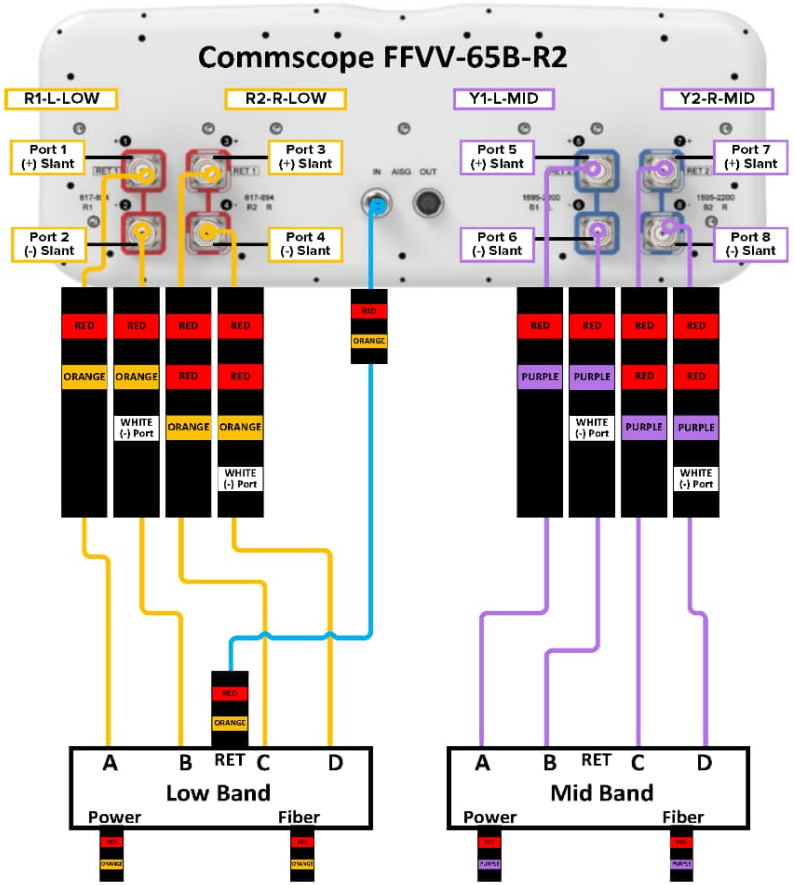
RF EQUIPMENT INFORMATION

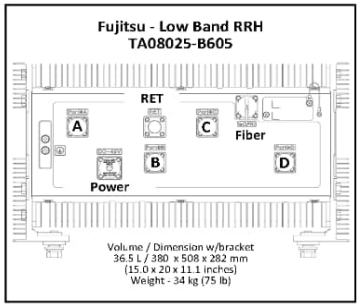
Issue Date/Revision	10/4/2023	**Revision:**	0	**Latitude**	41.3769
Site ID	BOBOS00935A			**Prequal Asset ID**	
Site Address	69 Oil Mill Rd, Waterford CT 06385			**SOW / RF**	
Structure Type	Utility Transmission Tower			**Comments**	Dish proposes to place 3 antennas, 6 RRUs, 1 junction box(s), and 1 (power/hybrid) cable(s), at the 95 foot RAD. Dish will require a lease area for ground equipment. Preliminary RFDS version, not to be used for construction. To be updated as needed
sectors >20' apart?	No	***Confirmed RAD?***	***No Confirmed RAD*** 95		

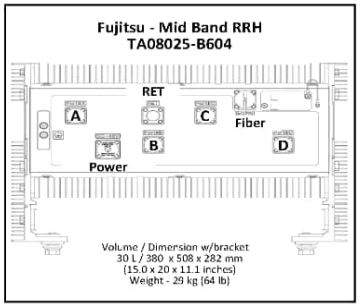
	Sector 1 (alpha)			Sector 2 (beta)			Sector 3 (gamma)		
ANTENNA									
Antenna Mount Position	**1**	**2**	**3**	**1**	**2**	**3**	**1**	**2**	**3**
Antenna ID		1			2			3	
Manufacturer		Commscope			Commscope			Commscope	
Model Number		FFVV-65B-R2			FFVV-65B-R2			FFVV-65B-R2	
Dimensions H x W x D (in)		72.0" x 19.6" 7.8"			72.0" x 19.6" 7.8"			72.0" x 19.6" 7.8"	
Weight (lbs.)		70.8			70.8			70.8	
TX Power Output (watts)		40000			40000			40000	
ERP (dBm)		76.02			76.02			76.02	
RAD Centerline Height (ft.)		95			95			95	
Azimuths (True North)		40°			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	125								
OTHER EQUIPMENT									
Type of Equipment									
Manufacturer									
Model Number									
Dimensions H x W x D (in)									
Weight (lbs.)									
Equipment Location									
Quantity									

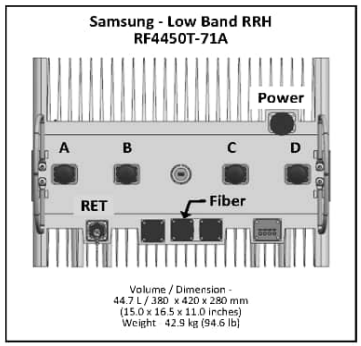
Frequencies	**n29**	**n66**	**n70**	**n71**
Downlink (TX)	-	|2160 - 2165| |2180 - 2200|	|1995 - 2020|	|632 - 652|
Uplink (RX)	-	|1760 - 1765|	|1695 - 1710|	|678 - 698|

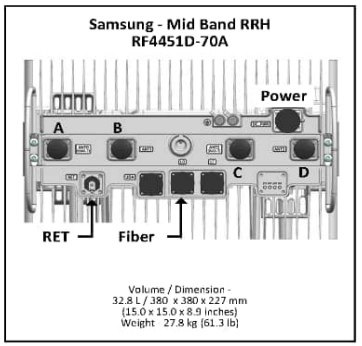
PLUMBING DIAGRAM ANTENNA











Wireless Engineering

Chuck Iversen	
20 - Sept – 2022	

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

Commscope FFVV-65B-R2 - 8 Port - 6ft
LOW/MID Radios
LOW Band RET cable

SIZE	CAGE CODE	DWG NAME	REV
	50HD6	FFVV-65B-R2-Commscope-6ft_ALPHA	1
SCALE None		SHEET 1 OF 1	

Dimensions

Length	1828 mm | 72.0 in	
Width	498 mm | 19.6 in	
Depth	197 mm | 7.8 in	

Mechanical Specifications

And Loading at Velocity, frontal	685 N @ 150 km/h | 154.0 lbf @ 150 km/h
And Loading at Velocity, lateral	232 N @ 150 km/h | 52.2 lbf @ 150 km/h
And Loading at Velocity, rear	184 N @ 150 km/h | 126.8 lbf @ 150 km/h
And Loading at Velocity, maximum	880 N @ 150 km/h | 198.8 lbf @ 150 km/h
And Speed, maximum	241 km/h | 150 mph

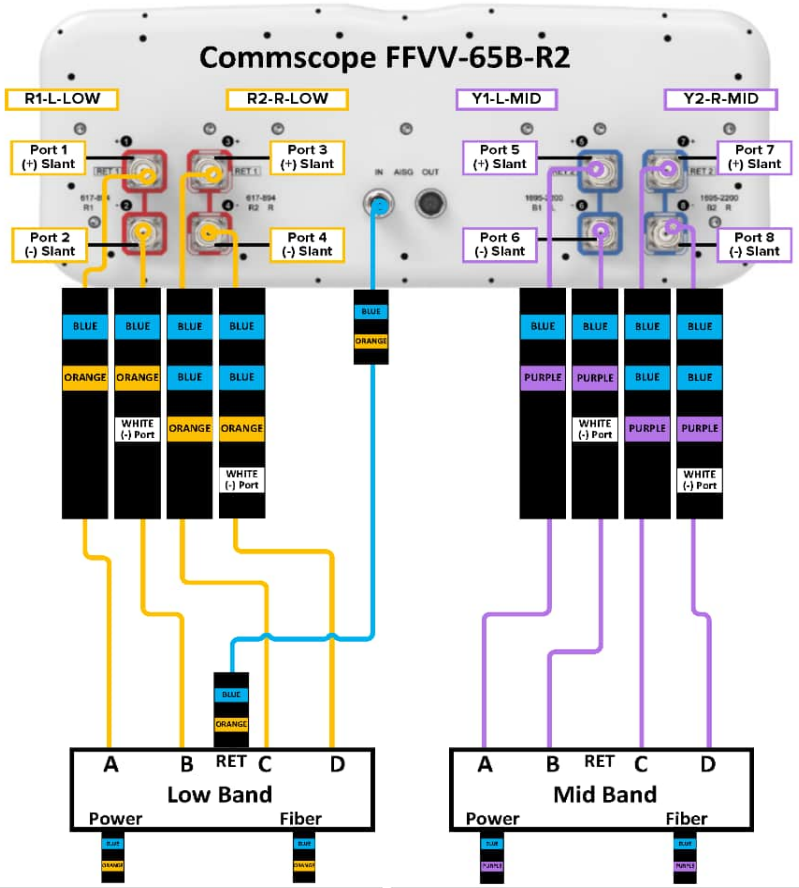
Packaging and Weights

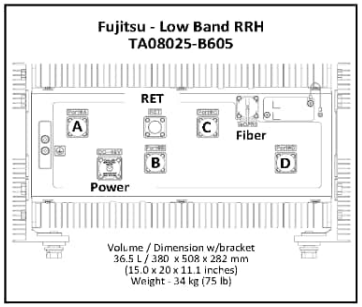
Length, packed	2030 mm | 79.1 in
Width, packed	608 mm | 23.9 in
Depth, packed	352 mm | 13.9 in
Net Weight, without mounting kit	32.1 kg | 70.8 lb
Weight, gross	44.5 kg | 98.1 lb

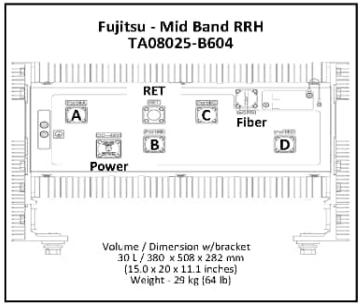
- Refer to the color coding chart for RF Cables
- Check RRH SFPs are 'I-temp' rated, (industrial-temp range)
- RF Connector recommended torque: 50 inch-lbs.
- RET connector recommended torque: 4.3-8.6 inch-lbs.
- Weatherproof boots required on all RF jumpers.
- RET cables require self-sealing tape.
- Protect unused ports with weather-sealing caps.
- **When COBE 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.**

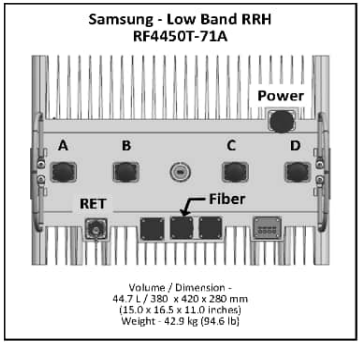
Sector Color Bands	Frequency Color Bands	Main Coax
ALPHA SECTOR	LOW BAND (LB)	RET Cable
BETA SECTOR	MID BAND (MB)	RF Jumper - Low Band
GAMMA SECTOR	FUTURE	RF Jumper - Mid Band

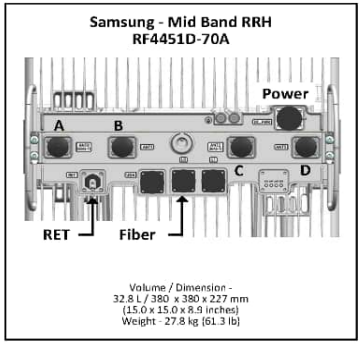
PLUMBING DIAGRAM ANTENNA











Wireless Engineering

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

Commscope FFVV-65B-R2 - 8 Port - 6ft
LOW/MID Radios
LOW Band RET cable

	SIZE	CAGE CODE	DWG NAME	REV
Chuck Iversen		50HD6	FFVV-65B-R2-Commscope-6ft_BETA	1
20 - Sept – 2022	SCALE None		SHEET 1 OF 1	

Dimensions

Length	1828 mm | 72.0 in
Width	498 mm | 19.6 in
Depth	197 mm | 7.8 in

Mechanical Specifications

Axial Loading at Velocity, frontal	685 N @ 150 km/h | 154.0 lbf @ 150 km/h
Axial Loading at Velocity, lateral	232 N @ 150 km/h | 52.2 lbf @ 150 km/h
Axial Loading at Velocity, rear	564 N @ 150 km/h | 126.8 lbf @ 150 km/h
Axial Loading at Velocity, maximum	880 N @ 150 km/h | 198.0 lbf @ 150 km/h
Wind Speed, maximum	241 km/h | 150 mph

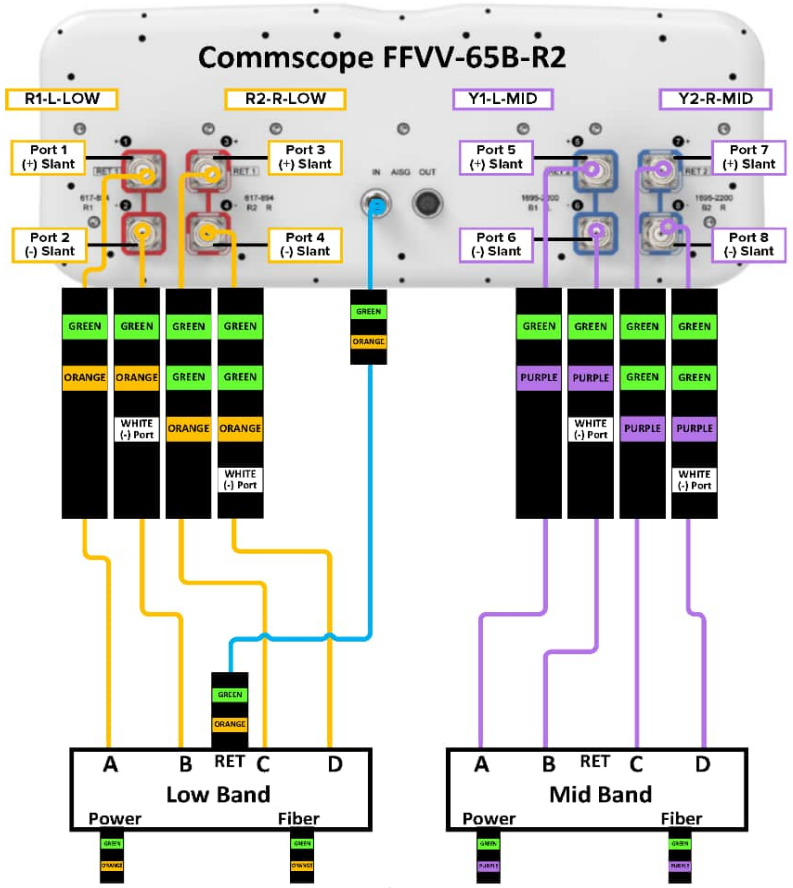
Packaging and Weights

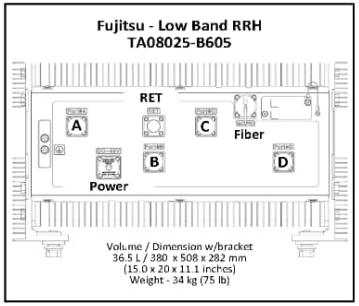
Length, packed	2010 mm | 79.1 in
Width, packed	608 mm | 23.9 in
Depth, packed	352 mm | 13.9 in
Net Weight, without mounting kit	32.1 kg | 70.8 lb
Weight, gross	44.5 kg | 98.1 lb

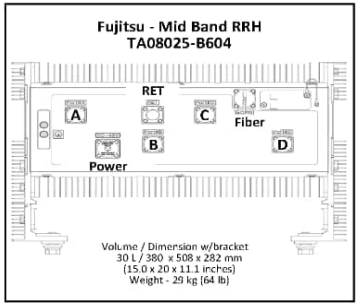
- Refer to the color coding chart for RF Cables
- Check RRH SFPs are 'Hotemp' rated. (industrial-temp range)
- RF Connector recommended torque: 50 inch-lbs.
- RET connector recommended torque: 4.3-8.6 inch-lbs.
- Weatherproof boots required on all RF jumpers.
- RET cables require self-sealing tape.
- 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.**

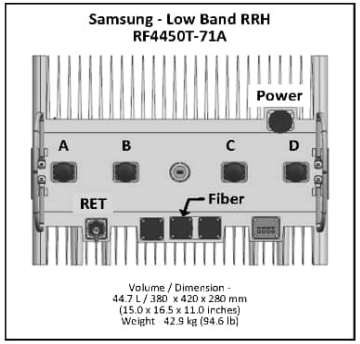
Sector Color Bands	Frequency Color Bands	Main Coax
ALPHA SECTOR	LOW BAND (LB)	RET Cable
BETA SECTOR	MID BAND (MB)	RF Jumper - Low Band
GAMMA SECTOR	FUTURE	RF Jumper - Mid Band

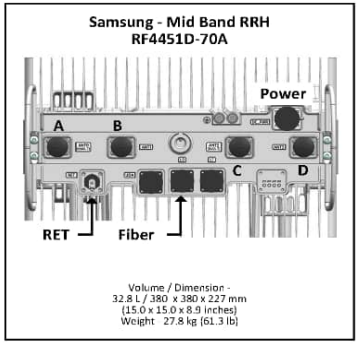
PLUMBING DIAGRAM ANTENNA











Wireless Engineering

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

Commscope FFVV-65B-R2 - 8 Port - 6ft
LOW/MID Radios
LOW Band RET cable

	SIZE	CAGE CODE	DWG NAME	REV
Chuck Iversen		50HD6	FFVV-65B-R2-Commscope-6ft_GAMMA	1
20 - Sept – 2022	SCALE None		SHEET 1 OF 1	

Dimensions

Length	1828 mm | 72.0 in
Width	498 mm | 19.6 in
Depth	197 mm | 7.8 in

Mechanical Specifications

And Loading at Velocity, frontal	685 N @ 150 km/h | 154.0 lbf @ 150 km/h
And Loading at Velocity, lateral	232 N @ 150 km/h | 52.2 lbf @ 150 km/h
And Loading at Velocity, rear	584 N @ 150 km/h | 126.8 lbf @ 150 km/h
And Loading at Velocity, maximum	889 N @ 150 km/h | 199.8 lbf @ 150 km/h
And Speed, maximum	241 km/h | 150 mph

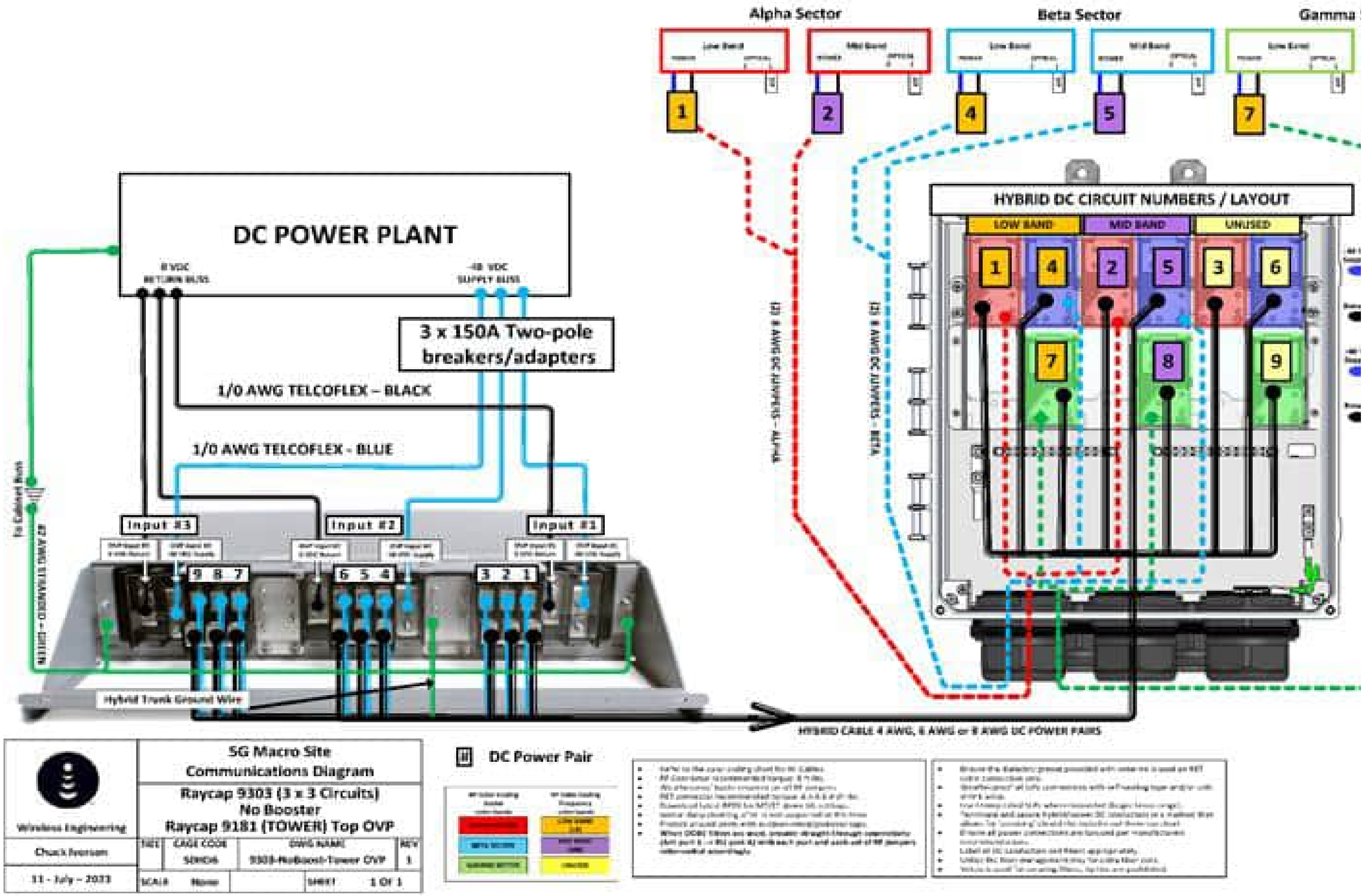
Packaging and Weights

Length, packed	2030 mm | 79.1 in
Width, packed	608 mm | 23.9 in
Depth, packed	352 mm | 13.9 in
Net Weight, without mounting kit	32.1 kg | 70.8 lb
Weight, gross	44.5 kg | 98.1 lb

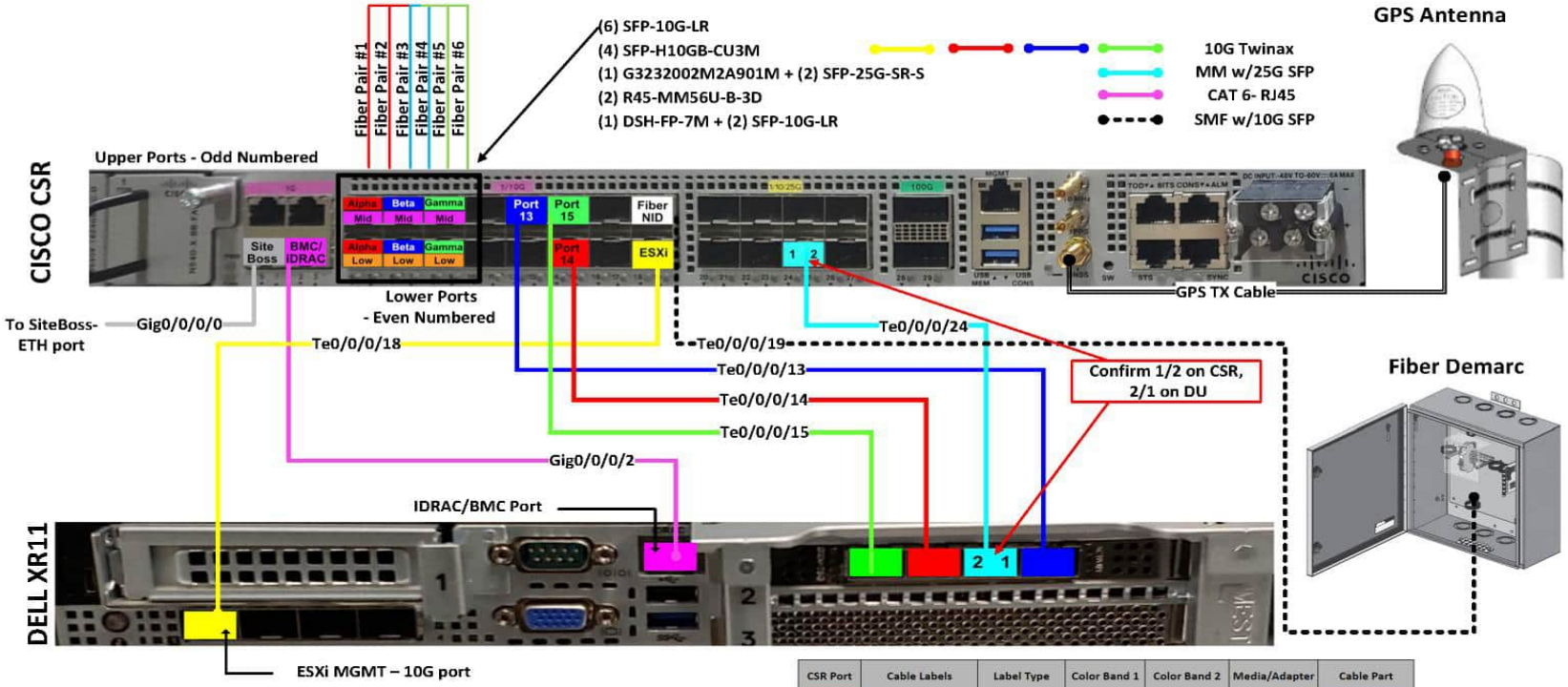
- Refer to the color coding chart for RF Cables.
- Check RRH SFPs are 'I-temp' rated. (Industrial-temp range)
- RF Connector recommended torque: 50 inch-lbs.
- RET connector recommended torque: 4.3-8.6 inch-lbs.
- Weatherproof boots required on all RF jumpers.
- RET cables require self-sealing tape.
- 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



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

Low-Band RRH -
(600MHz N71 baseband) +
(850MHz N26 band) +
(700MHz N29 band) - optional per market

Add Frequency Color to Sector Band
(CBRS will use Yellow bands)

	ALPHA RRH				BETA RRH				GAMMA RRH			
	Port 1 + slant	Port 2 - slant	Port 3 + slant	Port 4 - slant	Port 1 + slant	Port 2 - slant	Port 3 + slant	Port 4 - slant	Port 1 + slant	Port 2 - slant	Port 3 + slant	Port 4 - slant
	RED	RED	RED	RED	BLUE	BLUE	BLUE	BLUE	GREEN	GREEN	GREEN	GREEN
	ORANGE	ORANGE	RED	RED	ORANGE	ORANGE	BLUE	BLUE	ORANGE	ORANGE	GREEN	GREEN
		WHITE (-) Port	ORANGE	ORANGE		WHITE (-) Port	ORANGE	ORANGE		WHITE (-) Port	ORANGE	ORANGE
				WHITE (-) Port				WHITE (-) Port				WHITE (-) Port

Mid-band RRH -
(AWS bands N66+N70)

Add Frequency Color to Sector Band
(CBRS will use Yellow bands)

	RED	RED	RED	RED	BLUE	BLUE	BLUE	BLUE	GREEN	GREEN	GREEN	GREEN
	PURPLE	PURPLE	RED	RED	PURPLE	PURPLE	BLUE	BLUE	PURPLE	PURPLE	GREEN	GREEN
		WHITE (-) Port	PURPLE	PURPLE		WHITE (-) Port	PURPLE	PURPLE		WHITE (-) Port	PURPLE	PURPLE
				WHITE (-) Port				WHITE (-) Port				WHITE (-) Port

Hybrid/Discreet Cables

Include sector bands being supported along with frequency bands

Example 1 - Hybrid, or discreet, supports all sectors, both low-bands and mid-bands

Example 2 - Hybrid, or discreet, supports CBRS only, all sectors

Example 3 - Main Coax with ground mounted RRUs

Example 1	Example 2 (3rd Tech added)	Example 3 COAX#1 (Alpha)	(canister) COAX #2 (Alpha)
RED	RED	RED	RED
BLUE	BLUE		
GREEN	GREEN		RED
ORANGE	YELLOW		
PURPLE			

Fiber Jumpers to RRHs

Low Band RRH fiber cables have sector stripe only

Low Band RRH	Mid Band RRH	Low Band RRH	Mid Band RRH	Low Band RRH	Mid Band RRH
RED	RED	BLUE	BLUE	GREEN	GREEN
ORANGE	PURPLE	ORANGE	PURPLE	ORANGE	PURPLE

Power Cables to RRHs

Low Band RRH power cables have sector stripe only

Low Band RRH	Mid Band RRH	Low Band RRH	Mid Band RRH	Low Band RRH	Mid Band RRH
RED	RED	BLUE	BLUE	GREEN	GREEN
ORANGE	PURPLE	ORANGE	PURPLE	ORANGE	PURPLE

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.

Antenna 1 Mid Band / IN	Antenna 1 Low Band / IN	Antenna 1 Mid Band / IN	Antenna 1 Low Band / IN	Antenna 1 Mid Band / IN	Antenna 1 Low Band / IN
RED	RED	BLUE	BLUE	GREEN	GREEN
PURPLE	ORANGE	PURPLE	ORANGE	PURPLE	ORANGE

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.

Forward azimuth of 0-120 degrees		Forward azimuth of 120-240 degrees		Forward azimuth of 240-359 degrees	
Primary	Secondary	Primary	Secondary	Primary	Secondary
WHITE	WHITE	WHITE	WHITE	WHITE	WHITE
RED	RED	BLUE	BLUE	GREEN	GREEN
WHITE	WHITE	WHITE	WHITE	WHITE	WHITE
	RED		BLUE		GREEN
	WHITE		WHITE		WHITE

ATTACHMENT 6

FOX HILL TELECOM

Radio Frequency Emissions Analysis Report

Site ID: BOBOS00935A

69 Oil Mill Road
Waterford, CT 06385

December 4, 2023

Fox Hill Telecom Project Number: 231061

Site Compliance Summary	
Compliance Status:	**COMPLIANT**
Site total MPE% of FCC general population allowable limit:	**4.14 %**

FOX HILL TELECOM

December 4, 2023

Dish Wireless
5701 South Santa Fe Drive
Littleton, CO 80120

Emissions Analysis for Site: **BOBOS00935A**

Fox Hill Telecom, Inc ("Fox Hill") was directed to analyze the proposed radio installation for Dish Wireless, LLC (Dish) facility located at **69 Oil Mill Road, Waterford, 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 **69 Oil Mill Road, Waterford, 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	Commscope FFVV-65B-R2	96.5
B	1	Commscope FFVV-65B-R2	96.5
C	1	Commscope FFVV-65B-R2	96.5

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	Commscope FFVV-65B-R2	n71 (600 MHz) / n70 (AWS-4 / 1995-2020) / n66 (AWS-4 / 2180-2200)	12.15 / 15.95 / 16.25	12	566	17,079.80	4.14
						Sector A Composite MPE%	**4.14**
Antenna B1	Commscope FFVV-65B-R2	n71 (600 MHz) / n70 (AWS-4 / 1995-2020) / n66 (AWS-4 / 2180-2200)	12.15 / 15.95 / 16.25	12	566	17,079.80	4.14
						Sector B Composite MPE%	**4.14**
Antenna C1	Commscope FFVV-65B-R2	n71 (600 MHz) / n70 (AWS-4 / 1995-2020) / n66 (AWS-4 / 2180-2200)	12.15 / 15.95 / 16.25	12	566	17,079.80	4.14
						Sector C Composite MPE%	**4.14**

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 for 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	**4.14 %**
Site Total MPE %:	**4.14 %**

Table 4: All Carrier MPE Contributions

Dish Sector A Total:	4.14 %
Dish Sector B Total:	4.14 %
Dish Sector C Total:	4.14 %
Site Total:	4.14 %

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	1,008.96	96.5	10.96	n71 (600 MHz)	400	2.74%
Dish n70 (AWS-4 / 1995-2020) 5G	4	1,574.20	96.5	7.00	n70 (AWS-4 / 1995-2020)	1000	0.70%
Dish n66 (AWS-4 / 2180-2200) 5G	4	1,686.79	96.5	7.00	n66 (AWS-4 / 2180-2200)	1000	0.70%
						Total:	**4.14 %**

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:	4.14 %
Sector B:	4.14 %
Sector C:	4.14 %
Dish Maximum Total (per sector):	4.14 %
Site Total:	4.14 %
Site Compliance Status:	**COMPLIANT**

The anticipated composite emissions value for this site, assuming all carriers present, is **4.14 %** 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

UNITED STATES POSTAL SERVICE.

GREENDALE
290 W BOYLSTON ST
WORCESTER, MA 01606-2378
(800)275-8777

05/24/2024 09:47 AM

Product	Qty	Unit Price	Price
Prepaid Mail Waterford, CT 06385 Weight: 1 lb 1.10 oz Acceptance Date: Fri 05/24/2024 Tracking #: 9405 5036 9930 0689 6479 46	1		$0.00
Prepaid Mail Hartford, CT 06141 Weight: 1 lb 1.00 oz Acceptance Date: Fri 05/24/2024 Tracking #: 9405 5036 9930 0689 6479 39	1		$0.00
Prepaid Mail Waterford, CT 06385 Weight: 1 lb 0.90 oz Acceptance Date: Fri 05/24/2024 Tracking #: 9405 5036 9930 0689 6479 15	1		$0.00
Prepaid Mail Waterford, CT 06385 Weight: 1 lb 0.80 oz Acceptance Date: Fri 05/24/2024 Tracking #: 9405 5036 9930 0689 6479 08	1		$0.00
Grand Total:			$0.00

May 23, 2024

VIA USPS CERTIFIED MAIL/
RETURN RECEIPT REQUESTED

Amy E Campbell
87 Oil Mill Road
Waterford, CT 06385

RE: Proposed Modification to Existing Wireless Telecommunications Facility at Oil Mill Rd (Structure #6063A), Waterford, Connecticut

To Whom It May Concern:

I am writing to you on behalf of Dish Wireless LLC ("Dish"). Dish intends to file with the Connecticut Siting Council ("Council") a petition for declaratory ruling ("Petition") that a Certificate of Environmental Compatibility and Public Need is not required.

The Petition will provide details of the Existing Facility modification and explain why it will have no significant adverse environmental effect. Dish proposes to extend the height of the existing electric transmission pole by 2-feet, to a total height of approximately 99.5-feet above ground level (AGL).

This letter serves as notice to you as an abutting property owner pursuant to § 16-50j-40 of the Regulations of Connecticut State Agencies. Dish will file the Petition on or about May 31, 2024 and will request that the Council place the Petition on some future agenda.

You may review the Petition at the office of the Council, which is located at Ten Franklin Square, New Britain, Connecticut, 06051, or at the Office of the City Clerk at the Town of Waterford. All inquiries should be addressed to Council or to the undersigned.

Sincerely,

Victoria Masse
Northeast Site Solutions
Agent for Dish Wireless
5 Melrose Drive, Farmington CT 06032

7020 0640 0001 7661 3757

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City, State, ZIP+4®: Bayside NY 11361

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Sent To: Amy Campbell
Street and Apt. No., or PO Box No.: 87 Oil Mill Road
City, State, ZIP+4®: Waterford, CT 06385

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First-Class Mail® Letter Waterford, CT 06385 Weight: 0 lb 0.40 oz Estimated Delivery Date Tue 05/28/2024	1		$0.68
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Total			$8.73
First-Class Mail® Letter Berlin, CT 06037 Weight: 0 lb 0.40 oz Estimated Delivery Date Tue 05/28/2024	1		$0.68
Certified Mail® Tracking #: 70200640000176613764			$4.40
Return Receipt Tracking #: 9590 9402 8425 3156 4677 02			$3.65
Total			$8.73
First-Class Mail® Letter Waterford, CT 06385 Weight: 0 lb 0.40 oz Estimated Delivery Date Tue 05/28/2024	1		$0.68
Certified Mail® Tracking #: 70200640000176613771			$4.40
Return Receipt Tracking #: 9590 9402 8425 3156 4676 96			$3.65
Total			$8.73