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

October 18, 2022

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

RE: Tower Share Application
414 Chapel Hill Road, Montville, CT
Latitude: 41.28831 N
Longitude: -72.121666 W
Site#: BOBOS00069B

Dear Ms. Bachman:

This letter and attachments are submitted on behalf of Dish Wireless LLC. Dish Wireless LLC plans to install antennas and related equipment to the tower site located at 414 Chapel Hill Road, Montville, Connecticut.

Dish Wireless LLC proposes to install three (3) 600/1900/2100 5G MHz antenna and six (6) RRUs, at the 110-foot level of the existing 180-foot self support tower, one (1) Fiber cable will also be installed. Dish Wireless LLC equipment cabinets will be placed within 7x5 lease area. Included are plans by Centek, dated October 12, 2022, Exhibit C. Also included is a structural analysis prepared by Centek, dated October 12, 2022 confirming that the existing tower is structurally capable of supporting the proposed equipment. Attached as Exhibit D. This facility was approved by the Connecticut Siting Council, Petition No. 824 on July 20, 2007. Please see attached Exhibit A.

Please accept this letter as notification pursuant to Regulations of Connecticut State Agencies 16-50aa, of Dish Wireless LLC intent to share a telecommunications facility pursuant to R.C.S.A. 16-50j-88. In accordance with R.C.S.A., a copy of this letter is being sent to Ronald K. McDaniel, Mayor, Liz Burdick, Planning Director, as well as the property owner and tower owner.

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

1. The proposed modifications will not result in an increase in the height of the existing structure. The top of the tower is 180-feet; Dish Wireless LLC proposed antennas will be located at a center line height of 110-feet.

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

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

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SITE SOLUTIONS
Turnkey Wireless Development

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4.The operation of the proposed antennas will not increase radio frequency emissions at the facility to a level at or above the Federal Communications Commission safety standard. As indicated in the attached power density calculations, the combined site operations will result in a total density of 7.00% as evidenced by Exhibit F.

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

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

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

C. Environmental Feasibility. The proposed shared use of this facility would have a minimal environmental impact. The installation of Dish Wireless LLC equipment at the 110-foot level of the existing 180-foot tower would have an insignificant visual impact on the area around the self-support tower. Dish Wireless LLC ground equipment would be installed within the existing facility compound. Dish Wireless LLC shared use would therefore not cause any significant alteration in the physical or environmental characteristics of the existing site. Additionally, as evidenced by Exhibit F, the proposed antennas would not increase radio frequency emissions to a level at or above the Federal Communications Commission safety standard.

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

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

Sincerely,

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

Attachments
Cc:
Ronald K. McDaniel, Mayor
Montville Town Hall
310 Norwich-New London Tpke.
Uncasville, CT 06382

Liz Burdick, Planning Director
Montville Town Hall
310 Norwich-New London Tpke.
Uncasville, CT 06382

Connecticut Light and Power Company, Property Owner
PO BOX 270
Hartford, CT 06141

Eversource, Tower Owners
107 Selden Street
Berlin, CT 06037

Exhibit A

Original Facility Approval

Petition No. 824
CL&P
Montville, Connecticut
Staff Report
July 20, 2007

On July 12, 2007, Northeast Utilities System (CL&P) submitted a petition for a declaratory ruling that no Certificate of Environmental Compatibility and Public Need is required for the replacement of an existing 181-foot guyed lattice tower. The petition was field reviewed by Council member Phil Ashton and Council staff member David Martin on July 20, 2007. CL&P representative John D'Ambra attended the field review. Town officials were notified of the proposal.

CL&P is seeking to replace an existing, 181-foot guyed lattice tower with a self-supporting lattice tower of the same height on a 1.8 acre parcel on Chapel Hill Road in the western part of Montville. The existing tower was erected in 1978. There are three microwave antennas that are part of CL&P's trunk system and several other CL&P antennas installed on the tower. The Montville Fire and Public Works Departments also have antennas on the tower.

A recent structural analysis showed that the tower does not conform to current standards and could not be adequately reinforced because of age and condition. The replacement tower would be centered approximately 25 feet to the south of the existing tower. Each of the legs of the three-sided replacement tower would be approximately 25 feet wide at the base of the tower. They would taper to a width of approximately 10 feet at the top of the tower. Although the replacement tower would be wider than the existing tower, it would eliminate the need for guy wires that extend far beyond the existing tower. The antennas on the existing tower would be transferred to the replacement tower.

Despite its height, the visibility of the existing tower is limited by topography and vegetation. It is most visible from north of the site where there is a small commercial plaza and a fire house. There are a few single family homes clustered across the street from the commercial plaza, and three or four homes across the street just to the south of CL&P's property. There is also a taller, bulkier tower that was once used for AT&T microwave antennas just across the street from CL&P's tower. Any marginal increase in the visibility of the replacement tower would be insignificant.

CL&P has consulted with the Town of Montville about the proposed replacement. The town has not expressed any concerns.

Staff recommends approval of the proposal since it will increase the safety of an existing facility, and it will not result in any significant increase in visual or other environmental impact.

View of existing tower from commercial plaza to the north

View of two towers – CL&P on right, old AT&T tower on left

414 Chapel Hill Road

External

Inbox

M

Meredith Badalucca Fri, Oct 14, 3:26 PM (5 days ago)

to me

Good afternoon Chuck,

It was a pleasure speaking with you earlier today. Unfortunately, I do not have the zoning permit for the original tower at 414 Chapel Hill Road.

I have attached a blank zoning permit application for your use.

Please contact me with any further questions.

Respectfully,

Meredith Badalucca
Zoning & Wetlands Officer
Town of Montville
310 Norwich New London Tpke
Uncasville, CT 06382
860-848-6779

Exhibit B

Property Card

Property Card: **414 CHAPEL HILL RD**

Town of Montville, CT

Parcel Information

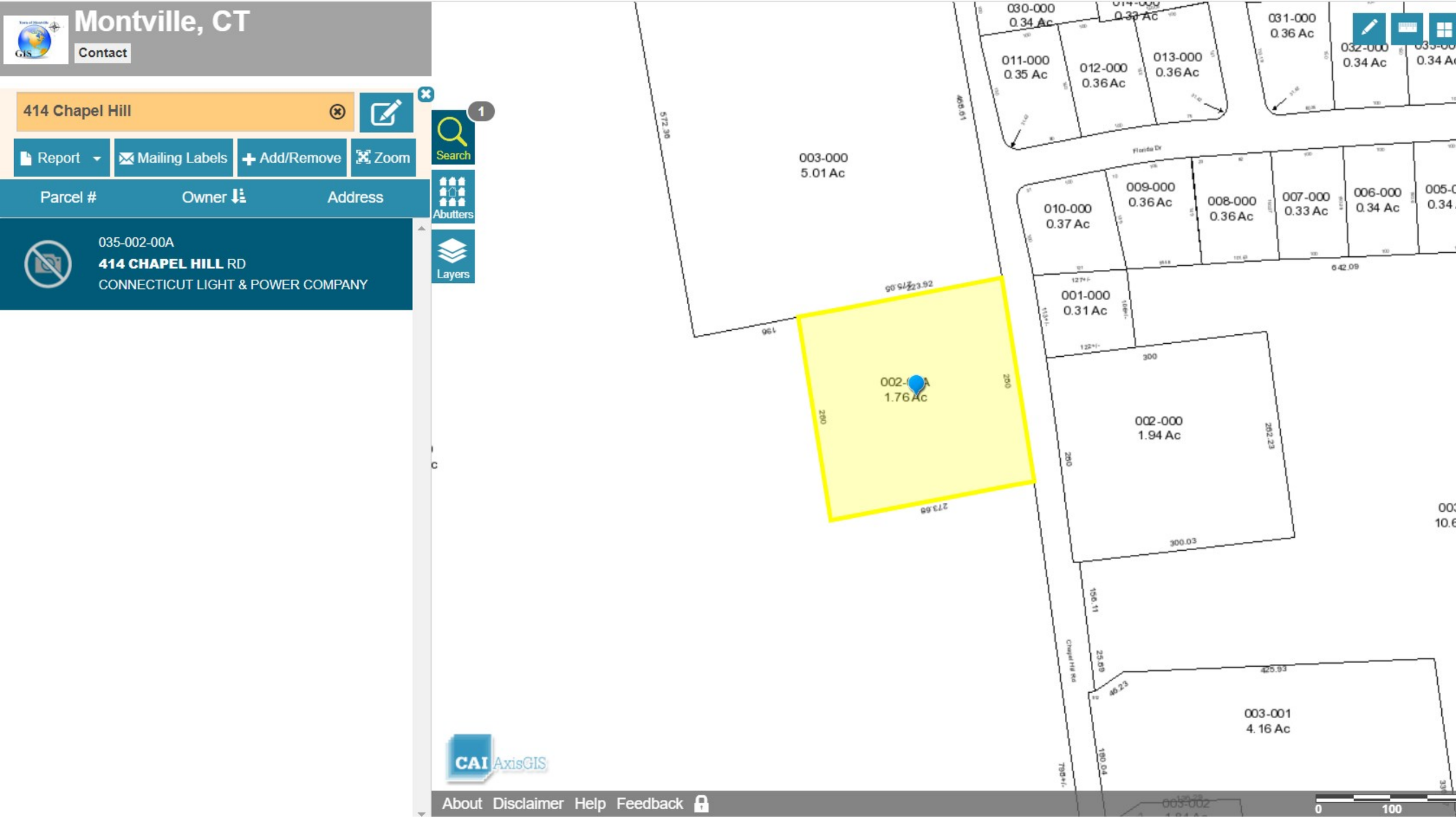
Location:	414 CHAPEL HILL RD	Property Use:	Public Utility	Primary Use:	Cell Tower
Unique ID:	C0154400	Map Block Lot:	035-002-00A	Acres:	1.76
		Zone:	C-1	Volume / Page:	0131/1181
		Sale Date:	07/26/1977	Sale Price:	$0

Value Information

	Appraised Value	Assessed Value
Land	100000	70000
Buildings	0	0
Detached Outbuildings	15000	10500
Total	115000	80500

Owner's Information

Owner's Data
CONNECTICUT LIGHT & POWER COMPANY PO BOX 270 HARTFORD, CT 061410270


Montville, CT
Contact
414 Chapel Hill
Report
Mailing Labels
Add/Remove
Zoom
Search
Abutters
Layers
Parcel #
Owner
Address
035-002-00A
414 CHAPEL HILL RD
CONNECTICUT LIGHT & POWER COMPANY
003-000
5.01 Ac
002-000
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001-000
0.31 Ac
002-000
1.94 Ac
003-001
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Florida Dr
Chapel Hill Rd
CAI AxisGIS
About
Disclaimer
Help
Feedback
0
100

Exhibit C

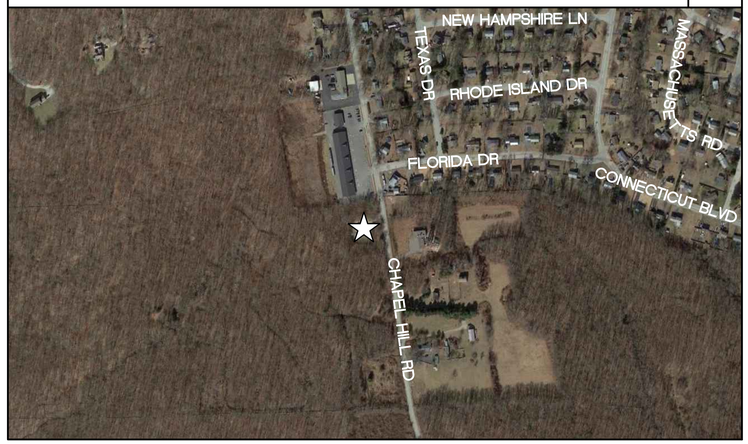
Construction Drawings

SITE NUMBER: BOBOSOOO69B
SITE NAME: CHAPEL HILL
414 CHAPEL HILL RD
OAKDALE, CT 06370

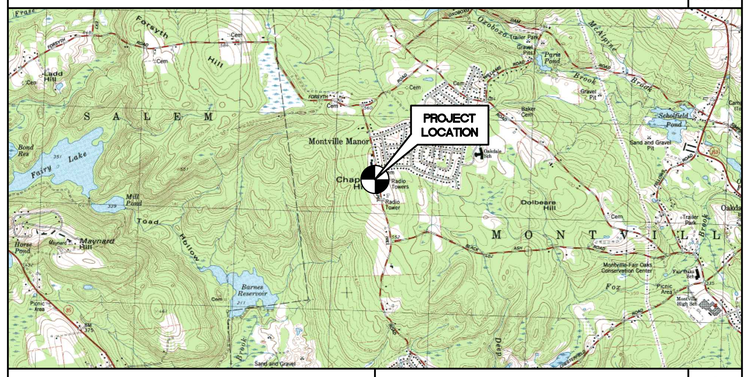
GENERAL NOTES

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 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.

SITE LOCATION MAP — N.T.S.



VICINITY MAP — N.T.S.



SITE COORDINATES AND GROUND ELEVATION REFERENCED FROM FAA 2C SURVEY, COMPLETED BY CENTEK ENGINEERING, DATED 04/20/22.

SITE COORDINATES: LATITUDE: 41°-28'-08" N
LONGITUDE: 72°-12'-16" W
GROUND ELEVATION: 603'± AMSL

NORTH

PROJECT SUMMARY

THE PROPOSED SCOPE OF WORK CONSISTS OF A MODIFICATION TO THE EXISTING UNMANNED TELECOMMUNICATIONS FACILITY INCLUDING THE FOLLOWING:

1. INSTALL (1) JMA: MX08FRO665-21 ANTENNA PER SECTOR, TOTAL OF (3)
2. INSTALL (1) FUJITSU: TA08025-B605 RADIO PER SECTOR, TOTAL OF (3)
3. INSTALL (1) FUJITSU: TA08025-B604 RADIO PER SECTOR, TOTAL OF (3)
4. INSTALL (1) RAYCAP: RDIDC-9181-PF-48 OVP BOX
5. INSTALL (1) VFA8-HD FRAME PER SECTOR. TOTAL (3)
6. INSTALL (1) 1.60" HYBRID CABLE
7. INSTALL (1) 5' x 7' STEEL PLATFORM ATOP PROPOSED CONCRETE PAD
8. INSTALL (1) H-FRAME (MOUNTED TO STEEL PLATFORM)
9. INSTALL NEW 6' x 8' CONCRETE PAD ON-GRADE
10. INSTALL CABLE ICE-BRIDGE
11. INSTALL (1) 200A UTILITY METER AND CIRCUIT BREAKER
12. INSTALL (1) 200A PPC CABINET
13. INSTALL (1) TELCO BOX
14. INSTALL (1) CHARLES HEX CABINET
15. LOWER EXISTING 20' WHIP ANTENNA TO NEW TOP HEIGHT OF ±199.61'. (1' LOWER)

PROJECT INFORMATION

SITE NUMBER:	BOBOSOOO69B
SITE NAME:	CHAPEL HILL
SITE ADDRESS:	414 CHAPEL HILL RD OAKDALE, CT 06370
APPLICANT:	DISH WIRELESS, LLC 5701 SOUTH SANTA FE DRIVE LITTLETON, CO 80120
CONTACT PERSON:	CHUCK REGULBUTO NORTHEAST SITE SOLUTIONS, LLC (860) 394-7021
ENGINEER OF RECORD:	CENTEK ENGINEERING, INC. 63-2 NORTH BRANFORD RD. BRANFORD, CT 06405 CARLO F. CENTORE, PE (203) 488-0580 EXT. 122
SITE COORDINATES:	LATITUDE: 41°-28'-08" N LONGITUDE: 72°-12'-16" W GROUND ELEVATION: 603'± AMSL SITE COORDINATES AND GROUND ELEVATION REFERENCED FROM FAA 2C SURVEY, COMPLETED BY CENTEK ENGINEERING, DATED 04/20/22.

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E-7	ELECTRICAL SPECIFICATIONS	1
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REV.	DATE	DRAWN BY	CHK'D BY	DESCRIPTION
0	10/10/22	JLD	TJR	CONSTRUCTION DRAWINGS - ISSUED FOR CONSTRUCTION
1	10/12/22	RYS	TJR	CONSTRUCTION DRAWINGS - UPDATED BUILDING CODES

PROFESSIONAL ENGINEER SEAL

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

DISH WIRELESS, LLC

SITE NUMBER: BOBOSOOO69B
SITE NAME: CHAPEL HILL
414 CHAPEL HILL RD
OAKDALE, CT 06370

DATE: 04/06/22
SCALE: AS NOTED
JOB NO. 22042.01

TITLE SHEET

T-1

Sheet No. 1 of 14

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: 101 MPH (Vasd)
  (EXPOSURE B/ 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.
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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 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.

ANTENNA/APPURTENANCE SCHEDULE

SECTOR	EXISTING/PROPOSED	ANTENNA	SIZE (INCHES) (L x W x D)	ANTENNA ℄ HEIGHT	AZIMUTH	(E/P) RRU (QTY)	(E/P) OVP (QTY)	(QTY) PROPOSED HYBRID/COAX
A1	PROPOSED	JMA WIRELESS: MX08FRO665-21	72 x 20 x 8	110'	0°	(P) FUJITSU: TA08025-B604 (1), (P) FUJITSU: TA08025-B605 (1)	(P) RAYCAP: RDIDC09181-PF-48	(1) 1.60" HYBRID CABLE
B1	PROPOSED	JMA WIRELESS: MX08FRO665-21	72 x 20 x 8	110'	120°	(P) FUJITSU: TA08025-B604 (1), (P) FUJITSU: TA08025-B605 (1)		
C1	PROPOSED	JMA WIRELESS: MX08FRO665-21	72 x 20 x 8	110'	240°	(P) FUJITSU: TA08025-B604 (1), (P) FUJITSU: TA08025-B605 (1)		

NOTE:
ALL HYBRID/COAX LENGTHS TO BE MEASURED AND VERIFIED IN FIELD BEFORE ORDERING

REV.	DATE	DRAWN BY	CHK'D BY	DESCRIPTION
0	10/10/22	JLD	TJR	CONSTRUCTION DRAWINGS - ISSUED FOR CONSTRUCTION
A	10/12/22	RYS	TJR	CONSTRUCTION DRAWINGS - UPDATED BUILDING CODES

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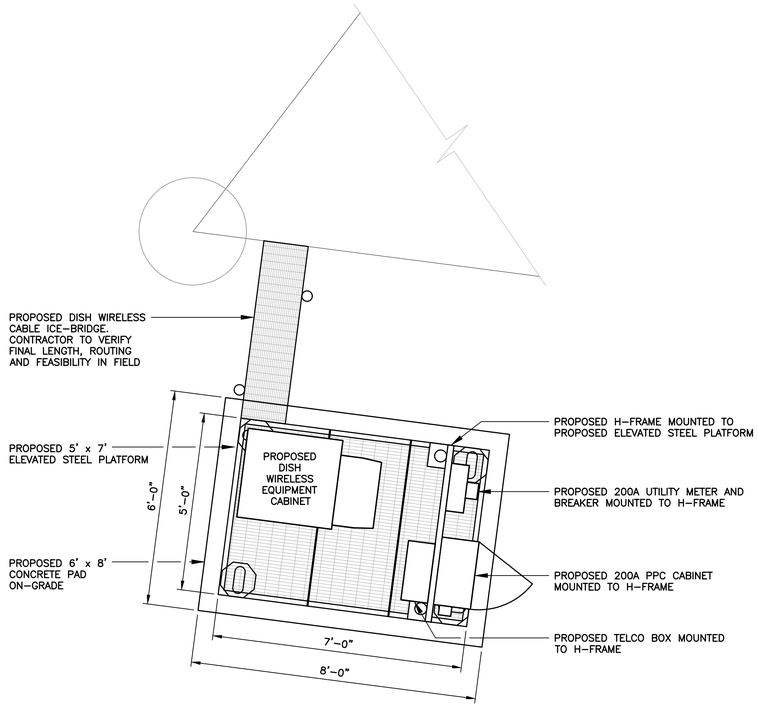
DISH WIRELESS, LLC

SITE NUMBER: BOBOSOOO69B
SITE NAME: CHAPEL HILL
414 CHAPEL HILL RD
OAKDALE, CT 06370

DATE: 04/06/22
SCALE: AS NOTED
JOB NO. 22042.01

SPECIFICATIONS, NOTES AND, ANT. SCHEDULE

N-1



2 / C-1 **PROPOSED EQUIPMENT LAYOUT PLAN**
SCALE: 1/2" = 1'
TRUE NORTH

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..

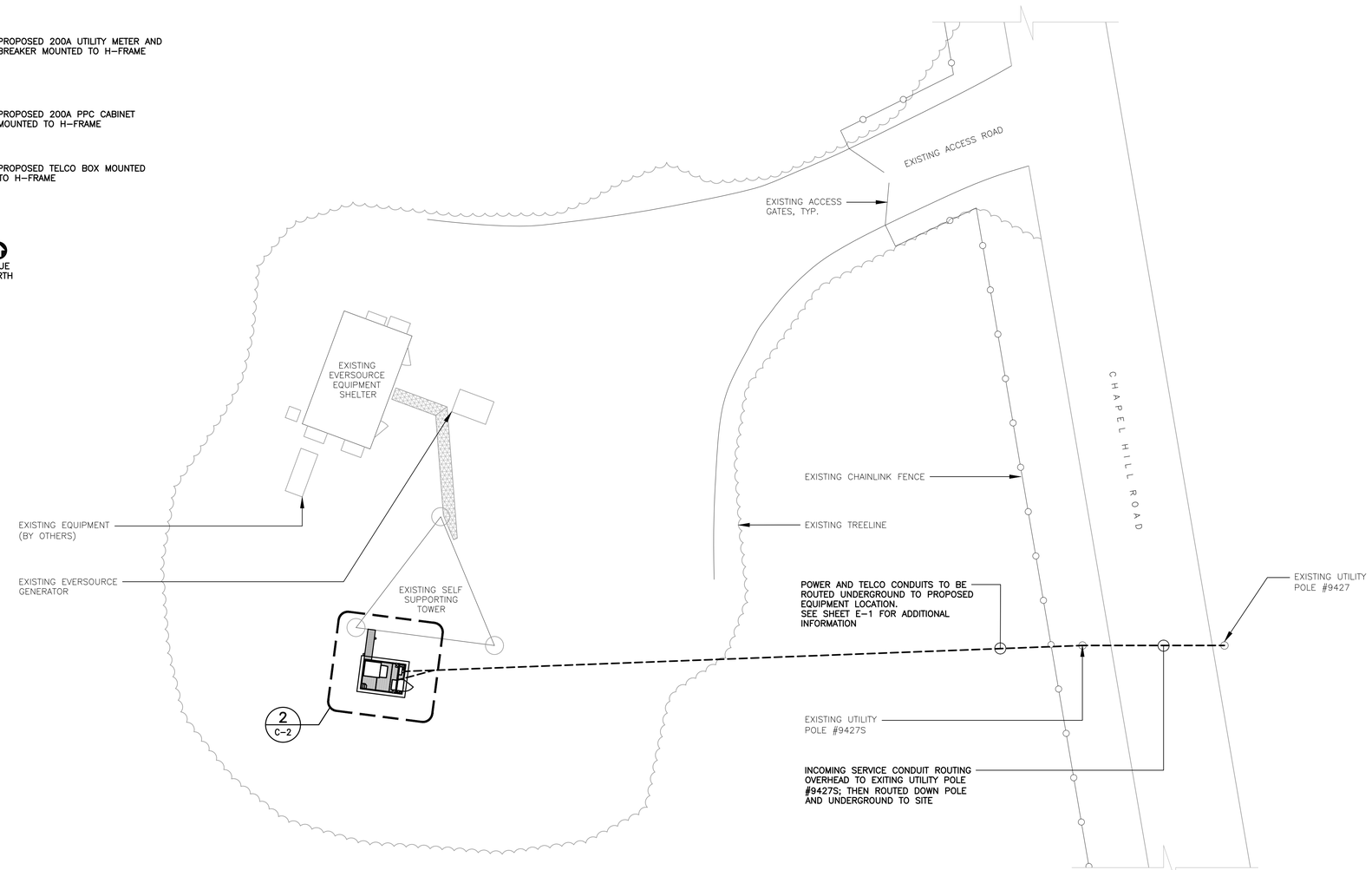
REFER TO THE ANTENNA MOUNT ANALYSIS REPORT PREPARED BY CENTEK ENGINEERING (PROJECT # 22042.01) DATED 10/12/22 FOR ADDITIONAL INFORMATION AND REQUIREMENTS.

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 # 22042.01) DATED 10/12/22 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.



1 / C-1 **PROPOSED COMPOUND PLAN**
SCALE: 1" = 10'
TRUE NORTH

REV.	DATE	DRAWN BY	CHK'D BY	DESCRIPTION
0	10/10/22	JLD	TJR	CONSTRUCTION DRAWINGS – ISSUED FOR CONSTRUCTION
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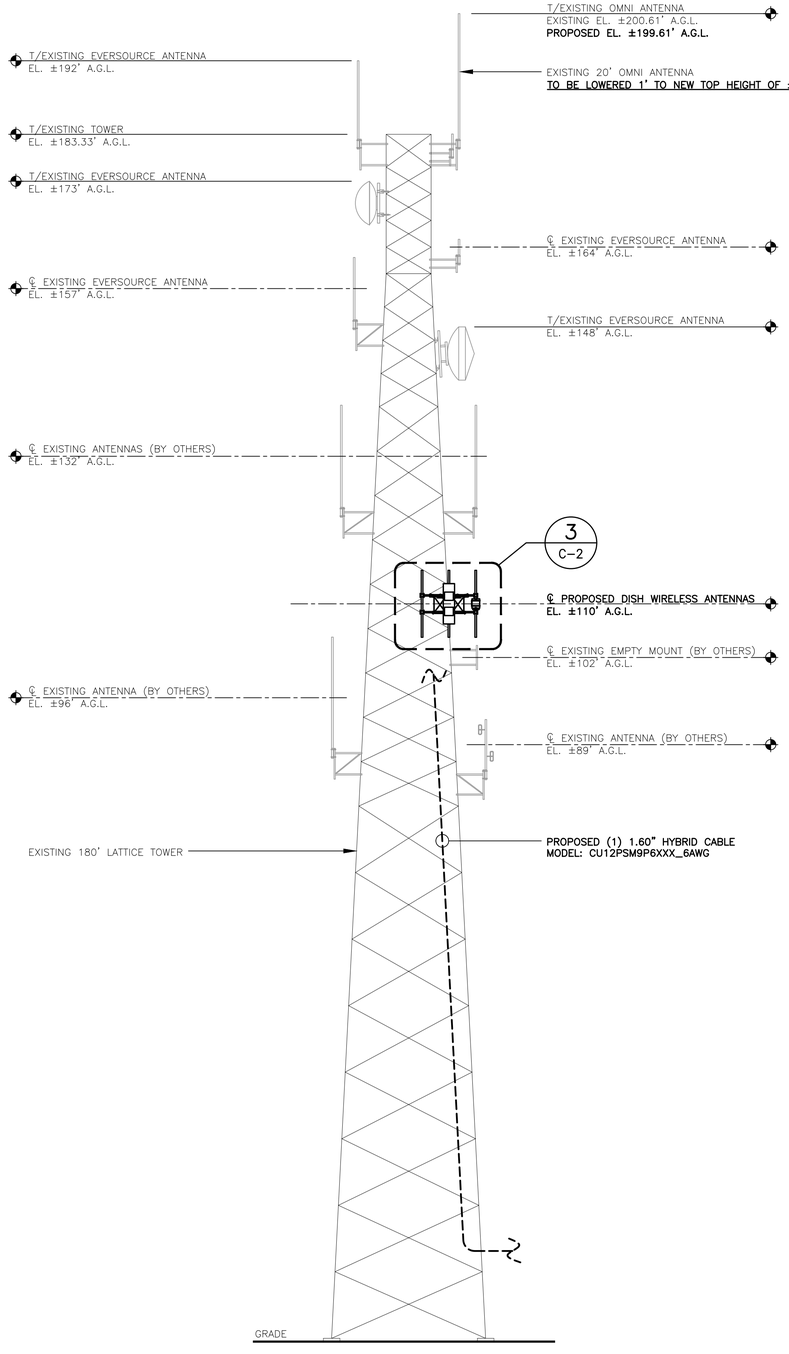
SITE NAME: CHAPEL HILL
414 CHAPEL HILL RD
OAKDALE, CT 06370

DATE: 04/06/22
SCALE: AS NOTED
JOB NO. 22042.01

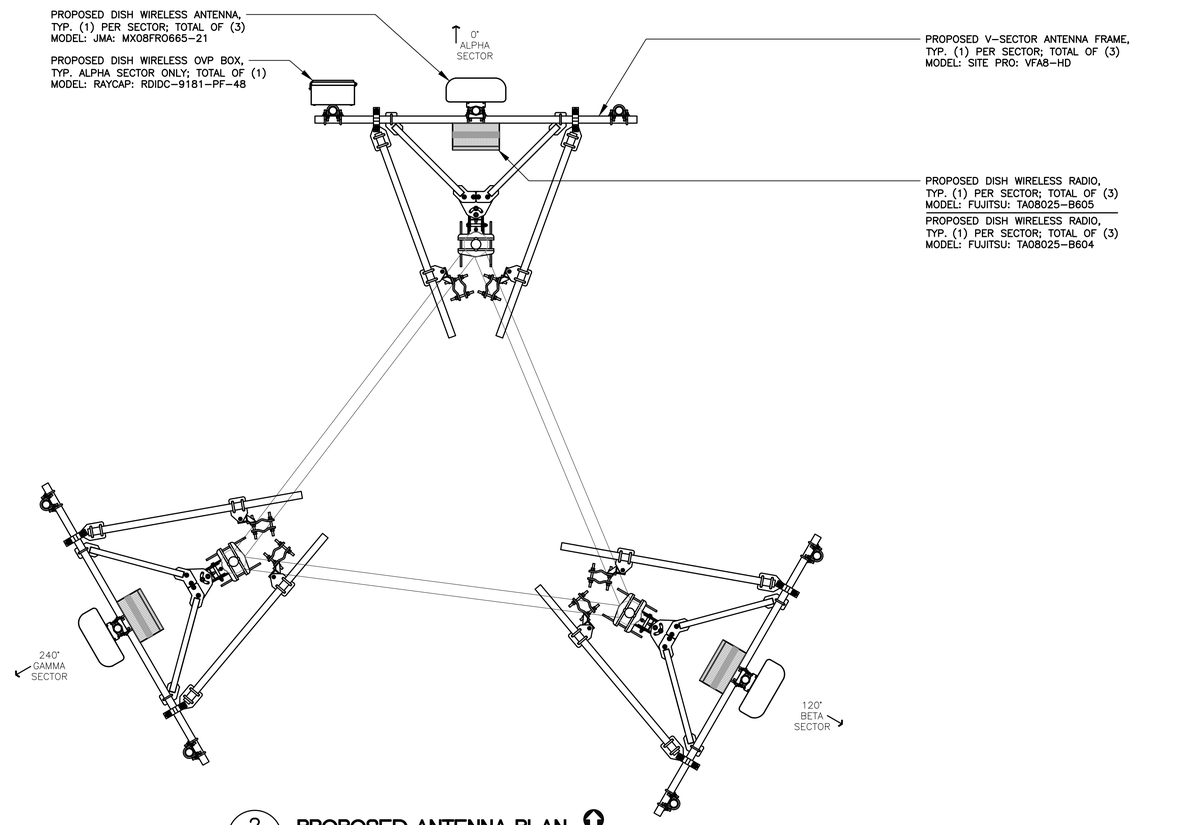
COMPOUND AND EQUIPMENT PLAN

C-1

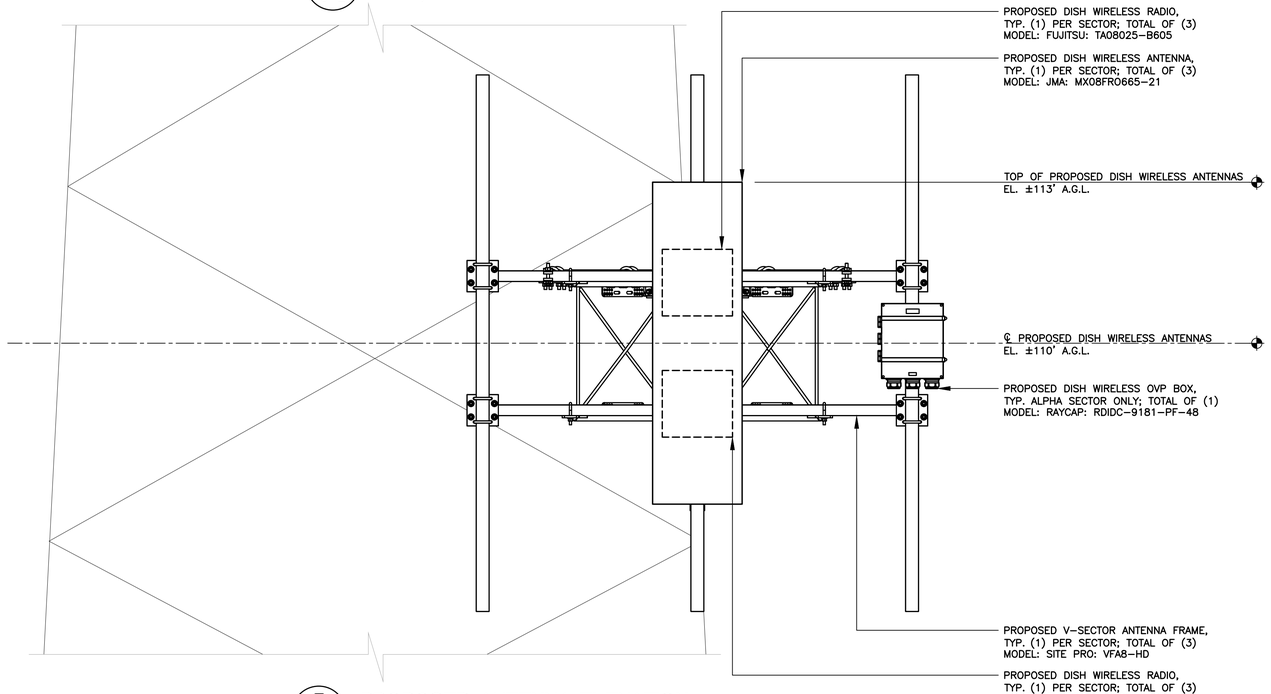
Sheet No. 3 of 14



1 C-2 **PROPOSED TOWER ELEVATION**
SCALE: 3/32" = 1'



2 C-2 **PROPOSED ANTENNA PLAN**
SCALE: 1/2" = 1'
TRUE NORTH



3 C-2 **PROPOSED ANTENNA ELEVATION**
SCALE: 3/4" = 1'

REV.	DATE	DRAWN BY	CHK'D BY	DESCRIPTION
0	10/10/22	JLD	TJR	CONSTRUCTION DRAWINGS - ISSUED FOR CONSTRUCTION
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ANTENNA PLANS AND ELEVATIONS

C-2

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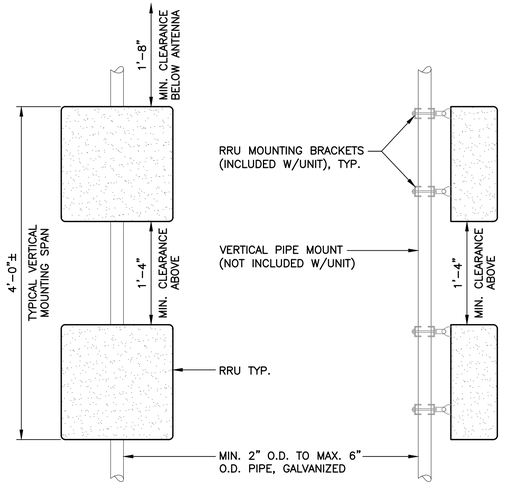
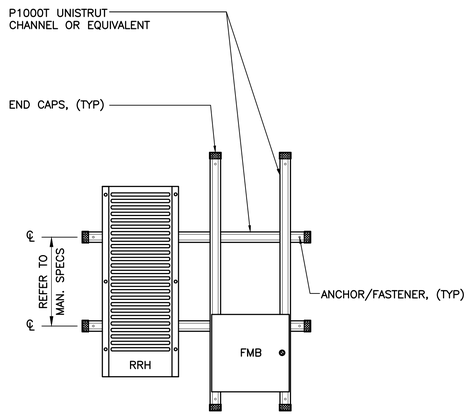


NOTES: (PIPE MOUNTING)

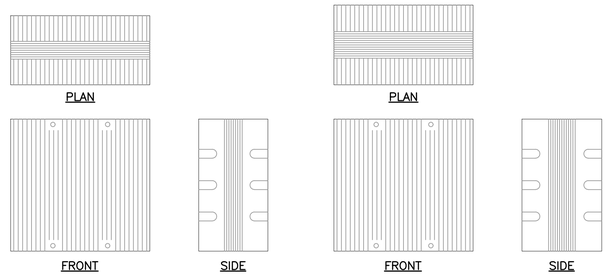
1. DISH WIRELESS SHALL SUPPLY RRU, AND RRU POLE-MOUNTING BRACKET. CONTRACTOR SHALL SUPPLY POLE/PIPE AND INSTALL ALL MOUNTING HARDWARE INCLUDING ERICSSON RRU POLE-MOUNTING BRACKET.
2. NO PAINTING OF THE RRU OR SOLAR SHIELD IS ALLOWED.

1 C-3 **TYPICAL RRU MOUNTING DETAILS**
SCALE: NOT TO SCALE



NOTES: (UNISTRUT MOUNTING)

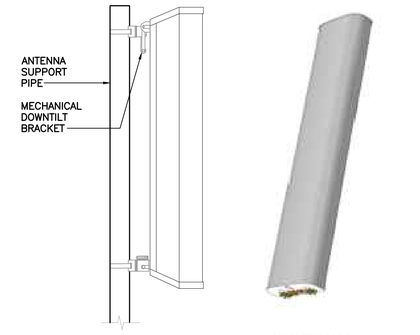
1. INSTALL A MINIMUM OF (2) ANCHORS PER UNISTRUT (± 16"o/c MIN).
2. MOUNT RRU TO UNISTRUT WITH 3/8"ø UNISTRUT BOLTING HARDWARE AND SPRING NUTS. TYPICAL FOUR PER BRACKET.
3. NO PAINTING OF THE RRU OR SOLAR SHIELD IS ALLOWED.



RRU (REMOTE RADIO UNIT)		
EQUIPMENT	DIMENSIONS	WEIGHT
MAKE: FUJITSU MODEL: TA08025-B604	14.9"L x 15.7"W x 7.8"D	±63.9 LBS.
MAKE: FUJITSU MODEL: TA08025-B605	14.9"L x 15.7"W x 9"D	±74.9 LBS.

NOTES:
1. CONTRACTOR TO COORDINATE FINAL EQUIPMENT MODEL SELECTION WITH DISH WIRELESS CONSTRUCTION MANAGER PRIOR TO ORDERING.

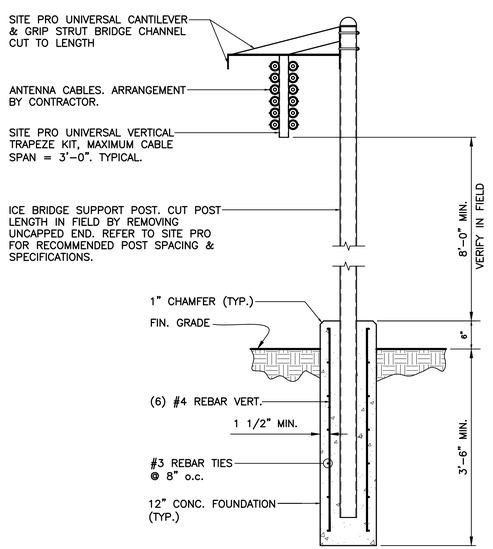
2 C-3 **PROPOSED RRU DETAIL**
SCALE: NOT TO SCALE



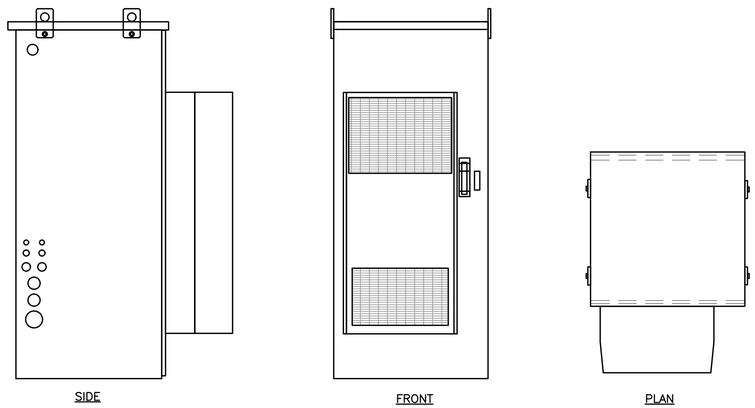
ALPHA/BETA/GAMMA ANTENNA		
EQUIPMENT	DIMENSIONS	WEIGHT
MAKE: JMA WIRELESS MODEL: MX08FRO665-21	72"L x 20"W x 8"D	±64.5 LBS.

NOTES:
1. CONTRACTOR TO COORDINATE FINAL EQUIPMENT MODEL SELECTION WITH DISH WIRELESS CONSTRUCTION MANAGER PRIOR TO ORDERING.

3 C-3 **PROPOSED ANTENNA DETAIL**
SCALE: NOT TO SCALE



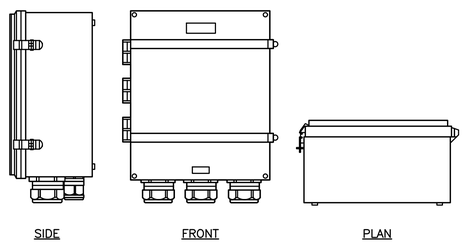
4 C-3 **TYPICAL ICE-BRIDGE DETAIL**
SCALE: NOT TO SCALE



CHARLES HEX CABINET		
EQUIPMENT	DIMENSIONS	WEIGHT
MAKE: CHARLES INDUSTRY HEX MODEL: CUBE-PM639155N4	74"H x 32"W x 32"D	±408 LBS

NOTES:
1. CONTRACTOR TO COORDINATE FINAL EQUIPMENT MODEL SELECTION WITH DISH WIRELESS CONSTRUCTION MANAGER PRIOR TO ORDERING.

5 C-3 **CHARLES HEX CABINET DETAIL**
SCALE: NOT TO SCALE



OVP BOX		
EQUIPMENT	DIMENSIONS	WEIGHT
MAKE: RAYCAP MODEL: RDIDC-9181-PF-48	16"H x 14"W x 8"D	21.85 LBS.

NOTES:
1. CONTRACTOR TO CONFIRM OVP BOX MAKE/MODEL AND QUANTITY WITH DISH WIRELESS CONSTRUCTION MANAGER PRIOR TO ORDERING.

6 C-3 **OVER-VOLTAGE PROTECTION BOX DETAIL**
SCALE: NOT TO SCALE

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JOB NO.	22042.01

TYPICAL EQUIPMENT DETAILS

C-3

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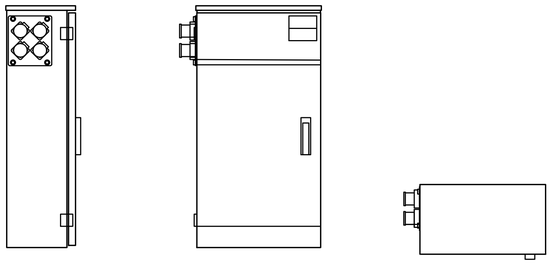
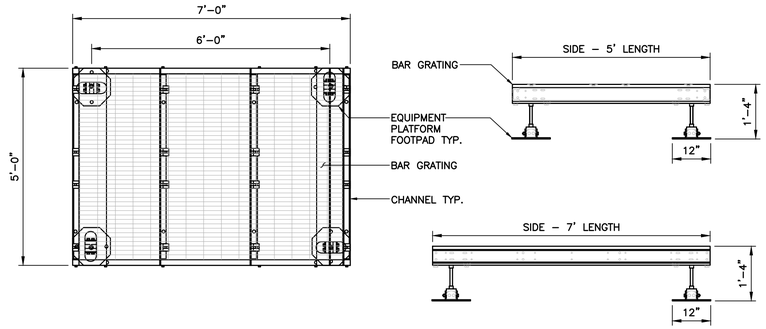


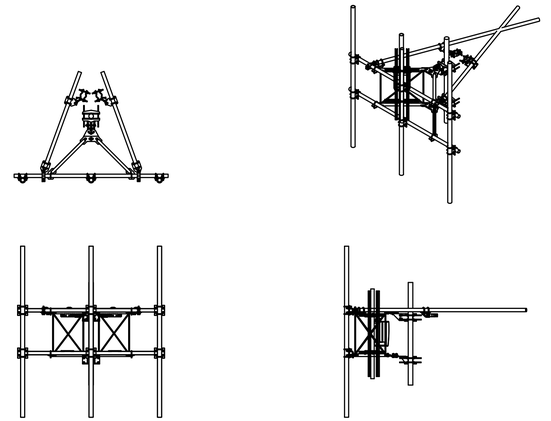
PPC CABINET		
EQUIPMENT	DIMENSIONS	WEIGHT
MAKE: RAYCAP MODEL: RDIAC-2465-P-240-MTS	39"H x 22.8"W x 12.5"D	80 LBS.
NOTES: 1. CONTRACTOR TO CONFIRM MAKE/MODEL AND QUANTITY WITH DISH WIRELESS CONSTRUCTION MANAGER PRIOR TO ORDERING.		

1 C-4 **PPC CABINET DETAIL**
SCALE: NOT TO SCALE



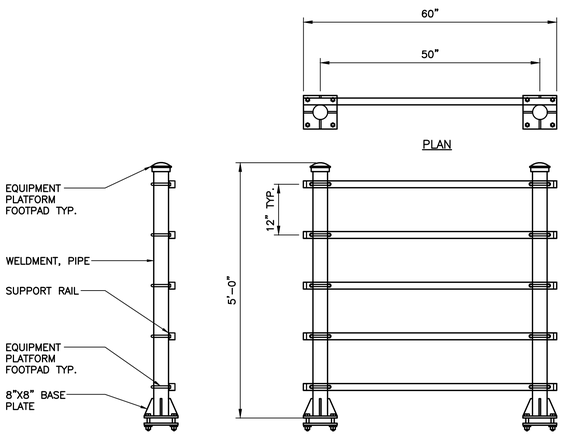
COMMSCOPE PLATFORM		
EQUIPMENT	DIMENSIONS	WEIGHT
MAKE: COMMSCOPE MODEL: MTC4045LP	16"L x 84"W x 60"D	423 LBS.
NOTES: 1. CONTRACTOR TO COORDINATE FINAL EQUIPMENT MODEL SELECTION WITH DISH WIRELESS CONSTRUCTION MANAGER PRIOR TO ORDERING.		

2 C-4 **PROPOSED PLATFORM DETAIL**
SCALE: NOT TO SCALE



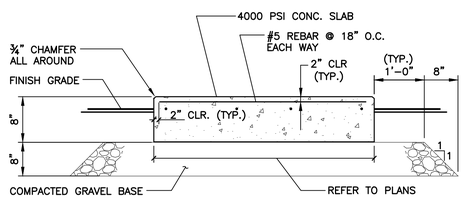
SITE PRO: VFA8-HD

3 C-4 **PROPOSED V-FRAME ANTENNA MOUNT DETAIL**
SCALE: NOT TO SCALE



H-FRAME		
EQUIPMENT	DIMENSIONS	WEIGHT
MAKE: KENWOOD MODEL: T1701KT5-5S	60"H x 60"W	173 LBS.
NOTES: 1. CONTRACTOR TO COORDINATE FINAL EQUIPMENT MODEL SELECTION WITH DISH WIRELESS CONSTRUCTION MANAGER PRIOR TO ORDERING.		

4 C-4 **PROPOSED H-FRAME DETAIL**
SCALE: NOT TO SCALE



5 C-4 **TYPICAL CONCRETE PAD DETAIL**
SCALE: NOT TO SCALE

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TYPICAL EQUIPMENT DETAILS

C-4

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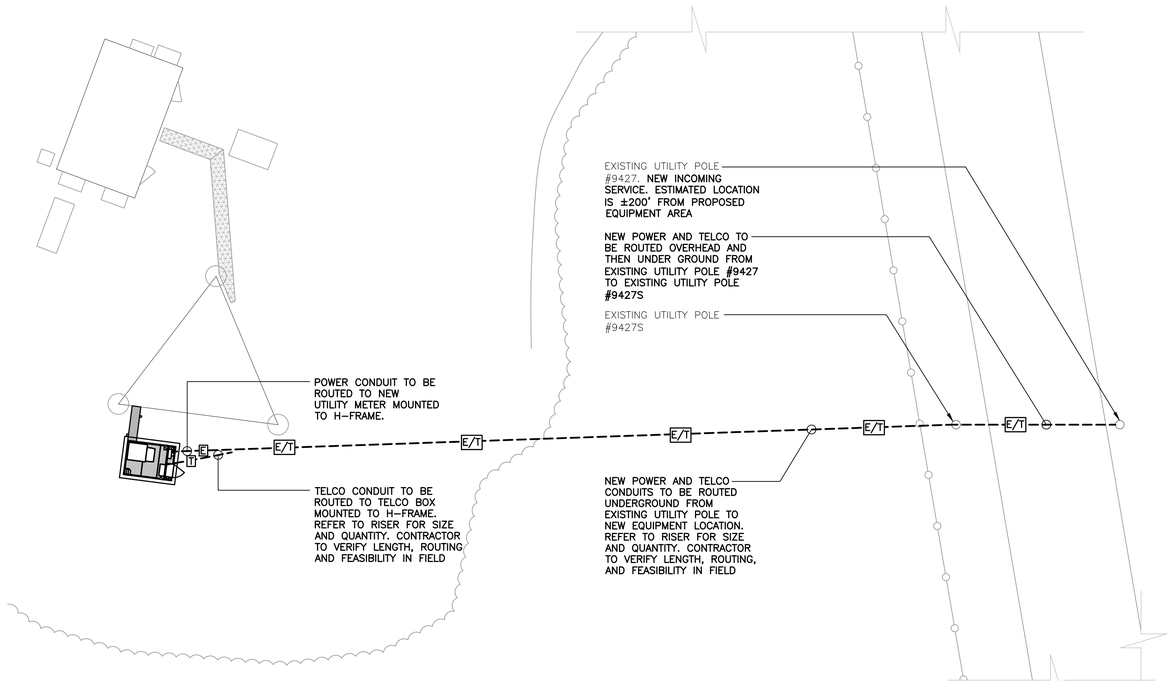
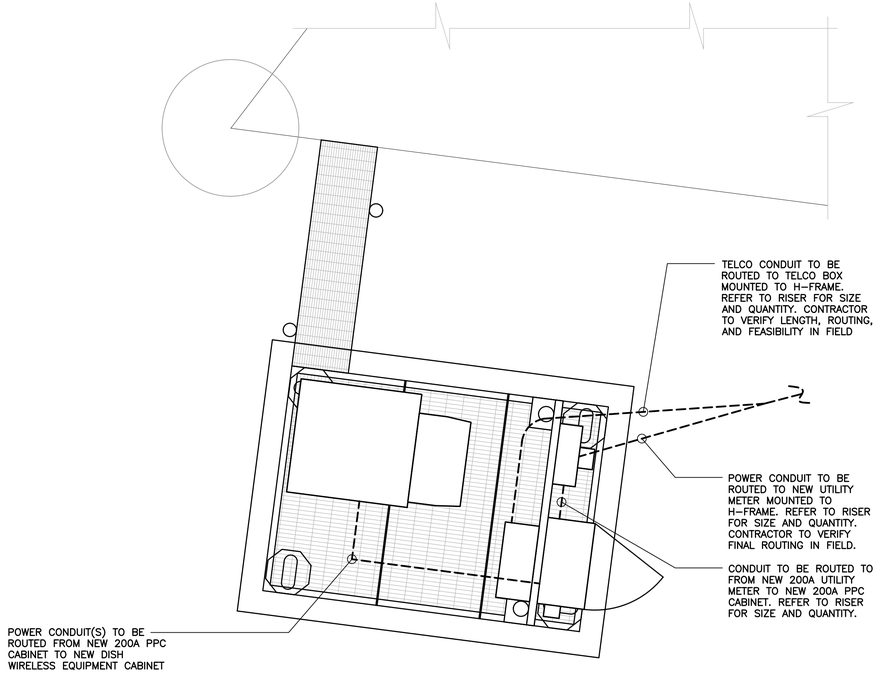


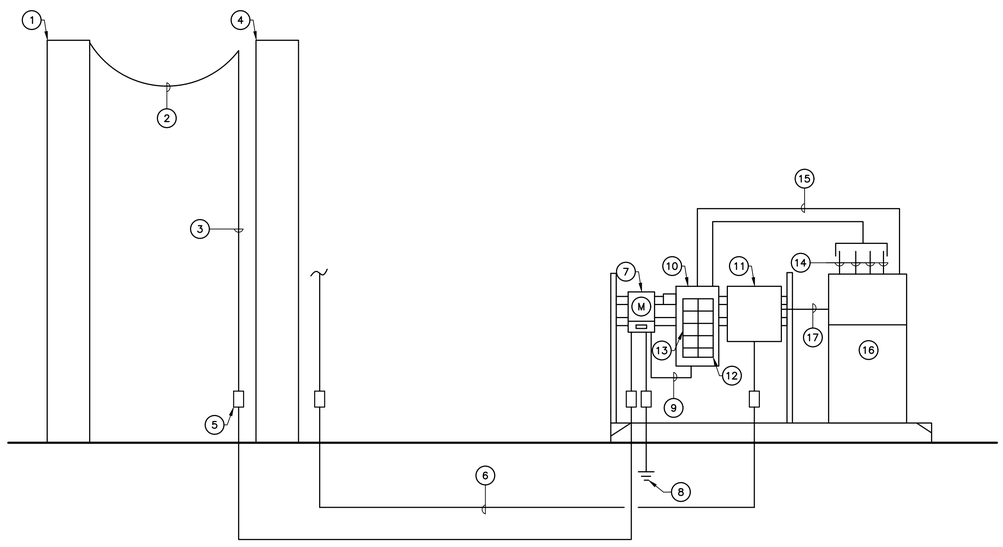
1 E-1 **ELECTRICAL CONDUIT ROUTING PLAN (FROM UTILITY POLE)**
SCALE: NOT TO SCALE



2 E-1 **ELECTRICAL CONDUIT ROUTING PLAN (EQUIPMENT)**
SCALE: NOT TO SCALE

RISER DIAGRAM NOTES

1. EXISTING UTILITY POLE #9427 TO BE USED.
2. OVERHEAD SECTION OF INCOMING UTILITY CONDUCTORS.
3. 3" CONDUIT WITH INCOMING SERVICE CONDUCTORS. COORDINATE ALL EQUIPMENT WITH UTILITY COMPANY.PROVIDE ALL COUPLINGS, ADAPTERS, SWEEPS, AND ASSOCIATED HARDWARE. MATERIAL SHALL BE PER UTILITY COMPANY SPECIFICATIONS
4. EXISTING UTILITY POLE #9427S.
5. EXPANSION COUPLING, TYPICAL.
6. 4" CONDUIT WITH PULL ROPES FOR TELCO CONDUCTORS. PROVIDE ALL COUPLINGS, ADAPTERS, SWEEPS, AND ASSOCIATED HARDWARE. MATERIAL SHALL BE PER TELEPHONE COMPANY SPECIFICATIONS.
7. 200A RATED, 240V, SINGLE PHASE, 3 WIRE UTILITY METER AND ASSOCIATED 200A/2P CIRCUIT BREAKER TO SERVE DISH WIRELESS. ALL EQUIPMENT MUST BE UTILITY COMPANY APPROVED.
8. #2 AWG MAIN SERVICE GROUNDING CONDUCTOR IN A 3/4" PVC CONDUIT. BOND TO GROUNDING TRIAD
9. (3) 3/0 AWG, (1) #6 AWG GROUND, 2" CONDUIT.
10. NEW 200A, 120/240V, SINGLE PHASE PPC CABINET.
11. 3 x 3 x 1 NEMA 3R HOFFMAN BOX
12. (4) 30A/2P CIRCUIT BREAKER TO SERVE NEW DISH WIRELESS EQUIPMENT.
13. (1) 20A/1P CIRCUIT BREAKER TO SERVE NEW DISH WIRELESS EQUIPMENT.
14. (4) SETS OF (3) #10 AWG, (1) #10 AWG GROUND. 3/4" CONDUIT.
15. (2) #12 AWG, (1) #12 AWG GROUND. 3/4" CONDUIT.
16. NEW DISH WIRELESS EQUIPMENT CABINET.
17. TELCO CONDUIT FOR CABINET CONNECTION PER MANUFACTURER REQUIREMENTS.



3 E-1 **ELECTRICAL RISER DIAGRAM**
SCALE: NOT TO SCALE

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ELECTRICAL RISER DIAGRAM AND CONDUIT ROUTING

E-1

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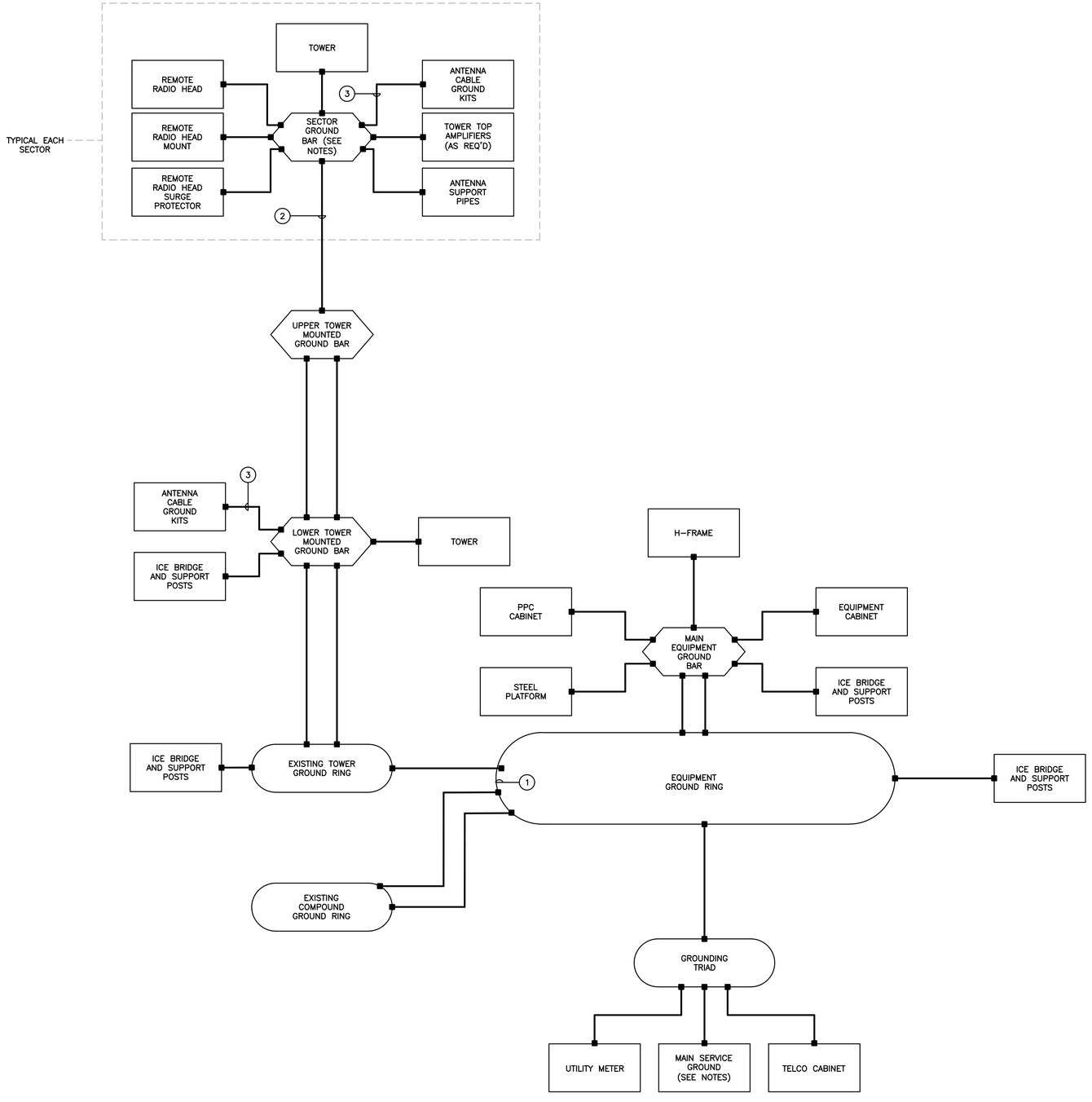

1 E-2 **ELECTRICAL SCHEMATIC DIAGRAM**

SCALE: NOT TO SCALE

GROUNDING SCHEMATIC NOTES

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

GENERAL NOTES:

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

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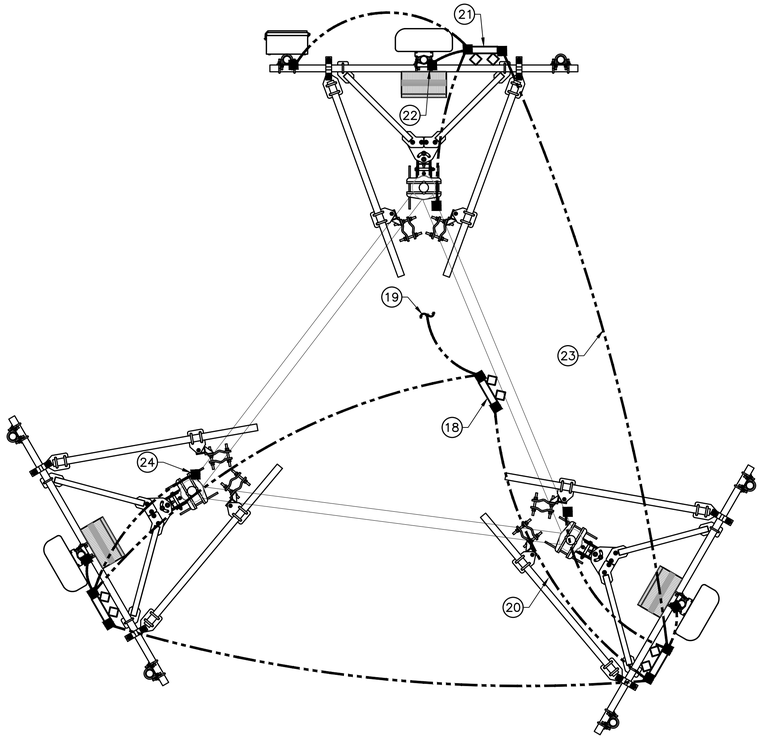
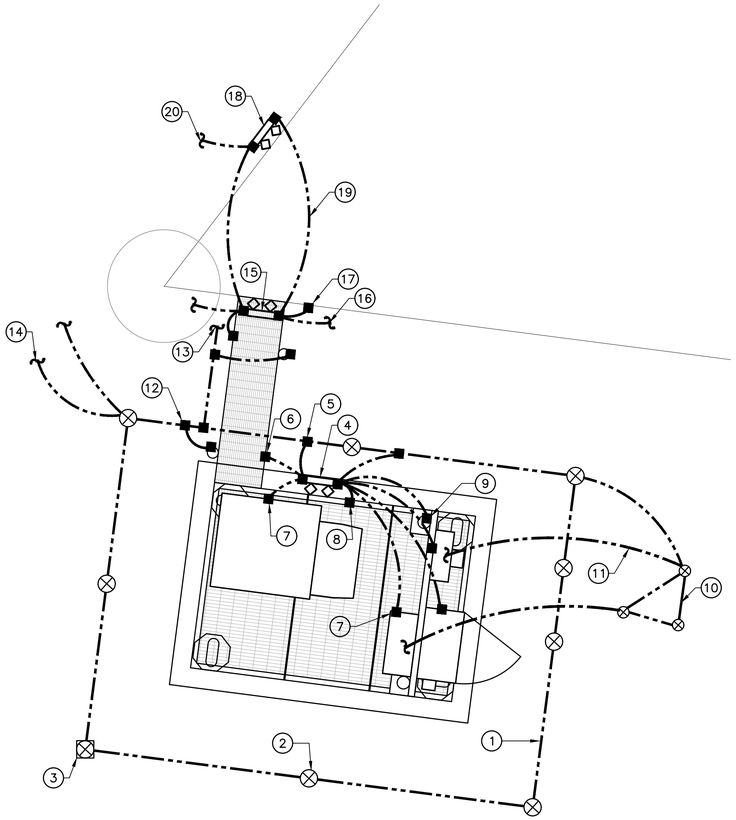
ELECTRICAL SCHEMATIC DIAGRAM

E-2

Sheet No. 8 of 14



1 E-3 **ELECTRICAL GROUNDING PLAN - ANTENNA**
SCALE: NOT TO SCALE



2 E-3 **ELECTRICAL GROUNDING PLAN - EQUIPMENT**
SCALE: NOT TO SCALE

GROUNDING PLAN NOTES

1. #2 SOLID TINNED BCW GROUND RING (2'-0" FROM OUTSIDE EDGE OF EQUIPMENT SHELTER FOUNDATION WHEN ROUTED ALONG SHELTER PERIMETER.) (TYP.).
2. GROUNDING ROD (TYP.).
3. GROUNDING ROD WITH ACCESS (TYP.).
4. MAIN EQUIPMENT GROUND BAR.
5. BOND GROUND BAR TO EQUIPMENT GROUND RING TYP. 2 PLACES.
6. BOND GROUND BAR TO ICE BRIDGE
7. BOND EQUIPMENT TO GROUND BAR TYP.
8. BOND GROUND BAR TO EQUIPMENT PLATFORM.
9. BOND H-FRAME TO GROUND BAR.
10. GROUNDING TRIAD. BOND TO GROUND RING.
11. #2 AWG. MAIN SERVICE GROUNDING ELECTRODE CONDUCTOR.
12. ICE BRIDGE POST AND COVER. BOND EACH SECTION AND SUPPORT TO GROUND RING.
13. CONNECT EQUIPMENT GROUND RING TO EXISTING TOWER GROUND RING. TYP.
14. CONNECT EQUIPMENT GROUND RING TO EXISTING COMPOUND GROUND RING TYP. OF 2 PLACES
15. LOWER TOWER MOUNTED GROUND BAR.
16. BOND GROUND BAR TO TOWER GROUND RING TYP. 2 PLACES.
17. BOND LOWER TOWER MOUNTED GROUND BAR TO TOWER STEEL.
18. UPPER TOWER MOUNTED GROUND BAR.
19. BOND UPPER TOWER MOUNTED GROUND BAR TO LOWER TOWER MOUNTED GROUND BAR TYP. 2 LEADS
20. BOND UPPER TOWER MOUNTED GROUND BAR TO SECTOR GROUND BAR.
21. SECTOR GROUND BARS TYP.
22. BOND ANTENNA MOUNTING PIPES TO SECTOR GROUND BAR.
23. ALL SECTOR GROUND BARS SHALL BE BONDED TOGETHER WITH #2 AWG SOLID TINNED BCW.
24. BOND SECTOR GROUND BARS TO TOWER STEEL TYP.

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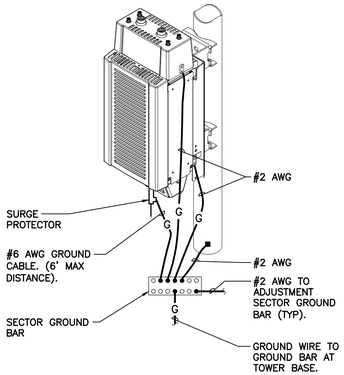
ELECTRICAL GROUNDING PLANS

E-3

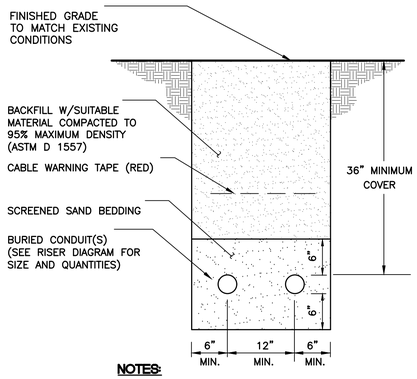
Sheet No. 9 of 14

EACH RRH CABINET SHALL BE GROUNDED IN THE FOLLOWING MANNER:

1. AT TOP OF THE CABINET
2. AT RIGHT SIDE OF THE CABINET.



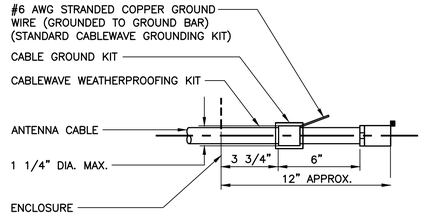
1 / E-4 **RRH POLE MOUNT GROUNDING**
SCALE: NOT TO SCALE



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.

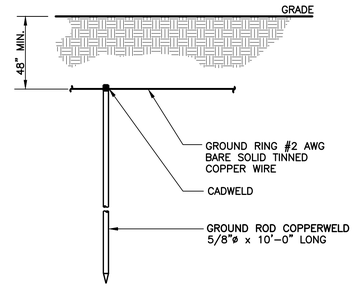
2 / E-4 **TYPICAL ELECTRICAL TRENCH DETAIL**
SCALE: NOT TO SCALE



NOTES:

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

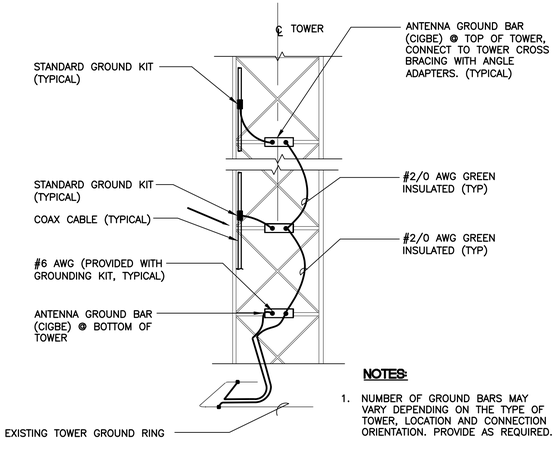
3 / E-4 **ANTENNA CABLE GROUNDING DETAIL**
SCALE: NOT TO SCALE



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.

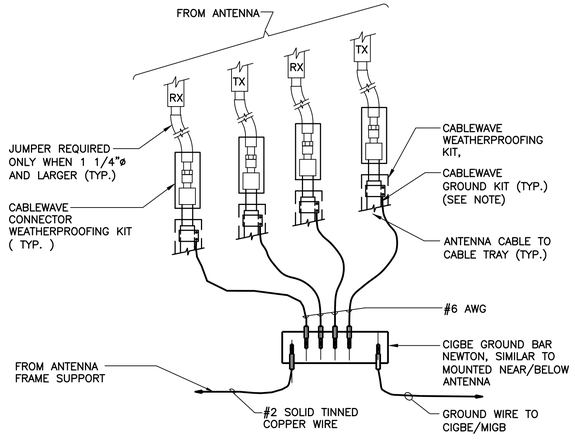
4 / E-4 **GROUND ROD DETAIL**
SCALE: NOT TO SCALE



NOTES:

1. NUMBER OF GROUND BARS MAY VARY DEPENDING ON THE TYPE OF TOWER, LOCATION AND CONNECTION ORIENTATION. PROVIDE AS REQUIRED.

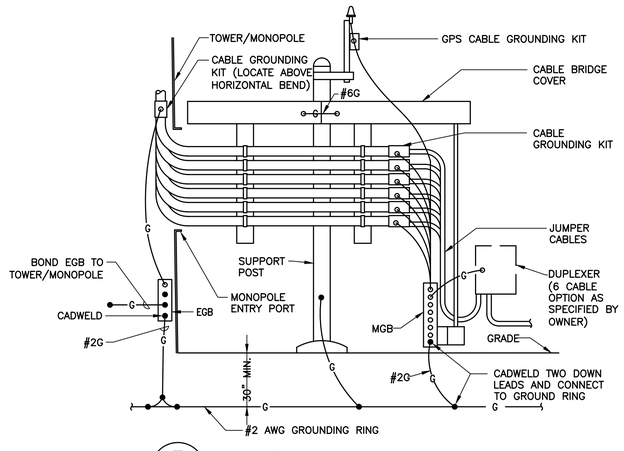
5 / E-4 **ANTENNA CABLE GROUNDING - LATTICE TOWER**
SCALE: NOT TO SCALE



NOTES:

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

6 / E-4 **CONNECTION OF GROUND WIRES TO GROUND BAR**
SCALE: NOT TO SCALE



7 / E-4 **CABLE BRIDGE GROUNDING DIAGRAM**
SCALE: NOT TO SCALE

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TYPICAL GROUNDING DETAILS

E-4

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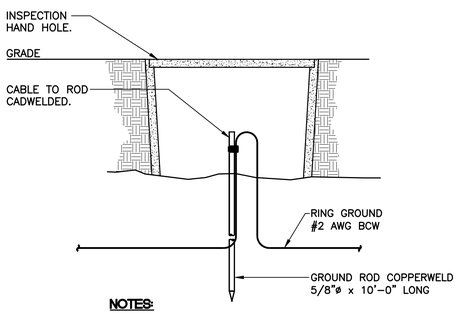
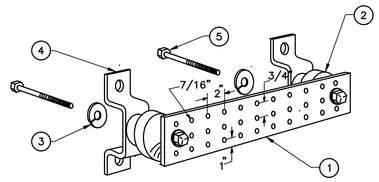


NOTES:

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

1 E-5 GROUND ROD WITH ACCESS DETAIL

SCALE: NOT TO SCALE

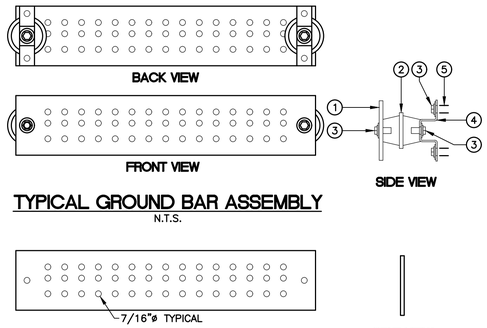


NOTES

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.

2 E-5 GROUND BAR DETAIL

SCALE: NOT TO SCALE



TYPICAL GROUND BAR ASSEMBLY

N.T.S.

TYPICAL GROUND BAR - DIMENSIONS

N.T.S.

BRACKET FOR GROUND BAR-DIMENSIONS

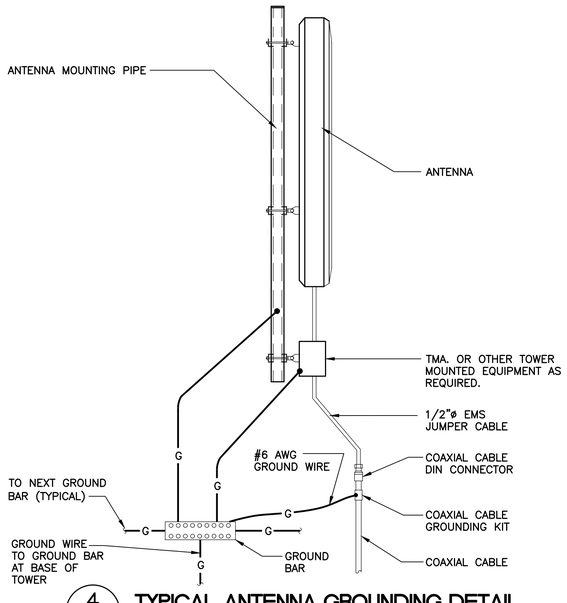
N.T.S.

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.

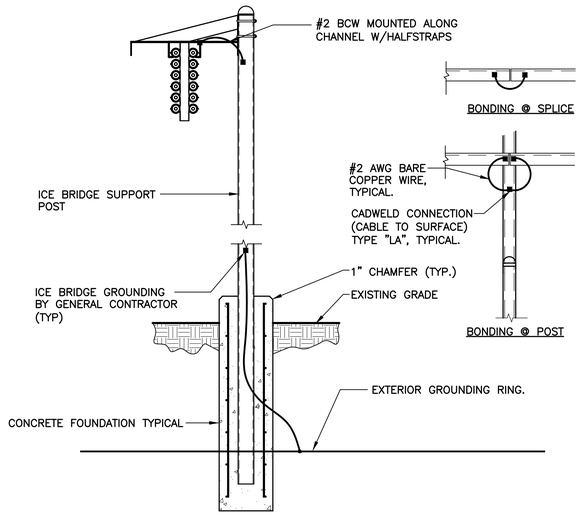
3 E-5 MASTER/EQUIPMENT GROUND BAR DETAILS

SCALE: NOT TO SCALE



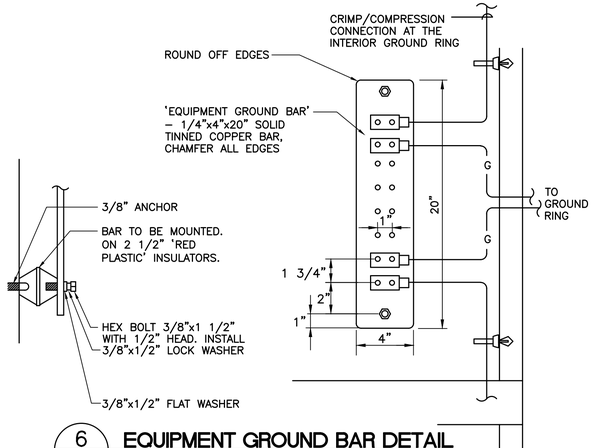
4 E-5 TYPICAL ANTENNA GROUNDING DETAIL

SCALE: NOT TO SCALE



5 E-5 ICE BRIDGE BONDING DETAIL

SCALE: NOT TO SCALE



6 E-5 EQUIPMENT GROUND BAR DETAIL

SCALE: NOT TO SCALE

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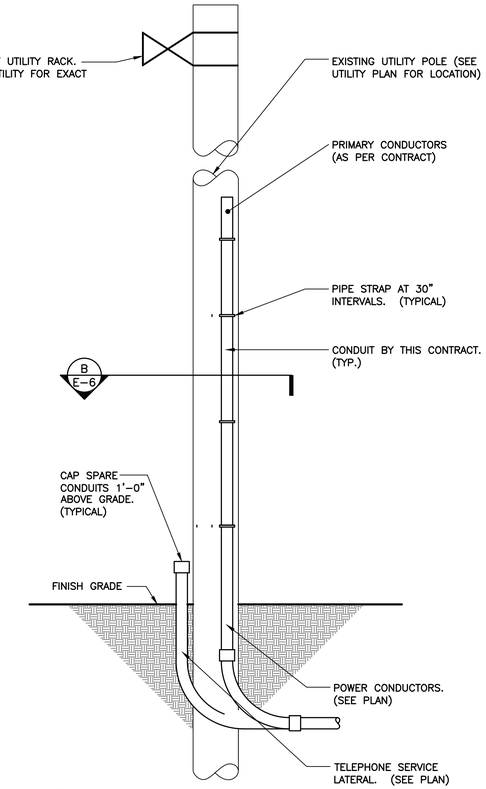
TYPICAL ELECTRICAL DETAILS

E-5

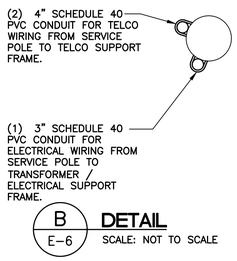
Sheet No. 11 of 14

SERVICE RISER NOTES:

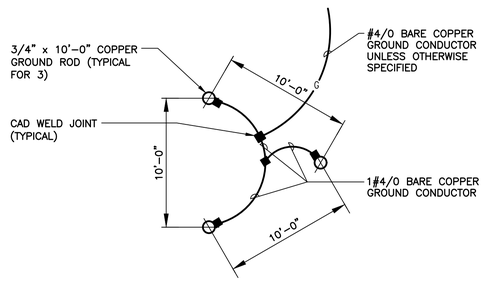
1. THE LOCATION SHOWN FOR THE CONNECTION TO UTILITIES, AND INCOMING POWER AND TELEPHONE SERVICES IS FOR CONCEPT ONLY. THE CONTRACTOR SHALL COORDINATE THE ACTUAL LOCATION WITH LOCAL TELEPHONE COMPANY, THE OWNER AND LOCAL ELECTRIC UTILITY COMPANY.
2. CONTRACTOR IS RESPONSIBLE FOR MAKING ARRANGEMENTS WITH LOCAL UTILITY COMPANY AND LOCAL TELEPHONE COMPANY FOR A TIMELY INSTALLATION OF THE INCOMING POWER AND TELEPHONE SERVICE. CONTRACTOR WILL OBTAIN AN ELECTRIC SERVICE ORDER (ESO) FOR THE SITE FROM LOCAL UTILITY COMPANY AND LOCAL TELEPHONE COMPANY PRIOR TO CONSTRUCTION.
3. THE INCOMING ELECTRIC SERVICE WILL BE INSPECTED BY THE AUTHORITY HAVING JURISDICTION AND A CERTIFICATE OF SUCH INSPECTION SHALL BE FURNISHED TO THE OWNER AND A COPY FORWARDED TO LOCAL UTILITY COMPANY.
4. FOR INCOMING UNDERGROUND TELEPHONE SERVICE, THE CONTRACTOR SHALL INSTALL CONDUIT AND PULL WIRES BETWEEN THE RISER POLE AND THE TELCO SERVICE CABINET. THE CONTRACTOR SHALL PROVIDE PRE CAST PULL–BOXES INCLUSIVE OF THE PRE CAST COVERS OF THE TYPE AND AS REQUIRED BY LOCAL TELEPHONE COMPANY THE MAXIMUM DISTANCE BETWEEN PULL–BOXES CAN NOT EXCEED 750' (CONTRACTOR TO CONFIRM WITH LOCAL UTILITY). AT THE PROPOSED RISER POLE EXTEND THE TELEPHONE CONDUIT UP THE POLE APPROXIMATELY 8' AND SEAL.
5. THE CONTRACTOR SHALL COORDINATE THE METER REQUIREMENTS WITH LOCAL UTILITY COMPANY.
6. THE INCOMING ELECTRICAL SERVICE SHALL BE INSTALLED IN CONFORMANCE WITH LOCAL UTILITY COMPANY STANDARDS (LATEST EDITION).
7. THIS SITE MAY CONTAIN CRITICAL UNDERGROUND ELECTRIC AND TELEPHONE SERVICES IN THE VICINITY OF THE NEW UNDERGROUND SERVICE AND THE EQUIPMENT SUPPORTS. THE CONTRACTOR SHALL TAKE ALL NECESSARY PRECAUTIONS TO AVOID DISRUPTION OF THESE EXISTING FACILITIES. THE CONTRACTOR SHALL ALSO CONTACT LOCAL UTILITY COMPANY AND LOCAL TELEPHONE COMPANY AND ALL THE APPROPRIATE AGENCIES PRIOR TO EXCAVATION AT THIS SITE.



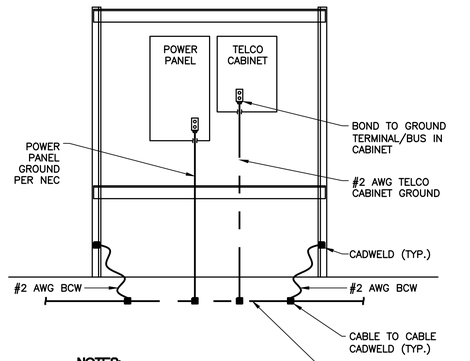
1 E–6 **INCOMING SERVICE POLE RISER**
SCALE: NOT TO SCALE



B E–6 **DETAIL**
SCALE: NOT TO SCALE



2 E–6 **GROUND TRIAD DETAIL**
SCALE: NOT TO SCALE



NOTES:

1. THE #2 AWG, BCW, FROM THE GROUND RING SHALL BE CADWELDED TO EACH POST, ABOVE GRADE.

3 E–6 **UTILITY FRAME GROUNDING DETAIL**
SCALE: NOT TO SCALE

REV.	DATE	DRAWN BY	CHK'D BY	DESCRIPTION
1	10/12/22	RYS	TJR	CONSTRUCTION DRAWINGS – UPDATED BUILDING CODES
0	10/10/22	JLD	TJR	CONSTRUCTION DRAWINGS – ISSUED FOR CONSTRUCTION

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DISH WIRELESS, LLC

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SITE NAME: CHAPEL HILL
44 CHAPEL HILL RD
OAKDALE, CT 06370

DATE:	04/06/22
SCALE:	AS NOTED
JOB NO.	22042.01

TYPICAL ELECTRICAL DETAILS

E-6

Sheet No. 12 of 14

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. INSTALL 200A, 240/120V, 1P, 3 WIRE ELECTRIC SERVICE WITH REVENUE METER AND 200A MAIN CIRCUIT BREAKER FOR OWNER AND ASSOCIATED DISTRIBUTION EQUIPMENT. (AS REQUIRED BY UTILITY CO.)
2. NEW SITE TELEPHONE SERVICE AS SPECIFIED BY TELEPHONE COMPANY.
3. FEEDERS AND BRANCH CIRCUIT WIRING TO PANELS, RECEPTACLES, EQUIPMENT, ETC. AS INDICATED OR NOTED ON PLANS.
4. CELLULAR GROUNDING SYSTEMS, CONSISTING OF ANTENNA GROUNDING, INTERIOR GROUNDING RING, GROUND BARS, ETC.
5. FURNISH AND INSTALL 3/4" PLYWOOD BACKBOARD OF SIZE INDICATED ON DRAWINGS FOR MOUNTING OF POWER/SERVICE EQUIPMENT AND TELEPHONE/ALARM EQUIPMENT. BACKBOARDS SHALL BE PAINTED WITH TWO (2) COATS OF SEMI-GLOSS GRAY FIRE RETARDANT PAINT.
6. 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.

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:

LINE	120/208/240V COLOR	277/480V 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.

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 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 250–122.
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 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.

REV.	DATE	DRAWN BY	CHK'D BY	DESCRIPTION
0	10/10/22	JLD	TJR	CONSTRUCTION DRAWINGS – ISSUED FOR CONSTRUCTION
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DISH WIRELESS, LLC

SITE NUMBER: BOBOSOO069B
SITE NAME: CHAPEL HILL
414 CHAPEL HILL RD
OAKDALE, CT 06370

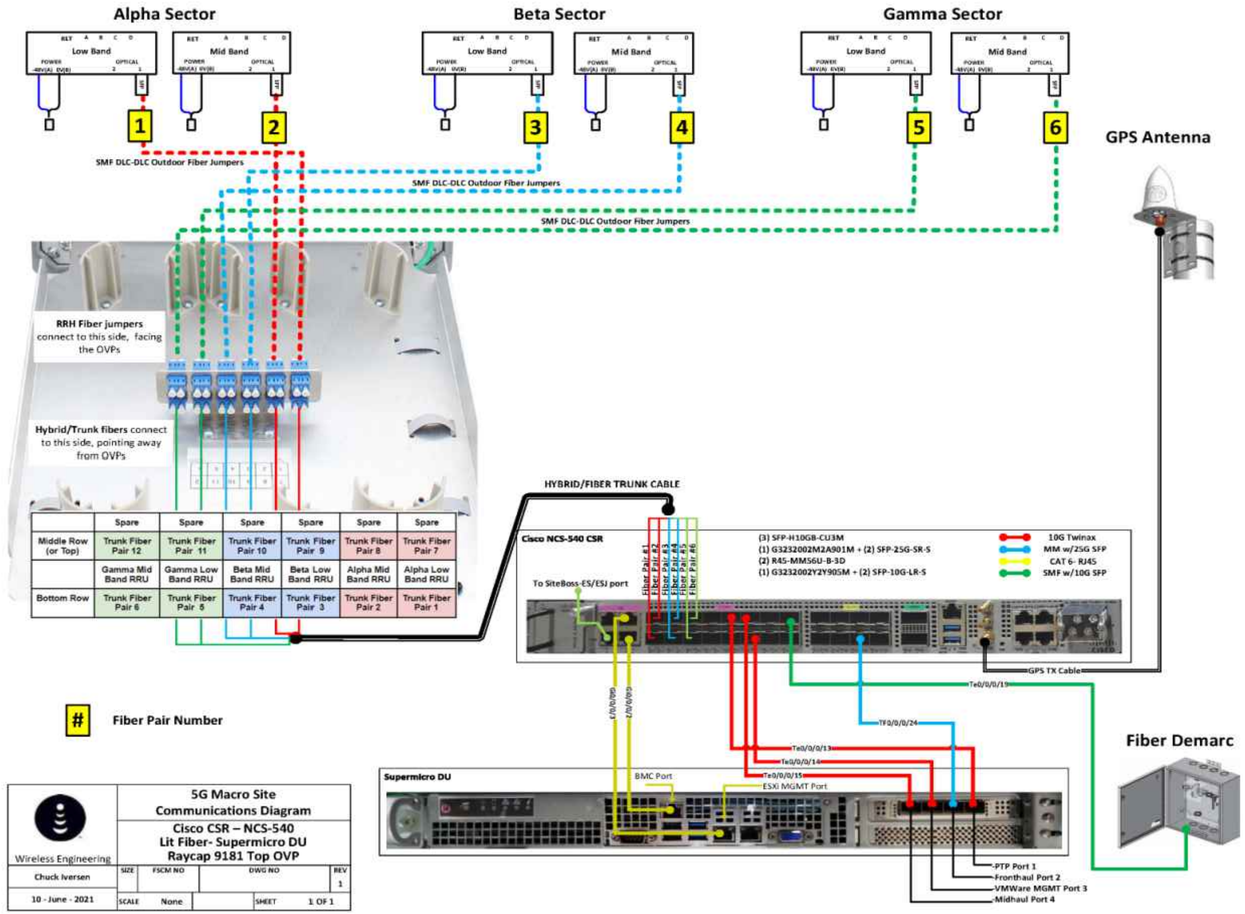
DATE: 04/06/22
SCALE: AS NOTED
JOB NO. 22042.01

ELECTRICAL SPECIFICATIONS

E-7

Sheet No. 13 of 14

PLUMBING DIAGRAM



	Spare	Spare	Spare	Spare	Spare	Spare
Middle Row (or Top)	Trunk Fiber Pair 12	Trunk Fiber Pair 11	Trunk Fiber Pair 10	Trunk Fiber Pair 9	Trunk Fiber Pair 8	Trunk Fiber Pair 7
	Gamma Mid Band RRU	Gamma Low Band RRU	Beta Mid Band RRU	Beta Low Band RRU	Alpha Mid Band RRU	Alpha Low Band RRU
Bottom Row	Trunk Fiber Pair 6	Trunk Fiber Pair 5	Trunk Fiber Pair 4	Trunk Fiber Pair 3	Trunk Fiber Pair 2	Trunk Fiber Pair 1

Wireless Engineering	5G Macro Site Communications Diagram Cisco CSR – NCS-540 Lit Fiber- Supermicro DU Raycap 9181 Top OVP		
Chuck Iversen	SIZE	FSCM NO	DWG NO / REV 1
10 - June - 2021	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

	ALPHA RRH				BETA RRH				GAMMA RRH			
	Port 1 + slant	Port 2 - slant	Port 3 + slant	Port 4 - slant	Port 1 + slant	Port 2 - slant	Port 3 + slant	Port 4 - slant	Port 1 + slant	Port 2 - slant	Port 3 + slant	Port 4 - slant
Low-Band RRH - (600MHz N71 baseband) + (850MHz N26 band) + (700MHz N29 band) - optional per market	RED	RED	RED	RED	BLUE	BLUE	BLUE	BLUE	GREEN	GREEN	GREEN	GREEN
Add Frequency Color to Sector Band (CBRS will use Yellow bands)	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)	RED	RED	RED	RED	BLUE	BLUE	BLUE	BLUE	GREEN	GREEN	GREEN	GREEN
Add Frequency Color to Sector Band (CBRS will use Yellow bands)	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

	Example 1	Example 2 (3rd Tech added)	Example 3 COAX#1 (Alpha)	(canister) COAX #2 (Alpha)
Include sector bands being supported along with frequency bands	RED	RED	RED	RED
	BLUE	BLUE		RED
Example 1 - Hybrid, or discreet, supports all sectors, both low-bands and mid-bands	GREEN	GREEN		
Example 2 - Hybrid, or discreet, supports CBRS only, all sectors	ORANGE	YELLOW		
	PURPLE			
Example 3 - Main Coax with ground mounted RRUs				

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

REV.	DATE	DRAWN BY	CHK'D BY	DESCRIPTION
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dish wireless

CENTEK engineering
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DISH WIRELESS, LLC

SITE NUMBER: BOBOSOOO69B
SITE NAME: CHAPEL HILL
414 CHAPEL HILL RD
OAKDALE, CT 06370

DATE: 04/06/22
SCALE: AS NOTED
JOB NO. 22042.01

RF COLOR CODING AND PLUMBING DIAGRAM

RF-1

Sheet No. 14 of 14

Exhibit D

Structural Analysis Report

CENTEK engineering

Centered on Solutions℠

Structural Analysis Report

180-ft Existing ROHN SSV Lattice Tower

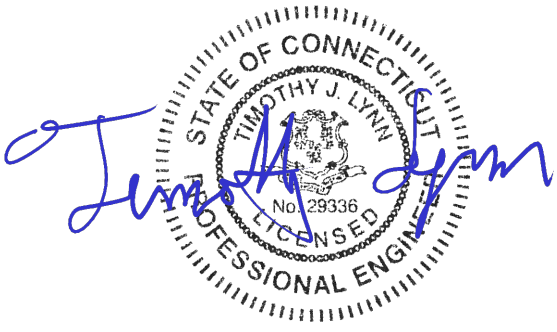
Proposed Dish
Antenna Installation

Dish Site #: BOBOS00069B

414 Chapel Hill Road
Montville, CT

Centek Project No. 22042.01

~~Date: April 18, 2022~~
Rev 1: October 12, 2022



Max Stress Ratio = 49%

Prepared for:

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

Table of Contents

Introduction

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

The host tower is a 180-ft, three legged, lattice tower originally manufactured by ROHN eng. file no. 0604135, 58213EH dated October 29, 2007. The tower geometry, structure member sizes and foundation information were taken from the aforementioned design documents.

Antenna and appurtenance inventory were obtained from a previous structural analysis prepared by Black and Veatch project no. 403039 dated August 17, 2020 and a Dish RF Sheet.

The tower consists of nine (9) tapered vertical sections consisting of steel pipe legs conforming to ASTM A572 Gr. 50 and lateral bracing conforming to ASTM A572 Gr. 50 and ASTM A36. The vertical tower sections are connected by bolted flange plates with the diagonal and horizontal bracing to pipe legs consisting of bolted connections. The width of the tower face is 6-ft 8-in at the top and 23-ft 2-in at the bottom.

Antenna and Appurtenance Summary

- Eversource (Existing):
  Antenna: One (1) RFS 1142-2CN Omni-directional whip antenna mounted on a 4-ft side arm with an elevation of ±178-ft above grade level.
  Coax Cable: One (1) 7/8" ∅ coax cable running on a leg/face of the existing tower as specified in Section 3 of this report.
- Eversource (Existing):
  Antenna: One (1) RFS 220-3AN Omni-directional whip antenna mounted on a 3-ft side arm with an elevation of ±178-ft above grade level.
  Coax Cable: One (1) 7/8" ∅ coax cable running on a leg/face of the existing tower as specified in Section 3 of this report.
- Eversource (Existing):
  Antenna: One (1) dbspectra DS2C00F36D-D antenna leg mounted with an elevation of ±177-ft above grade level.
  Coax Cable: Two (2) 7/8" ∅ coax cable running on a leg/face of the existing tower as specified in Section 3 of this report.
- Town (Existing):
  Antenna: One (1) 3-ft Omni-directional whip antenna mounted on a 6-ft side arm with an elevation of ±164-ft above grade level.
  Coax Cable: One (1) 7/8" ∅ coax cable running on a leg/face of the existing tower as specified in Section 3 of this report.
- Eversource (Existing):
  Antenna: One (1) 6-ft ∅ dish leg mounted with an elevation of ±170-ft above grade level.
  Coax Cable: One (1) E-65 cable running on a leg/face of the existing tower as specified in Section 3 of this report.

- Eversource (Existing):
  Antenna: One (1) 13-ft dipole antenna mounted on a 6-ft side arm with an elevation of ±168-ft above grade level.
  Coax Cable: One (1) 7/8" ∅ coax cable running on a leg/face of the existing tower as specified in Section 3 of this report.
- Unknown (Existing):
  Antenna: One (1) 6-ft Omni-directional whip antenna mounted on a 2-ft side arm with an elevation of ±163-ft above grade level.
  Coax Cable: One (1) 7/8" ∅ coax cable running on a leg/face of the existing tower as specified in Section 3 of this report.
- Eversource (Existing):
  Antenna: One (1) RFS 1142-2CN Omni-directional whip antenna mounted on a 6-ft side arm with an elevation of ±152-ft above grade level.
  Coax Cable: One (1) 7/8" ∅ coax cable running on a leg/face of the existing tower as specified in Section 3 of this report.
- Eversource (Existing):
  Antenna: One (1) 8-ft ∅ dish leg mounted with an elevation of ±148-ft above grade level.
  Coax Cable: One (1) E-65 cable running on a leg/face of the existing tower as specified in Section 3 of this report.
- Town (Existing):
  Antenna: One (1) 13-ft dipole antenna mounted on a 6-ft side arm with an elevation of ±144-ft above grade level.
  Coax Cable: One (1) 7/8" ∅ coax cable running on a leg/face of the existing tower as specified in Section 3 of this report.
- Town (Existing):
  Antenna: One (1) 13-ft dipole antenna mounted on a 6-ft side arm with an elevation of ±136-ft above grade level.
  Coax Cable: One (1) 7/8" ∅ coax cable running on a leg/face of the existing tower as specified in Section 3 of this report.
- Eversource (Existing):
  Antenna: One (1) 13-ft dipole antenna mounted on a 6-ft side arm with an elevation of ±132-ft above grade level.
  Coax Cable: One (1) 7/8" ∅ coax cable running on a leg/face of the existing tower as specified in Section 3 of this report.
- Dominion (Existing):
  Antenna: One (1) Comtelco BNF800S-06 Omni-directional whip antenna mounted on a 3-ft side arm with an elevation of ±129-ft above grade level.
  Coax Cable: One (1) 7/8" ∅ coax cable running on a leg/face of the existing tower as specified in Section 3 of this report.
- Town (Existing):
  Antenna: One (1) 15-ft dipole antenna mounted on a 3-ft side arm with an elevation of ±103-ft above grade level.
  Coax Cable: One (1) 7/8" ∅ coax cable running on a leg/face of the existing tower as specified in Section 3 of this report.

- Town (Existing):
  Antenna: One (1) 15-ft dipole antenna mounted on a 3-ft side arm with an elevation of ±103-ft above grade level.
  Coax Cable: One (1) 7/8" ∅ coax cable running on a leg/face of the existing tower as specified in Section 3 of this report.
- Eversource (Existing):
  Antenna: One (1) RFS 220-3AN Omni-directional whip antenna mounted on a 6-ft side arm with an elevation of ±84-ft above grade level.
  Coax Cable: One (1) 7/8" ∅ coax cable running on a leg/face of the existing tower as specified in Section 3 of this report.
- Town (Existing):
  Antenna: One (1) 10-ft dipole antenna mounted on a 6-ft side arm with an elevation of ±84-ft above grade level.
  Coax Cable: One (1) 7/8" ∅ coax cable running on a leg/face of the existing tower as specified in Section 3 of this report.
- Town (Existing):
  Antenna: One (1) 2-ft ∅ dish leg mounted with an elevation of ±83-ft above grade level.
  Coax Cable: One (1) EW90 cable running on a leg/face of the existing tower as specified in Section 3 of this report.
- Dominion (Existing):
  Antenna: One (1) Comtelco BNF800S-06 Omni-directional whip antenna mounted on a 3-ft side arm with an elevation of ±65-ft above grade level.
  Coax Cable: One (1) 7/8" ∅ coax cable running on a leg/face of the existing tower as specified in Section 3 of this report.
- **Dish (Proposed):**
  Antennas: Three (3) JMA MX08FRO665-21 panel antennas, three (3) Fujitsu TA08025-B605 remote radio heads, three (3) Fujitsu TA08025-B604 remote radio heads and and one (1) Raycap surge arrestor mounted on three (3) SitePro V-frames (p/n VFA8-HD) to the tower with a RAD center elevation of ±110-ft above grade level.
  Coax Cables: One (1) hybrid cable running on a face of the existing tower as specified in Section 3 of this report.

Primary Assumptions Used in the Analysis

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

Analysis

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

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

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

Tower Loading

Tower loading was determined by the basic wind speed as applied to projected surface areas with modification factors per TIA-222-H, gravity loads of the tower structure and its components, and the application of 1.00" radial ice on the tower structure and its components.

Load Cases:	Load Case 1; 135 mph (Ultimate) wind speed w/ no ice plus gravity load – used in calculation of tower stresses and rotation.	*[Appendix P of the 2022 CT Building Code]*
	Load Case 2; 50 mph wind speed w/ 1.00" radial ice plus gravity load – used in calculation of tower stresses.	*[Annex B of TIA-222-H]*
	Load Case 3; 105 mph (Nominal) wind speed used for deflection calculation.	

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

Tower Capacity

- Calculated stresses were found to be within allowable limits.

Tower Section	Elevation	Stress Ratio (percentage of capacity)	Result
Leg (T9)	0'-0"-20'-0"	29.5%	**PASS**
Diagonal (T9)	0'-0"-20'-0"	48.5%	**PASS**
Top Girt (T2)	140'-0"-160'-0"	11.3%	**PASS**

- The tower combined deflection is **0.1838 degrees**.

Deflection Criteria	Proposed (degrees)	Allowable (degrees)	Result
Sway (Tilt)	0.1810	0.5	**PASS**
Twist	0.0318	0.5	**PASS**
Combined	0.1838	0.5	**PASS**

Note 1: *Tower deflection calculated utilizing the service wind load combination and nominal wind speed of 112 mph.*

Foundation and Anchors

The existing foundation consists of three (3) 4-ft ∅ x 3.5-ft long reinforced concrete piers on a 33-ft square x 2.5-ft thick reinforced concrete pad bearing directly on existing sub grade. The sub-grade conditions used in the analysis of the existing foundation were obtained from a geotechnical report prepared by Dr. Clarence Welti dated May 31, 2007. Tower legs are connected to the foundation by means of (12) 1"∅, ASTM A1554 Gr. 105 anchor bolts per leg, embedded into the concrete foundation structure.

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

Load Effect	Proposed Tower Reactions
Leg Shear	24 kips
Leg Compression	203 kips
Leg Tension	161 kips
Base Moment	3739 ft-kips
Base Shear	39 kips

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

Tower Section	Component	Stress Ratio (percentage of capacity)	Result
Anchor Bolts	Combined Tension and Shear	23.2%	**PASS**

- The foundation was found to be within allowable limits.

Foundation	Design Limit	FS Required (1)	Proposed Loading (FS)(1)	Result
Reinforced Concrete Pad and Piers	OM(2)	1.0	3.0	**PASS**

Note 1: FS denotes Factor of Safety
Note 2: OM denotes Overturning Moment.

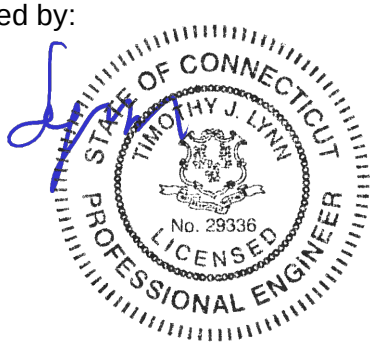
Conclusion

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

The analysis is based, in part, on the information provided to this office by 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 performed, results obtained, and recommendations made are in accordance with generally accepted engineering principles and practices. Centek Engineering, Inc. is not responsible for the conclusions, opinions and recommendations made by others based on the information we supply.

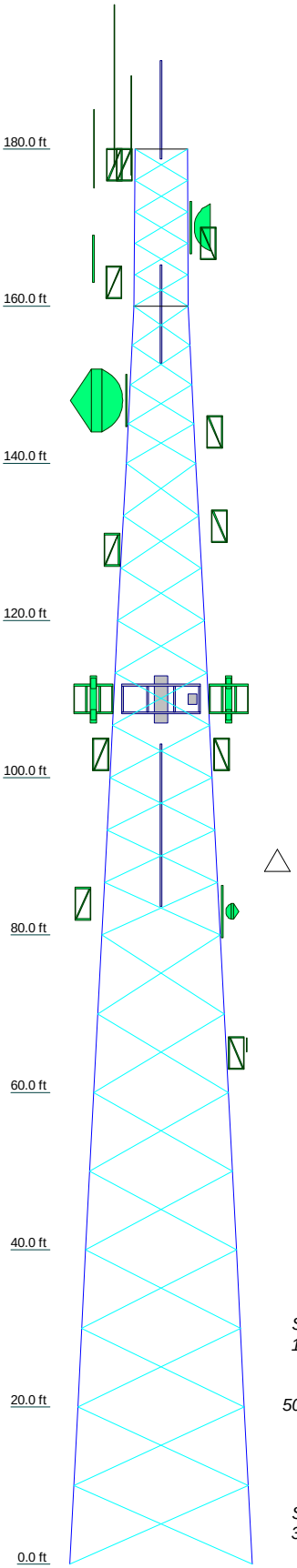
GENERAL DESCRIPTION OF STRUCTURAL ANALYSIS PROGRAM

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

TnxTower Features:

- TnxTower can analyze and design 3- and 4-sided guyed towers, 3- and 4-sided self-supporting towers and either round or tapered ground mounted poles with or without guys.
- The program analyzes towers using the TIA-222-G (2005) standard or any of the previous TIA/EIA standards back to RS-222 (1959). Steel design is checked using the AISC ASD 9th Edition or the AISC LRFD specifications.
- Linear and non-linear (P-delta) analyses can be used in determining displacements and forces in the structure. Wind pressures and forces are automatically calculated.
- Extensive graphics plots include material take-off, shear-moment, leg compression, displacement, twist, feed line, guy anchor and stress plots.
- TnxTower contains unique features such as True Cable behavior, hog rod take-up, foundation stiffness and much more.

Section	Legs	Leg Grade	Diagonals	Diagonal Grade	Top Girts	Face Width (ft)	# Panels @ (ft)	Weight (K)
T1	ROHN 3 STD	A572-50	L1 3/4x1 3/4x3/16	A36	L2x2x1/8	6.6875	5 @ 4	1.0
T2	ROHN 4 EH		L2x2x1/4			6.761	4 @ 5	1.6
T3	ROHN 5 EH		L2 1/2x2 1/2x1/4		N.A.	8.8333	9 @ 6.66667	2.1
T4	ROHN 6 EH		L3x3x1/4	A572-50		10.9167		2.9
T5	ROHN 8 EHS					13.0521		3.4
T6	ROHN 8 EH		L3 1/2x3 1/2x1/4			14.9896	8 @ 10	3.9
T7	ROHN 10 EH		L4x4x5/16			17.1458		5.3
T8						19.1563		5.5
T9						21.1563		5.7
						23.1563		31.4



DESIGNED APPURTENANCE LOADING

TYPE	ELEVATION	TYPE	ELEVATION
3' Whip (Town)	178	MX08FRO665-21 (Dish)	110
ROHN 6-ft Side Arm (Town)	178	MX08FRO665-21 (Dish)	110
1142-2CN (Eversource)	178	MX08FRO665-21 (Dish)	110
ROHN 4-ft Side Arm (Eversource)	178	TA08025-B604 (Dish)	110
220-3AN (Eversource)	178	TA08025-B604 (Dish)	110
ROHN 3-ft Side Arm (Eversource)	178	TA08025-B604 (Dish)	110
DS2C003F36D-D (Eversource)	177	TA08025-B605 (Dish)	110
6'8"x4" Pipe Mount (Eversource)	170	TA08025-B605 (Dish)	110
PAD6-59BC (Eversource)	170	TA08025-B605 (Dish)	110
DB222 (Eversource)	168	RD1DC-9181-PF-48 (Dish)	110
ROHN 6-ft Side Arm (Eversource)	168	SitePro VFA8-HD (Dish)	110
6' x 3" Dia Omni	163	SitePro VFA8-HD (Dish)	110
ROHN 3-ft Side Arm	163	SitePro VFA8-HD (Dish)	110
1142-2CN (Eversource)	152	ROHN 3-ft Side Arm (Town)	103
ROHN 6-ft Side Arm (Eversource)	152	ROHN 3-ft Side Arm (Town)	103
6'8"x4" Pipe Mount (Eversource)	148	DB212-1 (Town)	103
8' Dish (Eversource)	148	DB212-1 (Town)	103
ROHN 6-ft Side Arm (Town)	144	DB222 (Town)	84
DB222 (Town)	144	ROHN 6-ft Side Arm (Town)	84
ROHN 6-ft Side Arm (Town)	136	220-3AN (Eversource)	84
DB222 (Town)	136	ROHN 6-ft Side Arm (Eversource)	84
ROHN 6-ft Side Arm (Eversource)	132	6'8"x4" Pipe Mount (Town)	83
DB222 (Eversource)	132	Andrew 2' w/Radome (Town)	83
BNF800S-06 (Dominion)	129	BNF800S-06 (Dominion)	65
ROHN 3-ft Side Arm (Dominion)	129	ROHN 3-ft Side Arm (Dominion)	65

MATERIAL STRENGTH

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

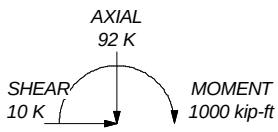
TOWER DESIGN NOTES

1. Tower designed for Exposure B to the TIA-222-H Standard.
2. Tower designed for a 135 mph basic wind in accordance with the TIA-222-H Standard.
3. Tower is also designed for a 50 mph basic wind with 1.00 in ice. Ice is considered to increase in thickness with height.
4. Deflections are based upon a 105 mph wind.
5. Tower Risk Category III.
6. Topographic Category 1 with Crest Height of 0.00 ft
7. TOWER RATING: 48.5%

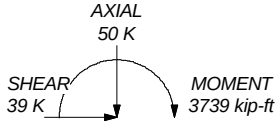
ALL REACTIONS ARE FACTORED

MAX. CORNER REACTIONS AT BASE:
DOWN: 203 K
SHEAR: 24 K

UPLIFT: -161 K
SHEAR: 20 K



TORQUE 20 kip-ft
50 mph WIND - 1.0000 in ICE



TORQUE 42 kip-ft
REACTIONS - 135 mph WIND

Centek Engineering Inc.
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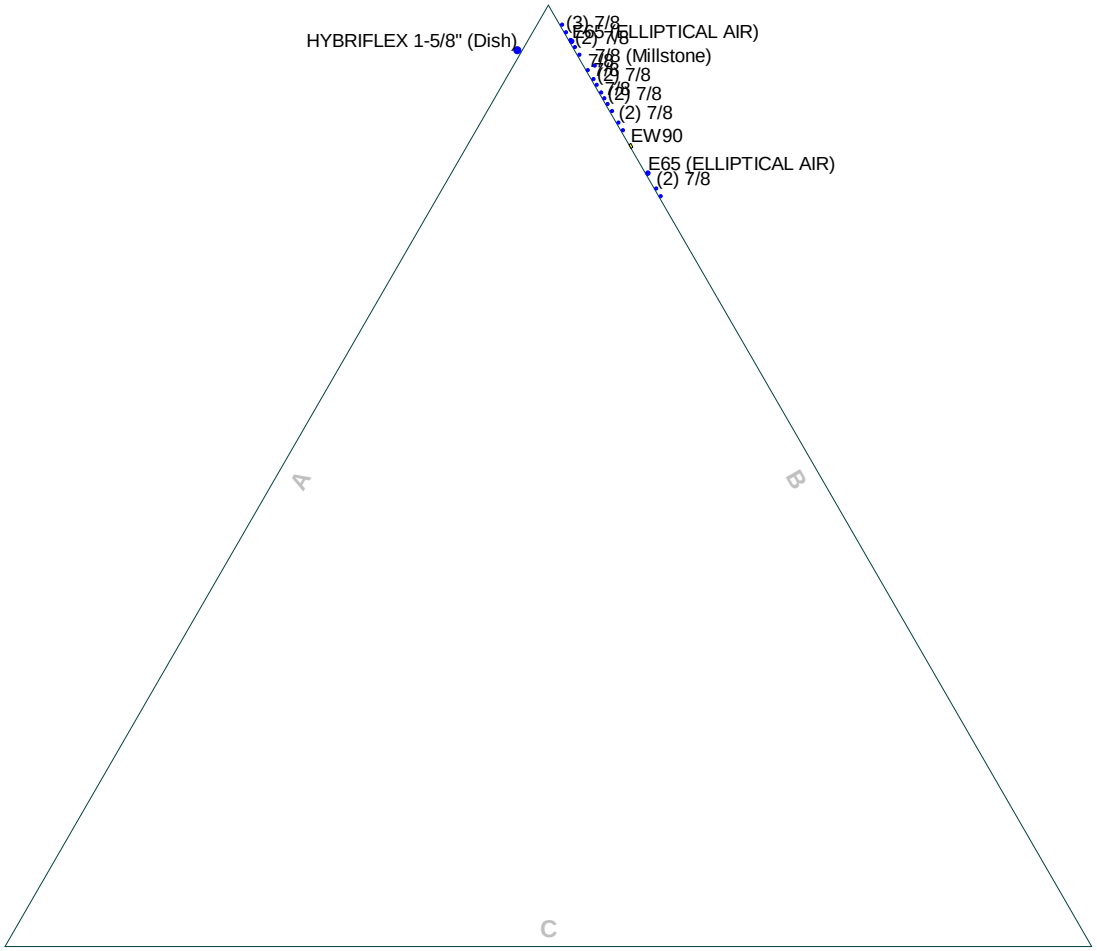
Job: ***22042.01 - BOBOS00069B***		
Project: ***180' Rohn Lattice Tower - 414 Chapel Hill Rd., Montville, CT***		
Client: Dish	Drawn by: TJL	App'd:
Code: TIA-222-H	Date: 10/12/22	Scale: NTS
Path:		Dwg No. E-1

Feed Line Plan

Round Flat App In Face App Out Face



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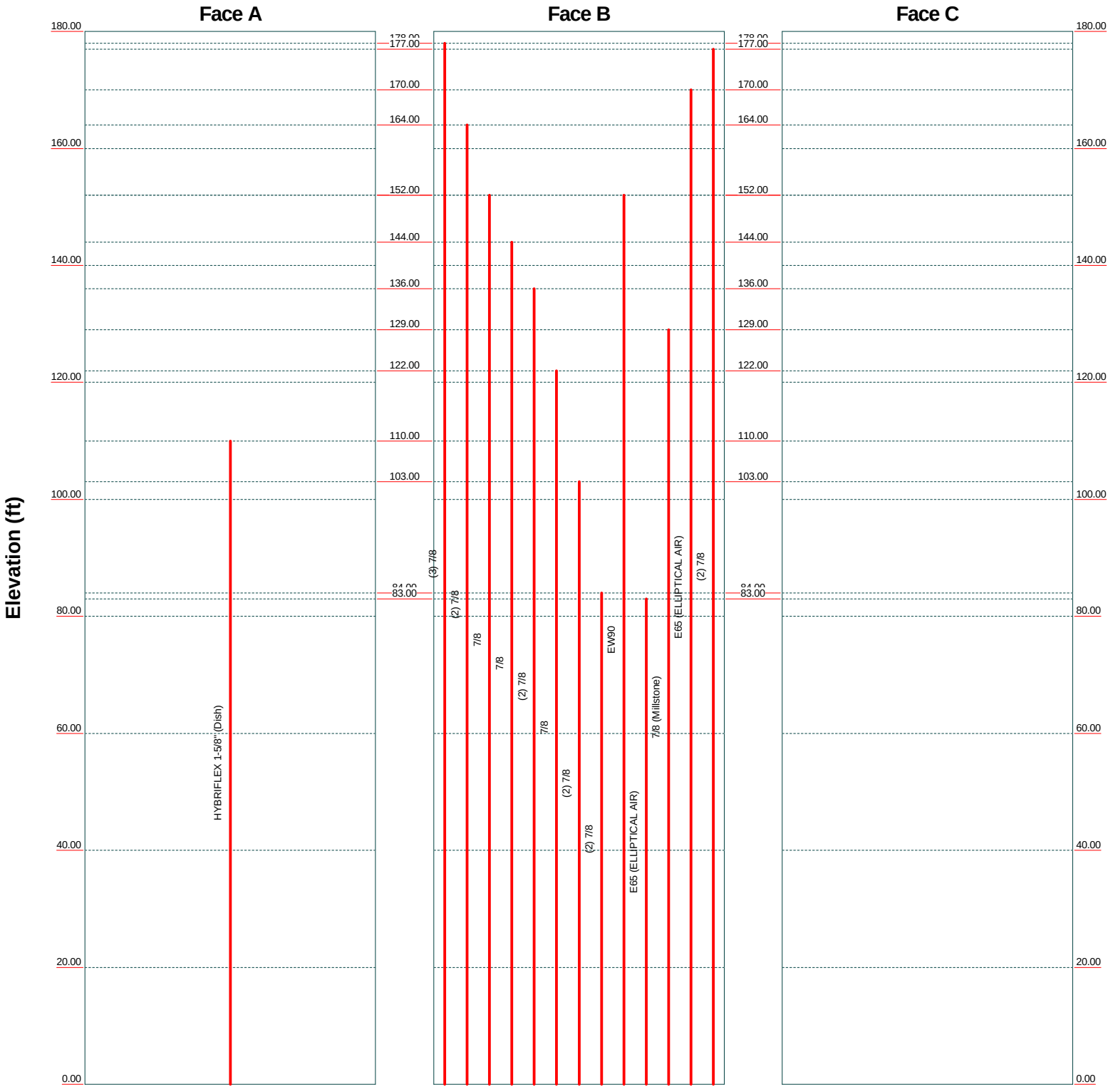
Code: TIA-222-H	Date: 10/12/22	Scale: NTS
Path:		Dwg No. E-7

Feed Line Distribution Chart
0' - 180'

Round | Flat | App In Face | App Out Face | Truss Leg



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Code: TIA-222-H	Date: 10/12/22	Scale: NTS
Path:		Dwg No. E-7

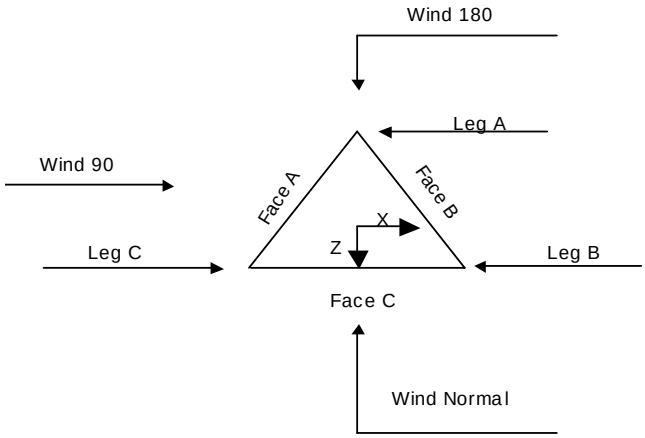
Tower Input Data

The main tower is a 3x free standing tower with an overall height of 180.00 ft above the ground line.
The base of the tower is set at an elevation of 0.00 ft above the ground line.
The face width of the tower is 6.69 ft at the top and 23.16 ft at the base.
This tower is designed using the TIA-222-H standard.
The following design criteria apply:

Tower base elevation above sea level: 0.00 ft.
Basic wind speed of 135 mph.
Risk Category III.
Exposure Category B.
Simplified Topographic Factor Procedure for wind speed-up calculations is used.
Topographic Category: 1.
Crest Height: 0.00 ft.
Nominal ice thickness of 1.0000 in.
Ice thickness is considered to increase with height.
Ice density of 56 pcf.
A wind speed of 50 mph is used in combination with ice.
Temperature drop of 50 °F.
Deflections calculated using a wind speed of 105 mph.
A non-linear (P-delta) analysis was used.
Pressures are calculated at each section.
Stress ratio used in tower member design is 1.
Local bending stresses due to climbing loads, feed line supports, and appurtenance mounts are not considered.

Options

	Consider Moments - Legs		Distribute Leg Loads As Uniform		Use ASCE 10 X-Brace Ly Rules
	Consider Moments - Horizontals		Assume Legs Pinned	√	Calculate Redundant Bracing Forces
	Consider Moments - Diagonals	√	Assume Rigid Index Plate		Ignore Redundant Members in FEA
	Use Moment Magnification	√	Use Clear Spans For Wind Area	√	SR Leg Bolts Resist Compression
√	Use Code Stress Ratios	√	Use Clear Spans For KL/r	√	All Leg Panels Have Same Allowable
√	Use Code Safety Factors - Guys		Retension Guys To Initial Tension		Offset Girt At Foundation
	Escalate Ice		Bypass Mast Stability Checks	√	Consider Feed Line Torque
	Always Use Max Kz	√	Use Azimuth Dish Coefficients		Include Angle Block Shear Check
	Use Special Wind Profile	√	Project Wind Area of Appurt.		Use TIA-222-H Bracing Resist. Exemption
√	Include Bolts In Member Capacity		Autocalc Torque Arm Areas		Use TIA-222-H Tension Splice Exemption
	Leg Bolts Are At Top Of Section		Add IBC .6D+W Combination		Poles
	Secondary Horizontal Braces Leg	√	Sort Capacity Reports By Component		Include Shear-Torsion Interaction
	Use Diamond Inner Bracing (4 Sided)		Triangulate Diamond Inner Bracing		Always Use Sub-Critical Flow
√	SR Members Have Cut Ends		Treat Feed Line Bundles As Cylinder		Use Top Mounted Sockets
	SR Members Are Concentric		Ignore KL/ry For 60 Deg. Angle Legs		Pole Without Linear Attachments
					Pole With Shroud Or No Appurtenances
					Outside and Inside Corner Radii Are Known



Triangular Tower

Tower Section Geometry

Tower Section	Tower Elevation	Assembly Database	Description	Section Width	Number of Sections	Section Length
	ft			ft		ft
T1	180.00-160.00			6.69	1	20.00
T2	160.00-140.00			6.76	1	20.00
T3	140.00-120.00			8.83	1	20.00
T4	120.00-100.00			10.92	1	20.00
T5	100.00-80.00			13.05	1	20.00
T6	80.00-60.00			14.99	1	20.00
T7	60.00-40.00			17.15	1	20.00
T8	40.00-20.00			19.16	1	20.00
T9	20.00-0.00			21.16	1	20.00

Tower Section Geometry *(cont'd)*

Tower Section	Tower Elevation	Diagonal Spacing	Bracing Type	Has K Brace End Panels	Has Horizontals	Top Girt Offset	Bottom Girt Offset
	ft	ft				in	in
T1	180.00-160.00	4.00	X Brace	No	Yes	0.0000	0.0000
T2	160.00-140.00	5.00	X Brace	No	Yes	0.0000	0.0000
T3	140.00-120.00	6.67	X Brace	No	No	0.0000	0.0000
T4	120.00-100.00	6.67	X Brace	No	No	0.0000	0.0000
T5	100.00-80.00	6.67	X Brace	No	No	0.0000	0.0000
T6	80.00-60.00	10.00	X Brace	No	No	0.0000	0.0000

Tower Section	Tower Elevation ft	Diagonal Spacing ft	Bracing Type	Has K Brace End Panels	Has Horizontals	Top Girt Offset in	Bottom Girt Offset in
T7	60.00-40.00	10.00	X Brace	No	No	0.0000	0.0000
T8	40.00-20.00	10.00	X Brace	No	No	0.0000	0.0000
T9	20.00-0.00	10.00	X Brace	No	No	0.0000	0.0000

Tower Section Geometry *(cont'd)*

Tower Elevation ft	Leg Type	Leg Size	Leg Grade	Diagonal Type	Diagonal Size	Diagonal Grade
T1 180.00-160.00	Pipe	ROHN 3 STD	A572-50 (50 ksi)	Single Angle	L1 3/4x1 3/4x3/16	A36 (36 ksi)
T2 160.00-140.00	Pipe	ROHN 4 EH	A572-50 (50 ksi)	Single Angle	L2x2x1/4	A36 (36 ksi)
T3 140.00-120.00	Pipe	ROHN 5 EH	A572-50 (50 ksi)	Single Angle	L2 1/2x2 1/2x1/4	A36 (36 ksi)
T4 120.00-100.00	Pipe	ROHN 6 EH	A572-50 (50 ksi)	Single Angle	L3x3x1/4	A572-50 (50 ksi)
T5 100.00-80.00	Pipe	ROHN 8 EHS	A572-50 (50 ksi)	Single Angle	L3x3x1/4	A572-50 (50 ksi)
T6 80.00-60.00	Pipe	ROHN 8 EH	A572-50 (50 ksi)	Single Angle	L3 1/2x3 1/2x1/4	A572-50 (50 ksi)
T7 60.00-40.00	Pipe	ROHN 10 EH	A572-50 (50 ksi)	Single Angle	L4x4x5/16	A572-50 (50 ksi)
T8 40.00-20.00	Pipe	ROHN 10 EH	A572-50 (50 ksi)	Single Angle	L4x4x5/16	A572-50 (50 ksi)
T9 20.00-0.00	Pipe	ROHN 10 EH	A572-50 (50 ksi)	Single Angle	L4x4x5/16	A572-50 (50 ksi)

Tower Section Geometry *(cont'd)*

Tower Elevation ft	Top Girt Type	Top Girt Size	Top Girt Grade	Bottom Girt Type	Bottom Girt Size	Bottom Girt Grade
T1 180.00-160.00	Single Angle	L2x2x1/8	A36 (36 ksi)	Single Angle		A36 (36 ksi)
T2 160.00-140.00	Single Angle	L2x2x1/8	A36 (36 ksi)	Single Angle		A36 (36 ksi)

Tower Section Geometry *(cont'd)*

Tower Elevation ft	Gusset Area (per face) ft^2	Gusset Thickness in	Gusset Grade	Adjust. Factor A_f	Adjust. Factor A_r	Weight Mult.	Double Angle Stitch Bolt Spacing Diagonals in	Double Angle Stitch Bolt Spacing Horizontals in	Double Angle Stitch Bolt Spacing Redundants in
T1 180.00-160.00	0.00	0.0000	A36 (36 ksi)	1	1	1	30.0000	30.0000	36.0000

Tower Elevation ft	Gusset Area (per face) ft^2	Gusset Thickness in	Gusset Grade	Adjust. Factor A_f	Adjust. Factor A_r	Weight Mult.	Double Angle Stitch Bolt Spacing Diagonals in	Double Angle Stitch Bolt Spacing Horizontals in	Double Angle Stitch Bolt Spacing Redundants in
T2 160.00-140.00	0.00	0.0000	A36 (36 ksi)	1	1	1	36.0000	36.0000	36.0000
T3 140.00-120.00	0.00	0.0000	A36 (36 ksi)	1	1	1	36.0000	36.0000	36.0000
T4 120.00-100.00	0.00	0.0000	A36 (36 ksi)	1	1	1	36.0000	36.0000	36.0000
T5 100.00-80.00	0.00	0.0000	A36 (36 ksi)	1	1	1	36.0000	36.0000	36.0000
T6 80.00-60.00	0.00	0.0000	A36 (36 ksi)	1	1	1	36.0000	36.0000	36.0000
T7 60.00-40.00	0.00	0.0000	A36 (36 ksi)	1	1	1	36.0000	36.0000	36.0000
T8 40.00-20.00	0.00	0.0000	A36 (36 ksi)	1	1	1	36.0000	36.0000	36.0000
T9 20.00-0.00	0.00	0.0000	A36 (36 ksi)	1	1	1	36.0000	36.0000	36.0000

Tower Section Geometry *(cont'd)*

Tower Elevation ft	Calc K Single Angles	Calc K Solid Rounds	K Factors[1] Legs	X Brace Diags X Y	K Brace Diags X Y	Single Diags X Y	Girts X Y	Horiz. X Y	Sec. Horiz. X Y	Inner Brace X Y
T1 180.00-160.00	Yes	Yes	1	1 1	1 1	1 1	1 1	1 1	1 1	1 1
T2 160.00-140.00	Yes	Yes	1	1 1	1 1	1 1	1 1	1 1	1 1	1 1
T3 140.00-120.00	Yes	Yes	1	1 1	1 1	1 1	1 1	1 1	1 1	1 1
T4 120.00-100.00	Yes	Yes	1	1 1	1 1	1 1	1 1	1 1	1 1	1 1
T5 100.00-80.00	Yes	Yes	1	1 1	1 1	1 1	1 1	1 1	1 1	1 1
T6 80.00-60.00	Yes	Yes	1	1 1	1 1	1 1	1 1	1 1	1 1	1 1
T7 60.00-40.00	Yes	Yes	1	1 1	1 1	1 1	1 1	1 1	1 1	1 1
T8 40.00-20.00	Yes	Yes	1	1 1	1 1	1 1	1 1	1 1	1 1	1 1
T9 20.00-0.00	Yes	Yes	1	1 1	1 1	1 1	1 1	1 1	1 1	1 1

[1]*Note: K factors are applied to member segment lengths. K-braces without inner supporting members will have the K factor in the out-of-plane direction applied to the overall length.*

Tower Section Geometry *(cont'd)*

Tower Elevation ft	Leg		Diagonal		Top Girt		Bottom Girt		Mid Girt		Long Horizontal		Short Horizontal	
	Net Width Deduct in	U	Net Width Deduct in	U	Net Width Deduct in	U	Net Width Deduct in	U	Net Width Deduct in	U	Net Width Deduct in	U	Net Width Deduct in	U
T1 180.00-160.00	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	0.75	0.0000	1	0.0000	0.75
T2 160.00-140.00	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	1
T3 140.00-120.00	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	1
T4 120.00-100.00	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	1
T5 100.00-80.00	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	1
T6 80.00-60.00	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	1
T7 60.00-40.00	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	1
T8 40.00-20.00	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	1
T9 20.00-0.00	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	1

Tower Elevation ft	Redundant Horizontal		Redundant Diagonal		Redundant Sub-Diagonal		Redundant Sub-Horizontal		Redundant Vertical		Redundant Hip		Redundant Hip Diagonal	
	Net Width Deduct in	U	Net Width Deduct in	U	Net Width Deduct in	U	Net Width Deduct in	U	Net Width Deduct in	U	Net Width Deduct in	U	Net Width Deduct in	U
T1 180.00-160.00	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75
T2 160.00-140.00	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75
T3 140.00-120.00	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75
T4 120.00-100.00	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75
T5 100.00-80.00	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75
T6 80.00-60.00	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75
T7 60.00-40.00	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75
T8 40.00-20.00	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75
T9 20.00-0.00	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75

Tower Section Geometry *(cont'd)*

Tower Elevation ft	Leg Connection Type	Leg		Diagonal		Top Girt		Bottom Girt		Mid Girt		Long Horizontal		Short Horizontal	
		Bolt Size in	No.	Bolt Size in	No.	Bolt Size in	No.	Bolt Size in	No.	Bolt Size in	No.	Bolt Size in	No.	Bolt Size in	No.
T1 180.00-160.00	Flange	0.8750 A325N	4	0.6250 A325N	1	0.6250 A325N	1	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0
T2 160.00-140.00	Flange	1.0000 A325N	4	0.6250 A325N	1	0.6250 A325N	1	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0
T3 140.00-120.00	Flange	1.0000 A325N	6	0.7500 A325N	1	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0

Tower Elevation ft	Leg Connection Type	Leg		Diagonal		Top Girt		Bottom Girt		Mid Girt		Long Horizontal		Short Horizontal	
		Bolt Size in	No.	Bolt Size in	No.	Bolt Size in	No.	Bolt Size in	No.	Bolt Size in	No.	Bolt Size in	No.	Bolt Size in	No.
T4 120.00-100.00	Flange	1.0000 A325N	8	0.7500 A325N	1	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0
T5 100.00-80.00	Flange	1.0000 A325N	8	0.7500 A325N	1	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0
T6 80.00-60.00	Flange	1.0000 A325N	12	0.7500 A325N	1	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0
T7 60.00-40.00	Flange	1.0000 A325N	12	0.7500 A325N	1	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0
T8 40.00-20.00	Flange	1.0000 A325N	12	0.7500 A325N	1	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0
T9 20.00-0.00	Flange	1.0000 F1554-105	12	0.7500 A325N	1	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0

Feed Line/Linear Appurtenances - Entered As Round Or Flat

Description	Face or Leg	Allow Shield	Exclude From Torque Calculation	Component Type	Placement ft	Face Offset in	Lateral Offset (Frac FW)	#	# Per Row	Clear Spacing in	Width or Diameter in	Perimeter in	Weight plf
7/8	B	No	No	Ar (CaAa)	178.00 - 0.00	0.0000	-0.47	3	3	1.1100	1.1100		0.54
7/8	B	No	No	Ar (CaAa)	164.00 - 0.00	0.0000	-0.45	2	2	1.1100	1.1100		0.54
7/8	B	No	No	Ar (CaAa)	152.00 - 0.00	0.0000	-0.43	1	1	1.1100	1.1100		0.54
7/8	B	No	No	Ar (CaAa)	144.00 - 0.00	0.0000	-0.42	1	1	1.1100	1.1100		0.54
7/8	B	No	No	Ar (CaAa)	136.00 - 0.00	0.0000	-0.41	2	2	1.1100	1.1100		0.54
7/8	B	No	No	Ar (CaAa)	122.00 - 0.00	0.0000	-0.4	1	1	1.1100	1.1100		0.54
7/8	B	No	No	Ar (CaAa)	103.00 - 0.00	0.0000	-0.39	2	2	1.1100	1.1100		0.54
7/8	B	No	No	Ar (CaAa)	84.00 - 0.00	0.0000	-0.37	2	2	1.1100	1.1100		0.54
EW90	B	No	No	Af (CaAa)	152.00 - 0.00	0.0000	-0.35	1	1	0.9869	0.9869		0.32
E65 (ELLIPTICAL AIR)	B	No	No	Ar (CaAa)	83.00 - 0.00	0.0000	-0.46	1	1	1.2000	1.2000		0.67
7/8 (Millstone)	B	No	No	Ar (CaAa)	129.00 - 0.00	2.0000	-0.43	1	1	1.1100	1.1100		0.54
HYBRIFLEX 1-5/8" (Dish)	A	No	No	Ar (CaAa)	110.00 - 0.00	0.0000	0.45	1	1	1.9800	1.9800		1.90
E65 (ELLIPTICAL AIR)	B	No	No	Ar (CaAa)	170.00 - 0.00	0.0000	-0.32	1	1	1.2000	1.2000		0.67
7/8	B	No	No	Ar (CaAa)	177.00 - 0.00	0.0000	-0.3	2	2	1.1100	1.1100		0.54

Feed Line/Linear Appurtenances Section Areas

Tower Section	Tower Elevation ft	Face	A_R ft^2	A_F ft^2	C_AA_A In Face ft^2	C_AA_A Out Face ft^2	Weight K
T1	180.00-160.00	A	0.000	0.000	0.000	0.000	0.00
		B	0.000	0.000	11.856	0.000	0.06
		C	0.000	0.000	0.000	0.000	0.00
T2	160.00-140.00	A	0.000	0.000	0.000	0.000	0.00
		B	0.000	0.000	21.690	0.000	0.10
		C	0.000	0.000	0.000	0.000	0.00
T3	140.00-120.00	A	0.000	0.000	0.000	0.000	0.00
		B	0.000	0.000	30.443	0.000	0.14
		C	0.000	0.000	0.000	0.000	0.00
T4	120.00-100.00	A	0.000	0.000	1.980	0.000	0.02
		B	0.000	0.000	35.216	0.000	0.16
		C	0.000	0.000	0.000	0.000	0.00
T5	100.00-80.00	A	0.000	0.000	3.960	0.000	0.04
		B	0.000	0.000	40.238	0.000	0.19
		C	0.000	0.000	0.000	0.000	0.00
T6	80.00-60.00	A	0.000	0.000	3.960	0.000	0.04
		B	0.000	0.000	45.830	0.000	0.22
		C	0.000	0.000	0.000	0.000	0.00
T7	60.00-40.00	A	0.000	0.000	3.960	0.000	0.04
		B	0.000	0.000	45.830	0.000	0.22
		C	0.000	0.000	0.000	0.000	0.00
T8	40.00-20.00	A	0.000	0.000	3.960	0.000	0.04
		B	0.000	0.000	45.830	0.000	0.22
		C	0.000	0.000	0.000	0.000	0.00
T9	20.00-0.00	A	0.000	0.000	3.960	0.000	0.04
		B	0.000	0.000	45.830	0.000	0.22
		C	0.000	0.000	0.000	0.000	0.00

Feed Line/Linear Appurtenances Section Areas - With Ice

Tower Section	Tower Elevation ft	Face or Leg	Ice Thickness in	A_R ft^2	A_F ft^2	C_AA_A In Face ft^2	C_AA_A Out Face ft^2	Weight K
T1	180.00-160.00	A	1.355	0.000	0.000	0.000	0.000	0.00
		B		0.000	0.000	43.144	0.000	0.43
		C		0.000	0.000	0.000	0.000	0.00
T2	160.00-140.00	A	1.338	0.000	0.000	0.000	0.000	0.00
		B		0.000	0.000	77.132	0.000	0.77
		C		0.000	0.000	0.000	0.000	0.00
T3	140.00-120.00	A	1.319	0.000	0.000	0.000	0.000	0.00
		B		0.000	0.000	107.200	0.000	1.08
		C		0.000	0.000	0.000	0.000	0.00
T4	120.00-100.00	A	1.297	0.000	0.000	4.574	0.000	0.07
		B		0.000	0.000	123.092	0.000	1.24
		C		0.000	0.000	0.000	0.000	0.00
T5	100.00-80.00	A	1.271	0.000	0.000	9.045	0.000	0.14
		B		0.000	0.000	141.021	0.000	1.38
		C		0.000	0.000	0.000	0.000	0.00
T6	80.00-60.00	A	1.240	0.000	0.000	8.919	0.000	0.14
		B		0.000	0.000	159.038	0.000	1.53
		C		0.000	0.000	0.000	0.000	0.00
T7	60.00-40.00	A	1.199	0.000	0.000	8.755	0.000	0.13
		B		0.000	0.000	156.207	0.000	1.48
		C		0.000	0.000	0.000	0.000	0.00
T8	40.00-20.00	A	1.139	0.000	0.000	8.516	0.000	0.12
		B		0.000	0.000	152.092	0.000	1.40
		C		0.000	0.000	0.000	0.000	0.00

Tower Section	Tower Elevation ft	Face or Leg	Ice Thickness in	A_R ft^2	A_F ft^2	C_AA_A In Face ft^2	C_AA_A Out Face ft^2	Weight K
T9	20.00-0.00	A	1.021	0.000	0.000	8.042	0.000	0.11
		B		0.000	0.000	143.935	0.000	1.24
		C		0.000	0.000	0.000	0.000	0.00

Feed Line Center of Pressure

Section	Elevation ft	CP_X in	CP_Z in	CP_X Ice in	CP_Z Ice in
T1	180.00-160.00	0.5674	-5.4265	1.1769	-10.2300
T2	160.00-140.00	0.9846	-9.5714	1.8397	-17.0321
T3	140.00-120.00	1.4259	-14.2808	2.5782	-24.8654
T4	120.00-100.00	1.5162	-17.0942	2.8503	-29.8865
T5	100.00-80.00	1.6928	-20.1521	3.2476	-35.1541
T6	80.00-60.00	2.1532	-25.3251	4.0322	-43.2093
T7	60.00-40.00	2.0609	-24.4476	4.0713	-44.0929
T8	40.00-20.00	2.1634	-25.8763	4.2728	-46.6629
T9	20.00-0.00	2.2546	-27.1592	4.3874	-48.3517

Shielding Factor Ka

Tower Section	Feed Line Record No.	Description	Feed Line Segment Elev.	K_a No Ice	K_a Ice
T1	1	7/8	160.00 - 178.00	0.6000	0.6000
T1	2	7/8	160.00 - 164.00	0.6000	0.6000
T1	13	E65 (ELLIPTICAL AIR)	160.00 - 170.00	0.6000	0.6000
T1	14	7/8	160.00 - 177.00	0.6000	0.6000
T2	1	7/8	140.00 - 160.00	0.6000	0.6000
T2	2	7/8	140.00 - 160.00	0.6000	0.6000
T2	3	7/8	140.00 - 152.00	0.6000	0.6000
T2	4	7/8	140.00 - 144.00	0.6000	0.6000
T2	9	EW90	140.00 - 152.00	0.6000	0.6000
T2	13	E65 (ELLIPTICAL AIR)	140.00 - 160.00	0.6000	0.6000
T2	14	7/8	140.00 - 160.00	0.6000	0.6000
T3	1	7/8	120.00 - 140.00	0.6000	0.6000
T3	2	7/8	120.00 - 140.00	0.6000	0.6000
T3	3	7/8	120.00 - 140.00	0.6000	0.6000

Tower Section	Feed Line Record No.	Description	Feed Line Segment Elev.	K_a No Ice	K_a Ice
T3	4	7/8	120.00 - 140.00	0.6000	0.6000
T3	5	7/8	120.00 - 136.00	0.6000	0.6000
T3	6	7/8	120.00 - 122.00	0.6000	0.6000
T3	9	EW90	120.00 - 140.00	0.6000	0.6000
T3	11	7/8	120.00 - 129.00	0.6000	0.6000
T3	13	E65 (ELLIPTICAL AIR)	120.00 - 140.00	0.6000	0.6000
T3	14	7/8	120.00 - 140.00	0.6000	0.6000
T4	1	7/8	100.00 - 120.00	0.6000	0.6000
T4	2	7/8	100.00 - 120.00	0.6000	0.6000
T4	3	7/8	100.00 - 120.00	0.6000	0.6000
T4	4	7/8	100.00 - 120.00	0.6000	0.6000
T4	5	7/8	100.00 - 120.00	0.6000	0.6000
T4	6	7/8	100.00 - 120.00	0.6000	0.6000
T4	7	7/8	100.00 - 103.00	0.6000	0.6000
T4	9	EW90	100.00 - 120.00	0.6000	0.6000
T4	11	7/8	100.00 - 120.00	0.6000	0.6000
T4	12	HYBRIFLEX 1-5/8"	100.00 - 110.00	0.6000	0.6000
T4	13	E65 (ELLIPTICAL AIR)	100.00 - 120.00	0.6000	0.6000
T4	14	7/8	100.00 - 120.00	0.6000	0.6000
T5	1	7/8	80.00 - 100.00	0.6000	0.6000
T5	2	7/8	80.00 - 100.00	0.6000	0.6000
T5	3	7/8	80.00 - 100.00	0.6000	0.6000
T5	4	7/8	80.00 - 100.00	0.6000	0.6000
T5	5	7/8	80.00 - 100.00	0.6000	0.6000
T5	6	7/8	80.00 - 100.00	0.6000	0.6000
T5	7	7/8	80.00 - 100.00	0.6000	0.6000
T5	8	7/8	80.00 - 84.00	0.6000	0.6000
T5	9	EW90	80.00 - 100.00	0.6000	0.6000
T5	10	E65 (ELLIPTICAL AIR)	80.00 - 83.00	0.6000	0.6000
T5	11	7/8	80.00 - 100.00	0.6000	0.6000
T5	12	HYBRIFLEX 1-5/8"	80.00 - 100.00	0.6000	0.6000
T5	13	E65 (ELLIPTICAL AIR)	80.00 - 100.00	0.6000	0.6000
T5	14	7/8	80.00 - 100.00	0.6000	0.6000
T6	1	7/8	60.00 - 80.00	0.6000	0.6000
T6	2	7/8	60.00 - 80.00	0.6000	0.6000
T6	3	7/8	60.00 - 80.00	0.6000	0.6000
T6	4	7/8	60.00 - 80.00	0.6000	0.6000
T6	5	7/8	60.00 - 80.00	0.6000	0.6000
T6	6	7/8	60.00 - 80.00	0.6000	0.6000
T6	7	7/8	60.00 - 80.00	0.6000	0.6000
T6	8	7/8	60.00 - 80.00	0.6000	0.6000
T6	9	EW90	60.00 - 80.00	0.6000	0.6000
T6	10	E65 (ELLIPTICAL AIR)	60.00 - 80.00	0.6000	0.6000

Tower Section	Feed Line Record No.	Description	Feed Line Segment Elev.	K_a No Ice	K_a Ice
T6	11	7/8	60.00 - 80.00	0.6000	0.6000
T6	12	HYBRIFLEX 1-5/8"	60.00 - 80.00	0.6000	0.6000
T6	13	E65 (ELLIPTICAL AIR)	60.00 - 80.00	0.6000	0.6000
T6	14	7/8	60.00 - 80.00	0.6000	0.6000
T7	1	7/8	40.00 - 60.00	0.6000	0.6000
T7	2	7/8	40.00 - 60.00	0.6000	0.6000
T7	3	7/8	40.00 - 60.00	0.6000	0.6000
T7	4	7/8	40.00 - 60.00	0.6000	0.6000
T7	5	7/8	40.00 - 60.00	0.6000	0.6000
T7	6	7/8	40.00 - 60.00	0.6000	0.6000
T7	7	7/8	40.00 - 60.00	0.6000	0.6000
T7	8	7/8	40.00 - 60.00	0.6000	0.6000
T7	9	EW90	40.00 - 60.00	0.6000	0.6000
T7	10	E65 (ELLIPTICAL AIR)	40.00 - 60.00	0.6000	0.6000
T7	11	7/8	40.00 - 60.00	0.6000	0.6000
T7	12	HYBRIFLEX 1-5/8"	40.00 - 60.00	0.6000	0.6000
T7	13	E65 (ELLIPTICAL AIR)	40.00 - 60.00	0.6000	0.6000
T7	14	7/8	40.00 - 60.00	0.6000	0.6000
T8	1	7/8	20.00 - 40.00	0.6000	0.6000
T8	2	7/8	20.00 - 40.00	0.6000	0.6000
T8	3	7/8	20.00 - 40.00	0.6000	0.6000
T8	4	7/8	20.00 - 40.00	0.6000	0.6000
T8	5	7/8	20.00 - 40.00	0.6000	0.6000
T8	6	7/8	20.00 - 40.00	0.6000	0.6000
T8	7	7/8	20.00 - 40.00	0.6000	0.6000
T8	8	7/8	20.00 - 40.00	0.6000	0.6000
T8	9	EW90	20.00 - 40.00	0.6000	0.6000
T8	10	E65 (ELLIPTICAL AIR)	20.00 - 40.00	0.6000	0.6000
T8	11	7/8	20.00 - 40.00	0.6000	0.6000
T8	12	HYBRIFLEX 1-5/8"	20.00 - 40.00	0.6000	0.6000
T8	13	E65 (ELLIPTICAL AIR)	20.00 - 40.00	0.6000	0.6000
T8	14	7/8	20.00 - 40.00	0.6000	0.6000
T9	1	7/8	0.00 - 20.00	0.6000	0.6000
T9	2	7/8	0.00 - 20.00	0.6000	0.6000
T9	3	7/8	0.00 - 20.00	0.6000	0.6000
T9	4	7/8	0.00 - 20.00	0.6000	0.6000
T9	5	7/8	0.00 - 20.00	0.6000	0.6000
T9	6	7/8	0.00 - 20.00	0.6000	0.6000
T9	7	7/8	0.00 - 20.00	0.6000	0.6000
T9	8	7/8	0.00 - 20.00	0.6000	0.6000
T9	9	EW90	0.00 - 20.00	0.6000	0.6000
T9	10	E65 (ELLIPTICAL AIR)	0.00 - 20.00	0.6000	0.6000
T9	11	7/8	0.00 - 20.00	0.6000	0.6000
T9	12	HYBRIFLEX 1-5/8"	0.00 - 20.00	0.6000	0.6000
T9	13	E65 (ELLIPTICAL AIR)	0.00 - 20.00	0.6000	0.6000
T9	14	7/8	0.00 - 20.00	0.6000	0.6000

Discrete Tower Loads

Description	Face or Leg	Offset Type	Offsets: Horz Lateral ft / Vert ft / ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
3' Whip	C	From Leg	6.00	0.0000	178.00	No Ice	1.25	1.25	0.01
(Town)			0.00			1/2" Ice	1.56	1.56	0.04
			2.00			1" Ice	1.87	1.87	0.07
ROHN 6-ft Side Arm	C	From Leg	3.00	0.0000	178.00	No Ice	6.68	6.68	0.08
(Town)			0.00			1/2" Ice	10.00	10.00	0.10
			0.00			1" Ice	13.32	13.32	0.13
1142-2CN	A	From Leg	4.00	0.0000	178.00	No Ice	2.50	2.50	0.02
(Eversource)			0.00			1/2" Ice	3.77	3.77	0.04
			7.00			1" Ice	5.07	5.07	0.07
ROHN 4-ft Side Arm	A	From Leg	2.00	0.0000	178.00	No Ice	5.28	5.28	0.07
(Eversource)			0.00			1/2" Ice	7.88	7.88	0.08
			0.00			1" Ice	10.48	10.48	0.10
220-3AN	C	From Leg	3.00	0.0000	178.00	No Ice	5.69	5.69	0.02
(Eversource)			0.00			1/2" Ice	7.79	7.79	0.07
			10.00			1" Ice	9.91	9.91	0.12
ROHN 3-ft Side Arm	C	From Leg	1.50	0.0000	178.00	No Ice	3.10	3.10	0.07
(Eversource)			0.00			1/2" Ice	5.00	5.00	0.10
			0.00			1" Ice	6.90	6.90	0.13
6'8"x4" Pipe Mount	B	From Leg	0.50	0.0000	170.00	No Ice	1.99	1.99	0.07
(Eversource)			0.00			1/2" Ice	3.01	3.01	0.09
			0.00			1" Ice	3.42	3.42	0.12
DB222	B	From Leg	6.00	0.0000	168.00	No Ice	1.60	1.60	0.02
(Eversource)			0.00			1/2" Ice	2.88	2.88	0.02
			6.00			1" Ice	4.16	4.16	0.03
ROHN 6-ft Side Arm	B	From Leg	3.00	0.0000	168.00	No Ice	6.68	6.68	0.08
(Eversource)			0.00			1/2" Ice	10.00	10.00	0.10
			0.00			1" Ice	13.32	13.32	0.13
6' x 3" Dia Omni	C	From Leg	6.00	0.0000	163.00	No Ice	1.77	1.77	0.02
			0.00			1/2" Ice	2.13	2.13	0.03
			3.00			1" Ice	2.50	2.50	0.05
ROHN 3-ft Side Arm	C	From Leg	3.00	0.0000	163.00	No Ice	3.10	3.10	0.07
			0.00			1/2" Ice	5.00	5.00	0.10
			0.00			1" Ice	6.90	6.90	0.13
1142-2CN	A	From Leg	6.00	0.0000	152.00	No Ice	2.50	2.50	0.02
(Eversource)			0.00			1/2" Ice	3.77	3.77	0.04
			7.00			1" Ice	5.07	5.07	0.07
ROHN 6-ft Side Arm	A	From Leg	3.00	0.0000	152.00	No Ice	6.68	6.68	0.08
(Eversource)			0.00			1/2" Ice	10.00	10.00	0.10
			0.00			1" Ice	13.32	13.32	0.13
6'8"x4" Pipe Mount	C	From Leg	0.50	0.0000	148.00	No Ice	2.02	2.02	0.07
(Eversource)			0.00			1/2" Ice	3.01	3.01	0.09
			0.00			1" Ice	3.42	3.42	0.12
DB222	B	From Leg	6.00	0.0000	144.00	No Ice	1.60	1.60	0.02
(Town)			0.00			1/2" Ice	2.88	2.88	0.02
			6.00			1" Ice	4.16	4.16	0.03
ROHN 6-ft Side Arm	B	From Leg	3.00	0.0000	144.00	No Ice	6.68	6.68	0.08
(Town)			0.00			1/2" Ice	10.00	10.00	0.10
			0.00			1" Ice	13.32	13.32	0.13
DB222	A	From Leg	6.00	0.0000	136.00	No Ice	1.60	1.60	0.02
(Town)			0.00			1/2" Ice	2.88	2.88	0.02
			6.00			1" Ice	4.16	4.16	0.03
ROHN 6-ft Side Arm	A	From Leg	3.00	0.0000	136.00	No Ice	6.68	6.68	0.08
(Town)			0.00			1/2" Ice	10.00	10.00	0.10
			0.00			1" Ice	13.32	13.32	0.13
DB222	B	From Leg	6.00	0.0000	132.00	No Ice	1.60	1.60	0.02
(Eversource)			0.00			1/2" Ice	2.88	2.88	0.02
			6.00			1" Ice	4.16	4.16	0.03

Description	Face or Leg	Offset Type	Offsets: Horz Lateral ft / Vert ft / ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
ROHN 6-ft Side Arm (Eversource)	B	From Leg	3.00 0.00 0.00	0.0000	132.00	No Ice 1/2" Ice 1" Ice	6.68 10.00 13.32	6.68 10.00 13.32	0.08 0.10 0.13
DB212-1 (Town)	B	From Leg	3.00 0.00 0.00	0.0000	103.00	No Ice 1/2" Ice 1" Ice	4.50 8.10 11.70	4.50 8.10 11.70	0.03 0.04 0.05
ROHN 3-ft Side Arm (Town)	B	From Leg	1.50 0.00 0.00	0.0000	103.00	No Ice 1/2" Ice 1" Ice	3.10 5.00 6.90	3.10 5.00 6.90	0.07 0.10 0.13
DB212-1 (Town)	C	From Leg	3.00 0.00 0.00	0.0000	103.00	No Ice 1/2" Ice 1" Ice	4.50 8.10 11.70	4.50 8.10 11.70	0.03 0.04 0.05
ROHN 3-ft Side Arm (Town)	C	From Leg	1.50 0.00 0.00	0.0000	103.00	No Ice 1/2" Ice 1" Ice	3.10 5.00 6.90	3.10 5.00 6.90	0.07 0.10 0.13
220-3AN (Eversource)	A	From Leg	6.00 0.00 10.00	0.0000	84.00	No Ice 1/2" Ice 1" Ice	5.69 7.79 9.91	5.69 7.79 9.91	0.02 0.07 0.12
ROHN 6-ft Side Arm (Eversource)	A	From Leg	3.00 0.00 0.00	0.0000	84.00	No Ice 1/2" Ice 1" Ice	6.68 10.00 13.32	6.68 10.00 13.32	0.08 0.10 0.13
DB222 (Town)	C	From Leg	6.00 0.00 6.00	0.0000	84.00	No Ice 1/2" Ice 1" Ice	1.60 2.88 4.16	1.60 2.88 4.16	0.02 0.02 0.03
ROHN 6-ft Side Arm (Town)	C	From Leg	3.00 0.00 0.00	0.0000	84.00	No Ice 1/2" Ice 1" Ice	6.68 10.00 13.32	6.68 10.00 13.32	0.08 0.10 0.13
6'8"x4" Pipe Mount (Town)	B	From Leg	0.50 0.00 0.00	0.0000	83.00	No Ice 1/2" Ice 1" Ice	2.16 3.01 3.42	2.16 3.01 3.42	0.07 0.09 0.12
BNF800S-06 (Dominion)	B	From Leg	3.00 0.00 1.00	0.0000	65.00	No Ice 1/2" Ice 1" Ice	0.19 0.31 0.43	0.19 0.31 0.43	2.00 2.00 2.01
ROHN 3-ft Side Arm (Dominion)	B	From Leg	1.50 0.00 0.00	0.0000	65.00	No Ice 1/2" Ice 1" Ice	3.10 5.00 6.90	3.10 5.00 6.90	0.07 0.10 0.13
BNF800S-06 (Dominion)	C	From Leg	3.00 0.00 1.00	0.0000	129.00	No Ice 1/2" Ice 1" Ice	0.19 0.31 0.43	0.19 0.31 0.43	2.00 2.00 2.01
ROHN 3-ft Side Arm (Dominion)	C	From Leg	1.50 0.00 0.00	0.0000	129.00	No Ice 1/2" Ice 1" Ice	3.10 5.00 6.90	3.10 5.00 6.90	0.07 0.10 0.13
MX08FRO665-21 (Dish)	A	From Leg	3.00 0.00 0.00	0.0000	110.00	No Ice 1/2" Ice 1" Ice	12.49 12.99 13.49	5.87 6.32 6.79	0.08 0.16 0.24
MX08FRO665-21 (Dish)	B	From Leg	3.00 0.00 0.00	0.0000	110.00	No Ice 1/2" Ice 1" Ice	12.49 12.99 13.49	5.87 6.32 6.79	0.08 0.16 0.24
MX08FRO665-21 (Dish)	C	From Leg	3.00 0.00 0.00	0.0000	110.00	No Ice 1/2" Ice 1" Ice	12.49 12.99 13.49	5.87 6.32 6.79	0.08 0.16 0.24
TA08025-B604 (Dish)	A	From Leg	3.00 0.00 2.00	0.0000	110.00	No Ice 1/2" Ice 1" Ice	1.98 2.15 2.33	1.04 1.18 1.32	0.07 0.08 0.10
TA08025-B604 (Dish)	B	From Leg	3.00 0.00 2.00	0.0000	110.00	No Ice 1/2" Ice 1" Ice	1.98 2.15 2.33	1.04 1.18 1.32	0.07 0.08 0.10

Description	Face or Leg	Offset Type	Offsets: Horz Lateral ft / Vert ft / ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
TA08025-B604	C	From Leg	3.00	0.0000	110.00	No Ice	1.98	1.04	0.07
(Dish)			0.00			1/2" Ice	2.15	1.18	0.08
			2.00			1" Ice	2.33	1.32	0.10
TA08025-B605	A	From Leg	3.00	0.0000	110.00	No Ice	1.98	1.20	0.08
(Dish)			0.00			1/2" Ice	2.15	1.34	0.09
			-2.00			1" Ice	2.33	1.49	0.11
TA08025-B605	B	From Leg	3.00	0.0000	110.00	No Ice	1.98	1.20	0.08
(Dish)			0.00			1/2" Ice	2.15	1.34	0.09
			-2.00			1" Ice	2.33	1.49	0.11
TA08025-B605	C	From Leg	3.00	0.0000	110.00	No Ice	1.98	1.20	0.08
(Dish)			0.00			1/2" Ice	2.15	1.34	0.09
			-2.00			1" Ice	2.33	1.49	0.11
RD1DC-9181-PF-48	A	From Leg	3.00	0.0000	110.00	No Ice	1.87	1.07	0.02
(Dish)			4.00			1/2" Ice	2.04	1.20	0.04
			0.00			1" Ice	2.21	1.35	0.06
SitePro VFA8-HD	A	From Leg	3.00	0.0000	110.00	No Ice	15.00	15.00	0.70
(Dish)			0.00			1/2" Ice	20.00	20.00	0.85
			0.00			1" Ice	25.00	25.00	1.00
SitePro VFA8-HD	B	From Leg	3.00	0.0000	110.00	No Ice	15.00	15.00	0.70
(Dish)			0.00			1/2" Ice	20.00	20.00	0.85
			0.00			1" Ice	25.00	25.00	1.00
SitePro VFA8-HD	C	From Leg	3.00	0.0000	110.00	No Ice	15.00	15.00	0.70
(Dish)			0.00			1/2" Ice	20.00	20.00	0.85
			0.00			1" Ice	25.00	25.00	1.00
DS2C003F36D-D	C	From Leg	0.50	0.0000	177.00	No Ice	3.80	3.80	0.05
(Eversource)			0.00			1/2" Ice	5.10	5.10	0.08
			6.00			1" Ice	6.42	6.42	0.11

Dishes

Description	Face or Leg	Dish Type	Offset Type	Offsets: Horz Lateral ft / Vert ft	Azimuth Adjustment °	3 dB Beam Width °	Elevation ft	Outside Diameter ft		Aperture Area ft^2	Weight K
PAD6-59BC	B	Paraboloid w/o	From	1.00	0.0000		170.00	6.00	No Ice	28.27	0.15
(Eversource)		Radome	Leg	0.00					1/2" Ice	29.07	0.29
				0.00					1" Ice	29.86	0.44
8' Dish	C	Paraboloid	From	1.00	0.0000		148.00	8.00	No Ice	50.27	0.10
(Eversource)		w/Radome	Leg	0.00					1/2" Ice	51.32	0.26
				0.00					1" Ice	52.37	0.49
Andrew 2' w/Radome	B	Paraboloid	From	1.00	0.0000		83.00	2.00	No Ice	3.14	0.07
(Town)		w/Radome	Leg	0.00					1/2" Ice	3.41	0.28
				0.00					1" Ice	3.68	0.49

Tower Pressures - No Ice

$G_H = 0.850$

Section Elevation ft	z ft	K_Z	q_z psf	A_G ft²	Face	A_F ft²	A_R ft²	A_{leg} ft²	Leg %	C_AA_A In Face ft²	C_AA_A Out Face ft²
T1	170.00	1.15	46	140.318	A	11.981	11.667	11.667	49.34	0.000	0.000
180.00-160.00					B	11.981	11.667		49.34	11.856	0.000
					C	11.981	11.667		49.34	0.000	0.000
T2	150.00	1.11	44	163.453	A	12.828	15.027	15.027	53.95	0.000	0.000
160.00-140.00					B	12.828	15.027		53.95	21.690	0.000
					C	12.828	15.027		53.95	0.000	0.000
T3	130.00	1.065	42	206.784	A	14.201	18.577	18.577	56.68	0.000	0.000
140.00-120.00					B	14.201	18.577		56.68	30.443	0.000
					C	14.201	18.577		56.68	0.000	0.000
T4	110.00	1.016	40	250.745	A	19.629	22.125	22.125	52.99	1.980	0.000
120.00-100.00					B	19.629	22.125		52.99	35.216	0.000
					C	19.629	22.125		52.99	0.000	0.000
T5	90.00	0.959	38	294.809	A	22.098	28.795	28.795	56.58	3.960	0.000
100.00-80.00					B	22.098	28.795		56.58	40.238	0.000
					C	22.098	28.795		56.58	0.000	0.000
T6 80.00-60.00	70.00	0.892	35	335.750	A	21.097	28.806	28.806	57.72	3.960	0.000
					B	21.097	28.806		57.72	45.830	0.000
					C	21.097	28.806		57.72	0.000	0.000
T7 60.00-40.00	50.00	0.811	32	380.960	A	26.272	35.894	35.894	57.74	3.960	0.000
					B	26.272	35.894		57.74	45.830	0.000
					C	26.272	35.894		57.74	0.000	0.000
T8 40.00-20.00	30.00	0.701	28	421.064	A	28.671	35.893	35.893	55.59	3.960	0.000
					B	28.671	35.893		55.59	45.830	0.000
					C	28.671	35.893		55.59	0.000	0.000
T9 20.00-0.00	10.00	0.7	28	461.064	A	31.104	35.893	35.893	53.57	3.960	0.000
					B	31.104	35.893		53.57	45.830	0.000
					C	31.104	35.893		53.57	0.000	0.000

Tower Pressure - With Ice

G_H = 0.850

Section Elevation ft	z ft	K_Z	q_z psf	t_Z in	A_G ft²	Face	A_F ft²	A_R ft²	A_{leg} ft²	Leg %	C_AA_A In Face ft²	C_AA_A Out Face ft²
T1	170.00	1.15	6	1.3549	144.835	A	11.981	39.044	20.699	40.57	0.000	0.000
180.00-160.00						B	11.981	39.044		40.57	43.144	0.000
						C	11.981	39.044		40.57	0.000	0.000
T2	150.00	1.11	6	1.3380	167.919	A	12.828	41.126	23.963	44.41	0.000	0.000
160.00-140.00						B	12.828	41.126		44.41	77.132	0.000
						C	12.828	41.126		44.41	0.000	0.000
T3	130.00	1.065	6	1.3190	211.187	A	14.201	42.370	27.386	48.41	0.000	0.000
140.00-120.00						B	14.201	42.370		48.41	107.200	0.000
						C	14.201	42.370		48.41	0.000	0.000
T4	110.00	1.016	6	1.2971	255.075	A	19.629	47.764	30.789	45.69	4.574	0.000
120.00-100.00						B	19.629	47.764		45.69	123.092	0.000
						C	19.629	47.764		45.69	0.000	0.000
T5 100.00-80.00	90.00	0.959	5	1.2714	299.052	A	22.098	56.013	37.284	47.73	9.045	0.000
						B	22.098	56.013		47.73	141.021	0.000
						C	22.098	56.013		47.73	0.000	0.000
T6 80.00-60.00	70.00	0.892	5	1.2398	339.889	A	21.097	52.034	37.087	50.71	8.919	0.000
						B	21.097	52.034		50.71	159.038	0.000
						C	21.097	52.034		50.71	0.000	0.000
T7 60.00-40.00	50.00	0.811	4	1.1988	384.961	A	26.272	59.646	43.899	51.09	8.755	0.000

Section Elevation	z	K_Z	q_z	t_Z	A_G	Face	A_F	A_R	A_{leg}	Leg %	C_AA_A In Face	C_AA_A Out Face
ft	ft		psf	in	ft^2		ft^2	ft^2	ft^2		ft^2	ft^2
						B	26.272	59.646		51.09	156.207	0.000
						C	26.272	59.646		51.09	0.000	0.000
T8 40.00-20.00	30.00	0.701	4	1.1391	424.866	A	28.671	59.829	43.500	49.15	8.516	0.000
						B	28.671	59.829		49.15	152.092	0.000
						C	28.671	59.829		49.15	0.000	0.000
T9 20.00-0.00	10.00	0.7	4	1.0206	464.470	A	31.104	58.580	42.708	47.62	8.042	0.000
						B	31.104	58.580		47.62	143.935	0.000
						C	31.104	58.580		47.62	0.000	0.000

Tower Pressure - Service

$G_H = 0.850$

Section Elevation	z	K_Z	q_z	A_G	Face	A_F	A_R	A_{leg}	Leg %	C_AA_A In Face	C_AA_A Out Face
ft	ft		psf	ft^2		ft^2	ft^2	ft^2		ft^2	ft^2
T1	170.00	1.15	28	140.318	A	11.981	11.667	11.667	49.34	0.000	0.000
180.00-160.00					B	11.981	11.667		49.34	11.856	0.000
					C	11.981	11.667		49.34	0.000	0.000
T2	150.00	1.11	27	163.453	A	12.828	15.027	15.027	53.95	0.000	0.000
160.00-140.00					B	12.828	15.027		53.95	21.690	0.000
					C	12.828	15.027		53.95	0.000	0.000
T3	130.00	1.065	26	206.784	A	14.201	18.577	18.577	56.68	0.000	0.000
140.00-120.00					B	14.201	18.577		56.68	30.443	0.000
					C	14.201	18.577		56.68	0.000	0.000
T4	110.00	1.016	24	250.745	A	19.629	22.125	22.125	52.99	1.980	0.000
120.00-100.00					B	19.629	22.125		52.99	35.216	0.000
					C	19.629	22.125		52.99	0.000	0.000
T5	90.00	0.959	23	294.809	A	22.098	28.795	28.795	56.58	3.960	0.000
100.00-80.00					B	22.098	28.795		56.58	40.238	0.000
					C	22.098	28.795		56.58	0.000	0.000
T6 80.00-60.00	70.00	0.892	21	335.750	A	21.097	28.806	28.806	57.72	3.960	0.000
					B	21.097	28.806		57.72	45.830	0.000
					C	21.097	28.806		57.72	0.000	0.000
T7 60.00-40.00	50.00	0.811	19	380.960	A	26.272	35.894	35.894	57.74	3.960	0.000
					B	26.272	35.894		57.74	45.830	0.000
					C	26.272	35.894		57.74	0.000	0.000
T8 40.00-20.00	30.00	0.701	17	421.064	A	28.671	35.893	35.893	55.59	3.960	0.000
					B	28.671	35.893		55.59	45.830	0.000
					C	28.671	35.893		55.59	0.000	0.000
T9 20.00-0.00	10.00	0.7	17	461.064	A	31.104	35.893	35.893	53.57	3.960	0.000
					B	31.104	35.893		53.57	45.830	0.000
					C	31.104	35.893		53.57	0.000	0.000

Tower Forces - No Ice - Wind Normal To Face

Section Elevation	Add Weight	Self Weight	Face	e	C_F	q_z	D_F	D_R	A_E	F	w	Ctrl. Face
ft	K	K				psf			ft^2	K	plf	
T1	0.06	0.98	A	0.169	2.704	46	1	1	18.491	2.21	110.72	C

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	q_z psf	D_F	D_R	A_E ft^2	F K	w plf	Ctrl. Face
180.00-160.00			B	0.169	2.704		1	1	18.491			
			C	0.169	2.704		1	1	18.491			
T2	0.10	1.64	A	0.17	2.698	44	1	1	20.616	2.57	128.35	C
160.00-140.00			B	0.17	2.698		1	1	20.616			
			C	0.17	2.698		1	1	20.616			
T3	0.14	2.12	A	0.159	2.74	42	1	1	22.989	2.92	145.89	C
140.00-120.00			B	0.159	2.74		1	1	22.989			
			C	0.159	2.74		1	1	22.989			
T4	0.18	2.93	A	0.167	2.712	40	1	1	29.316	3.49	174.26	C
120.00-100.00			B	0.167	2.712		1	1	29.316			
			C	0.167	2.712		1	1	29.316			
T5	0.23	3.36	A	0.173	2.69	38	1	1	34.495	3.86	192.83	C
100.00-80.00			B	0.173	2.69		1	1	34.495			
			C	0.173	2.69		1	1	34.495			
T6	0.25	3.92	A	0.149	2.777	35	1	1	33.138	3.67	183.34	C
80.00-60.00			B	0.149	2.777		1	1	33.138			
			C	0.149	2.777		1	1	33.138			
T7	0.25	5.32	A	0.163	2.724	32	1	1	41.545	3.91	195.42	C
60.00-40.00			B	0.163	2.724		1	1	41.545			
			C	0.163	2.724		1	1	41.545			
T8	0.25	5.50	A	0.153	2.759	28	1	1	43.761	3.56	177.85	C
40.00-20.00			B	0.153	2.759		1	1	43.761			
			C	0.153	2.759		1	1	43.761			
T9 20.00-0.00	0.25	5.68	A	0.145	2.789	28	1	1	46.047	3.74	186.76	C
			B	0.145	2.789		1	1	46.047			
			C	0.145	2.789		1	1	46.047			
Sum Weight:	1.73	31.45						OTM	2467.46 kip-ft	29.91		

Tower Forces - No Ice - Wind 45 To Face

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	q_z psf	D_F	D_R	A_E ft^2	F K	w plf	Ctrl. Face
T1	0.06	0.98	A	0.169	2.704	46	0.825	1	16.394	1.99	99.73	C
180.00-160.00			B	0.169	2.704		0.825	1	16.394			
			C	0.169	2.704		0.825	1	16.394			
T2	0.10	1.64	A	0.17	2.698	44	0.825	1	18.371	2.34	117.03	C
160.00-140.00			B	0.17	2.698		0.825	1	18.371			
			C	0.17	2.698		0.825	1	18.371			
T3	0.14	2.12	A	0.159	2.74	42	0.825	1	20.504	2.67	133.67	C
140.00-120.00			B	0.159	2.74		0.825	1	20.504			
			C	0.159	2.74		0.825	1	20.504			
T4	0.18	2.93	A	0.167	2.712	40	0.825	1	25.881	3.17	158.32	C
120.00-100.00			B	0.167	2.712		0.825	1	25.881			
			C	0.167	2.712		0.825	1	25.881			
T5	0.23	3.36	A	0.173	2.69	38	0.825	1	30.628	3.52	176.02	C
100.00-80.00			B	0.173	2.69		0.825	1	30.628			
			C	0.173	2.69		0.825	1	30.628			
T6	0.25	3.92	A	0.149	2.777	35	0.825	1	29.446	3.36	167.92	C
80.00-60.00			B	0.149	2.777		0.825	1	29.446			
			C	0.149	2.777		0.825	1	29.446			
T7	0.25	5.32	A	0.163	2.724	32	0.825	1	36.948	3.57	178.32	C

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	q_z psf	D_F	D_R	A_E ft²	F K	w plf	Ctrl. Face
60.00-40.00			B	0.163	2.724		0.825	1	36.948			
			C	0.163	2.724		0.825	1	36.948			
T8	0.25	5.50	A	0.153	2.759	28	0.825	1	38.743	3.23	161.51	C
40.00-20.00			B	0.153	2.759		0.825	1	38.743			
			C	0.153	2.759		0.825	1	38.743			
T9 20.00-0.00	0.25	5.68	A	0.145	2.789	28	0.825	1	40.604	3.38	168.85	C
			B	0.145	2.789		0.825	1	40.604			
			C	0.145	2.789		0.825	1	40.604			
Sum Weight:	1.73	31.45						OTM	2246.90 kip-ft	27.23		

Tower Forces - No Ice - Wind 60 To Face

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	q_z psf	D_F	D_R	A_E ft²	F K	w plf	Ctrl. Face
T1	0.06	0.98	A	0.169	2.704	46	0.8	1	16.095	1.96	98.16	C
180.00-160.00			B	0.169	2.704		0.8	1	16.095			
			C	0.169	2.704		0.8	1	16.095			
T2	0.10	1.64	A	0.17	2.698	44	0.8	1	18.051	2.31	115.41	C
160.00-140.00			B	0.17	2.698		0.8	1	18.051			
			C	0.17	2.698		0.8	1	18.051			
T3	0.14	2.12	A	0.159	2.74	42	0.8	1	20.149	2.64	131.92	C
140.00-120.00			B	0.159	2.74		0.8	1	20.149			
			C	0.159	2.74		0.8	1	20.149			
T4	0.18	2.93	A	0.167	2.712	40	0.8	1	25.390	3.12	156.04	C
120.00-100.00			B	0.167	2.712		0.8	1	25.390			
			C	0.167	2.712		0.8	1	25.390			
T5	0.23	3.36	A	0.173	2.69	38	0.8	1	30.076	3.47	173.62	C
100.00-80.00			B	0.173	2.69		0.8	1	30.076			
			C	0.173	2.69		0.8	1	30.076			
T6	0.25	3.92	A	0.149	2.777	35	0.8	1	28.919	3.31	165.72	C
80.00-60.00			B	0.149	2.777		0.8	1	28.919			
			C	0.149	2.777		0.8	1	28.919			
T7	0.25	5.32	A	0.163	2.724	32	0.8	1	36.291	3.52	175.87	C
60.00-40.00			B	0.163	2.724		0.8	1	36.291			
			C	0.163	2.724		0.8	1	36.291			
T8	0.25	5.50	A	0.153	2.759	28	0.8	1	38.026	3.18	159.17	C
40.00-20.00			B	0.153	2.759		0.8	1	38.026			
			C	0.153	2.759		0.8	1	38.026			
T9 20.00-0.00	0.25	5.68	A	0.145	2.789	28	0.8	1	39.827	3.33	166.29	C
			B	0.145	2.789		0.8	1	39.827			
			C	0.145	2.789		0.8	1	39.827			
Sum Weight:	1.73	31.45						OTM	2215.39 kip-ft	26.84		

Tower Forces - No Ice - Wind 90 To Face

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	q_z psf	D_F	D_R	A_E ft^2	F K	w plf	Ctrl. Face
T1	0.06	0.98	A	0.169	2.704	46	0.85	1	16.694	2.03	101.30	C
180.00-160.00			B	0.169	2.704		0.85	1	16.694			
			C	0.169	2.704		0.85	1	16.694			
T2	0.10	1.64	A	0.17	2.698	44	0.85	1	18.692	2.37	118.65	C
160.00-140.00			B	0.17	2.698		0.85	1	18.692			
			C	0.17	2.698		0.85	1	18.692			
T3	0.14	2.12	A	0.159	2.74	42	0.85	1	20.859	2.71	135.41	C
140.00-120.00			B	0.159	2.74		0.85	1	20.859			
			C	0.159	2.74		0.85	1	20.859			
T4	0.18	2.93	A	0.167	2.712	40	0.85	1	26.372	3.21	160.60	C
120.00-100.00			B	0.167	2.712		0.85	1	26.372			
			C	0.167	2.712		0.85	1	26.372			
T5	0.23	3.36	A	0.173	2.69	38	0.85	1	31.181	3.57	178.42	C
100.00-80.00			B	0.173	2.69		0.85	1	31.181			
			C	0.173	2.69		0.85	1	31.181			
T6	0.25	3.92	A	0.149	2.777	35	0.85	1	29.973	3.40	170.12	C
80.00-60.00			B	0.149	2.777		0.85	1	29.973			
			C	0.149	2.777		0.85	1	29.973			
T7	0.25	5.32	A	0.163	2.724	32	0.85	1	37.604	3.62	180.76	C
60.00-40.00			B	0.163	2.724		0.85	1	37.604			
			C	0.163	2.724		0.85	1	37.604			
T8	0.25	5.50	A	0.153	2.759	28	0.85	1	39.460	3.28	163.84	C
40.00-20.00			B	0.153	2.759		0.85	1	39.460			
			C	0.153	2.759		0.85	1	39.460			
T9 20.00-0.00	0.25	5.68	A	0.145	2.789	28	0.85	1	41.382	3.43	171.40	C
			B	0.145	2.789		0.85	1	41.382			
			C	0.145	2.789		0.85	1	41.382			
Sum Weight:	1.73	31.45						OTM	2278.41 kip-ft	27.61		

Tower Forces - With Ice - Wind Normal To Face

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	q_z psf	D_F	D_R	A_E ft^2	F K	w plf	Ctrl. Face
T1	0.43	3.09	A	0.352	2.166	6	1	1	36.068	0.55	27.66	C
180.00-160.00			B	0.352	2.166		1	1	36.068			
			C	0.352	2.166		1	1	36.068			
T2	0.77	3.87	A	0.321	2.241	6	1	1	37.744	0.67	33.57	C
160.00-140.00			B	0.321	2.241		1	1	37.744			
			C	0.321	2.241		1	1	37.744			
T3	1.08	4.46	A	0.268	2.385	6	1	1	39.182	0.78	38.85	C
140.00-120.00			B	0.268	2.385		1	1	39.182			
			C	0.268	2.385		1	1	39.182			
T4	1.31	5.85	A	0.264	2.396	6	1	1	47.744	0.90	44.84	C
120.00-100.00			B	0.264	2.396		1	1	47.744			
			C	0.264	2.396		1	1	47.744			
T5	1.52	6.67	A	0.261	2.404	5	1	1	55.024	0.99	49.29	C
100.00-80.00			B	0.261	2.404		1	1	55.024			
			C	0.261	2.404		1	1	55.024			
T6	1.67	6.95	A	0.215	2.546	5	1	1	51.136	0.95	47.66	C
80.00-60.00			B	0.215	2.546		1	1	51.136			
			C	0.215	2.546		1	1	51.136			

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	q_z psf	D_F	D_R	A_E ft^2	F K	w plf	Ctrl. Face
T7	1.61	8.87	A	0.223	2.52	4	1	1	60.802	0.95	47.27	C
60.00-40.00			B	0.223	2.52		1	1	60.802			
			C	0.223	2.52		1	1	60.802			
T8	1.52	9.05	A	0.208	2.569	4	1	1	63.132	0.84	41.87	C
40.00-20.00			B	0.208	2.569		1	1	63.132			
			C	0.208	2.569		1	1	63.132			
T9 20.00-0.00	1.36	8.99	A	0.193	2.619	4	1	1	64.688	0.84	42.18	C
			B	0.193	2.619		1	1	64.688			
			C	0.193	2.619		1	1	64.688			
Sum Weight:	11.26	57.81						OTM	630.69 kip-ft	7.46		

Tower Forces - With Ice - Wind 45 To Face

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	q_z psf	D_F	D_R	A_E ft^2	F K	w plf	Ctrl. Face
T1	0.43	3.09	A	0.352	2.166	6	0.825	1	33.972	0.53	26.45	C
180.00-160.00			B	0.352	2.166		0.825	1	33.972			
			C	0.352	2.166		0.825	1	33.972			
T2	0.77	3.87	A	0.321	2.241	6	0.825	1	35.499	0.65	32.28	C
160.00-140.00			B	0.321	2.241		0.825	1	35.499			
			C	0.321	2.241		0.825	1	35.499			
T3	1.08	4.46	A	0.268	2.385	6	0.825	1	36.697	0.75	37.39	C
140.00-120.00			B	0.268	2.385		0.825	1	36.697			
			C	0.268	2.385		0.825	1	36.697			
T4	1.31	5.85	A	0.264	2.396	6	0.825	1	44.309	0.86	42.91	C
120.00-100.00			B	0.264	2.396		0.825	1	44.309			
			C	0.264	2.396		0.825	1	44.309			
T5	1.52	6.67	A	0.261	2.404	5	0.825	1	51.157	0.94	47.23	C
100.00-80.00			B	0.261	2.404		0.825	1	51.157			
			C	0.261	2.404		0.825	1	51.157			
T6	1.67	6.95	A	0.215	2.546	5	0.825	1	47.444	0.91	45.72	C
80.00-60.00			B	0.215	2.546		0.825	1	47.444			
			C	0.215	2.546		0.825	1	47.444			
T7	1.61	8.87	A	0.223	2.52	4	0.825	1	56.205	0.90	45.10	C
60.00-40.00			B	0.223	2.52		0.825	1	56.205			
			C	0.223	2.52		0.825	1	56.205			
T8	1.52	9.05	A	0.208	2.569	4	0.825	1	58.114	0.80	39.79	C
40.00-20.00			B	0.208	2.569		0.825	1	58.114			
			C	0.208	2.569		0.825	1	58.114			
T9 20.00-0.00	1.36	8.99	A	0.193	2.619	4	0.825	1	59.245	0.80	39.87	C
			B	0.193	2.619		0.825	1	59.245			
			C	0.193	2.619		0.825	1	59.245			
Sum Weight:	11.26	57.81						OTM	604.35 kip-ft	7.13		

Tower Forces - With Ice - Wind 60 To Face

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	q_z psf	D_F	D_R	A_E ft^2	F K	w plf	Ctrl. Face
T1	0.43	3.09	A	0.352	2.166	6	0.8	1	33.672	0.53	26.28	C
180.00-160.00			B	0.352	2.166		0.8	1	33.672			
			C	0.352	2.166		0.8	1	33.672			
T2	0.77	3.87	A	0.321	2.241	6	0.8	1	35.178	0.64	32.10	C
160.00-140.00			B	0.321	2.241		0.8	1	35.178			
			C	0.321	2.241		0.8	1	35.178			
T3	1.08	4.46	A	0.268	2.385	6	0.8	1	36.342	0.74	37.18	C
140.00-120.00			B	0.268	2.385		0.8	1	36.342			
			C	0.268	2.385		0.8	1	36.342			
T4	1.31	5.85	A	0.264	2.396	6	0.8	1	43.818	0.85	42.63	C
120.00-100.00			B	0.264	2.396		0.8	1	43.818			
			C	0.264	2.396		0.8	1	43.818			
T5	1.52	6.67	A	0.261	2.404	5	0.8	1	50.604	0.94	46.94	C
100.00-80.00			B	0.261	2.404		0.8	1	50.604			
			C	0.261	2.404		0.8	1	50.604			
T6	1.67	6.95	A	0.215	2.546	5	0.8	1	46.917	0.91	45.44	C
80.00-60.00			B	0.215	2.546		0.8	1	46.917			
			C	0.215	2.546		0.8	1	46.917			
T7	1.61	8.87	A	0.223	2.52	4	0.8	1	55.548	0.90	44.79	C
60.00-40.00			B	0.223	2.52		0.8	1	55.548			
			C	0.223	2.52		0.8	1	55.548			
T8	1.52	9.05	A	0.208	2.569	4	0.8	1	57.397	0.79	39.49	C
40.00-20.00			B	0.208	2.569		0.8	1	57.397			
			C	0.208	2.569		0.8	1	57.397			
T9 20.00-0.00	1.36	8.99	A	0.193	2.619	4	0.8	1	58.468	0.79	39.54	C
			B	0.193	2.619		0.8	1	58.468			
			C	0.193	2.619		0.8	1	58.468			
Sum Weight:	11.26	57.81						OTM	600.59 kip-ft	7.09		

Tower Forces - With Ice - Wind 90 To Face

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	q_z psf	D_F	D_R	A_E ft^2	F K	w plf	Ctrl. Face
T1	0.43	3.09	A	0.352	2.166	6	0.85	1	34.271	0.53	26.62	C
180.00-160.00			B	0.352	2.166		0.85	1	34.271			
			C	0.352	2.166		0.85	1	34.271			
T2	0.77	3.87	A	0.321	2.241	6	0.85	1	35.820	0.65	32.46	C
160.00-140.00			B	0.321	2.241		0.85	1	35.820			
			C	0.321	2.241		0.85	1	35.820			
T3	1.08	4.46	A	0.268	2.385	6	0.85	1	37.052	0.75	37.60	C
140.00-120.00			B	0.268	2.385		0.85	1	37.052			
			C	0.268	2.385		0.85	1	37.052			
T4	1.31	5.85	A	0.264	2.396	6	0.85	1	44.799	0.86	43.18	C
120.00-100.00			B	0.264	2.396		0.85	1	44.799			
			C	0.264	2.396		0.85	1	44.799			
T5	1.52	6.67	A	0.261	2.404	5	0.85	1	51.709	0.95	47.53	C
100.00-80.00			B	0.261	2.404		0.85	1	51.709			
			C	0.261	2.404		0.85	1	51.709			
T6	1.67	6.95	A	0.215	2.546	5	0.85	1	47.972	0.92	46.00	C
80.00-60.00			B	0.215	2.546		0.85	1	47.972			

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	q_z psf	D_F	D_R	A_E ft^2	F K	w plf	Ctrl. Face
			C	0.215	2.546		0.85	1	47.972			
T7	1.61	8.87	A	0.223	2.52	4	0.85	1	56.862	0.91	45.41	C
60.00-40.00			B	0.223	2.52		0.85	1	56.862			
			C	0.223	2.52		0.85	1	56.862			
T8	1.52	9.05	A	0.208	2.569	4	0.85	1	58.831	0.80	40.08	C
40.00-20.00			B	0.208	2.569		0.85	1	58.831			
			C	0.208	2.569		0.85	1	58.831			
T9 20.00-0.00	1.36	8.99	A	0.193	2.619	4	0.85	1	60.023	0.80	40.20	C
			B	0.193	2.619		0.85	1	60.023			
			C	0.193	2.619		0.85	1	60.023			
Sum Weight:	11.26	57.81						OTM	608.11 kip-ft	7.18		

Tower Forces - Service - Wind Normal To Face

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	q_z psf	D_F	D_R	A_E ft^2	F K	w plf	Ctrl. Face
T1	0.06	0.98	A	0.169	2.704	28	1	1	18.627	1.35	67.41	C
180.00-160.00			B	0.169	2.704		1	1	18.627			
			C	0.169	2.704		1	1	18.627			
T2	0.10	1.64	A	0.17	2.698	27	1	1	21.258	1.59	79.61	C
160.00-140.00			B	0.17	2.698		1	1	21.258			
			C	0.17	2.698		1	1	21.258			
T3	0.14	2.12	A	0.159	2.74	26	1	1	23.983	1.82	91.21	C
140.00-120.00			B	0.159	2.74		1	1	23.983			
			C	0.159	2.74		1	1	23.983			
T4	0.18	2.93	A	0.167	2.712	24	1	1	30.662	2.18	109.20	C
120.00-100.00			B	0.167	2.712		1	1	30.662			
			C	0.167	2.712		1	1	30.662			
T5	0.23	3.36	A	0.173	2.69	23	1	1	34.918	2.36	117.76	C
100.00-80.00			B	0.173	2.69		1	1	34.918			
			C	0.173	2.69		1	1	34.918			
T6	0.25	3.92	A	0.149	2.777	21	1	1	33.878	2.26	112.78	C
80.00-60.00			B	0.149	2.777		1	1	33.878			
			C	0.149	2.777		1	1	33.878			
T7	0.25	5.32	A	0.163	2.724	19	1	1	41.545	2.36	118.22	C
60.00-40.00			B	0.163	2.724		1	1	41.545			
			C	0.163	2.724		1	1	41.545			
T8	0.25	5.50	A	0.153	2.759	17	1	1	43.761	2.15	107.59	C
40.00-20.00			B	0.153	2.759		1	1	43.761			
			C	0.153	2.759		1	1	43.761			
T9 20.00-0.00	0.25	5.68	A	0.145	2.789	17	1	1	46.047	2.26	112.98	C
			B	0.145	2.789		1	1	46.047			
			C	0.145	2.789		1	1	46.047			
Sum Weight:	1.73	31.45						OTM	1520.63 kip-ft	18.34		

Tower Forces - Service - Wind 45 To Face

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	q_z psf	D_F	D_R	A_E ft²	F K	w plf	Ctrl. Face
T1	0.06	0.98	A	0.169	2.704	28	0.825	1	16.531	1.22	60.76	C
180.00-160.00			B	0.169	2.704		0.825	1	16.531			
			C	0.169	2.704		0.825	1	16.531			
T2	0.10	1.64	A	0.17	2.698	27	0.825	1	19.013	1.46	72.75	C
160.00-140.00			B	0.17	2.698		0.825	1	19.013			
			C	0.17	2.698		0.825	1	19.013			
T3	0.14	2.12	A	0.159	2.74	26	0.825	1	21.498	1.68	83.82	C
140.00-120.00			B	0.159	2.74		0.825	1	21.498			
			C	0.159	2.74		0.825	1	21.498			
T4	0.18	2.93	A	0.167	2.712	24	0.825	1	27.227	1.99	99.55	C
120.00-100.00			B	0.167	2.712		0.825	1	27.227			
			C	0.167	2.712		0.825	1	27.227			
T5	0.23	3.36	A	0.173	2.69	23	0.825	1	31.051	2.15	107.59	C
100.00-80.00			B	0.173	2.69		0.825	1	31.051			
			C	0.173	2.69		0.825	1	31.051			
T6	0.25	3.92	A	0.149	2.777	21	0.825	1	30.186	2.07	103.45	C
80.00-60.00			B	0.149	2.777		0.825	1	30.186			
			C	0.149	2.777		0.825	1	30.186			
T7	0.25	5.32	A	0.163	2.724	19	0.825	1	36.948	2.16	107.87	C
60.00-40.00			B	0.163	2.724		0.825	1	36.948			
			C	0.163	2.724		0.825	1	36.948			
T8	0.25	5.50	A	0.153	2.759	17	0.825	1	38.743	1.95	97.70	C
40.00-20.00			B	0.153	2.759		0.825	1	38.743			
			C	0.153	2.759		0.825	1	38.743			
T9 20.00-0.00	0.25	5.68	A	0.145	2.789	17	0.825	1	40.604	2.04	102.14	C
			B	0.145	2.789		0.825	1	40.604			
			C	0.145	2.789		0.825	1	40.604			
Sum Weight:	1.73	31.45						OTM	1387.21 kip-ft	16.71		

Tower Forces - Service - Wind 60 To Face

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	q_z psf	D_F	D_R	A_E ft²	F K	w plf	Ctrl. Face
T1	0.06	0.98	A	0.169	2.704	28	0.8	1	16.231	1.20	59.81	C
180.00-160.00			B	0.169	2.704		0.8	1	16.231			
			C	0.169	2.704		0.8	1	16.231			
T2	0.10	1.64	A	0.17	2.698	27	0.8	1	18.692	1.44	71.78	C
160.00-140.00			B	0.17	2.698		0.8	1	18.692			
			C	0.17	2.698		0.8	1	18.692			
T3	0.14	2.12	A	0.159	2.74	26	0.8	1	21.143	1.66	82.76	C
140.00-120.00			B	0.159	2.74		0.8	1	21.143			
			C	0.159	2.74		0.8	1	21.143			
T4	0.18	2.93	A	0.167	2.712	24	0.8	1	26.736	1.96	98.17	C
120.00-100.00			B	0.167	2.712		0.8	1	26.736			
			C	0.167	2.712		0.8	1	26.736			
T5	0.23	3.36	A	0.173	2.69	23	0.8	1	30.498	2.12	106.14	C
100.00-80.00			B	0.173	2.69		0.8	1	30.498			
			C	0.173	2.69		0.8	1	30.498			

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	q_z psf	D_F	D_R	A_E ft^2	F K	w plf	Ctrl. Face
T6	0.25	3.92	A	0.149	2.777	21	0.8	1	29.658	2.04	102.12	C
80.00-60.00			B	0.149	2.777		0.8	1	29.658			
			C	0.149	2.777		0.8	1	29.658			
T7	0.25	5.32	A	0.163	2.724	19	0.8	1	36.291	2.13	106.39	C
60.00-40.00			B	0.163	2.724		0.8	1	36.291			
			C	0.163	2.724		0.8	1	36.291			
T8	0.25	5.50	A	0.153	2.759	17	0.8	1	38.026	1.93	96.29	C
40.00-20.00			B	0.153	2.759		0.8	1	38.026			
			C	0.153	2.759		0.8	1	38.026			
T9 20.00-0.00	0.25	5.68	A	0.145	2.789	17	0.8	1	39.827	2.01	100.59	C
			B	0.145	2.789		0.8	1	39.827			
			C	0.145	2.789		0.8	1	39.827			
Sum Weight:	1.73	31.45						OTM	1368.14 kip-ft	16.48		

Tower Forces - Service - Wind 90 To Face

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	q_z psf	D_F	D_R	A_E ft^2	F K	w plf	Ctrl. Face
T1	0.06	0.98	A	0.169	2.704	28	0.85	1	16.830	1.23	61.71	C
180.00-160.00			B	0.169	2.704		0.85	1	16.830			
			C	0.169	2.704		0.85	1	16.830			
T2	0.10	1.64	A	0.17	2.698	27	0.85	1	19.334	1.47	73.73	C
160.00-140.00			B	0.17	2.698		0.85	1	19.334			
			C	0.17	2.698		0.85	1	19.334			
T3	0.14	2.12	A	0.159	2.74	26	0.85	1	21.853	1.70	84.87	C
140.00-120.00			B	0.159	2.74		0.85	1	21.853			
			C	0.159	2.74		0.85	1	21.853			
T4	0.18	2.93	A	0.167	2.712	24	0.85	1	27.718	2.02	100.93	C
120.00-100.00			B	0.167	2.712		0.85	1	27.718			
			C	0.167	2.712		0.85	1	27.718			
T5	0.23	3.36	A	0.173	2.69	23	0.85	1	31.603	2.18	109.04	C
100.00-80.00			B	0.173	2.69		0.85	1	31.603			
			C	0.173	2.69		0.85	1	31.603			
T6	0.25	3.92	A	0.149	2.777	21	0.85	1	30.713	2.10	104.78	C
80.00-60.00			B	0.149	2.777		0.85	1	30.713			
			C	0.149	2.777		0.85	1	30.713			
T7	0.25	5.32	A	0.163	2.724	19	0.85	1	37.604	2.19	109.35	C
60.00-40.00			B	0.163	2.724		0.85	1	37.604			
			C	0.163	2.724		0.85	1	37.604			
T8	0.25	5.50	A	0.153	2.759	17	0.85	1	39.460	1.98	99.11	C
40.00-20.00			B	0.153	2.759		0.85	1	39.460			
			C	0.153	2.759		0.85	1	39.460			
T9 20.00-0.00	0.25	5.68	A	0.145	2.789	17	0.85	1	41.382	2.07	103.69	C
			B	0.145	2.789		0.85	1	41.382			
			C	0.145	2.789		0.85	1	41.382			
Sum Weight:	1.73	31.45						OTM	1406.27 kip-ft	16.94		

Force Totals

Load Case	Vertical Forces K	Sum of Forces X K	Sum of Forces Z K	Sum of Overturning Moments, M_x kip-ft	Sum of Overturning Moments, M_z kip-ft	Sum of Torques kip-ft
Leg Weight	18.80					
Bracing Weight	12.65					
Total Member Self-Weight	31.45			10.01	-8.56	
Total Weight	41.94			10.01	-8.56	
Wind 0 deg - No Ice		-1.23	-39.01	-3705.42	204.73	-0.66
Wind 30 deg - No Ice		18.20	-31.45	-2980.26	-1743.26	-19.64
Wind 45 deg - No Ice		25.78	-25.31	-2392.03	-2491.52	-27.64
Wind 60 deg - No Ice		31.15	-17.79	-1686.36	-3006.47	-34.39
Wind 90 deg - No Ice		36.92	0.01	12.10	-3562.37	-40.23
Wind 120 deg - No Ice		33.89	19.34	1842.97	-3243.35	-36.28
Wind 135 deg - No Ice		26.70	26.30	2498.70	-2557.95	-30.82
Wind 150 deg - No Ice		18.29	31.09	2956.69	-1761.77	-22.45
Wind 180 deg - No Ice		0.24	34.98	3323.15	-48.26	-1.11
Wind 210 deg - No Ice		-17.94	31.01	2934.97	1685.06	20.59
Wind 225 deg - No Ice		-26.10	24.72	2318.02	2534.63	29.37
Wind 240 deg - No Ice		-34.57	18.30	1662.98	3341.04	36.94
Wind 270 deg - No Ice		-36.93	-0.84	-133.70	3557.20	42.42
Wind 300 deg - No Ice		-31.17	-18.08	-1742.47	3007.12	35.51
Wind 315 deg - No Ice		-25.91	-25.45	-2425.34	2510.77	28.13
Wind 330 deg - No Ice		-18.85	-31.39	-2980.18	1847.40	19.30
Member Ice	26.36					
Total Weight Ice	83.29			-58.50	-16.59	
Wind 0 deg - Ice		-0.18	-9.74	-998.67	14.70	1.38
Wind 30 deg - Ice		4.71	-8.14	-843.71	-471.09	-8.51
Wind 45 deg - Ice		6.67	-6.60	-694.43	-664.33	-12.78
Wind 60 deg - Ice		8.11	-4.66	-508.28	-804.35	-16.26
Wind 90 deg - Ice		9.49	0.00	-58.17	-938.03	-19.70
Wind 120 deg - Ice		8.45	4.85	408.04	-833.26	-18.01
Wind 135 deg - Ice		6.78	6.72	587.98	-671.79	-15.32
Wind 150 deg - Ice		4.72	8.09	720.66	-473.92	-11.47
Wind 180 deg - Ice		0.03	9.23	829.75	-22.37	-1.64
Wind 210 deg - Ice		-4.67	8.08	717.31	432.03	8.65
Wind 225 deg - Ice		-6.72	6.51	563.77	640.11	13.02
Wind 240 deg - Ice		-8.55	4.70	381.61	816.89	16.63
Wind 270 deg - Ice		-9.49	-0.12	-79.53	906.82	20.02
Wind 300 deg - Ice		-8.12	-4.70	-516.66	774.12	17.90
Wind 315 deg - Ice		-6.69	-6.62	-699.54	636.80	14.93
Wind 330 deg - Ice		-4.80	-8.14	-843.96	455.95	11.01
Total Weight	41.94			10.01	-8.56	
Wind 0 deg - Service		-0.75	-23.87	-2255.79	121.57	-0.34
Wind 30 deg - Service		11.15	-19.26	-1812.83	-1072.81	-11.79
Wind 45 deg - Service		15.79	-15.50	-1451.91	-1532.09	-16.62
Wind 60 deg - Service		19.08	-10.90	-1018.41	-1848.67	-20.70
Wind 90 deg - Service		22.60	0.00	25.04	-2189.24	-24.25
Wind 120 deg - Service		20.74	11.83	1148.58	-1991.97	-21.90
Wind 135 deg - Service		16.34	16.10	1551.87	-1572.27	-18.63
Wind 150 deg - Service		11.20	19.04	1834.00	-1084.01	-13.59
Wind 180 deg - Service		0.14	21.43	2059.97	-31.47	-0.73
Wind 210 deg - Service		-10.99	18.99	1820.86	1033.06	12.36
Wind 225 deg - Service		-15.98	15.15	1442.57	1553.62	17.66
Wind 240 deg - Service		-21.15	11.21	1039.69	2046.52	22.24
Wind 270 deg - Service		-22.61	-0.51	-63.17	2181.57	25.58
Wind 300 deg - Service		-19.09	-11.07	-1052.35	1844.52	21.43
Wind 315 deg - Service		-15.87	-15.59	-1472.06	1539.18	17.00
Wind 330 deg - Service		-11.54	-19.23	-1812.78	1131.27	11.68

Load Combinations

Comb. No.	Description
1	Dead Only
2	1.2 Dead+1.0 Wind 0 deg - No Ice
3	0.9 Dead+1.0 Wind 0 deg - No Ice
4	1.2 Dead+1.0 Wind 30 deg - No Ice
5	0.9 Dead+1.0 Wind 30 deg - No Ice
6	1.2 Dead+1.0 Wind 45 deg - No Ice
7	0.9 Dead+1.0 Wind 45 deg - No Ice
8	1.2 Dead+1.0 Wind 60 deg - No Ice
9	0.9 Dead+1.0 Wind 60 deg - No Ice
10	1.2 Dead+1.0 Wind 90 deg - No Ice
11	0.9 Dead+1.0 Wind 90 deg - No Ice
12	1.2 Dead+1.0 Wind 120 deg - No Ice
13	0.9 Dead+1.0 Wind 120 deg - No Ice
14	1.2 Dead+1.0 Wind 135 deg - No Ice
15	0.9 Dead+1.0 Wind 135 deg - No Ice
16	1.2 Dead+1.0 Wind 150 deg - No Ice
17	0.9 Dead+1.0 Wind 150 deg - No Ice
18	1.2 Dead+1.0 Wind 180 deg - No Ice
19	0.9 Dead+1.0 Wind 180 deg - No Ice
20	1.2 Dead+1.0 Wind 210 deg - No Ice
21	0.9 Dead+1.0 Wind 210 deg - No Ice
22	1.2 Dead+1.0 Wind 225 deg - No Ice
23	0.9 Dead+1.0 Wind 225 deg - No Ice
24	1.2 Dead+1.0 Wind 240 deg - No Ice
25	0.9 Dead+1.0 Wind 240 deg - No Ice
26	1.2 Dead+1.0 Wind 270 deg - No Ice
27	0.9 Dead+1.0 Wind 270 deg - No Ice
28	1.2 Dead+1.0 Wind 300 deg - No Ice
29	0.9 Dead+1.0 Wind 300 deg - No Ice
30	1.2 Dead+1.0 Wind 315 deg - No Ice
31	0.9 Dead+1.0 Wind 315 deg - No Ice
32	1.2 Dead+1.0 Wind 330 deg - No Ice
33	0.9 Dead+1.0 Wind 330 deg - No Ice
34	1.2 Dead+1.0 Ice+1.0 Temp
35	1.2 Dead+1.0 Wind 0 deg+1.0 Ice+1.0 Temp
36	1.2 Dead+1.0 Wind 30 deg+1.0 Ice+1.0 Temp
37	1.2 Dead+1.0 Wind 45 deg+1.0 Ice+1.0 Temp
38	1.2 Dead+1.0 Wind 60 deg+1.0 Ice+1.0 Temp
39	1.2 Dead+1.0 Wind 90 deg+1.0 Ice+1.0 Temp
40	1.2 Dead+1.0 Wind 120 deg+1.0 Ice+1.0 Temp
41	1.2 Dead+1.0 Wind 135 deg+1.0 Ice+1.0 Temp
42	1.2 Dead+1.0 Wind 150 deg+1.0 Ice+1.0 Temp
43	1.2 Dead+1.0 Wind 180 deg+1.0 Ice+1.0 Temp
44	1.2 Dead+1.0 Wind 210 deg+1.0 Ice+1.0 Temp
45	1.2 Dead+1.0 Wind 225 deg+1.0 Ice+1.0 Temp
46	1.2 Dead+1.0 Wind 240 deg+1.0 Ice+1.0 Temp
47	1.2 Dead+1.0 Wind 270 deg+1.0 Ice+1.0 Temp
48	1.2 Dead+1.0 Wind 300 deg+1.0 Ice+1.0 Temp
49	1.2 Dead+1.0 Wind 315 deg+1.0 Ice+1.0 Temp
50	1.2 Dead+1.0 Wind 330 deg+1.0 Ice+1.0 Temp
51	Dead+Wind 0 deg - Service
52	Dead+Wind 30 deg - Service
53	Dead+Wind 45 deg - Service
54	Dead+Wind 60 deg - Service
55	Dead+Wind 90 deg - Service

Comb. No.	Description
56	Dead+Wind 120 deg - Service
57	Dead+Wind 135 deg - Service
58	Dead+Wind 150 deg - Service
59	Dead+Wind 180 deg - Service
60	Dead+Wind 210 deg - Service
61	Dead+Wind 225 deg - Service
62	Dead+Wind 240 deg - Service
63	Dead+Wind 270 deg - Service
64	Dead+Wind 300 deg - Service
65	Dead+Wind 315 deg - Service
66	Dead+Wind 330 deg - Service

Maximum Member Forces

Section No.	Elevation ft	Component Type	Condition	Gov. Load Comb.	Axial K	Major Axis Moment kip-ft	Minor Axis Moment kip-ft
T1	180 - 160	Leg	Max Tension	29	8.77	-0.15	0.04
			Max. Compression	24	-9.71	0.16	-0.00
			Max. Mx	2	1.25	0.44	-0.02
			Max. My	32	-0.43	-0.02	-0.60
			Max. Vy	28	0.34	-0.23	-0.01
			Max. Vx	16	0.48	0.00	-0.24
		Diagonal	Max Tension	10	2.13	0.00	0.00
			Max. Compression	10	-2.15	0.00	0.00
			Max. Mx	46	0.34	0.02	0.00
			Max. My	10	-1.96	0.00	-0.00
			Max. Vy	46	-0.02	0.02	0.00
			Max. Vx	10	0.00	0.00	0.00
		Top Girt	Max Tension	25	0.02	0.00	0.00
			Max. Compression	2	-0.05	0.00	0.00
			Max. Mx	34	-0.03	-0.05	0.00
			Max. My	47	-0.02	0.00	0.00
			Max. Vy	34	0.03	0.00	0.00
			Max. Vx	47	-0.00	0.00	0.00
T2	160 - 140	Leg	Max Tension	29	24.00	-0.18	0.14
			Max. Compression	24	-26.13	0.19	-0.02
			Max. Mx	8	16.21	0.42	0.08
			Max. My	16	-0.97	-0.04	0.65
			Max. Vy	8	-0.41	-0.36	0.08
			Max. Vx	16	-0.50	-0.04	-0.33
		Diagonal	Max Tension	10	3.10	0.00	0.00
			Max. Compression	10	-3.10	0.00	0.00
			Max. Mx	48	0.47	0.03	0.00
			Max. My	30	-2.42	0.01	0.00
			Max. Vy	48	0.03	0.03	0.00
			Max. Vx	50	-0.00	0.00	0.00
		Top Girt	Max Tension	25	0.06	0.00	0.00
			Max. Compression	26	-0.07	0.00	0.00
			Max. Mx	34	-0.01	-0.05	0.00
			Max. My	47	-0.01	0.00	0.00
			Max. Vy	34	0.03	0.00	0.00
			Max. Vx	47	0.00	0.00	0.00
T3	140 - 120	Leg	Max Tension	29	40.72	-0.23	0.01
			Max. Compression	24	-48.66	0.28	-0.01
			Max. Mx	8	25.30	-0.39	0.06
			Max. My	26	-6.03	0.01	-0.36
			Max. Vy	8	-0.24	-0.39	0.06
			Max. Vx	10	-0.27	-0.00	0.35

Section No.	Elevation ft	Component Type	Condition	Gov. Load Comb.	Axial K	Major Axis Moment kip-ft	Minor Axis Moment kip-ft
		Diagonal	Max Tension	10	3.55	0.00	0.00
			Max. Compression	10	-3.63	0.00	0.00
			Max. Mx	48	0.76	0.06	0.01
			Max. My	47	-0.51	0.05	-0.01
			Max. Vy	48	0.04	0.06	0.01
			Max. Vx	47	0.00	0.00	0.00
T4	120 - 100	Leg	Max Tension	29	57.79	-0.78	0.01
			Max. Compression	24	-71.14	0.33	0.09
			Max. Mx	28	56.73	-0.80	0.01
			Max. My	10	-4.15	-0.05	-0.79
			Max. Vy	18	0.50	-0.77	-0.00
			Max. Vx	26	0.50	-0.03	-0.70
		Diagonal	Max Tension	4	4.88	0.00	0.00
			Max. Compression	4	-4.90	0.00	0.00
			Max. Mx	48	0.69	0.09	-0.01
			Max. My	47	-0.65	0.08	-0.01
			Max. Vy	48	0.06	0.09	-0.01
			Max. Vx	47	0.00	0.00	0.00
T5	100 - 80	Leg	Max Tension	29	79.13	-0.57	-0.01
			Max. Compression	24	-96.77	1.34	-0.09
			Max. Mx	12	-94.06	1.36	0.11
			Max. My	26	-12.46	0.05	-1.08
			Max. Vy	13	-0.32	1.35	0.11
			Max. Vx	27	0.34	0.05	-1.08
		Diagonal	Max Tension	4	5.76	0.00	0.00
			Max. Compression	4	-5.80	0.00	0.00
			Max. Mx	48	0.83	0.11	-0.01
			Max. My	47	-0.78	0.10	-0.01
			Max. Vy	48	0.07	0.11	-0.01
			Max. Vx	47	-0.00	0.00	0.00
T6	80 - 60	Leg	Max Tension	29	98.49	-0.58	-0.05
			Max. Compression	12	-120.49	1.26	0.13
			Max. Mx	28	93.23	-1.50	-0.13
			Max. My	27	-12.41	0.06	-1.29
			Max. Vy	28	0.33	-1.50	-0.13
			Max. Vx	10	-0.23	0.01	1.29
		Diagonal	Max Tension	4	6.56	0.00	0.00
			Max. Compression	4	-6.61	0.00	0.00
			Max. Mx	48	0.89	0.18	-0.03
			Max. My	47	-1.05	0.15	-0.03
			Max. Vy	48	0.09	0.18	-0.03
			Max. Vx	47	-0.01	0.00	0.00
T7	60 - 40	Leg	Max Tension	29	116.69	-1.17	-0.04
			Max. Compression	12	-146.11	1.26	0.04
			Max. Mx	43	7.89	-1.66	0.00
			Max. My	26	-17.31	0.04	-1.32
			Max. Vy	43	0.24	-1.66	0.00
			Max. Vx	26	0.22	0.04	-1.32
		Diagonal	Max Tension	14	7.39	0.00	0.00
			Max. Compression	14	-7.57	0.00	0.00
			Max. Mx	38	1.15	0.26	0.03
			Max. My	47	-0.90	0.23	-0.04
			Max. Vy	38	0.12	0.26	0.03
			Max. Vx	47	-0.01	0.00	0.00
T8	40 - 20	Leg	Max Tension	29	136.87	-1.24	-0.04
			Max. Compression	12	-171.82	1.51	0.03
			Max. Mx	38	13.15	-6.08	0.02
			Max. My	10	-12.43	-0.11	1.37
			Max. Vy	43	0.93	-6.07	0.01
			Max. Vx	10	0.22	-0.11	1.37
		Diagonal	Max Tension	14	7.94	0.00	0.00

Section No.	Elevation ft	Component Type	Condition	Gov. Load Comb.	Axial K	Major Axis Moment kip-ft	Minor Axis Moment kip-ft
			Max. Compression	14	-8.21	0.00	0.00
			Max. Mx	38	0.33	0.29	0.04
			Max. My	47	-1.76	0.25	-0.04
			Max. Vy	38	0.13	0.28	0.04
			Max. Vx	47	-0.01	0.00	0.00
T9	20 - 0	Leg	Max Tension	29	156.30	-1.36	-0.05
			Max. Compression	12	-196.98	0.00	0.00
			Max. Mx	40	-77.39	7.99	-0.02
			Max. My	10	-14.99	-0.20	2.42
			Max. Vy	43	-1.39	-6.07	0.01
			Max. Vx	10	0.41	-0.20	2.42
		Diagonal	Max Tension	30	8.57	0.00	0.00
			Max. Compression	14	-9.16	0.00	0.00
			Max. Mx	38	-1.81	0.36	0.05
			Max. My	47	-3.90	0.33	-0.05
			Max. Vy	38	0.13	0.36	0.05
			Max. Vx	47	0.01	0.00	0.00

Maximum Reactions

Location	Condition	Gov. Load Comb.	Vertical K	Horizontal, X K	Horizontal, Z K
Leg C	Max. Vert	24	202.82	20.54	-12.87
	Max. H_x	24	202.82	20.54	-12.87
	Max. H_z	7	-154.86	-16.12	11.01
	Min. Vert	9	-159.51	-16.88	10.76
	Min. H_x	9	-159.51	-16.88	10.76
	Min. H_z	24	202.82	20.54	-12.87
Leg B	Max. Vert	12	203.24	-20.51	-12.86
	Max. H_x	29	-161.01	16.96	10.83
	Max. H_z	31	-156.60	16.23	11.08
	Min. Vert	29	-161.01	16.96	10.83
	Min. H_x	12	203.24	-20.51	-12.86
	Min. H_z	12	203.24	-20.51	-12.86
Leg A	Max. Vert	2	201.77	0.00	24.16
	Max. H_x	26	23.36	4.04	1.94
	Max. H_z	2	201.77	0.00	24.16
	Min. Vert	19	-153.29	-0.03	-19.44
	Min. H_x	11	12.03	-3.98	1.03
	Min. H_z	19	-153.29	-0.03	-19.44

Tower Mast Reaction Summary

Load Combination	Vertical K	$Shear_x$ K	$Shear_z$ K	Overturning Moment, M_x kip-ft	Overturning Moment, M_z kip-ft	Torque kip-ft
Dead Only	41.94	0.00	0.00	10.00	-8.56	0.00
1.2 Dead+1.0 Wind 0 deg - No Ice	50.33	-1.23	-39.01	-3709.82	203.49	-0.68
0.9 Dead+1.0 Wind 0 deg - No Ice	37.75	-1.23	-39.01	-3711.23	205.94	-0.68
1.2 Dead+1.0 Wind 30 deg - No	50.33	18.20	-31.45	-2983.38	-1747.94	-19.64

Load Combination	Vertical K	$Shear_x$ K	$Shear_z$ K	Overturning Moment, M_x kip-ft	Overturning Moment, M_z kip-ft	Torque kip-ft
Ice 0.9 Dead+1.0 Wind 30 deg - No Ice	37.75	18.20	-31.45	-2985.11	-1744.63	-19.64
1.2 Dead+1.0 Wind 45 deg - No Ice	50.33	25.78	-25.31	-2394.14	-2497.52	-27.62
0.9 Dead+1.0 Wind 45 deg - No Ice	37.75	25.78	-25.31	-2396.12	-2493.88	-27.62
1.2 Dead+1.0 Wind 60 deg - No Ice	50.33	31.15	-17.79	-1687.27	-3013.36	-34.36
0.9 Dead+1.0 Wind 60 deg - No Ice	37.75	31.15	-17.79	-1689.55	-3009.49	-34.37
1.2 Dead+1.0 Wind 90 deg - No Ice	50.33	36.92	0.01	14.12	-3570.24	-40.18
0.9 Dead+1.0 Wind 90 deg - No Ice	37.75	36.92	0.01	11.11	-3566.13	-40.19
1.2 Dead+1.0 Wind 120 deg - No Ice	50.33	33.89	19.34	1848.15	-3250.66	-36.23
0.9 Dead+1.0 Wind 120 deg - No Ice	37.75	33.89	19.34	1844.35	-3246.69	-36.24
1.2 Dead+1.0 Wind 135 deg - No Ice	50.33	26.70	26.30	2505.02	-2564.08	-30.77
0.9 Dead+1.0 Wind 135 deg - No Ice	37.75	26.70	26.30	2500.93	-2560.41	-30.80
1.2 Dead+1.0 Wind 150 deg - No Ice	50.33	18.29	31.09	2963.80	-1766.52	-22.41
0.9 Dead+1.0 Wind 150 deg - No Ice	37.75	18.29	31.09	2959.51	-1763.20	-22.42
1.2 Dead+1.0 Wind 180 deg - No Ice	50.33	0.24	34.98	3330.89	-50.05	-1.10
0.9 Dead+1.0 Wind 180 deg - No Ice	37.75	0.24	34.98	3326.44	-47.47	-1.10
1.2 Dead+1.0 Wind 210 deg - No Ice	50.33	-17.94	31.01	2942.03	1686.26	20.59
0.9 Dead+1.0 Wind 210 deg - No Ice	37.75	-17.94	31.01	2937.75	1688.10	20.59
1.2 Dead+1.0 Wind 225 deg - No Ice	50.33	-26.10	24.72	2323.98	2537.38	29.34
0.9 Dead+1.0 Wind 225 deg - No Ice	37.75	-26.10	24.72	2319.98	2538.83	29.36
1.2 Dead+1.0 Wind 240 deg - No Ice	50.33	-34.57	18.30	1667.76	3345.18	36.90
0.9 Dead+1.0 Wind 240 deg - No Ice	37.75	-34.57	18.30	1664.05	3346.28	36.91
1.2 Dead+1.0 Wind 270 deg - No Ice	50.33	-36.93	-0.84	-132.01	3561.69	42.38
0.9 Dead+1.0 Wind 270 deg - No Ice	37.75	-36.93	-0.84	-134.94	3562.70	42.38
1.2 Dead+1.0 Wind 300 deg - No Ice	50.33	-31.17	-18.08	-1743.50	3010.66	35.46
0.9 Dead+1.0 Wind 300 deg - No Ice	37.75	-31.17	-18.08	-1745.75	3011.90	35.47
1.2 Dead+1.0 Wind 315 deg - No Ice	50.33	-25.91	-25.45	-2427.54	2513.45	28.08
0.9 Dead+1.0 Wind 315 deg - No Ice	37.75	-25.91	-25.45	-2429.50	2514.91	28.10
1.2 Dead+1.0 Wind 330 deg - No Ice	50.33	-18.85	-31.39	-2983.31	1848.95	19.26
0.9 Dead+1.0 Wind 330 deg - No Ice	37.75	-18.85	-31.39	-2985.04	1850.70	19.27
1.2 Dead+1.0 Ice+1.0 Temp	91.68	-0.00	0.00	-56.49	-18.30	-0.00
1.2 Dead+1.0 Wind 0 deg+1.0	91.68	-0.18	-9.74	-999.77	13.13	1.37

Load Combination	Vertical K	$Shear_x$ K	$Shear_z$ K	Overturning Moment, M_x kip-ft	Overturning Moment, M_z kip-ft	Torque kip-ft
Ice+1.0 Temp						
1.2 Dead+1.0 Wind 30 deg+1.0 Ice+1.0 Temp	91.68	4.71	-8.14	-844.31	-474.24	-8.52
1.2 Dead+1.0 Wind 45 deg+1.0 Ice+1.0 Temp	91.68	6.67	-6.60	-694.55	-668.11	-12.78
1.2 Dead+1.0 Wind 60 deg+1.0 Ice+1.0 Temp	91.68	8.11	-4.66	-507.82	-808.57	-16.27
1.2 Dead+1.0 Wind 90 deg+1.0 Ice+1.0 Temp	91.68	9.49	0.00	-56.27	-942.68	-19.71
1.2 Dead+1.0 Wind 120 deg+1.0 Ice+1.0 Temp	91.68	8.45	4.85	411.38	-837.53	-18.02
1.2 Dead+1.0 Wind 135 deg+1.0 Ice+1.0 Temp	91.68	6.78	6.72	591.93	-675.59	-15.33
1.2 Dead+1.0 Wind 150 deg+1.0 Ice+1.0 Temp	91.68	4.72	8.09	725.03	-477.09	-11.47
1.2 Dead+1.0 Wind 180 deg+1.0 Ice+1.0 Temp	91.68	0.03	9.23	834.47	-24.10	-1.63
1.2 Dead+1.0 Wind 210 deg+1.0 Ice+1.0 Temp	91.68	-4.67	8.08	721.67	431.76	8.65
1.2 Dead+1.0 Wind 225 deg+1.0 Ice+1.0 Temp	91.68	-6.72	6.51	567.63	640.52	13.03
1.2 Dead+1.0 Wind 240 deg+1.0 Ice+1.0 Temp	91.68	-8.55	4.70	384.85	817.82	16.64
1.2 Dead+1.0 Wind 270 deg+1.0 Ice+1.0 Temp	91.68	-9.49	-0.12	-77.73	908.08	20.03
1.2 Dead+1.0 Wind 300 deg+1.0 Ice+1.0 Temp	91.68	-8.12	-4.70	-516.23	774.96	17.90
1.2 Dead+1.0 Wind 315 deg+1.0 Ice+1.0 Temp	91.68	-6.69	-6.62	-699.69	637.21	14.93
1.2 Dead+1.0 Wind 330 deg+1.0 Ice+1.0 Temp	91.68	-4.80	-8.14	-844.56	455.77	11.01
Dead+Wind 0 deg - Service	41.94	-0.75	-23.87	-2272.82	120.71	-0.35
Dead+Wind 30 deg - Service	41.94	11.15	-19.26	-1829.21	-1075.44	-11.78
Dead+Wind 45 deg - Service	41.94	15.79	-15.50	-1467.77	-1535.39	-16.61
Dead+Wind 60 deg - Service	41.94	19.08	-10.90	-1033.65	-1852.43	-20.68
Dead+Wind 90 deg - Service	41.94	22.60	0.00	11.29	-2193.50	-24.22
Dead+Wind 120 deg - Service	41.94	20.74	11.83	1136.45	-1995.94	-21.88
Dead+Wind 135 deg - Service	41.94	16.35	16.10	1540.33	-1575.64	-18.61
Dead+Wind 150 deg - Service	41.94	11.20	19.04	1822.87	-1086.68	-13.57
Dead+Wind 180 deg - Service	41.94	0.14	21.43	2049.16	-32.62	-0.72
Dead+Wind 210 deg - Service	41.94	-10.99	18.99	1809.70	1033.45	12.36
Dead+Wind 225 deg - Service	41.94	-15.98	15.15	1430.85	1554.79	17.66
Dead+Wind 240 deg - Service	41.94	-21.15	11.21	1027.37	2048.41	22.22
Dead+Wind 270 deg - Service	41.94	-22.61	-0.51	-77.07	2183.63	25.55
Dead+Wind 300 deg - Service	41.94	-19.09	-11.07	-1067.66	1846.11	21.41
Dead+Wind 315 deg - Service	41.94	-15.87	-15.59	-1487.97	1540.33	16.97
Dead+Wind 330 deg - Service	41.94	-11.54	-19.23	-1829.17	1131.83	11.66

Solution Summary

Load Comb.	Sum of Applied Forces PX K	PY K	PZ K	Sum of Reactions PX K	PY K	PZ K	% Error
1	0.00	-41.94	0.00	0.00	41.94	0.00	0.000%
2	-1.23	-50.33	-39.01	1.23	50.33	39.01	0.000%
3	-1.23	-37.75	-39.01	1.23	37.75	39.01	0.000%
4	18.20	-50.33	-31.45	-18.20	50.33	31.45	0.000%
5	18.20	-37.75	-31.45	-18.20	37.75	31.45	0.000%

	Sum of Applied Forces			Sum of Reactions			
Load Comb.	PX K	PY K	PZ K	PX K	PY K	PZ K	% Error
6	25.78	-50.33	-25.31	-25.78	50.33	25.31	0.000%
7	25.78	-37.75	-25.31	-25.78	37.75	25.31	0.000%
8	31.15	-50.33	-17.79	-31.15	50.33	17.79	0.000%
9	31.15	-37.75	-17.79	-31.15	37.75	17.79	0.000%
10	36.92	-50.33	0.01	-36.92	50.33	-0.01	0.000%
11	36.92	-37.75	0.01	-36.92	37.75	-0.01	0.001%
12	33.89	-50.33	19.34	-33.89	50.33	-19.34	0.001%
13	33.89	-37.75	19.34	-33.89	37.75	-19.34	0.000%
14	26.70	-50.33	26.30	-26.70	50.33	-26.30	0.000%
15	26.70	-37.75	26.30	-26.70	37.75	-26.30	0.000%
16	18.29	-50.33	31.09	-18.29	50.33	-31.09	0.000%
17	18.29	-37.75	31.09	-18.29	37.75	-31.09	0.000%
18	0.24	-50.33	34.98	-0.24	50.33	-34.98	0.000%
19	0.24	-37.75	34.98	-0.24	37.75	-34.98	0.000%
20	-17.94	-50.33	31.01	17.94	50.33	-31.01	0.000%
21	-17.94	-37.75	31.01	17.94	37.75	-31.01	0.000%
22	-26.10	-50.33	24.72	26.10	50.33	-24.72	0.000%
23	-26.10	-37.75	24.72	26.10	37.75	-24.72	0.000%
24	-34.57	-50.33	18.30	34.57	50.33	-18.30	0.001%
25	-34.57	-37.75	18.30	34.57	37.75	-18.30	0.000%
26	-36.93	-50.33	-0.84	36.93	50.33	0.84	0.000%
27	-36.93	-37.75	-0.84	36.93	37.75	0.84	0.001%
28	-31.17	-50.33	-18.08	31.17	50.33	18.08	0.000%
29	-31.17	-37.75	-18.08	31.17	37.75	18.08	0.000%
30	-25.91	-50.33	-25.45	25.91	50.33	25.45	0.000%
31	-25.91	-37.75	-25.45	25.91	37.75	25.45	0.000%
32	-18.85	-50.33	-31.39	18.85	50.33	31.39	0.000%
33	-18.85	-37.75	-31.39	18.85	37.75	31.39	0.000%
34	0.00	-91.68	0.00	0.00	91.68	-0.00	0.000%
35	-0.18	-91.68	-9.74	0.18	91.68	9.74	0.000%
36	4.71	-91.68	-8.14	-4.71	91.68	8.14	0.000%
37	6.67	-91.68	-6.60	-6.67	91.68	6.60	0.000%
38	8.11	-91.68	-4.66	-8.11	91.68	4.66	0.000%
39	9.49	-91.68	0.00	-9.49	91.68	-0.00	0.000%
40	8.45	-91.68	4.85	-8.45	91.68	-4.85	0.000%
41	6.78	-91.68	6.72	-6.78	91.68	-6.72	0.000%
42	4.72	-91.68	8.09	-4.72	91.68	-8.09	0.000%
43	0.03	-91.68	9.23	-0.03	91.68	-9.23	0.000%
44	-4.67	-91.68	8.08	4.67	91.68	-8.08	0.000%
45	-6.72	-91.68	6.51	6.72	91.68	-6.51	0.000%
46	-8.55	-91.68	4.70	8.55	91.68	-4.70	0.000%
47	-9.49	-91.68	-0.12	9.49	91.68	0.12	0.000%
48	-8.12	-91.68	-4.70	8.12	91.68	4.70	0.000%
49	-6.69	-91.68	-6.62	6.69	91.68	6.62	0.000%
50	-4.80	-91.68	-8.14	4.80	91.68	8.14	0.000%
51	-0.75	-41.94	-23.87	0.75	41.94	23.87	0.000%
52	11.15	-41.94	-19.26	-11.15	41.94	19.26	0.000%
53	15.79	-41.94	-15.50	-15.79	41.94	15.50	0.000%
54	19.08	-41.94	-10.90	-19.08	41.94	10.90	0.000%
55	22.60	-41.94	0.00	-22.60	41.94	-0.00	0.000%
56	20.74	-41.94	11.83	-20.74	41.94	-11.83	0.000%
57	16.34	-41.94	16.10	-16.35	41.94	-16.10	0.001%
58	11.20	-41.94	19.04	-11.20	41.94	-19.04	0.000%
59	0.14	-41.94	21.43	-0.14	41.94	-21.43	0.000%
60	-10.99	-41.94	18.99	10.99	41.94	-18.99	0.000%
61	-15.98	-41.94	15.15	15.98	41.94	-15.15	0.001%
62	-21.15	-41.94	11.21	21.15	41.94	-11.21	0.000%
63	-22.61	-41.94	-0.51	22.61	41.94	0.51	0.000%
64	-19.09	-41.94	-11.07	19.09	41.94	11.07	0.000%
65	-15.87	-41.94	-15.59	15.87	41.94	15.59	0.000%
66	-11.54	-41.94	-19.23	11.54	41.94	19.23	0.000%

Non-Linear Convergence Results

Load Combination	Converged?	Number of Cycles	Displacement Tolerance	Force Tolerance
1	Yes	4	0.00000001	0.00000001
2	Yes	4	0.00000001	0.00000001
3	Yes	4	0.00000001	0.00000001
4	Yes	4	0.00000001	0.00000001
5	Yes	4	0.00000001	0.00000001
6	Yes	4	0.00000001	0.00000001
7	Yes	4	0.00000001	0.00000001
8	Yes	4	0.00000001	0.00000001
9	Yes	4	0.00000001	0.00000001
10	Yes	4	0.00000001	0.00000001
11	Yes	4	0.00000001	0.00000001
12	Yes	4	0.00000001	0.00000143
13	Yes	4	0.00000001	0.00000001
14	Yes	4	0.00000001	0.00000001
15	Yes	4	0.00000001	0.00000001
16	Yes	4	0.00000001	0.00000001
17	Yes	4	0.00000001	0.00000001
18	Yes	4	0.00000001	0.00000001
19	Yes	4	0.00000001	0.00000001
20	Yes	4	0.00000001	0.00000001
21	Yes	4	0.00000001	0.00000001
22	Yes	4	0.00000001	0.00000001
23	Yes	4	0.00000001	0.00000001
24	Yes	4	0.00000001	0.00000142
25	Yes	4	0.00000001	0.00000001
26	Yes	4	0.00000001	0.00000001
27	Yes	4	0.00000001	0.00000214
28	Yes	4	0.00000001	0.00000001
29	Yes	4	0.00000001	0.00000001
30	Yes	4	0.00000001	0.00000001
31	Yes	4	0.00000001	0.00000001
32	Yes	4	0.00000001	0.00000001
33	Yes	4	0.00000001	0.00000001
34	Yes	4	0.00000001	0.00000001
35	Yes	4	0.00000001	0.00000001
36	Yes	4	0.00000001	0.00000001
37	Yes	4	0.00000001	0.00000001
38	Yes	4	0.00000001	0.00000001
39	Yes	4	0.00000001	0.00000001
40	Yes	4	0.00000001	0.00000001
41	Yes	4	0.00000001	0.00000001
42	Yes	4	0.00000001	0.00000001
43	Yes	4	0.00000001	0.00000001
44	Yes	4	0.00000001	0.00000001
45	Yes	4	0.00000001	0.00000001
46	Yes	4	0.00000001	0.00000001
47	Yes	4	0.00000001	0.00000001
48	Yes	4	0.00000001	0.00000001
49	Yes	4	0.00000001	0.00000001
50	Yes	4	0.00000001	0.00000001
51	Yes	4	0.00000001	0.00000001
52	Yes	4	0.00000001	0.00000001
53	Yes	4	0.00000001	0.00000001
54	Yes	4	0.00000001	0.00000001
55	Yes	4	0.00000001	0.00000001

56	Yes	4	0.00000001	0.00000001
57	Yes	4	0.00000001	0.00000001
58	Yes	4	0.00000001	0.00000001
59	Yes	4	0.00000001	0.00000001
60	Yes	4	0.00000001	0.00000001
61	Yes	4	0.00000001	0.00000001
62	Yes	4	0.00000001	0.00000001
63	Yes	4	0.00000001	0.00000001
64	Yes	4	0.00000001	0.00000001
65	Yes	4	0.00000001	0.00000001
66	Yes	4	0.00000001	0.00000001

Maximum Tower Deflections - Service Wind

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
T1	180 - 160	3.787	62	0.1810	0.0318
T2	160 - 140	3.024	62	0.1693	0.0282
T3	140 - 120	2.327	62	0.1486	0.0262
T4	120 - 100	1.723	62	0.1235	0.0240
T5	100 - 80	1.220	62	0.1001	0.0213
T6	80 - 60	0.802	56	0.0763	0.0175
T7	60 - 40	0.481	56	0.0561	0.0127
T8	40 - 20	0.247	56	0.0385	0.0088
T9	20 - 0	0.085	62	0.0197	0.0046

Critical Deflections and Radius of Curvature - Service Wind

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
178.00	3' Whip	62	3.710	0.1800	0.0305	243911
177.00	DS2C003F36D-D	62	3.671	0.1795	0.0303	243911
170.00	PAD6-59BC	62	3.401	0.1759	0.0294	121955
168.00	DB222	62	3.324	0.1748	0.0291	101630
163.00	6' x 3" Dia Omni	62	3.135	0.1716	0.0285	71914
152.00	1142-2CN	62	2.735	0.1621	0.0274	56020
148.00	8' Dish	62	2.595	0.1579	0.0270	53831
144.00	DB222	62	2.459	0.1533	0.0266	51810
136.00	DB222	62	2.198	0.1436	0.0256	49469
132.00	DB222	62	2.073	0.1386	0.0251	48172
129.00	BNF800S-06	62	1.982	0.1348	0.0246	47085
110.00	MX08FRO665-21	62	1.460	0.1117	0.0228	53299
103.00	DB212-1	62	1.290	0.1036	0.0218	62251
84.00	220-3AN	56	0.878	0.0809	0.0184	47119
83.00	Andrew 2' w/Radome	56	0.858	0.0798	0.0182	46313
65.00	BNF800S-06	56	0.552	0.0608	0.0139	51543

Maximum Tower Deflections - Design Wind

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
T1	180 - 160	6.158	24	0.2941	0.0531
T2	160 - 140	4.917	24	0.2752	0.0473
T3	140 - 120	3.785	24	0.2411	0.0437
T4	120 - 100	2.805	24	0.2005	0.0400
T5	100 - 80	1.987	24	0.1628	0.0355
T6	80 - 60	1.305	24	0.1242	0.0292
T7	60 - 40	0.783	24	0.0912	0.0211
T8	40 - 20	0.403	24	0.0626	0.0146
T9	20 - 0	0.139	24	0.0320	0.0076

Critical Deflections and Radius of Curvature - Design Wind

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
178.00	3' Whip	24	6.032	0.2926	0.0512	147410
177.00	DS2C003F36D-D	24	5.969	0.2918	0.0510	147410
170.00	PAD6-59BC	24	5.530	0.2859	0.0494	73705
168.00	DB222	24	5.405	0.2841	0.0490	61421
163.00	6' x 3" Dia Omni	24	5.098	0.2788	0.0479	43463
152.00	1142-2CN	24	4.447	0.2633	0.0459	33983
148.00	8' Dish	24	4.221	0.2563	0.0452	32699
144.00	DB222	24	4.000	0.2489	0.0445	31510
136.00	DB222	24	3.576	0.2331	0.0428	30208
132.00	DB222	24	3.373	0.2249	0.0419	29617
129.00	BNF800S-06	24	3.226	0.2187	0.0411	29048
110.00	MX08FRO665-21	24	2.378	0.1815	0.0380	33122
103.00	DB212-1	24	2.101	0.1684	0.0363	38599
84.00	220-3AN	24	1.429	0.1317	0.0306	29087
83.00	Andrew 2' w/Radome	24	1.397	0.1298	0.0303	28585
65.00	BNF800S-06	24	0.899	0.0988	0.0230	31684

Bolt Design Data

Section No.	Elevation ft	Component Type	Bolt Grade	Bolt Size in	Number Of Bolts	Maximum Load per Bolt K	Allowable Load per Bolt K	Ratio Load / Allowable	Allowable Ratio	Criteria
T1	180	Leg	A325N	0.8750	4	2.19	41.56	0.053 ✓	1	Bolt Tension
		Diagonal	A325N	0.6250	1	2.13	7.83	0.272 ✓	1	Member Bearing
		Top Girt	A325N	0.6250	1	0.05	8.70	0.005 ✓	1	Member Bearing
T2	160	Leg	A325N	1.0000	4	6.00	54.52	0.110 ✓	1	Bolt Tension
		Diagonal	A325N	0.6250	1	3.10	10.44	0.297 ✓	1	Member Bearing
		Top Girt	A325N	0.6250	1	0.45	5.22	0.087 ✓	1	Member Bearing
T3	140	Leg	A325N	1.0000	6	6.79	54.52	0.124 ✓	1	Bolt Tension
		Diagonal	A325N	0.7500	1	3.55	12.62	0.281 ✓	1	Member Bearing
T4	120	Leg	A325N	1.0000	8	7.22	54.52	0.133 ✓	1	Bolt Tension

Section No.	Elevation ft	Component Type	Bolt Grade	Bolt Size in	Number Of Bolts	Maximum Load per Bolt K	Allowable Load per Bolt K	Ratio Load / Allowable	Allowable Ratio	Criteria
		Diagonal	A325N	0.7500	1	4.88	14.14	0.345 ✔	1	Member Bearing
T5	100	Leg	A325N	1.0000	8	9.89	54.52	0.181 ✔	1	Bolt Tension
		Diagonal	A325N	0.7500	1	5.76	14.14	0.407 ✔	1	Member Bearing
T6	80	Leg	A325N	1.0000	12	8.21	54.52	0.151 ✔	1	Bolt Tension
		Diagonal	A325N	0.7500	1	6.56	14.14	0.464 ✔	1	Member Bearing
T7	60	Leg	A325N	1.0000	12	9.72	54.52	0.178 ✔	1	Bolt Tension
		Diagonal	A325N	0.7500	1	7.39	17.67	0.418 ✔	1	Member Bearing
T8	40	Leg	A325N	1.0000	12	11.41	54.52	0.209 ✔	1	Bolt Tension
		Diagonal	A325N	0.7500	1	7.94	17.67	0.449 ✔	1	Member Bearing
T9	20	Leg	F1554-105	1.0000	12	13.02	56.79	0.229 ✔	1	Bolt Tension
		Diagonal	A325N	0.7500	1	8.57	17.67	0.485 ✔	1	Member Bearing

Compression Checks

Leg Design Data (Compression)

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	A in^2	P_u K	ϕP_n K	Ratio $\frac{P_u}{\phi P_n}$
T1	180 - 160	ROHN 3 STD	20.00	4.00	41.3 K=1.00	2.2285	-9.71	88.55	0.110 [1] ✔
T2	160 - 140	ROHN 4 EH	20.04	5.01	40.7 K=1.00	4.4074	-26.13	175.71	0.149 [1] ✔
T3	140 - 120	ROHN 5 EH	20.04	6.68	43.6 K=1.00	6.1120	-48.66	239.38	0.203 [1] ✔
T4	120 - 100	ROHN 6 EH	20.04	6.68	36.5 K=1.00	8.4049	-71.14	343.08	0.207 [1] ✔
T5	100 - 80	ROHN 8 EHS	20.03	6.68	27.4 K=1.00	9.7193	-96.77	413.94	0.234 [1] ✔
T6	80 - 60	ROHN 8 EH	20.04	10.02	41.8 K=1.00	12.7627	-120.49	505.52	0.238 [1] ✔
T7	60 - 40	ROHN 10 EH	20.03	10.02	33.1 K=1.00	16.1007	-146.11	668.66	0.219 [1] ✔
T8	40 - 20	ROHN 10 EH	20.03	10.02	33.1 K=1.00	16.1007	-171.82	668.66	0.257 [1] ✔
T9	20 - 0	ROHN 10 EH	20.03	10.02	33.1 K=1.00	16.1007	-196.98	668.66	0.295 [1] ✔

[1] P_u / ϕP_n controls

Diagonal Design Data (Compression)

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	A in^2	P_u K	ϕP_n K	Ratio $\frac{P_u}{\phi P_n}$
T1	180 - 160	L1 3/4x1 3/4x3/16	7.85	3.64	127.2 K=1.00	0.6211	-2.15	10.99	0.196 [1] ✔
T2	160 - 140	L2x2x1/4	9.93	4.78	146.6 K=1.00	0.9380	-3.10	12.49	0.248 [1] ✔
T3	140 - 120	L2 1/2x2 1/2x1/4	12.50	6.04	147.7 K=1.00	1.1900	-3.63	15.61	0.233 [1] ✔
T4	120 - 100	L3x3x1/4	14.34	6.92	140.4 K=1.00	1.4400	-4.90	20.92	0.234 [1] ✔
T5	100 - 80	L3x3x1/4	16.11	7.70	156.1 K=1.00	1.4400	-5.80	16.90	0.343 [1] ✔
T6	80 - 60	L3 1/2x3 1/2x1/4	19.39	9.45	163.5 K=1.00	1.6900	-6.61	18.10	0.365 [1] ✔
T7	60 - 40	L4x4x5/16	21.17	10.23	155.1 K=1.00	2.4000	-7.57	28.55	0.265 [1] ✔
T8	40 - 20	L4x4x5/16	22.95	11.12	168.7 K=1.00	2.4000	-8.21	24.14	0.340 [1] ✔
T9	20 - 0	L4x4x5/16	24.77	12.03	182.5 K=1.00	2.4000	-9.16	20.62	0.444 [1] ✔

[1] P_u / ϕP_n controls

Top Girt Design Data (Compression)

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	A in^2	P_u K	ϕP_n K	Ratio $\frac{P_u}{\phi P_n}$
T1	180 - 160	L2x2x1/8	6.69	6.16	185.8 K=1.00	0.4844	-0.05	4.01	0.011 [1] ✔
T2	160 - 140	L2x2x1/8	6.76	6.15	185.5 K=1.00	0.4844	-0.45	4.03	0.113 [1] ✔

[1] P_u / ϕP_n controls

Tension Checks

Leg Design Data (Tension)

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	A in^2	P_u K	ϕP_n K	Ratio $\frac{P_u}{\phi P_n}$
T1	180 - 160	ROHN 3 STD	20.00	4.00	41.3	2.2285	8.77	100.28	0.087 [1] ✔

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	A in^2	P_u K	ϕP_n K	Ratio $\frac{P_u}{\phi P_n}$
T2	160 - 140	ROHN 4 EH	20.04	5.01	40.7	4.4074	24.00	198.34	0.121 [1] ✔
T3	140 - 120	ROHN 5 EH	20.04	6.68	43.6	6.1120	40.72	275.04	0.148 [1] ✔
T4	120 - 100	ROHN 6 EH	20.04	6.68	36.5	8.4049	57.79	378.22	0.153 [1] ✔
T5	100 - 80	ROHN 8 EHS	20.03	6.68	27.4	9.7193	79.13	437.37	0.181 [1] ✔
T6	80 - 60	ROHN 8 EH	20.04	10.02	41.8	12.7627	98.49	574.32	0.171 [1] ✔
T7	60 - 40	ROHN 10 EH	20.03	10.02	33.1	16.1007	116.69	724.53	0.161 [1] ✔
T8	40 - 20	ROHN 10 EH	20.03	10.02	33.1	16.1007	136.87	724.53	0.189 [1] ✔
T9	20 - 0	ROHN 10 EH	20.03	10.02	33.1	16.1007	156.30	724.53	0.216 [1] ✔

[1] P_u / ϕP_n controls

Diagonal Design Data (Tension)

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	A in^2	P_u K	ϕP_n K	Ratio $\frac{P_u}{\phi P_n}$
T1	180 - 160	L1 3/4x1 3/4x3/16	7.85	3.64	84.0	0.6211	2.13	20.12	0.106 [1] ✔
T2	160 - 140	L2x2x1/4	9.93	4.78	96.5	0.9380	3.10	30.39	0.102 [1] ✔
T3	140 - 120	L2 1/2x2 1/2x1/4	12.50	6.04	96.4	1.1900	3.55	38.56	0.092 [1] ✔
T4	120 - 100	L3x3x1/4	14.34	6.92	91.1	1.2213	4.88	59.54	0.082 [1] ✔
T5	100 - 80	L3x3x1/4	16.11	7.70	101.1	1.2213	5.76	59.54	0.097 [1] ✔
T6	80 - 60	L3 1/2x3 1/2x1/4	19.39	9.45	105.6	1.4713	6.56	71.72	0.091 [1] ✔
T7	60 - 40	L4x4x5/16	21.17	10.23	100.3	2.1266	7.39	103.67	0.071 [1] ✔
T8	40 - 20	L4x4x5/16	22.95	11.12	108.9	2.1266	7.94	103.67	0.077 [1] ✔
T9	20 - 0	L4x4x5/16	24.77	12.03	117.7	2.1266	8.57	103.67	0.083 [1] ✔

[1] P_u / ϕP_n controls

Top Girt Design Data (Tension)

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	A in^2	P_u K	ϕP_n K	Ratio $\frac{P_u}{\phi P_n}$
T1	180 - 160	L2x2x1/8	6.69	6.16	122.6	0.4844	0.02	15.69	0.001 [1] ✔
T2	160 - 140	L2x2x1/8	6.76	6.15	122.4	0.4844	0.45	15.69	0.029 [1] ✔

[1] P_u / ϕP_n controls

Section Capacity Table

Section No.	Elevation ft	Component Type	Size	Critical Element	P K	ϕP_{allow} K	% Capacity	Pass Fail
T1	180 - 160	Leg	ROHN 3 STD	1	-9.71	88.55	11.0	Pass
T2	160 - 140	Leg	ROHN 4 EH	37	-26.13	175.71	14.9	Pass
T3	140 - 120	Leg	ROHN 5 EH	67	-48.66	239.38	20.3	Pass
T4	120 - 100	Leg	ROHN 6 EH	88	-71.14	343.08	20.7	Pass
T5	100 - 80	Leg	ROHN 8 EHS	109	-96.77	413.94	23.4	Pass
T6	80 - 60	Leg	ROHN 8 EH	131	-120.49	505.52	23.8	Pass
T7	60 - 40	Leg	ROHN 10 EH	146	-146.11	668.66	21.9	Pass
T8	40 - 20	Leg	ROHN 10 EH	161	-171.82	668.66	25.7	Pass
T9	20 - 0	Leg	ROHN 10 EH	176	-196.98	668.66	29.5	Pass
T1	180 - 160	Diagonal	L1 3/4x1 3/4x3/16	8	-2.15	10.99	19.6 27.2 (b)	Pass
T2	160 - 140	Diagonal	L2x2x1/4	44	-3.10	12.49	24.8 29.7 (b)	Pass
T3	140 - 120	Diagonal	L2 1/2x2 1/2x1/4	71	-3.63	15.61	23.3 28.1 (b)	Pass
T4	120 - 100	Diagonal	L3x3x1/4	95	-4.90	20.92	23.4 34.5 (b)	Pass
T5	100 - 80	Diagonal	L3x3x1/4	116	-5.80	16.90	34.3 40.7 (b)	Pass
T6	80 - 60	Diagonal	L3 1/2x3 1/2x1/4	137	-6.61	18.10	36.5 46.4 (b)	Pass
T7	60 - 40	Diagonal	L4x4x5/16	150	-7.57	28.55	26.5 41.8 (b)	Pass
T8	40 - 20	Diagonal	L4x4x5/16	165	-8.21	24.14	34.0 44.9 (b)	Pass
T9	20 - 0	Diagonal	L4x4x5/16	180	-9.16	20.62	44.4 48.5 (b)	Pass
T1	180 - 160	Top Girt	L2x2x1/8	6	-0.05	4.01	1.1	Pass
T2	160 - 140	Top Girt	L2x2x1/8	42	-0.45	4.03	11.3	Pass
							Summary	
							Leg (T9) 29.5	Pass
							Diagonal (T9) 48.5	Pass
							Top Girt (T2) 11.3	Pass
							Bolt Checks 48.5	Pass
							RATING = 48.5	**Pass**

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:	Anchor Bolt Analysis
Location:	180-ft Lattice Tower Montville, CT
Rev. 1: 10/12/22	Prepared by: T.J.L. Checked by: C.F.C. Job No. 22042.01

Anchor Bolt Analysis:

Input Data:

Tower Reactions:

Tension Force =	Tension := 161·kips	(Input From tnxTower)
Compression Force =	Compression := 203·kips	(Input From tnxTower)
Shear Force =	Shear := 24·kips	(Input From tnxTower)

Anchor Bolt Data:

ASTM F1554-105

Number of Anchor Bolts =	N := 12	(User Input)
Bolt Ultimate Strength =	F_u := 125·ksi	(User Input)
Bolt Yield Strength =	F_y := 105·ksi	(User Input)
Bolt Modulus =	E := 29000·ksi	(User Input)
Diameter of Anchor Bolts =	D := 1.0·in	(User Input)
Threads per Inch =	n := 8	(User Input)
Length from Top of Pier to Bottom of Leveling Nut =	L_{ar} := 0·in	(User Input)

Anchor Bolt Analysis:

Calculated Anchor Bolt Properties:

Gross Area of Bolt = $A_g := \frac{\pi}{4} \cdot D^2 = 0.785 \cdot in^2$

Net Area of Bolt = $A_n := \frac{\pi}{4} \cdot \left(D - \frac{0.9743 \cdot in}{n} \right)^2 = 0.606 \cdot in^2$

Net Diameter = $D_n := \frac{2 \cdot \sqrt{A_n}}{\sqrt{\pi}} = 0.878 \cdot in$

Radius of Gyration of Bolt = $r := \frac{D_n}{4} = 0.22 \cdot in$

Elastic Section Modulus of Bolt = $S_x := \frac{\pi \cdot D_n^3}{32} = 0.066 \cdot in^3$

Plastic Section Modulus of Bolt = $Z_x := \frac{D_n^3}{6} = 0.113 \cdot in^3$

Anchor Bolt Design Strength:

Resistance Factor for Flexure = $\phi_f := 0.9$

Resistance Factor for Compression = $\phi_c := 0.9$

Resistance Factor for Tension = $\phi_t := 0.75$

Resistance Factor for Shear = $\phi_v := 0.75$

Design Tensile Strength = $\Phi R_{nt} := \phi_t \cdot F_u \cdot A_n = 56.8 \cdot k$

Design Compression Strength = $\Phi R_{nc} := \phi_c \cdot F_y \cdot A_g = 74.2 \cdot k$

Design Shear Strength (Tension) = $\Phi R_{nv} := \phi_v \cdot 0.5 F_u \cdot A_g = 36.8 \cdot k$

Design Shear Strength (Compression) = $\Phi R_{nvc} := \phi_c \cdot 0.6 F_y \cdot A_g \cdot 0.75 = 33.4 \cdot k$

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Subject:	Anchor Bolt Analysis
Location:	180-ft Lattice Tower Montville, CT
Rev. 1: 10/12/22	Prepared by: T.J.L. Checked by: C.F.C. Job No. 22042.01

Check Anchor Bolt Tension Force:

Maximum Tensile Force = $P_{ut} := \frac{Tension}{N} = 13.4 \cdot kips$

Maximum Compressive Force = $P_{uc} := \frac{Compression}{N} = 16.9 \cdot kips$

Maximum Shear Force = $V_u := \frac{Shear}{N} = 2 \cdot kips$

Condition1 = $Condition1 := if\left[\left[\left(\frac{P_{ut}}{\Phi R_{nt}}\right)^2 + \left(\frac{V_u}{\Phi R_{nv}}\right)^2\right] \le 1.00, "OK", "Overstressed"\right]$

Condition1 = "OK"

Condition2 = $Condition2 := if\left[\left[\left(\frac{P_{uc}}{\Phi R_{nc}}\right) + \left(\frac{V_u}{\Phi R_{nvc}}\right)^2\right] \le 1.00, "OK", "Overstressed"\right]$

Condition2 = "OK"

Bolt % of Capacity = $\max\left[\left(\frac{P_{ut}}{\Phi R_{nt}}\right)^2 + \left(\frac{V_u}{\Phi R_{nv}}\right)^2, \left(\frac{P_{uc}}{\Phi R_{nc}}\right) + \left(\frac{V_u}{\Phi R_{nvc}}\right)^2\right] = 23.2 \cdot \%$

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:	FOUNDATION ANALYSIS
Location:	Montville, CT
Rev. 1: 10/12/22	Prepared by: T.J.L. Checked by: C.F.C. Job No. 22042.01

Pier and Mat Foundation Analysis:

Input Data:

Tower Data

Overturning Moment =	$OM := 3739 \cdot ft \cdot kips$	(User Input from tnxTower)	
Shear Force =	$S_t := 39 \cdot kip$	(User Input from tnxTower)	
Axial Force =	$WT_t := 50 \cdot kip$	(User Input from tnxTower)	
Max Compression Force =	$C_t := 203 \cdot kip$	(User Input from tnxTower)	
Max Uplift Force =	$U_t := 161 \cdot kip$	(User Input from tnxTower)	
Tower Height =	$H_t := 180 \cdot ft$	(User Input)	
Tower Width =	$W_t := 23.16 \cdot ft$	(User Input)	
Tower Position on Foundation (1=offset, 2=centered) =	$Pos_t := 1$	(User Input)	

Footing Data:

Overall Depth of Footing =	$D_f := 5.5 \cdot ft$	(User Input)	
Length of Pier =	$L_p := 3.5 \cdot ft$	(User Input)	
Extension of Pier Above Grade =	$L_{pag} := 0.5 \cdot ft$	(User Input)	
Diameter of Pier =	$d_p := 4.0 \cdot ft$	(User Input)	
Thickness of Footing =	$T_f := 2.5 \cdot ft$	(User Input)	
Width of Footing =	$W_f := 33 \cdot ft$	(User Input)	

Material Properties:

Concrete Compressive Strength =	$f_c := 4000 \cdot psi$	(User Input)	
Steel Reinforcment Yield Strength =	$f_y := 60000 \cdot psi$	(User Input)	
Internal Friction Angle of Soil =	$\Phi_s := 34 \cdot deg$	(User Input)	
Ultimate Soil Bearing Capacity =	$q_s := 12000 \cdot psf$	(User Input)	
Unit Weight of Soil =	$\gamma_{soil} := 125 \cdot pcf$	(User Input)	
Unit Weight of Concrete =	$\gamma_{conc} := 150 \cdot pcf$	(User Input)	
Foundation Bouyancy =	$Bouyancy := 0$	(User Input)	(Yes=1 / No=0)
Depth to Neglect =	$n := 0 \cdot ft$	(User Input)	
Cohesion of Clay Type Soil =	$c := 0 \cdot ksf$	(User Input)	(Use 0 for Sandy Soil)
Seismic Zone Factor =	$Z := 2$	(User Input)	(UBC-1997 Fig 23-2)
Coefficient of Friction Between Concrete =	$\mu := 0.45$	(User Input)	

Pier Reinforcement:

Bar Size =	$BS_{pier} := 8$	(User Input)	
Bar Diameter =	$d_{bpier} := 1.0 \cdot in$	(User Input)	
Number of Bars =	$NB_{pier} := 16$	(User Input)	
Clear Cover of Reinforcement =	$Cvr_{pier} := 3 \cdot in$	(User Input)	
Reinforcement Location Factor =	$\alpha_{pier} := 1.0$	(User Input)	(ACI-2008 12.2.4)
Coating Factor =	$\beta_{pier} := 1.0$	(User Input)	(ACI-2008 12.2.4)
Concrete Strength Factor =	$\lambda_{pier} := 1.0$	(User Input)	(ACI-2008 12.2.4)
Reinforcement Size Factor =	$\gamma_{pier} := 1.0$	(User Input)	(ACI-2008 12.2.4)
Diameter of Tie =	$d_{Tie} := 0.5 \cdot in$	(User Input)	

Pad Reinforcement:

Bar Size =	$BS_{top} := 8$	(User Input)	(Top of Pad)
Bar Diameter =	$d_{btop} := 1.0 \cdot in$	(User Input)	(Top of Pad)
Number of Bars =	$NB_{top} := 46$	(User Input)	(Top of Pad)
Bar Size =	$BS_{bot} := 8$	(User Input)	(Bottom of Pad)
Bar Diameter =	$d_{bbot} := 1.0 \cdot in$	(User Input)	(Bottom of Pad)
Number of Bars =	$NB_{bot} := 46$	(User Input)	(Bottom of Pad)
Clear Cover of Reinforcement =	$Cvr_{pad} := 3.0 \cdot in$	(User Input)	
Reinforcement Location Factor =	$\alpha_{pad} := 1.0$	(User Input)	(ACI-2008 12.2.4)
Coating Factor =	$\beta_{pad} := 1.0$	(User Input)	(ACI-2008 12.2.4)
Concrete Strength Factor =	$\lambda_{pad} := 1.0$	(User Input)	(ACI-2008 12.2.4)
Reinforcement Size Factor =	$\gamma_{pad} := 1.0$	(User Input)	(ACI-2008 12.2.4)

Calculated Factors:

Pier Reinforcement Bar Area = $A_{bpier} := \frac{\pi \cdot d_{bpier}^2}{4} = 0.785 \cdot in^2$

Pad Top Reinforcement Bar Area = $A_{btop} := \frac{\pi \cdot d_{btop}^2}{4} = 0.785 \cdot in^2$

Pad Bottom Reinforcement Bar Area = $A_{bbot} := \frac{\pi \cdot d_{bbot}^2}{4} = 0.785 \cdot in^2$

Coefficient of Lateral Soil Pressure = $K_p := \frac{1 + \sin(\Phi_s)}{1 - \sin(\Phi_s)} = 3.537$

Load Factor = $LF := 1$

Stability of Footing:

Adjusted Concrete Unit Weight = $\gamma_c := if(Bouyancy = 1, \gamma_{conc} - 62.4pcf, \gamma_{conc}) = 150 \cdot pcf$

Adjusted Soil Unit Weight = $\gamma_s := if(Bouyancy = 1, \gamma_{soil} - 62.4pcf, \gamma_{soil}) = 125 \cdot pcf$

Passive Pressure = $P_{pn} := K_p \cdot \gamma_s \cdot n + c \cdot 2 \cdot \sqrt{K_p} = 0 \cdot ksf$

$P_{pt} := K_p \cdot \gamma_s \cdot (D_f - T_f) + c \cdot 2 \cdot \sqrt{K_p} = 1.326 \cdot ksf$

$P_{top} := if[n < (D_f - T_f), P_{pt}, P_{pn}] = 1.326 \cdot ksf$

$P_{bot} := K_p \cdot \gamma_s \cdot D_f + c \cdot 2 \cdot \sqrt{K_p} = 2.432 \cdot ksf$

$P_{ave} := \frac{P_{top} + P_{bot}}{2} = 1.879 \cdot ksf$

$T_p := if[n < (D_f - T_f), T_f, (D_f - n)] = 2.5 \cdot ft$

$A_p := W_f \cdot T_p = 82.5 \cdot ft^2$

Ultimate Shear = $S_u := P_{ave} \cdot A_p = 155.026 \cdot kip$

Weight of Concrete = $WT_c := \left[\left(W_f^2 \cdot T_f\right) + (3) \cdot \left(\frac{d_p^2 \cdot \pi}{4} L_p\right)\right] \cdot \gamma_c = 428.167 \cdot kip$

Weight of Soil Above Footing = $WT_{s1} := \left[\left[W_f^2 - (3) \cdot \left(\frac{d_p^2 \cdot \pi}{4}\right)\right] \cdot \left(|L_p - L_{pag} - n|\right)\right] \cdot \gamma_s = 394.24 \cdot kip$

Tower Offset = $X_{t1} := \left[\frac{W_f}{2} - \frac{(W_t \cdot \cos(30 \cdot deg))}{2}\right]$ $X_{t2} := \frac{W_f}{2} - \frac{(W_t \cdot \cos(30 \cdot deg))}{3}$

$X_t := if(Pos_t = 1, X_{t1}, X_{t2}) = 6.471$

$X_{off1} := \frac{W_f}{2} - \left[\frac{(W_t \cdot \cos(30 \cdot deg))}{3} + X_t\right] = 3.343$ $X_{off2} := 0$

$X_{off} := if(Pos_t = 1, X_{off1}, X_{off2})$ $X_{off} = 3.343 \cdot ft$

Total Weight = $WT_{tot} := 0.9WT_c + 0.75WT_{s1} = 681 \cdot kip$

Resisting Moment = $M_r := (WT_{tot}) \cdot \frac{W_f}{2} + 0.9WT_t \cdot \left(\frac{W_f}{2} - X_{off}\right) + 0.75\left(S_u \cdot \frac{T_p}{3}\right) = 11926 \cdot kip \cdot ft$

Overturning Moment = $M_{ot} := OM + S_t \cdot (L_p + T_f) = 3973 \cdot kip \cdot ft$

Factor of Safety Actual = $FS := \frac{M_r}{M_{ot}} = 3$

Factor of Safety Required = $FS_{req} := 1$ $OverTurning\_Moment\_Check := if(FS \geq FS_{req}, "Okay", "No Good")$

$OverTurning\_Moment\_Check = "Okay"$

Shear Capacity in Pier:

Shear Resistance of Pier = $S_p := \frac{P_{ave} \cdot A_p + \mu \cdot WT_{tot}}{FS_{req}} = 461.489 \cdot kips$

$Shear\_Check := if(S_p > S_t, "Okay", "No Good")$

Shear_Check = "Okay"

Bearing Pressure Caused by Footing:

Total Load = $Load_{tot} := WT_c + WT_{s1} + WT_t = 872 \cdot kip$

Area of the Mat = $A_{mat} := W_f^2 = 1.089 \times 10^3$

Section Modulus of Mat = $S := \frac{W_f^3}{6} = 5989.5 \cdot ft^3$

Maximum Pressure in Mat = $P_{max} := \frac{Load_{tot}}{A_{mat}} + \frac{M_{ot}}{S} = 1.464 \cdot ksf$

$Max\_Pressure\_Check := if(P_{max} < 0.75q_s, "Okay", "No Good")$

Max_Pressure_Check = "Okay"

Minimum Pressure in Mat = $P_{min} := \frac{Load_{tot}}{A_{mat}} - \frac{M_{ot}}{S} = 0.138 \cdot ksf$

$Min\_Pressure\_Check := if\left[(P_{min} \geq 0) \cdot (P_{min} < 0.75q_s), "Okay", "No Good"\right]$

Min_Pressure_Check = "Okay"

Distance to Resultant of Pressure Distribution = $X_p := \frac{P_{max}}{\frac{P_{max} - P_{min}}{W_f}} \cdot \frac{1}{3} = 12.142$

Distance to Kern = $X_k := \frac{W_f}{6} = 5.5$

Eccentricity = $e := \frac{M_{ot}}{Load_{tot}} = 4.554$

Adjusted Soil Pressure = $P_a := \frac{2 \cdot Load_{tot}}{3 \cdot W_f \cdot \left(\frac{W_f}{2} - e\right)} = 1.475 \cdot ksf$

$q_{adj} := if(P_{min} < 0, P_a, P_{max}) = 1.464 \cdot ksf$

$Pressure\_Check := if(q_{adj} < 0.75q_s, "Okay", "No Good")$

Pressure_Check = "Okay"

Concrete Bearing Capacity:

Strength Reduction Factor = $\Phi_c := 0.65$ (ACI-2008 9.3.2.2)

Bearing Strength Between Pier and Pad = $P_b := \Phi_c \cdot 0.85 \cdot f_c \cdot \frac{\pi \cdot d_p^2}{4} = 3.999 \times 10^3 \cdot kips$ (ACI-2008 10.14)

$Bearing\_Check := if(P_b > LF \cdot C_t, "Okay", "No Good")$

Bearing_Check = "Okay"

Shear Strength of Concrete:

Beam Shear: (Critical section located at a distance d from the face of Pier) (ACI 11.3.1.1)

$\phi_c := 0.85$ (ACI 9.3.2.5)

$d := T_f - Cvr_{pad} - d_{bbot} = 26 \cdot in$

$FL := LF \cdot \frac{C_t}{W_f^2} = 0.186 \cdot ksf$

$V_{req} := FL \cdot (X_t - .5 \cdot d_p - d) \cdot W_f = 14.178 \cdot kips$

$V_{Avail} := \phi_c \cdot 2 \cdot \sqrt{f_c \cdot psi} \cdot W_f \cdot d = 1107 \cdot kip$ (ACI-2008 11.2.1.1)

$Beam\_Shear\_Check := if(V_{req} < V_{Avail}, "Okay", "No Good")$

Beam_Shear_Check = "Okay"

Punching Shear: (Critical Section Located at a distance of d/2 from the face of pier) (ACI 11.11.1.2)

Critical Perimeter of Punching Shear = $b_o := (d_p + d) \cdot \pi = 19.4$

Area Included Inside Perimeter = $A_{bo} := \frac{\pi \cdot (d_p + d)^2}{4} = 29.9$

Required Shear Strength = $V_{req} := FL \cdot (W_f^2 - A_{bo}) = 197 \cdot kips$

Available Shear Strength = $V_{Avail} := \phi_c \cdot 4 \cdot \sqrt{f_c \cdot psi} \cdot b_o \cdot d = 1299.8 \cdot kip$ (ACI-2008 11.11.2.1)

$Punching\_Shear\_Check := if(V_{req} < V_{Avail}, "Okay", "No Good")$

Punching_Shear_Check = "Okay"

Steel Reinforcement in Pad:

Required Reinforcement for Bending:

Strength Reduction Factor = $\phi_m := .90$ (ACI-2008 9.3.2.1)

Maximum Moment in Pad = $M_{max} := 650 \cdot kip \cdot ft$ (User Input)

Design Moment = $M_n := \frac{LF \cdot M_{max}}{\phi_m} = 722.222 \cdot kips \cdot ft$

$$\beta := \begin{cases} 0.85 & \text{if } 2500 \cdot psi \le f_c \le 4000 \cdot psi \\ 0.65 & \text{if } f_c > 8000 \cdot psi \\ \left[0.85 - \left[\frac{\left(\frac{f_c}{psi} - 4000\right)}{1000}\right] \cdot 0.5\right] & \text{otherwise} \end{cases} = 0.85 \quad \text{(ACI-200810.2.7.3)}$$

$b_{eff} := W_t \cdot \cos(30 \cdot deg) + d_p = 288.686 \cdot in$

$A_s := \frac{M_n}{(f_y \cdot d)} = 5.556 \cdot in^2$

$a := \frac{A_s \cdot f_y}{\beta \cdot f_c \cdot b_{eff}} = 0.34 \cdot in$

$A_s := \frac{M_n}{f_y \cdot \left(d - \frac{a}{2}\right)} = 5.592 \cdot in^2$

$\rho := \frac{A_s}{b_{eff} d} = 0.00894 \cdot in$

Required Reinforcement for Temperature and Shrinkage:

$$\rho_{sh} := \begin{cases} .0018 & \text{if } f_y \geq 60000 \cdot psi \\ .0020 & \text{otherwise} \end{cases} = 0.0018$$

(ACI -2008 7.12.2.1)

Check Bottom Bars:

$$As := if\left(\rho \geq \rho_{sh}, A_s, \rho_{sh} \cdot \frac{b_{eff}}{2} \cdot d\right) = 6.8 \cdot in^2$$

$$As_{prov} := A_{bbot} \cdot NB_{bot} = 36.1 \cdot in^2$$

$$Pad\_Reinforcement\_Bot := if\left(As_{prov} > As, "Okay", "No\ Good"\right)$$

Pad_Reinforcement_Bot = "Okay"

Check top Bars:

$$As := if\left(\rho \geq \rho_{sh}, A_s, \rho_{sh} \cdot \frac{b_{eff}}{2} \cdot d\right) = 6.8 \cdot in^2$$

$$As_{prov} := A_{btop} \cdot NB_{top} = 36.1 \cdot in^2$$

$$Pad\_Reinforcement\_Top := if\left(As_{prov} > As, "Okay", "No\ Good"\right)$$

Pad_Reinforcement_Top = "Okay"

Steel Reinforcement in Pier:

Area of Pier = $A_p := \frac{\pi \cdot d_p^2}{4} = 1809.56 \cdot in^2$

$A_{smin} := 0.01 \cdot 0.5 \cdot A_p = 9.05 \cdot in^2$ (ACI-2008 10.8.4 & 10.9.1)

$A_{sprov} := NB_{pier} \cdot A_{bpier} = 12.57 \cdot in^2$

$Steel\_Area\_Check := if(A_{sprov} > A_{smin}, "Okay", "No Good")$

Steel_Area_Check = "Okay"

Bar Spacing In Pier = $B_{sPier} := \frac{d_p \cdot \pi}{NB_{pier}} - d_{bpier} = 8.425 \cdot in$

Diameter of Reinforcement Cage = $Diam_{cage} := d_p - 2 \cdot Cvr_{pier} = 42 \cdot in$

Maximum Moment in Pier = $M_p := S_t \cdot (L_p) \cdot LF = 1638 \cdot in \cdot kips$

Pier Check evaluated from outside program and results are listed below;

$(D \ N \ n \ P_u \ M_{xu}) := \left(d_p \cdot 12 \ \ NB_{pier} \ \ BS_{pier} \ \ \frac{C_t \cdot 1.333}{kips} \ \ \frac{M_p}{in \cdot kips}\right)$

$(D \ N \ n \ P_u \ M_{xu}) = (48 \ \ 16 \ \ 8 \ \ 270.599 \ \ 1.638 \times 10^3)$

$(\phi P_n \ \ \phi M_{xn} \ \ f_{sp} \ \ \rho) := (0 \ \ 0 \ \ 0 \ \ 0)$

$(\phi P_n \ \ \phi M_{xn} \ \ f_{sp} \ \ \rho) := \phi P'_n(D, N, n, P_u, M_{xu})^T$

$(\phi P_n \ \ \phi M_{xn} \ \ f_{sp} \ \ \rho) = (2.661 \times 10^3 \ \ 1.611 \times 10^4 \ \ -24.748 \ \ 6.985 \times 10^{-3})$

$Axial\_Load\_Check := if(\phi P_n \geq P_u, "Okay", "No Good")$

Axial_Load_Check = "Okay"

$Bending\_Check := if(\phi M_{xn} \geq M_{xu}, "Okay", "No Good")$

Bending_Check = "Okay"

RF DESIGN SHEET

Issue Date	4/5/2022
Revision	1

RFDS Status	Preliminary
Created By	Parikh, Dipesh

SITE INFORMATION	
DISH Site Number	BOBOS00069B
DISH Site Name	0
Prequal Asset ID	
AOI	BOS
PEA	0
Latitude	41.468972
Longitude	-72.204629
Address	414 Chapel Hill Rd
City	Oakdale
State	CT
ZIP Code	06370
County	New London
Rad Center (ft)	110
RAD Confirmed	*No Confirmed RAD*
Structure Type	SST

PROJECT ASSIGNMENTS	
Market Manager	0
Site Development Mgr.	JOHN LYONS
RF Engineer	Dipesh Parikh
Site Acq Specialist/Develop. Cord.	David Goodfellow /
SAQ Vendor/A&E Vendor	NORTHEAST SITE SOLUTIONS LLC / NORTHEAST SITE SOLUTIONS LLC
Asset Owner/Asset #	/
Construction Mgr. (Lead/Field)	Chad Wilcox /
Contractor (General/Tower/Civil)	/ /
Power Company / Fiber Provider	/

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

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

DESIGN COMMENTS

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

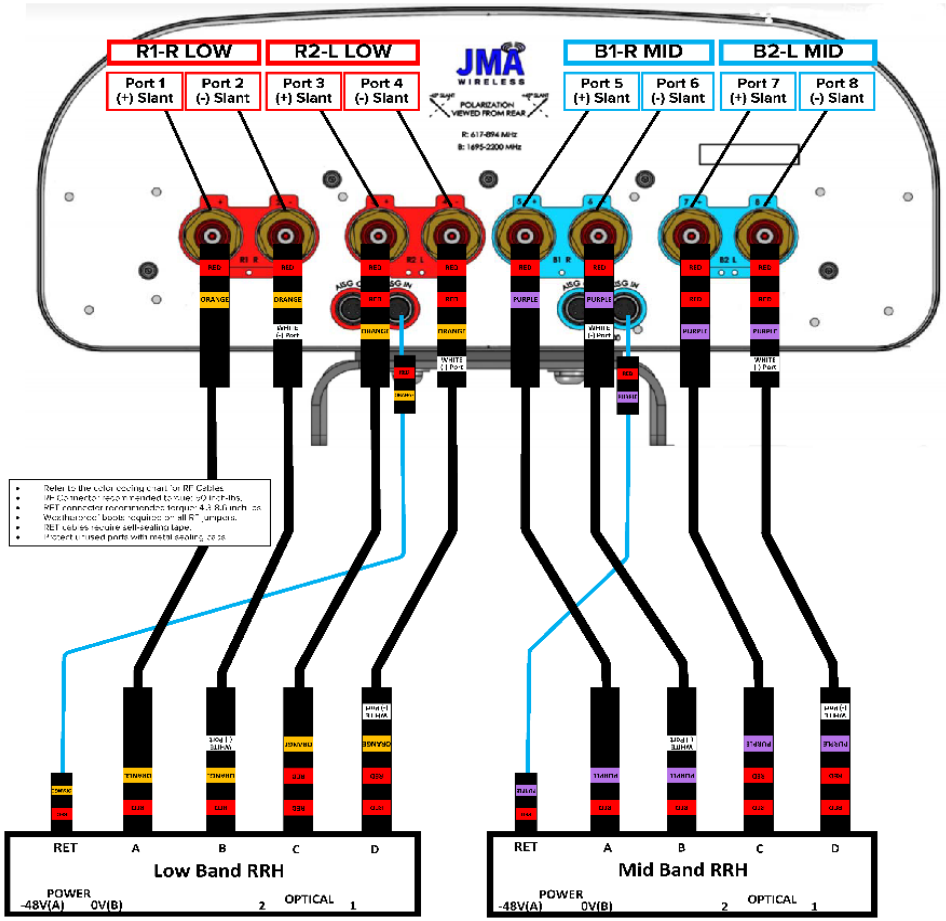
RF EQUIPMENT INFORMATION

Issue Date/Revision	4/5/2022	**Revision:**	1	**Latitude**	41.468972
Site ID	BOBOS00069B			**Prequal Asset ID**	
Site Address	414 Chapel Hill Rd, Oakdale CT 06370			**SOW / RF Comments**	Dish proposes to place 3 antennas, 6 RRUs, 1 junction box(s), and 1 (power/hybrid) cable(s), at the 110 foot RAD. Dish will require a 5x7 lease area for ground equipment. This RFDS is Preliminary and should be used for planning purposes only. A final RFDS needs to be received from Market RF
Structure Type	SST				
sectors >20' apart?	No	***Confirmed RAD?***	***No Confirmed RAD*** 110		

	Sector 1 (alpha)			Sector 2 (beta)			Sector 3 (gamma)		
ANTENNA									
Antenna Mount Position	**1**	**2**	**3**	**1**	**2**	**3**	**1**	**2**	**3**
Antenna ID		1			2			3	
Manufacturer		JMA			JMA			JMA	
Model Number		MX08FRO665-21			MX08FRO665-21			MX08FRO665-21	
Dimensions H x W x D (in)		72.0" x 20.0" x 8.0"			72.0" x 20.0" x 8.0"			72.0" x 20.0" x 8.0"	
Weight (lbs.)		64.5			64.5			64.5	
TX Power Output (watts)		40000			40000			40000	
ERP (dBm)		76.02			76.02			76.02	
RAD Centerline Height (ft.)		110			110			110	
Azimuths (True North)		0°			120°			240°	
Mech Down Tilt		0°			0°			0°	
Default Mount		Generic							
LOW BAND/RADIO #1									
Manufacturer		Fujitsu			Fujitsu			Fujitsu	
Model Number		TA08025-B605			TA08025-B605			TA08025-B605	
Dimensions H x W x D (in.)		14.96" x 15.75" x 9.06"			14.96" x 15.75" x 9.06"			14.96" x 15.75" x 9.06"	
Weight (lbs.)		74.95			74.95			74.95	
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		Fujitsu			Fujitsu			Fujitsu	
Model Number		TA08025-B604			TA08025-B604			TA08025-B604	
Dimensions H x W x D (in)		14.96" x 15.75" x 7.87"			14.96" x 15.75" x 7.87"			14.96" x 15.75" x 7.87"	
Weight (lbs.)		63.93			63.93			63.93	
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		4°			4°			4°	
OVP (Junction Box)									
Manufacturer		Raycap							
Model Number		RDIDC-9181-PF-48							
Dimensions H x W x D (in.)		18.97" x 16.20" x 9.64"							
Weight (lbs.)		21.85							
Quantity		1							
LINE DETAILS									
Line Type	Hybrid								
Manufacturer	Cables Unlimited								
Model Number	CU12PSM9P6XXX_6AWG								
Diameter (O.D. in.)	1.60"								
Weight (lbs. per ft.)	2.346 lbs/ft								
Quantity	1								
Approx. Cable Length	140								
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)	0 - 0	2180 - 2200	1995 - 2020	632 - 652
Uplink (RX)	-	-	1915 - 1920	678 - 698

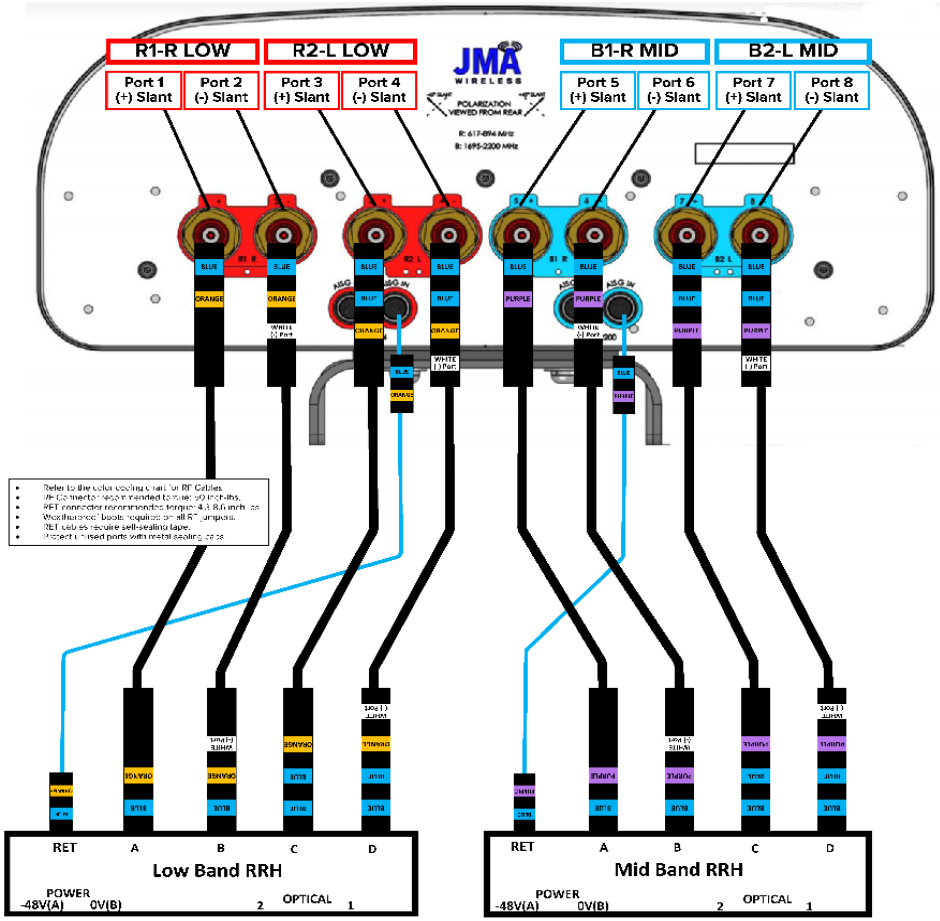
PLUMBING DIAGRAM ANTENNA



Wireless Engineering	ALPHA SECTOR (1 Antenna) RRU AND ANTENNA CABLING CONFIGURATION			
	JMA MX08FRO665-21 – 8 Port – 6ft Fujitsu LOW/MID LOW/MID RET cables			
Chuck Iversen	SIZE	FSCM NO	DWG NO	REV 1
20 - Dec - 2021	SCALE None		SHEET 1 OF 1	

Mechanical specifications	
Dimensions height/width/depth, inches (mm)	72.0/ 20.0/ 8.0 (1828.8/ 508.0/ 203.2)
Shipping dimensions length/width/height, inches (mm)	77.3/ 23.8/ 14.5 (1963.42/ 605/ 368)
No. of RF input ports, connector type, and location	8 x 4.3-10 female, bottom
RF connector torque	96 lbf-in (10.85 N-m or 8 lbf-ft)
Net antenna weight, lb (kg)	64.5 (29.3)
Shipping weight, lb (kg)	104 (47.2)
Antenna mounting and downtilt kit included with antenna	91900318
Net weight of the mounting and downtilt kit, lb (kg)	18 (8.2)
Range of mechanical up/down tilt	-2° to 12°
Rated wind survival speed, mph (km/h)	150 (241)
Frontal and lateral wind loading @ 150 km/h, lbf (N)	108.1 (480.9), 20.5 (91.2)
Effective projected area @ 150 km/h (EPA), frontal, sq ft	4.9

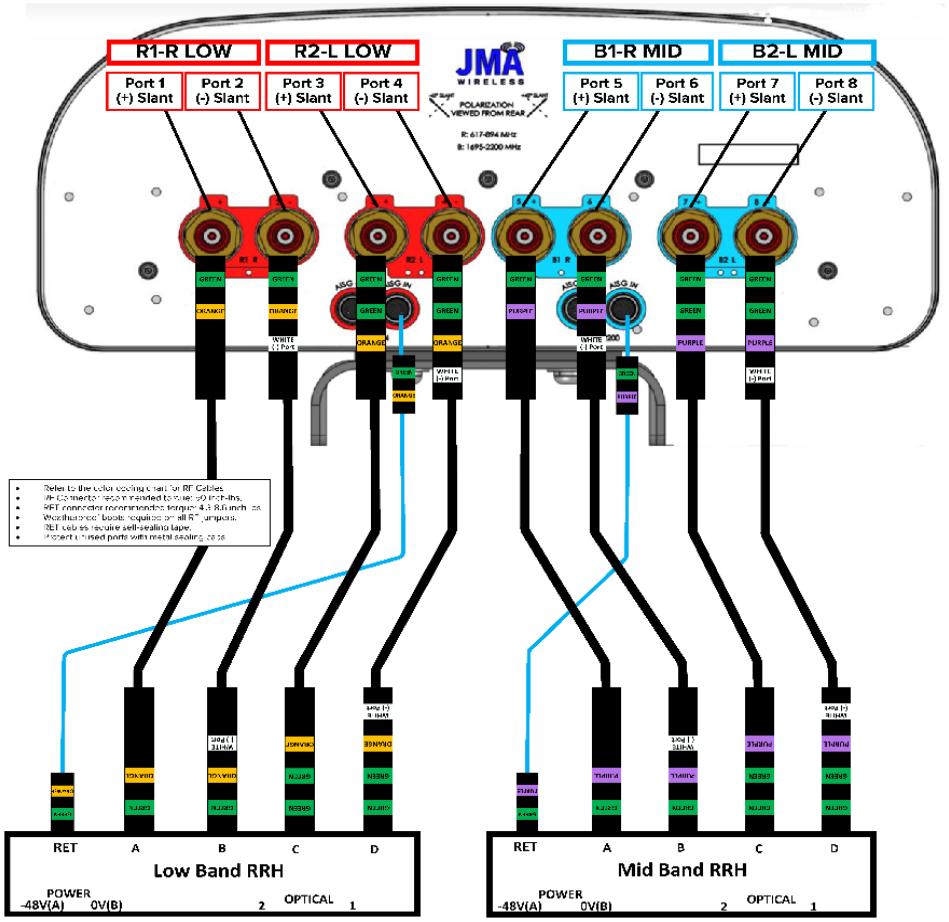
PLUMBING DIAGRAM ANTENNA



Wireless Engineering	BETA SECTOR (1 Antenna) RRU AND ANTENNA CABLING CONFIGURATION			
	JMA MX08FRO665-21 – 8 Port – 6ft Fujitsu LOW/MID LOW/MID RET cables			
Chuck Iversen	SIZE	FSCM NO	DWG NO	REV 1
20 - Dec - 2021	SCALE None		SHEET	1 OF 1

Mechanical specifications	
Dimensions height/width/depth, inches (mm)	72.0/ 20.0/ 8.0 (1828.8/ 508.0/ 203.2)
Shipping dimensions length/width/height, inches (mm)	77.3/ 23.8/ 14.5 (1963.42/ 605/ 368)
No. of RF input ports, connector type, and location	8 x 4.3-10 female, bottom
RF connector torque	96 lbf·in (10.85 N·m or 8 lbf·ft)
Net antenna weight, lb (kg)	64.5 (29.3)
Shipping weight, lb (kg)	104 (47.2)
Antenna mounting and downtilt kit included with antenna	91900318
Net weight of the mounting and downtilt kit, lb (kg)	18 (8.2)
Range of mechanical up/down tilt	-2° to 12°
Rated wind survival speed, mph (km/h)	150 (241)
Frontal and lateral wind loading @ 150 km/h, lbf (N)	108.1 (480.9), 20.5 (91.2)
Effective projected area @ 150 km/h (EPA), frontal, sq ft	4.9

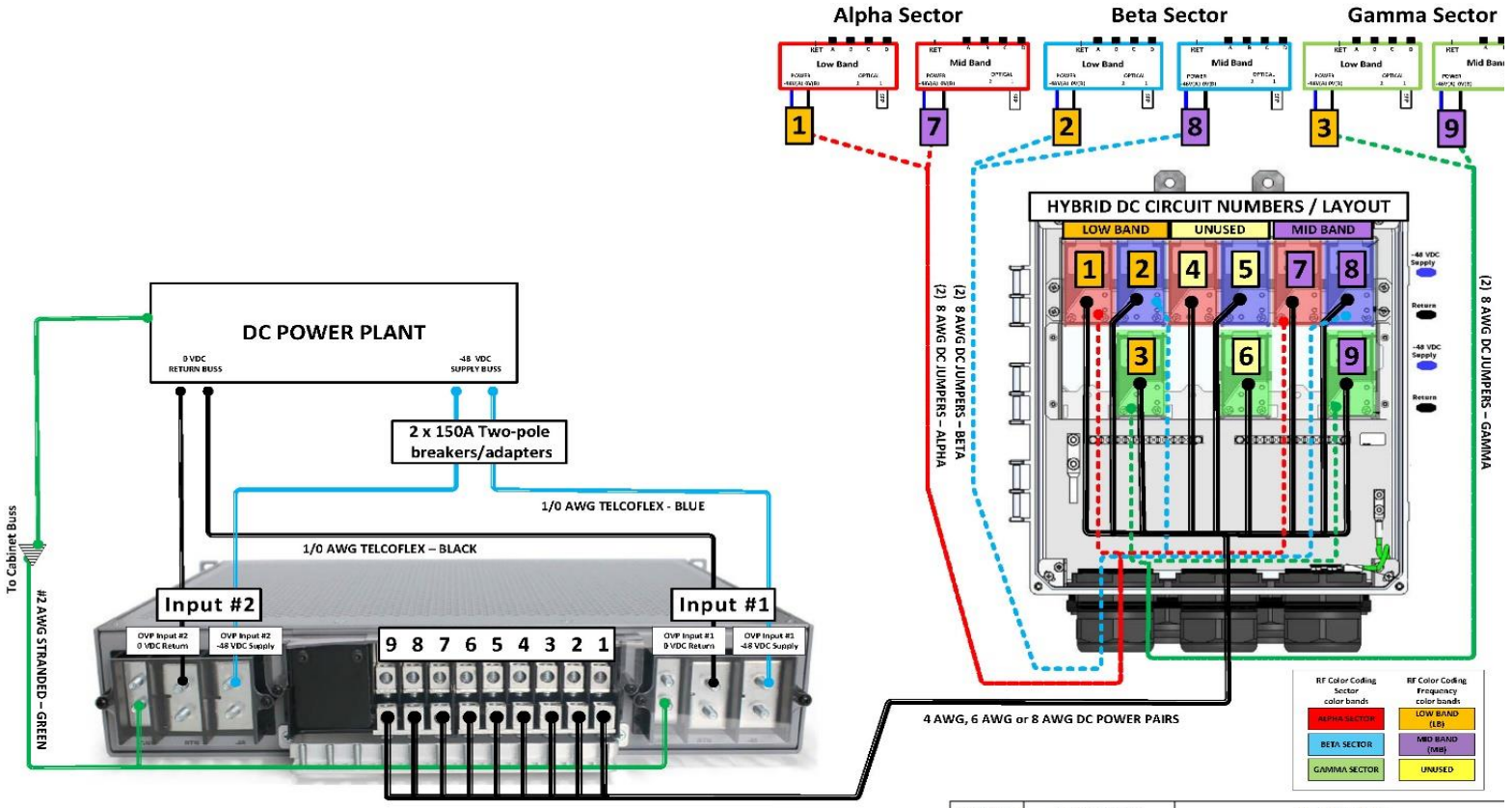
PLUMBING DIAGRAM ANTENNA



Wireless Engineering	GAMMA SECTOR (1 Antenna) RRU AND ANTENNA CABLING CONFIGURATION			
	JMA MX08FRO665-21 – 8 Port – 6ft Fujitsu LOW/MID LOW/MID RET cables			
Chuck Iversen	SIZE	FSCM NO	DWG NO	REV 1
20 - Dec - 2021	SCALE None		SHEET	1 OF 1

Mechanical specifications	
Dimensions height/width/depth, inches (mm)	72.0/ 20.0/ 8.0 (1828.8/ 508.0/ 203.2)
Shipping dimensions length/width/height, inches (mm)	77.3/ 23.8/ 14.5 (1963.42/ 605/ 368)
No. of RF input ports, connector type, and location	8 x 4.3-10 female, bottom
RF connector torque	96 lbf·in (10.85 N·m or 8 lbf·ft)
Net antenna weight, lb (kg)	64.5 (29.3)
Shipping weight, lb (kg)	104 (47.2)
Antenna mounting and downtilt kit included with antenna	91900318
Net weight of the mounting and downtilt kit, lb (kg)	18 (8.2)
Range of mechanical up/down tilt	-2° to 12°
Rated wind survival speed, mph (km/h)	150 (241)
Frontal and lateral wind loading @ 150 km/h, lbf (N)	108.1 (480.9), 20.5 (91.2)
Effective projected area @ 150 km/h (EPA), frontal, sq ft	4.9

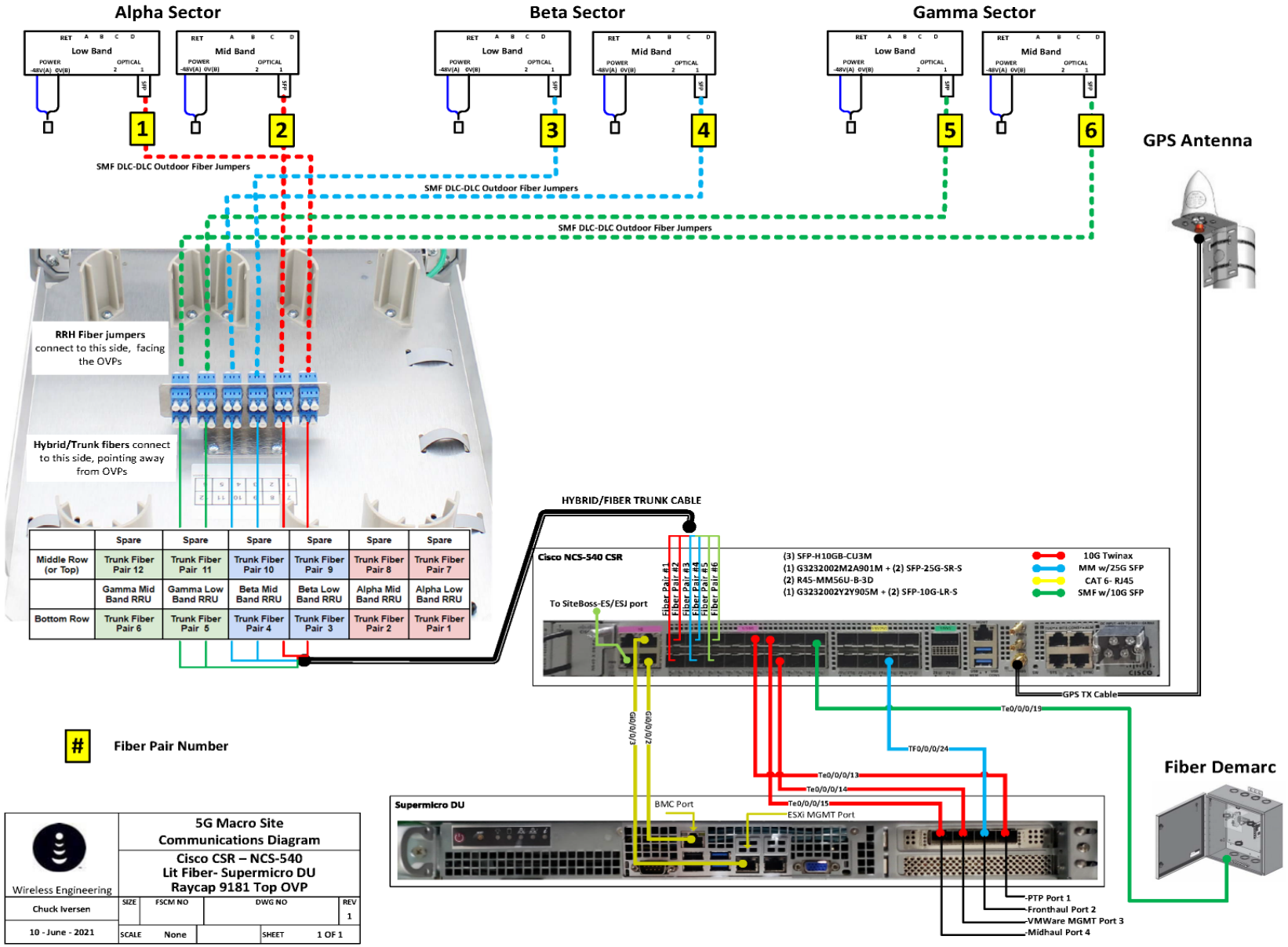
PLUMBING DIAGRAM OVP



OVP CKTs	Input Circuit #2			Input Circuit #1					
Sectors Boosted	CKT #9	CKT #8	CKT #7	CKT #6	CKT #5	CKT #4	CKT #3	CKT #2	CKT #1
NO	MB	MB	MB	unused	unused	unused	LB	LB	LB
ALL	MB	MB	MB	unused	unused	unused	LB	LB	LB
Alpha	MB	unused	LB	MB	unused	LB	MB	unused	LB
Beta	MB	unused	LB	MB	unused	LB	MB	unused	LB
Gamma	MB	unused	LB	MB	unused	LB	MB	unused	LB
Alpha/ Beta	MB	unused	LB	MB	unused	LB	MB	unused	LB
Beta/ Gamma	MB	unused	LB	MB	unused	LB	MB	unused	LB
Alpha/ Gamma	MB	unused	LB	MB	unused	LB	MB	unused	LB

Wireless Engineering	5G Macro Site DC Power Connection Diagram	
	6 x 12 / 9 x 12 Hybrid Cable Raycap 9181 (CENTRAL) Top OVP No Booster- Tower Config	
Chuck Iversen	SIZE / FSCM NO / DWG NO	REV 1
10 - June - 2021	SCALE None	SHEET 1 OF 1

PLUMBING DIAGRAM NETWORK



	Spare	Spare	Spare	Spare	Spare	Spare
Middle Row (or Top)	Trunk Fiber Pair 12	Trunk Fiber Pair 11	Trunk Fiber Pair 10	Trunk Fiber Pair 9	Trunk Fiber Pair 8	Trunk Fiber Pair 7
	Gamma Mid Band RRU	Gamma Low Band RRU	Beta Mid Band RRU	Beta Low Band RRU	Alpha Mid Band RRU	Alpha Low Band RRU
Bottom Row	Trunk Fiber Pair 6	Trunk Fiber Pair 5	Trunk Fiber Pair 4	Trunk Fiber Pair 3	Trunk Fiber Pair 2	Trunk Fiber Pair 1

Fiber Pair Number

Wireless Engineering	5G Macro Site Communications Diagram Cisco CSR – NCS-540 Lit Fiber- Supermicro DU Raycap 9181 Top OVP		
Chuck Iversen	SIZE	FSCM NO	DWG NO	REV 1
10 - June - 2021	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

Exhibit E

Mount Analysis

CENTEK engineering

Centered on Solutions℠

Structural Analysis Report

Antenna Mount Analysis

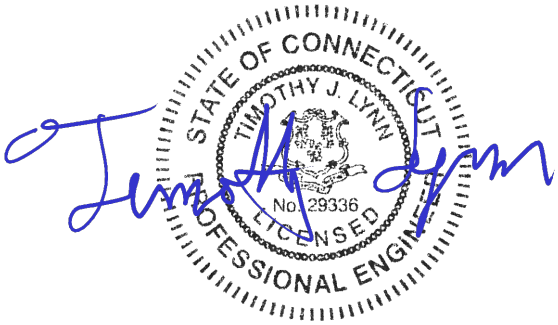
Dish Site #: BOBOS00069B

414 Chapel Hill Road
Montville, CT

Centek Project No. 22042.01

~~Date: April 18, 2022~~
Rev 1: October 12, 2022

Max Stress Ratio = 25%



Prepared for:

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

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CENTEK engineering

Centered on Solutions℠

October 12, 2022

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

Re: Structural Letter ~ Antenna Mount
Dish – Site Ref: BOBOS00069B
414 Chapel Hill Road
Montville, CT

Centek Project No. 22042.01

Dear Mr. Regulbuto,

Centek Engineering, Inc. has reviewed the T-Mobile antenna installation at the above referenced site. The purpose of the review is to determine the structural adequacy of the **proposed mount, consisting of three (3) V-frame sector mounts (SitePro P/N: VFA8-HD)** to support the proposed equipment configuration. The review considered the effects of wind load, dead load and ice load in accordance with the 2021 International Building Code as modified by the 2022 Connecticut State Building Code (CTBC) including ASCE 7-16 and ANSI/TIA-222-H *Structural Standard for Antenna Supporting Structures, Antennas and Small Wind Turbine Support Structures"*.

The loads considered in this analysis consist of the following:

- **Dish:**
  V-Frames: Three (3) JMA MX08FRO665-21 panel antennas, three (3) Fujitsu TA0825-B604 remote radio heads, three (3) Fujitsu TA0825-B604 remote radio heads and one (1) Raycap OVP box mounted on three (3) V-Frames with a RAD center elevation of 110-ft +/- AGL.

The antenna mount was 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 135 mph for Montville 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 mount has sufficient capacity** to support the aforementioned antenna configuration. If there are any questions regarding this matter, please feel free to call.

Respectfully Submitted by:

Timothy J. Lynn, PE
Structural Engineer

Section 2 - Calculations

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:	TIA-222-H Loads
Location:	Montville, CT
Rev. 1: 10/12/22	Prepared by: T.J.L. Checked by: C.F.C. Job No. 22042.01

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

Wind Speeds

Basic Wind Speed	$V := 135$	mph	(User Input - CSBC 2022 Appendix P)
Basic Wind Speed with Ice	$V_i := 50$	mph	(User Input - TIA-222-H Annex B)
Basic Wind Speed (Mount)	$V_m := 30$	mph	(User Input - TIA-222-H Section 16.3)

Input

Structure Type =	Structure_Type := Flexible		(User Input)
Structure Category =	SC := III		(User Input)
Exposure Category =	Exp := B		(User Input)
Structure Height =	$h := 180$	ft	(User Input)
Height to Center of Antennas =	$z_{ant} := 110$	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)
Rooftop Wind Speed-up Factor =	$K_s := 1.0$		(User Input)
Ground Elevation Factor =	$K_e = 0.996$		(User Input)
Gust Response Factor =	$G_H = 1.35$		(User Input)

Output

Wind Direction Probability Factor = $K_d := 0.95$ (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)

$$I_{Seismic} := \begin{cases} 0 & \text{if } SC = 1 \\ 1.00 & \text{if } SC = 2 \\ 1.25 & \text{if } SC = 3 \\ 1.50 & \text{if } SC = 4 \end{cases} = 1.25$$

$$K_{iz} := \left(\frac{z_{ant}}{33}\right)^{0.1} = 1.128$$

$$t_{iz} := t_i \cdot I_{ice} \cdot K_{iz} \cdot K_{zt}^{0.35} = 1.297$$

Velocity Pressure Coefficient Antennas =

$$Kz_{ant} := 2.01\left(\left(\frac{z_{ant}}{zg}\right)\right)^{\frac{2}{\alpha}} = 1.016$$

Velocity Pressure w/o Ice Antennas = $qz_{ant} := 0.00256 \cdot K_{zt} \cdot K_s \cdot K_e \cdot K_d \cdot Kz_{ant} \cdot V^2 = 44.812$

Velocity Pressure with Ice Antennas = $qz_{ice.ant} := 0.00256 \cdot K_{zt} \cdot K_s \cdot K_e \cdot K_d \cdot Kz_{ant} \cdot V_i^2 = 6.147$

Velocity Pressure with Ice Antennas = $qz_m := 0.00256 \cdot K_{zt} \cdot K_s \cdot K_e \cdot K_d \cdot Kz_{ant} \cdot V_m^2 = 2.213$

Development of Wind & Ice Load on Appurtenances

Appurtenance Data:

Appurtenance Model =	MX08FRO665-21		
Appurtenance Shape =	Flat		(User Input)
Appurtenance Height=	$L_{app} := 72$	in	(User Input)
Appurtenance Width =	$W_{app} := 20$	in	(User Input)
Appurtenance Thickness =	$T_{app} := 8$	in	(User Input)
Appurtenance Weight =	$WT_{app} := 70$	lbs	(User Input)
Number of Appurtenances=	$N_{app} := 1$		(User Input)
Appurtenance Aspect Ratio =	$Ar_{app} := \frac{L_{app}}{W_{app}} = 3.6$		
Appurtenance Force Coefficient =	$Ca_{app} = 1.25$		

Wind Load (without ice)

Surface Area for One Appurtenance (Front) =	$SA_{appF} := \frac{L_{app} \cdot W_{app}}{144} = 10$	sf
Total Appurtenance Wind Force =	$F_{app} := qz_{ant} \cdot G_H \cdot Ca_{app} \cdot K_a \cdot SA_{appF} = 756$	lbs
Surface Area for One Appurtenance (Side) =	$SA_{appS} := \frac{L_{app} \cdot T_{app}}{144} = 4$	sf
Total Appurtenance Wind Force =	$F_{app} := qz_{ant} \cdot G_H \cdot Ca_{app} \cdot K_a \cdot SA_{appS} = 302$	lbs

Wind Load (with ice)

Surface Area for One Appurtenance w/ Ice (Front)=	$SA_{ICEappF} := \frac{(L_{app} + 2 \cdot t_{iz}) \cdot (W_{app} + 2 \cdot t_{iz})}{144} = 11.7$	sf
Total Appurtenance Wind Force w/ Ice =	$Fi_{app} := qz_{ice.ant} \cdot G_H \cdot Ca_{app} \cdot K_a \cdot SA_{ICEappF} = 121$	lbs
Surface Area for One Appurtenance w/ Ice (Side) =	$SA_{ICEappS} := \frac{(L_{app} + 2 \cdot t_{iz}) \cdot (T_{app} + 2 \cdot t_{iz})}{144} = 5.5$	sf
Total Appurtenance Wind Force w/ Ice =	$Fi_{app} := qz_{ice.ant} \cdot G_H \cdot Ca_{app} \cdot K_a \cdot SA_{ICEappS} = 57$	lbs

Wind Load (Mount)

Surface Area for One Appurtenance (Front) =	$SA_{appF} := \frac{L_{app} \cdot W_{app}}{144} = 10$	sf
Total Appurtenance Wind Force =	$F_{app} := qz_m \cdot G_H \cdot Ca_{app} \cdot K_a \cdot SA_{appF} = 37$	lbs
Surface Area for One Appurtenance (Side) =	$SA_{appS} := \frac{L_{app} \cdot T_{app}}{144} = 4$	sf
Total Appurtenance Wind Force =	$F_{app} := qz_m \cdot G_H \cdot Ca_{app} \cdot K_a \cdot SA_{appS} = 15$	lbs

Gravity Loads (ice only)

Volume of Each Appurtenance =	$V_{app} := L_{app} \cdot W_{app} \cdot T_{app} = 1 \times 10^4$	cu in
Volume of Ice on Each Appurtenance =	$V_{ice} := (L_{app} + 2 \cdot t_{iz})(W_{app} + 2 \cdot t_{iz}) \cdot (T_{app} + 2 \cdot t_{iz}) - V_{app} = 6336$	cu in
Weight of Ice on Each Appurtenance =	$W_{ICEapp} := \frac{V_{ice}}{1728} \cdot Id = 205$	lbs
Weight of Ice on All Appurtenances =	$W_{ICEapp} \cdot N_{app} = 205$	lbs

Development of Wind & Ice Load on Appurtenances

Appurtenance Data:

Appurtenance Model =	Fujitsu TA0825-B604		
Appurtenance Shape =	Flat		(User Input)
Appurtenance Height =	$L_{app} := 14.96$	in	(User Input)
Appurtenance Width =	$W_{app} := 15.75$	in	(User Input)
Appurtenance Thickness =	$T_{app} := 7.87$	in	(User Input)
Appurtenance Weight =	$WT_{app} := 70$	lbs	(User Input)
Number of Appurtenances =	$N_{app} := 1$		(User Input)
Appurtenance Aspect Ratio =	$Ar_{app} := \frac{L_{app}}{W_{app}} = 0.9$		
Appurtenance Force Coefficient =	$Ca_{app} = 1.2$		

Wind Load (without ice)

Surface Area for One Appurtenance (Front) =	$SA_{appF} := \frac{L_{app} \cdot W_{app}}{144} = 1.6$	sf
Total Appurtenance Wind Force =	$F_{app} := qz_{ant} \cdot G_H \cdot Ca_{app} \cdot K_a \cdot SA_{appF} = 119$	lbs
Surface Area for One Appurtenance (Side) =	$SA_{appS} := \frac{L_{app} \cdot T_{app}}{144} = 0.8$	sf
Total Appurtenance Wind Force =	$F_{app} := qz_{ant} \cdot G_H \cdot Ca_{app} \cdot K_a \cdot SA_{appS} = 59$	lbs

Wind Load (with ice)

Surface Area for One Appurtenance w/ Ice (Front) =	$SA_{ICEappF} := \frac{(L_{app} + 2 \cdot t_{iz}) \cdot (W_{app} + 2 \cdot t_{iz})}{144} = 2.2$	sf
Total Appurtenance Wind Force w/ Ice =	$Fi_{app} := qz_{ice.ant} \cdot G_H \cdot Ca_{app} \cdot K_a \cdot SA_{ICEappF} = 22$	lbs
Surface Area for One Appurtenance w/ Ice (Side) =	$SA_{ICEappS} := \frac{(L_{app} + 2 \cdot t_{iz}) \cdot (T_{app} + 2 \cdot t_{iz})}{144} = 1.3$	sf
Total Appurtenance Wind Force w/ Ice =	$Fi_{app} := qz_{ice.ant} \cdot G_H \cdot Ca_{app} \cdot K_a \cdot SA_{ICEappS} = 13$	lbs

Wind Load (Mount)

Surface Area for One Appurtenance (Front) =	$SA_{appF} := \frac{L_{app} \cdot W_{app}}{144} = 1.6$	sf
Total Appurtenance Wind Force =	$F_{app} := qz_m \cdot G_H \cdot Ca_{app} \cdot K_a \cdot SA_{appF} = 6$	lbs
Surface Area for One Appurtenance (Side) =	$SA_{appS} := \frac{L_{app} \cdot T_{app}}{144} = 0.8$	sf
Total Appurtenance Wind Force =	$F_{app} := qz_m \cdot G_H \cdot Ca_{app} \cdot K_a \cdot SA_{appS} = 3$	lbs

Gravity Loads (ice only)

Volume of Each Appurtenance =	$V_{app} := L_{app} \cdot W_{app} \cdot T_{app} = 1854$	cu in
Volume of Ice on Each Appurtenance =	$V_{ice} := (L_{app} + 2 \cdot t_{iz})(W_{app} + 2 \cdot t_{iz}) \cdot (T_{app} + 2 \cdot t_{iz}) - V_{app} = 1515$	cu in
Weight of Ice on Each Appurtenance =	$W_{ICEapp} := \frac{V_{ice}}{1728} \cdot Id = 49$	lbs
Weight of Ice on All Appurtenances =	$W_{ICEapp} \cdot N_{app} = 49$	lbs

Development of Wind & Ice Load on Appurtenances

Appurtenance Data:

Appurtenance Model =	Fujitsu TA0825-B605		
Appurtenance Shape =	Flat		(User Input)
Appurtenance Height=	$L_{app} := 14.96$	in	(User Input)
Appurtenance Width =	$W_{app} := 15.75$	in	(User Input)
Appurtenance Thickness =	$T_{app} := 9.06$	in	(User Input)
Appurtenance Weight =	$WT_{app} := 80$	lbs	(User Input)
Number of Appurtenances=	$N_{app} := 1$		(User Input)
Appurtenance Aspect Ratio =	$Ar_{app} := \frac{L_{app}}{W_{app}} = 0.9$		
Appurtenance Force Coefficient =	$Ca_{app} = 1.2$		

Wind Load (without ice)

Surface Area for One Appurtenance (Front) =	$SA_{appF} := \frac{L_{app} \cdot W_{app}}{144} = 1.6$	sf
Total Appurtenance Wind Force =	$F_{app} := qz_{ant} \cdot G_H \cdot Ca_{app} \cdot K_a \cdot SA_{appF} = 119$	lbs
Surface Area for One Appurtenance (Side) =	$SA_{appS} := \frac{L_{app} \cdot T_{app}}{144} = 0.9$	sf
Total Appurtenance Wind Force =	$F_{app} := qz_{ant} \cdot G_H \cdot Ca_{app} \cdot K_a \cdot SA_{appS} = 68$	lbs

Wind Load (with ice)

Surface Area for One Appurtenance w/ Ice (Front)=	$SA_{ICEappF} := \frac{(L_{app} + 2 \cdot t_{iz}) \cdot (W_{app} + 2 \cdot t_{iz})}{144} = 2.2$	sf
Total Appurtenance Wind Force w/ Ice =	$Fi_{app} := qz_{ice.ant} \cdot G_H \cdot Ca_{app} \cdot K_a \cdot SA_{ICEappF} = 22$	lbs
Surface Area for One Appurtenance w/ Ice (Side) =	$SA_{ICEappS} := \frac{(L_{app} + 2 \cdot t_{iz}) \cdot (T_{app} + 2 \cdot t_{iz})}{144} = 1.4$	sf
Total Appurtenance Wind Force w/ Ice =	$Fi_{app} := qz_{ice.ant} \cdot G_H \cdot Ca_{app} \cdot K_a \cdot SA_{ICEappS} = 14$	lbs

Wind Load (Mount)

Surface Area for One Appurtenance (Front) =	$SA_{appF} := \frac{L_{app} \cdot W_{app}}{144} = 1.6$	sf
Total Appurtenance Wind Force =	$F_{app} := qz_m \cdot G_H \cdot Ca_{app} \cdot K_a \cdot SA_{appF} = 6$	lbs
Surface Area for One Appurtenance (Side) =	$SA_{appS} := \frac{L_{app} \cdot T_{app}}{144} = 0.9$	sf
Total Appurtenance Wind Force =	$F_{app} := qz_m \cdot G_H \cdot Ca_{app} \cdot K_a \cdot SA_{appS} = 3$	lbs

Gravity Loads (ice only)

Volume of Each Appurtenance =	$V_{app} := L_{app} \cdot W_{app} \cdot T_{app} = 2135$	cu in
Volume of Ice on Each Appurtenance =	$V_{ice} := (L_{app} + 2 \cdot t_{iz})(W_{app} + 2 \cdot t_{iz}) \cdot (T_{app} + 2 \cdot t_{iz}) - V_{app} = 1618$	cu in
Weight of Ice on Each Appurtenance =	$W_{ICEapp} := \frac{V_{ice}}{1728} \cdot Id = 52$	lbs
Weight of Ice on All Appurtenances =	$W_{ICEapp} \cdot N_{app} = 52$	lbs

Development of Wind & Ice Load on Appurtenances

Appurtenance Data:

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

Wind Load (without ice)

Surface Area for One Appurtenance (Front) =	$SA_{appF} := \frac{L_{app} \cdot W_{app}}{144} = 2.1$	sf
Total Appurtenance Wind Force =	$F_{app} := qz_{ant} \cdot G_H \cdot Ca_{app} \cdot K_a \cdot SA_{appF} = 155$	lbs
Surface Area for One Appurtenance (Side) =	$SA_{appS} := \frac{L_{app} \cdot T_{app}}{144} = 1.3$	sf
Total Appurtenance Wind Force =	$F_{app} := qz_{ant} \cdot G_H \cdot Ca_{app} \cdot K_a \cdot SA_{appS} = 92$	lbs

Wind Load (with ice)

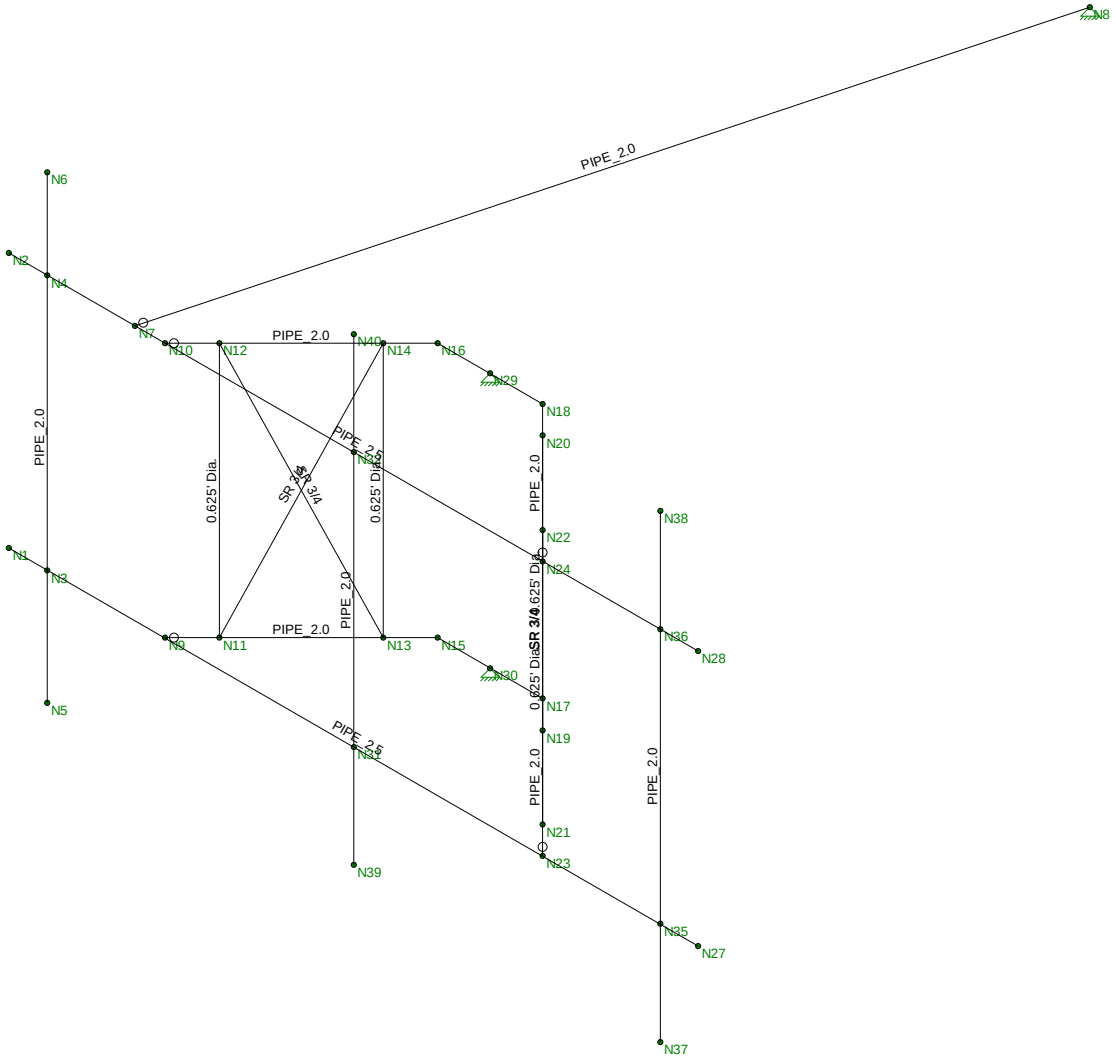
Surface Area for One Appurtenance w/ Ice (Front)=	$SA_{ICEappF} := \frac{(L_{app} + 2 \cdot t_{iz}) \cdot (W_{app} + 2 \cdot t_{iz})}{144} = 2.8$	sf
Total Appurtenance Wind Force w/ Ice =	$Fi_{app} := qz_{ice.ant} \cdot G_H \cdot Ca_{app} \cdot K_a \cdot SA_{ICEappF} = 28$	lbs
Surface Area for One Appurtenance w/ Ice (Side) =	$SA_{ICEappS} := \frac{(L_{app} + 2 \cdot t_{iz}) \cdot (T_{app} + 2 \cdot t_{iz})}{144} = 1.8$	sf
Total Appurtenance Wind Force w/ Ice =	$Fi_{app} := qz_{ice.ant} \cdot G_H \cdot Ca_{app} \cdot K_a \cdot SA_{ICEappS} = 18$	lbs

Wind Load (Mount)

Surface Area for One Appurtenance (Front) =	$SA_{appF} := \frac{L_{app} \cdot W_{app}}{144} = 2.1$	sf
Total Appurtenance Wind Force =	$F_{app} := qz_m \cdot G_H \cdot Ca_{app} \cdot K_a \cdot SA_{appF} = 8$	lbs
Surface Area for One Appurtenance (Side) =	$SA_{appS} := \frac{L_{app} \cdot T_{app}}{144} = 1.3$	sf
Total Appurtenance Wind Force =	$F_{app} := qz_m \cdot G_H \cdot Ca_{app} \cdot K_a \cdot SA_{appS} = 5$	lbs

Gravity Loads (ice only)

Volume of Each Appurtenance =	$V_{app} := L_{app} \cdot W_{app} \cdot T_{app} = 2963$	cu in
Volume of Ice on Each Appurtenance =	$V_{ice} := (L_{app} + 2 \cdot t_{iz})(W_{app} + 2 \cdot t_{iz}) \cdot (T_{app} + 2 \cdot t_{iz}) - V_{app} = 1996$	cu in
Weight of Ice on Each Appurtenance =	$W_{ICEapp} := \frac{V_{ice}}{1728} \cdot Id = 65$	lbs
Weight of Ice on All Appurtenances =	$W_{ICEapp} \cdot N_{app} = 65$	lbs



Centek Engineering		
TJL	BOBOS00069B	Oct 12, 2022 at 10:13 AM
22042.01	Member Framing	Mount.R3D

(Global) Model Settings

Display Sections for Member Calcs	5
Max Internal Sections for Member Calcs	97
Include Shear Deformation?	Yes
Increase Nailing Capacity for Wind?	Yes
Include Warping?	Yes
Trans Load Btwn Intersecting Wood Wall?	Yes
Area Load Mesh (in^2)	144
Merge Tolerance (in)	.12
P-Delta Analysis Tolerance	0.50%
Include P-Delta for Walls?	Yes
Automatically Iterate Stiffness for Walls?	Yes
Max Iterations for Wall Stiffness	3
Gravity Acceleration (ft/sec^2)	32.2
Wall Mesh Size (in)	12
Eigensolution Convergence Tol. (1.E-)	4
Vertical Axis	Y
Global Member Orientation Plane	XZ
Static Solver	Sparse Accelerated
Dynamic Solver	Accelerated Solver

Hot Rolled Steel Code	AISC 15th(360-16): LRFD
Adjust Stiffness?	Yes(Iterative)
RISAConnection Code	AISC 15th(360-16): LRFD
Cold Formed Steel Code	AISI S100-10: ASD
Wood Code	AWC NDS-12: ASD
Wood Temperature	< 100F
Concrete Code	ACI 318-11
Masonry Code	ACI 530-11: ASD
Aluminum Code	AA ADM1-10: ASD - Building
Stainless Steel Code	AISC 14th(360-10): ASD
Adjust Stiffness?	Yes(Iterative)

Number of Shear Regions	4
Region Spacing Increment (in)	4
Biaxial Column Method	Exact Integration
Parme Beta Factor (PCA)	.65
Concrete Stress Block	Rectangular
Use Cracked Sections?	Yes
Use Cracked Sections Slab?	No
Bad Framing Warnings?	No
Unused Force Warnings?	Yes
Min 1 Bar Diam. Spacing?	No
Concrete Rebar Set	REBAR_SET_ASTMA615
Min % Steel for Column	1
Max % Steel for Column	8

(Global) Model Settings, Continued

Seismic Code	ASCE 7-10
Seismic Base Elevation (ft)	Not Entered
Add Base Weight?	Yes
Ct X	.02
Ct Z	.02
T X (sec)	Not Entered
T Z (sec)	Not Entered
R X	3
R Z	3
Ct Exp. X	.75
Ct Exp. Z	.75
SD1	1
SDS	1
S1	1
TL (sec)	5
Risk Cat	I or II
Drift Cat	Other
Om Z	1
Om X	1
Cd Z	1
Cd X	1
Rho Z	1
Rho X	1
Footing Overturning Safety Factor	1
Optimize for OTM/Sliding	No
Check Concrete Bearing	No
Footing Concrete Weight (k/ft^3)	150.001
Footing Concrete f'c (ksi)	4
Footing Concrete Ec (ksi)	3644
Lambda	1
Footing Steel fy (ksi)	60
Minimum Steel	0.0018
Maximum Steel	0.0075
Footing Top Bar	#3
Footing Top Bar Cover (in)	2
Footing Bottom Bar	#3
Footing Bottom Bar Cover (in)	3.5
Pedestal Bar	#3
Pedestal Bar Cover (in)	1.5
Pedestal Ties	#3

Hot Rolled Steel Properties

	Label	E [ksi]	G [ksi]	Nu	Therm (\...	Density[k/ft^3]	Yield[ksi]	Ry	Fu[ksi]	Rt
1	A36 Gr.36	29000	11154	.3	.65	.49	36	1.5	58	1.2
2	A572 Gr.50	29000	11154	.3	.65	.49	50	1.1	58	1.2
3	A992	29000	11154	.3	.65	.49	50	1.1	58	1.2
4	A500 Gr.42	29000	11154	.3	.65	.49	42	1.3	58	1.1
5	A500 Gr.46	29000	11154	.3	.65	.49	46	1.2	58	1.1
6	A53 Grade B	29000	11154	.3	.65	.49	35	1.5	58	1.2

Hot Rolled Steel Section Sets

	Label	Shape	Type	Design List	Material	Design Ru...	A [in2]	Iyy [in4]	Izz [in4]	J [in4]
1	Antenna Mast_2.0 STD...	PIPE_2.0	Column	Pipe	A53 Grade B	Typical	1.02	.627	.627	1.25
2	Horizontal_2.5 STD Pipe	PIPE_2.5	Beam	Pipe	A53 Grade B	Typical	1.61	1.45	1.45	2.89
3	Outrigger_2.0 STD Pipe	PIPE_2.0	Beam	Pipe	A53 Grade B	Typical	1.02	.627	.627	1.25
4	Stabilizer_2.0 STD Pipe	PIPE_2.0	Beam	Pipe	A53 Grade B	Typical	1.02	.627	.627	1.25
5	0.625" Dia. Bar	0.625' Dia.	Column	BAR	A36 Gr.36	Typical	.307	.007	.007	.015
6	0.75"Dia. Bar	SR 3/4	Column	BAR	A36 Gr.36	Typical	.442	.016	.016	.031

Hot Rolled Steel Design Parameters

	Label	Shape	Length[ft]	Lbyy[ft]	Lbzz[ft]	Lcomp top[...	Lcomp bot[...	L-torq...	Kyy	Kzz	Cb	Functi...
1	M1	Horizontal_2.5 STD...	9	Segment		Lbyy						Lateral
2	M2	Horizontal_2.5 STD...	9	Segment		Lbyy						Lateral
3	M3	Stabilizer_2.0 STD ...	10.18			Lbyy						Lateral
4	M4	Outrigger_2.0 STD ...	2.521	Segment	Segment	Lbyy						Lateral
5	M5	Outrigger_2.0 STD ...	2.521	Segment	Segment	Lbyy						Lateral
6	M6	Outrigger_2.0 STD ...	2.521	Segment	Segment	Lbyy						Lateral
7	M7	Outrigger_2.0 STD ...	2.521	Segment	Segment	Lbyy						Lateral
8	M8	0.625" Dia. Bar	3.333									Lateral
9	M9	0.625" Dia. Bar	3.333									Lateral
10	M10	0.75"Dia. Bar	3.659	1.83	1.83	Lbyy						Lateral
11	M11	0.625" Dia. Bar	3.333									Lateral
12	M12	0.75"Dia. Bar	3.659	1.83	1.83	Lbyy						Lateral
13	M13	0.625" Dia. Bar	3.333									Lateral
14	M14	0.75"Dia. Bar	3.659	1.83	1.83	Lbyy						Lateral
15	M15	0.75"Dia. Bar	3.659	1.83	1.83	Lbyy						Lateral
16	M16	Antenna Mast_2.0 ...	6			Lbyy						Lateral
17	M18	Antenna Mast_2.0 ...	6			Lbyy						Lateral
18	M21	Antenna Mast_2.0 ...	6			Lbyy						Lateral

Member Primary Data

	Label	I Joint	J Joint	K Joint	Rotate(...	Section/Shape	Type	Design List	Material	Design ...
1	M1	N2	N28			Horizontal_2.5 STD Pipe	Beam	Pipe	A53 Grade B	Typical
2	M2	N1	N27			Horizontal_2.5 STD Pipe	Beam	Pipe	A53 Grade B	Typical
3	M3	N7	N8			Stabilizer_2.0 STD Pipe	Beam	Pipe	A53 Grade B	Typical
4	M4	N10	N16			Outrigger_2.0 STD Pipe	Beam	Pipe	A53 Grade B	Typical
5	M5	N9	N15			Outrigger_2.0 STD Pipe	Beam	Pipe	A53 Grade B	Typical
6	M6	N24	N18			Outrigger_2.0 STD Pipe	Beam	Pipe	A53 Grade B	Typical
7	M7	N23	N17			Outrigger_2.0 STD Pipe	Beam	Pipe	A53 Grade B	Typical
8	M8	N12	N11			0.625" Dia. Bar	Column	BAR	A36 Gr.36	Typical
9	M9	N14	N13			0.625" Dia. Bar	Column	BAR	A36 Gr.36	Typical
10	M10	N12	N13			0.75"Dia. Bar	Column	BAR	A36 Gr.36	Typical
11	M11	N22	N21			0.625" Dia. Bar	Column	BAR	A36 Gr.36	Typical
12	M12	N14	N11			0.75"Dia. Bar	Column	BAR	A36 Gr.36	Typical
13	M13	N20	N19			0.625" Dia. Bar	Column	BAR	A36 Gr.36	Typical
14	M14	N22	N19			0.75"Dia. Bar	Column	BAR	A36 Gr.36	Typical
15	M15	N20	N21			0.75"Dia. Bar	Column	BAR	A36 Gr.36	Typical
16	M16	N6	N5			Antenna Mast_2.0 STD Pi...	Column	Pipe	A53 Grade B	Typical
17	M18	N37	N38			Antenna Mast_2.0 STD Pi...	Column	Pipe	A53 Grade B	Typical
18	M19	N15	N17			RIGID	None	None	RIGID	Typical

Member Primary Data (Continued)

	Label	I Joint	J Joint	K Joint	Rotate(...	Section/Shape	Type	Design List	Material	Design ...
19	M20	N16	N18			RIGID	None	None	RIGID	Typical
20	M21	N39	N40			Antenna Mast_2.0 STD Pi...	Column	Pipe	A53 Grade B	Typical

Joint Coordinates and Temperatures

	Label	X [ft]	Y [ft]	Z [ft]	Temp [F]	Detach From Diap...
1	N1	0	0	0	0	
2	N2	0	3.333334	0	0	
3	N3	.5	0.	-0.	0	
4	N4	.5	3.333334	-0.	0	
5	N5	.5	-1.5	0	0	
6	N6	.5	4.5	0	0	
7	N7	1.640625	3.333334	-0.	0	
8	N8	4.275403	3.333334	-9.833125	0	
9	N9	2.03125	0.	-0.	0	
10	N10	2.03125	3.333334	-0.	0	
11	N11	2.388628	0.	-0.357378	0	
12	N12	2.388628	3.333334	-0.357378	0	
13	N13	3.456335	0.	-1.425085	0	
14	N14	3.456335	3.333334	-1.425085	0	
15	N15	3.813713	0.	-1.782463	0	
16	N16	3.813713	3.333334	-1.782463	0	
17	N17	5.186287	0.	-1.782463	0	
18	N18	5.186287	3.333334	-1.782463	0	
19	N19	5.543665	0.	-1.425085	0	
20	N20	5.543665	3.333334	-1.425085	0	
21	N21	6.611372	0.	-0.357378	0	
22	N22	6.611372	3.333334	-0.357378	0	
23	N23	6.96875	0.	-0.	0	
24	N24	6.96875	3.333334	-0.	0	
25	N27	9	0	0	0	
26	N28	9	3.333334	0	0	
27	N29	4.5	3.333334	-1.782463	0	
28	N30	4.5	0.	-1.782463	0	
29	N31	4.5	0.	-0.	0	
30	N32	4.5	3.333334	-0.	0	
31	N35	8.5	0.	-0.	0	
32	N36	8.5	3.333334	-0.	0	
33	N37	8.5	-1.333333	-0.	0	
34	N38	8.5	4.666667	-0.	0	
35	N39	4.5	-1.333333	-0.	0	
36	N40	4.5	4.666667	-0.	0	

Joint Boundary Conditions

	Joint 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	N8	Reaction	Reaction	Reaction			
2	N15						
3	N16						
4	N13						
5	N14						

Joint Boundary Conditions (Continued)

	Joint 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]
6	N17						
7	N18						
8	N19						
9	N20						
10	N29	Reaction	Reaction	Reaction			
11	N30	Reaction	Reaction	Reaction			

Member Point Loads (BLC 2 : Dead Load)

	Member Label	Direction	Magnitude[k,k-ft]	Location[ft,%]
1	M21	Y	-.035	.5
2	M21	Y	-.035	5.5
3	M21	Y	-.07	2
4	M21	Y	-.08	5
5	M18	Y	-.025	%50

Member Point Loads (BLC 3 : Ice Load)

	Member Label	Direction	Magnitude[k,k-ft]	Location[ft,%]
1	M21	Y	-.103	.5
2	M21	Y	-.103	5.5
3	M21	Y	-.049	2
4	M21	Y	-.052	5
5	M18	Y	-.065	%50

Member Point Loads (BLC 4 : Lm Maintenance Load (500lb))

	Member Label	Direction	Magnitude[k,k-ft]	Location[ft,%]
1	M18	Y	-.5	%50

Member Point Loads (BLC 5 : Lv Maintenance Load (250lb))

	Member Label	Direction	Magnitude[k,k-ft]	Location[ft,%]
1	M2	Y	-.25	%50

Member Point Loads (BLC 6 : Wind with Ice X)

	Member Label	Direction	Magnitude[k,k-ft]	Location[ft,%]
1	M21	X	.029	.5
2	M21	X	.029	5.5
3	M21	X	.013	2
4	M21	X	.014	5
5	M18	X	.018	%50

Member Point Loads (BLC 7 : Wind X)

	Member Label	Direction	Magnitude[k,k-ft]	Location[ft,%]
1	M21	X	.151	.5
2	M21	X	.151	5.5
3	M21	X	.059	2
4	M21	X	.068	5
5	M18	X	.092	%50

Member Point Loads (BLC 8 : Wm Wind X)

	Member Label	Direction	Magnitude[k,k-ft]	Location[ft,%]
1	M21	X	.008	.5
2	M21	X	.008	5.5
3	M21	X	.003	2
4	M21	X	.003	5
5	M18	X	.005	%50

Member Point Loads (BLC 9 : Wind with Ice Z)

	Member Label	Direction	Magnitude[k,k-ft]	Location[ft,%]
1	M21	Z	.061	.5
2	M21	Z	.061	5.5
3	M18	Z	.028	%50

Member Point Loads (BLC 10 : Wind Z)

	Member Label	Direction	Magnitude[k,k-ft]	Location[ft,%]
1	M21	Z	.378	.5
2	M21	Z	.378	5.5
3	M18	Z	.155	%50

Member Point Loads (BLC 11 : Wm Wind Z)

	Member Label	Direction	Magnitude[k,k-ft]	Location[ft,%]
1	M21	Z	.019	.5
2	M21	Z	.019	5.5
3	M18	Z	.008	%50

Member Distributed Loads (BLC 6 : Wind with Ice X)

	Member Label	Direction	Start Magnitude[k/ft,F,ksf]	End Magnitude[k/ft,F,k...	Start Location[ft..	End Location[ft,...
1	M1	PX	.003	.003	0	0
2	M2	PX	.003	.003	0	0
3	M3	PX	.003	.003	0	0
4	M4	PX	.003	.003	0	0
5	M5	PX	.003	.003	0	0
6	M6	PX	.003	.003	0	0
7	M7	PX	.003	.003	0	0
8	M8	PX	.003	.003	0	0
9	M9	PX	.003	.003	0	0
10	M10	PX	.003	.003	0	0
11	M11	PX	.003	.003	0	0
12	M12	PX	.003	.003	0	0
13	M13	PX	.003	.003	0	0
14	M14	PX	.003	.003	0	0
15	M15	PX	.003	.003	0	0
16	M16	PX	.003	.003	0	0
17	M18	PX	.003	.003	0	0
18	M19	PX	.003	.003	0	0
19	M20	PX	.003	.003	0	0
20	M21	PX	.003	.003	0	0

Member Distributed Loads (BLC 7 : Wind X)

Member Label	Direction	Start Magnitude[k/ft,F,ksf]	End Magnitude[k/ft,F,k...	Start Location[ft..	End Location[ft,...

Member Distributed Loads (BLC 7 : Wind X) (Continued)

	Member Label	Direction	Start Magnitude[k/ft,F,ksf]	End Magnitude[k/ft,F,k...	Start Location[ft..	End Location[ft,...
1	M1	PX	.012	.012	0	0
2	M2	PX	.012	.012	0	0
3	M3	PX	.012	.012	0	0
4	M4	PX	.012	.012	0	0
5	M5	PX	.012	.012	0	0
6	M6	PX	.012	.012	0	0
7	M7	PX	.012	.012	0	0
8	M8	PX	.012	.012	0	0
9	M9	PX	.012	.012	0	0
10	M10	PX	.012	.012	0	0
11	M11	PX	.012	.012	0	0
12	M12	PX	.012	.012	0	0
13	M13	PX	.012	.012	0	0
14	M14	PX	.012	.012	0	0
15	M15	PX	.012	.012	0	0
16	M16	PX	.012	.012	0	0
17	M18	PX	.012	.012	0	0
18	M19	PX	.012	.012	0	0
19	M20	PX	.012	.012	0	0
20	M21	PX	.012	.012	0	0

Member Distributed Loads (BLC 8 : Wm Wind X)

	Member Label	Direction	Start Magnitude[k/ft,F,ksf]	End Magnitude[k/ft,F,k...	Start Location[ft..	End Location[ft,...
1	M1	PX	.002	.002	0	0
2	M2	PX	.002	.002	0	0
3	M3	PX	.002	.002	0	0
4	M4	PX	.002	.002	0	0
5	M5	PX	.002	.002	0	0
6	M6	PX	.002	.002	0	0
7	M7	PX	.002	.002	0	0
8	M8	PX	.002	.002	0	0
9	M9	PX	.002	.002	0	0
10	M10	PX	.002	.002	0	0
11	M11	PX	.002	.002	0	0
12	M12	PX	.002	.002	0	0
13	M13	PX	.002	.002	0	0
14	M14	PX	.002	.002	0	0
15	M15	PX	.002	.002	0	0
16	M16	PX	.002	.002	0	0
17	M18	PX	.002	.002	0	0
18	M19	PX	.002	.002	0	0
19	M20	PX	.002	.002	0	0
20	M21	PX	.002	.002	0	0

Member Distributed Loads (BLC 9 : Wind with Ice Z)

	Member Label	Direction	Start Magnitude[k/ft,F,ksf]	End Magnitude[k/ft,F,k...	Start Location[ft..	End Location[ft,...
1	M1	PZ	.003	.003	0	0
2	M2	PZ	.003	.003	0	0
3	M3	PZ	.003	.003	0	0
4	M4	PZ	.003	.003	0	0
5	M5	PZ	.003	.003	0	0

Member Distributed Loads (BLC 9 : Wind with Ice Z) (Continued)

	Member Label	Direction	Start Magnitude[k/ft,F,ksf]	End Magnitude[k/ft,F,k...	Start Location[ft..	End Location[ft,...
6	M6	PZ	.003	.003	0	0
7	M7	PZ	.003	.003	0	0
8	M8	PZ	.003	.003	0	0
9	M9	PZ	.003	.003	0	0
10	M10	PZ	.003	.003	0	0
11	M11	PZ	.003	.003	0	0
12	M12	PZ	.003	.003	0	0
13	M13	PZ	.003	.003	0	0
14	M14	PZ	.003	.003	0	0
15	M15	PZ	.003	.003	0	0
16	M16	PZ	.003	.003	0	0
17	M19	PZ	.003	.003	0	0
18	M20	PZ	.003	.003	0	0

Member Distributed Loads (BLC 10 : Wind Z)

	Member Label	Direction	Start Magnitude[k/ft,F,ksf]	End Magnitude[k/ft,F,k...	Start Location[ft..	End Location[ft,...
1	M1	PZ	.012	.012	0	0
2	M2	PZ	.012	.012	0	0
3	M3	PZ	.012	.012	0	0
4	M4	PZ	.012	.012	0	0
5	M5	PZ	.012	.012	0	0
6	M6	PZ	.012	.012	0	0
7	M7	PZ	.012	.012	0	0
8	M8	PZ	.012	.012	0	0
9	M9	PZ	.012	.012	0	0
10	M10	PZ	.012	.012	0	0
11	M11	PZ	.012	.012	0	0
12	M12	PZ	.012	.012	0	0
13	M13	PZ	.012	.012	0	0
14	M14	PZ	.012	.012	0	0
15	M15	PZ	.012	.012	0	0
16	M16	PZ	.012	.012	0	0
17	M19	PZ	.012	.012	0	0
18	M20	PZ	.012	.012	0	0

Member Distributed Loads (BLC 11 : Wm Wind Z)

	Member Label	Direction	Start Magnitude[k/ft,F,ksf]	End Magnitude[k/ft,F,k...	Start Location[ft..	End Location[ft,...
1	M1	PZ	.002	.002	0	0
2	M2	PZ	.002	.002	0	0
3	M3	PZ	.002	.002	0	0
4	M4	PZ	.002	.002	0	0
5	M5	PZ	.002	.002	0	0
6	M6	PZ	.002	.002	0	0
7	M7	PZ	.002	.002	0	0
8	M8	PZ	.002	.002	0	0
9	M9	PZ	.002	.002	0	0
10	M10	PZ	.002	.002	0	0
11	M11	PZ	.002	.002	0	0
12	M12	PZ	.002	.002	0	0
13	M13	PZ	.002	.002	0	0
14	M14	PZ	.002	.002	0	0

Member Distributed Loads (BLC 11 : Wm Wind Z) (Continued)

	Member Label	Direction	Start Magnitude[k/ft,F,ksf]	End Magnitude[k/ft,F,k...	Start Location[ft..	End Location[ft,...
15	M15	PZ	.002	.002	0	0
16	M16	PZ	.002	.002	0	0
17	M19	PZ	.002	.002	0	0
18	M20	PZ	.002	.002	0	0

Basic Load Cases

	BLC Description	Category	X Gra...	Y Gra...	Z Gra...	Joint	Point	Distrib..	Area(...	Surfa...
1	Self Weight	None		-1						
2	Dead Load	None					5			
3	Ice Load	None					5			
4	Lm Maintenance Load (500lb)	None					1			
5	Lv Maintenance Load (250lb)	None					1			
6	Wind with Ice X	None					5	20		
7	Wind X	None					5	20		
8	Wm Wind X	None					5	20		
9	Wind with Ice Z	None					3	18		
10	Wind Z	None					3	18		
11	Wm Wind Z	None					3	18		

Load Combinations

	Description	So...	P...	S...	BLC	Fac...	BLC	Fac...	BLC	Fac...	BLC	Fac...	BLC	Fac...	BLC	Fac...	BLC	Fac...	BLC	Fac...	BLC	Fac...	BLC	Fac...
1	1.4D	Yes	Y		1	1.4	2	1.4																
2	1.2D +1.5Lv	Yes	Y		1	1.2	2	1.2	5	1.5														
3	1.2D + 1.0W (X-dir...	Yes	Y		1	1.2	2	1.2	7	1														
4	1.2D + 1.0Di + 1.0...	Yes	Y		1	1.2	2	1.2	3	1	6	1												
5	1.2D +1.5Lm+ 1.0...	Yes	Y		1	1.2	2	1.2	4	1.5	8	1												
6	1.2D + 1.0W (Z-dir...	Yes	Y		1	1.2	2	1.2	10	1														
7	1.2D + 1.0Di + 1.0...	Yes	Y		1	1.2	2	1.2	3	1	9	1												
8	1.2D +1.5Lm+ 1.0...	Yes	Y		1	1.2	2	1.2	4	1.5	11	1												

Envelope Joint Reactions

	Joint		X [k]	LC	Y [k]	LC	Z [k]	LC	MX [k-ft]	LC	MY [k-ft]	LC	MZ [k-ft]	LC
1	N8	max	.142	3	.025	1	.105	6	0	8	0	8	0	8
2		min	-.032	6	.021	5	-.751	3	0	1	0	1	0	1
3	N29	max	.014	6	.687	8	.456	3	0	8	0	8	0	8
4		min	-1.015	5	.298	3	-1.25	6	0	1	0	1	0	1
5	N30	max	.918	8	.668	5	.696	5	0	8	0	8	0	8
6		min	-.538	3	.294	6	-.532	6	0	1	0	1	0	1
7	Totals:	max	0	8	1.365	8	0	5						
8		min	-1.269	3	.615	6	-1.677	6						

Envelope Joint Displacements

	Joint		X [in]	LC	Y [in]	LC	Z [in]	LC	X Rotation [rad]	LC	Y Rotation [rad]	LC	Z Rotation [rad]	LC
1	N1	max	.049	3	.075	8	.086	3	6.587e-04	8	8.256e-04	3	2.817e-04	3
2		min	-.023	8	-.005	3	-.039	6	-1.462e-03	3	-1.332e-03	6	-1.206e-03	8
3	N2	max	.02	3	.075	8	.003	8	1.11e-03	6	-8.437e-06	1	2.823e-04	3

Envelope Joint Displacements (Continued)

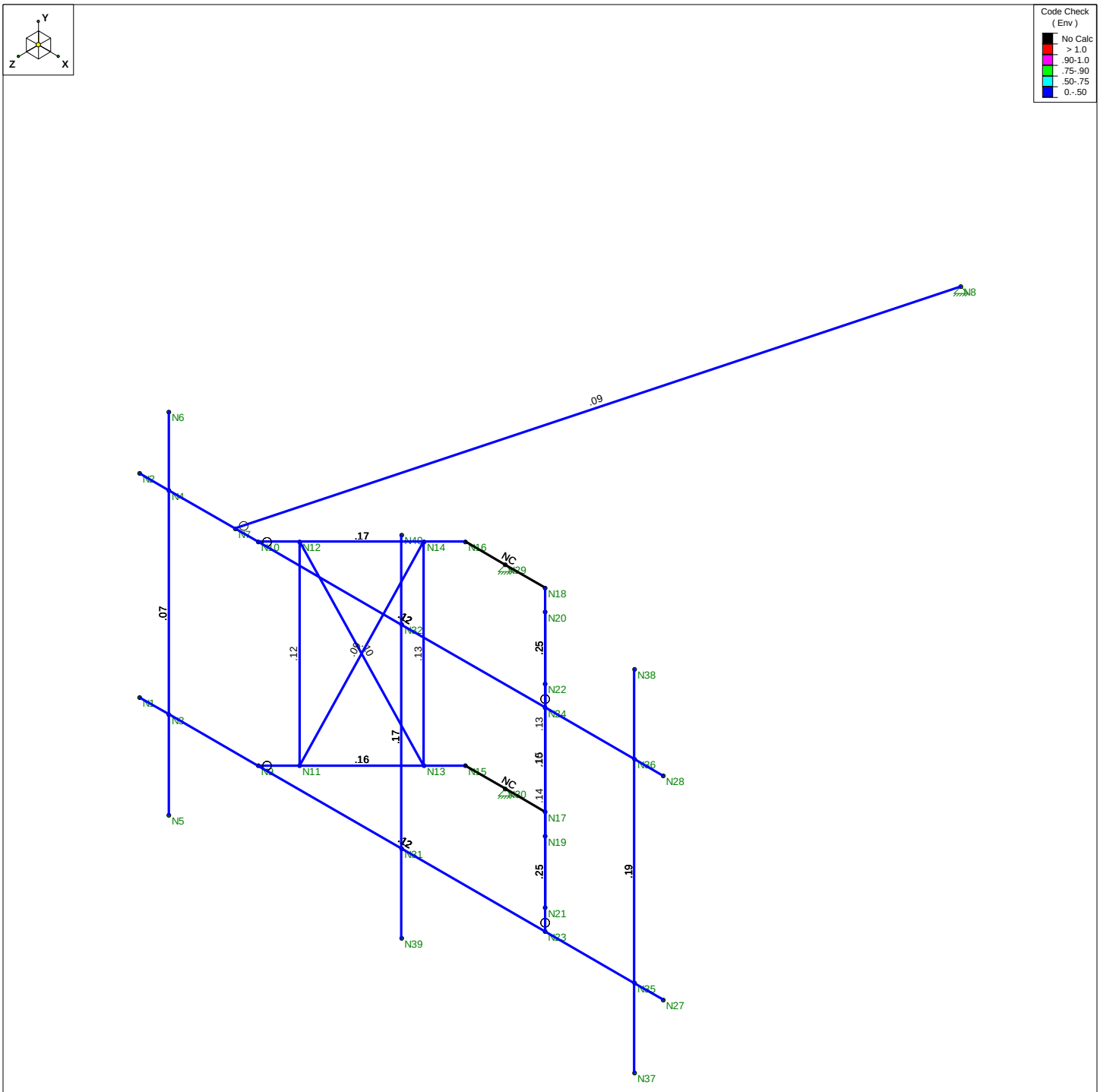
	Joint		X [in]	LC	Y [in]	LC	Z [in]	LC	X Rotation [rad]	LC	Y Rotation [rad]	LC	Z Rotation [rad]	LC
4		min	0	2	-.005	3	-.022	6	-1.555e-03	3	-1.103e-03	6	-1.228e-03	8
5	N3	max	.049	3	.068	8	.081	3	6.587e-04	8	8.256e-04	3	2.811e-04	3
6		min	-.023	8	-.003	3	-.031	6	-1.462e-03	3	-1.333e-03	6	-1.207e-03	8
7	N4	max	.02	3	.068	8	.003	8	1.11e-03	6	-8.437e-06	1	2.817e-04	3
8		min	0	2	-.003	3	-.015	6	-1.555e-03	3	-1.104e-03	6	-1.228e-03	8
9	N5	max	.055	3	.068	8	.107	3	6.476e-04	8	8.256e-04	3	3.479e-04	3
10		min	-.045	8	-.003	3	-.038	8	-1.462e-03	3	-1.333e-03	6	-1.207e-03	8
11	N6	max	.032	5	.068	8	.013	8	1.141e-03	6	-8.437e-06	1	2.503e-04	3
12		min	.003	1	-.003	3	-.022	3	-1.555e-03	3	-1.104e-03	6	-1.228e-03	8
13	N7	max	.02	3	.049	5	.009	3	1.283e-03	6	-6.539e-06	1	-1.537e-04	3
14		min	0	2	-.005	2	0	2	-1.098e-03	3	-1.172e-03	6	-1.533e-03	8
15	N8	max	0	8	0	8	0	8	2.178e-03	1	5.049e-03	3	6.046e-04	3
16		min	0	1	0	1	0	1	1.732e-03	3	6.255e-07	2	-1.237e-03	8
17	N9	max	.049	3	.042	5	.062	3	5.925e-04	8	1.365e-03	3	-4.429e-04	3
18		min	-.023	8	-.009	2	-.017	8	-9.544e-04	6	-1.693e-03	6	-1.675e-03	8
19	N10	max	.019	3	.042	5	.014	3	1.343e-03	6	-3.419e-06	8	-3.206e-04	3
20		min	0	2	-.009	2	0	1	-9.413e-04	3	-1.291e-03	6	-1.666e-03	8
21	N11	max	.038	3	.044	8	.051	3	1.559e-03	8	2.519e-03	3	2.697e-04	6
22		min	-.015	8	-.005	2	-.009	8	-1.726e-04	3	-1.83e-03	8	-1.132e-03	5
23	N12	max	.013	3	.044	8	.008	3	1.577e-03	8	1.471e-03	5	2.181e-04	3
24		min	0	2	-.005	2	-.002	8	-4.077e-04	3	1.982e-05	2	-1.12e-03	8
25	N13	max	.008	3	.04	8	.021	3	1.292e-03	8	2.031e-03	3	1.259e-04	3
26		min	0	6	-.007	3	-.002	6	2.301e-04	3	-2.797e-04	8	-2.819e-03	8
27	N14	max	0	6	.04	8	.002	6	1.268e-03	8	3.341e-04	3	3.05e-04	3
28		min	-.003	5	-.007	3	-.013	5	1.061e-04	3	-1.649e-04	8	-2.809e-03	8
29	N15	max	0	8	.031	8	.013	3	1.04e-03	2	1.597e-03	3	4.527e-04	3
30		min	0	1	-.004	3	-.001	6	5.51e-04	6	-1.555e-04	6	-3.73e-03	8
31	N16	max	0	8	.031	8	.001	6	1.038e-03	2	1.657e-04	6	4.524e-04	3
32		min	0	1	-.004	3	-.01	5	5.456e-04	3	-1.207e-03	5	-3.73e-03	8
33	N17	max	0	8	.004	3	.001	6	1.04e-03	2	1.597e-03	3	4.527e-04	3
34		min	0	1	-.031	8	-.013	3	5.51e-04	6	-1.555e-04	6	-3.73e-03	8
35	N18	max	0	8	.004	3	.01	5	1.038e-03	2	1.657e-04	6	4.524e-04	3
36		min	0	1	-.031	8	-.001	6	5.456e-04	3	-1.207e-03	5	-3.73e-03	8
37	N19	max	.008	3	.002	3	.002	6	8.101e-04	2	2.044e-03	3	2.638e-04	3
38		min	0	6	-.048	8	-.021	3	3.873e-05	8	-2.928e-04	8	-2.765e-03	8
39	N20	max	0	6	.003	3	.013	5	8.094e-04	2	3.575e-04	3	4.468e-04	3
40		min	-.003	8	-.048	8	-.002	6	1.5e-05	8	-2.031e-04	8	-2.782e-03	8
41	N21	max	.038	3	-.003	3	.009	8	7.863e-04	3	2.528e-03	3	1.883e-04	2
42		min	-.016	8	-.058	8	-.051	3	-7.964e-04	8	-1.794e-03	8	-2.159e-03	5
43	N22	max	.014	3	-.004	3	.003	8	1.092e-03	3	1.46e-03	5	3.06e-04	6
44		min	0	2	-.058	8	-.01	3	-8.098e-04	8	1.113e-05	2	-2.151e-03	8
45	N23	max	.049	3	-.007	3	.017	8	6.177e-04	3	2.23e-03	3	9.808e-04	2
46		min	-.024	8	-.068	5	-.062	3	-9.611e-04	6	-4.105e-04	8	-2.983e-03	5
47	N24	max	.02	3	-.007	6	0	2	7.488e-04	3	1.414e-03	6	9.726e-04	2
48		min	0	2	-.068	5	-.016	3	-1.007e-04	8	-1.161e-05	1	-2.99e-03	8
49	N27	max	.049	3	.003	2	.025	8	1.033e-03	3	1.988e-03	3	3.972e-04	3
50		min	-.024	8	-.145	8	-.112	3	-4.915e-04	6	-2.953e-04	8	-2.825e-03	8
51	N28	max	.02	3	.004	3	0	2	1.125e-03	3	1.636e-03	3	6.165e-04	3
52		min	0	2	-.145	8	-.054	3	-3.9e-04	8	-1.346e-04	8	-2.827e-03	8
53	N29	max	0	8	0	8	0	8	1.038e-03	2	1.657e-04	6	4.524e-04	3
54		min	0	1	0	1	0	1	5.456e-04	3	-1.207e-03	5	-3.73e-03	8
55	N30	max	0	8	0	8	0	8	1.04e-03	2	1.597e-03	3	4.527e-04	3

Envelope Joint Displacements (Continued)

	Joint		X [in]	LC	Y [in]	LC	Z [in]	LC	X Rotation [rad]	LC	Y Rotation [rad]	LC	Z Rotation [rad]	LC
56		min	0	1	0	1	0	1	5.51e-04	6	-1.555e-04	6	-3.73e-03	8
57	N31	max	.049	3	-.008	5	.036	6	1.428e-04	5	2.18e-03	3	2.412e-04	3
58		min	-.023	8	-.037	2	0	2	-2.04e-03	6	-5.945e-04	8	-1.48e-03	8
59	N32	max	.02	3	-.008	5	.035	6	2.063e-03	6	6.726e-04	3	-2.149e-05	2
60		min	0	2	-.037	2	0	1	6.937e-06	2	-7.989e-06	2	-1.477e-03	5
61	N35	max	.049	3	0	2	.023	8	1.033e-03	3	1.988e-03	3	3.978e-04	3
62		min	-.024	8	-.128	8	-.1	3	-4.915e-04	6	-2.951e-04	8	-2.824e-03	8
63	N36	max	.02	3	0	2	0	2	1.125e-03	3	1.636e-03	3	6.171e-04	3
64		min	0	2	-.128	8	-.044	3	-3.9e-04	8	-1.344e-04	8	-2.826e-03	8
65	N37	max	.056	3	0	2	.029	8	1.033e-03	3	1.988e-03	3	4.447e-04	3
66		min	-.069	8	-.128	8	-.117	3	-4.915e-04	6	-2.951e-04	8	-2.824e-03	8
67	N38	max	.06	5	0	2	0	1	1.125e-03	3	1.636e-03	3	5.702e-04	3
68		min	-.006	2	-.128	8	-.026	3	-3.9e-04	8	-1.344e-04	8	-2.826e-03	8
69	N39	max	.061	3	-.008	5	.086	6	1.428e-04	5	2.18e-03	3	8.07e-04	3
70		min	-.047	8	-.037	2	-.002	5	-3.338e-03	6	-5.945e-04	8	-1.48e-03	8
71	N40	max	.039	5	-.009	5	.086	6	3.365e-03	6	6.726e-04	3	-2.15e-05	2
72		min	0	2	-.037	2	0	2	6.941e-06	2	-7.989e-06	2	-1.515e-03	5

Envelope AISC 15th(360-16): LRFD Steel Code Checks

	Memb...	Shape	Code Check	L...	LC	Sh...	L...	Dir	...phi*P...	phi*Pn...	phi*Mn y-y [k-ft]	phi*...	Cb	Eqn
1	M6	PIPE_2.0	.251	2....	8	.069	.4...	5	32.032	32.13	1.872	1.872	1....	H1..
2	M7	PIPE_2.0	.249	2....	8	.070	.4...	8	32.032	32.13	1.872	1.872	1....	H1..
3	M18	PIPE_2.0	.188	4....	5	.024	4....	5	20.867	32.13	1.872	1.872	1....	H1..
4	M4	PIPE_2.0	.170	2....	5	.068	2....	5	32.032	32.13	1.872	1.872	1....	H1..
5	M21	PIPE_2.0	.168	4....	6	.039	4....	6	20.867	32.13	1.872	1.872	1....	H1..
6	M5	PIPE_2.0	.161	2....	8	.063	2....	5	32.032	32.13	1.872	1.872	1....	H1..
7	M14	SR 3/4	.154	3....	8	.008	0	5	6.954	14.314	.179	.179	1	H1..
8	M11	0.625' Dia.	.139	0	3	.015	3....	8	1.058	9.94	.104	.104	2....	H1..
9	M13	0.625' Dia.	.131	0	6	.012	3....	3	1.058	9.94	.104	.104	1....	H1..
10	M9	0.625' Dia.	.127	0	6	.012	3....	3	1.058	9.94	.104	.104	2....	H1..
11	M8	0.625' Dia.	.122	0	6	.015	0	8	1.058	9.94	.104	.104	1....	H1..
12	M1	PIPE_2.5	.122	4.5	6	.074	1....	3	26.137	50.715	3.596	3.596	2....	H1..
13	M2	PIPE_2.5	.120	4.5	6	.046	6....	6	26.137	50.715	3.596	3.596	2....	H1..
14	M15	SR 3/4	.101	0	5	.013	0	3	6.954	14.314	.179	.179	1	H1..
15	M10	SR 3/4	.098	0	6	.011	0	8	6.954	14.314	.179	.179	2....	H1..
16	M3	PIPE_2.0	.095	5....	3	.006	1...	3	9.492	32.13	1.872	1.872	1....	H1..
17	M12	SR 3/4	.094	0	3	.013	0	3	6.954	14.314	.179	.179	2....	H1..
18	M16	PIPE_2.0	.068	1....	3	.033	1....	3	20.867	32.13	1.872	1.872	1....	H1..



Centek Engineering		
TJL	BOBOS00069B	Oct 12, 2022 at 10:13 AM
22042.01	Unity Check	Mount.R3D

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:	Connection to Host Building
Location:	Montville, CT
Rev. 1: 10/12/22	Prepared by: T.J.L. Checked by: C.F.C. Job No. 22042.01

Antenna Mount Connection:

Anchor Data:

A307 Thru-Bolt =

Number of Anchor Bolts = $N := 4$ (User Input)

Diameter of Bolts = $D := 0.625in$ (User Input)

Design Tension = $T_{design} := 10.4 \cdot kips$ (User Input)

Design Shear = $V_{design} := 6.23 \cdot kips$ (User Input)

Design Reactions:

FX = $F_x := 1.1 \cdot kips$ (User Input)

FY = $F_y := 0.7 \cdot kips$ (User Input)

FZ = $F_z := 1.3 \cdot kips$ (User Input)

Anchor Check:

Max Tension Force = $T_{Max} := \frac{F_z}{N} = 325lb$

Max Shear Force = $V_{Max} := \frac{F_y + F_x}{N} = 450lb$

Condition 1 = $Condition1 := if\left(\frac{T_{Max}}{T_{design}} + \frac{V_{Max}}{V_{design}} \le 1.0, "OK", "NG"\right) = "OK"$

% of Capacity = $\max\left[\frac{T_{Max}}{T_{design}}, \frac{V_{Max}}{V_{design}}, \left(\frac{\frac{T_{Max}}{T_{design}} + \frac{V_{Max}}{V_{design}}}{1.0}\right)\right] = 10.3 \cdot \%$

Exhibit F

Power Density/RF Emissions Report

Fox Hill Telecom

Radio Frequency Emissions Analysis Report

Site ID: BOBOS00069B

414 Chapel Hill Road
Oakdale, CT 06370

October 14, 2022

Fox Hill Telecom Project Number: 221858

Site Compliance Summary	
Compliance Status:	**COMPLIANT**
Site total MPE% of FCC general population allowable limit:	**7.00 %**

Fox Hill Telecom

October 14, 2022

Dish Wireless
5701 South Santa Fe Drive
Littleton, CO 80120

Emissions Analysis for Site: **BOBOS00069B**

Fox Hill Telecom, Inc ("Fox Hill") was directed to analyze the proposed radio installation for Dish Wireless, LLC (Dish) facility located at **414 Chapel Hill Road, Oakdale, 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 limits for the 600 MHz & 700 MHz bands are approximately 400 $\mu W/cm^2$ and 467 $\mu W/cm^2$ respectively. 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 percent 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 radio system installation for **Dish** on the subject site located at **414 Chapel Hill Road, Oakdale, CT**, using the equipment information listed below. All calculations were performed per the specifications under FCC OET 65.

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

The radiation pattern of an antenna has developed in the Far Field region and the power gain needs to be considered in exposure predictions. Also, since the vertical radiation pattern of the antenna is considered, the exposure predictions would most likely be reduced significantly at ground level, resulting in a more realistic estimate of the actual exposure levels.

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 four-fold increase in power density.

These additional factors are considered, and the Far Field prediction model is determined by the following equation:

$$S = EIRP \times Rc \div 4\pi R^2$$

S = Power Density
EIRP = Effective Radiated Power from antenna
Rc = Reflection Coefficient (2.56)
R = Distance from the antenna

Predicted power densities are calculated 6 feet above the ground level and are displayed as a percentage of the applicable FCC standards.

All emissions values for additional carriers were taken from the Connecticut Siting Council (CSC) active MPE database. Values in this database are provided by the individual carriers themselves.

For each 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 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 the carrier with regards to anticipated antenna selection.

Sector	Antenna Number	Antenna Make / Model	Antenna Centerline (ft)
A	1	JMA MX08FRO665-21	110
B	1	JMA MX08FRO665-21	110
C	1	JMA MX08FRO665-21	110

Table 2: Antenna Data

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

RESULTS

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

Antenna ID	Antenna Make / Model	Frequency Bands	Antenna Gain (dBd)	Channel Count	Total TX Power (W)	ERP (W)	MPE %
Antenna A1	JMA MX08FRO665-21	n71 (600 MHz) / n70 (AWS-4 / 1995-2020) / n66 (AWS-4 / 2180-2200)	11.45 / 16.15 / 16.65	12	566	17,426.72	1.09
						Sector A Composite MPE%	**1.09**
Antenna B1	JMA MX08FRO665-21	n71 (600 MHz) / n70 (AWS-4 / 1995-2020) / n66 (AWS-4 / 2180-2200)	11.45 / 16.15 / 16.65	12	566	17,426.72	1.09
						Sector B Composite MPE%	**1.09**
Antenna C1	JMA MX08FRO665-21	n71 (600 MHz) / n70 (AWS-4 / 1995-2020) / n66 (AWS-4 / 2180-2200)	11.45 / 16.15 / 16.65	12	566	17,426.72	1.09
						Sector C Composite MPE%	**1.09**

Table 3: Dish Emissions Levels

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

Site Composite MPE%	
Carrier	**MPE%**
Dish – Max Per Sector Value	**1.09 %**
Eversource	0.58 %
CL&P	3.50 %
Montville FD	0.21 %
Montville Public Works	0.11 %
Dominion	1.51 %
Site Total MPE %:	**7.00 %**

Table 4: All Carrier MPE Contributions

Dish Sector A Total:	1.09 %
Dish Sector B Total:	1.09 %
Dish Sector C Total:	1.09 %
Site Total:	7.00 %

Table 5: Site MPE Summary

FCC OET 65 specifies that for carriers utilizing directional antennas that the highest recorded sector value be used for composite site MPE values due to their greatly reduced emissions contributions in the directions of the adjacent sectors. *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 on all three sectors.

Dish _ Frequency Band / Technology Max Power Values (Per Sector)	# Channels	Watts ERP (Per Channel)	Height (feet)	Total Power Density ($\mu W/cm^2$)	Frequency (MHz)	Allowable MPE ($\mu W/cm^2$)	Calculated % MPE
Dish n71 (600 MHz) 5G	4	858.77	110	2.12	n71 (600 MHz)	400	0.53%
Dish n70 (AWS-4 / 1995-2020) 5G	4	1,648.39	110	2.80	n70 (AWS-4 / 1995-2020)	1000	0.28%
Dish n66 (AWS-4 / 2180-2200) 5G	4	1,849.52	110	2.80	n66 (AWS-4 / 2180-2200)	1000	0.28%
						Total:	**1.09%**

Table 6: Dish Maximum Sector MPE Power Values

Fox Hill Telecom

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:	1.09 %
Sector B:	1.09 %
Sector C:	1.09 %
Dish Maximum Total (per sector):	1.09 %
Site Total:	7.00 %
Site Compliance Status:	**COMPLIANT**

The anticipated composite MPE value for this site assuming all carriers present is **7.00 %** of the allowable FCC established general population limit sampled at the ground level. This is based upon values listed in the Connecticut Siting Council database for existing carrier emissions.

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

Exhibit G

Letter of Authorization

FW: DISH-CT BOBOS00069B 414 Chapel Hill Rd, Montville

External

Inbox

G

Gelinas, Christopher Fri, Sep 30, 9:10 AM

to me

Morning Chuck

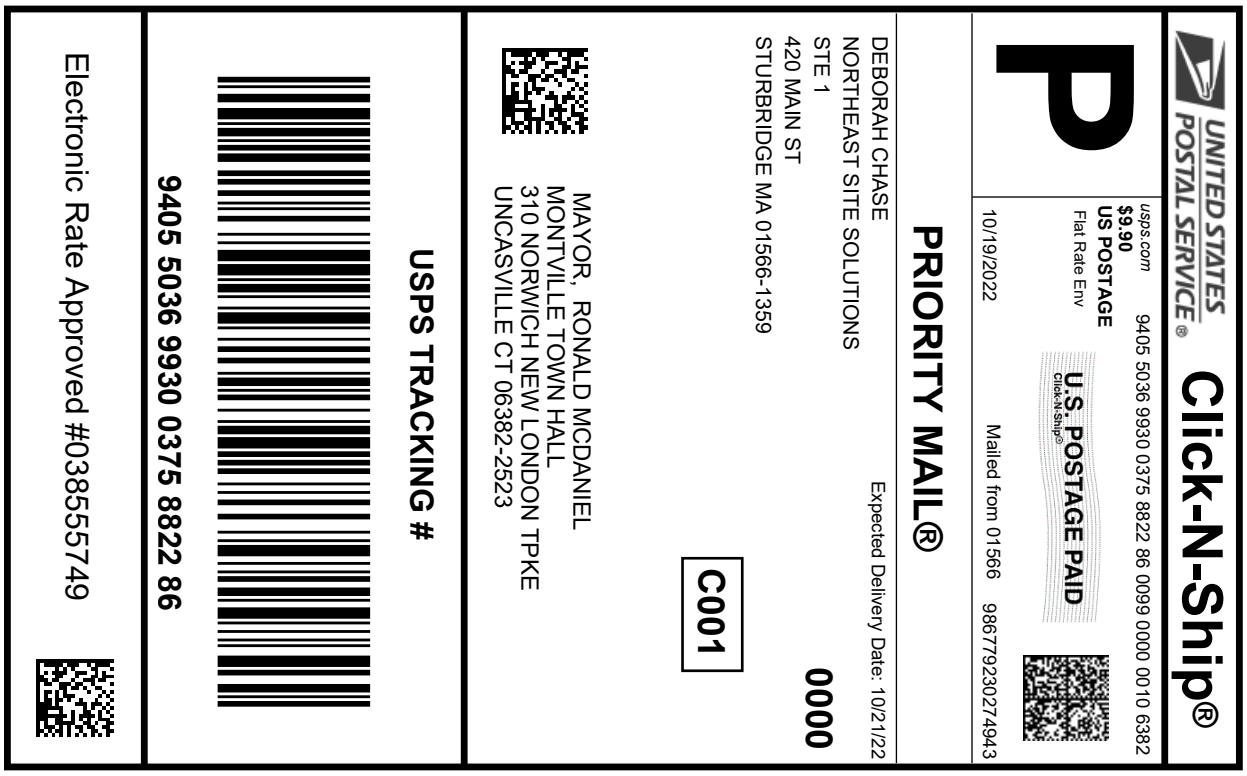
Per below, Montville CD’s and structural are approved.

Dish can file with CSC at their risk

Christopher Gelinas
Senior Specialist – Real Estate
107 Selden Street
Berlin, CT 06037
Office: (860) 665-2008
E-Mail: Christopher.Gelinas@Eversource.com

Exhibit H

Recipient Mailings



Cut on dotted line.

Instructions

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4. **To mail your package with PC Postage®, you may schedule a Package Pickup online, hand to your letter carrier, take to a Post Office™, or drop in a USPS collection box.**
5. **Mail your package on the "Ship Date" you selected when creating this label.**

Click-N-Ship® Label Record

USPS TRACKING # :
9405 5036 9930 0375 8822 86

Trans. #:	574114091
Print Date:	10/19/2022
Ship Date:	10/19/2022
Expected Delivery Date:	10/21/2022

Priority Mail® Postage:	**$9.90**
Total:	**$9.90**

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

To: MAYOR, RONALD MCDANIEL
MONTVILLE TOWN HALL
310 NORWICH NEW LONDON TPKE
UNCASVILLE CT 06382-2523

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

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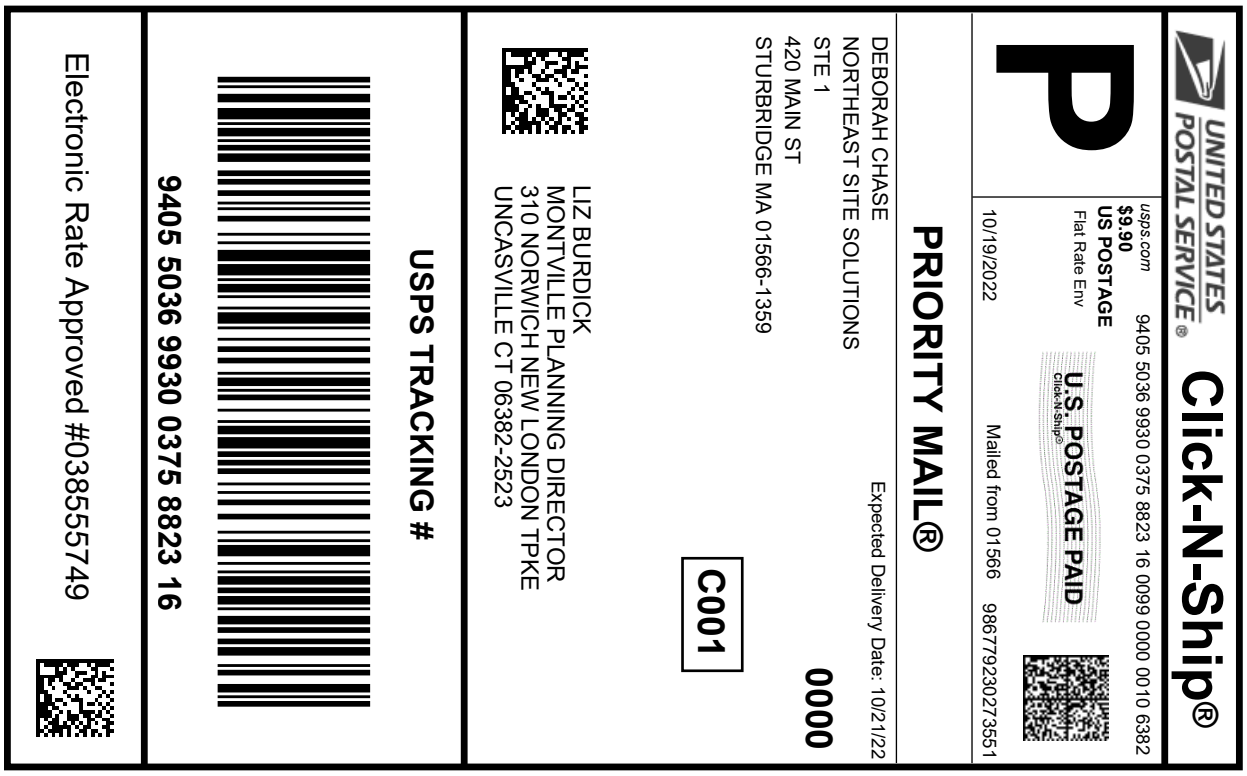

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USPS TRACKING # :
9405 5036 9930 0375 8823 16

Trans. #:	574114091
Print Date:	10/19/2022
Ship Date:	10/19/2022
Expected Delivery Date:	10/21/2022

Priority Mail® Postage:	**$9.90**
Total:	**$9.90**

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

To: LIZ BURDICK
MONTVILLE PLANNING DIRECTOR
310 NORWICH NEW LONDON TPKE
UNCASVILLE CT 06382-2523

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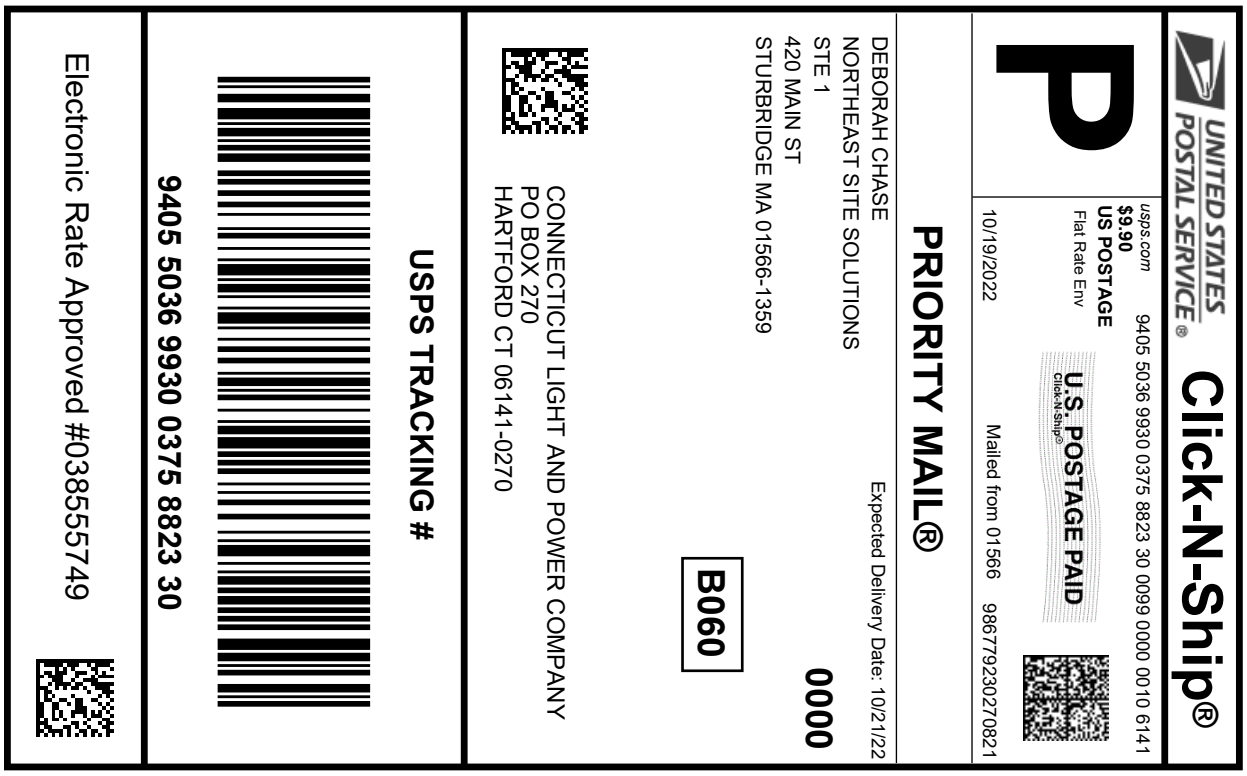

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4. **To mail your package with PC Postage®, you may schedule a Package Pickup online, hand to your letter carrier, take to a Post Office™, or drop in a USPS collection box.**
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Click-N-Ship® Label Record

USPS TRACKING # :
9405 5036 9930 0375 8823 30

Trans. #:	574114091
Print Date:	10/19/2022
Ship Date:	10/19/2022
Expected Delivery Date:	10/21/2022

Priority Mail® Postage:	**$9.90**
Total:	**$9.90**

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

To: CONNECTICUT LIGHT AND POWER COMPANY
PO BOX 270
HARTFORD CT 06141-0270

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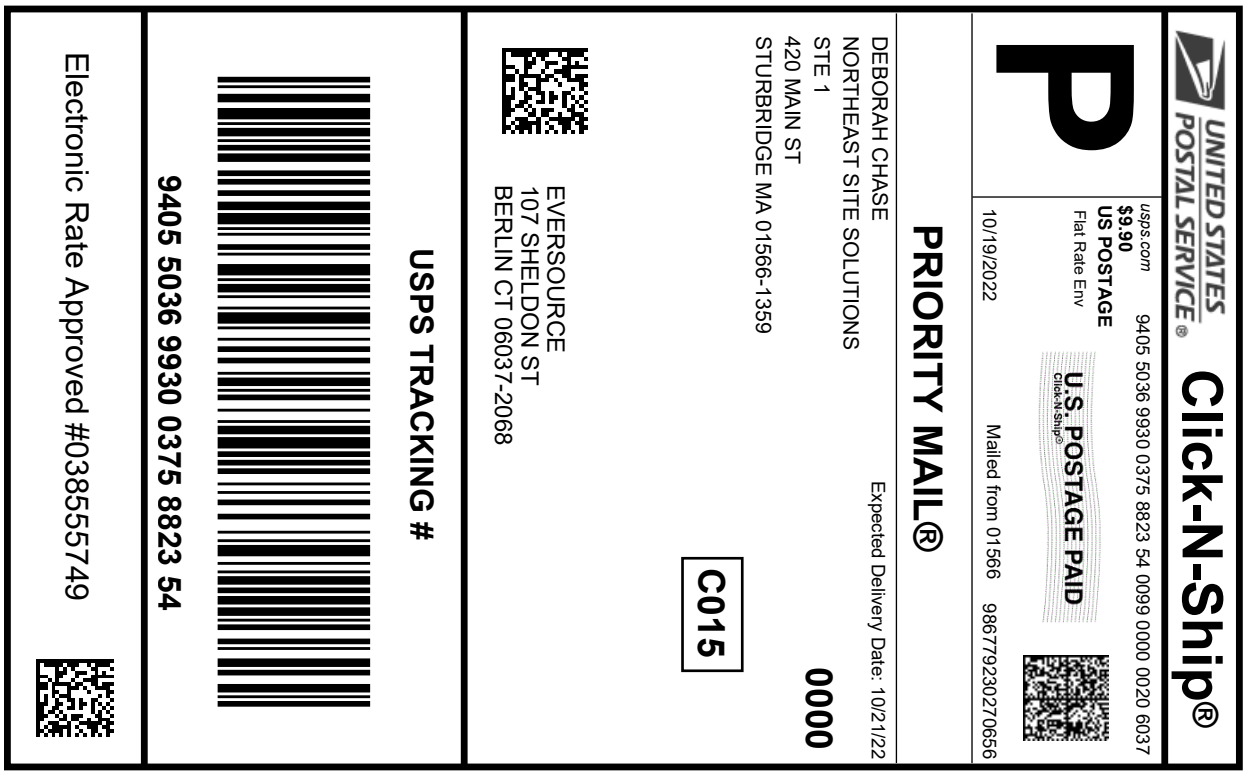

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5. **Mail your package on the "Ship Date" you selected when creating this label.**

Click-N-Ship® Label Record

USPS TRACKING # :
9405 5036 9930 0375 8823 54

Trans. #:	574114091
Print Date:	10/19/2022
Ship Date:	10/19/2022
Expected Delivery Date:	10/21/2022

Priority Mail® Postage:	**$9.90**
Total:	**$9.90**

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

To: EVERSOURCE
107 SHELDON ST
BERLIN CT 06037-2068

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UNITED STATES POSTAL SERVICE®

Shipment Confirmation Acceptance Notice

A. Mailer Action

Note To Mailer: The labels and volume associated to this form online, **must** match the labeled packages being presented to the USPS® employee with this form.

Shipment Date: 10/19/22

Shipped From:

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

Type of Mail	Volume
Priority Mail®	4
Priority Mail Express™*	0
International Mail*	0
First-Class Package Service - Retail™	0
Parcel Select® Ground	0
Other	0
Total Volume	4

*Start time for products with service guarantees will begin when mail arrives at the local Post Office™ and items receive individual processing and acceptance scans.

B. USPS Action

- USPS EMPLOYEE: Please scan upon pickup or receipt of mail. Leave form with customer or in customer's mail receptacle. Employee verifies the package volume count on the Package Pickup Carrier Manifest.
  - If the volume on the manifest matches the volume being collected from the customer, the employee should make the **1:YES** selection by pressing the number 1 on the keypad of the handheld scanner, or on the keyboard of the POS ONE terminal.
  - If the volume on the manifest does not match the volume being collected from the customer, the employee should make the **2:NO** selection. The mail should still be collected and dispatched as normal.

USPS SCAN

9475 7036 9930 0413 2486 88

BOB05000696 DISH

UNITED STATES POSTAL SERVICE.

FARMINGTON
210 MAIN ST
FARMINGTON, CT 06032-9998
(800)275-8777

10/19/2022 04:09 PM

Product	Qty	Unit Price	Price
Prepaid Mail Uncasville, CT 06382 Weight: 0 lb 13.10 oz Acceptance Date: Wed 10/19/2022 Tracking #: 9405 5036 9930 0375 8823 16	1		$0.00
Prepaid Mail Uncasville, CT 06382 Weight: 0 lb 13.10 oz Acceptance Date: Wed 10/19/2022 Tracking #: 9405 5036 9930 0375 8823 16	1		$0.00
Prepaid Mail Hartford, CT 06141 Weight: 0 lb 13.10 oz Acceptance Date: Wed 10/19/2022 Tracking #: 9405 5036 9930 0375 8823 30	1		$0.00
Prepaid Mail Uncasville, CT 06382 Weight: 0 lb 13.10 oz Acceptance Date: Wed 10/19/2022 Tracking #: 9405 5036 9930 0375 8822 86	1		$0.00
Prepaid Mail Berlin, CT 06037 Weight: 0 lb 13.10 oz Acceptance Date: Wed 10/19/2022 Tracking #: 9405 5036 9930 0375 8823 54	1		$0.00
Grand Total:			$0.00

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Refunds for guaranteed services only.
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or scan this code with your mobile device,

or call 1-800-410-7420