56 Prospect Street,
P.O. Box 270
Hartford, CT 06103

Deborah Denfeld
Team Lead – Transmission Siting
Tel: (860) 728-4654

October 17, 2023

Melanie A. Bachman
Executive Director
Connecticut Siting Council
10 Franklin Square
New Britain, CT 06051

RE: **Notice of Exempt Modification – Microwave Dish Replacement**
Eversource Site # 15215
20 Barnabas Road, Newtown, CT 06470
Latitude: 41-25-39.5 N / Longitude: 73-20-37.5 W

Dear Ms. Bachman:

The Connecticut Light and Power Company doing business as Eversource Energy ("Eversource") currently maintains multiple antennas and equipment at various mounting heights on an existing 180-foot self-supporting lattice tower located at 20 Barnabas Road in Newtown ("Site"). See Attachment A, Parcel Map and Property Card. The tower and property are owned by Eversource. Eversource plans to remove and replace one 6-foot diameter, single-polarity Standard Microwave dish with one 8-foot diameter, dual-polarity High Performance Microwave dish.

The proposed installation modification is part of Eversource's continued investment in upgrading its communications infrastructure. The current microwave dish is nearing the end of its useful life. The replacement microwave dish proposed at this Site will provide improved communications to the existing radio network and cellular systems utilized by Eversource for day-to-day operations. The Connecticut Siting Council approved the self-supporting tower at this location in Docket No. 144 in November 1991.

The proposed replacement microwave dish would be mounted on the existing microwave dish mount at an elevation of 179 feet above ground level ("AGL"). The existing elliptical waveguide cabling will be reused for the new microwave dish. One additional elliptical waveguide cable is proposed for potential future deployment but will not be installed as part of this initial upgrade.

Radio equipment will be modified within the existing Eversource equipment room. There will be no changes to the area of the fenced compound, the tower or other existing antennas and equipment currently mounted on the tower. The tower and existing and proposed equipment are depicted in Attachment B, Exempt Modification Drawings, dated October 10, 2023 and Attachment C, Structural Analysis, dated June 23, 2023.

Please accept this letter as notification, pursuant to Regulations of Connecticut State Agencies ("R.C.S.A.") §16-50j-73, for construction that constitutes an exempt modification pursuant to R.C.S.A § 16-50j-72(b)(2). In accordance with R.C.S.A. § 16-50j-73, a copy of this notice is being delivered to the Honorable Daniel Rosenthal, First Selectman for the Town of Newtown and Rob Sibley, Director of Land Use for the Town of Newtown - See Attachment D, Proof of Delivery of Notice.

The planned modifications to the facility meet the regulatory criteria provided for in R.C.S.A. § 16-50j-72(b)(2), as follows:

1. There will be no change to the height of the existing tower.
2. The proposed modifications will not require any extension of the Site boundary.
3. The proposed modifications will not increase noise levels at the facility by six decibels or more, or to levels that exceed state and local criteria.
4. The operation of the new dish will not increase radio emissions at the facility to a level at or above the Federal Communications Commission safety standard as shown in the attached Radio Frequency Emissions Report, dated September 28, 2023 (Attachment E – Power Density Report).
5. The proposed modifications will not cause a change or alteration in the physical or environmental characteristics of the Site.
6. The existing structure and its foundation can support the proposed loading (Attachment C, Structural Analysis).

For the foregoing reasons, Eversource respectfully submits that the proposed modifications to the above referenced telecommunications facility constitute an exempt modification under R.C.S.A. § 16-50j-72(b)(2).

One original and two copies of this notice and a check in the amount of $625 for the filing fee are enclosed. Please direct any communications regarding this Notice of Exempt Modification to me at (860) 728-4654.

By: Deborah Denfeld
_____
Deborah Denfeld
Team Lead – Transmission Siting

cc: Hon. Daniel Rosenthal, First Selectman, Town of Newtown
Rob Sibley, Director of Land Use, Town of Newtown

Attachments

A. Parcel Map and Property Card
B. Exempt Modification Drawings
C. Structural Analysis
D. Proof of Delivery of Notice
E. Power Density Report

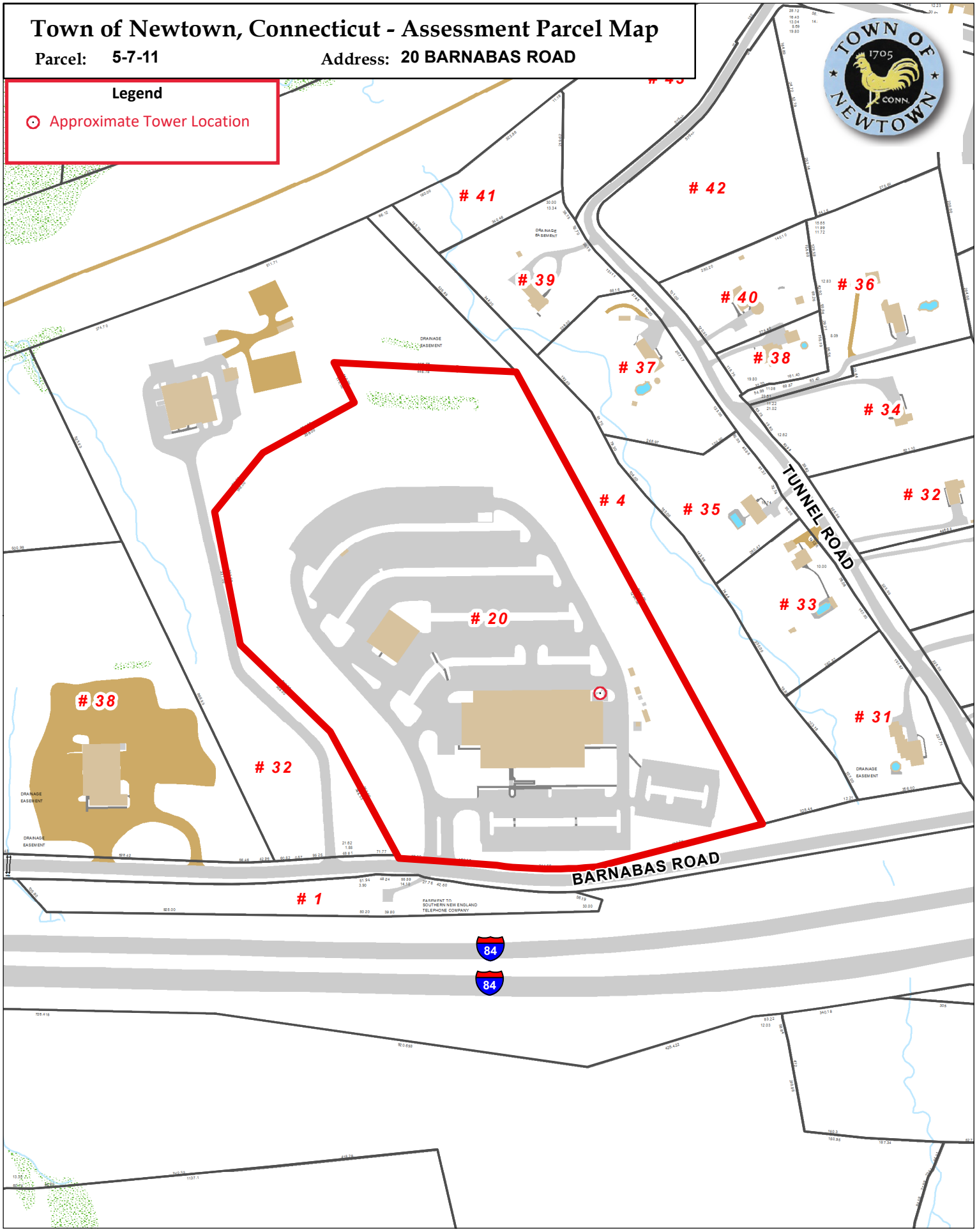
ATTACHMENT A – PARCEL MAP AND PROPERTY CARD

Town of Newtown, Connecticut - Assessment Parcel Map

Parcel: 5-7-11 **Address:** 20 BARNABAS ROAD

Legend

⊙ Approximate Tower Location



Approximate Scale:

0 75 150 225 300 Feet

N W E S

Disclaimer: This map is for informational purposes only. All information is subject to verification by any user. The Town of Newtown and its mapping contractors assume no legal responsibility for the information contained herein.

Map Produced Nov 2020

Town of Newtown, CT

Property Listing Report

Map Block Lot	5-7-11-1	Building #	1	PID	2346	Account	00696701

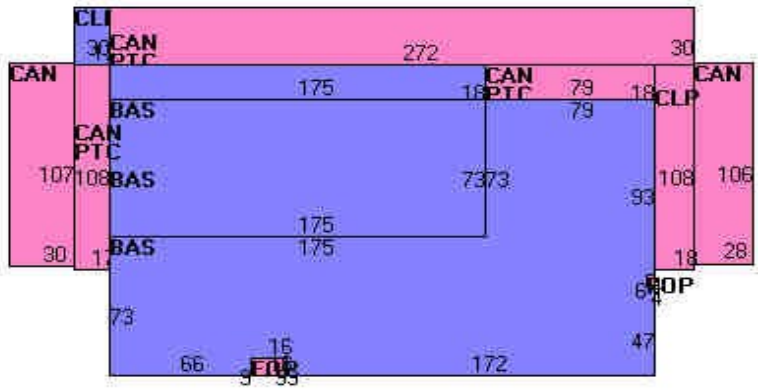
Property Information

Property Location	20 BARNABAS ROAD
Owner	CONNECTICUT LIGHT & POWER COMPANY
Co-Owner	C/O EVERSOURCE, LORI HUBER
Mailing Address	107 SELDEN STREET BERLIN CT 06037
Land Use	3400 OFFICE
Land Class	C
Zoning Code	M-1
Census Tract	

Neighborhood	C090
Acreage	23.88
Utilities	Well,Septic
Lot Setting/Desc	NA NA
Book / Page	1186/0139
Additional Info	

Photo

Sketch



Primary Construction Details

Year Built	1991
Building Desc.	OFFICE
Building Style	Office
Building Grade	
Stories	1
Occupancy	1.00
Exterior Walls	Concr/CinderBk
Exterior Walls 2	Pre-Fin Metal
Roof Style	Flat
Roof Cover	Rolled Compos
Interior Walls	Drywall/Sheet
Interior Walls 2	NA
Interior Floors 1	Carpet
Interior Floors 2	NA

Heating Fuel	Gas
Heating Type	Hot Water
AC %	03
Bedrooms	0
Full Bathrooms	0
Half Bathrooms	0
Extra Fixtures	0
Total Rooms	
Bath Style	NA
Kitchen Style	NA
Fin Bsmt Area	
Fin Bsmt Quality	
Bsmt Gar	
Fireplaces	0

(*Industrial / Commercial Details)

Building Use	Comm/Ind
Building Condition	G
Sprinkler %	NA
Heat / AC	HEAT/AC SPLIT
Frame Type	MASONRY
Baths / Plumbing	AVERAGE
Ceiling / Wall	SUS-CEIL & WL
Rooms / Prtns	ABOVE AVERAGE
Wall Height	14
First Floor Use	NA
Foundation	NA

Report Created On 9/29/2023

Town of Newtown, CT

Property Listing Report | Map Block Lot 5-7-11-1 | Building # 1 | PID 2346 | Account 00696701

Valuation Summary

(Assessed value = 70% of Appraised Value)

Item	Appraised	Assessed
Buildings	5751470	4026030
Extras	12900	9030
Improvements		
Outbuildings	406560	284590
Land	2550500	1785350
Total	8721430	6105000

Sub Areas

Subarea Type	Gross Area (sq ft)	Living Area (sq ft)
First Floor	40066	40066
Canopy	17596	0
Loading Platform	2454	0
Open Porch	168	0
Patio - Concrete	11418	0
Total Area	71702	40066

Outbuilding and Extra Features

Type	Description
Fence	19200.00 L.F.
Fence	1600.00 L.F.
Paving	340000.00 S.F.
Tower	1.00 UNITS
Lights	12.00 UNITS
Gen 30+ kw	1.00 UNITS

Sales History

Owner of Record	Book/ Page	Sale Date	Sale Price
CONNECTICUT LIGHT & POWER COMPANY	1186/0139	12/13/2021	9030000
BARNABAS REALTY GROUP GEN PRTSHP	0423/0805	09/25/1990	0

Report Created On 9/29/2023

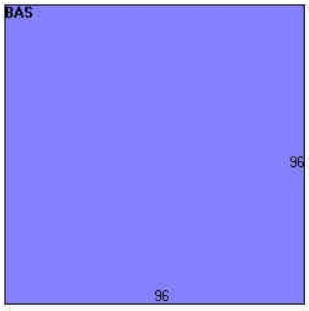
Town of Newtown, CT

Property Listing Report

Map Block Lot	5-7-11-1	Building #	2	PID	2346	Account	

Photo

Sketch



Primary Construction Details

Year Built	1991
Building Desc.	Comm/Ind
Building Style	Light Indust
Building Grade	
Stories	1
Occupancy	1.00
Exterior Walls	Pre-Fin Metal
Exterior Walls 2	NA
Roof Style	Flat
Roof Cover	Rolled Compos
Interior Walls	Drywall/Sheet
Interior Walls 2	NA
Interior Floors 1	Concr-Finished
Interior Floors 2	NA

Heating Fuel	Gas
Heating Type	Susp. Space
AC %	03
Bedrooms	0
Full Bathrooms	0
Half Bathrooms	0
Extra Fixtures	0
Total Rooms	
Bath Style	NA
Kitchen Style	NA
Fin Bsmt Area	
Fin Bsmt Quality	
Bsmt Gar	
Fireplaces	0

(*Industrial / Commercial Details)

Building Use	AUTO REPR
Building Condition	G
Sprinkler %	NA
Heat / AC	HEAT/AC SPLIT
Frame Type	STEEL
Baths / Plumbing	AVERAGE
Ceiling / Wall	Average
Rooms / Prtns	LIGHT
Wall Height	17
First Floor Use	NA
Foundation	NA

Sub Areas

Subarea Type	Gross Area (sq ft)	Living Area (sq ft)
First Floor	9216	9216

Subarea Type	Gross Area (sq ft)	Living Area (sq ft)
Total Area	9216	9216

Report Created On 9/29/2023

Town of Newtown, CT

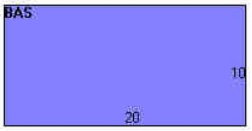
Property Listing Report

Map Block Lot	5-7-11-1	Building #	3	PID	2346	Account	

Photo

No Photo Available

Sketch



Primary Construction Details

Year Built	1995
Building Desc.	Ind/Comm
Building Style	Light Indust
Building Grade	
Stories	1
Occupancy	1.00
Exterior Walls	Pre-cast Concr
Exterior Walls 2	NA
Roof Style	Flat
Roof Cover	Rolled Compos
Interior Walls	Minim/Masonry
Interior Walls 2	NA
Interior Floors 1	Concr-Finished
Interior Floors 2	NA

Heating Fuel	Gas
Heating Type	Susp. Space
AC %	03
Bedrooms	0
Full Bathrooms	0
Half Bathrooms	0
Extra Fixtures	0
Total Rooms	
Bath Style	NA
Kitchen Style	NA
Fin Bsmt Area	
Fin Bsmt Quality	
Bsmt Gar	
Fireplaces	0

(*Industrial / Commercial Details)

Building Use	UTILITY BUILDING
Building Condition	G
Sprinkler %	NA
Heat / AC	HEAT/AC SPLIT
Frame Type	REINF. CONCR
Baths / Plumbing	AVERAGE
Ceiling / Wall	Average
Rooms / Prtns	LIGHT
Wall Height	10
First Floor Use	NA
Foundation	NA

Sub Areas

Subarea Type	Gross Area (sq ft)	Living Area (sq ft)
First Floor	200	200

Subarea Type	Gross Area (sq ft)	Living Area (sq ft)
Total Area	200	200

Report Created On 9/29/2023

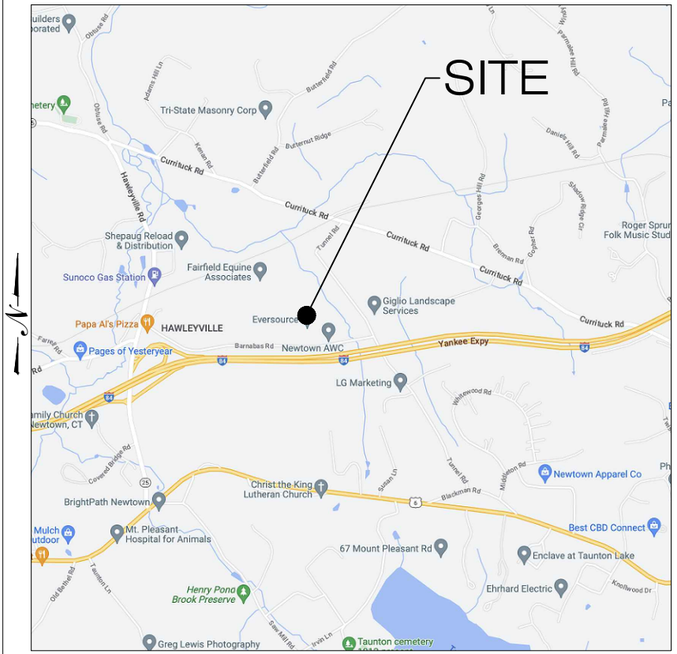
ATTACHMENT B – EXEMPT MODIFICATION DRAWINGS

EVERSOURCE ENERGY

NEWTOWN
20 BARNABAS ROAD
NEWTOWN, CT 06470

DESIGN: SITE UPGRADE
(SELF-SUPPORT TOWER)

LOCATION MAP



SCALE : NTS SOURCE: GOOGLE MAPS

CALL BEFORE YOU DIG
811 OR
800-922-4455
2040 WHITNEY AVE.
HAMDEN, CT 06517

DRAWING INDEX

T-1	TITLE SHEET & INDEX
C-1	SITE PLAN
C-2	TOWER ELEVATIONS
C-3	ANTENNA CUT SHEET & NOTES & SPECIFICATIONS

PROJECT DESCRIPTION

1. REPLACE EXIST. EVERSOURCE MICROWAVE DISH WITH NEW MICROWAVE DISH (COMMSCOPE HX8-6W-6GF) AT 176'-0" RAD CENTER.
2. INSTALL NEW EW63 ELLIPTICAL COAX CABLE ROUTED WITHIN EXISTING INTERIOR CONDUIT AND CABLE LADDER ON THE SOUTH FACE OF EXISTING TOWER.

GOVERNING CODES

2022 CONNECTICUT STATE BUILDING CODE (2021 IBC BASIS)
2018 NATIONAL ELECTRIC CODE
EIA/TIA 222H

GENERAL NOTES

THE FACILITY IS AN UNMANNED FACILITY AND IS NOT FOR HUMAN HABITATION. IT IS ONLY ACCESSED BY TRAINED TECHNICIANS FOR ROUTINE MAINTENANCE AND DOES NOT REQUIRE ANY SANITARY SEWER SERVICE, POTABLE WATER, OR TRASH DISPOSAL. THIS PROJECT WILL NOT INCUR ANY SIGNIFICANT DISTURBANCE OR EFFECT ON DRAINAGE. NO COMMERCIAL SIGNAGE IS PROPOSED.

SITE INFORMATION

SITE NAME:	NEWTOWN
SITE ID NUMBER:	15215
SITE ADDRESS:	20 BARNABAS ROAD NEWTOWN, CT 06470
MAP:	5
BLOCK:	7
LOT:	11
LATITUDE:	41° 25' 39.5" N
LONGITUDE:	73° 20' 37.5" W
ELEVATION:	457'± AMSL
FIRM FLOOD DESIGNNATION:	'X'

CONTACT INFORMATION

APPLICANT:
EVERSOURCE ENERGY
107 SELDEN STREET
BERLIN, CT 06037

PROPERTY OWNER:
EVERSOURCE ENERGY
107 SELDEN STREET
BERLIN, CT 06037

EVERSOURCE ENERGY:
PROJECT MANAGER
STEVE FLORIO
(860) 655-7943

POWER PROVIDER:
EVERSOURCE ENERGY
(800) 286-2000

TELCO PROVIDER:
FRONTIER
(800) 921-8102

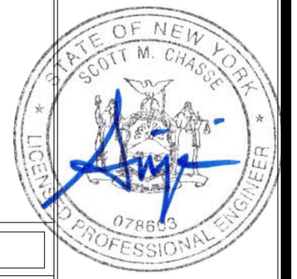
CALL BEFORE YOU DIG:
(800) 922-4455

EVERSOURCE ENERGY
107 SELDEN STREET
BERLIN, CT 06037
OFFICE: (860) 665-6748

ALL-POINTS TECHNOLOGY CORPORATION
567 VAUXHAUL STREET EXTENSION - SUITE 311
WATERFORD, CT 06385 PHONE: (860)-663-1697
WWW.ALLPOINTSTECH.COM FAX: (860)-663-0935

PERMIT DOCUMENTS

NO	DATE	REVISION
0	09/29/23	FOR CLIENT REVIEW
1	10/12/23	FOR FILING
2		
3		
4		
5		
6		



DESIGN PROFESSIONAL OF RECORD

PROF: SCOTT M. CHASSE PE
COMP: ALL-POINTS TECHNOLOGY CORPORATION, P.C.
ADD: 567 VAUXHAUL STREET EXTENSION - SUITE 311 WATERFORD, CT 06385

NEWTOWN SITE UPGRADE

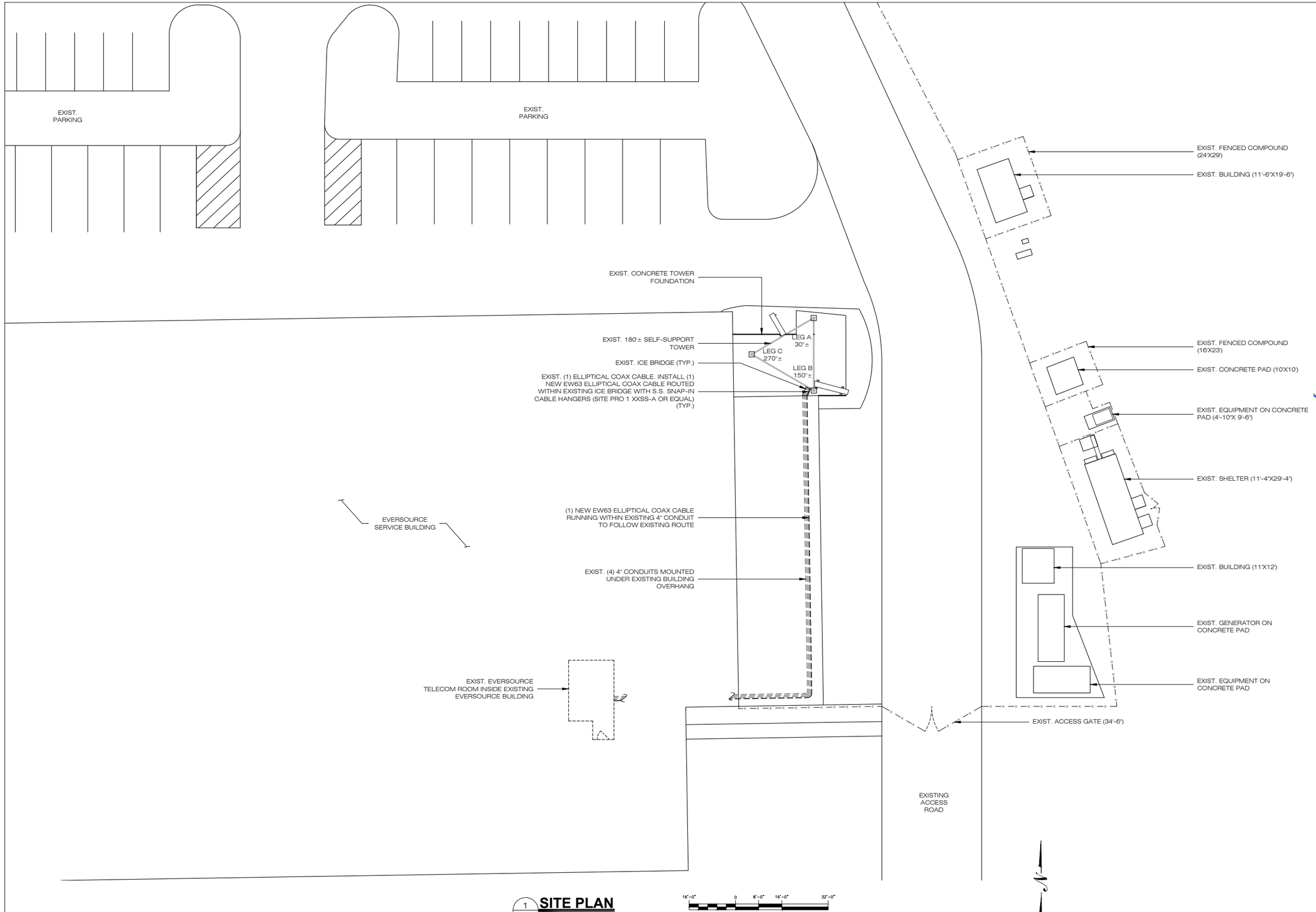
SITE ADDRESS: 20 BARNABAS ROAD NEWTOWN, CT 06470

APT FILING NUMBER: CT2592930

DRAWN BY: CDC
DATE: 09/29/23
CHECKED BY: KB

SHEET TITLE:
TITLE SHEET & INDEX

SHEET NUMBER:
T-1



1 / C-1 **SITE PLAN**
SCALE : 1/16" = 1'-0"

EVERSOURCE ENERGY
107 SELDEN STREET
BERLIN, CT 06037
OFFICE: (860) 665-6748

ALL-POINTS TECHNOLOGY CORPORATION
567 VAUXHAUL STREET EXTENSION - SUITE 311
WATERFORD, CT 06385 PHONE: (860)-663-1697
WWW.ALLPOINTSTECH.COM FAX: (860)-663-0935

PERMIT DOCUMENTS

NO	DATE	REVISION
0	09/29/23	FOR CLIENT REVIEW
1	10/12/23	FOR FILING
2		
3		
4		
5		
6		

STATE OF NEW YORK
SCOTT M. CHASSE
078603
LICENSED PROFESSIONAL ENGINEER

DESIGN PROFESSIONAL OF RECORD

PROF: SCOTT M. CHASSE PE
COMP: ALL-POINTS TECHNOLOGY CORPORATION, P.C.
ADD: 567 VAUXHAUL STREET EXTENSION - SUITE 311 WATERFORD, CT 06385

NEWTOWN SITE UPGRADE

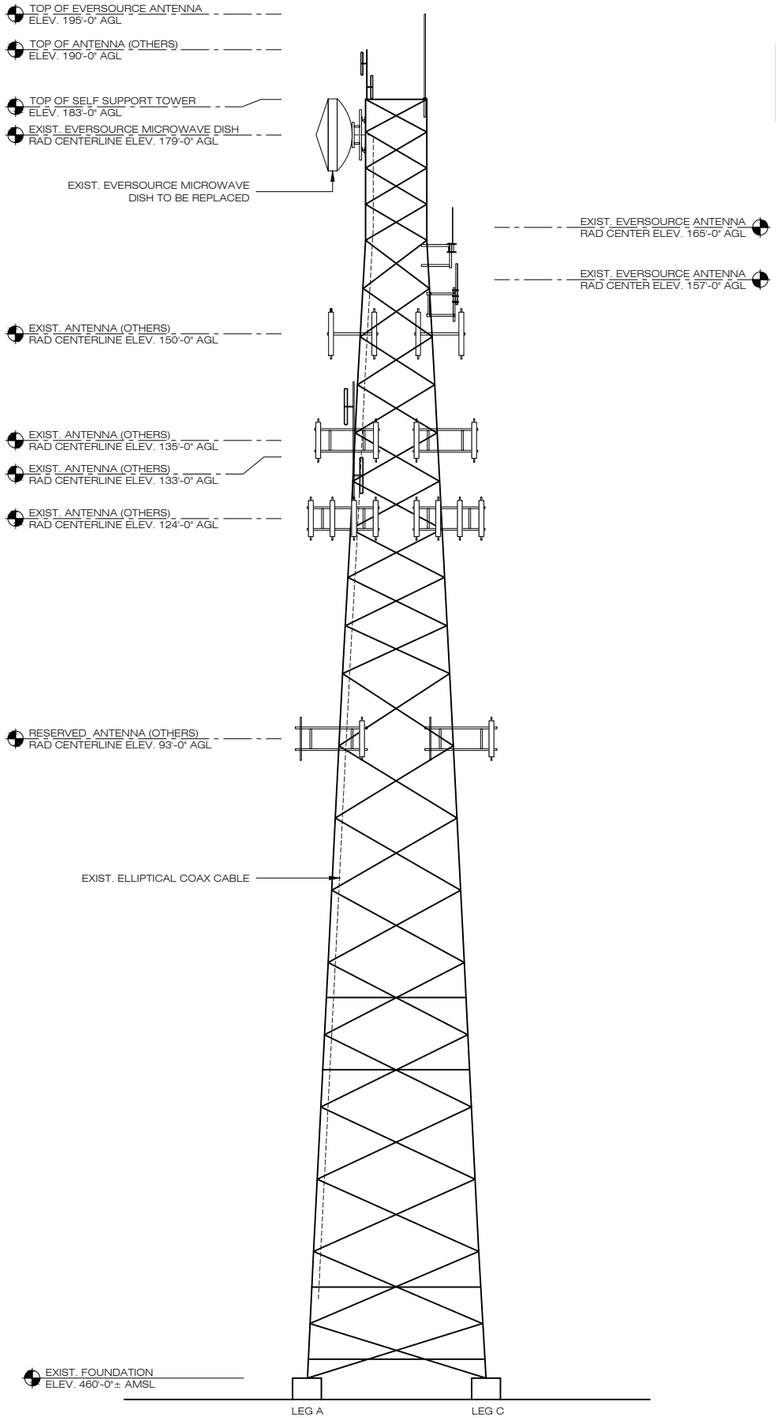
SITE ADDRESS: 20 BARNABAS ROAD NEWTOWN, CT 06470

APT FILING NUMBER: CT2592930

DRAWN BY: CDC
DATE: 09/29/23
CHECKED BY: KB

SHEET TITLE:
SITE PLAN

SHEET NUMBER:
C-1

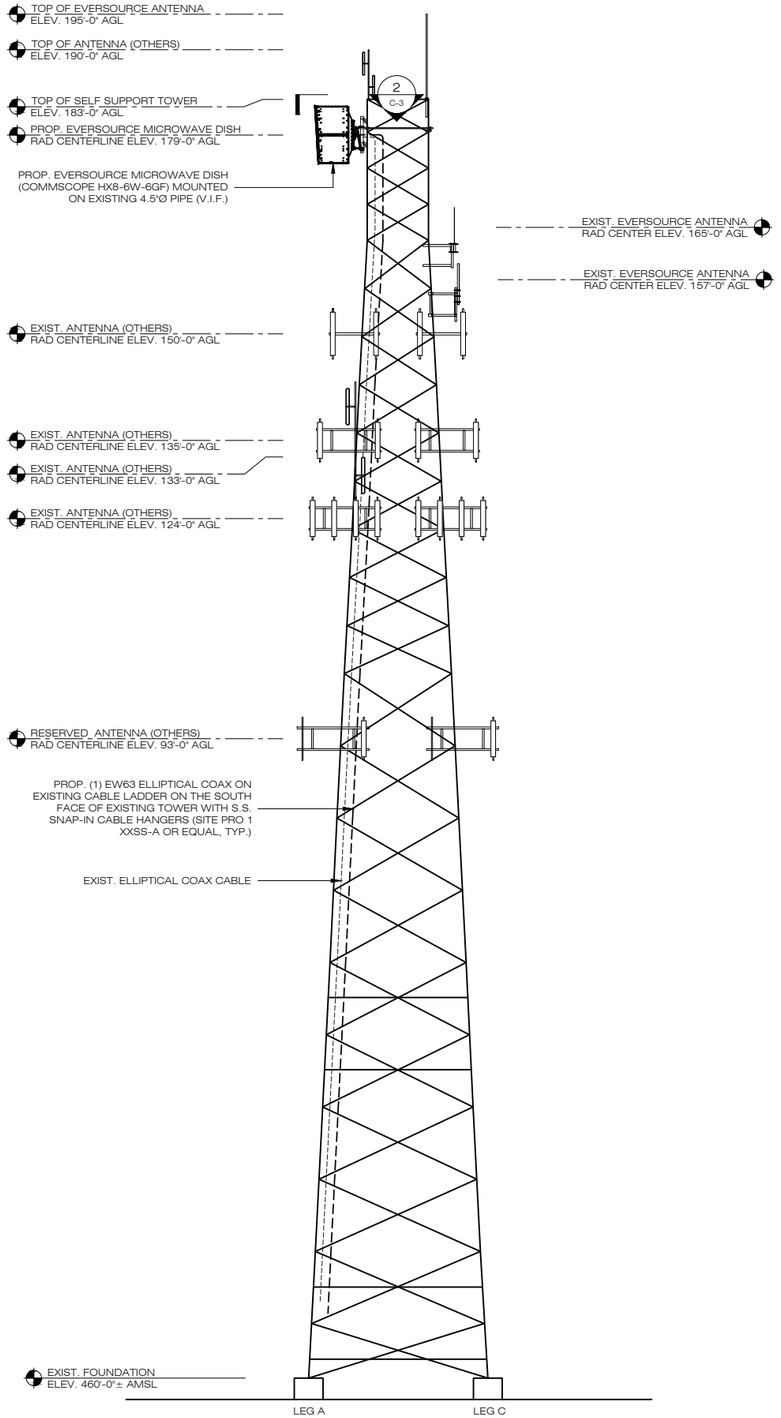


NOTE:
EXISTING ANTENNAS ARE NOT SHOWN FOR CLARITY:

1. OMNI ANTENNA AT 160' CL
2. DIPOLE ANTENNA AT 161' CL
3. OMNI ANTENNA AT 173' CL

1 C-2 **EXISTING TOWER ELEVATION**
SCALE : 3/32" = 1'-0"

10'-8" 0 5'-4" 10'-8" 21'-4"
3/32" SCALE: 1 INCH= 10'-8"



2 C-2 **PROPOSED TOWER ELEVATION**
SCALE : 3/32" = 1'-0"

EVERSOURCE ENERGY
107 SELDEN STREET
BERLIN, CT 06037
OFFICE: (860) 665-6748

ALL-POINTS TECHNOLOGY CORPORATION
567 VAUXHAUL STREET EXTENSION - SUITE 311
WATERFORD, CT 06385 PHONE: (860)-663-1697
WWW.ALLPOINTSTECH.COM FAX: (860)-663-0935

PERMIT DOCUMENTS

NO	DATE	REVISION
0	09/29/23	FOR CLIENT REVIEW
1	10/12/23	FOR FILING
2		
3		
4		
5		
6		

DESIGN PROFESSIONAL OF RECORD

PROF: SCOTT M. CHASSE PE
COMP: ALL-POINTS TECHNOLOGY CORPORATION, P.C.
ADD: 567 VAUXHAUL STREET EXTENSION - SUITE 311 WATERFORD, CT 06385

NEWTOWN SITE UPGRADE

SITE ADDRESS: 20 BARNABAS ROAD NEWTOWN, CT 06470

APT FILING NUMBER: CT2592930

DRAWN BY: CDC
DATE: 09/29/23
CHECKED BY: KB

SHEET TITLE:
TOWER ELEVATIONS & DETAILS

SHEET NUMBER:
C-2

DESIGN BASIS:

GOVERNING CODES/DESIGN STANDARDS:

2021 INTERNATIONAL BUILDING CODE (IBC) AS AMENDED BY THE 2022 CONNECTICUT STATE BUILDING CODE
ASCE 7-16
TIA-222-H (TOWER)

01 GENERAL:

ABBREVIATIONS USED IN THESE SPECIFICATIONS INCLUDE THE FOLLOWING:

ACI	AMERICAN CONCRETE INSTITUTE
ANSI	AMERICAN NATIONAL STANDARDS INSTITUTE
AWS	AMERICAN WELDING SOCIETY
AISC	AMERICAN INSTITUTE OF STEEL CONSTRUCTION
ASCE	AMERICAN SOCIETY OF CIVIL ENGINEERS
ASTM	AMERICAN STANDARDS AND TESTING METHODS
CRSI	CONCRETE REINFORCING STEEL INSTITUTE
ICC-ES	INTERNATIONAL CODE COUNCIL EVALUATION SERVICE
TIA	TELECOMMUNICATIONS INDUSTRY ASSOCIATION
UL	UNDERWIRTERS LABORATORIES
NEC	NATIONAL ELECTRICAL CODE
NFPA	NATIONAL FIRE PROTECTION ASSOCIATION
OSHA	OCCUPATIONAL SAFETY AND HEALTH ADMINISTRATION

EVERY INDIVIDUAL TRADE, DISCIPLINE, AND CONTRACTOR SHALL INCLUDE THESE GENERAL SPECIFICATIONS.

THE ENGINEER IS NOT RESPONSIBLE FOR NOR A GUARANTOR OF THE INSTALLING CONTRACTORS WORK, ADEQUACY OF ANY SITE COMPONENT, SUPERVISION OF ANY WORK, AND SAFETY IN, ON, OR ABOUT THE WORK SITE.

ANY REFERENCE HEREIN TO AN OR EQUAL ITEM, THAT EQUAL ITEM SHALL BE PRE-APPROVED BY THE CONSTRUCTION MANAGER BEFORE INSTALLATION

ALL TRADES SHALL COORDINATE THEIR WORK WITH ALL OTHER TRADES AND OTHER WORK AND CONDITIONS AS APNEWRIATE OR REQUIRED TO AVOID CONFLICTS. RESOLVE AND COORDINATE ALL CONFLICTS WITH ALL AFFECTED WORK AND SITE OPERATIONS. COORDINATION WITH THE SITE SHALL BE WITH THE OWNER, OR OWNER'S SPECIFIED REPRESENTATIVE, FOR EVERYTHING RELATED TO THE INSTALLATION OF THIS PROJECT.

ALL WORK SHALL BE IN STRICT ACCORDANCE WITH ALL APPLICABLE EDITIONS OF ALL APPLICABLE CODES AND SHALL BE ACCEPTABLE TO ALL AUTHORITIES HAVING JURISDICTION (AHJ). WHERE A CONFLICT EXISTS BETWEEN CODES, PLANS, SPECIFICATIONS, AND/OR AHJ, THE MORE STRINGENT AUTHORITY SHALL APPLY. WHERE CONFLICT EXISTS BETWEEN PLANS AND SPECIFICATIONS, PLAN SHALL APPLY. WHERE CONFLICT EXISTS BETWEEN PLAN SHEETS, CONSTRUCTION MANAGER SHALL BE CONSULTED PRIOR TO COMMENCING ANY WORK.

CONTRACTOR SHALL PROVIDE ALL LABOR, MATERIALS, INSURANCE, EQUIPMENT, INSTALLATION, CONSTRUCTION TOOLS, TRANSPORTATION, ETC., FOR A COMPLETE AND NEWERLY OPERATIVE AND USABLE SYSTEM THROUGHOUT AND AS INDICATED ON THE DRAWINGS AND AS SPECIFIED HEREIN AND/OR OTHERWISE REQUIRED.

CONTRACTOR SHALL VERIFY ALL EXISTING CONDITIONS, INSTALLATIONS, AND EQUIPMENT IN THE FIELD PRIOR TO BID, FABRICATION, AND INSTALLATION OF ANY WORK.

CONTRACTORS SHALL VERIFY ALL DIMENSIONS AND CONDITIONS IN THE FIELD PRIOR TO FABRICATION AND ERECTION OF ANY MATERIAL. THE ENGINEER SHALL BE NOTIFIED FOR INSPECTIONS PRIOR TO CLOSING PENETRATIONS AND OF ANY CONDITIONS WHICH PRECLUDE COMPLETION OF THE WORK IN ACCORDANCE WITH THE CONTRACT DOCUMENTS.

CONTRACTOR SHALL VISIT THE SITE TO MANAGE AND GAIN APPROVAL FOR ALL TENANT DISRUPTIONS, POWER OUTAGES, WORK SCHEDULES, DEFINITION OF WORK AREA AND WORK STORAGE, NEWER BUILDING/SITE ACCESS, NOISE AND CLEANLINESS REQUIREMENTS WITH THE BUILDING/SITE MANAGEMENT PRIOR TO ALL WORK. ANY DISRUPTIONS SHALL BE KEPT TO A MINIMUM AND SHALL BE IMPLEMENTED ONLY UPON WRITTEN APPROVAL OF THE OWNER.

THE CONTRACTOR SHALL SAFEGUARD AGAINST CREATING ANY HAZARD AFFECTING TENANT EGRESS OR COMPROMISING SITE SECURITY MEASURES.

PRIOR TO ALL BELOW-GRADE WORK AND ANY SURFACE WORK IN A NEW AREA FOR STRUCTURES OR VEHICLES, CONTRACTOR SHALL ENGAGE A MARKOUT SERVICE TO IDENTIFY ANY UNDERGROUND STRUCTURES, CONDUITS, AND PIPELINES IN THE AREA. ALL EXISTING SEWER, WATER, GAS, ELECTRIC, FIBER OPTIC, AND OTHER UNDERGROUND UTILITIES IDENTIFIED OR ENCOUNTERED, SHALL BE PROTECTED AT ALL TIMES. EXTREME CAUTION SHOULD BE USED BY THE CONTRACTOR WHEN DIGGING OR EXCAVATING IN ANY MANNER AROUND OR NEAR SUCH UTILITIES. CONTRACTOR IS RESPONSIBLE FOR REPAIRS, REPLACEMENT, AND ALL DAMAGES DUE TO DAMAGE OF UTILITIES BY HIS OPERATIONS.

ALL EXISTING AND NEW EQUIPMENT AND MATERIAL LOCATIONS, ROUTING, ORIENTATION, MOUNTING, SPECIFICATIONS AND GENERAL INSTALLED CHARACTERISTICS SHALL BE CONSIDERED DIAGRAMMATIC ON THE PLANS. EXACT CONDITIONS SHALL BE DETERMINED IN THE FIELD PRIOR TO ANY INSTALLATION. ANY DIFFERENCES THAT MAY CAUSE SCHEDULE, COST, OR QUALITY SHALL BE BROUGHT TO THE ATTENTION OF THE OWNER OR ENGINEER PRIOR TO ANY WORK.

ALL REFERENCES HEREIN TO VERIFICATION OF ANY CONDITION OF SITE, FIELD, PLANS, OR SPECIFICATIONS PRIOR TO ANY WORK SHALL BE THE FULL RESPONSIBILITY OF THE CONTRACTOR. ANY AND ALL ADDITIONS, MODIFICATIONS, CHANGES, REPAIR, OR DEMOLITION AS A RESULT OF FAILURE TO BRING ANY EXISTING CONDITION NEWERLY TO THE ATTENTION OF THE OWNER OR ENGINEER SHALL BE THE FULL RESPONSIBILITY OF THE CONTRACTOR WITHOUT DELAY, COST, OR CHANGES IN QUALITY.

ALL NOTES THIS SHEET SHALL APPLY UNLESS SPECIFICALLY NOTED OTHERWISE ON THE INCLUDED DRAWINGS OR IN SEPARATE PROJECT SPECIFICATIONS AS APPLICABLE. ALL SPECIFICATIONS SHALL BE CONSIDERED REQUIRED UNLESS APPROVED EQUAL BY THE OWNER, CONSTRUCTION MANAGER, OR ENGINEER AS APPLICABLE.

THE WORDS "PROVIDE" OR "INSTALL" SHALL MEAN FURNISH AND INSTALL.

CONTRACTOR SHALL PROVIDE ALL CUTTING AND PATCHING AS REQUIRED FOR THE INSTALLATION OF HIS WORK. ANY PATCHING SHALL MATCH EXISTING SURROUNDING AREA IN ALL RESPECTS. ALL REMOVED MATERIAL SHALL BE REMOVED FROM THE PREMISES DAILY IN AN APPROVED SAFE MANNER.

ALL SURPLUS MATERIAL SHALL BE REMOVED FROM THE SITE PROMPTLY WHEN DEEMED TO BE SURPLUS.

EVERY CONTRACTOR SHALL BE RESPONSIBLE FOR THE PROTECTION OF HIS WORK AND NEWLY INSTALLED OR EXISTING WORK, INCLUDING PROTECTION OF THE SITE, ALL STRUCTURES, AND ALL OCCUPANTS. FURNISH, INSTALL, MAINTAIN, AND REMOVE AS APNEWRIATE, ALL APNEWRIATE BARRIERS, SAFETY GUARDS, SIGNAGE, AND SECURITY AS REQUIRED.

EVERY CONTRACTOR SHALL BE RESPONSIBLE FOR THEIR RESPECTIVE FEES, PERMITS, INSPECTIONS, TESTING, CERTIFICATES, AND ALL MANAGEMENT OF SAME REQUIRED FOR COMPLETION OF AND LEGAL OCCUPANCY OF THE FINISHED PROJECT.

ALL CONTRACTORS SHALL PROVIDE ALL NECESSARY TOOLS, FIXTURES, SERVICES, MATERIALS, JOB AIDS, AND PERSONNEL REQUIRED FOR THE EXECUTION OF THEIR WORK.

EACH CONTRACTOR SHALL GUARANTEE ALL MATERIALS AND WORKMANSHIP BY THEM TO BE FREE OF DEFECTS AND MAINTAINED FOR A PERIOD OF ONE YEAR AFTER ACCEPTANCE OF THE INSTALLATION BY THE OWNER AND ENGINEER.

ALL WORK SHALL BE PERFORMED BY LICENSED CONTRACTORS IN THE TRADE HAVING JURISDICTION.

ANY DEVIATION, MODIFICATION, ADDITION, OR CHANGE IN DESIGN SHALL NOT BE MADE WITHOUT WRITTEN APPROVAL OF THE OWNER OR ENGINEER.

ALL CONTRACTORS SHALL SUBMIT SHOP DRAWINGS OF ALL EQUIPMENT AND MATERIALS TO THE ENGINEER FOR APPROVAL PRIOR TO FABRICATION AND INSTALLATION, AND SHALL NOT PROCEED UNTIL ENGINEER APPROVAL IN WRITING IS RETURNED. EACH CONTRACTOR SHALL MAINTAIN ON JOB SITE A COMPLETE SET OF SHOP DRAWINGS WITH ANY DEVIATIONS FROM THE ORIGINAL DESIGN SHALL BE NOTED.

ALL MATERIALS AND EQUIPMENT SHALL BE NEW, WITHOUT BLEMISH OR DEFECT, AND SUITABLE AND LISTED FOR THE INSTALLATION AND SHALL BE INSTALLED IN ACCORDANCE WITH MANUFACTURERS RECOMMENDATIONS OR SPECIFICATIONS. ALL ITEMS OF EQUIPMENT OR MATERIAL THAT ARE OF ONE GENERIC TYPE SHALL BE ONE MANUFACTURER THROUGHOUT.

ALL MATERIALS, EQUIPMENT, TOOLS, AND ITEMS UNDER THE CONTRACTOR'S RESPONSIBILITY ON THE JOBSITE SHALL BE ADEQUATELY SECURED, MAINTAINED, AND PROTECTED, SO AS NOT TO BECOME DAMAGED OR CREATE ANY HAZARD TO PERSONNEL OR NEWERTY.

THE CONTRACTORS HOURS OF WORK SHALL BE IN ACCORDANCE WITH LOCAL CODES AND ORDINANCES AND BE APPROVED BY THE OWNER.

CONTRACTOR SHALL PROVIDE SAFETY TRAINING FOR ALL OF HIS CREW AND INSURE THAT EVERY CREW MEMBER FOLLOWS SAVE WORK PRACTICES. SAFETY TRAINING SHALL INCLUDE, BUT NOT BE LIMITED TO, FALL PROTECTION, CONFINED SPACE ENTRY, ELECTRICAL SAFETY, AND TRENCHING/EXCAVATION SAFETY WHERE SUCH WORK IS EXECUTED OR ENCOUNTERED.

ALL TEMPORARY WORK REQUIRED OR SPECIFIED AS A PART OF THIS WORK, SHALL MEET ALL OF THE SAME REQUIREMENTS AS PERMANENT INSTALLATIONS, SHALL MEET ALL APPLICABLE CODE REQUIREMENTS, AND SHALL BE COMPLETELY REMOVED AFTER ITS PURPOSES HAVE BEEN SERVED.

ANY EXISTING UTILITY, SERVICE, STRUCTURE, EQUIPMENT, OR FIXTURE OBSTRUCTING THE WORK SHALL BE REMOVED AND/OR RELOCATED AS DIRECTED BY THE CONSTRUCTION MANAGER.

IF ASBESTOS IS ENCOUNTERED DURING WORK EXECUTION, CONTRACTOR SHALL IMMEDIATELY NOTIFY THE CONSTRUCTION MANAGER AND CEASE ALL ACTIVITIES IN AFFECTED AREAS UNTIL NOTIFIED BY THE CONSTRUCTION TO RESUME OPERATIONS.

EXIST. ELECTRICAL AND MECHANICAL FIXTURES, PIPING, WIRING AND EQUIPMENT OBSTRUCTING THE WORK SHALL BE REMOVED AND/OR RELOCATED AS DIRECTED BY THE CONSTRUCTION MANAGER. TEMPORARY SERVICE INTERRUPTIONS MUST BE COORDINATED WITH OWNER.

05 STEEL:

THESE SPECIFICATIONS SHALL INCLUDE THE GENERAL SPECIFICATIONS HEREIN.

MATERIALS:

WIDE FLANGE	ASTM A992, GR 50
TUBING	ASTM A500, GR B
PIPE	ASTM A53, GR B
BOLTS	ASTM A325
GRATING	TYPE GW-2 (1-1/4"x3/16" BARS)
EXISTING METALS	ASTM A36

PROVIDE CERTIFICATION THAT WELDERS TO BE USED IN WORK ARE LICENSED AND HAVE SATISFACTORILY PASSED AWS QUALIFICATION TEST UNDER THE PROVISIONS OF APPENDIX D, PARTS II AND III OF THE AWS CODE FOR WELDING IN BUILDING CONSTRUCTION.

ALL BUILDING CONNECTION POINTS TO BE CENTERED ON EXISTING STRUCTURAL BEARING POINTS AND THE LOCATIONS ARE TO BE VERIFIED IN FIELD PRIOR TO THE FABRICATION OF STEEL.

DESIGN AND CONSTRUCTION OF STRUCTURAL STEEL SHALL CONFORM TO THE LATEST EDITION OF AISC SPECIFICATION FOR *"THE DESIGN, FABRICATION AND ERECTION OF STRUCTURAL STEEL FOR BUILDINGS"*.

NON-STRUCTURAL CONNECTIONS FOR STEEL GRATING MAY USE 5/8" DIAMETER GALVANIZED ASTM A 307 BOLTS UNLESS OTHERWISE NOTED.

ALL STEEL MATERIAL SHALL BE GALVANIZED AFTER FABRICATION IN ACCORDANCE WITH ASTM A123 "ZINC (HOT-DIPPED GALVANIZED) COATINGS" ON IRON AND STEEL PRODUCTS WITH A COATING WEIGHT OF 2 OZ/SF.

ALL BOLTS, ANCHORS AND MISCELLANEOUS HARDWARE EXPOSED TO WEATHER SHALL BE GALVANIZED IN ACCORDANCE WITH ASTM A153 "ZINC COATING (HOT-DIP) ON IRON AND STEEL HARDWARE."

DAMAGED GALVANIZED SURFACES SHALL BE REPAIRED BY TOUCHING UP ALL DAMAGED GALVANIZED STEEL WITH COLD ZINC, "GALVANOX", "DRY GALV", OR "ZINC IT", IN ACCORDANCE WITH MANUFACTURERS GUIDELINES. TOUCH UP DAMAGED NON-GALVANIZED STEEL WITH SAME PAINT APPLIED IN SHOP OR FIELD.

THE ENGINEER SHALL BE NOTIFIED OF ANY INCORRECTLY FABRICATED, DAMAGED OR OTHERWISE MISFITTING OR NONCONFORMING MATERIALS OR CONDITIONS TO REMEDIAL OR CORRECTIVE ACTION. ANY SUCH ACTION SHALL REQUIRE ENGINEER REVIEW. FIELD CUTTING OF STRUCTURAL STEEL IS NOT PERMITTED EXCEPT WITH THE PRIOR APPROVAL OF THE ENGINEER.

CONTRACTOR TO REMOVE AND RE-INSTALL ALL FIRE PROOFING AS REQUIRED DURING CONSTRUCTION.

THE STEEL STRUCTURE SHALL BE DESIGNED TO BE SELF-SUPPORTING AND STABLE AFTER COMPLETION. IT IS THE CONTRACTOR'S SOLE RESPONSIBILITY TO DETERMINE ERECTION PROCEDURE AND SEQUENCE AND TO INSURE THE SAFETY OF THE BUILDING AND ITS COMPONENT PARTS DURING ERECTION.

ALL STEEL ELEMENTS SHALL BE INSTALLED PLUMB AND LEVEL.

TOWER MANUFACTURER'S DESIGNS SHALL PREVAIL FOR TOWER.

CONNECTIONS SHALL BE DESIGNED BY THE FABRICATOR AND CONSTRUCTED IN ACCORDANCE WITH THE LATEST EDITION OF THE AISC *"MANUAL OF STEEL CONSTRUCTION"*. CONNECTIONS SHALL BE PROVIDED TO CONFORM TO THE REQUIREMENTS OF TYPE 2 CONSTRUCTION.

STRUCTURAL CONNECTION BOLTS SHALL CONFORM TO ASTM A325. ALL BOLTS SHALL BE MINIMUM 3/4" DIAMETER AND EACH CONNECTION SHALL HAVE MINIMUM TWO BOLTS. LOCK WASHERS ARE NOT PERMITTED FOR A325 STEEL ASSEMBLIES. IF TENSION CONTROL BOLTS ARE USED, CONNECTIONS SHALL BE DESIGNED FOR SLIP CRITICAL BOLT ALLOWABLE LOAD VALUES.

DESIGN CONNECTIONS AT BEAM ENDS FOR 10 KIPS (MIN).

ALL U-BOLTED CONNECTIONS SHALL BE COMPLETED WITH DOUBLE NUTS OR A LOCK WASHER.

CONTRACTOR SHALL COMPLY WITH AWS CODE FOR PROCEDURES, APPEARANCE AND QUALITY OF WELDS, AND WELDING PROCESSES SHALL BE QUALIFIED IN ACCORDANCE WITH AWS *"STANDARD QUALIFICATION PROCEDURES"*. ALL WELDING SHALL BE PERFORMED USING E70XX ELECTRODES AND SHALL CONFORM TO AISC AND D1.1. WHERE FILLET WELD SIZES ARE NOT SHOWN, PROVIDE THE LARGER OF 1/4" FILLET OR MINIMUM SIZE PER TABLE J2.4 IN THE AISC *"MANUAL OF STEEL CONSTRUCTION"*. AT THE COMPLETION OF WELDING, ALL DAMAGE TO GALVANIZED COATING SHALL BE REPAIRED. SEE NOTE REGARDING DAMAGED GALVANIZED SURFACES.

ALL ARC AND GAS WELDING SHALL BE DONE BY A LICENSED AND CERTIFIED WELDER IN ACCORDANCE WITH AWS.

SEAL ALL PENETRATIONS AND SEAMS BETWEEN MASONRY AND STEEL WITH DOW CORNING 790 SILICONE BUILDING SEALANT OR EQUAL.

26 GROUNDING:

THESE SPECIFICATIONS SHALL INCLUDE THE GENERAL SPECIFICATIONS HEREIN.

GROUND ALL SYSTEMS AND EQUIPMENT IN ACCORDANCE WITH BEST INDUSTRY PRACTICE, THE REQUIREMENTS OF THE NFPA 70 NATIONAL ELECTRICAL CODE (NEC), AND ALL OTHER APPLICABLE CODES AND REGULATIONS.

ALL GROUNDING ELECTRODES PRESENT AT EACH SERVICE LOCATION SHALL BE BONDED TOGETHER TO FORM THE GROUNDING ELECTRODE SYSTEM.

ALL EQUIPMENT ENCLOSURES, DEVICES, AND CONDUITS SHALL BE GROUNDED BY THE INSTALLATION OF A SEPARATE GROUNDING CONDUCTOR FOR ALL FEEDER AND BRANCH CIRCUITS THAT IS SIZED PER CODE OR IS OF THE SIZE INDICATED ON THE DRAWINGS, SHALL BE CONTINUOUS IN LENGTH, AND SHALL BE BONDED TO EACH ENCLOSURE PASSED THROUGH. CONDUIT SHALL NOT BE USED AS A GROUNDING OR BONDING WIRE OR CIRCUIT.

BOND ALL METALLIC CONDUITS TOGETHER THAT ARE CONNECTED TO NON-METALLIC ENCLOSURES, IN-GROUND BOXES, AND TO AN ENCLOSURE WHERE A GROUND BUS IS SPECIFIED OR SUPPLIED. ACCOMPLISH THIS BOND WITH GROUNDING CONDUCTORS MINIMUM SIZED TO THE LARGEST GROUNDING CONDUCTOR PRESENT IN THE ENCLOSURE CONNECTED TO A GROUNDING TYPE BUSHING EQUALLY SIZED OR MAXIMUM GROUND WIRE ACCOMMODATION AVAILABLE IN STANDARD MANUFACTURE FOR THE CONDUIT SIZE, WHICHEVER IS LESS.

EQUIPMENT GROUNDING AND LOAD SIDE BONDING CONDUCTORS SHALL BE SIZED PER THE CIRCUIT'S OVER-CURRENT PROTECTIVE DEVICE (OCPD) SIZE. WHERE THE UNGROUNDED CONDUCTORS ARE INCREASED IN SIZE ABOVE THE STANDARD FOR THE CIRCUIT'S OCPD, INCREASE THE GROUNDING CONDUCTOR NEWORTIONATELY TO THE CROSS-SECTIONAL AREA OF THE UNGROUNDED CONDUCTORS.

SERVICE MAIN BONDING JUMPERS AND GROUNDING ELECTRODE CONDUCTORS SHALL BE SIZED AND INSTALLED PER THE MINIMUM OF ALL APPLICABLE CODES AND REGULATIONS.

26 LIGHTNING PROTECTION:

THESE SPECIFICATIONS SHALL INCLUDE THE GENERAL SPECIFICATIONS AND THE GROUNDING SPECIFICATIONS HEREIN.

THE LIGHTNING PROTECTION GROUNDING SYSTEM (LPGS) SHALL CONSIST OF BONDING ALL EQUIPMENT AND CONDUCTIVE STRUCTURES TO LOCALIZED SINGLE-POINT GROUNDING CONNECTIONS (TYPICALLY GROUND BARS) WHICH ARE BONDED TOGETHER AND TO AN IN-GROUND SYSTEM. IF THE LPGS IS ON A BUILDING, IT SHALL BE EFFECTIVELY BONDED TO THE ELECTRICAL SERVICE MAIN BONDING JUMPER AND TO ADDITIONAL IN-GROUND ELECTRODES AS MAY BE REQUIRED OR INDICATED. IF THE LPGS IS ON A DEDICATED COMMUNICATION SITE, ALL EQUIPMENT AREAS AND TOWERS SHALL EACH HAVE THEIR OWN IN-GROUND RING WITH EVERY RING BONDED TOGETHER, AND ALL CONDUCTIVE STRUCTURES IN CLOSE PROXIMITY (FENCES, ICE BRIDGES, ISOLATED EQUIPMENT, ETC.) ALSO BONDED TO PROVIDE A COMMON ELECTRICAL EQUIPOTENTIAL SYSTEM FOR ALL CONDUCTIVE ELEMENTS AND STRUCTURES.

CONDUCTORS:

- MIN #2 AWG SOLID BARE TINNED COPPER (SBTC) FOR ALL IN-GROUND CONDUCTORS.
- MIN #2 AWG COPPER GREEN STRANDED FOR BONDING STRUCTURES, AND FOR INTER-SYSTEM BONDING OF INDIVIDUAL ELEMENTS SUCH AS GROUND BAR TO GROUND BAR.
- MIN #6 AWG COPPER GREEN STRANDED OR ALL EQUIPMENT BONDING.
- INSTALL ALL IN-GROUND CONDUCTORS IN THE SAME HORIZONTAL PLANE OR IN A DOWNWARD DIRECTION AWAY FROM THE TOWER AND EQUIPMENT AREAS.
- AVOID LONG RUNS. MAKE DIRECT RUNS AS MUCH AS POSSIBLE.
- PLACE THROUGH NON-METALLIC SLEEVES WHEN PASSING THROUGH FLOORS, WALLS, CEILINGS, AND SIMILAR STRUCTURES.
- MAKE ALL CONNECTIONS IN CONTACT WITH EARTH WITH EXOTHERMIC WELDING. MAKE ALL OTHER CONNECTIONS WITH EXOTHERMIC WELDING, IRREVERSIBLE COMPRESSION CONNECTORS, OR LISTED COMPRESSION TWO-HOLE LUGS.
- INSTALL ALL CONDUCTORS WITH A MINIMUM 18 INCH BEND RADIUS AND NO BEND LONGER THAN A 90 DEGREE ARC. ALL BENDS SHALL BE HORIZONTAL, OR DOWNWARD TOWARDS EARTH.
- ALL CONDUCTORS PASSING FROM ABOVE-GROUND TO IN-GROUND CONNECTIONS, WHERE EXPOSED, SHALL BE COVERED AND PROTECTED WITH A NON-METALLIC CONDUIT SEALED AT BOTH ENDS.
- IF 2 OR MORE IN-GROUND CONDUCTOS ARE IN THE SAME PATH (2 RINGS OVERLAPPING, BONDING FOLLOWING ANOTHER RING OR RADIAL, OR SIMILAR), COMBINE WITH A SHARED SINGLE CONDUCTOR.

EQUIPMENT AND TOWER GROUND RINGS SHALL BE:

- BONDED TO ANY CONDUCTIVE OBJECT OR STRUCTURE WITHIN 5 FEET OF EQUIPMENT GROUND RINGS AND WITHIN 20 FEET OF TOWER GROUND RINGS.
- INSTALLED MINIMUM 18 INCHES FROM FOUNDATIONS, FOOTINGS, AND SIMILAR.

INSTALL ALL IN-GROUND RINGS, RADIALS, BONDS CONNECTING THEM, AND ALL SIMILAR GROUNDING:

- MIN 30 INCHES BELOW GRADE, OR 6 INCHES BELOW THE FROST LINE, WHICHEVER IS GREATER DEPTH.
- MIN 2 FEET FROM FOUNDATIONS, FOOTINGS, OTHER GROUNDING SYSTEMS, AND SIMILAR STRUCTURES, EXCEPT WHEN MAKING A BOND TO ANY OF THESE STRUCTURES. DO NOT BOND TO FOUNDATION INTERNAL REINFORCEMENT.

ALL EQUIPMENT GROUPED IN A COMMON AREA, COMPOUND, STRUCTURE, OR SIMILAR SHALL BE BONDED TO A SINGLE-POINT GROUND, PREFERABLY AN ISOLATED GROUND BAR. BOND THE GROUND BAR TO THE SYSTEM WITH MINIMUM SINGLE BONDING CONDUCTOR. IF BONDING TO AN IN-GROUND RING, INSTALL 2 BONDING CONDUCTORS MINIMUM WITH EACH CONDUCTOR INSTALLED DIRECTIONALLY AWAY FROM EACH OTHER AND PARALLEL TO THE IN-GROUND CONDUCTOR, WITH NO TEE CONNECTIONS.

TOWER GROUNDING:

- EACH TOWER LEG SHALL BE BONDED TO ITS RING. SINGLE-LEGGED TOWERS, OR MONOPOLES, SHALL HAVE 2 BONDS ON OPPOSITE SIDES.
- BOND TO TOWER BASE, NOT TO VERTICAL TOWER STRUCTURE, AWAY FROM TOWER MOUNTING HARDWARE.
- EACH BOND SHALL HAVE A CORRESPONDING GROUND ROD ON THE RING.
- EACH BOND SHALL CONSIST OF 2 CONDUCTORS FROM THE TOWER TO ITS RING WITH EACH CONDUCTOR DIRECTED IN OPPOSITE DIRECTIONS WITH A PARALLEL CONNECTION ON THE RING ON OPPOSITE SIDES OF THE GROUND ROD.

EQUIPMENT AREA GROUNDING:

- COMMUNICATION AREAS ON EARTH SHALL HAVE A GROUND RING.
- BOND ALL EQUIPMENT TO A SINGLE-POINT GROUND (GROUND BAR).
- BOND THE EQIPMENT SINGLE-POINT GROUND TO THE EQUIPMENT GROUND RING WITH MINIMUM 2 CONDUCTORS DIRECTED IN OPPOSITE DIRECTIONS WITH PARALLEL CONNECTIONS ON THE RING.
- IF EQUIPMENT IS ENCLOSED IN A SHELTER:
- IF THE SHELTER IS CONSIDERED TO BE EXPOSED TO A DIRECT LIGHTNING STRIKE, INSTALL A BUILDING LIGHTNING PROTECTION SYSTEM PER APPLICABLE VERSION OF NFPA 780.
- BOND ALL FIXED CONDUCTIVE BUILDING COMPONENTS TOGETHER AND TO THE BUILDING RING GROUND AT THE CORNERS. THIS IS TYPICALLY CALLED THE HALO GROUND. DO NOT BOND EQUIPMENT TO THE HALO GROUND.
- BOND ALL EQUIPMENT TOGETHER TO A SINGLE-POINT OR INTERIOR EQUIPMENT RING GROUND (IEGR). BOND THE SINGLE-POINT OR IEGR TO THE EXTERNAL EQUIPMENT RING GROUND.
- PLACE GROUND RODS AT THE EQUIPMENT GROUND RING CORNERS.

GROUND RODS:

- SEPARATION SPACE BETWEEN ANY 2 GROUND RODS SHALL BE NO CLOSER THAN THEIR DEPTH. THIS APPLIES TO ALL RODS IN THE COMPLETE SYSTEM.
- DRIVE VERTICALLY IN UNDISTURBED SOIL WITH THE TOP AT SAME DEPTH AS THE IN-GROUND CONDUCTOR. IF NOT POSSIBLE TO INSTALL VERTICALLY, PLACE AS CLOSE TO VERTICAL AS POSSIBLE AND IN A DIRECTION AWAY FROM THE NEAREST ABOVE-GROUND CONDUCTIVE ELEMENT (TOWER, EQUIPMENT, ETC.).

RADIALS (TYP. NEW DEDICATED COMMUNICATION SITES):

- WHERE FEASIBLE WITH ENOUGH SPACE AVAILABLE, INSTALL A MINIMUM OF 4, MAXIMUM 10 RING RADIALS.
- EACH RADIAL'S LENGTH SHALL BE MIN 20 FT, MAX 80 FT.
- EXTEND RADIALS PERPENDICULAR FROM RINGS IN AS STRAIGHT LINE AS POSSIBLE, AWAY FROM OTHER RING GROUNDS, RADIALS, BONDS, AND SIMILAR.
- A COMMON PRACTICE IS TO PLACE 4 RADIALS FROM THE TOWER RING TO THE 4 CORNERS OF THE AVAILABLE AREA.

AT A MINIMUM, BOND ALL COMPOUND CONDUCTIVE FENCE CORNER POSTS AND GATE POSTS TO THE LPGS. PREFERABLY, INSTALL A GROUND RING THAT FOLLOWS THE FENCE LINE, BONDING ALL POSTS TO THE RING.

27 ANTENNAS & CABLES:

THESE SPECIFICATIONS SHALL INCLUDE THE GENERAL SPECIFICATIONS HEREIN.

THE CONTRACTOR SHALL FURNISH AND INSTALL ALL TRANSMISSION CABLES, JUMPERS, CONNECTORS, GROUNDING STRAPS, ANTENNAS, MOUNT AND HARDWARE. ALL MATERIALS SHALL BE INSPECTED BY THE CONTRACTOR FOR DAMAGE UPON DELIVERY. JUMPERS SHALL BE SUPPLIED AT ANTENNAS AND EQUIPMENT INSIDE SHELTER. COORDINATE LENGTH OF JUMPER CABLES WITH OWNER. COORDINATE AND VERIFY ALL OF THE MATERIALS TO BE PROVIDED WITH OWNER PRIOR TO SUBMITTING BID AND ORDERING MATERIALS.

AFTER INSTALLATION, THE TRANSMISSION LINE SYSTEM SHALL BE PIM / SWEEP TESTED FOR NEWER INSTALLATION AND DAMAGE WITH ANTENNAS CONNECTED. CONTRACTOR SHALL OBTAIN AND USE LATEST TESTING PROCEDURES FROM OWNER OR MANUFACTURER PRIOR TO BIDDING.

ANTENNA CABLES SHALL BE UNIQUELY COLOR-CODED AT THE ANTENNAS, BOTH SIDES OF EQUIPMENT SHELTER WALL, AND JUMPER CABLES AT THE EQUIPMENT.

THE CONTRACTOR SHALL FURNISH AND INSTALL ALL CONNECTORS, ASSOCIATED CABLE MOUNTING AND GROUNDING HARDWARE, WALL MOUNTS, STANDOFFS, AND ALL ASSOCIATED HARDWARE TO INSTALL ALL CABLES AND ANTENNAS TO THE MANUFACTURER'S AND OWNER'S SPECIFICATIONS.

ANTENNA CABLES SHALL BE AS FOLLOWS:
EW63, HELIAX® STANDARD ELLIPTICAL WAVEGUIDE, 5.925-7.125 GHz, BLACK PE JACKET:

MATERIAL SPECIFICATIONS

CONDUCTOR MATERIAL:	CORRUGATED COPPER
JACKET MATERIAL:	PE

MECHANICAL SPECIFICATIONS:

MINIMUM BEND RADIUS, MULTIPLE BENDS (E PLANE): 260mm I 10.236"
MINIMUM BEND RADIUS, MULTIPLE BENDS (H PLANE): 740MM I 29.134"
MINIMUM BEND RADIUS, SINGLE BENDS (E PLANE): 180MM I 7.087"
MINIMUM BEND RADIUS, SINGLE BENDS (H PLANE): 510MM I 20.079"
MAXIMUM TWIST: 3.281°/m I 1°/FT

ENVIRONMENTAL SPECIFICATIONS:

INSTALLATION TEMPERATURE:	-40°C TO+60°C(-40°F TO+140°F)
OPERATING TEMPERATURE:	-55°C TO+85°C(-67°F TO+185°F)
STORAGE TEMPERATURE:	-70°C TO+85°C(-94°F TO+185°F)
ATTENUATION, AMBIENT TEMPERATURE:	70°F I 23.889°C
AVERAGE POWER, AMBIENT TEMPERATURE:	104°F I 40°C
AVERAGE POWER, TEMPERATURE RISE:	42°C I 107.6°F

CABLE SHALL BE INSTALLED WITH A MINIMUM NUMBER OF BENDS WHERE POSSIBLE. CABLE SHALL NOT BE LEFT UNTERMINATED AND SHALL BE SEALED IMMEDIATELY AFTER BEING INSTALLED.

ALL EXTERIOR CABLE CONNECTIONS SHALL BE COVERED WITH A WATERPROOF SPLICING KIT.

CONTRACTOR SHALL VERIFY EXACT LENGTH AND DIRECTION OF TRAVEL IN FIELD PRIOR TO CONSTRUCTION.

CABLE SHALL BE FURNISHED AND INSTALLED WITHOUT SPLICES AND WITH CONNECTORS AT EACH END.

HX8-6W-6GF

2.4m | 8ft ValuLine® High Performance, High XPD Antenna, dual-polarized, 5.925 – 7.125 GHz, grey, CPR137G flange

Product Classification

Product Type	Microwave antenna
Product Brand	ValuLine®

General Specifications

Antenna Type	HX - ValuLine® High Performance, High XPD Antenna, dual-polarized
Polarization	Dual
Antenna Input	CPR137G
Antenna Color	Gray
Reflector Construction	One-piece reflector
Radome Color	Gray
Radome Material	Fabric
Flash Included	Yes
Side Struts, Included	1
Side Struts, Optional	4

Dimensions

Diameter, nominal	2.4 m | 8 ft

Electrical Specifications

Operating Frequency Band	5.925 – 7.125 GHz
Gain, Low Band	40.8 dBi
Gain, Mid Band	41.6 dBi
Gain, Top Band	42.4 dBi
Boresite Cross Polarization Discrimination (XPD)	33 dB

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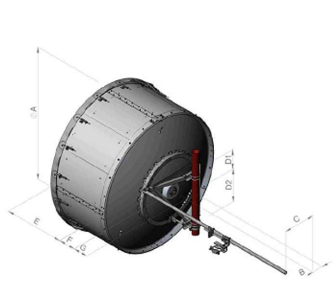
HX8-6W-6GF

Antenna Dimensions and Mounting Information

HX8



Dimensions in inches (mm)								
Antenna size, ft (m)	A	B	C	D1	D2	E	F	G
8 (2.4)	95.1 (2416)	8.0 (203)	22.5 (572)	14.1 (357)	23.6 (600)	42.4 (1078)	12.1 (306)	10.3 (262)

Wind Forces at Wind Velocity Survival Rating

Axial Force (FA)	10599 N | 2,382.751 lbf
Angle a for MT Max	-140 °
Side Force (FS)	4594 N | 1,032.773 lbf
Twisting Moment (MT)	-6518 N-m | -57,689.16 in lb
Force on Inboard Strut Side	11263 N | 2,532.024 lbf
Zcg without Ice	532 mm | 20.945 in
Zcg with 1/2 in (12 mm) Radial Ice	675 mm | 26.575 in
Weight with 1/2 in (12 mm) Radial Ice	342 kg | 753.98 lb

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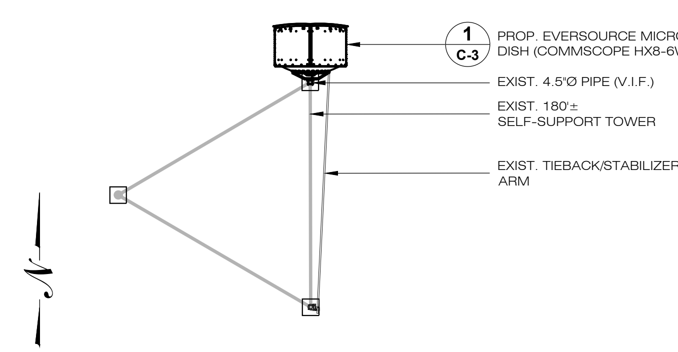
1 / C-3 **ANTENNA SPECIFICATIONS**
SCALE : NOT TO SCALE



2 / C-3 **ANTENNA SECTION DETAIL**
SCALE : NOT TO SCALE

EVERSOURCE ENERGY
107 SELDEN STREET
BERLIN, CT 06037
OFFICE: (860) 665-6748

ALL-POINTS TECHNOLOGY CORPORATION
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PERMIT DOCUMENTS

NO	DATE	REVISION
0	09/29/23	FOR CLIENT REVIEW
1	10/12/23	FOR FILING
2		
3		
4		
5		
6		

STATE OF NEW YORK
SCOTT M. CHASSE
078603
LICENSED PROFESSIONAL ENGINEER

DESIGN PROFESSIONAL OF RECORD

PROF: SCOTT M. CHASSE PE
COMP: ALL-POINTS TECHNOLOGY CORPORATION, P.C.
ADD: 567 VAUXHAUL STREET EXTENSION - SUITE 311 WATERFORD, CT 06385

NEWTOWN SITE UPGRADE

SITE ADDRESS: 20 BARNABAS ROAD NEWTOWN, CT 06470

APT FILING NUMBER: CT2592930

	DRAWN BY: CDC
DATE: 09/29/23	CHECKED BY: KB

SHEET TITLE:

ANTENNA CUT SHEET & NOTES & SPECIFICATIONS

SHEET NUMBER:

C-3

ATTACHMENT C – STRUCTURAL ANALYSIS

CENTEK engineering

Centered on Solutions℠

Structural Analysis Report

180-ft Existing ROHN SSV Lattice Tower

Proposed Eversource
Antenna Upgrade

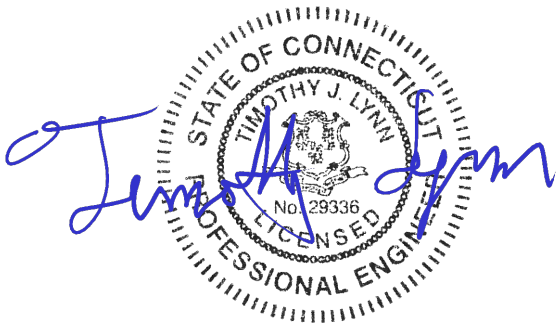
Site Ref: Newtown

20 Barnabas Road
Newtown, CT

CENTEK Project No. 23080.01

Date: June 23, 2023

Max Stress Ratio = 84%



Prepared for:

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Introduction

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

The host tower is a 180-ft three legged, tapered steel lattice tower originally designed and manufactured by UNR-ROHN. The tower geometry, structure member sizes and foundation information were taken from previous structural report prepared by Centek engineering job no. 22006.07, dated April 13, 2022,

Antenna and appurtenance inventory were obtained from a combination of the aforementioned Centek Engineering, Inc. structural analysis, a structural analysis report prepared by Magaram Engineering for Dish dated January 19, 2023 and information provided by Eversource.

The existing tower consists of nine (9) tapered steel pipe leg sections conforming to ASTM A572-50. Diagonal lateral support bracing consists of single angle steel sections conforming to ASTM A36. All tower connections are bolted. The width of the tower face is 8.56-ft at the top and 24.86-ft at the base.

Antenna and Appurtenance Summary

- UNKNOWN (Existing):
  Antenna: One (1) 10-ft Dipole antenna, one (1) 15-ft Omni-directional whip antenna and one (1) 20-ft Omni –directional whip antenna leg mounted with an elevations of ±192.5-ft, ±100-ft and ±189-ft above grade level, respectively.
  Coax Cable: One (1) 1/2" ∅ coax cable and two (2) 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) 12-ft Dipole antenna leg mounted with an elevation of ±161-ft above grade level.
  Coax Cable: One (1) 1/2" ∅coax cable running on a leg/face of the existing tower as specified in Section 3 of this report.
- UNKNOWN (Existing):
  Antenna: Two (2) 5-ft Omni-directional whip antennas (one upright, one inverted) and one (1) TTA mounted to the leg of the existing tower on a 3-ft stand-off with a RAD center elevation of ±157-ft above grade level.
  Coax Cable: Two (2) 7/8" ∅ coax cables running on the face of the existing tower as specified in Section 3 of this report.
- EVERSOURCE (Existing):
  Antenna: One (1) dBspectra SP2D03P36D-D antenna mounted on one (1) 4-ft side arm with an elevation of ±165-ft above grade level.
  Coax Cable: One (1) 7/8" ∅ coax cable running on the face of the existing tower as specified in Section 3 of this report

- T-MOBILE (Existing):
  Antennas: Three (3) Ericsson AIR6419 panel antennas, three (3) RFS APXVAALL24_43 panel antennas, three (3) Ericsson 4460 RRHs and three (3) Ericsson 4480 RRHs mounted on three (3) Site Pro V-Frames (p/n VFA12-HD) with a RAD center elevation of ±150-ft above grade level.
  Cables: Three (3) 6x24 hybrid cables running on a leg of the existing tower as specified in Section 3 of this report
- Unknown (Existing):
  Antenna: One (1) 10-ft 2 Bay Dipole antenna mounted on one (1) 3-ft side arm with a RAD center elevation of ±138-ft above grade level.
  Coax Cable: One (1) 7/8" ∅ coax cable running on the face of the existing tower as specified in Section 3 of this report.
- AT&T (Existing):
  Antenna: Three (3) Powerwave P65-16-XLH-RR panel antennas, three (3) Kathrein 800-10121 panel antennas, six (6) Powerwave LGP21401 TMAs, three (3) Ericsson RRUS-11 remote radio heads and one (1) Raycap Squid surge arrestor mounted on three (3) Frames with a RAD center elevation of ±135-ft above grade level.
  Coax Cable: Six (6) 1-5/8" ∅coax cables, one (1) fiber cables and two (2) dc control cables running on a leg/face of the existing tower as specified in Section 3 of this report.
- VERIZON (Existing):
  Antennas: Six (6) JMA MX06FRO660-03 panel antennas, three (3) Samsung MT6407-77A panel antennas, three (3) Samsung RF4439d-25A (B2/B66A RRH) Remote Radio Heads, three (3) Samsung RF4440d-13A (B5/B13 RRH) Remote Radio Heads and one (1) RayCap RVZDC-6627-PF-48 OVP box mounted to three (3) 12ft-6in. Heavy Duty V-Frames with a RAD center elevation of 124-ft above grade level.
  Cables: Two (2) ∅ Hybriflex fiber lines running on a face of the existing tower as specified in Section 3 of this report
- DISH (Reserved):
  Antennas: Three (3) Commscope FFVV-65B-R2 panel antennas, three (3) Fujitsu TA08025-B605 remote radio heads, three (3) Fujitsu TA08025-B604 remote radio heads and three (3) Raycap RD1DC-9181-PF-48 OVP boxes mounted on three (3) existing 8-ft T-Frames with a RAD center elevation of ±93-ft above the tower base.
  Coax Cables: Three (3) 1-1/4"∅ Hybriflex cables running on the face of the existing tower as specified in Section 3 of this report.
- **EVERSOURCE (Existing to Remove):**
  Antenna: One (1) 6-ft ∅ Microwave dish antenna mounted to the leg of the existing tower with a RAD center elevation of ±176-ft above grade level.
  Coax Cable: One (1) EW63 elliptical coax cable running on the face of the existing tower as specified in Section 3 of this report.
- **EVERSOURCE (Proposed):**
  Antenna: One (1) Commscope HX8-6W-6GF 8-ft ∅ Microwave dish antenna mounted to the leg of the existing tower with a RAD center elevation of ±176-ft above grade level.
  Coax Cable: One (1) EW63 elliptical coax cable running on the face of the existing tower as specified in Section 3 of this report.

Primary Assumptions Used in the Analysis

- The tower structure's theoretical capacity not including any assessment of the condition of the tower.
- The tower carries the horizontal and vertical loads due to the weight of antennas, ice load and wind.
- Tower is properly installed and maintained.
- Tower is in plumb condition.
- Tower loading for antennas and mounts as listed in this report.
- All bolts are appropriately tightened providing the necessary connection continuity.
- All welds are fabricated with ER-70S-6 electrodes.
- All members are assumed to be as specified in the original tower design documents.
- All members are "hot dipped" galvanized in accordance with ASTM A123 and ASTM A153 Standards.
- All member protective coatings are in good condition.
- All tower members were properly designed, detailed, fabricated, installed and have been properly maintained since erection.
- Any deviation from the analyzed antenna loading will require a new analysis for verification of structural adequacy.
- **All previous reinforcements per the below listed structural analysis and modification reports are assumed to be installed.**
  - **Structural report prepared by Centek Engineering for Verizon project no. 13118.00 dated 11/13/13.**
  - **Structural report prepared by Centek Engineering for T-Mobile project no. 14025.02 dated 4/9/14.**

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; 130 mph (Ultimate) wind speed w/ no ice plus gravity load – used in calculation of tower stresses and rotation.	*[Appendix P of the 2022 CT Building Code]*
	Load Case 2; 50 mph wind speed w/ 1.00" radial ice plus gravity load – used in calculation of tower stresses.	*[Annex B of TIA-222-H]*
	Load Case 3; 101 mph (Nominal) wind speed used for deflection calculation.	

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

Tower Capacity

- Calculated stresses were found to be within allowable limits.

Tower Section	Elevation	Stress Ratio (percentage of capacity)	Result
Leg (T5)	83'-0"-103'-0"	70.1%	**PASS**
Diagonal (T3)	123'-0"-143'-0"	84.3%	**PASS**
Secondary Horizontal (T10)	3'-0"-23'-0"	34.5%	**PASS**

- The tower combined deflection is **0.3669 degrees**.

Deflection Criteria	Proposed (degrees)	Allowable (degrees)	Result
Sway (Tilt)	0.3575	0.5	**PASS**
Twist	0.0824	0.5	**PASS**
Combined	0.3669	0.5	**PASS**

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

Foundation and Anchors

The existing foundation system consists of three (3) 2-ft 6in square reinforced concrete piers on three (3) 10-ft square x 2-ft deep reinforced concrete pads concentrically bearing on the existing sub grade, with subsequent mass concrete reinforcement located at grade. The existing foundation geometry was obtained from the aforementioned Centek structural report. The sub-grade conditions used in the analysis of the existing foundation were obtained from a geo-technical soil study prepared by Clarence Welti and Assoc., dated October 19, 2011. The tower legs are connected to the foundation with (6) 1.00"∅, ASTM A-449 (Fu = 120ksi) anchor bolts per leg.

- 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	28 kips
Leg Compression	219 kips
Leg Tension	185 kips
Base Moment	4376 ft-kips
Base Shear	45 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	60.0%	**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	2.58	**PASS**

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

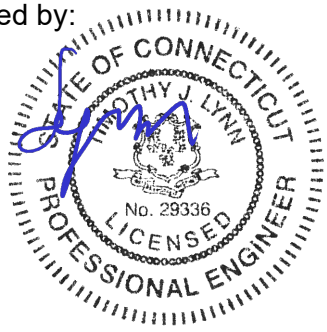
Conclusion

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 Eversource. If the existing conditions are different than the information in this report, Centek Engineering, Inc. must be contacted for resolution of any potential issues.

Please feel free to call with any questions or comments.

Respectfully Submitted by:



Timothy J. Lynn, PE
Structural Engineer

Standard Conditions for Furnishing of Professional Engineering Services on Existing Structures

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

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

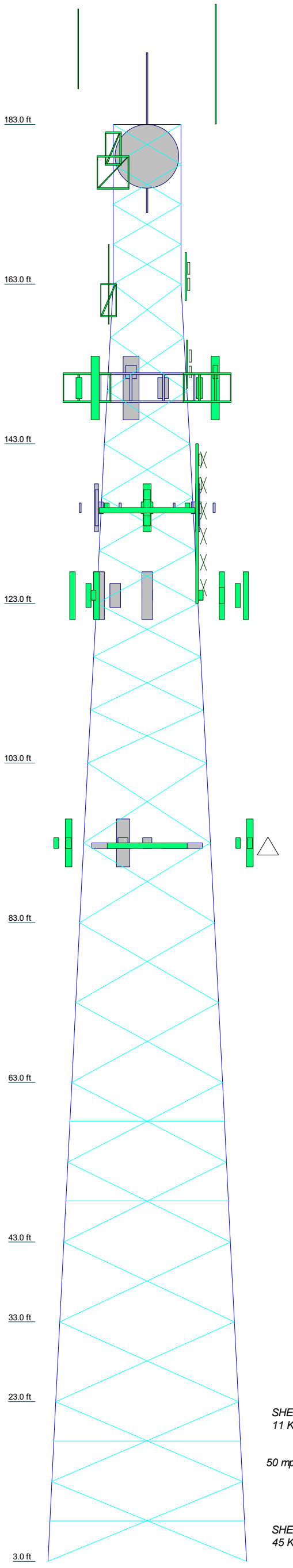
GENERAL DESCRIPTION OF STRUCTURAL ANALYSIS PROGRAM

TnxTower, is an integrated structural analysis and design software package for Designed specifically for the telecommunications industry, TnxTower, formerly 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	T1	T2	T3	T4	T5	T6	T7	T8	T9	T10
Legs	P2.5x.203	P2.5x.276	P3x.216	P4x.337	P5x.258	P5x.375		P6x.432		
Leg Grade					A572-50					
Diagonals	L1 3/4x1 3/4x3/16	L2x2x1/4	L2 1/2x2 1/2x3/16	L2 1/2x2 1/2x5/16	L3X3X3/16 Reinf w/L2.5X2.5X3/16	L3 1/2x3 1/2x5/16	L3 1/2x3 1/2x3/8		L4x4x3/8	
Diagonal Grade					A36					
Top Girts	L2 1/2x2 1/2x3/16									
Sec. Horizontals	N.A.						L3 1/2x3 1/2x1/4	N.A.		L4x4x1/4
Face Width (ft)	8.56	10.6	12.68	14.77	16.77	18.77		20.86	21.86	22.86 24.86
# Panels @ (ft)	4 @ 5	9 @ 6.66667					10 @ 10			
Weight (K)	0.9	1.1	1.2	2.3	3.3	3.0	4.2	2.2	2.3	5.7 26.2



DESIGNED APPURTENANCE LOADING

TYPE	ELEVATION	TYPE	ELEVATION
10' Dipole (-)	180	10-ft T-Frame (ATT)	135
15' x 2" Dia Omni (-)	180	10-ft T-Frame (ATT)	135
5-ft 2" Std. Pipe (-)	180	P65-16-XLH-RR (ATT)	135
5-ft 2" Std. Pipe (-)	180	P65-16-XLH-RR (ATT)	135
HX8-6W-6GF (Eversource - Proposed)	179	10' Dipole (-)	133
8.5' x 4.5" dia. Pipe Mount (-)	177	3' Pipe Mount Side Arm (-)	133
6'x2" Pipe Mount (-)	177	MX06FRO660 (Verizon)	124
6'x4" Pipe Mount (-)	177	MX06FRO660 (Verizon)	124
20' x 2" Dia Omni (-)	173	MT6407-77A (Verizon)	124
SitePro USF-4U (Eversource)	165	MT6407-77A (Verizon)	124
SP2D03P36D-D (Eversource)	165	MT6407-77A (Verizon)	124
2-ft Stand Off (-)	161	RF4439d-25A (B2/B66A RRH) (Verizon)	124
12' Dipole (-)	161	RF4439d-25A (B2/B66A RRH) (Verizon)	124
5' x 1" dia. Omni (-)	160	RF4439d-25A (B2/B66A RRH) (Verizon)	124
18"x18"x6" Junction box (-)	157	RF4440d-13A (B5/B13 RRH) (Verizon)	124
5-ft dipole (-)	157	RF4440d-13A (B5/B13 RRH) (Verizon)	124
5' x 1" dia. Omni (-)	157	RF4440d-13A (B5/B13 RRH) (Verizon)	124
APXVAALL24-43 (T-Mobile)	150	RVZDC-6627-PF-48 (Verizon)	124
AIR6419 (T-Mobile)	150	12' V-Frame (Verizon)	124
AIR6419 (T-Mobile)	150	12' V-Frame (Verizon)	124
AIR6419 (T-Mobile)	150	12' V-Frame (Verizon)	124
4460 B25+B66 (T-Mobile)	150	MX06FRO660 (Verizon)	124
4460 B25+B66 (T-Mobile)	150	MX06FRO660 (Verizon)	124
4460 B25+B66 (T-Mobile)	150	MX06FRO660 (Verizon)	124
4480 B71+B85 (T-Mobile)	150	MX06FRO660 (Verizon)	124
4480 B71+B85 (T-Mobile)	150	TA08025-B604 (Dish - Reserved)	93
4480 B71+B85 (T-Mobile)	150	TA08025-B604 (Dish - Reserved)	93
SitePro VFA12-HD (T-Mobile)	150	TA08025-B605 (Dish - Reserved)	93
SitePro VFA12-HD (T-Mobile)	150	TA08025-B605 (Dish - Reserved)	93
SitePro VFA12-HD (T-Mobile)	150	TA08025-B605 (Dish - Reserved)	93
APXVAALL24-43 (T-Mobile)	150	RD1DC-9181-PF-48 (Dish - Reserved)	93
APXVAALL24-43 (T-Mobile)	150	RD1DC-9181-PF-48 (Dish - Reserved)	93
P65-16-XLH-RR (ATT)	135	RD1DC-9181-PF-48 (Dish - Reserved)	93
800-10121 (ATT)	135	Commscope MTC3975083 8-ft V-Frame (Dish - Reserved)	93
800-10121 (ATT)	135		
800-10121 (ATT)	135	Commscope MTC3975083 8-ft V-Frame (Dish - Reserved)	93
(2) LPG21401 TMA (ATT)	135		
(2) LPG21401 TMA (ATT)	135	Commscope MTC3975083 8-ft V-Frame (Dish - Reserved)	93
(2) LPG21401 TMA (ATT)	135		
RRUS-11 (ATT)	135	FFVV-65B-R2 (Dish - Reserved)	93
RRUS-11 (ATT)	135	FFVV-65B-R2 (Dish - Reserved)	93
RRUS-11 (ATT)	135	FFVV-65B-R2 (Dish - Reserved)	93
DC6-48-60-18-8F Surge Arrestor (ATT)	135	TA08025-B604 (Dish - Reserved)	93
10-ft T-Frame (ATT)	135		

MATERIAL STRENGTH

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

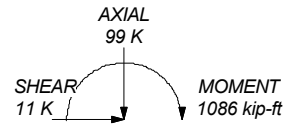
TOWER DESIGN NOTES

1. Tower is located in Fairfield County, Connecticut.
2. Tower designed for Exposure B to the TIA-222-H Standard.
3. Tower designed for a 130 mph basic wind in accordance with the TIA-222-H Standard.
4. Tower is also designed for a 50 mph basic wind with 1.00 in ice. Ice is considered to increase in thickness with height.
5. Deflections are based upon a 101 mph wind.
6. Tower Risk Category III.
7. Topographic Category 1 with Crest Height of 0.00 ft
8. TOWER RATING: 84.3%

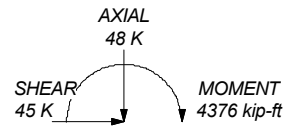
ALL REACTIONS ARE FACTORED

MAX. CORNER REACTIONS AT BASE:
DOWN: 219 K
SHEAR: 28 K

UPLIFT: -185 K
SHEAR: 24 K



TORQUE 4 kip-ft
50 mph WIND - 1.0000 in ICE



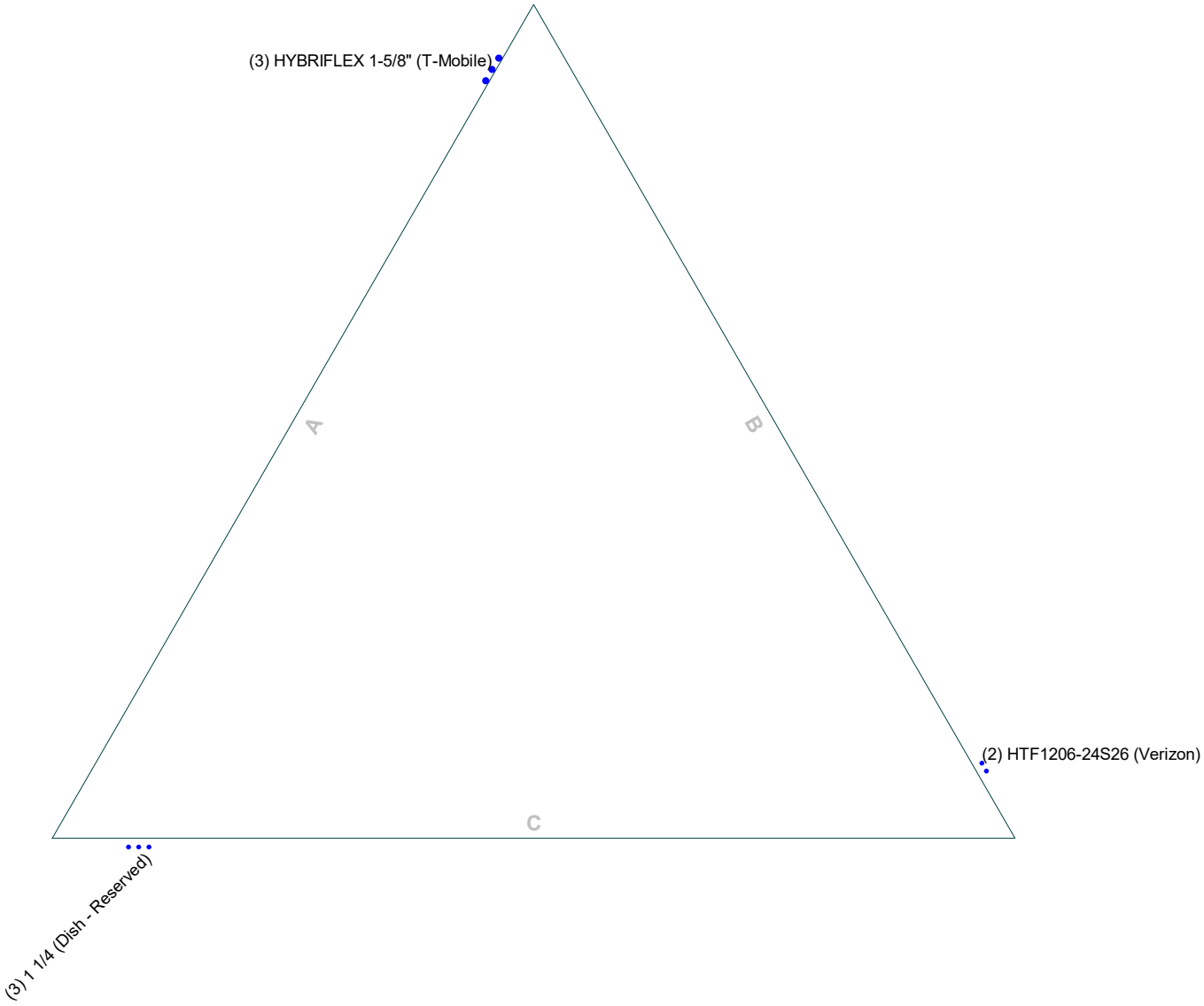
TORQUE 24 kip-ft
REACTIONS - 130 mph WIND

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

Job: 23080.01 - Newtown			
Project: 180-ft Lattice Tower - 20 Barnabas Rd, Newtown, CT			
Client: Eversource	Drawn by: TJL		App'd:
Code: TIA-222-H	Date: 06/23/23		Scale: NTS
Path: J:\Jobs\23080000.Wf\01_Newtown AWC\Structural Analysis\Tower\Backup Documentation\ERI Files\180 ROHN SSV Lattice Newton CT.eri			Dwg No. E-1

Feed Line Plan

Round Flat App In Face App Out Face



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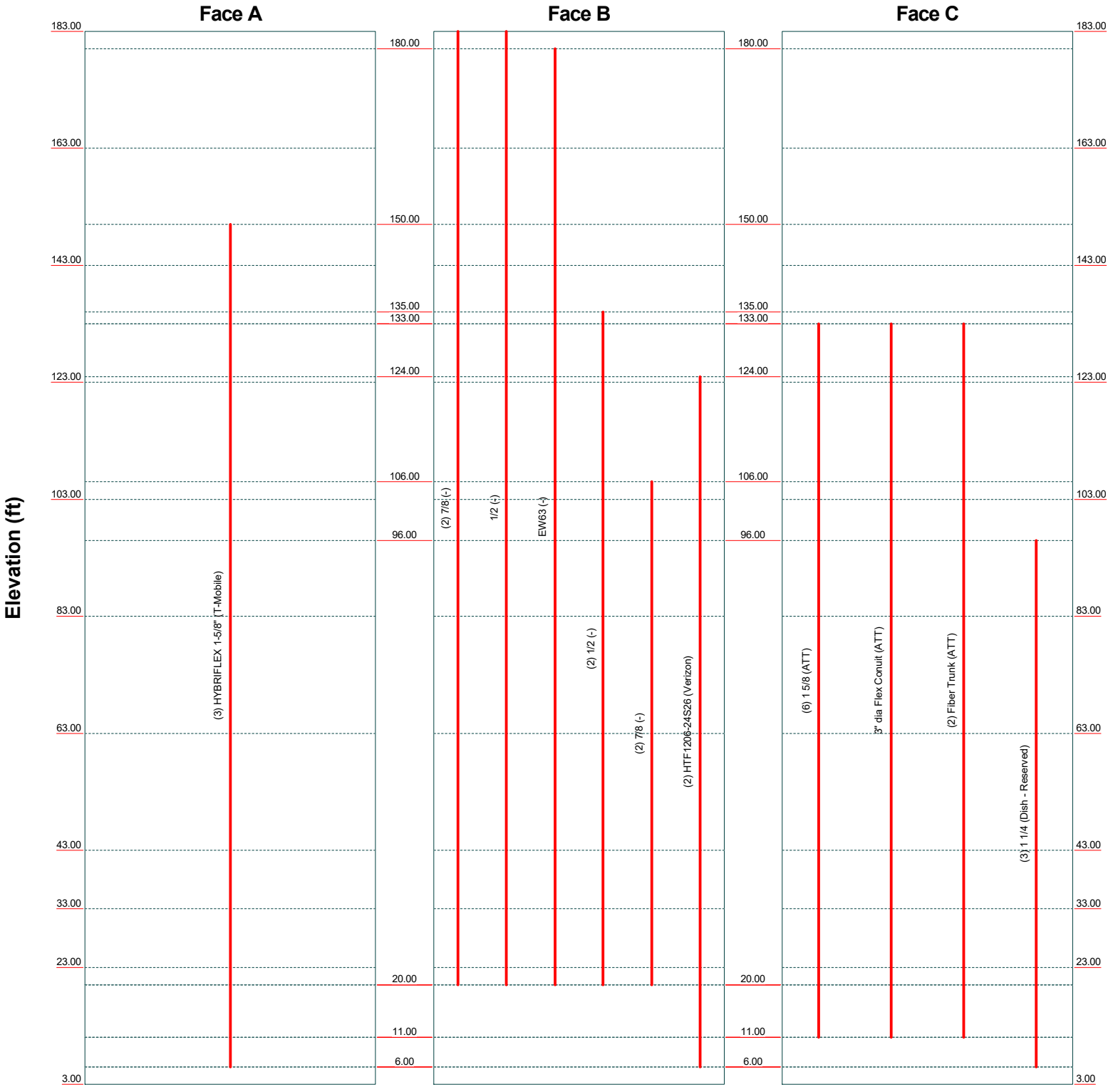
Path: J:\Jobs\23080000.WI\01_Newtown AWC\Structural Analysis\Tower\Backup Documentation\ERI Files\180 ROHN SSV Lattice Newton CT.eri		Dwg No. E-7

Feed Line Distribution Chart
3' - 183'

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



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Path: J:\Jobs\23080000.WI\01 Newtown AWC\Structural Analysis\Tower\Backup Documentation\ERI Files\180 ROHN SSV Lattice Newton CT.eri		Dwg No. E-7	

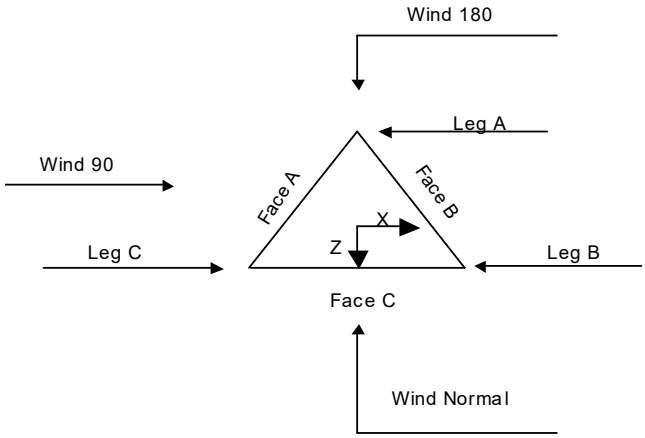
Tower Input Data

The main tower is a 3x free standing tower with an overall height of 183.00 ft above the ground line.
The base of the tower is set at an elevation of 3.00 ft above the ground line.
The face width of the tower is 8.56 ft at the top and 24.86 ft at the base.
This tower is designed using the TIA-222-H standard.
The following design criteria apply:

Tower is located in Fairfield County, Connecticut.
Tower base elevation above sea level: 3.00 ft.
Basic wind speed of 130 mph.
Risk Category III.
Exposure Category B.
Simplified Topographic Factor Procedure for wind speed-up calculations is used.
Topographic Category: 1.
Crest Height: 0.00 ft.
Nominal ice thickness of 1.0000 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 101 mph.
A non-linear (P-delta) analysis was used.
Pressures are calculated at each section.
Stress ratio used in tower member design is 1.
Local bending stresses due to climbing loads, feed line supports, and appurtenance mounts are not considered.

Options

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



Triangular Tower

Tower Section Geometry

Tower Section	Tower Elevation ft	Assembly Database	Description	Section Width ft	Number of Sections	Section Length ft
T1	183.00-163.00			8.56	1	20.00
T2	163.00-143.00			8.56	1	20.00
T3	143.00-123.00			10.60	1	20.00
T4	123.00-103.00			12.68	1	20.00
T5	103.00-83.00			14.77	1	20.00
T6	83.00-63.00			16.77	1	20.00
T7	63.00-43.00			18.77	1	20.00
T8	43.00-33.00			20.86	1	10.00
T9	33.00-23.00			21.86	1	10.00
T10	23.00-3.00			22.86	1	20.00

Tower Section Geometry *(cont'd)*

Tower Section	Tower Elevation ft	Diagonal Spacing ft	Bracing Type	Has K Brace End Panels	Has Horizontals	Top Girt Offset in	Bottom Girt Offset in
T1	183.00-163.00	5.00	X Brace	No	No	0.0000	0.0000
T2	163.00-143.00	6.67	X Brace	No	No	0.0000	0.0000
T3	143.00-123.00	6.67	X Brace	No	No	0.0000	0.0000
T4	123.00-103.00	6.67	X Brace	No	No	0.0000	0.0000
T5	103.00-83.00	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
T6	83.00-63.00	10.00	X Brace	No	No	0.0000	0.0000
T7	63.00-43.00	10.00	X Brace	No	Yes	0.0000	0.0000
T8	43.00-33.00	10.00	X Brace	No	No	0.0000	0.0000
T9	33.00-23.00	10.00	X Brace	No	No	0.0000	0.0000
T10	23.00-3.00	10.00	X Brace	No	Yes	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 183.00-163.00	Pipe	P2.5x.203	A572-50 (50 ksi)	Equal Angle	L1 3/4x1 3/4x3/16	A36 (36 ksi)
T2 163.00-143.00	Pipe	P2.5x.276	A572-50 (50 ksi)	Equal Angle	L2x2x1/4	A36 (36 ksi)
T3 143.00-123.00	Pipe	P3x.216	A572-50 (50 ksi)	Equal Angle	L2 1/2x2 1/2x3/16	A36 (36 ksi)
T4 123.00-103.00	Pipe	P4x.337	A572-50 (50 ksi)	Equal Angle	L2 1/2x2 1/2x5/16	A36 (36 ksi)
T5 103.00-83.00	Pipe	P5x.258	A572-50 (50 ksi)	Arbitrary Shape	L3X3X3/16 Reinf w/L2.5X2.5X3/16	A36 (36 ksi)
T6 83.00-63.00	Pipe	P5x.375	A572-50 (50 ksi)	Equal Angle	L3 1/2x3 1/2x5/16	A36 (36 ksi)
T7 63.00-43.00	Pipe	P5x.375	A572-50 (50 ksi)	Equal Angle	L3 1/2x3 1/2x3/8	A36 (36 ksi)
T8 43.00-33.00	Pipe	P6x.432	A572-50 (50 ksi)	Equal Angle	L4x4x3/8	A36 (36 ksi)
T9 33.00-23.00	Pipe	P6x.432	A572-50 (50 ksi)	Equal Angle	L4x4x3/8	A36 (36 ksi)
T10 23.00-3.00	Pipe	P6x.432	A572-50 (50 ksi)	Equal Angle	L4x4x3/8	A36 (36 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 183.00-163.00	Equal Angle	L2 1/2x2 1/2x3/16	A36 (36 ksi)	Equal Angle		A36 (36 ksi)

Tower Section Geometry *(cont'd)*

Tower Elevation ft	Secondary Horizontal Type	Secondary Horizontal Size	Secondary Horizontal Grade	Inner Bracing Type	Inner Bracing Size	Inner Bracing Grade
T7 63.00-43.00	Equal Angle	L3 1/2x3 1/2x1/4	A36	Equal Angle		A36

Tower Elevation ft	Secondary Horizontal Type	Secondary Horizontal Size	Secondary Horizontal Grade	Inner Bracing Type	Inner Bracing Size	Inner Bracing Grade
T10 23.00-3.00	Equal Angle	L4x4x1/4	(36 ksi) A36 (36 ksi)	Equal Angle		(36 ksi) 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 183.00-163.00	0.00	0.0000	A36 (36 ksi)	1	1	1	36.0000	36.0000	36.0000
T2 163.00-143.00	0.00	0.0000	A36 (36 ksi)	1	1	1	36.0000	36.0000	36.0000
T3 143.00-123.00	0.00	0.0000	A36 (36 ksi)	1	1	1	36.0000	36.0000	36.0000
T4 123.00-103.00	0.00	0.0000	A36 (36 ksi)	1	1	1	36.0000	36.0000	36.0000
T5 103.00-83.00	0.00	0.0000	A36 (36 ksi)	1	1	1	36.0000	36.0000	36.0000
T6 83.00-63.00	0.00	0.0000	A36 (36 ksi)	1	1	1	36.0000	36.0000	36.0000
T7 63.00-43.00	0.00	0.0000	A36 (36 ksi)	1	1	1	36.0000	36.0000	36.0000
T8 43.00-33.00	0.00	0.0000	A36 (36 ksi)	1	1	1	36.0000	36.0000	36.0000
T9 33.00-23.00	0.00	0.0000	A36 (36 ksi)	1	1	1	36.0000	36.0000	36.0000
T10 23.00-3.00	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	Yes	Yes	1	1	1	1	1	1	1	1
183.00-163.00				1	1	1	1	1	1	1
T2	Yes	Yes	1	1	1	1	1	1	1	1
163.00-143.00				1	1	1	1	1	1	1
T3	Yes	Yes	1	1	1	1	1	1	1	1
143.00-123.00				1	1	1	1	1	1	1
T4	Yes	Yes	1	1	1	1	1	1	1	1
123.00-103.00				1	1	1	1	1	1	1
T5	Yes	Yes	1	1	1	1	1	1	1	1
103.00-83.00				1	1	1	1	1	1	1
T6	Yes	Yes	1	1	1	1	1	1	1	1
83.00-63.00				1	1	1	1	1	1	1

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
T7	Yes	Yes	1	1	1	1	1	1	1	1
63.00-43.00				1	1	1	1	1	1	1
T8	Yes	Yes	1	1	1	1	1	1	1	1
43.00-33.00				1	1	1	1	1	1	1
T9	Yes	Yes	1	1	1	1	1	1	1	1
33.00-23.00				1	1	1	1	1	1	1
T10	Yes	Yes	1	1	1	1	1	1	1	1
23.00-3.00				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 Net Width Deduct in	Leg U	Diagonal Net Width Deduct in	Diagonal U	Top Girt Net Width Deduct in	Top Girt U	Bottom Girt Net Width Deduct in	Bottom Girt U	Mid Girt Net Width Deduct in	Mid Girt U	Long Horizontal Net Width Deduct in	Long Horizontal U	Short Horizontal Net Width Deduct in	Short Horizontal U
T1	0.0000	1	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75
183.00-163.00														
T2	0.0000	1	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75
163.00-143.00														
T3	0.0000	1	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75
143.00-123.00														
T4	0.0000	1	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75
123.00-103.00														
T5	0.0000	1	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75
103.00-83.00														
T6 83.00-63.00	0.0000	1	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 63.00-43.00	0.0000	1	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 43.00-33.00	0.0000	1	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 33.00-23.00	0.0000	1	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75
T10 23.00-3.00	0.0000	1	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 Elevation ft	Redundant Horizontal Net Width Deduct in	Redundant Horizontal U	Redundant Diagonal Net Width Deduct in	Redundant Diagonal U	Redundant Sub-Diagonal Net Width Deduct in	Redundant Sub-Diagonal U	Redundant Sub-Horizontal Net Width Deduct in	Redundant Sub-Horizontal U	Redundant Vertical Net Width Deduct in	Redundant Vertical U	Redundant Hip Net Width Deduct in	Redundant Hip U	Redundant Hip Diagonal Net Width Deduct in	Redundant Hip Diagonal U
T1	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
183.00-163.00														
T2	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
163.00-143.00														
T3	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
143.00-123.00														
T4	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
123.00-103.00														

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
T5 103.00-83.00	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 83.00-63.00	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 63.00-43.00	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 43.00-33.00	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 33.00-23.00	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
T10 23.00-3.00	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 183.00-163.00	Flange	0.6250 A325N	4	0.5000 A325N	1	0.5000 A325N	1	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0
T2 163.00-143.00	Flange	0.7500 A325N	4	0.5000 A325N	1	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0
T3 143.00-123.00	Flange	0.8750 A325N	4	0.5000 A325X	1	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0
T4 123.00-103.00	Flange	1.0000 A325N	4	0.5000 A325X	1	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0
T5 103.00-83.00	Flange	1.0000 A325N	4	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 83.00-63.00	Flange	1.0000 A325N	4	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 63.00-43.00	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
T8 43.00-33.00	Flange	0.0000 A325N	0	0.7500 A325X	1	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0
T9 33.00-23.00	Flange	1.0000 A325N	6	0.8750 A325N	1	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0
T10 23.00-3.00	Flange	1.0000 A449	6	0.8750 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)	183.00 - 20.00	0.0000	0.02	2	1	1.1100	1.1100		0.54
1/2 (-)	B	No	No	Ar (CaAa)	183.00 - 20.00	0.0000	0.03	1	1	0.5800	0.5800		0.25
EW63 (-)	B	No	No	Ar (CaAa)	180.00 - 20.00	2.0000	0.02	1	1	1.5742	1.5742		0.51

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
1/2 (-)	B	No	No	Ar (CaAa)	135.00 - 20.00	2.0000	0.04	2	1	0.5800	0.5800		0.25
7/8 (-)	B	No	No	Ar (CaAa)	106.00 - 20.00	2.0000	0.4	2	2	1.1100	1.1100		0.54
HYBRIFLEX 1-5/8" (T-Mobile)	A	No	No	Ar (CaAa)	150.00 - 6.00	0.0000	0.42	3	3	1.9800	1.9800		1.90
1 5/8 (ATT)	C	No	No	Ar (CaAa)	133.00 - 11.00	2.0000	0.46	6	3	1.9800	1.9800		1.04
3" dia Flex Conuit (ATT)	C	No	No	Ar (CaAa)	133.00 - 11.00	2.0000	0.45	1	1	3.0000	3.0000		5.00
Fiber Trunk (ATT)	C	No	No	Ar (CaAa)	133.00 - 11.00	2.0000	0.43	2	2	0.4000	0.4000		1.00
HTF1206-24S 26 (Verizon)	B	No	No	Ar (CaAa)	124.00 - 6.00	2.0000	0.42	2	2	1.4300	1.4300		1.63
1 1/4 (Dish - Reserved)	C	No	No	Ar (CaAa)	96.00 - 6.00	2.0000	0.41	3	3	1.5500	1.5500		0.66

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	183.00-163.00	A	0.000	0.000	0.000	0.000	0.00
		B	0.000	0.000	8.276	0.000	0.04
		C	0.000	0.000	0.000	0.000	0.00
T2	163.00-143.00	A	0.000	0.000	4.158	0.000	0.04
		B	0.000	0.000	8.748	0.000	0.04
		C	0.000	0.000	0.000	0.000	0.00
T3	143.00-123.00	A	0.000	0.000	11.880	0.000	0.11
		B	0.000	0.000	10.426	0.000	0.05
		C	0.000	0.000	15.680	0.000	0.13
T4	123.00-103.00	A	0.000	0.000	11.880	0.000	0.11
		B	0.000	0.000	17.454	0.000	0.12
		C	0.000	0.000	31.360	0.000	0.26
T5	103.00-83.00	A	0.000	0.000	11.880	0.000	0.11
		B	0.000	0.000	21.228	0.000	0.13
		C	0.000	0.000	37.405	0.000	0.29
T6	83.00-63.00	A	0.000	0.000	11.880	0.000	0.11
		B	0.000	0.000	21.228	0.000	0.13
		C	0.000	0.000	40.660	0.000	0.30
T7	63.00-43.00	A	0.000	0.000	11.880	0.000	0.11
		B	0.000	0.000	21.228	0.000	0.13
		C	0.000	0.000	40.660	0.000	0.30
T8	43.00-33.00	A	0.000	0.000	5.940	0.000	0.06
		B	0.000	0.000	10.614	0.000	0.07
		C	0.000	0.000	20.330	0.000	0.15
T9	33.00-23.00	A	0.000	0.000	5.940	0.000	0.06
		B	0.000	0.000	10.614	0.000	0.07
		C	0.000	0.000	20.330	0.000	0.15
T10	23.00-3.00	A	0.000	0.000	10.098	0.000	0.10
		B	0.000	0.000	7.188	0.000	0.07

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
		C	0.000	0.000	26.721	0.000	0.19

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	183.00-163.00	A	1.357	0.000	0.000	0.000	0.000	0.00
		B		0.000	0.000	31.761	0.000	0.35
		C		0.000	0.000	0.000	0.000	0.00
T2	163.00-143.00	A	1.341	0.000	0.000	11.740	0.000	0.16
		B		0.000	0.000	32.801	0.000	0.36
		C		0.000	0.000	0.000	0.000	0.00
T3	143.00-123.00	A	1.322	0.000	0.000	33.423	0.000	0.46
		B		0.000	0.000	41.691	0.000	0.44
		C		0.000	0.000	30.773	0.000	0.57
T4	123.00-103.00	A	1.301	0.000	0.000	33.286	0.000	0.45
		B		0.000	0.000	68.244	0.000	0.72
		C		0.000	0.000	61.162	0.000	1.12
T5	103.00-83.00	A	1.276	0.000	0.000	33.125	0.000	0.45
		B		0.000	0.000	82.218	0.000	0.83
		C		0.000	0.000	78.728	0.000	1.30
T6	83.00-63.00	A	1.245	0.000	0.000	32.929	0.000	0.44
		B		0.000	0.000	81.132	0.000	0.81
		C		0.000	0.000	87.683	0.000	1.39
T7	63.00-43.00	A	1.206	0.000	0.000	32.678	0.000	0.43
		B		0.000	0.000	79.737	0.000	0.78
		C		0.000	0.000	86.724	0.000	1.36
T8	43.00-33.00	A	1.166	0.000	0.000	16.213	0.000	0.21
		B		0.000	0.000	39.167	0.000	0.38
		C		0.000	0.000	42.880	0.000	0.67
T9	33.00-23.00	A	1.131	0.000	0.000	16.102	0.000	0.21
		B		0.000	0.000	38.544	0.000	0.36
		C		0.000	0.000	42.452	0.000	0.65
T10	23.00-3.00	A	1.048	0.000	0.000	26.921	0.000	0.34
		B		0.000	0.000	23.883	0.000	0.24
		C		0.000	0.000	56.282	0.000	0.81

Feed Line Center of Pressure

Section	Elevation ft	CP_X in	CP_Z in	CP_X Ice in	CP_Z Ice in
T1	183.00-163.00	2.4517	-1.3241	5.2593	-2.6677
T2	163.00-143.00	2.6529	-4.5689	5.5300	-7.4105
T3	143.00-123.00	-4.7748	-2.1499	-2.2554	-6.5176
T4	123.00-103.00	-7.7038	3.5572	-2.7916	0.5662
T5	103.00-83.00	-8.6667	6.0756	-3.2403	4.7102
T6	83.00-63.00	-10.1209	7.1470	-5.5367	6.4035
T7	63.00-43.00	-8.9636	6.3704	-5.3781	6.0838
T8	43.00-33.00	-10.3504	7.2459	-6.1882	6.7802
T9	33.00-23.00	-10.5520	7.3682	-6.4542	6.9261
T10	23.00-3.00	-8.0892	3.8045	-9.8465	4.1896

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	163.00 - 183.00	0.6000	0.6000
T1	2	1/2	163.00 - 183.00	0.6000	0.6000
T1	3	EW63	163.00 - 180.00	0.6000	0.6000
T2	1	7/8	143.00 - 163.00	0.6000	0.6000
T2	2	1/2	143.00 - 163.00	0.6000	0.6000
T2	3	EW63	143.00 - 163.00	0.6000	0.6000
T2	6	HYBRIFLEX 1-5/8"	143.00 - 150.00	0.6000	0.6000
T3	1	7/8	123.00 - 143.00	0.6000	0.6000
T3	2	1/2	123.00 - 143.00	0.6000	0.6000
T3	3	EW63	123.00 - 143.00	0.6000	0.6000
T3	4	1/2	123.00 - 135.00	0.6000	0.6000
T3	6	HYBRIFLEX 1-5/8"	123.00 - 143.00	0.6000	0.6000
T3	7	1 5/8	123.00 - 133.00	0.6000	0.6000
T3	8	3" dia Flex Conuit	123.00 - 133.00	0.6000	0.6000
T3	9	Fiber Trunk	123.00 - 133.00	0.6000	0.6000
T3	10	HTF1206-24S26	123.00 - 124.00	0.6000	0.6000
T4	1	7/8	103.00 - 123.00	0.6000	0.6000
T4	2	1/2	103.00 - 123.00	0.6000	0.6000
T4	3	EW63	103.00 - 123.00	0.6000	0.6000
T4	4	1/2	103.00 - 123.00	0.6000	0.6000
T4	5	7/8	103.00 - 106.00	0.6000	0.6000
T4	6	HYBRIFLEX 1-5/8"	103.00 - 123.00	0.6000	0.6000
T4	7	1 5/8	103.00 - 123.00	0.6000	0.6000
T4	8	3" dia Flex Conuit	103.00 - 123.00	0.6000	0.6000
T4	9	Fiber Trunk	103.00 - 123.00	0.6000	0.6000
T4	10	HTF1206-24S26	103.00 - 123.00	0.6000	0.6000
T5	1	7/8	83.00 - 103.00	0.6000	0.6000

Tower Section	Feed Line Record No.	Description	Feed Line Segment Elev.	K_a No Ice	K_a Ice
T5	2	1/2	83.00 - 103.00	0.6000	0.6000
T5	3	EW63	83.00 - 103.00	0.6000	0.6000
T5	4	1/2	83.00 - 103.00	0.6000	0.6000
T5	5	7/8	83.00 - 103.00	0.6000	0.6000
T5	6	HYBRIFLEX 1-5/8"	83.00 - 103.00	0.6000	0.6000
T5	7	1 5/8	83.00 - 103.00	0.6000	0.6000
T5	8	3" dia Flex Conuit	83.00 - 103.00	0.6000	0.6000
T5	9	Fiber Trunk	83.00 - 103.00	0.6000	0.6000
T5	10	HTF1206-24S26	83.00 - 103.00	0.6000	0.6000
T5	11	1 1/4	83.00 - 96.00	0.6000	0.6000
T6	1	7/8	63.00 - 83.00	0.6000	0.6000
T6	2	1/2	63.00 - 83.00	0.6000	0.6000
T6	3	EW63	63.00 - 83.00	0.6000	0.6000
T6	4	1/2	63.00 - 83.00	0.6000	0.6000
T6	5	7/8	63.00 - 83.00	0.6000	0.6000
T6	6	HYBRIFLEX 1-5/8"	63.00 - 83.00	0.6000	0.6000
T6	7	1 5/8	63.00 - 83.00	0.6000	0.6000
T6	8	3" dia Flex Conuit	63.00 - 83.00	0.6000	0.6000
T6	9	Fiber Trunk	63.00 - 83.00	0.6000	0.6000
T6	10	HTF1206-24S26	63.00 - 83.00	0.6000	0.6000
T6	11	1 1/4	63.00 - 83.00	0.6000	0.6000
T7	1	7/8	43.00 - 63.00	0.6000	0.6000
T7	2	1/2	43.00 - 63.00	0.6000	0.6000
T7	3	EW63	43.00 - 63.00	0.6000	0.6000
T7	4	1/2	43.00 - 63.00	0.6000	0.6000
T7	5	7/8	43.00 - 63.00	0.6000	0.6000
T7	6	HYBRIFLEX 1-5/8"	43.00 - 63.00	0.6000	0.6000
T7	7	1 5/8	43.00 - 63.00	0.6000	0.6000
T7	8	3" dia Flex Conuit	43.00 - 63.00	0.6000	0.6000
T7	9	Fiber Trunk	43.00 - 63.00	0.6000	0.6000
T7	10	HTF1206-24S26	43.00 - 63.00	0.6000	0.6000
T7	11	1 1/4	43.00 - 63.00	0.6000	0.6000
T8	1	7/8	33.00 - 43.00	0.6000	0.6000
T8	2	1/2	33.00 - 43.00	0.6000	0.6000
T8	3	EW63	33.00 - 43.00	0.6000	0.6000
T8	4	1/2	33.00 - 43.00	0.6000	0.6000
T8	5	7/8	33.00 - 43.00	0.6000	0.6000
T8	6	HYBRIFLEX 1-5/8"	33.00 - 43.00	0.6000	0.6000
T8	7	1 5/8	33.00 - 43.00	0.6000	0.6000
T8	8	3" dia Flex Conuit	33.00 - 43.00	0.6000	0.6000
T8	9	Fiber Trunk	33.00 - 43.00	0.6000	0.6000
T8	10	HTF1206-24S26	33.00 - 43.00	0.6000	0.6000
T8	11	1 1/4	33.00 - 43.00	0.6000	0.6000
T9	1	7/8	23.00 - 33.00	0.6000	0.6000
T9	2	1/2	23.00 - 33.00	0.6000	0.6000
T9	3	EW63	23.00 - 33.00	0.6000	0.6000
T9	4	1/2	23.00 - 33.00	0.6000	0.6000
T9	5	7/8	23.00 - 33.00	0.6000	0.6000
T9	6	HYBRIFLEX 1-5/8"	23.00 - 33.00	0.6000	0.6000
T9	7	1 5/8	23.00 - 33.00	0.6000	0.6000
T9	8	3" dia Flex Conuit	23.00 - 33.00	0.6000	0.6000
T9	9	Fiber Trunk	23.00 - 33.00	0.6000	0.6000
T9	10	HTF1206-24S26	23.00 - 33.00	0.6000	0.6000
T9	11	1 1/4	23.00 - 33.00	0.6000	0.6000
T10	1	7/8	20.00 - 23.00	0.6000	0.6000
T10	2	1/2	20.00 - 23.00	0.6000	0.6000
T10	3	EW63	20.00 - 23.00	0.6000	0.6000
T10	4	1/2	20.00 - 23.00	0.6000	0.6000
T10	5	7/8	20.00 - 23.00	0.6000	0.6000
T10	6	HYBRIFLEX 1-5/8"	6.00 - 23.00	0.6000	0.6000
T10	7	1 5/8	11.00 - 23.00	0.6000	0.6000
T10	8	3" dia Flex Conuit	11.00 - 23.00	0.6000	0.6000

Tower Section	Feed Line Record No.	Description	Feed Line Segment Elev.	K_a No Ice	K_a Ice
T10	9	Fiber Trunk	11.00 - 23.00	0.6000	0.6000
T10	10	HTF1206-24S26	6.00 - 23.00	0.6000	0.6000
T10	11	1 1/4	6.00 - 23.00	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
10' Dipole	C	From Leg	5.00	0.0000	180.00	No Ice	4.00	4.00	0.05
(-)			0.00			1/2" Ice	6.00	6.00	0.07
			12.50			1" Ice	8.00	8.00	0.10
15' x 2" Dia Omni	B	From Leg	5.00	0.0000	180.00	No Ice	3.00	3.00	0.04
(-)			0.00			1/2" Ice	4.53	4.53	0.06
			10.58			1" Ice	6.07	6.07	0.09
20' x 2" Dia Omni	A	From Leg	5.00	0.0000	173.00	No Ice	4.00	4.00	0.02
(-)			0.00			1/2" Ice	6.03	6.03	0.05
			9.00			1" Ice	8.07	8.07	0.09
5-ft 2" Std. Pipe	C	From Leg	0.00	0.0000	180.00	No Ice	1.19	1.19	0.02
(-)			0.00			1/2" Ice	1.50	1.50	0.03
			0.00			1" Ice	1.81	1.81	0.04
5-ft 2" Std. Pipe	C	From Leg	0.00	0.0000	180.00	No Ice	1.19	1.19	0.02
(-)			0.00			1/2" Ice	1.50	1.50	0.03
			0.00			1" Ice	1.81	1.81	0.04
8.5' x 4.5" dia. Pipe Mount	C	From Leg	0.00	0.0000	177.00	No Ice	2.77	2.77	0.09
(-)			0.00			1/2" Ice	4.17	4.17	0.12
			0.00			1" Ice	4.69	4.69	0.15
6'x2" Pipe Mount	A	From Leg	0.00	0.0000	177.00	No Ice	1.20	1.20	0.02
(-)			0.00			1/2" Ice	1.80	1.80	0.03
			0.00			1" Ice	2.17	2.17	0.04
6'x4" Pipe Mount	A	From Leg	0.00	0.0000	177.00	No Ice	1.80	1.80	0.05
(-)			0.00			1/2" Ice	2.46	2.46	0.07
			0.00			1" Ice	2.83	2.83	0.09
12' Dipole	C	From Leg	0.50	0.0000	161.00	No Ice	6.00	6.00	0.07
(-)			0.00			1/2" Ice	8.00	8.00	0.09
			2.00			1" Ice	10.00	10.00	0.11
2-ft Stand Off	C	From Leg	0.50	0.0000	161.00	No Ice	1.07	1.07	0.02
(-)			0.00			1/2" Ice	1.62	1.62	0.03
			0.00			1" Ice	2.17	2.17	0.04
5-ft dipole	A	From Leg	0.50	0.0000	157.00	No Ice	2.70	2.70	0.01
(-)			0.00			1/2" Ice	4.50	4.50	0.03
			4.00			1" Ice	6.30	6.30	0.04
18"x18"x6" Junction box	A	From Leg	0.50	0.0000	157.00	No Ice	2.70	0.92	0.06
(-)			0.00			1/2" Ice	2.90	1.05	0.08
			0.00			1" Ice	3.11	1.19	0.10
5' x 1" dia. Omni	B	From Leg	0.50	0.0000	157.00	No Ice	0.50	0.50	0.01
(-)			0.00			1/2" Ice	1.02	1.02	0.01
			-4.00			1" Ice	1.43	1.43	0.02
10' Dipole	B	From Leg	0.50	0.0000	133.00	No Ice	4.00	4.00	0.05
(-)			0.00			1/2" Ice	6.00	6.00	0.07
			5.00			1" Ice	8.00	8.00	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
3' Pipe Mount Side Arm	B	From Leg	0.50	0.0000	133.00	No Ice	0.30	0.30	0.01
(-)			0.00			1/2" Ice	0.61	0.61	0.05
			0.00			1" Ice	0.81	0.81	0.09
APXVAALL24-43	A	From Leg	3.00	0.0000	150.00	No Ice	20.24	8.89	0.15
(T-Mobile)			-2.00			1/2" Ice	20.89	9.49	0.27
			0.00			1" Ice	21.54	10.09	0.39
APXVAALL24-43	B	From Leg	3.00	0.0000	150.00	No Ice	20.24	8.89	0.15
(T-Mobile)			-2.00			1/2" Ice	20.89	9.49	0.27
			0.00			1" Ice	21.54	10.09	0.39
APXVAALL24-43	C	From Leg	3.00	0.0000	150.00	No Ice	20.24	8.89	0.15
(T-Mobile)			-2.00			1/2" Ice	20.89	9.49	0.27
			0.00			1" Ice	21.54	10.09	0.39
AIR6419	A	From Leg	3.00	0.0000	150.00	No Ice	4.17	2.02	0.06
(T-Mobile)			2.00			1/2" Ice	4.44	2.23	0.09
			0.00			1" Ice	4.71	2.44	0.12
AIR6419	B	From Leg	3.00	0.0000	150.00	No Ice	4.17	2.02	0.06
(T-Mobile)			2.00			1/2" Ice	4.44	2.23	0.09
			0.00			1" Ice	4.71	2.44	0.12
AIR6419	C	From Leg	3.00	0.0000	150.00	No Ice	4.17	2.02	0.06
(T-Mobile)			2.00			1/2" Ice	4.44	2.23	0.09
			0.00			1" Ice	4.71	2.44	0.12
4460 B25+B66	A	From Leg	3.00	0.0000	150.00	No Ice	2.56	1.98	0.11
(T-Mobile)			-2.00			1/2" Ice	2.76	2.16	0.13
			2.00			1" Ice	2.97	2.34	0.16
4460 B25+B66	B	From Leg	3.00	0.0000	150.00	No Ice	2.56	1.98	0.11
(T-Mobile)			-2.00			1/2" Ice	2.76	2.16	0.13
			2.00			1" Ice	2.97	2.34	0.16
4460 B25+B66	C	From Leg	3.00	0.0000	150.00	No Ice	2.56	1.98	0.11
(T-Mobile)			-2.00			1/2" Ice	2.76	2.16	0.13
			2.00			1" Ice	2.97	2.34	0.16
4480 B71+B85	A	From Leg	3.00	0.0000	150.00	No Ice	2.85	1.38	0.08
(T-Mobile)			-2.00			1/2" Ice	3.06	1.54	0.11
			-2.00			1" Ice	3.28	1.71	0.13
4480 B71+B85	B	From Leg	3.00	0.0000	150.00	No Ice	2.85	1.38	0.08
(T-Mobile)			-2.00			1/2" Ice	3.06	1.54	0.11
			-2.00			1" Ice	3.28	1.71	0.13
4480 B71+B85	C	From Leg	3.00	0.0000	150.00	No Ice	2.85	1.38	0.08
(T-Mobile)			-2.00			1/2" Ice	3.06	1.54	0.11
			-2.00			1" Ice	3.28	1.71	0.13
SitePro VFA12-HD	A	From Leg	3.00	0.0000	150.00	No Ice	21.00	21.00	0.75
(T-Mobile)			0.00			1/2" Ice	25.00	25.00	0.90
			0.00			1" Ice	29.00	29.00	1.05
SitePro VFA12-HD	B	From Leg	3.00	0.0000	150.00	No Ice	21.00	21.00	0.75
(T-Mobile)			0.00			1/2" Ice	25.00	25.00	0.90
			0.00			1" Ice	29.00	29.00	1.05
SitePro VFA12-HD	C	From Leg	3.00	0.0000	150.00	No Ice	21.00	21.00	0.75
(T-Mobile)			0.00			1/2" Ice	25.00	25.00	0.90
			0.00			1" Ice	29.00	29.00	1.05
P65-16-XLH-RR	A	From Face	4.00	0.0000	135.00	No Ice	8.13	4.70	0.06
(ATT)			0.00			1/2" Ice	8.59	5.15	0.11
			0.00			1" Ice	9.05	5.60	0.16
P65-16-XLH-RR	B	From Face	4.00	0.0000	135.00	No Ice	8.13	4.70	0.06
(ATT)			0.00			1/2" Ice	8.59	5.15	0.11
			0.00			1" Ice	9.05	5.60	0.16
P65-16-XLH-RR	C	From Face	4.00	0.0000	135.00	No Ice	8.13	4.70	0.06
(ATT)			0.00			1/2" Ice	8.59	5.15	0.11
			0.00			1" Ice	9.05	5.60	0.16

Description	Face or Leg	Offset Type	Offsets: Horz Lateral Vert ft ft ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
800-10121 (ATT)	A	From Face	4.00 0.00 0.00	0.0000	135.00	No Ice 1/2" Ice 1" Ice	5.16 5.51 5.87	3.29 3.64 3.99	0.05 0.08 0.12
800-10121 (ATT)	B	From Face	4.00 0.00 0.00	0.0000	135.00	No Ice 1/2" Ice 1" Ice	5.16 5.51 5.87	3.29 3.64 3.99	0.05 0.08 0.12
800-10121 (ATT)	C	From Face	4.00 0.00 0.00	0.0000	135.00	No Ice 1/2" Ice 1" Ice	5.16 5.51 5.87	3.29 3.64 3.99	0.05 0.08 0.12
(2) LPG21401 TMA (ATT)	A	From Face	3.50 0.00 0.00	0.0000	135.00	No Ice 1/2" Ice 1" Ice	0.82 0.94 1.06	0.35 0.44 0.54	0.02 0.02 0.03
(2) LPG21401 TMA (ATT)	B	From Face	3.50 0.00 0.00	0.0000	135.00	No Ice 1/2" Ice 1" Ice	0.82 0.94 1.06	0.35 0.44 0.54	0.02 0.02 0.03
(2) LPG21401 TMA (ATT)	C	From Face	3.50 0.00 0.00	0.0000	135.00	No Ice 1/2" Ice 1" Ice	0.82 0.94 1.06	0.35 0.44 0.54	0.02 0.02 0.03
RRUS-11 (ATT)	A	From Face	3.50 0.00 0.00	0.0000	135.00	No Ice 1/2" Ice 1" Ice	2.57 2.76 2.97	1.07 1.21 1.36	0.05 0.07 0.09
RRUS-11 (ATT)	B	From Face	3.50 0.00 0.00	0.0000	135.00	No Ice 1/2" Ice 1" Ice	2.57 2.76 2.97	1.07 1.21 1.36	0.05 0.07 0.09
RRUS-11 (ATT)	C	From Face	3.50 0.00 0.00	0.0000	135.00	No Ice 1/2" Ice 1" Ice	2.57 2.76 2.97	1.07 1.21 1.36	0.05 0.07 0.09
DC6-48-60-18-8F Surge Arrestor (ATT)	C	None		0.0000	135.00	No Ice 1/2" Ice 1" Ice	1.91 2.10 2.29	1.91 2.10 2.29	0.03 0.05 0.07
10-ft T-Frame (ATT)	A	None		0.0000	135.00	No Ice 1/2" Ice 1" Ice	13.60 17.50 21.40	13.60 17.50 21.40	0.38 0.53 0.68
10-ft T-Frame (ATT)	B	None		0.0000	135.00	No Ice 1/2" Ice 1" Ice	13.60 17.50 21.40	13.60 17.50 21.40	0.38 0.53 0.68
10-ft T-Frame (ATT)	C	None		0.0000	135.00	No Ice 1/2" Ice 1" Ice	13.60 17.50 21.40	13.60 17.50 21.40	0.38 0.53 0.68
MX06FRO660 (Verizon)	A	From Leg	3.50 -6.00 0.00	0.0000	124.00	No Ice 1/2" Ice 1" Ice	9.87 10.34 10.82	7.34 7.78 8.24	0.06 0.13 0.20
MX06FRO660 (Verizon)	B	From Leg	3.50 -6.00 0.00	0.0000	124.00	No Ice 1/2" Ice 1" Ice	9.87 10.34 10.82	7.34 7.78 8.24	0.06 0.13 0.20
MX06FRO660 (Verizon)	C	From Leg	3.50 -6.00 0.00	0.0000	124.00	No Ice 1/2" Ice 1" Ice	9.87 10.34 10.82	7.34 7.78 8.24	0.06 0.13 0.20
MX06FRO660 (Verizon)	A	From Leg	3.50 0.00 0.00	0.0000	124.00	No Ice 1/2" Ice 1" Ice	9.87 10.34 10.82	7.34 7.78 8.24	0.06 0.13 0.20
MX06FRO660 (Verizon)	B	From Leg	3.50 0.00 0.00	0.0000	124.00	No Ice 1/2" Ice 1" Ice	9.87 10.34 10.82	7.34 7.78 8.24	0.06 0.13 0.20
MX06FRO660 (Verizon)	C	From Leg	3.50 0.00 0.00	0.0000	124.00	No Ice 1/2" Ice 1" Ice	9.87 10.34 10.82	7.34 7.78 8.24	0.06 0.13 0.20

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
MT6407-77A	A	From Leg	3.50	0.0000	124.00	No Ice	4.71	1.84	0.09
(Verizon)			-4.00			1/2" Ice	5.00	2.06	0.12
			0.00			1" Ice	5.29	2.29	0.15
MT6407-77A	B	From Leg	3.50	0.0000	124.00	No Ice	4.71	1.84	0.09
(Verizon)			-4.00			1/2" Ice	5.00	2.06	0.12
			0.00			1" Ice	5.29	2.29	0.15
MT6407-77A	C	From Leg	3.50	0.0000	124.00	No Ice	4.71	1.84	0.09
(Verizon)			-4.00			1/2" Ice	5.00	2.06	0.12
			0.00			1" Ice	5.29	2.29	0.15
RF4439d-25A (B2/B66A RRH)	A	From Leg	0.50	0.0000	124.00	No Ice	1.88	1.25	0.08
			0.00			1/2" Ice	2.05	1.39	0.09
(Verizon)			0.00			1" Ice	2.22	1.54	0.11
RF4439d-25A (B2/B66A RRH)	B	From Leg	0.50	0.0000	124.00	No Ice	1.88	1.25	0.08
			0.00			1/2" Ice	2.05	1.39	0.09
(Verizon)			0.00			1" Ice	2.22	1.54	0.11
RF4439d-25A (B2/B66A RRH)	C	From Leg	0.50	0.0000	124.00	No Ice	1.88	1.25	0.08
			0.00			1/2" Ice	2.05	1.39	0.09
(Verizon)			0.00			1" Ice	2.22	1.54	0.11
RF4440d-13A (B5/B13 RRH)	A	From Leg	0.50	0.0000	124.00	No Ice	1.88	1.13	0.08
(Verizon)			0.00			1/2" Ice	2.05	1.26	0.09
			0.00			1" Ice	2.22	1.41	0.11
RF4440d-13A (B5/B13 RRH)	B	From Leg	0.50	0.0000	124.00	No Ice	1.88	1.13	0.08
(Verizon)			0.00			1/2" Ice	2.05	1.26	0.09
			0.00			1" Ice	2.22	1.41	0.11
RF4440d-13A (B5/B13 RRH)	C	From Leg	0.50	0.0000	124.00	No Ice	1.88	1.13	0.08
(Verizon)			0.00			1/2" Ice	2.05	1.26	0.09
			0.00			1" Ice	2.22	1.41	0.11
RVZDC-6627-PF-48	B	From Leg	3.50	0.0000	124.00	No Ice	3.25	2.15	0.03
(Verizon)			0.00			1/2" Ice	3.48	2.35	0.06
			0.00			1" Ice	3.71	2.55	0.09
12' V-Frame	A	From Leg	1.75	0.0000	124.00	No Ice	9.22	12.97	0.30
(Verizon)			0.00			1/2" Ice	9.22	12.97	0.40
			0.00			1" Ice	9.22	12.97	0.50
12' V-Frame	B	From Leg	1.75	0.0000	124.00	No Ice	9.22	12.97	0.30
(Verizon)			0.00			1/2" Ice	9.22	12.97	0.40
			0.00			1" Ice	9.22	12.97	0.50
12' V-Frame	C	From Leg	1.75	0.0000	124.00	No Ice	9.22	12.97	0.30
(Verizon)			0.00			1/2" Ice	9.22	12.97	0.40
			0.00			1" Ice	9.22	12.97	0.50
FFVV-65B-R2	A	From Leg	4.00	0.0000	93.00	No Ice	12.27	5.72	0.08
(Dish - Reserved)			-3.00			1/2" Ice	12.76	6.18	0.15
			0.00			1" Ice	13.26	6.64	0.23
FFVV-65B-R2	B	From Leg	4.00	0.0000	93.00	No Ice	12.27	5.72	0.08
(Dish - Reserved)			-3.00			1/2" Ice	12.76	6.18	0.15
			0.00			1" Ice	13.26	6.64	0.23
FFVV-65B-R2	C	From Leg	4.00	0.0000	93.00	No Ice	12.27	5.72	0.08
(Dish - Reserved)			-3.00			1/2" Ice	12.76	6.18	0.15
			0.00			1" Ice	13.26	6.64	0.23
TA08025-B604	A	From Leg	4.00	0.0000	93.00	No Ice	1.98	1.04	0.07
(Dish - Reserved)			-3.00			1/2" Ice	2.15	1.18	0.08
			0.00			1" Ice	2.33	1.32	0.10
TA08025-B604	B	From Leg	4.00	0.0000	93.00	No Ice	1.98	1.04	0.07
(Dish - Reserved)			-3.00			1/2" Ice	2.15	1.18	0.08
			0.00			1" Ice	2.33	1.32	0.10
TA08025-B604	C	From Leg	4.00	0.0000	93.00	No Ice	1.98	1.04	0.07
(Dish - Reserved)			-3.00			1/2" Ice	2.15	1.18	0.08
			0.00			1" Ice	2.33	1.32	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-B605	A	From Leg	4.00	0.0000	93.00	No Ice	1.98	1.20	0.08
(Dish - Reserved)			-3.00			1/2" Ice	2.15	1.34	0.09
			0.00			1" Ice	2.33	1.49	0.11
TA08025-B605	B	From Leg	4.00	0.0000	93.00	No Ice	1.98	1.20	0.08
(Dish - Reserved)			-3.00			1/2" Ice	2.15	1.34	0.09
			0.00			1" Ice	2.33	1.49	0.11
TA08025-B605	C	From Leg	4.00	0.0000	93.00	No Ice	1.98	1.20	0.08
(Dish - Reserved)			-3.00			1/2" Ice	2.15	1.34	0.09
			0.00			1" Ice	2.33	1.49	0.11
RD1DC-9181-PF-48	A	From Leg	4.00	0.0000	93.00	No Ice	1.87	1.07	0.02
(Dish - Reserved)			0.00			1/2" Ice	2.04	1.20	0.04
			0.00			1" Ice	2.21	1.35	0.06
RD1DC-9181-PF-48	B	From Leg	4.00	0.0000	93.00	No Ice	1.87	1.07	0.02
(Dish - Reserved)			0.00			1/2" Ice	2.04	1.20	0.04
			0.00			1" Ice	2.21	1.35	0.06
RD1DC-9181-PF-48	C	From Leg	4.00	0.0000	93.00	No Ice	1.87	1.07	0.02
(Dish - Reserved)			0.00			1/2" Ice	2.04	1.20	0.04
			0.00			1" Ice	2.21	1.35	0.06
Commscope MTC3975083	A	From Face	0.50	0.0000	93.00	No Ice	12.00	12.00	0.36
8-ft V-Frame			0.00			1/2" Ice	18.00	18.00	0.50
(Dish - Reserved)			0.00			1" Ice	24.00	24.00	0.64
Commscope MTC3975083	B	From Face	0.50	0.0000	93.00	No Ice	12.00	12.00	0.36
8-ft V-Frame			0.00			1/2" Ice	18.00	18.00	0.50
(Dish - Reserved)			0.00			1" Ice	24.00	24.00	0.64
Commscope MTC3975083	C	From Face	0.50	0.0000	93.00	No Ice	12.00	12.00	0.36
8-ft V-Frame			0.00			1/2" Ice	18.00	18.00	0.50
(Dish - Reserved)			0.00			1" Ice	24.00	24.00	0.64
5' x 1" dia. Omni	B	From Leg	0.50	0.0000	160.00	No Ice	0.50	0.50	0.01
(-)			0.00			1/2" Ice	1.02	1.02	0.01
			4.00			1" Ice	1.43	1.43	0.02
SitePro USF-4U	C	From Leg	0.00	0.0000	165.00	No Ice	5.75	5.75	0.16
(Eversource)			0.00			1/2" Ice	8.00	8.00	0.21
			0.00			1" Ice	10.25	10.25	0.26
SP2D03P36D-D	C	From Leg	0.00	0.0000	165.00	No Ice	4.75	4.75	0.08
(Eversource)			0.00			1/2" Ice	6.68	6.68	0.11
			0.00			1" Ice	8.63	8.63	0.16

Dishes

Description	Face or Leg	Dish Type	Offset Type	Offsets: Horz Lateral Vert ft	Azimuth Adjustment °	3 dB Beam Width °	Elevation ft	Outside Diameter ft		Aperture Area ft^2	Weight K
HX8-6W-6GF	A	Paraboloid w/o	From	8.00	0.0000		179.00	8.00	No Ice	50.27	0.70
(Eversource -		Radome	Leg	0.00					1/2" Ice	51.32	0.96
Proposed)				0.00					1" Ice	52.37	1.23

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 183.00-163.00	173.00	1.156	43	175.992	A	12.975	9.583	9.583	42.48	0.000	0.000
					B	12.975	9.583		42.48	8.276	0.000
					C	12.975	9.583		42.48	0.000	0.000
T2 163.00-143.00	153.00	1.116	41	196.398	A	11.385	9.600	9.600	45.75	4.158	0.000
					B	11.385	9.600		45.75	8.748	0.000
					C	11.385	9.600		45.75	0.000	0.000
T3 143.00-123.00	133.00	1.072	39	238.641	A	16.353	11.688	11.688	41.68	11.880	0.000
					B	16.353	11.688		41.68	10.426	0.000
					C	16.353	11.688		41.68	15.680	0.000
T4 123.00-103.00	113.00	1.023	38	282.010	A	18.556	15.027	15.027	44.75	11.880	0.000
					B	18.556	15.027		44.75	17.454	0.000
					C	18.556	15.027		44.75	31.360	0.000
T5 103.00-83.00	93.00	0.968	36	324.683	A	20.020	18.574	18.574	48.13	11.880	0.000
					B	20.020	18.574		48.13	21.228	0.000
					C	20.020	18.574		48.13	37.405	0.000
T6 83.00-63.00	73.00	0.903	33	364.683	A	23.172	18.574	18.574	44.49	11.880	0.000
					B	23.172	18.574		44.49	21.228	0.000
					C	23.172	18.574		44.49	40.660	0.000
T7 63.00-43.00	53.00	0.824	30	405.584	A	36.573	18.577	18.577	33.68	11.880	0.000
					B	36.573	18.577		33.68	21.228	0.000
					C	36.573	18.577		33.68	40.660	0.000
T8 43.00-33.00	38.00	0.75	28	219.128	A	15.318	11.060	11.060	41.93	5.940	0.000
					B	15.318	11.060		41.93	10.614	0.000
					C	15.318	11.060		41.93	20.330	0.000
T9 33.00-23.00	28.00	0.7	26	229.128	A	15.927	11.060	11.060	40.98	5.940	0.000
					B	15.927	11.060		40.98	10.614	0.000
					C	15.927	11.060		40.98	20.330	0.000
T10 23.00-3.00	13.00	0.7	26	488.255	A	49.231	22.120	22.120	31.00	10.098	0.000
					B	49.231	22.120		31.00	7.188	0.000
					C	49.231	22.120		31.00	26.721	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 183.00-163.00	173.00	1.156	6	1.3572	180.516	A	12.975	37.951	18.631	36.59	0.000	0.000
						B	12.975	37.951		36.59	31.761	0.000
						C	12.975	37.951		36.59	0.000	0.000
T2 163.00-143.00	153.00	1.116	6	1.3407	200.873	A	11.385	33.816	18.553	41.05	11.740	0.000
						B	11.385	33.816		41.05	32.801	0.000
						C	11.385	33.816		41.05	0.000	0.000
T3 143.00-123.00	133.00	1.072	6	1.3220	243.054	A	16.353	37.811	20.517	37.88	33.423	0.000
						B	16.353	37.811		37.88	41.691	0.000
						C	16.353	37.811		37.88	30.773	0.000
T4 123.00-103.00	113.00	1.023	6	1.3006	286.352	A	18.556	43.021	23.714	38.51	33.286	0.000
						B	18.556	43.021		38.51	68.244	0.000
						C	18.556	43.021		38.51	61.162	0.000

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
T5 103.00-83.00	93.00	0.968	5	1.2755	328.940	A	30.297	27.092	27.092	47.21	33.125	0.000
						B	30.297	27.092		47.21	82.218	0.000
						C	30.297	27.092		47.21	78.728	0.000
T6 83.00-63.00	73.00	0.903	5	1.2450	368.839	A	23.172	43.374	26.888	40.41	32.929	0.000
						B	23.172	43.374		40.41	81.132	0.000
						C	23.172	43.374		40.41	87.683	0.000
T7 63.00-43.00	53.00	0.824	4	1.2058	409.609	A	36.573	51.830	26.630	30.12	32.678	0.000
						B	36.573	51.830		30.12	79.737	0.000
						C	36.573	51.830		30.12	86.724	0.000
T8 43.00-33.00	38.00	0.75	4	1.1663	221.074	A	15.318	23.887	14.954	38.14	16.213	0.000
						B	15.318	23.887		38.14	39.167	0.000
						C	15.318	23.887		38.14	42.880	0.000
T9 33.00-23.00	28.00	0.7	4	1.1313	231.016	A	15.927	23.846	14.837	37.30	16.102	0.000
						B	15.927	23.846		37.30	38.544	0.000
						C	15.927	23.846		37.30	42.452	0.000
T10 23.00-3.00	13.00	0.7	4	1.0477	491.752	A	49.231	54.906	29.116	27.96	26.921	0.000
						B	49.231	54.906		27.96	23.883	0.000
						C	49.231	54.906		27.96	56.282	0.000

Tower Pressure - Service

$G_H = 0.850$

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 183.00-163.00	173.00	1.156	26	175.992	A	12.975	9.583	9.583	42.48	0.000	0.000
					B	12.975	9.583		42.48	8.276	0.000
					C	12.975	9.583		42.48	0.000	0.000
T2 163.00-143.00	153.00	1.116	25	196.398	A	11.385	9.600	9.600	45.75	4.158	0.000
					B	11.385	9.600		45.75	8.748	0.000
					C	11.385	9.600		45.75	0.000	0.000
T3 143.00-123.00	133.00	1.072	24	238.641	A	16.353	11.688	11.688	41.68	11.880	0.000
					B	16.353	11.688		41.68	10.426	0.000
					C	16.353	11.688		41.68	15.680	0.000
T4 123.00-103.00	113.00	1.023	23	282.010	A	18.556	15.027	15.027	44.75	11.880	0.000
					B	18.556	15.027		44.75	17.454	0.000
					C	18.556	15.027		44.75	31.360	0.000
T5 103.00-83.00	93.00	0.968	21	324.683	A	20.020	18.574	18.574	48.13	11.880	0.000
					B	20.020	18.574		48.13	21.228	0.000
					C	20.020	18.574		48.13	37.405	0.000
T6 83.00-63.00	73.00	0.903	20	364.683	A	23.172	18.574	18.574	44.49	11.880	0.000
					B	23.172	18.574		44.49	21.228	0.000
					C	23.172	18.574		44.49	40.660	0.000
T7 63.00-43.00	53.00	0.824	18	405.584	A	36.573	18.577	18.577	33.68	11.880	0.000
					B	36.573	18.577		33.68	21.228	0.000
					C	36.573	18.577		33.68	40.660	0.000
T8 43.00-33.00	38.00	0.75	17	219.128	A	15.318	11.060	11.060	41.93	5.940	0.000
					B	15.318	11.060		41.93	10.614	0.000
					C	15.318	11.060		41.93	20.330	0.000
T9 33.00-23.00	28.00	0.7	16	229.128	A	15.927	11.060	11.060	40.98	5.940	0.000
					B	15.927	11.060		40.98	10.614	0.000
					C	15.927	11.060		40.98	20.330	0.000
T10 23.00-3.00	13.00	0.7	16	488.255	A	49.231	22.120	22.120	31.00	10.098	0.000

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
					B	49.231	22.120		31.00	7.188	0.000
					C	49.231	22.120		31.00	26.721	0.000

Tower Forces - No 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 ft²	F K	w plf	Ctrl. Face
T1	0.04	0.93	A	0.128	2.853	43	1	1	18.396	2.08	103.79	C
183.00-163.00			B	0.128	2.853		1	1	18.396			
			C	0.128	2.853		1	1	18.396			
T2	0.08	1.13	A	0.107	2.937	41	1	1	16.805	1.99	99.57	C
163.00-143.00			B	0.107	2.937		1	1	16.805			
			C	0.107	2.937		1	1	16.805			
T3	0.29	1.20	A	0.117	2.895	39	1	1	22.944	2.99	149.48	C
143.00-123.00			B	0.117	2.895		1	1	22.944			
			C	0.117	2.895		1	1	22.944			
T4	0.49	2.27	A	0.119	2.889	38	1	1	26.406	3.60	180.24	C
123.00-103.00			B	0.119	2.889		1	1	26.406			
			C	0.119	2.889		1	1	26.406			
T5	0.54	3.33	A	0.119	2.889	36	1	1	28.955	3.81	190.57	C
103.00-83.00			B	0.119	2.889		1	1	28.955			
			C	0.119	2.889		1	1	28.955			
T6	0.55	2.99	A	0.114	2.907	33	1	1	32.243	3.90	194.78	C
83.00-63.00			B	0.114	2.907		1	1	32.243			
			C	0.114	2.907		1	1	32.243			
T7	0.55	4.18	A	0.136	2.824	30	1	1	45.935	4.48	224.13	C
63.00-43.00			B	0.136	2.824		1	1	45.935			
			C	0.136	2.824		1	1	45.935			
T8	0.28	2.24	A	0.12	2.883	28	1	1	20.513	1.90	190.43	C
43.00-33.00			B	0.12	2.883		1	1	20.513			
			C	0.12	2.883		1	1	20.513			
T9	0.28	2.29	A	0.118	2.894	26	1	1	21.210	1.83	182.71	C
33.00-23.00			B	0.118	2.894		1	1	21.210			
			C	0.118	2.894		1	1	21.210			
T10	0.36	5.69	A	0.146	2.786	26	1	1	59.981	4.23	211.69	C
23.00-3.00			B	0.146	2.786		1	1	59.981			
			C	0.146	2.786		1	1	59.981			
Sum Weight:	3.45	26.24						OTM	2431.29 kip-ft	30.82		

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	0.04	0.93	A	0.128	2.853	43	0.8	1	15.801	1.81	90.41	C
183.00-163.00			B	0.128	2.853		0.8	1	15.801			
			C	0.128	2.853		0.8	1	15.801			

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
T2	0.08	1.13	A	0.107	2.937	41	0.8	1	14.528	1.76	87.91	C
163.00-143.00			B	0.107	2.937		0.8	1	14.528			
			C	0.107	2.937		0.8	1	14.528			
T3	0.29	1.20	A	0.117	2.895	39	0.8	1	19.673	2.67	133.62	C
143.00-123.00			B	0.117	2.895		0.8	1	19.673			
			C	0.117	2.895		0.8	1	19.673			
T4	0.49	2.27	A	0.119	2.889	38	0.8	1	22.695	3.26	163.09	C
123.00-103.00			B	0.119	2.889		0.8	1	22.695			
			C	0.119	2.889		0.8	1	22.695			
T5	0.54	3.33	A	0.119	2.889	36	0.8	1	24.951	3.46	173.07	C
103.00-83.00			B	0.119	2.889		0.8	1	24.951			
			C	0.119	2.889		0.8	1	24.951			
T6	0.55	2.99	A	0.114	2.907	33	0.8	1	27.608	3.52	175.76	C
83.00-63.00			B	0.114	2.907		0.8	1	27.608			
			C	0.114	2.907		0.8	1	27.608			
T7	0.55	4.18	A	0.136	2.824	30	0.8	1	38.621	3.95	197.52	C
63.00-43.00			B	0.136	2.824		0.8	1	38.621			
			C	0.136	2.824		0.8	1	38.621			
T8	0.28	2.24	A	0.12	2.883	28	0.8	1	17.450	1.70	169.74	C
43.00-33.00			B	0.12	2.883		0.8	1	17.450			
			C	0.12	2.883		0.8	1	17.450			
T9	0.28	2.29	A	0.118	2.894	26	0.8	1	18.024	1.63	162.54	C
33.00-23.00			B	0.118	2.894		0.8	1	18.024			
			C	0.118	2.894		0.8	1	18.024			
T10	0.36	5.69	A	0.146	2.786	26	0.8	1	50.135	3.63	181.69	C
23.00-3.00			B	0.146	2.786		0.8	1	50.135			
			C	0.146	2.786		0.8	1	50.135			
Sum Weight:	3.45	26.24						OTM	2168.84 kip-ft	27.38		

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 ft²	F K	w plf	Ctrl. Face
T1	0.04	0.93	A	0.128	2.853	43	0.85	1	16.450	1.88	93.76	C
183.00-163.00			B	0.128	2.853		0.85	1	16.450			
			C	0.128	2.853		0.85	1	16.450			
T2	0.08	1.13	A	0.107	2.937	41	0.85	1	15.097	1.82	90.83	C
163.00-143.00			B	0.107	2.937		0.85	1	15.097			
			C	0.107	2.937		0.85	1	15.097			
T3	0.29	1.20	A	0.117	2.895	39	0.85	1	20.491	2.75	137.58	C
143.00-123.00			B	0.117	2.895		0.85	1	20.491			
			C	0.117	2.895		0.85	1	20.491			
T4	0.49	2.27	A	0.119	2.889	38	0.85	1	23.623	3.35	167.38	C
123.00-103.00			B	0.119	2.889		0.85	1	23.623			
			C	0.119	2.889		0.85	1	23.623			
T5	0.54	3.33	A	0.119	2.889	36	0.85	1	25.952	3.55	177.44	C
103.00-83.00			B	0.119	2.889		0.85	1	25.952			
			C	0.119	2.889		0.85	1	25.952			
T6	0.55	2.99	A	0.114	2.907	33	0.85	1	28.767	3.61	180.52	C
83.00-63.00			B	0.114	2.907		0.85	1	28.767			
			C	0.114	2.907		0.85	1	28.767			

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
T7	0.55	4.18	A	0.136	2.824	30	0.85	1	40.449	4.08	204.17	C
63.00-43.00			B	0.136	2.824		0.85	1	40.449			
			C	0.136	2.824		0.85	1	40.449			
T8	0.28	2.24	A	0.12	2.883	28	0.85	1	18.215	1.75	174.91	C
43.00-33.00			B	0.12	2.883		0.85	1	18.215			
			C	0.12	2.883		0.85	1	18.215			
T9	0.28	2.29	A	0.118	2.894	26	0.85	1	18.821	1.68	167.59	C
33.00-23.00			B	0.118	2.894		0.85	1	18.821			
			C	0.118	2.894		0.85	1	18.821			
T10	0.36	5.69	A	0.146	2.786	26	0.85	1	52.596	3.78	189.19	C
23.00-3.00			B	0.146	2.786		0.85	1	52.596			
			C	0.146	2.786		0.85	1	52.596			
Sum Weight:	3.45	26.24						OTM	2234.46 kip-ft	28.24		

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 ft²	F K	w plf	Ctrl. Face
T1	0.35	3.07	A	0.282	2.345	6	1	1	35.501	0.55	27.33	C
183.00-163.00			B	0.282	2.345		1	1	35.501			
			C	0.282	2.345		1	1	35.501			
T2	0.52	2.98	A	0.225	2.515	6	1	1	30.975	0.54	26.99	C
163.00-143.00			B	0.225	2.515		1	1	30.975			
			C	0.225	2.515		1	1	30.975			
T3	1.47	3.56	A	0.223	2.521	6	1	1	38.240	0.79	39.65	C
143.00-123.00			B	0.223	2.521		1	1	38.240			
			C	0.223	2.521		1	1	38.240			
T4	2.30	4.93	A	0.215	2.547	6	1	1	43.391	0.98	49.24	C
123.00-103.00			B	0.215	2.547		1	1	43.391			
			C	0.215	2.547		1	1	43.391			
T5	2.59	5.94	A	0.174	2.684	5	1	1	45.752	1.07	53.53	C
103.00-83.00			B	0.174	2.684		1	1	45.752			
			C	0.174	2.684		1	1	45.752			
T6	2.64	5.92	A	0.18	2.663	5	1	1	47.953	1.04	51.94	C
83.00-63.00			B	0.18	2.663		1	1	47.953			
			C	0.18	2.663		1	1	47.953			
T7	2.57	8.27	A	0.216	2.544	4	1	1	66.501	1.10	55.01	C
63.00-43.00			B	0.216	2.544		1	1	66.501			
			C	0.216	2.544		1	1	66.501			
T8	1.25	3.95	A	0.177	2.673	4	1	1	28.955	0.47	47.26	C
43.00-33.00			B	0.177	2.673		1	1	28.955			
			C	0.177	2.673		1	1	28.955			
T9	1.22	3.99	A	0.172	2.692	4	1	1	29.524	0.45	44.58	C
33.00-23.00			B	0.172	2.692		1	1	29.524			
			C	0.172	2.692		1	1	29.524			
T10	1.39	10.17	A	0.212	2.557	4	1	1	80.892	0.88	43.88	C
23.00-3.00			B	0.212	2.557		1	1	80.892			
			C	0.212	2.557		1	1	80.892			
Sum Weight:	16.29	52.78						OTM	645.88 kip-ft	7.87		

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 ft²	F K	w plf	Ctrl. Face
T1	0.35	3.07	A	0.282	2.345	6	0.8	1	32.906	0.51	25.71	C
183.00-163.00			B	0.282	2.345		0.8	1	32.906			
			C	0.282	2.345		0.8	1	32.906			
T2	0.52	2.98	A	0.225	2.515	6	0.8	1	28.698	0.51	25.51	C
163.00-143.00			B	0.225	2.515		0.8	1	28.698			
			C	0.225	2.515		0.8	1	28.698			
T3	1.47	3.56	A	0.223	2.521	6	0.8	1	34.969	0.75	37.60	C
143.00-123.00			B	0.223	2.521		0.8	1	34.969			
			C	0.223	2.521		0.8	1	34.969			
T4	2.30	4.93	A	0.215	2.547	6	0.8	1	39.680	0.94	47.00	C
123.00-103.00			B	0.215	2.547		0.8	1	39.680			
			C	0.215	2.547		0.8	1	39.680			
T5	2.59	5.94	A	0.174	2.684	5	0.8	1	39.693	1.00	49.90	C
103.00-83.00			B	0.174	2.684		0.8	1	39.693			
			C	0.174	2.684		0.8	1	39.693			
T6	2.64	5.92	A	0.18	2.663	5	0.8	1	43.319	0.99	49.37	C
83.00-63.00			B	0.18	2.663		0.8	1	43.319			
			C	0.18	2.663		0.8	1	43.319			
T7	2.57	8.27	A	0.216	2.544	4	0.8	1	59.186	1.03	51.47	C
63.00-43.00			B	0.216	2.544		0.8	1	59.186			
			C	0.216	2.544		0.8	1	59.186			
T8	1.25	3.95	A	0.177	2.673	4	0.8	1	25.891	0.44	44.42	C
43.00-33.00			B	0.177	2.673		0.8	1	25.891			
			C	0.177	2.673		0.8	1	25.891			
T9	1.22	3.99	A	0.172	2.692	4	0.8	1	26.338	0.42	41.80	C
33.00-23.00			B	0.172	2.692		0.8	1	26.338			
			C	0.172	2.692		0.8	1	26.338			
T10	1.39	10.17	A	0.212	2.557	4	0.8	1	71.046	0.80	39.80	C
23.00-3.00			B	0.212	2.557		0.8	1	71.046			
			C	0.212	2.557		0.8	1	71.046			
Sum Weight:	16.29	52.78						OTM	609.48 kip-ft	7.39		

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 ft²	F K	w plf	Ctrl. Face
T1	0.35	3.07	A	0.282	2.345	6	0.85	1	33.555	0.52	26.12	C
183.00-163.00			B	0.282	2.345		0.85	1	33.555			
			C	0.282	2.345		0.85	1	33.555			
T2	0.52	2.98	A	0.225	2.515	6	0.85	1	29.267	0.52	25.88	C
163.00-143.00			B	0.225	2.515		0.85	1	29.267			
			C	0.225	2.515		0.85	1	29.267			
T3	1.47	3.56	A	0.223	2.521	6	0.85	1	35.787	0.76	38.12	C
143.00-123.00			B	0.223	2.521		0.85	1	35.787			
			C	0.223	2.521		0.85	1	35.787			

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
T4	2.30	4.93	A	0.215	2.547	6	0.85	1	40.608	0.95	47.56	C
123.00-103.00			B	0.215	2.547		0.85	1	40.608			
			C	0.215	2.547		0.85	1	40.608			
T5	2.59	5.94	A	0.174	2.684	5	0.85	1	41.208	1.02	50.81	C
103.00-83.00			B	0.174	2.684		0.85	1	41.208			
			C	0.174	2.684		0.85	1	41.208			
T6	2.64	5.92	A	0.18	2.663	5	0.85	1	44.477	1.00	50.01	C
83.00-63.00			B	0.18	2.663		0.85	1	44.477			
			C	0.18	2.663		0.85	1	44.477			
T7	2.57	8.27	A	0.216	2.544	4	0.85	1	61.015	1.05	52.35	C
63.00-43.00			B	0.216	2.544		0.85	1	61.015			
			C	0.216	2.544		0.85	1	61.015			
T8	1.25	3.95	A	0.177	2.673	4	0.85	1	26.657	0.45	45.13	C
43.00-33.00			B	0.177	2.673		0.85	1	26.657			
			C	0.177	2.673		0.85	1	26.657			
T9	1.22	3.99	A	0.172	2.692	4	0.85	1	27.135	0.42	42.50	C
33.00-23.00			B	0.172	2.692		0.85	1	27.135			
			C	0.172	2.692		0.85	1	27.135			
T10	1.39	10.17	A	0.212	2.557	4	0.85	1	73.508	0.82	40.82	C
23.00-3.00			B	0.212	2.557		0.85	1	73.508			
			C	0.212	2.557		0.85	1	73.508			
Sum Weight:	16.29	52.78						OTM	618.58 kip-ft	7.51		

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 ft²	F K	w plf	Ctrl. Face
T1	0.04	0.93	A	0.128	2.853	26	1	1	18.396	1.25	62.65	C
183.00-163.00			B	0.128	2.853		1	1	18.396			
			C	0.128	2.853		1	1	18.396			
T2	0.08	1.13	A	0.107	2.937	25	1	1	16.805	1.20	60.10	C
163.00-143.00			B	0.107	2.937		1	1	16.805			
			C	0.107	2.937		1	1	16.805			
T3	0.29	1.20	A	0.117	2.895	24	1	1	22.956	1.81	90.26	C
143.00-123.00			B	0.117	2.895		1	1	22.956			
			C	0.117	2.895		1	1	22.956			
T4	0.49	2.27	A	0.119	2.889	23	1	1	27.048	2.21	110.58	C
123.00-103.00			B	0.119	2.889		1	1	27.048			
			C	0.119	2.889		1	1	27.048			
T5	0.54	3.33	A	0.119	2.889	21	1	1	29.973	2.35	117.71	C
103.00-83.00			B	0.119	2.889		1	1	29.973			
			C	0.119	2.889		1	1	29.973			
T6	0.55	2.99	A	0.114	2.907	20	1	1	33.237	2.40	120.03	C
83.00-63.00			B	0.114	2.907		1	1	33.237			
			C	0.114	2.907		1	1	33.237			
T7	0.55	4.18	A	0.136	2.824	18	1	1	46.834	2.75	137.26	C
63.00-43.00			B	0.136	2.824		1	1	46.834			
			C	0.136	2.824		1	1	46.834			
T8	0.28	2.24	A	0.12	2.883	17	1	1	21.146	1.18	117.53	C
43.00-33.00			B	0.12	2.883		1	1	21.146			
			C	0.12	2.883		1	1	21.146			

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
T9	0.28	2.29	A	0.118	2.894	16	1	1	21.825	1.13	112.64	C
33.00-23.00			B	0.118	2.894		1	1	21.825			
			C	0.118	2.894		1	1	21.825			
T10	0.36	5.69	A	0.146	2.786	16	1	1	61.124	2.60	129.88	C
23.00-3.00			B	0.146	2.786		1	1	61.124			
			C	0.146	2.786		1	1	61.124			
Sum Weight:	3.45	26.24						OTM	1483.75 kip-ft	18.87		

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	0.04	0.93	A	0.128	2.853	26	0.8	1	15.801	1.09	54.58	C
183.00-163.00			B	0.128	2.853		0.8	1	15.801			
			C	0.128	2.853		0.8	1	15.801			
T2	0.08	1.13	A	0.107	2.937	25	0.8	1	14.528	1.06	53.06	C
163.00-143.00			B	0.107	2.937		0.8	1	14.528			
			C	0.107	2.937		0.8	1	14.528			
T3	0.29	1.20	A	0.117	2.895	24	0.8	1	19.686	1.61	80.69	C
143.00-123.00			B	0.117	2.895		0.8	1	19.686			
			C	0.117	2.895		0.8	1	19.686			
T4	0.49	2.27	A	0.119	2.889	23	0.8	1	23.337	2.00	100.23	C
123.00-103.00			B	0.119	2.889		0.8	1	23.337			
			C	0.119	2.889		0.8	1	23.337			
T5	0.54	3.33	A	0.119	2.889	21	0.8	1	25.969	2.14	107.15	C
103.00-83.00			B	0.119	2.889		0.8	1	25.969			
			C	0.119	2.889		0.8	1	25.969			
T6	0.55	2.99	A	0.114	2.907	20	0.8	1	28.602	2.17	108.55	C
83.00-63.00			B	0.114	2.907		0.8	1	28.602			
			C	0.114	2.907		0.8	1	28.602			
T7	0.55	4.18	A	0.136	2.824	18	0.8	1	39.519	2.42	121.20	C
63.00-43.00			B	0.136	2.824		0.8	1	39.519			
			C	0.136	2.824		0.8	1	39.519			
T8	0.28	2.24	A	0.12	2.883	17	0.8	1	18.082	1.05	105.03	C
43.00-33.00			B	0.12	2.883		0.8	1	18.082			
			C	0.12	2.883		0.8	1	18.082			
T9	0.28	2.29	A	0.118	2.894	16	0.8	1	18.640	1.00	100.46	C
33.00-23.00			B	0.118	2.894		0.8	1	18.640			
			C	0.118	2.894		0.8	1	18.640			
T10	0.36	5.69	A	0.146	2.786	16	0.8	1	51.278	2.24	111.77	C
23.00-3.00			B	0.146	2.786		0.8	1	51.278			
			C	0.146	2.786		0.8	1	51.278			
Sum Weight:	3.45	26.24						OTM	1325.33 kip-ft	16.80		

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 ft²	F K	w plf	Ctrl. Face
T1	0.04	0.93	A	0.128	2.853	26	0.85	1	16.450	1.13	56.59	C
183.00-163.00			B	0.128	2.853		0.85	1	16.450			
			C	0.128	2.853		0.85	1	16.450			
T2	0.08	1.13	A	0.107	2.937	25	0.85	1	15.097	1.10	54.82	C
163.00-143.00			B	0.107	2.937		0.85	1	15.097			
			C	0.107	2.937		0.85	1	15.097			
T3	0.29	1.20	A	0.117	2.895	24	0.85	1	20.504	1.66	83.08	C
143.00-123.00			B	0.117	2.895		0.85	1	20.504			
			C	0.117	2.895		0.85	1	20.504			
T4	0.49	2.27	A	0.119	2.889	23	0.85	1	24.265	2.06	102.82	C
123.00-103.00			B	0.119	2.889		0.85	1	24.265			
			C	0.119	2.889		0.85	1	24.265			
T5	0.54	3.33	A	0.119	2.889	21	0.85	1	26.970	2.20	109.79	C
103.00-83.00			B	0.119	2.889		0.85	1	26.970			
			C	0.119	2.889		0.85	1	26.970			
T6	0.55	2.99	A	0.114	2.907	20	0.85	1	29.761	2.23	111.42	C
83.00-63.00			B	0.114	2.907		0.85	1	29.761			
			C	0.114	2.907		0.85	1	29.761			
T7	0.55	4.18	A	0.136	2.824	18	0.85	1	41.348	2.50	125.21	C
63.00-43.00			B	0.136	2.824		0.85	1	41.348			
			C	0.136	2.824		0.85	1	41.348			
T8	0.28	2.24	A	0.12	2.883	17	0.85	1	18.848	1.08	108.16	C
43.00-33.00			B	0.12	2.883		0.85	1	18.848			
			C	0.12	2.883		0.85	1	18.848			
T9	0.28	2.29	A	0.118	2.894	16	0.85	1	19.436	1.04	103.51	C
33.00-23.00			B	0.118	2.894		0.85	1	19.436			
			C	0.118	2.894		0.85	1	19.436			
T10	0.36	5.69	A	0.146	2.786	16	0.85	1	53.739	2.33	116.30	C
23.00-3.00			B	0.146	2.786		0.85	1	53.739			
			C	0.146	2.786		0.85	1	53.739			
Sum Weight:	3.45	26.24						OTM	1364.94 kip-ft	17.32		

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	8.98					
Bracing Weight	17.26					
Total Member Self-Weight	26.24			-4.11	10.84	
Total Weight	40.26			-4.11	10.84	
Wind 0 deg - No Ice		-0.01	-44.65	-4350.96	12.35	-20.46
Wind 30 deg - No Ice		20.75	-36.17	-3552.20	-2014.78	-23.29
Wind 60 deg - No Ice		34.81	-20.47	-2022.30	-3371.46	-14.02
Wind 90 deg - No Ice		40.72	-0.01	-6.38	-3901.80	0.49
Wind 120 deg - No Ice		37.40	24.39	2532.47	-3530.91	14.91
Wind 150 deg - No Ice		20.00	37.62	3797.64	-1881.23	24.36
Wind 180 deg - No Ice		0.01	42.13	4240.40	9.32	20.46
Wind 210 deg - No Ice		-19.98	37.61	3796.13	1900.28	11.07
Wind 240 deg - No Ice		-37.39	24.37	2529.85	3551.07	5.54
Wind 270 deg - No Ice		-40.72	-0.03	-9.41	3923.47	-0.49

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
Wind 300 deg - No Ice		-34.82	-20.49	-2024.93	3394.64	-6.44
Wind 330 deg - No Ice		-20.77	-36.19	-3553.71	2039.07	-12.14
Member Ice	26.55					
Total Weight Ice	91.28			2.27	36.97	
Wind 0 deg - Ice		-0.00	-10.76	-1042.80	37.21	-3.00
Wind 30 deg - Ice		5.15	-8.96	-872.01	-464.21	-3.37
Wind 60 deg - Ice		8.76	-5.12	-498.33	-812.45	-1.92
Wind 90 deg - Ice		10.19	-0.00	1.92	-943.87	0.27
Wind 120 deg - Ice		9.12	5.70	581.19	-833.45	2.40
Wind 150 deg - Ice		5.04	9.19	915.94	-443.48	3.73
Wind 180 deg - Ice		0.00	10.42	1035.80	36.73	3.00
Wind 210 deg - Ice		-5.03	9.19	915.70	517.00	1.47
Wind 240 deg - Ice		-9.12	5.70	580.78	907.14	0.60
Wind 270 deg - Ice		-10.19	-0.01	1.44	1017.81	-0.27
Wind 300 deg - Ice		-8.77	-5.12	-498.75	886.63	-1.08
Wind 330 deg - Ice		-5.16	-8.97	-872.25	538.56	-1.83
Total Weight	40.26			-4.11	10.84	
Wind 0 deg - Service		-0.01	-27.24	-2651.91	2.26	-12.42
Wind 30 deg - Service		12.67	-22.09	-2167.07	-1231.39	-14.12
Wind 60 deg - Service		21.26	-12.50	-1236.25	-2057.66	-8.49
Wind 90 deg - Service		24.87	-0.01	-9.36	-2380.48	0.30
Wind 120 deg - Service		22.83	14.87	1533.17	-2153.91	9.04
Wind 150 deg - Service		12.22	22.96	2304.21	-1150.78	14.77
Wind 180 deg - Service		0.01	25.72	2574.16	0.44	12.42
Wind 210 deg - Service		-12.21	22.95	2303.30	1151.90	6.74
Wind 240 deg - Service		-22.82	14.86	1531.59	2155.69	3.37
Wind 270 deg - Service		-24.87	-0.02	-11.19	2383.17	-0.30
Wind 300 deg - Service		-21.27	-12.51	-1237.83	2061.27	-3.93
Wind 330 deg - Service		-12.69	-22.10	-2167.99	1235.67	-7.39

Load Combinations

Comb. No.	Description
1	Dead Only
2	1.2 Dead+1.0 Wind 0 deg - No Ice
3	0.9 Dead+1.0 Wind 0 deg - No Ice
4	1.2 Dead+1.0 Wind 30 deg - No Ice
5	0.9 Dead+1.0 Wind 30 deg - No Ice
6	1.2 Dead+1.0 Wind 60 deg - No Ice
7	0.9 Dead+1.0 Wind 60 deg - No Ice
8	1.2 Dead+1.0 Wind 90 deg - No Ice
9	0.9 Dead+1.0 Wind 90 deg - No Ice
10	1.2 Dead+1.0 Wind 120 deg - No Ice
11	0.9 Dead+1.0 Wind 120 deg - No Ice
12	1.2 Dead+1.0 Wind 150 deg - No Ice
13	0.9 Dead+1.0 Wind 150 deg - No Ice
14	1.2 Dead+1.0 Wind 180 deg - No Ice
15	0.9 Dead+1.0 Wind 180 deg - No Ice
16	1.2 Dead+1.0 Wind 210 deg - No Ice
17	0.9 Dead+1.0 Wind 210 deg - No Ice
18	1.2 Dead+1.0 Wind 240 deg - No Ice
19	0.9 Dead+1.0 Wind 240 deg - No Ice
20	1.2 Dead+1.0 Wind 270 deg - No Ice
21	0.9 Dead+1.0 Wind 270 deg - No Ice
22	1.2 Dead+1.0 Wind 300 deg - No Ice

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

Maximum Member Forces

Section No.	Elevation ft	Component Type	Condition	Gov. Load Comb.	Axial K	Major Axis Moment kip-ft	Minor Axis Moment kip-ft
T1	183 - 163	Leg	Max Tension	15	7.01	0.02	-0.07
			Max. Compression	2	-9.38	-0.08	0.20
			Max. Mx	6	-2.06	0.58	0.16
			Max. My	18	-0.25	0.13	0.65
			Max. Vy	6	1.08	-0.49	0.16
			Max. Vx	19	1.13	0.13	-0.47
		Diagonal	Max Tension	7	2.53	0.00	0.00
			Max. Compression	18	-2.61	0.00	0.00
			Max. Mx	38	-0.08	0.03	-0.00
			Max. My	6	-2.18	0.01	0.01
			Max. Vy	38	-0.02	0.03	-0.00
			Max. Vx	6	0.00	0.00	0.00
		Top Girt	Max Tension	11	0.26	0.00	0.00
			Max. Compression	18	-0.19	0.00	0.00
			Max. Mx	31	-0.12	-0.11	0.00
			Max. My	4	-0.03	0.00	-0.00
			Max. Vy	31	0.05	0.00	0.00
			Max. Vx	4	0.00	0.00	0.00
T2	163 - 143	Leg	Max Tension	15	20.26	-0.30	0.01
			Max. Compression	2	-24.62	-0.13	0.01
			Max. Mx	2	-24.55	0.31	-0.01
			Max. My	24	-0.46	-0.03	-0.33
			Max. Vy	14	1.25	-0.30	0.01
			Max. Vx	8	-1.12	0.01	0.06
		Diagonal	Max Tension	5	4.23	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	4	-4.32	0.00	0.00
			Max. Mx	28	-0.17	0.04	0.01
			Max. My	4	-4.26	0.01	0.02
			Max. Vy	38	0.04	0.04	-0.01
			Max. Vx	4	-0.00	0.00	0.00
T3	143 - 123	Leg	Max Tension	15	40.84	-0.32	0.02
			Max. Compression	2	-47.93	0.70	0.01
			Max. Mx	10	-45.99	0.70	0.00
			Max. My	16	-9.90	-0.05	0.67
			Max. Vy	22	0.93	-0.68	-0.01
			Max. Vx	16	-0.78	0.02	0.29
		Diagonal	Max Tension	4	5.22	0.00	0.00
			Max. Compression	4	-5.25	0.00	0.00
			Max. Mx	38	0.45	0.07	-0.01
			Max. My	4	-4.87	0.01	0.02
			Max. Vy	27	0.05	0.07	0.01
			Max. Vx	4	-0.00	0.00	0.00
T4	123 - 103	Leg	Max Tension	15	65.30	-0.25	-0.01
			Max. Compression	2	-74.79	0.33	0.04
			Max. Mx	10	-54.35	0.70	0.00
			Max. My	12	-14.46	0.01	-0.56
			Max. Vy	10	0.18	0.70	0.00
			Max. Vx	12	0.18	0.01	-0.56
		Diagonal	Max Tension	4	6.25	0.00	0.00
			Max. Compression	4	-6.28	0.00	0.00
			Max. Mx	38	1.15	0.10	0.01
			Max. My	4	-6.15	0.02	0.02
			Max. Vy	38	0.06	0.10	-0.01
			Max. Vx	29	0.00	0.00	0.00
T5	103 - 83	Leg	Max Tension	15	87.43	-0.40	-0.05
			Max. Compression	2	-100.47	0.33	0.04
			Max. Mx	14	85.62	-0.40	-0.05
			Max. My	12	-15.37	0.01	-0.56
			Max. Vy	6	-0.75	-0.39	0.01
			Max. Vx	12	-0.73	-0.00	-0.45
		Diagonal	Max Tension	4	8.02	0.00	0.00
			Max. Compression	4	-8.16	0.00	0.00
			Max. Mx	37	1.57	-0.22	-0.03
			Max. My	4	-7.24	-0.07	-0.03
			Max. Vy	37	-0.11	-0.22	-0.03
			Max. Vx	28	-0.01	0.00	0.00
T6	83 - 63	Leg	Max Tension	15	112.13	-0.51	-0.05
			Max. Compression	2	-128.99	-0.01	0.04
			Max. Mx	14	109.84	-0.52	-0.05
			Max. My	13	-17.68	-0.03	-0.62
			Max. Vy	3	0.15	0.52	0.04
			Max. Vx	12	0.14	-0.04	-0.62
		Diagonal	Max Tension	4	8.21	0.00	0.00
			Max. Compression	4	-8.47	0.00	0.00
			Max. Mx	37	1.12	0.22	-0.03
			Max. My	27	0.12	0.20	0.03
			Max. Vy	37	0.10	0.21	0.03
			Max. Vx	27	0.01	0.00	0.00
T7	63 - 43	Leg	Max Tension	15	135.30	0.70	-0.02
			Max. Compression	2	-156.48	-0.16	0.03
			Max. Mx	2	-156.36	1.47	-0.00
			Max. My	12	-21.39	-0.26	-0.98
			Max. Vy	2	-0.56	1.47	-0.00
			Max. Vx	12	0.30	-0.26	-0.98
		Diagonal	Max Tension	4	8.47	0.00	0.00
			Max. Compression	4	-8.93	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. Mx	33	0.85	0.29	-0.03
			Max. My	27	2.35	0.25	0.03
			Max. Vy	33	0.12	0.26	0.03
			Max. Vx	28	0.01	0.00	0.00
		Secondary Horizontal	Max Tension	12	0.58	0.09	0.01
			Max. Compression	13	-0.56	0.07	0.02
			Max. Mx	28	0.02	0.21	0.03
			Max. My	32	-0.06	0.21	0.03
			Max. Vy	31	0.10	0.18	0.03
			Max. Vx	34	-0.01	0.00	0.00
T8	43 - 33	Leg	Max Tension	15	147.16	0.09	-0.03
			Max. Compression	2	-170.94	0.81	0.03
			Max. Mx	27	-63.81	1.99	-0.00
			Max. My	12	-24.14	-0.01	-0.74
			Max. Vy	27	-0.35	1.99	-0.00
			Max. Vx	24	-0.13	-0.06	0.72
		Diagonal	Max Tension	4	9.09	0.00	0.00
			Max. Compression	4	-9.07	0.00	0.00
			Max. Mx	33	0.65	0.42	-0.05
			Max. My	32	-1.68	0.38	-0.05
			Max. Vy	33	0.15	0.42	-0.05
			Max. Vx	32	-0.01	0.00	0.00
T9	33 - 23	Leg	Max Tension	15	158.26	-0.84	-0.04
			Max. Compression	2	-184.36	-0.04	0.02
			Max. Mx	35	-71.51	-2.21	-0.00
			Max. My	12	-24.92	-0.01	-0.74
			Max. Vy	27	0.42	1.99	-0.00
			Max. Vx	12	-0.13	-0.01	-0.74
		Diagonal	Max Tension	4	9.25	0.00	0.00
			Max. Compression	4	-9.52	0.00	0.00
			Max. Mx	33	2.79	0.30	0.04
			Max. My	33	2.79	0.30	0.04
			Max. Vy	33	0.14	0.30	0.04
			Max. Vx	33	0.01	0.00	0.00
T10	23 - 3	Leg	Max Tension	15	179.88	1.13	-0.02
			Max. Compression	2	-211.67	-0.00	-0.00
			Max. Mx	33	15.12	3.15	-0.02
			Max. My	12	-26.79	-0.42	-1.85
			Max. Vy	2	-0.83	2.10	-0.00
			Max. Vx	12	0.49	-0.42	-1.85
		Diagonal	Max Tension	4	9.53	0.00	0.00
			Max. Compression	4	-10.30	0.00	0.00
			Max. Mx	33	-0.44	0.50	-0.05
			Max. My	28	-4.70	0.47	0.05
			Max. Vy	33	0.16	0.50	-0.05
			Max. Vx	28	0.01	0.00	0.00
		Secondary Horizontal	Max Tension	12	0.88	0.12	0.01
			Max. Compression	13	-0.80	0.11	0.03
			Max. Mx	34	-0.33	0.36	0.04
			Max. My	34	-0.33	0.36	0.04
			Max. Vy	34	-0.13	0.36	0.04
			Max. Vx	32	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	18	218.42	23.88	-13.98
	Max. H_x	18	218.42	23.88	-13.98
	Max. H_z	5	-151.89	-16.18	11.90
	Min. Vert	7	-170.98	-19.30	11.52
	Min. H_x	7	-170.98	-19.30	11.52
	Min. H_z	18	218.42	23.88	-13.98
Leg B	Max. Vert	10	217.50	-24.11	-13.56
	Max. H_x	23	-171.89	19.56	11.13
	Max. H_z	25	-152.82	16.61	11.20
	Min. Vert	23	-171.89	19.56	11.13
	Min. H_x	10	217.50	-24.11	-13.56
	Min. H_z	10	217.50	-24.11	-13.56
Leg A	Max. Vert	2	218.90	-0.48	27.72
	Max. H_x	21	12.50	3.33	1.20
	Max. H_z	2	218.90	-0.48	27.72
	Min. Vert	15	-185.39	0.47	-23.63
	Min. H_x	8	16.44	-3.35	1.59
	Min. H_z	15	-185.39	0.47	-23.63

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	40.26	0.00	0.00	-4.13	10.84	0.00
1.2 Dead+1.0 Wind 0 deg - No Ice	48.32	-0.01	-44.65	-4365.98	14.61	-20.51
0.9 Dead+1.0 Wind 0 deg - No Ice	36.24	-0.01	-44.65	-4361.16	11.33	-20.50
1.2 Dead+1.0 Wind 30 deg - No Ice	48.32	20.75	-36.17	-3564.66	-2019.09	-23.37
0.9 Dead+1.0 Wind 30 deg - No Ice	36.24	20.75	-36.17	-3560.50	-2020.71	-23.35
1.2 Dead+1.0 Wind 60 deg - No Ice	48.32	34.81	-20.47	-2029.82	-3380.14	-14.10
0.9 Dead+1.0 Wind 60 deg - No Ice	36.24	34.81	-20.47	-2026.90	-3380.66	-14.08
1.2 Dead+1.0 Wind 90 deg - No Ice	48.32	40.72	-0.01	-7.30	-3912.13	0.41
0.9 Dead+1.0 Wind 90 deg - No Ice	36.24	40.72	-0.01	-6.04	-3912.25	0.43
1.2 Dead+1.0 Wind 120 deg - No Ice	48.32	37.40	24.39	2540.27	-3539.96	14.88
0.9 Dead+1.0 Wind 120 deg - No Ice	36.24	37.40	24.39	2539.34	-3540.40	14.89
1.2 Dead+1.0 Wind 150 deg - No Ice	48.32	20.00	37.62	3809.44	-1884.95	24.39
0.9 Dead+1.0 Wind 150 deg - No Ice	36.24	20.00	37.62	3807.51	-1886.71	24.38
1.2 Dead+1.0 Wind 180 deg - No Ice	48.32	0.01	42.13	4253.59	11.57	20.51
0.9 Dead+1.0 Wind 180 deg - No Ice	36.24	0.01	42.13	4251.31	8.30	20.50
1.2 Dead+1.0 Wind 210 deg - No Ice	48.32	-19.98	37.61	3807.89	1908.48	11.15
0.9 Dead+1.0 Wind 210 deg - No Ice	36.24	-19.98	37.61	3805.96	1903.71	11.13

Load Combination	Vertical	$Shear_x$	$Shear_z$	Overturning Moment, M_x	Overturning Moment, M_z	Torque
	K	K	K	kip-ft	kip-ft	kip-ft
1.2 Dead+1.0 Wind 240 deg - No Ice	48.32	-37.39	24.37	2537.60	3564.57	5.64
0.9 Dead+1.0 Wind 240 deg - No Ice	36.24	-37.39	24.37	2536.69	3558.47	5.62
1.2 Dead+1.0 Wind 270 deg - No Ice	48.32	-40.72	-0.03	-10.33	3938.22	-0.41
0.9 Dead+1.0 Wind 270 deg - No Ice	36.24	-40.72	-0.03	-9.07	3931.80	-0.43
1.2 Dead+1.0 Wind 300 deg - No Ice	48.32	-34.82	-20.49	-2032.41	3407.77	-6.40
0.9 Dead+1.0 Wind 300 deg - No Ice	36.24	-34.82	-20.49	-2029.50	3401.75	-6.41
1.2 Dead+1.0 Wind 330 deg - No Ice	48.32	-20.77	-36.19	-3566.14	2047.86	-12.15
0.9 Dead+1.0 Wind 330 deg - No Ice	36.24	-20.77	-36.19	-3561.98	2042.94	-12.15
1.2 Dead+1.0 Ice+1.0 Temp	99.33	0.00	0.00	1.25	39.35	0.00
1.2 Dead+1.0 Wind 0 deg+1.0 Ice+1.0 Temp	99.33	-0.00	-10.76	-1050.88	39.61	-3.03
1.2 Dead+1.0 Wind 30 deg+1.0 Ice+1.0 Temp	99.33	5.15	-8.96	-878.92	-465.17	-3.41
1.2 Dead+1.0 Wind 60 deg+1.0 Ice+1.0 Temp	99.33	8.76	-5.12	-502.73	-815.73	-1.96
1.2 Dead+1.0 Wind 90 deg+1.0 Ice+1.0 Temp	99.33	10.19	-0.00	0.90	-948.00	0.25
1.2 Dead+1.0 Wind 120 deg+1.0 Ice+1.0 Temp	99.33	9.12	5.70	584.22	-836.85	2.39
1.2 Dead+1.0 Wind 150 deg+1.0 Ice+1.0 Temp	99.33	5.04	9.19	921.18	-444.25	3.75
1.2 Dead+1.0 Wind 180 deg+1.0 Ice+1.0 Temp	99.33	0.00	10.42	1041.84	39.13	3.03
1.2 Dead+1.0 Wind 210 deg+1.0 Ice+1.0 Temp	99.33	-5.03	9.19	920.94	522.58	1.51
1.2 Dead+1.0 Wind 240 deg+1.0 Ice+1.0 Temp	99.33	-9.12	5.70	583.80	915.34	0.65
1.2 Dead+1.0 Wind 270 deg+1.0 Ice+1.0 Temp	99.33	-10.19	-0.01	0.42	1026.75	-0.25
1.2 Dead+1.0 Wind 300 deg+1.0 Ice+1.0 Temp	99.33	-8.77	-5.12	-503.15	894.72	-1.08
1.2 Dead+1.0 Wind 330 deg+1.0 Ice+1.0 Temp	99.33	-5.16	-8.97	-879.16	544.34	-1.85
Dead+Wind 0 deg - Service	40.26	-0.01	-27.24	-2655.24	11.80	-12.45
Dead+Wind 30 deg - Service	40.26	12.67	-22.09	-2169.10	-1225.19	-14.16
Dead+Wind 60 deg - Service	40.26	21.26	-12.50	-1235.77	-2053.67	-8.53
Dead+Wind 90 deg - Service	40.26	24.87	-0.01	-5.54	-2377.31	0.27
Dead+Wind 120 deg - Service	40.26	22.83	14.87	1541.40	-2150.10	9.03
Dead+Wind 150 deg - Service	40.26	12.22	22.96	2314.47	-1144.27	14.78
Dead+Wind 180 deg - Service	40.26	0.01	25.72	2585.12	9.97	12.45
Dead+Wind 210 deg - Service	40.26	-12.21	22.95	2313.54	1164.45	6.78
Dead+Wind 240 deg - Service	40.26	-22.82	14.86	1539.80	2170.93	3.42
Dead+Wind 270 deg - Service	40.26	-24.87	-0.02	-7.37	2399.05	-0.27
Dead+Wind 300 deg - Service	40.26	-21.27	-12.51	-1237.34	2076.32	-3.91
Dead+Wind 330 deg - Service	40.26	-12.69	-22.10	-2170.00	1248.53	-7.39

Solution Summary

	Sum of Applied Forces			Sum of Reactions			
Load Comb.	PX K	PY K	PZ K	PX K	PY K	PZ K	% Error
1	0.00	-40.26	0.00	0.00	40.26	0.00	0.000%
2	-0.01	-48.32	-44.65	0.01	48.32	44.65	0.001%
3	-0.01	-36.24	-44.65	0.01	36.24	44.65	0.000%
4	20.75	-48.32	-36.17	-20.75	48.32	36.17	0.000%
5	20.75	-36.24	-36.17	-20.75	36.24	36.17	0.000%
6	34.81	-48.32	-20.47	-34.81	48.32	20.47	0.000%
7	34.81	-36.24	-20.47	-34.81	36.24	20.47	0.000%
8	40.72	-48.32	-0.01	-40.72	48.32	0.01	0.000%
9	40.72	-36.24	-0.01	-40.72	36.24	0.01	0.000%
10	37.40	-48.32	24.39	-37.40	48.32	-24.39	0.001%
11	37.40	-36.24	24.39	-37.40	36.24	-24.39	0.000%
12	20.00	-48.32	37.62	-20.00	48.32	-37.62	0.000%
13	20.00	-36.24	37.62	-20.00	36.24	-37.62	0.000%
14	0.01	-48.32	42.13	-0.01	48.32	-42.13	0.000%
15	0.01	-36.24	42.13	-0.01	36.24	-42.13	0.000%
16	-19.98	-48.32	37.61	19.98	48.32	-37.61	0.000%
17	-19.98	-36.24	37.61	19.98	36.24	-37.61	0.000%
18	-37.39	-48.32	24.37	37.39	48.32	-24.37	0.001%
19	-37.39	-36.24	24.37	37.39	36.24	-24.37	0.000%
20	-40.72	-48.32	-0.03	40.72	48.32	0.03	0.000%
21	-40.72	-36.24	-0.03	40.72	36.24	0.03	0.000%
22	-34.82	-48.32	-20.49	34.82	48.32	20.49	0.000%
23	-34.82	-36.24	-20.49	34.82	36.24	20.49	0.000%
24	-20.77	-48.32	-36.19	20.77	48.32	36.19	0.000%
25	-20.77	-36.24	-36.19	20.77	36.24	36.19	0.000%
26	0.00	-99.33	0.00	-0.00	99.33	0.00	0.000%
27	-0.00	-99.33	-10.76	0.00	99.33	10.76	0.000%
28	5.15	-99.33	-8.96	-5.15	99.33	8.96	0.000%
29	8.76	-99.33	-5.12	-8.76	99.33	5.12	0.000%
30	10.19	-99.33	-0.00	-10.19	99.33	0.00	0.000%
31	9.12	-99.33	5.70	-9.12	99.33	-5.70	0.000%
32	5.04	-99.33	9.19	-5.04	99.33	-9.19	0.000%
33	0.00	-99.33	10.42	-0.00	99.33	-10.42	0.000%
34	-5.03	-99.33	9.19	5.03	99.33	-9.19	0.000%
35	-9.12	-99.33	5.70	9.12	99.33	-5.70	0.000%
36	-10.19	-99.33	-0.01	10.19	99.33	0.01	0.000%
37	-8.77	-99.33	-5.12	8.77	99.33	5.12	0.000%
38	-5.16	-99.33	-8.97	5.16	99.33	8.97	0.000%
39	-0.01	-40.26	-27.24	0.01	40.26	27.24	0.000%
40	12.67	-40.26	-22.09	-12.67	40.26	22.09	0.000%
41	21.26	-40.26	-12.50	-21.26	40.26	12.50	0.000%
42	24.87	-40.26	-0.01	-24.87	40.26	0.01	0.000%
43	22.83	-40.26	14.87	-22.83	40.26	-14.87	0.000%
44	12.22	-40.26	22.96	-12.22	40.26	-22.96	0.000%
45	0.01	-40.26	25.72	-0.01	40.26	-25.72	0.000%
46	-12.21	-40.26	22.95	12.21	40.26	-22.95	0.000%
47	-22.82	-40.26	14.86	22.82	40.26	-14.86	0.000%
48	-24.87	-40.26	-0.02	24.87	40.26	0.02	0.000%
49	-21.27	-40.26	-12.51	21.27	40.26	12.51	0.000%
50	-12.69	-40.26	-22.10	12.69	40.26	22.10	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	0.00000119
3	Yes	4	0.00000001	0.00000001
4	Yes	4	0.00000001	0.00000123
5	Yes	4	0.00000001	0.00000109
6	Yes	4	0.00000001	0.00000143
7	Yes	4	0.00000001	0.00000122
8	Yes	4	0.00000001	0.00000001
9	Yes	4	0.00000001	0.00000001
10	Yes	4	0.00000001	0.00000130
11	Yes	4	0.00000001	0.00000001
12	Yes	4	0.00000001	0.00000147
13	Yes	4	0.00000001	0.00000132
14	Yes	4	0.00000001	0.00000196
15	Yes	4	0.00000001	0.00000174
16	Yes	4	0.00000001	0.00000149
17	Yes	4	0.00000001	0.00000133
18	Yes	4	0.00000001	0.00000133
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	0.00000144
23	Yes	4	0.00000001	0.00000123
24	Yes	4	0.00000001	0.00000122
25	Yes	4	0.00000001	0.00000107
26	Yes	4	0.00000001	0.00000001
27	Yes	4	0.00000001	0.00000001
28	Yes	4	0.00000001	0.00000001
29	Yes	4	0.00000001	0.00000358
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	0.00000340
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

Maximum Tower Deflections - Service Wind

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
T1	183 - 163	7.521	39	0.3575	0.0824
T2	163 - 143	6.023	39	0.3431	0.0534
T3	143 - 123	4.611	39	0.3109	0.0337
T4	123 - 103	3.372	47	0.2560	0.0193
T5	103 - 83	2.326	47	0.2162	0.0124

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
T6	83 - 63	1.503	47	0.1643	0.0100
T7	63 - 43	0.859	47	0.1221	0.0067
T8	43 - 33	0.405	47	0.0753	0.0041
T9	33 - 23	0.245	47	0.0572	0.0031
T10	23 - 3	0.125	47	0.0387	0.0021

Critical Deflections and Radius of Curvature - Service Wind

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
180.00	10' Dipole	39	7.295	0.3557	0.0777	231465
179.00	HX8-6W-6GF	39	7.219	0.3551	0.0761	231465
177.00	8.5' x 4.5" dia. Pipe Mount	39	7.068	0.3539	0.0730	192887
173.00	20' x 2" Dia Omni	39	6.767	0.3513	0.0669	115732
165.00	SitePro USF-4U	39	6.170	0.3450	0.0557	64100
161.00	12' Dipole	39	5.876	0.3410	0.0511	51065
160.00	5' x 1" dia. Omni	39	5.803	0.3399	0.0500	48364
157.00	5-ft dipole	39	5.586	0.3363	0.0468	41591
150.00	APXVAALL24-43	39	5.089	0.3255	0.0399	31315
135.00	P65-16-XLH-RR	39	4.093	0.2892	0.0272	25599
133.00	10' Dipole	39	3.968	0.2834	0.0257	25791
124.00	MX06FRO660	47	3.430	0.2584	0.0199	26414
93.00	FFVV-65B-R2	47	1.889	0.1906	0.0111	23455

Maximum Tower Deflections - Design Wind

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
T1	183 - 163	12.357	2	0.5841	0.1362
T2	163 - 143	9.905	2	0.5623	0.0880
T3	143 - 123	7.594	18	0.5108	0.0555
T4	123 - 103	5.555	18	0.4214	0.0318
T5	103 - 83	3.830	18	0.3563	0.0205
T6	83 - 63	2.474	18	0.2706	0.0165
T7	63 - 43	1.413	18	0.2011	0.0111
T8	43 - 33	0.665	18	0.1239	0.0068
T9	33 - 23	0.403	18	0.0942	0.0051
T10	23 - 3	0.206	18	0.0636	0.0034

Critical Deflections and Radius of Curvature - Design Wind

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
180.00	10' Dipole	2	11.986	0.5815	0.1284	153718
179.00	HX8-6W-6GF	2	11.863	0.5806	0.1258	153718
177.00	8.5' x 4.5" dia. Pipe Mount	2	11.616	0.5788	0.1207	128098

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
173.00	20' x 2" Dia Omni	2	11.123	0.5749	0.1106	76859
165.00	SitePro USF-4U	2	10.147	0.5653	0.0919	42495
161.00	12' Dipole	2	9.665	0.5591	0.0842	33350
160.00	5' x 1" dia. Omni	2	9.545	0.5573	0.0824	31416
157.00	5-ft dipole	18	9.189	0.5517	0.0771	26614
150.00	APXVAALL24-43	18	8.377	0.5347	0.0658	19411
135.00	P65-16-XLH-RR	18	6.742	0.4755	0.0448	15218
133.00	10' Dipole	18	6.537	0.4660	0.0424	15351
124.00	MX06FRO660	18	5.650	0.4254	0.0327	15814
93.00	FFVV-65B-R2	18	3.110	0.3142	0.0183	14135

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	183	Leg	A325N	0.6250	4	1.75	20.34	0.086 ✓	1	Bolt Tension
		Diagonal	A325N	0.5000	1	2.53	6.20	0.409 ✓	1	Member Bearing
		Top Girt	A325N	0.5000	1	0.26	6.20	0.042 ✓	1	Member Bearing
T2	163	Leg	A325N	0.7500	4	5.06	30.10	0.168 ✓	1	Bolt Tension
		Diagonal	A325N	0.5000	1	4.23	8.27	0.512 ✓	1	Member Bearing
T3	143	Leg	A325N	0.8750	4	10.21	41.56	0.246 ✓	1	Bolt Tension
		Diagonal	A325X	0.5000	1	5.22	6.20	0.843 ✓	1	Member Bearing
T4	123	Leg	A325N	1.0000	4	16.33	54.52	0.299 ✓	1	Bolt Tension
		Diagonal	A325X	0.5000	1	6.25	10.33	0.605 ✓	1	Member Bearing
T5	103	Leg	A325N	1.0000	4	21.73	54.52	0.399 ✓	1	Bolt Tension
		Diagonal	A325N	0.7500	1	8.16	19.88	0.410 ✓	1	Bolt Shear
T6	83	Leg	A325N	1.0000	4	28.03	54.52	0.514 ✓	1	Bolt Tension
		Diagonal	A325N	0.7500	1	8.21	15.77	0.521 ✓	1	Member Bearing
T7	63	Leg	A325N	1.0000	6	22.52	54.52	0.413 ✓	1	Bolt Tension
		Diagonal	A325N	0.7500	1	8.93	19.88	0.449 ✓	1	Bolt Shear
T8	43	Diagonal	A325X	0.7500	1	9.09	18.92	0.480 ✓	1	Member Bearing
T9	33	Leg	A325N	1.0000	6	26.38	54.52	0.484 ✓	1	Bolt Tension
		Diagonal	A325N	0.8750	1	9.25	22.18	0.417 ✓	1	Member Bearing
T10	23	Leg	A449	1.0000	6	29.94	54.52	0.549 ✓	1	Bolt Tension
		Diagonal	A325N	0.8750	1	9.53	22.18	0.429 ✓	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	183 - 163	P2.5x.203	20.00	5.00	63.3 K=1.00	1.7040	-9.38	57.19	0.164 [1] ✔
T2	163 - 143	P2.5x.276	20.03	6.68	86.7 K=1.00	2.2535	-24.62	58.51	0.421 [1] ✔
T3	143 - 123	P3x.216	20.04	6.68	68.9 K=1.00	2.2285	-47.93	70.89	0.676 [1] ✔
T4	123 - 103	P4x.337	20.04	6.68	54.3 K=1.00	4.4074	-74.79	159.90	0.468 [1] ✔
T5	103 - 83	P5x.258	20.03	10.02	64.0 K=1.00	4.2999	-100.47	143.40	0.701 [1] ✔
T6	83 - 63	P5x.375	20.03	10.02	65.4 K=1.00	6.1120	-128.99	201.25	0.641 [1] ✔
T7	63 - 43	P5x.375	20.04	5.14	33.6 K=1.00	6.1120	-156.48	253.28	0.618 [1] ✔
T8	43 - 33	P6x.432	10.02	10.02	54.8 K=1.00	8.4049	-170.94	303.75	0.563 [1] ✔
T9	33 - 23	P6x.432	10.02	10.02	54.8 K=1.00	8.4049	-184.36	303.75	0.607 [1] ✔
T10	23 - 3	P6x.432	20.03	5.12	28.0 K=1.00	8.4049	-211.67	357.20	0.593 [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	183 - 163	L1 3/4x1 3/4x3/16	9.91	4.71	164.7 K=1.00	0.6211	-2.61	6.55	0.399 [1] ✔
T2	163 - 143	L2x2x1/4	12.24	6.07	186.4 K=1.00	0.9380	-4.32	7.72	0.559 [1] ✔
T3	143 - 123	L2 1/2x2 1/2x3/16	14.02	6.94	168.2 K=1.00	0.9020	-5.25	9.13	0.575 [1] ✔
T4	123 - 103	L2 1/2x2 1/2x5/16	15.89	7.83	192.0 K=1.00	1.4600	-6.28	11.33	0.554 [1] ✔
T5	103 - 83	L3X3X3/16 Reinf w/L2.5X2.5X3/16	19.10	9.57	143.2 K=1.00	3.2137	-8.16	35.40	0.231 [1] ✔
T6	83 - 63	L3 1/2x3 1/2x5/16	20.83	10.30	179.1 K=1.00	2.0900	-8.47	18.64	0.454 [1] ✔
T7	63 - 43	L3 1/2x3 1/2x3/8	22.67	11.23	196.2 K=1.00	2.4800	-8.93	18.45	0.484 [1] ✔
T8	43 - 33	L4x4x3/8	23.59	11.63	177.1 K=1.00	2.8600	-9.07	26.10	0.348 [1] ✔
T9	33 - 23	L4x4x3/8	24.50	12.07	183.8 K=1.00	2.8600	-9.52	24.24	0.393 [1] ✔
T10	23 - 3	L4x4x3/8	26.33	12.99	197.8	2.8600	-10.30	20.93	0.492 [1]

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	A in^2	P_u K	ϕP_n K	Ratio $\frac{P_u}{\phi P_n}$
					K=1.00				✔

[1] P_u / ϕP_n controls

Secondary Horizontal 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 $\frac{P_u}{\phi P_n}$
T7	63 - 43	L3 1/2x3 1/2x1/4	20.32	19.86	218.6 K=1.00	1.6900	-2.71	10.12	0.268 [1] ✔
T10	23 - 3	L4x4x1/4	24.35	23.80	228.5 K=1.00	1.9400	-3.67	10.64	0.345 [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	183 - 163	L2 1/2x2 1/2x3/16	8.56	8.11	196.7 K=1.00	0.9020	-0.19	6.68	0.029 [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	183 - 163	P2.5x.203	20.00	5.00	63.3	1.7040	7.01	76.68	0.091 [1] ✔
T2	163 - 143	P2.5x.276	20.03	6.68	86.7	2.2535	20.26	101.41	0.200 [1] ✔
T3	143 - 123	P3x.216	20.04	6.68	68.9	2.2285	40.84	100.28	0.407 [1] ✔
T4	123 - 103	P4x.337	20.04	6.68	54.3	4.4074	65.30	198.34	0.329 [1] ✔
T5	103 - 83	P5x.258	20.03	10.02	64.0	4.2999	86.92	193.49	0.449 [1]

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	A in^2	P_u K	ϕP_n K	Ratio $\frac{P_u}{\phi P_n}$
T6	83 - 63	P5x.375	20.03	10.02	65.4	6.1120	112.13	275.04	0.408 [1]
T7	63 - 43	P5x.375	20.04	5.14	33.6	6.1120	135.30	275.04	0.492 [1]
T8	43 - 33	P6x.432	10.02	10.02	54.8	8.4049	147.16	378.22	0.389 [1]
T9	33 - 23	P6x.432	10.02	10.02	54.8	8.4049	158.26	378.22	0.418 [1]
T10	23 - 3	P6x.432	20.03	5.12	28.0	8.4049	179.88	378.22	0.476 [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	183 - 163	L1 3/4x1 3/4x3/16	9.91	4.71	107.7	0.3779	2.53	16.44	0.154 [1]
T2	163 - 143	L2x2x1/4	12.24	6.07	121.7	0.5863	4.23	25.50	0.166 [1]
T3	143 - 123	L2 1/2x2 1/2x3/16	14.02	6.94	108.6	0.5886	5.22	25.60	0.204 [1]
T4	123 - 103	L2 1/2x2 1/2x5/16	15.26	7.51	120.1	0.9485	6.25	41.26	0.152 [1]
T5	103 - 83	L3X3X3/16 Reinf w/L2.5X2.5X3/16	19.10	9.57	143.2	3.2137	8.02	104.12	0.077 [1]
T6	83 - 63	L3 1/2x3 1/2x5/16	20.83	10.30	116.0	1.3624	8.21	59.27	0.139 [1]
T7	63 - 43	L3 1/2x3 1/2x3/8	22.67	11.23	127.5	1.6139	8.47	70.20	0.121 [1]
T8	43 - 33	L4x4x3/8	23.59	11.63	114.8	1.8989	9.09	82.60	0.110 [1]
T9	33 - 23	L4x4x3/8	24.50	12.07	119.2	1.8637	9.25	81.07	0.114 [1]
T10	23 - 3	L4x4x3/8	26.33	12.99	128.2	1.8637	9.53	81.07	0.118 [1]

[1] P_u / ϕP_n controls

Secondary Horizontal 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 $\frac{P_u}{\phi P_n}$
T7	63 - 43	L3 1/2x3 1/2x1/4	19.28	18.81	207.1	1.6900	2.71	54.76	0.050 [1] ✔
T10	23 - 3	L4x4x1/4	24.35	23.80	228.5	1.9400	3.67	62.86	0.058 [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	183 - 163	L2 1/2x2 1/2x3/16	8.56	8.11	128.3	0.5886	0.26	25.60	0.010 [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	183 - 163	Leg	P2.5x.203	3	-9.38	57.19	16.4	Pass
T2	163 - 143	Leg	P2.5x.276	33	-24.62	58.51	42.1	Pass
T3	143 - 123	Leg	P3x.216	54	-47.93	70.89	67.6	Pass
T4	123 - 103	Leg	P4x.337	75	-74.79	159.90	46.8	Pass
T5	103 - 83	Leg	P5x.258	96	-100.47	143.40	70.1	Pass
T6	83 - 63	Leg	P5x.375	111	-128.99	201.25	64.1	Pass
T7	63 - 43	Leg	P5x.375	126	-156.48	253.28	61.8	Pass
T8	43 - 33	Leg	P6x.432	147	-170.94	303.75	56.3	Pass
T9	33 - 23	Leg	P6x.432	156	-184.36	303.75	60.7	Pass
T10	23 - 3	Leg	P6x.432	165	-211.67	357.20	59.3	Pass
T1	183 - 163	Diagonal	L1 3/4x1 3/4x3/16	12	-2.61	6.55	39.9 40.9 (b)	Pass
T2	163 - 143	Diagonal	L2x2x1/4	38	-4.32	7.72	55.9	Pass
T3	143 - 123	Diagonal	L2 1/2x2 1/2x3/16	59	-5.25	9.13	57.5 84.3 (b)	Pass
T4	123 - 103	Diagonal	L2 1/2x2 1/2x5/16	80	-6.28	11.33	55.4 60.5 (b)	Pass
T5	103 - 83	Diagonal	L3X3X3/16 Reinf w/L2.5X2.5X3/16	101	-8.16	35.40	23.1 41.0 (b)	Pass
T6	83 - 63	Diagonal	L3 1/2x3 1/2x5/16	116	-8.47	18.64	45.4 52.1 (b)	Pass
T7	63 - 43	Diagonal	L3 1/2x3 1/2x3/8	131	-8.93	18.45	48.4	Pass
T8	43 - 33	Diagonal	L4x4x3/8	152	-9.07	26.10	34.8 48.0 (b)	Pass
T9	33 - 23	Diagonal	L4x4x3/8	161	-9.52	24.24	39.3 41.7 (b)	Pass
T10	23 - 3	Diagonal	L4x4x3/8	170	-10.30	20.93	49.2	Pass
T7	63 - 43	Secondary Horizontal	L3 1/2x3 1/2x1/4	134	-2.71	10.12	26.8	Pass
T10	23 - 3	Secondary Horizontal	L4x4x1/4	173	-3.67	10.64	34.5	Pass

Section No.	Elevation ft	Component Type	Size	Critical Element	P K	ϕP_{allow} K	% Capacity	Pass Fail
T1	183 - 163	Top Girt	L2 1/2x2 1/2x3/16	6	-0.19	6.68	2.9	Pass
							4.2 (b) Summary	
						Leg (T5)	70.1	Pass
						Diagonal (T3)	84.3	Pass
						Secondary Horizontal (T10)	34.5	Pass
						Top Girt (T1)	4.2	Pass
						Bolt Checks	84.3	Pass
						RATING =	**84.3**	**Pass**

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Branford, CT 06405 F: (203) 488-8587

Subject:	Anchor Bolt Analysis
Location:	180-ft Lattice Tower Newtown, CT
Rev. 0: 6/23/23	Prepared by: T.J.L. Checked by: C.F.C. Job No. 23080.01

Anchor Bolt Analysis:

Input Data:

Tower Reactions:

Tension Force =	Tension := 185·kips	(Input From tnxTower)
Compression Force =	Compression := 219·kips	(Input From tnxTower)
Shear Force =	Shear := 28·kips	(Input From tnxTower)

Anchor Bolt Data:

ASTMA449

Number of Anchor Bolts =	N := 6	(User Input)
Bolt Ultimate Strength =	F_u := 120·ksi	(User Input)
Bolt Yield Strength =	F_y := 90·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)

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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 = $\Phi R_{nt} := \phi_t \cdot F_u \cdot A_n = 54.5 \cdot k$

Design Compression Strength = $\Phi R_{nc} := \phi_c \cdot F_y \cdot A_g = 63.6 \cdot k$

Design Shear Strength (Tension) = $\Phi R_{nv} := \phi_v \cdot 0.5 F_u \cdot A_g = 35.3 \cdot k$

Design Shear Strength (Compression) = $\Phi R_{nvc} := \phi_c \cdot 0.6 F_y \cdot A_g \cdot 0.75 = 28.6 \cdot k$

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Check Anchor Bolt Tension Force:

Maximum Tensile Force = $P_{ut} := \frac{Tension}{N} = 30.8 \cdot kips$

Maximum Compressive Force = $P_{uc} := \frac{Compression}{N} = 36.5 \cdot kips$

Maximum Shear Force = $V_u := \frac{Shear}{N} = 4.7 \cdot kips$

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 = $\max\left[\left(\frac{P_{ut}}{\Phi R_{nt}}\right)^2 + \left(\frac{V_u}{\Phi R_{nv}}\right)^2, \left(\frac{P_{uc}}{\Phi R_{nc}}\right) + \left(\frac{V_u}{\Phi R_{nvc}}\right)^2\right] = 60 \cdot \%$

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Subject: Lattice Tower Foundation Anaylsis

Location: Newtown, CT

Rev. 0: 6/23/23

Prepared by: T.J.L. Checked by: C.F.C.
Job No. 23080.01

Pad and Pier Foundation:

Input Data:

Tower Data

Max Uplift Force =	$Uplift := 185 \cdot kips$	(User Input from tnxTower)	(Leg)
Max Shear Force =	$Shear := 28 \cdot kips$	(User Input from tnxTower)	(Leg)
Max Compressive Force =	$Compression := 219 \cdot kips$	(User Input from tnxTower)	(Leg)
Base Shear =	$Shear_{tot} := 45 \cdot kips$	(User Input from tnxTower)	(Tower)
Base Compression =	$Comp_{tot} := 48 \cdot kips$	(User Input from tnxTower)	(Tower)
Base Moment =	$Moment := 4376 \cdot ft \cdot kips$	(User Input from tnxTower)	(Tower)
Tower Height =	$H_t := 180 \cdot ft$	(User Input)	

Original Foundation Data (Foundation #1): (North East Leg):

Overall Depth of Footing =	$D_{f1} := 7.1 \cdot ft$	(User Input)	Foundation #1. Refer to Sketch SKRAD101498 Sheet 1 of 3 prepared for Connecticut Light and Power Company, dated 10/14/98
Length of Pier =	$L_{p1} := 10.0 \cdot ft$	(User Input)	
Pier Projection Above Grade =	$P_{P1} := 4.9 \cdot ft$	(User Input)	
Width of Pier =	$d_{p1} := 2.5 \cdot ft$	(User Input)	
Pad Width =	$PD_{w1} := 10.0 \cdot ft$	(User Input)	
Pad Thickness =	$PD_{t1} := 2.0 \cdot ft$	(User Input)	

Original Foundation Data (Foundation #2): (South West Leg):

Overall Depth of Footing =	$D_{f2} := 8.5 \cdot ft$	(User Input)	Foundation #2. Refer to Sketch SKRAD101498 Sheet 1 of 3 prepared for Connecticut Light and Power Company, dated 10/14/98
Length of Pier =	$L_{p2} := 10.0 \cdot ft$	(User Input)	
Pier Projection Above Grade =	$P_{P2} := 3.5 \cdot ft$	(User Input)	
Width of Pier =	$d_{p2} := 2.5 \cdot ft$	(User Input)	
Pad Width =	$PD_{w2} := 10.0 \cdot ft$	(User Input)	
Pad Thickness =	$PD_{t2} := 2.0 \cdot ft$	(User Input)	

Original Foundation Data (Foundation #3): (South East Leg):

Overall Depth of Footing =	$D_{f3} := 10.75 \cdot ft$	(User Input)	Foundation #3. Refer to Sketch SKRAD101498 Sheet 1 of 3 prepared for Connecticut Light and Power Company, dated 10/14/98
Length of Pier =	$L_{p3} := 10.0 \cdot ft$	(User Input)	
Pier Projection Above Grade =	$P_{P3} := 1.25 \cdot ft$	(User Input)	
Width of Pier =	$d_{p3} := 2.5 \cdot ft$	(User Input)	
Pad Width =	$PD_{w3} := 10.0 \cdot ft$	(User Input)	
Pad Thickness =	$PD_{t3} := 2.0 \cdot ft$	(User Input)	

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Subject:	Lattice Tower Foundation Anaylsis
Location:	Newtown, CT
Rev. 0: 6/23/23	Prepared by: T.J.L. Checked by: C.F.C. Job No. 23080.01

Material Properties:

Internal Friction Angle of Soil =	$\Phi_s := 34 \cdot deg$	(User Input)	Based on Geotech Report prepared by Clarence Welti & Assoc., INC., dated October 19, 2011
Allowable Soil Bearing Capacity =	$q_s := 6000 \cdot psf$	(User Input)	
Allowable Soil Bearing Capacity =	$q_{suse} := 3000 \cdot psf$	(User Input)	Note: 3000psf used for evaluation of existing concrete at grade and proposed concrete infill for soil bearing condition.
Unit Weight of Soil =	$\gamma_s := 125 \cdot pcf$	(User Input)	
Unit Weight of Concrete =	$\gamma_c := 150 \cdot pcf$	(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)	

Calculated Factors:

Load Factor =

$$LF := \begin{cases} 1.333 & \text{if } H_t \le 700 \cdot ft \\ 1.7 & \text{if } H_t \ge 1200 \cdot ft \\ 1.333 + \left(\frac{H_t - 700ft}{1200ft - 700ft} \right) \cdot 0.4 & \text{otherwise} \end{cases} = 1.333$$

Calculated Data:

Active Pressure =

$$K_a := \frac{\left(1 - \sin\left(\Phi_s\right)\right)}{\left(1 + \sin\left(\Phi_s\right)\right)} = 0.283$$

$$P_a := \frac{1}{2} \cdot \left(PD_{t1}\right)^2 \cdot PD_{w1} \cdot \gamma_s \cdot K_a = 0.71 \cdot kips$$

Coefficient of Lateral Soil Pressure =

$$K_p := \frac{1 + \sin\left(\Phi_s\right)}{1 - \sin\left(\Phi_s\right)} = 3.537$$

$$P_p := \frac{1}{2} \cdot \left(PD_{t1}\right)^2 \cdot PD_{w1} \cdot \gamma_s \cdot K_p = 8.84 \cdot kips$$

Stability of Footing:

Adjusted Concrete Unit Weight =

$$\gamma_c := if\left(Bouyancy = 1, \gamma_c - 62.4pcf, \gamma_c\right) = 150 \cdot pcf$$

Adjusted Soil Unit Weight =

$$\gamma_s := if\left(Bouyancy = 1, \gamma_s - 62.4pcf, \gamma_s\right) = 125 \cdot pcf$$

Cross Sectional Area 1 of Resisting Pyramid =

$$B_1 := PD_{w1}^2 = 100ft^2$$

Cross Sectional Area 2 of Resisting Pyramid =

$$B_2 := \left[2\left(L_{p1} - P_{P1} - n\right) \cdot \tan\left(\Phi_s\right) + PD_{w1}\right]^2 = 284.9ft^2$$

Volume and Weight of Original Tower Foundation

Foundation #1:

Volume of Concrete = $V_{origconc1} := \left[\left(PD_{w1}^{2} \cdot PD_{t1}\right) + d_{p1}^{2} L_{p1}\right] = 262.5 \cdot ft^3$

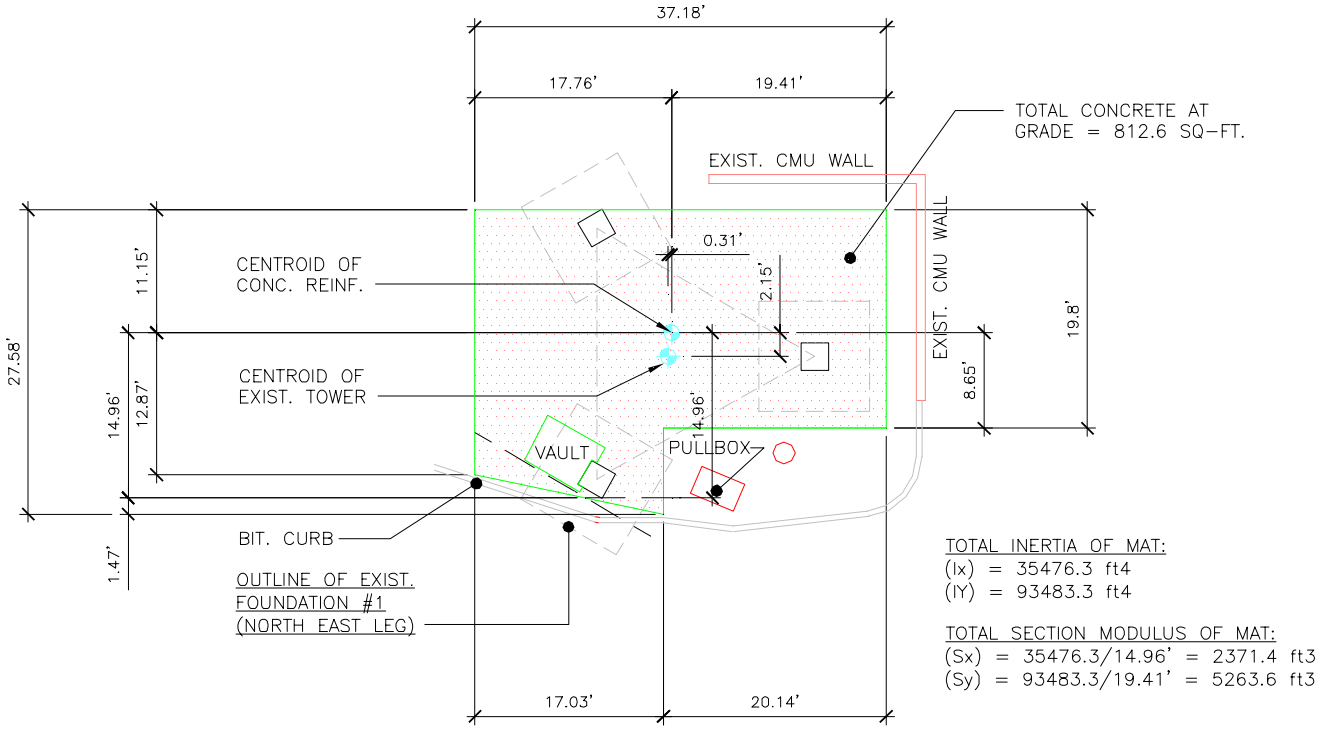
Foundation #2:

Volume of Concrete = $V_{origconc2} := \left[\left(PD_{w2}^{2} \cdot PD_{t2}\right) + d_{p2}^{2} L_{p2}\right] = 262.5 \cdot ft^3$

Foundation #3:

Volume of Concrete = $V_{origconc3} := \left[\left(PD_{w3}^{2} \cdot PD_{t3}\right) + d_{p3}^{2} L_{p3}\right] = 262.5 \cdot ft^3$

Total Weight of Original Concrete = $WT_{origconc} := \left(V_{origconc1} + V_{origconc2} + V_{origconc3}\right) \cdot \gamma_c = 118.1 \cdot kip$



TOTAL INERTIA OF MAT:
(Ix) = 35476.3 ft4
(IY) = 93483.3 ft4

TOTAL SECTION MODULUS OF MAT:
(Sx) = 35476.3/14.96' = 2371.4 ft3
(Sy) = 93483.3/19.41' = 5263.6 ft3

Volume and Weight of Soil Above Original Footing to Underside of Previous Reinforcement

Foundation #1:

Volume of Soil Above Footing = $V_{soilfnd1} := \left(PD_{w1}^{2} - d_{p1}^{2}\right)\left(L_{p1} - P_{P1}\right) = 478.12 \cdot ft^{3}$

Foundation #2:

Volume of Soil Above Footing = $V_{soilfnd2} := \left(PD_{w2}^{2} - d_{p2}^{2}\right)\left(L_{p2} - P_{P2}\right) = 609.38 \cdot ft^{3}$

Foundation #3:

Volume of Soil Above Footing = $V_{soilfnd3} := \left(PD_{w3}^{2} - d_{p3}^{2}\right)\left(L_{p3} - P_{P3}\right) = 820.31 \cdot ft^{3}$

Total Weight of Soil = $WT_{s} := \left(V_{soilfnd1} + V_{soilfnd2} + V_{soilfnd3}\right) \cdot \gamma_{s} = 238.5 \cdot kip$

Volume and Weight of Previous Concrete Reinforcement and Proposed Infill

Foundation #1:

Contact Area of Concrete At Grade = $A_{concfnd1} := \left(102.87ft^{2} - 6.25ft^{2}\right) = 96.62\,ft^{2}$

Volume of Concrete At Grade = $V_{concfnd1} := \left(A_{concfnd1} \cdot 6.0ft\right) = 579.72 \cdot ft^{3}$

Foundation #2:

Contact Area of Concrete At Grade = $A_{concfnd2} := \left(260ft^{2} - 6.25ft^{2}\right) = 253.75\,ft^{2}$

Volume of Concrete At Grade = $V_{concfnd2} := \left[\left(A_{concfnd2}\right)4.0ft\right] = 1015 \cdot ft^{3}$ (Minus pier area)

Foundation #3:

Contact Area of Concrete At Grade = $A_{concfnd3} := \left(169ft^{2} - 6.25ft^{2}\right) = 162.75\,ft^{2}$

Volume of Concrete At Grade = $V_{concfnd3} := \left[\left(A_{concfnd3}\right)4.5ft\right] = 732.38 \cdot ft^{3}$

Area of Existing Reinforced Concrete At Grade = $A_{origreinf} := \left(A_{concfnd1} + A_{concfnd2} + A_{concfnd3}\right) = 513.1 \cdot ft^{2}$

Area of Proposed Reinforced Concrete Infill = $A_{reinfprop} := 255ft^{2}$

Average Depth of Mat (Existing and Proposed Infill) = $Mat_{t} := 4.0ft$

Area of Proposed Reinforced Concrete Infill = $A_{mattot} := A_{origreinf} + A_{reinfprop} = 768.1\,ft^{2}$

Weight of Concrete At Grade (Proposed Infill) = $WT_{concgrade} := \left(V_{concfnd1} + V_{concfnd2} + V_{concfnd3}\right) \cdot \gamma_{c} = 349.1 \cdot kip$

Weight of Concrete At Grade (Proposed Infill) = $WT_{concgradeinfill} := \left[\left(A_{reinfprop}\right)Mat_{t}\right] \cdot \gamma_{c} = 153 \cdot kip$

Total Weight of Concrete At Grade = $WT_{concgradetot} := \left(WT_{concgrade} + WT_{concgradeinfill}\right) = 502.1 \cdot kip$

Total Weight of Original Concrete Foundation System (x3), Soil, Previous Concrete Reinforcement and Proposed R.C. Infill

Total Weight = $WT_{tot} := WT_{origconc} + WT_s + WT_{concgradetot} = 858.7 \cdot kip$

Soil Bearing Pressure:

Section Modulus of Mat = $S := 2274.5 ft^3$ (Calculated external of program)

Minimum Distance From Tower Centroid to Edge of Mat at Foundation #1 (North East leg) = $y1 := 14.62 ft$ (Calculated external of program)

Minimum Distance From Reinforced Mat Centroid to Edge of Mat at Foundation #1 (North East leg) = $y2 := 16.83 ft$ (Shortest Lever Arm Calculated external of program)

Maximum Pressure Under Mat = $P_{max} := \frac{WT_{tot} - WT_{origconc} - WT_s + Comp_{tot}}{A_{mattot}} + \frac{Shear_{tot} \cdot (Mat_t)}{S} = 0.8 \cdot ksf$

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

$Max\_Pressure\_Check = "Okay"$

Minimum Pressure Under Mat = $P_{min} := \frac{WT_{tot} - WT_{origconc} - WT_s + Comp_{tot}}{A_{mattot}} - \frac{Shear_{tot} \cdot (Mat_t)}{S} = 0.64 \cdot ksf$

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

$Min\_Pressure\_Check = "Okay"$

Overturning Moment Check:

Overturning Moment = $M_{ot} := Moment + Shear_{tot} \cdot (Mat_t) = 4556 \cdot kip \cdot ft$

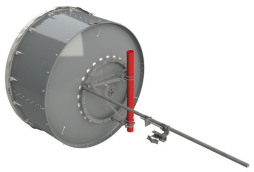
Resisting Moment = $M_r := (0.9WT_{origconc} + 0.75WT_s) \cdot y1 + (0.9WT_{concgradetot} \cdot y2) = 11774 ft \cdot kips$

Factor of Safety = $\frac{M_r}{M_{ot}} = 2.58$

$Overturning\_Moment := if\left(\frac{M_r}{M_{ot}} > 1, "OK", "NG"\right)$

$Overturning\_Moment = "OK"$

HX8-6W-6GF



2.4m | 8ft ValuLine® High Performance, High XPD Antenna, dual-polarized, 5.925 – 7.125 GHz, grey, CPR137G flange

Product Classification

Product Type	Microwave antenna
Product Brand	ValuLine®

General Specifications

Antenna Type	HX - ValuLine® High Performance, High XPD Antenna, dual-polarized
Polarization	Dual
Antenna Input	CPR137G
Antenna Color	Gray
Reflector Construction	One-piece reflector
Radome Color	Gray
Radome Material	Fabric
Flash Included	Yes
Side Struts, Included	1
Side Struts, Optional	4

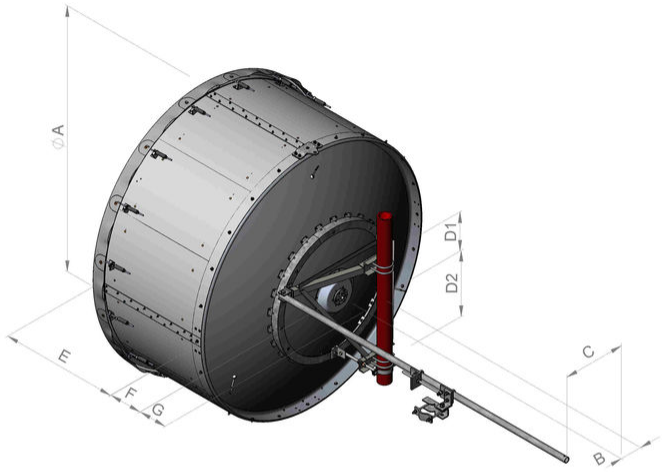
Dimensions

Diameter, nominal	2.4 m | 8 ft

HX8-6W-6GF

Antenna Dimensions and Mounting Information

HX8



Dimensions in inches (mm)								
Antenna size, ft (m)	A	B	C	D1	D2	E	F	G
8 (2.4)	95.1 (2416)	8.0 (203)	22.5 (572)	14.1 (357)	23.6 (600)	42.4 (1078)	12.1 (306)	10.3 (262)

Electrical Specifications

Operating Frequency Band	5.925 – 7.125 GHz
Gain, Low Band	40.8 dBi
Gain, Mid Band	41.6 dBi
Gain, Top Band	42.4 dBi
Boresite Cross Polarization Discrimination (XPD)	33 dB
Front-to-Back Ratio	70 dB
Beamwidth, Horizontal	1.3 °
Beamwidth, Vertical	1.3 °
Return Loss	26 dB

HX8-6W-6GF

VSWR	1.1
Radiation Pattern Envelope Reference (RPE)	7389
Electrical Compliance	ACMA FX03_6b, 6p7b | ETSI 302 217 Class 3 | IC 3059A | IC 3064A | US FCC Part 101A | US FCC Part 74A
Cross Polarization Discrimination (XPD) Electrical Compliance	ETSI EN 302217 XPD Category 2

Electrical Specifications, Band 2

Beamwidth, Horizontal	1.3 °
Beamwidth, Vertical	1.3 °
Gain, Mid Band	40.7 dBi
Operating Frequency Band	5.725 – 5.850 GHz

Mechanical Specifications

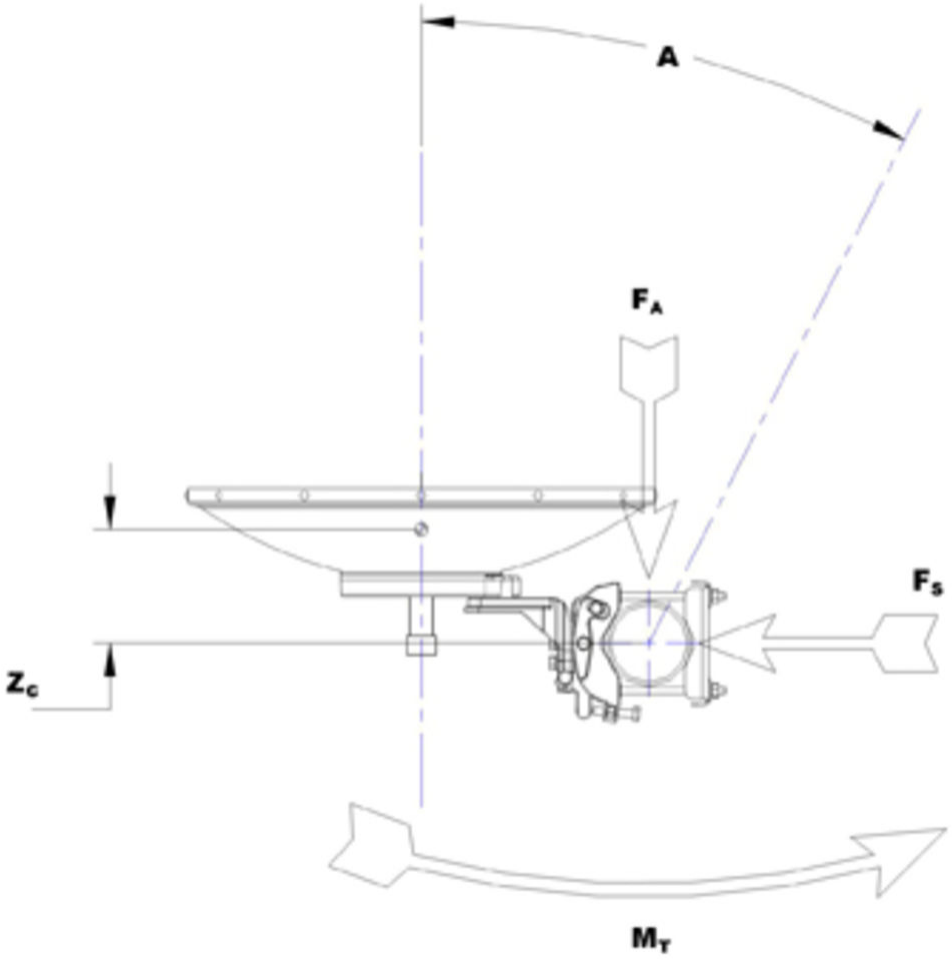
Compatible Mounting Pipe Diameter	115 mm | 4.5 in
Fine Azimuth Adjustment Range	±5°
Fine Elevation Adjustment Range	±5°
Wind Speed, operational	180 km/h | 111.847 mph
Wind Speed, survival	200 km/h | 124.274 mph

Wind Forces at Wind Velocity Survival Rating

Axial Force (FA)	10599 N | 2,382.751 lbf
Angle # for MT Max	-140 °
Side Force (FS)	4594 N | 1,032.773 lbf
Twisting Moment (MT)	-6518 N-m | -57,689.16 in lb
Force on Inboard Strut Side	11263 N | 2,532.024 lbf
Zcg without Ice	532 mm | 20.945 in
Zcg with 1/2 in (12 mm) Radial Ice	675 mm | 26.575 in
Weight with 1/2 in (12 mm) Radial Ice	342 kg | 753.98 lb

HX8-6W-6GF

Wind Forces at Wind Velocity Survival Rating Image



Packaging and Weights

Height, packed	2250 mm | 88.583 in
Width, packed	1130 mm | 44.488 in
Length, packed	2380 mm | 93.701 in
Packaging Type	Standard pack
Volume	6.1 m^3 | 215.42 ft^3
Weight, gross	318 kg | 701.069 lb
Weight, net	187 kg | 412.264 lb

Regulatory Compliance/Certifications

Agency	Classification

HX8-6W-6GF

ISO 9001:2015 Designed, manufactured and/or distributed under this quality management system

* Footnotes

Axial Force (FA)	Maximum forces exerted on a supporting structure as a result of wind from the most critical direction for this parameter. The individual maximums specified may not occur simultaneously. All forces are referenced to the mounting pipe.
Boresite Cross Polarization Discrimination (XPD)	The difference between the peak of the co-polarized main beam and the maximum cross-polarized signal over an angle twice the 3 dB beamwidth of the co-polarized main beam.
Cross Polarization Discrimination (XPD) Electrical Compliance	The difference between the peak of the co-polarized main beam and the maximum cross-polarized signal over an angle twice the 3 dB beamwidth of the co-polarized main beam.
Front-to-Back Ratio	Denotes highest radiation relative to the main beam, at 180° ±40°, across the band. Production antennas do not exceed rated values by more than 2 dB unless stated otherwise.
Gain, Mid Band	For a given frequency band, gain is primarily a function of antenna size. The gain of Andrew antennas is determined by either gain by comparison or by computer integration of the measured antenna patterns.
Operating Frequency Band	Bands correspond with CCIR recommendations or common allocations used throughout the world. Other ranges can be accommodated on special order.
Packaging Type	Andrew standard packing is suitable for export. Antennas are shipped as standard in totally recyclable cardboard or wire-bound crates (dependent on product). For your convenience, Andrew offers heavy duty export packing options.
Radiation Pattern Envelope Reference (RPE)	Radiation patterns define an antenna's ability to discriminate against unwanted signals. Under still dry conditions, production antennas will not have any peak exceeding the current RPE by more than 3dB, maintaining an angular accuracy of +/-1° throughout
Return Loss	The figure that indicates the proportion of radio waves incident upon the antenna that are rejected as a ratio of those that are accepted.
Side Force (FS)	Maximum side force exerted on the mounting pipe as a result of wind from the most critical direction for this parameter. The individual maximums specified may not occur simultaneously. All forces are referenced to the mounting pipe.

Twisting Moment (MT)	Maximum forces exerted on a supporting structure as a result of wind from the most critical direction for this parameter. The individual maximums specified may not occur simultaneously. All forces are referenced to the mounting pipe.
VSWR	Maximum; is the guaranteed Peak Voltage-Standing-Wave-Ratio within the operating band.
Wind Speed, operational	For VHLP(X), SHP(X), HX and USX antennas, the wind speed where the maximum antenna deflection is 0.3 x the 3 dB beam width of the antenna. For other antennas, it is defined as a deflection is equal to or less than 0.1 degrees.
Wind Speed, survival	The maximum wind speed the antenna, including mounts and radomes, where applicable, will withstand without permanent deformation. Realignment may be required. This wind speed is applicable to antenna with the specified amount of radial ice.

ATTACHMENT D – PROOF OF DELIVERY OF NOTICE

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Use of this system constitutes your agreement to the service conditions in the current FedEx Service Guide, available on fedex.com.FedEx will not be responsible for any claim in excess of $100 per package, whether the result of loss, damage, delay, non-delivery,misdelivery,or misinformation, unless you declare a higher value, pay an additional charge, document your actual loss and file a timely claim.Limitations found in the current FedEx Service Guide apply. Your right to recover from FedEx for any loss, including intrinsic value of the package, loss of sales, income interest, profit, attorney's fees, costs, and other forms of damage whether direct, incidental,consequential, or special is limited to the greater of $100 or the authorized declared value. Recovery cannot exceed actual documented loss.Maximum for items of extraordinary value is $1,000, e.g. jewelry, precious metals, negotiable instruments and other items listed in our ServiceGuide. Written claims must be filed within strict time limits, see current FedEx Service Guide.

ATTACHMENT E - POWER DENSITY REPORT

C Squared Systems, LLC
65 Dartmouth Drive
Auburn, NH 03032
603-644-2800
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Calculated Radio Frequency Emissions Report

EVERSOURCE ENERGY

ES-066

20 Barnabas Road

Newtown, CT 06470

September 28, 2023

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1. Introduction

The purpose of this report is to investigate compliance with applicable FCC regulations for the proposed Eversource swap out installation on the self-support tower at 20 Barnabas Road in Newtown, CT. Eversource is proposing to swap out one of the microwave antenna. This report provides and updated analysis with % MPE (Maximum Permissible Exposure) measurements around the site to determine FCC compliance of the facility.

Figure 1: View of ES-066 Newtown

Site Address	20 Barnabas Road
Latitude	41°25'39.5"N
Longitude	73°20'37.5"W
Site Elevation AMSL	457’
Survey Engineer	Ram Acharya
Survey Date/Time	9/21/2023; 11:40 PM – 1:15 PM

Table 1: Survey Information

2. FCC Guidelines for Evaluating RF Radiation Exposure Limits

In 1985, the FCC established rules to regulate radio frequency (RF) exposure from FCC licensed antenna facilities. In 1996, the FCC updated these rules, which were further amended in August 1997 by OET Bulletin 65 Edition 97-01. These new rules include Maximum Permissible Exposure (MPE) limits for transmitters operating between 300 kHz and 100 GHz. The FCC MPE limits are based upon those recommended by the National Council on Radiation Protection and Measurements (NCRP), developed by the Institute of Electrical and Electronics Engineers, Inc., (IEEE) and adopted by the American National Standards Institute (ANSI).

The FCC general population/uncontrolled limits set the maximum exposure to which most people may be subjected. General population/uncontrolled exposures apply in situations in which the general public may be exposed, or in which persons that are exposed as a consequence of their employment may not be fully aware of the potential for exposure or cannot exercise control over their exposure.

Public exposure to radio frequencies is regulated and enforced in units of milliwatts per square centimeter (mW/cm^2). The general population exposure limits for the various frequency ranges are defined in the attached "FCC Limits for Maximum Permissible Exposure (MPE)" in Attachment B of this report.

Higher exposure limits are permitted under the occupational/controlled exposure category, but only for persons who are exposed as a consequence of their employment and who have been made fully aware of the potential for exposure, and they must be able to exercise control over their exposure. General population/uncontrolled limits are five times more stringent than the levels that are acceptable for occupational, or radio frequency trained individuals. Attachment B contains excerpts from OET Bulletin 65 and defines the Maximum Exposure Limit.

Finally, it should be noted that the MPE limits adopted by the FCC for both general population/uncontrolled exposure and for occupational/controlled exposure incorporate a substantial margin of safety and have been established to be well below levels generally accepted as having the potential to cause adverse health effects.

3. Power Density Calculation Methods

The power density calculation results were generated using the following formula as outlined in FCC bulletin OET 65, and Connecticut Siting Council recommendations:

$$\text{Power Density} = \left(\frac{\text{GRF}^2 \times 1.64 \times \text{ERP}}{4\pi \times R^2}\right) \text{X Off Beam Loss}$$

Where:

EIRP = Effective Isotropic Radiated Power = 1.64 x ERP

R = Radial Distance = $\sqrt{(H^2 + V^2)}$

H = Horizontal Distance from antenna

V = Vertical Distance from radiation center of antenna

Ground reflection factor (GRF) of 1.6

Off Beam Loss is determined by the selected antenna pattern

These calculations assume that the antennas are operating at 100 percent capacity and full power, and that all antenna channels are transmitting simultaneously. Obstructions (trees, buildings, etc.) that would normally attenuate the signal are not taken into account. The calculations assume even terrain in the area of study and do not consider actual terrain elevations which could attenuate the signal. As a result, the calculated power density and corresponding % MPE levels reported below are much higher than the actual levels will be from the final installation.

4. Proposed Antenna Configuration

Table 2 below lists the technical details of the proposed swap out Eversource installation. These parameters are applied to the above calculation methods in order to calculate the % MPE values of the proposed swap out equipment. Any receive-only antennas have not been included in the table as they are irrelevant in terms of the % MPE calculations.

Operator	Antenna Model	TX Freq. (MHz)	Ant Gain (dBd)	Power per Channel (ERP - Watts)	Number of Channels	Vertical Beamwidth	Length (ft)	Antenna Centerline Height (ft)
Eversource	HX8-6W-6GF	5945.2	39.45	9772	1	1.3°	8	176

Table 2: Eversource Antenna Configuration (Proposed Swap Out)[1] [2]

[1] Transmit power assumes 0 dB of cable loss.

[2] Transmit antenna centerline height is based on the CENTEK ENGINEERING Structural Analysis Report dated June 23, 2023.

5. Measurement Procedure

Frequencies from 300 KHz to 50 GHz were measured using the Narda Probe EA 5091, E-Field, shaped, FCC probe in conjunction with the NBM550 survey meter. The EA 5091 probe is “shaped” such that in a mixed signal environment (i.e.: more than one frequency band is used in a particular location), it accurately measures the percent of MPE.

From FCC OET Bulletin No. 65 - Edition 97-01 – “A useful characteristic of broadband probes used in multiple-frequency RF environments is a frequency-dependent response that corresponds to the variation in MPE limits with frequency. Broadband probes having such a "shaped" response permit direct assessment of compliance at sites where RF fields result from antennas transmitting over a wide range of frequencies. Such probes can express the composite RF field as a percentage of the applicable MPEs”.

Probe Description - As suggested in FCC OET Bulletin No. 65 - Edition 97-01, the response of the measurement instrument should be essentially isotropic, (i.e., independent of orientation or rotation angle of the probe). For this reason, the Narda EA 5091 probe was used for these measurements.

Sampling Description - At each measurement location, a spatially averaged measurement is collected over the height of an average human body. The NBM550 survey meter performs a time average measurement while the user slowly moves the probe over a distance range of 20 cm to 200 cm (about 6 feet) above ground level. The results recorded at each measurement location include average values over the spatial distance.

Instrumentation Information - A summary of specifications for the equipment used is provided in the table below.

Manufacturer	Narda Microwave			
Probe	EA 5091, Serial# 0116			
Calibration Date	January 2023			
Calibration Interval	24 Months			
Meter	NBM550, Serial# E-1069			
Calibration Date	January 2023			
Calibration Interval	24 Months			
Probe Specifications	**Frequency Range**	**Field Measured**	**Standard**	**Measurement Range**
	300 KHz-50 GHz	Electric Field	U.S. FCC 1997 Occupational/Controlled	0.2 – 600 % of Standard

Table 3: Instrumentation Information

Instrument Measurement Uncertainty - The total measurement uncertainty of the NARDA measurement probe and meter is no greater than ±3 dB (0.5% to 6%), ±1 dB (6% to 100%), ±2 dB (100% to 600%). The factors which contribute to this include the probe’s frequency response deviation, calibration uncertainty, ellipse ratio, and isotropic response[3]. Every effort is taken to reduce the overall uncertainty during measurement collection including pointing the probe directly at the likely highest source of emissions.

[3] For further details, please refer to Narda Safety Test Solutions NBM550 Probe Specifications.
https://www.narda-sts.com/en/servicesupport/product-literature/nbmnim/pd/pdfs/22772/eID/

6. Surveyed and Calculated % MPE Results

Measured and calculated results and a description of each survey location are detailed in the table below. Measurements were recorded on September 21, 2023 between 11:40 AM and 1:15 PM. The calculated % MPE contribution from the proposed swap out equipment was then added to the measured % MPE values in the "Composite % MPE" column. These calculated values incorporate the antenna pattern of the antenna model specified by Eversource to determine the "Off Beam Loss" factor shown in the power density formula from Section 3. All % MPE values are in reference to the FCC Uncontrolled/General Population exposure limit.

Table 4 below lists 27 measurements recorded in the vicinity of the tower. The highest spatially averaged measurement was 13.32% (Average Uncontrolled/General Population MPE) and was recorded at Location 16. The highest composite (measured + calculated) % MPE value is calculated to be 13.32% (Average Uncontrolled/General Population) and is also calculated to occur at Location 16.

Meas. Location	Latitude	Longitude	Dist. From Site (feet)	Measured % MPE (Uncontrolled / General)	Calculated % MPE (Eversource Proposed)	Composite % MPE (Uncontrolled / General)
1	41.42750	-73.34361	63	< 1.00%	0.00%	< 1.00%
2	41.42774	-73.34375	37	3.63%	0.00%	3.63%
3	41.42775	-73.34488	313	3.39%	0.00%	3.39%
4	41.42793	-73.34532	441	4.28%	0.00%	4.28%
5	41.42806	-73.34404	173	6.83%	0.00%	6.83%
6	41.42835	-73.34424	291	1.59%	0.00%	1.59%
7	41.42834	-73.34563	575	1.43%	0.00%	< 1.22%
8	41.42809	-73.34631	720	1.87%	0.00%	< 1.33%
9	41.42865	-73.34456	430	< 1.00%	0.00%	< 1.00%
10	41.42896	-73.34467	543	4.12%	0.00%	4.12%
11	41.42889	-73.34592	750	3.38%	0.00%	3.38%
12	41.42851	-73.34649	815	< 1.00%	0.00%	< 1.00%
13	41.42777	-73.34600	619	< 1.00%	0.00%	< 1.00%
14	41.42732	-73.34553	503	2.40%	0.00%	2.40%
15	41.42716	-73.34336	204	8.75%	0.00%	8.75%
16	**41.42710**	**-73.34291**	**302**	**13.32%**	**0.00%**	**13.32%**
17	41.42688	-73.34315	322	7.45%	0.00%	7.45%
18	41.42691	-73.34397	273	4.91%	0.00%	4.91%
19	41.42673	-73.34456	400	3.74%	0.00%	3.74%
20	41.426673	-73.343682	353	< 1.00%	0.00%	< 1.00%
21	41.426532	-73.349571	1645	10.00%	0.00%	10.00%
22	41.426523	-73.347365	1071	2.35%	0.00%	2.35%
23	41.426451	-73.344312	461	< 1.00%	0.00%	< 1.00%
24	41.426651	-73.342370	523	< 1.00%	0.00%	< 1.00%
25	41.428125	-73.341180	726	8.24%	0.00%	8.24%
26	41.429177	-73.342096	722	3.09%	0.00%	3.09%
27	41.430337	-73.343262	995	< 1.00%	0.00%	< 1.00%

Table 4: Measured and Calculated % MPE Results [4][5][6]

[4] Due to measurement uncertainty at low levels (See Table 3), any readings outside the measurement range of the probe (< 1.00 % FCC General Population/Uncontrolled MPE) are noted as such.

[5] Measured and calculated % MPE values listed are rounded to two decimal points and the composite % MPE listed is a summation of each unrounded contribution. Therefore, summing each rounded value may not identically match the total composite value reflected in the table.

[6] The calculated %MPE is very low for Eversource's swap out antenna due to the parameters of the antenna. The swap out antenna has a very narrow beamwidth which is good for long range communication but covers a very narrow area.

Figures 2 and 3 below are aerial views[7] of the tower location and the surrounding area, along with the measurement locations listed in Table 4.

Figure 2: Measurement Points – Zoom In

[7] Map showing location of telecommunications facility and the surrounding area. *Google Earth*, https://earth.google.com/web

Figure 3: All Measurement Points

7. Conclusion

A number of accessible areas around the tower at 20 Barnabas Road in Newtown, CT were surveyed and found to be well within the mandated General Population/Uncontrolled limits for Maximum Permissible Exposure, as delineated in the Federal Communications Commission's Radio Frequency exposure rules published in 47 CFR 1.1307(b)(1)-(b)(3).

The highest spatially averaged % MPE measurement of all surveyed points based on the 1997 FCC standard for exposure to the general population is 13.32% MPE. This measurement was recorded at Location 16.

The highest composite (measured + calculated) power density is **13.32% of the FCC General Population MPE limit** with the proposed swap out Eversource equipment and is also calculated to occur at Location 16.

The above analysis concludes that RF exposure at ground level around the tower, both currently and with the proposed swap out antenna installation, will be below the maximum power density limits as outlined by the FCC in the OET Bulletin 65 Ed. 97-01.

As noted previously, the calculated % MPE levels are more conservative (higher) than the actual levels will be from the finished installation.

8. Statement of Certification

I certify to the best of my knowledge that the statements in this report are true and accurate. The calculations follow guidelines set forth in FCC OET Bulletin 65 Edition 97-01, IEEE Std. C95.1, and IEEE Std. C95.3.

September 26, 2023

Report Prepared By: Ram Acharya
RF Engineer
C Squared Systems, LLC — Date

September 28, 2023

Report Prepared By: Martin Lavin
Senior RF Engineer
C Squared Systems, LLC — Date

Attachment A: References

OET Bulletin 65 - Edition 97-01 - August 1997 Federal Communications Commission Office of Engineering & Technology

IEEE C95.1-2005, IEEE Standard Safety Levels With Respect to Human Exposure to Radio Frequency Electromagnetic Fields, 3 kHz to 300 GHz IEEE-SA Standards Board

IEEE C95.3-2002 (R2008), IEEE Recommended Practice for Measurements and Computations of Radio Frequency Electromagnetic Fields With Respect to Human Exposure to Such Fields, 100 kHz-300 GHz IEEE-SA Standards Board

Attachment B: FCC Limits for Maximum Permissible Exposure (MPE)

(A) Limits for Occupational/Controlled Exposure[8]

Frequency Range (MHz)	Electric Field Strength (E) (V/m)	Magnetic Field Strength (E) (A/m)	Power Density (S) (mW/cm^2)	Averaging Time $\|E\|^2$, $\|H\|^2$ or S (minutes)
0.3-3.0	614	1.63	(100)*	6
3.0-30	1842/f	4.89/f	($900/f^2$)*	6
30-300	61.4	0.163	1.0	6
300-1500	-	-	f/300	6
1500-100,000	-	-	5	6

(B) Limits for General Population/Uncontrolled Exposure[9]

Frequency Range (MHz)	Electric Field Strength (E) (V/m)	Magnetic Field Strength (E) (A/m)	Power Density (S) (mW/cm^2)	Averaging Time $\|E\|^2$, $\|H\|^2$ or S (minutes)
0.3-1.34	614	1.63	(100)*	30
1.34-30	824/f	2.19/f	($180/f^2$)*	30
30-300	27.5	0.073	0.2	30
300-1500	-	-	f/1500	30
1500-100,000	-	-	1.0	30

f = frequency in MHz * Plane-wave equivalent power density

Table 5: FCC Limits for Maximum Permissible Exposure (MPE)

[8] Occupational/controlled limits apply in situations in which persons are exposed as a consequence of their employment provided those persons are fully aware of the potential for exposure and can exercise control over their exposure. Limits for occupational/controlled exposure also apply in situations when an individual is transient through a location where occupational/controlled limits apply provided he or she is made aware of the potential for exposure

[9] General population/uncontrolled exposures apply in situations in which the general public may be exposed, or in which persons that are exposed as a consequence of their employment may not be fully aware of the potential for exposure or cannot exercise control over their exposure

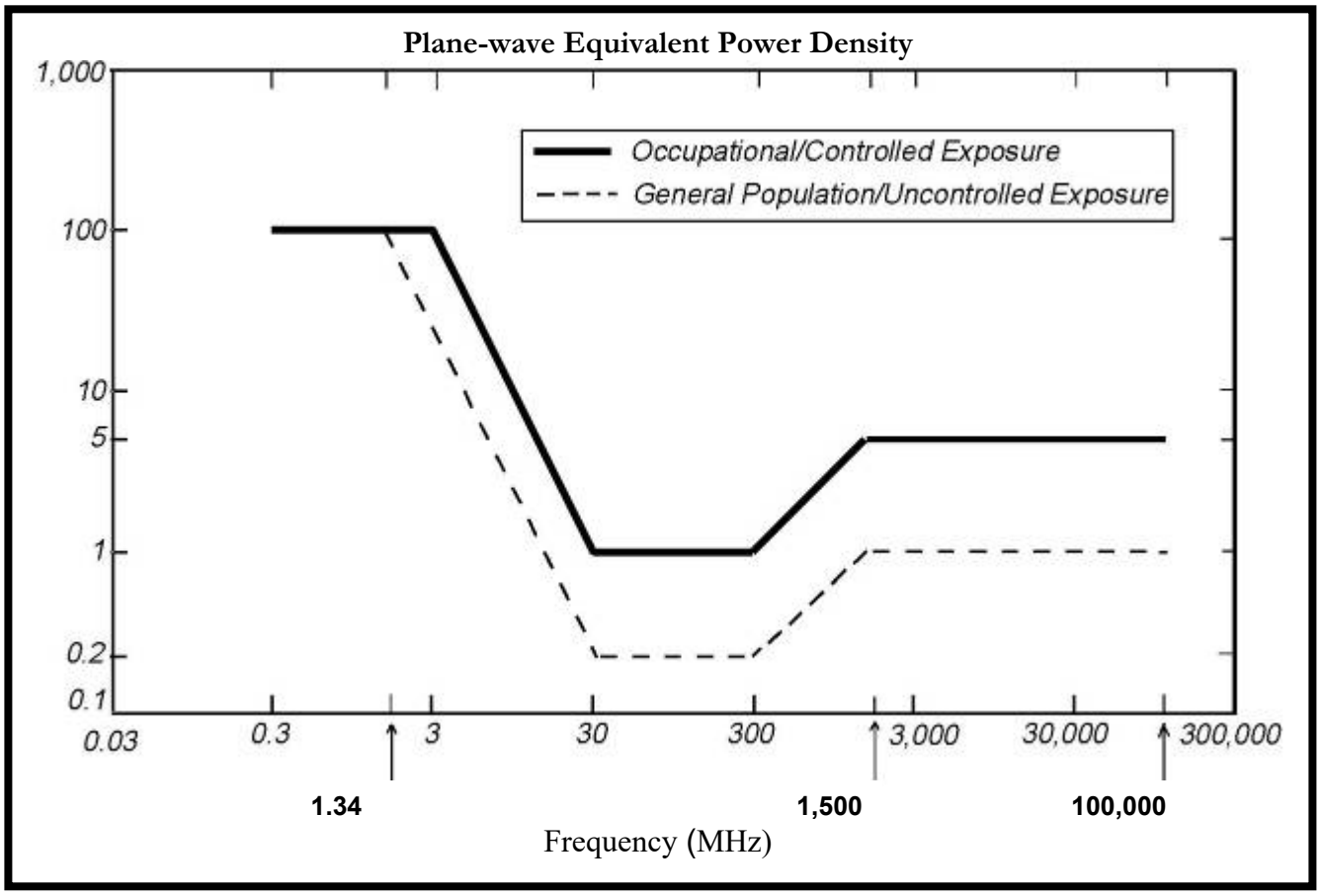

Figure 4: Graph of FCC Limits for Maximum Permissible Exposure (MPE)

Attachment C: Eversource Antenna Data Sheet and Electrical Patterns

217 MHz

Manufacturer:	COMMSCOPE
Model #:	HX8-6W-6GF
Frequency Band:	5.725-5.850 GHz
Gain:	39.45 dBd
Vertical Beamwidth:	1.3°
Horizontal Beamwidth:	1.3°
Polarization:	Dual-Polarization
Length:	8’