EVERSOURCE ENERGY

56 Prospect Street
P.O. Box 270
Hartford, CT 06141-0270

Kathleen M. Shanley
Manager - Transmission Siting
Tel: (860) 728-4527

August 12, 2016

Robert Stein, Chairman
Connecticut Siting Council
Ten Franklin Square
New Britain, CT 06051

Dear Chairman Stein:

The Connecticut Light and Power Company doing business as Eversource Energy ("Eversource") submits the attached original and fifteen (15) copies of a Request for Tower Sharing seeking the Council approval of the tower sharing of an existing telecommunications tower in Montville, Connecticut pursuant to the exemption provided under Sections 16-50j-88 to 16-50j-90 of the Regulations of Connecticut State Agencies.

Also, attached is a check for the filing fee in the amount of $625.

The Mayor of the Town of Montville (the Town is also the property owner) has been informed of the requested approval of sharing this tower in Montville.

Sincerely,

Kathleen M. Shanley
Manager - Transmission Siting

Attachment: Request for Tower Sharing

cc: Ronald K. McDaniel, Mayor, Town of Montville

THE CONNECTICUT LIGHT AND POWER COMPANY DOING BUSINESS AS EVERSOURCE ENERGY

REQUEST FOR TOWER SHARING ON AN EXISTING TELECOMMUNICATIONS FACILITY IN THE TOWN OF MONTVILLE, CONNECTICUT

A. Introduction:

Pursuant to Regulations of Connecticut State Agencies ("RCSA") §§16-50j-88 to 16-50j-90, and Connecticut General Statutes ("CGS") §16-50k, The Connecticut Light and Power Company doing business as Eversource Energy ("Eversource") hereby requests approval of the Connecticut Siting Council (the "Council") for tower sharing on an existing wireless telecommunications facility located at 911 Route 32 (Norwich New London Turnpike), Montville, Connecticut (the "Property"). The latitude and longitude of the location of this telecommunications facility are 41° 27' 04.37" N and 72° 06' 18.68" W respectively. Specifically, Eversource proposes to collocate on an existing telecommunications lattice tower (the "Tower") that is owned and maintained by the Town of Montville (the "Town"). The Tower is situated in the post office location of Uncasville, which is in the Town of Montville. Eversource submits that no certificate of environmental compatibility and public need pursuant to CGS §16-50k ("Certificate") is required because the proposed tower sharing would satisfy the requirements set out in RCSA §§16-50j-88 to 16-50j-90 and therefore would qualify for exemption.

B. Background:

Eversource is in the process of expanding its 900 megahertz ("MHz") Distribution Supervisory Control and Data Acquisition ("DSCADA") system throughout Connecticut. This system enhances the reliability of the electrical distribution system and public safety by means of remotely operating line disconnect equipment where wireless operated power switching equipment has been installed. Furthermore, Eversource is currently adding base stations throughout its service territory to improve land mobile radio voice communications with electrical workers when performing maintenance work on or repairs to the electric system infrastructure. The Town currently owns and operates a telecommunications tower located on the Property. The total height of the existing lattice tower is 145 feet above ground level ("AGL").

C. Project Description:

Eversource proposes to install one (1) Andrew DB589-Y 9-foot omnidirectional antenna mounted at 133 feet AGL on one (1) 3-foot side arm. The antenna will have a centerline elevation of 138 feet AGL.

Eversource also proposes to install radio equipment in the existing equipment room which also houses the Uncasville Fire Department ("UFD") radio transmitting and receiving equipment, and is located in an adjacent building. Emergency back-up power will be supplied by the UFD's existing generator. For elevation and location drawings of the proposed installations, please see Attachment A: Uncasville Project Plans.

The Town has agreed to Eversource's proposed installation (the "Project") and has entered into a lease agreement with Eversource to allow for the installation and to provide necessary associated rights to permit Eversource to access the Property. Please see Attachment B: Uncasville Tower Lease Agreement.

A structural loading analysis has been performed to determine if the tower and foundation are capable of supporting the additional loading from the proposed Eversource antenna system. This analysis was conducted by Centek Engineering, and it determined that the Tower and foundation are adequate to support the proposed antenna configuration. Please see Attachment C: Uncasville Structural Analysis. When Eversource's proposed installation is completed, the structural loading of the tower with the proposed equipment would be 84.4% of its total capacity.

D. The proposed installation would not have a substantial adverse environmental effect because:

1) Wetlands and Watercourses

There are no wetlands or watercourses located on or near the location of the proposed installation; therefore, the Project would not have an adverse effect on wetlands or watercourses.

2) Soil Erosion, Sediment Control, and Soil Remediation

This project would cause no ground disturbance and there would be no erosion.

3) Wildlife and Vegetation

The Project would not have a significant adverse effect on wildlife or vegetation because its scope is limited to the area within the existing fenced compound.

4) Noise

Sound emitted by the facility after completion of the proposed installation would not increase, and the sound levels would continue to comply with State and Town regulations.

5) Safety and Health

The proposed installation would not create any safety or health hazards to persons or property.

Radio-signal emissions from the proposed equipment, after the installation, would not exceed the total radio-frequency ("RF") electromagnetic power density level permitted by the Federal Communications Commission ("FCC"). To ensure compliance with the applicable standard, Eversource commissioned C Squared Systems to perform a calculated power-density analysis for the proposed Eversource antenna installation using the methodology prescribed by the FCC's

Office of Engineering and Technology ("OET") Bulletin No. 65, Edition 97-01 (August 1997). The analysis verifies that after completion of the proposed installation, composite emissions from the facility would be well below the maximum power density levels as outlined by the FCC in OET Bulletin 65 Ed. 97-01. The highest expected percentage of Maximum Permissible Exposure ("MPE"), occurring at ground level, is 0.25% of the FCC limit. For details of the analysis please refer to Attachment D: Uncasville MPE Report.

Eversource does not anticipate the need for specific traffic control measures during construction on the Property or during equipment and materials delivery. Subsequent to completion of construction, the proposed installations would not generate any additional traffic to the area other than periodic maintenance visits.

The Project would have minimal impact on the air quality in the area of the telecommunications facility. Eversource plans to use the existing outdoor emergency generator owned by the UFD to supply back-up power. As a result, the addition of the Eversource equipment to the facility would have only a negligible impact on emissions and those emissions would be consistent with present day levels.

6) Visual

The Project would have only minimal visual impact due to the dimensions and heights of the proposed antenna on the Tower. For a visual comparison of the existing and planned configurations, please refer to Attachment A.

7) Forests and Parks

The Property does not contain and does not abut any areas of recreation or public lands.

E. Schedule:

The proposed installation would begin as soon as practical after issuance of the requested approval by the Council and construction would be less than two months in duration. Eversource anticipates that construction would be completed by the end of the second quarter of 2016.

F. Conclusion:

RCSA §16-50j-88 provides that a Certificate is not required for a proposed sharing of a telecommunications facility that the Council determines satisfies the criteria set out in RCSA §§16-50j-88 to 16-50j-90. Based on the factors explained above, Eversource respectfully submits that the installation of the antenna and other equipment at this existing telecommunications facility would be technically, legally, environmentally and economically feasible and would satisfy the criteria of RCSA §§16-50j-88 to 16-50j-90 for exemption from the requirement for a Certificate. Accordingly, Eversource requests that

the Council issue an order approving this proposed tower sharing pursuant to RCSA §16-50j-88.

G. Communications regarding this Request for Tower Sharing should be directed to:

Kathleen M. Shanley
Manager – Transmission Siting
Eversource Energy
56 Prospect Street
Hartford, CT 06103
Telephone: (860) 728-4527

EVERSOURCE ENERGY

By: _____
Kathleen M. Shanley
Manager – Transmission Siting

Attachments:
Attachment A: Project Plans
Attachment B: Tower Lease Agreement
Attachment C: Structural Analysis
Attachment D: MPE Report

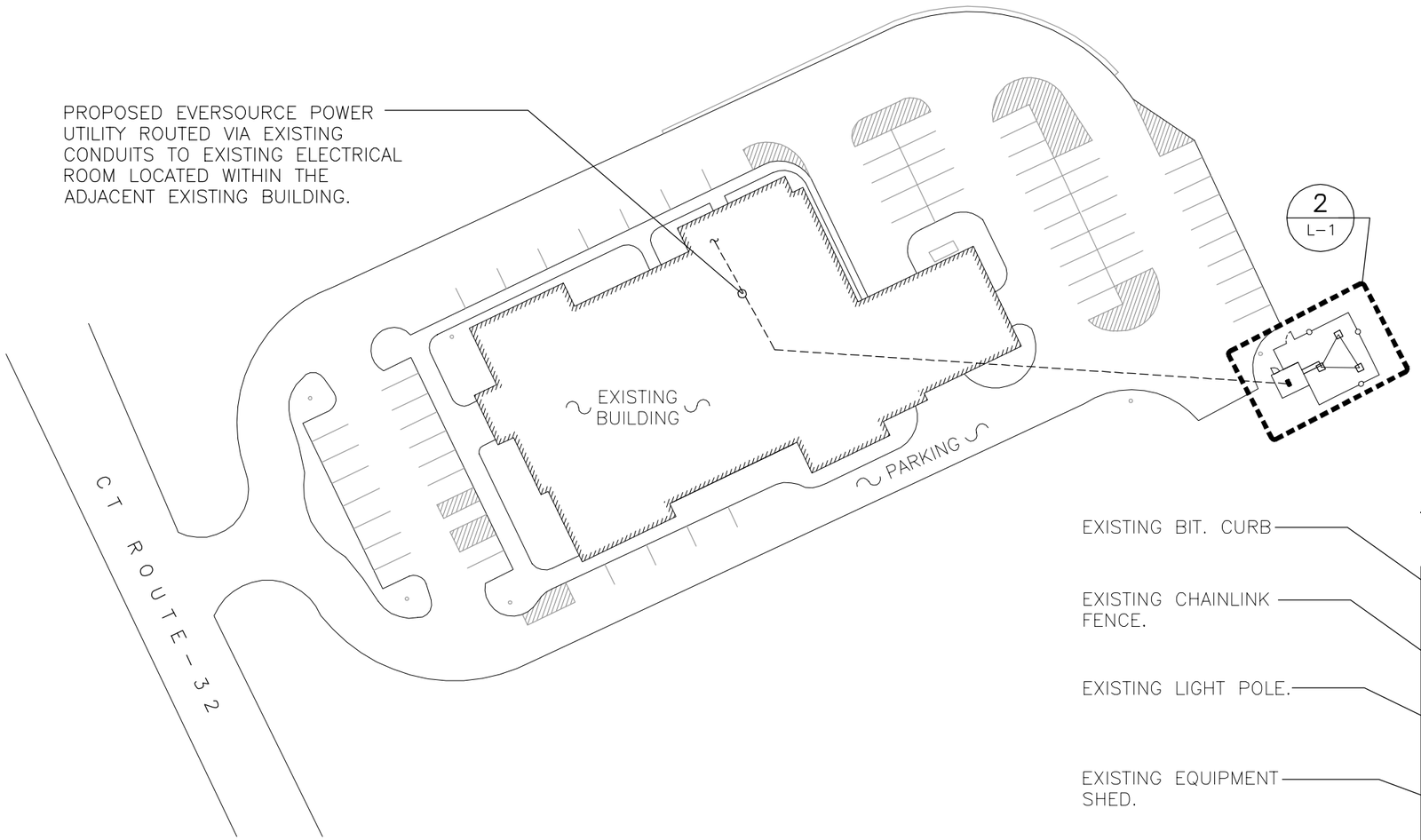
Attachment A:

Project Plans

NOTES:

1. THE PROPOSED EVERSOURCE ANTENNA INSTALLATION TO CONSIST OF A TOTAL OF (1) DECIBEL DB 589-Y OMNI ANTENNA AND ASSOCIATED CABLING.

2. POWER UTILITY SHALL BE ROUTED FROM THE EXISTING DEMARC WITHIN OR ADJACENT TO THE SUBJECT BUILDING. FINAL UTILITY DEMARC LOCATION AND ROUTING TO BE DETERMINED DURING CONSTRUCTION DOCUMENT PHASE OF THE PROJECT, AND WILL BE COORDINATED WITH BUILDING OWNER AND LOCAL UTILITY COMPANY REQUIREMENTS.



1 / L-1 **SITE LOCATION PLAN**

SCALE: 1" = 60'

APPROXIMATE NORTH

GRAPHIC SCALE

60 0 30 60 120 240

(IN FEET)

1 inch = 60 ft.

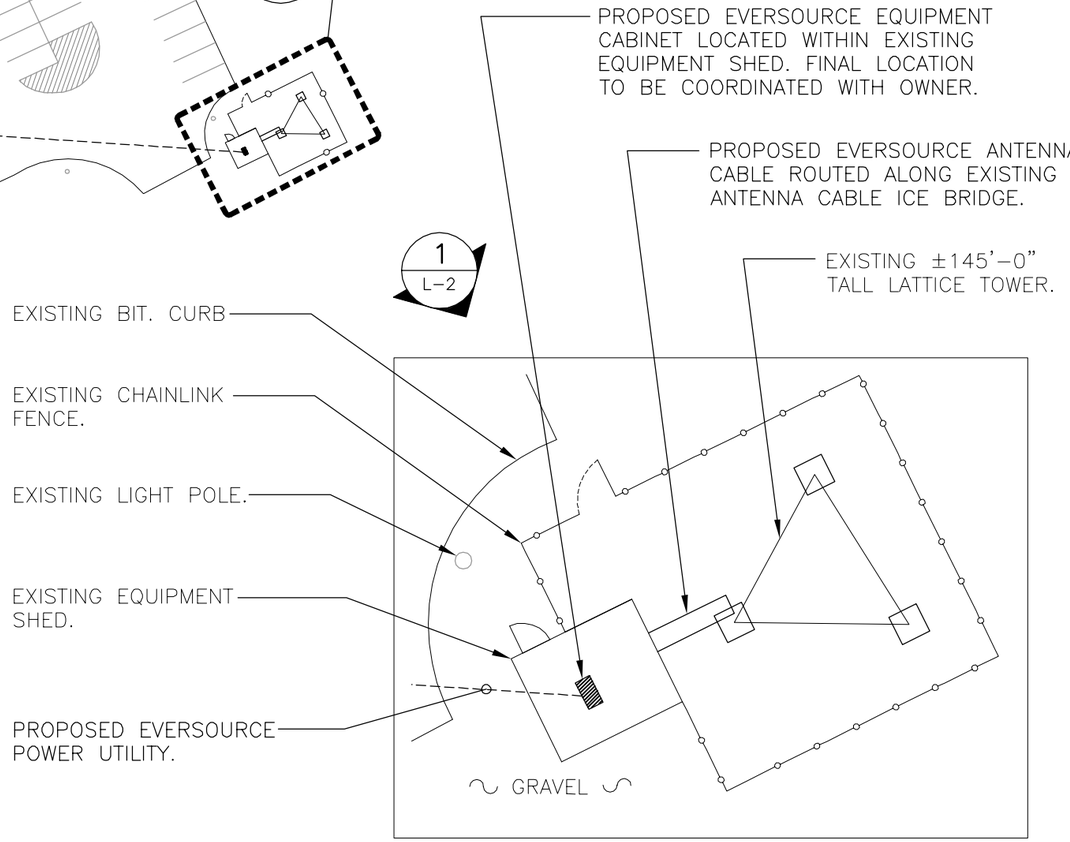
LEASE EXHIBIT

THIS LEASE PLAN IS DIAGRAMMATIC IN NATURE AND IS INTENDED TO PROVIDE GENERAL INFORMATION REGARDING THE LOCATION AND SIZE OF THE PROPOSED WIRELESS COMMUNICATION FACILITY. THE SITE LAYOUT WILL BE FINALIZED UPON COMPLETION OF SITE SURVEY AND FACILITY DESIGN.

SITE COORDINATES: LAT.: 41°-27'-4.37"
LNG.: 72°-06'-18.68"

GROUND ELEVATION: 37'± A.M.S.L.

SITE COORDINATES REFERENCED FROM CONNECTICUT SITING COUNCIL DATABASE.



2 / L-1 **COMPOUND PLAN**

SCALE: 1" = 15'

APPROXIMATE NORTH

REV.	DATE	DRAWN BY	CHK'D BY	DESCRIPTION
1	06/03/15	CTP	DMD	LEASE EXHIBIT - REVISED PER CLIENT COMMENTS
0	06/02/15	CTP	DMD	LEASE EXHIBIT - ISSUED FOR CLIENT REVIEW

PROFESSIONAL ENGINEER SEAL

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

EVERSOURCE ENERGY

UNCASVILLE CT

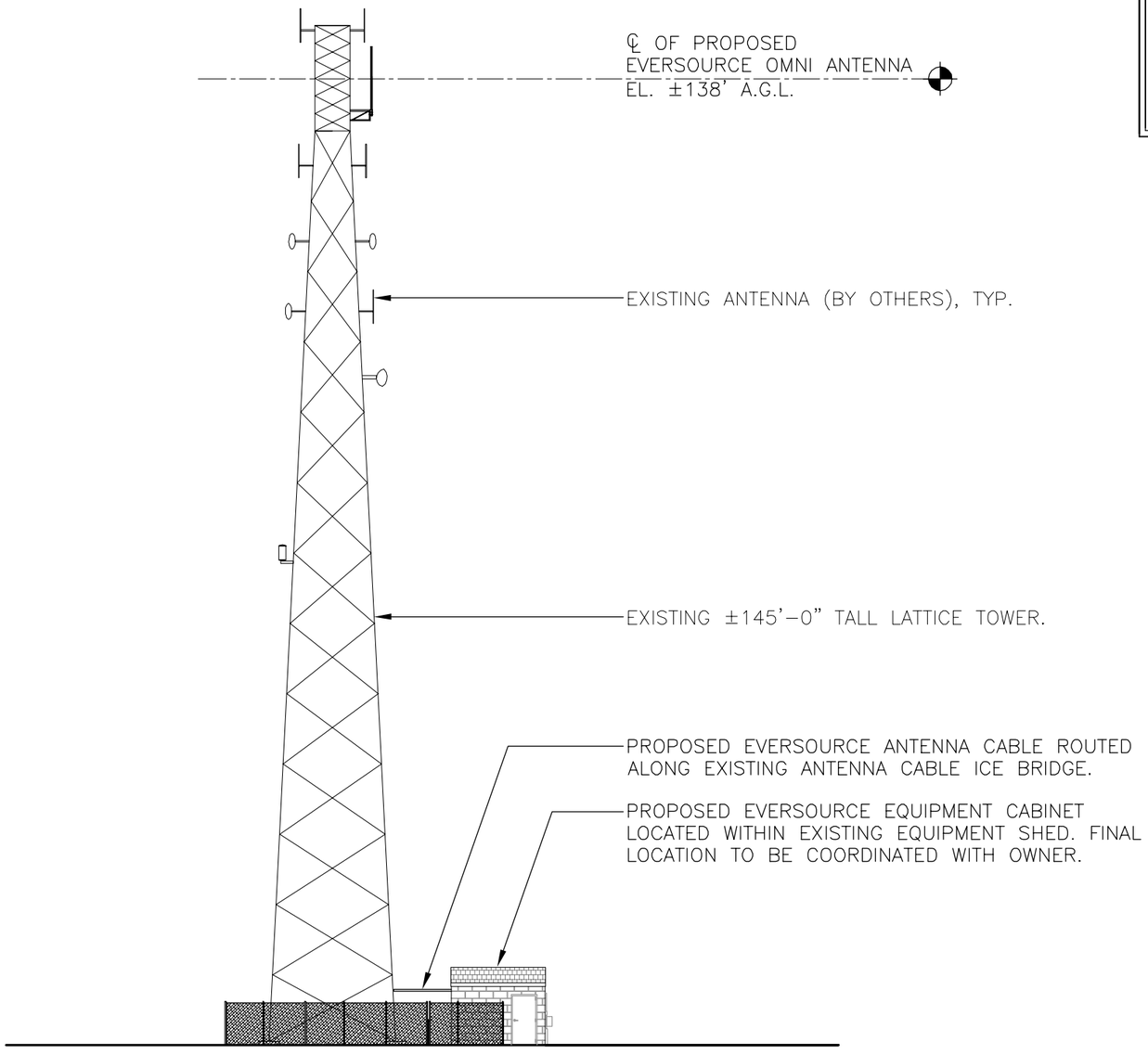
911 ROUTE 32
UNCASVILLE, CT

DATE:	06/02/15
SCALE:	AS SHOWN
JOB NO.	15122.000

SHEET NO.
L-1

LEASE EXHIBIT

THIS LEASE PLAN IS DIAGRAMMATIC IN NATURE AND IS INTENDED TO PROVIDE GENERAL INFORMATION REGARDING THE LOCATION AND SIZE OF THE PROPOSED WIRELESS COMMUNICATION FACILITY. THE SITE LAYOUT WILL BE FINALIZED UPON COMPLETION OF SITE SURVEY AND FACILITY DESIGN.



1 / L-2 **PARTIAL NORTH WEST ELEVATION**

SCALE: 1" = 20'

GRAPHIC SCALE

20 0 10 20 40 80

(IN FEET)

1 inch = 20 ft.

REV.	DATE	DRAWN BY	CHK'D BY	DESCRIPTION
1	06/03/15	CTP	DMD	LEASE EXHIBIT - REVISED PER CLIENT COMMENTS
0	06/02/15	CTP	DMD	LEASE EXHIBIT - ISSUED FOR CLIENT REVIEW

PROFESSIONAL ENGINEER SEAL

CENTEK engineering
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63-2 North Branford Road, Branford, CT 06405

EVERSOURCE ENERGY

UNCASVILLE CT

911 ROUTE 32
UNCASVILLE, CT

DATE:	06/02/15
SCALE:	AS SHOWN
JOB NO.	15122.000

SHEET NO.
L-2

Attachment B:

Tower Lease Agreement

LICENSE AGREEMENT

(Re: 911 Norwich New London Turnpike, Uncasville, CT)

THIS LICENSE AGREEMENT ("License") dated 6th June, 2016 is by and between THE CONNECTICUT LIGHT AND POWER COMPANY D/B/A **EVERSOURCE ENERGY** a Connecticut corporation having its principal office at 107 Selden Street, Berlin, Connecticut, 06037 ("Licensee"), and the **TOWN OF MONTVILLE,** a Connecticut municipal corporation with Offices at 310 Norwich-New London Turnpike, Uncasville, CT 06382 ("Licensor").

WITNESSETH

IN CONSIDERATION of the promises exchanged herein, and other good and valuable consideration, the receipt and sufficiency of which hereby acknowledged, Licensor and Licensee agree that:

NO TRANSFER OR RECORDING BY LICENSEE

1. This License is personal to Licensee and shall not be assigned, transferred or recorded by the Licensee without the express written consent of the Licensor which consent shall not be unreasonably withheld, denied or delayed. Notwithstanding the foregoing, the Licensee would be permitted to assign this License or rights hereunder to an affiliate within the Eversource Energy system. Under no circumstances shall this License be deemed to convey, transfer or grant any real property interest in the License Property (as defined in section 3 hereof) to the Licensee. Instead, the Licensee shall merely receive a license to use the License Property in accordance with the terms set forth herein. Licensor may assign or transfer this License to a successor-in-interest of the Land (as hereinafter defined) by providing written notice to Licensee. Notwithstanding anything in this License to the contrary, Licensor may withhold its consent to any proposed assignment of this License or any rights hereunder if the assignee cannot satisfy Licensor, in Licensor's sole discretion, that such assignee has the proper financial wherewithal, qualifications, permits, licensure, experience and ability to operate and maintain Licensee's equipment contemplated herein consistent with the Permitted Uses and to otherwise fulfill Licensee's obligations under this License.

TERM

2. This License commences on the later of the dates set forth on the signature page of this License ("Term Commencement Date") and shall continue for a term of five (5) years and will automatically renew thereafter for three (3) successive terms of five (5) years each unless sooner terminated in accordance with Section 7 of this License. The total term of the initial term and all renewal terms, if any, shall not exceed twenty (20) years unless otherwise agreed to in writing by the parties.

USES

3. Licensor is the owner of the tower and the land located at 911 Norwich New London Turnpike, in the Town of Montville, State of Connecticut (the "Land"), which Land is more particularly described on **EXHIBIT A** hereof.

   Licensor hereby grants to Licensee a non-exclusive license only over that portion of the Land where the "Proposed Eversource Power Utility", "proposed Eversource Equipment Cabinet", and "Proposed Eversource Antenna Cable" are displayed on the Site Location Plan attached as EXHIBIT B hereof, (the license area shall be defined herein as the "License Property"). This License is granted for the specific and limited purpose of allowing the Licensee to engage in the following activities on the License Property: install, use, maintain, repair, replace and operate, at Licensee's own expense, the antenna and telecom equipment (as indicated and described on Exhibit B attached hereto) on the Tower and portion of the Land immediately adjacent thereto, together with right to route electric and telecom distribution service via existing conduits to the existing electrical room located within the adjacent existing building on the Land, all as more particularly displayed and set forth on the attached **Exhibit B** ("Permitted Uses"); said Permitted Uses shall also include the temporary right by the Licensee and its representatives to temporarily access the License Property across other lands of the Licensor utilizing vehicles and also on foot together with the temporary parking of vehicles and the temporary storage of materials thereon. Licensee shall cooperate with the reasonable oral or written requests, instructions and/or directives of Licensor related to such access and storage, and shall not interfere with Licensor's operations on the Land and/or License Property.

   Notwithstanding anything in this Agreement to the contrary, Licensee acknowledges that this Agreement does not convey to Licensee the exclusive right (i) to utilize the License Property and/or Tower; (ii) to install telecommunications equipment on or at the License Property and/or Tower; and/or (iii) to run utilities to and/or from the existing building, License Property adjacent to and/or Tower. Licensee agrees that its rights with regard to the License Property, Tower and/or ground and/or Licensee's installation, operations, maintenance and/or repairs thereon and/or therefrom are non-exclusive in nature and such license rights are conveyed subject to all which Licensor may grant, assign, transfer or convey to third parties, related to and/or connected with the Land, Tower, ground and/or installations, operations and/or other activities thereon. Subject to section 4 of this License, the Licensor shall use all commercially reasonable efforts to avoid any material interference by Licensor or any of Licensor's current or future tenants or licensees with the Licensee's right to install, use, maintain, repair, replace and operate the antenna and telecom equipment. The parties understand that the plan attached as Exhibit B is diagrammatic in nature, and the final site layout shall be mutually agreed upon by the parties upon completion of the site survey and facility design – with any such agreement not to be unreasonably withheld, delayed or denied.

4. NON INTERFERENCE. Licensee acknowledges that Licensor currently utilizes the Land, License Property and Tower with its public safety building and may hereafter use such Tower for other purposes and/or grant rights to third parties to utilize such Tower in Licensor's sole discretion, including but not limited to rights to enter into other licenses and/or leases with third parties. It is also contemplated that Licensor will grant a lease or license to Verizon to allow installations

and use of antenna and communications equipment on and/or adjacent to the Tower and/or License Property.

Licensee agrees to install equipment of the type and frequency which will not cause harmful interference which is measurable and actionable in accordance with then existing industry standards to any current equipment of Licensor or of other lessees and/or licensees of the Property. Subject to the other provisions of this Agreement, Licensee shall at all times operate under this License, in its uses of the tower and of the License Property in a manner that is compatible and does not interfere in any material respects with the present and /or future uses of the tower, the License Property or Land by the Licensor and any other third party. Notwithstanding anything in this License to the contrary, if the Licensor reasonably determines that the Licensee's equipment is incompatible with such present or future uses of the tower, the License Property or Land, or is causing any negative and/or harmful electrical or physical interference with such, or with the Licensor's use of its telecommunications facilities, or those of other third party, including any future alterations, improvement or expansions necessary for the conduct of the Licensor's Business and/or current of future desired uses of the tower, License Property and/or Land, Licensor shall specify said incompatibility or interference in a written notice to Licensee. Upon such notice, Licensee will immediately take all commercially reasonable steps necessary to correct and eliminate interference, including but not limited to, at Licensee's option, powering down such equipment and later power up such equipment for intermittent testing. If such interference is causing an emergency situation such as it relates to Licensor's public safety communications capabilities, Licensee shall immediately power down its equipment to eliminate the interference at its sole cost and expense within Five (5) days after receipt of said notice; provided, however, that if the nature of Licensee's obligation is such that more than five (5) days after such notice is reasonably required for its performance, then it shall not be default under the License if performance commenced within such five (5) day period and thereafter diligently pursued to completion, subject to any indemnification obligations hereunder related to same, subject to immediate emergency shutdowns as contemplated in this section 4, provided in no event shall Licensee have greater than thirty (30) days to cure such default after written notice. If the Licensee fails to cure within such period, Licensee's rights with respect to the tower cited for the incompatibility or interference shall automatically terminate without further notice to the Licensee. Licensor may impose any reasonable conditions or restrictions necessary to prevent such incompatibility or interference. Licensee shall in good faith attempt to troubleshoot any interference issues it is having with other occupants of the Property. Licensee acknowledges that there will not be an adequate remedy at law for noncompliance with the provisions of this section 4 and therefore, Licensor shall have the right to equitable remedies, such as, without limitation, injunctive relief and specific performance.

Licensee shall provide notification to Licensor prior to accessing the tower. Licensee shall obtain written consent from Licensor prior to adding or removing any equipment from the tower with such consent not unreasonably withheld, delayed or denied.

Licensor shall provide one 30 amp breaker and generator backup to Licensee. Except for and in reasonable connection with the Permitted Uses, Licensee shall not perform any additional work or conduct any additional activities on the License Property without Licensor's prior consent. The Licensor shall have the right to impose conditions upon any additional work or activities Licensee proposes to conduct on the License Property. Within thirty (30) days of Licensor's submittal of an invoice, the Licensee shall reimburse Licensor for the reasonable out-of-pocket

expenses it paid to review any request for additional work (including but not limited to costs for administrative and attorney review, engineering and field inspection) not necessitated by the subsequent actions by or on behalf of the Licensor, its successors or assigns, or by its tenants and/or other licensees.

OTHER USES

5. Except to the extent described in Section 3, Licensee shall not undertake or permit:

   (a) Construction of any structures, fixtures or improvements on the License Property (excluding any improvements expressly authorized by Section 3 hereof); or

   (b) Parking or storage of materials or equipment on the License Property contrary to the terms and provisions of this License.

FEES AND CHARGES

6. The following fees and charges are due and payable by Licensee to Licensor under this License Agreement:

   (a) Subject to subsections 6(a)(i) and (ii) below, the monthly license fee and all other charges relating to the Permitted Uses are waived.

      (i) Starting with the beginning of the License's second five-year term, Licensor shall have the right, upon three (3) months' written notice to the Licensee, to review and adjust the amount of any fee owed by Licensee based on Licensor's assessment of the current fair market value of the rights and licenses granted to Licensee hereunder.

      (ii) Each payment owed by Licensee to Licensor under this LIcensee shall identify the date of this License and the location of the Property and invoices account number. Licensee shall ensure that no payment owned by Licensee to Licensor under this License shall be commingled with , or consolidated with, any payment(s) owed by Licensee to Licensor under any other agreement(s) between the parties; this requirement is necessary to facilitate the Licensor's billing system's tracking and monitoring of licensee fees owed and paid to Licensor.

TERMINATION

7. This License shall terminate upon the date specified in Section 2 or sooner with the occurrence of an one of the following events:

   (a) At Licensor's election, upon the date it is recorded without the written consent of the Licensor;
   (b) Immediately upon written notice from the Licensor if the Licensee breaches any condition of this License;
   (c) Without cause, upon 90 days prior written notice by either party, regardless of the five (5) year initial or automatic renewal terms set forth in section 2 hereof; or

(d) As of the date of any public taking , other than one brought by the town to the extent any portion of the License Property is condemned or taken in any manner for any public or quasipublic use.
(e) Upon mutual written agreement of the parties;
(f) If (i) a petition is filed against Licensee under any bankruptcy, reorganization, arrangement, composition, readjustment, liquidation, dissolution or insolvency law, and is not dismissed within sixty (60) days after such filing; or (ii) Licensee files a petition in voluntary bankruptcy or seeks relief under any provision of any bankruptcy, reorganization, arrangement, insolvency, readjustment of debt, dissolution or liquidation law of any jurisdiction, whether now or hereafter in effect, or consents to the filing of any petition against it under any such law, or (iii) makes any general assignment for the benefit of creditors or admits in writing its inability, or fails, to pay its debts generally as they become due, or consents to the appointment of a receiver, custodian, liquidator or trustee of itself, or of all or any part of its property, or (iv) Licensee is "insolvent", as hereafter defined; or (v) any trustee, custodian, receiver or liquidator of Licensee is appointed by court order, or any order for relief is entered with respect to Licensee; or (vi) Licensee is adjudicated bankrupt or insolvent, or any of the property of any of them is sequestered by court order. For purposes of this paragraph, a person or entity shall be deemed to be insolvent if he, she or it is unable to pay its debts as they become due or if the fair market value of his, her or its assets do not exceed his, her or its aggregate liabilities

Termination shall not affect the Licensee's obligations under this License arising on or before the effective date of termination and/or obligations that survive termination of this License, including but not limited to obligations for indemnity and reimbursement.

IMPROVEMENTS AND RESOTRATION

8. On or before the date of termination of the License, all improvements made by the Licensee to the License Property (including any improvements made by Licensee that are expressly permitted by Section 3 hereof) and all personal property of the Licensee shall be removed at the Licensee's sole cost and risk and the Licensee shall restore the License Property to the condition that existed at the commencement of Licensee's use, to the reasonable satisfaction of the Licensor. Any improvements or personal property remaining on the License Property forty-five (45) days following termination shall, at the sole option of the Licensor, either:

(a) Be deemed the property of the Licensor, and Licensee shall promptly execute any appropriate documents of transfer, or
(b) Be removed by the Licensor without the liability to the Licensee and all costs for removal, disposal and property restoration shall be paid by Licensee. The Licensee will be required to reimburse the Licensor for the expenses of such disposal within thirty (30) days from the date of the Licensor's invoice.

Nothing in this section 8 should be construed as permitting Licensee access to the property after termination of this License; provided, however, if such access is granted, Licensee shall continue to maintain all insurance during such access pursuant to section 13 of this License.

POLLUTANTS/PERMITS

9. Licensee shall not at any time use or store any pollutant or hazardous material on the License Property, and shall at all times maintain the License Property in a safe and lawful condition. Upon Licensor's request, Licensee shall provide evidence reasonably satisfactory to Licensor that all required consents or permits are in force for Licensee's use of the License Property.

COMPLIANCE WITH LAWS

10. The Licensee shall comply with, and shall cause the License Property solely in connection with Licensee's use to comply with, all applicable local, county, state and federal laws, statutes, regulations, codes, ordinances and/or other laws of every description, including but not limited to zoning, building, engineering, sanitation, health and environmental laws (collectively, "Laws"); and Licensee shall promptly remedy and breach of same.

INSPECTION OF THE LICENSE PROPERTY

11. The Licensee acknowledges that it has inspected the License Property and has determined it to be suitable for Licensee's use. The Licensee agrees that it is not relying on any oral or written representation of the Licensor concerning the License Property, including but not limited to, title, use, permitted uses, dimensions, soil conditions, environmental conditions, municipal restrictions, municipal planning and/or zoning requirements, and uses by adjoining or third parties. The License Property is being licensed on an "AS IS" basis to the Licensee.

LICENSOR'S USE OF THE LICENSE PROPERTY

12. Intentionally Omitted by the Parties

INSURANCE

13. For as long as this License is in effect, and as a condition to entering the License Property, Licensee must provide evidence of at least the following insurance coverage:

    (a) Worker's Compensation insurance in the amount of coverage required by applicable Connecticut law.
    (b) Comprehensive General Liability insurance, including broad form property damage liability, with a combined single limit for bodily injury and property of at least $2,000,000 per occurrence and in the annual aggregate.
    (c) If the Licensee, its employees or agents will or potentially will be operating motor vehicles on the License Property, then the Licensee shall also provide the Licensor with proof of Auto Liability insurance, and the amount and scope of said insurance must be reasonably acceptable to Licensor.
    (d) All insurance policies required to be maintained by Licensee pursuant to Sections 13(b) and 13(c) of this License Agreement shall be endorsed to: (i) name Licensor, its councils, boards,

officers, officials, commissions, departments, volunteers, directors, officers, employees, affiliates, successors and assigns as additional insured with respect to any and all third party bodily injury and/or property damage; (ii) contain a waiver of subrogation in favor of the additional insureds; (iii) be primary to any similar insurance or self-insurance maintained by the additional insureds and (iv) require that thirty (30) days written notice be given to Licensor prior to any cancellation or material change in any insurance policy.

(e) All certificates of insurance shall list the location of the License Property.

(f) On each anniversary of the Term Commencement Date (as defined in Section 2 hereof), the Licensee shall provide the Licensor with updated certificate(s) of insurance to ensure that the Licensee is in compliance with the insurance requirements of this Section 13.

(g) Subject to section 13(f), at any time during the term of this License, the Licensee shall provide the Licensor, within 10 days' of the Licensor's request therefor, with documentation which verifies that Licensee is in compliance with the insurance requirements of this Section 13.

(h) Licensee may self-insure for any or all of its obligations under this Section 13.

Licensor shall be responsible for maintaining fire and/or casualty insurance on its Tower and Licensee shall be responsible for maintaining fire and/or casualty insurance on Licensee's equipment and property installed hereunder.

INDEMNIFICATION

14. The Licensee shall indemnify and hold harmless the Licensor, its councils, boards, officers, commissions, departments, volunteers, directors, officers, officials, employees, affiliates, successors and assigns from any and all claims, costs (including any attorneys' fees), loss, damages or liability whatsoever for injury to persons (including death) or damage to property (including environmental damage to the License Property or abutting properties or waters) (collectively "Claims") caused by or resulting from any one or more of the following: (a) the use, misuse and/or abandonment of the License Property by Licensee, its employees or its agents, (b) the breach or default of this License by Licensee, its employees or its agents, (c) the negligent and/or willful acts or omissions of Licensee, its employees or agents in connection with and/or relating to this License, or (d) the violation of any Laws by Licensee, its employees or its agents – except to the extent any such claim, cost, loss, damage or liability is caused by or results from any negligence and/or willful act or omission by Licensor, its employees and/or agents. The Licensee's indemnification obligations shall survive the termination and expiration of this License.

NOTICES

15. All notices permitted or required to be made by the Licensee or the Licensor will be considered to be received upon (i) personal delivery, (ii) delivery to the recipient via a nationally recognized overnight courier service (e.g. UPS or Federal Express) provided a receipt confirming such delivery can be provided by the courier service or (iii) three (3) business days following mailing of a notice by certified U.S. mail, postage prepaid, return receipt requested to:

Licensee: Marco V. Charamella, Supervisor
Real Estate Management
Eversource Energy Service Company
107 Selden Street, Berlin CT 06037

Licensor: Town of Montville
c/o Mayor's Office
310 Norwich-New London Tpke.
Uncasville, CT 06382

CONTINUING OBLIGATION

16. The termination and/or expiration of this License shall not alter or terminate the Licensee's obligations as established by this License for events which take place on or before the effective date of termination.

ENTIRE AGREEMENT

17. This License constitutes the entire agreement between the Licensor and the Licensee with respect to the License Property and no oral statement, promises, express or implied warranties or other understanding except those expressly set forth in this License shall be valid unless reduced to writing and signed by both parties on or after the date of this License.

AUTHORITY

18. If Licensee is a corporation, partnership or limited liability company, then each individual executing this License on behalf of said entity represents, covenants and warrants that:

    (a) He or she is duly authorized to execute and deliver this License on behalf of said entity in accordance with : (i) if Licensee is a corporation, a duly adopted resolution of the Board of Directors of said corporation or in accordance with the by-laws of said corporation, (iii) if Licensee is a partnership, the terms of the partnership agreement, and (iii) if Licensee is a limited liability company, the terms of its operating agreement, and that this License is binging upon said entity in accordance with its terms.
    (b) No additional consents, waivers or approvals are necessary for the Licensee to enter into and fully perform under this License Agreement.

GOVERNING LAW AND DISPUTE RESOLUTION

19. Disputes arising out of, or in connection with, this License are governed by the following requirements:

    (a) Licensor and Licensee agree that this License and any and all claims and disputes arising out of, or in connection with, this License will be governed by and construed in accordance with the laws of the State of Connecticut.
    (b) Licensor and Licensee hereby agree that: (i) the appropriate Connecticut state trial court shall have exclusive jurisdiction over the actions arising out of, or in connection with, this License and the subject matter of this License, whether in contract, tort, or any other form of action (individually and collectively, "Action"); and (ii) agree to initiate each such Action against the other party only in the courts described in subsection (b)(i) above. THE LICENSEE HERBY IRREVOCABLY AND UNCONDITIONALLY WAIVES ITS RIGHT TO CHALLENGE ITS

AGREEMENT THAT ALL SUCH ACTIONS SHALL BE FILED IN STATE COURT DESCRIBED IN THIS SUBSECTION (b).

(c) In the event that Licensee defaults or breaches any term, provision or covenant of this License, then the Licensor shall immediately be entitled to: (i) terminate this License and/or (ii) initiate an Action to seek any and all remedies available to Licensor under this License, at law and /or in equity, including but not limited to specific performance and/or injunctive relief. All costs reasonably incurred by the Licensor to enforce its rights under this License, including but not limited to the Licensor's reasonable attorneys' fees, legal expenses and court costs, shall be paid for by the Licensee within 30 days' of the Licensee's receipt of a request for such reimbursement from the Licensor only if the Licensor is the prevailing party in any litigation or enforcement action associated with this License.

(d) NOTWITHSTANDING ANY PROVISIONS OF THIS LICENSE AGREEMENT TO THE CONTRARY, THE LICENSEE AND THE LICENSOR EACH ACKNOWLEDGES AND AGREES THAT UNDER NO CIRCUMSTANCES SHALL EITHER PARTY BE LIABLE TO THE OTHER FOR ANY CONSEQUENTIAL DAMAGES, SPECIAL DAMAGES, INDIRECT DAMAGES, PUNITIVE DAMAGES AND LOST PROFITS IN CONNECTION WITH, OR ARISING OUT OF, THIS LICENSE AGREEMENT.

(e) EACH PARTY ACKNOWLEDGES THAT: (i) IT HAS READ THIS LICENSE AGREEMENT; (ii) IT HAS HAD THE OPPORTUNITY, IF IT SO ELECTED, TO CONSULT WITH LEGAL COUNSEL OF ITS OWN CHOICE DURING THE PREPARATION, NEGOTIATION, AND EXECUTION OF THIS LICENSE AGREEMENT, (iii) IT UNDERSTNADS THE TERMS AND CONSEQUENCES OF THIS LICENSE AGREEMENT AND OF THE RELEASES, WAIVERS AND OBLICATIONS IT CONTAINS; AND (iv) IT IS FULLY AWARE OF THE LEGAL AND BINDING EFFECT OF THIS LICENSE AGREEMENT.

NO MECHANIC'S LIENS

20. Licensee shall not create or suffer to be created or to remain, and shall discharge, any mechanic's. laborer's or materialman's lien which might be or become a lien, encumbrance or charge upon the License Property, the Land and/or any parts thereof or the income therefrom, and will not suffer any other matter or thing, arising solely out of Licensee's use and/or operation on the License Property whereby the estate, rights and interests of Licensor might be impaired.

    If any mechanic's, laborer's or materialman's lien arising from work procured by Licensee shall at any time be filed against the License Property, Land or any part thereof, Licensee, within forty-five (45) days after notice of the filing thereof, shall cause such lien to be discharged of record by payment, deposit, bond, order of a court of competent jurisdiction or otherwise. If Licensee shall fail to cause such lien to be discharged within such period, then, in addition to any other right or remedy, Licensor may, but shall not be obligated to, discharge the same either by paying the amount claimed to be due or by procuring the discharge of such lien by deposit or by bonding, and in any such event, Licensor shall be entitled, if Licensor so elects, to compel the prosecution of an action for the foreclosure of such lien by the lienor and to pay the amount of the judgment in factor of the lienor with interest, costs and allowances. Any amount so paid by Licensor and costs and expenses incurred by Licensor in connection therewith, together with interest thereon at the rate of ten (10%) percent per annum (provided, however, that said interest shall in no event be at a rate greater than that legally payable by Licensee under applicable law), from the respective dates of Licensor's making of the payment or incurring of the cost and expenses and shall be paid by Licensee to Licensor on demand. Nothing in this License shall be deemed or construed in any way as constituting the authorization by, or

consent or request of, Licensor, express or implied, by inference or otherwise, to any contractor, subcontractor, laborer or materialman, architect or consultant for the construction of demolition of any improvement, the performance of any labor or services or the furnishing of any materials for any improvement upon, or alteration to or repair of the License Property, Land or any part thereof or to give Licensee any right, power or authority to contract or permit the rendering of any services or the furnishing of any materials that would give rise to the filing of any lien against the License Property, Land or any part thereof.

RIGHT TO ENTER

21. The License will have no right to enter or use the License Property until (a) one copy of this License, signed by both parties, has been delivered to the Licensee and (b) License has provided this Licensor with insurance certificate(s) required by Section 13 of this License.

IN WITNESS WHEREOF, and intending to be legally bound hereby the Parties have duly executed this License Agreement, as of the day and year first written above.

LICENSEE: THE CONNECTICUT LIGHT AND POWER COMPANY D/B/A EVERSOURCE ENERGY

By _____

_____

Name: Marco V. Charamella
Title: Supervisor, Real Estate
Eversource Agent, Duly Authorized
Date: 6/6/16

LICENSOR: TOWN OF MONTVILLE

By _____

_____

Name: Ronald McDaniel

Title: Mayor

Date: 6/7/16

EXHIBIT A

Legal Description – 911 Route 32, Uncasville, CT

EXHIBIT B

See attached map/diagram/sketch showing the License Property subject to this License
Equipment list, contact telephone numbers, etc.

Equipment List:

Standard 19inch Equipment Rack
One DB-589-Y Oni Antenna
7/8 Coax Cable from radio to antenna (150 feet)
UPS back up power supply
Telephone circuit
MHZ RX 935-939 Radio

Attachment C:

Structural Analysis

CENTEK engineering

Centered on Solutions℠

Structural Analysis Report

145' Valmont Lattice Tower

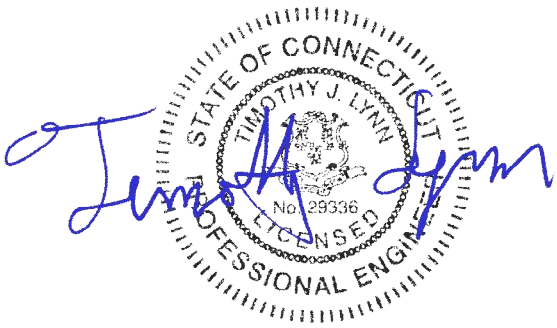
Proposed Eversource
Antenna Installation

911 Route 32
Uncasville, CT

CENTEK Project No. 15122.000

~~Date: May 21, 2015~~

Rev 1: December 7, 2015



Prepared for:

Eversource
56 Prospect Street
Hartford, CT 06103

63-2 North Branford Road, Branford, CT 06405 203.488.0580 Fax 203.488.8587 www.CentekEng.com

Table of Contents

Introduction

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

The host tower is a 145-ft, three legged, lattice tower designed and manufactured by Valmont eng. file no. A-158420 dated November 11, 2011. The tower geometry, structure member sizes and foundation information were taken from the original design documents.

Antenna and appurtenance inventory were taken from an antenna schedule provided by Montville PD, visual verification from grade conducted by Centek personnel on May 8, 2015, a previous structural analysis prepared by Centek for Verizon Wireless job no. 15115.000 dated May 19, 2015 and information provided by Eversource.

The tower consists of eight (8) vertical sections consisting of solid round legs and truss legs conforming to ASTM A572 Gr. 50 and solid round lateral bracing conforming to ASTM A572 Gr. 50 and angle lateral bracing conforming to ASTM A36. The vertical tower sections are connected by bolted flange plates with the diagonal and horizontal bracing to pipe legs consisting of bolted connections. The width of the tower face is 5.0-ft at the top and 18.0-ft at the bottom.

Eversource proposes the installation of one (1) Omni-directional whip antenna mounted on 3-ft sidearm. Refer to the Antenna and Appurtenance Summary below for a detailed description of the proposed antenna and appurtenance configuration.

Antenna and Appurtenance Summary

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

- Unknown (Existing):
  Antenna: Two (2) Telewave ANT150F2 Omni-directional whips, one (1) Kreco CO41A Omni-directional whip and one (1) Telewave ANT450F2 Omni-directional whip mounted on three (3) 3-ft side arms with an elevation of ±145-ft above grade level.
  Coax Cable: Four (4) 1/2" ∅ coax cables running on a leg of the existing tower as specified in Section 3 of this report.
- Unknown (Existing):
  Antenna: Two (2) Telewave ANT150F2 Omni-directional whips and one (1) Kreco CO156AN Omni-directional whip mounted on three (3) 3-ft side arms with an elevation of ±125-ft above grade level.
  Coax Cable: Two (2) 1/2" ∅ and one (1) 7/8" ∅ coax cables running on a leg of the existing tower as specified in Section 3 of this report.
- Unknown (Existing):
  Antenna: Two (2) Telewave ANT150D dipoles mounted on two (2) 3-ft standoffs with an elevation of ±115-ft above grade level.
  Coax Cable: Two (2) 1/2" ∅ coax cables running on a leg of the existing tower as specified in Section 3 of this report.
- Unknown (Existing):
  Antenna: One (1) Telewave ANT150F2 Omni-directional whip mounted on one (1) 3-ft side arm with an elevation of ±110-ft above grade level.

Coax Cable: One (1) 1/2" ∅ coax cable running on a leg of the existing tower as specified in Section 3 of this report.

- Unknown (Existing):
  Antenna: One (1) Telewave ANT150D dipole and one (1) 10-ft Omni-directional whip mounted on one (1) 3-ft side arm and one (1) 3-ft standoff with an elevation of ±105-ft above grade level.
  Coax Cable: Two (2) 1/2" ∅ coax cables running on a leg of the existing tower as specified in Section 3 of this report.
- Unknown (Existing):
  Antenna: One (1) Telewave ANT150D dipole mounted on one (1) 3-ft standoff with an elevation of ±102-ft above grade level.
  Coax Cable: One (1) 1/2" ∅ coax cable running on a leg of the existing tower as specified in Section 3 of this report.
- Unknown (Existing):
  Antenna: One (1) Radiowaves SPD2-4.7 microwave dish pipe mounted with an elevation of ±95-ft above grade level.
  Coax Cable: Two (2) 1/2" ∅ coax cables running on a leg of the existing tower as specified in Section 3 of this report.
- VERIZON (Reserved):
  Antennas: One (1) Andrew NH65PS-DG-F0M antenna and one (1) Alcatel-Lucent RRH2x60-AWS remote radio head leg mounted with a RAD center elevation of ±70-ft above grade level.
  Coax Cables: One (1) 1-5/8" ∅ fiber cable running on a leg of the tower as specified in Section 3 of this report.
- **Eversource (Proposed):**
  Antenna: One (1) Andrew DB589-Y Omni-directional whip mounted on one (1) 3-ft side arm with an elevation of ±133-ft above grade level.
  Coax Cable: One (1) 1-1/4" ∅ coax cable running on a leg 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 coax cables should be routed as specified in section 3 of this report.

A n a l y s i s

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 shaft, and the model assumes that the shaft members are subjected to bending, axial, and shear forces.

The existing tower was analyzed for the controlling basic wind speed (fastest mile) with no ice and a 75% reduction of wind force with ½ inch accumulative ice to determine stresses in members as per guidelines of TIA/EIA-222-F-96 entitled "Structural Standards for Steel Antenna Towers and Antenna Supporting Structures", the American Institute of Steel Construction (AISC) and the Manual of Steel Construction; Allowable Stress Design (ASD).

The controlling wind speed is determined by evaluating the local available wind speed data as provided in Appendix K of the CSBC[1] and the wind speed data available in the TIA/EIA-222-F-96 Standard. The higher of the two wind speeds is utilized in preparation on the tower analysis.

T o w e r L o a d i n g

Tower loading was determined by the basic wind speed as applied to projected surface areas with modification factors per TIA/EIA-222-F, gravity loads of the tower structure and its components, and the application of ½" radial ice on the tower structure and its components.

Basic Wind Speed:	New London; v = 85 mph (fastest mile)	*[Section 16 of TIA/EIA-222-F-96]*
	Uncasville (Montville); v = 115 mph (3 second gust) equivalent to v = 95 mph (fastest mile)	*[Appendix K of the 2005 CT Building Code Supplement]*
	Appendix-K wind speed controls.	
Load Cases:	Load Case 1; 95 mph wind speed w/ no ice plus gravity load – used in calculation of tower stresses and rotation.	*[Section 2.3.16 of TIA/EIA-222-F-96]*
	Load Case 2; 82 mph wind speed w/ ½" radial ice plus gravity load – used in calculation of tower stresses. The 82 mph wind speed velocity represents 75% of the wind pressure generated by the 95 mph wind speed.	*[Section 2.3.16 of TIA/EIA-222-F-96]*
	Load Case 3; Seismic – not checked	*[Section 1614.5 of State Bldg. Code 2005] does not control in the design of this structure type*

[1] The 2005 Connecticut State Building Code as amended by the 2009 CT State Supplement. (CSBC)

Tower Capacity

Tower stresses were calculated utilizing the structural analysis software tnxTower. Allowable stresses were determined based on Table 5 of the TIA/EIA code with a 1/3 increase per Section 3.1.1.1 of the same code.

- Calculated stresses were found to be within allowable limits. In Load Case 2, per tnxTower "Section Capacity Table", this tower was found to be at **84.8%** of its total capacity.

Tower Section	Elevation	Stress Ratio (percentage of capacity)	Result
Leg (T8)	0'-0"-20'-0"	83.0%	**PASS**
Diagonal (T8)	0'-0"-20'-0"	84.8%	**PASS**

Foundation and Anchors

The existing foundation consists of three (3) 3.0-ft square x 4.5-ft long reinforced concrete piers on a 26.5-ft square x 1.5-ft thick reinforced concrete pad bearing directly on existing sub grade. The sub-grade conditions used in the analysis of the existing foundation were obtained from the aforementioned design documents. Tower legs are connected to the foundation by means of (6) 1.0"∅, ASTM F1554 GR. 105 anchor bolts per leg, embedded 5-ft into the concrete foundation structure.

- The tower reactions developed from the governing Load Case 2 were used in the verification of the foundation:

Reactions	Vector	Proposed Base Reactions
Base	Shear	**21 kips**
	Compression	**23 kips**
	Moment	**1527 kip-ft**
Leg	Shear	**13 kips**
	Uplift	**106 kips**
	Compression	**83 kips**

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

Tower Component	Design Limit	Stress Ratio (percentage of capacity)	Result
Anchor Bolts	Tension	30.2%	**PASS**

- The foundation was found to be within allowable limits.

Foundation	Design Limit	IBC 2003/2005 CT State Building Code Section 3108.4.2 (FS)[1]	Proposed Loading (FS)[1]	Result
Reinforced Concrete Mat	OM[2]	2.0	3.98	**PASS**

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

Conclusion and Recommendations

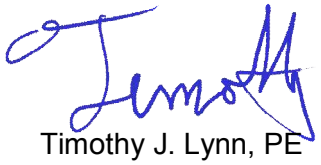
This analysis shows that the subject tower **is adequate** to support the proposed antenna configuration with the below recommendations.

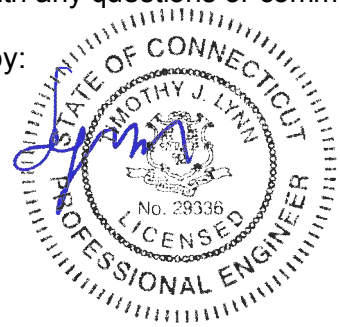
- **All coax cables routed as specified in Section 3 of this report**

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.

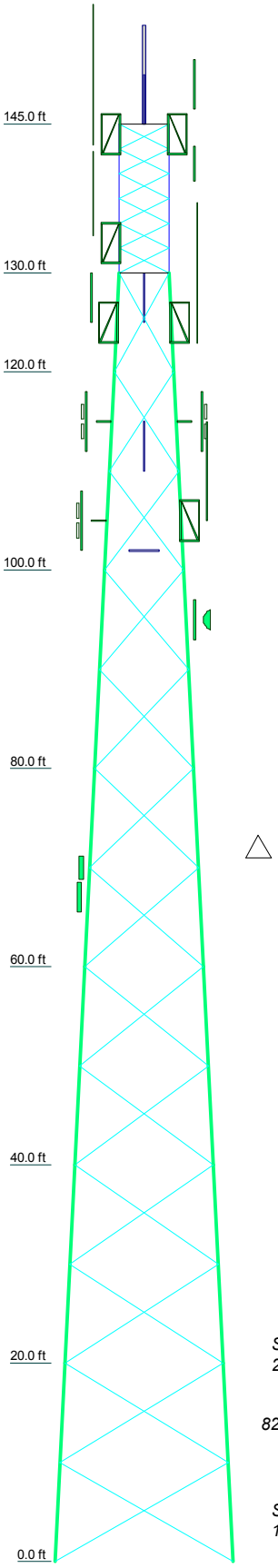
GENERAL DESCRIPTION OF STRUCTURAL ANALYSIS PROGRAM

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
Legs	SR 1 3/4	Pirod 207628						
Leg Grade	A572-50							
Diagonals	SR 7/8	L2 1/2x2 1/2x3/16						L3x3x3/16
Diagonal Grade	A572-50	A36						
Top Girts	SR 7/8	A	N.A.					
Face Width (ft)	5	6	8	10	12	14	16	18
# Panels @ (ft)	6 @ 2.5	13 @ 10						
Weight (K)	0.8	0.7	1.4	1.4	1.5	1.5	1.7	1.8



DESIGNED APPURTENANCE LOADING

TYPE	ELEVATION	TYPE	ELEVATION
10-ft Lightning Rod	145	ANT150D	115
ANT150F2	145	3' Pipe Mount Side Arm	115
ANT150F2	145	ANT150D	115
ANT450F2	145	3' Pipe Mount Side Arm	115
CO-41A	145	3' Side Mount Standoff	110
3' Side Mount Standoff	144	ANT150F2	110
3' Side Mount Standoff	144	3' Side Mount Standoff	105
3' Side Mount Standoff	144	ANT150D	105
DB589-Y (Eversource Proposed)	138	3' Pipe Mount Side Arm	105
3' Side Mount Standoff (Eversource Proposed)	133	10' x 3" Dia Omni	105
		ANT150D	102
ANT150F2	125	3' Pipe Mount Side Arm	102
CO156AN	125	4'x4" Pipe Mount	95
3' Side Mount Standoff	125	SPD2-4.7	95
3' Side Mount Standoff	125	NH65PS-DG-F0M (Verizon Reserved)	70
ANT150F2	125	RRH2x60-AWS (Verizon Reserved)	67
3' Side Mount Standoff	125		

SYMBOL LIST

MARK	SIZE	MARK	SIZE
A	L2 1/2x2 1/2x3/16		

MATERIAL STRENGTH

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

TOWER DESIGN NOTES

1. Tower designed for a 95 mph basic wind in accordance with the TIA/EIA-222-F Standard.
2. Tower is also designed for a 82 mph basic wind with 0.50 in ice.
3. Deflections are based upon a 50 mph wind.
4. Weld together tower sections have flange connections.
5. Connections use galvanized A325 bolts, nuts and locking devices. Installation per TIA/EIA-222 and AISC Specifications.
6. Tower members are "hot dipped" galvanized in accordance with ASTM A123 and ASTM A153 Standards.
7. Welds are fabricated with ER-70S-6 electrodes.
8. TOWER RATING: 84.8%

MAX. CORNER REACTIONS AT BASE:
DOWN: 106 K
SHEAR: 11 K

UPLIFT: -83 K
SHEAR: 13 K

AXIAL 23 K
SHEAR 21 K *MOMENT 1527 kip-ft*
TORQUE 9 kip-ft
82 mph WIND - 0.5000 in ICE

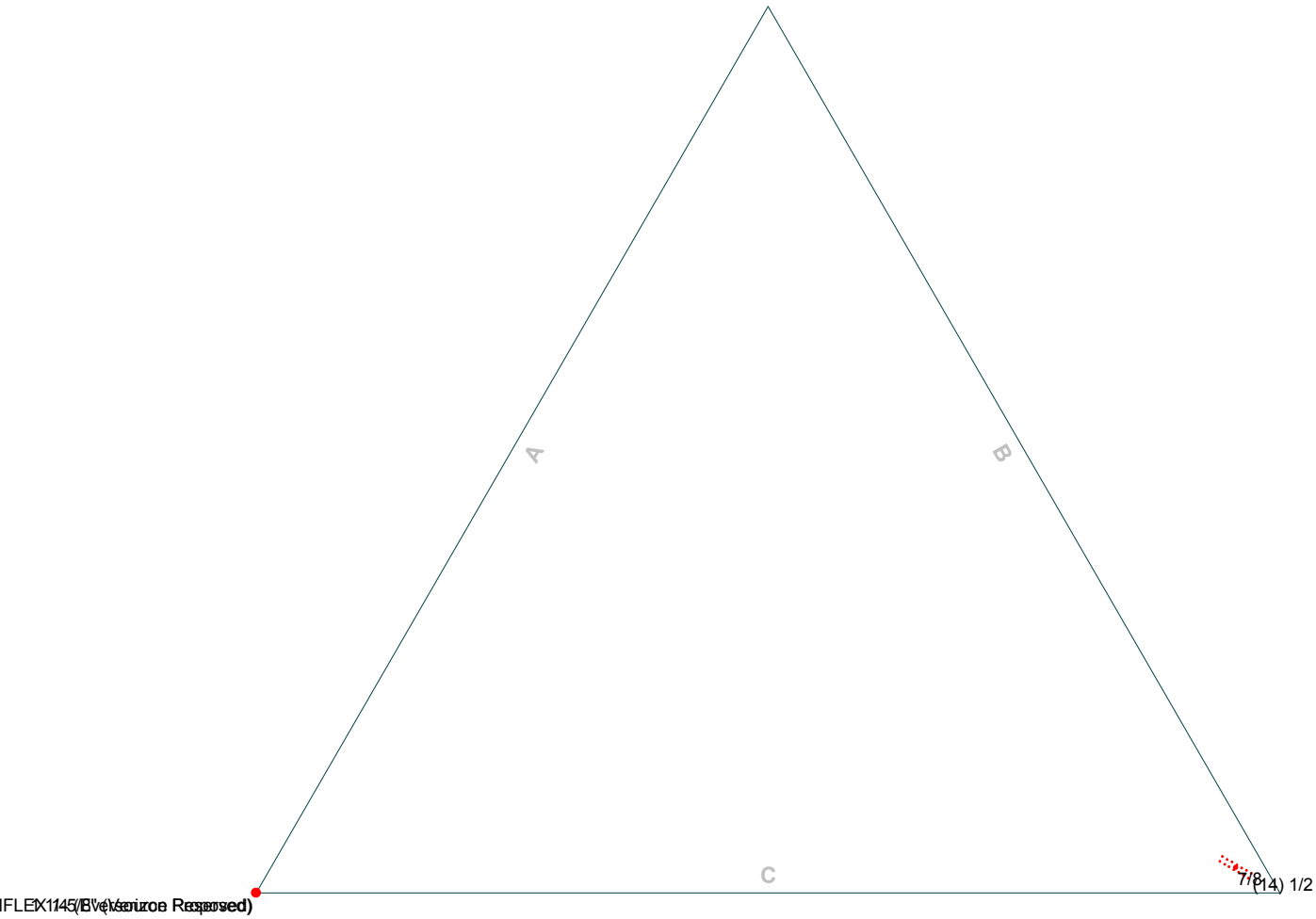
AXIAL 12 K
SHEAR 18 K *MOMENT 1327 kip-ft*
TORQUE 7 kip-ft
REACTIONS - 95 mph WIND

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

Job: ***15122.000 - Montville PD***			
Project: ***145' Valmont Lattice Tower - 911 Route 32 Uncasville, CT***			
Client: Eversource	Drawn by: TJL	App'd:	
Code: TIA/EIA-222-F	Date: 12/07/15	Scale: NTS	
Path: J:\Jobs\1512200.W04 Structural\Backup Documentation\Rev F\Rev (1)\ER Files\145ft Valmont Lattice Uncasville,CT.eri		Dwg No. E-1	

Feed Line Plan

Round Flat App In Face App Out Face Truss-Leg



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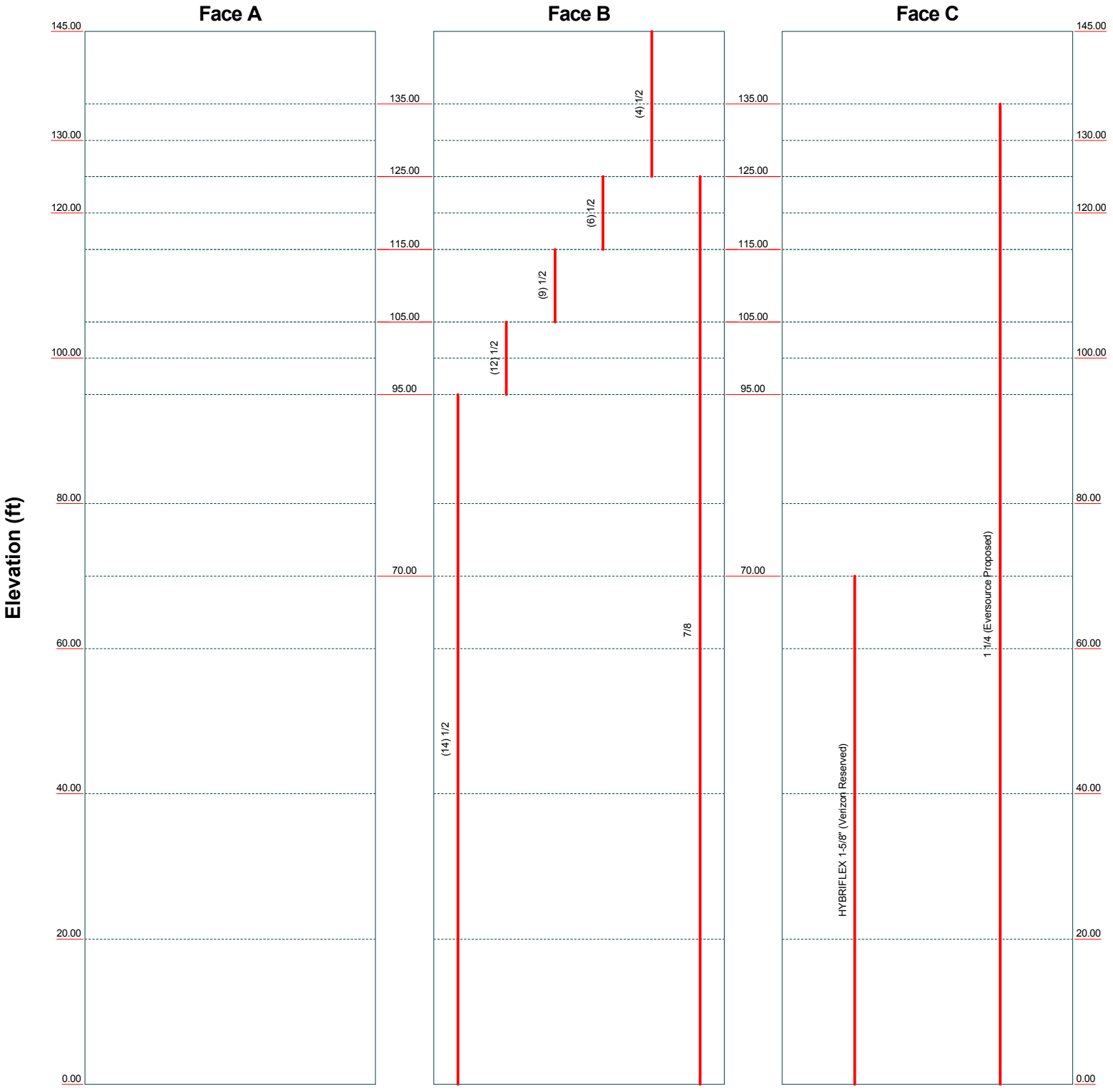
Feed Line Distribution Chart
0' - 145'

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



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Code: TIA/EIA-222-F	Date: 12/07/15	Scale: NTS	
Path: J:\Jobs\1512200.W\04 Structural\Backup Documentation\Rev F\Rev (1)\ER Files\145ft Valmont Lattice Uncasville,CT.er		Dwg No. E-7	

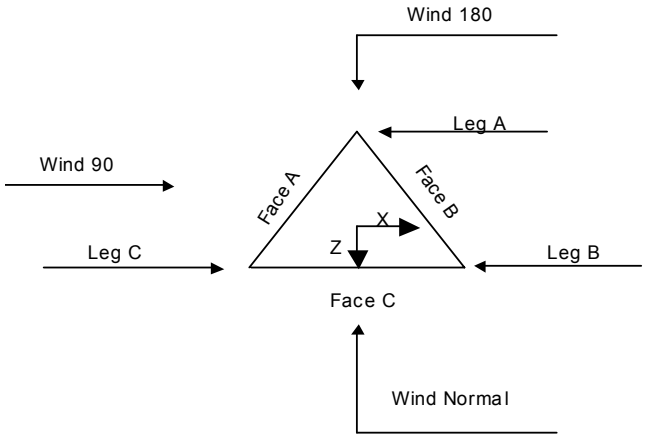
Tower Input Data

The main tower is a 3x free standing tower with an overall height of 145.00 ft above the ground line.
The base of the tower is set at an elevation of 0.00 ft above the ground line.
The face width of the tower is 5.00 ft at the top and 18.00 ft at the base.
This tower is designed using the TIA/EIA-222-F standard.
The following design criteria apply:

Basic wind speed of 95 mph.
Nominal ice thickness of 0.5000 in.
Ice density of 56 pcf.
A wind speed of 82 mph is used in combination with ice.
Temperature drop of 50 °F.
Deflections calculated using a wind speed of 50 mph.
Weld together tower sections have flange connections..
Connections use galvanized A325 bolts, nuts and locking devices. Installation per TIA/EIA-222 and AISC Specifications..
Tower members are "hot dipped" galvanized in accordance with ASTM A123 and ASTM A153 Standards..
Welds are fabricated with ER-70S-6 electrodes..
A non-linear (P-delta) analysis was used.
Pressures are calculated at each section.
Stress ratio used in tower member design is 1.333.
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	Treat Feedline Bundles As Cylinder
Consider Moments - Horizontals	Assume Legs Pinned	Use ASCE 10 X-Brace Ly Rules
Consider Moments - Diagonals	√ Assume Rigid Index Plate	Calculate Redundant Bracing Forces
Use Moment Magnification	√ Use Clear Spans For Wind Area	Ignore Redundant Members in FEA
√ Use Code Stress Ratios	√ Use Clear Spans For KL/r	√ SR Leg Bolts Resist Compression
√ Use Code Safety Factors - Guys	Retension Guys To Initial Tension	√ All Leg Panels Have Same Allowable
Escalate Ice	Bypass Mast Stability Checks	Offset Girt At Foundation
Always Use Max Kz	√ Use Azimuth Dish Coefficients	√ Consider Feedline Torque
Use Special Wind Profile	√ Project Wind Area of Appurt.	Include Angle Block Shear Check
√ Include Bolts In Member Capacity	Autocalc Torque Arm Areas	Poles
Leg Bolts Are At Top Of Section	SR Members Have Cut Ends	Include Shear-Torsion Interaction
√ Secondary Horizontal Braces Leg	√ Sort Capacity Reports By Component	Always Use Sub-Critical Flow
Use Diamond Inner Bracing (4 Sided)	Triangulate Diamond Inner Bracing	Use Top Mounted Sockets
Add IBC .6D+W Combination	Use TIA-222-G Tension Splice Capacity Exemption	



Triangular Tower

Tower Section Geometry

Tower Section	Tower Elevation ft	Assembly Database	Description	Section Width ft	Number of Sections	Section Length ft
T1	145.00-130.00			5.00	1	15.00
T2	130.00-120.00			5.00	1	10.00
T3	120.00-100.00			6.00	1	20.00
T4	100.00-80.00			8.00	1	20.00
T5	80.00-60.00			10.00	1	20.00
T6	60.00-40.00			12.00	1	20.00
T7	40.00-20.00			14.00	1	20.00
T8	20.00-0.00			16.00	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	145.00-130.00	2.50	X Brace	No	No	0.0000	0.0000
T2	130.00-120.00	10.00	X Brace	No	No	0.0000	0.0000
T3	120.00-100.00	10.00	X Brace	No	No	0.0000	0.0000
T4	100.00-80.00	10.00	X Brace	No	No	0.0000	0.0000
T5	80.00-60.00	10.00	X Brace	No	No	0.0000	0.0000
T6	60.00-40.00	10.00	X Brace	No	No	0.0000	0.0000
T7	40.00-20.00	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
T8	20.00-0.00	10.00	X Brace	No	No	0.0000	0.0000

Tower Section Geometry *(cont'd)*

Tower Elevation ft	Leg Type	Leg Size	Leg Grade	Diagonal Type	Diagonal Size	Diagonal Grade
T1 145.00-130.00	Solid Round	1 3/4	A572-50 (50 ksi)	Solid Round	7/8	A572-50 (50 ksi)
T2 130.00-120.00	Truss Leg	Pirod 207628	A572-50 (50 ksi)	Equal Angle	L2 1/2x2 1/2x3/16	A36 (36 ksi)
T3 120.00-100.00	Truss Leg	Pirod 207628	A572-50 (50 ksi)	Equal Angle	L2 1/2x2 1/2x3/16	A36 (36 ksi)
T4 100.00-80.00	Truss Leg	Pirod 207628	A572-50 (50 ksi)	Equal Angle	L2 1/2x2 1/2x3/16	A36 (36 ksi)
T5 80.00-60.00	Truss Leg	Pirod 207628	A572-50 (50 ksi)	Equal Angle	L2 1/2x2 1/2x3/16	A36 (36 ksi)
T6 60.00-40.00	Truss Leg	Pirod 207628	A572-50 (50 ksi)	Equal Angle	L2 1/2x2 1/2x3/16	A36 (36 ksi)
T7 40.00-20.00	Truss Leg	Pirod 207628	A572-50 (50 ksi)	Equal Angle	L3x3x3/16	A36 (36 ksi)
T8 20.00-0.00	Truss Leg	Pirod 207628	A572-50 (50 ksi)	Equal Angle	L3x3x3/16	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 145.00-130.00	Solid Round	7/8	A572-50 (50 ksi)	Equal Angle		A36 (36 ksi)
T2 130.00-120.00	Equal Angle	L2 1/2x2 1/2x3/16	A36 (36 ksi)	Equal Angle		A36 (36 ksi)

Tower Section Geometry *(cont'd)*

Tower Elevation ft	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
T1 145.00-130.00	0.00	0.0000	A36 (36 ksi)	1	1	1	36.0000	36.0000
T2 130.00-120.00	0.00	0.0000	A36 (36 ksi)	1	1	1	36.0000	36.0000
T3 120.00-100.00	0.00	0.0000	A36 (36 ksi)	1	1	1	36.0000	36.0000

Tower Elevation ft	Gusset Area (per face) ft²	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
T4 100.00-80.00	0.00	0.0000	A36 (36 ksi)	1	1	1	36.0000	36.0000
T5 80.00-60.00	0.00	0.0000	A36 (36 ksi)	1	1	1	36.0000	36.0000
T6 60.00-40.00	0.00	0.0000	A36 (36 ksi)	1	1	1	36.0000	36.0000
T7 40.00-20.00	0.00	0.0000	A36 (36 ksi)	1	1	1	36.0000	36.0000
T8 20.00-0.00	0.00	0.0000	A36 (36 ksi)	1	1	1	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 145.00-130.00	Yes	Yes	1	1 1	1 1	1 1	1 1	1 1	1 1	1 1
T2 130.00-120.00	Yes	Yes	1	1 1	1 1	1 1	1 1	1 1	1 1	1 1
T3 120.00-100.00	Yes	Yes	1	1 1	1 1	1 1	1 1	1 1	1 1	1 1
T4 100.00-80.00	Yes	Yes	1	1 1	1 1	1 1	1 1	1 1	1 1	1 1
T5 80.00-60.00	Yes	Yes	1	1 1	1 1	1 1	1 1	1 1	1 1	1 1
T6 60.00-40.00	Yes	Yes	1	1 1	1 1	1 1	1 1	1 1	1 1	1 1
T7 40.00-20.00	Yes	Yes	1	1 1	1 1	1 1	1 1	1 1	1 1	1 1
T8 20.00-0.00	Yes	Yes	1	1 1	1 1	1 1	1 1	1 1	1 1	1 1

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

Tower Section Geometry *(cont'd)*

Tower Elevation ft	Truss-Leg K Factors: Truss-Legs Used As Leg Members — Leg Panels	X Brace Diagonals	Z Brace Diagonals	Truss-Legs Used As Inner Members — Leg Panels	X Brace Diagonals	Z Brace Diagonals
T2 130.00-120.00	1	0.5	0.85	1	0.5	0.85
T3 120.00-100.00	1	0.5	0.85	1	0.5	0.85
T4 100.00-80.00	1	0.5	0.85	1	0.5	0.85

T5 80.00-60.00	1	0.5	0.85	1	0.5	0.85
T6 60.00-40.00	1	0.5	0.85	1	0.5	0.85
T7 40.00-20.00	1	0.5	0.85	1	0.5	0.85
T8 20.00-0.00	1	0.5	0.85	1	0.5	0.85

Tower Section Geometry *(cont'd)*

Tower Elevation ft	*Leg*		*Diagonal*		*Top Girt*		*Bottom Girt*		*Mid Girt*		*Long Horizontal*		*Short Horizontal*	
	Net Width Deduct in	*U*	*Net Width Deduct* in	*U*	*Net Width Deduct* in	*U*	*Net Width Deduct* in	*U*	*Net Width Deduct* in	*U*	*Net Width Deduct* in	*U*	*Net Width Deduct* in	*U*
T1 145.00-130.00	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	1
T2 130.00-120.00	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	1
T3 120.00-100.00	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	1
T4 100.00-80.00	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	1
T5 80.00-60.00	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	1
T6 60.00-40.00	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	1
T7 40.00-20.00	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	1
T8 20.00-0.00	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	1

Tower 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 145.00-130.00	Flange	1.0000 A325N	6	1.0000 A325N	0	0.5000 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0
T2 130.00-120.00	Flange	1.0000 A325N	6	1.0000 A325N	1	1.0000 A325N	1	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0
T3 120.00-100.00	Flange	1.0000 A325N	6	1.0000 A325N	1	0.6250 A325N	0	0.0000 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0
T4 100.00-80.00	Flange	1.0000 A325N	6	1.0000 A325N	1	0.6250 A325N	0	0.0000 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0
T5 80.00-60.00	Flange	1.0000 A325N	6	1.0000 A325N	1	0.6250 A325N	0	0.0000 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0
T6 60.00-40.00	Flange	1.0000 A325N	6	1.0000 A325N	1	0.6250 A325N	0	0.0000 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0
T7 40.00-20.00	Flange	1.0000 A325N	6	1.0000 A325N	1	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	1
T8 20.00-0.00	Flange	1.0000 F1554-105	6	1.0000 A325N	1	0.6250 A325N	0	0.0000 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	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	Ar (Leg)	95.00 - 0.00	0.0000	0.05	14	7	0.5800	0.5800		0.25
1/2	B	No	Ar (Leg)	105.00 - 95.00	0.0000	0.05	12	6	0.5800	0.5800		0.25
1/2	B	No	Ar (Leg)	115.00 - 105.00	0.0000	0.05	9	5	0.5800	0.5800		0.25
1/2	B	No	Ar (Leg)	125.00 - 115.00	0.0000	0.05	6	3	0.5800	0.5800		0.25
1/2	B	No	Ar (Leg)	145.00 - 125.00	0.0000	0.05	4	2	0.5800	0.5800		0.25
7/8	B	No	Ar (Leg)	125.00 - 0.00	0.0000	0.05	1	1	1.1100	1.1100		0.54
HYBRIFLEX 1-5/8" (Verizon Reserved)	C	No	Ar (Leg)	70.00 - 0.00	0.0000	0	1	1	1.9800	1.9800		1.90
1 1/4 (Eversource Proposed)	C	No	Ar (Leg)	135.00 - 0.00	0.0000	0	1	1	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	145.00-130.00	A	0.646	0.000	0.000	0.000	0.00
		B	1.450	0.000	0.000	0.000	0.01
		C	2.096	0.000	0.000	0.000	0.00
T2	130.00-120.00	A	1.292	0.000	0.000	0.000	0.00
		B	1.671	0.000	0.000	0.000	0.02
		C	2.962	0.000	0.000	0.000	0.01
T3	120.00-100.00	A	2.583	0.000	0.000	0.000	0.00
		B	6.442	0.000	0.000	0.000	0.06
		C	9.025	0.000	0.000	0.000	0.01
T4	100.00-80.00	A	2.583	0.000	0.000	0.000	0.00
		B	8.375	0.000	0.000	0.000	0.08
		C	10.958	0.000	0.000	0.000	0.01
T5	80.00-60.00	A	4.233	0.000	0.000	0.000	0.00
		B	8.617	0.000	0.000	0.000	0.08
		C	12.850	0.000	0.000	0.000	0.03
T6	60.00-40.00	A	5.883	0.000	0.000	0.000	0.00
		B	8.617	0.000	0.000	0.000	0.08
		C	14.500	0.000	0.000	0.000	0.05
T7	40.00-20.00	A	5.883	0.000	0.000	0.000	0.00
		B	8.617	0.000	0.000	0.000	0.08
		C	14.500	0.000	0.000	0.000	0.05
T8	20.00-0.00	A	5.883	0.000	0.000	0.000	0.00
		B	8.617	0.000	0.000	0.000	0.08
		C	14.500	0.000	0.000	0.000	0.05

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

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	145.00-130.00	A	0.500	1.063	0.000	0.000	0.000	0.00
		B		1.975	1.450	0.000	0.000	0.05
		C		3.038	1.450	0.000	0.000	0.01
T2	130.00-120.00	A	0.500	2.125	0.000	0.000	0.000	0.00
		B		2.196	1.450	0.000	0.000	0.05
		C		4.321	1.450	0.000	0.000	0.02
T3	120.00-100.00	A	0.500	4.250	0.000	0.000	0.000	0.00
		B		6.150	7.250	0.000	0.000	0.17
		C		10.400	7.250	0.000	0.000	0.04
T4	100.00-80.00	A	0.500	4.250	0.000	0.000	0.000	0.00
		B		6.150	11.117	0.000	0.000	0.24
		C		10.400	11.117	0.000	0.000	0.04
T5	80.00-60.00	A	0.500	6.733	0.000	0.000	0.000	0.00
		B		6.150	11.600	0.000	0.000	0.25
		C		12.883	11.600	0.000	0.000	0.07
T6	60.00-40.00	A	0.500	9.217	0.000	0.000	0.000	0.00
		B		6.150	11.600	0.000	0.000	0.25
		C		15.367	11.600	0.000	0.000	0.11
T7	40.00-20.00	A	0.500	9.217	0.000	0.000	0.000	0.00
		B		6.150	11.600	0.000	0.000	0.25
		C		15.367	11.600	0.000	0.000	0.11
T8	20.00-0.00	A	0.500	9.217	0.000	0.000	0.000	0.00
		B		6.150	11.600	0.000	0.000	0.25
		C		15.367	11.600	0.000	0.000	0.11

Feed Line Center of Pressure

Section	Elevation ft	CP_X in	CP_Z in	CP_X Ice in	CP_Z Ice in
T1	145.00-130.00	0.6240	1.0460	0.1259	0.6625
T2	130.00-120.00	0.2109	1.3146	0.0280	1.1803
T3	120.00-100.00	1.7008	2.4868	1.6740	2.4012
T4	100.00-80.00	3.0219	3.5174	3.1554	3.5136
T5	80.00-60.00	2.3859	4.7097	2.7345	4.6842
T6	60.00-40.00	1.4636	5.8489	2.0042	5.8033
T7	40.00-20.00	1.5089	6.0296	2.1410	6.1994
T8	20.00-0.00	1.6381	6.5459	2.3422	6.7819

Discrete Tower Loads

Description	Face or Leg	Offset Type	Offsets: Horz Lateral ft / Vert ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
10-ft Lightning Rod	A	From Leg	0.00 0.00 5.00	0.0000	145.00	No Ice 1/2" Ice	3.00 4.03	3.00 4.03	0.05 0.07
ANT150F2	A	From Leg	3.00	0.0000	145.00	No Ice	1.29	1.29	0.02

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
			0.00 2.50			1/2" Ice	1.60	1.60	0.03
3' Side Mount Standoff	A	From Leg	1.00 0.00 0.00	0.0000	144.00	No Ice 1/2" Ice	2.64 3.69	2.64 3.69	0.04 0.05
ANT150F2	A	From Leg	3.00 0.00 2.50	0.0000	125.00	No Ice 1/2" Ice	1.29 1.60	1.29 1.60	0.02 0.03
3' Side Mount Standoff	A	From Leg	1.00 0.00 0.00	0.0000	125.00	No Ice 1/2" Ice	2.64 3.69	2.64 3.69	0.04 0.05
ANT150F2	A	From Leg	3.00 0.00 2.50	0.0000	110.00	No Ice 1/2" Ice	1.29 1.60	1.29 1.60	0.02 0.03
3' Side Mount Standoff	A	From Leg	1.00 0.00 0.00	0.0000	110.00	No Ice 1/2" Ice	2.64 3.69	2.64 3.69	0.04 0.05
ANT150D	A	From Leg	3.00 0.00 0.00	0.0000	102.00	No Ice 1/2" Ice	0.80 1.44	0.80 1.44	0.01 0.01
3' Pipe Mount Side Arm	A	From Leg	1.00 0.00 0.00	0.0000	102.00	No Ice 1/2" Ice	0.47 0.69	0.47 0.69	0.01 0.05
ANT150F2	B	From Leg	3.00 0.00 4.00	0.0000	145.00	No Ice 1/2" Ice	1.29 1.60	1.29 1.60	0.02 0.03
ANT450F2	B	From Leg	3.00 0.00 -4.00	0.0000	145.00	No Ice 1/2" Ice	0.79 1.01	0.79 1.01	0.01 0.02
3' Side Mount Standoff	B	From Leg	1.00 0.00 0.00	0.0000	144.00	No Ice 1/2" Ice	2.64 3.69	2.64 3.69	0.04 0.05
CO156AN	B	From Leg	3.00 0.00 5.00	0.0000	125.00	No Ice 1/2" Ice	2.27 3.71	2.27 3.71	0.01 0.03
3' Side Mount Standoff	B	From Leg	1.00 0.00 0.00	0.0000	125.00	No Ice 1/2" Ice	2.64 3.69	2.64 3.69	0.04 0.05
ANT150D	B	From Leg	3.00 0.00 0.00	0.0000	115.00	No Ice 1/2" Ice	0.80 1.44	0.80 1.44	0.01 0.01
3' Pipe Mount Side Arm	B	From Leg	1.00 0.00 0.00	0.0000	115.00	No Ice 1/2" Ice	0.47 0.69	0.47 0.69	0.01 0.05
10' x 3" Dia Omni	B	From Leg	3.00 0.00 5.00	0.0000	105.00	No Ice 1/2" Ice	3.00 4.03	3.00 4.03	0.03 0.05
3' Side Mount Standoff	B	From Leg	1.00 0.00 0.00	0.0000	105.00	No Ice 1/2" Ice	2.64 3.69	2.64 3.69	0.04 0.05
4'x4" Pipe Mount	B	From Leg	1.00 0.00 0.00	0.0000	95.00	No Ice 1/2" Ice	1.32 1.58	1.32 1.58	0.04 0.06
CO-41A	C	From Leg	3.00 0.00 5.00	0.0000	145.00	No Ice 1/2" Ice	2.27 3.71	2.27 3.71	0.01 0.03
3' Side Mount Standoff	C	From Leg	1.00	0.0000	144.00	No Ice	2.64	2.64	0.04

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
			0.00			1/2" Ice	3.69	3.69	0.05
			0.00						
ANT150F2	C	From Leg	3.00	0.0000	125.00	No Ice	1.29	1.29	0.02
			0.00			1/2" Ice	1.60	1.60	0.03
			2.50						
3' Side Mount Standoff	C	From Leg	1.00	0.0000	125.00	No Ice	2.64	2.64	0.04
			0.00			1/2" Ice	3.69	3.69	0.05
			0.00						
ANT150D	C	From Leg	3.00	0.0000	115.00	No Ice	0.80	0.80	0.01
			0.00			1/2" Ice	1.44	1.44	0.01
			0.00						
3' Pipe Mount Side Arm	C	From Leg	1.00	0.0000	115.00	No Ice	0.47	0.47	0.01
			0.00			1/2" Ice	0.69	0.69	0.05
			0.00						
ANT150D	C	From Leg	3.00	0.0000	105.00	No Ice	0.80	0.80	0.01
			0.00			1/2" Ice	1.44	1.44	0.01
			0.00						
3' Pipe Mount Side Arm	C	From Leg	1.00	0.0000	105.00	No Ice	0.47	0.47	0.01
			0.00			1/2" Ice	0.69	0.69	0.05
			0.00						
NH65PS-DG-F0M (Verizon Reserved)	C	From Leg	1.00	0.0000	70.00	No Ice	1.91	1.91	0.03
			0.00			1/2" Ice	2.15	2.15	0.05
			0.00						
RRH2x60-AWS (Verizon Reserved)	C	From Leg	1.00	0.0000	67.00	No Ice	3.78	2.07	0.06
			0.00			1/2" Ice	4.09	2.35	0.08
			0.00						
DB589-Y (Eversource Proposed)	C	From Leg	3.00	0.0000	138.00	No Ice	2.13	2.13	0.01
			0.00			1/2" Ice	3.00	3.00	0.03
			0.00						
3' Side Mount Standoff (Eversource Proposed)	C	From Leg	1.00	0.0000	133.00	No Ice	2.64	2.64	0.04
			0.00			1/2" Ice	3.69	3.69	0.05
			0.00						

Dishes

Description	Face or Leg	Dish Type	Offset Type	Offsets: Horz Lateral ft / Vert ft	Azimuth Adjustment °	3 dB Beam Width °	Elevation ft	Outside Diameter ft		Aperture Area ft^2	Weight K
SPD2-4.7	B	Paraboloid w/o Radome	From Leg	2.00	0.0000		95.00	2.00	No Ice	3.14	0.03
				0.00					1/2" Ice	3.41	0.04
				0.00							

Truss-Leg Properties

Section Designation	Area in^2	Area Ice in^2	Self Weight K	Ice Weight K	Equiv. Diameter in	Equiv. Diameter Ice in	Leg Area in^2
Pirod 207628	1122.3795	2062.3919	0.30	0.31	3.8972	7.1611	3.6816
Pirod 207628	1122.3795	2062.3919	0.30	0.31	3.8972	7.1611	3.6816
Pirod 207628	1122.3795	2062.3919	0.30	0.31	3.8972	7.1611	3.6816
Pirod 207628	1122.3795	2062.3919	0.30	0.31	3.8972	7.1611	3.6816
Pirod 207628	1122.3795	2062.3919	0.30	0.31	3.8972	7.1611	3.6816
Pirod 207628	1122.3795	2062.3919	0.30	0.31	3.8972	7.1611	3.6816
Pirod 207628	1122.3795	2062.3919	0.30	0.31	3.8972	7.1611	3.6816

Tower Pressures - No Ice

$G_H = 1.136$

Section Elevation ft	z ft	K_Z	q_z psf	A_G ft^2	Face	A_F ft^2	A_R ft^2	A_{leg} ft^2	Leg %	C_AA_A In Face ft^2	C_AA_A Out Face ft^2
T1 145.00-130.00	137.50	1.503	35	77.188	A	0.000	10.124	4.375	43.22	0.000	0.000
					B	0.000	10.928		40.04	0.000	0.000
					C	0.000	11.574		37.80	0.000	0.000
T2 130.00-120.00	125.00	1.463	34	66.055	A	5.273	7.798	6.506	49.77	0.000	0.000
					B	5.273	8.177		48.37	0.000	0.000
					C	5.273	9.469		44.13	0.000	0.000
T3 120.00-100.00	110.00	1.411	33	162.111	A	8.723	15.595	13.012	53.51	0.000	0.000
					B	8.723	19.454		46.18	0.000	0.000
					C	8.723	22.037		42.30	0.000	0.000
T4 100.00-80.00	90.00	1.332	31	202.111	A	9.970	15.595	13.012	50.90	0.000	0.000
					B	9.970	21.387		41.50	0.000	0.000
					C	9.970	23.970		38.34	0.000	0.000
T5 80.00-60.00	70.00	1.24	29	242.111	A	11.267	17.245	13.012	45.64	0.000	0.000
					B	11.267	21.629		39.56	0.000	0.000
					C	11.267	25.862		35.05	0.000	0.000
T6 60.00-40.00	50.00	1.126	26	282.111	A	12.620	18.895	13.012	41.29	0.000	0.000
					B	12.620	21.629		37.99	0.000	0.000
					C	12.620	27.512		32.42	0.000	0.000
T7 40.00-20.00	30.00	1	23	322.111	A	16.830	18.895	13.012	36.42	0.000	0.000
					B	16.830	21.629		33.83	0.000	0.000
					C	16.830	27.512		29.34	0.000	0.000
T8 20.00-0.00	10.00	1	23	362.111	A	18.566	18.895	13.012	34.73	0.000	0.000
					B	18.566	21.629		32.37	0.000	0.000
					C	18.566	27.512		28.24	0.000	0.000

Tower Pressure - With Ice

$G_H = 1.136$

Section Elevation ft	z ft	K_Z	q_z psf	t_Z in	A_G ft^2	Face	A_F ft^2	A_R ft^2	A_{leg} ft^2	Leg %	C_AA_A In Face ft^2	C_AA_A Out Face ft^2
T1 145.00-130.00	137.50	1.503	26	0.5000	78.438	A	0.000	18.872	6.875	36.43	0.000	0.000
						B	1.450	19.784		32.38	0.000	0.000
						C	1.450	20.847		30.83	0.000	0.000
T2	125.00	1.463	25	0.5000	66.890	A	5.273	16.189	11.955	55.70	0.000	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
130.00-120.00						B	6.723	16.260		52.02	0.000	0.000
						C	6.723	18.385		47.61	0.000	0.000
T3	110.00	1.411	24	0.5000	163.780	A	8.723	31.649	23.910	59.22	0.000	0.000
120.00-100.00						B	15.973	33.549		48.28	0.000	0.000
						C	15.973	37.799		44.47	0.000	0.000
T4 100.00-80.00	90.00	1.332	23	0.5000	203.780	A	9.970	32.148	23.910	56.77	0.000	0.000
						B	21.087	34.048		43.37	0.000	0.000
						C	21.087	38.298		40.26	0.000	0.000
T5 80.00-60.00	70.00	1.24	21	0.5000	243.780	A	11.267	35.150	23.910	51.51	0.000	0.000
						B	22.867	34.567		41.63	0.000	0.000
						C	22.867	41.300		37.26	0.000	0.000
T6 60.00-40.00	50.00	1.126	20	0.5000	283.780	A	12.620	38.175	23.910	47.07	0.000	0.000
						B	24.220	35.108		40.30	0.000	0.000
						C	24.220	44.325		34.88	0.000	0.000
T7 40.00-20.00	30.00	1	17	0.5000	323.780	A	16.830	38.737	23.910	43.03	0.000	0.000
						B	28.430	35.670		37.30	0.000	0.000
						C	28.430	44.887		32.61	0.000	0.000
T8 20.00-0.00	10.00	1	17	0.5000	363.780	A	18.566	39.315	23.910	41.31	0.000	0.000
						B	30.166	36.249		36.00	0.000	0.000
						C	30.166	45.465		31.61	0.000	0.000

Tower Pressure - Service

$G_H = 1.136$

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	137.50	1.503	10	77.188	A	0.000	10.124	4.375	43.22	0.000	0.000
145.00-130.00					B	0.000	10.928		40.04	0.000	0.000
					C	0.000	11.574		37.80	0.000	0.000
T2	125.00	1.463	9	66.055	A	5.273	7.798	6.506	49.77	0.000	0.000
130.00-120.00					B	5.273	8.177		48.37	0.000	0.000
					C	5.273	9.469		44.13	0.000	0.000
T3	110.00	1.411	9	162.111	A	8.723	15.595	13.012	53.51	0.000	0.000
120.00-100.00					B	8.723	19.454		46.18	0.000	0.000
					C	8.723	22.037		42.30	0.000	0.000
T4	90.00	1.332	9	202.111	A	9.970	15.595	13.012	50.90	0.000	0.000
100.00-80.00					B	9.970	21.387		41.50	0.000	0.000
					C	9.970	23.970		38.34	0.000	0.000
T5 80.00-60.00	70.00	1.24	8	242.111	A	11.267	17.245	13.012	45.64	0.000	0.000
					B	11.267	21.629		39.56	0.000	0.000
					C	11.267	25.862		35.05	0.000	0.000
T6 60.00-40.00	50.00	1.126	7	282.111	A	12.620	18.895	13.012	41.29	0.000	0.000
					B	12.620	21.629		37.99	0.000	0.000
					C	12.620	27.512		32.42	0.000	0.000
T7 40.00-20.00	30.00	1	6	322.111	A	16.830	18.895	13.012	36.42	0.000	0.000
					B	16.830	21.629		33.83	0.000	0.000
					C	16.830	27.512		29.34	0.000	0.000
T8 20.00-0.00	10.00	1	6	362.111	A	18.566	18.895	13.012	34.73	0.000	0.000
					B	18.566	21.629		32.37	0.000	0.000
					C	18.566	27.512		28.24	0.000	0.000

Tower Forces - No Ice - Wind Normal To Face

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	R_R	D_F	D_R	A_E ft^2	F K	w plf	Ctrl. Face
T1	0.02	0.81	A	0.131	2.842	0.579	1	1	5.859	0.74	49.05	C
145.00-130.00			B	0.142	2.803	0.58	1	1	6.340			
			C	0.15	2.772	0.581	1	1	6.730			
T2	0.02	0.71	A	0.198	2.603	0.59	1	1	9.874	1.06	105.56	C
130.00-120.00			B	0.204	2.584	0.591	1	1	10.107			
			C	0.223	2.52	0.595	1	1	10.911			
T3	0.07	1.36	A	0.15	2.771	0.581	1	1	17.791	2.11	105.58	C
120.00-100.00			B	0.174	2.686	0.585	1	1	20.111			
			C	0.19	2.631	0.588	1	1	21.688			
T4	0.09	1.41	A	0.126	2.86	0.578	1	1	18.987	2.27	113.41	C
100.00-80.00			B	0.155	2.753	0.582	1	1	22.423			
			C	0.168	2.707	0.584	1	1	23.978			
T5	0.11	1.46	A	0.118	2.894	0.577	1	1	21.218	2.36	118.10	C
80.00-60.00			B	0.136	2.824	0.579	1	1	23.799			
			C	0.153	2.759	0.582	1	1	26.318			
T6	0.13	1.52	A	0.112	2.917	0.576	1	1	23.511	2.36	118.25	C
60.00-40.00			B	0.121	2.88	0.578	1	1	25.111			
			C	0.142	2.8	0.58	1	1	28.586			
T7	0.13	1.71	A	0.111	2.921	0.576	1	1	27.719	2.42	121.15	C
40.00-20.00			B	0.119	2.887	0.577	1	1	29.316			
			C	0.138	2.817	0.58	1	1	32.778			
T8 20.00-0.00	0.13	1.79	A	0.103	2.95	0.575	1	1	29.440	2.58	129.22	C
			B	0.111	2.92	0.576	1	1	31.031			
			C	0.127	2.857	0.578	1	1	34.475			
Sum Weight:	0.71	10.77						OTM	1051.65 kip-ft	15.91		

Tower Forces - No Ice - Wind 45 To Face

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	R_R	D_F	D_R	A_E ft^2	F K	w plf	Ctrl. Face
T1	0.02	0.81	A	0.131	2.842	0.579	0.825	1	5.859	0.74	49.05	C
145.00-130.00			B	0.142	2.803	0.58	0.825	1	6.340			
			C	0.15	2.772	0.581	0.825	1	6.730			
T2	0.02	0.71	A	0.198	2.603	0.59	0.825	1	8.951	0.97	96.64	C
130.00-120.00			B	0.204	2.584	0.591	0.825	1	9.184			
			C	0.223	2.52	0.595	0.825	1	9.988			
T3	0.07	1.36	A	0.15	2.771	0.581	0.825	1	16.265	1.96	98.15	C
120.00-100.00			B	0.174	2.686	0.585	0.825	1	18.585			
			C	0.19	2.631	0.588	0.825	1	20.162			
T4	0.09	1.41	A	0.126	2.86	0.578	0.825	1	17.242	2.10	105.15	C
100.00-80.00			B	0.155	2.753	0.582	0.825	1	20.679			
			C	0.168	2.707	0.584	0.825	1	22.233			
T5	0.11	1.46	A	0.118	2.894	0.577	0.825	1	19.247	2.19	109.25	C
80.00-60.00			B	0.136	2.824	0.579	0.825	1	21.827			
			C	0.153	2.759	0.582	0.825	1	24.346			
T6	0.13	1.52	A	0.112	2.917	0.576	0.825	1	21.302	2.18	109.11	C
60.00-40.00			B	0.121	2.88	0.578	0.825	1	22.903			
			C	0.142	2.8	0.58	0.825	1	26.377			

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	R_R	D_F	D_R	A_E ft²	F K	w plf	Ctrl. Face
T7	0.13	1.71	A	0.111	2.921	0.576	0.825	1	24.774	2.21	110.27	C
40.00-20.00			B	0.119	2.887	0.577	0.825	1	26.370			
			C	0.138	2.817	0.58	0.825	1	29.832			
T8 20.00-0.00	0.13	1.79	A	0.103	2.95	0.575	0.825	1	26.191	2.34	117.04	C
			B	0.111	2.92	0.576	0.825	1	27.782			
			C	0.127	2.857	0.578	0.825	1	31.226			
Sum Weight:	0.71	10.77						OTM	978.80 kip-ft	14.68		

Tower Forces - No Ice - Wind 60 To Face

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	R_R	D_F	D_R	A_E ft²	F K	w plf	Ctrl. Face
T1	0.02	0.81	A	0.131	2.842	0.579	0.8	1	5.859	0.74	49.05	C
145.00-130.00			B	0.142	2.803	0.58	0.8	1	6.340			
			C	0.15	2.772	0.581	0.8	1	6.730			
T2	0.02	0.71	A	0.198	2.603	0.59	0.8	1	8.819	0.95	95.36	C
130.00-120.00			B	0.204	2.584	0.591	0.8	1	9.052			
			C	0.223	2.52	0.595	0.8	1	9.856			
T3	0.07	1.36	A	0.15	2.771	0.581	0.8	1	16.046	1.94	97.09	C
120.00-100.00			B	0.174	2.686	0.585	0.8	1	18.366			
			C	0.19	2.631	0.588	0.8	1	19.944			
T4	0.09	1.41	A	0.126	2.86	0.578	0.8	1	16.993	2.08	103.97	C
100.00-80.00			B	0.155	2.753	0.582	0.8	1	20.429			
			C	0.168	2.707	0.584	0.8	1	21.984			
T5	0.11	1.46	A	0.118	2.894	0.577	0.8	1	18.965	2.16	107.99	C
80.00-60.00			B	0.136	2.824	0.579	0.8	1	21.545			
			C	0.153	2.759	0.582	0.8	1	24.065			
T6	0.13	1.52	A	0.112	2.917	0.576	0.8	1	20.987	2.16	107.81	C
60.00-40.00			B	0.121	2.88	0.578	0.8	1	22.587			
			C	0.142	2.8	0.58	0.8	1	26.062			
T7	0.13	1.71	A	0.111	2.921	0.576	0.8	1	24.353	2.17	108.71	C
40.00-20.00			B	0.119	2.887	0.577	0.8	1	25.950			
			C	0.138	2.817	0.58	0.8	1	29.412			
T8 20.00-0.00	0.13	1.79	A	0.103	2.95	0.575	0.8	1	25.727	2.31	115.30	C
			B	0.111	2.92	0.576	0.8	1	27.317			
			C	0.127	2.857	0.578	0.8	1	30.762			
Sum Weight:	0.71	10.77						OTM	968.39 kip-ft	14.51		

Tower Forces - No Ice - Wind 90 To Face

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	R_R	D_F	D_R	A_E ft²	F K	w plf	Ctrl. Face
T1	0.02	0.81	A	0.131	2.842	0.579	0.85	1	5.859	0.74	49.05	C
145.00-130.00			B	0.142	2.803	0.58	0.85	1	6.340			
			C	0.15	2.772	0.581	0.85	1	6.730			

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	R_R	D_F	D_R	A_E ft^2	F K	w plf	Ctrl. Face
T2	0.02	0.71	A	0.198	2.603	0.59	0.85	1	9.083	0.98	97.91	C
130.00-120.00			B	0.204	2.584	0.591	0.85	1	9.316			
			C	0.223	2.52	0.595	0.85	1	10.120			
T3	0.07	1.36	A	0.15	2.771	0.581	0.85	1	16.483	1.98	99.21	C
120.00-100.00			B	0.174	2.686	0.585	0.85	1	18.803			
			C	0.19	2.631	0.588	0.85	1	20.380			
T4	0.09	1.41	A	0.126	2.86	0.578	0.85	1	17.491	2.13	106.33	C
100.00-80.00			B	0.155	2.753	0.582	0.85	1	20.928			
			C	0.168	2.707	0.584	0.85	1	22.483			
T5	0.11	1.46	A	0.118	2.894	0.577	0.85	1	19.528	2.21	110.52	C
80.00-60.00			B	0.136	2.824	0.579	0.85	1	22.109			
			C	0.153	2.759	0.582	0.85	1	24.628			
T6	0.13	1.52	A	0.112	2.917	0.576	0.85	1	21.618	2.21	110.42	C
60.00-40.00			B	0.121	2.88	0.578	0.85	1	23.218			
			C	0.142	2.8	0.58	0.85	1	26.693			
T7	0.13	1.71	A	0.111	2.921	0.576	0.85	1	25.194	2.24	111.82	C
40.00-20.00			B	0.119	2.887	0.577	0.85	1	26.791			
			C	0.138	2.817	0.58	0.85	1	30.253			
T8 20.00-0.00	0.13	1.79	A	0.103	2.95	0.575	0.85	1	26.655	2.38	118.78	C
			B	0.111	2.92	0.576	0.85	1	28.246			
			C	0.127	2.857	0.578	0.85	1	31.691			
Sum Weight:	0.71	10.77						OTM	989.21 kip-ft	14.86		

Tower Forces - With Ice - Wind Normal To Face

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	R_R	D_F	D_R	A_E ft^2	F K	w plf	Ctrl. Face
T1	0.06	1.05	A	0.241	2.466	0.6	1	1	11.314	0.98	65.46	C
145.00-130.00			B	0.271	2.377	0.607	1	1	13.467			
			C	0.284	2.339	0.611	1	1	14.192			
T2	0.07	1.37	A	0.321	2.242	0.623	1	1	15.351	1.13	112.79	C
130.00-120.00			B	0.344	2.186	0.63	1	1	16.971			
			C	0.375	2.115	0.642	1	1	18.524			
T3	0.21	2.63	A	0.246	2.448	0.601	1	1	27.743	2.44	122.19	C
120.00-100.00			B	0.302	2.29	0.617	1	1	36.660			
			C	0.328	2.223	0.625	1	1	39.596			
T4	0.28	2.71	A	0.207	2.574	0.592	1	1	28.995	2.71	135.48	C
100.00-80.00			B	0.271	2.377	0.607	1	1	41.766			
			C	0.291	2.319	0.613	1	1	44.576			
T5	0.32	2.80	A	0.19	2.628	0.588	1	1	31.952	2.80	140.03	C
80.00-60.00			B	0.236	2.481	0.598	1	1	43.548			
			C	0.263	2.398	0.605	1	1	47.867			
T6	0.36	2.90	A	0.179	2.668	0.586	1	1	35.004	2.77	138.64	C
60.00-40.00			B	0.209	2.566	0.592	1	1	45.014			
			C	0.242	2.463	0.6	1	1	50.804			
T7	0.36	3.23	A	0.172	2.694	0.585	1	1	39.492	2.73	136.30	C
40.00-20.00			B	0.198	2.603	0.59	1	1	49.475			
			C	0.226	2.51	0.596	1	1	55.189			
T8 20.00-0.00	0.36	3.36	A	0.159	2.738	0.583	1	1	41.484	2.89	144.34	C
			B	0.183	2.655	0.587	1	1	51.444			
			C	0.208	2.57	0.592	1	1	57.084			
Sum Weight:	2.01	20.07						OTM	1234.01	18.45		

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	R_R	D_F	D_R	A_E ft^2	F K	w plf	Ctrl. Face
									kip-ft			

Tower Forces - With Ice - Wind 45 To Face

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	R_R	D_F	D_R	A_E ft^2	F K	w plf	Ctrl. Face
T1	0.06	1.05	A	0.241	2.466	0.6	0.825	1	11.314	0.96	64.29	C
145.00-130.00			B	0.271	2.377	0.607	0.825	1	13.213			
			C	0.284	2.339	0.611	0.825	1	13.938			
T2	0.07	1.37	A	0.321	2.242	0.623	0.825	1	14.428	1.06	105.62	C
130.00-120.00			B	0.344	2.186	0.63	0.825	1	15.794			
			C	0.375	2.115	0.642	0.825	1	17.347			
T3	0.21	2.63	A	0.246	2.448	0.601	0.825	1	26.217	2.27	113.56	C
120.00-100.00			B	0.302	2.29	0.617	0.825	1	33.865			
			C	0.328	2.223	0.625	0.825	1	36.801			
T4	0.28	2.71	A	0.207	2.574	0.592	0.825	1	27.250	2.49	124.26	C
100.00-80.00			B	0.271	2.377	0.607	0.825	1	38.075			
			C	0.291	2.319	0.613	0.825	1	40.885			
T5	0.32	2.80	A	0.19	2.628	0.588	0.825	1	29.980	2.57	128.33	C
80.00-60.00			B	0.236	2.481	0.598	0.825	1	39.546			
			C	0.263	2.398	0.605	0.825	1	43.865			
T6	0.36	2.90	A	0.179	2.668	0.586	0.825	1	32.795	2.54	127.08	C
60.00-40.00			B	0.209	2.566	0.592	0.825	1	40.776			
			C	0.242	2.463	0.6	0.825	1	46.566			
T7	0.36	3.23	A	0.172	2.694	0.585	0.825	1	36.546	2.48	124.01	C
40.00-20.00			B	0.198	2.603	0.59	0.825	1	44.500			
			C	0.226	2.51	0.596	0.825	1	50.214			
T8 20.00-0.00	0.36	3.36	A	0.159	2.738	0.583	0.825	1	38.235	2.62	130.99	C
			B	0.183	2.655	0.587	0.825	1	46.165			
			C	0.208	2.57	0.592	0.825	1	51.805			
Sum Weight:	2.01	20.07						OTM	1145.48 kip-ft	16.99		

Tower Forces - With Ice - Wind 60 To Face

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	R_R	D_F	D_R	A_E ft^2	F K	w plf	Ctrl. Face
T1	0.06	1.05	A	0.241	2.466	0.6	0.8	1	11.314	0.96	64.12	C
145.00-130.00			B	0.271	2.377	0.607	0.8	1	13.177			
			C	0.284	2.339	0.611	0.8	1	13.902			
T2	0.07	1.37	A	0.321	2.242	0.623	0.8	1	14.297	1.05	104.60	C
130.00-120.00			B	0.344	2.186	0.63	0.8	1	15.626			
			C	0.375	2.115	0.642	0.8	1	17.179			
T3	0.21	2.63	A	0.246	2.448	0.601	0.8	1	25.999	2.25	112.33	C
120.00-100.00			B	0.302	2.29	0.617	0.8	1	33.465			
			C	0.328	2.223	0.625	0.8	1	36.401			
T4	0.28	2.71	A	0.207	2.574	0.592	0.8	1	27.001	2.45	122.66	C

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	R_R	D_F	D_R	A_E ft²	F K	w plf	Ctrl. Face
100.00-80.00			B	0.271	2.377	0.607	0.8	1	37.548			
			C	0.291	2.319	0.613	0.8	1	40.358			
T5	0.32	2.80	A	0.19	2.628	0.588	0.8	1	29.699	2.53	126.65	C
80.00-60.00			B	0.236	2.481	0.598	0.8	1	38.975			
			C	0.263	2.398	0.605	0.8	1	43.293			
T6	0.36	2.90	A	0.179	2.668	0.586	0.8	1	32.479	2.51	125.42	C
60.00-40.00			B	0.209	2.566	0.592	0.8	1	40.170			
			C	0.242	2.463	0.6	0.8	1	45.960			
T7	0.36	3.23	A	0.172	2.694	0.585	0.8	1	36.126	2.45	122.26	C
40.00-20.00			B	0.198	2.603	0.59	0.8	1	43.789			
			C	0.226	2.51	0.596	0.8	1	49.503			
T8 20.00-0.00	0.36	3.36	A	0.159	2.738	0.583	0.8	1	37.771	2.58	129.08	C
			B	0.183	2.655	0.587	0.8	1	45.411			
			C	0.208	2.57	0.592	0.8	1	51.051			
Sum Weight:	2.01	20.07						OTM	1132.83 kip-ft	16.78		

Tower Forces - With Ice - Wind 90 To Face

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	R_R	D_F	D_R	A_E ft²	F K	w plf	Ctrl. Face
T1	0.06	1.05	A	0.241	2.466	0.6	0.85	1	11.314	0.97	64.46	C
145.00-130.00			B	0.271	2.377	0.607	0.85	1	13.249			
			C	0.284	2.339	0.611	0.85	1	13.974			
T2	0.07	1.37	A	0.321	2.242	0.623	0.85	1	14.560	1.07	106.65	C
130.00-120.00			B	0.344	2.186	0.63	0.85	1	15.962			
			C	0.375	2.115	0.642	0.85	1	17.515			
T3	0.21	2.63	A	0.246	2.448	0.601	0.85	1	26.435	2.30	114.79	C
120.00-100.00			B	0.302	2.29	0.617	0.85	1	34.264			
			C	0.328	2.223	0.625	0.85	1	37.200			
T4	0.28	2.71	A	0.207	2.574	0.592	0.85	1	27.500	2.52	125.86	C
100.00-80.00			B	0.271	2.377	0.607	0.85	1	38.602			
			C	0.291	2.319	0.613	0.85	1	41.413			
T5	0.32	2.80	A	0.19	2.628	0.588	0.85	1	30.262	2.60	130.00	C
80.00-60.00			B	0.236	2.481	0.598	0.85	1	40.118			
			C	0.263	2.398	0.605	0.85	1	44.437			
T6	0.36	2.90	A	0.179	2.668	0.586	0.85	1	33.110	2.57	128.73	C
60.00-40.00			B	0.209	2.566	0.592	0.85	1	41.381			
			C	0.242	2.463	0.6	0.85	1	47.171			
T7	0.36	3.23	A	0.172	2.694	0.585	0.85	1	36.967	2.52	125.77	C
40.00-20.00			B	0.198	2.603	0.59	0.85	1	45.210			
			C	0.226	2.51	0.596	0.85	1	50.925			
T8 20.00-0.00	0.36	3.36	A	0.159	2.738	0.583	0.85	1	38.699	2.66	132.89	C
			B	0.183	2.655	0.587	0.85	1	46.919			
			C	0.208	2.57	0.592	0.85	1	52.559			
Sum Weight:	2.01	20.07						OTM	1158.12 kip-ft	17.19		

Tower Forces - Service - Wind Normal To Face

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	R_R	D_F	D_R	A_E ft²	F K	w plf	Ctrl. Face
T1	0.02	0.81	A	0.131	2.842	0.579	1	1	5.859	0.20	13.59	C
145.00-130.00			B	0.142	2.803	0.58	1	1	6.340			
			C	0.15	2.772	0.581	1	1	6.730			
T2	0.02	0.71	A	0.198	2.603	0.59	1	1	9.874	0.29	29.24	C
130.00-120.00			B	0.204	2.584	0.591	1	1	10.107			
			C	0.223	2.52	0.595	1	1	10.911			
T3	0.07	1.36	A	0.15	2.771	0.581	1	1	17.791	0.58	29.25	C
120.00-100.00			B	0.174	2.686	0.585	1	1	20.111			
			C	0.19	2.631	0.588	1	1	21.688			
T4	0.09	1.41	A	0.126	2.86	0.578	1	1	18.987	0.63	31.41	C
100.00-80.00			B	0.155	2.753	0.582	1	1	22.423			
			C	0.168	2.707	0.584	1	1	23.978			
T5	0.11	1.46	A	0.118	2.894	0.577	1	1	21.218	0.65	32.71	C
80.00-60.00			B	0.136	2.824	0.579	1	1	23.799			
			C	0.153	2.759	0.582	1	1	26.318			
T6	0.13	1.52	A	0.112	2.917	0.576	1	1	23.511	0.66	32.76	C
60.00-40.00			B	0.121	2.88	0.578	1	1	25.111			
			C	0.142	2.8	0.58	1	1	28.586			
T7	0.13	1.71	A	0.111	2.921	0.576	1	1	27.719	0.67	33.56	C
40.00-20.00			B	0.119	2.887	0.577	1	1	29.316			
			C	0.138	2.817	0.58	1	1	32.778			
T8 20.00-0.00	0.13	1.79	A	0.103	2.95	0.575	1	1	29.440	0.72	35.79	C
			B	0.111	2.92	0.576	1	1	31.031			
			C	0.127	2.857	0.578	1	1	34.475			
Sum Weight:	0.71	10.77						OTM	291.32 kip-ft	4.41		

Tower Forces - Service - Wind 45 To Face

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	R_R	D_F	D_R	A_E ft²	F K	w plf	Ctrl. Face
T1	0.02	0.81	A	0.131	2.842	0.579	0.825	1	5.859	0.20	13.59	C
145.00-130.00			B	0.142	2.803	0.58	0.825	1	6.340			
			C	0.15	2.772	0.581	0.825	1	6.730			
T2	0.02	0.71	A	0.198	2.603	0.59	0.825	1	8.951	0.27	26.77	C
130.00-120.00			B	0.204	2.584	0.591	0.825	1	9.184			
			C	0.223	2.52	0.595	0.825	1	9.988			
T3	0.07	1.36	A	0.15	2.771	0.581	0.825	1	16.265	0.54	27.19	C
120.00-100.00			B	0.174	2.686	0.585	0.825	1	18.585			
			C	0.19	2.631	0.588	0.825	1	20.162			
T4	0.09	1.41	A	0.126	2.86	0.578	0.825	1	17.242	0.58	29.13	C
100.00-80.00			B	0.155	2.753	0.582	0.825	1	20.679			
			C	0.168	2.707	0.584	0.825	1	22.233			
T5	0.11	1.46	A	0.118	2.894	0.577	0.825	1	19.247	0.61	30.26	C
80.00-60.00			B	0.136	2.824	0.579	0.825	1	21.827			
			C	0.153	2.759	0.582	0.825	1	24.346			
T6	0.13	1.52	A	0.112	2.917	0.576	0.825	1	21.302	0.60	30.23	C
60.00-40.00			B	0.121	2.88	0.578	0.825	1	22.903			
			C	0.142	2.8	0.58	0.825	1	26.377			
T7	0.13	1.71	A	0.111	2.921	0.576	0.825	1	24.774	0.61	30.54	C
40.00-20.00			B	0.119	2.887	0.577	0.825	1	26.370			
			C	0.138	2.817	0.58	0.825	1	29.832			
T8 20.00-0.00	0.13	1.79	A	0.103	2.95	0.575	0.825	1	26.191	0.65	32.42	C
			B	0.111	2.92	0.576	0.825	1	27.782			

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	R_R	D_F	D_R	A_E ft²	F K	w plf	Ctrl. Face
			C	0.127	2.857	0.578	0.825	1	31.226			
Sum Weight:	0.71	10.77						OTM	271.14 kip-ft	4.07		

Tower Forces - Service - Wind 60 To Face

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	R_R	D_F	D_R	A_E ft²	F K	w plf	Ctrl. Face
T1	0.02	0.81	A	0.131	2.842	0.579	0.8	1	5.859	0.20	13.59	C
145.00-130.00			B	0.142	2.803	0.58	0.8	1	6.340			
			C	0.15	2.772	0.581	0.8	1	6.730			
T2	0.02	0.71	A	0.198	2.603	0.59	0.8	1	8.819	0.26	26.42	C
130.00-120.00			B	0.204	2.584	0.591	0.8	1	9.052			
			C	0.223	2.52	0.595	0.8	1	9.856			
T3	0.07	1.36	A	0.15	2.771	0.581	0.8	1	16.046	0.54	26.89	C
120.00-100.00			B	0.174	2.686	0.585	0.8	1	18.366			
			C	0.19	2.631	0.588	0.8	1	19.944			
T4	0.09	1.41	A	0.126	2.86	0.578	0.8	1	16.993	0.58	28.80	C
100.00-80.00			B	0.155	2.753	0.582	0.8	1	20.429			
			C	0.168	2.707	0.584	0.8	1	21.984			
T5	0.11	1.46	A	0.118	2.894	0.577	0.8	1	18.965	0.60	29.91	C
80.00-60.00			B	0.136	2.824	0.579	0.8	1	21.545			
			C	0.153	2.759	0.582	0.8	1	24.065			
T6	0.13	1.52	A	0.112	2.917	0.576	0.8	1	20.987	0.60	29.86	C
60.00-40.00			B	0.121	2.88	0.578	0.8	1	22.587			
			C	0.142	2.8	0.58	0.8	1	26.062			
T7	0.13	1.71	A	0.111	2.921	0.576	0.8	1	24.353	0.60	30.11	C
40.00-20.00			B	0.119	2.887	0.577	0.8	1	25.950			
			C	0.138	2.817	0.58	0.8	1	29.412			
T8 20.00-0.00	0.13	1.79	A	0.103	2.95	0.575	0.8	1	25.727	0.64	31.94	C
			B	0.111	2.92	0.576	0.8	1	27.317			
			C	0.127	2.857	0.578	0.8	1	30.762			
Sum Weight:	0.71	10.77						OTM	268.25 kip-ft	4.02		

Tower Forces - Service - Wind 90 To Face

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	R_R	D_F	D_R	A_E ft²	F K	w plf	Ctrl. Face
T1	0.02	0.81	A	0.131	2.842	0.579	0.85	1	5.859	0.20	13.59	C
145.00-130.00			B	0.142	2.803	0.58	0.85	1	6.340			
			C	0.15	2.772	0.581	0.85	1	6.730			
T2	0.02	0.71	A	0.198	2.603	0.59	0.85	1	9.083	0.27	27.12	C
130.00-120.00			B	0.204	2.584	0.591	0.85	1	9.316			
			C	0.223	2.52	0.595	0.85	1	10.120			
T3	0.07	1.36	A	0.15	2.771	0.581	0.85	1	16.483	0.55	27.48	C
120.00-100.00			B	0.174	2.686	0.585	0.85	1	18.803			

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	R_R	D_F	D_R	A_E ft^2	F K	w plf	Ctrl. Face
			C	0.19	2.631	0.588	0.85	1	20.380			
T4	0.09	1.41	A	0.126	2.86	0.578	0.85	1	17.491	0.59	29.45	C
100.00-80.00			B	0.155	2.753	0.582	0.85	1	20.928			
			C	0.168	2.707	0.584	0.85	1	22.483			
T5	0.11	1.46	A	0.118	2.894	0.577	0.85	1	19.528	0.61	30.61	C
80.00-60.00			B	0.136	2.824	0.579	0.85	1	22.109			
			C	0.153	2.759	0.582	0.85	1	24.628			
T6	0.13	1.52	A	0.112	2.917	0.576	0.85	1	21.618	0.61	30.59	C
60.00-40.00			B	0.121	2.88	0.578	0.85	1	23.218			
			C	0.142	2.8	0.58	0.85	1	26.693			
T7	0.13	1.71	A	0.111	2.921	0.576	0.85	1	25.194	0.62	30.98	C
40.00-20.00			B	0.119	2.887	0.577	0.85	1	26.791			
			C	0.138	2.817	0.58	0.85	1	30.253			
T8 20.00-0.00	0.13	1.79	A	0.103	2.95	0.575	0.85	1	26.655	0.66	32.90	C
			B	0.111	2.92	0.576	0.85	1	28.246			
			C	0.127	2.857	0.578	0.85	1	31.691			
Sum Weight:	0.71	10.77						OTM	274.02 kip-ft	4.12		

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	6.29					
Bracing Weight	4.48					
Total Member Self-Weight	10.77			2.77	-1.14	
Total Weight	12.28			2.77	-1.14	
Wind 0 deg - No Ice		-0.12	-18.10	-1318.01	11.10	2.19
Wind 30 deg - No Ice		8.52	-14.71	-1081.39	-629.06	5.20
Wind 45 deg - No Ice		11.95	-11.88	-874.41	-884.31	6.24
Wind 60 deg - No Ice		14.47	-8.33	-613.67	-1072.39	6.86
Wind 90 deg - No Ice		17.06	-0.02	1.69	-1259.53	6.90
Wind 120 deg - No Ice		15.69	9.03	661.89	-1145.96	5.04
Wind 135 deg - No Ice		11.93	11.90	883.13	-883.14	3.11
Wind 150 deg - No Ice		8.51	14.73	1089.92	-629.39	1.34
Wind 180 deg - No Ice		-0.01	16.65	1235.96	-1.31	-2.20
Wind 210 deg - No Ice		-8.52	14.71	1087.06	626.58	-5.20
Wind 225 deg - No Ice		-12.01	11.85	876.78	887.95	-6.23
Wind 240 deg - No Ice		-15.78	8.94	652.57	1152.00	-7.23
Wind 270 deg - No Ice		-17.11	-0.07	-4.15	1262.19	-6.54
Wind 300 deg - No Ice		-14.52	-8.36	-617.34	1076.13	-4.66
Wind 315 deg - No Ice		-12.00	-11.91	-878.50	888.12	-3.34
Wind 330 deg - No Ice		-8.61	-14.73	-1084.65	636.52	-1.70
Member Ice	9.30					
Total Weight Ice	23.35			7.43	-4.74	
Wind 0 deg - Ice		-0.10	-20.71	-1506.57	5.31	3.04
Wind 30 deg - Ice		9.72	-16.80	-1233.42	-722.66	6.33
Wind 45 deg - Ice		13.62	-13.57	-996.20	-1013.19	7.41
Wind 60 deg - Ice		16.49	-9.50	-697.02	-1227.76	8.00
Wind 90 deg - Ice		19.46	-0.01	6.63	-1442.80	7.81
Wind 120 deg - Ice		17.95	10.34	763.46	-1316.66	5.52
Wind 135 deg - Ice		13.61	13.59	1013.76	-1012.35	3.26
Wind 150 deg - Ice		9.72	16.82	1250.79	-723.07	1.19
Wind 180 deg - Ice		-0.00	19.00	1416.72	-4.96	-2.91

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 210 deg - Ice		-9.72	16.80	1248.38	713.02	-6.33
Wind 225 deg - Ice		-13.67	13.54	1008.48	1008.52	-7.41
Wind 240 deg - Ice		-18.02	10.27	755.73	1313.88	-8.56
Wind 270 deg - Ice		-19.50	-0.05	1.71	1437.34	-7.52
Wind 300 deg - Ice		-16.54	-9.53	-700.15	1223.27	-5.09
Wind 315 deg - Ice		-13.67	-13.60	-999.65	1008.78	-3.45
Wind 330 deg - Ice		-9.80	-16.83	-1236.15	721.25	-1.48
Total Weight	12.28			2.77	-1.14	
Wind 0 deg - Service		-0.03	-5.01	-365.47	3.43	0.61
Wind 30 deg - Service		2.36	-4.07	-299.92	-173.90	1.44
Wind 45 deg - Service		3.31	-3.29	-242.59	-244.61	1.73
Wind 60 deg - Service		4.01	-2.31	-170.36	-296.70	1.90
Wind 90 deg - Service		4.72	-0.01	0.10	-348.54	1.91
Wind 120 deg - Service		4.34	2.50	182.98	-317.08	1.40
Wind 135 deg - Service		3.30	3.30	244.26	-244.28	0.86
Wind 150 deg - Service		2.36	4.08	301.55	-173.99	0.37
Wind 180 deg - Service		-0.00	4.61	342.00	-0.01	-0.61
Wind 210 deg - Service		-2.36	4.07	300.75	173.92	-1.44
Wind 225 deg - Service		-3.33	3.28	242.51	246.32	-1.73
Wind 240 deg - Service		-4.37	2.48	180.40	319.47	-2.00
Wind 270 deg - Service		-4.74	-0.02	-1.52	349.99	-1.81
Wind 300 deg - Service		-4.02	-2.31	-171.38	298.45	-1.29
Wind 315 deg - Service		-3.32	-3.30	-243.72	246.37	-0.92
Wind 330 deg - Service		-2.39	-4.08	-300.82	176.68	-0.47

Load Combinations

Comb. No.	*Description*
1	Dead Only
2	Dead+Wind 0 deg - No Ice
3	Dead+Wind 30 deg - No Ice
4	Dead+Wind 45 deg - No Ice
5	Dead+Wind 60 deg - No Ice
6	Dead+Wind 90 deg - No Ice
7	Dead+Wind 120 deg - No Ice
8	Dead+Wind 135 deg - No Ice
9	Dead+Wind 150 deg - No Ice
10	Dead+Wind 180 deg - No Ice
11	Dead+Wind 210 deg - No Ice
12	Dead+Wind 225 deg - No Ice
13	Dead+Wind 240 deg - No Ice
14	Dead+Wind 270 deg - No Ice
15	Dead+Wind 300 deg - No Ice
16	Dead+Wind 315 deg - No Ice
17	Dead+Wind 330 deg - No Ice
18	Dead+Ice+Temp
19	Dead+Wind 0 deg+Ice+Temp
20	Dead+Wind 30 deg+Ice+Temp
21	Dead+Wind 45 deg+Ice+Temp
22	Dead+Wind 60 deg+Ice+Temp
23	Dead+Wind 90 deg+Ice+Temp
24	Dead+Wind 120 deg+Ice+Temp
25	Dead+Wind 135 deg+Ice+Temp
26	Dead+Wind 150 deg+Ice+Temp
27	Dead+Wind 180 deg+Ice+Temp

Comb. No.	Description
28	Dead+Wind 210 deg+Ice+Temp
29	Dead+Wind 225 deg+Ice+Temp
30	Dead+Wind 240 deg+Ice+Temp
31	Dead+Wind 270 deg+Ice+Temp
32	Dead+Wind 300 deg+Ice+Temp
33	Dead+Wind 315 deg+Ice+Temp
34	Dead+Wind 330 deg+Ice+Temp
35	Dead+Wind 0 deg - Service
36	Dead+Wind 30 deg - Service
37	Dead+Wind 45 deg - Service
38	Dead+Wind 60 deg - Service
39	Dead+Wind 90 deg - Service
40	Dead+Wind 120 deg - Service
41	Dead+Wind 135 deg - Service
42	Dead+Wind 150 deg - Service
43	Dead+Wind 180 deg - Service
44	Dead+Wind 210 deg - Service
45	Dead+Wind 225 deg - Service
46	Dead+Wind 240 deg - Service
47	Dead+Wind 270 deg - Service
48	Dead+Wind 300 deg - Service
49	Dead+Wind 315 deg - Service
50	Dead+Wind 330 deg - Service

Maximum Member Forces

Section No.	Elevation ft	Component Type	Condition	Gov. Load Comb.	Force K	Major Axis Moment kip-ft	Minor Axis Moment kip-ft
T1	145 - 130	Leg	Max Tension	27	3.59	0.01	-0.01
			Max. Compression	30	-4.58	0.02	-0.01
			Max. Mx	23	-0.56	0.06	-0.00
			Max. My	27	-0.37	0.00	0.06
			Max. Vy	23	-0.19	0.00	0.00
			Max. Vx	27	-0.20	0.00	0.00
		Diagonal	Max Tension	28	0.76	0.00	0.00
			Max. Compression	20	-0.77	0.00	0.00
			Max. Mx	29	0.69	-0.00	0.00
			Max. My	19	-0.09	-0.00	-0.00
			Max. Vy	29	0.00	-0.00	0.00
			Max. Vx	19	-0.00	0.00	0.00
		Top Girt	Max Tension	13	0.05	0.00	0.00
			Max. Compression	27	-0.07	0.00	0.00
			Max. Mx	18	-0.01	0.01	0.00
			Max. My	23	-0.01	0.00	0.00
			Max. Vy	18	-0.01	0.00	0.00
			Max. Vx	23	-0.00	0.00	0.00
T2	130 - 120	Leg	Max Tension	27	5.71	-0.02	0.01
			Max. Compression	30	-7.40	0.65	0.02
			Max. Mx	32	5.47	-0.74	0.03
			Max. My	28	-0.91	-0.05	0.73
			Max. Vy	32	0.25	-0.74	0.03
			Max. Vx	28	-0.27	-0.05	0.73
		Diagonal	Max Tension	32	1.49	0.00	0.00
			Max. Compression	24	-1.63	0.00	0.00
			Max. Mx	27	1.08	0.02	-0.00
			Max. My	33	-0.92	0.01	0.01
			Max. Vy	27	0.01	0.02	-0.00
			Max. Vx	33	-0.00	0.00	0.00

Section No.	Elevation ft	Component Type	Condition	Gov. Load Comb.	Force K	Major Axis Moment kip-ft	Minor Axis Moment kip-ft
		Top Girt	Max Tension	27	0.04	0.00	0.00
			Max. Compression	29	-0.03	0.00	0.00
			Max. Mx	30	-0.03	-0.02	0.00
			Max. My	30	0.02	0.00	0.00
			Max. Vy	30	0.01	0.00	0.00
			Max. Vx	30	0.00	0.00	0.00
T3	120 - 100	Leg	Max Tension	27	15.53	-0.70	0.03
			Max. Compression	24	-19.80	0.94	-0.01
			Max. Mx	32	15.00	-0.97	0.01
			Max. My	28	-2.16	-0.02	0.97
			Max. Vy	32	0.18	-0.97	0.01
			Max. Vx	20	0.21	-0.02	-0.96
		Diagonal	Max Tension	31	2.40	0.00	0.00
			Max. Compression	31	-2.45	0.00	0.00
			Max. Mx	27	2.00	0.03	-0.00
			Max. My	32	-1.70	0.01	0.01
			Max. Vy	27	0.01	0.03	-0.00
			Max. Vx	33	-0.00	0.00	0.00
T4	100 - 80	Leg	Max Tension	27	27.78	-0.98	0.03
			Max. Compression	24	-35.03	1.10	-0.01
			Max. Mx	24	-35.03	1.10	-0.01
			Max. My	28	-3.36	-0.01	1.09
			Max. Vy	32	0.13	-1.00	0.01
			Max. Vx	28	-0.13	-0.02	1.01
		Diagonal	Max Tension	31	2.97	0.00	0.00
			Max. Compression	31	-3.02	0.00	0.00
			Max. Mx	27	2.25	0.04	0.00
			Max. My	22	-2.52	0.02	-0.01
			Max. Vy	27	0.02	0.04	0.00
			Max. Vx	21	0.00	0.00	0.00
T5	80 - 60	Leg	Max Tension	27	40.62	-1.17	0.02
			Max. Compression	24	-51.04	1.24	-0.02
			Max. Mx	22	40.10	-1.32	-0.03
			Max. My	26	-4.10	-0.08	-1.28
			Max. Vy	22	-0.12	-1.17	-0.03
			Max. Vx	34	0.14	0.00	1.14
		Diagonal	Max Tension	31	3.42	0.00	0.00
			Max. Compression	31	-3.48	0.00	0.00
			Max. Mx	27	2.62	0.05	0.00
			Max. My	22	-2.88	0.02	-0.01
			Max. Vy	27	0.02	0.05	0.00
			Max. Vx	22	0.00	0.00	0.00
T6	60 - 40	Leg	Max Tension	27	53.75	-1.08	0.01
			Max. Compression	24	-67.74	1.12	-0.02
			Max. Mx	27	53.51	-2.00	0.02
			Max. My	28	-5.68	-0.49	1.47
			Max. Vy	32	0.18	-2.00	0.03
			Max. Vx	28	-0.11	-0.49	1.47
		Diagonal	Max Tension	31	3.88	0.00	0.00
			Max. Compression	31	-3.78	0.00	0.00
			Max. Mx	27	2.97	0.05	0.01
			Max. My	22	-3.14	0.03	-0.01
			Max. Vy	27	0.03	0.05	0.01
			Max. Vx	22	0.00	0.00	0.00
T7	40 - 20	Leg	Max Tension	27	66.42	-0.26	0.01
			Max. Compression	24	-84.96	-0.21	-0.01
			Max. Mx	27	66.18	-3.54	0.01
			Max. My	26	-6.58	1.03	-1.63
			Max. Vy	32	0.40	-3.54	0.01
			Max. Vx	28	0.16	1.04	1.62
		Diagonal	Max Tension	31	4.75	0.00	0.00

Section No.	Elevation ft	Component Type	Condition	Gov. Load Comb.	Force K	Major Axis Moment kip-ft	Minor Axis Moment kip-ft
			Max. Compression	31	-4.35	0.00	0.00
			Max. Mx	27	2.79	0.08	0.01
			Max. My	22	-3.67	0.04	-0.01
			Max. Vy	27	0.03	0.08	0.01
			Max. Vx	22	0.00	0.00	0.00
T8	20 - 0	Leg	Max Tension	27	78.41	1.07	0.02
			Max. Compression	24	-102.37	-0.00	0.00
			Max. Mx	24	-92.13	4.03	-0.01
			Max. My	26	-8.60	2.49	-2.99
			Max. Vy	32	-0.54	-3.54	0.01
			Max. Vx	28	0.38	2.49	2.98
		Diagonal	Max Tension	31	6.18	0.00	0.00
			Max. Compression	31	-5.37	0.00	0.00
			Max. Mx	27	2.03	0.11	0.01
			Max. My	23	-5.32	0.06	-0.02
			Max. Vy	27	0.04	0.11	0.01
			Max. Vx	23	0.00	0.00	0.00

Maximum Reactions

Location	Condition	Gov. Load Comb.	Vertical K	Horizontal, X K	Horizontal, Z K
Leg C	Max. Vert	30	105.36	9.66	-5.25
	Max. H_x	13	89.20	10.01	-5.51
	Max. H_z	21	-80.77	-11.29	6.57
	Min. Vert	22	-83.10	-11.68	6.46
	Min. H_x	22	-83.10	-11.68	6.46
	Min. H_z	13	89.20	10.01	-5.51
Leg B	Max. Vert	24	105.76	-9.61	-5.34
	Max. H_x	32	-82.95	11.65	6.54
	Max. H_z	33	-80.64	11.25	6.69
	Min. Vert	32	-82.95	11.65	6.54
	Min. H_x	7	89.17	-9.96	-5.56
	Min. H_z	7	89.17	-9.96	-5.56
Leg A	Max. Vert	19	104.77	0.11	10.96
	Max. H_x	31	7.67	0.82	-1.64
	Max. H_z	2	88.82	0.07	11.40
	Min. Vert	27	-83.42	-0.09	-13.33
	Min. H_x	24	-41.37	-0.82	-8.00
	Min. H_z	27	-83.42	-0.09	-13.33

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	12.28	0.00	0.00	2.77	-1.14	0.00
Dead+Wind 0 deg - No Ice	12.28	-0.12	-18.10	-1320.80	11.12	2.20
Dead+Wind 30 deg - No Ice	12.28	8.52	-14.71	-1083.69	-630.41	5.20
Dead+Wind 45 deg - No Ice	12.28	11.95	-11.88	-876.26	-886.21	6.24
Dead+Wind 60 deg - No Ice	12.28	14.47	-8.33	-614.97	-1074.68	6.87
Dead+Wind 90 deg - No Ice	12.28	17.06	-0.02	1.70	-1262.22	6.90

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
Dead+Wind 120 deg - No Ice	12.28	15.69	9.03	663.30	-1148.38	5.05
Dead+Wind 135 deg - No Ice	12.28	11.93	11.90	885.01	-885.02	3.11
Dead+Wind 150 deg - No Ice	12.28	8.51	14.73	1092.24	-630.74	1.34
Dead+Wind 180 deg - No Ice	12.28	-0.01	16.65	1238.60	-1.32	-2.21
Dead+Wind 210 deg - No Ice	12.28	-8.52	14.71	1089.38	627.90	-5.20
Dead+Wind 225 deg - No Ice	12.28	-12.01	11.85	878.66	889.83	-6.24
Dead+Wind 240 deg - No Ice	12.28	-15.78	8.94	653.96	1154.44	-7.24
Dead+Wind 270 deg - No Ice	12.28	-17.11	-0.07	-4.15	1264.88	-6.55
Dead+Wind 300 deg - No Ice	12.28	-14.52	-8.36	-618.66	1078.43	-4.67
Dead+Wind 315 deg - No Ice	12.28	-12.00	-11.91	-880.37	890.02	-3.34
Dead+Wind 330 deg - No Ice	12.28	-8.61	-14.73	-1086.96	637.88	-1.70
Dead+Ice+Temp	23.35	-0.00	-0.00	7.43	-4.74	0.00
Dead+Wind 0 deg+Ice+Temp	23.35	-0.10	-20.71	-1511.87	5.32	3.06
Dead+Wind 30 deg+Ice+Temp	23.35	9.72	-16.80	-1237.78	-725.24	6.36
Dead+Wind 45 deg+Ice+Temp	23.35	13.62	-13.57	-999.72	-1016.79	7.45
Dead+Wind 60 deg+Ice+Temp	23.35	16.49	-9.50	-699.48	-1232.13	8.03
Dead+Wind 90 deg+Ice+Temp	23.35	19.46	-0.01	6.67	-1447.92	7.83
Dead+Wind 120 deg+Ice+Temp	23.35	17.95	10.34	766.16	-1321.29	5.53
Dead+Wind 135 deg+Ice+Temp	23.35	13.61	13.59	1017.36	-1015.93	3.27
Dead+Wind 150 deg+Ice+Temp	23.35	9.72	16.82	1255.23	-725.64	1.19
Dead+Wind 180 deg+Ice+Temp	23.35	-0.00	19.00	1421.75	-4.99	-2.93
Dead+Wind 210 deg+Ice+Temp	23.35	-9.72	16.80	1252.81	715.53	-6.36
Dead+Wind 225 deg+Ice+Temp	23.35	-13.67	13.54	1012.06	1012.09	-7.44
Dead+Wind 240 deg+Ice+Temp	23.35	-18.02	10.27	758.40	1318.50	-8.59
Dead+Wind 270 deg+Ice+Temp	23.35	-19.50	-0.05	1.73	1442.44	-7.54
Dead+Wind 300 deg+Ice+Temp	23.35	-16.54	-9.53	-702.63	1227.62	-5.10
Dead+Wind 315 deg+Ice+Temp	23.35	-13.67	-13.60	-1003.19	1012.37	-3.46
Dead+Wind 330 deg+Ice+Temp	23.35	-9.80	-16.83	-1240.53	723.82	-1.48
Dead+Wind 0 deg - Service	12.28	-0.03	-5.01	-363.87	2.26	0.61
Dead+Wind 30 deg - Service	12.28	2.36	-4.07	-298.19	-175.45	1.44
Dead+Wind 45 deg - Service	12.28	3.31	-3.29	-240.73	-246.31	1.73
Dead+Wind 60 deg - Service	12.28	4.01	-2.31	-168.35	-298.52	1.90
Dead+Wind 90 deg - Service	12.28	4.72	-0.01	2.48	-350.47	1.91
Dead+Wind 120 deg - Service	12.28	4.34	2.50	185.75	-318.94	1.40
Dead+Wind 135 deg - Service	12.28	3.30	3.30	247.16	-245.99	0.86
Dead+Wind 150 deg - Service	12.28	2.36	4.08	304.57	-175.54	0.37
Dead+Wind 180 deg - Service	12.28	-0.00	4.61	345.11	-1.19	-0.61
Dead+Wind 210 deg - Service	12.28	-2.36	4.07	303.78	173.11	-1.44
Dead+Wind 225 deg - Service	12.28	-3.33	3.28	245.40	245.67	-1.73
Dead+Wind 240 deg - Service	12.28	-4.37	2.48	183.16	318.97	-2.01
Dead+Wind 270 deg - Service	12.28	-4.74	-0.02	0.86	349.56	-1.81
Dead+Wind 300 deg - Service	12.28	-4.02	-2.31	-169.37	297.91	-1.29
Dead+Wind 315 deg - Service	12.28	-3.32	-3.30	-241.87	245.72	-0.93
Dead+Wind 330 deg - Service	12.28	-2.39	-4.08	-299.09	175.87	-0.47

Solution Summary

	Sum of Applied Forces			Sum of Reactions			
Load Comb.	PX	PY	PZ	PX	PY	PZ	% Error
	K	K	K	K	K	K	
1	0.00	-12.28	0.00	0.00	12.28	0.00	0.000%
2	-0.12	-12.28	-18.10	0.12	12.28	18.10	0.000%
3	8.52	-12.28	-14.71	-8.52	12.28	14.71	0.000%
4	11.95	-12.28	-11.88	-11.95	12.28	11.88	0.000%
5	14.47	-12.28	-8.33	-14.47	12.28	8.33	0.000%
6	17.06	-12.28	-0.02	-17.06	12.28	0.02	0.000%
7	15.69	-12.28	9.03	-15.69	12.28	-9.03	0.000%
8	11.93	-12.28	11.90	-11.93	12.28	-11.90	0.000%

	Sum of Applied Forces			Sum of Reactions			
Load Comb.	PX K	PY K	PZ K	PX K	PY K	PZ K	% Error
9	8.51	-12.28	14.73	-8.51	12.28	-14.73	0.002%
10	-0.01	-12.28	16.65	0.01	12.28	-16.65	0.000%
11	-8.52	-12.28	14.71	8.52	12.28	-14.71	0.000%
12	-12.01	-12.28	11.85	12.01	12.28	-11.85	0.000%
13	-15.78	-12.28	8.94	15.78	12.28	-8.94	0.000%
14	-17.11	-12.28	-0.07	17.11	12.28	0.07	0.000%
15	-14.52	-12.28	-8.36	14.52	12.28	8.36	0.000%
16	-12.00	-12.28	-11.91	12.00	12.28	11.91	0.000%
17	-8.61	-12.28	-14.73	8.61	12.28	14.73	0.002%
18	0.00	-23.35	0.00	0.00	23.35	0.00	0.000%
19	-0.10	-23.35	-20.71	0.10	23.35	20.71	0.000%
20	9.72	-23.35	-16.80	-9.72	23.35	16.80	0.000%
21	13.62	-23.35	-13.57	-13.62	23.35	13.57	0.000%
22	16.49	-23.35	-9.50	-16.49	23.35	9.50	0.000%
23	19.46	-23.35	-0.01	-19.46	23.35	0.01	0.000%
24	17.95	-23.35	10.34	-17.95	23.35	-10.34	0.000%
25	13.61	-23.35	13.59	-13.61	23.35	-13.59	0.000%
26	9.72	-23.35	16.82	-9.72	23.35	-16.82	0.000%
27	-0.00	-23.35	19.00	0.00	23.35	-19.00	0.000%
28	-9.72	-23.35	16.80	9.72	23.35	-16.80	0.000%
29	-13.67	-23.35	13.54	13.67	23.35	-13.54	0.000%
30	-18.02	-23.35	10.27	18.02	23.35	-10.27	0.000%
31	-19.50	-23.35	-0.05	19.50	23.35	0.05	0.000%
32	-16.54	-23.35	-9.53	16.54	23.35	9.53	0.000%
33	-13.67	-23.35	-13.60	13.67	23.35	13.60	0.000%
34	-9.80	-23.35	-16.83	9.80	23.35	16.83	0.000%
35	-0.03	-12.28	-5.01	0.03	12.28	5.01	0.000%
36	2.36	-12.28	-4.07	-2.36	12.28	4.07	0.000%
37	3.31	-12.28	-3.29	-3.31	12.28	3.29	0.000%
38	4.01	-12.28	-2.31	-4.01	12.28	2.31	0.000%
39	4.72	-12.28	-0.01	-4.72	12.28	0.01	0.000%
40	4.34	-12.28	2.50	-4.34	12.28	-2.50	0.000%
41	3.30	-12.28	3.30	-3.30	12.28	-3.30	0.000%
42	2.36	-12.28	4.08	-2.36	12.28	-4.08	0.000%
43	-0.00	-12.28	4.61	0.00	12.28	-4.61	0.000%
44	-2.36	-12.28	4.07	2.36	12.28	-4.07	0.000%
45	-3.33	-12.28	3.28	3.33	12.28	-3.28	0.000%
46	-4.37	-12.28	2.48	4.37	12.28	-2.48	0.000%
47	-4.74	-12.28	-0.02	4.74	12.28	0.02	0.000%
48	-4.02	-12.28	-2.31	4.02	12.28	2.31	0.000%
49	-3.32	-12.28	-3.30	3.32	12.28	3.30	0.000%
50	-2.39	-12.28	-4.08	2.39	12.28	4.08	0.000%

Non-Linear Convergence Results

Load Combination	Converged?	Number of Cycles	Displacement Tolerance	Force Tolerance
1	Yes	4	0.00000001	0.00000001
2	Yes	4	0.00000001	0.00000001
3	Yes	4	0.00000001	0.00000001
4	Yes	4	0.00000001	0.00000001
5	Yes	4	0.00000001	0.00000001
6	Yes	4	0.00000001	0.00000001
7	Yes	4	0.00000001	0.00000001
8	Yes	4	0.00000001	0.00000001
9	Yes	4	0.00000001	0.00000001

10	Yes	4	0.00000001	0.00000001
11	Yes	4	0.00000001	0.00000001
12	Yes	4	0.00000001	0.00000001
13	Yes	4	0.00000001	0.00000001
14	Yes	4	0.00000001	0.00000001
15	Yes	4	0.00000001	0.00000001
16	Yes	4	0.00000001	0.00000001
17	Yes	4	0.00000001	0.00000001
18	Yes	4	0.00000001	0.00000001
19	Yes	4	0.00000001	0.00000001
20	Yes	4	0.00000001	0.00000001
21	Yes	4	0.00000001	0.00000409
22	Yes	4	0.00000001	0.00000001
23	Yes	4	0.00000001	0.00000001
24	Yes	4	0.00000001	0.00000001
25	Yes	4	0.00000001	0.00000001
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	0.00000001
30	Yes	4	0.00000001	0.00000001
31	Yes	4	0.00000001	0.00000001
32	Yes	4	0.00000001	0.00000001
33	Yes	4	0.00000001	0.00000335
34	Yes	4	0.00000001	0.00000001
35	Yes	4	0.00000001	0.00000001
36	Yes	4	0.00000001	0.00000001
37	Yes	4	0.00000001	0.00000001
38	Yes	4	0.00000001	0.00000001
39	Yes	4	0.00000001	0.00000001
40	Yes	4	0.00000001	0.00000001
41	Yes	4	0.00000001	0.00000001
42	Yes	4	0.00000001	0.00000001
43	Yes	4	0.00000001	0.00000001
44	Yes	4	0.00000001	0.00000001
45	Yes	4	0.00000001	0.00000001
46	Yes	4	0.00000001	0.00000001
47	Yes	4	0.00000001	0.00000001
48	Yes	4	0.00000001	0.00000001
49	Yes	4	0.00000001	0.00000001
50	Yes	4	0.00000001	0.00000001

Maximum Tower Deflections - Service Wind

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
T1	145 - 130	2.177	40	0.1089	0.0093
T2	130 - 120	1.834	40	0.1067	0.0091
T3	120 - 100	1.609	40	0.1044	0.0083
T4	100 - 80	1.178	40	0.0957	0.0073
T5	80 - 60	0.793	40	0.0820	0.0056
T6	60 - 40	0.471	40	0.0648	0.0039
T7	40 - 20	0.224	40	0.0450	0.0024
T8	20 - 0	0.066	40	0.0232	0.0012

Critical Deflections and Radius of Curvature - Service Wind

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
145.00	10-ft Lightning Rod	40	2.177	0.1089	0.0093	965886
144.00	3' Side Mount Standoff	40	2.154	0.1088	0.0093	965886
138.00	DB589-Y	40	2.016	0.1080	0.0093	689925
133.00	3' Side Mount Standoff	40	1.902	0.1073	0.0092	403418
125.00	ANT150F2	40	1.721	0.1057	0.0086	273449
115.00	ANT150D	40	1.499	0.1027	0.0081	181415
110.00	ANT150F2	40	1.390	0.1007	0.0079	144730
105.00	10' x 3" Dia Omni	40	1.283	0.0984	0.0076	119885
102.00	ANT150D	40	1.220	0.0968	0.0074	108906
95.00	SPD2-4.7	40	1.077	0.0927	0.0069	93469
70.00	NH65PS-DG-F0M	40	0.623	0.0737	0.0047	68236
67.00	RRH2x60-AWS	40	0.576	0.0711	0.0045	66627

Maximum Tower Deflections - Design Wind

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
T1	145 - 130	8.978	24	0.4485	0.0398
T2	130 - 120	7.566	24	0.4397	0.0384
T3	120 - 100	6.641	24	0.4300	0.0351
T4	100 - 80	4.868	24	0.3941	0.0304
T5	80 - 60	3.279	24	0.3382	0.0234
T6	60 - 40	1.949	24	0.2676	0.0168
T7	40 - 20	0.929	24	0.1862	0.0104
T8	20 - 0	0.271	24	0.0961	0.0052

Critical Deflections and Radius of Curvature - Design Wind

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
145.00	10-ft Lightning Rod	24	8.978	0.4485	0.0398	247382
144.00	3' Side Mount Standoff	24	8.883	0.4480	0.0398	247382
138.00	DB589-Y	24	8.317	0.4449	0.0397	176701
133.00	3' Side Mount Standoff	24	7.847	0.4419	0.0391	103234
125.00	ANT150F2	24	7.101	0.4354	0.0365	67667
115.00	ANT150D	24	6.185	0.4231	0.0343	43722
110.00	ANT150F2	24	5.737	0.4148	0.0332	35116
105.00	10' x 3" Dia Omni	24	5.297	0.4051	0.0319	29340
102.00	ANT150D	24	5.038	0.3987	0.0310	26752
95.00	SPD2-4.7	24	4.450	0.3818	0.0288	23019
70.00	NH65PS-DG-F0M	24	2.578	0.3045	0.0200	16693
67.00	RRH2x60-AWS	24	2.381	0.2937	0.0191	16268

Bolt Design Data

Section No.	Elevation ft	Component Type	Bolt Grade	Bolt Size in	Number Of Bolts	Maximum Load per Bolt K	Allowable Load K	Ratio Load / Allowable	Allowable Ratio	Criteria
T1	145	Leg	A325N	1.0000	6	0.60	34.56	0.017 ✔	1.333	Bolt Tension
T2	130	Leg	A325N	1.0000	6	0.95	34.56	0.028 ✔	1.333	Bolt Tension
		Diagonal	A325N	1.0000	1	1.49	8.16	0.182 ✔	1.333	Member Bearing
		Top Girt	A325N	1.0000	1	0.04	8.16	0.005 ✔	1.333	Member Bearing
T3	120	Leg	A325N	1.0000	6	2.58	34.56	0.075 ✔	1.333	Bolt Tension
		Diagonal	A325N	1.0000	1	2.40	8.16	0.294 ✔	1.333	Member Bearing
T4	100	Leg	A325N	1.0000	6	4.63	34.56	0.134 ✔	1.333	Bolt Tension
		Diagonal	A325N	1.0000	1	2.97	8.16	0.364 ✔	1.333	Member Bearing
T5	80	Leg	A325N	1.0000	6	6.77	34.56	0.196 ✔	1.333	Bolt Tension
		Diagonal	A325N	1.0000	1	3.42	8.16	0.420 ✔	1.333	Member Bearing
T6	60	Leg	A325N	1.0000	6	8.96	34.56	0.259 ✔	1.333	Bolt Tension
		Diagonal	A325N	1.0000	1	3.88	8.16	0.476 ✔	1.333	Member Bearing
T7	40	Leg	A325N	1.0000	6	11.07	34.56	0.320 ✔	1.333	Bolt Tension
		Diagonal	A325N	1.0000	1	4.75	8.16	0.582 ✔	1.333	Member Bearing
T8	20	Leg	F1554-105	1.0000	6	13.07	32.40	0.403 ✔	1.333	Bolt Tension
		Diagonal	A325N	1.0000	1	6.18	8.16	0.758 ✔	1.333	Member Bearing

Compression Checks

Leg Design Data (Compression)

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	F_a ksi	A in^2	Actual P K	Allow. P_a K	Ratio P / P_a
T1	145 - 130	1 3/4	15.00	2.50	68.6 K=1.00	21.201	2.4053	-4.58	50.99	0.090 ✔
T2	130 - 120	Pirod 207628	10.02	10.02	44.8 K=1.00	25.140	3.6816	-7.40	92.56	0.080 ✔
T3	120 - 100	Pirod 207628	20.03	10.02	44.8 K=1.00	25.140	3.6816	-19.80	92.56	0.214 ✔
T4	100 - 80	Pirod 207628	20.03	10.02	44.8 K=1.00	25.140	3.6816	-35.03	92.56	0.378 ✔
T5	80 - 60	Pirod 207628	20.03	10.02	44.8 K=1.00	25.140	3.6816	-51.04	92.56	0.552 ✔
T6	60 - 40	Pirod 207628	20.03	10.02	44.8 K=1.00	25.140	3.6816	-67.74	92.56	0.732 ✔
T7	40 - 20	Pirod 207628	20.03	10.02	44.8 K=1.00	25.140	3.6816	-84.96	92.56	0.918 ✔

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	F_a ksi	A in^2	Actual P K	Allow. P_a K	Ratio $\frac{P}{P_a}$
T8	20 - 0	Pirod 207628	20.03	10.02	44.8 K=1.00	25.140	3.6816	-102.37	92.56	1.106 ✔

Truss-Leg Diagonal Data

Section No.	Elevation ft	Diagonal Size	L_d ft	Kl/r	F_a ksi	A in^2	Actual V K	Allow. V_a K	Stress Ratio
T2	130 - 120	0.5	1.47	120.0	10.365	0.1963	0.28	2.30	0.120 ✔
T3	120 - 100	0.5	1.47	120.0	10.365	0.1963	0.22	2.30	0.095 ✔
T4	100 - 80	0.5	1.47	120.0	10.365	0.1963	0.15	2.30	0.067 ✔
T5	80 - 60	0.5	1.47	120.0	10.365	0.1963	0.13	2.30	0.058 ✔
T6	60 - 40	0.5	1.47	120.0	10.365	0.1963	0.18	2.30	0.077 ✔
T7	40 - 20	0.5	1.47	120.0	10.365	0.1963	0.40	2.30	0.176 ✔
T8	20 - 0	0.5	1.47	120.0	10.365	0.1963	0.57	2.30	0.249 ✔

Diagonal Design Data (Compression)

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	F_a ksi	A in^2	Actual P K	Allow. P_a K	Ratio $\frac{P}{P_a}$
T1	145 - 130	7/8	5.59	2.71	134.0 K=0.90	8.320	0.6013	-0.77	5.00	0.153 ✔
T2	130 - 120	L2 1/2x2 1/2x3/16	11.42	5.02	121.8 K=1.00	10.024	0.9020	-1.63	9.04	0.180 ✔
T3	120 - 100	L2 1/2x2 1/2x3/16	12.50	5.67	137.4 K=1.00	7.907	0.9020	-2.45	7.13	0.343 ✔
T4	100 - 80	L2 1/2x2 1/2x3/16	13.80	6.37	154.4 K=1.00	6.265	0.9020	-3.02	5.65	0.535 ✔
T5	80 - 60	L2 1/2x2 1/2x3/16	15.24	7.12	172.7 K=1.00	5.008	0.9020	-3.48	4.52	0.771 ✔
T6	60 - 40	L2 1/2x2 1/2x3/16	16.80	7.92	192.1 K=1.00	4.047	0.9020	-3.78	3.65	1.036 ✔
T7	40 - 20	L3x3x3/16	17.62	8.35	168.1 K=1.00	5.283	1.0900	-4.35	5.76	0.756 ✔
T8	20 - 0	L3x3x3/16	19.30	9.20	185.2 K=1.00	4.354	1.0900	-5.37	4.75	1.131 ✔

Top Girt Design Data (Compression)

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	F_a ksi	A in^2	Actual P K	Allow. P_a K	Ratio $\frac{P}{P_a}$
T1	145 - 130	7/8	5.00	4.85	186.4 K=0.70	4.298	0.6013	-0.07	2.58	0.029 ✔
T2	130 - 120	L2 1/2x2 1/2x3/16	5.00	4.52	114.8 K=1.05	11.016	0.9020	-0.03	9.94	0.003 ✔

Tension Checks

Leg Design Data (Tension)

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	F_a ksi	A in^2	Actual P K	Allow. P_a K	Ratio $\frac{P}{P_a}$
T1	145 - 130	1 3/4	15.00	2.50	68.6	30.000	2.4053	3.59	72.16	0.050 ✔
T2	130 - 120	Pirod 207628	10.02	10.02	44.8	30.000	3.6816	5.71	110.45	0.052 ✔
T3	120 - 100	Pirod 207628	20.03	10.02	44.8	30.000	3.6816	15.46	110.45	0.140 ✔
T4	100 - 80	Pirod 207628	20.03	10.02	44.8	30.000	3.6816	27.78	110.45	0.252 ✔
T5	80 - 60	Pirod 207628	20.03	10.02	44.8	30.000	3.6816	40.62	110.45	0.368 ✔
T6	60 - 40	Pirod 207628	20.03	10.02	44.8	30.000	3.6816	53.75	110.45	0.487 ✔
T7	40 - 20	Pirod 207628	20.03	10.02	44.8	30.000	3.6816	66.42	110.45	0.601 ✔
T8	20 - 0	Pirod 207628	20.03	10.02	44.8	30.000	3.6816	78.41	110.45	0.710 ✔

Truss-Leg Diagonal Data

Section No.	Elevation ft	Diagonal Size	L_d ft	Kl/r	F_a ksi	A in^2	Actual V K	Allow. V_a K	Stress Ratio
T2	130 - 120	0.5	1.47	120.0	10.365	0.1963	0.28	2.30	0.120 ✔
T3	120 - 100	0.5	1.47	120.0	10.365	0.1963	0.22	2.30	0.095 ✔
T4	100 - 80	0.5	1.47	120.0	10.365	0.1963	0.15	2.30	0.067 ✔
T5	80 - 60	0.5	1.47	120.0	10.365	0.1963	0.13	2.30	0.058 ✔
T6	60 - 40	0.5	1.47	120.0	10.365	0.1963	0.18	2.30	0.077

Section No.	Elevation ft	Diagonal Size	L_d ft	Kl/r	F_a ksi	A in^2	Actual V K	Allow. V_a K	Stress Ratio
T7	40 - 20	0.5	1.47	120.0	10.365	0.1963	0.40	2.30	0.176 ✓
T8	20 - 0	0.5	1.47	120.0	10.365	0.1963	0.57	2.30	0.249 ✓

Diagonal Design Data (Tension)

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	F_a ksi	A in^2	Actual P K	Allow. P_a K	Ratio $\frac{P}{P_a}$
T1	145 - 130	7/8	5.59	2.71	148.9	30.000	0.6013	0.76	18.04	0.042 ✓
T2	130 - 120	L2 1/2x2 1/2x3/16	11.42	5.02	80.1	21.600	0.9020	1.49	19.48	0.076 ✓
T3	120 - 100	L2 1/2x2 1/2x3/16	12.50	5.67	90.0	21.600	0.9020	2.40	19.48	0.123 ✓
T4	100 - 80	L2 1/2x2 1/2x3/16	13.80	6.37	100.8	21.600	0.9020	2.97	19.48	0.153 ✓
T5	80 - 60	L2 1/2x2 1/2x3/16	15.24	7.12	112.4	21.600	0.9020	3.42	19.48	0.176 ✓
T6	60 - 40	L2 1/2x2 1/2x3/16	16.80	7.92	124.8	21.600	0.9020	3.88	19.48	0.199 ✓
T7	40 - 20	L3x3x3/16	18.45	8.76	114.1	21.600	1.0900	4.75	23.54	0.202 ✓
T8	20 - 0	L3x3x3/16	20.16	9.62	125.1	21.600	1.0900	6.18	23.54	0.263 ✓

Top Girt Design Data (Tension)

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	F_a ksi	A in^2	Actual P K	Allow. P_a K	Ratio $\frac{P}{P_a}$
T1	145 - 130	7/8	5.00	4.85	266.3	30.000	0.6013	0.05	18.04	0.003 ✓
T2	130 - 120	L2 1/2x2 1/2x3/16	5.00	4.52	74.9	21.600	0.9020	0.04	19.48	0.002 ✓

Section Capacity Table

Section No.	Elevation ft	Component Type	Size	Critical Element	P K	$SF*P_{allow}$ K	% Capacity	Pass Fail
T1	145 - 130	Leg	1 3/4	1	-4.58	67.98	6.7	Pass
T2	130 - 120	Leg	Pirod 207628	44	-7.37	123.38	9.0	Pass

Section No.	Elevation ft	Component Type	Size	Critical Element	P K	$SF*P_{allow}$ K	% Capacity	Pass Fail
T3	120 - 100	Leg	Pirod 207628	56	-19.80	123.38	16.1	Pass
T4	100 - 80	Leg	Pirod 207628	71	-35.03	123.38	28.4	Pass
T5	80 - 60	Leg	Pirod 207628	86	-51.04	123.38	41.4	Pass
T6	60 - 40	Leg	Pirod 207628	101	-67.74	123.38	54.9	Pass
T7	40 - 20	Leg	Pirod 207628	116	-84.96	123.38	68.9	Pass
T8	20 - 0	Leg	Pirod 207628	131	-102.37	123.38	83.0	Pass
T1	145 - 130	Diagonal	7/8	11	-0.77	6.67	11.5	Pass
T2	130 - 120	Diagonal	L2 1/2x2 1/2x3/16	50	-1.63	12.05	13.5 13.7 (b)	Pass
T3	120 - 100	Diagonal	L2 1/2x2 1/2x3/16	58	-2.45	9.51	25.7	Pass
T4	100 - 80	Diagonal	L2 1/2x2 1/2x3/16	73	-3.02	7.53	40.1	Pass
T5	80 - 60	Diagonal	L2 1/2x2 1/2x3/16	88	-3.48	6.02	57.8	Pass
T6	60 - 40	Diagonal	L2 1/2x2 1/2x3/16	103	-3.78	4.87	77.7	Pass
T7	40 - 20	Diagonal	L3x3x3/16	124	-4.35	7.68	56.7	Pass
T8	20 - 0	Diagonal	L3x3x3/16	139	-5.37	6.33	84.8	Pass
T1	145 - 130	Top Girt	7/8	4	-0.07	3.45	2.2	Pass
T2	130 - 120	Top Girt	L2 1/2x2 1/2x3/16	47	-0.03	13.25	0.2 0.4 (b)	Pass
						Summary		
						Leg (T8)	83.0	Pass
						Diagonal (T8)	84.8	Pass
						Top Girt (T1)	2.2	Pass
						Bolt Checks	56.9	Pass
						RATING =	**84.8**	**Pass**

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Subject: FOUNDATION ANALYSIS

Location: Uncasville, CT

Rev. 1: 12/7/15

Prepared by: T.J.L. Checked by: C.F.C.
Job No. 15122.000

Mat Foundation Analysis:

Input Data:

Tower Data

Overturning Moment =	$OM := 1527 \cdot ft \cdot kips$	(User Input from tnxTower)	
Shear Force =	$S_t := 21 \cdot kip$	(User Input from tnxTower)	
Axial Force =	$WT_t := 23 \cdot kip$	(User Input from tnxTower)	
Max Compression Force =	$C_t := 106 \cdot kip$	(User Input from tnxTower)	
Max Uplift Force =	$U_t := 83 \cdot kip$	(User Input from tnxTower)	
Tower Height =	$H_t := 145 \cdot ft$	(User Input)	
Tower Width =	$W_t := 18 \cdot ft$	(User Input)	
Tower Position on Foundation (1=offset, 2=centered) =	$Pos_t := 1$	(User Input)	

Footing Data:

Overall Depth of Footing =	$D_f := 5.5 \cdot ft$	(User Input)	
Thickness of Footing =	$T_f := 1.5 \cdot ft$	(User Input)	
Width of Footing =	$W_f := 26.5 \cdot ft$	(User Input)	
Length of Pier =	$L_p := 4.5 \cdot ft$	(User Input)	
Extension of Pier Above Grade =	$L_{pag} := 0.5 \cdot ft$	(User Input)	
Diameter of Pier =	$d_p := 3.0 \cdot ft$	(User Input)	

Material Properties:

Concrete Compressive Strength =	$f_c := 4000 \cdot psi$	(User Input)	
Steel Reinforcment Yield Strength =	$f_y := 60000 \cdot psi$	(User Input)	
Internal Friction Angle of Soil =	$\Phi_s := 30 \cdot deg$	(User Input)	
Allowable Soil Bearing Capacity =	$q_s := 4000 \cdot psf$	(User Input)	
Unit Weight of Soil =	$\gamma_{soil} := 100 \cdot pcf$	(User Input)	
Unit Weight of Concrete =	$\gamma_{conc} := 150 \cdot pcf$	(User Input)	
Foundation Bouyancy =	$Bouyancy := 0$	(User Input)	(Yes=1 / No=0)
Depth to Neglect =	$n := 0 \cdot ft$	(User Input)	
Cohesion of Clay Type Soil =	$c := 0 \cdot ksf$	(User Input)	(Use 0 for Sandy Soil)
Seismic Zone Factor =	$Z := 2$	(User Input)	(UBC-1997 Fig 23-2)
Coefficient of Friction Between Concrete =	$\mu := 0.45$	(User Input)	

Pier Reinforcement:

Bar Size =	$BS_{pier} := 6$	(User Input)	
Bar Diameter =	$d_{bpier} := 0.75 \cdot in$	(User Input)	
Number of Bars =	$NB_{pier} := 12$	(User Input)	
Clear Cover of Reinforcement =	$Cvr_{pier} := 3.0 \cdot in$	(User Input)	
Reinforcement Location Factor =	$\alpha_{pier} := 1.0$	(User Input)	(ACI-2008 12.2.4)
Coating Factor =	$\beta_{pier} := 1.0$	(User Input)	(ACI-2008 12.2.4)
Concrete Strength Factor =	$\lambda_{pier} := 1.0$	(User Input)	(ACI-2008 12.2.4)
Reinforcement Size Factor =	$\gamma_{pier} := 1.0$	(User Input)	(ACI-2008 12.2.4)
Diameter of Tie =	$d_{Tie} := 3 \cdot in$	(User Input)	

Pad Reinforcement:

Bar Size =	$BS_{top} := 6$	(User Input)	(Top of Pad)
Bar Diameter =	$d_{btop} := 0.75 \cdot in$	(User Input)	(Top of Pad)
Number of Bars =	$NB_{top} := 39$	(User Input)	(Top of Pad)
Bar Size =	$BS_{bot} := 6$	(User Input)	(Bottom of Pad)
Bar Diameter =	$d_{bbot} := 0.75 \cdot in$	(User Input)	(Bottom of Pad)
Number of Bars =	$NB_{bot} := 39$	(User Input)	(Bottom of Pad)
Clear Cover of Reinforcement =	$Cvr_{pad} := 3.0 \cdot in$	(User Input)	
Reinforcement Location Factor =	$\alpha_{pad} := 1.0$	(User Input)	(ACI-2008 12.2.4)
Coating Factor =	$\beta_{pad} := 1.0$	(User Input)	(ACI-2008 12.2.4)
Concrete Strength Factor =	$\lambda_{pad} := 1.0$	(User Input)	(ACI-2008 12.2.4)
Reinforcement Size Factor =	$\gamma_{pad} := 1.0$	(User Input)	(ACI-2008 12.2.4)

Calculated Factors:

Pier Reinforcement Bar Area =

$$A_{bpier} := \frac{\pi \cdot d_{bpier}^2}{4} = 0.442 \cdot in^2$$

Pad Top Reinforcement Bar Area =

$$A_{btop} := \frac{\pi \cdot d_{btop}^2}{4} = 0.442 \cdot in^2$$

Pad Bottom Reinforcement Bar Area =

$$A_{bbot} := \frac{\pi \cdot d_{bbot}^2}{4} = 0.442 \cdot in^2$$

Coefficient of Lateral Soil Pressure =

$$K_p := \frac{1 + \sin(\Phi_s)}{1 - \sin(\Phi_s)} = 3$$

Load Factor =

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

Stability of Footing:

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

Adjusted Soil Unit Weight = $\gamma_s := if(Bouyancy = 1, \gamma_{soil} - 62.4pcf, \gamma_{soil}) = 100 \cdot pcf$

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

$P_{pt} := K_p \cdot \gamma_s \cdot (D_f - T_f) + c \cdot 2 \cdot \sqrt{K_p} = 1.2 \cdot ksf$

$P_{top} := if[n < (D_f - T_f), P_{pt}, P_{pn}] = 1.2 \cdot ksf$

$P_{bot} := K_p \cdot \gamma_s \cdot D_f + c \cdot 2 \cdot \sqrt{K_p} = 1.65 \cdot ksf$

$P_{ave} := \frac{P_{top} + P_{bot}}{2} = 1.425 \cdot ksf$

$T_p := if[n < (D_f - T_f), T_f, (D_f - n)] = 1.5$

$A_p := W_f \cdot T_p = 39.75$

Ultimate Shear = $S_u := P_{ave} \cdot A_p = 56.644 \cdot kip$

Weight of Concrete Pad = $WT_{pad} := (W_f^2 \cdot T_f) \cdot \gamma_c = 158.006 \cdot kip$

Weight of Concrete Piers = $WT_{pier} := 3 \cdot [(L_p \cdot d_p^2) \cdot \gamma_c] = 18.225 \cdot kip$

Total Weight of Concrete = $WT_c := WT_{pad} + WT_{pier} = 176 \cdot kip$

Weight of Soil Above Footing = $WT_{s1} := (W_f^2 - 3 \cdot d_p^2) \cdot (L_p - L_{pag}) \cdot \gamma_s = 270 \cdot kip$

Weight of Soil Back Face = $WT_{s2} := \left[\frac{\tan(\Phi_s) \cdot (D_f)^2}{2} \cdot W_f\right] \cdot \gamma_s = 23 \cdot kip$

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

$X_t := if(Pos_t, X_{t1}, X_{t2}) = 5.456$

$X_{off} := \frac{W_f}{2} - \left[\frac{(W_t \cdot \cos(30 \cdot deg))}{3} + X_t\right] = 2.598$

Resisting Moment = $M_r := (WT_c + WT_{s1}) \cdot \frac{W_f}{2} + S_u \cdot \frac{T_f}{3} + WT_{s2} \cdot \left[W_f + \frac{\tan(\Phi_s) \cdot (L_p - L_{pag})}{3}\right] = 6573 \cdot kip$

Overturning Moment = $M_{ot} := OM + S_t \cdot (L_p + T_f) = 1653 \cdot kip \cdot ft$

Factor of Safety Actual = $FS := \frac{M_r}{M_{ot}} = 3.98$

Factor of Safety Required = $FS_{req} := 2$

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

$OverTurning\_Moment\_Check = "Okay"$

Bearing Pressure Caused by Footing:

Total Load = $Load_{tot} := WT_c + WT_{s1} + WT_t = 469 \cdot kip$

Area of the Mat = $A_{mat} := W_f^{\,2} = 702.25$

Section Modulus of Mat = $S := \frac{W_f^{\,3}}{6} = 3101.6 \cdot ft^3$

Maximum Pressure in Mat = $P_{max} := \frac{Load_{tot}}{A_{mat}} + \frac{M_{ot}}{S} = 1.201 \cdot ksf$

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

$Max\_Pressure\_Check = "Okay"$

Minimum Pressure in Mat = $P_{min} := \frac{Load_{tot}}{A_{mat}} - \frac{M_{ot}}{S} = 0.135 \cdot ksf$

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

$Min\_Pressure\_Check = "Okay"$

Distance to Resultant of Pressure Distribution = $X_p := \frac{P_{max}}{\frac{P_{max} - P_{min}}{W_f}} \cdot \frac{1}{3} = 9.955$

Distance to Kern = $X_k := \frac{W_f}{6} = 4.417$ Since Resultant Force is Not in Kern, Area to which Pressure is Applied Must be Reduced.

Eccentricity = $e := \frac{M_{ot}}{Load_{tot}} = 3.522$

Adjusted Soil Pressure = $P_a := \frac{2 \cdot Load_{tot}}{3 \cdot W_f \cdot \left(\frac{W_f}{2} - e\right)} = 1.214 \cdot ksf$

$q_{adj} := if\left(P_{min} < 0, P_a, P_{max}\right) = 1.201 \cdot ksf$

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

$Pressure\_Check = "Okay"$

Concrete Bearing Capacity:

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

Bearing Strength Between Pier and Pad = $P_b := \Phi_c \cdot 0.85 \cdot f_c \cdot \frac{\pi \cdot d_p^{\,2}}{4} = 2.25 \times 10^3 \cdot kips$ (ACI-2008 10.14)

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

$Bearing\_Check = "Okay"$

Shear Strength of Concrete:

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

$\phi_c := 0.85$ (ACI 9.3.2.5)

$d := T_f - Cvr_{pad} - \frac{d_{bbot}}{2} = 14.625 \cdot in$

$FL := \frac{C_t}{W_f^2} = 0.1509 \cdot ksf$

$V_{req} := LF \cdot FL \cdot \left(X_t - 0.5 \cdot d_p - d\right) \cdot W_f = 14.594 \cdot kip$

$V_{Avail} := \phi_c \cdot 2 \cdot \sqrt{f_c \cdot psi} \cdot W_f \cdot d = 500 \cdot kip$ (ACI-2008 11.2.1.1)

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

Beam_Shear_Check = "Okay"

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

Critical Perimeter of Punching Shear = $b_o := \left(d_p + d\right) \cdot \pi = 13.3$

Required Shear Strength = $V_{req} := LF \cdot FL \cdot \left[W_f^2 - \left(d_p + d\right)^2 \cdot \frac{\pi}{4}\right] = 138.5 \cdot kips$

Available Shear Strength = $V_{Avail} := \phi_c \cdot 4 \cdot \sqrt{f_c \cdot psi} \cdot b_o \cdot d = 500.2 \cdot kip$ (ACI-2008 11.11.2.1)

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

Punching_Shear_Check = "Okay"

Steel Reinforcement in Pad:

Required Reinforcement for Bending:

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

$$M_{nT} := LF\cdot\left[U_t\cdot\left(W_t\cdot\sin(60\cdot deg) - \frac{d_p}{2}\right) + S_t\cdot\left(D_f + L_{pag}\right)\right] - WT_t\cdot X_{off} = 1667\cdot ft\cdot k$$

$$M_{nS} := -1\cdot\left[\frac{1}{2}\cdot\left(\frac{W_f}{2} + \frac{W_t}{3}\cdot\cos(30\cdot deg) - \frac{d_p}{2}\right)^2\cdot W_t\cdot\left[\gamma_s\cdot\left(T_p - T_f\right)\right] + WT_{s2}\cdot\left[\frac{W_f}{2} + \frac{W_t}{3}\cdot\cos(30\cdot deg) - \frac{d_p}{2} + \left(D_f - n\right)\cdot\tan\left(\Phi_s\right)\right]\right] = -4$$

$$M_{nC} := -1\cdot\left[\frac{1}{2}\cdot\left(\frac{W_f}{2} + \frac{W_t}{3}\cdot\cos(30\cdot deg) - \frac{d_p}{2}\right)^2\cdot W_t\cdot\left(\gamma_c\cdot T_f\right)\right]$$

Design Moment = $M_n := \frac{M_{nT} + M_{nS} + M_{nC}}{\phi_m} = 688.64\cdot kips\cdot ft$

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

(ACI-200810.2.7.3)

$b_{eff} := W_t\cdot\cos(30\cdot deg) + d_p = 223.061\cdot in$

$d := T_f - Cvr_{pad} - d_{bbot} = 14.25\cdot in$

$A_s := \frac{M_n}{\left(f_y\cdot d\right)} = 9.665\cdot in^2$

$a := \frac{A_s\cdot f_y}{\beta\cdot f_c\cdot b_{eff}} = 0.765\cdot in$

$A_s := \frac{M_n}{f_y\cdot\left(d - \frac{a}{2}\right)} = 9.932\cdot in^2$

$\rho := \frac{A_s}{b_{eff}\,d} = 0.00312$

Required Reinforcement for Temperature and Shrinkage:

$$\rho_{sh} := \begin{cases} .0018 \text{ if } f_y \geq 60000\cdot psi = 0.0018 \\ .0020 \text{ otherwise} \end{cases} \quad \text{(ACI -2008 7.12.2.1)}$$

Check Bottom Bars:

$$As := \begin{cases} \left(\rho \cdot b_{eff} \cdot d\right) \text{ if } \left(\rho \cdot b_{eff} \cdot d\right) > \rho_{sh} \cdot \frac{b_{eff}}{2} \cdot d = 9.932\cdot in^2 \\ \rho_{sh} \cdot \frac{b_{eff}}{2} \cdot d \text{ otherwise} \end{cases}$$

$$As_{prov} := A_{bbot} \cdot NB_{bot} = 17.2\cdot in^2$$

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

Pad_Reinforcement_Bot = "Okay"

Check top Bars:

$$As := if\left(\rho \geq \rho_{sh}, A_s, \rho_{sh} \cdot \frac{b_{eff}}{2} \cdot d\right) = 9.9\cdot in^2$$

$$As_{prov} := A_{btop} \cdot NB_{top} = 17.2\cdot in^2$$

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

Pad_Reinforcement_Top = "Okay"

Developement Length Pad Reinforcement:

Bar Spacing =

$$B_{sPad} := \frac{W_f - 2\cdot Cvr_{pad} - NB_{bot}\cdot d_{bbot}}{NB_{bot} - 1} = 7.44\cdot in$$

Spacing or Cover Dimension =

$$c := if\left(Cvr_{pad} < \frac{B_{sPad}}{2}, Cvr_{pad}, \frac{B_{sPad}}{2}\right) = 3\cdot in$$

Transverse Reinforcement Index =

$$k_{tr} := 0 \quad \text{(ACI-2008 12.2.3)}$$

$$L_{dbt} := \frac{3\cdot f_y \alpha_{pad}\cdot\beta_{pad}\cdot\gamma_{pad}\cdot\lambda_{pad}}{40\cdot\sqrt{f_c\cdot psi}\cdot\frac{c + k_{tr}}{d_{bbot}}}\cdot d_{bbot} = 13.3\cdot in$$

Minimum Development Length =

$$L_{dbmin} := 12\cdot in \quad \text{(ACI-2008 12.2.1)}$$

$$L_{dbtCheck} := if\left(L_{dbt} \geq L_{dbmin}, "Use\ L.dbt", "Use\ L.dbmin"\right) = "Use\ L.dbt"$$

Available Length in Pad =

$$L_{Pad} := \frac{W_f}{2} - \frac{W_t}{2} - Cvr_{pad} = 48\cdot in$$

$$Lpad\_Check := if\left(L_{Pad} > L_{dbt}, "Okay", "No Good"\right)$$

Lpad_Check = "Okay"

Steel Reinforcement in Pier:

Area of Pier = $A_p := \frac{\pi \cdot d_p^2}{4} = 1017.88 \cdot in^2$

$A_{smin} := 0.01 \cdot 0.5 \cdot A_p = 5.09 \cdot in^2$ (ACI-2008 10.8.4 & 10.9.1)

$A_{sprov} := NB_{pier} \cdot A_{bpier} = 5.3 \cdot in^2$

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

$Steel\_Area\_Check = "Okay"$

Bar Spacing In Pier = $B_{sPier} := \frac{d_p \cdot \pi}{NB_{pier}} - d_{bpier} = 8.675 \cdot in$

Diameter of Reinforcement Cage = $Diam_{cage} := d_p - 2 \cdot Cvr_{pier} = 30 \cdot in$

Maximum Moment in Pier = $M_p := \left[S_t \cdot \left(L_p + \frac{A_{BP}}{2} \right) \right] \cdot LF = 1679.6 \cdot in \cdot kips$

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

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

$(D \ N \ n \ P_u \ M_{xu}) = (36 \ \ 12 \ \ 6 \ \ 141.3 \ \ 1679.6)$

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

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

$(\phi P_n \ \ \phi M_{xn} \ \ f_{sp} \ \ \rho) = (715.2 \ \ 8501 \ \ -60 \ \ 0)$

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

$Axial\_Load\_Check = "Okay"$

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

$Bending\_Check = "Okay"$

Development Length Pier Reinforcement:

Available Length in Foundation:

$L_{pier} := L_p - Cvr_{pier} = 51 \cdot in$

$L_{pad} := T_f - Cvr_{pad} = 15 \cdot in$

Tension: (ACI-2008 12.2.3)

Spacing or Cover Dimension =

$c := if\left(Cvr_{pier} < \frac{B_{sPier}}{2}, Cvr_{pier}, \frac{B_{sPier}}{2}\right) = 3 \cdot in$

Transverse Reinforcement =

$k_{tr} := 0$ (ACI-2008 12.2.3)

$L_{dbt} := \frac{3 \cdot f_y \alpha_{pier} \cdot \beta_{pier} \cdot \gamma_{pier} \cdot \lambda_{pier}}{40 \cdot \sqrt{f_c \cdot psi} \cdot \left(\frac{c + k_{tr}}{d_{bpier}}\right)} \cdot d_{bpier} = 13.34 \cdot in$

Minimum Development Length =

$L_{dh} := \frac{1200 \cdot d_{bpier}}{\sqrt{\frac{f_c}{psi}}} \cdot .7 = 9.961 \cdot in$ (ACI 12.2.1)

Pier reinforcement bars are standard 90 degree hooks and therefore developement in the pad is computed as follows:

$L_{db} := \max\left(L_{dbt}, L_{dbmin}\right)$

$L_{tension\_Check} := if\left(L_{pier} + L_{pad} > L_{dbt}, "Okay", "No Good"\right)$

$L_{tension\_Check} = "Okay"$

Compression: (ACI-2008 12.3.2)

$L_{dbc1} := \frac{.02 \cdot d_{bpier} \cdot f_y}{\sqrt{f_c \cdot psi}} = 14.23 \cdot in$

$L_{dbmin} := 0.0003 \cdot \frac{in^2}{lb} \cdot \left(d_{bpier} \cdot f_y\right) = 13.5 \cdot in$

$L_{dbc} := if\left(L_{dbc1} \geq L_{dbmin}, L_{dbc1}, L_{dbmin}\right) = 14.23 \cdot in$

$L_{compression\_Check} := if\left(L_{pier} + L_{pad} > L_{dbc}, "Okay", "No Good"\right)$

$L_{compression\_Check} = "Okay"$

Tie Size and Spacing in Column:

Minimum Tie Size = $Tie_{min} := if(BS_{pier} \le 10, 3, 4) = 3$

Used #3 Ties

Seismic Factor = $z := if(Z \le 2, 1, 0.5) = 1$ (ACI-2008 21.10.5)

$s_{lim1} := 16 \cdot d_{bpier} \cdot z = 12 \cdot in$

$s_{lim2} := \frac{48 \cdot d_{Tie}}{8} \cdot z = 18 \cdot in$

$s_{lim3} := D_f \cdot z = 66 \cdot in$

$s_{lim4} := 18in$

Maximum Spacing = $s_{tie} := \min\left(\begin{pmatrix} s_{lim1} \\ s_{lim2} \\ s_{lim3} \\ s_{lim4} \end{pmatrix}\right) = 12 \cdot in$

Number of Ties Required = $n_{tie} := \frac{L_{pier} - 3 \cdot in}{s_{tie}} + 1 = 5$

Check Anchor Steel Embedment:

Depth Available = $D_{ab} := L_{st} - A_{BP} = 5 \cdot ft$

Length of Anchor Bolt = $L_{anchor} := \frac{(0.11 \cdot f_{ya}) \cdot in}{\sqrt{f_c \cdot psi}} = 10.87 \cdot ft$

$Depth\_Check := if(D_{ab} \ge L_{anchor}, "Okay", "No Good")$

Depth_Check = "No Good"

Note: Anchor plate is provided

Product Specifications

COMMSCOPE®

POWERED BY ANDREW®

DB589-Y

Andrew® Omni Antenna, 890–960 MHz, 360° horizontal beamwidth, fixed electrical tilt, fits on 38–51 mm (1-1/2 to 2 in) OD pipe

- Light weight, low profile omnidirectional antenna ideal for low to moderate gain applications
- Integral dual purpose mount allows top or side mounting

Electrical Specifications

Frequency Band, MHz	**890–960**
Gain, dBi	11.1
Beamwidth, Horizontal, degrees	360
Beamwidth, Vertical, degrees	9.0
Beam Tilt, degrees	0
VSWR | Return Loss, dB	1.5 | 14.0
PIM, 5th Order, 2 x 20 W, dBc	-153
Input Power per Port, maximum, watts	400
Polarization	Vertical
Impedance	50 ohm

General Specifications

Antenna Brand	Andrew®
Antenna Type	Omni
Band	Single band
Operating Frequency Band	890 – 960 MHz
Includes	V-bolts
Performance Note	Outdoor usage

Mechanical Specifications

Color	Horizon blue
Lightning Protection	dc Ground
Radiator Material	Brass
Radome Material	Fiberglass, UV resistant
RF Connector Interface	N Female
RF Connector Location	Bottom
RF Connector Quantity, total	1
Wind Loading, maximum	176.1 N @ 100 mph 39.6 lbf @ 100 mph
Wind Speed, maximum	201.2 km/h | 125.0 mph

Dimensions

Length	2794.0 mm | 110.0 in
Outer Diameter	38.1 mm | 1.5 in
Net Weight	5.2 kg | 11.5 lb

Product Specifications

DB589-Y

Regulatory Compliance/Certifications

Agency	Classification
RoHS 2011/65/EU	Compliant by Exemption
China RoHS SJ/T 11364-2006	Above Maximum Concentration Value (MCV)
ISO 9001:2008	Designed, manufactured and/or distributed under this quality management system

* Footnotes

Performance Note	Severe environmental conditions may degrade optimum performance

Attachment D:

MPE Report

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Calculated Radio Frequency Emissions

EVERSOURCE ENERGY

911 Norwich-New London Turnpike

Uncasville, CT 06382

October 7, 2015

Table of Contents

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1. Introduction

The purpose of this report is to investigate compliance with applicable FCC regulations for the proposed modifications to the existing Public Safety Tower located at 911 Norwich-New London Turnpike, Uncasville, CT. Eversource Energy is proposing to a single 900 MHz omni-directional antenna to the tower at a centerline of 138' AGL. The coordinates of the tower are 41-27-4.37N, 72-06-18.68W.

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. RF Exposure Prediction Methods

The emission field calculation results displayed in the following figures were generated using the following formula as outlined in FCC bulletin OET 65:

$$\text{Power Density} = \left(\frac{1.6^2 \times EIRP}{4\pi \times R^2} \right) \text{x Off Beam Loss}$$

Where:

EIRP = Effective Isotropic Radiated Power

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

H = Horizontal Distance from antenna in meters

V = Vertical Distance from radiation center of antenna in meters

Ground reflection factor 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 power, and that all 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 take into account actual terrain elevations which could attenuate the signal. As a result, the predicted signal levels reported below are much higher than the actual signal levels will be from the finished modifications.

4. Calculation Results

Table 1 below outlines the power density information for the site. Due to the directional nature of the proposed Eversource antennas and the existing Uncasville antennas, the majority of the RF power is focused out towards the horizon. As a result, there will be less RF power directed below the antennas relative to the horizon, and consequently lower power density levels around the base of the tower. Please refer to the Attachment for the vertical patterns of the proposed Eversource Energy antenna and the existing transmitting antennas on the tower. The calculated results below include a nominal 10 dB off-beam pattern loss to account for the lower relative gain directly below the antennas.

Location	Carrier	Vertical Distance to Antenna (Ft.)	Operating Frequency (MHz)	Number of Trans.	Effective Radiated Power (ERP) Per Transmitter (Watts)	Power Density (mw/cm^2)	Limit	% MPE
Ground Level	Uncasville FD	145	159.965	1	20	0.00004	0.2000	0.02%
	Uncasville FD	145	151.6475	1	20	0.00004	0.2000	0.02%
	Uncasville FD	145	159.3675	1	20	0.00004	0.2000	0.02%
	Uncasville FD	95	2400	1	40	0.00018	1.0000	0.02%
	Eversource	137.5	900	2	255	0.00106	0.6000	0.18%
							Total	**0.25%**

Table 1: Carrier Information[1]

[1] The power density information for the Uncasville Fire Department shown in the table above obtained directly from the Town of Montville Fire Marshall. Please note that %MPE values listed are rounded to two decimal points. The total %MPE listed is a summation of each unrounded contribution. Therefore, summing each rounded value may not reflect the total value listed in the table.

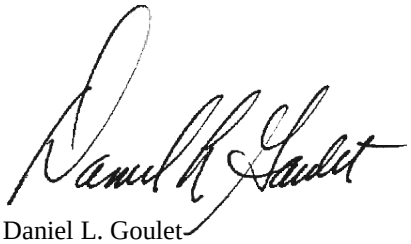
5. Conclusion

The above analysis verifies that emissions from the existing site will be below the maximum power density levels as outlined by the FCC in the OET Bulletin 65 Ed. 97-01. Even when using conservative methods, the cumulative power density from the proposed transmit antennas at the existing facility is well below the limits for the general public. The highest expected percent of Maximum Permissible Exposure at ground level is **0.25% of the FCC limit**.

As noted previously, obstructions (trees, buildings, etc.) that would normally attenuate the signal are not taken into account. As a result, the predicted signal levels are more conservative (higher) than the actual signal levels will be from the finished modifications.

6. 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 ANSI/IEEE Std. C95.3, ANSI/IEEE Std. C95.1 and FCC OET Bulletin 65 Edition 97-01.



Daniel L. Goulet
C Squared Systems, LLC

October 7, 2015
Date

Attachment A: References

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

ANSI C95.1-1982, American National Standard Safety Levels With Respect to Human Exposure to Radio Frequency Electromagnetic Fields, 300 kHz to 100 GHz. IEEE-SA Standards Board

IEEE Std C95.3-1991 (Reaff 1997), IEEE Recommended Practice for the Measurement of Potentially Hazardous Electromagnetic Fields - RF and Microwave. IEEE-SA Standards Board

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

(A) Limits for Occupational/Controlled Exposure[2]

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[3]

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 2: FCC Limits for Maximum Permissible Exposure (MPE)

[2] 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

[3] 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

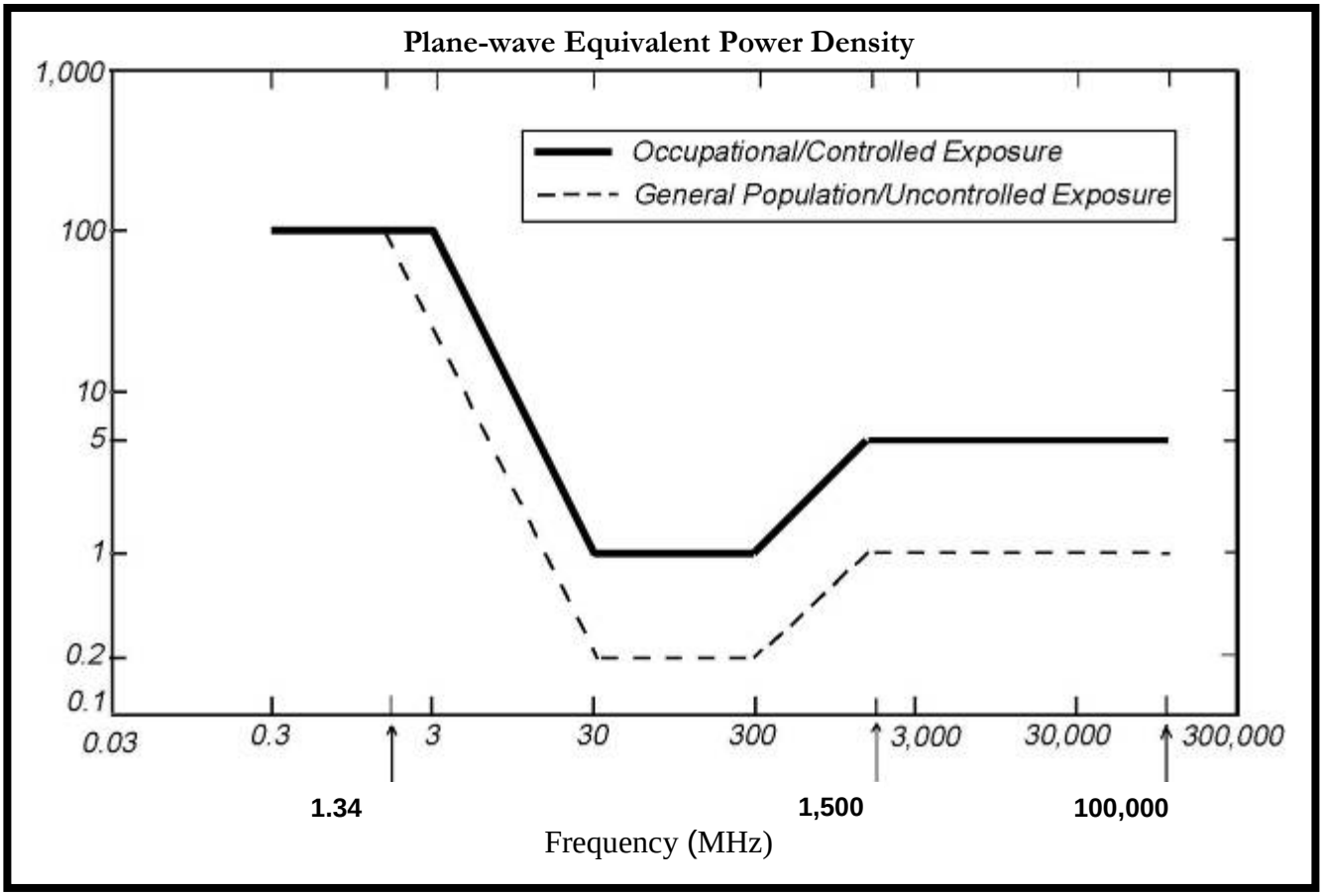
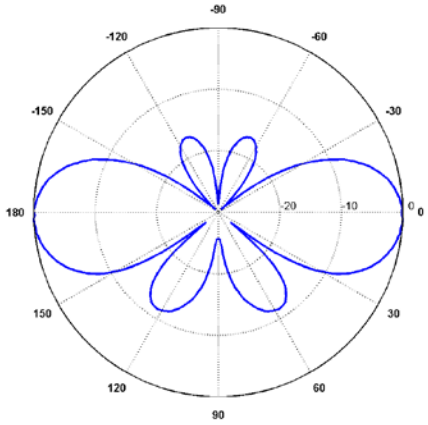


Figure 1: Graph of FCC Limits for Maximum Permissible Exposure (MPE)

Attachment C: Uncasville FD's Antenna Data Sheets and Electrical Patterns

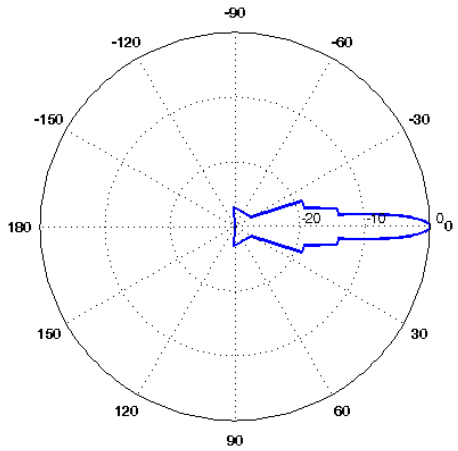
150 MHz

Manufacturer:	Telewave
Model #:	ANT150F2
Frequency Band:	148-174 MHz
Gain:	2.5 dBd
Vertical Beamwidth:	38°
Horizontal Beamwidth:	360°
Polarization:	Vertical Pol
Size L x W x D:	60" x 2.75" x 2.75"



4400 MHz

Manufacturer:	Radiowaves
Model #:	SPD2-2.4
Frequency Band:	2400-2700 MHz
Gain:	18.5 dBd
Vertical Beamwidth:	14°
Horizontal Beamwidth:	14°
Polarization:	Single
Diameter:	24''



Attachment D: Eversource Energy's Antenna Data Sheet and Electrical Pattern

900 MHz

Manufacturer:	Andrew
Model #:	DB589-Y
Frequency Band:	890-960 MHz
Gain:	9.0 dBd
Vertical Beamwidth:	9.0°
Horizontal Beamwidth:	360°
Polarization:	Vertical Pol
Size L x W x D:	110.0" x 1.5" x 1.5"