EVERSOURCE ENERGY

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

John R. Morissette
Project Manager - Transmission Siting - CT

June 8, 2015

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 Greenwich, 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 First Selectman of the Town of Greenwich and the property owner has been informed of the requested approval of sharing this tower in Greenwich.

If you have any questions or comments, please call me at (860) 728-4532.

Sincerely,

John R. Morissette
Project Manager - Transmission Siting - CT

Attachment: Request for Tower Sharing

cc: Peter J. Tesei, First Selectman, Town of Greenwich
Nancye Fritz, Greenwich Hospital

THE CONNECTICUT LIGHT AND POWER COMPANY DOING BUSINESS AS EVERSOURCE ENERGY

REQUEST FOR TOWER SHARING ON AN EXISTING TELECOMMUNICATIONS FACILITY IN THE TOWN OF GREENWICH, 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 5 Perryridge Road, Greenwich, Connecticut (the "Property"). The latitude and longitude of the location of this telecommunications facility are 41° 02' 02.1" N and 73° 37' 51.0" W respectively. Specifically, Eversource proposes to collocate on an existing tower that is owned and maintained by Greenwich Hospital. 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 MHz Distribution Supervisory Control and Data Acquisition ("DSCADA") system throughout Connecticut. This system allows for a more reliable electrical distribution system and enhanced public safety by means of remotely operating line disconnect equipment where wireless operated power switching equipment has been installed. Furthermore, Eversource is adding base stations to improve land mobile radio voice communications with electrical workers that maintain and repair the electric system infrastructure. Greenwich Hospital currently owns and operates a telecommunications tower that is located on the property. The height of the existing monopole tower is 164 feet above ground level ("AGL").

C. Description of the "Project":

Eversource proposes to install a tower top amplifier, three (3) 5-foot high omnidirectional antennas and one (1) 20 foot long pipe with an attached exposed dipole antenna on an existing vacated 13 foot low profile platform with a center elevation of 114 feet above grade level.

Eversource also proposes to install radio equipment in the existing equipment room that previously housed Nextel radio transmitting and receiving equipment. Emergency back-up power will be supplied by a new telecommunications battery and an existing generator. For elevation and location drawings of the proposed installations, please see Attachment A: Greenwich Hospital Project Plans.

Greenwich Hospital has agreed to Eversource's proposed installations and has entered into a lease agreement with Eversource to allow for such installations and to provide necessary associated rights to Eversource to access the Property. Please see Attachment B: Tower Lease Agreement.

A structural loading analysis has been performed to ensure that the tower and foundation are capable of supporting the structural loading from the proposed antenna systems. This analysis was conducted by Centek Engineering. Please see Attachment C: Structural Analysis Report. When Eversource's proposed installations are completed, the structural loading of the tower with proposed equipment would be 50.1%.

D. The proposed installations 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 installations; therefore, the Project would not have an adverse effect on wetlands or watercourses.

2) Soil Erosion, Sediment Control, and Soil Remediation

To the extent needed during the Project, Eversource would apply soil erosion and sediment control practices pursuant to the *2002 Connecticut Guidelines for Soil Erosion and Sediment Control*.

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 installations would not increase, and the sound levels would continue to comply with State and Town regulations. The addition of the Eversource equipment to the facility would have only a negligible impact on sound emissions.

5) Safety and Health

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

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

Radio-signal emissions from the proposed equipment, after the installations, 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 Bulletin No. 65, Edition 97-01 (August 1997). The analysis verifies that after completion of the proposed installations, 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 on the 6th floor hospital rooftop, is 21.44% of the FCC limit. The highest expected percentage of MPE for any publicly accessible areas near the facility is 6.11%, and it would occur on the top level of the parking garage. Please refer to Attachment D: Radio Frequency Exposure Report for details of the analysis.

6) Visual

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

7) Forests and Parks

The Property contains no areas of recreation or public interest administered by any federal, state, local, or private agencies.

E. Schedule:

The proposed installations would begin as soon as practical after issuance of the requested approval by the Council and would be less than four months in duration. Eversource anticipates that construction would be completed by the end of the third quarter of 2015.

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 installations 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:

Mr. John R. Morissette
Project Manager – Transmission Siting - CT
Eversource Energy
P.O. Box 270
Hartford, CT 06141-0270
Telephone: (860) 728-4532

EVERSOURCE ENERGY

By: 
John R. Morissette
Project Manager – Transmission Siting - CT

Attachments:
Attachment A: Greenwich Hospital Project Plans
Attachment B: Tower Lease Agreement
Attachment C: Structural Analysis Report
Attachment D: Radio Frequency Exposure Report

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Attachment A: Greenwich Hospital Project Plans

EVERSOURCE ENERGY

GREENWICH HOSPITAL
5 PERRYRIDGE ROAD
GREENWICH, CT 06830

SITE DIRECTIONS

FROM: 107 SELDEN STREET, BERLIN, CONNECTICUT **TO:** 5 PERRYRIDGE ROAD, GREENWICH, CONNECTICUT

1. Head northwest	141 ft
2. Turn left toward Selden St	0.2 mi
3. Turn left toward Selden St	0.1 mi
4. Turn right onto Selden St	0.2 mi
5. Take the first left onto CT-15 S/US-5 S/Berlin Turnpike	6.6 mi
6. Keep left to continue on CT-15 S	61 mi
7. Take exit 31 for North St	381 mi
8. Turn right onto North St	4.2 mi
9. Turn right onto Maple Ave	92 ft
10. Turn left onto Patterson Ave	0.2 mi
11. Continue straight onto Deer Park Dr	335 ft
12. Turn left onto Perryridge Dr, destination will be on the right	0.4 mi

GENERAL NOTES

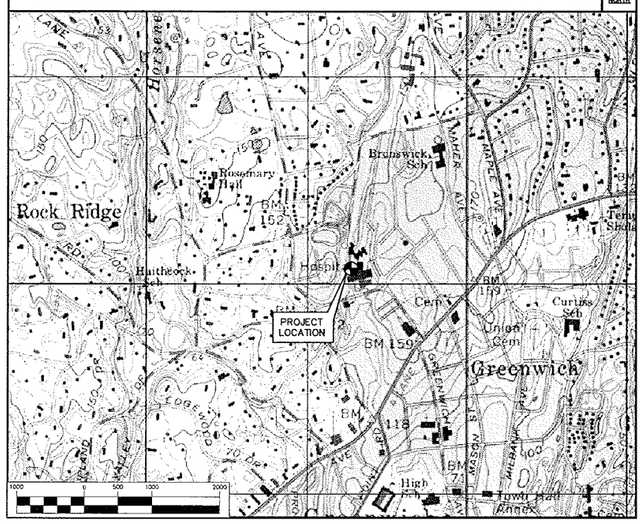
1. PROPOSED ANTENNA LOCATIONS AND HEIGHTS PROVIDED BY EVERSOURCE ENERGY SERVICE COMPANY.

PROJECT SCOPE

1. THE PROPOSED SCOPE OF WORK GENERALLY INCLUDES THE ACQUISITION OF AN EXISTING ABANDONED NEXTEL ±10' X ±20' EQUIPMENT ROOM.
2. TWO (2) DECIBEL DB586-Y WHIP ANTENNAS, ONE (1) BIRD 430-94C-09168-M-110/48 TOWER TOP AMPLIFIER, ONE (1) TELEWAVE ANT150-F2 WHIP ANTENNA, AND ONE (1) COMPROD 731-50HD DIPOLE ANTENNA ARE PROPOSED TO BE INSTALLED ON THE EXISTING TOWER.
3. NO CHANGES ARE PROPOSED TO THE EXISTING UTILITIES SERVICING THE COMPOUND AT THIS TIME.

VICINITY MAP

SCALE: 1" = 1000'



PROJECT SUMMARY

SITE NAME:	GREENWICH HOSPITAL
SITE ADDRESS:	5 PERRYRIDGE ROAD GREENWICH, CT 06830
LESSEE/ TENANT:	EVERSOURCE ENERGY SERVICE COMPANY 107 SELDEN STREET BERLIN, CT 06037
CONTACT PERSON:	STEVE FLORIO EVERSOURCE ENERGY SERVICE COMPANY (860) 665-5611
TOWER COORDINATES:	LATITUDE: 41°-02'-2.1" N LONGITUDE: 73°-37'-51.0" W GROUND ELEVATION: ±200' AMSL

SHEET INDEX

SHT. NO.	DESCRIPTION	REV. NO.
T-1	TITLE SHEET	4
C-1	PARTIAL SITE PLAN AND ELEVATION	4

REV.	DATE	DRAWN BY	CHK'D BY	DESCRIPTION
4	04/24/15	DMD	CFC	CSC - REVISED PER CLIENT COMMENTS
3	03/17/15	CTP	DMD	CSC - REVISED PER CLIENT COMMENTS
2	1/05/15	CTP	DMD	CSC
1	12/18/14	CTP	DMD	CSC
0	12/17/14	CTP	DMD	CSC - ISSUED FOR CLIENT REVIEW

PROFESSIONAL ENGINEER SEAL

EVERSOURCE ENERGY

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

EVERSOURCE ENERGY SERVICE COMPANY

WIRELESS COMMUNICATIONS FACILITY

GREENWICH HOSPITAL

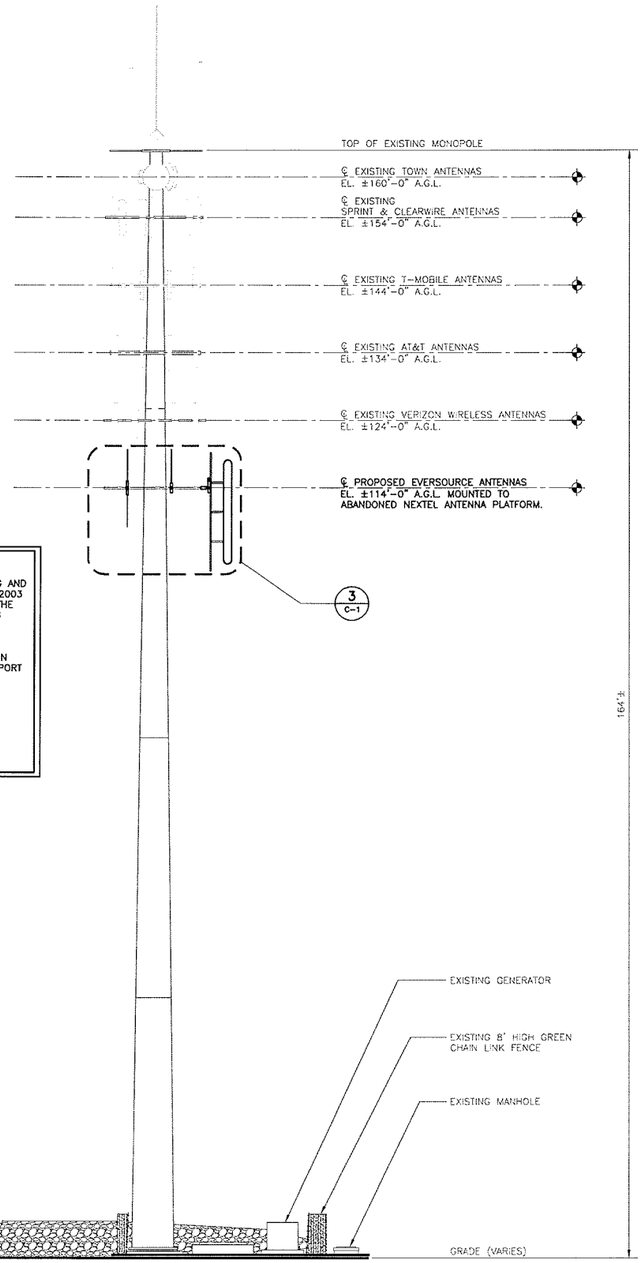
5 PERRYRIDGE ROAD
GREENWICH, CT 06830

DATE: 12/01/14
SCALE: AS NOTED
JOB NO. 14263.000

TITLE SHEET

T-1

Sheet No. 1 of 2



TOWER STRUCTURAL NOTES:

1. TOWER STRUCTURE TO COMPLY WITH LOADING AND DESIGN REQUIREMENTS PRESCRIBED BY THE 2003 INTERNATIONAL BUILDING CODE PORTION OF THE 2005 CONNECTICUT STATE BUILDING CODE AS MODIFIED BY THE 2009 CONNECTICUT SUPPLEMENT.
2. ALL ANTENNAS AND COAX TO BE INSTALLED IN ACCORDANCE WITH STRUCTURAL ANALYSIS REPORT PREPARED BY CENTEK ENGINEERING, INC. CENTEK PROJECT NUMBER: 14263.000 DATED: MARCH 17, 2015.
3. REFER TO ABOVE REFERENCED STRUCTURAL ANALYSIS REPORT FOR ALL EXISTING AND RESERVED ANTENNA AND CABLE LOADING INFORMATION.

NOTE:
NOT ALL EXISTING ANTENNAS SHOWN FOR CLARITY

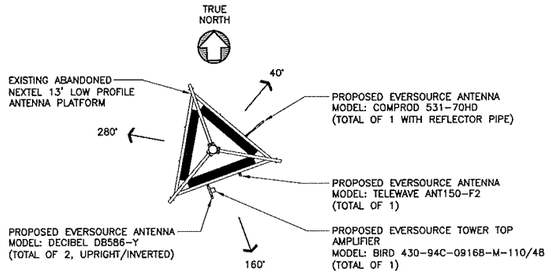
2 C-1 PARTIAL SOUTH ELEVATION

SCALE: 1" = 10'

GRAPHIC SCALE

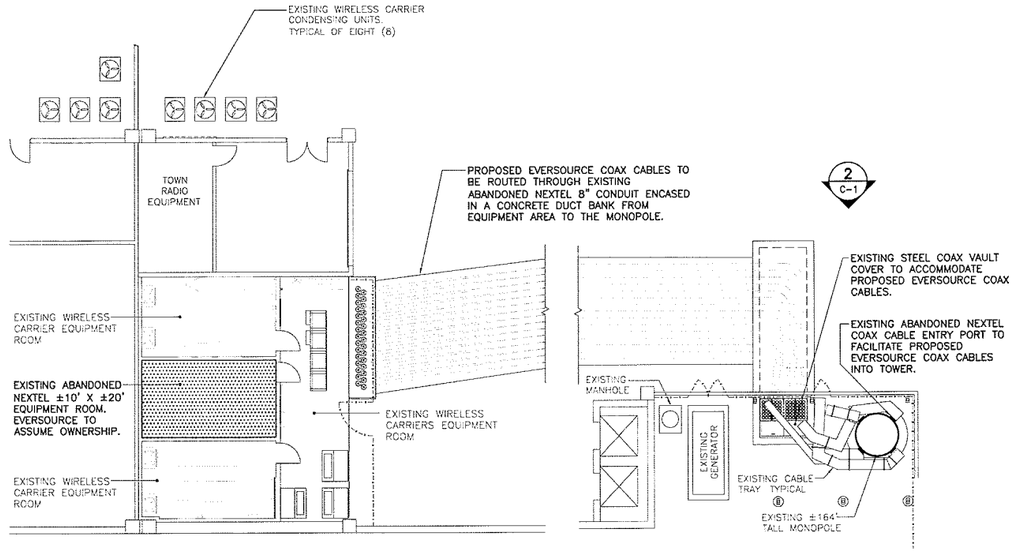
10 0 5 10 20 40

(IN FEET)
1 inch = 10 ft.



3 C-1 ANTENNA MOUNTING CONFIGURATION

NOT TO SCALE



1 C-1 PARTIAL SITE PLAN

SCALE: 1" = 10'-0"

NORTH

GRAPHIC SCALE

10 0 5 10 20 40

(IN FEET)
1 inch = 10 ft.

PROFESSIONAL ENGINEER SEAL

REV.	DATE	DRAWN BY	CHK'D BY	DESCRIPTION
4	04/24/15	DMD	CFC	CSC - REVISED PER CLIENT COMMENTS
3	03/17/15	CTP	DMD	CSC - REVISED PER CLIENT COMMENTS
2	1/05/15	CTP	DMD	CSC
1	12/18/14	CTP	DMD	CSC
0	12/17/14	CTP	DMD	CSC - ISSUED FOR CLIENT REVIEW

EVERSOURCE ENERGY

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Centered on Solutions℠
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63-2 North Branford Road, Branford, CT 06405

EVERSOURCE ENERGY SERVICE COMPANY

WIRELESS COMMUNICATIONS FACILITY

GREENWICH HOSPITAL

5 PERRYRIDGE ROAD
GREENWICH, CT 06830

DATE: 12/01/14
SCALE: AS NOTED
JOB NO. 14263.000

PARTIAL SITE PLAN AND ELEVATION

C-1

Sheet No. 2 of 2

Attachment B: Tower Lease Agreement

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EXECUTION COPY

TOWER LEASE AGREEMENT

Greenwich Hospital
And
The Connecticut Light and Power Company
(d/b/a Eversource Energy)

This Tower Lease Agreement (this "Agreement" or this "Lease"), is entered into as of the ____ day of April, 2015 (the "Effective Date") by and between **Greenwich Hospital**, a Connecticut corporation with an address of 5 Perryridge Road, Greenwich, CT, 06830 ("Hospital"), and **The Connecticut Light and Power Company** d/b/a Eversource Energy ("Lessee") a specially-chartered Connecticut corporation with an address of 107 Selden Street, Berlin, CT 06037.

RECITALS

Hospital is the owner of a certain parcel of land at 5 Perryridge Road in the Town of Greenwich, Fairfield County, Connecticut (the "Hospital's Land").

Hospital has constructed a monopole on the Hospital's Land and Lessee desires to lease a portion of the space on such monopole together with additional space on the Hospital's Land for use as an equipment room, all as more particularly set forth below.

AGREEMENT

Accordingly, for good and valuable consideration received, and in consideration of the mutual covenants and promises set forth herein, the receipt, sufficiency and adequacy of which are hereby acknowledged, Hospital and Lessee hereby agree as follows:

1. Lease – Generally;

   a. Definitions. A monopole tower and equipment room facilities (collectively the "Wireless Facility Site") are located on the Hospital's Land. The Wireless Facility Site is more particularly shown on the plans attached as **Exhibit 1(a)**. The monopole tower included within the Wireless Facility Site is hereinafter referred to as the "Tower". The equipment room and/or equipment space to be leased to Lessee hereunder is sometimes hereinafter referred to as the "Equipment Space." The space on the Tower to be leased to Lessee hereunder is sometimes hereinafter referred to as the "Lessee's Tower Space".

   b. Leased Space. Each of the Lessee's Tower Space and the Equipment Space are more particular shown on **Exhibit 2** attached hereto. Hospital hereby leases to Lessee the

Lessee's Tower Space and the Equipment Space (together, the "Leased Space") for the purpose of constructing, installing, maintaining, erecting, repairing, testing, replacing, removing, operating and upgrading (expressly excluding expanding) the Lessee Wireless Facilities (as defined below), all on the terms and conditions set forth herein. The lease of the Leased Space shall, except as otherwise expressly set forth in this Agreement, be on an "AS-IS, WHERE-IS" basis and without warranty or representation of any kind.

2. Lessee Wireless Facilities;

a. General. The Lessee Wireless Facilities shall mean those certain broadcast antennae, radio equipment, power supplies, equipment structures, and associated wires, cables, conduits, and pipes to be utilized in connection therewith, all of which facilities are expressly set forth and shall be located at or on the Leased Space as shown and/or described on the Exhibits attached hereto (collectively the "Lessee Wireless Facilities"). In particular, **Exhibit 2** contains a description of the portion of the Lessee Wireless Facilities (i) which are to be mounted on the Tower and identifies the location of Lessee's Tower Space for the same, and (ii) which are to be located in the Equipment Space and identifies the location of such Equipment Space. Lessee shall, subject to the terms and conditions of this Agreement, have the right within the Leased Space, at its expense, to construct, install, erect, maintain, repair, test, replace, remove, operate and upgrade the Lessee Wireless Facilities to the extent such facilities are identified, shown or described in the attached **Exhibit 2**. In connection therewith, to the extent identified, shown or described in such **Exhibit 2**, Lessee has the right to do all work necessary to prepare, maintain and alter the Leased Space for Lessee's business operations and/or other uses/purposes as expressly allowed hereunder and to construct and install Lessee Wireless Facilities. All of Lessee's construction and installation work shall be performed at Lessee's sole cost and expense and in a good and workmanlike manner and otherwise in compliance with the terms and conditions of this Agreement. Lessee shall hold title to the Lessee Wireless Facilities and all of the Lessee Wireless Facilities shall remain Lessee's personal property, are not fixtures, and do not otherwise constitute real estate. Notwithstanding anything to the contrary contained in this Agreement, Lessee shall remove the Lessee Wireless Facilities at its sole expense on or before the tenth (10) day following the expiration or earlier termination of this Agreement, and Lessee shall repair any damage to the Leased Space and Hospital's Land caused by such removal.

b. Rights Limited to Leased Space. Unless and to the extent additional rights are granted to Lessee hereunder (such as the right of access and ingress and egress provided pursuant to other provisions of this Lease), Lessee's rights in the Hospital's Land are limited to solely the Leased Space.

3. Use, Purpose and Ownership

a. Use. Lessee shall use the Lessee Wireless Facilities and Leased Space solely for the purpose of constructing, installing, maintaining, erecting, testing, replacing, removing, operating and upgrading (expressly excluding expanding) the Lessee Wireless Facilities pursuant and subject to the terms and conditions of this Agreement and all Governmental Requirements (as defined below) and for no other purpose.

b. Purpose of Wireless Facility Site. Lessee recognizes that the primary use of the Tower and Wireless Facility Site is for a communication facility for Lessee and/or Lessee's public service company affiliates ("Lessee's Affiliates") to be used solely and directly in connection with Lessee's and/or Lessee's Affiliates' respective businesses of providing electric power and/or the transmission/distribution of electricity and/or natural gas , and, for the avoidance of doubt, not for any purpose related to providing communication services to any third parties (i.e., not Lessee or any of Lessee's Affiliates), including without limitation Lessee's customers, the general public or other consumers. Lessee shall conduct its business on the Leased Space so as to not adversely affect the use of the Wireless Facility Site.

c. Owner. Hospital is the owner of the Wireless Facility Site with the exception of personal property owned by Lessee or other tenants of the Wireless Facility Site.

4. Governmental Requirements; Rules and Regulations. Lessee's use of the Leased Space and access to the Hospital's Land shall at all times be in compliance with all applicable federal, state and local requirements, as the same may be amended or supplemented from time to time, including without limitation those applicable to the construction, operation, maintenance, and safety of wireless facilities including but not limited to the requirements of the Town of Greenwich, Connecticut Planning & Zoning Commission (the "PZC") and the Connecticut Siting Council (individually and collectively, "Governmental Requirements"), it being agreed, however, that Lessee's obligation to satisfy Governmental Requirements shall in no event be deemed to apply to requirements expressly applicable solely to Hospital as owner of the Tower. Without limiting the foregoing, Lessee shall cause all installations and operations in connection with the Lessee Wireless Facilities to meet all applicable rules and regulations of the Federal Communications Commission ("FCC"), and the Federal Aviation Administration, it being expressly agreed that Hospital assumes no responsibility for the

licensing, construction, operation, maintenance, and/or safety of the Lessee Wireless Facilities. In addition, Lessee agrees that all access to the Lessee Wireless Facilities, the Tower and the Wireless Facility Site shall be subject to reasonable rules and regulations of general application promulgated from time to time by Hospital. The initial Wireless Facility Site Rules and Regulations are set forth on **Exhibit 3** attached hereto. Lessee agrees that Lessee shall provide to Hospital copies of all documents and materials that Lessee intends to file with the PZC and/or other governmental departments or authorities prior to any such filing and such filings shall be subject to the prior written consent of Hospital which consent shall not be unreasonably withheld, conditioned or delayed.

5. Lessee Fit-Out Work Matters and Utilities

   a. (1) Commencement of Lessee Fit-out. Initial construction of the Lessee Wireless Facilities shall be commenced promptly upon Lessee's obtaining and providing copies to Hospital of all requisite building and other certificates, permits, consents, and authorizations in accordance with all Governmental Requirements, (with all applicable appeal periods either having lapsed unexercised or subject to a final decision by a court of competent jurisdiction), including but not limited to, if applicable, those of the Town of Greenwich Building Department, the FCC, the Connecticut Siting Council (the "Lessee Fit-Out Start Date") and any other certificates, permits, approvals, consents and authorizations required hereunder, and shall be diligently and continuously prosecuted thereafter through completion, which completion shall include restoration of any and all Hospital or other lessee facility, equipment and/or structures, and any and all surfacing or landscaping, in each case to the extent disturbed in connection with such construction.

   a. (2) Early Entry: Notwithstanding anything to the contrary contained in this Agreement, including, without limitation, the requirements and conditions contained in subsections 5.a(1) above and 5.d below, the Lessee, at any time after the execution of this Agreement and prior to the Lessee Fit-Out Start Date (the "Early Entry Period"), for the rental payment of One Thousand One Hundred Fifty and NO/100ths Dollars ($1,150.00) per month, pro-rated on a daily basis, may enter the Hospital's Land and perform the following work within the Equipment Space: the installation of wiring, conduit and related appurtenances and equipment and any other work reasonably related to the Lessee's proposed use of the Equipment Space during the term of this Lease (the "Early Entry Work"). The Early Entry Work shall not include installation of any equipment on the monopole tower.

   The Lessee shall secure all permits and/or other governmental approvals required and applicable to the Early Entry Work. Moreover, the Lessee shall provide any insurance coverages described under Section 13 that would pertain specifically to the Early Entry Work. In the event that this Lease is terminated pursuant to the

provisions of Section 8(d), then all applicable restoration obligations found in the first sentence of Section 15 shall also apply to Early Entry Work. The Appurtenant Rights under Section 6 shall also apply to the Early Entry Work.

Neither Base Rent nor Additional Rent (as such are hereinafter defined) shall apply to the Early Entry Period.

b. Permits. Hospital has made no representation to Lessee as to the permitted use of the Wireless Facility Site as a communications facility or Lessee's ability to obtain any permits or approvals necessary to construct and operate Lessee Wireless Facilities. Lessee, at its sole expense, shall take such actions as necessary to obtain all certificates, permits, consents and other authorizations under Governmental Requirements for the use of the Leased Space as set forth herein. Hospital shall reasonably cooperate with Lessee in Lessee's efforts to obtain such approvals, provided, however, Hospital shall not be obligated to incur out-of-pocket costs or expenses in connection therewith. Subject to the foregoing, the Hospital represents and warrants that it has all required governmental approvals for the Tower including, without limitation, as to its current siting and operation on or at the Hospital's property.

c. Reserved

d. Cost of Lessee Fit-out. The installation and construction of the Lessee Wireless Facilities shall be at the sole cost and expense of Lessee, and except as provided under subsection 5.a(2) above, such construction and installation may not proceed prior to the Lessee Fit-Out Start Date, as set forth above. All of the Lessee Wireless Facilities including without limitation any antennae on the Tower must be identified in a manner reasonably satisfactory to Hospital by markings securely fastened, including without limitation markings at the transmission line conduit openings where such lines enter the Equipment Space.

e. Fit-Out Coordination and Approval. Except as expressly specified otherwise by Hospital in writing, Lessee's fit-out work shall be performed (a) so as not to interfere with Hospital's operations or those of any other then current tenant on the Tower or Wireless Facility Site, (b) in compliance with all applicable Government Requirements, and (c) in compliance with the plans and specifications set forth in the Exhibits hereto. Prior to Lessee commencing construction of the Lessee Wireless Facilities or otherwise performing any installations, tests or accessing any portion of the Tower, Lessee shall obtain, at its sole cost and expense, a structural analysis of the Tower to determine, among other things, the effects that the Lessee Wireless Facilities will have on the rotational, vibrational and lateral movement, characteristics and tolerances of the Tower, the results of which analysis must confirm that the

Lessee Wireless Facilities will not adversely affect any other then current tenant on the Tower or Wireless Facility Site, including without limitation the microwave equipment operated by the Town of Greenwich. Lessee shall engage Centek Engineering, LLC of Branford, Connecticut, or another licensed engineering firm designated by the Hospital in its sole but reasonable discretion, to perform such analysis.

f. Utilities. Lessee shall be responsible for all utilities necessary for the operation of the Lessee Wireless Facilities. Except as otherwise agreed by Hospital, Lessee shall, at its sole expense, provide such separate electrical connections, and if necessary as determined by Hospital in its sole discretion, separate sub-meters, so that Lessee is responsible for the expense of all utility usage for the Leased Space and Lessee Wireless Facilities. Hospital agrees, at no out of pocket cost or expense to Hospital, to provide such reasonable access to existing utilities to permit the servicing of the Lessee Wireless Facilities, in such a location or locations which is/are approved by Hospital.

g. Lessee's Temporary Facilities. Hospital shall notify Lessee sixty (60) days prior to performing any scheduled maintenance on the Tower and shall inform Lessee of the nature and duration of the scheduled maintenance. In the event Lessee determines that the scheduled maintenance will interfere with Lessee's operations, Lessee shall be permitted to erect temporary facilities, including without limitation a COW (cell on wheels) unit, on the property in a location satisfactory to both Lessee and Hospital for the duration of the scheduled maintenance, and Lessee shall promptly remove the temporary facilities upon Hospital's completion of the scheduled maintenance. Hospital shall not be required to notify Lessee before performing any emergency maintenance on the Tower, and Hospital shall give Lessee notice of such emergency maintenance as soon as is reasonably practical.

6. Appurtenant Rights. The lease rights demised hereunder shall include as appurtenant leasehold rights during the Term: (a) the non-exclusive right for ingress and egress, seven (7) days a week, twenty-four (24) hours a day, on foot or motor vehicle, for the purpose of constructing, maintaining, installing, inspecting, repairing, restoring, upgrading, replacing and removing the Lessee Wireless Facilities and for any other purposes reasonably connected to the foregoing purposes; provided, however, none of the foregoing shall be deemed to permit or allow, and Lessee shall not undertake or perform, any expansion of the Lessee Wireless Facilities, and (b) the non-exclusive right to install and maintain utility wires, cables, conduits, and pipes, primarily underground and in a location(s) to be designated by Hospital, provided, however, any and all such underground facilities are to be installed in connection with the initial construction of the Lessee Wireless Facilities and located as shown on **Exhibit 2** (including, without limitation, within the "Existing Abandoned Nextel +/- 10' x +/- 20' Equipment Room", the "Proposed EESCO Coax Cables to be Routed

Through Existing Abandoned Nextel 8" Conduit Encased in a Concrete Duct Bank From Equipment Area to the Monopole' and, in common with others, within the "Existing Wireless Carriers Equipment Room" as each are depicted on said Exhibit 2). All such access shall be subject to Hospital's Wireless Facility Site Rules and Regulations which are attached hereto as **Exhibit 3**, which Rules and Regulations the Hospital shall have the right to reasonably revise and update from time to time. In lieu of keys, Hospital shall provide Lessee with a combination lock and access code to permit such ingress and egress to the Leased Space. Lessee to advise Hospital Security when on premises.

7. Equipment Changes and Survey.

   a. Equipment Changes. Lessee reserves the right to replace the aforementioned Lessee Wireless Facilities with similar and comparable equipment provided said replacement does not (a) materially increase structural loading of said Tower, (b) alter the appearance, noise level, or other external features of the Lessee Wireless Facilities in any material respect, (c) identifiably interfere with any other radio communications or other equipment located at the Wireless Facility Site, (d) increase the total radio frequency electromagnetic radiation power density except as expressly permitted herein, (e) alter the frequency group or communications technology of the Lessee Wireless Facilities, or (f) operate in any manner other than in compliance with all applicable Governmental Requirements, including but not limited to those of the Town of Greenwich Planning & Zoning Commission. Anything herein to the contrary notwithstanding, Lessee shall obtain, at its sole cost and expense, the structural analysis described in Section 5(e) above in connection with any proposed equipment changes, the results of which analysis must confirm that the proposed equipment changes will not identifiably interfere with any other then current tenant on the Tower or Wireless Facility Site, including without limitation the microwave equipment operated by the Town of Greenwich.

   b. Survey. Hospital also hereby grants to Lessee the right to survey the Wireless Facility Site upon reasonable prior written notice to Hospital. Any such survey shall be at Lessee's sole cost and expense. Lessee will provide Hospital with a copy of any and all surveys prepared by or on behalf of Lessee.

8. Term and Rent

   a. Term and Base Rent. This Agreement is effective as of the date of this Agreement set forth above ("Effective Date") and the initial term shall end **five (5)** years after the Rent Commencement Date, defined in Section 9 below, and upon such Rent Commencement Date base rental payments (the "Base Rent") will be due at the annual base rental rate of $55,200.00, to be paid in equal monthly installments of $4,600 on the first day of the month, in advance, to Hospital or to such other person,

firm or place as Hospital may, from time to time, designate in writing at least thirty (30) days in advance of any rental payment date. Any payments required hereunder shall be due and payable on such required payment date without invoice to Lessee. Any rental payment required hereunder that is not paid within five (5) business days after written notice of late payment shall, without limiting any of Hospital's other rights or remedies, be subject to an interest charge treated as additional rent equal to eighteen percent (18%) per annum (or the maximum interest rate allowed by law if such interest rate is determined to be in excess of such statutory maximum).

b. Additional Rent. Lessee shall be responsible for and shall pay as additional rent (all sums due and payable from Lessee under this Agreement, other than Base Rent, are sometimes referred to as "Additional Rent" or "additional rent") any increase in real estate or personal property taxes (or any payment in lieu of taxes) which may directly result from the installation or use of the Lessee Wireless Facilities. Lessee shall also be responsible for any increase in Hospital's extended hazard, liability and/or other insurance coverages, which directly results from the installation or use of the Lessee Wireless Facilities. Such Additional Rent shall be calculated by Hospital and billed to Lessee on a periodic basis, and shall be due and payable by Lessee to Hospital within thirty (30) days of receipt of written notice by Lessee. With respect to any increase in real and/or personal property taxes for which Lessee is responsible under this Agreement, Hospital shall reasonably cooperate with Lessee in the lawful protest of any such assessment, provided, however, (i) such cooperation obligation on the part of Hospital shall not require Hospital to incur any out of pocket costs or expenses and (ii) Lessee shall, in all events, be required to pay any and all amounts as are required to be paid under applicable law during the pendency of any such tax protest. Notwithstanding anything to the contrary herein, except for the provisions contained in the preceding sentence, Lessee shall be solely responsible for the payment of any and all taxes attributable to the Lessee Wireless Facilities and shall pay the same promptly upon receipt of the governmental invoices therefor and, in no event, shall allow the same to be become late or otherwise delinquent.

c. Address for Rent Payments. The address for payment of rent and all amounts due hereunder shall be:

Medical Center Realty
P.O Box 9403
New Haven, CT 06534

d. Termination and the Securing of Permits and Other Approvals

In the event the Lessee does not secure, after using diligent commercial efforts, by June 30, 2015, all requisite building permits and all other certificates, permits, approvals, consents, and authorizations in accordance with all Governmental Requirements (with all applicable appeal periods either having lapsed unexercised or subject to a final decision by a court of competent jurisdiction), including but not limited to, if applicable, those of the Town of Greenwich Building Department, the FCC and the Connecticut Siting Council and any other certificates, permits, approvals, consents and authorizations required under this Agreement, reasonably acceptable to the Lessee, then the Lessee may elect to terminate this Agreement by providing written notice to Hospital and thereupon the Lessee's obligations under this Agreement including, without limitation, the obligation to pay rent, shall cease except for those obligations which expressly survive the expiration or termination of this Agreement.

9. Rent Commencement Date. The Rent Commencement Date shall mean the earlier of (i) the Lessee Fit-Out Start Date, and (ii) July 1, 2015.

10. Extension Terms. Provided Lessee is not then in default in the faithful performance of each of the covenants, agreements, and undertakings of Lessee hereunder, Lessee shall have three (3) five (5) year extension options, each exercisable only by written notice from Lessee to Hospital delivered not earlier than the date which is twelve (12) months prior to the end of the then current Term and not later than the date which is six (6) months prior to the end of the then current Term. The initial term described in Section 8(a) and all extension terms under this Section 10, if and as elected, are referred to herein as the "Term".

11. Extension Term Rent. The annual Base Rent during each extension term shall, commencing on the first day of the first extension term, increase once per twelve (12) month period by three percent (3%) such that the annual Base Rent for that twelve (12) month period is equal to 103% of the annual Base Rent in effect on last day of the immediately prior twelve (12) month period.

12. Maintenance and Operation; Non-Interference, Repairs and Other Matters

a. Generally. Lessee covenants and agrees to maintain and operate the Lessee Wireless Facilities and the Leased Space in good order and repair, reasonable use and wear excepted, and in all events in compliance with all Governmental Requirements.

b. Separate Electric Meter. Lessee shall furnish and install an electric meter at a location determined by Hospital for the measurement of electric power used by the Lessee Wireless Facilities, and all electricity charges registered thereby shall be at the sole cost and expense of Lessee.

c. Non-interference by Lessee. Lessee covenants and agrees that the Lessee Wireless Facilities will not cause any identifiable interference to Hospital or any of its equipment or infrastructure, or that of any of Hospital's other lessees located on the Hospital's Land, Tower and/or the Wireless Facility Site prior in time to Lessee (excluding, however, any equipment or infrastructure or uses of Hospital and/or of such other lessees that were activated, commenced or installed after the Effective Date). Such determination as to what constitutes "any identifiable interference" shall be based on the prevailing standard and generally accepted engineering practices and principles. In the event any of the Lessee Wireless Facilities cause such interference, and after Hospital has notified Lessee of such interference in writing, Lessee will immediately take all steps necessary to correct and eliminate the interference. In the event that the Lessee Wireless Facilities pose an actual threat to health or safety of persons upon the Hospital's Land, and/or are otherwise considered a health threat as defined in the FCC rules and regulations, then Lessee shall promptly power down and/or cease operation in order to eliminate any such threat upon notice by the Hospital to Lessee, until such time that the Hospital has received assurances reasonably satisfactory to the Hospital that such interference has been eliminated, and if Lessee does not so power down or cease operations, then, the Hospital may declare such event an event of default hereunder and, without limiting any of the Hospital's other rights or remedies, the Hospital may immediately turn off or cause to be turned off the Lessee Wireless Facilities provided that the Hospital reasonably perceives an emergency or harm to patients or other individuals will result or is likely to result.

d. Notwithstanding the foregoing or anything to the contrary herein, nothing in this Agreement shall make Hospital responsible for determining if the Lessee Wireless Facilities are safe, nor impose any liability on Hospital with respect to the Lessee Wireless Facilities and/or the frequencies and radiation emitted therefrom.

e. Non-interference by others. Hospital agrees that Hospital and any other tenants of the property who currently have or in the future take possession of portions of the Tower or the Wireless Facility Site will be permitted to install only such future radio equipment or other future equipment (or make modifications of existing equipment) that is of the type and frequency which will not cause measurable interference to Lessee and/or to Lessee Wireless Facilities. In the event any such Hospital's or tenant's future equipment causes such interference, Hospital will immediately use

reasonable and diligent efforts to cause any such interfering party (including itself) to take all steps necessary to correct and eliminate the interference. In the event Hospital is unable to correct and eliminate such interference, or otherwise comply with this section, Lessee may, upon a minimum of thirty (30) days' prior written notice and opportunity to cure, terminate this Agreement without further liability or obligation (including the obligation to pay Base Rent and Additional Rent) except for those obligations which expressly survive the expiration or termination of this Agreement.

f. Lessee other Maintenance Obligations. Lessee agrees to maintain its antennas, transmission lines and other appurtenances included within the Lessee Wireless Facilities, in proper operating condition and maintain same in satisfactory condition as to appearance and safety.

g. No Obligation on Hospital for Licensing. The Hospital assumes no responsibility for the licensing, operation, and/or maintenance of the Lessee Wireless Facilities.

h. Repairs. Lessee shall be responsible to keep the Leased Space in good condition and free from damage caused by Lessee, its officers, directors, shareholders, partners, employees, agents, contractors, agents or invitees, or any successor or assign of any of the foregoing. Lessee shall further be responsible for any damage or cost associated with the connection by or on behalf of Lessee of utilities to the Lessee Wireless Facilities. Lessee shall indemnify, defend and hold the Hospital and its Related Parties (as defined below) harmless from any and all damages, liabilities, losses, expenses, fines, fees, claims, demands, and/or costs (including without limitation reasonable attorneys' fees) (collectively, "Losses") actually incurred relative to any repair needed to the Wireless Facility Site, the Hospital's Land, and/or any improvements thereon if and to the extent the need for the same arises out of or is a result of any installation or operation of the Lessee Wireless Facilities and/or Lessee's presence upon the Leased Space or the Hospital's Land, provided, however, Lessee's indemnification hereunder shall not extend to Losses to the extent caused by the Hospital's (or any of its Related Parties') negligence or willful misconduct.

i. Hospital Inspection and Repair Rights. After providing reasonable notice to the Lessee (except in the event of emergencies, in which case no notice shall be required), the Hospital shall have the right to inspect the Lessee Wireless Facilities including without limitation the Equipment Space at any time (provided such inspection is conducted in a manner so as to not interfere with Lessee's operations and, to the extent practical and except in the event of emergencies, Lessee has been given the reasonable opportunity to accompany the Hospital's representatives during this inspection) and shall have the right, after affording the Lessee a reasonable time to respond (except in the event of emergencies), to make emergency repairs if the

Lessee refuses or fails to do so, and be reimbursed by Lessee for the actual cost of such repairs upon demand.

j. Power Density. Lessee represents and warrants that at all times during the Term of this Agreement, Lessee's power density at the base of the monopole shall not exceed two percent (2%) of the maximum power density allowable by the FCC from time to time (such FCC allowed maximum may be referred to as the "Maximum Power Density"); provided, however, that with respect to Lessee's VHF signals only, Lessee may exceed such two percent (2%) cap by no more than an additional three percent (3%), but in no event shall Lessee's power density at the base of the monopole in the aggregate exceed five percent (5%) of the Maximum Power Density. Lessee shall submit prior to commencement of its operations and annually thereafter evidence of compliance with this requirement reasonably satisfactory to Hospital.

k. Relocation by Hospital. Hospital shall have the right, on not less than sixty (60) days written notice to Lessee, to relocate the Lessee Wireless Facilities to a substitute location on the Hospital's Lands selected by Hospital, provided, however, that (a) such substitute location on the Hospital's Land is substantially equivalent to the Lessee Wireless Facilities described herein with respect to signal coverage; (b) any such relocation shall be at the sole cost and expense of Hospital; and (c) such relocation is effectuated without any interruption in the service provided by the Lessee Wireless Facilities.

13. Insurance

a. Lessee shall secure and maintain the following insurance coverages in effect, at its own expense throughout the term of this Agreement. All insurance companies providing coverage must have an A.M. Best financial strength rating of at least "A" (Excellent) and a financial size category of at least "VII" ($50mm - $100mm).

i. commercial general liability insurance with limits not less than $5,000,000 per occurrence, including products and completed operations; minimum limits may be achieved in conjunction with an umbrella or excess liability policy.

Lessee policy must name Greenwich Hospital as an additional insured, be designated as primary and non-contributory with any coverage carried by Greenwich Hospital and contain a waiver of subrogation in favor of Greenwich Hospital.

ii. workers' compensation insurance in accordance with the statutory limit requirements of the Lessee's state(s) of operation; minimum employers liability limits are $500,000 per each occupational accident /$500,000 per each occupational disease and $1,000,000 policy aggregate.

Lessee policy must contain a waiver of subrogation in favor of the Hospital.

iii. an all Special Form Causes of Loss insurance policy on Lessee Wireless Facilities insuring the full replacement value thereof.

Lessee policy must contain a waiver of subrogation in favor of the Hospital.

iv. automobile insurance in an amount not less than $1,000,000 combined single limit.

v. umbrella or excess liability insurance with limits of not less than $10,000,000 per occurrence.

b. Lessee must supply the Hospital with a Certificate(s) of Insurance prior to the initiation of this Agreement and thereafter upon the renewal of all required coverages.

i. Coverages represented on the certificate must show carrier names, policy numbers, policy dates and limits.

ii. For commercial general liability coverage, the certificate must state that "Greenwich Hospital, its trustees, officers, agents and employees are Additional Insureds as their interests may appear relating to this Agreement. This language must appear in the COI section entitled DESCRIPTION OF OPERATIONS /LOCATIONS/ VEHICLES/SPECIAL ITEMS)

iii. A minimum of thirty (30) days written notice of cancellation, non-renewal or material restriction of coverage terms or limits from the insurance company.

In order to assure that the Hospital has been properly afforded additional insured status on Lessee's commercial general liability policy, vendor must also supply a copy of an additional insured endorsement naming "Greenwich Hospital, its trustees, officers, agents and employees as Additional Insureds as their interests may appear relating to this Agreement".

c. The Lessee may self insure for all or a portion of its insurance obligations hereunder.

d. The Hospital shall carry casualty insurance customarily maintained by landlords of facilities similar to the Tower; provided, however, that the Hospital shall not be liable for any injury or damage to persons or property resulting from or in connection with Lessee's use of the Wireless Facilities Site.

14. Investigations and Indemnity. Lessee represents and warrants that it has reviewed the documents and exhibits referred to herein and made such other investigations of the Wireless Facility Site and the Hospital's Land as are deemed necessary or appropriate by Lessee and

Lessee has deemed the same, including without limitation the structural integrity of the Tower, to be sufficient for Lessee's intended purposes, and its compliance with all applicable Governmental Requirements including but not limited to those regarding lighting, marking and painting. Lessee covenants and agrees to indemnify, defend, and hold Hospital and its Related Parties, harmless from any Losses arising out of or in connection with claims that the Lessee's negligence and/or willful misconduct regarding its use of the Lessee Wireless Facilities resulted in the damage of the Tower, compromised its structural integrity in any respect or caused the Tower to violate any applicable Governmental Requirement in any material respect. Lessee covenants and agrees to indemnify, defend, and hold Hospital and its Related Parties harmless from and against any and all Losses to the extent the same are caused by or arise out of the Lessee's negligence or willful misconduct relating to or in connection with (a) the presence or use of the Lessee Wireless Facilities upon Hospital's Land or (b) a breach of this Agreement or any obligation hereunder by Lessee and/or any person or party claiming by, through, or under Lessee (collectively, the "Lessee Parties"); provided, however, that Lessee's indemnification hereunder shall not extend to Losses to the extent caused by the Hospital's (or any of its Related Parties') negligence or willful misconduct. Notwithstanding anything to the contrary in this Agreement, the parties hereby confirm that the provisions of this section shall survive the expiration or termination of this Agreement.

15. Lease Termination / No Holdover. On or before the tenth (10^{th}) day following the expiration or termination of this Agreement, Lessee shall remove the Lessee Wireless Facilities and substantially restore the Leased Space and any other affected areas of the Hospital's Land to their original condition as existed at the start of the Lease, reasonable wear and tear excepted, all at Lessee's sole cost and expense. Notwithstanding anything to the contrary herein, the Base Rent due and payable during all periods following said ten (10) day period immediately following the expiration or termination of this Agreement shall, until such time as Lessee shall have removed the Lessee Wireless Facilities and substantially restored the Leased Space and any other affected areas of the Hospital's Land to their original condition, be at a rate equal to one hundred fifty percent (150%) of the Base Rent in effect on the day immediately prior to such expiration or termination. Any obligation to pay such holdover rent incurred in accordance with the foregoing provisions shall survive any subsequent termination of the Lease. Such obligation shall be limited to the holdover period.

16. Quiet Enjoyment; Damage to Property; Taking of Property.

    a. Quiet Enjoyment. Hospital covenants and agrees that Lessee, subject to Lessee's faithful performance of each of the material covenants, agreements, and undertakings of Lessee hereunder, shall peaceably and quietly have, hold and enjoy the Leased Space described herein free from hindrance or molestation by Hospital. Hospital agrees, represents and warrants that Hospital owns the Hospital's Land in fee simple;

has the right to make and perform Hospital's obligations under this Agreement; and is authorized to enter into this Agreement.

b. Damage to Leased Space. If the Leased Space is materially or totally damaged or destroyed by fire or other casualty or if, as a result of such other damage or casualty, the Leased Space is unsuitable for the use for which the same was leased or, as a result, the Lessee no longer has reasonable means of access to the Leased Space, and in any of the foregoing events the Leased Space reasonably cannot be restored within 180 days following such fire or other casualty, then either party may elect to terminate this Agreement by written notice to the other party delivered within the sixty (60) days following the casualty, or if neither party so terminates, Hospital shall repair the damage and restore and rebuild the damaged portion of the Wireless Facility Site within the one (1) year after notice to Hospital of the damage or destruction. In the event neither party terminates this Agreement as set forth in this Section 16(b), the Basic Rent and Additional Rent payable hereunder shall be abated if and to the extent that the Leased Space shall have been rendered unsuitable for Lessee's use (as set forth in Section 3) from the date of the relevant casualty to the date the damage shall have been substantially repaired, restored or rebuilt. In the event that this Agreement is terminated in accordance with this Section 16(b), then the Lessee's obligations under this Agreement including, without limitation, the obligation to pay Basic Rent and Additional Rent shall cease, except for those obligations that expressly survive the expiration or termination hereof.

c. Taking. If the whole or a material portion of the Hospital's Land, the Wireless Facility Site or the Leased Space shall be lawfully condemned or taken in any similar manner for any public or quasi-public use or purpose, this Agreement shall terminate as of the date of vesting of title and the Base Rent and Additional Rent, as applicable, payable hereunder shall be apportioned as of such date. If any part of the Leased Space shall be so condemned or taken, then this Agreement shall be and remain unaffected by such condemnation or taking, except that the Base Rent and Additional Rent, as applicable, allocable to the part so taken shall be apportioned as of the date of taking; provided, however, if any part of the Leased Space is so taken so as to render the Leased Space unsuitable for the use for which the same are leased, or if Lessee no longer has reasonable means of access to the Leased Space, Lessee shall have the right to terminate this Agreement by written notice to Hospital given within thirty (30) days of such taking, and Base Rent and Additional Rent shall be paid only to the date of taking and all other obligations of Lessee hereunder shall cease, except for those obligations which expressly survive the expiration or termination of this Agreement. In the event of any such acquisition or condemnation of all or any part of the Hospital's Land, the Wireless Facility Site or the Leased Space, Hospital shall be entitled to receive the entire award; provided, however, nothing herein provided shall preclude Lessee from

making a claim in any condemnation proceeding for Lessee's moving expenses and/or the value of Lessee Wireless Facilities, provided, further that no such claim shall be made by Lessee if doing so could in any manner reduce the amount of Hospital's award. If the temporary use or occupancy of all or any part of the Leased Space shall be lawfully taken during the Term of this Agreement, Lessee shall be entitled to receive that portion of the award which represents compensation for the use and occupancy of the Leased Space and if so awarded, for the taking of Lessee Wireless Facilities and for moving expenses. This Agreement shall be and remain unaffected by such temporary taking and Lessee shall continue to be responsible for all of its obligations hereunder insofar as such obligations are not affected by such taking and shall continue to pay in full the Base Rent and Additional Rent when due.

17. Entire Agreement; Severability. It is agreed and understood that this Agreement contains all agreements, promises and understandings between Hospital and Lessee with respect to the operation of wireless facilities by Lessee on the Hospital's Land and the lease of the Leased Space, and that no prior agreements (oral or written), promises or understandings regarding said subject matter shall be binding upon either Hospital or Lessee in any dispute, controversy or proceeding at law or in equity, and any addition, variation or modification to this Agreement shall be void and ineffective unless made in writing signed by the parties. In the event any provision of the Agreement is found to be invalid or unenforceable, such finding shall not affect the validity and enforceability of the remaining provisions of this Agreement.

18. Governing Law. This Agreement and the performance thereof shall be governed, interpreted, construed and regulated by the internal laws of the State of Connecticut.

19. Sublease and Assignment. Lessee may not assign, license, sublease, or otherwise transfer all or any part of its interest in this Agreement or in the Leased Space without the consent of the Hospital, which shall be provided or withheld in Hospital's sole discretion. Hospital, however, shall not unreasonably withhold, condition or delay its consent if the proposed assignment or sublease is to a present or future parent, subsidiary or affiliate of the Lessee, subject to the other terms and conditions of this Lease, including without limitation Section 3 regarding use of the Tower and Wireless Facility Site. This Agreement shall extend to and bind the successors and permitted assigns of the Parties hereto.

20. Notices. All notices hereunder must be in writing and shall be deemed validly given only if sent by first class mail; certified mail, return receipt requested or by commercial courier, provided the courier's regular business is delivery service, addressed as follows (or any other address that the party to be notified may have designated to the sender by like notice):

Director, Real Estate Services HSC
Real Estate Department (840 Howard)
Yale-New Haven Health System

Marco Charamela, Supervisor
Eversource Energy – Real Estate
107 Selden Street

20 York Street
New Haven, CT 06510

Berlin, CT 06037

With a copy to:

Yale-New Haven Health System
Legal and Risk Services Department
20 York Street, CB-230
New Haven, CT 06504
Attention: General Counsel

With a copy to:

Robert J. Bourne
Assistant General Counsel
Eversource Energy – Legal Dept.
107 Selden Street
Berlin, CT 06037

Notice shall be effective upon mailing or delivering the same to the United States Postal Service (evidenced by a certificate of mailing from USPS) or a commercial courier, as permitted above.

21. Default. In the event there is a default by Lessee with respect to any of the provisions of this Agreement or its obligations under it, including without limitation, the payment of Base Rent and/or Additional Rent, Hospital shall give Lessee written notice of such default. After receipt of such written notice, Lessee shall have five (5) business days in which to cure any monetary default and thirty (30) days in which to cure any non-monetary default, provided Lessee shall have such extended period as may be required beyond the thirty (30) days if the nature of the cure is such that it reasonably requires more than thirty (30) days and Lessee promptly commences the cure and thereafter continuously and diligently pursues the cure to completion. Notwithstanding the foregoing, Hospital shall not be required to give Lessee notice of default if Hospital has previously given notice of such default twice in the preceding 12-month period.

22. Mortgage; Estoppel Certificates. This Agreement shall be automatically and without the need for further instrument subordinate to any superior mortgage or other security interest which from time to time may encumber all or part of the Hospital's Land or other property; provided, however, every such mortgage or other security interest shall, for so long as Lessee is not in default under this Agreement beyond the applicable grace period, recognize the validity of this Agreement in the event of a foreclosure of such superior rights and also Lessee's right to remain in occupancy of and have access to the Leased Space on the terms and conditions set forth in this Agreement. Notwithstanding the automatic nature of the foregoing subordination Lessee shall promptly execute whatever instruments may reasonably be required to evidence this subordination. Hospital and Lessee mutually covenant and agree, upon not less than fifteen (15) days' written notice from the other, to execute estoppel certificates setting forth the date of this Agreement, and any amendments or supplements thereto, any outstanding defaults by the other party (if any), the dates through which rent has been paid, and such other factual matters as may reasonably be requested.

23. Environmental Provisions

a. Except in the ordinary course of its business and then only in compliance with all Governmental Requirements relating to Hazardous Materials (as defined below) ("Environmental Laws"), Lessee shall not use, treat, generate, store, produce, dispose of, spill, leak or release, and shall not cause or permit the use, treatment, generation, storage, production, disposal, spill, leakage, release or threatened release of, Hazardous Materials, on, under or about the Leased Space and/or the Hospital's Land.

b. Lessee shall indemnify, defend, and hold Hospital and its officers, directors, shareholders, partners, employees, agents, contractors and lenders (collectively, "Related Parties") harmless from and against any and all Losses incurred by Hospital or any of its Related Parties by reason of Lessee's failure to fully comply with its obligations under all applicable Environmental Laws or by reason of Lessee's failure to keep, observe or perform any of its obligations under this Section 23.

c. "Hazardous Materials" means any and all hazardous or toxic substances or wastes (as so categorized by any Governmental Requirements); petroleum or crude oil or any constituent, fraction or product thereof; and asbestos and polychlorinated biphenyls.

d. Notwithstanding anything to the contrary contained in this Agreement including the foregoing in this section, the Lessee shall not be responsible (including any responsibility under the indemnification or other provisions of this Section 23) for any Hazardous Materials brought onto the Leased Space or the Hospital's Lands (or for any liability or obligations resulting from said materials) by persons or entities other than the Lessee and/or its employees and authorized agents in their performance under this Agreement.

e. The provisions of this Section 23 shall survive the expiration or earlier termination of the Term of this Agreement.

24. Security Deposit. Lessee shall deposit with Hospital upon the execution of this Agreement a cash security deposit (the "Security Deposit") in the amount of Ten Thousand and no/100ths Dollars ($10,000.00) as security for the faithful performance and observance by Lessee of the terms, conditions, covenants and provisions of this Agreement, including without limitation the surrender of possession of the Leased Space to Hospital as herein provided. The Security Deposit is not required to be held by Lessee in a segregated account and any interest earned on the Security Deposit shall be the exclusive property of Hospital. The Security Deposit shall not be mortgaged, assigned, transferred or encumbered by Lessee without the prior written consent of Hospital, which consent may be withheld or conditioned

in Hospital's sole discretion, and any such act on the part of Lessee without Hospital's prior written consent shall be null and void and without force and effect and shall not be binding upon Hospital. If any item of Base Rent or Additional Rent herein reserved or any other sum payable by Lessee to Hospital shall be overdue and unpaid, after notice and the expiration of any applicable cure period, if any, or if Hospital shall make payments on behalf of Lessee in accordance with the provisions of this Agreement or if Lessee fails to perform any of the terms and conditions of this Agreement, after notice and the expiration of any applicable cure period, then Hospital may (but shall not be obligated to), at its sole option and without prejudice to any other remedy which Hospital may have on account thereof, appropriate and apply the Security Deposit (or so much thereof as may be necessary) to compensate Hospital toward the payment of Base Rent, Additional Rent or any other sum payable by Lessee to Hospital or loss or damage sustained by Hospital due to such breach on the part of Lessee, as the case may be, and Lessee shall, within five (5) calendar days after written demand therefor, restore the Security Deposit to the original sum deposited. If Lessee shall substantially comply with all of the terms and conditions of this Agreement, the Security Deposit shall be returned in full to Lessee at the end of the Term of this Agreement when Lessee has surrendered possession of the Leased Space to Hospital in accordance with the terms and conditions contained herein (including without limitation completion of all of its removal obligations). In the event of bankruptcy or other creditor-debtor proceedings against Lessee (any such event shall be a Lessee default under this Agreement), the Security Deposit shall be deemed to be applied first to the payment of Base Rent, Additional Rent and other charges due Hospital for all periods prior to the filing of such proceedings. The Security Deposit shall not constitute liquidated damages. Hospital, and its successors and assigns, may deliver the Security Deposit to any purchaser of Hospital's interest in the Hospital's Land (or any portion thereof) in the event that Hospital's interest is sold, and thereupon Hospital shall be discharged from any further liability with respect to the Security Deposit, and Lessee shall look solely to such purchaser for the return of the Security Deposit.

25. Miscellaneous

a. This Agreement shall be binding upon, and inure to the benefit of, the respective parties and their heirs, administrators, executors, legal representatives, successors and permitted assigns.

b. Failure of either party to insist upon the strict and prompt performance of the terms, covenants, agreements and conditions herein contained, or any of them, shall not constitute or be construed as a waiver or relinquishment of such party's right thereafter to enforce any such term, covenant, agreement or condition, but the same shall continue in full force and effect.

c. In the event of any actual failure, breach or default hereunder by Hospital, Lessee's sole and exclusive remedy shall be against Hospital's interest in the Wireless

Facility Site subject to the rights of any mortgagees of the same and in no event shall any action or claim be brought against or satisfied out of any other assets of Hospital or any person or party claiming by, through or under Hospital for any claim of damages of any kind, nature or description. Accordingly, no personal liability is assumed by, nor at any time may be asserted against Hospital or any person or party claiming by, through or under Hospital and all such liability is hereby expressly waived and released by Lessee. Each party hereto hereby waives any and all claims and rights to recover consequential, special, and indirect damages arising out of, under, or in connection with this Agreement.

d. The provisions of this Agreement with respect to indemnification, insurance, and surrender shall survive the termination or expiration of this Agreement.

e. Each of Hospital and Lessee covenant, warrant and represent to each other that no broker was instrumental in bringing about or consummating this Agreement and that such party has had no conversations or negotiations with any broker concerning the leasing of the Leased Space herein provided. Each party shall indemnify, defend and hold harmless the other party against all Losses for any leasing commission, finder's fee or similar compensation alleged to be owing on account of the indemnifying party's dealings with any real estate broker, agent or finder other than those expressly named in this Section 25(e), if any.

f. The captions in this Agreement are inserted only for convenience and in no way constitute or interpret the provisions hereof or affect their scope or intent.

g. This Agreement may be executed in counterparts, each of which shall be deemed an original, enforceable in accordance with its terms, as long as each party has signed at least one counterpart. Counterparts transmitted via facsimile and/or .PDF shall be deemed originals.

h. Each party hereto covenants, represents and warrants to the other party that, as of the Effective Date and throughout the Term of this Agreement: (i) it is duly incorporated, validly existing and in good standing in the state of its organization and has the corporate power to execute, deliver, and perform this Agreement and to carry on its business as contemplated by the Agreement, including without limitation being registered to do business in the State of Connecticut, (ii) the execution and performance of this Agreement have been duly authorized by said party and the Agreement constitutes a legally binding obligation of said party, (iii) the persons executing this Agreement on behalf of each party are authorized to do so, (iv) the execution, delivery and performance by a party hereto of its respective obligations under this Agreement will not conflict with or result in a breach of, or constitute a default under (x) any of the provisions of that party's governance documents, or (y)

any law, governmental rule, regulation, judgment, decree or order by which that party is bound.

i. Lessee shall promptly upon request of Hospital provide to Hospital copies of current and correct radio frequency ("RF") and other reports customarily required for approval by the Connecticut Siting Council with respect to the subject Lessee Wireless Facility. This information shall include without limitation the following: (a) a list of Lessee's transmit and receive frequencies, (b) RF emissions data, and (c) power output data. To the extent such information is provided by Lessee to Hospital, Lessee agrees that Hospital may share such information with other tenants for purposes of Connecticut Siting Council approval. If Lessee requests in writing copies of this type of information from Hospital with respect to other tenants of the Wireless Facility Site, Hospital shall use commercially-reasonable efforts to obtain same for Lessee, provided however Hospital shall not be obligated to incur any cost or expense in connection with the efforts.

26. Regulatory Requirements

a. Lessee's Representations. Subject to the provisions found in subsection 26.g below, Lessee represents and, where applicable, agrees that:

to its actual knowledge, neither Lessee nor any of its employees directly performing services under this Lease (the "Lessee Employee Control Group") (i) has ever been convicted of a criminal offense related to health care and/or related to the provision of services paid for by Medicare, Medicaid or another state or federal health care program; (ii) is excluded or debarred from participation in any state or federal health care program, including Medicare and Medicaid; or (iii) is listed on the General Services Administration's or Office of Inspector General's Excluded Party Listing System. Lessee shall make reasonable inquiries of the Management Control Group (as defined in subsection 26.g below) utilizing said process at least quarterly to determine whether the representations contained in this Subsection are true. Lessee shall notify Hospital promptly in the event the Lessee becomes actually aware that any of the representations contained in this Subsection are or become untrue at any time during the Term of this Lease. Notwithstanding anything to the contrary contained in this Lease, in the event that the Lessee becomes actually aware that Lessee or any member of the Lessee Employee Control Group (1) was convicted of a criminal offense related to health care and/or related to the provision of services paid for by Medicare, Medicaid or another state or federal health care program; (2) is excluded from or debarred from participation in any state or federal health care program, including Medicare and Medicaid; or (3) is listed on the General Services Administration's or

Office of Inspector General's Excluded Party Listing System), Hospital will provide Lessee an opportunity to remedy the ongoing situation such that each of the representations contained in this Subsection are true within thirty (30) days. In the event of termination of this Lease by Hospital for the Lessee's failure to rectify said situation within said 30-day period, Lessee shall nevertheless be liable for all Base Rent and Additional Rent otherwise due hereunder through the end of the six-month period following such termination.

b. Cooperation with Regulatory Authorities. Lessee and Hospital shall reasonably cooperate with one another to respond to and/or correct any regulatory deficiencies relating to the Lessee's lease of the Leased Space that are identified by any regulatory authority including, but not limited to, governmental bodies including, but not limited to, the Department of Public Health, the Centers for Medicare and Medicaid Services and The Joint Commission. Lessee shall be solely responsible for the costs of any repairs or improvements that are required as a direct result of Lessee's lease of the Leased Space and would not be required to be performed if the Leased Space were leased to a tenant or other lessee that is not planning the same uses of the Leased Space as Lessee. Notwithstanding the foregoing, if such costs to correct such deficiencies or of such repairs or improvements are not acceptable to Lessee then the Lessee shall have the option of terminating this Agreement without liability including any obligation to pay Base Rent or Additional Rent except for that particular portion of same accruing during the reasonable period immediately following said ten (10) day period after said termination in which the Lessee is allowed to remove/relocate the Lessee Wireless Facilities.

c. Non-Use of Hospital Name. Lessee shall not use or permit the use of Hospital's name, logo or likeness, or that of any other affiliate of the Yale New Haven Health System, in any way, including in any advertising or promotional media, without obtaining the prior written consent of Hospital or its affiliate, as applicable.

d. False Claims. Lessee acknowledges that Hospital is an affiliate of the Yale New Haven Health System and that Yale New Haven Health System has provided it with access to its policy on False Claims and Payment Fraud Prevention (the "Policy") located on its internet site at *www.ynhhs.org/FalseClaims.pdf.* The federal False Claims Act imposes civil penalties on people and companies who knowingly submit a false claim or statement to a federally funded program, or otherwise conspire to defraud the government, in order to receive payment. Said act also protects people who report suspected fraud. Any suspected fraud should be reported as provided in the Policy.

e. Conflicts of Interest. Lessee represents, to its actual knowledge, that it has disclosed on **Exhibit 5** attached hereto and made a part hereof all relationships or financial interests, if any, that may represent or could reasonably be construed as conflict of interest with respect to Lessee's transaction of business under this Agreement with Hospital. Except as may be disclosed on **Exhibit 5** by Lessee and subject to or qualified by the terms below, the Hospital and Lessee each represents that to its respective actual knowledge, no employee, director or officer of Hospital or any other affiliate of the Yale New Haven Health System is a partner or member of, or, has a financial interest in Lessee or any corporate affiliate of Lessee. For purposes of this subsection 26.e, said term "financial interest" shall include, but not be limited to, the following transactions or relationships between an employee, director or officer of any affiliate of the Yale New Haven Health System and Lessee: (a) consulting fees, honoraria, gifts or other emoluments, or "in kind" compensation; (b) equity interests, including stock options, of any amount in a non-publicly-traded company (or entitlement to the same), and expressly excludes any stock or other equity interest in, or bond or other debt instrument issued by, any publicly-traded company affiliate or other corporate affiliate of the Lessee; (c) royalty income (or other income excluding dividends) or the right to receive future royalties (or other income excluding dividends); (d) any non-royalty payments or entitlements to payments other than those made in the ordinary course (e.g., as a customer of the Hospital or its affiliates or as a utility customer of Lessee or its affiliates); or (e) service as an officer, director, or in any other role, whether or not remuneration is received for such service. A breach of any representation under this Paragraph shall be grounds for immediate termination of this Lease.

f. Fair Market Value. Lessee and Hospital acknowledge and agree that, to their knowledge, the rental amounts set forth in this Lease are consistent with fair market value for properties located in Fairfield County, Connecticut and were determined on an arm's-length basis.

g. References to Lessee's Knowledge, Awareness and the Like. Any and all references in this Agreement including, without limitation, this Section 26, to the Lessee's knowledge, actual knowledge, awareness, actual awareness or similar words or phrases thereto shall be limited solely to the actual knowledge or actual awareness, without any independent inquiry, of the Lessee's Manager of Telecom Engineering (currently, Mr. James Ahrens) and the Lessee's Director of System Engineering (currently, Mr. Roderick Kalbfleisch) and of no other person or entity (said manager and director positions shall be collectively referred to herein as the "Management Control Group").

h. Change in Law. The parties recognize that this Lease is at all times to be subject to applicable local, state and federal statutory and common law, regulations of state

and federal agencies, and state and federal judicial and administrative decisions. The parties further recognize that this Lease shall be subject to changes and amendments in these laws and regulations and to the provisions of any new legislation, regulations and case law affecting this Lease. Any provisions of law or judicial or administrative decisions that invalidate, or are otherwise inconsistent with, the terms of this Lease, or which would cause one of the parties to be in violation of law, shall automatically supersede the terms of this Lease; provided, however, that the parties shall exercise their best efforts to modify the terms and conditions of this Lease to accommodate such provisions of law or judicial or administrative decisions and to effectuate the existing terms and intent of this Lease to the greatest possible extent consistent with the requirements of such law or decision. If such terms cannot be modified to the reasonable satisfaction of any party hereto, then either party should have the right to terminate this Lease without further liability. In such event, the Hospital shall provide the Lessee with a reasonable amount of time to relocate the Lessee Wireless Facilities to another location.

i. No Violation of Law. The parties hereto further agree that, to their actual respective knowledge, nothing in this Lease contemplates the counseling or promotion of a business arrangement or other activity that violates any state or federal law.

j. Notice of Lease. In lieu of recording this Agreement, a notice of this lease may be recorded in the land records of the Town of Greenwich, Connecticut pursuant to Connecticut General Statutes Section 47-19. The form Notice of Lease acceptable to the parties hereto is found in Exhibit 4.

[Remainder of page intentionally left blank; signature page follows.]

IN WITNESS WHEREOF, Hospital and Lessee have set their hands and affixed their respective seals as of the day and year first above written.

Hospital:

GREENWICH HOSPITAL

By: ~~Frank A. Corvino~~ Norman G. Roth
Interim
Its: President & CEO (duly authorized)

Lessee:

THE CONNECTICUT LIGHT AND POWER COMPANY
d/b/a Eversource Energy

By: _____
Printed Name: Salvatore Giuliano
Its: Manager of Real Estate Management

Exhibit 2

EVERSOURCE ENERGY

GREENWICH HOSPITAL
5 PERRYRIDGE ROAD
GREENWICH, CT 06830

SITE DIRECTIONS

FROM: 107 SELDEN STREET, BERLIN, CONNECTICUT TO: 5 PERRYRIDGE ROAD, GREENWICH, CONNECTICUT

1. Head northeast	141 ft
2. Turn left toward Selden St	0.2 mi
3. Turn left toward Selden St	0.1 mi
4. Turn right onto Selden St	0.2 mi
5. Take the first left onto CT-15 S/US-5 S/Berlin Turnpike	0.9 mi
6. Keep left to continue on CT-15 S	61 mi
7. Take exit 31 for North St	361 mi
8. Turn right onto North St	4.2 mi
9. Turn right onto Maple Ave	92 ft
10. Turn left onto Patterson Ave	0.2 mi
11. Continue straight onto Dear Park Dr	335 ft
12. Turn left onto Perryridge Dr, destination will be on the right	0.4 mi

GENERAL NOTES

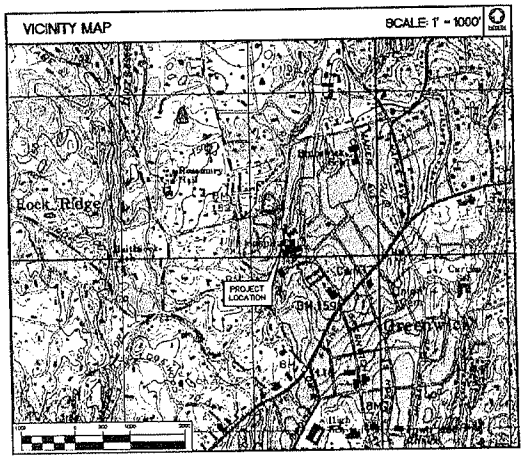
1. PROPOSED ANTENNA LOCATIONS AND HEIGHTS PROVIDED BY EVERSOURCE ENERGY SERVICE COMPANY.

PROJECT SCOPE

1. THE PROPOSED SCOPE OF WORK GENERALLY INCLUDES THE ACQUISITION OF AN EXISTING ABANDONED NEXTEL ±10' x ±20' EQUIPMENT ROOM.
2. TWO (2) DECIBEL DB586-Y WHIP ANTENNAS, ONE (1) BIRD 430-94C-09168-M-110/48 TOWER TOP AMPLIFIER, ONE (1) TELEWAVE ANT150-F2 WHIP ANTENNA, AND ONE (1) COMPROD 731-50HD DIPOLE ANTENNA ARE PROPOSED TO BE INSTALLED ON THE EXISTING TOWER.
3. NO CHANGES ARE PROPOSED TO THE EXISTING UTILITIES SERVICING THE COMPOUND AT THIS TIME.

VICINITY MAP

SCALE: 1" = 1000'



PROJECT SUMMARY

SITE NAME:	GREENWICH HOSPITAL
SITE ADDRESS:	5 PERRYRIDGE ROAD GREENWICH, CT 06830
LESSEE/ TENANT:	EVERSOURCE ENERGY SERVICE COMPANY 107 SELDEN STREET BERLIN, CT 06037
CONTACT PERSON:	STEVE FLORID EVERSOURCE ENERGY SERVICE COMPANY (860) 665-5611
TOWER COORDINATES:	LATITUDE: 41°-02'-2.1" N LONGITUDE: 73°-37'-51.0" W GROUND ELEVATION: ±200' AMSL

SHEET INDEX

SHT. NO.	DESCRIPTION	REV. NO.
T-1	TITLE SHEET	2
C-1	PARTIAL SITE PLAN AND ELEVATION	2

REV.	DATE	DRAWN BY	CHKD BY	DESCRIPTION
3	05/15/15	CTP	DKD	ESC - REVISED PER CLIENT COMMENTS
2	11/05/15	CTP	DKD	ESC -
1	12/16/14	CTP	DKD	ESC -
0	12/1/14	CTP	DKD	ESC - ISSUED FOR CLIENT REVIEW

PROFESSIONAL ENGINEER SEAL

EVERSOURCE ENERGY SERVICE COMPANY
WIRELESS COMMUNICATIONS FACILITY

GREENWICH HOSPITAL

5 PERRYRIDGE ROAD
GREENWICH, CT 06830

EVERSOURCE ENERGY

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

DATE: 12/01/14
SCALE: AS NOTED
JOB NO. 14263.000

TITLE SHEET

T-1

Sheet No. 1 of 2

Attachment C: Structural Analysis Report

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CENTEK engineering

Centered on Solutions℠

Structural Analysis Report

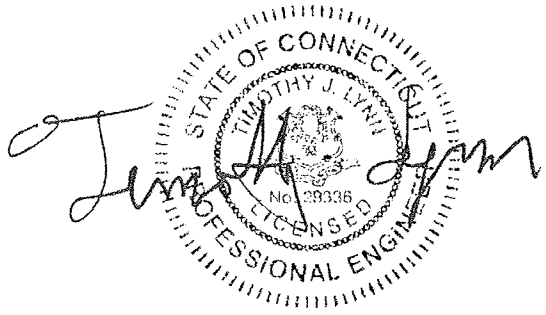
164-ft Existing EEI Monopole

Proposed Eversource Energy
Antenna Installation

5 Perryridge Road
Greenwich, CT

Centek Project No. 14263.000

~~Date: December 11, 2014~~
~~Rev 1: December 18, 2014~~
~~Rev 2: January 5, 2015~~
Rev 3: March 17, 2015



Prepared for:

Eversource Energy
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 upgrade proposed by Eversource Energy on the existing monopole (tower) owned and operated by Greenwich Hospital located in Greenwich, Connecticut.

The host tower is a 164-ft tall, five-section, eighteen sided, tapered monopole, originally designed and manufactured by Engineered Endeavors Incorporated (EEI); project no. 11030 dated August 21, 2002. The tower geometry, structure member sizes and foundation system information were obtained from the original manufacturers design documents.

Antenna and appurtenance information were obtained from a tower mapping report prepared by Eastern Communications dated November 25, 2014, a previous structural analysis report prepared by Infinigy; job no; 333-000, dated July 12, 2014 and information provided by NU.

The tower is made up of five (5) tapered vertical sections consisting of A572-65 pole sections. The bottom four (4) vertical tower sections are slip joint connected while the top section is flange connected. The diameter of the pole (flat-flat) is 47.0-in at the top and 76.0-in at the base.

Eversource proposes the installation of three (3) whip antennas, one (1) dipole antenna and one (1) tower top amplifier mounted to the existing vacant low profile platform. 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 tower was designed to support several communication antennas. The existing, proposed and future loads considered in this analysis consist of the following:

- TOWN (EXISTING):
  Antennas: One (1) 12-ft Omni-directional whip antenna, two (2) 10-ft Omni-directional whip antennas, two (2) 8-ft Omni-directional whip antennas, one Kathrein Scala 2' square panel and one (1) camera mounted on a PiROD 13-ft low profile platform with an elevation of 164-ft above grade level.
  Coax Cables: Six (6) 1/2" ∅, one (1) 5/8" ∅, three (3) 7/8" ∅ and two (2) 1-1/4" ∅ coax cables running on the inside of the existing tower.
- TOWN (EXISTING):
  Antennas: Two (2) 4 FT Dishes and one (1) 2 Ft Dish mounted on three 4'x4" pipe mounts with a RAD center elevation of 160-ft above grade level.
  Coax Cables: Three (3) 1-1/4" ∅ coax cables running on the inside of the existing tower.
- CLEARWIRE (EXISTING):
  Antennas: Three (3) Argus LLPX310R panel antennas, three (3) Samsung FDD-R6-RRH, two (2) Dragonwave Horizon ODU's and two (2) Dragonwave A-ANT-23-G-2-C dishes mounted on the Sprint 13-ft low profile platform with a RAD center elevation of 154-ft above the existing tower base plate.
  Coax Cables: Two (2) 2" ∅ conduits and two (2) 5/8" ∅ coax cables running on the inside of the existing tower.

- SPRINT (EXISTING):
  Antennas: Two (2) RFS APXVSPP18-C-A20 panel antennas, one (1) Powerwave P40-16-XLPP-RR-A panel antennas, three (3) RFS APXVTM14 panel antennas and one (1) GPS antenna mounted to a low profile platform with a RAD center elevation of 154-ft above the existing tower base plate. Three (3) ALU 1900 MHz RRH's, three (3) ALU 800 MHz RRH's and ALU TD-RRH-820 remote radio heads mounted on a universal tr-bracket below the existing low profile platform.
  Coax Cables: Six (6) 1-5/8" ∅ Hybriflex cables and one (1) 1/2" ∅ coax cable running on the inside of the existing tower.
- T-MOBILE (EXISTING/RESERVED):
  Antennas: Six (6) Ericsson AIR21 panel antennas, three (3) TMA's and three (3) Bias Tee's mounted on a PiROD 13-ft low profile platform with a RAD center elevation of 144-ft above grade level.
  Coax Cables: Fourteen (14) 1-5/8" ∅ coax cables and three (3) 1-5/8" ∅ fiber cables running on the inside of the existing tower.
- AT&T (EXISTING):
  Antennas: Six (6) Ericsson RRUS-11 and one (1) Raycap DC6-48-60-18-8F surge arrestor mounted to one (1) universal ring mount with a RAD center elevation of 138-ft above grade level.
  Coax Cables: One (1) fiber cable and two (2) dc control cables running on the inside of the existing tower.
- AT&T (EXISTING):
  Antennas: Six (6) Powerwave 7770.00 panel antennas, three (3) Powerwave P65-16-XLH-RR panel antennas, six (6) LGP21401 TMA's and six (6) LGP21901 diplexers mounted on a PiROD 13-ft low profile platform with a RAD center elevation of 134-ft above grade level.
  Coax Cables: Twelve (12) 1-5/8" ∅ coax cables running on the inside of the existing tower
- VERIZON (EXISTING TO REMAIN):
  Antennas: Six (6) Decibel DB844H65E-XY panel antennas, three (3) Andrew LNX-6514DS-T4M panel antennas, six (6) RYMSA MG D3-800T0 panel antennas, three (3) Alcatel-Lucent RRH2x40-AWS Remote Radio Heads, three (3) Alcatel-Lucent RRH2x40-07-U Remote Radio Heads, one (1) Raycap RC2DC-3315-PF-48 main distribution box and six (6) RFS FD9R6004/2C-3L Diplexers mounted on a PiROD 13-ft low profile platform with a RAD center elevation of 124-ft above grade level.
  Coax Cables: Six (6) 1-5/8" ∅ coax cables and one (1) 1-5/8" ∅ fiber cable running on the inside of the existing tower.
- UNKNOWN (EXISTING):
  Antennas: Three GPS antennas mounted on three (3) standoffs with a RAD center elevation of 50-ft above grade level.
  Coax Cables: Three (3) 7/8" ∅ coax cables running on the exterior of the existing tower.

- **EVERSOURCE ENERGY(PROPOSED):**
  Antennas: Two (2) Decibel DB586-Y omni-directional whips (one upright and one inverted), one (1) Telewave ANT150F2 omni-directional whip, one (1) Comprod 531-70HD dipole and one (1) tower top amplifier mounted on a PiROD 13-ft low profile platform with an elevation of 114-ft above grade level.
  Coax Cables: Two (2) 1-5/8" ∅, two (2) 7/8" ∅ and one (1) 1/2" ∅ coax cables running on the inside of the existing tower

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 or reinforcement drawings.
- 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 to be installed as indicated in this report.

Analysis

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

The existing tower was analyzed for 85mph basic wind speed (fastest mile) with no ice and 85mph with ½ inch accumulative ice to determine stresses in members as per guidelines of Northeast Utilities Substation Standard (NU SUB-090), 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).

Tower Loading

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 tower structure and its components.

Basic Wind Speed:	Fairfield; v = 85 mph (fastest mile)	*[Section 16 of TIA/EIA-222-F-96]*
	NU SUB-090; v = 85 mph (fastest mile)	*[Northeast Utilities Substation Standard 090]*
	Greenwich; v = 100 mph (3 second gust) equivalent to v = 80 mph (fastest mile)	*[Appendix K of the 2005 CT Building Code Supplement]*
	NU–SUB-090 wind speed controls	
Load Cases:	Load Case 1; 85 mph wind speed w/ no ice plus gravity load – used in calculation of tower stresses and rotation. This load case typically controls the design.	*[Northeast Utilities Substation Standard 090]*
	Load Case 2; 85 mph wind speed w/ ½" radial ice plus gravity load – used in calculation of tower stresses. This load case typically controls the design of lattice towers.	*[Northeast Utilities Substation Standard 090]*
	Load Case 3; Seismic – not checked	*[Section 1614.5 of State Bldg. Code 2005] does not control in the design of this structure type*

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 1, per tnxTower "Section Capacity Table", this tower was found to be at **50.1%** of its total capacity.

Tower Section	Elevation	Stress Ratio (percentage of capacity)	Result
Pole Shaft (L5)	1.50'-39.88'	50.1%	**PASS**

- The tower deflection (tilt) was found to be within allowable limits.

Deflection (degrees)	Proposed	Allowable [1]	Result
Tilt	1.5	1.9	**PASS**

(1) Allowable tilt taken from original EEI design documents job no. 11030 dated 8/21/02.

Foundation and Anchors

The existing foundation consists of a 9.0 ∅ x 28.0-ft long reinforced concrete caisson. The sub-grade conditions used in the analysis of the existing foundation were obtained from the aforementioned EEI design report; project no. 11030 dated August 21, 2002. The base of the tower is connected to the foundation by means of (30) 2.25"∅, ASTM A615-75 anchor bolts embedded approximately 7-ft into the concrete foundation structure.

- The tower base reactions developed from the governing Load Case 1 were used in the verification of the foundation and its anchors:

Location	Vector	Proposed Reactions
Base	Shear	46 kips
	Compression	93 kips
	Moment	5209 kip-ft

- The foundation was found to be within allowable limits.

Foundation	Design Limit	Proposed Loading	Result
Reinforced Concrete Caisson	Moment Capacity	56.5%	**PASS**
	Lateral Deflection	0.61 in.[1]	**PASS**

(1) Lateral deflection typically limited to 1.0 in. for monopole tower structures.

- The flange bolts and plate were found to be within allowable limits.

Tower Component	Design Limit	Stress Ratio (percentage of capacity)	Result
Flange Bolts	Tension	61.8%	**PASS**
Flange Plate	Bending	47.1%	**PASS**

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

Tower Component	Design Limit	Stress Ratio (percentage of capacity)	Result
Anchor Bolts	Combined Axial and Bending	51.3%	**PASS**
Base Plate	Bending	40.3%	**PASS**

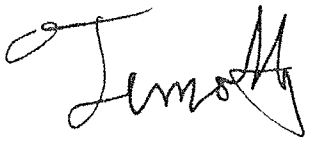
Conclusion

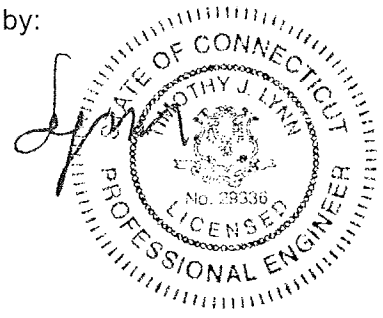
This analysis shows that the subject tower **is adequate** to support the proposed modified antenna configuration.

The analysis is based, in part, on the information provided to this office by Eversource Energy. 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.

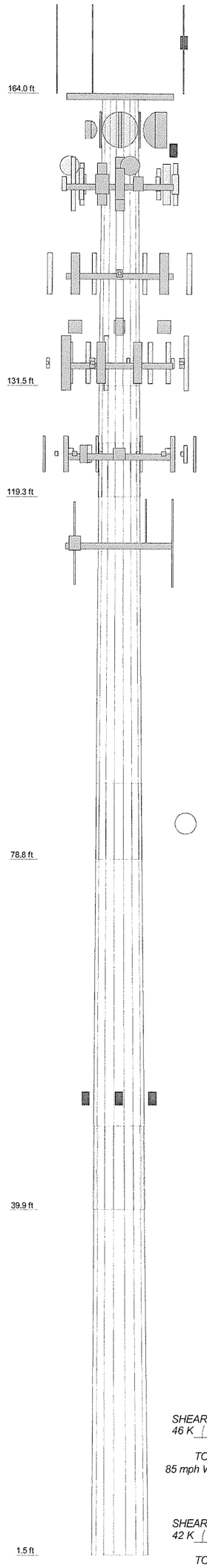
GENERAL DESCRIPTION OF STRUCTURAL ANALYSIS PROGRAM

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	1	2	3	4	5
Length (ft)	32.50	12.21	46.50	47.33	47.63
Number of Sides	18	18	18	18	18
Thickness (in)	0.3125	0.3750	0.4375	0.5625	0.5625
Socket Length (ft)		6.00	8.42	9.25	
Top Dia (in)	47.0000	53.4200	54.0585	60.4813	66.7412
Bot Dia (in)	53.4200	56.1500	62.9700	69.6600	76.0000
Grade			A572-65		
Weight (K)	5.5	2.7	12.8	18.5	21.5



AXIAL
93 K
SHEAR
46 K
MOMENT
5209 kip-ft
TORQUE 4 kip-ft
85 mph WIND - 0.5000 in ICE
AXIAL
82 K
SHEAR
42 K
MOMENT
4728 kip-ft
TORQUE 3 kip-ft
REACTIONS - 85 mph WIND

DESIGNED APPURTENANCE LOADING

TYPE	ELEVATION	TYPE	ELEVATION
12' x 3" Dia Omni (Town Existing)	164	(2) RRUS-11 (ATT Existing)	138
8' x 3" Dia Omni (Town Existing)	164	(2) RRUS-11 (ATT Existing)	138
2'x2' Panel (Town Existing)	164	DC6-48-60-18-8F Surge Arrestor (ATT Existing)	138
10' x 3" Dia Omni (Town Existing)	164	Valmont Uni-Tri Bracket (ATT Existing)	138
10' x 3" Dia Omni (Town Existing)	164	P65-16-XLH-RR (ATT Existing)	134
8' x 3" Dia Omni (Town Existing)	164	7770.00 (ATT Existing)	134
Camera (Town Existing)	164	7770.00 (ATT Existing)	134
Low Profile Platform (Town Existing)	164	P65-16-XLH-RR (ATT Existing)	134
4'x4" Pipe Mount (Town Existing)	160	(2) LGP21401 TMA (ATT Existing)	134
4'x4" Pipe Mount (Town Existing)	160	(2) LGP21401 TMA (ATT Existing)	134
4'x4" Pipe Mount (Town Existing)	160	(2) LGP21401 TMA (ATT Existing)	134
4 FT DISH (Town Existing)	160	(2) LGP21901 Diplexer (ATT Existing)	134
4 FT DISH (Town Existing)	160	(2) LGP21901 Diplexer (ATT Existing)	134
2 FT DISH (Town Existing)	160	(2) LGP21901 Diplexer (ATT Existing)	134
Horizon ODU (Clearwire Existing)	154	Low Profile Platform (ATT Existing)	134
Horizon ODU (Clearwire Existing)	154	7770.00 (ATT Existing)	134
APXVSPP18-C-A20 (Sprint Existing)	154	7770.00 (ATT Existing)	134
P40-16-XLPP-RR-A (Sprint Existing)	154	P65-16-XLH-RR (ATT Existing)	134
APXVSPP18-C-A20 (Sprint Existing)	154	7770.00 (ATT Existing)	134
FD-RRH 4x45 1900 (Sprint Existing)	154	7770.00 (ATT Existing)	134
FD-RRH 4x45 1900 (Sprint Existing)	154	DB844H65E-XY (Verizon Existing)	124
FD-RRH 4x45 1900 (Sprint Existing)	154	MG D3-800TX (Verizon Existing)	124
FD-RRH 2x50 800 (Sprint Existing)	154	LNX-6514DS-T0M (Verizon Existing)	124
FD-RRH 2x50 800 (Sprint Existing)	154	MG D3-800TX (Verizon Existing)	124
FD-RRH 2x50 800 (Sprint Existing)	154	DB844H65E-XY (Verizon Existing)	124
GPS (Sprint Existing)	154	DB844H65E-XY (Verizon Existing)	124
Low Profile Platform (Sprint Existing)	154	MG D3-800TX (Verizon Existing)	124
APXVTM14 (Sprint Existing)	154	LNX-6514DS-T0M (Verizon Existing)	124
APXVTM14 (Sprint Existing)	154	MG D3-800TX (Verizon Existing)	124
APXVTM14 (Sprint Existing)	154	DB844H65E-XY (Verizon Existing)	124
TD-RRH8x20-25 (Sprint Existing)	154	(2) FD9R6004/2C-3L Diplexer (Verizon Existing)	124
TD-RRH8x20-25 (Sprint Existing)	154	(2) FD9R6004/2C-3L Diplexer (Verizon Existing)	124
TD-RRH8x20-25 (Sprint Existing)	154	(2) FD9R6004/2C-3L Diplexer (Verizon Existing)	124
LLPX310R (Clearwire Existing)	154	RRH2x40-AWS (Verizon Existing)	124
LLPX310R (Clearwire Existing)	154	RRH2x40-AWS (Verizon Existing)	124
LLPX310R (Clearwire Existing)	154	RRH2x40-AWS (Verizon Existing)	124
A-Ant-23G-2-C (Clearwire Existing)	154	RRH2x40-07-U (Verizon Existing)	124
A-Ant-23G-2-C (Clearwire Existing)	154	RRH2x40-07-U (Verizon Existing)	124
Remote Radio Head FD R6 RRH (Clearwire Existing)	151.5	RRH2x40-07-U (Verizon Existing)	124
Remote Radio Head FD R6 RRH (Clearwire Existing)	151.5	RC2DC-3315-PF-48 (Verizon Existing)	124
Remote Radio Head FD R6 RRH (Clearwire Existing)	151.5	Low Profile Platform (Verizon Existing)	124
Valmont Uni-Tri Bracket (Sprint Existing)	151.5	DB844H65E-XY (Verizon Existing)	124
TMA 10"x8"x3" (T-Mobile Reserved)	144	MG D3-800TX (Verizon Existing)	124
Smart Bias T (T-Mobile Reserved)	144	LNX-6514DS-T0M (Verizon Existing)	124
Smart Bias T (T-Mobile Reserved)	144	MG D3-800TX (Verizon Existing)	124
Smart Bias T (T-Mobile Reserved)	144	DB844H65E-XY (Verizon Existing)	124
Low Profile Platform (T-Mobile Existing)	144	DB586-Y (Eversouce - Proposed (Upright))	114
(2) AIR21 (T-Mobile Reserved)	144	DB586-Y (Eversoucre - Proposed (Inverted))	114
(2) AIR21 (T-Mobile Reserved)	144	ANT150F2 (Eversource - Proposed)	114
TMA 10"x8"x3" (T-Mobile Reserved)	144	Tower Top Amplifier (Eversource - Proposed)	114
TMA 10"x8"x3" (T-Mobile Reserved)	144	Low Profile Platform	114
(2) AIR21 (T-Mobile Reserved)	144	531-70HD (Eversource - Proposed)	114
(2) RRUS-11 (ATT Existing)	138	GPS	51.5
		GPS	51.5
		GPS	51.5

MATERIAL STRENGTH

GRADE	Fy	Fu	GRADE	Fy	Fu
A572-65	65 ksi	80 ksi			

TOWER DESIGN NOTES

1. Tower designed for a 85 mph basic wind in accordance with the TIA/EIA-222-F Standard.
2. Tower is also designed for a 85 mph basic wind with 0.50 in ice.
3. Deflections are based upon a 85 mph wind.
4. Tower members are "hot dipped" galvanized in accordance with ASTM A123 and ASTM A153 Standards.
5. Welds are fabricated with ER-70S-6 electrodes.
6. TOWER RATING: 50.1%

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

Job: **14263.000**			
Project: ***164' EEI Monopole - 5 Perryridge Rd., Greenwich, CT***			
Client: Eversource Energy	Drawn by: TJL	App'd:	
Code: TIA/EIA-222-F	Date: 03/17/15	Scale: NTS	
Path:		Dwg No. E-1	

Tower Input Data

There is a pole section.
This tower is designed using the TIA/EIA-222-F standard.
The following design criteria apply:

Basic wind speed of 85 mph.
Nominal ice thickness of 0.5000 in.
Ice density of 56 pcf.
A wind speed of 85 mph is used in combination with ice.
Temperature drop of 50 °F.
Deflections calculated using a wind speed of 85 mph.
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 pole design is 1.333.
Local bending stresses due to climbing loads, feedline 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				

Tapered Pole Section Geometry

Section	*Elevation* *ft*	*Section Length* *ft*	*Splice Length* *ft*	*Number of Sides*	*Top Diameter* *in*	*Bottom Diameter* *in*	*Wall Thickness* *in*	*Bend Radius* *in*	*Pole Grade*
L1	164.00-131.50	32.50	0.00	18	47.0000	53.4200	0.3125	1.2500	A572-65 (65 ksi)
L2	131.50-119.29	12.21	6.00	18	53.4200	56.1500	0.3750	1.5000	A572-65 (65 ksi)
L3	119.29-78.79	46.50	8.42	18	54.0585	62.9700	0.4375	1.7500	A572-65 (65 ksi)
L4	78.79-39.88	47.33	9.25	18	60.4813	69.6600	0.5625	2.2500	A572-65 (65 ksi)
L5	39.88-1.50	47.63		18	66.7412	76.0000	0.5625	2.2500	A572-65 (65 ksi)

Tapered Pole Properties

Section	Tip Dia. in	Area in^2	I in^4	r in	C in	I/C in^3	J in^4	It/Q in^2	w in	w/t
L1	47.7251	46.3082	12752.5270	16.5741	23.8760	534.1149	25521.8341	23.1585	7.7220	24.71
	54.2441	52.6760	18769.9004	18.8532	27.1374	691.6627	37564.4987	26.3430	8.8519	28.326
L2	54.2441	63.1368	22444.4518	18.8310	27.1374	827.0684	44918.4365	31.5744	8.7419	23.312
	57.0162	66.3862	26091.2194	19.8001	28.5242	914.7047	52216.7704	33.1994	9.2224	24.593
L3	56.0600	74.4594	27047.4669	19.0354	27.4617	984.9157	54130.5236	37.2368	8.7443	19.987
	63.9414	86.8342	42898.2727	22.1990	31.9888	1341.0421	85852.9920	43.4253	10.3127	23.572
L4	63.0724	106.9776	48524.0652	21.2712	30.7245	1579.3269	97111.9796	53.4990	9.6547	17.164
	70.7346	123.3649	74413.8720	24.5296	35.3873	2102.8424	148925.6597	61.6942	11.2702	20.036
L5	69.5966	118.1537	65376.3617	23.4934	33.9045	1928.2498	130838.7474	59.0881	10.7564	19.123
	77.1724	134.6842	96834.1984	26.7803	38.6080	2508.1382	193795.8137	67.3549	12.3860	22.02

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
L1 164.00-131.50				1	1	1		
L2 131.50-119.29				1	1	1		
L3 119.29-78.79				1	1	1		
L4 78.79-39.88				1	1	1		
L5 39.88-1.50				1	1	1		

Feed Line/Linear Appurtenances - Entered As Area

Description	Face or Leg	Allow Shield	Component Type	Placement ft	Total Number		C_AA_A ft^2/ft	Weight plf
1/2	A	No	Inside Pole	164.00 - 4.50	6	No Ice	0.00	0.25
(Town Existing)						1/2" Ice	0.00	0.25
5/8	A	No	Inside Pole	164.00 - 4.50	1	No Ice	0.00	0.40
(Town Existing)						1/2" Ice	0.00	0.40
7/8	A	No	Inside Pole	164.00 - 4.50	3	No Ice	0.00	0.54
(Town Existing)						1/2" Ice	0.00	0.54
1 1/4	A	No	Inside Pole	164.00 - 4.50	5	No Ice	0.00	0.66
(Town Existing)						1/2" Ice	0.00	0.66
1/2	B	No	Inside Pole	154.00 - 7.50	1	No Ice	0.00	0.25
(Sprint Existing)						1/2" Ice	0.00	0.25
2" Rigid Conduit	B	No	Inside Pole	154.00 - 7.50	2	No Ice	0.00	2.80
(Clearwire Existing)						1/2" Ice	0.00	2.80
LDF4.5-50 (5/8 FOAM)	B	No	Inside Pole	154.00 - 7.50	2	No Ice	0.00	0.15
(Clearwire Existing)						1/2" Ice	0.00	0.15
1 5/8	B	No	Inside Pole	144.00 - 4.50	14	No Ice	0.00	1.04
(T-Mobile Existing)						1/2" Ice	0.00	1.04
1 5/8	A	No	Inside Pole	134.00 - 11.50	12	No Ice	0.00	1.04

Description	Face or Leg	Allow Shield	Component Type	Placement ft	Total Number		C_AA_A ft^2/ft	Weight plf
(AT&T Existing)						1/2" Ice	0.00	1.04
1 5/8	C	No	Inside Pole	124.00 - 7.50	6	No Ice	0.00	1.04
(Verizon Existing)						1/2" Ice	0.00	1.04
RG6-Fiber	A	No	Inside Pole	134.00 - 11.50	1	No Ice	0.00	0.00
(AT&T Existing)						1/2" Ice	0.00	0.00
#8 AWG Copper WIre	A	No	Inside Pole	134.00 - 11.50	2	No Ice	0.00	0.00
(AT&T Existing)						1/2" Ice	0.00	0.00
7/8	B	No	CaAa (Out Of Face)	51.50 - 4.50	3	No Ice	0.11	0.54
						1/2" Ice	0.21	1.52
HYBRIFLEX 1-5/8"	B	No	Inside Pole	154.00 - 7.50	6	No Ice	0.00	1.90
(Sprint Existing)						1/2" Ice	0.00	1.90
HYBRIFLEX 1-5/8"	B	No	Inside Pole	144.00 - 7.50	3	No Ice	0.00	1.90
(T-Mobile - Reserved)						1/2" Ice	0.00	1.90
HYBRIFLEX 1-5/8"	C	No	Inside Pole	124.00 - 7.50	1	No Ice	0.00	1.90
(Verizon Existing)						1/2" Ice	0.00	1.90
7/8	C	No	Inside Pole	114.00 - 1.50	2	No Ice	0.00	0.54
(Eversource - Proposed)						1/2" Ice	0.00	0.54
1 5/8	C	No	Inside Pole	114.00 - 1.50	2	No Ice	0.00	1.04
(Eversource - Proposed)						1/2" Ice	0.00	1.04
1/2	C	No	Inside Pole	114.00 - 1.50	1	No Ice	0.00	0.25
(Eversource - Proposed)						1/2" Ice	0.00	0.25

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
L1	164.00-131.50	A	0.000	0.000	0.000	0.000	0.25
		B	0.000	0.000	0.000	0.000	0.65
		C	0.000	0.000	0.000	0.000	0.00
L2	131.50-119.29	A	0.000	0.000	0.000	0.000	0.24
		B	0.000	0.000	0.000	0.000	0.46
		C	0.000	0.000	0.000	0.000	0.04
L3	119.29-78.79	A	0.000	0.000	0.000	0.000	0.78
		B	0.000	0.000	0.000	0.000	1.53
		C	0.000	0.000	0.000	0.000	0.45
L4	78.79-39.88	A	0.000	0.000	0.000	0.000	0.75
		B	0.000	0.000	0.000	3.869	1.49
		C	0.000	0.000	0.000	0.000	0.45
L5	39.88-1.50	A	0.000	0.000	0.000	0.000	0.60
		B	0.000	0.000	0.000	11.782	1.33
		C	0.000	0.000	0.000	0.000	0.39

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
L1	164.00-131.50	A	0.500	0.000	0.000	0.000	0.000	0.25
		B		0.000	0.000	0.000	0.000	0.65
		C		0.000	0.000	0.000	0.000	0.00
L2	131.50-119.29	A	0.500	0.000	0.000	0.000	0.000	0.24
		B		0.000	0.000	0.000	0.000	0.46
		C		0.000	0.000	0.000	0.000	0.04
L3	119.29-78.79	A	0.500	0.000	0.000	0.000	0.000	0.78

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
		B		0.000	0.000	0.000	0.000	1.53
		C		0.000	0.000	0.000	0.000	0.45
L4	78.79-39.88	A	0.500	0.000	0.000	0.000	0.000	0.75
		B		0.000	0.000	0.000	7.355	1.52
		C		0.000	0.000	0.000	0.000	0.45
L5	39.88-1.50	A	0.500	0.000	0.000	0.000	0.000	0.60
		B		0.000	0.000	0.000	22.395	1.43
		C		0.000	0.000	0.000	0.000	0.39

Feed Line Center of Pressure

Section	Elevation ft	CP_X in	CP_Z in	CP_X Ice in	CP_Z Ice in
L1	164.00-131.50	0.0000	0.0000	0.0000	0.0000
L2	131.50-119.29	0.0000	0.0000	0.0000	0.0000
L3	119.29-78.79	0.0000	0.0000	0.0000	0.0000
L4	78.79-39.88	0.1320	0.0762	0.2434	0.1405
L5	39.88-1.50	0.3779	0.2182	0.6797	0.3924

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
4'x4" Pipe Mount	A	From Face	0.50	0.0000	160.00	No Ice	1.32	1.32	0.04
(Town Existing)			0.00			1/2" Ice	1.58	1.58	0.06
			0.00						
4'x4" Pipe Mount	B	From Face	0.50	0.0000	160.00	No Ice	1.32	1.32	0.04
(Town Existing)			0.00			1/2" Ice	1.58	1.58	0.06
			0.00						
4'x4" Pipe Mount	C	From Face	0.50	0.0000	160.00	No Ice	1.32	1.32	0.04
(Town Existing)			0.00			1/2" Ice	1.58	1.58	0.06
			0.00						
12' x 3" Dia Omni	A	From Face	4.00	0.0000	164.00	No Ice	3.60	3.60	0.04
(Town Existing)			-4.00			1/2" Ice	4.83	4.83	0.06
			5.00						
8' x 3" Dia Omni	A	From Face	4.00	0.0000	164.00	No Ice	2.40	2.40	0.03
(Town Existing)			4.00			1/2" Ice	3.19	3.19	0.04
			5.00						
2'x2' Panel	B	From Face	4.00	0.0000	164.00	No Ice	5.60	0.72	0.02
(Town Existing)			4.00			1/2" Ice	5.92	0.88	0.05
			5.00						
10' x 3" Dia Omni	B	From Face	4.00	0.0000	164.00	No Ice	3.00	3.00	0.03
(Town Existing)			4.00			1/2" Ice	4.03	4.03	0.05
			5.00						
10' x 3" Dia Omni	A	From Face	4.00	0.0000	164.00	No Ice	3.00	3.00	0.03
(Town Existing)			-4.00			1/2" Ice	4.03	4.03	0.05

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
			5.00						
8' x 3" Dia Omni	A	From Face	4.00	0.0000	164.00	No Ice	2.40	2.40	0.03
(Town Existing)			4.00			1/2" Ice	3.19	3.19	0.04
			5.00						
Camera	C	From Face	4.00	0.0000	164.00	No Ice	3.00	3.00	0.10
(Town Existing)			-4.00			1/2" Ice	4.00	4.00	0.15
			2.00						
Low Profile Platform	C	None		0.0000	164.00	No Ice	15.70	15.70	1.30
(Town Existing)						1/2" Ice	20.10	20.10	1.76
LLPX310R	A	From Face	3.00	0.0000	154.00	No Ice	4.83	1.95	0.03
(Clearwire Existing)			0.00			1/2" Ice	5.18	2.21	0.05
			0.00						
LLPX310R	B	From Face	3.00	0.0000	154.00	No Ice	4.83	1.95	0.03
(Clearwire Existing)			0.00			1/2" Ice	5.18	2.21	0.05
			0.00						
LLPX310R	C	From Face	3.00	0.0000	154.00	No Ice	4.83	1.95	0.03
(Clearwire Existing)			0.00			1/2" Ice	5.18	2.21	0.05
			0.00						
Remote Radio Head FD R6	A	From Face	3.00	0.0000	151.50	No Ice	1.80	0.78	0.03
RRH			0.00			1/2" Ice	1.99	0.92	0.04
(Clearwire Existing)			0.00						
Remote Radio Head FD R6	B	From Face	3.00	0.0000	151.50	No Ice	1.80	0.78	0.03
RRH			0.00			1/2" Ice	1.99	0.92	0.04
(Clearwire Existing)			0.00						
Remote Radio Head FD R6	C	From Face	3.00	0.0000	151.50	No Ice	1.80	0.78	0.03
RRH			0.00			1/2" Ice	1.99	0.92	0.04
(Clearwire Existing)			0.00						
Horizon ODU	A	None		0.0000	154.00	No Ice	0.79	0.17	0.00
(Clearwire Existing)						1/2" Ice	0.91	0.25	0.00
Horizon ODU	C	None		0.0000	154.00	No Ice	0.79	0.17	0.00
(Clearwire Existing)						1/2" Ice	0.91	0.25	0.00
APXVSPP18-C-A20	A	From Face	4.00	0.0000	154.00	No Ice	8.26	5.28	0.06
(Sprint Existing)			0.00			1/2" Ice	8.81	5.74	0.11
			0.00						
P40-16-XLPP-RR-A	B	From Face	4.00	0.0000	154.00	No Ice	10.50	3.52	0.05
(Sprint Existing)			0.00			1/2" Ice	10.98	3.87	0.11
			0.00						
APXVSPP18-C-A20	C	From Face	4.00	0.0000	154.00	No Ice	8.26	5.28	0.06
(Sprint Existing)			0.00			1/2" Ice	8.81	5.74	0.11
			0.00						
FD-RRH 4x45 1900	A	From Face	4.00	0.0000	154.00	No Ice	2.71	2.78	0.06
(Sprint Existing)			2.00			1/2" Ice	2.94	3.02	0.08
			0.00						
FD-RRH 4x45 1900	B	From Face	4.00	0.0000	154.00	No Ice	2.71	2.78	0.06
(Sprint Existing)			2.00			1/2" Ice	2.94	3.02	0.08
			0.00						
FD-RRH 4x45 1900	C	From Face	4.00	0.0000	154.00	No Ice	2.71	2.78	0.06
(Sprint Existing)			2.00			1/2" Ice	2.94	3.02	0.08
			0.00						
FD-RRH 2x50 800	A	From Face	4.00	0.0000	154.00	No Ice	2.40	2.25	0.06
(Sprint Existing)			-2.00			1/2" Ice	2.61	2.46	0.09
			0.00						
FD-RRH 2x50 800	B	From Face	4.00	0.0000	154.00	No Ice	2.40	2.25	0.06
(Sprint Existing)			-2.00			1/2" Ice	2.61	2.46	0.09
			0.00						
FD-RRH 2x50 800	C	From Face	4.00	0.0000	154.00	No Ice	2.40	2.25	0.06
(Sprint Existing)			-2.00			1/2" Ice	2.61	2.46	0.09

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						
Valmont Uni-Tri Bracket	A	None		0.0000	151.50	No Ice	1.75	1.75	0.29
(Sprint Existing)						1/2" Ice	1.94	1.94	0.31
GPS	C	From Face	4.00	0.0000	154.00	No Ice	1.00	1.00	0.01
(Sprint Existing)			-6.00			1/2" Ice	1.50	1.50	0.01
			3.00						
Low Profile Platform	C	None		0.0000	154.00	No Ice	15.70	15.70	1.30
(Sprint Existing)						1/2" Ice	20.10	20.10	1.76
APXVTM14	A	From Face	4.00	0.0000	154.00	No Ice	6.90	3.61	0.06
(Sprint Existing)			2.00			1/2" Ice	7.35	3.97	0.10
			0.00						
APXVTM14	B	From Face	4.00	0.0000	154.00	No Ice	6.90	3.61	0.06
(Sprint Existing)			2.00			1/2" Ice	7.35	3.97	0.10
			0.00						
APXVTM14	C	From Face	4.00	0.0000	154.00	No Ice	6.90	3.61	0.06
(Sprint Existing)			2.00			1/2" Ice	7.35	3.97	0.10
			0.00						
TD-RRH8x20-25	A	From Face	4.00	0.0000	154.00	No Ice	4.72	1.70	0.07
(Sprint Existing)			2.00			1/2" Ice	5.01	1.92	0.10
			0.00						
TD-RRH8x20-25	B	From Face	4.00	0.0000	154.00	No Ice	4.72	1.70	0.07
(Sprint Existing)			2.00			1/2" Ice	5.01	1.92	0.10
			0.00						
TD-RRH8x20-25	C	From Face	4.00	0.0000	154.00	No Ice	4.72	1.70	0.07
(Sprint Existing)			2.00			1/2" Ice	5.01	1.92	0.10
			0.00						
(2) AIR21	A	From Face	4.00	0.0000	144.00	No Ice	6.53	4.36	0.08
(T-Mobile Reserved)			0.00			1/2" Ice	6.98	4.77	0.12
			0.00						
(2) AIR21	B	From Face	4.00	0.0000	144.00	No Ice	6.53	4.36	0.08
(T-Mobile Reserved)			0.00			1/2" Ice	6.98	4.77	0.12
			0.00						
(2) AIR21	C	From Face	4.00	0.0000	144.00	No Ice	6.53	4.36	0.08
(T-Mobile Reserved)			0.00			1/2" Ice	6.98	4.77	0.12
			0.00						
TMA 10"x8"x3"	A	From Face	4.00	0.0000	144.00	No Ice	0.78	0.29	0.02
(T-Mobile Reserved)			0.00			1/2" Ice	0.90	0.38	0.02
			0.00						
TMA 10"x8"x3"	B	From Face	4.00	0.0000	144.00	No Ice	0.78	0.29	0.02
(T-Mobile Reserved)			0.00			1/2" Ice	0.90	0.38	0.02
			0.00						
TMA 10"x8"x3"	C	From Face	4.00	0.0000	144.00	No Ice	0.78	0.29	0.02
(T-Mobile Reserved)			0.00			1/2" Ice	0.90	0.38	0.02
			0.00						
Smart Bias T	A	From Face	4.00	0.0000	144.00	No Ice	0.16	0.08	0.00
(T-Mobile Reserved)			0.00			1/2" Ice	0.21	0.12	0.00
			0.00						
Smart Bias T	B	From Face	4.00	0.0000	144.00	No Ice	0.16	0.08	0.00
(T-Mobile Reserved)			0.00			1/2" Ice	0.21	0.12	0.00
			0.00						
Smart Bias T	C	From Face	4.00	0.0000	144.00	No Ice	0.16	0.08	0.00
(T-Mobile Reserved)			0.00			1/2" Ice	0.21	0.12	0.00
			0.00						
Low Profile Platform	C	None		0.0000	144.00	No Ice	15.70	15.70	1.30
(T-Mobile Existing)						1/2" Ice	20.10	20.10	1.76
(2) RRUS-11	A	From Face	0.50	0.0000	138.00	No Ice	2.99	1.25	0.05
(AT&T Existing)			0.00			1/2" Ice	3.23	1.41	0.07

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
			0.00							
(2) RRUS-11	B	From Face	0.50	0.0000	138.00	No Ice		2.99	1.25	0.05
(AT&T Existing)			0.00			1/2" Ice		3.23	1.41	0.07
			0.00							
(2) RRUS-11	C	From Face	0.50	0.0000	138.00	No Ice		2.99	1.25	0.05
(AT&T Existing)			0.00			1/2" Ice		3.23	1.41	0.07
			0.00							
DC6-48-60-18-8F Surge	C	From Face	0.50	0.0000	138.00	No Ice		2.23	2.23	0.02
Arrestor			0.00			1/2" Ice		2.45	2.45	0.04
(AT&T Existing)			0.00							
Valmont Uni-Tri Bracket	C	None		0.0000	138.00	No Ice		1.75	1.75	0.29
(AT&T Existing)						1/2" Ice		1.94	1.94	0.31
7770.00	A	From Face	3.00	0.0000	134.00	No Ice		5.88	2.93	0.04
(AT&T Existing)			-2.00			1/2" Ice		6.31	3.27	0.07
			0.00							
7770.00	A	From Face	3.00	0.0000	134.00	No Ice		5.88	2.93	0.04
(AT&T Existing)			2.00			1/2" Ice		6.31	3.27	0.07
			0.00							
P65-16-XLH-RR	A	From Face	3.00	0.0000	134.00	No Ice		8.40	4.70	0.06
(AT&T Existing)			6.00			1/2" Ice		8.95	5.15	0.11
			0.00							
7770.00	B	From Face	3.00	0.0000	134.00	No Ice		5.88	2.93	0.04
(AT&T Existing)			-2.00			1/2" Ice		6.31	3.27	0.07
			0.00							
7770.00	B	From Face	3.00	0.0000	134.00	No Ice		5.88	2.93	0.04
(AT&T Existing)			2.00			1/2" Ice		6.31	3.27	0.07
			0.00							
P65-16-XLH-RR	B	From Face	3.00	0.0000	134.00	No Ice		8.40	4.70	0.06
(AT&T Existing)			6.00			1/2" Ice		8.95	5.15	0.11
			0.00							
7770.00	C	From Face	3.00	0.0000	134.00	No Ice		5.88	2.93	0.04
(AT&T Existing)			2.00			1/2" Ice		6.31	3.27	0.07
			0.00							
7770.00	C	From Face	3.00	0.0000	134.00	No Ice		5.88	2.93	0.04
(AT&T Existing)			-2.00			1/2" Ice		6.31	3.27	0.07
			0.00							
P65-16-XLH-RR	C	From Face	3.00	0.0000	134.00	No Ice		8.40	4.70	0.06
(AT&T Existing)			6.00			1/2" Ice		8.95	5.15	0.11
			0.00							
(2) LGP21401 TMA	A	From Face	3.00	0.0000	134.00	No Ice		0.95	0.37	0.02
(AT&T Existing)			-2.00			1/2" Ice		1.09	0.48	0.02
			0.00							
(2) LGP21401 TMA	B	From Face	3.00	0.0000	134.00	No Ice		0.95	0.37	0.02
(AT&T Existing)			-2.00			1/2" Ice		1.09	0.48	0.02
			0.00							
(2) LGP21401 TMA	C	From Face	3.00	0.0000	134.00	No Ice		0.95	0.37	0.02
(AT&T Existing)			-2.00			1/2" Ice		1.09	0.48	0.02
			0.00							
(2) LGP21901 Diplexer	A	From Face	3.00	0.0000	134.00	No Ice		0.23	0.12	0.01
(AT&T Existing)			-2.00			1/2" Ice		0.30	0.17	0.01
			0.00							
(2) LGP21901 Diplexer	B	From Face	3.00	0.0000	134.00	No Ice		0.23	0.12	0.01
(AT&T Existing)			-2.00			1/2" Ice		0.30	0.17	0.01
			0.00							
(2) LGP21901 Diplexer	C	From Face	3.00	0.0000	134.00	No Ice		0.23	0.12	0.01
(AT&T Existing)			-2.00			1/2" Ice		0.30	0.17	0.01
			0.00							

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
Low Profile Platform	C	None		0.0000	134.00	No Ice	15.70	15.70	1.30
(AT&T Existing)						1/2" Ice	20.10	20.10	1.76
DB844H65E-XY	A	From Face	4.00	0.0000	124.00	No Ice	2.87	4.20	0.01
(Verizon Existing)			-6.00			1/2" Ice	3.18	4.57	0.04
			0.00						
MG D3-800TX	A	From Face	4.00	0.0000	124.00	No Ice	3.45	2.22	0.00
(Verizon Existing)			-4.00			1/2" Ice	3.80	2.55	0.02
			0.00						
LNX-6514DS-T0M	A	From Face	4.00	0.0000	124.00	No Ice	8.41	5.41	0.04
(Verizon Existing)			0.00			1/2" Ice	8.96	5.86	0.09
			0.00						
MG D3-800TX	A	From Face	4.00	0.0000	124.00	No Ice	3.45	2.22	0.00
(Verizon Existing)			4.00			1/2" Ice	3.80	2.55	0.02
			0.00						
DB844H65E-XY	A	From Face	4.00	0.0000	124.00	No Ice	2.87	4.20	0.01
(Verizon Existing)			6.00			1/2" Ice	3.18	4.57	0.04
			0.00						
DB844H65E-XY	B	From Face	4.00	0.0000	124.00	No Ice	2.87	4.20	0.01
(Verizon Existing)			-6.00			1/2" Ice	3.18	4.57	0.04
			0.00						
MG D3-800TX	B	From Face	4.00	0.0000	124.00	No Ice	3.45	2.22	0.00
(Verizon Existing)			-4.00			1/2" Ice	3.80	2.55	0.02
			0.00						
LNX-6514DS-T0M	B	From Face	4.00	0.0000	124.00	No Ice	8.41	5.41	0.04
(Verizon Existing)			0.00			1/2" Ice	8.96	5.86	0.09
			0.00						
MG D3-800TX	B	From Face	4.00	0.0000	124.00	No Ice	3.45	2.22	0.00
(Verizon Existing)			4.00			1/2" Ice	3.80	2.55	0.02
			0.00						
DB844H65E-XY	B	From Face	4.00	0.0000	124.00	No Ice	2.87	4.20	0.01
(Verizon Existing)			6.00			1/2" Ice	3.18	4.57	0.04
			0.00						
DB844H65E-XY	C	From Face	4.00	0.0000	124.00	No Ice	2.87	4.20	0.01
(Verizon Existing)			-6.00			1/2" Ice	3.18	4.57	0.04
			0.00						
MG D3-800TX	C	From Face	4.00	0.0000	124.00	No Ice	3.45	2.22	0.00
(Verizon Existing)			-4.00			1/2" Ice	3.80	2.55	0.02
			0.00						
LNX-6514DS-T0M	C	From Face	4.00	0.0000	124.00	No Ice	8.41	5.41	0.04
(Verizon Existing)			0.00			1/2" Ice	8.96	5.86	0.09
			0.00						
MG D3-800TX	C	From Face	4.00	0.0000	124.00	No Ice	3.45	2.22	0.00
(Verizon Existing)			4.00			1/2" Ice	3.80	2.55	0.02
			0.00						
DB844H65E-XY	C	From Face	4.00	0.0000	124.00	No Ice	2.87	4.20	0.01
(Verizon Existing)			6.00			1/2" Ice	3.18	4.57	0.04
			0.00						
(2) FD9R6004/2C-3L	B	From Face	3.00	0.0000	124.00	No Ice	0.37	0.08	0.00
Diplexer			0.00			1/2" Ice	0.45	0.14	0.01
(Verizon Existing)			0.00						
(2) FD9R6004/2C-3L	C	From Face	3.00	0.0000	124.00	No Ice	0.37	0.08	0.00
Diplexer			0.00			1/2" Ice	0.45	0.14	0.01
(Verizon Existing)			0.00						
(2) FD9R6004/2C-3L	A	From Face	3.00	0.0000	124.00	No Ice	0.37	0.08	0.00
Diplexer			0.00			1/2" Ice	0.45	0.14	0.01
(Verizon Existing)			0.00						
RRH2x40-AWS	A	From Face	4.00	0.0000	124.00	No Ice	2.52	1.59	0.04

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
(Verizon Existing)			4.00				1/2" Ice	2.75	1.80	0.06
			0.00							
RRH2x40-AWS	B	From Face	4.00		0.0000	124.00	No Ice	2.52	1.59	0.04
(Verizon Existing)			4.00				1/2" Ice	2.75	1.80	0.06
			0.00							
RRH2x40-AWS	C	From Face	4.00		0.0000	124.00	No Ice	2.52	1.59	0.04
(Verizon Existing)			4.00				1/2" Ice	2.75	1.80	0.06
			0.00							
RRH2x40-07-U	A	From Face	4.00		0.0000	124.00	No Ice	2.25	1.23	0.05
(Verizon Existing)			0.00				1/2" Ice	2.45	1.39	0.07
			0.00							
RRH2x40-07-U	B	From Face	4.00		0.0000	124.00	No Ice	2.25	1.23	0.05
(Verizon Existing)			0.00				1/2" Ice	2.45	1.39	0.07
			0.00							
RRH2x40-07-U	C	From Face	4.00		0.0000	124.00	No Ice	2.25	1.23	0.05
(Verizon Existing)			0.00				1/2" Ice	2.45	1.39	0.07
			0.00							
RC2DC-3315-PF-48	A	From Face	4.00		0.0000	124.00	No Ice	3.52	2.29	0.03
(Verizon Existing)			4.00				1/2" Ice	3.77	2.51	0.05
			0.00							
Low Profile Platform	C	None			0.0000	124.00	No Ice	15.70	15.70	1.30
(Verizon Existing)							1/2" Ice	20.10	20.10	1.76
Low Profile Platform	C	None			0.0000	114.00	No Ice	15.70	15.70	1.30
							1/2" Ice	20.10	20.10	1.76
GPS	A	From Face	1.50		0.0000	51.50	No Ice	1.00	1.00	0.01
			0.00				1/2" Ice	1.50	1.50	0.01
			0.00							
GPS	B	From Face	1.50		0.0000	51.50	No Ice	1.00	1.00	0.01
			0.00				1/2" Ice	1.50	1.50	0.01
			0.00							
GPS	C	From Face	1.50		0.0000	51.50	No Ice	1.00	1.00	0.01
			0.00				1/2" Ice	1.50	1.50	0.01
			0.00							
531-70HD	C	From Face	3.00		0.0000	114.00	No Ice	6.00	6.00	0.04
(Eversource - Proposed)			-6.00				1/2" Ice	6.90	6.90	0.05
			0.00							
DB586-Y	C	From Face	3.00		0.0000	114.00	No Ice	1.01	1.01	0.01
(Eversouce - Proposed			5.00				1/2" Ice	1.28	1.28	0.02
(Upright))			2.50							
DB586-Y	C	From Face	3.00		0.0000	114.00	No Ice	1.01	1.01	0.01
(Eversoucre - Proposed			5.00				1/2" Ice	1.28	1.28	0.02
(Inverted))			-2.50							
ANT150F2	C	From Face	3.00		0.0000	114.00	No Ice	1.29	1.29	0.02
(Eversource - Proposed)			-3.00				1/2" Ice	1.60	1.60	0.03
			2.50							
Tower Top Amplifier	C	From Face	3.00		0.0000	114.00	No Ice	3.11	1.17	0.04
(Eversource - Proposed)			5.00				1/2" Ice	3.35	1.34	0.06
			0.00							

Dishes

Description	Face or Leg	Dish Type	Offset Type	Offsets: Horz Lateral Vert ft	Azimuth Adjustment °	3 dB Beam Width °	Elevation ft	Outside Diameter ft		Aperture Area ft^2	Weight K
4 FT DISH	A	Paraboloid	From	1.00	Worst		160.00	4.00	No Ice	12.56	0.17
(Town Existing)		w/Shroud (HP)	Leg	0.00					1/2" Ice	13.09	0.24
				0.00							
4 FT DISH	B	Paraboloid	From	1.00	Worst		160.00	4.00	No Ice	12.56	0.17
(Town Existing)		w/Shroud (HP)	Leg	0.00					1/2" Ice	13.09	0.24
				0.00							
2 FT DISH	C	Paraboloid	From	1.00	Worst		160.00	2.00	No Ice	3.14	0.03
(Town Existing)		w/Shroud (HP)	Leg	0.00					1/2" Ice	3.41	0.04
				0.00							
A-Ant-23G-2-C	A	Paraboloid	From	3.10	Worst		154.00	2.17	No Ice	3.72	0.03
(Clearwire Existing)		w/Radome	Face	-2.52					1/2" Ice	4.01	0.05
				2.00							
A-Ant-23G-2-C	C	Paraboloid	From	3.80	Worst		154.00	2.17	No Ice	3.72	0.03
(Clearwire Existing)		w/Radome	Face	-1.24					1/2" Ice	4.01	0.05
				2.00							

Tower Pressures - No Ice

$G_H = 1.690$

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
L1	147.53	1.534	28	135.985	A	0.000	135.985	135.985	100.00	0.000	0.000
164.00-131.50					B	0.000	135.985		100.00	0.000	0.000
					C	0.000	135.985		100.00	0.000	0.000
L2	125.34	1.464	27	55.744	A	0.000	55.744	55.744	100.00	0.000	0.000
131.50-119.29					B	0.000	55.744		100.00	0.000	0.000
					C	0.000	55.744		100.00	0.000	0.000
L3	98.89	1.368	25	199.426	A	0.000	199.426	199.426	100.00	0.000	0.000
119.29-78.79					B	0.000	199.426		100.00	0.000	0.000
					C	0.000	199.426		100.00	0.000	0.000
L4 78.79-39.88	59.42	1.183	22	213.639	A	0.000	213.639	213.639	100.00	0.000	0.000
					B	0.000	213.639		100.00	0.000	3.869
					C	0.000	213.639		100.00	0.000	0.000
L5 39.88-1.50	20.36	1	18	231.142	A	0.000	231.142	231.142	100.00	0.000	0.000
					B	0.000	231.142		100.00	0.000	11.782
					C	0.000	231.142		100.00	0.000	0.000

Tower Pressure - With Ice

$G_H = 1.690$

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
L1	147.53	1.534	28	0.5000	138.694	A	0.000	138.694	138.694	100.00	0.000	0.000
164.00-131.50						B	0.000	138.694		100.00	0.000	0.000
						C	0.000	138.694		100.00	0.000	0.000
L2	125.34	1.464	27	0.5000	56.761	A	0.000	56.761	56.761	100.00	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
131.50-119.29						B	0.000	56.761		100.00	0.000	0.000
						C	0.000	56.761		100.00	0.000	0.000
L3 119.29-78.79	98.89	1.368	25	0.5000	202.801	A	0.000	202.801	202.801	100.00	0.000	0.000
						B	0.000	202.801		100.00	0.000	0.000
						C	0.000	202.801		100.00	0.000	0.000
L4 78.79-39.88	59.42	1.183	22	0.5000	216.881	A	0.000	216.881	216.881	100.00	0.000	0.000
						B	0.000	216.881		100.00	0.000	7.355
						C	0.000	216.881		100.00	0.000	0.000
L5 39.88-1.50	20.36	1	18	0.5000	234.341	A	0.000	234.341	234.341	100.00	0.000	0.000
						B	0.000	234.341		100.00	0.000	22.395
						C	0.000	234.341		100.00	0.000	0.000

Tower Pressure - Service

$G_H = 1.690$

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
L1	147.53	1.534	28	135.985	A	0.000	135.985	135.985	100.00	0.000	0.000
164.00-131.50					B	0.000	135.985		100.00	0.000	0.000
					C	0.000	135.985		100.00	0.000	0.000
L2	125.34	1.464	27	55.744	A	0.000	55.744	55.744	100.00	0.000	0.000
131.50-119.29					B	0.000	55.744		100.00	0.000	0.000
					C	0.000	55.744		100.00	0.000	0.000
L3	98.89	1.368	25	199.426	A	0.000	199.426	199.426	100.00	0.000	0.000
119.29-78.79					B	0.000	199.426		100.00	0.000	0.000
					C	0.000	199.426		100.00	0.000	0.000
L4 78.79-39.88	59.42	1.183	22	213.639	A	0.000	213.639	213.639	100.00	0.000	0.000
					B	0.000	213.639		100.00	0.000	3.869
					C	0.000	213.639		100.00	0.000	0.000
L5 39.88-1.50	20.36	1	18	231.142	A	0.000	231.142	231.142	100.00	0.000	0.000
					B	0.000	231.142		100.00	0.000	11.782
					C	0.000	231.142		100.00	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 ft²	F K	w plf	Ctrl. Face
L1	0.90	5.47	A	1	0.65	1	1	1	135.985	4.24	130.34	C
164.00-131.50			B	1	0.65	1	1	1	135.985			
			C	1	0.65	1	1	1	135.985			
L2	0.74	2.69	A	1	0.65	1	1	1	55.744	1.66	135.82	C
131.50-119.29			B	1	0.65	1	1	1	55.744			
			C	1	0.65	1	1	1	55.744			
L3	2.76	12.76	A	1	0.65	1	1	1	199.426	5.53	136.63	C
119.29-78.79			B	1	0.65	1	1	1	199.426			
			C	1	0.65	1	1	1	199.426			
L4	2.69	18.55	A	1	0.65	1	1	1	213.639	5.25	134.97	C

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
78.79-39.88			B	1	0.65	1	1	1	213.639			
			C	1	0.65	1	1	1	213.639			
L5 39.88-1.50	2.32	20.49	A	1	0.65	1	1	1	231.142	5.06	131.96	C
			B	1	0.65	1	1	1	231.142			
			C	1	0.65	1	1	1	231.142			
Sum Weight:	9.41	59.96						OTM	1762.61 kip-ft	21.74		

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 ft^2	F K	w plf	Ctrl. Face
L1	0.90	5.47	A	1	0.65	1	1	1	135.985	4.24	130.34	C
164.00-131.50			B	1	0.65	1	1	1	135.985			
			C	1	0.65	1	1	1	135.985			
L2	0.74	2.69	A	1	0.65	1	1	1	55.744	1.66	135.82	C
131.50-119.29			B	1	0.65	1	1	1	55.744			
			C	1	0.65	1	1	1	55.744			
L3	2.76	12.76	A	1	0.65	1	1	1	199.426	5.53	136.63	C
119.29-78.79			B	1	0.65	1	1	1	199.426			
			C	1	0.65	1	1	1	199.426			
L4	2.69	18.55	A	1	0.65	1	1	1	213.639	5.25	134.97	C
78.79-39.88			B	1	0.65	1	1	1	213.639			
			C	1	0.65	1	1	1	213.639			
L5 39.88-1.50	2.32	20.49	A	1	0.65	1	1	1	231.142	5.06	131.96	C
			B	1	0.65	1	1	1	231.142			
			C	1	0.65	1	1	1	231.142			
Sum Weight:	9.41	59.96						OTM	1762.61 kip-ft	21.74		

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 ft^2	F K	w plf	Ctrl. Face
L1	0.90	5.47	A	1	0.65	1	1	1	135.985	4.24	130.34	C
164.00-131.50			B	1	0.65	1	1	1	135.985			
			C	1	0.65	1	1	1	135.985			
L2	0.74	2.69	A	1	0.65	1	1	1	55.744	1.66	135.82	C
131.50-119.29			B	1	0.65	1	1	1	55.744			
			C	1	0.65	1	1	1	55.744			
L3	2.76	12.76	A	1	0.65	1	1	1	199.426	5.53	136.63	C
119.29-78.79			B	1	0.65	1	1	1	199.426			
			C	1	0.65	1	1	1	199.426			
L4	2.69	18.55	A	1	0.65	1	1	1	213.639	5.25	134.97	C
78.79-39.88			B	1	0.65	1	1	1	213.639			
			C	1	0.65	1	1	1	213.639			
L5 39.88-1.50	2.32	20.49	A	1	0.65	1	1	1	231.142	5.06	131.96	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
			B	1	0.65	1	1	1	231.142			
			C	1	0.65	1	1	1	231.142			
Sum Weight:	9.41	59.96						OTM	1762.61 kip-ft	21.74		

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 ft²	F K	w plf	Ctrl. Face
L1	0.90	6.49	A	1	0.65	1	1	1	138.694	4.32	132.93	C
164.00-131.50			B	1	0.65	1	1	1	138.694			
			C	1	0.65	1	1	1	138.694			
L2	0.74	3.11	A	1	0.65	1	1	1	56.761	1.69	138.30	C
131.50-119.29			B	1	0.65	1	1	1	56.761			
			C	1	0.65	1	1	1	56.761			
L3	2.76	14.25	A	1	0.65	1	1	1	202.801	5.63	138.94	C
119.29-78.79			B	1	0.65	1	1	1	202.801			
			C	1	0.65	1	1	1	202.801			
L4	2.72	20.14	A	1	0.65	1	1	1	216.881	5.46	140.26	C
78.79-39.88			B	1	0.65	1	1	1	216.881			
			C	1	0.65	1	1	1	216.881			
L5 39.88-1.50	2.42	22.21	A	1	0.65	1	1	1	234.341	5.46	142.30	C
			B	1	0.65	1	1	1	234.341			
			C	1	0.65	1	1	1	234.341			
Sum Weight:	9.54	66.20						OTM	1807.20 kip-ft	22.55		

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 ft²	F K	w plf	Ctrl. Face
L1	0.90	6.49	A	1	0.65	1	1	1	138.694	4.32	132.93	C
164.00-131.50			B	1	0.65	1	1	1	138.694			
			C	1	0.65	1	1	1	138.694			
L2	0.74	3.11	A	1	0.65	1	1	1	56.761	1.69	138.30	C
131.50-119.29			B	1	0.65	1	1	1	56.761			
			C	1	0.65	1	1	1	56.761			
L3	2.76	14.25	A	1	0.65	1	1	1	202.801	5.63	138.94	C
119.29-78.79			B	1	0.65	1	1	1	202.801			
			C	1	0.65	1	1	1	202.801			
L4	2.72	20.14	A	1	0.65	1	1	1	216.881	5.46	140.26	C
78.79-39.88			B	1	0.65	1	1	1	216.881			
			C	1	0.65	1	1	1	216.881			
L5 39.88-1.50	2.42	22.21	A	1	0.65	1	1	1	234.341	5.46	142.30	C
			B	1	0.65	1	1	1	234.341			
			C	1	0.65	1	1	1	234.341			
Sum Weight:	9.54	66.20						OTM	1807.20	22.55		

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 90 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
L1	0.90	6.49	A	1	0.65	1	1	1	138.694	4.32	132.93	C
164.00-131.50			B	1	0.65	1	1	1	138.694			
			C	1	0.65	1	1	1	138.694			
L2	0.74	3.11	A	1	0.65	1	1	1	56.761	1.69	138.30	C
131.50-119.29			B	1	0.65	1	1	1	56.761			
			C	1	0.65	1	1	1	56.761			
L3	2.76	14.25	A	1	0.65	1	1	1	202.801	5.63	138.94	C
119.29-78.79			B	1	0.65	1	1	1	202.801			
			C	1	0.65	1	1	1	202.801			
L4	2.72	20.14	A	1	0.65	1	1	1	216.881	5.46	140.26	C
78.79-39.88			B	1	0.65	1	1	1	216.881			
			C	1	0.65	1	1	1	216.881			
L5 39.88-1.50	2.42	22.21	A	1	0.65	1	1	1	234.341	5.46	142.30	C
			B	1	0.65	1	1	1	234.341			
			C	1	0.65	1	1	1	234.341			
Sum Weight:	9.54	66.20						OTM	1807.20 kip-ft	22.55		

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 ft^2	F K	w plf	Ctrl. Face
L1	0.90	5.47	A	1	0.65	1	1	1	135.985	4.24	130.34	C
164.00-131.50			B	1	0.65	1	1	1	135.985			
			C	1	0.65	1	1	1	135.985			
L2	0.74	2.69	A	1	0.65	1	1	1	55.744	1.66	135.82	C
131.50-119.29			B	1	0.65	1	1	1	55.744			
			C	1	0.65	1	1	1	55.744			
L3	2.76	12.76	A	1	0.65	1	1	1	199.426	5.53	136.63	C
119.29-78.79			B	1	0.65	1	1	1	199.426			
			C	1	0.65	1	1	1	199.426			
L4	2.69	18.55	A	1	0.65	1	1	1	213.639	5.25	134.97	C
78.79-39.88			B	1	0.65	1	1	1	213.639			
			C	1	0.65	1	1	1	213.639			
L5 39.88-1.50	2.32	20.49	A	1	0.65	1	1	1	231.142	5.06	131.96	C
			B	1	0.65	1	1	1	231.142			
			C	1	0.65	1	1	1	231.142			
Sum Weight:	9.41	59.96						OTM	1762.61 kip-ft	21.74		

tnxTower	Job	Page
	14263.000	15 of 23
Centek Engineering Inc. 63-2 North Branford Rd. Branford, CT 06405 Phone: (203) 488-0580 FAX: (203) 488-8587	Project 164' EEI Monopole - 5 Perryridge Rd., Greenwich, CT	Date 06:24:43 03/17/15
	Client Eversource Energy	Designed by TJL

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
L1	0.90	5.47	A	1	0.65	1	1	1	135.985	4.24	130.34	C
164.00-131.50			B	1	0.65	1	1	1	135.985			
			C	1	0.65	1	1	1	135.985			
L2	0.74	2.69	A	1	0.65	1	1	1	55.744	1.66	135.82	C
131.50-119.29			B	1	0.65	1	1	1	55.744			
			C	1	0.65	1	1	1	55.744			
L3	2.76	12.76	A	1	0.65	1	1	1	199.426	5.53	136.63	C
119.29-78.79			B	1	0.65	1	1	1	199.426			
			C	1	0.65	1	1	1	199.426			
L4	2.69	18.55	A	1	0.65	1	1	1	213.639	5.25	134.97	C
78.79-39.88			B	1	0.65	1	1	1	213.639			
			C	1	0.65	1	1	1	213.639			
L5 39.88-1.50	2.32	20.49	A	1	0.65	1	1	1	231.142	5.06	131.96	C
			B	1	0.65	1	1	1	231.142			
			C	1	0.65	1	1	1	231.142			
Sum Weight:	9.41	59.96						OTM	1762.61 kip-ft	21.74		

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
L1	0.90	5.47	A	1	0.65	1	1	1	135.985	4.24	130.34	C
164.00-131.50			B	1	0.65	1	1	1	135.985			
			C	1	0.65	1	1	1	135.985			
L2	0.74	2.69	A	1	0.65	1	1	1	55.744	1.66	135.82	C
131.50-119.29			B	1	0.65	1	1	1	55.744			
			C	1	0.65	1	1	1	55.744			
L3	2.76	12.76	A	1	0.65	1	1	1	199.426	5.53	136.63	C
119.29-78.79			B	1	0.65	1	1	1	199.426			
			C	1	0.65	1	1	1	199.426			
L4	2.69	18.55	A	1	0.65	1	1	1	213.639	5.25	134.97	C
78.79-39.88			B	1	0.65	1	1	1	213.639			
			C	1	0.65	1	1	1	213.639			
L5 39.88-1.50	2.32	20.49	A	1	0.65	1	1	1	231.142	5.06	131.96	C
			B	1	0.65	1	1	1	231.142			
			C	1	0.65	1	1	1	231.142			
Sum Weight:	9.41	59.96						OTM	1762.61 kip-ft	21.74		

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	59.96					
Bracing Weight	0.00					
Total Member Self-Weight	59.96			0.89	-0.43	
Total Weight	81.77			0.89	-0.43	
Wind 0 deg - No Ice		0.17	-42.08	-4612.89	-27.95	0.56
Wind 30 deg - No Ice		21.26	-36.52	-4008.52	-2345.60	1.98
Wind 60 deg - No Ice		36.66	-21.18	-2329.84	-4034.86	2.87
Wind 90 deg - No Ice		42.24	-0.17	-26.63	-4643.10	2.99
Wind 120 deg - No Ice		36.49	20.89	2283.95	-4007.34	2.31
Wind 150 deg - No Ice		20.97	36.36	3982.79	-2297.93	1.01
Wind 180 deg - No Ice		-0.17	42.08	4614.68	27.10	-0.56
Wind 210 deg - No Ice		-21.26	36.52	4010.31	2344.75	-1.98
Wind 240 deg - No Ice		-36.66	21.18	2331.63	4034.01	-2.87
Wind 270 deg - No Ice		-42.24	0.17	28.42	4642.25	-2.99
Wind 300 deg - No Ice		-36.49	-20.89	-2282.16	4006.49	-2.31
Wind 330 deg - No Ice		-20.97	-36.36	-3981.00	2297.07	-1.01
Member Ice	6.24					
Total Weight Ice	93.39			1.50	-0.88	
Wind 0 deg - Ice		0.17	-45.85	-5069.98	-29.00	0.53
Wind 30 deg - Ice		23.15	-39.79	-4404.59	-2575.70	2.27
Wind 60 deg - Ice		39.93	-23.07	-2558.60	-4432.48	3.40
Wind 90 deg - Ice		46.02	-0.17	-26.63	-5101.81	3.62
Wind 120 deg - Ice		39.77	22.78	2512.88	-4404.35	2.87
Wind 150 deg - Ice		22.86	39.62	4379.46	-2526.98	1.35
Wind 180 deg - Ice		-0.17	45.85	5072.97	27.25	-0.53
Wind 210 deg - Ice		-23.15	39.79	4407.59	2573.95	-2.27
Wind 240 deg - Ice		-39.93	23.07	2561.59	4430.72	-3.40
Wind 270 deg - Ice		-46.02	0.17	29.62	5100.06	-3.62
Wind 300 deg - Ice		-39.77	-22.78	-2509.88	4402.60	-2.87
Wind 330 deg - Ice		-22.86	-39.62	-4376.46	2525.23	-1.35
Total Weight	81.77			0.89	-0.43	
Wind 0 deg - Service		0.17	-42.08	-4613.00	-27.76	0.56
Wind 30 deg - Service		21.26	-36.52	-4008.64	-2345.41	1.98
Wind 60 deg - Service		36.66	-21.18	-2329.95	-4034.67	2.87
Wind 90 deg - Service		42.24	-0.17	-26.74	-4642.91	2.99
Wind 120 deg - Service		36.49	20.89	2283.84	-4007.14	2.31
Wind 150 deg - Service		20.97	36.36	3982.67	-2297.73	1.01
Wind 180 deg - Service		-0.17	42.08	4614.57	27.30	-0.56
Wind 210 deg - Service		-21.26	36.52	4010.20	2344.94	-1.98
Wind 240 deg - Service		-36.66	21.18	2331.51	4034.21	-2.87
Wind 270 deg - Service		-42.24	0.17	28.31	4642.44	-2.99
Wind 300 deg - Service		-36.49	-20.89	-2282.27	4006.68	-2.31
Wind 330 deg - Service		-20.97	-36.36	-3981.11	2297.27	-1.01

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 60 deg - No Ice
5	Dead+Wind 90 deg - No Ice
6	Dead+Wind 120 deg - No Ice
7	Dead+Wind 150 deg - No Ice
8	Dead+Wind 180 deg - No Ice

Comb. No.	Description
9	Dead+Wind 210 deg - No Ice
10	Dead+Wind 240 deg - No Ice
11	Dead+Wind 270 deg - No Ice
12	Dead+Wind 300 deg - No Ice
13	Dead+Wind 330 deg - No Ice
14	Dead+Ice+Temp
15	Dead+Wind 0 deg+Ice+Temp
16	Dead+Wind 30 deg+Ice+Temp
17	Dead+Wind 60 deg+Ice+Temp
18	Dead+Wind 90 deg+Ice+Temp
19	Dead+Wind 120 deg+Ice+Temp
20	Dead+Wind 150 deg+Ice+Temp
21	Dead+Wind 180 deg+Ice+Temp
22	Dead+Wind 210 deg+Ice+Temp
23	Dead+Wind 240 deg+Ice+Temp
24	Dead+Wind 270 deg+Ice+Temp
25	Dead+Wind 300 deg+Ice+Temp
26	Dead+Wind 330 deg+Ice+Temp
27	Dead+Wind 0 deg - Service
28	Dead+Wind 30 deg - Service
29	Dead+Wind 60 deg - Service
30	Dead+Wind 90 deg - Service
31	Dead+Wind 120 deg - Service
32	Dead+Wind 150 deg - Service
33	Dead+Wind 180 deg - Service
34	Dead+Wind 210 deg - Service
35	Dead+Wind 240 deg - Service
36	Dead+Wind 270 deg - Service
37	Dead+Wind 300 deg - Service
38	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
L1	164 - 131.5	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	14	-20.22	-0.59	-0.63
			Max. Mx	18	-19.68	-395.26	5.44
			Max. My	21	-19.69	5.46	-388.31
			Max. Vy	18	21.99	-395.26	5.44
			Max. Vx	21	21.76	5.46	-388.31
			Max. Torque	24			1.42
L2	131.5 - 119.29	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	14	-22.15	-0.59	-0.63
			Max. Mx	18	-21.61	-534.53	6.66
			Max. My	21	-21.62	6.68	-526.17
			Max. Vy	18	22.87	-534.53	6.66
			Max. Vx	21	22.64	6.68	-526.17
			Max. Torque	24			1.42
L3	119.29 - 78.79	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	14	-42.49	-0.33	-1.18
			Max. Mx	18	-41.87	-1724.04	12.75
			Max. My	21	-41.87	13.60	-1709.12
			Max. Vy	18	34.52	-1724.04	12.75
			Max. Vx	21	34.35	13.60	-1709.12
			Max. Torque	24			3.43
L4	78.79 - 39.88	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	14	-63.88	-0.43	-1.24

Section No.	Elevation ft	Component Type	Condition	Gov. Load Comb.	Force K	Major Axis Moment kip-ft	Minor Axis Moment kip-ft
			Max. Mx	18	-63.44	-3142.13	19.28
			Max. My	21	-63.45	20.11	-3120.77
			Max. Vy	18	39.98	-3142.13	19.28
			Max. Vx	21	39.81	20.11	-3120.77
			Max. Torque	24			3.48
L5	39.88 - 1.5	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	14	-93.39	-0.88	-1.50
			Max. Mx	18	-93.38	-5193.04	27.18
			Max. My	21	-93.38	27.82	-5163.60
			Max. Vy	18	46.04	-5193.04	27.18
			Max. Vx	21	45.88	27.82	-5163.60
			Max. Torque	24			3.67

Maximum Reactions

Location	Condition	Gov. Load Comb.	Vertical K	Horizontal, X K	Horizontal, Z K
Pole	Max. Vert	18	93.39	-46.02	0.17
	Max. H_x	24	93.39	46.02	-0.17
	Max. H_z	15	93.39	-0.17	45.85
	Max. M_x	15	5160.53	-0.17	45.85
	Max. M_z	18	5193.04	-46.02	0.17
	Max. Torsion	24	3.67	46.02	-0.17
	Min. Vert	1	81.77	0.00	0.00
	Min. H_x	18	93.39	-46.02	0.17
	Min. H_z	21	93.39	0.17	-45.85
	Min. M_x	21	-5163.60	0.17	-45.85
	Min. M_z	24	-5191.26	46.02	-0.17
	Min. Torsion	18	-3.64	-46.02	0.17

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	81.77	0.00	0.00	0.89	-0.43	0.00
Dead+Wind 0 deg - No Ice	81.77	0.17	-42.08	-4680.24	-28.43	0.56
Dead+Wind 30 deg - No Ice	81.77	21.26	-36.52	-4067.07	-2379.95	1.99
Dead+Wind 60 deg - No Ice	81.77	36.66	-21.18	-2363.90	-4093.88	2.88
Dead+Wind 90 deg - No Ice	81.77	42.24	-0.17	-27.08	-4710.98	3.00
Dead+Wind 120 deg - No Ice	81.77	36.49	20.89	2317.24	-4065.89	2.32
Dead+Wind 150 deg - No Ice	81.77	20.97	36.36	4040.92	-2331.47	1.03
Dead+Wind 180 deg - No Ice	81.77	-0.17	42.08	4682.07	27.56	-0.54
Dead+Wind 210 deg - No Ice	81.77	-21.26	36.52	4068.90	2379.08	-1.97
Dead+Wind 240 deg - No Ice	81.77	-36.66	21.18	2365.73	4093.01	-2.88
Dead+Wind 270 deg - No Ice	81.77	-42.24	0.17	28.91	4710.11	-3.02
Dead+Wind 300 deg - No Ice	81.77	-36.49	-20.89	-2315.42	4065.02	-2.34
Dead+Wind 330 deg - No Ice	81.77	-20.97	-36.36	-4039.09	2330.60	-1.03
Dead+Ice+Temp	93.39	0.00	0.00	1.50	-0.88	0.00
Dead+Wind 0 deg+Ice+Temp	93.39	0.17	-45.85	-5160.53	-29.61	0.54
Dead+Wind 30 deg+Ice+Temp	93.39	23.15	-39.79	-4483.30	-2621.83	2.29
Dead+Wind 60 deg+Ice+Temp	93.39	39.93	-23.07	-2604.36	-4511.78	3.43

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 90 deg+Ice+Temp	93.39	46.02	-0.17	-27.18	-5193.04	3.64
Dead+Wind 120 deg+Ice+Temp	93.39	39.77	22.78	2557.70	-4483.08	2.89
Dead+Wind 150 deg+Ice+Temp	93.39	22.86	39.62	4457.66	-2572.11	1.38
Dead+Wind 180 deg+Ice+Temp	93.39	-0.17	45.85	5163.60	27.82	-0.51
Dead+Wind 210 deg+Ice+Temp	93.39	-23.15	39.79	4486.37	2620.05	-2.27
Dead+Wind 240 deg+Ice+Temp	93.39	-39.93	23.07	2607.43	4510.00	-3.43
Dead+Wind 270 deg+Ice+Temp	93.39	-46.02	0.17	30.25	5191.26	-3.67
Dead+Wind 300 deg+Ice+Temp	93.39	-39.77	-22.78	-2554.63	4481.29	-2.92
Dead+Wind 330 deg+Ice+Temp	93.39	-22.86	-39.62	-4454.59	2570.32	-1.38
Dead+Wind 0 deg - Service	81.77	0.17	-42.08	-4680.24	-28.43	0.56
Dead+Wind 30 deg - Service	81.77	21.26	-36.52	-4067.07	-2379.95	1.99
Dead+Wind 60 deg - Service	81.77	36.66	-21.18	-2363.90	-4093.88	2.88
Dead+Wind 90 deg - Service	81.77	42.24	-0.17	-27.08	-4710.98	3.00
Dead+Wind 120 deg - Service	81.77	36.49	20.89	2317.24	-4065.89	2.32
Dead+Wind 150 deg - Service	81.77	20.97	36.36	4040.92	-2331.47	1.03
Dead+Wind 180 deg - Service	81.77	-0.17	42.08	4682.07	27.56	-0.54
Dead+Wind 210 deg - Service	81.77	-21.26	36.52	4068.90	2379.08	-1.97
Dead+Wind 240 deg - Service	81.77	-36.66	21.18	2365.73	4093.01	-2.88
Dead+Wind 270 deg - Service	81.77	-42.24	0.17	28.91	4710.11	-3.02
Dead+Wind 300 deg - Service	81.77	-36.49	-20.89	-2315.42	4065.02	-2.34
Dead+Wind 330 deg - Service	81.77	-20.97	-36.36	-4039.09	2330.60	-1.03

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	-81.77	0.00	0.00	81.77	0.00	0.000%
2	0.17	-81.77	-42.08	-0.17	81.77	42.08	0.000%
3	21.26	-81.77	-36.52	-21.26	81.77	36.52	0.000%
4	36.66	-81.77	-21.18	-36.66	81.77	21.18	0.000%
5	42.24	-81.77	-0.17	-42.24	81.77	0.17	0.000%
6	36.49	-81.77	20.89	-36.49	81.77	-20.89	0.000%
7	20.97	-81.77	36.36	-20.97	81.77	-36.36	0.000%
8	-0.17	-81.77	42.08	0.17	81.77	-42.08	0.000%
9	-21.26	-81.77	36.52	21.26	81.77	-36.52	0.000%
10	-36.66	-81.77	21.18	36.66	81.77	-21.18	0.000%
11	-42.24	-81.77	0.17	42.24	81.77	-0.17	0.000%
12	-36.49	-81.77	-20.89	36.49	81.77	20.89	0.000%
13	-20.97	-81.77	-36.36	20.97	81.77	36.36	0.000%
14	0.00	-93.39	0.00	0.00	93.39	0.00	0.000%
15	0.17	-93.39	-45.85	-0.17	93.39	45.85	0.000%
16	23.15	-93.39	-39.79	-23.15	93.39	39.79	0.000%
17	39.93	-93.39	-23.07	-39.93	93.39	23.07	0.000%
18	46.02	-93.39	-0.17	-46.02	93.39	0.17	0.000%
19	39.77	-93.39	22.78	-39.77	93.39	-22.78	0.000%
20	22.86	-93.39	39.62	-22.86	93.39	-39.62	0.000%
21	-0.17	-93.39	45.85	0.17	93.39	-45.85	0.000%
22	-23.15	-93.39	39.79	23.15	93.39	-39.79	0.000%
23	-39.93	-93.39	23.07	39.93	93.39	-23.07	0.000%
24	-46.02	-93.39	0.17	46.02	93.39	-0.17	0.000%
25	-39.77	-93.39	-22.78	39.77	93.39	22.78	0.000%
26	-22.86	-93.39	-39.62	22.86	93.39	39.62	0.000%
27	0.17	-81.77	-42.08	-0.17	81.77	42.08	0.000%
28	21.26	-81.77	-36.52	-21.26	81.77	36.52	0.000%
29	36.66	-81.77	-21.18	-36.66	81.77	21.18	0.000%
30	42.24	-81.77	-0.17	-42.24	81.77	0.17	0.000%
31	36.49	-81.77	20.89	-36.49	81.77	-20.89	0.000%

	Sum of Applied Forces			Sum of Reactions			
Load Comb.	PX K	PY K	PZ K	PX K	PY K	PZ K	% Error
32	20.97	-81.77	36.36	-20.97	81.77	-36.36	0.000%
33	-0.17	-81.77	42.08	0.17	81.77	-42.08	0.000%
34	-21.26	-81.77	36.52	21.26	81.77	-36.52	0.000%
35	-36.66	-81.77	21.18	36.66	81.77	-21.18	0.000%
36	-42.24	-81.77	0.17	42.24	81.77	-0.17	0.000%
37	-36.49	-81.77	-20.89	36.49	81.77	20.89	0.000%
38	-20.97	-81.77	-36.36	20.97	81.77	36.36	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	0.00003516
3	Yes	4	0.00000001	0.00050117
4	Yes	4	0.00000001	0.00044504
5	Yes	4	0.00000001	0.00008309
6	Yes	4	0.00000001	0.00049526
7	Yes	4	0.00000001	0.00044109
8	Yes	4	0.00000001	0.00003098
9	Yes	4	0.00000001	0.00045460
10	Yes	4	0.00000001	0.00051992
11	Yes	4	0.00000001	0.00009725
12	Yes	4	0.00000001	0.00042763
13	Yes	4	0.00000001	0.00047267
14	Yes	4	0.00000001	0.00000001
15	Yes	5	0.00000001	0.00002764
16	Yes	5	0.00000001	0.00004165
17	Yes	5	0.00000001	0.00004100
18	Yes	5	0.00000001	0.00002793
19	Yes	5	0.00000001	0.00004114
20	Yes	5	0.00000001	0.00004031
21	Yes	5	0.00000001	0.00002766
22	Yes	5	0.00000001	0.00004112
23	Yes	5	0.00000001	0.00004199
24	Yes	5	0.00000001	0.00002797
25	Yes	5	0.00000001	0.00004014
26	Yes	5	0.00000001	0.00004076
27	Yes	4	0.00000001	0.00003516
28	Yes	4	0.00000001	0.00050117
29	Yes	4	0.00000001	0.00044504
30	Yes	4	0.00000001	0.00008309
31	Yes	4	0.00000001	0.00049526
32	Yes	4	0.00000001	0.00044109
33	Yes	4	0.00000001	0.00003098
34	Yes	4	0.00000001	0.00045460
35	Yes	4	0.00000001	0.00051992
36	Yes	4	0.00000001	0.00009725
37	Yes	4	0.00000001	0.00042763
38	Yes	4	0.00000001	0.00047267

Maximum Tower Deflections - Service Wind

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
L1	164 - 131.5	28.894	35	1.3436	0.0028
L2	131.5 - 119.29	19.893	35	1.2718	0.0022
L3	125.29 - 78.79	18.259	35	1.2404	0.0021
L4	87.21 - 39.88	9.359	35	0.9392	0.0012
L5	49.13 - 1.5	3.154	35	0.5722	0.0006

Critical Deflections and Radius of Curvature - Service Wind

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
164.00	12' x 3" Dia Omni	35	28.894	1.3436	0.0028	80015
160.00	4 FT DISH	35	27.765	1.3392	0.0027	80015
156.00	A-Ant-23G-2-C	35	26.639	1.3343	0.0026	50009
154.00	LLPX310R	35	26.077	1.3316	0.0026	40007
151.50	Remote Radio Head FD R6 RRH	35	25.376	1.3279	0.0026	32006
144.00	(2) AIR21	35	23.289	1.3133	0.0024	20003
138.00	(2) RRUS-11	35	21.644	1.2966	0.0023	15387
134.00	7770.00	35	20.562	1.2823	0.0023	13331
124.00	DB844H65E-XY	35	17.925	1.2330	0.0021	10085
114.00	Low Profile Platform	35	15.405	1.1666	0.0018	8927
51.50	GPS	35	3.432	0.5973	0.0006	4125

Maximum Tower Deflections - Design Wind

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
L1	164 - 131.5	32.027	23	1.4946	0.0032
L2	131.5 - 119.29	22.025	23	1.4126	0.0026
L3	125.29 - 78.79	20.210	23	1.3772	0.0025
L4	87.21 - 39.88	10.343	23	1.0401	0.0014
L5	49.13 - 1.5	3.480	23	0.6321	0.0007

Critical Deflections and Radius of Curvature - Design Wind

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
164.00	12' x 3" Dia Omni	23	32.027	1.4946	0.0032	70520
160.00	4 FT DISH	23	30.772	1.4894	0.0031	70520
156.00	A-Ant-23G-2-C	23	29.520	1.4837	0.0031	44075
154.00	LLPX310R	23	28.895	1.4806	0.0030	35260
151.50	Remote Radio Head FD R6 RRH	23	28.116	1.4763	0.0030	28207
144.00	(2) AIR21	23	25.797	1.4596	0.0029	17629
138.00	(2) RRUS-11	23	23.969	1.4406	0.0028	13561
134.00	7770.00	23	22.767	1.4244	0.0027	11752
124.00	DB844H65E-XY	23	19.840	1.3689	0.0024	8992

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
114.00	Low Profile Platform	23	17.044	1.2944	0.0022	7970
51.50	GPS	23	3.787	0.6599	0.0007	3728

Compression Checks

Pole Design Data

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 $\frac{P}{P_a}$
L1	164 - 131.5 (1)	TP53.42x47x0.3125	32.50	162.50	103.4	13.959	52.6760	-19.68	735.30	0.027
L2	131.5 - 119.29 (2)	TP56.15x53.42x0.375	12.21	162.50	100.9	14.665	64.7894	-21.61	950.11	0.023
L3	119.29 - 78.79 (3)	TP62.97x54.0585x0.4375	46.50	162.50	90.2	18.264	84.5934	-41.86	1545.03	0.027
L4	78.79 - 39.88 (4)	TP69.66x60.4813x0.5625	47.33	162.50	81.6	21.155	120.1620	-63.44	2542.07	0.025
L5	39.88 - 1.5 (5)	TP76x66.7412x0.5625	47.63	162.50	72.8	23.922	134.6840	-93.38	3221.92	0.029

Pole Bending Design Data

Section No.	Elevation ft	Size	Actual M_x kip-ft	Actual f_{bx} ksi	Allow. F_{bx} ksi	Ratio $\frac{f_{bx}}{F_{bx}}$	Actual M_y kip-ft	Actual f_{by} ksi	Allow. F_{by} ksi	Ratio $\frac{f_{by}}{F_{by}}$
L1	164 - 131.5 (1)	TP53.42x47x0.3125	398.36	-6.911	36.775	0.188	0.00	0.000	36.775	0.000
L2	131.5 - 119.29 (2)	TP56.15x53.42x0.375	538.34	-7.416	39.000	0.190	0.00	0.000	39.000	0.000
L3	119.29 - 78.79 (3)	TP62.97x54.0585x0.4375	1732.13	-16.334	39.000	0.419	0.00	0.000	39.000	0.000
L4	78.79 - 39.88 (4)	TP69.66x60.4813x0.5625	3154.18	-18.976	39.000	0.487	0.00	0.000	39.000	0.000
L5	39.88 - 1.5 (5)	TP76x66.7412x0.5625	5209.49	-24.924	39.000	0.639	0.00	0.000	39.000	0.000

Pole Interaction Design Data

Section No.	Elevation ft	Size	Ratio $\frac{P}{P_a}$	Ratio $\frac{f_{bx}}{F_{bx}}$	Ratio $\frac{f_{by}}{F_{by}}$	Comb. Stress Ratio	Allow. Stress Ratio	Criteria
L1	164 - 131.5 (1)	TP53.42x47x0.3125	0.027	0.188	0.000	0.215 ✓	1.333	H1-3 ✓
L2	131.5 - 119.29 (2)	TP56.15x53.42x0.375	0.023	0.190	0.000	0.213 ✓	1.333	H1-3 ✓
L3	119.29 - 78.79 (3)	TP62.97x54.0585x0.4375	0.027	0.419	0.000	0.446 ✓	1.333	H1-3 ✓
L4	78.79 - 39.88 (4)	TP69.66x60.4813x0.5625	0.025	0.487	0.000	0.512 ✓	1.333	H1-3 ✓

Section No.	Elevation ft	Size	Ratio $\frac{P}{P_a}$	Ratio $\frac{f_{bx}}{F_{bx}}$	Ratio $\frac{f_{by}}{F_{by}}$	Comb. Stress Ratio	Allow. Stress Ratio	Criteria
L5	39.88 - 1.5 (5)	TP76x66.7412x0.5625	0.029	0.639	0.000	0.668 ✔	1.333	H1-3 ✔

Section Capacity Table

Section No.	Elevation ft	Component Type	Size	Critical Element	P K	$SF*P_{allow}$ K	% Capacity	Pass Fail
L1	164 - 131.5	Pole	TP53.42x47x0.3125	1	-19.68	980.15	16.1	Pass
L2	131.5 - 119.29	Pole	TP56.15x53.42x0.375	2	-21.61	1266.50	16.0	Pass
L3	119.29 - 78.79	Pole	TP62.97x54.0585x0.4375	3	-41.86	2059.52	33.5	Pass
L4	78.79 - 39.88	Pole	TP69.66x60.4813x0.5625	4	-63.44	3388.58	38.4	Pass
L5	39.88 - 1.5	Pole	TP76x66.7412x0.5625	5	-93.38	4294.82	50.1	Pass
							Summary	
						Pole (L5)	50.1	Pass
						RATING =	**50.1**	**Pass**

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Subject:		Flange Bolt and Plate Analysis
Location:		164-ft EEI Monopole Greenwich, CT
Rev. 2: 1/5/15		Prepared by: T.J.L. Checked by: C.F.C. Job No. 14263.000

Flange Bolt and Plate Analysis:

Input Data:

Tower Reactions:

Overturning Moment =	OM := 396ft·kips	(Input From tnxTower)
Shear Force =	Shear := 22·kips	(Input From tnxTower)
Axial Force =	Axial := 20.5·kips	(Input From tnxTower)

Flange Bolt Data:

Use ASTM A325

Number of Flange Bolts =	N := 12	(User Input)
Diameter of Bolt Circle =	D_{bc} := 58.00·in	(User Input)
Bolt Ultimate Strength =	F_u := 120·ksi	(User Input)
Bolt Yield Strength =	F_y := 92·ksi	(User Input)
Bolt Modulus =	E := 29000·ksi	(User Input)
Diameter of Flange Bolts =	D := 1.00·in	(User Input)

Flange Plate Data:

Use ASTM A36

Plate Yield Strength =	Fy_{bp} := 36.00·ksi	(User Input)
Flange Plate Thickness =	t_{bp} := 1.00·in	(User Input)
Flange Plate Diameter =	D_{bp} := 61.00·in	(User Input)
Outer Pole Diameter =	D_{pole} := 53.42·in	(User Input)

Geometric Layout Data:

Distance from Bolts to Centroid of Pole:

Radius of Bolt Circle =: $R_{bc} := \frac{D_{bc}}{2} = 29 \cdot in$

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

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

$d_1 = 14.50 \cdot in$ $d_7 = -14.50 \cdot in$

$d_2 = 25.11 \cdot in$ $d_8 = -25.11 \cdot in$

$d_3 = 29.00 \cdot in$ $d_9 = -29.00 \cdot in$

$d_4 = 25.11 \cdot in$ $d_{10} = -25.11 \cdot in$

$d_5 = 14.50 \cdot in$ $d_{11} = -14.50 \cdot in$

$d_6 = 0.00 \cdot in$ etc.

Critical Distances For Bending in Plate:

Outer Pole Radius = $R_{pole} := \frac{D_{pole}}{2} = 26.7 \cdot in$

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

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

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

$MA_3 = 2.29 \cdot in$ $MA_9 = 0.00 \cdot in$

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

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

$MA_6 = 0.00 \cdot in$ etc

Effective Width of Plate for Bending = $B_{eff} := .8 \cdot 2 \cdot \sqrt{\left(\frac{D_{bp}}{2} \right)^2 - \left(\frac{D_{pole}}{2} \right)^2} = 23.6 \cdot in$

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	Subject:	Flange Bolt and Plate Analysis
	Location:	164-ft EEI Monopole Greenwich, CT
	Rev. 2: 1/5/15	Prepared by: T.J.L. Checked by: C.F.C. Job No. 14263.000

Flange Bolt Analysis:

Calculated Flange Bolt Properties:

Polar Moment of Inertia = $I_p := \sum_i \left(d_i\right)^2 = 5.046 \times 10^3 \cdot in^2$

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

Check Flange Bolt Tension Force:

Maximum Tensile Force = $T_{Max} := OM \cdot \frac{R_{bc}}{I_p} - \frac{Axial}{N} = 25.6 \cdot kips$

Allowable Tensile Force = $T_{ALL.Gross} := 1.333 \cdot \left(0.33 \cdot A_g \cdot F_u\right) = 41.5 \cdot kips$ (1.333 increase allowed per TIA/EIA)

Bolt Tension % of Capacity = $\frac{T_{Max}}{T_{ALL.Gross}} = 61.8 \cdot \%$

Condition1 = $Condition1 := if\left(\frac{T_{Max}}{T_{ALL.Gross}} \le 1.00, "OK", "Overstressed"\right)$

Condition1 = "OK"

Flange Plate Analysis:

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

$C_1 = 15.4 \cdot kips$ $C_7 = -11.9 \cdot kips$

$C_2 = 25.4 \cdot kips$ $C_8 = -21.9 \cdot kips$

$C_3 = 29.0 \cdot kips$ $C_9 = -25.6 \cdot kips$

$C_4 = 25.4 \cdot kips$ $C_{10} = -21.9 \cdot kips$

$C_5 = 15.4 \cdot kips$ $C_{11} = -11.9 \cdot kips$

$C_6 = 1.7 \cdot kips$ etc.

Maximum Bending Stress in Plate = $f_{bp} := \sum_i \frac{6 \cdot C_i \cdot MA_i}{\left(B_{eff} t_{bp}^2\right)} = 16.9 \cdot ksi$

Allowable Bending Stress in Plate = $F_{bp} := 1.33 \cdot 0.75 \cdot Fy_{bp} = 35.9 \cdot ksi$

Plate Bending Stress % of Capacity = $\frac{f_{bp}}{F_{bp}} = 47.1 \cdot \%$

Condition3 = $Condition2 := if\left(\frac{f_{bp}}{F_{bp}} < 1.00, "Ok", "Overstressed"\right)$

Condition2 = "Ok"

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Subject:		Anchor Bolt and Baseplate Analysis
Location:		164-ft EEI Monopole Greenwich, CT
Rev. 2: 1/5/15		Prepared by: T.J.L. Checked by: C.F.C. Job No. 14263.000

Anchor Bolt and Base Plate Analysis:

Input Data:

Tower Reactions:

Overturning Moment =	OM := 5209·ft·kips	(Input From tnxTower)
Shear Force =	Shear := 46·kips	(Input From tnxTower)
Axial Force =	Axial := 93·kips	(Input From tnxTower)

Anchor Bolt Data:

Use ASTM A615 Grade 75

Number of Anchor Bolts =	N := 30	(User Input)
Diameter of Bolt Circle =	D_{bc} := 86.00·in	(User Input)
Bolt "Column" Distance =	l := 3.0·in	(User Input)
Bolt Ultimate Strenght =	F_u := 100·ksi	(User Input)
Bolt Yeild Strenght =	F_y := 75·ksi	(User Input)
Bolt Modulus =	E := 29000·ksi	(User Input)
Diameter of Anchor Bolts =	D := 2.25·in	(User Input)
Threads per Inch =	n := 4.5	(User Input)

Base Plate Data:

Use ASTM A572 GR 60

Plate Yield Strength =	Fy_{bp} := 60·ksi	(User Input)
Base Plate Thickness =	t_{bp} := 3.0·in	(User Input)
Base Plate Diameter =	D_{bp} := 92.00·in	(User Input)
Outer Pole Diameter =	D_{pole} := 76.00·in	(User Input)

Geometric Layout Data:

Distance from Bolts to Centroid of Pole:

Radius of Bolt Circle =: $R_{bc} := \frac{D_{bc}}{2} = 43 \cdot in$

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

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

$d_1 = 8.94 \cdot in$ $d_7 = 42.76 \cdot in$

$d_2 = 17.49 \cdot in$ $d_8 = 42.76 \cdot in$

$d_3 = 25.27 \cdot in$ $d_9 = 40.90 \cdot in$

$d_4 = 31.96 \cdot in$ $d_{10} = 37.24 \cdot in$

$d_5 = 37.24 \cdot in$ $d_{11} = 31.96 \cdot in$

$d_6 = 40.90 \cdot in$ etc.

Critical Distances For Bending in Plate:

Outer Pole Radius = $R_{pole} := \frac{D_{pole}}{2} = 38 \cdot in$

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

$MA_1 = 0.00 \cdot in$ $MA_7 = 4.76 \cdot in$

$MA_2 = 0.00 \cdot in$ $MA_8 = 4.76 \cdot in$

$MA_3 = 0.00 \cdot in$ $MA_9 = 2.90 \cdot in$

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

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

$MA_6 = 2.90 \cdot in$ etc

Effective Width of Baseplate for Bending = $B_{eff} := .8 \cdot 2 \cdot \sqrt{\left(\frac{D_{bp}}{2}\right)^2 - \left(\frac{D_{pole}}{2}\right)^2} = 41.5 \cdot in$

Anchor Bolt Analysis:

Calculated Anchor Bolt Properties:

Polar Moment of Inertia = $I_p := \sum_i \left(d_i\right)^2 = 2.773 \times 10^4 \cdot in^2$

Gross Area of Bolt = $A_g := \frac{\pi}{4} \cdot D^2 = 3.976 \cdot in^2$

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

Net Diameter = $D_n := \frac{2 \cdot \sqrt{A_n}}{\sqrt{\pi}} = 2.033 \cdot in$

Radius of Gyration of Bolt = $r := \frac{D_n}{4} = 0.508 \cdot in$

Section Modulus of Bolt = $S_x := \frac{\pi \cdot D_n^3}{32} = 0.826 \cdot in^3$

Check Anchor Bolt Tension Force:

Maximum Tensile Force = $T_{Max} := OM \cdot \frac{R_{bc}}{I_p} - \frac{Axial}{N} = 93.8 \cdot kips$

Allowable Tensile Force = $T_{ALL.Gross} := 1.333 \cdot \left(0.33 \cdot A_g \cdot F_u\right) = 174.9 \cdot kips$ (1.333 increase allowed per TIA/EIA)

$T_{ALL.Net} := 1.333 \cdot \left(0.60 \cdot A_n \cdot F_y\right) = 194.812 \cdot kips$ (1.333 increase allowed per TIA/EIA)

Bolt Tension % of Capacity = $\frac{T_{Max}}{T_{ALL.Net}} = 48.2 \cdot \%$ Bolts are "upset bolts". Use net area per AISC

Condition1 = $Condition1 := if\left(\frac{T_{Max}}{T_{ALL.Net}} \le 1.00, "OK", "Overstressed"\right)$

Condition1 = "OK"

Check Anchor Bolt Bending Stress:

Maximum Bending Moment = $M_x := \left(\frac{Shear}{N}\right) \cdot l = 0.383 \cdot ft \cdot kips$

Maximum Bending Stress = $f_{bx} := \frac{M_x}{S_x} = 5.6 \cdot ksi$

Allowable Bending Stress = $F_{bx} := 1.333 \cdot 0.6 \cdot F_y = 60 \cdot ksi$ (1.333 increase allowed per TIA/EIA)

Check Combined Stress Requirement:

Per ASCE Manual 72: "If the clearance between the base plate and concrete does not exceed two times the bolt diameter a bending stress analysis of the bolts is NOT normally required.

$$l := \begin{cases} l & \text{if } l > 2 \cdot D_n \\ 0 & \text{otherwise} \end{cases} = 0 \cdot in$$

$$f_{bx} := \begin{cases} f_{bx} & \text{if } l > 2 \cdot D_n \\ 0 & \text{otherwise} \end{cases} = 0 \cdot ksi$$

Check Anchor Bolt Compression/Combined Stress:

Maximum Compressive Force =

$$C_{Max} := OM \cdot \frac{R_{bc}}{I_p} + \frac{Axial}{N} = 100 \cdot kips$$

Maximum Compressive Stress =

$$f_a := \frac{C_{Max}}{A_n} = 30.8 \cdot ksi$$

$$K := 0.65$$

$$C_c := \sqrt{\frac{2 \cdot \pi^2 \cdot E}{F_y}} = 87.364$$

$$F_a := \begin{cases} \dfrac{\left[1 - \dfrac{\left(\frac{K \cdot l}{r}\right)^2}{2 \cdot C_c^{\,2}}\right] \cdot F_y}{\dfrac{5}{3} + \dfrac{3 \cdot \left(\frac{K \cdot l}{r}\right)}{8 \cdot C_c} - \dfrac{\left(\frac{K \cdot l}{r}\right)^3}{8 \cdot C_c^{\,3}}} & \text{if } \dfrac{K \cdot l}{r} \le C_c \\ \dfrac{12 \cdot \pi^2 \cdot E}{23 \cdot \left(\frac{K \cdot l}{r}\right)^2} & \text{if } \dfrac{K \cdot l}{r} > C_c \end{cases} = 45 \cdot ksi$$

Allowable Compressive Stress =

$$F_a := 1.333 \cdot F_a = 60 \cdot ksi$$

(1.333 increase allowed per TIA/EIA)

Combined Stress % of Capacity =

$$\left(\frac{f_a}{F_a} + \frac{f_{bx}}{F_{bx}}\right) = 51.3 \cdot \%$$

Condition 2 =

$$Condition2 := if\left(\frac{f_a}{F_a} + \frac{f_{bx}}{F_{bx}} \le 1.00, \text{"OK"}, \text{"Overstressed"}\right)$$

Condition2 = "OK"

Base Plate Analysis:

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

$C_1 = 23.2 \cdot kips$ $C_7 = 99.5 \cdot kips$

$C_2 = 42.5 \cdot kips$ $C_8 = 99.5 \cdot kips$

$C_3 = 60.1 \cdot kips$ $C_9 = 95.3 \cdot kips$

$C_4 = 75.1 \cdot kips$ $C_{10} = 87.0 \cdot kips$

$C_5 = 87.0 \cdot kips$ $C_{11} = 75.1 \cdot kips$

$C_6 = 95.3 \cdot kips$ etc.

Maximum Bending Stress in Plate = $f_{bp} := \sum_i \frac{6 \cdot C_i \cdot MA_i}{\left(B_{eff} \cdot t_{bp}^2\right)} = 24.1 \cdot ksi$

Allowable Bending Stress in Plate = $F_{bp} := 1.33 \cdot 0.75 \cdot Fy_{bp} = 59.9 \cdot ksi$

Plate Bending Stress % of Capacity = $\frac{f_{bp}}{F_{bp}} = 40.3 \cdot \%$

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

$Condition3 = "Ok"$

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Subject:	CAISSON FOUNDATION
Location:	164-ft EEI Monopole Greenwich, CT
Rev. 2: 1/5/15	Prepared by: TJL Checked by: C.F.C. Job No. 14263.000

Caisson Foundation:

Input Data:

Shear Force =	$S := 46k$	*USER INPUT-FROM tnxTower*
Overturning Moment =	$M := 5209ft \cdot k$	*USER INPUT-FROM tnxTower*
Applied Axial Load =	$A1 := 93k$	*USER INPUT-FROM tnxTower*
Bending Moment =	$Mu := 5452ft \cdot k$	*USER INPUT--FROM LPILE*
Moment Capacity =	$Mn := 12372ft \cdot k$	*USER INPUT--FROM LPILE*
Foundation Diameter =	$d := 9.0ft$	*USER INPUT*
Overall Length of Caisson =	$L_c := 28.0ft$	*USER INPUT*
Depth From Top of Caisson to Grade =	$L_{pag} := 1.0ft$	*USER INPUT*
Number of Rebar =	$n := 33$	*USER INPUT*
Area of Rebar =	$Ar := 1.560in^2$	*USER INPUT*
Rebar Yield Strength =	$fy := 60ksi$	*USER INPUT*
Concrete Comp Strength =	$f'c := 3ksi$	*USER INPUT*

Check Moment Capacity:

Factor of Safety = $FS := \frac{Mn}{Mu} = 2.3$

Factor of Safety Required = $FS_{reqd} := 1.3$

$FOSCheck := if(FS \geq FS_{reqd}, "OK", "NO GOOD")$

$FOSCheck = "OK"$

LPILE Plus for Windows, Version 5.0 (5.0.47)

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

This program is licensed to:

TJL
Centek Engineering

Files Used for Analysis

Path to file locations: J:\Jobs\1426300.WI\04_Structural\Backup Documentation\Rev (2)\Foundation\
Name of input data file: Greenwich Hospital Caisson Analysis.lpd
Name of output file: Greenwich Hospital Caisson Analysis.lpo
Name of plot output file: Greenwich Hospital Caisson Analysis.lpp
Name of runtime file: Greenwich Hospital Caisson Analysis.lpr

Time and Date of Analysis

Date: January 5, 2015 Time: 9:23:42

Problem Title

14263.000 - Greenwich Hospital

Program Options

Units Used in Computations - US Customary Units: Inches, Pounds

Basic Program Options:

Analysis Type 3:
- Computation of Nonlinear Bending Stiffness and Ultimate Bending Moment Capacity with Pile Response Computed Using Nonlinear EI

Computation Options:
- Only internally-generated p-y curves used in analysis
- Analysis does not use p-y multipliers (individual pile or shaft action only)
- Analysis assumes no shear resistance at pile tip
- Analysis for fixed-length pile or shaft only
- Analysis includes computation of foundation stiffness matrix elements
- Output pile response for full length of pile
- Analysis assumes no soil movements acting on pile
- No additional p-y curves to be computed at user-specified depths

Solution Control Parameters:
- Number of pile increments = 100
- Maximum number of iterations allowed = 100
- Deflection tolerance for convergence = 1.0000E-04 in
- Maximum allowable deflection = 1.0000E+02 in

Printing Options:
- Values of pile-head deflection, bending moment, shear force, and soil reaction are printed for full length of pile.
- Printing Increment (spacing of output points) = 8

Pile Structural Properties and Geometry

Pile Length = 336.00 in

Depth of ground surface below top of pile = 12.00 in

Slope angle of ground surface = 0.00 deg.

Structural properties of pile defined using 2 points

Point No.	Point Depth in	Pile Diameter in	Moment of Inertia in**4	Pile Area Sq.in	Modulus of Elasticity lbs/Sq.in
1	0.0000	108.00000	6678285.	9160.9000	3600000.
2	336.0000	108.00000	6678285.	9160.9000	3600000.

Please note that because this analysis makes computations of ultimate moment capacity and pile response using nonlinear bending stiffness that the above values of moment of inertia and modulus of are not used for any computations other than total stress due to combined axial loading and bending.

Soil and Rock Layering Information

The soil profile is modelled using 4 layers

Layer 1 is sand, p-y criteria by Reese et al., 1974
Distance from top of pile to top of layer = 12.000 in
Distance from top of pile to bottom of layer = 48.000 in
p-y subgrade modulus k for top of soil layer = 20.000 lbs/in**3
p-y subgrade modulus k for bottom of layer = 20.000 lbs/in**3

Layer 2 is sand, p-y criteria by Reese et al., 1974
Distance from top of pile to top of layer = 48.000 in
Distance from top of pile to bottom of layer = 72.000 in
p-y subgrade modulus k for top of soil layer = 90.000 lbs/in**3
p-y subgrade modulus k for bottom of layer = 90.000 lbs/in**3

Layer 3 is sand, p-y criteria by Reese et al., 1974
Distance from top of pile to top of layer = 72.000 in
Distance from top of pile to bottom of layer = 132.000 in
p-y subgrade modulus k for top of soil layer = 150.000 lbs/in**3
p-y subgrade modulus k for bottom of layer = 150.000 lbs/in**3

Layer 4 is sand, p-y criteria by Reese et al., 1974
Distance from top of pile to top of layer = 132.000 in
Distance from top of pile to bottom of layer = 360.000 in
p-y subgrade modulus k for top of soil layer = 250.000 lbs/in**3
p-y subgrade modulus k for bottom of layer = 250.000 lbs/in**3

(Depth of lowest layer extends 24.00 in below pile tip)

Effective Unit Weight of Soil vs. Depth

Effective unit weight of soil with depth defined using 8 points

Point No.	Depth X in	Eff. Unit Weight lbs/in**3
1	12.00	0.05800
2	48.00	0.05800
3	48.00	0.06900
4	72.00	0.06900
5	72.00	0.06900
6	132.00	0.06900
7	132.00	0.07500
8	360.00	0.07500

Shear Strength of Soils

Shear strength parameters with depth defined using 8 points

Point No.	Depth X in	Cohesion c lbs/in**2	Angle of Friction Deg.	E50 or k_rm	RQD %
1	12.000	0.00000	20.00	------	------
2	48.000	0.00000	20.00	------	------
3	48.000	0.00000	30.00	------	------
4	72.000	0.00000	30.00	------	------
5	72.000	0.00000	35.00	------	------
6	132.000	0.00000	35.00	------	------
7	132.000	0.00000	42.00	------	------
8	360.000	0.00000	42.00	------	------

Notes:

(1) Cohesion = uniaxial compressive strength for rock materials.
(2) Values of E50 are reported for clay strata.
(3) Default values will be generated for E50 when input values are 0.
(4) RQD and k_rm are reported only for weak rock strata.

Loading Type

Static loading criteria was used for computation of p-y curves.

Pile-head Loading and Pile-head Fixity Conditions

Number of loads specified = 1

Load Case Number 1

Pile-head boundary conditions are Shear and Moment (BC Type 1)
Shear force at pile head = 46000.000 lbs
Bending moment at pile head = 62508000.000 in-lbs
Axial load at pile head = 93000.000 lbs

Non-zero moment at pile head for this load case indicates the pile-head may rotate under the applied pile-head loading, but is not a free-head (zero moment) condition.

Computations of Nominal Moment Capacity and Nonlinear Bending Stiffness

Number of sections = 1

Pile Section No. 1

The sectional shape is a circular drilled shaft (bored pile).

Outside Diameter = 108.0000 in

Material Properties:

Compressive Strength of Concrete	=	3.000 kip/in**2
Yield Stress of Reinforcement	=	60. kip/in**2
Modulus of Elasticity of Reinforcement	=	29000. kip/in**2
Number of Reinforcing Bars	=	33
Area of Single Bar	=	1.56000 in**2
Number of Rows of Reinforcing Bars	=	33
Area of Steel	=	51.480 in**2
Area of Shaft	=	9160.884 in**2
Percentage of Steel Reinforcement	=	0.562 percent
Cover Thickness (edge to bar center)	=	4.000 in

Unfactored Axial Squash Load Capacity = 26317.78 kip

Distribution and Area of Steel Reinforcement

Row Number	Area of Reinforcement in**2	Distance to Centroidal Axis in
1	1.560	49.943
2	1.560	49.491
3	1.560	48.591
4	1.560	47.250
5	1.560	45.482
6	1.560	43.301
7	1.560	40.729
8	1.560	37.787
9	1.560	34.504
10	1.560	30.908
11	1.560	27.032
12	1.560	22.911
13	1.560	18.583
14	1.560	14.087
15	1.560	9.463
16	1.560	4.753
17	1.560	0.000
18	1.560	-4.753

19	1.560	-9.463
20	1.560	-14.087
21	1.560	-18.583
22	1.560	-22.911
23	1.560	-27.032
24	1.560	-30.908
25	1.560	-34.504
26	1.560	-37.787
27	1.560	-40.729
28	1.560	-43.301
29	1.560	-45.482
30	1.560	-47.250
31	1.560	-48.591
32	1.560	-49.491
33	1.560	-49.943

Axial Thrust Force = 93000.00 lbs

Bending Moment in-lbs	Bending Stiffness lb-in2	Bending Curvature rad/in	Maximum Strain in/in	Neutral Axis Position inches	Max. Concrete Stress psi	Max. Steel Stress psi
11415205.	2.283041E+13	5.000000E-07	0.00003019	60.38691527	92.81390575	816.78909
22713485.	2.271348E+13	0.00000100	0.00005732	57.32354182	174.60474	1544.74035
33889354.	2.259290E+13	0.00000150	0.00008442	56.27727431	254.89848	2271.59790
44949693.	2.247485E+13	0.00000200	0.00011158	55.79213995	334.03487	3000.65940
55888371.	2.235535E+13	0.00000250	0.00013870	55.47826034	411.61851	3728.06798
55888371.	1.862946E+13	0.00000300	0.00008635	28.78175336	256.62917	6539.06038
55888371.	1.596811E+13	0.00000350	0.00009857	28.16398484	291.67398	7691.60729
55888371.	1.397209E+13	0.00000400	0.00011082	27.70424241	326.49112	8843.73845
55888371.	1.241964E+13	0.00000450	0.00012307	27.34987539	361.07994	9995.45065
55888371.	1.117767E+13	0.00000500	0.00013535	27.06928629	395.43966	11146.74170
55888371.	1.016152E+13	0.00000550	0.00014797	26.90398926	430.54272	12287.78074
55888371.	9.314728E+12	0.00000600	0.00016021	26.70197064	464.25923	13440.00296
55888371.	8.598211E+12	0.00000650	0.00017247	26.53345174	497.74985	14591.76902
55888371.	7.984053E+12	0.00000700	0.00018474	26.39126784	531.01375	15743.07612
55888371.	7.451783E+12	0.00000750	0.00019703	26.27016610	564.05016	16893.92119
55888371.	6.986046E+12	0.00000800	0.00020933	26.16621333	596.85839	18044.29964
55888371.	6.575102E+12	0.00000850	0.00022165	26.07639045	629.43750	19194.20971
55888371.	6.209819E+12	0.00000900	0.00023399	25.99835747	661.78675	20343.64748
55888371.	5.882986E+12	0.00000950	0.00024634	25.93026370	693.90528	21492.60995
55888371.	5.588837E+12	0.00001000	0.00025871	25.87063175	725.79231	22641.09321
55888371.	5.322702E+12	0.00001050	0.00027109	25.81826431	757.44701	23789.09376
55888371.	5.080761E+12	0.00001100	0.00028349	25.77217966	788.86847	24936.60875
55888371.	4.859858E+12	0.00001150	0.00029591	25.73157316	820.05599	26083.63323
55888371.	4.657364E+12	0.00001200	0.00030835	25.69576567	851.00853	27230.16525
55888371.	4.471070E+12	0.00001250	0.00032080	25.66419393	881.72533	28376.20022
55888371.	4.299105E+12	0.00001300	0.00033327	25.63637835	912.20548	29521.73471
55888371.	4.139879E+12	0.00001350	0.00034576	25.61191016	942.44806	30666.76534
57203078.	4.085934E+12	0.00001400	0.00035827	25.59044176	972.45223	31811.28763
59113686.	4.076806E+12	0.00001450	0.00037079	25.57167059	1002.21703	32955.29832
61022099.	4.068140E+12	0.00001500	0.00038333	25.55533594	1031.74156	34098.79349
62928309.	4.059891E+12	0.00001550	0.00039589	25.54121250	1061.02495	35241.76843
64832300.	4.052019E+12	0.00001600	0.00040847	25.52910072	1090.06622	36384.21954
66734059.	4.044488E+12	0.00001650	0.00042106	25.51882678	1118.86445	37526.14247
68633572.	4.037269E+12	0.00001700	0.00043367	25.51023620	1147.41866	38667.53346
70530817.	4.030332E+12	0.00001750	0.00044631	25.50319058	1175.72779	39808.38951
72425794.	4.023655E+12	0.00001800	0.00045896	25.49757403	1203.79104	40948.70391
74318474.	4.017215E+12	0.00001850	0.00047163	25.49327391	1231.60723	42088.47492
76208851.	4.010992E+12	0.00001900	0.00048431	25.49019688	1259.17547	43227.69671
78096919.	4.004970E+12	0.00001950	0.00049702	25.48825926	1286.49486	44366.36341
81866025.	3.993465E+12	0.00002050	0.00052249	25.48748678	1340.38241	46642.02077
85625677.	3.982590E+12	0.00002150	0.00054804	25.49042541	1393.26162	48915.40906
89375736.	3.972255E+12	0.00002250	0.00057367	25.49663419	1445.12376	51186.49313
93116096.	3.962387E+12	0.00002350	0.00059939	25.50575906	1495.96038	53455.22978
96846618.	3.952923E+12	0.00002450	0.00062518	25.51749748	1545.76239	55721.58026
1.005672E+08	3.943810E+12	0.00002550	0.00065106	25.53159517	1594.52046	57985.50524
1.042471E+08	3.933852E+12	0.00002650	0.00067695	25.54525191	1642.09627	60000.00000
1.071701E+08	3.897095E+12	0.00002750	0.00070122	25.49898380	1685.48789	60000.00000
1.096080E+08	3.845894E+12	0.00002850	0.00072444	25.41881686	1725.92276	60000.00000
1.117347E+08	3.787618E+12	0.00002950	0.00074696	25.32068020	1764.18261	60000.00000
1.136171E+08	3.725150E+12	0.00003050	0.00076893	25.21069247	1800.58112	60000.00000
1.153728E+08	3.662628E+12	0.00003150	0.00079320	25.18102294	1839.96077	60000.00000
1.169420E+08	3.598215E+12	0.00003250	0.00081415	25.05087358	1872.89243	60000.00000
1.183177E+08	3.531872E+12	0.00003350	0.00083455	24.91204351	1904.16899	60000.00000
1.196524E+08	3.468186E+12	0.00003450	0.00085488	24.77906173	1934.58860	60000.00000
1.208076E+08	3.403031E+12	0.00003550	0.00087465	24.63812667	1963.44651	60000.00000
1.219593E+08	3.341350E+12	0.00003650	0.00089447	24.50604290	1991.67220	60000.00000
1.229511E+08	3.278695E+12	0.00003750	0.00091376	24.36702615	2018.44849	60000.00000
1.239234E+08	3.218790E+12	0.00003850	0.00093304	24.23470420	2044.53839	60000.00000
1.248482E+08	3.160714E+12	0.00003950	0.00095217	24.10567170	2069.78772	60000.00000
1.256613E+08	3.102749E+12	0.00004050	0.00097092	23.97343665	2093.87378	60000.00000
1.264716E+08	3.047508E+12	0.00004150	0.00098971	23.84844357	2117.38695	60000.00000
1.272609E+08	2.994374E+12	0.00004250	0.00100846	23.72837502	2140.22656	60000.00000
1.279321E+08	2.940969E+12	0.00004350	0.00102674	23.60332078	2161.88549	60000.00000
1.286008E+08	2.889906E+12	0.00004450	0.00104507	23.48465234	2182.99706	60000.00000
1.288288E+08	2.831402E+12	0.00004550	0.00106470	23.39999861	2205.03779	60000.00000

1.299963E+08	2.795620E+12	0.00004650	0.00108637	23.36282641	2228.67913	60000.00000
1.305295E+08	2.747989E+12	0.00004750	0.00110366	23.23498803	2246.74188	60000.00000
1.310605E+08	2.702279E+12	0.00004850	0.00112098	23.11307842	2264.31575	60000.00000
1.315894E+08	2.658372E+12	0.00004950	0.00113834	22.99674028	2281.39778	60000.00000
1.321162E+08	2.616162E+12	0.00005050	0.00115573	22.88565177	2297.98536	60000.00000
1.325849E+08	2.574463E+12	0.00005150	0.00117281	22.77308267	2313.75832	60000.00000
1.330093E+08	2.533511E+12	0.00005250	0.00118968	22.66062301	2328.81815	60000.00000
1.334318E+08	2.494053E+12	0.00005350	0.00120658	22.55293018	2343.40902	60000.00000
1.338524E+08	2.456007E+12	0.00005450	0.00122351	22.44974989	2357.52850	60000.00000
1.342710E+08	2.419297E+12	0.00005550	0.00124047	22.35084397	2371.17400	60000.00000
1.346875E+08	2.383850E+12	0.00005650	0.00125746	22.25598389	2384.34255	60000.00000
1.350349E+08	2.348432E+12	0.00005750	0.00127403	22.15710050	2396.68254	60000.00000
1.353671E+08	2.313967E+12	0.00005850	0.00129054	22.06056672	2408.50022	60000.00000
1.356974E+08	2.280629E+12	0.00005950	0.00130708	21.96776658	2419.86468	60000.00000
1.363528E+08	2.217118E+12	0.00006150	0.00134025	21.79266876	2441.22459	60000.00000
1.370007E+08	2.157492E+12	0.00006350	0.00137354	21.63048416	2460.74146	60000.00000
1.376675E+08	2.101794E+12	0.00006550	0.00141436	21.59334415	2482.25682	60000.00000
1.381479E+08	2.046635E+12	0.00006750	0.00144549	21.41467363	2496.47445	60000.00000
1.386223E+08	1.994566E+12	0.00006950	0.00147673	21.24789280	2509.06399	60000.00000
1.390907E+08	1.945324E+12	0.00007150	0.00150808	21.09203285	2520.00698	60000.00000
1.395356E+08	1.898443E+12	0.00007350	0.00153937	20.94375283	2529.23267	60000.00000
1.398883E+08	1.852825E+12	0.00007550	0.00156985	20.79276913	2536.58602	60000.00000
1.402354E+08	1.809489E+12	0.00007750	0.00160045	20.65098435	2542.35753	60000.00000
1.405768E+08	1.768262E+12	0.00007950	0.00163116	20.51773220	2546.52915	60000.00000
1.409125E+08	1.728988E+12	0.00008150	0.00166198	20.39240116	2549.08220	60000.00000
1.412423E+08	1.691525E+12	0.00008350	0.00169292	20.27444404	2549.99762	60000.00000
1.415385E+08	1.655421E+12	0.00008550	0.00172371	20.16036540	2545.19268	60000.00000
1.417745E+08	1.620280E+12	0.00008750	0.00175388	20.04439741	2540.21577	60000.00000
1.420080E+08	1.586682E+12	0.00008950	0.00178417	19.93485707	2544.25939	60000.00000
1.422389E+08	1.554524E+12	0.00009150	0.00181457	19.83133882	2547.38717	60000.00000
1.422389E+08	1.521272E+12	0.00009350	0.00185130	19.79999882	2549.59126	60000.00000
1.428175E+08	1.495471E+12	0.00009550	0.00189090	19.79999882	2547.59774	60000.00000
1.430297E+08	1.466972E+12	0.00009750	0.00192043	19.69669944	2543.36548	60000.00000
1.432342E+08	1.439540E+12	0.00009950	0.00194997	19.59767765	2539.13103	60000.00000
1.434341E+08	1.413144E+12	0.00010150	0.00197954	19.50287229	2540.93292	60000.00000
1.435779E+08	1.387227E+12	0.00010350	0.00200813	19.40227014	2544.23924	60000.00000
1.437205E+08	1.362280E+12	0.00010550	0.00203681	19.30627388	2546.80823	60000.00000
1.438619E+08	1.338250E+12	0.00010750	0.00206557	19.21464533	2548.63046	60000.00000
1.440020E+08	1.315086E+12	0.00010950	0.00209442	19.12715274	2549.69609	60000.00000
1.441404E+08	1.292739E+12	0.00011150	0.00212338	19.04372531	2549.60168	60000.00000
1.442755E+08	1.271150E+12	0.00011350	0.00215252	18.96495849	2546.06769	60000.00000
1.444098E+08	1.250301E+12	0.00011550	0.00218173	18.88944250	2542.52310	60000.00000
1.445434E+08	1.230156E+12	0.00011750	0.00221100	18.81701964	2538.96775	60000.00000
1.446762E+08	1.210679E+12	0.00011950	0.00224033	18.74754184	2535.40147	60000.00000
1.448082E+08	1.191837E+12	0.00012150	0.00226973	18.68087071	2537.12230	60000.00000
1.449340E+08	1.173554E+12	0.00012350	0.00229904	18.61572522	2540.59184	60000.00000
1.450252E+08	1.155580E+12	0.00012550	0.00232755	18.54625386	2543.38970	60000.00000
1.451159E+08	1.138164E+12	0.00012750	0.00235613	18.47942501	2545.70273	60000.00000
1.452059E+08	1.121281E+12	0.00012950	0.00238476	18.41511637	2547.52543	60000.00000
1.452953E+08	1.104907E+12	0.00013150	0.00241345	18.35322171	2548.85235	60000.00000
1.453840E+08	1.089018E+12	0.00013350	0.00244220	18.29363483	2549.67784	60000.00000
1.454720E+08	1.073594E+12	0.00013550	0.00247101	18.23626238	2549.99622	60000.00000
1.455576E+08	1.058601E+12	0.00013750	0.00250001	18.18186074	2547.47391	60000.00000
1.456426E+08	1.044033E+12	0.00013950	0.00252905	18.12941927	2544.58880	60000.00000
1.458117E+08	1.016109E+12	0.00014350	0.00258726	18.02971512	2538.79860	60000.00000
1.466286E+08	9.940921E+11	0.00014750	0.00265500	18.00000054	2531.33751	60000.00000
1.476109E+08	9.743296E+11	0.00015150	0.00272700	18.00000054	2536.11274	60000.00000
1.484654E+08	9.547614E+11	0.00015550	0.00279900	18.00000054	2543.79153	60000.00000
1.484654E+08	9.308175E+11	0.00015950	0.00285954	17.92816025	2547.39463	60000.00000
1.484654E+08	9.080452E+11	0.00016350	0.00291622	17.83620983	2549.26556	60000.00000
1.484654E+08	8.863606E+11	0.00016750	0.00297309	17.74977297	2549.99122	60000.00000
1.484654E+08	8.656874E+11	0.00017150	0.00303191	17.67879206	2545.89403	60000.00000
1.484654E+08	8.459567E+11	0.00017550	0.00309099	17.61249429	2541.21419	60000.00000
1.484654E+08	8.271053E+11	0.00017950	0.00315019	17.54983038	2536.51297	60000.00000
1.484654E+08	8.090757E+11	0.00018350	0.00320952	17.49057823	2531.78988	60000.00000
1.484654E+08	7.918154E+11	0.00018750	0.00326897	17.43453187	2527.04449	60000.00000
1.484654E+08	7.752762E+11	0.00019150	0.00332856	17.38150781	2522.27623	60000.00000
1.484654E+08	7.594138E+11	0.00019550	0.00338828	17.33133870	2523.03349	60000.00000
1.484654E+08	7.441874E+11	0.00019950	0.00344969	17.29166240	2529.63452	60000.00000
1.484654E+08	7.295597E+11	0.00020350	0.00351129	17.25449663	2535.35666	60000.00000
1.484654E+08	7.154959E+11	0.00020750	0.00357308	17.21965796	2540.17350	60000.00000
1.484654E+08	7.019640E+11	0.00021150	0.00363506	17.18704659	2544.06206	60000.00000
1.484654E+08	6.889345E+11	0.00021550	0.00369485	17.14548737	2546.73434	60000.00000
1.484654E+08	6.763799E+11	0.00021950	0.00375479	17.10610396	2548.62428	60000.00000
1.484654E+08	6.642747E+11	0.00022350	0.00381489	17.06887060	2549.71535	60000.00000

Unfactored (Nominal) Moment Capacity at Concrete Strain of 0.003 = 148465.39377 in-kip

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

Pile-head boundary conditions are Shear and Moment (Pile-head Condition Type 1)
Specified shear force at pile head = 46000.000 lbs

Specified moment at pile head = 62508000.000 in-lbs
Specified axial load at pile head = 93000.000 lbs

Depth X in	Deflect. y in	Moment M lbs-in	Shear V lbs	Slope S Rad.	Total Stress lbs/in**2	Flx. Rig. EI lbs-in**2	Soil Res. p lbs/in	Es*h F/L
0.000	0.605959	6.25E+07	46000.	-0.004219	515.586	4.06E+12	0.000	0.000
26.880	0.498159	6.37E+07	44841.	-0.003801	525.619	4.06E+12	-148.252	999.936
53.760	0.401712	6.49E+07	35657.	-0.003374	534.759	4.05E+12	-880.264	7362.713
80.640	0.316825	6.54E+07	-320.163	-0.002941	539.190	4.05E+12	-1906.380	20218.
107.520	0.243590	6.46E+07	-65125.	-0.002509	532.627	4.05E+12	-2852.049	39340.
134.400	0.181844	6.18E+07	-1.44E+05	-0.002089	510.094	4.06E+12	-3832.391	70813.
161.280	0.131049	5.66E+07	-2.46E+05	-0.001710	467.650	9.54E+12	-3642.525	93392.
188.160	0.086106	4.87E+07	-3.36E+05	-0.001641	404.149	2.24E+13	-2971.957	1.16E+05
215.040	0.042727	3.88E+07	-4.01E+05	-0.001589	323.542	2.25E+13	-1761.855	1.39E+05
241.920	0.000588	2.75E+07	-4.26E+05	-0.001549	232.891	2.26E+13	-28.186	1.61E+05
268.800	-0.040673	1.63E+07	-3.97E+05	-0.001523	142.322	2.28E+13	2223.780	1.84E+05
295.680	-0.081410	6.78E+06	-3.02E+05	-0.001510	64.996	2.28E+13	4998.156	2.06E+05
322.560	-0.121922	8.62E+05	-1.24E+05	-0.001506	17.126	2.28E+13	8304.772	2.29E+05

Please note that because this analysis makes computations of ultimate moment capacity and pile response using nonlinear bending stiffness that the above values of total stress due to combined axial stress and bending may not be representative of actual conditions.

Output Verification:

Computed forces and moments are within specified convergence limits.

Output Summary for Load Case No. 1:

Pile-head deflection	=	0.60595920 in
Computed slope at pile head	=	-0.00421871
Maximum bending moment	=	65427224. lbs-in
Maximum shear force	=	-425817.60429 lbs
Depth of maximum bending moment	=	80.64000000 in
Depth of maximum shear force	=	241.92000 in
Number of iterations	=	64
Number of zero deflection points	=	1

Summary of Pile Response(s)

Definition of Symbols for Pile-Head Loading Conditions:

Type 1 = Shear and Moment, y = pile-head displacment in
Type 2 = Shear and Slope, M = Pile-head Moment lbs-in
Type 3 = Shear and Rot. Stiffness, V = Pile-head Shear Force lbs
Type 4 = Deflection and Moment, S = Pile-head Slope, radians
Type 5 = Deflection and Slope, R = Rot. Stiffness of Pile-head in-lbs/rad

Load Type	Pile-Head Condition 1	Pile-Head Condition 2	Axial Load lbs	Pile-Head Deflection in	Maximum Moment in-lbs	Maximum Shear lbs
1	V= 46000.	M= 6.25E+07	93000.0000	0.6059592	6.5427E+07	-425818.

Computed Pile-head Stiffness Matrix Members
K22, K23, K32, K33 for Superstructure

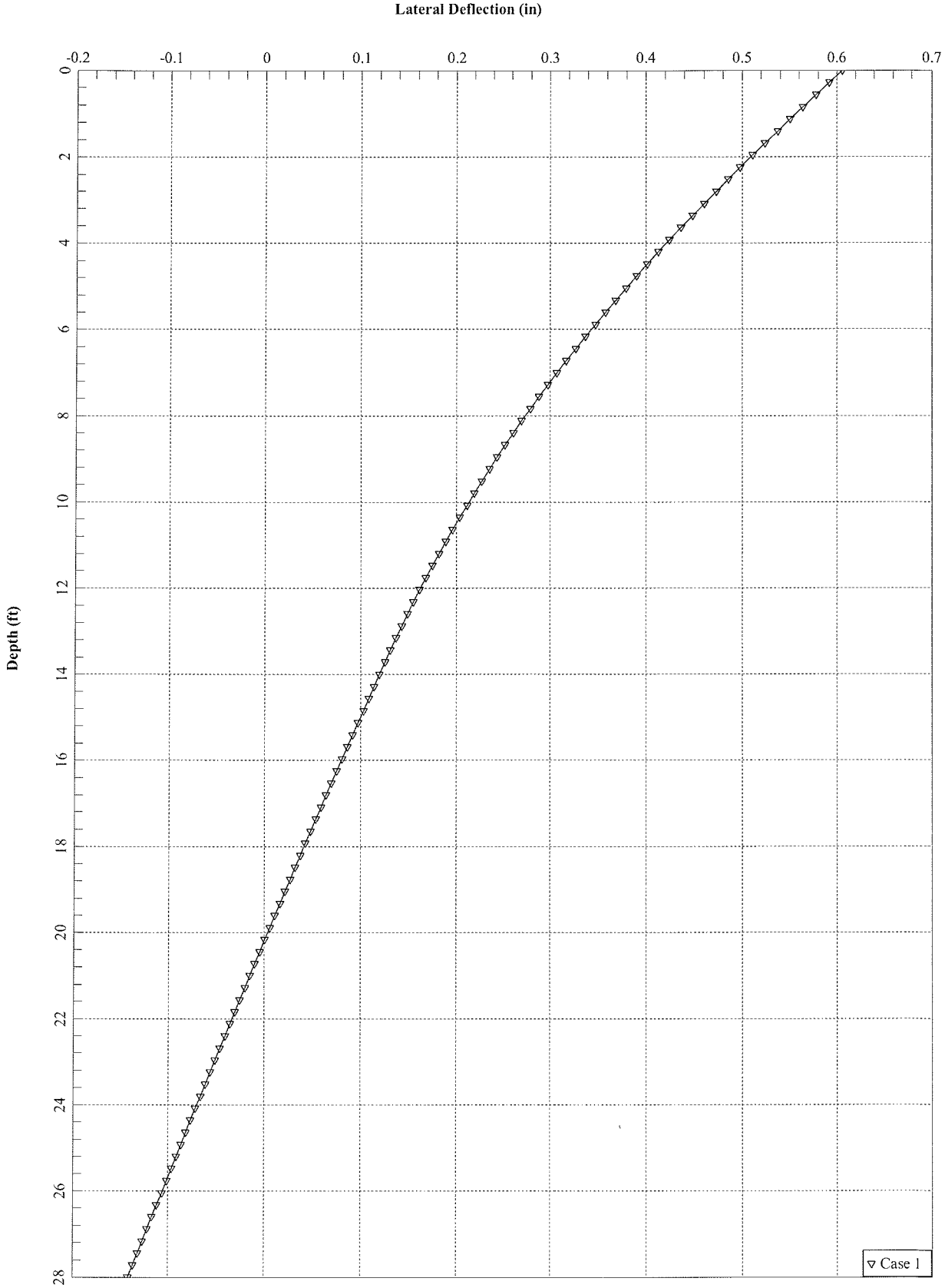
Top y in	Shear React. lbs	Mom. React. in-lbs	K22 lbs/in	K32 in-lbs/in
0.00118855	4600.00007	919608.68474	3870261.	7.737230E+08
0.00357789	13847.37980	2768298.	3870261.	7.737230E+08
0.00567083	21947.57772	4387648.	3870261.	7.737230E+08
0.00715579	27694.75960	5536596.	3870261.	7.737230E+08
0.00830761	32152.62020	6427789.	3870261.	7.737230E+08
0.00924872	35794.95752	7155946.	3870261.	7.737230E+08
0.01004442	38874.50984	7771595.	3870261.	7.737230E+08
0.01073368	41542.13940	8304894.	3870261.	7.737230E+08
0.01134165	43895.15543	8775297.	3870261.	7.737230E+08
0.01188550	46000.00000	9196087.	3870261.	7.737230E+08

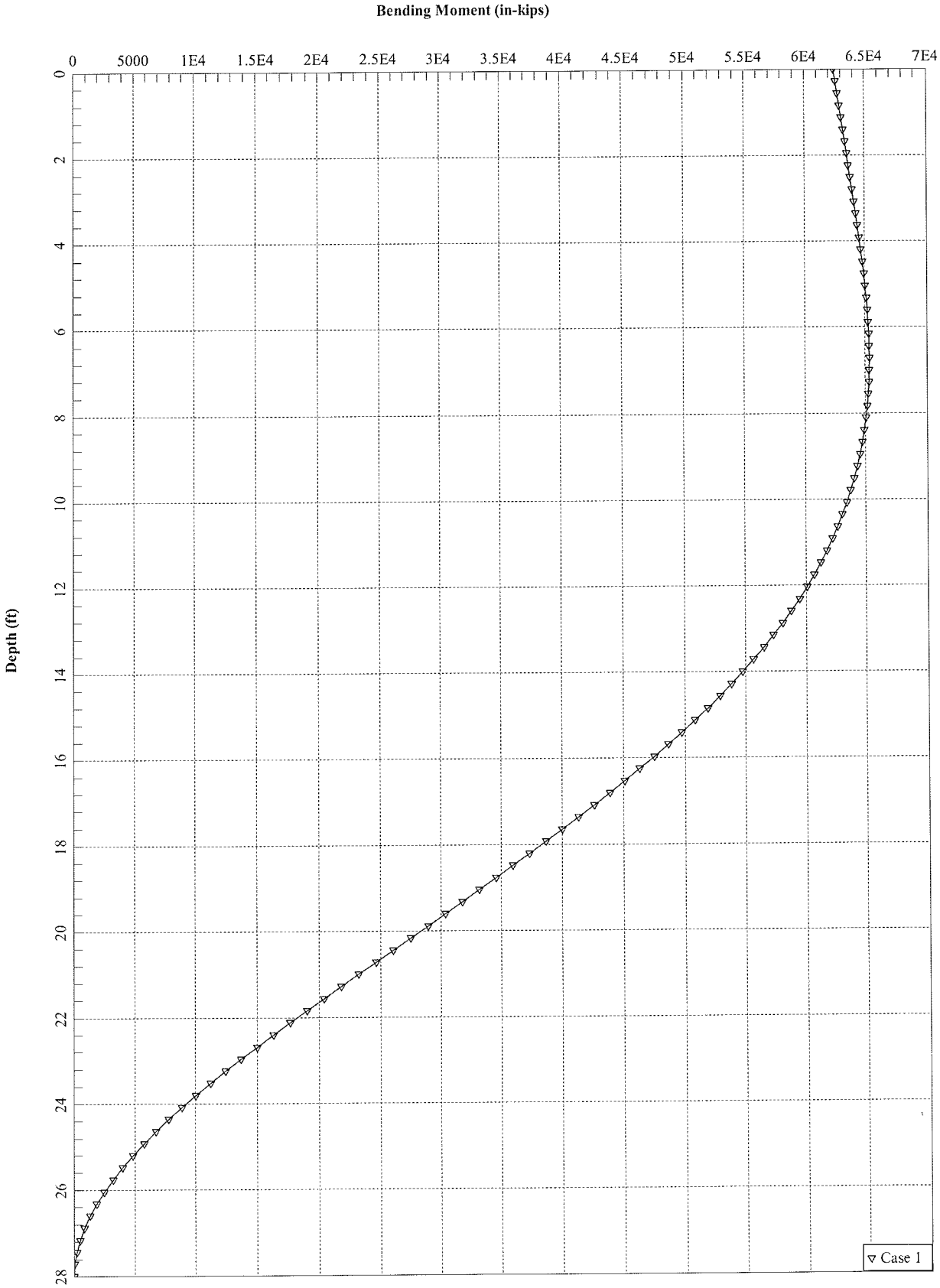
Top Rota. rad	Shear React. lbs	Mom. React. in-lbs	K23 lbs/rad	K33 in-lbs/rad

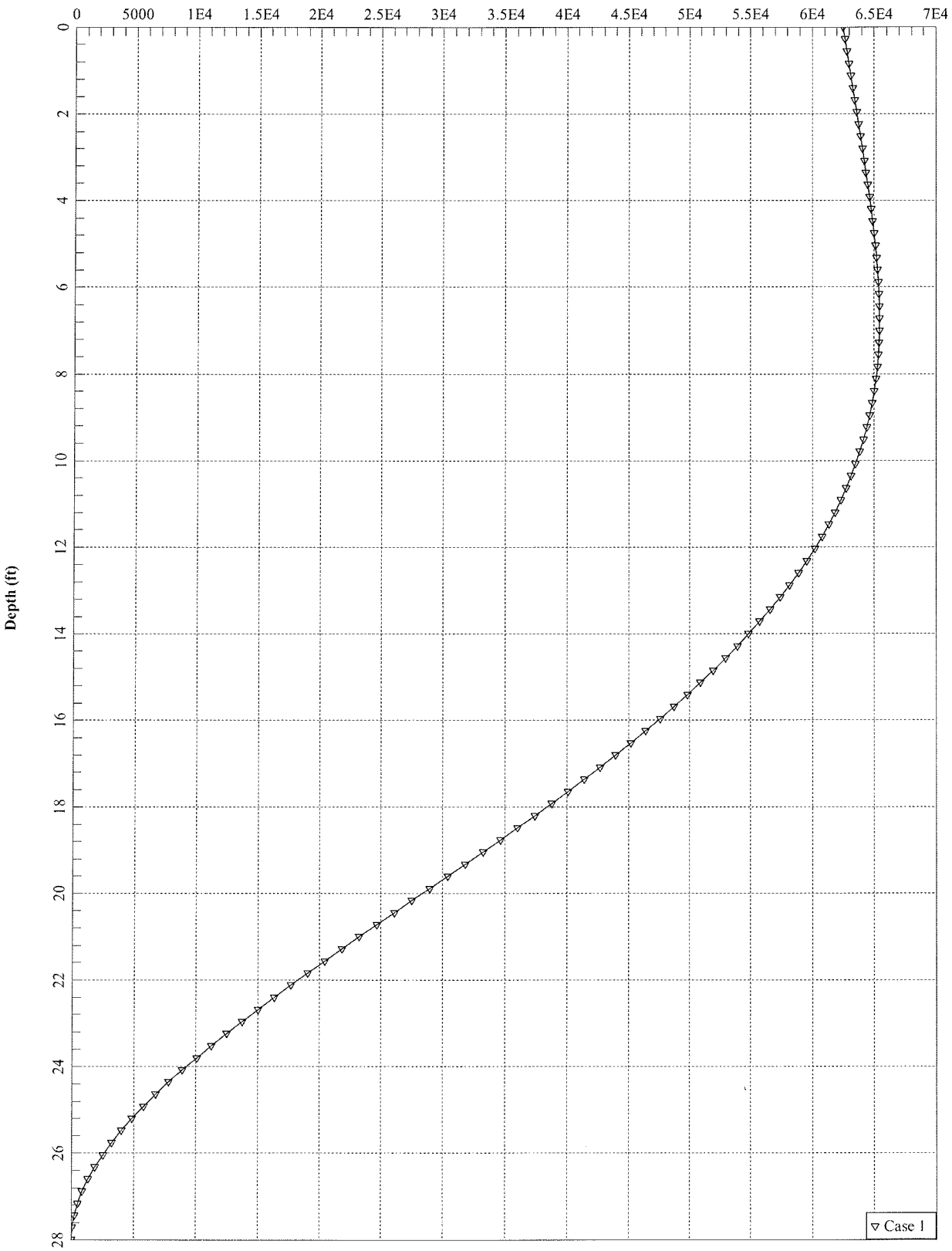
0.00003326	25731.91460	6250800.	7.737230E+08	1.879529E+11
0.00010025	77464.25704	18816783.	7.726804E+08	1.876912E+11
0.00015927	122794.50443	29823895.	7.709858E+08	1.872543E+11
0.00020133	154966.40364	37633566.	7.697092E+08	1.869238E+11
0.00023407	179926.40978	43691217.	7.686755E+08	1.866561E+11
0.00026089	200323.78439	48640678.	7.678444E+08	1.864405E+11
0.00028362	217572.08436	52825388.	7.671153E+08	1.862517E+11
0.00030335	232515.15150	56450349.	7.664970E+08	1.860912E+11
0.00032578	245715.15988	59647791.	7.542275E+08	1.830901E+11
0.00035235	257577.91495	62508000.	7.310262E+08	1.774026E+11

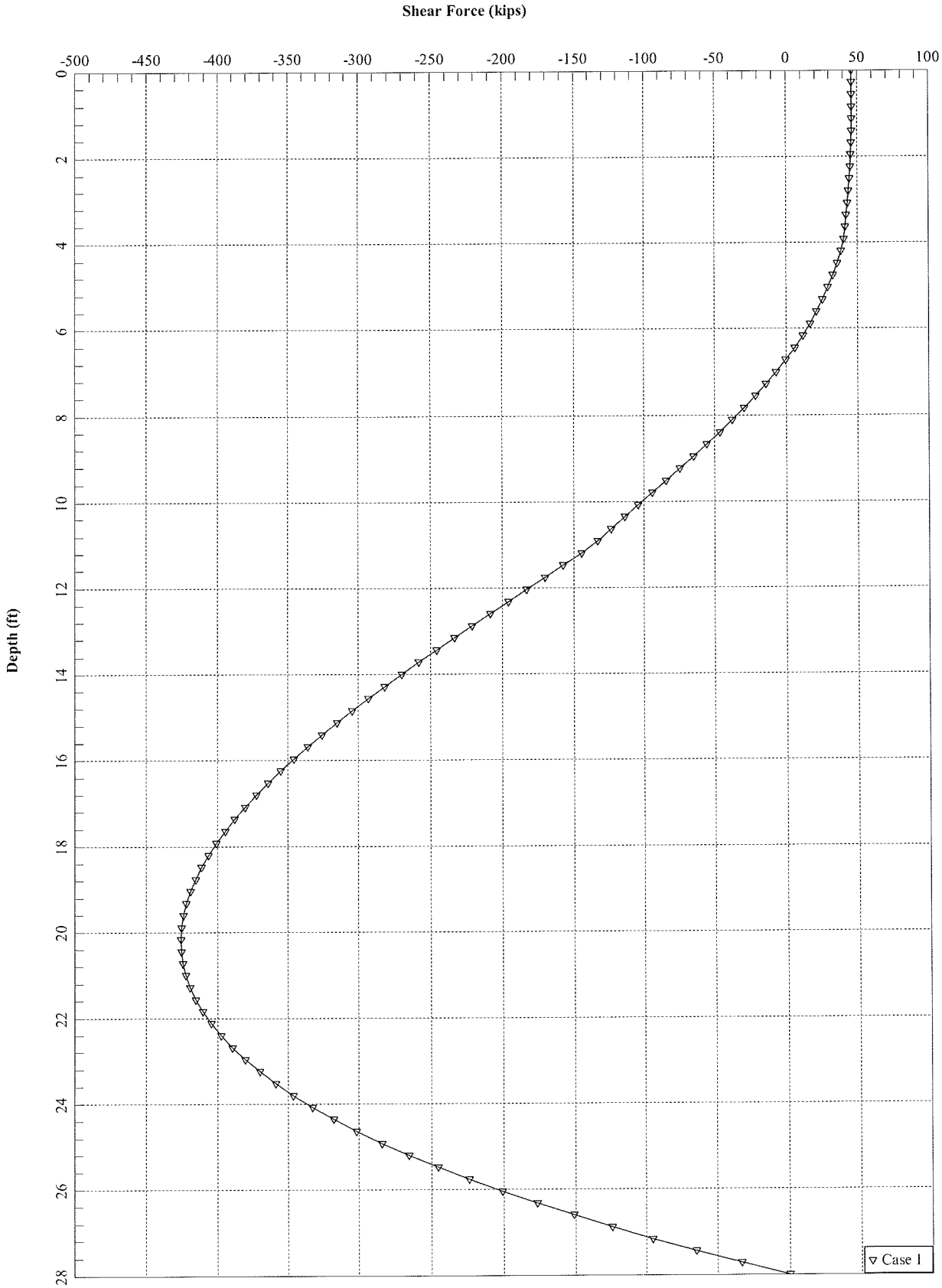
K22 = abs(Shear Reaction/Top y)
K23 = abs(Shear Reaction/Top Rotation)
K32 = abs(Moment Reaction/Top y)
K33 = abs(Moment Reaction/Top Rotation)

The analysis ended normally.


Lateral Deflection (in)
-0.2
-0.1
0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
Depth (ft)
0
2
4
6
8
10
12
14
16
18
20
22
24
26
28
Case 1


Bending Moment (in-kips)
0
5000
1E4
1.5E4
2E4
2.5E4
3E4
3.5E4
4E4
4.5E4
5E4
5.5E4
6E4
6.5E4
7E4
Depth (ft)
0
2
4
6
8
10
12
14
16
18
20
22
24
26
28
Case 1


Bending Moment (in-kips)
0
5000
1E4
1.5E4
2E4
2.5E4
3E4
3.5E4
4E4
4.5E4
5E4
5.5E4
6E4
6.5E4
7E4
Depth (ft)
0
2
4
6
8
10
12
14
16
18
20
22
24
26
28
Case 1


Shear Force (kips)
-500
-450
-400
-350
-300
-250
-200
-150
-100
-50
0
50
100
Depth (ft)
0
2
4
6
8
10
12
14
16
18
20
22
24
26
28
Case 1

TELEWAVE, INC.

148 - 174 MHz

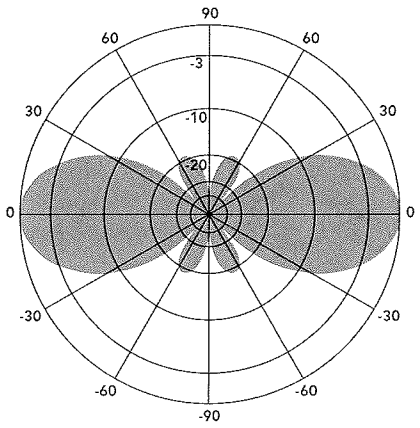
ANT150F2

FIBERGLASS COLLINEAR ANTENNA 2.5 dBd

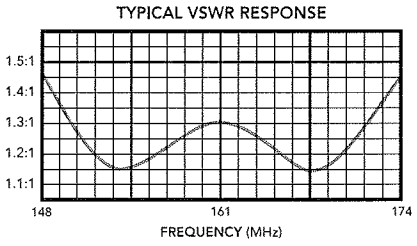
The Telewave ANT150F2 is an extremely rugged collinear antenna, with moderate gain and wide vertical beamwidth. This compact antenna produces 2.5 dBd gain, and is designed for operation in all environmental conditions. The antenna is constructed with brass and copper elements, with a path to DC ground for lightning impulse protection.

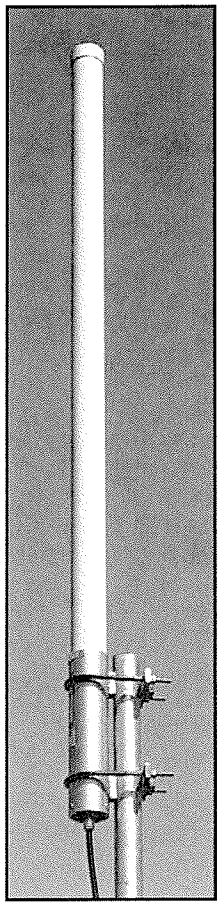
All junctions are fully soldered to prevent RF intermodulation, and each antenna is completely protected within a rugged, high-tech radome to ensure survivability in the worst environments. The "Cool Blue" radome provides maximum protection from corrosive gases, ultraviolet radiation, icing, salt spray, acid rain, and wind blown abrasives.

The ANT150F2 includes the ANTC485 dual clamp set for mounting to a 1.5" to 3" O.D. support pipe, and a 24" removable RG-213 N-Male jumper.



ANT150F2 156 MHz
Vertical Plane
Gain = 2.55 dBd





SPECIFICATIONS			
Frequency (continuous)	148-174 MHz	**Dimensions (L x base diam.) in.**	60 x 2.75
Gain	2.5 dBd	**Tower weight (antenna + clamps)**	12 lb.
Power rating (typ.)	500 watts	**Shipping weight**	16 lb.
Impedance	50 ohms	**Wind rating / with 0.5" ice**	200 / 150 MPH
VSWR	1.5:1 or less	**Maximum exposed area**	1.3 ft.^{2}
Pattern	Omnidirectional	**Lateral thrust at 100 MPH**	50 lb.
Vertical beamwidth	38°	**Bending moment at top clamp**	67 ft. lb.
Termination	Recessed N Female 7-16 DIN-F opt.	**(100 MPH, 40 PSF flat plate equiv.)**	

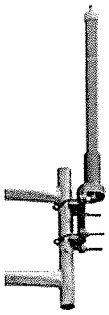
Telewave, Inc. • San Jose, CA • 1-800-331-3396 ~ 408-929-4400 • www.telewave.com

TWDS-7017 Rev. 1/11

Product Specifications

COMMSCOPE®

POWERED BY ANDREW®



DB586-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	8.1
Beamwidth, Horizontal, degrees	360
Beamwidth, Vertical, degrees	18.0
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

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	89.4 N @ 100 mph 20.1 lbf @ 100 mph
Wind Speed, maximum	201.2 km/h | 125.0 mph

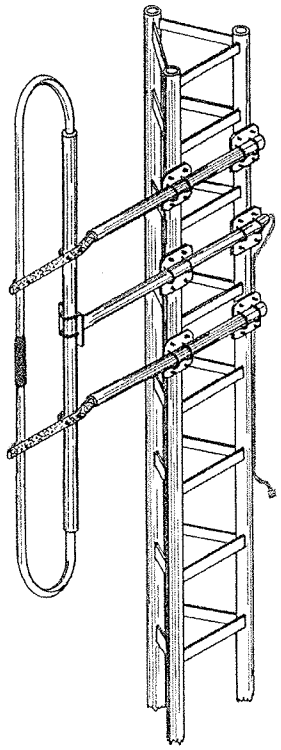
Dimensions

Length	1498.6 mm | 59.0 in
Outer Diameter	38.1 mm | 1.5 in
Net Weight	3.7 kg | 8.3 lb

LOW BAND EXPOSED DIPOLE ANTENNA

The Low Band Exposed Dipole Antenna Series is available in our standard or heavy duty construction. These exposed dipole antennas come in single and dual configurations, depending on the required gain. They are constructed from high-strength, corrosion-resistant aluminum alloy, hot galvanized steel mounting hardware, and use unique PVC off-set support arms. Our heavy duty versions have dual support braces and use a superior anti-torque support. All components are oversize.

- Rugged design to withstand the most extreme environmental conditions.
- Supplied with anti-torque supports.
- DC ground for lightning protection.
- Available with black anodized coating for enhanced anti-corrosion and de-icing properties.



531-70HD

30-76MHz
EXPOSED DIPOLE ANTENNA

Electrical Specifications	531-70	531-70HD	532-70	532-70HD
Frequency Range, MHz	30-76	30-76	30-76	30-76
Nominal Gain, dBd	2,5	2,5	5,5	5,5
Bandwidth: 1.5:1 VSWR, MHz	7%	7%	7%	7%
Polarization	Vertical	Vertical	Vertical	Vertical
Pattern	UniDirectional	UniDirectional	UniDirectional	UniDirectional
Power Rating, Watts	300	300	300	300
Nominal Impedance, Ohms	50	50	50	50
Lightning Protection	DC Ground	DC Ground	DC Ground	DC Ground
Standard Termination	Type N Male	Type N Male	Type N Male	Type N Male
Mechanical Specifications				
Length @ 30MHz, in (mm)	189 (4800)	189 (4800)	472 (11989)	472 (11989)
Width, in (mm)	87 (2210)	87 (2210)	87 (2210)	87 (2210)
Weight, lbs (kg)	37 (17)	43 (19.5)	79 (36)	91 (41)
Rated Wind Velocity: No Ice, mph (km/h)	143 (230)	200 (322)	143 (230)	200 (322)
Rated Wind Velocity: 0.5" (13mm) Ice, mph (km/h)	98 (158)	160 (258)	98 (158)	160 (258)
Lateral Thrust @ 100mph wind, lbs (kg)	133 (60.8)	160 (72.3)	266 (121.6)	320 (144.6)
Projected Area, ft^2 (m^2)	4.98 (0.46)	5.94 (0.55)	9.96 (0.92)	11.88 (1.10)
Mounting Hardware (not included)	(4) 1.25"-2.38"	(6) 1.25"-2.38"	(8) 1.25"-2.38"	(12) 1.25"-2.38

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Attachment D: Radio Frequency Exposure Report

C Squared Systems, LLC
65 Dartmouth Drive
Auburn, NH 03032
Phone: (603) 644-2800
support@csquaredsystems.com

EVERSOURCE ENERGY

RADIO FREQUENCY EXPOSURE REPORT

GREENWICH HOSPITAL CT

5 PERRYRIDGE ROAD
GREENWICH, CT 06830

December 17, 2014

Table of Contents

List of Tables

List of Figures

1. Introduction

The purpose of this report is to investigate compliance with applicable FCC regulations for the proposed Eversource Energy (formerly Northeast Utilities) antennas, to be mounted on the monopole tower located at Greenwich Hospital in Greenwich, CT. Figure 1 below is a view of the tower.

Eversource Energy is proposing the following:

1) Install one 37 MHz omnidirectional antenna;
2) Install one 154 MHz omnidirectional antenna;
3) Install one 937 MHz omnidirectional antenna.

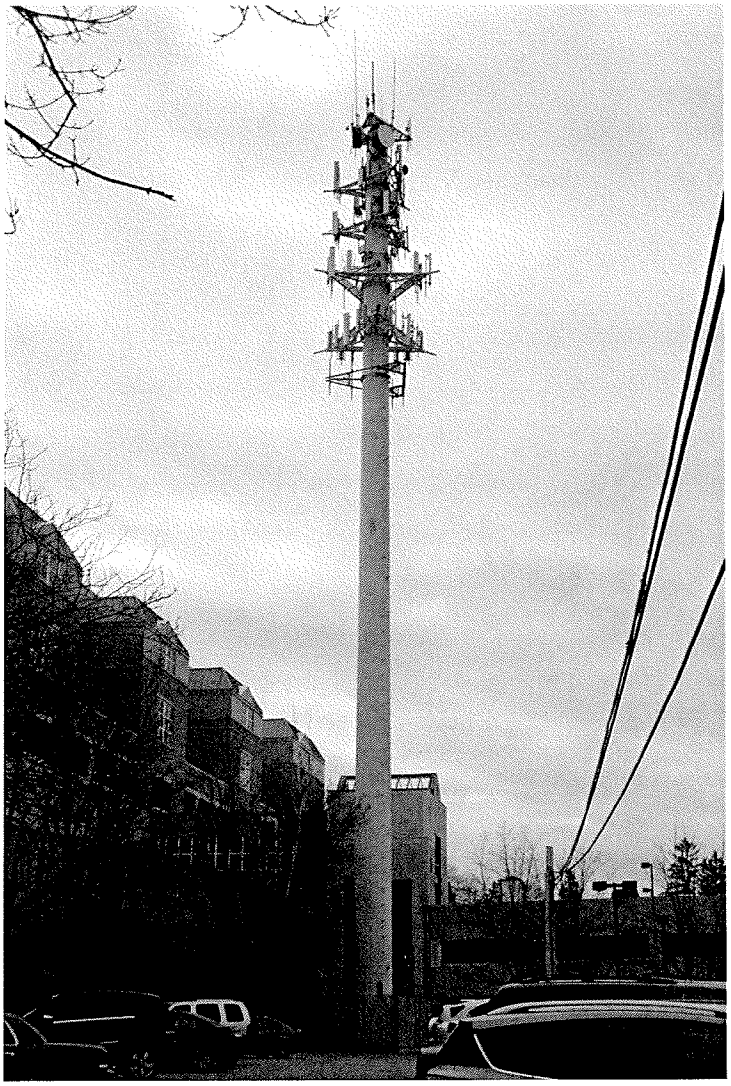


Figure 1: View of Greenwich Hospital Monopole Tower

Site Address	5 Perryridge Rd, Greenwich, CT
Latitude	41° 02' 03.14" N
Longitude	73° 37' 51.02" W
Site Elevation AMSL	136'
Survey Engineer	Evan Thibodeau
Survey Date/Time	12/12/2014; 8:30AM – 10:30AM

Table 1: Site Specific Data

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 provided they are fully aware of the potential for exposure, and are able to exercise control over their exposure. General population/uncontrolled limits are five times more stringent than the levels considered 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. Measurement Procedure

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

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

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

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

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

Manufacturer	Narda Microwave			
Probe	EA 5091, Serial# 01059			
Calibration Date	February 2013			
Calibration Interval	24 Months			
Meter	NBM550, Serial# B-0495			
Calibration Date	January 2013			
Calibration Interval	24 Months			
Probe Specifications	**Frequency Range**	**Field Measured**	**Standard**	**Measurement Range**
	300 KHz-50 GHz	Electric Field	U.S. FCC 1997 Occupational/Controlled	0.2 – 600 % of Standard

Table 2: Instrumentation Information

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

[1] For further details, please refer to Narda Safety Test Solutions NBM550 Probe Specifications, pg. 64
http://www.narda-sts.us/pdf_files/DataSheets/NBM-Probes_DataSheet.pdf

4. RF Exposure Prediction Methods

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

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

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 2.0

Off Beam Loss is determined by the selected antenna pattern

These calculations assume that the antennas are operating at 100 percent capacity, that all antenna channels are transmitting simultaneously, and that the radio transmitters are operating at full power. Obstructions (trees, buildings, etc.) that would normally attenuate the signal are not taken into account. As a result, the predicted signal levels reported below are much higher than the actual signal levels will be from the final site configuration.

5. Proposed Antenna Configuration

Table 3 below lists the specifications of the proposed Eversource Energy's antennas. The parameters listed in Table 3 were used for the calculated values shown in Table 4.

Operator	TX Freq. (MHz)	Power at Antenna (Watts)	Ant Gain (dBd)	Power ERP (Watts)	Antenna Model	Beam Width	Mech. Downtilt	Length (ft)	Antenna Centerline Height (ft)
Eversource Energy	938.7125	63	6.0	250	DB586-Y	360	0	5	116.5
	936	63	6.0	250					
	154.46375	141	2.5	250	ANT150F2	360	0	5	116.5
	37.76	147	2.3	250	531-70HD	360	0	12	112.0

Table 3: Proposed Antenna Configuration[2]

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

6. Survey Results

Measured and calculated results, and a description of each survey location are detailed in the table below. Measurements were recorded on December 12, 2014 between 8:30AM and 10:30AM. The calculated % MPE contributions from the proposed antennas were then added to the measured % MPE values in the "Composite % MPE" column. These calculated values incorporate the antenna pattern of the particular antenna models specified by Eversource Energy to determine the "Off Beam Loss" factor shown in the power density formula from Section 4. All % MPE values are in reference to the FCC Uncontrolled/General Population exposure limit.

For the calculations shown in Table 4 below, the height of the antennas was adjusted to compensate for the roof height of the hospital and the top level of the parking garage. The main roof height of the hospital is 65' AGL and the height of the top level of the parking garage is 18' AGL.

Table 4 below lists 29 measurements recorded in the vicinity of the tower. The highest spatially averaged measurement was **1.22%** (Average Uncontrolled/General Population MPE) and was recorded at Location 3, on the 6th floor hospital rooftop. The highest composite (measured + calculated) % MPE value is calculated to be **< 21.44%** (Average Uncontrolled/General Population) and is calculated to occur at Location 7, also on the 6th floor hospital rooftop. Please note that access to the hospital rooftop is restricted to authorized personnel only, and is not accessible to the general public. The highest composite (measured + calculated) % MPE value, for all publicly accessible areas, is calculated to be **< 6.11%** (Average Uncontrolled/General Population) and is calculated to occur at Location 18, on the top level of the parking garage.

Meas. Location	Location Description	Latitude	Longitude	Dist. From Site (feet)	Measured % MPE (Uncontrolled / General)	Calculated % MPE (37MHz Omni)	Calculated % MPE (154MHz Omni)	Calculated % MPE (937MHz Omni)	Composite % MPE (Uncontrolled / General)
1	Hospital Rooftop - 6th Floor	41.03395	-73.63052	129	< 1.00	2.62	2.48	1.09	< 7.19
2	Hospital Rooftop - 6th Floor	41.03404	-73.63052	107	< 1.00	3.66	3.45	1.00	< 9.11
3	**Hospital Rooftop - 6th Floor**	**41.03409**	**-73.63013**	**200**	**1.22**	**1.12**	**1.12**	**0.72**	**4.19**
4	Hospital Rooftop - 6th Floor	41.03420	-73.63015	190	< 1.00	1.24	1.25	0.80	< 4.29
5	Hospital Rooftop - 6th Floor	41.03420	-73.63043	114	< 1.00	3.36	3.17	1.41	< 8.95
6	Hospital Rooftop - 6th Floor	41.03413	-73.63050	98	< 1.00	4.33	4.06	0.88	< 10.27
7	**Hospital Rooftop - 6th Floor**	**41.03414**	**-73.63071**	**43**	**< 1.00**	**8.78**	**11.55**	**0.11**	**< 21.44**
8	Hospital Rooftop - 6th Floor	41.03432	-73.63071	56	< 1.00	8.03	8.82	0.15	< 18.01
9	Hospital Rooftop - 6th Floor	41.03433	-73.63039	131	< 1.00	2.57	2.43	1.30	< 7.29
10	Hospital Rooftop - 6th Floor	41.03432	-73.63014	198	< 1.00	1.14	1.15	0.73	< 4.03
11	Hospital Rooftop - 6th Floor	41.03442	-73.63060	103	< 1.00	3.82	3.56	0.61	< 8.99
12	Hospital Rooftop - 6th Floor	41.03466	-73.63050	191	< 1.00	1.21	1.18	0.69	< 4.08
13	Hospital Rooftop - 6th Floor	41.03364	-73.63079	208	1.08	1.02	1.00	0.58	3.68
14	Hospital Rooftop - 6th Floor	41.03363	-73.63057	223	< 1.00	0.90	0.89	0.57	< 3.35
15	Hospital Rooftop - 6th Floor	41.03380	-73.63074	150	< 1.00	1.92	1.79	0.69	< 5.40
16	Hospital Rooftop - 6th Floor	41.03383	-73.63052	162	< 1.00	1.68	1.64	0.92	< 5.24
17	Hospital Rooftop - 6th Floor	41.03370	-73.63045	213	< 1.00	0.98	0.98	0.63	< 3.59
18	**Parking Garage - Top Level**	**41.03401**	**-73.63093**	**74**	**< 1.00**	**1.90**	**3.19**	**0.01**	**< 6.11**
19	Parking Garage - Top Level	41.03370	-73.63093	188	< 1.00	0.99	1.01	0.04	< 3.04
20	Parking Garage - Top Level	41.03402	-73.63114	106	< 1.00	1.83	2.35	0.04	< 5.22
21	Parking Garage - Top Level	41.03370	-73.63114	201	< 1.00	0.91	0.90	0.07	< 2.89
22	Parking Garage - Top Level	41.03401	-73.63135	158	< 1.00	1.28	1.34	0.02	< 3.64
23	Parking Garage - Top Level	41.03371	-73.63136	231	< 1.00	0.73	0.70	0.12	< 2.55
24	Ground Level - Tower Compound Gate	41.03416	-73.63089	20	< 1.00	0.19	0.41	0.04	< 1.64
25	Ground Level - NW of Tower	41.03438	-73.63097	73	< 1.00	0.56	1.36	0.05	< 2.96
26	Ground Level - N of Tower	41.03487	-73.63104	248	< 1.00	0.51	0.54	0.01	< 2.06
27	Ground Level - NW of Tower	41.03483	-73.63132	264	< 1.00	0.48	0.51	0.01	< 2.00
28	Ground Level - NW of Tower	41.03455	-73.63150	222	< 1.00	0.61	0.67	0.01	< 2.29
29	Ground Level - W of Tower	41.03419	-73.63138	148	< 1.00	0.74	1.08	0.01	< 2.84

Table 4: Measured & Calculated Results[3]

[3] Due to measurement uncertainty at low levels (See Table 2), any readings outside the measurement range of the probe (< 1.00 % FCC General Population/Uncontrolled MPE) are noted as such.

Figure 2 below is an aerial view of the facility location and the surrounding area. Labeled points indicate the locations of the measurements recorded on December 12, 2014, as listed above in Table 4.

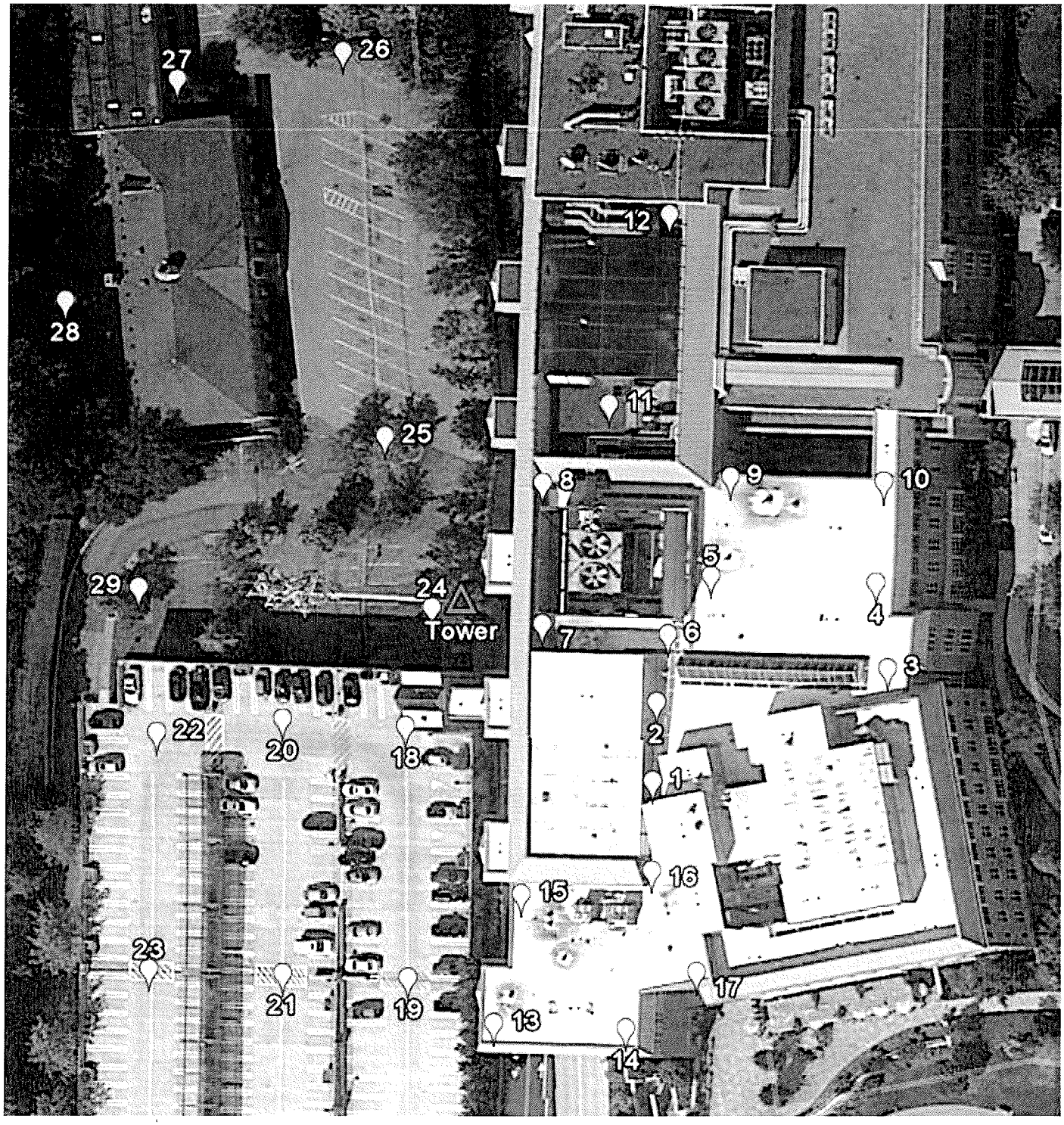


Figure 2: Aerial View of Facility & All Measurement Locations

7. Summary of Findings

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

The highest spatially averaged %MPE measurement of all surveyed points based on the 1997 FCC standard for exposure to the general population is **1.22%** MPE. This measurement was recorded at Location 3, on the 6th floor hospital rooftop.

The highest composite (measured + calculated) power density is **< 21.44% of the FCC General Population MPE limit** with the proposed Eversource Energy's antennas, and is calculated to occur at Location 7, also on the 6th floor hospital rooftop.

The highest composite (measured + calculated) power density for all publicly accessible areas is **< 6.11% of the FCC General Population MPE limit** with the proposed s' antennas, and is calculated to occur at Location 18, on the top level of the parking garage.

The above analysis verifies that exposure levels in the areas surrounding the tower; both currently and after the proposed installation, are well below the Maximum Permissible Exposure levels as outlined by the FCC in the OET Bulletin 65 Ed. 97-01.

8. Statement of Certification

I certify to the best of my knowledge that the statements in this report are true and accurate. The field measurements and calculated results were obtained with properly calibrated equipment using techniques and guidelines set forth in ANSI/IEEE Std. C95.3, ANSI/IEEE Std C95.1, and FCC OET Bulletin 65 Edition 97-01.

Evan Thibodeau

December 17, 2014
Date

Report Prepared By: Evan Thibodeau
RF Engineer
C Squared Systems, LLC

Keith Vellante

December 22, 2014
Date

Reviewed/Approved By: Keith Vellante
RF Manager
C Squared Systems, LLC

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

IEEE Std C95.7-2005, IEEE Recommended Practice for Radio Frequency Safety Programs, 3 kHz to 300 GHz. IEEE-SA Standards Board

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

(A) Limits for Occupational/Controlled Exposure[4]

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[5]

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

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

Table 5: FCC Limits for Maximum Permissible Exposure

[4] 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.

[5] 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.

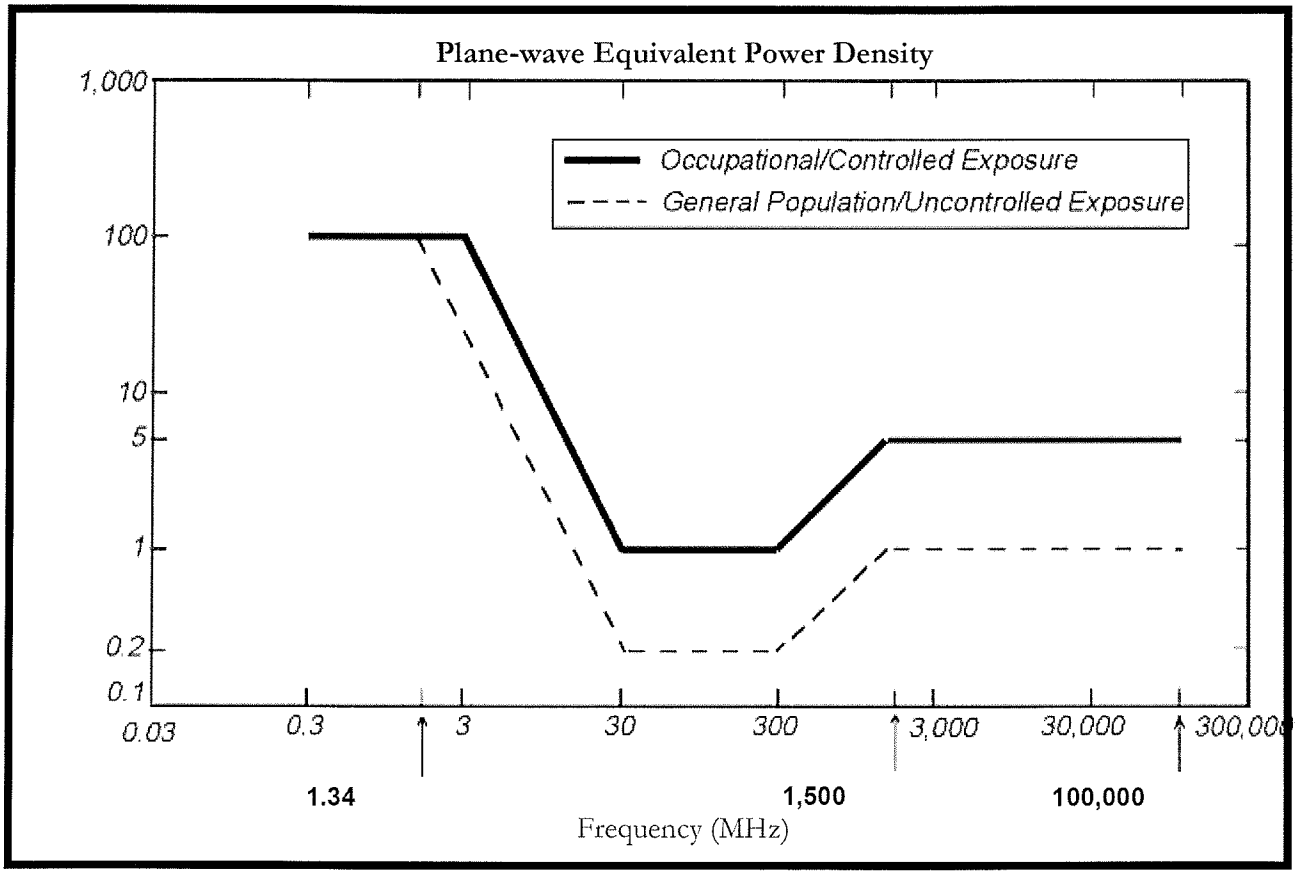
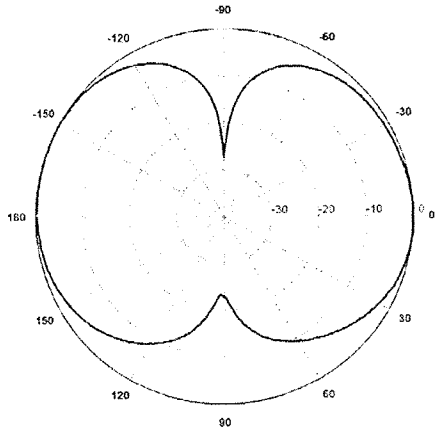


Figure 3: Graph of FCC Limits for Maximum Permissible Exposure (MPE)

Attachment C: Antenna Model Data Sheets and Vertical Patterns

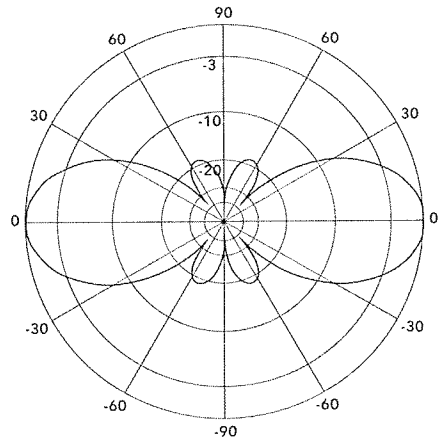
37 MHz

Manufacturer:	Comprod
Model #:	531-70HD
Frequency Band:	40-50 MHz
Gain:	2.3 dBd
Vertical Beamwidth:	N/A
Horizontal Beamwidth:	360°
Polarization:	Vertical
Length:	12’



154 MHz

Manufacturer:	Telewave
Model #:	ANT150F2
Frequency Band:	147-174 MHz
Gain:	2.5 dBd
Vertical Beamwidth:	38°
Horizontal Beamwidth:	360°
Polarization:	Vertical
Length:	5’



937 MHz

Manufacturer:	Commscope
Model #:	DB586-Y
Frequency Band:	890-960 MHz
Gain:	6.0 dBd
Vertical Beamwidth:	18°
Horizontal Beamwidth:	360°
Polarization:	Vertical
Length:	5’