September 21, 2015

VERTICAL DEVELOPMENT
20 Commercial St Branford, CT 06405

VIA EMAIL AND HAND DELIVERY

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

RE: T-Mobile Northeast LLC (CT11426A)
Resubmittal of Notice of Exempt Modification
670 Chapel Street, Eversource Pole 1321, Stratford, CT

Dear Ms. Bachman:

This letter and attachments are submitted on behalf of T-Mobile Northeast LLC ("T-Mobile"). T-Mobile's original notice of exempt modification which was acknowledged by the Council on May 9, 2014 (EM-T-138-140422) expired as construction of the antenna installation has not yet commenced. Please accept this letter and attachments as filing of a new notice, pursuant to R.C.S.A. Section 16-50j-73, of construction which constitutes an exempt modification pursuant to R.C.S.A Section 16-50j-72(b)(2). In compliance with R.C.S.A. Section 16-50j-73, a copy of this letter and attachments is being sent to the Mayor of Stratford and the property owner, Connecticut Light & Power. Connecticut Light & Power has reviewed and approved T-Mobile's proposed modifications, as evidenced by the attached letter dated March 18, 2014.

T-Mobile plans to modify the existing facility at 670 Chapel Street owned by Connecticut Light and Power (coordinates 41.23785, -73.12244). Attached are drawings depicting the planned changes, and documentation of the structural sufficiency of the tower to accommodate the revised antenna configuration subject to tower modifications outlined in the structural analysis report prepared by Centek Engineering dated February 25, 2014. Also included is a power density calculation reflecting the modification to T-Mobile's operations at the site.

The changes to the facility do not constitute a modification as defined in Connecticut General Statutes ("C.G.S.") Section 16-50i(d) because the general physical characteristics of the facility will not be significantly changed. Rather, the planned changes to the facility fall squarely within those activities explicitly provided for in R.C.S.A. Section 16-50j-72(b)(2).

1. The height of the overall structure will be unaffected. T-Mobile proposes to replace three (3) antennas on the existing FWT powermount at a centerline height of 109'AGL. T-Mobile will also install six (6) new 1-1/4" coax cables on the outside of the tower.

VERTICAL DEVELOPMENT
20 Commercial St Branford, CT 06405

2. The proposed changes will not extend the site boundaries. T-Mobile will replace an equipment cabinet on an existing concrete pad.

3. The proposed changes will not increase the noise level at the existing facility by six decibels or more. The incremental effect of the proposed changes will be negligible.

4. The changes to the facility will not increase the calculated "worst case" power density for the combined operations at the site to a level at or above the applicable standard for uncontrolled environments as calculated for a mixed frequency site. As indicated in the attached power density calculations, T-Mobile's operations at the site will result in a power density of 0.803%%; the combined site operations will result in a total power density of 23.123%.

Please feel free to call me with any questions or concerns regarding this matter. Thank you for your consideration.

Respectfully submitted,

By: _____
Eric Dahl, Agent for T-Mobile
edahl@comcast.net
860-227-1975

Attachments

cc: Town of Stratford, Mayor John A. Harkins
Hank O'Brien, Eversource/CL&P

Northeast
Utilities System

56 Prospect Street, Hartford, CT 06103

Northeast Utilities Service Company
P.O. Box 270
Hartford, CT 06141-0270
(203) 665-5000

March 17, 2014

Mr. Mark Richard
T-Mobile
35 Griffin Rd.
Bloomfield, CT 06002

RE: T-Mobile Antenna Site, CT-11 426A, 670 Chapel St., Stratford CT, structure 1321.

Dear Mr. Richard:

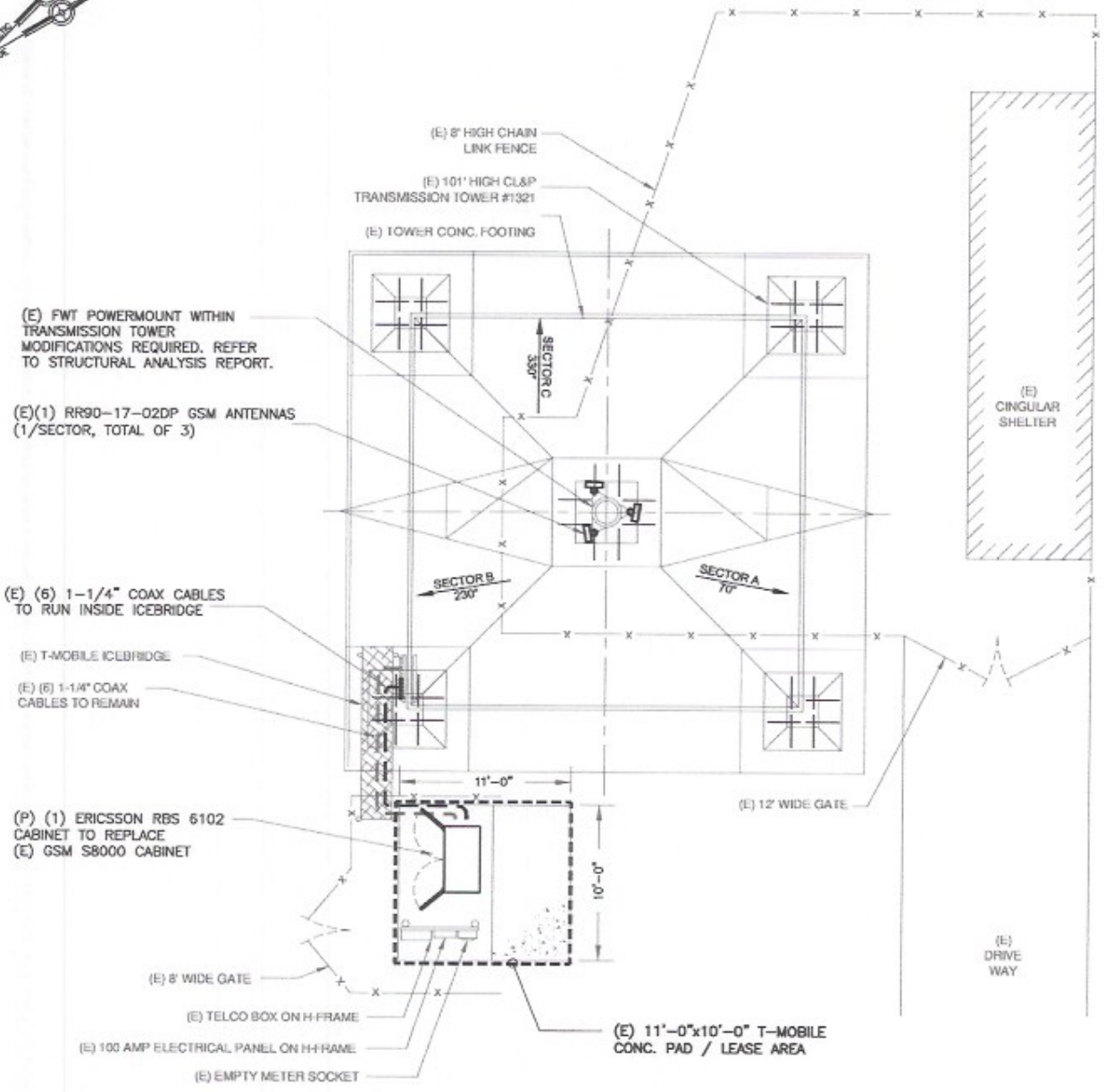
Based on our reviews of the site drawings, the structural analysis and foundation review provided by Centek Engineering, along with a third party review performed by Paul J Ford Systems we have reviewed for acceptance this modification.

Since there are no outstanding structural or site related issues to resolve at this time, construction at these locations may begin as soon as scheduling allows. You may contact Mr. O'Brien (860-665-6987); once the lease issues are secured you may then contact Mr. John Landry directly (860-665-5425) to begin the construction arrangements

Sincerely,

Robert Gray
Transmission Line Engineering

Ref: CT11426A-MDRN-CD-V2.pdf
13317.000 - CT11426A Structural Anlaysis Rev2 14-02-25.pdf



ALL EQUIPMENT LOCATIONS ARE APPROXIMATE AND ARE SUBJECT TO APPROVAL BY LESSEE/LICENSEE'S STRUCTURAL & RF ENGINEERS. LOCATIONS OF POWER & TELEPHONE FACILITIES ARE SUBJECT TO APPROVAL BY UTILITY COMPANIES.

COMPOUND PLAN

SCALE: 1" = 10'-0"

1
LE-3

CONFIGURATION
4B

SUBMITTALS	
LE REV A	10.28.13
LE REV 0	03.10.14

ATLANTIS GROUP
1340 Centre Street
Suite 212
Newton, MA 02459
Office: 617-965-0789
Fax: 617-213-5056

LEASE EXHIBIT

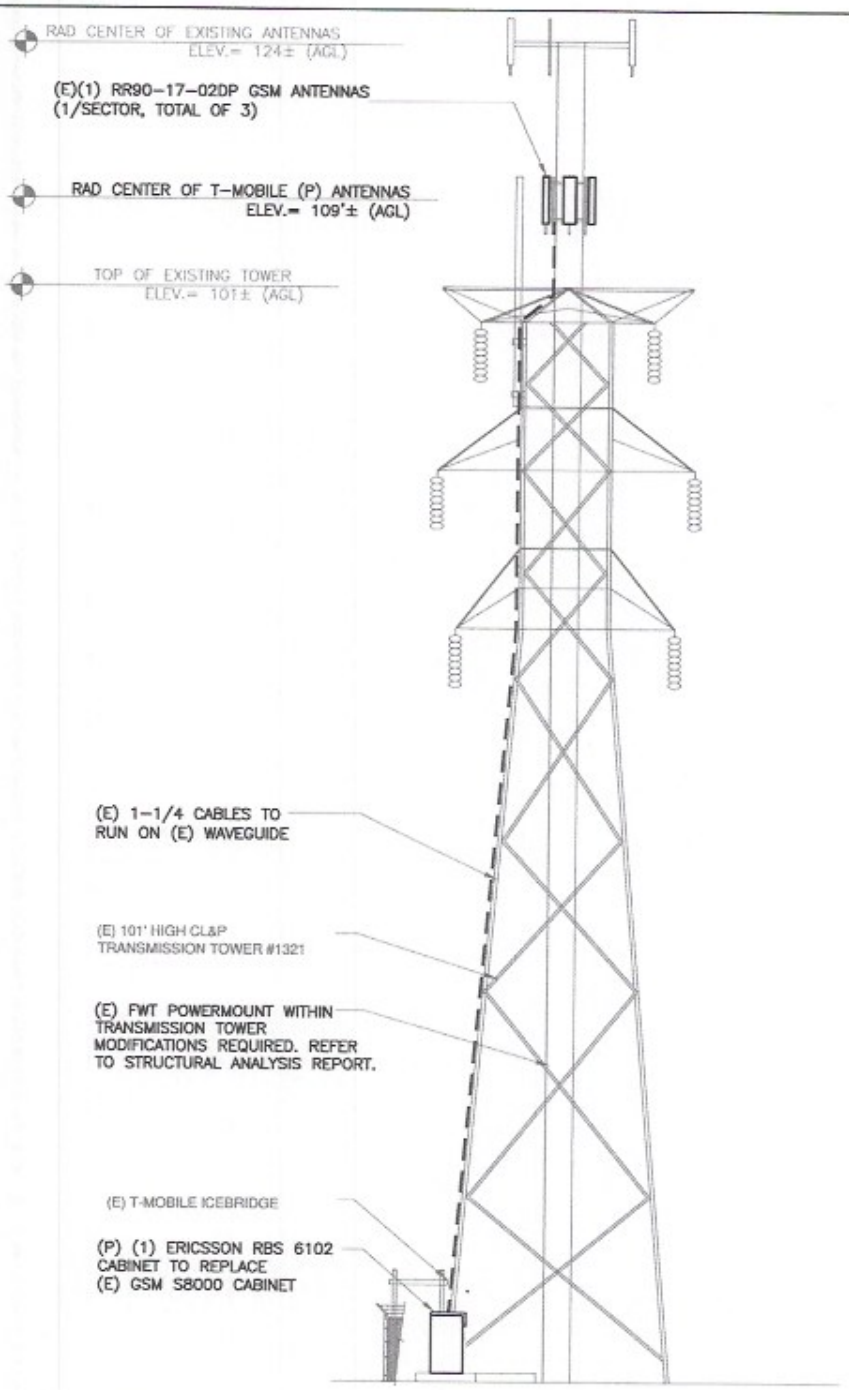
SITE NUMBER:
CT11426A

SITE NAME:
STRATFORD/MP/JAMES FARM

SITE ADDRESS:
670 CHAPEL STRRET
STRATFORD, CT 06614

NORTHEAST SITE SOLUTIONS
54 MAIN STREET, UNIT 3
STURBRIDGE, MA 01566
(508) 434-5237
FOR
T-MOBILE NORTHEAST, LLC
35 GRIFFIN ROAD SOUTH
BLOOMFIELD, CT 06002
OFFICE: (860) 682-7100
FAX: (860) 682-7159

DRAWN BY: EB | CHECKED BY: SM



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ELEVATION

SCALE: 1" = 16'-0"

CONFIGURATION

4B

SUBMITTALS	
LE REV A	10.28.13
LE REV 0	03.10.14

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1340 Centre Street
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DRAWN BY: EB | CHECKED BY: SM

CENTEK engineering

Centered on Solutions℠

Structural Analysis of Powermount and CL&P Tower

T-Mobile Site Ref: CT11426A

CL&P Structure No. 1321
101' Electric Transmission Lattice Tower

670 Chapel Street
Stratford, CT

CENTEK Project No. 13317.000

~~Date: November 22, 2013~~
~~Rev 1: January 27, 2014~~
Rev 2: February 25, 2014

Prepared for:
T-Mobile Towers
4 Sylvan Way
Parsippany, NJ 07054

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 analyze the existing powermount and 101' CL&P tower located at 670 Chapel Street in Stratford, CT for the proposed antenna and equipment upgrade by T-Mobile.

The existing and proposed loads consist of the following:

- AT&T (Existing to Remain):
  Antennas: Six (6) Powerwave 7770 panel antennas, three (3) Powerwave P65-16-XHL-RR panel antennas, twelve (12) Powerwave LGP214 TMA's and three (3) CCI DTMABP7819VG12A TMA's mounted on a low profile platform with a RAD center elevation of 124-ft above grade.
  Coax Cables: Eighteen (18) 1-1/4" ∅ coax cables running on the inside of the existing FWT Powermount.
- T-MOBILE (Existing to be Removed):
  Antennas: Two (2) RR90-17-02DP panel antennas and two (2) TMA's mounted on a PCS mast with a RAD center elevation of 109-ft above grade. One (1) RR90-17-02DP panel antenna and one (1) TMA's flush mounted to the FWT Powermount with a RAD center elevation of 109-ft above grade.
  Mast: 4-in SCH. 40 pipe (O.D. = 4.5") and related hardware.
- T-MOBILE (Existing to remain):
  Coax Cables: Six (6) 1-1/4" ∅ coax cables running on the outside of the tower as indicated in section 4 of this report.
- **T-MOBILE (Proposed):**
  Antennas: Three (3) RFS APX16DWV-16DWVS-E-A20 panel antennas mounted the existing FWT Powermount with a RAD center elevation of 109-ft above grade.
  Coax Cables: Six (6) 1-1/4" ∅ coax cables running on the outside of the tower as indicated in section 4 of this report

Primary assumptions used in the analysis

- Allowable steel stresses are defined by AISC-ASD 9th edition for design of the Powermount and antenna supporting elements.
- ASCE Manual No. 10-97, "Design of Latticed Steel Transmission Structures", defines allowable steel stresses for evaluation of the CL&P utility tower.
- All utility tower members are adequately protected to prevent corrosion of steel members.
- All proposed antenna mounts are modeled as listed above.
- All coaxial cable will be installed within the powermount unless specified otherwise.
- Powermount will be properly installed and maintained.
- No residual stresses exist due to incorrect tower erection.
- All bolts are appropriately tightened providing the necessary connection continuity.
- All welds conform to the requirements of AWS D1.1.
- Powermount and utility tower will be in plumb condition.
- Utility tower was properly installed and maintained and all members were properly designed, detailed, fabricated, and installed and have been properly maintained since erection.
- Any deviation from the analyzed loading will require a new analysis for verification of structural adequacy.

Analysis

Structural analysis of the existing powermount was independently completed using the current version of RISA-3D computer program licensed to CENTEK Engineering, Inc. The RISA-3D program contains a library of all AISC shapes and corresponding section properties are computed and applied directly within the program. The program's Steel Code Check option was also utilized.

The existing FWT powermount consisting of a HSS18"x0.375" pipe conforming to ASTM A500 Grade B (Fy = 42ksi) connected at six points to the existing tower was analyzed for its ability to resist loads prescribed by the TIA/EIA standard. Section 5 of this report details these gravity and lateral wind loads. Load cases and combinations used in RISA-3D for TIA/EIA loading are listed in report Section 6.

Structural analysis of the existing CL&P tower structure was completed using the current version of PLS-Tower computer program licensed to CENTEK Engineering, Inc. The NESC program contains a library of all AISC angle shapes and corresponding section properties are computed and applied directly within the program. The program's Steel Code Check option was also utilized.

The existing 101-ft tall CL&P lattice tower was analyzed for its ability to resist loads prescribed by the NESC standard. Maximum usage for the tower was calculated considering the additional forces from the powermount and associated appurtenances. Section 7 of this report details these gravity and lateral wind loads.

Design Basis

Our analysis was performed in accordance with EIA-222-F-1996, ASCE Manual No. 10-97, "Design of Latticed Steel Transmission Structures", NESC C2-2007 and Northeast Utilities Design Criteria.

The CL&P tower structure, considering existing and future conductor and shield wire loading, with the existing powermount was analyzed under two conditions:

- UTILITY TOWER ANALYSIS

  The purpose of this analysis is to determine the adequacy of the existing utility structure to support the proposed antenna loads. The loading and design requirements were analyzed in accordance with the NU Design Criteria Table, NESC C2-2007 ~ Construction Grade B, and ASCE Manual No. 10-97, "Design of Latticed Steel Transmission Structures".

  Load cases considered:

  Load Case 1: NESC Heavy

Wind Pressure.....	4.0 psf
Radial Ice Thickness.....	0.5"
Vertical Overload Capacity Factor.....	1.50
Wind Overload Capacity Factor.....	2.50
Wire Tension Overload Capacity Factor.....	1.65

  Load Case 2: NESC Extreme

Wind Speed.....	110 mph (1)
Radial Ice Thickness.....	0"

  Note 1: NESC C2-2007, Section25, Rule 250C: Extreme Wind Loading, 1.25 x Gust Response Factor (wind speed: 3-second gust)

- POWERMOUNT ANALYSIS

The powermount, appurtenances and connections to the utility tower were analyzed and designed in accordance with the NU Design Criteria Table, TIA/EIA-222-F, and AISC-ASD standards.

Load cases considered:

Load Case 1:
Wind Speed..... 85 mph [2]
Radial Ice Thickness..... 0"

Load Case 2:
Wind Pressure..... 75% of 85 mph wind pressure
Radial Ice Thickness..... 0.5"

Note 2: Per NU Mast Design Criteria Exception 1.

Results

- POWERMOUNT

With the proposed reinforcements detailed in Section 4 of this report the existing powermount was determined to be structurally **adequate.**

Component	Design Limit	Stress Ratio (percentage of capacity)	Result
HSS 18" x 0.375" Pipe	Bending	69.3%	**PASS**
L2.5x2.5x3/16 Brace	Bending	80.8%	**PASS**
Connection	Shear	87.4%	**PASS**

- UTILITY TOWER

This analysis finds that the subject utility structure is adequate to support the proposed antenna mast and related appurtenances. The tower stresses meet the requirements set forth by the ASCE Manual No. 10-97, "Design of Latticed Steel Transmission Structures", for the applied NESC Heavy and Hi-Wind load cases. The detailed analysis results are provided in Section 8 of this report. The analysis results are summarized as follows:

A maximum usage of **94.01%** occurs in the utility tower under the **NESC Extreme** loading condition.

TOWER SECTION:

The utility structure was found to be within allowable limits.

Tower Member	Stress Ratio (% of capacity)	Result
Angle g37X	94.01%	**PASS**

- FOUNDATION AND ANCHORS

The existing foundation consists of four (4) 2-ft square tapering to 5-ft square x 5-ft-8" long reinforced concrete piers and four (4) 8-ft square x 2-ft thick reinforced concrete pads with a 33-ft-6in square x 3-ft-6-in thick concrete mat flush with the top of the piers. The base of the tower is connected to the foundation by four (4) 1-1/4" ø ASTM A36 anchor bolts per leg. Foundation information was obtained from NUSCO drawing # 01021-60001 and construction drawings prepared by Centek engineering project no. 10021.CO3 dated 10/6/2010 marked rev 2.

BASE REACTIONS:

From PLS-Tower analysis of CL&P tower based on NESC/NU prescribed loads.

Load Case	Shear	Uplift	Compression
NESC Heavy Wind	10.22 kips	31.31 kips	53.05 kips
NESC Extreme Wind	21.27 kips	76.44 kips	93.15 kips

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

ANCHOR BOLTS:

The anchor bolts were found to be within allowable limits.

Tower Component	Design Limit	Stress Ratio (percentage of capacity)	Result
Anchor Bolts	Tension	87.2%	PASS

FOUNDATION:

The foundation was found to be within allowable limits.

Foundation	Design Limit	Required FS (1)	Proposed Loading FS (2)	Result
Reinf. Conc. Pad & Pier w/ Mat	Uplift	1.0	2.06	PASS
	Bearing Pressure	4 ksf	1.09 ksf	PASS

Note 1: FS denotes Factor of Safety
Note 2: 10% increase to PLS base reactions used in foundation analysis per OTRM 051.

Conclusion

This analysis shows that the subject utility tower **with the proposed reinforcements outlined below and detailed in Section 4 of this report is adequate** to support the proposed T-Mobile equipment installaiton.

- Replacement of the existing powermount connection brackets at 101-ft and 96-ft AGL.

The analysis is based, in part on the information provided to this office by Northeast Utilities and T-Mobile. 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:

Carlo F. Centore, PE
Principal ~ Structural Engineer

STATE OF CONNECTICUT
CARLO F. CENTORE
No. 18084
LICENSED
PROFESSIONAL ENGINEER

Prepared by:

Timothy J. Lynn, PE
Structural Engineer

STANDARD CONDITIONS FOR FURNISHING OF PROFESSIONAL ENGINEERING SERVICES ON EXISTING STRUCTURES

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

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

GENERAL DESCRIPTION OF STRUCTURAL ANALYSIS PROGRAM ~ RISA-3D

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

Modeling Features:

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

Analysis Features:

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

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

Graphics Features:

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

Design Features:

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

Results Features:

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

GENERAL DESCRIPTION OF STRUCTURAL ANALYSIS PROGRAM ~ PLS-TOWER

PLS-TOWER is a Microsoft Windows program for the analysis and design of steel latticed towers used in electric power lines or communication facilities. Both self-supporting and guyed towers can be modeled. The program performs design checks of structures under user specified loads. For electric power structures it can also calculate maximum allowable wind and weight spans and interaction diagrams between different ratios of allowable wind and weight spans.

Modeling Features:

- Powerful graphics module (stress usages shown in different colors)
- Graphical selection of joints and members allows graphical editing and checking
- Towers can be shown as lines, wire frames or can be rendered as 3-d polygon surfaces
- Can extract geometry and connectivity information from a DXF CAD drawing
- CAD design drawings, title blocks, drawing borders or photos can be tied to structure model
- XML based post processor interface
- Steel Detailing Neutral File (SDNF) export to link with detailing packages
- Can link directly to line design program PLS-CADD
- Automatic generation of structure files for PLS-CADD
- Databases of steel angles, rounds, bolts, guys, etc.
- Automatic generation of joints and members by symmetries and interpolations
- Automated mast generation (quickly builds model for towers that have regular repeating sections) via graphical copy/paste
- Steel angles and rounds modeled either as truss, beam or tension-only elements
- Guys are easily handled (can be modeled as exact cable elements)

Analysis Features:

- Automatic handling of tension-only members
- Automatic distribution of loads in 2-part suspension insulators (v-strings, horizontal vees, etc.)
- Automatic calculation of tower dead, ice, and wind loads as well as drag coefficients according to:
  - ASCE 74-1991
  - NESC 2002
  - NESC 2007
  - IEC 60826:2003
  - EN50341-1:2001 (CENELEC)
  - EN50341-3-9:2001 (UK NNA)
  - EN50341-3-17:2001 (Portugal NNA)
  - ESAA C(b)1-2003 (Australia)
  - TPNZ (New Zealand)
  - REE (Spain)
  - EIA/TIA 222-F
  - ANSI/TIA 222-G
  - CSA S37-01
- Automated microwave antenna loading as per EIA/TIA 222-F and ANSI/TIA 222-G
- Minimization of problems caused by unstable joints and mechanisms
- Automatic bandwidth minimization and ability to solve large problems
- Design checks according to (other standards can be added easily):
  - ASCE Standard 10-90

- AS 3995 (Australian Standard 3995)
- BS 8100 (British Standard 8100)
- EN50341-1 (CENELEC, both empirical and analytical methods are available)
- ECCS 1985
- NGT-ECCS
- PN-90/B-03200
- EIA/TIA 222-F
- ANSI/TIA 222-G
- CSA S37-01
- EDF/RTE Resal
- IS 802 (India Standard 802)

Results Features:

- Design summaries printed for each group of members
- Easy to interpret text, spreadsheet and graphics design summaries
- Automatic determination of allowable wind and weight spans
- Automatic determination of interaction diagrams between allowable wind and weight spans
- Capability to batch run multiple tower configurations and consolidate the results
- Automated optimum angle member size selection and bolt quantity determination

Tool for interactive angle member sizing and bolt quantity determination.

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

Introduction

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

ANSI Standard TIA/EIA-222 covering the design of telecommunications structures specifies a working strength/allowable stress design approach. This approach applies the loads from extreme weather loading conditions, and designs the structure so that it does not exceed some defined percentage of failure strength (allowable stress).

ANSI Standard C2-2007 (National Electrical Safety Code) covering the design of electric transmission metal structures is based upon an ultimate strength/yield stress design approach. This approach applies a multiplier (overload capacity factor) to the loads possible from extreme weather loading conditions, and designs the structure so that it does not exceed its ultimate strength (yield stress).

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

Two extreme weather conditions are considered. The first is an extreme wind condition (hurricane) based upon a 50-year recurrence (2% annual probability). The second is a winter condition combining wind and ice loadings.

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

Note 1: *Prepared from documentation provide from Northeast Utilities.*

PCS Mast

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

1. An 85 mph extreme wind speed shall be used for locations in all counties throughout the NU system.
2. The stress increase of TIA Section 3.1.1.1 is disallowed. The combined wind and ice condition shall consider ½" radial ice in combination with the wind load (0.75 Wi) as specified in TIA section 2.3.16.

ELECTRIC TRANSMISSION TOWER

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

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

The uniform loadings and factors specified for the above components in the table are based upon the National Electrical Safety Code 2007 Edition Extreme Wind (Rule 250C) and Combined Ice and Wind (Rule 250B-Heavy) Loadings. These provide equivalent loadings compared to TIA and its loads and factors with the exceptions noted above. (Note that the NESC does not require the projected wind surfaces of structures and equipment to be increased by the ice covering.)

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

Attachment A

NU Design Criteria

			Basic Wind Speed	Pressure	Height Factor	Gust Factor	Load or Stress Factor	Force Coef - Shape Factor
			V (MPH)	Q (PSF)	Kz	Gh		
Ice Condition	TIA/EIA	Antenna Mount	TIA	TIA (.75Wi)	TIA	TIA	TIA, Section 3.1.1.1 disallowed for connection design	TIA
	NESC Heavy	Tower/Pole Analysis with antennas extending above top of Tower/Pole (Yield Stress)	----	4	1.00	1.00	2.50	1.6 Flat Surfaces 1.3 Round Surfaces
		Tower/Pole Analysis with Antennas below top of Tower/Pole (on two faces)	----	4	1.00	1.00	2.50	1.6 Flat Surfaces 1.3 Round Surfaces
		Conductors:	Conductor loads provided by NU					
High Wind Condtion	TIA/EIA	Antenna Mount	85	TIA	TIA	TIA	TIA, Section 3.1.1.1 disallowed for connection design	TIA
	NESC Extreme Wind	Tower/Pole Analysis with antennas extending above top of Tower/Pole	Use NESC C2-2007, Section 25, Rule 250C: Extreme Wind Loading 1.25 x Gust Response Factor Height above ground level based on top of Mast/Antenna					1.6 Flat Surfaces 1.3 Round Surfaces
		Tower/Pole Analysis with Antennas below top of Tower/Pole	Use NESC C2-2007, Section 25, Rule 250C: Extreme Wind Loading Height above ground level based on top of Tower/Pole					1.6 Flat Surfaces 1.3 Round Surfaces
		Conductors:	Conductor loads provided by NU					
NESC Extreme Ice with Wind Conditon*		Tower/Pole Analysis with antennas extending above top of Tower/Pole	Use NESC C2-2007, Section 25, Rule 250D: Extreme Ice with Wind Loading 4PSF Wind Load 1.25 x Gust Response Factor Height above ground level based on top of Mast/Antenna					1.6 Flat Surfaces 1.3 Round Surfaces
		Tower/Pole Analysis with Antennas below top of Tower/Pole	Use NESC C2-2007, Section 25, Rule 250D: Extreme Ice with Wind Loading 4PSF Wind Load Height above ground level based on top of Tower/Pole					1.6 Flat Surfaces 1.3 Round Surfaces
		Conductors:	Conductor loads provided by NU					
		* Only for Structures Installed after 2007						

Shape Factor Criteria shall be per TIA Shape Factors.

2) STEP 2 - The electric transmission structure analysis and evaluation shall be performed in accordance with NESC requirements and shall include the mast and antenna loads determined from NESC applied loading conditions (not TIA/EIA Loads) on the structure and mount as specified below, and shall include the wireless communication mast and antenna loads per NESC criteria)

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

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

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

c) Electric Transmission Structure

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

ii) Shape Factor Multiplier:

NESC Structure Shape	Cd
Polyround (for polygonal steel poles)	1.3
Flat	1.6
Open Lattice	3.2

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

Mount Type	Cable Cd	Pole Cd
Coaxial Cables on outside periphery (One layer)	1.45	1.45
Coaxial Cables mounted on stand offs	1.6	1.3

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

Note: The NESC does not require ice load be included in the supporting structure. (Ice on conductors and shield wire only, and NU will provide these loads).

e) Mast reaction loads shall be evaluated for local effects on the transmission structure members at the attachment points.

Northeast Utilities System

Job :
Description: T-Mobile

Spec. Number
Computed by
Checked by

Page of
Sheet of
Date 7/27/10
Date

INPUT DATA

TOWER ID: 1321

Structure Height (ft) : 101

Wind Zone : Central CT (green)

Wind Speed : 90.5711047 mph

Tower Type : (●) Suspension ( ) Strain

Extreme Wind Model : PCS Addition

Shield Wire Properties:

	BACK	AHEAD
NAME =	*3/8 CW*	*3/8 CW*
DESCRIPTION =	3/8	3/8
STRANDING =	7 #8 Cu Weld	7 #8 Cu Weld
DIAMETER =	0.385 in	0.385 in
WEIGHT =	0.324 lb/ft	0.324 lb/ft

Conductor Properties:

	BACK	AHEAD	
NAME =	*TERN*	*TERN*	
Number of Conductors per phase: 1	795.000 45/7 ACSR	795.000 45/7 ACSR	1 Number of Conductors per phase
DIAMETER =	1.063 in	1.063 in	
WEIGHT =	0.895 lb/ft	0.895 lb/ft	

Insulator Weight = 0 lbs

Broken Wire Side = AHEAD SPAN

Horizontal Line Tensions:

	BACK		AHEAD	
	Shield	Conductor	Shield	Conductor
NESC HEAVY =	3,800	7,000	3,800	7,000
EXTREME WIND =	3,038	7,356	3,061	8,027
LONG. WIND =	na	na	na	na
250D COMBINED =	na	na	na	na
NESC W/O OLF =	na	na	na	na
60 DEG F NO WIND =	1,280	2,733	1,073	2,736

Line Geometry:

					SUM
LINE ANGLE (deg) =	BACK:	1	AHEAD:	1	**2**
WIND SPAN (ft) =	BACK:	402	AHEAD:	402	**804**
WEIGHT SPAN (ft) =	BACK:	489	AHEAD:	489	**978**

Northeast Utilities System

Job :
Description: T-Mobile

Spec. Number
Computed by
Checked by

Page of
Sheet of
Date 7/27/10
Date

WIRE LOADING AT ATTACHMENTS

TOWER ID: 1321

Wind Span =	804 ft
Weight Span =	978 ft
Total Angle =	2 degrees

Broken Wire Span =	AHEAD SPAN
Type of Insulator Attachment =	SUSPENSION

1. NESC RULE 250B Heavy Loading:

	INTACT CONDITION			BROKEN WIRE CONDITION		
	Horizontal	Longitudinal	Vertical	Horizontal	Longitudinal	Vertical
Shield Wire =	1,147 lb	0 lb	1,282 lb	573 lb	6,269 lb	641 lb
Conductor =	1,785 lb	0 lb	2,739 lb	893 lb	11,548 lb	1,369 lb

2. NESC RULE 250C Transverse Extreme Wind Loading:

	Horizontal	Longitudinal	Vertical
Shield Wire =	705 lb	26 lb	364 lb
Conductor =	1,917 lb	772 lb	1,007 lb

3. NESC RULE 250C Longitudinal Extreme Wind Loading:

	Horizontal	Longitudinal	Vertical
Shield Wire =	#VALUE!	#VALUE!	364 lb
Conductor =	#VALUE!	#VALUE!	1,007 lb

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

	Horizontal	Longitudinal	Vertical
Shield Wire =	#VALUE!	#VALUE!	2,001 lb
Conductor =	#VALUE!	#VALUE!	3,384 lb

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

	Horizontal	Longitudinal	Vertical
Shield Wire =	#VALUE!	#VALUE!	855 lb
Conductor =	#VALUE!	#VALUE!	1,826 lb

6. 60 Deg. F. No Wind

	Horizontal	Longitudinal	Vertical
Shield Wire =	41 lb	207 lb	317 lb
Conductor =	95 lb	3 lb	875 lb

7. Construction

	Horizontal	Longitudinal	Vertical
Shield Wire =	62 lb	310 lb	475 lb
Conductor =	143 lb	4 lb	1,313 lb

Northeast Utilities System

Job :
Description: T-Mobile

Spec. Number
Computed by
Checked by

Page of
Sheet of
Date 7/27/10
Date

INPUT DATA

TOWER ID: 1321

Structure Height (ft) : 101

Wind Zone : Central CT (green)

Wind Speed : 90.5711047 mph

Tower Type : (●) Suspension ( ) Strain

Extreme Wind Model : PCS Addition

Shield Wire Properties:

	BACK	AHEAD
NAME =	*3/8 AW*	*3/8 AW*
DESCRIPTION =	3/8	3/8
STRANDING =	7 #8 Al Weld	7 #8 Al Weld
DIAMETER =	0.385 in	0.385 in
WEIGHT =	0.262 lb/ft	0.262 lb/ft

Conductor Properties:

	BACK	AHEAD	
NAME =	*TERN*	*TERN*	
Number of Conductors per phase: 1	795.000 45/7 ACSR	795.000 45/7 ACSR	1 Number of Conductors per phase
DIAMETER =	1.063 in	1.063 in	
WEIGHT =	0.895 lb/ft	0.895 lb/ft	

Insulator Weight = 0 lbs

Broken Wire Side = AHEAD SPAN

Horizontal Line Tensions:

	BACK		AHEAD	
	Shield	Conductor	Shield	Conductor
NESC HEAVY =	3,600	7,000	3,600	7,000
EXTREME WIND =	2,846	7,356	2,838	8,027
LONG. WIND =	na	na	na	na
250D COMBINED =	na	na	na	na
NESC W/O OLF =	na	na	na	na
60 DEG F NO WIND =	1,094	2,733	783	2,736

Line Geometry:

					SUM
LINE ANGLE (deg) =	BACK:	1	AHEAD:	1	**2**
WIND SPAN (ft) =	BACK:	402	AHEAD:	402	**804**
WEIGHT SPAN (ft) =	BACK:	489	AHEAD:	489	**978**

Northeast Utilities System

Job :
Description: T-Mobile

Spec. Number
Computed by
Checked by

Page of
Sheet of
Date 7/27/10
Date

WIRE LOADING AT ATTACHMENTS

TOWER ID: 1321

Wind Span =	804 ft
Weight Span =	978 ft
Total Angle =	2 degrees

Broken Wire Span =	AHEAD SPAN
Type of Insulator Attachment =	SUSPENSION

1. NESC RULE 250B Heavy Loading:

	INTACT CONDITION			BROKEN WIRE CONDITION		
	Horizontal	Longitudinal	Vertical	Horizontal	Longitudinal	Vertical
Shield Wire =	1,135 lb	0 lb	1,191 lb	568 lb	5,939 lb	596 lb
Conductor =	1,785 lb	0 lb	2,739 lb	893 lb	11,548 lb	1,369 lb

2. NESC RULE 250C Transverse Extreme Wind Loading:

	Horizontal	Longitudinal	Vertical
Shield Wire =	697 lb	9 lb	294 lb
Conductor =	1,917 lb	772 lb	1,007 lb

3. NESC RULE 250C Longitudinal Extreme Wind Loading:

	Horizontal	Longitudinal	Vertical
Shield Wire =	#VALUE!	#VALUE!	294 lb
Conductor =	#VALUE!	#VALUE!	1,007 lb

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

	Horizontal	Longitudinal	Vertical
Shield Wire =	#VALUE!	#VALUE!	1,940 lb
Conductor =	#VALUE!	#VALUE!	3,384 lb

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

	Horizontal	Longitudinal	Vertical
Shield Wire =	#VALUE!	#VALUE!	794 lb
Conductor =	#VALUE!	#VALUE!	1,826 lb

6. 60 Deg. F, No Wind

	Horizontal	Longitudinal	Vertical
Shield Wire =	33 lb	311 lb	256 lb
Conductor =	95 lb	3 lb	875 lb

7. Construction

	Horizontal	Longitudinal	Vertical
Shield Wire =	49 lb	466 lb	384 lb
Conductor =	143 lb	4 lb	1,313 lb

Connecticut Light & Power

POWERMOUNT REINFORCEMENT DESIGN

CL&P STRUCT. NO. 1321
670 CHAPEL STREET
STRATFORD, CT 06614

VICINITY MAP

NORTH

PROJECT SUMMARY

SITE ADDRESS:	670 CHAPEL STREET STRATFORD, CT 06614
PROJECT COORDINATES:	LAT: 41°-14'-16.80"N LON: 73°-07'-20.50"W ELEV:±152' AMSL
CL&P STRUCT NO:	1321
CL&P CONTACT:	ROBERT GRAY 860.665.3175
T-MOBILE SITE REF.:	CT11426A
T-MOBILE CONTACT:	MARK RICHARD 860.692.7143
ANTENNA CL HEIGHT:	109'-0"
ENGINEER OF RECORD:	CENTEK ENGINEERING, INC. 63-2 NORTH BRANFORD ROAD BRANFORD, CT 06405
CENTEK CONTACT:	CARLO F. CENTORE, PE 203.488.0580 ext. 122

SHEET INDEX

SHT. NO.	DESCRIPTION	REV.
T-1	TITLE SHEET	0
N-1	DESIGN BASIS & GENERAL NOTES	0
N-2	STRUCTURAL STEEL NOTES	0
MI-1	MODIFICATION INSPECTION REQUIREMENTS	0
S-1	TOWER ELEVATION & FEEDLINE PLAN	0
S-2	POWERMOUNT CONNECTION DETAILS	0

DESIGNED BY: TJL
DRAWN BY: TJL
CHK'D BY: DFC

REV.	DATE	ISSUED FOR CONSTRUCTION
1	2/25/14	DFC
0	1/27/14	DFC

T-MOBILE
CT11-426A
CL&P STRUCTURE 1321
670 CHAPEL STREET
STRATFORD, CT 06614

DATE: 01/27/14
SCALE: AS SHOWN
JOB NO.: 13317.000

TITLE SHEET

SHEET NO.
T-1

DESIGN BASIS

1. GOVERNING CODE: 2003 INTERNATIONAL BUILDING CODE AS MODIFIED BY THE 2005 CT STATE BUILDING CODE AND 2009 AMENDMENTS.

2. TIA/EIA-222-F-1996, ASCE MANUAL NO. 72 – "DESIGN OF STEEL TRANSMISSION POLE STRUCTURES SECOND EDITION", NESC C2-2007 AND NORTHEAST UTILITIES DESIGN CRITERIA.

3. DESIGN CRITERIA

   WIND LOAD: (PCS MAST)
   BASIC WIND SPEED (V) =85 MPH (FASTEST MILE); BASED ON TIA/EIA-222F AND NU MAST DESIGN CRITERIA EXCEPTION 1.

   WIND LOAD: (UTILITY POLE & FOUNDATION)
   BASIC WIND SPEED (V) =110 MPH (3-SECOND GUST) BASED ON NESC C2-2007, SECTION 25 RULE 250C.

GENERAL NOTES

1. REFER TO STRUCTURAL ANALYSIS REPORT PREPARED BY CENTEK ENGINEERING, INC., FOR T-MOBILE, DATED 2/25/14.

2. TOWER GEOMETRY AND STRUCTURE MEMBER SIZES WERE OBTAINED FROM THE TOWER DESIGN DRAWINGS PREPARED BY R.D. COOMBS & CO.; DATED APRIL 12, 1957.

3. ALL CONSTRUCTION SHALL BE IN ACCORDANCE WITH THE GOVERNING BUILDING CODE.

4. DRAWINGS INDICATE THE MINIMUM STANDARDS, BUT IF ANY WORK SHOULD BE INDICATED TO BE SUBSTANDARD TO ANY ORDINANCES, LAWS, CODES, RULES, OR REGULATIONS BEARING ON THE WORK, THE CONTRACTOR SHALL INCLUDE IN HIS SCOPE OF WORK AND SHALL EXECUTE THE WORK CORRECTLY IN ACCORDANCE WITH SUCH ORDINANCES, LAWS, CODES, RULES OR REGULATIONS WITH NO INCREASE IN COSTS.

5. BEFORE BEGINNING THE WORK, THE CONTRACTOR IS RESPONSIBLE FOR MAKING SUCH INVESTIGATIONS CONCERNING PHYSICAL CONDITIONS (SURFACE AND SUBSURFACE) AT OR CONTIGUOUS TO THE SITE WHICH MAY AFFECT PERFORMANCE AND COST OF THE WORK. THIS INCLUDES VERIFYING ALL DIMENSIONS, ELEVATIONS, ANGLES, AND EXISTING CONDITIONS AT THE SITE, PRIOR TO FABRICATION AND/OR INSTALLATION OF ANY WORK IN THE CONTRACT AREA. CONTRACTOR SHALL TAKE FIELD MEASUREMENTS NECESSARY TO ASSURE PROPER FIT OF ALL FINISHED WORK.

6. ALL WORK SHALL BE CONDUCTED BY FIELD CREWS EXPERIENCED IN THE ASSEMBLY AND ERECTION OF TRANSMISSION STRUCTURES. ALL SAFETY PROCEDURES, RIGGING AND ERECTION METHODS SHALL BE STANDARD TO THE INDUSTRY AND IN COMPLIANCE WITH OSHA.

7. IF ANY FIELD CONDITIONS EXIST WHICH PRECLUDE COMPLIANCE WITH THE DRAWINGS, THE CONTRACTOR SHALL IMMEDIATELY NOTIFY THE ENGINEER AND SHALL PROCEED WITH AFFECTED WORK AFTER, CONFLICT IS SATISFACTORILY RESOLVED.

8. ALL DAMAGE CAUSED TO ANY EXISTING STRUCTURE SHALL BE THE SOLE RESPONSIBILITY OF THE CONTRACTOR. THE CONTRACTOR WILL BE HELD LIABLE FOR ALL REPAIRS REQUIRED FOR EXISTING STRUCTURES IF DAMAGED DURING CONSTRUCTION ACTIVITIES.

9. NO DRILLING WELDING OR TAPING IS PERMITTED ON CL&P OWNED EQUIPMENT.

DESIGNED BY:			T.A.
DRAWN BY:			T.A.
CHK'D BY:			DFD
1	3/25/14	T.A.	ISSUED FOR CONSTRUCTION
0	1/27/14	T.A.	ISSUED FOR CONSTRUCTION
REV.	DATE	DRAWN BY	DESCRIPTION

PROFESSIONAL ENGINEER SEAL

CENTEK engineering

T-Mobile

T-MOBILE
CT11-426A
CL&P STRUCTURE 1321

DATE:	01/27/14
SCALE:	AS SHOWN
JOB NO.	13317.000

DESIGN BASIS AND GENERAL NOTES

SHEET NO.
N-1
Sheet no. 1 of 1

STRUCTURAL STEEL

1. ALL STRUCTURAL STEEL IS DESIGNED BY ALLOWABLE STRESS DESIGN (ASD).

2. MATERIAL SPECIFICATIONS

   A. STRUCTURAL STEEL (W SHAPES)---ASTM A992 (FY = 50 KSI)
   B. STRUCTURAL STEEL (OTHER SHAPES)---ASTM A36 (FY = 36 KSI).
   C. STRUCTURAL STEEL (TOWER REINF. SOLID ROUND BAR)--- ASTM A572_GR50 (50 KSI)
   D. STRUCTURAL HSS (RECTANGULAR SHAPES)---ASTM A500 GRADE B, (FY = 46 KSI)
   E. STRUCTURAL HSS (ROUND SHAPES)---ASTM A500 GRADE B, (FY = 42 KSI)
   F. PIPE---ASTM A53 GRADE B (FY = 35 KSI)

3. FASTENER SPECIFICATIONS

   A. CONNECTION BOLTS---ASTM A325-N, UNLESS OTHERWISE SCHEDULED.
   B U-BOLTS---ASTM A307
   C. ANCHOR RODS---ASTM F1554
   D. WELDING ELECTRODES---ASTM E70XX FOR A36 & A572_GR50 STEELS, ASTM E80XX FOR A572_GR65 STEEL.
   E. BLIND BOLTS---AS1252 PROPERTY CLASS 8.8 (FU=120 KSI).

4. CONTRACTOR TO REVIEW ALL SHOP DRAWINGS AND SUBMIT COPY TO ENGINEER FOR APPROVAL. DRAWINGS MUST BEAR THE CHECKER'S INITIALS BEFORE SUBMITTING TO THE ENGINEER FOR REVIEW. SHOP DRAWINGS SHALL INCLUDE THE FOLLOWING: SECTION PROFILES, SIZES, CONNECTION ATTACHMENTS, REINFORCING, ANCHORAGE, SIZE AND TYPE OF FASTENERS AND ACCESSORIES. INCLUDE ERECTION DRAWINGS, ELEVATIONS AND DETAILS.

5. STRUCTURAL STEEL SHALL BE DETAILED, FABRICATED AND ERECTED IN ACCORDANCE WITH THE LATEST PROVISIONS OF AISC MANUAL OF STEEL CONSTRUCTION.

6. PROVIDE ALL PLATES, CLIP ANGLES, CLOSURE PIECES, STRAP ANCHORS, MISCELLANEOUS PIECES AND HOLES REQUIRED TO COMPLETE THE STRUCTURE.

7. FIT AND SHOP ASSEMBLE FABRICATIONS IN THE LARGEST PRACTICAL SECTIONS FOR DELIVERY TO SITE.

8. INSTALL FABRICATIONS PLUMB AND LEVEL, ACCURATELY FITTED, AND FREE FROM DISTORTIONS OR DEFECTS.

9. AFTER ERECTION OF STRUCTURES, TOUCHUP ALL WELDS, ABRASIONS AND NON-GALVANIZED SURFACES WITH A 95% ORGANIC ZINC RICH PAINT IN ACCORDANCE WITH ASTM 780.

10. ALL STEEL MATERIAL (EXPOSED TO WEATHER) SHALL BE GALVANIZED AFTER FABRICATION IN ACCORDANCE WITH ASTM A123 "ZINC (HOT DIPPED GALVANIZED) COATINGS" ON IRONS AND STEEL PRODUCTS.

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

12. CONTRACTOR SHALL COMPLY WITH AWS CODE FOR PROCEDURES APPEARANCE AND QUALITY OF WELDS, AND WELDING PROCESSES SHALL BE QUALIFIED IN ACCORDANCE WITH AWS "STANDARD QUALIFICATION PROCEDURES". ALL WELDING SHALL BE DONE USING THE SCHEDULED ELECTRODES AND WELDING SHALL CONFORM TO AISC AND D1.1 WHERE FILLET WELD SIZES ARE NOT SHOWN, PROVIDE THE MINIMUM SIZE PER TABLET J2.4 IN THE AISC "MANUAL OF STEEL CONSTRUCTION" 9TH EDITION. AT THE COMPLETION OF WELDING, ALL DAMAGE TO GALVANIZED COATING SHALL BE REPAIRED.

13. THE ENGINEER SHALL BE NOTIFIED OF ANY INCORRECTLY FABRICATED, DAMAGED OR OTHERWISE MISFITTING OR NON CONFORMING MATERIALS OR CONDITIONS TO REMEDIAL OR CORRECTIVE ACTION. ANY SUCH ACTION SHALL REQUIRE ENGINEER REVIEW.

14. CONNECTION ANGLES SHALL HAVE A MINIMUM THICKNESS OF 1/4 INCHES.

15. STRUCTURAL CONNECTION BOLTS SHALL CONFORM TO ASTM A325. ALL BOLTS SHALL BE 3/4" DIAMETER MINIMUM AND SHALL HAVE A MINIMUM OF TWO BOLTS, UNLESS OTHERWISE ON THE DRAWINGS.

16. ALL BOLTS SHALL BE INSTALLED PER THE REQUIREMENTS OF AISC 14TH EDITION & RCSC "SPECIFICATION FOR STRUCTURAL JOINTS USING HIGH STRENGTH BOLTS".

17. ALL BOLTS SHALL BE INSTALLED AS SNUG-TIGHT CONNECTIONS UNLESS OTHERWISE INDICATED. CONNECTIONS SPECIFIED AS PRETENSIONED OR SLIP-CRITICAL SHALL BE TIGHTENED TO A BOLT TENSION NOT LESS THAN THAT GIVEN IN TABLE J3.1 OF AISC 14TH EDITION.

18. LOCK WASHER ARE NOT PERMITTED FOR A325 BOLTED STEEL ASSEMBLIES.

19. LOAD INDICATOR WASHERS SHALL BE UTILIZED ON ALL PRETENSIONED OR SLIP-CRITICAL CONNECTIONS.

20. SHOP CONNECTIONS SHALL BE WELDED OR HIGH STRENGTH BOLTED.

21. MILL BEARING ENDS OF COLUMNS, STIFFENERS, AND OTHER BEARING SURFACES TO TRANSFER LOAD OVER ENTIRE CROSS SECTION.

22. FABRICATE BEAMS WITH MILL CAMBER UP.

23. LEVEL AND PLUMB INDIVIDUAL MEMBERS OF THE STRUCTURE TO AN ACCURACY OF 1:500, BUT NOT TO EXCEED 1/4" IN THE FULL HEIGHT OF THE COLUMN.

24. COMMENCEMENT OF STRUCTURAL STEEL WORK WITHOUT NOTIFYING THE ENGINEER OF ANY DISCREPANCIES WILL BE CONSIDERED ACCEPTANCE OF PRECEDING WORK.

DESIGNED BY:		T.L.
DRAWN BY:		T.L.
CHK'D BY:		CPD
1	3/20/14	T.L.
0	1/27/14	T.L.
REV	DATE	DRAWN BY/CHK'D BY DESCRIPTION

ISSUED FOR CONSTRUCTION
ISSUED FOR CONSTRUCTION

PROFESSIONAL ENGINEER SEAL

CBNTEK consulting

T-Mobile

T-MOBILE
CT11-426A
CLAP STRUCTURE 1321

DATE:	01/27/14
SCALE:	AS SHOWN
JOB NO.	13317.000

STRUCTURAL STEEL NOTES

SHEET NO.
N-2

MODIFICATION INSPECTION REPORT REQUIREMENTS

PRE-CONSTUCTION		DURING CONSTRUCTION		POST-CONSTRUCTION	
SCHEDULED ITEM	REPORT ITEM	SCHEDULED ITEM	REPORT ITEM	SCHEDULED ITEM	REPORT ITEM
X	EOR MODIFICATION INSPECTION DRAWING	-	FOUNDATIONS	X	MODIFICATION INSPECTOR RECORD REDLINE DRAWING
X	EOR APPROVED SHOP DRAWINGS	-	EARTHWORK/ BACKFILL MATERIAL & COMPACTION	-	POST-INSTALLED ANCHOR ROD PULL-OUT TEST
-	EOR APPROVED POST-INSTALLED ANCHOR MPII	-	REBAR & FORMWORK GEOMETRY VERIFICATION	X	PHOTOGRAPHS
-	FABRICATION INSPECTION	-	CONCRETE TESTING		
-	FABRICATOR CERTIFIED WELDER INSPECTION	X	STEEL INSPECTION		
X	MATERIAL CERTIFICATIONS	-	POST INSTALLED ANCHOR ROD VERIFICATION		
		-	BASE PLATE GROUT VERIFICATION		
		-	CONTRACTOR'S CERTIFIED WELD INSPECTION		
		X	ON-SITE COLD GALVANIZING VERIFICATION		
		X	CONTRACTOR AS-BUILT REDLINE DRAWINGS		

NOTES:
1. REFER TO MODIFICATION INSPECTION NOTES FOR ADDITIONAL REQUIREMENTS
2. 'X' DENOTES DOCUMENT REQUIRED FOR INCLUSION IN MODIFICATION INSPECTION FINAL REPORT.
3. '-' DENOTES DOCUMENT NOT REQUIRED FOR INCLUSION IN MODIFICATION INSPECTION FINAL REPORT.
4. EOR - ENGINEER OF RECORD
4. MPII - 'MANUFACTURER'S PRINTED INSTALLATION GUIDELINES'

GENERAL

1. THE MODIFICATION INSPECTION IS A VISUAL INSPECTION OF STRUCTURAL MODIFICATIONS, TO INCLUDE A REVIEW AND COMPILATION OF SPECIFIED SUBMITTALS AND CONSTRUCTION INSPECTIONS, AS AN ASSURANCE OF COMPLIANCE WITH THE CONSTRUCTION DOCUMENTS PREPARED UNDER THE DIRECTION OF THE ENGINEER OF RECORD (EOR).
2. THE MODIFICATION INSPECTION IS TO CONFIRM INSTALLATION CONFIGURATION AND GENERAL WORKMANSHIP AND IS NOT A REVIEW OF THE MODIFICATION DESIGN. OWNERSHIP OF THE MODIFICATION DESIGN EFFECTIVENESS AND INTENT RESIDES WITH THE ENGINEER OF RECORD.
3. TO ENSURE COMPLIANCE WITH THE MODIFICATION INSPECTION REQUIREMENTS THE GENERAL CONTRACTOR (GC) AND THE MODIFICATION INSPECTOR (MI) COMMENCE COMMUNICATION UPON AUTHORIZATION TO PROCEED BY THE CLIENT. EACH PARTY SHALL BE PROACTIVE IN CONTACTING THE OTHER. THE EOR SHALL BE CONTACTED IF SPECIFIC GC/MI CONTACT INFORMATION IS NOT MADE AVAILABLE.
4. THE GC SHALL PROVIDE THE MI WITH A MINIMUM OF 5 BUSINESS DAYS NOTICE OF IMPENDING INSPECTIONS.
5. WHEN POSSIBLE, THE GC AND MI SHALL BE ON SITE DURING THE MODIFICATION INSPECTION TO HAVE ANY NOTED DEFICIENCIES ADDRESSED DURING THE INITIAL MODIFICATION INSPECTION.

MODIFICATION INSPECTOR (MI)

1. THE MI SHALL CONTACT THE GC UPON AUTHORIZATION BY THE CLIENT TO:

   - REVIEW THE MODIFICATION INSPECTION REPORT REQUIREMENTS.
   - WORK WITH THE GC IN DEVELOPMENT OF A SCHEDULE FOR ON-SITE INSPECTIONS.
   - DISCUSS CRITICAL INSPECTIONS AND PROJECT CONCERNS.

2. THE MI IS RESPONSIBLE FOR COLLECTION OF ALL INSPECTION AND TEST REPORTS, REVIEWING REPORTS FOR ADHERENCE TO THE CONTRACT DOCUMENTS, CONDUCTING ON-SITE INSPECTIONS AND COMPILATION & SUBMISSION OF THE MODIFICATION INSPECTION REPORT TO THE CLIENT AND THE EOR.

GENERAL CONTRACTOR (GC)

1. THE GC IS REQUIRED TO CONTACT THE GC UPON AUTHORIZATION TO PROCEED WITH CONSTRUCTION BY THE CLIENT TO:

   - REVIEW THE MODIFICATION INSPECTION REPORT REQUIREMENTS.
   - WORK WITH THE MI IN DEVELOPMENT OF A SCHEDULE FOR ON-SITE INSPECTIONS.
   - DISCUSS CRITICAL INSPECTIONS AND PROJECT CONCERNS.

2. THE GC IS RESPONSIBLE FOR COORDINATING AND SCHEDULING IN ADVANCE ALL REQUIRED INSPECTIONS AND TESTS WITH THE MI.

CORRECTION OF FAILING MODIFICATION INSPECTION

1. SHOULD THE STRUCTURAL MODIFICATION NOT COMPLY WITH THE REQUIREMENTS OF THE CONSTRUCTION DOCUMENTS, THE GC SHALL WORK WITH THE MODIFICATION INSPECTOR IN A VIABLE REMEDIATION PLAN AS FOLLOWS:

   - CORRECT ALL DEFICIENCIES TO COMPLY WITH THE CONTRACT DOCUMENTS AND COORDINATE WITH THE MI FOR A FOLLOW UP INSPECTION.
   - WITH CLIENT AUTHORIZATION, THE GC MAY WORK WITH THE EOR TO REANALYZE THE MODIFICATION USING THE AS-BUILT CONDITION.

REQUIRED PHOTOGRAPHS

1. THE GC AND MI SHALL AT MINIMUM PHOTO DOCUMENT THE FOLLOWING FOR INCLUSION IN THE MODIFICATION INSPECTION REPORT:

   - PRE-CONSTRUCTION: GENERAL CONDITION OF THE SITE.
   - DURING CONSTRUCTION: RAW MATERIALS, CRITICAL DETAILS, WELD PREPARATION, BOLT INSTALLATION & TORQUE, FINAL INSTALLED CONDITION & SURFACE COATING REPAIRS.
   - POST-CONSTRUCTION: FINAL CONDITION OF THE SITE

DESIGNED BY: TJL
DRAWN BY: TJL
CHK'D BY: DFC

NO.	DATE	WHEN & WHAT IS REVISED
1	3/20/15	ISSUED FOR CONSTRUCTION
0	1/27/14	ISSUED FOR CONSTRUCTION

PROFESSIONAL ENGINEER SEAL

CENTEK engineering

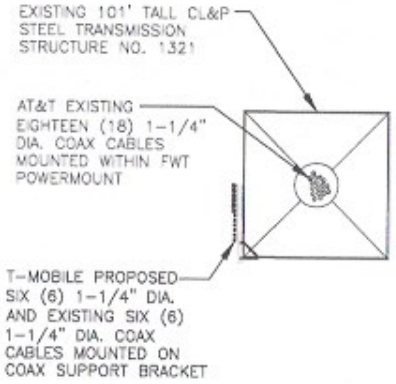
T-Mobile

T-MOBILE
CT11-426A
CL&P STRUCTURE 1321

DATE: 01/27/14
SCALE: AS SHOWN
JOB NO. 13317.000

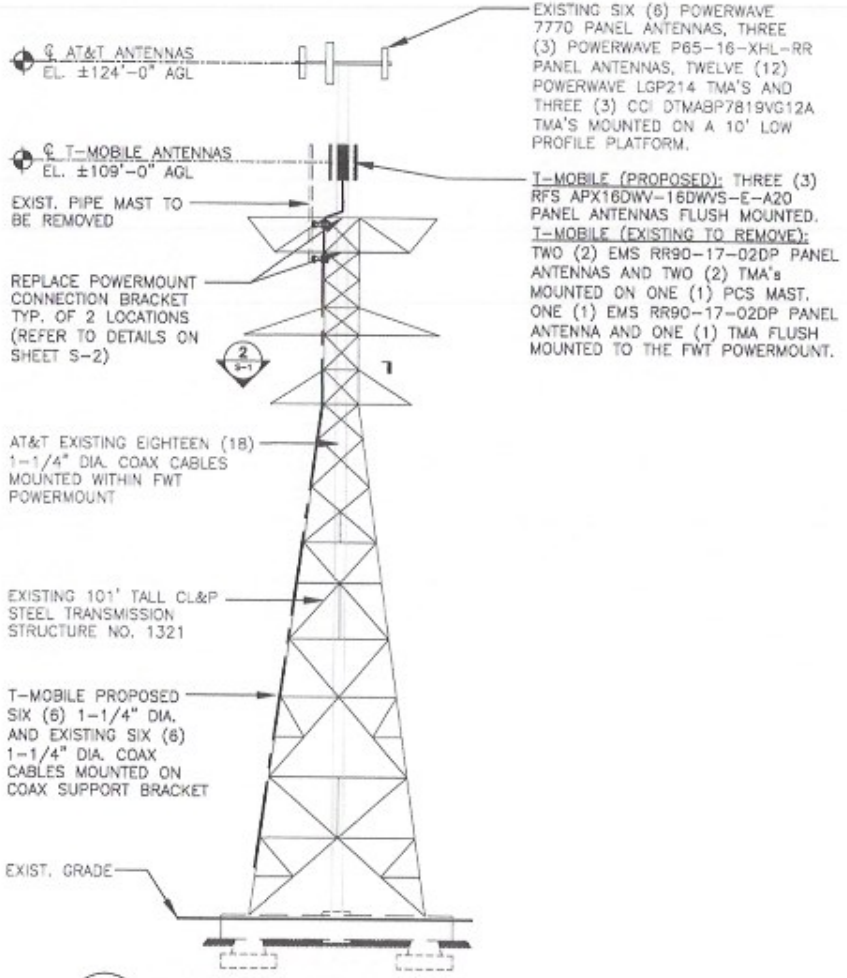
MODIFICATION INSPECTION REQUIREMENTS

SHEET NO.
MI-1
Sheet No. 1 of 1



2 / S-1 COAX CABLE PLAN

SCALE: NOT TO SCALE



1 / S-1 TOWER & MAST ELEVATION

SCALE: NOT TO SCALE

DESIGNED BY: TJL
DRAWN BY: TJL
CHK'D BY: CFC

NO.	DATE	BY	DESCRIPTION
1	12/20/13	TJL	ISSUED FOR CONSTRUCTION
0	1/27/14	CFC	ISSUED FOR CONSTRUCTION

PROFESSIONAL ENGINEER SEAL

CBTEK

T-Mobile

T-MOBILE

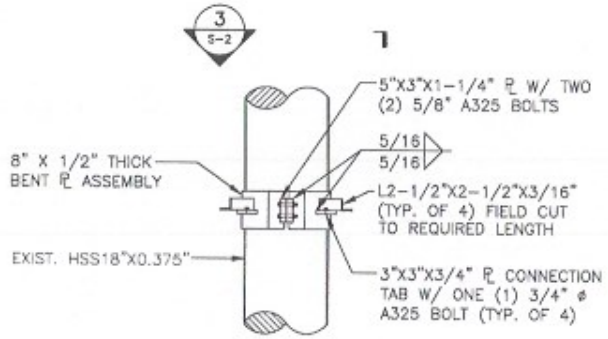
CT11-426A

CL&P STRUCTURE 1321

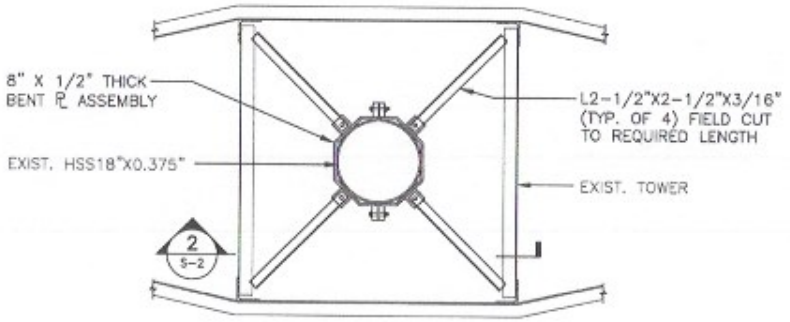
DATE: 01/27/14
SCALE: AS SHOWN
JOB NO.: 13317.000

TOWER ELEVATION AND FEEDLINE PLAN

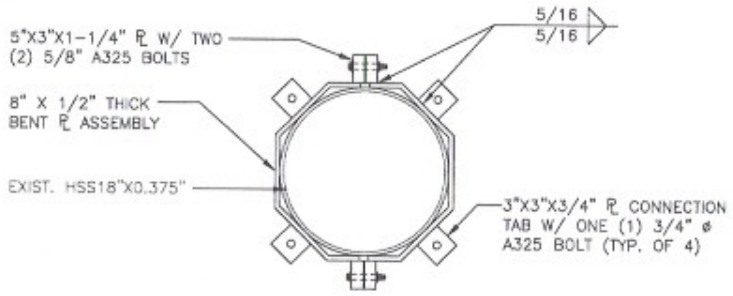
SHEET NO.
S-1
Sheet No. 3 of 3



2 S-2 **BRACKET ELEVATION**
SCALE: 1/2" = 1'-0"



1 S-2 **BRACKET PLAN**
SCALE: 1/2" = 1'-0"



3 S-2 **BRACKET DETAIL**
SCALE: 1" = 1'-0"

DESIGNED BY:	TJL
DRAWN BY:	TJL
CHK'D BY:	DFD

REV.	DATE	ISSUED BY	DESCRIPTION
1	2/26/14	TJL	ISSUED FOR CONSTRUCTION
0	1/27/14	TJL	ISSUED FOR CONSTRUCTION

PROFESSIONAL ENGINEER SEAL

CBNTEK engineering
T-Mobile

T-MOBILE
CT11-426A
CLAP STRUCTURE 1321
69 CANAL STREET
BRISTOL CT 06010

DATE: 01/27/14
SCALE: AS SHOWN
JOB NO. 13217.000

POWER/MOUNT CONNECTION DETAILS

SHEET NO.
S-2
Sheet No. 2 of 5

EBI Consulting
environmental | engineering | due diligence

RADIO FREQUENCY EMISSIONS ANALYSIS REPORT
EVALUATION OF HUMAN EXPOSURE POTENTIAL TO NON-IONIZING EMISSIONS

T-Mobile Existing Facility

Site ID: CT11426A

Stratford / MP / James Farm
670 Chapel Street
Stratford, CT 06614

March 12, 2014

EBI Project Number: 62141454

21 B Street Burlington, MA 01803 Tel: (781) 273.2500 Fax: (781) 273.3311

EBI Consulting
environmental | engineering | due diligence

March 12, 2014

T-Mobile USA
Attn: Jason Overbey, RF Manager
35 Griffin Road South
Bloomfield, CT 06002

Re: Emissions Values for Site: **CT11426A - Stratford / MP / James Farm**

EBI Consulting was directed to analyze the proposed T-Mobile facility located at 670 Chapel Street, Stratford, CT, for the purpose of determining whether the emissions from the Proposed T-Mobile Antenna Installation located on this property are within specified federal limits.

All information used in this report was analyzed as a percentage of current Maximum Permissible Exposure (% MPE) as listed in the FCC OET Bulletin 65 Edition 97-01and ANSI/IEEE Std C95.1. The FCC regulates Maximum Permissible Exposure in units of microwatts per square centimeter (μW/cm2). The number of μW/cm2 calculated at each sample point is called the power density. The exposure limit for power density varies depending upon the frequencies being utilized. Wireless Carriers and Paging Services use different frequency bands each with different exposure limits, therefore it is necessary to report results and limits in terms of percent MPE rather than power density.

All results were compared to the FCC (Federal Communications Commission) radio frequency exposure rules, 47 CFR 1.1307(b)(1) – (b)(3), to determine compliance with the Maximum Permissible Exposure (MPE) limits for General Population/Uncontrolled environments as defined below.

General population/uncontrolled exposure limits apply to situations in which the general public may be exposed or in which persons who are exposed as a consequence of their employment may not be made fully aware of the potential for exposure or cannot exercise control over their exposure. Therefore, members of the general public would always be considered under this category when exposure is not employment related, for example, in the case of a telecommunications tower that exposes persons in a nearby residential area.

Public exposure to radio frequencies is regulated and enforced in units of microwatts per square centimeter (μW/cm2). The general population exposure limit for the cellular band is 567 μW/cm2, and the general population exposure limit for the PCS band is 1000 μW/cm2. Because each carrier will be using different frequency bands, and each frequency band has different exposure limits, it is necessary to report percent of MPE rather than power density.

Occupational/controlled exposure limits apply to situations in which persons are exposed as a consequence of their employment and in which those persons who are exposed have been made fully aware of the potential for exposure and can exercise control over their exposure. Occupational/controlled exposure limits also apply where exposure is of a transient nature as a result of incidental passage through a location where exposure levels may be above general population/uncontrolled limits (see below), as long as the exposed person has been made fully aware of the potential for exposure and can exercise control over his or her exposure by leaving the area or by some other appropriate means.

Additional details can be found in FCC OET 65.

CALCULATIONS

Calculations were done for the proposed T-Mobile Wireless antenna facility located at 670 Chapel Street, Stratford, CT, using the equipment information listed below. All calculations were performed per the specifications under FCC OET 65. Since T-Mobile is proposing highly focused directional panel antennas, which project most of the emitted energy out toward the horizon, the actual antenna pattern gain value in the direction of the sample area was used. For this report the sample point is a 6 foot person standing at the base of the tower

For all calculations, all equipment was calculated using the following assumptions:

1) 2 GSM channels (1940.000 MHz—to 1950.000 MHz) were considered for each sector of the proposed installation.
2) 2 UMTS channels (2110.000 MHz to 2120.000 MHz / 2140.000 MHz to 2145.000 MHz) were considered for each sector of the proposed installation
3) 2 LTE channels (2110.000 MHz to 2120.000 MHz / 2140.000 MHz to 2145.000 MHz) were considered for each sector of the proposed installation
4) All radios at the proposed installation were considered to be running at full power and were uncombined in their RF transmissions paths per carrier prescribed configuration. Per FCC OET Bulletin No. 65 - Edition 97-01 recommendations to achieve the maximum anticipated value at each sample point, all power levels emitting from the proposed antenna installation are increased by a factor of 2.56 to account for possible in-phase reflections from the surrounding environment. This is rarely the case, and if so, is never continuous.
5) For the following calculations the sample point was the top of a six foot person standing at the base of the tower. The actual gain in this direction was used per the manufactures supplied specifications.
6) The antenna used in this modeling is the RFS APX16DWV-16DWVS-E-A20 for LTE, UMTS and GSM. This is based on feedback from the carrier with regards to anticipated antenna selection. This antenna has a 16.3 dBd gain value at its main lobe. Actual antenna gain values were used for all calculations as per the manufacturers specifications

7) The antenna mounting height centerline of the proposed antennas is **109 feet** above ground level (AGL)
8) Emissions values for additional carriers were taken from the Connecticut Siting Council active database. Values in this database are provided by the individual carriers themselves.

All calculation were done with respect to uncontrolled / general public threshold limits

Site ID	CT11426A - Stratford / MP / James Farm
Site Address	670 Chapel Street, Stratford, CT 06614
Site Type	Transmission Tower

Sector 1

Antenna Number	Antenna Make	Antenna Model	Status	Frequency Band	Technology	Power Out Per Channel (Watts)	Number of Channels	Composite Power	Antenna Gain in direction of sample point (dBd)	Antenna Height (ft)	analysis height	Cable Size	Cable Loss (dB)	Additional Loss	ERP	Power Density Value	Power Density Percentage
1a	RFS	APX16DWV-16DWVS-E-A20	Active	PCS - 1950 MHz	GSM / UMTS	30	2	60	-3.25	109	103	7/8"	1.2	0	21.535316	0.729765	0.07298%
1B	RFS	APX16DWV-16DWVS-E-A20	Active	AWS - 2100 MHz	UMTS/LTE	40	4	160	-3.25	109	103	7/8"	1.2	0	57.42751	1.946039	0.19460%
														Sector total Power Density Value:		0.268%	

Sector 2

Antenna Number	Antenna Make	Antenna Model	Status	Frequency Band	Technology	Power Out Per Channel (Watts)	Number of Channels	Composite Power	Antenna Gain in direction of sample point (dBd)	Antenna Height (ft)	analysis height	Cable Size	Cable Loss (dB)	Additional Loss	ERP	Power Density Value	Power Density Percentage
1a	RFS	APX16DWV-16DWVS-E-A20	Active	PCS - 1950 MHz	GSM / UMTS	30	2	60	-3.25	109	103	7/8"	1.2	0	21.535316	0.729765	0.07298%
1B	RFS	APX16DWV-16DWVS-E-A20	Active	AWS - 2100 MHz	UMTS/LTE	40	4	160	-3.25	109	103	1-5/8"	1.2	0	57.42751	1.946039	0.19460%
														Sector total Power Density Value:		0.268%	

Sector 3

Antenna Number	Antenna Make	Antenna Model	Status	Frequency Band	Technology	Power Out Per Channel (Watts)	Number of Channels	Composite Power	Antenna Gain in direction of sample point (dBd)	Antenna Height (ft)	analysis height	Cable Size	Cable Loss (dB)	Additional Loss	ERP	Power Density Value	Power Density Percentage
1a	RFS	APX16DWV-16DWVS-E-A20	Active	PCS - 1950 MHz	GSM / UMTS	30	2	60	-3.25	109	103	7/8"	1.2	0	21.535316	0.729765	0.07298%
1B	RFS	APX16DWV-16DWVS-E-A20	Active	AWS - 2100 MHz	UMTS/LTE	40	4	160	-3.25	109	103	1-5/8"	1.2	0	57.42751	1.946039	0.19460%
														Sector total Power Density Value:		0.268%	

Site Composite MPE %

Carrier	MPE %
T-Mobile	0.803%
AT&T	22.320%
Total Site MPE %	**23.123%**

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Summary

All calculations performed for this analysis yielded results that were well within the allowable limits for general public exposure to RF Emissions.

The anticipated Maximum Composite contributions from the T-Mobile facility are **0.803% (0.268% from each sector)** of the allowable FCC established general public limit considering all three sectors simultaneously.

The anticipated composite MPE value for this site assuming all carriers present is **23.123%** of the allowable FCC established general public limit. This is based upon values listed in the Connecticut Siting Council database for existing carrier emissions.

FCC guidelines state that if a site is found to be out of compliance (over allowable thresholds), that carriers over a 5% contribution to the composite value will require measures to bring the site into compliance. For this facility, the composite values calculated were within the allowable 100% threshold standard per the federal government.

Scott Heffernan
RF Engineering Director

EBI Consulting
21 B Street
Burlington, MA 01803