Centek Engineering, Inc.
3-2 North Branford Road
Branford, Connecticut 06405
Phone: (203) 488-0580
Fax: (203) 488-8587

Steven L. Levine
Real Estate Consultant

HAND DELIVERED

April 18, 2016

Attorney Melanie Bachman
Acting Executive Director
Connecticut Siting Council
10 Franklin Square
New Britain, Connecticut 06051

Notice of Exempt Modification: Existing Telecommunications Facility at Garden Circle (Farmdale Drive), Waterbury

Dear Ms. Bachman:

In order to accommodate technological changes, implement Uniform Mobile Telecommunications System ("UMTS") and/or Long Term Evolution ("LTE") capabilities, and enhance system performance in the State of Connecticut, New Cingular Wireless PCS, LLC ("AT&T") plans to modify the equipment configurations at many of its existing cell sites. Please accept this letter and attachments as notification, 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, copies of this letter are being sent to the chief elected official of the municipality in which the affected cell site is located, the property owner of record, and the tower owner or operator.

UMTS technology offers services to mobile computer and phone users anywhere in the world. Based on the Global System for Mobile ("GSM") communication standard, UMTS is the planned worldwide standard for mobile users. UMTS, fully implemented, gives computer and phone users high-speed access to the Internet as they travel. They have the same capabilities even when they roam, through both terrestrial wireless and satellite transmissions.

LTE is a high-performance air interface for cellular mobile communications. It is designed to increase the capacity and speed of mobile telephone networks.

Attached is a summary of the planned modifications, including power density calculations reflecting the change in AT&T's operations at the site. Also included is documentation of the structural sufficiency of the tower to accommodate the revised antenna configuration.

The changes to the facility do not constitute modifications as defined in Connecticut General Statutes ("C.G.S.") Section 16-50i(d) because the general physical and environmental characteristics of the site will not be significantly changed or altered. 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 not increase.

2. The proposed changes will not extend the site boundaries.

3. The proposed changes will not increase the noise level at the site boundary by six decibels or more, or to levels that exceed state and local criteria.

4. The changes will not add radio frequency sending or receiving capability which increases the total radio frequency electromagnetic radiation power density measured at the site boundary to or above the standards adopted by the Federal Communications Commission pursuant to Section 704 of the Telecommunications Act of 1996, as amended, and the State Department of Energy and Environmental Protection, pursuant to Section 22a-162 of the Connecticut General Statutes.

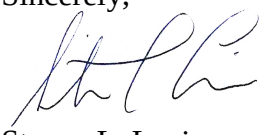
5. The proposed modifications will not cause a change or alteration in the physical or environmental characteristics of the site.

6. The proposed changes will not impair the structural integrity of the facility, as determined in a certification provided by a professional engineer licensed in Connecticut.

For the foregoing reasons, AT&T respectfully submits that the proposed changes at the referenced site constitute exempt modifications under R.C.S.A. Section 16-50j-72(b)(2).

Please feel free to call me at (860) 830-0380 with questions concerning this matter. Thank you for your consideration.

Sincerely,



Steven L. Levine
Real Estate Consultant

cc: TownCEO – Mayor Neil M. O'Leary, City of Waterbury
Property Owner of Record – AT&T
Tower Owner / Operator – American Tower Corporation (by email)

Attachments

NEW CINGULAR WIRELESS PCS, LLC
Equipment Modification

Garden Circle (Farmdale Drive), Waterbury, CT
Site Number 1005
Prior Decisions: Docket 44.5
EM's 4/89, 3/94, 8/02, 7/07, 5/12, 6/13, 5/14, 6/15

Tower Owner/Manager: American Tower

Property Owner: AT&T

Original Permitting: The Garden Circle (Farmdale Drive), Waterbury site was approved by the Council in 1984 in Docket 44.5, the tower not to exceed 167 feet in height. Please refer to the attached Decision & Order. Proposed equipment modifications will not violate any of the approval conditions.

Lease Area: The Garden Circle (Farmdale Drive), Waterbury site was approved by the Council in Docket 44.5 with a 70 ft x 70 ft lease area. (See attached site plan from Docket 44.5 Application.) Subsequently, on 3/30/94 the Council approved an exempt modification expanding the lease and fenced areas to 70 ft x 100 ft, as shown in the current construction drawings ("CD's"; attached) to accommodate colocation by Verizon. No further changes have been made to the site's lease and fenced areas. Since all proposed equipment modifications will occur either on the existing tower structure or within AT&T's existing equipment shelter, the proposed modifications will not extend either the lease area or the overall site boundaries.

Equipment configuration: 155 ft. Guyed Monopole

Current and/or approved:
Equipment platform @ 150 ft
Three PowerWave 7770 antennas @ 153 ft c.l.
Three CCI OPA-65R-LCUU-H6 antennas @ 153 ft c.l.
Three CCI OPA-65R-LCUU-H8 antennas @ 153 ft c.l.
Twelve TMA's @ 153 ft
Nine remote radio heads @ 153 ft
Two Raycap DC6-48-60-18-8F surge arrestors @ 153 ft
Twelve lines 1¼ inch coax
Two fiber and four DC control cables
Equipment shelter
Diesel generator on concrete pad

Proposed modifications:
Remove two CCI OPA-65R-LCUU-H6 antennas.
Remove one CCI OPA-65R-LCUU-H8 antenna.
Remove three RRUS-11 remote radio heads.
Install two CCI TPA-65R-LCUUUU-H8 antennas @ 153 ft c.l.
Install one Quintel QS66512-3 antenna @ 153 ft c.l.
Install three RRUS-32 remote radio heads @ 153 ft c.l.

Power Density:

Worst-case calculations with 10 dB reduction for existing wireless operations at the site indicate a radio frequency electromagnetic radiation power density, measured at six feet above ground level beside the tower, of approximately 3.8 % of the standard adopted by the FCC. As depicted in the second table below, the total radio frequency electromagnetic radiation power density following proposed modifications would be approximately 5.3 % of the standard.

Existing

Company	Frequency (MHz)	Centerline Ht (feet)	Number of Channels	Power Per Channel (Watts)	Power Density (mW/cm^2)	Standard Limits (mW/cm^2)	Percent of Limit
Other Users *							2.63
AT&T LTE †	740	154	1	500	0.0082	0.4933	0.17
AT&T LTE †	880	154	1	500	0.0082	0.5867	0.14
AT&T LTE †	1900	154	1	500	0.0082	1.0000	0.08
AT&T LTE †	2300	154	1	500	0.0082	1.0000	0.08
AT&T UMTS †	880	154	3	500	0.0246	0.5867	0.42
AT&T UMTS †	1900	154	1	500	0.0082	1.0000	0.08
AT&T GSM †	880	154	1	296	0.0049	0.5867	0.08
AT&T GSM †	1900	154	1	427	0.0070	1.0000	0.07
Total							**3.76%**

***** Per CSC records. † Source of AT&T Data is EM-CING-151-150605.

Proposed

Company	Frequency (MHz)	Antenna (Total for all sectors)	Centerline Ht (feet)	Number of Channels	Power Per Channel (Watts)	Power Density (mW/cm^2)	Standard Limits (mW/cm^2)	Percent of Limit
Other Users *								2.63
AT&T LTE	740	CCI TPA 2 antennas Quintel 1 antenna	153	2	1476	0.0491	0.4933	1.00
AT&T LTE	1900	CCI TPA 2 antennas Quintel 1 antenna	153	2	2421	0.0806	1.0000	0.81
AT&T LTE	2300	CCI OPA H8 2 antennas CCI OPA H6 1 antenna	153	2	1146	0.0381	1.0000	0.38
AT&T UMTS	880	PW 7770 3 antennas	153	3	261	0.0130	0.5867	0.22
AT&T UMTS	1900	PW 7770 3 antennas	153	2	424	0.0141	1.0000	0.14
AT&T GSM	880	CCI OPA H8 2 antennas CCI OPA H6 1 antenna	153	1	261	0.0043	0.5867	0.07
Total								**5.25%**

***** Per CSC records

Structural information:

The attached structural analysis (American Tower Corp., 4/12/16) demonstrates that the tower and foundation are adequate to accommodate the proposed equipment modifications.

Docket 44 Excerpt

DOCKET NO. 44

AN APPLICATION SUBMITTED BY THE SOUTHERN NEW ENGLAND TELEPHONE COMPANY FOR A CERTIFICATE OF ENVIRONMENTAL COMPATIBILITY AND PUBLIC NEED FOR THE CONSTRUCTION, MAINTENANCE AND OPERATION OF FACILITIES TO PROVIDE CELLULAR SERVICE IN NEW HAVEN COUNTY	:	CONNECTICUT SITING COUNCIL July 24, 1984

D E C I S I O N A N D O R D E R

Pursuant to the foregoing opinion, the Council hereby directs that a certificate of environmental compatibility and public need as required by section 16-50k of the General Statutes of Connecticut, revisions of 1958, revised to 1983, as amended, be issued to the Southern New England Telephone Company for the construction, operation, and maintenance of a telecommunications tower and associated equipment to provide cellular service at each of the following sites:

Jasudowich tract, Brushy Plain Road, Branford, Connecticut;
Town of Guilford tract, Tanner Marsh Road, Guilford, Connecticut;
Bridgeport Avenue, Milford, Connecticut;
Quagliaro tract, Farmdale Drive, Waterbury, Connecticut;
Pease Road, Woodbridge, Connecticut; and
Dwight Street, North Haven, Connecticut.

The facilities shall be constructed, operated, and maintained as specified in the Council's record on this matter, and subject to the following conditions:

1. The towers including antennas shall be no taller than necessary to provide the proposed service and in no event shall exceed

   a) 167' at the Branford site,
   b) 167' at the Guilford site,
   c) 117' at the Milford site,
   d) 167' at the Waterbury site,
   e) 167' at the Woodbridge site,
   f) 167' at the North Haven site;

2. A fence not lower than eight feet shall surround each tower and its associated equipment;

3. The applicant or its successor shall notify the Council if and when directional antennas or any other equipment is added to any of these facilities;
4. The applicant or its successor shall permit, in accordance with representations made by it during the proceeding, public or private entities to share space on the facilities, for due consideration received, or shall provide any requesting entity with specific legal, technical, environmental, or economic reasons precluding such tower sharing;
5. Unless necessary to comply with condition number six, below, no lights shall be installed on any of these towers;
6. The facilities shall be constructed in accordance with all applicable federal, state, and municipal laws and regulations;
7. The applicant shall submit a development and management plan (D&M) for the Branford, Milford, Woodbridge, and North Haven sites pursuant to sections 16-50j-85 through 16-50j-87 of the regulations of state agencies, except that irrelevant items in section 16-50j-86 need only be identified as such. The D&M plans shall include appropriate evergreen screening of the sites, erosion control measures, reseeding plans, and tree removal plans. The applicant shall comply with the reporting requirements of section 16-50j-87 for all sites;
8. Construction activities shall take place during daylight working hours;
9. This decision and order shall be void and the towers and associated equipment approved herein shall be dismantled and removed, or reapplication for any new use shall be made to the Connecticut

Siting Council before any such new use is made, if the towers do not provide or permanently cease to provide cellular service following completion of construction;

10. This decision and order shall be void if all construction authorized is not completed within three years of the issuance of this decision.

Pursuant to section 16-50p of the General Statutes, we hereby direct that a copy of the opinion and decision and order be served on each person listed below. A notice of the issuance shall be published in the Hartford Courant, New Haven Register, and the Waterbury Republican.

The parties to this proceeding are

The Southern New England Telephone Company
Room 314
227 Church Street
New Haven, Connecticut 06506

(Applicant)

ATTENTION: Mr. Peter J. Tyrrell
Senior Attorney

(its attorney)

Town of Hamden
Peter F. Villano, Mayor
Shirley Gonzales, Town Planner

represented by:

Mr. Hugh Manke, Esquire
Office of the Town Attorney
Memorial Town Hall
2372 Whitney Avenue
Hamden, Connecticut 06518

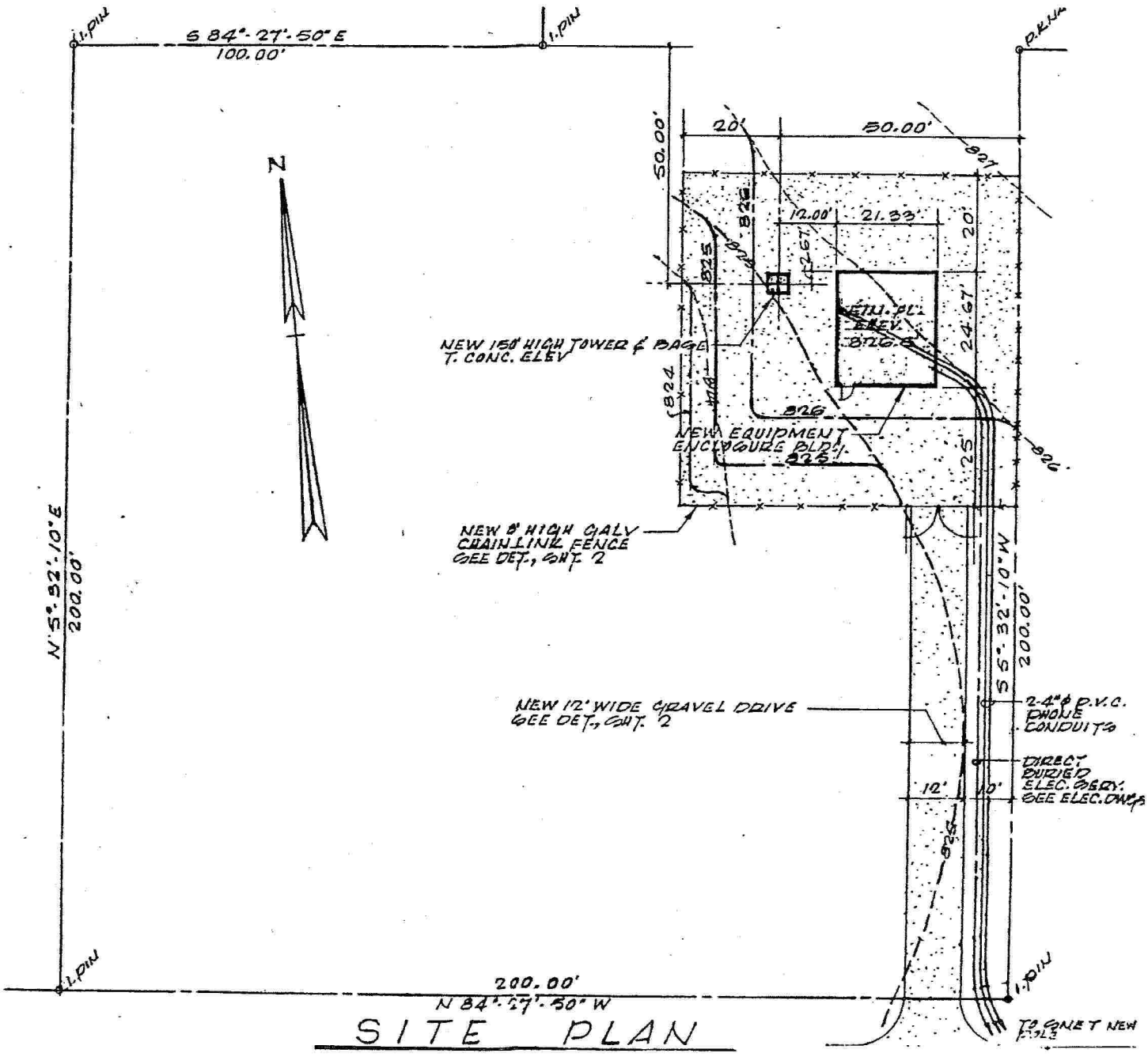
Inland Wetlands Agency
Town of Woodbridge

represented by:

Robert J. Klancko
Chairman
Town Hall
11 Meeting House Lane
Woodbridge, Connecticut 06525

Connecticut Siting Council Application

Southern New England Telephone Company



SITE PLAN

PROJECT INFORMATION

SCOPE OF WORK:	REMOVE & RELOCATE (1) EXISTING ANTENNA PER SECTOR, REMOVE & RELOCATE (1) EXISTING RRUS PER SECTOR
SITE ADDRESS:	FARMDALE DRIVE WATERBURY, CT 06704
LATITUDE:	41° 34' 14.4" (NAD 83)*
LONGITUDE:	73° 01' 3.3" (NAD 83)* *PER AT&T EXISTING PLANS
JURISDICTION:	CONNECTICUT SITING COUNCIL
CURRENT USE:	TELECOMMUNICATIONS FACILITY
PROPOSED USE:	TELECOMMUNICATIONS FACILITY
NAME OF APPLICANT:	AT&T MOBILITY 500 ENTERPRISE DRIVE, SUITE 3A ROCKY HILL, CT 06067
TOWER OWNER: TOWER NUMBER:	AMERICAN TOWER 302476

DRAWING INDEX

		REV
T01	TITLE SHEET	4
G01	GENERAL NOTES	4
A01	SITE PLAN & SHELTER LAYOUT	4
A02	ANTENNA LAYOUTS & ELEVATIONS	4
A03	CONSTRUCTION DETAILS	4
E01	GROUNDING DETAILS	4

THIS DOCUMENT WAS DEVELOPED TO REFLECT A SPECIFIC SITE AND ITS SITE CONDITIONS AND IS NOT TO BE USED FOR ANOTHER SITE OR WHEN OTHER CONDITIONS PERTAIN. REUSE OF THIS DOCUMENT IS AT THE SOLE RISK OF THE USER.

STRUCTURAL NOTE:

1. AS REQUIRED THE TIA/EIA 222F – STANDARD, SAI COMMUNICATIONS, INC. SHALL PROVIDE A STRUCTURAL ANALYSIS OF THE TOWER PREPARED BY A LICENSED CONNECTICUT STRUCTURAL ENGINEER CERTIFYING THAT, THE EXISTING TOWER AND ANY REQUIRED IMPROVEMENTS AND REINFORCEMENTS HAVE SUFFICIENT CAPACITY TO SUPPORT ALL EXISTING AND PROPOSED ANTENNAS, CABLES, SUPPORTS AND APPURTENANCES AND COMPLIES WITH THE CURRENT CONNECTICUT STATE BUILDING CODE AND EIA/TIA CRITERIA. THE CONTRACTOR IS RESPONSIBLE TO CONFIRM THAT ANY IMPROVEMENTS AND REINFORCEMENTS REQUIRED BY THE STRUCTURAL ANALYSIS CERTIFICATION ARE PROPERLY INSTALLED PRIOR TO THE ADDITION OF ANTENNAS, CABLES, SUPPORTS AND APPURTENANCES PROPOSED ON THESE DRAWINGS OR OTHERWISE NOTED IN THE STRUCTURAL ANALYSIS.

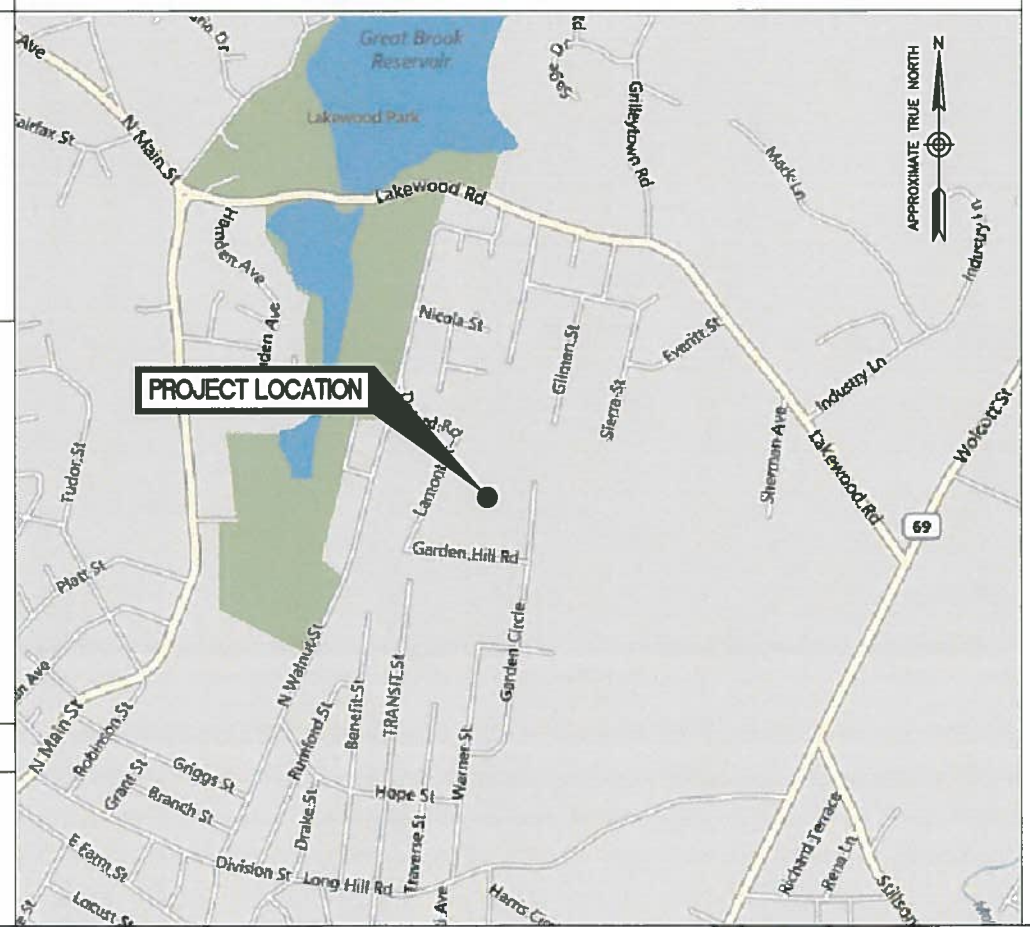
CONTACT INFORMATION

CONTACT	CONTACT	COMPANY	PHONE NO.
ENGINEERING:	GREG H. NAWROTZKI	DEWBERRY	(973) 576-9653
SAC:	WARREN KELLEHER	SAI	(978) 807-2700
CONST.:	SCOTT KELLEY	SAI	(978) 979-7638

SITE NAME: WOLCOTT WEST
SITE NUMBER: CT1005

VICINITY MAP

DIRECTIONS: (FROM ROCKY HILL, CT) HEAD NORTHEAST ON ENTERPRISE DR TOWARD CAPITOL BLVD. 0.3 MILES TURN LEFT ONTO CAPITOL BLVD. 0.2 MILES TURN LEFT ONTO WEST ST. 0.3 MILES MERGE ONTO I-81 S VIA RAMP ON THE LEFT TOWARD NEW HAVEN. 9.0 MILES MERGE ONTO I-691 W VIA EXIT 18 TOWARD MERIDEN/WATERBURY. 7.9 MILES MERGE ONTO I-84 W VIA EXIT 1 ON THE LEFT TOWARD WATERBURY/DANBURY. 7.4 MILES TAKE THE UNION ST EXIT TOWARD DOWNTOWN WATERBURY. STAY STRAIGHT TO GO ONTO BRASS MILL DR. BRASS MILL DR BECOMES WELTON ST. 0.1 MILES TURN RIGHT ONTO WALNUT ST. 0.8 MILES TURN RIGHT ONTO DELFORD RD. DELFORD RD BECOMES LAMONT ST. 0.1 MILES TURN LEFT ONTO GARDEN HILL RD. TURN LEFT ONTO GARDEN HILL CIRCLE. TURN LEFT ONTO FARMDALE DR. SITE IS ON THE RIGHT.



APPLICABLE BUILDING CODES AND STANDARDS

CONTRACTOR'S WORK SHALL COMPLY WITH PROJECT STANDARD NOTES, SYMBOLS AND DETAILS (SEE DRAWING INDEX FOR STANDARD NOTES AND DETAILS INCLUDED WITH TYPICAL DRAWING PACKAGE). CONTRACTOR WORK SHALL COMPLY WITH ALL APPLICABLE NATIONAL, STATE, AND LOCAL CODES AS ADOPTED BY THE LOCAL AUTHORITY HAVING JURISDICTION (AHJ) FOR THE LOCATION. THE EDITION OF THE AHJ ADOPTED CODES AND STANDARDS IN EFFECT ON THE DATE OF CONTRACT AWARD SHALL GOVERN THE DESIGN.

BUILDING CODE:
CONNECTICUT STATE BUILDING CODE (2005) & ALL SUBSEQUENT AMENDMENTS

ELECTRICAL CODE:
NATIONAL ELECTRICAL CODE (NEC 2005)

CONTRACTOR'S WORK SHALL COMPLY WITH THE LATEST EDITION OF THE FOLLOWING STANDARDS.
AMERICAN CONCRETE INSTITUTE (ACI) 318, BUILDING CODE REQUIREMENTS FOR STRUCTURAL CONCRETE
AMERICAN INSTITUTE OF STEEL CONSTRUCTION (AISC), MANUAL OF STEEL CONSTRUCTION, ASD, NINTH EDITION
TELECOMMUNICATIONS INDUSTRY ASSOCIATION (TIA) 222-F, STRUCTURAL STANDARDS FOR STEEL ANTENNA TOWER AND ANTENNA SUPPORTING STRUCTURES:
TIA 607, COMMERCIAL BUILDING GROUNDING AND BONDING REQUIREMENTS FOR TELECOMMUNICATIONS

INSTITUTE FOR ELECTRICAL AND ELECTRONICS ENGINEERS (IEEE) 81, GUIDE FOR MEASURING EARTH RESISTIVITY, GROUND IMPEDANCE, AND EARTH SURFACE POTENTIALS OF A GROUND SYSTEM
IEEE 1100 (1999) RECOMMENDED PRACTICE FOR POWERING AND GROUNDING OF ELECTRONIC EQUIPMENT

IEEE C62.41, RECOMMENDED PRACTICES ON SURGE VOLTAGES IN LOW VOLTAGE AC POWER CIRCUITS (FOR LOCATION CATEGORY "C3" AND "HIGH SYSTEM EXPOSURE")

TELCORDIA GR-1503, COAXIAL CABLE CONNECTIONS

ANSI T1.311, FOR TELECOM – DC POWER SYSTEMS – TELECOM, ENVIRONMENTAL PROTECTION

FOR ANY CONFLICTS BETWEEN SECTIONS OF LISTED CODES AND STANDARDS REGARDING MATERIAL, METHODS OF CONSTRUCTION, OR OTHER REQUIREMENTS, THE MOST RESTRICTIVE REQUIREMENT SHALL GOVERN. WHERE THERE IS CONFLICT BETWEEN A GENERAL REQUIREMENT AND A SPECIFIC REQUIREMENT, THE SPECIFIC REQUIREMENT SHALL GOVERN.

Dewberry
Dewberry Engineers Inc.
600 PARSIPPANY ROAD
SUITE 301
PARSIPPANY, NJ 07054
PHONE: 973.739.9400
FAX: 973.739.9710

SAI
27 NORTHWESTERN DRIVE
SALEM, NH 03079

WOLCOTT WEST
SITE NO. CT1005

FARMDALE DRIVE
WATERBURY, CT 06704

at&t
500 ENTERPRISE DRIVE,
SUITE 3A
ROCKY HILL, CT 06067

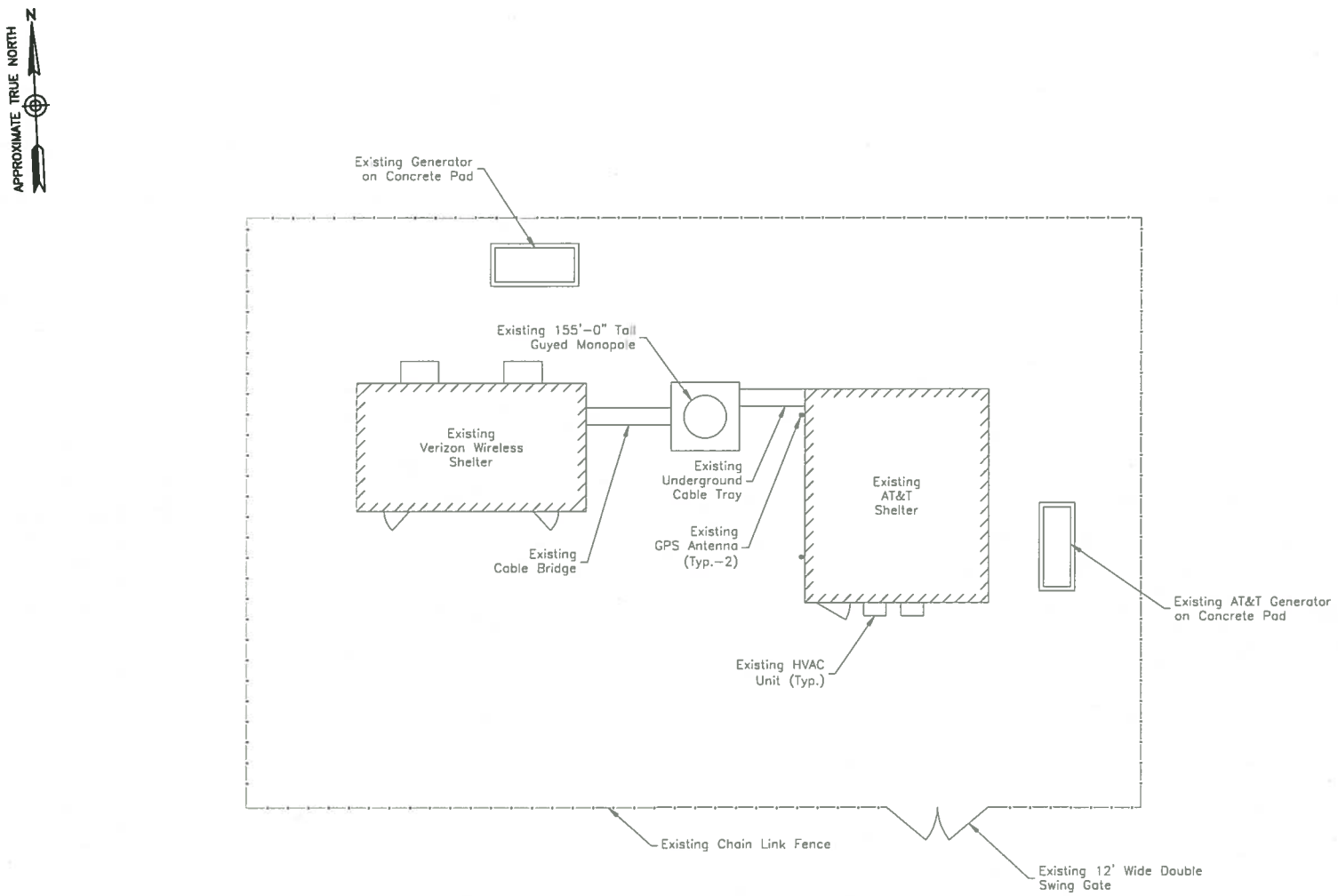
NO.	DATE	REVISIONS	BY	CHK	APP'D
4	04/07/16	FINAL	RSA	MCD	GHN
3	03/18/16	REVISED PER RF DESIGN	RSA	MCD	GHN
2	04/27/15	REVISED PER COMMENTS	RSA	PD	GHN
1	03/18/15	REVISED PER COMMENTS	RSA	PD	GHN
0	04/29/14	ISSUED FOR CONSTRUCTION	RSA	BSH	GHN

SCALE: AS SHOWN | DESIGNED BY: BSH | DRAWN BY: RSA

STATE OF CONNECTICUT
JIANG YU
32282
LICENSED PROFESSIONAL ENGINEER
CT LICENSE NUMBER

TITLE SHEET

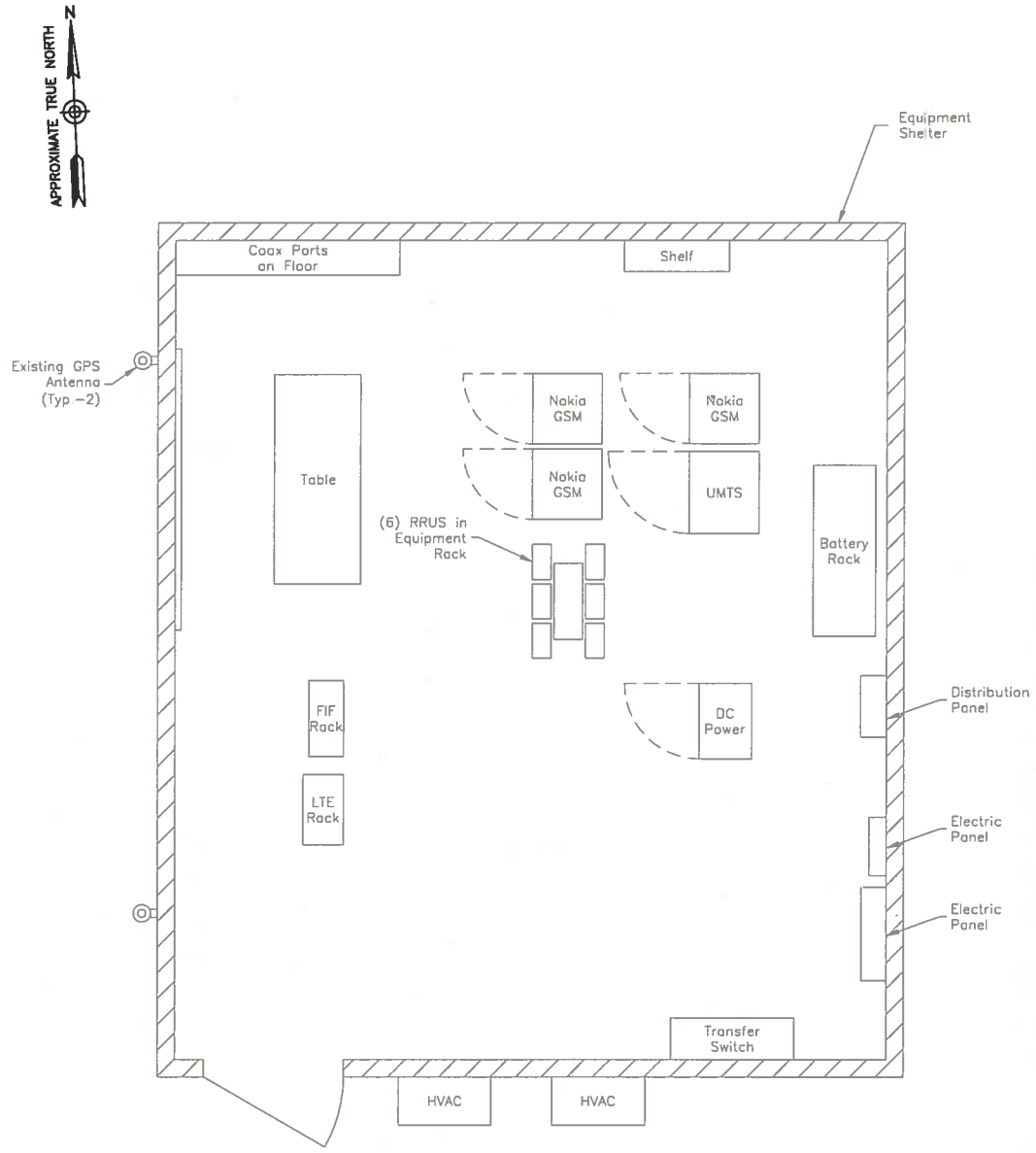
DEWBERRY NO.	DRAWING NUMBER	REV
50055106/50065666	T01	4



SITE PLAN 1

SCALE: 1"=20' FOR 11"x17"
1"=10' FOR 22"x34"

0' 10' 20'



SHELTER LAYOUT DETAIL 2

SCALE: 3/16"=1' FOR 11"x17"
3/8"=1' FOR 22"x34"

0' 2' 4' 6'

NOTES:

1. NORTH SHOWN AS APPROXIMATE.
2. MOUNT ALL ANTENNAS, COAX, SURGE ARRESTORS, RRU'S, ETC. IN ACCORDANCE WITH STRUCTURAL ANALYSIS BY OTHERS.
3. NOT ALL INFORMATION SHOWN FOR CLARITY.

Dewberry
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PARSIPPANY, NJ 07054
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SITE NO. CT1005

FARMDALE DRIVE
WATERBURY, CT 06704

at&t
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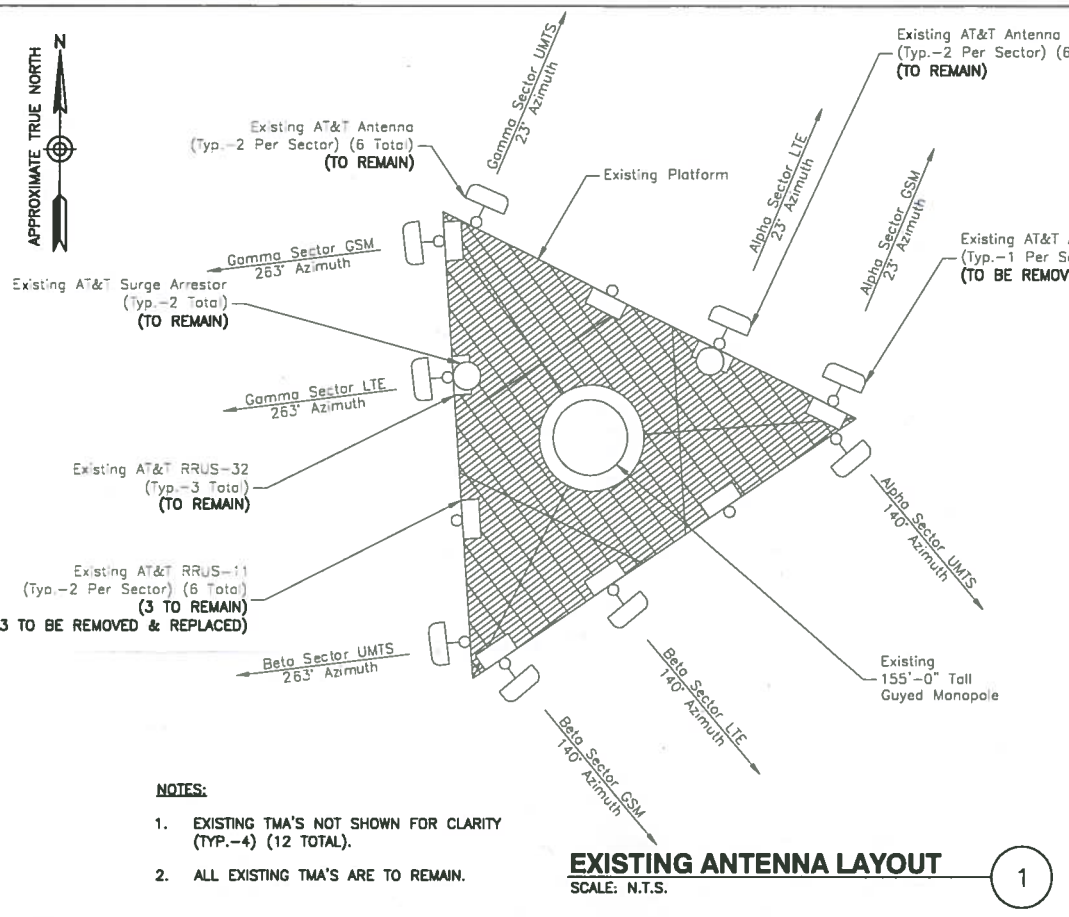
0	04/29/14	ISSUED FOR CONSTRUCTION	RSA	BSH	GHN

SCALE: AS SHOWN | DESIGNED BY: BSH | DRAWN BY: RSA

STATE OF CONNECTICUT
JIANG YU
No. 23222
LICENSED
PROFESSIONAL ENGINEER

SITE PLAN & SHELTER LAYOUT

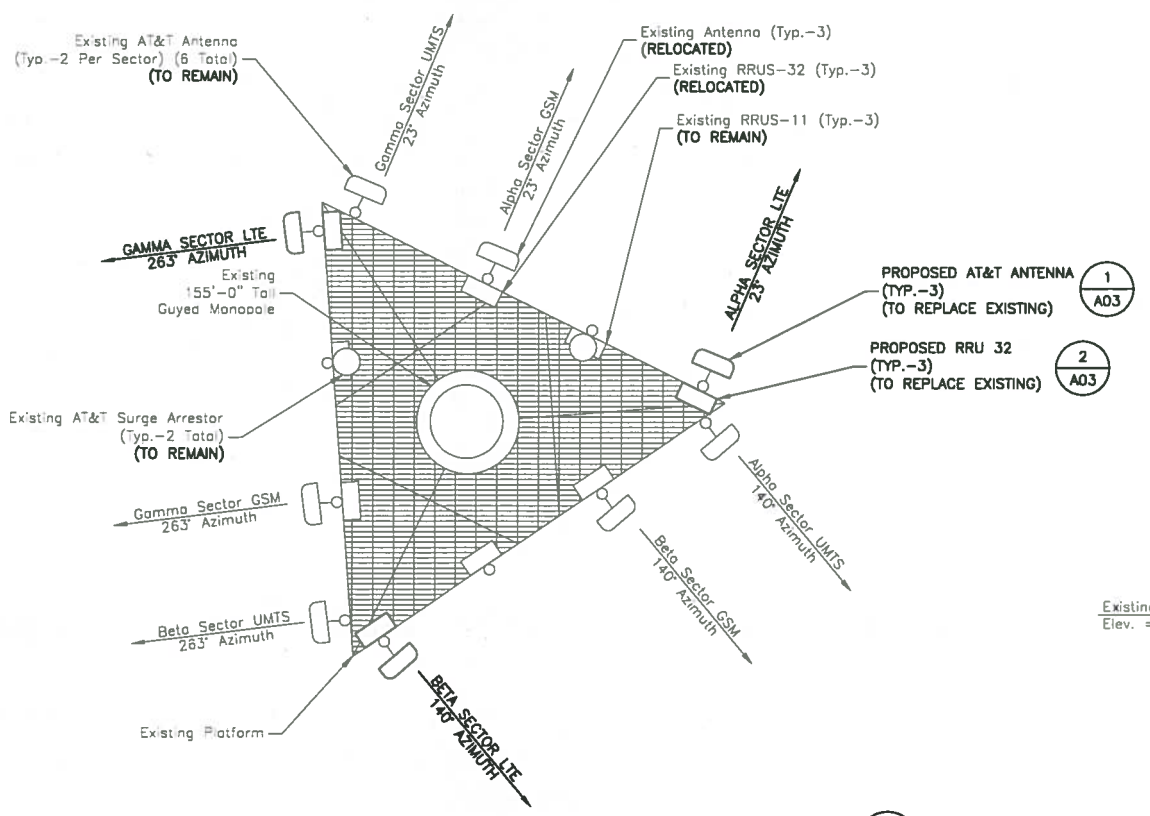
DEWBERRY NO.	DRAWING NUMBER	REV
50055106/50065666	A01	4



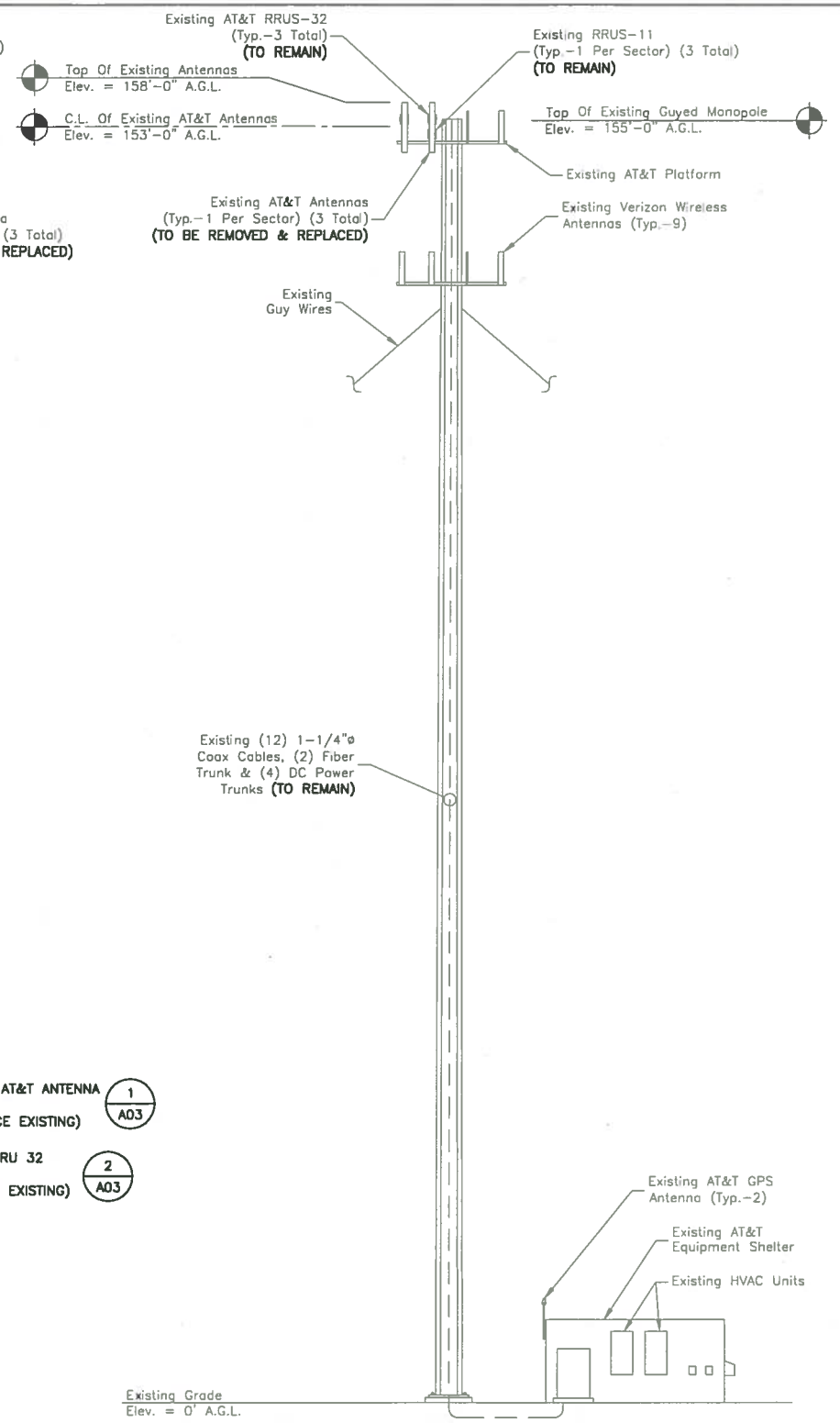
NOTES:

1. EXISTING TMA'S NOT SHOWN FOR CLARITY (TYP.-4) (12 TOTAL).
2. ALL EXISTING TMA'S ARE TO REMAIN.

EXISTING ANTENNA LAYOUT (1)
SCALE: N.T.S.

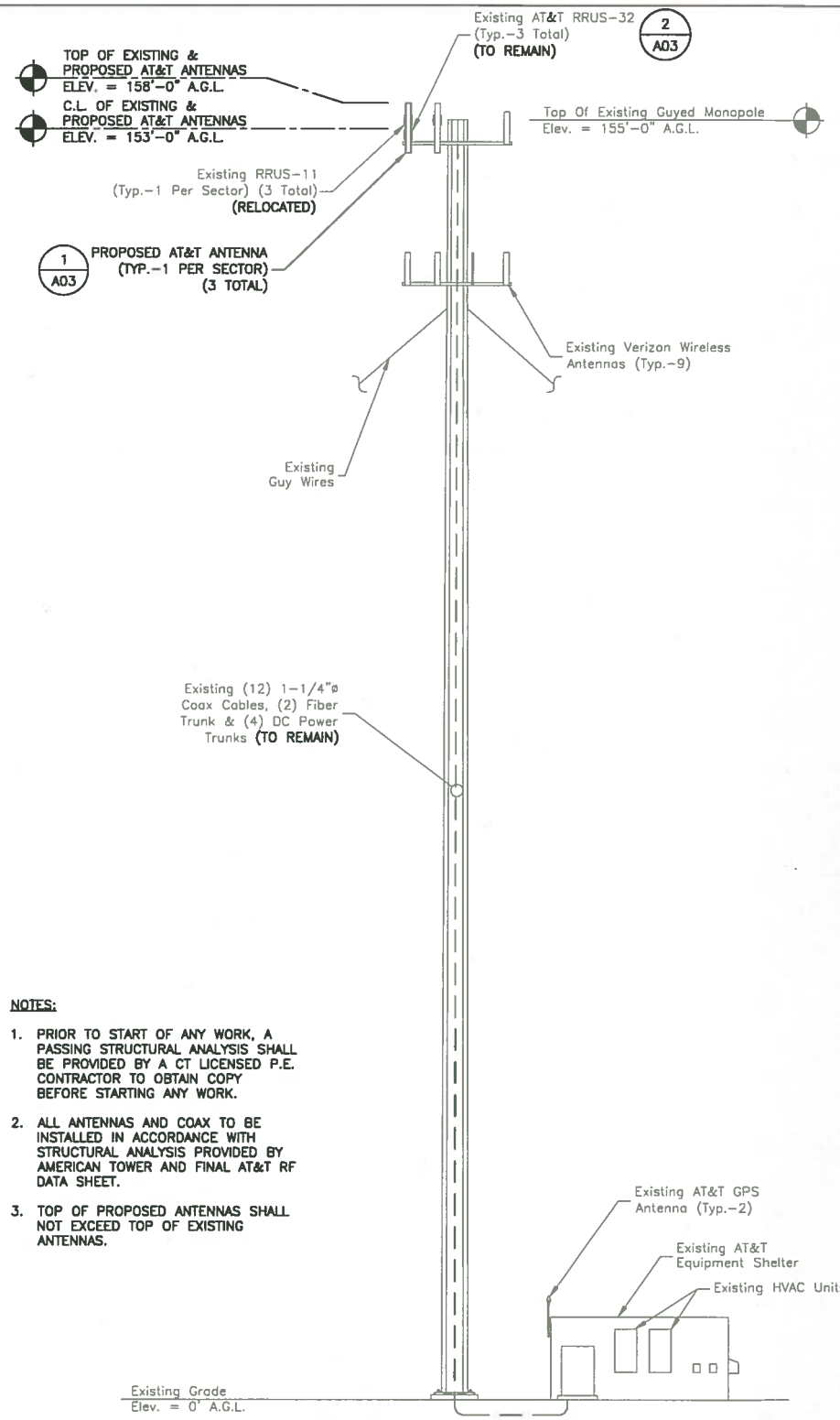


PROPOSED ANTENNA LAYOUT (2)
SCALE: N.T.S.



EXISTING SOUTH ELEVATION (3)
SCALE: 3/64"=1' FOR 11"x17"
3/32"=1' FOR 22"x34"
0' 8' 16' 24'

A.G.L. = ABOVE GRADE LEVEL
C.L. = CENTER LINE



NOTES:

1. PRIOR TO START OF ANY WORK, A PASSING STRUCTURAL ANALYSIS SHALL BE PROVIDED BY A CT LICENSED P.E. CONTRACTOR TO OBTAIN COPY BEFORE STARTING ANY WORK.
2. ALL ANTENNAS AND COAX TO BE INSTALLED IN ACCORDANCE WITH STRUCTURAL ANALYSIS PROVIDED BY AMERICAN TOWER AND FINAL AT&T RF DATA SHEET.
3. TOP OF PROPOSED ANTENNAS SHALL NOT EXCEED TOP OF EXISTING ANTENNAS.

PROPOSED SOUTH ELEVATION (4)
SCALE: 1"=20' FOR 11"x17"
1"=10' FOR 22"x34"
0' 10' 20'

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SCALE: AS SHOWN | DESIGNED BY: BSH | DRAWN BY: RSA

STATE OF CONNECTICUT
JIANG YU
No. 23222
PROFESSIONAL ENGINEER
LICENSED
JIANG YU, PE
LICENSE No. 23222
DATE

ANTENNA LAYOUTS & ELEVATIONS

DEWBERRY NO.	DRAWING NUMBER	REV
50055106/50065666	A02	4

AMERICAN TOWER®
CORPORATION

Structural Analysis Report

Structure	:	**150 ft Guyed Monopole**
ATC Site Name	:	**Wtbr - Waterbury, CT**
ATC Site Number	:	**302476**
Engineering Number	:	**65649522**
Proposed Carrier	:	**AT&T Mobility**
Carrier Site Name	:	**Waterbury**
Carrier Site Number	:	**CT1005/FA#10034976**
Site Location	:	**Farmdale Drive** **Waterbury, CT 06704-2833** **41.570667,-73.017600**
County	:	**New Haven**
Date	:	**April 12, 2016**
Max Usage	:	**80%**
Result	:	**Pass**

Prepared By:
Sarah W. Frye, E.I.
Structural Engineer I

COA: F-6274

Introduction

The purpose of this report is to summarize results of a structural analysis performed on the 150 ft guyed monopole to reflect the change in loading by AT&T Mobility.

Supporting Documents

Tower Drawings	SpectraSite Site #CT-0012, Rev 1, dated November 18, 2004
Foundation Drawing	Girard & Co. Engineers Job #38926, dated July 10, 1984

Analysis

The tower was analyzed using tnxTower version 6.1 analysis software. This program considers an elastic three-dimensional model and second-order effects per ANSI/EIA-222.

Basic Wind Speed:	95 mph (3-Second Gust)
Basic Wind Speed w/ Ice:	50 mph (3-Second Gust) w/ 3/4" radial ice concurrent
Code:	ANSI/TIA-222-G / 2003 IBC w/ 2005 CT Supplement & 2009 CT Amendment
Structure Class:	II
Exposure Category:	B
Topographic Category:	1
Crest Height:	0 ft

Conclusion

Based on the analysis results, the structure meets the requirements per the applicable codes listed above. The tower and foundation can support the equipment as described in this report.

If you have any questions or require additional information, please contact American Tower via email at Engineering@americantower.com. Please include the American Tower site name, site number, and engineering number in the subject line for any questions.

Existing and Reserved Equipment

Elevation[1] (ft)		Qty	Antenna	Mount Type	Lines	Carrier
Mount	RAD					
154.0	154.0	6	CCI DTMABP7819VG12A	Platform w/ Handrails	(12) 1 1/4" Coax (2) 0.78" 8 AWG 6 (1) 0.39" Fiber Trunk	AT&T Mobility
		2	Raycap DC6-48-60-18-8F			
		6	ADC DD1900			
		3	Ericsson RRUS 32			
		3	Ericsson RRUS 11 B5			
		3	Ericsson RRUS-32			
		3	Powerwave 7770.00			
		1	CCI OPA-65R-LCUU-H6			
		2	CCI OPA-65R-LCUU-H8			
129.0	129.0	6	RFS FD9R6004/2C-3L	Low Profile Platform	(15) 1 5/8" Coax (2) 1 5/8" Hybriflex	Verizon
		3	Andrew DB948F85E-M			
		3	Antel BXA-80063-4CF-EDIN-X			
		1	Commscope LNX-4514DS-A1M			
		4	Commscope SBNHH-1D65B			
		2	Commscope LNX-6514DS-A1M			
		2	Commscope SBNHH-1D45B			
	126.0	3	Alcatel-Lucent RRH2X60-1900			
		3	Alcatel-Lucent RRH2x60 700			
		3	Alcatel-Lucent RRH4x45-B66 w/o Solar Shield			
		1	RFS DB-T1-6Z-8AB-0Z			

Equipment to be Removed

Elevation[1] (ft)		Qty	Antenna	Mount Type	Lines	Carrier
Mount	RAD					
154.0	154.0	1	CCI OPA-65R-LCUU-H8	-	-	AT&T Mobility
		2	CCI OPA-65R-LCUU-H6			
		3	Ericsson RRUS E2 B29			

Proposed Equipment

Elevation[1] (ft)		Qty	Antenna	Mount Type	Lines	Carrier
Mount	RAD					
154.0	154.0	1	Quintel QS66512-3	Platform w/ Handrails	(4) 0.78" 8 AWG 6 (1) 0.39" Fiber Trunk	AT&T Mobility
		2	CCI TPA-65R-LCUUUU-H8			

[1]Mount elevation is defined as height above bottom of steel structure to the bottom of mount, RAD elevation is defined as center of antenna above ground level (AGL).

Install proposed coax outside the pole shaft. Stacking is not allowed.

Structure Usages

Structural Component	Controlling Usage	Pass/Fail
Anchor Bolts	16%	Pass
Shaft	80%	Pass
Base Plate	10%	Pass
Flanges	52%	Pass
Guys	65%	Pass

Foundations

Reaction Component	Analysis Reactions
Moment (Kips-Ft)	244.8
Axial (Kips)	75.3
Shear (Kips)	5.8
Anchor Uplift (Kips)	22.3
Anchor Shear (Kips)	21.3

The structure base reactions resulting from this analysis were found to be acceptable through analysis based on geotechnical and foundation information, therefore no modification or reinforcement of the foundation will be required. Foundations include a factor of safety of 2 or greater.

Deflection, Twist and Sway*

Antenna Elevation (ft)	Antenna	Carrier	Deflection (in)	Sway (Rotation) (°)	Twist (°)
154.0	Quintel QS66512-3	AT&T Mobility	5.003	0.792	0.012
	CCI TPA-65R-LCUUUU-H8				

***Deflection, Twist and Sway was evaluated considering a design wind speed of 60 mph (3-Second Gust) per ANSI/TIA-222-G.**

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Standard Conditions

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

-- Information supplied by the client regarding the structure itself, antenna, mounts and feed line loading on the structure and its components, or other relevant information.

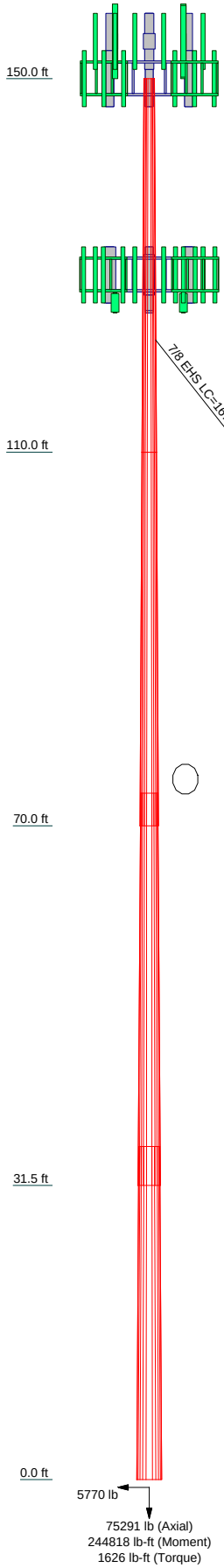
-- Information from drawings in the possession of American Tower Corporation, or generated by field inspections or measurements of the structure.

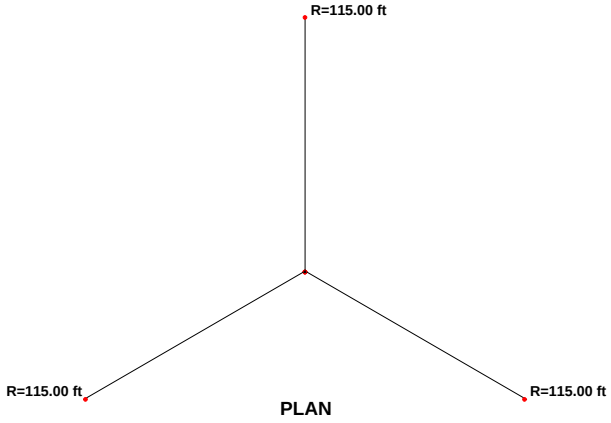
It is the responsibility of the client to ensure that the information provided to ATC Tower Services LLC and used in the performance of our engineering services is correct and complete. In the absence of information to the contrary, we assume that all structures were constructed in accordance with the drawings and specifications and that their capacity has not significantly changed from the "as new" condition.

Unless explicitly agreed by both the client and American Tower Corporation, all services will be performed in accordance with the current revision of ANSI/TIA -222. The design basic wind speed will be determined based on the minimum basic wind speed as prescribed in ANSI/TIA-222. Although every effort is taken to ensure that the loading considered is adequate to meet the requirements of all applicable regulatory entities, we can provide no assurance to meet any other local and state codes or requirements. 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.

All services are performed, results obtained, and recommendations made in accordance with generally accepted engineering principles and practices. ATC Tower Services LLC is not responsible for the conclusions, opinions and recommendations made by others based on the information we supply.

Section	Length (ft)	Number of Sides	Thickness (in)	Socket Length (ft)	Top Dia (in)	Bot Dia (in)	Grade	Weight (lb)
1	40.00	12	0.1875		15.0000	21.2500		1474.1
2	40.00	12	0.2500	3.50	21.2500	27.6100		2649.4
3	42.00	12	0.3125	4.17	26.5535	33.1000		4244.5
4	35.67	12	0.3750		31.8255	37.3800		5016.1
							A572-65	13384.0





DESIGNED APPURTENANCE LOADING

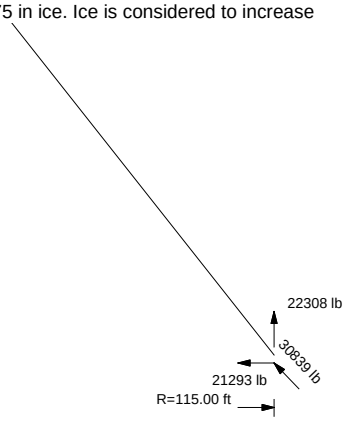
TYPE	ELEVATION	TYPE	ELEVATION
7770.00	150	Flat Platform w/ Handrails	129
7770.00	150	(2) FD9R6004/2C-3L (3.1 lbs)	129
7770.00	150	(2) FD9R6004/2C-3L (3.1 lbs)	129
DC6-48-60-18-8F	150	(2) FD9R6004/2C-3L (3.1 lbs)	129
DC6-48-60-18-8F	150	RRH2X60-1900	129
(2) DTMABP7819VG12A	150	RRH2X60-1900	129
(2) DTMABP7819VG12A	150	RRH2X60-1900	129
(2) DTMABP7819VG12A	150	RRH2x60 700	129
(2) DD1900	150	RRH2x60 700	129
(2) DD1900	150	RRH2x60 700	129
(2) DD1900	150	RRH4x45-B66 w/o Solar Shield	129
RRUS-32	150	RRH4x45-B66 w/o Solar Shield	129
RRUS-32	150	RRH4x45-B66 w/o Solar Shield	129
RRUS-32	150	DB948F85E-M	129
OPA-65R-LCUU-H6	150	DB948F85E-M	129
OPA-65R-LCUU-H8 (92.7")	150	DB948F85E-M	129
OPA-65R-LCUU-H8 (92.7")	150	BXA-80063-4CF-EDIN-X	129
RRUS 32	150	BXA-80063-4CF-EDIN-X	129
RRUS 32	150	BXA-80063-4CF-EDIN-X	129
RRUS 32	150	DB-T1-6Z-8AB-0Z	129
RRUS 11 B5	150	DB-T1-6Z-8AB-0Z	129
RRUS 11 B5	150	LNX-4514DS-A1M	129
RRUS 11 B5	150	(2) SBNHH-1D45B	129
QS66512-3 (112 lbs.)	150	(2) SBNHH-1D65B	129
TPA-65R-LCUUUU-H8	150	(2) SBNHH-1D65B	129
TPA-65R-LCUUUU-H8	150	LNX-6514DS-A1M	129
Flat Platform w/ Handrails	150		

MATERIAL STRENGTH

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

TOWER DESIGN NOTES

1. Tower is located in New Haven County, Connecticut.
2. Tower designed for Exposure B to the TIA-222-G Standard.
3. Tower designed for a 95 mph basic wind in accordance with the TIA-222-G Standard.
4. Tower is also designed for a 50 mph basic wind with 0.75 in ice. Ice is considered to increase in thickness with height.
5. Deflections are based upon a 60 mph wind.
6. Tower Structure Class II.
7. Topographic Category 1 with Crest Height of 0.00 ft
8. TOWER RATING: 80%



ALL REACTIONS ARE FACTORED

American Tower Corporation
3500 Regency Parkway, Suite 100
Cary, North Carolina 27518
Phone:
FAX:

Job: ***302476 - Wtbr-Waterbury, CT***			
Project: ***65649522***			
Client: AT&T Mobility	Drawn by: sarah.frye	App'd:	
Code: TIA-222-G	Date: 04/12/16	Scale: NTS	
Path: U:\TNX\Wtbr - Waterbury, CT (302476)\656495 AT&T Mobility\656495_2\2. tnx\302476-656495_2.eri		Dwg No. E-1	

Centek Engineering, Inc.
3-2 North Branford Road
Branford, Connecticut 06405
Phone: (203) 488-0580
Fax: (203) 488-8587

Steven L. Levine
Real Estate Consultant

April 18, 2016

Honorable Neil M. O'Leary, Mayor
City of Waterbury
City Hall, 235 Grand Street
Waterbury, CT 06702

Notice of Exempt Modification: Existing Telecommunications Facility at Garden Circle (Farmdale Drive), Waterbury

Dear Mayor O'Leary:

In order to accommodate technological changes, implement Uniform Mobile Telecommunications System ("UMTS") and Long Term Evolution ("LTE") capabilities, and enhance system performance in the State of Connecticut, New Cingular Wireless PCS, LLC ("AT&T") will be changing its equipment configuration at certain cell sites.

As required by Regulations of Connecticut State Agencies ("R.C.S.A.") Section 16-50j-73, the Connecticut Siting Council has been notified of the changes and will review AT&T's proposal. Please accept this letter as notification under Section 16-50j-73 of construction which constitutes an exempt modification pursuant to R.C.S.A. Section 16-50j-72(b)(2).

The enclosed Notice fully sets forth the AT&T proposal. However, if you have any questions or require any further information on the plans for the site or the Siting Council's procedures, please contact the undersigned at 860-830-0380 or Ms. Melanie Bachman, Acting Executive Director, Connecticut Siting Council at (860) 827-2935.

Sincerely,

Steven L. Levine
Real Estate Consultant

Enclosure

AMERICAN TOWER®
CORPORATION

Structural Analysis Report

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County	:	**New Haven**
Date	:	**April 12, 2016**
Max Usage	:	**80%**
Result	:	**Pass**

Reviewed by:
Scott Wirgau, PE
Structural Team Leader

Prepared By:
Sarah W. Frye, E.I.
Structural Engineer I

Apr 14 2016 11:34 AM

COA: F-6274

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CORPORATION

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Calculations ..... Attached

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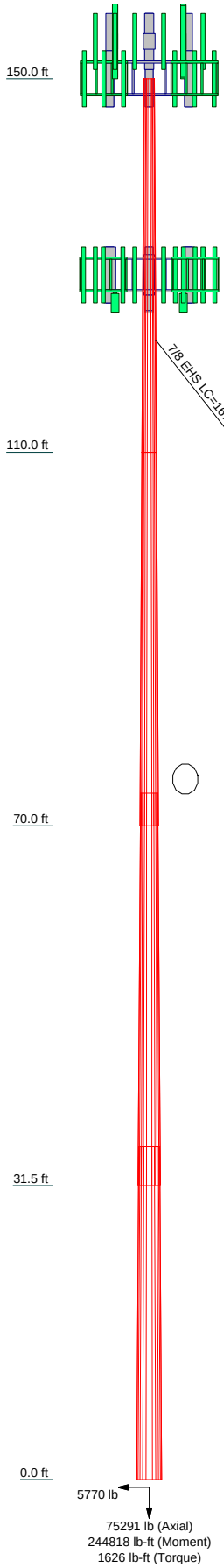

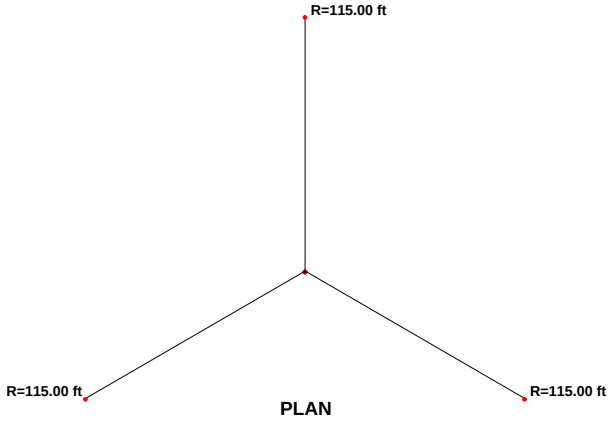

DESIGNED APPURTENANCE LOADING

TYPE	ELEVATION	TYPE	ELEVATION
7770.00	150	Flat Platform w/ Handrails	129
7770.00	150	(2) FD9R6004/2C-3L (3.1 lbs)	129
7770.00	150	(2) FD9R6004/2C-3L (3.1 lbs)	129
DC6-48-60-18-8F	150	(2) FD9R6004/2C-3L (3.1 lbs)	129
DC6-48-60-18-8F	150	RRH2X60-1900	129
(2) DTMABP7819VG12A	150	RRH2X60-1900	129
(2) DTMABP7819VG12A	150	RRH2X60-1900	129
(2) DTMABP7819VG12A	150	RRH2x60 700	129
(2) DD1900	150	RRH2x60 700	129
(2) DD1900	150	RRH2x60 700	129
(2) DD1900	150	RRH4x45-B66 w/o Solar Shield	129
RRUS-32	150	RRH4x45-B66 w/o Solar Shield	129
RRUS-32	150	RRH4x45-B66 w/o Solar Shield	129
RRUS-32	150	DB948F85E-M	129
OPA-65R-LCUU-H6	150	DB948F85E-M	129
OPA-65R-LCUU-H8 (92.7")	150	DB948F85E-M	129
OPA-65R-LCUU-H8 (92.7")	150	BXA-80063-4CF-EDIN-X	129
RRUS 32	150	BXA-80063-4CF-EDIN-X	129
RRUS 32	150	BXA-80063-4CF-EDIN-X	129
RRUS 32	150	DB-T1-6Z-8AB-0Z	129
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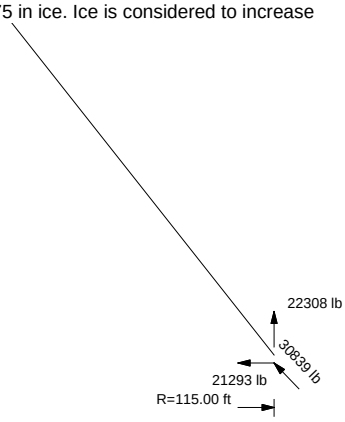
RRUS 11 B5	150	(2) SBNHH-1D45B	129
QS66512-3 (112 lbs.)	150	(2) SBNHH-1D65B	129
TPA-65R-LCUUUU-H8	150	(2) SBNHH-1D65B	129
TPA-65R-LCUUUU-H8	150	LNX-6514DS-A1M	129
Flat Platform w/ Handrails	150		

MATERIAL STRENGTH

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

TOWER DESIGN NOTES

1. Tower is located in New Haven County, Connecticut.
2. Tower designed for Exposure B to the TIA-222-G Standard.
3. Tower designed for a 95 mph basic wind in accordance with the TIA-222-G Standard.
4. Tower is also designed for a 50 mph basic wind with 0.75 in ice. Ice is considered to increase in thickness with height.
5. Deflections are based upon a 60 mph wind.
6. Tower Structure Class II.
7. Topographic Category 1 with Crest Height of 0.00 ft
8. TOWER RATING: 80%



ALL REACTIONS ARE FACTORED

American Tower Corporation
3500 Regency Parkway, Suite 100
Cary, North Carolina 27518
Phone:
FAX:

Job: ***302476 - Wtbr-Waterbury, CT***			
Project: ***65649522***			
Client: AT&T Mobility	Drawn by: sarah.frye	App'd:	
Code: TIA-222-G	Date: 04/12/16	Scale: NTS	
Path: U:\TNX\Wtbr - Waterbury, CT (302476)\656495 AT&T Mobility\656495_2\2. tnx\302476-656495_2.eri		Dwg No. E-1	

Tower Input Data

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

Tower is located in New Haven County, Connecticut.
Basic wind speed of 95 mph.
Structure Class II.
Exposure Category B.
Topographic Category 1.
Crest Height 0.00 ft.
Nominal ice thickness of 0.7500 in.
Ice thickness is considered to increase with height.
Ice density of 56 pcf.
A wind speed of 50 mph is used in combination with ice.
Temperature drop of 50 °F.
Deflections calculated using a wind speed of 60 mph.
Pressures are calculated at each section.
Stress ratio used in pole design is 1.
Safety factor used in guy design is 1.
Local bending stresses due to climbing loads, feed line supports, and appurtenance mounts are not considered.

Options

Consider Moments - Legs	Distribute Leg Loads As Uniform	Use ASCE 10 X-Brace Ly Rules
Consider Moments - Horizontals	Assume Legs Pinned	√ Calculate Redundant Bracing Forces
Consider Moments - Diagonals	√ Assume Rigid Index Plate	Ignore Redundant Members in FEA
Use Moment Magnification	√ Use Clear Spans For Wind Area	√ SR Leg Bolts Resist Compression
√ Use Code Stress Ratios	√ Use Clear Spans For KL/r	All Leg Panels Have Same Allowable
√ Use Code Safety Factors - Guys	√ Retension Guys To Initial Tension	Offset Girt At Foundation
Escalate Ice	Bypass Mast Stability Checks	√ Consider Feed Line Torque
Always Use Max Kz	√ Use Azimuth Dish Coefficients	√ Include Angle Block Shear Check
Use Special Wind Profile	√ Project Wind Area of Appurt.	Use TIA-222-G Bracing Resist. Exemption
√ Include Bolts In Member Capacity	√ Autocalc Torque Arm Areas	Use TIA-222-G Tension Splice Exemption
Leg Bolts Are At Top Of Section	Add IBC .6D+W Combination	Poles
√ Secondary Horizontal Braces Leg	√ Sort Capacity Reports By Component	√ Include Shear-Torsion Interaction
Use Diamond Inner Bracing (4 Sided)	Triangulate Diamond Inner Bracing	Always Use Sub-Critical Flow
SR Members Have Cut Ends	Treat Feed Line Bundles As Cylinder	Use Top Mounted Sockets
SR Members Are Concentric		

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	150.00-110.00	40.00	0.00	12	15.0000	21.2500	0.1875	4.0000	A572-65 (65 ksi)
L2	110.00-70.00	40.00	3.50	12	21.2500	27.6100	0.2500	4.0000	A572-65 (65 ksi)

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
L3	70.00-31.50	42.00	4.17	12	26.5535	33.1000	0.3125	4.0000	A572-65 (65 ksi)
L4	31.50-0.00	35.67		12	31.8255	37.3800	0.3750	4.0000	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	15.5291	8.9430	250.4541	5.3029	7.7700	32.2335	507.4880	4.4015	3.5175	18.76
	21.9996	12.7165	720.0669	7.5404	11.0075	65.4160	1459.0508	6.2587	5.1925	27.693
L2	21.9996	16.9050	951.5678	7.5180	11.0075	86.4472	1928.1342	8.3201	5.0250	20.1
	28.5840	22.0248	2104.4088	9.7949	14.3020	147.1411	4264.1028	10.8399	6.7295	26.918
L3	28.0550	26.4050	2320.7747	9.3943	13.7547	168.7258	4702.5188	12.9957	6.2788	20.092
	34.2676	32.9924	4527.0653	11.7379	17.1458	264.0335	9173.0615	16.2379	8.0333	25.707
L4	33.6200	37.9765	4794.6345	11.2593	16.4856	290.8376	9715.2293	18.6909	7.5242	20.065
	38.6986	44.6835	7810.0590	13.2478	19.3628	403.3530	15825.2970	21.9919	9.0128	24.034

Tower Elevation ft	Gusset Area (per face) ft^2	Gusset Thickness in	Gusset Grade	Adjust. Factor A_f	Adjust. Factor A_r	Weight Mult.	Double Angle Stitch Bolt Spacing Diagonals in	Double Angle Stitch Bolt Spacing Horizontals in	Double Angle Stitch Bolt Spacing Redundants in
L1 150.00-110.00				1	1	1			
L2 110.00-70.00				1	1	1			
L3 70.00-31.50				1	1	1			
L4 31.50-0.00				1	1	1			

Guy Data

Guy Elevation ft	Guy Grade		Guy Size	Initial Tension lb	%	Guy Modulus ksi	Guy Weight plf	L_u ft	Anchor Radius ft	Anchor Azimuth Adj. °	Anchor Elevation ft	End Fitting Efficiency %
122	EHS	A	7/8	7970.00	10%	19000	1.581	166.95	115.00	0.0000	0.00	100%
		B	7/8	7970.00	10%	19000	1.581	166.95	115.00	0.0000	0.00	100%
		C	7/8	7970.00	10%	19000	1.581	166.95	115.00	0.0000	0.00	100%

Guy Data*(cont'd)*

Guy Elevation ft	Mount Type	Torque-Arm Spread ft	Torque-Arm Leg Angle °	Torque-Arm Style	Torque-Arm Grade	Torque-Arm Type	Torque-Arm Size
122	Corner						

Guy Data *(cont'd)*

Guy Elevation ft	Diagonal Grade	Diagonal Type	Upper Diagonal Size	Lower Diagonal Size	Is Strap.	Pull-Off Grade	Pull-Off Type	Pull-Off Size
122.00	A572-50 (50 ksi)	Solid Round			No	A572-50 (50 ksi)	Solid Round	1 1/4

Guy Data *(cont'd)*

Guy Elevation ft	Cable Weight A lb	Cable Weight B lb	Cable Weight C lb	Cable Weight D lb	Tower Intercept A ft	Tower Intercept B ft	Tower Intercept C ft	Tower Intercept D ft
122	263.95	263.95	263.95		2.73 2.9 sec/pulse	2.73 2.9 sec/pulse	2.73 2.9 sec/pulse	

Guy Data *(cont'd)*

Guy Elevation ft	Calc K Single Angles	Calc K Solid Rounds	Torque Arm K_x	Torque Arm K_y	Pull Off K_x	Pull Off K_y	Diagonal K_x	Diagonal K_y
122	No	No			1	1	1	1

Guy Data *(cont'd)*

Guy Elevation ft	Torque-Arm Bolt Size in	Torque-Arm Number	Torque-Arm Net Width Deduct in	Torque-Arm U	Pull Off Bolt Size in	Pull Off Number	Pull Off Net Width Deduct in	Pull Off U	Diagonal Bolt Size in	Diagonal Number	Diagonal Net Width Deduct in	Diagonal U
122	0.6250 A325N	0	0.0000	0.75	0.6250 A325N	0	0.0000	0.75	0.6250 A325N	0	0.0000	0.75

Guy Pressures

Guy Elevation ft	Guy Location	z ft	q_z psf	q_z Ice psf	Ice Thickness in
122	A	61.00	19	5	1.5950
	B	61.00	19	5	1.5950
	C	61.00	19	5	1.5950

Guy-Tensioning Information

Guy Elevation ft		H ft	V ft	Temperature At Time Of Tensioning: 0 F Initial Tension lb	0 F Intercept ft	20 F Initial Tension lb	20 F Intercept ft	40 F Initial Tension lb	40 F Intercept ft	60 F Initial Tension lb	60 F Intercept ft	80 F Initial Tension lb	80 F Intercept ft	100 F Initial Tension lb	100 F Intercept ft	120 F Initial Tension lb	120 F Intercept ft
122	A	114.19	122.00	9507	2.30	8992	2.43	8479	2.57	7970	2.73	7465	2.92	6966	3.12	6473	3.36
	B	114.19	122.00	9507	2.30	8992	2.43	8479	2.57	7970	2.73	7465	2.92	6966	3.12	6473	3.36
	C	114.19	122.00	9507	2.30	8992	2.43	8479	2.57	7970	2.73	7465	2.92	6966	3.12	6473	3.36

Feed Line/Linear Appurtenances - Entered As Round Or Flat

Description	Sector	Component Type	Placement ft	Total Number	Number Per Row	Start/End Position	Width or Diameter in	Perimeter in	Weight plf
0.78" (19.7 mm) 8 AWG 6	A	Surface Ar (CaAa)	150.00 - 7.00	2	2	-0.200 0.200	0.7800		0.59
0.39" (10mm) Fiber Trunk **	A	Surface Ar (CaAa)	150.00 - 7.00	1	1	0.200 0.250	0.3900		0.07
1 5/8" Coax	C	Surface Ar (CaAa)	129.00 - 7.00	15	8	-0.250 0.250	1.9800		0.82
1 5/8" Hybriflex ***	C	Surface Ar (CaAa)	129.00 - 7.00	2	2	0.250 0.300	1.9800		1.30

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 1/4" Coax	A	No	Inside Pole	150.00 - 7.00	12	No Ice	0.00	0.63
						1/2" Ice	0.00	0.63
						1" Ice	0.00	0.63
0.39" (10mm) Fiber Trunk	A	No	Inside Pole	150.00 - 7.00	1	No Ice	0.00	0.07
						1/2" Ice	0.00	0.07
						1" Ice	0.00	0.07
0.78" (19.7 mm) 8 AWG 6	A	No	Inside Pole	150.00 - 7.00	4	No Ice	0.00	0.59
						1/2" Ice	0.00	0.59
						1" Ice	0.00	0.59
*** ***								

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 lb
L1	150.00-110.00	A	0.000	0.000	7.800	0.000	449.60
		B	0.000	0.000	0.000	0.000	0.00

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 lb
		C	0.000	0.000	37.620	0.000	283.10
L2	110.00-70.00	A	0.000	0.000	7.800	0.000	449.60
		B	0.000	0.000	0.000	0.000	0.00
		C	0.000	0.000	79.200	0.000	596.00
L3	70.00-31.50	A	0.000	0.000	7.507	0.000	432.74
		B	0.000	0.000	0.000	0.000	0.00
		C	0.000	0.000	76.230	0.000	573.65
L4	31.50-0.00	A	0.000	0.000	4.777	0.000	275.38
		B	0.000	0.000	0.000	0.000	0.00
		C	0.000	0.000	48.510	0.000	365.05

Feed Line/Linear Appurtenances Section Areas - With Ice

Tower Section	Tower Elevation ft	Face or Leg	Ice Thickness in	A_R ft^2	A_F ft^2	C_AA_A In Face ft^2	C_AA_A Out Face ft^2	Weight lb
L1	150.00-110.00	A	1.719	0.000	0.000	40.305	0.000	880.52
		B		0.000	0.000	0.000	0.000	0.00
		C		0.000	0.000	63.357	0.000	1112.86
L2	110.00-70.00	A	1.657	0.000	0.000	39.191	0.000	855.06
		B		0.000	0.000	0.000	0.000	0.00
		C		0.000	0.000	132.146	0.000	2277.18
L3	70.00-31.50	A	1.566	0.000	0.000	37.722	0.000	822.99
		B		0.000	0.000	0.000	0.000	0.00
		C		0.000	0.000	127.190	0.000	2191.78
L4	31.50-0.00	A	1.390	0.000	0.000	22.994	0.000	501.46
		B		0.000	0.000	0.000	0.000	0.00
		C		0.000	0.000	79.816	0.000	1336.01

Feed Line Center of Pressure

Section	Elevation ft	CP_X in	CP_Z in	CP_X Ice in	CP_Z Ice in
L1	150.00-110.00	-0.2397	0.8892	-0.4297	0.5193
L2	110.00-70.00	-0.2810	1.4875	-0.4615	1.0691
L3	70.00-31.50	-0.3075	1.6031	-0.5329	1.2113
L4	31.50-0.00	-0.2755	1.4244	-0.5171	1.1966

Shielding Factor Ka

Tower Section	Feed Line Record No.	Description	Feed Line Segment Elev.	K_a No Ice	K_a Ice
L1	4	0.78" (19.7 mm) 8 AWG 6	110.00 - 150.00	1.0000	1.0000
L1	6	0.39" (10mm) Fiber Trunk	110.00 - 150.00	1.0000	1.0000
L1	11	1 5/8" Coax	110.00 -	1.0000	1.0000

Tower Section	Feed Line Record No.	Description	Feed Line Segment Elev.	K_a No Ice	K_a Ice
			129.00		
L1	12	1 5/8" Hybriflex	110.00 - 129.00	1.0000	1.0000
L2	4	0.78" (19.7 mm) 8 AWG 6	70.00 - 110.00	1.0000	1.0000
L2	6	0.39" (10mm) Fiber Trunk	70.00 - 110.00	1.0000	1.0000
L2	11	1 5/8" Coax	70.00 - 110.00	1.0000	1.0000
L2	12	1 5/8" Hybriflex	70.00 - 110.00	1.0000	1.0000
L3	4	0.78" (19.7 mm) 8 AWG 6	31.50 - 70.00	1.0000	1.0000
L3	6	0.39" (10mm) Fiber Trunk	31.50 - 70.00	1.0000	1.0000
L3	11	1 5/8" Coax	31.50 - 70.00	1.0000	1.0000
L3	12	1 5/8" Hybriflex	31.50 - 70.00	1.0000	1.0000

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 lb
7770.00	A	From Centroid-Leg	5.00 0.00 4.00		0.0000	150.00	No Ice 1/2" Ice 1" Ice	5.51 5.86 6.21	2.93 3.26 3.61	35.00 67.63 105.06
7770.00	B	From Centroid-Leg	5.00 0.00 4.00		0.0000	150.00	No Ice 1/2" Ice 1" Ice	5.51 5.86 6.21	2.93 3.26 3.61	35.00 67.63 105.06
7770.00	C	From Centroid-Leg	5.00 0.00 4.00		0.0000	150.00	No Ice 1/2" Ice 1" Ice	5.51 5.86 6.21	2.93 3.26 3.61	35.00 67.63 105.06
DC6-48-60-18-8F	B	From Centroid-Leg	5.00 0.00 4.00		0.0000	150.00	No Ice 1/2" Ice 1" Ice	1.11 1.67 1.88	1.47 1.67 1.88	31.80 49.52 69.72
DC6-48-60-18-8F	C	From Centroid-Leg	5.00 0.00 4.00		0.0000	150.00	No Ice 1/2" Ice 1" Ice	1.11 1.67 1.88	1.47 1.67 1.88	31.80 49.52 69.72
(2) DTMABP7819VG12A	A	From Centroid-Leg	5.00 0.00 3.00		0.0000	150.00	No Ice 1/2" Ice 1" Ice	0.97 0.00 1.43	0.39 0.49 0.60	19.20 26.49 35.63
(2) DTMABP7819VG12A	B	From Centroid-Leg	5.00 0.00 3.00		0.0000	150.00	No Ice 1/2" Ice 1" Ice	0.97 0.00 1.43	0.39 0.49 0.60	19.20 26.49 35.63
(2) DTMABP7819VG12A	C	From Centroid-Leg	5.00 0.00 3.00		0.0000	150.00	No Ice 1/2" Ice 1" Ice	0.97 0.00 1.43	0.39 0.49 0.60	19.20 26.49 35.63
(2) DD1900	A	From Centroid-Leg	5.00 0.00 3.00		0.0000	150.00	No Ice 1/2" Ice 1" Ice	1.09 1.43 1.59	0.30 0.40 0.51	12.10 19.21 28.18
(2) DD1900	B	From Centroid-Leg	5.00 0.00 3.00		0.0000	150.00	No Ice 1/2" Ice 1" Ice	1.09 1.43 1.59	0.30 0.40 0.51	12.10 19.21 28.18
(2) DD1900	C	From Centroid-Leg	5.00 0.00 3.00		0.0000	150.00	No Ice 1/2" Ice 1" Ice	1.09 1.43 1.59	0.30 0.40 0.51	12.10 19.21 28.18
RRUS-32	A	From	5.00		0.0000	150.00	No Ice	3.31	2.76	77.00

Description	Face or Leg	Offset Type	Offsets: Horz Lateral ft	Offsets: Vert ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight lb
		Centroid-Leg	0.00				1/2" Ice	4.15	3.02	104.93
			3.00				1" Ice	4.44	3.29	136.47
RRUS-32	B	From Centroid-Leg	5.00	0.00	0.0000	150.00	No Ice	3.31	2.76	77.00
			0.00				1/2" Ice	4.15	3.02	104.93
			3.00				1" Ice	4.44	3.29	136.47
RRUS-32	C	From Centroid-Leg	5.00	0.00	0.0000	150.00	No Ice	3.31	2.76	77.00
			0.00				1/2" Ice	4.15	3.02	104.93
			3.00				1" Ice	4.44	3.29	136.47
OPA-65R-LCUU-H6	A	From Centroid-Leg	5.00	0.00	0.0000	150.00	No Ice	9.66	5.52	73.00
			0.00				1/2" Ice	10.11	5.96	131.43
			4.00				1" Ice	10.58	6.41	196.17
OPA-65R-LCUU-H8 (92.7")	B	From Centroid-Leg	5.00	0.00	0.0000	150.00	No Ice	12.75	7.25	88.00
			0.00				1/2" Ice	13.31	7.80	159.29
			4.00				1" Ice	13.88	8.37	238.16
OPA-65R-LCUU-H8 (92.7")	C	From Centroid-Leg	5.00	0.00	0.0000	150.00	No Ice	12.75	7.25	88.00
			0.00				1/2" Ice	13.31	7.80	159.29
			4.00				1" Ice	13.88	8.37	238.16
RRUS 32	A	From Centroid-Leg	5.00	0.00	0.0000	150.00	No Ice	2.69	1.57	50.80
			0.00				1/2" Ice	2.91	1.75	71.20
			4.00				1" Ice	3.14	1.93	94.75
RRUS 32	B	From Centroid-Leg	5.00	0.00	0.0000	150.00	No Ice	2.69	1.57	50.80
			0.00				1/2" Ice	2.91	1.75	71.20
			4.00				1" Ice	3.14	1.93	94.75
RRUS 32	C	From Centroid-Leg	5.00	0.00	0.0000	150.00	No Ice	2.69	1.57	50.80
			0.00				1/2" Ice	2.91	1.75	71.20
			4.00				1" Ice	3.14	1.93	94.75
RRUS 11 B5	A	From Centroid-Leg	5.00	0.00	0.0000	150.00	No Ice	2.79	1.19	50.70
			0.00				1/2" Ice	3.00	1.34	71.57
			4.00				1" Ice	3.21	1.50	95.48
RRUS 11 B5	B	From Centroid-Leg	5.00	0.00	0.0000	150.00	No Ice	2.79	1.19	50.70
			0.00				1/2" Ice	3.00	1.34	71.57
			4.00				1" Ice	3.21	1.50	95.48
RRUS 11 B5	C	From Centroid-Leg	5.00	0.00	0.0000	150.00	No Ice	2.79	1.19	50.70
			0.00				1/2" Ice	3.00	1.34	71.57
			4.00				1" Ice	3.21	1.50	95.48
QS66512-3 (112 lbs.)	A	From Centroid-Leg	5.00	0.00	0.0000	150.00	No Ice	8.13	6.80	112.00
			0.00				1/2" Ice	8.57	7.26	169.20
			4.00				1" Ice	9.02	7.69	232.66
TPA-65R-LCUUUU-H8	B	From Centroid-Leg	5.00	0.00	0.0000	150.00	No Ice	13.30	8.82	82.10
			0.00				1/2" Ice	13.88	9.41	161.56
			4.00				1" Ice	14.46	10.00	248.92
TPA-65R-LCUUUU-H8	C	From Centroid-Leg	5.00	0.00	0.0000	150.00	No Ice	13.30	8.82	82.10
			0.00				1/2" Ice	13.88	9.41	161.56
			4.00				1" Ice	14.46	10.00	248.92
Flat Platform w/ Handrails	A	None			0.0000	150.00	No Ice	42.40	42.40	2000.00
							1/2" Ice	48.40	48.40	2450.00
							1" Ice	54.40	54.40	2900.00
***										
Flat Platform w/ Handrails	B	None			0.0000	129.00	No Ice	42.40	42.40	2000.00
							1/2" Ice	48.40	48.40	2450.00
							1" Ice	54.40	54.40	2900.00
(2) FD9R6004/2C-3L (3.1 lbs)	A	From Centroid-Leg	5.00	0.00	0.0000	129.00	No Ice	0.36	0.08	3.10
			0.00				1/2" Ice	0.39	0.12	5.40
			0.00				1" Ice	0.47	0.17	8.79
(2) FD9R6004/2C-3L (3.1 lbs)	B	From Centroid-Leg	5.00	0.00	0.0000	129.00	No Ice	0.36	0.08	3.10
			0.00				1/2" Ice	0.39	0.12	5.40
			0.00				1" Ice	0.47	0.17	8.79

Description	Face or Leg	Offset Type	Offsets: Horz Lateral ft	Offsets: Vert ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight lb
(2) FD9R6004/2C-3L (3.1 lbs)	C	From Centroid-Leg	5.00	0.00	0.0000	129.00	No Ice	0.36	0.08	3.10
			0.00				1/2" Ice	0.39	0.12	5.40
			0.00				1" Ice	0.47	0.17	8.79
RRH2X60-1900	A	From Centroid-Leg	5.00	0.00	0.0000	129.00	No Ice	1.88	1.22	43.00
			0.00				1/2" Ice	2.05	1.36	58.88
			-3.00				1" Ice	2.24	1.52	77.45
RRH2X60-1900	B	From Centroid-Leg	5.00	0.00	0.0000	129.00	No Ice	1.88	1.22	43.00
			0.00				1/2" Ice	2.05	1.36	58.88
			-3.00				1" Ice	2.24	1.52	77.45
RRH2X60-1900	C	From Centroid-Leg	5.00	0.00	0.0000	129.00	No Ice	1.88	1.22	43.00
			0.00				1/2" Ice	2.05	1.36	58.88
			-3.00				1" Ice	2.24	1.52	77.45
RRH2x60 700	A	From Centroid-Leg	5.00	0.00	0.0000	129.00	No Ice	2.15	1.61	56.70
			0.00				1/2" Ice	2.34	1.79	76.24
			-3.00				1" Ice	2.54	1.97	98.73
RRH2x60 700	B	From Centroid-Leg	5.00	0.00	0.0000	129.00	No Ice	2.15	1.61	56.70
			0.00				1/2" Ice	2.34	1.79	76.24
			-3.00				1" Ice	2.54	1.97	98.73
RRH2x60 700	C	From Centroid-Leg	5.00	0.00	0.0000	129.00	No Ice	2.15	1.61	56.70
			0.00				1/2" Ice	2.34	1.79	76.24
			-3.00				1" Ice	2.54	1.97	98.73
RRH4x45-B66 w/o Solar Shield	A	From Centroid-Leg	5.00	0.00	0.0000	129.00	No Ice	2.47	1.37	63.30
			0.00				1/2" Ice	2.68	1.54	81.49
			-3.00				1" Ice	2.90	1.71	102.69
RRH4x45-B66 w/o Solar Shield	B	From Centroid-Leg	5.00	0.00	0.0000	129.00	No Ice	2.47	1.37	63.30
			0.00				1/2" Ice	2.68	1.54	81.49
			-3.00				1" Ice	2.90	1.71	102.69
RRH4x45-B66 w/o Solar Shield	C	From Centroid-Leg	5.00	0.00	0.0000	129.00	No Ice	2.47	1.37	63.30
			0.00				1/2" Ice	2.68	1.54	81.49
			-3.00				1" Ice	2.90	1.71	102.69
DB948F85E-M	A	From Centroid-Leg	5.00	0.00	0.0000	129.00	No Ice	3.25	3.27	8.50
			0.00				1/2" Ice	2.19	3.63	27.56
			0.00				1" Ice	2.50	4.00	50.60
DB948F85E-M	B	From Centroid-Leg	5.00	0.00	0.0000	129.00	No Ice	3.25	3.27	8.50
			0.00				1/2" Ice	2.19	3.63	27.56
			0.00				1" Ice	2.50	4.00	50.60
DB948F85E-M	C	From Centroid-Leg	5.00	0.00	0.0000	129.00	No Ice	3.25	3.27	8.50
			0.00				1/2" Ice	2.19	3.63	27.56
			0.00				1" Ice	2.50	4.00	50.60
BXA-80063-4CF-EDIN-X	A	From Centroid-Leg	5.00	0.00	0.0000	129.00	No Ice	4.71	2.25	9.90
			0.00				1/2" Ice	5.55	2.55	37.73
			0.00				1" Ice	5.94	2.85	69.84
BXA-80063-4CF-EDIN-X	B	From Centroid-Leg	5.00	0.00	0.0000	129.00	No Ice	4.71	2.25	9.90
			0.00				1/2" Ice	5.55	2.55	37.73
			0.00				1" Ice	5.94	2.85	69.84
BXA-80063-4CF-EDIN-X	C	From Centroid-Leg	5.00	0.00	0.0000	129.00	No Ice	4.71	2.25	9.90
			0.00				1/2" Ice	5.55	2.55	37.73
			0.00				1" Ice	5.94	2.85	69.84
DB-T1-6Z-8AB-0Z	B	From Centroid-Leg	5.00	0.00	0.0000	129.00	No Ice	4.80	2.00	44.00
			0.00				1/2" Ice	5.07	2.19	80.13
			-3.00				1" Ice	5.35	2.39	120.22
DB-T1-6Z-8AB-0Z	C	From Centroid-Leg	5.00	0.00	0.0000	129.00	No Ice	4.80	2.00	44.00
			0.00				1/2" Ice	5.07	2.19	80.13
			-3.00				1" Ice	5.35	2.39	120.22
LNX-4514DS-A1M	A	From Centroid-Leg	5.00	0.00	0.0000	129.00	No Ice	6.78	3.28	29.50
			0.00				1/2" Ice	7.13	3.61	71.29
			0.00				1" Ice	7.48	3.93	118.03

Description	Face or Leg	Offset Type	Offsets: Horz Lateral ft Vert ft ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight lb
(2) SBNHH-1D45B	A	From Centroid-Le	5.00 0.00	0.0000	129.00	No Ice 1/2" Ice	11.40 11.87	5.28 5.72	61.70 127.29
		g	0.00			1" Ice	12.35	6.17	199.37
(2) SBNHH-1D65B	B	From Centroid-Le	5.00 0.00	0.0000	129.00	No Ice 1/2" Ice	8.17 8.62	5.41 5.85	50.70 101.21
		g	0.00			1" Ice	9.07	6.30	157.85
(2) SBNHH-1D65B	C	From Centroid-Le	5.00 0.00	0.0000	129.00	No Ice 1/2" Ice	8.17 8.62	5.41 5.85	50.70 101.21
		g	0.00			1" Ice	9.07	6.30	157.85
LNX-6514DS-A1M	B	From Centroid-Le	5.00 0.00	0.0000	129.00	No Ice 1/2" Ice	8.17 8.62	5.41 5.85	38.80 89.31
***		g	0.00			1" Ice	9.07	6.30	145.95

Tower Pressures - No Ice

G_H = 1.100

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	129.07	1.063	23	62.548	A	0.000	62.548	62.548	100.00	7.800	0.000
150.00-110.00					B	0.000	62.548		100.00	0.000	0.000
					C	0.000	62.548		100.00	37.620	0.000
L2	89.45	0.957	21	84.306	A	0.000	84.306	84.306	100.00	7.800	0.000
110.00-70.00					B	0.000	84.306		100.00	0.000	0.000
					C	0.000	84.306		100.00	79.200	0.000
L3 70.00-31.50	50.64	0.814	18	99.976	A	0.000	99.976	99.976	100.00	7.507	0.000
					B	0.000	99.976		100.00	0.000	0.000
					C	0.000	99.976		100.00	76.230	0.000
L4 31.50-0.00	15.38	0.7	15	94.918	A	0.000	94.918	94.918	100.00	4.777	0.000
					B	0.000	94.918		100.00	0.000	0.000
					C	0.000	94.918		100.00	48.510	0.000

Tower Pressure - With Ice

G_H = 1.100

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	129.07	1.063	6	1.7192	74.009	A	0.000	74.009	74.009	100.00	40.305	0.000
150.00-110.00						B	0.000	74.009		100.00	0.000	0.000
						C	0.000	74.009		100.00	63.357	0.000
L2 110.00-70.00	89.45	0.957	6	1.6573	95.355	A	0.000	95.355	95.355	100.00	39.191	0.000

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
						B	0.000	95.355		100.00	0.000	0.000
						C	0.000	95.355		100.00	132.146	0.000
L3 70.00-31.50	50.64	0.814	5	1.5656	110.610	A	0.000	110.610	110.610	100.00	37.722	0.000
						B	0.000	110.610		100.00	0.000	0.000
						C	0.000	110.610		100.00	127.190	0.000
L4 31.50-0.00	15.38	0.7	4	1.3898	103.138	A	0.000	103.138	103.138	100.00	22.994	0.000
						B	0.000	103.138		100.00	0.000	0.000
						C	0.000	103.138		100.00	79.816	0.000

Tower Pressure - Service

G_H = 1.100

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	129.07	1.063	8	62.548	A	0.000	62.548	62.548	100.00	7.800	0.000
150.00-110.00					B	0.000	62.548		100.00	0.000	0.000
					C	0.000	62.548		100.00	37.620	0.000
L2	89.45	0.957	7	84.306	A	0.000	84.306	84.306	100.00	7.800	0.000
110.00-70.00					B	0.000	84.306		100.00	0.000	0.000
					C	0.000	84.306		100.00	79.200	0.000
L3 70.00-31.50	50.64	0.814	6	99.976	A	0.000	99.976	99.976	100.00	7.507	0.000
					B	0.000	99.976		100.00	0.000	0.000
					C	0.000	99.976		100.00	76.230	0.000
L4 31.50-0.00	15.38	0.7	5	94.918	A	0.000	94.918	94.918	100.00	4.777	0.000
					B	0.000	94.918		100.00	0.000	0.000
					C	0.000	94.918		100.00	48.510	0.000

Tower Forces - No Ice - Wind Normal To Face

Section Elevation ft	Add Weight lb	Self Weight lb	Face	e	C_F	q_z psf	D_F	D_R	A_E ft^2	F lb	w plf	Ctrl. Face
L1	732.70	1474.06	A	1	1.151	23	1	1	62.548	1885.07	47.13	B
150.00-110.00			B	1	1.176		1	1	62.548			
			C	1	1		1	1	62.548			
L2	1045.60	2649.40	A	1	1.2	21	1	1	84.306	3017.62	75.44	A
110.00-70.00			B	1	1.2		1	1	84.306			
			C	1	1		1	1	84.306			
L3	1006.39	4244.46	A	1	1.2	18	1	1	99.976	2340.81	60.80	A
70.00-31.50			B	1	1.187		1	1	99.976			
			C	1	1		1	1	99.976			
L4 31.50-0.00	640.43	5016.11	A	1	1.083	15	1	1	94.918	1737.81	55.17	A
			B	1	1.026		1	1	94.918			
			C	1	1		1	1	94.918			
Sum Weight:	3425.12	13384.03								8981.31		

Tower Forces - No Ice - Wind 60 To Face

Section Elevation ft	Add Weight lb	Self Weight lb	Face	e	C_F	q_z psf	D_F	D_R	A_E ft²	F lb	w plf	Ctrl. Face
L1	732.70	1474.06	A	1	1	23	1	1	62.548	1885.07	47.13	C
150.00-110.00			B	1	1.151		1	1	62.548			
			C	1	1.176		1	1	62.548			
L2	1045.60	2649.40	A	1	1	21	1	1	84.306	3017.62	75.44	B
110.00-70.00			B	1	1.2		1	1	84.306			
			C	1	1.2		1	1	84.306			
L3	1006.39	4244.46	A	1	1	18	1	1	99.976	2340.81	60.80	B
70.00-31.50			B	1	1.2		1	1	99.976			
			C	1	1.187		1	1	99.976			
L4 31.50-0.00	640.43	5016.11	A	1	1	15	1	1	94.918	1737.81	55.17	B
			B	1	1.083		1	1	94.918			
			C	1	1.026		1	1	94.918			
Sum Weight:	3425.12	13384.03								8981.31		

Tower Forces - No Ice - Wind 90 To Face

Section Elevation ft	Add Weight lb	Self Weight lb	Face	e	C_F	q_z psf	D_F	D_R	A_E ft²	F lb	w plf	Ctrl. Face
L1	732.70	1474.06	A	1	1	23	1	1	62.548	1604.66	40.12	C
150.00-110.00			B	1	1		1	1	62.548			
			C	1	1.001		1	1	62.548			
L2	1045.60	2649.40	A	1	1	21	1	1	84.306	2273.91	56.85	C
110.00-70.00			B	1	1		1	1	84.306			
			C	1	1.17		1	1	84.306			
L3	1006.39	4244.46	A	1	1	18	1	1	99.976	2109.15	54.78	C
70.00-31.50			B	1	1		1	1	99.976			
			C	1	1.081		1	1	99.976			
L4 31.50-0.00	640.43	5016.11	A	1	1	15	1	1	94.918	1604.17	50.93	C
			B	1	1		1	1	94.918			
			C	1	1		1	1	94.918			
Sum Weight:	3425.12	13384.03								7591.90		

Tower Forces - With Ice - Wind Normal To Face

Section Elevation ft	Add Weight lb	Self Weight lb	Face	e	C_F	q_z psf	D_F	D_R	A_E ft²	F lb	w plf	Ctrl. Face
L1	1993.39	3182.88	A	1	1.2	6	1	1	74.009	887.06	22.18	B
150.00-110.00			B	1	1.2		1	1	74.009			
			C	1	1.2		1	1	74.009			
L2	3132.23	4814.95	A	1	1.2	6	1	1	95.355	1050.79	26.27	B
110.00-70.00			B	1	1.2		1	1	95.355			
			C	1	1.2		1	1	95.355			
L3	3014.78	6634.54	A	1	1.2	5	1	1	110.610	977.94	25.40	B
70.00-31.50			B	1	1.2		1	1	110.610			
			C	1	1.2		1	1	110.610			
L4 31.50-0.00	1837.48	7006.97	A	1	1.2	4	1	1	103.138	579.42	18.39	C
			B	1	1.2		1	1	103.138			
			C	1	1.2		1	1	103.138			
Sum Weight:	9977.87	21639.34								3495.20		

Tower Forces - With Ice - Wind 60 To Face

Section Elevation ft	Add Weight lb	Self Weight lb	Face	e	C_F	q_z psf	D_F	D_R	A_E ft²	F lb	w plf	Ctrl. Face
L1	1993.39	3182.88	A	1	1.2	6	1	1	74.009	887.06	22.18	C
150.00-110.00			B	1	1.2		1	1	74.009			
			C	1	1.2		1	1	74.009			
L2	3132.23	4814.95	A	1	1.2	6	1	1	95.355	1050.79	26.27	C
110.00-70.00			B	1	1.2		1	1	95.355			
			C	1	1.2		1	1	95.355			
L3	3014.78	6634.54	A	1	1.2	5	1	1	110.610	977.94	25.40	C
70.00-31.50			B	1	1.2		1	1	110.610			
			C	1	1.2		1	1	110.610			
L4 31.50-0.00	1837.48	7006.97	A	1	1.2	4	1	1	103.138	579.42	18.39	C
			B	1	1.2		1	1	103.138			
			C	1	1.2		1	1	103.138			
Sum Weight:	9977.87	21639.34								3495.20		

Tower Forces - With Ice - Wind 90 To Face

Section Elevation ft	Add Weight lb	Self Weight lb	Face	e	C_F	q_z psf	D_F	D_R	A_E ft²	F lb	w plf	Ctrl. Face
L1	1993.39	3182.88	A	1	1.2	6	1	1	74.009	799.52	19.99	A
150.00-110.00			B	1	1.2		1	1	74.009			
			C	1	1.2		1	1	74.009			
L2	3132.23	4814.95	A	1	1.2	6	1	1	95.355	952.69	23.82	C
110.00-70.00			B	1	1.2		1	1	95.355			
			C	1	1.2		1	1	95.355			
L3	3014.78	6634.54	A	1	1.2	5	1	1	110.610	898.04	23.33	C
70.00-31.50			B	1	1.2		1	1	110.610			
			C	1	1.2		1	1	110.610			
L4 31.50-0.00	1837.48	7006.97	A	1	1.2	4	1	1	103.138	579.42	18.39	C
			B	1	1.2		1	1	103.138			
			C	1	1.2		1	1	103.138			

Section Elevation ft	Add Weight lb	Self Weight lb	Face	e	C_F	q_z psf	D_F	D_R	A_E ft^2	F lb	w plf	Ctrl. Face
Sum Weight:	9977.87	21639.34								3229.68		

Tower Forces - Service - Wind Normal To Face

Section Elevation ft	Add Weight lb	Self Weight lb	Face	e	C_F	q_z psf	D_F	D_R	A_E ft^2	F lb	w plf	Ctrl. Face
L1	732.70	1474.06	A	1	1.151	8	1	1	62.548	672.79	16.82	B
150.00-110.00			B	1	1.176		1	1	62.548			
			C	1	1		1	1	62.548			
L2	1045.60	2649.40	A	1	1.2	7	1	1	84.306	1077.00	26.92	A
110.00-70.00			B	1	1.2		1	1	84.306			
			C	1	1		1	1	84.306			
L3	1006.39	4244.46	A	1	1.2	6	1	1	99.976	835.44	21.70	A
70.00-31.50			B	1	1.187		1	1	99.976			
			C	1	1		1	1	99.976			
L4 31.50-0.00	640.43	5016.11	A	1	1.083	5	1	1	94.918	620.23	19.69	A
			B	1	1.026		1	1	94.918			
			C	1	1		1	1	94.918			
Sum Weight:	3425.12	13384.03								3205.46		

Tower Forces - Service - Wind 60 To Face

Section Elevation ft	Add Weight lb	Self Weight lb	Face	e	C_F	q_z psf	D_F	D_R	A_E ft^2	F lb	w plf	Ctrl. Face
L1	732.70	1474.06	A	1	1	8	1	1	62.548	672.79	16.82	C
150.00-110.00			B	1	1.151		1	1	62.548			
			C	1	1.176		1	1	62.548			
L2	1045.60	2649.40	A	1	1	7	1	1	84.306	1077.00	26.92	B
110.00-70.00			B	1	1.2		1	1	84.306			
			C	1	1.2		1	1	84.306			
L3	1006.39	4244.46	A	1	1	6	1	1	99.976	835.44	21.70	B
70.00-31.50			B	1	1.2		1	1	99.976			
			C	1	1.187		1	1	99.976			
L4 31.50-0.00	640.43	5016.11	A	1	1	5	1	1	94.918	620.23	19.69	B
			B	1	1.083		1	1	94.918			
			C	1	1.026		1	1	94.918			
Sum Weight:	3425.12	13384.03								3205.46		

Tower Forces - Service - Wind 90 To Face

Section Elevation ft	Add Weight lb	Self Weight lb	Face	e	C_F	q_z psf	D_F	D_R	A_E ft^2	F lb	w plf	Ctrl. Face
L1	732.70	1474.06	A	1	1	8	1	1	62.548	572.71	14.32	C
150.00-110.00			B	1	1		1	1	62.548			
			C	1	1.001		1	1	62.548			
L2	1045.60	2649.40	A	1	1	7	1	1	84.306	811.57	20.29	C
110.00-70.00			B	1	1		1	1	84.306			
			C	1	1.17		1	1	84.306			
L3	1006.39	4244.46	A	1	1	6	1	1	99.976	752.76	19.55	C
70.00-31.50			B	1	1		1	1	99.976			
			C	1	1.081		1	1	99.976			
L4 31.50-0.00	640.43	5016.11	A	1	1	5	1	1	94.918	572.53	18.18	C
			B	1	1		1	1	94.918			
			C	1	1		1	1	94.918			
Sum Weight:	3425.12	13384.03								2709.57		

Force Totals (Does not include forces on guys)

Load Case	Vertical Forces lb	Sum of Forces X lb	Sum of Forces Z lb	Sum of Torques lb-ft
Leg Weight	13384.03			
Bracing Weight	0.00			
Total Member Self-Weight	13384.03			
Guy Weight	791.86			
Total Weight	24063.41			
Wind 0 deg - No Ice		-23.06	-13331.51	450.45
Wind 30 deg - No Ice		6629.75	-11533.89	733.56
Wind 60 deg - No Ice		12438.11	-7183.86	820.12
Wind 90 deg - No Ice		13789.02	23.06	686.92
Wind 120 deg - No Ice		13122.41	7605.57	1011.87
Wind 150 deg - No Ice		6669.70	11556.96	-46.64
Wind 180 deg - No Ice		23.06	13331.51	-450.45
Wind 210 deg - No Ice		-6629.75	11533.89	-733.56
Wind 240 deg - No Ice		-12438.11	7183.86	-820.12
Wind 270 deg - No Ice		-13789.02	-23.06	-686.92
Wind 300 deg - No Ice		-13122.41	-7605.57	-1011.87
Wind 330 deg - No Ice		-6669.70	-11556.96	46.64
Member Ice	8255.31			
Guy Ice	2410.85			
Total Weight Ice	51242.82			
Wind 0 deg - Ice		-6.38	-5003.74	160.93
Wind 30 deg - Ice		2675.98	-4647.90	263.02
Wind 60 deg - Ice		5048.29	-2914.75	294.63
Wind 90 deg - Ice		5398.58	6.38	247.30
Wind 120 deg - Ice		4931.38	2854.62	292.05
Wind 150 deg - Ice		2503.58	4336.55	-15.72
Wind 180 deg - Ice		6.38	5003.74	-160.93
Wind 210 deg - Ice		-2675.98	4647.90	-263.02
Wind 240 deg - Ice		-5048.29	2914.75	-294.63
Wind 270 deg - Ice		-5398.58	-6.38	-247.30
Wind 300 deg - Ice		-4931.38	-2854.62	-292.05
Wind 330 deg - Ice		-2503.58	-4336.55	15.72
Total Weight	24063.41			
Wind 0 deg - Service		-8.23	-4758.06	160.77

Load Case	Vertical Forces lb	Sum of Forces X lb	Sum of Forces Z lb	Sum of Torques lb-ft
Wind 30 deg - Service		2366.18	-4116.48	261.81
Wind 60 deg - Service		4439.20	-2563.94	292.70
Wind 90 deg - Service		4921.35	8.23	245.17
Wind 120 deg - Service		4683.43	2714.45	131.94
Wind 150 deg - Service		2380.44	4124.72	-16.65
Wind 180 deg - Service		8.23	4758.06	-160.77
Wind 210 deg - Service		-2366.18	4116.48	-261.81
Wind 240 deg - Service		-4439.20	2563.94	-292.70
Wind 270 deg - Service		-4921.35	-8.23	-245.17
Wind 300 deg - Service		-4683.43	-2714.45	-131.94
Wind 330 deg - Service		-2380.44	-4124.72	16.65

Load Combinations

Comb. No.	Description
1	Dead Only
2	1.2 Dead+1.6 Wind 0 deg - No Ice+1.0 Guy
3	1.2 Dead+1.6 Wind 30 deg - No Ice+1.0 Guy
4	1.2 Dead+1.6 Wind 60 deg - No Ice+1.0 Guy
5	1.2 Dead+1.6 Wind 90 deg - No Ice+1.0 Guy
6	1.2 Dead+1.6 Wind 120 deg - No Ice+1.0 Guy
7	1.2 Dead+1.6 Wind 150 deg - No Ice+1.0 Guy
8	1.2 Dead+1.6 Wind 180 deg - No Ice+1.0 Guy
9	1.2 Dead+1.6 Wind 210 deg - No Ice+1.0 Guy
10	1.2 Dead+1.6 Wind 240 deg - No Ice+1.0 Guy
11	1.2 Dead+1.6 Wind 270 deg - No Ice+1.0 Guy
12	1.2 Dead+1.6 Wind 300 deg - No Ice+1.0 Guy
13	1.2 Dead+1.6 Wind 330 deg - No Ice+1.0 Guy
14	1.2 Dead+1.0 Ice+1.0 Temp+Guy
15	1.2 Dead+1.0 Wind 0 deg+1.0 Ice+1.0 Temp+1.0 Guy
16	1.2 Dead+1.0 Wind 30 deg+1.0 Ice+1.0 Temp+1.0 Guy
17	1.2 Dead+1.0 Wind 60 deg+1.0 Ice+1.0 Temp+1.0 Guy
18	1.2 Dead+1.0 Wind 90 deg+1.0 Ice+1.0 Temp+1.0 Guy
19	1.2 Dead+1.0 Wind 120 deg+1.0 Ice+1.0 Temp+1.0 Guy
20	1.2 Dead+1.0 Wind 150 deg+1.0 Ice+1.0 Temp+1.0 Guy
21	1.2 Dead+1.0 Wind 180 deg+1.0 Ice+1.0 Temp+1.0 Guy
22	1.2 Dead+1.0 Wind 210 deg+1.0 Ice+1.0 Temp+1.0 Guy
23	1.2 Dead+1.0 Wind 240 deg+1.0 Ice+1.0 Temp+1.0 Guy
24	1.2 Dead+1.0 Wind 270 deg+1.0 Ice+1.0 Temp+1.0 Guy
25	1.2 Dead+1.0 Wind 300 deg+1.0 Ice+1.0 Temp+1.0 Guy
26	1.2 Dead+1.0 Wind 330 deg+1.0 Ice+1.0 Temp+1.0 Guy
27	Dead+Wind 0 deg - Service+Guy
28	Dead+Wind 30 deg - Service+Guy
29	Dead+Wind 60 deg - Service+Guy
30	Dead+Wind 90 deg - Service+Guy
31	Dead+Wind 120 deg - Service+Guy
32	Dead+Wind 150 deg - Service+Guy
33	Dead+Wind 180 deg - Service+Guy
34	Dead+Wind 210 deg - Service+Guy
35	Dead+Wind 240 deg - Service+Guy
36	Dead+Wind 270 deg - Service+Guy
37	Dead+Wind 300 deg - Service+Guy
38	Dead+Wind 330 deg - Service+Guy

Maximum Member Forces

Section No.	Elevation ft	Component Type	Condition	Gov. Load Comb.	Axial lb	Major Axis Moment lb-ft	Minor Axis Moment lb-ft
L1	150 - 110	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	6	-51355.66	-132300.42	-75450.64
			Max. Mx	5	-9106.88	-220946.76	-1307.64
			Max. My	2	-9070.54	77.09	218044.68
			Max. Vy	5	11980.96	-220946.76	-1307.64
			Max. Vx	2	-12057.76	77.09	218044.68
			Max. Torque	4			-1318.15
		Guy A	Bottom Tension	7	30401.83		
			Top Tension	7	30592.71		
			Top Cable Vert	7	22425.97		
			Top Cable Norm	7	20808.40		
			Top Cable Tan	7	8.95		
			Bot Cable Vert	7	-21993.38		
			Bot Cable Norm	7	20988.58		
			Bot Cable Tan	7	204.11		
		Guy B	Bottom Tension	12	30838.56		
			Top Tension	12	31030.09		
			Top Cable Vert	12	22747.90		
			Top Cable Norm	12	21104.49		
			Top Cable Tan	12	0.01		
			Bot Cable Vert	12	-22307.58		
			Bot Cable Norm	12	21292.92		
			Bot Cable Tan	12	0.01		
		Guy C	Bottom Tension	5	30786.22		
			Top Tension	5	30977.07		
			Top Cable Vert	5	22704.87		
			Top Cable Norm	5	21072.92		
			Top Cable Tan	5	13.18		
			Bot Cable Vert	5	-22272.27		
			Bot Cable Norm	5	21253.09		
			Bot Cable Tan	5	208.34		
L2	110 - 70	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	6	-55268.52	-43035.92	-24620.42
			Max. Mx	5	-45304.61	-153640.34	-5439.93
			Max. My	2	-48476.77	53.96	159297.96
			Max. Vy	12	4673.72	120516.95	68357.20
			Max. Vx	8	-4359.79	-465.54	-147891.34
			Max. Torque	12			1529.68
L3	70 - 31.5	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	23	-63889.39	9360.73	-5190.70
			Max. Mx	6	-61284.96	-78071.05	-45853.04
			Max. My	2	-58440.54	100.14	63408.68
			Max. Vy	6	2462.83	-78071.05	-45853.04
			Max. Vx	8	-1651.48	-460.94	-24036.21
			Max. Torque	12			1626.35
L4	31.5 - 0	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	23	-75291.45	37883.44	-20784.46
			Max. Mx	6	-68770.39	-211324.35	-123602.71
			Max. My	2	-65919.04	98.39	164753.84
			Max. Vy	6	5005.00	-211324.35	-123602.71
			Max. Vx	2	-4244.86	98.39	164753.84
			Max. Torque	12			1626.35

Maximum Reactions

Location	Condition	Gov. Load Comb.	Vertical lb	Horizontal, X lb	Horizontal, Z lb
Mast	Max. Vert	23	75291.45	1049.30	-530.21
	Max. H_x	12	55061.69	4769.40	2799.67
	Max. H_z	2	65919.04	-3.62	4244.86
	Max. M_x	2	164753.84	-3.62	4244.86
	Max. M_z	6	211324.38	-4997.36	-2884.03
	Max. Torsion	12	1626.34	4769.40	2799.67
	Min. Vert	1	41333.94	-0.51	19.27
	Min. H_x	6	68771.14	-4997.36	-2884.03
	Min. H_z	8	53994.38	-1.31	-3955.05
	Min. M_x	6	-123602.66	-4997.36	-2884.03
	Min. M_z	10	-177700.46	4353.73	-2516.38
	Min. Torsion	6	-1579.99	-4997.36	-2884.03
Guy C @ 115 ft Elev 0 ft Azimuth 240 deg	Max. Vert	10	-158.94	-86.73	50.07
	Max. H_x	10	-158.94	-86.73	50.07
	Max. H_z	3	-21866.87	-17971.44	10609.72
	Min. Vert	5	-22272.27	-18509.89	10446.12
	Min. H_x	5	-22272.27	-18509.89	10446.12
	Min. H_z	10	-158.94	-86.73	50.07
Guy B @ 115 ft Elev 0 ft Azimuth 120 deg	Max. Vert	6	-154.57	83.28	48.08
	Max. H_x	11	-22276.88	18513.34	10448.85
	Max. H_z	13	-21948.41	18038.00	10649.03
	Min. Vert	12	-22307.58	18440.20	10646.47
	Min. H_x	6	-154.57	83.28	48.08
	Min. H_z	6	-154.57	83.28	48.08
Guy A @ 115 ft Elev 0 ft Azimuth 0 deg	Max. Vert	2	-166.87	0.00	-107.39
	Max. H_x	10	-19373.11	341.18	-18454.17
	Max. H_z	2	-166.87	0.00	-107.39
	Min. Vert	7	-21993.38	-204.11	-20988.58
	Min. H_x	6	-19949.52	-351.57	-19000.00
	Min. H_z	7	-21993.38	-204.11	-20988.58

Tower Mast Reaction Summary

Load Combination	Vertical lb	$Shear_x$ lb	$Shear_z$ lb	Overturning Moment, M_x lb-ft	Overturning Moment, M_z lb-ft	Torque lb-ft
Dead Only	41333.94	0.51	-19.27	-32.74	149.50	-0.00
1.2 Dead+1.6 Wind 0 deg - No Ice+1.0 Guy	65919.04	3.62	-4244.86	-164753.84	98.39	704.29
1.2 Dead+1.6 Wind 30 deg - No Ice+1.0 Guy	62111.93	1897.57	-3692.45	-139228.14	-42344.41	1220.92
1.2 Dead+1.6 Wind 60 deg - No Ice+1.0 Guy	54619.16	4136.87	-2432.73	-71498.01	-122129.20	1310.14
1.2 Dead+1.6 Wind 90 deg - No Ice+1.0 Guy	62749.44	4574.51	151.92	32642.74	-164838.16	1030.08
1.2 Dead+1.6 Wind 120 deg - No Ice+1.0 Guy	68771.14	4997.36	2884.03	123602.66	-211324.38	1579.99
1.2 Dead+1.6 Wind 150 deg -	62289.58	2193.28	3470.35	107830.59	-97326.14	-41.15

Load Combination	Vertical lb	$Shear_x$ lb	$Shear_z$ lb	Overturning Moment, M_x lb-ft	Overturning Moment, M_z lb-ft	Torque lb-ft
No Ice+1.0 Guy						
1.2 Dead+1.6 Wind 180 deg - No Ice+1.0 Guy	53994.38	1.31	3955.05	105764.31	-330.57	-705.43
1.2 Dead+1.6 Wind 210 deg - No Ice+1.0 Guy	62140.04	-2195.10	3472.94	107674.88	97303.68	-1178.05
1.2 Dead+1.6 Wind 240 deg - No Ice+1.0 Guy	67671.99	-4353.73	2516.38	104046.53	177700.46	-1263.43
1.2 Dead+1.6 Wind 270 deg - No Ice+1.0 Guy	62675.32	-4572.89	156.94	32620.10	164994.28	-1031.90
1.2 Dead+1.6 Wind 300 deg - No Ice+1.0 Guy	55061.69	-4769.40	-2799.67	-89884.29	153227.35	-1626.34
1.2 Dead+1.6 Wind 330 deg - No Ice+1.0 Guy	62187.52	-1891.11	-3690.66	-139448.62	42567.56	-0.17
1.2 Dead+1.0 Ice+1.0 Temp+Guy	73959.30	2.17	-80.76	-658.64	1000.61	0.40
1.2 Dead+1.0 Wind 0 deg+1.0 Ice+1.0 Temp+1.0 Guy	74956.10	2.96	-931.76	-23997.54	1036.72	154.47
1.2 Dead+1.0 Wind 30 deg+1.0 Ice+1.0 Temp+1.0 Guy	74914.61	466.65	-894.16	-25974.74	-13136.21	296.66
1.2 Dead+1.0 Wind 60 deg+1.0 Ice+1.0 Temp+1.0 Guy	74864.54	1047.52	-689.22	-21218.30	-34232.18	306.10
1.2 Dead+1.0 Wind 90 deg+1.0 Ice+1.0 Temp+1.0 Guy	74900.11	1110.66	-81.98	-653.71	-34338.84	232.43
1.2 Dead+1.0 Wind 120 deg+1.0 Ice+1.0 Temp+1.0 Guy	75219.89	1033.62	517.76	19942.33	-34345.56	308.14
1.2 Dead+1.0 Wind 150 deg+1.0 Ice+1.0 Temp+1.0 Guy	74861.38	421.09	653.15	19168.48	-10052.63	27.95
1.2 Dead+1.0 Wind 180 deg+1.0 Ice+1.0 Temp+1.0 Guy	74753.88	2.06	767.72	22222.42	1030.81	-153.68
1.2 Dead+1.0 Wind 210 deg+1.0 Ice+1.0 Temp+1.0 Guy	74976.69	-463.32	730.24	24434.70	15588.99	-294.10
1.2 Dead+1.0 Wind 240 deg+1.0 Ice+1.0 Temp+1.0 Guy	75291.45	-1049.30	530.21	20784.46	37883.44	-303.79
1.2 Dead+1.0 Wind 270 deg+1.0 Ice+1.0 Temp+1.0 Guy	74901.16	-1105.67	-81.06	-656.95	36410.36	-231.74
1.2 Dead+1.0 Wind 300 deg+1.0 Ice+1.0 Temp+1.0 Guy	74831.02	-1023.38	-677.69	-20564.16	35154.33	-308.81
1.2 Dead+1.0 Wind 330 deg+1.0 Ice+1.0 Temp+1.0 Guy	74807.24	-417.66	-815.27	-20370.93	12379.50	-28.88
Dead+Wind 0 deg - Service+Guy	41439.80	0.99	-902.36	-20892.41	147.56	159.16
Dead+Wind 30 deg - Service+Guy	41423.56	437.74	-784.25	-18078.73	-10028.71	269.15
Dead+Wind 60 deg - Service+Guy	41425.37	918.98	-555.50	-14633.75	-24525.72	291.93
Dead+Wind 90 deg - Service+Guy	41429.14	979.96	-20.77	-137.15	-25261.34	235.93
Dead+Wind 120 deg - Service+Guy	41467.95	1059.96	597.04	18406.72	-31251.56	131.32
Dead+Wind 150 deg - Service+Guy	41425.82	435.61	745.14	18055.36	-9862.56	-7.93
Dead+Wind 180 deg - Service+Guy	41417.88	-0.14	863.97	20884.45	168.54	-159.05
Dead+Wind 210 deg - Service+Guy	41425.11	-435.74	745.71	18066.00	10196.71	-267.58
Dead+Wind 240 deg - Service+Guy	41456.27	-917.73	516.08	14518.89	24812.70	-290.46
Dead+Wind 270 deg - Service+Guy	41429.12	-979.11	-19.64	-116.25	25578.65	-236.02
Dead+Wind 300 deg - Service+Guy	41432.32	-1059.29	-636.35	-18503.67	31565.69	-132.80

Load Combination	Vertical	$Shear_x$	$Shear_z$	Overturning Moment, M_x	Overturning Moment, M_z	Torque
	lb	lb	lb	lb-ft	lb-ft	lb-ft
Dead+Wind 330 deg - Service+Guy	41424.28	-435.91	-783.69	-18069.24	10327.14	6.49

Solution Summary

Load Comb.	Sum of Applied Forces PX lb	PY lb	PZ lb	Sum of Reactions PX lb	PY lb	PZ lb	% Error
1	0.00	-24063.39	0.00	0.01	24063.31	0.03	0.000%
2	-36.90	-28768.37	-22322.74	36.90	28768.32	22321.71	0.003%
3	11103.32	-28717.70	-19312.85	-11103.30	28717.67	19312.14	0.002%
4	20760.37	-28667.04	-11990.34	-20760.18	28667.03	11990.39	0.000%
5	23053.89	-28717.71	36.90	-23053.25	28717.67	-36.57	0.002%
6	21855.23	-28768.37	12665.08	-21854.23	28768.30	-12664.50	0.003%
7	11167.24	-28717.71	19349.75	-11166.64	28717.67	-19349.38	0.002%
8	36.90	-28667.04	22322.74	-36.80	28667.03	-22322.62	0.000%
9	-11103.32	-28717.71	19312.85	11102.73	28717.67	-19312.48	0.002%
10	-20760.37	-28768.37	11990.34	20759.40	28768.31	-11989.79	0.003%
11	-23053.89	-28717.70	-36.90	23053.25	28717.67	37.24	0.002%
12	-21855.23	-28667.04	-12665.08	21855.11	28667.03	12665.01	0.000%
13	-11167.24	-28717.70	-19349.75	11167.22	28717.67	19349.05	0.002%
14	0.00	-56377.70	0.00	0.05	56377.70	0.23	0.000%
15	-6.38	-56418.46	-5801.90	6.38	56418.45	5801.44	0.001%
16	3074.71	-56377.70	-5338.52	-3074.68	56377.70	5338.16	0.001%
17	5739.52	-56336.95	-3313.84	-5738.66	56336.93	3313.47	0.002%
18	6196.04	-56377.70	6.38	-6195.71	56377.70	-6.21	0.001%
19	5622.61	-56418.46	3253.70	-5622.08	56418.44	-3253.39	0.001%
20	2902.31	-56377.70	5027.17	-2902.03	56377.70	-5026.97	0.001%
21	6.38	-56336.95	5801.90	-6.36	56336.92	-5800.95	0.002%
22	-3074.71	-56377.70	5338.52	3074.38	56377.69	-5338.30	0.001%
23	-5739.52	-56418.46	3313.84	5738.96	56418.44	-3313.51	0.001%
24	-6196.04	-56377.70	-6.38	6195.71	56377.70	6.54	0.001%
25	-5622.61	-56336.95	-3253.70	5621.78	56336.93	3253.33	0.002%
26	-2902.31	-56377.70	-5027.17	2902.28	56377.70	5026.86	0.001%
27	-8.23	-24074.70	-4979.41	8.23	24074.69	4979.32	0.000%
28	2476.76	-24063.39	-4308.01	-2476.75	24063.39	4307.95	0.000%
29	4630.90	-24052.09	-2674.62	-4630.86	24052.09	2674.60	0.000%
30	5142.51	-24063.39	8.23	-5142.43	24063.39	-8.21	0.000%
31	4875.13	-24074.70	2825.13	-4875.02	24074.69	-2825.07	0.001%
32	2491.02	-24063.39	4316.24	-2490.96	24063.39	-4316.20	0.000%
33	8.23	-24052.09	4979.41	-8.23	24052.09	-4979.37	0.000%
34	-2476.76	-24063.39	4308.01	2476.71	24063.39	-4307.97	0.000%
35	-4630.90	-24074.70	2674.62	4630.80	24074.69	-2674.56	0.000%
36	-5142.51	-24063.39	-8.23	5142.43	24063.39	8.26	0.000%
37	-4875.13	-24052.09	-2825.13	4875.08	24052.09	2825.10	0.000%
38	-2491.02	-24063.39	-4316.24	2491.00	24063.39	4316.18	0.000%

Non-Linear Convergence Results

Load Combination	Converged?	Number of Cycles	Displacement Tolerance	Force Tolerance
1	Yes	4	0.00000001	0.00017263
2	Yes	7	0.00000001	0.00026465

3	Yes	7	0.00000001	0.00035143
4	Yes	6	0.00000001	0.00025191
5	Yes	7	0.00000001	0.00024677
6	Yes	7	0.00010497	0.00049049
7	Yes	7	0.00000001	0.00029492
8	Yes	6	0.00000001	0.00012316
9	Yes	7	0.00000001	0.00033033
10	Yes	7	0.00000001	0.00051231
11	Yes	7	0.00000001	0.00024438
12	Yes	6	0.00000001	0.00024495
13	Yes	7	0.00000001	0.00026720
14	Yes	4	0.00000001	0.00005920
15	Yes	6	0.00000001	0.00009244
16	Yes	6	0.00000001	0.00009240
17	Yes	5	0.00077524	0.00036737
18	Yes	6	0.00000001	0.00008623
19	Yes	6	0.00000001	0.00012513
20	Yes	6	0.00000001	0.00009163
21	Yes	5	0.00083867	0.00037857
22	Yes	6	0.00000001	0.00009811
23	Yes	6	0.00000001	0.00013336
24	Yes	6	0.00000001	0.00008397
25	Yes	5	0.00076779	0.00034409
26	Yes	6	0.00000001	0.00008183
27	Yes	5	0.00000001	0.00006884
28	Yes	5	0.00000001	0.00008628
29	Yes	5	0.00000001	0.00007544
30	Yes	5	0.00000001	0.00007858
31	Yes	5	0.00000001	0.00007267
32	Yes	5	0.00000001	0.00005479
33	Yes	5	0.00000001	0.00006138
34	Yes	5	0.00000001	0.00007397
35	Yes	5	0.00000001	0.00010017
36	Yes	5	0.00000001	0.00007792
37	Yes	5	0.00000001	0.00005119
38	Yes	5	0.00000001	0.00005532

Maximum Tower Deflections - Service Wind

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
L1	150 - 110	5.003	35	0.7924	0.0119
L2	110 - 70	0.803	31	0.1573	0.0046
L3	73.5 - 31.5	0.366	37	0.0285	0.0018
L4	35.667 - 0	0.132	37	0.0285	0.0006

Critical Deflections and Radius of Curvature - Service Wind

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
150.00	7770.00	35	5.003	0.7924	0.0119	24743
129.00	Flat Platform w/ Handrails	31	2.393	0.4121	0.0077	5891
122.00	Guy	31	1.689	0.3039	0.0064	4418

Maximum Tower Deflections - Design Wind

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
L1	150 - 110	32.565	6	4.1475	0.0582
L2	110 - 70	8.966	6	1.1956	0.0208
L3	73.5 - 31.5	3.734	6	0.4300	0.0097
L4	35.667 - 0	1.025	6	0.2435	0.0031

Critical Deflections and Radius of Curvature - Design Wind

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
150.00	7770.00	6	32.565	4.1475	0.0582	5227
129.00	Flat Platform w/ Handrails	6	18.348	2.3990	0.0345	1243
122.00	Guy	6	14.330	1.8946	0.0289	931

Guy Design Data

Section No.	Elevation ft	Size	Initial Tension lb	Breaking Load lb	Actual T_u lb	Allowable ϕT_n lb	Required S.F.	Actual S.F.
L1	122.00 (A) (7)	7/8 EHS	7970.00	79699.84	30592.70	47820.00	1.000	1.563
	122.00 (B) (6)	7/8 EHS	7970.00	79699.84	31030.10	47820.00	1.000	1.541
	122.00 (C) (5)	7/8 EHS	7970.00	79699.84	30977.10	47820.00	1.000	1.544

Compression Checks

Pole Design Data

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	A in^2	P_u lb	ϕP_n lb	Ratio $\frac{P_u}{\phi P_n}$
L1	150 - 110 (1)	TP21.25x15x0.1875	40.00	28.00	48.9	11.5845	-50657.70	615724.00	0.082
L2	110 - 70 (2)	TP27.61x21.25x0.25	40.00	122.00	194.7	16.9050	-50335.40	100711.00	0.500
L3	70 - 31.5 (3)	TP33.1x26.5535x0.3125	42.00	122.00	152.7	26.9540	-55106.50	261264.00	0.211
L4	31.5 - 0 (4)	TP37.38x31.8255x0.375	35.67	122.00	110.5	44.6835	-68770.40	826594.00	0.083

Pole Bending Design Data

Section No.	Elevation ft	Size	M_{ux} lb-ft	ϕM_{nx} lb-ft	Ratio $\frac{M_{ux}}{\phi M_{nx}}$	M_{uy} lb-ft	ϕM_{ny} lb-ft	Ratio $\frac{M_{uy}}{\phi M_{ny}}$
L1	150 - 110 (1)	TP21.25x15x0.1875	208078.33	315006.67	0.661	0.00	315006.67	0.000
L2	110 - 70 (2)	TP27.61x21.25x0.25	159306.67	531001.67	0.300	0.00	531001.67	0.000
L3	70 - 31.5 (3)	TP33.1x26.5535x0.3125	54238.58	1080200.00	0.050	0.00	1080200.00	0.000
L4	31.5 - 0 (4)	TP37.38x31.8255x0.375	244817.50	2374800.00	0.103	0.00	2374800.00	0.000

Pole Shear Design Data

Section No.	Elevation ft	Size	Actual V_u lb	ϕV_n lb	Ratio $\frac{V_u}{\phi V_n}$	Actual T_u lb-ft	ϕT_n lb-ft	Ratio $\frac{T_u}{\phi T_n}$
L1	150 - 110 (1)	TP21.25x15x0.1875	4749.97	403664.00	0.012	554.96	638735.00	0.001
L2	110 - 70 (2)	TP27.61x21.25x0.25	4030.33	623034.00	0.006	1264.23	1076708.33	0.001
L3	70 - 31.5 (3)	TP33.1x26.5535x0.3125	959.34	993388.00	0.001	1263.48	2190300.00	0.001
L4	31.5 - 0 (4)	TP37.38x31.8255x0.375	5778.71	1578480.00	0.004	1579.98	4815341.67	0.000

Pole Interaction Design Data

Section No.	Elevation ft	Ratio $\frac{P_u}{\phi P_n}$	Ratio $\frac{M_{ux}}{\phi M_{nx}}$	Ratio $\frac{M_{uy}}{\phi M_{ny}}$	Ratio $\frac{V_u}{\phi V_n}$	Ratio $\frac{T_u}{\phi T_n}$	Comb. Stress Ratio	Allow. Stress Ratio	Criteria
L1	150 - 110 (1)	0.082	0.661	0.000	0.012	0.001	0.743	1.000	4.8.2
L2	110 - 70 (2)	0.500	0.300	0.000	0.006	0.001	0.800	1.000	4.8.2
L3	70 - 31.5 (3)	0.211	0.050	0.000	0.001	0.001	0.261	1.000	4.8.2
L4	31.5 - 0 (4)	0.083	0.103	0.000	0.004	0.000	0.186	1.000	4.8.2

Section Capacity Table

Section No.	Elevation ft	Component Type	Size	Critical Element	P lb	ϕP_{allow} lb	% Capacity	Pass Fail
L1	150 - 110	Pole	TP21.25x15x0.1875	1	-50657.70	615724.00	74.3	Pass
L2	110 - 70	Pole	TP27.61x21.25x0.25	2	-50335.40	100711.00	80.0	Pass
L3	70 - 31.5	Pole	TP33.1x26.5535x0.3125	3	-55106.50	261264.00	26.1	Pass
L4	31.5 - 0	Pole	TP37.38x31.8255x0.375	4	-68770.40	826594.00	18.6	Pass
L1	150 - 110	Guy A@122	7/8	7	30592.70	47820.00	64.0	Pass
L1	150 - 110	Guy B@122	7/8	6	31030.10	47820.00	64.9	Pass
L1	150 - 110	Guy C@122	7/8	5	30977.10	47820.00	64.8	Pass
							Summary	
						Pole (L2)	80.0	Pass
						Guy A (L1)	64.0	Pass
						Guy B (L1)	64.9	Pass
						Guy C (L1)	64.8	Pass
						RATING =	**80.0**	**Pass**

Base/Flange Plate			
	Plate Type	***Baseplate***	
	Pole Diameter	37.38	in
	Pole Thickness	0.375	in
	Plate Length	44	in
	Plate Thickness	2.5	in
	Plate Fy	60	ksi
	Weld Length	0.3125	in
	ϕ_s Resistance	1382.37	k-in
	Applied	137.75	k-in

Stiffeners		
	#	***0***

Bolts			
	#	***8***	
	Bolt Circle	44	in
	(R)adial / (S)quare	S	
	Bolt Gap	6	in
●	Diameter	2.25	in
	Hole Diameter	2.75	in
	Type	A615-75	
	Fy	75	ksi
	Fu	100	ksi
	ϕ_s Resistance	259.82	k
	Applied	42.45	k

Reinforcement ●		
	#	***0***

Extra Bolts O		
	#	***0***

Code Rev. ***G***

Moment 244.8 k-ft

Axial 75.3 k

Date	4/12/2016
Engineer	SWF
Site #	302476
Carrier	AT&T Mobility

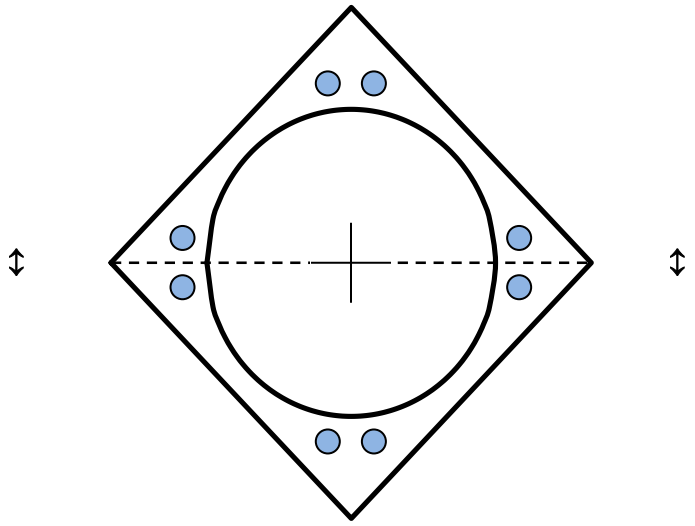


Plate Stress Ratio:

0.10 (Pass)

Bolt Stress Ratio:

0.16 (Pass)

Base/Flange Plate	Plate Type	***Flange***	***@ 110.0 ft***
	Pole Diameter	21.267	in
	Pole Thickness	0.1875	in
	Plate Diameter	28.5	in
	Plate Thickness	1	in
	Plate Fy	60	ksi
	Weld Length	0.3125	in
	Allowable	75.16	k-in
	Applied	38.37	k-in
Stiffeners	#	***0***	

Bolts	#	***12***	
	Bolt Circle	25.75	in
	(R)adial / (S)quare	R	
●	Diameter	1	in
	Hole Diameter	1.125	in
	Type	A325	
	Fy	92	ksi
	Fu	120	ksi
	Allowable	54.52	k
	Applied	28.08	k
Reinforcement ●	#	***0***	
Extra Bolts O	#	***0***	

Code Rev. ***G***

Moment	208.1 k-ft
Axial	50.7 k

Date	4/12/2016
Engineer	SWF
Site #	302476
Carrier	AT&T Mobility

Required Flange Thickness:
0.71 in OK

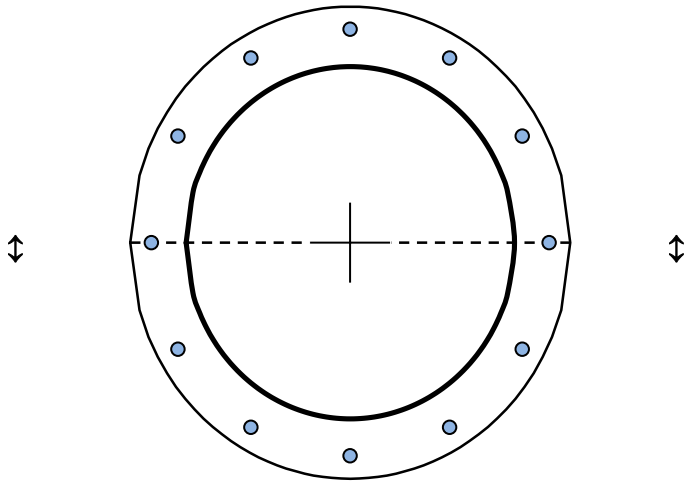
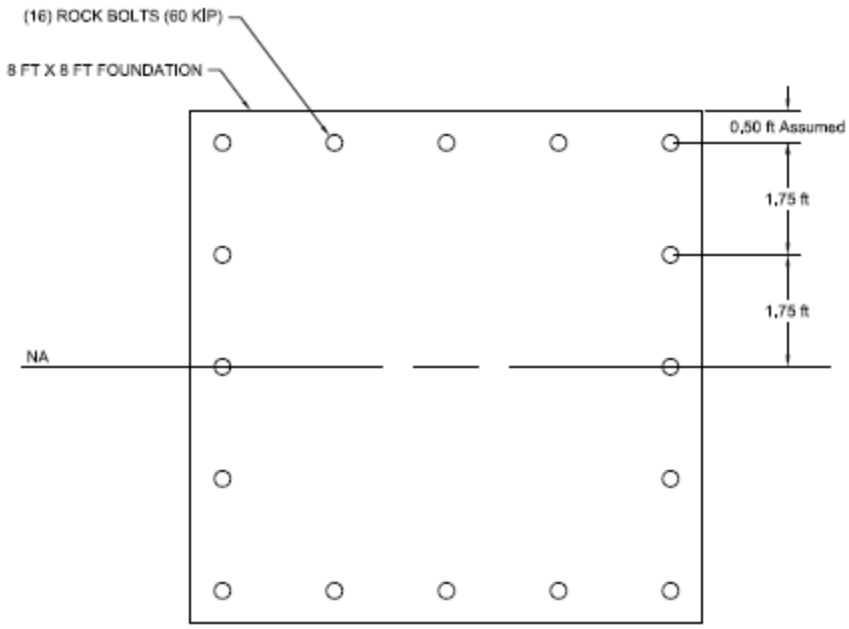


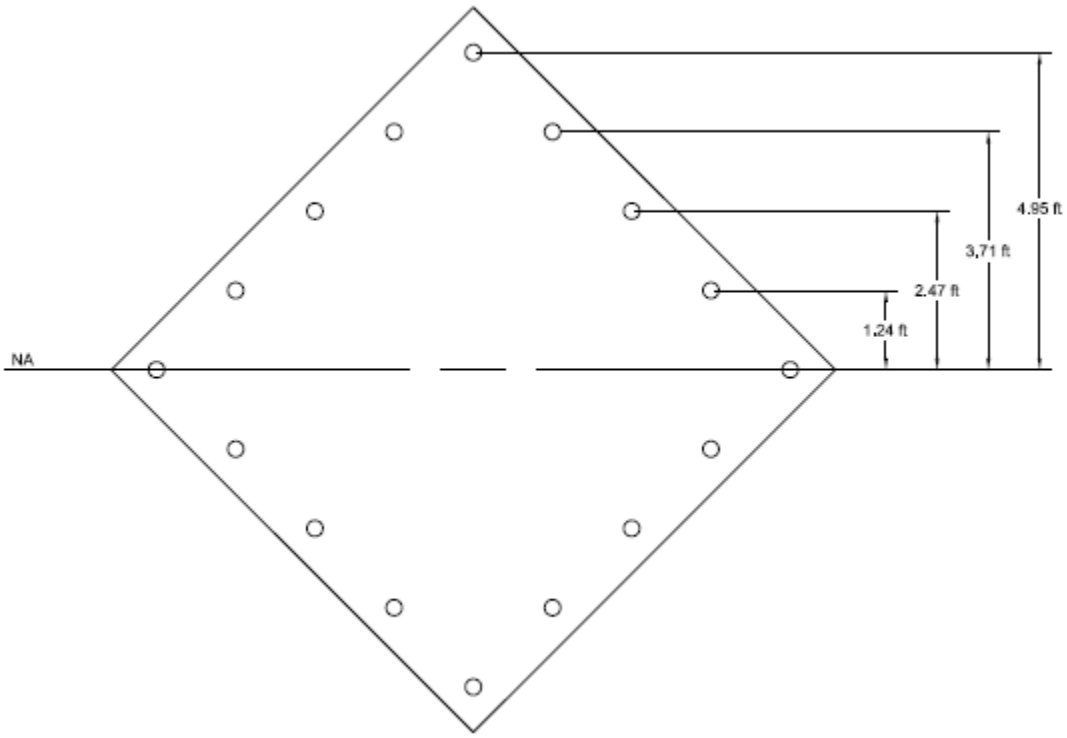
Plate Stress Ratio:
0.51 (Pass)

Bolt Stress Ratio:
0.52 (Pass)



REF TIA-G 4.9.6.4

OTM = $60\ K[(5 * 3.5\ ft) + (2 * 1.75\ ft)] * 0.9 = 1134.0\ kft$



OTM = $60\ K[4.95\ ft + (2 * 3.71\ ft) + (2 * 2.47 ft) + (2 * 1.24\ ft)] * 0.9 = 1068.7\ kft$

CONTROLLING USAGE

$244.8kft/1068.6\ kft = 0.23$ OK

COMBINED SHEAR & TENSION

Vtotal = $5.8\ k$ Vub = $5.4\ k/16\ bolts = 0.36\ k$

Tub = Tapplied = $4.71\ k$ (from Baseplate Spreadsheet)

$$\left(\frac{Vub}{\emptyset Rnv}\right)^2 + \left(\frac{Tub}{\emptyset Rnt}\right)^2 = \left(\frac{0.36\ k}{0.75(0.45 * 60\ k)}\right)^2 + \left(\frac{4.71\ k}{0.75(60\ k)}\right)^2 = 0.01$$

$0.01 < 1.0$ OK

GUY ANCHOR ROD CHECK

$\left.\begin{matrix} T = 22.3\ k \\ V = 21.3k \end{matrix}\right\}$ Guy Anchor Reactions

Tub = Tapplied $= \sqrt{(22.3\ k)^2 + (21.3\ k)^2} = 30.8\ k$

1.5” Diameter Anchor Rod
A36 Grade Assumed Ant $= 1.405\ in^2$

$$\frac{Tub}{\emptyset Rnt} = \frac{30.8k}{0.5(58\ ksi * 1.405\ in^2)} = 0.76$$

$0.76 < 1.0$ OK