Crown Castle
3 Corporate Park Drive, Suite 101
Clifton Park, NY 12065

November 28, 2017

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

RE: **Notice of Exempt Modification for AT&T/ LTE 3C Crown Site BU: 881533**
AT&T Site ID: CT2182
75 Roberts Road, Groton, CT 06340
Latitude: 41° 21′ 36.80″/ Longitude: -72° 2′ 55.10″

Dear Ms. Bachman:

AT&T currently maintains nine (9) antennas at the 145-foot level of the existing 145-foot monopole tower at 75 Roberts Road in Groton, CT. The tower and property is owned by Crown Castle. The town does not hold a property card for the telecommunications tower at this address and a redacted copy of the deed has been provided. AT&T now intends to replace three (3) antennas with three (3) new CCI antennas. AT&T also intends to install three (3) RRU32s, one (1) raycap, two (2) DC lines, and two (2) fiber lines.

This facility was approved by the by the Town of Groton Planning and Development Commission on March 1, 2000. This approval was given without conditions.

Please accept this letter as notification pursuant to Regulations of Connecticut State Agencies § 16-50j-73, for construction that constitutes an exempt modification pursuant to R.C.S.A. § 16-50j-72(b)(2). In accordance with R.S.C.A. § 16-50j-73, a copy of this letter is being sent to Mr. Mark Haddad, Town Manager, Town of Groton, and Crown Castle is the tower and property owner.

1. The proposed modifications will not result in an increase in the height of the existing tower.

2. The proposed modifications will not require the extension of the site boundary.

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

4. The operation of the replacement antennas will not increase radio frequency emissions at the facility to a level at or above the Federal Communication Commission safety standard.

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

6. The existing structure and its foundation can support the proposed loading.

For the foregoing reasons, AT&T respectfully submits that the proposed modifications to the above-reference telecommunications facility constitutes an exempt modification under R.C.S.A. § 16-50j-72(b)(2). Please send approval/rejection letter to Attn: Jeffrey Barbadora.

Sincerely,

Jeffrey Barbadora
Real Estate Specialist
12 Gill Street, Suite 5800, Woburn, MA 01801
781-729-0053
Jeff.Barbadora@crowncastle.com

Attachments:

Tab 1: Exhibit-1: Compound plan and elevation depicting the planned changes
Tab 2: Exhibit-2: Structural Modification Report
Tab 3: Exhibit-3: General Power Density Table Report (RF Emissions Analysis Report)

cc: Mr. Mark Haddad
Town of Groton
173 Main Street
Groton, CT 06340

Planning and Development
134 Groton Long Point Road
Groton, CT 06340

Hanlon, Dashanna

From: TrackingUpdates@fedex.com
Sent: Tuesday, November 21, 2017 10:43 AM
To: Hanlon, Dashanna
Subject: FedEx Shipment 770796103437 Delivered

This tracking update has been requested by:

Company Name: Crown Castle
Name: Amanda Goodall
E-mail: dashanna.hanlon@crowncastle.com

Our records indicate that the following shipment has been delivered:

Reference: 1766.6680
Ship date: Nov 20, 2017
Signed for by: K.KATIE
Delivery location: GROTON, CT
Delivered to: Receptionist/Front Desk
Delivery date: Tue, 11/21/2017 10:42 am
Service type: FedEx Standard Overnight
Packaging type: FedEx Envelope
Number of pieces: 1
Weight: 0.50 lb.
Special handling/Services Deliver Weekday
Standard transit: 11/21/2017 by 3:00 pm

Tracking number: 770796103437

Shipper Information	Recipient Information
Amanda Goodall	Planning and Development
Crown Castle	Town of Groton
12 Gill Street	134 Groton Long Point Road
Woburn	GROTON
MA	CT
US	US
01801	06340

Please do not respond to this message. This email was sent from an unattended mailbox. This report was generated at approximately 9:43 AM CST on 11/21/2017.

All weights are estimated.

The shipment is scheduled for delivery on or before the scheduled delivery displayed above. FedEx does not determine money-back guarantee or delay claim requests based on the scheduled delivery. Please see the FedEx Service Guide for terms and
conditions of service, including the FedEx Money-Back Guarantee, or contact your FedEx customer support representative.

To track the status of this shipment online, please use the following:
https://www.fedex.com/apps/fedextrack/?action=track&tracknumbers=770796103437&language=en&opco=FX&clientype=ivother

Standard transit is the date and time the package is scheduled to be delivered by, based on the selected service, destination and ship date. Limitations and exceptions may apply. Please see the FedEx Service Guide for terms and conditions of service, including the FedEx Money-Back Guarantee, or contact your FedEx Customer Support representative.

Thank you for your business.

Hanlon, Dashanna

From: TrackingUpdates@fedex.com
Sent: Tuesday, November 28, 2017 10:44 AM
To: Hanlon, Dashanna
Subject: FedEx Shipment 770833908163 Delivered

This tracking update has been requested by:

Company Name: Crown Castle
Name: Amanda Goodall
E-mail: dashanna.hanlon@crowncastle.com

Our records indicate that the following shipment has been delivered:

Reference: 1766.6680
Ship date: Nov 27, 2017
Signed for by: L.HYTON
Delivery location: GROTON, CT
Delivered to: Receptionist/Front Desk
Delivery date: Tue, 11/28/2017 10:41 am
Service type: FedEx Standard Overnight
Packaging type: FedEx Envelope
Number of pieces: 1
Weight: 0.50 lb.
Special handling/Services Deliver Weekday
Standard transit: 11/28/2017 by 3:00 pm

Tracking number: 770833908163

Shipper Information	Recipient Information
Amanda Goodall	Mr. Mark Haddad, Town Manager
Crown Castle	Groton Town Hall
12 Gill Street	45 Fort Hill Road
Woburn	GROTON
MA	CT
US	US
01801	06340

Please do not respond to this message. This email was sent from an unattended mailbox. This report was generated at approximately 9:43 AM CST on 11/28/2017.

All weights are estimated.

The shipment is scheduled for delivery on or before the scheduled delivery displayed above. FedEx does not determine money-back guarantee or delay claim requests based on the scheduled delivery. Please see the FedEx Service Guide for terms and
conditions of service, including the FedEx Money-Back Guarantee, or contact your FedEx customer support representative.

To track the status of this shipment online, please use the following:
https://www.fedex.com/apps/fedextrack/?action=track&tracknumbers=770833908163&language=en&opco=FX&clientype=ivother

Standard transit is the date and time the package is scheduled to be delivered by, based on the selected service, destination and ship date. Limitations and exceptions may apply. Please see the FedEx Service Guide for terms and conditions of service, including the FedEx Money-Back Guarantee, or contact your FedEx Customer Support representative.

Thank you for your business.

TOWN OF GROTON

PLANNING AND DEVELOPMENT SERVICES
Planning Department

134 Groton Long Point Road
Groton, Connecticut 06340-4873

March 1, 2000

Gerald Longobardi
Candid Communications of Groton, LLC
110 Washington Avenue
North Haven, Connecticut 06473

Dear Mr. Longobardi:

The Town of Groton Planning Commission, at its meeting on February 22, 2000, approved with modifications your site plan entitled Candid Communications Telecommunications Tower and Facilities, Roberts Road (see attachment).

If your plan was approved with modifications, you should submit two paper check prints of the revised plan for final review to insure compliance with the Commission's approval. Following this review, two mylars and eight paper prints of the entire plan must be submitted for the Chairman's signature.

Please note that this plan, after being signed by the Chairman of the Commission, must be filed by you or your representative in the Land Records Office at Town Hall, **and until such filing has been done, no building permit can be issued and no construction shall commence.** Please note as per the Zoning Regulations, "any approved site plan for which construction has not commenced or which is not otherwise put into effect within a period of one year shall become null and void, unless an extension of time is applied for by the applicant and granted by the Planning Commission."

If a building permit is involved, "Post Site Plan Approval Requirements and Procedures" and "Contractor's Punch List for Site Work" have been enclosed to assist you in the construction phase of your project.

Please note that any modification to this plan subsequent to Planning Commission approval requires resubmission of an application for site plan modification approval in the same manner as the original application. Failure to submit requisite modification applications could result in delays in issuance of Certificates of Site Plan Compliance and Certificates of Occupancy.

If you have any questions, please do not hesitate to contact me.

Sincerely,

Michael J. Murphy, AICP
Assistant Director of
Planning and Development

MJM:nb
Certified # Z 414 682 282

GROUND LEASE MODIFICATION AGREEMENT

THIS GROUND LEASE MODIFICATION AGREEMENT (the "Agreement") is by and between **Global Signal Acquisitions IV LLC**, a Delaware limited liability company, ("Landlord") and **Crown Atlantic Company LLC**, a Delaware limited liability company, ("Tenant") effective as of March 22, 2012 ("Effective Date").

Whereas, Landlord has acquired an easement ("*Easement*") along with a concomitant ground lease ("*Ground Lease*") relating to a certain tower site ("*Tower Site*") upon which Tenant has one or more communication towers and related improvements or assets; and

Whereas, Landlord and Tenant desire to extend the term of the Ground Lease; and

Whereas, Landlord and Tenant have agreed upon terms for the modification of the Ground Lease and they desire to memorialize such agreement in writing.

Now, Therefore, Landlord and Tenant, for good and valuable consideration, agree as follows:

Definitions

"Agreement" means this Ground Lease Modification Agreement.

"Ground Lease" means the lease dated November 12, 1999, for property located in Groton, Connecticut, a memorandum of which is recorded in New London County. The original landlord's interest in the lease was assigned to Landlord in the Easement which is dated March 19, 2012

"Tenant's Notice Address" means c/o Crown Castle USA Inc., E. Blake Hawk, General Counsel, Attn: Legal – Real Estate Dept., 2000 Corporate Drive, Canonsburg, PA 15317.

"Landlord's Notice Address" means c/o Crown Castle USA Inc., E. Blake Hawk, General Counsel, Attn: Legal – Real Estate Dept., 2000 Corporate Drive, Canonsburg, PA 15317.

Ground Lease Termination. Tenant has the right to terminate the Ground Lease with at least five (5) years' prior written notice to Landlord.

Rent. Effective as of the Effective Date, Tenant shall pay rent to Landlord in the monthly amount of [redacted] The monthly rent shall increase annually commencing on each January 1, to an amount equal to the monthly rent prior to such adjustment multiplied by the CPI indicator published on or about October 1 prior to such adjustment divided by the CPI indicator published on or about October 1 for the prior year. "CPI" means the Consumer Price Index published by the Bureau of Labor for all Urban Consumers, U.S. City Averages or a substantially similar index if such index is not published.

Notices. All notices hereunder shall be in writing and shall be given by (i) established national courier service which maintains delivery records, (ii) hand delivery, or (iii) certified or registered mail, postage prepaid, return receipt requested. Notices are effective upon receipt, or upon attempted delivery if delivery is refused or if delivery is impossible because of failure to provide reasonable means for accomplishing delivery. The notices shall be sent to Landlord at Landlord's Notice Address and to Tenant at Tenant's Notice Address.

Assignment, Sublease, Licensing and Encumbrance. Tenant has the right, without any requirement that it pay any additional consideration to Landlord and at its sole discretion, to assign all or any interest in the Ground Lease and to sublease or license the rights granted to it in the Ground Lease or modify or alter the Tower Site. If there is any conflict between the Ground Lease and this Agreement, this Agreement shall prevail.

IN WITNESS WHEREOF, Landlord and Tenant having read the foregoing and intending to be legally bound hereby, have executed this Agreement as of the day and year first written above.

LANDLORD:
Global Signal Acquisitions IV LLC,
a Delaware limited liability company

By: _____
Name Tracy Van Swol
Title Real Estate Transaction Manager

_____
Witness

_____
Witness

TENANT:
Crown Atlantic Company LLC,
a Delaware limited liability company

By: _____
Name Tracy Van Swol
Title Real Estate Transaction Manager

_____
Witness

_____
Witness

Site Name: Groton Tower
BUN: 881533]
694521.1 03/08/2012

By: (Initials) DL Date 4/17/12 Doc Type I
BUN: 881533 Lease/Lic 161432

Crown Castle International Corp. Consolidated Subsidiaries as Named Insureds

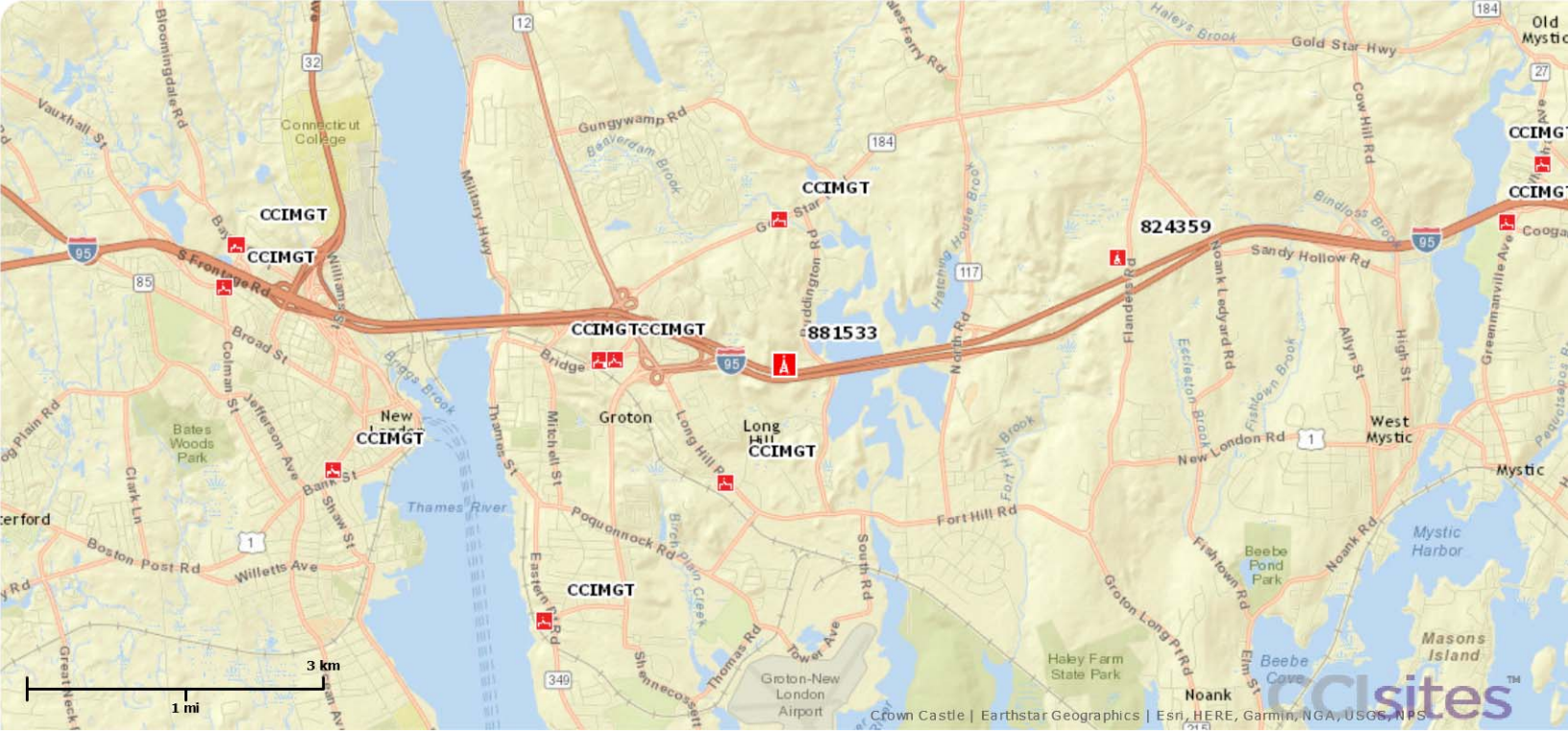
Entity Name **4/1/2017 Edition**

24/7 Chesapeake Holdings, LLC
24/7 Mid-Atlantic Network, LLC
24/7 Mid-Atlantic Network of Virginia, LLC
Access Fiber Group Holdings LLC
Access Fiber Group, Inc.
AirComm of Avon, L.L.C.
Atlantic Coast Communications LLC
CA - CLEC LLC
CCT2 Holdings LLC
CC Castle International LLC
CC Towers Holding LLC
CC TS LLC
CC FN Holdings LLC
CC Finance LLC
CC Holdings GS V LLC
CC Site Acquisitions II LLC
CC Sunesys Fiber Networks LLC
CC TM PA LLC
CC Towers Guarantor LLC
CCATT Holdings LLC
CCATT LCC
CCATT PR LLC
CCGS Holdings Corp.
CCPR VI Tower Newco LLC
CCS & E LLC
CCTM Holdings LLC
CCTM1 LLC
CCTM2 LLC
CCTMO LLC
ComSite Venture, Inc.
Chesapeake Fiber, LLC
Coastal Antennas LLC
Coverage Plus Antenna Systems LLC
Crown Atlantic Company LLC
Crown Mobile Systems, Inc.
Crown Castle AS LLC
Crown Castle Atlantic LLC
Crown Castle Augusta LLC
Crown Castle BP ATT LLC
Crown Castle CA Corp.
Crown Castle GS III Corp.
Crown Castle GT Company LLC
Crown Castle GT Corp.
Crown Castle GT Holding Sub LLC
Crown Castle International Corp.
Crown Castle International LLC
Crown Castle International Corp. de Puerto Rico
Crown Castle Investment II Corp.
Crown Castle Investment Corp.
Crown Castle MM Holding Corp.
Crown Castle MM Holding LLC
Crown Castle MU LLC
Crown Castle NG Atlantic LLC
Crown Castle NG Central LLC
Crown Castle NG East LLC
Crown Castle NG Networks LLC
Crown Castle NG West LLC
Crown Castle Operating Company
Crown Castle Orlando Corp.
Crown Castle PR LLC
Crown Castle PR Solutions LLC
Crown Castle PT Inc.
Crown Castle Puerto Rico Corp.
Crown Castle Services LLC
Crown Castle Solutions LLC
Crown Castle South LLC
Crown Castle TDC LLC
Crown Castle TLA LLC
Crown Castle Towers 05 LLC
Crown Castle Towers 06-2 LLC
Crown Castle Towers 09 LLC
Crown Castle Towers LLC
Crown Castle MUPA LLC
Crown Castle USA Inc.
Crown Communication LLC
Crown Communication New York, Inc.
DAS Development Corporation
Fibernet Direct Florida LLC
Fibernet Direct Holdings LLC
Fibernet Direct TEL LLC
Fibernet Direct Texas LLC
Global Signal Acquisitions II LLC
Global Signal Acquisitions III LLC
Global Signal Acquisitions IV LLC
Global Signal Acquisitions LLC
Global Signal GP LLC
Global Signal Holdings III LLC
Global Signal Holdings IV LLC
Global Signal Operating Partnership, L.P.
Global Signal Services LLC
GoldenState Towers, LLC
GS Savings Inc.
High Point Management Co. LLC
ICB Towers, LLC
InfraSource FI, LLC
InSITE Fiber of Virginia LLC
InSITE Solutions LLC
Interstate Tower Communications LLC

Crown Castle International Corp. Consolidated Subsidiaries as Named Insureds

Entity Name **4/1/2017 Edition**

Intracoastal City Towers LLC
LL Q1-16, LLC
Mobile Media California LLC
Mobile Media National LLC
Modeo LLC
Md7 Capitol One, LLC
MW Cell REIT 1 LLC
MW Cell TRS 1 LLC
NewPath Networks Holding LLC
NewPath Networks LLC
NY - CLEC LLC
OP 2 LLC
OP LLC
P3 CHB-1, LLC
PA - CLEC LLC
Pinnacle San Antonio L.L.C.
Pinnacle Towers Acquisition Holdings LLC
Pinnacle Towers Acquisition LLC
Pinnacle Towers Asset Holding LLC
Pinnacle Towers Canada, Inc.
Pinnacle Towers III LLC
Pinnacle Towers Limited
Pinnacle Towers LLC
Pinnacle Towers V Inc.
Pinnacle St. Louis LLC
PR Site Development Corporation
PR TDC Corporation
Princeton Ancillary Services II LLC
Princeton Ancillary Services III LLC
Radio Station WGLD LLC
RGP Tower Group, LLC
Shaffer & Associates, Inc.
Sierra Towers, Inc.
Sunesys, LLC
Sunesys Enterprise LLC
Sunesys of Massachusetts, LLC
Sunesys of Virginia, Inc.
Tower Development Corporation
Towers Finco LLC
Towers Finco II LLC
Towers Finco III LLC
Tower Systems LLC
Tower Technology Company of Jacksonville LLC
Tower Ventures III, LLC
TowerOne 2012, LLC
TowerOne Allentown 001, LLC
TowerOne Bethlehem 001, LLC
TowerOne Doylestown, LLC
TowerOne East Rockhill 001, LLC
TowerOne Marple, LLC
TowerOne Middleton 003, LLC
TowerOne Middletown 001, LLC
TowerOne Middletown 002, LLC
TowerOne North Coventry, LLC
TowerOne Partners, LLC
TowerOne Richland, LLC
TowerOne Upper Pottsgrove, LLC
TowerOne Upper Pottsgrove 002, LLC
TowerOne Warminster 001, LLC
TowerOne Warrington 002, LLC
TriStar Investors LLC
TVHT, LLC
WA - CLEC LLC
WCP Wireless Lease Subsidiary, LLC
WCP Wireless Site Funding LLC
WCP Wireless Site Holdco LLC
WCP Wireless Site Non-RE Funding LLC
WCP Wireless Site Non-RE Holdco LLC
WCP Wireless Site RE Funding LLC
WCP Wireless Site RE Holdco LLC
Wireless Funding, LLC
Wireless Realty Holdings II, LLC
Wireless Revenue Properties, LLC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Groton
Long Hill
New London
Bates Woods Park
Connecticut College
Thames River
Mystic Harbor
Beebe Pond Park
Haley Farm State Park
Groton-New London Airport
Noank
Masons Island
West Mystic
Mystic
Old Mystic
Gold Star Hwy
Sandy Hollow Rd
New London Rd
Fort Hill Rd
Boston Post Rd
Willetts Ave
Gungywamp Rd
S Frontage Rd
Broad St
Bridge
Poquonnock Rd
Thomas Rd
Shennecossett
Tower Ave
Groton Long Pt Rd
Noank Rd
Fishtown Rd
Flanders Rd
North Rd
Hatching House Brook
Haleys Brook
Bindloss Brook
Eccleston Brook
Fishtown Brook
Fort Hill Brook
Birch Plain Creek
Briggs Brook
Beaverdam Brook
Thames St
Mitchell St
Long Hill Pl
Eastern Pt Rd
South Rd
Williams St
Bank St
Shaw St
Jefferson Ave
Colman St
Clark Ln
Military Hwy
Cow Hill Rd
Allyn St
High St
Greenmanville Ave
Noank Ledyard Rd
Elm St
Vauxhall St
Bloomingdale Rd
Ferry Rd
Cooga
3 km
1 mi
Crown Castle | Earthstar Geographics | Esri, HERE, Garmin, NGA, USGS, NPS
CCIsites™

WIRELESS COMMUNICATIONS FACILITY
CT2182 - LTE 3C (PCS)
GROTON ROBERTS RD
CROWN CASTLE SITE NO.: 881533
75 ROBERTS ROAD
GROTON, CT 06340

GENERAL NOTES

1. ALL WORK SHALL BE IN ACCORDANCE WITH THE 2012 INTERNATIONAL BUILDING CODE AS MODIFIED BY THE 2016 CONNECTICUT STATE BUILDING CODE, INCLUDING THE TIA-222 REVISION "G" STRUCTURAL STANDARDS FOR STEEL ANTENNA TOWERS AND SUPPORTING STRUCTURES, 2016 CONNECTICUT FIRE SAFETY CODE AND, NATIONAL ELECTRICAL CODE AND LOCAL CODES.
2. THE COMPOUND, TOWER, PRIMARY GROUND RING, ELECTRICAL SERVICE TO THE METER BANK AND TELEPHONE SERVICE TO THE DEMARCATION POINT ARE PROVIDED BY SITE OWNER. AS BUILT FIELD CONDITIONS REGARDING THESE ITEMS SHALL BE CONFIRMED BY THE CONTRACTOR. SHOULD ANY FIELD CONDITIONS PRECLUDE COMPLIANCE WITH THE DRAWINGS, THE CONTRACTOR SHALL IMMEDIATELY NOTIFY THE ENGINEER AND SHALL NOT PROCEED WITH ANY AFFECTED WORK.
3. CONTRACTOR SHALL REVIEW ALL DRAWINGS AND SPECIFICATIONS IN THE CONTRACT DOCUMENT SET. CONTRACTOR SHALL COORDINATE ALL WORK SHOWN IN THE SET OF DRAWINGS. THE CONTRACTOR SHALL PROVIDE A COMPLETE SET OF DRAWINGS TO ALL SUBCONTRACTORS AND ALL RELATED PARTIES. THE SUBCONTRACTORS SHALL EXAMINE ALL THE DRAWINGS AND SPECIFICATIONS FOR THE INFORMATION THAT AFFECTS THEIR WORK.
4. CONTRACTOR SHALL PROVIDE A COMPLETE BUILD-OUT WITH ALL FINISHES, STRUCTURAL, MECHANICAL, AND ELECTRICAL COMPONENTS AND PROVIDE ALL ITEMS AS SHOWN OR INDICATED ON THE DRAWINGS OR IN THE WRITTEN SPECIFICATIONS.
5. CONTRACTOR SHALL FURNISH ALL MATERIAL, LABOR AND EQUIPMENT TO COMPLETE THE WORK AND FURNISH A COMPLETED JOB ALL IN ACCORDANCE WITH LOCAL AND STATE GOVERNING AUTHORITIES AND OTHER AUTHORITIES HAVING LAWFUL JURISDICTION OVER THE WORK.
6. CONTRACTOR SHALL SECURE AND PAY FOR ALL PERMITS AND ALL INSPECTIONS REQUIRED AND SHALL ALSO PAY FEES REQUIRED FOR THE GENERAL CONSTRUCTION, PLUMBING, ELECTRICAL AND HVAC. PERMITS SHALL BE PAID FOR BY THE RESPECTIVE SUBCONTRACTORS.
7. CONTRACTOR SHALL MAINTAIN A CURRENT SET OF DRAWINGS AND SPECIFICATIONS ON SITE AT ALL TIMES AND INSURE DISTRIBUTION OF NEW DRAWINGS TO SUBCONTRACTORS AND OTHER RELEVANT PARTIES AS SOON AS THEY ARE MADE AVAILABLE. ALL OLD DRAWINGS SHALL BE MARKED VOID AND REMOVED FROM THE CONTRACT AREA. THE CONTRACTOR SHALL FURNISH AN 'AS-BUILT' SET OF DRAWINGS TO OWNER UPON COMPLETION OF PROJECT.
8. LOCATION OF EQUIPMENT, AND WORK SUPPLIED BY OTHERS THAT IS DIAGRAMMATICALLY INDICATED ON THE DRAWINGS SHALL BE DETERMINED BY THE CONTRACTOR. THE CONTRACTOR SHALL DETERMINE LOCATIONS AND DIMENSIONS SUBJECT TO STRUCTURAL CONDITIONS AND WORK OF THE SUBCONTRACTORS.
9. THE CONTRACTOR IS SOLELY RESPONSIBLE TO DETERMINE CONSTRUCTION PROCEDURE AND SEQUENCE, AND TO ENSURE THE SAFETY OF THE EXISTING STRUCTURES AND ITS COMPONENT PARTS DURING CONSTRUCTION. THIS INCLUDES THE ADDITION OF WHATEVER SHORING, BRACING, UNDERPINNING, ETC. THAT MAY BE NECESSARY. MAINTAIN EXISTING BUILDING'S/PROPERTY'S OPERATIONS, COORDINATE WORK WITH BUILDING/PROPERTY OWNER.
10. 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 WORK AND SHALL EXECUTE THE WORK CORRECTLY IN ACCORDANCE WITH SUCH ORDINANCES, LAWS, CODES, RULES OR REGULATIONS WITH NO INCREASE IN COSTS.
11. ALL UTILITY WORK SHALL BE IN ACCORDANCE WITH LOCAL UTILITY COMPANY REQUIREMENTS AND SPECIFICATIONS.
12. ALL EQUIPMENT AND PRODUCTS PURCHASED ARE TO BE REVIEWED BY CONTRACTOR AND ALL APPLICABLE SUBCONTRACTORS FOR ANY CONDITION PER MFR.'S RECOMMENDATIONS. CONTRACTOR TO SUPPLY THESE ITEMS AT NO COST TO OWNER OR CONSTRUCTION MANAGER.
13. ANY AND ALL ERRORS, DISCREPANCIES, AND 'MISSED" ITEMS ARE TO BE BROUGHT TO THE ATTENTION OF THE AT&T CONSTRUCTION MANAGER DURING THE BIDDING PROCESS BY THE CONTRACTOR. ALL THESE ITEMS ARE TO BE INCLUDED IN THE BID. NO 'EXTRA' WILL BE ALLOWED FOR MISSED ITEMS.
14. CONTRACTOR SHALL BE RESPONSIBLE FOR ALL ON-SITE SAFETY FROM THE TIME THE JOB IS AWARDED UNTIL ALL WORK IS COMPLETE AND ACCEPTED BY THE OWNER.
15. CONTRACTOR TO REVIEW ALL SHOP DRAWINGS AND SUBMIT COPY TO ENGINEER FOR APPROVAL. DRAWINGS MUST BEAR THE CHECKER'S INITIALS BEFORE SUBMITTING TO THE CONSTRUCTION MANAGER FOR REVIEW.
16. THE CONTRACTOR SHALL FIELD VERIFY ALL DIMENSIONS, ELEVATIONS, ANGLES, AND EXISTING CONDITIONS AT THE SITE, PRIOR TO FABRICATION AND/OR INSTALLATION OF ANY WORK IN THE CONTRACT AREA.
17. COORDINATION, LAYOUT, FURNISHING AND INSTALLATION OF CONDUIT AND ALL APPURTENANCES REQUIRED FOR PROPER INSTALLATION OF ELECTRICAL AND TELECOMMUNICATION SERVICE SHALL BE THE SOLE RESPONSIBILITY OF THE CONTRACTOR.
18. ALL EQUIPMENT AND PRODUCTS PURCHASED ARE TO BE REVIEWED BY CONTRACTOR AND ALL APPLICABLE SUB-CONTRACTORS FOR ANY CONDITION PER THE MANUFACTURER'S RECOMMENDATIONS. CONTRACTOR TO SUPPLY THESE ITEMS AT NO COST TO OWNER OR CONSTRUCTION MANAGER.
19. 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.
20. THE CONTRACTOR SHALL CONTACT "CALL BEFORE YOU DIG" AT LEAST 48 HOURS PRIOR TO ANY EXCAVATIONS AT 1-800-922-4455. ALL UTILITIES SHALL BE IDENTIFIED AND CLEARLY MARKED PRIOR TO ANY EXCAVATION WORK. CONTRACTOR SHALL MAINTAIN AND PROTECT MARKED UTILITIES THROUGHOUT PROJECT COMPLETION.
21. CONTRACTOR SHALL COMPLY WITH OWNERS ENVIRONMENTAL ENGINEER ON ALL METHODS AND PROVISIONS FOR ALL EXCAVATION ACTIVITIES INCLUDING SOIL DISPOSAL. ALL BACKFILL MATERIALS TO BE PROVIDED BY THE CONTRACTOR.

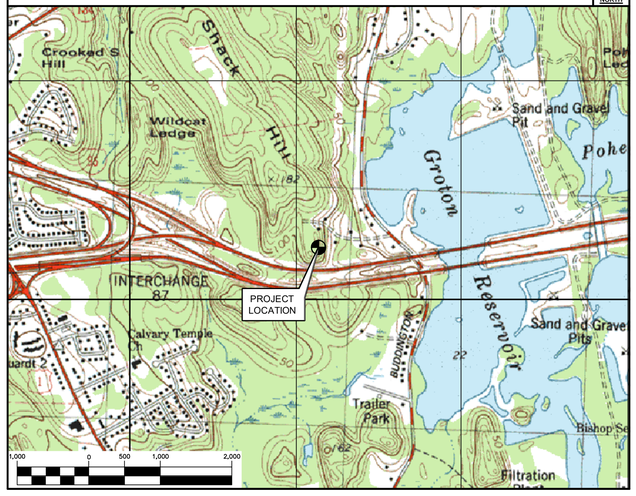
SITE DIRECTIONS

FROM: 500 ENTERPRISE DRIVE, ROCKY HILL, CONNECTICUT
TO: 75 ROBERTS ROAD, GROTON, CONNECTICUT

1.	HEAD NORTHEAST ON ENTERPRISE DR TOWARD CAPITAL BLVD	0.03 MI
2.	TURN LEFT ONTO CAPITAL BLVD	0.02 MI
3.	TURN LEFT ONTO STATE HWY 411	0.03 MI
4.	TURN LEFT TO MERGE ONTO I-91 S	0.03 MI
5.	TAKE EXIT 22S ON THE LEFT TO MERGE ONTO CT- S TOWARD MIDDLETOWN/OLD SAYBROOK	29.2 MI
6.	MERGE ONTO I-95N/US 1 N TOWARD NEW LONDON/PROVIDENCE	10.6 MI
7.	KEEP RIGHT AT THE FORK TO STAY ON I-95 N TOWARDS NEW LONDON/PROVIDENCE	6.6 MI
8.	TAKE EXIT 86 ON LEFT TO CT-184/CT-12 TOWARD U.S. SUB BASE GALES FERRY	0.3 MI
9.	KEEP LEFT AT THE FORK TO CONTINUE TOWARD CT-184 E	443 FT
10.	CONTINUE ONTO CT-184 E	1.2 MI
11.	TURN RIGHT ONTO BUDDINGTON RD	1.0 MI
12.	TURN RIGHT ONTO ROBERTS RD	0.2 MI

VICINITY MAP

SCALE: 1" = 1000'



PROJECT SUMMARY

1. THE PROPOSED SCOPE OF WORK CONSISTS OF A MODIFICATION TO THE EXISTING UNMANNED TELECOMMUNICATIONS FACILITY INCLUDING THE FOLLOWING:
   - A. REMOVE AND REPLACE EXISTING POSITION 4 ANTENNA FOR PROPOSED 12-PORT ANTENNA, (1) PER SECTOR (ALPHA/BETA SECTOR).
   - B. REMOVE AND REPLACE EXISTING POSITION 3 ANTENNA FOR PROPOSED 12-PORT ANTENNA, (1) PER SECTOR (GAMMA SECTOR).
   - C. INSTALL (1) NEW RRUS-32 B2 BEHIND POSITION 4 ANTENNA @ ALPHA AND BETA SECTOR
   - D. INSTALL (1) NEW RRUS-32 B2 BEHIND POSITION 3 ANTENNA @ GAMMA SECTOR
   - E. REMOVE (12) EXISTING DIPLEXERS, (6) ON TOWER AND (6) WITHIN EXISTING EQUIPMENT SHELTER.
   - F. INSTALL (2) NEW TRIPLEXERS BEHIND POSITION 4 ANTENNA (ALPHA/BETA SECTOR).
   - G. INSTALL (2) NEW TRIPLEXERS BEHIND POSITION 3 ANTENNA (GAMMA SECTOR).
   - H. INSTALL (6) NEW TRIPLEXERS WITHIN EXISTING EQUIPMENT ROOM
   - I. INSTALL (1) AT&T DC6 SURGE ARRESTOR ON TOWER.
   - J. REMOVE EXISTING AT&T RACK MOUNTED SURGE ARRESTOR (DC6) AND REPLACE WITH (2) NEW RACK MOUNTED DC12 SURGE ARRESTORS.
   - K. INSTALL ONE NEW FIBER TRUNK FROM EQUIPMENT ROOM TO PROPOSED DC6 SURGE ARRESTOR ON TOWER ROUTED WITHIN EXISTING TOWER.
   - L. INSTALL (2) NEW DC CONDUCTOR CABLES ROUTED FROM EQUIPMENT ROOM WITHIN FLEXIBLE CONDUIT TO PROPOSED DC6 SURGE ARRESTOR ON TOWER ROUTED WITHIN EXISTING TOWER.

PROJECT INFORMATION

AT&T SITE NUMBER:	CT2182
AT&T SITE NAME:	GROTON ROBERTS RD
SITE ADDRESS:	CROWN CASTLE SITE NO.: 881533 75 ROBERTS ROAD GROTON, CT 06340
LESSEE/APPLICANT:	AT&T MOBILITY 500 ENTERPRISE DRIVE, SUITE 3A ROCKY HILL, CT 06067
ENGINEER:	CENTEK ENGINEERING, INC. 63-2 NORTH BRANFORD RD. BRANFORD, CT 06405
PROJECT COORDINATES:	LATITUDE: 41°-21'-37.03" N LONGITUDE: 72°-02'-54.42" W GROUND ELEVATION: ±129' AMSL SITE COORDINATES AND GROUND ELEVATION REFERENCED FROM GOOGLE EARTH.

SHEET INDEX

SHT. NO.	DESCRIPTION	REV.
T-1	TITLE SHEET	0
N-1	NOTES, SPECIFICATIONS AND DETAILS	0
C-1	PLANS AND ELEVATION	0
C-2	LTE 3C EQUIPMENT DETAILS	0
E-1	LTE SCHEMATIC DIAGRAM AND NOTES	0
E-2	LTE WIRING DIAGRAM	0
E-3	TYPICAL ELECTRICAL DETAILS	0

REV.	DATE	DRAWN BY	CHK'D BY	DESCRIPTION
1	03/09/17	KAWJR	CAG	CONSTRUCTION DRAWINGS - REVISED PER CLIENT COMMENTS
0	02/10/17	KAWJR	CAG	CONSTRUCTION DRAWINGS - ISSUED FOR CONSTRUCTION

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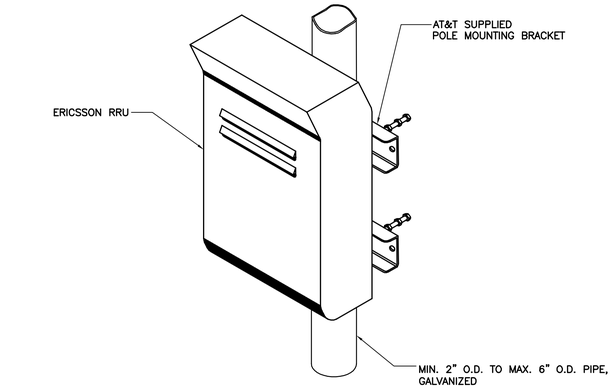
DATE: 01/16/17
SCALE: AS NOTED
JOB NO. 16071.97

TITLE SHEET

T-1

Sheet No. 1 of 7



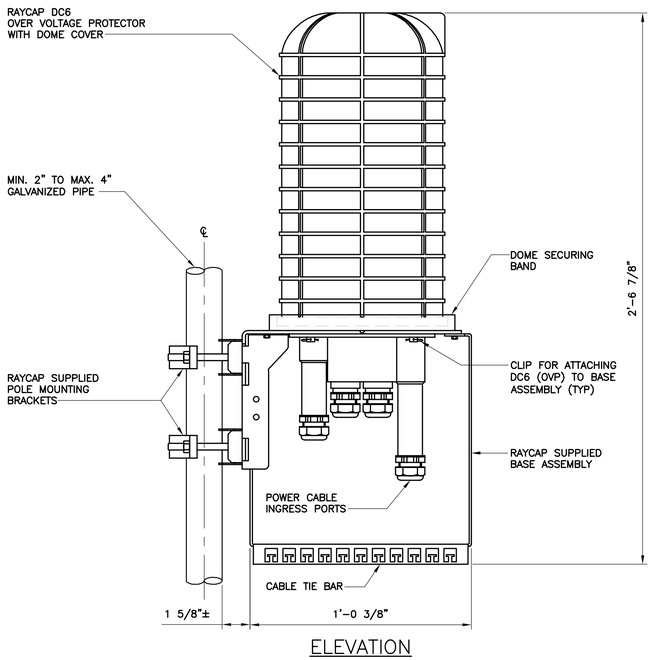
ISOMETRIC VIEW

NOTES:

1. AT&T SHALL SUPPLY RRU, AND RRU POLE–MOUNTING BRACKET. CONTRACTOR SHALL SUPPLY POLE/PIPE AND INSTALL ALL MOUNTING HARDWARE INCLUDING ERICSSON RRU POLE–MOUNTING BRACKET. CONTRACTOR SHALL INSTALLS RRU AND MAKES CABLE TERMINATIONS.
2. NO PAINTING OF THE RRU OR SOLAR SHIELD IS ALLOWED.

1/N–1 TYPICAL RRUS MOUNTING DETAILS

SCALE: NTS



ELEVATION

NOTES:

1. RAYCAP VIA AT&T SUPPLIES THE DC6 OVER VOLTAGE PROTECTOR AND PIPE MOUNTING BRACKETS. SUBCONTRACTOR SHALL SUPPLY THE PIPE.

2/N–1 TYPICAL SURGE ARRESTOR MOUNTING DETAIL

SCALE: NTS

NOTES AND SPECIFICATIONS

DESIGN BASIS:

GOVERNING CODE: 2012 INTERNATIONAL BUILDING (IBC) AS MODIFIED BY THE 2016 CT STATE BUILDING CODE AND AMENDMENTS.

1. DESIGN CRITERIA:

- WIND LOAD: PER TIA 222 G (ANTENNA MOUNTS): 105–120 MPH (3 SECOND GUST)
- RISK CATEGORY: II (BASED ON IBC TABLE 1604.5)
- NOMINAL DESIGN SPEED (OTHER STRUCTURE): 105 MPH (Vasd) (EXPOSURE B/IMPORTANCE FACTOR 1.0 BASED ON ASCE 7–10) PER 2012 INTERNATIONAL BUILDING CODE (IBC) AS MODIFIED BY THE 2016 CONNECTICUT STATE BUILDING CODE.
- SEISMIC LOAD (DOES NOT CONTROL): PER ASCE 7–10 MINIMUM DESIGN LOADS FOR BUILDING AND OTHER STRUCTURES.

GENERAL NOTES:

1. ALL CONSTRUCTION SHALL BE IN COMPLIANCE WITH THE GOVERNING BUILDING CODE.
2. 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 WORK AND SHALL EXECUTE THE WORK CORRECTLY IN ACCORDANCE WITH SUCH ORDINANCES, LAWS, CODES, RULES OR REGULATIONS WITH NO INCREASE IN COSTS.
3. 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.
4. DIMENSIONS AND DETAILS SHALL BE CHECKED AGAINST EXISTING FIELD CONDITIONS.
5. THE CONTRACTOR SHALL VERIFY AND COORDINATE THE SIZE AND LOCATION OF ALL OPENINGS, SLEEVES AND ANCHOR BOLTS AS REQUIRED BY ALL TRADES.
6. ALL DIMENSIONS, ELEVATIONS, AND OTHER REFERENCES TO EXISTING STRUCTURES, SURFACE, AND SUBSURFACE CONDITIONS ARE APPROXIMATE. NO GUARANTEE IS MADE FOR THE ACCURACY OR COMPLETENESS OF THE INFORMATION SHOWN. THE CONTRACTOR SHALL VERIFY AND COORDINATE ALL DIMENSIONS, ELEVATIONS, ANGLES WITH EXISTING CONDITIONS AND WITH ARCHITECTURAL AND SITE DRAWINGS BEFORE PROCEEDING WITH ANY WORK.
7. AS THE WORK PROGRESSES, THE CONTRACTOR SHALL NOTIFY THE OWNER OF ANY CONDITIONS WHICH ARE IN CONFLICT OR OTHERWISE NOT CONSISTENT WITH THE CONSTRUCTION DOCUMENTS AND SHALL NOT PROCEED WITH SUCH WORK UNTIL THE CONFLICT IS SATISFACTORILY RESOLVED.
8. THE CONTRACTOR SHALL COMPLY WITH ALL APPLICABLE SAFETY CODES AND REGULATIONS DURING ALL PHASES OF CONSTRUCTION. THE CONTRACTOR IS SOLELY RESPONSIBLE FOR PROVIDING AND MAINTAINING ADEQUATE SHORING, BRACING, AND BARRICADES AS MAY BE REQUIRED FOR THE PROTECTION OF EXISTING PROPERTY, CONSTRUCTION WORKERS, AND FOR PUBLIC SAFETY.
9. THE CONTRACTOR IS SOLELY RESPONSIBLE TO DETERMINE CONSTRUCTION PROCEDURE AND SEQUENCE, AND TO ENSURE THE SAFETY OF THE EXISTING STRUCTURES AND ITS COMPONENT PARTS DURING CONSTRUCTION. THIS INCLUDES THE ADDITION OF WHATEVER SHORING, BRACING, UNDERPINNING, ETC. THAT MAY BE NECESSARY. MAINTAIN EXISTING SITE OPERATIONS, COORDINATE WORK WITH NORTHEAST UTILITIES
10. THE STRUCTURE IS DESIGNED TO BE SELF–SUPPORTING AND STABLE AFTER FOUNDATION REMEDIATION WORK IS COMPLETE. IT IS THE CONTRACTOR'S SOLE RESPONSIBILITY TO DETERMINE ERECTION PROCEDURE AND SEQUENCE AND TO ENSURE THE SAFETY OF THE STRUCTURE AND ITS COMPONENT PARTS DURING ERECTION. THIS INCLUDES THE ADDITION OF WHATEVER SHORING, TEMPORARY BRACING, GUYS OR TIEDOWNS, WHICH MIGHT BE NECESSARY.
11. 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.
12. SHOP DRAWINGS, CONCRETE MIX DESIGNS, TEST REPORTS, AND OTHER SUBMITTALS PERTAINING TO STRUCTURAL WORK SHALL BE FORWARDED TO THE OWNER FOR REVIEW BEFORE FABRICATION AND/OR INSTALLATION IS MADE. SHOP DRAWINGS SHALL INCLUDE ERECTION DRAWINGS AND COMPLETE DETAILS OF CONNECTIONS AS WELL AS MANUFACTURER'S SPECIFICATION DATA WHERE APPROPRIATE. SHOP DRAWINGS SHALL BE CHECKED BY THE CONTRACTOR AND BEAR THE CHECKER'S INITIALS BEFORE BEING SUBMITTED FOR REVIEW.
13. NO DRILLING WELDING OR TAPING ON EVERSOURCE OWNED EQUIPMENT.
14. REFER TO DRAWING T1 FOR ADDITIONAL NOTES AND REQUIREMENTS.

STRUCTURAL STEEL

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

   A. STRUCTURAL STEEL (W SHAPES)–––ASTM A992 (FY = 50 KSI)
   B. STRUCTURAL STEEL (OTHER SHAPES)–––ASTM A36 (FY = 36 KSI)
   C. STRUCTURAL HSS (RECTANGULAR SHAPES)–––ASTM A500 GRADE B, (FY = 46 KSI)
   D. STRUCTURAL HSS (ROUND SHAPES)–––ASTM A500 GRADE B, (FY = 42 KSI)
   E. PIPE–––ASTM A53 (FY = 35 KSI)
   F. CONNECTION BOLTS–––ASTM A325–N
   G. U–BOLTS–––ASTM A36
   H. ANCHOR RODS–––ASTM F 1554
   I. WELDING ELECTRODE–––ASTM E 70XX

2. 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.
3. STRUCTURAL STEEL SHALL BE DETAILED, FABRICATED AND ERECTED IN ACCORDANCE WITH THE LATEST PROVISIONS OF AISC MANUAL OF STEEL CONSTRUCTION.
4. PROVIDE ALL PLATES, CLIP ANGLES, CLOSURE PIECES, STRAP ANCHORS, MISCELLANEOUS PIECES AND HOLES REQUIRED TO COMPLETE THE STRUCTURE.
5. FIT AND SHOP ASSEMBLE FABRICATIONS IN THE LARGEST PRACTICAL SECTIONS FOR DELIVERY TO SITE.
6. INSTALL FABRICATIONS PLUMB AND LEVEL, ACCURATELY FITTED, AND FREE FROM DISTORTIONS OR DEFECTS.
7. AFTER ERECTION OF STRUCTURES, TOUCHUP ALL WELDS, ABRASIONS AND NON–GALVANIZED SURFACES WITH A 95% ORGANIC ZINC RICH PAINT IN ACCORDANCE WITH ASTM 780.
8. 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.
9. ALL BOLTS, ANCHORS AND MISCELLANEOUS HARDWARE SHALL BE GALVANIZED IN ACCORDANCE WITH ASTM A153 "ZINC COATING (HOT–DIP) ON IRON AND STEEL HARDWARE".
10. 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.
11. CONNECTION ANGLES SHALL HAVE A MINIMUM THICKNESS OF 1/4 INCHES.
12. 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.
13. LOCK WASHER ARE NOT PERMITTED FOR A325 STEEL ASSEMBLIES.
14. SHOP CONNECTIONS SHALL BE WELDED OR HIGH STRENGTH BOLTED.
15. MILL BEARING ENDS OF COLUMNS, STIFFENERS, AND OTHER BEARING SURFACES TO TRANSFER LOAD OVER ENTIRE CROSS SECTION.
16. FABRICATE BEAMS WITH MILL CAMBER UP.
17. 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.
18. COMMENCEMENT OF STRUCTURAL STEEL WORK WITHOUT NOTIFYING THE ENGINEER OF ANY DISCREPANCIES WILL BE CONSIDERED ACCEPTANCE OF PRECEDING WORK.
19. INSPECTION AND TESTING OF ALL WELDING AND HIGH STRENGTH BOLTING SHALL BE PERFORMED BY AN INDEPENDENT TESTING LABORATORY.
20. FOUR COPIES OF ALL INSPECTION TEST REPORTS SHALL BE SUBMITTED TO THE ENGINEER WITHIN TEN (10) WORKING DAYS OF THE DATE OF INSPECTION.

PAINT NOTES

PAINTING SCHEDULE:

1. ANTENNA PANELS:

   A. SHERWIN WILLIAMS POLANE–B
   B. COLOR TO BE MATCHED WITH EXISTING TOWER STRUCTURE.

2. COAXIAL CABLES:

   A. ONE COAT OF DTM BONDING PRIMER (2–5 MILS. DRY FINISH)
   B. TWO COATS OF DTM ACRYLIC PRIMER/FINISH (2.5–5 MILS. DRY FINISH)
   C. COLOR TO BE FIELD MATCHED WITH EXISTING STRUCTURE.

EXAMINATION AND PREPARATION:

1. DO NOT APPLY PAINT IN SNOW, RAIN, FOG OR MIST OR WHEN RELATIVE HUMIDITY EXCEEDS 85%. DO NOT APPLY PAINT TO DAMP OR WET SURFACES.
2. VERIFY THAT SUBSTRATE CONDITIONS ARE READY TO RECEIVE WORK. EXAMINE SURFACE SCHEDULED TO BE FINISHED PRIOR TO COMMENCEMENT OF WORK. REPORT ANY CONDITION THAT MAY POTENTIALLY AFFECT PROPER APPLICATION.
3. TEST SHOP APPLIED PRIMER FOR COMPATIBILITY WITH SUBSEQUENT COVER MATERIALS.
4. PERFORM PREPARATION AND CLEANING PROCEDURE IN STRICT ACCORDANCE WITH COATING MANUFACTURER'S INSTRUCTIONS FOR EACH SUBSTRATE CONDITION.
5. CORRECT DEFECTS AND CLEAN SURFACES WHICH AFFECT WORK OF THIS SECTION. REMOVE EXISTING COATINGS THAT EXHIBIT LOOSE SURFACE DEFECTS.
6. IMPERVIOUS SURFACE: REMOVE MILDEW BY SCRUBBING WITH SOLUTION OF TRI–SODIUM PHOSPHATE AND BLEACH. RINSE WITH CLEAN WATER AND ALLOW SURFACE TO DRY.
7. ALUMINUM SURFACE SCHEDULED FOR PAINT FINISH: REMOVE SURFACE CONTAMINATION BY STEAM OR HIGH–PRESSURE WATER. REMOVE OXIDATION WITH ACID ETCH AND SOLVENT WASHING. APPLY ETCHING PRIMER IMMEDIATELY FOLLOWING CLEANING.
8. FERROUS METALS: CLEAN UNGALVANIZED FERROUS METAL SURFACES THAT HAVE NOT BEEN SHOP COATED; REMOVE OIL, GREASE, DIRT, LOOSE MILL SCALE, AND OTHER FOREIGN SUBSTANCES. USE SOLVENT OR MECHANICAL CLEANING METHODS THAT COMPLY WITH THE STEEL STRUCTURES PAINTING COUNCIL'S (SSPC) RECOMMENDATIONS. TOUCH UP BARE AREAS AND SHOP APPLIED PRIME COATS THAT HAVE BEEN DAMAGED. WIRE BRUSH, CLEAN WITH SOLVENTS RECOMMENDED BY PAINT MANUFACTURER, AND TOUCH UP WITH THE SAME PRIMER AS THE SHOP COAT.
9. GALVANIZED SURFACES: CLEAN GALVANIZED SURFACES WITH NON–PETROLEUM–BASED SOLVENTS SO SURFACE IS FREE OF OIL AND SURFACE CONTAMINANTS. REMOVE PRETREATMENT FROM GALVANIZED SHEET METAL FABRICATED FROM COIL STOCK BY MECHANICAL METHODS.
10. ANTENNA PANELS: REMOVE ALL OIL, DUST, GREASE, DIRT, AND OTHER FOREIGN MATERIAL TO ENSURE ADEQUATE ADHESION. PANELS MUST BE WIPED WITH METHYL ETHYL KETONE (MEK).
11. COAXIAL CABLES: REMOVE ALL OIL, DUST, GREASE. DIRT, AND OTHER FOREIGN MATERIAL TO ENSURE ADEQUATE ADHESION.

CLEANING:

1. COLLECT WASTE MATERIAL, WHICH MAY CONSTITUTE A FIRE HAZARD, PLACE IN CLOSED METAL CONTAINERS AND REMOVE DAILY FROM SITE.

APPLICATION:

1. APPLY PRODUCTS IN ACCORDANCE WITH MANUFACTURER'S INSTRUCTIONS.
2. DO NOT APPLY FINISHES TO SURFACES THAT ARE NOT DRY.
3. APPLY EACH COAT TO UNIFORM FINISH.
4. APPLY EACH COAT OF PAINT SLIGHTLY DARKER THAN PRECEDING COAT UNLESS OTHERWISE APPROVED.
5. SAND METAL LIGHTLY BETWEEN COATS TO ACHIEVE REQUIRED FINISH.
6. VACUUM CLEAN SURFACES FREE OF LOOSE PARTICLES. USE TACK CLOTH JUST PRIOR TO APPLYING NEXT COAT.
7. ALLOW APPLIED COAT TO DRY BEFORE NEXT COAT IS APPLIED.

COMPLETED WORK:

1. SAMPLES: PREPARE 24" X 24" SAMPLE AREA FOR REVIEW.
2. MATCH APPROVED SAMPLES FOR COLOR, TEXTURE AND COVERAGE. REMOVE REFINISH OR REPAINT WORK NOT IN COMPLIANCE WITH SPECIFIED REQUIREMENTS.

REV.	DATE	DRAWN BY	CHK'D BY	DESCRIPTION
0	02/10/17	KAW/JR	CAG	CONSTRUCTION DRAWINGS – ISSUED FOR CONSTRUCTION
1	03/09/17	KAW/JR	CAG	CONSTRUCTION DRAWINGS – REVISED PER CLIENT COMMENTS

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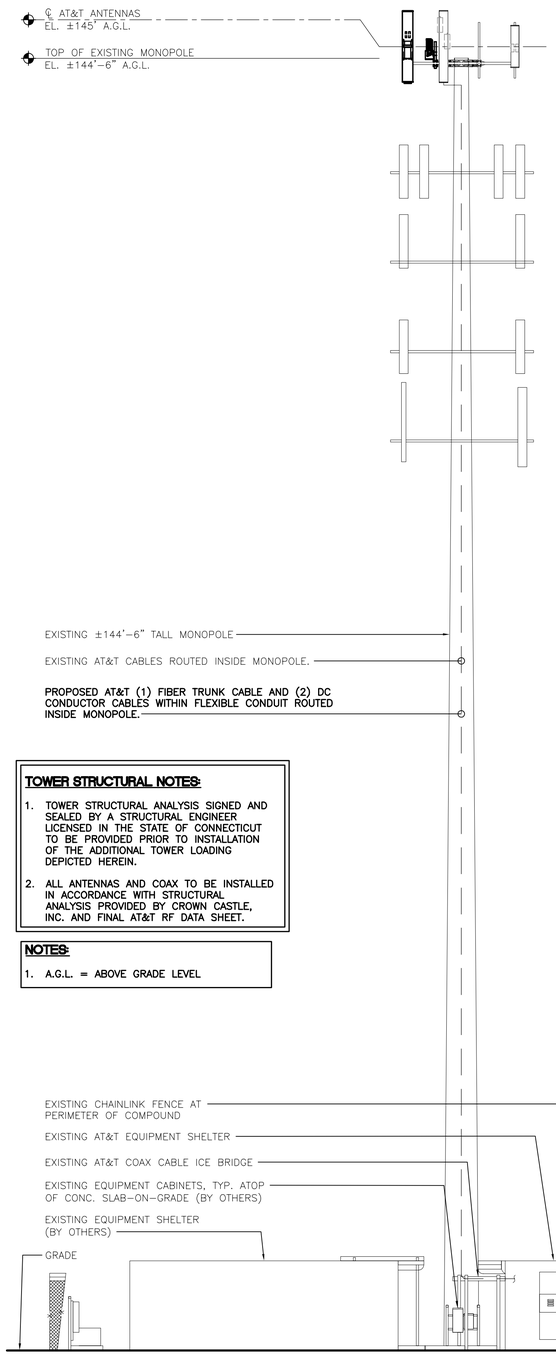
GROTON, CT 06340

DATE:	01/16/17
SCALE:	AS NOTED
JOB NO.	16071.97

NOTES, SPECIFICATIONS AND DETAILS

N–1

Sheet No. 2 of 7



TOWER STRUCTURAL NOTES:

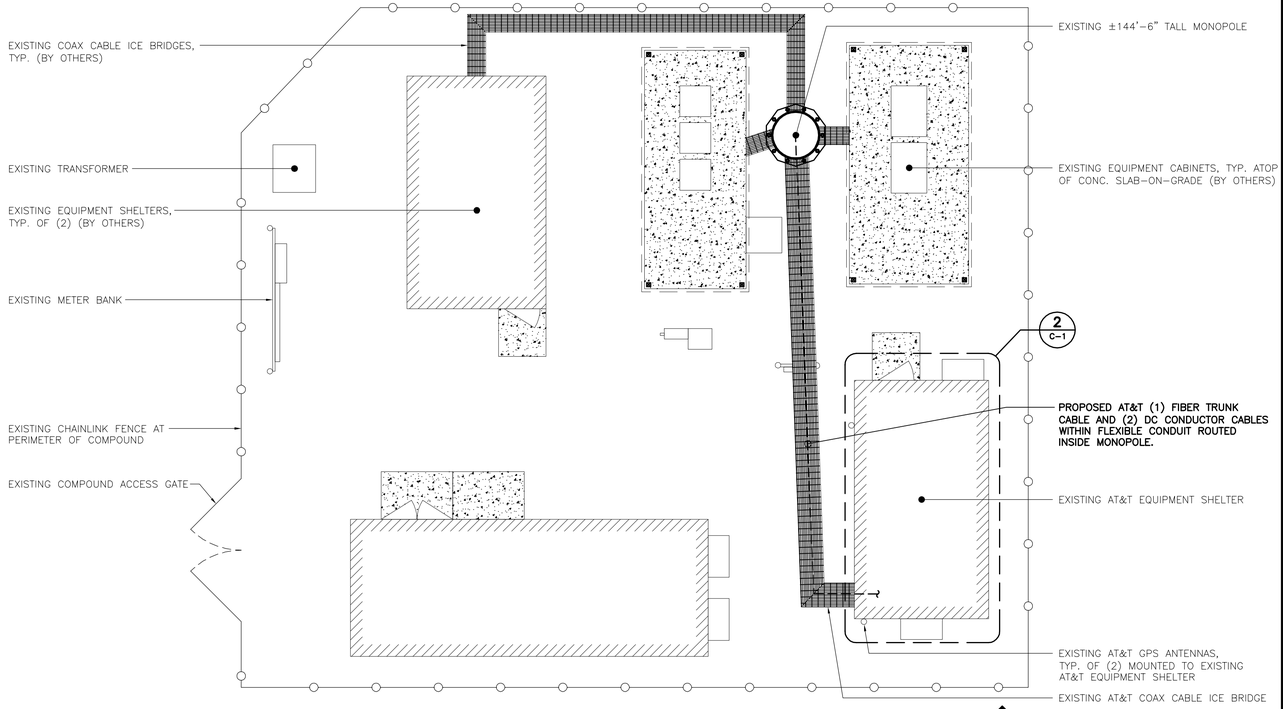
1. TOWER STRUCTURAL ANALYSIS SIGNED AND SEALED BY A STRUCTURAL ENGINEER LICENSED IN THE STATE OF CONNECTICUT TO BE PROVIDED PRIOR TO INSTALLATION OF THE ADDITIONAL TOWER LOADING DEPICTED HEREIN.
2. ALL ANTENNAS AND COAX TO BE INSTALLED IN ACCORDANCE WITH STRUCTURAL ANALYSIS PROVIDED BY CROWN CASTLE, INC. AND FINAL AT&T RF DATA SHEET.

NOTES:

1. A.G.L. = ABOVE GRADE LEVEL

3 C-1 **NORTH ELEVATION**
SCALE: 1" = 8'

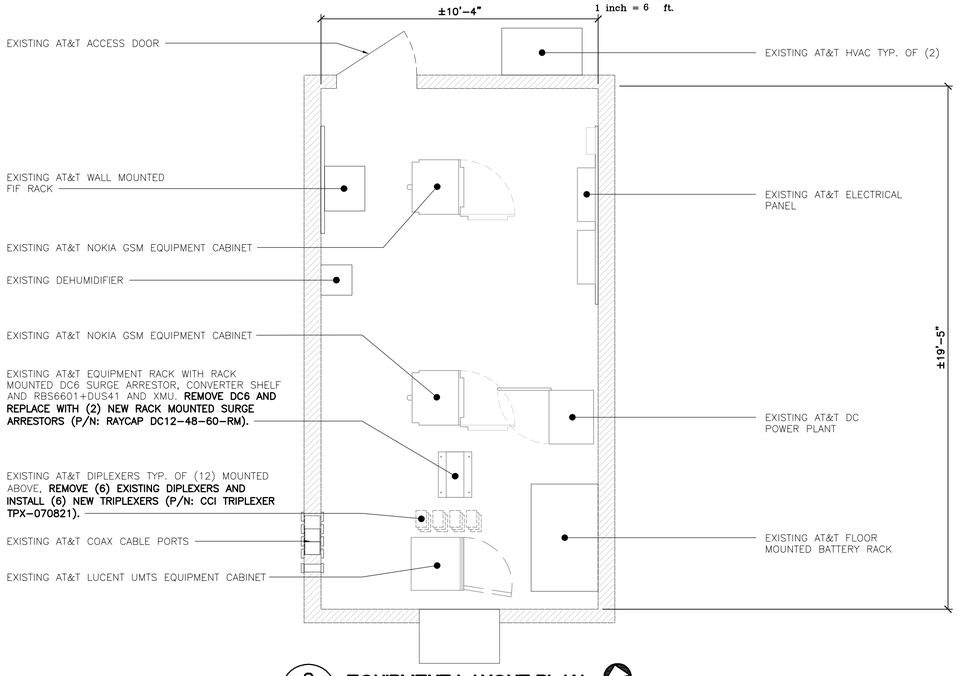
GRAPHIC SCALE
8 0 4 8 16 32
(IN FEET)
1 inch = 8 ft.



1 C-1 **COMPOUND PLAN**
SCALE: 1" = 6'

TRUE NORTH

GRAPHIC SCALE
6 0 3 6 12 24
(IN FEET)
1 inch = 6 ft.



2 C-1 **EQUIPMENT LAYOUT PLAN**
SCALE: 3/8" = 1'-0"

TRUE NORTH

REV.	DATE	DRAWN BY	CHK'D BY	DESCRIPTION
1	03/09/17	KAW/JR	CAG	CONSTRUCTION DRAWINGS – REVISED PER CLIENT COMMENTS
0	02/10/17	KAW/JR	CAG	CONSTRUCTION DRAWINGS – ISSUED FOR CONSTRUCTION

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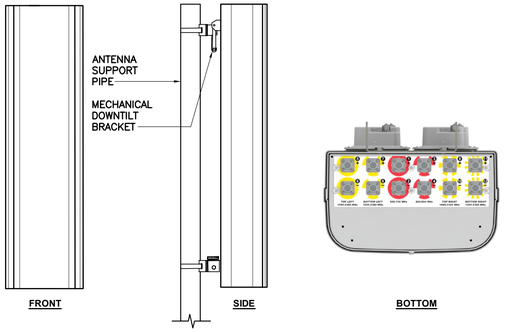
JOB NO. 16071.97

PLANS AND ELEVATION

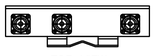
C-1

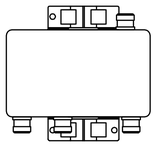
Sheet No. 3 of 7



ALPHA/BETA/GAMMA ANTENNA		
EQUIPMENT	DIMENSIONS	WEIGHT
MAKE: CCI MODEL: TPA-65R-LCUUUU-H8	96"L x 14.4"W x 8.6"D	94.2 LBS.

5 C-2 PROPOSED ANTENNA DETAIL
SCALE: 1/2" = 1'-0"

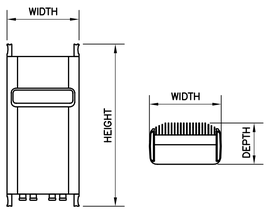

TOP VIEW


FRONT VIEW

TRIPLEXER		
EQUIPMENT	DIMENSIONS	WEIGHT
MAKE: CCI MODEL: TPX-070821	5.83"H x 9.65"W x 2.05"D	7.5 LBS.

NOTES:
1. CONTRACTOR TO COORDINATE FINAL EQUIPMENT MODEL SELECTION WITH AT&T CONSTRUCTION MANAGER PRIOR TO ORDERING.

6 C-2 TRIPLEXER DETAIL
SCALE: NONE

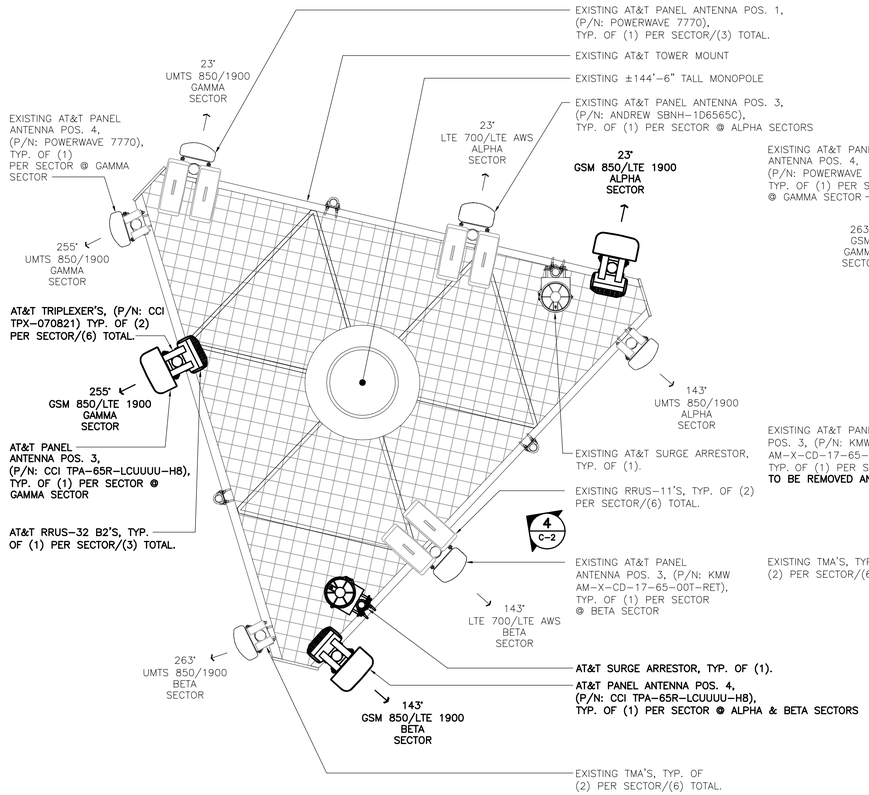


FRONT VIEW TOP VIEW

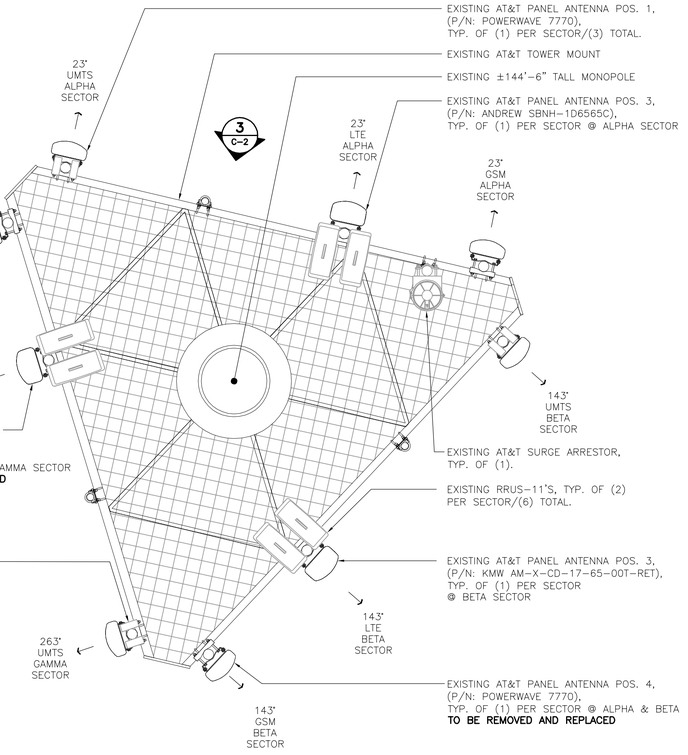
RRU (REMOTE RADIO UNIT)			
EQUIPMENT	DIMENSIONS	WEIGHT	CLEARANCES
MAKE: ERICSSON MODEL: RRUS-32	27.17"H x 12.05"W x 7.01"D	52.91 LBS.	ABOVE: 16" MIN. BELOW: 12" MIN. FRONT: 36" MIN.

NOTES:
1. CONTRACTOR TO COORDINATE FINAL EQUIPMENT MODEL SELECTION WITH AT&T CONSTRUCTION MANAGER PRIOR TO ORDERING.

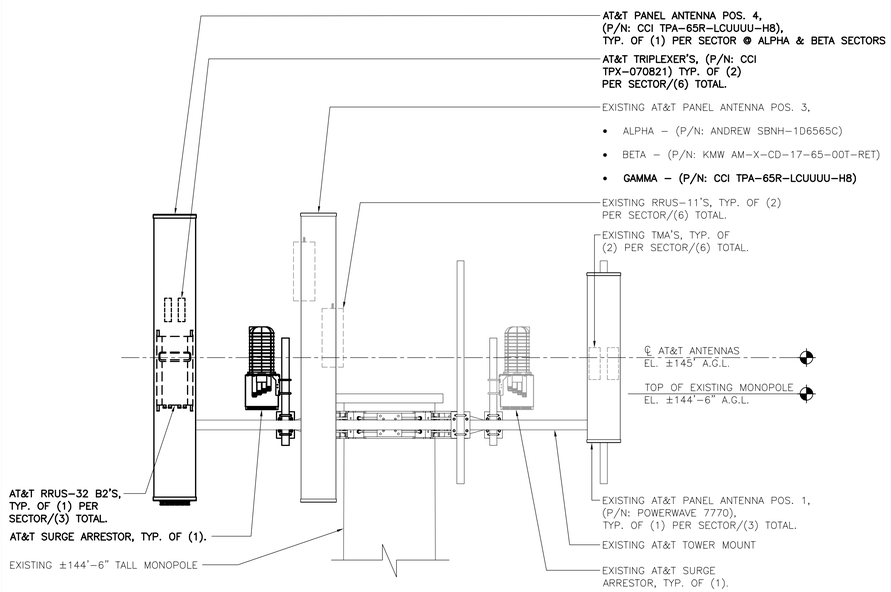
7 C-2 ERICSSON RRUS-32 B2 DETAIL
SCALE: 1" = 1'-0"



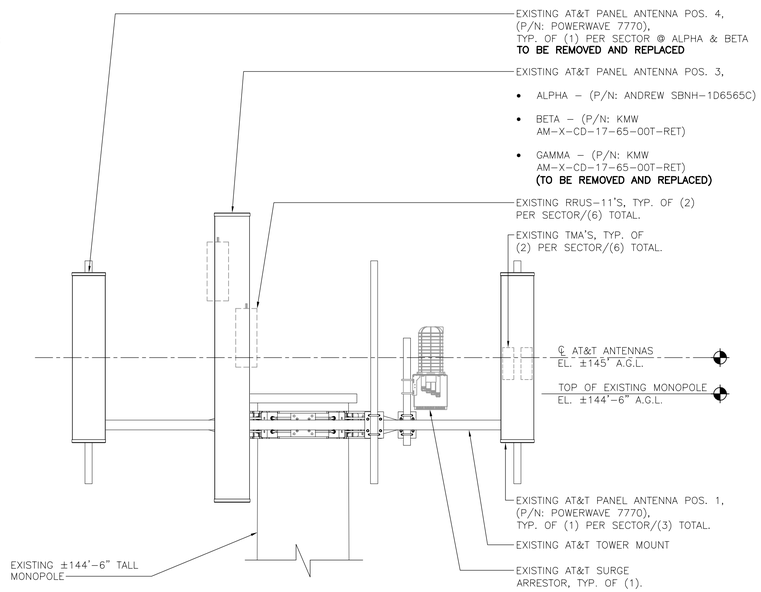
2 C-2 PROPOSED ANTENNA PLAN
SCALE: 1/2" = 1'-0" NORTH



1 C-2 EXISTING ANTENNA PLAN
SCALE: 1/2" = 1'-0" NORTH



4 C-2 PROPOSED ANTENNA ELEVATION
SCALE: 1/2" = 1'-0"



3 C-2 EXISTING ANTENNA ELEVATION
SCALE: 1/2" = 1'-0"

REV.	DATE	DRAWN BY	CHK'D BY	DESCRIPTION
1	03/09/17	KAW/JR	CAG	CONSTRUCTION DRAWINGS – REVISED PER CLIENT COMMENTS
0	02/10/17	KAW/JR	CAG	CONSTRUCTION DRAWINGS – ISSUED FOR CONSTRUCTION

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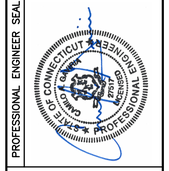

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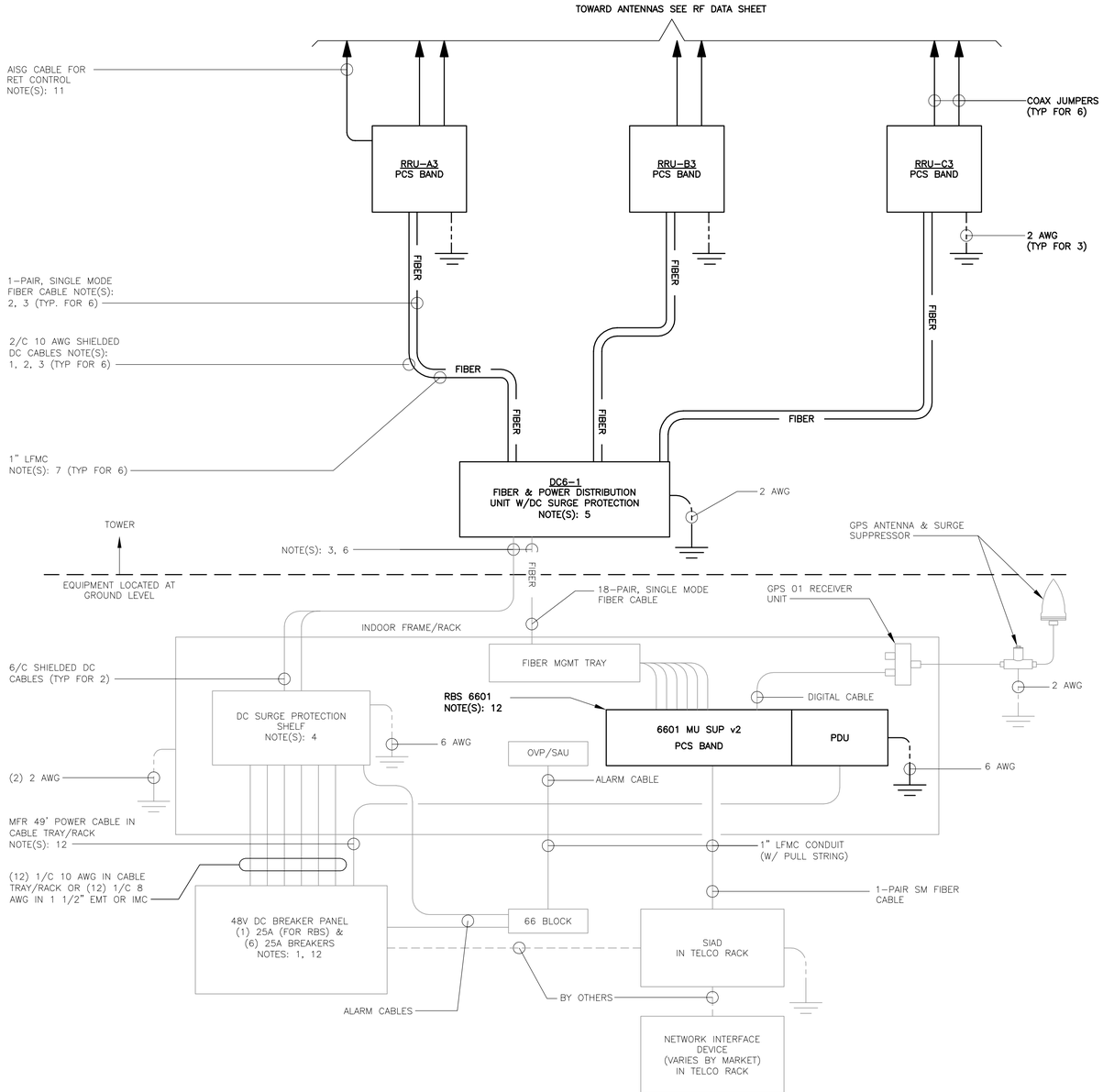
DATE: 01/16/17
SCALE: AS NOTED
JOB NO. 16071.97

LTE 3C EQUIPMENT DETAILS

C-2

Sheet No. 4 of 7



1 E-1 LTE SCHEMATIC DIAGRAM

NOT TO SCALE

LTE SCHEMATIC DIAGRAM NOTES:

1. BREAKERS TO BE TAGGED AND LOCKED OUT. A 20A (MIN.) OR 30A (MAX.) BREAKER FOR RRUs MAY BE SUBSTITUTED FOR THE RECOMMENDED 25A BREAKER. SIZE 12 CONDUCTORS MAY BE USED ONLY WITH 20A BREAKERS.
2. LEAVE COILED AND PROTECTED UNTIL TERMINATED.
3. DC AND FIBER CABLE SHALL BE ROUTED WITH THE EXISTING COAX CABLE.
4. DC SURGE PROTECTION SHELF SHALL BE RAYCAP DCx-48-60-RM.
5. FIBER & DC DISTRIBUTION BOX W/DC SURGE PROTECTION SHALL BE RAYCAP DC6-48-60-18-8F.
6. SUPPORT FIBER & DC POWER CABLES WITH SNAP-IN HANGERS SPACED NO GREATER THAN 3 FEET APART ON TOWER. SUPPORT FIBER AND DC POWER CABLES INSIDE MONOPOLE WITH CABLE HOISTING GRIPS AT 250 FT MAXIMUM INTERVALS. DRESS CABLES TO PREVENT CONTACT WITH ENTRANCE AND EXIT OPENINGS.
7. CONDUIT TO BE USED ON A TOWER IF THE RRU IS MORE THAN 10' FROM THE DISTRIBUTION UNITS. MAX CABLE LENGTH IS 16 FEET.
8. SINGLE-CONDUCTOR DC POWER CABLES SHALL BE TELCOFLEX® OR KS24194™, COPPER, UL LISTED RHH NON-HALOGEN, LOW SMOKE WITH BRAIDED COVER, TYPE TC (1/0 AND LARGER). UNLESS OTHERWISE NOTED, STRANDING SHALL BE CLASS B (TYPE III) FOR CABLES SIZES 14, 12 & 10 AWG AND CLASS I (TYPE IV) FOR SIZES 8 AWG AND LARGER. CABLES SHALL BE COLOR CODED RED FOR +24V, BLUE FOR -48V AND GRAY FOR 24V AND 48V RETURN CONDUCTORS. MULTI-CONDUCTOR DC POWER CABLES SHALL BE COPPER, CLASS B STRANDING WITH FLAME RETARDANT PVC JACKET, TYPE TC, UL LISTED FOR 90°C DRY/ 75°C WET INSTALLATION.
9. GROUNDING WIRES SHALL BE COPPER, GREEN THHN/THWN UL LISTED FOR 90°C DRY/75°C WET INSTALLATION. MINIMUM SIZE IS 6 AWG UNLESS NOTED OTHERWISE.
10. FIBER OPTIC CABLES SHALL BE INSTALLED IN FLEXIBLE CONDUIT AS SCOPED BY MARKET.
11. RET CONTROL FROM THE RRU IS AN OPTIONAL METHOD OF CONNECTION. REFER TO RF DATA SHEET FOR APPLICABILITY.
12. RBS 6601 VARIANT 2 REQUIRES A 25A BREAKER AND 10 AWG (MIN.) CONDUCTORS. REPLACE EXISTING 15A OR 20A BREAKERS AND 12 AWG CONDUCTORS WHEN UPGRADING AN EXISTING RBS 6601 VARIANT 1.

ELECTRICAL NOTES

1. PRIOR TO START OF CONSTRUCTION CONTRACTOR SHALL COORDINATE WITH OWNER FOR ALL CONSTRUCTION STANDARDS AND SPECIFICATIONS, AND ALL MANUFACTURER DOCUMENTATION FOR ALL EQUIPMENT TO BE INSTALLED.
2. INSTALL ALL EQUIPMENT IN ACCORDANCE WITH LOCAL BUILDING CODE, NATIONAL ELECTRIC CODE, OWNER AND MANUFACTURER'S SPECIFICATIONS.
3. CONNECT ALL NEW EQUIPMENT TO EXISTING TELCO AS REQUIRED BY MANUFACTURER.
4. MAINTAIN ALL CLEARANCES REQUIRED BY NEC AND EQUIPMENT MANUFACTURER.
5. PRIOR TO INSTALLATION CONTRACTOR SHALL MEASURE EXISTING ELECTRICAL LOAD AND VERIFY EXISTING AVAILABLE CAPACITY FOR PROPOSED INSTALLATION. IF INADEQUATE CAPACITY IS AVAILABLE, CONTRACTOR SHALL COORDINATE WITH LOCAL ELECTRIC UTILITY COMPANY TO UPGRADE EXISTING ELECTRIC SERVICE.
6. CONTRACTOR SHALL INSPECT EXISTING GROUNDING AND LIGHTNING PROTECTION SYSTEM AND ENSURE THAT IT IS IN COMPLIANCE WITH NEC, AND SITE OWNER'S SPECIFICATIONS. THE RESULTS OF THIS INSPECTION SHALL BE PRESENTED TO OWNERS REPRESENTATIVE, AND ANY DEFICIENCIES SHALL BE CORRECTED.
7. ALL TRANSMISSION TOWER SITES CONTAIN AN EXTENSIVE BURIED GROUNDING SYSTEM. ALL GROUNDING WORK MUST BE COORDINATED WITH, AND APPROVED BY, THE TOWER OWNER'S SITE REPRESENTATIVE. ALL OF THE TOWER OWNER'S SPECIFICATIONS MUST BE STRICTLY FOLLOWED.
8. PROVIDE AND INSTALL GROUND KITS FOR ALL NEW COAXIAL CABLES AND BOND TO EXISTING OWNERS GROUNDING SYSTEM PER OWNERS SPECIFICATIONS AND NEC.
9. ALL CONDUCTORS SHALL BE TYPE THWN (INT. APPLICATION) AND XHHW (EXT. APPLICATION), 75 DEGREE C, 600 VOLT INSULATION, SOFT ANNEALED STRANDED COPPER. #10 AWG AND SMALLER SHALL BE SPLICED USING ACCEPTABLE SOLDERLESS PRESSURE CONNECTORS. #8 AWG AND LARGER SHALL BE SPLICED USING COMPRESSION SPLIT-BOLT TYPE CONNECTORS, #12 AWG SHALL BE THE MINIMUM SIZE CONDUCTOR FOR LINE VOLTAGE BRANCH CIRCUITS. REFER TO PANEL SCHEDULE FOR BRANCH CIRCUIT CONDUCTOR SIZE(S). CONDUCTORS SHALL BE COLOR CODED FOR CONSISTENT PHASE IDENTIFICATION:
10. MINIMUM BENDING RADIUS FOR CONDUCTORS SHALL BE 12 TIMES THE LARGEST DIAMETER OF BRANCH CIRCUIT CONDUCTOR.
11. THE ENTIRE ELECTRICAL INSTALLATION SHALL BE MADE IN STRICT ACCORDANCE WITH ALL LOCAL, STATE AND NATIONAL CODES AND REGULATIONS WHICH MAY APPLY AND NOTHING IN THE DRAWINGS OR SPECIFICATIONS SHALL BE INTERPRETED AS AN INFRINGEMENT OF SUCH CODES OR REGULATIONS.
12. THE ELECTRICAL CONTRACTOR IS TO BE RESPONSIBLE FOR THE COMPLETE INSTALLATION AND COORDINATION OF THE ENTIRE ELECTRICAL SERVICE. ALL ACTIVITIES TO BE COORDINATED THROUGH OWNER'S REPRESENTATIVE, DESIGN ENGINEER AND OTHER AUTHORITIES HAVING JURISDICTION OF TRADES.
13. THE CONTRACTOR SHALL BE RESPONSIBLE FOR OBTAINING ALL PERMITS AND PAY ALL FEES AS MAY BE REQUIRED FOR THE ELECTRICAL WORK AND FOR SCHEDULING OF ALL INSPECTIONS AS MAY BE REQUIRED BY THE LOCAL AUTHORITY.
14. THE CONTRACTOR SHALL BE RESPONSIBLE FOR COORDINATION WITH THE SITE AND/OR BUILDING OWNER FOR NEW AND/OR DEMOLITION WORK INVOLVED.
15. THE CONTRACTOR SHALL GUARANTEE ALL NEW WORK FOR A PERIOD OF ONE YEAR FROM THE ACCEPTANCE DATE BY THE OWNER. THE CONTRACTOR SHALL BE RESPONSIBLE FOR OBTAINING WARRANTIES FROM ALL EQUIPMENT MANUFACTURERS FOR SUBMISSION TO THE OWNER.
16. DRAWINGS INDICATE GENERAL ARRANGEMENT OF WORK INCLUDED IN CONTRACT. CONTRACTOR SHALL WITHOUT EXTRA CHARGE, MAKE MODIFICATIONS TO THE LAYOUT OF THE WORK TO PREVENT CONFLICT WITH WORK OF OTHER TRADES AND FOR THE PROPER INSTALLATION OF WORK. CHECK ALL DRAWINGS AND VISIT JOB SITE TO VERIFY SPACE AND TYPE OF EXISTING CONDITIONS IN WHICH WORK WILL BE DONE, PRIOR TO SUBMITTAL OF BID.
17. ALL NON-CURRENT CARRYING PARTS OF THE ELECTRICAL AND TELEPHONE CONDUIT SYSTEMS SHALL BE MECHANICALLY AND ELECTRICALLY CONNECTED TO PROVIDE AN INDEPENDENT RETURN PATH TO THE EQUIPMENT GROUNDING SOURCES.
18. GROUNDING SYSTEM WILL BE IN ACCORDANCE WITH THE LATEST ACCEPTABLE EDITION OF THE NATIONAL ELECTRICAL CODE AND REQUIREMENTS PER LOCAL INSPECTOR HAVING JURISDICTION.
19. EACH EQUIPMENT GROUND CONDUCTOR SHALL BE SIZED IN ACCORDANCE WITH THE N.E.C. ARTICLE 250-122. (MIN. #12 AWG).
20. CONTRACTOR SHALL PROVIDE A CELLULAR GROUNDING SYSTEM WITH THE MAXIMUM AC RESISTANCE TO GROUND OF 5 OHM BETWEEN ANY POINT ON THE GROUNDING SYSTEM AS MEASURED BY 3-POINT GROUNDING TEST. (REFER TO SECTION 16960).

TESTS BY INDEPENDENT ELECTRICAL TESTING FIRM

A. CONTRACTOR SHALL RETAIN THE SERVICES OF A LOCAL INDEPENDENT ELECTRICAL TESTING FIRM (WITH MINIMUM 5 YEARS COMMERCIAL EXPERIENCE IN THE ELECTRICAL TESTING INDUSTRY) AS SPECIFIED BY OWNER TO PERFORM:

TEST 1: RESISTANCE TO GROUND TEST ON THE CELLULAR GROUNDING SYSTEM.

THE TESTING FIRM SHALL INCLUDE THE FOLLOWING INFORMATION WITH THE REPORT:

1. TESTING PROCEDURE INCLUDING THE MAKE AND MODEL OF TEST EQUIPMENT.
2. CERTIFICATION OF TESTING EQUIPMENT CALIBRATION WITHIN SIX (6) MONTHS OF DATE OF TESTING. INCLUDE CERTIFICATION LAB ADDRESS AND TELEPHONE NUMBER.
3. GRAPHICAL DESCRIPTION OF TESTING METHOD ACTUALLY IMPLEMENTED.

B. TESTING SHALL BE PERFORMED IN THE PRESENCE AND TO THE SATISFACTION OF OWNERS CONSTRUCTION REPRESENTATIVE. TESTING DATA SHALL BE INITIALED AND DATED BY THE CONSTRUCTION AND INCLUDED WITH THE WRITTEN REPORT/ANALYSIS.

C. THE CONTRACTOR SHALL FORWARD SIX (6) COPIES OF THE INDEPENDENT ELECTRICAL TESTING FIRM REPORT/ANALYSIS TO ENGINEER A MINIMUM OF TEN (10) WORKING DAYS PRIOR TO THE JOB TURNOVER.

D. CONTRACTOR TO PROVIDE A MINIMUM OF ONE (1) WEEK NOTICE TO OWNER AND ENGINEER FOR ALL TESTS REQUIRING WITNESSING.

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DATE:	01/16/17
SCALE:	AS NOTED
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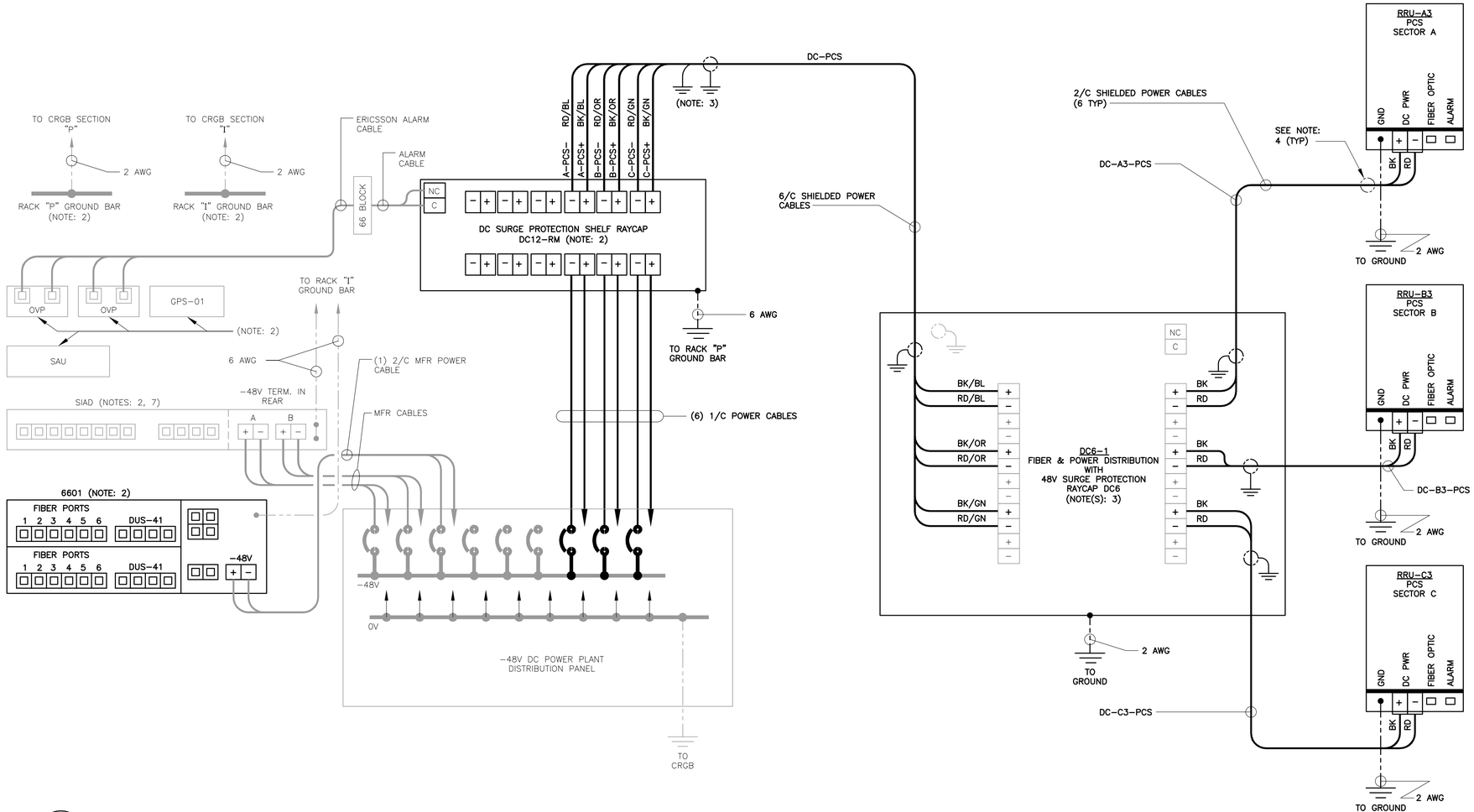
LTE SCHEMATIC DIAGRAM AND NOTES

E-1

Sheet No. 5 of 7



1 / E-2 LTE WIRING DIAGRAM

NOT TO SCALE

LTE WIRING DIAGRAM NOTES:

1. LABEL THE DC POWER CABLES AT BOTH ENDS OF EVERY WIRE AND IN ANY PULL BOX IF USED. LABEL SHALL BE DURABLE, SELF ADHESIVE, WRAPPED LONGITUDINALLY ALONG THE CABLE AND STATE THE SECTOR, FREQUENCY BAND AND POLARITY; I.E. "A-1900+". CABLE AND WIRE LABELS SHOWN ARE REPRESENTATIVE AND MAY BE MODIFIED AS DIRECTED BY AT&T.
2. INSTALL ON BASEBAND EQUIPMENT RACK.
3. THE BARE GROUND WIRE OF EACH MULTI-CONDUCTOR CABLE SHALL BE CONNECTED TO THE "P" GROUND BAR ON THE RACK. WHEN A SHIELDED CABLE IS USED, THE DRAIN WIRE ALSO SHALL BE CONNECTED TO THE "P" GROUND BAR.
4. CABLE GROUND WIRE AND SHIELD DRAIN WIRE TO BE LEFT UN-TERMINATED AT RRU AND DC POWER PLANT.
5. SEE LTE SCHEMATIC DIAGRAM DETAIL 1/E-1 FOR BREAKER RATING.

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SCALE: AS NOTED

JOB NO. 16071.97

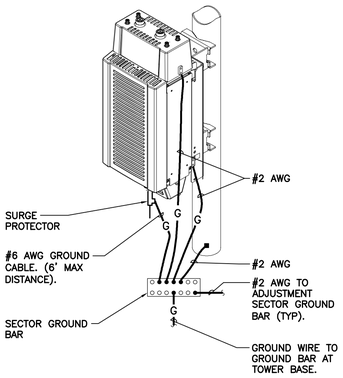
LTE WIRING DIAGRAM

E-2

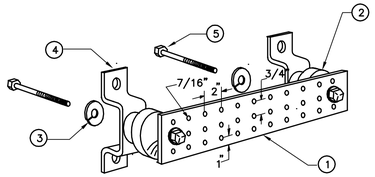
Sheet No. 6 of 7

EACH RRH CABINET SHALL BE GROUNDED IN THE FOLLOWING MANNER:

1. AT TOP OF THE CABINET
2. AT RIGHT SIDE OF THE CABINET.



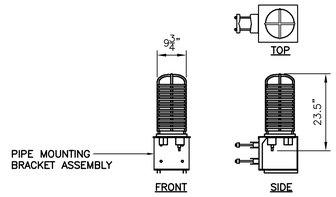
4 E-3 **RRU POLE MOUNT GROUNDING**
NOT TO SCALE



LEGEND

1. TINNED COPPER GROUND BAR, 1/4"x 4"x 20", NEWTON INSTRUMENT CO. HOLE CENTERS TO MATCH NEMA DOUBLE LUG .
2. INSULATORS, NEWTON INSTRUMENT CAT. NO. 2. 3061-4.
3. 3. 5/8" LOCK WASHERS, NEWTON INSTRUMENT CO. CAT. NO. 3015-8.
4. WALL MOUNTING BRACKET, NEWTON INSTRUMENT CO. 4. CAT NO. A-6056.
5. STAINLESS STEEL SECURITY SCREWS.

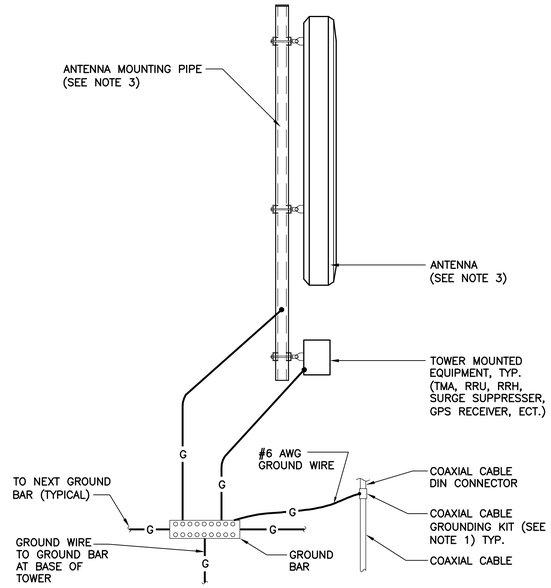
3 E-3 **GROUND BAR DETAIL**
NOT TO SCALE



SITE TYPE	ARRESTOR MAKE/MODEL	QTY REQUIRED	ARRESTOR LOCATION	WEIGHT
	MAKE: RAYCAP (SQUID) MODEL: DC6-48-60-18-8F	(1) PER SITE	TOWER, ADJACENT TO AT&T ANTENNAS AND RRUs.	20 LBS. (WITHOUT MOUNT)

NOTES:
1. CONTRACTOR TO COORDINATE FINAL SURGE ARRESTOR MODEL SELECTION(S) WITH AT&T CONSTRUCTION MANAGER PRIOR TO ORDERING.
2. CONTRACTOR TO INSTALL ARRESTOR IN CONFORMANCE WITH MANUFACTURERS RECOMMENDATIONS.

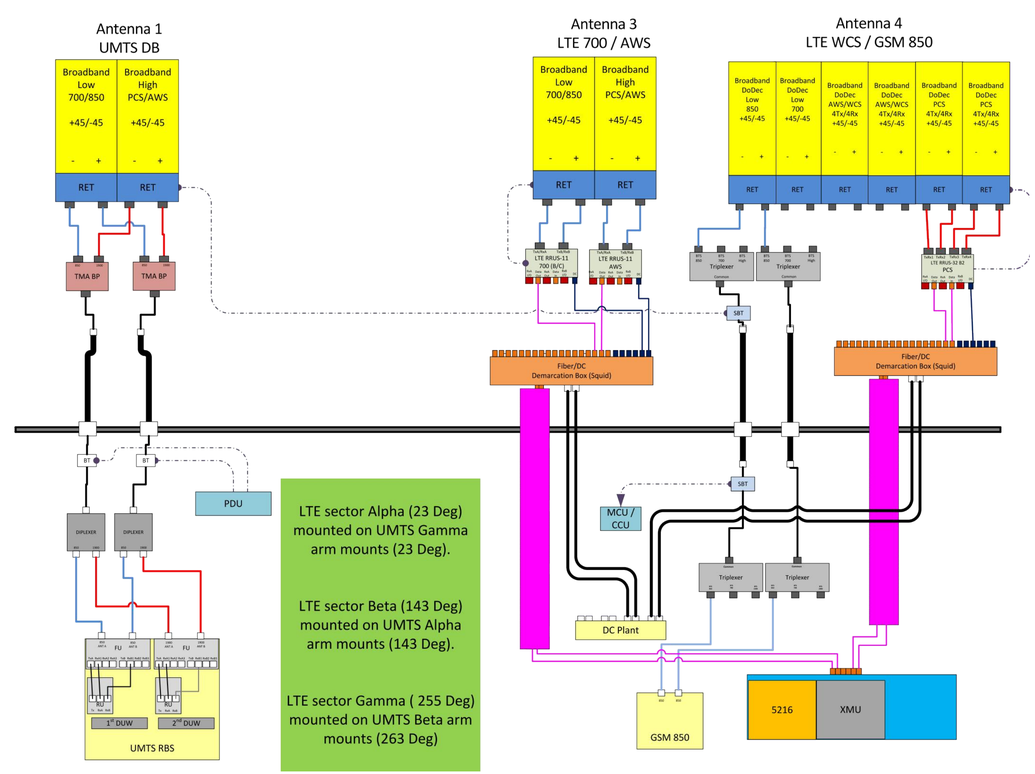
2 E-3 **SURGE ARRESTOR DETAIL**
SCALE: NTS



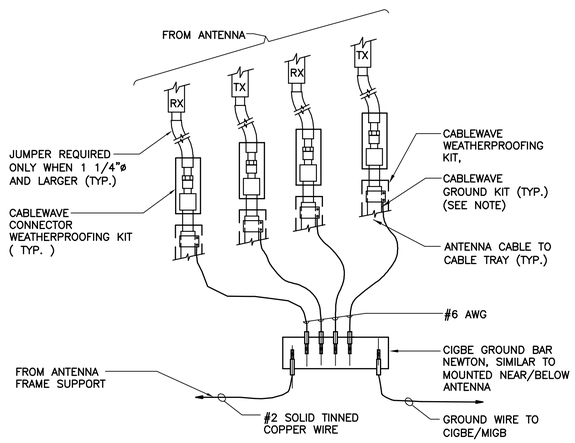
NOTES:

1. BOND COAXIAL CABLE GROUND KITS TO EACH OWNER'S GROUND BAR ALONG ENTIRE COAX RUN FROM ANTENNA TO SHELTER.
2. BOND ALL EQUIPMENT TO GROUND PER NEC AND MANUFACTURERS SPECIFICATIONS.
3. DETAIL IS TYPICAL FOR ALL ANTENNA SECTORS, INCLUDING GPS ANTENNA.

1 E-3 **TYPICAL ANTENNA GROUNDING DETAIL**
NOT TO SCALE



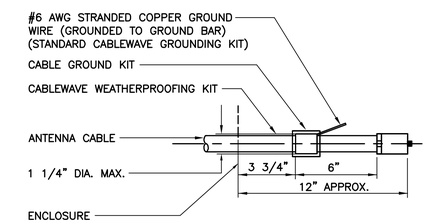
7 E-3 **RF PLUMBING DIAGRAM**
NOT TO SCALE



NOTE:

1. DO NOT INSTALL CABLE GROUND KIT AT A BEND AND ALWAYS DIRECT GROUND WIRE DOWN TO CIGBE

6 E-3 **CONNECTION OF GROUND WIRES TO GROUND BAR**
NOT TO SCALE



NOTE:

1. DO NOT INSTALL CABLE GROUND KIT AT A BEND AND ALWAYS DIRECT GROUND WIRE DOWN TO GROUND BAR.

5 E-3 **ANTENNA CABLE GROUNDING DETAIL**
NOT TO SCALE

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TYPICAL ELECTRICAL DETAILS

E-3
Sheet No. 7 of 7

PAUL J. FORD & COMPANY

Date: **February 08, 2017**

Charles McGuirt
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Charlotte, NC 28277
704.406.6607

Paul J Ford and Company
250 E. Broad Street, Suite 600
Columbus, OH 43215
614.221.6679
rkoors@pjfweb.com

Subject: **Structural Analysis Report**

Carrier Designation:	***AT&T Mobility* Co-Locate**	
	Carrier Site Number:	CT2182
	Carrier Site Name:	Groton
Crown Castle Designation:	**Crown Castle BU Number:**	881533
	Crown Castle Site Name:	GROTON TOWER
	Crown Castle JDE Job Number:	415559
	Crown Castle Work Order Number:	1357826
	Crown Castle Application Number:	374247 Rev. 2
Engineering Firm Designation:	**Paul J Ford and Company Project Number:**	37517-0635.001.7805
Site Data:	**75 Roberts Road, Groton, New London County, CT**	
	Latitude *41° 21' 36.8"*, Longitude *-72° 2' 55.1"*	
	144.5 Foot - Monopole Tower	

Dear Charles McGuirt,

Paul J Ford and Company is pleased to submit this **"Structural Analysis Report"** to determine the structural integrity of the above mentioned tower. This analysis has been performed in accordance with the Crown Castle Structural 'Statement of Work' and the terms of Crown Castle Purchase Order Number 998436, in accordance with application 374247, revision 2.

The purpose of the analysis is to determine acceptability of the tower stress level. Based on our analysis we have determined the tower stress level for the structure and foundation, under the following load case, to be:

LC7: Existing + Reserved + Proposed Equipment **Insufficient Capacity**
Note: See Table I and Table II for the proposed and existing/reserved loading, respectively.

This analysis has been performed in accordance with the 2016 Connecticut State Building Code based upon an ultimate 3-second gust wind speed of 135 mph converted to a nominal 3-second gust wind speed of 104.6 mph per Section 1609.3 and Appendix N as required for use in the ANSI/TIA-222-G-2005 Standard, "Structural Standard for Antenna Supporting Structures and Antennas", with ANSI/TIA-222-G-1-2007 and ANSI/TIA-222-G-2-2009 Addenda per Exception #5 of Section 1609.1.1. Risk Category II, Exposure Category C and Topographic Category 1 were used in this analysis.

We at *Paul J Ford and Company* appreciate the opportunity of providing our continuing professional services to you and Crown Castle. If you have any questions or need further assistance on this or any other projects please give us a call.

Respectfully submitted by:

Robert Koors

Bob Koors, E.I.
Structural Designer JRS

STATE OF CONNECTICUT
JUSTIN T. KLINE
No. 30301
LICENSED
PROFESSIONAL ENGINEER

2-9-17

Date: **February 08, 2017**

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Subject: Structural Analysis Report

Carrier Designation:	***AT&T Mobility* Co-Locate**	
	Carrier Site Number:	CT2182
	Carrier Site Name:	Groton
Crown Castle Designation:	**Crown Castle BU Number:**	881533
	Crown Castle Site Name:	GROTON TOWER
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Respectfully submitted by:

Bob Koors, E.I.
Structural Designer

TABLE OF CONTENTS

1) INTRODUCTION

This tower is a 144.5 ft Monopole tower designed by ENGINEERED ENDEAVORS, INC. in January of 2001. The tower was originally designed for a wind speed of 85 mph per TIA/EIA-222-F.

2) ANALYSIS CRITERIA

This analysis has been performed in accordance with the 2016 Connecticut State Building Code based upon an ultimate 3-second gust wind speed of 135 mph converted to a nominal 3-second gust wind speed of 104.6 mph per Section 1609.3 and Appendix N as required for use in the ANSI/TIA-222-G-2005 Standard, "Structural Standard for Antenna Supporting Structures and Antennas", with ANSI/TIA-222-G-1-2007 and ANSI/TIA-222-G-2-2009 Addenda per Exception #5 of Section 1609.1.1. Risk Category II, Exposure Category C and Topographic Category 1 were used in this analysis.

Table 1 - Proposed Antenna and Cable Information

Mounting Level (ft)	Center Line Elevation (ft)	Number of Antennas	Antenna Manufacturer	Antenna Model	Number of Feed Lines	Feed Line Size (in)	Note
145.0	145.0	3	cci antennas	TPA-65R-LCUUUU-H8 w/ Mount Pipe	2 2	3/8 3/4	-
		6	cci antennas	TPX-070821			
		3	commscope	ATSBT-TOP-FF-4G			
		3	ericsson	RRUS 32 B2			
		1	raycap	DC6-48-60-18-8F			

Table 2 - Existing and Reserved Antenna and Cable Information

Mounting Level (ft)	Center Line Elevation (ft)	Number of Antennas	Antenna Manufacturer	Antenna Model	Number of Feed Lines	Feed Line Size (in)	Note
145.0	146.0	3	powerwave technologies	7770.00 w/ Mount Pipe	1	3/8	3
	145.0	6	adc	DUAL BAND 800/1900 FULL BAND MASTHEAD			
		6	kathrein	782-10250			
		1	andrew	SBNH-1D6565C w/ Mount Pipe	2 13	3/4 1-5/8	1
		6	ericsson	RRUS 11			
		1	kmw communications	AM-X-CD-17-65-00T-RET w/ Mount Pipe			
		12	powerwave technologies	7020.00			
		3	powerwave technologies	7770.00 w/ Mount Pipe			
		6	powerwave technologies	LGP21401			
		1	powerwave technologies	P65-17-XLH-RR w/ Mount Pipe			
		1	raycap	DC6-48-60-18-8F			
		1	tower mounts	Platform Mount [LP 601-1]			

Mounting Level (ft)	Center Line Elevation (ft)	Number of Antennas	Antenna Manufacturer	Antenna Model	Number of Feed Lines	Feed Line Size (in)	Note
135.0	137.0	3	alcatel lucent	B66A RRH4X45	1	1-5/8	2
		3	alcatel lucent	RRH2X60-PCS			
		3	alcatel lucent	RRH2x60-700			
		3	amphenol	QUAD656C0000X w/ Mount Pipe			
		6	commscope	HBXX-6517DS-A2M w/ Mount Pipe			
		1	rfs celwave	DB-T1-6Z-8AB-0Z			
		3	andrew	LNX-6512DS-VTM w/ Mount Pipe	7	1-5/8	1
		1	rfs celwave	DB-T1-6Z-8AB-0Z			
	135.0	1	tower mounts	Platform Mount [LP 601-1]			
125.0	126.0	3	commscope	LNX-6515DS-A1M w/ Mount Pipe	1 12	1-1/4 1-5/8	1
		3	ericsson	ERICSSON AIR 21 B2A B4P w/ Mount Pipe			
		3	ericsson	ERICSSON AIR 21 B4A B2P w/ Mount Pipe			
		3	ericsson	KRY 112 144/1			
		3	ericsson	RRUS 11 B12			
	125.0	1	tower mounts	Platform Mount [LP 601-1]			
113.0	113.0	3	alcatel lucent	TD-RRH8x20-25	1 3	5/8 1-1/4	1
		3	rfs celwave	APXVSPP18-C-A20 w/ Mount Pipe			
		3	rfs celwave	APXVTM14-C-120 w/ Mount Pipe			
		1	tower mounts	Platform Mount [LP 601-1]			
111.0	111.0	3	alcatel lucent	PCS 1900MHz 4x45W-65MHz	-	-	1
		1	tower mounts	Side Arm Mount [SO 102-3]			
	109.0	3	alcatel lucent	800MHz 2X50W RRH W/FILTER			
100.0	100.0	1	tower mounts	Platform Mount [LP 601-1]	-	-	1
51.0	52.0	1	lucent	KS24019-L112A	1	1/2	1
	51.0	1	tower mounts	Side Arm Mount [SO 701-1]			

Notes:
1) Existing Equipment
2) Reserved Equipment
3) Equipment To Be Removed

3) ANALYSIS PROCEDURE

Table 3 - Documents Provided

Document	Remarks	Reference	Source
4-GEOTECHNICAL REPORTS	Clarence Welti, 03/13/2000	1406209	CCISITES
4-POST-MODIFICATION INSPECTION	Vertical Structures, 2007-004-164, 08/01/2008	2304223	CCISITES
4-POST-MODIFICATION INSPECTION	Vertical Structures, 2009-004-059, 04/28/2009	2435103	CCISITES
4-POST-MODIFICATION INSPECTION	SGS, 145071, 08/18/2014	5246681	CCISITES
4-POST-MODIFICATION INSPECTION	ETS, 151208, 12/14/2015	6017666	CCISITES
4-POST-MODIFICATION INSPECTION	ETS, 151208, 02/05/2016	6089847	CCISITES
4-TOWER FOUNDATION DRAWINGS/DESIGN/SPECS	URS, F301877.01/F04, 12/21/2000	1405796	CCISITES
4-TOWER MANUFACTURER DRAWINGS	EEI, 8409, 01/02/2001	1405782	CCISITES
4-TOWER REINFORCEMENT DESIGN/DRAWINGS/DATA	CCI, 711991, 02/25/2014	4491288	CCISITES

3.1) Analysis Method

tnxTower (version 7.0.5.1), a commercially available analysis software package, was used to create a three-dimensional model of the tower and calculate member stresses for various loading cases. Selected output from the analysis is included in Appendix A.

3.2) Assumptions

1) Monopole was fabricated and installed in accordance with the manufacturer's specifications.
2) Monopole has been properly maintained in accordance with manufacturer's specifications.
3) The configuration of antennas, transmission cables, mounts and other appurtenances are as specified in Tables 1 and 2 and the referenced drawings.
4) For existing modifications: monopole was modified in conformance with the referenced modification drawings.

This analysis may be affected if any assumptions are not valid or have been made in error. Paul J Ford and Company should be notified to determine the effect on the structural integrity of the tower.

4) ANALYSIS RESULTS

Table 4 - Section Capacity (Summary)

Section No.	Elevation (ft)	Component Type	Size	Critical Element	P (K)	SF*P_allow (K)	% Capacity	Pass / Fail
L1	144.5 - 117.65	Pole	TP26.875x21x0.1875	1	-7.50	1034.43	77.0	Pass
L2	117.65 - 112.58	Pole	TP27.5444x25.6554x0.25	2	-10.71	1572.31	76.7	Pass
L3	112.58 - 102.25	Pole	TP29.7295x27.5444x0.3737	3	-13.27	1569.10	110.2	Fail
L4	102.25 - 98.5	Pole	TP30.5228x29.7295x0.407	4	-15.46	1644.97	116.4	Fail
L5	98.5 - 86.85	Pole	TP32.9871x30.5228x0.5518	5	-17.49	2330.70	97.6	Pass
L6	86.85 - 83	Pole	TP33.3344x30.904x0.375	6	-20.46	2914.58	91.7	Pass
L7	83 - 77	Pole	TP34.6268x33.3344x0.5613	7	-22.41	2828.16	104.7	Fail
L8	77 - 60	Pole	TP38.2888x34.6268x0.6038	8	-28.50	3424.04	106.3	Fail
L9	60 - 41.78	Pole	TP42.2135x38.2888x0.5869	9	-33.21	3566.01	114.3	Fail
L10	41.78 - 31.25	Pole	TP43.7445x39.7408x0.6356	10	-41.96	4135.88	114.0	Fail
L11	31.25 - 27.83	Pole	TP44.4838x43.7445x0.6509	11	-43.51	4195.06	115.0	Fail
L12	27.83 - 0	Pole	TP50.5x44.4838x0.5592	12	-55.57	5162.39	108.3	Fail
							Summary	
						Pole (L4)	116.4	Fail
						RATING =	116.4	Fail

Table 5 - Tower Component Stresses vs. Capacity – LC7

Notes	Component	Elevation (ft)	% Capacity	Pass / Fail
1	Anchor Rods	0	90.9	Pass
1	Base Plate	0	81.0	Pass
1	Base Foundation Steel	0	34.2	Pass
1	Base Foundation Soil Interaction	0	60.8	Pass

Structure Rating (max from all components) =	**116.4%**

Notes:
1) See additional documentation in “Appendix C – Additional Calculations” for calculations supporting the % capacity consumed.
2) Capacities up to 105% are considered acceptable based on analysis methods used.

4.1) Recommendations

Provide shaft reinforcing from 0’-73’, 77’-83’, 91’-93’, and 98’-109’.

APPENDIX A

TNXTOWER OUTPUT

Tower Input Data

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

1) Tower is located in New London County, Connecticut.
2) ASCE 7-10 Wind Data is used (wind speeds converted to nominal values).
3) Basic wind speed of 105 mph.
4) Structure Class II.
5) Exposure Category C.
6) Topographic Category 1.
7) Crest Height 0.0000 ft.
8) Nominal ice thickness of 0.7500 in.
9) Ice thickness is considered to increase with height.
10) Ice density of 56.00 pcf.
11) A wind speed of 50 mph is used in combination with ice.
12) Temperature drop of 50 °F.
13) Deflections calculated using a wind speed of 60 mph.
14) A non-linear (P-delta) analysis was used.
15) Pressures are calculated at each section.
16) Stress ratio used in pole design is 1.
17) 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*	*Section Length*	*Splice Length*	*Number of Sides*	*Top Diameter*	*Bottom Diameter*	*Wall Thickness*	*Bend Radius*	*Pole Grade*
	ft	*ft*	*ft*		*in*	*in*	*in*	*in*	
L1	144.5000-117.6500	26.8500	3.86	18	21.0000	26.8750	0.1875	0.7500	A572-65 (65 ksi)
L2	117.6500-112.5800	8.9300	0.00	18	25.6554	27.5444	0.2500	1.0000	A572-65 (65 ksi)
L3	112.5800-102.2500	10.3300	0.00	18	27.5444	29.7295	0.3737	1.4946	Reinf 39.43 ksi (39 ksi)
L4	102.2500-98.5000	3.7500	0.00	18	29.7295	30.5227	0.4070	1.6281	Reinf 36.99 ksi (37 ksi)
L5	98.5000-	11.6500	4.63	18	30.5227	32.9871	0.5518	2.2074	Reinf 37.01 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
	86.8500								(37 ksi)
L6	86.8500-83.0000	8.4800	0.00	18	30.9040	33.3344	0.3750	1.5000	A572-65 (65 ksi)
L7	83.0000-77.0000	6.0000	0.00	18	33.3344	34.6268	0.5613	2.2452	Reinf 40.77 ksi (41 ksi)
L8	77.0000-60.0000	17.0000	0.00	18	34.6268	38.2888	0.6038	2.4151	Reinf 41.48 ksi (41 ksi)
L9	60.0000-41.7800	18.2200	6.03	18	38.2888	42.2135	0.5869	2.3476	Reinf 41.53 ksi (42 ksi)
L10	41.7800-31.2500	16.5600	0.00	18	39.7408	43.7445	0.6355	2.5422	Reinf 41.61 ksi (42 ksi)
L11	31.2500-27.8300	3.4200	0.00	18	43.7445	44.4838	0.6509	2.6036	Reinf 40.53 ksi (41 ksi)
L12	27.8300-0.0000	27.8300		18	44.4838	50.5000	0.5592	2.2370	Reinf 50.95 ksi (51 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	21.3240	12.3860	677.8263	7.3884	10.6680	63.5383	1356.5444	6.1942	3.3660	17.952
	27.2896	15.8824	1429.1221	9.4741	13.6525	104.6784	2860.1246	7.9427	4.4000	23.467
L2	26.8803	20.1592	1643.8512	9.0189	13.0329	126.1305	3289.8653	10.0815	4.0754	16.301
	27.9693	21.6581	2038.4689	9.6895	13.9925	145.6825	4079.6200	10.8311	4.4078	17.631
L3	27.9693	32.2244	3005.5532	9.6456	13.9925	214.7968	6015.0612	16.1153	4.1902	11.214
	30.1881	34.8159	3790.5738	10.4213	15.1026	250.9883	7586.1354	17.4113	4.5748	12.243
L4	30.1881	37.8821	4115.0289	10.4095	15.1026	272.4717	8235.4724	18.9446	4.5160	11.095
	30.9936	38.9069	4458.1076	10.6911	15.5056	287.5168	8922.0813	19.4571	4.6556	11.438
L5	30.9936	52.4953	5957.4079	10.6397	15.5056	384.2112	11922.6547	26.2526	4.4008	7.975
	33.4960	56.8117	7551.0909	11.5145	16.7574	450.6111	15112.1178	28.4112	4.8345	8.761
L6	32.7282	36.3372	4278.7236	10.8378	15.6992	272.5433	8563.0772	18.1720	4.7791	12.744
	33.8486	39.2299	5384.0855	11.7006	16.9339	317.9480	10775.2556	19.6187	5.2068	13.885
L7	33.8486	58.3874	7923.0135	11.6344	16.9339	467.8801	15856.4522	29.1992	4.8790	8.692
	35.1610	60.6900	8897.8299	12.0933	17.5904	505.8339	17807.3679	30.3507	5.1064	9.098
L8	35.1610	65.2017	9535.4690	12.0782	17.5904	542.0831	19083.4851	32.6070	5.0317	8.334
	38.8794	72.2194	12957.7013	13.3782	19.4507	666.1821	25932.4526	36.1166	5.6762	9.401
L9	38.8794	70.2318	12612.3732	13.3842	19.4507	648.4281	25241.3420	35.1226	5.7059	9.722
	42.8647	77.5429	16975.4502	14.7774	21.4445	791.6008	33973.2372	38.7788	6.3966	10.899
L10	41.8342	78.8845	15240.4911	13.8824	20.1883	754.9162	30501.0361	39.4497	5.8758	9.245
	44.4193	86.9609	20417.1832	15.3037	22.2222	918.7743	40861.2319	43.4887	6.5805	10.354
L11	44.4193	89.0281	20887.6700	15.2982	22.2222	939.9463	41802.8246	44.5225	6.5535	10.068
	45.1700	90.5555	21981.2902	15.5607	22.5978	972.7192	43991.5040	45.2864	6.6836	10.268
L12	45.1700	77.9673	19004.8810	15.5932	22.5978	841.0067	38034.7692	38.9911	6.8449	12.24
	51.2790	88.6462	27932.3864	17.7290	25.6540	1088.8121	55901.5270	44.3315	7.9037	14.133

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 144.5000-117.6500				1	1	1			
L2 117.6500-112.5800				1	1	1			
L3 112.5800-102.2500				1	1	1			
L4 102.2500-98.5000				1	1	1			
L5 98.5000-86.8500				1	1	1			
L6 86.8500-83.0000				1	1	1			
L7 83.0000-77.0000				1	1	1			
L8 77.0000-60.0000				1	1	1			
L9 60.0000-41.7800				1	1	1			
L10 41.7800-31.2500				1	1	1			
L11 31.2500-27.8300				1	1	1			
L12 27.8300-0.0000				1	1	1			

Feed Line/Linear Appurtenances - Entered As Round Or Flat

Description	Face or Leg	Allow Shield	Component Type	Placement ft	Total Number	Number Per Row	Clear Spacing in	Width or Diameter in	Perimeter in	Weight plf
**										

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
FB-L98B-034-XXX(3/8)	C	No	Inside Pole	144.5000 - 0.0000	2	No Ice	0.0000	0.06
						1/2" Ice	0.0000	0.06
						1" Ice	0.0000	0.06
WR-VG86ST-BRD(3/4)	C	No	Inside Pole	144.5000 - 0.0000	2	No Ice	0.0000	0.58
						1/2" Ice	0.0000	0.58
						1" Ice	0.0000	0.58
2" (Nominal) Conduit	C	No	Inside Pole	144.5000 - 0.0000	1	No Ice	0.0000	0.72
						1/2" Ice	0.0000	0.72
						1" Ice	0.0000	0.72
WR-VG86ST-BRD(3/4)	C	No	Inside Pole	144.5000 - 0.0000	2	No Ice	0.0000	0.58
						1/2" Ice	0.0000	0.58
						1" Ice	0.0000	0.58
LDF7-50A(1-5/8)	C	No	Inside Pole	144.5000 - 0.0000	1	No Ice	0.0000	0.82
						1/2" Ice	0.0000	0.82
						1" Ice	0.0000	0.82
CR 50 1873(1-5/8)	C	No	Inside Pole	144.5000 - 0.0000	12	No Ice	0.0000	0.83
						1/2" Ice	0.0000	0.83
						1" Ice	0.0000	0.83
**								
HB158-1-08U8-S8J18(1-5/8)	C	No	Inside Pole	135.0000 - 0.0000	1	No Ice	0.0000	1.30
						1/2" Ice	0.0000	1.30
						1" Ice	0.0000	1.30
LDF7-50A(1-5/8)	C	No	Inside Pole	135.0000 - 0.0000	6	No Ice	0.0000	0.82

Description	Face or Leg	Allow Shield	Component Type	Placement ft	Total Number		C_AA_A ft^2/ft	Weight plf
						1/2" Ice	0.0000	0.82
						1" Ice	0.0000	0.82
HB158-1-08U8-S8J18(1-5/8)	C	No	Inside Pole	135.0000 - 0.0000	1	No Ice	0.0000	1.30
						1/2" Ice	0.0000	1.30
						1" Ice	0.0000	1.30
**								
MLE Hybrid 3Power/6Fiber RL 2(1-1/4)	C	No	Inside Pole	125.0000 - 0.0000	1	No Ice	0.0000	0.68
						1/2" Ice	0.0000	0.68
						1" Ice	0.0000	0.68
LDF7-50A(1-5/8)	C	No	Inside Pole	125.0000 - 0.0000	10	No Ice	0.0000	0.82
						1/2" Ice	0.0000	0.82
						1" Ice	0.0000	0.82
LDF7-50A(1-5/8)	C	No	CaAa (Out Of Face)	125.0000 - 0.0000	1	No Ice	0.0000	0.82
						1/2" Ice	0.0000	2.33
						1" Ice	0.0000	4.46
LDF7-50A(1-5/8)	C	No	CaAa (Out Of Face)	125.0000 - 0.0000	1	No Ice	0.1980	0.82
						1/2" Ice	0.2980	2.33
						1" Ice	0.3980	4.46
**								
LDF4.5-50(5/8)	C	No	CaAa (Out Of Face)	113.0000 - 0.0000	1	No Ice	0.0865	0.15
						1/2" Ice	0.1865	0.98
						1" Ice	0.2865	2.43
HB114-1-08U4-M5J(1-1/4)	C	No	Inside Pole	113.0000 - 0.0000	3	No Ice	0.0000	1.08
						1/2" Ice	0.0000	1.08
						1" Ice	0.0000	1.08
**								
LDF4-50A(1/2)	C	No	CaAa (Out Of Face)	51.0000 - 0.0000	1	No Ice	0.0000	0.15
						1/2" Ice	0.0000	0.84
						1" Ice	0.0000	2.14
**								
1 1/4" Flat Reinforcement	C	No	CaAa (Out Of Face)	80.0000 - 0.0000	1	No Ice	0.2083	0.00
						1/2" Ice	0.3194	0.00
						1" Ice	0.4306	0.00
1" Flat Reinforcement	C	No	CaAa (Out Of Face)	114.0800 - 90.0000	1	No Ice	0.1667	0.00
						1/2" Ice	0.2778	0.00
						1" Ice	0.3889	0.00
**								

Feed Line/Linear Appurtenances Section Areas

Tower Section	Tower Elevation ft	Face	A_R ft^2	A_F ft^2	C_AA_A In Face ft^2	C_AA_A Out Face ft^2	Weight K
L1	144.5000-117.6500	A	0.000	0.000	0.000	0.000	0.00
		B	0.000	0.000	0.000	0.000	0.00
		C	0.000	0.000	0.000	1.455	0.58
L2	117.6500-112.5800	A	0.000	0.000	0.000	0.000	0.00
		B	0.000	0.000	0.000	0.000	0.00
		C	0.000	0.000	0.000	1.290	0.16
L3	112.5800-102.2500	A	0.000	0.000	0.000	0.000	0.00
		B	0.000	0.000	0.000	0.000	0.00
		C	0.000	0.000	0.000	4.661	0.37
L4	102.2500-98.5000	A	0.000	0.000	0.000	0.000	0.00
		B	0.000	0.000	0.000	0.000	0.00
		C	0.000	0.000	0.000	1.692	0.13
L5	98.5000-86.8500	A	0.000	0.000	0.000	0.000	0.00
		B	0.000	0.000	0.000	0.000	0.00
		C	0.000	0.000	0.000	4.731	0.41
L6	86.8500-83.0000	A	0.000	0.000	0.000	0.000	0.00
		B	0.000	0.000	0.000	0.000	0.00
		C	0.000	0.000	0.000	1.095	0.14
L7	83.0000-77.0000	A	0.000	0.000	0.000	0.000	0.00
		B	0.000	0.000	0.000	0.000	0.00
		C	0.000	0.000	0.000	2.332	0.21
L8	77.0000-60.0000	A	0.000	0.000	0.000	0.000	0.00
		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 K
		C	0.000	0.000	0.000	8.378	0.60
L9	60.0000-41.7800	A	0.000	0.000	0.000	0.000	0.00
		B	0.000	0.000	0.000	0.000	0.00
		C	0.000	0.000	0.000	8.979	0.65
L10	41.7800-31.2500	A	0.000	0.000	0.000	0.000	0.00
		B	0.000	0.000	0.000	0.000	0.00
		C	0.000	0.000	0.000	5.190	0.37
L11	31.2500-27.8300	A	0.000	0.000	0.000	0.000	0.00
		B	0.000	0.000	0.000	0.000	0.00
		C	0.000	0.000	0.000	1.685	0.12
L12	27.8300-0.0000	A	0.000	0.000	0.000	0.000	0.00
		B	0.000	0.000	0.000	0.000	0.00
		C	0.000	0.000	0.000	13.716	0.99

Feed Line/Linear Appurtenances Section Areas - With Ice

Tower Section	Tower Elevation ft	Face or Leg	Ice Thickness in	A_R ft^2	A_F ft^2	C_AA_A In Face ft^2	C_AA_A Out Face ft^2	Weight K
L1	144.5000-	A	1.721	0.000	0.000	0.000	0.000	0.00
	117.6500	B		0.000	0.000	0.000	0.000	0.00
		C		0.000	0.000	0.000	3.985	0.70
L2	117.6500-	A	1.700	0.000	0.000	0.000	0.000	0.00
	112.5800	B		0.000	0.000	0.000	0.000	0.00
		C		0.000	0.000	0.000	3.754	0.25
L3	112.5800-	A	1.688	0.000	0.000	0.000	0.000	0.00
	102.2500	B		0.000	0.000	0.000	0.000	0.00
		C		0.000	0.000	0.000	15.509	0.58
L4	102.2500-	A	1.676	0.000	0.000	0.000	0.000	0.00
	98.5000	B		0.000	0.000	0.000	0.000	0.00
		C		0.000	0.000	0.000	5.604	0.21
L5	98.5000-86.8500	A	1.663	0.000	0.000	0.000	0.000	0.00
		B		0.000	0.000	0.000	0.000	0.00
		C		0.000	0.000	0.000	15.622	0.65
L6	86.8500-83.0000	A	1.649	0.000	0.000	0.000	0.000	0.00
		B		0.000	0.000	0.000	0.000	0.00
		C		0.000	0.000	0.000	3.656	0.22
L7	83.0000-77.0000	A	1.639	0.000	0.000	0.000	0.000	0.00
		B		0.000	0.000	0.000	0.000	0.00
		C		0.000	0.000	0.000	7.358	0.33
L8	77.0000-60.0000	A	1.613	0.000	0.000	0.000	0.000	0.00
		B		0.000	0.000	0.000	0.000	0.00
		C		0.000	0.000	0.000	25.443	0.94
L9	60.0000-41.7800	A	1.566	0.000	0.000	0.000	0.000	0.00
		B		0.000	0.000	0.000	0.000	0.00
		C		0.000	0.000	0.000	26.732	1.04
L10	41.7800-31.2500	A	1.515	0.000	0.000	0.000	0.000	0.00
		B		0.000	0.000	0.000	0.000	0.00
		C		0.000	0.000	0.000	15.450	0.62
L11	31.2500-27.8300	A	1.483	0.000	0.000	0.000	0.000	0.00
		B		0.000	0.000	0.000	0.000	0.00
		C		0.000	0.000	0.000	4.842	0.20
L12	27.8300-0.0000	A	1.373	0.000	0.000	0.000	0.000	0.00
		B		0.000	0.000	0.000	0.000	0.00
		C		0.000	0.000	0.000	37.491	1.53

Feed Line Center of Pressure

Section	Elevation ft	CP_X in	CP_Z in	CP_X Ice in	CP_Z Ice in
L1	144.5000-	-0.0736	0.0425	-0.1702	0.0983

Section	Elevation	CP_X	CP_Z	CP_X Ice	CP_Z Ice
	ft	in	in	in	in
	117.6500				
L2	117.6500-112.5800	-0.2939	0.1697	-0.6560	0.3788
L3	112.5800-102.2500	-0.4866	0.2809	-1.1066	0.6389
L4	102.2500-98.5000	-0.4904	0.2831	-1.1273	0.6509
L5	98.5000-86.8500	-0.4499	0.2598	-1.0674	0.6163
L6	86.8500-83.0000	-0.3301	0.1906	-0.8424	0.4864
L7	83.0000-77.0000	-0.4391	0.2535	-1.0334	0.5966
L8	77.0000-60.0000	-0.5436	0.3139	-1.2178	0.7031
L9	60.0000-41.7800	-0.5508	0.3180	-1.2452	0.7189
L10	41.7800-31.2500	-0.5544	0.3201	-1.2675	0.7318
L11	31.2500-27.8300	-0.5570	0.3216	-1.2531	0.7235
L12	27.8300-0.0000	-0.5616	0.3242	-1.2379	0.7147

Shielding Factor Ka

Tower Section	Feed Line Record No.	Description	Feed Line Segment Elev.	K_a No Ice	K_a Ice

Discrete Tower Loads

Description	Face or Leg	Offset Type	Offsets: Horz Lateral Vert ft ft ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
7770.00 w/ Mount Pipe	A	From Leg	4.0000 0.00 0.00	0.00	145.0000	No Ice 1/2" Ice 1" Ice	5.7890 6.2677 6.6966	4.4945 5.5082 6.2127	0.09 0.14 0.21
7770.00 w/ Mount Pipe	B	From Leg	4.0000 0.00 0.00	0.00	145.0000	No Ice 1/2" Ice 1" Ice	5.7890 6.2677 6.6966	4.4945 5.5082 6.2127	0.09 0.14 0.21
7770.00 w/ Mount Pipe	C	From Leg	4.0000 0.00 0.00	0.00	145.0000	No Ice 1/2" Ice 1" Ice	5.7890 6.2677 6.6966	4.4945 5.5082 6.2127	0.09 0.14 0.21
P65-17-XLH-RR w/ Mount Pipe	A	From Leg	4.0000 0.00 0.00	0.00	145.0000	No Ice 1/2" Ice 1" Ice	11.8229 12.5940 13.3752	9.0563 10.6186 12.2051	0.09 0.18 0.28
AM-X-CD-17-65-00T-RET w/ Mount Pipe	B	From Leg	4.0000 0.00 0.00	0.00	145.0000	No Ice 1/2" Ice 1" Ice	11.5486 12.2673 12.9953	8.9375 10.4499 11.9863	0.09 0.18 0.27
SBNH-1D6565C w/ Mount Pipe	C	From Leg	4.0000 0.00 0.00	0.00	145.0000	No Ice 1/2" Ice 1" Ice	11.5561 12.2227 12.8929	9.7151 11.1857 12.5942	0.10 0.19 0.28
(4) 7020.00	A	From Leg	4.0000 0.00 0.00	0.00	145.0000	No Ice 1/2" Ice 1" Ice	0.1021 0.1469 0.1991	0.1750 0.2393 0.3109	0.00 0.01 0.01
(4) 7020.00	B	From Leg	4.0000 0.00 0.00	0.00	145.0000	No Ice 1/2" Ice 1" Ice	0.1021 0.1469 0.1991	0.1750 0.2393 0.3109	0.00 0.01 0.01

Description	Face or Leg	Offset Type	Offsets: Horz Lateral Vert ft ft ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
(4) 7020.00	C	From Leg	4.0000 0.00 0.00	0.00	145.0000	No Ice 1/2" Ice 1" Ice	0.1021 0.1469 0.1991	0.1750 0.2393 0.3109	0.00 0.01 0.01
(2) RRUS 11	A	From Leg	4.0000 0.00 0.00	0.00	145.0000	No Ice 1/2" Ice 1" Ice	2.7908 2.9984 3.2134	1.1923 1.3395 1.4957	0.05 0.07 0.10
(2) RRUS 11	B	From Leg	4.0000 0.00 0.00	0.00	145.0000	No Ice 1/2" Ice 1" Ice	2.7908 2.9984 3.2134	1.1923 1.3395 1.4957	0.05 0.07 0.10
(2) RRUS 11	C	From Leg	4.0000 0.00 0.00	0.00	145.0000	No Ice 1/2" Ice 1" Ice	2.7908 2.9984 3.2134	1.1923 1.3395 1.4957	0.05 0.07 0.10
(2) LGP21401	A	From Leg	4.0000 0.00 0.00	0.00	145.0000	No Ice 1/2" Ice 1" Ice	1.1040 1.2388 1.3810	0.3471 0.4422 0.5444	0.01 0.02 0.03
(2) LGP21401	B	From Leg	4.0000 0.00 0.00	0.00	145.0000	No Ice 1/2" Ice 1" Ice	1.1040 1.2388 1.3810	0.3471 0.4422 0.5444	0.01 0.02 0.03
(2) LGP21401	C	From Leg	4.0000 0.00 0.00	0.00	145.0000	No Ice 1/2" Ice 1" Ice	1.1040 1.2388 1.3810	0.3471 0.4422 0.5444	0.01 0.02 0.03
DC6-48-60-18-8F	B	From Leg	4.0000 0.00 0.00	0.00	145.0000	No Ice 1/2" Ice 1" Ice	0.9167 1.4583 1.6431	0.9167 1.4583 1.6431	0.02 0.04 0.06
TPA-65R-LCUUUU-H8 w/ Mount Pipe	A	From Leg	4.0000 0.00 0.00	0.00	145.0000	No Ice 1/2" Ice 1" Ice	13.5353 14.2380 14.9495	10.9597 12.4861 14.0367	0.11 0.22 0.33
TPA-65R-LCUUUU-H8 w/ Mount Pipe	B	From Leg	4.0000 0.00 0.00	0.00	145.0000	No Ice 1/2" Ice 1" Ice	13.5353 14.2380 14.9495	10.9597 12.4861 14.0367	0.11 0.22 0.33
TPA-65R-LCUUUU-H8 w/ Mount Pipe	C	From Leg	4.0000 0.00 0.00	0.00	145.0000	No Ice 1/2" Ice 1" Ice	13.5353 14.2380 14.9495	10.9597 12.4861 14.0367	0.11 0.22 0.33
(2) TPX-070821	A	From Leg	4.0000 0.00 0.00	0.00	145.0000	No Ice 1/2" Ice 1" Ice	0.4688 0.5585 0.6556	0.1009 0.1471 0.2020	0.01 0.01 0.02
(2) TPX-070821	B	From Leg	4.0000 0.00 0.00	0.00	145.0000	No Ice 1/2" Ice 1" Ice	0.4688 0.5585 0.6556	0.1009 0.1471 0.2020	0.01 0.01 0.02
(2) TPX-070821	C	From Leg	4.0000 0.00 0.00	0.00	145.0000	No Ice 1/2" Ice 1" Ice	0.4688 0.5585 0.6556	0.1009 0.1471 0.2020	0.01 0.01 0.02
ATSBT-TOP-FF-4G	A	From Leg	4.0000 0.00 0.00	0.00	145.0000	No Ice 1/2" Ice 1" Ice	0.1736 0.2291 0.2921	0.0949 0.1399 0.1934	0.00 0.00 0.01
ATSBT-TOP-FF-4G	B	From Leg	4.0000 0.00 0.00	0.00	145.0000	No Ice 1/2" Ice 1" Ice	0.1736 0.2291 0.2921	0.0949 0.1399 0.1934	0.00 0.00 0.01
ATSBT-TOP-FF-4G	C	From Leg	4.0000	0.00	145.0000	No Ice	0.1736	0.0949	0.00

Description	Face or Leg	Offset Type	Offsets: Horz Lateral Vert ft ft ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
			0.00 0.00			1/2" Ice 1" Ice	0.2291 0.2921	0.1399 0.1934	0.00 0.01
RRUS 32 B2	A	From Leg	4.0000 0.00 0.00	0.00	145.0000	No Ice 1/2" Ice 1" Ice	2.7313 2.9531 3.1823	1.6681 1.8552 2.0493	0.05 0.07 0.10
RRUS 32 B2	B	From Leg	4.0000 0.00 0.00	0.00	145.0000	No Ice 1/2" Ice 1" Ice	2.7313 2.9531 3.1823	1.6681 1.8552 2.0493	0.05 0.07 0.10
RRUS 32 B2	C	From Leg	4.0000 0.00 0.00	0.00	145.0000	No Ice 1/2" Ice 1" Ice	2.7313 2.9531 3.1823	1.6681 1.8552 2.0493	0.05 0.07 0.10
DC6-48-60-18-8F	B	From Leg	4.0000 0.00 0.00	0.00	145.0000	No Ice 1/2" Ice 1" Ice	0.9167 1.4583 1.6431	0.9167 1.4583 1.6431	0.02 0.04 0.06
Platform Mount [LP 601-1]	C	None		0.00	145.0000	No Ice 1/2" Ice 1" Ice	28.4700 33.5900 38.7100	28.4700 33.5900 38.7100	1.12 1.51 1.91
8-ft Ladder	A	From Leg	4.0000 0.00 0.00	0.00	145.0000	No Ice 1/2" Ice 1" Ice	7.0700 9.7300 11.1900	7.0700 9.7300 11.1900	0.04 0.07 0.08
2.375" OD x 6' Mount Pipe	A	From Leg	4.0000 0.00 0.00	0.00	145.0000	No Ice 1/2" Ice 1" Ice	1.4250 1.9250 2.2939	1.4250 1.9250 2.2939	0.03 0.04 0.05
2.375" OD x 6' Mount Pipe	B	From Leg	4.0000 0.00 0.00	0.00	145.0000	No Ice 1/2" Ice 1" Ice	1.4250 1.9250 2.2939	1.4250 1.9250 2.2939	0.03 0.04 0.05
2.375" OD x 6' Mount Pipe	C	From Leg	4.0000 0.00 0.00	0.00	145.0000	No Ice 1/2" Ice 1" Ice	1.4250 1.9250 2.2939	1.4250 1.9250 2.2939	0.03 0.04 0.05
**									
LNX-6512DS-VTM w/ Mount Pipe	A	From Leg	4.0000 0.00 2.00	0.00	135.0000	No Ice 1/2" Ice 1" Ice	5.2679 5.6547 6.0492	4.4756 5.0847 5.7043	0.04 0.09 0.14
LNX-6512DS-VTM w/ Mount Pipe	B	From Leg	4.0000 0.00 2.00	0.00	135.0000	No Ice 1/2" Ice 1" Ice	5.2679 5.6547 6.0492	4.4756 5.0847 5.7043	0.04 0.09 0.14
LNX-6512DS-VTM w/ Mount Pipe	C	From Leg	4.0000 0.00 2.00	0.00	135.0000	No Ice 1/2" Ice 1" Ice	5.2679 5.6547 6.0492	4.4756 5.0847 5.7043	0.04 0.09 0.14
DB-T1-6Z-8AB-0Z	A	From Leg	4.0000 0.00 2.00	0.00	135.0000	No Ice 1/2" Ice 1" Ice	4.8000 5.0704 5.3481	2.0000 2.1926 2.3926	0.04 0.08 0.12
QUAD656C0000X w/ Mount Pipe	A	From Leg	4.0000 0.00 2.00	0.00	135.0000	No Ice 1/2" Ice 1" Ice	13.4791 14.0955 14.6815	7.3313 8.5469 9.5003	0.08 0.17 0.28
QUAD656C0000X w/ Mount Pipe	B	From Leg	4.0000 0.00 2.00	0.00	135.0000	No Ice 1/2" Ice 1" Ice	13.4791 14.0955 14.6815	7.3313 8.5469 9.5003	0.08 0.17 0.28
QUAD656C0000X w/	C	From Leg	4.0000	0.00	135.0000	No Ice	13.4791	7.3313	0.08

Description	Face or Leg	Offset Type	Offsets: Horz Lateral Vert ft ft ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
Mount Pipe			0.00			1/2" Ice	14.0955	8.5469	0.17
			2.00			1" Ice	14.6815	9.5003	0.28
(2) HBXX-6517DS-A2M w/ Mount Pipe	A	From Leg	4.0000	0.00	135.0000	No Ice	8.7655	6.9629	0.07
			0.00			1/2" Ice	9.3417	8.1817	0.14
			2.00			1" Ice	9.8885	9.1436	0.21
(2) HBXX-6517DS-A2M w/ Mount Pipe	B	From Leg	4.0000	0.00	135.0000	No Ice	8.7655	6.9629	0.07
			0.00			1/2" Ice	9.3417	8.1817	0.14
			2.00			1" Ice	9.8885	9.1436	0.21
(2) HBXX-6517DS-A2M w/ Mount Pipe	C	From Leg	4.0000	0.00	135.0000	No Ice	8.7655	6.9629	0.07
			0.00			1/2" Ice	9.3417	8.1817	0.14
			2.00			1" Ice	9.8885	9.1436	0.21
RRH2x60-700	A	From Leg	4.0000	0.00	135.0000	No Ice	3.5002	1.8157	0.06
			0.00			1/2" Ice	3.7609	2.0519	0.08
			2.00			1" Ice	4.0285	2.2894	0.11
RRH2x60-700	B	From Leg	4.0000	0.00	135.0000	No Ice	3.5002	1.8157	0.06
			0.00			1/2" Ice	3.7609	2.0519	0.08
			2.00			1" Ice	4.0285	2.2894	0.11
RRH2x60-700	C	From Leg	4.0000	0.00	135.0000	No Ice	3.5002	1.8157	0.06
			0.00			1/2" Ice	3.7609	2.0519	0.08
			2.00			1" Ice	4.0285	2.2894	0.11
RRH2X60-PCS	A	From Leg	4.0000	0.00	135.0000	No Ice	2.2000	1.7233	0.06
			0.00			1/2" Ice	2.3926	1.9015	0.08
			2.00			1" Ice	2.5926	2.0870	0.10
RRH2X60-PCS	B	From Leg	4.0000	0.00	135.0000	No Ice	2.2000	1.7233	0.06
			0.00			1/2" Ice	2.3926	1.9015	0.08
			2.00			1" Ice	2.5926	2.0870	0.10
RRH2X60-PCS	C	From Leg	4.0000	0.00	135.0000	No Ice	2.2000	1.7233	0.06
			0.00			1/2" Ice	2.3926	1.9015	0.08
			2.00			1" Ice	2.5926	2.0870	0.10
B66A RRH4X45	A	From Leg	4.0000	0.00	135.0000	No Ice	2.5800	1.6296	0.07
			0.00			1/2" Ice	2.7937	1.8106	0.09
			2.00			1" Ice	3.0148	1.9986	0.11
B66A RRH4X45	B	From Leg	4.0000	0.00	135.0000	No Ice	2.5800	1.6296	0.07
			0.00			1/2" Ice	2.7937	1.8106	0.09
			2.00			1" Ice	3.0148	1.9986	0.11
B66A RRH4X45	C	From Leg	4.0000	0.00	135.0000	No Ice	2.5800	1.6296	0.07
			0.00			1/2" Ice	2.7937	1.8106	0.09
			2.00			1" Ice	3.0148	1.9986	0.11
DB-T1-6Z-8AB-0Z	C	From Leg	4.0000	0.00	135.0000	No Ice	4.8000	2.0000	0.04
			0.00			1/2" Ice	5.0704	2.1926	0.08
			2.00			1" Ice	5.3481	2.3926	0.12
Platform Mount [LP 601-1]	C	None		0.00	135.0000	No Ice	28.4700	28.4700	1.12
						1/2" Ice	33.5900	33.5900	1.51
						1" Ice	38.7100	38.7100	1.91
8-ft Ladder	C	From Leg	2.0000	0.00	135.0000	No Ice	7.0700	7.0700	0.04
			0.00			1/2" Ice	9.7300	9.7300	0.07
			-2.00			1" Ice	11.1900	11.1900	0.08
**									
ERICSSON AIR 21 B2A	A	From Leg	4.0000	0.00	125.0000	No Ice	6.3292	5.6424	0.11

Description	Face or Leg	Offset Type	Offsets: Horz Lateral Vert ft ft ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
B4P w/ Mount Pipe			0.00			1/2" Ice	6.7751	6.4259	0.17
			1.00			1" Ice	7.2137	7.1313	0.23
ERICSSON AIR 21 B2A B4P w/ Mount Pipe	B	From Leg	4.0000 0.00 1.00	0.00	125.0000	No Ice 1/2" Ice 1" Ice	6.3292 6.7751 7.2137	5.6424 6.4259 7.1313	0.11 0.17 0.23
ERICSSON AIR 21 B2A B4P w/ Mount Pipe	C	From Leg	4.0000 0.00 1.00	0.00	125.0000	No Ice 1/2" Ice 1" Ice	6.3292 6.7751 7.2137	5.6424 6.4259 7.1313	0.11 0.17 0.23
LNX-6515DS-A1M w/ Mount Pipe	A	From Leg	4.0000 0.00 1.00	0.00	125.0000	No Ice 1/2" Ice 1" Ice	11.6828 12.4043 13.1351	9.8418 11.3657 12.9138	0.08 0.17 0.27
LNX-6515DS-A1M w/ Mount Pipe	B	From Leg	4.0000 0.00 1.00	0.00	125.0000	No Ice 1/2" Ice 1" Ice	11.6828 12.4043 13.1351	9.8418 11.3657 12.9138	0.08 0.17 0.27
LNX-6515DS-A1M w/ Mount Pipe	C	From Leg	4.0000 0.00 1.00	0.00	125.0000	No Ice 1/2" Ice 1" Ice	11.6828 12.4043 13.1351	9.8418 11.3657 12.9138	0.08 0.17 0.27
ERICSSON AIR 21 B4A B2P w/ Mount Pipe	A	From Leg	4.0000 0.00 1.00	0.00	125.0000	No Ice 1/2" Ice 1" Ice	6.3186 6.7646 7.2032	5.6334 6.4160 7.1208	0.11 0.17 0.23
ERICSSON AIR 21 B4A B2P w/ Mount Pipe	B	From Leg	4.0000 0.00 1.00	0.00	125.0000	No Ice 1/2" Ice 1" Ice	6.3186 6.7646 7.2032	5.6334 6.4160 7.1208	0.11 0.17 0.23
ERICSSON AIR 21 B4A B2P w/ Mount Pipe	C	From Leg	4.0000 0.00 1.00	0.00	125.0000	No Ice 1/2" Ice 1" Ice	6.3186 6.7646 7.2032	5.6334 6.4160 7.1208	0.11 0.17 0.23
KRY 112 144/1	A	From Leg	4.0000 0.00 1.00	0.00	125.0000	No Ice 1/2" Ice 1" Ice	0.3500 0.4259 0.5093	0.1750 0.2343 0.3009	0.01 0.01 0.02
KRY 112 144/1	B	From Leg	4.0000 0.00 1.00	0.00	125.0000	No Ice 1/2" Ice 1" Ice	0.3500 0.4259 0.5093	0.1750 0.2343 0.3009	0.01 0.01 0.02
KRY 112 144/1	C	From Leg	4.0000 0.00 1.00	0.00	125.0000	No Ice 1/2" Ice 1" Ice	0.3500 0.4259 0.5093	0.1750 0.2343 0.3009	0.01 0.01 0.02
RRUS 11 B12	A	From Leg	4.0000 0.00 1.00	0.00	125.0000	No Ice 1/2" Ice 1" Ice	2.8333 3.0426 3.2593	1.1821 1.3299 1.4848	0.05 0.07 0.10
RRUS 11 B12	B	From Leg	4.0000 0.00 1.00	0.00	125.0000	No Ice 1/2" Ice 1" Ice	2.8333 3.0426 3.2593	1.1821 1.3299 1.4848	0.05 0.07 0.10
RRUS 11 B12	C	From Leg	4.0000 0.00 1.00	0.00	125.0000	No Ice 1/2" Ice 1" Ice	2.8333 3.0426 3.2593	1.1821 1.3299 1.4848	0.05 0.07 0.10
Platform Mount [LP 601-1]	C	None		0.00	125.0000	No Ice 1/2" Ice 1" Ice	28.4700 33.5900 38.7100	28.4700 33.5900 38.7100	1.12 1.51 1.91
8-ft Ladder	C	From Leg	2.0000 0.00	0.00	125.0000	No Ice 1/2"	7.0700 9.7300	7.0700 9.7300	0.04 0.07

Description	Face or Leg	Offset Type	Offsets: Horz Lateral Vert ft ft ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
			-2.00			Ice 1" Ice	11.1900	11.1900	0.08
**									
APXVSPP18-C-A20 w/ Mount Pipe	A	From Leg	4.0000 0.00 0.00	0.00	113.0000	No Ice 1/2" Ice 1" Ice	8.2619 8.8215 9.3462	6.9458 8.1266 9.0212	0.08 0.15 0.23
APXVSPP18-C-A20 w/ Mount Pipe	B	From Leg	4.0000 0.00 0.00	0.00	113.0000	No Ice 1/2" Ice 1" Ice	8.2619 8.8215 9.3462	6.9458 8.1266 9.0212	0.08 0.15 0.23
APXVSPP18-C-A20 w/ Mount Pipe	C	From Leg	4.0000 0.00 0.00	0.00	113.0000	No Ice 1/2" Ice 1" Ice	8.2619 8.8215 9.3462	6.9458 8.1266 9.0212	0.08 0.15 0.23
APXVTM14-C-120 w/ Mount Pipe	A	From Leg	4.0000 0.00 0.00	0.00	113.0000	No Ice 1/2" Ice 1" Ice	6.5799 7.0306 7.4733	4.9591 5.7544 6.4723	0.08 0.13 0.19
APXVTM14-C-120 w/ Mount Pipe	B	From Leg	4.0000 0.00 0.00	0.00	113.0000	No Ice 1/2" Ice 1" Ice	6.5799 7.0306 7.4733	4.9591 5.7544 6.4723	0.08 0.13 0.19
APXVTM14-C-120 w/ Mount Pipe	C	From Leg	4.0000 0.00 0.00	0.00	113.0000	No Ice 1/2" Ice 1" Ice	6.5799 7.0306 7.4733	4.9591 5.7544 6.4723	0.08 0.13 0.19
TD-RRH8x20-25	A	From Leg	4.0000 0.00 0.00	0.00	113.0000	No Ice 1/2" Ice 1" Ice	4.0455 4.2975 4.5570	1.5345 1.7142 1.9008	0.07 0.10 0.13
TD-RRH8x20-25	B	From Leg	4.0000 0.00 0.00	0.00	113.0000	No Ice 1/2" Ice 1" Ice	4.0455 4.2975 4.5570	1.5345 1.7142 1.9008	0.07 0.10 0.13
TD-RRH8x20-25	C	From Leg	4.0000 0.00 0.00	0.00	113.0000	No Ice 1/2" Ice 1" Ice	4.0455 4.2975 4.5570	1.5345 1.7142 1.9008	0.07 0.10 0.13
Platform Mount [LP 601-1]	C	None		0.00	113.0000	No Ice 1/2" Ice 1" Ice	28.4700 33.5900 38.7100	28.4700 33.5900 38.7100	1.12 1.51 1.91
8-ft Ladder	C	From Leg	2.0000 0.00 -2.00	0.00	113.0000	No Ice 1/2" Ice 1" Ice	7.0700 9.7300 11.1900	7.0700 9.7300 11.1900	0.04 0.07 0.08
2.375" OD x 6' Mount Pipe	A	From Leg	4.0000 0.00 0.00	0.00	113.0000	No Ice 1/2" Ice 1" Ice	1.4250 1.9250 2.2939	1.4250 1.9250 2.2939	0.03 0.04 0.05
2.375" OD x 6' Mount Pipe	B	From Leg	4.0000 0.00 0.00	0.00	113.0000	No Ice 1/2" Ice 1" Ice	1.4250 1.9250 2.2939	1.4250 1.9250 2.2939	0.03 0.04 0.05
2.375" OD x 6' Mount Pipe	C	From Leg	4.0000 0.00 0.00	0.00	113.0000	No Ice 1/2" Ice 1" Ice	1.4250 1.9250 2.2939	1.4250 1.9250 2.2939	0.03 0.04 0.05
**									
PCS 1900MHz 4x45W-65MHz	A	From Leg	4.0000 0.00 0.00	0.00	111.0000	No Ice 1/2" Ice 1" Ice	2.3218 2.5266 2.7388	2.2381 2.4407 2.6507	0.06 0.08 0.11
PCS 1900MHz 4x45W-	B	From Leg	4.0000	0.00	111.0000	No Ice	2.3218	2.2381	0.06

Description	Face or Leg	Offset Type	Offsets: Horz Lateral Vert ft ft ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
65MHz			0.00 0.00			1/2" Ice 1" Ice	2.5266 2.7388	2.4407 2.6507	0.08 0.11
PCS 1900MHz 4x45W-65MHz	C	From Leg	4.0000 0.00 0.00	0.00	111.0000	No Ice 1/2" Ice 1" Ice	2.3218 2.5266 2.7388	2.2381 2.4407 2.6507	0.06 0.08 0.11
800MHz 2X50W RRH W/FILTER	A	From Leg	4.0000 0.00 -2.00	0.00	111.0000	No Ice 1/2" Ice 1" Ice	2.0583 2.2398 2.4287	1.9317 2.1087 2.2931	0.06 0.09 0.11
800MHz 2X50W RRH W/FILTER	B	From Leg	4.0000 0.00 -2.00	0.00	111.0000	No Ice 1/2" Ice 1" Ice	2.0583 2.2398 2.4287	1.9317 2.1087 2.2931	0.06 0.09 0.11
800MHz 2X50W RRH W/FILTER	C	From Leg	4.0000 0.00 -2.00	0.00	111.0000	No Ice 1/2" Ice 1" Ice	2.0583 2.2398 2.4287	1.9317 2.1087 2.2931	0.06 0.09 0.11
Side Arm Mount [SO 102-3]	C	None		0.00	111.0000	No Ice 1/2" Ice 1" Ice	3.0000 3.4800 3.9600	3.0000 3.4800 3.9600	0.08 0.11 0.14
**									
Platform Mount [LP 601-1]	C	None		0.00	100.0000	No Ice 1/2" Ice 1" Ice	28.4700 33.5900 38.7100	28.4700 33.5900 38.7100	1.12 1.51 1.91
8-ft Ladder	C	From Leg	2.0000 0.00 -2.00	0.00	100.0000	No Ice 1/2" Ice 1" Ice	7.0700 9.7300 11.1900	7.0700 9.7300 11.1900	0.04 0.07 0.08
(2) 2.375" OD x 6' Mount Pipe	A	From Leg	4.0000 0.00 0.00	0.00	100.0000	No Ice 1/2" Ice 1" Ice	1.4250 1.9250 2.2939	1.4250 1.9250 2.2939	0.03 0.04 0.05
(2) 2.375" OD x 6' Mount Pipe	B	From Leg	4.0000 0.00 0.00	0.00	100.0000	No Ice 1/2" Ice 1" Ice	1.4250 1.9250 2.2939	1.4250 1.9250 2.2939	0.03 0.04 0.05
(2) 2.375" OD x 6' Mount Pipe	C	From Leg	4.0000 0.00 0.00	0.00	100.0000	No Ice 1/2" Ice 1" Ice	1.4250 1.9250 2.2939	1.4250 1.9250 2.2939	0.03 0.04 0.05
**									
KS24019-L112A	C	From Leg	4.0000 0.00 1.00	0.00	51.0000	No Ice 1/2" Ice 1" Ice	0.1407 0.1979 0.2621	0.1407 0.1979 0.2621	0.01 0.01 0.01
Side Arm Mount [SO 701-1]	C	None		0.00	51.0000	No Ice 1/2" Ice 1" Ice	0.8500 1.1400 1.4300	1.6700 2.3400 3.0100	0.07 0.08 0.09
**									

Tower Pressures - No Ice

G_H = 1.100

Section Elevation ft	z ft	K_Z	q_z psf	A_G ft²	Face	A_F ft²	A_R ft²	A_{leg} ft²	Leg %	C_AA_A In Face ft²	C_AA_A Out Face ft²
L1 144.5000-117.6500	130.5258	1.339	35.892	54.386	A	0.000	54.386	54.386	100.00	0.000	0.000
					B	0.000	54.386		100.00	0.000	0.000
					C	0.000	54.386		100.00	0.000	1.455
L2 117.6500-112.5800	115.0982	1.304	34.954	11.587	A	0.000	11.587	11.587	100.00	0.000	0.000
					B	0.000	11.587		100.00	0.000	0.000
					C	0.000	11.587		100.00	0.000	1.290
L3 112.5800-102.2500	107.3493	1.285	34.445	25.032	A	0.000	25.032	25.032	100.00	0.000	0.000
					B	0.000	25.032		100.00	0.000	0.000
					C	0.000	25.032		100.00	0.000	4.661
L4 102.2500-98.5000	100.3668	1.267	33.961	9.560	A	0.000	9.560	9.560	100.00	0.000	0.000
					B	0.000	9.560		100.00	0.000	0.000
					C	0.000	9.560		100.00	0.000	1.692
L5 98.5000-86.8500	92.5997	1.245	33.390	31.304	A	0.000	31.304	31.304	100.00	0.000	0.000
					B	0.000	31.304		100.00	0.000	0.000
					C	0.000	31.304		100.00	0.000	4.731
L6 86.8500-83.0000	84.9142	1.223	32.786	10.680	A	0.000	10.680	10.680	100.00	0.000	0.000
					B	0.000	10.680		100.00	0.000	0.000
					C	0.000	10.680		100.00	0.000	1.095
L7 83.0000-77.0000	79.9810	1.207	32.376	17.252	A	0.000	17.252	17.252	100.00	0.000	0.000
					B	0.000	17.252		100.00	0.000	0.000
					C	0.000	17.252		100.00	0.000	2.332
L8 77.0000-60.0000	68.3577	1.168	31.323	52.445	A	0.000	52.445	52.445	100.00	0.000	0.000
					B	0.000	52.445		100.00	0.000	0.000
					C	0.000	52.445		100.00	0.000	8.378
L9 60.0000-41.7800	50.7420	1.097	29.418	62.057	A	0.000	62.057	62.057	100.00	0.000	0.000
					B	0.000	62.057		100.00	0.000	0.000
					C	0.000	62.057		100.00	0.000	8.979
L10 41.7800-31.2500	36.4624	1.023	27.441	37.844	A	0.000	37.844	37.844	100.00	0.000	0.000
					B	0.000	37.844		100.00	0.000	0.000
					C	0.000	37.844		100.00	0.000	5.190
L11 31.2500-27.8300	29.5352	0.979	26.251	12.766	A	0.000	12.766	12.766	100.00	0.000	0.000
					B	0.000	12.766		100.00	0.000	0.000
					C	0.000	12.766		100.00	0.000	1.685
L12 27.8300-0.0000	13.6212	0.85	22.791	111.841	A	0.000	111.841	111.841	100.00	0.000	0.000
					B	0.000	111.841		100.00	0.000	0.000
					C	0.000	111.841		100.00	0.000	13.716

Tower Pressure - With Ice

G_H = 1.100

Section Elevation ft	z ft	K_Z	q_z psf	t_Z in	A_G ft²	Face	A_F ft²	A_R ft²	A_{leg} ft²	Leg %	C_AA_A In Face ft²	C_AA_A Out Face ft²
L1 144.5000-117.6500	130.5258	1.339	8.139	1.7211	62.088	A	0.000	62.088	62.088	100.00	0.000	0.000
						B	0.000	62.088		100.00	0.000	0.000
						C	0.000	62.088		100.00	0.000	3.985
L2 117.6500-112.5800	115.0982	1.304	7.926	1.6996	13.041	A	0.000	13.041	13.041	100.00	0.000	0.000
						B	0.000	13.041		100.00	0.000	0.000
						C	0.000	13.041		100.00	0.000	3.754
L3 112.5800-102.2500	107.3493	1.285	7.811	1.6878	27.938	A	0.000	27.938	27.938	100.00	0.000	0.000
						B	0.000	27.938		100.00	0.000	0.000
						C	0.000	27.938		100.00	0.000	15.509
L4 102.2500-98.5000	100.3668	1.267	7.701	1.6765	10.607	A	0.000	10.607	10.607	100.00	0.000	0.000
						B	0.000	10.607		100.00	0.000	0.000
						C	0.000	10.607		100.00	0.000	5.604
L5 98.5000-86.8500	92.5997	1.245	7.571	1.6630	34.533	A	0.000	34.533	34.533	100.00	0.000	0.000
						B	0.000	34.533		100.00	0.000	0.000
						C	0.000	34.533		100.00	0.000	15.622
L6 86.8500-83.0000	84.9142	1.223	7.435	1.6487	11.747	A	0.000	11.747	11.747	100.00	0.000	0.000
						B	0.000	11.747		100.00	0.000	0.000
						C	0.000	11.747		100.00	0.000	3.656
L7 83.0000-77.0000	79.9810	1.207	7.341	1.6388	18.891	A	0.000	18.891	18.891	100.00	0.000	0.000
						B	0.000	18.891		100.00	0.000	0.000

Section Elevation ft	z ft	K_Z	q_z psf	t_Z in	A_G ft²	Face	A_F ft²	A_R ft²	A_{leg} ft²	Leg %	C_AA_A In Face ft²	C_AA_A Out Face ft²
						C	0.000	18.891		100.00	0.000	7.358
L8 77.0000-60.0000	68.3577	1.168	7.103	1.6133	57.016	A	0.000	57.016	57.016	100.00	0.000	0.000
						B	0.000	57.016		100.00	0.000	0.000
						C	0.000	57.016		100.00	0.000	25.443
L9 60.0000-41.7800	50.7420	1.097	6.671	1.5659	66.813	A	0.000	66.813	66.813	100.00	0.000	0.000
						B	0.000	66.813		100.00	0.000	0.000
						C	0.000	66.813		100.00	0.000	26.732
L10 41.7800-31.2500	36.4624	1.023	6.222	1.5150	40.592	A	0.000	40.592	40.592	100.00	0.000	0.000
						B	0.000	40.592		100.00	0.000	0.000
						C	0.000	40.592		100.00	0.000	15.450
L11 31.2500-27.8300	29.5352	0.979	5.952	1.4835	13.612	A	0.000	13.612	13.612	100.00	0.000	0.000
						B	0.000	13.612		100.00	0.000	0.000
						C	0.000	13.612		100.00	0.000	4.842
L12 27.8300-0.0000	13.6212	0.85	5.168	1.3730	118.209	A	0.000	118.209	118.209	100.00	0.000	0.000
						B	0.000	118.209		100.00	0.000	0.000
						C	0.000	118.209		100.00	0.000	37.491

Tower Pressure - Service

G_H = 1.100

Section Elevation ft	z ft	K_Z	q_z psf	A_G ft²	Face	A_F ft²	A_R ft²	A_{leg} ft²	Leg %	C_AA_A In Face ft²	C_AA_A Out Face ft²
L1 144.5000-117.6500	130.5258	1.339	10.486	54.386	A	0.000	54.386	54.386	100.00	0.000	0.000
					B	0.000	54.386		100.00	0.000	0.000
					C	0.000	54.386		100.00	0.000	1.455
L2 117.6500-112.5800	115.0982	1.304	10.212	11.587	A	0.000	11.587	11.587	100.00	0.000	0.000
					B	0.000	11.587		100.00	0.000	0.000
					C	0.000	11.587		100.00	0.000	1.290
L3 112.5800-102.2500	107.3493	1.285	10.063	25.032	A	0.000	25.032	25.032	100.00	0.000	0.000
					B	0.000	25.032		100.00	0.000	0.000
					C	0.000	25.032		100.00	0.000	4.661
L4 102.2500-98.5000	100.3668	1.267	9.922	9.560	A	0.000	9.560	9.560	100.00	0.000	0.000
					B	0.000	9.560		100.00	0.000	0.000
					C	0.000	9.560		100.00	0.000	1.692
L5 98.5000-86.8500	92.5997	1.245	9.755	31.304	A	0.000	31.304	31.304	100.00	0.000	0.000
					B	0.000	31.304		100.00	0.000	0.000
					C	0.000	31.304		100.00	0.000	4.731
L6 86.8500-83.0000	84.9142	1.223	9.579	10.680	A	0.000	10.680	10.680	100.00	0.000	0.000
					B	0.000	10.680		100.00	0.000	0.000
					C	0.000	10.680		100.00	0.000	1.095
L7 83.0000-77.0000	79.9810	1.207	9.459	17.252	A	0.000	17.252	17.252	100.00	0.000	0.000
					B	0.000	17.252		100.00	0.000	0.000
					C	0.000	17.252		100.00	0.000	2.332
L8 77.0000-60.0000	68.3577	1.168	9.151	52.445	A	0.000	52.445	52.445	100.00	0.000	0.000
					B	0.000	52.445		100.00	0.000	0.000
					C	0.000	52.445		100.00	0.000	8.378
L9 60.0000-41.7800	50.7420	1.097	8.595	62.057	A	0.000	62.057	62.057	100.00	0.000	0.000
					B	0.000	62.057		100.00	0.000	0.000
					C	0.000	62.057		100.00	0.000	8.979
L10 41.7800-31.2500	36.4624	1.023	8.017	37.844	A	0.000	37.844	37.844	100.00	0.000	0.000
					B	0.000	37.844		100.00	0.000	0.000
					C	0.000	37.844		100.00	0.000	5.190
L11 31.2500-27.8300	29.5352	0.979	7.669	12.766	A	0.000	12.766	12.766	100.00	0.000	0.000
					B	0.000	12.766		100.00	0.000	0.000
					C	0.000	12.766		100.00	0.000	1.685
L12 27.8300-0.0000	13.6212	0.85	6.659	111.841	A	0.000	111.841	111.841	100.00	0.000	0.000
					B	0.000	111.841		100.00	0.000	0.000
					C	0.000	111.841		100.00	0.000	13.716

Tower Forces - No Ice - Wind Normal To Face

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	q_z psf	D_F	D_R	A_E ft^2	F K	w plf	Ctrl. Face
L1 144.5000-117.6500	0.58	1.29	A	1	0.65	35.89	1	1	54.386	1.45	54.12	C
			B	1	0.65	2	1	1	54.386			
			C	1	0.65		1	1	54.386			
L2 117.6500-112.5800	0.16	0.64	A	1	0.65	34.95	1	1	11.587	0.34	66.90	C
			B	1	0.65	4	1	1	11.587			
			C	1	0.65		1	1	11.587			
L3 112.5800-102.2500	0.37	1.18	A	1	0.758	34.44	1	1	25.032	0.90	86.65	C
			B	1	0.758	5	1	1	25.032			
			C	1	0.758		1	1	25.032			
L4 102.2500-98.5000	0.13	0.49	A	1	0.743	33.96	1	1	9.560	0.33	87.57	C
			B	1	0.743	1	1	1	9.560			
			C	1	0.743		1	1	9.560			
L5 98.5000-86.8500	0.41	2.17	A	1	0.701	33.39	1	1	31.304	0.98	84.06	C
			B	1	0.701	0	1	1	31.304			
			C	1	0.701		1	1	31.304			
L6 86.8500-83.0000	0.14	1.09	A	1	0.65	32.78	1	1	10.680	0.29	75.29	C
			B	1	0.65	6	1	1	10.680			
			C	1	0.65		1	1	10.680			
L7 83.0000-77.0000	0.21	1.22	A	1	0.675	32.37	1	1	17.252	0.50	82.93	C
			B	1	0.675	6	1	1	17.252			
			C	1	0.675		1	1	17.252			
L8 77.0000-60.0000	0.60	3.97	A	1	0.715	31.32	1	1	52.445	1.58	92.94	C
			B	1	0.715	3	1	1	52.445			
			C	1	0.715		1	1	52.445			
L9 60.0000-41.7800	0.65	4.58	A	1	0.69	29.41	1	1	62.057	1.68	92.01	C
			B	1	0.69	8	1	1	62.057			
			C	1	0.69		1	1	62.057			
L10 41.7800-31.2500	0.37	4.67	A	1	0.678	27.44	1	1	37.844	0.93	88.41	C
			B	1	0.678	1	1	1	37.844			
			C	1	0.678		1	1	37.844			
L11 31.2500-27.8300	0.12	1.04	A	1	0.67	26.25	1	1	12.766	0.30	86.40	C
			B	1	0.67	1	1	1	12.766			
			C	1	0.67		1	1	12.766			
L12 27.8300-0.0000	0.99	7.89	A	1	0.654	22.79	1	1	111.841	2.18	78.27	C
			B	1	0.654	1	1	1	111.841			
			C	1	0.654		1	1	111.841			
Sum Weight:	4.74	30.23						OTM	778.27 kip-ft	11.44		

Tower Forces - No Ice - Wind 60 To Face

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	q_z psf	D_F	D_R	A_E ft^2	F K	w plf	Ctrl. Face
L1 144.5000-117.6500	0.58	1.29	A	1	0.65	35.89	1	1	54.386	1.45	54.12	C
			B	1	0.65	2	1	1	54.386			
			C	1	0.65		1	1	54.386			
L2 117.6500-112.5800	0.16	0.64	A	1	0.65	34.95	1	1	11.587	0.34	66.90	C
			B	1	0.65	4	1	1	11.587			
			C	1	0.65		1	1	11.587			
L3 112.5800-102.2500	0.37	1.18	A	1	0.758	34.44	1	1	25.032	0.90	86.65	C
			B	1	0.758	5	1	1	25.032			
			C	1	0.758		1	1	25.032			
L4 102.2500-98.5000	0.13	0.49	A	1	0.743	33.96	1	1	9.560	0.33	87.57	C
			B	1	0.743	1	1	1	9.560			
			C	1	0.743		1	1	9.560			
L5 98.5000-86.8500	0.41	2.17	A	1	0.701	33.39	1	1	31.304	0.98	84.06	C
			B	1	0.701	0	1	1	31.304			
			C	1	0.701		1	1	31.304			

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	q_z psf	D_F	D_R	A_E ft^2	F K	w plf	Ctrl. Face
L6 86.8500-83.0000	0.14	1.09	A	1	0.65	32.78	1	1	10.680	0.29	75.29	C
			B	1	0.65	6	1	1	10.680			
			C	1	0.65		1	1	10.680			
L7 83.0000-77.0000	0.21	1.22	A	1	0.675	32.37	1	1	17.252	0.50	82.93	C
			B	1	0.675	6	1	1	17.252			
			C	1	0.675		1	1	17.252			
L8 77.0000-60.0000	0.60	3.97	A	1	0.715	31.32	1	1	52.445	1.58	92.94	C
			B	1	0.715	3	1	1	52.445			
			C	1	0.715		1	1	52.445			
L9 60.0000-41.7800	0.65	4.58	A	1	0.69	29.41	1	1	62.057	1.68	92.01	C
			B	1	0.69	8	1	1	62.057			
			C	1	0.69		1	1	62.057			
L10 41.7800-31.2500	0.37	4.67	A	1	0.678	27.44	1	1	37.844	0.93	88.41	C
			B	1	0.678	1	1	1	37.844			
			C	1	0.678		1	1	37.844			
L11 31.2500-27.8300	0.12	1.04	A	1	0.67	26.25	1	1	12.766	0.30	86.40	C
			B	1	0.67	1	1	1	12.766			
			C	1	0.67		1	1	12.766			
L12 27.8300-0.0000	0.99	7.89	A	1	0.654	22.79	1	1	111.841	2.18	78.27	C
			B	1	0.654	1	1	1	111.841			
			C	1	0.654		1	1	111.841			
Sum Weight:	4.74	30.23						OTM	778.27 kip-ft	11.44		

Tower Forces - No Ice - Wind 90 To Face

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	q_z psf	D_F	D_R	A_E ft^2	F K	w plf	Ctrl. Face
L1 144.5000-117.6500	0.58	1.29	A	1	0.65	35.89	1	1	54.386	1.45	54.12	C
			B	1	0.65	2	1	1	54.386			
			C	1	0.65		1	1	54.386			
L2 117.6500-112.5800	0.16	0.64	A	1	0.65	34.95	1	1	11.587	0.34	66.90	C
			B	1	0.65	4	1	1	11.587			
			C	1	0.65		1	1	11.587			
L3 112.5800-102.2500	0.37	1.18	A	1	0.758	34.44	1	1	25.032	0.90	86.65	C
			B	1	0.758	5	1	1	25.032			
			C	1	0.758		1	1	25.032			
L4 102.2500-98.5000	0.13	0.49	A	1	0.743	33.96	1	1	9.560	0.33	87.57	C
			B	1	0.743	1	1	1	9.560			
			C	1	0.743		1	1	9.560			
L5 98.5000-86.8500	0.41	2.17	A	1	0.701	33.39	1	1	31.304	0.98	84.06	C
			B	1	0.701	0	1	1	31.304			
			C	1	0.701		1	1	31.304			
L6 86.8500-83.0000	0.14	1.09	A	1	0.65	32.78	1	1	10.680	0.29	75.29	C
			B	1	0.65	6	1	1	10.680			
			C	1	0.65		1	1	10.680			
L7 83.0000-77.0000	0.21	1.22	A	1	0.675	32.37	1	1	17.252	0.50	82.93	C
			B	1	0.675	6	1	1	17.252			
			C	1	0.675		1	1	17.252			
L8 77.0000-60.0000	0.60	3.97	A	1	0.715	31.32	1	1	52.445	1.58	92.94	C
			B	1	0.715	3	1	1	52.445			
			C	1	0.715		1	1	52.445			
L9 60.0000-41.7800	0.65	4.58	A	1	0.69	29.41	1	1	62.057	1.68	92.01	C
			B	1	0.69	8	1	1	62.057			
			C	1	0.69		1	1	62.057			
L10 41.7800-31.2500	0.37	4.67	A	1	0.678	27.44	1	1	37.844	0.93	88.41	C
			B	1	0.678	1	1	1	37.844			
			C	1	0.678		1	1	37.844			
L11 31.2500-27.8300	0.12	1.04	A	1	0.67	26.25	1	1	12.766	0.30	86.40	C
			B	1	0.67	1	1	1	12.766			
			C	1	0.67		1	1	12.766			

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	q_z psf	D_F	D_R	A_E ft^2	F K	w plf	Ctrl. Face
L12 27.8300-0.0000	0.99	7.89	A	1	0.654	22.79	1	1	111.841	2.18	78.27	C
			B	1	0.654	1	1	1	111.841			
			C	1	0.654		1	1	111.841			
Sum Weight:	4.74	30.23						OTM	778.27 kip-ft	11.44		

Tower Forces - With Ice - Wind Normal To Face

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	q_z psf	D_F	D_R	A_E ft^2	F K	w plf	Ctrl. Face
L1 144.5000-117.6500	0.70	2.75	A	1	1.2	8.139	1	1	62.088	0.70	26.17	C
			B	1	1.2		1	1	62.088			
			C	1	1.2		1	1	62.088			
L2 117.6500-112.5800	0.25	0.94	A	1	1.2	7.926	1	1	13.041	0.17	33.37	C
			B	1	1.2		1	1	13.041			
			C	1	1.2		1	1	13.041			
L3 112.5800-102.2500	0.58	1.83	A	1	1.2	7.811	1	1	27.938	0.42	40.78	C
			B	1	1.2		1	1	27.938			
			C	1	1.2		1	1	27.938			
L4 102.2500-98.5000	0.21	0.74	A	1	1.2	7.701	1	1	10.607	0.16	41.41	C
			B	1	1.2		1	1	10.607			
			C	1	1.2		1	1	10.607			
L5 98.5000-86.8500	0.65	2.97	A	1	1.2	7.571	1	1	34.533	0.48	40.79	C
			B	1	1.2		1	1	34.533			
			C	1	1.2		1	1	34.533			
L6 86.8500-83.0000	0.22	1.36	A	1	1.2	7.435	1	1	11.747	0.15	37.71	C
			B	1	1.2		1	1	11.747			
			C	1	1.2		1	1	11.747			
L7 83.0000-77.0000	0.33	1.65	A	1	1.2	7.341	1	1	18.891	0.24	40.41	C
			B	1	1.2		1	1	18.891			
			C	1	1.2		1	1	18.891			
L8 77.0000-60.0000	0.94	5.26	A	1	1.2	7.103	1	1	57.016	0.73	43.14	C
			B	1	1.2		1	1	57.016			
			C	1	1.2		1	1	57.016			
L9 60.0000-41.7800	1.04	6.05	A	1	1.2	6.671	1	1	66.813	0.78	43.06	C
			B	1	1.2		1	1	66.813			
			C	1	1.2		1	1	66.813			
L10 41.7800-31.2500	0.62	5.54	A	1	1.2	6.222	1	1	40.592	0.44	41.71	C
			B	1	1.2		1	1	40.592			
			C	1	1.2		1	1	40.592			
L11 31.2500-27.8300	0.20	1.33	A	1	1.2	5.952	1	1	13.612	0.14	40.54	C
			B	1	1.2		1	1	13.612			
			C	1	1.2		1	1	13.612			
L12 27.8300-0.0000	1.53	10.19	A	1	1.2	5.168	1	1	118.209	1.02	36.63	C
			B	1	1.2		1	1	118.209			
			C	1	1.2		1	1	118.209			
Sum Weight:	7.27	40.62						OTM	371.67 kip-ft	5.43		

Tower Forces - With Ice - Wind 60 To Face

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

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	q_z psf	D_F	D_R	A_E ft^2	F K	w plf	Ctrl. Face
L1 144.5000-117.6500	0.70	2.75	A	1	1.2	8.139	1	1	62.088	0.70	26.17	C
			B	1	1.2		1	1	62.088			
			C	1	1.2		1	1	62.088			
L2 117.6500-112.5800	0.25	0.94	A	1	1.2	7.926	1	1	13.041	0.17	33.37	C
			B	1	1.2		1	1	13.041			
			C	1	1.2		1	1	13.041			
L3 112.5800-102.2500	0.58	1.83	A	1	1.2	7.811	1	1	27.938	0.42	40.78	C
			B	1	1.2		1	1	27.938			
			C	1	1.2		1	1	27.938			
L4 102.2500-98.5000	0.21	0.74	A	1	1.2	7.701	1	1	10.607	0.16	41.41	C
			B	1	1.2		1	1	10.607			
			C	1	1.2		1	1	10.607			
L5 98.5000-86.8500	0.65	2.97	A	1	1.2	7.571	1	1	34.533	0.48	40.79	C
			B	1	1.2		1	1	34.533			
			C	1	1.2		1	1	34.533			
L6 86.8500-83.0000	0.22	1.36	A	1	1.2	7.435	1	1	11.747	0.15	37.71	C
			B	1	1.2		1	1	11.747			
			C	1	1.2		1	1	11.747			
L7 83.0000-77.0000	0.33	1.65	A	1	1.2	7.341	1	1	18.891	0.24	40.41	C
			B	1	1.2		1	1	18.891			
			C	1	1.2		1	1	18.891			
L8 77.0000-60.0000	0.94	5.26	A	1	1.2	7.103	1	1	57.016	0.73	43.14	C
			B	1	1.2		1	1	57.016			
			C	1	1.2		1	1	57.016			
L9 60.0000-41.7800	1.04	6.05	A	1	1.2	6.671	1	1	66.813	0.78	43.06	C
			B	1	1.2		1	1	66.813			
			C	1	1.2		1	1	66.813			
L10 41.7800-31.2500	0.62	5.54	A	1	1.2	6.222	1	1	40.592	0.44	41.71	C
			B	1	1.2		1	1	40.592			
			C	1	1.2		1	1	40.592			
L11 31.2500-27.8300	0.20	1.33	A	1	1.2	5.952	1	1	13.612	0.14	40.54	C
			B	1	1.2		1	1	13.612			
			C	1	1.2		1	1	13.612			
L12 27.8300-0.0000	1.53	10.19	A	1	1.2	5.168	1	1	118.209	1.02	36.63	C
			B	1	1.2		1	1	118.209			
			C	1	1.2		1	1	118.209			
Sum Weight:	7.27	40.62						OTM	371.67 kip-ft	5.43		

Tower Forces - With Ice - Wind 90 To Face

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	q_z psf	D_F	D_R	A_E ft^2	F K	w plf	Ctrl. Face
L1 144.5000-117.6500	0.70	2.75	A	1	1.2	8.139	1	1	62.088	0.70	26.17	C
			B	1	1.2		1	1	62.088			
			C	1	1.2		1	1	62.088			
L2 117.6500-112.5800	0.25	0.94	A	1	1.2	7.926	1	1	13.041	0.17	33.37	C
			B	1	1.2		1	1	13.041			
			C	1	1.2		1	1	13.041			
L3 112.5800-102.2500	0.58	1.83	A	1	1.2	7.811	1	1	27.938	0.42	40.78	C
			B	1	1.2		1	1	27.938			
			C	1	1.2		1	1	27.938			
L4 102.2500-98.5000	0.21	0.74	A	1	1.2	7.701	1	1	10.607	0.16	41.41	C
			B	1	1.2		1	1	10.607			
			C	1	1.2		1	1	10.607			
L5 98.5000-86.8500	0.65	2.97	A	1	1.2	7.571	1	1	34.533	0.48	40.79	C
			B	1	1.2		1	1	34.533			
			C	1	1.2		1	1	34.533			
L6 86.8500-83.0000	0.22	1.36	A	1	1.2	7.435	1	1	11.747	0.15	37.71	C
			B	1	1.2		1	1	11.747			
			C	1	1.2		1	1	11.747			

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	q_z psf	D_F	D_R	A_E ft^2	F K	w plf	Ctrl. Face
L7 83.0000-77.0000	0.33	1.65	A	1	1.2	7.341	1	1	18.891	0.24	40.41	C
			B	1	1.2		1	1	18.891			
			C	1	1.2		1	1	18.891			
L8 77.0000-60.0000	0.94	5.26	A	1	1.2	7.103	1	1	57.016	0.73	43.14	C
			B	1	1.2		1	1	57.016			
			C	1	1.2		1	1	57.016			
L9 60.0000-41.7800	1.04	6.05	A	1	1.2	6.671	1	1	66.813	0.78	43.06	C
			B	1	1.2		1	1	66.813			
			C	1	1.2		1	1	66.813			
L10 41.7800-31.2500	0.62	5.54	A	1	1.2	6.222	1	1	40.592	0.44	41.71	C
			B	1	1.2		1	1	40.592			
			C	1	1.2		1	1	40.592			
L11 31.2500-27.8300	0.20	1.33	A	1	1.2	5.952	1	1	13.612	0.14	40.54	C
			B	1	1.2		1	1	13.612			
			C	1	1.2		1	1	13.612			
L12 27.8300-0.0000	1.53	10.19	A	1	1.2	5.168	1	1	118.209	1.02	36.63	C
			B	1	1.2		1	1	118.209			
			C	1	1.2		1	1	118.209			
Sum Weight:	7.27	40.62						OTM	371.67 kip-ft	5.43		

Tower Forces - Service - Wind Normal To Face

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	q_z psf	D_F	D_R	A_E ft^2	F K	w plf	Ctrl. Face
L1 144.5000-117.6500	0.58	1.29	A	1	0.65	10.48	1	1	54.386	0.42	15.81	C
			B	1	0.65	6	1	1	54.386			
			C	1	0.65		1	1	54.386			
L2 117.6500-112.5800	0.16	0.64	A	1	0.65	10.21	1	1	11.587	0.10	19.55	C
			B	1	0.65	2	1	1	11.587			
			C	1	0.65		1	1	11.587			
L3 112.5800-102.2500	0.37	1.18	A	1	0.758	10.06	1	1	25.032	0.26	25.32	C
			B	1	0.758	3	1	1	25.032			
			C	1	0.758		1	1	25.032			
L4 102.2500-98.5000	0.13	0.49	A	1	0.743	9.922	1	1	9.560	0.10	25.59	C
			B	1	0.743		1	1	9.560			
			C	1	0.743		1	1	9.560			
L5 98.5000-86.8500	0.41	2.17	A	1	0.701	9.755	1	1	31.304	0.29	24.56	C
			B	1	0.701		1	1	31.304			
			C	1	0.701		1	1	31.304			
L6 86.8500-83.0000	0.14	1.09	A	1	0.65	9.579	1	1	10.680	0.08	22.00	C
			B	1	0.65		1	1	10.680			
			C	1	0.65		1	1	10.680			
L7 83.0000-77.0000	0.21	1.22	A	1	0.675	9.459	1	1	17.252	0.15	24.23	C
			B	1	0.675		1	1	17.252			
			C	1	0.675		1	1	17.252			
L8 77.0000-60.0000	0.60	3.97	A	1	0.715	9.151	1	1	52.445	0.46	27.15	C
			B	1	0.715		1	1	52.445			
			C	1	0.715		1	1	52.445			
L9 60.0000-41.7800	0.65	4.58	A	1	0.69	8.595	1	1	62.057	0.49	26.88	C
			B	1	0.69		1	1	62.057			
			C	1	0.69		1	1	62.057			
L10 41.7800-31.2500	0.37	4.67	A	1	0.678	8.017	1	1	37.844	0.27	25.83	C
			B	1	0.678		1	1	37.844			
			C	1	0.678		1	1	37.844			
L11 31.2500-27.8300	0.12	1.04	A	1	0.67	7.669	1	1	12.766	0.09	25.24	C
			B	1	0.67		1	1	12.766			
			C	1	0.67		1	1	12.766			
L12 27.8300-0.0000	0.99	7.89	A	1	0.654	6.659	1	1	111.841	0.64	22.87	C
			B	1	0.654		1	1	111.841			
			C	1	0.654		1	1	111.841			

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	q_z psf	D_F	D_R	A_E ft^2	F K	w plf	Ctrl. Face
Sum Weight:	4.74	30.23						OTM	227.38 kip-ft	3.34		

Tower Forces - Service - Wind 60 To Face

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	q_z psf	D_F	D_R	A_E ft^2	F K	w plf	Ctrl. Face
L1 144.5000-117.6500	0.58	1.29	A	1	0.65	10.48	1	1	54.386	0.42	15.81	C
			B	1	0.65	6	1	1	54.386			
			C	1	0.65		1	1	54.386			
L2 117.6500-112.5800	0.16	0.64	A	1	0.65	10.21	1	1	11.587	0.10	19.55	C
			B	1	0.65	2	1	1	11.587			
			C	1	0.65		1	1	11.587			
L3 112.5800-102.2500	0.37	1.18	A	1	0.758	10.06	1	1	25.032	0.26	25.32	C
			B	1	0.758	3	1	1	25.032			
			C	1	0.758		1	1	25.032			
L4 102.2500-98.5000	0.13	0.49	A	1	0.743	9.922	1	1	9.560	0.10	25.59	C
			B	1	0.743		1	1	9.560			
			C	1	0.743		1	1	9.560			
L5 98.5000-86.8500	0.41	2.17	A	1	0.701	9.755	1	1	31.304	0.29	24.56	C
			B	1	0.701		1	1	31.304			
			C	1	0.701		1	1	31.304			
L6 86.8500-83.0000	0.14	1.09	A	1	0.65	9.579	1	1	10.680	0.08	22.00	C
			B	1	0.65		1	1	10.680			
			C	1	0.65		1	1	10.680			
L7 83.0000-77.0000	0.21	1.22	A	1	0.675	9.459	1	1	17.252	0.15	24.23	C
			B	1	0.675		1	1	17.252			
			C	1	0.675		1	1	17.252			
L8 77.0000-60.0000	0.60	3.97	A	1	0.715	9.151	1	1	52.445	0.46	27.15	C
			B	1	0.715		1	1	52.445			
			C	1	0.715		1	1	52.445			
L9 60.0000-41.7800	0.65	4.58	A	1	0.69	8.595	1	1	62.057	0.49	26.88	C
			B	1	0.69		1	1	62.057			
			C	1	0.69		1	1	62.057			
L10 41.7800-31.2500	0.37	4.67	A	1	0.678	8.017	1	1	37.844	0.27	25.83	C
			B	1	0.678		1	1	37.844			
			C	1	0.678		1	1	37.844			
L11 31.2500-27.8300	0.12	1.04	A	1	0.67	7.669	1	1	12.766	0.09	25.24	C
			B	1	0.67		1	1	12.766			
			C	1	0.67		1	1	12.766			
L12 27.8300-0.0000	0.99	7.89	A	1	0.654	6.659	1	1	111.841	0.64	22.87	C
			B	1	0.654		1	1	111.841			
			C	1	0.654		1	1	111.841			
Sum Weight:	4.74	30.23						OTM	227.38 kip-ft	3.34		

Tower Forces - Service - Wind 90 To Face

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	q_z psf	D_F	D_R	A_E ft^2	F K	w plf	Ctrl. Face
L1 144.5000-117.6500	0.58	1.29	A	1	0.65	10.48	1	1	54.386	0.42	15.81	C
			B	1	0.65	6	1	1	54.386			
			C	1	0.65		1	1	54.386			

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	q_z psf	D_F	D_R	A_E ft^2	F K	w plf	Ctrl. Face
L2 117.6500-112.5800	0.16	0.64	A	1	0.65	10.21	1	1	11.587	0.10	19.55	C
			B	1	0.65	2	1	1	11.587			
			C	1	0.65		1	1	11.587			
L3 112.5800-102.2500	0.37	1.18	A	1	0.758	10.06	1	1	25.032	0.26	25.32	C
			B	1	0.758	3	1	1	25.032			
			C	1	0.758		1	1	25.032			
L4 102.2500-98.5000	0.13	0.49	A	1	0.743	9.922	1	1	9.560	0.10	25.59	C
			B	1	0.743		1	1	9.560			
			C	1	0.743		1	1	9.560			
L5 98.5000-86.8500	0.41	2.17	A	1	0.701	9.755	1	1	31.304	0.29	24.56	C
			B	1	0.701		1	1	31.304			
			C	1	0.701		1	1	31.304			
L6 86.8500-83.0000	0.14	1.09	A	1	0.65	9.579	1	1	10.680	0.08	22.00	C
			B	1	0.65		1	1	10.680			
			C	1	0.65		1	1	10.680			
L7 83.0000-77.0000	0.21	1.22	A	1	0.675	9.459	1	1	17.252	0.15	24.23	C
			B	1	0.675		1	1	17.252			
			C	1	0.675		1	1	17.252			
L8 77.0000-60.0000	0.60	3.97	A	1	0.715	9.151	1	1	52.445	0.46	27.15	C
			B	1	0.715		1	1	52.445			
			C	1	0.715		1	1	52.445			
L9 60.0000-41.7800	0.65	4.58	A	1	0.69	8.595	1	1	62.057	0.49	26.88	C
			B	1	0.69		1	1	62.057			
			C	1	0.69		1	1	62.057			
L10 41.7800-31.2500	0.37	4.67	A	1	0.678	8.017	1	1	37.844	0.27	25.83	C
			B	1	0.678		1	1	37.844			
			C	1	0.678		1	1	37.844			
L11 31.2500-27.8300	0.12	1.04	A	1	0.67	7.669	1	1	12.766	0.09	25.24	C
			B	1	0.67		1	1	12.766			
			C	1	0.67		1	1	12.766			
L12 27.8300-0.0000	0.99	7.89	A	1	0.654	6.659	1	1	111.841	0.64	22.87	C
			B	1	0.654		1	1	111.841			
			C	1	0.654		1	1	111.841			
Sum Weight:	4.74	30.23						OTM	227.38 kip-ft	3.34		

Load Combinations

Comb. No.	Description
1	Dead Only
2	1.2 Dead+1.6 Wind 0 deg - No Ice
3	0.9 Dead+1.6 Wind 0 deg - No Ice
4	1.2 Dead+1.6 Wind 30 deg - No Ice
5	0.9 Dead+1.6 Wind 30 deg - No Ice
6	1.2 Dead+1.6 Wind 60 deg - No Ice
7	0.9 Dead+1.6 Wind 60 deg - No Ice
8	1.2 Dead+1.6 Wind 90 deg - No Ice
9	0.9 Dead+1.6 Wind 90 deg - No Ice
10	1.2 Dead+1.6 Wind 120 deg - No Ice
11	0.9 Dead+1.6 Wind 120 deg - No Ice
12	1.2 Dead+1.6 Wind 150 deg - No Ice
13	0.9 Dead+1.6 Wind 150 deg - No Ice
14	1.2 Dead+1.6 Wind 180 deg - No Ice
15	0.9 Dead+1.6 Wind 180 deg - No Ice
16	1.2 Dead+1.6 Wind 210 deg - No Ice
17	0.9 Dead+1.6 Wind 210 deg - No Ice
18	1.2 Dead+1.6 Wind 240 deg - No Ice
19	0.9 Dead+1.6 Wind 240 deg - No Ice
20	1.2 Dead+1.6 Wind 270 deg - No Ice
21	0.9 Dead+1.6 Wind 270 deg - No Ice
22	1.2 Dead+1.6 Wind 300 deg - No Ice
23	0.9 Dead+1.6 Wind 300 deg - No Ice

Comb. No.	Description
24	1.2 Dead+1.6 Wind 330 deg - No Ice
25	0.9 Dead+1.6 Wind 330 deg - No Ice
26	1.2 Dead+1.0 Ice+1.0 Temp
27	1.2 Dead+1.0 Wind 0 deg+1.0 Ice+1.0 Temp
28	1.2 Dead+1.0 Wind 30 deg+1.0 Ice+1.0 Temp
29	1.2 Dead+1.0 Wind 60 deg+1.0 Ice+1.0 Temp
30	1.2 Dead+1.0 Wind 90 deg+1.0 Ice+1.0 Temp
31	1.2 Dead+1.0 Wind 120 deg+1.0 Ice+1.0 Temp
32	1.2 Dead+1.0 Wind 150 deg+1.0 Ice+1.0 Temp
33	1.2 Dead+1.0 Wind 180 deg+1.0 Ice+1.0 Temp
34	1.2 Dead+1.0 Wind 210 deg+1.0 Ice+1.0 Temp
35	1.2 Dead+1.0 Wind 240 deg+1.0 Ice+1.0 Temp
36	1.2 Dead+1.0 Wind 270 deg+1.0 Ice+1.0 Temp
37	1.2 Dead+1.0 Wind 300 deg+1.0 Ice+1.0 Temp
38	1.2 Dead+1.0 Wind 330 deg+1.0 Ice+1.0 Temp
39	Dead+Wind 0 deg - Service
40	Dead+Wind 30 deg - Service
41	Dead+Wind 60 deg - Service
42	Dead+Wind 90 deg - Service
43	Dead+Wind 120 deg - Service
44	Dead+Wind 150 deg - Service
45	Dead+Wind 180 deg - Service
46	Dead+Wind 210 deg - Service
47	Dead+Wind 240 deg - Service
48	Dead+Wind 270 deg - Service
49	Dead+Wind 300 deg - Service
50	Dead+Wind 330 deg - Service

Maximum Member Forces

Section No.	Elevation ft	Component Type	Condition	Gov. Load Comb.	Axial K	Major Axis Moment kip-ft	Minor Axis Moment kip-ft
L1	144.5 - 117.65	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	26	-28.47	0.84	0.15
			Max. Mx	20	-7.52	416.41	-0.54
			Max. My	2	-7.50	-0.31	418.12
			Max. Vy	20	-27.29	416.41	-0.54
			Max. Vx	14	27.39	0.63	-418.02
			Max. Torque	5			2.53
L2	117.65 - 112.58	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	26	-36.28	1.28	-0.10
			Max. Mx	20	-10.74	665.80	-0.92
			Max. My	14	-10.71	1.09	-668.33
			Max. Vy	20	-33.32	665.80	-0.92
			Max. Vx	14	33.43	1.09	-668.33
			Max. Torque	15			-3.76
L3	112.58 - 102.25	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	26	-40.19	1.58	-0.26
			Max. Mx	20	-13.30	1024.52	-1.38
			Max. My	14	-13.27	1.63	-1028.18
			Max. Vy	20	-35.66	1024.52	-1.38
			Max. Vx	14	35.77	1.63	-1028.18
			Max. Torque	15			-4.04
L4	102.25 - 98.5	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	26	-44.55	1.99	-0.49
			Max. Mx	20	-15.48	1162.69	-1.55
			Max. My	14	-15.46	1.83	-1166.71
			Max. Vy	20	-38.98	1162.69	-1.55
			Max. Vx	14	39.09	1.83	-1166.71
			Max. Torque	15			-5.32
L5	98.5 - 86.85	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	26	-47.02	2.21	-0.61

Section No.	Elevation ft	Component Type	Condition	Gov. Load Comb.	Axial K	Major Axis Moment kip-ft	Minor Axis Moment kip-ft
			Max. Mx	20	-17.51	1439.72	-1.87
			Max. My	14	-17.49	2.19	-1444.51
			Max. Vy	20	-39.97	1439.72	-1.87
			Max. Vx	14	40.08	2.19	-1444.51
			Max. Torque	15			-5.50
L6	86.85 - 83	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	26	-50.83	2.45	-0.75
			Max. Mx	20	-20.49	1784.02	-2.24
			Max. My	14	-20.47	2.62	-1789.76
			Max. Vy	20	-41.14	1784.02	-2.24
			Max. Vx	14	41.25	2.62	-1789.76
			Max. Torque	15			-5.70
L7	83 - 77	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	26	-53.10	2.62	-0.84
			Max. Mx	20	-22.43	2033.10	-2.51
			Max. My	14	-22.41	2.92	-2039.50
			Max. Vy	20	-41.92	2033.10	-2.51
			Max. Vx	14	42.03	2.92	-2039.50
			Max. Torque	15			-5.86
L8	77 - 60	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	26	-60.22	3.09	-1.12
			Max. Mx	20	-28.51	2766.16	-3.26
			Max. My	14	-28.50	3.74	-2774.44
			Max. Vy	20	-44.36	2766.16	-3.26
			Max. Vx	14	44.47	3.74	-2774.44
			Max. Torque	15			-6.45
L9	60 - 41.78	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	26	-65.74	3.56	-1.40
			Max. Mx	20	-33.22	3316.71	-3.81
			Max. My	14	-33.21	4.34	-3326.32
			Max. Vy	20	-46.04	3316.71	-3.81
			Max. Vx	14	46.15	4.34	-3326.32
			Max. Torque	15			-6.92
L10	41.78 - 31.25	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	26	-76.16	4.16	-1.76
			Max. Mx	20	-41.97	4098.63	-4.54
			Max. My	14	-41.96	5.11	-4110.06
			Max. Vy	20	-48.25	4098.63	-4.54
			Max. Vx	14	48.36	5.11	-4110.06
			Max. Torque	13			-7.61
L11	31.25 - 27.83	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	26	-77.92	4.29	-1.83
			Max. Mx	20	-43.51	4264.22	-4.69
			Max. My	14	-43.51	5.26	-4276.02
			Max. Vy	20	-48.62	4264.22	-4.69
			Max. Vx	14	48.73	5.26	-4276.02
			Max. Torque	13			-7.76
L12	27.83 - 0	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	26	-91.42	5.28	-2.42
			Max. Mx	20	-55.57	5647.32	-5.88
			Max. My	14	-55.57	6.48	-5662.11
			Max. Vy	20	-50.82	5647.32	-5.88
			Max. Vx	14	50.93	6.48	-5662.11
			Max. Torque	13			-8.83

Maximum Reactions

Location	Condition	Gov. Load Comb.	Vertical K	Horizontal, X K	Horizontal, Z K
Pole	Max. Vert	26	91.42	-0.00	0.00
	Max. H_x	21	41.71	50.78	-0.04
	Max. H_z	3	41.71	-0.04	50.89

Location	Condition	Gov. Load Comb.	Vertical K	Horizontal, X K	Horizontal, Z K
	Max. M_x	2	5661.45	-0.04	50.89
	Max. M_z	8	5645.37	-50.78	0.04
	Max. Torsion	25	8.83	25.36	44.05
	Min. Vert	9	41.71	-50.78	0.04
	Min. H_x	8	55.61	-50.78	0.04
	Min. H_z	15	41.71	0.04	-50.89
	Min. M_x	14	-5662.11	0.04	-50.89
	Min. M_z	20	-5647.32	50.78	-0.04
	Min. Torsion	13	-8.83	-25.36	-44.05

Tower Mast Reaction Summary

Load Combination	Vertical K	$Shear_x$ K	$Shear_z$ K	Overturning Moment, M_x kip-ft	Overturning Moment, M_z kip-ft	Torque kip-ft
Dead Only	46.34	-0.00	0.00	0.27	0.78	0.00
1.2 Dead+1.6 Wind 0 deg - No Ice	55.61	0.04	-50.89	-5661.45	-4.65	-8.57
0.9 Dead+1.6 Wind 0 deg - No Ice	41.71	0.04	-50.89	-5607.88	-4.83	-8.57
1.2 Dead+1.6 Wind 30 deg - No Ice	55.61	25.43	-44.09	-4905.72	-2827.08	-6.02
0.9 Dead+1.6 Wind 30 deg - No Ice	41.71	25.43	-44.09	-4859.30	-2800.52	-6.02
1.2 Dead+1.6 Wind 60 deg - No Ice	55.61	44.00	-25.48	-2835.41	-4891.78	-1.86
0.9 Dead+1.6 Wind 60 deg - No Ice	41.71	44.00	-25.48	-2808.61	-4845.66	-1.86
1.2 Dead+1.6 Wind 90 deg - No Ice	55.61	50.78	-0.04	-5.24	-5645.37	2.81
0.9 Dead+1.6 Wind 90 deg - No Ice	41.71	50.78	-0.04	-5.27	-5591.99	2.81
1.2 Dead+1.6 Wind 120 deg - No Ice	55.61	43.96	25.41	2826.45	-4886.28	6.72
0.9 Dead+1.6 Wind 120 deg - No Ice	41.71	43.96	25.41	2799.59	-4840.21	6.72
1.2 Dead+1.6 Wind 150 deg - No Ice	55.61	25.36	44.05	4900.87	-2817.49	8.83
0.9 Dead+1.6 Wind 150 deg - No Ice	41.71	25.36	44.05	4854.33	-2791.02	8.83
1.2 Dead+1.6 Wind 180 deg - No Ice	55.61	-0.04	50.89	5662.11	6.47	8.57
0.9 Dead+1.6 Wind 180 deg - No Ice	41.71	-0.04	50.89	5608.37	6.18	8.58
1.2 Dead+1.6 Wind 210 deg - No Ice	55.61	-25.43	44.09	4906.43	2828.95	6.02
0.9 Dead+1.6 Wind 210 deg - No Ice	41.71	-25.43	44.09	4859.82	2801.90	6.02
1.2 Dead+1.6 Wind 240 deg - No Ice	55.61	-44.00	25.48	2836.11	4893.71	1.85
0.9 Dead+1.6 Wind 240 deg - No Ice	41.71	-44.00	25.48	2809.13	4847.09	1.85
1.2 Dead+1.6 Wind 270 deg - No Ice	55.61	-50.78	0.04	5.88	5647.32	-2.81
0.9 Dead+1.6 Wind 270 deg - No Ice	41.71	-50.78	0.04	5.74	5593.60	-2.81
1.2 Dead+1.6 Wind 300 deg - No Ice	55.61	-43.96	-25.41	-2825.86	4888.19	-6.72
0.9 Dead+1.6 Wind 300 deg - No Ice	41.71	-43.96	-25.41	-2799.15	4841.63	-6.72
1.2 Dead+1.6 Wind 330 deg - No Ice	55.61	-25.36	-44.05	-4900.27	2819.33	-8.82
0.9 Dead+1.6 Wind 330 deg - No Ice	41.71	-25.36	-44.05	-4853.88	2792.39	-8.83
1.2 Dead+1.0 Ice+1.0 Temp	91.42	0.00	-0.00	2.42	5.28	-0.00

Load Combination	Vertical	$Shear_x$	$Shear_z$	Overturning Moment, M_x	Overturning Moment, M_z	Torque
	K	K	K	kip-ft	kip-ft	kip-ft
1.2 Dead+1.0 Wind 0 deg+1.0 Ice+1.0 Temp	91.42	0.01	-12.27	-1357.06	4.71	-2.82
1.2 Dead+1.0 Wind 30 deg+1.0 Ice+1.0 Temp	91.42	6.13	-10.63	-1175.40	-673.81	-1.89
1.2 Dead+1.0 Wind 60 deg+1.0 Ice+1.0 Temp	91.42	10.62	-6.14	-678.10	-1170.25	-0.45
1.2 Dead+1.0 Wind 90 deg+1.0 Ice+1.0 Temp	91.42	12.25	-0.01	1.58	-1351.60	1.10
1.2 Dead+1.0 Wind 120 deg+1.0 Ice+1.0 Temp	91.42	10.61	6.13	681.53	-1169.27	2.36
1.2 Dead+1.0 Wind 150 deg+1.0 Ice+1.0 Temp	91.42	6.12	10.62	1179.56	-672.10	2.99
1.2 Dead+1.0 Wind 180 deg+1.0 Ice+1.0 Temp	91.42	-0.01	12.27	1362.21	6.69	2.82
1.2 Dead+1.0 Wind 210 deg+1.0 Ice+1.0 Temp	91.42	-6.13	10.63	1180.55	685.22	1.89
1.2 Dead+1.0 Wind 240 deg+1.0 Ice+1.0 Temp	91.42	-10.62	6.14	683.25	1181.67	0.45
1.2 Dead+1.0 Wind 270 deg+1.0 Ice+1.0 Temp	91.42	-12.25	0.01	3.56	1363.02	-1.10
1.2 Dead+1.0 Wind 300 deg+1.0 Ice+1.0 Temp	91.42	-10.61	-6.13	-676.39	1180.68	-2.36
1.2 Dead+1.0 Wind 330 deg+1.0 Ice+1.0 Temp	91.42	-6.12	-10.62	-1174.42	683.50	-2.99
Dead+Wind 0 deg - Service	46.34	0.01	-9.29	-1029.69	-0.20	-0.89
Dead+Wind 30 deg - Service	46.34	4.64	-8.05	-892.29	-513.69	-0.71
Dead+Wind 60 deg - Service	46.34	8.03	-4.65	-515.63	-889.32	-0.35
Dead+Wind 90 deg - Service	46.34	9.27	-0.01	-0.73	-1026.34	0.11
Dead+Wind 120 deg - Service	46.34	8.03	4.64	514.43	-888.31	0.54
Dead+Wind 150 deg - Service	46.34	4.63	8.04	891.83	-511.94	0.82
Dead+Wind 180 deg - Service	46.34	-0.01	9.29	1030.24	1.83	0.89
Dead+Wind 210 deg - Service	46.34	-4.64	8.05	892.85	515.32	0.71
Dead+Wind 240 deg - Service	46.34	-8.03	4.65	516.19	890.95	0.35
Dead+Wind 270 deg - Service	46.34	-9.27	0.01	1.29	1027.97	-0.11
Dead+Wind 300 deg - Service	46.34	-8.03	-4.64	-513.88	889.94	-0.54
Dead+Wind 330 deg - Service	46.34	-4.63	-8.04	-891.28	513.57	-0.82

Solution Summary

	Sum of Applied Forces			Sum of Reactions			
Load Comb.	PX	PY	PZ	PX	PY	PZ	% Error
	K	K	K	K	K	K	
1	0.00	-46.34	0.00	0.00	46.34	-0.00	0.000%
2	0.04	-55.61	-50.89	-0.04	55.61	50.89	0.001%
3	0.04	-41.71	-50.89	-0.04	41.71	50.89	0.001%
4	25.43	-55.61	-44.09	-25.43	55.61	44.09	0.000%
5	25.43	-41.71	-44.09	-25.43	41.71	44.09	0.000%
6	44.00	-55.61	-25.48	-44.00	55.61	25.48	0.000%
7	44.00	-41.71	-25.48	-44.00	41.71	25.48	0.000%
8	50.78	-55.61	-0.04	-50.78	55.61	0.04	0.002%
9	50.78	-41.71	-0.04	-50.78	41.71	0.04	0.004%
10	43.96	-55.61	25.41	-43.96	55.61	-25.41	0.000%
11	43.96	-41.71	25.41	-43.96	41.71	-25.41	0.000%
12	25.36	-55.61	44.05	-25.36	55.61	-44.05	0.000%
13	25.36	-41.71	44.05	-25.36	41.71	-44.05	0.000%
14	-0.04	-55.61	50.89	0.04	55.61	-50.89	0.001%
15	-0.04	-41.71	50.89	0.04	41.71	-50.89	0.001%
16	-25.43	-55.61	44.09	25.43	55.61	-44.09	0.000%

Load Comb.	Sum of Applied Forces PX K	PY K	PZ K	Sum of Reactions PX K	PY K	PZ K	% Error
17	-25.43	-41.71	44.09	25.43	41.71	-44.09	0.000%
18	-44.00	-55.61	25.48	44.00	55.61	-25.48	0.000%
19	-44.00	-41.71	25.48	44.00	41.71	-25.48	0.000%
20	-50.78	-55.61	0.04	50.78	55.61	-0.04	0.002%
21	-50.78	-41.71	0.04	50.78	41.71	-0.04	0.001%
22	-43.96	-55.61	-25.41	43.96	55.61	25.41	0.000%
23	-43.96	-41.71	-25.41	43.96	41.71	25.41	0.000%
24	-25.36	-55.61	-44.05	25.36	55.61	44.05	0.000%
25	-25.36	-41.71	-44.05	25.36	41.71	44.05	0.000%
26	0.00	-91.42	0.00	-0.00	91.42	0.00	0.002%
27	0.01	-91.42	-12.27	-0.01	91.42	12.27	0.000%
28	6.13	-91.42	-10.63	-6.13	91.42	10.63	0.000%
29	10.62	-91.42	-6.14	-10.62	91.42	6.14	0.000%
30	12.25	-91.42	-0.01	-12.25	91.42	0.01	0.000%
31	10.61	-91.42	6.13	-10.61	91.42	-6.13	0.000%
32	6.12	-91.42	10.62	-6.12	91.42	-10.62	0.000%
33	-0.01	-91.42	12.27	0.01	91.42	-12.27	0.000%
34	-6.13	-91.42	10.63	6.13	91.42	-10.63	0.000%
35	-10.62	-91.42	6.14	10.62	91.42	-6.14	0.000%
36	-12.25	-91.42	0.01	12.25	91.42	-0.01	0.000%
37	-10.61	-91.42	-6.13	10.61	91.42	6.13	0.000%
38	-6.12	-91.42	-10.62	6.12	91.42	10.62	0.000%
39	0.01	-46.34	-9.29	-0.01	46.34	9.29	0.003%
40	4.64	-46.34	-8.05	-4.64	46.34	8.05	0.001%
41	8.03	-46.34	-4.65	-8.03	46.34	4.65	0.001%
42	9.27	-46.34	-0.01	-9.27	46.34	0.01	0.003%
43	8.03	-46.34	4.64	-8.03	46.34	-4.64	0.001%
44	4.63	-46.34	8.04	-4.63	46.34	-8.04	0.001%
45	-0.01	-46.34	9.29	0.01	46.34	-9.29	0.003%
46	-4.64	-46.34	8.05	4.64	46.34	-8.05	0.001%
47	-8.03	-46.34	4.65	8.03	46.34	-4.65	0.001%
48	-9.27	-46.34	0.01	9.27	46.34	-0.01	0.003%
49	-8.03	-46.34	-4.64	8.03	46.34	4.64	0.001%
50	-4.63	-46.34	-8.04	4.63	46.34	8.04	0.001%

Non-Linear Convergence Results

Load Combination	Converged?	Number of Cycles	Displacement Tolerance	Force Tolerance
1	Yes	6	0.00000001	0.00000001
2	Yes	16	0.00000001	0.00012099
3	Yes	16	0.00000001	0.00008907
4	Yes	19	0.00000001	0.00008847
5	Yes	19	0.00000001	0.00005945
6	Yes	19	0.00000001	0.00009233
7	Yes	19	0.00000001	0.00006218
8	Yes	15	0.00001721	0.00007106
9	Yes	14	0.00002934	0.00012933
10	Yes	19	0.00000001	0.00009365
11	Yes	19	0.00000001	0.00006315
12	Yes	19	0.00000001	0.00008724
13	Yes	19	0.00000001	0.00005862
14	Yes	16	0.00000001	0.00012891
15	Yes	16	0.00000001	0.00009476
16	Yes	19	0.00000001	0.00009439
17	Yes	19	0.00000001	0.00006360
18	Yes	19	0.00000001	0.00009017
19	Yes	19	0.00000001	0.00006063
20	Yes	15	0.00001720	0.00008847
21	Yes	15	0.00000001	0.00006680
22	Yes	19	0.00000001	0.00008823
23	Yes	19	0.00000001	0.00005931
24	Yes	19	0.00000001	0.00009501
25	Yes	19	0.00000001	0.00006408
26	Yes	7	0.00000001	0.00002104

27	Yes	17	0.00000001	0.00007413
28	Yes	17	0.00000001	0.00009667
29	Yes	17	0.00000001	0.00009818
30	Yes	17	0.00000001	0.00007269
31	Yes	17	0.00000001	0.00009982
32	Yes	17	0.00000001	0.00009660
33	Yes	17	0.00000001	0.00007440
34	Yes	17	0.00000001	0.00010110
35	Yes	17	0.00000001	0.00009871
36	Yes	17	0.00000001	0.00007343
37	Yes	17	0.00000001	0.00009740
38	Yes	17	0.00000001	0.00010150
39	Yes	13	0.00009591	0.00007172
40	Yes	14	0.00000001	0.00007482
41	Yes	14	0.00000001	0.00009089
42	Yes	13	0.00009590	0.00004014
43	Yes	14	0.00000001	0.00009347
44	Yes	14	0.00000001	0.00007348
45	Yes	13	0.00009591	0.00007257
46	Yes	14	0.00000001	0.00009896
47	Yes	14	0.00000001	0.00007945
48	Yes	13	0.00009591	0.00004038
49	Yes	14	0.00000001	0.00007679
50	Yes	14	0.00000001	0.00010021

Maximum Tower Deflections - Service Wind

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
L1	144.5 - 117.65	23.83	46	1.55	0.01
L2	121.51 - 112.58	16.69	46	1.35	0.00
L3	112.58 - 102.25	14.24	46	1.24	0.00
L4	102.25 - 98.5	11.69	46	1.11	0.00
L5	98.5 - 86.85	10.84	46	1.06	0.00
L6	91.48 - 83	9.34	46	0.99	0.00
L7	83 - 77	7.66	46	0.89	0.00
L8	77 - 60	6.59	46	0.82	0.00
L9	60 - 41.78	4.02	46	0.63	0.00
L10	47.81 - 31.25	2.59	46	0.49	0.00
L11	31.25 - 27.83	1.12	46	0.34	0.00
L12	27.83 - 0	0.88	46	0.31	0.00

Critical Deflections and Radius of Curvature - Service Wind

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
145.0000	7770.00 w/ Mount Pipe	46	23.83	1.55	0.01	17982
135.0000	LNX-6512DS-VTM w/ Mount Pipe	46	20.79	1.48	0.00	9464
125.0000	ERICSSON AIR 21 B2A B4P w/ Mount Pipe	46	17.71	1.39	0.00	4617
113.0000	APXVSPP18-C-A20 w/ Mount Pipe	46	14.35	1.25	0.00	4254
111.0000	PCS 1900MHz 4x45W-65MHz	46	13.83	1.22	0.00	4287
100.0000	Platform Mount [LP 601-1]	46	11.18	1.08	0.00	4531
51.0000	KS24019-L112A	46	2.94	0.52	0.00	6173

Maximum Tower Deflections - Design Wind

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
L1	144.5 - 117.65	130.58	14	8.50	0.03
L2	121.51 - 112.58	91.52	14	7.44	0.03
L3	112.58 - 102.25	78.13	14	6.82	0.02
L4	102.25 - 98.5	64.17	14	6.09	0.02
L5	98.5 - 86.85	59.50	14	5.82	0.02
L6	91.48 - 83	51.26	14	5.41	0.02
L7	83 - 77	42.03	14	4.87	0.01
L8	77 - 60	36.16	14	4.48	0.01
L9	60 - 41.78	22.06	16	3.44	0.01
L10	47.81 - 31.25	14.24	16	2.69	0.01
L11	31.25 - 27.83	6.13	16	1.88	0.00
L12	27.83 - 0	4.85	16	1.69	0.00

Critical Deflections and Radius of Curvature - Design Wind

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
145.0000	7770.00 w/ Mount Pipe	14	130.58	8.50	0.03	3424
135.0000	LNX-6512DS-VTM w/ Mount Pipe	14	113.93	8.13	0.03	1801
125.0000	ERICSSON AIR 21 B2A B4P w/ Mount Pipe	14	97.10	7.64	0.03	875
113.0000	APXVSPP18-C-A20 w/ Mount Pipe	14	78.73	6.85	0.02	799
111.0000	PCS 1900MHz 4x45W-65MHz	14	75.88	6.71	0.02	804
100.0000	Platform Mount [LP 601-1]	14	61.34	5.92	0.02	845
51.0000	KS24019-L112A	16	16.13	2.87	0.01	1130

Compression Checks

Pole Design Data

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	A in^2	P_u K	ϕP_n K	Ratio $\frac{P_u}{\phi P_n}$
L1	144.5 - 117.65 (1)	TP26.875x21x0.1875 4.8.2 (1.10 CR) - 3	26.8500	0.0000	0.0	15.3798	-7.50	1034.43	0.007
L2	117.65 - 112.58 (2)	TP27.5444x25.6554x0.25 4.8.2 (1.16 CR) - 4	8.9300	0.0000	0.0	21.6581	-10.71	1572.31	0.007
L3	112.58 - 102.25 (3)	TP29.7295x27.5444x0.3737 4.8.2 (1.05 CR) - 7	10.3300	0.0000	0.0	34.8159	-13.27	1569.10	0.008
L4	102.25 - 98.5 (4)	TP30.5228x29.7295x0.407 4.8.2 (1.06 CR) - 8	3.7500	0.0000	0.0	38.9069	-15.46	1644.97	0.009
L5	98.5 - 86.85 (5)	TP32.9871x30.5228x0.5518 4.8.2 (1.14 CR) - 9	11.6500	0.0000	0.0	55.0962	-17.49	2330.70	0.008
L6	86.85 - 83 (6)	TP33.3344x30.904x0.375	8.4800	0.0000	0.0	39.2299	-20.46	2914.58	0.007
L7	83 - 77 (7)	TP34.6268x33.3344x0.5613	6.0000	0.0000	0.0	60.6900	-22.41	2828.16	0.008
L8	77 - 60 (8)	TP38.2888x34.6268x0.6038	17.0000	0.0000	0.0	72.2194	-28.50	3424.04	0.008
L9	60 - 41.78 (9)	TP42.2135x38.2888x0.5869	18.2200	0.0000	0.0	75.1232	-33.21	3566.01	0.009
L10	41.78 - 31.25 (10)	TP43.7445x39.7408x0.6356	16.5600	0.0000	0.0	86.9609	-41.96	4135.88	0.010

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	A in^2	P_u K	ϕP_n K	Ratio $\frac{P_u}{\phi P_n}$
L11	31.25 - 27.83 (11)	4.8.2 (1.14 CR) - 10 TP44.4838x43.7445x0.6509	3.4200	0.0000	0.0	90.5555	-43.51	4195.06	0.010
L12	27.83 - 0 (12)	4.8.2 (1.15 CR) - 11 TP50.5x44.4838x0.5592 4.8.2 (1.08 CR) - 12	27.8300	0.0000	0.0	88.6462	-55.57	5162.39	0.011

Pole Bending Design Data

Section No.	Elevation ft	Size	M_{ux} kip-ft	ϕM_{nx} kip-ft	Ratio $\frac{M_{ux}}{\phi M_{nx}}$	M_{uy} kip-ft	ϕM_{ny} kip-ft	Ratio $\frac{M_{uy}}{\phi M_{ny}}$
L1	144.5 - 117.65 (1)	TP26.875x21x0.1875	418.12	550.04	0.760	0.00	550.04	0.000
L2	117.65 - 112.58 (2)	TP27.5444x25.6554x0.25	668.53	881.34	0.759	0.00	881.34	0.000
L3	112.58 - 102.25 (3)	TP29.7295x27.5444x0.3737	1028.49	942.64	1.091	0.00	942.64	0.000
L4	102.25 - 98.5 (4)	TP30.5228x29.7295x0.407	1167.11	1013.01	1.152	0.00	1013.01	0.000
L5	98.5 - 86.85 (5)	TP32.9871x30.5228x0.5518	1444.99	1493.23	0.968	0.00	1493.23	0.000
L6	86.85 - 83 (6)	TP33.3344x30.904x0.375	1790.32	1968.49	0.909	0.00	1968.49	0.000
L7	83 - 77 (7)	TP34.6268x33.3344x0.5613	2040.13	1964.33	1.039	0.00	1964.33	0.000
L8	77 - 60 (8)	TP38.2888x34.6268x0.6038	2775.24	2632.07	1.054	0.00	2632.07	0.000
L9	60 - 41.78 (9)	TP42.2135x38.2888x0.5869	3327.26	2937.68	1.133	0.00	2937.68	0.000
L10	41.78 - 31.25 (10)	TP43.7445x39.7408x0.6356	4111.18	3641.43	1.129	0.00	3641.43	0.000
L11	31.25 - 27.83 (11)	TP44.4838x43.7445x0.6509	4277.18	3755.17	1.139	0.00	3755.17	0.000
L12	27.83 - 0 (12)	TP50.5x44.4838x0.5592	5663.57	5283.99	1.072	0.00	5283.99	0.000

Pole Shear Design Data

Section No.	Elevation ft	Size	Actual V_u K	ϕV_n K	Ratio $\frac{V_u}{\phi V_n}$	Actual T_u kip-ft	ϕT_n kip-ft	Ratio $\frac{T_u}{\phi T_n}$
L1	144.5 - 117.65 (1)	TP26.875x21x0.1875	27.39	513.92	0.053	2.50	1101.43	0.002
L2	117.65 - 112.58 (2)	TP27.5444x25.6554x0.25	33.44	786.15	0.043	3.25	1764.83	0.002
L3	112.58 - 102.25 (3)	TP29.7295x27.5444x0.3737	35.79	784.55	0.046	3.41	1887.58	0.002
L4	102.25 - 98.5 (4)	TP30.5228x29.7295x0.407	39.10	822.48	0.048	4.15	2028.49	0.002
L5	98.5 - 86.85 (5)	TP32.9871x30.5228x0.5518	40.09	1165.35	0.034	4.25	2990.13	0.001
L6	86.85 - 83 (6)	TP33.3344x30.904x0.375	41.26	1457.29	0.028	4.36	3941.81	0.001
L7	83 - 77 (7)	TP34.6268x33.3344x0.5613	42.04	1414.08	0.030	4.45	3933.46	0.001
L8	77 - 60 (8)	TP38.2888x34.6268x0.6038	44.48	1712.02	0.026	4.79	5270.57	0.001
L9	60 - 41.78 (9)	TP42.2135x38.2888x0.5869	46.16	1783.00	0.026	5.06	5882.53	0.001
L10	41.78 - 31.25 (10)	TP43.7445x39.7408x0.6356	48.37	2067.94	0.023	5.41	7291.76	0.001
L11	31.25 - 27.83 (11)	TP44.4838x43.7445x0.6509	48.74	2097.53	0.023	5.48	7519.52	0.001

Section No.	Elevation ft	Size	Actual V_u K	ϕV_n K	Ratio $\frac{V_u}{\phi V_n}$	Actual T_u kip-ft	ϕT_n kip-ft	Ratio $\frac{T_u}{\phi T_n}$
L12	27.83 - 0 (12)	TP50.5x44.4838x0.5592	50.94	2581.19	0.020	6.02	10580.92	0.001

Pole Interaction Design Data

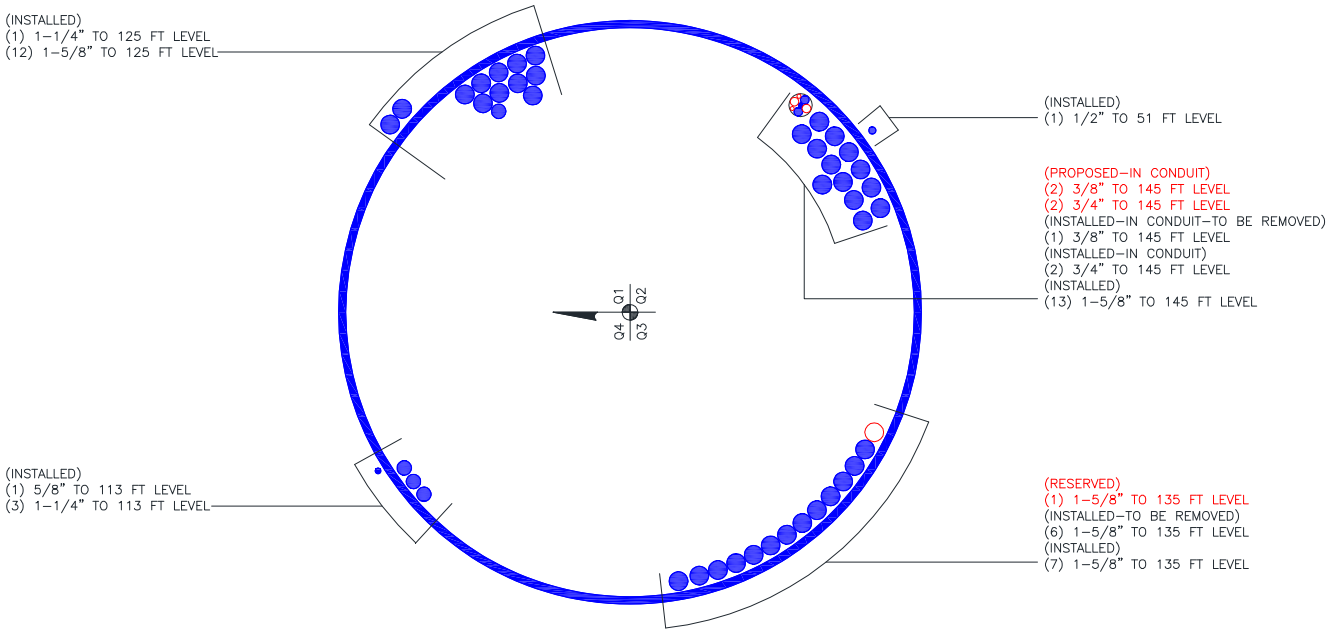
Section No.	Elevation ft	Ratio $\frac{P_u}{\phi P_n}$	Ratio $\frac{M_{ux}}{\phi M_{nx}}$	Ratio $\frac{M_{uy}}{\phi M_{ny}}$	Ratio $\frac{V_u}{\phi V_n}$	Ratio $\frac{T_u}{\phi T_n}$	Comb. Stress Ratio	Allow. Stress Ratio	Criteria
L1	144.5 - 117.65 (1)	0.007	0.760	0.000	0.053	0.002	0.770 ✓	1.000	4.8.2 ✓
L2	117.65 - 112.58 (2)	0.007	0.759	0.000	0.043	0.002	0.767 ✓	1.000	4.8.2 ✓
L3	112.58 - 102.25 (3)	0.008	1.091	0.000	0.046	0.002	1.102 ✗	1.000	4.8.2 ✗
L4	102.25 - 98.5 (4)	0.009	1.152	0.000	0.048	0.002	1.164 ✗	1.000	4.8.2 ✗
L5	98.5 - 86.85 (5)	0.008	0.968	0.000	0.034	0.001	0.976 ✓	1.000	4.8.2 ✓
L6	86.85 - 83 (6)	0.007	0.909	0.000	0.028	0.001	0.917 ✓	1.000	4.8.2 ✓
L7	83 - 77 (7)	0.008	1.039	0.000	0.030	0.001	1.047 ✗	1.000	4.8.2 ✗
L8	77 - 60 (8)	0.008	1.054	0.000	0.026	0.001	1.063 ✗	1.000	4.8.2 ✗
L9	60 - 41.78 (9)	0.009	1.133	0.000	0.026	0.001	1.143 ✗	1.000	4.8.2 ✗
L10	41.78 - 31.25 (10)	0.010	1.129	0.000	0.023	0.001	1.140 ✗	1.000	4.8.2 ✗
L11	31.25 - 27.83 (11)	0.010	1.139	0.000	0.023	0.001	1.150 ✗	1.000	4.8.2 ✗
L12	27.83 - 0 (12)	0.011	1.072	0.000	0.020	0.001	1.083 ✗	1.000	4.8.2 ✗

Section Capacity Table

Section No.	Elevation ft	Component Type	Size	Critical Element	P K	ϕP_{allow} K	% Capacity	Pass Fail
L1	144.5 - 117.65	Pole	TP26.875x21x0.1875	1	-7.50	1034.43	77.0	Pass
L2	117.65 - 112.58	Pole	TP27.5444x25.6554x0.25	2	-10.71	1572.31	76.7	Pass
L3	112.58 - 102.25	Pole	TP29.7295x27.5444x0.3737	3	-13.27	1569.10	110.2	Fail ✗
L4	102.25 - 98.5	Pole	TP30.5228x29.7295x0.407	4	-15.46	1644.97	116.4	Fail ✗
L5	98.5 - 86.85	Pole	TP32.9871x30.5228x0.5518	5	-17.49	2330.70	97.6	Pass
L6	86.85 - 83	Pole	TP33.3344x30.904x0.375	6	-20.46	2914.58	91.7	Pass
L7	83 - 77	Pole	TP34.6268x33.3344x0.5613	7	-22.41	2828.16	104.7	Fail ✗
L8	77 - 60	Pole	TP38.2888x34.6268x0.6038	8	-28.50	3424.04	106.3	Fail ✗
L9	60 - 41.78	Pole	TP42.2135x38.2888x0.5869	9	-33.21	3566.01	114.3	Fail ✗
L10	41.78 - 31.25	Pole	TP43.7445x39.7408x0.6356	10	-41.96	4135.88	114.0	Fail ✗
L11	31.25 - 27.83	Pole	TP44.4838x43.7445x0.6509	11	-43.51	4195.06	115.0	Fail ✗
L12	27.83 - 0	Pole	TP50.5x44.4838x0.5592	12	-55.57	5162.39	108.3	Fail ✗
							Summary	
						Pole (L4)	116.4	Fail ✗
						RATING =	**116.4**	**Fail** ✗

APPENDIX B

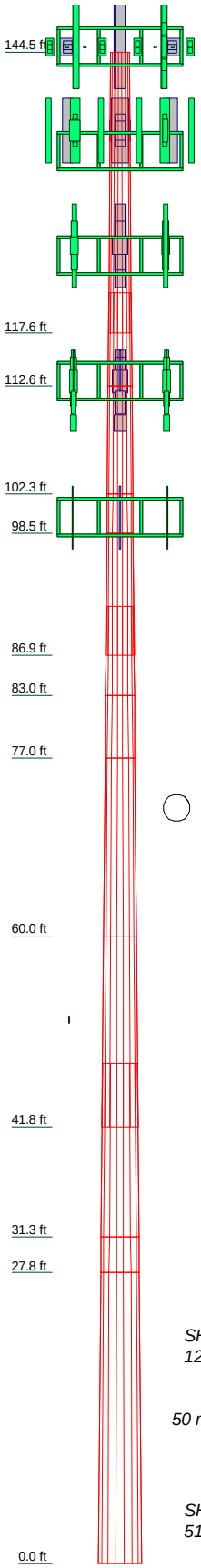
BASE LEVEL DRAWING


(INSTALLED)
(1) 1-1/4" TO 125 FT LEVEL
(12) 1-5/8" TO 125 FT LEVEL
(INSTALLED)
(1) 1/2" TO 51 FT LEVEL
(PROPOSED-IN CONDUIT)
(2) 3/8" TO 145 FT LEVEL
(2) 3/4" TO 145 FT LEVEL
(INSTALLED-IN CONDUIT-TO BE REMOVED)
(1) 3/8" TO 145 FT LEVEL
(INSTALLED-IN CONDUIT)
(2) 3/4" TO 145 FT LEVEL
(INSTALLED)
(13) 1-5/8" TO 145 FT LEVEL
Q1
Q2
Q4
Q3
(INSTALLED)
(1) 5/8" TO 113 FT LEVEL
(3) 1-1/4" TO 113 FT LEVEL
(RESERVED)
(1) 1-5/8" TO 135 FT LEVEL
(INSTALLED-TO BE REMOVED)
(6) 1-5/8" TO 135 FT LEVEL
(INSTALLED)
(7) 1-5/8" TO 135 FT LEVEL

APPENDIX C

ADDITIONAL CALCULATIONS

Section	1	2	3	4	5	6	7	8	9	10	11	12
Length (ft)	26.8500	8.9300	10.3300	3.7500	11.6500	8.4800	6.0000	17.0000	18.2200	16.5600	3.4200	27.8300
Number of Sides	18	18	18	18	18	18	18	18	18	18	18	18
Thickness (in)	0.1875	0.2500	0.3737	0.4070	0.5518	0.3750	0.5613	0.6038	0.5869	0.6355	0.6509	0.5592
Socket Length (ft)	3.8600				4.6300			6.0300				
Top Dia (in)	21.0000	25.6554	27.5444	29.7295	30.5227	30.9040	33.3344	34.6268	38.2888	39.7408	43.7445	44.4838
Bot Dia (in)	26.8750	27.5444	29.7295	30.5227	32.9871	33.3344	34.6268	38.2888	42.2135	43.7445	44.4838	50.5000
Grade	A572-65		Reinf 39.43 ksi		Reinf 36.99 ksi	Reinf 37.01 ksi	A572-65	Reinf 40.77 ksi	Reinf 41.48 ksi	Reinf 41.53 ksi	Reinf 41.61 ksi	Reinf 40.53 ksi
Weight (K)	1.3	0.6	1.2	0.5	2.2	1.1	1.2	4.0	4.6	4.7	1.0	7.9



ALL REACTIONS ARE FACTORED

AXIAL 91 K

SHEAR 12 K

MOM 1365

TORQUE 3 kip-ft
50 mph WIND - 0.7500 in ICE

AXIAL 56 K

SHEAR 51 K

MOMEN 5664 k-ft

TORQUE 9 kip-ft
REACTIONS - 105 mph WIND

DESIGNED APPURTENANCE LOADING

TYPE	ELEVATION	TYPE	ELEVATION
7770.00 w/ Mount Pipe	145	DB-T1-6Z-8AB-0Z	135
7770.00 w/ Mount Pipe	145	Platform Mount [LP 601-1]	135
7770.00 w/ Mount Pipe	145	8-ft Ladder	135
P65-17-XLH-RR w/ Mount Pipe	145	ERICSSON AIR 21 B2A B4P w/ Mount Pipe	125
AM-X-CD-17-65-00T-RET w/ Mount Pipe	145	ERICSSON AIR 21 B2A B4P w/ Mount Pipe	125
SBNH-1D6565C w/ Mount Pipe	145	ERICSSON AIR 21 B2A B4P w/ Mount Pipe	125
(4) 7020.00	145	LNX-6515DS-A1M w/ Mount Pipe	125
(4) 7020.00	145	LNX-6515DS-A1M w/ Mount Pipe	125
(4) 7020.00	145	LNX-6515DS-A1M w/ Mount Pipe	125
(2) RRUS 11	145	ERICSSON AIR 21 B4A B2P w/ Mount Pipe	125
(2) RRUS 11	145	ERICSSON AIR 21 B4A B2P w/ Mount Pipe	125
(2) RRUS 11	145	ERICSSON AIR 21 B4A B2P w/ Mount Pipe	125
(2) LGP21401	145	KRY 112 144/1	125
(2) LGP21401	145	KRY 112 144/1	125
(2) LGP21401	145	KRY 112 144/1	125
DC6-48-60-18-8F	145	RRUS 11 B12	125
TPA-65R-LCUUUU-H8 w/ Mount Pipe	145	RRUS 11 B12	125
TPA-65R-LCUUUU-H8 w/ Mount Pipe	145	RRUS 11 B12	125
TPA-65R-LCUUUU-H8 w/ Mount Pipe	145	Platform Mount [LP 601-1]	125
(2) TPX-070821	145	8-ft Ladder	125
(2) TPX-070821	145	APXVSPP18-C-A20 w/ Mount Pipe	113
(2) TPX-070821	145	APXVSPP18-C-A20 w/ Mount Pipe	113
ATSBT-TOP-FF-4G	145	APXVSPP18-C-A20 w/ Mount Pipe	113
ATSBT-TOP-FF-4G	145	APXVTM14-C-120 w/ Mount Pipe	113
ATSBT-TOP-FF-4G	145	APXVTM14-C-120 w/ Mount Pipe	113
RRUS 32 B2	145	APXVTM14-C-120 w/ Mount Pipe	113
RRUS 32 B2	145	TD-RRH8x20-25	113
RRUS 32 B2	145	TD-RRH8x20-25	113
DC6-48-60-18-8F	145	TD-RRH8x20-25	113
Platform Mount [LP 601-1]	145	Platform Mount [LP 601-1]	113
8-ft Ladder	145	8-ft Ladder	113
2.375" OD x 6' Mount Pipe	145	2.375" OD x 6' Mount Pipe	113
2.375" OD x 6' Mount Pipe	145	2.375" OD x 6' Mount Pipe	113
2.375" OD x 6' Mount Pipe	145	2.375" OD x 6' Mount Pipe	113
LNX-6512DS-VTM w/ Mount Pipe	135	PCS 1900MHz 4x45W-65MHz	111
LNX-6512DS-VTM w/ Mount Pipe	135	PCS 1900MHz 4x45W-65MHz	111
LNX-6512DS-VTM w/ Mount Pipe	135	PCS 1900MHz 4x45W-65MHz	111
DB-T1-6Z-8AB-0Z	135	800MHz 2X50W RRH W/FILTER	111
QUAD656C0000X w/ Mount Pipe	135	800MHz 2X50W RRH W/FILTER	111
QUAD656C0000X w/ Mount Pipe	135	800MHz 2X50W RRH W/FILTER	111
QUAD656C0000X w/ Mount Pipe	135	Side Arm Mount [SO 102-3]	111
(2) HBXX-6517DS-A2M w/ Mount Pipe	135	Platform Mount [LP 601-1]	100
(2) HBXX-6517DS-A2M w/ Mount Pipe	135	8-ft Ladder	100
(2) HBXX-6517DS-A2M w/ Mount Pipe	135	(2) 2.375" OD x 6' Mount Pipe	100
RRH2x60-700	135	(2) 2.375" OD x 6' Mount Pipe	100
RRH2x60-700	135	(2) 2.375" OD x 6' Mount Pipe	100
RRH2x60-700	135	KS24019-L112A	51
RRH2X60-PCS	135	Side Arm Mount [SO 701-1]	51
RRH2X60-PCS	135		
RRH2X60-PCS	135		
B66A RRH4X45	135		
B66A RRH4X45	135		
B66A RRH4X45	135		

MATERIAL STRENGTH

GRADE	Fy	Fu	GRADE	Fy	Fu
A572-65	65 ksi	80 ksi	Reinf 41.48 ksi	41 ksi	52 ksi
Reinf 39.43 ksi	39 ksi	50 ksi	Reinf 41.53 ksi	42 ksi	52 ksi
Reinf 36.99 ksi	37 ksi	47 ksi	Reinf 41.61 ksi	42 ksi	53 ksi
Reinf 37.01 ksi	37 ksi	47 ksi	Reinf 40.53 ksi	41 ksi	51 ksi
Reinf 40.77 ksi	41 ksi	51 ksi	Reinf 50.95 ksi	51 ksi	64 ksi

TOWER DESIGN NOTES

1. Tower is located in New London County, Connecticut.
2. Tower designed for Exposure C to the TIA-222-G Standard.
3. Tower designed for a 105 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 0.0000 ft
8. TOWER RATING: 116.4%

Paul J Ford and Company
250 E. Broad Street Suite 600
Columbus, OH 43215
Phone: 614.221.6679
FAX: 614.448.4105

Job: ***145' Monopole / Groton Tower***			
Project: ***PJF 37517-0635 / BU 881533***			
Client: Crown Castle	Drawn by: Robert Koors	App'd:	
Code: TIA-222-G	Date: 02/09/17	Scale: NTS	
Path: G:\TOWER\375_Crown_Castle\2017\37517-0635_881533_Groton Tower\37517-0635.001.7805_SA_1357826\37517-0635.001.7805_Reinforced.eri		Dwg No. E-1	

PAUL J. FORD & COMPANY
250 E Broad St, Ste 600 • Columbus, OH 43215
Phone 614.221.6679 www.pauljford.com

v4.4 - Effective 7-12-13

Date: 2/9/2017
PJF Project: 37517-0635.001.7805
Client Ref. # 881533
Site Name: Groton Tower
Description: 145' Monopole
Owner: Crown Castle
Engineer: RMK

Asymmetric Anchor Rod Analysis

Moment =	5664	k-ft	TIA Ref.	G	Location =	Base Plate		
Axial =	56.0	kips	ASIF =	N/A	η =	0.55	for BP, Rev. G Sect. 4.9.9	
Shear =	51.0	kips	Max Ratio =	105.0%	Threads =	N/A	for FP, Rev. G	
Anchor Qty =	23							

**** For Post Installed Anchors: Check anchors for embedment, epoxy/grout bond, and capacity based on proof load. ****

Item	Nominal Anchor Dia, in	Spec	Fy, ksi	Fu, ksi	Location, degrees	Anchor Circle, in	Area Override, in^2	Area, in^2	Max Net Compression, kips	Max Net Tension, kips	Load for Capacity Calc, kips	Capacity Override, kips	Capacity, kips	Capacity Ratio
1	2.250	#18J A615 Gr 75	75	100	15.0	59.00	0.00	3.98	222.83	217.29	227.41	0.00	260.00	87.5%
2	2.250	#18J A615 Gr 75	75	100	37.5	59.00	0.00	3.98	219.19	213.65	223.77	0.00	260.00	86.1%
3	2.250	#18J A615 Gr 75	75	100	60.0	59.00	0.00	3.98	216.57	211.03	221.15	0.00	260.00	85.1%
4	2.250	#18J A615 Gr 75	75	100	82.5	59.00	0.00	3.98	216.52	210.98	221.10	0.00	260.00	85.0%
5	2.250	#18J A615 Gr 75	75	100	105.0	59.00	0.00	3.98	219.43	213.89	224.01	0.00	260.00	86.2%
6	2.250	#18J A615 Gr 75	75	100	127.5	59.00	0.00	3.98	224.16	218.62	228.74	0.00	260.00	88.0%
7	2.250	#18J A615 Gr 75	75	100	150.0	59.00	0.00	3.98	228.76	223.22	233.34	0.00	260.00	89.7%
8	2.250	#18J A615 Gr 75	75	100	172.5	59.00	0.00	3.98	231.51	225.97	236.09	0.00	260.00	90.8%
9	2.250	#18J A615 Gr 75	75	100	195.0	59.00	0.00	3.98	231.72	226.18	236.30	0.00	260.00	90.9%
10	2.250	#18J A615 Gr 75	75	100	217.5	59.00	0.00	3.98	229.93	224.39	234.51	0.00	260.00	90.2%
11	2.250	#18J A615 Gr 75	75	100	240.0	59.00	0.00	3.98	227.53	221.99	232.11	0.00	260.00	89.3%
12	2.250	#18J A615 Gr 75	75	100	262.5	59.00	0.00	3.98	225.95	220.41	230.53	0.00	260.00	88.7%
13	2.250	#18J A615 Gr 75	75	100	285.0	59.00	0.00	3.98	225.81	220.27	230.39	0.00	260.00	88.6%
14	2.250	#18J A615 Gr 75	75	100	307.5	59.00	0.00	3.98	226.55	221.01	231.13	0.00	260.00	88.9%
15	2.250	#18J A615 Gr 75	75	100	330.0	59.00	0.00	3.98	226.89	221.35	231.47	0.00	260.00	89.0%
16	2.250	#18J A615 Gr 75	75	100	352.5	59.00	0.00	3.98	225.72	220.18	230.30	0.00	260.00	88.6%
17	1.750	A193 Gr B7	105	125	11.3	62.61	0.00	2.41	143.32	139.97	146.09	0.00	190.00	76.9%
18	1.750	A193 Gr B7	105	125	26.3	62.61	0.00	2.41	141.81	138.46	144.58	0.00	190.00	76.1%
19	1.750	A193 Gr B7	105	125	93.8	62.61	0.00	2.41	139.63	136.28	142.40	0.00	190.00	74.9%
20	1.750	A193 Gr B7	105	125	116.3	62.61	0.00	2.41	142.15	138.80	144.92	0.00	190.00	76.3%
21	1.750	A193 Gr B7	105	125	183.8	62.61	0.00	2.41	148.50	145.15	151.27	0.00	190.00	79.6%
22	1.750	A193 Gr B7	105	125	251.3	62.61	0.00	2.41	145.01	141.66	147.78	0.00	190.00	77.8%
23	1.750	A193 Gr B7	105	125	296.3	62.61	0.00	2.41	144.84	141.49	147.61	0.00	190.00	77.7%
								80.52						

Stiffened or Unstiffened, Ungrouted, Circular Base Plate - Any Rod Material

TIA Rev G Assumption: Clear space between bottom of leveling nut and top of concrete **not** exceeding (1)*(Rod Diameter)

Site Data

BU#:	
Site Name:	
App #:	
Pole Manufacturer:	*Other*

Reactions		
Mu:	4502.7	ft-kips
Axial, Pu:	44.3	kips
Shear, Vu:	40.3	kips
Eta Factor, η	0.55	TIA G (Fig. 4-4)

Reactions adjusted to account for additional anchor rods.

If No stiffeners, Criteria:	AISC LRFD	<-Only Applcable to Unstiffened Cases

Anchor Rod Data		
Qty:	16	
Diam:	2.25	in
Rod Material:	A615-J	
Strength (Fu):	100	ksi
Yield (Fy):	75	ksi
Bolt Circle:	59	in

Plate Data		
Diam:	65	in
Thick:	2	in
Grade:	60	ksi
Single-Rod B-eff:	10.02	in

Stiffener Data (Welding at both sides)		
Config:	1	*
Weld Type:	Fillet	
Groove Depth:		<-- Disregard
Groove Angle:		<-- Disregard
Fillet H. Weld:	0.625	in
Fillet V. Weld:	0.375	in
Width:	6.75	in
Height:	27	in
Thick:	0.625	in
Notch:	0.75	in
Grade:	50	ksi
Weld str.:	70	ksi

Pole Data		
Diam:	50.5	in
Thick:	0.4375	in
Grade:	65	ksi
# of Sides:	18	"0" IF Round
Fu	80	ksi
Reinf. Fillet Weld	0	"0" if None

Anchor Rod Results

		Stiffened
Max Rod (Cu+ Vu/ή):	236.3 Kips	AISC LRFD
Allowable Axial, Φ*Fu*Anet:	260.0 Kips	φ*Tn
Anchor Rod Stress Ratio:	90.9% **Pass**	

Base Plate Results Flexural Check

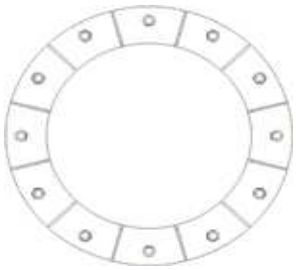
		Stiffened
Base Plate Stress:	39.0 ksi	AISC LRFD
Allowable Plate Stress:	54.0 ksi	φ*Fy
Base Plate Stress Ratio:	72.3% **Pass**	Y.L. Length: N/A, Roark

Stiffener Results

Horizontal Weld :	76.7% **Pass**
Vertical Weld:	30.9% **Pass**
Plate Flex+Shear, fb/Fb+(fv/Fv)^2:	14.9% **Pass**
Plate Tension+Shear, ft/Ft+(fv/Fv)^2	81.0% **Pass**
Plate Comp. (AISC Bracket):	72.2% **Pass**

Pole Results

Pole Punching Shear Check:	6.3% **Pass**



* 0 = none, 1 = every bolt, 2 = every 2 bolts, 3 = 2 per bolt

** Note: for complete joint penetration groove welds the groove depth must be exactly 1/2 the stiffener thickness for calculation purposes

PJF job no. _____ Project name _____

foundation loads

Limit states Tower or Pole Weight =	**56**	kips
limit states total horizontal force =	**51**	kips
limit states overturning moment =	**5664**	ft-kips
limit states (LRFD) leg compression =		
limit states (LRFD) leg tension =		

soil properties

Safety factor against overturning =	**1**	
Soil Density =	**165**	pcf
Ultimate soil bearing =	**24**	ksf
Depth to water table =	**99**	ft

mat dimensions

Depth to Bottom of Footing =	**5**	ft
Footing Thickness =	**5**	ft
Footing Width =	**30**	ft
Footing Length =	**30**	ft
Base Plate Diameter =		
Anchor Plate Diameter =		
Depth of Anchor Plate =		
Tower Base Width =		
Tower Center Offset =	**0**	ft

Summary of analysis results

Overturning Moment: (Stress Ratio = 0.608) **< CONTROLLING CRITERIA**

Calculated Ultimate Overturning Moment = 5919 ft-kips

Resisting Moment = 9742.5 ft-kips

Factor of Safety against overturning = 1.646 **> 1 okay**

Soil Bearing (Stress Ratio = 0.102)

Limit States Maximum Net Soil Bearing = 18 ksf

Ultimate Bearing Pressure = 1.839 **ksf < 18 ksf okay**

Bending Moment (Stress Ratio = 0.342)

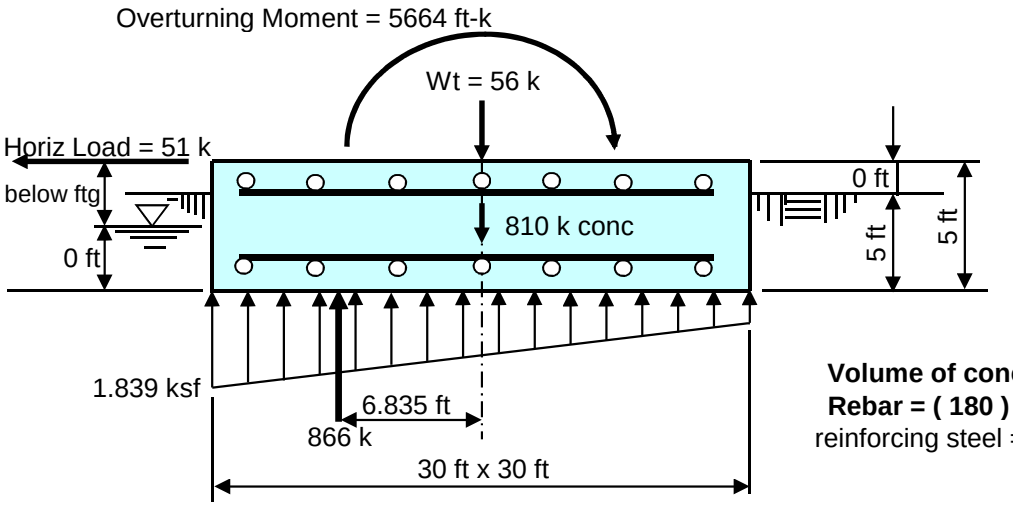
Ultimate Bending Moment Resistance = 8579 ft-kips

Calculated Ultimate Bending Moment = 2930 **ft-kips < 8579 ft-kips okay**

Bending Shear (Stress Ratio = 0.153)

Ultimate Bending Shear Resistance = 2109 kips

Calculated Ultimate Bending Shear = 323 **kips < 2109 kips okay**



Concrete strength = f'_c = **4** (ksi)

Rebar strength = F_y = **60** (ksi)

minimum cover over rebar = **4** inches

Volume of concrete = 166.67 yd^3

Rebar = (180) #8 bars by 29.5 ft long

reinforcing steel = (45) #8 @ 8.05 in o.c. ea way top and bottom

Radio Frequency Emissions Analysis Report

AT&T Existing Facility

Site ID: CT2182

Groton Roberts Rd
75 Roberts Road
Groton, CT 6340

October 23, 2017

Centerline Communications Project Number: 950006-079

Site Compliance Summary	
Compliance Status:	**COMPLIANT**
Site total MPE% of FCC general population allowable limit:	**12.28 %**

October 23, 2017

AT&T Mobility – New England
Attn: John Benedetto, RF Manager
550 Cochituate Road
Suite 550 – 13&14
Framingham, MA 06040

Emissions Analysis for Site: **CT2182 – Groton Roberts Rd**

Centerline Communications, LLC ("Centerline") was directed to analyze the proposed AT&T facility located at **75 Roberts Road, Groton, CT**, for the purpose of determining whether the emissions from the Proposed AT&T 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 $\mu W/cm^2$ 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 population 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 population 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.

Population exposure to radio frequencies is regulated and enforced in units of microwatts per square centimeter ($\mu W/cm^2$). The general population exposure limits for the 700 and 850 MHz Bands are approximately 467 $\mu W/cm^2$ and 567 $\mu W/cm^2$ respectively. The general population exposure limit for the 1900 MHz (PCS), 2100 MHz (AWS) and 2300 MHz (WCS) bands is 1000 $\mu W/cm^2$. 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 performed for the proposed AT&T Wireless antenna facility located at **75 Roberts Road, Groton, CT**, using the equipment information listed below. All calculations were performed per the specifications under FCC OET 65. Since AT&T is proposing highly focused directional panel antennas, which project most of the emitted energy out toward the horizon, all calculations were performed assuming a lobe representing the maximum gain of the antenna per the antenna manufactures supplied specifications, minus 10 dB, was focused at the base of the tower. For this report the sample point is the top of a 6-foot person standing at the base of the tower.

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. All power values expressed and analyzed are maximum power levels expected to be used on all radios.

All emissions values for additional carriers were taken from the Connecticut Siting Council (CSC) active MPE database. Values in this database are provided by the individual carriers themselves

For each sector the following channel counts, frequency bands and power levels were utilized as shown in *Table 1*:

Technology	Frequency Band	Channel Count	Transmit Power per Channel (W)
UMTS	850 MHz	2	30
UMTS	1900 MHz (PCS)	2	30
LTE	700 MHz	2	60
LTE	2100 MHz (AWS)	2	60
LTE	1900 MHz (PCS)	2	60

Table 1: Channel Data Table

The following antennas listed in *Table 2* were used in the modeling for transmission in the 700 MHz, 850 MHz, 1900 MHz (PCS) and 2100 MHz (AWS) frequency bands. This is based on feedback from the carrier with regards to anticipated antenna selection. Maximum gain values for all antennas are listed in the Inventory and Power Data table below. The maximum gain of the antenna per the antenna manufactures supplied specifications, minus 10 dB, was used for all calculations. This value is a very conservative estimate as gain reductions for these particular antennas are typically much higher in this direction.

Sector	Antenna Number	Antenna Make / Model	Antenna Centerline (ft)
A	1	Powerwave 7770	145
A	2	KMW AM-X-CD-17-65-00T-RET	145
A	3	CCI TPA-65R-LCUUUU-H8	145
B	1	Powerwave 7770	145
B	2	KMW AM-X-CD-17-65-00T-RET	145
B	3	CCI TPA-65R-LCUUUU-H8	145
C	1	Powerwave 7770	145
C	2	Commscope SBNH-1D6565C	145
C	3	CCI TPA-65R-LCUUUU-H8	145

Table 2: Antenna Data

All calculations were done with respect to uncontrolled / general population threshold limits.

RESULTS

Per the calculations completed for the proposed AT&T configurations *Table 3* shows resulting emissions power levels and percentages of the FCC's allowable general population limit.

Antenna ID	Antenna Make / Model	Frequency Bands	Antenna Gain (dBd)	Channel Count	Total TX Power (W)	ERP (W)	MPE %
Antenna A1	Powerwave 7770	850 MHz / 1900 MHz (PCS)	11.4 / 13.4	4	120	2,140.89	0.52
Antenna A2	KMW AM-X-CD-17-65-00T-RET	700 MHz / 2100 MHz (AWS)	14.65 / 15.35	4	240	7,614.13	2.16
Antenna A3	CCI TPA-65R-LCUUUU-H8	1900 MHz (PCS)	13.75	2	120	2,845.65	0.53
						Sector A Composite MPE%	**3.21**
Antenna B1	Powerwave 7770	850 MHz / 1900 MHz (PCS)	11.4 / 13.4	4	120	2,140.89	0.52
Antenna B2	KMW AM-X-CD-17-65-00T-RET	700 MHz / 2100 MHz (AWS)	14.65 / 15.35	4	240	7,614.13	2.16
Antenna B3	CCI TPA-65R-LCUUUU-H8	1900 MHz (PCS)	13.75	2	120	2,845.65	0.53
						Sector B Composite MPE%	**3.21**
Antenna C1	Powerwave 7770	850 MHz / 1900 MHz (PCS)	11.4 / 13.4	4	120	2,140.89	0.52
Antenna C2	Commscope SBNH-1D6565C	700 MHz / 2100 MHz (AWS)	13.65 / 16.35	4	240	7,959.10	2.07
Antenna C3	CCI TPA-65R-LCUUUU-H8	1900 MHz (PCS)	13.75	2	120	2,845.65	0.53
						Sector C Composite MPE%	**3.12**

Table 3: AT&T Emissions Levels

The Following table (*table 4*) shows all additional carriers on site and their MPE% as recorded in the CSC active MPE database for this facility along with the newly calculated maximum AT&T MPE contributions per this report. FCC OET 65 specifies that for carriers utilizing directional antennas that the highest recorded sector value be used for composite site MPE values due to their greatly reduced emissions contributions in the directions of the adjacent sectors. For this site, the sectors with the largest calculated MPE% are Sectors A & B. *Table 5* below shows a summary for each AT&T Sector as well as the composite MPE value for the site.

Site Composite MPE%	
Carrier	**MPE%**
AT&T – Max Sector Value	**3.21 %**
Sprint	1.52 %
MetroPCS	0.85 %
T-Mobile	2.79 %
Verizon Wireless	3.91 %
Site Total MPE %:	**12.28 %**

Table 4: All Carrier MPE Contributions

AT&T Sector A Total:	3.21 %
AT&T Sector B Total:	3.21 %
AT&T Sector C Total:	3.12 %
Site Total:	12.28 %

Table 5: Site MPE Summary

FCC OET 65 specifies that for carriers utilizing directional antennas that the highest recorded sector value be used for composite site MPE values due to their greatly reduced emissions contributions in the directions of the adjacent sectors. *Table 6* below details a breakdown by frequency band and technology for the MPE power values for the maximum calculated AT&T sector(s). For this site, the sectors with the largest calculated MPE% are Sectors A & B.

AT&T _ Frequency Band / Technology (Sectors A&B)	# Channels	Watts ERP (Per Channel)	Height (feet)	Total Power Density ($\mu W/cm^2$)	Frequency (MHz)	Allowable MPE ($\mu W/cm^2$)	Calculated % MPE
AT&T 850 MHz UMTS	2	414.12	145	1.54	850 MHz	567	0.27%
AT&T 1900 MHz (PCS) UMTS	2	656.33	145	2.44	1900 MHz (PCS)	1000	0.24%
AT&T 700 MHz LTE	2	1,750.46	145	6.51	700 MHz	467	1.39%
AT&T 2100 MHz (AWS) LTE	2	2,056.61	145	7.65	2100 MHz (AWS)	1000	0.77%
AT&T 1900 MHz (PCS) LTE	2	1,422.82	145	5.29	1900 MHz (PCS)	1000	0.53%
						Total:	**3.21 %**

Table 6: AT&T Maximum Sector MPE Power Values

Summary

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

The anticipated maximum composite contributions from the AT&T facility as well as the site composite emissions value with regards to compliance with FCC's allowable limits for general population exposure to RF Emissions are shown here:

AT&T Sector	Power Density Value (%)
Sector A:	3.21 %
Sector B:	3.21 %
Sector C:	3.12 %
AT&T Maximum Total (Sectors A & B):	3.21 %
Site Total:	12.28 %
Site Compliance Status:	**COMPLIANT**

The anticipated composite MPE value for this site assuming all carriers present is **12.28 %** of the allowable FCC established general population limit sampled at the ground level. 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 well within the allowable 100% threshold standard per the federal government.

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