STATE OF CONNECTICUT
CONNECTICUT SITING COUNCIL
Ten Franklin Square, New Britain, CT 06051
Phone: (860) 827-2935 Fax: (860) 827-2950
E-Mail: siting.council@ct.gov
www.ct.gov/csc

April 13, 2012

Stephen Kelleher
Real Estate Consultant
New Cingular Wireless PCS, LLC
960 Turnpike Street, Suite 28
Canton, MA 02021

RE: **EM-CING-034-120326** - New Cingular Wireless PCS, LLC notice of intent to modify an existing telecommunications facility located at 144 Old Boston Post Road (Moses Mountain), Danbury, Connecticut.

Dear Mr. Kelleher:

The Connecticut Siting Council (Council) hereby acknowledges your notice to modify this existing telecommunications facility, pursuant to Section 16-50j-73 of the Regulations of Connecticut State Agencies with the following conditions:

- The coax lines, TMAs, and RRHs be installed and the modifications be completed in accordance with the recommendations made in the Structural Analysis Report prepared by FDH Engineering dated March 16, 2012 and stamped by Christopher Murphy; and

- Prior to antenna installation, a signed letter from a Professional Engineer duly licensed in the State of Connecticut shall be submitted to the Council to certify that the recommended modifications have been completed and the tower and foundation will not exceed 100 percent of the post-construction structural rating.

- Any deviation from the proposed modification as specified in this notice and supporting materials with Council shall render this acknowledgement invalid;

- Any material changes to this modification as proposed shall require the filing of a new notice with the Council;

- Not less than 45 days after completion of construction, the Council shall be notified in writing that construction has been completed;

- The validity of this action shall expire one year from the date of this letter; and

- The applicant may file a request for an extension of time beyond the one year deadline provided that such request is submitted to the Council not less than 60 days prior to the expiration;

The proposed modifications including the placement of all necessary equipment and shelters within the tower compound are to be implemented as specified here and in your notice dated March 26, 2012. The modifications are in compliance with the exception criteria in Section 16-50j-72 (b) of the Regulations of Connecticut State Agencies as changes to an existing facility site that would not increase tower height, extend the boundaries of the tower site, increase noise levels at the tower site boundary by six decibels, and increase the total radio frequencies electromagnetic radiation power density measured at the tower site boundary to or above the standard adopted by the State Department of Environmental Protection pursuant to General Statutes § 22a-162. This facility has also been carefully modeled to ensure that radio frequency emissions are conservatively below State and federal standards applicable to the frequencies now used on this tower.

CSC
CONNECTICUT SITING COUNCIL

This decision is under the exclusive jurisdiction of the Council. Please be advised that the validity of this action shall expire one year from the date of this letter. Any additional change to this facility will require explicit notice to this agency pursuant to Regulations of Connecticut State Agencies Section 16-50j-73. Such notice shall include all relevant information regarding the proposed change with cumulative worst-case modeling of radio frequency exposure at the closest point of uncontrolled access to the tower base, consistent with Federal Communications Commission, Office of Engineering and Technology, Bulletin 65. Thank you for your attention and cooperation.

Very truly yours,

Linda Roberts
Executive Director

LR/CDM/laf

c: The Honorable Mark D. Boughton, Mayor, City of Danbury
Dennis Elpern, City Planner, City of Danbury
Christopher B. Fisher, Esq., Cuddy & Feder LLP

EM-CING-034-120326

New Cingular Wireless PCS, LLC
960 Turnpike Street, Suite 28
Canton, MA 02021
Phone: (508) 404-8917
Fax: (617) 249-0819

Stephen Kelleher
Real Estate Consultant
skelleher@clinellc.com

ORIGINAL

March 26, 2012

Honorable Robert Stein, Chairman,
and Members of the Connecticut Siting Council
Connecticut Siting Council
10 Franklin Square
New Britain, Connecticut 06051

Re: Request by New Cingular Wireless PCS, LLC for an Order Approving an Exempt Modification of an Existing tower at 144 Old Boston Post Road (Moses Mountain), Danbury, CT 06810.

Dear Chairman Stein and Members of the Council:

In order to accommodate technological changes, implement Long Term Evolution ("LTE") capabilities, and enhance system performance in the State of Connecticut, New Cingular Wireless PCS, LLC ("AT&T") plans to modify the equipment configurations at many of its existing cell sites. Please accept this letter and attachments as notification, pursuant to R.C.S.A Section 16-50j-73, of construction which constitutes an exempt modification pursuant to R.C.S.A Section 16-50j-72(b)(2). In compliance with R.C.S.A Section 16-50j-73, a copy of this letter and attachments is being sent to the chief elected official of the municipality in which the affected cell site is located.

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

Attached is a summary of the planned modifications, including power density calculations reflecting the changes in AT&T's operation of the site. Also, included is documentation of the structural sufficiency of the tower. The tower, with the proposed structural modifications depicted in the Structural Analysis, is structurally sufficient to accommodate the revised antenna configuration.

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

1. The height of the overall structure will be unaffected.

2. The proposed changes will not extend the site boundaries. There will be no effect on the site compound other than some enlarged equipment pads as may be noted in the attachments
3. The proposed changes will not increase the noise level at the existing facility by six decibels or more.
4. LTE will utilize additional radio frequencies newly licensed by the FCC for cellular mobile communications. However, the changes will not increase the calculated "worst case" power density for the combined operations at the site to a level at or above the applicable standard for uncontrolled environments as calculated for a mixed frequency site.

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

Please feel free to contact me at 508-404-8917 with questions concerning this matter. Thank you for your consideration.

Sincerely,

Stephen Kelleher
Real Estate Consultant

Attachments

EXHIBIT 1

WIRELESS COMMUNICATIONS FACILITY

CT2133
S. DANBURY
MOSES MOUNTAIN
DANBURY, CT 06810

SITE DIRECTIONS

FROM: 500 ENTERPRISE DRIVE, ROCKY HILL, CONNECTICUT **TO:** MOSES MOUNTAIN, DANBURY, CONNECTICUT

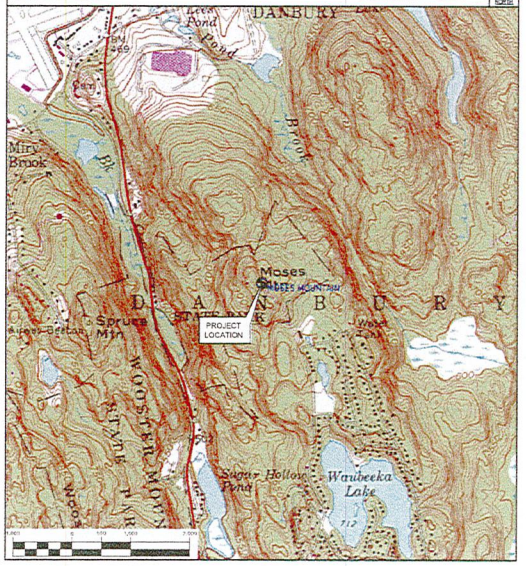
1.	Depart Enterprise Dr toward Capitol Blvd	0.4 mi.
2.	Turn left onto Capitol Blvd	0.2 mi.
3.	Turn left onto West St	0.3 mi.
4.	Take ramp left for I-91 South	9.1 mi.
5.	At exit 18, take ramp right for I-691 West toward Waterbury / Meriden	7.9 mi.
6.	At exit 1, take ramp left for I-84 West toward Waterbury / Danbury	37.1 mi.
7.	Bear left onto US-7 South	3.1 mi.
8.	Turn left onto Starrs Plain Rd	0.3 mi.
9.	Bear left onto Post Rd	1.0 mi.
10.	Arrive at access drive ahead.	

GENERAL NOTES

1. ALL WORK SHALL BE IN ACCORDANCE WITH THE 2005 INTERNATIONAL BUILDING CODE AS MODIFIED BY THE 2009 CONNECTICUT SUPPLEMENT, INCLUDING THE TIA/EIA-222 REVISION "F" "STRUCTURAL STANDARDS FOR STEEL ANTENNA TOWERS AND SUPPORTING STRUCTURES." 2005 CONNECTICUT FIRE SAFETY CODE AND 2009 AMENDMENTS, 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.

VICINITY MAP

SCALE: 1" = 1000'



PROJECT SUMMARY

1. THE PROPOSED SCOPE OF WORK GENERALLY CONSISTS OF THE INSTALLATION OF ONE (1) LTE ANTENNA PER SECTOR FOR A TOTAL OF (3) LTE ANTENNAS TO THE EXISTING AT&T ANTENNA ARRAY. AN LTE BASEBAND EQUIPMENT UNIT (RBS) WILL BE INSTALLED WITHIN THE EXISTING AT&T EQUIPMENT SHELTER.
2. ADDITIONALLY, (2) REMOTE RADIO UNITS (RRUs) PER SECTOR WILL BE INSTALLED. SURGE ARRESTORS WILL BE INSTALLED AT BOTH AT&T RRU AND EQUIPMENT LOCATIONS. REFER TO THESE ACCOMPANYING DRAWINGS FOR FURTHER INFORMATION.

PROJECT INFORMATION

AT&T SITE NUMBER:	CT2133
AT&T SITE NAME:	S. DANBURY
SITE ADDRESS:	MOSES MOUNTAIN DANBURY, CT 06810
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'-34.42" N LONGITUDE: 73°-27'-55.70" W GROUND ELEVATION: ±975' AMSL

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DESIGNED BY:			CFC
DRAWN BY:			DEB
CHK'D BY:			CFC
1	03/25/11	DEB	CFC CONSTRUCTION
0	03/23/11	DEB	CFC CONSTRUCTION - CLIENT REVIEW
REV.	DATE	DRAWN BY	CHK'D BY

at&t

SAI communications solutions

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

AT&T MOBILITY
WIRELESS COMMUNICATIONS FACILITY
SITE NUMBER: CT2133
SITE NAME: S. DANBURY
MOSES MOUNTAIN
DANBURY, CT

DATE: 3/24/11
SCALE: AS NOTED
JOB NO. 11021.C020

TITLE SHEET

T-1

Sheet No. 1 of 8

STRUCTURAL SPECIFICATIONS

DESIGN BASIS

GOVERNING CODE: 2003 INTERNATIONAL BUILDING CODE (IBC) AS MODIFIED BY THE 2005 CONNECTICUT STATE BUILDING CODE AND 2009 AMENDMENTS.

1. DESIGN CRITERIA:
   - WIND LOAD: PER EIA/TIA 222 F-96 (ANTENNA MOUNTS): 85 MPH (FASTEST MILE), EQUIVALENT TO 105 MPH (3 SECOND GUST).
   - BASIC WIND SPEED (OTHER STRUCTURE): 95 MPH (3 SECOND GUST) (EXPOSURE B/IMPORTANCE FACTOR 1.0 BASED ON ASCE 7-02) PER 2003 INTERNATIONAL BUILDING CODE (IBC) AS MODIFIED BY THE 2005 CONNECTICUT SUPPLEMENT AND 2009 AMMENDMENT.
   - SEISMIC LOAD (DOES NOT CONTROL): PER ASCE 7-95 MINIMUM DESIGN LOADS FOR BUILDINGS AND OTHER STRUCTURES.

GENERAL NOTES

1. IF ANY FIELD CONDITIONS EXIST WHICH PRECLUDE COMPLIANCE WITH THE DRAWINGS, THE CONTRACTOR SHALL IMMEDIATELY NOTIFY THE ENGINEER AND SHALL PROCEED WITH AFFECTED WORK AFTER CONFLICT IS SATISFACTORILY RESOLVED.
2. DIMENSIONS AND DETAILS SHALL BE CHECKED AGAINST THE PRE MANUFACTURED EQUIPMENT BUILDING SHOP DRAWINGS.
3. THE CONTRACTOR SHALL VERIFY AND COORDINATE THE SIZE AND LOCATION OF ALL OPENINGS, SLEEVES AND ANCHOR BOLTS AS REQUIRED BY ALL TRADES.
4. REFER TO DRAWING T1 FOR ADDITIONAL NOTES AND REQUIREMENTS.

SITE NOTES

1. THE CONTRACTOR SHALL CALL UTILITIES PRIOR TO THE START OF CONSTRUCTION.
2. ACTIVE EXISTING UTILITIES, WHERE ENCOUNTERED IN THE WORK, SHALL BE PROTECTED AT ALL TIMES. THE ENGINEER SHALL BE NOTIFIED IMMEDIATELY, PRIOR TO PROCEEDING, SHOULD ANY UNCOVERED EXISTING UTILITY PRECLUDE COMPLETION OF THE WORK IN ACCORDANCE WITH THE CONTRACT DOCUMENTS.
3. ALL RUBBISH, STUMPS, DEBRIS, STICKS, STONES AND OTHER REFUSE SHALL BE REMOVED OFF SITE AND BE LEGALLY DISPOSED, AT NO ADDITIONAL COST.
4. THE SITE SHALL BE GRADED TO CAUSE SURFACE WATER TO FLOW AWAY FROM THE EQUIPMENT AND TOWER AREAS.
5. NO FILL OR EMBANKMENT MATERIAL SHALL BE PLACED ON FROZEN GROUND. FROZEN MATERIALS, SNOW OR ICE SHALL NOT BE PLACED IN ANY FILL OR EMBANKMENT.
6. THE SUBGRADE SHALL BE COMPACTED AND BROUGHT TO A SMOOTH UNIFORM GRADE PRIOR TO FINISHED SURFACE APPLICATION.
7. THE AREAS OF THE COMPOUND DISTURBED BY THE WORK SHALL BE RETURNED TO THEIR ORIGINAL CONDITION.
8. CONTRACTOR SHALL MINIMIZE DISTURBANCE TO EXISTING SITE DURING CONSTRUCTION. EROSION CONTROL MEASURES, SHALL BE IN CONFORMANCE WITH THE LOCAL GUIDELINES FOR EROSION AND SEDIMENT CONTROL.

EARTHWORK NOTES

1. COMPACTED GRAVEL FILL SHALL BE FURNISHED AND PLACED AS A FOUNDATION FOR STRUCTURES, WHERE SHOWN ON THE CONTRACT DRAWINGS OR DIRECTED BY THE ENGINEER.
2. CRUSHED STONE FILL SHALL BE PLACED IN 12" MAX. LIFTS AND CONSOLIDATED USING A HAND OPERATED VIBRATORY PLATE COMPACTOR WITH A MINIMUM OF 2 PAQSSES OF COMPACTOR PER LIFT.
3. COMPACTED GRAVEL FILL TO BE WELL GRADED BANK RUN GRAVEL MEETING THE FOLLOWING GRADATION REQUIREMENTS:

SIEVE DESIGNATION	% PASSING
1 ½"	100
No. 4	40-70
No. 100	5-20
No. 200	4-8

4. CRUSHED STONE TO BE UNIFORMLY GRADED, CLEAN, HARD PROCESS AGGREGATE MEETING THE FOLLOWING GRADATION REQUIREMENTS:

SIEVE DESIGNATION	% PASSING
1"	100
¾"	90-100
½"	0-15
⅜"	0-5

5. SELECT BACKFILL FOR FOUNDATION WALLS SHALL BE FREE OF ORGANIC MATERIAL, TOPSOIL, DEBRIS AND BOULDERS LARGER THAN 6".
6. GRAVEL AND GRANULAR FILL SHALL BE INSTALLED IN 8" MAX. LIFTS, COMPACTED TO 95% MIN. AT MAX. DRY DENSITY.
7. NON WOVEN GEOTEXTILE FOR SEPARATION PURPOSES SHALL BE MIRAFI 140N, OR ENGINEER APPROVED EQUAL.

FOUNDATION CONSTRUCTION NOTES

1. ALL FOOTINGS SHALL BE PLACED ON SUITABLE, COMPACTED SOIL HAVING ADEQUATE BEARING CAPACITY AND FREE OF ORGANIC CONTENT, CLAY, OR OTHER UNSUITABLE MATERIAL. ADDITIONAL EXCAVATION MAY BE REQUIRED BELOW FOOTING ELEVATIONS INDICATED IF UNSUITABLE MATERIAL IS ENCOUNTERED.
2. SUBGRADE PREPARATION: IF UNSUITABLE SOIL IS ENCOUNTERED, REMOVE ALL UNSUITABLE MATERIALS FROM BELOW PROPOSED STRUCTURE FOUNDATIONS AND COMPACT EXPOSED SOIL SURFACES. PLACE AND COMPACT APPROVED GRAVEL FILL. PLACEMENT OF ALL COMPACTED FILL MUST BE UNDER SUPERVISION OF AN APPROVED TESTING LABORATORY. FILL SHALL BE COMPACTED IN LAYERS NOT TO EXCEED 10" BEFORE COMPACTION. DETERMINE MAXIMUM DRY DENSITY IN ACCORDANCE WITH ASTM D1557-70 AND MAKE ONE (1) FIELD DENSITY TEST IN ACCORDANCE WITH ASTM D2167-66 FOR EACH 50 CUBIC YARDS OF COMPACTED FILL, BUT NOT LESS THAN ONE (1) PER LAYER, TO INSURE COMPACTION TO 95% OF MAX. DRY DENSITY.
3. ALL SOIL SURROUNDING AND UNDER ALL FOOTINGS SHALL BE KEPT REASONABLY DRY AND PROTECTED FROM FREEZING AND FROST ACTION DURING THE COURSE OF CONSTRUCTION.
4. WHERE GROUNDWATER IS ENCOUNTERED, DEWATERING SHALL BE ACCOMPLISHED CONTINUOUSLY AND COMPLETELY DURING FOUNDATION CONSTRUCTION. PROVIDE CRUSHED STONE AS REQUIRED TO STABILIZE FOOTING SUBGRADE.
5. ALL FOOTINGS ARE TO REST ON FIRM SOIL, REGARDLESS OF ELEVATIONS SHOWN ON THE DRAWINGS, BUT IN NO CASE MAY FOOTING ELEVATIONS BE HIGHER THAN INDICATED ON THE FOUNDATION PLAN, UNLESS SPECIFICALLY DIRECTED BY THE ENGINEER.

CONCRETE CONSTRUCTION NOTES

1. CONCRETE CONSTRUCTION SHALL CONFORM TO THE FOLLOWING STANDARDS:

   ACI 211 – STANDARD PRACTICE FOR SELECTING PROPORTIONS FOR NORMAL AND HEAVYWEIGHT CONCRETE.

   ACI 301 – SPECIFICATIONS FOR STRUCTURAL CONCRETE FOR BUILDINGS.

   ACI 302 – GUIDE FOR CONCRETE FLOOR AND SLAB CONSTRUCTION

   ACI 304 – RECOMMENDED PRACTICE FOR MEASURING, MIXING, TRANSPORTING, AND PLACING CONCRETE.

   ACI 306.1 STANDARD SPECIFICATION FOR COLD WEATHER CONCRETING

   ACI 318 – BUILDING CODE REQUIREMENTS FOR REINFORCED CONCRETE.

2. CONCRETE SHALL DEVELOP COMPRESSIVE STRENGTH IN 28 DAYS AS FOLLOWS:

SLABS ON GRADE	4,000 PSI
ALL OTHER CONCRETE	3,000 PSI

   - PORTLAND CEMENT: ASTM C150, TYPE II, (540 LBS/CUBIC YARD)
   - AGGREGATE: ASTM C33, No. 67, TYPICAL
   - WATER: POTABLE WITH MAXIMUM WATER CEMENT RATIO OF .55
   - SLUMP: 3" TO 4"
   - ADMIXTURES: USE AIR ENTRAINING ADDENT CONFORMING TO ASTM C260 WITH 4 TO 6% TOTAL AIR. USE WATER REDUCING AGENT CONFORMING TO ASTM C494, TYPE A, IN ALL CONCRETE. CALCIUM CHLORIDE MAY NOT BE USED TO ACCELERATE THE CONCRETE SETTING TIME.

3. REINFORCING STEEL SHALL BE 60,000 PSI YIELD STRENGTH.
4. WELDED WIRE FABRIC SHALL CONFORM TO ASTM- A-185.
5. ALL DETAILING, FABRICATION, AND ERECTION OF REINFORCING BARS, UNLESS OTHERWISE NOTED, MUST FOLLOW THE LATEST ACI CODE AND LATEST ACI "MANUAL OF STANDARD PRACTICE FOR DETAILING REINFORCED CONCRETE STRUCTURES".
6. CONCRETE COVER OVER REINFORCING SHALL CONFORM TO THE FOLLOWING, UNLESS OTHERWISE SHOWN:

BOTTOM OF FOOTINGS	3 INCHES
SURFACES NOT EXPOSED TO EARTH OR WEATHER	1-1/2 INCHES

7. NO STEEL WIRE, METAL FORM TIES, OR ANY OTHER METAL SHALL REMAIN WITHIN THE REQUIRED COVER OF ANY CONCRETE SURFACE.
8. ALL REINFORCEMENT SHALL BE CONTINUOUS UNLESS OTHERWISE NOTED. SPLICES SHALL BE WELL STAGGERED. ADDITIONAL BARS AND SPECIAL BENDING DETAILS ARE REQUIRED AT INTERSECTING WALLS AND AT JOINTS. SUCH DETAILS SHALL COMPLY WITH ACI 315 RECOMMENDATIONS UNLESS OTHERWISE SHOWN.
9. NO TACK WELDING OF REINFORCING WILL BE PERMITTED.
10. NO CALCIUM CHLORIDE OR ADMIXTURES CONTAINING MORE THAN 1% CHLORIDE BY WEIGHT OF ADMIXTURE SHALL BE USED IN THE CONCRETE.
11. UNLESS OTHERWISE NOTED, ALL LAP SPLICES SHALL BE 48 BAR DIAMETERS.
12. SLAB ON GRADE FINISHES:

    EXTERIOR SLAB: NON-SLIP BROOM FINISH
    INTERIOR SLAB: STEEL TROWEL FINISH

GENERAL NOTES (REFERENCE)

CONTRACTOR TO REFER TO THE GENERAL NOTES ON SHEET T-1 FOR ADDITIONAL INFORMATION.

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

REV	DATE	DRAWN BY: CHK'D BY	
0	3/24/11	DEB CFC	CONSTRUCTION – CLIENT REVIEW
1	6/16/11	FG CFC	CONSTRUCTION

PROFESSIONAL ENGINEER SEAL

at&t

SAI COMMUNICATIONS

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

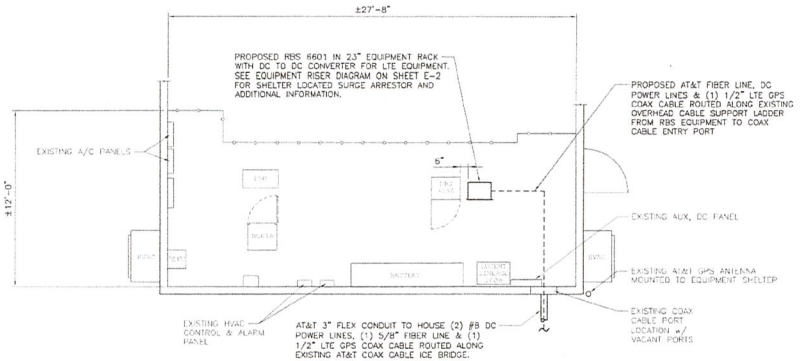
AT&T MOBILITY
WIRELESS COMMUNICATIONS FACILITY
SITE NUMBER: CT2133
SITE NAME: S. DANBURY
MOSES MOUNTAIN
DANBURY, CT

DATE: 3/24/11
SCALE: AS NOTED
JOB NO. 11021.0020

NOTES AND SPECIFICATIONS

N-1

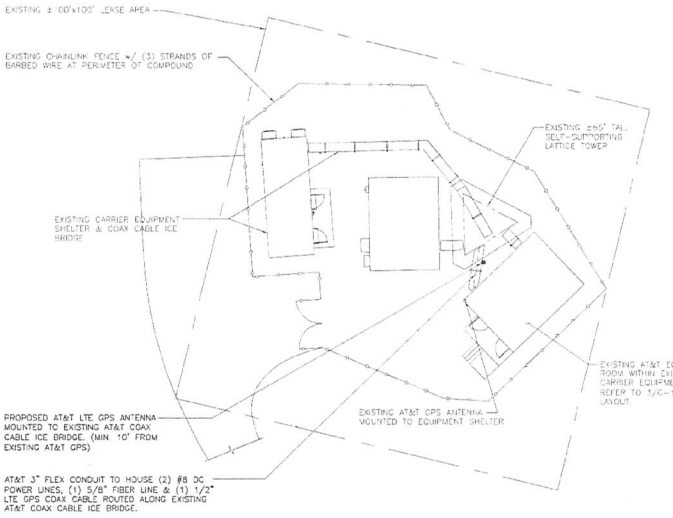
Sheet No. 2 of 6



3 / C-1 **EQUIPMENT ROOM PLAN**
SCALE: 1/4" = 1'-0"

TRUE NORTH

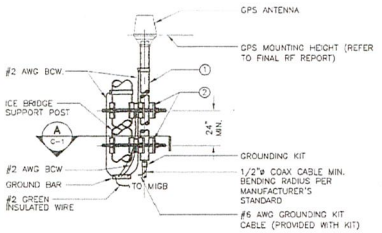
GRAPHIC SCALE
(IN FEET)
1 inch = 4 ft.



1 / C-1 **COMPOUND PLAN**
SCALE: 1" = 15'

TRUE NORTH

GRAPHIC SCALE
(IN FEET)
1 inch = 15 ft.



GPS ANTENNA MOUNTING BRACKET

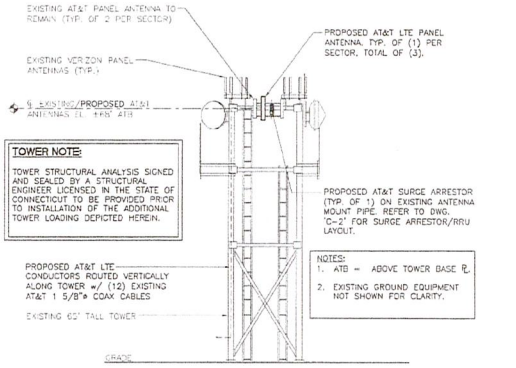
BILL OF MATERIALS		
ITEM	DESCRIPTION	QUANTITY
①	2-1/2"ø SCH. 40 x 8'-0" LG. MAX SS OR GALV. PIPE	1
②	UNIVERSAL CLAMP SET.	2

A / C-1 **SECTION**
NOT TO SCALE

NOTES:

1. THE ELEVATION AND LOCATION OF THE GPS ANTENNA SHALL BE IN ACCORDANCE WITH THE FINAL RF REPORT AND COORDINATED WITH AT&T CONSTRUCTION MANAGER.
2. THE GPS ANTENNA MOUNT IS DESIGNED TO FASTEN TO A STANDARD 2-1/2" DIAMETER, SCHEDULE 40, GALVANIZED STEEL OR STAINLESS STEEL PIPE. THE PIPE MUST NOT BE THREADED AT THE ANTENNA MOUNT END. THE PIPE SHALL BE CUT TO THE REQUIRED LENGTH (MINIMUM OF 24 INCHES) USING A HAND OR ROTARY PIPE CUTTER TO ASSURE A SMOOTH AND PERPENDICULAR CUT. A HACK SAW SHALL NOT BE USED. THE CUT PIPE END SHALL BE DEBURRED AND SMOOTH IN ORDER TO SEAL AGAINST THE NEOPRENE GASKET ATTACHED TO THE ANTENNA MOUNT.
3. PRIOR TO INSTALLATION CONTRACTOR SHALL TEST GPS LOCATION WITH HAND HELD AND MOVE GPS ANTENNA TO OTHER ICE BRIDGE POSTS AS REQUIRED TO ACHIEVE ADEQUATE SIGNAL. FAILURE TO ACHIEVE ADEQUATE SIGNAL WITH A HAND HELD GPS SHALL BE REPORTED TO CONSTRUCTION MANAGER AND ENGINEER TO DETERMINE ALTERNATE INSTALLATION LOCATION FOR GPS ANTENNA.

4 / C-1 **GPS GROUNDING / MOUNTING BRACKET DETAILS**
NOT TO SCALE



2 / C-1 **TOWER ELEVATION**
SCALE: 1" = 15'

GRAPHIC SCALE
(IN FEET)
1 inch = 15 ft.

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

DATE	DRAWN BY	CHK'D BY	
3/24/11	DEB	CFC	CONSTRUCTION - CLIENT REVIEW
04/05/11	DEB	CFC	CONSTRUCTION - CLIENT REVIEW

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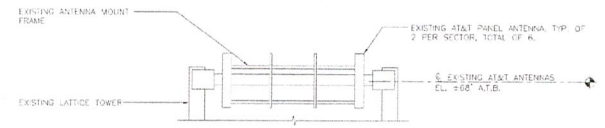
AT&T MOBILITY
WIRELESS COMMUNICATIONS FACILITY
SITE NUMBER: CT2133
SITE NAME: S. DANBURY
MOSES MOUNTAIN
DANBURY, CT

DATE:	3/24/11
SCALE:	AS NOTED
JOB NO.	11021.0220

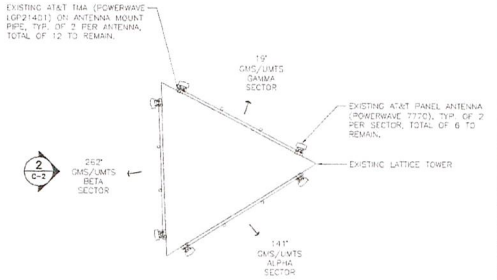
PLANS AND ELEVATION

C-1

Sheet No. 3 of 5



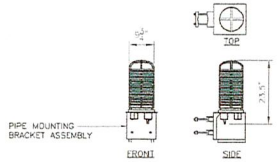
2 C-2 **EXISTING ANTENNA SECTOR ELEVATION**
SCALE: 3/16" = 1'-0"



NOTE:
EXISTING GSM/UMTS TMA's ON VACANT ANTENNA MOUNTS TO BE RELOCATED TO GSM/UMTS ANTENNA MOUNT PIPE BEHIND EXISTING ANTENNA.

1 C-2 **EXISTING ANTENNA PLAN**
SCALE: 3/16" = 1'-0"

NORTH



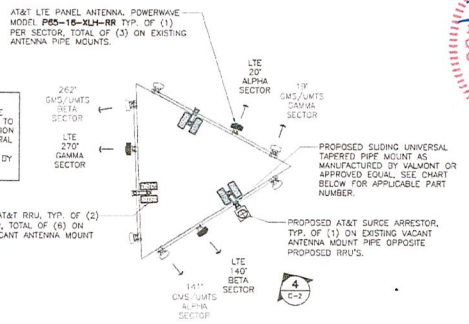
4 C-2 **PROPOSED ANTENNA SECTOR ELEVATION**
SCALE: 3/16" = 1'-0"

NOTE:
REPLACE EXISTING ANTENNA MOUNT PIPES AS REQUIRED TO ACCOMMODATE PROPOSED LTE ANTENNAS, RRU'S & SURGE ARRESTOR.

SURGE ARRESTOR				
SITE TYPE	ARRESTOR MAKE/MODEL	QTY REQUIRED	ARRESTOR LOCATION	WEIGHT
TOWER	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.

8 C-2 **SURGE ARRESTOR DETAIL**
NOT TO SCALE

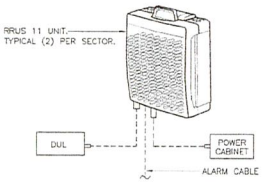


NOTE:
FINAL ANTENNA & RRU/SURGE ARRESTOR MOUNTING DETAILS TO BE PROVIDED UPON VERIFICATION OF EXISTING TOWER STRUCTURAL MEMBER SIZES AND CONFIGURATION AS PROVIDED BY TOWER OWNER.

SLIDING UNIVERSAL TAPERED PIPE MOUNT				
MAKE	PART #	DESCRIPTION	PIPE OD	STANDOFF
VALMONT	TAM-2U	TWO BRACKETS, U-BOLTS AND HDWR	2 3/8" AND 2 7/8"	1'- 0"
VALMONT	TAM-3U	TWO BRACKETS, U-BOLTS AND HDWR	3 1/2" AND 4 1/2"	1'- 0"

3 C-2 **PROPOSED ANTENNA/RRU PLAN**
SCALE: 3/16" = 1'-0"

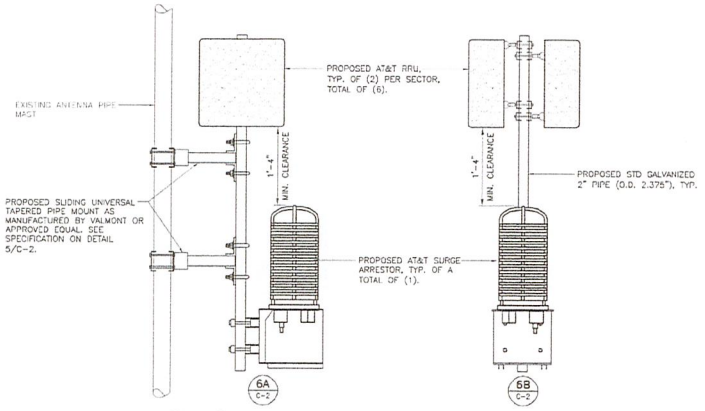
NORTH



RRU (REMOTE RADIO UNIT)			
EQUIPMENT	DIMENSIONS	WEIGHT	CLEARANCES
MAKE: ERRICSON MODEL: RRUS 11	17.8"L x 17.3"W x 7.2"D	BAND 4: 44 LBS. BAND 12: 50 LBS.	ABOVE: 16" MIN. BELOW: 12" MIN. SIDE: 0" MIN.

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

7 C-2 **RRU DETAIL**
NOT TO SCALE



6A C-2 6B C-2 **RRU AND SURGE ARRESTOR MOUNTING DETAILS**
NOT TO SCALE

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

REV.	DATE	DRAWN BY	CHK'D BY	DESCRIPTION
1	04/08/11	DEB	CFC	CONSTRUCTION DOCUMENTS - CLIENT REVIEW

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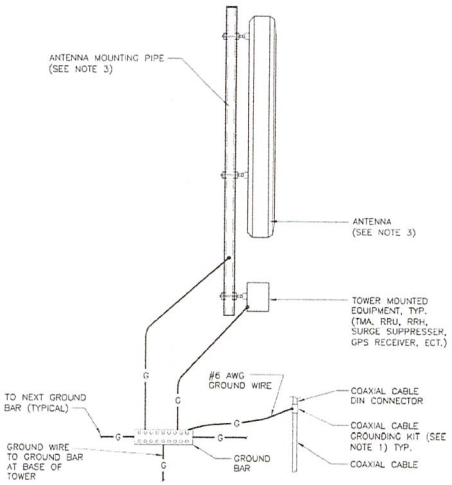
AT&T MOBILITY
WIRELESS COMMUNICATIONS FACILITY
SITE NUMBER: CT2133
SITE NAME: S. DANBURY
MOSES MOUNTAIN
DANBURY, CT.

DATE:	3/24/11
SCALE:	AS NOTED
JOB NO.	11021.C020

LTE SYSTEM EQUIPMENT PLANS AND DETAILS

C-2

Sheet No. 4 of 8

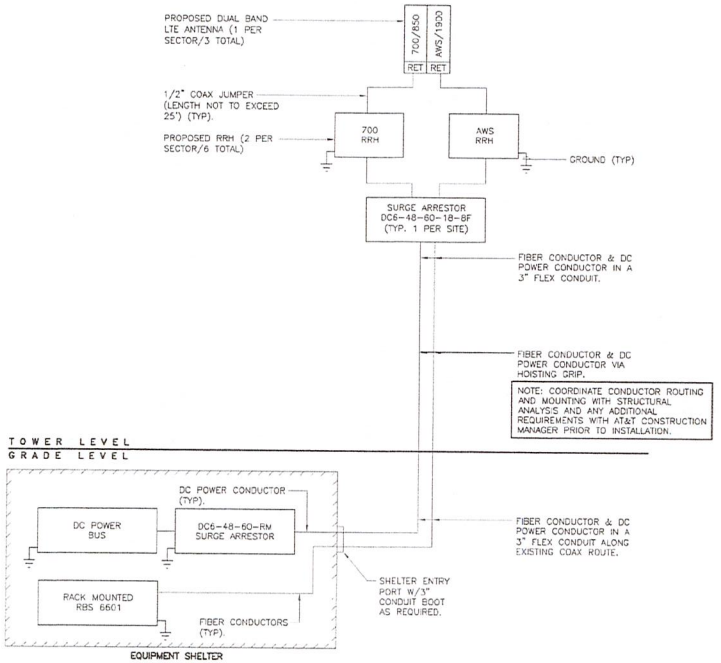


NOTES:

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 TYPICAL ANTENNA GROUNDING DETAIL

E-1 NOT TO SCALE

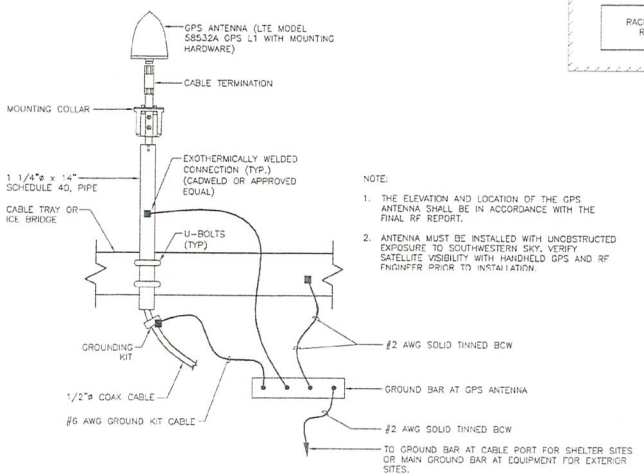


NOTES:

1. CONTRACTOR TO CONFIRM ALL PARTS.
2. INSTALL ALL EQUIPMENT TO MANUFACTURERS RECOMMENDATIONS.

2 LTE SCHEMATIC DIAGRAM

E-1 NOT TO SCALE



NOTE:

1. THE ELEVATION AND LOCATION OF THE GPS ANTENNA SHALL BE IN ACCORDANCE WITH THE FINAL RF REPORT.
2. ANTENNA MUST BE INSTALLED WITH UNOBSTRUCTED EXPOSURE TO SOUTHWESTERN SKY. VERIFY SATELLITE VISIBILITY WITH HANDHELD GPS AND RF ENGINEER PRIOR TO INSTALLATION.

3 GPS MOUNTED TO CABLE TRAY / ICE BRIDGE

E-1 NOT TO SCALE

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 MU"

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.

DESIGNED BY:	CKD
DRAWN BY:	TJB
CHK'D BY:	CKD

REV.	DATE	DRAWN BY	CHK'D BY	
1	04/05/11	TJB	CKD	CONSTRUCTION - CLIENT REVIEW
0	3/24/11	TJB	CKD	CONSTRUCTION - CLIENT REVIEW

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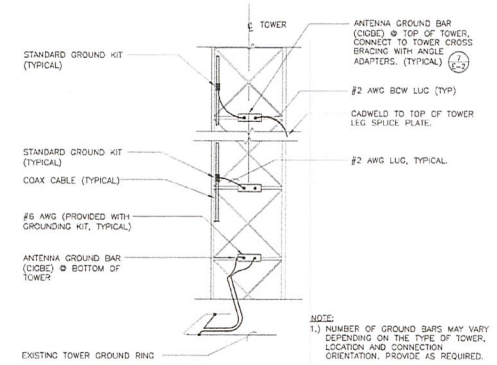
WIRELESS COMMUNICATIONS FACILITY
SITE NUMBER: CT2133
SITE NAME: S. DANBURY
MOSES MOUNTAIN
DANBURY, CT

DATE:	3/24/11
SCALE:	AS NOTED
JOB NO.	11021.0020

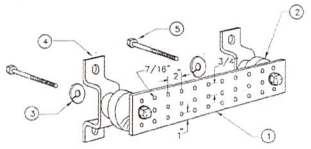
ELECTRICAL DETAILS AND NOTES

E-1

Sheet No. 5 of 8



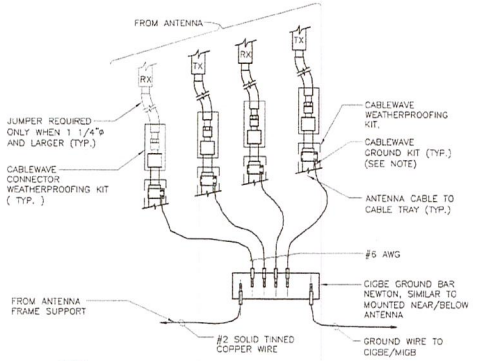
1 E-2 ANTENNA CABLE GROUNDING - LATTICE
NOT TO SCALE



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.

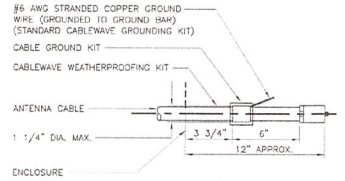
2 E-2 GROUND BAR DETAIL
NOT TO SCALE



NOTE:

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

3 E-2 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.

4 E-2 ANTENNA CABLE GROUNDING DETAIL
NOT TO SCALE

DESIGNED BY:	CKD
DRAWN BY:	TJB
CHK'D BY:	CKD

NO.	DESCRIPTION	DATE	DRAWN BY	CHK'D BY
1	CONSTRUCTION - CLIENT REVIEW	3/29/11	DEB	CFC
0	CONSTRUCTION	03/08/11	FLG	CFC

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SITE NUMBER: CT2133
SITE NAME: S. DANBURY

MOSES MOUNTAIN
DANBURY, CT

DATE:	3/24/11
SCALE:	AS NOTED
JOB NO.	11021.C020

ELECTRICAL DETAILS

E-2

Sheet No. 6 of 8

EXHIBIT 2

AT&T Towers
5405 Windward Parkway
Alpharetta, GA 30004
770-708-6100
Friday, March 16, 2012

RIGOROUS STRUCTURAL ANALYSIS
65' SST

AT&T DESIGNATION:	Site ID:	SNET005-A
	Site FA:	10137472
	Site Name:	Danbury
	Project Number:	12-03174E S1
ANALYSIS CRITERIA:	Codes:	TIA/EIA-222-F
SITE DATA:	144 Old Boston Post Road, Danbury, CT 06810, Fairfield County Latitude 41.3595, Longitude 73.4655 Market: MA/RI/VT/NH/ME/CT 65' SST	

Mr. Marty Jelleme

FDH Engineering Inc. is pleased to submit this Structural Analysis Report to determine the structural integrity of the aformentioned tower. The purpose of the analysis is to determine the suitability of the tower with the existing and proposed loading configuration detailed in the analysis report.

Analysis Results

Tower Stress Level with Proposed Equipment:	93.10%	Pass
Foundation Ratio with Proposed Equipment:	94.00%	Pass

We at FDH Engineering Inc. appreciate the opportunity of providing our continuing professional services to you and AT&T Towers. If you have any questions or need further assistance on this or any other projects please give us a call.

Respectfully Submitted by:	Stephanie Amortnont, PE
Analysis Prepared by:	Stephanie Amortnont, PE
Analysis Reviewed by:	Christopher M. Murphy, PE

FDH Engineering, Inc., 2730 Rowland Rd. Raleigh, NC 27615, Ph. 919.755.1012, Fax 919.755.1031

Structural Analysis for AT&T Towers

65' Self-Support Tower

AT&T Towers Site Name: Danbury
AT&T Towers Site USID: SNET005-A
New Cingular Site Name: Danbury South
New Cingular Site ID: CT2133

FDH Project Number 12-03174E S1

Analysis Results*

Tower Components	93.1%	Sufficient
Foundation	94.0%	Sufficient

*Analysis results are only valid after the modification have been installed per FDH Modification Drawings (Project No. 12-03174E S1)

Prepared By:

Stephanie Amortnont

Stephanie Amortnont, PE
Project Engineer

Reviewed By:

Christopher M Murphy

Christopher M Murphy, PE
President
CT PE License No. 25842

FDH Engineering, Inc.
2730 Rowland Rd.
Raleigh, NC 27615
(919) 755-1012
info@fdh-inc.com

March 16, 2012

Prepared pursuant to TIA/EIA-222-F Structural Standards for Steel Antenna Towers and Antenna Supporting Structures

TABLE OF CONTENTS

EXECUTIVE SUMMARY

At the request of AT&T Towers, FDH Engineering, Inc. performed a structural analysis of the existing self-supported tower located in Danbury, CT to determine whether the tower is structurally adequate to support both the existing and proposed loads pursuant to the *Structural Standards for Steel Antenna Towers and Antenna Supporting Structures, TIA/EIA-222-F.* Information pertaining to the existing/proposed antenna loading, current tower geometry, the member sizes, soil parameters and foundation dimensions was obtained from:

- FDH, Inc. (Job No. 11-07130T T1) Self-Support Tower Mapping Report dated August 23, 2011
- FDH Engineering, Inc. (Project No. 11-07110E N1) Dispersive Wave Propagation Testing of an Existing Tower Foundation dated August 23, 2011
- FDH Engineering, Inc. (Project No. 11-07110E G1) Geotechnical Evaluation of Subsurface Conditions dated August 24, 2011
- FDH Engineering, Inc. (Project No. 12-03174E S1) Modification Drawings for a 65' Self-Support Tower dated March 16, 2012
- AT&T Towers

The *basic design wind speed* per the *TIA/EIA-222-F* standards is 85 mph without ice and 74 mph with 1/2" radial ice.

Conclusions

With the existing and proposed antennas from New Cingular in place at 64 ft, the tower meets the requirements of the *TIA/EIA-222-F* standards provided the **Recommendations** below are satisfied. Furthermore, given the existing foundation dimensions (see FDH Project No. 11-07110E N1), and given soil parameters (see FDH Project No. 11-07110E G1), the foundation should have the necessary capacity to support the existing and proposed loading. For a more detailed description of the analysis of the tower, see the **Results** section of this report.

Our structural analysis has been performed assuming all information provided to FDH Engineering, Inc. is accurate (i.e., the steel data, tower layout, existing antenna loading, and proposed antenna loading) and that the tower has been properly erected and maintained per the original design drawings.

Recommendations

To ensure the requirements of the *TIA/EIA-222-F* standards are met with the existing and proposed loading in place, we have the following recommendations:

1. Coax lines must be installed as show in **Figure 1**.
2. The proposed TMAs and RRHs should be installed directly behind the existing and proposed panel antennas.
3. Modifications should be installed per FDH Engineering, Inc. (Project No. 12-03174E S1) Modification Drawings for a 65' Self-Support Tower dated March 16, 2012.

APPURTENANCE LISTING

The proposed and existing antennas with their corresponding cables/coax lines are shown in **Table 1**. *If the actual layout determined in the field deviates from the layout, FDH Engineering, Inc. should be contacted to perform a revised analysis.*

Table 1 - Appurtenance Loading

There is a model change to LGP17210 will not make a difference in the structural

Existing Loading:

Antenna Elevation (ft)	Description	Coax and Lines	Coax No.	Carrier	Mount Elevation (ft)	Mount Type
73.5	(1) GPS	(1) 1/2"	19	Verizon	72	(1) 28" x 1.6" Pipe Mount
72.6	(1) Antenex 5 Element (38" x 13.5") Yagi	(1) 3/8"	38	---	68	(1) 5.25' x 2.4" Pipe Mount
69	(2) Antel BXA-70063/6CF W/Mount Pipe (4) Decibel DB846F65ZAXY w/Mount Pipe (4) Antel LPA-185063/12CF W/Mount Pipe	(12) 1 5/8"	11-18; 48-51	Verizon	66.5	(2) I-Beam Mounts
64	(6) Powerwave 7770.00 W/Mount Pipe (6) Powerwave LGP13519 TMAs (6) Powerwave 14.5"x9.25"x2.5" TMAs	(12) 1 5/8"	22-33, 45-47	New Cingular	62.5	(3) 8.3' Face Mount T-Frames
60.5	(1) RFS 6' Dish	(1) WE65	2	State Police	61.5	5.7'x4.5" Pipe Mount
57	(1) RFS 6' Dish	(1) WE65	1		58	(1) 6.6'x4.5" Pipe Mount
---	---	---	---	---	58	(1) 14.7'x3.5" Pipe Mount
65	(1) TX/RX Systems 15.5'x3.5" Omni	(1) 1 1/4"	42	---	57.5	(1) 2' Standoff
55	(1) 9.5'x1.75" 4-Element Dipole	(1) 1/2"	21	---	56.5	(1) 14.5'x1.9" Pipe Mount
59	(1) Adtran 13"x10.5"x3.5" TMA	(1) 1/2"	34	---		(1) 16'x3.5" Pipe Mount
57.5	(1) Radiowaves SPD2-5.8 Dish					
---	---	---	---	---	56	(1) 7.7'x1.6" Pipe Mount
65	(1) Telewave 21'x2.5" Omni	(1) 1/2"	37	---	54.5	(1) 8' Standoff
57.5	(1) 7.25'x0.95" Omni	---	---	---	52.5	(1) 5'x2.4" Pipe Mount
---	---	---	---	---		(1) 5'x2.4" Pipe Mount
58.5	(1) Telewave 4-Element (10'x1.6") Dipole	(1) 1/2"	40	---		(1) 5'x2.4" Pipe Mount
55	(1) 5-Element (80.5"x3.7") Yagi	(1) 1/2"	36	---		(1) 5'x2.4" Pipe Mount
59.5	(1) TX/RX Systems 9.25'x3.5" Omni	(2) 1 5/8"	5-6	State Police	51.5	(1) 6.5' I-Beam Standoff
46.5	(1) Telewave 4-Element (10'x1.6") Dipole	(2) 7/8"	3-4			
59.5	(1) Decibel 10'x3" Omni	(1) 1 5/8"	8			(1) 9.5' I-Beam Standoff
57.5	(1) Antel 11.5'x2.5" Omni	(1) 1 1/4"	35			
51.5	(1) 20"x16"x7.25" TMA	(2) 3/8"	9-10			
45.5	(1) Decibel 10'x3" Omni	(1) 1 5/8"	7			
51.5	(1) 4'x2.4" Pipe Mount	---	---	---		(1) 10.5' I-Beam Standoff
45.5	(1) Decibel 10'x3" Omni	(1) 1 1/4"	44	---	50.5	(1) 6.5' Standoff
---	---	---	---	---		(2) 15" Standoffs
46	(1) Decibel DB636NS-C Omni	(1) 1 1/4"	43	---		(1) 6.5' Standoff
52.5	(1) 20.5"x6.75"x4.5" TMA	(1) 1/2"	39	Skytel		(1) 15" Standoff
43.5	(1) Scala 11'x2" Omni					
46.5	(1) Scala PRFTV-48/75 Grid Dish	(1) 1/2"	20	---	46.5	(1) 5' Standoff

Proposed Loading:

Antenna Elevation (ft)	Description	Coax and Lines	Coax No.	Carrier	Mount Elevation (ft)	Mount Type	Antenna Azimuth (°)
64	(3) Powerwave P65-16-XLH-RR w/ Mount Pipe (6) Ericsson RBS 6000 RRHs (6) Powerwave LGP21401 TMAs (1) Raycap DC6-48-60-18-8F Surge Suppressor (1) GPS	(3) 1/2" (2) DC Cables (1) Fiber Cable	45-47, 52-54	AT&T	62.5	(3) 8.3' Face Mount T-Frames	20, 140, 270

There is model change to TT08-19-DB111-001 and will not change structural

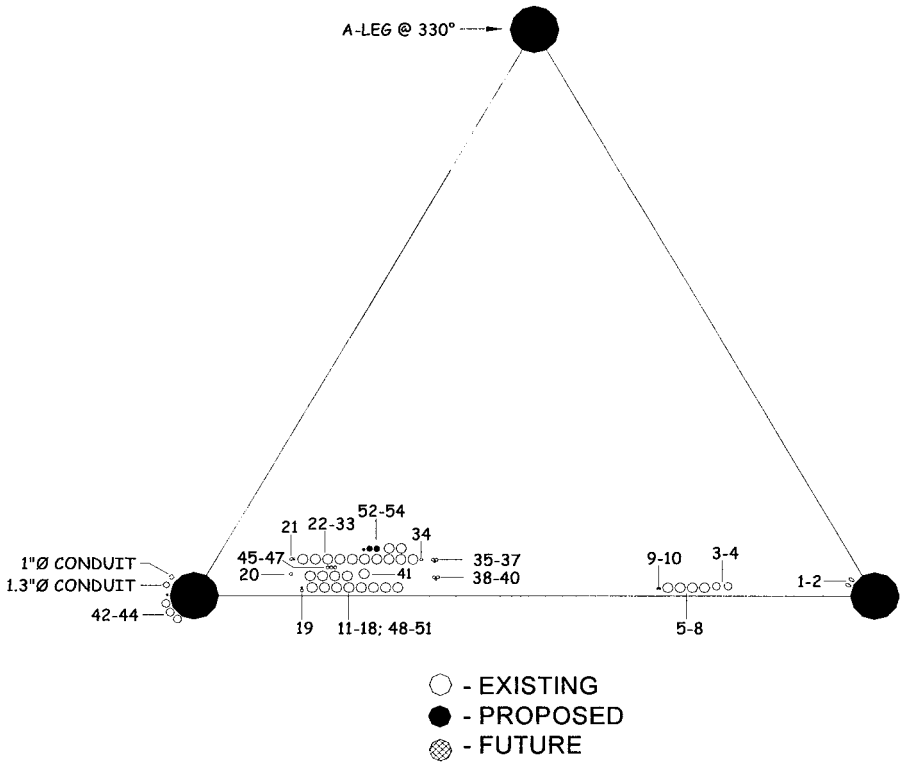


Figure 1 – Coax Layout

RESULTS

The following yield strength of steel for individual members was used for analysis:

Table 2 - Material Strength

Member Type	Yield Strength
Legs	36 ksi (Assumed)
Bracing	36 ksi (Assumed)

Table 3 displays the summary of the ratio (as a percentage) of force in the member to their capacities. Values greater than 100% indicate locations where the maximum force in the member exceeds its capacity. **Table 4** displays the maximum foundation reactions.

If the assumptions outlined in this report differ from actual field conditions, FDH Engineering, Inc. should be contacted to perform a revised analysis. Furthermore, as no information pertaining to the allowable twist and sway requirements for the existing or proposed appurtenances was provided, deflection and rotation were not taken into consideration when performing this analysis.

See the **Appendix** for detailed modeling information

Table 3 - Summary of Working Percentage of Structural Components

Section No.	Elevation ft	Component Type	Size	% Capacity*	Pass Fail
T1	65 - 50.1042	Leg	15.5"Ø x 0.260 8-Sided Polygon	34.2	Pass
		Top Girt	12.45"Ø x 0.265 8-Sided Polygon	37.8	Pass
T2	50.1042 - 48.1042	Leg	15.5"Ø x 0.260 8-Sided Polygon	52.1	Pass
		Horizontal	12.45"Ø x 0.265 8-Sided Polygon	73.7	Pass
T3	48.1042 - 25.1667	Leg	15.5"Ø x 0.260 8-Sided Polygon	93.1	Pass
		Horizontal	W10x26	85.4	Pass
T4	25.1667 - 0	Leg	15.5"Ø x 0.260 8-Sided Polygon	21.1	Pass
		Diagonal	W6x25	23.3 37.5 (b)	Pass
		Horizontal	12.45"Ø x 0.265 8-Sided Polygon	0.8 1.5 (b)	Pass

*Capacities include 1/3 allowable increase for wind.

Table 4 - Maximum Base Reactions

Load Type	Direction	Current Analysis* *(TIA/EIA-222-F)*	Original Design
Individual Foundation	Horizontal	17 k	---
	Uplift	76 k	---
	Compression	102 k	---
Overturning Moment	---	1,111 k-ft	---

*Foundation adequate per independent analysis.

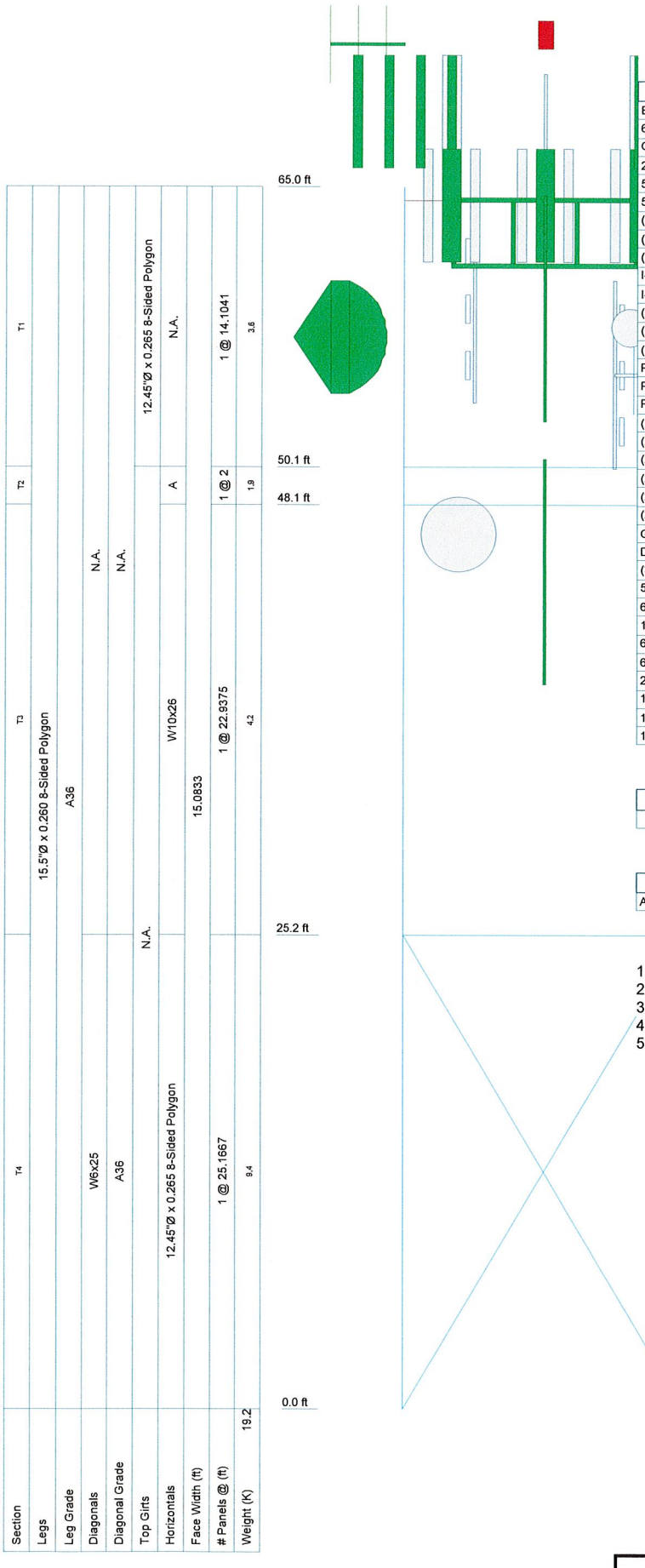
GENERAL COMMENTS

This engineering analysis is based upon the theoretical capacity of the structure. It is not a condition assessment of the tower and its foundation. It is the responsibility of AT&T Towers to verify that the tower modeled and analyzed is the correct structure (with accurate antenna loading information) modeled. If there are substantial modifications to be made or the assumptions made in this analysis are not accurate, FDH Engineering, Inc. should be notified immediately to perform a revised analysis.

LIMITATIONS

All opinions and conclusions are considered accurate to a reasonable degree of engineering certainty based upon the evidence available at the time of this report. All opinions and conclusions are subject to revision based upon receipt of new or additional/updated information. All services are provided exercising a level of care and diligence equivalent to the standard and care of our profession. No other warranty or guarantee, expressed or implied, is offered. Our services are confidential in nature and we will not release this report to any other party without the client's consent. The use of this engineering work is limited to the express purpose for which it was commissioned and it may not be reused, copied, or distributed for any other purpose without the written consent of FDH Engineering, Inc.

APPENDIX



Section	T1	T2	T3	T4
Legs	12.45"Ø x 0.265 8-Sided Polygon	A	W10x26	12.45"Ø x 0.265 8-Sided Polygon
Leg Grade	N.A.	N.A.	A36	A36
Diagonals	N.A.		W6x25	
Diagonal Grade	N.A.		A36	
Top Girts	N.A.			
Horizontals	N.A.		15.0833	
Face Width (ft)	3.6	1.9	4.2	8.4
# Panels @ (ft)	1 @ 14.1041	1 @ 2	1 @ 22.9375	1 @ 25.1667
Weight (K)	19.2			

DESIGNED APPURTENANCE LOADING

TYPE	ELEVATION	TYPE	ELEVATION
Beacon	65	13"x10.5"x3.5" TMA	56.5
6.5' x 4.5" Pipe Mount	65	9.5'x1.75" 4-Element Dipole	56.5
GPS	65	SPD2-5.8	56.5
28" x 1.6" Pipe Mount Mnt	65	7.7'x1.6" Pipe Mount Mnt	56
5 Element (38" x 13.5") Yagi	65	21'x2.5" Omni	54.5
5.25' x 2.4" Pipe Mount	65	8' Standoff Mnt	54.5
(2) BXA-70063/6CF W/Mount Pipe	65	5'x2.4" Pipe Mount	52.5
(4) DB846F65ZAXY w/Mount Pipe	65	10'x1.6" Omni	52.5
(4) LPA-185063/12CF W/Mount Pipe	65	5-Element (80.5"x3.7") Yagi	52.5
I-Beam Mnt	65	4-Element (10'x1.6") Dipole	52.5
I-Beam Mnt	65	7.25'x0.95" Omni	52.5
(2) 7770.00 W/Mount Pipe	62.5	(2) 5'x2.4" Pipe Mount	52.5
(2) 7770.00 W/Mount Pipe	62.5	5'x2.4" Pipe Mount	52.5
(2) 7770.00 W/Mount Pipe	62.5	10.5' I-Beam Standoff	51.5
P65-16-XLH-RR w/ Mount Pipe	62.5	4'x2.4" Pipe Mount Mnt	51.5
P65-16-XLH-RR w/ Mount Pipe	62.5	11.5'x2.5" Omni	51.5
P65-16-XLH-RR w/ Mount Pipe	62.5	10'x3" Omni	51.5
(2) LGP21401 TMA	62.5	20"x16"x7.25" TMA	51.5
(2) LGP21401 TMA	62.5	10'x3" Omni	51.5
(2) LGP21401 TMA	62.5	9.5' I-Beam Standoff Mnt	51.5
(2) RBS 6000 RRH	62.5	9.25'x3.5" Omni	51.5
(2) RBS 6000 RRH	62.5	4-Element (10'x1.6") Dipole	51.5
(2) RBS 6000 RRH	62.5	6.5' I-Beam Standoff Mnt	51.5
GPS	62.5	(1) 15" Standoff Mnt	50.5
DC6-48-60-18-8F	62.5	DB636NS-C	50.5
(3) 8.3' Face Mounted T-Frames Mnt	62.5	6.5' Standoff	50.5
5.7'x4.5" Pipe Mount Mnt	61.5	11'x2" Omni	50.5
6' Dish	61.5	(1) 15" Standoff Mnt	50.5
14.7'x3.5" Pipe Mount Mnt	58	20.5"x6.75"x4.5" TMA	50.5
6.6'x4.5" Pipe Mount Mnt	58	10'x3" Omni	50.5
6' Dish	58	6.5' Standoff Mnt	50.5
2' Standoff Mnt	57.5	(1) 15" Standoff Mnt	50.5
15.5'x3.5" Omni	57.5	5' Standoff Mnt	46.5
14.5x1.9" Pipe Mount Mnt	56.5	PRFTV-48/75 Grid Dish	46.5
16'x3.5" Pipe Mount Mnt	56.5		

SYMBOL LIST

MARK	SIZE	MARK	SIZE
A	12.45"Ø x 0.265 8-Sided Polygon		

MATERIAL STRENGTH

GRADE	Fy	Fu	GRADE	Fy	Fu
A36	36 ksi	58 ksi			

TOWER DESIGN NOTES

1. Tower is located in Fairfield County, Connecticut.
2. Tower designed for a 85 mph basic wind in accordance with the TIA/EIA-222-F Standard.
3. Tower is also designed for a 74 mph basic wind with 0.50 in ice.
4. Deflections are based upon a 50 mph wind.
5. TOWER RATING: 93.1%

SHEAR: 17 K

UPLIFT: -75 K
SHEAR: 16 K

AXIAL
41 K

SHEAR 29 K — *MOMENT 1157 kip-ft*

TORQUE 42 kip-ft
74 mph WIND - 0.5000 in ICE

AXIAL
29 K

SHEAR 27 K — *MOMENT 1111 kip-ft*

TORQUE 44 kip-ft
REACTIONS - 85 mph WIND

FDH ENGINEERING
FDH Engineering
2730 Rowland Road
Raleigh, NC 27615
Phone: (919) 755-1012
FAX: (919) 800-9373
Tower Analysis

Job: *Danbury, CT (SNET005-A)*			
Project: *12-03174E S1*			
Client: AT&T Towers	Drawn by: Stephanie Amortnont	App'd:	
Code: TIA/EIA-222-F	Date: 03/16/12	Scale: NTS	
Path: \\FDH-SERVER\Projects\2012 Projects\3 - March\12-03174E\Danbury, CT\S1 - Mod. ATT\Analysis\Danbury, CT_(SNET005-A).eri		Dwg No. E-1	

tnxTower	Job	Page
	Danbury, CT (SNET005-A)	1 of 22
FDH Engineering 2730 Rowland Road Raleigh, NC 27615 Phone: (919) 755-1012 FAX: (919) 800-9373	Project 12-03174E S1	Date 13:20:20 03/16/12
	Client AT&T Towers	Designed by Stephanie Amortnont

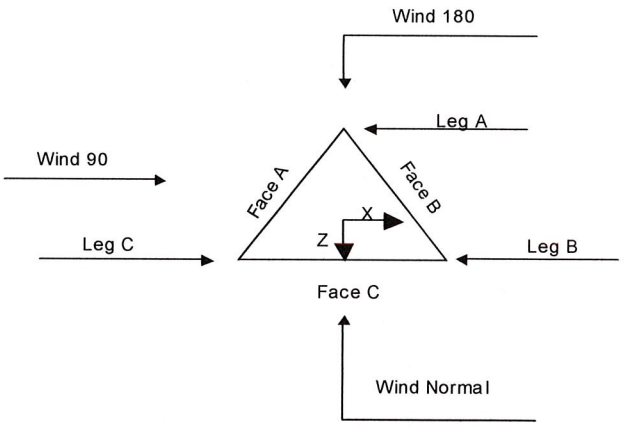
Tower Input Data

The main tower is a 3x free standing tower with an overall height of 65.00 ft above the ground line.
The base of the tower is set at an elevation of 0.00 ft above the ground line.
The face width of the tower is 15.08 ft at the top and 15.08 ft at the base.
This tower is designed using the TIA/EIA-222-F standard.
The following design criteria apply:

- Tower is located in Fairfield County, Connecticut.
- Basic wind speed of 85 mph.
- Nominal ice thickness of 0.5000 in.
- Ice density of 56 pcf.
- A wind speed of 74 mph is used in combination with ice.
- Temperature drop of 50 °F.
- Deflections calculated using a wind speed of 50 mph.
- Pressures are calculated at each section.
- Stress ratio used in tower member design is 1.333.
- Local bending stresses due to climbing loads, feedline supports, and appurtenance mounts are not considered.

Options

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



Triangular Tower

Tower Section Geometry

Tower Section	Tower Elevation	Assembly Database	Description	Section Width	Number of Sections	Section Length
	ft			ft		ft
T1	65.00-50.10			15.08	1	14.90
T2	50.10-48.10			15.08	1	2.00
T3	48.10-25.17			15.08	1	22.94
T4	25.17-0.00			15.08	1	25.17

Tower Section Geometry *(cont'd)*

Tower Section	Tower Elevation	Diagonal Spacing	Bracing Type	Has K Brace End Panels	Has Horizontals	Top Girt Offset	Bottom Girt Offset
	ft	ft				in	in
T1	65.00-50.10	14.10	X Brace	No	Yes	9.5000	0.0000
T2	50.10-48.10	2.00	X Brace	No	Yes	0.0000	0.0000
T3	48.10-25.17	22.94	X Brace	No	Yes	0.0000	0.0000
T4	25.17-0.00	25.17	X Brace	No	Yes	0.0000	0.0000

Tower Section Geometry *(cont'd)*

Tower Elevation ft	Leg Type	Leg Size	Leg Grade	Diagonal Type	Diagonal Size	Diagonal Grade
T1 65.00-50.10	Arbitrary Shape	15.5"Ø x 0.260 8-Sided Polygon	A36 (36 ksi)	Equal Angle		A36 (36 ksi)
T2 50.10-48.10	Arbitrary Shape	15.5"Ø x 0.260 8-Sided Polygon	A36 (36 ksi)	Equal Angle		A36 (36 ksi)
T3 48.10-25.17	Arbitrary Shape	15.5"Ø x 0.260 8-Sided Polygon	A36 (36 ksi)	Wide Flange		A36 (36 ksi)
T4 25.17-0.00	Arbitrary Shape	15.5"Ø x 0.260 8-Sided Polygon	A36 (36 ksi)	Wide Flange	W6x25	A36 (36 ksi)

Tower Section Geometry *(cont'd)*

Tower Elevation ft	No. of Mid Girts	Mid Girt Type	Mid Girt Size	Mid Girt Grade	Horizontal Type	Horizontal Size	Horizontal Grade
T1 65.00-50.10	None	Flat Bar		A36 (36 ksi)	Arbitrary Shape	12.45"Ø x 0.265 8-Sided Polygon	A36 (36 ksi)
T2 50.10-48.10	None	Flat Bar		A36 (36 ksi)	Arbitrary Shape	12.45"Ø x 0.265 8-Sided Polygon	A36 (36 ksi)
T3 48.10-25.17	None	Flat Bar		A36 (36 ksi)	Wide Flange	W10x26	A572-50 (50 ksi)
T4 25.17-0.00	None	Flat Bar		A36 (36 ksi)	Arbitrary Shape	12.45"Ø x 0.265 8-Sided Polygon	A36 (36 ksi)

Tower Section Geometry *(cont'd)*

Tower Elevation ft	Gusset Area (per face) ft^2	Gusset Thickness in	Gusset Grade	Adjust. Factor A_f	Adjust. Factor A_r	Weight Mult.	Double Angle Stitch Bolt Spacing Diagonals in	Double Angle Stitch Bolt Spacing Horizontals in
T1 65.00-50.10	0.00	0.0000	A36 (36 ksi)	1	1	1	36.0000	36.0000
T2 50.10-48.10	0.00	0.0000	A36 (36 ksi)	1	1	1	36.0000	36.0000
T3 48.10-25.17	0.00	0.0000	A36 (36 ksi)	1	1	1	36.0000	36.0000
T4 25.17-0.00	0.00	0.0000	A36 (36 ksi)	1	1	1	36.0000	36.0000

Tower Section Geometry *(cont'd)*

Tower Elevation ft	Calc K Single Angles	Calc K Solid Rounds	K Factors[1] Legs	X Brace Diags X Y	K Brace Diags X Y	Single Diags X Y	Girts X Y	Horiz. X Y	Sec. Horiz. X Y	Inner Brace X Y

Tower Elevation ft	Calc K Single Angles	Calc K Solid Rounds	K Factors[1] Legs	X Brace Diags X	X Brace Diags Y	K Single Diags X	K Single Diags Y	Girts X	Girts Y	Horiz. X	Horiz. Y	Sec. Horiz. X	Sec. Horiz. Y	Inner Brace X	Inner Brace Y
T1 65.00-50.10	Yes	Yes	1	1	1	1	1	1	1	1	1	1	1	1	1
T2 50.10-48.10	Yes	Yes	1	1	1	1	1	1	1	1	1	1	1	1	1
T3 48.10-25.17	Yes	Yes	1	1	1	1	1	1	1	1	1	1	1	1	1
T4 25.17-0.00	Yes	Yes	1	1	1	1	1	1	1	1	1	1	1	1	1

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

Tower Section Geometry *(cont'd)*

Tower Elevation ft	Leg Net Width Deduct in	Leg U	Diagonal Net Width Deduct in	Diagonal U	Top Girt Net Width Deduct in	Top Girt U	Bottom Girt Net Width Deduct in	Bottom Girt U	Mid Girt Net Width Deduct in	Mid Girt U	Long Horizontal Net Width Deduct in	Long Horizontal U	Short Horizontal Net Width Deduct in	Short Horizontal U
T1 65.00-50.10	0.0000	1	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75
T2 50.10-48.10	0.0000	1	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75
T3 48.10-25.17	0.0000	1	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75
T4 25.17-0.00	0.0000	1	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75

Tower Section Geometry *(cont'd)*

Tower Elevation ft	Leg Connection Type	Leg Bolt Size in	Leg No.	Diagonal Bolt Size in	Diagonal No.	Top Girt Bolt Size in	Top Girt No.	Bottom Girt Bolt Size in	Bottom Girt No.	Mid Girt Bolt Size in	Mid Girt No.	Long Horizontal Bolt Size in	Long Horizontal No.	Short Horizontal Bolt Size in	Short Horizontal No.
T1 65.00-50.10	Flange	1.0000 A325N	0	0.6250 A325N	0	1.2500 A325N	4	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0
T2 50.10-48.10	Flange	1.0000 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	1.2500 A325N	0	0.6250 A325N	0
T3 48.10-25.17	Flange	2.2500 A572-50	4	0.7500 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	1.2500 A325N	4	0.6250 A325N	0
T4 25.17-0.00	Flange	2.2500 A572-50	4	0.7500 A325N	6	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	1.2500 A325N	4	0.6250 A325N	0

Feed Line/Linear Appurtenances - Entered As Round Or Flat

Description	Face or Leg	Allow Shield	Component Type	Placement ft	Face Offset in	Lateral Offset (Frac FW)	#	# Per Row	Clear Spacing in	Width or Diameter in	Perimeter in	Weight plf

Description	Face or Leg	Allow Shield	Component Type	Placement ft	Face Offset in	Lateral Offset (Frac FW)	#	# Per Row	Clear Spacing in	Width or Diameter in	Perimeter in	Weight plf
***												
WE65	C	Yes	Ar (CfAe)	58.00 - 0.00	-2.0000	-0.5	2	2	0.5000	1.5836		0.53
WE65	C	Yes	Ar (CfAe)	61.50 - 58.00	-2.0000	-0.5	1	1	0.5000	1.5836		0.53
***												
7/8	C	Yes	Ar (CfAe)	51.50 - 0.00	-1.0000	-0.3	2	2	0.5000	1.1100		0.54
1 5/8	C	Yes	Ar (CfAe)	51.50 - 0.00	-1.0000	-0.25	4	4	0.5000	1.9800		1.04
LDF2-50A(3/8")	C	Yes	Ar (CfAe)	51.50 - 0.00	-1.0000	-0.18	2	2	0.4400	0.4400		0.08
***												
1 1/4	C	Yes	Ar (CfAe)	51.50 - 0.00	-3.0000	0.1	1	1	1.0000	1.5500		0.66
1/2	C	Yes	Ar (CfAe)	52.50 - 0.00	-2.0000	0.1	2	2	0.5000	0.5800		0.25
1/2	C	Yes	Ar (CfAe)	54.50 - 52.50	-2.0000	0.1	1	1	0.5000	0.5800		0.25
1/2	C	Yes	Ar (CfAe)	50.50 - 0.00	-0.5000	0.1	2	2	0.5000	0.5800		0.25
1/2	C	Yes	Ar (CfAe)	52.50 - 50.50	-0.5000	0.1	1	1	0.5000	0.5800		0.25
LDF2-50A(3/8")	C	Yes	Ar (CfAe)	65.00 - 0.00	-1.0000	0.1	1	1	0.4400	0.4400		0.08
***												
1/2	C	Yes	Ar (CfAe)	54.50 - 0.00	-4.0000	0.12	1	1	0.5800	0.5800		0.25
1 5/8	C	Yes	Ar (CfAe)	62.50 - 0.00	-4.0000	0.2	12	10	0.5000	1.9800		1.04
1/2	C	Yes	Ar (CfAe)	62.50 - 0.00	-3.0000	0.15	3	2	0.5800	0.5800		0.25
1 5/8	C	Yes	Ar (CfAe)	51.50 - 0.00	-3.0000	0.2	1	1	0.5000	1.9800		1.04
1 5/8	C	Yes	Ar (CfAe)	65.00 - 0.00	-1.0000	0.2	12	8	0.5000	1.9800		1.04
1/2	C	Yes	Ar (CfAe)	65.00 - 0.00	-1.0000	0.35	1	1	0.5800	0.5800		0.25
1/2	C	Yes	Ar (CfAe)	46.50 - 0.00	-3.0000	0.38	1	1	0.5800	0.5800		0.25
1/2	C	Yes	Ar (CfAe)	56.50 - 0.00	-4.0000	0.35	1	1	0.5800	0.5800		0.25
1 1/4	C	Yes	Ar (CfAe)	50.50 - 0.00	0.0000	0.5	3	3	0.5000	1.5500		0.66
1 1/4	C	Yes	Ar (CfAe)	57.50 - 50.50	0.0000	0.5	1	1	0.5000	1.5500		0.66
***												
1" conduit & 1.3" conduit	A	Yes	Ar (CfAe)	65.00 - 0.00	0.0000	-0.49	2	2	1.0000	1.0900		0.33
***												
Feedline Ladder (Af)	C	Yes	Af (CfAe)	65.00 - 0.00	-2.0000	0.25	1	1	3.0000	3.0000	9.0000	8.40
Feedline Ladder (Af)	C	Yes	Af (CfAe)	51.50 - 0.00	-2.0000	-0.25	1	1	3.0000	3.0000	9.0000	8.40
***												
3/4" DC Cable	C	Yes	Ar (CfAe)	62.50 - 0.00	-1.0000	0.3	2	2	0.2500	0.7500		0.33
3/8" Fiber Cable	C	Yes	Ar (CfAe)	62.50 - 0.00	-1.0000	0.35	1	1	0.4400	0.4400		0.08
***												

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
***							

Feed Line/Linear Appurtenances Section Areas

Tower Section	Tower Elevation ft	Face	A_R ft^2	A_F ft^2	C_AA_A In Face ft^2	C_AA_A Out Face ft^2	Weight K
T1	65.00-50.10	A	2.706	0.000	0.000	0.000	0.01

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
		B	0.000	0.000	0.000	0.000	0.00
		C	50.864	4.073	0.000	0.000	0.53
T2	50.10-48.10	A	0.363	0.000	0.000	0.000	0.00
		B	0.000	0.000	0.000	0.000	0.00
		C	10.935	1.000	0.000	0.000	0.11
T3	48.10-25.17	A	4.167	0.000	0.000	0.000	0.02
		B	0.000	0.000	0.000	0.000	0.00
		C	126.436	11.469	0.000	0.000	1.27
T4	25.17-0.00	A	4.572	0.000	0.000	0.000	0.02
		B	0.000	0.000	0.000	0.000	0.00
		C	138.809	12.583	0.000	0.000	1.40

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
T1	65.00-50.10	A	0.500	2.594	2.594	0.000	0.000	0.04
		B		0.000	0.000	0.000	0.000	0.00
		C		23.197	54.727	0.000	0.000	1.21
T2	50.10-48.10	A	0.500	0.348	0.348	0.000	0.000	0.01
		B		0.000	0.000	0.000	0.000	0.00
		C		6.211	11.241	0.000	0.000	0.25
T3	48.10-25.17	A	0.500	3.995	3.995	0.000	0.000	0.07
		B		0.000	0.000	0.000	0.000	0.00
		C		74.037	128.922	0.000	0.000	2.87
T4	25.17-0.00	A	0.500	4.383	4.383	0.000	0.000	0.07
		B		0.000	0.000	0.000	0.000	0.00
		C		81.464	141.451	0.000	0.000	3.15

Feed Line Shielding

Section	Elevation ft	Face	A_R ft^2	A_R Ice ft^2	A_F ft^2	A_F Ice ft^2
T1	65.00-50.10	A	0.188	0.390	0.000	0.000
		B	0.000	0.000	0.000	0.000
		C	3.826	5.897	0.000	0.000
T2	50.10-48.10	A	0.188	0.390	0.000	0.000
		B	0.000	0.000	0.000	0.000
		C	6.191	9.843	0.000	0.000
T3	48.10-25.17	A	0.000	0.029	0.156	0.300
		B	0.000	0.000	0.000	0.000
		C	0.000	0.742	5.176	7.665
T4	25.17-0.00	A	0.188	0.503	0.376	0.721
		B	0.000	0.000	0.000	0.000
		C	6.241	12.880	12.443	18.436

Feed Line Center of Pressure

Section	Elevation ft	CP_X in	CP_Z in	CP_X Ice in	CP_Z Ice in
T1	65.00-50.10	-8.3383	12.6537	-8.7803	12.4236
T2	50.10-48.10	-1.8570	4.6046	-1.6590	2.4839
T3	48.10-25.17	-8.0226	19.5484	-8.8265	17.6413
T4	25.17-0.00	-6.1095	14.8676	-6.6837	13.0310

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
***									
Beacon	A	From Leg	0.00 0.00 7.30	0.0000	65.00	No Ice 1/2" Ice	2.00 2.50	2.00 2.50	0.02 0.03
6.5' x 4.5" Pipe Mount	A	From Leg	0.00 0.00 3.00	0.0000	65.00	No Ice 1/2" Ice	2.60 3.01	2.60 3.01	0.07 0.09
***									
GPS	C	From Leg	0.00 11.00 1.50	0.0000	65.00	No Ice 1/2" Ice	0.62 0.75	0.62 0.75	0.01 0.02
28" x 1.6" Pipe Mount Mnt	C	From Leg	0.00 7.00 0.00	0.0000	65.00	No Ice 1/2" Ice	0.36 0.49	0.36 0.49	0.03 0.03
***									
5 Element (38" x 13.5") Yagi	C	From Leg	0.00 0.00 7.60	0.0000	65.00	No Ice 1/2" Ice	1.50 1.90	1.50 1.90	0.02 0.02
5.25' x 2.4" Pipe Mount	C	From Leg	0.00 0.00 3.00	0.0000	65.00	No Ice 1/2" Ice	1.33 1.63	1.33 1.63	0.03 0.04
***									
(2) BXA-70063/6CF W/Mount Pipe	A	From Leg	0.00 0.00 4.00	-40.0000	65.00	No Ice 1/2" Ice	7.75 8.29	5.18 6.11	0.04 0.09
(4) DB846F65ZAXY w/Mount Pipe	B	From Leg	0.00 0.00 4.00	75.0000	65.00	No Ice 1/2" Ice	7.27 7.88	7.82 9.01	0.05 0.11
(4) LPA-185063/12CF W/Mount Pipe	C	From Leg	0.00 0.00 4.00	40.0000	65.00	No Ice 1/2" Ice	4.99 5.44	5.94 6.88	0.04 0.08
I-Beam Mnt	A	From Leg	0.00 0.00 1.50	0.0000	65.00	No Ice 1/2" Ice	8.76 12.74	0.78 0.95	0.34 0.50
I-Beam Mnt	C	From Leg	0.00 0.00 1.50	0.0000	65.00	No Ice 1/2" Ice	8.76 12.74	0.78 0.95	0.34 0.50
***									
(2) 7770.00 W/Mount Pipe	A	From Face	0.00 0.00 1.50	50.0000	62.50	No Ice 1/2" Ice	2.70 3.42	2.49 3.39	0.03 0.06
(2) 7770.00 W/Mount Pipe	B	From Face	0.00	50.0000	62.50	No Ice	2.70	2.49	0.03

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 1.50			1/2" Ice	3.42	3.39	0.06
(2) 7770.00 W/Mount Pipe	C	From Face	0.00 0.00 1.50	30.0000	62.50	No Ice 1/2" Ice	2.70 3.42	2.49 3.39	0.03 0.06
P65-16-XLH-RR w/ Mount Pipe	A	From Face	0.00 0.00 1.50	50.0000	62.50	No Ice 1/2" Ice	8.64 9.29	6.36 7.54	0.08 0.14
P65-16-XLH-RR w/ Mount Pipe	B	From Face	0.00 0.00 1.50	50.0000	62.50	No Ice 1/2" Ice	8.64 9.29	6.36 7.54	0.08 0.14
P65-16-XLH-RR w/ Mount Pipe	C	From Face	0.00 0.00 1.50	30.0000	62.50	No Ice 1/2" Ice	8.64 9.29	6.36 7.54	0.08 0.14
(2) LGP21401 TMA	A	From Face	0.00 0.00 1.50	50.0000	62.50	No Ice 1/2" Ice	0.95 1.09	0.37 0.48	0.02 0.02
(2) LGP21401 TMA	B	From Face	0.00 0.00 1.50	50.0000	62.50	No Ice 1/2" Ice	0.95 1.09	0.37 0.48	0.02 0.02
(2) LGP21401 TMA	C	From Face	0.00 0.00 1.50	30.0000	62.50	No Ice 1/2" Ice	0.95 1.09	0.37 0.48	0.02 0.02
(2) RBS 6000 RRH	A	From Leg	0.00 0.00 1.50	50.0000	62.50	No Ice 1/2" Ice	2.94 3.17	1.19 1.35	0.06 0.07
(2) RBS 6000 RRH	B	From Leg	0.00 0.00 1.50	50.0000	62.50	No Ice 1/2" Ice	2.94 3.17	1.19 1.35	0.06 0.07
(2) RBS 6000 RRH	C	From Leg	0.00 0.00 1.50	30.0000	62.50	No Ice 1/2" Ice	2.94 3.17	1.19 1.35	0.06 0.07
GPS	C	From Leg	0.00 0.00 1.50	30.0000	62.50	No Ice 1/2" Ice	0.62 0.75	0.62 0.75	0.01 0.02
DC6-48-60-18-8F	C	From Leg	0.00 0.00 1.50	30.0000	62.50	No Ice 1/2" Ice	2.57 2.80	4.32 4.60	0.02 0.05
(3) 8.3' Face Mounted T-Frames Mnt	C	None		0.0000	62.50	No Ice 1/2" Ice	19.73 27.41	19.73 27.41	0.82 1.17
***									
5.7'x4.5" Pipe Mount Mnt	B	From Leg	0.00 0.00 0.00	0.0000	61.50	No Ice 1/2" Ice	2.60 3.01	2.60 3.01	0.07 0.09
***									
6.6'x4.5" Pipe Mount Mnt	C	From Leg	0.00 0.00 0.00	0.0000	58.00	No Ice 1/2" Ice	2.60 3.01	2.60 3.01	0.07 0.09
***									
15.5'x3.5" Omni	B	From Leg	2.00 0.00 7.50	0.0000	57.50	No Ice 1/2" Ice	5.25 6.79	5.25 6.79	0.02 0.06
2' Standoff Mnt	B	From Leg	1.00 0.00 0.00	0.0000	57.50	No Ice 1/2" Ice	1.00 1.39	0.90 1.42	0.02 0.03
***									
14.7'x3.5" Pipe Mount Mnt	A	From Face	0.00	0.0000	58.00	No Ice	5.87	5.87	0.26

tnxTower	Job	Page
	Danbury, CT (SNET005-A)	9 of 22
FDH Engineering 2730 Rowland Road Raleigh, NC 27615 Phone: (919) 755-1012 FAX: (919) 800-9373	**Project** 12-03174E S1	**Date** 13:20:20 03/16/12
	Client AT&T Towers	**Designed by** Stephanie Amortnont

Description	Face or Leg	Offset Type	Offsets: Horz Lateral ft / Vert ft / ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
			0.00			1/2" Ice	7.40	7.40	0.33
7.7'x1.6" Pipe Mount Mnt	A	From Face	0.00 0.00 0.00 0.00	0.0000	56.00	No Ice 1/2" Ice	2.30 3.13	2.30 3.13	0.04 0.06
***									
9.5'x1.75" 4-Element Dipole	B	From Face	0.00 0.00	0.0000	56.50	No Ice 1/2" Ice	1.75 2.77	1.75 2.77	0.03 0.04
14.5x1.9" Pipe Mount Mnt	B	From Face	-1.50 0.00 0.00 0.00	0.0000	56.50	No Ice 1/2" Ice	3.45 4.94	3.45 4.94	0.10 0.14
***									
16'x3.5" Pipe Mount Mnt	C	From Face	0.00 0.00	0.0000	56.50	No Ice 1/2" Ice	6.40 8.05	6.40 8.05	0.30 0.37
13"x10.5"x3.5" TMA	C	From Face	0.00 0.00 0.00 2.50	0.0000	56.50	No Ice 1/2" Ice	1.52 1.69	0.36 0.47	0.02 0.03
***									
21'x2.5" Omni	B	From Leg	8.00 0.00	0.0000	54.50	No Ice 1/2" Ice	5.25 7.38	5.25 7.38	0.03 0.07
8' Standoff Mnt	B	From Leg	10.50 4.00 0.00 0.00	0.0000	54.50	No Ice 1/2" Ice	5.00 10.00	5.00 10.00	0.25 0.30
***									
7.25'x0.95" Omni	B	From Leg	0.00 0.00	0.0000	52.50	No Ice 1/2" Ice	0.69 1.43	0.69 1.43	0.02 0.02
(2) 5'x2.4" Pipe Mount	B	From Face	5.00 0.00 0.00	0.0000	52.50	No Ice 1/2" Ice	1.33 1.63	1.33 1.63	0.03 0.04
5'x2.4" Pipe Mount	C	From Face	0.00 0.00 0.00	0.0000	52.50	No Ice 1/2" Ice	1.33 1.63	1.33 1.63	0.03 0.04
5'x2.4" Pipe Mount	A	From Face	0.00 0.00 0.00	0.0000	52.50	No Ice 1/2" Ice	1.33 1.63	1.33 1.63	0.03 0.04
10'x1.6" Omni	A	From Face	0.00 0.00 0.00	0.0000	52.50	No Ice 1/2" Ice	2.00 3.02	2.00 3.02	0.02 0.04
5-Element (80.5"x3.7") Yagi	B	From Face	6.00 0.00 0.00	0.0000	52.50	No Ice 1/2" Ice	2.40 3.19	2.40 3.19	0.04 0.06
4-Element (10'x1.6") Dipole	A	From Face	2.50 0.00 0.00 6.00	0.0000	52.50	No Ice 1/2" Ice	2.00 3.02	2.00 3.02	0.02 0.04
***									
***									
9.25'x3.5" Omni	B	From Face	6.50 5.00	0.0000	51.50	No Ice 1/2" Ice	2.85 3.83	2.85 3.83	0.03 0.05
4-Element (10'x1.6") Dipole	B	From Face	8.00 6.50 5.00	0.0000	51.50	No Ice 1/2" Ice	2.00 3.02	2.00 3.02	0.02 0.04
6.5' I-Beam Standoff Mnt	B	From Face	-5.00 3.25	0.0000	51.50	No Ice	0.37	4.82	0.16

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
			5.00 0.00			1/2" Ice	0.46	5.37	0.20
***									
10.5' I-Beam Standoff	B	From Leg	5.75 -5.00 0.00	0.0000	51.50	No Ice 1/2" Ice	0.37 0.46	7.79 8.65	0.26 0.32
4'x2.4" Pipe Mount Mnt	B	From Leg	10.50 -5.00 0.00	0.0000	51.50	No Ice 1/2" Ice	1.00 1.39	1.00 1.39	0.03 0.04
***									
11.5'x2.5" Omni	C	From Face	3.00 0.00 6.00	0.0000	51.50	No Ice 1/2" Ice	2.75 3.88	2.75 3.88	0.03 0.05
10'x3" Omni	C	From Face	9.50 0.00 8.00	0.0000	51.50	No Ice 1/2" Ice	3.00 4.03	3.00 4.03	0.03 0.05
20"x16"x7.25" TMA	C	From Face	0.00 0.00 0.00	0.0000	51.50	No Ice 1/2" Ice	3.11 3.35	1.41 1.59	0.04 0.06
10'x3" Omni	C	From Face	9.50 0.00 6.00	0.0000	51.50	No Ice 1/2" Ice	3.00 4.03	3.00 4.03	0.03 0.05
9.5' I-Beam Standoff Mnt	C	From Face	4.75 0.00 0.00	0.0000	51.50	No Ice 1/2" Ice	0.37 0.46	7.05 7.83	0.24 0.29
***									
10'x3" Omni	C	From Face	6.50 0.00 -5.00	0.0000	50.50	No Ice 1/2" Ice	3.00 4.03	3.00 4.03	0.03 0.05
6.5' Standoff Mnt	C	From Leg	3.25 0.00 0.00	0.0000	50.50	No Ice 1/2" Ice	2.72 4.11	12.93 17.82	0.15 0.22
***									
(1) 15" Standoff Mnt	B	From Leg	0.00 0.00 0.00	0.0000	50.50	No Ice 1/2" Ice	0.63 1.00	0.94 1.45	0.02 0.03
(1) 15" Standoff Mnt	C	From Leg	0.00 0.00 0.00	0.0000	50.50	No Ice 1/2" Ice	0.63 1.00	0.94 1.45	0.02 0.03
***									
DB636NS-C	B	From Leg	0.00 0.00 -4.50	0.0000	50.50	No Ice 1/2" Ice	2.51 3.59	2.51 3.59	0.03 0.05
6.5' Standoff	B	From Leg	6.50 0.00 0.00	0.0000	50.50	No Ice 1/2" Ice	2.72 4.11	12.93 17.82	0.15 0.22
***									
11'x2" Omni	C	From Face	1.25 0.00 -7.00	0.0000	50.50	No Ice 1/2" Ice	2.75 3.88	2.75 3.88	0.03 0.05
(1) 15" Standoff Mnt	C	From Face	0.00 0.00 0.00	0.0000	50.50	No Ice 1/2" Ice	0.63 1.00	0.94 1.45	0.02 0.03
20.5"x6.75"x4.5" TMA	C	From Face	1.25 0.00 2.00	0.0000	50.50	No Ice 1/2" Ice	1.35 1.53	0.90 1.06	0.04 0.05
***									

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
5' Standoff Mnt	A	From Face	5.00 0.00 0.00	0.0000	46.50	No Ice 1/2" Ice	0.98 1.70	2.60 4.50	0.05 0.07
***									
***									

Dishes

Description	Face or Leg	Dish Type	Offset Type	Offsets: Horz Lateral Vert ft	Azimuth Adjustment °	3 dB Beam Width °	Elevation ft	Outside Diameter ft		Aperture Area ft^2	Weight K
6' Dish	B	Paraboloid w/Radome	From Leg	1.00 0.00 -1.00	0.0000		61.50	6.00	No Ice 1/2" Ice	28.27 29.07	0.38 0.45
6' Dish	C	Paraboloid w/Radome	From Leg	1.00 0.00 -1.00	0.0000		58.00	6.00	No Ice 1/2" Ice	28.27 29.07	0.38 0.45
SPD2-5.8	B	Paraboloid w/o Radome	From Face	1.00 0.00 1.00	0.0000		56.50	2.00	No Ice 1/2" Ice	3.14 3.41	0.02 0.04
PRFTV-48/75 Grid Dish	A	Grid	From Face	1.00 0.00 0.00	0.0000		46.50	4.00	No Ice 1/2" Ice	12.57 13.10	0.07 0.14

Load Combinations

Comb. No.	Description
1	Dead Only
2	Dead+Wind 0 deg - No Ice
3	Dead+Wind 30 deg - No Ice
4	Dead+Wind 60 deg - No Ice
5	Dead+Wind 90 deg - No Ice
6	Dead+Wind 120 deg - No Ice
7	Dead+Wind 150 deg - No Ice
8	Dead+Wind 180 deg - No Ice
9	Dead+Wind 210 deg - No Ice
10	Dead+Wind 240 deg - No Ice
11	Dead+Wind 270 deg - No Ice
12	Dead+Wind 300 deg - No Ice
13	Dead+Wind 330 deg - No Ice
14	Dead+Ice+Temp
15	Dead+Wind 0 deg+Ice+Temp
16	Dead+Wind 30 deg+Ice+Temp
17	Dead+Wind 60 deg+Ice+Temp
18	Dead+Wind 90 deg+Ice+Temp

Comb. No.	Description
19	Dead+Wind 120 deg+Ice+Temp
20	Dead+Wind 150 deg+Ice+Temp
21	Dead+Wind 180 deg+Ice+Temp
22	Dead+Wind 210 deg+Ice+Temp
23	Dead+Wind 240 deg+Ice+Temp
24	Dead+Wind 270 deg+Ice+Temp
25	Dead+Wind 300 deg+Ice+Temp
26	Dead+Wind 330 deg+Ice+Temp
27	Dead+Wind 0 deg - Service
28	Dead+Wind 30 deg - Service
29	Dead+Wind 60 deg - Service
30	Dead+Wind 90 deg - Service
31	Dead+Wind 120 deg - Service
32	Dead+Wind 150 deg - Service
33	Dead+Wind 180 deg - Service
34	Dead+Wind 210 deg - Service
35	Dead+Wind 240 deg - Service
36	Dead+Wind 270 deg - Service
37	Dead+Wind 300 deg - Service
38	Dead+Wind 330 deg - Service

Maximum Member Forces

Section No.	Elevation ft	Component Type	Condition	Gov. Load Comb.	Force K	Major Axis Moment kip-ft	Minor Axis Moment kip-ft
T1	65 - 50.1042	Leg	Max Tension	12	5.12	31.95	-2.97
			Max. Compression	19	-12.31	22.88	-0.16
			Max. Mx	2	-7.38	-34.93	0.93
			Max. My	3	-0.72	-0.20	15.44
			Max. Vy	2	-5.45	25.14	-0.11
			Max. Vx	3	2.67	0.12	1.15
		Top Girt	Max Tension	2	1.88	-2.81	0.02
			Max. Compression	8	-1.95	-0.63	-0.04
			Max. Mx	11	-0.08	-28.13	-0.09
			Max. My	10	-1.04	-24.29	-0.09
			Max. Vy	11	3.94	-28.13	-0.09
			Max. Vx	11	0.01	27.10	0.09
T2	50.1042 - 48.1042	Leg	Max Tension	8	13.98	42.50	-1.65
			Max. Compression	19	-23.76	-14.35	4.42
			Max. Mx	15	-21.08	-45.64	1.54
			Max. My	3	-4.86	0.86	43.80
			Max. Vy	2	-15.79	-13.25	1.05
			Max. Vx	11	-7.65	-0.09	17.56
		Horizontal	Max Tension	2	10.48	-4.88	0.16
			Max. Compression	4	-10.65	10.20	-0.14
			Max. Mx	11	-0.35	-54.70	-0.31
			Max. My	23	-5.65	-46.70	-0.35
			Max. Vy	11	7.45	-54.70	-0.31
			Max. Vx	11	0.04	53.47	0.31
T3	48.1042 - 25.1667	Leg	Max Tension	8	22.42	71.56	-2.10
			Max. Compression	23	-35.70	59.49	10.94
			Max. Mx	15	-31.53	-75.42	2.00
			Max. My	3	-5.30	1.27	69.84
			Max. Vy	15	-6.21	60.18	-1.22
			Max. Vx	3	6.15	-1.04	-63.48
		Horizontal	Max Tension	4	12.27	-6.17	0.02

Section No.	Elevation ft	Component Type	Condition	Gov. Load Comb.	Force K	Major Axis Moment kip-ft	Minor Axis Moment kip-ft
			Max. Compression	2	-12.03	-0.19	-0.01
			Max. Mx	11	0.43	-46.94	0.05
			Max. My	11	0.43	-46.94	0.05
			Max. Vy	11	6.36	-46.94	0.05
			Max. Vx	11	-0.01	46.08	-0.05
T4	25.1667 - 0	Leg	Max Tension	8	43.12	-57.47	1.50
			Max. Compression	23	-66.14	0.00	0.00
			Max. Mx	15	-61.09	60.18	-1.22
			Max. My	3	-4.36	-1.04	-63.48
			Max. Vy	15	2.71	60.18	-1.22
			Max. Vx	3	-2.88	-1.04	-63.48
		Diagonal	Max Tension	17	26.68	0.00	0.00
			Max. Compression	10	-27.81	0.00	0.00
			Max. Mx	22	20.08	-0.83	-0.02
			Max. My	11	-25.46	0.05	-0.04
			Max. Vy	22	0.18	-0.83	-0.02
			Max. Vx	11	0.00	0.02	-0.04
		Horizontal	Max Tension	2	1.36	0.00	0.00
			Max. Compression	17	-2.00	0.00	0.00
			Max. Mx	14	-1.57	1.25	0.00
			Max. Vy	14	-0.33	0.00	0.00

Maximum Reactions

Location	Condition	Gov. Load Comb.	Vertical K	Horizontal, X K	Horizontal, Z K
Leg C	Max. Vert	23	102.25	15.70	-7.23
	Max. H_x	10	94.75	18.29	-8.72
	Max. H_z	17	-64.91	-17.53	8.81
	Min. Vert	4	-71.86	-14.36	6.75
	Min. H_x	17	-64.91	-17.53	8.81
	Min. H_z	10	94.75	18.29	-8.72
Leg B	Max. Vert	19	100.96	-15.68	-7.07
	Max. H_x	25	-64.89	17.43	8.73
	Max. H_z	25	-64.89	17.43	8.73
	Min. Vert	12	-71.40	14.28	6.71
	Min. H_x	6	93.97	-18.16	-8.65
	Min. H_z	6	93.97	-18.16	-8.65
Leg A	Max. Vert	15	97.17	-0.13	17.00
	Max. H_x	5	8.16	1.96	1.91
	Max. H_z	2	92.93	0.01	20.21
	Min. Vert	8	-74.97	-0.01	-16.02
	Min. H_x	11	7.12	-1.96	1.72
	Min. H_z	21	-71.10	0.02	-20.00

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	29.33	0.00	0.00	26.46	-0.72	0.00
Dead+Wind 0 deg - No Ice	29.33	0.08	-27.11	-1086.20	-5.37	-0.28

Load Combination	Vertical	$Shear_x$	$Shear_z$	Overturning Moment, M_x	Overturning Moment, M_z	Torque
	K	K	K	kip-ft	kip-ft	kip-ft
Dead+Wind 30 deg - No Ice	29.33	13.08	-23.27	-933.43	-534.21	20.98
Dead+Wind 60 deg - No Ice	29.33	22.62	-13.43	-529.15	-925.85	37.20
Dead+Wind 90 deg - No Ice	29.33	26.36	-0.10	21.09	-1079.44	43.91
Dead+Wind 120 deg - No Ice	29.33	23.03	13.43	575.54	-937.59	38.26
Dead+Wind 150 deg - No Ice	29.33	13.01	22.92	966.32	-530.62	21.41
Dead+Wind 180 deg - No Ice	29.33	-0.19	26.33	1107.07	10.16	0.17
Dead+Wind 210 deg - No Ice	29.33	-13.25	22.98	969.81	542.64	-21.04
Dead+Wind 240 deg - No Ice	29.33	-23.15	13.60	585.31	943.75	-37.98
Dead+Wind 270 deg - No Ice	29.33	-26.40	0.14	34.68	1081.10	-44.17
Dead+Wind 300 deg - No Ice	29.33	-22.63	-13.22	-517.34	925.70	-37.37
Dead+Wind 330 deg - No Ice	29.33	-12.96	-23.19	-929.51	526.26	-21.09
Dead+Ice+Temp	41.28	0.00	0.00	48.84	6.34	0.00
Dead+Wind 0 deg+Ice+Temp	41.28	0.10	-28.85	-1089.56	0.54	-3.09
Dead+Wind 30 deg+Ice+Temp	41.28	13.35	-23.61	-895.83	-523.06	18.45
Dead+Wind 60 deg+Ice+Temp	41.28	22.91	-13.24	-483.39	-907.50	34.52
Dead+Wind 90 deg+Ice+Temp	41.28	26.93	0.06	50.27	-1063.48	42.11
Dead+Wind 120 deg+Ice+Temp	41.28	24.69	14.38	614.05	-960.83	38.97
Dead+Wind 150 deg+Ice+Temp	41.28	13.46	23.35	977.76	-526.06	21.47
Dead+Wind 180 deg+Ice+Temp	41.28	0.10	26.50	1108.42	4.17	1.31
Dead+Wind 210 deg+Ice+Temp	41.28	-13.47	23.39	981.18	542.78	-18.49
Dead+Wind 240 deg+Ice+Temp	41.28	-24.69	14.49	621.95	975.60	-35.87
Dead+Wind 270 deg+Ice+Temp	41.28	-26.85	0.17	58.53	1073.46	-41.60
Dead+Wind 300 deg+Ice+Temp	41.28	-22.68	-13.22	-479.63	909.32	-35.83
Dead+Wind 330 deg+Ice+Temp	41.28	-13.19	-23.56	-892.41	526.30	-21.94
Dead+Wind 0 deg - Service	29.33	0.03	-9.38	-358.54	-2.33	-0.10
Dead+Wind 30 deg - Service	29.33	4.53	-8.05	-305.68	-185.32	7.26
Dead+Wind 60 deg - Service	29.33	7.83	-4.65	-165.79	-320.83	12.87
Dead+Wind 90 deg - Service	29.33	9.12	-0.03	24.60	-373.98	15.19
Dead+Wind 120 deg - Service	29.33	7.97	4.65	216.46	-324.89	13.24
Dead+Wind 150 deg - Service	29.33	4.50	7.93	351.67	-184.08	7.41
Dead+Wind 180 deg - Service	29.33	-0.06	9.11	400.38	3.05	0.06
Dead+Wind 210 deg - Service	29.33	-4.58	7.95	352.88	187.29	-7.28
Dead+Wind 240 deg - Service	29.33	-8.01	4.71	219.83	326.09	-13.14
Dead+Wind 270 deg - Service	29.33	-9.14	0.05	29.31	373.61	-15.28
Dead+Wind 300 deg - Service	29.33	-7.83	-4.57	-161.70	319.84	-12.93
Dead+Wind 330 deg - Service	29.33	-4.48	-8.02	-304.32	181.63	-7.30

Solution Summary

	Sum of Applied Forces			Sum of Reactions			
Load Comb.	PX K	PY K	PZ K	PX K	PY K	PZ K	% Error
1	0.00	-29.33	0.00	0.00	29.33	0.00	0.000%
2	0.08	-29.33	-27.11	-0.08	29.33	27.11	0.000%
3	13.08	-29.33	-23.27	-13.08	29.33	23.27	0.000%
4	22.62	-29.33	-13.43	-22.62	29.33	13.43	0.000%
5	26.36	-29.33	-0.10	-26.36	29.33	0.10	0.000%
6	23.03	-29.33	13.43	-23.03	29.33	-13.43	0.000%
7	13.01	-29.33	22.92	-13.01	29.33	-22.92	0.000%
8	-0.19	-29.33	26.33	0.19	29.33	-26.33	0.000%
9	-13.25	-29.33	22.98	13.25	29.33	-22.98	0.000%
10	-23.15	-29.33	13.60	23.15	29.33	-13.60	0.000%
11	-26.40	-29.33	0.14	26.40	29.33	-0.14	0.000%
12	-22.63	-29.33	-13.22	22.63	29.33	13.22	0.000%
13	-12.96	-29.33	-23.19	12.96	29.33	23.19	0.000%
14	0.00	-41.28	0.00	0.00	41.28	-0.00	0.000%
15	0.10	-41.28	-28.85	-0.10	41.28	28.85	0.000%
16	13.35	-41.28	-23.61	-13.35	41.28	23.61	0.000%

	Sum of Applied Forces			Sum of Reactions			
Load Comb.	PX K	PY K	PZ K	PX K	PY K	PZ K	% Error
17	22.91	-41.28	-13.24	-22.91	41.28	13.24	0.000%
18	26.93	-41.28	0.06	-26.93	41.28	-0.06	0.000%
19	24.69	-41.28	14.38	-24.69	41.28	-14.38	0.000%
20	13.46	-41.28	23.35	-13.46	41.28	-23.35	0.000%
21	0.10	-41.28	26.50	-0.10	41.28	-26.50	0.000%
22	-13.47	-41.28	23.39	13.47	41.28	-23.39	0.000%
23	-24.69	-41.28	14.49	24.69	41.28	-14.49	0.000%
24	-26.85	-41.28	0.17	26.85	41.28	-0.17	0.000%
25	-22.68	-41.28	-13.22	22.68	41.28	13.22	0.000%
26	-13.19	-41.28	-23.56	13.19	41.28	23.56	0.000%
27	0.03	-29.33	-9.38	-0.03	29.33	9.38	0.000%
28	4.53	-29.33	-8.05	-4.53	29.33	8.05	0.000%
29	7.83	-29.33	-4.65	-7.83	29.33	4.65	0.000%
30	9.12	-29.33	-0.03	-9.12	29.33	0.03	0.000%
31	7.97	-29.33	4.65	-7.97	29.33	-4.65	0.000%
32	4.50	-29.33	7.93	-4.50	29.33	-7.93	0.000%
33	-0.06	-29.33	9.11	0.06	29.33	-9.11	0.000%
34	-4.58	-29.33	7.95	4.58	29.33	-7.95	0.000%
35	-8.01	-29.33	4.71	8.01	29.33	-4.71	0.000%
36	-9.14	-29.33	0.05	9.14	29.33	-0.05	0.000%
37	-7.83	-29.33	-4.57	7.83	29.33	4.57	0.000%
38	-4.48	-29.33	-8.02	4.48	29.33	8.02	0.000%

Maximum Tower Deflections - Service Wind

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
T1	65 - 50.1042	1.047	27	0.0126	0.1345
T2	50.1042 - 48.1042	0.847	27	0.0120	0.1074
T3	48.1042 - 25.1667	0.815	27	0.0117	0.1024
T4	25.1667 - 0	0.041	34	0.0076	0.0048

Critical Deflections and Radius of Curvature - Service Wind

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
65.00	Beacon	27	1.047	0.0126	0.1345	120732
62.50	(2) 7770.00 W/Mount Pipe	27	1.015	0.0126	0.1305	120732
61.50	5.7'x4.5" Pipe Mount Mnt	27	1.002	0.0126	0.1289	120732
60.50	6' Dish	27	0.989	0.0125	0.1273	120732
58.00	6.6'x4.5" Pipe Mount Mnt	27	0.957	0.0125	0.1230	86237
57.50	SPD2-5.8	27	0.950	0.0125	0.1221	80488
57.00	6' Dish	27	0.944	0.0125	0.1212	75457
56.50	9.5'x1.75" 4-Element Dipole	27	0.937	0.0124	0.1203	71019
56.00	7.7'x1.6" Pipe Mount Mnt	27	0.930	0.0124	0.1194	67073
54.50	21'x2.5" Omni	27	0.910	0.0123	0.1166	56876
52.50	7.25'x0.95" Omni	27	0.882	0.0122	0.1126	28127
51.50	9.25'x3.5" Omni	27	0.868	0.0121	0.1105	17205
50.50	10'x3" Omni	27	0.853	0.0120	0.1082	11189
46.50	PRFTV-48/75 Grid Dish	27	0.781	0.0115	0.0975	4757

Maximum Tower Deflections - Design Wind

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
T1	65 - 50.1042	3.044	2	0.0344	0.3888
T2	50.1042 - 48.1042	2.473	15	0.0328	0.3102
T3	48.1042 - 25.1667	2.380	15	0.0322	0.2960
T4	25.1667 - 0	0.122	23	0.0214	0.0139

Critical Deflections and Radius of Curvature - Design Wind

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
65.00	Beacon	2	3.044	0.0344	0.3888	37169
62.50	(2) 7770.00 W/Mount Pipe	2	2.951	0.0343	0.3772	37169
61.50	5.7'x4.5" Pipe Mount Mnt	15	2.915	0.0343	0.3725	37169
60.50	6' Dish	15	2.879	0.0342	0.3678	37169
58.00	6.6'x4.5" Pipe Mount Mnt	15	2.787	0.0341	0.3555	26549
57.50	SPD2-5.8	15	2.768	0.0341	0.3530	24779
57.00	6' Dish	15	2.749	0.0340	0.3504	23230
56.50	9.5'x1.75" 4-Element Dipole	15	2.730	0.0340	0.3478	21864
56.00	7.7'x1.6" Pipe Mount Mnt	15	2.711	0.0339	0.3451	20649
54.50	21'x2.5" Omni	15	2.653	0.0337	0.3369	17530
52.50	7.25'x0.95" Omni	15	2.573	0.0334	0.3253	9072
51.50	9.25'x3.5" Omni	15	2.532	0.0331	0.3192	5679
50.50	10'x3" Omni	15	2.490	0.0329	0.3128	3745
46.50	PRFTV-48/75 Grid Dish	15	2.281	0.0317	0.2819	1621

Bolt Design Data

Section No.	Elevation ft	Component Type	Bolt Grade	Bolt Size in	Number Of Bolts	Maximum Load per Bolt K	Allowable Load K	Ratio Load / Allowable	Allowable Ratio	Criteria
T1	65	Top Girt	A325N	1.2500	4	0.49	25.77	0.019 ✓	1.333	Bolt Shear
T3	48.1042	Leg	A572-50	2.2500	4	5.60	85.29	0.066 ✓	1.333	Bolt Tension
		Horizontal	A325N	1.2500	4	3.07	25.35	0.121 ✓	1.333	Member Bearing
T4	25.1667	Leg	A572-50	2.2500	4	10.78	85.29	0.126 ✓	1.333	Bolt Tension
		Diagonal	A325N	0.7500	6	4.64	9.28	0.500 ✓	1.333	Bolt Shear
		Horizontal	A325N	1.2500	4	0.50	25.77	0.019 ✓	1.333	Bolt Shear

Compression Checks

Leg Design Data (Compression)

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	F_a ksi	A in^2	Actual P K	Allow. P_a K	Ratio $\frac{P}{P_a}$
T1	65 - 50.1042	15.5"Ø x 0.260 8-Sided Polygon	14.90	14.10	30.5 K=1.00	19.903	13.1302	-7.93	261.33	0.030
T2	50.1042 - 48.1042	15.5"Ø x 0.260 8-Sided Polygon	2.00	2.00	4.3 K=1.00	21.422	13.1302	-19.75	281.27	0.070
T3	48.1042 - 25.1667	15.5"Ø x 0.260 8-Sided Polygon	22.94	22.94	49.7 K=1.00	18.379	13.1302	-28.58	241.32	0.118
T4	25.1667 - 0	15.5"Ø x 0.260 8-Sided Polygon	25.17	25.17	54.5 K=1.00	17.946	13.1302	-66.14	235.63	0.281

Leg Bending Design Data (Compression)

Section No.	Elevation ft	Size	Actual M_x kip-ft	Actual f_{bx} ksi	Allow. F_{bx} ksi	Ratio $\frac{f_{bx}}{F_{bx}}$	Actual M_y kip-ft	Actual f_{by} ksi	Allow. F_{by} ksi	Ratio $\frac{f_{by}}{F_{by}}$
T1	65 - 50.1042	15.5"Ø x 0.260 8-Sided Polygon	-29.70	-6.852	21.600	0.317	-10.12	-2.334	21.600	0.108
T2	50.1042 - 48.1042	15.5"Ø x 0.260 8-Sided Polygon	-37.38	-8.625	21.600	0.399	21.04	-4.854	21.600	0.225
T3	48.1042 - 25.1667	15.5"Ø x 0.260 8-Sided Polygon	-62.57	-14.435	21.600	0.668	-42.60	-9.828	21.600	0.455
T4	25.1667 - 0	15.5"Ø x 0.260 8-Sided Polygon	0.00	0.000	21.600	0.000	0.00	0.000	21.600	0.000

Leg Interaction Design Data (Compression)

Section No.	Elevation ft	Size	Ratio $\frac{P}{P_a}$	Ratio $\frac{f_{bx}}{F_{bx}}$	Ratio $\frac{f_{by}}{F_{by}}$	Comb. Stress Ratio	Allow. Stress Ratio	Criteria
T1	65 - 50.1042	15.5"Ø x 0.260 8-Sided Polygon	0.030	0.317	0.108	0.456 ✔	1.333	H1-3 ✔
T2	50.1042 - 48.1042	15.5"Ø x 0.260 8-Sided Polygon	0.070	0.399	0.225	0.694 ✔	1.333	H1-3 ✔
T3	48.1042 - 25.1667	15.5"Ø x 0.260 8-Sided Polygon	0.118	0.668	0.455	1.242 ✔	1.333	H1-3 ✔
T4	25.1667 - 0	15.5"Ø x 0.260 8-Sided Polygon	0.281	0.000	0.000	0.281 ✔	1.333	H1-3 ✔

Diagonal Design Data (Compression)

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	F_a ksi	A in^2	Actual P K	Allow. P_a K	Ratio $\frac{P}{P_a}$
T4	25.1667 - 0	W6x25	29.34	13.41	105.9 K=1.00	12.217	7.3400	-27.81	89.67	0.310 ✔

Horizontal Design Data (Compression)

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	F_a ksi	A in^2	Actual P K	Allow. P_a K	Ratio $\frac{P}{P_a}$
T2	50.1042 - 48.1042	12.45"Ø x 0.265 8-Sided Polygon	15.08	13.79	37.4 K=1.00	19.397	10.7000	-0.35	207.55	0.002
T3	48.1042 - 25.1667	W10x26	15.08	13.79	121.7 K=1.00	32.500	5.4394	0.00	76.74	0.000
T4	25.1667 - 0	12.45"Ø x 0.265 8-Sided Polygon	15.08	13.79	37.4 K=1.00	19.397	10.7000	-1.57	207.55	0.008*

* DL controls

Horizontal Bending Design Data

Section No.	Elevation ft	Size	Actual M_x kip-ft	Actual f_{bx} ksi	Allow. F_{bx} ksi	Ratio $\frac{f_{bx}}{F_{bx}}$	Actual M_y kip-ft	Actual f_{by} ksi	Allow. F_{by} ksi	Ratio $\frac{f_{by}}{F_{by}}$
T2	50.1042 - 48.1042	12.45"Ø x 0.265 8-Sided Polygon	-54.70	-21.058	21.600	0.975	-0.31	-0.119	21.600	0.005
T3	48.1042 - 25.1667	W10x26	-46.94	-20.191	17.815	1.133	0.05	-0.120	37.500	0.003
T4	25.1667 - 0	12.45"Ø x 0.265 8-Sided Polygon	0.00	0.000	21.600	0.000	0.00	0.000	21.600	0.000

Horizontal Interaction Design Data

Section No.	Elevation ft	Size	Ratio $\frac{P}{P_a}$	Ratio $\frac{f_{bx}}{F_{bx}}$	Ratio $\frac{f_{by}}{F_{by}}$	Comb. Stress Ratio	Allow. Stress Ratio	Criteria
T2	50.1042 - 48.1042	12.45"Ø x 0.265 8-Sided Polygon	0.002	0.975	0.005	0.982 ✔	1.333	H1-3 ✔
T3	48.1042 - 25.1667	W10x26	0.000	1.133	0.003	1.137 ✔	1.333	H1-3 ✔
T4	25.1667 - 0	12.45"Ø x 0.265 8-Sided Polygon	0.008	0.000	0.000	0.008* ✔	1.000	H1-3 ✔

* DL controls

Top Girt Design Data (Compression)

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	F_a ksi	A in^2	Actual P K	Allow. P_a K	Ratio $\frac{P}{P_a}$
T1	65 - 50.1042	12.45"Ø x 0.265 8-Sided Polygon	15.08	13.79	37.4 K=1.00	19.397	10.7000	-0.08	207.55	0.000

Top Girt Bending Design Data

Section No.	Elevation ft	Size	Actual M_x kip-ft	Actual f_{bx} ksi	Allow. F_{bx} ksi	Ratio $\frac{f_{bx}}{F_{bx}}$	Actual M_y kip-ft	Actual f_{by} ksi	Allow. F_{by} ksi	Ratio $\frac{f_{by}}{F_{by}}$
T1	65 - 50.1042	12.45"Ø x 0.265 8-Sided Polygon	-28.13	-10.828	21.600	0.501	-0.09	-0.034	21.600	0.002

Top Girt Interaction Design Data

Section No.	Elevation ft	Size	Ratio $\frac{P}{P_a}$	Ratio $\frac{f_{bx}}{F_{bx}}$	Ratio $\frac{f_{by}}{F_{by}}$	Comb. Stress Ratio	Allow. Stress Ratio	Criteria
T1	65 - 50.1042	12.45"Ø x 0.265 8-Sided Polygon	0.000	0.501	0.002	0.503 ✔	1.333	H1-3 ✔

Tension Checks

Leg Design Data (Tension)

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	F_a ksi	A in^2	Actual P K	Allow. P_a K	Ratio $\frac{P}{P_a}$
T1	65 - 50.1042	15.5"Ø x 0.260 8-Sided Polygon	14.90	14.10	30.5	21.600	13.1302	4.31	283.61	0.015
T2	50.1042 - 48.1042	15.5"Ø x 0.260 8-Sided Polygon	2.00	2.00	4.3	21.600	13.1302	10.29	283.61	0.036
T3	48.1042 - 25.1667	15.5"Ø x 0.260 8-Sided Polygon	22.94	22.94	49.7	21.600	13.1302	16.66	283.61	0.059
T4	25.1667 - 0	15.5"Ø x 0.260 8-Sided Polygon	25.17	25.17	54.5	21.600	13.1302	43.12	283.61	0.152

Leg Bending Design Data (Tension)

Section No.	Elevation ft	Size	Actual M_x kip-ft	Actual f_{bx} ksi	Allow. F_{bx} ksi	Ratio $\frac{f_{bx}}{F_{bx}}$	Actual M_y kip-ft	Actual f_{by} ksi	Allow. F_{by} ksi	Ratio $\frac{f_{by}}{F_{by}}$
T1	65 - 50.1042	15.5"Ø x 0.260 8-Sided Polygon	27.57	6.360	21.600	0.294	-10.31	2.378	21.600	0.110
T2	50.1042 - 48.1042	15.5"Ø x 0.260 8-Sided Polygon	36.76	8.481	21.600	0.393	20.74	4.784	21.600	0.221
T3	48.1042 - 25.1667	15.5"Ø x 0.260 8-Sided Polygon	61.67	14.226	21.600	0.659	-43.48	10.030	21.600	0.464
T4	25.1667 - 0	15.5"Ø x 0.260 8-Sided Polygon	0.00	0.000	21.600	0.000	0.00	0.000	21.600	0.000

Leg Interaction Design Data (Tension)

Section No.	Elevation ft	Size	Ratio $\frac{P}{P_a}$	Ratio $\frac{f_{bx}}{F_{bx}}$	Ratio $\frac{f_{by}}{F_{by}}$	Comb. Stress Ratio	Allow. Stress Ratio	Criteria
T1	65 - 50.1042	15.5"Ø x 0.260 8-Sided Polygon	0.015	0.294	0.110	0.420 ✔	1.333	H2-1 ✔
T2	50.1042 - 48.1042	15.5"Ø x 0.260 8-Sided Polygon	0.036	0.393	0.221	0.650 ✔	1.333	H2-1 ✔
T3	48.1042 - 25.1667	15.5"Ø x 0.260 8-Sided Polygon	0.059	0.659	0.464	1.182 ✔	1.333	H2-1 ✔
T4	25.1667 - 0	15.5"Ø x 0.260 8-Sided Polygon	0.152	0.000	0.000	0.152 ✔	1.333	H2-1 ✔

Diagonal Design Data (Tension)

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	F_a ksi	A in^2	Actual P K	Allow. P_a K	Ratio $\frac{P}{P_a}$
T4	25.1667 - 0	W6x25	29.34	13.41	105.9	29.000	5.2950	26.68	153.56	0.174 ✔

Horizontal Design Data (Tension)

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	F_a ksi	A in^2	Actual P K	Allow. P_a K	Ratio $\frac{P}{P_a}$
T2	50.1042 - 48.1042	12.45"Ø x 0.265 8-Sided Polygon	15.08	13.79	37.4	21.600	10.7000	5.14	231.12	0.022
T3	48.1042 - 25.1667	W10x26	15.08	13.79	121.7	32.500	5.4394	0.43	176.78	0.002
T4	25.1667 - 0	12.45"Ø x 0.265 8-Sided Polygon	15.08	13.79	37.4	21.600	10.7000	1.02	231.12	0.004*

* DL controls

Horizontal Bending Design Data

Section No.	Elevation ft	Size	Actual M_x kip-ft	Actual f_{bx} ksi	Allow. F_{bx} ksi	Ratio $\frac{f_{bx}}{F_{bx}}$	Actual M_y kip-ft	Actual f_{by} ksi	Allow. F_{by} ksi	Ratio $\frac{f_{by}}{F_{by}}$
T2	50.1042 - 48.1042	12.45"Ø x 0.265 8-Sided Polygon	-48.53	18.680	21.600	0.865	-0.18	0.070	21.600	0.003
T3	48.1042 - 25.1667	W10x26	-46.94	20.191	17.815	1.133	0.05	0.120	37.500	0.003
T4	25.1667 - 0	12.45"Ø x 0.265 8-Sided Polygon	0.00	0.000	21.600	0.000	0.00	0.000	21.600	0.000

Horizontal Interaction Design Data

Section No.	Elevation ft	Size	Ratio $\frac{P}{P_a}$	Ratio $\frac{f_{bx}}{F_{bx}}$	Ratio $\frac{f_{by}}{F_{by}}$	Comb. Stress Ratio	Allow. Stress Ratio	Criteria
T2	50.1042 - 48.1042	12.45"Ø x 0.265 8-Sided Polygon	0.022	0.865	0.003	0.890 ✔	1.333	H2-1 ✔
T3	48.1042 - 25.1667	W10x26	0.002	1.133	0.003	1.139 ✔	1.333	H2-1 ✔
T4	25.1667 - 0	12.45"Ø x 0.265 8-Sided Polygon	0.004	0.000	0.000	0.004* ✔	1.000	H2-1 ✔

* DL controls

Top Girt Design Data (Tension)

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	F_a ksi	A in^2	Actual P K	Allow. P_a K	Ratio $\frac{P}{P_a}$
T1	65 - 50.1042	12.45"Ø x 0.265 8-Sided Polygon	15.08	13.79	37.4	21.600	10.7000	0.91	231.12	0.004

Top Girt Bending Design Data

Section No.	Elevation ft	Size	Actual M_x kip-ft	Actual f_{bx} ksi	Allow. F_{bx} ksi	Ratio $\frac{f_{bx}}{F_{bx}}$	Actual M_y kip-ft	Actual f_{by} ksi	Allow. F_{by} ksi	Ratio $\frac{f_{by}}{F_{by}}$
T1	65 - 50.1042	12.45"Ø x 0.265 8-Sided Polygon	-24.96	9.609	21.600	0.445	-0.06	0.024	21.600	0.001

Top Girt Interaction Design Data

Section No.	Elevation ft	Size	Ratio $\frac{P}{P_a}$	Ratio $\frac{f_{bx}}{F_{bx}}$	Ratio $\frac{f_{by}}{F_{by}}$	Comb. Stress Ratio	Allow. Stress Ratio	Criteria
T1	65 - 50.1042	12.45"Ø x 0.265 8-Sided Polygon	0.004	0.445	0.001	0.450 ✔	1.333	H2-1 ✔

Section Capacity Table

Section No.	Elevation ft	Component Type	Size	Critical Element	P K	$SF*P_{allow}$ K	% Capacity	Pass Fail
T1	65 - 50.1042	Leg	15.5"Ø x 0.260 8-Sided Polygon	1	-7.93	348.35	34.2	Pass
		Top Girt	12.45"Ø x 0.265 8-Sided Polygon	4	0.91	308.08	37.8	Pass
T2	50.1042 - 48.1042	Leg	15.5"Ø x 0.260 8-Sided Polygon	8	-19.75	374.94	52.1	Pass
		Horizontal	12.45"Ø x 0.265 8-Sided Polygon	10	5.14	308.08	73.7	Pass
T3	48.1042 - 25.1667	Leg	15.5"Ø x 0.260 8-Sided Polygon	13	-28.58	321.68	93.1	Pass
		Horizontal	W10x26	16	0.43	235.65	85.4	Pass
T4	25.1667 - 0	Leg	15.5"Ø x 0.260 8-Sided Polygon	19	-66.14	314.10	21.1	Pass
		Diagonal	W6x25	25	-27.81	119.53	23.3	Pass
		Horizontal	12.45"Ø x 0.265 8-Sided Polygon	23	-1.57	207.55	37.5 (b) 0.8 1.5 (b)	Pass
						Summary		
						Leg (T3)	93.1	Pass
						Diagonal (T4)	37.5	Pass
						Horizontal (T3)	85.4	Pass
						Top Girt (T1)	37.8	Pass
						Bolt Checks	37.5	Pass
						RATING =	**93.1**	**Pass**

FDH ENGINEERING

Project: DANBURY - CT
Sheet ____ of ____
By: ____
Checked By: ____
Date: ____
FDH Project #: 12-03[illegible]
Drawing #: ____

OVERTURNING

$$FS = \frac{(P + W_c + W_s)(L/2)}{M + Vd}$$

$$FS = \frac{(40k + 133.9k)\left(\frac{21.6}{2}\right)}{1111 + 29(2.5)}$$

$$= 1.59$$

$$\% = \frac{1.5}{1.59} = .94 \quad 94\%$$

BEARING PRESSURE

$$\frac{M}{S} + \frac{P}{A} \qquad S = \frac{I}{9} = \frac{11197.4\ ft^4}{13\ ft} = 861\ ft^3$$

$$9 = \frac{1111k\text{-}ft}{861\ ft^3} \quad \frac{40k}{357.2\ ft^2} = 1.4$$

$$\% = \frac{1.4}{1.5(2.5\ ksf)} = 11.2\%$$

2730 Rowland Rd., Ste 100, Raleigh, NC 27615 (919) 755-1012 fax: (919) 755-1031 info@fdh-inc.com

THE MODIFICATIONS DEPICTED ON THESE DRAWINGS ARE BASED ON THE RECOMMENDATIONS OUTLINED IN THE STRUCTURAL ANALYSIS COMPLETED BY FDH ENGINEERING, INC., PROJECT NO. 11-07110E S2 DATED OCTOBER 14, 2011.

THIS REPORT WAS BASED ON A SPECIFIC ANTENNA AND COAX CONFIGURATION PROVIDED BY THE TOWER OWNER. ANY CHANGE TO THIS INFORMATION MUST BE REVIEWED BY FDH ENGINEERING, INC.

ALL DIMENSIONS, MEASUREMENTS, QUANTITIES, PART NUMBERS AND COAX/ANTENNA PLACEMENTS TO BE FIELD VERIFIED BY CONTRACTOR PRIOR TO MATERIAL ORDERS AND CONSTRUCTION.

PROJECT DESCRIPTION:

MODIFICATION DRAWINGS FOR A 65' SELF-SUPPORT TOWER

at&t

SITE NAME:

DANBURY

SITE NUMBER:

SNET005-A

SITE ADDRESS:

144 OLD BOSTON POST RD
DANBURY, CT 06810

COORDINATES:

LATITUDE: 41.3595°
LONGITUDE: -73.4655°

SHEET INDEX	
SHT. NO.	DESCRIPTION
T-1	TITLE SHEET
N-1	GENERAL NOTES
S-1	MODIFICATION SCHEDULE
S-2	HORIZONTAL INSTALLATION DETAILS I
S-3	HORIZONTAL INSTALLATION DETAILS II

PREPARED BY:

FDH ENGINEERING INNOVATION

2730 ROWLAND RD.
RALEIGH, NC 27615
PHONE: 919-755-1012
FAX: 919-755-1031

PREPARED FOR:

at&t

LIBERTY 1 PLAZA
4801 CON. RD., SUITE 300
GLENN ALLEN, VA 23060

STATE OF CONNECTICUT
Christopher Michael Murphy
No. 25842
LICENSED PROFESSIONAL ENGINEER
3/16/12

CHRISTOPHER M. MURPHY, P.E.
CONNECTICUT LICENSE NO. 25842

DRAWN BY:	JRJ
CHECKED BY:	SAA
ENG APPV'D:	CMM
PROJECT NO:	12-03174E S1

SUBMITTALS		
DATE	DESCRIPTION	REV
03/16/12	CONSTRUCTION	1

SITE NAME:
DANBURY

SITE NUMBER:
SNET005-A

SITE ADDRESS:
144 OLD BOSTON POST RD
DANBURY, CT 06810

SHEET TITLE
TITLE SHEET

SHEET NUMBER
T-1

GENERAL NOTES:

1. ALL WORK SHALL BE DONE IN ACCORDANCE WITH ALL APPLICABLE FEDERAL, STATE AND LOCAL CODES AND ORDINANCES. IT IS THE CONTRACTOR'S RESPONSIBILITY TO OBTAIN ALL PERMITS NECESSARY TO COMPLETE THE PROJECT AND ABIDE BY ALL CONDITIONS AND REQUIREMENTS OF THE PERMITS.
2. THE CONTRACTOR SHALL BE RESPONSIBLE FOR VERIFICATION OF ALL DIMENSIONS, ELEVATIONS AND EXISTING CONDITIONS AT THE SITE BEFORE ORDERING ANY MATERIALS OR DOING ANY WORK. NO EXTRA CHARGE OR COMPENSATION SHALL BE ALLOWED DUE TO DIFFERENCE BETWEEN ACTUAL DIMENSIONS AND DIMENSIONS INDICATED ON THE CONSTRUCTION DRAWINGS. ANY SUCH DISCREPANCY IN DIMENSION WHICH MAY BE FOUND SHALL BE SUBMITTED TO FDH ENGINEERING FOR CONSIDERATION BEFORE THE CONTRACTOR PROCEEDS WITH THE WORK IN THE AFFECTED AREAS.
3. INCORRECTLY FABRICATED, DAMAGED, OTHERWISE MISFITTING, OR NON-CONFORMING MATERIALS AND CONDITIONS SHALL BE REPORTED TO FDH ENGINEERING PRIOR TO ANY REMEDIAL OR CORRECTIVE ACTION. ALL ACTIONS SHALL REQUIRE FDH ENGINEERING APPROVAL.
4. IT IS THE CONTRACTOR'S SOLE RESPONSIBILITY TO DETERMINE ERECTION PROCEDURE AND SEQUENCE TO ENSURE THE SAFETY OF THE STRUCTURE AND ITS COMPONENT PARTS DURING ERECTION AND/OR FIELD MODIFICATIONS. THIS INCLUDES, BUT IS NOT LIMITED TO, THE ADDITION OF TEMPORARY BRACING, GUYS OR TIE DOWNS THAT MAY BE NECESSARY. SUCH MATERIAL SHALL BE REMOVED AFTER THE COMPLETION OF THE PROJECT.
5. CONTRACTOR SHALL PROMPTLY REMOVE ANY & ALL DEBRIS FROM SITE AND RESTORE AS BEST AS POSSIBLE TO PRECONSTRUCTION CONDITION.

CONTRACTOR QUALIFICATION NOTES:

1. ALL REPAIRS SHALL BE PERFORMED BY A TOWER CONTRACTOR WITH A MINIMUM 5 YEARS EXPERIENCE IN TOWER ERECTION AND RETROFIT AND WITH WORKING KNOWLEDGE OF THE TIA/EIA 222-F "STRUCTURAL STANDARD FOR STEEL ANTENNA TOWERS AND ANTENNA SUPPORTING STRUCTURES".
2. CONTRACTOR IS RESPONSIBLE FOR ALL CONSTRUCTION MEANS AND METHODS. SHOULD THE CONTRACTOR REQUIRE DIRECT CONSULTATION, FDH ENGINEERING, INC. IS WILLING TO OFFER SERVICES BASED UPON AN AGREED FEE FOR THE WORK REQUIRED.
3. ALL SUBMITTAL INFORMATION MUST BE SENT TO FDH ENGINEERING, INC. 2730 ROWLAND ROAD, RALEIGH NC, 27615, TEL. (919) 755-1012, FAX. (919) 755-1031, E-MAIL INFO@FDH-INC.COM. ANY VARIATION OF THESE SPECIFICATIONS OR DRAWINGS WITHOUT CONSENT FROM FDH ENGINEERING, INC. WILL VOID ANY RESPONSIBILITY OR LIABILITY FOR DAMAGE (MATERIAL OR PHYSICAL) TOWARDS FDH ENGINEERING, INC.

JOB SITE SAFETY & NOTES:

1. NEITHER THE PROFESSIONAL ACTIVITIES OF FDH ENGINEERING, INC. NOR THE PRESENCE OF FDH ENGINEERING, INC. OR EMPLOYEES AND SUB-CONSULTANTS AT THE CONSTRUCTION SITE, SHALL RELIEVE THE GENERAL CONTRACTOR AND OR SUBCONTRACTORS AND ANY OTHER ENTITY OF THEIR OBLIGATIONS, DUTIES AND RESPONSIBILITIES INCLUDING, BUT NOT LIMITED TO, CONSTRUCTION MEANS, METHODS, SEQUENCE, TECHNIQUES OR PROCEDURES NECESSARY FOR PERFORMING, SUPERINTENDING OR COORDINATING ALL PORTIONS OF THE WORK OF CONSTRUCTION IN ACCORDANCE WITH THE CONTRACT DOCUMENTS AND ANY HEALTH OR SAFETY PRECAUTIONS REQUIRED BY ANY REGULATORY AGENCIES. THE GENERAL CONTRACTOR AND OR SUBCONTRACTOR IS SOLELY RESPONSIBLE FOR JOB SAFETY, AND WARRANTS THAT THIS INTENT IS EVIDENT BY ACCEPTING THIS WORK.

SUBSTITUTES AND/OR EQUALS:

1. IF CONTRACTOR WISHES TO FURNISH OR USE A SUBSTITUTE ITEM OF MATERIAL OR EQUIPMENT, CONTRACTOR SHALL FIRST MAKE WRITTEN APPLICATION TO ENGINEER OF RECORD FOR ACCEPTANCE THEREOF, CERTIFYING THAT THE PROPOSED SUBSTITUTE WILL PERFORM ADEQUATELY THE FUNCTIONS AND ACHIEVE THE RESULTS CALLED FOR BY THE GENERAL DESIGN, BE SIMILAR IN SUBSTANCE TO THAT SPECIFIED AND SUITED TO THE SAME USE AS THAT SPECIFIED. ALL VARIATIONS OF THE PROPOSED SUBSTITUTE FROM THAT SPECIFIED WILL BE IDENTIFIED IN THE APPLICATION AND AVAILABLE MAINTENANCE, REPAIR AND REPLACEMENT SERVICE WILL BE INDICATED. THE APPLICATION WILL ALSO CONTAIN AN ITEMIZED ESTIMATE OF ALL COSTS OR CREDITS THAT WILL RESULT DIRECTLY OR INDIRECTLY FROM ACCEPTANCE OF SUCH SUBSTITUTE INCLUDING COSTS OF REDESIGN AND CLAIMS OF OTHER CONTRACTORS AFFECTED BY THE RESULTING CHANGE, ALL OF WHICH WILL BE CONSIDERED BY ENGINEER OF RECORD IN EVALUATION OF THE PROPOSED SUBSTITUTE. ENGINEER OF RECORD MAY REQUIRE CONTRACTOR TO FURNISH ADDITIONAL DATA ABOUT THE PROPOSED SUBSTITUTE.

STEEL:

1. ALL STRUCTURAL STEEL SHALL BE FABRICATED AND ERECTED IN ACCORDANCE WITH THE LATEST AISC CODE AND ASTM SPECIFICATIONS.

   *ALL STEEL PLATE SHALL BE ASTM A36 (Fy=36KSI) UNLESS OTHERWISE SPECIFIED.

   *ALL STEEL SHAPES AND PLATE STEEL SHALL BE ASTM A992 (Fy=50 KSI) UNLESS OTHERWISE SPECIFIED.
2. ALL CONNECTIONS OF STRUCTURAL STEEL MEMBERS SHALL BE MADE USING SPECIFIED WELDS WITH WELDING ELECTRODES E-70XX OR SPECIFIED HIGH STRENGTH BOLTS TO BE ASTM A325N, THREAD INCLUDED WITH SHEAR PLANE (UNLESS OTHERWISE NOTED).
3. ALL BOLTED CONNECTIONS TO BE INSTALLED TO A SNUG-TIGHTENED CONDITION IN ACCORDANCE WITH AISC 13 PART 16.2, "SPECIFICATION FOR STRUCTURAL JOINTS USING ASTM A325 OR A490 BOLTS", SECTION 8.1, UNLESS OTHERWISE SPECIFIED. WHEN "X" TYPE BOLTS ARE USED, CONTRACTOR MAY BE REQUIRED TO STACK ADDITIONAL WASHERS TO OBTAIN PROPER SNUG TIGHT INSTALLATION. ALL NUTS SHALL BE HEAVY HEX UNLESS OTHERWISE NOTED.
4. ALL STEEL, AFTER FABRICATION, SHALL BE HOT DIPPED GALVANIZED PER ASTM A-123. ALL DAMAGED SURFACES, WELDED AREAS AND AUTHORIZED NON-GALVANIZED MEMBERS OR PARTS (EXISTING OR NEW) SHALL BE PAINTED WITH MULTIPLE COATS OF ZRC COLD GALVANIZING COMPOUND ACHEIVING A MINIMUM OF 4 MILS DRY FILM PER ASTM A 780.
5. ALL SHOP AND FIELD WELDING SHALL BE DONE BY WELDERS QUALIFIED AS DESCRIBED IN THE "AMERICAN WELDING SOCIETY'S STANDARD QUALIFICATION PROCEDURE" TO PERFORM THE TYPE OF WORK REQUIRED. CONTRACTOR IS REQUIRED TO PROVIDE FDH ENGINEERING, INC. WITH A PASSING CERTIFIED WELDING INSPECTION FOR ALL WELDS.
6. STRUCTURAL STEEL MAY NOT BE TORCH CUT FOR FABRICATION. ALL STEEL FABRICATION MUST FOLLOW AISC STANDARDS.

MISC. NOTES:

1. ALL MODIFICATIONS ARE ASSUMED TO BE MADE ON AN EMPTY TOWER. CONTRACTOR IS RESPONSIBLE TO MAKE PROVISIONS TO SUPPORT OR WORK AROUND EXISTING ANTENNAS AND TRANSMISSION LINES. MODIFICATIONS MUST BE CONTINUOUS THROUGH ALL AREAS SHOWN.
2. CONTRACTOR FIELD VERIFY ALL DIMENSIONS PRIOR TO CONSTRUCTION.

FABRICATION NOTES:

1. ALL DIMENSIONS ARE PRELIMINARY UNTIL FIELD VERIFIED BY CONTRACTOR. ANY CHANGES MUST BE APPROVED BY ENGINEER OF RECORD IN WRITING PRIOR TO FABRICATION AND INSTALLATION.
2. NEW STEEL MEMBERS MUST HAVE SINGLE DRILLED HOLES. SLOTTED AND DOUBLE DRILLED HOLES ARE NOT ACCEPTABLE MEANS OF FABRICATION.

CORRECTION OF FAILING MODIFICATION INSPECTIONS (MI):

IF THE MODIFICATION INSTALLATION WOULD FAIL THE MI ("FAILED MI"), THE GC SHALL WORK WITH FDH TO COORDINATE A REMEDIATION PLAN IN ONE OF TWO WAYS:

1. CORRECT FAILING ISSUES TO COMPLY WITH THE SPECIFICATIONS CONTAINED IN THE ORIGINAL CONTRACT DOCUMENTS AND COORDINATE A SUPPLEMENT MI.
   1.1. IF A MI RE-VISIT IS REQUIRED, THE GC IS RESPONSIBLE FOR THE ASSOCIATED COST.
2. OR, WITH FDH'S APPROVAL, THE GC MAY WORK WITH THE EOR TO RE-ANALYZE THE MODIFICATION/REINFORCEMENT USING THE AS-BUILT CONDITION. FEE TO BE DETERMINED.

REQUIRED PHOTOS:

BETWEEN THE GC AND THE MI INSPECTOR THE FOLLOWING PHOTOGRAPHS, AT A MINIMUM, ARE TO BE TAKEN AND INCLUDED IN THE CLOSE OUT DOCUMENTS:

1. PRE-CONSTRUCTION GENERAL SITE CONDITION
2. PHOTOGRAPHS DURING THE REINFORCEMENT MODIFICATION CONSTRUCTION/ERECTION AND INSPECTION:
   2.1. RAW MATERIALS
   2.2. PHOTOS OF ALL CRITICAL DETAILS
   2.3. WELD PREPARATION
   2.4. BOLT INSTALLATION AND TORQUE
   2.5. FINAL INSTALLED CONDITION
   2.6. SURFACE COATING REPAIR
3. POST CONSTRUCTION PHOTOGRAPHS:
   3.1. FINAL INFIELD CONDITION

PHOTOS OF ELEVATED MODIFICATIONS TAKEN FROM THE GROUND SHALL BE CONSIDERED INADEQUATE.

SURFACE PREPARATION:

1. PREPARE SURFACE TO BE WELDED BY REMOVING PAINT OR GALVANIZATION TO BARE METAL USING POWER WIRE BRUSHING IN ACCORDANCE WITH SSPC-SP11, (STEEL STRUCTURES PAINTING COUNCIL). FOLLOWING POWER WIRE BRUSHING CONTRACTOR SHALL POLISH METAL SURFACE WITH HIGH SPEED GRINDER WITH 400+ GRIT SANDPAPER.
2. AFTER NEW STEEL INSTALLATION CONTRACTOR TO BRUSH PAINT (2) COATS OF ZRC OR ZINGA COLD GALVANIZATION COMPOUND PER MANUFACTURER'S SPECIFICATIONS.

WELDING NOTES:

1. ALL WELDING TO THE EXISTING TOWER SHALL BE PERFORMED BY CERTIFIED WELDERS UTILIZING PROCEDURES QUALIFIED IN ACCORDANCE WITH AWS D1.1 AND AWS C5.4.
2. CONTRACTOR SHALL COMPLY WITH AWS D1.1 FOR PROCEDURES, APPEARANCE AND QUALITY OF WELDS AND FOR METHODS USED IN CORRECTING WELDING. ALL WELDERS AND WELDING PROCESSES SHALL BE QUALIFIED IN ACCORDANCE WITH AWS "STANDARD QUALIFICATION PROCEDURES". CONTRACTOR SHALL SUBMIT CERTIFICATION OF WELDERS TO THE ENGINEER PRIOR TO COMMENCEMENT OF THE WORK.
3. CONTRACTOR RESPONSIBLE FOR TEMPORARY HEAT SHIELDING AS REQUIRED DURING WELDING.
4. CONTRACTOR RESPONSIBLE FOR VIEWING EXISTING TOWER FOR LOOSE AND FLAMMABLE MATERIAL PRIOR TO WELDING FLAT PLATE.
5. ALL WELDS TO BE VISUALLY INSPECTED BY A CERTIFIED WELD INSPECTOR PER AWS D1.1.

PREPARED BY:

FDH ENGINEERING INNOVATION

2730 ROWLAND RD.
RALEIGH, NC 27615
PHONE: 919-755-1012
FAX: 919-755-1031

PREPARED FOR:

at&t

LIBERTY 1 PLAZA
4801 COX RD., SUITE 300
GLENN ALLEN, VA 23060

STATE OF CONNECTICUT
Christopher Michael Murphy
No. 25842
LICENSED PROFESSIONAL ENGINEER
5/16/12

CHRISTOPHER M. MURPHY, P.E.
CONNECTICUT LICENSE NO. 25842

DRAWN BY:	JRJ
CHECKED BY:	SAA
ENG APPV'D:	CMM
PROJECT NO:	12-03174E S1

SUBMITTALS

DATE	DESCRIPTION	REV
03/16/12	CONSTRUCTION	1

SITE NAME:
DANBURY

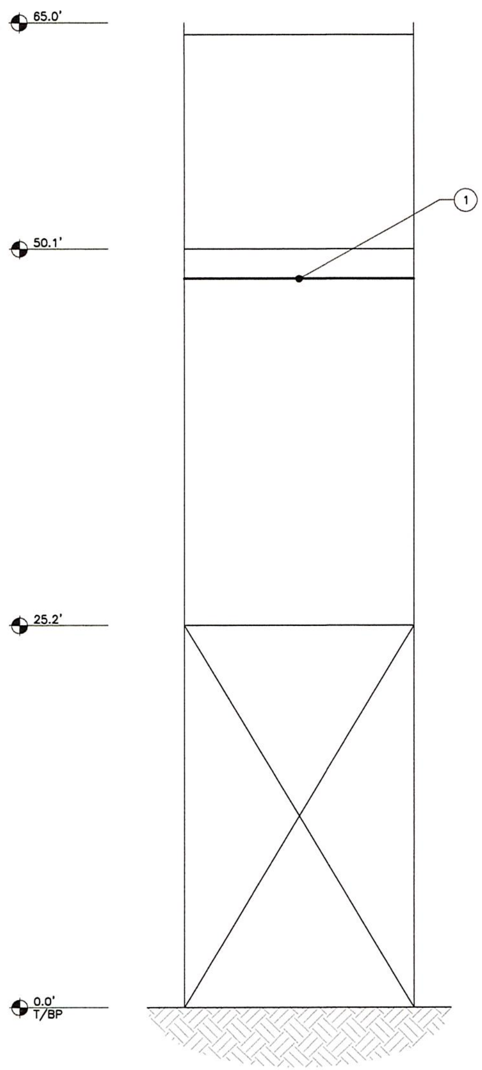
SITE NUMBER:
SNET005-A

SITE ADDRESS:
144 OLD BOSTON POST RD
DANBURY, CT 06810

SHEET TITLE
GENERAL NOTES

SHEET NUMBER
N-1

	0.0' – 25.2'	25.2' – 50.1'	50.1' – 65.0'
LEGS	15.5"ø X 0.260 8-SIDED POLYGON		12.45"ø X 0.265 8-SIDED POLYGON
DIAGONALS	W6X25	N.A.	
TOP GIRTS	N.A.		12.45"ø X 0.265 8-SIDED POLYGON
HORIZONTALS	12.45"ø X 0.265 8-SIDED POLYGON		N.A.
FACE WIDTH	15.0833		
# PANELS @ (FT)	1 @ 25.1667	1 @ 24.9375	1 @ 14.1042
TOWER FINISH	PAINTED		



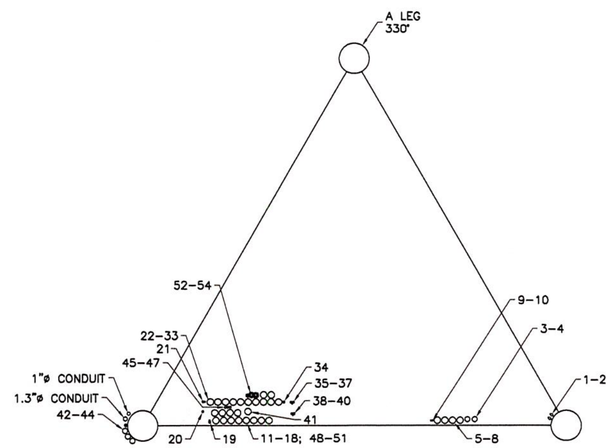
TOWER ELEVATION
SCALE: NTS

- APPURTENANCES MAY INTERFERE WITH PROPOSED MODIFICATIONS.
- ALL MODIFICATIONS TO BE INSTALLED CONTINUOUSLY THROUGH EXISTING EQUIPMENT. ALL EXISTING EQUIPMENT NOT TO BE DAMAGED OR TAKEN OFF AIR DURING INSTALLATION.
- ANTENNA GRAPHICS NOT SHOWN FOR CLARITY. SEE STRUCTURAL ANALYSIS REPORT FOR EXISTING ANTENNA LOADING.

TOWER MODIFICATION SCHEDULE*

NO.	TYPE OF MODIFICATION	BOTTOM ELEV. (FT)	TOP ELEV. (FT)
1	INSTALLATION OF NEW HORIZONTALS. SEE S-2 & S-3 FOR DETAILS.	-	48.1±

*ALL NEW MEMBERS TO BE PAINTED TO MATCH EXISTING TOWER.



*FOR COAX TYPES AND ELEVATIONS SEE STRUCTURAL ANALYSIS BY FDH ENGINEERING, INC. PROJECT NUMBER 11-07110E S2 DATED OCTOBER 14, 2011

COAX LAYOUT
SCALE: NTS

PREPARED BY:
FDH
ENGINEERING INNOVATION
2730 ROWLAND RD.
RALEIGH, NC 27615
PHONE: 919-755-1012
FAX: 919-755-1031

PREPARED FOR:
at&t
LIBERTY 1 PLAZA
4801 COX RD., SUITE 300
GLENN ALLEN, VA 23060

STATE OF CONNECTICUT
Christopher Michael Murphy
No. 25842
LICENSED
PROFESSIONAL ENGINEER

CHRISTOPHER M. MURPHY, P.E.
CONNECTICUT LICENSE NO. 25842

DRAWN BY:	JRJ
CHECKED BY:	SAA
ENG APPV'D:	CMM
PROJECT NO:	12-03174E S1

SUBMITTALS

DATE	DESCRIPTION	REV
03/16/12	CONSTRUCTION	1

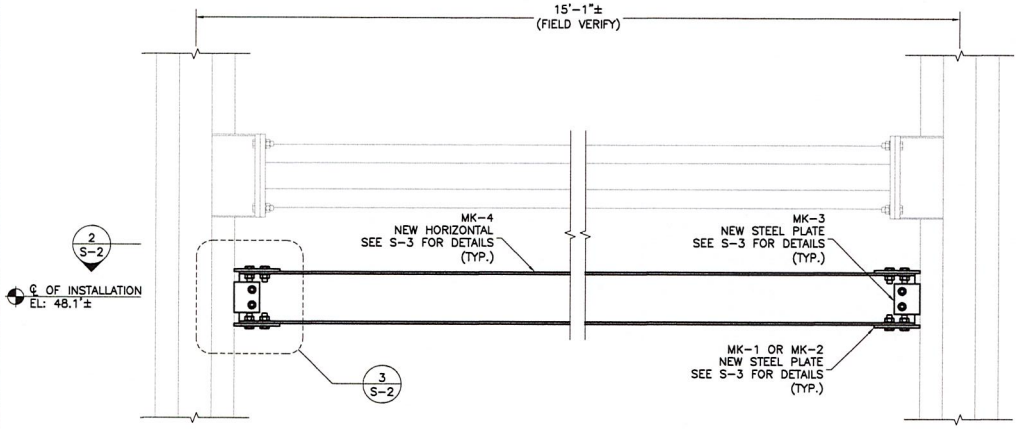
SITE NAME:
DANBURY

SITE NUMBER:
SNET005-A

SITE ADDRESS:
144 OLD BOSTON POST RD
DANBURY, CT 06810

SHEET TITLE
MODIFICATION SCHEDULE

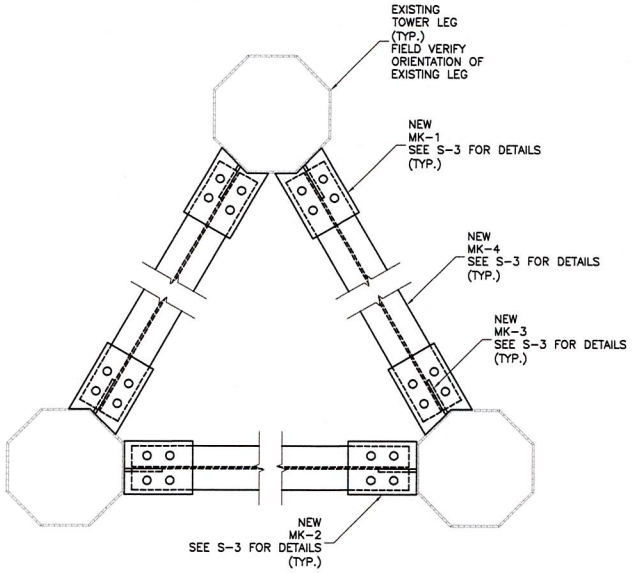
SHEET NUMBER
S-1



HORIZONTAL INSTALLATION
ELEVATION VIEW

1 / S-2 **ELEVATION**

SCALE: 1/2" = 1'-0"

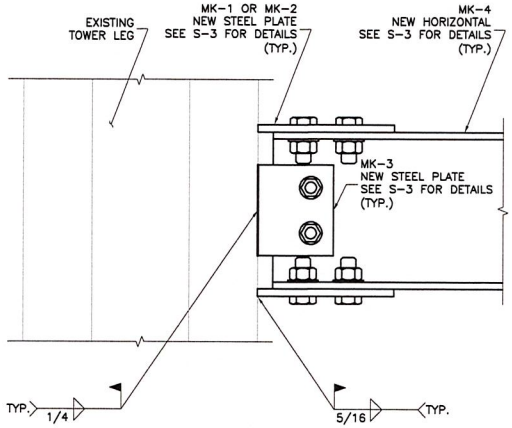


HORIZONTAL INSTALLATION
PLAN VIEW

2 / S-2 **SECTION**

SCALE: 1/2" = 1'-0"

HORIZONTAL MATERIAL LIST			
PART #	QTY.	DESCRIPTION	ELEVATION
MK-1	8	STEEL PLATE	48.1'±
MK-2	4	STEEL PLATE	48.1'±
MK-3	6	STEEL PLATE	48.1'±
MK-4	3	W10X26	48.1'±
–	48	1"ø A325N BOLTS	VARIES
–	12	3/4"ø A325N BOLTS	VARIES
ALL NEW FLAT PLATE STEEL TO HAVE Fy=36 KSI			



HORIZONTAL INSTALLATION
ELEVATION VIEW

3 / S-2 **DETAIL**

SCALE: 1-1/2" = 1'-0"

PREPARED BY:
FDH ENGINEERING INNOVATION
2730 ROWLAND RD.
RALEIGH, NC 27615
PHONE: 919-755-1012
FAX: 919-755-1031

PREPARED FOR:
at&t
LIBERTY 1 PLAZA
4801 COX RD., SUITE 300
GLENN ALLEN, VA 23060

STATE OF CONNECTICUT
Christopher Michael Murphy
No. 25842
LICENSED
PROFESSIONAL ENGINEER
3/16/12

CHRISTOPHER M. MURPHY, P.E.
CONNECTICUT LICENSE NO. 25842

DRAWN BY:	JRJ
CHECKED BY:	SAA
ENG APPV'D:	CMM
PROJECT NO:	12-03174E S1

SUBMITTALS		
DATE	DESCRIPTION	REV
03/16/12	CONSTRUCTION	1

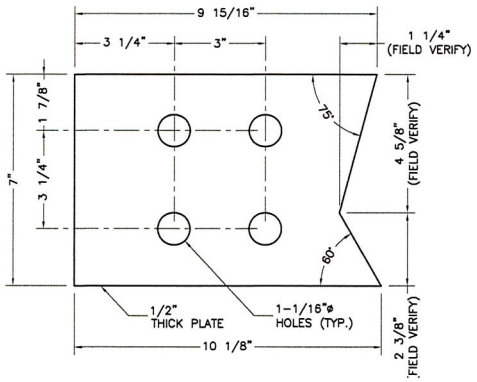
SITE NAME:
DANBURY

SITE NUMBER:
SNET005-A

SITE ADDRESS:
144 OLD BOSTON POST RD
DANBURY, CT 06810

SHEET TITLE
HORIZONTAL INSTALLATION DETAILS I

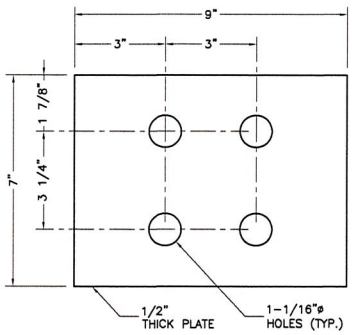
SHEET NUMBER
S-2



HORIZONTAL INSTALLATION
FRONT VIEW

MK-1 / S-3 **DETAIL**

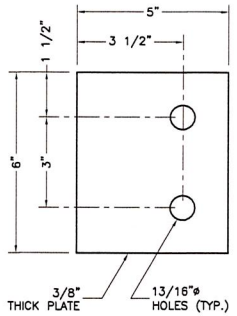
SCALE: 3" = 1'-0"



HORIZONTAL INSTALLATION
FRONT VIEW

MK-2 / S-3 **DETAIL**

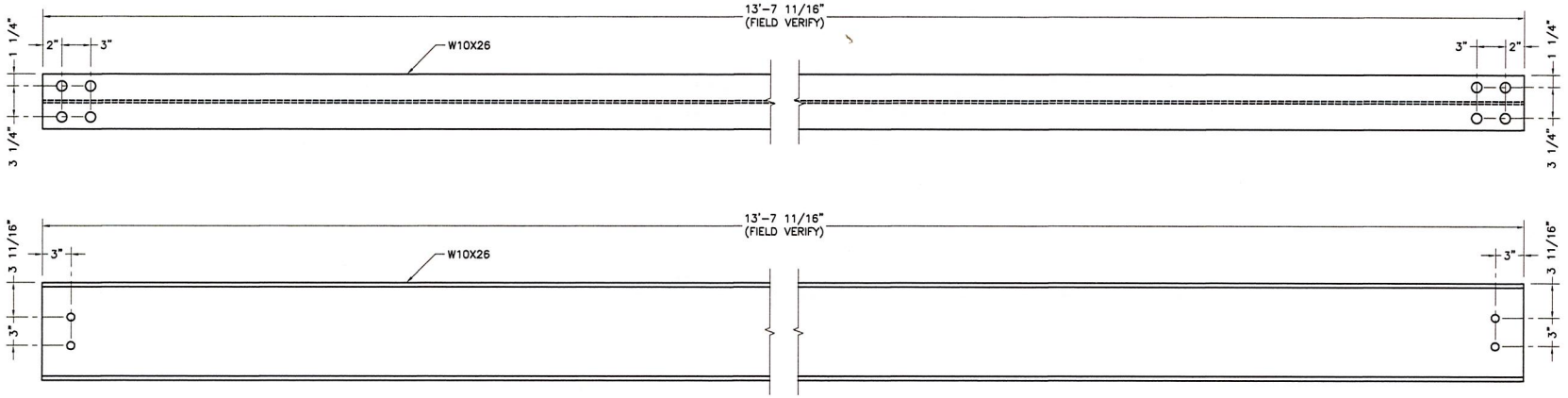
SCALE: 3" = 1'-0"



HORIZONTAL INSTALLATION
FRONT VIEW

MK-3 / S-3 **DETAIL**

SCALE: 3" = 1'-0"



HORIZONTAL INSTALLATION
TOP & FRONT VIEWS

MK-4 / S-3 **DETAIL**

SCALE: 1" = 1'-0"

PREPARED BY:

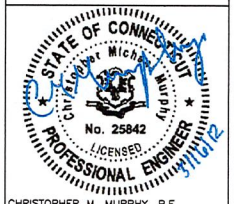
FDH
ENGINEERING INNOVATION

2730 ROWLAND RD.
RALEIGH, NC 27615
PHONE: 919-755-1012
FAX: 919-755-1031

PREPARED FOR:

at&t

LIBERTY 1 PLAZA
4801 COX RD., SUITE 300
GLENN ALLEN, VA 23060



CHRISTOPHER M. MURPHY, P.E.
CONNECTICUT LICENSE NO. 25842

DRAWN BY:	JRJ
CHECKED BY:	SAA
ENG APPV'D:	CMM
PROJECT NO:	12-03174E S1

SUBMITTALS

DATE	DESCRIPTION	REV
03/16/12	CONSTRUCTION	1

SITE NAME:
DANBURY

SITE NUMBER:
SNET005-A

SITE ADDRESS:
144 OLD BOSTON POST RD
DANBURY, CT 06810

SHEET TITLE
HORIZONTAL INSTALLATION DETAILS II

SHEET NUMBER
S-3

EXHIBIT 3

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

Calculated Radio Frequency Emissions

Site CT2133

Moses Mountain, Danbury, CT

October 26, 2011

Table of Contents

List of Tables

List of Figures

1. Introduction

The purpose of this report is to investigate compliance with applicable FCC regulations for the proposed modifications to the existing AT&T antenna arrays mounted on the existing lattice tower located at Moses Mountain in Danbury, CT. Marcus, Pagenet and Verizon also have antennas installed on the tower. The coordinates of the tower are 41-21-34.27 N, 73-27-55.7 W.

AT&T is proposing the following modifications:

1) Install three 700 MHz LTE antennas (one per sector);

2. FCC Guidelines for Evaluating RF Radiation Exposure Limits

In 1985, the FCC established rules to regulate radio frequency (RF) exposure from FCC licensed antenna facilities. In 1996, the FCC updated these rules, which were further amended in August 1997 by OET Bulletin 65 Edition 97-01. These new rules include Maximum Permissible Exposure (MPE) limits for transmitters operating between 300 kHz and 100 GHz. The FCC MPE limits are based upon those recommended by the National Council on Radiation Protection and Measurements (NCRP), developed by the Institute of Electrical and Electronics Engineers, Inc., (IEEE) and adopted by the American National Standards Institute (ANSI).

The FCC general population/uncontrolled limits set the maximum exposure to which most people may be subjected. General population/uncontrolled exposures apply in situations in which the general public may be exposed, or in which persons that are exposed as a consequence of their employment may not be fully aware of the potential for exposure or cannot exercise control over their exposure.

Public exposure to radio frequencies is regulated and enforced in units of milliwatts per square centimeter (mW/cm^2). The general population exposure limits for the various frequency ranges are defined in the attached "FCC Limits for Maximum Permissible Exposure (MPE)" in Attachment B of this report.

Higher exposure limits are permitted under the occupational/controlled exposure category, but only for persons who are exposed as a consequence of their employment and who have been made fully aware of the potential for exposure, and they must be able to exercise control over their exposure. General population/uncontrolled limits are five times more stringent than the levels that are acceptable for occupational, or radio frequency trained individuals. Attachment B contains excerpts from OET Bulletin 65 and defines the Maximum Exposure Limit.

Finally, it should be noted that the MPE limits adopted by the FCC for both general population/uncontrolled exposure and for occupational/controlled exposure incorporate a substantial margin of safety and have been established to be well below levels generally accepted as having the potential to cause adverse health effects.

3. RF Exposure Prediction Methods

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

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

Where:

EIRP = Effective Isotropic Radiated Power

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

H = Horizontal Distance from antenna in meters

V = Vertical Distance from radiation center of antenna in meters

Ground reflection factor of 1.6

Off Beam Loss is determined by the selected antenna pattern

These calculations assume that the antennas are operating at 100 percent capacity and power, and that all channels are transmitting simultaneously. Obstructions (trees, buildings, etc.) that would normally attenuate the signal are not taken into account. The calculations assume even terrain in the area of study and do not take into account actual terrain elevations which could attenuate the signal. As a result, the predicted signal levels reported below are much higher than the actual signal levels will be from the finished modifications.

4. Calculation Results

Table 1 below outlines the power density information for the site. All information for Marcus, Pagenet and Verizon comes directly from the current CSC database. Because the proposed AT&T antennas are directional in nature, the majority of the RF power is focused out towards the horizon. As a result, there will be less RF power directed below the antennas relative to the horizon, and consequently lower power density levels around the base of the tower. Please refer to Attachment C for the vertical pattern of the proposed AT&T antennas. The calculated results for AT&T in Table 1 include a nominal 10 dB off-beam pattern loss to account for the lower relative gain below the antennas.

Carrier	Antenna Height (Feet)	Operating Frequency (MHz)	Number of Trans.	ERP Per Transmitter (Watts)	Power Density (mw/cm^2)	Limit	%MPE
AT&T UMTS	68	880	1	500	0.0389	0.5867	0.66%
AT&T UMTS	68	1900	1	500	0.0389	1.0000	0.39%
AT&T LTE	68	734	1	500	0.0389	0.4893	0.79%
AT&T GSM	68	880	3	296	0.0691	0.5867	1.18%
AT&T GSM	68	1900	1	427	0.0332	1.0000	0.33%
Marcus - antenna #1	50	460		100	0.0256	0.3067	8.34%
Marcus - antenna #2	50	460		100	0.0256	0.3067	8.34%
Marcus - antenna #4	49	5800		0.1	0.0021	1.0000	0.21%
Pagenet	58	940.3		n/a	0.1136	0.6269	18.12%
Verizon	69	880	9	200	0.1359	0.5867	23.17%
Verizon	69	1900	3	285	0.0646	1.0000	6.46%
						Total	**68.00%**

Table 1: Carrier Information[1] [2]

[1] Calculated values for AT&T include a -10 dB off-beam loss factor. Antenna specifics for Marcus, Pagenet and Verizon were unavailable and therefore do not include any off-beam loss factor.

[2] Blank spaces indicate where information was unavailable from the CSC database.

5. Conclusion

The above analysis verifies that emissions from the existing site will be below the maximum power density levels as outlined by the FCC in the OET Bulletin 65 Ed. 97-01. Even when using conservative methods, the cumulative power density from the proposed and existing transmit antennas at the existing facility is below the limits for the general public. The highest expected percent of Maximum Permissible Exposure at the base of the tower is 68.00% of the FCC limit.

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

6. Statement of Certification

I certify to the best of my knowledge that the statements in this report are true and accurate. The calculations follow guidelines set forth in ANSI/IEEE Std. C95.3, ANSI/IEEE Std. C95.1 and FCC OET Bulletin 65 Edition 97-01.

Daniel L. Goulet
C Squared Systems, LLC

October 26, 2011
Date

Attachment A: References

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

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

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

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

(A) Limits for Occupational/Controlled Exposure[3]

Frequency Range (MHz)	Electric Field Strength (E) (V/m)	Magnetic Field Strength (E) (A/m)	Power Density (S) (mW/cm^2)	Averaging Time $\|E\|^2$, $\|H\|^2$ or S (minutes)
0.3-3.0	614	1.63	(100)*	6
3.0-30	1842/f	4.89/f	($900/f^2$)*	6
30-300	61.4	0.163	1.0	6
300-1500	-	-	f/300	6
1500-100,000	-	-	5	6

(B) Limits for General Population/Uncontrolled Exposure[4]

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

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

Table 2: FCC Limits for Maximum Permissible Exposure (MPE)

[3] Occupational/controlled limits apply in situations in which persons are exposed as a consequence of their employment provided those persons are fully aware of the potential for exposure and can exercise control over their exposure. Limits for occupational/controlled exposure also apply in situations when an individual is transient through a location where occupational/controlled limits apply provided he or she is made aware of the potential for exposure

[4] General population/uncontrolled exposures apply in situations in which the general public may be exposed, or in which persons that are exposed as a consequence of their employment may not be fully aware of the potential for exposure or cannot exercise control over their exposure

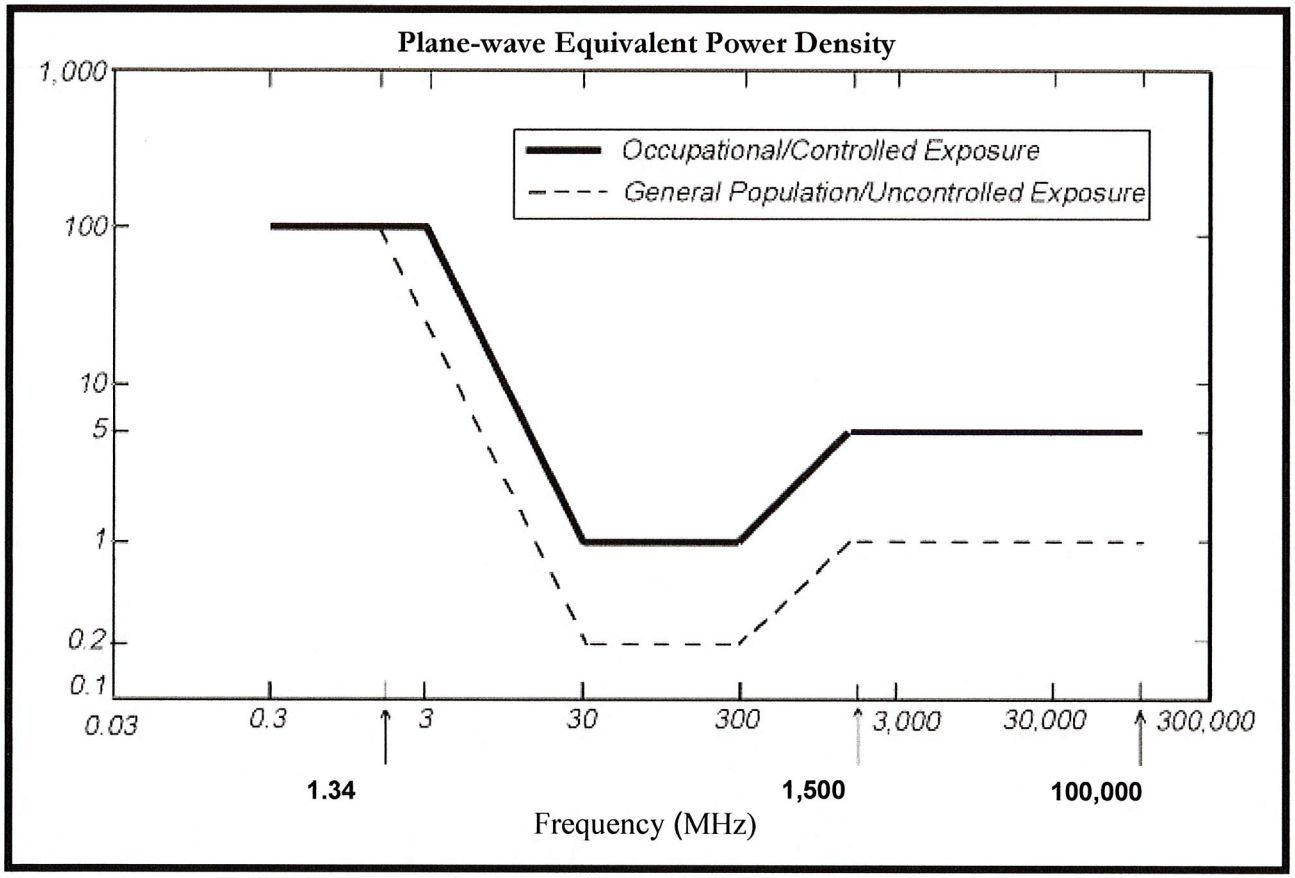
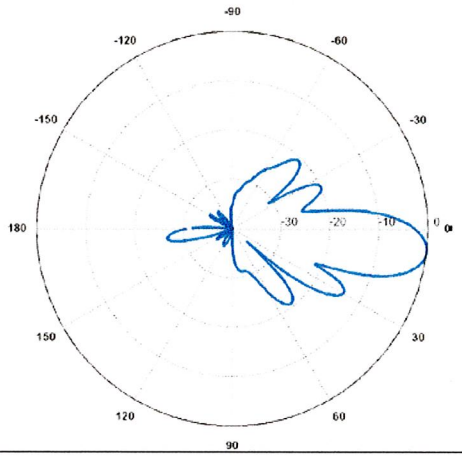
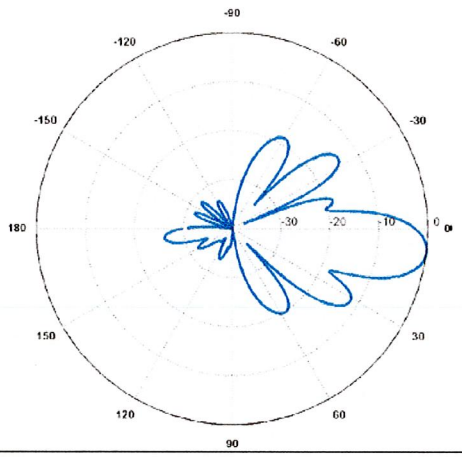


Figure 1: Graph of FCC Limits for Maximum Permissible Exposure (MPE)

Attachment C: AT&T's Antenna Model Data Sheets and Electrical Patterns

700 MHz Manufacturer: Powerwave Model #: P65-16-XLH-RR Frequency Band: 698-894 MHz Gain: 12.7 dBd Vertical Beamwidth: 14.7 deg Horizontal Beamwidth: 73 deg Polarization: Dual Linear ± 45 deg Size L x W x D: 72" x 12" x 6"	
850 MHz Manufacturer: Powerwave Model #: 7770.00 Frequency Band: 824-896 MHz Gain: 11.4 dBd Vertical Beamwidth: 15 deg Horizontal Beamwidth: 85 deg Polarization: Dual Linear ± 45 deg Size L x W x D: 55.4" x 11" x 4.9"	
1900 MHz Manufacturer: Powerwave Model #: 7770.00 Frequency Band: 1850-1990 MHz Gain: 13.4 dBd Vertical Beamwidth: 7 deg Horizontal Beamwidth: 90 deg Polarization: Dual Linear ± 45 deg Size L x W x D: 72" x 12" x 6"