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

June 30, 2015

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

RE: **AT&T LTE Amendment - Crown Site BU: 826053**
Sprint PCS Site ID: CTL05189
Located at: 88 Main Street, Monroe, CT 06468

Dear Ms. Bachman:

This letter and exhibits are submitted on behalf of AT&T. AT&T is making modifications to certain existing sites in its Connecticut system in order to implement their 2.5GHz LTE technology. Please accept this letter and exhibits as notification, pursuant to § 16-50j-73 of the Regulations of Connecticut State Agencies ("R.C.S.A."), of construction that constitutes an exempt modification pursuant to R.C.S.A. § 16-50j-72(b)(2). In compliance with R.C.S.A. § 16-50j-73, a copy of this letter is being sent to Mr. Stephen J. Vavrek, First Selectman for the Town of Monroe, and Stepney Volunteer Fire Department, Property Owner.

AT&T plans to modify the existing wireless communications facility owned by Crown Castle and located at **88 Main Street, Monroe, CT 06468**. Attached are a compound plan and elevation depicting the planned changes (Exhibit-1), and documentation of the structural sufficiency of the structure to accommodate the revised antenna configuration (Exhibit-2). Also included is a power density table report reflecting the modification to AT&T's operations at the site (Exhibit-3).

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

1. The proposed modifications will not result in an increase in the height of the existing tower. AT&T's additional antennas will be located at the same elevation on the existing tower.

2. There will be no proposed modifications to the ground and no extension of boundaries.

3. The proposed modifications will not increase noise levels at the facility by six decibels or more.

4. A Structural Modification Report confirming that the tower and foundation can support AT&T's proposed modifications is included as Exhibit-2.

5. The operation of the additional antennas will not increase radio frequency (RF) emissions at the facility to a level at or above the Federal Communications Commission (FCC) adopted safety standard. A cumulative General Power Density table report for AT&T's modified facility is included as Exhibit-3.

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

Sincerely,

Jeff Barbadora
Real Estate Specialist

Enclosures

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

cc: Mr. Stephen J. Vavrek, First Selectman
Monroe Town Hall
7 Fan Hill Road
Monroe, CT 06468

cc: Stepney Volunteer Fire Department
P.O. Box 266
Monroe, CT 06468

PROJECT INFORMATION

SCOPE OF WORK:

- AT&T ANTENNAS: (1) NEW LTE ANTENNAS PER SECTOR WITH (3) SECTORS, FOR A TOTAL OF (3) NEW LTE ANTENNAS; (3) EXISTING UMTS/GSM ANTENNAS & TMAs TO BE RE-USED (1 PER SECTOR)
- AT&T RRUs: (1) NEW RRUs PER SECTOR WITH (3) SECTORS, FOR A TOTAL OF (3) NEW RRUs; (1) EXISTING RRU PER SECTOR TO BE REUSED, FOR A TOTAL OF (3) EXISTING RRUs.
- (1) NEW A2 MODULE PER SECTOR WITH (3) SECTORS, FOR A TOTAL OF (3) A2 MODULES.

SITE ADDRESS:	80 MAIN STREET MONROE, CT 06468
LATITUDE: LONGITUDE:	41.3016531 41° 18' 5.95116"N -73.2507800 73° 15' 2.808"W
USID:	24490
TOWER OWNER:	CROWN CASTLE 1220 AUGUSTA DRIVE, SUITE 600 HOUSTON, TX 77057
TYPE OF SITE:	MONOPOLE/OUTDOOR EQUIPMENT
RAD CENTER:	175'-0"±
CURRENT USE:	UNMANNED WIRELESS TELECOMMUNICATIONS FACILITY
PROPOSED USE:	UNMANNED WIRELESS TELECOMMUNICATIONS FACILITY

at&t MOBILITY

FA CODE: 10071138
SITE NUMBER: CT5189
SITE NAME: MONROE-SOUTH

PROJECT TEAM

CLIENT REPRESENTATIVE
COMPANY: EMPIRE TELECOM
ADDRESS: 16 ESQUIRE ROAD, BILLERICA, MA 01821
CONTACT: DAVID COOPER
PHONE: 617-639-4908
EMAIL: dcooper@empiretelecomm.com

SITE ACQUISITION:
COMPANY: VERTICAL DEVELOPMENT, LLC
ADDRESS: 20 COMMERCIAL STREET, BRANFORD, CT 06405
CONTACT: DAVID BASS
PHONE: 203-826-5857
EMAIL: dbass@verticaldevelopmentllc.com

ZONING:
COMPANY: VERTICAL DEVELOPMENT, LLC
ADDRESS: 20 COMMERCIAL STREET, BRANFORD, CT 06405
CONTACT: DAVID BASS
PHONE: 203-826-5857
EMAIL: dbass@verticaldevelopmentllc.com

ENGINEERING:
COMPANY: COM-EX CONSULTANTS, LLC
ADDRESS: 4 SECOND AVENUE, SUITE 204, DENVILLE, NJ 07834
CONTACT: NICHOLAS D. BARILE, P.E.
PHONE: 862-209-4300
EMAIL: nbarile@comexconsultants.com

RF ENGINEER:
COMPANY: AT&T MOBILITY - NEW ENGLAND
ADDRESS: 550 COCHITUATE ROAD, SUITE 550 13 & 14, FRAMINGHAM, MA 01701
CONTACT: CAMERON SYME
PHONE: 508-596-7146
EMAIL: cs6970@att.com

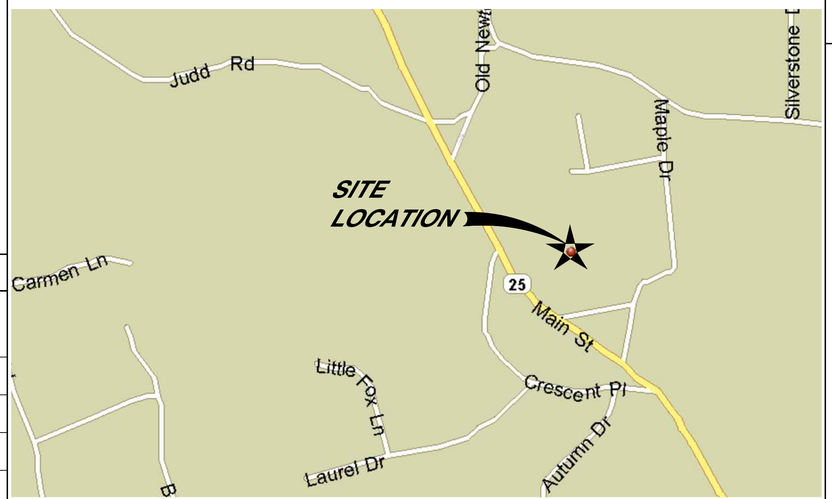
CONSTRUCTION MANAGEMENT:
COMPANY: EMPIRE TELECOM
ADDRESS: 16 ESQUIRE ROAD, BILLERICA, MA 01821
CONTACT: GRZEGORZ "GREG" DORMAN
PHONE: 484-683-1750
EMAIL: gdorman@empiretelecomm.com

DRAWING INDEX

		REV.
T-1	TITLE SHEET	0
GN-1	GROUNDING & GENERAL NOTES	0
A-1	ROOF PLAN	0
A-2	EQUIPMENT LAYOUT	0
A-3	ANTENNA LAYOUTS & ELEVATION	0
A-4	DETAILS	0
G-1	GROUNDING DETAILS	0

VICINITY MAP

1. DEPART 550 COCHITUATE RD, TOWN OF FRAMINGHAM, MA 01701 ON SR-30 [COCHITUATE RD] (WEST) 2. BEAR LEFT (SOUTH) ONTO SR-126 [CONCORD ST], TURN LEFT (SOUTH) ONTO CONCORD STTURN RIGHT (WEST) ONTO SR-9 [WORCESTER RD]. 3. MERGE ONTO SR-30 [SR-9], KEEP STRAIGHT ONTO SR-9 [WORCESTER RD]. 4. TURN RIGHT ONTO RAMP, KEEP LEFT TO STAY ON RAMP *TOLL ROAD* MERGE ONTO I-90 [MASS PIKE] 5. AT EXIT 9, TAKE RAMP (RIGHT) ONTO I-84 [ENTERING CONNECTICUT] 5. AT EXIT 57, TAKE RAMP (LEFT) ONTO SR-15, ROAD NAME CHANGES TO US-5 [SR-15] 6. AT EXIT 86, TAKE RAMP (RIGHT) ONTO I-91. 7. AT EXIT 17, TURN RIGHT ONTO RAMP, TAKE RAMP (LEFT) ONTO SR-15 [WILBUR CROSS PKWY]. 8. AT EXIT 49, TAKE RAMP (RIGHT) ONTO SR-25TURN RIGHT (EAST) ONTO MILL ST TURN LEFT (NORTH) ONTO PARKING LOT AND ACCESS ROAD TO SITE IS ON RIGHT.



GENERAL NOTES

1. THIS DOCUMENT IS THE CREATION, DESIGN, PROPERTY, AND COPYRIGHTED WORK OF AT&T. ANY DUPLICATION OR USE WITHOUT EXPRESS WRITTEN CONSENT IS STRICTLY PROHIBITED. DUPLICATION AND USE BY GOVERNMENT AGENCIES FOR THE PURPOSES OF CONDUCTING THEIR LAWFULLY AUTHORIZED REGULATORY AND ADMINISTRATIVE FUNCTIONS IS SPECIFICALLY ALLOWED.
2. THE FACILITY IS AN UNMANNED PRIVATE AND SECURED EQUIPMENT INSTALLATION. IT IS ONLY ACCESSED BY TRAINED TECHNICIANS FOR PERIODIC ROUTINE MAINTENANCE AND THEREFORE DOES NOT REQUIRE ANY WATER OR SANITARY SEWER SERVICE. THE FACILITY IS NOT GOVERNED BY REGULATIONS REQUIRING PUBLIC ACCESS PER ADA REQUIREMENTS.
3. CONTRACTOR SHALL VERIFY ALL PLANS AND EXISTING DIMENSIONS AND CONDITIONS ON THE JOB SITE AND SHALL IMMEDIATELY NOTIFY THE AT&T REPRESENTATIVE IN WRITING OF DISCREPANCIES BEFORE PROCEEDING WITH THE WORK OR BE RESPONSIBLE FOR SAME.

CONNECTICUT ONE CALL SYSTEM, INC. 1-800-922-4455 STOP - CALL BEFORE YOU DIG!

CONNECTICUT LAW REQUIRES TWO WORKING DAYS NOTICE PRIOR TO ANY EARTH MOVING ACTIVITIES BY CALLING 800-922-4455 OR DIAL 811

APPROVALS

THE FOLLOWING PARTIES HEREBY APPROVE AND ACCEPT THESE DOCUMENTS AND AUTHORIZE THE SUBCONTRACTOR TO PROCEED WITH THE CONSTRUCTION DESCRIBED HEREIN, ALL DOCUMENTS ARE SUBJECT TO REVIEW BY THE LOCAL BUILDING DEPARTMENT AMD MAY IMPOSE CHANGES OR SITE MODIFICATIONS.

DISCIPLINE:	NAME:	DATE:
SITE ACQUISITION:		
CONSTRUCTION MANAGER:		
AT&T PROJECT MANAGER:		

COM-EX Consultants
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SUITE 204
DENVILLE, NJ 07834
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FRAMINGHAM, MA 01701

NO.	DATE	REVISIONS	BY	CHK	APP'D
0	07/01/15	ISSUED AS FINAL	GR	NDB	NDB

SCALE: AS SHOWN | DESIGNED BY: CJT | DRAWN BY: GR

SEAL: STATE OF CONNECTICUT — NICHOLAS D. BARILE — 22643 — PROFESSIONAL ENGINEER

AT&T

DRAWING TITLE: TITLE SHEET

JOB NUMBER	DRAWING NUMBER	REV
14253-EMP	T-1	1

GROUNDING NOTES:

1. THE SUBCONTRACTOR SHALL REVIEW AND INSPECT THE EXISTING FACILITY GROUNDING SYSTEM AND LIGHTNING PROTECTION SYSTEM (AS DESIGNED AND INSTALLED) FOR STRICT COMPLIANCE WITH THE NEC (AS ADOPTED BY THE AHJ), THE SITE-SPECIFIC (UL, LPI, OR NFPA) LIGHTING PROTECTION CODE, AND GENERAL COMPLIANCE WITH TELCORDIA AND TIA GROUNDING STANDARDS. THE SUBCONTRACTOR SHALL REPORT ANY VIOLATIONS OR ADVERSE FINDINGS TO THE CONTRACTOR FOR RESOLUTION.

2. ALL GROUND ELECTRODE SYSTEMS (INCLUDING TELECOMMUNICATION, RADIO, LIGHTNING PROTECTION, AND AC POWER GES'S) SHALL BE BONDED TOGETHER, AT OR BELOW GRADE, BY TWO OR MORE COPPER BONDING CONDUCTORS IN ACCORDANCE WITH THE NEC.

3. THE SUBCONTRACTOR SHALL PERFORM IEEE FALL-OF-POTENTIAL RESISTANCE TO EARTH TESTING (PER IEEE 1100 AND 81) FOR NEW GROUND ELECTRODE SYSTEMS. THE SUBCONTRACTOR SHALL FURNISH AND INSTALL SUPPLEMENTAL GROUND ELECTRODES AS NEEDED TO ACHIEVE A TEST RESULT OF 5 OHMS OR LESS. TESTS SHALL BE PERFORMED IN ACCORDANCE WITH 25471-000-3PS-EG00-0001, DESIGN & TESTING OF FACILITY GROUNDING FOR CELL SITES.

4. METAL RACEWAY SHALL NOT BE USED AS THE NEC REQUIRED EQUIPMENT GROUND CONDUCTOR. STRANDED COPPER CONDUCTORS WITH GREEN INSULATION, SIZED IN ACCORDANCE WITH THE NEC, SHALL BE FURNISHED AND INSTALLED WITH THE POWER CIRCUITS TO BTS EQUIPMENT.

5. EACH BTS CABINET FRAME SHALL BE DIRECTLY CONNECTED TO THE MASTER GROUND BAR WITH GREEN INSULATED SUPPLEMENTAL EQUIPMENT GROUND WIRES, 6 AWG STRANDED COPPER OR LARGER FOR INDOOR BTS; 2 AWG STRANDED COPPER FOR OUTDOOR BTS.

6. EXOTHERMIC WELDS SHALL BE USED FOR ALL GROUNDING CONNECTIONS BELOW GRADE.

7. APPROVED ANTIOXIDANT COATINGS (I.E., CONDUCTIVE GEL OR PASTE) SHALL BE USED ON ALL COMPRESSION AND BOLTED GROUND CONNECTIONS.

8. ICE BRIDGE BONDING CONDUCTORS SHALL BE EXOTHERMICALLY BONDED OR BOLTED WITH STAINLESS STEEL HARDWARE TO THE BRIDGE AND THE TOWER GROUND BAR.

9. ALUMINUM CONDUCTOR OR COPPER CLAD STEEL CONDUCTOR SHALL NOT BE USED FOR GROUNDING CONNECTIONS.

10. MISCELLANEOUS ELECTRICAL AND NON-ELECTRICAL METAL BOXES, FRAMES AND SUPPORTS SHALL BE BONDED TO THE GROUND RING, IN ACCORDANCE WITH THE NEC.

11. METAL CONDUIT AND TRAY SHALL BE GROUNDED AND MADE ELECTRICALLY CONTINUOUS WITH LISTED BONDING FITTINGS OR BY BONDING ACROSS THE DISCONTINUITY WITH 6 AWG COPPER WIRE UL APPROVED GROUNDING TYPE CONDUIT CLAMPS.

12. GROUND CONDUCTORS USED IN THE FACILITY GROUND AND LIGHTNING PROTECTION SYSTEMS SHALL NOT BE ROUTED THROUGH METALLIC OBJECTS THAT FORM A RING AROUND THE CONDUCTOR, SUCH AS METALLIC CONDUITS, METAL SUPPORT CLIPS OR SLEEVES THROUGH WALLS OR FLOORS. WHEN IT IS REQUIRED TO BE HOUSED IN CONDUIT TO MEET CODE REQUIREMENTS OR LOCAL CONDITIONS, NON-METALLIC MATERIAL SUCH AS PVC PLASTIC CONDUIT SHALL BE USED. WHERE USE OF METAL CONDUIT IS UNAVOIDABLE (E.G., NON-METALLIC CONDUIT PROHIBITED BY LOCAL CODE) THE GROUND CONDUCTOR SHALL BE BONDED TO EACH END OF THE METAL CONDUIT.

13. ALL TOWER GROUNDING SYSTEMS SHALL COMPLY WITH THE REQUIREMENTS OF ANSI/TIA 222. FOR TOWERS BEING BUILT TO REV-G OF THE STANDARD, THE WIRE SIZE OF THE BURIED GROUND RING AND CONNECTIONS BETWEEN THE TOWER AND THE BURIED GROUND RING SHALL BE CHANGED FROM 2 AWG TO 2/0 AWG. IN ADDITION, THE MINIMUM LENGTH OF THE GROUND RODS SHALL BE INCREASED FROM EIGHT FEET (8') TO TEN FEET (10').

14. ALL NEW STRUCTURES WITH A FOUNDATION AND/OR FOOTING HAVING 20 FT. OR MORE ½" OR GREATER ELECTRICALLY CONDUCTIVE REINFORCING STEEL MUST HAVE IT BONDED TO THE GROUND RING USING AN EXOTHERMIC WELD CONNECTION USING #2 AWG SOLID TINNED COPPER GROUND WIRE, PER NEC 250.50.

GENERAL NOTES:

1. FOR THE PURPOSE OF CONSTRUCTION DRAWING, THE FOLLOWING DEFINITIONS SHALL APPLY:
   CONTRACTOR – EMPIRE TELECOM
   SUBCONTRACTOR – GENERAL CONTRACTOR (CONSTRUCTION)
   OWNER – AT&T MOBILITY
   OEM – ORIGINAL EQUIPMENT MANUFACTURER

2. INFORMATION SHOWN ON THIS SET OF DRAWINGS TAKEN FROM PLANS PREPARED BY CHA FOR AT&T DATED (04/20/11). CONTRACTOR TO NOTIFY ENGINEER IF DISCREPANCIES EXIST PRIOR TO COMMENCEMENT OF CONSTRUCTION.

3. PRIOR TO THE SUBMISSION OF BIDS, THE BIDDING SUBCONTRACTOR SHALL VISIT THE CELL SITE TO FAMILIARIZE WITH THE EXISTING CONDITIONS AND TO CONFIRM THAT THE WORK CAN BE ACCOMPLISHED AS SHOWN ON THE CONSTRUCTION DRAWINGS. ANY DISCREPANCY FOUND SHALL BE BROUGHT TO THE ATTENTION OF CONTRACTOR.

4. ALL MATERIALS FURNISHED AND INSTALLED SHALL BE IN STRICT ACCORDANCE WITH ALL APPLICABLE CODES, REGULATIONS, AND ORDINANCES. SUBCONTRACTOR SHALL ISSUE ALL APPROPRIATE NOTICES AND COMPLY WITH ALL LAWS, ORDINANCES, RULES, REGULATIONS, AND LAWFUL ORDERS OF ANY PUBLIC AUTHORITY REGARDING THE PERFORMANCE OF THE WORK. ALL WORK CARRIED OUT SHALL COMPLY WITH ALL APPLICABLE MUNICIPAL AND UTILITY COMPANY SPECIFICATIONS AND LOCAL JURISDICTIONAL CODES, ORDINANCES AND APPLICABLE REGULATIONS.

5. DRAWINGS PROVIDED HERE ARE NOT TO BE SCALED AND ARE INTENDED TO SHOW OUTLINE ONLY.

6. UNLESS NOTED OTHERWISE, THE WORK SHALL INCLUDE FURNISHING MATERIALS, EQUIPMENT, APPURTENANCES, AND LABOR NECESSARY TO COMPLETE ALL INSTALLATIONS AS INDICATED ON THE DRAWINGS.

7. THE SUBCONTRACTOR SHALL INSTALL ALL EQUIPMENT AND MATERIALS IN ACCORDANCE WITH MANUFACTURER'S RECOMMENDATIONS UNLESS SPECIFICALLY STATED OTHERWISE.

8. IF THE SPECIFIED EQUIPMENT CANNOT BE INSTALLED AS SHOWN ON THESE DRAWINGS, THE SUBCONTRACTOR SHALL PROPOSE AN ALTERNATIVE INSTALLATION SPACE FOR APPROVAL BY THE CONTRACTOR.

9. SUBCONTRACTOR SHALL DETERMINE ACTUAL ROUTING OF CONDUIT, POWER AND T1 CABLES, GROUNDING CABLES AS SHOWN ON THE POWER, GROUNDING AND TELCO PLAN DRAWING. SUBCONTRACTOR SHALL UTILIZE EXISTING TRAYS AND/OR SHALL ADD NEW TRAYS AS NECESSARY. SUBCONTRACTOR SHALL CONFIRM THE ACTUAL ROUTING WITH THE CONTRACTOR. ROUTING OF TRENCHING SHALL BE APPROVED BY CONTRACTOR

10. THE SUBCONTRACTOR SHALL PROTECT EXISTING IMPROVEMENTS, PAVEMENTS, CURBS, LANDSCAPING AND STRUCTURES. ANY DAMAGED PART SHALL BE REPAIRED AT SUBCONTRACTOR'S EXPENSE TO THE SATISFACTION OF OWNER.

11. SUBCONTRACTOR SHALL LEGALLY AND PROPERLY DISPOSE OFF ALL SCRAP MATERIALS SUCH AS COAXIAL CABLES AND OTHER ITEMS REMOVED FROM THE EXISTING FACILITY. ANTENNAS REMOVED SHALL BE RETURNED TO THE OWNER'S DESIGNATED LOCATION.

12. SUBCONTRACTOR SHALL LEAVE PREMISES IN CLEAN CONDITION.

13. ALL CONCRETE REPAIR WORK SHALL BE DONE IN ACCORDANCE WITH AMERICAN CONCRETE INSTITUTE (ACI) 301.

14. ANY NEW CONCRETE NEEDED FOR THE CONSTRUCTION SHALL HAVE 4000 PSI STRENGTH AT 28 DAYS UNLESS OTHERWISE SPECIFIED. ALL CONCRETING WORK SHALL BE DONE IN ACCORDANCE WITH ACI 318 CODE REQUIREMENTS.

15. ALL STRUCTURAL STEEL WORK SHALL BE DETAILED, FABRICATED AND ERECTED IN ACCORDANCE WITH AISC SPECIFICATIONS. ALL STRUCTURAL STEEL SHALL BE ASTM A36 (Fy=36 ksi). ALL STEEL EXPOSED TO WEATHER SHALL BE HOT DIPPED GALVANIZED. TOUCH UP ALL SCRATCHES AND OTHER MARKS IN THE FIELD AFTER STEEL IS ERECTED USING A COMPATIBLE ZINC RICH PAINT.

16. CONSTRUCTION SHALL COMPLY WITH SPECIFICATION 25741-000-3APS-A00Z-00002, "GENERAL CONSTRUCTION SERVICES FOR CONSTRUCTION OF AT&T MOBILITY SITES."

17. SUBCONTRACTOR SHALL VERIFY ALL EXISTING DIMENSIONS AND CONDITIONS PRIOR TO COMMENCING ANY WORK. ALL DIMENSIONS OF EXISTING CONSTRUCTION SHOWN ON THE DRAWINGS MUST BE VERIFIED. SUBCONTRACTOR SHALL NOTIFY THE CONTRACTOR OF ANY DISCREPANCIES PRIOR TO ORDERING MATERIAL OR PROCEEDING WITH CONSTRUCTION.

18. THE EXISTING CELL SITE IS IN FULL COMMERCIAL OPERATION. ANY CONSTRUCTION WORK BY SUBCONTRACTOR SHALL NOT DISRUPT THE EXISTING NORMAL OPERATION. ANY WORK ON EXISTING EQUIPMENT MUST BE COORDINATED WITH CONTRACTOR. ALSO, WORK MAY NEED TO BE SCHEDULED FOR AN APPROPRIATE MAINTENANCE WINDOW USUALLY IN LOW TRAFFIC PERIODS AFTER MIDNIGHT.

19. SINCE THE CELL SITE MAY BE ACTIVE, ALL SAFETY PRECAUTIONS MUST BE TAKEN WHEN WORKING AROUND HIGH LEVELS OF ELECTROMAGNETIC RADIATION. EQUIPMENT SHOULD BE SHUTDOWN PRIOR TO PERFORMING ANY WORK THAT COULD EXPOSE THE WORKERS TO DANGER. PERSONAL RF EXPOSURE MONITORS ARE REQUIRED TO BE WORN TO ALERT OF ANY DANGEROUS EXPOSURE LEVELS.

20. SUBCONTRACTOR'S WORK SHALL COMPLY WITH ALL APPLICABLE NATIONAL, STATE, AND LOCAL CODES AS ADOPTED BY THE LOCAL AUTHORITY HAVING JURISDICTION (AHJ) FOR THE LOCATION. THE EDITION OF THE AHJ ADOPTED CODES AND STANDARDS IN EFFECT ON THE DATE OF CONTRACT AWARD SHALL GOVERN THE DESIGN.
    - INTERNATIONAL BUILDING CODE: IBC 2009 WITH LOCAL & COUNTY AMENDMENTS
    - NATIONAL ELECTRICAL CODE: NEC 2011 WITH LOCAL & COUNTY AMENDMENTS
    - FIRE/LIFE SAFETY CODE: NFPA-101 2009 WITH LOCAL & COUNTY AMENDMENTS

21. SUBCONTRACTOR'S WORK SHALL COMPLY WITH THE LATEST EDITION OF THE FOLLOWING STANDARDS:
    - AMERICAN CONCRETE INSTITUTE (ACI) 318, BUILDING CODE REQUIREMENTS FOR STRUCTURAL CONCRETE
    - AMERICAN INSTITUTE OF STEEL CONSTRUCTION (AISC), MANUAL OF STEEL CONSTRUCTION, THIRTEENTH EDITION
    - AMERICAN SOCIETY OF TESTING OF MATERIALS, ASTM
    - TELECOMMUNICATIONS INDUSTRY ASSOCIATION (ANSI/TIA-222-G-1), STRUCTURAL STANDARDS FOR STEEL ANTENNA TOWER AND ANTENNA SUPPORTING STRUCTURES:
    - TIA 607, COMMERCIAL BUILDING GROUNDING AND BONDING REQUIREMENTS FOR TELECOMMUNICATIONS
    - OCCUPATIONAL SAFETY AND HEALTH ADMINISTRATION, OSHA
    - INSTITUTE FOR ELECTRICAL AND ELECTRONICS ENGINEERS (IEEE) 81, GUIDE FOR MEASURING EARTH RESISTIVELY, GROUND IMPEDANCE, AND EARTH SURFACE POTENTIALS OF A GROUND SYSTEM IEEE 1100 (1999) RECOMMENDED PRACTICE FOR POWERING AND GROUNDING OF ELECTRONIC EQUIPMENT
    - TELCORDIA GR-1503, COAXIAL CABLE CONNECTIONS

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

23. INFORMATION SHOWN ON THIS SET OF DRAWINGS TAKEN FROM PLANS PREPARED BY HUDSON DESIGN GROUP FOR AT&T DATED 10/31/11. CONTRACTOR TO NOTIFY ENGINEER IF DISCREPANCIES EXIST PRIOR TO COMMENCEMENT OF CONSTRUCTION.

COM-EX Consultants
4 SECOND AVENUE
SUITE 204
DENVILLE, NJ 07834
PHONE: 862.209.4300
FAX: 862.209.4301

EMPIRE telecom
16 ESQUIRE ROAD
BILLERICA, MA 01821

SITE NUMBER: CT5189
SITE NAME: MONROE-SOUTH
88 MAIN STREET
MONROE, CT 06468
FAIRFIELD COUNTY

at&t MOBILITY
550 COCHITUATE ROAD
FRAMINGHAM, MA 01701

NO.	DATE	REVISIONS	BY	CHK	APP'D
0	07/01/15	ISSUED AS FINAL	GR	NDB	NDB

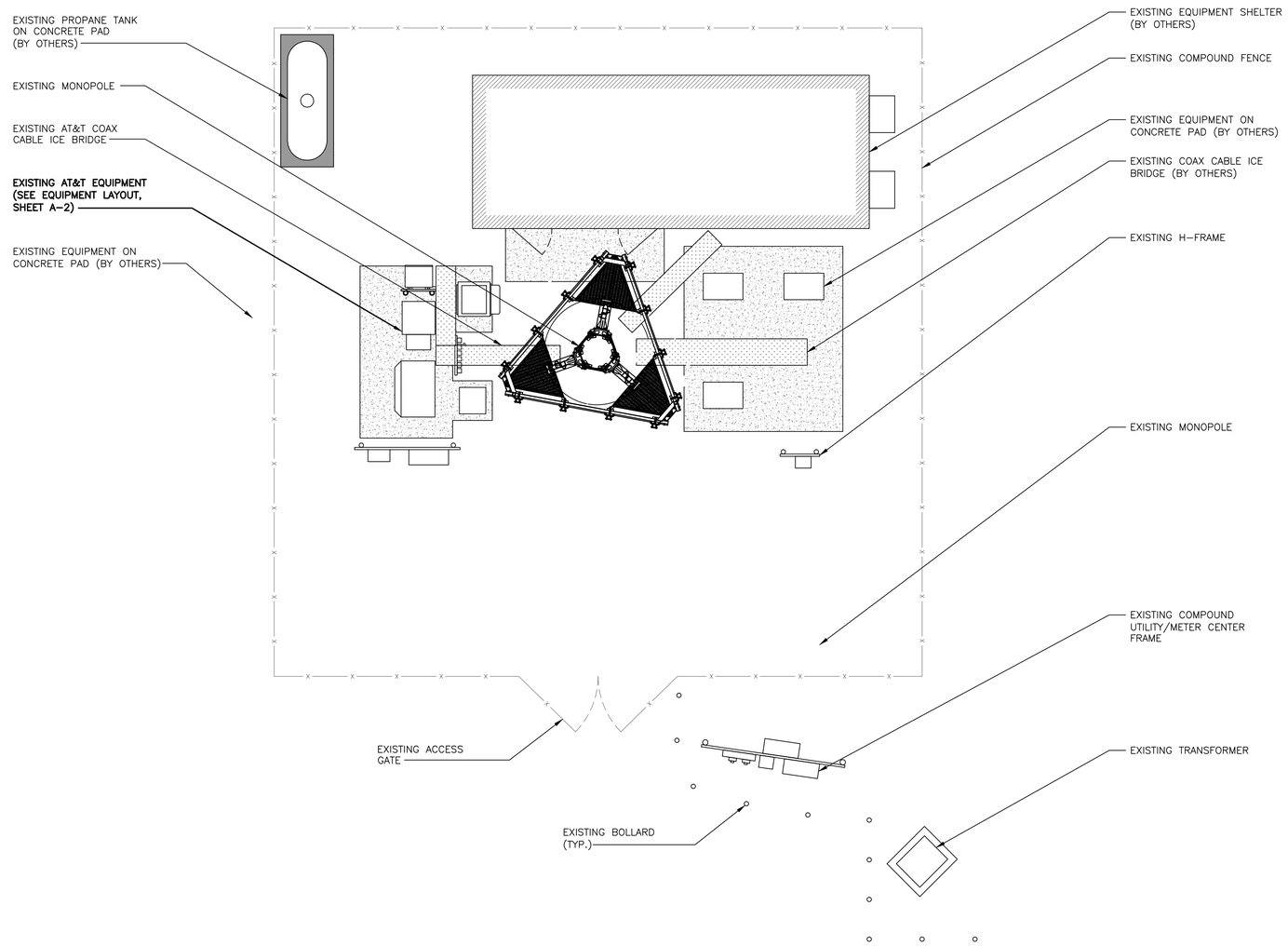
SCALE: AS SHOWN | DESIGNED BY: CJT | DRAWN BY: GR

SEAL:
STATE OF CONNECTICUT
NICHOLAS D. BARBA
PROFESSIONAL ENGINEER
CT PROFESSIONAL ENGINEER 28643

AT&T

DRAWING TITLE:
GROUNDING NOTES & GENERAL NOTES

JOB NUMBER	DRAWING NUMBER	REV
14253-EMP	GN-1	1

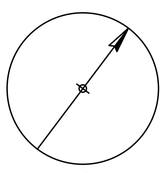


COMPOUND PLAN
SCALE: 3/16" = 1'–0"

GRAPHIC SCALE

4 0 2 4 8 16

(IN FEET)
3/16 Inch = 1 Foot



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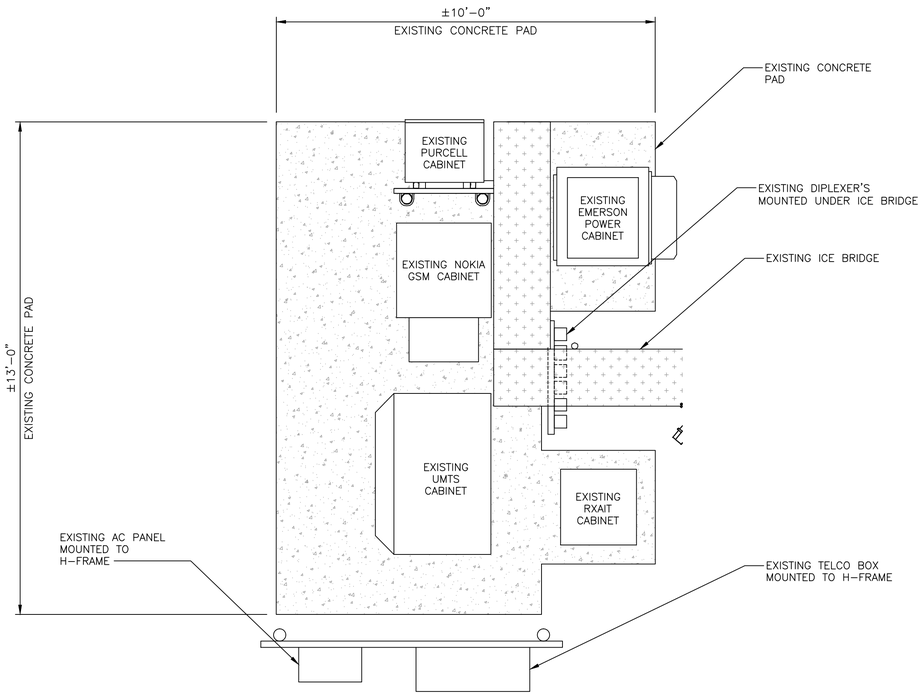
SCALE: AS SHOWN | DESIGNED BY: CJT | DRAWN BY: GR

SEAL:
STATE OF CONNECTICUT
NICHOLAS D. BARTOLOMEO
LICENSED PROFESSIONAL ENGINEER
PROFESSIONAL ENGINEER
CT LICENSE NO. 28643

AT&T

DRAWING TITLE:
COMPOUND LAYOUT

JOB NUMBER	DRAWING NUMBER	REV
14253–EMP	A–1	1



NOTE:
NO GROUND EQUIPMENT CHANGES ARE PROPOSED UNDER THIS SCOPE OF WORK. EXISTING GROUND EQUIPMENT CONFIGURATION TO REMAIN.

NORTH

EXISTING EQUIPMENT LAYOUT

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

2 0 1 2 4 8

(IN FEET)
1/2 Inch = 1 Foot

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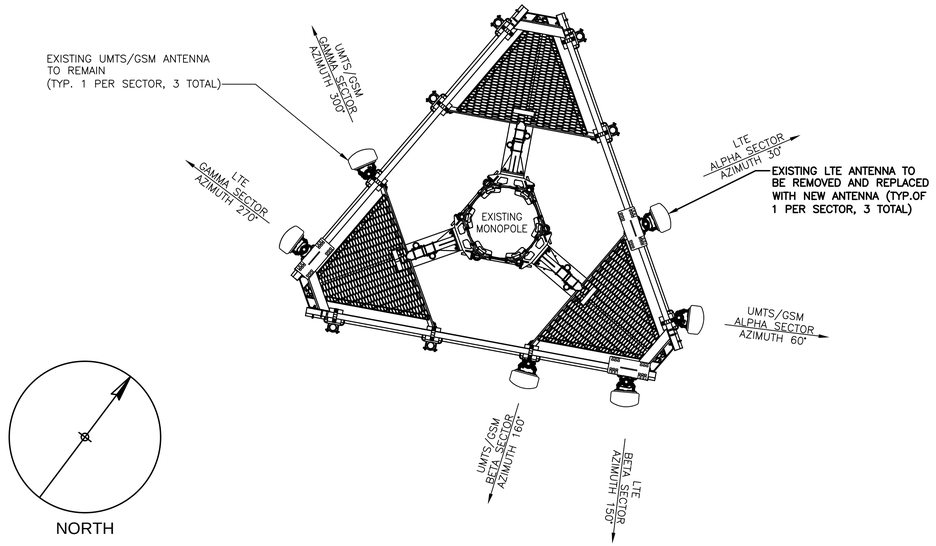
SCALE: AS SHOWN | DESIGNED BY: CJT | DRAWN BY: GR

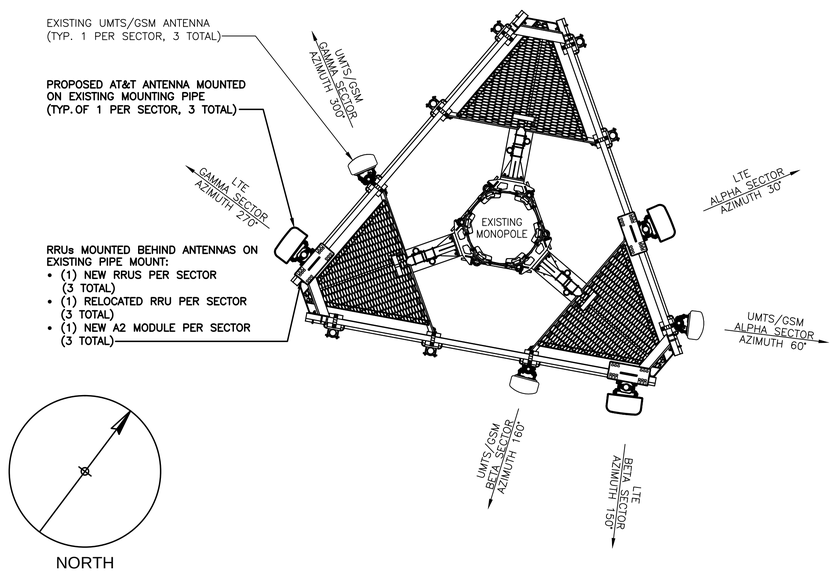
SEAL:
STATE OF CONNECTICUT
DOUGLAS D. BAKER
LICENSED PROFESSIONAL ENGINEER
PROFESSIONAL ENGINEER
CT LICENSE NO. 23643

AT&T

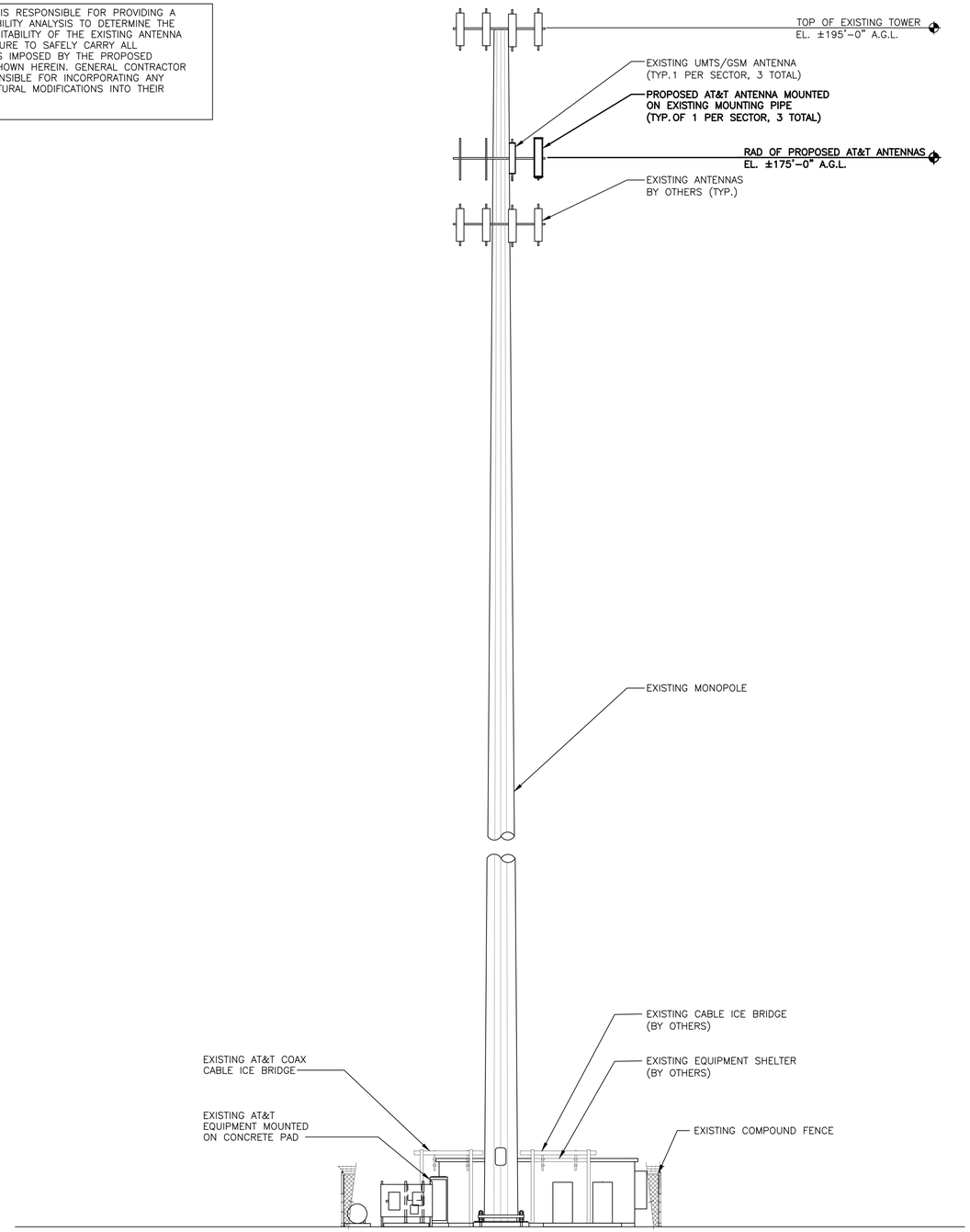
DRAWING TITLE:
EQUIPMENT LAYOUT

JOB NUMBER	DRAWING NUMBER	REV
14253-EMP	A-2	1





PROJECT OWNER IS RESPONSIBLE FOR PROVIDING A STRUCTURAL STABILITY ANALYSIS TO DETERMINE THE CAPACITY AND SUITABILITY OF THE EXISTING ANTENNA SUPPORT STRUCTURE TO SAFELY CARRY ALL ADDITIONAL LOADS IMPOSED BY THE PROPOSED EQUIPMENT AS SHOWN HEREIN. GENERAL CONTRACTOR SHALL BE RESPONSIBLE FOR INCORPORATING ANY REQUIRED STRUCTURAL MODIFICATIONS INTO THEIR SCOPE OF WORK.



TOWER ELEVATION
SCALE: NTS

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FAX: 862.209.4301

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SITE NAME: MONROE-SOUTH
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FAIRFIELD COUNTY

at&t MOBILITY
550 COCHITUATE ROAD
FRAMINGHAM, MA 01701

NO.	DATE	REVISIONS	BY	CHK	APP'D
0	07/01/15	ISSUED AS FINAL	GR	NDB	NDB

SCALE: AS SHOWN | DESIGNED BY: CJT | DRAWN BY: GR

SEAL:
STATE OF CONNECTICUT
NICHOLAS D. BUFFUM
LICENSED PROFESSIONAL ENGINEER
PROFESSIONAL ENGINEER
CT LICENSE NO. 28643

AT&T

DRAWING TITLE:
ANTENNA LAYOUTS & ELEVATION

JOB NUMBER	DRAWING NUMBER	REV
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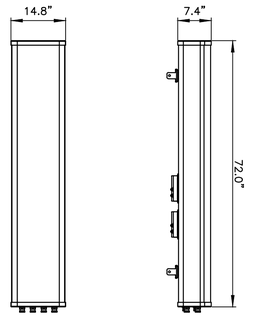
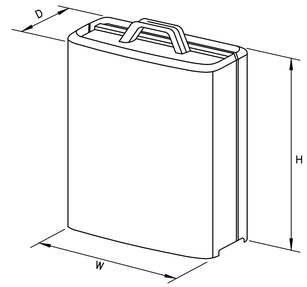


FRONT VIEW SIDE VIEW

BOTTOM VIEW

MANUFACTURER	CCI
MODEL	OPA-65R-LCUU-H6
WEIGHT	73.0 LBS

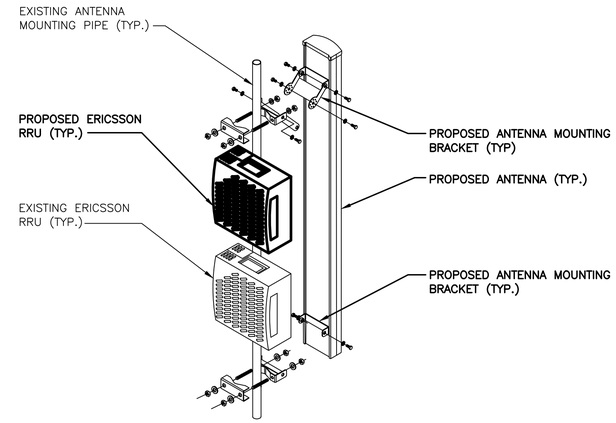
ANTENNA DETAIL
SCALE: N.T.S.



MODEL	L x W x H	WEIGHT
*RRUS-11	19.69" x 16.97" x 7.17"	50.7 LBS
RRUS-12	20.4" x 18.5" x 7.5"	58 LBS
A2 MODULE	16.4" x 15.2" x 3.4"	22 LBS

*DENOTES EXISTING.

RRUS DETAIL
SCALE: N.T.S.



ANTENNA AND RRU MOUNTING DETAIL
SCALE: N.T.S.

EXISTING ANTENNA SCHEDULE

SECTOR	POSITION	MAKE	MODEL	SIZE (INCHES)
ALPHA	A1	POWERWAVE	P65-16-XLH-RR	72"x12"x6"
	A2	–	–	–
	A3	–	–	–
	A4	POWERWAVE	7770.00.850.06	55"x11"x5"
BETA	B1	POWERWAVE	P65-16-XLH-RR	72"x12"x6"
	B2	–	–	–
	B3	–	–	–
	B4	POWERWAVE	7770.00.850.06	55"x11"x5"
GAMMA	G1	POWERWAVE	P65-16-XLH-RR	72"x12"x6"
	G2	–	–	–
	G3	–	–	–
	G4	POWERWAVE	7770.00.850.06	55"x11"x5"

FINAL ANTENNA SCHEDULE

SECTOR	POSITION	MAKE	MODEL	SIZE (INCHES)
ALPHA	A1	**CCI**	**OPA-65R-LCUU-H6**	**72"x14.8"x7.4"**
	A2	–	–	–
	A3	–	–	–
	A4	POWERWAVE	7770.00.850.06	55"x11"x5"
BETA	B1	**CCI**	**OPA-65R-LCUU-H6**	**72"x14.8"x7.4"**
	B2	–	–	–
	B3	–	–	–
	B4	POWERWAVE	7770.00.850.06	55"x11"x5"
GAMMA	G1	**CCI**	**OPA-65R-LCUU-H6**	**72"x14.8"x7.4"**
	G2	–	–	–
	G3	–	–	–
	G4	POWERWAVE	7770.00.850.06	55"x11"x5"

PROPOSED RRH SCHEDULE

SECTOR	MAKE	MODEL	SIZE (INCHES)	ADDITIONAL COMPONENT	SIZE (INCHES)
ALPHA	**ERICSSON**	**RRUS-12**	**20.4"x18.5"x7.5"**	**ERICSSON A2 MODULE**	**16.4"x15.2"x3.4"**
	ERICSSON	RRUS-11 (RELOCATED)	19.7"x16.9"x7.2"		
BETA	**ERICSSON**	**RRUS-12**	**20.4"x18.5"x7.5"**	**ERICSSON A2 MODULE**	**16.4"x15.2"x3.4"**
	ERICSSON	RRUS-11 (RELOCATED)	19.7"x16.9"x7.2"		
GAMMA	**ERICSSON**	**RRUS-12**	**20.4"x18.5"x7.5"**	**ERICSSON A2 MODULE**	**16.4"x15.2"x3.4"**
	ERICSSON	RRUS-11 (RELOCATED)	19.7"x16.9"x7.2"		

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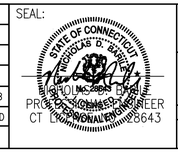
SCALE: AS SHOWN | DESIGNED BY: CJT | DRAWN BY: GR

SEAL:


PROFESSIONAL ENGINEER
CT LICENSE NO. 28643

AT&T

DRAWING TITLE:
DETAILS

JOB NUMBER	DRAWING NUMBER	REV
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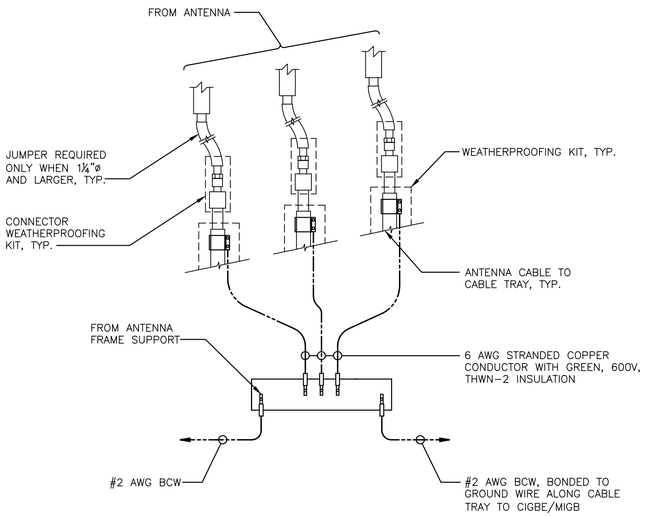
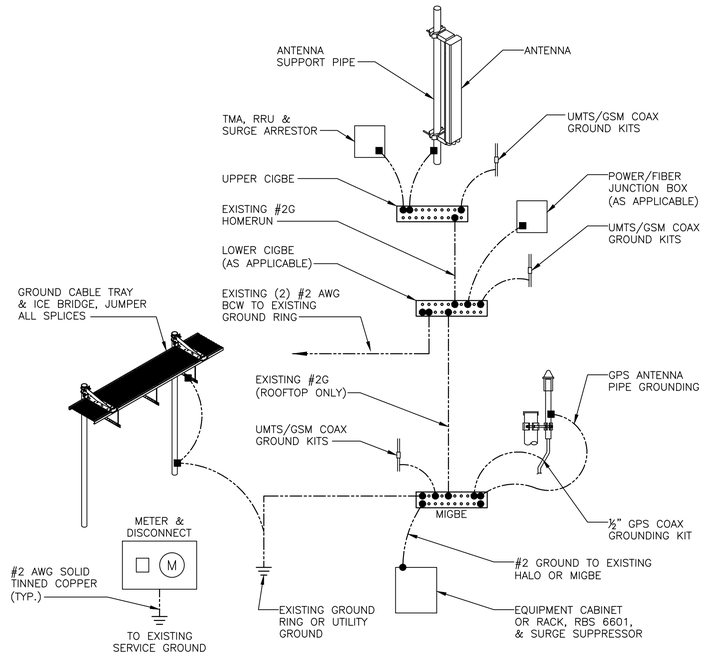


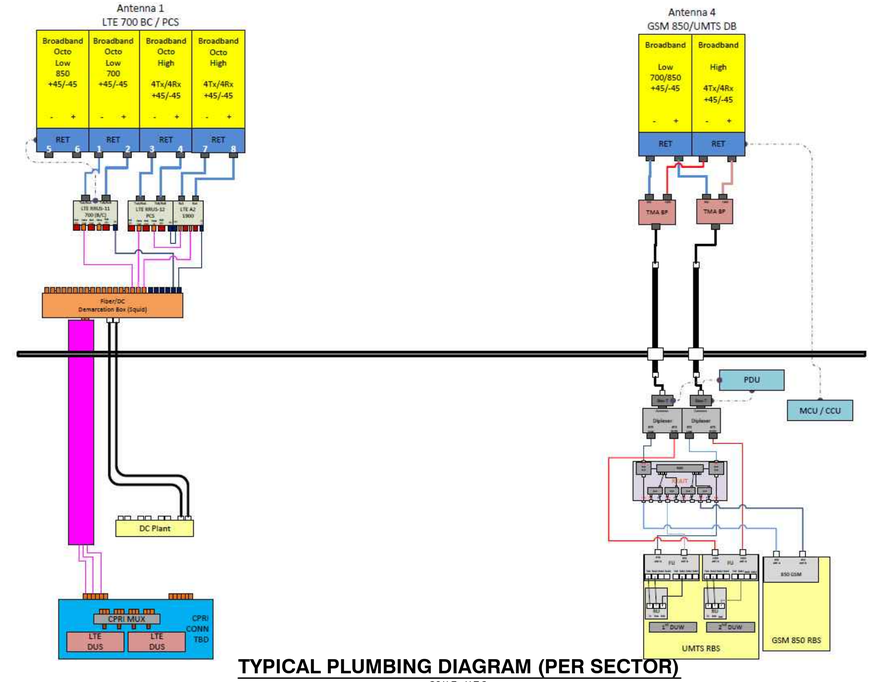
GROUND WIRE TO GROUND BAR CONNECTION DETAIL

SCALE: N.T.S.



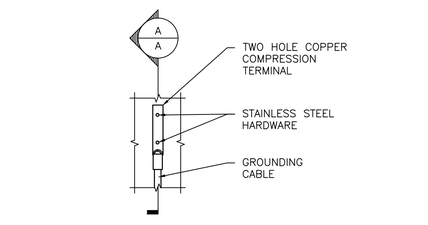
GROUNDING RISER DIAGRAM

SCALE: N.T.S.

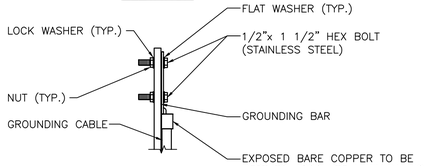


TYPICAL PLUMBING DIAGRAM (PER SECTOR)

SCALE: N.T.S.



ELEVATION



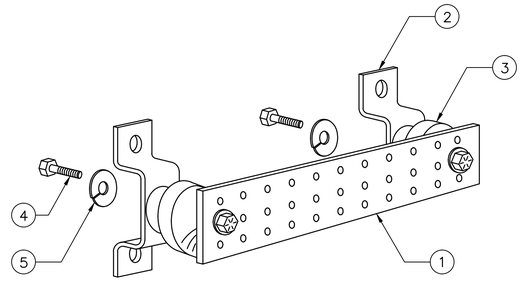
SECTION "A–A"

NOTE:

1. "DOUBLING UP" OR "STACKING" OF CONNECTIONS IS NOT PERMITTED.
2. OXIDE INHIBITING COMPOUND TO BE USED AT ALL LOCATIONS.
3. CADWELD DOWNLEADS FROM UPPER EGB, LOWER EGB, AND MGB.

TYPICAL GROUND BAR CONNECTION DETAIL

SCALE: N.T.S.



ITEM NO.	QTY.	DESCRIPTION
1	1	SOLID GROUND BAR (20"x 4"x ¼")
2	2	WALL MOUNTING BRACKET
3	2	INSULATORS
4	4	⅝"–11x1" H.H.C.S.
5	4	⅝" LOCK WASHER

NOTES:

EACH GROUND CONDUCTOR TERMINATING ON ANY GROUND BAR SHALL HAVE AN IDENTIFICATION TAG ATTACHED AT EACH END THAT WILL IDENTIFY ITS ORIGIN AND DESTINATION

SECTION "P" – SURGE PRODUCERS
- CABLE ENTRY PORTS (HATCH PLATES) (#2)
- GENERATOR FRAMEWORK (IF AVAILABLE) (#2)
- TELCO GROUND BAR
- COMMERCIAL POWER COMMON NEUTRAL/GROUND BOND (#2)
- +24V POWER SUPPLY RETURN BAR (#2)
- –48V POWER SUPPLY RETURN BAR (#2)
- RECTIFIER FRAMES

SECTION "A" – SURGE ABSORBERS
- INTERIOR GROUND RING (#2)
- EXTERNAL EARTH GROUND FIELD (BURIED GROUND RING) (#2)
- METALLIC COLD WATER PIPE (IF AVAILABLE) (#2)
- BUILDING STEEL (IF AVAILABLE) (#2)

GROUND BAR DETAIL

SCALE: N.T.S.

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SCALE: AS SHOWN | DESIGNED BY: CJT | DRAWN BY: GR

SEAL:

AT&T

DRAWING TITLE:
GROUNDING DETAILS

JOB NUMBER	DRAWING NUMBER	REV
14253-EMP	G-1	1

Date: **April 27, 2015**

Darcy Tarr
Crown Castle
3530 Toringdon Way Suite 300
Charlotte, NC 28277

Destek Engineering, LLC
1281 Kennestone Circle, Suite 100
Marietta, GA 30066
(770) 693-0835

Subject: **Structural Analysis Report**

Carrier Designation:	***AT&T Mobility* Co-Locate**	
	Carrier Site Number:	CTL05189
	Carrier Site Name:	AWE Monroe South
Crown Castle Designation:	**Crown Castle BU Number:**	826053
	Crown Castle Site Name:	Monroe-1/Rt 25
	Crown Castle JDE Job Number:	331568
	Crown Castle Work Order Number:	1048407
	Crown Castle Application Number:	288544 Rev. 0
Engineering Firm Designation:	**Destek Engineering, LLC Project Number:**	1502126
Site Data:	**88 Main Street, Monroe, Fairfield County, CT** **Latitude *41° 18' 6.06"*, Longitude *-73° 15' 2.92"*** **195 Foot - Monopole Tower**	

Dear Darcy Tarr,

Destek Engineering, LLC is pleased to submit this **"Structural Analysis Report"** to determine the structural integrity of the above mentioned tower. This analysis has been performed in accordance with the Crown Castle Structural 'Statement of Work' and the terms of Crown Castle Purchase Order Number Darcy Tarr, in accordance with application 288544, revision 0.

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

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

The analysis has been performed in accordance with the TIA/EIA-222-F standard and 2005 CT State Building Code with 2009 amendment based upon a wind speed of 70 mph fastest mile.

All modifications and equipment proposed in this report shall be installed in accordance with the attached drawings for the determined available structural capacity to be effective.

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

Structural analysis prepared by: Dave Chen, EIT

Respectfully submitted by:

STATE OF CONNECTICUT
AHMET COLAKOGLU
PEN 27057
LICENSED
PROFESSIONAL ENGINEER

4/27/2015

Ahmet Colakoglu, PE
President

TABLE OF CONTENTS

1) INTRODUCTION

This tower is a 195 ft Monopole tower designed by FWT INC. in May of 2001. The tower was originally designed for a wind speed of 85 mph per TIA/EIA-222-F.

2) ANALYSIS CRITERIA

The structural analysis was performed for this tower in accordance with the requirements of TIA/EIA-222-F Structural Standards for Steel Antenna Towers and Antenna Supporting Structures using a fastest mile wind speed of 85 mph with no ice, 37.6 mph with 0.75 inch ice thickness and 50 mph under service loads.

Table 1 - Proposed Antenna and Cable Information

Mounting Level (ft)	Center Line Elevation (ft)	Number of Antennas	Antenna Manufacturer	Antenna Model	Number of Feed Lines	Feed Line Size (in)	Note
175.0	175.0	3	cci antennas	OPA-65R-LCUU-H6 w/ Mount Pipe	2 1	7/8 3/8	-
		3	ericsson	RRUS12/RRUS A2			
		6	powerwave technologies	7020.00			

Table 2 - Existing and Reserved Antenna and Cable Information

Mounting Level (ft)	Center Line Elevation (ft)	Number of Antennas	Antenna Manufacturer	Antenna Model	Number of Feed Lines	Feed Line Size (in)	Note
195.0	195.0	3	commscope	LNX-6515DS-VTM w/ Mount Pipe	-	-	2
		3	ericsson	ERICSSON AIR 21 B2A B4P w/ Mount Pipe	13	1-5/8	1
		3	ericsson	ERICSSON AIR 21 B4A B2P w/ Mount Pipe			
		3	ericsson	KRY 112 71			
		3	ericsson	RRUS 11 B12	-	-	2
		1	tower mounts	Sector Mount [SM 901-3]			1
175.0	175.0	3	ericsson	RRUS-11	6 2 1	1-5/8 7/8 3/4	1
		3	ericsson	RRUS-11	6	1-5/8	3
		3	powerwave technologies	7770.00 w/ Mount Pipe	-	-	1
		6	powerwave technologies	LGP21401			
		3	powerwave technologies	P65-16-XLH-RR w/ Mount Pipe	-	-	3
		1	raycap	DC6-48-60-18-8F			1
		1	tower mounts	Platform Mount [LP 303-1]			
165.0	165.0	3	alcatel lucent	RRH2x40-AWS	19	1-5/8	1
		3	antel	BXA-171085-12BF w/			

Mounting Level (ft)	Center Line Elevation (ft)	Number of Antennas	Antenna Manufacturer	Antenna Model	Number of Feed Lines	Feed Line Size (in)	Note
				Mount Pipe			
		3	antel	BXA-70063/6CF w/ Mount Pipe			
		6	antel	LPA-80080/6CF w/ Mount Pipe			
		3	kathrein	742 213 w/ Mount Pipe			
		1	rfs celwave	DB-B1-6C-8AB-0Z			
		1	tower mounts	Platform Mount [LP 403-1]			

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

Table 3 - Design Antenna and Cable Information

Mounting Level (ft)	Center Line Elevation (ft)	Number of Antennas	Antenna Manufacturer	Antenna Model	Number of Feed Lines	Feed Line Size (in)
195	195	12	-	EMS RR90-17-00DP PCS	-	-
185	185	12	-	EMS RR90-17-00DP PCS	-	-
175	175	12	-	EMS RR90-17-00DP PCS	-	-
165	165	12	-	EMS RR90-17-00DP PCS	-	-
155	155	12	-	EMS RR90-17-00DP PCS	-	-
140	135	2	-	10' WHIP	-	-
120	115	2	-	10' WHIP	-	-

3) ANALYSIS PROCEDURE

Table 4 - Documents Provided

Document	Remarks	Reference	Source
4-GEOTECHNICAL REPORTS	Jaworski Geotech, Inc. (Proj No. 01129G, 2/15/2001)	3488965	CCISITES
4-TOWER FOUNDATION DRAWINGS/DESIGN/SPECS	Summit Manufacturing, Inc. (Job No. 29201-0505, 5/10/2001)	3950063	CCISITES
4-TOWER MANUFACTURER DRAWINGS	Summit Manufacturing, Inc. (Job No. 29201-0505, 5/4/2001)	3488966	CCISITES

3.1) Analysis Method

tnxTower (version 6.1.4.1), a commercially available analysis software package, was used to create a three-dimensional model of the tower and calculate member stresses for various loading cases. Selected output from the analysis is included in Appendix A.

3.2) Assumptions

1) Tower and structures were built in accordance with the manufacturer's specifications.
2) The tower and structures have been maintained in accordance with the manufacturer's specification.
3) The configuration of antennas, transmission cables, mounts and other appurtenances are as specified in Tables 1 and 2 and the referenced drawings.
4) The analysis was performed for the main tower members and their connections. It does not include an evaluation of the antenna mounts and their connections.

This analysis may be affected if any assumptions are not valid or have been made in error. Destek Engineering, LLC should be notified to determine the effect on the structural integrity of the tower.

4) ANALYSIS RESULTS

Table 5 - Section Capacity (Summary)

Section No.	Elevation (ft)	Component Type	Size	Critical Element	P (K)	SF*P_allow (K)	% Capacity	Pass / Fail
L1	195 - 157.5	Pole	TP33.351x26x0.25	1	-8.24	1331.10	34.4	Pass
L2	157.5 - 116.75	Pole	TP40.839x32.0179x0.3125	2	-14.89	2036.66	70.3	Pass
L3	116.75 - 77	Pole	TP48.006x39.1849x0.375	3	-24.16	2874.51	80.0	Pass
L4	77 - 38	Pole	TP54.901x46.0798x0.375	4	-34.97	3289.03	93.8	Pass
L5	38 - 0	Pole	TP61.6x52.7788x0.4375	5	-51.12	4415.35	89.3	Pass
							Summary	
						Pole (L4)	93.8	Pass
						Rating =	93.8	Pass

Table 6 - Tower Component Stresses vs. Capacity – LC7

Notes	Component	Elevation (ft)	% Capacity	Pass / Fail
1	Anchor Rods	0	86.1	Pass
1	Base Plate	0	79.0	Pass
1	Base Foundation	0	86.3	Pass
1	Base Foundation Soil Interaction	0	67.9	Pass

Structure Rating (max from all components) =	93.8%

Notes:
1) See additional documentation in "Appendix C – Additional Calculations" for calculations supporting the % capacity consumed.

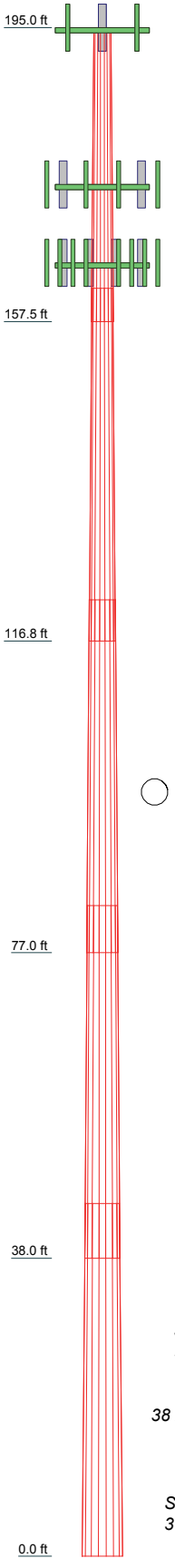
4.1) Recommendations

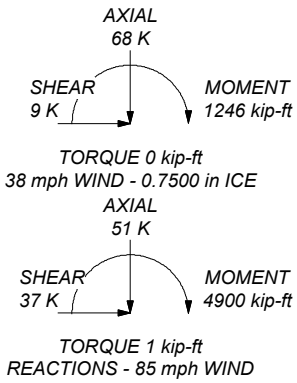
The tower and its foundation have sufficient capacity to carry the existing and proposed loads. No modifications are required at this time.

APPENDIX A

TNXTOWER OUTPUT

Section	1	2	3	4	5
Length (ft)	37.50	45.00	45.00	45.00	45.00
Number of Sides	18	18	18	18	18
Thickness (in)	0.2500	0.3125	0.3750	0.3750	0.4375
Socket Length (ft)	4.25	5.25	6.00	7.00	
Top Dia (in)	26.0000	32.0179	39.1849	46.0798	52.7788
Bot Dia (in)	33.3510	40.8390	48.0060	54.9010	61.6000
Grade			A607-65		
Weight (K)	3.0	5.5	7.9	9.1	12.1





DESIGNED APPURTENANCE LOADING

TYPE	ELEVATION	TYPE	ELEVATION
ERICSSON AIR 21 B2A B4P w/ Mount Pipe	195	(2) 7020.00	175
ERICSSON AIR 21 B2A B4P w/ Mount Pipe	195	7770.00 w/ Mount Pipe	175
ERICSSON AIR 21 B2A B4P w/ Mount Pipe	195	7770.00 w/ Mount Pipe	175
ERICSSON AIR 21 B4A B2P w/ Mount Pipe	195	7770.00 w/ Mount Pipe	175
ERICSSON AIR 21 B4A B2P w/ Mount Pipe	195	(2) LGP21401	175
ERICSSON AIR 21 B4A B2P w/ Mount Pipe	195	(2) LGP21401	175
KRY 112 71	195	(2) LGP21401	175
KRY 112 71	195	RRUS-11	175
KRY 112 71	195	RRUS-11	175
LNX-6515DS-VTM w/ Mount Pipe	195	RRUS-11	175
LNX-6515DS-VTM w/ Mount Pipe	195	DC6-48-60-18-8F	175
LNX-6515DS-VTM w/ Mount Pipe	195	Platform Mount [LP 303-1]	175
RRUS 11 B12	195	BXA-171085-12BF w/ Mount Pipe	165
RRUS 11 B12	195	BXA-171085-12BF w/ Mount Pipe	165
RRUS 11 B12	195	BXA-171085-12BF w/ Mount Pipe	165
Sector Mount [SM 901-3]	195	BXA-70063/6CF w/ Mount Pipe	165
OPA-65R-LCUU-H6 w/ Mount Pipe	175	BXA-70063/6CF w/ Mount Pipe	165
OPA-65R-LCUU-H6 w/ Mount Pipe	175	BXA-70063/6CF w/ Mount Pipe	165
OPA-65R-LCUU-H6 w/ Mount Pipe	175	(2) LPA-80080/6CF w/ Mount Pipe	165
RRUS12/RRUS A2	175	(2) LPA-80080/6CF w/ Mount Pipe	165
RRUS12/RRUS A2	175	(2) LPA-80080/6CF w/ Mount Pipe	165
RRUS12/RRUS A2	175	742 213 w/ Mount Pipe	165
(2) 7020.00	175	742 213 w/ Mount Pipe	165
(2) 7020.00	175	742 213 w/ Mount Pipe	165
		RRH2x40-AWS	165
		RRH2x40-AWS	165
		RRH2x40-AWS	165
		DB-B1-6C-8AB-0Z	165
		Platform Mount [LP 403-1]	165

MATERIAL STRENGTH

GRADE	Fy	Fu	GRADE	Fy	Fu
A607-65	65 ksi	80 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 38 mph basic wind with 0.75 in ice. Ice is considered to increase in thickness with height.
4. Deflections are based upon a 50 mph wind.
5. TOWER RATING: 93.8%

Destek Engineering, LLC
1281 Kennestone Circle, Suite 100
Marietta, GA 30066
Phone: (770) 693-0835
FAX:

Job: ***BU# 826053 Monroe-1/Rt 25***			
Project: ***1502126***			
Client: Crown Castle	Drawn by: Ahmet Coakoglu		App'd:
Code: TIA/EIA-222-F	Date: 04/24/15		Scale: NTS
Path: Y:\2015\02 - Crown\1502126 - 826053 Monroe-1 Rt 25 (2) WO\WO 1048407\TNXTower\826053.eri			Dwg No. E-1

Tower Input Data

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

4) Tower is located in Fairfield County, Connecticut.
5) Basic wind speed of 85 mph.
6) Nominal ice thickness of 0.7500 in.
7) Ice thickness is considered to increase with height.
8) Ice density of 56 pcf.
9) A wind speed of 38 mph is used in combination with ice.
10) Temperature drop of 50 °F.
11) Deflections calculated using a wind speed of 50 mph.
12) A non-linear (P-delta) analysis was used.
13) Pressures are calculated at each section.
14) Stress ratio used in pole design is 1.333.
15) Local bending stresses due to climbing loads, feed line supports, and appurtenance mounts are not considered.

Options

	Consider Moments - Legs		Distribute Leg Loads As Uniform		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
	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		Use TIA-222-G Tension Splice Capacity Exemption		

Tapered Pole Section Geometry

Section	Elevation ft	Section Length ft	Splice Length ft	Number of Sides	Top Diameter in	Bottom Diameter in	Wall Thickness in	Bend Radius in	Pole Grade
L1	195.00-157.50	37.50	4.25	18	26.0000	33.3510	0.2500	1.0000	A607-65 (65 ksi)
L2	157.50-116.75	45.00	5.25	18	32.0179	40.8390	0.3125	1.2500	A607-65 (65 ksi)
L3	116.75-77.00	45.00	6.00	18	39.1849	48.0060	0.3750	1.5000	A607-65 (65 ksi)
L4	77.00-38.00	45.00	7.00	18	46.0798	54.9010	0.3750	1.5000	A607-65 (65 ksi)
L5	38.00-0.00	45.00		18	52.7788	61.6000	0.4375	1.7500	A607-65 (65 ksi)

Tapered Pole Properties

Section	Tip Dia. in	Area in^2	I in^4	r in	C in	I/C in^3	J in^4	It/Q in^2	w in	w/t

Section	Tip Dia. in	Area in^2	I in^4	r in	C in	I/C in^3	J in^4	It/Q in^2	w in	w/t
L1	26.4011	20.4326	1711.6544	9.1412	13.2080	129.5922	3425.5610	10.2183	4.1360	16.544
	33.8655	26.2656	3635.8648	11.7509	16.9423	214.6027	7276.5137	13.1353	5.4298	21.719
L2	33.3578	31.4478	3993.8667	11.2554	16.2651	245.5484	7992.9887	15.7269	5.0851	16.272
	41.4690	40.1972	8340.8765	14.3869	20.7462	402.0433	16692.7281	20.1024	6.6377	21.241
L3	40.8344	46.1934	8790.2698	13.7775	19.9059	441.5909	17592.1060	23.1011	6.2365	16.631
	48.7466	56.6928	16249.6772	16.9090	24.3870	666.3241	32520.7362	28.3518	7.7891	20.771
L4	47.9850	54.4002	14356.9595	16.2252	23.4086	613.3208	28732.8103	27.2053	7.4501	19.867
	55.7479	64.8996	24377.3537	19.3567	27.8897	874.0627	48786.7837	32.4560	9.0026	24.007
L5	54.9864	72.6825	25156.8620	18.5812	26.8116	938.2813	50346.8261	36.3481	8.5191	19.472
	62.5503	84.9318	40140.0691	21.7127	31.2928	1282.7254	80332.9556	42.4740	10.0716	23.021

Tower Elevation ft	Gusset Area (per face) ft^2	Gusset Thickness in	Gusset Grade	Adjust. Factor A_f	Adjust. Factor A_r	Weight Mult.	Double Angle Stitch Bolt Spacing Diagonals in	Double Angle Stitch Bolt Spacing Horizontals in
L1 195.00-157.50				1	1	1		
L2 157.50-116.75				1	1	1		
L3 116.75-77.00				1	1	1		
L4 77.00-38.00				1	1	1		
L5 38.00-0.00				1	1	1		

Feed Line/Linear Appurtenances - Entered As Area

Description	Face or Leg	Allow Shield	Component Type	Placement ft	Total Number		C_AA_A ft^2/ft	Weight klf
5/8 rod/step	C	No	CaAa (Out Of Face)	195.00 - 0.00	1	No Ice	0.02	0.00
						1/2" Ice	0.12	0.00
						1" Ice	0.22	0.00
						2" Ice	0.42	0.01
						4" Ice	0.82	0.02
Safety Line 3/8	C	No	CaAa (Out Of Face)	195.00 - 0.00	1	No Ice	0.04	0.00
						1/2" Ice	0.14	0.00
						1" Ice	0.24	0.00
						2" Ice	0.44	0.00
						4" Ice	0.84	0.00
*								
LDF7-50A(1-5/8")	B	No	Inside Pole	195.00 - 0.00	12	No Ice	0.00	0.00
						1/2" Ice	0.00	0.00
						1" Ice	0.00	0.00
						2" Ice	0.00	0.00
						4" Ice	0.00	0.00
MLE Hybrid 9Power/18Fiber RL 2(1 5/8)	B	No	CaAa (Out Of Face)	195.00 - 0.00	1	No Ice	0.16	0.00
						1/2" Ice	0.26	0.00
						1" Ice	0.36	0.00
						2" Ice	0.56	0.01
						4" Ice	0.96	0.03
*								
LDF5-50A(7/8")	C	No	Inside Pole	175.00 - 0.00	2	No Ice	0.00	0.00
						1/2" Ice	0.00	0.00
						1" Ice	0.00	0.00
						2" Ice	0.00	0.00
						4" Ice	0.00	0.00
LDF7-50A(1-5/8")	C	No	Inside Pole	175.00 - 0.00	6	No Ice	0.00	0.00

Description	Face or Leg	Allow Shield	Component Type	Placement ft	Total Number		C_AA_A ft^2/ft	Weight klf
						1/2" Ice	0.00	0.00
						1" Ice	0.00	0.00
						2" Ice	0.00	0.00
						4" Ice	0.00	0.00
9776(3/4")	C	No	Inside Pole	175.00 - 0.00	1	No Ice	0.00	0.00
						1/2" Ice	0.00	0.00
						1" Ice	0.00	0.00
						2" Ice	0.00	0.00
						4" Ice	0.00	0.00
2" Rigid Conduit	C	No	Inside Pole	175.00 - 0.00	1	No Ice	0.00	0.00
						1/2" Ice	0.00	0.00
						1" Ice	0.00	0.00
						2" Ice	0.00	0.00
						4" Ice	0.00	0.00
FB-L98B-002-XXX(3/8)	C	No	Inside Pole	175.00 - 0.00	1	No Ice	0.00	0.00
						1/2" Ice	0.00	0.00
						1" Ice	0.00	0.00
						2" Ice	0.00	0.00
						4" Ice	0.00	0.00
WR-VG66ST-BRD(7/8")	C	No	Inside Pole	175.00 - 0.00	2	No Ice	0.00	0.00
						1/2" Ice	0.00	0.00
						1" Ice	0.00	0.00
						2" Ice	0.00	0.00
						4" Ice	0.00	0.00
*								
LDF7-50A(1-5/8")	A	No	Inside Pole	165.00 - 0.00	18	No Ice	0.00	0.00
						1/2" Ice	0.00	0.00
						1" Ice	0.00	0.00
						2" Ice	0.00	0.00
						4" Ice	0.00	0.00
HB158-1-08U8-S8J18(1-5/8)	A	No	CaAa (Out Of Face)	165.00 - 0.00	1	No Ice	0.20	0.00
						1/2" Ice	0.30	0.00
						1" Ice	0.40	0.00
						2" Ice	0.60	0.01
						4" Ice	1.00	0.03

Feed Line/Linear Appurtenances Section Areas

Tower Section	Tower Elevation ft	Face	A_R ft^2	A_F ft^2	C_AA_A In Face ft^2	C_AA_A Out Face ft^2	Weight K
L1	195.00-157.50	A	0.000	0.000	0.000	1.485	0.12
		B	0.000	0.000	0.000	6.094	0.41
		C	0.000	0.000	0.000	2.156	0.20
L2	157.50-116.75	A	0.000	0.000	0.000	8.069	0.65
		B	0.000	0.000	0.000	6.622	0.44
		C	0.000	0.000	0.000	2.343	0.45
L3	116.75-77.00	A	0.000	0.000	0.000	7.871	0.64
		B	0.000	0.000	0.000	6.460	0.43
		C	0.000	0.000	0.000	2.286	0.44
L4	77.00-38.00	A	0.000	0.000	0.000	7.722	0.63
		B	0.000	0.000	0.000	6.338	0.43
		C	0.000	0.000	0.000	2.243	0.43
L5	38.00-0.00	A	0.000	0.000	0.000	7.524	0.61
		B	0.000	0.000	0.000	6.175	0.41
		C	0.000	0.000	0.000	2.185	0.42

Feed Line/Linear Appurtenances Section Areas - With Ice

Tower Section	Tower Elevation ft	Face or Leg	Ice Thickness in	A_R ft^2	A_F ft^2	C_AA_A In Face ft^2	C_AA_A Out Face ft^2	Weight K
L1	195.00-157.50	A	0.917	0.000	0.000	0.000	2.860	0.15

Tower Section	Tower Elevation ft	Face or Leg	Ice Thickness in	A_R ft^2	A_F ft^2	C_AA_A In Face ft^2	C_AA_A Out Face ft^2	Weight K
		B		0.000	0.000	0.000	12.968	0.52
		C		0.000	0.000	0.000	15.905	0.29
L2	157.50-116.75	A	0.889	0.000	0.000	0.000	15.539	0.79
		B		0.000	0.000	0.000	14.092	0.56
		C		0.000	0.000	0.000	17.284	0.54
L3	116.75-77.00	A	0.853	0.000	0.000	0.000	14.941	0.76
		B		0.000	0.000	0.000	13.530	0.54
		C		0.000	0.000	0.000	16.427	0.53
L4	77.00-38.00	A	0.802	0.000	0.000	0.000	14.377	0.74
		B		0.000	0.000	0.000	12.992	0.53
		C		0.000	0.000	0.000	15.552	0.51
L5	38.00-0.00	A	0.750	0.000	0.000	0.000	13.617	0.72
		B		0.000	0.000	0.000	12.268	0.51
		C		0.000	0.000	0.000	14.370	0.49

Feed Line Center of Pressure

Section	Elevation ft	CP_X in	CP_Z in	CP_X Ice in	CP_Z Ice in
L1	195.00-157.50	0.1234	0.0902	-0.0725	0.3218
L2	157.50-116.75	0.1201	-0.1162	-0.0714	0.0039
L3	116.75-77.00	0.1225	-0.1185	-0.0703	0.0010
L4	77.00-38.00	0.1242	-0.1202	-0.0660	-0.0031
L5	38.00-0.00	0.1255	-0.1215	-0.0576	-0.0094

Discrete Tower Loads

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
ERICSSON AIR 21 B2A B4P w/ Mount Pipe	A	From Leg	4.00 0.00 0.00	0.0000	195.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	6.83 7.35 7.86 8.93 11.18	5.64 6.48 7.26 8.86 12.29	0.11 0.17 0.23 0.38 0.81
ERICSSON AIR 21 B2A B4P w/ Mount Pipe	B	From Leg	4.00 0.00 0.00	0.0000	195.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	6.83 7.35 7.86 8.93 11.18	5.64 6.48 7.26 8.86 12.29	0.11 0.17 0.23 0.38 0.81
ERICSSON AIR 21 B2A B4P w/ Mount Pipe	C	From Leg	4.00 0.00 0.00	0.0000	195.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	6.83 7.35 7.86 8.93 11.18	5.64 6.48 7.26 8.86 12.29	0.11 0.17 0.23 0.38 0.81
ERICSSON AIR 21 B4A B2P w/ Mount Pipe	A	From Leg	4.00 0.00 0.00	0.0000	195.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	6.81 7.33 7.85 8.91 11.16	5.63 6.47 7.24 8.85 12.27	0.11 0.17 0.23 0.38 0.81
ERICSSON AIR 21 B4A B2P w/ Mount Pipe	B	From Leg	4.00 0.00	0.0000	195.00	No Ice 1/2"	6.81 7.33	5.63 6.47	0.11 0.17

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			Ice	7.85	7.24	0.23
						1" Ice	8.91	8.85	0.38
						2" Ice	11.16	12.27	0.81
						4" Ice			
ERICSSON AIR 21 B4A B2P w/ Mount Pipe	C	From Leg	4.00	0.0000	195.00	No Ice	6.81	5.63	0.11
			0.00			1/2"	7.33	6.47	0.17
			0.00			Ice	7.85	7.24	0.23
						1" Ice	8.91	8.85	0.38
						2" Ice	11.16	12.27	0.81
						4" Ice			
KRY 112 71	A	From Leg	4.00	0.0000	195.00	No Ice	0.68	0.45	0.01
			0.00			1/2"	0.80	0.56	0.02
			0.00			Ice	0.93	0.68	0.03
						1" Ice	1.22	0.94	0.04
						2" Ice	1.90	1.57	0.11
						4" Ice			
KRY 112 71	B	From Leg	4.00	0.0000	195.00	No Ice	0.68	0.45	0.01
			0.00			1/2"	0.80	0.56	0.02
			0.00			Ice	0.93	0.68	0.03
						1" Ice	1.22	0.94	0.04
						2" Ice	1.90	1.57	0.11
						4" Ice			
KRY 112 71	C	From Leg	4.00	0.0000	195.00	No Ice	0.68	0.45	0.01
			0.00			1/2"	0.80	0.56	0.02
			0.00			Ice	0.93	0.68	0.03
						1" Ice	1.22	0.94	0.04
						2" Ice	1.90	1.57	0.11
						4" Ice			
LNX-6515DS-VTM w/ Mount Pipe	A	From Leg	4.00	0.0000	195.00	No Ice	11.68	9.84	0.08
			0.00			1/2"	12.40	11.37	0.17
			0.00			Ice	13.14	12.91	0.27
						1" Ice	14.60	15.27	0.51
						2" Ice	17.87	20.14	1.15
						4" Ice			
LNX-6515DS-VTM w/ Mount Pipe	B	From Leg	4.00	0.0000	195.00	No Ice	11.68	9.84	0.08
			0.00			1/2"	12.40	11.37	0.17
			0.00			Ice	13.14	12.91	0.27
						1" Ice	14.60	15.27	0.51
						2" Ice	17.87	20.14	1.15
						4" Ice			
LNX-6515DS-VTM w/ Mount Pipe	C	From Leg	4.00	0.0000	195.00	No Ice	11.68	9.84	0.08
			0.00			1/2"	12.40	11.37	0.17
			0.00			Ice	13.14	12.91	0.27
						1" Ice	14.60	15.27	0.51
						2" Ice	17.87	20.14	1.15
						4" Ice			
RRUS 11 B12	A	From Leg	4.00	0.0000	195.00	No Ice	3.31	1.36	0.05
			0.00			1/2"	3.55	1.54	0.07
			0.00			Ice	3.80	1.73	0.10
						1" Ice	4.33	2.13	0.15
						2" Ice	5.50	3.04	0.31
						4" Ice			
RRUS 11 B12	B	From Leg	4.00	0.0000	195.00	No Ice	3.31	1.36	0.05
			0.00			1/2"	3.55	1.54	0.07
			0.00			Ice	3.80	1.73	0.10
						1" Ice	4.33	2.13	0.15
						2" Ice	5.50	3.04	0.31
						4" Ice			
RRUS 11 B12	C	From Leg	4.00	0.0000	195.00	No Ice	3.31	1.36	0.05
			0.00			1/2"	3.55	1.54	0.07
			0.00			Ice	3.80	1.73	0.10
						1" Ice	4.33	2.13	0.15
						2" Ice	5.50	3.04	0.31
						4" Ice			
Sector Mount [SM 901-3]	C	None		0.0000	195.00	No Ice	12.90	12.90	1.26

Description	Face or Leg	Offset Type	Offsets: Horz Lateral ft Vert ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
						1/2" Ice	17.16	17.16	1.43
						1" Ice	21.42	21.42	1.61
						2" Ice	29.94	29.94	1.96
						4" Ice	46.98	46.98	2.65
***									
OPA-65R-LCUU-H6 w/ Mount Pipe	A	From Leg	4.00 0.00 0.00	0.0000	175.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	10.60 11.27 11.91 13.21 15.93	7.18 8.36 9.26 11.09 15.15	0.10 0.18 0.26 0.46 1.00
OPA-65R-LCUU-H6 w/ Mount Pipe	B	From Leg	4.00 0.00 0.00	0.0000	175.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	10.60 11.27 11.91 13.21 15.93	7.18 8.36 9.26 11.09 15.15	0.10 0.18 0.26 0.46 1.00
OPA-65R-LCUU-H6 w/ Mount Pipe	C	From Leg	4.00 0.00 0.00	0.0000	175.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	10.60 11.27 11.91 13.21 15.93	7.18 8.36 9.26 11.09 15.15	0.10 0.18 0.26 0.46 1.00
RRUS12/RRUS A2	A	From Leg	4.00 0.00 0.00	0.0000	175.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	3.67 3.92 4.19 4.74 5.96	2.14 2.35 2.56 3.02 4.03	0.07 0.10 0.13 0.20 0.40
RRUS12/RRUS A2	B	From Leg	4.00 0.00 0.00	0.0000	175.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	3.67 3.92 4.19 4.74 5.96	2.14 2.35 2.56 3.02 4.03	0.07 0.10 0.13 0.20 0.40
RRUS12/RRUS A2	C	From Leg	4.00 0.00 0.00	0.0000	175.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	3.67 3.92 4.19 4.74 5.96	2.14 2.35 2.56 3.02 4.03	0.07 0.10 0.13 0.20 0.40
(2) 7020.00	A	From Leg	4.00 0.00 0.00	0.0000	175.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	0.12 0.17 0.23 0.38 0.78	0.20 0.28 0.36 0.56 1.05	0.00 0.01 0.01 0.02 0.07
(2) 7020.00	B	From Leg	4.00 0.00 0.00	0.0000	175.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	0.12 0.17 0.23 0.38 0.78	0.20 0.28 0.36 0.56 1.05	0.00 0.01 0.01 0.02 0.07
(2) 7020.00	C	From Leg	4.00 0.00 0.00	0.0000	175.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	0.12 0.17 0.23 0.38 0.78	0.20 0.28 0.36 0.56 1.05	0.00 0.01 0.01 0.02 0.07
7770.00 w/ Mount Pipe	A	From Leg	4.00 0.00 0.00	0.0000	175.00	No Ice 1/2" Ice 1" Ice 2" Ice	6.12 6.63 7.13 8.16 10.36	4.25 5.01 5.71 7.16 10.41	0.06 0.10 0.16 0.29 0.66

Description	Face or Leg	Offset Type	Offsets: Horz Lateral Vert ft ft ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
						4" Ice			
7770.00 w/ Mount Pipe	B	From Leg	4.00 0.00 0.00	0.0000	175.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	6.12 6.63 7.13 8.16 10.36	4.25 5.01 5.71 7.16 10.41	0.06 0.10 0.16 0.29 0.66
7770.00 w/ Mount Pipe	C	From Leg	4.00 0.00 0.00	0.0000	175.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	6.12 6.63 7.13 8.16 10.36	4.25 5.01 5.71 7.16 10.41	0.06 0.10 0.16 0.29 0.66
(2) LGP21401	A	From Leg	4.00 0.00 0.00	0.0000	175.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	1.29 1.45 1.61 1.97 2.79	0.23 0.31 0.40 0.61 1.12	0.01 0.02 0.03 0.05 0.14
(2) LGP21401	B	From Leg	4.00 0.00 0.00	0.0000	175.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	1.29 1.45 1.61 1.97 2.79	0.23 0.31 0.40 0.61 1.12	0.01 0.02 0.03 0.05 0.14
(2) LGP21401	C	From Leg	4.00 0.00 0.00	0.0000	175.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	1.29 1.45 1.61 1.97 2.79	0.23 0.31 0.40 0.61 1.12	0.01 0.02 0.03 0.05 0.14
RRUS-11	A	From Leg	4.00 0.00 0.00	0.0000	175.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	3.25 3.49 3.74 4.27 5.43	1.37 1.55 1.74 2.14 3.04	0.05 0.07 0.09 0.15 0.31
RRUS-11	B	From Leg	4.00 0.00 0.00	0.0000	175.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	3.25 3.49 3.74 4.27 5.43	1.37 1.55 1.74 2.14 3.04	0.05 0.07 0.09 0.15 0.31
RRUS-11	C	From Leg	4.00 0.00 0.00	0.0000	175.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	3.25 3.49 3.74 4.27 5.43	1.37 1.55 1.74 2.14 3.04	0.05 0.07 0.09 0.15 0.31
DC6-48-60-18-8F	A	From Leg	4.00 0.00 0.00	0.0000	175.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	2.57 2.80 3.04 3.54 4.66	2.57 2.80 3.04 3.54 4.66	0.02 0.04 0.07 0.13 0.30
Platform Mount [LP 303-1]	C	None		0.0000	175.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	14.66 18.87 23.08 31.50 48.34	14.66 18.87 23.08 31.50 48.34	1.25 1.48 1.71 2.18 3.10
165									
BXA-171085-12BF w/ Mount Pipe	A	From Leg	4.00 0.00 0.00	0.0000	165.00	No Ice 1/2" Ice	4.97 5.52 6.04	5.23 6.39 7.26	0.04 0.09 0.14

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
						1" Ice	7.09	9.05	0.27
						2" Ice	9.36	12.82	0.67
						4" Ice			
BXA-171085-12BF w/ Mount Pipe	B	From Leg	4.00 0.00 0.00	0.0000	165.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	4.97 5.52 6.04 7.09 9.36	5.23 6.39 7.26 9.05 12.82	0.04 0.09 0.14 0.27 0.67
BXA-171085-12BF w/ Mount Pipe	C	From Leg	4.00 0.00 0.00	0.0000	165.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	4.97 5.52 6.04 7.09 9.36	5.23 6.39 7.26 9.05 12.82	0.04 0.09 0.14 0.27 0.67
BXA-70063/6CF w/ Mount Pipe	A	From Leg	4.00 0.00 0.00	0.0000	165.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	7.98 8.62 9.23 10.47 13.08	5.41 6.56 7.42 9.20 12.95	0.04 0.10 0.17 0.33 0.79
BXA-70063/6CF w/ Mount Pipe	B	From Leg	4.00 0.00 0.00	0.0000	165.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	7.98 8.62 9.23 10.47 13.08	5.41 6.56 7.42 9.20 12.95	0.04 0.10 0.17 0.33 0.79
BXA-70063/6CF w/ Mount Pipe	C	From Leg	4.00 0.00 0.00	0.0000	165.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	7.98 8.62 9.23 10.47 13.08	5.41 6.56 7.42 9.20 12.95	0.04 0.10 0.17 0.33 0.79
(2) LPA-80080/6CF w/ Mount Pipe	A	From Leg	4.00 0.00 0.00	0.0000	165.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	4.56 5.11 5.61 6.65 8.83	10.73 11.99 12.97 14.98 19.22	0.05 0.11 0.19 0.36 0.86
(2) LPA-80080/6CF w/ Mount Pipe	B	From Leg	4.00 0.00 0.00	0.0000	165.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	4.56 5.11 5.61 6.65 8.83	10.73 11.99 12.97 14.98 19.22	0.05 0.11 0.19 0.36 0.86
(2) LPA-80080/6CF w/ Mount Pipe	C	From Leg	4.00 0.00 0.00	0.0000	165.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	4.56 5.11 5.61 6.65 8.83	10.73 11.99 12.97 14.98 19.22	0.05 0.11 0.19 0.36 0.86
742 213 w/ Mount Pipe	A	From Leg	4.00 0.00 0.00	0.0000	165.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	5.37 5.95 6.50 7.61 9.93	4.62 6.00 6.98 8.85 12.79	0.05 0.09 0.15 0.28 0.68
742 213 w/ Mount Pipe	B	From Leg	4.00 0.00 0.00	0.0000	165.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	5.37 5.95 6.50 7.61 9.93	4.62 6.00 6.98 8.85 12.79	0.05 0.09 0.15 0.28 0.68
742 213 w/ Mount Pipe	C	From Leg	4.00 0.00	0.0000	165.00	No Ice 1/2"	5.37 5.95	4.62 6.00	0.05 0.09

Description	Face or Leg	Offset Type	Offsets: Horz Lateral Vert ft ft ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
			0.00			Ice	6.50	6.98	0.15
						1" Ice	7.61	8.85	0.28
						2" Ice	9.93	12.79	0.68
						4" Ice			
RRH2x40-AWS	A	From Leg	4.00	0.0000	165.00	No Ice	2.52	1.59	0.04
			0.00			1/2"	2.75	1.80	0.06
			0.00			Ice	2.99	2.01	0.08
						1" Ice	3.50	2.46	0.13
						2" Ice	4.61	3.48	0.28
						4" Ice			
RRH2x40-AWS	B	From Leg	4.00	0.0000	165.00	No Ice	2.52	1.59	0.04
			0.00			1/2"	2.75	1.80	0.06
			0.00			Ice	2.99	2.01	0.08
						1" Ice	3.50	2.46	0.13
						2" Ice	4.61	3.48	0.28
						4" Ice			
RRH2x40-AWS	C	From Leg	4.00	0.0000	165.00	No Ice	2.52	1.59	0.04
			0.00			1/2"	2.75	1.80	0.06
			0.00			Ice	2.99	2.01	0.08
						1" Ice	3.50	2.46	0.13
						2" Ice	4.61	3.48	0.28
						4" Ice			
DB-B1-6C-8AB-0Z	C	From Leg	4.00	0.0000	165.00	No Ice	5.60	2.33	0.04
			0.00			1/2"	5.92	2.56	0.08
			0.00			Ice	6.24	2.79	0.12
						1" Ice	6.91	3.28	0.21
						2" Ice	8.37	4.37	0.45
						4" Ice			
Platform Mount [LP 403-1]	C	None		0.0000	165.00	No Ice	18.85	18.85	1.50
						1/2"	24.30	24.30	1.80
						Ice	29.75	29.75	2.09
						1" Ice	40.65	40.65	2.69
						2" Ice	62.45	62.45	3.87
						4" Ice			
***									

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
19	Dead+Wind 120 deg+Ice+Temp

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

Maximum Member Forces

Section No.	Elevation ft	Component Type	Condition	Gov. Load Comb.	Force K	Major Axis Moment kip-ft	Minor Axis Moment kip-ft
L1	195 - 157.5	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	14	-17.12	0.48	-0.07
			Max. Mx	11	-8.25	297.42	-0.32
			Max. My	8	-8.26	0.39	-296.98
			Max. Vy	11	-19.06	297.42	-0.32
			Max. Vx	2	-18.97	-0.14	296.93
			Max. Torque	5			0.66
L2	157.5 - 116.75	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	14	-25.82	0.42	-0.01
			Max. Mx	11	-14.89	1148.03	-3.18
			Max. My	2	-14.91	-3.05	1144.27
			Max. Vy	11	-23.78	1148.03	-3.18
			Max. Vx	2	-23.70	-3.05	1144.27
			Max. Torque	3			0.60
L3	116.75 - 77	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	14	-37.13	0.34	0.07
			Max. Mx	11	-24.16	2168.67	-6.00
			Max. My	2	-24.17	-5.94	2161.68
			Max. Vy	11	-28.48	2168.67	-6.00
			Max. Vx	2	-28.40	-5.94	2161.68
			Max. Torque	3			0.58
L4	77 - 38	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	14	-49.86	0.27	0.17
			Max. Mx	11	-34.97	3331.98	-8.74
			Max. My	2	-34.97	-8.76	3321.86
			Max. Vy	11	-32.57	3331.98	-8.74
			Max. Vx	2	-32.49	-8.76	3321.86
			Max. Torque	4			0.58
L5	38 - 0	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	14	-68.29	0.16	0.29
			Max. Mx	11	-51.12	4892.70	-11.90
			Max. My	2	-51.12	-12.03	4878.98
			Max. Vy	11	-36.68	4892.70	-11.90
			Max. Vx	2	-36.60	-12.03	4878.98
			Max. Torque	4			0.60

Maximum Reactions

Location	Condition	Gov. Load Comb.	Vertical K	Horizontal, X K	Horizontal, Z K
Pole	Max. Vert	24	68.29	9.08	-0.01
	Max. H_x	11	51.14	36.65	-0.07
	Max. H_z	2	51.14	-0.07	36.57
	Max. M_x	2	4878.98	-0.07	36.57
	Max. M_z	5	4892.67	-36.65	0.07
	Max. Torsion	4	0.60	-31.78	18.35
	Min. Vert	1	51.14	0.00	0.00
	Min. H_x	5	51.14	-36.65	0.07
	Min. H_z	8	51.14	0.07	-36.57
	Min. M_x	8	-4878.70	0.07	-36.57
	Min. M_z	11	-4892.70	36.65	-0.07
	Min. Torsion	10	-0.60	31.78	-18.35

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	51.14	0.00	0.00	-0.14	0.01	0.00
Dead+Wind 0 deg - No Ice	51.14	0.07	-36.57	-4878.98	-12.03	-0.31
Dead+Wind 30 deg - No Ice	51.14	18.39	-31.71	-4231.32	-2456.77	-0.52
Dead+Wind 60 deg - No Ice	51.14	31.78	-18.35	-2449.95	-4243.19	-0.60
Dead+Wind 90 deg - No Ice	51.14	36.65	-0.07	-12.17	-4892.67	-0.51
Dead+Wind 120 deg - No Ice	51.14	31.71	18.22	2428.87	-4231.22	-0.28
Dead+Wind 150 deg - No Ice	51.14	18.26	31.64	4219.08	-2435.95	0.01
Dead+Wind 180 deg - No Ice	51.14	-0.07	36.57	4878.70	12.05	0.31
Dead+Wind 210 deg - No Ice	51.14	-18.39	31.71	4231.05	2456.78	0.52
Dead+Wind 240 deg - No Ice	51.14	-31.78	18.35	2449.68	4243.21	0.60
Dead+Wind 270 deg - No Ice	51.14	-36.65	0.07	11.90	4892.70	0.51
Dead+Wind 300 deg - No Ice	51.14	-31.71	-18.22	-2429.14	4231.24	0.29
Dead+Wind 330 deg - No Ice	51.14	-18.26	-31.64	-4219.36	2435.98	-0.01
Dead+Ice+Temp	68.29	0.00	0.00	-0.29	0.16	0.00
Dead+Wind 0 deg+Ice+Temp	68.29	0.01	-9.07	-1242.22	-2.33	-0.16
Dead+Wind 30 deg+Ice+Temp	68.29	4.55	-7.86	-1077.10	-624.42	-0.16
Dead+Wind 60 deg+Ice+Temp	68.29	7.87	-4.55	-623.45	-1079.13	-0.12
Dead+Wind 90 deg+Ice+Temp	68.29	9.08	-0.01	-2.83	-1244.64	-0.05
Dead+Wind 120 deg+Ice+Temp	68.29	7.86	4.52	618.46	-1076.60	0.03
Dead+Wind 150 deg+Ice+Temp	68.29	4.53	7.84	1073.96	-620.03	0.11
Dead+Wind 180 deg+Ice+Temp	68.29	-0.01	9.07	1241.62	2.74	0.16
Dead+Wind 210 deg+Ice+Temp	68.29	-4.55	7.86	1076.50	624.82	0.16
Dead+Wind 240 deg+Ice+Temp	68.29	-7.87	4.55	622.85	1079.53	0.12
Dead+Wind 270 deg+Ice+Temp	68.29	-9.08	0.01	2.24	1245.04	0.05
Dead+Wind 300 deg+Ice+Temp	68.29	-7.86	-4.52	-619.06	1077.00	-0.03
Dead+Wind 330 deg+Ice+Temp	68.29	-4.53	-7.84	-1074.56	620.43	-0.11
Dead+Wind 0 deg - Service	51.14	0.02	-12.65	-1690.95	-4.16	-0.11
Dead+Wind 30 deg - Service	51.14	6.36	-10.97	-1466.51	-851.42	-0.18
Dead+Wind 60 deg - Service	51.14	10.99	-6.35	-849.16	-1470.53	-0.21
Dead+Wind 90 deg - Service	51.14	12.68	-0.02	-4.31	-1695.61	-0.18
Dead+Wind 120 deg - Service	51.14	10.97	6.31	841.65	-1466.36	-0.10
Dead+Wind 150 deg - Service	51.14	6.32	10.95	1462.06	-844.19	0.01
Dead+Wind 180 deg -	51.14	-0.02	12.65	1690.67	4.18	0.11

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
Service						
Dead+Wind 210 deg - Service	51.14	-6.36	10.97	1466.23	851.44	0.18
Dead+Wind 240 deg - Service	51.14	-10.99	6.35	848.88	1470.56	0.21
Dead+Wind 270 deg - Service	51.14	-12.68	0.02	4.03	1695.64	0.18
Dead+Wind 300 deg - Service	51.14	-10.97	-6.31	-841.94	1466.39	0.10
Dead+Wind 330 deg - Service	51.14	-6.32	-10.95	-1462.35	844.22	-0.01

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	-51.14	0.00	0.00	51.14	0.00	0.000%
2	0.07	-51.14	-36.57	-0.07	51.14	36.57	0.000%
3	18.39	-51.14	-31.71	-18.39	51.14	31.71	0.000%
4	31.78	-51.14	-18.35	-31.78	51.14	18.35	0.000%
5	36.65	-51.14	-0.07	-36.65	51.14	0.07	0.000%
6	31.71	-51.14	18.22	-31.71	51.14	-18.22	0.000%
7	18.26	-51.14	31.64	-18.26	51.14	-31.64	0.000%
8	-0.07	-51.14	36.57	0.07	51.14	-36.57	0.000%
9	-18.39	-51.14	31.71	18.39	51.14	-31.71	0.000%
10	-31.78	-51.14	18.35	31.78	51.14	-18.35	0.000%
11	-36.65	-51.14	0.07	36.65	51.14	-0.07	0.000%
12	-31.71	-51.14	-18.22	31.71	51.14	18.22	0.000%
13	-18.26	-51.14	-31.64	18.26	51.14	31.64	0.000%
14	0.00	-68.29	0.00	0.00	68.29	0.00	0.000%
15	0.01	-68.29	-9.07	-0.01	68.29	9.07	0.000%
16	4.55	-68.29	-7.86	-4.55	68.29	7.86	0.000%
17	7.87	-68.29	-4.55	-7.87	68.29	4.55	0.000%
18	9.08	-68.29	-0.01	-9.08	68.29	0.01	0.000%
19	7.86	-68.29	4.52	-7.86	68.29	-4.52	0.000%
20	4.53	-68.29	7.84	-4.53	68.29	-7.84	0.000%
21	-0.01	-68.29	9.07	0.01	68.29	-9.07	0.000%
22	-4.55	-68.29	7.86	4.55	68.29	-7.86	0.000%
23	-7.87	-68.29	4.55	7.87	68.29	-4.55	0.000%
24	-9.08	-68.29	0.01	9.08	68.29	-0.01	0.000%
25	-7.86	-68.29	-4.52	7.86	68.29	4.52	0.000%
26	-4.53	-68.29	-7.84	4.53	68.29	7.84	0.000%
27	0.02	-51.14	-12.65	-0.02	51.14	12.65	0.000%
28	6.36	-51.14	-10.97	-6.36	51.14	10.97	0.000%
29	10.99	-51.14	-6.35	-10.99	51.14	6.35	0.000%
30	12.68	-51.14	-0.02	-12.68	51.14	0.02	0.000%
31	10.97	-51.14	6.31	-10.97	51.14	-6.31	0.000%
32	6.32	-51.14	10.95	-6.32	51.14	-10.95	0.000%
33	-0.02	-51.14	12.65	0.02	51.14	-12.65	0.000%
34	-6.36	-51.14	10.97	6.36	51.14	-10.97	0.000%
35	-10.99	-51.14	6.35	10.99	51.14	-6.35	0.000%
36	-12.68	-51.14	0.02	12.68	51.14	-0.02	0.000%
37	-10.97	-51.14	-6.31	10.97	51.14	6.31	0.000%
38	-6.32	-51.14	-10.95	6.32	51.14	10.95	0.000%

Non-Linear Convergence Results

Load Combination	Converged?	Number of Cycles	Displacement Tolerance	Force Tolerance
1	Yes	4	0.00000001	0.00000001
2	Yes	4	0.00000001	0.00040845

3	Yes	6	0.00000001	0.00007569
4	Yes	6	0.00000001	0.00007682
5	Yes	4	0.00000001	0.00073549
6	Yes	6	0.00000001	0.00007545
7	Yes	6	0.00000001	0.00007546
8	Yes	4	0.00000001	0.00071661
9	Yes	6	0.00000001	0.00007678
10	Yes	6	0.00000001	0.00007572
11	Yes	4	0.00000001	0.00041427
12	Yes	6	0.00000001	0.00007580
13	Yes	6	0.00000001	0.00007573
14	Yes	4	0.00000001	0.00000001
15	Yes	5	0.00000001	0.00033172
16	Yes	5	0.00000001	0.00044158
17	Yes	5	0.00000001	0.00044361
18	Yes	5	0.00000001	0.00033223
19	Yes	5	0.00000001	0.00043983
20	Yes	5	0.00000001	0.00043881
21	Yes	5	0.00000001	0.00033165
22	Yes	5	0.00000001	0.00044397
23	Yes	5	0.00000001	0.00044261
24	Yes	5	0.00000001	0.00033266
25	Yes	5	0.00000001	0.00044040
26	Yes	5	0.00000001	0.00044075
27	Yes	4	0.00000001	0.00015302
28	Yes	5	0.00000001	0.00013541
29	Yes	5	0.00000001	0.00013952
30	Yes	4	0.00000001	0.00016691
31	Yes	5	0.00000001	0.00013473
32	Yes	5	0.00000001	0.00013469
33	Yes	4	0.00000001	0.00016469
34	Yes	5	0.00000001	0.00013935
35	Yes	5	0.00000001	0.00013559
36	Yes	4	0.00000001	0.00015462
37	Yes	5	0.00000001	0.00013604
38	Yes	5	0.00000001	0.00013573

Compression Checks

Pole Design Data

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	F_a ksi	A in^2	Actual P K	Allow. P_a K	Ratio $\frac{P}{P_a}$
L1	195 - 157.5 (1)	TP33.351x26x0.25	37.50	0.00	0.0	39.000	25.6046	-8.24	998.58	0.008
L2	157.5 - 116.75 (2)	TP40.839x32.0179x0.3125	45.00	0.00	0.0	39.000	39.1765	-14.89	1527.88	0.010
L3	116.75 - 77 (3)	TP48.006x39.1849x0.375	45.00	0.00	0.0	39.000	55.2929	-24.16	2156.42	0.011
L4	77 - 38 (4)	TP54.901x46.0798x0.375	45.00	0.00	0.0	39.000	63.2663	-34.97	2467.39	0.014
L5	38 - 0 (5)	TP61.6x52.7788x0.4375	45.00	0.00	0.0	39.000	84.9318	-51.12	3312.34	0.015

Pole Bending Design Data

Section No.	Elevation ft	Size	Actual M_x kip-ft	Actual f_{bx} ksi	Allow. F_{bx} ksi	Ratio $\frac{f_{bx}}{F_{bx}}$	Actual M_y kip-ft	Actual f_{by} ksi	Allow. F_{by} ksi	Ratio $\frac{f_{by}}{F_{by}}$
L1	195 - 157.5 (1)	TP33.351x26x0.25	297.56	17.513	39.000	0.449	0.00	0.000	39.000	0.000
L2	157.5 - 116.75 (2)	TP40.839x32.0179x0.3125	1149.85	36.139	39.000	0.927	0.00	0.000	39.000	0.000
L3	116.75 - 77	TP48.006x39.1849x0.375	2172.13	41.132	39.000	1.055	0.00	0.000	39.000	0.000

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 $\frac{f_{by}}{F_{by}}$
	(3)		1							
L4	77 - 38 (4)	TP54.901x46.0798x0.375	3337.01	48.218	39.000	1.236	0.00	0.000	39.000	0.000
L5	38 - 0 (5)	TP61.6x52.7788x0.4375	4899.68	45.837	39.000	1.175	0.00	0.000	39.000	0.000

Pole Shear Design Data

Section No.	Elevation ft	Size	Actual V K	Actual f_v ksi	Allow. F_v ksi	Ratio $\frac{f_v}{F_v}$	Actual T kip-ft	Actual f_{vt} ksi	Allow. F_{vt} ksi	Ratio $\frac{f_{vt}}{F_{vt}}$
L1	195 - 157.5 (1)	TP33.351x26x0.25	19.10	0.746	26.000	0.057	0.55	0.016	26.000	0.001
L2	157.5 - 116.75 (2)	TP40.839x32.0179x0.3125	23.82	0.608	26.000	0.047	0.55	0.008	26.000	0.000
L3	116.75 - 77 (3)	TP48.006x39.1849x0.375	28.53	0.516	26.000	0.040	0.56	0.005	26.000	0.000
L4	77 - 38 (4)	TP54.901x46.0798x0.375	32.61	0.515	26.000	0.040	0.58	0.004	26.000	0.000
L5	38 - 0 (5)	TP61.6x52.7788x0.4375	36.72	0.432	26.000	0.033	0.60	0.003	26.000	0.000

Pole Interaction Design Data

Section No.	Elevation ft	Ratio $\frac{P}{P_a}$	Ratio $\frac{f_{bx}}{F_{bx}}$	Ratio $\frac{f_{by}}{F_{by}}$	Ratio $\frac{f_v}{F_v}$	Ratio $\frac{f_{vt}}{F_{vt}}$	Comb. Stress Ratio	Allow. Stress Ratio	Criteria
L1	195 - 157.5 (1)	0.008	0.449	0.000	0.057	0.001	0.458 ✔	1.333	H1-3+VT ✔
L2	157.5 - 116.75 (2)	0.010	0.927	0.000	0.047	0.000	0.937 ✔	1.333	H1-3+VT ✔
L3	116.75 - 77 (3)	0.011	1.055	0.000	0.040	0.000	1.066 ✔	1.333	H1-3+VT ✔
L4	77 - 38 (4)	0.014	1.236	0.000	0.040	0.000	1.251 ✔	1.333	H1-3+VT ✔
L5	38 - 0 (5)	0.015	1.175	0.000	0.033	0.000	1.191 ✔	1.333	H1-3+VT ✔

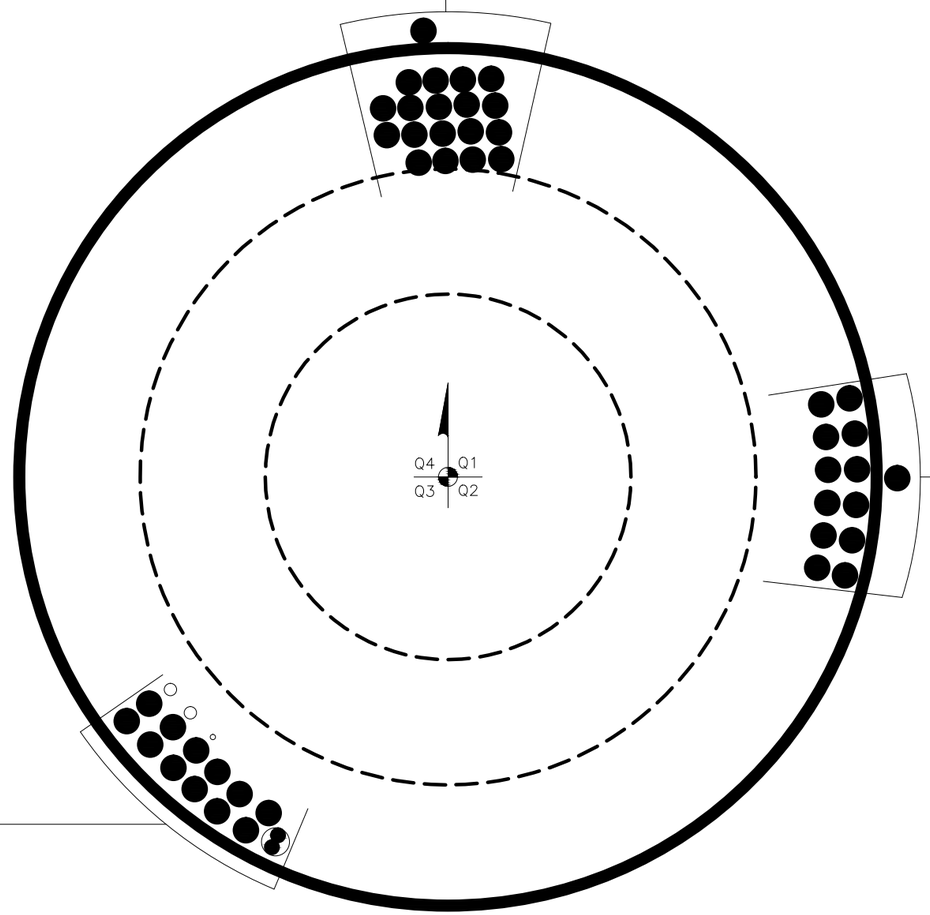
Section Capacity Table

Section No.	Elevation ft	Component Type	Size	Critical Element	P K	$SF*P_{allow}$ K	% Capacity	Pass Fail
L1	195 - 157.5	Pole	TP33.351x26x0.25	1	-8.24	1331.10	34.4	Pass
L2	157.5 - 116.75	Pole	TP40.839x32.0179x0.3125	2	-14.89	2036.66	70.3	Pass
L3	116.75 - 77	Pole	TP48.006x39.1849x0.375	3	-24.16	2874.51	80.0	Pass
L4	77 - 38	Pole	TP54.901x46.0798x0.375	4	-34.97	3289.03	93.8	Pass
L5	38 - 0	Pole	TP61.6x52.7788x0.4375	5	-51.12	4415.35	89.3	Pass
							Summary	
						Pole (L4)	93.8	Pass
						RATING =	**93.8**	**Pass**

APPENDIX B

BASE LEVEL DRAWING

(INSTALLED)
(19) 1–5/8" TO 165 FT LEVEL



(INSTALLED)
(13) 1–5/8" TO 195 FT LEVEL

(PROPOSED)
(1) 3/8" TO 175 FT LEVEL
(2) 7/8" TO 175 FT LEVEL
(INSTALLED–TO BE REMOVED)
(6) 1–5/8" TO 175 FT LEVEL
(INSTALLED–IN 2" CONDUIT)
(2) 7/8" TO 175 FT LEVEL
(INSTALLED)
(1) 3/4" TO 175 FT LEVEL
(6) 1–5/8" TO 175 FT LEVEL

BUSINESS UNIT: 826053 TOWER ID: C_BASELEVEL

APPENDIX C

ADDITIONAL CALCULATIONS

Square, Stiffened / Unstiffened Base Plate, Any Rod Material - Rev. F /G

Assumptions: 1) Rod groups at corners. Total # rods divisible by 4. Maximum total # of rods = 48 (12 per Corner).
2) Rod Spacing = Straight Center-to-Center distance between any (2) adjacent rods (same corner)
3) Clear space between bottom of leveling nut and top of concrete **not** exceeding (1)*(Rod Diameter)

Site Data

BU#: *826053*
Site Name: *Monroe-1/Rt 25*
App #: *288544 Rev. 1*

Anchor Rod Data		
Qty:	20	
Diam:	2.25	in
Rod Material:	A615-J	
Yield, Fy:	75	ksi
Strength, Fu:	100	ksi
Bolt Circle:	69	in
Anchor Spacing:	6	in

Plate Data		
W=Side:	68	in
Thick:	3	in
Grade:	55	ksi
Clip Distance:	13	in

Stiffener Data (Welding at both sides)		
Configuration:	Unstiffened	
Weld Type:		**
Groove Depth:		in **
Groove Angle:		degrees
Fillet H. Weld:		<-- Disregard
Fillet V. Weld:		in
Width:		in
Height:		in
Thick:		in
Notch:		in
Grade:		ksi
Weld str.:		ksi

Pole Data		
Diam:	61.6	in
Thick:	0.4375	in
Grade:	65	ksi
# of Sides:	18	"0" IF Round

Stress Increase Factor		
ASD ASIF:	1.333	

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

Base Reactions		
TIA Revision:	F	
Unfactored Moment, M:	4900	ft-kips
Unfactored Axial, P:	51	kips
Unfactored Shear, V:	37	kips

Anchor Rod Results

TIA F --> Maximum Rod Tension	167.9	Kips
Allowable Tension:	195.0	Kips
Anchor Rod Stress Ratio:	86.1%	**Pass**

Base Plate Results Flexural Check

Base Plate Stress:	43.5	ksi
Allowable PL Bending Stress:	55.0	ksi
Base Plate Stress Ratio:	79.0%	**Pass**

PL Ref. Data
Yield Line (in):
34.57
Max PL Length:
34.57

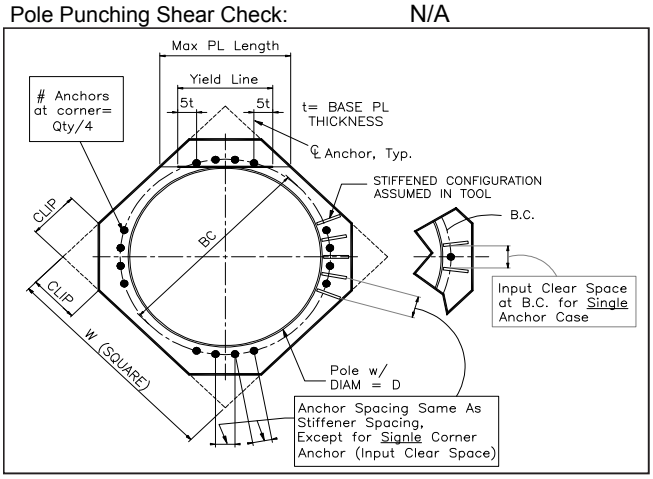
N/A - Unstiffened

Stiffener Results

Horizontal Weld :	N/A
Vertical Weld:	N/A
Plate Flex+Shear, fb/Fb+(fv/Fv)^2:	N/A
Plate Tension+Shear, ft/Ft+(fv/Fv)^2:	N/A
Plate Comp. (AISC Bracket):	N/A

Pole Results

Pole Punching Shear Check: N/A



CCI Foundation Tool Suite - Monopole Pier

CCIFTS 1.2.108.14286 - Phase 1-2 Date: 4/24/2015

BU:	826053
Site Name:	Monroe-1/Rt 25
App Number:	288544 rev 1
Work Order:	1048407

Monopole Drilled Pier

Input

Criteria

TIA Revision:	F
ACI 318 Revision:	2002
Seismic Category:	B

Forces

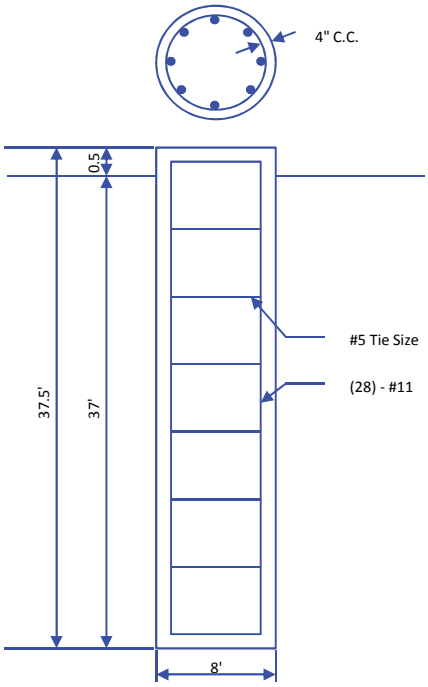
Compression	51	kips
Shear	37	kips
Moment	4900	k-ft
Swelling Force	0	kips

Foundation Dimensions

Pier Diameter:	8	ft
Ext. above grade:	0.5	ft
Depth below grade:	37	ft

Material Properties

Number of Rebar:	28	
Rebar Size:	11	
Tie Size	5	
Rebar tensile strength:	60	ksi
Concrete Strength:	4500	psi
Ultimate Concrete Strain	0.003	in/in
Clear Cover to Ties:	4	in



Soil Profile: 826053_Soil

Layer	Thickness (ft)	From (ft)	To (ft)	Unit Weight (pcf)	Cohesion (psf)	Friction Angle (deg)	Ultimate Uplift Skin Friction (ksf)	Ultimate Comp. Skin Friction (ksf)	Ultimate Bearing Capacity (ksf)	SPT 'N' Counts
1	3	0	3	115	0	0	0	0	0	
2	10	3	13	52.6	0	0	0	0	0	
3	24	13	37	52.6	0	34	1.5	1.5	30	

Analysis Results

Soil Lateral Capacity

Depth to Zero Shear:	14.42	ft
Max Moment, Mu:	5449.26	k-ft
Soil Safety Factor:	2.95	
Safety Factor Req'd:	2	
RATING:	67.9%	

Soil Axial Capacity

Skin Friction (k):	452.39	kips
End Bearing (k):	753.98	kips
Comp. Capacity (k), ϕCn:	1206.37	kips
Comp. (k), Cu:	66.30	kips
RATING:	5.5%	

Concrete/Steel Check

Mu (from soil analysis)	7084.04	k-ft
ϕMn	8203.95	k-ft
RATING:	86.3%	

rho provided	0.60	
rho required	0.34	OK

Rebar Spacing	8.17	
Spacing required	22.56	OK

Dev. Length required	22.25	
Dev. Length provided	50.45	OK

Overall Foundation Rating: 86.3%

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

AT&T Existing Facility

Site ID: CT5189

Monroe South
80 Main Street
Monroe, CT 06468

July 15, 2015

EBI Project Number: 6215003970

Site Compliance Summary	
Compliance Status:	COMPLIANT
Site total MPE% of FCC general public allowable limit:	35.11 %

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

EBI Consulting
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July 15, 2015

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

Emissions Analysis for Site: **CT5189 – Monroe South**

EBI Consulting was directed to analyze the proposed AT&T facility located at **80 Main Street, Monroe, CT**, for the purpose of determining whether the emissions from the Proposed AT&T Antenna Installation located on this property are within specified federal limits.

All information used in this report was analyzed as a percentage of current Maximum Permissible Exposure (% MPE) as listed in the FCC OET Bulletin 65 Edition 97-01and ANSI/IEEE Std C95.1. The FCC regulates Maximum Permissible Exposure in units of microwatts per square centimeter (μW/cm2). The number of $\mu W/cm^2$ calculated at each sample point is called the power density. The exposure limit for power density varies depending upon the frequencies being utilized. Wireless Carriers and Paging Services use different frequency bands each with different exposure limits, therefore it is necessary to report results and limits in terms of percent MPE rather than power density.

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

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

Public exposure to radio frequencies is regulated and enforced in units of microwatts per square centimeter ($\mu W/cm^2$). The general population exposure limits for the 700 and 800 MHz Bands are 467 $\mu W/cm^2$ and 467 $\mu W/cm^2$ respectively. The general population exposure limit for the 1900 MHz (PCS) band is 1000 $\mu W/cm^2$. Because each carrier will be using different frequency bands, and each frequency band has different exposure limits, it is necessary to report percent of MPE rather than power density.

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

Additional details can be found in FCC OET 65.

CALCULATIONS

Calculations were done for the proposed AT&T Wireless antenna facility located at **80 Main Street, Monroe, CT**, using the equipment information listed below. All calculations were performed per the specifications under FCC OET 65. Since AT&T is proposing highly focused directional panel antennas, which project most of the emitted energy out toward the horizon, all calculations were performed assuming a lobe representing the maximum gain of the antenna per the antenna manufactures supplied specifications, minus 10 dB, was focused at the base of the tower. For this report the sample point is the top of a 6 foot person standing at the base of the tower.

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

1) 4 GSM channels (850 MHz) were considered for each sector of the proposed installation. These Channels have a transmit power of 30 Watts per Channel.

2) 2 UMTS channels (PCS Band - 1900 MHz) were considered for each sector of the proposed installation. These Channels have a transmit power of 30 Watts per Channel.

3) 2 UMTS channels (850 MHz) were considered for each sector of the proposed installation. These Channels have a transmit power of 30 Watts per Channel.

4) 4 LTE channels (PCS Band – 1900 MHz) were considered for each sector of the proposed installation. These Channels have a transmit power of 60 Watts per Channel.

5) 4 LTE channel (700 MHz Band) was considered for each sector of the proposed installation. This channel has a transmit power of 60 Watts

6) All radios at the proposed installation were considered to be running at full power and were uncombined in their RF transmissions paths per carrier prescribed configuration. Per FCC OET Bulletin No. 65 - Edition 97-01 recommendations to achieve the maximum anticipated value at each sample point, all power levels emitting from the proposed antenna installation are increased by a factor of 2.56 to account for possible in-phase reflections from the surrounding environment. This is rarely the case, and if so, is never continuous.

7) For the following calculations the sample point was the top of a six foot person standing at the base of the tower. The maximum gain of the antenna per the antenna manufactures supplied specifications minus 10 dB was used in this direction. This value is a very conservative estimate as gain reductions for these particular antennas are typically much higher in this direction.

8) The antennas used in this modeling are the **Powerwave 7770** for 1900 MHz (PCS) and 850 MHz channels and the **CCI OPA-65R-LCUU-H6** for 1900 MHz (PCS) and 700 MHz channels. This is based on feedback from the carrier with regards to anticipated antenna selection. The **Powerwave 7770** has a maximum gain of **11.4 dBd** at 850 MHz and **13.4 dBd** at 1900MHz at its main lobe. The **CCI OPA-65R-LCUU-H6** has a maximum gain of **11.7 dBd** at 700 and **14.9 dBd** at 1900 MHz at its main lobe. The maximum gain of the antenna per the antenna manufactures supplied specifications, minus 10 dB, was used for all calculations. This value is a very conservative estimate as gain reductions for these particular antennas are typically much higher in this direction.

9) The antenna mounting height centerline of the proposed antennas is **175 feet** above ground level (AGL).

10) Emissions values for additional carriers were taken from the Connecticut Siting Council active database. Values in this database are provided by the individual carriers themselves.

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

AT&T Site Inventory and Power Data

Sector:	A	Sector:	B	Sector:	C
Antenna #:	**1**	Antenna #:	**1**	Antenna #:	**1**
Make / Model:	**Powerwave 7770**	Make / Model:	**Powerwave 7770**	Make / Model:	**Powerwave 7770**
Gain:	11.4 / 13.4 dBd	Gain:	11.4 / 13.4 dBd	Gain:	11.4 / 13.4 dBd
Height (AGL):	175 feet	Height (AGL):	175 feet	Height (AGL):	175 feet
Frequency Bands	8500 MHz / 1900 MHz(PCS)	Frequency Bands	8500 MHz / 1900 MHz(PCS)	Frequency Bands	8500 MHz / 1900 MHz(PCS)
Channel Count	8	Channel Count	8	# PCS Channels:	8
Total TX Power:	240	Total TX Power:	240	# AWS Channels:	240
ERP (W):	3,797.35	ERP (W):	3,797.35	ERP (W):	3,797.35
Antenna A1 MPE%	**0.72** (0.55 @ 850 MHz) (0.17 @ 1900 MHz)	Antenna B1 MPE%	**0.72** (0.55 @ 850 MHz) (0.17 @ 1900 MHz)	Antenna C1 MPE%	**0.72** (0.55 @ 850 MHz) (0.17 @ 1900 MHz)
Antenna #:	**2**	Antenna #:	**2**	Antenna #:	**2**
Make / Model:	**CCI OPA-65R-LCUU-H6**	Make / Model:	**CCI OPA-65R-LCUU-H6**	Make / Model:	**CCI OPA-65R-LCUU-H6**
Gain:	11.7 / 14.9 dBd	Gain:	11.7 / 14.9 dBd	Gain:	11.7 / 14.9 dBd
Height (AGL):	175 feet	Height (AGL):	175 feet	Height (AGL):	175 feet
Frequency Bands	700 MHz / 1900 MHz (PCS)	Frequency Bands	700 MHz / 1900 MHz (PCS)	Frequency Bands	700 MHz / 1900 MHz (PCS)
Channel Count	8	Channel Count	8	Channel Count	8
Total TX Power:	480	Total TX Power:	480	Total TX Power:	480
ERP (W):	602.72	ERP (W):	602.72	ERP (W):	602.72
Antenna A2 MPE%	**1.89** (0.96 @ 700 MHz) 0.93 @ 1900 MHz)	Antenna B2 MPE%	**1.89** (0.96 @ 700 MHz) 0.93 @ 1900 MHz)	Antenna C2 MPE%	**1.89** (0.96 @ 700 MHz) 0.93 @ 1900 MHz)

Site Composite MPE%	
Carrier	**MPE%**
AT&T	**7.82**
Verizon Wireless	17.64 %
T-Mobile	9.65 %
Site Total MPE %:	**35.11 %**

AT&T Sector 1 Total:	2.61 %
AT&T Sector 2 Total:	2.61 %
AT&T Sector 3 Total:	2.61 %
Site Total:	35.11 %

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Summary

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

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

AT&T Sector	Power Density Value (%)
Sector 1:	2.61 %
Sector 2:	2.61 %
Sector 3 :	2.61 %
AT&T Total:	7.82 %
Site Total:	35.11 %
Site Compliance Status:	**COMPLIANT**

The anticipated composite MPE value for this site assuming all carriers present is **35.11%** of the allowable FCC established general public limit sampled at the ground level. This is based upon values listed in the Connecticut Siting Council database for existing carrier emissions.

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

Scott Heffernan
RF Engineering Director

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