Crown Castle
500 West Cummings Park, Suite 3600
Woburn, MA 01801

December 5, 2014

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

RE: **AT&T-Exempt Modification – Crown Castle Site ID: 825983**
AT&T Site ID: CT1044
Located at: 90 Industrial Park Road, Middletown, CT 06457

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 maintain their 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 The Honorable Daniel T. Drew, Mayor for the Town of Middletown, and Philip Armetta, Property Owner.

Crown Castle is responsible for this wireless facility located at **90 Industrial Park Road, Middletown, CT 06457**. AT&T proposes to modify their existing antenna array to include the addition of three (3) antennas, three (3) remote radio heads, and one (1) fiber cable. 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).

Sincerely,

Jeffrey Barbadora
Real Estate Specialist
Telephone: 781-970-0053
Email: jeff.barbadora@crowncastle.com

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: The Honorable Daniel T. Drew, Town Mayor
245 deKoven Drive
Middletown, CT 06457

Philip Armetta
90 Industrial Park Road
Middletown, CT 06457

PROJECT INFORMATION

SCOPE OF WORK:
- REMOVE EXISTING GSM ANTENNAS; EXISTING SECTOR MOUNTING FRAMES TO REMAIN.
- NEW AT&T ANTENNAS: (2) ANTENNAS PER SECTOR WITH (3) SECTORS, FOR A TOTAL OF (6) NEW ANTENNAS; (3) EXISTING UMTS ANTENNAS TO BE RE-USED (1 PER SECTOR)
- NEW AT&T RRUs: (2) NEW RRUs PER SECTOR WITH (3) SECTORS, FOR A TOTAL OF (6) NEW RRUs.
- (1) NEW A2 MODULES PER SECTOR WITH (3) SECTORS, FOR A TOTAL OF (3) A2 MODULES.
- (2) NEW AT&T DC6 SURGE SUPPRESSORS.
- (2) NEW FIBER TRUNKS & (4) NEW DC TRUNKS.
- NEW POWER PLANT
- NEW LTE RBS-6601 INSTALLED IN EXISTING LTE RACK.

SITE ADDRESS:	90 INDUSTRIAL PARK RD MIDDLETOWN, CT 06457	
LATITUDE:	41.5856	41° 35' 8.16"N
LONGITUDE:	-72.714	72° 42' 50.4"W
USID:	4536	
TOWER OWNER:	CROWN CASTLE INTERNATIONAL CORPORATION 2000 CORPORATE DRIVE CANONSBURG, PA 15317	
TYPE OF SITE:	MONOPOLE/INDOOR EQUIPMENT	
MONOPOLE HEIGHT:	185'-0"±	
RAD CENTER:	175'-0"±	
CURRENT USE:	UNMANNED WIRELESS TELECOMMUNICATIONS FACILITY	
PROPOSED USE:	UNMANNED WIRELESS TELECOMMUNICATIONS FACILITY	

at&t MOBILITY

FA CODE: 10035130
SITE NUMBER: CT1044
SITE NAME:
MIDDLETOWN DAINTY RUBBISH

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: CROWN CASTLE
ADDRESS: 2000 CORPORATE DRIVE, CANONSBURG, PA 15317
CONTACT: TO BE PROVIDED
PHONE: TO BE PROVIDED
EMAIL: TO BE PROVIDED

ZONING:
COMPANY: CROWN CASTLE
ADDRESS: 2000 CORPORATE DRIVE, CANONSBURG, PA 15317
CONTACT: TO BE PROVIDED
PHONE: TO BE PROVIDED
EMAIL: TO BE PROVIDED

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

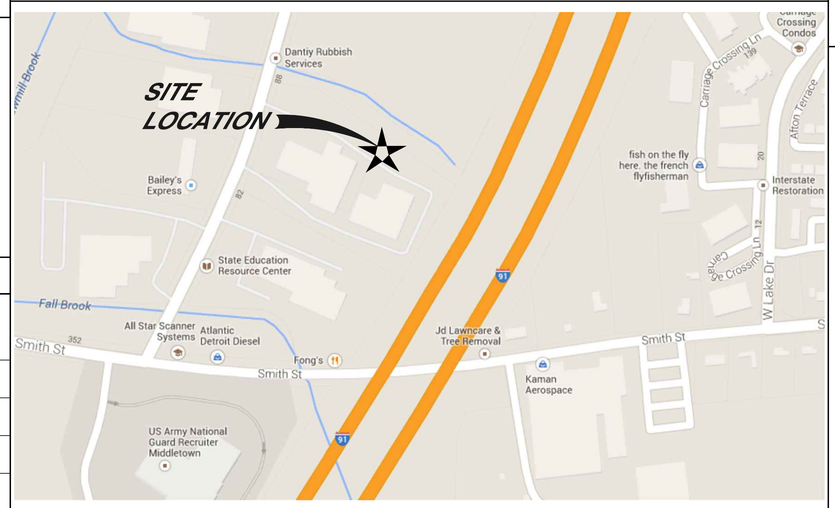
CONSTRUCTION MANAGEMENT:
COMPANY: EMPIRE TELECOM
ADDRESS: 16 ESQUIRE ROAD, BILLERICA, MA 01821
CONTACT: GRZEGORZ "GREG" DORMAN
PHONE: 484-683-1750
EMAIL: gdorman@empiretelecomm.com

DRAWING INDEX

		REV.
T-1	TITLE SHEET	0
GN-1	GROUNDING & GENERAL NOTES	0
A-1	COMPOUND LAYOUTS	0
A-2	EQUIPMENT LAYOUTS	0
A-3	ANTENNA LAYOUTS & ELEVATIONS	0
A-4	DETAILS	0
A-5	ANTENNA MOUNTING DETAILS	0
G-1	GROUNDING, ONE-LINE DIAGRAM & DETAILS	0

VICINITY MAP

1. HEAD WEST ON COCHITUATE RD TOWARD BURR ST (0.3 MI) 2. TURN LEFT ONTO SHOPPERS WORLD DR (230 FT) 3. MAKE A U-TURN AT RING RD (138 FT) 4. TAKE THE 1ST RIGHT ONTO COCHITUATE RD (0.3 MI) 5. TAKE THE RAMP TO I-90 E/MASSPIKE W/SPRINGFIELD/BOSTON TOLL ROAD (0.6 MI) 6. KEEP LEFT AT THE FORK, FOLLOW SIGNS FOR INTERSTATE 90 W/MASSACHUSETTS TURNPIKE/WORCHESTER/SPRINGFIELD AND MERGE ONTO I-90 W/MASSACHUSETTS TURNPIKE PARTIAL TOLL ROAD (38.3 MI) 7. TAKE EXIT 9 TO MERGE ONTO I-84 TOWARD US-20/HARTFORD/NEW YORK CITY PARTIAL TOLL ROAD ENTERING CONNECTICUT (41.7 MI) 8. KEEP LEFT TO CONTINUE ON CT-15 S, FOLLOW SIGNS FOR I-91 S/CHARTER OAK BRIDGE/N Y. CITY (1.1 MI) 9. CONTINUE ONTO CT-15 S/US-5 S (0.8 MI) 10. TAKE EXIT 86 TO MERGE ONTO I-91 S TOWARD NEW HAVEN/NEW YORK CITY (10.7 MI) 11. TAKE EXIT 21 FOR CT-372 TOWARD CROMWELL/BERLIN (0.4 MI) 12. MERGE ONTO INDUSTRIAL PARK RD. DESTINATION WILL BE ON THE LEFT



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. STOP-CALL BEFORE YOU DIG! 1-800-922-4455

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:		

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MIDDLESEX COUNTY

at&t MOBILITY
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NO.	DATE	REVISIONS	BY	CHK	APP'D
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SCALE: AS SHOWN | DESIGNED BY: CJT | DRAWN BY: PAV

SEAL: NICHOLAS D. BARILE No. 23648 LICENSED PROFESSIONAL ENGINEER STATE OF CONNECTICUT
12/05/14

AT&T

DRAWING TITLE: TITLE SHEET

JOB NUMBER	DRAWING NUMBER	REV
14012-EMP	T-1	0

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. 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.

3. 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.

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

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

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

7. 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.

8. 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

9. 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.

10. 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.

11. SUBCONTRACTOR SHALL LEAVE PREMISES IN CLEAN CONDITION.

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

13. 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.

14. 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.

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

16. 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.

17. 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.

18. 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.

19. 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

20. 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

21. 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.

COM-EX Consultants
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DENVILLE, NJ 07834
PHONE: 862.209.4300
FAX: 862.209.4301

EMPIRE telecom
16 ESQUIRE ROAD
BILLERICA, MA 01821

SITE NUMBER: CT1044
SITE NAME: MIDDLETOWN DAINTY RUBBISH

90 INDUSTRIAL PARK RD
MIDDLETOWN, CT 06457
MIDDLESEX COUNTY

at&t MOBILITY
550 COCHITUATE ROAD
FRAMINGHAM, MA 01701

NO.	DATE	REVISIONS	BY	CHK	APP'D
0	12/05/14	INITIAL SUBMISSION	CJT	NDB	NDB

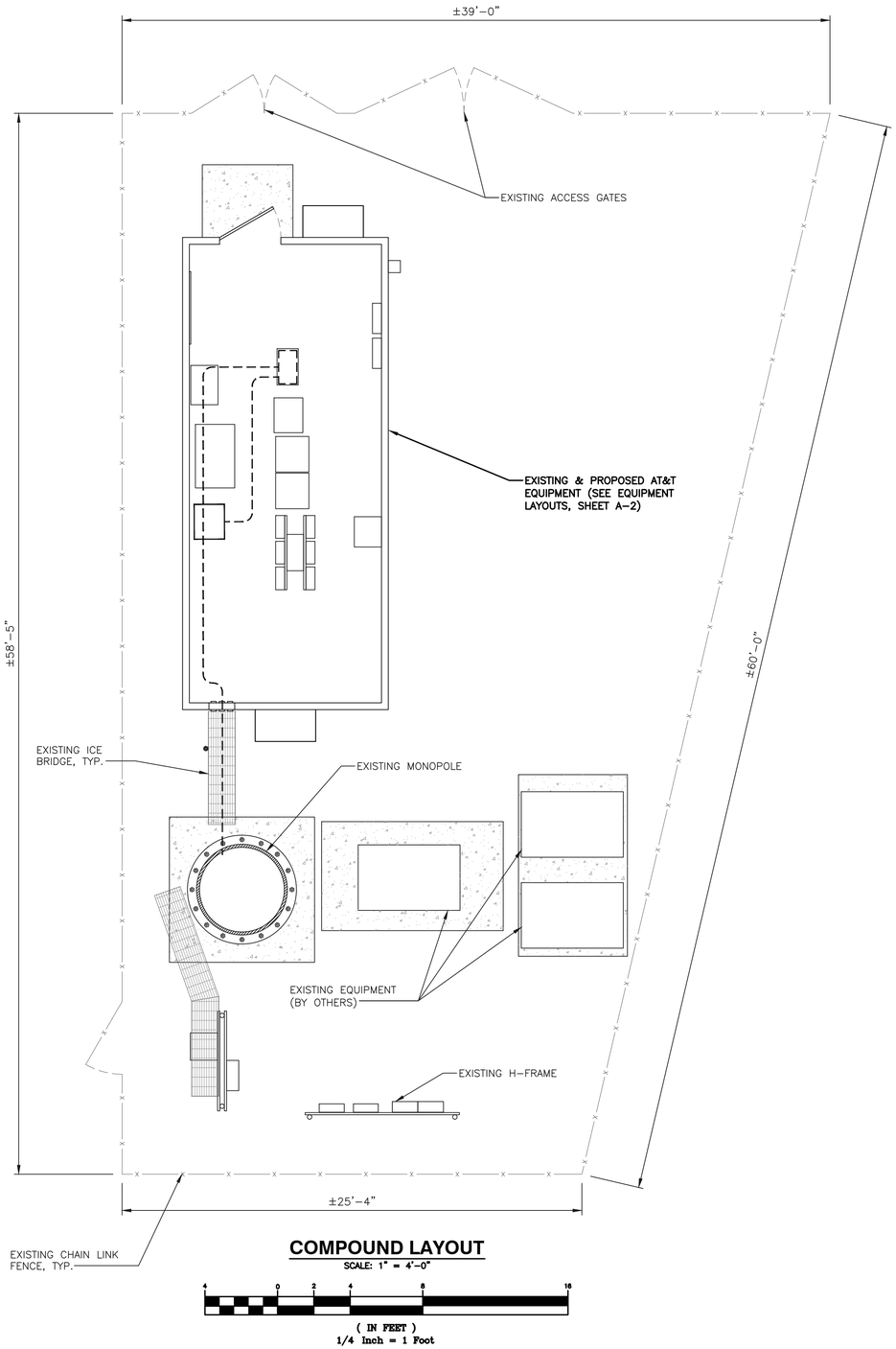
SCALE: AS SHOWN | DESIGNED BY: CJT | DRAWN BY: PAV

SEAL: STATE OF CONNECTICUT "DOUGLAS D. WARD" No. 28634 LICENSED PROFESSIONAL ENGINEER
12/05/14

AT&T

DRAWING TITLE:
GROUNDING NOTES & GENERAL NOTES

JOB NUMBER	DRAWING NUMBER	REV
14012-EMP	GN-1	0



COMPOUND LAYOUT

SCALE: 1" = 4'-0"

4 0 2 4 8 16

(IN FEET)
1/4 inch = 1 Foot

13.938° W

NORTH

COM-EX Consultants
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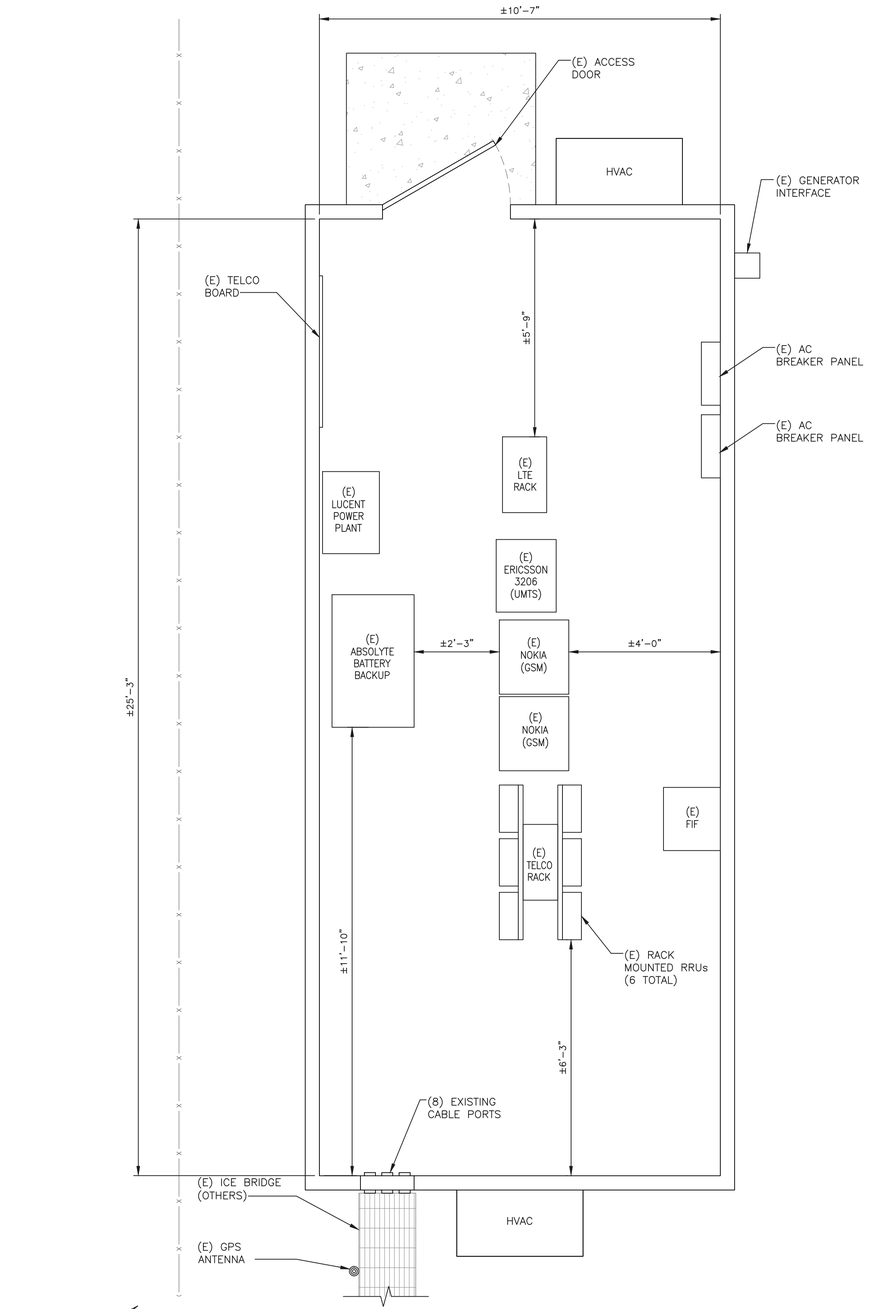
SCALE: AS SHOWN | DESIGNED BY: CJT | DRAWN BY: PAV

SEAL: STATE OF CONNECTICUT · NICHOLAS S. WARD · No. 23648 · LICENSED PROFESSIONAL ENGINEER
12/05/14

AT&T

DRAWING TITLE:
COMPOUND LAYOUT

JOB NUMBER	DRAWING NUMBER	REV
14012-EMP	A-1	0

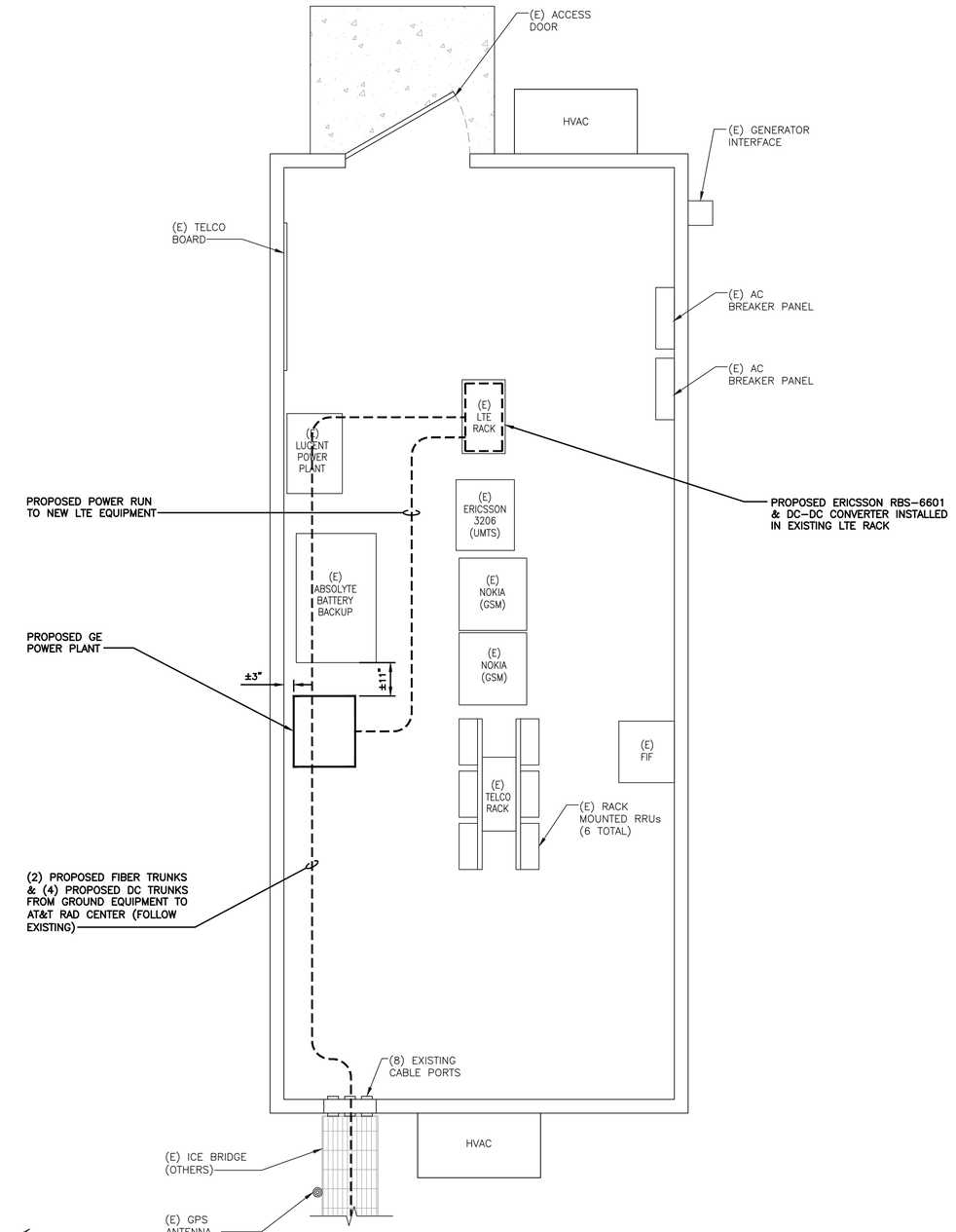


EXISTING EQUIPMENT LAYOUT

SCALE: 1" = 2'-0"

2 0 1 2 4 8

(IN FEET)
1/2 Inch = 1 Foot



PROPOSED EQUIPMENT LAYOUT

SCALE: 1" = 2'-0"

2 0 1 2 4 8

(IN FEET)
1/2 Inch = 1 Foot

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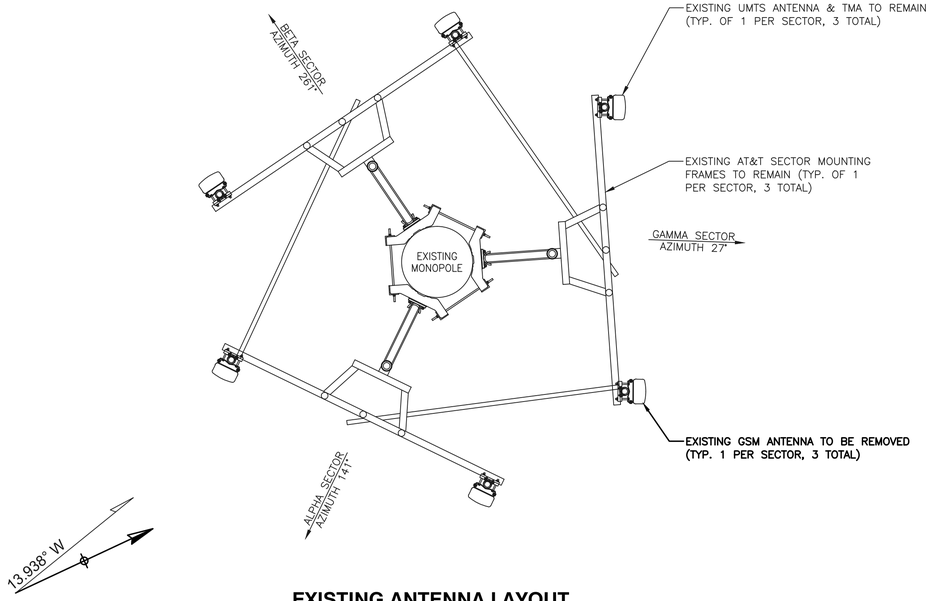
SCALE: AS SHOWN | DESIGNED BY: CJT | DRAWN BY: PAV

SEAL:
STATE OF CONNECTICUT
THOMAS G. PARENT
No. 28643
LICENSED PROFESSIONAL ENGINEER
12/05/14

AT&T

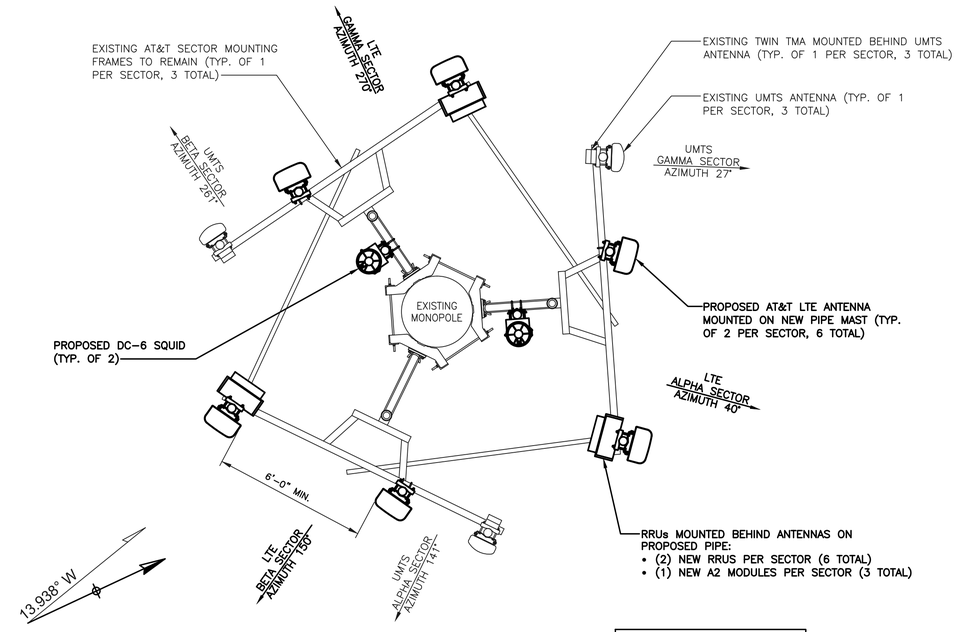
DRAWING TITLE:
EQUIPMENT LAYOUTS

JOB NUMBER	DRAWING NUMBER	REV
14012-EMP	A-2	0



EXISTING ANTENNA LAYOUT

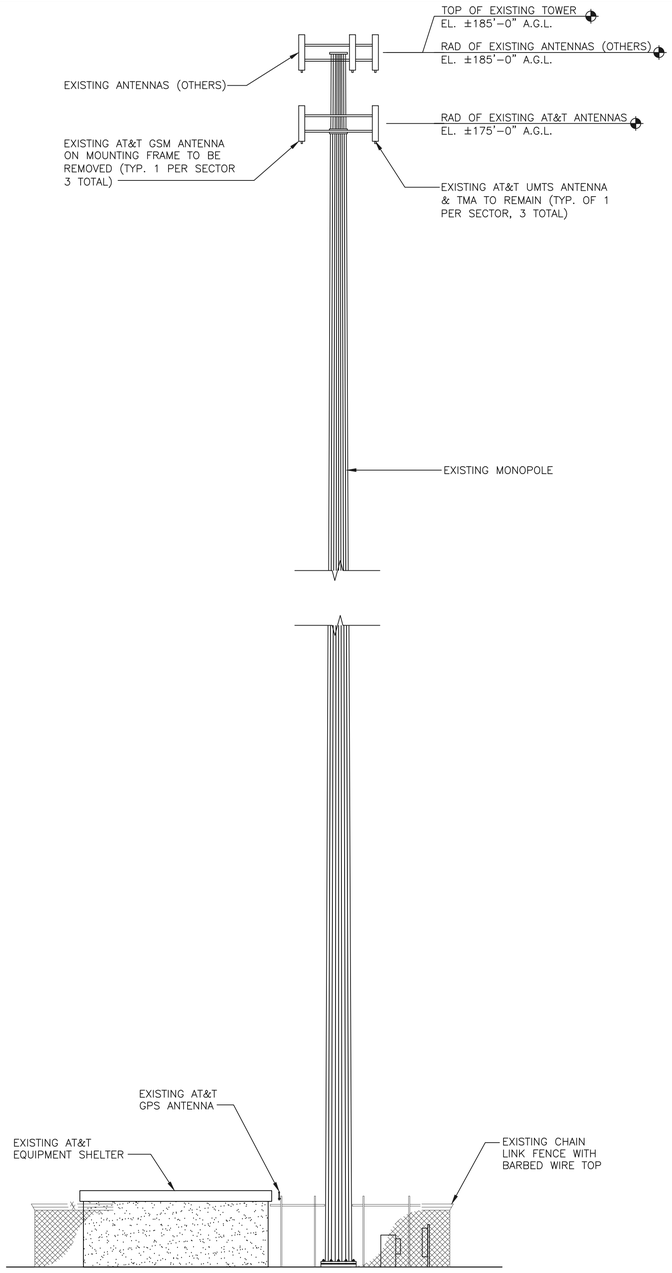
SCALE: N.T.S.



PROPOSED ANTENNA LAYOUT

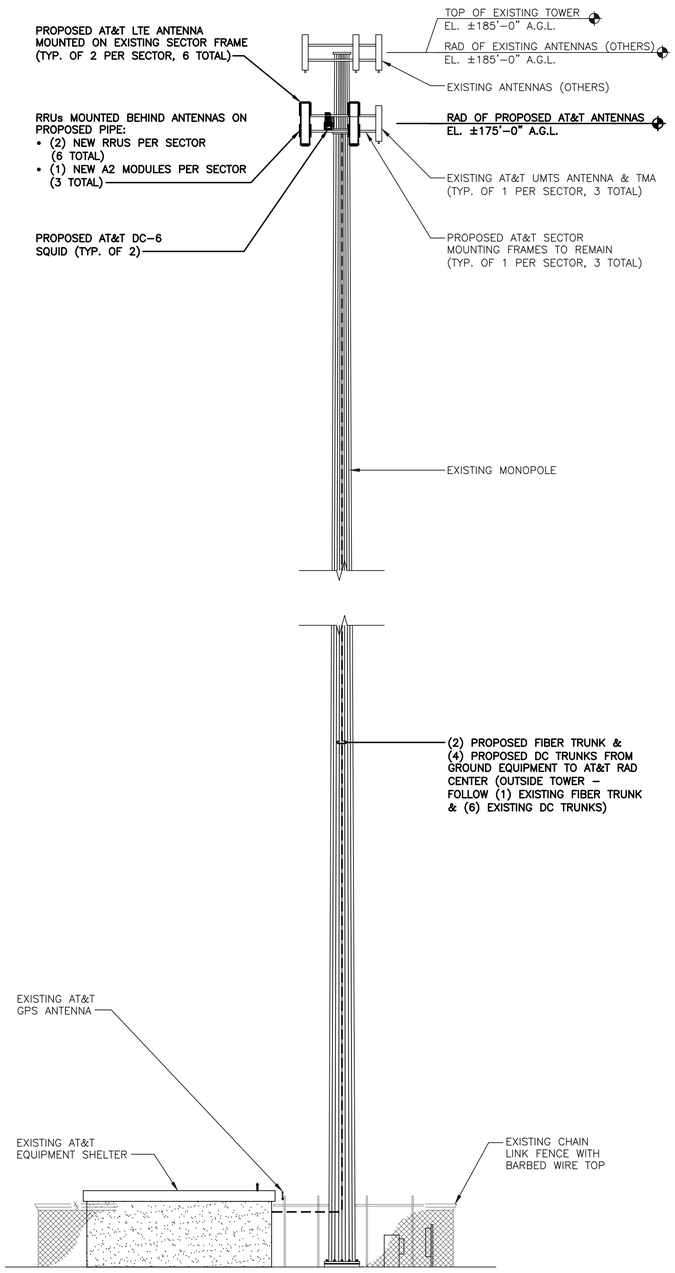
SCALE: N.T.S.

MINIMUM SEPARATION OF 6'-0" TO BE MAINTAINED BETWEEN ALL PROPOSED AT&T LTE ANTENNAS



EXISTING TOWER ELEVATION

SCALE: NTS



PROPOSED TOWER ELEVATION

SCALE: NTS

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.

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SITE NAME: MIDDLETOWN DAINTY RUBBISH

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MIDDLESEX COUNTY

at&t MOBILITY
550 COCHITUATE ROAD
FRAMINGHAM, MA 01701

NO.	DATE	REVISIONS	BY	CHK	APP'D
0	12/05/14	INITIAL SUBMISSION	CJT	NDB	NDB

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

SEAL: STATE OF CONNECTICUT — DOUGLAS "G." BUTLER — No. 28643 — LICENSED PROFESSIONAL ENGINEER — 12/05/14

AT&T

DRAWING TITLE:
ANTENNA LAYOUTS & ELEVATIONS

JOB NUMBER	DRAWING NUMBER	REV
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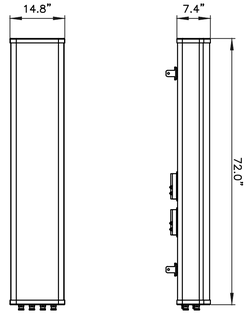


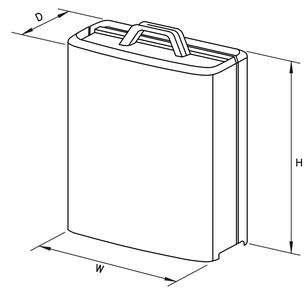
FRONT VIEW SIDE VIEW

BOTTOM VIEW

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

LTE ANTENNA DETAIL

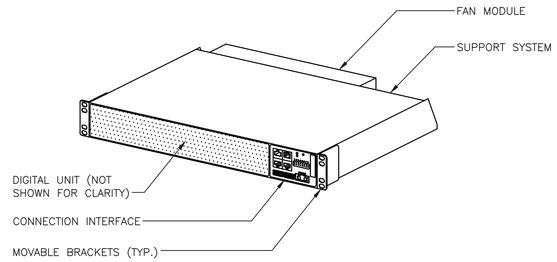
SCALE: N.T.S.



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
RRUS-32	29.9" x 13.3" x 9.5"	77 LBS
A2 MODULE	16.4" x 15.2" x 3.4"	22 LBS

RRUS DETAIL

SCALE: N.T.S.

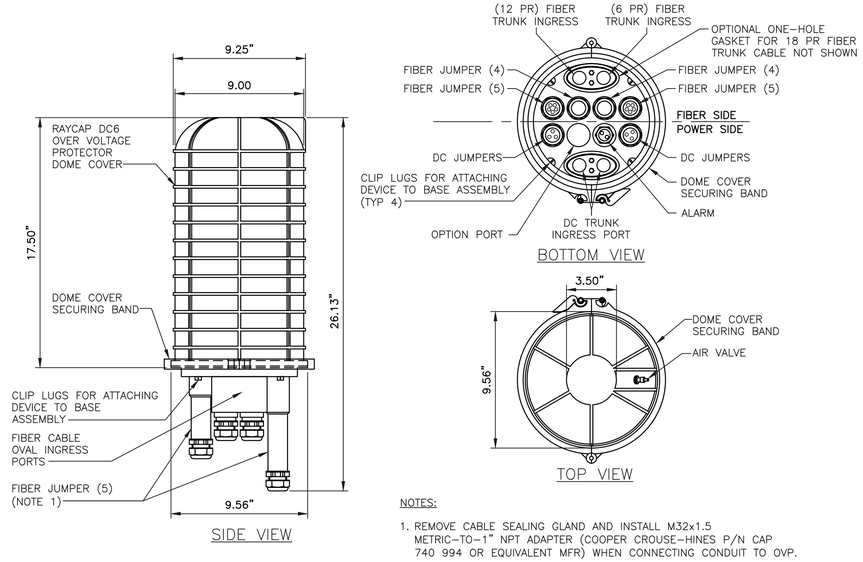


PHYSICAL CHARACTERISTICS	
HEIGHT	2.59" (1.5 U)
WIDTH	19"
DEPTH	13.77"
WEIGHT (FULLY EQUIPPED)	<22 LBS.
COLOR	WHITE

DC POWER SUPPLY	
NOMINAL VOLTAGE	-48VDC
OPERATING VOLTAGE RANGE	-40.0 TO -57.6 VDC
NON-DESTRUCTIVE VOLTAGE RANGE	0 TO -60 VDC

RBS 6601 DETAIL

SCALE: N.T.S.

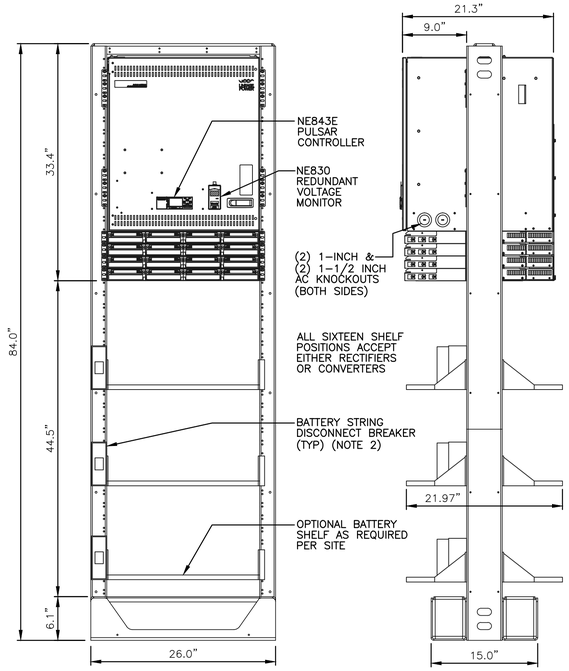


NOTES:

1. REMOVE CABLE SEALING GLAND AND INSTALL M32x1.5 METRIC-TO-1" NPT ADAPTER (COOPER CROUSE-HINES P/N CAP 740 994 OR EQUIVALENT MFR) WHEN CONNECTING CONDUIT TO OVP.

DC-6 SURGE SUPPRESSOR DETAIL

SCALE: N.T.S.



FRONT VIEW SIDE VIEW

WEIGHT:
FRAME W/DC POWER SYSTEM AND W/O BATTERIES = 435lbs

BATTERY SHELF (W/(4) 155AH BATTERIES = APPROXIMATELY 500lbs PER SHELF

CLEARANCE:
FRONT = 36"
REAR = 6"
SIDES = 2"

NOTES:

1. GE/LINEAGE FLOOR ANCHOR KIT (847135688) MAY BE USED UNLESS LOCAL REQUIREMENTS GOVERN.
2. DISCONNECT MAY BE MOUNTED TO EITHER SIDE OF TRAY OR DIRECTLY TO FRAMEWORK
3. PER MANUFACTURER, FRAME IS SEISMIC COMPLIANT UP TO 3 BATTERY SHELVES.

POWER PLANT DETAIL

SCALE: N.T.S.

COM-EX Consultants
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SITE NUMBER: CT1044
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MIDDLESEX COUNTY

at&t MOBILITY
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FRAMINGHAM, MA 01701

NO.	DATE	REVISIONS	BY	CHK	APP'D
0	12/05/14	INITIAL SUBMISSION	CJT	NDB	NDB

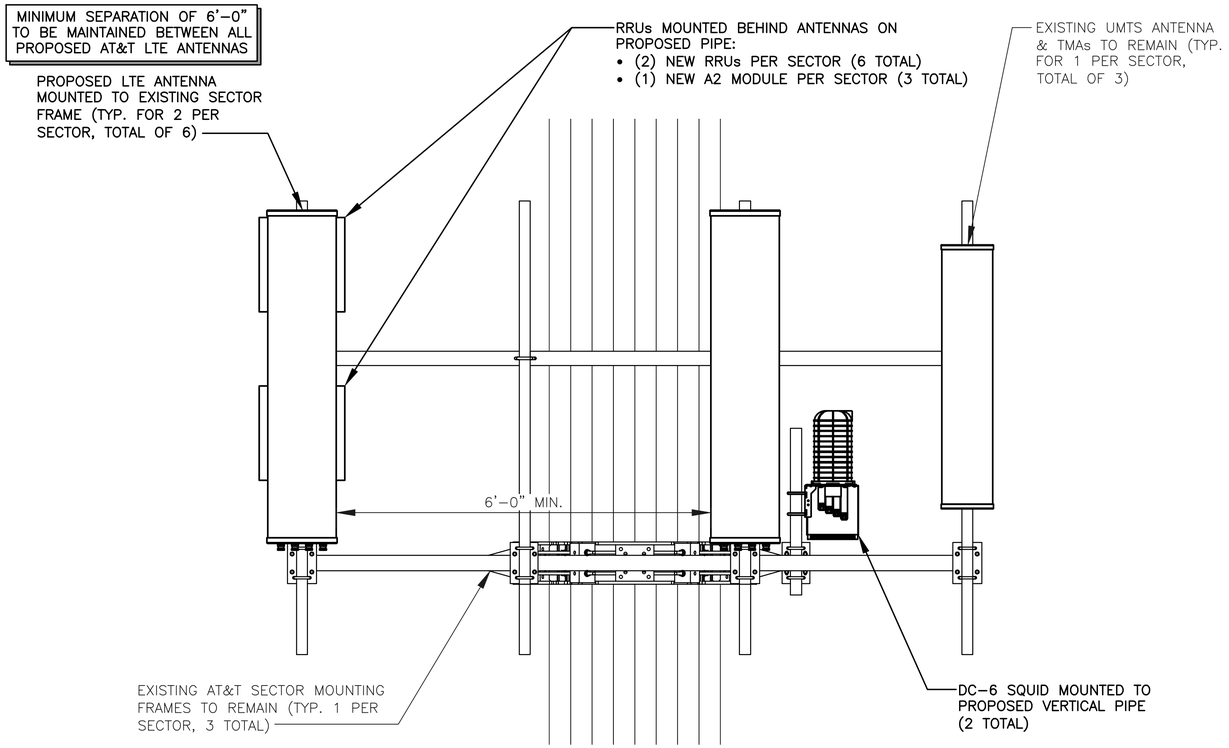
SCALE: AS SHOWN | DESIGNED BY: CJT | DRAWN BY: PAV

SEAL: STATE OF CONNECTICUT · NICHOLAS G. WARD · No. 20648 · LICENSED PROFESSIONAL ENGINEER
12/05/14

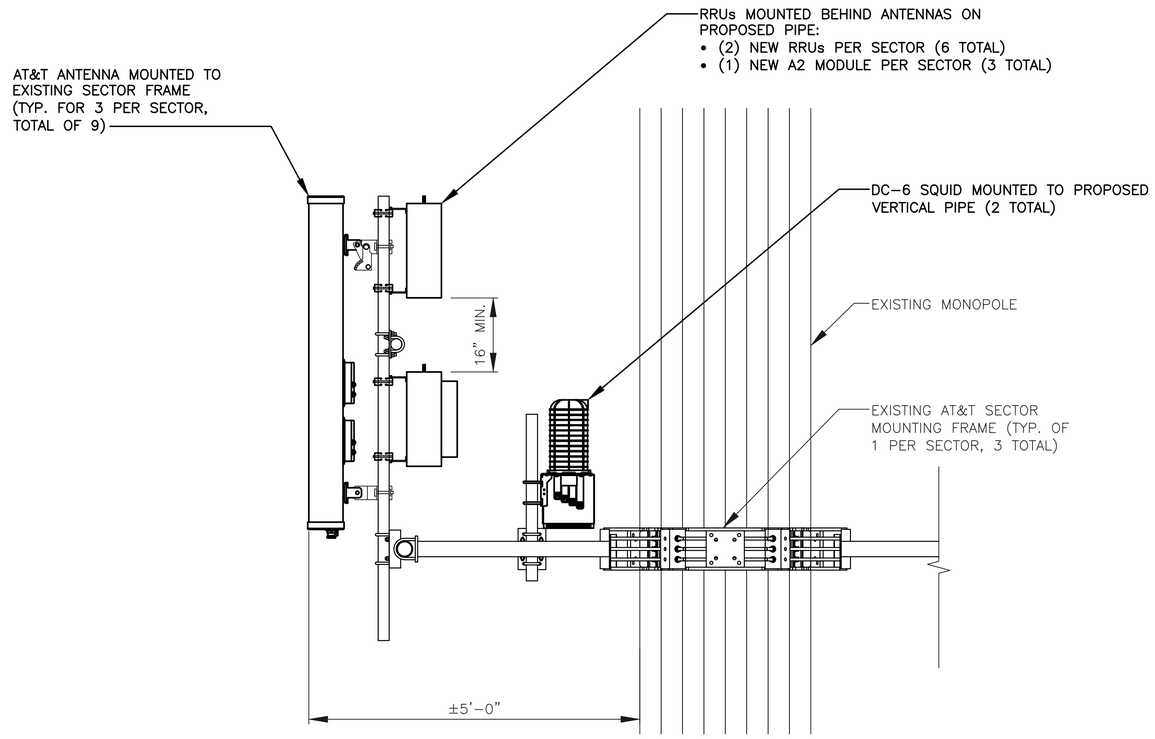
AT&T

DRAWING TITLE: DETAILS

JOB NUMBER	DRAWING NUMBER	REV
14012-EMP	A-4	0



PROPOSED ANTENNA MOUNTING DETAIL (FRONT VIEW)
SCALE: N.T.S.



PROPOSED ANTENNA MOUNTING DETAIL (SIDE VIEW)
SCALE: N.T.S.

EXISTING ANTENNA SCHEDULE

	SECTOR	MAKE	MODEL	SIZE (INCHES)
ALPHA	A1	POWERWAVE	7770	55"x11"x5"
	A2	–	–	–
	A3	–	–	–
	A4	POWERWAVE	7770	55"x11"x5"
BETA	B1	POWERWAVE	7770	55"x11"x5"
	B2	–	–	–
	B3	–	–	–
	B4	POWERWAVE	7770	55"x11"x5"
GAMMA	G1	POWERWAVE	7770	55"x11"x5"
	G2	–	–	–
	G3	–	–	–
	G4	POWERWAVE	7770	55"x11"x5"

PROPOSED ANTENNA SCHEDULE

SECTOR	POSITION	MAKE	MODEL	SIZE (INCHES)
ALPHA	A1	POWERWAVE	7770	55"x11"x5"
	A2	CCI	OPA–65R–LCUU–H6	72"x14.8"x7.4"
	A3	–	–	–
	A4	CCI	OPA–65R–LCUU–H6	72"x14.8"x7.4"
BETA	B1	POWERWAVE	7770	55"x11"x5"
	B2	CCI	OPA–65R–LCUU–H6	72"x14.8"x7.4"
	B3	–	–	–
	B4	CCI	OPA–65R–LCUU–H6	72"x14.8"x7.4"
GAMMA	G1	POWERWAVE	7770	55"x11"x5"
	G2	CCI	OPA–65R–LCUU–H6	72"x14.8"x7.4"
	G3	–	–	–
	G4	CCI	OPA–65R–LCUU–H6	72"x14.8"x7.4"

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	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	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	19.7"x16.9"x7.2"		

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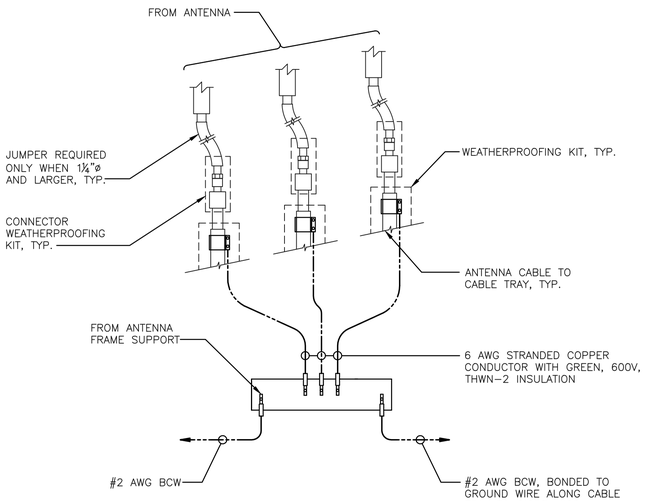
SCALE: AS SHOWN | DESIGNED BY: CJT | DRAWN BY: PAV

SEAL: STATE OF CONNECTICUT · NICHOLAS B. WARD · No. 28648 · LICENSED PROFESSIONAL ENGINEER · 12/05/14

AT&T

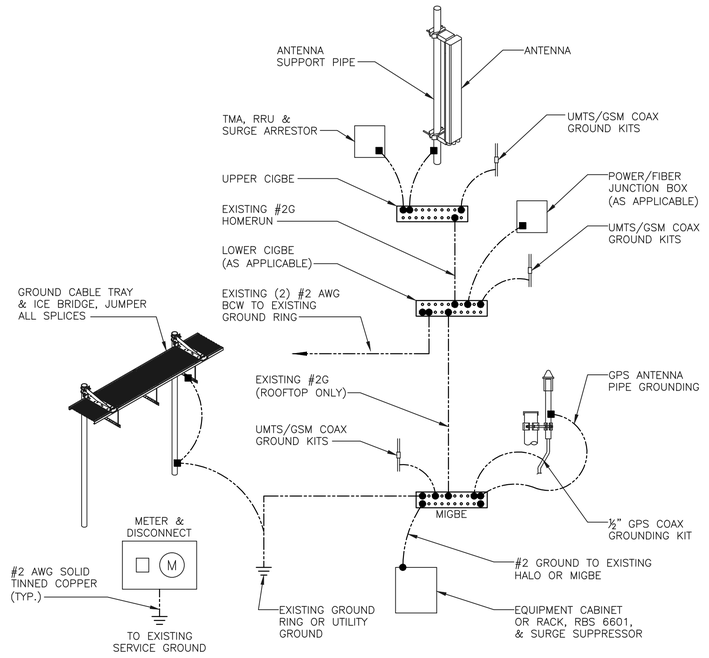
DRAWING TITLE:
ANTENNA MOUNTING DETAILS

JOB NUMBER	DRAWING NUMBER	REV
14012–EMP	A–5	0



GROUND WIRE TO GROUND BAR CONNECTION DETAIL

SCALE: N.T.S.



GROUNDING RISER DIAGRAM

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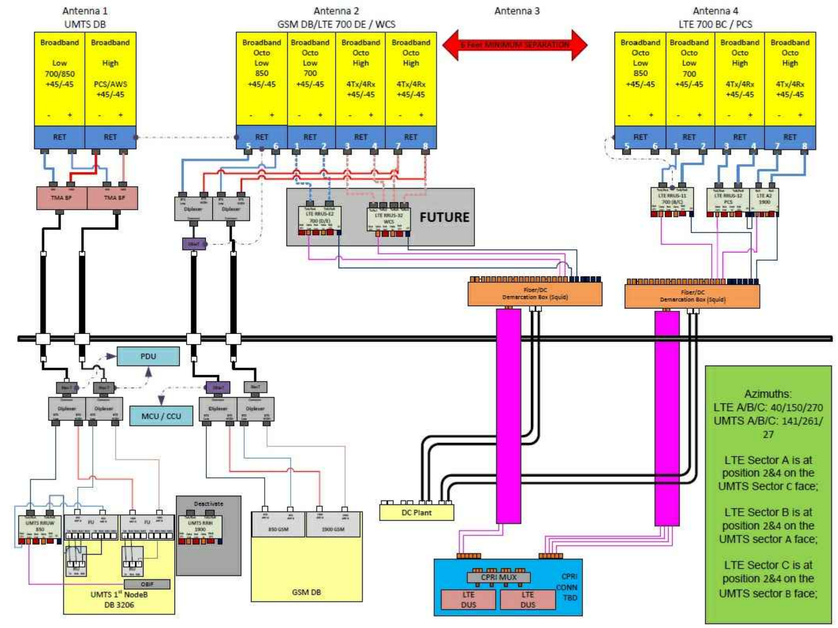

PLUMBING DIAGRAM

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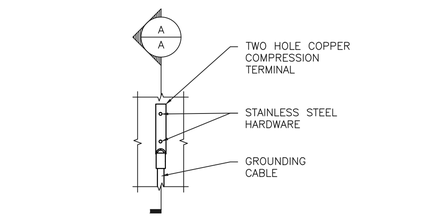
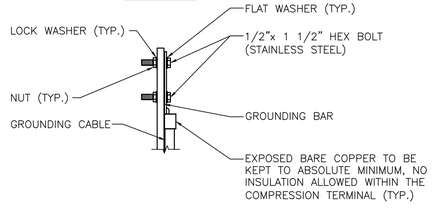


ELEVATION



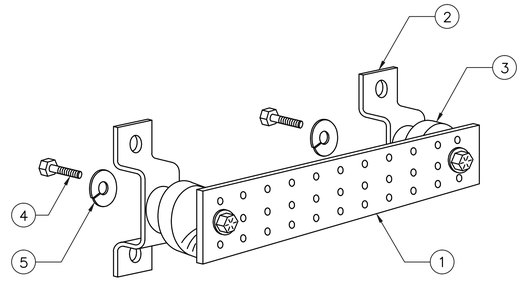
SECTION "A–A"

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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SEAL: STATE OF CONNECTICUT · NICHOLAS G. PARISI · No. 28648 · LICENSED PROFESSIONAL ENGINEER · 12/05/14

AT&T

DRAWING TITLE: GROUNDING, ONE-LINE DIAGRAM & DETAILS

JOB NUMBER	DRAWING NUMBER	REV
14012-EMP	G-1	0

PAUL J. FORD AND COMPANY
STRUCTURAL ENGINEERS
250 East Broad Street • Suite 600 • Columbus, Ohio 43215-3708

Date: **October 20, 2014**

Sean Dempsey
Crown Castle
3530 Toringdon Way Suite 300
Charlotte, NC 28277

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

Subject: **Structural Analysis Report**

Carrier Designation:	***AT&T Mobility* Co-Locate**	
	Carrier Site Number:	CT1044
	Carrier Site Name:	MIDDLETOWN DAINTY RUBBISH
Crown Castle Designation:	**Crown Castle BU Number:**	825983
	Crown Castle Site Name:	MIDDLETOWN_1
	Crown Castle JDE Job Number:	289078
	Crown Castle Work Order Number:	947023
	Crown Castle Application Number:	246621 Rev. 7
Engineering Firm Designation:	**Paul J Ford and Company Project Number:**	37513-1570.003.7805
Site Data:	**90 Industrial Park Road, Middletown, Middlesex County, CT**	
	Latitude *41° 35' 8.3"*, Longitude *-72° 42' 50.49"*	
	185 Foot - Monopole Tower	

Dear Sean Dempsey,

Paul J Ford and Company is pleased to submit this **"Structural Analysis Report"** to determine the structural integrity of the above mentioned tower. This analysis has been performed in accordance with the Crown Castle Structural 'Statement of Work' and the terms of Crown Castle Purchase Order Number 717503, in accordance with application 246621, revision 7.

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:

LC4.7: Existing + Reserved + Proposed Equipment w/ Proposed Modifications **Sufficient Capacity**
Note: See Table I and Table II for the proposed and existing/reserved loading, respectively.

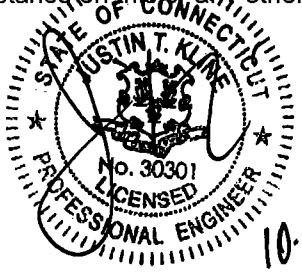
The structural analysis was performed for this tower in accordance with the requirements the 2005 Connecticut State Building Code of TIA/EIA-222-F Structural Standards for Steel Antenna Towers and Antenna Supporting Structures using a fastest mile wind speed of 85 mph with no ice, 37.6 mph with 0.75 inch ice thickness and 50 mph under service loads.

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

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

Respectfully submitted by:

John J. Woolley, E.I.
Structural Designer



10·21·14

tnxTower Report - version 6.1.4.1

PAUL J. FORD AND COMPANY
STRUCTURAL ENGINEERS
250 East Broad Street • Suite 600 • Columbus, Ohio 43215-3708

Date: **October 20, 2014**

Sean Dempsey
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Charlotte, NC 28277

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Columbus, OH 43215
614.221.6679
jwoolley@pjfweb.com

Subject: Structural Analysis Report

Carrier Designation:	***AT&T Mobility* Co-Locate**	
	Carrier Site Number:	CT1044
	Carrier Site Name:	MIDDLETOWN DAINTY RUBBISH
Crown Castle Designation:	**Crown Castle BU Number:**	825983
	Crown Castle Site Name:	MIDDLETOWN_1
	Crown Castle JDE Job Number:	289078
	Crown Castle Work Order Number:	947023
	Crown Castle Application Number:	246621 Rev. 7
Engineering Firm Designation:	**Paul J Ford and Company Project Number:**	37513-1570.003.7805
Site Data:	**90 Industrial Park Road, Middletown, Middlesex County, CT** **Latitude *41° 35' 8.3''*, Longitude *-72° 42' 50.49''*** **185 Foot - Monopole Tower**	

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Respectfully submitted by:

John J. Woolley, E.I.
Structural Designer

TABLE OF CONTENTS

1) INTRODUCTION

This tower is a 185 ft Monopole tower designed by FRED A. NUDD CORPORATION in May of 1998. The tower was originally designed for a wind speed of 85 mph per TIA/EIA-222-E.

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	6	cci antennas	OPA-65R-LCUU-H6 w/ Mount Pipe	1 2	3/8 3/4	-
		3	ericsson	RRUS A2 MODULE			
		3	ericsson	RRUS-11 1900MHz			
		1	raycap	DC6-48-60-18-8F			

Table 2 - Existing and Reserved Antenna and Cable Information

Mounting Level (ft)	Center Line Elevation (ft)	Number of Antennas	Antenna Manufacturer	Antenna Model	Number of Feed Lines	Feed Line Size (in)	Note
185.0	185.0	3	commscope	ATBT-BOTTOM-24V	-	-	2
		2	commscope	LNX-6515DS-VTM w/ Mount Pipe			
		1	commscope	SBNHH-1D65C w/ Mount Pipe			
		3	ems wireless	RR90-17-02DP w/ Mount Pipe	18	1-5/8	1
		3	andrew	ETW190VS12UB			
		3	rfs celwave	APX16DWV-16DWVS-C w/ Mount Pipe			
		1	tower mounts	Sector Mount [SM 802-3]			
175.0	175.0	3	ericsson	RRUS 11-700	1 2	3/8 3/4	2
		1	raycap	DC6-48-60-18-8F			
		3	powerwave technologies	7770.00 w/ Mount Pipe	-	-	3
		2	powerwave technologies	LGP 21403			
		6	powerwave technologies	LGP21401			
		4	powerwave technologies	LGP21903			
		3	powerwave technologies	7770.00 w/ Mount Pipe	12	1-1/4	1
		1	tower mounts	Sector Mount [SM 802-3]			
165.0	165.0	3	rfs celwave	APXV18-206517S-C w/ Mount Pipe	6	1-5/8	1
		1	tower mounts	Pipe Mount [PM 601-3]			
155.0	155.0	3	alcatel lucent	RRH2X40-07-U	2	1-5/8	2
		3	alcatel lucent	RRH2X40-AWS			
		6	antel	BXA-171063-12CF-EDIN-2 w/ Mount Pipe			
		6	antel	BXA-70063-6CF-EDIN-2 w/ Mount Pipe			
		1	rfs celwave	DB-T1-6Z-8AB-0Z			
		1	tower mounts	Platform Mount [LP 301-1]			

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

3) ANALYSIS PROCEDURE

Table 3 - Documents Provided

Document	Remarks	Reference	Source
4-GEOTECHNICAL REPORTS	Clarence Welti, 3/27/1998	3473514	CCISITES
4-TOWER FOUNDATION DRAWINGS/DESIGN/SPECS	Nudd, 98-5980, 5/1/1998	3880469	CCISITES
4-TOWER MANUFACTURER DRAWINGS	Nudd, 98-5980, 5/1/1998	3473517	CCISITES
4-TOWER REINFORCEMENT DESIGN/DRAWINGS/DATA	All-Points Tech, CT107572, 4/26/2005	3879955	CCISITES
4-TOWER REINFORCEMENT DESIGN/DRAWINGS/DATA	PJF, 37513-1570 BP, 8/14/2013	3954032	CCISITES
4-TOWER REINFORCEMENT DESIGN/DRAWINGS/DATA	PJF, 37513-1570 BP A, 9/17/13	3990532	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 Nudd manufacturer's drawings specify an anchor rod that does not exist. From experience with Nudd monopoles, the anchors are likely A36 standard anchors and have been assumed as such.
5) Monopole will be reinforced in conformance with the referenced modification drawings dated 8/14/2013.
6) Monopole will be reinforced in conformance with the referenced proposed modification drawings dated 9/17/13.

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

4) ANALYSIS RESULTS

Table 4 - Section Capacity (Summary)

Section No.	Elevation (ft)	Component Type	Size	Critical Element	P (K)	SF*P_allow (K)	% Capacity	Pass / Fail
L1	185 - 180	Pole	TP18x18x0.1875	1	-1.360	361.254	18.8	Pass
L2	180 - 153	Pole	TP26.8088x18x0.25	2	-7.680	718.182	92.5	Pass
L3	153 - 151.833	Pole	TP27.1894x26.8088x0.3625	3	-7.852	1051.792	67.1	Pass
L4	151.833 - 151	Pole	TP27.4613x27.1894x0.5246	4	-8.013	1527.325	48.4	Pass
L5	151 - 130	Pole	TP34.3125x27.4613x0.3802	5	-10.643	1328.220	87.7	Pass
L6	130 - 120.667	Pole	TP36.844x31.9209x0.4447	6	-14.261	1750.722	87.1	Pass
L7	120.667 - 115	Pole	TP38.6875x36.844x0.4776	7	-15.603	1934.076	85.4	Pass
L8	115 - 114	Pole	TP39.0125x38.6875x0.5402	8	-15.871	2248.011	74.7	Pass
L9	114 - 95	Pole	TP45.1875x39.0125x0.4463	9	-19.033	2065.883	93.9	Pass
L10	95 - 91	Pole	TP45.8125x42.3448x0.5294	10	-23.232	2592.778	84.0	Pass
L11	91 - 90	Pole	TP46.1391x45.8125x0.465	11	-23.508	2297.212	95.3	Pass
L12	90 - 61.5	Pole	TP55.4461x46.1391x0.5299	12	-33.110	3147.320	86.6	Pass
L13	61.5 - 58	Pole	TP56.5891x55.4461x0.5263	13	-34.395	3165.902	88.1	Pass
L14	58 - 40	Pole	TP61.6875x56.5891x0.5788	14	-41.916	3628.093	86.9	Pass
L15	40 - 33	Pole	TP63.9583x61.6875x0.5704	15	-44.974	3910.529	83.8	Pass
L16	33 - 28	Pole	TP65.5804x63.9583x0.595	16	-47.305	4047.974	83.2	Pass
L17	28 - 0	Pole	TP73.8125x65.5804x0.5758	17	-60.891	4154.028	93.6	Pass
							Summary	
						Pole (L11)	95.3	Pass
						Rating =	95.3	Pass

Table 5 - Tower Component Stresses vs. Capacity

Notes	Component	Elevation (ft)	% Capacity	Pass / Fail
1	Anchor Rods	0	86.9	Pass
1	Base Plate	0	51.9	Pass
1	Base Foundation (Combined)	0	86.9	Pass

Structure Rating (max from all components) =	95.3%

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

4.1) Recommendations

Reinforce the pole as shown in PJF drawings 37513-1570 BP and 37513-1570 BP A, dated 8/14/13 and 9/17/13, respectively.

APPENDIX A

TNXTOWER OUTPUT

Tower Input Data

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

1) Tower is located in Middlesex County, Connecticut.
2) Basic wind speed of 85 mph.
3) Nominal ice thickness of 0.7500 in.
4) Ice density of 56.000 pcf.
5) A wind speed of 38 mph is used in combination with ice.
6) Temperature drop of 50.000 °F.
7) Deflections calculated using a wind speed of 50 mph.
8) A non-linear (P-delta) analysis was used.
9) Pressures are calculated at each section.
10) Stress ratio used in pole design is 1.333.
11) 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
	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		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	185.000-180.000	5.000	0.000	12	18.0000	18.0000	0.1875	0.7500	A36M-42 (42 ksi)
L2	180.000-153.000	27.000	0.000	12	18.0000	26.8088	0.2500	1.0000	A36M-42 (42 ksi)
L3	153.000-151.833	1.167	0.000	12	26.8088	27.1894	0.3625	1.4499	Reinf 42.00 ksi (42 ksi)
L4	151.833-151.000	0.833	0.000	12	27.1894	27.4613	0.5246	2.0983	Reinf 41.97 ksi (42 ksi)
L5	151.000-130.000	21.000	5.000	12	27.4613	34.3125	0.3802	1.5206	Reinf 42.00 ksi (42 ksi)
L6	130.000-120.667	14.333	0.000	12	31.9209	36.8440	0.4447	1.7787	Reinf 42.00 ksi (42 ksi)
L7	120.667-115.000	5.667	0.000	12	36.8440	38.6875	0.4776	1.9105	Reinf 41.15 ksi (41 ksi)
L8	115.000-114.000	1.000	0.000	12	38.6875	39.0125	0.5402	2.1608	Reinf 42.00 ksi (42 ksi)
L9	114.000-95.000	19.000	6.000	12	39.0125	45.1875	0.4463	1.7854	Reinf 42.00 ksi (42 ksi)
L10	95.000-91.000	10.000	0.000	12	42.3448	45.8125	0.5293	2.1174	Reinf 42.00 ksi

Section	Elevation ft	Section Length ft	Splice Length ft	Number of Sides	Top Diameter in	Bottom Diameter in	Wall Thickness in	Bend Radius in	Pole Grade
L11	91.000-90.000	1.000	0.000	12	45.8125	46.1391	0.4650	1.8600	(42 ksi) Reinf 42.00 ksi
L12	90.000-61.500	28.500	0.000	12	46.1391	55.4461	0.5299	2.1194	(42 ksi) Reinf 42.00 ksi
L13	61.500-58.000	3.500	0.000	12	55.4461	56.5891	0.5263	2.1054	(42 ksi) Reinf 41.66 ksi
L14	58.000-40.000	18.000	0.000	12	56.5891	61.6875	0.5788	2.3152	(42 ksi) Reinf 39.83 ksi
L15	40.000-33.000	7.000	0.000	12	61.6875	63.9583	0.5704	2.2814	(40 ksi) Reinf 42.00 ksi
L16	33.000-28.000	5.000	0.000	12	63.9583	65.5804	0.5950	2.3800	(42 ksi) Reinf 40.65 ksi
L17	28.000-0.000	28.000		12	65.5804	73.8125	0.5758	2.3032	(41 ksi) Reinf 38.25 ksi (38 ksi)

Tapered Pole Properties

Section	Tip Dia. in	Area in^2	I in^4	r in	C in	I/C in^3	J in^4	It/Q in^2	w in	w/t
L1	18.6350	10.7543	435.5296	6.3769	9.3240	46.7106	882.5011	5.2929	4.3215	23.048
	18.6350	10.7543	435.5296	6.3769	9.3240	46.7106	882.5011	5.2929	4.3215	23.048
L2	18.6350	14.2888	574.6149	6.3545	9.3240	61.6275	1164.3256	7.0325	4.1540	16.616
	27.7545	21.3798	1924.8847	9.5080	13.8869	138.6112	3900.3383	10.5225	6.5147	26.059
L3	27.7545	30.8669	2755.5460	9.4678	13.8869	198.4273	5583.4833	15.1917	6.2133	17.142
	28.1485	31.3111	2876.2480	9.6040	14.0841	204.2195	5828.0583	15.4104	6.3153	17.423
L4	28.1485	45.0408	4087.6060	9.5460	14.0841	290.2283	8282.5980	22.1677	5.8809	11.211
	28.4300	45.5000	4213.9101	9.6433	14.2249	296.2342	8538.5243	22.3937	5.9537	11.35
L5	28.4300	33.1504	3103.1778	9.6950	14.2249	218.1507	6287.8796	16.3156	6.3408	16.679
	35.5229	41.5371	6104.4940	12.1478	17.7739	343.4532	12369.3598	20.4433	8.1769	21.509
L6	34.8249	45.0689	5699.3931	11.2685	16.5350	344.6858	11548.5156	22.1815	7.3631	16.559
	38.1438	52.1180	8813.7607	13.0310	19.0852	461.8110	17859.0686	25.6509	8.6825	19.526
L7	38.1438	55.9304	9441.3633	13.0192	19.0852	494.6952	19130.7618	27.5272	8.5942	17.993
	40.0522	58.7656	10951.1594	13.6791	20.0401	546.4616	22190.0179	28.9226	9.0882	19.028
L8	40.0522	66.3563	12325.2437	13.6567	20.0401	615.0283	24974.2852	32.6586	8.9205	16.513
	40.3887	66.9216	12642.9539	13.7731	20.2085	625.6263	25618.0523	32.9368	9.0076	16.674
L9	40.3887	55.4279	10522.6912	13.8067	20.2085	520.7068	21321.8253	27.2799	9.2592	20.745
	46.7815	64.3027	16429.6893	16.0173	23.4071	701.9098	33291.0048	31.6478	10.9141	24.452
L10	45.9926	71.2747	15907.2598	14.9699	21.9346	725.2127	32232.4211	35.0793	9.9298	18.758
	47.4286	77.1854	20202.0122	16.2114	23.7309	851.2966	40934.7537	37.9883	10.8591	20.514
L11	47.4286	67.8974	17821.5622	16.2344	23.7309	750.9863	36111.3167	33.4170	11.0316	23.724
	47.7667	68.3863	18209.3555	16.3513	23.9000	761.8967	36897.0910	33.6577	11.1191	23.913
L12	47.7667	77.8146	20661.0510	16.3281	23.9000	864.4779	41864.8909	38.2980	10.9453	20.657
	57.4020	93.6935	36065.9307	19.6600	28.7211	1255.7305	73079.3535	46.1131	13.4396	25.365
L13	57.4020	93.0788	35833.8815	19.6613	28.7211	1247.6511	72609.1589	45.8106	13.4490	25.552
	58.5853	95.0159	38118.0515	20.0705	29.3131	1300.3745	77237.5066	46.7639	13.7553	26.134
L14	58.5853	104.3883	41799.6948	20.0517	29.3131	1425.9716	84697.5140	51.3768	13.6147	23.522

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
	63.8636	113.8905	54284.9546	21.8769	31.9541	1698.8403	109996.0354	56.0534	14.9811	25.883
L15	63.8636	112.2433	53514.6328	21.8799	31.9541	1674.7332	108435.1547	55.2427	15.0037	26.306
	66.2145	116.4137	59704.0792	22.6929	33.1304	1802.0927	120976.6510	57.2953	15.6123	27.373
L16	66.2145	121.3998	62212.8161	22.6841	33.1304	1877.8158	126060.0321	59.7493	15.5462	26.128
	67.8938	124.5075	67113.8995	23.2648	33.9706	1975.6450	135990.9560	61.2788	15.9809	26.858
L17	67.8938	120.5234	65004.7289	23.2716	33.9706	1913.5570	131717.2044	59.3179	16.0324	27.844
	76.4163	135.7864	92960.7852	26.2187	38.2349	2431.3087	188363.7538	66.8299	18.2386	31.675

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 185.000-180.000				1	1	1		
L2 180.000-153.000				1	1	1		
L3 153.000-151.833				1	1	1		
L4 151.833-151.000				1	1	1		
L5 151.000-130.000				1	1	1		
L6 130.000-120.667				1	1	1		
L7 120.667-115.000				1	1	1		
L8 115.000-114.000				1	1	1		
L9 114.000-95.000				1	1	1		
L10 95.000-91.000				1	1	1		
L11 91.000-90.000				1	1	1		
L12 90.000-61.500				1	1	1		
L13 61.500-58.000				1	1	1		
L14 58.000-40.000				1	1	1		
L15 40.000-33.000				1	1	1		
L16 33.000-28.000				1	1	1		
L17 28.000-0.000				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
LDF7-50A(1-5/8")	C	No	CaAa (Out Of Face)	185.000 - 0.000	1	No Ice	0.198	0.001
						1/2" Ice	0.298	0.002
						1" Ice	0.398	0.004
LDF7-50A(1-5/8")	C	No	CaAa (Out Of Face)	185.000 - 0.000	5	No Ice	0.000	0.001
						1/2" Ice	0.000	0.002
						1" Ice	0.000	0.004

Description	Face or Leg	Allow Shield	Component Type	Placement ft	Total Number		C_AA_A ft^2/ft	Weight klf
LDF7-50A(1-5/8")	C	No	Inside Pole	185.000 - 0.000	15	No Ice	0.000	0.001
						1/2" Ice	0.000	0.001
						1" Ice	0.000	0.001
LDF6-50A(1-1/4")	C	No	Inside Pole	175.000 - 0.000	12	No Ice	0.000	0.001
						1/2" Ice	0.000	0.001
						1" Ice	0.000	0.001
FB-L98-002-XXX(3/8)	C	No	CaAa (Out Of Face)	175.000 - 0.000	2	No Ice	0.000	0.000
						1/2" Ice	0.000	0.001
						1" Ice	0.000	0.002
WR-VG86ST-BRD(3/4)	C	No	CaAa (Out Of Face)	175.000 - 0.000	3	No Ice	0.000	0.001
						1/2" Ice	0.000	0.001
						1" Ice	0.000	0.003
WR-VG86ST-BRD(3/4)	C	No	CaAa (Out Of Face)	175.000 - 0.000	1	No Ice	0.077	0.001
						1/2" Ice	0.177	0.001
						1" Ice	0.277	0.003
LDF7-50A(1-5/8")	C	No	Inside Pole	165.000 - 0.000	6	No Ice	0.000	0.001
						1/2" Ice	0.000	0.001
						1" Ice	0.000	0.001
HB158-1-08U8-S8J18(1-5/8)	C	No	Inside Pole	155.000 - 0.000	2	No Ice	0.000	0.001
						1/2" Ice	0.000	0.001
						1" Ice	0.000	0.001
Aero MP3-04	C	No	CaAa (Out Of Face)	53.330 - 38.330	1	No Ice	0.269	0.000
						1/2" Ice	0.380	0.000
						1" Ice	0.491	0.000
Aero MP3-05	C	No	CaAa (Out Of Face)	123.330 - 88.330	1	No Ice	0.348	0.000
						1/2" Ice	0.400	0.000
						1" Ice	0.657	0.000
Aero MP3-04	C	No	CaAa (Out Of Face)	153.750 - 123.330	1	No Ice	0.269	0.000
						1/2" Ice	0.380	0.000
						1" Ice	0.491	0.000
Aero MP3-08	C	No	CaAa (Out Of Face)	37.000 - 0.000	1	No Ice	0.467	0.000
						1/2" Ice	0.578	0.000
						1" Ice	0.689	0.000
Aero MP3-06	C	No	CaAa (Out Of Face)	93.250 - 37.000	1	No Ice	0.434	0.000
						1/2" Ice	0.545	0.000
						1" Ice	0.657	0.000
Aero MP3-04	C	No	CaAa (Out Of Face)	98.250 - 93.250	1	No Ice	0.269	0.000
						1/2" Ice	0.380	0.000
						1" Ice	0.491	0.000
Aero MP3-03	C	No	CaAa (Out Of Face)	132.500 - 112.500	1	No Ice	0.262	0.000
						1/2" Ice	0.374	0.000
						1" Ice	0.485	0.000
Aero MP3-03	C	No	CaAa (Out Of Face)	154.500 - 149.500	1	No Ice	0.262	0.000
						1/2" Ice	0.374	0.000
						1" Ice	0.485	0.000

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	185.000-180.000	A	0.000	0.000	0.000	0.000	0.000
		B	0.000	0.000	0.000	0.000	0.000
		C	0.000	0.000	0.000	0.990	0.086
L2	180.000-153.000	A	0.000	0.000	0.000	0.000	0.000
		B	0.000	0.000	0.000	0.000	0.000
		C	0.000	0.000	0.000	7.644	0.758
L3	153.000-151.833	A	0.000	0.000	0.000	0.000	0.000
		B	0.000	0.000	0.000	0.000	0.000
		C	0.000	0.000	0.000	0.941	0.041
L4	151.833-151.000	A	0.000	0.000	0.000	0.000	0.000
		B	0.000	0.000	0.000	0.000	0.000
		C	0.000	0.000	0.000	0.672	0.029
L5	151.000-130.000	A	0.000	0.000	0.000	0.000	0.000
		B	0.000	0.000	0.000	0.000	0.000
		C	0.000	0.000	0.000	12.483	0.738

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
L6	130.000-120.667	A	0.000	0.000	0.000	0.000	0.000
		B	0.000	0.000	0.000	0.000	0.000
		C	0.000	0.000	0.000	7.741	0.328
L7	120.667-115.000	A	0.000	0.000	0.000	0.000	0.000
		B	0.000	0.000	0.000	0.000	0.000
		C	0.000	0.000	0.000	5.019	0.199
L8	115.000-114.000	A	0.000	0.000	0.000	0.000	0.000
		B	0.000	0.000	0.000	0.000	0.000
		C	0.000	0.000	0.000	0.886	0.035
L9	114.000-95.000	A	0.000	0.000	0.000	0.000	0.000
		B	0.000	0.000	0.000	0.000	0.000
		C	0.000	0.000	0.000	13.109	0.668
L10	95.000-91.000	A	0.000	0.000	0.000	0.000	0.000
		B	0.000	0.000	0.000	0.000	0.000
		C	0.000	0.000	0.000	3.941	0.141
L11	91.000-90.000	A	0.000	0.000	0.000	0.000	0.000
		B	0.000	0.000	0.000	0.000	0.000
		C	0.000	0.000	0.000	1.058	0.035
L12	90.000-61.500	A	0.000	0.000	0.000	0.000	0.000
		B	0.000	0.000	0.000	0.000	0.000
		C	0.000	0.000	0.000	20.808	1.002
L13	61.500-58.000	A	0.000	0.000	0.000	0.000	0.000
		B	0.000	0.000	0.000	0.000	0.000
		C	0.000	0.000	0.000	2.484	0.123
L14	58.000-40.000	A	0.000	0.000	0.000	0.000	0.000
		B	0.000	0.000	0.000	0.000	0.000
		C	0.000	0.000	0.000	16.361	0.633
L15	40.000-33.000	A	0.000	0.000	0.000	0.000	0.000
		B	0.000	0.000	0.000	0.000	0.000
		C	0.000	0.000	0.000	5.547	0.246
L16	33.000-28.000	A	0.000	0.000	0.000	0.000	0.000
		B	0.000	0.000	0.000	0.000	0.000
		C	0.000	0.000	0.000	3.710	0.176
L17	28.000-0.000	A	0.000	0.000	0.000	0.000	0.000
		B	0.000	0.000	0.000	0.000	0.000
		C	0.000	0.000	0.000	20.778	0.984

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	185.000-180.000	A	0.750	0.000	0.000	0.000	0.000	0.000
		B		0.000	0.000	0.000	0.000	0.000
		C		0.000	0.000	0.000	1.740	0.163
L2	180.000-153.000	A	0.750	0.000	0.000	0.000	0.000	0.000
		B		0.000	0.000	0.000	0.000	0.000
		C		0.000	0.000	0.000	15.369	1.355
L3	153.000-151.833	A	0.750	0.000	0.000	0.000	0.000	0.000
		B		0.000	0.000	0.000	0.000	0.000
		C		0.000	0.000	0.000	1.680	0.069
L4	151.833-151.000	A	0.750	0.000	0.000	0.000	0.000	0.000
		B		0.000	0.000	0.000	0.000	0.000
		C		0.000	0.000	0.000	1.200	0.049
L5	151.000-130.000	A	0.750	0.000	0.000	0.000	0.000	0.000
		B		0.000	0.000	0.000	0.000	0.000
		C		0.000	0.000	0.000	22.950	1.234
L6	130.000-120.667	A	0.750	0.000	0.000	0.000	0.000	0.000
		B		0.000	0.000	0.000	0.000	0.000
		C		0.000	0.000	0.000	13.689	0.548
L7	120.667-115.000	A	0.750	0.000	0.000	0.000	0.000	0.000
		B		0.000	0.000	0.000	0.000	0.000
		C		0.000	0.000	0.000	8.686	0.333
L8	115.000-114.000	A	0.750	0.000	0.000	0.000	0.000	0.000
		B		0.000	0.000	0.000	0.000	0.000
		C		0.000	0.000	0.000	1.533	0.059

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
L9	114.000-95.000	A	0.750	0.000	0.000	0.000	0.000	0.000
		B		0.000	0.000	0.000	0.000	0.000
		C		0.000	0.000	0.000	23.030	1.116
L10	95.000-91.000	A	0.750	0.000	0.000	0.000	0.000	0.000
		B		0.000	0.000	0.000	0.000	0.000
		C		0.000	0.000	0.000	6.530	0.235
L11	91.000-90.000	A	0.750	0.000	0.000	0.000	0.000	0.000
		B		0.000	0.000	0.000	0.000	0.000
		C		0.000	0.000	0.000	1.705	0.059
L12	90.000-61.500	A	0.750	0.000	0.000	0.000	0.000	0.000
		B		0.000	0.000	0.000	0.000	0.000
		C		0.000	0.000	0.000	34.410	1.675
L13	61.500-58.000	A	0.750	0.000	0.000	0.000	0.000	0.000
		B		0.000	0.000	0.000	0.000	0.000
		C		0.000	0.000	0.000	4.117	0.206
L14	58.000-40.000	A	0.750	0.000	0.000	0.000	0.000	0.000
		B		0.000	0.000	0.000	0.000	0.000
		C		0.000	0.000	0.000	26.983	1.058
L15	40.000-33.000	A	0.750	0.000	0.000	0.000	0.000	0.000
		B		0.000	0.000	0.000	0.000	0.000
		C		0.000	0.000	0.000	9.092	0.411
L16	33.000-28.000	A	0.750	0.000	0.000	0.000	0.000	0.000
		B		0.000	0.000	0.000	0.000	0.000
		C		0.000	0.000	0.000	6.044	0.294
L17	28.000-0.000	A	0.750	0.000	0.000	0.000	0.000	0.000
		B		0.000	0.000	0.000	0.000	0.000
		C		0.000	0.000	0.000	33.844	1.645

Feed Line Center of Pressure

Section	Elevation ft	CP_X in	CP_Z in	CP_X Ice in	CP_Z Ice in
L1	185.000-180.000	-0.2272	0.1312	-0.3437	0.1984
L2	180.000-153.000	-0.3266	0.1886	-0.5518	0.3186
L3	153.000-151.833	-0.7715	0.4454	-1.1033	0.6370
L4	151.833-151.000	-0.7739	0.4468	-1.1088	0.6402
L5	151.000-130.000	-0.6285	0.3629	-0.9653	0.5573
L6	130.000-120.667	-0.8409	0.4855	-1.2363	0.7138
L7	120.667-115.000	-0.8978	0.5184	-1.3042	0.7530
L8	115.000-114.000	-0.9034	0.5216	-1.3169	0.7603
L9	114.000-95.000	-0.7505	0.4333	-1.1422	0.6594
L10	95.000-91.000	-1.0147	0.5859	-1.4457	0.8347
L11	91.000-90.000	-1.0766	0.6216	-1.4987	0.8653
L12	90.000-61.500	-0.8070	0.4659	-1.1903	0.6872
L13	61.500-58.000	-0.8003	0.4620	-1.1950	0.6900
L14	58.000-40.000	-0.9993	0.5770	-1.4682	0.8477
L15	40.000-33.000	-0.8932	0.5157	-1.3251	0.7651
L16	33.000-28.000	-0.8475	0.4893	-1.2591	0.7269
L17	28.000-0.000	-0.8548	0.4935	-1.2770	0.7372

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

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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
ETW190VS12UB	A	From Leg	4.000 0.000 0.000	0.000	185.000	No Ice 1/2" Ice 1" Ice	0.664 0.778 0.901	0.367 0.461 0.564	0.015 0.020 0.026
ETW190VS12UB	B	From Leg	4.000 0.000 0.000	0.000	185.000	No Ice 1/2" Ice 1" Ice	0.664 0.778 0.901	0.367 0.461 0.564	0.015 0.020 0.026
ETW190VS12UB	C	From Leg	4.000 0.000 0.000	0.000	185.000	No Ice 1/2" Ice 1" Ice	0.664 0.778 0.901	0.367 0.461 0.564	0.015 0.020 0.026
Sector Mount [SM 802-3]	C	None		0.000	185.000	No Ice 1/2" Ice 1" Ice	24.410 31.390 38.370	24.410 31.390 38.370	0.930 1.362 1.794
RR90-17-02DP w/ Mount Pipe	A	From Leg	4.000 0.000 0.000	0.000	185.000	No Ice 1/2" Ice 1" Ice	4.593 5.088 5.578	3.319 4.089 4.784	0.034 0.072 0.115
RR90-17-02DP w/ Mount Pipe	B	From Leg	4.000 0.000 0.000	0.000	185.000	No Ice 1/2" Ice 1" Ice	4.593 5.088 5.578	3.319 4.089 4.784	0.034 0.072 0.115
RR90-17-02DP w/ Mount Pipe	C	From Leg	4.000 0.000 0.000	0.000	185.000	No Ice 1/2" Ice 1" Ice	4.593 5.088 5.578	3.319 4.089 4.784	0.034 0.072 0.115
APX16DWV-16DWVS-C w/ Mount Pipe	A	From Leg	4.000 0.000 0.000	0.000	185.000	No Ice 1/2" Ice 1" Ice	7.466 7.994 8.518	3.494 4.263 4.960	0.061 0.110 0.165
APX16DWV-16DWVS-C w/ Mount Pipe	B	From Leg	4.000 0.000 0.000	0.000	185.000	No Ice 1/2" Ice 1" Ice	7.466 7.994 8.518	3.494 4.263 4.960	0.061 0.110 0.165
APX16DWV-16DWVS-C w/ Mount Pipe	C	From Leg	4.000 0.000 0.000	0.000	185.000	No Ice 1/2" Ice 1" Ice	7.466 7.994 8.518	3.494 4.263 4.960	0.061 0.110 0.165
ATBT-BOTTOM-24V	A	From Leg	4.000 0.000 0.000	0.000	185.000	No Ice 1/2" Ice 1" Ice	0.121 0.172 0.232	0.075 0.119 0.172	0.003 0.004 0.006
SBNHH-1D65C w/ Mount Pipe	A	From Leg	4.000 0.000 0.000	0.000	185.000	No Ice 1/2" Ice 1" Ice	11.626 12.346 13.074	9.793 11.311 12.854	0.082 0.172 0.271
ATBT-BOTTOM-24V	B	From Leg	4.000 0.000 0.000	0.000	185.000	No Ice 1/2" Ice 1" Ice	0.121 0.172 0.232	0.075 0.119 0.172	0.003 0.004 0.006
LNX-6515DS-VTM w/ Mount Pipe	B	From Leg	4.000 0.000 0.000	0.000	185.000	No Ice 1/2" Ice 1" Ice	11.683 12.404 13.135	9.842 11.366 12.914	0.083 0.173 0.273
ATBT-BOTTOM-24V	C	From Leg	4.000 0.000 0.000	0.000	185.000	No Ice 1/2" Ice 1" Ice	0.121 0.172 0.232	0.075 0.119 0.172	0.003 0.004 0.006
LNX-6515DS-VTM w/ Mount Pipe	C	From Leg	4.000 0.000 0.000	0.000	185.000	No Ice 1/2" Ice 1" Ice	11.683 12.404 13.135	9.842 11.366 12.914	0.083 0.173 0.273

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Description	Face or Leg	Offset Type	Offsets: Horz Lateral Vert ft ft ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
7770.00 w/ Mount Pipe	A	From Leg	4.000 0.000 0.000	10.000	175.000	No Ice 1/2" Ice 1" Ice	6.221 6.714 7.218	4.820 5.508 6.213	0.086 0.143 0.208
7770.00 w/ Mount Pipe	B	From Leg	4.000 0.000 0.000	10.000	175.000	No Ice 1/2" Ice 1" Ice	6.221 6.714 7.218	4.820 5.508 6.213	0.086 0.143 0.208
7770.00 w/ Mount Pipe	C	From Leg	4.000 0.000 0.000	10.000	175.000	No Ice 1/2" Ice 1" Ice	6.221 6.714 7.218	4.820 5.508 6.213	0.086 0.143 0.208
RRUS 11-700	A	From Leg	4.000 0.000 0.000	0.000	175.000	No Ice 1/2" Ice 1" Ice	2.942 3.172 3.410	1.246 1.412 1.587	0.055 0.074 0.097
RRUS 11-700	B	From Leg	4.000 0.000 0.000	0.000	175.000	No Ice 1/2" Ice 1" Ice	2.942 3.172 3.410	1.246 1.412 1.587	0.055 0.074 0.097
RRUS 11-700	C	From Leg	4.000 0.000 0.000	0.000	175.000	No Ice 1/2" Ice 1" Ice	2.942 3.172 3.410	1.246 1.412 1.587	0.055 0.074 0.097
DC6-48-60-18-8F	A	From Leg	4.000 0.000 0.000	0.000	175.000	No Ice 1/2" Ice 1" Ice	2.513 2.741 2.978	2.513 2.741 2.978	0.019 0.041 0.066
(2) OPA-65R-LCUU-H6 w/ Mount Pipe	A	From Leg	4.000 0.000 0.000	0.000	175.000	No Ice 1/2" Ice 1" Ice	10.598 11.268 11.906	7.179 8.362 9.259	0.099 0.175 0.261
(2) OPA-65R-LCUU-H6 w/ Mount Pipe	B	From Leg	4.000 0.000 0.000	0.000	175.000	No Ice 1/2" Ice 1" Ice	10.598 11.268 11.906	7.179 8.362 9.259	0.099 0.175 0.261
(2) OPA-65R-LCUU-H6 w/ Mount Pipe	C	From Leg	4.000 0.000 0.000	0.000	175.000	No Ice 1/2" Ice 1" Ice	10.598 11.268 11.906	7.179 8.362 9.259	0.099 0.175 0.261
RRUS A2 MODULE	A	From Leg	4.000 0.000 0.000	0.000	175.000	No Ice 1/2" Ice 1" Ice	1.867 2.051 2.244	0.423 0.532 0.650	0.021 0.031 0.044
RRUS A2 MODULE	B	From Leg	4.000 0.000 0.000	0.000	175.000	No Ice 1/2" Ice 1" Ice	1.867 2.051 2.244	0.423 0.532 0.650	0.021 0.031 0.044
RRUS A2 MODULE	C	From Leg	4.000 0.000 0.000	0.000	175.000	No Ice 1/2" Ice 1" Ice	1.867 2.051 2.244	0.423 0.532 0.650	0.021 0.031 0.044
RRUS-11 1900MHz	A	From Leg	4.000 0.000 0.000	0.000	175.000	No Ice 1/2" Ice 1" Ice	2.942 3.172 3.410	1.190 1.351 1.521	0.044 0.063 0.086
RRUS-11 1900MHz	B	From Leg	4.000 0.000 0.000	0.000	175.000	No Ice 1/2" Ice 1" Ice	2.942 3.172 3.410	1.190 1.351 1.521	0.044 0.063 0.086
RRUS-11 1900MHz	C	From Leg	4.000 0.000 0.000	0.000	175.000	No Ice 1/2" Ice 1" Ice	2.942 3.172 3.410	1.190 1.351 1.521	0.044 0.063 0.086
DC6-48-60-18-8F	B	From Leg	4.000	0.000	175.000	No Ice	2.513	2.513	0.019

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
			0.000 0.000			1/2" Ice 1" Ice	2.741 2.978	2.741 2.978	0.041 0.066
Sector Mount [SM 802-3]	C	None		0.000	175.000	No Ice 1/2" Ice 1" Ice	24.410 31.390 38.370	24.410 31.390 38.370	0.930 1.362 1.794
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APXV18-206517S-C w/ Mount Pipe	A	From Leg	4.000 0.000 0.000	0.000	165.000	No Ice 1/2" Ice 1" Ice	5.404 5.960 6.481	4.700 5.860 6.734	0.052 0.097 0.150
APXV18-206517S-C w/ Mount Pipe	B	From Leg	4.000 0.000 0.000	0.000	165.000	No Ice 1/2" Ice 1" Ice	5.404 5.960 6.481	4.700 5.860 6.734	0.052 0.097 0.150
APXV18-206517S-C w/ Mount Pipe	C	From Leg	4.000 0.000 0.000	0.000	165.000	No Ice 1/2" Ice 1" Ice	5.404 5.960 6.481	4.700 5.860 6.734	0.052 0.097 0.150
Pipe Mount [PM 601-3]	C	None		0.000	165.000	No Ice 1/2" Ice 1" Ice	4.390 5.480 6.570	4.390 5.480 6.570	0.195 0.237 0.280
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(2) BXA-70063-6CF-EDIN-2 w/ Mount Pipe	A	From Leg	4.000 0.000 0.000	0.000	155.000	No Ice 1/2" Ice 1" Ice	7.969 8.609 9.216	5.801 6.953 7.819	0.042 0.103 0.171
(2) BXA-70063-6CF-EDIN-2 w/ Mount Pipe	B	From Leg	4.000 0.000 0.000	0.000	155.000	No Ice 1/2" Ice 1" Ice	7.969 8.609 9.216	5.801 6.953 7.819	0.042 0.103 0.171
(2) BXA-70063-6CF-EDIN-2 w/ Mount Pipe	C	From Leg	4.000 0.000 0.000	0.000	155.000	No Ice 1/2" Ice 1" Ice	7.969 8.609 9.216	5.801 6.953 7.819	0.042 0.103 0.171
(2) BXA-171063-12CF-EDIN-2 w/ Mount Pipe	A	From Leg	4.000 0.000 0.000	0.000	155.000	No Ice 1/2" Ice 1" Ice	5.029 5.583 6.103	5.289 6.459 7.348	0.041 0.087 0.140
(2) BXA-171063-12CF-EDIN-2 w/ Mount Pipe	B	From Leg	4.000 0.000 0.000	0.000	155.000	No Ice 1/2" Ice 1" Ice	5.029 5.583 6.103	5.289 6.459 7.348	0.041 0.087 0.140
(2) BXA-171063-12CF-EDIN-2 w/ Mount Pipe	C	From Leg	4.000 0.000 0.000	0.000	155.000	No Ice 1/2" Ice 1" Ice	5.029 5.583 6.103	5.289 6.459 7.348	0.041 0.087 0.140
RRH2X40-AWS	A	From Leg	4.000 0.000 0.000	0.000	155.000	No Ice 1/2" Ice 1" Ice	2.522 2.753 2.993	1.589 1.795 2.010	0.044 0.061 0.082
RRH2X40-AWS	B	From Leg	4.000 0.000 0.000	0.000	155.000	No Ice 1/2" Ice 1" Ice	2.522 2.753 2.993	1.589 1.795 2.010	0.044 0.061 0.082
RRH2X40-AWS	C	From Leg	4.000 0.000 0.000	0.000	155.000	No Ice 1/2" Ice 1" Ice	2.522 2.753 2.993	1.589 1.795 2.010	0.044 0.061 0.082
RRH2X40-07-U	A	From Leg	4.000 0.000 0.000	0.000	155.000	No Ice 1/2" Ice 1" Ice	2.246 2.447 2.657	1.228 1.385 1.551	0.050 0.067 0.086

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
RRH2X40-07-U	B	From Leg	4.000 0.000 0.000	0.000	155.000	No Ice 1/2" Ice 1" Ice	2.246 2.447 2.657	1.228 1.385 1.551	0.050 0.067 0.086
RRH2X40-07-U	C	From Leg	4.000 0.000 0.000	0.000	155.000	No Ice 1/2" Ice 1" Ice	2.246 2.447 2.657	1.228 1.385 1.551	0.050 0.067 0.086
DB-T1-6Z-8AB-0Z	C	From Leg	4.000 0.000 0.000	0.000	155.000	No Ice 1/2" Ice 1" Ice	5.600 5.915 6.240	2.333 2.558 2.791	0.044 0.080 0.120
Platform Mount [LP 301-1]	C	None		0.000	155.000	No Ice 1/2" Ice 1" Ice	30.100 40.800 51.500	30.100 40.800 51.500	1.589 2.029 2.470
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Tower Pressures - No Ice

G_H = 1.690

Section Elevation ft	z ft	K_Z	q_z ksf	A_G ft^2	Face	A_F ft^2	A_R ft^2	A_{leg} ft^2	Leg %	C_AA_A In Face ft^2	C_AA_A Out Face ft^2
L1 185.000-180.000	182.500	1.63	0.030	7.500	A	0.000	7.500	7.500	100.00	0.000	0.000
					B	0.000	7.500		100.00	0.000	0.000
					C	0.000	7.500		100.00	0.000	0.990
L2 180.000-153.000	165.615	1.586	0.029	50.410	A	0.000	50.410	50.410	100.00	0.000	0.000
					B	0.000	50.410		100.00	0.000	0.000
					C	0.000	50.410		100.00	0.000	7.644
L3 153.000-151.833	152.415	1.548	0.029	2.625	A	0.000	2.625	2.625	100.00	0.000	0.000
					B	0.000	2.625		100.00	0.000	0.000
					C	0.000	2.625		100.00	0.000	0.941
L4 151.833-151.000	151.416	1.545	0.029	1.898	A	0.000	1.898	1.898	100.00	0.000	0.000
					B	0.000	1.898		100.00	0.000	0.000
					C	0.000	1.898		100.00	0.000	0.672
L5 151.000-130.000	140.112	1.512	0.028	54.052	A	0.000	54.052	54.052	100.00	0.000	0.000
					B	0.000	54.052		100.00	0.000	0.000
					C	0.000	54.052		100.00	0.000	12.483
L6 130.000-120.667	125.263	1.464	0.027	27.410	A	0.000	27.410	27.410	100.00	0.000	0.000
					B	0.000	27.410		100.00	0.000	0.000
					C	0.000	27.410		100.00	0.000	7.741
L7 120.667-115.000	117.810	1.438	0.027	17.834	A	0.000	17.834	17.834	100.00	0.000	0.000
					B	0.000	17.834		100.00	0.000	0.000
					C	0.000	17.834		100.00	0.000	5.019
L8 115.000-114.000	114.499	1.427	0.026	3.237	A	0.000	3.237	3.237	100.00	0.000	0.000
					B	0.000	3.237		100.00	0.000	0.000
					C	0.000	3.237		100.00	0.000	0.886
L9 114.000-95.000	104.268	1.389	0.026	66.658	A	0.000	66.658	66.658	100.00	0.000	0.000
					B	0.000	66.658		100.00	0.000	0.000
					C	0.000	66.658		100.00	0.000	13.109
L10 95.000-91.000	92.990	1.344	0.025	15.040	A	0.000	15.040	15.040	100.00	0.000	0.000
					B	0.000	15.040		100.00	0.000	0.000
					C	0.000	15.040		100.00	0.000	3.941
L11 91.000-90.000	90.499	1.334	0.025	3.831	A	0.000	3.831	3.831	100.00	0.000	0.000
					B	0.000	3.831		100.00	0.000	0.000
					C	0.000	3.831		100.00	0.000	1.058

Section Elevation ft	z ft	K_Z	q_z ksf	A_G ft^2	Face	A_F ft^2	A_R ft^2	A_{leg} ft^2	Leg %	C_AA_A In Face ft^2	C_AA_A Out Face ft^2
L12 90.000-61.500	75.315	1.266	0.023	120.632	A	0.000	120.632	120.632	100.00	0.000	0.000
					B	0.000	120.632		100.00	0.000	0.000
					C	0.000	120.632		100.00	0.000	20.808
L13 61.500-58.000	59.744	1.185	0.022	16.338	A	0.000	16.338	16.338	100.00	0.000	0.000
					B	0.000	16.338		100.00	0.000	0.000
					C	0.000	16.338		100.00	0.000	2.484
L14 58.000-40.000	48.871	1.119	0.021	88.707	A	0.000	88.707	88.707	100.00	0.000	0.000
					B	0.000	88.707		100.00	0.000	0.000
					C	0.000	88.707		100.00	0.000	16.361
L15 40.000-33.000	36.479	1.029	0.019	36.647	A	0.000	36.647	36.647	100.00	0.000	0.000
					B	0.000	36.647		100.00	0.000	0.000
					C	0.000	36.647		100.00	0.000	5.547
L16 33.000-28.000	30.490	1	0.018	26.987	A	0.000	26.987	26.987	100.00	0.000	0.000
					B	0.000	26.987		100.00	0.000	0.000
					C	0.000	26.987		100.00	0.000	3.710
L17 28.000-0.000	13.724	1	0.018	162.625	A	0.000	162.625	162.625	100.00	0.000	0.000
					B	0.000	162.625		100.00	0.000	0.000
					C	0.000	162.625		100.00	0.000	20.778

Tower Pressure - With Ice

G_H = 1.690

Section Elevation ft	z ft	K_Z	q_z ksf	t_Z in	A_G ft^2	Face	A_F ft^2	A_R ft^2	A_{leg} ft^2	Leg %	C_AA_A In Face ft^2	C_AA_A Out Face ft^2
L1 185.000-180.000	182.500	1.63	0.006	0.7500	8.125	A	0.000	8.125	8.125	100.00	0.000	0.000
						B	0.000	8.125		100.00	0.000	0.000
						C	0.000	8.125		100.00	0.000	1.740
L2 180.000-153.000	165.615	1.586	0.006	0.7500	53.785	A	0.000	53.785	53.785	100.00	0.000	0.000
						B	0.000	53.785		100.00	0.000	0.000
						C	0.000	53.785		100.00	0.000	15.369
L3 153.000-151.833	152.415	1.548	0.006	0.7500	2.771	A	0.000	2.771	2.771	100.00	0.000	0.000
						B	0.000	2.771		100.00	0.000	0.000
						C	0.000	2.771		100.00	0.000	1.680
L4 151.833-151.000	151.416	1.545	0.006	0.7500	2.002	A	0.000	2.002	2.002	100.00	0.000	0.000
						B	0.000	2.002		100.00	0.000	0.000
						C	0.000	2.002		100.00	0.000	1.200
L5 151.000-130.000	140.112	1.512	0.005	0.7500	56.677	A	0.000	56.677	56.677	100.00	0.000	0.000
						B	0.000	56.677		100.00	0.000	0.000
						C	0.000	56.677		100.00	0.000	22.950
L6 130.000-120.667	125.263	1.464	0.005	0.7500	28.576	A	0.000	28.576	28.576	100.00	0.000	0.000
						B	0.000	28.576		100.00	0.000	0.000
						C	0.000	28.576		100.00	0.000	13.689
L7 120.667-115.000	117.810	1.438	0.005	0.7500	18.542	A	0.000	18.542	18.542	100.00	0.000	0.000
						B	0.000	18.542		100.00	0.000	0.000
						C	0.000	18.542		100.00	0.000	8.686
L8 115.000-114.000	114.499	1.427	0.005	0.7500	3.362	A	0.000	3.362	3.362	100.00	0.000	0.000
						B	0.000	3.362		100.00	0.000	0.000
						C	0.000	3.362		100.00	0.000	1.533
L9 114.000-95.000	104.268	1.389	0.005	0.7500	69.033	A	0.000	69.033	69.033	100.00	0.000	0.000
						B	0.000	69.033		100.00	0.000	0.000
						C	0.000	69.033		100.00	0.000	23.030
L10 95.000-91.000	92.990	1.344	0.005	0.7500	15.540	A	0.000	15.540	15.540	100.00	0.000	0.000
						B	0.000	15.540		100.00	0.000	0.000
						C	0.000	15.540		100.00	0.000	6.530
L11 91.000-90.000	90.499	1.334	0.005	0.7500	3.956	A	0.000	3.956	3.956	100.00	0.000	0.000
						B	0.000	3.956		100.00	0.000	0.000
						C	0.000	3.956		100.00	0.000	1.705
L12 90.000-61.500	75.315	1.266	0.005	0.7500	124.195	A	0.000	124.195	124.195	100.00	0.000	0.000
						B	0.000	124.195		100.00	0.000	0.000
						C	0.000	124.195		100.00	0.000	34.410
L13 61.500-58.000	59.744	1.185	0.004	0.7500	16.776	A	0.000	16.776	16.776	100.00	0.000	0.000
						B	0.000	16.776		100.00	0.000	0.000

Section Elevation ft	z ft	K_Z	q_z ksf	t_Z in	A_G ft²	Face	A_F ft²	A_R ft²	A_{leg} ft²	Leg %	C_AA_A In Face ft²	C_AA_A Out Face ft²
						C	0.000	16.776		100.00	0.000	4.117
L14 58.000-40.000	48.871	1.119	0.004	0.7500	90.957	A	0.000	90.957	90.957	100.00	0.000	0.000
						B	0.000	90.957		100.00	0.000	0.000
						C	0.000	90.957		100.00	0.000	26.983
L15 40.000-33.000	36.479	1.029	0.004	0.7500	37.522	A	0.000	37.522	37.522	100.00	0.000	0.000
						B	0.000	37.522		100.00	0.000	0.000
						C	0.000	37.522		100.00	0.000	9.092
L16 33.000-28.000	30.490	1	0.004	0.7500	27.612	A	0.000	27.612	27.612	100.00	0.000	0.000
						B	0.000	27.612		100.00	0.000	0.000
						C	0.000	27.612		100.00	0.000	6.044
L17 28.000-0.000	13.724	1	0.004	0.7500	166.125	A	0.000	166.125	166.125	100.00	0.000	0.000
						B	0.000	166.125		100.00	0.000	0.000
						C	0.000	166.125		100.00	0.000	33.844

Tower Pressure - Service

G_H = 1.690

Section Elevation ft	z ft	K_Z	q_z ksf	A_G ft²	Face	A_F ft²	A_R ft²	A_{leg} ft²	Leg %	C_AA_A In Face ft²	C_AA_A Out Face ft²
L1 185.000-180.000	182.500	1.63	0.010	7.500	A	0.000	7.500	7.500	100.00	0.000	0.000
					B	0.000	7.500		100.00	0.000	0.000
					C	0.000	7.500		100.00	0.000	0.990
L2 180.000-153.000	165.615	1.586	0.010	50.410	A	0.000	50.410	50.410	100.00	0.000	0.000
					B	0.000	50.410		100.00	0.000	0.000
					C	0.000	50.410		100.00	0.000	7.644
L3 153.000-151.833	152.415	1.548	0.010	2.625	A	0.000	2.625	2.625	100.00	0.000	0.000
					B	0.000	2.625		100.00	0.000	0.000
					C	0.000	2.625		100.00	0.000	0.941
L4 151.833-151.000	151.416	1.545	0.010	1.898	A	0.000	1.898	1.898	100.00	0.000	0.000
					B	0.000	1.898		100.00	0.000	0.000
					C	0.000	1.898		100.00	0.000	0.672
L5 151.000-130.000	140.112	1.512	0.010	54.052	A	0.000	54.052	54.052	100.00	0.000	0.000
					B	0.000	54.052		100.00	0.000	0.000
					C	0.000	54.052		100.00	0.000	12.483
L6 130.000-120.667	125.263	1.464	0.009	27.410	A	0.000	27.410	27.410	100.00	0.000	0.000
					B	0.000	27.410		100.00	0.000	0.000
					C	0.000	27.410		100.00	0.000	7.741
L7 120.667-115.000	117.810	1.438	0.009	17.834	A	0.000	17.834	17.834	100.00	0.000	0.000
					B	0.000	17.834		100.00	0.000	0.000
					C	0.000	17.834		100.00	0.000	5.019
L8 115.000-114.000	114.499	1.427	0.009	3.237	A	0.000	3.237	3.237	100.00	0.000	0.000
					B	0.000	3.237		100.00	0.000	0.000
					C	0.000	3.237		100.00	0.000	0.886
L9 114.000-95.000	104.268	1.389	0.009	66.658	A	0.000	66.658	66.658	100.00	0.000	0.000
					B	0.000	66.658		100.00	0.000	0.000
					C	0.000	66.658		100.00	0.000	13.109
L10 95.000-91.000	92.990	1.344	0.009	15.040	A	0.000	15.040	15.040	100.00	0.000	0.000
					B	0.000	15.040		100.00	0.000	0.000
					C	0.000	15.040		100.00	0.000	3.941
L11 91.000-90.000	90.499	1.334	0.009	3.831	A	0.000	3.831	3.831	100.00	0.000	0.000
					B	0.000	3.831		100.00	0.000	0.000
					C	0.000	3.831		100.00	0.000	1.058
L12 90.000-61.500	75.315	1.266	0.008	120.632	A	0.000	120.632	120.632	100.00	0.000	0.000
					B	0.000	120.632		100.00	0.000	0.000
					C	0.000	120.632		100.00	0.000	20.808
L13 61.500-58.000	59.744	1.185	0.008	16.338	A	0.000	16.338	16.338	100.00	0.000	0.000
					B	0.000	16.338		100.00	0.000	0.000
					C	0.000	16.338		100.00	0.000	2.484
L14 58.000-40.000	48.871	1.119	0.007	88.707	A	0.000	88.707	88.707	100.00	0.000	0.000
					B	0.000	88.707		100.00	0.000	0.000

Section Elevation ft	z ft	K_Z	q_z ksf	A_G ft²	Face	A_F ft²	A_R ft²	A_{leg} ft²	Leg %	C_AA_A In Face ft²	C_AA_A Out Face ft²
					C	0.000	88.707		100.00	0.000	16.361
L15 40.000-33.000	36.479	1.029	0.007	36.647	A	0.000	36.647	36.647	100.00	0.000	0.000
					B	0.000	36.647		100.00	0.000	0.000
					C	0.000	36.647		100.00	0.000	5.547
L16 33.000-28.000	30.490	1	0.006	26.987	A	0.000	26.987	26.987	100.00	0.000	0.000
					B	0.000	26.987		100.00	0.000	0.000
					C	0.000	26.987		100.00	0.000	3.710
L17 28.000-0.000	13.724	1	0.006	162.625	A	0.000	162.625	162.625	100.00	0.000	0.000
					B	0.000	162.625		100.00	0.000	0.000
					C	0.000	162.625		100.00	0.000	20.778

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
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	185 - 180	Pole	Max Tension	14	0.000	-0.000	0.000
			Max. Compression	14	-3.455	0.069	-0.046
			Max. Mx	11	-1.360	23.949	-0.014

Section No.	Elevation ft	Component Type	Condition	Gov. Load Comb.	Force K	Major Axis Moment kip-ft	Minor Axis Moment kip-ft
			Max. My	8	-1.361	0.016	-23.944
			Max. Vy	11	-5.019	23.949	-0.014
			Max. Vx	8	5.018	0.016	-23.944
			Max. Torque	6			-0.019
L2	180 - 153	Pole	Max Tension	1	0.000	0.000	0.000
			Max. Compression	14	-16.075	0.955	-0.558
			Max. Mx	11	-7.685	353.642	-0.332
			Max. My	8	-7.694	0.452	-353.335
			Max. Vy	11	-20.954	353.642	-0.332
			Max. Vx	8	20.873	0.452	-353.335
			Max. Torque	13			-0.574
L3	153 - 151.833	Pole	Max Tension	1	0.000	0.000	0.000
			Max. Compression	14	-16.297	0.992	-0.579
			Max. Mx	11	-7.857	378.197	-0.419
			Max. My	8	-7.866	0.543	-377.793
			Max. Vy	11	-21.134	378.197	-0.419
			Max. Vx	8	21.053	0.543	-377.793
			Max. Torque	13			0.084
L4	151.833 - 151	Pole	Max Tension	1	0.000	0.000	0.000
			Max. Compression	14	-16.496	1.020	-0.595
			Max. Mx	11	-8.017	395.868	-0.482
			Max. My	8	-8.027	0.609	-395.393
			Max. Vy	11	-21.268	395.868	-0.482
			Max. Vx	8	21.187	0.609	-395.393
			Max. Torque	13			0.094
L5	151 - 130	Pole	Max Tension	1	0.000	0.000	0.000
			Max. Compression	14	-19.878	1.597	-0.929
			Max. Mx	11	-10.647	755.261	-1.683
			Max. My	8	-10.655	1.869	-753.432
			Max. Vy	11	-23.709	755.261	-1.683
			Max. Vx	8	23.628	1.869	-753.432
			Max. Torque	13			0.238
L6	130 - 120.667	Pole	Max Tension	1	0.000	0.000	0.000
			Max. Compression	14	-24.257	2.159	-1.253
			Max. Mx	11	-14.265	1113.487	-2.768
			Max. My	8	-14.273	3.010	-1110.435
			Max. Vy	11	-26.278	1113.487	-2.768
			Max. Vx	8	26.197	3.010	-1110.435
			Max. Torque	13			0.420
L7	120.667 - 115	Pole	Max Tension	1	0.000	0.000	0.000
			Max. Compression	14	-25.900	2.395	-1.389
			Max. Mx	11	-15.607	1265.410	-3.201
			Max. My	8	-15.614	3.468	-1261.871
			Max. Vy	11	-27.342	1265.410	-3.201
			Max. Vx	8	27.260	3.468	-1261.871
			Max. Torque	13			0.511
L8	115 - 114	Pole	Max Tension	1	0.000	0.000	0.000
			Max. Compression	14	-26.223	2.438	-1.414
			Max. Mx	11	-15.875	1292.852	-3.278
			Max. My	8	-15.882	3.549	-1289.226
			Max. Vy	11	-27.533	1292.852	-3.278
			Max. Vx	8	27.452	3.549	-1289.226
			Max. Torque	13			0.527
L9	114 - 95	Pole	Max Tension	1	0.000	0.000	0.000
			Max. Compression	14	-30.084	3.040	-1.762
			Max. Mx	11	-19.037	1665.978	-4.279
			Max. My	8	-19.043	4.614	-1661.229
			Max. Vy	11	-29.898	1665.978	-4.279
			Max. Vx	8	29.817	4.614	-1661.229
			Max. Torque	13			0.698
L10	95 - 91	Pole	Max Tension	1	0.000	0.000	0.000
			Max. Compression	14	-34.908	3.518	-2.037
			Max. Mx	11	-23.235	1975.375	-5.053
			Max. My	8	-23.241	5.438	-1969.758
			Max. Vy	11	-31.966	1975.375	-5.053

Section No.	Elevation ft	Component Type	Condition	Gov. Load Comb.	Force K	Major Axis Moment kip-ft	Minor Axis Moment kip-ft
			Max. Vx	8	31.884	5.438	-1969.758
			Max. Torque	13			0.862
L11	91 - 90	Pole	Max Tension	1	0.000	0.000	0.000
			Max. Compression	14	-35.242	3.568	-2.067
			Max. Mx	11	-23.511	2007.447	-5.130
			Max. My	8	-23.517	5.521	-2001.743
			Max. Vy	11	-32.172	2007.447	-5.130
			Max. Vx	8	32.090	5.521	-2001.743
			Max. Torque	13			0.884
L12	90 - 61.5	Pole	Max Tension	1	0.000	0.000	0.000
			Max. Compression	14	-46.613	5.164	-2.988
			Max. Mx	11	-33.112	3002.554	-7.364
			Max. My	8	-33.116	7.921	-2994.357
			Max. Vy	11	-37.806	3002.554	-7.364
			Max. Vx	8	37.725	7.921	-2994.357
			Max. Torque	13			1.328
L13	61.5 - 58	Pole	Max Tension	1	0.000	0.000	0.000
			Max. Compression	14	-48.125	5.380	-3.113
			Max. Mx	11	-34.397	3136.094	-7.641
			Max. My	8	-34.401	8.221	-3127.589
			Max. Vy	11	-38.497	3136.094	-7.641
			Max. Vx	8	38.416	8.221	-3127.589
			Max. Torque	13			1.383
L14	58 - 40	Pole	Max Tension	1	0.000	0.000	0.000
			Max. Compression	14	-56.880	6.556	-3.792
			Max. Mx	11	-41.917	3861.480	-9.067
			Max. My	8	-41.920	9.768	-3851.390
			Max. Vy	11	-42.134	3861.480	-9.067
			Max. Vx	8	42.053	9.768	-3851.390
			Max. Torque	13			1.745
L15	40 - 33	Pole	Max Tension	1	0.000	0.000	0.000
			Max. Compression	14	-60.432	7.042	-4.072
			Max. Mx	11	-44.975	4161.054	-9.624
			Max. My	8	-44.977	10.375	-4150.347
			Max. Vy	11	-43.455	4161.054	-9.624
			Max. Vx	8	43.374	10.375	-4150.347
			Max. Torque	13			1.865
L16	33 - 28	Pole	Max Tension	1	0.000	0.000	0.000
			Max. Compression	14	-63.126	7.400	-4.279
			Max. Mx	11	-47.306	4380.676	-10.023
			Max. My	8	-47.307	10.810	-4369.528
			Max. Vy	11	-44.385	4380.676	-10.023
			Max. Vx	8	44.305	10.810	-4369.528
			Max. Torque	13			1.945
L17	28 - 0	Pole	Max Tension	1	0.000	0.000	0.000
			Max. Compression	14	-78.834	9.558	-5.525
			Max. Mx	11	-60.891	5698.944	-12.261
			Max. My	8	-60.891	13.269	-5685.325
			Max. Vy	11	-49.848	5698.944	-12.261
			Max. Vx	8	49.768	13.269	-5685.325
			Max. Torque	13			2.429

Maximum Reactions

Location	Condition	Gov. Load Comb.	Vertical K	Horizontal, X K	Horizontal, Z K
Pole	Max. Vert	14	78.834	-0.001	0.000
	Max. H_x	11	60.902	49.835	-0.069
	Max. H_z	2	60.902	-0.069	49.755
	Max. M_x	2	5682.551	-0.069	49.755
	Max. M_z	5	5694.157	-49.835	0.069
	Max. Torsion	13	2.429	24.860	43.059
	Min. Vert	11	60.902	49.835	-0.069
	Min. H_x	5	60.902	-49.835	0.069

Location	Condition	Gov. Load Comb.	Vertical K	Horizontal, X K	Horizontal, Z K
	Min. H_z	8	60.902	0.069	-49.755
	Min. M_x	8	-5685.325	0.069	-49.755
	Min. M_z	11	-5698.944	49.835	-0.069
	Min. Torsion	7	-2.429	-24.860	-43.059

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	60.902	-0.000	0.000	1.362	2.352	0.000
Dead+Wind 0 deg - No Ice	60.902	0.069	-49.755	-5682.551	-8.478	-2.098
Dead+Wind 30 deg - No Ice	60.902	24.980	-43.128	-4927.098	-2855.662	-1.205
Dead+Wind 60 deg - No Ice	60.902	43.197	-24.940	-2850.349	-4937.022	0.011
Dead+Wind 90 deg - No Ice	60.902	49.835	-0.069	-9.486	-5694.157	1.224
Dead+Wind 120 deg - No Ice	60.902	43.128	24.821	2834.302	-4926.170	2.109
Dead+Wind 150 deg - No Ice	60.902	24.860	43.059	4919.020	-2836.839	2.429
Dead+Wind 180 deg - No Ice	60.902	-0.069	49.755	5685.325	13.269	2.098
Dead+Wind 210 deg - No Ice	60.902	-24.980	43.128	4929.872	2860.451	1.205
Dead+Wind 240 deg - No Ice	60.902	-43.197	24.940	2853.124	4941.810	-0.011
Dead+Wind 270 deg - No Ice	60.902	-49.835	0.069	12.261	5698.944	-1.223
Dead+Wind 300 deg - No Ice	60.902	-43.128	-24.821	-2831.526	4930.959	-2.109
Dead+Wind 330 deg - No Ice	60.902	-24.860	-43.059	-4916.245	2841.629	-2.429
Dead+Ice+Temp	78.834	0.001	-0.000	5.525	9.558	-0.000
Dead+Wind 0 deg+Ice+Temp	78.834	0.014	-11.451	-1350.078	7.629	-0.699
Dead+Wind 30 deg+Ice+Temp	78.834	5.746	-9.924	-1169.558	-671.260	-0.402
Dead+Wind 60 deg+Ice+Temp	78.834	9.938	-5.738	-674.128	-1167.640	0.002
Dead+Wind 90 deg+Ice+Temp	78.834	11.467	-0.014	3.464	-1348.507	0.406
Dead+Wind 120 deg+Ice+Temp	78.834	9.924	5.713	681.656	-1165.398	0.701
Dead+Wind 150 deg+Ice+Temp	78.834	5.721	9.910	1178.728	-667.377	0.809
Dead+Wind 180 deg+Ice+Temp	78.834	-0.014	11.451	1361.489	12.112	0.699
Dead+Wind 210 deg+Ice+Temp	78.834	-5.746	9.924	1180.969	690.999	0.402
Dead+Wind 240 deg+Ice+Temp	78.834	-9.938	5.738	685.538	1187.379	-0.002
Dead+Wind 270 deg+Ice+Temp	78.834	-11.467	0.014	7.947	1368.246	-0.406
Dead+Wind 300 deg+Ice+Temp	78.834	-9.924	-5.713	-670.245	1185.138	-0.701
Dead+Wind 330 deg+Ice+Temp	78.834	-5.721	-9.910	-1167.317	687.117	-0.809
Dead+Wind 0 deg - Service	60.902	0.024	-17.216	-1966.491	-1.366	-0.727
Dead+Wind 30 deg - Service	60.902	8.643	-14.923	-1704.862	-987.067	-0.418
Dead+Wind 60 deg - Service	60.902	14.947	-8.629	-985.889	-1707.640	0.004
Dead+Wind 90 deg - Service	60.902	17.244	-0.024	-2.375	-1969.854	0.424
Dead+Wind 120 deg - Service	60.902	14.923	8.588	982.148	-1703.876	0.731
Dead+Wind 150 deg - Service	60.902	8.602	14.899	1703.878	-980.546	0.842
Dead+Wind 180 deg - Service	60.902	-0.024	17.216	1969.270	6.163	0.727
Dead+Wind 210 deg - Service	60.902	-8.643	14.923	1707.642	991.864	0.418
Dead+Wind 240 deg - Service	60.902	-14.947	8.629	988.669	1712.437	-0.004
Dead+Wind 270 deg - Service	60.902	-17.244	0.024	5.154	1974.651	-0.424
Dead+Wind 300 deg -	60.902	-14.923	-8.588	-979.368	1708.674	-0.731

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
Service Dead+Wind 330 deg - Service	60.902	-8.602	-14.899	-1701.098	985.344	-0.842

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	0.000	-60.902	0.000	0.000	60.902	-0.000	0.000%
2	0.069	-60.902	-49.760	-0.069	60.902	49.755	0.006%
3	24.980	-60.902	-43.128	-24.980	60.902	43.128	0.000%
4	43.197	-60.902	-24.940	-43.197	60.902	24.940	0.000%
5	49.840	-60.902	-0.069	-49.835	60.902	0.069	0.006%
6	43.128	-60.902	24.821	-43.128	60.902	-24.821	0.000%
7	24.861	-60.902	43.059	-24.860	60.902	-43.059	0.000%
8	-0.069	-60.902	49.760	0.069	60.902	-49.755	0.006%
9	-24.980	-60.902	43.128	24.980	60.902	-43.128	0.000%
10	-43.197	-60.902	24.940	43.197	60.902	-24.940	0.000%
11	-49.840	-60.902	0.069	49.835	60.902	-0.069	0.006%
12	-43.128	-60.902	-24.821	43.128	60.902	24.821	0.000%
13	-24.861	-60.902	-43.059	24.860	60.902	43.059	0.000%
14	0.000	-78.834	0.000	-0.001	78.834	0.000	0.001%
15	0.014	-78.834	-11.451	-0.014	78.834	11.451	0.000%
16	5.746	-78.834	-9.924	-5.746	78.834	9.924	0.000%
17	9.938	-78.834	-5.738	-9.938	78.834	5.738	0.000%
18	11.467	-78.834	-0.014	-11.467	78.834	0.014	0.000%
19	9.924	-78.834	5.713	-9.924	78.834	-5.713	0.000%
20	5.721	-78.834	9.910	-5.721	78.834	-9.910	0.000%
21	-0.014	-78.834	11.451	0.014	78.834	-11.451	0.000%
22	-5.746	-78.834	9.924	5.746	78.834	-9.924	0.000%
23	-9.938	-78.834	5.738	9.938	78.834	-5.738	0.000%
24	-11.467	-78.834	0.014	11.467	78.834	-0.014	0.000%
25	-9.924	-78.834	-5.713	9.924	78.834	5.713	0.000%
26	-5.721	-78.834	-9.910	5.721	78.834	9.910	0.000%
27	0.024	-60.902	-17.218	-0.024	60.902	17.216	0.003%
28	8.643	-60.902	-14.923	-8.643	60.902	14.923	0.001%
29	14.947	-60.902	-8.630	-14.947	60.902	8.629	0.001%
30	17.246	-60.902	-0.024	-17.244	60.902	0.024	0.003%
31	14.923	-60.902	8.588	-14.923	60.902	-8.588	0.001%
32	8.602	-60.902	14.899	-8.602	60.902	-14.899	0.001%
33	-0.024	-60.902	17.218	0.024	60.902	-17.216	0.003%
34	-8.643	-60.902	14.923	8.643	60.902	-14.923	0.001%
35	-14.947	-60.902	8.630	14.947	60.902	-8.629	0.001%
36	-17.246	-60.902	0.024	17.244	60.902	-0.024	0.003%
37	-14.923	-60.902	-8.588	14.923	60.902	8.588	0.001%
38	-8.602	-60.902	-14.899	8.602	60.902	14.899	0.001%

Non-Linear Convergence Results

Load Combination	Converged?	Number of Cycles	Displacement Tolerance	Force Tolerance
1	Yes	6	0.00000001	0.00000001
2	Yes	13	0.00008143	0.00010015
3	Yes	17	0.00000001	0.00011282
4	Yes	17	0.00000001	0.00011362
5	Yes	13	0.00008141	0.00008398
6	Yes	17	0.00000001	0.00011390
7	Yes	17	0.00000001	0.00011092
8	Yes	13	0.00008142	0.00011940
9	Yes	17	0.00000001	0.00011468
10	Yes	17	0.00000001	0.00011400

11	Yes	13	0.00008141	0.00009786
12	Yes	17	0.00000001	0.00011126
13	Yes	17	0.00000001	0.00011412
14	Yes	6	0.00000001	0.00004818
15	Yes	16	0.00000001	0.00007110
16	Yes	16	0.00000001	0.00007546
17	Yes	16	0.00000001	0.00007549
18	Yes	16	0.00000001	0.00007100
19	Yes	16	0.00000001	0.00007573
20	Yes	16	0.00000001	0.00007577
21	Yes	16	0.00000001	0.00007173
22	Yes	16	0.00000001	0.00007690
23	Yes	16	0.00000001	0.00007699
24	Yes	16	0.00000001	0.00007208
25	Yes	16	0.00000001	0.00007622
26	Yes	16	0.00000001	0.00007606
27	Yes	13	0.00008458	0.00003888
28	Yes	14	0.00000001	0.00007679
29	Yes	14	0.00000001	0.00007850
30	Yes	13	0.00008458	0.00003763
31	Yes	14	0.00000001	0.00008098
32	Yes	14	0.00000001	0.00007441
33	Yes	13	0.00008458	0.00003947
34	Yes	14	0.00000001	0.00008095
35	Yes	14	0.00000001	0.00007934
36	Yes	13	0.00008458	0.00003805
37	Yes	14	0.00000001	0.00007508
38	Yes	14	0.00000001	0.00008155

Maximum Tower Deflections - Service Wind

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
L1	185 - 180	29.698	35	1.722	0.000
L2	180 - 153	27.900	35	1.708	0.000
L3	153 - 151.833	18.994	35	1.376	0.001
L4	151.833 - 151	18.660	35	1.361	0.001
L5	151 - 130	18.423	35	1.354	0.001
L6	135 - 120.667	14.246	35	1.135	0.001
L7	120.667 - 115	11.040	35	0.982	0.001
L8	115 - 114	9.913	35	0.917	0.001
L9	114 - 95	9.722	35	0.907	0.001
L10	101 - 91	7.464	35	0.753	0.000
L11	91 - 90	5.949	35	0.682	0.000
L12	90 - 61.5	5.808	35	0.671	0.000
L13	61.5 - 58	2.576	35	0.418	0.000
L14	58 - 40	2.280	35	0.389	0.000
L15	40 - 33	1.060	35	0.259	0.000
L16	33 - 28	0.716	35	0.210	0.000
L17	28 - 0	0.513	35	0.178	0.000

Critical Deflections and Radius of Curvature - Service Wind

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
185.000	ETW190VS12UB	35	29.698	1.722	0.000	12082
175.000	7770.00 w/ Mount Pipe	35	26.127	1.674	0.001	7363
165.000	APXV18-206517S-C w/ Mount Pipe	35	22.717	1.553	0.001	4402
155.000	(2) BXA-70063-6CF-EDIN-2 w/ Mount Pipe	35	19.579	1.404	0.001	3354

Maximum Tower Deflections - Design Wind

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
L1	185 - 180	85.549	10	4.962	0.001
L2	180 - 153	80.377	10	4.924	0.001
L3	153 - 151.833	54.750	10	3.967	0.002
L4	151.833 - 151	53.787	10	3.925	0.002
L5	151 - 130	53.105	10	3.903	0.002
L6	135 - 120.667	41.076	10	3.273	0.002
L7	120.667 - 115	31.836	10	2.833	0.002
L8	115 - 114	28.588	10	2.644	0.001
L9	114 - 95	28.038	10	2.615	0.001
L10	101 - 91	21.529	10	2.173	0.001
L11	91 - 90	17.161	10	1.968	0.001
L12	90 - 61.5	16.753	10	1.936	0.001
L13	61.5 - 58	7.433	10	1.206	0.001
L14	58 - 40	6.579	10	1.123	0.001
L15	40 - 33	3.059	10	0.748	0.000
L16	33 - 28	2.066	10	0.607	0.000
L17	28 - 0	1.480	10	0.513	0.000

Critical Deflections and Radius of Curvature - Design Wind

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
185.000	ETW190VS12UB	10	85.549	4.962	0.001	4252
175.000	7770.00 w/ Mount Pipe	10	75.276	4.825	0.001	2588
165.000	APXV18-206517S-C w/ Mount Pipe	10	65.464	4.475	0.002	1545
155.000	(2) BXA-70063-6CF-EDIN-2 w/ Mount Pipe	10	56.434	4.048	0.002	1175

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	185 - 180 (1)	TP18x18x0.1875	5.000	0.000	0.0	25.200	10.7543	-1.360	271.008	0.005
L2	180 - 153 (2)	TP26.8088x18x0.25	27.000	0.000	0.0	25.200	21.3798	-7.680	538.771	0.014
L3	153 - 151.833 (3)	TP27.1894x26.8088x0.3625	1.167	0.000	0.0	25.200	31.3111	-7.852	789.041	0.010
L4	151.833 - 151 (4)	TP27.4613x27.1894x0.5246	0.833	0.000	0.0	25.182	45.5000	-8.013	1145.780	0.007
L5	151 - 130 (5)	TP34.3125x27.4613x0.3802	21.000	0.000	0.0	25.200	39.5403	-10.643	996.414	0.011
L6	130 - 120.667 (6)	TP36.844x31.9209x0.4447	14.333	0.000	0.0	25.200	52.1180	-14.261	1313.370	0.011
L7	120.667 - 115 (7)	TP38.6875x36.844x0.4776	5.667	0.000	0.0	24.690	58.7656	-15.603	1450.920	0.011
L8	115 - 114 (8)	TP39.0125x38.6875x0.5402	1.000	0.000	0.0	25.200	66.9216	-15.871	1686.430	0.009
L9	114 - 95 (9)	TP45.1875x39.0125x0.4463	19.000	0.000	0.0	25.200	61.5001	-19.033	1549.800	0.012

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 $\frac{P}{P_a}$
L10	95 - 91 (10)	TP45.8125x42.3448x0.5294	10.000	0.000	0.0	25.200	77.1854	-23.232	1945.070	0.012
L11	91 - 90 (11)	TP46.1391x45.8125x0.465	1.000	0.000	0.0	25.200	68.3863	-23.508	1723.340	0.014
L12	90 - 61.5 (12)	TP55.4461x46.1391x0.5299	28.500	0.000	0.0	25.200	93.6935	-33.110	2361.080	0.014
L13	61.5 - 58 (13)	TP56.5891x55.4461x0.5263	3.500	0.000	0.0	24.996	95.0159	-34.395	2375.020	0.014
L14	58 - 40 (14)	TP61.6875x56.5891x0.5788	18.000	0.000	0.0	23.898	113.8900	-41.916	2721.750	0.015
L15	40 - 33 (15)	TP63.9583x61.6875x0.5704	7.000	0.000	0.0	25.200	116.4140	-44.974	2933.630	0.015
L16	33 - 28 (16)	TP65.5804x63.9583x0.595	5.000	0.000	0.0	24.390	124.5080	-47.305	3036.740	0.016
L17	28 - 0 (17)	TP73.8125x65.5804x0.5758	28.000	0.000	0.0	22.950	135.7860	-60.891	3116.300	0.020

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	185 - 180 (1)	TP18x18x0.1875	23.956	6.154	25.200	0.244	0.000	0.000	25.200	0.000
L2	180 - 153 (2)	TP26.8088x18x0.25	353.818	30.631	25.200	1.216	0.000	0.000	25.200	0.000
L3	153 - 151.833 (3)	TP27.1894x26.8088x0.3625	378.425	22.236	25.200	0.882	0.000	0.000	25.200	0.000
L4	151.833 - 151 (4)	TP27.4613x27.1894x0.5246	396.134	16.047	25.182	0.637	0.000	0.000	25.182	0.000
L5	151 - 130 (5)	TP34.3125x27.4613x0.3802	756.239	29.175	25.200	1.158	0.000	0.000	25.200	0.000
L6	130 - 120.667 (6)	TP36.844x31.9209x0.4447	1115.117	28.976	25.200	1.150	0.000	0.000	25.200	0.000
L7	120.667 - 115 (7)	TP38.6875x36.844x0.4776	1267.300	27.829	24.690	1.127	0.000	0.000	24.690	0.000
L8	115 - 114 (8)	TP39.0125x38.6875x0.5402	1294.792	24.835	25.200	0.986	0.000	0.000	25.200	0.000
L9	114 - 95 (9)	TP45.1875x39.0125x0.4463	1668.517	31.198	25.200	1.238	0.000	0.000	25.200	0.000
L10	95 - 91 (10)	TP45.8125x42.3448x0.5294	1978.383	27.888	25.200	1.107	0.000	0.000	25.200	0.000
L11	91 - 90 (11)	TP46.1391x45.8125x0.465	2010.508	31.666	25.200	1.257	0.000	0.000	25.200	0.000
L12	90 - 61.5 (12)	TP55.4461x46.1391x0.5299	3006.967	28.735	25.200	1.140	0.000	0.000	25.200	0.000
L13	61.5 - 58 (13)	TP56.5891x55.4461x0.5263	3140.675	28.983	24.996	1.159	0.000	0.000	24.996	0.000
L14	58 - 40 (14)	TP61.6875x56.5891x0.5788	3866.917	27.314	23.898	1.143	0.000	0.000	23.898	0.000
L15	40 - 33 (15)	TP63.9583x61.6875x0.5704	4166.825	27.747	25.200	1.101	0.000	0.000	25.200	0.000
L16	33 - 28 (16)	TP65.5804x63.9583x0.595	4386.692	26.645	24.390	1.092	0.000	0.000	24.390	0.000
L17	28 - 0 (17)	TP73.8125x65.5804x0.5758	5706.291	28.164	22.950	1.227	0.000	0.000	22.950	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	185 - 180 (1)	TP18x18x0.1875	5.021	0.467	16.800	0.056	0.011	0.001	16.800	0.000

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 $\frac{f_{vt}}{F_{vt}}$
L2	180 - 153 (2)	TP26.8088x18x0.25	20.998	0.982	16.800	0.119	0.011	0.000	16.800	0.000
L3	153 - 151.833 (3)	TP27.1894x26.8088x0.3625	21.180	0.676	16.800	0.082	0.011	0.000	16.800	0.000
L4	151.833 - 151 (4)	TP27.4613x27.1894x0.5246	21.319	0.469	16.788	0.057	0.011	0.000	16.788	0.000
L5	151 - 130 (5)	TP34.3125x27.4613x0.3802	23.757	0.601	16.800	0.073	0.011	0.000	16.800	0.000
L6	130 - 120.667 (6)	TP36.844x31.9209x0.4447	26.326	0.505	16.800	0.061	0.011	0.000	16.800	0.000
L7	120.667 - 115 (7)	TP38.6875x36.844x0.4776	27.389	0.466	16.460	0.058	0.011	0.000	16.460	0.000
L8	115 - 114 (8)	TP39.0125x38.6875x0.5402	27.582	0.412	16.800	0.050	0.011	0.000	16.800	0.000
L9	114 - 95 (9)	TP45.1875x39.0125x0.4463	29.945	0.487	16.800	0.059	0.011	0.000	16.800	0.000
L10	95 - 91 (10)	TP45.8125x42.3448x0.5294	32.013	0.415	16.800	0.050	0.011	0.000	16.800	0.000
L11	91 - 90 (11)	TP46.1391x45.8125x0.465	32.218	0.471	16.800	0.057	0.011	0.000	16.800	0.000
L12	90 - 61.5 (12)	TP55.4461x46.1391x0.5299	37.850	0.404	16.800	0.049	0.011	0.000	16.800	0.000
L13	61.5 - 58 (13)	TP56.5891x55.4461x0.5263	38.541	0.406	16.664	0.049	0.011	0.000	16.664	0.000
L14	58 - 40 (14)	TP61.6875x56.5891x0.5788	42.176	0.370	15.932	0.047	0.011	0.000	15.932	0.000
L15	40 - 33 (15)	TP63.9583x61.6875x0.5704	43.497	0.374	16.800	0.045	0.011	0.000	16.800	0.000
L16	33 - 28 (16)	TP65.5804x63.9583x0.595	44.428	0.357	16.260	0.045	0.011	0.000	16.260	0.000
L17	28 - 0 (17)	TP73.8125x65.5804x0.5758	49.893	0.367	15.300	0.049	0.011	0.000	15.300	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	185 - 180 (1)	0.005	0.244	0.000	0.056	0.000	0.250 ✔	1.333	H1-3+VT ✔
L2	180 - 153 (2)	0.014	1.216	0.000	0.119	0.000	1.233 ✔	1.333	H1-3+VT ✔
L3	153 - 151.833 (3)	0.010	0.882	0.000	0.082	0.000	0.894 ✔	1.333	H1-3+VT ✔
L4	151.833 - 151 (4)	0.007	0.637	0.000	0.057	0.000	0.645 ✔	1.333	H1-3+VT ✔
L5	151 - 130 (5)	0.011	1.158	0.000	0.073	0.000	1.170 ✔	1.333	H1-3+VT ✔
L6	130 - 120.667 (6)	0.011	1.150	0.000	0.061	0.000	1.162 ✔	1.333	H1-3+VT ✔
L7	120.667 - 115 (7)	0.011	1.127	0.000	0.058	0.000	1.139 ✔	1.333	H1-3+VT ✔
L8	115 - 114 (8)	0.009	0.986	0.000	0.050	0.000	0.996 ✔	1.333	H1-3+VT ✔
L9	114 - 95 (9)	0.012	1.238	0.000	0.059	0.000	1.251 ✔	1.333	H1-3+VT ✔
L10	95 - 91 (10)	0.012	1.107	0.000	0.050	0.000	1.119 ✔	1.333	H1-3+VT ✔
L11	91 - 90 (11)	0.014	1.257	0.000	0.057	0.000	1.271 ✔	1.333	H1-3+VT ✔

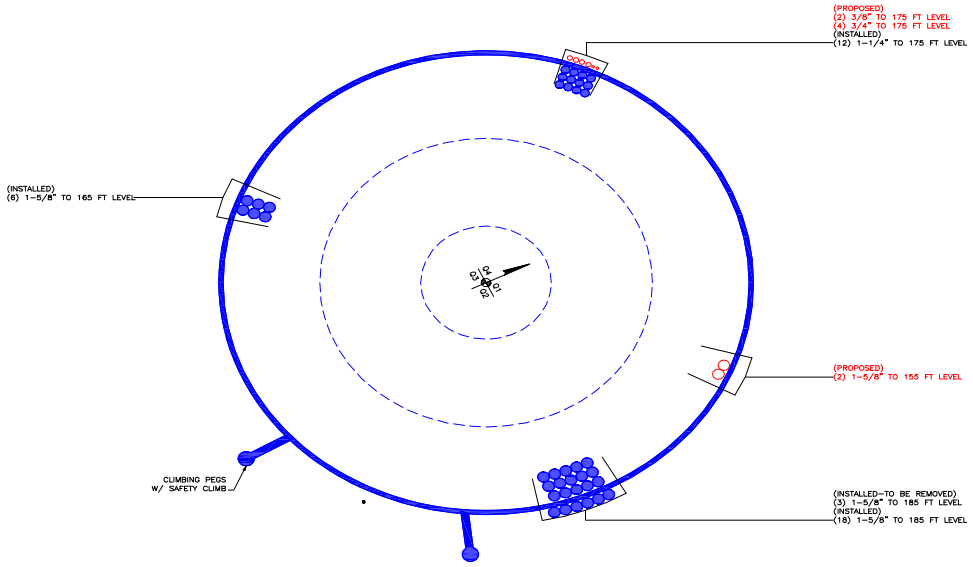
Section No.	Elevation ft	Ratio $\frac{P}{P_a}$	Ratio $\frac{f_{bx}}{F_{bx}}$	Ratio $\frac{f_{by}}{F_{by}}$	Ratio $\frac{f_v}{F_v}$	Ratio $\frac{f_{vt}}{F_{vt}}$	Comb. Stress Ratio	Allow. Stress Ratio	Criteria
L12	90 - 61.5 (12)	0.014	1.140	0.000	0.049	0.000	1.155 ✔	1.333	H1-3+VT ✔
L13	61.5 - 58 (13)	0.014	1.159	0.000	0.049	0.000	1.175 ✔	1.333	H1-3+VT ✔
L14	58 - 40 (14)	0.015	1.143	0.000	0.047	0.000	1.159 ✔	1.333	H1-3+VT ✔
L15	40 - 33 (15)	0.015	1.101	0.000	0.045	0.000	1.117 ✔	1.333	H1-3+VT ✔
L16	33 - 28 (16)	0.016	1.092	0.000	0.045	0.000	1.109 ✔	1.333	H1-3+VT ✔
L17	28 - 0 (17)	0.020	1.227	0.000	0.049	0.000	1.247 ✔	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	185 - 180	Pole	TP18x18x0.1875	1	-1.360	361.254	18.8	Pass
L2	180 - 153	Pole	TP26.8088x18x0.25	2	-7.680	718.182	92.5	Pass
L3	153 - 151.833	Pole	TP27.1894x26.8088x0.3625	3	-7.852	1051.792	67.1	Pass
L4	151.833 - 151	Pole	TP27.4613x27.1894x0.5246	4	-8.013	1527.325	48.4	Pass
L5	151 - 130	Pole	TP34.3125x27.4613x0.3802	5	-10.643	1328.220	87.7	Pass
L6	130 - 120.667	Pole	TP36.844x31.9209x0.4447	6	-14.261	1750.722	87.1	Pass
L7	120.667 - 115	Pole	TP38.6875x36.844x0.4776	7	-15.603	1934.076	85.4	Pass
L8	115 - 114	Pole	TP39.0125x38.6875x0.5402	8	-15.871	2248.011	74.7	Pass
L9	114 - 95	Pole	TP45.1875x39.0125x0.4463	9	-19.033	2065.883	93.9	Pass
L10	95 - 91	Pole	TP45.8125x42.3448x0.5294	10	-23.232	2592.778	84.0	Pass
L11	91 - 90	Pole	TP46.1391x45.8125x0.465	11	-23.508	2297.212	95.3	Pass
L12	90 - 61.5	Pole	TP55.4461x46.1391x0.5299	12	-33.110	3147.320	86.6	Pass
L13	61.5 - 58	Pole	TP56.5891x55.4461x0.5263	13	-34.395	3165.902	88.1	Pass
L14	58 - 40	Pole	TP61.6875x56.5891x0.5788	14	-41.916	3628.093	86.9	Pass
L15	40 - 33	Pole	TP63.9583x61.6875x0.5704	15	-44.974	3910.529	83.8	Pass
L16	33 - 28	Pole	TP65.5804x63.9583x0.595	16	-47.305	4047.974	83.2	Pass
L17	28 - 0	Pole	TP73.8125x65.5804x0.5758	17	-60.891	4154.028	93.6	Pass
							Summary	
						Pole (L11)	95.3	Pass
						RATING =	**95.3**	**Pass**

APPENDIX B

BASE LEVEL DRAWING

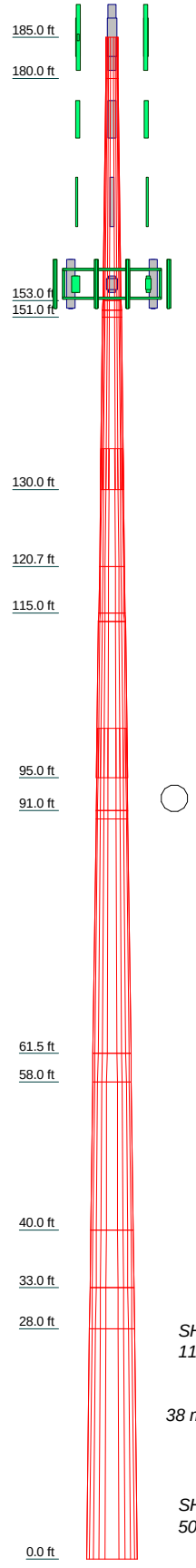

(PROPOSED)
(2) 3/8" TO 175 FT LEVEL
(4) 3/4" TO 175 FT LEVEL
(INSTALLED)
(12) 1-1/4" TO 175 FT LEVEL
(INSTALLED)
(6) 1-5/8" TO 165 FT LEVEL
(PROPOSED)
(2) 1-5/8" TO 155 FT LEVEL
CLIMBING PEGS
W/ SAFETY CLIMB
(INSTALLED-TO BE REMOVED)
(3) 1-5/8" TO 185 FT LEVEL
(INSTALLED)
(18) 1-5/8" TO 185 FT LEVEL

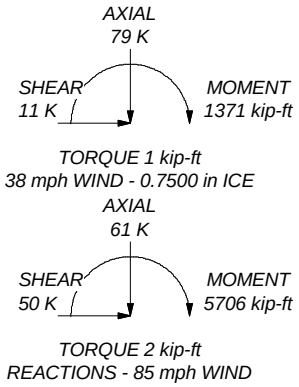
APPENDIX C

ADDITIONAL CALCULATIONS

Section	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
Length (ft)	5.000	27.000	0.333	0.667	21.000	14.333	5.667	1.000	19.000	10.000	1.000	28.500	3.500	18.000	7.000	5.000	28.000
Number of Sides	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12
Thickness (in)	0.1875	0.2500	0.2500	0.2500	0.3802	0.4447	0.4776	0.5402	0.4463	0.4293	0.4293	0.5299	0.5263	0.5788	0.5704	0.5950	0.5758
Socket Length (ft)					5.000				6.000								
Top Dia (in)	18.0000	18.0000	18.0000	18.0000	27.4613	31.9209	36.8440	38.6875	39.0125	45.3448	45.3448	46.1391	55.4461	56.5891	61.6875	63.9583	65.5804
Bot Dia (in)	18.0000	26.8088	26.8088	26.8088	34.3125	36.8440	38.6875	39.0125	45.1875	46.1875	46.1875	55.4461	55.5891	61.6875	63.9583	65.5804	73.8125
Grade	A36M-42				Reinf 42.00 ksi	Reinf 42.00 ksi	Reinf 41.15 ksi	Reinf 41.15 ksi		Reinf 42.00 ksi			Reinf 41.66 ksi	Reinf 39.83 ksi	Reinf 42.00 ksi	Reinf 40.65 ksi	Reinf 38.25 ksi
Weight (K)	0.2	1.6	0.1	0.1	2.7	2.4	1.1	0.2	3.9	0.2	2.5	8.3	1.1	6.7	2.7	2.1	12.2

48.2





DESIGNED APPURTENANCE LOADING

TYPE	ELEVATION	TYPE	ELEVATION
ETW190VS12UB	185	RRUS A2 MODULE	175
ETW190VS12UB	185	RRUS-11 1900MHz	175
ETW190VS12UB	185	RRUS-11 1900MHz	175
Sector Mount [SM 802-3]	185	RRUS-11 1900MHz	175
RR90-17-02DP w/ Mount Pipe	185	DC6-48-60-18-8F	175
RR90-17-02DP w/ Mount Pipe	185	Sector Mount [SM 802-3]	175
RR90-17-02DP w/ Mount Pipe	185	APXV18-206517S-C w/ Mount Pipe	165
APX16DWV-16DWVS-C w/ Mount Pipe	185	APXV18-206517S-C w/ Mount Pipe	165
		APXV18-206517S-C w/ Mount Pipe	165
APX16DWV-16DWVS-C w/ Mount Pipe	185	Pipe Mount [PM 601-3]	165
APX16DWV-16DWVS-C w/ Mount Pipe	185	(2) BXA-70063-6CF-EDIN-2 w/ Mount Pipe	155
		(2) BXA-70063-6CF-EDIN-2 w/ Mount Pipe	155
ATBT-BOTTOM-24V	185	(2) BXA-70063-6CF-EDIN-2 w/ Mount Pipe	155
SBNHH-1D65C w/ Mount Pipe	185		
ATBT-BOTTOM-24V	185	(2) BXA-171063-12CF-EDIN-2 w/ Mount Pipe	155
LNX-6515DS-VTM w/ Mount Pipe	185		
ATBT-BOTTOM-24V	185	(2) BXA-171063-12CF-EDIN-2 w/ Mount Pipe	155
LNX-6515DS-VTM w/ Mount Pipe	185		
7770.00 w/ Mount Pipe	175	(2) BXA-171063-12CF-EDIN-2 w/ Mount Pipe	155
7770.00 w/ Mount Pipe	175		
7770.00 w/ Mount Pipe	175	RRH2X40-AWS	155
RRUS 11-700	175	RRH2X40-AWS	155
RRUS 11-700	175	RRH2X40-AWS	155
RRUS 11-700	175	RRH2X40-07-U	155
DC6-48-60-18-8F	175	RRH2X40-07-U	155
(2) OPA-65R-LCUU-H6 w/ Mount Pipe	175	RRH2X40-07-U	155
(2) OPA-65R-LCUU-H6 w/ Mount Pipe	175	DB-T1-6Z-8AB-0Z	155
(2) OPA-65R-LCUU-H6 w/ Mount Pipe	175	Platform Mount [LP 301-1]	155
RRUS A2 MODULE	175		
RRUS A2 MODULE	175		

MATERIAL STRENGTH

GRADE	Fy	Fu	GRADE	Fy	Fu
A36M-42	42 ksi	60 ksi	Reinf 41.66 ksi	42 ksi	53 ksi
Reinf 42.00 ksi	42 ksi	53 ksi	Reinf 39.83 ksi	40 ksi	50 ksi
Reinf 41.97 ksi	42 ksi	53 ksi	Reinf 40.65 ksi	41 ksi	51 ksi
Reinf 41.15 ksi	41 ksi	52 ksi	Reinf 38.25 ksi	38 ksi	48 ksi

TOWER DESIGN NOTES

1. Tower is located in Middlesex 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.
4. Deflections are based upon a 50 mph wind.
5. TOWER RATING: 95.3%

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

Job:	***185' Monopole / Middletown_1***		
Project:	***PJF 37513-1570 / BU 825983***		
Client: CCI	Drawn by: John J Woolley	App'd:	
Code: TIA/EIA-222-F	Date: 10/21/14	Scale: NTS	
Path: G:\TOWER\375_Crown_Castle\2013\37513-1570 BU 825983\WO 947023 BU 825983 - 003 SA\37513-1570.003.7805 (2 mods incl.eri		Dwg No. E-1	

PAUL J. FORD AND COMPANY
STRUCTURAL ENGINEERS
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v4.2 - Effective 4-3-13

Date: 10/21/2014
PJF Project: 37513-1570.003.7805
Client Ref. # 825983
Site Name: Middletown_1
Description: Micropile
Owner: CCI
Engineer: JJW

Micropile Analysis

Moment =	5706	k-ft	TIA Ref.	F	Location =	Micropile		
Axial =	61.0	kips	ASIF =	1.3333	η =	N/A	for BP, Rev. G Sect. 4.9.9	
Shear =	50.0	kips	Max Ratio =	100.0%	Threads =	N/A	for FP, Rev. G	
Item Qty =	30				Soil =	Soft Clay / Silty Clay (Lean)	for Micropile	

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

Item	Nominal Anchor Dia, in	Description	Fy, ksi	Fu, ksi	Location, degrees	Anchor Circle, in	Area Override, in^2	Area, in^2	Max Net Compression, kips	Max Net Tension, kips	Load for Capacity Calc, kips	Capacity Override, kips	Capacity, kips	Capacity Ratio	Required Bond Length, ft
1	2.000	A36	36	58	0.0	68.00	0.00	3.14	57.66	53.81	53.81	0.00	80.17	67.1%	
2	2.000	A36	36	58	15.0	68.00	0.00	3.14	59.05	55.20	55.20	0.00	80.17	68.9%	
3	2.000	A36	36	58	30.0	68.00	0.00	3.14	60.40	56.55	56.55	0.00	80.17	70.5%	
4	2.000	A36	36	58	45.0	68.00	0.00	3.14	61.34	57.48	57.48	0.00	80.17	71.7%	
5	2.000	A36	36	58	60.0	68.00	0.00	3.14	61.58	57.73	57.73	0.00	80.17	72.0%	
6	2.000	A36	36	58	75.0	68.00	0.00	3.14	61.04	57.19	57.19	0.00	80.17	71.3%	
7	2.000	A36	36	58	90.0	68.00	0.00	3.14	59.77	55.92	55.92	0.00	80.17	69.7%	
8	2.000	A36	36	58	105.0	68.00	0.00	3.14	58.03	54.18	54.18	0.00	80.17	67.6%	
9	2.000	A36	36	58	120.0	68.00	0.00	3.14	56.19	52.34	52.34	0.00	80.17	65.3%	
10	2.000	A36	36	58	135.0	68.00	0.00	3.14	54.72	50.87	50.87	0.00	80.17	63.4%	
11	2.000	A36	36	58	150.0	68.00	0.00	3.14	54.00	50.14	50.14	0.00	80.17	62.5%	
12	2.000	A36	36	58	165.0	68.00	0.00	3.14	54.22	50.37	50.37	0.00	80.17	62.8%	
13	2.000	A36	36	58	180.0	68.00	0.00	3.14	55.30	51.45	51.45	0.00	80.17	64.2%	
14	2.000	A36	36	58	195.0	68.00	0.00	3.14	56.91	53.06	53.06	0.00	80.17	66.2%	
15	2.000	A36	36	58	210.0	68.00	0.00	3.14	58.61	54.76	54.76	0.00	80.17	68.3%	
16	2.000	A36	36	58	225.0	68.00	0.00	3.14	59.99	56.14	56.14	0.00	80.17	70.0%	
17	2.000	A36	36	58	240.0	68.00	0.00	3.14	60.75	56.89	56.89	0.00	80.17	71.0%	
18	2.000	A36	36	58	255.0	68.00	0.00	3.14	60.75	56.90	56.90	0.00	80.17	71.0%	
19	2.000	A36	36	58	270.0	68.00	0.00	3.14	60.07	56.21	56.21	0.00	80.17	70.1%	
20	2.000	A36	36	58	285.0	68.00	0.00	3.14	58.91	55.06	55.06	0.00	80.17	68.7%	
21	2.000	A36	36	58	300.0	68.00	0.00	3.14	57.63	53.78	53.78	0.00	80.17	67.1%	
22	2.000	A36	36	58	315.0	68.00	0.00	3.14	56.64	52.79	52.79	0.00	80.17	65.8%	
23	2.000	A36	36	58	330.0	68.00	0.00	3.14	56.25	52.40	52.40	0.00	80.17	65.4%	
24	2.000	A36	36	58	345.0	68.00	0.00	3.14	56.62	52.77	52.77	0.00	80.17	65.8%	
25	0.000	Other			45.0	169.81	4.02	4.02	190.99	186.06	190.99	219.90	219.90	86.9%	55.00
26	0.000	Other			165.0	169.81	4.02	4.02	171.86	166.94	171.86	219.90	219.90	78.2%	55.00
27	0.000	Other			285.0	169.81	4.02	4.02	183.68	178.75	183.68	219.90	219.90	83.5%	55.00
28	0.000	Other			105.0	169.81	4.02	4.02	182.55	177.62	182.55	219.90	219.90	83.0%	55.00
29	0.000	Other			210.0	169.81	4.02	4.02	185.30	180.38	185.30	219.90	219.90	84.3%	55.00
30	0.000	Other			335.0	169.81	4.02	4.02	173.95	169.02	173.95	219.90	219.90	79.1%	55.00
								99.52							

Stiffened or Unstiffened, Interior Flange Plate - Any Bolt Material TIA Rev F

Site Data

BU#:	
Site Name:	
App #:	

Manufacturer:	Other

Reactions		
Moment:	2028.4	ft-kips
Axial:	46.2	kips
Shear:	37.9	kips
Exterior Flange Run, T+Q:	0	kips

Reactions adjusted to account for micropiles

Elevation: 0 feet

Bolt Data				
Qty:	24			
Diam:	2		Bolt Fu:	58
Bolt Material:	Other		Bolt Fy:	36
Strength (Fu):	58	ksi	Bolt Fty:	19.14
Yield (Fy):	36	ksi		
Circle:	68	in		

Interior Flange Bolt Results

Maximum Bolt Tension:	57.7	Kips, Ext. T=Interior T
Allowable Tension:	80.2	Kips
Bolt Stress Ratio:	72.0%	**Pass**

Plate Data		
Plate Outer Diam:	72.9375	in
Plate Inner Diam:	62	in (Hole @ Ctr)
Thick:	2	in
Grade:	36	ksi
Effective Width:	9.77	in

Interior Flange Plate Results Flexural Check

Controlling Bolt Axial Force:	61.6	Kips, Ext. C= Interior C
Plate Stress:	18.7	ksi
Allowable Plate Stress:	36.0	ksi
Plate Stress Ratio:	51.9%	**Pass**

Stiffener Data (Welding at Both Sides)		
Config:	1	*
Weld Type:	Fillet	
Groove Depth:		<-- Disregard
Groove Angle:		<-- Disregard
Fillet H. Weld:	0.75	in
Fillet V. Weld:	0.375	in
Width:	5	in
Height:	18	in
Thick:	1	in
Notch:	1	in
Grade:	50	ksi
Weld str.:	70	ksi

Stiffener Results

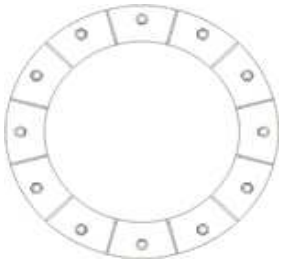
Horizontal Weld :	23.4%	**Pass**
Vertical Weld:	11.8%	**Pass**
Plate Flex+Shear, fb/Fb+(fv/Fv)^2:	2.2%	**Pass**
Plate Tension+Shear, ft/Ft+(fv/Fv)^2:	17.3%	**Pass**
Plate Comp. (AISC Bracket):	15.5%	**Pass**

Pole Results

Pole Punching Shear Check:	3.8%	**Pass**

Pole Data		
Pole OuterDiam:	73.8125	in
Thick:	0.4375	in
Pole Inner Diam:	72.9375	in
Grade:	42	ksi
# of Sides:	12	"0" IF Round
Fu	60	ksi

Stress Increase Factor	
ASIF:	1.333



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

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

Foundation Loads:

Pole weight or tower leg compression =	**46.2**	(kips)
Horizontal load at top of pier =	**37.9**	(kips)
Overturning moment at top of pier=	**2028**	(ft-kips)

Design criteria:

Safety factor against overturning =	**1.5**	

Soil Properties:

Soil density =	**120**	(pcf)
Allowable soil bearing =	**3**	(ksf)
Depth to water table =	**16**	(ft)

Dimensions:

Pier shape (round or square)	**R**	("R" or "S")
Pier width =	**7.5**	(ft)
Pier height above grade =	**0.25**	(ft)
depth to bottom of footing =	**10.5**	(ft)
Footing thickness =	**3**	(ft)
Footing width =	**25**	(ft)
Footing length =	**25**	(ft)

Concrete:

Concrete strength =	**3**	(ksi)
Rebar strength =	**60**	(ksi)
ultimate load factor =	**1.3**	

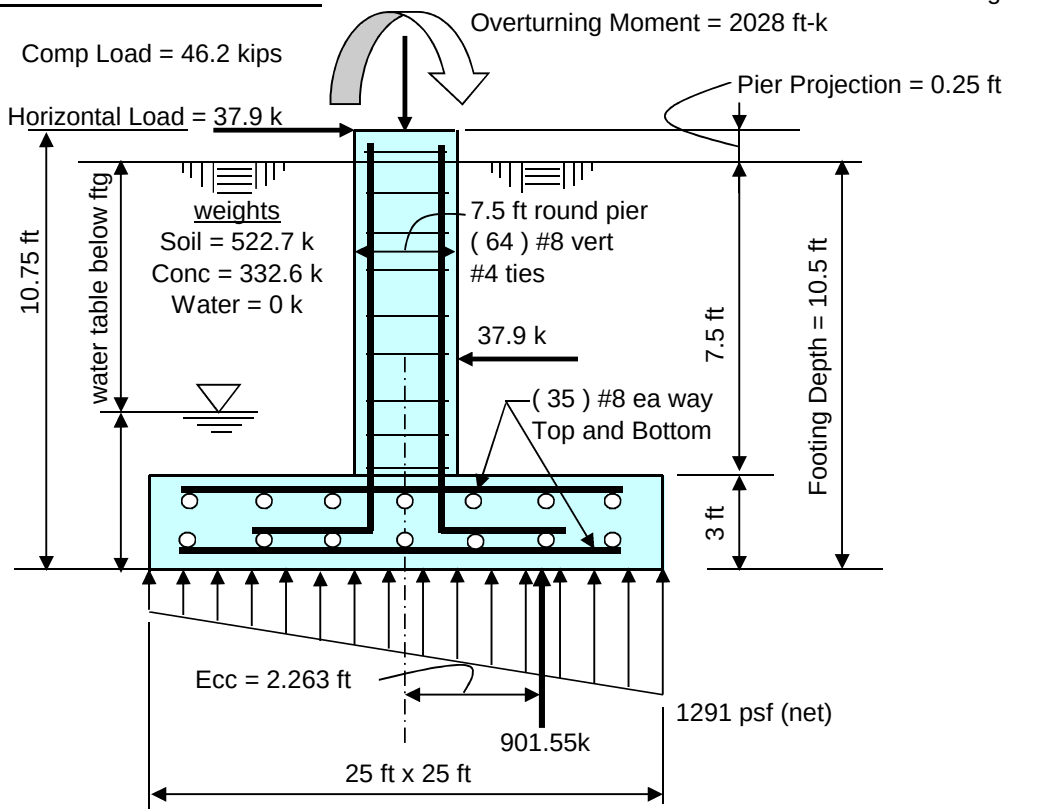
Reinforcing Steel:

	Pad	
minimum cover over rebar =	**3**	inches
size of pad rebar =	**#8**	bar
quantity of pad rebar =	**35**	(ea direction)

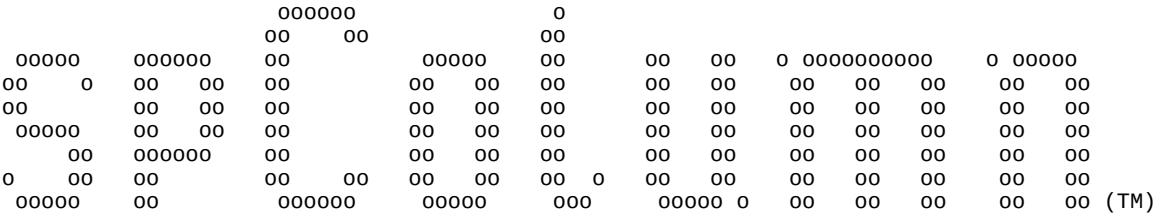
Reinforcing Steel:

	Pier	
size of vert rebar in pier=	**#8**	bar
vertical rebar quantity =	**64**	
size of pier ties =	**#4**	bar
minimum cover over rebar =	**3**	inches

Total volume of concrete = 82.1 cu yd



Summary of analysis results	
Maximum Net Soil Bearing = 1.291 ksf Allowable Net Soil Bearing = 3 ksf **Soil Bearing Stress Ratio = 0.43 Okay**	Ult Bending Shear Capacity = 110 psi Ult Bending Shear Stress = 19 psi **Bending Shear Stress Ratio = 0.18 Okay**
Ftg Overturning Resistance = 11269 ft-kips Overturning Moment = 2041 ft-kips Required Overturning Safety Factor = 1.5 Overturning Safety Factor = 5.523 **Ratio = 0.27 Okay**	Pad Bending Moment Capacity= 3784 ft-k Pad Bending Moment = 862 ft-k **Bending Moment Stress Ratio = 0.23 OK**



spColumn v4.80 (TM)
Computer program for the Strength Design of Reinforced Concrete Sections

General Information:
==========
File Name: g:\tower\375_crown_castle\2013\37513-1570 bu 825983\wo 947023 bu 8...\37513-1570 bp a.col
Project:
Column: Engineer:
Code: ACI 318-11 Units: English

Run Option: Investigation Slenderness: Not considered
Run Axis: X-axis Column Type: Architectural

Material Properties:
==========
f'c = 4 ksi fy = 60 ksi
Ec = 3605 ksi Es = 29000 ksi
Ultimate strain = 0.003 in/in
Beta1 = 0.85

Section:
========
Circular: Diameter = 90 in

Gross section area, Ag = 6361.73 in^2
Ix = 3.22062e+006 in^4 Iy = 3.22062e+006 in^4
rx = 22.5 in ry = 22.5 in
Xo = 0 in Yo = 0 in

Reinforcement:
==========
Bar Set: ASTM A615

Size	Diam (in)	Area (in^2)	Size	Diam (in)	Area (in^2)	Size	Diam (in)	Area (in^2)
# 3	0.38	0.11	# 4	0.50	0.20	# 5	0.63	0.31
# 6	0.75	0.44	# 7	0.88	0.60	# 8	1.00	0.79
# 9	1.13	1.00	# 10	1.27	1.27	# 11	1.41	1.56
# 14	1.69	2.25	# 18	2.26	4.00			

Confinement: Tied; #3 ties with #10 bars, #4 with larger bars.
phi(a) = 0.8, phi(b) = 0.9, phi(c) = 0.65

Layout: Circular
Pattern: All Sides Equal (Cover to transverse reinforcement)
Total steel area: As = 51.35 in^2 at rho = 0.81% (Note: rho < 1.0%)
Minimum clear spacing = 2.97 in

65 #8 Cover = 3 in

Factored Loads and Moments with Corresponding Capacities:
==========

No.	Pu kip	Mux k-ft	PhiMnx k-ft	PhiMn/Mu	NA depth in	Dt depth in	eps_t	Phi
1	46.20	3018.24	8592.15	2.847	16.08	86.08	0.01307	0.900

*** End of output ***

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

AT&T Existing Facility

Site ID: CT1044

Middletown - Dainty Rubbish
90 Industrial Park Road
Middletown, CT 06457

November 25, 2014

EBI Project Number: 62146225

Site Compliance Summary	
Compliance Status:	COMPLIANT
Site total MPE% of FCC general public allowable limit:	46.39 %

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

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November 25, 2014

AT&T Mobility – New England
Attn: Cameron Syme
550 Cochituate Road
Suite 550 – 13&14
Framingham, MA 01701

Emissions Analysis for Site: **CT1044 – Middletown - Dainty Rubbish**

EBI Consulting was directed to analyze the proposed AT&T facility located at **90 Industrial Park Road, Middletown, 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 MHz and 800 MHz Bands are 467 $\mu W/cm^2$ and 567 $\mu W/cm^2$ respectively. The general population exposure limit for the PCS and AWS bands is 1000 $\mu W/cm^2$. Because each carrier will be using different frequency bands, and each frequency band has different exposure limits, it is necessary to report percent of MPE rather than power density.

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

Additional details can be found in FCC OET 65.

CALCULATIONS

Calculations were done for the proposed AT&T Wireless antenna facility located at **90 Industrial Park Road, Middletown, 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) 2 GSM 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.

2) 2 GSM channels (850 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 (PCS Band - 1900 MHz) were considered for each sector of the proposed installation. These Channels have a transmit power of 30 Watts per Channel.

4) 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.

5) 2 LTE channels (WCS Band – 2300 MHz) were considered for each sector of the proposed installation. These Channels have a transmit power of 30 Watts per Channel.

6) 2 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.

7) 4 LTE channel (700 MHz Band) was considered for each sector of the proposed installation. This channel has a transmit power of 60 Watts

8) 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.

9) 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.

10) The antennas used in this modeling are the **Powerwave 7770** for 850 MHz and 1900 MHz (PCS) channels and the **CCI OPA-65R-LCUU-H6** for 700 MHz, 850 MHz, 1900 MHz and 2300 MHz channels. This is based on feedback from the carrier with regards to anticipated antenna selection. The **Powerwave 7770** has a maximum gain of **13.3 dBd for 850 MHz and 15.5 dBd for 1900 MHz** at its main lobe. The **CCI OPA-65R-LCUU-H6** has a maximum gain of **13.9 dBd for 700 MHz, 14.5 dBd for 850 MHz, 15.8 dBd for 2100 MHz and 17.56 dBd for 2300 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.

11) The antenna mounting height centerlines of the proposed antennas are **173 feet** above ground level (AGL).

12) 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:	15.5 / 13.5 dBd	Gain:	15.5 / 13.5 dBd	Gain:	15.5 / 13.5 dBd
Height (AGL):	173 feet	Height (AGL):	173 feet	Height (AGL):	173 feet
Frequency Bands	1900 MHz(PCS) / 850 MHz	Frequency Bands	1900 MHz(PCS) / 850 MHz	Frequency Bands	1900 MHz(PCS) / 850 MHz
Channel Count	8	Channel Count	8	# PCS Channels:	8
Total TX Power:	240	Total TX Power:	240	# AWS Channels:	240
ERP (W):	3,172.53	ERP (W):	3,172.53	ERP (W):	3,172.53
Antenna A1 MPE%	0.93	Antenna B1 MPE%	0.93	Antenna C1 MPE%	0.93
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:	13.9/14.5/15.8/17.56 dBd	Gain:	13.9/14.5/15.8/17.56 dBd	Gain:	13.9/14.5/15.8/17.56 dBd
Height (AGL):	173 feet	Height (AGL):	173 feet	Height (AGL):	173 feet
Frequency Bands	700 MHz / 850 MHz / 1900 MHz (PCS)/ 2300 MHz (WCS)	Frequency Bands	700 MHz / 850 MHz / 1900 MHz (PCS)/ 2300 MHz (WCS)	Frequency Bands	700 MHz / 850 MHz / 1900 MHz (PCS)/ 2300 MHz (WCS)
Channel Count	4	Channel Count	4	Channel Count	4
Total TX Power:	240	Total TX Power:	240	Total TX Power:	240
ERP (W):	3,522.41	ERP (W):	3,522.41	ERP (W):	3,522.41
Antenna A2 MPE%	1.68	Antenna B2 MPE%	1.68	Antenna C2 MPE%	1.68
Antenna #:	**3**	Antenna #:	**3**	Antenna #:	**3**
Make / Model:	CCI OPA-65R-LCUU-H6	Make / Model:	CCI OPA-65R-LCUU-H6	Make / Model:	CCI OPA-65R-LCUU-H6
Gain:	13.9 / 15.8 dBd	Gain:	13.9 / 15.8 dBd	Gain:	13.9 / 15.8 dBd
Height (AGL):	173 feet	Height (AGL):	173 feet	Height (AGL):	173 feet
Frequency Bands	700 Mhz / 1900 MHz (PCS)	Frequency Bands	700 Mhz / 1900 MHz (PCS)	Frequency Bands	700 Mhz / 1900 MHz (PCS)
Channel Count	4	Channel Count	4	Channel Count	4
Total TX Power:	120	Total TX Power:	120	Total TX Power:	120
ERP (W):	3,534.37	ERP (W):	3,534.37	ERP (W):	3,534.37
Antenna A3 MPE%	1.66	Antenna B3 MPE%	1.66	Antenna C3 MPE%	1.66

Site Composite MPE%	
Carrier	**MPE%**
AT&T	**12.83 %**
T-Mobile	5.03 %
MetroPCS	4.47 %
Verizon Wireless	24.06%
Site Total MPE %:	**46.39 %**

AT&T Sector 1 Total:	4.28 %
AT&T Sector 2 Total:	4.28 %
AT&T Sector 3 Total:	4.28 %
Site Total:	**46.39 %**

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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:	4.28%
Sector 2:	4.28 %
Sector 3 :	4.28 %
AT&T Total:	12.83 %
Site Total:	46.39 %
Site Compliance Status:	**COMPLIANT**

The anticipated composite MPE value for this site assuming all carriers present is **46.39%** 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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