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

VIA ELECTRONIC MAIL

November 13, 2019

Anne Marie Zsamba
Real Estate Specialist
Crown Castle
3 Corporate Park Drive, Suite 101
Clifton Park, NY 12065

RE: **EM-AT&T-066-191104** – AT&T notice of intent to modify an existing telecommunications facility located at 64 Hungerford Lane, Harwinton, Connecticut.

Dear Ms. Zsamba:

The Connecticut Siting Council (Council) is in receipt of your correspondence of November 12, 2019 submitted in response to the Council's November 6, 2019 notification of an incomplete request for exempt modification with regard to the above-referenced matter.

The submission renders the request for exempt modification complete and the Council will process the request in accordance with the Federal Communications Commission 60-day timeframe.

Thank you for your attention and cooperation.

Sincerely,

Melanie A. Bachman
Executive Director

MAB/IN/emr

Robidoux, Evan

From: Zsamba, Anne Marie <AnneMarie.Zsamba@crowncastle.com>
Sent: Monday, November 11, 2019 10:44 AM
To: Robidoux, Evan
Cc: CSC-DL Siting Council
Subject: RE: Council Incomplete Letter for EM-AT&T-066-191104 (64 Hungerford Lane, Harwinton)
Attachments: FCDS.pdf; AT&T_ExemptModificationApp_876369_64HungerfordLaneHarwinton_try2.pdf

Good morning,

My apologies for the confusion on the submitted application. Attached please find the FCDs that are applicable to this application. If someone can kindly confirm that these are visible starting at page 19 of the complete submission? I have also attached a file with just the drawings as well.

There appears to have been an issue with the merging of the PDFs and I sincerely apologize for the inconvenience and delay. Hardcopy drawings will arrive tomorrow.

Best,
Anne Marie

ANNE MARIE ZSAMBA
Network Real Estate Specialist
T: (201) 236-9224
F: (724) 416-6112

CROWN CASTLE
3 Corporate Park Drive Suite 101
Clifton Park, NY 12065
CrownCastle.com

From: Robidoux, Evan <Evan.Robidoux@ct.gov>
Sent: Thursday, November 7, 2019 9:09 AM
To: Zsamba, Anne Marie <AnneMarie.Zsamba@crowncastle.com>
Cc: CSC-DL Siting Council <Siting.Council@ct.gov>
Subject: Council Incomplete Letter for EM-AT&T-066-191104 (64 Hungerford Lane, Harwinton)

Please see the attached correspondence.

Evan Robidoux
Clerk Typist
Connecticut Siting Council
10 Franklin Square

New Britain, CT 06051

PROJECT INFORMATION

SCOPE OF WORK:

ITEMS TO BE INSTALLED ON & REMOVED FROM EXISTING TOWER:

- REMOVE (6) EXISTING ANTENNAS, (3) RRH's.

- INSTALL AT&T ANTENNA (80010965) (TYP. OF 1 PER ALPHA SECTOR).
- INSTALL AT&T ANTENNA (80010964) (TYP. OF 1 PER BETA & GAMMA SECTORS).
- INSTALL AT&T ANTENNA (HPA65R-BU6A) (TYP. OF 1 PER ALPHA SECTOR).
- INSTALL AT&T ANTENNA (SBNHH-1D65A) (TYP. OF 1 PER BETA & GAMMA SECTORS).
- INSTALL AT&T 4449 B5/B12 (700) (TYP. OF 1 PER SECTOR, TOTAL OF 3).
- INSTALL AT&T 8843 B2/B66A (1900/AWS) (TYP. OF 1 PER SECTOR, TOTAL OF 3).
- INSTALL SURGE ARRESTOR (DC6-48-60-18-8C-EV) (TOTAL OF 1).
- INSTALL SURGE PROTECTOR (TSXDC-4310FM) (TOTAL OF 8).
- INSTALL (2) DC TRUNK CABLES & (1) FIBER TRUNK CABLES.
- INSTALL PLATFORM HANDRAIL KIT (VALMONT SITEPRO1 PART # HRK-12 OR APPROVED EQUAL) 42" ABOVE THE PLATFORM.

ITEMS TO BE MOUNTED INSIDE EXISTING SHELTER:

- INSTALL AT&T 4478 B14 (700) (TOTAL OF 2).
- SWAP DUS WITH 6630.
- ADD (1) XMU
- ADD (1) 66305G
- ADD (1) IDLE.

ITEMS TO REMAIN:

- (3) ANTENNAS, (6) TMAS, (1) SURGE SUPPRESSOR, (12) COAX CABLES, (1) FIBER TRUNK CABLE & (2) DC TRUNK CABLES.

SITE ADDRESS:	64 HUNGERFORD LANE HARWINTON, CT 06791
LATITUDE (NAD 83):	N 41° 45' 26.15"
LONGITUDE (NAD 83):	W 73° 3' 9.20"
LANDLORD:	CROWN CASTLE INTERNATIONAL 500 W. CUMMINGS PARK, STE 3600 WOBURN, MA 01801
TYPE OF SITE:	MONOPOLE/INDOOR/OUTDOOR
TOWER HEIGHT:	178'
RAD CENTER:	158'
CURRENT USE:	TELECOMMUNICATIONS FACILITY
PROPOSED USE:	TELECOMMUNICATIONS FACILITY

SITE NUMBER: CTL01178

FA LOCATION CODE: 10110565

SITE NAME: HARWINTON - HUNGERFORD LANE

CROWN SITE NAME: HARWINTON / BUCKLEY BROADCASTI

PROJECT: LTE 2C/LTE 3C/LTE 4C/LTE 5C/4TX4RX SOFTWARE RETROFIT

PACE ID: MRCTB037900, MRCTB037962, MRCTB038045, MRCTB038146, MRCTB038016

BU#: 876369

NOTE:

ALL CONSTRUCTION ACTIVITIES ARE TO BE COMPLETED DIRECTLY THROUGH CROWN. CONTRACTOR MUST HAVE CONSTRUCTION PO AND NTP FROM CROWN DIRECT IN ORDER TO BEGIN. PRE-APPROVAL TO ENTER THE PROPERTY MUST BE OBTAINED. FOR ACCESS AUTHORIZATION, PLEASE CONTACT CROWN.

at&t
5841 BRIDGE STREET
EAST SYRACUSE, NY 13057

CROWN CASTLE
3 CORPORATE PARK DRIVE
SUITE 101
CLIFTON PARK, NY 12065

JACOBS
JACOBS ENGINEERING GROUP, INC.
120 ST. JAMES AVENUE, 5TH FLOOR
BOSTON, MA 02116

STATE OF CONNECTICUT
DANIEL J. CORNING
34035
LICENSED
PROFESSIONAL ENGINEER

PROJECT NO:	ERCC0004
DRAWN BY:	CM
CHECKED BY:	DJC

SUBMITTALS

3	10/30/19	REVISED DRAWINGS
2	10/03/19	ISSUED FOR CONSTRUCTION
1	09/04/19	ISSUED FOR PERMITTING
0	06/14/19	ISSUED FOR PERMITTING

FA# 10110565
SITE# CTL01178
HARWINTON -
HUNGERFORD LANE
64 HUNGERFORD LANE
HARWINTON, CT 06791

TITLE SHEET

T-1

DRAWING INDEX

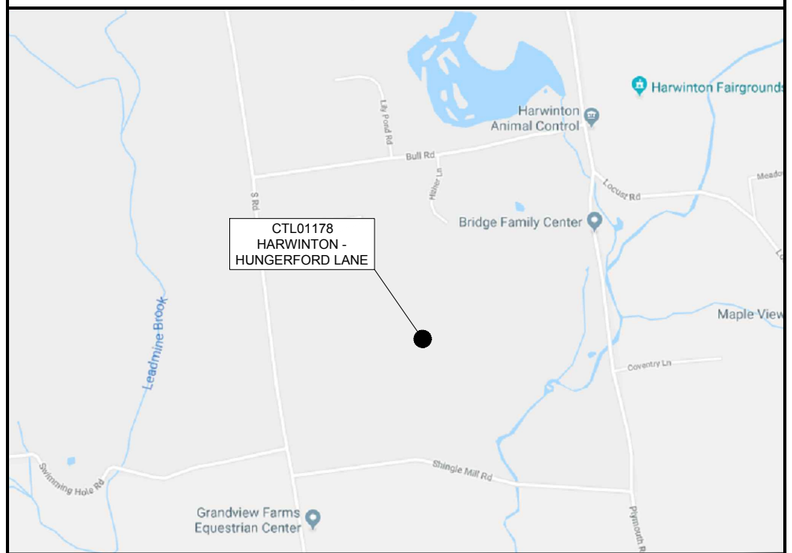
SHEET NO:	SHEET TITLE
T-1	TITLE SHEET
GN-1	GENERAL NOTES I
GN-2	GENERAL NOTES II
C-1	SITE PLAN
C-2	EQUIPMENT LAYOUT & PROPOSED TOWER ELEVATION
C-3	EXISTING & PROPOSED ANTENNA LAYOUT
C-4	EQUIPMENT DETAILS
C-5	EQUIPMENT DETAILS
RF-1	ANTENNA CHART & RF EQUIPMENT SCHEMATIC
G-1	GROUNDING DETAILS

CROWN CASTLE SITE ID #: 876369
CROWN CASTLE SITE NAME: HARWINTON / BUCKLEY BROADCASTI

ENGINEERING

2018 CONNECTICUT STATE BUILDING CODE
2018 AMENDMENT WITH 2015 INTERNATIONAL BUILDING CODE
2009 ICC/ANSI A117.1 ACCESSIBLE AND USABLE BUILDINGS AND FACILITIES
2015 INTERNATIONAL MECHANICAL CODE
2015 INTERNATIONAL ENERGY CONSERVATION CODE
2017 NATIONAL ELECTRICAL CODE (NFPA 70 2017)
ANSI/TIA-222-G

VICINITY MAP



I-91 SOUTH TOWARD NEW HAVEN. TAKE EXIT 22 NORTH TOWARD NEW BRITAIN. MERGE ONTO I-84 WEST/US-6 WEST VIA EXIT 32 ON LEFT TOWARD WATERBURY. MERGE ONTO FARMINGTON AVENUE/CT-4/MAIN STREET. CONTINUE TO FOLLOW CT-4; LEFT ONTO CT-4/SPIELMAN HIGHWAY. TURN SLIGHT LEFT ONTO SOUTH ROAD. LEFT ONTO HUNGERFORD LN. GO TO END OF ROAD. ACCESS ROAD IS ON RIGHT AFTER LAST HOUSE. FOLLOW ACCESS ROAD PAST RADIO STATION TO SHELTER SITE IN WOODS ON RIGHT.

GENERAL NOTES

1. 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.

2. 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.

811

UNDERGROUND SERVICE ALERT

STATE LAW REQUIRES
TWO WORKING DAYS NOTICE PRIOR TO ANY
EARTH MOVING ACTIVITIES BY CALLING
DIAL 811

PART 1 - GENERAL

1.1 GENERAL CONDITIONS:

A. CONTRACTOR SHALL INSPECT THE EXISTING SITE CONDITIONS PRIOR TO SUBMITTING BID. ANY QUESTIONS ARISING DURING THE BID PERIOD IN REGARDS TO THE CONTRACTORS FUNCTIONS, THE SCOPE OF WORK, OR ANY OTHER ISSUE RELATED TO THIS PROJECT SHALL BE BROUGHT UP DURING THE BID PERIOD WITH THE PROJECT MANAGER FOR CLARIFICATION, NOT AFTER THE CONTRACT HAS BEEN AWARDED.

B. THE CONTRACTOR SHALL OBTAIN PERMITS, LICENSES, MAKE ALL DEPOSITS, AND PAY ALL FEES REQUIRED FOR THE CONSTRUCTION PERFORMANCE FOR THE WORK UNDER THIS SECTION.

C. DRAWINGS SHOW THE GENERAL ARRANGEMENT OF ALL SYSTEMS AND COMPONENTS COVERED UNDER THIS SECTION. THE CONTRACTOR SHALL VERIFY ALL DIMENSIONS. DRAWING SHALL NOT BE SCALED TO DETERMINE DIMENSIONS.

1.2 LAWS, REGULATIONS, ORDINANCES, STATUTES AND CODES.

A. ALL WORK SHALL BE INSTALLED IN ACCORDANCE WITH THE LATEST EDITION OF THE NATIONAL ELECTRICAL CODE, AND ALL APPLICABLE LOCAL LAWS, REGULATIONS, ORDINANCES, STATUTES AND CODES. CONDUIT BENDS SHALL BE THE RADIUS BEND FOR THE TRADE SIZE OF CONDUIT IN COMPLIANCE WITH THE LATEST EDITIONS OF NEC.

1.3 REFERENCES:

A. THE PUBLICATIONS LISTED BELOW ARE PART OF THIS SPECIFICATION. EACH PUBLICATION SHALL BE THE LATEST REVISION AND ADDENDUM IN EFFECT ON THE DATE. THIS SPECIFICATION IS ISSUED FOR CONSTRUCTION UNLESS OTHERWISE NOTED. EXCEPT AS MODIFIED BY THE REQUIREMENT SPECIFIED HEREIN OR THE DETAILS OF THE DRAWINGS, WORK INCLUDED IN THIS SPECIFICATION SHALL CONFORM TO THE APPLICABLE PROVISION OF THESE PUBLICATIONS.

1. ANSI/IEEE (AMERICAN NATIONAL STANDARDS INSTITUTE)
2. ASTM (AMERICAN SOCIETY FOR TESTING AND MATERIALS)
3. ICEA (INSULATED CABLE ENGINEERS ASSOCIATION)
4. NEMA (NATIONAL ELECTRICAL MANUFACTURER'S ASSOCIATION)
5. NFPA (NATIONAL FIRE PROTECTION ASSOCIATION)
6. OSHA (OCCUPATIONAL SAFETY AND HEALTH ADMINISTRATION)
7. UL (UNDERWRITERS LABORATORIES INC.)
8. AT&T GROUNDING AND BONDING STANDARDS TP-76416

1.4 SCOPE OF WORK

A. WORK UNDER THIS SECTION SHALL CONSIST OF FURNISHING ALL LABOR, MATERIAL, AND ASSOCIATED SERVICES REQUIRED TO COMPLETE REQUIRED CONSTRUCTION AND BE OPERATIONAL.

B. ALL ELECTRICAL EQUIPMENT UNDER THIS CONTRACT SHALL BE PROPERLY TESTED, ADJUSTED, AND ALIGNED BY THE CONTRACTOR.

C. THE CONTRACTOR SHALL BE RESPONSIBLE FOR ALL EXCAVATING, DRAINING, TRENCHES, BACKFILLING, AND REMOVAL OF EXCESS DIRT.

D. THE CONTRACTOR SHALL FURNISH TO THE OWNER WITH CERTIFICATES OF A FINAL INSPECTION AND APPROVAL FROM THE INSPECTION AUTHORITIES HAVING JURISDICTION.

E. THE CONTRACTOR SHALL PREPARE A COMPLETE SET OF AS-BUILT DRAWINGS, DOCUMENT ALL WIRING EQUIPMENT CONDITIONS, AND CHANGES WHILE COMPLETING THIS CONTRACT. THE AS-BUILT DRAWINGS SHALL BE SUBMITTED AT COMPLETION OF THE PROJECT.

PART 2 - PRODUCTS

2.1 GENERAL:

A. ALL MATERIALS AND EQUIPMENT SHALL BE UL LISTED, NEW, AND FREE FROM DEFECTS.

B. ALL ITEMS OF MATERIALS AND EQUIPMENT SHALL BE ACCEPTABLE TO THE AUTHORITY HAVING JURISDICTION AS SUITABLE FOR THE USE INTENDED.

C. ALL EQUIPMENT SHALL BEAR THE UNDERWRITERS LABORATORIES LABEL OF APPROVAL, AND SHALL CONFORM TO REQUIREMENT OF THE NATIONAL ELECTRICAL CODE.

D. ALL OVERCURRENT DEVICES SHALL HAVE AN INTERRUPTING CURRENT RATING THAT SHALL BE GREATER THAN THE SHORT CIRCUIT CURRENT TO WHICH THEY ARE SUBJECTED, 10,000 AIC MINIMUM. VERIFY AVAILABLE SHORT CIRCUIT CURRENT DOES NOT EXCEED THE RATING OF ELECTRICAL EQUIPMENT IN ACCORDANCE WITH ARTICLE 110.24 NEC OR THE MOST CURRENT ADOPTED CODE PER THE GOVERNING JURISDICTION.

2.2 MATERIALS AND EQUIPMENT:

A. CONDUIT:

1. RIGID METAL CONDUIT (RMC) SHALL BE HOT-DIPPED GALVANIZED INSIDE AND OUTSIDE INCLUDING ENDS AND THREADS AND ENAMELED OR LACQUERED INSIDE IN ADDITION TO GALVANIZING.
2. LIQUIDTIGHT FLEXIBLE METAL CONDUIT SHALL BE UL LISTED.
3. CONDUIT CLAMPS, STRAPS AND SUPPORTS SHALL BE STEEL OR MALLEABLE IRON. ALL FITTINGS SHALL BE COMPRESSION AND CONCRETE TIGHT TYPE. GROUNDING BUSHINGS WITH INSULATED THROATS SHALL BE INSTALLED ON ALL CONDUIT TERMINATIONS.
4. NONMETALLIC CONDUIT AND FITTINGS SHALL BE SCHEDULE 40 PVC. INSTALL USING SOLVENT-CEMENT-TYPE JOINTS AS RECOMMENDED BY THE MANUFACTURER.

B. CONDUCTORS AND CABLE:

1. CONDUCTORS AND CABLE SHALL BE FLAME-RETARDANT, MOISTURE AND HEAT RESISTANT THERMOPLASTIC, SINGLE CONDUCTOR, COPPER, TYPE THHN/THWN-2, 600 VOLT, SIZE AS INDICATED, #12 AWG SHALL BE THE MINIMUM SIZE CONDUCTOR USED.
2. #10 AWG AND SMALLER CONDUCTOR SHALL BE SOLID OR STRANDED AND #8 AWG AND LARGER CONDUCTORS SHALL BE STRANDED.
3. SOLDERLESS, COMPRESSION-TYPE CONNECTORS SHALL BE USED FOR TERMINATION OF ALL STRANDED CONDUCTORS.
4. STRAIN-RELIEF SUPPORTS GRIPS SHALL BE HUBBELL KELLEMS OR APPROVED EQUAL. CABLES SHALL BE SUPPORTED IN ACCORDANCE WITH THE NEC AND CABLE MANUFACTURER'S RECOMMENDATIONS.
5. ALL CONDUCTORS SHALL BE TAGGED AT BOTH ENDS OF THE CONDUCTOR, AT ALL PULL BOXES, J-BOXES, EQUIPMENT AND CABINETS AND SHALL BE IDENTIFIED WITH APPROVED PLASTIC TAGS (ACTION CRAFT, BRADY, OR APPROVED EQUAL).

C. DISCONNECT SWITCHES:

1. DISCONNECT SWITCHES SHALL BE HEAVY DUTY, DEAD-FRONT, QUICK-MAKE, QUICK-BREAK, EXTERNALLY OPERABLE, HANDLE LOCKABLE AND INTERLOCK WITH COVER IN CLOSED POSITION, RATING AS INDICATED, UL LABELED FURNISHED IN NEMA 3R ENCLOSURE, SQUARE-D OR ENGINEER APPROVED EQUAL.

D. CHEMICAL ELECTROLYTIC GROUNDING SYSTEM:

1. INSTALL CHEMICAL GROUNDING AS REQUIRED. THE SYSTEM SHALL BE ELECTROLYTIC MAINTENANCE FREE ELECTRODE CONSISTING OF RODS WITH A MINIMUM #2 AWG CU EXOTHERMICALLY WELDED PIGTAIL, PROTECTIVE BOXES, AND BACKFILL MATERIAL. MANUFACTURER SHALL BE LYNCOLE XIT GROUNDING ROD TYPES K2-(*)CS OR K2L-(*)CS (*) LENGTH AS REQUIRED.
2. GROUND ACCESS BOX SHALL BE A POLYPLASTIC BOX FOR NON-TRAFFIC APPLICATIONS, INCLUDING BOLT DOWN FLUSH COVER WITH "BREATHER" HOLES, XIT MODEL #XB-22. ALL DISCONNECT SWITCHES AND CONTROLLING DEVICES SHALL BE PROVIDED WITH ENGRAVED LAMICOID NAMEPLATES INDICATING EQUIPMENT CONTROLLED, BRANCH CIRCUITS ID NUMBERING, AND THE ELECTRICAL POWER SOURCE.
3. BACKFILL MATERIAL SHALL BE LYNCONITE AND LYNCOLE GROUNDING GRAVEL.

E. SYSTEM GROUNDING:

1. ALL GROUNDING COMPONENTS SHALL BE TINNED AND GROUNDING CONDUCTOR SHALL BE #2 AWG BARE, SOLID, TINNED, COPPER. ABOVE GRADE GROUNDING CONDUCTORS SHALL BE INSULATED WHERE NOTED.
2. GROUNDING BUSES SHALL BE BARE, TINNED, ANNEALED COPPER BARS OF RECTANGULAR CROSS SECTION. STANDARD BUS BARS MGB, SHALL BE FURNISHED AND INSTALLED BY THE CONTRACTOR. THEY SHALL NOT BE FABRICATED OR MODIFIED IN THE FIELD. ALL GROUNDING BUSES SHALL BE IDENTIFIED WITH MINIMUM 3/4" LETTERS BY WAY OF STENCILING OR DESIGNATION PLATE.
3. CONNECTORS SHALL BE HIGH-CONDUCTIVITY, HEAVY DUTY, LISTED AND LABELED AS GROUNDING CONNECTORS FOR THE MATERIALS USED. USE TWO-HOLE COMPRESSION LUGS WITH HEAT SHRINK FOR MECHANICAL CONNECTIONS. INTERIOR CONNECTIONS USE TWO-HOLE COMPRESSION LUGS WITH INSPECTION WINDOW AND CLEAR HEAT SHRINK.
4. EXOTHERMIC WELDED CONNECTIONS SHALL BE PROVIDED IN KIT FORM AND SELECTED FOR THE SPECIFIC TYPES, SIZES, AND COMBINATIONS OF CONDUCTORS AND OTHER ITEMS TO BE CONNECTED.
5. GROUND RODS SHALL BE COPPER-CLAD STEEL WITH HIGH-STRENGTH STEEL CORE AND ELECTROLYTIC-GRADE COPPER OUTER SHEATH, MOLTEN WELDED TO CORE, 5/8"x10'-0". ALL GROUNDING RODS SHALL BE INSTALLED WITH INSPECTION SLEEVES.
6. INSTALL AN EQUIPMENT GROUNDING CONDUCTOR IN ALL CONDUITS IN COMPLIANCE WITH THE AT&T SPECIFICATIONS AND NEC. THE EQUIPMENT GROUNDING CONDUCTORS SHALL BE BONDED AT ALL JUNCTION BOXES, PULLBOXES, DISCONNECT SWITCHES, STARTERS, AND EQUIPMENT CABINETS.

F. OTHER MATERIALS:

6. THE CONTRACTOR SHALL PROVIDE OTHER MATERIALS, THOUGH NOT SPECIFICALLY DESCRIBED, WHICH ARE REQUIRED FOR A COMPLETELY OPERATIONAL SYSTEM AND PROPER INSTALLATION OF THE WORK.
7. PROVIDE PULL BOXES AND JUNCTION BOXES WHERE SHOWN OR REQUIRED BY NEC.

G. PANELS AND LOAD CENTERS:

1. ALL PANEL DIRECTORIES SHALL BE TYPEWRITTEN.

PART 3 - EXECUTION

3.1 GENERAL:

A. ALL MATERIAL AND EQUIPMENT SHALL BE INSTALLED IN STRICT ACCORDANCE WITH THE MANUFACTURER'S RECOMMENDATIONS.

B. EQUIPMENT SHALL BE TIGHTLY COVERED AND PROTECTED AGAINST DIRT OR WATER, AND AGAINST CHEMICAL OR MECHANICAL INJURY DURING INSTALLATION AND CONSTRUCTION PERIODS.

3.2 LABOR AND WORKMANSHIP:

A. ALL LABOR FOR THE INSTALLATION OF MATERIALS AND EQUIPMENT FURNISHED FOR THE ELECTRICAL SYSTEM SHALL BE INSTALLED BY EXPERIENCED WIREMEN, IN A NEAT AND WORKMAN-LIKE MANNER.

B. ALL ELECTRICAL EQUIPMENT SHALL BE ADJUSTED, ALIGNED AND TESTED BY THE CONTRACTOR AS REQUIRED TO PRODUCE THE INTENDED PERFORMANCE.

C. UPON COMPLETION OF WORK, THE CONTRACTOR SHALL THOROUGHLY CLEAN ALL EXPOSED EQUIPMENT, REMOVE ALL LABELS AND ANY DEBRIS, CRATING OR CARTONS AND LEAVE THE INSTALLATION FINISHED AND READY FOR OPERATION.

3.3 COORDINATION:

A. THE CONTRACTOR SHALL COORDINATE THE INSTALLATION OF ELECTRICAL ITEMS WITH THE OWNER-FURNISHED EQUIPMENT DELIVERY SCHEDULE TO PREVENT UNNECESSARY DELAYS IN THE TOTAL WORK.

3.4 INSTALLATION:

A. CONDUIT:

1. ALL ELECTRICAL WIRING SHALL BE INSTALLED IN CONDUIT AS SPECIFIED. NO CONDUIT OR TUBING OF LESS THAN 3/4 INCH TRADE SIZE.
2. PROVIDE RIGID PVC SCHEDULE 80 CONDUITS FOR ALL RISERS, RMC OTHERWISE NOTED. EMT MAY BE INSTALLED FOR EXTERIOR CONDUITS WHERE NOT SUBJECT TO PHYSICAL DAMAGE.
3. INSTALL SCHEDULE 40 PVC CONDUIT WITH A MINIMUM COVER OF 24" UNDER ROADWAYS, PARKING LOTS, STREETS, AND ALLEYS. CONDUIT SHALL HAVE A MINIMUM COVER OF 18" IN ALL OTHER NON-TRAFFIC APPLICATIONS (REFER TO 2017 NEC, TABLE 300.5).
4. USE GALVANIZED FLEXIBLE STEEL CONDUIT WHERE DIRECT CONNECTION TO EQUIPMENT WITH MOVEMENT, VIBRATION, OR FOR EASE OF MAINTENANCE. USE LIQUID TIGHT, FLEXIBLE METAL CONDUIT FOR OUTDOOR APPLICATIONS. INSTALL GALVANIZED FLEXIBLE STEEL CONDUIT AT ALL POINTS OF CONNECTION TO EQUIPMENT MOUNTED ON SUPPORT TO ALLOW FOR EXPANSION AND CONTRACTION.
5. A RUN OF CONDUIT BETWEEN BOXES OR EQUIPMENT SHALL NOT CONTAIN MORE THAN THE EQUIVALENT OF THREE QUARTER-BENDS. CONDUIT BEND SHALL BE MADE WITH THE UL LISTED BENDER OR FACTORY 90 DEGREE ELBOWS MAY BE USED.
6. FIELD FABRICATED CONDUITS SHALL BE CUT SQUARE WITH A CONDUIT CUTTING TOOL AND REAMED TO PROVIDE A SMOOTH INSIDE SURFACE.
7. PROVIDE INSULATED GROUNDING BUSHING FOR ALL CONDUITS.
8. CONTRACTOR IS RESPONSIBLE FOR PROTECTING ALL CONDUITS DURING CONSTRUCTION. TEMPORARY OPENINGS IN THE CONDUIT SYSTEM SHALL BE PLUGGED OR CAPPED TO PREVENT ENTRANCE OF MOISTURE OR FOREIGN MATTER. CONTRACTOR SHALL REPLACE ANY CONDUITS CONTAINING FOREIGN MATERIALS THAT CANNOT BE REMOVED.
9. ALL CONDUITS SHALL BE SWABBED CLEAN BY PULLING AN APPROPRIATE SIZE MANDREL THROUGH THE CONDUIT BEFORE INSTALLATION OF CONDUCTORS OR CABLES. CONDUIT SHALL BE FREE OF DIRT AND DEBRIS.
10. INSTALL PULL STRINGS IN ALL CLEAN EMPTY CONDUITS. IDENTIFY PULL STRINGS AT EACH END.
11. INSTALL 2" HIGHLY VISIBLE AND DETECTABLE TAPE 12" ABOVE ALL UNDERGROUND CONDUITS AND CONDUCTORS.
12. CONDUITS SHALL BE INSTALLED IN SUCH A MANNER AS TO INSURE AGAINST COLLECTION OF TRAPPED CONDENSATION.
13. PROVIDE CORE DRILLING AS NECESSARY FOR PENETRATIONS TO ALLOW FOR RACEWAYS AND CABLES TO BE ROUTED THROUGH THE BUILDING. DO NOT PENETRATE STRUCTURAL MEMBERS. SLEEVES AND/OR PENETRATIONS IN FIRE RATED CONSTRUCTION SHALL BE EFFECTIVELY SEALED WITH FIRE RATED MATERIAL WHICH SHALL MAINTAIN THE FIRE RATING OF THE WALL OR STRUCTURE. FIRE STOPS AT FLOOR PENETRATIONS SHALL PREVENT PASSAGE OF WATER, SMOKE, FIRE, AND FUMES. ALL MATERIAL SHALL BE UL APPROVED FOR THIS PURPOSE.

B. CONDUCTORS AND CABLE:

1. ALL POWER WIRING SHALL BE COLOR CODED AS FOLLOWS:

DESCRIPTION	208/240/120 VOLT SYSTEMS
PHASE A	BLACK
PHASE B	RED
PHASE C	BLUE
NEUTRAL	WHITE
GROUNDING	GREEN

2. SPLICES SHALL BE MADE ONLY AT OUTLETS, JUNCTION BOXES, OR ACCESSIBLE RACEWAY CONDUITS APPROVED FOR THIS PURPOSE.
3. PULLING LUBRICANTS SHALL BE UL APPROVED. CONTRACTOR SHALL USE NYLON OR HEMP ROPE FOR PULLING CONDUCTOR OR CABLES INTO THE CONDUIT.
4. CABLES SHALL BE NEATLY TRAINED, WITHOUT INTERLACING, AND BE OF SUFFICIENT LENGTH IN ALL BOXES & EQUIPMENT TO PERMIT MAKING A NEAT ARRANGEMENT. CABLES SHALL BE SECURED IN A MANNER TO AVOID TENSION ON CONDUCTORS OR TERMINALS. CONDUCTORS SHALL BE PROTECTED FROM MECHANICAL INJURY AND MOISTURE. SHARP BENDS OVER CONDUIT BUSHINGS IS PROHIBITED. DAMAGED CABLES SHALL BE REMOVED AND REPLACED AT THE CONTRACTOR'S EXPENSE.

C. DISCONNECT SWITCHES:

1. INSTALL DISCONNECT SWITCHES LEVEL AND PLUMB. CONNECT TO WIRING SYSTEM AND GROUNDING SYSTEM AS INDICATED.

D. GROUNDING:

1. ALL METALLIC PARTS OF ELECTRICAL EQUIPMENT WHICH DO NOT CARRY CURRENT SHALL BE GROUNDED IN ACCORDANCE WITH THE REQUIREMENTS OF THE BUILDING MANUFACTURER, AT&T GROUNDING AND BONDING STANDARDS TP-76416, ND-00135, AND THE NATIONAL ELECTRICAL CODE.
2. PROVIDE ELECTRICAL GROUNDING AND BONDING SYSTEM INDICATED WITH ASSEMBLY OF MATERIALS, INCLUDING GROUNDING ELECTRODES, BONDING JUMPERS AND ADDITIONAL ACCESSORIES AS REQUIRED FOR A COMPLETE INSTALLATION.
3. ALL GROUNDING CONDUCTORS SHALL PROVIDE A STRAIGHT DOWNWARD PATH TO GROUND WITH GRADUAL BEND AS REQUIRED. GROUNDING CONDUCTORS SHALL NOT BE LOOPED OR SHARPLY BENT. ROUTE GROUNDING CONNECTIONS AND CONDUCTORS TO GROUND IN THE SHORTEST AND STRAIGHTEST PATHS POSSIBLE TO MINIMIZE TRANSIENT VOLTAGE RISES.
4. BUILDINGS AND/OR NEW TOWERS GREATER THAN 75 FEET IN HEIGHT AND WHERE THE MAIN GROUNDING CONDUCTORS ARE REQUIRED TO BE ROUTED TO GRADE, THE CONTRACTOR SHALL ROUTE TWO GROUNDING CONDUCTORS FROM THE ROOFTOP, TOWERS, AND WATER TOWERS GROUNDING RING, TO THE EXISTING GROUNDING SYSTEM, THE GROUNDING CONDUCTORS SHALL NOT BE SMALLER THAN 2/0 AWG COPPER. ROOFTOP GROUNDING RING SHALL BE BONDED TO THE EXISTING GROUNDING SYSTEM, THE BUILDING STEEL COLUMNS, LIGHTNING PROTECTION SYSTEM, AND BUILDING MAIN WATER LINE (FERROUS OR NONFERROUS METAL PIPING ONLY). SEE STANDARD 6.3.2.2.
5. TIGHTEN GROUNDING AND BONDING CONNECTORS, INCLUDING SCREWS AND BOLTS, IN ACCORDANCE WITH MANUFACTURER'S PUBLISHED TORQUE TIGHTENING VALUES FOR CONNECTORS AND BOLTS. WHERE MANUFACTURER'S TORQUING REQUIREMENTS ARE NOT AVAILABLE, TIGHTEN CONNECTIONS TO COMPLY WITH TIGHTENING TORQUE VALUES SPECIFIED IN UL TO ASSURE PERMANENT AND EFFECTIVE GROUNDING.
6. CONTRACTOR SHALL VERIFY THE LOCATIONS OF GROUNDING TIE-IN-POINTS TO THE EXISTING GROUNDING SYSTEM. ALL UNDERGROUND GROUNDING CONNECTIONS SHALL BE MADE BY THE EXOTHERMIC WELD PROCESS AND INSTALLED IN ACCORDANCE WITH THE MANUFACTURER'S INSTRUCTIONS.
7. ALL GROUNDING CONNECTIONS SHALL BE INSPECTED FOR TIGHTNESS. EXOTHERMIC WELDED CONNECTIONS SHALL BE APPROVED BY THE INSPECTOR HAVING JURISDICTION BEFORE BEING PERMANENTLY CONCEALED.
8. APPLY CORROSION-RESISTANT FINISH TO FIELD CONNECTIONS AND PLACES WHERE FACTORY APPLIED PROTECTIVE COATINGS HAVE BEEN DESTROYED. USE KOPR-SHIELD ANTI-OXIDATION COMPOUND ON ALL COMPRESSION GROUNDING CONNECTIONS.
9. A SEPARATE, CONTINUOUS, INSULATED EQUIPMENT GROUNDING CONDUCTOR SHALL BE INSTALLED IN ALL FEEDER AND BRANCH CIRCUITS.
10. BOND ALL INSULATED GROUNDING BUSHINGS WITH A BARE #6 AWG GROUNDING CONDUCTOR TO A GROUND BUS.
11. DIRECT BURIED GROUNDING CONDUCTORS SHALL BE INSTALLED AT A NOMINAL DEPTH OF 36" MINIMUM BELOW GRADE, OR 6" BELOW THE FROST LINE, USE THE GREATER OF THE TWO DISTANCES.
12. ALL GROUNDING CONDUCTORS EMBEDDED IN OR PENETRATING CONCRETE SHALL BE INSTALLED IN SCHEDULE 40 PVC CONDUIT.
13. THE INSTALLATION OF CHEMICAL ELECTROLYTIC GROUNDING SYSTEM IN STRICT ACCORDANCE WITH MANUFACTURER'S INSTRUCTIONS. REMOVE SEALING TAPE FROM LEACHING AND BREATHER HOLES. INSTALL PROTECTIVE BOX FLUSH WITH GRADE.
14. DRIVE GROUND RODS UNTIL TOPS ARE A MINIMUM DISTANCE OF 36" DEPTH OR 6" BELOW FROST LINE, USING THE GREATER OF THE TWO DISTANCES.
15. IF COAX ON THE ICE BRIDGE IS MORE THAN 6 FT. FROM THE GROUNDING BAR AT THE BASE OF THE TOWER, A SECOND GROUNDING BAR WILL BE NEEDED AT THE END OF THE ICE BRIDGE, TO GROUND THE COAX CABLE GROUNDING KITS AND IN-LINE ARRESTORS.
16. CONTRACTOR SHALL REPAIR, AND/OR REPLACE, EXISTING GROUNDING SYSTEM COMPONENTS DAMAGED DURING CONSTRUCTION AT THE CONTRACTORS EXPENSE.

3.5 ACCEPTANCE TESTING:

A. CERTIFIED PERSONNEL USING CERTIFIED EQUIPMENT SHALL PERFORM REQUIRED TESTS AND SUBMIT WRITTEN TEST REPORTS UPON COMPLETION.

B. WHEN MATERIAL AND/OR WORKMANSHIP IS FOUND NOT TO COMPLY WITH THE SPECIFIED REQUIREMENTS, THE NON-COMPLYING ITEMS SHALL BE REMOVED FROM THE PROJECT SITE AND REPLACED WITH ITEMS COMPLYING WITH THE SPECIFIED REQUIREMENTS PROMPTLY AFTER RECEIPT OF NOTICE FOR NON-COMPLIANCE.

C. TEST PROCEDURES:

1. ALL FEEDERS SHALL HAVE INSULATION TESTED AFTER INSTALLATION, BEFORE CONNECTION TO DEVICES. THE CONDUCTORS SHALL TEST FREE FROM SHORT CIRCUITS AND GROUNDS. TESTING SHALL BE FOR ONE MINUTE USING 1000V DC. PROVIDE WRITTEN DOCUMENTATION FOR ALL TEST RESULTS.
2. PRIOR TO ENERGIZING CIRCUITRY, TEST WIRING DEVICES FOR ELECTRICAL CONTINUITY AND PROPER POLARITY CONNECTIONS.
3. MEASURE AND RECORD VOLTAGES BETWEEN PHASES AND BETWEEN PHASE CONDUCTORS AND NEUTRALS. SUBMIT A REPORT OF MAXIMUM AND MINIMUM VOLTAGES.
4. PERFORM GROUNDING TEST TO MEASURE GROUNDING RESISTANCE OF GROUNDING SYSTEM USING THE IEEE STANDARD 3-POINT "FALL-OF-POTENTIAL" METHOD. PROVIDE PLOTTED TEST VALUES AND LOCATION SKETCH. NOTIFY THE ENGINEER IMMEDIATELY IF MEASURED VALUE IS OVER 5 OHMS.

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DANIEL J. CORNING
24055
LICENSED
PROFESSIONAL ENGINEER

PROJECT NO: ERCC0004
DRAWN BY: CM
CHECKED BY: DJC

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HARWINTON -
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GENERAL NOTES I

GN-1

ANTENNA MOUNTING

1. DESIGN AND CONSTRUCTION OF ANTENNA SUPPORTS SHALL CONFORM TO CURRENT ANSI/TIA-222 OR APPLICABLE LOCAL CODES.
2. ALL STEEL MATERIALS SHALL BE GALVANIZED AFTER FABRICATION IN ACCORDANCE WITH ASTM A123 "ZINC (HOT-DIP GALVANIZED) COATINGS ON IRON AND STEEL PRODUCTS", UNLESS NOTED OTHERWISE.
3. ALL BOLTS, ANCHORS AND MISCELLANEOUS HARDWARE SHALL BE GALVANIZED IN ACCORDANCE WITH ASTM A153 "ZINC-COATING (HOT-DIP) ON IRON AND STEEL HARDWARE", UNLESS NOTED OTHERWISE.
4. DAMAGED GALVANIZED SURFACES SHALL BE REPAIRED BY COLD GALVANIZING IN ACCORDANCE WITH ASTM A780.
5. ALL ANTENNA MOUNTS SHALL BE INSTALLED WITH LOCK NUTS, DOUBLE NUTS AND SHALL BE TORQUED TO MANUFACTURER'S RECOMMENDATIONS.
6. CONTRACTOR SHALL INSTALL ANTENNA PER MANUFACTURER'S RECOMMENDATION FOR INSTALLATION AND GROUNDING.
7. ALL UNUSED PORTS ON ANY ANTENNAS SHALL BE TERMINATED WITH A 50-OHM LOAD TO ENSURE ANTENNAS PERFORM AS DESIGNED.
8. PRIOR TO SETTING ANTENNA AZIMUTHS AND DOWNTILTS, ANTENNA CONTRACTOR SHALL CHECK THE ANTENNA MOUNT FOR TIGHTNESS AND ENSURE THAT THEY ARE PLUMB. ANTENNA AZIMUTHS SHALL BE SET FROM TRUE NORTH AND BE ORIENTED WITHIN +/- 5% AS DEFINED BY THE RFDS. ANTENNA DOWNTILTS SHALL BE WITHIN +/- 0.5% AS DEFINED BY THE RFDS. REFER TO ND-00246.
9. JUMPERS FROM THE TMA'S MUST TERMINATE TO OPPOSITE POLARIZATION'S IN EACH SECTOR.
10. CONTRACTOR SHALL RECORD THE SERIAL #, SECTOR, AND POSITION OF EACH ACTUATOR INSTALLED AT THE ANTENNAS AND PROVIDE THE INFORMATION TO AT&T.
11. TMA'S SHALL BE MOUNTED ON PIPE DIRECTLY BEHIND ANTENNAS AS CLOSE TO ANTENNA AS FEASIBLE IN A VERTICAL POSITION.

TORQUE REQUIREMENTS

12. ALL RF CONNECTIONS SHALL BE TIGHTENED BY A TORQUE WRENCH.
13. ALL RF CONNECTIONS, GROUNDING HARDWARE AND ANTENNA HARDWARE SHALL HAVE A TORQUE MARK INSTALLED IN A CONTINUOUS STRAIGHT LINE FROM BOTH SIDES OF THE CONNECTION.
    A. RF CONNECTION BOTH SIDES OF THE CONNECTOR.
    B. GROUNDING AND ANTENNA HARDWARE ON THE NUT SIDE STARTING FROM THE THREADS TO THE SOLID SURFACE. EXAMPLE OF SOLID SURFACE: GROUND BAR, ANTENNA BRACKET METAL.
    C. ALL 8M ANTENNA HARDWARE SHALL BE TIGHTENED TO 9 LB-FT (12 NM).
14. ALL 12M ANTENNA HARDWARE SHALL BE TIGHTENED TO 43 LB-FT (58 NM).
15. ALL GROUNDING HARDWARE SHALL BE TIGHTENED UNTIL THE LOCK WASHER COLLAPSES AND THE GROUNDING HARDWARE IS NO LONGER LOOSE.
16. ALL DIN TYPE CONNECTIONS SHALL BE TIGHTENED TO 18-22 LB-FT (24.4 - 29.8 NM).
17. ALL N TYPE CONNECTIONS SHALL BE TIGHTENED TO 15-20 LB-IN (1.7 - 2.3 NM).

FIBER & POWER CABLE MOUNTING

18. THE FIBER OPTIC TRUNK CABLES SHALL BE INSTALLED INTO CONDUITS, CHANNEL CABLE TRAYS, OR CABLE TRAY. WHEN INSTALLING FIBER OPTIC TRUNK CABLES INTO A CABLE TRAY SYSTEM, THEY SHALL BE INSTALLED INTO AN INTER DUCT AND A PARTITION BARRIER SHALL BE INSTALLED BETWEEN THE 600 VOLT CABLES AND THE INTER DUCT IN ORDER TO SEGREGATE CABLE TYPES. OPTIC FIBER TRUNK CABLES SHALL HAVE APPROVED CABLE RESTRAINTS EVERY (60) SIXTY FEET AND SECURELY FASTENED TO THE CABLE TRAY SYSTEM. NFPA 70 (NEC) ARTICLE 770 RULES SHALL APPLY.
19. THE TYPE TC-ER CABLES SHALL BE INSTALLED INTO CONDUITS, CHANNEL CABLE TRAYS, OR CABLE TRAY AND SHALL BE SECURED AT INTERVALS NOT EXCEEDING (6) SIX FEET. AN EXCEPTION; WHERE TYPE TC-ER CABLES ARE NOT SUBJECT TO PHYSICAL DAMAGE, CABLES SHALL BE PERMITTED TO MAKE A TRANSITION BETWEEN CONDUITS, CHANNEL CABLE TRAYS, OR CABLE TRAY WHICH ARE SERVING UTILIZATION EQUIPMENT OR DEVICES, A DISTANCE (6) SIX FEET SHALL NOT BE EXCEEDED WITHOUT CONTINUOUS SUPPORTING. NFPA 70 (NEC) ARTICLES 336 AND 392 RULES SHALL APPLY.
20. WHEN INSTALLING OPTIC FIBER TRUNK CABLES OR TYPE TC-ER CABLES INTO CONDUITS, NFPA 70 (NEC) ARTICLE 300 RULES SHALL APPLY.

COAXIAL CABLE NOTES

21. TYPES AND SIZES OF THE ANTENNA CABLE ARE BASED ON ESTIMATED LENGTHS. PRIOR TO ORDERING CABLE, CONTRACTOR SHALL VERIFY ACTUAL LENGTH BASED ON CONSTRUCTION LAYOUT AND NOTIFY THE PROJECT MANAGER IF ACTUAL LENGTHS EXCEED ESTIMATED LENGTHS.
22. CONTRACTOR SHALL VERIFY THE DOWN-TILT OF EACH ANTENNA WITH A DIGITAL LEVEL.
23. CONTRACTOR SHALL CONFIRM COAX COLOR CODING PRIOR TO CONSTRUCTION. REFER TO "ANTENNA SYSTEM LABELING STANDARD" ND-00027 LATEST VERSION.
24. ALL JUMPERS TO THE ANTENNAS FROM THE MAIN TRANSMISSION LINE SHALL BE 1/2" DIA. LDF AND SHALL NOT EXCEED 6'-0".
25. ALL COAXIAL CABLE SHALL BE SECURED TO THE DESIGNED SUPPORT STRUCTURE, IN AN APPROVED MANNER, AT DISTANCES NOT TO EXCEED 4'-0" O.C.
26. CONTRACTOR SHALL FOLLOW ALL MANUFACTURER'S RECOMMENDATIONS REGARDING BOTH THE INSTALLATION AND GROUNDING OF ALL COAXIAL CABLES, CONNECTORS, ANTENNAS, AND ALL OTHER EQUIPMENT.
27. CONTRACTOR SHALL WEATHERPROOF ALL ANTENNA CONNECTORS WITH SELF AMALGAMATING TAPE. WEATHERPROOFING SHALL BE COMPLETED IN STRICT ACCORDANCE WITH AT&T STANDARDS.
28. CONTRACTOR SHALL GROUND ALL EQUIPMENT. INCLUDING ANTENNAS, RET MOTORS, TMA'S, COAX CABLES, AND RET CONTROL CABLES AS A COMPLETE SYSTEM. GROUNDING SHALL BE EXECUTED BY QUALIFIED WIREMEN IN COMPLIANCE WITH MANUFACTURER'S SPECIFICATION AND RECOMMENDATION.
29. CONTRACTOR SHALL PROVIDE STRAIN-RELIEF AND CABLE SUPPORTS FOR ALL CABLE ASSEMBLIES, COAX CABLES, AND RET CONTROL CABLES. CABLE STRAIN-RELIEFS AND CABLE SUPPORTS SHALL BE APPROVED FOR THE PURPOSE. INSTALLATION SHALL BE IN ACCORDANCE WITH MANUFACTURER'S SPECIFICATIONS AND RECOMMENDATIONS.
30. CONTRACTOR TO VERIFY THAT EXISTING COAX HANGERS ARE STACKABLE SNAP IN HANGERS. IF EXISTING HANGERS ARE NOT STACKABLE SNAP IN HANGERS THE CONTRACTOR SHALL REPLACE EXISTING HANGERS WITH NEW SNAP IN HANGERS IF APPLICABLE.

GENERAL CABLE AND EQUIPMENT NOTES

31. CONTRACTOR SHALL BE RESPONSIBLE TO VERIFY ANTENNA, TMAS, DIPLEXERS, AND COAX CONFIGURATION, MAKE AND MODELS PRIOR TO INSTALLATION.
32. ALL CONNECTIONS FOR HANGERS, SUPPORTS, BRACING, ETC. SHALL BE INSTALLED PER TOWER MANUFACTURER'S RECOMMENDATIONS.
33. CONTRACTOR SHALL REFERENCE THE TOWER STRUCTURAL ANALYSIS/DESIGN DRAWINGS FOR DIRECTIONS ON CABLE DISTRIBUTION/ROUTING.
34. ALL OUTDOOR RF CONNECTORS/CONNECTIONS SHALL BE WEATHERPROOFED, EXCEPT THE RET CONNECTORS, USING BUTYL TAPE AFTER INSTALLATION AND FINAL CONNECTIONS ARE MADE. BUTYL TAPE SHALL HAVE A MINIMUM OF ONE-HALF TAPE WIDTH OVERLAP ON EACH TURN AND EACH LAYER SHALL BE WRAPPED THREE TIMES. WEATHERPROOFING SHALL BE SMOOTH WITHOUT BUCKLING. BUTYL BLEEDING IS NOT ALLOWED.
35. IF REQUIRED TO PAINT ANTENNAS AND/OR COAX:
    A. TEMPERATURE SHALL BE ABOVE 50° F.
    B. PAINT COLOR MUST BE APPROVED BY BUILDING OWNER/LANDLORD.
    C. FOR REGULATED TOWERS, FAA/FCC APPROVED PAINT IS REQUIRED.
    D. DO NOT PAINT OVER COLOR CODING OR ON EQUIPMENT MODEL NUMBERS.
36. ALL CABLES SHALL BE GROUNDED WITH COAXIAL CABLE GROUND KITS. FOLLOW THE MANUFACTURER'S RECOMMENDATIONS.
    A. GROUNDING AT THE ANTENNA LEVEL.
    B. GROUNDING AT MID LEVEL, TOWERS WHICH ARE OVER 200'-0", ADDITIONAL CABLE GROUNDING REQUIRED.
    C. GROUNDING AT BASE OF TOWER PRIOR TO TURNING HORIZONTAL.
    D. GROUNDING OUTSIDE THE EQUIPMENT SHELTER AT ENTRY PORT.
    E. GROUNDING INSIDE THE EQUIPMENT SHELTER AT THE ENTRY PORT.
37. ALL PROPOSED GROUND BAR DOWNLEADS ARE TO BE TERMINATED TO THE EXISTING ADJACENT GROUND
38. BAR DOWNLEADS A MINIMUM DISTANCE OF 4'-0" BELOW GROUND BAR. TERMINATIONS MAY BE EXOTHERMIC OR COMPRESSION.
39. THE CONTRACTOR SHALL BE RESPONSIBLE FOR VERIFYING THE ANTENNA AND THE COAX CONFIGURATION IS THE CORRECT MAKE AND MODELS, PRIOR TO INSTALLATION.
40. ALL CONNECTIONS FOR HANGERS, SUPPORTS, BRACING, ETC. SHALL BE INSTALLED PER TOWER MANUFACTURER'S SPECIFICATION & RECOMMENDATIONS.
41. ANTENNA CONTRACTOR SHALL FURNISH AND INSTALL A 12'-0" T-BOOM SECTOR ANTENNA MOUNT, IF APPLICABLE, INCLUDING ALL HARDWARE.

GROUNDING NOTES

42. GROUNDING IS SHOWN DIAGRAMMATICALLY ONLY.
43. CONTRACTOR SHALL GROUND ALL EQUIPMENT AS A COMPLETE SYSTEM. GROUNDING SHALL BE IN COMPLIANCE WITH NEC SECTION 250 AND AT&T GROUNDING AND BONDING REQUIREMENTS (ATT-TP-76416) AND MANUFACTURER'S SPECIFICATIONS.
44. ALL GROUND CONDUCTORS SHALL BE COPPER; NO ALUMINUM CONDUCTORS SHALL BE USED.
45. ALL CABLES SHALL BE GROUNDED WITH COAXIAL CABLE GROUNDING KITS. FOLLOW THE MANUFACTURER'S RECOMMENDATIONS.
    A. GROUNDING AT THE ANTENNA LEVEL.
    B. GROUNDING AT MID LEVEL, TOWERS WHICH ARE OVER 200', ADDITIONAL CABLE GROUNDING REQUIRED.
    C. GROUNDING AT BASE OF TOWER PRIOR TO TURNING HORIZONTAL.
    D. GROUNDING OUTSIDE THE EQUIPMENT SHELTER AT ENTRY PORT.
    E. GROUNDING INSIDE THE EQUIPMENT SHELTER AT THE ENTRY PORT.
46. ALL PROPOSED GROUNDING BAR DOWNLEADS ARE TO BE TERMINATED TO THE EXISTING ADJACENT GROUNDING BAR DOWNLEADS A MINIMUM DISTANCE OF 4'-0" BELOW GROUNDING BAR. TERMINATIONS MAY BE EXOTHERMIC OR COMPRESSION.

EXOTHERMIC CONNECTION
MECHANICAL CONNECTION
CHEMICAL ELECTROLYTIC GROUNDING SYSTEM
TEST CHEMICAL ELECTROLYTIC GROUNDING SYSTEM
EXOTHERMIC WITH INSPECTION SLEEVE
GROUNDING BAR
SHELTER GROUNDING BAR
GROUND ROD
TEST GROUND ROD WITH INSPECTION SLEEVE
SINGLE POLE SWITCH
DUPLEX RECEPTACLE
DUPLEX GFCI RECEPTACLE
FLUORESCENT LIGHTING FIXTURE (2) TWO LAMPS 48-T8
EXISTING SMOKE DETECTION (DC)
EXISTING EMERGENCY LIGHTING (DC)
SECURITY LIGHT W/PHOTOCELL LITHONIA ALXW LED-1-25A400/51K-SR4-120-PE-DDBTXD
EXISTING UTILITY POLE
EXISTING CHAIN LINK FENCE
EXISTING WOOD/WROUGHT IRON FENCE
EXISTING WALL STRUCTURE
LEASE AREA
PROPERTY LINE (PL)
SETBACKS
PROPOSED/EXISTING ICE BRIDGE
PROPOSED/EXISTING CABLE TRAY
EXISTING WATER LINE
PROPOSED UNDERGROUND POWER
PROPOSED UNDERGROUND TELCO
PROPOSED OVERHEAD POWER
PROPOSED OVERHEAD TELCO
PROPOSED OVERHEAD UTILITIES
PROPOSED ABOVE GROUND POWER
PROPOSED ABOVE GROUND TELCO

CALLOUT REFERENCE
REVISION REFERENCE
WORKPOINT
SECTION REFERENCE
DETAIL REFERENCE
ELEVATION REFERENCE

AB	ANCHOR BOLT	COL	COLUMN
ABV	ABOVE	COMM	COMMON
AC	ALTERNATING CURRENT	CONC	CONCRETE
ADDL	ADDITIONAL	CONSTR	CONSTRUCTION
AFF	ABOVE FINISHED FLOOR	DBL	DOUBLE
AFG	ABOVE FINISHED GRADE	DC	DIRECT CURRENT
AIC	AMPERAGE INTERRUPTION CAPACITY	DEPT	DEPARTMENT
ALUM	ALUMINUM	DF	DOUGLAS FIR
ALT	ALTERNATE	DIA	DIAMETER
ANT	ANTENNA	DIAG	DIAGONAL
APPROX	APPROXIMATE	DIM	DIMENSION
ARCH	ARCHITECTURAL	DWG	DRAWING
ATS	AUTOMATIC TRANSFER SWITCH	DWL	DOWEL
AWG	AMERICAN WIRE GAUGE	(E)	EXISTING
BATT	BATTERY	EA	EACH
BLDG	BUILDING	EC	ELECTRICAL CONDUCTOR
BLK	BLOCK	EL	ELEVATION
BLKG	BLOCKING	ELEC	ELECTRICAL
BM	BEAM	EMT	ELECTRICAL METALLIC TUBING
BTC	BARE TINNED COPPER CONDUCTOR	ENG	ENGINEER
BOF	BOTTOM OF FOOTING	EQ	EQUAL
CAB	CABINET	EXP	EXPANSION
CANT	CANTILEVERED	EXT	EXTERIOR
CEC	CALIFORNIA ELECTRIC CODE	FAB	FABRICATION
CHG	CHARGING	FF	FINISH FLOOR
CLG	CEILING	FG	FINISH GRADE
CLR	CLEAR	FIF	FACILITY INTERFACE FRAME
FIN	FINISH(ED)	MAS	MASONRY
FLR	FLOOR	MAX	MAXIMUM
FDN	FOUNDATION	MB	MACHINE BOLT
FOC	FACE OF CONCRETE	MECH	MECHANICAL
FOM	FACE OF MASONRY	MFR	MANUFACTURER
FOS	FACE OF STUD	MGB	MASTER GROUND BAR
FOW	FACE OF WALL	MIN	MINIMUM
FS	FINISH SURFACE	MISC	MISCELLANEOUS
FT	FOOT	MTL	METAL
FTG	FOOTING	MTS	MANUAL TRANSFER SWITCH
GA	GAUGE	MW	MICROWAVE
GEN	GENERATOR	(N)	NEW
GFCI	GROUND FAULT CIRCUIT INTERRUPTER	NEC	NATIONAL ELECTRIC CODE
GLB	GLUE LAMINATED BEAM	NO.(#)	NUMBER
GLV	GALVANIZED	NTS	NOT TO SCALE
GPS	GLOBAL POSITIONING SYSTEM	OC	ON CENTER
GND	GROUND	OPNG	OPENING
GSM	GLOBAL SYSTEM FOR MOBILE	(P)	PROPOSED
HDR	HEADER	P/C	PRECAST CONCRETE
HGR	HANGER	PCS	PERSONAL COMMUNICATION SERVICES
HVAC	HEAT/VENTILATION/AIR CONDITIONING	PCU	PRIMARY CONTROL UNIT
HT	HEIGHT	PRC	PRIMARY RADIO CABINET
IGR	INTERIOR GROUND RING	PP	POLARIZING PRESERVING
IN	INCH	PSF	POUNDS PER SQUARE FOOT
INT	INTERIOR	PSI	POUNDS PER SQUARE INCH
LB(S)	POUND(S)	PT	PRESSURE TREATED
LF	LINEAR FEET	PWR	POWER CABINET
QTY	QUANTITY	TOF	TOP OF FOUNDATION
RAD	RADIUS	TOP	TOP OF PLATE (PARAPET)
RECT	RECTIFIER	TOS	TOP OF STEEL
REF	REFERENCE	TOW	TOP OF WALL
REINF	REINFORCEMENT	TVSS	TRANSIENT VOLTAGE SUPPRESSION
REQ'D	REQUIRED		SYSTEM
RET	REMOTE ELECTRIC TILT	TYP	TYPICAL
RMC	RIGID METALLIC CONDUIT	UG	UNDERGROUND
RRH	REMOTE RADIO HEAD	UL	UNDERWRITERS LABORATORY
RRU	REMOTE RADIO UNIT	UNO	UNLESS NOTED OTHERWISE
RWY	RACEWAY	UMTS	UNIVERSAL MOBILE
SCH	SCHEDULE		TELECOMMUNICATIONS SYSTEM
SHT	SHEET	UPS	UNINTERRUPTIBLE POWER SYSTEM
SIAD	SMART INTEGRATED DEVICE		(DC POWER PLANT)
SIM	SIMILAR	VIF	VERIFIED IN FIELD
SPEC	SPECIFICATION	W	WIDE
SQ	SQUARE	W/	WITH
SS	STAINLESS STEEL	WD	WOOD
STD	STANDARD	W.P.	WORK POINT
STL	STEEL	WP	WEATHERPROOF
STRUCT	STRUCTURAL	WT	WEIGHT
TEMP	TEMPORARY		
THK	THICKNESS		
TMA	TOWER MOUNTED AMPLIFIER		
TN	TOE NAIL		
TOA	TOP OF ANTENNA		
TOC	TOP OF CURB		

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STATE OF CONNECTICUT
DANIEL J. CORNING
24051
LICENSED
PROFESSIONAL ENGINEER

PROJECT NO: ERCC0004

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CHECKED BY: DJC

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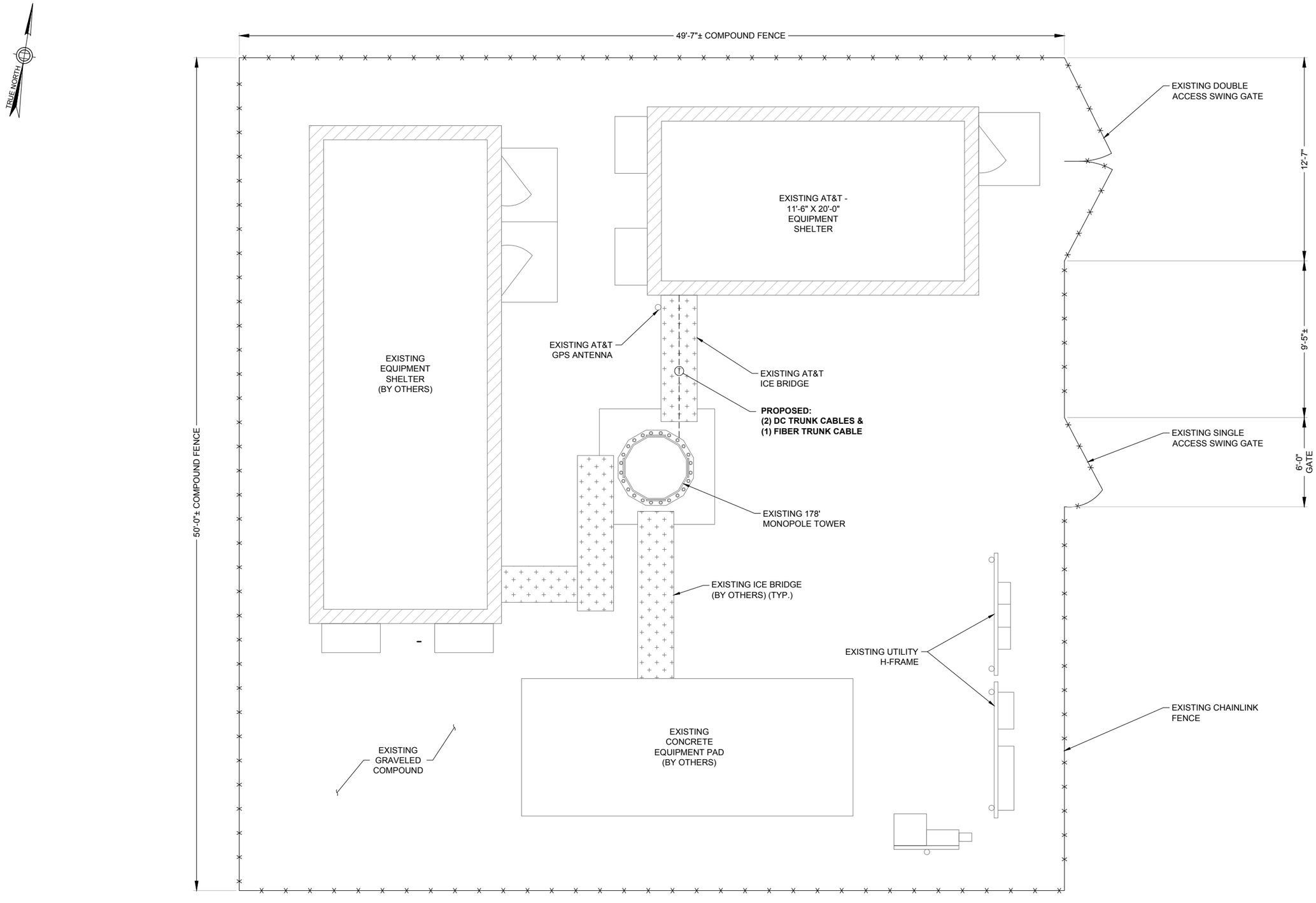
64 HUNGERFORD LANE
HARWINTON, CT 06791

GENERAL NOTES II

GN-2



NOTES:

1. PLAN BASED ON CONSTRUCTION DRAWINGS ISSUED BY CENTEK ENGINEERING CENTERED ON SOLUTIONS ON 10/08/12. CONTRACTOR TO FIELD VERIFY ALL DIMENSIONS AND LOCATION/ORIENTATION OF EXISTING EQUIPMENT.

1 SITE PLAN

SCALE: 3/8"=1'

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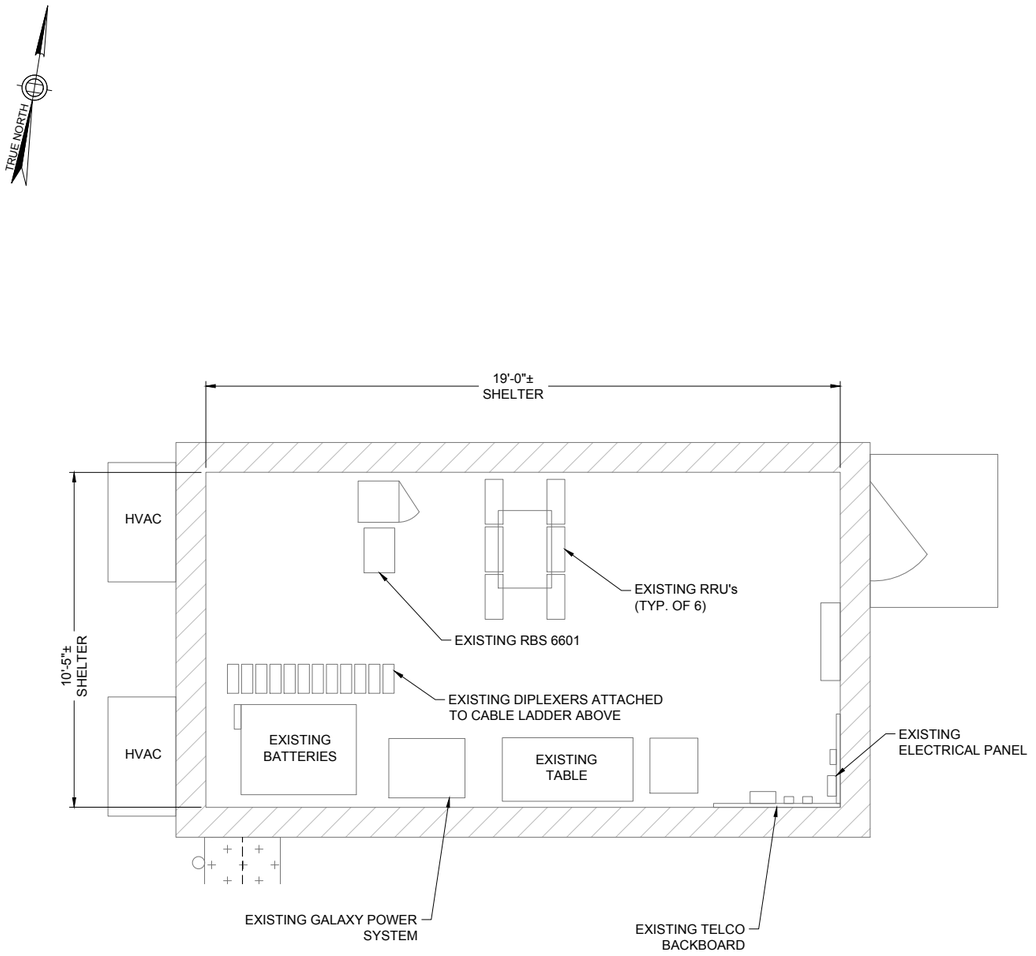
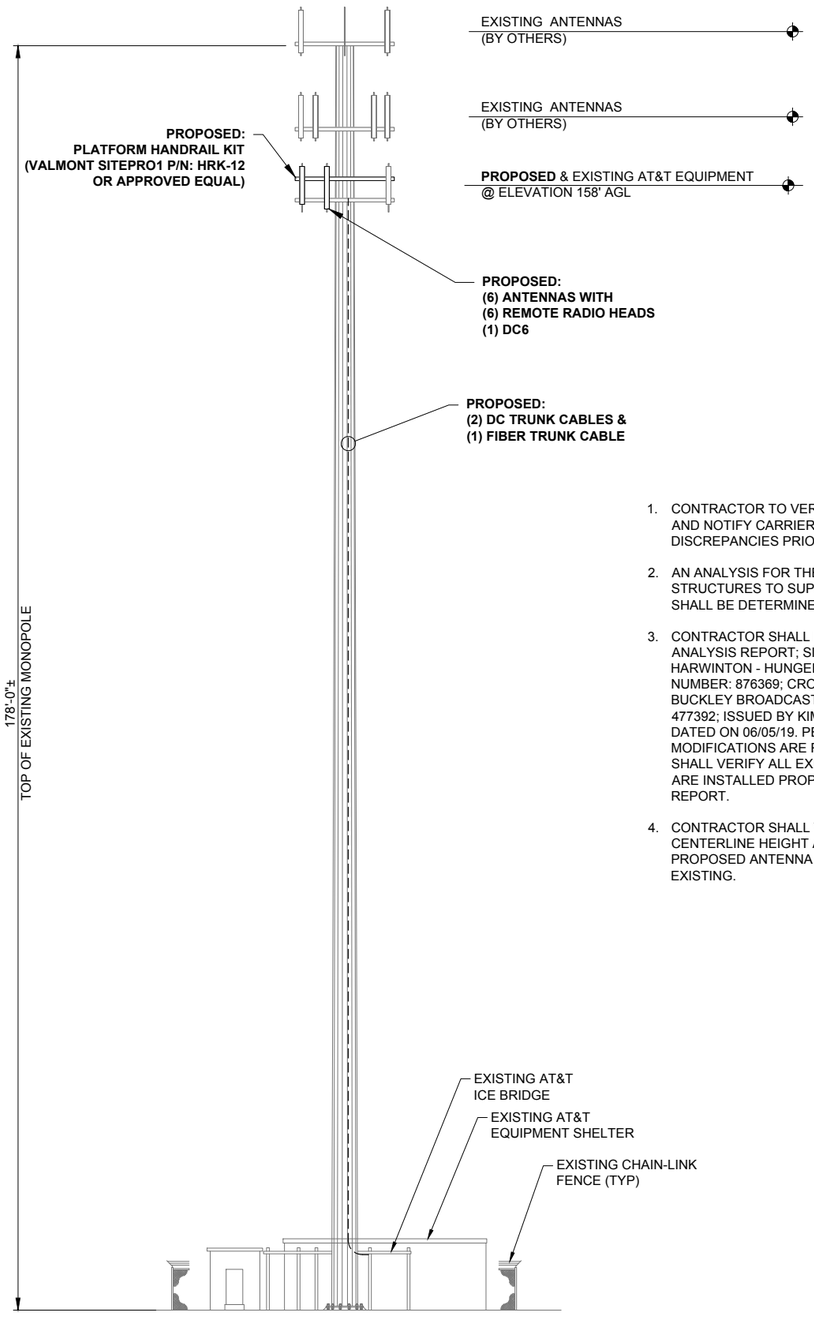
SITE PLAN

C-1



1 EQUIPMENT LAYOUT — SCALE: 1/2" = 1'-0"



2 TOWER ELEVATION — SCALE: 3/32" = 1'-0"

1. CONTRACTOR TO VERIFY FINAL RF CONFIGURATION AND NOTIFY CARRIER AND ENGINEER W/ ANY DISCREPANCIES PRIOR TO THE INSTALLATION.
2. AN ANALYSIS FOR THE CAPACITY OF THE EXISTING STRUCTURES TO SUPPORT THE PROPOSED EQUIPMENT SHALL BE DETERMINED PRIOR TO CONSTRUCTION.
3. CONTRACTOR SHALL REFER TO THE STRUCTURAL ANALYSIS REPORT; SITE NUMBER: CTL01178; SITE NAME: HARWINTON - HUNGERFORD LANE; CROWN BU NUMBER: 876369; CROWN SITE NAME: HARWINTON / BUCKLEY BROADCASTI; CROWN ORDER NUMBER: 477392; ISSUED BY KIMLEY-HORN AND ASSOCIATES, INC. DATED ON 06/05/19. PER THIS ANALYSIS NO MODIFICATIONS ARE REQUIRED. THE CONTRACTOR SHALL VERIFY ALL EXISTING MEMBERS AND HARDWARE ARE INSTALLED PROPERLY AS DESCRIBED IN THIS REPORT.
4. CONTRACTOR SHALL VERIFY THE EXISTING ANTENNA CENTERLINE HEIGHT ABOVE GROUND LEVEL. PROPOSED ANTENNA CENTERLINE SHALL MATCH EXISTING.

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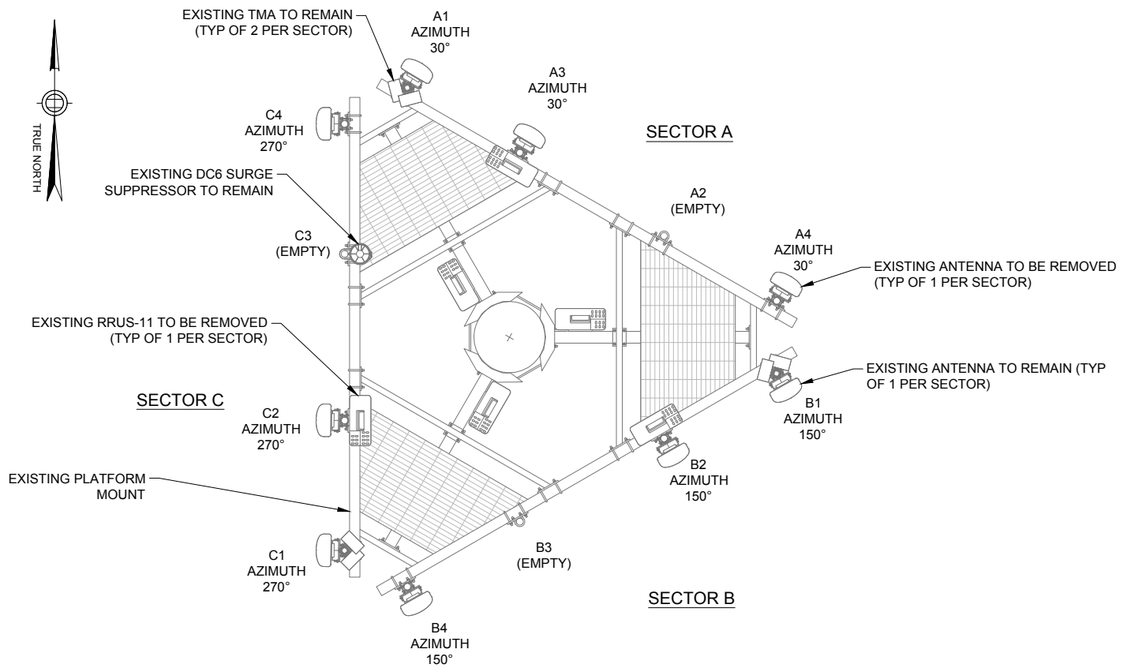
EQUIPMENT LAYOUT &
PROPOSED TOWER
ELEVATION

C-2



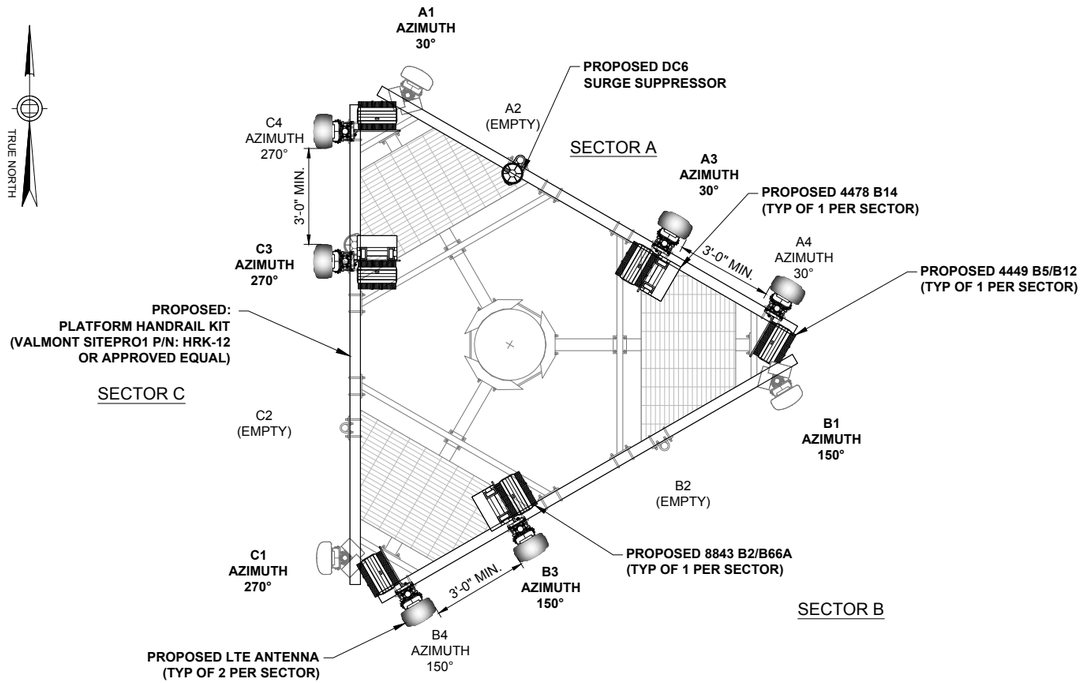
ELEVATION 158'

1 EXISTING ANTENNA LAYOUT

SCALE: N.T.S.

NOTES:

1. CONTRACTOR SHALL REFER TO THE MOUNT MODIFICATION REPORT; SITE NUMBER: CTL01178; SITE NAME: HARWINTON - HUNGERFORD LANE; CROWN BU NUMBER: 876369; CROWN SITE NAME: HARWINTON / BUCKLEY BROADCASTI; CROWN ORDER NUMBER: 477392; ISSUED BY JACOBS ENGINEERING GROUP, INC. DATED ON 10/24/19. THE MOUNT MODIFICATIONS MUST BE PERFORMED PRIOR TO THE INSTALLATION OF THE EQUIPMENT SHOWN ON THE DRAWINGS. CONTRACTOR SHALL REFER TO APPENDIX "E" FOR DETAILS. THE CONTRACTOR SHALL VERIFY ALL EXISTING MEMBERS AND HARDWARE ARE INSTALLED PROPERLY AS DESCRIBED IN THIS REPORT.
2. CONTRACTOR TO VERIFY FINAL RF CONFIGURATION AND NOTIFY CARRIER AND ENGINEER W/ ANY DISCREPANCIES PRIOR TO THE INSTALLATION.
3. CONTRACTOR SHALL NOT EXCEED MOUNTING MORE THAN (2) RRHS PER ANTENNA MOUNTING PIPE - RELOCATE TO AN ADJACENT ANTENNA MOUNTING PIPE AS NEEDED.



ELEVATION 158'

2 PROPOSED ANTENNA LAYOUT

SCALE: N.T.S.

at&t
5841 BRIDGE STREET
EAST SYRACUSE, NY 13057

CROWN CASTLE
3 CORPORATE PARK DRIVE
SUITE 101
CLIFTON PARK, NY 12065

JACOBS
JACOBS ENGINEERING GROUP, INC.
120 ST. JAMES AVENUE, 5TH FLOOR
BOSTON, MA 02116

STATE OF CONNECTICUT
DANIEL J. CORNING
21055
LICENSED
PROFESSIONAL ENGINEER

PROJECT NO:	ERCC0004
DRAWN BY:	CM
CHECKED BY:	DJC

SUBMITTALS

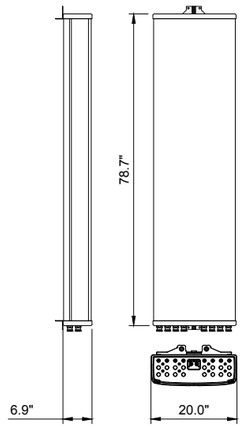
3	10/30/19	REVISED DRAWINGS
2	10/03/19	ISSUED FOR CONSTRUCTION
1	09/04/19	ISSUED FOR PERMITTING
0	06/14/19	ISSUED FOR PERMITTING

FA# 10110565
SITE# CTL01178
HARWINTON -
HUNGERFORD LANE
64 HUNGERFORD LANE
HARWINTON, CT 06791

EXISTING & PROPOSED
ANTENNA LAYOUT

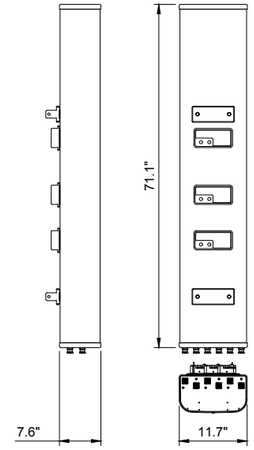
C-3

MANUFACTURER:	KATHREIN
MODEL NO.:	80010965
RADOME MATERIAL:	FIBERGLASS, UV RESISTANT
COLOR:	LIGHT GRAY
DIMENSIONS (LxWxD):	78.7" x 20.0" x 6.9" 1999mm x 508mm x 175mm
WEIGHT (lbs):	97.6
CONNECTOR:	8 x 4.3-10 FEMALE
FRONT WIND LOAD:	254 LBF @ 93 MPH 1130 N @ 150 KM/H
SIDE WIND LOAD:	256 LBF @ 93 MPH 1140 N @ 150 KM/H
WIND SPEED MAX.:	>150 MPH (>241 KM/H)



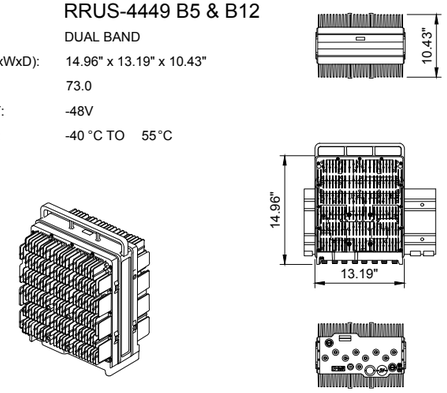
1 ANTENNA SPECIFICATIONS — SCALE: N.T.S.

MANUFACTURER:	CCI
MODEL NO.:	HPA65R-BU6A
COLOR:	LIGHT GRAY
DIMENSIONS (LxWxD):	71.1" x 11.7" x 7.6" 1807mm x 297mm x 193mm
WEIGHT (lbs):	41.9
CONNECTOR:	6 x 4.3-10 FEMALE
FRONT WIND LOAD:	201 LBS @ 100 MPH 894 N @ 161 KPH
SIDE WIND LOAD:	142 LBS @ 100 MPH 633 N @ 161 KPH
WIND SPEED MAX.:	>150 MPH (>241 KPH)



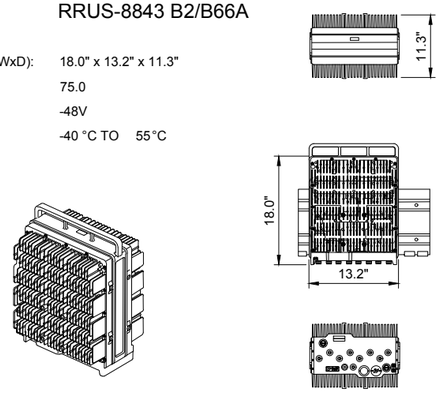
2 ANTENNA SPECIFICATIONS — SCALE: N.T.S.

MANUFACTURER:	ERICSSON
MODEL NO.:	RRUS-4449 B5 & B12
TECHNOLOGY:	DUAL BAND
DIMENSIONS (HxWxD):	14.96" x 13.19" x 10.43"
WEIGHT (lbs):	73.0
POWER SUPPLY:	-48V
TEMPERATURE:	-40 °C TO 55 °C



3 RRUS SPECIFICATIONS — SCALE: N.T.S.

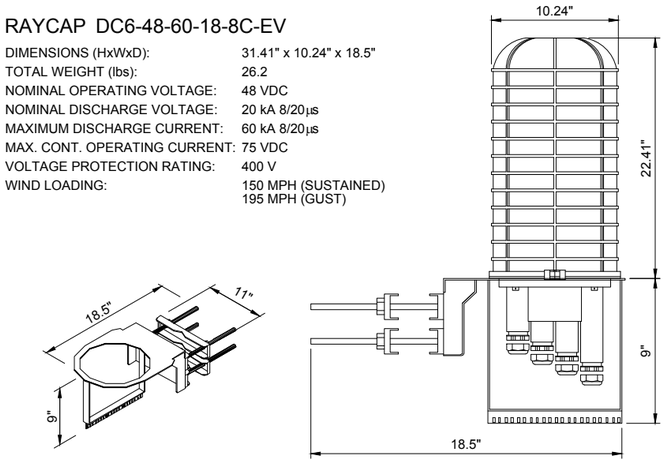
MANUFACTURER:	ERICSSON
MODEL NO.:	RRUS-8843 B2/B66A
DIMENSIONS (HxWxD):	18.0" x 13.2" x 11.3"
WEIGHT (lbs):	75.0
POWER SUPPLY:	-48V
TEMPERATURE:	-40 °C TO 55 °C



4 RRUS SPECIFICATIONS — SCALE: N.T.S.

RAYCAP DC6-48-60-18-8C-EV

DIMENSIONS (HxWxD):	31.41" x 10.24" x 18.5"
TOTAL WEIGHT (lbs):	26.2
NOMINAL OPERATING VOLTAGE:	48 VDC
NOMINAL DISCHARGE VOLTAGE:	20 kA 8/20μs
MAXIMUM DISCHARGE CURRENT:	60 kA 8/20μs
MAX. CONT. OPERATING CURRENT:	75 VDC
VOLTAGE PROTECTION RATING:	400 V
WIND LOADING:	150 MPH (SUSTAINED) 195 MPH (GUST)



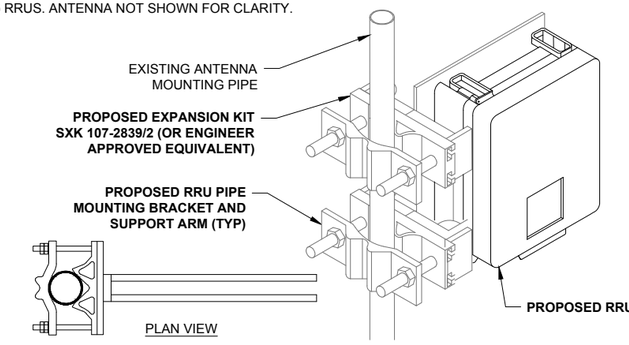
5 DC SURGE PROTECTION SPECIFICATIONS — SCALE: N.T.S.

CUE DEE PART # 5335/5336 ERICSSON RRU MOUNTING KIT

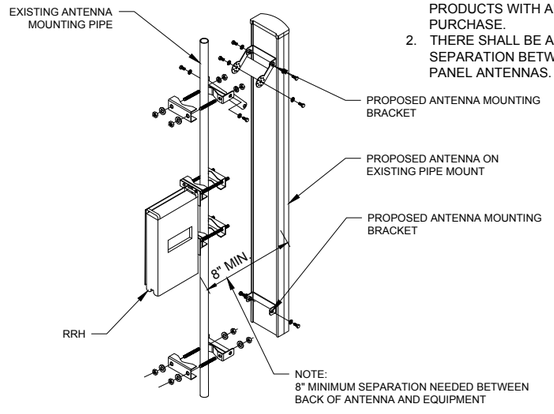
SXK 107 2839/1: SINGLE RRU SUPPORT KIT (PART #5335) (OR ENGINEER APPROVED EQUIVALENT) SXK 107 2839/2: EXPANSION KIT (PART #5336) (OR ENGINEER APPROVED EQUIVALENT)

MOUNTING NOTES:

REFER TO PRODUCT SPECS FOR BOLT SIZE & PIPE DIAMETER TOLERANCES. THE PART NO. SXK107-2839/2 IS REQUIRED FOR (2) RRUS. ANTENNA NOT SHOWN FOR CLARITY.



6 RRU MOUNTING DETAIL — SCALE: N.T.S.



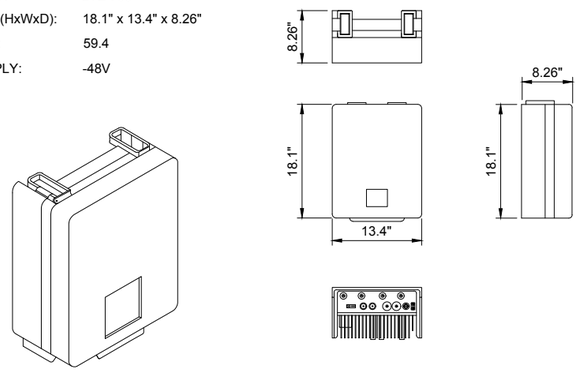
NOTES:

1. MOUNTING OPTIONS ARE INCLUDED PRODUCTS WITH ANTENNA PURCHASE.
2. THERE SHALL BE A MINIMUM 3'-0" SEPARATION BETWEEN ALL LTE PANEL ANTENNAS.

7 ANTENNA MOUNTING DETAIL — SCALE: N.T.S.

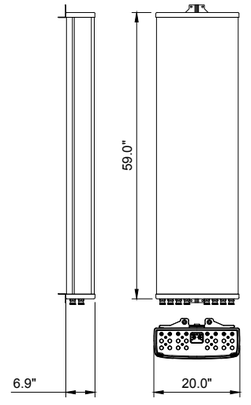
MANUFACTURER:	ERICSSON
MODEL NO.:	RRUS-4478 B14
TECHNOLOGY:	LTE 700
DIMENSIONS (HxWxD):	18.1" x 13.4" x 8.26"
WEIGHT (lbs):	59.4
POWER SUPPLY:	-48V

NOTE:
PENDING FINAL PRODUCT SPECIFICATION



8 RRUS SPECIFICATIONS — SCALE: N.T.S.

MANUFACTURER:	KATHREIN
MODEL NO.:	80010964
RADOME MATERIAL:	FIBERGLASS, UV RESISTANT
COLOR:	LIGHT GRAY
DIMENSIONS (LxWxD):	59.0" x 20.0" x 6.9" 1499mm x 488mm x 175mm
WEIGHT (lbs):	83.8
CONNECTOR:	8 x 4.3-10 FEMALE
FRONT WIND LOAD:	188 LBF @ 93 MPH 835 N @ 148 KM/H
SIDE WIND LOAD:	189 LBF @ 93 MPH 840 N @ 148 KM/H
WIND SPEED MAX.:	>148 MPH (>241 KM/H)



9 ANTENNA SPECIFICATIONS — SCALE: N.T.S.

at&t
5841 BRIDGE STREET
EAST SYRACUSE, NY 13057

CROWN CASTLE
3 CORPORATE PARK DRIVE
SUITE 101
CLIFTON PARK, NY 12065

JACOBS
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120 ST. JAMES AVENUE, 5TH FLOOR
BOSTON, MA 02116

STATE OF CONNECTICUT
DANIEL J. CORNING
24058
LICENSED
PROFESSIONAL ENGINEER

PROJECT NO:	ERCC0004
DRAWN BY:	CM
CHECKED BY:	DJC

SUBMITTALS

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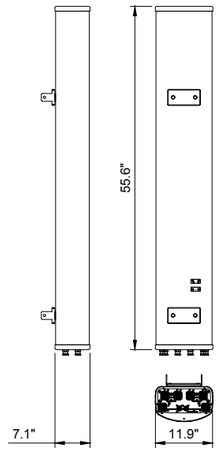
FA# 10110565
SITE# CTL01178
HARWINTON -
HUNGERFORD LANE
64 HUNGERFORD LANE
HARWINTON, CT 06791

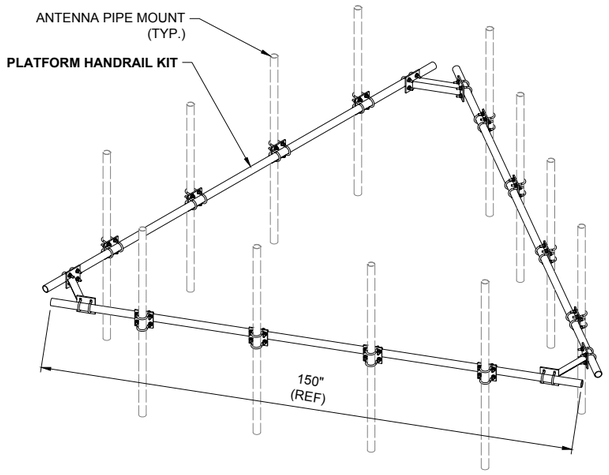
EQUIPMENT DETAILS

C-4

MANUFACTURER:	COMMSCOPE
MODEL NO.:	SBNHH-1D65A
RADOME MATERIAL:	FIBERGLASS, UV RESISTANT
COLOR:	LIGHT GRAY
DIMENSIONS (LxWxD):	55.6" x 11.9" x 7.1" 1413mm x 301mm x 180mm
WEIGHT (lbs):	33.5
CONNECTOR:	6 x 7-16 DIN FEMALE
FRONT WIND LOAD:	46.3 LBF @ 150 KM/H 206 N @ 123 KM/H
SIDE WIND LOAD:	38.0 LBF @ 150 KM/H 169 N @ 123 KM/H
WIND SPEED MAX.:	>123 MPH (>241 KM/H)
WIND LOADING, MAX.:	89.0 LBF @ 150 KM/H 396 N @ 150 KM/H



1 ANTENNA SPECIFICATIONS SCALE: N.T.S.



2 PLATFORM HANDRAIL KIT - SITEPRO1 P/N HRK-12 SCALE: N.T.S.

3 DETAIL NOT USED SCALE: N.T.S.

4 DETAIL NOT USED SCALE: N.T.S.

5 DETAIL NOT USED SCALE: N.T.S.

6 DETAIL NOT USED SCALE: N.T.S.

7 DETAIL NOT USED SCALE: N.T.S.

8 DETAIL NOT USED SCALE: N.T.S.

9 DETAIL NOT USED SCALE: N.T.S.

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BOSTON, MA 02116

STATE OF CONNECTICUT
DANIEL J. CORNING
24055
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PROFESSIONAL ENGINEER

PROJECT NO:	ERCC0004
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CHECKED BY:	DJC

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SITE# CTL01178
HARWINTON -
HUNGERFORD LANE
64 HUNGERFORD LANE
HARWINTON, CT 06791

EQUIPMENT
DETAILS

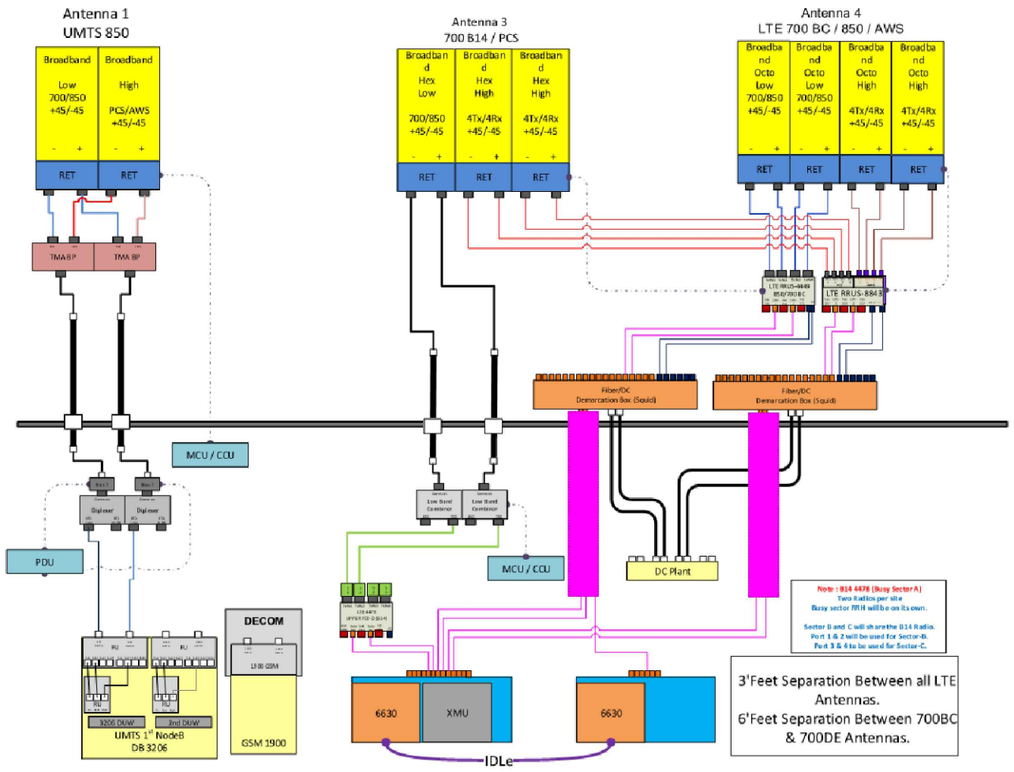
C-5

ANTENNA NUMBER	ANTENNA MODEL	ANTENNA BAND	AZIMUTH	ANTENNA CENTERLINE FROM GROUND	TMA's	RRH's	FEEDER	RAYCAP
A1	7770 (55"x11"x5")	UMTS 850	30°	158'	(2) LGP 21401	-	**(2) DC (1) FIBER** (2) DC (1) FIBER	(1) RAYCAP DC6-48-60-18-8C-EV
A2	-	-	30°	158'	-	-	-	
A3	**HPA65R-BU6A (71.2"x11.7"x8.4")**	**LTE 700 LTE 1900 LTE 1900**	**30°**	**158'**	**-**	**(1) 8843 B2/B66A (PCS/AWS) (1) 4478 B14 (700)**	-	
A4	**800-10965 (78.7"x20"x6.9")**	**LTE 700 LTE 850 LTE AWS 5G 850**	**30°**	**158'**	**-**	**(1) 4449 B5/B12 (850/700)**	(4) 1-5/8" COAX (LENGTH @ 208')	
B1	7770 (55"x11"x5")	UMTS 850	150°	158'	(2) LGP 21401	-	-	
B2	-	-	150°	158'	-	-	-	
B3	**SBNHH-1D65A (55"x11.9"x7.1")**	**LTE 700 LTE 1900 LTE 1900**	**150°**	**158'**	**-**	**(1) 8843 B2/B66A (PCS/AWS) (1) 4478 B14 (700)**	-	(1) RAYCAP DC6-48-60-18-8F
B4	**800-10964 (59"x20"x6.9")**	**LTE 700 LTE 850 LTE AWS 5G 850**	**150°**	**158'**	**-**	**(1) 4449 B5/B12 (850/700)**	(4) 1-5/8" COAX (LENGTH @ 208')	
G1	7770 (55"x11"x5")	UMTS 850	270°	158'	(2) LGP 21401	-	-	
G2	-	-	270°	158'	-	-	-	
G3	**SBNHH-1D65A (55"x11.9"x7.1")**	**LTE 700 LTE 1900 LTE 1900**	**270°**	**158'**	**-**	**(1) 8843 B2/B66A (PCS/AWS) (1) 4478 B14 (700)**	-	
G4	**800-10964 (59"x20"x6.9")**	**LTE 700 LTE 850 LTE AWS 5G 850**	**270°**	**158'**	**-**	**(1) 4449 B5/B12 (850/700)**	(4) 1-5/8" COAX (LENGTH @ 208')	

NOTES:

1. EQUIPMENT LISTED IN **BOLD**, DELINEATES THAT THE EQUIPMENT IS PROPOSED
2. * DENOTES THAT EQUIPMENT IS TO BE GROUND MOUNTED
3. ANTENNA DESIGN PER RFDS DATED 12/19/2018 UPDATED 07/22/2019

1 ANTENNA INFORMATION CHART — SCALE: N.T.S.



NOTE:

1. RF SCHEMATIC FROM RFDS DATED 12/19/18 UPDATED 07/22/2019

2 RF EQUIPMENT SCHEMATIC — SCALE: N.T.S.

at&t
5841 BRIDGE STREET
EAST SYRACUSE, NY 13057

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STATE OF CONNECTICUT
DANIEL J. CORNING
31055
LICENSED PROFESSIONAL ENGINEER

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CHECKED BY: DJC

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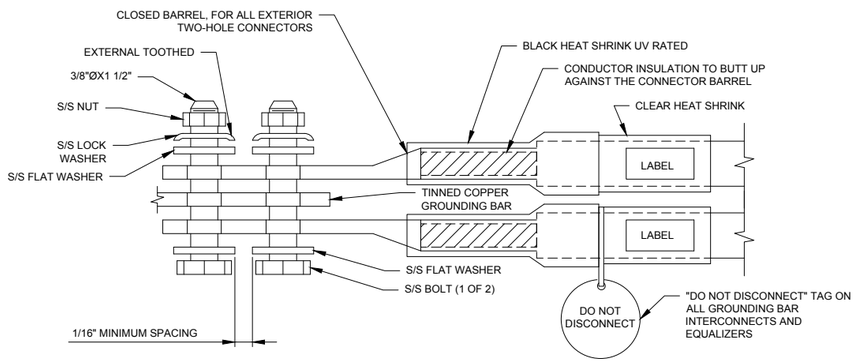
SITE# CTL01178
HARWINTON - HUNGERFORD LANE
64 HUNGERFORD LANE
HARWINTON, CT 06791

ANTENNA CHART & RF EQUIPMENT SCHEMATIC

RF-1

NOTES:

1. EXOTHERMIC WELD (2) TWO, #2 AWG BARE TINNED SOLID COPPER CONDUCTORS TO GROUNDING BAR. ROUTE CONDUCTORS TO BURIED GROUNDING RING AND PROVIDE PARALLEL EXOTHERMIC WELD.
2. ALL GROUNDING BARS SHALL BE STAMPED IN TO THE METAL "IF STOLEN DO NOT RECYCLE." THE CONTRACTOR SHALL USE PERMANENT MARKER TO DRAW THE LINES BETWEEN EACH SECTION AND LABEL EACH SECTION ("P", "A", "N", "I") WITH 1" HIGH LETTERS.
3. ALL HARDWARE SHALL BE STAINLESS STEEL 3/8" DIAMETER OR LARGER. ALL HARDWARE 18-8 STAINLESS STEEL INCLUDING LOCK WASHERS, COAT ALL SURFACES WITH AN ANTI-OXIDANT COMPOUND BEFORE MATING.
4. FOR GROUND BOND TO STEEL ONLY: INSERT A CADMIUM FLAT WASHER BETWEEN LUG AND STEEL, COAT ALL SURFACES WITH AN ANTI-OXIDANT COMPOUND BEFORE MATING.
5. DO NOT INSTALL CABLE GROUNDING KIT AT A BEND AND ALWAYS DIRECT GROUNDING CONDUCTOR DOWN TO GROUNDING BUS.
6. NUT & WASHER SHALL BE PLACED ON THE FRONT SIDE OF THE GROUNDING BAR AND BOLTED ON THE BACK SIDE. INSTALL BLACK HEAT-SHRINKING TUBE, 600 VOLT INSULATION, ON ALL GROUNDING TERMINATIONS. THE INTENT IS TO WEATHERPROOF THE COMPRESSION CONNECTION.
7. SUPPLIED AND INSTALLED BY CONTRACTOR.
8. THE CONTRACTOR SHALL BE RESPONSIBLE FOR INSTALLING ADDITIONAL GROUNDING BAR AS REQUIRED, PROVIDING 50% SPARE CONNECTION POINTS.
9. ENSURE THE WIRE INSULATION TERMINATION IS WITHIN 1/8" OF THE BARREL (NO SHINERS).



1 EXTERIOR TWO HOLE LUG DETAIL

SCALE: N.T.S.

GENERAL NOTES:

1. CONTRACTOR SHALL HAVE A COMPLETE UNDERSTANDING OF THE CONTENTS OF AT&T STANDARD TP-76416.
2. ALL INSTALLATIONS SHALL BE FIELD VERIFIED.
3. ALL GROUND CONNECTIONS FOR ALL RELOCATED EQUIPMENT SHALL BE RE-ESTABLISHED BY THE CONTRACTOR. CONTRACTOR SHALL FURNISH ALL MATERIALS AS REQUIRED.

GROUNDING NOTES:

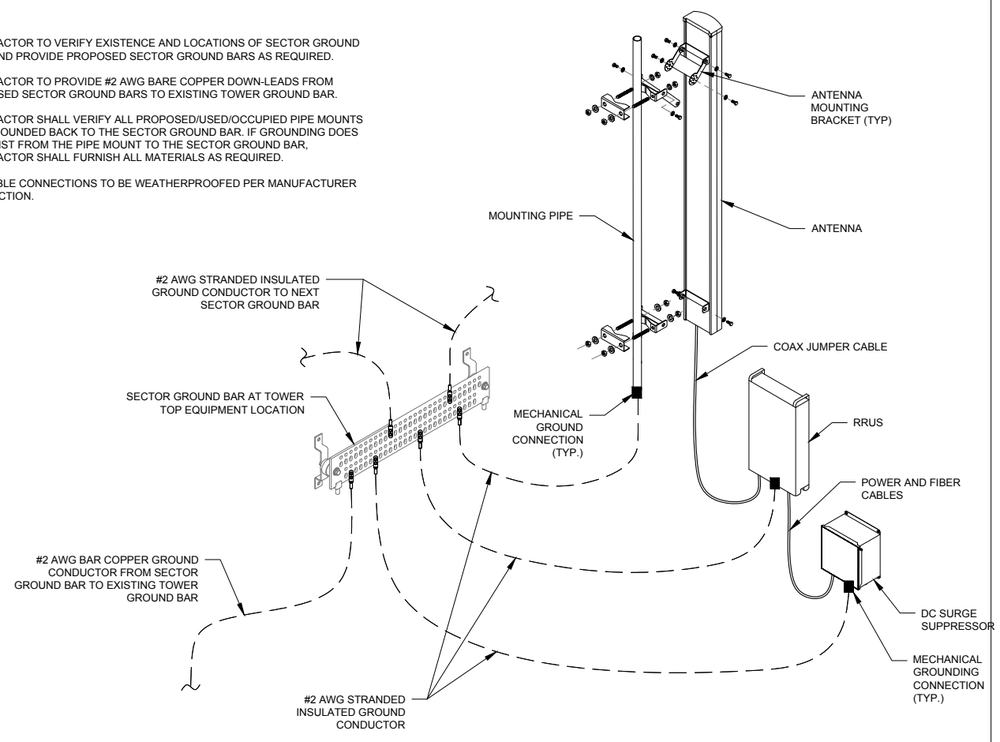
1. TOWER GROUNDING BAR: EXTEND (2) #2 AWG TINNED CU WIRE FROM BURIED GROUND RING UP TO THE TOWER GROUND BAR AND MAKE A MECHANICAL CONNECTION. SECURE GROUND BAR DIRECTLY TO TOWER WITH STAINLESS STEEL MOUNTING MATERIAL.
2. ANTENNA GROUNDING BAR: ANDREW CORPORATION PART #UGBKIT-0424-T MOUNT GROUND BAR DIRECTLY TO TOWER. SECURE TO TOWER WITH STAINLESS STEEL MOUNTING MATERIAL.
3. GROUNDING BAR: LOCATED CLOSE TO GRADE LOCK BOX TESSCO PART #351546: INSTALL PER MANUFACTURER GUIDELINES.
4. EXOTHERMIC OR COMPRESSION CONNECTION FOR PIPE MOUNT TO ANTENNA ROUTE CONDUCTOR TO NEAREST GROUNDING BAR SO THE GROUNDING CONDUCTORS PROVIDE A STRAIGHT DOWNWARD PATH TO GROUND. USE #2 AWG SOLID TINNED COPPER CONDUCTOR. GROUNDING CONNECTION SHALL BE LOCATED AT THE TOP 2" OF PIPE.
5. ALL GROUNDING CONDUCTORS SHALL BE #2 AWG COPPER TINNED UNLESS NOTED OTHERWISE.
6. ALL GROUNDING CONDUCTORS SHALL PROVIDE A STRAIGHT DOWNWARD PATH TO GROUND WITH GRADUAL BEND AS REQUIRED. GROUND WIRES SHALL NOT BE LOOPED OR SHARPLY BENT.
7. KOPR-SHIELD ANTI-OXIDATION COMPOUND SHALL BE USED ON ALL COMPRESSION GROUNDING CONNECTIONS.
8. ALL EXOTHERMIC CONNECTIONS SHALL BE INSTALLED UTILIZING THE PROPER CONNECTION/MOLD AND MATERIALS FOR THE PARTICULAR APPLICATION.
9. ALL BOLTED GROUNDING CONNECTIONS SHALL BE INSTALLED WITH AN EXTERNAL TOOTHED LOCK WASHER. GROUNDING BUS BARS MAY HAVE PRE-PUNCHED HOLES OR TAPPED HOLES. ALL HARDWARE SHALL BE SECURITY TORQUE HARDWARE 3/8" STAINLESS STEEL.
10. EXTERNAL GROUNDING CONDUCTOR SHALL NOT BE INSTALLED OR ROUTED THROUGH HOLES IN ANY METAL OBJECTS, CONDUITS, OR SUPPORTS TO PRECLUDE ESTABLISHING A MAGNETIC CHOKE POINT.
11. PLASTIC CLIPS SHALL BE USED TO FASTEN AND SUPPORT GROUNDING CONDUCTORS. FERROUS METAL CLIPS WHICH COMPLETELY SURROUND THE GROUNDING CONDUCTOR SHALL NOT BE USED.
12. IF COAX ON ICE BRIDGE IS MORE THAT 6' FROM THE GROUND BAR AT THE BASE OF THE TOWER, A SECOND GROUND BAR WILL BE NEEDED AT THE END OF THE ICE BRIDGE RUN TO GROUND THE COAX GROUND KIT AND THE IN-LINE SURGE ARRESTORS (SURGE ARRESTORS INSTALLED BY LUCENT ONLY HAVE 6' GROUND TAILS).
13. CONTRACTOR SHALL REPAIR/PLACE EXISTING GROUNDING SYSTEM COMPONENTS DAMAGED DURING CONSTRUCTION AT THE CONTRACTORS EXPENSE.
14. DO NOT ALLOW THE COPPER CONDUCTOR TO TOUCH THE GALVANIZED GUY WIRE AT THE CONNECTION POINT OR AT ANY OTHER POINT. NO EXOTHERMICALLY WELDED CONNECTION SHALL BE MADE TO THE GUY WIRE.
15. CONTRACTOR SHALL VERIFY EXISTING SECTOR GROUNDING CONDITION AND GROUND THE PROPOSED EQUIPMENT IN THE SAME MANNER. A PROPOSED SECTOR GROUND BAR SHALL BE INSTALLED IF REQUIRED.

2 GROUNDING NOTES

SCALE: N.T.S.

NOTES:

1. CONTRACTOR TO VERIFY EXISTENCE AND LOCATIONS OF SECTOR GROUND BARS AND PROVIDE PROPOSED SECTOR GROUND BARS AS REQUIRED.
2. CONTRACTOR TO PROVIDE #2 AWG BARE COPPER DOWN-LEADS FROM PROPOSED SECTOR GROUND BARS TO EXISTING TOWER GROUND BAR.
3. CONTRACTOR SHALL VERIFY ALL PROPOSED/USED/OCCUPIED PIPE MOUNTS ARE GROUNDED BACK TO THE SECTOR GROUND BAR. IF GROUNDING DOES NOT EXIST FROM THE PIPE MOUNT TO THE SECTOR GROUND BAR, CONTRACTOR SHALL FURNISH ALL MATERIALS AS REQUIRED.
4. ALL CABLE CONNECTIONS TO BE WEATHERPROOFED PER MANUFACTURER INSTRUCTION.



3 TYPICAL ANTENNA GROUNDING SCHEMATIC

SCALE: N.T.S.

4 DETAIL NOT USED

SCALE: N.T.S.

at&t
5841 BRIDGE STREET
EAST SYRACUSE, NY 13057

CROWN CASTLE
3 CORPORATE PARK DRIVE
SUITE 101
CLIFTON PARK, NY 12065

JACOBS
JACOBS ENGINEERING GROUP, INC.
120 ST. JAMES AVENUE, 5TH FLOOR
BOSTON, MA 02116

STATE OF CONNECTICUT
DANIEL J. CORNING
31055
LICENSED PROFESSIONAL ENGINEER

PROJECT NO:	ERCC0004
DRAWN BY:	CM
CHECKED BY:	DJC

SUBMITTALS

3	10/30/19	REVISED DRAWINGS
2	10/03/19	ISSUED FOR CONSTRUCTION
1	09/04/19	ISSUED FOR PERMITTING
0	06/14/19	ISSUED FOR PERMITTING

FA# 10110565
SITE# CTL01178
HARWINTON -
HUNGERFORD LANE
64 HUNGERFORD LANE
HARWINTON, CT 06791

GROUNDING DETAILS

G-1

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

November 1, 2019

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

RE: **Notice of Exempt Modification for AT&T: 876369**
64 Hungerford Lane, Harwinton, CT 06791
Latitude: 41° 45′ 26.15″ / Longitude: -73° 3′ 9.20″

Dear Ms. Bachman:

AT&T currently maintains nine (9) antennas at the 156-foot mount on the existing 178-foot Monopole Tower, located at 64 Hungerford Lane, Harwinton, CT. The tower is owned by Crown Castle and the property is owned by Red Wolf Broadcasting Corp. AT&T now intends to replace six (6) existing antennas with six (6) new antennas. The new antennas will be installed at the 156-ft level of the tower. AT&T is also proposing tower mount modifications, as shown on the enclosed mount analysis.

Two email requests were sent to the Town of Hawinton's zoning department in an effort to obtain the original facility approval. Those requests were not answered.

Please accept this letter as notification pursuant to Regulations of Connecticut State Agencies §16-50j-73, for construction that constitutes an exempt modification pursuant to R.C.S.A. § 16-50j-72(b)(2). In accordance with R.C.S.A. § 16-50j-73, a copy of this letter is being sent to Michael Criss, First Selectman for the Town of Harwinton, Polly Redmond, Land Use Coordinator, Crown Castle as the tower owner, and Red Wolf Broadcasting Corporation, the property owner.

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

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

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

4. The operation of the replacement antennas will not increase radio frequency emissions at the facility to a level at or above the Federal Communication Commission safety standard.
5. The proposed modifications will not cause a change or alteration in the physical or environmental characteristics of the site.

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

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

Sincerely,

Anne Marie Zsamba
Network Real Estate Specialist
3 Corporate Park Drive, Suite 101
Clifton Park, NY 12065
(201) 236-9224
AnneMarie.Zsamba@crowncastle.com

Attachments
cc:

Michael R. Criss, First Selectman
Town of Harwinton
100 Bentley Drive
Harwinton, CT 06791
860-485-9051

Polly Redmond, Land Use Coordinator
Town of Harwinton
Land Use Department
100 Bentley Drive
Harwinton, CT 06791
860-485-2784

Red Wolf Broadcasting Corporation
Attention: John Fuller
758 Colonel Ledyard Highway
Ledyard, CT 06339

Crown Castle, Tower Owner

ORIGIN ID:ONHA (585) 445-5896
RICHARD ZAJAC
CROWN CASTLE
300 MERIDIAN CENTRE

ROCHESTER, NY 14618
UNITED STATES US

SHIP DATE: 01NOV19
ACTWGT: 4.00 LB
CAD: 104924194/INET4160

BILL SENDER

TO **MELANIE BACHMAN**
CONNECTICUT SITING COUNCIL
10 FRANKLIN SQUARE

NEW BRITAIN CT 06051
(860) 827-2951 REF: 1765.6680
INV:
PO: DEPT:

567J3/2A3C/05A2

FedEx Express

J192119091901uv

TRK# 0201 **7768 7482 2894**

MON - 04 NOV 3:00P
STANDARD OVERNIGHT

XE BDLA

06051
BDL
CT-US

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2. Fold the printed page along the horizontal line.
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Warning: Use only the printed original label for shipping. Using a photocopy of this label for shipping purposes is fraudulent and could result in additional billing charges, along with the cancellation of your FedEx account number.
Use of this system constitutes your agreement to the service conditions in the current FedEx Service Guide, available on fedex.com.FedEx will not be responsible for any claim in excess of $100 per package, whether the result of loss, damage, delay, non-delivery,misdelivery,or misinformation, unless you declare a higher value, pay an additional charge, document your actual loss and file a timely claim.Limitations found in the current FedEx Service Guide apply. Your right to recover from FedEx for any loss, including intrinsic value of the package, loss of sales, income interest, profit, attorney's fees, costs, and other forms of damage whether direct, incidental,consequential, or special is limited to the greater of $100 or the authorized declared value. Recovery cannot exceed actual documented loss.Maximum for items of extraordinary value is $1,000, e.g. jewelry, precious metals, negotiable instruments and other items listed in our ServiceGuide. Written claims must be filed within strict time limits, see current FedEx Service Guide.

ORIGIN ID:ONHA (585) 445-5896
RICHARD ZAJAC
CROWN CASTLE
300 MERIDIAN CENTRE

ROCHESTER, NY 14618
UNITED STATES US

SHIP DATE: 01NOV19
ACTWGT: 1.50 LB
CAD: 104924194/INET4160

BILL SENDER

TO **MICHAEL CRISS, FIRST SELECTMAN**
TOWN OF HARWINTON
100 BENTLEY DRIVE

HARWINTON CT 06791
(860) 485-9051 REF: 1734.7680
INV:
PO: DEPT:

567J3/2A3C/05A2

FedEx Express

J192119091901uv

MON - 04 NOV 3:00P
STANDARD OVERNIGHT

TRK# **7768 7484 0871**
0201

06791
BDL
CT-US

XE HFDA

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ORIGIN ID:ONHA (585) 445-5896
RICHARD ZAJAC
CROWN CASTLE
300 MERIDIAN CENTRE

ROCHESTER, NY 14618
UNITED STATES US

SHIP DATE: 01NOV19
ACTWGT: 1.50 LB
CAD: 104924194/INET4160

BILL SENDER

TO **POLLY REDMOND, LAND USE COORDINATOR**
TOWN OF HARWINTON
LAND USE DEPT
100 BENTLEY DRIVE
HARWINTON CT 06791
(860) 485-2784 REF: 1734.7680
INV:
PO: DEPT:

567J3/2A3C/05A2

FedEx Express

J192119091901uv

TRK# 0201 **7768 7485 5841**

MON - 04 NOV 3:00P
STANDARD OVERNIGHT

XE HFDA

06791
CT-US **BDL**

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ORIGIN ID:ONHA (585) 445-5896
RICHARD ZAJAC
CROWN CASTLE
300 MERIDIAN CENTRE

ROCHESTER, NY 14618
UNITED STATES US

SHIP DATE: 01NOV19
ACTWGT: 1.50 LB
CAD: 104924194/INET4160

BILL SENDER

TO **RED WOLF BROADCASTING CORPORATION**
ATTN: JOHN FULLER
758 COLONEL LEDYARD HWY
LEDYARD CT 06339
(201) 236-9224 REF: 1734.7680
INV:
PO: DEPT:

567J3/2A3C/05A2

FedEx Express

E

J192119091901uv

MON - 04 NOV 3:00P
STANDARD OVERNIGHT

TRK# 0201 **7768 7486 7890**

06339
BDL

XE GONA
CT-US

After printing this label:
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CROWN CASTLE - ETA PROPERTY
3530 TORINGDON WAY, SUITE 300
CHARLOTTE, NC 28277

17043

DATE 10/28/19

32-61/1110

PAY TO THE ORDER OF Connecticut Sitney Council

$ 625.00

Six hundred twenty five dollars + xx/100 DOLLARS

CHASE
JPMorgan Chase Bank, N.A.
www.Chase.com

VALID FOR 180 DAYS

AT+T CSC FEE

FOR 876369-477392-556170

⑈017043⑈ ⑆111000614⑆ 464638118⑈

Exhibit A

Original Facility Approval

From: Zsamba, Anne Marie
To: zoningenforcementofficer@harwinton.us
Subject: RE: Seeking Original Telecom Tower Approval - 876369
Date: Thursday, September 26, 2019 9:10:00 AM

Good morning,

Following up on my email below. Please let me know if it would be possible to obtain the original zoning approval for this telecommunications facility located at 64 Hungerford Lane. This is for submission to the Connecticut Siting Council. Thank you kindly.

Best,
Anne Marie

ANNE MARIE ZSAMBA
Network Real Estate Specialist
T: (201) 236-9224
F: (724) 416-6112

CROWN CASTLE
3 Corporate Park Drive, Suite 101,
Clifton Park, NY 12065
CrownCastle.com

From: Zsamba, Anne Marie
Sent: Friday, September 20, 2019 12:11 PM
To: zoningenforcementofficer@harwinton.us
Subject: Seeking Original Telecom Tower Approval - 876369

Good afternoon,

Seeking assistance if possible in obtaining the original planning/zoning approval for the telecommunications tower located at 64 Hungerford Lane.

Please let me know if the Town of Harwinton maintains these records. Thank you kindly.

Best,
Anne Marie

ANNE MARIE ZSAMBA
Real Estate Specialist
T: (201) 236-9224
F: (724) 416-6112

CROWN CASTLE
3 Corporate Park Drive, Suite 101,
Clifton Park, NY 12065
CrownCastle.com

STATE OF CONNECTICUT

CONNECTICUT SITING COUNCIL

Ten Franklin Square, New Britain, CT 06051
Phone: (860) 827-2935 Fax: (860) 827-2950
E-Mail: siting.council@po.state.ct.us
Web Site: www.state.ct.us/csc/index.htm

October 15, 2003

Kenneth C. Baldwin
Robinson & Cole
280 Trumbull Street
Hartford, CT 06103-3597

RE: **TS-VER-066-030918** - Cellco Partnership d/b/a Verizon Wireless request for an order to approve tower sharing at an existing telecommunications facility located at 64 Hungerford Lane, Harwinton, Connecticut.

Dear Attorney Baldwin:

At a public meeting held October 14, 2003, the Connecticut Siting Council (Council) ruled that the shared use of this existing tower site is technically, legally, environmentally, and economically feasible and meets public safety concerns, and therefore, in compliance with General Statutes § 16-50aa, the Council has ordered the shared use of this facility to avoid the unnecessary proliferation of tower structures. This facility has also been carefully modeled to ensure that radio frequency emissions are conservatively below State and federal standards applicable to the frequencies now used on this tower.

This decision is under the exclusive jurisdiction of the Council. Any additional change to this facility may require an explicit request to this agency pursuant to General Statutes § 16-50aa or notice pursuant to Regulations of Connecticut State Agencies Section 16-50j-73, as applicable. Such request or notice shall include all relevant information regarding the proposed change with cumulative worst-case modeling of radio frequency exposure at the closest point of uncontrolled access to the tower base, consistent with Federal Communications Commission, Office of Engineering and Technology, Bulletin 65. Any deviation from this format may result in the Council implementing enforcement proceedings pursuant to General Statutes § 16-50u including, without limitation, imposition of expenses resulting from such failure and of civil penalties in an amount not less than one thousand dollars per day for each day of construction or operation in material violation.

This decision applies only to this request for tower sharing and is not applicable to any other request or construction.

The proposed shared use is to be implemented as specified in your letter dated September 18, 2003.

Thank you for your attention and cooperation.

Very truly yours,

Pamela B. Katz, P.E.
Chairman

PBK/laf

c: Honorable Marie M. Knudsen, First Selectman, Town of Harwinton
William J. Tracy, Jr., Planning Chairman, Town of Harwinton
Thomas J. Regan, Esq., Brown Rudnick Berlack Israels

Building Permit

09

TOWN OF HARWINTON

MINIMUM FEE: $.

DATE: 5/29/01

TYPE OF INSTALLATION

ELECTRICAL SERVICE-NEW OR CHANGE		WATER HEATER	
ELECTRICAL INSTALLATION		ROOFING	
ELECTRICAL-SWIMMING POOL		RE-ROOFING:	
PLUMBING INSTALLATION		HOW MANY LAYERS?	
HEATING INSTALLATION		SIDING	
AIR CONDITIONING		OTHER	
OIL BURNER-GAS BURNER			
WOODBURNING STOVE		Stove Flue 485	
CHIMNEY INSTALLATION			

NAME OF CONTRACTOR Baron Hill Corporation

ADDRESS OF CONTRACTOR 24 Corporate Circle Albany NY 12203

LICENSE # 007-00-619 EXPIRATION DATE _____ TELE. # 518-456-8114

REQUEST PERMISSION TO PERFORM _____

AT: LOT # 21A-21-3 STREET ADDRESS Hungerford Lane

ESTIMATED COST $272,000.00

REMARKS: _____

OWNER Tower owner: Sprint Spectrum LP

ADDRESS One International Blvd. 3rd Floor Mahwah NJ 07495

VALUATION OF WORK $272.00

FEE $4 per $1000.00

PERMIT # 4587

Frank Kyfak 4

BUILDING OFFICIAL

PAID DATE 5-29-01

10-15-2001

BUILDING INSPECTION DIVISION HARWINTON, CONN.

CERTIFICATE OF OCCUPANCY

Sprint Spectrum L P

This is to certify that the ~~new house~~ at Tele Communication Tower Lot as constructed under Permit No conforms substantially to the requirements of the State Building Code and is hereby approved for occupancy as indicated below. At the date and time this Certificate is issued the house is owned by

Approved for occupancy: Sprint Spectrum L. P

Towers ok

Basement
•

First Floor
•

Second Floor
•

Use Group:
Type of Construction:

Frank Lyle

This certificate is VOID unless signed by the Building Official

Exhibit B

Property Card

qPublic.net™ Town of Harwinton, CT

Summary

ParcelId	341
Account Number	595
Location Address	64 HUNGERFORD LA
Map-Block-Lot	D5 /02 /0032
Use Class/Description	2-1 COMM LAND
Assessing Neighborhood	0001A
Census Tract	2984
Acreage	40.28
Utilities	

Owner

RED WOLF BROADCASTING CORPORATION
758 COLONEL LEDYARD HIGHWAY
LEDYARD, CT 06339

Current Appraised Value

		2017	2016	2015
+	Building Value	$35,280	$35,280	$35,280
+	XF Value	$0	$0	$0
+	OB Value	$3,950	$3,950	$3,950
+	Land Value	$367,850	$367,850	$367,850
+	Special Land Value			
+	Total Appraised Value	$407,080	$407,080	$407,080
+	Net Appraised Value	$407,080	$407,080	$407,080
+	Current Assessment	$284,960	$284,960	$284,960

Assessment History

		2018	2017	2016	2015
+	Building Value	$53,450	$24,700	$24,700	$24,700
+	OB/Misc	$2,060	$2,760	$2,760	$2,760
+	Land	$238,080	$257,500	$257,500	$257,500
+	Total Assessment	$293,590	$284,960	$284,960	$284,960

Land

Use	Class	Zoning	Area	Value
2-1 COMM LAND	C	CR2	1 AC	$74,330
5-2V EX COMM V	C		10.97 AC	$78,980
3-1 IND LAND	I		1 BL	$180,000
6-2 FOREST LD	R		28.31 AC	$2,806,650

Commercial Building

Building #	1
Style	Office Bldg
Actual Year Built	1964
Effective Year Built	1965
Gross Area	1230
Stories	1
Grade	Below Average
Exterior Wall	Brick/Masonry
Interior Wall	Drywall/Sheet
Wall Height	8
Units	1
Roof Cover	Asph/F Gls/Cmp
Roof Structure	Gable/Hip
Floor Type	Quarry Tile
Heat Type	Oil
Heat Fuel	Forced Air-Duc
AC Type	HEAT/AC PKGS
Sprinkler	03

Construction	MASONRY
Plumbing	AVERAGE
Comm Walls	0

Building Sub Areas

Code	Description	Living Area	Gross Area	Effective Area
BAS		1200	1200	1200
FEP	Enclosed Porch	0	30	20
	Totals	1200	1230	1220

Out Buildings\Extra Features

Description	Sub Description	Area	Year Built	Value
SHED FRAME AVE		360S.F.	2004	$2,790
PATIO GOOD		36S.F.	2000	$160

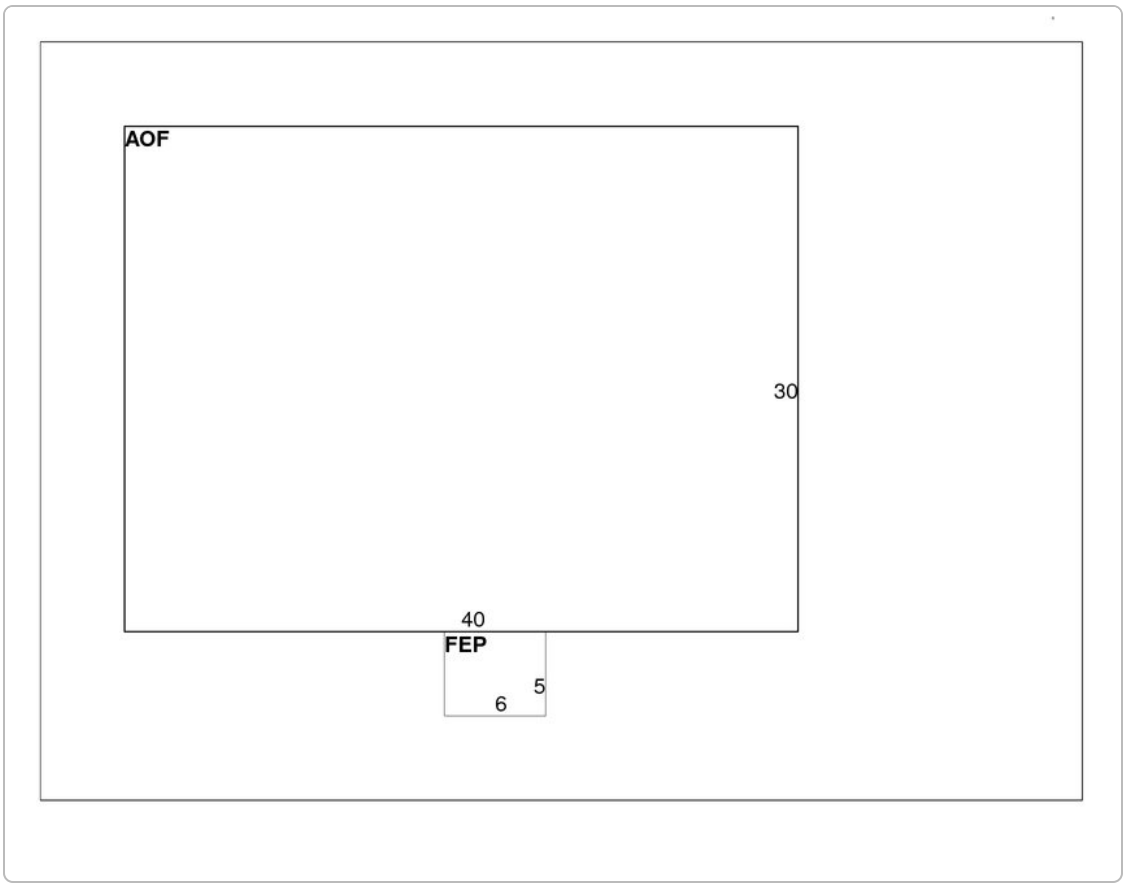
Sales History

Sales Date	Type of Document	Grantee	Vacant/Improved	Book/Page	Amount
04-04-2018		RED WOLF BROADCASTING CORPORATION	Improved	0256/0776	$407,080
07-09-2014		CONNOISSEUR MEDIA OF CONNECTICUT LLC	Improved	0243/1029	$407,080
07-23-1997		BUCKLEY BROADCASTING CORP OF CT	Improved	0145/0372	$0
01-09-1997		USA	Improved	0145/0216	$0
07-24-1985		CONSUMER SERVICE RADIO INC	Improved	0101/0665	$0

Permit Information

Permit ID	Issue Date	Type	Description	Amount	Inspection Date	% Complete	Date Complete	Comments
17126B	09-11-2017		3 ANTENNAS	$20,000		100		
	11-30-2015		CERTIFCATE OF APPROV	$0		0		
9417	10-24-2014		MODIFICATIONS	$20,000		0		
8721	11-29-2012		CELL TOWER MODIFICAT	$25,000		0		
8703	11-21-2012		ANTENNAS	$12,000		0		
8619	10-02-2012		REPLACE 6 ANTENNAS O	$10,000		0		
CO	04-17-2006		CO ISSUED	$0		0		
6239	01-17-2006			$50,000		0		PREFAB CONCRETE SHELTER

Sketch



Photos

No data available for the following modules: Building Data.

Developed by Schneider GEOSPATIAL

Last Data Upload: 9/19/2019, 8:27:35 PM

Version 2.3.4

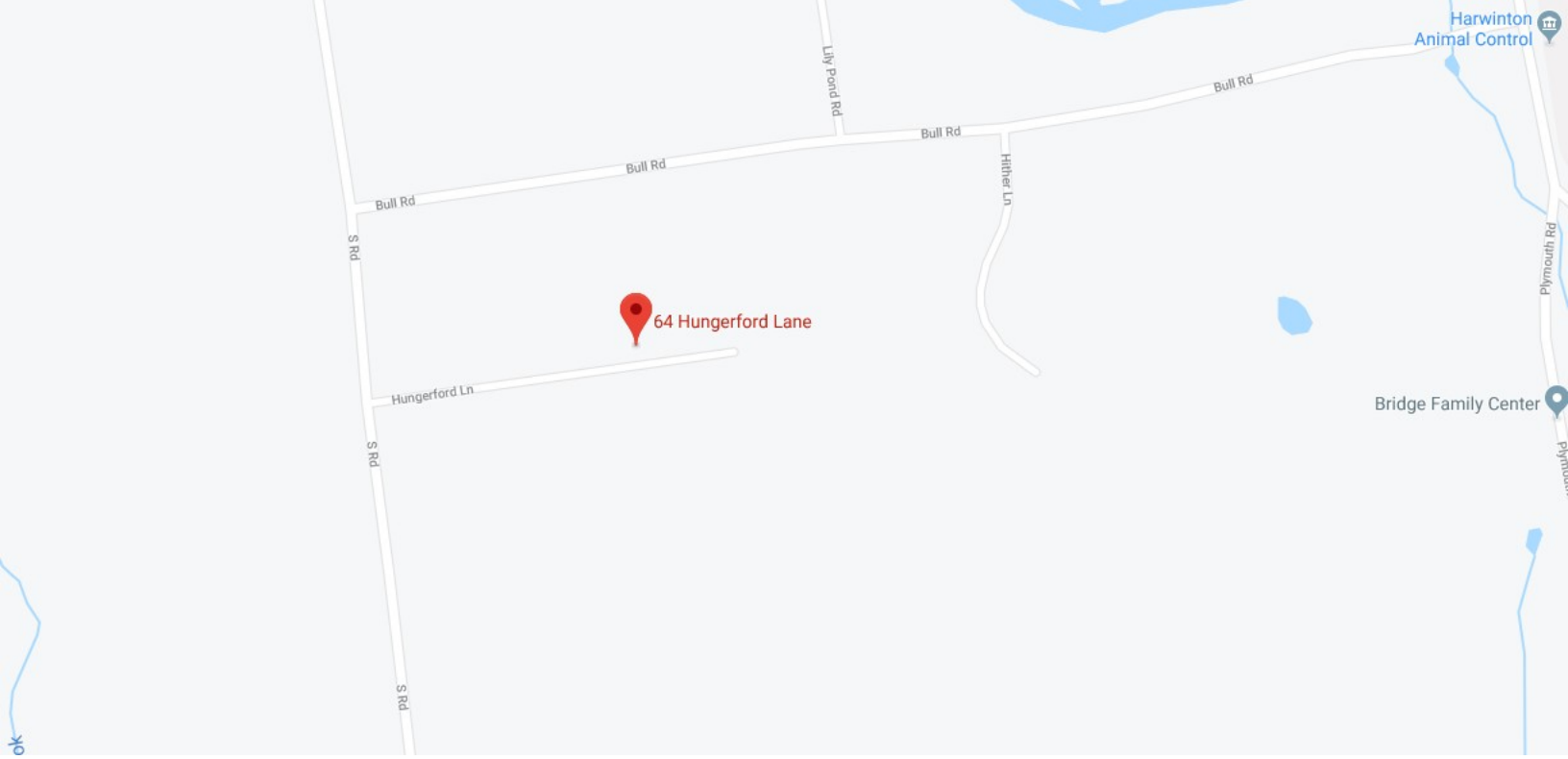

Harwinton
Animal Control
Bull Rd
Bull Rd
Bull Rd
Lily Pond Rd
Hither Ln
S Rd
64 Hungerford Lane
Hungerford Ln
Plymouth Rd
Bridge Family Center
S Rd
S Rd

Exhibit C

Construction Drawings

PROJECT INFORMATION

SCOPE OF WORK:

ITEMS TO BE INSTALLED ON & REMOVED FROM EXISTING TOWER:

- REMOVE (6) EXISTING ANTENNAS, (3) RRH's.

- INSTALL AT&T ANTENNA (80010965) (TYP. OF 1 PER ALPHA SECTOR).
- INSTALL AT&T ANTENNA (80010964) (TYP. OF 1 PER BETA & GAMMA SECTORS).
- INSTALL AT&T ANTENNA (HPA65R-BU6A) (TYP. OF 1 PER ALPHA SECTOR).
- INSTALL AT&T ANTENNA (SBNHH-1D65A) (TYP. OF 1 PER BETA & GAMMA SECTORS).
- INSTALL AT&T 4449 B5/B12 (700) (TYP. OF 1 PER SECTOR, TOTAL OF 3).
- INSTALL AT&T 8843 B2/B66A (1900/AWS) (TYP. OF 1 PER SECTOR, TOTAL OF 3).
- INSTALL SURGE ARRESTOR (DC6-48-60-18-8C-EV) (TOTAL OF 1).
- INSTALL SURGE PROTECTOR (TSXDC-4310FM) (TOTAL OF 8).
- INSTALL (2) DC TRUNK CABLES & (1) FIBER TRUNK CABLES.
- INSTALL PLATFORM HANDRAIL KIT (VALMONT SITEPRO1 PART # HRK-12 OR APPROVED EQUAL) 42" ABOVE THE PLATFORM.

ITEMS TO BE MOUNTED INSIDE EXISTING SHELTER:

- INSTALL AT&T 4478 B14 (700) (TOTAL OF 2).
- SWAP DUS WITH 6630.
- ADD (1) XMU
- ADD (1) 66305G
- ADD (1) IDLE.

ITEMS TO REMAIN:

- (3) ANTENNAS, (6) TMAS, (1) SURGE SUPPRESSOR, (12) COAX CABLES, (1) FIBER TRUNK CABLE & (2) DC TRUNK CABLES.

SITE ADDRESS:	64 HUNGERFORD LANE HARWINTON, CT 06791
LATITUDE (NAD 83):	N 41° 45' 26.15"
LONGITUDE (NAD 83):	W 73° 3' 9.20"
LANDLORD:	CROWN CASTLE INTERNATIONAL 500 W. CUMMINGS PARK, STE 3600 WOBURN, MA 01801
TYPE OF SITE:	MONOPOLE/INDOOR/OUTDOOR
TOWER HEIGHT:	178'
RAD CENTER:	158'
CURRENT USE:	TELECOMMUNICATIONS FACILITY
PROPOSED USE:	TELECOMMUNICATIONS FACILITY

SITE NUMBER: CTL01178

FA LOCATION CODE: 10110565

SITE NAME: HARWINTON - HUNGERFORD LANE

CROWN SITE NAME: HARWINTON / BUCKLEY BROADCASTI

PROJECT: LTE 2C/LTE 3C/LTE 4C/LTE 5C/4TX4RX SOFTWARE RETROFIT

PACE ID: MRCTB037900, MRCTB037962, MRCTB038045, MRCTB038146, MRCTB038016

BU#: 876369

NOTE:

ALL CONSTRUCTION ACTIVITIES ARE TO BE COMPLETED DIRECTLY THROUGH CROWN. CONTRACTOR MUST HAVE CONSTRUCTION PO AND NTP FROM CROWN DIRECT IN ORDER TO BEGIN. PRE-APPROVAL TO ENTER THE PROPERTY MUST BE OBTAINED. FOR ACCESS AUTHORIZATION, PLEASE CONTACT CROWN.

at&t
5841 BRIDGE STREET
EAST SYRACUSE, NY 13057

CROWN CASTLE
3 CORPORATE PARK DRIVE
SUITE 101
CLIFTON PARK, NY 12065

JACOBS
JACOBS ENGINEERING GROUP, INC.
120 ST. JAMES AVENUE, 5TH FLOOR
BOSTON, MA 02116

STATE OF CONNECTICUT
DANIEL J. CORNING
34035
LICENSED
PROFESSIONAL ENGINEER

PROJECT NO:	ERCC0004
DRAWN BY:	CM
CHECKED BY:	DJC

SUBMITTALS

3	10/30/19	REVISED DRAWINGS
2	10/03/19	ISSUED FOR CONSTRUCTION
1	09/04/19	ISSUED FOR PERMITTING
0	06/14/19	ISSUED FOR PERMITTING

FA# 10110565
SITE# CTL01178
HARWINTON -
HUNGERFORD LANE
64 HUNGERFORD LANE
HARWINTON, CT 06791

TITLE SHEET

T-1

DRAWING INDEX

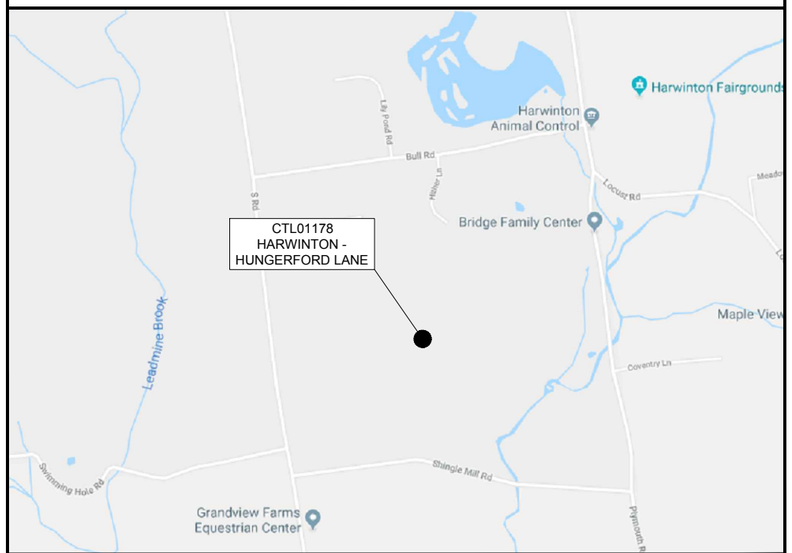
SHEET NO:	SHEET TITLE
T-1	TITLE SHEET
GN-1	GENERAL NOTES I
GN-2	GENERAL NOTES II
C-1	SITE PLAN
C-2	EQUIPMENT LAYOUT & PROPOSED TOWER ELEVATION
C-3	EXISTING & PROPOSED ANTENNA LAYOUT
C-4	EQUIPMENT DETAILS
C-5	EQUIPMENT DETAILS
RF-1	ANTENNA CHART & RF EQUIPMENT SCHEMATIC
G-1	GROUNDING DETAILS

CROWN CASTLE SITE ID #: 876369
CROWN CASTLE SITE NAME: HARWINTON / BUCKLEY BROADCASTI

ENGINEERING

2018 CONNECTICUT STATE BUILDING CODE
2018 AMENDMENT WITH 2015 INTERNATIONAL BUILDING CODE
2009 ICC/ANSI A117.1 ACCESSIBLE AND USABLE BUILDINGS AND FACILITIES
2015 INTERNATIONAL MECHANICAL CODE
2015 INTERNATIONAL ENERGY CONSERVATION CODE
2017 NATIONAL ELECTRICAL CODE (NFPA 70 2017)
ANSI/TIA-222-G

VICINITY MAP



I-91 SOUTH TOWARD NEW HAVEN. TAKE EXIT 22 NORTH TOWARD NEW BRITAIN. MERGE ONTO I-84 WEST/US-6 WEST VIA EXIT 32 ON LEFT TOWARD WATERBURY. MERGE ONTO FARMINGTON AVENUE/CT-4/MAIN STREET. CONTINUE TO FOLLOW CT-4; LEFT ONTO CT-4/SPIELMAN HIGHWAY. TURN SLIGHT LEFT ONTO SOUTH ROAD. LEFT ONTO HUNGERFORD LN. GO TO END OF ROAD. ACCESS ROAD IS ON RIGHT AFTER LAST HOUSE. FOLLOW ACCESS ROAD PAST RADIO STATION TO SHELTER SITE IN WOODS ON RIGHT.

GENERAL NOTES

1. 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.

2. 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.

811

UNDERGROUND SERVICE ALERT

STATE LAW REQUIRES
TWO WORKING DAYS NOTICE PRIOR TO ANY
EARTH MOVING ACTIVITIES BY CALLING
DIAL 811

PART 1 - GENERAL

1.1 GENERAL CONDITIONS:

A. CONTRACTOR SHALL INSPECT THE EXISTING SITE CONDITIONS PRIOR TO SUBMITTING BID. ANY QUESTIONS ARISING DURING THE BID PERIOD IN REGARDS TO THE CONTRACTORS FUNCTIONS, THE SCOPE OF WORK, OR ANY OTHER ISSUE RELATED TO THIS PROJECT SHALL BE BROUGHT UP DURING THE BID PERIOD WITH THE PROJECT MANAGER FOR CLARIFICATION, NOT AFTER THE CONTRACT HAS BEEN AWARDED.

B. THE CONTRACTOR SHALL OBTAIN PERMITS, LICENSES, MAKE ALL DEPOSITS, AND PAY ALL FEES REQUIRED FOR THE CONSTRUCTION PERFORMANCE FOR THE WORK UNDER THIS SECTION.

C. DRAWINGS SHOW THE GENERAL ARRANGEMENT OF ALL SYSTEMS AND COMPONENTS COVERED UNDER THIS SECTION. THE CONTRACTOR SHALL VERIFY ALL DIMENSIONS. DRAWING SHALL NOT BE SCALED TO DETERMINE DIMENSIONS.

1.2 LAWS, REGULATIONS, ORDINANCES, STATUTES AND CODES.

A. ALL WORK SHALL BE INSTALLED IN ACCORDANCE WITH THE LATEST EDITION OF THE NATIONAL ELECTRICAL CODE, AND ALL APPLICABLE LOCAL LAWS, REGULATIONS, ORDINANCES, STATUTES AND CODES. CONDUIT BENDS SHALL BE THE RADIUS BEND FOR THE TRADE SIZE OF CONDUIT IN COMPLIANCE WITH THE LATEST EDITIONS OF NEC.

1.3 REFERENCES:

A. THE PUBLICATIONS LISTED BELOW ARE PART OF THIS SPECIFICATION. EACH PUBLICATION SHALL BE THE LATEST REVISION AND ADDENDUM IN EFFECT ON THE DATE. THIS SPECIFICATION IS ISSUED FOR CONSTRUCTION UNLESS OTHERWISE NOTED. EXCEPT AS MODIFIED BY THE REQUIREMENT SPECIFIED HEREIN OR THE DETAILS OF THE DRAWINGS, WORK INCLUDED IN THIS SPECIFICATION SHALL CONFORM TO THE APPLICABLE PROVISION OF THESE PUBLICATIONS.

1. ANSI/IEEE (AMERICAN NATIONAL STANDARDS INSTITUTE)
2. ASTM (AMERICAN SOCIETY FOR TESTING AND MATERIALS)
3. ICEA (INSULATED CABLE ENGINEERS ASSOCIATION)
4. NEMA (NATIONAL ELECTRICAL MANUFACTURER'S ASSOCIATION)
5. NFPA (NATIONAL FIRE PROTECTION ASSOCIATION)
6. OSHA (OCCUPATIONAL SAFETY AND HEALTH ADMINISTRATION)
7. UL (UNDERWRITERS LABORATORIES INC.)
8. AT&T GROUNDING AND BONDING STANDARDS TP-76416

1.4 SCOPE OF WORK

A. WORK UNDER THIS SECTION SHALL CONSIST OF FURNISHING ALL LABOR, MATERIAL, AND ASSOCIATED SERVICES REQUIRED TO COMPLETE REQUIRED CONSTRUCTION AND BE OPERATIONAL.

B. ALL ELECTRICAL EQUIPMENT UNDER THIS CONTRACT SHALL BE PROPERLY TESTED, ADJUSTED, AND ALIGNED BY THE CONTRACTOR.

C. THE CONTRACTOR SHALL BE RESPONSIBLE FOR ALL EXCAVATING, DRAINING, TRENCHES, BACKFILLING, AND REMOVAL OF EXCESS DIRT.

D. THE CONTRACTOR SHALL FURNISH TO THE OWNER WITH CERTIFICATES OF A FINAL INSPECTION AND APPROVAL FROM THE INSPECTION AUTHORITIES HAVING JURISDICTION.

E. THE CONTRACTOR SHALL PREPARE A COMPLETE SET OF AS-BUILT DRAWINGS, DOCUMENT ALL WIRING EQUIPMENT CONDITIONS, AND CHANGES WHILE COMPLETING THIS CONTRACT. THE AS-BUILT DRAWINGS SHALL BE SUBMITTED AT COMPLETION OF THE PROJECT.

PART 2 - PRODUCTS

2.1 GENERAL:

A. ALL MATERIALS AND EQUIPMENT SHALL BE UL LISTED, NEW, AND FREE FROM DEFECTS.

B. ALL ITEMS OF MATERIALS AND EQUIPMENT SHALL BE ACCEPTABLE TO THE AUTHORITY HAVING JURISDICTION AS SUITABLE FOR THE USE INTENDED.

C. ALL EQUIPMENT SHALL BEAR THE UNDERWRITERS LABORATORIES LABEL OF APPROVAL, AND SHALL CONFORM TO REQUIREMENT OF THE NATIONAL ELECTRICAL CODE.

D. ALL OVERCURRENT DEVICES SHALL HAVE AN INTERRUPTING CURRENT RATING THAT SHALL BE GREATER THAN THE SHORT CIRCUIT CURRENT TO WHICH THEY ARE SUBJECTED, 10,000 AIC MINIMUM. VERIFY AVAILABLE SHORT CIRCUIT CURRENT DOES NOT EXCEED THE RATING OF ELECTRICAL EQUIPMENT IN ACCORDANCE WITH ARTICLE 110.24 NEC OR THE MOST CURRENT ADOPTED CODE PER THE GOVERNING JURISDICTION.

2.2 MATERIALS AND EQUIPMENT:

A. CONDUIT:

1. RIGID METAL CONDUIT (RMC) SHALL BE HOT-DIPPED GALVANIZED INSIDE AND OUTSIDE INCLUDING ENDS AND THREADS AND ENAMELED OR LACQUERED INSIDE IN ADDITION TO GALVANIZING.
2. LIQUIDTIGHT FLEXIBLE METAL CONDUIT SHALL BE UL LISTED.
3. CONDUIT CLAMPS, STRAPS AND SUPPORTS SHALL BE STEEL OR MALLEABLE IRON. ALL FITTINGS SHALL BE COMPRESSION AND CONCRETE TIGHT TYPE. GROUNDING BUSHINGS WITH INSULATED THROATS SHALL BE INSTALLED ON ALL CONDUIT TERMINATIONS.
4. NONMETALLIC CONDUIT AND FITTINGS SHALL BE SCHEDULE 40 PVC. INSTALL USING SOLVENT-CEMENT-TYPE JOINTS AS RECOMMENDED BY THE MANUFACTURER.

B. CONDUCTORS AND CABLE:

1. CONDUCTORS AND CABLE SHALL BE FLAME-RETARDANT, MOISTURE AND HEAT RESISTANT THERMOPLASTIC, SINGLE CONDUCTOR, COPPER, TYPE THHN/THWN-2, 600 VOLT, SIZE AS INDICATED, #12 AWG SHALL BE THE MINIMUM SIZE CONDUCTOR USED.
2. #10 AWG AND SMALLER CONDUCTOR SHALL BE SOLID OR STRANDED AND #8 AWG AND LARGER CONDUCTORS SHALL BE STRANDED.
3. SOLDERLESS, COMPRESSION-TYPE CONNECTORS SHALL BE USED FOR TERMINATION OF ALL STRANDED CONDUCTORS.
4. STRAIN-RELIEF SUPPORTS GRIPS SHALL BE HUBBELL KELLEMS OR APPROVED EQUAL. CABLES SHALL BE SUPPORTED IN ACCORDANCE WITH THE NEC AND CABLE MANUFACTURER'S RECOMMENDATIONS.
5. ALL CONDUCTORS SHALL BE TAGGED AT BOTH ENDS OF THE CONDUCTOR, AT ALL PULL BOXES, J-BOXES, EQUIPMENT AND CABINETS AND SHALL BE IDENTIFIED WITH APPROVED PLASTIC TAGS (ACTION CRAFT, BRADY, OR APPROVED EQUAL).

C. DISCONNECT SWITCHES:

1. DISCONNECT SWITCHES SHALL BE HEAVY DUTY, DEAD-FRONT, QUICK-MAKE, QUICK-BREAK, EXTERNALLY OPERABLE, HANDLE LOCKABLE AND INTERLOCK WITH COVER IN CLOSED POSITION, RATING AS INDICATED, UL LABELED FURNISHED IN NEMA 3R ENCLOSURE, SQUARE-D OR ENGINEER APPROVED EQUAL.

D. CHEMICAL ELECTROLYTIC GROUNDING SYSTEM:

1. INSTALL CHEMICAL GROUNDING AS REQUIRED. THE SYSTEM SHALL BE ELECTROLYTIC MAINTENANCE FREE ELECTRODE CONSISTING OF RODS WITH A MINIMUM #2 AWG CU EXOTHERMICALLY WELDED PIGTAIL, PROTECTIVE BOXES, AND BACKFILL MATERIAL. MANUFACTURER SHALL BE LYNCOLE XIT GROUNDING ROD TYPES K2-(*)CS OR K2L-(*)CS (*) LENGTH AS REQUIRED.
2. GROUND ACCESS BOX SHALL BE A POLYPLASTIC BOX FOR NON-TRAFFIC APPLICATIONS, INCLUDING BOLT DOWN FLUSH COVER WITH "BREATHER" HOLES, XIT MODEL #XB-22. ALL DISCONNECT SWITCHES AND CONTROLLING DEVICES SHALL BE PROVIDED WITH ENGRAVED LAMICOID NAMEPLATES INDICATING EQUIPMENT CONTROLLED, BRANCH CIRCUITS ID NUMBERING, AND THE ELECTRICAL POWER SOURCE.
3. BACKFILL MATERIAL SHALL BE LYNCONITE AND LYNCOLE GROUNDING GRAVEL.

E. SYSTEM GROUNDING:

1. ALL GROUNDING COMPONENTS SHALL BE TINNED AND GROUNDING CONDUCTOR SHALL BE #2 AWG BARE, SOLID, TINNED, COPPER. ABOVE GRADE GROUNDING CONDUCTORS SHALL BE INSULATED WHERE NOTED.
2. GROUNDING BUSES SHALL BE BARE, TINNED, ANNEALED COPPER BARS OF RECTANGULAR CROSS SECTION. STANDARD BUS BARS MGB, SHALL BE FURNISHED AND INSTALLED BY THE CONTRACTOR. THEY SHALL NOT BE FABRICATED OR MODIFIED IN THE FIELD. ALL GROUNDING BUSES SHALL BE IDENTIFIED WITH MINIMUM 3/4" LETTERS BY WAY OF STENCILING OR DESIGNATION PLATE.
3. CONNECTORS SHALL BE HIGH-CONDUCTIVITY, HEAVY DUTY, LISTED AND LABELED AS GROUNDING CONNECTORS FOR THE MATERIALS USED. USE TWO-HOLE COMPRESSION LUGS WITH HEAT SHRINK FOR MECHANICAL CONNECTIONS. INTERIOR CONNECTIONS USE TWO-HOLE COMPRESSION LUGS WITH INSPECTION WINDOW AND CLEAR HEAT SHRINK.
4. EXOTHERMIC WELDED CONNECTIONS SHALL BE PROVIDED IN KIT FORM AND SELECTED FOR THE SPECIFIC TYPES, SIZES, AND COMBINATIONS OF CONDUCTORS AND OTHER ITEMS TO BE CONNECTED.
5. GROUND RODS SHALL BE COPPER-CLAD STEEL WITH HIGH-STRENGTH STEEL CORE AND ELECTROLYTIC-GRADE COPPER OUTER SHEATH, MOLTEN WELDED TO CORE, 5/8"x10'-0". ALL GROUNDING RODS SHALL BE INSTALLED WITH INSPECTION SLEEVES.
6. INSTALL AN EQUIPMENT GROUNDING CONDUCTOR IN ALL CONDUITS IN COMPLIANCE WITH THE AT&T SPECIFICATIONS AND NEC. THE EQUIPMENT GROUNDING CONDUCTORS SHALL BE BONDED AT ALL JUNCTION BOXES, PULLBOXES, DISCONNECT SWITCHES, STARTERS, AND EQUIPMENT CABINETS.

F. OTHER MATERIALS:

6. THE CONTRACTOR SHALL PROVIDE OTHER MATERIALS, THOUGH NOT SPECIFICALLY DESCRIBED, WHICH ARE REQUIRED FOR A COMPLETELY OPERATIONAL SYSTEM AND PROPER INSTALLATION OF THE WORK.
7. PROVIDE PULL BOXES AND JUNCTION BOXES WHERE SHOWN OR REQUIRED BY NEC.

G. PANELS AND LOAD CENTERS:

1. ALL PANEL DIRECTORIES SHALL BE TYPEWRITTEN.

PART 3 - EXECUTION

3.1 GENERAL:

A. ALL MATERIAL AND EQUIPMENT SHALL BE INSTALLED IN STRICT ACCORDANCE WITH THE MANUFACTURER'S RECOMMENDATIONS.

B. EQUIPMENT SHALL BE TIGHTLY COVERED AND PROTECTED AGAINST DIRT OR WATER, AND AGAINST CHEMICAL OR MECHANICAL INJURY DURING INSTALLATION AND CONSTRUCTION PERIODS.

3.2 LABOR AND WORKMANSHIP:

A. ALL LABOR FOR THE INSTALLATION OF MATERIALS AND EQUIPMENT FURNISHED FOR THE ELECTRICAL SYSTEM SHALL BE INSTALLED BY EXPERIENCED WIREMEN, IN A NEAT AND WORKMAN-LIKE MANNER.

B. ALL ELECTRICAL EQUIPMENT SHALL BE ADJUSTED, ALIGNED AND TESTED BY THE CONTRACTOR AS REQUIRED TO PRODUCE THE INTENDED PERFORMANCE.

C. UPON COMPLETION OF WORK, THE CONTRACTOR SHALL THOROUGHLY CLEAN ALL EXPOSED EQUIPMENT, REMOVE ALL LABELS AND ANY DEBRIS, CRATING OR CARTONS AND LEAVE THE INSTALLATION FINISHED AND READY FOR OPERATION.

3.3 COORDINATION:

A. THE CONTRACTOR SHALL COORDINATE THE INSTALLATION OF ELECTRICAL ITEMS WITH THE OWNER-FURNISHED EQUIPMENT DELIVERY SCHEDULE TO PREVENT UNNECESSARY DELAYS IN THE TOTAL WORK.

3.4 INSTALLATION:

A. CONDUIT:

1. ALL ELECTRICAL WIRING SHALL BE INSTALLED IN CONDUIT AS SPECIFIED. NO CONDUIT OR TUBING OF LESS THAN 3/4 INCH TRADE SIZE.
2. PROVIDE RIGID PVC SCHEDULE 80 CONDUITS FOR ALL RISERS, RMC OTHERWISE NOTED. EMT MAY BE INSTALLED FOR EXTERIOR CONDUITS WHERE NOT SUBJECT TO PHYSICAL DAMAGE.
3. INSTALL SCHEDULE 40 PVC CONDUIT WITH A MINIMUM COVER OF 24" UNDER ROADWAYS, PARKING LOTS, STREETS, AND ALLEYS. CONDUIT SHALL HAVE A MINIMUM COVER OF 18" IN ALL OTHER NON-TRAFFIC APPLICATIONS (REFER TO 2017 NEC, TABLE 300.5).
4. USE GALVANIZED FLEXIBLE STEEL CONDUIT WHERE DIRECT CONNECTION TO EQUIPMENT WITH MOVEMENT, VIBRATION, OR FOR EASE OF MAINTENANCE. USE LIQUID TIGHT, FLEXIBLE METAL CONDUIT FOR OUTDOOR APPLICATIONS. INSTALL GALVANIZED FLEXIBLE STEEL CONDUIT AT ALL POINTS OF CONNECTION TO EQUIPMENT MOUNTED ON SUPPORT TO ALLOW FOR EXPANSION AND CONTRACTION.
5. A RUN OF CONDUIT BETWEEN BOXES OR EQUIPMENT SHALL NOT CONTAIN MORE THAN THE EQUIVALENT OF THREE QUARTER-BENDS. CONDUIT BEND SHALL BE MADE WITH THE UL LISTED BENDER OR FACTORY 90 DEGREE ELBOWS MAY BE USED.
6. FIELD FABRICATED CONDUITS SHALL BE CUT SQUARE WITH A CONDUIT CUTTING TOOL AND REAMED TO PROVIDE A SMOOTH INSIDE SURFACE.
7. PROVIDE INSULATED GROUNDING BUSHING FOR ALL CONDUITS.
8. CONTRACTOR IS RESPONSIBLE FOR PROTECTING ALL CONDUITS DURING CONSTRUCTION. TEMPORARY OPENINGS IN THE CONDUIT SYSTEM SHALL BE PLUGGED OR CAPPED TO PREVENT ENTRANCE OF MOISTURE OR FOREIGN MATTER. CONTRACTOR SHALL REPLACE ANY CONDUITS CONTAINING FOREIGN MATERIALS THAT CANNOT BE REMOVED.
9. ALL CONDUITS SHALL BE SWABBED CLEAN BY PULLING AN APPROPRIATE SIZE MANDREL THROUGH THE CONDUIT BEFORE INSTALLATION OF CONDUCTORS OR CABLES. CONDUIT SHALL BE FREE OF DIRT AND DEBRIS.
10. INSTALL PULL STRINGS IN ALL CLEAN EMPTY CONDUITS. IDENTIFY PULL STRINGS AT EACH END.
11. INSTALL 2" HIGHLY VISIBLE AND DETECTABLE TAPE 12" ABOVE ALL UNDERGROUND CONDUITS AND CONDUCTORS.
12. CONDUITS SHALL BE INSTALLED IN SUCH A MANNER AS TO INSURE AGAINST COLLECTION OF TRAPPED CONDENSATION.
13. PROVIDE CORE DRILLING AS NECESSARY FOR PENETRATIONS TO ALLOW FOR RACEWAYS AND CABLES TO BE ROUTED THROUGH THE BUILDING. DO NOT PENETRATE STRUCTURAL MEMBERS. SLEEVES AND/OR PENETRATIONS IN FIRE RATED CONSTRUCTION SHALL BE EFFECTIVELY SEALED WITH FIRE RATED MATERIAL WHICH SHALL MAINTAIN THE FIRE RATING OF THE WALL OR STRUCTURE. FIRE STOPS AT FLOOR PENETRATIONS SHALL PREVENT PASSAGE OF WATER, SMOKE, FIRE, AND FUMES. ALL MATERIAL SHALL BE UL APPROVED FOR THIS PURPOSE.

B. CONDUCTORS AND CABLE:

1. ALL POWER WIRING SHALL BE COLOR CODED AS FOLLOWS:

DESCRIPTION	208/240/120 VOLT SYSTEMS
PHASE A	BLACK
PHASE B	RED
PHASE C	BLUE
NEUTRAL	WHITE
GROUNDING	GREEN

2. SPLICES SHALL BE MADE ONLY AT OUTLETS, JUNCTION BOXES, OR ACCESSIBLE RACEWAY CONDUITS APPROVED FOR THIS PURPOSE.
3. PULLING LUBRICANTS SHALL BE UL APPROVED. CONTRACTOR SHALL USE NYLON OR HEMP ROPE FOR PULLING CONDUCTOR OR CABLES INTO THE CONDUIT.
4. CABLES SHALL BE NEATLY TRAINED, WITHOUT INTERLACING, AND BE OF SUFFICIENT LENGTH IN ALL BOXES & EQUIPMENT TO PERMIT MAKING A NEAT ARRANGEMENT. CABLES SHALL BE SECURED IN A MANNER TO AVOID TENSION ON CONDUCTORS OR TERMINALS. CONDUCTORS SHALL BE PROTECTED FROM MECHANICAL INJURY AND MOISTURE. SHARP BENDS OVER CONDUIT BUSHINGS IS PROHIBITED. DAMAGED CABLES SHALL BE REMOVED AND REPLACED AT THE CONTRACTOR'S EXPENSE.

C. DISCONNECT SWITCHES:

1. INSTALL DISCONNECT SWITCHES LEVEL AND PLUMB. CONNECT TO WIRING SYSTEM AND GROUNDING SYSTEM AS INDICATED.

D. GROUNDING:

1. ALL METALLIC PARTS OF ELECTRICAL EQUIPMENT WHICH DO NOT CARRY CURRENT SHALL BE GROUNDED IN ACCORDANCE WITH THE REQUIREMENTS OF THE BUILDING MANUFACTURER, AT&T GROUNDING AND BONDING STANDARDS TP-76416, ND-00135, AND THE NATIONAL ELECTRICAL CODE.
2. PROVIDE ELECTRICAL GROUNDING AND BONDING SYSTEM INDICATED WITH ASSEMBLY OF MATERIALS, INCLUDING GROUNDING ELECTRODES, BONDING JUMPERS AND ADDITIONAL ACCESSORIES AS REQUIRED FOR A COMPLETE INSTALLATION.
3. ALL GROUNDING CONDUCTORS SHALL PROVIDE A STRAIGHT DOWNWARD PATH TO GROUND WITH GRADUAL BEND AS REQUIRED. GROUNDING CONDUCTORS SHALL NOT BE LOOPED OR SHARPLY BENT. ROUTE GROUNDING CONNECTIONS AND CONDUCTORS TO GROUND IN THE SHORTEST AND STRAIGHTEST PATHS POSSIBLE TO MINIMIZE TRANSIENT VOLTAGE RISES.
4. BUILDINGS AND/OR NEW TOWERS GREATER THAN 75 FEET IN HEIGHT AND WHERE THE MAIN GROUNDING CONDUCTORS ARE REQUIRED TO BE ROUTED TO GRADE, THE CONTRACTOR SHALL ROUTE TWO GROUNDING CONDUCTORS FROM THE ROOFTOP, TOWERS, AND WATER TOWERS GROUNDING RING, TO THE EXISTING GROUNDING SYSTEM, THE GROUNDING CONDUCTORS SHALL NOT BE SMALLER THAN 2/0 AWG COPPER. ROOFTOP GROUNDING RING SHALL BE BONDED TO THE EXISTING GROUNDING SYSTEM, THE BUILDING STEEL COLUMNS, LIGHTNING PROTECTION SYSTEM, AND BUILDING MAIN WATER LINE (FERROUS OR NONFERROUS METAL PIPING ONLY). SEE STANDARD 6.3.2.2.
5. TIGHTEN GROUNDING AND BONDING CONNECTORS, INCLUDING SCREWS AND BOLTS, IN ACCORDANCE WITH MANUFACTURER'S PUBLISHED TORQUE TIGHTENING VALUES FOR CONNECTORS AND BOLTS. WHERE MANUFACTURER'S TORQUING REQUIREMENTS ARE NOT AVAILABLE, TIGHTEN CONNECTIONS TO COMPLY WITH TIGHTENING TORQUE VALUES SPECIFIED IN UL TO ASSURE PERMANENT AND EFFECTIVE GROUNDING.
6. CONTRACTOR SHALL VERIFY THE LOCATIONS OF GROUNDING TIE-IN-POINTS TO THE EXISTING GROUNDING SYSTEM. ALL UNDERGROUND GROUNDING CONNECTIONS SHALL BE MADE BY THE EXOTHERMIC WELD PROCESS AND INSTALLED IN ACCORDANCE WITH THE MANUFACTURER'S INSTRUCTIONS.
7. ALL GROUNDING CONNECTIONS SHALL BE INSPECTED FOR TIGHTNESS. EXOTHERMIC WELDED CONNECTIONS SHALL BE APPROVED BY THE INSPECTOR HAVING JURISDICTION BEFORE BEING PERMANENTLY CONCEALED.
8. APPLY CORROSION-RESISTANT FINISH TO FIELD CONNECTIONS AND PLACES WHERE FACTORY APPLIED PROTECTIVE COATINGS HAVE BEEN DESTROYED. USE KOPR-SHIELD ANTI-OXIDATION COMPOUND ON ALL COMPRESSION GROUNDING CONNECTIONS.
9. A SEPARATE, CONTINUOUS, INSULATED EQUIPMENT GROUNDING CONDUCTOR SHALL BE INSTALLED IN ALL FEEDER AND BRANCH CIRCUITS.
10. BOND ALL INSULATED GROUNDING BUSHINGS WITH A BARE #6 AWG GROUNDING CONDUCTOR TO A GROUND BUS.
11. DIRECT BURIED GROUNDING CONDUCTORS SHALL BE INSTALLED AT A NOMINAL DEPTH OF 36" MINIMUM BELOW GRADE, OR 6" BELOW THE FROST LINE, USE THE GREATER OF THE TWO DISTANCES.
12. ALL GROUNDING CONDUCTORS EMBEDDED IN OR PENETRATING CONCRETE SHALL BE INSTALLED IN SCHEDULE 40 PVC CONDUIT.
13. THE INSTALLATION OF CHEMICAL ELECTROLYTIC GROUNDING SYSTEM IN STRICT ACCORDANCE WITH MANUFACTURER'S INSTRUCTIONS. REMOVE SEALING TAPE FROM LEACHING AND BREATHER HOLES. INSTALL PROTECTIVE BOX FLUSH WITH GRADE.
14. DRIVE GROUND RODS UNTIL TOPS ARE A MINIMUM DISTANCE OF 36" DEPTH OR 6" BELOW FROST LINE, USING THE GREATER OF THE TWO DISTANCES.
15. IF COAX ON THE ICE BRIDGE IS MORE THAN 6 FT. FROM THE GROUNDING BAR AT THE BASE OF THE TOWER, A SECOND GROUNDING BAR WILL BE NEEDED AT THE END OF THE ICE BRIDGE, TO GROUND THE COAX CABLE GROUNDING KITS AND IN-LINE ARRESTORS.
16. CONTRACTOR SHALL REPAIR, AND/OR REPLACE, EXISTING GROUNDING SYSTEM COMPONENTS DAMAGED DURING CONSTRUCTION AT THE CONTRACTORS EXPENSE.

3.5 ACCEPTANCE TESTING:

A. CERTIFIED PERSONNEL USING CERTIFIED EQUIPMENT SHALL PERFORM REQUIRED TESTS AND SUBMIT WRITTEN TEST REPORTS UPON COMPLETION.

B. WHEN MATERIAL AND/OR WORKMANSHIP IS FOUND NOT TO COMPLY WITH THE SPECIFIED REQUIREMENTS, THE NON-COMPLYING ITEMS SHALL BE REMOVED FROM THE PROJECT SITE AND REPLACED WITH ITEMS COMPLYING WITH THE SPECIFIED REQUIREMENTS PROMPTLY AFTER RECEIPT OF NOTICE FOR NON-COMPLIANCE.

C. TEST PROCEDURES:

1. ALL FEEDERS SHALL HAVE INSULATION TESTED AFTER INSTALLATION, BEFORE CONNECTION TO DEVICES. THE CONDUCTORS SHALL TEST FREE FROM SHORT CIRCUITS AND GROUNDS. TESTING SHALL BE FOR ONE MINUTE USING 1000V DC. PROVIDE WRITTEN DOCUMENTATION FOR ALL TEST RESULTS.
2. PRIOR TO ENERGIZING CIRCUITRY, TEST WIRING DEVICES FOR ELECTRICAL CONTINUITY AND PROPER POLARITY CONNECTIONS.
3. MEASURE AND RECORD VOLTAGES BETWEEN PHASES AND BETWEEN PHASE CONDUCTORS AND NEUTRALS. SUBMIT A REPORT OF MAXIMUM AND MINIMUM VOLTAGES.
4. PERFORM GROUNDING TEST TO MEASURE GROUNDING RESISTANCE OF GROUNDING SYSTEM USING THE IEEE STANDARD 3-POINT "FALL-OF-POTENTIAL" METHOD. PROVIDE PLOTTED TEST VALUES AND LOCATION SKETCH. NOTIFY THE ENGINEER IMMEDIATELY IF MEASURED VALUE IS OVER 5 OHMS.

at&t
5841 BRIDGE STREET
EAST SYRACUSE, NY 13057

CROWN CASTLE
3 CORPORATE PARK DRIVE
SUITE 101
CLIFTON PARK, NY 12065

JACOBS
JACOBS ENGINEERING GROUP, INC.
120 ST. JAMES AVENUE, 5TH FLOOR
BOSTON, MA 02116

STATE OF CONNECTICUT
DANIEL J. CORNING
24055
LICENSED
PROFESSIONAL ENGINEER

PROJECT NO: ERCC0004
DRAWN BY: CM
CHECKED BY: DJC

SUBMITTALS

3	10/30/19	REVISED DRAWINGS
2	10/03/19	ISSUED FOR CONSTRUCTION
1	09/04/19	ISSUED FOR PERMITTING
0	06/14/19	ISSUED FOR PERMITTING

FA# 10110565
SITE# CTL01178
HARWINTON -
HUNGERFORD LANE
64 HUNGERFORD LANE
HARWINTON, CT 06791

GENERAL NOTES I

GN-1

ANTENNA MOUNTING

1. DESIGN AND CONSTRUCTION OF ANTENNA SUPPORTS SHALL CONFORM TO CURRENT ANSI/TIA-222 OR APPLICABLE LOCAL CODES.
2. ALL STEEL MATERIALS SHALL BE GALVANIZED AFTER FABRICATION IN ACCORDANCE WITH ASTM A123 "ZINC (HOT-DIP GALVANIZED) COATINGS ON IRON AND STEEL PRODUCTS", UNLESS NOTED OTHERWISE.
3. ALL BOLTS, ANCHORS AND MISCELLANEOUS HARDWARE SHALL BE GALVANIZED IN ACCORDANCE WITH ASTM A153 "ZINC-COATING (HOT-DIP) ON IRON AND STEEL HARDWARE", UNLESS NOTED OTHERWISE.
4. DAMAGED GALVANIZED SURFACES SHALL BE REPAIRED BY COLD GALVANIZING IN ACCORDANCE WITH ASTM A780.
5. ALL ANTENNA MOUNTS SHALL BE INSTALLED WITH LOCK NUTS, DOUBLE NUTS AND SHALL BE TORQUED TO MANUFACTURER'S RECOMMENDATIONS.
6. CONTRACTOR SHALL INSTALL ANTENNA PER MANUFACTURER'S RECOMMENDATION FOR INSTALLATION AND GROUNDING.
7. ALL UNUSED PORTS ON ANY ANTENNAS SHALL BE TERMINATED WITH A 50-OHM LOAD TO ENSURE ANTENNAS PERFORM AS DESIGNED.
8. PRIOR TO SETTING ANTENNA AZIMUTHS AND DOWNTILTS, ANTENNA CONTRACTOR SHALL CHECK THE ANTENNA MOUNT FOR TIGHTNESS AND ENSURE THAT THEY ARE PLUMB. ANTENNA AZIMUTHS SHALL BE SET FROM TRUE NORTH AND BE ORIENTED WITHIN +/- 5% AS DEFINED BY THE RFDS. ANTENNA DOWNTILTS SHALL BE WITHIN +/- 0.5% AS DEFINED BY THE RFDS. REFER TO ND-00246.
9. JUMPERS FROM THE TMA'S MUST TERMINATE TO OPPOSITE POLARIZATION'S IN EACH SECTOR.
10. CONTRACTOR SHALL RECORD THE SERIAL #, SECTOR, AND POSITION OF EACH ACTUATOR INSTALLED AT THE ANTENNAS AND PROVIDE THE INFORMATION TO AT&T.
11. TMA'S SHALL BE MOUNTED ON PIPE DIRECTLY BEHIND ANTENNAS AS CLOSE TO ANTENNA AS FEASIBLE IN A VERTICAL POSITION.

TORQUE REQUIREMENTS

12. ALL RF CONNECTIONS SHALL BE TIGHTENED BY A TORQUE WRENCH.
13. ALL RF CONNECTIONS, GROUNDING HARDWARE AND ANTENNA HARDWARE SHALL HAVE A TORQUE MARK INSTALLED IN A CONTINUOUS STRAIGHT LINE FROM BOTH SIDES OF THE CONNECTION.
    A. RF CONNECTION BOTH SIDES OF THE CONNECTOR.
    B. GROUNDING AND ANTENNA HARDWARE ON THE NUT SIDE STARTING FROM THE THREADS TO THE SOLID SURFACE. EXAMPLE OF SOLID SURFACE: GROUND BAR, ANTENNA BRACKET METAL.
    C. ALL 8M ANTENNA HARDWARE SHALL BE TIGHTENED TO 9 LB-FT (12 NM).
14. ALL 12M ANTENNA HARDWARE SHALL BE TIGHTENED TO 43 LB-FT (58 NM).
15. ALL GROUNDING HARDWARE SHALL BE TIGHTENED UNTIL THE LOCK WASHER COLLAPSES AND THE GROUNDING HARDWARE IS NO LONGER LOOSE.
16. ALL DIN TYPE CONNECTIONS SHALL BE TIGHTENED TO 18-22 LB-FT (24.4 - 29.8 NM).
17. ALL N TYPE CONNECTIONS SHALL BE TIGHTENED TO 15-20 LB-IN (1.7 - 2.3 NM).

FIBER & POWER CABLE MOUNTING

18. THE FIBER OPTIC TRUNK CABLES SHALL BE INSTALLED INTO CONDUITS, CHANNEL CABLE TRAYS, OR CABLE TRAY. WHEN INSTALLING FIBER OPTIC TRUNK CABLES INTO A CABLE TRAY SYSTEM, THEY SHALL BE INSTALLED INTO AN INTER DUCT AND A PARTITION BARRIER SHALL BE INSTALLED BETWEEN THE 600 VOLT CABLES AND THE INTER DUCT IN ORDER TO SEGREGATE CABLE TYPES. OPTIC FIBER TRUNK CABLES SHALL HAVE APPROVED CABLE RESTRAINTS EVERY (60) SIXTY FEET AND SECURELY FASTENED TO THE CABLE TRAY SYSTEM. NFPA 70 (NEC) ARTICLE 770 RULES SHALL APPLY.
19. THE TYPE TC-ER CABLES SHALL BE INSTALLED INTO CONDUITS, CHANNEL CABLE TRAYS, OR CABLE TRAY AND SHALL BE SECURED AT INTERVALS NOT EXCEEDING (6) SIX FEET. AN EXCEPTION; WHERE TYPE TC-ER CABLES ARE NOT SUBJECT TO PHYSICAL DAMAGE, CABLES SHALL BE PERMITTED TO MAKE A TRANSITION BETWEEN CONDUITS, CHANNEL CABLE TRAYS, OR CABLE TRAY WHICH ARE SERVING UTILIZATION EQUIPMENT OR DEVICES, A DISTANCE (6) SIX FEET SHALL NOT BE EXCEEDED WITHOUT CONTINUOUS SUPPORTING. NFPA 70 (NEC) ARTICLES 336 AND 392 RULES SHALL APPLY.
20. WHEN INSTALLING OPTIC FIBER TRUNK CABLES OR TYPE TC-ER CABLES INTO CONDUITS, NFPA 70 (NEC) ARTICLE 300 RULES SHALL APPLY.

COAXIAL CABLE NOTES

21. TYPES AND SIZES OF THE ANTENNA CABLE ARE BASED ON ESTIMATED LENGTHS. PRIOR TO ORDERING CABLE, CONTRACTOR SHALL VERIFY ACTUAL LENGTH BASED ON CONSTRUCTION LAYOUT AND NOTIFY THE PROJECT MANAGER IF ACTUAL LENGTHS EXCEED ESTIMATED LENGTHS.
22. CONTRACTOR SHALL VERIFY THE DOWN-TILT OF EACH ANTENNA WITH A DIGITAL LEVEL.
23. CONTRACTOR SHALL CONFIRM COAX COLOR CODING PRIOR TO CONSTRUCTION. REFER TO "ANTENNA SYSTEM LABELING STANDARD" ND-00027 LATEST VERSION.
24. ALL JUMPERS TO THE ANTENNAS FROM THE MAIN TRANSMISSION LINE SHALL BE 1/2" DIA. LDF AND SHALL NOT EXCEED 6'-0".
25. ALL COAXIAL CABLE SHALL BE SECURED TO THE DESIGNED SUPPORT STRUCTURE, IN AN APPROVED MANNER, AT DISTANCES NOT TO EXCEED 4'-0" O.C.
26. CONTRACTOR SHALL FOLLOW ALL MANUFACTURER'S RECOMMENDATIONS REGARDING BOTH THE INSTALLATION AND GROUNDING OF ALL COAXIAL CABLES, CONNECTORS, ANTENNAS, AND ALL OTHER EQUIPMENT.
27. CONTRACTOR SHALL WEATHERPROOF ALL ANTENNA CONNECTORS WITH SELF AMALGAMATING TAPE. WEATHERPROOFING SHALL BE COMPLETED IN STRICT ACCORDANCE WITH AT&T STANDARDS.
28. CONTRACTOR SHALL GROUND ALL EQUIPMENT. INCLUDING ANTENNAS, RET MOTORS, TMA'S, COAX CABLES, AND RET CONTROL CABLES AS A COMPLETE SYSTEM. GROUNDING SHALL BE EXECUTED BY QUALIFIED WIREMEN IN COMPLIANCE WITH MANUFACTURER'S SPECIFICATION AND RECOMMENDATION.
29. CONTRACTOR SHALL PROVIDE STRAIN-RELIEF AND CABLE SUPPORTS FOR ALL CABLE ASSEMBLIES, COAX CABLES, AND RET CONTROL CABLES. CABLE STRAIN-RELIEFS AND CABLE SUPPORTS SHALL BE APPROVED FOR THE PURPOSE. INSTALLATION SHALL BE IN ACCORDANCE WITH MANUFACTURER'S SPECIFICATIONS AND RECOMMENDATIONS.
30. CONTRACTOR TO VERIFY THAT EXISTING COAX HANGERS ARE STACKABLE SNAP IN HANGERS. IF EXISTING HANGERS ARE NOT STACKABLE SNAP IN HANGERS THE CONTRACTOR SHALL REPLACE EXISTING HANGERS WITH NEW SNAP IN HANGERS IF APPLICABLE.

GENERAL CABLE AND EQUIPMENT NOTES

31. CONTRACTOR SHALL BE RESPONSIBLE TO VERIFY ANTENNA, TMAS, DIPLEXERS, AND COAX CONFIGURATION, MAKE AND MODELS PRIOR TO INSTALLATION.
32. ALL CONNECTIONS FOR HANGERS, SUPPORTS, BRACING, ETC. SHALL BE INSTALLED PER TOWER MANUFACTURER'S RECOMMENDATIONS.
33. CONTRACTOR SHALL REFERENCE THE TOWER STRUCTURAL ANALYSIS/DESIGN DRAWINGS FOR DIRECTIONS ON CABLE DISTRIBUTION/ROUTING.
34. ALL OUTDOOR RF CONNECTORS/CONNECTIONS SHALL BE WEATHERPROOFED, EXCEPT THE RET CONNECTORS, USING BUTYL TAPE AFTER INSTALLATION AND FINAL CONNECTIONS ARE MADE. BUTYL TAPE SHALL HAVE A MINIMUM OF ONE-HALF TAPE WIDTH OVERLAP ON EACH TURN AND EACH LAYER SHALL BE WRAPPED THREE TIMES. WEATHERPROOFING SHALL BE SMOOTH WITHOUT BUCKLING. BUTYL BLEEDING IS NOT ALLOWED.
35. IF REQUIRED TO PAINT ANTENNAS AND/OR COAX:
    A. TEMPERATURE SHALL BE ABOVE 50° F.
    B. PAINT COLOR MUST BE APPROVED BY BUILDING OWNER/LANDLORD.
    C. FOR REGULATED TOWERS, FAA/FCC APPROVED PAINT IS REQUIRED.
    D. DO NOT PAINT OVER COLOR CODING OR ON EQUIPMENT MODEL NUMBERS.
36. ALL CABLES SHALL BE GROUNDED WITH COAXIAL CABLE GROUND KITS. FOLLOW THE MANUFACTURER'S RECOMMENDATIONS.
    A. GROUNDING AT THE ANTENNA LEVEL.
    B. GROUNDING AT MID LEVEL, TOWERS WHICH ARE OVER 200'-0", ADDITIONAL CABLE GROUNDING REQUIRED.
    C. GROUNDING AT BASE OF TOWER PRIOR TO TURNING HORIZONTAL.
    D. GROUNDING OUTSIDE THE EQUIPMENT SHELTER AT ENTRY PORT.
    E. GROUNDING INSIDE THE EQUIPMENT SHELTER AT THE ENTRY PORT.
37. ALL PROPOSED GROUND BAR DOWNLEADS ARE TO BE TERMINATED TO THE EXISTING ADJACENT GROUND
38. BAR DOWNLEADS A MINIMUM DISTANCE OF 4'-0" BELOW GROUND BAR. TERMINATIONS MAY BE EXOTHERMIC OR COMPRESSION.
39. THE CONTRACTOR SHALL BE RESPONSIBLE FOR VERIFYING THE ANTENNA AND THE COAX CONFIGURATION IS THE CORRECT MAKE AND MODELS, PRIOR TO INSTALLATION.
40. ALL CONNECTIONS FOR HANGERS, SUPPORTS, BRACING, ETC. SHALL BE INSTALLED PER TOWER MANUFACTURER'S SPECIFICATION & RECOMMENDATIONS.
41. ANTENNA CONTRACTOR SHALL FURNISH AND INSTALL A 12'-0" T-BOOM SECTOR ANTENNA MOUNT, IF APPLICABLE, INCLUDING ALL HARDWARE.

GROUNDING NOTES

42. GROUNDING IS SHOWN DIAGRAMMATICALLY ONLY.
43. CONTRACTOR SHALL GROUND ALL EQUIPMENT AS A COMPLETE SYSTEM. GROUNDING SHALL BE IN COMPLIANCE WITH NEC SECTION 250 AND AT&T GROUNDING AND BONDING REQUIREMENTS (ATT-TP-76416) AND MANUFACTURER'S SPECIFICATIONS.
44. ALL GROUND CONDUCTORS SHALL BE COPPER; NO ALUMINUM CONDUCTORS SHALL BE USED.
45. ALL CABLES SHALL BE GROUNDED WITH COAXIAL CABLE GROUNDING KITS. FOLLOW THE MANUFACTURER'S RECOMMENDATIONS.
    A. GROUNDING AT THE ANTENNA LEVEL.
    B. GROUNDING AT MID LEVEL, TOWERS WHICH ARE OVER 200', ADDITIONAL CABLE GROUNDING REQUIRED.
    C. GROUNDING AT BASE OF TOWER PRIOR TO TURNING HORIZONTAL.
    D. GROUNDING OUTSIDE THE EQUIPMENT SHELTER AT ENTRY PORT.
    E. GROUNDING INSIDE THE EQUIPMENT SHELTER AT THE ENTRY PORT.
46. ALL PROPOSED GROUNDING BAR DOWNLEADS ARE TO BE TERMINATED TO THE EXISTING ADJACENT GROUNDING BAR DOWNLEADS A MINIMUM DISTANCE OF 4'-0" BELOW GROUNDING BAR. TERMINATIONS MAY BE EXOTHERMIC OR COMPRESSION.

EXOTHERMIC CONNECTION
MECHANICAL CONNECTION
CHEMICAL ELECTROLYTIC GROUNDING SYSTEM
TEST CHEMICAL ELECTROLYTIC GROUNDING SYSTEM
EXOTHERMIC WITH INSPECTION SLEEVE
GROUNDING BAR
SHELTER GROUNDING BAR
GROUND ROD
TEST GROUND ROD WITH INSPECTION SLEEVE
SINGLE POLE SWITCH
DUPLEX RECEPTACLE
DUPLEX GFCI RECEPTACLE
FLUORESCENT LIGHTING FIXTURE (2) TWO LAMPS 48-T8
EXISTING SMOKE DETECTION (DC)
EXISTING EMERGENCY LIGHTING (DC)
SECURITY LIGHT W/PHOTOCELL LITHONIA ALXW LED-1-25A400/51K-SR4-120-PE-DDBTXD
EXISTING UTILITY POLE
EXISTING CHAIN LINK FENCE
EXISTING WOOD/WROUGHT IRON FENCE
EXISTING WALL STRUCTURE
LEASE AREA
PROPERTY LINE (PL)
SETBACKS
PROPOSED/EXISTING ICE BRIDGE
PROPOSED/EXISTING CABLE TRAY
EXISTING WATER LINE
PROPOSED UNDERGROUND POWER
PROPOSED UNDERGROUND TELCO
PROPOSED OVERHEAD POWER
PROPOSED OVERHEAD TELCO
PROPOSED OVERHEAD UTILITIES
PROPOSED ABOVE GROUND POWER
PROPOSED ABOVE GROUND TELCO

CALLOUT REFERENCE
REVISION REFERENCE
WORKPOINT
SECTION REFERENCE
DETAIL REFERENCE
ELEVATION REFERENCE

AB	ANCHOR BOLT	COL	COLUMN
ABV	ABOVE	COMM	COMMON
AC	ALTERNATING CURRENT	CONC	CONCRETE
ADDL	ADDITIONAL	CONSTR	CONSTRUCTION
AFF	ABOVE FINISHED FLOOR	DBL	DOUBLE
AFG	ABOVE FINISHED GRADE	DC	DIRECT CURRENT
AIC	AMPERAGE INTERRUPTION CAPACITY	DEPT	DEPARTMENT
ALUM	ALUMINUM	DF	DOUGLAS FIR
ALT	ALTERNATE	DIA	DIAMETER
ANT	ANTENNA	DIAG	DIAGONAL
APPROX	APPROXIMATE	DIM	DIMENSION
ARCH	ARCHITECTURAL	DWG	DRAWING
ATS	AUTOMATIC TRANSFER SWITCH	DWL	DOWEL
AWG	AMERICAN WIRE GAUGE	(E)	EXISTING
BATT	BATTERY	EA	EACH
BLDG	BUILDING	EC	ELECTRICAL CONDUCTOR
BLK	BLOCK	EL	ELEVATION
BLKG	BLOCKING	ELEC	ELECTRICAL
BM	BEAM	EMT	ELECTRICAL METALLIC TUBING
BTC	BARE TINNED COPPER CONDUCTOR	ENG	ENGINEER
BOF	BOTTOM OF FOOTING	EQ	EQUAL
CAB	CABINET	EXP	EXPANSION
CANT	CANTILEVERED	EXT	EXTERIOR
CEC	CALIFORNIA ELECTRIC CODE	FAB	FABRICATION
CHG	CHARGING	FF	FINISH FLOOR
CLG	CEILING	FG	FINISH GRADE
CLR	CLEAR	FIF	FACILITY INTERFACE FRAME
FIN	FINISH(ED)	MAS	MASONRY
FLR	FLOOR	MAX	MAXIMUM
FDN	FOUNDATION	MB	MACHINE BOLT
FOC	FACE OF CONCRETE	MECH	MECHANICAL
FOM	FACE OF MASONRY	MFR	MANUFACTURER
FOS	FACE OF STUD	MGB	MASTER GROUND BAR
FOW	FACE OF WALL	MIN	MINIMUM
FS	FINISH SURFACE	MISC	MISCELLANEOUS
FT	FOOT	MTL	METAL
FTG	FOOTING	MTS	MANUAL TRANSFER SWITCH
GA	GAUGE	MW	MICROWAVE
GEN	GENERATOR	(N)	NEW
GFCI	GROUND FAULT CIRCUIT INTERRUPTER	NEC	NATIONAL ELECTRIC CODE
GLB	GLUE LAMINATED BEAM	NO.(#)	NUMBER
GLV	GALVANIZED	NTS	NOT TO SCALE
GPS	GLOBAL POSITIONING SYSTEM	OC	ON CENTER
GND	GROUND	OPNG	OPENING
GSM	GLOBAL SYSTEM FOR MOBILE	(P)	PROPOSED
HDR	HEADER	P/C	PRECAST CONCRETE
HGR	HANGER	PCS	PERSONAL COMMUNICATION SERVICES
HVAC	HEAT/VENTILATION/AIR CONDITIONING	PCU	PRIMARY CONTROL UNIT
HT	HEIGHT	PRC	PRIMARY RADIO CABINET
IGR	INTERIOR GROUND RING	PP	POLARIZING PRESERVING
IN	INCH	PSF	POUNDS PER SQUARE FOOT
INT	INTERIOR	PSI	POUNDS PER SQUARE INCH
LB(S)	POUND(S)	PT	PRESSURE TREATED
LF	LINEAR FEET	PWR	POWER CABINET
QTY	QUANTITY	TOF	TOP OF FOUNDATION
RAD	RADIUS	TOP	TOP OF PLATE (PARAPET)
RECT	RECTIFIER	TOS	TOP OF STEEL
REF	REFERENCE	TOW	TOP OF WALL
REINF	REINFORCEMENT	TVSS	TRANSIENT VOLTAGE SUPPRESSION
REQ'D	REQUIRED		SYSTEM
RET	REMOTE ELECTRIC TILT	TYP	TYPICAL
RMC	RIGID METALLIC CONDUIT	UG	UNDERGROUND
RRH	REMOTE RADIO HEAD	UL	UNDERWRITERS LABORATORY
RRU	REMOTE RADIO UNIT	UNO	UNLESS NOTED OTHERWISE
RWY	RACEWAY	UMTS	UNIVERSAL MOBILE
SCH	SCHEDULE		TELECOMMUNICATIONS SYSTEM
SHT	SHEET	UPS	UNINTERRUPTIBLE POWER SYSTEM
SIAD	SMART INTEGRATED DEVICE		(DC POWER PLANT)
SIM	SIMILAR	VIF	VERIFIED IN FIELD
SPEC	SPECIFICATION	W	WIDE
SQ	SQUARE	W/	WITH
SS	STAINLESS STEEL	WD	WOOD
STD	STANDARD	W.P.	WORK POINT
STL	STEEL	WP	WEATHERPROOF
STRUCT	STRUCTURAL	WT	WEIGHT
TEMP	TEMPORARY		
THK	THICKNESS		
TMA	TOWER MOUNTED AMPLIFIER		
TN	TOE NAIL		
TOA	TOP OF ANTENNA		
TOC	TOP OF CURB		

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EAST SYRACUSE, NY 13057

CROWN CASTLE
3 CORPORATE PARK DRIVE
SUITE 101
CLIFTON PARK, NY 12065

JACOBS
JACOBS ENGINEERING GROUP, INC.
120 ST. JAMES AVENUE, 5TH FLOOR
BOSTON, MA 02116

STATE OF CONNECTICUT
DANIEL J. CORNING
24051
LICENSED
PROFESSIONAL ENGINEER

PROJECT NO: ERCC0004

DRAWN BY: CM

CHECKED BY: DJC

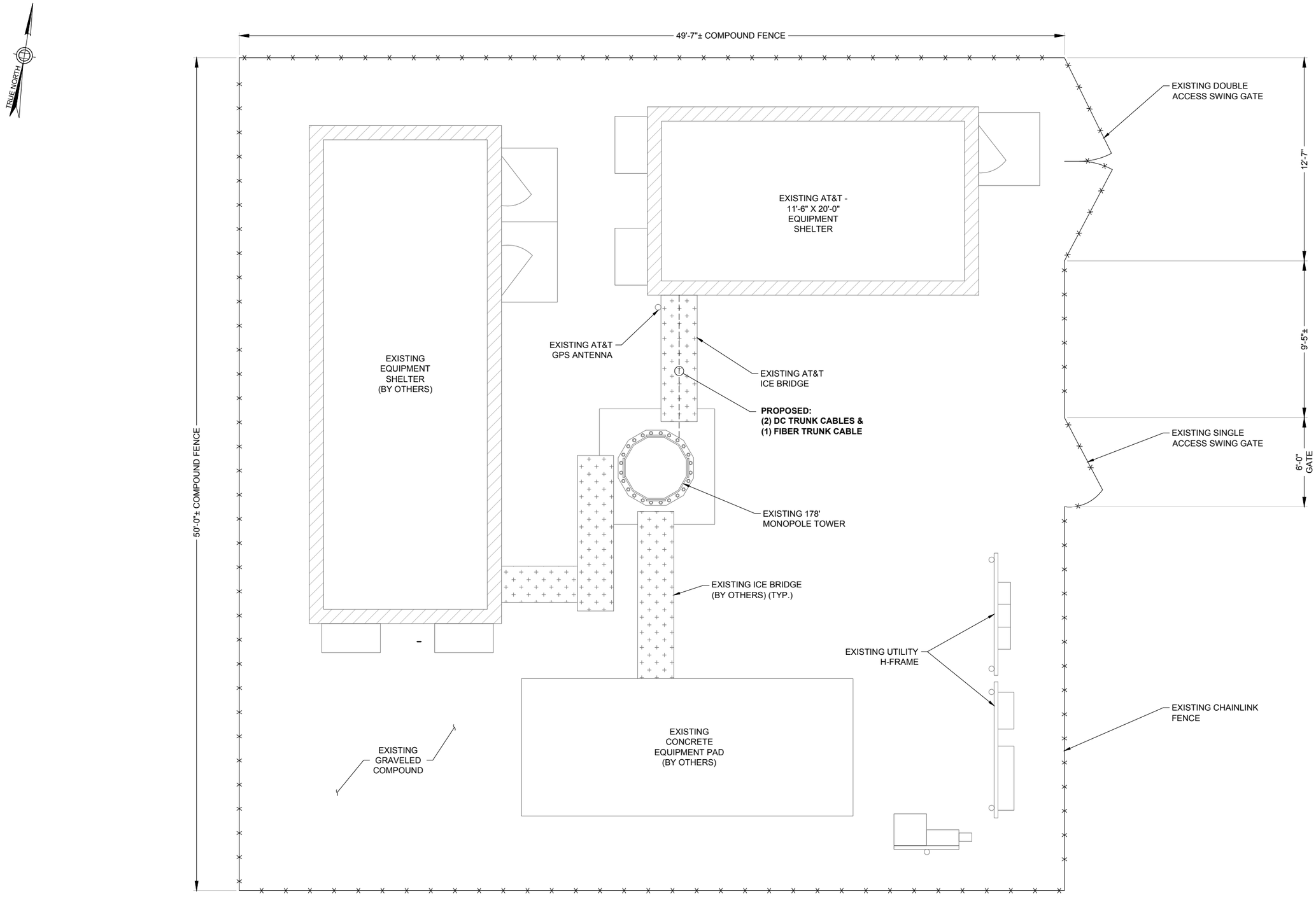
SUBMITTALS

3	10/30/19	REVISED DRAWINGS
2	10/03/19	ISSUED FOR CONSTRUCTION
1	09/04/19	ISSUED FOR PERMITTING
0	06/14/19	ISSUED FOR PERMITTING

FA# 10110565
SITE# CTL01178
HARWINTON - HUNGERFORD LANE
64 HUNGERFORD LANE
HARWINTON, CT 06791

GENERAL NOTES II

GN-2



NOTES:

1. PLAN BASED ON CONSTRUCTION DRAWINGS ISSUED BY CENTEK ENGINEERING CENTERED ON SOLUTIONS ON 10/08/12. CONTRACTOR TO FIELD VERIFY ALL DIMENSIONS AND LOCATION/ORIENTATION OF EXISTING EQUIPMENT.

1 SITE PLAN

SCALE: 3/8"=1'

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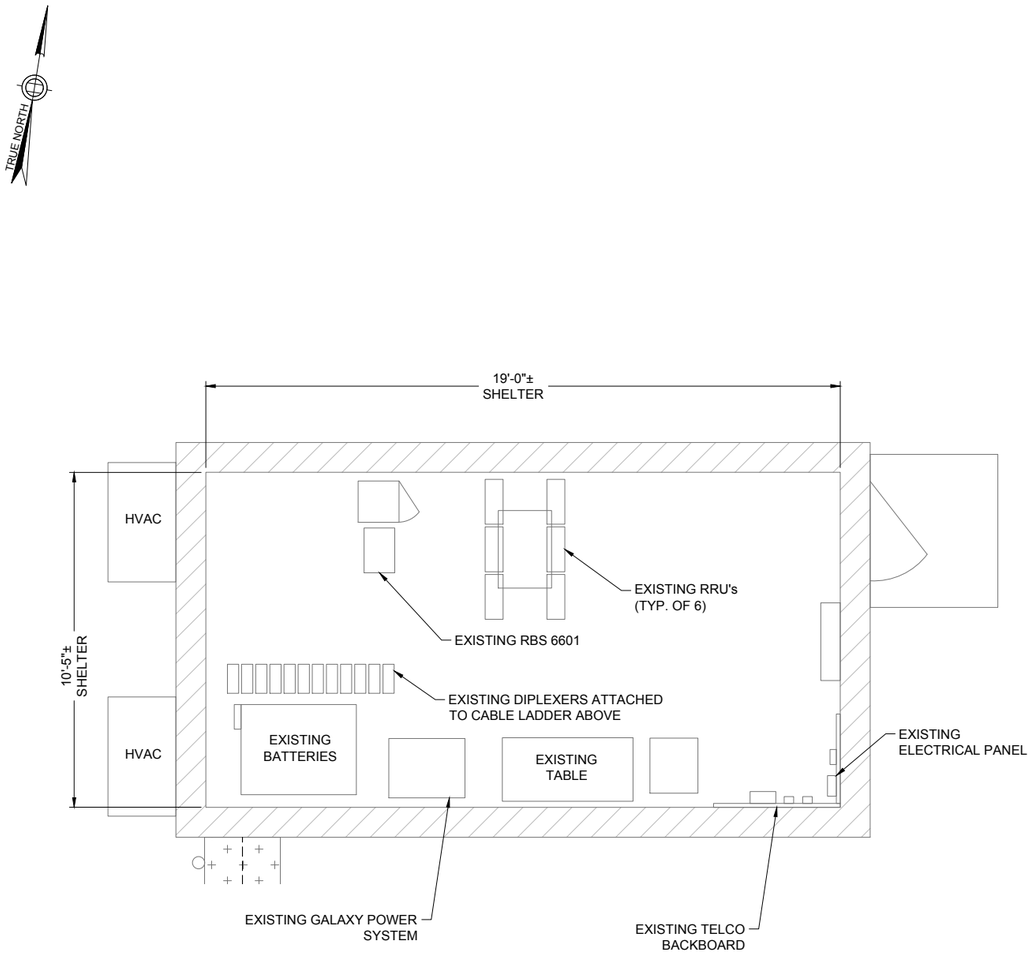
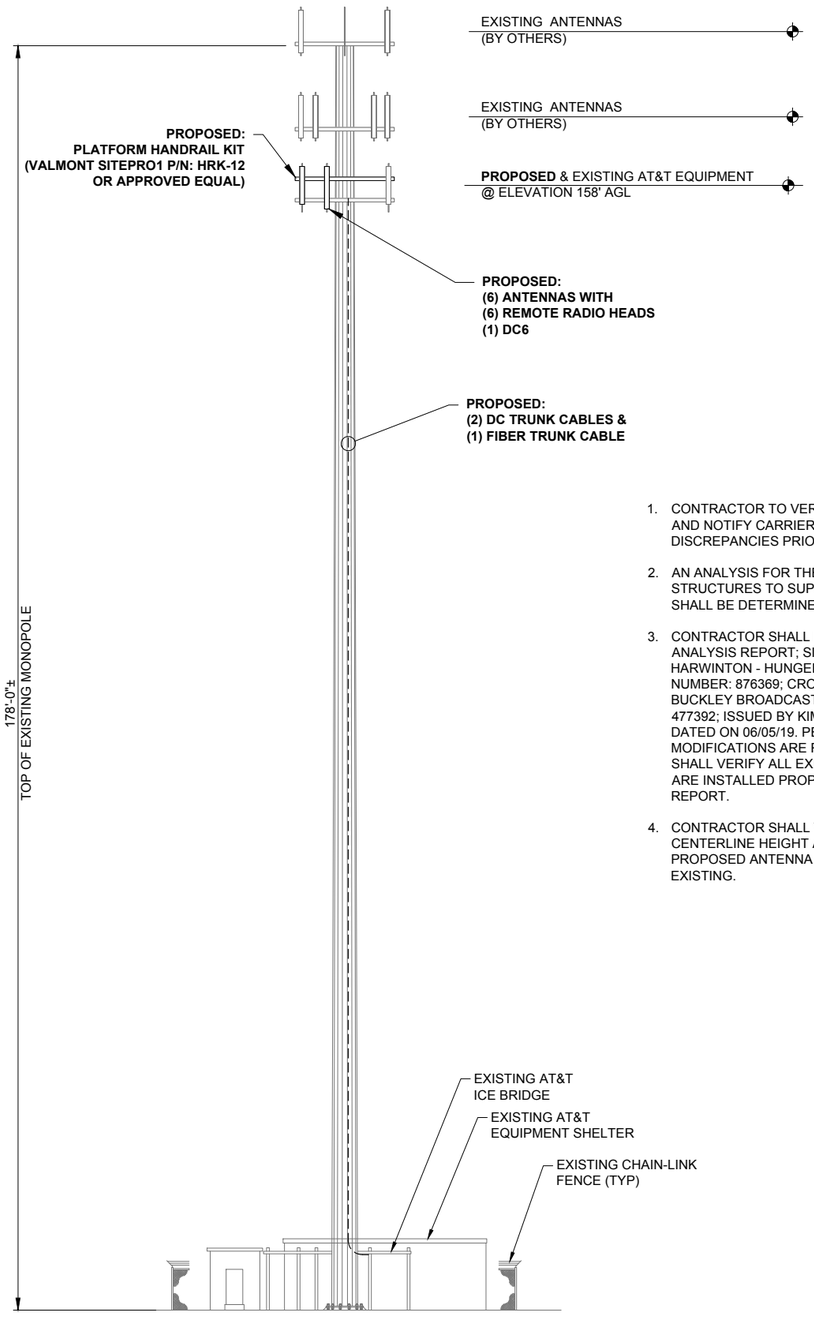
SITE PLAN

C-1



1 EQUIPMENT LAYOUT — SCALE: 1/2" = 1'-0"



2 TOWER ELEVATION — SCALE: 3/32" = 1'-0"

1. CONTRACTOR TO VERIFY FINAL RF CONFIGURATION AND NOTIFY CARRIER AND ENGINEER W/ ANY DISCREPANCIES PRIOR TO THE INSTALLATION.
2. AN ANALYSIS FOR THE CAPACITY OF THE EXISTING STRUCTURES TO SUPPORT THE PROPOSED EQUIPMENT SHALL BE DETERMINED PRIOR TO CONSTRUCTION.
3. CONTRACTOR SHALL REFER TO THE STRUCTURAL ANALYSIS REPORT; SITE NUMBER: CTL01178; SITE NAME: HARWINTON - HUNGERFORD LANE; CROWN BU NUMBER: 876369; CROWN SITE NAME: HARWINTON / BUCKLEY BROADCASTI; CROWN ORDER NUMBER: 477392; ISSUED BY KIMLEY-HORN AND ASSOCIATES, INC. DATED ON 06/05/19. PER THIS ANALYSIS NO MODIFICATIONS ARE REQUIRED. THE CONTRACTOR SHALL VERIFY ALL EXISTING MEMBERS AND HARDWARE ARE INSTALLED PROPERLY AS DESCRIBED IN THIS REPORT.
4. CONTRACTOR SHALL VERIFY THE EXISTING ANTENNA CENTERLINE HEIGHT ABOVE GROUND LEVEL. PROPOSED ANTENNA CENTERLINE SHALL MATCH EXISTING.

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STATE OF CONNECTICUT
DANIEL J. CORNING
31055
LICENSED
PROFESSIONAL ENGINEER

PROJECT NO: ERCC0004

DRAWN BY: CM

CHECKED BY: DJC

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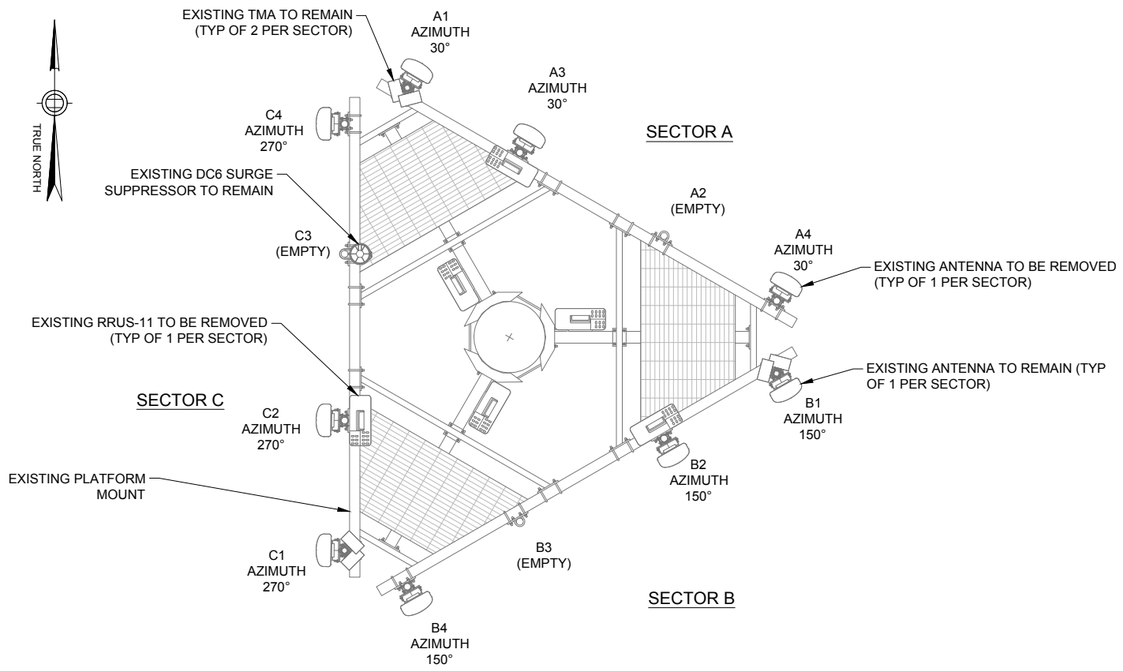
FA# 10110565
SITE# CTL01178
HARWINTON -
HUNGERFORD LANE
64 HUNGERFORD LANE
HARWINTON, CT 06791

EQUIPMENT LAYOUT &
PROPOSED TOWER
ELEVATION

C-2



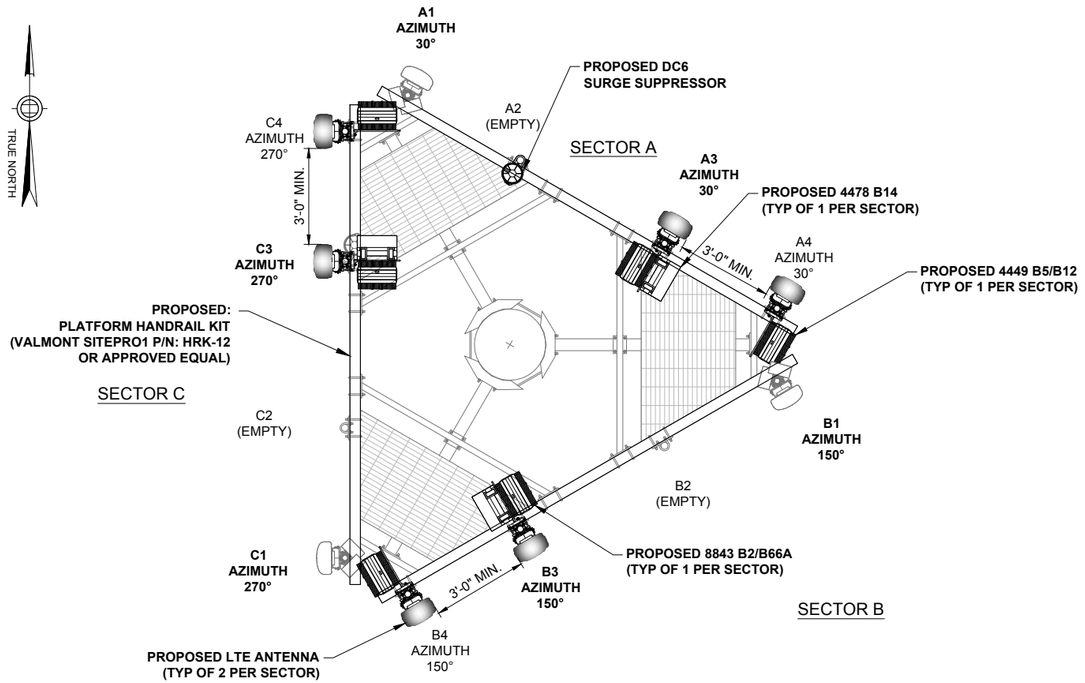
ELEVATION 158'

1 EXISTING ANTENNA LAYOUT

SCALE: N.T.S.

NOTES:

1. CONTRACTOR SHALL REFER TO THE MOUNT MODIFICATION REPORT; SITE NUMBER: CTL01178; SITE NAME: HARWINTON - HUNGERFORD LANE; CROWN BU NUMBER: 876369; CROWN SITE NAME: HARWINTON / BUCKLEY BROADCASTI; CROWN ORDER NUMBER: 477392; ISSUED BY JACOBS ENGINEERING GROUP, INC. DATED ON 10/24/19. THE MOUNT MODIFICATIONS MUST BE PERFORMED PRIOR TO THE INSTALLATION OF THE EQUIPMENT SHOWN ON THE DRAWINGS. CONTRACTOR SHALL REFER TO APPENDIX "E" FOR DETAILS. THE CONTRACTOR SHALL VERIFY ALL EXISTING MEMBERS AND HARDWARE ARE INSTALLED PROPERLY AS DESCRIBED IN THIS REPORT.
2. CONTRACTOR TO VERIFY FINAL RF CONFIGURATION AND NOTIFY CARRIER AND ENGINEER W/ ANY DISCREPANCIES PRIOR TO THE INSTALLATION.
3. CONTRACTOR SHALL NOT EXCEED MOUNTING MORE THAN (2) RRHS PER ANTENNA MOUNTING PIPE - RELOCATE TO AN ADJACENT ANTENNA MOUNTING PIPE AS NEEDED.



ELEVATION 158'

2 PROPOSED ANTENNA LAYOUT

SCALE: N.T.S.

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STATE OF CONNECTICUT
DANIEL J. CORNING
21055
LICENSED
PROFESSIONAL ENGINEER

PROJECT NO:	ERCC0004
DRAWN BY:	CM
CHECKED BY:	DJC

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HUNGERFORD LANE
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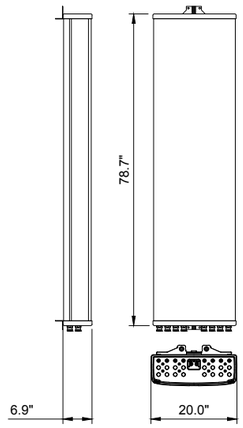
EXISTING & PROPOSED
ANTENNA LAYOUT

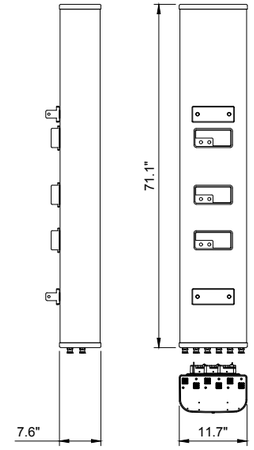
C-3

MANUFACTURER:	KATHREIN
MODEL NO.:	80010965
RADOME MATERIAL:	FIBERGLASS, UV RESISTANT
COLOR:	LIGHT GRAY
DIMENSIONS (LxWxD):	78.7" x 20.0" x 6.9" 1999mm x 508mm x 175mm
WEIGHT (lbs):	97.6
CONNECTOR:	8 x 4.3-10 FEMALE
FRONT WIND LOAD:	254 LBF @ 93 MPH 1130 N @ 150 KM/H
SIDE WIND LOAD:	256 LBF @ 93 MPH 1140 N @ 150 KM/H
WIND SPEED MAX.:	>150 MPH (>241 KM/H)



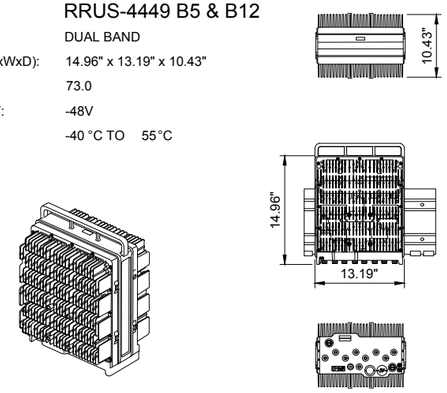
1 ANTENNA SPECIFICATIONS — SCALE: N.T.S.

MANUFACTURER:	CCI
MODEL NO.:	HPA65R-BU6A
COLOR:	LIGHT GRAY
DIMENSIONS (LxWxD):	71.1" x 11.7" x 7.6" 1807mm x 297mm x 193mm
WEIGHT (lbs):	41.9
CONNECTOR:	6 x 4.3-10 FEMALE
FRONT WIND LOAD:	201 LBS @ 100 MPH 894 N @ 161 KPH
SIDE WIND LOAD:	142 LBS @ 100 MPH 633 N @ 161 KPH
WIND SPEED MAX.:	>150 MPH (>241 KPH)



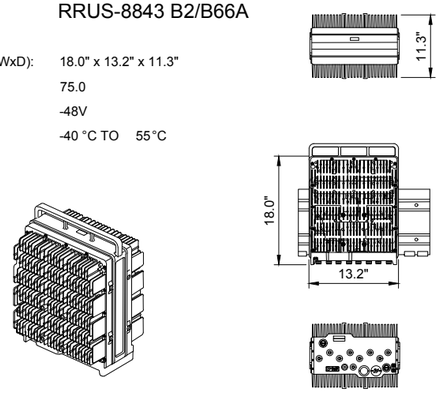
2 ANTENNA SPECIFICATIONS — SCALE: N.T.S.

MANUFACTURER:	ERICSSON
MODEL NO.:	RRUS-4449 B5 & B12
TECHNOLOGY:	DUAL BAND
DIMENSIONS (HxWxD):	14.96" x 13.19" x 10.43"
WEIGHT (lbs):	73.0
POWER SUPPLY:	-48V
TEMPERATURE:	-40 °C TO 55 °C



3 RRUS SPECIFICATIONS — SCALE: N.T.S.

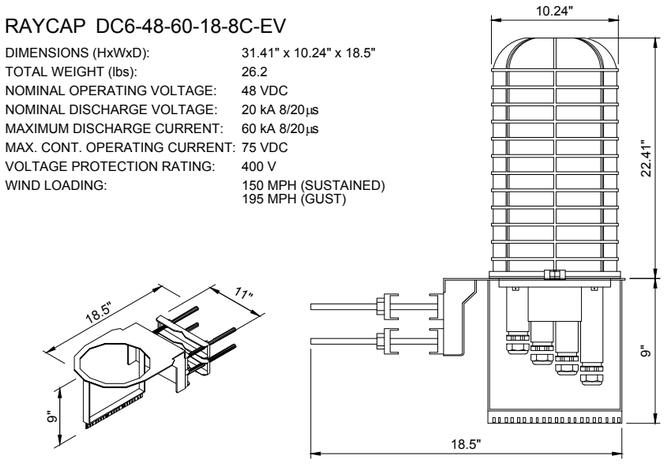
MANUFACTURER:	ERICSSON
MODEL NO.:	RRUS-8843 B2/B66A
DIMENSIONS (HxWxD):	18.0" x 13.2" x 11.3"
WEIGHT (lbs):	75.0
POWER SUPPLY:	-48V
TEMPERATURE:	-40 °C TO 55 °C



4 RRUS SPECIFICATIONS — SCALE: N.T.S.

RAYCAP DC6-48-60-18-8C-EV

DIMENSIONS (HxWxD):	31.41" x 10.24" x 18.5"
TOTAL WEIGHT (lbs):	26.2
NOMINAL OPERATING VOLTAGE:	48 VDC
NOMINAL DISCHARGE VOLTAGE:	20 kA 8/20μs
MAXIMUM DISCHARGE CURRENT:	60 kA 8/20μs
MAX. CONT. OPERATING CURRENT:	75 VDC
VOLTAGE PROTECTION RATING:	400 V
WIND LOADING:	150 MPH (SUSTAINED) 195 MPH (GUST)



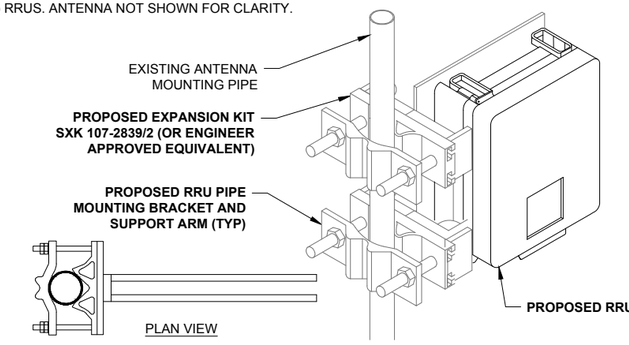
5 DC SURGE PROTECTION SPECIFICATIONS — SCALE: N.T.S.

CUE DEE PART # 5335/5336 ERICSSON RRU MOUNTING KIT

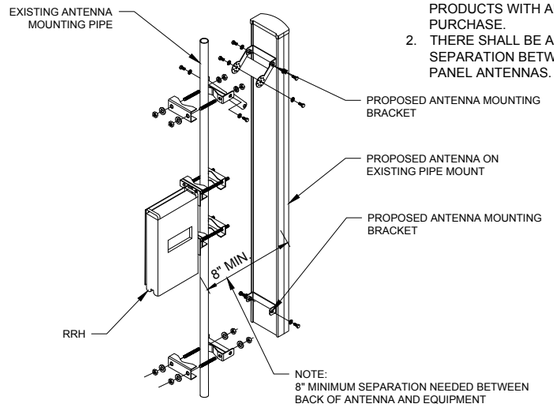
SXK 107 2839/1: SINGLE RRU SUPPORT KIT (PART #5335) (OR ENGINEER APPROVED EQUIVALENT) SXK 107 2839/2: EXPANSION KIT (PART #5336) (OR ENGINEER APPROVED EQUIVALENT)

MOUNTING NOTES:

REFER TO PRODUCT SPECS FOR BOLT SIZE & PIPE DIAMETER TOLERANCES. THE PART NO. SXK107-2839/2 IS REQUIRED FOR (2) RRUS. ANTENNA NOT SHOWN FOR CLARITY.



6 RRU MOUNTING DETAIL — SCALE: N.T.S.



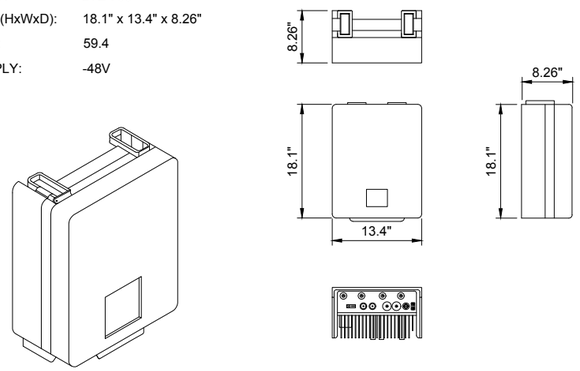
NOTES:

1. MOUNTING OPTIONS ARE INCLUDED PRODUCTS WITH ANTENNA PURCHASE.
2. THERE SHALL BE A MINIMUM 3'-0" SEPARATION BETWEEN ALL LTE PANEL ANTENNAS.

7 ANTENNA MOUNTING DETAIL — SCALE: N.T.S.

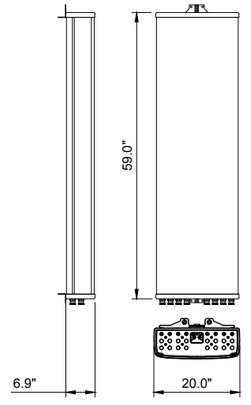
MANUFACTURER:	ERICSSON
MODEL NO.:	RRUS-4478 B14
TECHNOLOGY:	LTE 700
DIMENSIONS (HxWxD):	18.1" x 13.4" x 8.26"
WEIGHT (lbs):	59.4
POWER SUPPLY:	-48V

NOTE:
PENDING FINAL PRODUCT SPECIFICATION



8 RRUS SPECIFICATIONS — SCALE: N.T.S.

MANUFACTURER:	KATHREIN
MODEL NO.:	80010964
RADOME MATERIAL:	FIBERGLASS, UV RESISTANT
COLOR:	LIGHT GRAY
DIMENSIONS (LxWxD):	59.0" x 20.0" x 6.9" 1499mm x 488mm x 175mm
WEIGHT (lbs):	83.8
CONNECTOR:	8 x 4.3-10 FEMALE
FRONT WIND LOAD:	188 LBF @ 93 MPH 835 N @ 148 KM/H
SIDE WIND LOAD:	189 LBF @ 93 MPH 840 N @ 148 KM/H
WIND SPEED MAX.:	>148 MPH (>241 KM/H)



9 ANTENNA SPECIFICATIONS — SCALE: N.T.S.

at&t
5841 BRIDGE STREET
EAST SYRACUSE, NY 13057

CROWN CASTLE
3 CORPORATE PARK DRIVE
SUITE 101
CLIFTON PARK, NY 12065

JACOBS
JACOBS ENGINEERING GROUP, INC.
120 ST. JAMES AVENUE, 5TH FLOOR
BOSTON, MA 02116

STATE OF CONNECTICUT
DANIEL J. CORNING
24058
LICENSED
PROFESSIONAL ENGINEER

PROJECT NO:	ERCC0004
DRAWN BY:	CM
CHECKED BY:	DJC

SUBMITTALS

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1	09/04/19	ISSUED FOR PERMITTING
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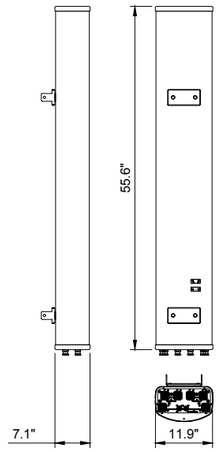
FA# 10110565
SITE# CTL01178
HARWINTON -
HUNGERFORD LANE
64 HUNGERFORD LANE
HARWINTON, CT 06791

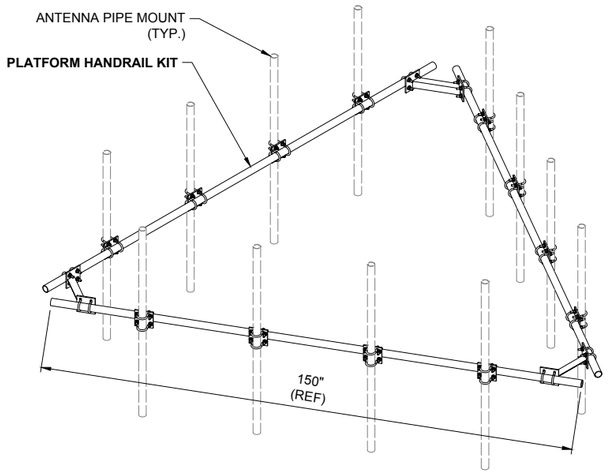
EQUIPMENT DETAILS

C-4

MANUFACTURER:	COMMSCOPE
MODEL NO.:	SBNHH-1D65A
RADOME MATERIAL:	FIBERGLASS, UV RESISTANT
COLOR:	LIGHT GRAY
DIMENSIONS (LxWxD):	55.6" x 11.9" x 7.1" 1413mm x 301mm x 180mm
WEIGHT (lbs):	33.5
CONNECTOR:	6 x 7-16 DIN FEMALE
FRONT WIND LOAD:	46.3 LBF @ 150 KM/H 206 N @ 123 KM/H
SIDE WIND LOAD:	38.0 LBF @ 150 KM/H 169 N @ 123 KM/H
WIND SPEED MAX.:	>123 MPH (>241 KM/H)
WIND LOADING, MAX.:	89.0 LBF @ 150 KM/H 396 N @ 150 KM/H



1 ANTENNA SPECIFICATIONS SCALE: N.T.S.



2 PLATFORM HANDRAIL KIT - SITEPRO1 P/N HRK-12 SCALE: N.T.S.

3 DETAIL NOT USED SCALE: N.T.S.

4 DETAIL NOT USED SCALE: N.T.S.

5 DETAIL NOT USED SCALE: N.T.S.

6 DETAIL NOT USED SCALE: N.T.S.

7 DETAIL NOT USED SCALE: N.T.S.

8 DETAIL NOT USED SCALE: N.T.S.

9 DETAIL NOT USED SCALE: N.T.S.

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BOSTON, MA 02116

STATE OF CONNECTICUT
DANIEL J. CORNING
24055
LICENSED
PROFESSIONAL ENGINEER

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CHECKED BY:	DJC

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EQUIPMENT
DETAILS

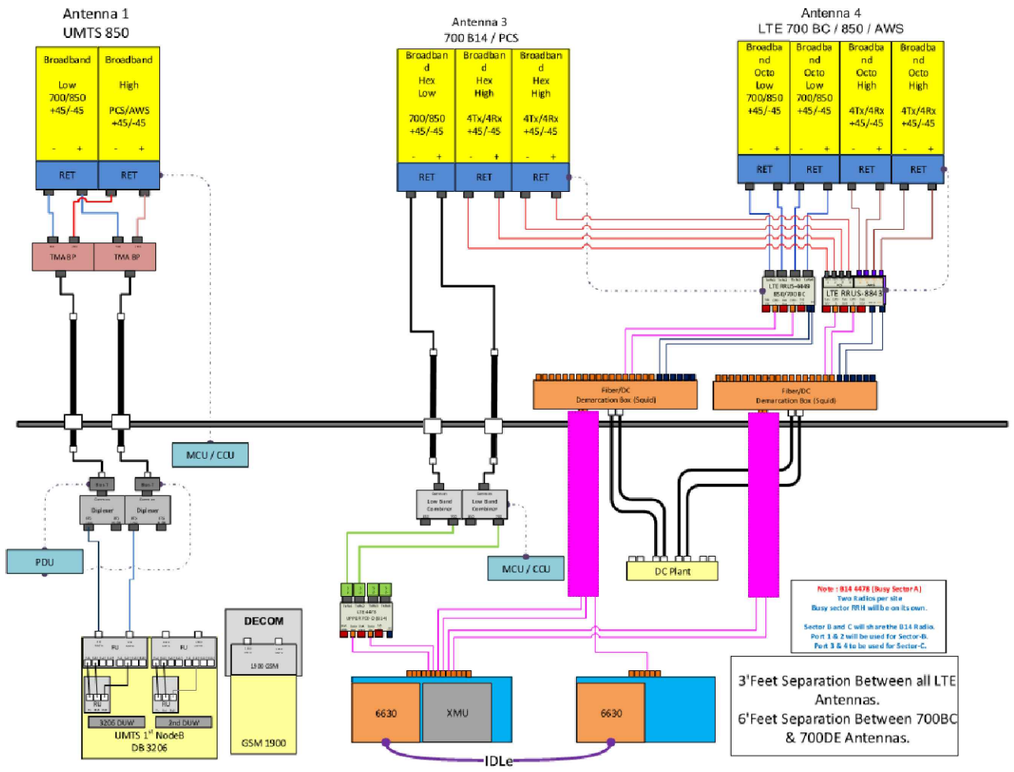
C-5

ANTENNA NUMBER	ANTENNA MODEL	ANTENNA BAND	AZIMUTH	ANTENNA CENTERLINE FROM GROUND	TMA's	RRH's	FEEDER	RAYCAP
A1	7770 (55"x11"x5")	UMTS 850	30°	158'	(2) LGP 21401	-	**(2) DC (1) FIBER** (2) DC (1) FIBER	(1) RAYCAP DC6-48-60-18-8C-EV
A2	-	-	30°	158'	-	-	-	
A3	**HPA65R-BU6A (71.2"x11.7"x8.4")**	**LTE 700 LTE 1900 LTE 1900**	**30°**	**158'**	**-**	**(1) 8843 B2/B66A (PCS/AWS) (1) 4478 B14 (700)**	-	
A4	**800-10965 (78.7"x20"x6.9")**	**LTE 700 LTE 850 LTE AWS 5G 850**	**30°**	**158'**	**-**	**(1) 4449 B5/B12 (850/700)**	(4) 1-5/8" COAX (LENGTH @ 208')	
B1	7770 (55"x11"x5")	UMTS 850	150°	158'	(2) LGP 21401	-	-	
B2	-	-	150°	158'	-	-	-	
B3	**SBNHH-1D65A (55"x11.9"x7.1")**	**LTE 700 LTE 1900 LTE 1900**	**150°**	**158'**	**-**	**(1) 8843 B2/B66A (PCS/AWS) (1) 4478 B14 (700)**	-	(1) RAYCAP DC6-48-60-18-8F
B4	**800-10964 (59"x20"x6.9")**	**LTE 700 LTE 850 LTE AWS 5G 850**	**150°**	**158'**	**-**	**(1) 4449 B5/B12 (850/700)**	(4) 1-5/8" COAX (LENGTH @ 208')	
G1	7770 (55"x11"x5")	UMTS 850	270°	158'	(2) LGP 21401	-	-	
G2	-	-	270°	158'	-	-	-	
G3	**SBNHH-1D65A (55"x11.9"x7.1")**	**LTE 700 LTE 1900 LTE 1900**	**270°**	**158'**	**-**	**(1) 8843 B2/B66A (PCS/AWS) (1) 4478 B14 (700)**	-	
G4	**800-10964 (59"x20"x6.9")**	**LTE 700 LTE 850 LTE AWS 5G 850**	**270°**	**158'**	**-**	**(1) 4449 B5/B12 (850/700)**	(4) 1-5/8" COAX (LENGTH @ 208')	

NOTES:

1. EQUIPMENT LISTED IN **BOLD**, DELINEATES THAT THE EQUIPMENT IS PROPOSED
2. * DENOTES THAT EQUIPMENT IS TO BE GROUND MOUNTED
3. ANTENNA DESIGN PER RFDS DATED 12/19/2018 UPDATED 07/22/2019

1 ANTENNA INFORMATION CHART — SCALE: N.T.S.



NOTE:

1. RF SCHEMATIC FROM RFDS DATED 12/19/18 UPDATED 07/22/2019

2 RF EQUIPMENT SCHEMATIC — SCALE: N.T.S.

at&t
5841 BRIDGE STREET
EAST SYRACUSE, NY 13057

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STATE OF CONNECTICUT
DANIEL J. CORNING
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PROJECT NO: ERCC0004

DRAWN BY: CM

CHECKED BY: DJC

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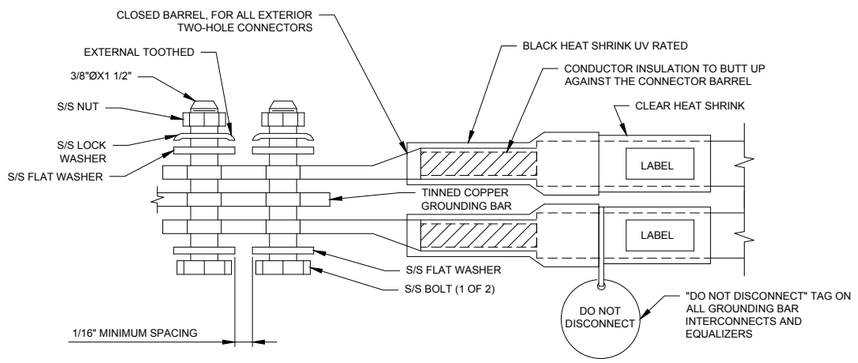
ANTENNA CHART & RF EQUIPMENT SCHEMATIC

RF-1

NOTES:

1. EXOTHERMIC WELD (2) TWO, #2 AWG BARE TINNED SOLID COPPER CONDUCTORS TO GROUNDING BAR. ROUTE CONDUCTORS TO BURIED GROUNDING RING AND PROVIDE PARALLEL EXOTHERMIC WELD.
2. ALL GROUNDING BARS SHALL BE STAMPED IN TO THE METAL "IF STOLEN DO NOT RECYCLE." THE CONTRACTOR SHALL USE PERMANENT MARKER TO DRAW THE LINES BETWEEN EACH SECTION AND LABEL EACH SECTION ("P", "A", "N", "I") WITH 1" HIGH LETTERS.
3. ALL HARDWARE SHALL BE STAINLESS STEEL 3/8" DIAMETER OR LARGER. ALL HARDWARE 18-8 STAINLESS STEEL INCLUDING LOCK WASHERS, COAT ALL SURFACES WITH AN ANTI-OXIDANT COMPOUND BEFORE MATING.
4. FOR GROUND BOND TO STEEL ONLY: INSERT A CADMIUM FLAT WASHER BETWEEN LUG AND STEEL, COAT ALL SURFACES WITH AN ANTI-OXIDANT COMPOUND BEFORE MATING.
5. DO NOT INSTALL CABLE GROUNDING KIT AT A BEND AND ALWAYS DIRECT GROUNDING CONDUCTOR DOWN TO GROUNDING BUS.
6. NUT & WASHER SHALL BE PLACED ON THE FRONT SIDE OF THE GROUNDING BAR AND BOLTED ON THE BACK SIDE. INSTALL BLACK HEAT-SHRINKING TUBE, 600 VOLT INSULATION, ON ALL GROUNDING TERMINATIONS. THE INTENT IS TO WEATHERPROOF THE COMPRESSION CONNECTION.
7. SUPPLIED AND INSTALLED BY CONTRACTOR.
8. THE CONTRACTOR SHALL BE RESPONSIBLE FOR INSTALLING ADDITIONAL GROUNDING BAR AS REQUIRED, PROVIDING 50% SPARE CONNECTION POINTS.
9. ENSURE THE WIRE INSULATION TERMINATION IS WITHIN 1/8" OF THE BARREL (NO SHINERS).



1 EXTERIOR TWO HOLE LUG DETAIL

SCALE: N.T.S.

GENERAL NOTES:

1. CONTRACTOR SHALL HAVE A COMPLETE UNDERSTANDING OF THE CONTENTS OF AT&T STANDARD TP-76416.
2. ALL INSTALLATIONS SHALL BE FIELD VERIFIED.
3. ALL GROUND CONNECTIONS FOR ALL RELOCATED EQUIPMENT SHALL BE RE-ESTABLISHED BY THE CONTRACTOR. CONTRACTOR SHALL FURNISH ALL MATERIALS AS REQUIRED.

GROUNDING NOTES:

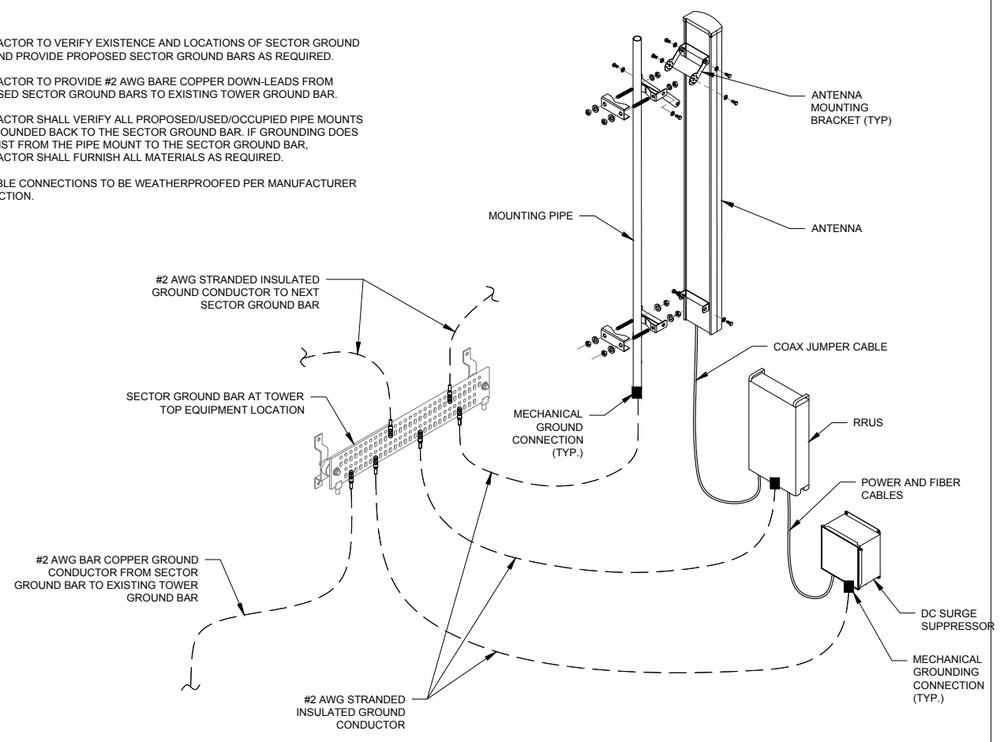
1. TOWER GROUNDING BAR: EXTEND (2) #2 AWG TINNED CU WIRE FROM BURIED GROUND RING UP TO THE TOWER GROUND BAR AND MAKE A MECHANICAL CONNECTION. SECURE GROUND BAR DIRECTLY TO TOWER WITH STAINLESS STEEL MOUNTING MATERIAL.
2. ANTENNA GROUNDING BAR: ANDREW CORPORATION PART #UGBKIT-0424-T MOUNT GROUND BAR DIRECTLY TO TOWER. SECURE TO TOWER WITH STAINLESS STEEL MOUNTING MATERIAL.
3. GROUNDING BAR: LOCATED CLOSE TO GRADE LOCK BOX TESSCO PART #351546: INSTALL PER MANUFACTURER GUIDELINES.
4. EXOTHERMIC OR COMPRESSION CONNECTION FOR PIPE MOUNT TO ANTENNA ROUTE CONDUCTOR TO NEAREST GROUNDING BAR SO THE GROUNDING CONDUCTORS PROVIDE A STRAIGHT DOWNWARD PATH TO GROUND. USE #2 AWG SOLID TINNED COPPER CONDUCTOR. GROUNDING CONNECTION SHALL BE LOCATED AT THE TOP 2" OF PIPE.
5. ALL GROUNDING CONDUCTORS SHALL BE #2 AWG COPPER TINNED UNLESS NOTED OTHERWISE.
6. ALL GROUNDING CONDUCTORS SHALL PROVIDE A STRAIGHT DOWNWARD PATH TO GROUND WITH GRADUAL BEND AS REQUIRED. GROUND WIRES SHALL NOT BE LOOPED OR SHARPLY BENT.
7. KOPR-SHIELD ANTI-OXIDATION COMPOUND SHALL BE USED ON ALL COMPRESSION GROUNDING CONNECTIONS.
8. ALL EXOTHERMIC CONNECTIONS SHALL BE INSTALLED UTILIZING THE PROPER CONNECTION/MOLD AND MATERIALS FOR THE PARTICULAR APPLICATION.
9. ALL BOLTED GROUNDING CONNECTIONS SHALL BE INSTALLED WITH AN EXTERNAL TOOTHED LOCK WASHER. GROUNDING BUS BARS MAY HAVE PRE-PUNCHED HOLES OR TAPPED HOLES. ALL HARDWARE SHALL BE SECURITY TORQUE HARDWARE 3/8" STAINLESS STEEL.
10. EXTERNAL GROUNDING CONDUCTOR SHALL NOT BE INSTALLED OR ROUTED THROUGH HOLES IN ANY METAL OBJECTS, CONDUITS, OR SUPPORTS TO PRECLUDE ESTABLISHING A MAGNETIC CHOKE POINT.
11. PLASTIC CLIPS SHALL BE USED TO FASTEN AND SUPPORT GROUNDING CONDUCTORS. FERROUS METAL CLIPS WHICH COMPLETELY SURROUND THE GROUNDING CONDUCTOR SHALL NOT BE USED.
12. IF COAX ON ICE BRIDGE IS MORE THAT 6' FROM THE GROUND BAR AT THE BASE OF THE TOWER, A SECOND GROUND BAR WILL BE NEEDED AT THE END OF THE ICE BRIDGE RUN TO GROUND THE COAX GROUND KIT AND THE IN-LINE SURGE ARRESTORS (SURGE ARRESTORS INSTALLED BY LUCENT ONLY HAVE 6' GROUND TAILS).
13. CONTRACTOR SHALL REPAIR/PLACE EXISTING GROUNDING SYSTEM COMPONENTS DAMAGED DURING CONSTRUCTION AT THE CONTRACTORS EXPENSE.
14. DO NOT ALLOW THE COPPER CONDUCTOR TO TOUCH THE GALVANIZED GUY WIRE AT THE CONNECTION POINT OR AT ANY OTHER POINT. NO EXOTHERMICALLY WELDED CONNECTION SHALL BE MADE TO THE GUY WIRE.
15. CONTRACTOR SHALL VERIFY EXISTING SECTOR GROUNDING CONDITION AND GROUND THE PROPOSED EQUIPMENT IN THE SAME MANNER. A PROPOSED SECTOR GROUND BAR SHALL BE INSTALLED IF REQUIRED.

2 GROUNDING NOTES

SCALE: N.T.S.

NOTES:

1. CONTRACTOR TO VERIFY EXISTENCE AND LOCATIONS OF SECTOR GROUND BARS AND PROVIDE PROPOSED SECTOR GROUND BARS AS REQUIRED.
2. CONTRACTOR TO PROVIDE #2 AWG BARE COPPER DOWN-LEADS FROM PROPOSED SECTOR GROUND BARS TO EXISTING TOWER GROUND BAR.
3. CONTRACTOR SHALL VERIFY ALL PROPOSED/USED/OCCUPIED PIPE MOUNTS ARE GROUNDED BACK TO THE SECTOR GROUND BAR. IF GROUNDING DOES NOT EXIST FROM THE PIPE MOUNT TO THE SECTOR GROUND BAR, CONTRACTOR SHALL FURNISH ALL MATERIALS AS REQUIRED.
4. ALL CABLE CONNECTIONS TO BE WEATHERPROOFED PER MANUFACTURER INSTRUCTION.



3 TYPICAL ANTENNA GROUNDING SCHEMATIC

SCALE: N.T.S.

4 DETAIL NOT USED

SCALE: N.T.S.

at&t
5841 BRIDGE STREET
EAST SYRACUSE, NY 13057

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HARWINTON -
HUNGERFORD LANE
64 HUNGERFORD LANE
HARWINTON, CT 06791

GROUNDING DETAILS

G-1

Exhibit D

Structural Analysis Report

PAUL J. FORD & COMPANY

Date: **October 08, 2019**

Rebecca Klein
Crown Castle
3530 Toringdon Way, Suite 300
Charlotte, NC 28277

Paul J. Ford and Company
250 E. Broad St., Ste 600
Columbus, OH 43215
614-221-6679

Subject:	**Structural Analysis Report**	
Carrier Designation:	***AT&T Mobility* Co-Locate**	
	Carrier Site Number:	CTL01178
	Carrier Site Name:	HARWINTON – HUNGERFORD LANE
Crown Castle Designation:	**Crown Castle BU Number:**	876369
	Crown Castle Site Name:	HARWINTON / BUCKLEY BROADCASTI
	Crown Castle JDE Job Number:	556170
	Crown Castle Work Order Number:	1798529
	Crown Castle Order Number:	477392 Rev. 1
Engineering Firm Designation:	**Paul J. Ford and Company Project Number:**	37519-3424.001.7805
Site Data:	**64 Hungerford Lane, Harwinton, Litchfield County, CT** **Latitude *41° 45' 26.15"*, Longitude *-73° 3' 9.2"*** **178 Foot - Monopole Tower**	

Dear Rebecca Klein,

Paul J. Ford and Company is pleased to submit this **"Structural Analysis Report"** to determine the structural integrity of the above mentioned tower.

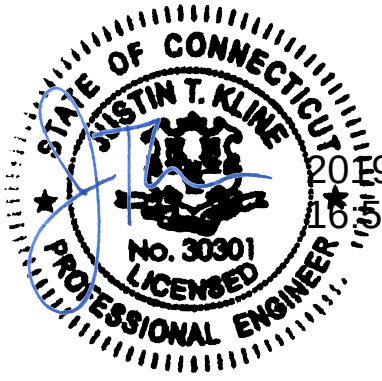
The purpose of the analysis is to determine acceptability of the tower stress level. Based on our analysis we have determined the tower stress level for the structure and foundation, under the following load case, to be:

LC7: Proposed Equipment Configuration **Sufficient Capacity (73.9%)**

This analysis utilizes an ultimate 3-second gust wind speed of 120 mph as required by the 2018 Connecticut State Building Code and Appendix N. Applicable Standard references and design criteria are listed in Section 2 - Analysis Criteria.

Respectfully submitted by:

Angela Sage, E.I.
Structural Designer
asage@pauljford.com



2019.10.09 16:57:01-04'00'

TABLE OF CONTENTS

1) INTRODUCTION

This tower is a 178 ft Monopole tower designed by ENGINEERED ENDEAVORS, INC. in April of 2001.

2) ANALYSIS CRITERIA

TIA-222 Revision:	TIA-222-H
Risk Category:	II
Wind Speed:	120 mph
Exposure Category:	C
Topographic Factor:	1
Ice Thickness:	1.5 in
Wind Speed with Ice:	50 mph
Service Wind Speed:	60 mph

Table 1 - Proposed Equipment Configuration

Mounting Level (ft)	Center Line Elevation (ft)	Number of Antennas	Antenna Manufacturer	Antenna Model	Number of Feed Lines	Feed Line Size (in)
156.0	158.0	3	cci antennas	HPA65R-BU6A w/ Mount Pipe	12 2 2 2 1	1-5/8 3/8 7/16 3/4 2” Cond
		3	ericsson	RRUS 4449 B5/B12		
		3	ericsson	RRUS 8843 B2/B66A		
		3	kathrein	80010964 w/ Mount Pipe		
		3	powerwave technologies	7770.00 w/ Mount Pipe		
		6	powerwave technologies	LGP21401		
		1	raycap	DC6-48-60-18-8C-EV		
		1	raycap	DC6-48-60-18-8F		
	156.0	1	tower mounts	Platform Mount [LP 303-1_HR-1]		

Table 2 - Other Considered Equipment

Mounting Level (ft)	Center Line Elevation (ft)	Number of Antennas	Antenna Manufacturer	Antenna Model	Number of Feed Lines	Feed Line Size (in)
178.0	180.0	3	alcatel lucent	TD-RRH8X20-25	4	1-1/4
		9	rfs celwave	ACU-A20-N		
		3	rfs celwave	APXVSPP18-C-A20 w/ Mount Pipe		
		3	rfs celwave	APXVTM14-ALU-I20 w/ Mount Pipe		
	178.0	1	tower mounts	Miscellaneous [NA 507-1]		
		1	tower mounts	Platform Mount [LP 712-1]		

Mounting Level (ft)	Center Line Elevation (ft)	Number of Antennas	Antenna Manufacturer	Antenna Model	Number of Feed Lines	Feed Line Size (in)
176.0	176.0	2	alcatel lucent	1900MHZ RRH (65MHZ)	-	-
		2	alcatel lucent	800 EXTERNAL NOTCH FILTER		
		2	alcatel lucent	800MHZ RRH		
		1	tower mounts	Side Arm Mount [SO 102-3]		
	172.0	1	alcatel lucent	1900MHZ RRH (65MHZ)		
		1	alcatel lucent	800 EXTERNAL NOTCH FILTER		
		1	alcatel lucent	800MHZ RRH		
168.0	170.0	3	antel	BXA-171085-12BF-2 w/ Mount Pipe	12	1-5/8
		3	antel	BXA-70063-6CF-2 w/ Mount Pipe		
		6	antel	LPA-80080/6CF w/ Mount Pipe		
		6	rfs celwave	FD9R6004/2C-3L		
	168.0	1	tower mounts	Platform Mount [LP 403-1]		
75.0	76.0	1	lucent	KS24019-L112A	1	1/2
	75.0	1	tower mounts	Side Arm Mount [SO 701-1]		

3) ANALYSIS PROCEDURE

Table 3 - Documents Provided

Document	Remarks	Reference	Source
4-GEOTECHNICAL REPORTS	DR. CLARENCE WELTI, CT33XC021, 3/29/2001	1532983	CCISITES
4-TOWER FOUNDATION DRAWINGS/DESIGN/SPECS	EEI, CT33XC021, 4/17/2001	2150286	CCISITES
4-TOWER MANUFACTURER DRAWINGS	EEI, CT33XC021, 4/16/2001	2150280	CCISITES

3.1) Analysis Method

tnxTower (version 8.0.5.0), 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 and maintained in accordance with the manufacturer's specifications.
2) The configuration of antennas, transmission cables, mounts and other appurtenances are as specified in Tables 1 and 2 and the referenced drawings.
3) Base plate grout was not installed at the time of the analysis and has not been considered.

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	178 - 129.87	Pole	TP29.64x19.5x0.25	1	-12.26	1388.85	57.8	Pass
L2	129.87 - 84.83	Pole	TP38.5x28.2446x0.375	2	-21.36	2706.23	55.5	Pass
L3	84.83 - 41.2833	Pole	TP46.8x36.6403x0.4375	3	-34.11	3840.78	55.6	Pass
L4	41.2833 - 0	Pole	TP54.5x44.5913x0.5	4	-53.19	5264.00	53.2	Pass
							Summary	
						Pole (L1)	57.8	Pass
						Rating =	57.8	Pass

Table 5 - Tower Component Stresses vs. Capacity – LC7

Notes	Component	Elevation (ft)	% Capacity	Pass / Fail
1	Anchor Rods	0	56.7	Pass
1	Base Plate	0	60.2	Pass
1	Base Foundation Structural Steel	0	73.9	Pass
1	Base Foundation Soil Interaction	0	60.1	Pass

Structure Rating (max from all components) =	73.9%

Notes:

- All structural ratings are per TIA-222-H Section 15.5

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

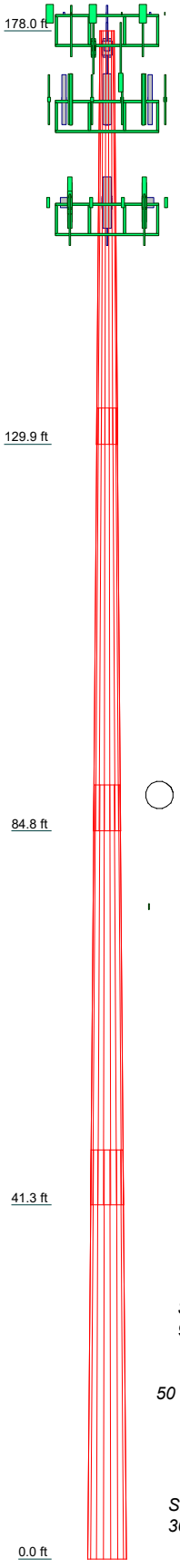
4.1) Recommendations

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

APPENDIX A

TNXTOWER OUTPUT

Section	Length (ft)	Number of Sides	Thickness (in)	Socket Length (ft)	Top Dia (in)	Bot Dia (in)	Grade	Weight (K)
1	48.1300	18	0.2500	4.2500	19.5000	29.6400	A572-65	3.2
2	49.2900	18	0.3750	5.3333	28.2446	38.5000		6.6
3	48.8800	18	0.4375	6.4167	36.6403	46.8000		9.5
4	47.7000	18	0.5000		44.5913	54.5000		12.6
								31.9



ALL REACTIONS ARE FACTORED

AXIAL 79 K
SHEAR 9 K
MOMENT 1159 kip-ft
TORQUE 0 kip-ft
50 mph WIND - 1.5000 in ICE

AXIAL 53 K
SHEAR 30 K
MOMENT 3742 kip-ft
TORQUE 1 kip-ft
REACTIONS - 120 mph WIND

MATERIAL STRENGTH

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

TOWER DESIGN NOTES

1. Tower is located in Litchfield County, Connecticut.
2. Tower designed for Exposure C to the TIA-222-H Standard.
3. Tower designed for a 120 mph basic wind in accordance with the TIA-222-H Standard.
4. Tower is also designed for a 50 mph basic wind with 1.50 in ice. Ice is considered to increase in thickness with height.
5. Deflections are based upon a 60 mph wind.
6. Tower Risk Category II.
7. Topographic Category 1 with Crest Height of 0.0000 ft
8. TIA-222-H Annex S
9. TOWER RATING: 57.8%

PJFLogo

Paul J. Ford and Company
250 E. Broad St., Ste 600
Columbus, OH 43215
Phone: 614-221-6679
FAX:

Job:	***178-Ft Monopole / Harwinton/Buckley Broadcasti***		
Project:	***37519-3424 / BU#876369***		
Client: CCI	Drawn by: Angela Sage		App'd:
Code: TIA-222-H	Date: 10/08/19		Scale: NTS
Path: G:\TOWER\375_Crown_Castle\2019\37519-3424_876369_HARWINTON - BUCKLEY BRO\37519-3424.001.7805_SA_1798529\37519-3424.001.7805.eri			Dwg No. E-1

Tower Input Data

The tower is a monopole.
This tower is designed using the TIA-222-H standard.
The following design criteria apply:

1) Tower is located in Litchfield County, Connecticut.
2) Tower base elevation above sea level: 840.5300 ft.
3) Basic wind speed of 120 mph.
4) Risk Category II.
5) Exposure Category C.
6) Simplified Topographic Factor Procedure for wind speed-up calculations is used.
7) Topographic Category: 1.
8) Crest Height: 0.0000 ft.
9) Nominal ice thickness of 1.5000 in.
10) Ice thickness is considered to increase with height.
11) Ice density of 56.00 pcf.
12) A wind speed of 50 mph is used in combination with ice.
13) Temperature drop of 50 °F.
14) Deflections calculated using a wind speed of 60 mph.
15) TIA-222-H Annex S.
16) A non-linear (P-delta) analysis was used.
17) Pressures are calculated at each section.
18) Stress ratio used in pole design is 1.05.
19) Tower analysis based on target reliabilities in accordance with Annex S.
20) Load Modification Factors used: $K_{es}(F_w) = 0.95$, $K_{es}(t_i) = 0.85$.
21) Local bending stresses due to climbing loads, feed line supports, and appurtenance mounts are not considered.

Options

Consider Moments - Legs		Distribute Leg Loads As Uniform		Use ASCE 10 X-Brace Ly Rules	
Consider Moments - Horizontals		Assume Legs Pinned		Calculate Redundant Bracing Forces	
Consider Moments - Diagonals	√	Assume Rigid Index Plate		Ignore Redundant Members in FEA	
Use Moment Magnification	√	Use Clear Spans For Wind Area		SR Leg Bolts Resist Compression	
Use Code Stress Ratios		Use Clear Spans For KL/r		All Leg Panels Have Same Allowable	
Use Code Safety Factors - Guys		Retension Guys To Initial Tension		Offset Girt At Foundation	
Escalate Ice	√	Bypass Mast Stability Checks	√	Consider Feed Line Torque	
Always Use Max Kz	√	Use Azimuth Dish Coefficients		Include Angle Block Shear Check	
Use Special Wind Profile	√	Project Wind Area of Appurt.		Use TIA-222-H Bracing Resist. Exemption	
Include Bolts In Member Capacity		Autocalc Torque Arm Areas		Use TIA-222-H Tension Splice Exemption	
Leg Bolts Are At Top Of Section		Add IBC .6D+W Combination		Poles	
Secondary Horizontal Braces Leg		Sort Capacity Reports By Component	√	Include Shear-Torsion Interaction	
Use Diamond Inner Bracing (4 Sided)		Triangulate Diamond Inner Bracing		Always Use Sub-Critical Flow	
SR Members Have Cut Ends		Treat Feed Line Bundles As Cylinder		Use Top Mounted Sockets	
SR Members Are Concentric		Ignore KL/ry For 60 Deg. Angle Legs		Pole Without Linear Attachments	
				Pole With Shroud Or No Appurtenances	
				Outside and Inside Corner Radii Are Known	

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	178.0000-129.8700	48.1300	4.25	18	19.5000	29.6400	0.2500	1.0000	A572-65 (65 ksi)

Section	Elevation ft	Section Length ft	Splice Length ft	Number of Sides	Top Diameter in	Bottom Diameter in	Wall Thickness in	Bend Radius in	Pole Grade
L2	129.8700-84.8300	49.2900	5.33	18	28.2446	38.5000	0.3750	1.5000	A572-65 (65 ksi)
L3	84.8300-41.2833	48.8800	6.42	18	36.6403	46.8000	0.4375	1.7500	A572-65 (65 ksi)
L4	41.2833-0.0000	47.7000		18	44.5913	54.5000	0.5000	2.0000	A572-65 (65 ksi)

Tapered Pole Properties

Section	Tip Dia. in	Area in^2	I in^4	r in	C in	I/C in^3	J in^4	It/Q in^2	w in	w/t
L1	19.7623	15.2749	715.1161	6.8338	9.9060	72.1902	1431.1733	7.6389	2.9920	11.968
	30.0587	23.3210	2544.9728	10.4335	15.0571	169.0212	5093.2943	11.6627	4.7766	19.107
L2	29.5204	33.1718	3255.1307	9.8937	14.3483	226.8658	6514.5446	16.5891	4.3111	11.496
	39.0361	45.3783	8333.0732	13.5344	19.5580	426.0698	16677.1113	22.6935	6.1160	16.309
L3	38.2637	50.2722	8324.3516	12.8520	18.6133	447.2261	16659.6565	25.1409	5.6787	12.98
	47.4545	64.3801	17483.2823	16.4587	23.7744	735.3827	34989.5695	32.1962	7.4668	17.067
L4	46.5556	69.9729	17185.9266	15.6524	22.6524	758.6809	34394.4670	34.9931	6.9681	13.936
	55.2636	85.6980	31571.5320	19.1700	27.6860	1140.3428	63184.6066	42.8571	8.7120	17.424

Tower Elevation ft	Gusset Area (per face) ft^2	Gusset Thickness in	Gusset Grade	Adjust. Factor A_f	Adjust. Factor A_r	Weight Mult.	Double Angle Stitch Bolt Spacing Diagonals in	Double Angle Stitch Bolt Spacing Horizontals in	Double Angle Stitch Bolt Spacing Redundants in
L1 178.0000-129.8700				1	1	1			
L2 129.8700-84.8300				1	1	1			
L3 84.8300-41.2833				1	1	1			
L4 41.2833-0.0000				1	1	1			

Feed Line/Linear Appurtenances - Entered As Round Or Flat

Description	Sector	Exclude From Torque Calculation	Component Type	Placement ft	Total Number	Number Per Row	Start/End Position	Width or Diameter in	Perimeter in	Weight klf
***										
LDF4-50A(1/2)	C	No	Surface Ar (CaAa)	75.0000 - 0.0000	1	1	0.184 0.184	0.6250		0.00

Feed Line/Linear Appurtenances - Entered As Area

Description	Face or Leg	Allow Shield	Exclude From Torque Calculation	Component Type	Placement ft	Total Number		C_AA_A ft^2/ft	Weight klf
HB114-1-0813U4-M5J(1-1/4)	C	No	No	Inside Pole	178.0000 - 0.0000	3	No Ice	0.0000	0.00
							1/2" Ice	0.0000	0.00
							1" Ice	0.0000	0.00
							2" Ice	0.0000	0.00
HB114-21U3M12-XXXF(1-1/4)	C	No	No	Inside Pole	178.0000 - 0.0000	1	No Ice	0.0000	0.00
							1/2" Ice	0.0000	0.00
							1" Ice	0.0000	0.00
							2" Ice	0.0000	0.00

Description	Face or Leg	Allow Shield	Exclude From Torque Calculation	Component Type	Placement ft	Total Number		C_AA_A ft^2/ft	Weight klf
***									
LDF7-50A(1-5/8)	C	No	No	Inside Pole	168.0000 - 0.0000	12	No Ice	0.0000	0.00
							1/2" Ice	0.0000	0.00
							1" Ice	0.0000	0.00
							2" Ice	0.0000	0.00
***									
LDF7-50A(1-5/8)	C	No	No	Inside Pole	156.0000 - 0.0000	12	No Ice	0.0000	0.00
							1/2" Ice	0.0000	0.00
							1" Ice	0.0000	0.00
							2" Ice	0.0000	0.00
FB-L98B-002-75000(3/8)	C	No	No	Inside Pole	156.0000 - 0.0000	1	No Ice	0.0000	0.00
							1/2" Ice	0.0000	0.00
							1" Ice	0.0000	0.00
							2" Ice	0.0000	0.00
WR-VG122ST-BRDA(7/16)	C	No	No	Inside Pole	156.0000 - 0.0000	2	No Ice	0.0000	0.00
							1/2" Ice	0.0000	0.00
							1" Ice	0.0000	0.00
							2" Ice	0.0000	0.00
FB-L98B-002-75000(3/8)	C	No	No	Inside Pole	156.0000 - 0.0000	1	No Ice	0.0000	0.00
							1/2" Ice	0.0000	0.00
							1" Ice	0.0000	0.00
							2" Ice	0.0000	0.00
WR-VG86ST-BRD(3/4)	C	No	No	Inside Pole	156.0000 - 0.0000	2	No Ice	0.0000	0.00
							1/2" Ice	0.0000	0.00
							1" Ice	0.0000	0.00
							2" Ice	0.0000	0.00
2" (Nominal) Conduit	C	No	No	Inside Pole	156.0000 - 0.0000	1	No Ice	0.0000	0.00
							1/2" Ice	0.0000	0.00
							1" Ice	0.0000	0.00
							2" Ice	0.0000	0.00

Feed Line/Linear Appurtenances Section Areas

Tower Section	Tower Elevation ft	Face	A_R ft^2	A_F ft^2	C_AA_A In Face ft^2	C_AA_A Out Face ft^2	Weight K
L1	178.0000-129.8700	A	0.000	0.000	0.000	0.000	0.00
		B	0.000	0.000	0.000	0.000	0.00
		C	0.000	0.000	0.000	0.000	0.92
L2	129.8700-84.8300	A	0.000	0.000	0.000	0.000	0.00
		B	0.000	0.000	0.000	0.000	0.00
		C	0.000	0.000	0.000	0.000	1.21
L3	84.8300-41.2833	A	0.000	0.000	0.000	0.000	0.00
		B	0.000	0.000	0.000	0.000	0.00
		C	0.000	0.000	2.107	0.000	1.17
L4	41.2833-0.0000	A	0.000	0.000	0.000	0.000	0.00
		B	0.000	0.000	0.000	0.000	0.00
		C	0.000	0.000	2.580	0.000	1.11

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	178.0000-129.8700	A	1.486	0.000	0.000	0.000	0.000	0.00
		B		0.000	0.000	0.000	0.000	0.00
		C		0.000	0.000	0.000	0.000	0.92
L2	129.8700-84.8300	A	1.434	0.000	0.000	0.000	0.000	0.00
		B		0.000	0.000	0.000	0.000	0.00
		C		0.000	0.000	0.000	0.000	1.21
L3	84.8300-41.2833	A	1.359	0.000	0.000	0.000	0.000	0.00

Tower Section	Tower Elevation ft	Face or Leg	Ice Thickness in	A_R ft^2	A_F ft^2	C_AA_A In Face ft^2	C_AA_A Out Face ft^2	Weight K
		B		0.000	0.000	0.000	0.000	0.00
		C		0.000	0.000	11.774	0.000	1.29
L4	41.2833-0.0000	A	1.218	0.000	0.000	0.000	0.000	0.00
		B		0.000	0.000	0.000	0.000	0.00
		C		0.000	0.000	13.805	0.000	1.25

Feed Line Center of Pressure

Section	Elevation ft	CP_X in	CP_Z in	CP_X Ice in	CP_Z Ice in
L1	178.0000-129.8700	0.0000	0.0000	0.0000	0.0000
L2	129.8700-84.8300	0.0000	0.0000	0.0000	0.0000
L3	84.8300-41.2833	-0.1503	0.3709	-0.4604	1.1363
L4	41.2833-0.0000	-0.1888	0.4660	-0.5602	1.3827

Note: For pole sections, center of pressure calculations do not consider feed line shielding.

Shielding Factor Ka

Tower Section	Feed Line Record No.	Description	Feed Line Segment Elev.	K_a No Ice	K_a Ice
L2	13	LDF4-50A(1/2)	84.83 - 75.00	1.0000	1.0000
L3	13	LDF4-50A(1/2)	41.28 - 75.00	1.0000	1.0000

Discrete Tower Loads

Description	Face or Leg	Offset Type	Offsets: Horz Lateral Vert ft ft ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
APXVTM14-ALU-I20 w/ Mount Pipe	A	From Leg	4.0000 0.00 2.00	0.0000	178.0000	No Ice 1/2" Ice 1" Ice 2" Ice	4.0900 4.4800 4.8800 5.7100	2.8600 3.2300 3.6100 4.4000	0.08 0.13 0.19 0.33
APXVTM14-ALU-I20 w/ Mount Pipe	B	From Leg	4.0000 0.00 2.00	0.0000	178.0000	No Ice 1/2" Ice 1" Ice 2" Ice	4.0900 4.4800 4.8800 5.7100	2.8600 3.2300 3.6100 4.4000	0.08 0.13 0.19 0.33
APXVTM14-ALU-I20 w/ Mount Pipe	C	From Leg	4.0000 0.00 2.00	0.0000	178.0000	No Ice 1/2" Ice 1" Ice 2" Ice	4.0900 4.4800 4.8800 5.7100	2.8600 3.2300 3.6100 4.4000	0.08 0.13 0.19 0.33
APXVSPP18-C-A20 w/ Mount Pipe	A	From Leg	4.0000 0.00 2.00	0.0000	178.0000	No Ice 1/2" Ice 1" Ice 2" Ice	4.6000 5.0500 5.5000 6.4400	4.0100 4.4500 4.8900 5.8200	0.10 0.16 0.23 0.42
APXVSPP18-C-A20 w/ Mount Pipe	B	From Leg	4.0000 0.00 2.00	0.0000	178.0000	No Ice 1/2" Ice	4.6000 5.0500 5.5000	4.0100 4.4500 4.8900	0.10 0.16 0.23

Description	Face or Leg	Offset Type	Offsets: Horz Lateral Vert ft ft ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
						1" Ice	6.4400	5.8200	0.42
						2" Ice			
APXVSPP18-C-A20 w/ Mount Pipe	C	From Leg	4.0000 0.00 2.00	0.0000	178.0000	No Ice	4.6000	4.0100	0.10
						1/2" Ice	5.0500	4.4500	0.16
							5.5000	4.8900	0.23
						1" Ice	6.4400	5.8200	0.42
						2" Ice			
(3) ACU-A20-N	A	From Leg	4.0000 0.00 2.00	0.0000	178.0000	No Ice	0.0667	0.1167	0.00
						1/2" Ice	0.1037	0.1620	0.00
							0.1481	0.2148	0.00
						1" Ice	0.2593	0.3426	0.01
						2" Ice			
(3) ACU-A20-N	B	From Leg	4.0000 0.00 2.00	0.0000	178.0000	No Ice	0.0667	0.1167	0.00
						1/2" Ice	0.1037	0.1620	0.00
							0.1481	0.2148	0.00
						1" Ice	0.2593	0.3426	0.01
						2" Ice			
(3) ACU-A20-N	C	From Leg	4.0000 0.00 2.00	0.0000	178.0000	No Ice	0.0667	0.1167	0.00
						1/2" Ice	0.1037	0.1620	0.00
							0.1481	0.2148	0.00
						1" Ice	0.2593	0.3426	0.01
						2" Ice			
TD-RRH8X20-25	B	From Leg	4.0000 0.00 2.00	0.0000	178.0000	No Ice	4.0455	1.5345	0.07
						1/2" Ice	4.2975	1.7142	0.10
							4.5570	1.9008	0.13
						1" Ice	5.0981	2.2951	0.20
						2" Ice			
(2) TD-RRH8X20-25	C	From Leg	4.0000 0.00 2.00	0.0000	178.0000	No Ice	4.0455	1.5345	0.07
						1/2" Ice	4.2975	1.7142	0.10
							4.5570	1.9008	0.13
						1" Ice	5.0981	2.2951	0.20
						2" Ice			
Platform Mount [LP 712-1]	C	None		0.0000	178.0000	No Ice	24.5600	24.5600	1.34
						1/2" Ice	27.9200	27.9200	1.91
							31.2700	31.2700	2.55
						1" Ice	37.9800	37.9800	3.97
						2" Ice			
Miscellaneous [NA 507-1]	C	None		0.0000	178.0000	No Ice	4.5600	4.5600	0.25
						1/2" Ice	6.3900	6.3900	0.31
							8.1800	8.1800	0.40
						1" Ice	11.6600	11.6600	0.66
						2" Ice			
(2) 2.375" OD x 6' Mount Pipe	A	From Leg	4.0000 0.00 0.00	0.0000	178.0000	No Ice	1.4250	1.4250	0.03
						1/2" Ice	1.9250	1.9250	0.04
							2.2939	2.2939	0.05
						1" Ice	3.0596	3.0596	0.09
						2" Ice			
(2) 2.375" OD x 6' Mount Pipe	B	From Leg	4.0000 0.00 0.00	0.0000	178.0000	No Ice	1.4250	1.4250	0.03
						1/2" Ice	1.9250	1.9250	0.04
							2.2939	2.2939	0.05
						1" Ice	3.0596	3.0596	0.09
						2" Ice			
(2) 2.375" OD x 6' Mount Pipe	C	From Leg	4.0000 0.00 0.00	0.0000	178.0000	No Ice	1.4250	1.4250	0.03
						1/2" Ice	1.9250	1.9250	0.04
							2.2939	2.2939	0.05
						1" Ice	3.0596	3.0596	0.09
						2" Ice			
***									
1900MHZ RRH (65MHZ)	A	From Leg	1.0000 0.00 0.00	0.0000	176.0000	No Ice	2.3218	2.2360	0.06
						1/2" Ice	2.5266	2.4385	0.08
							2.7388	2.6485	0.11
						1" Ice	3.1855	3.0906	0.17
						2" Ice			
1900MHZ RRH (65MHZ)	B	From Leg	1.0000 0.00	0.0000	176.0000	No Ice	2.3218	2.2360	0.06
							2.5266	2.4385	0.08

Description	Face or Leg	Offset Type	Offsets: Horz Lateral Vert ft ft ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
			-4.00			1/2" Ice	2.7388	2.6485	0.11
						1" Ice	3.1855	3.0906	0.17
						2" Ice			
1900MHZ RRH (65MHZ)	C	From Leg	1.0000 0.00 0.00	0.0000	176.0000	No Ice 1/2" Ice 1" Ice 2" Ice	2.3218 2.5266 2.7388 3.1855	2.2360 2.4385 2.6485 3.0906	0.06 0.08 0.11 0.17
800MHZ RRH	A	From Leg	1.0000 0.00 0.00	0.0000	176.0000	No Ice 1/2" Ice 1" Ice 2" Ice	2.1342 2.3195 2.5123 2.9201	1.7730 1.9461 2.1267 2.5100	0.05 0.07 0.10 0.16
800MHZ RRH	B	From Leg	1.0000 0.00 -4.00	0.0000	176.0000	No Ice 1/2" Ice 1" Ice 2" Ice	2.1342 2.3195 2.5123 2.9201	1.7730 1.9461 2.1267 2.5100	0.05 0.07 0.10 0.16
800MHZ RRH	C	From Leg	1.0000 0.00 0.00	0.0000	176.0000	No Ice 1/2" Ice 1" Ice 2" Ice	2.1342 2.3195 2.5123 2.9201	1.7730 1.9461 2.1267 2.5100	0.05 0.07 0.10 0.16
800 EXTERNAL NOTCH FILTER	A	From Leg	1.0000 0.00 0.00	0.0000	176.0000	No Ice 1/2" Ice 1" Ice 2" Ice	0.6601 0.7627 0.8727 1.1149	0.3211 0.3983 0.4830 0.6744	0.01 0.02 0.02 0.04
800 EXTERNAL NOTCH FILTER	B	From Leg	1.0000 0.00 -4.00	0.0000	176.0000	No Ice 1/2" Ice 1" Ice 2" Ice	0.6601 0.7627 0.8727 1.1149	0.3211 0.3983 0.4830 0.6744	0.01 0.02 0.02 0.04
800 EXTERNAL NOTCH FILTER	C	From Leg	1.0000 0.00 0.00	0.0000	176.0000	No Ice 1/2" Ice 1" Ice 2" Ice	0.6601 0.7627 0.8727 1.1149	0.3211 0.3983 0.4830 0.6744	0.01 0.02 0.02 0.04
Side Arm Mount [SO 102-3]	C	None		0.0000	176.0000	No Ice 1/2" Ice 1" Ice 2" Ice	3.6000 4.1800 4.7500 5.9000	3.6000 4.1800 4.7500 5.9000	0.07 0.11 0.14 0.20
2.375" OD x 6' Mount Pipe	A	From Leg	1.0000 0.00 0.00	0.0000	176.0000	No Ice 1/2" Ice 1" Ice 2" Ice	1.4250 1.9250 2.2939 3.0596	1.4250 1.9250 2.2939 3.0596	0.03 0.04 0.05 0.09
2.375" OD x 6' Mount Pipe	B	From Leg	1.0000 0.00 0.00	0.0000	176.0000	No Ice 1/2" Ice 1" Ice 2" Ice	1.4250 1.9250 2.2939 3.0596	1.4250 1.9250 2.2939 3.0596	0.03 0.04 0.05 0.09
2.375" OD x 6' Mount Pipe	C	From Leg	1.0000 0.00 0.00	0.0000	176.0000	No Ice 1/2" Ice 1" Ice 2" Ice	1.4250 1.9250 2.2939 3.0596	1.4250 1.9250 2.2939 3.0596	0.03 0.04 0.05 0.09
***									
(2) LPA-80080/6CF w/ Mount Pipe	A	From Leg	4.0000 0.00 2.00	0.0000	168.0000	No Ice 1/2" Ice 1" Ice 2" Ice	4.5639 5.1051 5.6116 6.6508	10.2588 11.4274 12.3118 14.1293	0.05 0.11 0.19 0.36

Description	Face or Leg	Offset Type	Offsets: Horz Lateral Vert ft ft ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
(2) LPA-80080/6CF w/ Mount Pipe	B	From Leg	4.0000 0.00 2.00	0.0000	168.0000	No Ice 1/2" Ice 1" Ice 2" Ice	4.5639 5.1051 5.6116 6.6508	10.2588 11.4274 12.3118 14.1293	0.05 0.11 0.19 0.36
(2) LPA-80080/6CF w/ Mount Pipe	C	From Leg	4.0000 0.00 2.00	0.0000	168.0000	No Ice 1/2" Ice 1" Ice 2" Ice	4.5639 5.1051 5.6116 6.6508	10.2588 11.4274 12.3118 14.1293	0.05 0.11 0.19 0.36
BXA-70063-6CF-2 w/ Mount Pipe	A	From Leg	4.0000 0.00 2.00	0.0000	168.0000	No Ice 1/2" Ice 1" Ice 2" Ice	7.8065 8.3569 8.8720 9.9271	5.8008 6.9529 7.8191 9.6015	0.04 0.10 0.17 0.34
BXA-70063-6CF-2 w/ Mount Pipe	B	From Leg	4.0000 0.00 2.00	0.0000	168.0000	No Ice 1/2" Ice 1" Ice 2" Ice	7.8065 8.3569 8.8720 9.9271	5.8008 6.9529 7.8191 9.6015	0.04 0.10 0.17 0.34
BXA-70063-6CF-2 w/ Mount Pipe	C	From Leg	4.0000 0.00 2.00	0.0000	168.0000	No Ice 1/2" Ice 1" Ice 2" Ice	7.8065 8.3569 8.8720 9.9271	5.8008 6.9529 7.8191 9.6015	0.04 0.10 0.17 0.34
BXA-171085-12BF-2 w/ Mount Pipe	A	From Leg	4.0000 0.00 2.00	0.0000	168.0000	No Ice 1/2" Ice 1" Ice 2" Ice	4.9710 5.5211 6.0361 7.0911	5.2283 6.3892 7.2610 9.0462	0.04 0.09 0.14 0.27
BXA-171085-12BF-2 w/ Mount Pipe	B	From Leg	4.0000 0.00 2.00	0.0000	168.0000	No Ice 1/2" Ice 1" Ice 2" Ice	4.9710 5.5211 6.0361 7.0911	5.2283 6.3892 7.2610 9.0462	0.04 0.09 0.14 0.27
BXA-171085-12BF-2 w/ Mount Pipe	C	From Leg	4.0000 0.00 2.00	0.0000	168.0000	No Ice 1/2" Ice 1" Ice 2" Ice	4.9710 5.5211 6.0361 7.0911	5.2283 6.3892 7.2610 9.0462	0.04 0.09 0.14 0.27
(2) FD9R6004/2C-3L	A	From Leg	4.0000 0.00 2.00	0.0000	168.0000	No Ice 1/2" Ice 1" Ice 2" Ice	0.3142 0.3862 0.4656 0.6468	0.0762 0.1189 0.1685 0.2940	0.00 0.01 0.01 0.02
(2) FD9R6004/2C-3L	B	From Leg	4.0000 0.00 2.00	0.0000	168.0000	No Ice 1/2" Ice 1" Ice 2" Ice	0.3142 0.3862 0.4656 0.6468	0.0762 0.1189 0.1685 0.2940	0.00 0.01 0.01 0.02
(2) FD9R6004/2C-3L	C	From Leg	4.0000 0.00 2.00	0.0000	168.0000	No Ice 1/2" Ice 1" Ice 2" Ice	0.3142 0.3862 0.4656 0.6468	0.0762 0.1189 0.1685 0.2940	0.00 0.01 0.01 0.02
Platform Mount [LP 403-1]	C	None		0.0000	168.0000	No Ice 1/2" Ice 1" Ice 2" Ice	18.9400 23.3100 27.7400 36.7700	18.9400 23.3100 27.7400 36.7700	1.50 1.90 2.37 3.53
***									
7770.00 w/ Mount Pipe	A	From Leg	4.0000 0.00 2.00	0.0000	156.0000	No Ice 1/2" Ice 1" Ice	5.7460 6.1791 6.6067 7.4880	4.2543 5.0137 5.7109 7.1553	0.06 0.10 0.16 0.29

Description	Face or Leg	Offset Type	Offsets: Horz Lateral Vert ft ft ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
						2" Ice			
7770.00 w/ Mount Pipe	B	From Leg	4.0000 0.00 2.00	0.0000	156.0000	No Ice 1/2" Ice 1" Ice 2" Ice	5.7460 6.1791 6.6067 7.4880	4.2543 5.0137 5.7109 7.1553	0.06 0.10 0.16 0.29
7770.00 w/ Mount Pipe	C	From Leg	4.0000 0.00 2.00	0.0000	156.0000	No Ice 1/2" Ice 1" Ice 2" Ice	5.7460 6.1791 6.6067 7.4880	4.2543 5.0137 5.7109 7.1553	0.06 0.10 0.16 0.29
HPA65R-BU6A w/ Mount Pipe	A	From Leg	4.0000 0.00 2.00	0.0000	156.0000	No Ice 1/2" Ice 1" Ice 2" Ice	8.0881 8.6418 9.1599 10.2212	7.1928 8.3606 9.2408 11.0512	0.07 0.14 0.21 0.39
HPA65R-BU6A w/ Mount Pipe	B	From Leg	4.0000 0.00 2.00	0.0000	156.0000	No Ice 1/2" Ice 1" Ice 2" Ice	8.0881 8.6418 9.1599 10.2212	7.1928 8.3606 9.2408 11.0512	0.07 0.14 0.21 0.39
HPA65R-BU6A w/ Mount Pipe	C	From Leg	4.0000 0.00 2.00	0.0000	156.0000	No Ice 1/2" Ice 1" Ice 2" Ice	8.0881 8.6418 9.1599 10.2212	7.1928 8.3606 9.2408 11.0512	0.07 0.14 0.21 0.39
80010964 w/ Mount Pipe	A	From Leg	4.0000 0.00 2.00	0.0000	156.0000	No Ice 1/2" Ice 1" Ice 2" Ice	8.6100 9.1800 9.7700 10.9800	4.1000 4.5900 5.1000 6.1600	0.12 0.19 0.26 0.45
80010964 w/ Mount Pipe	B	From Leg	4.0000 0.00 2.00	0.0000	156.0000	No Ice 1/2" Ice 1" Ice 2" Ice	8.6100 9.1800 9.7700 10.9800	4.1000 4.5900 5.1000 6.1600	0.12 0.19 0.26 0.45
80010964 w/ Mount Pipe	C	From Leg	4.0000 0.00 2.00	0.0000	156.0000	No Ice 1/2" Ice 1" Ice 2" Ice	8.6100 9.1800 9.7700 10.9800	4.1000 4.5900 5.1000 6.1600	0.12 0.19 0.26 0.45
DC6-48-60-18-8F	C	From Leg	4.0000 0.00 2.00	0.0000	156.0000	No Ice 1/2" Ice 1" Ice 2" Ice	1.2117 1.8924 2.1051 2.5703	1.2117 1.8924 2.1051 2.5703	0.03 0.05 0.08 0.14
(2) LGP21401	A	From Leg	4.0000 0.00 2.00	0.0000	156.0000	No Ice 1/2" Ice 1" Ice 2" Ice	1.1040 1.2388 1.3810 1.6877	0.3471 0.4422 0.5444 0.7696	0.01 0.02 0.03 0.05
(2) LGP21401	B	From Leg	4.0000 0.00 2.00	0.0000	156.0000	No Ice 1/2" Ice 1" Ice 2" Ice	1.1040 1.2388 1.3810 1.6877	0.3471 0.4422 0.5444 0.7696	0.01 0.02 0.03 0.05
(2) LGP21401	C	From Leg	4.0000 0.00 2.00	0.0000	156.0000	No Ice 1/2" Ice 1" Ice 2" Ice	1.1040 1.2388 1.3810 1.6877	0.3471 0.4422 0.5444 0.7696	0.01 0.02 0.03 0.05
RRUS 4449 B5/B12	A	From Leg	4.0000 0.00 2.00	0.0000	156.0000	No Ice 1/2" Ice 1" Ice	1.9675 2.1439 2.3278 2.7177	1.4081 1.5637 1.7267 2.0749	0.07 0.09 0.11 0.16

Description	Face or Leg	Offset Type	Offsets: Horz Lateral Vert ft ft ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
						2" Ice			
RRUS 4449 B5/B12	B	From Leg	4.0000 0.00 2.00	0.0000	156.0000	No Ice 1/2" Ice 1" Ice 2" Ice	1.9675 2.1439 2.3278 2.7177	1.4081 1.5637 1.7267 2.0749	0.07 0.09 0.11 0.16
RRUS 4449 B5/B12	C	From Leg	4.0000 0.00 2.00	0.0000	156.0000	No Ice 1/2" Ice 1" Ice 2" Ice	1.9675 2.1439 2.3278 2.7177	1.4081 1.5637 1.7267 2.0749	0.07 0.09 0.11 0.16
RRUS 8843 B2/B66A	A	From Leg	4.0000 0.00 2.00	0.0000	156.0000	No Ice 1/2" Ice 1" Ice 2" Ice	1.6390 1.7988 1.9660 2.3227	1.3534 1.5005 1.6549 1.9860	0.07 0.09 0.11 0.16
RRUS 8843 B2/B66A	B	From Leg	4.0000 0.00 2.00	0.0000	156.0000	No Ice 1/2" Ice 1" Ice 2" Ice	1.6390 1.7988 1.9660 2.3227	1.3534 1.5005 1.6549 1.9860	0.07 0.09 0.11 0.16
RRUS 8843 B2/B66A	C	From Leg	4.0000 0.00 2.00	0.0000	156.0000	No Ice 1/2" Ice 1" Ice 2" Ice	1.6390 1.7988 1.9660 2.3227	1.3534 1.5005 1.6549 1.9860	0.07 0.09 0.11 0.16
DC6-48-60-18-8C-EV	A	From Leg	4.0000 0.00 2.00	0.0000	156.0000	No Ice 1/2" Ice 1" Ice 2" Ice	2.7357 2.9620 3.1953 3.6830	2.7357 2.9620 3.1953 3.6830	0.03 0.05 0.08 0.15
Platform Mount [LP 303-1_HR-1]	C	None		0.0000	156.0000	No Ice 1/2" Ice 1" Ice 2" Ice	17.0900 21.4700 25.7200 33.9600	17.0900 21.4700 25.7200 33.9600	1.50 1.88 2.35 3.52
2.375" OD x 6' Mount Pipe	A	From Leg	4.0000 0.00 0.00	0.0000	156.0000	No Ice 1/2" Ice 1" Ice 2" Ice	1.4250 1.9250 2.2939 3.0596	1.4250 1.9250 2.2939 3.0596	0.03 0.04 0.05 0.09
2.375" OD x 6' Mount Pipe	B	From Leg	4.0000 0.00 0.00	0.0000	156.0000	No Ice 1/2" Ice 1" Ice 2" Ice	1.4250 1.9250 2.2939 3.0596	1.4250 1.9250 2.2939 3.0596	0.03 0.04 0.05 0.09
2.375" OD x 6' Mount Pipe	C	From Leg	4.0000 0.00 0.00	0.0000	156.0000	No Ice 1/2" Ice 1" Ice 2" Ice	1.4250 1.9250 2.2939 3.0596	1.4250 1.9250 2.2939 3.0596	0.03 0.04 0.05 0.09
***									
KS24019-L112A	B	From Leg	4.0000 0.00 1.00	0.0000	75.0000	No Ice 1/2" Ice 1" Ice 2" Ice	0.1407 0.1979 0.2621 0.4148	0.1407 0.1979 0.2621 0.4148	0.01 0.01 0.01 0.02
Side Arm Mount [SO 701-1]	C	None		0.0000	75.0000	No Ice 1/2" Ice 1" Ice 2" Ice	0.8500 1.1400 1.4300 2.0100	1.6700 2.3400 3.0100 4.3500	0.07 0.08 0.09 0.12

Tower Pressures - No Ice

G_H = 1.100

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 178.0000-129.8700	152.4729	1.383	0.045	99.912	A	0.000	99.912	99.912	100.00	0.000	0.000
					B	0.000	99.912		100.00	0.000	0.000
					C	0.000	99.912		100.00	0.000	0.000
L2 129.8700-84.8300	106.5566	1.283	0.041	128.658	A	0.000	128.658	128.658	100.00	0.000	0.000
					B	0.000	128.658		100.00	0.000	0.000
					C	0.000	128.658		100.00	0.000	0.000
L3 84.8300-41.2833	62.6781	1.147	0.037	155.531	A	0.000	155.531	155.531	100.00	0.000	0.000
					B	0.000	155.531		100.00	0.000	0.000
					C	0.000	155.531		100.00	2.107	0.000
L4 41.2833-0.0000	20.8275	0.91	0.030	175.143	A	0.000	175.143	175.143	100.00	0.000	0.000
					B	0.000	175.143		100.00	0.000	0.000
					C	0.000	175.143		100.00	2.580	0.000

Tower Pressure - With Ice

G_H = 1.100

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
L1 178.0000-129.8700	152.4729	1.383	0.008	1.4859	111.831	A	0.000	111.831	111.831	100.00	0.000	0.000
						B	0.000	111.831		100.00	0.000	0.000
						C	0.000	111.831		100.00	0.000	0.000
L2 129.8700-84.8300	106.5566	1.283	0.007	1.4336	139.811	A	0.000	139.811	139.811	100.00	0.000	0.000
						B	0.000	139.811		100.00	0.000	0.000
						C	0.000	139.811		100.00	0.000	0.000
L3 84.8300-41.2833	62.6781	1.147	0.006	1.3595	165.935	A	0.000	165.935	165.935	100.00	0.000	0.000
						B	0.000	165.935		100.00	0.000	0.000
						C	0.000	165.935		100.00	11.774	0.000
L4 41.2833-0.0000	20.8275	0.91	0.005	1.2177	184.497	A	0.000	184.497	184.497	100.00	0.000	0.000
						B	0.000	184.497		100.00	0.000	0.000
						C	0.000	184.497		100.00	13.805	0.000

Tower Pressure - Service

G_H = 1.100

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 178.0000-129.8700	152.4729	1.383	0.011	99.912	A	0.000	99.912	99.912	100.00	0.000	0.000
					B	0.000	99.912		100.00	0.000	0.000
					C	0.000	99.912		100.00	0.000	0.000
L2 129.8700-84.8300	106.5566	1.283	0.010	128.658	A	0.000	128.658	128.658	100.00	0.000	0.000
					B	0.000	128.658		100.00	0.000	0.000
					C	0.000	128.658		100.00	0.000	0.000
L3 84.8300-41.2833	62.6781	1.147	0.009	155.531	A	0.000	155.531	155.531	100.00	0.000	0.000
					B	0.000	155.531		100.00	0.000	0.000
					C	0.000	155.531		100.00	2.107	0.000
L4 41.2833-0.0000	20.8275	0.91	0.007	175.143	A	0.000	175.143	175.143	100.00	0.000	0.000
					B	0.000	175.143		100.00	0.000	0.000
					C	0.000	175.143		100.00	2.580	0.000

Tower Forces - No Ice - Wind Normal To Face

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	q_z ksf	D_F	D_R	A_E ft²	F K	w klf	Ctrl. Face
L1 178.0000-129.8700	0.92	3.16	A	1	0.73	0.045	1	1	99.912	3.58	0.07	C
			B	1	0.73		1	1	99.912			
			C	1	0.73		1	1	99.912			
L2 129.8700-84.8300	1.21	6.59	A	1	0.73	0.041	1	1	128.658	4.27	0.09	C
			B	1	0.73		1	1	128.658			
			C	1	0.73		1	1	128.658			
L3 84.8300-41.2833	1.17	9.53	A	1	0.73	0.037	1	1	155.531	4.61	0.11	C
			B	1	0.73		1	1	155.531			
			C	1	0.73		1	1	155.531			
L4 41.2833-0.0000	1.11	12.63	A	1	0.73	0.030	1	1	175.143	4.16	0.10	C
			B	1	0.73		1	1	175.143			
			C	1	0.73		1	1	175.143			
Sum Weight:	4.41	31.92						OTM	1375.92 kip-ft	16.61		

Tower Forces - No Ice - Wind 60 To Face

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	q_z ksf	D_F	D_R	A_E ft²	F K	w klf	Ctrl. Face
L1 178.0000-129.8700	0.92	3.16	A	1	0.73	0.045	1	1	99.912	3.58	0.07	C
			B	1	0.73		1	1	99.912			
			C	1	0.73		1	1	99.912			
L2 129.8700-84.8300	1.21	6.59	A	1	0.73	0.041	1	1	128.658	4.27	0.09	C
			B	1	0.73		1	1	128.658			
			C	1	0.73		1	1	128.658			
L3 84.8300-41.2833	1.17	9.53	A	1	0.73	0.037	1	1	155.531	4.61	0.11	C
			B	1	0.73		1	1	155.531			
			C	1	0.73		1	1	155.531			
L4 41.2833-0.0000	1.11	12.63	A	1	0.73	0.030	1	1	175.143	4.16	0.10	C
			B	1	0.73		1	1	175.143			
			C	1	0.73		1	1	175.143			
Sum Weight:	4.41	31.92						OTM	1375.92 kip-ft	16.61		

Tower Forces - No Ice - Wind 90 To Face

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	q_z ksf	D_F	D_R	A_E ft²	F K	w klf	Ctrl. Face
L1 178.0000-129.8700	0.92	3.16	A	1	0.73	0.045	1	1	99.912	3.58	0.07	C
			B	1	0.73		1	1	99.912			
			C	1	0.73		1	1	99.912			
L2 129.8700-84.8300	1.21	6.59	A	1	0.73	0.041	1	1	128.658	4.27	0.09	C
			B	1	0.73		1	1	128.658			
			C	1	0.73		1	1	128.658			
L3 84.8300-41.2833	1.17	9.53	A	1	0.73	0.037	1	1	155.531	4.61	0.11	C
			B	1	0.73		1	1	155.531			
			C	1	0.73		1	1	155.531			
L4 41.2833-0.0000	1.11	12.63	A	1	0.73	0.030	1	1	175.143	4.16	0.10	C
			B	1	0.73		1	1	175.143			
			C	1	0.73		1	1	175.143			
Sum Weight:	4.41	31.92						OTM	1375.92 kip-ft	16.61		

Tower Forces - With Ice - Wind Normal To Face

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	q_z ksf	D_F	D_R	A_E ft^2	F K	w klf	Ctrl. Face
L1 178.0000-129.8700	0.92	5.46	A	1	1.2	0.008	1	1	111.831	1.14	0.02	C
			B	1	1.2		1	1	111.831			
			C	1	1.2		1	1	111.831			
L2 129.8700-84.8300	1.21	9.40	A	1	1.2	0.007	1	1	139.811	1.32	0.03	C
			B	1	1.2		1	1	139.811			
			C	1	1.2		1	1	139.811			
L3 84.8300-41.2833	1.29	12.72	A	1	1.2	0.006	1	1	165.935	1.40	0.03	C
			B	1	1.2		1	1	165.935			
			C	1	1.2		1	1	165.935			
L4 41.2833-0.0000	1.25	15.82	A	1	1.2	0.005	1	1	184.497	1.25	0.03	C
			B	1	1.2		1	1	184.497			
			C	1	1.2		1	1	184.497			
Sum Weight:	4.67	43.41						OTM	429.34 kip-ft	5.12		

Tower Forces - With Ice - Wind 60 To Face

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	q_z ksf	D_F	D_R	A_E ft^2	F K	w klf	Ctrl. Face
L1 178.0000-129.8700	0.92	5.46	A	1	1.2	0.008	1	1	111.831	1.14	0.02	C
			B	1	1.2		1	1	111.831			
			C	1	1.2		1	1	111.831			
L2 129.8700-84.8300	1.21	9.40	A	1	1.2	0.007	1	1	139.811	1.32	0.03	C
			B	1	1.2		1	1	139.811			
			C	1	1.2		1	1	139.811			
L3 84.8300-41.2833	1.29	12.72	A	1	1.2	0.006	1	1	165.935	1.40	0.03	C
			B	1	1.2		1	1	165.935			
			C	1	1.2		1	1	165.935			
L4 41.2833-0.0000	1.25	15.82	A	1	1.2	0.005	1	1	184.497	1.25	0.03	C
			B	1	1.2		1	1	184.497			
			C	1	1.2		1	1	184.497			
Sum Weight:	4.67	43.41						OTM	429.34 kip-ft	5.12		

Tower Forces - With Ice - Wind 90 To Face

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	q_z ksf	D_F	D_R	A_E ft^2	F K	w klf	Ctrl. Face
L1 178.0000-129.8700	0.92	5.46	A	1	1.2	0.008	1	1	111.831	1.14	0.02	C
			B	1	1.2		1	1	111.831			
			C	1	1.2		1	1	111.831			
L2 129.8700-84.8300	1.21	9.40	A	1	1.2	0.007	1	1	139.811	1.32	0.03	C
			B	1	1.2		1	1	139.811			
			C	1	1.2		1	1	139.811			
L3 84.8300-41.2833	1.29	12.72	A	1	1.2	0.006	1	1	165.935	1.40	0.03	C
			B	1	1.2		1	1	165.935			
			C	1	1.2		1	1	165.935			
L4 41.2833-0.0000	1.25	15.82	A	1	1.2	0.005	1	1	184.497	1.25	0.03	C
			B	1	1.2		1	1	184.497			
			C	1	1.2		1	1	184.497			
Sum Weight:	4.67	43.41						OTM	429.34 kip-ft	5.12		

Tower Forces - Service - Wind Normal To Face

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	q_z ksf	D_F	D_R	A_E ft²	F K	w klf	Ctrl. Face
L1 178.0000-129.8700	0.92	3.16	A	1	0.73	0.011	1	1	99.912	0.84	0.02	C
			B	1	0.73		1	1	99.912			
			C	1	0.73		1	1	99.912			
L2 129.8700-84.8300	1.21	6.59	A	1	0.73	0.010	1	1	128.658	1.01	0.02	C
			B	1	0.73		1	1	128.658			
			C	1	0.73		1	1	128.658			
L3 84.8300-41.2833	1.17	9.53	A	1	0.73	0.009	1	1	155.531	1.08	0.02	C
			B	1	0.73		1	1	155.531			
			C	1	0.73		1	1	155.531			
L4 41.2833-0.0000	1.11	12.63	A	1	0.73	0.007	1	1	175.143	0.98	0.02	C
			B	1	0.73		1	1	175.143			
			C	1	0.73		1	1	175.143			
Sum Weight:	4.41	31.92						OTM	323.97 kip-ft	3.91		

Tower Forces - Service - Wind 60 To Face

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	q_z ksf	D_F	D_R	A_E ft²	F K	w klf	Ctrl. Face
L1 178.0000-129.8700	0.92	3.16	A	1	0.73	0.011	1	1	99.912	0.84	0.02	C
			B	1	0.73		1	1	99.912			
			C	1	0.73		1	1	99.912			
L2 129.8700-84.8300	1.21	6.59	A	1	0.73	0.010	1	1	128.658	1.01	0.02	C
			B	1	0.73		1	1	128.658			
			C	1	0.73		1	1	128.658			
L3 84.8300-41.2833	1.17	9.53	A	1	0.73	0.009	1	1	155.531	1.08	0.02	C
			B	1	0.73		1	1	155.531			
			C	1	0.73		1	1	155.531			
L4 41.2833-0.0000	1.11	12.63	A	1	0.73	0.007	1	1	175.143	0.98	0.02	C
			B	1	0.73		1	1	175.143			
			C	1	0.73		1	1	175.143			
Sum Weight:	4.41	31.92						OTM	323.97 kip-ft	3.91		

Tower Forces - Service - Wind 90 To Face

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	q_z ksf	D_F	D_R	A_E ft²	F K	w klf	Ctrl. Face
L1 178.0000-129.8700	0.92	3.16	A	1	0.73	0.011	1	1	99.912	0.84	0.02	C
			B	1	0.73		1	1	99.912			
			C	1	0.73		1	1	99.912			
L2 129.8700-84.8300	1.21	6.59	A	1	0.73	0.010	1	1	128.658	1.01	0.02	C
			B	1	0.73		1	1	128.658			
			C	1	0.73		1	1	128.658			
L3 84.8300-41.2833	1.17	9.53	A	1	0.73	0.009	1	1	155.531	1.08	0.02	C
			B	1	0.73		1	1	155.531			
			C	1	0.73		1	1	155.531			
L4 41.2833-0.0000	1.11	12.63	A	1	0.73	0.007	1	1	175.143	0.98	0.02	C
			B	1	0.73		1	1	175.143			
			C	1	0.73		1	1	175.143			
Sum Weight:	4.41	31.92						OTM	323.97 kip-ft	3.91		

Force Totals

Load Case	Vertical Forces K	Sum of Forces X K	Sum of Forces Z K	Sum of Overturning Moments, M_x kip-ft	Sum of Overturning Moments, M_z kip-ft	Sum of Torques kip-ft
Leg Weight	31.92					
Bracing Weight	0.00					
Total Member Self-Weight	31.92			0.47	0.40	
Total Weight	44.34			0.47	0.40	
Wind 0 deg - No Ice		0.06	-29.36	-3519.83	-9.62	-0.51
Wind 30 deg - No Ice		14.83	-25.46	-3053.21	-1785.63	-0.36
Wind 60 deg - No Ice		25.62	-14.73	-1768.36	-3083.07	-0.12
Wind 90 deg - No Ice		29.56	-0.06	-9.55	-3554.30	0.16
Wind 120 deg - No Ice		25.57	14.63	1751.94	-3073.05	0.39
Wind 150 deg - No Ice		14.73	25.40	3044.13	-1768.27	0.52
Wind 180 deg - No Ice		-0.06	29.36	3520.77	10.42	0.51
Wind 210 deg - No Ice		-14.83	25.46	3054.14	1786.42	0.36
Wind 240 deg - No Ice		-25.62	14.73	1769.29	3083.86	0.12
Wind 270 deg - No Ice		-29.56	0.06	10.48	3555.09	-0.16
Wind 300 deg - No Ice		-25.57	-14.63	-1751.01	3073.84	-0.39
Wind 330 deg - No Ice		-14.73	-25.40	-3043.19	1769.07	-0.52
Member Ice	11.49					
Total Weight Ice	69.19			1.45	1.10	
Wind 0 deg - Ice		0.01	-8.74	-1034.84	-0.80	-0.15
Wind 30 deg - Ice		4.40	-7.57	-896.95	-521.93	-0.11
Wind 60 deg - Ice		7.61	-4.38	-518.34	-902.92	-0.04
Wind 90 deg - Ice		8.78	-0.01	-0.45	-1041.68	0.04
Wind 120 deg - Ice		7.60	4.36	517.95	-901.03	0.11
Wind 150 deg - Ice		4.38	7.56	897.95	-518.65	0.15
Wind 180 deg - Ice		-0.01	8.74	1037.74	2.99	0.15
Wind 210 deg - Ice		-4.40	7.57	899.85	524.13	0.11
Wind 240 deg - Ice		-7.61	4.38	521.23	905.12	0.04
Wind 270 deg - Ice		-8.78	0.01	3.34	1043.87	-0.04
Wind 300 deg - Ice		-7.60	-4.36	-515.05	903.22	-0.11
Wind 330 deg - Ice		-4.38	-7.56	-895.05	520.84	-0.15
Total Weight	44.34			0.47	0.40	
Wind 0 deg - Service		0.01	-6.91	-828.43	-1.96	-0.12
Wind 30 deg - Service		3.49	-5.99	-718.57	-420.13	-0.08
Wind 60 deg - Service		6.03	-3.47	-416.04	-725.63	-0.03
Wind 90 deg - Service		6.96	-0.01	-1.91	-836.58	0.04
Wind 120 deg - Service		6.02	3.45	412.84	-723.27	0.09
Wind 150 deg - Service		3.47	5.98	717.10	-416.05	0.12
Wind 180 deg - Service		-0.01	6.91	829.32	2.76	0.12
Wind 210 deg - Service		-3.49	5.99	719.45	420.93	0.08
Wind 240 deg - Service		-6.03	3.47	416.93	726.42	0.03
Wind 270 deg - Service		-6.96	0.01	2.80	837.38	-0.04
Wind 300 deg - Service		-6.02	-3.45	-411.95	724.06	-0.09
Wind 330 deg - Service		-3.47	-5.98	-716.21	416.84	-0.12

Load Combinations

Comb. No.	Description
1	Dead Only
2	1.2 Dead+1.0 Wind 0 deg - No Ice
3	0.9 Dead+1.0 Wind 0 deg - No Ice
4	1.2 Dead+1.0 Wind 30 deg - No Ice
5	0.9 Dead+1.0 Wind 30 deg - No Ice
6	1.2 Dead+1.0 Wind 60 deg - No Ice
7	0.9 Dead+1.0 Wind 60 deg - No Ice
8	1.2 Dead+1.0 Wind 90 deg - No Ice
9	0.9 Dead+1.0 Wind 90 deg - No Ice
10	1.2 Dead+1.0 Wind 120 deg - No Ice
11	0.9 Dead+1.0 Wind 120 deg - No Ice
12	1.2 Dead+1.0 Wind 150 deg - No Ice

Comb. No.	Description
13	0.9 Dead+1.0 Wind 150 deg - No Ice
14	1.2 Dead+1.0 Wind 180 deg - No Ice
15	0.9 Dead+1.0 Wind 180 deg - No Ice
16	1.2 Dead+1.0 Wind 210 deg - No Ice
17	0.9 Dead+1.0 Wind 210 deg - No Ice
18	1.2 Dead+1.0 Wind 240 deg - No Ice
19	0.9 Dead+1.0 Wind 240 deg - No Ice
20	1.2 Dead+1.0 Wind 270 deg - No Ice
21	0.9 Dead+1.0 Wind 270 deg - No Ice
22	1.2 Dead+1.0 Wind 300 deg - No Ice
23	0.9 Dead+1.0 Wind 300 deg - No Ice
24	1.2 Dead+1.0 Wind 330 deg - No Ice
25	0.9 Dead+1.0 Wind 330 deg - No Ice
26	1.2 Dead+1.0 Ice+1.0 Temp
27	1.2 Dead+1.0 Wind 0 deg+1.0 Ice+1.0 Temp
28	1.2 Dead+1.0 Wind 30 deg+1.0 Ice+1.0 Temp
29	1.2 Dead+1.0 Wind 60 deg+1.0 Ice+1.0 Temp
30	1.2 Dead+1.0 Wind 90 deg+1.0 Ice+1.0 Temp
31	1.2 Dead+1.0 Wind 120 deg+1.0 Ice+1.0 Temp
32	1.2 Dead+1.0 Wind 150 deg+1.0 Ice+1.0 Temp
33	1.2 Dead+1.0 Wind 180 deg+1.0 Ice+1.0 Temp
34	1.2 Dead+1.0 Wind 210 deg+1.0 Ice+1.0 Temp
35	1.2 Dead+1.0 Wind 240 deg+1.0 Ice+1.0 Temp
36	1.2 Dead+1.0 Wind 270 deg+1.0 Ice+1.0 Temp
37	1.2 Dead+1.0 Wind 300 deg+1.0 Ice+1.0 Temp
38	1.2 Dead+1.0 Wind 330 deg+1.0 Ice+1.0 Temp
39	Dead+Wind 0 deg - Service
40	Dead+Wind 30 deg - Service
41	Dead+Wind 60 deg - Service
42	Dead+Wind 90 deg - Service
43	Dead+Wind 120 deg - Service
44	Dead+Wind 150 deg - Service
45	Dead+Wind 180 deg - Service
46	Dead+Wind 210 deg - Service
47	Dead+Wind 240 deg - Service
48	Dead+Wind 270 deg - Service
49	Dead+Wind 300 deg - Service
50	Dead+Wind 330 deg - Service

Maximum Member Forces

Section No.	Elevation ft	Component Type	Condition	Gov. Load Comb.	Axial K	Major Axis Moment kip-ft	Minor Axis Moment kip-ft
L1	178 - 129.87	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	26	-29.09	1.37	-1.08
			Max. Mx	20	-12.26	557.70	-3.30
			Max. My	14	-12.30	3.26	-548.52
			Max. Vy	20	-17.39	557.70	-3.30
			Max. Vx	14	17.18	3.26	-548.52
			Max. Torque	22			0.76
L2	129.87 - 84.83	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	26	-40.73	1.37	-1.08
			Max. Mx	20	-21.36	1412.00	-5.97
			Max. My	14	-21.39	5.94	-1393.75
			Max. Vy	20	-21.51	1412.00	-5.97
			Max. Vx	14	21.30	5.94	-1393.75
			Max. Torque	24			0.61
L3	84.83 - 41.2833	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	26	-56.53	1.28	-1.29
			Max. Mx	20	-34.11	2416.39	-8.53
			Max. My	14	-34.12	8.45	-2389.51
			Max. Vy	20	-25.70	2416.39	-8.53
			Max. Vx	14	25.49	8.45	-2389.51
			Max. Torque	24			0.61

Section No.	Elevation ft	Component Type	Condition	Gov. Load Comb.	Axial K	Major Axis Moment kip-ft	Minor Axis Moment kip-ft
L4	41.2833 - 0	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	26	-79.21	1.24	-1.60
			Max. Mx	20	-53.19	3741.05	-11.28
			Max. My	14	-53.19	11.18	-3704.77
			Max. Vy	20	-29.59	3741.05	-11.28
			Max. Vx	14	29.39	11.18	-3704.77
			Max. Torque	24			0.59

Maximum Reactions

Location	Condition	Gov. Load Comb.	Vertical K	Horizontal, X K	Horizontal, Z K
Pole	Max. Vert	26	79.21	-0.00	0.00
	Max. H_x	21	39.91	29.55	-0.06
	Max. H_z	3	39.91	-0.06	29.36
	Max. M_x	2	3703.53	-0.06	29.36
	Max. M_z	8	3740.00	-29.55	0.06
	Max. Torsion	24	0.59	14.73	25.40
	Min. Vert	21	39.91	29.55	-0.06
	Min. H_x	9	39.91	-29.55	0.06
	Min. H_z	15	39.91	0.06	-29.36
	Min. M_x	14	-3704.77	0.06	-29.36
	Min. M_z	20	-3741.05	29.55	-0.06
	Min. Torsion	12	-0.56	-14.73	-25.40

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	44.34	0.00	-0.00	0.46	0.40	0.00
1.2 Dead+1.0 Wind 0 deg - No Ice	53.21	0.06	-29.36	-3703.53	-10.13	-0.51
0.9 Dead+1.0 Wind 0 deg - No Ice	39.91	0.06	-29.36	-3653.79	-10.10	-0.50
1.2 Dead+1.0 Wind 30 deg - No Ice	53.21	14.83	-25.46	-3213.00	-1879.30	-0.31
0.9 Dead+1.0 Wind 30 deg - No Ice	39.91	14.83	-25.46	-3169.68	-1853.94	-0.31
1.2 Dead+1.0 Wind 60 deg - No Ice	53.21	25.62	-14.73	-1860.86	-3244.68	-0.05
0.9 Dead+1.0 Wind 60 deg - No Ice	39.91	25.62	-14.73	-1835.83	-3200.83	-0.06
1.2 Dead+1.0 Wind 90 deg - No Ice	53.21	29.55	-0.06	-10.03	-3740.00	0.22
0.9 Dead+1.0 Wind 90 deg - No Ice	39.91	29.55	-0.06	-10.03	-3689.64	0.20
1.2 Dead+1.0 Wind 120 deg - No Ice	53.21	25.57	14.63	1843.70	-3234.11	0.44
0.9 Dead+1.0 Wind 120 deg - No Ice	39.91	25.57	14.63	1818.63	-3190.43	0.42
1.2 Dead+1.0 Wind 150 deg - No Ice	53.21	14.73	25.40	3203.67	-1860.89	0.56
0.9 Dead+1.0 Wind 150 deg - No Ice	39.91	14.73	25.40	3160.17	-1835.82	0.55
1.2 Dead+1.0 Wind 180 deg - No Ice	53.21	-0.06	29.36	3704.77	11.18	0.55
0.9 Dead+1.0 Wind 180 deg - No Ice	39.91	-0.06	29.36	3654.69	10.86	0.54
1.2 Dead+1.0 Wind 210 deg - No Ice	53.21	-14.83	25.46	3214.24	1880.35	0.37
0.9 Dead+1.0 Wind 210 deg - No Ice	39.91	-14.83	25.46	3170.59	1854.70	0.37
1.2 Dead+1.0 Wind 240 deg - No Ice	53.21	-25.62	14.73	1862.11	3245.74	0.07
0.9 Dead+1.0 Wind 240 deg - No Ice	39.91	-25.62	14.73	1836.74	3201.59	0.09
1.2 Dead+1.0 Wind 270 deg - No Ice	53.21	-29.55	0.06	11.28	3741.05	-0.25
0.9 Dead+1.0 Wind 270 deg - No Ice	39.91	-29.55	0.06	10.94	3690.41	-0.23
1.2 Dead+1.0 Wind 300 deg - No Ice	53.21	-25.57	-14.63	-1842.46	3235.17	-0.50
0.9 Dead+1.0 Wind 300 deg - No Ice	39.91	-25.57	-14.63	-1817.71	3191.18	-0.48
1.2 Dead+1.0 Wind 330 deg - No Ice	53.21	-14.73	-25.40	-3202.43	1861.95	-0.59
0.9 Dead+1.0 Wind 330 deg - No Ice	39.91	-14.73	-25.40	-3159.28	1836.60	-0.57
1.2 Dead+1.0 Ice+1.0 Temp	79.21	0.00	-0.00	1.60	1.24	-0.00
1.2 Dead+1.0 Wind 0 deg+1.0 Ice+1.0 Temp	79.21	0.01	-8.74	-1147.24	-0.67	-0.17
1.2 Dead+1.0 Wind 30 deg+1.0 Ice+1.0 Temp	79.21	4.40	-7.57	-994.37	-578.60	-0.10
1.2 Dead+1.0 Wind 60 deg+1.0 Ice+1.0 Temp	79.21	7.60	-4.38	-574.57	-1001.10	0.00
1.2 Dead+1.0 Wind 90 deg+1.0 Ice+1.0 Temp	79.21	8.78	-0.01	-0.32	-1154.95	0.10

Load Combination	Vertical	$Shear_x$	$Shear_z$	Overturning Moment, M_x	Overturning Moment, M_z	Torque
	K	K	K	kip-ft	kip-ft	kip-ft
1.2 Dead+1.0 Wind 120 deg+1.0 Ice+1.0 Temp	79.21	7.59	4.36	574.51	-998.94	0.17
1.2 Dead+1.0 Wind 150 deg+1.0 Ice+1.0 Temp	79.21	4.38	7.56	995.89	-574.87	0.20
1.2 Dead+1.0 Wind 180 deg+1.0 Ice+1.0 Temp	79.21	-0.01	8.74	1150.91	3.65	0.17
1.2 Dead+1.0 Wind 210 deg+1.0 Ice+1.0 Temp	79.21	-4.40	7.57	998.04	581.58	0.10
1.2 Dead+1.0 Wind 240 deg+1.0 Ice+1.0 Temp	79.21	-7.60	4.38	578.24	1004.08	-0.00
1.2 Dead+1.0 Wind 270 deg+1.0 Ice+1.0 Temp	79.21	-8.78	0.01	3.99	1157.93	-0.10
1.2 Dead+1.0 Wind 300 deg+1.0 Ice+1.0 Temp	79.21	-7.59	-4.36	-570.83	1001.92	-0.18
1.2 Dead+1.0 Wind 330 deg+1.0 Ice+1.0 Temp	79.21	-4.38	-7.56	-992.21	577.85	-0.20
Dead+Wind 0 deg - Service	44.34	0.01	-6.91	-865.42	-2.05	-0.12
Dead+Wind 30 deg - Service	44.34	3.49	-5.99	-750.65	-438.95	-0.08
Dead+Wind 60 deg - Service	44.34	6.03	-3.47	-434.61	-758.12	-0.02
Dead+Wind 90 deg - Service	44.34	6.96	-0.01	-1.98	-874.04	0.05
Dead+Wind 120 deg - Service	44.34	6.02	3.45	431.32	-755.64	0.11
Dead+Wind 150 deg - Service	44.34	3.47	5.98	749.19	-434.65	0.13
Dead+Wind 180 deg - Service	44.34	-0.01	6.91	866.45	2.93	0.13
Dead+Wind 210 deg - Service	44.34	-3.49	5.99	751.68	439.83	0.08
Dead+Wind 240 deg - Service	44.34	-6.03	3.47	435.63	759.00	0.02
Dead+Wind 270 deg - Service	44.34	-6.96	0.01	3.00	874.91	-0.05
Dead+Wind 300 deg - Service	44.34	-6.02	-3.45	-430.30	756.51	-0.11
Dead+Wind 330 deg - Service	44.34	-3.47	-5.98	-748.17	435.52	-0.14

Solution Summary

	Sum of Applied Forces			Sum of Reactions			
Load Comb.	PX	PY	PZ	PX	PY	PZ	% Error
	K	K	K	K	K	K	
1	0.00	-44.34	0.00	-0.00	44.34	0.00	0.000%
2	0.06	-53.21	-29.36	-0.06	53.21	29.36	0.006%
3	0.06	-39.91	-29.36	-0.06	39.91	29.36	0.005%
4	14.83	-53.21	-25.46	-14.83	53.21	25.46	0.000%
5	14.83	-39.91	-25.46	-14.83	39.91	25.46	0.000%
6	25.62	-53.21	-14.73	-25.62	53.21	14.73	0.000%
7	25.62	-39.91	-14.73	-25.62	39.91	14.73	0.000%
8	29.56	-53.21	-0.06	-29.55	53.21	0.06	0.006%
9	29.56	-39.91	-0.06	-29.55	39.91	0.06	0.005%
10	25.57	-53.21	14.63	-25.57	53.21	-14.63	0.000%
11	25.57	-39.91	14.63	-25.57	39.91	-14.63	0.000%
12	14.73	-53.21	25.40	-14.73	53.21	-25.40	0.000%
13	14.73	-39.91	25.40	-14.73	39.91	-25.40	0.000%
14	-0.06	-53.21	29.36	0.06	53.21	-29.36	0.006%
15	-0.06	-39.91	29.36	0.06	39.91	-29.36	0.005%
16	-14.83	-53.21	25.46	14.83	53.21	-25.46	0.000%
17	-14.83	-39.91	25.46	14.83	39.91	-25.46	0.000%
18	-25.62	-53.21	14.73	25.62	53.21	-14.73	0.000%
19	-25.62	-39.91	14.73	25.62	39.91	-14.73	0.000%
20	-29.56	-53.21	0.06	29.55	53.21	-0.06	0.006%
21	-29.56	-39.91	0.06	29.55	39.91	-0.06	0.005%
22	-25.57	-53.21	-14.63	25.57	53.21	14.63	0.000%
23	-25.57	-39.91	-14.63	25.57	39.91	14.63	0.000%
24	-14.73	-53.21	-25.40	14.73	53.21	25.40	0.000%
25	-14.73	-39.91	-25.40	14.73	39.91	25.40	0.000%
26	0.00	-79.21	0.00	-0.00	79.21	0.00	0.001%
27	0.01	-79.21	-8.74	-0.01	79.21	8.74	0.001%
28	4.40	-79.21	-7.57	-4.40	79.21	7.57	0.001%
29	7.61	-79.21	-4.38	-7.60	79.21	4.38	0.001%
30	8.78	-79.21	-0.01	-8.78	79.21	0.01	0.001%
31	7.60	-79.21	4.36	-7.59	79.21	-4.36	0.001%
32	4.38	-79.21	7.56	-4.38	79.21	-7.56	0.001%
33	-0.01	-79.21	8.74	0.01	79.21	-8.74	0.001%
34	-4.40	-79.21	7.57	4.40	79.21	-7.57	0.001%
35	-7.61	-79.21	4.38	7.60	79.21	-4.38	0.001%
36	-8.78	-79.21	0.01	8.78	79.21	-0.01	0.001%
37	-7.60	-79.21	-4.36	7.59	79.21	4.36	0.001%
38	-4.38	-79.21	-7.56	4.38	79.21	7.56	0.001%
39	0.01	-44.34	-6.91	-0.01	44.34	6.91	0.002%
40	3.49	-44.34	-5.99	-3.49	44.34	5.99	0.002%

Load Comb.	Sum of Applied Forces PX K	PY K	PZ K	Sum of Reactions PX K	PY K	PZ K	% Error
41	6.03	-44.34	-3.47	-6.03	44.34	3.47	0.002%
42	6.96	-44.34	-0.01	-6.96	44.34	0.01	0.002%
43	6.02	-44.34	3.45	-6.02	44.34	-3.45	0.002%
44	3.47	-44.34	5.98	-3.47	44.34	-5.98	0.002%
45	-0.01	-44.34	6.91	0.01	44.34	-6.91	0.002%
46	-3.49	-44.34	5.99	3.49	44.34	-5.99	0.002%
47	-6.03	-44.34	3.47	6.03	44.34	-3.47	0.002%
48	-6.96	-44.34	0.01	6.96	44.34	-0.01	0.002%
49	-6.02	-44.34	-3.45	6.02	44.34	3.45	0.002%
50	-3.47	-44.34	-5.98	3.47	44.34	5.98	0.002%

Non-Linear Convergence Results

Load Combination	Converged?	Number of Cycles	Displacement Tolerance	Force Tolerance
1	Yes	6	0.00000001	0.00000001
2	Yes	15	0.00008728	0.00009776
3	Yes	15	0.00005679	0.00008038
4	Yes	19	0.00000001	0.00009366
5	Yes	19	0.00000001	0.00006617
6	Yes	19	0.00000001	0.00009458
7	Yes	19	0.00000001	0.00006680
8	Yes	15	0.00008711	0.00009804
9	Yes	15	0.00005666	0.00008055
10	Yes	19	0.00000001	0.00009344
11	Yes	19	0.00000001	0.00006601
12	Yes	19	0.00000001	0.00009172
13	Yes	18	0.00000001	0.00014821
14	Yes	15	0.00008729	0.00010711
15	Yes	15	0.00005679	0.00008732
16	Yes	19	0.00000001	0.00009478
17	Yes	19	0.00000001	0.00006694
18	Yes	19	0.00000001	0.00009472
19	Yes	19	0.00000001	0.00006682
20	Yes	15	0.00008711	0.00010280
21	Yes	15	0.00005666	0.00008379
22	Yes	19	0.00000001	0.00009222
23	Yes	18	0.00000001	0.00014897
24	Yes	19	0.00000001	0.00009311
25	Yes	19	0.00000001	0.00006583
26	Yes	8	0.00000001	0.00000560
27	Yes	17	0.00007419	0.00005139
28	Yes	17	0.00007399	0.00007923
29	Yes	17	0.00007400	0.00007964
30	Yes	17	0.00007420	0.00005178
31	Yes	17	0.00007402	0.00007993
32	Yes	17	0.00007404	0.00007890
33	Yes	17	0.00007425	0.00005172
34	Yes	17	0.00007408	0.00008089
35	Yes	17	0.00007409	0.00008089
36	Yes	17	0.00007427	0.00005212
37	Yes	17	0.00007405	0.00007920
38	Yes	17	0.00007402	0.00007982
39	Yes	15	0.00000001	0.00002770
40	Yes	15	0.00000001	0.00002671
41	Yes	15	0.00000001	0.00002795
42	Yes	15	0.00000001	0.00002800
43	Yes	15	0.00000001	0.00002844
44	Yes	15	0.00000001	0.00002607
45	Yes	15	0.00000001	0.00002782
46	Yes	15	0.00000001	0.00002834
47	Yes	15	0.00000001	0.00002793
48	Yes	15	0.00000001	0.00002809
49	Yes	15	0.00000001	0.00002666
50	Yes	15	0.00000001	0.00002820

Maximum Tower Deflections - Service Wind

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
L1	178 - 129.87	31.8476	47	1.7291	0.0024
L2	134.12 - 84.83	17.2497	47	1.3255	0.0007
L3	90.1633 - 41.2833	7.3268	47	0.8065	0.0003
L4	47.7 - 0	1.9723	47	0.3815	0.0001

Critical Deflections and Radius of Curvature - Service Wind

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
178.0000	APXVTM14-ALU-I20 w/ Mount Pipe	47	31.8476	1.7291	0.0024	33701
176.0000	1900MHZ RRH (65MHZ)	47	31.1365	1.7123	0.0023	33701
168.0000	(2) LPA-80080/6CF w/ Mount Pipe	47	28.3038	1.6447	0.0020	16850
156.0000	7770.00 w/ Mount Pipe	47	24.1518	1.5398	0.0014	7658
75.0000	KS24019-L112A	47	4.9598	0.6413	0.0002	5516

Maximum Tower Deflections - Design Wind

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
L1	178 - 129.87	136.0355	20	7.3851	0.0107
L2	134.12 - 84.83	73.7724	20	5.6731	0.0030
L3	90.1633 - 41.2833	31.3465	20	3.4528	0.0011
L4	47.7 - 0	8.4375	18	1.6328	0.0004

Critical Deflections and Radius of Curvature - Design Wind

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
178.0000	APXVTM14-ALU-I20 w/ Mount Pipe	20	136.0355	7.3851	0.0107	8134
176.0000	1900MHZ RRH (65MHZ)	20	133.0041	7.3140	0.0103	8134
168.0000	(2) LPA-80080/6CF w/ Mount Pipe	20	120.9270	7.0280	0.0086	4066
156.0000	7770.00 w/ Mount Pipe	20	103.2221	6.5841	0.0063	1845
75.0000	KS24019-L112A	18	21.2183	2.7454	0.0009	1293

Compression Checks

Pole Design Data

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	A in^2	P_u K	ϕP_n K	Ratio $\frac{P_u}{\phi P_n}$
L1	178 - 129.87 (1)	TP29.64x19.5x0.25	48.1300	0.0000	0.0	22.6105	-12.26	1322.71	0.009
L2	129.87 - 84.83 (2)	TP38.5x28.2446x0.375	49.2900	0.0000	0.0	44.0575	-21.36	2577.36	0.008
L3	84.83 - 41.2833 (3)	TP46.8x36.6403x0.4375	48.8800	0.0000	0.0	62.5281	-34.11	3657.89	0.009
L4	41.2833 - 0 (4)	TP54.5x44.5913x0.5	47.7000	0.0000	0.0	85.6980	-53.19	5013.33	0.011

Pole Bending Design Data

Section No.	Elevation ft	Size	M_{ux} kip-ft	ϕM_{nx} kip-ft	Ratio $\frac{M_{ux}}{\phi M_{nx}}$	M_{uy} kip-ft	ϕM_{ny} kip-ft	Ratio $\frac{M_{uy}}{\phi M_{ny}}$
L1	178 - 129.87 (1)	TP29.64x19.5x0.25	558.05	936.75	0.596	0.00	936.75	0.000
L2	129.87 - 84.83 (2)	TP38.5x28.2446x0.375	1412.51	2463.13	0.573	0.00	2463.13	0.000
L3	84.83 - 41.2833 (3)	TP46.8x36.6403x0.4375	2417.09	4208.93	0.574	0.00	4208.93	0.000
L4	41.2833 - 0 (4)	TP54.5x44.5913x0.5	3741.96	6831.09	0.548	0.00	6831.09	0.000

Pole Shear Design Data

Section No.	Elevation ft	Size	Actual V_u K	ϕV_n K	Ratio $\frac{V_u}{\phi V_n}$	Actual T_u kip-ft	ϕT_n kip-ft	Ratio $\frac{T_u}{\phi T_n}$
L1	178 - 129.87 (1)	TP29.64x19.5x0.25	17.40	396.81	0.044	0.10	990.22	0.000
L2	129.87 - 84.83 (2)	TP38.5x28.2446x0.375	21.51	773.21	0.028	0.10	2506.45	0.000
L3	84.83 - 41.2833 (3)	TP46.8x36.6403x0.4375	25.70	1097.37	0.023	0.07	4327.36	0.000
L4	41.2833 - 0 (4)	TP54.5x44.5913x0.5	29.59	1504.00	0.020	0.07	7112.49	0.000

Pole Interaction Design Data

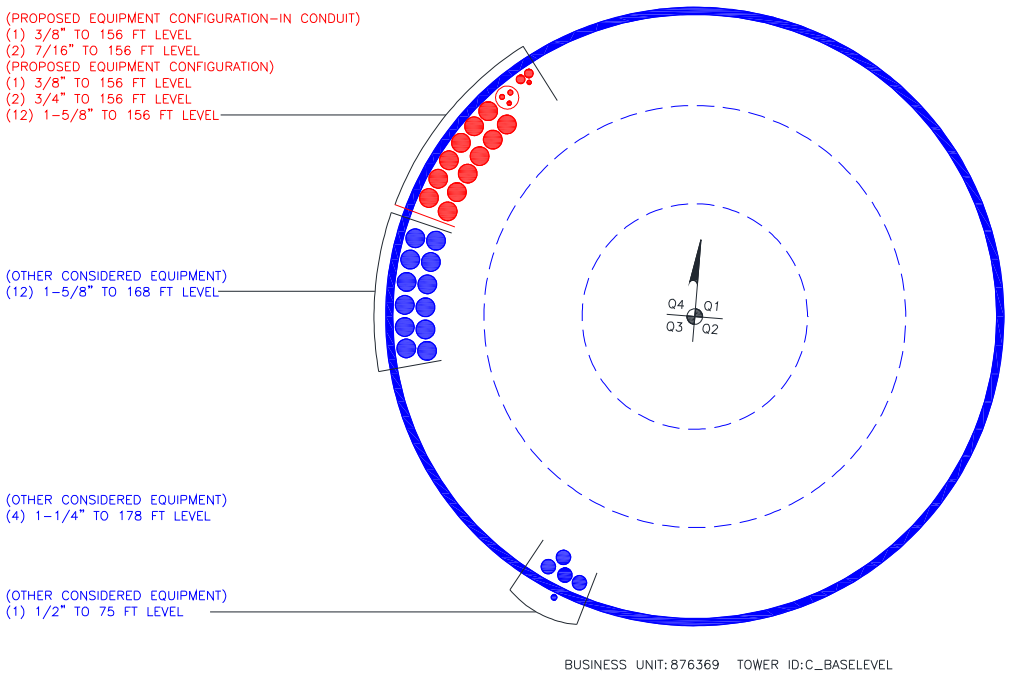
Section No.	Elevation ft	Ratio $\frac{P_u}{\phi P_n}$	Ratio $\frac{M_{ux}}{\phi M_{nx}}$	Ratio $\frac{M_{uy}}{\phi M_{ny}}$	Ratio $\frac{V_u}{\phi V_n}$	Ratio $\frac{T_u}{\phi T_n}$	Comb. Stress Ratio	Allow. Stress Ratio	Criteria
L1	178 - 129.87 (1)	0.009	0.596	0.000	0.044	0.000	0.607	1.050	4.8.2
L2	129.87 - 84.83 (2)	0.008	0.573	0.000	0.028	0.000	0.583	1.050	4.8.2
L3	84.83 - 41.2833 (3)	0.009	0.574	0.000	0.023	0.000	0.584	1.050	4.8.2
L4	41.2833 - 0 (4)	0.011	0.548	0.000	0.020	0.000	0.559	1.050	4.8.2

Section Capacity Table

Section No.	Elevation ft	Component Type	Size	Critical Element	P K	ϕP_{allow} K	% Capacity	Pass Fail
L1	178 - 129.87	Pole	TP29.64x19.5x0.25	1	-12.26	1388.85	57.8	Pass
L2	129.87 - 84.83	Pole	TP38.5x28.2446x0.375	2	-21.36	2706.23	55.5	Pass
L3	84.83 - 41.2833	Pole	TP46.8x36.6403x0.4375	3	-34.11	3840.78	55.6	Pass
L4	41.2833 - 0	Pole	TP54.5x44.5913x0.5	4	-53.19	5264.00	53.2	Pass
							Summary	
						Pole (L1)	57.8	Pass
						RATING =	**57.8**	**Pass**

APPENDIX B

BASE LEVEL DRAWING


(PROPOSED EQUIPMENT CONFIGURATION-IN CONDUIT)
(1) 3/8" TO 156 FT LEVEL
(2) 7/16" TO 156 FT LEVEL
(PROPOSED EQUIPMENT CONFIGURATION)
(1) 3/8" TO 156 FT LEVEL
(2) 3/4" TO 156 FT LEVEL
(12) 1-5/8" TO 156 FT LEVEL
(OTHER CONSIDERED EQUIPMENT)
(12) 1-5/8" TO 168 FT LEVEL
(OTHER CONSIDERED EQUIPMENT)
(4) 1-1/4" TO 178 FT LEVEL
(OTHER CONSIDERED EQUIPMENT)
(1) 1/2" TO 75 FT LEVEL
Q4
Q1
Q3
Q2
BUSINESS UNIT:876369 TOWER ID:C_BASELEVEL

APPENDIX C

ADDITIONAL CALCULATIONS

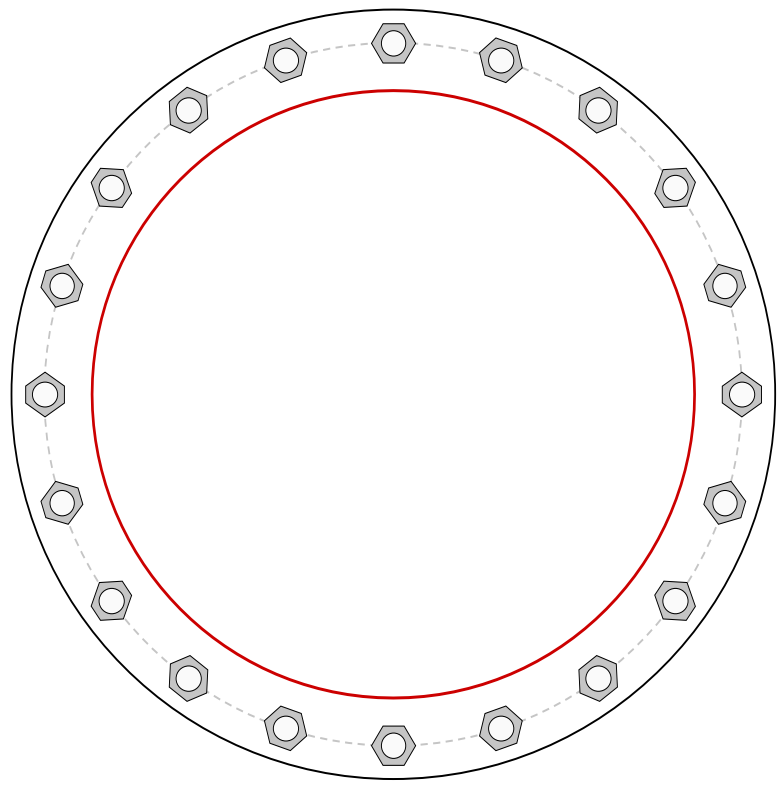
Monopole Base Plate Connection

Site Info	
BU #	876369
Site Name	
Order #	

Analysis Considerations	
TIA-222 Revision	H
Grout Considered:	No
l_{ar} (in)	1

Applied Loads	
Moment (kip-ft)	3741.96
Axial Force (kips)	53.19
Shear Force (kips)	29.59

**TIA-222-H Section 15.5 Applied*



Connection Properties

Anchor Rod Data

(20) 2-1/4" ø bolts (A615-75 N; Fy=75 ksi, Fu=100 ksi) on 63" BC

Base Plate Data

69" OD x 2.25" Plate (A572-60; Fy=60 ksi, Fu=75 ksi)

Stiffener Data

N/A

Pole Data

54.5" x 0.5" 18-sided pole (A572-65; Fy=65 ksi, Fu=80 ksi)

Analysis Results

Anchor Rod Summary *(units of kips, kip-in)*

Pu_c = 145.14	ϕPn_c = 243.75	**Stress Rating**
Vu = 1.48	ϕVn = 73.13	**56.7%**
Mu = n/a	ϕMn = n/a	**Pass**

Base Plate Summary

Max Stress (ksi):	34.13	(Flexural)
Allowable Stress (ksi):	54	
Stress Rating:	**60.2%**	**Pass**

Pier and Pad Foundation

BU # :	876369
Site Name:	
App. Number:	

TIA-222 Revision:	H
Tower Type:	Monopole

Top & Bot. Pad Rein. Different?:	☑
Block Foundation?:	☐

Superstructure Analysis Reactions

Compression, **P_{comp}**:	53	kips
Base Shear, Vu_comp:	30	kips
Moment, **M_u**:	3742	ft-kips
Tower Height, **H**:	178	ft
BP Dist. Above Fdn, **bp_{dist}**:	3.25	in

Pier Properties

Pier Shape:	Circular	
Pier Diameter, **dpier**:	7	ft
Ext. Above Grade, **E**:	1	ft
Pier Rebar Size, **Sc**:	8	
Pier Rebar Quantity, **mc**:	46	
Pier Tie/Spiral Size, **St**:	4	
Pier Tie/Spiral Quantity, **mt**:	5	
Pier Reinforcement Type:	Tie	
Pier Clear Cover, **cc_{pier}**:	3	in

Pad Properties

Depth, **D**:	6.5	ft
Pad Width, **W**:	28	ft
Pad Thickness, **T**:	3	ft
Pad Rebar Size (Top), **Sp_{top}**:	8	
Pad Top Rebar Quantity (Top), **mp_{top}**:	15	
Pad Rebar Size (Bottom), **Sp**:	8	
Pad Rebar Quantity (Bottom), **mp**:	34	
Pad Clear Cover, **cc_{pad}**:	3	in

Material Properties

Rebar Grade, **Fy**:	60	ksi
Concrete Compressive Strength, **F'c**:	3	ksi
Dry Concrete Density, **δc**:	150	pcf

Soil Properties

Total Soil Unit Weight, γ:	125	pcf
Ultimate Gross Bearing, Qult:	8.000	ksf
Cohesion, **Cu**:	0.000	ksf
Friction Angle, φ:	38	degrees
SPT Blow Count, **N_{blows}**:	24	
Base Friction, μ:	0.6	
Neglected Depth, **N**:	4.00	ft
Foundation Bearing on Rock?	No	
Groundwater Depth, **gw**:	2	ft

<--Toggle between Gross and Net

Foundation Analysis Checks

	Capacity	Demand	Rating*	Check
Lateral (Sliding) (kips)	314.30	30.00	**9.1%**	**Pass**
Bearing Pressure (ksf)	6.00	1.66	**27.7%**	**Pass**
*Overturning (kip*ft)*	6610.98	3975.13	**60.1%**	**Pass**
*Pier Flexure (Comp.) (kip*ft)*	5754.14	3877.00	**64.2%**	**Pass**
Pier Compression (kip)	18370.97	79.85	**0.4%**	**Pass**
*Pad Flexure (kip*ft)*	3693.73	1614.32	**41.6%**	**Pass**
Pad Shear - 1-way (kips)	869.56	219.20	**24.0%**	**Pass**
Pad Shear - 2-way (Comp) (ksi)	0.164	0.039	**22.4%**	**Pass**
*Flexural 2-way (Comp) (kip*ft)*	2996.21	2326.20	**73.9%**	**Pass**

**Rating per TIA-222-H Section 15.5*

Soil Rating*:	**60.1%**
Structural Rating*:	**73.9%**

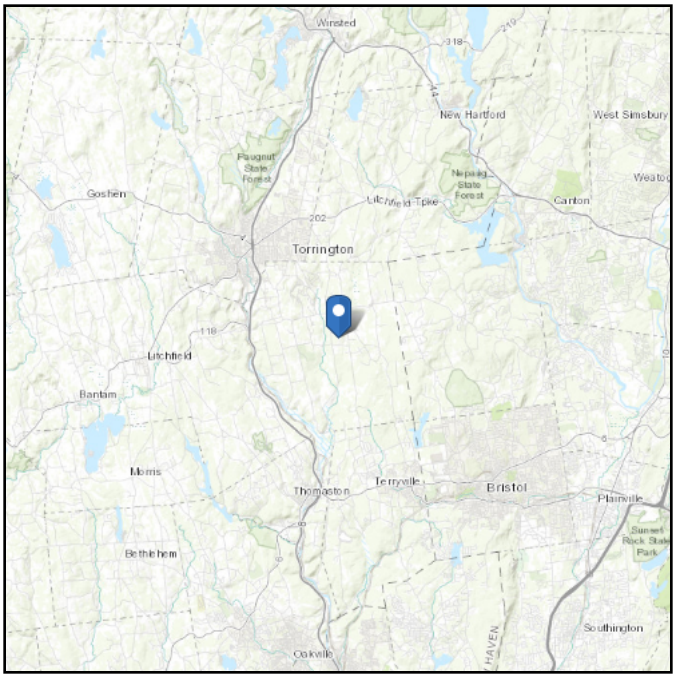
Version 3.3.0

ASCE 7 Hazards Report

Address:
No Address at This Location

Standard: ASCE/SEI 7-10
Risk Category: II
Soil Class: D - Stiff Soil

Elevation: 840.53 ft (NAVD 88)
Latitude: 41.757264
Longitude: -73.052556



Wind

Results:

Wind Speed:	118 Vmph ⟵ Jurisdiction requires 120 mph Ultimate Wind Speed
10-year MRI	76 Vmph
25-year MRI	85 Vmph
50-year MRI	90 Vmph
100-year MRI	97 Vmph
Data Source:	ASCE/SEI 7-10, Fig. 26.5-1A and Figs. CC-1–CC-4, incorporating errata of March 12, 2014
Date Accessed:	Tue Oct 08 2019

Value provided is 3-second gust wind speeds at 33 ft above ground for Exposure C Category, based on linear interpolation between contours. Wind speeds are interpolated in accordance with the 7-10 Standard. Wind speeds correspond to approximately a 7% probability of exceedance in 50 years (annual exceedance probability = 0.00143, MRI = 700 years).

Site is in a hurricane-prone region as defined in ASCE/SEI 7-10 Section 26.2. Glazed openings need not be protected against wind-borne debris.

Mountainous terrain, gorges, ocean promontories, and special wind regions should be examined for unusual wind conditions.

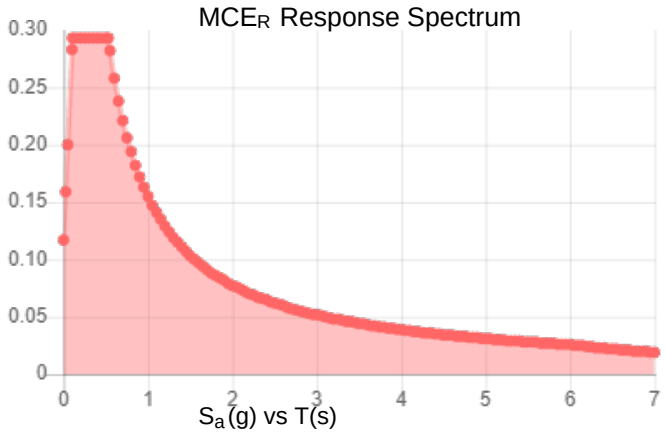
Seismic

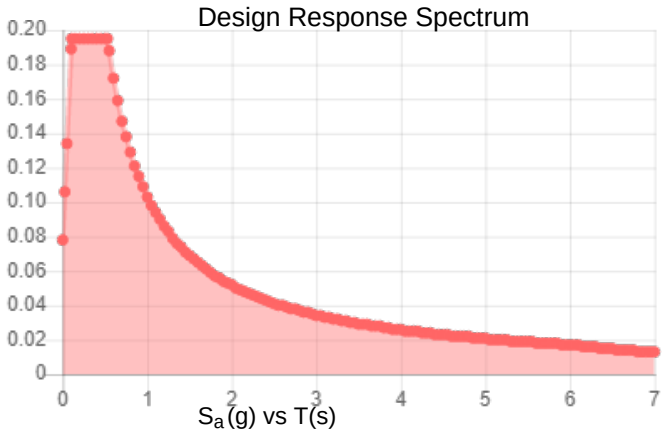
Site Soil Class: D - Stiff Soil

Results:

S_S :	0.183	S_{DS} :	0.195
S_1 :	0.065	S_{D1} :	0.103
F_a :	1.6	T_L :	6
F_v :	2.4	PGA :	0.093
S_{MS} :	0.293	PGA_M :	0.148
S_{M1} :	0.155	F_{PGA} :	1.6
		I_e :	1

Seismic Design Category B





Data Accessed: Tue Oct 08 2019

Date Source: USGS Seismic Design Maps based on ASCE/SEI 7-10, incorporating Supplement 1 and errata of March 31, 2013, and ASCE/SEI 7-10 Table 1.5-2. Additional data for site-specific ground motion procedures in accordance with ASCE/SEI 7-10 Ch. 21 are available from USGS.

Ice

Results:

Ice Thickness:	0.75 in.
Concurrent Temperature:	5 F
Gust Speed:	50 mph
Data Source:	Standard ASCE/SEI 7-10, Figs. 10-2 through 10-8
Date Accessed:	Tue Oct 08 2019

Ice thicknesses on structures in exposed locations at elevations higher than the surrounding terrain and in valleys and gorges may exceed the mapped values.

Values provided are equivalent radial ice thicknesses due to freezing rain with concurrent 3-second gust speeds, for a 50-year mean recurrence interval, and temperatures concurrent with ice thicknesses due to freezing rain. Thicknesses for ice accretions caused by other sources shall be obtained from local meteorological studies. Ice thicknesses in exposed locations at elevations higher than the surrounding terrain and in valleys and gorges may exceed the mapped values.

Exhibit E

Mount Analysis

Date: **October 24, 2019**

Charles McGuirt
Crown Castle
3530 Toringdon Way, Suite 300
Charlotte, NC 28277
704-405-6607

Jacobs Engineering Group, Inc.
5449 Bells Ferry Rd
Acworth, GA 30102
770-701-2500
www.jacobs.com

Subject:	**Mount Modification Report**	
Carrier Designation:	**AT&T Equipment Change-Out**	
	Carrier Site Number:	CTL01178
	Carrier Site Name:	Harwinton - Hungerford Lane
	FA Location:	10110565
Crown Castle Designation:	**Crown Castle BU Number:**	876369
	Crown Castle Site Name:	Harwinton / Buckley Broadcasti
	Crown Castle JDE Job Number:	556170
	Crown Castle PO Number:	1462189
	Crown Castle Application Number:	477392 Revision 0
Engineering Firm Designation:	**Jacobs Engineering Group, Inc. Report Designation:** ERCC0303	
Site Data:	**64 Hungerford Lane** **Harwinton, Litchfield County, CT, 06791** **Latitude 41°45'26.15" Longitude -73°3'9.20"**	
Structure Information:	**Tower Height & Type:**	**178 ft Monopole**
	Mount Elevation:	**156 ft**
	Mount Type:	**12 ft Platform**

Dear Charles McGuirt,

Jacobs Engineering Group, Inc. is pleased to submit this **"Mount Modification Report"** to determine the structural integrity of AT&T's antenna mounting system with the proposed appurtenance and equipment addition on the abovementioned supporting tower structure. Analysis of the existing supporting tower structure is to be completed by others and therefore is not part of this analysis. Analysis of the antenna mounting system as a tie-off point for fall protection or rigging is not part of this document.

The purpose of the analysis is to determine acceptability of the mount stress level. Based on our analysis we have determined the mount stress level to be:

Platform (single) **Sufficient (With Modifications)**

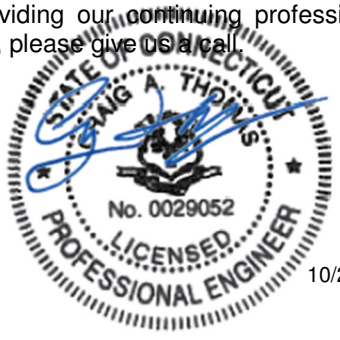
***See Section 4.1 of this report for the loading and structural modifications required in order for the mount to support the loading listed in Table 1.**

The analysis has been performed in accordance with the TIA-222-H Standard based upon an ultimate 3-second gust wind speed of 115 mph. Applicable Standard references and design criteria are listed in Section 2 - Analysis Criteria.

We at Jacobs Engineering Group, Inc. appreciate the opportunity of providing our continuing professional services to you. If you have any questions or need further assistance on this, please give us a call.

Mount analysis prepared by: Azi Asghari, EI

Engineer of Record:



Craig A. Thomas, PE
PE No. 0029052

10/24/19

TABLE OF CONTENTS

1) INTRODUCTION

This mount is a 12 ft Platform Mount, mapped by Jacobs in Feburary of 2019.

2) ANALYSIS CRITERIA

Building Code: 2018 IBC
TIA-222 Revision: TIA-222-H
Risk Category: II
Ultimate Wind Speed: 115 mph
Exposure Category: C
Topographic Factor: 1
Ice Thickness: 1 in
Wind Speed with Ice: 50 mph
Live Loading Wind Speed: 30 mph
Man Live Load at Mid/End-Points: 250 lb
Man Live Load at Mount Pipes: 500 lb

Table 1 - Proposed Equipment Configuration Information

Mount Centerline (ft)	Antenna Centerline (ft)	Number of Antennas	Antenna Manufacturer	Antenna Model	Mount / Modification Details
156.0	158.0	3	POWERWAVE TECHNOLOGIES	7770.00	Platform
		3	CCI ANTENNAS	HPA65R-BU6A	
		3	KATHREIN	80010964	
		1	RAYCAP	DC6-48-60-18-8F	
		3	ERICSSON	RRUS 4449 B5/B12	
		3	ERICSSON	RRUS 8843 B2/B66A	
		6	LUCENT	LGP21401	
		1	RAYCAP	DC6-48-60-18-8C-EV	

3) ANALYSIS PROCEDURE

Table 2 - Documents Provided

Document	Remarks	Reference	Source
4-MOUNT MAPPING	AT&T	02/23/2019	CCISITES
MOUNT PHOTOS	AT&T	11/04/2019	CCISITES
APPLICATION	AT&T	477392 Revision *0*	CCISITES
MOUNT SPEC SHEET	Valmont	HRK12	VALMONT

3.1) Analysis Method

RISA-3D (Version 17.0.1), a commercially available analysis software package, was used to create a three-dimensional model of the antenna mounting system and calculate member stresses for various loading cases.

A tool internally developed, using Microsoft Excel, by Jacobs was used to calculate wind loading on all appurtenances, dishes, and mount members for various load cases. Selected output from the analysis is included in Appendix B.

This analysis was performed in accordance with Crown Castle's ENG-SOW-10208 Tower Mount Analysis (Revision C).

3.2) Assumptions

1) The antenna mounting system was properly fabricated, installed and maintained in good condition in accordance with its original design and manufacturer's specifications.
2) The configuration of antennas, mounts, and other appurtenances are as specified in Tables 1 and 2 and the referenced drawings.
3) All member connections are assumed to have been designed to meet or exceed the load carrying capacity of the connected member unless otherwise specified in this report.
4) The analysis will be required to be revised if the existing conditions in the field differ from those shown in the above-referenced documents or assumed in this analysis. No allowance was made for any damaged, missing, or rusted members.
5) Steel grades have been assumed as follows, unless noted otherwise:

Channel, Solid Round, Angle, Plate	ASTM A36 (GR 36)
HSS (Rectangular)	ASTM 500 (GR B-46)
Pipe	ASTM A53 (GR 35)
Connection Bolts	ASTM A325
U-Bolts	ASTM A307

6) Antenna pipes to be implemented vertically on/between the face members and equally spaced horizontally along the mount face.
7) RRHs to be implemented vertically between the face members.

This analysis may be affected if any assumptions are not valid or have been made in error. Crown Castle should be notified to determine the effect on the structural integrity of the antenna mounting system.

4) ANALYSIS RESULTS

Table 3 - Mount Component Stresses vs. Capacity (Platform)

Notes	Component	Critical Member	Mount Centerline (ft)	% Capacity	Pass / Fail
1	Antenna Pipe Members	7	156.0	33.4	Pass
1	Handrail MOD Members	19,20	156.0	11.6	Passs
1	Horizontal Members	22	156.0	11.9	Pass
1	Standoff Members	56	156.0	26.5	Pass
2	Mount-to-Tower Connection	-	156.0	6.9	Pass

Structure Rating (max from all components) =	33.4%

Notes:
1) See additional documentation in "Appendix C - Analysis Output" for calculations supporting the % capacity consumed.
2) See additional documentation in "Appendix D - Analysis Output" for calculations supporting the % capacity consumed.
3) Rating per TIA-222-H, Section 15.5.

4.1) Recommendations

The antenna mounting system has sufficient capacity to carry the proposed load configuration.

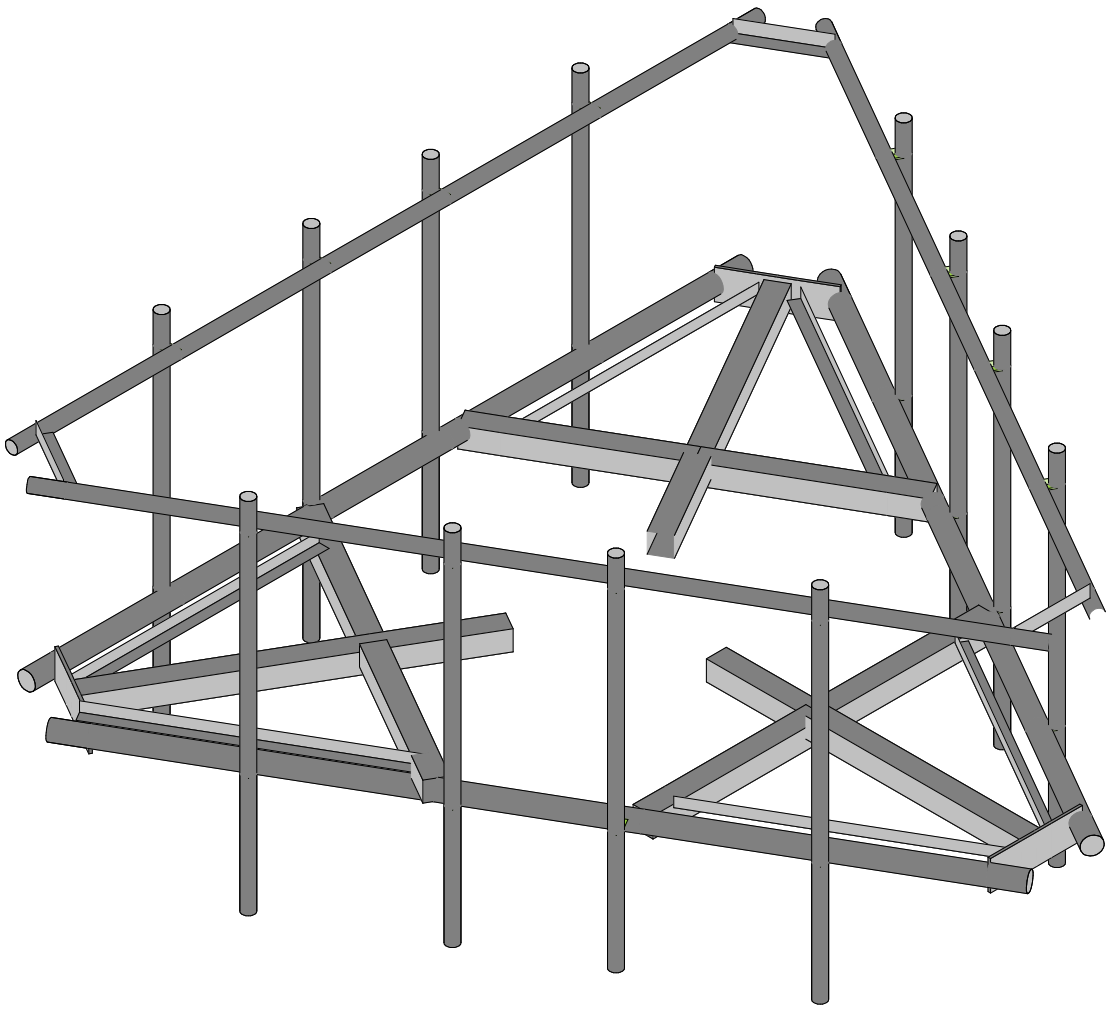
In order for the results of this analysis to be considered valid, the mount modification, as follows, must be completed.

1. Installation of a platform handrail kit (Valmont SitePro1 part no. HRK12 or approved equivalent). Implement the handrail at 42" above the platform.

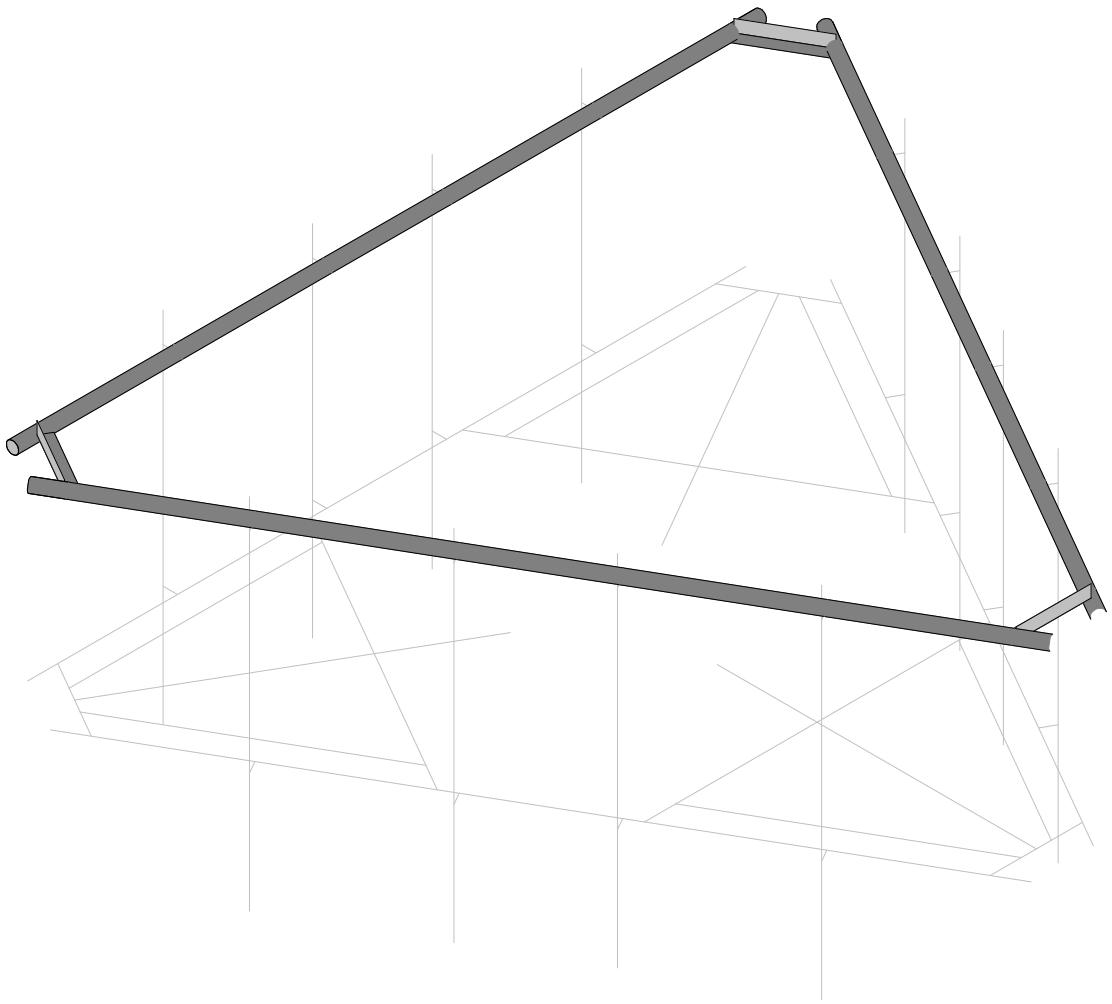
Engineering detail drawings have been provided in Appendix E – Mount Modification Design Drawings. Connection from the mount to the tower and local stresses on the tower are sufficient.

APPENDIX A

WIRE FRAME AND RENDERED MODELS



Jacobs Engineering Group...	Modified Antenna Mount Frame	Page 1
A. Asghari		Oct 23, 2019 at 3:30 PM
ERCC0303 - 876369		Platform_12FT_H.R3D



Jacobs Engineering Group...	Modified Antenna Mount Frame	Page 2
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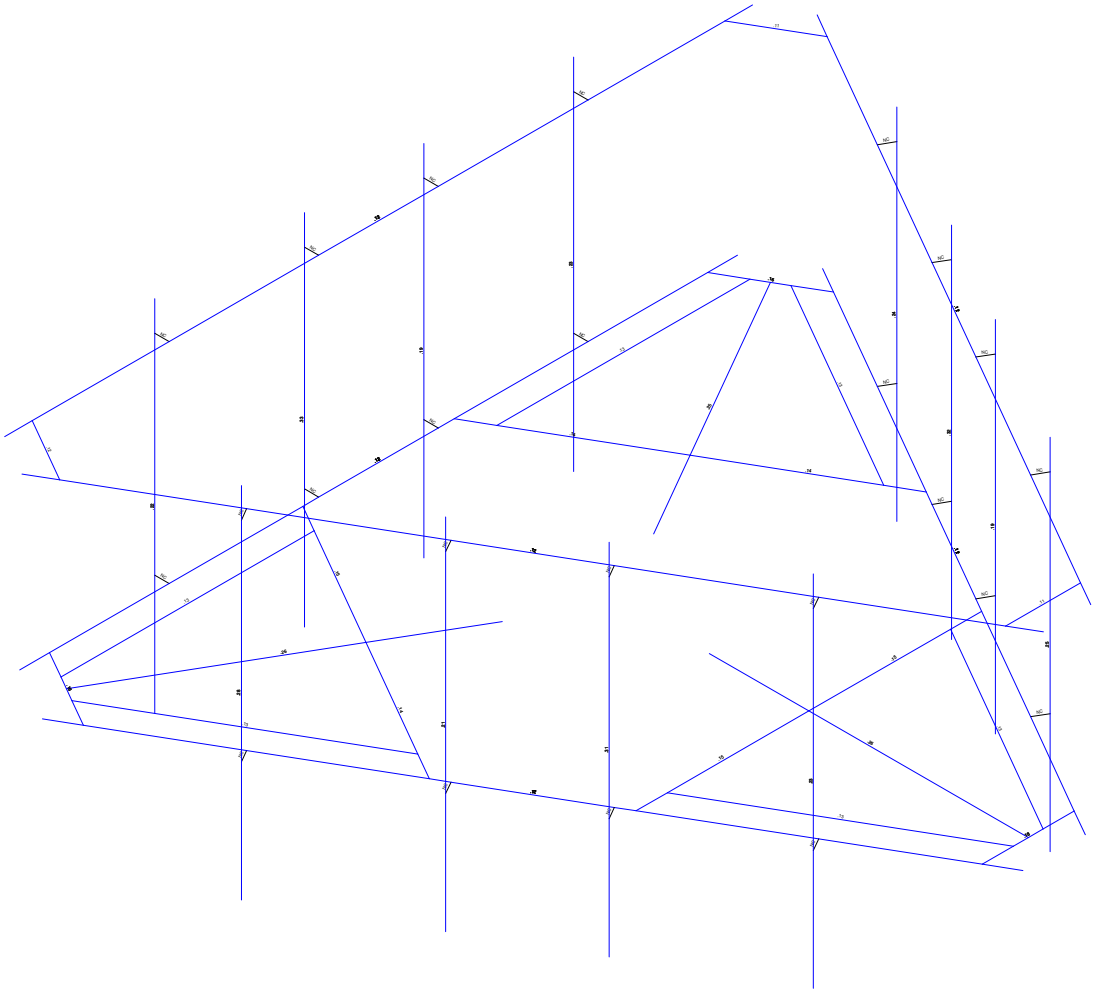
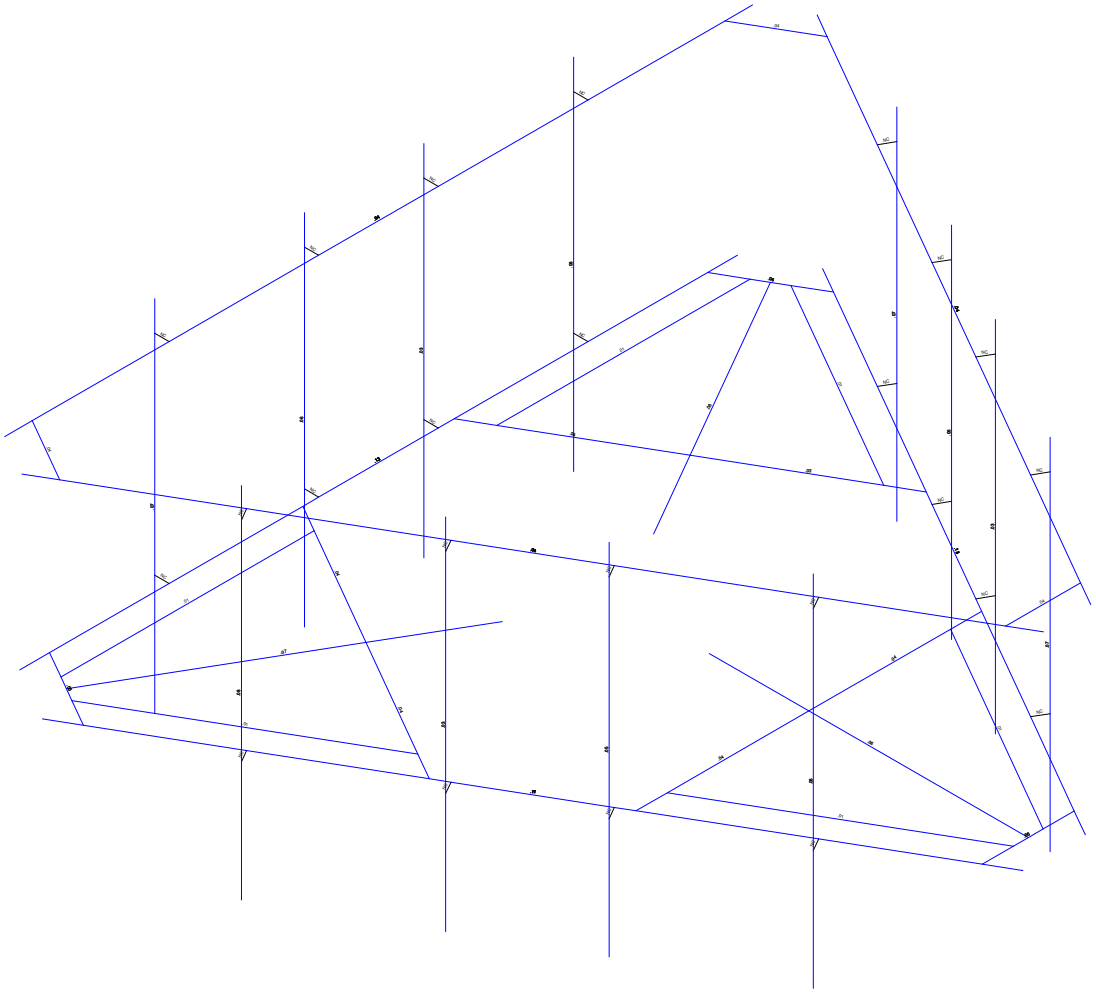
ERCC0303 - 876369		Platform_12FT_H.R3D



Member Code Checks Displayed (Enveloped)
Loads: BLC 13, 1.2D+1.6L+0.5S
Envelope Only Solution

Jacobs Engineering Group...		Page 3
A. Asghari	Modified Antenna Mount Frame	Oct 23, 2019 at 3:31 PM
ERCC0303 - 876369		Platform_12FT_H.R3D



Member Shear Checks Displayed (Enveloped)
Loads: BLC 13,
Envelope Only Solution

Jacobs Engineering Group...		Page 4
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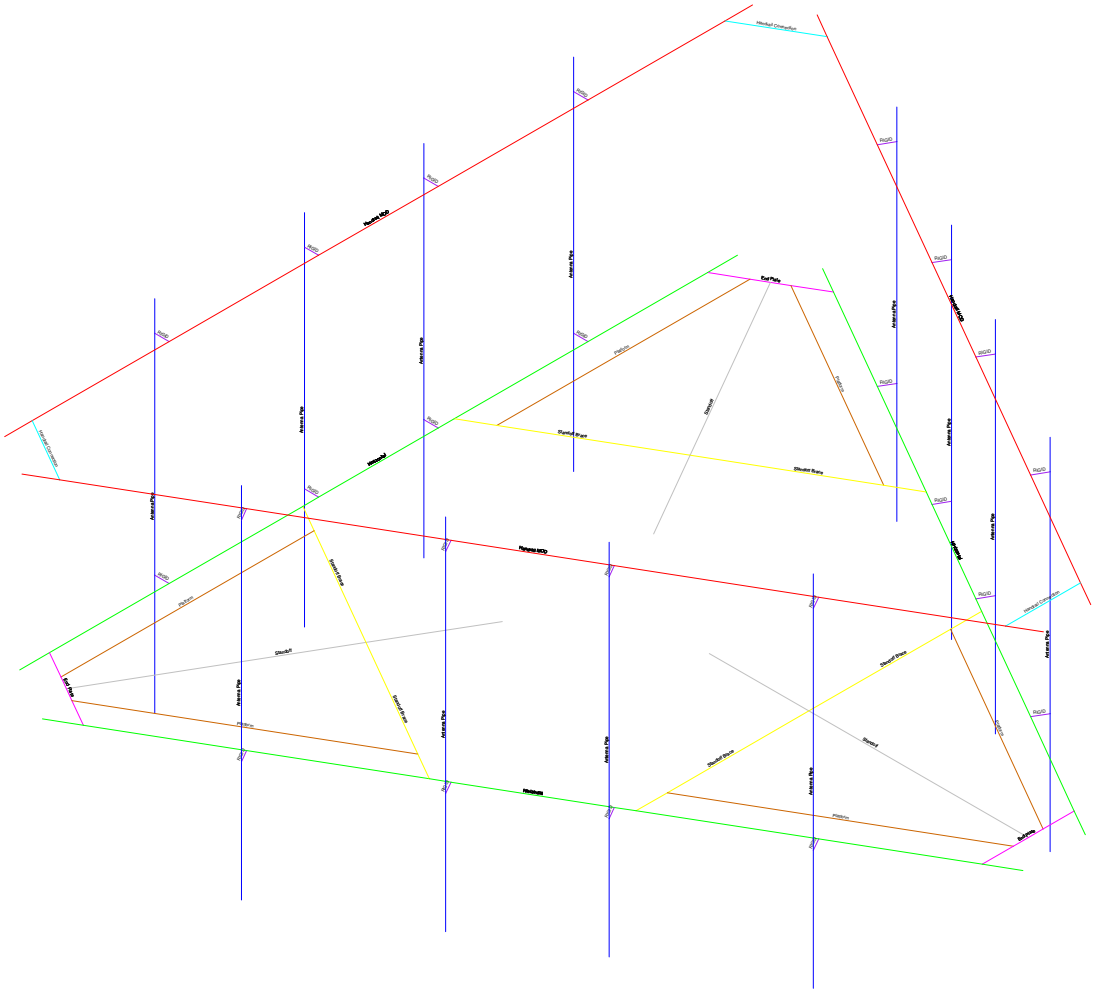
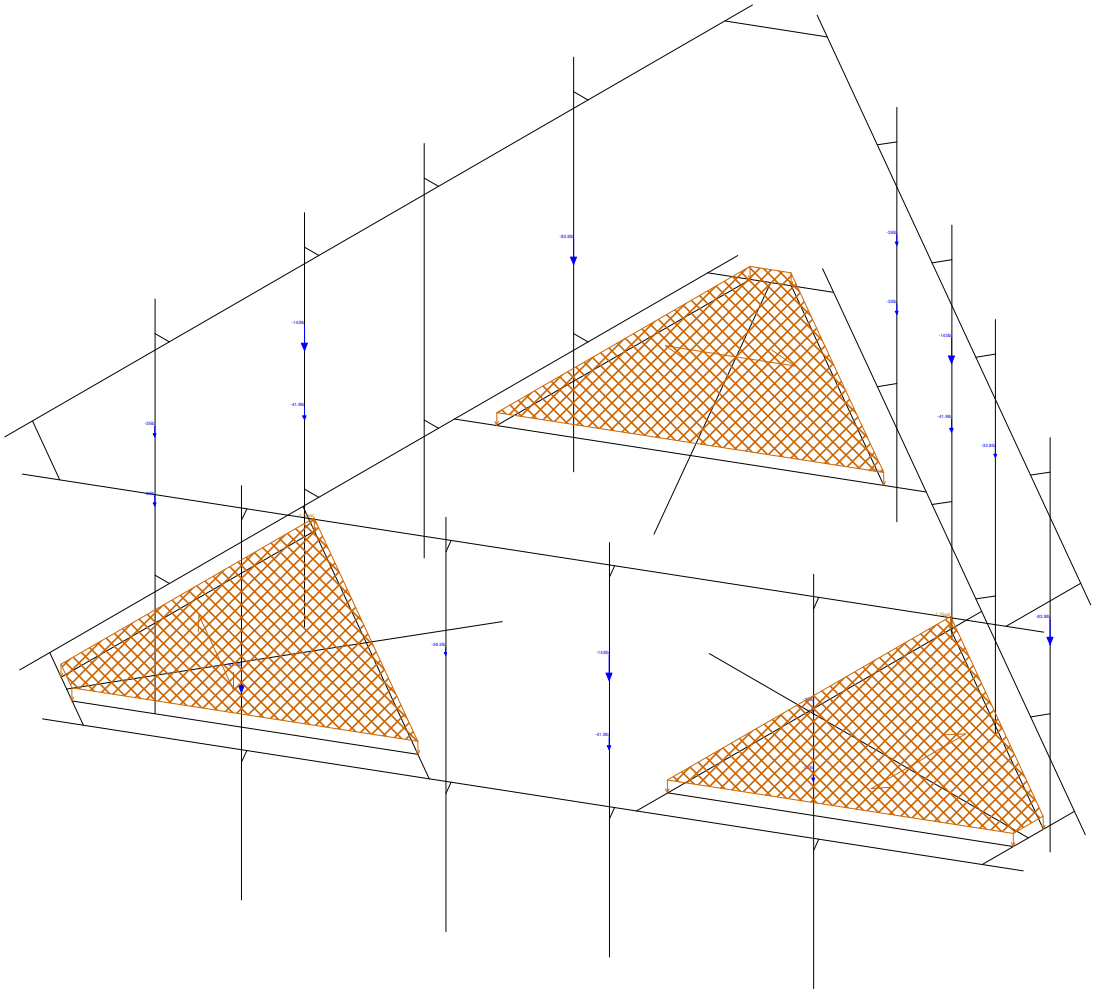


Jacobs Engineering Group...		Page 5
A. Asghari	Modified Antenna Mount Frame	Oct 23, 2019 at 3:31 PM
ERCC0303 - 876369		Platform_12FT_H.R3D



Jacobs Engineering Group...		Page 6
A. Asghari	Modified Antenna Mount Frame	Oct 23, 2019 at 3:31 PM
ERCC0303 - 876369		Platform_12FT_H.R3D

APPENDIX B

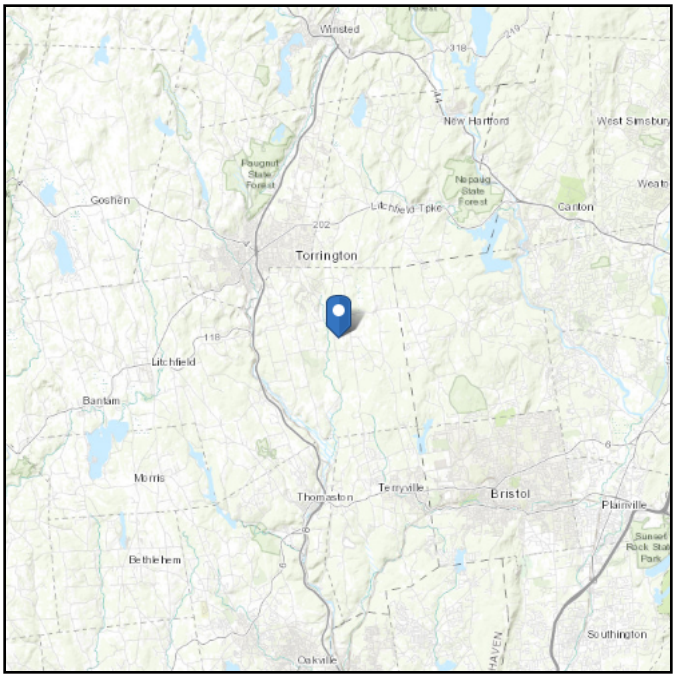
SOFTWARE INPUT CALCULATIONS

ASCE 7 Hazards Report

Address:
64 Hungerford Ln
Harwinton, Connecticut
06791

Standard: ASCE/SEI 7-16
Risk Category: II
Soil Class: D - Default (see Section 11.4.3)

Elevation: 823.72 ft (NAVD 88)
Latitude: 41.760601
Longitude: -73.055207



Wind

Results:

Wind Speed:	115 Vmph
10-year MRI	75 Vmph
25-year MRI	84 Vmph
50-year MRI	89 Vmph
100-year MRI	96 Vmph
Data Source:	ASCE/SEI 7-16, Fig. 26.5-1B and Figs. CC.2-1–CC.2-4
Date Accessed:	Tue Feb 26 2019

Value provided is 3-second gust wind speeds at 33 ft above ground for Exposure C Category, based on linear interpolation between contours. Wind speeds are interpolated in accordance with the 7-16 Standard. Wind speeds correspond to approximately a 7% probability of exceedance in 50 years (annual exceedance probability = 0.00143, MRI = 700 years).

Site is in a hurricane-prone region as defined in ASCE/SEI 7-16 Section 26.2. Glazed openings need not be protected against wind-borne debris.

Mountainous terrain, gorges, ocean promontories, and special wind regions should be examined for unusual wind conditions.

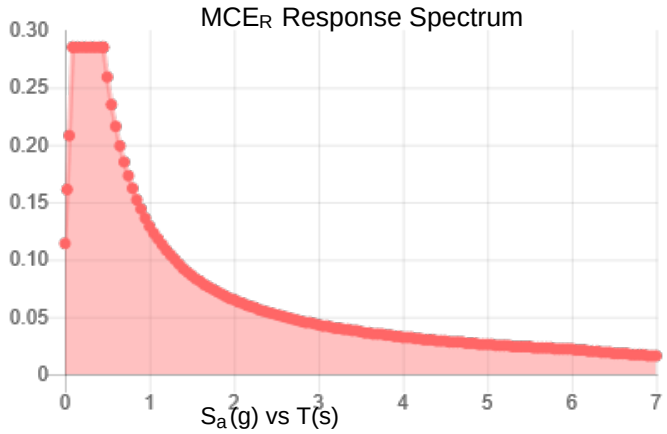
Seismic

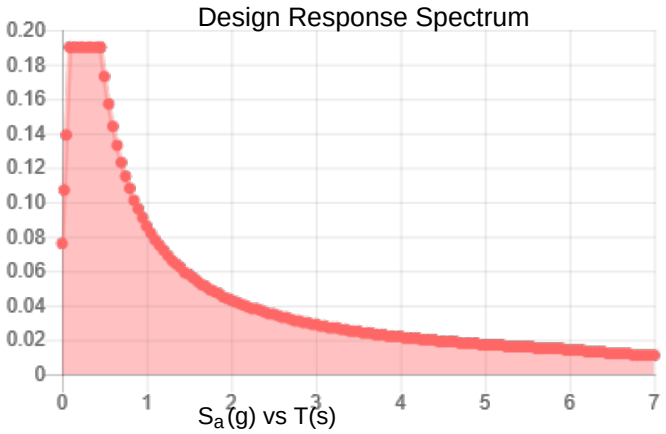
Site Soil Class: D - Default (see Section 11.4.3)

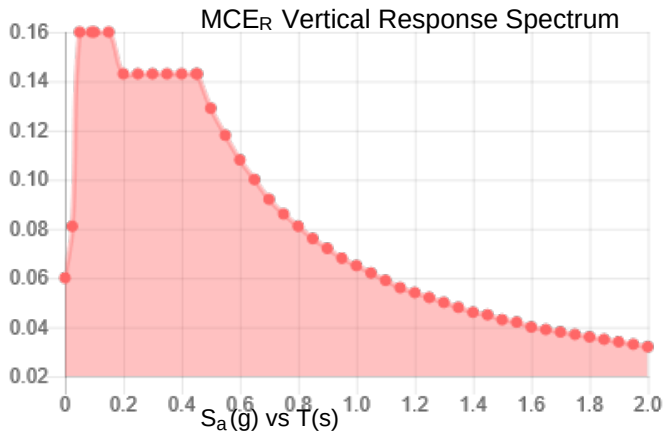
Results:

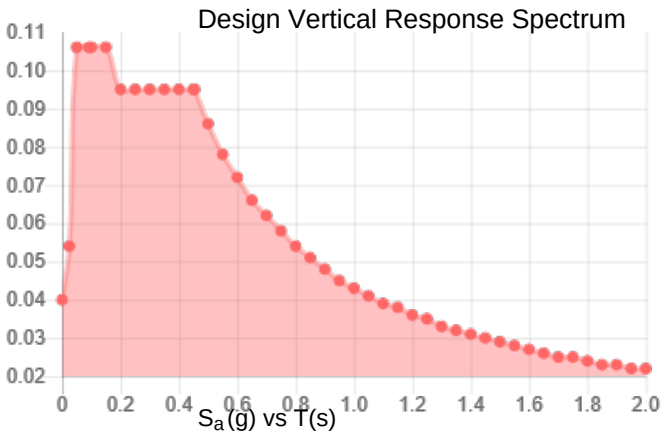
S_S :	0.178	S_{D1} :	0.086
S_1 :	0.054	T_L :	6
F_a :	1.6	PGA :	0.095
F_v :	2.4	PGA_M :	0.152
S_{MS} :	0.285	F_{PGA} :	1.6
S_{M1} :	0.129	I_e :	1
S_{DS} :	0.19	C_v :	0.7

Seismic Design Category B









Data Accessed: Tue Feb 26 2019

Date Source: USGS Seismic Design Maps based on ASCE/SEI 7-16 and ASCE/SEI 7-16 Table 1.5-2. Additional data for site-specific ground motion procedures in accordance with ASCE/SEI 7-16 Ch. 21 are available from USGS.

Ice

Results:

Ice Thickness:	1.00 in.
Concurrent Temperature:	5 F
Gust Speed:	50 mph
Data Source:	Standard ASCE/SEI 7-16, Figs. 10-2 through 10-8
Date Accessed:	Tue Feb 26 2019

Ice thicknesses on structures in exposed locations at elevations higher than the surrounding terrain and in valleys and gorges may exceed the mapped values.

Values provided are equivalent radial ice thicknesses due to freezing rain with concurrent 3-second gust speeds, for a 500-year mean recurrence interval, and temperatures concurrent with ice thicknesses due to freezing rain. Thicknesses for ice accretions caused by other sources shall be obtained from local meteorological studies. Ice thicknesses in exposed locations at elevations higher than the surrounding terrain and in valleys and gorges may exceed the mapped values.

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WIND/ICE/SERVICE LOADING
ANTENNA MOUNTING SYSTEM
ANSI/TIA-222-H

Project Number:	ERCC0303
Site Name:	876369
Engineer:	A. Asghari
Date:	10/23/2019
Carrier:	AT&T
Reviewed By:	B. Bartlett

Input Data

Front

Manufacturer	**POWERWAVE TECHNOLOGIES**		
Model #	**7770**		
Length	55	in	
Width	11	in	
Depth	5	in	
Weight	35	lb	
Design Ice Thickness (t_i)	1	in	
Structure Type	M	(S, G, M, B)	
Structure Height (h)	178	ft	
Antenna Centerline (z)	158	ft	
Basic Wind Speed (V)	115	mph	(w/o ice)
Basic Wind Speed (V_i)	50	mph	(w/ ice)
Basic Wind Speed (V_s)	30	mph	(service)
Risk Category	II	(I, II, III, IV)	
Exposure Category	C	(B, C or D)	
Topographic Category	1	(1, 2, 3 or 4)	
Crest Height (H)	0	ft	
Shape	F	(R / F / S)	
Length / Width	5.000		(w/o ice)
Length / Width	4.299		(w/ ice)
C_a	1.311		(w/o ice)
C_a	1.280		(w/ ice)
C_a	1.311		(service)
$(EPA)_A$	4.958	ft^2	(w/o ice)
$(EPA)_A$	6.119	ft^2	(w/ ice)
$(EPA)_A$	4.958	ft^2	(service)
$F_A = q_z G_h (EPA)_A$	222.208	lb	(w/o ice)
$F_A = q_z G_h (EPA)_A$	51.841	lb	(w/ ice)
$F_A = q_z G_h (EPA)_A$	15.122	lb	(service)
Ice Weight	86.790	lb	
Weight	121.790	lb	(w/ ice)

Equations

$K_z = 2.01[z/z_g]^{(2/\alpha)}$	1.394		$K_{zmin} \le K_z \le 2.01$
$K_h = e^{[(f)(z)/H]}$	1.000		
$K_{zt} = [1+(K_c K_t)/K_h]^2$	1.000		
$K_{iz} = [z/33]^{(0.10)}$	1.170		$K_{iz} \le 1.4$
$t_{iz} = (t_i)(I)(K_{iz})(K_{zt})^{(0.35)}$	1.170	in	(w/ ice)
$C = (K_{zt}K_zK_e)^{0.5}(V)(D)$	124.443		(w/o ice)
$C = (K_{zt}K_zK_e)^{0.5}(V_i)(D)$	54.106		(w/ ice)
$C = (K_{zt}K_zK_e)^{0.5}(V)(D)$	32.464		(service)
$G_h =$	1.00		
$K_d =$	0.95		
$K_s =$	1.00		
$K_a =$	0.90		
$K_e = e^{-0.0000362zs}$	1.00		
$q_z = 0.00256K_zK_{zt}K_sK_eK_dV^2$	44.82	psf	(w/o ice)
$q_z = 0.00256K_zK_{zt}K_eK_dV_i^2$	8.47	psf	(w/ ice)
$q_z = 0.00256K_zK_{zt}K_sK_eK_dV_s^2$	3.05	psf	(service)

Position	1	x	1
		x	
		x	
		x	

Side

Manufacturer	POWERWAVE TECHNOLOGIES		
Model #	7770		
Length	55	in	
Width	11	in	
Depth	5	in	
Weight	35	lb	
Design Ice Thickness (t_i)	1	in	
Structure Type	M	(S, G, M, B)	
Structure Height (h)	178	ft	
Antenna Centerline (z)	158	ft	
Basic Wind Speed (V)	115	mph	(w/o ice)
Basic Wind Speed (V_i)	50	mph	(w/ ice)
Basic Wind Speed (V_s)	30	mph	(service)
Risk Category	II	(I, II, III, IV)	
Exposure Category	C	(B, C or D)	
Topographic Category	1	(1, 2, 3 or 4)	
Crest Height (H)	0	ft	
Shape	F	(R / F / S)	
Length / Width	11.000		(w/o ice)
Length / Width	7.813		(w/ ice)
C_a	1.533		(w/o ice)
C_a	1.427		(w/ ice)
C_a	1.533		(service)
$(EPA)_A$	2.635	ft^2	(w/o ice)
$(EPA)_A$	3.753	ft^2	(w/ ice)
$(EPA)_A$	2.635	ft^2	(service)
$F_A = q_z G_h (EPA)_A$	118.123	lb	(w/o ice)
$F_A = q_z G_h (EPA)_A$	31.802	lb	(w/ ice)
$F_A = q_z G_h (EPA)_A$	8.039	lb	(service)
Ice Weight	86.790	lb	
Weight	121.790	lb	(w/ ice)

Equations

$K_z = 2.01[z/z_g]^{(2/\alpha)}$	1.394		$K_{zmin} \le K_z \le 2.01$
$K_h = e^{[(f)(z)/H]}$	1.000		
$K_{zt} = [1+(K_c K_t)/K_h]^2$	1.000		
$K_{iz} = [z/33]^{(0.10)}$	1.170		$K_{iz} \le 1.4$
$t_{iz} = (t_i)(I)(K_{iz})(K_{zt})^{(0.35)}$	1.170	in	(w/ ice)
$C = (K_{zt}K_zK_e)^{0.5}(V)(D)$	56.565		(w/o ice)
$C = (K_{zt}K_zK_e)^{0.5}(V_i)(D)$	24.594		(w/ ice)
$C = (K_{zt}K_zK_e)^{0.5}(V)(D)$	14.756		(service)
$G_h =$	1.00		
$K_d =$	0.95		
$K_s =$	1.00		
$K_a =$	0.90		
$K_e = e^{-0.0000362zs}$	1.00		
$q_z = 0.00256K_zK_{zt}K_sK_eK_dV^2$	44.821	psf	(w/o ice)
$q_z = 0.00256K_zK_{zt}K_eK_dV_i^2$	8.473	psf	(w/ ice)
$q_z = 0.00256K_zK_{zt}K_sK_eK_dV_s^2$	3.050	psf	(service)

Position	1	x	1
		x	
		x	
		x	

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WIND/ICE/SERVICE LOADING
ANTENNA MOUNTING SYSTEM
ANSI/TIA-222-H

Project Number:	ERCC0303
Site Name:	876369
Engineer:	A. Asghari
Date:	10/23/2019
Carrier:	AT&T
Reviewed By:	B. Bartlett

Input Data

Front

Manufacturer	**CCI ANTENNAS**		
Model #	**HPA65R-BU6A**		
Length	71.1	in	
Width	11.7	in	
Depth	7.6	in	
Weight	41.9	lb	
Design Ice Thickness (t_i)	1	in	
Structure Type	M	(S, G, M, B)	
Structure Height (h)	178	ft	
Antenna Centerline (z)	158	ft	
Basic Wind Speed (V)	115	mph	(w/o ice)
Basic Wind Speed (V_i)	50	mph	(w/ ice)
Basic Wind Speed (V_s)	30	mph	(service)
Risk Category	II	(I, II, III, IV)	
Exposure Category	C	(B, C or D)	
Topographic Category	1	(1, 2, 3 or 4)	
Crest Height (H)	0	ft	
Shape	F	(R / F / S)	
Length / Width	6.077		(w/o ice)
Length / Width	5.231		(w/ ice)
C_a	1.359		(w/o ice)
C_a	1.321		(w/ ice)
C_a	1.359		(service)
$(EPA)_A$	7.066	ft^2	(w/o ice)
$(EPA)_A$	8.515	ft^2	(w/ ice)
$(EPA)_A$	7.066	ft^2	(service)
$F_A = q_z G_h (EPA)_A$	316.688	lb	(w/o ice)
$F_A = q_z G_h (EPA)_A$	72.144	lb	(w/ ice)
$F_A = q_z G_h (EPA)_A$	21.552	lb	(service)
Ice Weight	128.016	lb	
Weight	169.916	lb	(w/ ice)

Equations

$K_z = 2.01[z/z_g]^{(2/\alpha)}$	1.394		$K_{zmin} \le K_z \le 2.01$
$K_h = e^{[(f)(z)/H]}$	1.000		
$K_{zt} = [1+(K_c K_t)/K_h]^2$	1.000		
$K_{iz} = [z/33]^{(0.10)}$	1.170		$K_{iz} \le 1.4$
$t_{iz} = (t_i)(I)(K_{iz})(K_{zt})^{(0.35)}$	1.170	in	(w/ ice)
$C = (K_{zt}K_zK_e)^{0.5}(V)(D)$	132.363		(w/o ice)
$C = (K_{zt}K_zK_e)^{0.5}(V_i)(D)$	57.549		(w/ ice)
$C = (K_{zt}K_zK_e)^{0.5}(V)(D)$	34.529		(service)
G_h =	1.00		
K_d =	0.95		
K_s =	1.00		
K_a =	0.90		
$K_e = e^{-0.0000362zs}$	1.00		
$q_z = 0.00256K_zK_{zt}K_sK_eK_dV^2$	44.82	psf	(w/o ice)
$q_z = 0.00256K_zK_{zt}K_eK_dV_i^2$	8.47	psf	(w/ ice)
$q_z = 0.00256K_zK_{zt}K_sK_eK_dV_s^2$	3.05	psf	(service)

Position	2	x	1
		x	
		x	
		x	

Side

Manufacturer	CCI ANTENNAS		
Model #	HPA65R-BU6A		
Length	71.1	in	
Width	11.7	in	
Depth	7.6	in	
Weight	41.9	lb	
Design Ice Thickness (t_i)	1	in	
Structure Type	M	(S, G, M, B)	
Structure Height (h)	178	ft	
Antenna Centerline (z)	158	ft	
Basic Wind Speed (V)	115	mph	(w/o ice)
Basic Wind Speed (V_i)	50	mph	(w/ ice)
Basic Wind Speed (V_s)	30	mph	(service)
Risk Category	II	(I, II, III, IV)	
Exposure Category	C	(B, C or D)	
Topographic Category	1	(1, 2, 3 or 4)	
Crest Height (H)	0	ft	
Shape	F	(R / F / S)	
Length / Width	9.355		(w/o ice)
Length / Width	7.389		(w/ ice)
C_a	1.479		(w/o ice)
C_a	1.413		(w/ ice)
C_a	1.479		(service)
$(EPA)_A$	4.993	ft^2	(w/o ice)
$(EPA)_A$	6.446	ft^2	(w/ ice)
$(EPA)_A$	4.993	ft^2	(service)
$F_A = q_z G_h (EPA)_A$	223.806	lb	(w/o ice)
$F_A = q_z G_h (EPA)_A$	54.615	lb	(w/ ice)
$F_A = q_z G_h (EPA)_A$	15.231	lb	(service)
Ice Weight	128.016	lb	
Weight	169.916	lb	(w/ ice)

Equations

$K_z = 2.01[z/z_g]^{(2/\alpha)}$	1.394		$K_{zmin} \le K_z \le 2.01$
$K_h = e^{[(f)(z)/H]}$	1.000		
$K_{zt} = [1+(K_c K_t)/K_h]^2$	1.000		
$K_{iz} = [z/33]^{(0.10)}$	1.170		$K_{iz} \le 1.4$
$t_{iz} = (t_i)(I)(K_{iz})(K_{zt})^{(0.35)}$	1.170	in	(w/ ice)
$C = (K_{zt}K_zK_e)^{0.5}(V)(D)$	85.979		(w/o ice)
$C = (K_{zt}K_zK_e)^{0.5}(V_i)(D)$	37.382		(w/ ice)
$C = (K_{zt}K_zK_e)^{0.5}(V)(D)$	22.429		(service)
G_h =	1.00		
K_d =	0.95		
K_s =	1.00		
K_a =	0.90		
$K_e = e^{-0.0000362zs}$	1.00		
$q_z = 0.00256K_zK_{zt}K_sK_eK_dV^2$	44.821	psf	(w/o ice)
$q_z = 0.00256K_zK_{zt}K_eK_dV_i^2$	8.473	psf	(w/ ice)
$q_z = 0.00256K_zK_{zt}K_sK_eK_dV_s^2$	3.050	psf	(service)

Position	2	x	1
		x	
		x	
		x	

JACOBS™

WIND/ICE/SERVICE LOADING
ANTENNA MOUNTING SYSTEM
ANSI/TIA-222-H

Project Number:	ERCC0303
Site Name:	876369
Engineer:	A. Asghari
Date:	10/23/2019
Carrier:	AT&T
Reviewed By:	B. Bartlett

Input Data

Front

Manufacturer	**KATHREIN**		
Model #	**80010964**		
Length	59	in	
Width	20	in	
Depth	6.9	in	
Weight	83.8	lb	
Design Ice Thickness (t_i)	1	in	
Structure Type	M	(S, G, M, B)	
Structure Height (h)	178	ft	
Antenna Centerline (z)	158	ft	
Basic Wind Speed (V)	115	mph	(w/o ice)
Basic Wind Speed (V_i)	50	mph	(w/ ice)
Basic Wind Speed (V_s)	30	mph	(service)
Risk Category	II	(I, II, III, IV)	
Exposure Category	C	(B, C or D)	
Topographic Category	1	(1, 2, 3 or 4)	
Crest Height (H)	0	ft	
Shape	F	(R / F / S)	
Length / Width	2.950		(w/o ice)
Length / Width	2.746		(w/ ice)
C_a	1.220		(w/o ice)
C_a	1.211		(w/ ice)
C_a	1.220		(service)
$(EPA)_A$	8.998	ft^2	(w/o ice)
$(EPA)_A$	10.371	ft^2	(w/ ice)
$(EPA)_A$	8.998	ft^2	(service)
$F_A = q_z G_h (EPA)_A$	403.280	lb	(w/o ice)
$F_A = q_z G_h (EPA)_A$	87.868	lb	(w/ ice)
$F_A = q_z G_h (EPA)_A$	27.444	lb	(service)
Ice Weight	156.848	lb	
Weight	240.648	lb	(w/ ice)

Equations

$K_z = 2.01[z/z_g]^{(2/\alpha)}$	1.394		$K_{zmin} \le K_z \le 2.01$
$K_h = e^{[(f)(z)/H]}$	1.000		
$K_{zt} = [1+(K_c K_t)/K_h]^2$	1.000		
$K_{iz} = [z/33]^{(0.10)}$	1.170		$K_{iz} \le 1.4$
$t_{iz} = (t_i)(I)(K_{iz})(K_{zt})^{(0.35)}$	1.170	in	(w/ ice)
$C = (K_{zt}K_zK_e)^{0.5}(V)(D)$	226.261		(w/o ice)
$C = (K_{zt}K_zK_e)^{0.5}(V_i)(D)$	98.374		(w/ ice)
$C = (K_{zt}K_zK_e)^{0.5}(V)(D)$	59.025		(service)
$G_h =$	1.00		
$K_d =$	0.95		
$K_s =$	1.00		
$K_a =$	0.90		
$K_e = e^{-0.0000362zs}$	1.00		
$q_z = 0.00256K_zK_{zt}K_sK_eK_dV^2$	44.82	psf	(w/o ice)
$q_z = 0.00256K_zK_{zt}K_eK_dV_i^2$	8.47	psf	(w/ ice)
$q_z = 0.00256K_zK_{zt}K_sK_eK_dV_s^2$	3.05	psf	(service)

Position	4	x	1
		x	
		x	
		x	

Side

Manufacturer	KATHREIN		
Model #	80010964		
Length	59	in	
Width	20	in	
Depth	6.9	in	
Weight	83.8	lb	
Design Ice Thickness (t_i)	1	in	
Structure Type	M	(S, G, M, B)	
Structure Height (h)	178	ft	
Antenna Centerline (z)	158	ft	
Basic Wind Speed (V)	115	mph	(w/o ice)
Basic Wind Speed (V_i)	50	mph	(w/ ice)
Basic Wind Speed (V_s)	30	mph	(service)
Risk Category	II	(I, II, III, IV)	
Exposure Category	C	(B, C or D)	
Topographic Category	1	(1, 2, 3 or 4)	
Crest Height (H)	0	ft	
Shape	F	(R / F / S)	
Length / Width	8.551		(w/o ice)
Length / Width	6.639		(w/ ice)
C_a	1.452		(w/o ice)
C_a	1.384		(w/ ice)
C_a	1.452		(service)
$(EPA)_A$	3.694	ft^2	(w/o ice)
$(EPA)_A$	4.902	ft^2	(w/ ice)
$(EPA)_A$	3.694	ft^2	(service)
$F_A = q_z G_h (EPA)_A$	165.554	lb	(w/o ice)
$F_A = q_z G_h (EPA)_A$	41.533	lb	(w/ ice)
$F_A = q_z G_h (EPA)_A$	11.266	lb	(service)
Ice Weight	156.848	lb	
Weight	240.648	lb	(w/ ice)

Equations

$K_z = 2.01[z/z_g]^{(2/\alpha)}$	1.394		$K_{zmin} \le K_z \le 2.01$
$K_h = e^{[(f)(z)/H]}$	1.000		
$K_{zt} = [1+(K_c K_t)/K_h]^2$	1.000		
$K_{iz} = [z/33]^{(0.10)}$	1.170		$K_{iz} \le 1.4$
$t_{iz} = (t_i)(I)(K_{iz})(K_{zt})^{(0.35)}$	1.170	in	(w/ ice)
$C = (K_{zt}K_zK_e)^{0.5}(V)(D)$	78.060		(w/o ice)
$C = (K_{zt}K_zK_e)^{0.5}(V_i)(D)$	33.939		(w/ ice)
$C = (K_{zt}K_zK_e)^{0.5}(V)(D)$	20.363		(service)
$G_h =$	1.00		
$K_d =$	0.95		
$K_s =$	1.00		
$K_a =$	0.90		
$K_e = e^{-0.0000362zs}$	1.00		
$q_z = 0.00256K_zK_{zt}K_sK_eK_dV^2$	44.821	psf	(w/o ice)
$q_z = 0.00256K_zK_{zt}K_eK_dV_i^2$	8.473	psf	(w/ ice)
$q_z = 0.00256K_zK_{zt}K_sK_eK_dV_s^2$	3.050	psf	(service)

Position	4	x	1
		x	
		x	
		x	

JACOBS™

WIND/ICE/SERVICE LOADING
ANTENNA MOUNTING SYSTEM
ANSI/TIA-222-H

Project Number:	ERCC0303
Site Name:	876369
Engineer:	A. Asghari
Date:	10/23/2019
Carrier:	AT&T
Reviewed By:	B. Bartlett

Input Data

Front

Manufacturer	**RAYCAP**		
Model #	**DC6-48-60-18-8F**		
Length	31.25	in	
Width	11	in	
Depth	11	in	
Weight	32.8	lb	
Design Ice Thickness (t_i)	1	in	
Structure Type	M	(S, G, M, B)	
Structure Height (h)	178	ft	
Antenna Centerline (z)	158	ft	
Basic Wind Speed (V)	115	mph	(w/o ice)
Basic Wind Speed (V_i)	50	mph	(w/ ice)
Basic Wind Speed (V_s)	30	mph	(service)
Risk Category	II	(I, II, III, IV)	
Exposure Category	C	(B, C or D)	
Topographic Category	1	(1, 2, 3 or 4)	
Crest Height (H)	0	ft	
Shape	R	(R / F / S)	
Length / Width	2.841		(w/o ice)
Length / Width	2.518		(w/ ice)
C_a	0.508		(w/o ice)
C_a	0.700		(w/ ice)
C_a	0.708		(service)
$(EPA)_A$	1.090	ft^2	(w/o ice)
$(EPA)_A$	1.961	ft^2	(w/ ice)
$(EPA)_A$	1.520	ft^2	(service)
$F_A = q_z G_h (EPA)_A$	48.877	lb	(w/o ice)
$F_A = q_z G_h (EPA)_A$	16.618	lb	(w/ ice)
$F_A = q_z G_h (EPA)_A$	4.637	lb	(service)
Ice Weight	62.237	lb	
Weight	95.037	lb	(w/ ice)

Equations

$K_z = 2.01[z/z_g]^{(2/\alpha)}$	1.394		$K_{zmin} \le K_z \le 2.01$
$K_h = e^{[(f)(z)/H]}$	1.000		
$K_{zt} = [1+(K_c K_t)/K_h]^2$	1.000		
$K_{iz} = [z/33]^{(0.10)}$	1.170		$K_{iz} \le 1.4$
$t_{iz} = (t_i)(I)(K_{iz})(K_{zt})^{(0.35)}$	1.170	in	(w/ ice)
$C = (K_{zt}K_zK_e)^{0.5}(V)(D)$	124.443		(w/o ice)
$C = (K_{zt}K_zK_e)^{0.5}(V_i)(D)$	54.106		(w/ ice)
$C = (K_{zt}K_zK_e)^{0.5}(V)(D)$	32.464		(service)
G_h =	1.00		
K_d =	0.95		
K_s =	1.00		
K_a =	0.90		
$K_e = e^{-0.0000362zs}$	1.00		
$q_z = 0.00256K_zK_{zt}K_sK_eK_dV^2$	44.82	psf	(w/o ice)
$q_z = 0.00256K_zK_{zt}K_eK_dV_i^2$	8.47	psf	(w/ ice)
$q_z = 0.00256K_zK_{zt}K_sK_eK_dV_s^2$	3.05	psf	(service)

Position	6	x	1
		x	
		x	
		x	

Side

Manufacturer	RAYCAP		
Model #	DC6-48-60-18-8F		
Length	31.25	in	
Width	11	in	
Depth	11	in	
Weight	32.8	lb	
Design Ice Thickness (t_i)	1	in	
Structure Type	M	(S, G, M, B)	
Structure Height (h)	178	ft	
Antenna Centerline (z)	158	ft	
Basic Wind Speed (V)	115	mph	(w/o ice)
Basic Wind Speed (V_i)	50	mph	(w/ ice)
Basic Wind Speed (V_s)	30	mph	(service)
Risk Category	II	(I, II, III, IV)	
Exposure Category	C	(B, C or D)	
Topographic Category	1	(1, 2, 3 or 4)	
Crest Height (H)	0	ft	
Shape	R	(R / F / S)	
Length / Width	2.841		(w/o ice)
Length / Width	2.518		(w/ ice)
C_a	0.508		(w/o ice)
C_a	0.700		(w/ ice)
C_a	0.708		(service)
$(EPA)_A$	1.090	ft^2	(w/o ice)
$(EPA)_A$	1.961	ft^2	(w/ ice)
$(EPA)_A$	1.520	ft^2	(service)
$F_A = q_z G_h (EPA)_A$	48.877	lb	(w/o ice)
$F_A = q_z G_h (EPA)_A$	16.618	lb	(w/ ice)
$F_A = q_z G_h (EPA)_A$	4.637	lb	(service)
Ice Weight	62.237	lb	
Weight	95.037	lb	(w/ ice)

Equations

$K_z = 2.01[z/z_g]^{(2/\alpha)}$	1.394		$K_{zmin} \le K_z \le 2.01$
$K_h = e^{[(f)(z)/H]}$	1.000		
$K_{zt} = [1+(K_c K_t)/K_h]^2$	1.000		
$K_{iz} = [z/33]^{(0.10)}$	1.170		$K_{iz} \le 1.4$
$t_{iz} = (t_i)(I)(K_{iz})(K_{zt})^{(0.35)}$	1.170	in	(w/ ice)
$C = (K_{zt}K_zK_e)^{0.5}(V)(D)$	124.443		(w/o ice)
$C = (K_{zt}K_zK_e)^{0.5}(V_i)(D)$	54.106		(w/ ice)
$C = (K_{zt}K_zK_e)^{0.5}(V)(D)$	32.464		(service)
G_h =	1.00		
K_d =	0.95		
K_s =	1.00		
K_a =	0.90		
$K_e = e^{-0.0000362zs}$	1.00		
$q_z = 0.00256K_zK_{zt}K_sK_eK_dV^2$	44.821	psf	(w/o ice)
$q_z = 0.00256K_zK_{zt}K_eK_dV_i^2$	8.473	psf	(w/ ice)
$q_z = 0.00256K_zK_{zt}K_sK_eK_dV_s^2$	3.050	psf	(service)

Position	6	x	1
		x	
		x	
		x	

JACOBS™

WIND/ICE/SERVICE LOADING
ANTENNA MOUNTING SYSTEM
ANSI/TIA-222-H

Project Number:	ERCC0303
Site Name:	876369
Engineer:	A. Asghari
Date:	10/23/2019
Carrier:	AT&T
Reviewed By:	B. Bartlett

Input Data

Front

Manufacturer	**ERICSSON**		
Model #	**RRUS 4449 B5/B12**		
Length	17.9	in	
Width	13.19	in	
Depth	9.44	in	
Weight	71	lb	
Design Ice Thickness (t_i)	1	in	
Structure Type	M	(S, G, M, B)	
Structure Height (h)	178	ft	
Antenna Centerline (z)	158	ft	
Basic Wind Speed (V)	115	mph	(w/o ice)
Basic Wind Speed (V_i)	50	mph	(w/ ice)
Basic Wind Speed (V_s)	30	mph	(service)
Risk Category	II	(I, II, III, IV)	
Exposure Category	C	(B, C or D)	
Topographic Category	1	(1, 2, 3 or 4)	
Crest Height (H)	0	ft	
Shape	F	(R / F / S)	
Length / Width	1.357		(w/o ice)
Length / Width	1.303		(w/ ice)
C_a	1.200		(w/o ice)
C_a	1.200		(w/ ice)
C_a	1.200		(service)
$(EPA)_A$	1.771	ft^2	(w/o ice)
$(EPA)_A$	2.357	ft^2	(w/ ice)
$(EPA)_A$	1.771	ft^2	(service)
$F_A = q_z G_h (EPA)_A$	79.368	lb	(w/o ice)
$F_A = q_z G_h (EPA)_A$	19.972	lb	(w/ ice)
$F_A = q_z G_h (EPA)_A$	5.401	lb	(service)
Ice Weight	37.064	lb	
Weight	108.064	lb	(w/ ice)

Equations

$K_z = 2.01[z/z_g]^{(2/\alpha)}$	1.394		$K_{zmin} \le K_z \le 2.01$
$K_h = e^{[(f)(z)/H]}$	1.000		
$K_{zt} = [1+(K_c K_t)/K_h]^2$	1.000		
$K_{iz} = [z/33]^{(0.10)}$	1.170		$K_{iz} \le 1.4$
$t_{iz} = (t_i)(I)(K_{iz})(K_{zt})^{(0.35)}$	1.170	in	(w/ ice)
$C = (K_{zt}K_zK_e)^{0.5}(V)(D)$	149.219		(w/o ice)
$C = (K_{zt}K_zK_e)^{0.5}(V_i)(D)$	64.878		(w/ ice)
$C = (K_{zt}K_zK_e)^{0.5}(V)(D)$	38.927		(service)
$G_h =$	1.00		
$K_d =$	0.95		
$K_s =$	1.00		
$K_a =$	0.90		
$K_e = e^{-0.0000362zs}$	1.00		
$q_z = 0.00256K_zK_{zt}K_sK_eK_dV^2$	44.82	psf	(w/o ice)
$q_z = 0.00256K_zK_{zt}K_eK_dV_i^2$	8.47	psf	(w/ ice)
$q_z = 0.00256K_zK_{zt}K_sK_eK_dV_s^2$	3.05	psf	(service)

Position	1	x	1
		x	
		x	
		x	

Side

Manufacturer	ERICSSON		
Model #	RRUS 4449 B5/B12		
Length	17.9	in	
Width	13.19	in	
Depth	9.44	in	
Weight	71	lb	
Design Ice Thickness (t_i)	1	in	
Structure Type	M	(S, G, M, B)	
Structure Height (h)	178	ft	
Antenna Centerline (z)	158	ft	
Basic Wind Speed (V)	115	mph	(w/o ice)
Basic Wind Speed (V_i)	50	mph	(w/ ice)
Basic Wind Speed (V_s)	30	mph	(service)
Risk Category	II	(I, II, III, IV)	
Exposure Category	C	(B, C or D)	
Topographic Category	1	(1, 2, 3 or 4)	
Crest Height (H)	0	ft	
Shape	F	(R / F / S)	
Length / Width	1.896		(w/o ice)
Length / Width	1.718		(w/ ice)
C_a	1.200		(w/o ice)
C_a	1.200		(w/ ice)
C_a	1.200		(service)
$(EPA)_A$	1.267	ft^2	(w/o ice)
$(EPA)_A$	1.788	ft^2	(w/ ice)
$(EPA)_A$	1.267	ft^2	(service)
$F_A = q_z G_h (EPA)_A$	56.803	lb	(w/o ice)
$F_A = q_z G_h (EPA)_A$	15.149	lb	(w/ ice)
$F_A = q_z G_h (EPA)_A$	3.866	lb	(service)
Ice Weight	37.064	lb	
Weight	108.064	lb	(w/ ice)

Equations

$K_z = 2.01[z/z_g]^{(2/\alpha)}$	1.394		$K_{zmin} \le K_z \le 2.01$
$K_h = e^{[(f)(z)/H]}$	1.000		
$K_{zt} = [1+(K_c K_t)/K_h]^2$	1.000		
$K_{iz} = [z/33]^{(0.10)}$	1.170		$K_{iz} \le 1.4$
$t_{iz} = (t_i)(I)(K_{iz})(K_{zt})^{(0.35)}$	1.170	in	(w/ ice)
$C = (K_{zt}K_zK_e)^{0.5}(V)(D)$	106.795		(w/o ice)
$C = (K_{zt}K_zK_e)^{0.5}(V_i)(D)$	46.433		(w/ ice)
$C = (K_{zt}K_zK_e)^{0.5}(V)(D)$	27.860		(service)
$G_h =$	1.00		
$K_d =$	0.95		
$K_s =$	1.00		
$K_a =$	0.90		
$K_e = e^{-0.0000362zs}$	1.00		
$q_z = 0.00256K_zK_{zt}K_sK_eK_dV^2$	44.821	psf	(w/o ice)
$q_z = 0.00256K_zK_{zt}K_eK_dV_i^2$	8.473	psf	(w/ ice)
$q_z = 0.00256K_zK_{zt}K_sK_eK_dV_s^2$	3.050	psf	(service)

Position	1	x	1
		x	
		x	
		x	

JACOBS™

WIND/ICE/SERVICE LOADING
ANTENNA MOUNTING SYSTEM
ANSI/TIA-222-H

Project Number:	ERCC0303
Site Name:	876369
Engineer:	A. Asghari
Date:	10/23/2019
Carrier:	AT&T
Reviewed By:	B. Bartlett

Input Data

Front

Manufacturer	**ERICSSON**		
Model #	**RRUS 8843 B2/B66A**		
Length	14.9	in	
Width	13.2	in	
Depth	10.9	in	
Weight	72	lb	
Design Ice Thickness (t_i)	1	in	
Structure Type	M	(S, G, M, B)	
Structure Height (h)	178	ft	
Antenna Centerline (z)	158	ft	
Basic Wind Speed (V)	115	mph	(w/o ice)
Basic Wind Speed (V_i)	50	mph	(w/ ice)
Basic Wind Speed (V_s)	30	mph	(service)
Risk Category	II	(I, II, III, IV)	
Exposure Category	C	(B, C or D)	
Topographic Category	1	(1, 2, 3 or 4)	
Crest Height (H)	0	ft	
Shape	F	(R / F / S)	
Length / Width	1.129		(w/o ice)
Length / Width	1.109		(w/ ice)
C_a	1.200		(w/o ice)
C_a	1.200		(w/ ice)
C_a	1.200		(service)
$(EPA)_A$	1.475	ft^2	(w/o ice)
$(EPA)_A$	2.009	ft^2	(w/ ice)
$(EPA)_A$	1.475	ft^2	(service)
$F_A = q_z G_h (EPA)_A$	66.116	lb	(w/o ice)
$F_A = q_z G_h (EPA)_A$	17.023	lb	(w/ ice)
$F_A = q_z G_h (EPA)_A$	4.499	lb	(service)
Ice Weight	32.446	lb	
Weight	104.446	lb	(w/ ice)

Equations

$K_z = 2.01[z/z_g]^{(2/\alpha)}$	1.394		$K_{zmin} \le K_z \le 2.01$
$K_h = e^{[(f)(z)/H]}$	1.000		
$K_{zt} = [1+(K_c K_t)/K_h]^2$	1.000		
$K_{iz} = [z/33]^{(0.10)}$	1.170		$K_{iz} \le 1.4$
$t_{iz} = (t_i)(I)(K_{iz})(K_{zt})^{(0.35)}$	1.170	in	(w/ ice)
$C = (K_{zt}K_zK_e)^{0.5}(V)(D)$	149.332		(w/o ice)
$C = (K_{zt}K_zK_e)^{0.5}(V_i)(D)$	64.927		(w/ ice)
$C = (K_{zt}K_zK_e)^{0.5}(V)(D)$	38.956		(service)
$G_h =$	1.00		
$K_d =$	0.95		
$K_s =$	1.00		
$K_a =$	0.90		
$K_e = e^{-0.0000362zs}$	1.00		
$q_z = 0.00256K_zK_{zt}K_sK_eK_dV^2$	44.82	psf	(w/o ice)
$q_z = 0.00256K_zK_{zt}K_eK_dV_i^2$	8.47	psf	(w/ ice)
$q_z = 0.00256K_zK_{zt}K_sK_eK_dV_s^2$	3.05	psf	(service)

Position	1	x	1
		x	
		x	
		x	

Side

Manufacturer	ERICSSON		
Model #	RRUS 8843 B2/B66A		
Length	14.9	in	
Width	13.2	in	
Depth	10.9	in	
Weight	72	lb	
Design Ice Thickness (t_i)	1	in	
Structure Type	M	(S, G, M, B)	
Structure Height (h)	178	ft	
Antenna Centerline (z)	158	ft	
Basic Wind Speed (V)	115	mph	(w/o ice)
Basic Wind Speed (V_i)	50	mph	(w/ ice)
Basic Wind Speed (V_s)	30	mph	(service)
Risk Category	II	(I, II, III, IV)	
Exposure Category	C	(B, C or D)	
Topographic Category	1	(1, 2, 3 or 4)	
Crest Height (H)	0	ft	
Shape	F	(R / F / S)	
Length / Width	1.367		(w/o ice)
Length / Width	1.302		(w/ ice)
C_a	1.200		(w/o ice)
C_a	1.200		(w/ ice)
C_a	1.200		(service)
$(EPA)_A$	1.218	ft^2	(w/o ice)
$(EPA)_A$	1.712	ft^2	(w/ ice)
$(EPA)_A$	1.218	ft^2	(service)
$F_A = q_z G_h (EPA)_A$	54.596	lb	(w/o ice)
$F_A = q_z G_h (EPA)_A$	14.503	lb	(w/ ice)
$F_A = q_z G_h (EPA)_A$	3.715	lb	(service)
Ice Weight	32.446	lb	
Weight	104.446	lb	(w/ ice)

Equations

$K_z = 2.01[z/z_g]^{(2/\alpha)}$	1.394		$K_{zmin} \le K_z \le 2.01$
$K_h = e^{[(f)(z)/H]}$	1.000		
$K_{zt} = [1+(K_c K_t)/K_h]^2$	1.000		
$K_{iz} = [z/33]^{(0.10)}$	1.170		$K_{iz} \le 1.4$
$t_{iz} = (t_i)(I)(K_{iz})(K_{zt})^{(0.35)}$	1.170	in	(w/ ice)
$C = (K_{zt}K_zK_e)^{0.5}(V)(D)$	123.312		(w/o ice)
$C = (K_{zt}K_zK_e)^{0.5}(V_i)(D)$	53.614		(w/ ice)
$C = (K_{zt}K_zK_e)^{0.5}(V)(D)$	32.168		(service)
$G_h =$	1.00		
$K_d =$	0.95		
$K_s =$	1.00		
$K_a =$	0.90		
$K_e = e^{-0.0000362zs}$	1.00		
$q_z = 0.00256K_zK_{zt}K_sK_eK_dV^2$	44.821	psf	(w/o ice)
$q_z = 0.00256K_zK_{zt}K_eK_dV_i^2$	8.473	psf	(w/ ice)
$q_z = 0.00256K_zK_{zt}K_sK_eK_dV_s^2$	3.050	psf	(service)

Position	1	x	1
		x	
		x	
		x	

JACOBS™

WIND/ICE/SERVICE LOADING
ANTENNA MOUNTING SYSTEM
ANSI/TIA-222-H

Project Number:	ERCC0303
Site Name:	876369
Engineer:	A. Asghari
Date:	10/23/2019
Carrier:	AT&T
Reviewed By:	B. Bartlett

Input Data

Front

Manufacturer	**LUCENT**		
Model #	**LGP21401**		
Length	14	in	
Width	7	in	
Depth	2.7	in	
Weight	17.5	lb	
Design Ice Thickness (t_i)	1	in	
Structure Type	M	(S, G, M, B)	
Structure Height (h)	178	ft	
Antenna Centerline (z)	158	ft	
Basic Wind Speed (V)	115	mph	(w/o ice)
Basic Wind Speed (V_i)	50	mph	(w/ ice)
Basic Wind Speed (V_s)	30	mph	(service)
Risk Category	II	(I, II, III, IV)	
Exposure Category	C	(B, C or D)	
Topographic Category	1	(1, 2, 3 or 4)	
Crest Height (H)	0	ft	
Shape	F	(R / F / S)	
Length / Width	2.000		(w/o ice)
Length / Width	1.750		(w/ ice)
C_a	1.200		(w/o ice)
C_a	1.200		(w/ ice)
C_a	1.200		(service)
$(EPA)_A$	0.735	ft^2	(w/o ice)
$(EPA)_A$	1.144	ft^2	(w/ ice)
$(EPA)_A$	0.735	ft^2	(service)
$F_A = q_z G_h (EPA)_A$	32.944	lb	(w/o ice)
$F_A = q_z G_h (EPA)_A$	9.697	lb	(w/ ice)
$F_A = q_z G_h (EPA)_A$	2.242	lb	(service)
Ice Weight	14.457	lb	
Weight	31.957	lb	(w/ ice)

Equations

$K_z = 2.01[z/z_g]^{(2/\alpha)}$	1.394		$K_{zmin} \le K_z \le 2.01$
$K_h = e^{[(f)(z)/H]}$	1.000		
$K_{zt} = [1+(K_c K_t)/K_h]^2$	1.000		
$K_{iz} = [z/33]^{(0.10)}$	1.170		$K_{iz} \le 1.4$
$t_{iz} = (t_i)(I)(K_{iz})(K_{zt})^{(0.35)}$	1.170	in	(w/ ice)
$C = (K_{zt}K_zK_e)^{0.5}(V)(D)$	79.191		(w/o ice)
$C = (K_{zt}K_zK_e)^{0.5}(V_i)(D)$	34.431		(w/ ice)
$C = (K_{zt}K_zK_e)^{0.5}(V)(D)$	20.659		(service)
$G_h =$	1.00		
$K_d =$	0.95		
$K_s =$	1.00		
$K_a =$	0.90		
$K_e = e^{-0.0000362zs}$	1.00		
$q_z = 0.00256K_zK_{zt}K_sK_eK_dV^2$	44.82	psf	(w/o ice)
$q_z = 0.00256K_zK_{zt}K_eK_dV_i^2$	8.47	psf	(w/ ice)
$q_z = 0.00256K_zK_{zt}K_sK_eK_dV_s^2$	3.05	psf	(service)

Position	1	x	2
		x	
		x	
		x	

Side

Manufacturer	LUCENT		
Model #	LGP21401		
Length	14	in	
Width	7	in	
Depth	2.7	in	
Weight	17.5	lb	
Design Ice Thickness (t_i)	1	in	
Structure Type	M	(S, G, M, B)	
Structure Height (h)	178	ft	
Antenna Centerline (z)	158	ft	
Basic Wind Speed (V)	115	mph	(w/o ice)
Basic Wind Speed (V_i)	50	mph	(w/ ice)
Basic Wind Speed (V_s)	30	mph	(service)
Risk Category	II	(I, II, III, IV)	
Exposure Category	C	(B, C or D)	
Topographic Category	1	(1, 2, 3 or 4)	
Crest Height (H)	0	ft	
Shape	F	(R / F / S)	
Length / Width	5.185		(w/o ice)
Length / Width	3.242		(w/ ice)
C_a	1.319		(w/o ice)
C_a	1.233		(w/ ice)
C_a	1.319		(service)
$(EPA)_A$	0.312	ft^2	(w/o ice)
$(EPA)_A$	0.634	ft^2	(w/ ice)
$(EPA)_A$	0.312	ft^2	(service)
$F_A = q_z G_h (EPA)_A$	13.971	lb	(w/o ice)
$F_A = q_z G_h (EPA)_A$	5.376	lb	(w/ ice)
$F_A = q_z G_h (EPA)_A$	0.951	lb	(service)
Ice Weight	14.457	lb	
Weight	31.957	lb	(w/ ice)

Equations

$K_z = 2.01[z/z_g]^{(2/\alpha)}$	1.394		$K_{zmin} \le K_z \le 2.01$
$K_h = e^{[(f)(z)/H]}$	1.000		
$K_{zt} = [1+(K_c K_t)/K_h]^2$	1.000		
$K_{iz} = [z/33]^{(0.10)}$	1.170		$K_{iz} \le 1.4$
$t_{iz} = (t_i)(I)(K_{iz})(K_{zt})^{(0.35)}$	1.170	in	(w/ ice)
$C = (K_{zt}K_zK_e)^{0.5}(V)(D)$	30.545		(w/o ice)
$C = (K_{zt}K_zK_e)^{0.5}(V_i)(D)$	13.281		(w/ ice)
$C = (K_{zt}K_zK_e)^{0.5}(V)(D)$	7.968		(service)
$G_h =$	1.00		
$K_d =$	0.95		
$K_s =$	1.00		
$K_a =$	0.90		
$K_e = e^{-0.0000362zs}$	1.00		
$q_z = 0.00256K_zK_{zt}K_sK_eK_dV^2$	44.821	psf	(w/o ice)
$q_z = 0.00256K_zK_{zt}K_eK_dV_i^2$	8.473	psf	(w/ ice)
$q_z = 0.00256K_zK_{zt}K_sK_eK_dV_s^2$	3.050	psf	(service)

Position	1	x	2
		x	
		x	
		x	

JACOBS™

WIND/ICE/SERVICE LOADING
ANTENNA MOUNTING SYSTEM
ANSI/TIA-222-H

Project Number:	ERCC0303
Site Name:	876369
Engineer:	A. Asghari
Date:	10/23/2019
Carrier:	AT&T
Reviewed By:	B. Bartlett

Input Data

Front

Manufacturer	**RAYCAP**		
Model #	**DC6-48-60-18-8C-EV**		
Length	31.4	in	
Width	10.24	in	
Depth	10.24	in	
Weight	26.2	lb	
Design Ice Thickness (t_i)	1	in	
Structure Type	M	(S, G, M, B)	
Structure Height (h)	178	ft	
Antenna Centerline (z)	158	ft	
Basic Wind Speed (V)	115	mph	(w/o ice)
Basic Wind Speed (V_i)	50	mph	(w/ ice)
Basic Wind Speed (V_s)	30	mph	(service)
Risk Category	II	(I, II, III, IV)	
Exposure Category	C	(B, C or D)	
Topographic Category	1	(1, 2, 3 or 4)	
Crest Height (H)	0	ft	
Shape	R	(R / F / S)	
Length / Width	3.066		(w/o ice)
Length / Width	2.682		(w/ ice)
C_a	0.513		(w/o ice)
C_a	0.704		(w/ ice)
C_a	0.713		(service)
$(EPA)_A$	1.030	ft^2	(w/o ice)
$(EPA)_A$	1.868	ft^2	(w/ ice)
$(EPA)_A$	1.432	ft^2	(service)
$F_A = q_z G_h (EPA)_A$	46.170	lb	(w/o ice)
$F_A = q_z G_h (EPA)_A$	15.823	lb	(w/ ice)
$F_A = q_z G_h (EPA)_A$	4.368	lb	(service)
Ice Weight	58.517	lb	
Weight	84.717	lb	(w/ ice)

Equations

$K_z = 2.01[z/z_g]^{(2/\alpha)}$	1.394		$K_{zmin} \le K_z \le 2.01$
$K_h = e^{[(f)(z)/H]}$	1.000		
$K_{zt} = [1+(K_c K_t)/K_h]^2$	1.000		
$K_{iz} = [z/33]^{(0.10)}$	1.170		$K_{iz} \le 1.4$
$t_{iz} = (t_i)(I)(K_{iz})(K_{zt})^{(0.35)}$	1.170	in	(w/ ice)
$C = (K_{zt}K_zK_e)^{0.5}(V)(D)$	115.846		(w/o ice)
$C = (K_{zt}K_zK_e)^{0.5}(V_i)(D)$	50.368		(w/ ice)
$C = (K_{zt}K_zK_e)^{0.5}(V)(D)$	30.221		(service)
G_h =	1.00		
K_d =	0.95		
K_s =	1.00		
K_a =	0.90		
$K_e = e^{-0.0000362zs}$	1.00		
$q_z = 0.00256K_zK_{zt}K_sK_eK_dV^2$	44.82	psf	(w/o ice)
$q_z = 0.00256K_zK_{zt}K_eK_dV_i^2$	8.47	psf	(w/ ice)
$q_z = 0.00256K_zK_{zt}K_sK_eK_dV_s^2$	3.05	psf	(service)

Position	5	x	1
		x	
		x	
		x	

Side

Manufacturer	RAYCAP		
Model #	DC6-48-60-18-8C-EV		
Length	31.4	in	
Width	10.24	in	
Depth	10.24	in	
Weight	26.2	lb	
Design Ice Thickness (t_i)	1	in	
Structure Type	M	(S, G, M, B)	
Structure Height (h)	178	ft	
Antenna Centerline (z)	158	ft	
Basic Wind Speed (V)	115	mph	(w/o ice)
Basic Wind Speed (V_i)	50	mph	(w/ ice)
Basic Wind Speed (V_s)	30	mph	(service)
Risk Category	II	(I, II, III, IV)	
Exposure Category	C	(B, C or D)	
Topographic Category	1	(1, 2, 3 or 4)	
Crest Height (H)	0	ft	
Shape	R	(R / F / S)	
Length / Width	3.066		(w/o ice)
Length / Width	2.682		(w/ ice)
C_a	0.513		(w/o ice)
C_a	0.704		(w/ ice)
C_a	0.713		(service)
$(EPA)_A$	1.030	ft^2	(w/o ice)
$(EPA)_A$	1.868	ft^2	(w/ ice)
$(EPA)_A$	1.432	ft^2	(service)
$F_A = q_z G_h (EPA)_A$	46.170	lb	(w/o ice)
$F_A = q_z G_h (EPA)_A$	15.823	lb	(w/ ice)
$F_A = q_z G_h (EPA)_A$	4.368	lb	(service)
Ice Weight	58.517	lb	
Weight	84.717	lb	(w/ ice)

Equations

$K_z = 2.01[z/z_g]^{(2/\alpha)}$	1.394		$K_{zmin} \le K_z \le 2.01$
$K_h = e^{[(f)(z)/H]}$	1.000		
$K_{zt} = [1+(K_c K_t)/K_h]^2$	1.000		
$K_{iz} = [z/33]^{(0.10)}$	1.170		$K_{iz} \le 1.4$
$t_{iz} = (t_i)(I)(K_{iz})(K_{zt})^{(0.35)}$	1.170	in	(w/ ice)
$C = (K_{zt}K_zK_e)^{0.5}(V)(D)$	115.846		(w/o ice)
$C = (K_{zt}K_zK_e)^{0.5}(V_i)(D)$	50.368		(w/ ice)
$C = (K_{zt}K_zK_e)^{0.5}(V)(D)$	30.221		(service)
G_h =	1.00		
K_d =	0.95		
K_s =	1.00		
K_a =	0.90		
$K_e = e^{-0.0000362zs}$	1.00		
$q_z = 0.00256K_zK_{zt}K_sK_eK_dV^2$	44.821	psf	(w/o ice)
$q_z = 0.00256K_zK_{zt}K_eK_dV_i^2$	8.473	psf	(w/ ice)
$q_z = 0.00256K_zK_{zt}K_sK_eK_dV_s^2$	3.050	psf	(service)

Position	5	x	1
		x	
		x	
		x	

JACOBS™

WIND/ICE/SERVICE LOADING
ANTENNA MOUNTING SYSTEM
ANSI/TIA-222-H

Project Number:	ERCC0303
Site Name:	876369
Engineer:	A. Asghari
Date:	10/23/2019
Carrier:	AT&T
Reviewed By:	B. Bartlett

Input Data

Front

Member	**Antenna Pipe A**		
Size	**Pipe 2.0**		
Length	66	in	
Width	2.38	in	
Depth	2.38	in	
Weight	0	lb/ft	
Design Ice Thickness (t_i)	1	in	
Structure Type	M	(S, G, M, B)	
Structure Height (h)	178	ft	
Antenna Centerline (z)	158	ft	
Basic Wind Speed (V)	115	mph	(w/o ice)
Basic Wind Speed (V_i)	50	mph	(w/ ice)
Basic Wind Speed (V_s)	30	mph	(service)
Risk Category	II	(I, II, III, IV)	
Exposure Category	C	(B, C or D)	
Topographic Category	1	(1, 2, 3 or 4)	
Crest Height (H)	0	ft	
Shape	R	(R / F / S)	
Length / Width	27.731		(w/o ice)
Length / Width	14.481		(w/ ice)
C_a	1.200		(w/o ice)
C_a	0.966		(w/ ice)
C_a	1.200		(service)
$(EPA)_A$	1.178	ft^2	(w/o ice)
$(EPA)_A$	1.948	ft^2	(w/ ice)
$(EPA)_A$	1.178	ft^2	(service)
$F_A = q_z G_h (EPA)_A$	0.800	lb/in	(w/o ice)
$F_A = q_z G_h (EPA)_A$	0.250	lb/in	(w/ ice)
$F_A = q_z G_h (EPA)_A$	0.054	lb/in	(service)
Ice Weight	0.540	lb/in	
Weight	0.540	lb/in	(w/ ice)

Equations

$K_z = 2.01[z/z_g]^{(2/\alpha)}$	1.394		$K_{zmin} \le K_z \le 2.01$
$K_h = e^{[(f)(z)/H]}$	1.000		
$K_{zt} = [1+(K_c K_t)/K_h]^2$	1.000		
$K_{iz} = [z/33]^{(0.10)}$	1.170		$K_{iz} \le 1.4$
$t_{iz} = (t_i)(I)(K_{iz})(K_{zt})^{(0.35)}$	1.170	in	(w/ ice)
$C = (K_{zt}K_zK_e)^{0.5}(V)(D)$	26.925		(w/o ice)
$C = (K_{zt}K_zK_e)^{0.5}(V_i)(D)$	11.707		(w/ ice)
$C = (K_{zt}K_zK_e)^{0.5}(V)(D)$	7.024		(service)
$G_h =$	1.00		
$K_d =$	0.95		
$K_s =$	1.00		
$K_a =$	0.90		
$K_e = e^{-0.0000362zs}$	1.00		
$q_z = 0.00256K_zK_{zt}K_sK_eK_dV^2$	44.82	psf	(w/o ice)
$q_z = 0.00256K_zK_{zt}K_eK_dV_i^2$	8.47	psf	(w/ ice)
$q_z = 0.00256K_zK_{zt}K_sK_eK_dV_s^2$	3.05	psf	(service)
Quantity	12		(18 max)

Side

Member	Antenna Pipe A		
Size	Pipe 2.0		
Length	66	in	
Width	2.38	in	
Depth	2.38	in	
Weight	0	lb/ft	
Design Ice Thickness (t_i)	1	in	
Structure Type	M	(S, G, M, B)	
Structure Height (h)	178	ft	
Antenna Centerline (z)	158	ft	
Basic Wind Speed (V)	115	mph	(w/o ice)
Basic Wind Speed (V_i)	50	mph	(w/ ice)
Basic Wind Speed (V_s)	30	mph	(service)
Risk Category	II	(I, II, III, IV)	
Exposure Category	C	(B, C or D)	
Topographic Category	1	(1, 2, 3 or 4)	
Crest Height (H)	0	ft	
Shape	R	(R / F / S)	
Length / Width	27.731		(w/o ice)
Length / Width	14.481		(w/ ice)
C_a	1.200		(w/o ice)
C_a	0.966		(w/ ice)
C_a	1.200		(service)
$(EPA)_A$	1.178	ft^2	(w/o ice)
$(EPA)_A$	1.948	ft^2	(w/ ice)
$(EPA)_A$	1.178	ft^2	(service)
$F_A = q_z G_h (EPA)_A$	0.800	lb/in	(w/o ice)
$F_A = q_z G_h (EPA)_A$	0.250	lb/in	(w/ ice)
$F_A = q_z G_h (EPA)_A$	0.054	lb/in	(service)
Ice Weight	0.540	lb/in	
Weight	0.540	lb/in	(w/ ice)

Equations

$K_z = 2.01[z/z_g]^{(2/\alpha)}$	1.394		$K_{zmin} \le K_z \le 2.01$
$K_h = e^{[(f)(z)/H]}$	1.000		
$K_{zt} = [1+(K_c K_t)/K_h]^2$	1.000		
$K_{iz} = [z/33]^{(0.10)}$	1.170		$K_{iz} \le 1.4$
$t_{iz} = (t_i)(I)(K_{iz})(K_{zt})^{(0.35)}$	1.170	in	(w/ ice)
$C = (K_{zt}K_zK_e)^{0.5}(V)(D)$	26.925		(w/o ice)
$C = (K_{zt}K_zK_e)^{0.5}(V_i)(D)$	11.707		(w/ ice)
$C = (K_{zt}K_zK_e)^{0.5}(V)(D)$	7.024		(service)
$G_h =$	1.00		
$K_d =$	0.95		
$K_s =$	1.00		
$K_a =$	0.90		
$K_e = e^{-0.0000362zs}$	1.00		
$q_z = 0.00256K_zK_{zt}K_sK_eK_dV^2$	44.821	psf	(w/o ice)
$q_z = 0.00256K_zK_{zt}K_eK_dV_i^2$	8.473	psf	(w/ ice)
$q_z = 0.00256K_zK_{zt}K_sK_eK_dV_s^2$	3.050	psf	(service)
Quantity	12		(18 max)

JACOBS™

WIND/ICE/SERVICE LOADING
ANTENNA MOUNTING SYSTEM
ANSI/TIA-222-H

Project Number:	ERCC0303
Site Name:	876369
Engineer:	A. Asghari
Date:	10/23/2019
Carrier:	AT&T
Reviewed By:	B. Bartlett

Input Data

Front

Member Size	**Handrail MOD Pipe 2.0**		
Length	150	in	
Width	2.38	in	
Depth	2.38	in	
Weight	0	lb/ft	
Design Ice Thickness (t_i)	1	in	
Structure Type	M	(S, G, M, B)	
Structure Height (h)	178	ft	
Antenna Centerline (z)	158	ft	
Basic Wind Speed (V)	115	mph	(w/o ice)
Basic Wind Speed (V_i)	50	mph	(w/ ice)
Basic Wind Speed (V_s)	30	mph	(service)
Risk Category	II	(I, II, III, IV)	
Exposure Category	C	(B, C or D)	
Topographic Category	1	(1, 2, 3 or 4)	
Crest Height (H)	0	ft	
Shape	R	(R / F / S)	
Length / Width	63.025		(w/o ice)
Length / Width	32.282		(w/ ice)
C_a	1.200		(w/o ice)
C_a	1.200		(w/ ice)
C_a	1.200		(service)
$(EPA)_A$	2.678	ft^2	(w/o ice)
$(EPA)_A$	5.392	ft^2	(w/ ice)
$(EPA)_A$	2.678	ft^2	(service)
$F_A = q_z G_h (EPA)_A$	0.800	lb/in	(w/o ice)
$F_A = q_z G_h (EPA)_A$	0.305	lb/in	(w/ ice)
$F_A = q_z G_h (EPA)_A$	0.054	lb/in	(service)
Ice Weight	0.540	lb/in	
Weight	0.540	lb/in	(w/ ice)

Equations

$K_z = 2.01[z/z_g]^{(2/\alpha)}$	1.394		$K_{zmin} \le K_z \le 2.01$
$K_h = e^{[(f)(z)/H]}$	1.000		
$K_{zt} = [1+(K_c K_t)/K_h]^2$	1.000		
$K_{iz} = [z/33]^{(0.10)}$	1.170		$K_{iz} \le 1.4$
$t_{iz} = (t_i)(I)(K_{iz})(K_{zt})^{(0.35)}$	1.170	in	(w/ ice)
$C = (K_{zt}K_zK_e)^{0.5}(V)(D)$	26.925		(w/o ice)
$C = (K_{zt}K_zK_e)^{0.5}(V_i)(D)$	11.707		(w/ ice)
$C = (K_{zt}K_zK_e)^{0.5}(V)(D)$	7.024		(service)
G_h =	1.00		
K_d =	0.95		
K_s =	1.00		
K_a =	0.90		
$K_e = e^{-0.0000362zs}$	1.00		
$q_z = 0.00256K_zK_{zt}K_sK_eK_dV^2$	44.82	psf	(w/o ice)
$q_z = 0.00256K_zK_{zt}K_eK_dV_i^2$	8.47	psf	(w/ ice)
$q_z = 0.00256K_zK_{zt}K_sK_eK_dV_s^2$	3.05	psf	(service)
Quantity	3		(18 max)

Side

Member Size	Handrail MOD Pipe 2.0		
Length	150	in	
Width	2.38	in	
Depth	2.38	in	
Weight	0	lb/ft	
Design Ice Thickness (t_i)	1	in	
Structure Type	M	(S, G, M, B)	
Structure Height (h)	178	ft	
Antenna Centerline (z)	158	ft	
Basic Wind Speed (V)	115	mph	(w/o ice)
Basic Wind Speed (V_i)	50	mph	(w/ ice)
Basic Wind Speed (V_s)	30	mph	(service)
Risk Category	II	(I, II, III, IV)	
Exposure Category	C	(B, C or D)	
Topographic Category	1	(1, 2, 3 or 4)	
Crest Height (H)	0	ft	
Shape	R	(R / F / S)	
Length / Width	63.025		(w/o ice)
Length / Width	32.282		(w/ ice)
C_a	1.200		(w/o ice)
C_a	1.200		(w/ ice)
C_a	1.200		(service)
$(EPA)_A$	2.678	ft^2	(w/o ice)
$(EPA)_A$	5.392	ft^2	(w/ ice)
$(EPA)_A$	2.678	ft^2	(service)
$F_A = q_z G_h (EPA)_A$	0.800	lb/in	(w/o ice)
$F_A = q_z G_h (EPA)_A$	0.305	lb/in	(w/ ice)
$F_A = q_z G_h (EPA)_A$	0.054	lb/in	(service)
Ice Weight	0.540	lb/in	
Weight	0.540	lb/in	(w/ ice)

Equations

$K_z = 2.01[z/z_g]^{(2/\alpha)}$	1.394		$K_{zmin} \le K_z \le 2.01$
$K_h = e^{[(f)(z)/H]}$	1.000		
$K_{zt} = [1+(K_c K_t)/K_h]^2$	1.000		
$K_{iz} = [z/33]^{(0.10)}$	1.170		$K_{iz} \le 1.4$
$t_{iz} = (t_i)(I)(K_{iz})(K_{zt})^{(0.35)}$	1.170	in	(w/ ice)
$C = (K_{zt}K_zK_e)^{0.5}(V)(D)$	26.925		(w/o ice)
$C = (K_{zt}K_zK_e)^{0.5}(V_i)(D)$	11.707		(w/ ice)
$C = (K_{zt}K_zK_e)^{0.5}(V)(D)$	7.024		(service)
G_h =	1.00		
K_d =	0.95		
K_s =	1.00		
K_a =	0.90		
$K_e = e^{-0.0000362zs}$	1.00		
$q_z = 0.00256K_zK_{zt}K_sK_eK_dV^2$	44.821	psf	(w/o ice)
$q_z = 0.00256K_zK_{zt}K_eK_dV_i^2$	8.473	psf	(w/ ice)
$q_z = 0.00256K_zK_{zt}K_sK_eK_dV_s^2$	3.050	psf	(service)
Quantity	3		(18 max)

JACOBS™

WIND/ICE/SERVICE LOADING
ANTENNA MOUNTING SYSTEM
ANSI/TIA-222-H

Project Number:	ERCC0303
Site Name:	876369
Engineer:	A. Asghari
Date:	10/23/2019
Carrier:	AT&T
Reviewed By:	B. Bartlett

Input Data

Front

Member Size	**Horizontal Pipe 3.0**		
Length	144	in	
Width	3.5	in	
Depth	3.5	in	
Weight	0	lb/ft	
Design Ice Thickness (t_i)	1	in	
Structure Type	M	(S, G, M, B)	
Structure Height (h)	178	ft	
Antenna Centerline (z)	158	ft	
Basic Wind Speed (V)	115	mph	(w/o ice)
Basic Wind Speed (V_i)	50	mph	(w/ ice)
Basic Wind Speed (V_s)	30	mph	(service)
Risk Category	II	(I, II, III, IV)	
Exposure Category	C	(B, C or D)	
Topographic Category	1	(1, 2, 3 or 4)	
Crest Height (H)	0	ft	
Shape	R	(R / F / S)	
Length / Width	41.143		(w/o ice)
Length / Width	25.062		(w/ ice)
C_a	1.182		(w/o ice)
C_a	1.200		(w/ ice)
C_a	1.200		(service)
$(EPA)_A$	3.723	ft^2	(w/o ice)
$(EPA)_A$	6.409	ft^2	(w/ ice)
$(EPA)_A$	3.780	ft^2	(service)
$F_A = q_z G_h (EPA)_A$	1.159	lb/in	(w/o ice)
$F_A = q_z G_h (EPA)_A$	0.377	lb/in	(w/ ice)
$F_A = q_z G_h (EPA)_A$	0.080	lb/in	(service)
Ice Weight	0.729	lb/in	
Weight	0.729	lb/in	(w/ ice)
Equations			
$K_z = 2.01[z/z_g]^{(2/\alpha)}$	1.394		$K_{zmin} \le K_z \le 2.01$
$K_h = e^{[(f)(z)/H]}$	1.000		
$K_{zt} = [1+(K_c K_t)/K_h]^2$	1.000		
$K_{iz} = [z/33]^{(0.10)}$	1.170		$K_{iz} \le 1.4$
$t_{iz} = (t_i)(I)(K_{iz})(K_{zt})^{(0.35)}$	1.170	in	(w/ ice)
$C = (K_{zt}K_zK_e)^{0.5}(V)(D)$	39.596		(w/o ice)
$C = (K_{zt}K_zK_e)^{0.5}(V_i)(D)$	17.215		(w/ ice)
$C = (K_{zt}K_zK_e)^{0.5}(V)(D)$	10.329		(service)
G_h =	1.00		
K_d =	0.95		
K_s =	1.00		
K_a =	0.90		
$K_e = e^{-0.0000362zs}$	1.00		
$q_z = 0.00256K_zK_{zt}K_sK_eK_dV^2$	44.82	psf	(w/o ice)
$q_z = 0.00256K_zK_{zt}K_eK_dV_i^2$	8.47	psf	(w/ ice)
$q_z = 0.00256K_zK_{zt}K_sK_eK_dV_s^2$	3.05	psf	(service)
Quantity	3		(18 max)

Side

Member Size	Horizontal Pipe 3.0		
Length	144	in	
Width	3.5	in	
Depth	3.5	in	
Weight	0	lb/ft	
Design Ice Thickness (t_i)	1	in	
Structure Type	M	(S, G, M, B)	
Structure Height (h)	178	ft	
Antenna Centerline (z)	158	ft	
Basic Wind Speed (V)	115	mph	(w/o ice)
Basic Wind Speed (V_i)	50	mph	(w/ ice)
Basic Wind Speed (V_s)	30	mph	(service)
Risk Category	II	(I, II, III, IV)	
Exposure Category	C	(B, C or D)	
Topographic Category	1	(1, 2, 3 or 4)	
Crest Height (H)	0	ft	
Shape	R	(R / F / S)	
Length / Width	41.143		(w/o ice)
Length / Width	25.062		(w/ ice)
C_a	1.182		(w/o ice)
C_a	1.200		(w/ ice)
C_a	1.200		(service)
$(EPA)_A$	3.723	ft^2	(w/o ice)
$(EPA)_A$	6.409	ft^2	(w/ ice)
$(EPA)_A$	3.780	ft^2	(service)
$F_A = q_z G_h (EPA)_A$	1.159	lb/in	(w/o ice)
$F_A = q_z G_h (EPA)_A$	0.377	lb/in	(w/ ice)
$F_A = q_z G_h (EPA)_A$	0.080	lb/in	(service)
Ice Weight	0.729	lb/in	
Weight	0.729	lb/in	(w/ ice)
Equations			
$K_z = 2.01[z/z_g]^{(2/\alpha)}$	1.394		$K_{zmin} \le K_z \le 2.01$
$K_h = e^{[(f)(z)/H]}$	1.000		
$K_{zt} = [1+(K_c K_t)/K_h]^2$	1.000		
$K_{iz} = [z/33]^{(0.10)}$	1.170		$K_{iz} \le 1.4$
$t_{iz} = (t_i)(I)(K_{iz})(K_{zt})^{(0.35)}$	1.170	in	(w/ ice)
$C = (K_{zt}K_zK_e)^{0.5}(V)(D)$	39.596		(w/o ice)
$C = (K_{zt}K_zK_e)^{0.5}(V_i)(D)$	17.215		(w/ ice)
$C = (K_{zt}K_zK_e)^{0.5}(V)(D)$	10.329		(service)
G_h =	1.00		
K_d =	0.95		
K_s =	1.00		
K_a =	0.90		
$K_e = e^{-0.0000362zs}$	1.00		
$q_z = 0.00256K_zK_{zt}K_sK_eK_dV^2$	44.821	psf	(w/o ice)
$q_z = 0.00256K_zK_{zt}K_eK_dV_i^2$	8.473	psf	(w/ ice)
$q_z = 0.00256K_zK_{zt}K_sK_eK_dV_s^2$	3.050	psf	(service)
Quantity	3		(18 max)

JACOBS™

WIND/ICE/SERVICE LOADING
ANTENNA MOUNTING SYSTEM
ANSI/TIA-222-H

Project Number:	ERCC0303
Site Name:	876369
Engineer:	A. Asghari
Date:	10/23/2019
Carrier:	AT&T
Reviewed By:	B. Bartlett

Input Data

Front

Member	**Standoff**		
Size	**HSS 4x4**		
Length	64	in	
Width	4	in	
Depth	4	in	
Weight	0	lb/ft	
Design Ice Thickness (t_i)	1	in	
Structure Type	M	(S, G, M, B)	
Structure Height (h)	178	ft	
Antenna Centerline (z)	158	ft	
Basic Wind Speed (V)	115	mph	(w/o ice)
Basic Wind Speed (V_i)	50	mph	(w/ ice)
Basic Wind Speed (V_s)	30	mph	(service)
Risk Category	II	(I, II, III, IV)	
Exposure Category	C	(B, C or D)	
Topographic Category	1	(1, 2, 3 or 4)	
Crest Height (H)	0	ft	
Shape	S	(R / F / S)	
Length / Width	16.000		(w/o ice)
Length / Width	10.465		(w/ ice)
C_a	1.075		(w/o ice)
C_a	0.967		(w/ ice)
C_a	1.075		(service)
$(EPA)_A$	1.720	ft^2	(w/o ice)
$(EPA)_A$	2.543	ft^2	(w/ ice)
$(EPA)_A$	1.720	ft^2	(service)
$F_A = q_z G_h (EPA)_A$	1.205	lb/in	(w/o ice)
$F_A = q_z G_h (EPA)_A$	0.337	lb/in	(w/ ice)
$F_A = q_z G_h (EPA)_A$	0.082	lb/in	(service)
Ice Weight	0.813	lb/in	
Weight	0.813	lb/in	(w/ ice)

Equations

$K_z = 2.01[z/z_g]^{(2/\alpha)}$	1.394		$K_{zmin} \le K_z \le 2.01$
$K_h = e^{[(f)(z)/H]}$	1.000		
$K_{zt} = [1+(K_c K_t)/K_h]^2$	1.000		
$K_{iz} = [z/33]^{(0.10)}$	1.170		$K_{iz} \le 1.4$
$t_{iz} = (t_i)(I)(K_{iz})(K_{zt})^{(0.35)}$	1.170	in	(w/ ice)
$C = (K_{zt}K_zK_e)^{0.5}(V)(D)$	45.252		(w/o ice)
$C = (K_{zt}K_zK_e)^{0.5}(V_i)(D)$	19.675		(w/ ice)
$C = (K_{zt}K_zK_e)^{0.5}(V)(D)$	11.805		(service)
G_h =	1.00		
K_d =	0.95		
K_s =	1.00		
K_a =	0.90		
$K_e = e^{-0.0000362zs}$	1.00		
$q_z = 0.00256K_zK_{zt}K_sK_eK_dV^2$	44.82	psf	(w/o ice)
$q_z = 0.00256K_zK_{zt}K_eK_dV_i^2$	8.47	psf	(w/ ice)
$q_z = 0.00256K_zK_{zt}K_sK_eK_dV_s^2$	3.05	psf	(service)
Quantity	3		(12 max)

Side

Member	Standoff		
Size	HSS 4x4		
Length	64	in	
Width	4	in	
Depth	4	in	
Weight	0	lb/ft	
Design Ice Thickness (t_i)	1	in	
Structure Type	M	(S, G, M, B)	
Structure Height (h)	178	ft	
Antenna Centerline (z)	158	ft	
Basic Wind Speed (V)	115	mph	(w/o ice)
Basic Wind Speed (V_i)	50	mph	(w/ ice)
Basic Wind Speed (V_s)	30	mph	(service)
Risk Category	II	(I, II, III, IV)	
Exposure Category	C	(B, C or D)	
Topographic Category	1	(1, 2, 3 or 4)	
Crest Height (H)	0	ft	
Shape	S	(R / F / S)	
Length / Width	16.000		(w/o ice)
Length / Width	10.465		(w/ ice)
C_a	1.075		(w/o ice)
C_a	0.967		(w/ ice)
C_a	1.075		(service)
$(EPA)_A$	1.720	ft^2	(w/o ice)
$(EPA)_A$	2.543	ft^2	(w/ ice)
$(EPA)_A$	1.720	ft^2	(service)
$F_A = q_z G_h (EPA)_A$	1.205	lb/in	(w/o ice)
$F_A = q_z G_h (EPA)_A$	0.337	lb/in	(w/ ice)
$F_A = q_z G_h (EPA)_A$	0.082	lb/in	(service)
Ice Weight	0.813	lb/in	
Weight	0.813	lb/in	(w/ ice)

Equations

$K_z = 2.01[z/z_g]^{(2/\alpha)}$	1.394		$K_{zmin} \le K_z \le 2.01$
$K_h = e^{[(f)(z)/H]}$	1.000		
$K_{zt} = [1+(K_c K_t)/K_h]^2$	1.000		
$K_{iz} = [z/33]^{(0.10)}$	1.170		$K_{iz} \le 1.4$
$t_{iz} = (t_i)(I)(K_{iz})(K_{zt})^{(0.35)}$	1.170	in	(w/ ice)
$C = (K_{zt}K_zK_e)^{0.5}(V)(D)$	45.252		(w/o ice)
$C = (K_{zt}K_zK_e)^{0.5}(V_i)(D)$	19.675		(w/ ice)
$C = (K_{zt}K_zK_e)^{0.5}(V)(D)$	11.805		(service)
G_h =	1.00		
K_d =	0.95		
K_s =	1.00		
K_a =	0.90		
$K_e = e^{-0.0000362zs}$	1.00		
$q_z = 0.00256K_zK_{zt}K_sK_eK_dV^2$	44.821	psf	(w/o ice)
$q_z = 0.00256K_zK_{zt}K_eK_dV_i^2$	8.473	psf	(w/ ice)
$q_z = 0.00256K_zK_{zt}K_sK_eK_dV_s^2$	3.050	psf	(service)
Quantity	3		(12 max)

APPENDIX C

SOFTWARE ANALYSIS OUTPUT

Basic Load Cases

	BLC Description	Category	X Gravity	Y Gravity	Z Gravity	Joint	Point	Distribut...	Area(Me...	Surface(...
1	DEAD LOAD	None			-1		20		3	
2	DEAD LOAD (ICE)	None					20	21	3	
3	WIND LOAD (NO ICE) FRONT	None					20	21		
4	WIND LOAD (NO ICE) SIDE	None					20	21		
5	WIND LOAD (ICE) FRONT	None					20	21		
6	WIND LOAD (ICE) SIDE	None					20	21		
7	LIVE LOAD (MAN)	None							3	
8	WIND LOAD (SERVICE) FRONT	None					20	21		
9	WIND LOAD (SERVICE) SIDE	None					20	21		
10	LIVE LOAD (SERVICE)	None					3			
16	BLC 1 Transient Area Loads	None						45		
17	BLC 2 Transient Area Loads	None						45		
18	BLC 7 Transient Area Loads	None						45		

Load Combinations

	Description	S...	PD...	S...	BLC	Fa...	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...
1	DEAD LOAD	Y...	Y		1	1.4																				
2	DEAD LOAD + WIND LOAD (NO ICE) 0 D...	Y...	Y		1	1.2			3	1	4															
3	DEAD LOAD + WIND LOAD (NO ICE) 30 ...	Y...	Y		1	1.2			3	.866	4	.5														
4	DEAD LOAD + WIND LOAD (NO ICE) 60 ...	Y...	Y		1	1.2			3	.5	4	.866														
5	DEAD LOAD + WIND LOAD (NO ICE) 90 ...	Y...	Y		1	1.2			3		4	1														
6	DEAD LOAD + WIND LOAD (NO ICE) 120...	Y...	Y		1	1.2			3	-.5	4	.866														
7	DEAD LOAD + WIND LOAD (NO ICE) 150...	Y...	Y		1	1.2			3	-.8...	4	.5														
8	DEAD LOAD + WIND LOAD (NO ICE) 180...	Y...	Y		1	1.2			3	-1	4															
9	DEAD LOAD + WIND LOAD (NO ICE) 210...	Y...	Y		1	1.2			3	-.8...	4	-.5														
10	DEAD LOAD + WIND LOAD (NO ICE) 240...	Y...	Y		1	1.2			3	-.5	4	-.8...														
11	DEAD LOAD + WIND LOAD (NO ICE) 270...	Y...	Y		1	1.2			3		4	-1														
12	DEAD LOAD + WIND LOAD (NO ICE) 300...	Y...	Y		1	1.2			3	.5	4	-.8...														
13	DEAD LOAD + WIND LOAD (NO ICE) 330...	Y...	Y		1	1.2			3	.866	4	-.5														
14	DEAD LOAD + DEAD LOAD (ICE) + WIND...	Y...	Y		1	1.2	2	1					5	1	6											
15	DEAD LOAD + DEAD LOAD (ICE) + WIND...	Y...	Y		1	1.2	2	1					5	.866	6	.5										
16	DEAD LOAD + DEAD LOAD (ICE) + WIND...	Y...	Y		1	1.2	2	1					5	.5	6	.866										
17	DEAD LOAD + DEAD LOAD (ICE) + WIND...	Y...	Y		1	1.2	2	1					5		6	1										
18	DEAD LOAD + DEAD LOAD (ICE) + WIND...	Y...	Y		1	1.2	2	1					5	-.5	6	.866										
19	DEAD LOAD + DEAD LOAD (ICE) + WIND...	Y...	Y		1	1.2	2	1					5	-.8...	6	.5										
20	DEAD LOAD + DEAD LOAD (ICE) + WIND...	Y...	Y		1	1.2	2	1					5	-1	6											
21	DEAD LOAD + DEAD LOAD (ICE) + WIND...	Y...	Y		1	1.2	2	1					5	-.8...	6	-.5										
22	DEAD LOAD + DEAD LOAD (ICE) + WIND...	Y...	Y		1	1.2	2	1					5	-.5	6	-.8...										
23	DEAD LOAD + DEAD LOAD (ICE) + WIND...	Y...	Y		1	1.2	2	1					5		6	-1										
24	DEAD LOAD + DEAD LOAD (ICE) + WIND...	Y...	Y		1	1.2	2	1					5	.5	6	-.8...										
25	DEAD LOAD + DEAD LOAD (ICE) + WIND...	Y...	Y		1	1.2	2	1					5	.866	6	-.5										
26	DEAD LOAD + LIVE LOAD (MAN)	Y...	Y		1	1.2											7	1.5								
27	DEAD LOAD + LIVE LOAD (SERVICE) + ...	Y...	Y		1	1.2													8	1	9		10	1.5		
28	DEAD LOAD + LIVE LOAD (SERVICE) + ...	Y...	Y		1	1.2													8	.866	9	.5	10	1.5		
29	DEAD LOAD + LIVE LOAD (SERVICE) + ...	Y...	Y		1	1.2													8	.5	9	.866	10	1.5		
30	DEAD LOAD + LIVE LOAD (SERVICE) + ...	Y...	Y		1	1.2													8		9	1	10	1.5		
31	DEAD LOAD + LIVE LOAD (SERVICE) + ...	Y...	Y		1	1.2													8	-.5	9	.866	10	1.5		
32	DEAD LOAD + LIVE LOAD (SERVICE) + ...	Y...	Y		1	1.2													8	-.8...	9	.5	10	1.5		
33	DEAD LOAD + LIVE LOAD (SERVICE) + ...	Y...	Y		1	1.2													8	-1	9		10	1.5		
34	DEAD LOAD + LIVE LOAD (SERVICE) + ...	Y...	Y		1	1.2													8	-.8...	9	-.5	10	1.5		
35	DEAD LOAD + LIVE LOAD (SERVICE) + ...	Y...	Y		1	1.2													8	-.5	9	-.8...	10	1.5		
36	DEAD LOAD + LIVE LOAD (SERVICE) + ...	Y...	Y		1	1.2													8		9	-1	10	1.5		
37	DEAD LOAD + LIVE LOAD (SERVICE) + ...	Y...	Y		1	1.2													8	.5	9	-.8...	10	1.5		
38	DEAD LOAD + LIVE LOAD (SERVICE) + ...	Y...	Y		1	1.2													8	.866	9	-.5	10	1.5		

Load Combinations (Continued)

	Description	S...	PD...	S...	BLC	Fa...	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...
39	DEAD LOAD + SEISMIC LOAD (VERTICA...	Y...	Y		1	1.2	1		11	1	12	1	13		14		15							
40	DEAD LOAD + SEISMIC LOAD (VERTICA...	Y...	Y		1	1.2	1		11	1	12	.866	13	.5	14		15							
41	DEAD LOAD + SEISMIC LOAD (VERTICA...	Y...	Y		1	1.2	1		11	1	12	.5	13	.866	14		15							
42	DEAD LOAD + SEISMIC LOAD (VERTICA...	Y...	Y		1	1.2	1		11	1	12		13	1	14		15							
43	DEAD LOAD + SEISMIC LOAD (VERTICA...	Y...	Y		1	1.2	1		11	1	12	-.5	13	.866	14		15							
44	DEAD LOAD + SEISMIC LOAD (VERTICA...	Y...	Y		1	1.2	1		11	1	12	-.8...	13	.5	14		15							
45	DEAD LOAD + SEISMIC LOAD (VERTICA...	Y...	Y		1	1.2	1		11	1	12	-1	13		14		15							
46	DEAD LOAD + SEISMIC LOAD (VERTICA...	Y...	Y		1	1.2	1		11	1	12	-.8...	13	-.5	14		15							
47	DEAD LOAD + SEISMIC LOAD (VERTICA...	Y...	Y		1	1.2	1		11	1	12	-.5	13	-.8...	14		15							
48	DEAD LOAD + SEISMIC LOAD (VERTICA...	Y...	Y		1	1.2	1		11	1	12		13	-1	14		15							
49	DEAD LOAD + SEISMIC LOAD (VERTICA...	Y...	Y		1	1.2	1		11	1	12	.5	13	-.8...	14		15							
50	DEAD LOAD + SEISMIC LOAD (VERTICA...	Y...	Y		1	1.2	1		11	1	12	.866	13	-.5	14		15							

Joint Boundary Conditions

	Joint Label	X [k/in]	Y [k/in]	Z [k/in]	X Rot.[k-ft/rad]	Y Rot.[k-ft/rad]	Z Rot.[k-ft/rad]
1	N54	Reaction	Reaction	Reaction	Reaction	Reaction	Reaction
2	N53	Reaction	Reaction	Reaction	Reaction	Reaction	Reaction
3	N31	Reaction	Reaction	Reaction	Reaction	Reaction	Reaction

Hot Rolled Steel Section Sets

	Label	Shape	Type	Design List	Material	Design ...	A [in2]	Iyy [in4]	Izz [in4]	J [in4]
1	Antenna Pipe	PIPE_2.0	Column	Pipe	A53 Gr.B	Typical	1.02	.627	.627	1.25
2	Horizontal	PIPE_3.0	Beam	Pipe	A53 Gr.B	Typical	2.07	2.85	2.85	5.69
3	Handrail MOD	PIPE_2.0	Beam	Pipe	A53 Gr.B	Typical	1.02	.627	.627	1.25
4	Standoff	HSS4X4X4	Beam	Tube	A500 Gr.B Rect	Typical	3.37	7.8	7.8	12.8
5	End Plate	PL6"x1/2"	Beam	RECT	A36 Gr.36	Typical	3	.063	9	.237
6	Handrail Connection	L2.5x2.5x4	Beam	Single Angle	A36 Gr.36	Typical	1.19	.692	.692	.026
7	Platform	L2x2x4	Beam	Single Angle	A36 Gr.36	Typical	.944	.346	.346	.021
8	Standoff Brace	HSS4X4X4	Beam	Tube	A500 Gr.B Rect	Typical	3.37	7.8	7.8	12.8

Member Primary Data

	Label	I Joint	J Joint	K Joint	Rotate(deg)	Section/Shape	Type	Design List	Material	Design Ru...
1	M1	N1	N77			Antenna Pipe	Column	Pipe	A53 Gr.B	Typical
2	M2	N2	N78			Antenna Pipe	Column	Pipe	A53 Gr.B	Typical
3	M3	N3	N79			Antenna Pipe	Column	Pipe	A53 Gr.B	Typical
4	M4	N4	N80			Antenna Pipe	Column	Pipe	A53 Gr.B	Typical
5	M5	N5	N81			Antenna Pipe	Column	Pipe	A53 Gr.B	Typical
6	M6	N6	N82			Antenna Pipe	Column	Pipe	A53 Gr.B	Typical
7	M7	N7	N83			Antenna Pipe	Column	Pipe	A53 Gr.B	Typical
8	M8	N8	N84			Antenna Pipe	Column	Pipe	A53 Gr.B	Typical
9	M9	N9	N85			Antenna Pipe	Column	Pipe	A53 Gr.B	Typical
10	M10	N10	N86			Antenna Pipe	Column	Pipe	A53 Gr.B	Typical
11	M11	N11	N87			Antenna Pipe	Column	Pipe	A53 Gr.B	Typical
12	M12	N12	N88			Antenna Pipe	Column	Pipe	A53 Gr.B	Typical
13	M13	N22	N27			End Plate	Beam	RECT	A36 Gr.36	Typical
14	M14	N25	N23			End Plate	Beam	RECT	A36 Gr.36	Typical
15	M15	N24	N26			End Plate	Beam	RECT	A36 Gr.36	Typical
16	M16	N119	N120			Handrail Connection	Beam	Single Angle	A36 Gr.36	Typical
17	M17	N121	N122			Handrail Connection	Beam	Single Angle	A36 Gr.36	Typical
18	M18	N123	N124			Handrail Connection	Beam	Single Angle	A36 Gr.36	Typical
19	M19	N117	N118			Handrail MOD	Beam	Pipe	A53 Gr.B	Typical
20	M20	N89	N90			Handrail MOD	Beam	Pipe	A53 Gr.B	Typical

Member Primary Data (Continued)

	Label	I Joint	J Joint	K Joint	Rotate(deg)	Section/Shape	Type	Design List	Material	Design Ru...
21	M21	N115	N116			Handrail MOD	Beam	Pipe	A53 Gr.B	Typical
22	M22	N14	N16			Horizontal	Beam	Pipe	A53 Gr.B	Typical
23	M23	N15	N18			Horizontal	Beam	Pipe	A53 Gr.B	Typical
24	M24	N17	N13			Horizontal	Beam	Pipe	A53 Gr.B	Typical
25	M25	N33	N44			Platform	Beam	Single Angle	A36 Gr.36	Typical
26	M26	N35	N45			Platform	Beam	Single Angle	A36 Gr.36	Typical
27	M27	N46	N47			Platform	Beam	Single Angle	A36 Gr.36	Typical
28	M28	N48	N49			Platform	Beam	Single Angle	A36 Gr.36	Typical
29	M29	N50	N51			Platform	Beam	Single Angle	A36 Gr.36	Typical
30	M30	N34	N52			Platform	Beam	Single Angle	A36 Gr.36	Typical
31	M31	N20	N21			RIGID	None	None	RIGID	Typical
32	M32	N55	N56			RIGID	None	None	RIGID	Typical
33	M33	N57	N58			RIGID	None	None	RIGID	Typical
34	M34	N59	N60			RIGID	None	None	RIGID	Typical
35	M35	N61	N62			RIGID	None	None	RIGID	Typical
36	M36	N63	N64			RIGID	None	None	RIGID	Typical
37	M37	N65	N66			RIGID	None	None	RIGID	Typical
38	M38	N67	N68			RIGID	None	None	RIGID	Typical
39	M39	N69	N70			RIGID	None	None	RIGID	Typical
40	M40	N71	N72			RIGID	None	None	RIGID	Typical
41	M41	N73	N74			RIGID	None	None	RIGID	Typical
42	M42	N75	N76			RIGID	None	None	RIGID	Typical
43	M43	N91	N92			RIGID	None	None	RIGID	Typical
44	M44	N93	N94			RIGID	None	None	RIGID	Typical
45	M45	N95	N96			RIGID	None	None	RIGID	Typical
46	M46	N97	N98			RIGID	None	None	RIGID	Typical
47	M47	N99	N100			RIGID	None	None	RIGID	Typical
48	M48	N101	N102			RIGID	None	None	RIGID	Typical
49	M49	N103	N104			RIGID	None	None	RIGID	Typical
50	M50	N105	N106			RIGID	None	None	RIGID	Typical
51	M51	N107	N108			RIGID	None	None	RIGID	Typical
52	M52	N109	N110			RIGID	None	None	RIGID	Typical
53	M53	N111	N112			RIGID	None	None	RIGID	Typical
54	M54	N113	N114			RIGID	None	None	RIGID	Typical
55	M55	N30	N31			Standoff	Beam	Tube	A500 Gr....	Typical
56	M56	N28	N53			Standoff	Beam	Tube	A500 Gr....	Typical
57	M57	N29	N54			Standoff	Beam	Tube	A500 Gr....	Typical
58	M58	N37	N32			Standoff Brace	Beam	Tube	A500 Gr....	Typical
59	M59	N32	N36			Standoff Brace	Beam	Tube	A500 Gr....	Typical
60	M60	N40	N38			Standoff Brace	Beam	Tube	A500 Gr....	Typical
61	M61	N38	N39			Standoff Brace	Beam	Tube	A500 Gr....	Typical
62	M62	N43	N41			Standoff Brace	Beam	Tube	A500 Gr....	Typical
63	M63	N41	N42			Standoff Brace	Beam	Tube	A500 Gr....	Typical

Hot Rolled Steel Design Parameters

	Label	Shape	Length[in]	Lbyy[in]	Lbzz[in]	Lcomp top[in]	Lcomp bot[in]	L-torqu...	Kyy	Kzz	Cb	Functi...
1	M1	Antenna Pipe	72	Segment	Segment	Lbyy			2.1	2.1		Lateral
2	M2	Antenna Pipe	72	Segment	Segment	Lbyy			2.1	2.1		Lateral
3	M3	Antenna Pipe	72	Segment	Segment	Lbyy			2.1	2.1		Lateral
4	M4	Antenna Pipe	72	Segment	Segment	Lbyy			2.1	2.1		Lateral
5	M5	Antenna Pipe	72	Segment	Segment	Lbyy			2.1	2.1		Lateral
6	M6	Antenna Pipe	72	Segment	Segment	Lbyy			2.1	2.1		Lateral
7	M7	Antenna Pipe	72	Segment	Segment	Lbyy			2.1	2.1		Lateral
8	M8	Antenna Pipe	72	Segment	Segment	Lbyy			2.1	2.1		Lateral
9	M9	Antenna Pipe	72	Segment	Segment	Lbyy			2.1	2.1		Lateral

Hot Rolled Steel Design Parameters (Continued)

	Label	Shape	Length[in]	Lbyy[in]	Lbzz[in]	Lcomp top[in]	Lcomp bot[in]	L-torqu...	Kyy	Kzz	Cb	Functi...
10	M10	Antenna Pipe	72	Segment	Segment	Lbyy			2.1	2.1		Lateral
11	M11	Antenna Pipe	72	Segment	Segment	Lbyy			2.1	2.1		Lateral
12	M12	Antenna Pipe	72	Segment	Segment	Lbyy			2.1	2.1		Lateral
13	M13	End Plate	18.48	Segment	Segment	Lbyy			.65	.65		Lateral
14	M14	End Plate	18.48	Segment	Segment	Lbyy			.65	.65		Lateral
15	M15	End Plate	18.48	Segment	Segment	Lbyy			.65	.65		Lateral
16	M16	Handrail Conne...	15.016	Segment	Segment	Lbyy			.65	.65		Lateral
17	M17	Handrail Conne...	15.016	Segment	Segment	Lbyy			.65	.65		Lateral
18	M18	Handrail Conne...	15.016	Segment	Segment	Lbyy			.65	.65		Lateral
19	M19	Handrail MOD	150	Segment	Segment	Lbyy			2.1	2.1		Lateral
20	M20	Handrail MOD	150	Segment	Segment	Lbyy			2.1	2.1		Lateral
21	M21	Handrail MOD	150	Segment	Segment	Lbyy			2.1	2.1		Lateral
22	M22	Horizontal	144	Segment	Segment	Lbyy			2.1	2.1		Lateral
23	M23	Horizontal	144	Segment	Segment	Lbyy			2.1	2.1		Lateral
24	M24	Horizontal	144	Segment	Segment	Lbyy			2.1	2.1		Lateral
25	M25	Platform	50.807	Segment	Segment	Lbyy			.65	.65		Lateral
26	M26	Platform	50.807	Segment	Segment	Lbyy			.65	.65		Lateral
27	M27	Platform	50.807	Segment	Segment	Lbyy			.65	.65		Lateral
28	M28	Platform	50.807	Segment	Segment	Lbyy			.65	.65		Lateral
29	M29	Platform	50.807	Segment	Segment	Lbyy			.65	.65		Lateral
30	M30	Platform	50.807	Segment	Segment	Lbyy			.65	.65		Lateral
31	M55	Standoff	64	Segment	Segment	Lbyy			2.1	2.1		Lateral
32	M56	Standoff	64	Segment	Segment	Lbyy			2.1	2.1		Lateral
33	M57	Standoff	64	Segment	Segment	Lbyy			2.1	2.1		Lateral
34	M58	Standoff Brace	34.643	Segment	Segment	Lbyy			.65	.65		Lateral
35	M59	Standoff Brace	34.643	Segment	Segment	Lbyy			.65	.65		Lateral
36	M60	Standoff Brace	34.643	Segment	Segment	Lbyy			.65	.65		Lateral
37	M61	Standoff Brace	34.643	Segment	Segment	Lbyy			.65	.65		Lateral
38	M62	Standoff Brace	34.643	Segment	Segment	Lbyy			.65	.65		Lateral
39	M63	Standoff Brace	34.643	Segment	Segment	Lbyy			.65	.65		Lateral

Plate Primary Data

Label	A Joint	B Joint	C Joint	D Joint	Material	Thickness[in]
No Data to Print ...						

Member Point Loads (BLC 1 : DEAD LOAD)

	Member Label	Direction	Magnitude[lb,k-ft]	Location[in,%]
1	M1	Z	-35	36
2	M1	Z	-35	24
3	M3	Z	-71	24
4	M3	Z	-72	24
5	M3	Z	-41.9	36
6	M2	Z	-83.8	36
7	M9	Z	-35	36
8	M9	Z	-35	24
9	M11	Z	-71	24
10	M11	Z	-72	24
11	M11	Z	-41.9	36
12	M10	Z	-83.8	36
13	M5	Z	-35	36
14	M5	Z	-35	24
15	M7	Z	-71	24
16	M7	Z	-72	24
17	M7	Z	-41.9	36

Member Point Loads (BLC 1 : DEAD LOAD) (Continued)

	Member Label	Direction	Magnitude[lb,k-ft]	Location[in,%]
18	M6	Z	-83.8	36
19	M12	Z	-26.2	24
20	M4	Z	-32.8	24

Member Point Loads (BLC 2 : DEAD LOAD (ICE))

	Member Label	Direction	Magnitude[lb,k-ft]	Location[in,%]
1	M1	Z	-86.8	36
2	M1	Z	-28.9	24
3	M3	Z	-37.1	24
4	M3	Z	-32.4	24
5	M3	Z	-128	36
6	M2	Z	-156.8	36
7	M9	Z	-86.8	36
8	M9	Z	-28.9	24
9	M11	Z	-37.1	24
10	M11	Z	-32.4	24
11	M11	Z	-128	36
12	M10	Z	-156.8	36
13	M5	Z	-86.8	36
14	M5	Z	-28.9	24
15	M7	Z	-37.1	24
16	M7	Z	-32.4	24
17	M7	Z	-128	36
18	M6	Z	-156.8	36
19	M12	Z	-58.5	24
20	M4	Z	-62.2	24

Member Point Loads (BLC 3 : WIND LOAD (NO ICE) FRONT)

	Member Label	Direction	Magnitude[lb,k-ft]	Location[in,%]
1	M1	Y	222.2	36
2	M1	Y	65.9	24
3	M3	Y	79.4	24
4	M3	Y	66.1	24
5	M3	Y	316.7	36
6	M2	Y	403.3	36
7	M9	Y	222.2	36
8	M9	Y	65.9	24
9	M11	Y	79.4	24
10	M11	Y	66.1	24
11	M11	Y	316.7	36
12	M10	Y	403.3	36
13	M5	Y	222.2	36
14	M5	Y	65.9	24
15	M7	Y	79.4	24
16	M7	Y	66.1	24
17	M7	Y	316.7	36
18	M6	Y	403.3	36
19	M12	Y	46.2	24
20	M4	Y	48.9	24

Member Point Loads (BLC 4 : WIND LOAD (NO ICE) SIDE)

	Member Label	Direction	Magnitude[lb,k-ft]	Location[in,%]
1	M1	X	118.1	36
2	M1	X	27.9	24
3	M3	X	56.8	24

Member Point Loads (BLC 4 : WIND LOAD (NO ICE) SIDE) (Continued)

	Member Label	Direction	Magnitude[lb,k-ft]	Location[in,%]
4	M3	X	54.6	24
5	M3	X	223.8	36
6	M2	X	165.6	36
7	M9	X	118.1	36
8	M9	X	27.9	24
9	M11	X	56.8	24
10	M11	X	54.6	24
11	M11	X	223.8	36
12	M10	X	165.6	36
13	M5	X	118.1	36
14	M5	X	27.9	24
15	M7	X	56.8	24
16	M7	X	54.6	24
17	M7	X	223.8	36
18	M6	X	165.6	36
19	M12	X	46.2	24
20	M4	X	48.9	24

Member Point Loads (BLC 5 : WIND LOAD (ICE) FRONT)

	Member Label	Direction	Magnitude[lb,k-ft]	Location[in,%]
1	M1	Y	51.8	36
2	M1	Y	19.4	24
3	M3	Y	20	24
4	M3	Y	17	24
5	M3	Y	72.1	36
6	M2	Y	87.9	36
7	M9	Y	51.8	36
8	M9	Y	19.4	24
9	M11	Y	20	24
10	M11	Y	17	24
11	M11	Y	72.1	36
12	M10	Y	87.9	36
13	M5	Y	51.8	36
14	M5	Y	19.4	24
15	M7	Y	20	24
16	M7	Y	17	24
17	M7	Y	72.1	36
18	M6	Y	87.9	36
19	M12	Y	15.8	24
20	M4	Y	16.6	24

Member Point Loads (BLC 6 : WIND LOAD (ICE) SIDE)

	Member Label	Direction	Magnitude[lb,k-ft]	Location[in,%]
1	M1	X	31.8	36
2	M1	X	10.8	24
3	M3	X	15.1	24
4	M3	X	14.5	24
5	M3	X	54.6	36
6	M2	X	41.5	36
7	M9	X	31.8	36
8	M9	X	10.8	24
9	M11	X	15.1	24
10	M11	X	14.5	24
11	M11	X	54.6	36
12	M10	X	41.5	36
13	M5	X	31.8	36

Member Point Loads (BLC 6 : WIND LOAD (ICE) SIDE) (Continued)

	Member Label	Direction	Magnitude[lb,k-ft]	Location[in,%]
14	M5	X	10.8	24
15	M7	X	15.1	24
16	M7	X	14.5	24
17	M7	X	54.6	36
18	M6	X	41.5	36
19	M12	X	15.8	24
20	M4	X	16.6	24

Member Point Loads (BLC 8 : WIND LOAD (SERVICE) FRONT)

	Member Label	Direction	Magnitude[lb,k-ft]	Location[in,%]
1	M1	Y	15.1	36
2	M1	Y	4.5	24
3	M3	Y	5.4	24
4	M3	Y	4.5	24
5	M3	Y	21.6	36
6	M2	Y	27.4	36
7	M9	Y	15.1	36
8	M9	Y	4.5	24
9	M11	Y	5.4	24
10	M11	Y	4.5	24
11	M11	Y	21.6	36
12	M10	Y	27.4	36
13	M5	Y	15.1	36
14	M5	Y	4.5	24
15	M7	Y	5.4	24
16	M7	Y	4.5	24
17	M7	Y	21.6	36
18	M6	Y	27.4	36
19	M12	Y	4.4	24
20	M4	Y	4.6	24

Member Point Loads (BLC 9 : WIND LOAD (SERVICE) SIDE)

	Member Label	Direction	Magnitude[lb,k-ft]	Location[in,%]
1	M1	X	8	36
2	M1	X	1.9	24
3	M3	X	3.9	24
4	M3	X	3.7	24
5	M3	X	15.2	36
6	M2	X	11.3	36
7	M9	X	8	36
8	M9	X	1.9	24
9	M11	X	3.9	24
10	M11	X	3.7	24
11	M11	X	15.2	36
12	M10	X	11.3	36
13	M5	X	8	36
14	M5	X	1.9	24
15	M7	X	3.9	24
16	M7	X	3.7	24
17	M7	X	15.2	36
18	M6	X	11.3	36
19	M12	X	4.4	24
20	M4	X	4.6	24

Member Point Loads (BLC 10 : LIVE LOAD (SERVICE))

Member Label	Direction	Magnitude[lb,k-ft]	Location[in,%]

Member Point Loads (BLC 10 : LIVE LOAD (SERVICE)) (Continued)

	Member Label	Direction	Magnitude[lb,k-ft]	Location[in,%]
1	M9	Z	-500	0
2	M1	Z	-500	0
3	M5	Z	-500	0

Member Distributed Loads (BLC 2 : DEAD LOAD (ICE))

	Member Label	Direction	Start Magnitude[lb/in,...	End Magnitude[lb/in,...	Start Location[in,%]	End Location[in,%]
1	M1	Z	-.54	-.54	0	0
2	M2	Z	-.54	-.54	0	0
3	M3	Z	-.54	-.54	0	0
4	M4	Z	-.54	-.54	0	0
5	M5	Z	-.54	-.54	0	0
6	M6	Z	-.54	-.54	0	0
7	M7	Z	-.54	-.54	0	0
8	M8	Z	-.54	-.54	0	0
9	M9	Z	-.54	-.54	0	0
10	M10	Z	-.54	-.54	0	0
11	M11	Z	-.54	-.54	0	0
12	M12	Z	-.54	-.54	0	0
13	M19	Z	-.54	-.54	0	0
14	M20	Z	-.54	-.54	0	0
15	M21	Z	-.54	-.54	0	0
16	M22	Z	-.729	-.729	0	0
17	M23	Z	-.729	-.729	0	0
18	M24	Z	-.729	-.729	0	0
19	M55	Z	-.813	-.813	0	0
20	M56	Z	-.813	-.813	0	0
21	M57	Z	-.813	-.813	0	0

Member Distributed Loads (BLC 3 : WIND LOAD (NO ICE) FRONT)

	Member Label	Direction	Start Magnitude[lb/in,...	End Magnitude[lb/in,...	Start Location[in,%]	End Location[in,%]
1	M1	PY	.8	.8	0	0
2	M2	PY	.8	.8	0	0
3	M3	PY	.8	.8	0	0
4	M4	PY	.8	.8	0	0
5	M5	PY	.8	.8	0	0
6	M6	PY	.8	.8	0	0
7	M7	PY	.8	.8	0	0
8	M8	PY	.8	.8	0	0
9	M9	PY	.8	.8	0	0
10	M10	PY	.8	.8	0	0
11	M11	PY	.8	.8	0	0
12	M12	PY	.8	.8	0	0
13	M19	PY	.8	.8	0	0
14	M20	PY	.8	.8	0	0
15	M21	PY	.8	.8	0	0
16	M22	PY	1.159	1.159	0	0
17	M23	PY	1.159	1.159	0	0
18	M24	PY	1.159	1.159	0	0
19	M55	PY	1.205	1.205	0	0
20	M56	PY	1.205	1.205	0	0
21	M57	PY	1.205	1.205	0	0

Member Distributed Loads (BLC 4 : WIND LOAD (NO ICE) SIDE)

	Member Label	Direction	Start Magnitude[lb/in,...	End Magnitude[lb/in,...	Start Location[in,%]	End Location[in,%]

Member Distributed Loads (BLC 4 : WIND LOAD (NO ICE) SIDE) (Continued)

	Member Label	Direction	Start Magnitude[lb/in,...	End Magnitude[lb/in,...	Start Location[in,%]	End Location[in,%]
1	M1	PX	.8	.8	0	0
2	M2	PX	.8	.8	0	0
3	M3	PX	.8	.8	0	0
4	M4	PX	.8	.8	0	0
5	M5	PX	.8	.8	0	0
6	M6	PX	.8	.8	0	0
7	M7	PX	.8	.8	0	0
8	M8	PX	.8	.8	0	0
9	M9	PX	.8	.8	0	0
10	M10	PX	.8	.8	0	0
11	M11	PX	.8	.8	0	0
12	M12	PX	.8	.8	0	0
13	M19	PX	.8	.8	0	0
14	M20	PX	.8	.8	0	0
15	M21	PX	.8	.8	0	0
16	M22	PX	1.159	1.159	0	0
17	M23	PX	1.159	1.159	0	0
18	M24	PX	1.159	1.159	0	0
19	M55	PX	1.205	1.205	0	0
20	M56	PX	1.205	1.205	0	0
21	M57	PX	1.205	1.205	0	0

Member Distributed Loads (BLC 5 : WIND LOAD (ICE) FRONT)

	Member Label	Direction	Start Magnitude[lb/in,...	End Magnitude[lb/in,...	Start Location[in,%]	End Location[in,%]
1	M1	PY	.25	.25	0	0
2	M2	PY	.25	.25	0	0
3	M3	PY	.25	.25	0	0
4	M4	PY	.25	.25	0	0
5	M5	PY	.25	.25	0	0
6	M6	PY	.25	.25	0	0
7	M7	PY	.25	.25	0	0
8	M8	PY	.25	.25	0	0
9	M9	PY	.25	.25	0	0
10	M10	PY	.25	.25	0	0
11	M11	PY	.25	.25	0	0
12	M12	PY	.25	.25	0	0
13	M19	PY	.305	.305	0	0
14	M20	PY	.305	.305	0	0
15	M21	PY	.305	.305	0	0
16	M22	PY	.377	.377	0	0
17	M23	PY	.377	.377	0	0
18	M24	PY	.377	.377	0	0
19	M55	PY	.337	.337	0	0
20	M56	PY	.337	.337	0	0
21	M57	PY	.337	.337	0	0

Member Distributed Loads (BLC 6 : WIND LOAD (ICE) SIDE)

	Member Label	Direction	Start Magnitude[lb/in,...	End Magnitude[lb/in,...	Start Location[in,%]	End Location[in,%]
1	M1	PX	.25	.25	0	0
2	M2	PX	.25	.25	0	0
3	M3	PX	.25	.25	0	0
4	M4	PX	.25	.25	0	0
5	M5	PX	.25	.25	0	0
6	M6	PX	.25	.25	0	0
7	M7	PX	.25	.25	0	0
8	M8	PX	.25	.25	0	0

Member Distributed Loads (BLC 6 : WIND LOAD (ICE) SIDE) (Continued)

	Member Label	Direction	Start Magnitude[lb/in,...	End Magnitude[lb/in,...	Start Location[in,%]	End Location[in,%]
9	M9	PX	.25	.25	0	0
10	M10	PX	.25	.25	0	0
11	M11	PX	.25	.25	0	0
12	M12	PX	.25	.25	0	0
13	M19	PX	.305	.305	0	0
14	M20	PX	.305	.305	0	0
15	M21	PX	.305	.305	0	0
16	M22	PX	.377	.377	0	0
17	M23	PX	.377	.377	0	0
18	M24	PX	.377	.377	0	0
19	M55	PX	.337	.337	0	0
20	M56	PX	.337	.337	0	0
21	M57	PX	.337	.337	0	0

Member Distributed Loads (BLC 8 : WIND LOAD (SERVICE) FRONT)

	Member Label	Direction	Start Magnitude[lb/in,...	End Magnitude[lb/in,...	Start Location[in,%]	End Location[in,%]
1	M1	PY	.054	.054	0	0
2	M2	PY	.054	.054	0	0
3	M3	PY	.054	.054	0	0
4	M4	PY	.054	.054	0	0
5	M5	PY	.054	.054	0	0
6	M6	PY	.054	.054	0	0
7	M7	PY	.054	.054	0	0
8	M8	PY	.054	.054	0	0
9	M9	PY	.054	.054	0	0
10	M10	PY	.054	.054	0	0
11	M11	PY	.054	.054	0	0
12	M12	PY	.054	.054	0	0
13	M19	PY	.054	.054	0	0
14	M20	PY	.054	.054	0	0
15	M21	PY	.054	.054	0	0
16	M22	PY	.08	.08	0	0
17	M23	PY	.08	.08	0	0
18	M24	PY	.08	.08	0	0
19	M55	PY	.082	.082	0	0
20	M56	PY	.082	.082	0	0
21	M57	PY	.082	.082	0	0

Member Distributed Loads (BLC 9 : WIND LOAD (SERVICE) SIDE)

	Member Label	Direction	Start Magnitude[lb/in,...	End Magnitude[lb/in,...	Start Location[in,%]	End Location[in,%]
1	M1	PX	.054	.054	0	0
2	M2	PX	.054	.054	0	0
3	M3	PX	.054	.054	0	0
4	M4	PX	.054	.054	0	0
5	M5	PX	.054	.054	0	0
6	M6	PX	.054	.054	0	0
7	M7	PX	.054	.054	0	0
8	M8	PX	.054	.054	0	0
9	M9	PX	.054	.054	0	0
10	M10	PX	.054	.054	0	0
11	M11	PX	.054	.054	0	0
12	M12	PX	.054	.054	0	0
13	M19	PX	.054	.054	0	0
14	M20	PX	.054	.054	0	0
15	M21	PX	.054	.054	0	0
16	M22	PX	.08	.08	0	0

Member Distributed Loads (BLC 9 : WIND LOAD (SERVICE) SIDE) (Continued)

	Member Label	Direction	Start Magnitude[lb/in,...	End Magnitude[lb/in,...	Start Location[in,%]	End Location[in,%]
17	M23	PX	.08	.08	0	0
18	M24	PX	.08	.08	0	0
19	M55	PX	.082	.082	0	0
20	M56	PX	.082	.082	0	0
21	M57	PX	.082	.082	0	0

Member Distributed Loads (BLC 16 : BLC 1 Transient Area Loads)

	Member Label	Direction	Start Magnitude[lb/in,...	End Magnitude[lb/in,...	Start Location[in,%]	End Location[in,%]
1	M27	Z	-.006	-.047	0	10.161
2	M27	Z	-.047	-.068	10.161	20.323
3	M27	Z	-.068	-.092	20.323	30.484
4	M27	Z	-.092	-.12	30.484	40.645
5	M27	Z	-.12	-.125	40.645	50.807
6	M29	Z	-.006	-.047	0	10.161
7	M29	Z	-.047	-.068	10.161	20.323
8	M29	Z	-.068	-.092	20.323	30.484
9	M29	Z	-.092	-.12	30.484	40.645
10	M29	Z	-.12	-.125	40.645	50.807
11	M56	Z	-.013	-.104	0	10.24
12	M56	Z	-.104	-.187	10.24	20.48
13	M56	Z	-.187	-.336	20.48	30.72
14	M56	Z	-.336	-.226	30.72	40.96
15	M56	Z	-.226	-.005	40.96	51.2
16	M25	Z	-.006	-.047	0	10.161
17	M25	Z	-.047	-.068	10.161	20.323
18	M25	Z	-.068	-.092	20.323	30.484
19	M25	Z	-.092	-.12	30.484	40.645
20	M25	Z	-.12	-.125	40.645	50.807
21	M30	Z	-.006	-.047	0	10.161
22	M30	Z	-.047	-.068	10.161	20.323
23	M30	Z	-.068	-.092	20.323	30.484
24	M30	Z	-.092	-.12	30.484	40.645
25	M30	Z	-.12	-.125	40.645	50.807
26	M57	Z	-.013	-.104	0	10.24
27	M57	Z	-.104	-.187	10.24	20.48
28	M57	Z	-.187	-.336	20.48	30.72
29	M57	Z	-.336	-.226	30.72	40.96
30	M57	Z	-.226	-.005	40.96	51.2
31	M26	Z	-.006	-.047	0	10.161
32	M26	Z	-.047	-.068	10.161	20.323
33	M26	Z	-.068	-.092	20.323	30.484
34	M26	Z	-.092	-.12	30.484	40.645
35	M26	Z	-.12	-.125	40.645	50.807
36	M28	Z	-.006	-.047	0	10.161
37	M28	Z	-.047	-.068	10.161	20.323
38	M28	Z	-.068	-.092	20.323	30.484
39	M28	Z	-.092	-.12	30.484	40.645
40	M28	Z	-.12	-.125	40.645	50.807
41	M55	Z	-.013	-.104	0	10.24
42	M55	Z	-.104	-.187	10.24	20.48
43	M55	Z	-.187	-.336	20.48	30.72
44	M55	Z	-.336	-.226	30.72	40.96
45	M55	Z	-.226	-.005	40.96	51.2

Member Distributed Loads (BLC 17 : BLC 2 Transient Area Loads)

Member Label	Direction	Start Magnitude[lb/in,...	End Magnitude[lb/in,...	Start Location[in,%]	End Location[in,%]

Member Distributed Loads (BLC 17 : BLC 2 Transient Area Loads) (Continued)

	Member Label	Direction	Start Magnitude[lb/in,...	End Magnitude[lb/in,...	Start Location[in,%]	End Location[in,%]
1	M27	Z	-.019	-.148	0	10.161
2	M27	Z	-.148	-.211	10.161	20.323
3	M27	Z	-.211	-.288	20.323	30.484
4	M27	Z	-.288	-.374	30.484	40.645
5	M27	Z	-.374	-.389	40.645	50.807
6	M29	Z	-.019	-.148	0	10.161
7	M29	Z	-.148	-.211	10.161	20.323
8	M29	Z	-.211	-.288	20.323	30.484
9	M29	Z	-.288	-.374	30.484	40.645
10	M29	Z	-.374	-.389	40.645	50.807
11	M56	Z	-.041	-.323	0	10.24
12	M56	Z	-.323	-.582	10.24	20.48
13	M56	Z	-.582	-1.048	20.48	30.72
14	M56	Z	-1.048	-.705	30.72	40.96
15	M56	Z	-.705	-.014	40.96	51.2
16	M25	Z	-.019	-.148	0	10.161
17	M25	Z	-.148	-.211	10.161	20.323
18	M25	Z	-.211	-.288	20.323	30.484
19	M25	Z	-.288	-.374	30.484	40.645
20	M25	Z	-.374	-.389	40.645	50.807
21	M30	Z	-.019	-.148	0	10.161
22	M30	Z	-.148	-.211	10.161	20.323
23	M30	Z	-.211	-.288	20.323	30.484
24	M30	Z	-.288	-.374	30.484	40.645
25	M30	Z	-.374	-.389	40.645	50.807
26	M57	Z	-.041	-.323	0	10.24
27	M57	Z	-.323	-.582	10.24	20.48
28	M57	Z	-.582	-1.048	20.48	30.72
29	M57	Z	-1.048	-.705	30.72	40.96
30	M57	Z	-.705	-.014	40.96	51.2
31	M26	Z	-.019	-.148	0	10.161
32	M26	Z	-.148	-.211	10.161	20.323
33	M26	Z	-.211	-.288	20.323	30.484
34	M26	Z	-.288	-.374	30.484	40.645
35	M26	Z	-.374	-.389	40.645	50.807
36	M28	Z	-.019	-.148	0	10.161
37	M28	Z	-.148	-.211	10.161	20.323
38	M28	Z	-.211	-.288	20.323	30.484
39	M28	Z	-.288	-.374	30.484	40.645
40	M28	Z	-.374	-.389	40.645	50.807
41	M55	Z	-.041	-.323	0	10.24
42	M55	Z	-.323	-.582	10.24	20.48
43	M55	Z	-.582	-1.048	20.48	30.72
44	M55	Z	-1.048	-.705	30.72	40.96
45	M55	Z	-.705	-.014	40.96	51.2

Member Distributed Loads (BLC 18 : BLC 7 Transient Area Loads)

	Member Label	Direction	Start Magnitude[lb/in,...	End Magnitude[lb/in,...	Start Location[in,%]	End Location[in,%]
1	M27	Z	-.136	-1.085	0	10.161
2	M27	Z	-1.085	-1.548	10.161	20.323
3	M27	Z	-1.548	-2.109	20.323	30.484
4	M27	Z	-2.109	-2.738	30.484	40.645
5	M27	Z	-2.738	-2.849	40.645	50.807
6	M29	Z	-.136	-1.085	0	10.161
7	M29	Z	-1.085	-1.548	10.161	20.323
8	M29	Z	-1.548	-2.109	20.323	30.484

Member Distributed Loads (BLC 18 : BLC 7 Transient Area Loads) (Continued)

	Member Label	Direction	Start Magnitude[lb/in,...	End Magnitude[lb/in,...	Start Location[in,%]	End Location[in,%]
9	M29	Z	-2.109	-2.738	30.484	40.645
10	M29	Z	-2.738	-2.849	40.645	50.807
11	M56	Z	-.301	-2.369	0	10.24
12	M56	Z	-2.369	-4.267	10.24	20.48
13	M56	Z	-4.267	-7.676	20.48	30.72
14	M56	Z	-7.676	-5.163	30.72	40.96
15	M56	Z	-5.163	-.103	40.96	51.2
16	M25	Z	-.136	-1.085	0	10.161
17	M25	Z	-1.085	-1.548	10.161	20.323
18	M25	Z	-1.548	-2.109	20.323	30.484
19	M25	Z	-2.109	-2.738	30.484	40.645
20	M25	Z	-2.738	-2.849	40.645	50.807
21	M30	Z	-.136	-1.085	0	10.161
22	M30	Z	-1.085	-1.548	10.161	20.323
23	M30	Z	-1.548	-2.109	20.323	30.484
24	M30	Z	-2.109	-2.738	30.484	40.645
25	M30	Z	-2.738	-2.849	40.645	50.807
26	M57	Z	-.301	-2.369	0	10.24
27	M57	Z	-2.369	-4.267	10.24	20.48
28	M57	Z	-4.267	-7.676	20.48	30.72
29	M57	Z	-7.676	-5.163	30.72	40.96
30	M57	Z	-5.163	-.103	40.96	51.2
31	M26	Z	-.136	-1.085	0	10.161
32	M26	Z	-1.085	-1.548	10.161	20.323
33	M26	Z	-1.548	-2.109	20.323	30.484
34	M26	Z	-2.109	-2.738	30.484	40.645
35	M26	Z	-2.738	-2.849	40.645	50.807
36	M28	Z	-.136	-1.085	0	10.161
37	M28	Z	-1.085	-1.548	10.161	20.323
38	M28	Z	-1.548	-2.109	20.323	30.484
39	M28	Z	-2.109	-2.738	30.484	40.645
40	M28	Z	-2.738	-2.849	40.645	50.807
41	M55	Z	-.301	-2.369	0	10.24
42	M55	Z	-2.369	-4.267	10.24	20.48
43	M55	Z	-4.267	-7.676	20.48	30.72
44	M55	Z	-7.676	-5.163	30.72	40.96
45	M55	Z	-5.163	-.103	40.96	51.2

Member Area Loads (BLC 1 : DEAD LOAD)

	Joint A	Joint B	Joint C	Joint D	Direction	Distribution	Magnitude[psf]
1	N51	N47	N46	N50	Z	A-B	-1.75
2	N44	N52	N34	N33	Z	A-B	-1.75
3	N45	N49	N48	N35	Z	A-B	-1.75

Member Area Loads (BLC 2 : DEAD LOAD (ICE))

	Joint A	Joint B	Joint C	Joint D	Direction	Distribution	Magnitude[psf]
1	N51	N47	N46	N50	Z	A-B	-5.46
2	N44	N52	N34	N33	Z	A-B	-5.46
3	N45	N49	N48	N35	Z	A-B	-5.46

Member Area Loads (BLC 7 : LIVE LOAD (MAN))

	Joint A	Joint B	Joint C	Joint D	Direction	Distribution	Magnitude[psf]
1	N51	N47	N46	N50	Z	A-B	-40
2	N44	N52	N34	N33	Z	A-B	-40

Member Area Loads (BLC 7 : LIVE LOAD (MAN)) (Continued)

	Joint A	Joint B	Joint C	Joint D	Direction	Distribution	Magnitude[psf]
3	N45	N49	N48	N35	Z	A-B	-40

Envelope Joint Reactions

	Joint		X [lb]	LC	Y [lb]	LC	Z [lb]	LC	MX [k-ft]	LC	MY [k-ft]	LC	MZ [k-ft]	LC
1	N54	max	1169.246	11	1438.544	8	2006.183	22	.269	3	3.365	22	1.124	13
2		min	-1192.091	5	-1448.871	2	280.175	4	-1.882	21	.114	4	-1.121	7
3	N53	max	1142.076	11	1934.149	8	2158.543	14	4.134	14	.41	11	1.189	5
4		min	-1140.155	5	-1908.822	2	127.264	8	-.387	8	-.443	5	-1.185	11
5	N31	max	1081.571	12	1581.809	8	2025.288	18	.227	13	-.091	12	1.199	8
6		min	-1060.709	6	-1596.796	2	288.913	12	-1.987	19	-3.369	18	-1.197	2
7	Totals:	max	3377.905	11	4954.502	8	5610.657	21						
8		min	-3377.904	5	-4954.489	2	2742.206	3						

Envelope Member Section Forces

	Member	Sec		Axial[lb]	LC	y Shear[lb]	LC	z Shear[lb]	LC	Torque[k-...	LC	y-y Mome...	LC	z-z Mome...	LC
1	M1	1	max	750	38	.396	33	1.217	37	0	50	0	50	0	50
2			min	0	1	-.003	2	-.004	6	0	1	0	1	0	1
3		2	max	636.997	35	92.507	8	12.968	11	.024	6	.005	12	.075	2
4			min	-15.486	26	-149.507	2	-107.647	29	-.063	12	-.133	31	-.032	8
5		3	max	0	50	.008	2	.004	5	0	50	0	50	0	50
6			min	0	1	-.009	8	-.034	23	0	1	0	1	0	1
7	M2	1	max	0	50	.003	7	.004	11	0	50	0	50	0	50
8			min	0	1	-.005	25	-.004	5	0	1	0	1	0	1
9		2	max	36.125	2	126.298	35	67.74	10	.057	12	.056	11	-.005	8
10			min	-75.664	8	16.884	4	-47.922	4	-.018	6	-.059	4	-.129	27
11		3	max	0	50	.033	14	.007	6	0	50	0	50	0	50
12			min	0	1	-.006	8	-.016	24	0	1	0	1	0	1
13	M3	1	max	0	50	.003	7	.007	24	0	50	0	50	0	50
14			min	0	1	-.003	13	-.004	6	0	1	0	1	0	1
15		2	max	385.843	21	165.497	8	95.199	11	.003	3	.036	12	.076	13
16			min	141.719	2	-203.652	2	-140.819	5	-.018	22	-.124	6	-.077	7
17		3	max	0	50	.015	25	.002	5	0	50	0	50	0	50
18			min	0	1	-.004	7	-.039	23	0	1	0	1	0	1
19	M4	1	max	0	50	.003	7	.005	12	0	50	0	50	0	50
20			min	0	1	-.005	25	-.005	6	0	1	0	1	0	1
21		2	max	318.103	14	189.318	8	146.217	11	.023	38	.142	11	.104	2
22			min	57.064	8	-151.015	2	-138.804	5	-.004	7	-.187	5	-.163	8
23		3	max	0	50	.026	25	.003	6	0	50	0	50	0	50
24			min	0	1	-.004	7	-.031	24	0	1	0	1	0	1
25	M5	1	max	750	38	.976	33	.001	12	0	50	0	50	0	50
26			min	0	1	-.006	2	-.826	31	0	1	0	1	0	1
27		2	max	634.851	32	56.856	8	124.094	22	.029	2	.105	22	.097	28
28			min	-16.682	26	-94.31	2	-25.843	4	-.067	8	.021	4	-.029	9
29		3	max	0	50	.01	2	.021	18	0	50	0	50	0	50
30			min	0	1	-.03	20	-.002	12	0	1	0	1	0	1
31	M6	1	max	0	50	.006	8	.003	22	0	50	0	50	0	50
32			min	0	1	-.005	2	-.001	4	0	1	0	1	0	1
33		2	max	19.547	10	-7.909	4	4.02	12	.059	8	-.034	2	.071	24
34			min	-65.771	26	-41.829	25	-137.307	31	-.022	2	-.127	33	0	4
35		3	max	0	50	.01	2	.002	5	0	50	0	50	0	50
36			min	0	1	-.028	20	-.021	23	0	1	0	1	0	1
37	M7	1	max	0	50	.007	8	0	11	0	50	0	50	0	50
38			min	0	1	-.006	2	-.003	17	0	1	0	1	0	1
39		2	max	383.625	17	133.985	8	150.6	11	.002	10	.076	35	.142	2

Envelope Member Section Forces (Continued)

	Member	Sec		Axial[lb]	LC	y Shear[lb]	LC	z Shear[lb]	LC	Torque[k-...	LC	y-y Mome...	LC	z-z Mome...	LC
40			min	163.755	11	-154.623	2	-90.833	5	-.016	16	.002	4	-.066	8
41		3	max	0	50	.007	2	.01	18	0	50	0	50	0	50
42			min	0	1	-.039	20	-.002	12	0	1	0	1	0	1
43	M8	1	max	0	50	.007	8	.002	23	0	50	0	50	0	50
44			min	0	1	-.007	2	-.001	5	0	1	0	1	0	1
45		2	max	224.535	22	114.763	8	92.315	11	.023	34	.075	11	.227	2
46			min	50.492	4	-125.346	2	-132.168	5	-.007	3	-.106	5	-.163	8
47		3	max	0	50	.006	2	.002	5	0	50	0	50	0	50
48			min	0	1	-.036	20	-.007	23	0	1	0	1	0	1
49	M9	1	max	750	38	.003	9	.004	11	0	50	0	50	0	50
50			min	0	1	-1.188	28	-.452	30	0	1	0	1	0	1
51		2	max	636.855	27	133.54	7	73.209	11	.022	10	.08	11	-.037	4
52			min	-15.61	26	-35.516	13	-86.303	5	-.062	4	-.07	5	-.133	34
53		3	max	0	50	.032	15	.017	16	0	50	0	50	0	50
54			min	0	1	-.006	8	-.007	10	0	1	0	1	0	1
55	M10	1	max	0	50	.003	8	.004	10	0	50	0	50	0	50
56			min	0	1	-.003	2	-.006	16	0	1	0	1	0	1
57		2	max	36.75	7	20.188	8	97.332	24	.058	4	.12	22	.088	31
58			min	-78.413	13	-106.478	27	11.194	6	-.02	10	.013	3	.021	13
59		3	max	0	50	.008	2	.033	17	0	50	0	50	0	50
60			min	0	1	-.01	8	-.004	11	0	1	0	1	0	1
61	M11	1	max	0	50	.003	9	.004	10	0	50	0	50	0	50
62			min	0	1	-.005	15	-.005	4	0	1	0	1	0	1
63		2	max	396.46	25	188.291	8	130.935	11	0	7	.118	11	.006	3
64			min	140.855	7	-130.581	2	-140.248	5	-.017	25	-.071	5	-.105	34
65		3	max	0	50	.029	15	.031	16	0	50	0	50	0	50
66			min	0	1	-.004	9	-.003	10	0	1	0	1	0	1
67	M12	1	max	0	50	.004	9	.004	10	0	50	0	50	0	50
68			min	0	1	-.004	3	-.006	16	0	1	0	1	0	1
69		2	max	298.608	19	180.704	8	136.816	11	.023	5	.173	10	.175	2
70			min	66.696	13	-210.032	2	-105.976	5	-.008	11	-.099	4	-.181	8
71		3	max	0	50	.015	15	.036	17	0	50	0	50	0	50
72			min	0	1	-.004	9	-.002	11	0	1	0	1	0	1
73	M13	1	max	101.441	5	94.214	8	57.909	8	.027	3	.034	2	.293	13
74			min	-81.436	11	-112.752	2	-59.18	2	-.013	9	-.033	8	-.118	7
75		2	max	514.109	2	232.641	27	842.614	8	.036	17	.151	8	.377	3
76			min	-495.864	8	-115.094	2	-832.153	2	-.046	13	-.15	2	-.162	9
77		3	max	111.078	12	219.473	27	84.242	2	.007	5	.041	2	.284	3
78			min	-82.309	6	-73.433	8	-74.311	8	-.028	36	-.038	8	-.112	9
79	M14	1	max	148.121	8	70.765	3	62.983	9	.012	2	.026	4	.24	12
80			min	-119.153	2	-221.286	34	-53.334	3	-.028	33	-.029	10	-.078	6
81		2	max	364.082	10	67.928	10	745.112	3	.039	13	.128	9	.345	9
82			min	-346.848	4	-234.135	34	-735.977	9	-.045	9	-.13	3	-.152	3
83		3	max	190.508	13	63.059	10	47.807	5	.023	12	.024	4	.314	8
84			min	-172.469	7	-83.464	29	-48.889	11	-.01	6	-.026	10	-.15	2
85	M15	1	max	175.957	8	91.274	13	56.04	13	.029	8	.03	7	.244	4
86			min	-156.978	2	-107.913	7	-57.332	7	-.016	2	-.029	13	-.078	10
87		2	max	398.328	7	229.441	31	769.467	7	.037	9	.135	13	.363	7
88			min	-381.412	13	-74.831	17	-770.566	13	-.038	5	-.134	7	-.162	13
89		3	max	143.555	3	216.259	31	69.966	6	.011	9	.033	6	.3	8
90			min	-115.901	9	-43.664	26	-60.581	12	-.028	28	-.03	12	-.141	2
91	M16	1	max	22.469	8	33.162	11	44.113	5	.007	5	.029	8	.012	10
92			min	-84.896	2	-25.359	5	-42.351	11	-.007	11	-.086	2	-.097	16
93		2	max	22.469	8	30.121	11	44.113	5	.007	5	.029	8	-.003	8
94			min	-84.896	2	-28.4	5	-42.351	11	-.007	11	-.083	2	-.091	14
95		3	max	22.469	8	27.081	11	44.113	5	.007	5	.027	8	.006	7
96			min	-84.896	2	-31.44	5	-42.351	11	-.007	11	-.08	2	-.093	25

Envelope Member Section Forces (Continued)

	Member	Sec		Axial[lb]	LC	y Shear[lb]	LC	z Shear[lb]	LC	Torque[k-...	LC	y-y Mome...	LC	z-z Mome...	LC
97	M17	1	max	23.519	4	34.585	7	59.099	13	.008	13	.028	4	.011	6
98			min	-84.341	10	-25.065	13	-55.015	7	-.008	7	-.085	10	-.095	24
99		2	max	23.519	4	31.545	7	59.099	13	.008	13	.026	4	-.005	4
100			min	-84.341	10	-28.105	13	-55.015	7	-.008	7	-.079	10	-.09	22
101		3	max	23.519	4	28.505	7	59.099	13	.008	13	.023	4	.014	2
102			min	-84.341	10	-31.145	13	-55.015	7	-.008	7	-.074	10	-.093	20
103	M18	1	max	25.568	13	33.529	3	59.08	9	.008	9	.032	13	.024	2
104			min	-85.896	7	-25.559	9	-57.27	3	-.008	3	-.087	7	-.098	8
105		2	max	25.568	13	30.489	3	59.08	9	.008	9	.029	12	-.004	13
106			min	-85.896	7	-28.599	9	-57.27	3	-.008	3	-.08	6	-.09	19
107		3	max	25.568	13	27.448	3	59.08	9	.008	9	.029	12	.003	11
108			min	-85.896	7	-31.639	9	-57.27	3	-.008	3	-.08	6	-.091	17
109	M19	1	max	0	50	.003	3	0	2	0	50	0	50	0	50
110			min	0	1	0	11	-.002	10	0	1	0	1	0	1
111		2	max	-40.33	3	149.89	3	27.799	6	.03	10	.011	5	.07	27
112			min	-214.15	34	-116.923	9	-32.138	12	-.034	4	-.069	24	.003	8
113		3	max	0	50	0	14	.002	2	0	50	0	50	0	50
114			min	0	1	-.003	10	-.002	11	0	1	0	1	0	1
115	M20	1	max	0	50	0	50	0	50	0	50	0	50	0	50
116			min	0	1	0	1	0	1	0	1	0	1	0	1
117		2	max	-35.928	12	105.297	11	44.844	2	.027	6	.007	2	.071	35
118			min	-220.616	31	-68.61	5	-50.232	8	-.03	12	-.065	20	.007	4
119		3	max	0	50	0	50	0	50	0	50	0	50	0	50
120			min	0	1	0	1	0	1	0	1	0	1	0	1
121	M21	1	max	0	50	.003	6	.002	5	0	50	0	50	0	50
122			min	0	1	0	25	-.002	2	0	1	0	1	0	1
123		2	max	-34.913	7	145.024	7	27.512	10	.036	2	.013	10	.07	31
124			min	-217.393	38	-116.706	13	-31.73	4	-.038	8	-.068	16	.011	12
125		3	max	0	50	0	5	.002	5	0	50	0	50	0	50
126			min	0	1	-.003	13	-.001	2	0	1	0	1	0	1
127	M22	1	max	0	50	.006	3	0	8	0	50	0	50	0	50
128			min	0	1	-.001	22	0	5	0	1	0	1	0	1
129		2	max	563.753	13	364.151	3	202.627	4	.17	3	.063	6	.336	36
130			min	-406.848	7	-245.955	9	-199.049	10	-.203	9	-.065	12	.059	5
131		3	max	0	50	0	16	0	8	0	50	0	50	0	50
132			min	0	1	-.005	9	0	5	0	1	0	1	0	1
133	M23	1	max	0	50	0	50	0	50	0	50	0	50	0	50
134			min	0	1	0	1	0	1	0	1	0	1	0	1
135		2	max	679.393	8	285.782	11	89.059	12	.122	12	.075	2	.348	32
136			min	-512.78	2	-153.228	5	-85.086	6	-.17	6	-.077	8	.042	13
137		3	max	0	50	0	50	0	50	0	50	0	50	0	50
138			min	0	1	0	1	0	1	0	1	0	1	0	1
139	M24	1	max	0	50	.005	7	0	11	0	50	0	50	0	50
140			min	0	1	-.001	24	0	8	0	1	0	1	0	1
141		2	max	497.818	4	357.895	7	214.912	7	.188	8	.068	9	.342	28
142			min	-336.269	10	-254.385	13	-212.218	13	-.228	2	-.071	3	.042	9
143		3	max	0	50	.001	18	0	11	0	50	0	50	0	50
144			min	0	1	-.006	13	0	7	0	1	0	1	0	1
145	M25	1	max	614.213	11	48.69	26	17.252	5	0	21	.009	11	.052	10
146			min	-631.004	5	.308	5	-13.65	11	0	3	-.031	26	-.038	4
147		2	max	614.213	11	3.668	11	17.252	5	0	21	.017	26	.023	9
148			min	-631.004	5	-9.331	5	-13.65	11	0	3	-.002	7	-.01	3
149		3	max	614.213	11	-7.8	11	17.252	5	0	21	.003	4	.077	26
150			min	-631.004	5	-109.168	26	-13.65	11	0	3	-.055	26	-.002	12
151	M26	1	max	831.768	7	48.676	26	23.905	13	0	18	.015	7	.068	7
152			min	-846.831	13	-2.472	13	-20.295	7	0	12	-.031	26	-.054	13
153		2	max	831.768	7	6.421	7	23.905	13	0	18	.017	26	.022	6

Envelope Member Section Forces (Continued)

	Member	Sec		Axial[lb]	LC	y Shear[lb]	LC	z Shear[lb]	LC	Torque[k-...	LC	y-y Mome...	LC	z-z Mome...	LC
154			min	-846.831	13	-12.111	13	-20.295	7	0	12	-.002	3	-.009	12
155		3	max	831.768	7	-5.048	7	23.905	13	0	18	.008	13	.077	26
156			min	-846.831	13	-109.183	26	-20.295	7	0	12	-.055	26	-.012	8
157	M27	1	max	862.735	2	48.566	26	24.644	9	0	14	.015	3	.074	2
158			min	-877.511	8	-2.632	9	-20.915	3	0	8	-.031	26	-.059	8
159		2	max	862.735	2	6.367	3	24.644	9	0	14	.017	26	.029	2
160			min	-877.511	8	-12.27	9	-20.915	3	0	8	-.002	23	-.014	8
161		3	max	862.735	2	-5.101	3	24.644	9	0	14	.01	8	.078	26
162			min	-877.511	8	-109.29	26	-20.915	3	0	8	-.055	26	-.008	3
163	M28	1	max	609.234	6	47.856	26	19.603	6	0	13	.011	12	.044	11
164			min	-621.171	12	-4.442	6	-15.133	12	0	32	-.031	26	-.031	5
165		2	max	609.234	6	6.685	12	19.603	6	0	13	.017	26	.029	33
166			min	-621.171	12	-14.08	6	-15.133	12	0	32	-.006	7	-.007	26
167		3	max	609.234	6	-4.783	12	19.603	6	0	13	-.003	4	.08	26
168			min	-621.171	12	-110	26	-15.133	12	0	32	-.056	26	-.021	12
169	M29	1	max	908.3	2	47.782	26	28.241	2	0	9	.018	8	.064	7
170			min	-920.315	8	-9.541	2	-23.658	8	0	28	-.031	26	-.05	13
171		2	max	908.3	2	11.643	8	28.241	2	0	9	.017	26	.029	28
172			min	-920.315	8	-19.179	2	-23.658	8	0	28	-.008	2	-.007	26
173		3	max	908.3	2	.175	8	28.241	2	0	9	0	13	.094	2
174			min	-920.315	8	-110.077	26	-23.658	8	0	28	-.056	26	-.042	8
175	M30	1	max	830.759	9	47.723	26	25.526	9	0	5	.015	3	.06	3
176			min	-840.685	3	-7.082	9	-20.879	3	0	36	-.031	26	-.046	9
177		2	max	830.759	9	9.057	3	25.526	9	0	5	.017	26	.029	37
178			min	-840.685	3	-16.72	9	-20.879	3	0	36	-.006	35	-.007	26
179		3	max	830.759	9	-2.411	3	25.526	9	0	5	0	8	.081	9
180			min	-840.685	3	-110.133	26	-20.879	3	0	36	-.056	26	-.029	3
181	M31	1	max	254.261	7	691.646	35	293.47	9	.242	9	.081	4	.234	13
182			min	-215.853	13	39.051	26	-381.579	3	-.417	3	-.099	10	-.297	7
183		2	max	254.261	7	691.646	35	293.47	9	.242	9	.045	4	.224	13
184			min	-215.853	13	39.051	26	-381.579	3	-.417	3	-.074	10	-.307	7
185		3	max	254.261	7	691.646	35	293.47	9	.242	9	.024	6	.214	13
186			min	-215.853	13	39.051	26	-381.579	3	-.417	3	-.063	12	-.316	7
187	M32	1	max	292.758	7	271.242	14	471.453	9	.455	9	.128	2	.238	12
188			min	-257.142	13	37.176	8	-370.149	3	-.257	3	-.113	8	-.288	6
189		2	max	292.758	7	271.242	14	471.453	9	.455	9	.086	2	.225	12
190			min	-257.142	13	37.176	8	-370.149	3	-.257	3	-.059	8	-.296	6
191		3	max	292.758	7	271.242	14	471.453	9	.455	9	.057	12	.211	12
192			min	-257.142	13	37.176	8	-370.149	3	-.257	3	-.018	6	-.305	6
193	M33	1	max	411.444	6	596.166	21	469.974	9	.45	9	.13	3	.47	12
194			min	-391.063	12	203.861	2	-526.313	3	-.548	3	-.13	9	-.431	6
195		2	max	411.444	6	596.166	21	469.974	9	.45	9	.067	3	.439	12
196			min	-391.063	12	203.861	2	-526.313	3	-.548	3	-.073	9	-.468	6
197		3	max	411.444	6	596.166	21	469.974	9	.45	9	.003	3	.408	12
198			min	-391.063	12	203.861	2	-526.313	3	-.548	3	-.018	22	-.505	6
199	M34	1	max	162.267	6	350.019	14	232.344	9	.337	9	.06	3	.277	12
200			min	-149.079	12	69.529	8	-195.066	3	-.272	3	-.053	9	-.29	6
201		2	max	162.267	6	350.019	14	232.344	9	.337	9	.039	2	.256	12
202			min	-149.079	12	69.529	8	-195.066	3	-.272	3	-.027	8	-.303	6
203		3	max	162.267	6	350.019	14	232.344	9	.337	9	.023	38	.236	12
204			min	-149.079	12	69.529	8	-195.066	3	-.272	3	-.004	7	-.317	6
205	M35	1	max	345.302	2	689.467	32	166.62	5	.098	5	.062	12	.315	8
206			min	-307.594	8	37.852	26	-259.879	11	-.282	11	-.078	6	-.377	2
207		2	max	345.302	2	689.467	32	166.62	5	.098	5	.041	13	.303	8
208			min	-307.594	8	37.852	26	-259.879	11	-.282	11	-.068	7	-.384	2
209		3	max	345.302	2	689.467	32	166.62	5	.098	5	.029	2	.291	8
210			min	-307.594	8	37.852	26	-259.879	11	-.282	11	-.067	8	-.391	2

Envelope Member Section Forces (Continued)

	Member	Sec		Axial[lb]	LC	y Shear[lb]	LC	z Shear[lb]	LC	Torque[k-...	LC	y-y Mome...	LC	z-z Mome...	LC
211	M36	1	max	444.747	2	260.498	22	294.351	5	.306	6	.075	10	.35	8
212			min	-410.794	8	47.321	26	-186.388	11	-.095	12	-.064	4	-.397	2
213		2	max	444.747	2	260.498	22	294.351	5	.306	6	.06	9	.338	8
214			min	-410.794	8	47.321	26	-186.388	11	-.095	12	-.036	3	-.406	2
215		3	max	444.747	2	260.498	22	294.351	5	.306	6	.059	8	.326	8
216			min	-410.794	8	47.321	26	-186.388	11	-.095	12	-.022	2	-.415	2
217	M37	1	max	499.236	2	593.912	17	342.972	5	.294	5	.097	11	.568	8
218			min	-478.439	8	226.532	11	-402.994	11	-.4	11	-.096	5	-.529	2
219		2	max	499.236	2	593.912	17	342.972	5	.294	5	.049	11	.535	8
220			min	-478.439	8	226.532	11	-402.994	11	-.4	11	-.055	5	-.564	2
221		3	max	499.236	2	593.912	17	342.972	5	.294	5	.002	10	.502	8
222			min	-478.439	8	226.532	11	-402.994	11	-.4	11	-.016	16	-.599	2
223	M38	1	max	153.817	2	256.452	22	160.847	5	.224	5	.042	10	.296	8
224			min	-142.747	8	62.962	4	-120.844	11	-.153	11	-.036	4	-.319	2
225		2	max	153.817	2	256.452	22	160.847	5	.224	5	.03	10	.279	8
226			min	-142.747	8	62.962	4	-120.844	11	-.153	11	-.02	4	-.328	2
227		3	max	153.817	2	256.452	22	160.847	5	.224	5	.023	34	.263	8
228			min	-142.747	8	62.962	4	-120.844	11	-.153	11	-.007	3	-.338	2
229	M39	1	max	252.79	10	691.489	27	280.657	13	.219	13	.093	8	.227	4
230			min	-214.819	4	38.923	26	-372.212	7	-.4	7	-.111	2	-.289	10
231		2	max	252.79	10	691.489	27	280.657	13	.219	13	.052	8	.214	4
232			min	-214.819	4	38.923	26	-372.212	7	-.4	7	-.08	2	-.296	10
233		3	max	252.79	10	691.489	27	280.657	13	.219	13	.022	10	.201	4
234			min	-214.819	4	38.923	26	-372.212	7	-.4	7	-.062	4	-.303	10
235	M40	1	max	304.391	9	269.187	18	485.136	2	.478	2	.117	7	.252	3
236			min	-269.638	3	34.536	13	-381.794	8	-.276	8	-.104	13	-.3	9
237		2	max	304.391	9	269.187	18	485.136	2	.478	2	.075	6	.243	3
238			min	-269.638	3	34.536	13	-381.794	8	-.276	8	-.05	12	-.313	9
239		3	max	304.391	9	269.187	18	485.136	2	.478	2	.058	4	.234	3
240			min	-269.638	3	34.536	13	-381.794	8	-.276	8	-.02	10	-.326	9
241	M41	1	max	410.092	10	606.731	25	464.638	13	.441	13	.124	7	.47	4
242			min	-388.993	4	203.661	7	-519.831	7	-.537	7	-.125	13	-.431	10
243		2	max	410.092	10	606.731	25	464.638	13	.441	13	.062	7	.435	4
244			min	-388.993	4	203.661	7	-519.831	7	-.537	7	-.069	13	-.464	10
245		3	max	410.092	10	606.731	25	464.638	13	.441	13	0	7	.399	4
246			min	-388.993	4	203.661	7	-519.831	7	-.537	7	-.017	25	-.498	10
247	M42	1	max	161.928	10	330.604	19	238.239	13	.349	13	.061	7	.276	4
248			min	-149.8	4	79.164	13	-197.103	7	-.277	7	-.056	13	-.29	10
249		2	max	161.928	10	330.604	19	238.239	13	.349	13	.039	6	.26	4
250			min	-149.8	4	79.164	13	-197.103	7	-.277	7	-.029	12	-.306	10
251		3	max	161.928	10	330.604	19	238.239	13	.349	13	.023	5	.244	3
252			min	-149.8	4	79.164	13	-197.103	7	-.277	7	-.008	11	-.323	9
253	M43	1	max	-11.081	5	173.244	29	103.532	14	.071	8	.052	11	.003	3
254			min	-63.637	36	-13.86	10	14.648	8	-.204	2	-.033	5	-.024	22
255		2	max	-11.081	5	173.244	29	103.532	14	.071	8	.057	11	-.005	3
256			min	-63.637	36	-13.86	10	14.648	8	-.204	2	-.028	5	-.043	34
257		3	max	-11.081	5	173.244	29	103.532	14	.071	8	.063	12	-.011	2
258			min	-63.637	36	-13.86	10	14.648	8	-.204	2	-.024	6	-.063	33
259	M44	1	max	9.501	8	88.144	8	-9.557	5	.211	35	.023	7	.013	8
260			min	-45.335	15	-23.734	2	-132.863	36	-.048	4	-.038	13	-.028	2
261		2	max	9.501	8	88.144	8	-9.557	5	.211	35	.02	7	.003	7
262			min	-45.335	15	-23.734	2	-132.863	36	-.048	4	-.047	13	-.027	14
263		3	max	9.501	8	88.144	8	-9.557	5	.211	35	.018	6	-.006	7
264			min	-45.335	15	-23.734	2	-132.863	36	-.048	4	-.057	12	-.033	25
265	M45	1	max	14.2	5	42.323	2	98.067	27	.114	9	.013	9	.031	2
266			min	-34.95	11	-130.078	33	14.673	8	-.211	3	-.017	28	-.024	8
267		2	max	14.2	5	42.323	2	98.067	27	.114	9	.015	9	.026	2

Envelope Member Section Forces (Continued)

	Member	Sec		Axial[lb]	LC	y Shear[lb]	LC	z Shear[lb]	LC	Torque[k-...	LC	y-y Mome...	LC	z-z Mome...	LC
268			min	-34.95	11	-130.078	33	14.673	8	-.211	3	-.008	3	-.01	8
269		3	max	14.2	5	42.323	2	98.067	27	.114	9	.018	22	.034	24
270			min	-34.95	11	-130.078	33	14.673	8	-.211	3	-.003	3	.003	7
271	M46	1	max	42.572	12	-5.152	8	88.579	3	.259	9	.03	8	.047	11
272			min	-55.778	6	-184.627	14	-125.846	9	-.195	3	-.037	2	-.048	5
273		2	max	42.572	12	-5.152	8	88.579	3	.259	9	.016	8	.059	12
274			min	-55.778	6	-184.627	14	-125.846	9	-.195	3	-.027	2	-.041	6
275		3	max	42.572	12	-5.152	8	88.579	3	.259	9	.004	7	.071	12
276			min	-55.778	6	-184.627	14	-125.846	9	-.195	3	-.023	38	-.035	6
277	M47	1	max	2.388	13	173.527	38	109.515	20	.024	4	.049	8	-.003	12
278			min	-64.137	32	.231	7	15.893	3	-.183	22	-.033	2	-.021	30
279		2	max	2.388	13	173.527	38	109.515	20	.024	4	.058	8	-.008	10
280			min	-64.137	32	.231	7	15.893	3	-.183	22	-.031	2	-.042	29
281		3	max	2.388	13	173.527	38	109.515	20	.024	4	.067	8	-.011	9
282			min	-64.137	32	.231	7	15.893	3	-.183	22	-.029	2	-.062	28
283	M48	1	max	16.144	2	87.131	16	-14.035	13	.215	31	.027	2	.022	2
284			min	-50.11	8	-7.151	10	-136.072	32	-.025	12	-.038	8	-.034	8
285		2	max	16.144	2	87.131	16	-14.035	13	.215	31	.024	2	.016	2
286			min	-50.11	8	-7.151	10	-136.072	32	-.025	12	-.048	8	-.037	8
287		3	max	16.144	2	87.131	16	-14.035	13	.215	31	.022	2	.011	2
288			min	-50.11	8	-7.151	10	-136.072	32	-.025	12	-.059	8	-.04	8
289	M49	1	max	20.66	13	20.339	11	100.48	31	.038	4	.008	2	.022	10
290			min	-41.779	7	-128.88	30	5.149	12	-.179	35	-.018	34	-.015	4
291		2	max	20.66	13	20.339	11	100.48	31	.038	4	.012	3	.022	21
292			min	-41.779	7	-128.88	30	5.149	12	-.179	35	-.006	9	-.005	3
293		3	max	20.66	13	20.339	11	100.48	31	.038	4	.016	16	.033	20
294			min	-41.779	7	-128.88	30	5.149	12	-.179	35	-.002	10	.002	2
295	M50	1	max	85.129	8	-37.886	4	63.252	11	.196	5	.024	4	.068	8
296			min	-96.207	2	-192.603	22	-103.25	5	-.127	11	-.03	10	-.07	2
297		2	max	85.129	8	-37.886	4	63.252	11	.196	5	.014	4	.082	8
298			min	-96.207	2	-192.603	22	-103.25	5	-.127	11	-.024	10	-.064	2
299		3	max	85.129	8	-37.886	4	63.252	11	.196	5	.007	3	.096	8
300			min	-96.207	2	-192.603	22	-103.25	5	-.127	11	-.023	34	-.058	2
301	M51	1	max	4.359	7	173.352	33	109.065	17	.05	12	.046	3	.003	7
302			min	-64.313	27	-13.311	2	12.147	11	-.19	6	-.029	9	-.022	38
303		2	max	4.359	7	173.352	33	109.065	17	.05	12	.054	3	-.003	6
304			min	-64.313	27	-13.311	2	12.147	11	-.19	6	-.026	9	-.042	37
305		3	max	4.359	7	173.352	33	109.065	17	.05	12	.062	4	-.007	5
306			min	-64.313	27	-13.311	2	12.147	11	-.19	6	-.022	10	-.063	36
307	M52	1	max	-6.486	10	90.883	13	-17.4	8	.222	2	.031	11	.012	11
308			min	-39.987	18	-24.241	7	-133.583	27	-.063	8	-.044	5	-.025	5
309		2	max	-6.486	10	90.883	13	-17.4	8	.222	2	.024	11	.005	10
310			min	-39.987	18	-24.241	7	-133.583	27	-.063	8	-.05	5	-.027	17
311		3	max	-6.486	10	90.883	13	-17.4	8	.222	2	.02	10	.001	9
312			min	-39.987	18	-24.241	7	-133.583	27	-.063	8	-.058	4	-.035	15
313	M53	1	max	20.727	9	43.241	7	97.122	30	.105	13	.009	12	.028	6
314			min	-42.132	3	-133.696	38	17.426	11	-.2	7	-.017	31	-.022	12
315		2	max	20.727	9	43.241	7	97.122	30	.105	13	.011	24	.024	6
316			min	-42.132	3	-133.696	38	17.426	11	-.2	7	-.005	32	-.009	12
317		3	max	20.727	9	43.241	7	97.122	30	.105	13	.017	25	.035	16
318			min	-42.132	3	-133.696	38	17.426	11	-.2	7	0	7	.001	11
319	M54	1	max	52.56	3	-22.734	13	93.319	7	.272	13	.031	12	.059	3
320			min	-64.474	9	-176.746	19	-134.443	13	-.201	7	-.036	7	-.059	9
321		2	max	52.56	3	-22.734	13	93.319	7	.272	13	.018	12	.065	3
322			min	-64.474	9	-176.746	19	-134.443	13	-.201	7	-.028	6	-.047	9
323		3	max	52.56	3	-22.734	13	93.319	7	.272	13	.008	11	.071	3
324			min	-64.474	9	-176.746	19	-134.443	13	-.201	7	-.023	5	-.034	9

Envelope Member Section Forces (Continued)

	Member	Sec		Axial[lb]	LC	y Shear[lb]	LC	z Shear[lb]	LC	Torque[k-...	LC	y-y Mome...	LC	z-z Mome...	LC
325	M55	1	max	1235.032	12	87.345	13	30.614	8	.254	3	.078	9	0	13
326			min	-1221.981	6	-192.921	7	-30.588	2	-.257	9	-.077	3	-.067	19
327		2	max	1257.84	12	44.433	13	5.782	6	.254	3	.116	8	.512	7
328			min	-1244.789	6	-243.592	26	-5.743	12	-.257	9	-.116	2	-.178	13
329		3	max	1467.393	13	-288.851	12	1221.596	2	.553	3	1.197	2	3.886	18
330			min	-1441.88	7	-2024.558	18	-1218.084	8	-.561	9	-1.199	8	.069	12
331	M56	1	max	1665.619	8	129.374	8	39.249	5	.193	11	.056	5	0	9
332			min	-1653.035	2	-237.244	2	-39.109	11	-.198	5	-.055	11	-.07	15
333		2	max	1665.619	8	86.462	8	7.231	2	.193	11	.109	5	.63	2
334			min	-1653.035	2	-280.156	2	-7.106	8	-.198	5	-.108	11	-.292	8
335		3	max	1934.149	8	-126.694	8	1142.113	11	.41	11	1.185	11	4.134	14
336			min	-1908.822	2	-2157.566	14	-1140.13	5	-.443	5	-1.189	5	-.387	8
337	M57	1	max	1223.38	4	79.529	4	26.211	13	.248	7	.08	13	-.008	5
338			min	-1210.762	10	-183.716	10	-25.875	7	-.263	13	-.079	7	-.065	23
339		2	max	1246.188	4	36.617	4	6.617	9	.248	7	.11	13	.496	10
340			min	-1233.57	10	-242.808	26	-6.267	3	-.263	13	-.109	7	-.167	4
341		3	max	1460.467	4	-280.111	4	1177.485	7	.506	7	1.121	7	3.83	22
342			min	-1435.583	10	-2005.467	22	-1175.112	13	-.607	13	-1.124	13	.063	4
343	M58	1	max	558.309	8	-.582	13	647.621	11	.303	34	.301	5	.532	3
344			min	-525.849	2	-796.995	19	-636.196	5	-.115	3	-.321	11	-.613	9
345		2	max	511.523	9	-26.779	13	144.417	10	.267	9	.129	10	1.049	16
346			min	-477.02	3	-845.733	19	-145.691	4	-.132	3	-.124	4	.027	10
347		3	max	511.523	9	-46.643	13	144.417	10	.267	9	.337	10	2.229	18
348			min	-477.02	3	-865.596	19	-145.691	4	-.132	3	-.334	4	.285	12
349	M59	1	max	766.123	2	863.17	17	213.927	8	.186	8	.543	2	2.223	19
350			min	-728.95	8	147.102	11	-227.883	2	-.262	2	-.531	8	.226	13
351		2	max	766.123	2	843.306	17	213.927	8	.186	8	.219	13	1.049	20
352			min	-728.95	8	127.238	11	-227.883	2	-.262	2	-.227	7	-.177	2
353		3	max	430.032	3	799.297	17	891.865	7	.178	8	.395	8	.548	9
354			min	-403.745	9	89.199	11	-917.006	13	-.293	2	-.412	2	-.716	3
355	M60	1	max	547.385	4	-10.212	9	916.086	8	.304	30	.403	2	.408	11
356			min	-513.054	10	-839.045	15	-904.996	2	-.063	11	-.424	8	-.501	5
357		2	max	506.98	5	-32.928	9	162.442	7	.259	30	.186	6	1.113	25
358			min	-470.818	11	-888.492	15	-163.642	13	-.087	11	-.181	12	-.055	7
359		3	max	506.98	5	-52.791	9	162.442	7	.259	30	.417	7	2.373	14
360			min	-470.818	11	-908.356	15	-163.642	13	-.087	11	-.413	13	.113	8
361	M61	1	max	645.552	10	930.667	25	165.545	3	.135	4	.467	9	2.395	14
362			min	-607.354	4	75.271	7	-179.846	9	-.218	10	-.456	3	.137	8
363		2	max	645.552	10	910.803	25	165.545	3	.135	4	.208	9	1.111	15
364			min	-607.354	4	55.408	7	-179.846	9	-.218	10	-.217	3	-.096	9
365		3	max	572.717	12	867.055	25	900.775	3	.125	4	.378	3	.426	5
366			min	-545.224	6	15.951	7	-925.977	9	-.248	10	-.396	9	-.591	11
367	M62	1	max	325.64	12	-69.764	5	892.189	3	.311	38	.38	8	.521	7
368			min	-292	6	-750.735	23	-882.864	9	-.095	7	-.4	2	-.589	13
369		2	max	579.574	2	-97.191	5	203.025	2	.277	13	.195	2	1.051	20
370			min	-544.921	8	-799.794	23	-204.491	8	-.124	7	-.19	8	-.116	2
371		3	max	579.574	2	-117.054	5	203.025	2	.277	13	.488	2	2.176	21
372			min	-544.921	8	-819.658	23	-204.491	8	-.124	7	-.485	8	.189	3
373	M63	1	max	653.67	7	892.455	21	161.287	12	.163	13	.389	6	2.256	22
374			min	-617.067	13	67.498	3	-175.196	6	-.23	7	-.377	12	.319	4
375		2	max	653.67	7	872.591	21	161.287	12	.163	13	.136	6	1.048	24
376			min	-617.067	13	47.635	3	-175.196	6	-.23	7	-.145	12	-.019	6
377		3	max	605.218	8	828.554	21	664.588	11	.155	13	.325	11	.565	13
378			min	-579.994	2	10.2	3	-691.176	5	-.261	7	-.343	5	-.725	7

Envelope Member Section Stresses

	Member	Sec		Axial[k...	LC	y She...	LC	z She...	LC	y-Top[ksi]	LC	y-Bot[...	LC	z-Top[...	LC	z-Bot[...	LC
1	M1	1	max	.735	38	0	33	.002	37	0	50	0	50	0	50	0	50
2			min	0	1	0	2	0	6	0	1	0	1	0	1	0	1
3		2	max	.625	35	.181	8	.025	11	.732	8	1.701	2	.103	12	3.016	31
4			min	-.015	26	-.293	2	-.211	29	-1.701	2	-.732	8	-3.016	31	-.103	12
5		3	max	0	50	0	2	0	5	0	50	0	50	0	50	0	50
6			min	0	1	0	8	0	23	0	1	0	1	0	1	0	1
7	M2	1	max	0	50	0	7	0	11	0	50	0	50	0	50	0	50
8			min	0	1	0	25	0	5	0	1	0	1	0	1	0	1
9		2	max	.035	2	.248	35	.133	10	2.931	27	-.115	8	1.284	11	1.337	4
10			min	-.074	8	.033	4	-.094	4	.115	8	-2.931	27	-1.337	4	-1.284	11
11		3	max	0	50	0	14	0	6	0	50	0	50	0	50	0	50
12			min	0	1	0	8	0	24	0	1	0	1	0	1	0	1
13	M3	1	max	0	50	0	7	0	24	0	50	0	50	0	50	0	50
14			min	0	1	0	13	0	6	0	1	0	1	0	1	0	1
15		2	max	.378	21	.325	8	.187	11	1.753	7	1.723	13	.819	12	2.81	6
16			min	.139	2	-.399	2	-.276	5	-1.723	13	-1.753	7	-2.81	6	-.819	12
17		3	max	0	50	0	25	0	5	0	50	0	50	0	50	0	50
18			min	0	1	0	7	0	23	0	1	0	1	0	1	0	1
19	M4	1	max	0	50	0	7	0	12	0	50	0	50	0	50	0	50
20			min	0	1	0	25	0	6	0	1	0	1	0	1	0	1
21		2	max	.312	14	.371	8	.287	11	3.696	8	2.36	2	3.216	11	4.247	5
22			min	.056	8	-.296	2	-.272	5	-2.36	2	-3.696	8	-4.247	5	-3.216	11
23		3	max	0	50	0	25	0	6	0	50	0	50	0	50	0	50
24			min	0	1	0	7	0	24	0	1	0	1	0	1	0	1
25	M5	1	max	.735	38	.002	33	0	12	0	50	0	50	0	50	0	50
26			min	0	1	0	2	-.002	31	0	1	0	1	0	1	0	1
27		2	max	.622	32	.111	8	.243	22	.66	9	2.198	28	2.394	22	-.474	4
28			min	-.016	26	-.185	2	-.051	4	-2.198	28	-.66	9	.474	4	-2.394	22
29		3	max	0	50	0	2	0	18	0	50	0	50	0	50	0	50
30			min	0	1	0	20	0	12	0	1	0	1	0	1	0	1
31	M6	1	max	0	50	0	8	0	22	0	50	0	50	0	50	0	50
32			min	0	1	0	2	0	4	0	1	0	1	0	1	0	1
33		2	max	.019	10	-.016	4	.008	12	-.004	4	1.611	24	-.766	2	2.879	33
34			min	-.064	26	-.082	25	-.269	31	-1.611	24	.004	4	-2.879	33	.766	2
35		3	max	0	50	0	2	0	5	0	50	0	50	0	50	0	50
36			min	0	1	0	20	0	23	0	1	0	1	0	1	0	1
37	M7	1	max	0	50	0	8	0	11	0	50	0	50	0	50	0	50
38			min	0	1	0	2	0	17	0	1	0	1	0	1	0	1
39		2	max	.376	17	.263	8	.295	11	1.491	8	3.224	2	1.723	35	-.051	4
40			min	.161	11	-.303	2	-.178	5	-3.224	2	-1.491	8	.051	4	-1.723	35
41		3	max	0	50	0	2	0	18	0	50	0	50	0	50	0	50
42			min	0	1	0	20	0	12	0	1	0	1	0	1	0	1
43	M8	1	max	0	50	0	8	0	23	0	50	0	50	0	50	0	50
44			min	0	1	0	2	0	5	0	1	0	1	0	1	0	1
45		2	max	.22	22	.225	8	.181	11	3.694	8	5.159	2	1.697	11	2.408	5
46			min	.05	4	-.246	2	-.259	5	-5.159	2	-3.694	8	-2.408	5	-1.697	11
47		3	max	0	50	0	2	0	5	0	50	0	50	0	50	0	50
48			min	0	1	0	20	0	23	0	1	0	1	0	1	0	1
49	M9	1	max	.735	38	0	9	0	11	0	50	0	50	0	50	0	50
50			min	0	1	-.002	28	0	30	0	1	0	1	0	1	0	1
51		2	max	.624	27	.262	7	.144	11	3.022	34	-.849	4	1.823	11	1.588	5
52			min	-.015	26	-.07	13	-.169	5	.849	4	-3.022	34	-1.588	5	-1.823	11
53		3	max	0	50	0	15	0	16	0	50	0	50	0	50	0	50
54			min	0	1	0	8	0	10	0	1	0	1	0	1	0	1
55	M10	1	max	0	50	0	8	0	10	0	50	0	50	0	50	0	50
56			min	0	1	0	2	0	16	0	1	0	1	0	1	0	1

Envelope Member Section Stresses (Continued)

	Member	Sec		Axial[k...	LC	y She...	LC	z She...	LC	y-Top[ksi]	LC	y-Bot[...	LC	z-Top[...	LC	z-Bot[...	LC
57		2	max	.036	7	.04	8	.191	24	-.483	13	2.008	31	2.733	22	-.302	3
58			min	-.077	13	-.209	27	.022	6	-2.008	31	.483	13	.302	3	-2.733	22
59		3	max	0	50	0	2	0	17	0	50	0	50	0	50	0	50
60			min	0	1	0	8	0	11	0	1	0	1	0	1	0	1
61	M11	1	max	0	50	0	9	0	10	0	50	0	50	0	50	0	50
62			min	0	1	0	15	0	4	0	1	0	1	0	1	0	1
63		2	max	.389	25	.369	8	.257	11	2.392	34	.143	3	2.682	11	1.624	5
64			min	.138	7	-.256	2	-.275	5	-.143	3	-2.392	34	-1.624	5	-2.682	11
65		3	max	0	50	0	15	0	16	0	50	0	50	0	50	0	50
66			min	0	1	0	9	0	10	0	1	0	1	0	1	0	1
67	M12	1	max	0	50	0	9	0	10	0	50	0	50	0	50	0	50
68			min	0	1	0	3	0	16	0	1	0	1	0	1	0	1
69		2	max	.293	19	.354	8	.268	11	4.104	8	3.969	2	3.925	10	2.249	4
70			min	.065	13	-.412	2	-.208	5	-3.969	2	-4.104	8	-2.249	4	-3.925	10
71		3	max	0	50	0	15	0	17	0	50	0	50	0	50	0	50
72			min	0	1	0	9	0	11	0	1	0	1	0	1	0	1
73	M13	1	max	.034	5	.047	8	.029	8	.473	7	1.171	13	1.647	2	1.584	8
74			min	-.027	11	-.056	2	-.03	2	-1.171	13	-.473	7	-1.584	8	-1.647	2
75		2	max	.171	2	.116	27	.421	8	.649	9	1.506	3	7.243	8	7.183	2
76			min	-.165	8	-.058	2	-.416	2	-1.506	3	-.649	9	-7.183	2	-7.243	8
77		3	max	.037	12	.11	27	.042	2	.449	9	1.134	3	1.974	2	1.811	8
78			min	-.027	6	-.037	8	-.037	8	-1.134	3	-.449	9	-1.811	8	-1.974	2
79	M14	1	max	.049	8	.035	3	.031	9	.312	6	.961	12	1.233	4	1.393	10
80			min	-.04	2	-.111	34	-.027	3	-.961	12	-.312	6	-1.393	10	-1.233	4
81		2	max	.121	10	.034	10	.373	3	.61	3	1.38	9	6.163	9	6.217	3
82			min	-.116	4	-.117	34	-.368	9	-1.38	9	-.61	3	-6.217	3	-6.163	9
83		3	max	.064	13	.032	10	.024	5	.599	2	1.257	8	1.169	4	1.225	10
84			min	-.057	7	-.042	29	-.024	11	-1.257	8	-.599	2	-1.225	10	-1.169	4
85	M15	1	max	.059	8	.046	13	.028	13	.312	10	.975	4	1.451	7	1.392	13
86			min	-.052	2	-.054	7	-.029	7	-.975	4	-.312	10	-1.392	13	-1.451	7
87		2	max	.133	7	.115	31	.385	7	.647	13	1.452	7	6.459	13	6.425	7
88			min	-.127	13	-.037	17	-.385	13	-1.452	7	-.647	13	-6.425	7	-6.459	13
89		3	max	.048	3	.108	31	.035	6	.563	2	1.201	8	1.592	6	1.437	12
90			min	-.039	9	-.022	26	-.03	12	-1.201	8	-.563	2	-1.437	12	-1.592	6
91	M16	1	max	.019	8	.064	11	.085	5	1.758	16	.219	10	1.076	8	3.753	2
92			min	-.071	2	-.049	5	-.081	11	-.219	10	-1.758	16	-3.175	2	-1.272	8
93		2	max	.019	8	.058	11	.085	5	1.658	14	-.049	8	1.056	8	3.602	2
94			min	-.071	2	-.055	5	-.081	11	.049	8	-1.658	14	-3.048	2	-1.248	8
95		3	max	.019	8	.052	11	.085	5	1.697	25	.115	7	.986	8	3.511	2
96			min	-.071	2	-.06	5	-.081	11	-.115	7	-1.697	25	-2.97	2	-1.166	8
97	M17	1	max	.02	4	.066	7	.113	13	1.735	24	.207	6	1.025	4	3.696	10
98			min	-.071	10	-.048	13	-.106	7	-.207	6	-1.735	24	-3.127	10	-1.212	4
99		2	max	.02	4	.061	7	.113	13	1.631	22	-.085	4	.97	4	3.426	10
100			min	-.071	10	-.054	13	-.106	7	.085	4	-1.631	22	-2.899	10	-1.147	4
101		3	max	.02	4	.055	7	.113	13	1.691	20	.252	2	.865	4	3.216	10
102			min	-.071	10	-.06	13	-.106	7	-.252	2	-1.691	20	-2.721	10	-1.023	4
103	M18	1	max	.021	13	.064	3	.113	9	1.782	8	.432	2	1.191	13	3.784	7
104			min	-.072	7	-.049	9	-.11	3	-.432	2	-1.782	8	-3.201	7	-1.408	13
105		2	max	.021	13	.059	3	.113	9	1.632	19	-.07	13	1.056	12	3.496	6
106			min	-.072	7	-.055	9	-.11	3	.07	13	-1.632	19	-2.958	6	-1.248	12
107		3	max	.021	13	.053	3	.113	9	1.663	17	.052	11	1.059	12	3.486	6
108			min	-.072	7	-.061	9	-.11	3	-.052	11	-1.663	17	-2.949	6	-1.251	12
109	M19	1	max	0	50	0	3	0	2	0	50	0	50	0	50	0	50
110			min	0	1	0	11	0	10	0	1	0	1	0	1	0	1
111		2	max	-.04	3	.294	3	.055	6	-.078	8	1.589	27	.25	5	1.562	24
112			min	-.21	34	-.229	9	-.063	12	-1.589	27	.078	8	-1.562	24	-.25	5
113		3	max	0	50	0	14	0	2	0	50	0	50	0	50	0	50

Envelope Member Section Stresses (Continued)

	Member	Sec		Axial[k...	LC	y She...	LC	z She...	LC	y-Top[ksi]	LC	y-Bot[...	LC	z-Top[...	LC	z-Bot[...	LC
114			min	0	1	0	10	0	11	0	1	0	1	0	1	0	1
115	M20	1	max	0	50	0	50	0	50	0	50	0	50	0	50	0	50
116			min	0	1	0	1	0	1	0	1	0	1	0	1	0	1
117		2	max	-.035	12	.206	11	.088	2	-.155	4	1.614	35	.162	2	1.468	20
118			min	-.216	31	-.135	5	-.098	8	-1.614	35	.155	4	-1.468	20	-.162	2
119		3	max	0	50	0	50	0	50	0	50	0	50	0	50	0	50
120			min	0	1	0	1	0	1	0	1	0	1	0	1	0	1
121	M21	1	max	0	50	0	6	0	5	0	50	0	50	0	50	0	50
122			min	0	1	0	25	0	2	0	1	0	1	0	1	0	1
123		2	max	-.034	7	.284	7	.054	10	-.247	12	1.589	31	.291	10	1.556	16
124			min	-.213	38	-.229	13	-.062	4	-1.589	31	.247	12	-1.556	16	-.291	10
125		3	max	0	50	0	5	0	5	0	50	0	50	0	50	0	50
126			min	0	1	0	13	0	2	0	1	0	1	0	1	0	1
127	M22	1	max	0	50	0	3	0	9	0	50	0	50	0	50	0	50
128			min	0	1	0	22	0	5	0	1	0	1	0	1	0	1
129		2	max	.272	13	.352	3	.196	4	-.436	5	2.477	36	.462	6	.481	12
130			min	-.197	7	-.238	9	-.192	10	-2.477	36	.436	5	-.481	12	-.462	6
131		3	max	0	50	0	16	0	8	0	50	0	50	0	50	0	50
132			min	0	1	0	9	0	5	0	1	0	1	0	1	0	1
133	M23	1	max	0	50	0	50	0	50	0	50	0	50	0	50	0	50
134			min	0	1	0	1	0	1	0	1	0	1	0	1	0	1
135		2	max	.328	8	.276	11	.086	12	-.312	13	2.564	32	.551	2	.567	8
136			min	-.248	2	-.148	5	-.082	6	-2.564	32	.312	13	-.567	8	-.551	2
137		3	max	0	50	0	50	0	50	0	50	0	50	0	50	0	50
138			min	0	1	0	1	0	1	0	1	0	1	0	1	0	1
139	M24	1	max	0	50	0	7	0	11	0	50	0	50	0	50	0	50
140			min	0	1	0	24	0	8	0	1	0	1	0	1	0	1
141		2	max	.24	4	.346	7	.208	7	-.313	9	2.517	28	.503	9	.521	3
142			min	-.162	10	-.246	13	-.205	13	-2.517	28	.313	9	-.521	3	-.503	9
143		3	max	0	50	0	18	0	11	0	50	0	50	0	50	0	50
144			min	0	1	0	13	0	7	0	1	0	1	0	1	0	1
145	M25	1	max	.651	11	.117	26	.041	5	1.104	4	1.514	10	.5	11	2.196	26
146			min	-.668	5	0	5	-.033	11	-1.514	10	-1.104	4	-1.785	26	-.614	11
147		2	max	.651	11	.009	11	.041	5	.283	3	.66	9	.996	26	.147	7
148			min	-.668	5	-.022	5	-.033	11	-.66	9	-.283	3	-.12	7	-1.225	26
149		3	max	.651	11	-.019	11	.041	5	.069	12	2.216	26	.191	4	3.841	26
150			min	-.668	5	-.262	26	-.033	11	-2.216	26	-.069	12	-3.123	26	-.235	4
151	M26	1	max	.881	7	.117	26	.057	13	1.556	13	1.971	7	.848	7	2.197	26
152			min	-.897	13	-.006	13	-.049	7	-1.971	7	-1.556	13	-1.787	26	-1.043	7
153		2	max	.881	7	.015	7	.057	13	.26	12	.647	6	.994	26	.148	3
154			min	-.897	13	-.029	13	-.049	7	-.647	6	-.26	12	-.12	3	-1.223	26
155		3	max	.881	7	-.012	7	.057	13	.339	8	2.222	26	.461	13	3.845	26
156			min	-.897	13	-.262	26	-.049	7	-2.222	26	-.339	8	-3.127	26	-.567	13
157	M27	1	max	.914	2	.117	26	.059	9	1.713	8	2.144	2	.871	3	2.201	26
158			min	-.93	8	-.006	9	-.05	3	-2.144	2	-1.713	8	-1.79	26	-1.071	3
159		2	max	.914	2	.015	3	.059	9	.414	8	.827	2	.987	26	.139	23
160			min	-.93	8	-.029	9	-.05	3	-.827	2	-.414	8	-.113	23	-1.214	26
161		3	max	.914	2	-.012	3	.059	9	.228	3	2.243	26	.558	8	3.859	26
162			min	-.93	8	-.262	26	-.05	3	-2.243	26	-.228	3	-3.138	26	-.686	8
163	M28	1	max	.645	6	.115	26	.047	6	.889	5	1.28	11	.613	12	2.168	26
164			min	-.658	12	-.011	6	-.036	12	-1.28	11	-.889	5	-1.763	26	-.754	12
165		2	max	.645	6	.016	12	.047	6	.2	26	.835	33	.978	26	.429	7
166			min	-.658	12	-.034	6	-.036	12	-.835	33	-.2	26	-.348	7	-1.202	26
167		3	max	.645	6	-.011	12	.047	6	.617	12	2.317	26	-.2	4	3.915	26
168			min	-.658	12	-.264	26	-.036	12	-2.317	26	-.617	12	-3.183	26	.246	4
169	M29	1	max	.962	2	.115	26	.068	2	1.443	13	1.844	7	1.03	8	2.174	26
170			min	-.975	8	-.023	2	-.057	8	-1.844	7	-1.443	13	-1.768	26	-1.266	8

Envelope Member Section Stresses (Continued)

	Member	Sec		Axial[k...	LC	y She...	LC	z She...	LC	y-Top[ksi]	LC	y-Bot[...	LC	z-Top[...	LC	z-Bot[...	LC
171		2	max	.962	2	.028	8	.068	2	.189	26	.844	28	.971	26	.563	2
172			min	-.975	8	-.046	2	-.057	8	-.844	28	-.189	26	-.458	2	-1.194	26
173		3	max	.962	2	0	8	.068	2	1.223	8	2.726	2	-.057	13	3.925	26
174			min	-.975	8	-.264	26	-.057	8	-2.726	2	-1.223	8	-3.191	26	.07	13
175	M30	1	max	.88	9	.115	26	.061	9	1.336	9	1.723	3	.867	3	2.17	26
176			min	-.891	3	-.017	9	-.05	3	-1.723	3	-1.336	9	-1.764	26	-1.066	3
177		2	max	.88	9	.022	3	.061	9	.192	26	.84	37	.973	26	.43	35
178			min	-.891	3	-.04	9	-.05	3	-.84	37	-.192	26	-.349	35	-1.196	26
179		3	max	.88	9	-.006	3	.061	9	.84	3	2.345	9	-.029	8	3.925	26
180			min	-.891	3	-.264	26	-.05	3	-2.345	9	-.84	3	-3.192	26	.036	8
181	M31	1	max	0	7	0	50	0	50	0	50	0	50	0	50	0	50
182			min	0	12	0	1	0	1	0	1	0	1	0	1	0	1
183		2	max	0	7	0	50	0	50	0	50	0	50	0	50	0	50
184			min	0	12	0	1	0	1	0	1	0	1	0	1	0	1
185		3	max	0	7	0	50	0	50	0	50	0	50	0	50	0	50
186			min	0	12	0	1	0	1	0	1	0	1	0	1	0	1
187	M32	1	max	0	7	0	50	0	50	0	50	0	50	0	50	0	50
188			min	0	12	0	1	0	1	0	1	0	1	0	1	0	1
189		2	max	0	7	0	50	0	50	0	50	0	50	0	50	0	50
190			min	0	12	0	1	0	1	0	1	0	1	0	1	0	1
191		3	max	0	7	0	50	0	50	0	50	0	50	0	50	0	50
192			min	0	12	0	1	0	1	0	1	0	1	0	1	0	1
193	M33	1	max	0	6	0	50	0	50	0	50	0	50	0	50	0	50
194			min	0	12	0	1	0	1	0	1	0	1	0	1	0	1
195		2	max	0	6	0	50	0	50	0	50	0	50	0	50	0	50
196			min	0	12	0	1	0	1	0	1	0	1	0	1	0	1
197		3	max	0	6	0	50	0	50	0	50	0	50	0	50	0	50
198			min	0	12	0	1	0	1	0	1	0	1	0	1	0	1
199	M34	1	max	0	6	0	50	0	50	0	50	0	50	0	50	0	50
200			min	0	12	0	1	0	1	0	1	0	1	0	1	0	1
201		2	max	0	6	0	50	0	50	0	50	0	50	0	50	0	50
202			min	0	12	0	1	0	1	0	1	0	1	0	1	0	1
203		3	max	0	6	0	50	0	50	0	50	0	50	0	50	0	50
204			min	0	12	0	1	0	1	0	1	0	1	0	1	0	1
205	M35	1	max	0	2	0	50	0	50	0	50	0	50	0	50	0	50
206			min	0	8	0	1	0	1	0	1	0	1	0	1	0	1
207		2	max	0	2	0	50	0	50	0	50	0	50	0	50	0	50
208			min	0	8	0	1	0	1	0	1	0	1	0	1	0	1
209		3	max	0	2	0	50	0	50	0	50	0	50	0	50	0	50
210			min	0	8	0	1	0	1	0	1	0	1	0	1	0	1
211	M36	1	max	0	2	0	50	0	50	0	50	0	50	0	50	0	50
212			min	0	8	0	1	0	1	0	1	0	1	0	1	0	1
213		2	max	0	2	0	50	0	50	0	50	0	50	0	50	0	50
214			min	0	8	0	1	0	1	0	1	0	1	0	1	0	1
215		3	max	0	2	0	50	0	50	0	50	0	50	0	50	0	50
216			min	0	8	0	1	0	1	0	1	0	1	0	1	0	1
217	M37	1	max	0	2	0	50	0	50	0	50	0	50	0	50	0	50
218			min	0	8	0	1	0	1	0	1	0	1	0	1	0	1
219		2	max	0	2	0	50	0	50	0	50	0	50	0	50	0	50
220			min	0	8	0	1	0	1	0	1	0	1	0	1	0	1
221		3	max	0	2	0	50	0	50	0	50	0	50	0	50	0	50
222			min	0	8	0	1	0	1	0	1	0	1	0	1	0	1
223	M38	1	max	0	2	0	50	0	50	0	50	0	50	0	50	0	50
224			min	0	8	0	1	0	1	0	1	0	1	0	1	0	1
225		2	max	0	2	0	50	0	50	0	50	0	50	0	50	0	50
226			min	0	8	0	1	0	1	0	1	0	1	0	1	0	1
227		3	max	0	2	0	50	0	50	0	50	0	50	0	50	0	50

Envelope Member Section Stresses (Continued)

	Member	Sec		Axial[k...	LC	y She...	LC	z She...	LC	y-Top[ksi]	LC	y-Bot[...	LC	z-Top[...	LC	z-Bot[...	LC
228			min	0	8	0	1	0	1	0	1	0	1	0	1	0	1
229	M39	1	max	0	10	0	50	0	50	0	50	0	50	0	50	0	50
230			min	0	4	0	1	0	1	0	1	0	1	0	1	0	1
231		2	max	0	10	0	50	0	50	0	50	0	50	0	50	0	50
232			min	0	4	0	1	0	1	0	1	0	1	0	1	0	1
233		3	max	0	10	0	50	0	50	0	50	0	50	0	50	0	50
234			min	0	4	0	1	0	1	0	1	0	1	0	1	0	1
235	M40	1	max	0	9	0	50	0	50	0	50	0	50	0	50	0	50
236			min	0	3	0	1	0	1	0	1	0	1	0	1	0	1
237		2	max	0	9	0	50	0	50	0	50	0	50	0	50	0	50
238			min	0	3	0	1	0	1	0	1	0	1	0	1	0	1
239		3	max	0	9	0	50	0	50	0	50	0	50	0	50	0	50
240			min	0	3	0	1	0	1	0	1	0	1	0	1	0	1
241	M41	1	max	0	10	0	50	0	50	0	50	0	50	0	50	0	50
242			min	0	4	0	1	0	1	0	1	0	1	0	1	0	1
243		2	max	0	10	0	50	0	50	0	50	0	50	0	50	0	50
244			min	0	4	0	1	0	1	0	1	0	1	0	1	0	1
245		3	max	0	10	0	50	0	50	0	50	0	50	0	50	0	50
246			min	0	4	0	1	0	1	0	1	0	1	0	1	0	1
247	M42	1	max	0	10	0	50	0	50	0	50	0	50	0	50	0	50
248			min	0	3	0	1	0	1	0	1	0	1	0	1	0	1
249		2	max	0	10	0	50	0	50	0	50	0	50	0	50	0	50
250			min	0	3	0	1	0	1	0	1	0	1	0	1	0	1
251		3	max	0	10	0	50	0	50	0	50	0	50	0	50	0	50
252			min	0	3	0	1	0	1	0	1	0	1	0	1	0	1
253	M43	1	max	0	50	0	50	0	50	0	50	0	50	0	50	0	50
254			min	0	27	0	1	0	1	0	1	0	1	0	1	0	1
255		2	max	0	50	0	50	0	50	0	50	0	50	0	50	0	50
256			min	0	27	0	1	0	1	0	1	0	1	0	1	0	1
257		3	max	0	50	0	50	0	50	0	50	0	50	0	50	0	50
258			min	0	27	0	1	0	1	0	1	0	1	0	1	0	1
259	M44	1	max	0	50	0	50	0	50	0	50	0	50	0	50	0	50
260			min	0	2	0	1	0	1	0	1	0	1	0	1	0	1
261		2	max	0	50	0	50	0	50	0	50	0	50	0	50	0	50
262			min	0	2	0	1	0	1	0	1	0	1	0	1	0	1
263		3	max	0	50	0	50	0	50	0	50	0	50	0	50	0	50
264			min	0	2	0	1	0	1	0	1	0	1	0	1	0	1
265	M45	1	max	0	50	0	50	0	50	0	50	0	50	0	50	0	50
266			min	0	11	0	1	0	1	0	1	0	1	0	1	0	1
267		2	max	0	50	0	50	0	50	0	50	0	50	0	50	0	50
268			min	0	11	0	1	0	1	0	1	0	1	0	1	0	1
269		3	max	0	50	0	50	0	50	0	50	0	50	0	50	0	50
270			min	0	11	0	1	0	1	0	1	0	1	0	1	0	1
271	M46	1	max	0	12	0	50	0	50	0	50	0	50	0	50	0	50
272			min	0	5	0	1	0	1	0	1	0	1	0	1	0	1
273		2	max	0	12	0	50	0	50	0	50	0	50	0	50	0	50
274			min	0	5	0	1	0	1	0	1	0	1	0	1	0	1
275		3	max	0	12	0	50	0	50	0	50	0	50	0	50	0	50
276			min	0	5	0	1	0	1	0	1	0	1	0	1	0	1
277	M47	1	max	0	50	0	50	0	50	0	50	0	50	0	50	0	50
278			min	0	27	0	1	0	1	0	1	0	1	0	1	0	1
279		2	max	0	50	0	50	0	50	0	50	0	50	0	50	0	50
280			min	0	27	0	1	0	1	0	1	0	1	0	1	0	1
281		3	max	0	50	0	50	0	50	0	50	0	50	0	50	0	50
282			min	0	27	0	1	0	1	0	1	0	1	0	1	0	1
283	M48	1	max	0	50	0	50	0	50	0	50	0	50	0	50	0	50
284			min	0	7	0	1	0	1	0	1	0	1	0	1	0	1

Envelope Member Section Stresses (Continued)

	Member	Sec		Axial[k...	LC	y She...	LC	z She...	LC	y-Top[ksi]	LC	y-Bot[...	LC	z-Top[...	LC	z-Bot[...	LC
285		2	max	0	50	0	50	0	50	0	50	0	50	0	50	0	50
286			min	0	7	0	1	0	1	0	1	0	1	0	1	0	1
287		3	max	0	50	0	50	0	50	0	50	0	50	0	50	0	50
288			min	0	7	0	1	0	1	0	1	0	1	0	1	0	1
289	M49	1	max	0	50	0	50	0	50	0	50	0	50	0	50	0	50
290			min	0	6	0	1	0	1	0	1	0	1	0	1	0	1
291		2	max	0	50	0	50	0	50	0	50	0	50	0	50	0	50
292			min	0	6	0	1	0	1	0	1	0	1	0	1	0	1
293		3	max	0	50	0	50	0	50	0	50	0	50	0	50	0	50
294			min	0	6	0	1	0	1	0	1	0	1	0	1	0	1
295	M50	1	max	0	8	0	50	0	50	0	50	0	50	0	50	0	50
296			min	0	2	0	1	0	1	0	1	0	1	0	1	0	1
297		2	max	0	8	0	50	0	50	0	50	0	50	0	50	0	50
298			min	0	2	0	1	0	1	0	1	0	1	0	1	0	1
299		3	max	0	8	0	50	0	50	0	50	0	50	0	50	0	50
300			min	0	2	0	1	0	1	0	1	0	1	0	1	0	1
301	M51	1	max	0	50	0	50	0	50	0	50	0	50	0	50	0	50
302			min	0	27	0	1	0	1	0	1	0	1	0	1	0	1
303		2	max	0	50	0	50	0	50	0	50	0	50	0	50	0	50
304			min	0	27	0	1	0	1	0	1	0	1	0	1	0	1
305		3	max	0	50	0	50	0	50	0	50	0	50	0	50	0	50
306			min	0	27	0	1	0	1	0	1	0	1	0	1	0	1
307	M52	1	max	0	50	0	50	0	50	0	50	0	50	0	50	0	50
308			min	0	14	0	1	0	1	0	1	0	1	0	1	0	1
309		2	max	0	50	0	50	0	50	0	50	0	50	0	50	0	50
310			min	0	14	0	1	0	1	0	1	0	1	0	1	0	1
311		3	max	0	50	0	50	0	50	0	50	0	50	0	50	0	50
312			min	0	14	0	1	0	1	0	1	0	1	0	1	0	1
313	M53	1	max	0	50	0	50	0	50	0	50	0	50	0	50	0	50
314			min	0	2	0	1	0	1	0	1	0	1	0	1	0	1
315		2	max	0	50	0	50	0	50	0	50	0	50	0	50	0	50
316			min	0	2	0	1	0	1	0	1	0	1	0	1	0	1
317		3	max	0	50	0	50	0	50	0	50	0	50	0	50	0	50
318			min	0	2	0	1	0	1	0	1	0	1	0	1	0	1
319	M54	1	max	0	4	0	50	0	50	0	50	0	50	0	50	0	50
320			min	0	8	0	1	0	1	0	1	0	1	0	1	0	1
321		2	max	0	4	0	50	0	50	0	50	0	50	0	50	0	50
322			min	0	8	0	1	0	1	0	1	0	1	0	1	0	1
323		3	max	0	4	0	50	0	50	0	50	0	50	0	50	0	50
324			min	0	8	0	1	0	1	0	1	0	1	0	1	0	1
325	M55	1	max	.366	12	.057	13	.02	8	.207	19	0	13	.239	9	.236	3
326			min	-.363	6	-.125	7	-.02	2	0	13	-.207	19	-.236	3	-.239	9
327		2	max	.373	12	.029	13	.004	6	.549	13	1.574	7	.358	8	.356	2
328			min	-.369	6	-.158	26	-.004	12	-1.574	7	-.549	13	-.356	2	-.358	8
329		3	max	.435	13	-.188	12	.794	2	-.212	12	11.956	18	3.682	2	3.69	8
330			min	-.428	7	-1.316	18	-.792	8	-11.956	18	.212	12	-3.69	8	-3.682	2
331	M56	1	max	.494	8	.084	8	.026	5	.215	15	-.002	9	.171	5	.169	11
332			min	-.491	2	-.154	2	-.025	11	.002	9	-.215	15	-.169	11	-.171	5
333		2	max	.494	8	.056	8	.005	2	.898	8	1.937	2	.335	5	.332	11
334			min	-.491	2	-.182	2	-.005	8	-1.937	2	-.898	8	-.332	11	-.335	5
335		3	max	.574	8	-.082	8	.742	11	1.191	8	12.72	14	3.646	11	3.659	5
336			min	-.566	2	-1.403	14	-.741	5	-12.72	14	-1.191	8	-3.659	5	-3.646	11
337	M57	1	max	.363	4	.052	4	.017	13	.199	23	-.023	5	.245	13	.244	7
338			min	-.359	10	-.119	10	-.017	7	.023	5	-.199	23	-.244	7	-.245	13
339		2	max	.37	4	.024	4	.004	9	.512	4	1.527	10	.338	13	.334	7
340			min	-.366	10	-.158	26	-.004	3	-1.527	10	-.512	4	-.334	7	-.338	13
341		3	max	.433	4	-.182	4	.765	7	-.193	4	11.786	22	3.449	7	3.46	13

Envelope Member Section Stresses (Continued)

	Member	Sec		Axial[k...	LC	y She...	LC	z She...	LC	y-Top[ksi]	LC	y-Bot[...	LC	z-Top[...	LC	z-Bot[...	LC
342			min	-.426	10	-1.304	22	-.764	13	-11.786	22	.193	4	-3.46	13	-3.449	7
343	M58	1	max	.166	8	0	13	.421	11	1.887	9	1.638	3	.926	5	.989	11
344			min	-.156	2	-.518	19	-.414	5	-1.638	3	-1.887	9	-.989	11	-.926	5
345		2	max	.152	9	-.017	13	.094	10	-.082	10	3.227	16	.397	10	.381	4
346			min	-.142	3	-.55	19	-.095	4	-3.227	16	.082	10	-.381	4	-.397	10
347		3	max	.152	9	-.03	13	.094	10	-.878	12	6.86	18	1.038	10	1.029	4
348			min	-.142	3	-.563	19	-.095	4	-6.86	18	.878	12	-1.029	4	-1.038	10
349	M59	1	max	.227	2	.561	17	.139	8	-.696	13	6.84	19	1.671	2	1.635	8
350			min	-.216	8	.096	11	-.148	2	-6.84	19	.696	13	-1.635	8	-1.671	2
351		2	max	.227	2	.548	17	.139	8	.546	2	3.229	20	.674	13	.699	7
352			min	-.216	8	.083	11	-.148	2	-3.229	20	-.546	2	-.699	7	-.674	13
353		3	max	.128	3	.52	17	.58	7	2.203	3	1.687	9	1.215	8	1.267	2
354			min	-.12	9	.058	11	-.596	13	-1.687	9	-2.203	3	-1.267	2	-1.215	8
355	M60	1	max	.162	4	-.007	9	.596	8	1.54	5	1.255	11	1.241	2	1.306	8
356			min	-.152	10	-.545	15	-.588	2	-1.255	11	-1.54	5	-1.306	8	-1.241	2
357		2	max	.15	5	-.021	9	.106	7	.169	7	3.424	25	.573	6	.558	12
358			min	-.14	11	-.578	15	-.106	13	-3.424	25	-.169	7	-.558	12	-.573	6
359		3	max	.15	5	-.034	9	.106	7	-.348	8	7.302	14	1.282	7	1.272	13
360			min	-.14	11	-.591	15	-.106	13	-7.302	14	.348	8	-1.272	13	-1.282	7
361	M61	1	max	.192	10	.605	25	.108	3	-.422	8	7.37	14	1.438	9	1.402	3
362			min	-.18	4	.049	7	-.117	9	-7.37	14	.422	8	-1.402	3	-1.438	9
363		2	max	.192	10	.592	25	.108	3	.297	9	3.418	15	.639	9	.666	3
364			min	-.18	4	.036	7	-.117	9	-3.418	15	-.297	9	-.666	3	-.639	9
365		3	max	.17	12	.564	25	.586	3	1.818	11	1.31	5	1.165	3	1.217	9
366			min	-.162	6	.01	7	-.602	9	-1.31	5	-1.818	11	-1.217	9	-1.165	3
367	M62	1	max	.097	12	-.045	5	.58	3	1.813	13	1.602	7	1.169	8	1.231	2
368			min	-.087	6	-.488	23	-.574	9	-1.602	7	-1.813	13	-1.231	2	-1.169	8
369		2	max	.172	2	-.063	5	.132	2	.356	2	3.233	20	.599	2	.583	8
370			min	-.162	8	-.52	23	-.133	8	-3.233	20	-.356	2	-.583	8	-.599	2
371		3	max	.172	2	-.076	5	.132	2	-.58	3	6.695	21	1.5	2	1.492	8
372			min	-.162	8	-.533	23	-.133	8	-6.695	21	.58	3	-1.492	8	-1.5	2
373	M63	1	max	.194	7	.58	21	.105	12	-.982	4	6.942	22	1.197	6	1.161	12
374			min	-.183	13	.044	3	-.114	6	-6.942	22	.982	4	-1.161	12	-1.197	6
375		2	max	.194	7	.567	21	.105	12	.057	6	3.225	24	.419	6	.445	12
376			min	-.183	13	.031	3	-.114	6	-3.225	24	-.057	6	-.445	12	-.419	6
377		3	max	.18	8	.539	21	.432	11	2.23	7	1.74	13	1	11	1.055	5
378			min	-.172	2	.007	3	-.449	5	-1.74	13	-2.23	7	-1.055	5	-1	11

Envelope AISC 15th(360-16): LRFD Steel Code Checks

	Member	Shape	Code Check	Loc[in]	LC	Shear C...	Loc.....		LC	phi*P...	phi*P...	phi*M...	phi*M...	...	Eqn
1	M7	PIPE_2.0	.334	47.755	2	.057	47....		2	16811...	32130	1.872	1.872	...	H1-1b
2	M3	PIPE_2.0	.321	47.755	2	.060	47....		8	16811...	32130	1.872	1.872	...	H1-1b
3	M11	PIPE_2.0	.312	47.755	8	.055	47....		8	16811...	32130	1.872	1.872	...	H1-1b
4	M10	PIPE_2.0	.279	47.755	2	.075	47....		3	16811...	32130	1.872	1.872	...	H1-1b
5	M56	HSS4X4...	.265	64	15	.063	64	y	16	13254...	139518	16.181	16.181	...	H1-1b
6	M55	HSS4X4...	.260	64	7	.072	64	z	9	13254...	139518	16.181	16.181	...	H1-1b
7	M2	PIPE_2.0	.253	47.755	8	.066	47....		13	16811...	32130	1.872	1.872	...	H1-1b
8	M57	HSS4X4...	.249	64	21	.075	64	z	13	13254...	139518	16.181	16.181	...	H1-1b
9	M1	PIPE_2.0	.241	47.755	2	.067	47....		13	16811...	32130	1.872	1.872	...	H1-1b
10	M6	PIPE_2.0	.231	47.755	2	.077	47....		8	16811...	32130	1.872	1.872	...	H1-1b
11	M9	PIPE_2.0	.225	47.755	8	.061	47....		3	16811...	32130	1.872	1.872	...	H1-1b
12	M5	PIPE_2.0	.219	47.755	2	.071	47....		8	16811...	32130	1.872	1.872	...	H1-1b
13	M12	PIPE_2.0	.208	47.755	2	.030	47....		3	16811...	32130	1.872	1.872	...	H1-1b
14	M8	PIPE_2.0	.192	47.755	2	.026	47....		8	16811...	32130	1.872	1.872	...	H1-1b
15	M4	PIPE_2.0	.191	47.755	8	.028	47....		2	16811...	32130	1.872	1.872	...	H1-1b

Envelope AISC 15th(360-16): LRFD Steel Code Checks (Continued)

	Member	Shape	Code Check	Loc[in]	LC	Shear C...	Loc....	...	LC	phi*P...	phi*P...	phi*M...	phi*M...	...	Eqn
16	M13	PL6"x1/2"	.180	9.24	2	.064	9.4...	y	13	96270..	97200	1.012	12.045	...	H1-1b
17	M15	PL6"x1/2"	.164	9.24	7	.051	9.4...	y	5	96270..	97200	1.012	12.15	...	H1-1b
18	M14	PL6"x1/2"	.157	9.24	9	.062	9.0...	y	9	96270..	97200	1.012	12.15	...	H1-1b
19	M61	HSS4X4...	.154	0	15	.040	28....	z	9	13814..	139518	16.181	16.181	...	H1-1b
20	M60	HSS4X4...	.153	34.643	25	.038	6.01	y	29	13814..	139518	16.181	16.181	...	H1-1b
21	M59	HSS4X4...	.145	0	19	.044	28....	z	2	13814..	139518	16.181	16.181	...	H1-1b
22	M63	HSS4X4...	.144	0	23	.034	28....	z	6	13814..	139518	16.181	16.181	...	H1-1b
23	M62	HSS4X4...	.142	34.643	21	.042	0	z	2	13814..	139518	16.181	16.181	...	H1-1b
24	M58	HSS4X4...	.142	34.643	17	.038	6.01	y	33	13814..	139518	16.181	16.181	...	H1-1b
25	M29	L2x2x4	.133	50.807	26	.014	50....	y	26	20846..	30585...	.691	1.577	...	H2-1
26	M30	L2x2x4	.133	50.807	26	.014	50....	y	26	20846..	30585...	.691	1.577	...	H2-1
27	M28	L2x2x4	.132	50.807	26	.014	50....	y	26	20846..	30585...	.691	1.577	...	H2-1
28	M27	L2x2x4	.129	50.807	26	.014	50....	y	26	20846..	30585...	.691	1.577	...	H2-1
29	M26	L2x2x4	.128	50.807	26	.014	50....	y	26	20846..	30585...	.691	1.577	...	H2-1
30	M25	L2x2x4	.128	50.807	26	.014	50....	y	26	20846..	30585...	.691	1.577	...	H2-1
31	M23	PIPE_3.0	.122	57.306	34	.128	86....		3	65096..	65205	5.749	5.749	...	H1-1b
32	M22	PIPE_3.0	.119	57.306	38	.133	86....		7	65096..	65205	5.749	5.749	...	H1-1b
33	M24	PIPE_3.0	.118	57.306	30	.111	86....		11	65096..	65205	5.749	5.749	...	H1-1b
34	M18	L2.5x2.5...	.117	0	7	.045	0	z	3	37732..	38556	1.114	2.537	...	H2-1
35	M19	PIPE_2.0	.116	116.327	28	.036	64....		3	23088..	32130	1.872	1.872	...	H1-1b
36	M20	PIPE_2.0	.116	116.327	36	.041	62....		8	23088..	32130	1.872	1.872	...	H1-1b
37	M21	PIPE_2.0	.115	116.327	32	.037	64....		7	23088..	32130	1.872	1.872	...	H1-1b
38	M16	L2.5x2.5...	.112	0	3	.039	0	z	11	37732..	38556	1.114	2.537	...	H2-1
39	M17	L2.5x2.5...	.110	0	11	.044	0	z	7	37732..	38556	1.114	2.537	...	H2-1

Envelope Plate/Shell Principal Stresses

Plate	Surface	Sigma1 [ksi]	LC	Sigma2 [ksi]	LC	Tau Max [ksi]	LC	Angle [r...	LC	Von Mises [ksi]	LC
No Data to Print ...											

APPENDIX D

ADDITIONAL CALCUATIONS

JACOBS™

CONNECTION CHECK
ANTENNA MOUNTING SYSTEM
ANSI/TIA-222-H

Project Number:	ERCC0303
Site Name:	876369
Engineer:	A. Asghari
Date:	10/23/2019
Carrier:	AT&T
Reviewed By:	B. Bartlett

Input Data

Type A

Connection Type	Single Bolt or Threaded Part		
Max Vertical, V_{us}	2159	lb	
Max Normal	1934	lb	
Max Tangential	1169	lb	
Max Vertical Moment, T_{ur}		k-ft	(ubolt)
V_{ub}	2455	lb	
T_{ub}	1934	lb	
Bolt Size, d	0.5	in	
No. of Bolts	4		
Bolt Grade	A325		
Bolt Spacing, L_b	10	in	
Threads in Shear Plane	Yes		
Clear Distance, L_c		in	(ubolt)
Thickness of Connected Part, t		in	(ubolt)
Tensile of Connected Part, F_u		ksi	(ubolt)
Diameter of Suport Member, D		in	(ubolt)
Slotted Holes			(ubolt)
n	13	per inch	
F_{ub}	120	ksi	
Pretension, T_p	4	kip	
ϕR_{nt}	13	kip	
ϕR_{nv}	9	kip	
ϕR_n	0	kip	
ϕR_{ns}	2	kip	
ϕR_{nr}	0	kip	
Total ϕR_{nt}	**51083**	lb	
Total ϕR_{nv}	**35343**	lb	
Total ϕR_n	**0**	lb	
Total ϕR_{ns}	**7104**	lb	
Total ϕR_{nr}	**0**	lb	

Equations

ϕ =	0.75		
$A_n = \pi/4(d - 0.9382/n)^2$	0.142	in^2	
R_b =	1		
$A_b = \pi d^2/4$	0.196	in^2	
$R_{nt} = F_{ub}A_n$	17.028	kip	
$R_{nv} = 0.625R_bF_{ub}A_b$	11.781	kip	
ϕ =	0.8		
$R_n = 1.2(L_c+d/4)tF_u \le 2.4dtF_u$	N/A	kip	
$R_n = 1.0L_ctF_u \le 2.0dtF_u$	N/A	kip	
ϕ_u =	1.0		
$R_{ns} = 0.30(2T_p-T_{ut}) \ge 0$	1.776	kip	
$R_{nr} = 0.5(DR_{ns})$	0.000	kip	

Combined Shear and Tension	0.006		0.6%
Shear	0.069		6.9%
Tension	0.038		3.8%
Bearing	0.000		0.0%
Torsion Transfer	0.000		0.0%
			6.9%

Type B

Connection Type	Single Bolt or Threaded Part		
Max Vertical, V_{us}		lb	
Max Normal		lb	
Max Tangential		lb	
Max Vertical Moment, T_{ur}		k-ft	(ubolt)
V_{ub}	0	lb	
T_{ub}	0	lb	
Bolt Size, d	0.5	in	
No. of Bolts	1		
Bolt Grade	A325		
Bolt Spacing, L_b	10	in	
Threads in Shear Plane	Yes		
Clear Distance, L_c		in	(ubolt)
Thickness of Connected Part, t		in	(ubolt)
Tensile of Connected Part, F_u		ksi	(ubolt)
Diameter of Suport Member, D		in	(ubolt)
Slotted Holes			(ubolt)
n	13	per inch	
F_{ub}	120	ksi	
Pretension, T_p	4	kip	
ϕR_{nt}	13	kip	
ϕR_{nv}	9	kip	
ϕR_n	0	kip	
ϕR_{ns}	2	kip	
ϕR_{nr}	0	kip	
Total ϕR_{nt}	**12771**	lb	
Total ϕR_{nv}	**8836**	lb	
Total ϕR_n	**0**	lb	
Total ϕR_{ns}	**2356**	lb	
Total ϕR_{nr}	**0**	lb	

Equations

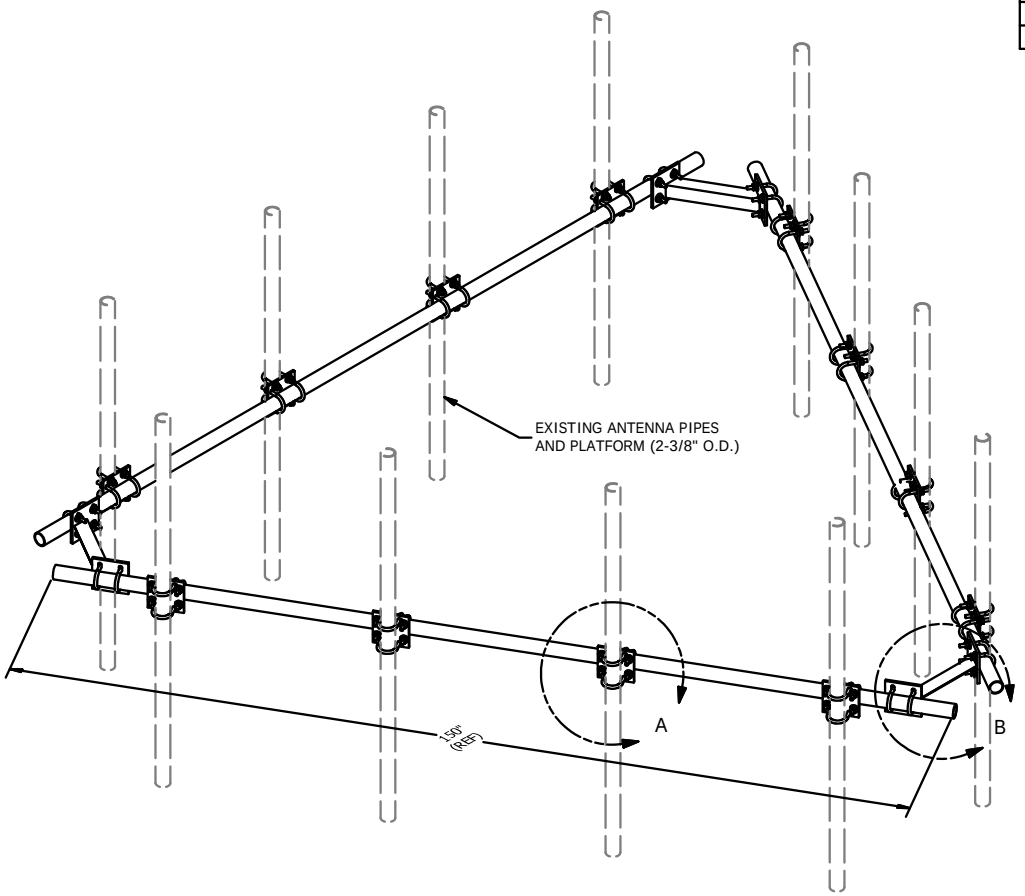
ϕ =	0.75		
$A_n = \pi/4(d - 0.9382/n)^2$	0.142	in^2	
R_b =	1		
$A_b = \pi d^2/4$	0.196	in^2	
$R_{nt} = F_{ub}A_n$	17.028	kip	
$R_{nv} = 0.625R_bF_{ub}A_b$	11.781	kip	
ϕ =	0.8		
$R_n = 1.2(L_c+d/4)tF_u \le 2.4dtF_u$	N/A	kip	
$R_n = 1.0L_ctF_u \le 2.0dtF_u$	N/A	kip	
ϕ_u =	1.0		
$R_{ns} = 0.30(2T_p-T_{ut}) \ge 0$	2.356	kip	
$R_{nr} = 0.5(DR_{ns})$	0.000	kip	

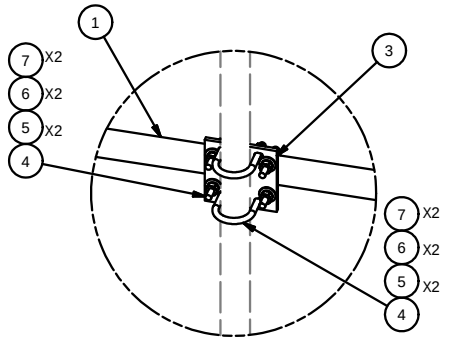
Combined Shear and Tension	0.000		0.0%
Shear	0.000		0.0%
Tension	0.000		0.0%
Bearing	0.000		0.0%
Torsion Transfer	0.000		0.0%
			0.0%

APPENDIX E

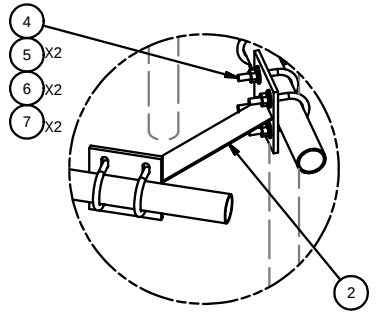
MOUNT MODIFICATION DESIGN DRAWINGS (MDD) / SUPPLEMENTAL DRAWINGS

PARTS LIST						
ITEM	QTY	PART NO.	PART DESCRIPTION	LENGTH	UNIT WT.	NET WT.
1	3	P2150	2-3/8" OD X 150" SCH 40 GALVANIZED PIPE	150 in	48.06	144.17
2	3	X-AHCP	ANGLE HANDRAIL CORNER PLATE		12.92	38.76
3	12	SCX1	CROSSOVER PLATE 2-3/8" X 2-3/8"		3.71	44.50
4	120	G12FW	1/2" HDG USS FLATWASHER		0.03	4.08
5	60	X-UB1212	1/2" X 2-1/2" X 4-1/2" X 2" U-BOLT (HDG.)		0.73	43.90
6	120	G12LW	1/2" HDG LOCKWASHER		0.01	1.67
7	120	G12NUT	1/2" HDG HEAVY 2H HEX NUT		0.07	8.58
					TOTAL WT. #	261.72





DETAIL A



DETAIL B

REV	DESCRIPTION OF REVISIONS	CPD	BY	DATE
A	REPLACED HCP WITH X-AHCP		CEK	7/10/2014

REVISION HISTORY

TOLERANCE NOTES

TOLERANCES ON DIMENSIONS, UNLESS OTHERWISE NOTED ARE:
SAWED, SHEARED AND GAS CUT EDGES *(± 0.030")*
DRILLED AND GAS CUT HOLES *(± 0.030")* - NO CONING OF HOLES
LASER CUT EDGES AND HOLES *(± 0.010")* - NO CONING OF HOLES
BENDS ARE ± 1/2 DEGREE
ALL OTHER MACHINING *(± 0.030")*
ALL OTHER ASSEMBLY *(± 0.060")*

DESCRIPTION
HANDRAIL KIT
FOR 12'-6" FACE

SITE PRO 1
A valmont COMPANY

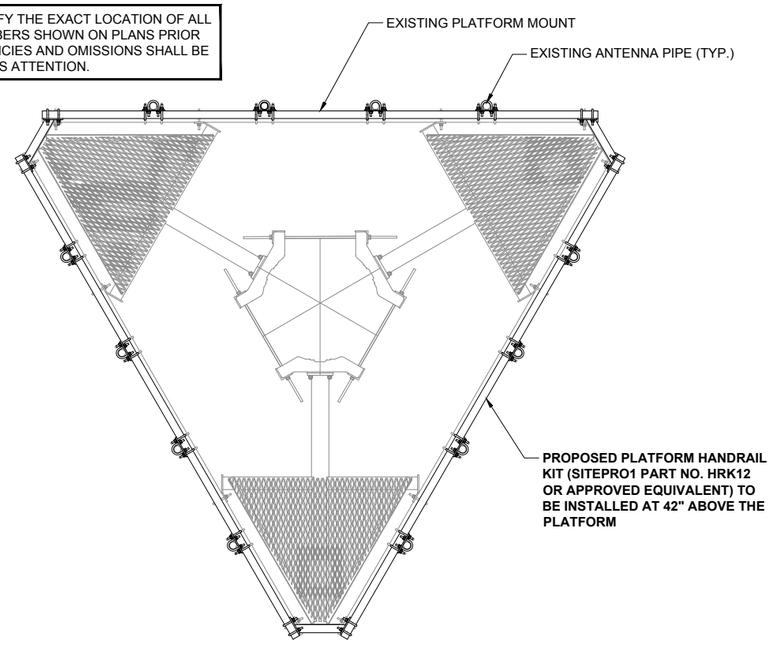
Engineering Support Team:
1-888-753-7446

Locations:
New York, NY
Atlanta, GA
Los Angeles, CA
Plymouth, IN
Salem, OR
Dallas, TX

CPD NO.	DRAWN BY	ENG. APPROVAL	PART NO.
	KC8 5/30/2012		HRK12

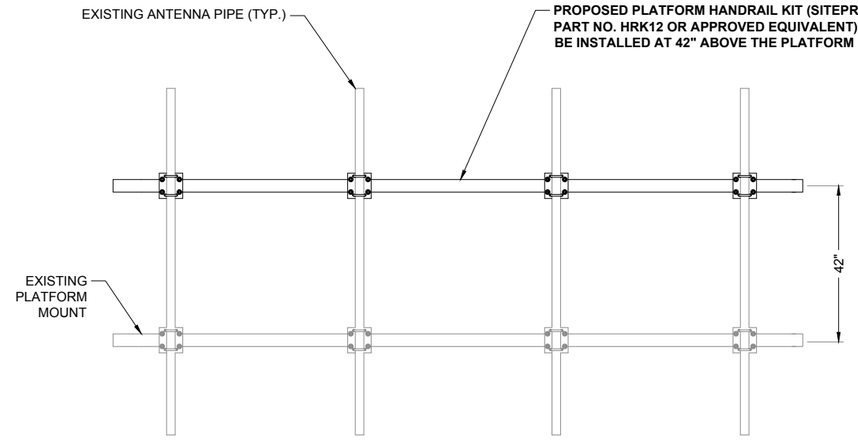
CLASS	SUB	DRAWING USAGE	CHECKED BY	DWG. NO.
81	01	CUSTOMER	BMC 7/14/2014	HRK12

CONTRACTOR TO FIELD VERIFY THE EXACT LOCATION OF ALL EXISTING STRUCTURAL MEMBERS SHOWN ON PLANS PRIOR TO FABRICATION. DISCREPANCIES AND OMISSIONS SHALL BE BROUGHT TO THE ENGINEER'S ATTENTION.



NOTES:

1. EQUIPMENT AND TOWER MEMBERS ARE OMITTED FOR CLARITY.
2. EXISTING MOUNT IS GENERIC FOR VISUAL PURPOSES.
3. ALL COMPONENTS AND HARDWARE SHALL BE OF A SUITABLE MATERIAL OR TREATED TO RESIST CORROSION.
4. ALL MOUNTING FRAME MEMBERS, ATTACHMENT CONNECTIONS, AND OTHER SUPPORTING STRUCTURES ARE TO BE THOROUGHLY INSPECTED PRIOR TO INSTALLATION OF THE PROPOSED APPURTENANCE CONFIGURATION. ANY DETERIORATION, LOCALIZED DAMAGE, OR DISTRESS TO THE STRUCTURE SHOULD BE DOCUMENTED AND REPORTED TO THE ENGINEER. THE CONTRACTOR SHALL REPAIR ALL DEFICIENCIES PRIOR TO INSTALLATION OF THE PROPOSED EQUIPMENT.



DETAIL A	NO SCALE	1

DETAIL B	NO SCALE	2

NOT USED	NO SCALE	3

NOT USED	NO SCALE	4

PREPARED BY:
JACOBS
JACOBS TELECOMMUNICATIONS, INC.
5449 BELLS FERRY RD
ACWORTH, GA 30102
770-701-2500 GENERAL
470-785-4033 PM

PREPARED FOR:
CROWN CASTLE

ENGINEER SEAL:

DESIGN REVISIONS:

NO.	DATE	REVISIONS	BY
0	10/24/19	ISSUED FOR CONSTRUCTION	BB
A	10/24/19	ISSUED FOR REVIEW	HB

NOT VALID WITHOUT SIGNATURE AND DATE

PREPARED BY:
CHECKED BY: B. BARTLETT
DESIGNED BY: A. ASGHARI
PROJECT NO: ERCC0303
DATE: 10/24/2019

SITE NAME:
876369

SITE NO:
BU NO: 876369
SITE NAME: HARWINTON/BUCKLEY BROADCASTI

SITE ADDRESS:
64 HUNGERFORD LANE
HARWINTON, CT 06791
LITCHFIELD COUNTY

SHEET NAME:
MOUNT MODIFICATION

SHEET NUMBER:
S-1

BILL OF MATERIAL		
ITEM	QUANTITY	DESCRIPTION
1	1	SITEPRO1 PART NO. HRK12
2		
3		
4		
5		
6		
7		
8		

NOTES:

1. ALL MATERIALS TO BE GALVANIZED.
2. CONTACT JACOBS FOR AN APPROVED EQUIVALENT PART NUMBER FOR SUBSTITUTIONS. APPROVAL LETTER CAN BE PROVIDED.

DETAIL A | NO SCALE | 1

NOT USED | NO SCALE | 2

NOT USED | NO SCALE | 3

NOT USED | NO SCALE | 4

PREPARED BY:
JACOBS™
JACOBS TELECOMMUNICATIONS, INC.
5449 BELLS FERRY RD
ACWORTH, GA 30102
770-701-2500 GENERAL
470-785-4033 PM

PREPARED FOR:
CROWN CASTLE

ENGINEER SEAL:

DESIGN REVISIONS:

NO.	DATE	REVISIONS	BY
0	10/24/19	ISSUED FOR CONSTRUCTION	BB
A	10/24/19	ISSUED FOR REVIEW	HB

NOT VALID WITHOUT SIGNATURE AND DATE

PREPARED BY:
CHECKED BY: B. BARTLETT
DESIGNED BY: A. ASGHARI
PROJECT NO: ERCC0303
DATE: 10/24/2019

SITE NAME: 876369

SITE NO: BU NO: 876369
SITE NAME: HARWINTON/BUCKLEY BROADCASTI

SITE ADDRESS: 64 HUNGERFORD LANE
HARWINTON, CT 06791
LITCHFIELD COUNTY

SHEET NAME: MOUNT MODIFICATION

SHEET NUMBER: S-2

Exhibit F

Power Density/RF Emissions Report

RF EMISSIONS COMPLIANCE REPORT

Crown Castle on behalf of AT&T Mobility, LLC

Crown Castle Site Name: HARWINTON / BUCKLEY BROADCASTI
Crown Castle Site BU: 876369
AT&T Mobility, LLC Site FA #: 10110565
64 Hungerford Lane
Harwinton, CT
6/25/2019

Report Status:

AT&T Mobility, LLC Is Compliant

Michael Fischer, P.E.
Registered Professional Engineer (Electrical)
Pennsylvania License Number PE076436
Expires September 30, 2019

Signed 25 June 2019

Prepared By:

Site Safe, LLC

8618 Westwood Center Drive
Suite 315

Vienna, VA 22182

Voice: 703-276-1100
Fax: 703-276-1169

Engineering Statement in Re:
Electromagnetic Energy Analysis
Crown Castle
Harwinton, CT

My signature on the cover of this document indicates:

That I am registered as a Professional Engineer in the jurisdiction indicated; and

That I have extensive professional experience in the wireless communications engineering industry; and

That I am an employee of Site Safe, LLC in Vienna, Virginia; and

That I am thoroughly familiar with the Rules and Regulations of the Federal Communications Commission ("the FCC" and "the FCC Rules") both in general and specifically as they apply to the FCC's Guidelines for Human Exposure to Radio Frequency Electromagnetic Fields; and

That the technical information serving as the basis for this report was supplied by Crown Castle (see attached Site Summary and Carrier documents) and that AT&T Mobility, LLC's installation involves communications equipment, antennas and associated technical equipment at a location referred to as "HARWINTON / BUCKLEY BROADCASTI" ("the site"); and

That AT&T Mobility, LLC proposes to operate at the site with transmit antennas listed in the carrier summary and with a maximum effective radiated power as specified by AT&T Mobility, LLC and shown on the worksheet and that worst-case 100% duty cycle has been assumed; and

That this analysis has been performed with the assumption that the ground immediately surrounding the tower is primarily flat or falling; and

That at this time, the FCC requires that certain licensees address specific levels of radio frequency energy to which workers or members of the public might possibly be exposed (at §1.1307(b) of the FCC Rules); and

That such consideration of possible exposure of humans to radio frequency energy must utilize the standards set by the FCC, which is the federal agency having jurisdiction over communications facilities; and

That the FCC rules define two tiers of permissible exposure guidelines: 1) "uncontrolled environments," which defines situations in which persons may not be aware of (the "general public"), or may not be able to control their exposure to a transmission facility; and 2) "controlled environments," which defines situations in which persons are aware of their potential for exposure (industry personnel); and

That this statement specifically addresses the uncontrolled environment (which is more conservative than the controlled environment) and the limits set forth in the FCC rules for licensees of AT&T Mobility, LLC's operating frequencies as shown on the attached antenna worksheet; and

That when applying the uncontrolled environment standards, the predicted Maximum Power Density at two meters above ground level from the proposed AT&T Mobility, LLC operation is

no more than 1.428% of the maximum permissible exposure limits in any accessible area on the ground; and

That it is understood per FCC Guidelines and OET 65 Appendix A, that regardless of the existent radio frequency environment, only those licensees whose contributions exceed 5% of the exposure limit pertinent to their operation(s) bear any responsibility for bringing any non-compliant area(s) into compliance; and

That when applying the uncontrolled environment standards, the cumulative predicted energy density from the proposed operation is no more than 2.961% of the maximum in any accessible area up to two meters above the ground per OET 65; and

That the calculations provided in this report are based on data provided by the client and antenna pattern data supplied by the antenna manufacturer, in accordance with FCC guidelines listed in OET 65. Horizontal and vertical antenna patterns are combined for modeling purposes to accurately reflect the energy two meters above ground level where on-axis energy refers to maximum energy two meters above the ground along the azimuth of the antenna and where area energy refers to the maximum energy anywhere two meters above the ground regardless of the antenna azimuth, accounting for cumulative energy from multiple antennas for the carrier(s) and frequency range(s) indicated; and

That the Occupational Safety and Health Administration has policies in place which address worker safety in and around communications sites, thus individual companies will be responsible for their employees' training regarding radio frequency safety; and

In summary, it is stated here that the proposed operation at the site will not result in exposure of the public to excessive levels of radio frequency energy as defined in the FCC Rules and Regulations, specifically 47 CFR 1.1307(b), and that AT&T Mobility, LLC's proposed operation is completely compliant.

Finally, it is stated that access to the tower should be restricted to communication industry professionals and approved contractor personnel trained in radio frequency safety and that this instant analysis addresses exposure levels at two meters above ground level and does not address exposure levels on the tower or in the immediate proximity of the antennas.

Crown Castle
HARWINTON / BUCKLEY BROADCASTI
Site Summary

Carrier	Area Maximum Percentage MPE
AT&T Mobility, LLC (Decommissioned)	0 %
AT&T Mobility, LLC (Proposed)	0.228 %
AT&T Mobility, LLC (Proposed)	0.156 %
AT&T Mobility, LLC (Proposed)	0.31 %
AT&T Mobility, LLC (Proposed)	0.539 %
AT&T Mobility, LLC (Proposed)	0.195 %
Sprint	0.203 %
Sprint	0.133 %
Sprint	0.133 %
Sprint	0.052 %
Sprint	0.052 %
Verizon Wireless	0.325 %
Verizon Wireless	0.296 %
Verizon Wireless	0.339 %
Composite Site MPE:	2.961 %

AT&T Mobility, LLC (Decommissioned)
HARWINTON / BUCKLEY BROADCASTI
Carrier Summary

Frequency:	850	MHz
Maximum Permissible Exposure (MPE):	566.67	µW/cm^2
Maximum power density at ground level:	0	µW/cm^2
Highest percentage of Maximum Permissible Exposure:	0	%

					On Axis		Area	
Antenna Make	**Model**	**Height (feet)**	**Orientation (degrees true)**	**ERP (Watts)**	**Max Power Density (µW/cm^2)**	**Percent of MPE**	**Max Power Density (µW/cm^2)**	**Percent of MPE**
Powerwave	7770	158	30	0	0	0	0	0
Powerwave	7770	158	150	0	0	0	0	0
Powerwave	7770	158	270	0	0	0	0	0

AT&T Mobility, LLC (Proposed)
HARWINTON / BUCKLEY BROADCASTI
Carrier Summary

Frequency:	2100	MHz
Maximum Permissible Exposure (MPE):	1000	µW/cm^2
Maximum power density at ground level:	2.27556	µW/cm^2
Highest percentage of Maximum Permissible Exposure:	0.22756	%

					On Axis		Area	
Antenna Make	**Model**	**Height (feet)**	**Orientation (degrees true)**	**ERP (Watts)**	**Max Power Density (µW/cm^2)**	**Percent of MPE**	**Max Power Density (µW/cm^2)**	**Percent of MPE**
Kathrein-Scala	800-10964	158	30	5274	0.895408	0.089541	2.161986	0.216199
Kathrein-Scala	800-10964	158	150	5274	0.917642	0.091764	2.161986	0.216199
Kathrein-Scala	800-10964	158	270	5274	0.917642	0.091764	2.161986	0.216199

AT&T Mobility, LLC (Proposed)
HARWINTON / BUCKLEY BROADCASTI
Carrier Summary

Frequency:	850	MHz
Maximum Permissible Exposure (MPE):	566.67	µW/cm^2
Maximum power density at ground level:	0.88193	µW/cm^2
Highest percentage of Maximum Permissible Exposure:	0.15564	%

					On Axis		Area	
Antenna Make	**Model**	**Height (feet)**	**Orientation (degrees true)**	**ERP (Watts)**	**Max Power Density (µW/cm^2)**	**Percent of MPE**	**Max Power Density (µW/cm^2)**	**Percent of MPE**
Kathrein-Scala	800-10964	158	30	2631	0.613366	0.108241	0.743229	0.131158
Kathrein-Scala	800-10964	158	150	2631	0.614716	0.108479	0.743229	0.131158
Kathrein-Scala	800-10964	158	270	2631	0.613366	0.108241	0.743229	0.131158

AT&T Mobility, LLC (Proposed)
HARWINTON / BUCKLEY BROADCASTI
Carrier Summary

Frequency:	2300	MHz
Maximum Permissible Exposure (MPE):	1000	µW/cm^2
Maximum power density at ground level:	3.104	µW/cm^2
Highest percentage of Maximum Permissible Exposure:	0.3104	%

					On Axis		Area	
Antenna Make	**Model**	**Height (feet)**	**Orientation (degrees true)**	**ERP (Watts)**	**Max Power Density (µW/cm^2)**	**Percent of MPE**	**Max Power Density (µW/cm^2)**	**Percent of MPE**
CCI Antennas	HPA65R-BU6A	158	30	3206	2.571042	0.257104	3.081806	0.308181
CCI Antennas	HPA65R-BU6A	158	150	3206	2.581849	0.258185	3.081806	0.308181
CCI Antennas	HPA65R-BU6A	158	270	3206	2.571042	0.257104	3.081806	0.308181

AT&T Mobility, LLC (Proposed)
HARWINTON / BUCKLEY BROADCASTI
Carrier Summary

Frequency:	1900	MHz
Maximum Permissible Exposure (MPE):	1000	µW/cm^2
Maximum power density at ground level:	5.38995	µW/cm^2
Highest percentage of Maximum Permissible Exposure:	0.539	%

					On Axis		Area	
Antenna Make	**Model**	**Height (feet)**	**Orientation (degrees true)**	**ERP (Watts)**	**Max Power Density (µW/cm^2)**	**Percent of MPE**	**Max Power Density (µW/cm^2)**	**Percent of MPE**
CCI Antennas	HPA65R-BU6A	158	30	4788	4.656104	0.46561	5.373369	0.537337
CCI Antennas	HPA65R-BU6A	158	150	4788	4.566436	0.456644	5.373369	0.537337
CCI Antennas	HPA65R-BU6A	158	270	4788	4.566436	0.456644	5.373369	0.537337

AT&T Mobility, LLC (Proposed)
HARWINTON / BUCKLEY BROADCASTI
Carrier Summary

Frequency:	737	MHz
Maximum Permissible Exposure (MPE):	491.33	µW/cm^2
Maximum power density at ground level:	0.95952	µW/cm^2
Highest percentage of Maximum Permissible Exposure:	0.19529	%

					On Axis		Area	
Antenna Make	**Model**	**Height (feet)**	**Orientation (degrees true)**	**ERP (Watts)**	**Max Power Density (µW/cm^2)**	**Percent of MPE**	**Max Power Density (µW/cm^2)**	**Percent of MPE**
CCI Antennas	HPA65R-BU6A	158	30	2819	0.864755	0.176002	0.897743	0.182716
CCI Antennas	HPA65R-BU6A	158	150	2819	0.868131	0.176689	0.897743	0.182716
CCI Antennas	HPA65R-BU6A	158	270	2819	0.868131	0.176689	0.897743	0.182716

Sprint
HARWINTON / BUCKLEY BROADCASTI
Carrier Summary

Frequency:	2500	MHz
Maximum Permissible Exposure (MPE):	1000	µW/cm^2
Maximum power density at ground level:	2.0292	µW/cm^2
Highest percentage of Maximum Permissible Exposure:	0.20292	%

					On Axis		Area	
Antenna Make	**Model**	**Height (feet)**	**Orientation (degrees true)**	**ERP (Watts)**	**Max Power Density (µW/cm^2)**	**Percent of MPE**	**Max Power Density (µW/cm^2)**	**Percent of MPE**
RFS	APXVTM14-C-I20	180	70	6168	0.686455	0.068645	1.284076	0.128408
RFS	APXVTM14-C-I20	180	170	6168	0.686192	0.068619	1.284076	0.128408
RFS	APXVTM14-C-I20	180	330	6168	0.686455	0.068645	1.284076	0.128408

Sprint
HARWINTON / BUCKLEY BROADCASTI
Carrier Summary

Frequency:	1990	MHz
Maximum Permissible Exposure (MPE):	1000	µW/cm^2
Maximum power density at ground level:	1.33144	µW/cm^2
Highest percentage of Maximum Permissible Exposure:	0.13314	%

					On Axis		Area	
Antenna Make	**Model**	**Height (feet)**	**Orientation (degrees true)**	**ERP (Watts)**	**Max Power Density (µW/cm^2)**	**Percent of MPE**	**Max Power Density (µW/cm^2)**	**Percent of MPE**
RFS	APXVSPP18-C-A20	180	70	3804	0.58178	0.058178	1.034015	0.103401
RFS	APXVSPP18-C-A20	180	170	3804	0.58178	0.058178	1.034015	0.103401
RFS	APXVSPP18-C-A20	180	330	3804	0.58178	0.058178	1.034015	0.103402

Sprint
HARWINTON / BUCKLEY BROADCASTI
Carrier Summary

Frequency:	1900	MHz
Maximum Permissible Exposure (MPE):	1000	µW/cm^2
Maximum power density at ground level:	1.33144	µW/cm^2
Highest percentage of Maximum Permissible Exposure:	0.13314	%

					On Axis		Area	
Antenna Make	**Model**	**Height (feet)**	**Orientation (degrees true)**	**ERP (Watts)**	**Max Power Density (µW/cm^2)**	**Percent of MPE**	**Max Power Density (µW/cm^2)**	**Percent of MPE**
RFS	APXVSPP18-C-A20	180	70	3804	0.58178	0.058178	1.034015	0.103401
RFS	APXVSPP18-C-A20	180	170	3804	0.58178	0.058178	1.034015	0.103401
RFS	APXVSPP18-C-A20	180	330	3804	0.58178	0.058178	1.034015	0.103402

Sprint
HARWINTON / BUCKLEY BROADCASTI
Carrier Summary

Frequency:	866	MHz
Maximum Permissible Exposure (MPE):	577.33	µW/cm^2
Maximum power density at ground level:	0.2997	µW/cm^2
Highest percentage of Maximum Permissible Exposure:	0.05191	%

					On Axis		Area	
Antenna Make	**Model**	**Height (feet)**	**Orientation (degrees true)**	**ERP (Watts)**	**Max Power Density (µW/cm^2)**	**Percent of MPE**	**Max Power Density (µW/cm^2)**	**Percent of MPE**
RFS	APXVSPP18-C-A20	180	70	1084	0.235083	0.040719	0.241009	0.041745
RFS	APXVSPP18-C-A20	180	170	1084	0.235083	0.040719	0.241009	0.041745
RFS	APXVSPP18-C-A20	180	330	1084	0.235863	0.040854	0.241009	0.041745

Sprint
HARWINTON / BUCKLEY BROADCASTI
Carrier Summary

Frequency:	862	MHz
Maximum Permissible Exposure (MPE):	574.67	µW/cm^2
Maximum power density at ground level:	0.2997	µW/cm^2
Highest percentage of Maximum Permissible Exposure:	0.05215	%

					On Axis		Area	
Antenna Make	**Model**	**Height (feet)**	**Orientation (degrees true)**	**ERP (Watts)**	**Max Power Density (µW/cm^2)**	**Percent of MPE**	**Max Power Density (µW/cm^2)**	**Percent of MPE**
RFS	APXVSPP18-C-A20	180	70	1084	0.235083	0.040908	0.241009	0.041939
RFS	APXVSPP18-C-A20	180	170	1084	0.235083	0.040908	0.241009	0.041939
RFS	APXVSPP18-C-A20	180	330	1084	0.235863	0.041043	0.241009	0.041939

Verizon Wireless
HARWINTON / BUCKLEY BROADCASTI
Carrier Summary

Frequency:	751	MHz
Maximum Permissible Exposure (MPE):	500.67	µW/cm^2
Maximum power density at ground level:	1.62704	µW/cm^2
Highest percentage of Maximum Permissible Exposure:	0.32497	%

					On Axis		Area	
Antenna Make	**Model**	**Height (feet)**	**Orientation (degrees true)**	**ERP (Watts)**	**Max Power Density (µW/cm^2)**	**Percent of MPE**	**Max Power Density (µW/cm^2)**	**Percent of MPE**
Antel	BXA-70063-6CF	170	50	4019	1.593532	0.318282	1.622749	0.324118
Antel	BXA-70063-6CF	170	180	4019	1.596228	0.318821	1.622749	0.324118
Antel	BXA-70063-6CF	170	300	4019	1.593532	0.318282	1.622748	0.324118

Verizon Wireless
HARWINTON / BUCKLEY BROADCASTI
Carrier Summary

Frequency:	1900	MHz
Maximum Permissible Exposure (MPE):	1000	µW/cm^2
Maximum power density at ground level:	2.95878	µW/cm^2
Highest percentage of Maximum Permissible Exposure:	0.29588	%

					On Axis		Area	
Antenna Make	**Model**	**Height (feet)**	**Orientation (degrees true)**	**ERP (Watts)**	**Max Power Density (µW/cm^2)**	**Percent of MPE**	**Max Power Density (µW/cm^2)**	**Percent of MPE**
Antel	BXA-171085-12CF	170	50	5677	1.196534	0.119653	2.350776	0.235078
Antel	BXA-171085-12CF	170	180	5677	1.196534	0.119653	2.350776	0.235078
Antel	BXA-171085-12CF	170	300	5677	1.196534	0.119653	2.350776	0.235078

Verizon Wireless
HARWINTON / BUCKLEY BROADCASTI
Carrier Summary

Frequency:	850	MHz
Maximum Permissible Exposure (MPE):	566.67	µW/cm^2
Maximum power density at ground level:	1.91988	µW/cm^2
Highest percentage of Maximum Permissible Exposure:	0.3388	%

					On Axis		Area	
Antenna Make	**Model**	**Height (feet)**	**Orientation (degrees true)**	**ERP (Watts)**	**Max Power Density (µW/cm^2)**	**Percent of MPE**	**Max Power Density (µW/cm^2)**	**Percent of MPE**
Antel	LPA-80080-6CF	170	50	4019	0.919525	0.162269	1.410195	0.248858
Antel	LPA-80080-6CF	170	180	4019	0.919525	0.162269	1.410195	0.248858
Antel	LPA-80080-6CF	170	300	4019	0.919525	0.162269	1.410195	0.248858