Crown Castle
3530 Toringdon Way Suite 300
Charlotte NC 28277

Tel (704) 405-6600

May 26, 2015

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

RE: **T-Mobile-Exempt Modification - Crown Site BU: 876381**
T-Mobile Site ID: CT11393B
Located at: 2365 Long Hill Road, Guilford, CT 06437

Dear Ms. Bachman:

This letter and exhibits are submitted on behalf of T-Mobile. T-Mobile is making modifications to certain existing sites in its Connecticut system in order to implement their 700MHz technology. Please accept this letter and exhibits as notification, pursuant to § 16-50j-73 of the Regulations of Connecticut State Agencies ("R.C.S.A."), of construction that constitutes an exempt modification pursuant to R.C.S.A. § 16-50j-72(b)(2). In compliance with R.C.S.A. § 16-50j-73, a copy of this letter is being sent to Mr. Joseph S. Mazza, First Selectman for the Town of Guilford and Janice M. Ward Family Trust, Property Owner.

T-Mobile plans to modify the existing wireless communications facility owned by Crown Castle and located at **2365 Long Hill Road, Guilford, CT 06437**. Attached are a compound plan and elevation depicting the planned changes (Exhibit-1), and documentation of the structural sufficiency of the structure to accommodate the revised antenna configuration (Exhibit-2). Also included is a power density table report reflecting the modification to T-Mobile's operations at the site (Exhibit-3).

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

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

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

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

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

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

For the foregoing reasons, T-Mobile respectfully submits the proposed modifications to the above-reference telecommunications facility constitutes an exempt modification under R.C.S.A. § 16-50j-72(b)(2).

Sincerely,

Jerry Feathers
Real Estate Specialist

Enclosure

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

cc: Mr. Joseph S. Mazza, First Selectman
31 Park Street
Guilford, CT 06437

cc: Janice M. Ward Family Trust
Janice M. Ward, Trustee
2365 Long Hill Road
Guilford, CT 06437

T-MOBILE NORTHEAST LLC

T-MOBILE SITE #: CT11393B
CROWN CASTLE BU #: 876381
SITE NAME: WARD
2365 LONG HILL ROAD
GUILFORD, CT 06437
NEW HAVEN COUNTY

VICINITY MAP

FROM PARSIPPANY, NJ:

DEPART SYLVAN WAY TOWARD CENTURY DR. TURN RIGHT ONTO US-202/LITTETON RD. TAKE RAMP RIGHT AND MERGE ONTO I-287 N. TAKE THE EXIT ONTO I-287 E TOWARD TAPPAN ZEE BRIDGE. KEEP LEFT AT THE FORK TO CONTINUE ON I-287 E, FOLLOW SIGNS FOR WHITE PLAINS. MERGE ONTO I-95 N. TAKE EXIT 55 FOR US-1/E MAIN ST TOWARD N BRANFORD. TURN RIGHT ONTO US-1 N/E MAIN ST. TURN LEFT ONTO CT-1389 N. TURN RIGHT ONTO CT-80 E. TURN RIGHT ONTO LONG HILL RD. TURN LEFT AT CARDINAL DR. SITE WILL BE STRAIGHT AHEAD.

ENGINEER
DEWBERRY ENGINEERS INC.
600 PARSIPPANY ROAD
SUITE 301
PARSIPPANY, NJ 07054

CONTACT: BRYAN HUFF
PHONE #: (973) 576-0147

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

CONTACT: PATRICIA PELON
PHONE #: (518) 373-3507

CONSULTANT TEAM

SITE NAME:
WARD

SITE NUMBER:
CT11393B

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

APPLICANT/DEVELOPER:
T-MOBILE NORTHEAST LLC
4 SYLVAN WAY
PARSIPPANY, NJ 07054

COORDINATES:
LATITUDE: 41°-20'-47.34" N (NAD83)
LONGITUDE: 72°-43'-23.15" W (NAD83)
(PER CROWN CASTLE)

CONFIGURATION
702Cc

PROJECT SUMMARY

SITE ADDRESS:
2365 LONG HILL ROAD
GUILFORD, CT 06437
NEW HAVEN COUNTY

PROJECT DIRECTORY

- REMOVE AND REPLACE (3) EXISTING ANTENNAS WITH (3) NEW ANTENNAS.
- INSTALL (3) NEW RRU'S.

SCOPE OF WORK

THIS DOCUMENT WAS DEVELOPED TO REFLECT A SPECIFIC SITE AND ITS SITE CONDITIONS AND IS NOT TO BE USED FOR ANOTHER SITE OR WHEN OTHER CONDITIONS PERTAIN. REUSE OF THIS DOCUMENT IS AT THE SOLE RISK OF THE USER.

A.D.A. COMPLIANCE:
FACILITY IS UNMANNED AND NOT FOR HUMAN HABITATION.

SHT. NO.	DESCRIPTION
T-1	TITLE SHEET
G-1	GENERAL NOTES
C-1	COMPOUND PLAN & EQUIPMENT PLANS
C-2	ANTENNA LAYOUTS & ELEVATIONS
C-3	CONSTRUCTION DETAILS
E-1	GROUNDING NOTES & DETAILS

SHEET INDEX

T-MOBILE NORTHEAST LLC
4 SYLVAN WAY
PARSIPPANY, NJ 07054

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

CT11393B
WARD

CONSTRUCTION DRAWINGS		
0	05/21/15	ISSUED AS FINAL
A	05/19/15	ISSUED FOR REVIEW

Dewberry
Dewberry Engineers Inc.
600 PARSIPPANY ROAD
SUITE 301
PARSIPPANY, NJ 07054
PHONE: 973.739.9400
FAX: 973.739.9710

STATE OF CONNECTICUT
JIANG, YUE
No. 28222
REGISTERED PROFESSIONAL ENGINEER
CONNECTICUT LICENSE NO. 028222
IT IS A VIOLATION OF LAW FOR ANY PERSON, UNLESS THEY ARE ACTING UNDER THE DIRECTION OF A LICENSED PROFESSIONAL ENGINEER TO ALTER THIS DOCUMENT.

DRAWN BY:	RA
REVIEWED BY:	BSH
CHECKED BY:	GHN
PROJECT NUMBER:	50066258
JOB NUMBER:	50071493
SITE ADDRESS:	

2365 LONG HILL ROAD
GUILFORD, CT 06437
NEW HAVEN COUNTY

SHEET TITLE

TITLE SHEET

SHEET NUMBER

T-1

GENERAL NOTES:

1. FOR THE PURPOSE OF CONSTRUCTION DRAWING, THE FOLLOWING DEFINITIONS SHALL APPLY:
   PROJECT MANAGEMENT – CROWN CASTLE
   CONTRACTOR – GENERAL CONTRACTOR (CONSTRUCTION)
   OWNER – T–MOBILE
   OEM – ORIGINAL EQUIPMENT MANUFACTURER
2. PRIOR TO THE SUBMISSION OF BIDS, THE BIDDING CONTRACTOR SHALL VISIT THE CELL SITE TO FAMILIARIZE WITH THE EXISTING CONDITIONS AND TO CONFIRM THAT THE WORK CAN BE ACCOMPLISHED AS SHOWN ON THE CONSTRUCTION DRAWINGS. ANY DISCREPANCY FOUND SHALL BE BROUGHT TO THE ATTENTION OF PROJECT MANAGEMENT.
3. ALL MATERIALS FURNISHED AND INSTALLED SHALL BE IN STRICT ACCORDANCE WITH ALL APPLICABLE CODES, REGULATIONS, AND ORDINANCES. CONTRACTOR SHALL ISSUE ALL APPROPRIATE NOTICES AND COMPLY WITH ALL LAWS, ORDINANCES, RULES, REGULATIONS, AND LAWFUL ORDERS OF ANY PUBLIC AUTHORITY REGARDING THE PERFORMANCE OF THE WORK.
4. ALL WORK CARRIED OUT SHALL COMPLY WITH ALL APPLICABLE MUNICIPAL AND UTILITY COMPANY SPECIFICATIONS AND LOCAL JURISDICTIONAL CODES, ORDINANCES AND APPLICABLE REGULATIONS.
5. DRAWINGS PROVIDED HERE ARE NOT TO SCALE UNLESS OTHERWISE NOTED AND ARE INTENDED TO SHOW OUTLINE ONLY.
6. UNLESS NOTED OTHERWISE, THE WORK SHALL INCLUDE FURNISHING MATERIALS, EQUIPMENT, APPURTENANCES, AND LABOR NECESSARY TO COMPLETE ALL INSTALLATIONS AS INDICATED ON THE DRAWINGS.
7. THE CONTRACTOR SHALL INSTALL ALL EQUIPMENT AND MATERIALS IN ACCORDANCE WITH MANUFACTURER'S RECOMMENDATIONS UNLESS SPECIFICALLY STATED OTHERWISE.
8. IF THE SPECIFIED EQUIPMENT CANNOT BE INSTALLED AS SHOWN ON THESE DRAWINGS, THE CONTRACTOR SHALL PROPOSE AN ALTERNATIVE INSTALLATION FOR APPROVAL BY PROJECT MANAGEMENT.
9. CONTRACTOR SHALL DETERMINE ACTUAL ROUTING OF CONDUIT, POWER AND T1 CABLES, GROUNDING CABLES AS SHOWN ON THE POWER, GROUNDING AND TELCO PLAN DRAWING. CONTRACTOR SHALL UTILIZE EXISTING TRAYS AND/OR SHALL ADD NEW TRAYS AS NECESSARY. CONTRACTOR SHALL CONFIRM THE ACTUAL ROUTING WITH PROJECT MANAGEMENT.
10. THE CONTRACTOR SHALL PROTECT EXISTING IMPROVEMENTS, PAVEMENTS, CURBS, LANDSCAPING AND STRUCTURES. ANY DAMAGED PART SHALL BE REPAIRED AT CONTRACTOR'S EXPENSE TO THE SATISFACTION OF THE OWNER.
11. CONTRACTOR SHALL LEGALLY AND PROPERLY DISPOSE OF ALL SCRAP MATERIALS SUCH AS COAXIAL CABLES AND OTHER ITEMS REMOVED FROM THE EXISTING FACILITY. ANTENNAS REMOVED SHALL BE RETURNED TO THE OWNER'S DESIGNATED LOCATION.
12. CONTRACTOR SHALL LEAVE PREMISES IN CLEAN CONDITION.
13. THE CONTRACTOR SHALL SUPERVISE AND DIRECT THE PROJECT DESCRIBED HEREIN. THE CONTRACTOR SHALL BE SOLELY RESPONSIBLE FOR ALL CONSTRUCTION MEANS, METHODS, TECHNIQUES, SEQUENCES, AND PROCEDURES AND FOR COORDINATING ALL PORTIONS OF THE WORK UNDER THE CONTRACT.
14. CONTRACTOR SHALL NOTIFY DEWBERRY 48 HOURS IN ADVANCE OF POURING CONCRETE, OR BACKFILLING TRENCHES, SEALING ROOF AND WALL PENETRATIONS & POST DOWNS, FINISHING NEW WALLS OR FINAL ELECTRICAL CONNECTIONS FOR ENGINEER REVIEW.
15. CONTRACTOR SHALL VERIFY ALL EXISTING DIMENSIONS AND CONDITIONS PRIOR TO COMMENCING ANY WORK. ALL DIMENSIONS OF EXISTING CONSTRUCTION SHOWN ON THE DRAWINGS MUST BE VERIFIED. CONTRACTOR SHALL NOTIFY PROJECT MANAGEMENT OF ANY DISCREPANCIES PRIOR TO ORDERING MATERIAL OR PROCEEDING WITH CONSTRUCTION.
16. THE EXISTING CELL SITE IS IN FULL COMMERCIAL OPERATION. ANY CONSTRUCTION WORK BY CONTRACTOR SHALL NOT DISRUPT THE EXISTING NORMAL OPERATION. ANY WORK ON EXISTING EQUIPMENT MUST BE COORDINATED WITH CONTRACTOR. ALSO, WORK SHOULD BE SCHEDULED FOR AN APPROPRIATE MAINTENANCE WINDOW USUALLY IN LOW TRAFFIC PERIODS AFTER MIDNIGHT.
17. SINCE THE CELL SITE IS ACTIVE, ALL SAFETY PRECAUTIONS MUST BE TAKEN WHEN WORKING AROUND HIGH LEVELS OF ELECTROMAGNETIC RADIATION. EQUIPMENT SHOULD BE SHUTDOWN PRIOR TO PERFORMING ANY WORK THAT COULD EXPOSE THE WORKERS TO DANGER. PERSONAL RF EXPOSURE MONITORS ARE ADVISED TO BE WORN TO ALERT OF ANY DANGEROUS EXPOSURE LEVELS.

SITE WORK GENERAL NOTES:

1. THE CONTRACTOR SHALL CONTACT UTILITY LOCATING SERVICES PRIOR TO THE START OF CONSTRUCTION.
2. ALL EXISTING ACTIVE SEWER, WATER, GAS, ELECTRIC, AND OTHER UTILITIES WHERE ENCOUNTERED IN THE WORK, SHALL BE PROTECTED AT ALL TIMES, AND WHERE REQUIRED FOR THE PROPER EXECUTION OF THE WORK, SHALL BE RELOCATED AS DIRECTED BY CONTRACTOR. EXTREME CAUTION SHOULD BE USED BY THE CONTRACTOR WHEN EXCAVATING OR DRILLING PIERS AROUND OR NEAR UTILITIES. CONTRACTOR SHALL PROVIDE SAFETY TRAINING FOR THE WORKING CREW. THIS WILL INCLUDE BUT NOT BE LIMITED TO:
   A) FALL PROTECTION
   B) CONFINED SPACE
   C) ELECTRICAL SAFETY
   D) TRENCHING & EXCAVATION.
3. ALL SITE WORK SHALL BE AS INDICATED ON THE DRAWINGS AND PROJECT SPECIFICATIONS.
4. IF NECESSARY, RUBBISH, STUMPS, DEBRIS, STICKS, STONES, TOP SOIL AND OTHER REFUSE SHALL BE REMOVED FROM THE SITE AND DISPOSED OF LEGALLY.
5. ALL EXISTING INACTIVE SEWER, WATER, GAS, ELECTRIC AND OTHER UTILITIES, WHICH INTERFERE WITH THE EXECUTION OF THE WORK, SHALL BE REMOVED AND/OR CAPPED, PLUGGED OR OTHERWISE DISCONTINUED AT POINTS WHICH WILL NOT INTERFERE WITH THE EXECUTION OF THE WORK, SUBJECT TO THE APPROVAL OF CONTRACTOR, OWNER AND/OR LOCAL UTILITIES.
6. CONTRACTOR SHALL MINIMIZE DISTURBANCE TO EXISTING SITE DURING CONSTRUCTION.
7. THE CONTRACTOR SHALL PROVIDE SITE SIGNAGE IN ACCORDANCE WITH THE T–MOBILE SPECIFICATION FOR SITE SIGNAGE.
8. THE SITE SHALL BE GRADED TO CAUSE SURFACE WATER TO FLOW AWAY FROM THE TRANSMISSION EQUIPMENT AND TOWER AREAS.
9. NO FILL OR EMBANKMENT MATERIAL SHALL BE PLACED ON FROZEN GROUND. FROZEN MATERIALS, SNOW OR ICE SHALL NOT BE PLACED IN ANY FILL OR EMBANKMENT.
10. THE SUB GRADE SHALL BE COMPACTED AND BROUGHT TO A SMOOTH UNIFORM GRADE PRIOR TO FINISHED SURFACE APPLICATION, SEE SOIL COMPACTION NOTES.
11. THE AREAS OF THE OWNER'S PROPERTY DISTURBED BY THE WORK AND NOT COVERED BY THE TOWER, EQUIPMENT OR DRIVEWAY, SHALL BE GRADED TO A UNIFORM SLOPE, AND STABILIZED TO PREVENT EROSION.
12. EROSION CONTROL MEASURES, IF REQUIRED DURING CONSTRUCTION, SHALL BE IN CONFORMANCE WITH THE LOCAL JURISDICTION'S GUIDELINES FOR EROSION AND SEDIMENT CONTROL.

ELECTRICAL INSTALLATION NOTES:

1. ALL ELECTRICAL WORK SHALL BE PERFORMED IN ACCORDANCE WITH THE PROJECT SPECIFICATIONS, NEC AND ALL APPLICABLE LOCAL CODES.
2. CONTRACTOR SHALL MODIFY EXISTING CABLE TRAY SYSTEM AS REQUIRED TO SUPPORT RF AND TRANSPORT CABLING TO THE NEW BTS EQUIPMENT. CONTRACTOR SHALL SUBMIT MODIFICATIONS TO PROJECT MANAGEMENT FOR APPROVAL.
3. CONDUIT ROUTINGS ARE SCHEMATIC. CONTRACTOR SHALL INSTALL CONDUITS SO THAT ACCESS TO EQUIPMENT IS NOT BLOCKED.
4. WIRING, RACEWAY AND SUPPORT METHODS AND MATERIALS SHALL COMPLY WITH THE REQUIREMENTS OF THE NEC AND TELCORDIA.
5. ALL CIRCUITS SHALL BE SEGREGATED AND MAINTAIN MINIMUM CABLE SEPARATION AS REQUIRED BY THE NEC AND TELCORDIA.
6. CABLES SHALL NOT BE ROUTED THROUGH LADDER–STYLE CABLE TRAY RUNGS.
7. EACH END OF EVERY POWER, POWER PHASE CONDUCTOR (I.E., HOTS), GROUNDING, AND T1 CONDUCTOR AND CABLE SHALL BE LABELED WITH COLOR–CODED INSULATION OR ELECTRICAL TAPE (3M BRAND, 1/2 INCH PLASTIC ELECTRICAL TAPE WITH UV PROTECTION, OR EQUAL). THE IDENTIFICATION METHOD SHALL CONFORM WITH NEC & OSHA, AND MATCH EXISTING INSTALLATION REQUIREMENTS.
8. ALL ELECTRICAL COMPONENTS SHALL BE CLEARLY LABELED WITH ENGRAVED LAMACOID PLASTIC LABELS. ALL EQUIPMENT SHALL BE LABELED WITH THEIR VOLTAGE RATING, PHASE CONFIGURATION, WIRE CONFIGURATION, POWER OR AMPACITY RATING, AND BRANCH CIRCUIT ID NUMBERS (I.E., PANELBOARD AND CIRCUIT ID'S).
9. PANELBOARDS (ID NUMBERS) AND INTERNAL CIRCUIT BREAKERS (CIRCUIT ID NUMBERS) SHALL BE CLEARLY LABELED WITH ENGRAVED LAMACOID PLASTIC LABELS.
10. ALL TIE WRAPS SHALL BE CUT FLUSH WITH APPROVED CUTTING TOOL TO REMOVE SHARP EDGES.
11. POWER, CONTROL, AND EQUIPMENT GROUND WIRING IN TUBING OR CONDUIT SHALL BE SINGLE CONDUCTOR (SIZE 14 AWG OR LARGER), 600V, OIL RESISTANT THHN OR THWN–2, CLASS B STRANDED COPPER CABLE RATED FOR 90 °C (WET AND DRY) OPERATION; LISTED OR LABELED FOR THE LOCATION AND RACEWAY SYSTEM USED, UNLESS OTHERWISE SPECIFIED.
12. POWER PHASE CONDUCTORS (I.E., HOTS) SHALL BE LABELED WITH COLOR–CODED INSULATION OR ELECTRICAL TAPE (3M BRAND, 1/2 INCH PLASTIC ELECTRICAL TAPE WITH UV PROTECTION, OR EQUAL.) PHASE CONDUCTOR COLOR CODES SHALL CONFORM WITH THE NEC & OSHA AND MATCH EXISTING INSTALLATION REQUIREMENTS.
13. SUPPLEMENTAL EQUIPMENT GROUND WIRING LOCATED INDOORS SHALL BE SINGLE CONDUCTOR (SIZE 6 AWG OR LARGER), 600V, OIL RESISTANT THHN OR THWN–2 GREEN INSULATION, CLASS B STRANDED COPPER CABLE RATED FOR 90°C (WET AND DRY) OPERATION; LISTED OR LABELED FOR THE LOCATION AND RACEWAY SYSTEM USED, UNLESS OTHERWISE SPECIFIED.
14. SUPPLEMENTAL EQUIPMENT GROUND WIRING LOCATED OUTDOORS, OR BELOW GRADE, SHALL BE SINGLE CONDUCTOR #2 AWG SOLID TINNED COPPER CABLE, UNLESS OTHERWISE SPECIFIED.
15. POWER AND CONTROL WIRING, NOT IN TUBING OR CONDUIT, SHALL BE MULTI–CONDUCTOR, TYPE TC CABLE (SIZE 14 AWG OR LARGER), 600V, OIL RESISTANT THHN OR THWN–2, CLASS B STRANDED COPPER CABLE RATED FOR 90°C (WET AND DRY) OPERATION; WITH OUTER JACKET; LISTED OR LABELED FOR THE LOCATION USED, UNLESS OTHERWISE SPECIFIED.
16. ALL POWER AND POWER GROUNDING CONNECTIONS SHALL BE CRIMP–STYLE, COMPRESSION WIRE LUGS AND WIRENUTS BY THOMAS AND BETTS (OR EQUAL). LUGS AND WIRENUTS SHALL BE RATED FOR OPERATION AT NO LESS THAN 75°C (90°C IF AVAILABLE).
17. RACEWAY AND CABLE TRAY SHALL BE LISTED OR LABELED FOR ELECTRICAL USE IN ACCORDANCE WITH NEMA, UL, ANSI/IEEE, AND NEC.
18. NEW RACEWAY OR CABLE TRAY WILL MATCH THE EXISTING INSTALLATION WHERE POSSIBLE.
19. ELECTRICAL METALLIC TUBING (EMT) OR RIGID NONMETALLIC CONDUIT (I.E., RIGID PVC SCHEDULE 40, OR RIGID PVC SCHEDULE 80 FOR LOCATIONS SUBJECT TO PHYSICAL DAMAGE) SHALL BE USED FOR EXPOSED INDOOR LOCATIONS.
20. ELECTRICAL METALLIC TUBING (EMT), ELECTRICAL NONMETALLIC TUBING (ENT), OR RIGID NONMETALLIC CONDUIT (RIGID PVC, SCHEDULE 40) SHALL BE USED FOR CONCEALED INDOOR LOCATIONS.
21. GALVANIZED STEEL INTERMEDIATE METALLIC CONDUIT (IMC) SHALL BE USED FOR OUTDOOR LOCATIONS ABOVE GRADE.
22. RIGID NONMETALLIC CONDUIT (I.E., RIGID PVC SCHEDULE 40 OR RIGID PVC SCHEDULE 80) SHALL BE USED UNDERGROUND; DIRECT BURIED, IN AREAS OF OCCASIONAL LIGHT VEHICLE TRAFFIC OR ENCASED IN REINFORCED CONCRETE IN AREAS OF HEAVY VEHICLE TRAFFIC.
23. LIQUID–TIGHT FLEXIBLE METALLIC CONDUIT (LIQUID–TITE FLEX) SHALL BE USED INDOORS AND OUTDOORS, WHERE VIBRATION OCCURS OR FLEXIBILITY IS NEEDED.
24. CONDUIT AND TUBING FITTINGS SHALL BE THREADED OR COMPRESSION–TYPE AND APPROVED FOR THE LOCATION USED. SETSCREW FITTINGS ARE NOT ACCEPTABLE.
25. CABINETS, BOXES, AND WIREWAYS SHALL BE LISTED OR LABELED FOR ELECTRICAL USE IN ACCORDANCE WITH NEMA, UL, ANSI/IEEE, AND NEC.
26. CABINETS, BOXES, AND WIREWAYS TO MATCH THE EXISTING INSTALLATION WHERE POSSIBLE.
27. WIREWAYS SHALL BE EPOXY–COATED (GRAY) AND INCLUDE A HINGED COVER, DESIGNED TO SWING OPEN DOWNWARD; SHALL BE PANDUIT TYPE E (OR EQUAL); AND RATED NEMA 1 (OR BETTER) INDOORS, OR NEMA 3R (OR BETTER) OUTDOORS.
28. EQUIPMENT CABINETS, TERMINAL BOXES, JUNCTION BOXES, AND PULL BOXES SHALL BE GALVANIZED OR EPOXY–COATED SHEET STEEL, SHALL MEET OR EXCEED UL 50, AND RATED NEMA 1 (OR BETTER) INDOORS, OR NEMA 3R (OR BETTER) OUTDOORS.
29. METAL RECEPTACLE, SWITCH, AND DEVICE BOXES SHALL BE GALVANIZED, EPOXY–COATED, OR NON–CORRODING; SHALL MEET OR EXCEED UL 514A AND NEMA OS 1; AND RATED NEMA 1 (OR BETTER) INDOORS, OR WEATHER PROTECTED (WP OR BETTER) OUTDOORS.
30. NONMETALLIC RECEPTACLE, SWITCH, AND DEVICE BOXES SHALL MEET OR EXCEED NEMA OS 2; AND RATED NEMA 1 (OR BETTER) INDOORS, OR WEATHER PROTECTED (WP OR BETTER) OUTDOORS.
31. THE CONTRACTOR SHALL NOTIFY AND OBTAIN NECESSARY AUTHORIZATION FROM PROJECT MANAGEMENT BEFORE COMMENCING WORK ON THE AC POWER DISTRIBUTION PANELS.
32. THE CONTRACTOR SHALL PROVIDE NECESSARY TAGGING ON THE BREAKERS, CABLES AND DISTRIBUTION PANELS IN ACCORDANCE WITH THE APPLICABLE CODES AND STANDARDS TO SAFEGUARD AGAINST LIFE AND PROPERTY.

CONCRETE AND REINFORCING STEEL NOTES:

1. ALL CONCRETE WORK SHALL BE IN ACCORDANCE WITH THE ACI 301, ACI 318, ACI 336, ASTM A184, ASTM A185 AND THE DESIGN AND CONSTRUCTION SPECIFICATION FOR CAST–IN–PLACE CONCRETE.
2. ALL CONCRETE SHALL HAVE A MINIMUM COMPRESSIVE STRENGTH OF 4000 PSI AT 28 DAYS, UNLESS NOTED OTHERWISE. A HIGHER STRENGTH (4000 PSI) MAY BE USED. ALL CONCRETING WORK SHALL BE DONE IN ACCORDANCE WITH ACI 318 CODE REQUIREMENTS.
3. REINFORCING STEEL SHALL CONFORM TO ASTM A 615, GRADE 60, DEFORMED UNLESS NOTED OTHERWISE. WELDED WIRE FABRIC SHALL CONFORM TO ASTM A 185 WELDED STEEL WIRE FABRIC UNLESS NOTED OTHERWISE (UNO). SPLICES SHALL BE CLASS "B" AND ALL HOOKS SHALL BE STANDARD, UNO.
4. THE FOLLOWING MINIMUM CONCRETE COVER SHALL BE PROVIDED FOR REINFORCING STEEL UNLESS SHOWN OTHERWISE ON DRAWINGS:

   CONCRETE CAST AGAINST EARTH.....3 IN.
   CONCRETE EXPOSED TO EARTH OR WEATHER:
   #6 AND LARGER .....2 IN.
   #5 AND SMALLER & WWF.....1 1/2 IN.
   CONCRETE NOT EXPOSED TO EARTH OR WEATHER OR NOT CAST AGAINST THE GROUND:
   SLAB AND WALL .....3/4 IN.
   BEAMS AND COLUMNS.....1 1/2 IN.

5. A CHAMFER 3/4" SHALL BE PROVIDED AT ALL EXPOSED EDGES OF CONCRETE, UNO, IN ACCORDANCE WITH ACI 301 SECTION 4.2.4.
6. INSTALLATION OF CONCRETE EXPANSION/WEDGE ANCHOR, SHALL BE PER MANUFACTURER'S WRITTEN RECOMMENDED PROCEDURE. THE ANCHOR BOLT, DOWEL OR ROD SHALL CONFORM TO MANUFACTURER'S RECOMMENDATION FOR EMBEDMENT DEPTH OR AS SHOWN ON THE DRAWINGS. NO REBAR SHALL BE CUT WITHOUT PRIOR CONTRACTOR APPROVAL WHEN DRILLING HOLES IN CONCRETE. SPECIAL INSPECTIONS, REQUIRED BY GOVERNING CODES, SHALL BE PERFORMED IN ORDER TO MAINTAIN MANUFACTURER'S MAXIMUM ALLOWABLE LOADS. ALL EXPANSION/WEDGE ANCHORS SHALL BE STAINLESS STEEL OR HOT DIPPED GALVANIZED. EXPANSION BOLTS SHALL BE PROVIDED BY RAMSET/REDHEAD OR APPROVED EQUAL.
7. CONCRETE CYLINDER TEST IS NOT REQUIRED FOR SLAB ON GRADE WHEN CONCRETE IS LESS THAN 50 CUBIC YARDS (IBC 1905.6.2.3) IN THAT EVENT THE FOLLOWING RECORDS SHALL BE PROVIDED BY THE CONCRETE SUPPLIER;
   (A) RESULTS OF CONCRETE CYLINDER TESTS PERFORMED AT THE SUPPLIER'S PLANT,
   (B) CERTIFICATION OF MINIMUM COMPRESSIVE STRENGTH FOR THE CONCRETE GRADE SUPPLIED.
   FOR GREATER THAN 50 CUBIC YARDS THE GC SHALL PERFORM THE CONCRETE CYLINDER TEST.
8. AS AN ALTERNATIVE TO ITEM 7, TEST CYLINDERS SHALL BE TAKEN INITIALLY AND THEREAFTER FOR EVERY 50 YARDS OF CONCRETE FROM EACH DIFFERENT BATCH PLANT.
9. EQUIPMENT SHALL NOT BE PLACED ON NEW PADS FOR SEVEN DAYS AFTER PAD IS POURED, UNLESS IT IS VERIFIED BY CYLINDER TESTS THAT COMPRESSIVE STRENGTH HAS BEEN ATTAINED.

STRUCTURAL STEEL NOTES:

1. ALL STEEL WORK SHALL BE PAINTED OR GALVANIZED IN ACCORDANCE WITH THE DRAWINGS UNLESS NOTED OTHERWISE. STRUCTURAL STEEL SHALL BE ASTM–A–36 UNLESS OTHERWISE NOTED ON THE SITE SPECIFIC DRAWINGS. STEEL DESIGN, INSTALLATION AND BOLTING SHALL BE PERFORMED IN ACCORDANCE WITH THE AMERICAN INSTITUTE OF STEEL CONSTRUCTION (AISC) "MANUAL OF STEEL CONSTRUCTION".
2. ALL WELDING SHALL BE PERFORMED USING E70XX ELECTRODES AND WELDING SHALL CONFORM TO AISC. WHERE FILLET WELD SIZES ARE NOT SHOWN, PROVIDE THE MINIMUM SIZE PER TABLE J2.4 IN THE AISC "MANUAL OF STEEL CONSTRUCTION". PAINTED SURFACES SHALL BE TOUCHED UP.
3. BOLTED CONNECTIONS SHALL BE ASTM A325 BEARING TYPE (3/4"Ø) CONNECTIONS AND SHALL HAVE MINIMUM OF TWO BOLTS UNLESS NOTED OTHERWISE.
4. NON–STRUCTURAL CONNECTIONS FOR STEEL GRATING MAY USE 5/8" DIA. ASTM A 307 BOLTS UNLESS NOTED OTHERWISE.
5. INSTALLATION OF CONCRETE EXPANSION/WEDGE ANCHOR, SHALL BE PER MANUFACTURER'S WRITTEN RECOMMENDED PROCEDURE. THE ANCHOR BOLT, DOWEL OR ROD SHALL CONFORM TO MANUFACTURER'S RECOMMENDATION FOR EMBEDMENT DEPTH OR AS SHOWN ON THE DRAWINGS. NO REBAR SHALL BE CUT WITHOUT PRIOR CONTRACTOR APPROVAL WHEN DRILLING HOLES IN CONCRETE. SPECIAL INSPECTIONS, REQUIRED BY GOVERNING CODES, SHALL BE PERFORMED IN ORDER TO MAINTAIN MANUFACTURER'S MAXIMUM ALLOWABLE LOADS. ALL EXPANSION/WEDGE ANCHORS SHALL BE STAINLESS STEEL OR HOT DIPPED GALVANIZED. EXPANSION BOLTS SHALL BE PROVIDED BY RAMSET/REDHEAD OR APPROVED EQUAL.
6. CONTRACTOR SHALL SUBMIT SHOP DRAWINGS FOR ENGINEER REVIEW & APPROVAL ON PROJECTS REQUIRING STRUCTURAL STEEL.
7. ALL STRUCTURAL STEEL WORK SHALL BE DONE IN ACCORDANCE WITH AISC SPECIFICATIONS.

CONSTRUCTION NOTES:

1. FIELD VERIFICATION:
   CONTRACTOR SHALL FIELD VERIFY SCOPE OF WORK, T–MOBILE ANTENNA PLATFORM LOCATION AND ANTENNAS TO BE REPLACED.
2. COORDINATION OF WORK:
   CONTRACTOR SHALL COORDINATE RF WORK AND PROCEDURES WITH PROJECT MANAGEMENT.
3. CABLE LADDER RACK:
   CONTRACTOR SHALL FURNISH AND INSTALL CABLE LADDER RACK, CABLE TRAY, AND CONDUIT AS REQUIRED TO SUPPORT CABLES TO THE NEW BTS LOCATION.
4. GROUNDING OF ALL EQUIPMENT AND ANTENNAS IS NOT CONSIDERED PART OF THE SCOPE OF THIS PROJECT AND IS THE RESPONSIBILITY OF THE OWNER AND CONTRACTOR AT THE TIME OF CONSTRUCTION. ALL EQUIPMENT AND ANTENNAS TO BE INSTALLED AND GROUNDED IN ACCORDANCE WITH GOVERNING BUILDING CODE, MANUFACTURER RECOMMENDATIONS AND OWNER SPECIFICATIONS.

T-Mobile
T–MOBILE NORTHEAST LLC
4 SYLVAN WAY
PARSIPPANY, NJ 07054

CROWN CASTLE

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

CT11393B
WARD

CONSTRUCTION DRAWINGS		
0	05/21/15	ISSUED AS FINAL
A	05/19/15	ISSUED FOR REVIEW

Dewberry®
Dewberry Engineers Inc.
600 PARSIPPANY ROAD
SUITE 301
PARSIPPANY, NJ 07054
PHONE: 973.739.9400
FAX: 973.739.9710

STATE OF CONNECTICUT
JIANG, YU
No. 29222
REGISTERED PROFESSIONAL ENGINEER
CHARLOTTE, N.C.
CONNECTICUT LICENSE NO. 29222

IT IS A VIOLATION OF LAW FOR ANY PERSON, UNLESS THEY ARE ACTING UNDER THE DIRECTION OF A LICENSED PROFESSIONAL ENGINEER TO ALTER THIS DOCUMENT.

DRAWN BY:	RA
REVIEWED BY:	BSH
CHECKED BY:	GHN
PROJECT NUMBER:	50066258
JOB NUMBER:	50071493
SITE ADDRESS:	

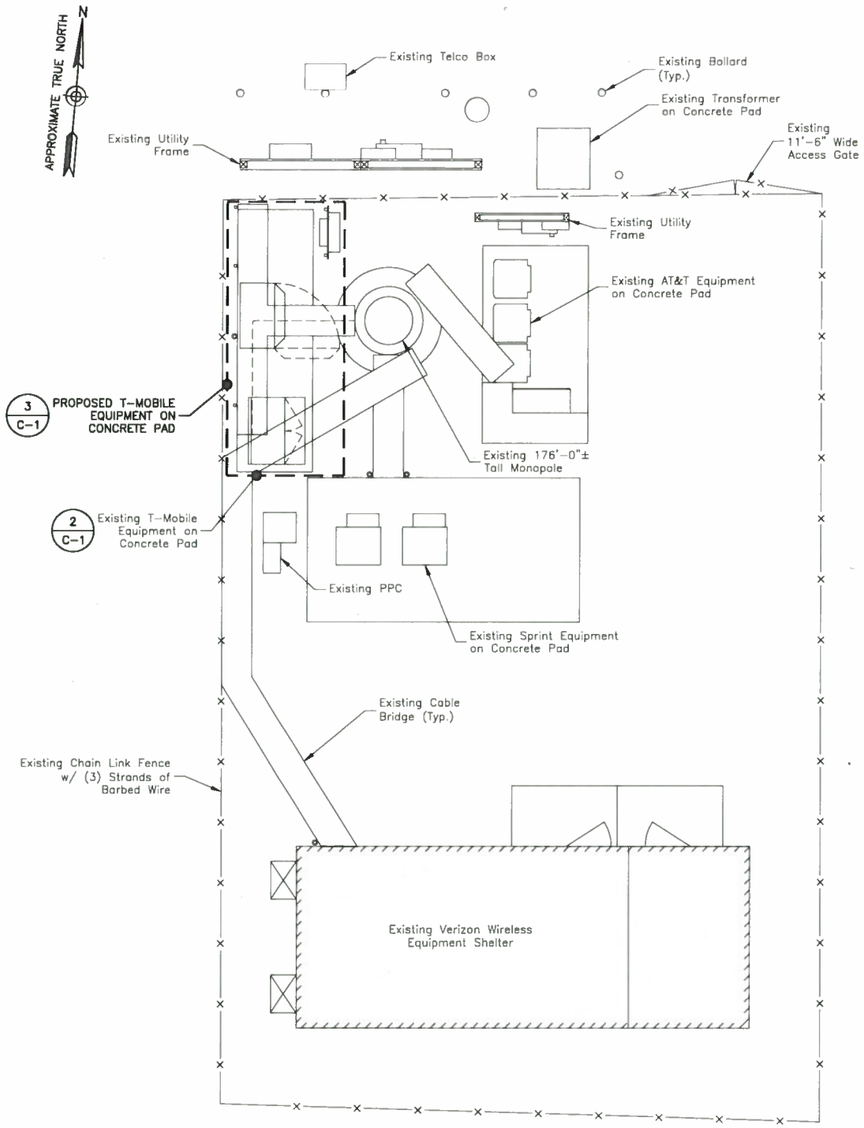
2365 LONG HILL ROAD
GUILFORD, CT 06437
NEW HAVEN COUNTY

SHEET TITLE

GENERAL NOTES

SHEET NUMBER

G–1



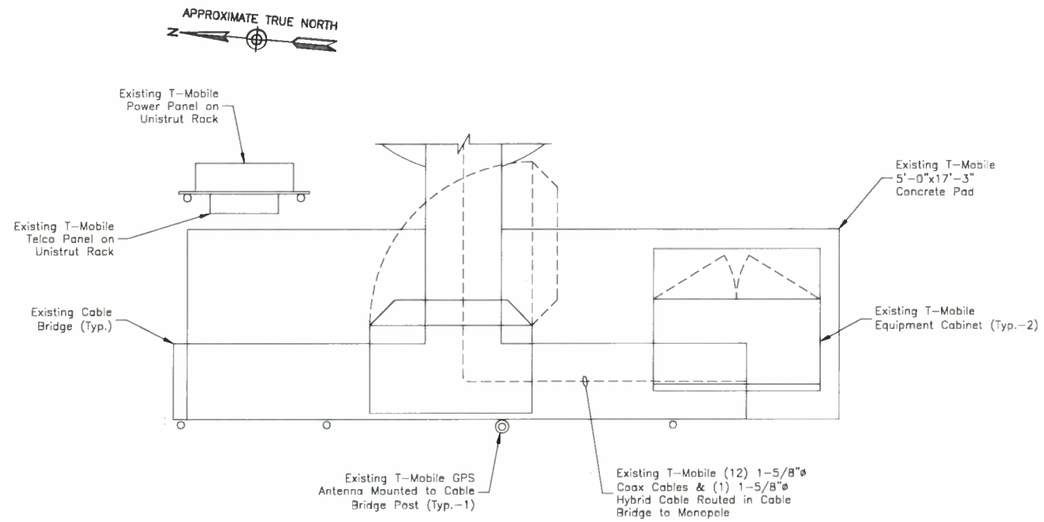
COMPOUND PLAN 1

SCALE: 1"=10' FOR 11"x17"
1"=5' FOR 22"x34"

0' 5' 10'

NOTES:

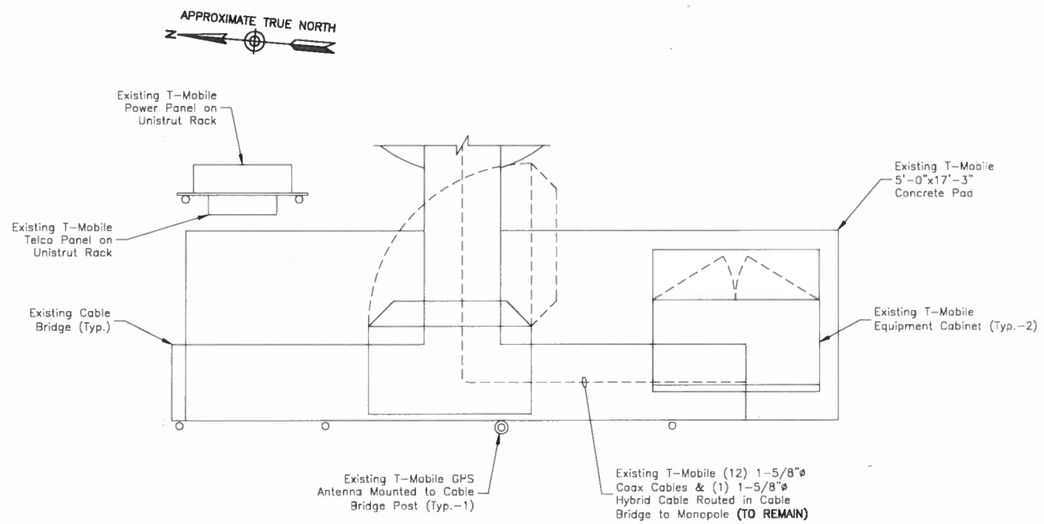
1. NORTH ARROW SHOWN AS APPROXIMATE.
2. NOT ALL INFORMATION IS SHOWN FOR CLARITY.
3. ALL PROPOSED EQUIPMENT, INCLUDING ANTENNAS, RRU'S, COAX, ETC., SHALL BE MOUNTED IN ACCORDANCE WITH THE TOWER STRUCTURAL ANALYSIS & STRUCTURAL DESIGN DRAWINGS BY TOWER ENGINEER PROFESSIONALS DATED APRIL 24, 2015.



EXISTING EQUIPMENT PLAN 2

SCALE: 1/4"=1' FOR 11"x17"
1/2"=1' FOR 22"x34"

0' 1' 2' 4'



NOTE:

1. NO EQUIPMENT IS PROPOSED AT GRADE.

PROPOSED EQUIPMENT PLAN 3

SCALE: 1/4"=1' FOR 11"x17"
1/2"=1' FOR 22"x34"

0' 1' 2' 4'

T-Mobile
T-MOBILE NORTHEAST LLC
4 SYLVAN WAY
PARSIPPANY, NJ 07054

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

CT11393B
WARD

CONSTRUCTION DRAWINGS

0	05/21/15	ISSUED AS FINAL
A	05/19/15	ISSUED FOR REVIEW

Dewberry
Dewberry Engineers Inc.
600 PARSIPPANY ROAD
SUITE 301
PARSIPPANY, NJ 07054
PHONE: 973.739.9400
FAX: 973.739.9710

STATE OF CONNECTICUT
JIANG YU
No. 23222
REGISTERED PROFESSIONAL ENGINEER
CONNECTICUT LICENSE NO. 0023222
IT IS A VIOLATION OF LAW FOR ANY PERSON, UNLESS THEY ARE ACTING UNDER THE DIRECTION OF A LICENSED PROFESSIONAL ENGINEER TO ALTER THIS DOCUMENT.

DRAWN BY:	RA
REVIEWED BY:	BSH
CHECKED BY:	GHN
PROJECT NUMBER:	50066258
JOB NUMBER:	50071493
SITE ADDRESS:	

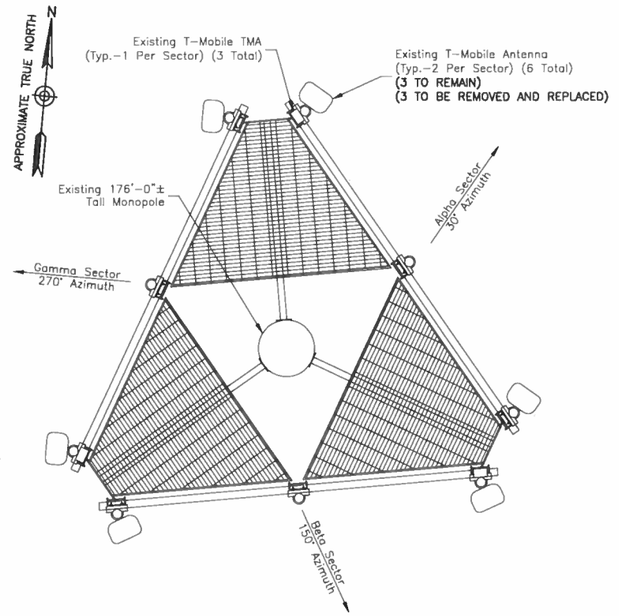
2365 LONG HILL ROAD
GUILFORD, CT 06437
NEW HAVEN COUNTY

SHEET TITLE

COMPOUND PLAN & EQUIPMENT PLANS

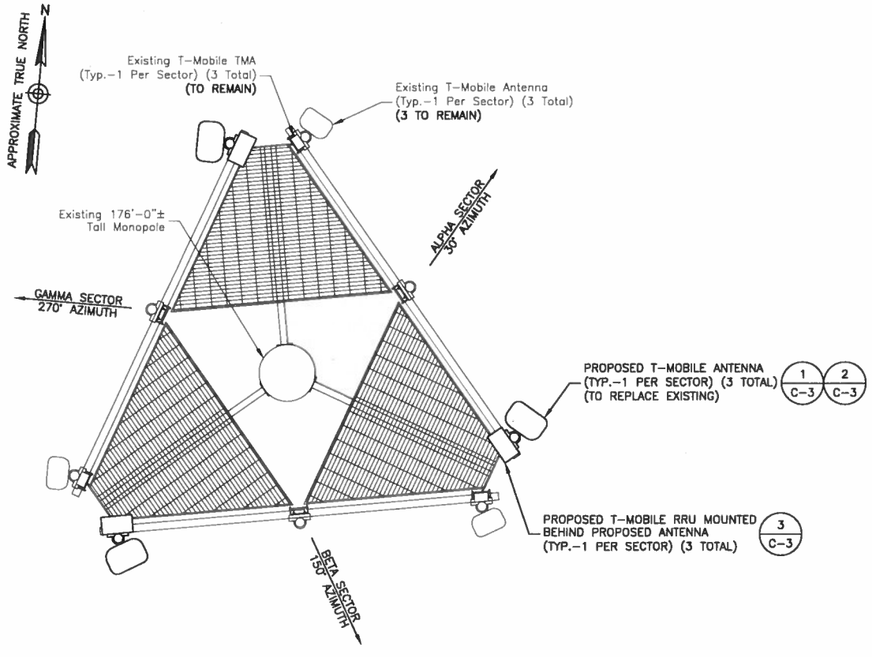
SHEET NUMBER

C-1



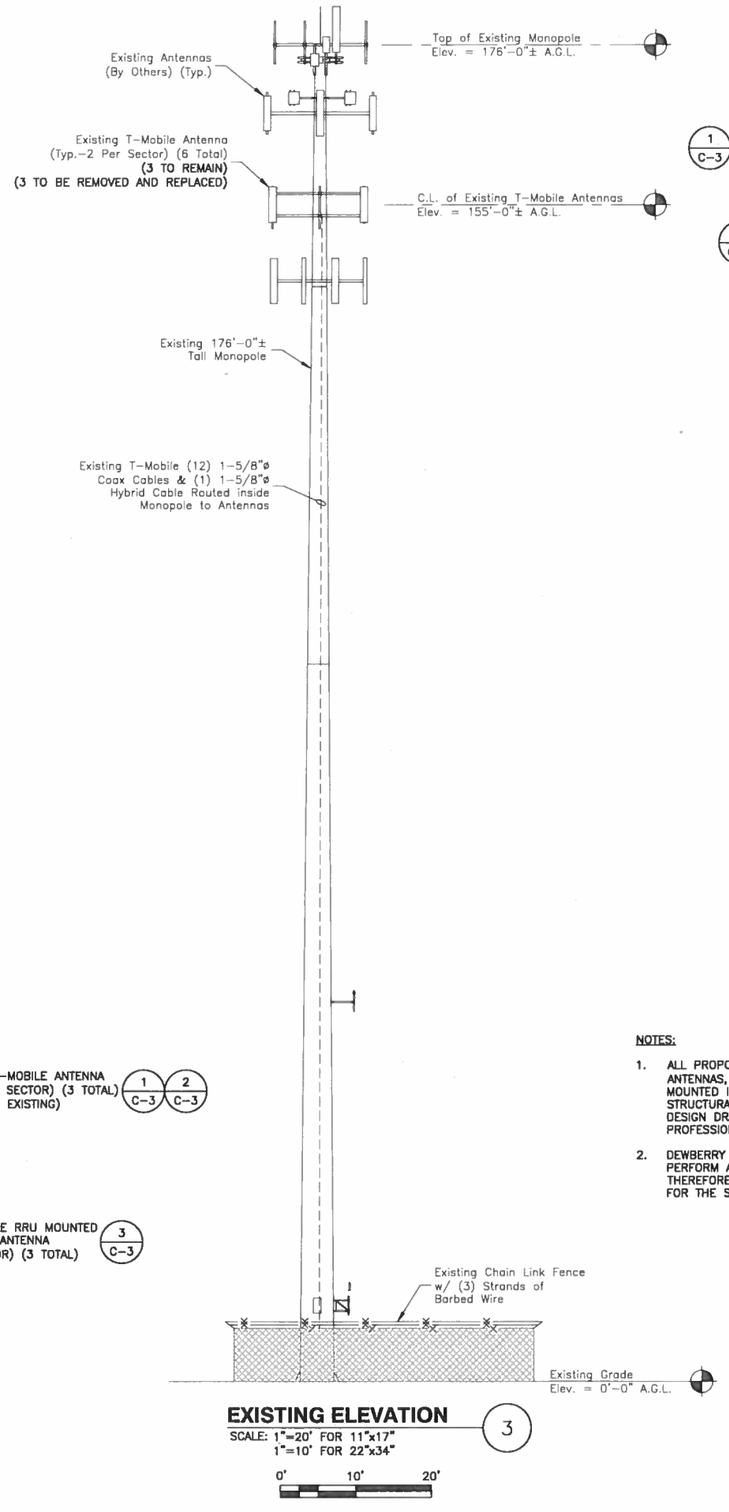
EXISTING ANTENNA LAYOUT (1)

SCALE: N.T.S.



PROPOSED ANTENNA LAYOUT (2)

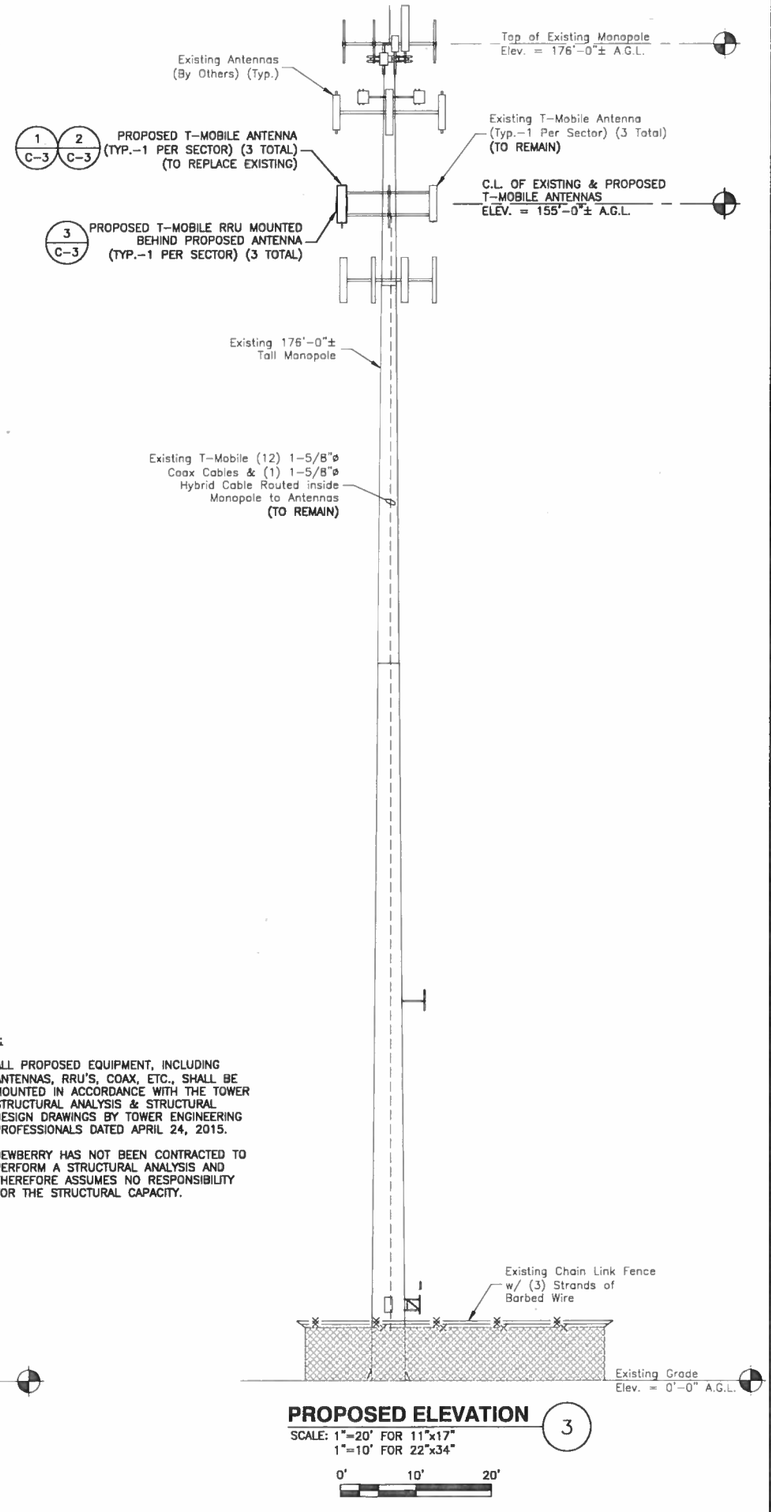
SCALE: N.T.S.



EXISTING ELEVATION (3)

SCALE: 1"=20' FOR 11"x17"
1"=10' FOR 22"x34"

0' 10' 20'



PROPOSED ELEVATION (3)

SCALE: 1"=20' FOR 11"x17"
1"=10' FOR 22"x34"

0' 10' 20'

NOTES:

1. ALL PROPOSED EQUIPMENT, INCLUDING ANTENNAS, RRU'S, COAX, ETC., SHALL BE MOUNTED IN ACCORDANCE WITH THE TOWER STRUCTURAL ANALYSIS & STRUCTURAL DESIGN DRAWINGS BY TOWER ENGINEERING PROFESSIONALS DATED APRIL 24, 2015.
2. DEWBERRY HAS NOT BEEN CONTRACTED TO PERFORM A STRUCTURAL ANALYSIS AND THEREFORE ASSUMES NO RESPONSIBILITY FOR THE STRUCTURAL CAPACITY.

T-Mobile

T-MOBILE NORTHEAST LLC
4 SYLVAN WAY
PARSIPPANY, NJ 07054

CROWN CASTLE

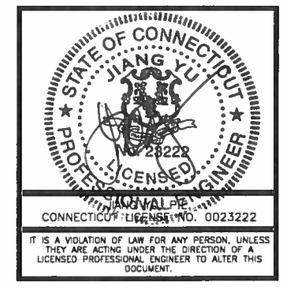
CROWN CASTLE
3 CORPORATE PARK DRIVE, SUITE 101
CLIFTON PARK, NY 12065

CT11393B
WARD

CONSTRUCTION DRAWINGS

0	05/21/15	ISSUED AS FINAL
A	05/19/15	ISSUED FOR REVIEW

Dewberry®
Dewberry Engineers Inc.
600 PARSIPPANY ROAD
SUITE 301
PARSIPPANY, NJ 07054
PHONE: 973.739.9400
FAX: 973.739.9710



DRAWN BY:	RA
REVIEWED BY:	BSH
CHECKED BY:	GHN
PROJECT NUMBER:	50066258
JOB NUMBER:	50071493
SITE ADDRESS:	

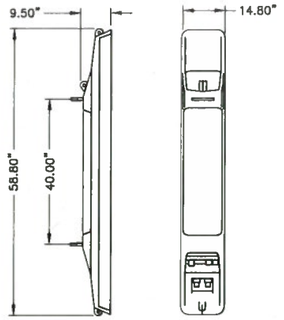
2365 LONG HILL ROAD
GUILFORD, CT 06437
NEW HAVEN COUNTY

SHEET TITLE

ANTENNA LAYOUTS & ELEVATIONS

SHEET NUMBER

C-2

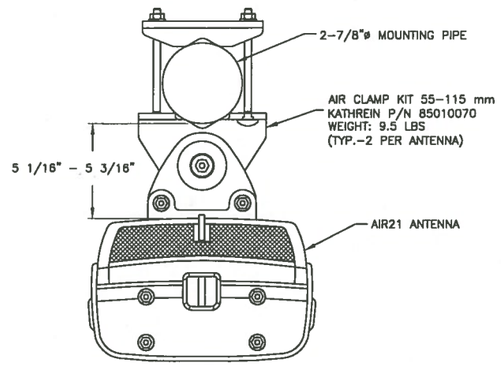


WEIGHT: 124.0 LBS.

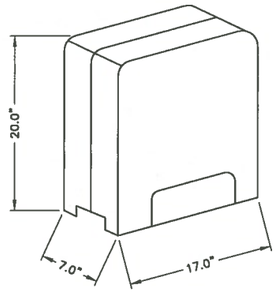
NOTES:

1. MOUNT ANTENNAS PER MANUFACTURER'S RECOMMENDATIONS.
2. GROUND ANTENNAS AND MOUNTS PER MANUFACTURER'S RECOMMENDATIONS AND T-MOBILE STANDARDS.
3. CONFIRM REQUIRED ANTENNAS WITH THE LATEST RFDS.

AIR21 ANTENNA DETAIL (1)
SCALE: N.T.S.



AIR21 MOUNT/CLAMP (2)
SCALE: N.T.S.



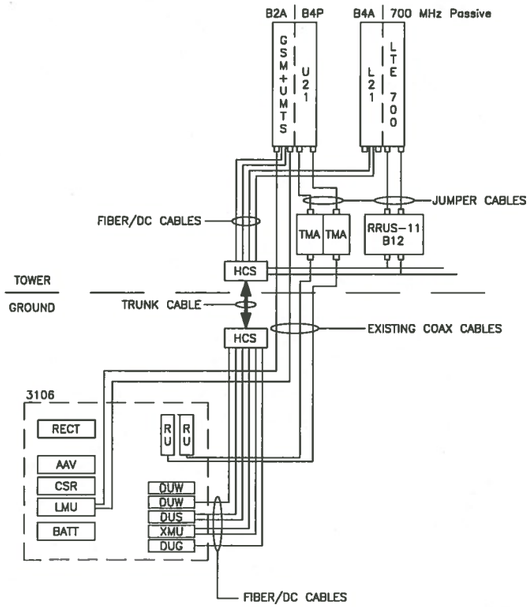
SPECIFICATIONS:
HEIGHT: 20.0"
WIDTH: 17.0"
DEPTH: 7.0"
WEIGHT: 50.7 LBS

ERICSSON RRUS-11 B12

RRU NOTES:

1. MOUNT EQUIPMENT PER MANUFACTURER'S RECOMMENDATIONS.
2. GROUND EQUIPMENT AND MOUNTS PER MANUFACTURER'S RECOMMENDATIONS AND T-MOBILE STANDARDS.
3. CONFIRM REQUIRED EQUIPMENT WITH THE LATEST RFDS.

RRUS-11 - REMOTE RADIO UNIT (3)
SCALE: N.T.S.



SITE CONFIGURATION 702Cc (4)
SCALE: N.T.S.

DESIGN CONFIGURATION

	ANTENNAS		COAX		COAX LENGTH	EXISTING HCS
	EXISTING	PROPOSED	EXISTING	PROPOSED		
ALPHA	ERICSSON AIR21 B2A B4P	EXISTING TO REMAIN	(4) 1-5/8"ø	-	205'-0"	(1) 1-5/8"ø @ 205'-0"
	ERICSSON AIR21 B4A B2P	ERICSSON AIR21 B4A B12P-B8P 4FT				
BETA	ERICSSON AIR21 B2A B4P	EXISTING TO REMAIN	(4) 1-5/8"ø	-	205'-0"	
	ERICSSON AIR21 B4A B2P	ERICSSON AIR21 B4A B12P-B8P 4FT				
GAMMA	ERICSSON AIR21 B2A B4P	EXISTING TO REMAIN	(4) 1-5/8"ø	-	205'-0"	
	ERICSSON AIR21 B4A B2P	ERICSSON AIR21 B4A B12P-B8P 4FT				

T-Mobile
T-MOBILE NORTHEAST LLC
4 SYLVAN WAY
PARSIPPANY, NJ 07054

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

CT11393B
WARD

CONSTRUCTION DRAWINGS

0	05/21/15	ISSUED AS FINAL
A	05/19/15	ISSUED FOR REVIEW

Dewberry
Dewberry Engineers Inc.
600 PARSIPPANY ROAD
SUITE 301
PARSIPPANY, NJ 07054
PHONE: 973.739.9400
FAX: 973.739.9710

STATE OF CONNECTICUT
JIANG YU
No. 0023222
LICENSED PROFESSIONAL ENGINEER
JIANG YU, PE
CONNECTICUT LICENSE NO. 0023222

DRAWN BY:	RA
REVIEWED BY:	BSH
CHECKED BY:	GHN
PROJECT NUMBER:	50066258
JOB NUMBER:	50071493
SITE ADDRESS:	

2365 LONG HILL ROAD
GUILFORD, CT 06437
NEW HAVEN COUNTY

SHEET TITLE

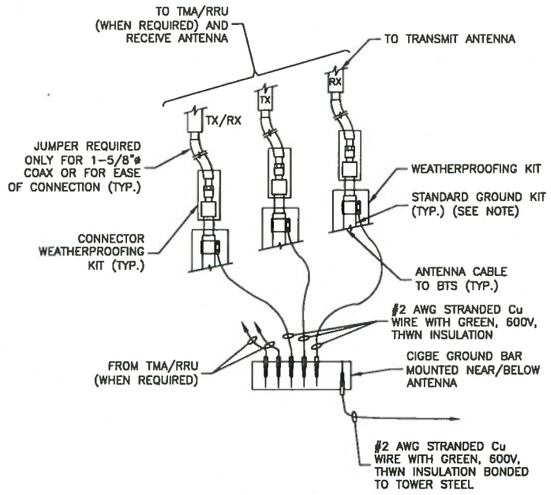
CONSTRUCTION DETAILS

SHEET NUMBER

C-3

GROUNDING NOTES:

1. THE CONTRACTOR SHALL REVIEW AND INSPECT THE EXISTING FACILITY GROUNDING SYSTEM AND LIGHTNING PROTECTION SYSTEM (AS DESIGNED AND INSTALLED) FOR STRICT COMPLIANCE WITH THE NEC (AS ADOPTED BY THE AHJ). THE SITE-SPECIFIC (UL, LPI, OR NFPA) LIGHTING PROTECTION CODE, AND GENERAL COMPLIANCE WITH TELCORDIA AND TIA GROUNDING STANDARDS. THE CONTRACTOR SHALL REPORT ANY VIOLATIONS OR ADVERSE FINDINGS TO THE ENGINEER FOR RESOLUTION.
2. ALL GROUND ELECTRODE SYSTEMS (INCLUDING TELECOMMUNICATION, RADIO, LIGHTNING PROTECTION, AND AC POWER GES'S) SHALL BE BONDED TOGETHER, AT OR BELOW GRADE, BY TWO OR MORE COPPER BONDING CONDUCTORS. ALL AVAILABLE GROUNDING ELECTRODES SHALL BE CONNECTED TOGETHER IN ACCORDANCE WITH THE NEC.
3. THE CONTRACTOR SHALL PERFORM IEEE FALL-OF-POTENTIAL RESISTANCE TO EARTH TESTING (PER IEEE 1100 AND 81) FOR GROUND ELECTRODE SYSTEMS. USE OF OTHER METHODS MUST BE PRE-APPROVED BY THE ENGINEER IN WRITING.
4. THE CONTRACTOR SHALL FURNISH AND INSTALL SUPPLEMENTAL GROUND ELECTRODES AS NEEDED TO ACHIEVE A TEST RESULT OF 5 OHMS OR LESS ON TOWER SITES AND 10 OHMS OR LESS ON ROOFTOP SITES. WHEN ADDING ELECTRODES, CONTRACTOR SHALL MAINTAIN A MINIMUM DISTANCE BETWEEN THE ADDED ELECTRODE AND ANY OTHER EXISTING ELECTRODE EQUAL TO THE BURIED LENGTH OF THE ROD. IDEALLY, CONTRACTOR SHALL STRIVE TO KEEP THE SEPARATION DISTANCE EQUAL TO TWICE THE BURIED LENGTH OF THE RODS.
5. THE CONTRACTOR IS RESPONSIBLE FOR PROPERLY SEQUENCING GROUNDING AND UNDERGROUND CONDUIT INSTALLATION AS TO PREVENT ANY LOSS OF CONTINUITY IN THE GROUNDING SYSTEM OR DAMAGE TO THE CONDUIT.
6. METAL CONDUIT AND TRAY SHALL BE GROUNDED AND MADE ELECTRICALLY CONTINUOUS WITH LISTED BONDING FITTINGS OR BY BONDING ACROSS THE DISCONTINUITY WITH 8 AWG COPPER WIRE AND UL APPROVED GROUNDING TYPE CONDUIT CLAMPS.
7. METAL RACEWAY SHALL NOT BE USED AS THE NEC REQUIRED EQUIPMENT GROUND CONDUCTOR. STRANDED COPPER CONDUCTORS WITH GREEN INSULATION, SIZED IN ACCORDANCE WITH THE NEC, SHALL BE FURNISHED AND INSTALLED WITH THE POWER CIRCUITS TO TRANSMISSION EQUIPMENT.
8. CONNECTIONS TO THE GROUND BUS SHALL NOT BE DOUBLED UP OR STACKED. BACK-TO-BACK CONNECTIONS ON OPPOSITE SIDES OF THE GROUND BUS ARE PERMITTED.
9. ALUMINUM CONDUCTOR OR COPPER CLAD STEEL CONDUCTOR SHALL NOT BE USED FOR GROUNDING CONNECTIONS.
10. USE OF 90° BENDS IN THE PROTECTION GROUNDING CONDUCTORS SHALL BE AVOIDED WHEN 45° BENDS CAN BE ADEQUATELY SUPPORTED. IN ALL CASES, BENDS SHALL BE MADE WITH A MINIMUM BEND RADIUS OF 8 INCHES.
11. EACH INTERIOR TRANSMISSION CABINET FRAME/PLINTH SHALL BE DIRECTLY CONNECTED TO THE MASTER GROUND BAR WITH 6 AWG STRANDED, GREEN INSULATED SUPPLEMENTAL EQUIPMENT GROUND WIRE UNLESS NOTED OTHERWISE IN THE DETAILS. EACH OUTDOOR CABINET FRAME/PLINTH SHALL BE DIRECTLY CONNECTED TO THE BURIED GROUND RING WITH 2 AWG SOLID TIN-PLATED COPPER WIRE UNLESS NOTED OTHERWISE IN THE DETAILS.
12. ALL EXTERIOR GROUND CONDUCTORS BETWEEN EQUIPMENT/GROUND BARS AND THE GROUND RING, SHALL BE 2 AWG SOLID TIN-PLATED COPPER UNLESS OTHERWISE INDICATED.
13. EXOTHERMIC WELDS SHALL BE USED FOR ALL GROUNDING CONNECTIONS BELOW GRADE. CONNECTIONS TO ABOVE GRADE UNITS SHALL BE MADE WITH EXOTHERMIC WELDS WHERE PRACTICAL OR WITH 2 HOLE MECHANICAL TYPE BRASS CONNECTORS WITH STAINLESS STEEL HARDWARE, INCLUDING SET SCREWS. HIGH PRESSURE CRIMP CONNECTORS MAY ONLY BE USED WITH WRITTEN PERMISSION FROM T-MOBILE MARKET REPRESENTATIVE.
14. EXOTHERMIC WELDS SHALL BE PERMITTED ON TOWERS ONLY WITH THE EXPRESS APPROVAL OF THE TOWER MANUFACTURER OR THE CONTRACTORS STRUCTURAL ENGINEER.
15. ALL WIRE TO WIRE GROUND CONNECTIONS TO THE INTERIOR GROUND RING SHALL BE FORMED USING HIGH PRESS CRIMPS OR SPLIT BOLT CONNECTORS WHERE INDICATED IN THE DETAILS.
16. ON ROOFTOP SITES WHERE EXOTHERMIC WELDS ARE A FIRE HAZARD COPPER COMPRESSION CAP CONNECTORS MAY BE USED FOR WIRE TO WIRE CONNECTORS. 2 HOLE MECHANICAL TYPE BRASS CONNECTORS WITH STAINLESS STEEL HARDWARE, INCLUDING SET SCREWS SHALL BE USED FOR CONNECTION TO ALL ROOFTOP TRANSMISSION EQUIPMENT AND STRUCTURAL STEEL.
17. COAX BRIDGE BONDING CONDUCTORS SHALL BE EXOTHERMICALLY BONDED OR BOLTED TO THE BRIDGE AND THE TOWER GROUND BAR USING TWO-HOLE MECHANICAL TYPE BRASS CONNECTORS AND STAINLESS STEEL HARDWARE.
18. APPROVED ANTIOXIDANT COATINGS (I.E., CONDUCTIVE GEL OR PASTE) SHALL BE USED ON ALL COMPRESSION AND BOLTED GROUND CONNECTIONS.
19. ALL EXTERIOR GROUND CONNECTIONS SHALL BE COATED WITH A CORROSION RESISTANT MATERIAL.
20. MISCELLANEOUS ELECTRICAL AND NON-ELECTRICAL METAL BOXES, FRAMES AND SUPPORTS SHALL BE BONDED TO THE GROUND RING, IN ACCORDANCE WITH THE NEC.
21. BOND ALL METALLIC OBJECTS WITHIN 6 FT OF THE BURIED GROUND RING WITH 2 AWG SOLID TIN-PLATED COPPER GROUND CONDUCTOR. DURING EXCAVATION FOR NEW GROUND CONDUCTORS, IF EXISTING GROUND CONDUCTORS ARE ENCOUNTERED, BOND EXISTING GROUND CONDUCTORS TO NEW CONDUCTORS.
22. GROUND CONDUCTORS USED IN THE FACILITY GROUND AND LIGHTNING PROTECTION SYSTEMS SHALL NOT BE ROUTED THROUGH METALLIC OBJECTS THAT FORM A RING AROUND THE CONDUCTOR, SUCH AS METALLIC CONDUITS, METAL SUPPORT CLIPS OR SLEEVES THROUGH WALLS OR FLOORS. WHEN IT IS REQUIRED TO BE HOUSED IN CONDUIT TO MEET CODE REQUIREMENTS OR LOCAL CONDITIONS, NON-METALLIC MATERIAL SUCH AS PVC PLASTIC CONDUIT SHALL BE USED. WHERE USE OF METAL CONDUIT IS UNAVOIDABLE (E.G., NON-METALLIC CONDUIT PROHIBITED BY LOCAL CODE) THE GROUND CONDUCTOR SHALL BE BONDED TO EACH END OF THE METAL CONDUIT WITH LISTED BONDING FITTINGS.

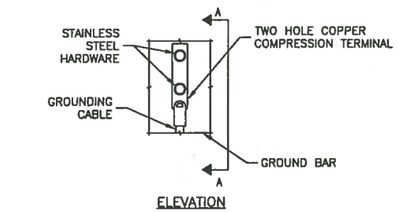


NOTE:

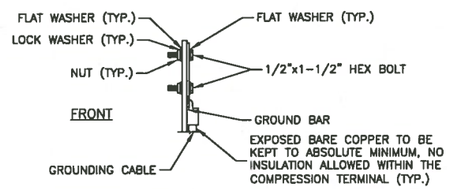
1. DO NOT INSTALL CABLE GROUND KIT AT A BEND AND ALWAYS DIRECT GROUND WIRE DOWN TO CIGBE.

CONNECTION OF GROUND WIRES TO GROUNDING BAR (CIGBE) 1

SCALE: N.T.S.



ELEVATION



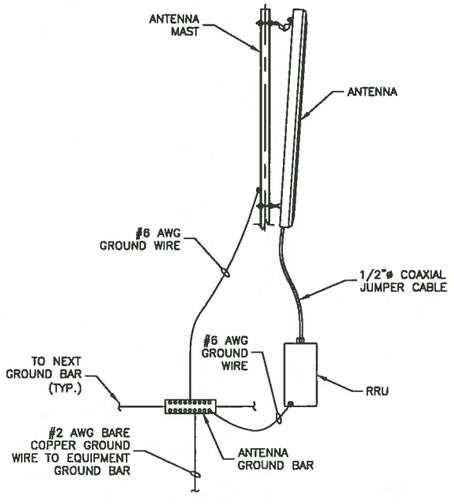
SECTION 'A-A'

NOTES:

1. DOUBLING UP OR STACKING OF CONNECTIONS IS NOT PERMITTED.
2. OXIDE INHIBITING COMPOUND TO BE USED AT ALL LOCATIONS.

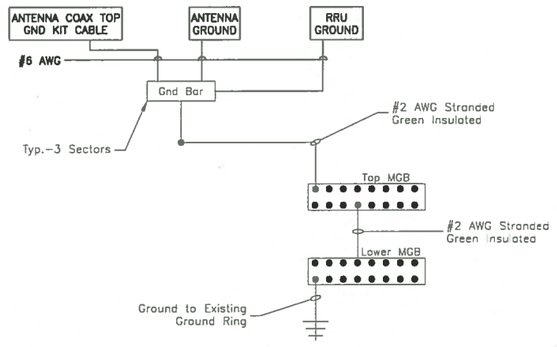
TYPICAL GROUND BAR MECHANICAL CONNECTION DETAIL 2

SCALE: N.T.S.



TYPICAL ANTENNA GROUNDING DETAIL 3

SCALE: N.T.S



NOTES:

1. BOND ANTENNA GROUNDING KIT CABLE TO TOP CIGBE
2. BOND ANTENNA GROUNDING KIT CABLE TO BOTTOM CIGBE.
3. SCHEMATIC GROUNDING DIAGRAM IS TYPICAL FOR EACH SECTOR.
4. VERIFY EXISTING GROUND SYSTEM IS INSTALLED PER T-MOBILE STANDARDS.

SCHEMATIC GROUNDING DIAGRAM 4

SCALE: N.T.S.

T-MOBILE NORTHEAST LLC
4 SYLVAN WAY
PARSIPPANY, NJ 07054

CROWN CASTLE

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

CT11393B
WARD

CONSTRUCTION DRAWINGS

0	05/21/15	ISSUED AS FINAL
A	05/19/15	ISSUED FOR REVIEW

Dewberry
Dewberry Engineers Inc.
600 PARSIPPANY ROAD
SUITE 301
PARSIPPANY, NJ 07054
PHONE: 973.739.9400
FAX: 973.739.9710

STATE OF CONNECTICUT
JIANG YU
0023222
LICENSED
PROFESSIONAL ENGINEER
CONNECTICUT LICENSE NO. 0023222

IT IS A VIOLATION OF LAW FOR ANY PERSON, UNLESS THEY ARE ACTING UNDER THE DIRECTION OF A LICENSED PROFESSIONAL ENGINEER TO ALTER THIS DOCUMENT.

DRAWN BY:	RA
REVIEWED BY:	BSH
CHECKED BY:	GHN
PROJECT NUMBER:	50066258
JOB NUMBER:	50071493
SITE ADDRESS:	

2365 LONG HILL ROAD
GUILFORD, CT 06437
NEW HAVEN COUNTY

SHEET TITLE

GROUNDING NOTES & DETAILS

SHEET NUMBER

E-1

Date: **April 24, 2015**

Adam Winters
Crown Castle
3530 Toringdon Way, Suite 300
Charlotte, NC 28277
(980) 209-8238

Tower Engineering Professionals
326 Tryon Road
Raleigh, NC 27603
(919) 661-6351
crown@tepgroup.net

Subject: Structural Modification Analysis Report

Carrier Designation:	***T-Mobile* Co-Locate**	
	Carrier Site Number:	CT11393B
	Carrier Site Name:	CT393/Global Guilford_MP2
Crown Castle Designation:	**Crown Castle BU Number:**	876381
	Crown Castle Site Name:	Ward
	Crown Castle JDE Job Number:	322290
	Crown Castle Work Order Number:	1041353
	Crown Castle Application Number:	282674 Rev. 4
Engineering Firm Designation:	**TEP Project Number:**	51819.31710
Site Data:	**2365 Long Hill Rd., Guilford, New Haven County, CT 06437** **Latitude *41° 20' 47.34"*, Longitude *-72° 43' 23.15"*** **176 Foot - Monopole Tower**	

Dear Adam Winters,

Tower Engineering Professionals is pleased to submit this **"Structural Modification Analysis Report"** to determine the structural integrity of the above mentioned tower. This analysis has been performed in accordance with the Crown Castle Structural 'Statement of Work' and the terms of Crown Castle Purchase Order Number 775262, in accordance with application 282674, revision 4.

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

LC4.5: Existing + Proposed Equipment with Proposed Modifications **Sufficient Capacity**
Note: See Table I and Table II for the proposed and existing loading, respectively.

This analysis has been performed in accordance with the TIA/EIA-222-F standard and the 2005 Connecticut State Building Code with 2009 amendment based upon a wind speed of 85 mph fastest mile.

All modifications and equipment proposed in this report shall be installed in accordance with the appurtenances listed in Tables 1 and 2 and the attached drawings for the determined available structural capacity to be effective.

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

Structural analysis prepared by: Ardalan Arabi, E.I. / IVV

Respectfully submitted by:

Graham M. Andres, P.E.

STATE OF CONNECTICUT · GRAHAM M. ANDRES · 29538 · LICENSED PROFESSIONAL ENGINEER · 4/24/15

Electronic Copy

TABLE OF CONTENTS

1) INTRODUCTION

This tower is a 176-ft monopole tower designed by Engineered Endeavors, Inc. in July of 2003. The tower was originally designed for a wind speed of 90 mph per EIA-222-F for the appurtenances listed in Table 3. The tower has been modified per reinforcement drawings prepared by Tower Engineering Professionals in January of 2014. TEP visited the site in July of 2014 to perform a post modification inspection. All information provided to TEP was assumed to be accurate and complete.

2) ANALYSIS CRITERIA

The analysis has been performed in accordance with the TIA/EIA-222-F Structural Standards for Steel Antenna Towers and Antenna Supporting Structures and ASCE 7-05 Minimum Design Loads for Buildings and Other Structures using a fastest mile wind speed of 85 mph with no ice, 37.6 mph with 0.75 inch escalating ice thickness and 50 mph under service loads.

Table 1 - Proposed Antenna and Cable Information

Mounting Level (ft)	Center Line Elevation (ft)	Number of Antennas	Antenna Manufacturer	Antenna Model	Number of Feed Lines	Feed Line Size (in)	Note
155.0	155.0	3	Ericsson	Air 21 B4A B12P-B8P 4FT	-	-	-
		3	Ericsson	RRUS 11 B12			

Table 2 - Existing Antenna and Cable Information

Mounting Level (ft)	Center Line Elevation (ft)	Number of Antennas	Antenna Manufacturer	Antenna Model	Number of Feed Lines	Feed Line Size (in)	Note
176.0	178.0	3	RFS Celwave	APXVSPP18-C-A20 w/ Mount Pipe	1	1/2	1
		9	RFS Celwave	ACU-A20-N			
		3	Alcatel Lucent	800 External Notch Filter			
	176.0	1	Tower Mounts	Platform Mount [LP 712-1]			
174.0	176.0	3	Alcatel Lucent	PCS 1900MHz 4x45W-65MHz	3	1-1/4	1
	174.0	3	Alcatel Lucent	TME-800MHZ RRH			
		1	Tower Mounts	Side Arm Mount [SO 102-3]			
169.0	169.0	3	Ericsson	TME-RRUS-11 w/ Mount Pipe	-	-	1
		1	Tower Mounts	T-Arm Mount [TA 702-3]			
167.0	167.0	6	Powerwave Technologies	7770.00 w/ Mount Pipe	1 2 12	3/8 7/16 1-5/8	1
		3	KMW Communications	AM-X-CD-16-65-00T-RET w/ Mount Pipe			
		6	Powerwave Technologies	LGP21401			
		6	Powerwave Technologies	LGP21901			
		1	Raycap	DC6-48-60-18-8F			
		1	Tower Mounts	Platform Mount [LP 303-1]			
155.0	155.0	3	Ericsson	AIR 21 B4A B2P	-	-	2
		3	Ericsson	AIR 21 B2A B4P	13	1-5/8	1
		3	Ericsson	KRY 112 144/1			
		1	Tower Mounts	Platform Mount [LP 301-1]			

Mounting Level (ft)	Center Line Elevation (ft)	Number of Antennas	Antenna Manufacturer	Antenna Model	Number of Feed Lines	Feed Line Size (in)	Note
145.0	145.0	6	Amphenol	BXA-70063-6CF-EDIN-X w/ Mount Pipe	2	1-1/4	1
		6	Amphenol	BXA-171063-12CF-EDIN-X w/ Mount Pipe			
		3	Alcatel Lucent	RRH2X40-AWS			
		3	Alcatel Lucent	RRH2X40-07-U			
		1	RFS Celwave	DB-B1-6C-8AB-0Z			
		1	Tower Mounts	Platform Mount [LP 303-1]			
50.0	51.0	1	Lucent	KS24019-L112A	1	1/2	1
	50.0	1	Tower Mounts	Side Arm Mount [SO 701-1]			
10.0	12.0	1	Kathrein	OG-860/1920/GPS-A	1	1/4	3

Notes:
1) Existing equipment
2) Existing equipment; to be removed
3) Existing equipment; installed on ice bridge

Table 3 - Design Antenna and Cable Information

Mounting Level (ft)	Center Line Elevation (ft)	Number of Antennas	Antenna Manufacturer	Antenna Model	Number of Feed Lines	Feed Line Size (in)
177.5	177.5	12	DAPA	48000	-	-
167.5	167.5	12	DAPA	48000	-	-
157.5	157.5	12	DAPA	48000	-	-

3) ANALYSIS PROCEDURE

Table 4 - Documents Provided

Document	Remarks	Reference	Source
Geotechnical Report	Jaworski Geotech, Inc.	1532993	CCISites
Tower Foundation Drawings	Engineered Endeavors, Inc.	1614617	CCISites
Tower Manufacturer Drawings	Engineered Endeavors, Inc.	1613550	CCISites
Tower Design Calculations	Engineered Endeavors, Inc.	1614660	CCISites
Tower Reinforcement Drawings	Tower Engineering Professionals	4318894	CCISites
Post Modification Inspection	Tower Engineering Professionals	5163807	CCISites
Previous Structural Analysis	Tower Engineering Professionals	5615694	CCISites

3.1) Analysis Method

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

For analysis of monopole shaft reinforcements, the plates are modeled as linear appurtenances along the exterior of the pole. The loads calculated from tnxTower are then exported to a proprietary calculation sheet created by Tower Engineering Professionals, Inc. that analyzes each reinforcing element along each critical axis and presents percent capacities for each element and the pole shaft along each critical axis. The actual percent capacity of the tower structure including the reinforcing elements is reported in Table 5 - Section Capacity (Summary).

3.2) Assumptions

1) The tower and foundation were built in accordance with the manufacturer's specifications.
2) The tower and foundation have been maintained in accordance with the manufacturer's specification.
3) The configuration of antennas, transmission cables, mounts and other appurtenances are as specified in Tables 1 and 2, and "Appendix B – Base Level Drawing".
4) When applicable, transmission cables are considered as structural components for calculating wind loads as allowed by the standard.
5) All tower components are in sufficient condition to carry their full design capacity.
6) Serviceability with respect to antenna twist, tilt, roll, or lateral translation, is not checked and is left to the carrier or tower owner to ensure conformance.
7) All antenna mounts and mounting hardware are structurally sufficient to carry the full design capacity requirements of appurtenance wind area and weight as provided by the original manufacturer specifications. It is the carrier's responsibility to ensure compliance to the structural limitations of the existing and/or proposed antenna mounts. TEP did not perform a site visit to verify the size, condition or capacity of the antenna mounts and did not analyze antennas supporting mounts as part of this structural analysis report.

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

4) ANALYSIS RESULTS

Table 5 - Section Capacity (Summary)

Section No.	Elevation (ft)	Component Type	Size	Critical Element	P (K)	SF*P_{allow} (K)	% Capacity	Pass / Fail
L1	176.00-144.25	Pole	TP23.65×16.50×0.1875	1	Note 1	Note 1	86.2	Pass
L2	147.75-94.58	Pole	TP34.33×22.49×0.3125	2	Note 1	Note 1	91.9	Pass
L3	99.41-46.95	Pole	TP44.30×32.63×0.3750	3	Note 1	Note 1	79.1	Pass
L4	53.03-0.00	Pole	TP54.00×42.20×0.3750	4	Note 1	Note 1	78.6	Pass
M1b	35.00-0.00	Mod (Ex)	CCI-WSFP-065125	1	Note 1	Note 1	91.2	Pass
M2	64.25-29.25	Mod (Ex)	CCI-SFP-065125	2	Note 1	Note 1	96.7	Pass
M3	89.25-64.25	Mod (Ex)	CCI-SFP-060100	3	Note 1	Note 1	98.6	Pass
M4	119.25-89.25	Mod (Ex)	CCI-SFP-060100	4	Note 1	Note 1	91.6	Pass
M5	129.25-119.25	Mod (Pr)	CCI-SFP-045100	5	Note 1	Note 1	94.7	Pass
							Summary	
						Pole (L2)	91.9	Pass
						Mod (M3)	98.6	Pass
						RATING =	**98.6**	**Pass**

Table 6 - Tower Component Stresses vs. Capacity

Notes	Component	Elevation (ft)	% Capacity	Pass / Fail
1	Anchor Rods	-	99.5	Pass
1	Base Plate	-	81.8	Pass
1	Base Foundation Soil Interaction	-	51.8	Pass
1	Base Foundation Structural	-	93.8	Pass

Structure Rating (max from all components) =	**99.5%**

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

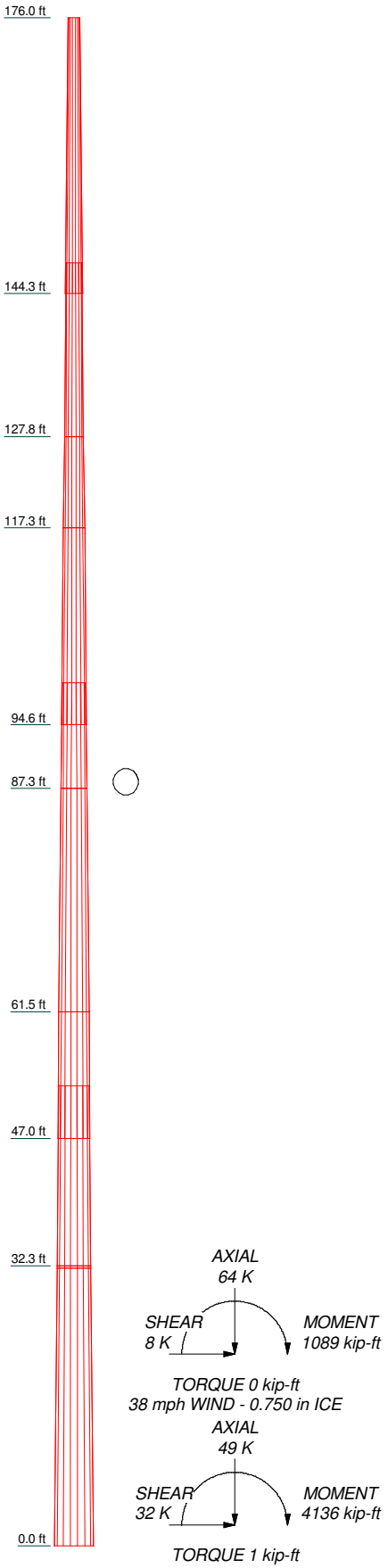
4.1) Recommendations

1) If the load differs from that described in Tables 1 and 2 of this report, “Appendix B – Base Level Drawing” or the provisions of this analysis are found to be invalid, another structural analysis should be performed.
2) The modifications depicted in “Appendix D – Structural Design Drawings” shall be installed and, upon completion, inspected. The tower and its foundation have sufficient capacity to carry the existing and proposed loads once the proposed modifications are installed.

APPENDIX A

TNXTOWER OUTPUT

Section	1	2	3	4	5	6	7	8	9	10
Length (ft)	31.75	20.00	10.50	22.67	12.16	25.75	14.55	20.78	0.25	32.00
Number of Sides	18	18	18	18	18	18	18	18	18	18
Thickness (in)	0.188	0.313	0.481	0.508	0.559	0.529	0.577	0.558	0.797	0.570
Socket Length (ft)	3.50			4.83			6.08			
Top Dia (in)	16.500	22.487	26.942	29.280	32.629	35.334	41.063	42.197	46.822	46.878
Bot Dia (in)	23.650	26.942	29.280	34.330	35.334	41.063	44.300	46.822	46.878	54.000
Grade	MPRF-Fy=65ksi, Density=100%								MPRF-Fy=65ksi, Density=50%	MPRF-Fy=65ksi, Density=100%
Weight (K)	1.3	1.6	1.0	2.4	1.7	3.9	2.5	3.7	0.0	6.5



DESIGNED APPURTENANCE LOADING

TYPE	ELEVATION	TYPE	ELEVATION
800 EXTERNAL NOTCH FILTER	176	(2) LGP21901	167
800 EXTERNAL NOTCH FILTER	176	(2) LGP21901	167
800 EXTERNAL NOTCH FILTER	176	(2) LGP21901	167
(3) ACU-A20-N	176	DC6-48-60-18-8F	167
(3) ACU-A20-N	176	Platform Mount [LP 303-1]	167
(3) ACU-A20-N	176	ERICSSON AIR 21 B2A B4P	155
APXVSPP18-C-A20 w/ Mount Pipe	176	ERICSSON AIR 21 B2A B4P	155
APXVSPP18-C-A20 w/ Mount Pipe	176	ERICSSON AIR 21 B2A B4P	155
APXVSPP18-C-A20 w/ Mount Pipe	176	KRY 112 144/1	155
(3) 2.4" Dia. x 6' Mount Pipe	176	KRY 112 144/1	155
(3) 2.4" Dia. x 6' Mount Pipe	176	KRY 112 144/1	155
(3) 2.4" Dia. x 6' Mount Pipe	176	Ericsson Air 21 B4A B12P-B8P 4FT	155
Platform Mount [LP 712-1]	176	Ericsson Air 21 B4A B12P-B8P 4FT	155
PCS 1900MHz 4x45W-65MHz	174	Ericsson Air 21 B4A B12P-B8P 4FT	155
PCS 1900MHz 4x45W-65MHz	174	RRUS 11 B12	155
PCS 1900MHz 4x45W-65MHz	174	RRUS 11 B12	155
TME-800MHZ RRH	174	RRUS 11 B12	155
TME-800MHZ RRH	174	Platform Mount [LP 301-1]	155
TME-800MHZ RRH	174	RRH2X40-07-U	145
2.4" Dia. x 6' Mount Pipe	174	RRH2X40-07-U	145
2.4" Dia. x 6' Mount Pipe	174	RRH2X40-07-U	145
2.4" Dia. x 6' Mount Pipe	174	RRH2X40-AWS	145
Side Arm Mount [SO 102-3]	174	RRH2X40-AWS	145
RRUS 11	169	RRH2X40-AWS	145
RRUS 11	169	(2) BXA-171063-12CF-EDIN-X w/ Mount Pipe	145
RRUS 11	169		
2.4" Dia x 4-ft Mount Pipe	169	(2) BXA-171063-12CF-EDIN-X w/ Mount Pipe	145
2.4" Dia x 4-ft Mount Pipe	169		
2.4" Dia x 4-ft Mount Pipe	169	(2) BXA-171063-12CF-EDIN-X w/ Mount Pipe	145
T-Arm Mount [TA 702-3]	169		
AM-X-CD-16-65-00T-RET w/ Mount Pipe	167	(2) BXA-70063-6CF-EDIN-X w/ Mount Pipe	145
AM-X-CD-16-65-00T-RET w/ Mount Pipe	167	(2) BXA-70063-6CF-EDIN-X w/ Mount Pipe	145
AM-X-CD-16-65-00T-RET w/ Mount Pipe	167	(2) BXA-70063-6CF-EDIN-X w/ Mount Pipe	145
(2) 7770.00 w/ Mount Pipe	167	DB-B1-6C-8AB-0Z	145
(2) 7770.00 w/ Mount Pipe	167	Platform Mount [LP 303-1]	145
(2) 7770.00 w/ Mount Pipe	167	KS24019-L112A	50
(2) LGP21401	167	1.9" x 3' Pipe	50
(2) LGP21401	167	Side Arm Mount [SO 701-1]	50
(2) LGP21401	167		

MATERIAL STRENGTH

GRADE	Fy	Fu	GRADE	Fy	Fu
MPRF-Fy=65ksi Density=100%	65 ksi	80 ksi	MPRF-Fy=65ksi Density=50%	65 ksi	80 ksi

TOWER DESIGN NOTES

1. Tower is located in New Haven County, Connecticut.
2. Tower designed for a 85 mph basic wind in accordance with the TIA/EIA-222-F Standard.
3. Tower is also designed for a 38 mph basic wind with 0.75 in ice. Ice is considered to increase in thickness with height.
4. Deflections are based upon a 50 mph wind.

Tower Engineering Professionals
326 Tryon Road
Raleigh, NC 27603
Phone: (919) 661-6351
FAX: (919) 661-6350

Job: *Ward (BU 876381)*			
Project: *TEP No. 51819.31710*			
Client: Crown Castle	Drawn by: aaarabi	App'd:	
Code: TIA/EIA-222-F	Date: 04/24/15	Scale: NTS	
Path: \\tep-vm-file01_TowersExtend02\51819-TEMP\31710_876381 Ward CMRP\tnxTower\876381_LC4.7.er		Dwg No. E-1	

Tower Input Data

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

Tower is located in New Haven County, Connecticut.
Basic wind speed of 85 mph.
Nominal ice thickness of 0.750 in.
Ice thickness is considered to increase with height.
Ice density of 56 pcf.
A wind speed of 38 mph is used in combination with ice.
Temperature drop of 50 °F.
Deflections calculated using a wind speed of 50 mph.
A non-linear (P-delta) analysis was used.
Pressures are calculated at each section.
Stress ratio used in pole design is 1.333.
Local bending stresses due to climbing loads, feed line supports, and appurtenance mounts are not considered.

Options

	Consider Moments - Legs		Distribute Leg Loads As Uniform		Treat Feedline Bundles As Cylinder
	Consider Moments - Horizontals		Assume Legs Pinned		Use ASCE 10 X-Brace Ly Rules
	Consider Moments - Diagonals	√	Assume Rigid Index Plate		Calculate Redundant Bracing Forces
	Use Moment Magnification	√	Use Clear Spans For Wind Area		Ignore Redundant Members in FEA
√	Use Code Stress Ratios		Use Clear Spans For KL/r		SR Leg Bolts Resist Compression
√	Use Code Safety Factors - Guys		Retension Guys To Initial Tension		All Leg Panels Have Same Allowable
√	Escalate Ice	√	Bypass Mast Stability Checks		Offset Girt At Foundation
	Always Use Max Kz	√	Use Azimuth Dish Coefficients	√	Consider Feedline Torque
	Use Special Wind Profile	√	Project Wind Area of Appurt.		Include Angle Block Shear Check
	Include Bolts In Member Capacity		Autocalc Torque Arm Areas		Poles
	Leg Bolts Are At Top Of Section		SR Members Have Cut Ends	√	Include Shear-Torsion Interaction
	Secondary Horizontal Braces Leg	√	Sort Capacity Reports By Component		Always Use Sub-Critical Flow
	Use Diamond Inner Bracing (4 Sided)		Triangulate Diamond Inner Bracing		Use Top Mounted Sockets
	Add IBC .6D+W Combination		Use TIA-222-G Tension Splice Capacity Exemption		

Tapered Pole Section Geometry

Section	*Elevation* *ft*	*Section Length* *ft*	*Splice Length* *ft*	*Number of Sides*	*Top Diameter* *in*	*Bottom Diameter* *in*	*Wall Thickness* *in*	*Bend Radius* *in*	*Pole Grade*
L1	176.00-144.25	31.75	3.50	18	16.500	23.650	0.188	0.750	MPRF-Fy=65ksi, Density=100% (65 ksi)
L2	144.25-127.75	20.00	0.00	18	22.487	26.942	0.313	1.250	MPRF-Fy=65ksi, Density=100% (65 ksi)
L3	127.75-117.25	10.50	0.00	18	26.942	29.280	0.481	1.923	MPRF-Fy=65ksi, Density=100%

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
L4	117.25-94.58	22.67	4.83	18	29.280	34.330	0.508	2.030	(65 ksi) MPRF-Fy=65ksi, Density=100%
L5	94.58-87.25	12.16	0.00	18	32.629	35.334	0.559	2.235	(65 ksi) MPRF-Fy=65ksi, Density=100%
L6	87.25-61.50	25.75	0.00	18	35.334	41.063	0.529	2.118	(65 ksi) MPRF-Fy=65ksi, Density=100%
L7	61.50-46.95	14.55	6.08	18	41.063	44.300	0.577	2.308	(65 ksi) MPRF-Fy=65ksi, Density=100%
L8	46.95-32.25	20.78	0.00	18	42.197	46.822	0.558	2.232	(65 ksi) MPRF-Fy=65ksi, Density=100%
L9	32.25-32.00	0.25	0.00	18	46.822	46.878	0.797	3.187	(65 ksi) MPRF-Fy=65ksi, Density=50%
L10	32.00-0.00	32.00		18	46.878	54.000	0.570	2.281	(65 ksi) MPRF-Fy=65ksi, Density=100%

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	16.755	9.708	326.368	5.791	8.382	38.937	653.165	4.855	2.574	13.728
	24.015	13.963	971.110	8.329	12.014	80.830	1943.498	6.983	3.832	20.439
L2	23.625	21.994	1366.296	7.872	11.423	119.606	2734.390	10.999	3.408	10.905
	27.357	26.413	2366.281	9.453	13.686	172.893	4735.675	13.209	4.192	13.414
L3	27.357	40.380	3572.013	9.394	13.686	260.991	7148.726	20.194	3.896	8.102
	29.732	43.949	4605.352	10.224	14.874	309.615	9216.764	21.979	4.307	8.958
L4	29.732	46.354	4848.340	10.214	14.874	325.951	9703.059	23.182	4.260	8.393
	34.860	54.489	7875.133	12.007	17.440	451.565	15760.629	27.250	5.149	10.144
L5	34.224	56.877	7390.622	11.385	16.576	445.873	14790.969	28.444	4.759	8.518
	35.879	61.675	9423.097	12.345	17.950	524.967	18858.593	30.843	5.235	9.37
L6	35.879	58.485	8950.823	12.356	17.950	498.656	17913.423	29.248	5.287	9.987
	41.697	68.111	14137.895	14.389	20.860	677.751	28294.393	34.062	6.295	11.891
L7	41.697	74.143	15353.837	14.373	20.860	736.041	30727.876	37.078	6.212	10.766
	44.983	80.071	19338.853	15.522	22.504	859.337	38703.153	40.043	6.781	11.753
L8	44.222	73.735	16151.820	14.782	21.436	753.481	32324.893	36.875	6.445	11.552
	47.545	81.925	22153.681	16.424	23.786	931.386	44336.513	40.970	7.259	13.011
L9	47.545	116.408	31154.119	16.339	23.786	1309.783	62349.231	58.215	6.838	8.582
	47.601	116.549	31267.245	16.359	23.814	1312.978	62575.631	58.285	6.848	8.594
L10	47.601	83.805	22704.759	16.439	23.814	953.421	45439.394	41.911	7.247	12.71
	54.833	96.695	34874.447	18.968	27.432	1271.305	69794.783	48.357	8.500	14.908

Tower Elevation ft	Gusset Area (per face) ft^2	Gusset Thickness in	Gusset Grade	Adjust. Factor A_f	Adjust. Factor A_r	Weight Mult.	Double Angle Stitch Bolt Spacing Diagonals in	Double Angle Stitch Bolt Spacing Horizontals in
L1 176.00-144.25				1	1	1		
L2 144.25-127.75				1	1	1		
L3 127.75-117.25				1	1	0.653768		
L4 117.25-94.58				1	1	0.619342		
L5 94.58-87.25				1	1	0.674678		
L6 87.25-61.50				1	1	0.711031		
L7 61.50-46.95				1	1	0.653042		
L8 46.95-32.25				1	1	0.674813		
L9 32.25-32.00				1	1	0.94982		
L10 32.00-0.00				1	1	0.66009		

Feed Line/Linear Appurtenances - Entered As Area

Description	Face or Leg	Allow Shield	Component Type	Placement ft	Total Number		C_AA_A ft^2/ft	Weight plf
176***								
LDF4P-50A(1/2")	C	No	Inside Pole	176.00 - 0.00	1	No Ice	0.00	0.15
						1/2" Ice	0.00	0.15
						1" Ice	0.00	0.15
						2" Ice	0.00	0.15
						4" Ice	0.00	0.15
***174**								
HB114-21U3M12-XXX F(1-1/4")	C	No	Inside Pole	174.00 - 0.00	3	No Ice	0.00	1.22
						1/2" Ice	0.00	1.22
						1" Ice	0.00	1.22
						2" Ice	0.00	1.22
						4" Ice	0.00	1.22
*** 167' ***								
LDF7-50A(1-5/8")	B	No	Inside Pole	167.00 - 0.00	12	No Ice	0.00	0.82
						1/2" Ice	0.00	0.82
						1" Ice	0.00	0.82
						2" Ice	0.00	0.82
						4" Ice	0.00	0.82
FB-L98B-002-75000(3/8")	B	No	Inside Pole	167.00 - 0.00	1	No Ice	0.00	0.06
						1/2" Ice	0.00	0.06
						1" Ice	0.00	0.06
						2" Ice	0.00	0.06
						4" Ice	0.00	0.06
WR-VG122ST-BRDA(7/ 16)	B	No	Inside Pole	167.00 - 0.00	2	No Ice	0.00	0.14
						1/2" Ice	0.00	0.14
						1" Ice	0.00	0.14
						2" Ice	0.00	0.14
						4" Ice	0.00	0.14
2" Flexible Conduit	B	No	Inside Pole	167.00 - 0.00	1	No Ice	0.00	0.34
						1/2" Ice	0.00	0.34
						1" Ice	0.00	0.34
						2" Ice	0.00	0.34
						4" Ice	0.00	0.34
*** 155' ***								
LDF7-50A(1-5/8")	C	No	Inside Pole	155.00 - 0.00	13	No Ice	0.00	0.82
						1/2" Ice	0.00	0.82

Description	Face or Leg	Allow Shield	Component Type	Placement ft	Total Number		C_AA_A ft^2/ft	Weight plf
						1" Ice	0.00	0.82
						2" Ice	0.00	0.82
						4" Ice	0.00	0.82
*** 145' ***								
MLE Hybrid 3Power/6Fiber RL 2(1 1/4")	C	No	Inside Pole	145.00 - 0.00	2	No Ice	0.00	0.68
						1/2" Ice	0.00	0.68
						1" Ice	0.00	0.68
						2" Ice	0.00	0.68
						4" Ice	0.00	0.68
*** 50' ***								
LDF4P-50A(1/2")	C	No	CaAa (Out Of Face)	35.00 - 0.00	1	No Ice	0.00	0.15
						1/2" Ice	0.00	0.84
						1" Ice	0.00	2.14
						2" Ice	0.00	6.58
						4" Ice	0.00	22.78
LDF4P-50A(1/2")	C	No	CaAa (Out Of Face)	50.00 - 35.00	1	No Ice	0.06	0.15
						1/2" Ice	0.16	0.84
						1" Ice	0.26	2.14
						2" Ice	0.46	6.58
						4" Ice	0.86	22.78
*** 10' ***								
Equipment								
Step Pegs (5/8" SR) 7-in. w/30" step	A	No	CaAa (Out Of Face)	176.00 - 0.00	1	No Ice	0.03	0.49
						1/2" Ice	0.14	1.01
						1" Ice	0.23	2.07
						2" Ice	0.43	6.09
						4" Ice	0.83	21.46
Safety Line 3/8	A	No	CaAa (Out Of Face)	176.00 - 0.00	1	No Ice	0.04	0.22
						1/2" Ice	0.14	0.75
						1" Ice	0.24	1.28
						2" Ice	0.44	2.34
						4" Ice	0.84	4.46
***Mods**								
CCI-65FP-065125	A	No	CaAa (Out Of Face)	35.00 - 0.00	1	No Ice	0.21	27.65
						1/2" Ice	0.32	28.73
						1" Ice	0.43	30.15
						2" Ice	0.65	34.04
						4" Ice	1.10	45.97
CCI-65FP-065125	B	No	CaAa (Out Of Face)	35.00 - 0.00	1	No Ice	0.00	27.65
						1/2" Ice	0.00	28.73
						1" Ice	0.00	30.15
						2" Ice	0.00	34.04
						4" Ice	0.00	45.97
CCI-65FP-065125	B	No	CaAa (Out Of Face)	35.00 - 0.00	1	No Ice	0.00	27.65
						1/2" Ice	0.00	28.73
						1" Ice	0.00	30.15
						2" Ice	0.00	34.04
						4" Ice	0.00	45.97
CCI-65FP-065125	C	No	CaAa (Out Of Face)	35.00 - 0.00	1	No Ice	0.21	27.65
						1/2" Ice	0.32	28.73
						1" Ice	0.43	30.15
						2" Ice	0.65	34.04
						4" Ice	1.10	45.97
*****								
CCI-65FP-065125	A	No	CaAa (Out Of Face)	64.25 - 35.00	1	No Ice	0.21	27.65
						1/2" Ice	0.32	28.73
						1" Ice	0.43	30.15
						2" Ice	0.65	34.04
						4" Ice	1.10	45.97
CCI-65FP-065125	A	No	CaAa (Out Of Face)	35.00 - 29.25	1	No Ice	0.00	27.65
						1/2" Ice	0.00	28.73

Description	Face or Leg	Allow Shield	Component Type	Placement ft	Total Number		C_AA_A ft^2/ft	Weight plf
						1" Ice	0.00	30.15
						2" Ice	0.00	34.04
						4" Ice	0.00	45.97
CCI-65FP-065125	B	No	CaAa (Out Of Face)	64.25 - 29.25	1	No Ice	0.00	27.65
						1/2" Ice	0.00	28.73
						1" Ice	0.00	30.15
						2" Ice	0.00	34.04
						4" Ice	0.00	45.97
CCI-65FP-065125	C	No	CaAa (Out Of Face)	64.25 - 29.25	1	No Ice	0.00	27.65
						1/2" Ice	0.00	28.73
						1" Ice	0.00	30.15
						2" Ice	0.00	34.04
						4" Ice	0.00	45.97
*****								
CCI-65FP-060100	A	No	CaAa (Out Of Face)	89.25 - 64.25	1	No Ice	0.17	20.42
						1/2" Ice	0.28	21.37
						1" Ice	0.39	22.66
						2" Ice	0.61	26.29
						4" Ice	1.06	37.70
CCI-65FP-060100	B	No	CaAa (Out Of Face)	89.25 - 64.25	1	No Ice	0.00	20.42
						1/2" Ice	0.00	21.37
						1" Ice	0.00	22.66
						2" Ice	0.00	26.29
						4" Ice	0.00	37.70
CCI-65FP-060100	C	No	CaAa (Out Of Face)	89.25 - 64.25	1	No Ice	0.00	20.42
						1/2" Ice	0.00	21.37
						1" Ice	0.00	22.66
						2" Ice	0.00	26.29
						4" Ice	0.00	37.70
*****								
CCI-65FP-060100	A	No	CaAa (Out Of Face)	119.25 - 89.25	1	No Ice	0.17	20.42
						1/2" Ice	0.28	21.37
						1" Ice	0.39	22.66
						2" Ice	0.61	26.29
						4" Ice	1.06	37.70
CCI-65FP-060100	B	No	CaAa (Out Of Face)	119.25 - 89.25	1	No Ice	0.00	20.42
						1/2" Ice	0.00	21.37
						1" Ice	0.00	22.66
						2" Ice	0.00	26.29
						4" Ice	0.00	37.70
CCI-65FP-060100	C	No	CaAa (Out Of Face)	119.25 - 89.25	1	No Ice	0.00	20.42
						1/2" Ice	0.00	21.37
						1" Ice	0.00	22.66
						2" Ice	0.00	26.29
						4" Ice	0.00	37.70
***								
*****								
CCI-65FP-045100	A	No	CaAa (Out Of Face)	129.25 - 119.25	1	No Ice	0.17	15.31
						1/2" Ice	0.28	16.17
						1" Ice	0.39	17.36
						2" Ice	0.61	20.80
						4" Ice	1.06	31.82
CCI-65FP-045100	B	No	CaAa (Out Of Face)	129.25 - 119.25	1	No Ice	0.00	15.31
						1/2" Ice	0.00	16.17
						1" Ice	0.00	17.36
						2" Ice	0.00	20.80
						4" Ice	0.00	31.82
CCI-65FP-045100	C	No	CaAa (Out Of Face)	129.25 - 119.25	1	No Ice	0.00	15.31
						1/2" Ice	0.00	16.17
						1" Ice	0.00	17.36
						2" Ice	0.00	20.80

Description	Face or Leg	Allow Shield	Component Type	Placement ft	Total Number		C_AA_A ft^2/ft	Weight plf
						4" Ice	0.00	31.82
*****								
*****								

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	176.00-144.25	A	0.000	0.000	0.000	2.302	0.02
		B	0.000	0.000	0.000	0.000	0.24
		C	0.000	0.000	0.000	0.000	0.23
L2	144.25-127.75	A	0.000	0.000	0.000	1.446	0.03
		B	0.000	0.000	0.000	0.000	0.20
		C	0.000	0.000	0.000	0.000	0.28
L3	127.75-117.25	A	0.000	0.000	0.000	2.511	0.18
		B	0.000	0.000	0.000	0.000	0.28
		C	0.000	0.000	0.000	0.000	0.34
L4	117.25-94.58	A	0.000	0.000	0.000	5.422	0.48
		B	0.000	0.000	0.000	0.000	0.70
		C	0.000	0.000	0.000	0.000	0.82
L5	94.58-87.25	A	0.000	0.000	0.000	1.753	0.15
		B	0.000	0.000	0.000	0.000	0.23
		C	0.000	0.000	0.000	0.000	0.27
L6	87.25-61.50	A	0.000	0.000	0.000	6.273	0.56
		B	0.000	0.000	0.000	0.000	0.82
		C	0.000	0.000	0.000	0.000	0.95
L7	61.50-46.95	A	0.000	0.000	0.000	4.086	0.41
		B	0.000	0.000	0.000	0.000	0.56
		C	0.000	0.000	0.000	0.192	0.63
L8	46.95-32.25	A	0.000	0.000	0.000	4.128	0.49
		B	0.000	0.000	0.000	0.000	0.71
		C	0.000	0.000	0.000	1.326	0.72
L9	32.25-32.00	A	0.000	0.000	0.000	0.070	0.01
		B	0.000	0.000	0.000	0.000	0.02
		C	0.000	0.000	0.000	0.052	0.02
L10	32.00-0.00	A	0.000	0.000	0.000	8.987	0.98
		B	0.000	0.000	0.000	0.000	2.18
		C	0.000	0.000	0.000	6.667	1.47

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	176.00-144.25	A	0.906	0.000	0.000	0.000	13.807	0.10
		B		0.000	0.000	0.000	0.000	0.24
		C		0.000	0.000	0.000	0.000	0.23
L2	144.25-127.75	A	0.889	0.000	0.000	0.000	7.727	0.08
		B		0.000	0.000	0.000	0.000	0.20
		C		0.000	0.000	0.000	0.000	0.29
L3	127.75-117.25	A	0.878	0.000	0.000	0.000	8.246	0.22
		B		0.000	0.000	0.000	0.000	0.30
		C		0.000	0.000	0.000	0.000	0.36
L4	117.25-94.58	A	0.862	0.000	0.000	0.000	17.586	0.57

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	0.74
		C		0.000	0.000	0.000	0.000	0.86
L5	94.58-87.25	A	0.847	0.000	0.000	0.000	5.686	0.18
		B		0.000	0.000	0.000	0.000	0.24
		C		0.000	0.000	0.000	0.000	0.28
L6	87.25-61.50	A	0.826	0.000	0.000	0.000	19.514	0.66
		B		0.000	0.000	0.000	0.000	0.86
		C		0.000	0.000	0.000	0.000	1.00
L7	61.50-46.95	A	0.796	0.000	0.000	0.000	11.292	0.47
		B		0.000	0.000	0.000	0.000	0.58
		C		0.000	0.000	0.000	0.678	0.67
L8	46.95-32.25	A	0.766	0.000	0.000	0.000	11.408	0.56
		B		0.000	0.000	0.000	0.000	0.75
		C		0.000	0.000	0.000	3.714	0.77
L9	32.25-32.00	A	0.750	0.000	0.000	0.000	0.187	0.02
		B		0.000	0.000	0.000	0.000	0.02
		C		0.000	0.000	0.000	0.094	0.02
L10	32.00-0.00	A	0.750	0.000	0.000	0.000	23.920	1.10
		B		0.000	0.000	0.000	0.000	2.30
		C		0.000	0.000	0.000	12.000	1.58

Feed Line Center of Pressure

Section	Elevation ft	CP_X in	CP_Z in	CP_X Ice in	CP_Z Ice in
L1	176.00-144.25	0.000	-0.104	0.000	-0.483
L2	144.25-127.75	0.000	-0.128	0.000	-0.545
L3	127.75-117.25	0.000	-0.326	0.000	-0.843
L4	117.25-94.58	0.000	-0.329	0.000	-0.864
L5	94.58-87.25	0.000	-0.331	0.000	-0.882
L6	87.25-61.50	0.000	-0.340	0.000	-0.887
L7	61.50-46.95	-0.016	-0.380	-0.049	-0.889
L8	46.95-32.25	-0.108	-0.321	-0.252	-0.744
L9	32.25-32.00	-0.240	-0.235	-0.369	-0.637
L10	32.00-0.00	-0.242	-0.237	-0.376	-0.648

Discrete Tower Loads

Description	Face or Leg	Offset Type	Offsets: Horz Lateral ft Vert ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
*** 176' ***									
800 EXTERNAL NOTCH FILTER	A	From Centroid-Leg	4.00 -2.00 2.00	20.000	176.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	0.77 0.89 1.02 1.30 1.97	0.37 0.46 0.56 0.79 1.34	0.01 0.02 0.02 0.04 0.11
800 EXTERNAL NOTCH FILTER	B	From Centroid-Leg	4.00 -2.00 2.00	40.000	176.00	No Ice 1/2" Ice 1" Ice	0.77 0.89 1.02	0.37 0.46 0.56	0.01 0.02 0.02

Description	Face or Leg	Offset Type	Offsets: Horz Lateral ft / Vert ft / ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
						2" Ice	1.30	0.79	0.04
						4" Ice	1.97	1.34	0.11
800 EXTERNAL NOTCH FILTER	C	From Centroid-Leg	4.00 -2.00 2.00	30.000	176.00	No Ice	0.77	0.37	0.01
						1/2" Ice	0.89	0.46	0.02
						1" Ice	1.02	0.56	0.02
						2" Ice	1.30	0.79	0.04
						4" Ice	1.97	1.34	0.11
(3) ACU-A20-N	A	From Centroid-Leg	4.00 -2.00 2.00	20.000	176.00	No Ice	0.08	0.14	0.00
						1/2" Ice	0.12	0.19	0.00
						1" Ice	0.17	0.25	0.00
						2" Ice	0.30	0.40	0.01
						4" Ice	0.67	0.80	0.04
(3) ACU-A20-N	B	From Centroid-Leg	4.00 -2.00 2.00	40.000	176.00	No Ice	0.08	0.14	0.00
						1/2" Ice	0.12	0.19	0.00
						1" Ice	0.17	0.25	0.00
						2" Ice	0.30	0.40	0.01
						4" Ice	0.67	0.80	0.04
(3) ACU-A20-N	C	From Centroid-Leg	4.00 -2.00 2.00	30.000	176.00	No Ice	0.08	0.14	0.00
						1/2" Ice	0.12	0.19	0.00
						1" Ice	0.17	0.25	0.00
						2" Ice	0.30	0.40	0.01
						4" Ice	0.67	0.80	0.04
APXVSPP18-C-A20 w/ Mount Pipe	A	From Centroid-Leg	4.00 -2.00 2.00	20.000	176.00	No Ice	8.50	6.95	0.08
						1/2" Ice	9.15	8.13	0.15
						1" Ice	9.77	9.02	0.23
						2" Ice	11.03	10.84	0.41
						4" Ice	13.68	14.85	0.91
APXVSPP18-C-A20 w/ Mount Pipe	B	From Centroid-Leg	4.00 -2.00 2.00	40.000	176.00	No Ice	8.50	6.95	0.08
						1/2" Ice	9.15	8.13	0.15
						1" Ice	9.77	9.02	0.23
						2" Ice	11.03	10.84	0.41
						4" Ice	13.68	14.85	0.91
APXVSPP18-C-A20 w/ Mount Pipe	C	From Centroid-Leg	4.00 -2.00 2.00	30.000	176.00	No Ice	8.50	6.95	0.08
						1/2" Ice	9.15	8.13	0.15
						1" Ice	9.77	9.02	0.23
						2" Ice	11.03	10.84	0.41
						4" Ice	13.68	14.85	0.91
(3) 2.4" Dia. x 6' Mount Pipe	A	From Centroid-Leg	4.00 0.67 0.00	0.000	176.00	No Ice	1.43	1.43	0.02
						1/2" Ice	1.93	1.93	0.04
						1" Ice	2.32	2.32	0.06
						2" Ice	3.15	3.15	0.10
						4" Ice	5.06	5.06	0.25
(3) 2.4" Dia. x 6' Mount Pipe	B	From Centroid-Leg	4.00 0.67 0.00	0.000	176.00	No Ice	1.43	1.43	0.02
						1/2" Ice	1.93	1.93	0.04
						1" Ice	2.32	2.32	0.06
						2" Ice	3.15	3.15	0.10
						4" Ice	5.06	5.06	0.25
(3) 2.4" Dia. x 6' Mount Pipe	C	From Centroid-Leg	4.00 0.67 0.00	0.000	176.00	No Ice	1.43	1.43	0.02
						1/2" Ice	1.93	1.93	0.04
						1" Ice	2.32	2.32	0.06
						2" Ice	3.15	3.15	0.10
						4" Ice	5.06	5.06	0.25
Platform Mount [LP 712-1]	C	None		0.000	176.00	No Ice	24.53	24.53	1.34
						1/2" Ice	29.94	29.94	1.65
						1" Ice	35.35	35.35	1.96
						2" Ice	46.17	46.17	2.58
						4" Ice	67.81	67.81	3.82

Description	Face or Leg	Offset Type	Offsets: Horz Lateral ft / Vert ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
*** 174' ***									
PCS 1900MHz 4x45W-65MHz	A	From Leg	1.50 0.00 2.00	20.000	174.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	2.71 2.95 3.20 3.72 4.86	2.61 2.85 3.09 3.61 4.74	0.06 0.08 0.11 0.17 0.35
PCS 1900MHz 4x45W-65MHz	B	From Leg	1.50 0.00 2.00	40.000	174.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	2.71 2.95 3.20 3.72 4.86	2.61 2.85 3.09 3.61 4.74	0.06 0.08 0.11 0.17 0.35
PCS 1900MHz 4x45W-65MHz	C	From Leg	1.50 0.00 2.00	30.000	174.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	2.71 2.95 3.20 3.72 4.86	2.61 2.85 3.09 3.61 4.74	0.06 0.08 0.11 0.17 0.35
TME-800MHZ RRH	A	From Leg	1.50 0.00 0.00	20.000	174.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	2.49 2.71 2.93 3.41 4.46	2.07 2.27 2.48 2.93 3.93	0.05 0.07 0.10 0.16 0.32
TME-800MHZ RRH	B	From Leg	1.50 0.00 0.00	40.000	174.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	2.49 2.71 2.93 3.41 4.46	2.07 2.27 2.48 2.93 3.93	0.05 0.07 0.10 0.16 0.32
TME-800MHZ RRH	C	From Leg	1.50 0.00 0.00	30.000	174.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	2.49 2.71 2.93 3.41 4.46	2.07 2.27 2.48 2.93 3.93	0.05 0.07 0.10 0.16 0.32
2.4" Dia. x 6' Mount Pipe	A	From Leg	1.50 0.00 0.00	0.000	174.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	1.43 1.93 2.32 3.15 5.06	1.43 1.93 2.32 3.15 5.06	0.02 0.04 0.06 0.10 0.25
2.4" Dia. x 6' Mount Pipe	B	From Leg	1.50 0.00 0.00	0.000	174.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	1.43 1.93 2.32 3.15 5.06	1.43 1.93 2.32 3.15 5.06	0.02 0.04 0.06 0.10 0.25
2.4" Dia. x 6' Mount Pipe	C	From Leg	1.50 0.00 0.00	0.000	174.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	1.43 1.93 2.32 3.15 5.06	1.43 1.93 2.32 3.15 5.06	0.02 0.04 0.06 0.10 0.25
Side Arm Mount [SO 102-3]	C	None		0.000	174.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	3.00 3.48 3.96 4.92 6.84	3.00 3.48 3.96 4.92 6.84	0.08 0.11 0.14 0.20 0.32
*** 169' ***									
RRUS 11	A	From Leg	3.00 -2.00 0.00	30.000	169.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	3.25 3.49 3.74 4.27 5.43	1.37 1.55 1.74 2.14 3.04	0.05 0.07 0.09 0.15 0.31

Description	Face or Leg	Offset Type	Offsets: Horz Lateral ft / Vert ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
RRUS 11	B	From Leg	3.00 -2.00 0.00	40.000	169.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	3.25 3.49 3.74 4.27 5.43	1.37 1.55 1.74 2.14 3.04	0.05 0.07 0.09 0.15 0.31
RRUS 11	C	From Leg	3.00 -2.00 0.00	40.000	169.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	3.25 3.49 3.74 4.27 5.43	1.37 1.55 1.74 2.14 3.04	0.05 0.07 0.09 0.15 0.31
2.4" Dia x 4-ft Mount Pipe	A	From Leg	3.00 -2.00 0.00	0.000	169.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	0.87 1.12 1.37 1.91 3.24	0.87 1.12 1.37 1.91 3.24	0.01 0.02 0.03 0.06 0.16
2.4" Dia x 4-ft Mount Pipe	B	From Leg	3.00 -2.00 0.00	0.000	169.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	0.87 1.12 1.37 1.91 3.24	0.87 1.12 1.37 1.91 3.24	0.01 0.02 0.03 0.06 0.16
2.4" Dia x 4-ft Mount Pipe	C	From Leg	33.00 -2.00 0.00	0.000	169.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	0.87 1.12 1.37 1.91 3.24	0.87 1.12 1.37 1.91 3.24	0.01 0.02 0.03 0.06 0.16
T-Arm Mount [TA 702-3]	C	None		0.000	169.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	5.64 6.55 7.46 9.28 12.92	5.64 6.55 7.46 9.28 12.92	0.34 0.43 0.52 0.70 1.06
*** 167' ***									
AM-X-CD-16-65-00T-RET w/ Mount Pipe	A	From Centroid-Leg	4.00 0.00 0.00	30.000	167.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	8.50 9.15 9.77 11.03 13.68	6.30 7.48 8.37 10.18 14.02	0.07 0.14 0.21 0.38 0.87
AM-X-CD-16-65-00T-RET w/ Mount Pipe	B	From Centroid-Leg	4.00 0.00 0.00	40.000	167.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	8.50 9.15 9.77 11.03 13.68	6.30 7.48 8.37 10.18 14.02	0.07 0.14 0.21 0.38 0.87
AM-X-CD-16-65-00T-RET w/ Mount Pipe	C	From Centroid-Leg	4.00 0.00 0.00	40.000	167.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	8.50 9.15 9.77 11.03 13.68	6.30 7.48 8.37 10.18 14.02	0.07 0.14 0.21 0.38 0.87
(2) 7770.00 w/ Mount Pipe	A	From Centroid-Leg	4.00 0.00 0.00	30.000	167.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	6.12 6.63 7.13 8.16 10.36	4.25 5.01 5.71 7.16 10.41	0.06 0.10 0.16 0.29 0.66
(2) 7770.00 w/ Mount Pipe	B	From Centroid-Leg	4.00 0.00 0.00	40.000	167.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	6.12 6.63 7.13 8.16 10.36	4.25 5.01 5.71 7.16 10.41	0.06 0.10 0.16 0.29 0.66
(2) 7770.00 w/ Mount Pipe	C	From	4.00	40.000	167.00	No Ice	6.12	4.25	0.06

Description	Face or Leg	Offset Type	Offsets: Horz Lateral ft / Vert ft / ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
		Centroid-Leg	0.00 0.00			1/2" Ice 1" Ice 2" Ice 4" Ice	6.63 7.13 8.16 10.36	5.01 5.71 7.16 10.41	0.10 0.16 0.29 0.66
(2) LGP21401	A	From Centroid-Leg	4.00 -3.00 0.00	30.000	167.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	1.29 1.45 1.61 1.97 2.79	0.23 0.31 0.40 0.61 1.12	0.01 0.02 0.03 0.05 0.14
(2) LGP21401	B	From Centroid-Leg	4.00 -3.00 0.00	40.000	167.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	1.29 1.45 1.61 1.97 2.79	0.23 0.31 0.40 0.61 1.12	0.01 0.02 0.03 0.05 0.14
(2) LGP21401	C	From Centroid-Leg	4.00 -3.00 0.00	40.000	167.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	1.29 1.45 1.61 1.97 2.79	0.23 0.31 0.40 0.61 1.12	0.01 0.02 0.03 0.05 0.14
(2) LGP21901	A	From Centroid-Leg	4.00 3.00 0.00	30.000	167.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	0.27 0.34 0.43 0.62 1.10	0.18 0.25 0.32 0.49 0.94	0.01 0.01 0.01 0.02 0.07
(2) LGP21901	B	From Centroid-Leg	4.00 3.00 0.00	40.000	167.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	0.27 0.34 0.43 0.62 1.10	0.18 0.25 0.32 0.49 0.94	0.01 0.01 0.01 0.02 0.07
(2) LGP21901	C	From Centroid-Leg	4.00 3.00 0.00	40.000	167.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	0.27 0.34 0.43 0.62 1.10	0.18 0.25 0.32 0.49 0.94	0.01 0.01 0.01 0.02 0.07
DC6-48-60-18-8F	B	From Centroid-Leg	4.00 0.00 0.00	40.000	167.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	1.27 1.46 1.66 2.09 3.10	1.27 1.46 1.66 2.09 3.10	0.02 0.04 0.05 0.10 0.21
Platform Mount [LP 303-1]	C	None		0.000	167.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	14.66 18.87 23.08 31.50 48.34	14.66 18.87 23.08 31.50 48.34	1.25 1.48 1.71 2.18 3.10
*** 155' ***									
ERICSSON AIR 21 B2A B4P	A	From Centroid-Leg	4.00 -6.00 0.00	30.000	155.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	6.59 7.03 7.49 8.42 10.40	4.30 4.70 5.13 6.01 7.87	0.09 0.13 0.18 0.29 0.58
ERICSSON AIR 21 B2A B4P	B	From Centroid-Leg	4.00 -6.00 0.00	30.000	155.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	6.59 7.03 7.49 8.42 10.40	4.30 4.70 5.13 6.01 7.87	0.09 0.13 0.18 0.29 0.58
ERICSSON AIR 21 B2A B4P	C	From Centroid-Leg	4.00 -6.00	30.000	155.00	No Ice 1/2" Ice	6.59 7.03	4.30 4.70	0.09 0.13

Description	Face or Leg	Offset Type	Offsets: Horz Lateral ft / Vert ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
		g	0.00			1" Ice	7.49	5.13	0.18
						2" Ice	8.42	6.01	0.29
						4" Ice	10.40	7.87	0.58
KRY 112 144/1	A	From Centroid-Leg	4.00 -6.00 0.00	30.000	155.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	0.41 0.50 0.60 0.82 1.36	0.19 0.26 0.33 0.51 0.97	0.01 0.01 0.02 0.03 0.08
KRY 112 144/1	B	From Centroid-Leg	4.00 -6.00 0.00	30.000	155.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	0.41 0.50 0.60 0.82 1.36	0.19 0.26 0.33 0.51 0.97	0.01 0.01 0.02 0.03 0.08
KRY 112 144/1	C	From Centroid-Leg	4.00 -6.00 0.00	30.000	155.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	0.41 0.50 0.60 0.82 1.36	0.19 0.26 0.33 0.51 0.97	0.01 0.01 0.02 0.03 0.08
Ericsson Air 21 B4A B12P-B8P 4FT	A	From Centroid-Leg	4.00 6.00 0.00	30.000	155.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	8.46 8.94 9.43 10.44 12.55	5.43 5.88 6.33 7.27 9.25	0.12 0.18 0.24 0.37 0.72
Ericsson Air 21 B4A B12P-B8P 4FT	B	From Centroid-Leg	4.00 6.00 0.00	30.000	155.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	8.46 8.94 9.43 10.44 12.55	5.43 5.88 6.33 7.27 9.25	0.12 0.18 0.24 0.37 0.72
Ericsson Air 21 B4A B12P-B8P 4FT	C	From Centroid-Leg	4.00 6.00 0.00	30.000	155.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	8.46 8.94 9.43 10.44 12.55	5.43 5.88 6.33 7.27 9.25	0.12 0.18 0.24 0.37 0.72
RRUS 11 B12	A	From Centroid-Leg	4.00 6.00 0.00	30.000	155.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	3.31 3.55 3.80 4.33 5.50	1.36 1.54 1.73 2.13 3.04	0.05 0.07 0.10 0.15 0.31
RRUS 11 B12	B	From Centroid-Leg	4.00 6.00 0.00	30.000	155.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	3.31 3.55 3.80 4.33 5.50	1.36 1.54 1.73 2.13 3.04	0.05 0.07 0.10 0.15 0.31
RRUS 11 B12	C	From Centroid-Leg	4.00 6.00 0.00	30.000	155.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	3.31 3.55 3.80 4.33 5.50	1.36 1.54 1.73 2.13 3.04	0.05 0.07 0.10 0.15 0.31
Platform Mount [LP 301-1]	C	None		0.000	155.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	30.10 40.80 51.50 72.90 115.70	30.10 40.80 51.50 72.90 115.70	1.59 2.03 2.47 3.35 5.11
*** 145' ***									
RRH2X40-07-U	A	From Centroid-Leg	4.00 -6.00 0.00	20.000	145.00	No Ice 1/2" Ice 1" Ice	2.25 2.45 2.66	1.23 1.39 1.55	0.05 0.07 0.09

Description	Face or Leg	Offset Type	Offsets: Horz Lateral ft / Vert ft / ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
						2" Ice	3.10	1.91	0.13
						4" Ice	4.10	2.73	0.27
RRH2X40-07-U	B	From Centroid-Leg	4.00 -6.00 0.00	20.000	145.00	No Ice	2.25	1.23	0.05
						1/2" Ice	2.45	1.39	0.07
						1" Ice	2.66	1.55	0.09
						2" Ice	3.10	1.91	0.13
						4" Ice	4.10	2.73	0.27
RRH2X40-07-U	C	From Centroid-Leg	4.00 -6.00 0.00	30.000	145.00	No Ice	2.25	1.23	0.05
						1/2" Ice	2.45	1.39	0.07
						1" Ice	2.66	1.55	0.09
						2" Ice	3.10	1.91	0.13
						4" Ice	4.10	2.73	0.27
RRH2X40-AWS	A	From Centroid-Leg	4.00 6.00 0.00	20.000	145.00	No Ice	2.52	1.59	0.04
						1/2" Ice	2.75	1.80	0.06
						1" Ice	2.99	2.01	0.08
						2" Ice	3.50	2.46	0.13
						4" Ice	4.61	3.48	0.28
RRH2X40-AWS	B	From Centroid-Leg	4.00 6.00 0.00	20.000	145.00	No Ice	2.52	1.59	0.04
						1/2" Ice	2.75	1.80	0.06
						1" Ice	2.99	2.01	0.08
						2" Ice	3.50	2.46	0.13
						4" Ice	4.61	3.48	0.28
RRH2X40-AWS	C	From Centroid-Leg	4.00 6.00 0.00	30.000	145.00	No Ice	2.52	1.59	0.04
						1/2" Ice	2.75	1.80	0.06
						1" Ice	2.99	2.01	0.08
						2" Ice	3.50	2.46	0.13
						4" Ice	4.61	3.48	0.28
(2) BXA-171063-12CF-EDIN-X w/ Mount Pipe	A	From Centroid-Leg	4.00 -2.00 0.00	20.000	145.00	No Ice	5.03	5.29	0.04
						1/2" Ice	5.58	6.46	0.09
						1" Ice	6.10	7.35	0.14
						2" Ice	7.17	9.15	0.27
						4" Ice	9.44	12.95	0.68
(2) BXA-171063-12CF-EDIN-X w/ Mount Pipe	B	From Centroid-Leg	4.00 -2.00 0.00	20.000	145.00	No Ice	5.03	5.29	0.04
						1/2" Ice	5.58	6.46	0.09
						1" Ice	6.10	7.35	0.14
						2" Ice	7.17	9.15	0.27
						4" Ice	9.44	12.95	0.68
(2) BXA-171063-12CF-EDIN-X w/ Mount Pipe	C	From Centroid-Leg	4.00 -2.00 0.00	30.000	145.00	No Ice	5.03	5.29	0.04
						1/2" Ice	5.58	6.46	0.09
						1" Ice	6.10	7.35	0.14
						2" Ice	7.17	9.15	0.27
						4" Ice	9.44	12.95	0.68
(2) BXA-70063-6CF-EDIN-X w/ Mount Pipe	A	From Centroid-Leg	4.00 2.00 0.00	20.000	145.00	No Ice	7.97	5.80	0.04
						1/2" Ice	8.61	6.95	0.10
						1" Ice	9.22	7.82	0.17
						2" Ice	10.46	9.60	0.34
						4" Ice	13.07	13.37	0.80
(2) BXA-70063-6CF-EDIN-X w/ Mount Pipe	B	From Centroid-Leg	4.00 2.00 0.00	20.000	145.00	No Ice	7.97	5.80	0.04
						1/2" Ice	8.61	6.95	0.10
						1" Ice	9.22	7.82	0.17
						2" Ice	10.46	9.60	0.34
						4" Ice	13.07	13.37	0.80
(2) BXA-70063-6CF-EDIN-X w/ Mount Pipe	C	From Centroid-Leg	4.00 2.00 0.00	30.000	145.00	No Ice	7.97	5.80	0.04
						1/2" Ice	8.61	6.95	0.10
						1" Ice	9.22	7.82	0.17
						2" Ice	10.46	9.60	0.34
						4" Ice	13.07	13.37	0.80

Description	Face or Leg	Offset Type	Offsets: Horz Lateral ft / Vert ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
DB-B1-6C-8AB-0Z	A	From Centroid-Leg	4.00 -2.00 0.00	20.000	145.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	5.60 5.92 6.24 6.91 8.37	2.33 2.56 2.79 3.28 4.37	0.04 0.08 0.12 0.21 0.45
Platform Mount [LP 303-1]	C	None		0.000	145.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	14.66 18.87 23.08 31.50 48.34	14.66 18.87 23.08 31.50 48.34	1.25 1.48 1.71 2.18 3.10
*** 50' ***									
KS24019-L112A	B	From Face	3.00 0.00 1.00	0.000	50.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	0.09 0.15 0.22 0.40 0.89	0.09 0.15 0.22 0.40 0.89	0.01 0.01 0.01 0.02 0.04
1.9" x 3' Pipe	B	From Face	3.00 0.00 0.00	0.000	50.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	0.51 0.69 0.89 1.31 2.42	0.51 0.69 0.89 1.31 2.42	0.01 0.01 0.02 0.04 0.11
Side Arm Mount [SO 701-1]	B	From Face	1.50 0.00 0.00	0.000	50.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	0.85 1.14 1.43 2.01 3.17	1.67 2.34 3.01 4.35 7.03	0.07 0.08 0.09 0.12 0.18
******									

Load Combinations

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

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

Maximum Member Forces

Section No.	Elevation ft	Component Type	Condition	Gov. Load Comb.	Force K	Major Axis Moment kip-ft	Minor Axis Moment kip-ft
L1	176 - 144.25	Pole	Max Tension	33	0.00	-0.00	0.00
			Max. Compression	14	-14.49	0.65	-0.49
			Max. Mx	11	-6.94	273.54	0.56
			Max. My	8	-6.88	-0.46	-278.75
			Max. Vy	11	-14.85	273.54	0.56
			Max. Vx	8	15.09	-0.46	-278.75
			Max. Torque	6			-1.45
L2	144.25 - 127.75	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	14	-21.55	0.87	0.02
			Max. Mx	11	-11.10	671.24	1.25
			Max. My	2	-11.04	1.39	682.76
			Max. Vy	11	-21.25	671.24	1.25
			Max. Vx	2	-21.60	1.39	682.76
			Max. Torque	7			-1.66
L3	127.75 - 117.25	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	14	-23.75	0.87	0.05
			Max. Mx	11	-13.02	898.89	1.55
			Max. My	2	-12.96	1.71	914.03
			Max. Vy	11	-22.13	898.89	1.55
			Max. Vx	2	-22.47	1.71	914.03
			Max. Torque	7			-1.65
L4	117.25 - 94.58	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	14	-27.94	0.87	0.12
			Max. Mx	11	-16.71	1306.96	2.07
			Max. My	2	-16.66	2.23	1328.26
			Max. Vy	11	-23.65	1306.96	2.07
			Max. Vx	2	-23.99	2.23	1328.26
			Max. Torque	7			-1.63
L5	94.58 - 87.25	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	14	-31.93	0.87	0.17
			Max. Mx	11	-20.11	1601.69	2.42
			Max. My	2	-20.07	2.59	1627.20
			Max. Vy	5	24.79	-1601.12	-2.26
			Max. Vx	2	-25.13	2.59	1627.20
			Max. Torque	7			-1.60

Section No.	Elevation ft	Component Type	Condition	Gov. Load Comb.	Force K	Major Axis Moment kip-ft	Minor Axis Moment kip-ft
L6	87.25 - 61.5	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	14	-39.43	0.87	0.29
			Max. Mx	11	-26.82	2267.07	3.17
			Max. My	2	-26.79	3.32	2301.48
			Max. Vy	5	26.94	-2266.50	-2.97
			Max. Vx	8	27.28	-2.81	-2301.31
			Max. Torque	7			-1.59
L7	61.5 - 46.95	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	14	-42.22	0.88	0.32
			Max. Mx	11	-29.32	2498.06	3.42
			Max. My	2	-29.29	3.56	2535.39
			Max. Vy	5	27.63	-2497.50	-3.19
			Max. Vx	8	27.97	-3.05	-2535.20
			Max. Torque	7			-1.56
L8	46.95 - 32.25	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	14	-51.07	0.43	0.53
			Max. Mx	5	-37.08	-3091.78	-3.91
			Max. My	2	-37.06	4.01	3136.73
			Max. Vy	5	29.41	-3091.78	-3.91
			Max. Vx	8	29.77	-4.21	-3136.36
			Max. Torque	7			-1.24
L9	32.25 - 32	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	14	-51.19	0.42	0.52
			Max. Mx	5	-37.19	-3099.15	-3.93
			Max. My	2	-37.18	4.01	3144.16
			Max. Vy	5	29.42	-3099.15	-3.93
			Max. Vx	8	29.78	-4.23	-3143.81
			Max. Torque	7			-1.24
L10	32 - 0	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	14	-64.17	-1.21	-0.35
			Max. Mx	5	-48.89	-4081.36	-6.09
			Max. My	8	-48.88	-7.11	-4136.44
			Max. Vy	5	31.91	-4081.36	-6.09
			Max. Vx	8	32.26	-7.11	-4136.44
			Max. Torque	7			-1.26

Maximum Reactions

Location	Condition	Gov. Load Comb.	Vertical K	Horizontal, X K	Horizontal, Z K
Pole	Max. Vert	21	64.17	-0.00	-8.18
	Max. H_x	11	48.90	31.89	0.04
	Max. H_z	2	48.90	0.04	32.23
	Max. M_x	2	4135.02	0.04	32.23
	Max. M_z	5	4081.36	-31.89	-0.04
	Max. Torsion	2	1.25	0.04	32.23
	Min. Vert	1	48.90	0.00	0.00
	Min. H_x	5	48.90	-31.89	-0.04
	Min. H_z	8	48.90	-0.04	-32.23
	Min. M_x	8	-4136.44	-0.04	-32.23
	Min. M_z	11	-4077.95	31.89	0.04
	Min. Torsion	7	-1.26	-15.98	-27.93

Tower Mast Reaction Summary

Load Combination	Vertical	$Shear_x$	$Shear_z$	Overturning Moment, M_x	Overturning Moment, M_z	Torque
	K	K	K	kip-ft	kip-ft	kip-ft
Dead Only	48.90	0.00	0.00	0.71	-1.70	0.00
Dead+Wind 0 deg - No Ice	48.90	-0.04	-32.23	-4135.02	3.67	-1.25
Dead+Wind 30 deg - No Ice	48.90	15.91	-27.89	-3578.32	-2036.78	-0.92
Dead+Wind 60 deg - No Ice	48.90	27.60	-16.08	-2062.61	-3532.05	-0.34
Dead+Wind 90 deg - No Ice	48.90	31.89	0.04	6.09	-4081.36	0.34
Dead+Wind 120 deg - No Ice	48.90	27.64	16.15	2073.33	-3537.42	0.92
Dead+Wind 150 deg - No Ice	48.90	15.98	27.93	3585.09	-2046.10	1.26
Dead+Wind 180 deg - No Ice	48.90	0.04	32.23	4136.44	-7.11	1.25
Dead+Wind 210 deg - No Ice	48.90	-15.91	27.89	3579.75	2033.35	0.91
Dead+Wind 240 deg - No Ice	48.90	-27.60	16.08	2064.03	3528.65	0.33
Dead+Wind 270 deg - No Ice	48.90	-31.89	-0.04	-4.69	4077.95	-0.34
Dead+Wind 300 deg - No Ice	48.90	-27.64	-16.15	-2071.94	3533.99	-0.91
Dead+Wind 330 deg - No Ice	48.90	-15.98	-27.93	-3583.68	2042.66	-1.25
Dead+Ice+Temp	64.17	-0.00	0.00	0.35	-1.21	0.00
Dead+Wind 0 deg+Ice+Temp	64.17	-0.00	-8.18	-1088.32	-0.94	-0.34
Dead+Wind 30 deg+Ice+Temp	64.17	4.06	-7.08	-942.37	-540.03	-0.34
Dead+Wind 60 deg+Ice+Temp	64.17	7.03	-4.09	-543.82	-934.73	-0.25
Dead+Wind 90 deg+Ice+Temp	64.17	8.12	0.00	0.54	-1079.28	-0.09
Dead+Wind 120 deg+Ice+Temp	64.17	7.03	4.09	544.83	-934.94	0.09
Dead+Wind 150 deg+Ice+Temp	64.17	4.06	7.09	943.23	-540.39	0.25
Dead+Wind 180 deg+Ice+Temp	64.17	0.00	8.18	1088.98	-1.36	0.35
Dead+Wind 210 deg+Ice+Temp	64.17	-4.06	7.08	943.02	537.74	0.34
Dead+Wind 240 deg+Ice+Temp	64.17	-7.03	4.09	544.47	932.44	0.25
Dead+Wind 270 deg+Ice+Temp	64.17	-8.12	-0.00	0.12	1076.99	0.09
Dead+Wind 300 deg+Ice+Temp	64.17	-7.03	-4.09	-544.18	932.65	-0.09
Dead+Wind 330 deg+Ice+Temp	64.17	-4.06	-7.09	-942.58	538.10	-0.25
Dead+Wind 0 deg - Service	48.90	-0.01	-11.15	-1433.21	0.17	-0.44
Dead+Wind 30 deg - Service	48.90	5.51	-9.65	-1240.18	-707.28	-0.32
Dead+Wind 60 deg - Service	48.90	9.55	-5.56	-714.64	-1225.67	-0.12
Dead+Wind 90 deg - Service	48.90	11.03	0.01	2.58	-1416.09	0.12
Dead+Wind 120 deg - Service	48.90	9.56	5.59	719.30	-1227.54	0.33
Dead+Wind 150 deg - Service	48.90	5.53	9.67	1243.47	-710.52	0.45
Dead+Wind 180 deg - Service	48.90	0.01	11.15	1434.64	-3.57	0.44
Dead+Wind 210 deg - Service	48.90	-5.51	9.65	1241.61	703.88	0.32
Dead+Wind 240 deg - Service	48.90	-9.55	5.56	716.07	1222.27	0.12
Dead+Wind 270 deg - Service	48.90	-11.03	-0.01	-1.16	1412.69	-0.12
Dead+Wind 300 deg - Service	48.90	-9.56	-5.59	-717.88	1224.14	-0.33
Dead+Wind 330 deg - Service	48.90	-5.53	-9.67	-1242.05	707.11	-0.44

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	-48.90	0.00	0.00	48.90	0.00	0.000%
2	-0.04	-48.90	-32.23	0.04	48.90	32.23	0.000%
3	15.91	-48.90	-27.89	-15.91	48.90	27.89	0.000%
4	27.60	-48.90	-16.08	-27.60	48.90	16.08	0.000%
5	31.89	-48.90	0.04	-31.89	48.90	-0.04	0.000%
6	27.64	-48.90	16.15	-27.64	48.90	-16.15	0.000%
7	15.98	-48.90	27.93	-15.98	48.90	-27.93	0.000%
8	0.04	-48.90	32.23	-0.04	48.90	-32.23	0.000%
9	-15.91	-48.90	27.89	15.91	48.90	-27.89	0.000%
10	-27.60	-48.90	16.08	27.60	48.90	-16.08	0.000%
11	-31.89	-48.90	-0.04	31.89	48.90	0.04	0.000%

	Sum of Applied Forces			Sum of Reactions			
Load Comb.	PX K	PY K	PZ K	PX K	PY K	PZ K	% Error
12	-27.64	-48.90	-16.15	27.64	48.90	16.15	0.000%
13	-15.98	-48.90	-27.93	15.98	48.90	27.93	0.000%
14	0.00	-64.17	0.00	0.00	64.17	-0.00	0.000%
15	-0.00	-64.17	-8.18	0.00	64.17	8.18	0.000%
16	4.06	-64.17	-7.08	-4.06	64.17	7.08	0.000%
17	7.03	-64.17	-4.09	-7.03	64.17	4.09	0.000%
18	8.12	-64.17	0.00	-8.12	64.17	-0.00	0.000%
19	7.03	-64.17	4.09	-7.03	64.17	-4.09	0.000%
20	4.06	-64.17	7.09	-4.06	64.17	-7.09	0.000%
21	0.00	-64.17	8.18	-0.00	64.17	-8.18	0.000%
22	-4.06	-64.17	7.08	4.06	64.17	-7.08	0.000%
23	-7.03	-64.17	4.09	7.03	64.17	-4.09	0.000%
24	-8.12	-64.17	-0.00	8.12	64.17	0.00	0.000%
25	-7.03	-64.17	-4.09	7.03	64.17	4.09	0.000%
26	-4.06	-64.17	-7.09	4.06	64.17	7.09	0.000%
27	-0.01	-48.90	-11.15	0.01	48.90	11.15	0.000%
28	5.51	-48.90	-9.65	-5.51	48.90	9.65	0.000%
29	9.55	-48.90	-5.56	-9.55	48.90	5.56	0.000%
30	11.03	-48.90	0.01	-11.03	48.90	-0.01	0.000%
31	9.56	-48.90	5.59	-9.56	48.90	-5.59	0.000%
32	5.53	-48.90	9.67	-5.53	48.90	-9.67	0.000%
33	0.01	-48.90	11.15	-0.01	48.90	-11.15	0.000%
34	-5.51	-48.90	9.65	5.51	48.90	-9.65	0.000%
35	-9.55	-48.90	5.56	9.55	48.90	-5.56	0.000%
36	-11.03	-48.90	-0.01	11.03	48.90	0.01	0.000%
37	-9.56	-48.90	-5.59	9.56	48.90	5.59	0.000%
38	-5.53	-48.90	-9.67	5.53	48.90	9.67	0.000%

Non-Linear Convergence Results

Load Combination	Converged?	Number of Cycles	Displacement Tolerance	Force Tolerance
1	Yes	4	0.00000001	0.00000001
2	Yes	5	0.00000001	0.00017889
3	Yes	6	0.00000001	0.00021198
4	Yes	6	0.00000001	0.00021493
5	Yes	5	0.00000001	0.00011057
6	Yes	6	0.00000001	0.00021930
7	Yes	6	0.00000001	0.00021061
8	Yes	5	0.00000001	0.00014867
9	Yes	6	0.00000001	0.00021756
10	Yes	6	0.00000001	0.00021407
11	Yes	5	0.00000001	0.00008751
12	Yes	6	0.00000001	0.00021131
13	Yes	6	0.00000001	0.00022053
14	Yes	4	0.00000001	0.00000617
15	Yes	6	0.00000001	0.00023061
16	Yes	6	0.00000001	0.00025034
17	Yes	6	0.00000001	0.00024961
18	Yes	6	0.00000001	0.00022781
19	Yes	6	0.00000001	0.00024981
20	Yes	6	0.00000001	0.00025037
21	Yes	6	0.00000001	0.00023059
22	Yes	6	0.00000001	0.00025159
23	Yes	6	0.00000001	0.00025011
24	Yes	6	0.00000001	0.00022869
25	Yes	6	0.00000001	0.00025019
26	Yes	6	0.00000001	0.00025184

27	Yes	4	0.00000001	0.00094857
28	Yes	5	0.00000001	0.00039031
29	Yes	5	0.00000001	0.00039820
30	Yes	4	0.00000001	0.00078629
31	Yes	5	0.00000001	0.00041402
32	Yes	5	0.00000001	0.00038727
33	Yes	4	0.00000001	0.00092201
34	Yes	5	0.00000001	0.00040979
35	Yes	5	0.00000001	0.00039588
36	Yes	4	0.00000001	0.00077219
37	Yes	5	0.00000001	0.00038821
38	Yes	5	0.00000001	0.00042101

Maximum Tower Deflections - Service Wind

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
L1	176 - 144.25	48.936	33	2.879	0.010
L2	147.75 - 127.75	32.864	27	2.406	0.004
L3	127.75 - 117.25	23.669	33	1.932	0.002
L4	117.25 - 94.58	19.643	33	1.729	0.002
L5	99.41 - 87.25	13.807	33	1.397	0.001
L6	87.25 - 61.5	10.436	33	1.226	0.001
L7	61.5 - 46.95	5.027	33	0.788	0.000
L8	53.03 - 32.25	3.739	33	0.665	0.000
L9	32.25 - 32	1.343	33	0.407	0.000
L10	32 - 0	1.322	33	0.405	0.000

Critical Deflections and Radius of Curvature - Service Wind

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
176.00	800 EXTERNAL NOTCH FILTER	33	48.936	2.879	0.010	11776
174.00	PCS 1900MHz 4x45W-65MHz	33	47.744	2.851	0.010	11776
169.00	RRUS 11	33	44.774	2.779	0.008	8411
167.00	AM-X-CD-16-65-00T-RET w/ Mount Pipe	33	43.595	2.750	0.008	6542
155.00	ERICSSON AIR 21 B2A B4P	33	36.732	2.552	0.006	2802
145.00	RRH2X40-07-U	27	31.470	2.343	0.004	2134
50.00	KS24019-L112A	33	3.322	0.623	0.000	5251

Maximum Tower Deflections - Design Wind

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
L1	176 - 144.25	140.643	8	8.275	0.028
L2	147.75 - 127.75	94.559	2	6.921	0.012
L3	127.75 - 117.25	68.148	8	5.563	0.006
L4	117.25 - 94.58	56.570	8	4.978	0.005
L5	99.41 - 87.25	39.776	8	4.023	0.003
L6	87.25 - 61.5	30.072	8	3.534	0.003

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
L7	61.5 - 46.95	14.490	8	2.270	0.001
L8	53.03 - 32.25	10.780	8	1.916	0.001
L9	32.25 - 32	3.872	8	1.174	0.001
L10	32 - 0	3.810	8	1.167	0.001

Critical Deflections and Radius of Curvature - Design Wind

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
176.00	800 EXTERNAL NOTCH FILTER	8	140.643	8.275	0.029	4255
174.00	PCS 1900MHz 4x45W-65MHz	8	137.227	8.194	0.028	4255
169.00	RRUS 11	8	128.716	7.990	0.024	3038
167.00	AM-X-CD-16-65-00T-RET w/ Mount Pipe	8	125.336	7.906	0.023	2362
155.00	ERICSSON AIR 21 B2A B4P	8	105.659	7.341	0.016	1009
145.00	RRH2X40-07-U	2	90.560	6.742	0.012	764
50.00	KS24019-L112A	8	9.575	1.796	0.001	1826

Compression Checks

Pole Design Data

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	F_a ksi	A in^2	Actual P K	Allow. P_a K	Ratio $\frac{P}{P_a}$
L1	176 - 174.513	TP23.65x16.5x0.187	31.75	0.00	0.0	39.000	9.907	-1.37	386.38	0.004
	174.513 - 173.026					39.000	10.106	-1.74	394.15	0.004
	173.026 - 171.539					39.000	10.306	-1.81	401.93	0.004
	171.539 - 170.053					39.000	10.505	-1.87	409.70	0.005
	170.053 - 168.566					39.000	10.704	-2.34	417.47	0.006
	168.566 - 167.079					39.000	10.904	-2.41	425.24	0.006
	167.079 - 165.592					39.000	11.103	-3.86	433.01	0.009
	165.592 - 164.105					39.000	11.302	-3.94	440.78	0.009
	164.105 - 162.618					39.000	11.501	-4.02	448.55	0.009
	162.618 - 161.132					39.000	11.701	-4.10	456.32	0.009
	161.132 - 159.645					39.000	11.900	-4.19	464.10	0.009
	159.645 - 158.158					39.000	12.099	-4.27	471.87	0.009
	158.158 - 156.671					39.000	12.298	-4.36	479.64	0.009
	156.671 - 155.184					39.000	12.498	-4.45	487.41	0.009
	155.184 - 153.697					39.000	12.697	-6.45	495.18	0.013
	153.697 - 152.211					39.000	12.896	-6.55	502.95	0.013
	152.211 - 150.724					39.000	13.095	-6.66	510.73	0.013
	150.724 - 149.237					39.000	13.295	-6.77	518.50	0.013
	149.237 - 147.75					39.000	13.494	-6.88	526.27	0.013
	147.75 - 144.25					39.000	13.963	-4.03	544.56	0.007
L2	147.75 - 144.25	TP26.942x22.487x0.313	20.00	0.00	0.0	39.000	22.767	-4.79	887.93	0.005
	144.25 - 143.219					39.000	22.995	-8.95	896.82	0.010
	143.219 - 142.188					39.000	23.223	-9.08	905.70	0.010
	142.188 - 141.156					39.000	23.451	-9.21	914.59	0.010
	141.156 - 140.125					39.000	23.679	-9.34	923.47	0.010
	140.125 - 139.094					39.000	23.907	-9.48	932.36	0.010

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	F_a ksi	A in^2	Actual P K	Allow. P_a K	Ratio $\frac{P}{P_a}$
	139.094 - 138.063					39.000	24.134	-9.61	941.24	0.010
	138.063 - 137.031					39.000	24.362	-9.75	950.13	0.010
	137.031 - 136					39.000	24.590	-9.89	959.01	0.010
	136 - 134.969					39.000	24.818	-10.02	967.90	0.010
	134.969 - 133.938					39.000	25.046	-10.17	976.78	0.010
	133.938 - 132.906					39.000	25.274	-10.31	985.67	0.010
	132.906 - 131.875					39.000	25.501	-10.45	994.56	0.011
	131.875 - 130.844					39.000	25.729	-10.59	1003.44	0.011
	130.844 - 129.813					39.000	25.957	-10.74	1012.33	0.011
	129.813 - 128.781					39.000	26.185	-10.89	1021.21	0.011
	128.781 - 127.75					39.000	26.413	-11.04	1030.10	0.011
L3	127.75 - 126.7	TP29.28x26.942x0.481	10.50	0.00	0.0	39.000	40.737	-11.23	1588.74	0.007
	126.7 - 125.65					39.000	41.094	-11.42	1602.66	0.007
	125.65 - 124.6					39.000	41.451	-11.61	1616.58	0.007
	124.6 - 123.55					39.000	41.808	-11.80	1630.50	0.007
	123.55 - 122.5					39.000	42.165	-11.99	1644.42	0.007
	122.5 - 121.45					39.000	42.522	-12.18	1658.34	0.007
	121.45 - 120.4					39.000	42.879	-12.37	1672.26	0.007
	120.4 - 119.35					39.000	43.235	-12.57	1686.18	0.007
	119.35 - 118.3					39.000	43.592	-12.77	1700.10	0.008
	118.3 - 117.25					39.000	43.949	-12.96	1714.02	0.008
L4	117.25 - 116.201	TP34.33x29.28x0.508	22.67	0.00	0.0	39.000	46.731	-13.17	1822.50	0.007
	116.201 - 115.151					39.000	47.107	-13.38	1837.19	0.007
	115.151 - 114.102					39.000	47.484	-13.59	1851.87	0.007
	114.102 - 113.052					39.000	47.861	-13.81	1866.56	0.007
	113.052 - 112.003					39.000	48.237	-14.02	1881.25	0.007
	112.003 - 110.954					39.000	48.614	-14.24	1895.93	0.008
	110.954 - 109.904					39.000	48.990	-14.45	1910.62	0.008
	109.904 - 108.855					39.000	49.367	-14.67	1925.31	0.008
	108.855 - 107.805					39.000	49.743	-14.89	1939.99	0.008
	107.805 - 106.756					39.000	50.120	-15.10	1954.68	0.008
	106.756 - 105.706					39.000	50.497	-15.32	1969.37	0.008
	105.706 - 104.657					39.000	50.873	-15.54	1984.05	0.008
	104.657 - 103.608					39.000	51.250	-15.76	1998.74	0.008
	103.608 - 102.558					39.000	51.626	-15.99	2013.43	0.008
	102.558 - 101.509					39.000	52.003	-16.21	2028.11	0.008
	101.509 - 100.459					39.000	52.380	-16.43	2042.80	0.008
	100.459 - 99.41					39.000	52.756	-16.66	2057.49	0.008
	99.41 - 94.58					39.000	54.489	-8.88	2125.08	0.004
L5	99.41 - 94.58	TP35.334x32.629x0.559	12.16	0.00	0.0	39.000	58.782	-9.39	2292.52	0.004
	94.58 - 93.5329					39.000	59.196	-18.54	2308.63	0.008
	93.5329 - 92.4857					39.000	59.609	-18.79	2324.74	0.008
	92.4857 - 91.4386					39.000	60.022	-19.05	2340.85	0.008
	91.4386 - 90.3914					39.000	60.435	-19.30	2356.97	0.008
	90.3914 - 89.3443					39.000	60.848	-19.55	2373.08	0.008
	89.3443 - 88.2971					39.000	61.261	-19.81	2389.19	0.008
	88.2971 - 87.25					39.000	61.674	-20.07	2405.31	0.008
L6	87.25 - 85.9625	TP41.063x35.334x0.529	25.75	0.00	0.0	39.000	58.966	-20.38	2299.67	0.009
	85.9625 - 84.675					39.000	59.447	-20.71	2318.45	0.009
	84.675 - 83.3875					39.000	59.929	-21.03	2337.22	0.009
	83.3875 - 82.1					39.000	60.410	-21.36	2355.99	0.009
	82.1 - 80.8125					39.000	60.891	-21.69	2374.76	0.009
	80.8125 - 79.525					39.000	61.373	-22.02	2393.53	0.009
	79.525 - 78.2375					39.000	61.854	-22.35	2412.30	0.009
	78.2375 - 76.95					39.000	62.335	-22.68	2431.07	0.009
	76.95 - 75.6625					39.000	62.817	-23.01	2449.84	0.009
	75.6625 - 74.375					39.000	63.298	-23.35	2468.61	0.009
	74.375 - 73.0875					39.000	63.779	-23.69	2487.38	0.010
	73.0875 - 71.8					39.000	64.260	-24.02	2506.16	0.010
	71.8 - 70.5125					39.000	64.742	-24.36	2524.93	0.010

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	F_a ksi	A in^2	Actual P K	Allow. P_a K	Ratio $\frac{P}{P_a}$
	70.5125 - 69.225					39.000	65.223	-24.71	2543.70	0.010
	69.225 - 67.9375					39.000	65.704	-25.05	2562.47	0.010
	67.9375 - 66.65					39.000	66.186	-25.40	2581.24	0.010
	66.65 - 65.3625					39.000	66.667	-25.74	2600.01	0.010
	65.3625 - 64.075					39.000	67.148	-26.09	2618.78	0.010
	64.075 - 62.7875					39.000	67.630	-26.44	2637.55	0.010
	62.7875 - 61.5					39.000	68.111	-26.79	2656.32	0.010
L7	61.5 - 60.4412	TP44.3x41.063x0.577	14.55	0.00	0.0	39.000	74.574	-27.10	2908.39	0.009
	60.4412 - 59.3825					39.000	75.005	-27.41	2925.21	0.009
	59.3825 - 58.3237					39.000	75.437	-27.72	2942.03	0.009
	58.3237 - 57.265					39.000	75.868	-28.04	2958.85	0.009
	57.265 - 56.2062					39.000	76.299	-28.35	2975.68	0.010
	56.2062 - 55.1475					39.000	76.731	-28.66	2992.50	0.010
	55.1475 - 54.0887					39.000	77.162	-28.98	3009.32	0.010
	54.0887 - 53.03					39.000	77.593	-29.29	3026.15	0.010
	53.03 - 46.95					39.000	80.071	-16.66	3122.75	0.005
L8	53.03 - 46.95	TP46.822x42.197x0.558	20.78	0.00	0.0	39.000	76.131	-15.51	2969.12	0.005
	46.95 - 45.9					39.000	76.545	-32.53	2985.26	0.011
	45.9 - 44.85					39.000	76.959	-32.88	3001.40	0.011
	44.85 - 43.8					39.000	77.373	-33.22	3017.54	0.011
	43.8 - 42.75					39.000	77.786	-33.56	3033.67	0.011
	42.75 - 41.7					39.000	78.200	-33.91	3049.81	0.011
	41.7 - 40.65					39.000	78.614	-34.25	3065.95	0.011
	40.65 - 39.6					39.000	79.028	-34.60	3082.09	0.011
	39.6 - 38.55					39.000	79.028	-34.62	3082.09	0.011
	38.55 - 37.5					39.000	79.442	-34.97	3098.23	0.011
	37.5 - 36.45					39.000	79.856	-35.32	3114.37	0.011
	36.45 - 35.4					39.000	80.270	-35.67	3130.51	0.011
	35.4 - 34.35					39.000	80.683	-36.02	3146.65	0.011
	34.35 - 33.3					39.000	81.097	-36.38	3162.79	0.012
	33.3 - 32.25					39.000	81.511	-36.73	3178.93	0.012
L9	32.25 - 32 (9)	TP46.878x46.822x0.797	0.25	0.00	0.0	39.000	116.408	-37.12	4539.91	0.008
L10	32 - 30.4	TP54x46.878x0.57	32.00	0.00	0.0	39.000	83.805	-37.46	3268.41	0.011
	30.4 - 28.8					39.000	84.450	-38.02	3293.55	0.012
	28.8 - 27.2					39.000	85.094	-38.59	3318.68	0.012
	27.2 - 25.6					39.000	85.739	-39.16	3343.81	0.012
	25.6 - 24					39.000	86.383	-39.73	3368.95	0.012
	24 - 22.4					39.000	87.028	-40.31	3394.08	0.012
	22.4 - 20.8					39.000	87.672	-40.88	3419.22	0.012
	20.8 - 19.2					39.000	88.317	-41.46	3444.35	0.012
	19.2 - 17.6					39.000	88.961	-41.77	3469.48	0.012
	17.6 - 16					39.000	89.606	-42.35	3494.62	0.012
	16 - 14.4					39.000	90.250	-42.94	3519.75	0.012
	14.4 - 12.8					39.000	90.895	-43.52	3544.89	0.012
	12.8 - 11.2					39.000	91.539	-44.11	3570.02	0.012
	11.2 - 9.6					39.000	92.183	-44.71	3595.15	0.012
	9.6 - 8					39.000	92.828	-45.30	3620.29	0.013
	8 - 6.4					39.000	93.472	-45.90	3645.42	0.013
	6.4 - 4.8					39.000	94.117	-46.50	3670.56	0.013
	4.8 - 3.2					39.000	94.761	-47.10	3695.69	0.013
	3.2 - 1.6					39.000	95.406	-47.70	3720.82	0.013
	1.6 - 0					39.000	96.050	-48.31	3745.96	0.013

Pole Bending Design Data

Section No.	Elevation ft	Size	Actual M_x kip-ft	Actual f_{bx} ksi	Allow. F_{bx} ksi	Ratio $\frac{f_{bx}}{F_{bx}}$	Actual M_y kip-ft	Actual f_{by} ksi	Allow. F_{by} ksi	Ratio $\frac{f_{by}}{F_{by}}$
L1	176 - 174.513	TP23.65x16.5x0.187	7.84	2.319	39.000	0.059	0.00	0.000	39.000	0.000
	174.513 - 173.026		15.07	4.285	39.000	0.110	0.00	0.000	39.000	0.000
	173.026 - 171.539		22.24	6.079	39.000	0.156	0.00	0.000	39.000	0.000
	171.539 - 170.053		29.54	7.767	39.000	0.199	0.00	0.000	39.000	0.000
	170.053 - 168.566		37.46	9.486	39.000	0.243	0.00	0.000	39.000	0.000
	168.566 - 167.079		46.25	11.286	39.000	0.289	0.00	0.000	39.000	0.000
	167.079 - 165.592		60.89	14.327	39.000	0.367	0.00	0.000	39.000	0.000
	165.592 - 164.105		75.95	17.241	39.000	0.442	0.00	0.000	39.000	0.000
	164.105 - 162.618		91.13	19.974	39.000	0.512	0.00	0.000	39.000	0.000
	162.618 - 161.132		106.44	22.538	39.000	0.578	0.00	0.000	39.000	0.000
	161.132 - 159.645		121.88	24.947	39.000	0.640	0.00	0.000	39.000	0.000
	159.645 - 158.158		137.46	27.212	39.000	0.698	0.00	0.000	39.000	0.000
	158.158 - 156.671		153.17	29.343	39.000	0.752	0.00	0.000	39.000	0.000
	156.671 - 155.184		169.01	31.349	39.000	0.804	0.00	0.000	39.000	0.000
	155.184 - 153.697		190.11	34.161	39.000	0.876	0.00	0.000	39.000	0.000
	153.697 - 152.211		212.08	36.934	39.000	0.947	0.00	0.000	39.000	0.000
	152.211 - 150.724		234.17	39.544	39.000	1.014	0.00	0.000	39.000	0.000
	150.724 - 149.237		256.39	42.004	39.000	1.077	0.00	0.000	39.000	0.000
	149.237 - 147.75		278.75	44.322	39.000	1.136	0.00	0.000	39.000	0.000
	147.75 - 144.25		132.61	19.687	39.000	0.505	0.00	0.000	39.000	0.000
L2	147.75 - 144.25	TP26.942x22.487x0.313	203.15	19.012	39.000	0.487	0.00	0.000	39.000	0.000
	144.25 - 143.219		356.86	32.734	39.000	0.839	0.00	0.000	39.000	0.000
	143.219 - 142.188		378.09	34.000	39.000	0.872	0.00	0.000	39.000	0.000
	142.188 - 141.156		399.39	35.217	39.000	0.903	0.00	0.000	39.000	0.000
	141.156 - 140.125		420.77	36.386	39.000	0.933	0.00	0.000	39.000	0.000
	140.125 - 139.094		442.21	37.510	39.000	0.962	0.00	0.000	39.000	0.000
	139.094 - 138.063		463.72	38.591	39.000	0.990	0.00	0.000	39.000	0.000
	138.063 - 137.031		485.30	39.631	39.000	1.016	0.00	0.000	39.000	0.000
	137.031 - 136		506.96	40.631	39.000	1.042	0.00	0.000	39.000	0.000
	136 - 134.969		528.68	41.593	39.000	1.066	0.00	0.000	39.000	0.000
	134.969 - 133.938		550.48	42.519	39.000	1.090	0.00	0.000	39.000	0.000
	133.938 - 132.906		572.35	43.409	39.000	1.113	0.00	0.000	39.000	0.000
	132.906 - 131.875		594.29	44.267	39.000	1.135	0.00	0.000	39.000	0.000
	131.875 - 130.844		616.30	45.092	39.000	1.156	0.00	0.000	39.000	0.000
	130.844 - 129.813		638.38	45.887	39.000	1.177	0.00	0.000	39.000	0.000
	129.813 - 128.781		660.53	46.652	39.000	1.196	0.00	0.000	39.000	0.000
	128.781 - 127.75		682.76	47.389	39.000	1.215	0.00	0.000	39.000	0.000
L3	127.75 - 126.7	TP29.28x26.942x0.481	705.48	31.866	39.000	0.817	0.00	0.000	39.000	0.000
	126.7 - 125.65		728.28	32.322	39.000	0.829	0.00	0.000	39.000	0.000
	125.65 - 124.6		751.18	32.762	39.000	0.840	0.00	0.000	39.000	0.000
	124.6 - 123.55		774.16	33.185	39.000	0.851	0.00	0.000	39.000	0.000
	123.55 - 122.5		797.24	33.594	39.000	0.861	0.00	0.000	39.000	0.000
	122.5 - 121.45		820.42	33.987	39.000	0.871	0.00	0.000	39.000	0.000
	121.45 - 120.4		843.68	34.367	39.000	0.881	0.00	0.000	39.000	0.000
	120.4 - 119.35		867.03	34.733	39.000	0.891	0.00	0.000	39.000	0.000
	119.35 - 118.3		890.49	35.086	39.000	0.900	0.00	0.000	39.000	0.000
	118.3 - 117.25		914.03	35.426	39.000	0.908	0.00	0.000	39.000	0.000
L4	117.25 - 116.201	TP34.33x29.28x0.508	937.66	33.961	39.000	0.871	0.00	0.000	39.000	0.000
	116.201 - 115.151		961.37	34.261	39.000	0.878	0.00	0.000	39.000	0.000
	115.151 - 114.102		985.17	34.550	39.000	0.886	0.00	0.000	39.000	0.000
	114.102 - 113.052		1009.08	34.829	39.000	0.893	0.00	0.000	39.000	0.000
	113.052 - 112.003		1033.07	35.098	39.000	0.900	0.00	0.000	39.000	0.000
	112.003 - 110.954		1057.15	35.357	39.000	0.907	0.00	0.000	39.000	0.000
	110.954 - 109.904		1081.33	35.607	39.000	0.913	0.00	0.000	39.000	0.000
	109.904 - 108.855		1105.59	35.849	39.000	0.919	0.00	0.000	39.000	0.000
	108.855 - 107.805		1129.95	36.081	39.000	0.925	0.00	0.000	39.000	0.000
	107.805 - 106.756		1154.41	36.306	39.000	0.931	0.00	0.000	39.000	0.000
	106.756 - 105.706		1178.96	36.523	39.000	0.936	0.00	0.000	39.000	0.000

Section No.	Elevation ft	Size	Actual M_x kip-ft	Actual f_{bx} ksi	Allow. F_{bx} ksi	Ratio $\frac{f_{bx}}{F_{bx}}$	Actual M_y kip-ft	Actual f_{by} ksi	Allow. F_{by} ksi	Ratio $\frac{f_{by}}{F_{by}}$
	105.706 - 104.657		1203.61	36.732	39.000	0.942	0.00	0.000	39.000	0.000
	104.657 - 103.608		1228.34	36.934	39.000	0.947	0.00	0.000	39.000	0.000
	103.608 - 102.558		1253.18	37.129	39.000	0.952	0.00	0.000	39.000	0.000
	102.558 - 101.509		1278.11	37.317	39.000	0.957	0.00	0.000	39.000	0.000
	101.509 - 100.459		1303.13	37.498	39.000	0.961	0.00	0.000	39.000	0.000
	100.459 - 99.41		1328.26	37.673	39.000	0.966	0.00	0.000	39.000	0.000
	99.41 - 94.58		710.31	18.876	39.000	0.484	0.00	0.000	39.000	0.000
L5	99.41 - 94.58	TP35.334x32.629x0.559	735.04	18.510	39.000	0.475	0.00	0.000	39.000	0.000
	94.58 - 93.5329		1471.04	36.525	39.000	0.937	0.00	0.000	39.000	0.000
	93.5329 - 92.4857		1496.83	36.648	39.000	0.940	0.00	0.000	39.000	0.000
	92.4857 - 91.4386		1522.72	36.766	39.000	0.943	0.00	0.000	39.000	0.000
	91.4386 - 90.3914		1548.70	36.880	39.000	0.946	0.00	0.000	39.000	0.000
	90.3914 - 89.3443		1574.78	36.989	39.000	0.948	0.00	0.000	39.000	0.000
	89.3443 - 88.2971		1600.94	37.094	39.000	0.951	0.00	0.000	39.000	0.000
	88.2971 - 87.25		1627.21	37.196	39.000	0.954	0.00	0.000	39.000	0.000
L6	87.25 - 85.9625	TP41.063x35.334x0.529	1659.63	39.284	39.000	1.007	0.00	0.000	39.000	0.000
	85.9625 - 84.675		1692.18	39.404	39.000	1.010	0.00	0.000	39.000	0.000
	84.675 - 83.3875		1724.86	39.518	39.000	1.013	0.00	0.000	39.000	0.000
	83.3875 - 82.1		1757.68	39.626	39.000	1.016	0.00	0.000	39.000	0.000
	82.1 - 80.8125		1790.63	39.729	39.000	1.019	0.00	0.000	39.000	0.000
	80.8125 - 79.525		1823.72	39.826	39.000	1.021	0.00	0.000	39.000	0.000
	79.525 - 78.2375		1856.95	39.919	39.000	1.024	0.00	0.000	39.000	0.000
	78.2375 - 76.95		1890.31	40.006	39.000	1.026	0.00	0.000	39.000	0.000
	76.95 - 75.6625		1923.81	40.090	39.000	1.028	0.00	0.000	39.000	0.000
	75.6625 - 74.375		1957.44	40.168	39.000	1.030	0.00	0.000	39.000	0.000
	74.375 - 73.0875		1991.22	40.243	39.000	1.032	0.00	0.000	39.000	0.000
	73.0875 - 71.8		2025.13	40.313	39.000	1.034	0.00	0.000	39.000	0.000
	71.8 - 70.5125		2059.18	40.380	39.000	1.035	0.00	0.000	39.000	0.000
	70.5125 - 69.225		2093.38	40.442	39.000	1.037	0.00	0.000	39.000	0.000
	69.225 - 67.9375		2127.71	40.502	39.000	1.038	0.00	0.000	39.000	0.000
	67.9375 - 66.65		2162.18	40.557	39.000	1.040	0.00	0.000	39.000	0.000
	66.65 - 65.3625		2196.79	40.610	39.000	1.041	0.00	0.000	39.000	0.000
	65.3625 - 64.075		2231.55	40.659	39.000	1.043	0.00	0.000	39.000	0.000
	64.075 - 62.7875		2266.44	40.706	39.000	1.044	0.00	0.000	39.000	0.000
	62.7875 - 61.5		2301.48	40.749	39.000	1.045	0.00	0.000	39.000	0.000
L7	61.5 - 60.4412	TP44.3x41.063x0.577	2330.40	37.552	39.000	0.963	0.00	0.000	39.000	0.000
	60.4412 - 59.3825		2359.41	37.581	39.000	0.964	0.00	0.000	39.000	0.000
	59.3825 - 58.3237		2388.51	37.607	39.000	0.964	0.00	0.000	39.000	0.000
	58.3237 - 57.265		2417.70	37.632	39.000	0.965	0.00	0.000	39.000	0.000
	57.265 - 56.2062		2446.98	37.656	39.000	0.966	0.00	0.000	39.000	0.000
	56.2062 - 55.1475		2476.36	37.678	39.000	0.966	0.00	0.000	39.000	0.000
	55.1475 - 54.0887		2505.82	37.698	39.000	0.967	0.00	0.000	39.000	0.000
	54.0887 - 53.03		2535.39	37.717	39.000	0.967	0.00	0.000	39.000	0.000
	53.03 - 46.95		1411.42	19.709	39.000	0.505	0.00	0.000	39.000	0.000
L8	53.03 - 46.95	TP46.822x42.197x0.558	1296.20	19.356	39.000	0.496	0.00	0.000	39.000	0.000
	46.95 - 45.9		2737.73	40.439	39.000	1.037	0.00	0.000	39.000	0.000
	45.9 - 44.85		2767.93	40.444	39.000	1.037	0.00	0.000	39.000	0.000
	44.85 - 43.8		2798.20	40.447	39.000	1.037	0.00	0.000	39.000	0.000
	43.8 - 42.75		2828.56	40.450	39.000	1.037	0.00	0.000	39.000	0.000
	42.75 - 41.7		2859.00	40.451	39.000	1.037	0.00	0.000	39.000	0.000
	41.7 - 40.65		2889.53	40.451	39.000	1.037	0.00	0.000	39.000	0.000
	40.65 - 39.6		2920.13	40.450	39.000	1.037	0.00	0.000	39.000	0.000
	39.6 - 38.55		2920.13	40.450	39.000	1.037	0.00	0.000	39.000	0.000
	38.55 - 37.5		2950.82	40.447	39.000	1.037	0.00	0.000	39.000	0.000
	37.5 - 36.45		2981.60	40.444	39.000	1.037	0.00	0.000	39.000	0.000
	36.45 - 35.4		3012.46	40.440	39.000	1.037	0.00	0.000	39.000	0.000
	35.4 - 34.35		3043.40	40.435	39.000	1.037	0.00	0.000	39.000	0.000
	34.35 - 33.3		3074.43	40.429	39.000	1.037	0.00	0.000	39.000	0.000
	33.3 - 32.25		3105.53	40.422	39.000	1.036	0.00	0.000	39.000	0.000
L9	32.25 - 32 (9)	TP46.878x46.822x0.797	3136.73	28.738	39.000	0.737	0.00	0.000	39.000	0.000

Section No.	Elevation ft	Size	Actual M_x kip-ft	Actual f_{bx} ksi	Allow. F_{bx} ksi	Ratio $\frac{f_{bx}}{F_{bx}}$	Actual M_y kip-ft	Actual f_{by} ksi	Allow. F_{by} ksi	Ratio $\frac{f_{by}}{F_{by}}$
L10	32 - 30.4	TP54x46.878x0.57	3144.17	39.573	39.000	1.015	0.00	0.000	39.000	0.000
	30.4 - 28.8		3191.86	39.559	39.000	1.014	0.00	0.000	39.000	0.000
	28.8 - 27.2		3239.73	39.543	39.000	1.014	0.00	0.000	39.000	0.000
	27.2 - 25.6		3287.81	39.525	39.000	1.013	0.00	0.000	39.000	0.000
	25.6 - 24		3336.07	39.506	39.000	1.013	0.00	0.000	39.000	0.000
	24 - 22.4		3384.53	39.485	39.000	1.012	0.00	0.000	39.000	0.000
	22.4 - 20.8		3433.19	39.462	39.000	1.012	0.00	0.000	39.000	0.000
	20.8 - 19.2		3482.04	39.438	39.000	1.011	0.00	0.000	39.000	0.000
	19.2 - 17.6		3531.44	39.417	39.000	1.011	0.00	0.000	39.000	0.000
	17.6 - 16		3580.77	39.392	39.000	1.010	0.00	0.000	39.000	0.000
	16 - 14.4		3630.29	39.365	39.000	1.009	0.00	0.000	39.000	0.000
	14.4 - 12.8		3680.02	39.337	39.000	1.009	0.00	0.000	39.000	0.000
	12.8 - 11.2		3729.93	39.308	39.000	1.008	0.00	0.000	39.000	0.000
	11.2 - 9.6		3780.05	39.278	39.000	1.007	0.00	0.000	39.000	0.000
	9.6 - 8		3830.37	39.247	39.000	1.006	0.00	0.000	39.000	0.000
	8 - 6.4		3880.88	39.215	39.000	1.006	0.00	0.000	39.000	0.000
	6.4 - 4.8		3931.59	39.183	39.000	1.005	0.00	0.000	39.000	0.000
	4.8 - 3.2		3982.50	39.149	39.000	1.004	0.00	0.000	39.000	0.000
	3.2 - 1.6		4033.62	39.115	39.000	1.003	0.00	0.000	39.000	0.000
	1.6 - 0		4084.93	39.080	39.000	1.002	0.00	0.000	39.000	0.000

Pole Shear Design Data

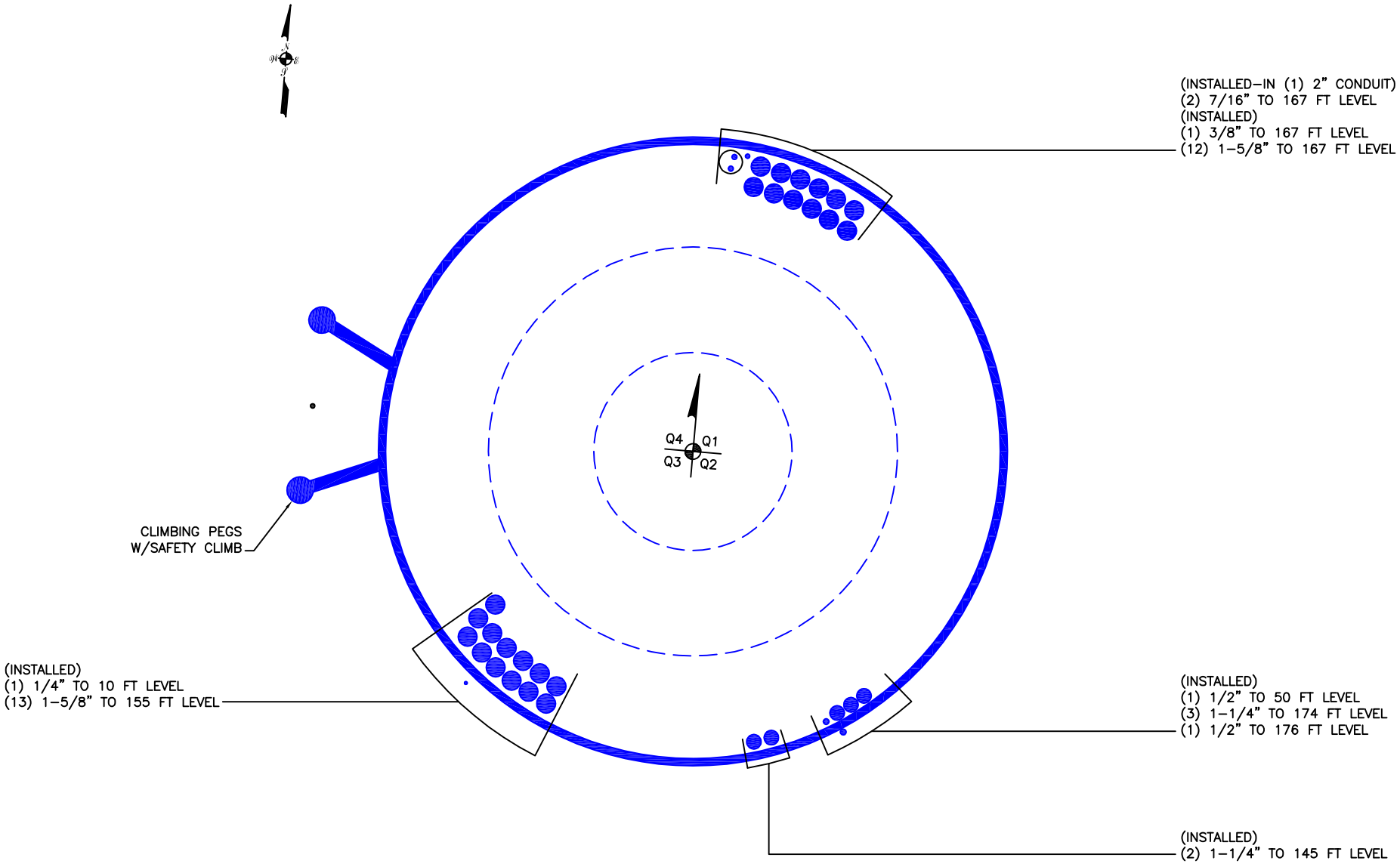
Section No.	Elevation ft	Size	Actual V K	Actual f_v ksi	Allow. F_v ksi	Ratio $\frac{f_v}{F_v}$	Actual T kip-ft	Actual f_{vt} ksi	Allow. F_{vt} ksi	Ratio $\frac{f_{vt}}{F_{vt}}$
L1	176 - 174.513	TP23.65x16.5x0.187	3.52	0.355	26.000	0.027	0.07	0.010	26.000	0.000
	174.513 - 173.026		4.78	0.473	26.000	0.036	0.09	0.012	26.000	0.000
	173.026 - 171.539		4.86	0.472	26.000	0.036	0.09	0.012	26.000	0.000
	171.539 - 170.053		4.95	0.471	26.000	0.036	0.09	0.011	26.000	0.000
	170.053 - 168.566		5.87	0.549	26.000	0.042	1.03	0.127	26.000	0.005
	168.566 - 167.079		5.96	0.546	26.000	0.043	1.03	0.122	26.000	0.005
	167.079 - 165.592		10.08	0.908	26.000	0.070	1.03	0.118	26.000	0.005
	165.592 - 164.105		10.17	0.900	26.000	0.070	0.76	0.084	26.000	0.003
	164.105 - 162.618		10.26	0.892	26.000	0.070	0.76	0.081	26.000	0.003
	162.618 - 161.132		10.35	0.884	26.000	0.069	0.76	0.078	26.000	0.003
	161.132 - 159.645		10.43	0.877	26.000	0.069	0.76	0.076	26.000	0.003
	159.645 - 158.158		10.52	0.870	26.000	0.068	0.76	0.073	26.000	0.003
	158.158 - 156.671		10.62	0.863	26.000	0.067	0.76	0.071	26.000	0.003
	156.671 - 155.184		10.71	0.857	26.000	0.067	0.76	0.068	26.000	0.003
	155.184 - 153.697		14.73	1.160	26.000	0.091	0.76	0.066	26.000	0.003
	153.697 - 152.211		14.82	1.149	26.000	0.090	0.76	0.064	26.000	0.002
	152.211 - 150.724		14.91	1.139	26.000	0.089	0.76	0.062	26.000	0.002
	150.724 - 149.237		15.00	1.128	26.000	0.088	0.76	0.060	26.000	0.002
	149.237 - 147.75		15.09	1.118	26.000	0.087	0.76	0.059	26.000	0.002
	147.75 - 144.25		10.79	0.773	26.000	0.059	0.89	0.065	26.000	0.002
L2	147.75 - 144.25	TP26.942x22.487x0.313	9.64	0.423	26.000	0.033	0.55	0.025	26.000	0.001
	144.25 - 143.219		20.56	0.894	26.000	0.069	1.44	0.064	26.000	0.002
	143.219 - 142.188		20.63	0.888	26.000	0.068	1.44	0.063	26.000	0.002
	142.188 - 141.156		20.70	0.882	26.000	0.068	1.44	0.062	26.000	0.002
	141.156 - 140.125		20.76	0.877	26.000	0.067	1.44	0.060	26.000	0.002
	140.125 - 139.094		20.83	0.871	26.000	0.067	1.44	0.059	26.000	0.002
	139.094 - 138.063		20.90	0.866	26.000	0.067	1.44	0.058	26.000	0.002
	138.063 - 137.031		20.97	0.861	26.000	0.066	1.44	0.057	26.000	0.002
	137.031 - 136		21.04	0.856	26.000	0.066	1.44	0.056	26.000	0.002
	136 - 134.969		21.11	0.850	26.000	0.065	1.44	0.055	26.000	0.002

Section No.	Elevation ft	Size	Actual V K	Actual f_v ksi	Allow. F_v ksi	Ratio $\frac{f_v}{F_v}$	Actual T kip-ft	Actual f_{vt} ksi	Allow. F_{vt} ksi	Ratio $\frac{f_{vt}}{F_{vt}}$
	134.969 - 133.938		21.18	0.846	26.000	0.065	1.44	0.054	26.000	0.002
	133.938 - 132.906		21.25	0.841	26.000	0.065	1.44	0.053	26.000	0.002
	132.906 - 131.875		21.32	0.836	26.000	0.064	1.44	0.052	26.000	0.002
	131.875 - 130.844		21.39	0.831	26.000	0.064	1.44	0.051	26.000	0.002
	130.844 - 129.813		21.46	0.827	26.000	0.064	1.44	0.050	26.000	0.002
	129.813 - 128.781		21.53	0.822	26.000	0.063	1.44	0.049	26.000	0.002
	128.781 - 127.75		21.60	0.818	26.000	0.063	1.44	0.048	26.000	0.002
L3	127.75 - 126.7	TP29.28x26.942x0.481	21.68	0.532	26.000	0.041	1.44	0.031	26.000	0.001
	126.7 - 125.65		21.77	0.530	26.000	0.041	1.44	0.031	26.000	0.001
	125.65 - 124.6		21.85	0.527	26.000	0.041	1.44	0.030	26.000	0.001
	124.6 - 123.55		21.94	0.525	26.000	0.040	1.44	0.030	26.000	0.001
	123.55 - 122.5		22.03	0.522	26.000	0.040	1.44	0.029	26.000	0.001
	122.5 - 121.45		22.12	0.520	26.000	0.040	1.44	0.029	26.000	0.001
	121.45 - 120.4		22.21	0.518	26.000	0.040	1.44	0.028	26.000	0.001
	120.4 - 119.35		22.30	0.516	26.000	0.040	1.44	0.028	26.000	0.001
	119.35 - 118.3		22.38	0.513	26.000	0.039	1.44	0.027	26.000	0.001
	118.3 - 117.25		22.47	0.511	26.000	0.039	1.44	0.027	26.000	0.001
L4	117.25 - 116.201	TP34.33x29.28x0.508	22.56	0.483	26.000	0.037	1.43	0.025	26.000	0.001
	116.201 - 115.151		22.65	0.481	26.000	0.037	1.43	0.025	26.000	0.001
	115.151 - 114.102		22.73	0.479	26.000	0.037	1.43	0.024	26.000	0.001
	114.102 - 113.052		22.82	0.477	26.000	0.037	1.43	0.024	26.000	0.001
	113.052 - 112.003		22.91	0.475	26.000	0.037	1.43	0.024	26.000	0.001
	112.003 - 110.954		23.00	0.473	26.000	0.036	1.43	0.023	26.000	0.001
	110.954 - 109.904		23.09	0.471	26.000	0.036	1.43	0.023	26.000	0.001
	109.904 - 108.855		23.18	0.469	26.000	0.036	1.43	0.022	26.000	0.001
	108.855 - 107.805		23.27	0.468	26.000	0.036	1.43	0.022	26.000	0.001
	107.805 - 106.756		23.36	0.466	26.000	0.036	1.43	0.022	26.000	0.001
	106.756 - 105.706		23.45	0.464	26.000	0.036	1.43	0.021	26.000	0.001
	105.706 - 104.657		23.54	0.463	26.000	0.036	1.43	0.021	26.000	0.001
	104.657 - 103.608		23.63	0.461	26.000	0.035	1.43	0.021	26.000	0.001
	103.608 - 102.558		23.72	0.459	26.000	0.035	1.43	0.021	26.000	0.001
	102.558 - 101.509		23.81	0.458	26.000	0.035	1.43	0.020	26.000	0.001
	101.509 - 100.459		23.90	0.456	26.000	0.035	1.43	0.020	26.000	0.001
	100.459 - 99.41		23.99	0.455	26.000	0.035	1.43	0.020	26.000	0.001
	99.41 - 94.58		12.16	0.223	26.000	0.017	0.70	0.009	26.000	0.000
L5	99.41 - 94.58	TP35.334x32.629x0.559	12.35	0.210	26.000	0.016	0.73	0.009	26.000	0.000
	94.58 - 93.5329		24.59	0.415	26.000	0.032	1.43	0.017	26.000	0.001
	93.5329 - 92.4857		24.68	0.414	26.000	0.032	1.43	0.017	26.000	0.001
	92.4857 - 91.4386		24.77	0.413	26.000	0.032	1.43	0.017	26.000	0.001
	91.4386 - 90.3914		24.86	0.411	26.000	0.032	1.43	0.016	26.000	0.001
	90.3914 - 89.3443		24.95	0.410	26.000	0.032	1.43	0.016	26.000	0.001
	89.3443 - 88.2971		25.04	0.409	26.000	0.031	1.43	0.016	26.000	0.001
	88.2971 - 87.25		25.13	0.408	26.000	0.031	1.43	0.016	26.000	0.001
L6	87.25 - 85.9625	TP41.063x35.334x0.529	25.24	0.428	26.000	0.033	1.43	0.016	26.000	0.001
	85.9625 - 84.675		25.34	0.426	26.000	0.033	1.43	0.016	26.000	0.001
	84.675 - 83.3875		25.45	0.425	26.000	0.033	1.43	0.016	26.000	0.001
	83.3875 - 82.1		25.55	0.423	26.000	0.033	1.43	0.016	26.000	0.001
	82.1 - 80.8125		25.66	0.421	26.000	0.032	1.43	0.015	26.000	0.001
	80.8125 - 79.525		25.76	0.420	26.000	0.032	1.43	0.015	26.000	0.001
	79.525 - 78.2375		25.87	0.418	26.000	0.032	1.43	0.015	26.000	0.001
	78.2375 - 76.95		25.98	0.417	26.000	0.032	1.43	0.015	26.000	0.001
	76.95 - 75.6625		26.08	0.415	26.000	0.032	1.43	0.014	26.000	0.001
	75.6625 - 74.375		26.19	0.414	26.000	0.032	1.43	0.014	26.000	0.001
	74.375 - 73.0875		26.30	0.412	26.000	0.032	1.43	0.014	26.000	0.001
	73.0875 - 71.8		26.41	0.411	26.000	0.032	1.43	0.014	26.000	0.001
	71.8 - 70.5125		26.51	0.410	26.000	0.031	1.43	0.014	26.000	0.001
	70.5125 - 69.225		26.62	0.408	26.000	0.031	1.43	0.013	26.000	0.001
	69.225 - 67.9375		26.73	0.407	26.000	0.031	1.43	0.013	26.000	0.001
	67.9375 - 66.65		26.84	0.406	26.000	0.031	1.43	0.013	26.000	0.001
	66.65 - 65.3625		26.95	0.404	26.000	0.031	1.43	0.013	26.000	0.000

Section No.	Elevation ft	Size	Actual V K	Actual f_v ksi	Allow. F_v ksi	Ratio $\frac{f_v}{F_v}$	Actual T kip-ft	Actual f_{vt} ksi	Allow. F_{vt} ksi	Ratio $\frac{f_{vt}}{F_{vt}}$
	65.3625 - 64.075		27.06	0.403	26.000	0.031	1.43	0.013	26.000	0.000
	64.075 - 62.7875		27.17	0.402	26.000	0.031	1.43	0.012	26.000	0.000
	62.7875 - 61.5		27.28	0.401	26.000	0.031	1.43	0.012	26.000	0.000
L7	61.5 - 60.4412	TP44.3x41.063x0.577	27.37	0.367	26.000	0.028	1.43	0.011	26.000	0.000
	60.4412 - 59.3825		27.45	0.366	26.000	0.028	1.43	0.011	26.000	0.000
	59.3825 - 58.3237		27.54	0.365	26.000	0.028	1.43	0.011	26.000	0.000
	58.3237 - 57.265		27.63	0.364	26.000	0.028	1.43	0.011	26.000	0.000
	57.265 - 56.2062		27.71	0.363	26.000	0.028	1.43	0.011	26.000	0.000
	56.2062 - 55.1475		27.80	0.362	26.000	0.028	1.43	0.011	26.000	0.000
	55.1475 - 54.0887		27.89	0.361	26.000	0.028	1.43	0.010	26.000	0.000
	54.0887 - 53.03		27.97	0.361	26.000	0.028	1.43	0.010	26.000	0.000
	53.03 - 46.95		15.09	0.189	26.000	0.014	0.80	0.005	26.000	0.000
L8	53.03 - 46.95	TP46.822x42.197x0.558	13.59	0.178	26.000	0.014	0.62	0.005	26.000	0.000
	46.95 - 45.9		28.73	0.375	26.000	0.029	1.18	0.008	26.000	0.000
	45.9 - 44.85		28.81	0.374	26.000	0.029	1.18	0.008	26.000	0.000
	44.85 - 43.8		28.89	0.373	26.000	0.029	1.18	0.008	26.000	0.000
	43.8 - 42.75		28.97	0.372	26.000	0.029	1.18	0.008	26.000	0.000
	42.75 - 41.7		29.05	0.371	26.000	0.029	1.18	0.008	26.000	0.000
	41.7 - 40.65		29.13	0.371	26.000	0.028	1.18	0.008	26.000	0.000
	40.65 - 39.6		29.21	0.370	26.000	0.028	1.18	0.008	26.000	0.000
	39.6 - 38.55		29.29	0.371	26.000	0.028	1.18	0.008	26.000	0.000
	38.55 - 37.5		29.37	0.370	26.000	0.028	1.18	0.008	26.000	0.000
	37.5 - 36.45		29.45	0.369	26.000	0.028	1.18	0.008	26.000	0.000
	36.45 - 35.4		29.53	0.368	26.000	0.028	1.19	0.008	26.000	0.000
	35.4 - 34.35		29.61	0.367	26.000	0.028	1.19	0.008	26.000	0.000
	34.35 - 33.3		29.69	0.366	26.000	0.028	1.19	0.008	26.000	0.000
	33.3 - 32.25		29.77	0.365	26.000	0.028	1.19	0.008	26.000	0.000
L9	32.25 - 32 (9)	TP46.878x46.822x0.797	29.78	0.256	26.000	0.020	1.19	0.005	26.000	0.000
L10	32 - 30.4	TP54x46.878x0.57	29.91	0.357	26.000	0.027	1.19	0.007	26.000	0.000
	30.4 - 28.8		30.03	0.356	26.000	0.027	1.19	0.007	26.000	0.000
	28.8 - 27.2		30.16	0.354	26.000	0.027	1.20	0.007	26.000	0.000
	27.2 - 25.6		30.28	0.353	26.000	0.027	1.20	0.007	26.000	0.000
	25.6 - 24		30.40	0.352	26.000	0.027	1.20	0.007	26.000	0.000
	24 - 22.4		30.52	0.351	26.000	0.027	1.21	0.007	26.000	0.000
	22.4 - 20.8		30.64	0.349	26.000	0.027	1.21	0.007	26.000	0.000
	20.8 - 19.2		30.76	0.348	26.000	0.027	1.21	0.007	26.000	0.000
	19.2 - 17.6		30.89	0.347	26.000	0.027	1.22	0.007	26.000	0.000
	17.6 - 16		31.01	0.346	26.000	0.026	1.22	0.007	26.000	0.000
	16 - 14.4		31.13	0.345	26.000	0.026	1.22	0.006	26.000	0.000
	14.4 - 12.8		31.25	0.344	26.000	0.026	1.23	0.006	26.000	0.000
	12.8 - 11.2		31.38	0.343	26.000	0.026	1.23	0.006	26.000	0.000
	11.2 - 9.6		31.50	0.342	26.000	0.026	1.23	0.006	26.000	0.000
	9.6 - 8		31.63	0.341	26.000	0.026	1.24	0.006	26.000	0.000
	8 - 6.4		31.75	0.340	26.000	0.026	1.24	0.006	26.000	0.000
	6.4 - 4.8		31.88	0.339	26.000	0.026	1.24	0.006	26.000	0.000
	4.8 - 3.2		32.00	0.338	26.000	0.026	1.25	0.006	26.000	0.000
	3.2 - 1.6		32.13	0.337	26.000	0.026	1.25	0.006	26.000	0.000
	1.6 - 0		32.26	0.336	26.000	0.026	1.25	0.006	26.000	0.000

APPENDIX B

BASE LEVEL DRAWING



BUSINESS UNIT: 876381 TOWER ID: C_BASELEVEL

APPENDIX C

ADDITIONAL CALCULATIONS

Pole (L2)	91.9%	Pass
Mod (M3)	98.6%	Pass

Ward (BU 876381)

TEP #: 51819.31710

Analysis: AAA 4/24/2015

Check: IVV 4/24/2015

Monopole Reinforcement_v1.4.8 - TIA-222-F

Mod #	Modification Type	Termination Length (ft)	Bot. Elevation (ft)	Top Elevation (ft)	Termination Length (ft)	Modification Location (° or Flat/Point #)	Location (F/P)	Lateral Offset (in)
1a	CCI-WSFP-065125	0.00	0.00	35.00		2 11	Flats	-1.50
1b	CCI-WSFP-065125	0.00	0.00	35.00		6 15	Flats	1.50
2	CCI-SFP-065125		29.25	64.25		1 7 13	Flats	0.00
3	CCI-SFP-060100	-2.75	64.25	89.25		1 7 13	Flats	0.00
4	CCI-SFP-060100	-2.00	89.25	119.25		1 7 13	Flats	0.00
5	CCI-SFP-045100	-2.00	119.25	129.25		1 7 13	Flats	0.00

MODIFICATION PROPERTIES

#	Modification	Default Termination (ft)	Stitch (in)	k	Drill Hole (in)	Bolt/Weld Capacity (k)	A_G (in^2)	F_Y (ksi)	F_U (ksi)
1	CCI-WSFP-065125	2.75	19.00	0.80	1.1875	30.0	8.13	65.0	80.0
2	CCI-SFP-065125	2.75	19.00	0.80	1.1875	30.0	8.13	65.0	80.0
3	CCI-SFP-060100	2.00	16.00	0.80	1.1875	30.0	6.00	65.0	80.0
5	CCI-SFP-045100	1.50	20.00	0.80	1.1875	30.0	4.50	65.0	80.0

Tower Engineering Professionals, Inc.
326 Tryon Road|Raleigh, NC 27603-3530|Office: (919) 661-6351|Fax: (919) 661-6350|www.tepgroup.net

Pole (L2)	91.9%	Pass
Mod (M3)	98.6%	Pass

Ward (BU 876381)

TEP #: 51819.31710

Analysis: AAA 4/24/2015

Check: IVV 4/24/2015

Monopole Reinforcement_v1.4.8 - TIA-222-F - Capacities

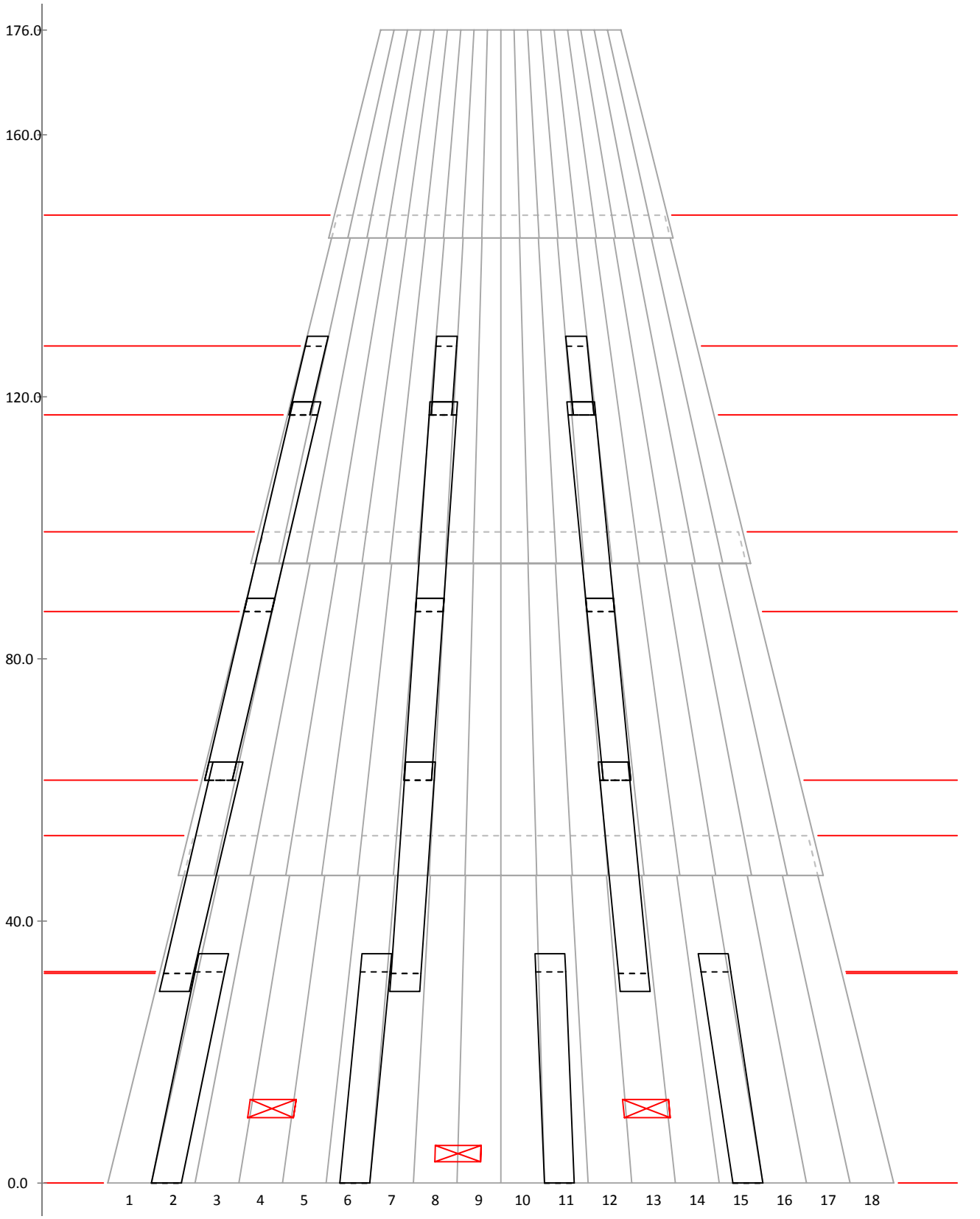
Section No.	*Elevation (ft)*	*Type*	*Size*	*Critical Element*	*P (k)*	*Pa (k)*	*% Capacity*	*Pass/Fail*
L1	176.00-144.25	Pole	TP23.65×16.50×0.1875	1	Note 1	Note 1	86.2	Pass
L2	147.75-94.58	Pole	TP34.33×22.49×0.3125	2	Note 1	Note 1	91.9	Pass
L3	99.41-46.95	Pole	TP44.30×32.63×0.3750	3	Note 1	Note 1	79.1	Pass
L4	53.03-0.00	Pole	TP54.00×42.20×0.3750	4	Note 1	Note 1	78.6	Pass
M1b	35.00-0.00	Mod (Ex)	CCI-WSFP-065125	1	Note 1	Note 1	91.2	Pass
M2	64.25-29.25	Mod (Ex)	CCI-SFP-065125	2	Note 1	Note 1	96.7	Pass
M3	89.25-64.25	Mod (Ex)	CCI-SFP-060100	3	Note 1	Note 1	98.6	Pass
M4	119.25-89.25	Mod (Ex)	CCI-SFP-060100	4	Note 1	Note 1	91.6	Pass
M5	129.25-119.25	Mod (Pr)	CCI-SFP-045100	5	Note 1	Note 1	94.7	Pass

	Summary	
Pole (L2)	91.9	Pass
Mod (M3)	98.6	Pass
RATING =	**98.6**	**Pass**

*Note 1: See additional documentation in following sheets for details.

Tower Engineering Professionals, Inc.
326 Tryon Road|Raleigh, NC 27603-3530|Office: (919) 661-6351|Fax: (919) 661-6350|www.tepgroup.net

Reinforcement Layout



Tower Engineering Professionals, Inc.

326 Tryon Road|Raleigh, NC 27603-3530|Office: (919) 661-6351|Fax: (919) 661-6350|www.tepgroup.net

Elevation: 0.00-ft

Loads	
Axial:	48.9 k
Moment:	4,136.4 k·ft
Shear:	32.3 k
Torsion:	1.3 k·ft

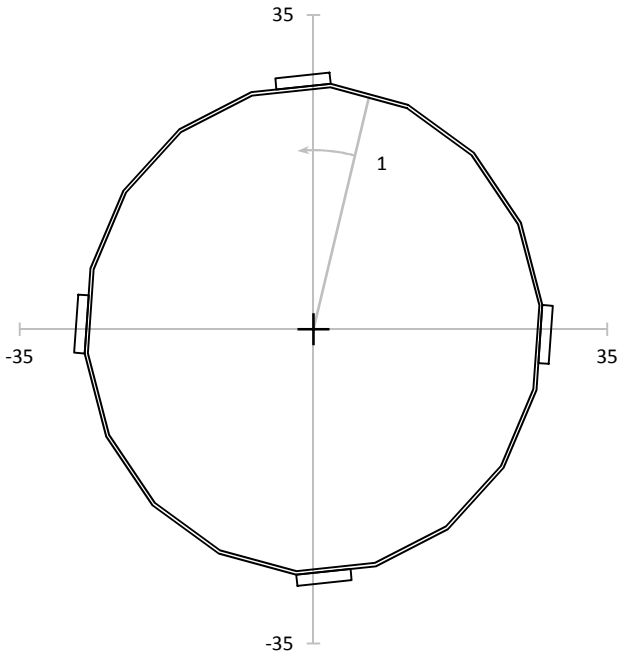
Pole Info	
OD:	54.00 in
t:	0.3750 in
Pole A_G:	63.83 in²
Pole I_G:	23,188.8 in⁴

Equivalent Loads to Pole	
Axial:	32.4 k
Moment:	2,750.4 k·ft
Shear:	21.4 k
Torsion:	1.3 k·ft

Controlling	
Angle:	**14.30°**
I_{CONT}:	35,665.9 in⁴
A_G:	96.33 in²

Shear Flow	
Controlling Mod:	1
q:	0.203 k/in
Bolt/Weld Cap:	30.0 k/bolt
Max Spacing:	147.72 in
Stitch:	19.00 in
Capacity:	**12.9%**

Minimum	
Angle:	**150.00°**
I_{MIN}:	34,874.4 in⁴
t_{EFF}:	0.5702 in



Pole Segment: L4, F_Y = 65 ksi

POLE CAPACITY

Angle (°)	y_{CONT} (in)	I (in⁴)	σ_A (ksi)	σ_B (ksi)	F_A (ksi)	F_B (ksi)	Capacity
150.00	27.43	34874.4	0.507	39.044	52.000	52.000	**76.1%**

MODIFICATION CAPACITIES

Mod Number	#	Angle (°)	y_{CONT} (in)	I (in⁴)	σ_A (ksi)	σ_B (ksi)	F_T (ksi)	F_C (ksi)	Capacity
1a	1	**14.30**	27.64	35665.9	0.507	38.464	42.735	43.077	**91.2%**
1a	2	**194.30**	27.64	35665.9	0.507	38.464	42.735	43.077	**91.2%**
1b	1	**105.70**	27.64	35665.9	0.507	38.464	42.735	43.077	**91.2%**
1b	2	**285.70**	27.64	35665.9	0.507	38.464	42.735	43.077	**91.2%**

Tower Engineering Professionals, Inc.
326 Tryon Road|Raleigh, NC 27603-3530|Office: (919) 661-6351|Fax: (919) 661-6350|www.tepgroup.net

Elevation: 32.00-ft

Loads	
Axial:	37.2 k
Moment:	3,144.2 k·ft
Shear:	29.8 k
Torsion:	1.2 k·ft

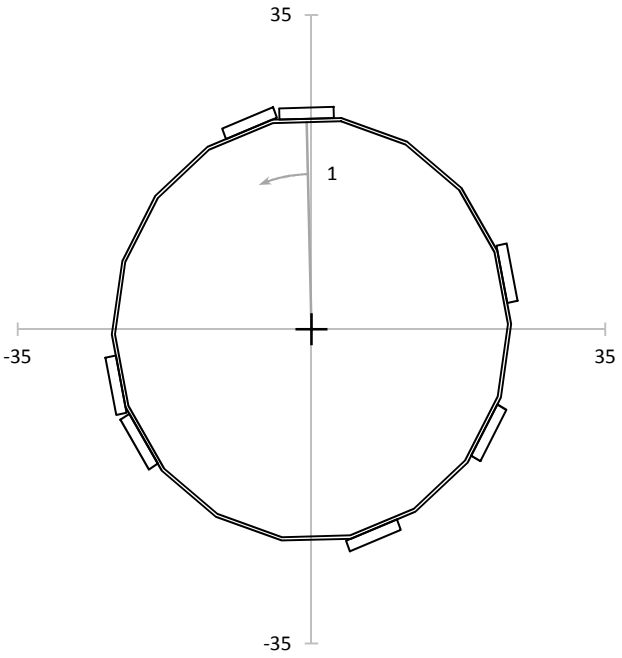
Pole Info	
OD:	46.88 in
t:	0.3750 in
Pole A_G:	55.35 in²
Pole I_G:	15,122.2 in⁴

Equivalent Loads to Pole	
Axial:	18.3 k
Moment:	1,520.7 k·ft
Shear:	14.7 k
Torsion:	1.2 k·ft

Controlling	
Angle:	**358.60°**
I_G:	31,479.3 in⁴
A_G:	112.23 in²

Shear Flow	
Controlling Mod:	3
q:	0.185 k/in
Bolt/Weld Cap:	30.0 k/bolt
Max Spacing:	162.26 in
Stitch:	19.00 in
Capacity:	**11.7%**

Minimum	
Angle:	**150.00°**
I_{MIN}:	31,267.2 in⁴
t_{EFF}:	0.7969 in



Pole Segment: L4, F_Y = 65 ksi

POLE CAPACITY

Angle (°)	y_{CONT} (in)	I (in⁴)	σ_A (ksi)	σ_B (ksi)	F_A (ksi)	F_B (ksi)	Capacity
150.00	23.81	31267.2	0.331	28.736	52.000	52.000	**55.9%**

MODIFICATION CAPACITIES

Mod Number	#	Angle (°)	y_{CONT} (in)	I (in⁴)	σ_A (ksi)	σ_B (ksi)	F_T (ksi)	F_C (ksi)	Capacity
1a	1	**14.75**	24.10	31726.0	0.331	28.661	42.735	43.077	**67.8%**
1a	2	**194.75**	24.10	31726.0	0.331	28.661	42.735	43.077	**67.8%**
1b	1	**105.25**	24.10	31726.0	0.331	28.661	42.735	43.077	**67.8%**
1b	2	**285.25**	24.10	31726.0	0.331	28.661	42.735	43.077	**67.8%**
2	1	**358.60**	24.06	31479.3	0.331	28.834	42.735	43.077	**68.2%**
2	2	**121.40**	24.06	31479.3	0.331	28.834	42.735	43.077	**68.2%**
2	3	**240.00**	24.06	32192.9	0.331	28.203	42.735	43.077	**66.8%**

Tower Engineering Professionals, Inc.
326 Tryon Road|Raleigh, NC 27603-3530|Office: (919) 661-6351|Fax: (919) 661-6350|www.tepgroup.net

Elevation: 32.25-ft

Loads	
Axial:	37.1 k
Moment:	3,136.7 k·ft
Shear:	29.8 k
Torsion:	1.2 k·ft

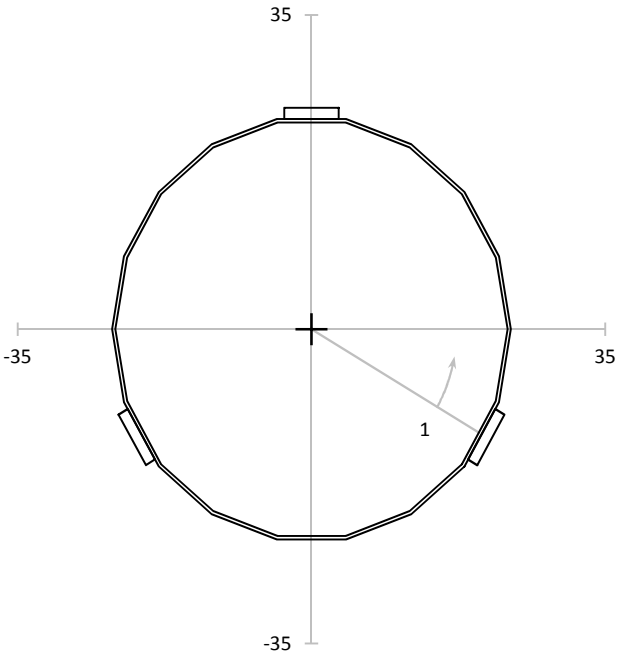
Pole Info	
OD:	46.82 in
t:	0.3750 in
Pole A_G:	55.28 in^2
Pole I_G:	15,068.0 in^4

Equivalent Loads to Pole	
Axial:	25.7 k
Moment:	2,133.5 k·ft
Shear:	20.7 k
Torsion:	1.2 k·ft

Controlling	
Angle:	**120.00°**
I_G:	22,153.7 in^4
A_G:	79.66 in^2

Shear Flow	
Controlling Mod:	3
q:	0.262 k/in
Bolt/Weld Cap:	30.0 k/bolt
Max Spacing:	114.33 in
Stitch:	19.00 in
Capacity:	**16.6%**

Minimum	
Angle:	**119.40°**
I_{MIN}:	22,153.7 in^4
t_{EFF}:	0.5579 in



Pole Segment: L4, F_Y = 65 ksi

POLE CAPACITY

Angle (°)	y_{CONT} (in)	I (in^4)	σ_A (ksi)	σ_B (ksi)	F_A (ksi)	F_B (ksi)	Capacity
110.00	23.79	22153.7	0.465	40.414	52.000	52.000	**78.6%**

MODIFICATION CAPACITIES

Mod Number	#	Angle (°)	y_{CONT} (in)	I (in^4)	σ_A (ksi)	σ_B (ksi)	F_T (ksi)	F_C (ksi)	Capacity
2	1	**0.00**	24.04	22153.7	0.465	40.839	42.735	43.077	**96.7%**
2	2	**120.00**	24.04	22153.7	0.465	40.839	42.735	43.077	**96.7%**
2	3	**240.00**	24.04	22153.7	0.465	40.839	42.735	43.077	**96.7%**

Tower Engineering Professionals, Inc.
326 Tryon Road|Raleigh, NC 27603-3530|Office: (919) 661-6351|Fax: (919) 661-6350|www.tepgroup.net

Elevation: 53.03-ft

Loads	
Axial:	29.3 k
Moment:	2,535.4 k·ft
Shear:	28.0 k
Torsion:	1.4 k·ft

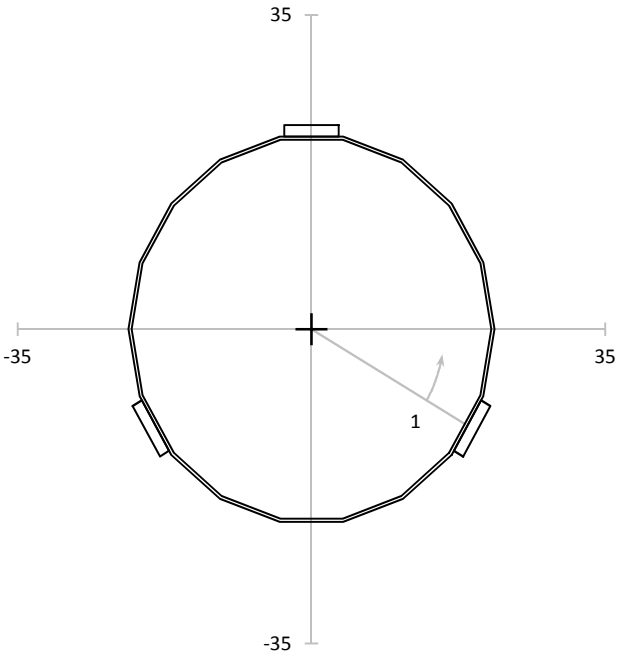
Pole Info	
OD:	42.95 in
t:	0.3750 in
Pole A_G:	50.67 in^2
Pole I_G:	11,602.7 in^4

Equivalent Loads to Pole	
Axial:	19.8 k
Moment:	1,671.5 k·ft
Shear:	18.9 k
Torsion:	1.4 k·ft

Controlling	
Angle:	**120.00°**
I_G:	17,599.0 in^4
A_G:	75.05 in^2

Shear Flow	
Controlling Mod:	3
q:	0.285 k/in
Bolt/Weld Cap:	30.0 k/bolt
Max Spacing:	105.11 in
Stitch:	19.00 in
Capacity:	**18.1%**

Minimum	
Angle:	**117.20°**
I_{MIN}:	17,599.0 in^4
t_{EFF}:	0.5770 in



Pole Segment: L3, F_Y = 65 ksi

POLE CAPACITY

Angle (°)	y_{CONT} (in)	I (in^4)	σ_A (ksi)	σ_B (ksi)	F_A (ksi)	F_B (ksi)	Capacity
110.00	21.82	17599.0	0.390	37.717	52.000	52.000	**73.3%**

MODIFICATION CAPACITIES

Mod Number	#	Angle (°)	y_{CONT} (in)	I (in^4)	σ_A (ksi)	σ_B (ksi)	F_T (ksi)	F_C (ksi)	Capacity
2	1	**0.00**	22.10	17599.0	0.390	38.204	42.735	43.077	**90.3%**
2	2	**120.00**	22.10	17599.0	0.390	38.204	42.735	43.077	**90.3%**
2	3	**240.00**	22.10	17599.0	0.390	38.204	42.735	43.077	**90.3%**

Tower Engineering Professionals, Inc.
326 Tryon Road|Raleigh, NC 27603-3530|Office: (919) 661-6351|Fax: (919) 661-6350|www.tepgroup.net

Elevation: 61.50-ft

Loads	
Axial:	26.8 k
Moment:	2,301.5 k·ft
Shear:	27.3 k
Torsion:	1.4 k·ft

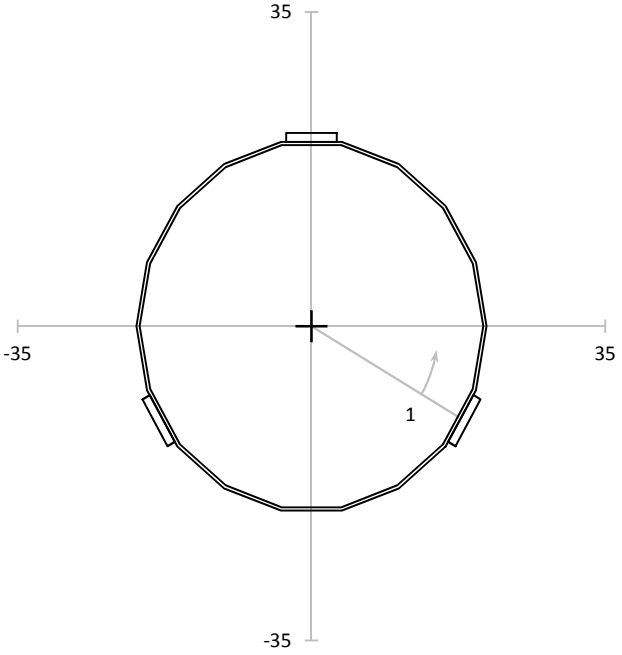
Pole Info	
OD:	41.06 in
t:	0.3750 in
Pole A_G:	48.43 in^2
Pole I_G:	10,129.2 in^4

Equivalent Loads to Pole	
Axial:	19.5 k
Moment:	1,648.9 k·ft
Shear:	19.9 k
Torsion:	1.4 k·ft

Controlling	
Angle:	**120.00°**
I_G:	14,137.9 in^4
A_G:	66.43 in^2

Shear Flow	
Controlling Mod:	4
q:	0.244 k/in
Bolt/Weld Cap:	30.0 k/bolt
Max Spacing:	123.20 in
Stitch:	16.00 in
Capacity:	**13.0%**

Minimum	
Angle:	**111.80°**
I_{MIN}:	14,137.9 in^4
t_{EFF}:	0.5294 in



Pole Segment: L3, F_Y = 65 ksi

POLE CAPACITY

Angle (°)	y_{CONT} (in)	I (in^4)	σ_A (ksi)	σ_B (ksi)	F_A (ksi)	F_B (ksi)	Capacity
110.00	20.86	14137.9	0.403	40.749	52.000	52.000	**79.1%**

MODIFICATION CAPACITIES

Mod Number	#	Angle (°)	y_{CONT} (in)	I (in^4)	σ_A (ksi)	σ_B (ksi)	F_T (ksi)	F_C (ksi)	Capacity
3	1	**0.00**	21.03	14137.9	0.403	41.084	42.057	42.222	**98.6%**
3	2	**120.00**	21.03	14137.9	0.403	41.084	42.057	42.222	**98.6%**
3	3	**240.00**	21.03	14137.9	0.403	41.084	42.057	42.222	**98.6%**

Tower Engineering Professionals, Inc.
326 Tryon Road|Raleigh, NC 27603-3530|Office: (919) 661-6351|Fax: (919) 661-6350|www.tepgroup.net

Elevation: 87.25-ft

Loads	
Axial:	20.1 k
Moment:	1,627.2 k·ft
Shear:	25.1 k
Torsion:	1.4 k·ft

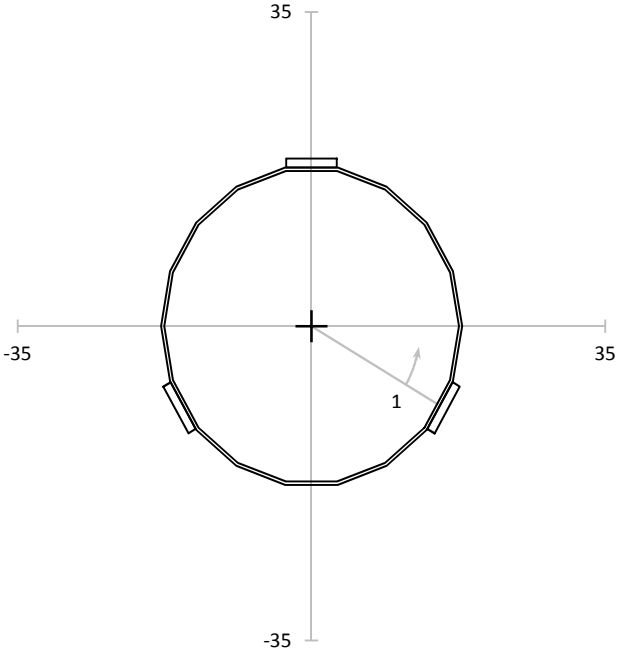
Pole Info	
OD:	35.33 in
t:	0.3750 in
Pole A_G:	41.61 in^2
Pole I_G:	6,424.9 in^4

Equivalent Loads to Pole	
Axial:	14.0 k
Moment:	1,109.5 k·ft
Shear:	17.5 k
Torsion:	1.4 k·ft

Controlling	
Angle:	**120.00°**
I_G:	9,423.1 in^4
A_G:	59.61 in^2

Shear Flow	
Controlling Mod:	5
q:	0.291 k/in
Bolt/Weld Cap:	30.0 k/bolt
Max Spacing:	103.18 in
Stitch:	16.00 in
Capacity:	**15.5%**

Minimum	
Angle:	**109.70°**
I_{MIN}:	9,423.1 in^4
t_{EFF}:	0.5588 in



Pole Segment: L3, F_Y = 65 ksi

POLE CAPACITY

Angle (°)	y_{CONT} (in)	I (in^4)	σ_A (ksi)	σ_B (ksi)	F_A (ksi)	F_B (ksi)	Capacity
110.00	17.95	9423.1	0.337	37.196	52.000	52.000	**72.2%**

MODIFICATION CAPACITIES

Mod Number	#	Angle (°)	y_{CONT} (in)	I (in^4)	σ_A (ksi)	σ_B (ksi)	F_T (ksi)	F_C (ksi)	Capacity
4	1	**0.00**	18.17	9423.1	0.337	37.646	42.057	42.222	**90.3%**
4	2	**120.00**	18.17	9423.1	0.337	37.646	42.057	42.222	**90.3%**
4	3	**240.00**	18.17	9423.1	0.337	37.646	42.057	42.222	**90.3%**

Tower Engineering Professionals, Inc.
326 Tryon Road|Raleigh, NC 27603-3530|Office: (919) 661-6351|Fax: (919) 661-6350|www.tepgroup.net

Elevation: 99.41-ft

Loads	
Axial:	16.7 k
Moment:	1,328.3 k·ft
Shear:	24.0 k
Torsion:	1.4 k·ft

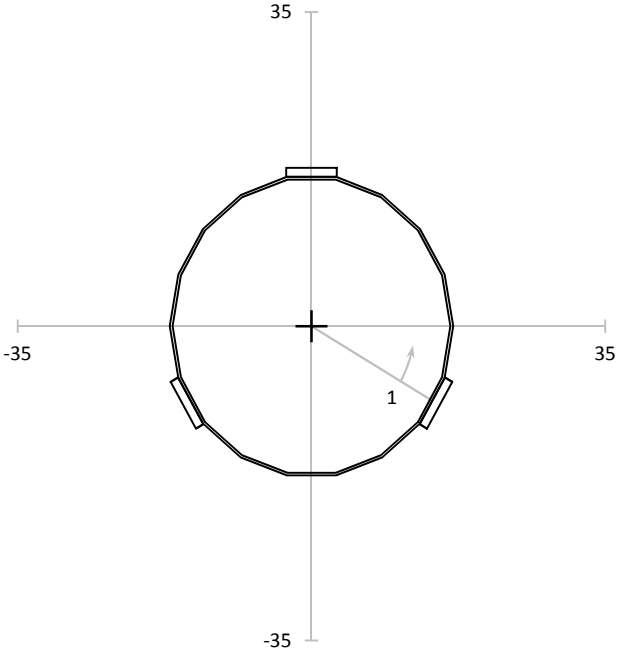
Pole Info	
OD:	33.25 in
t:	0.3125 in
Pole A_G:	32.67 in^2
Pole I_G:	4,479.5 in^4

Equivalent Loads to Pole	
Axial:	10.7 k
Moment:	832.5 k·ft
Shear:	15.5 k
Torsion:	1.4 k·ft

Controlling	
Angle:	**120.00°**
I_G:	7,147.3 in^4
A_G:	50.67 in^2

Shear Flow	
Controlling Mod:	5
q:	0.345 k/in
Bolt/Weld Cap:	30.0 k/bolt
Max Spacing:	86.96 in
Stitch:	16.00 in
Capacity:	**18.4%**

Minimum	
Angle:	**111.30°**
I_{MIN}:	7,147.3 in^4
t_{EFF}:	0.5076 in



Pole Segment: L2, F_Y = 65 ksi

POLE CAPACITY

Angle (°)	y_{CONT} (in)	I (in^4)	σ_A (ksi)	σ_B (ksi)	F_A (ksi)	F_B (ksi)	Capacity
110.00	16.89	7147.3	0.329	37.673	52.000	52.000	**73.1%**

MODIFICATION CAPACITIES

Mod Number	#	Angle (°)	y_{CONT} (in)	I (in^4)	σ_A (ksi)	σ_B (ksi)	F_T (ksi)	F_C (ksi)	Capacity
4	1	**0.00**	17.13	7147.3	0.329	38.195	42.057	42.222	**91.6%**
4	2	**120.00**	17.13	7147.3	0.329	38.195	42.057	42.222	**91.6%**
4	3	**240.00**	17.13	7147.3	0.329	38.195	42.057	42.222	**91.6%**

Tower Engineering Professionals, Inc.
326 Tryon Road|Raleigh, NC 27603-3530|Office: (919) 661-6351|Fax: (919) 661-6350|www.tepgroup.net

Loads	
Axial:	13.0 k
Moment:	914.0 k·ft
Shear:	22.5 k
Torsion:	1.4 k·ft

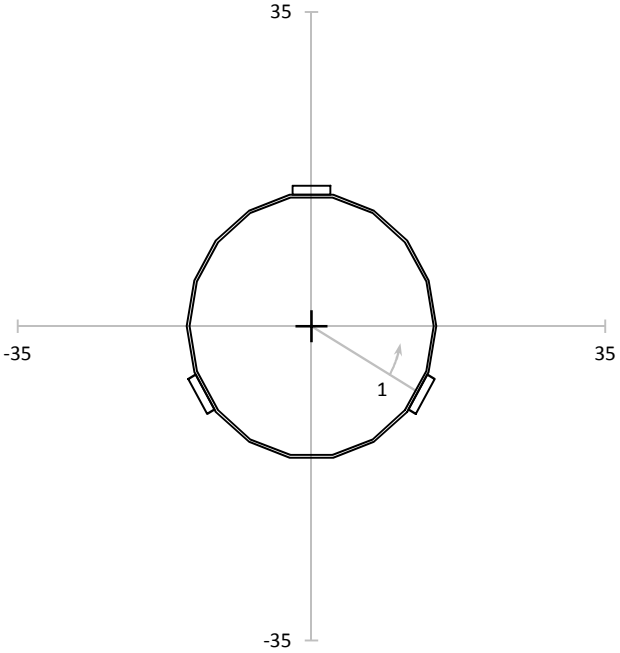
Pole Info	
OD:	29.28 in
t:	0.3125 in
Pole A_G:	28.73 in^2
Pole I_G:	3,046.1 in^4

Equivalent Loads to Pole	
Axial:	8.8 k
Moment:	604.6 k·ft
Shear:	15.3 k
Torsion:	1.4 k·ft

Controlling	
Angle:	**120.00°**
I_G:	4,605.4 in^4
A_G:	42.23 in^2

Shear Flow	
Controlling Mod:	6
q:	0.332 k/in
Bolt/Weld Cap:	30.0 k/bolt
Max Spacing:	90.23 in
Stitch:	20.00 in
Capacity:	**22.2%**

Minimum	
Angle:	**100.80°**
I_{MIN}:	4,605.4 in^4
t_{EFF}:	0.4808 in



Pole Segment: L2, F_Y = 65 ksi

POLE CAPACITY

Angle (°)	y_{CONT} (in)	I (in^4)	σ_A (ksi)	σ_B (ksi)	F_A (ksi)	F_B (ksi)	Capacity
110.00	14.87	4605.4	0.307	35.426	52.000	52.000	**68.7%**

MODIFICATION CAPACITIES

Mod Number	#	Angle (°)	y_{CONT} (in)	I (in^4)	σ_A (ksi)	σ_B (ksi)	F_T (ksi)	F_C (ksi)	Capacity
5	1	**0.00**	15.14	4605.4	0.307	36.059	38.419	38.519	**94.7%**
5	2	**120.00**	15.14	4605.4	0.307	36.059	38.419	38.519	**94.7%**
5	3	**240.00**	15.14	4605.4	0.307	36.059	38.419	38.519	**94.7%**

Tower Engineering Professionals, Inc.
326 Tryon Road|Raleigh, NC 27603-3530|Office: (919) 661-6351|Fax: (919) 661-6350|www.tepgroup.net

Loads	
Axial:	11.0 k
Moment:	682.8 k·ft
Shear:	21.6 k
Torsion:	1.4 k·ft

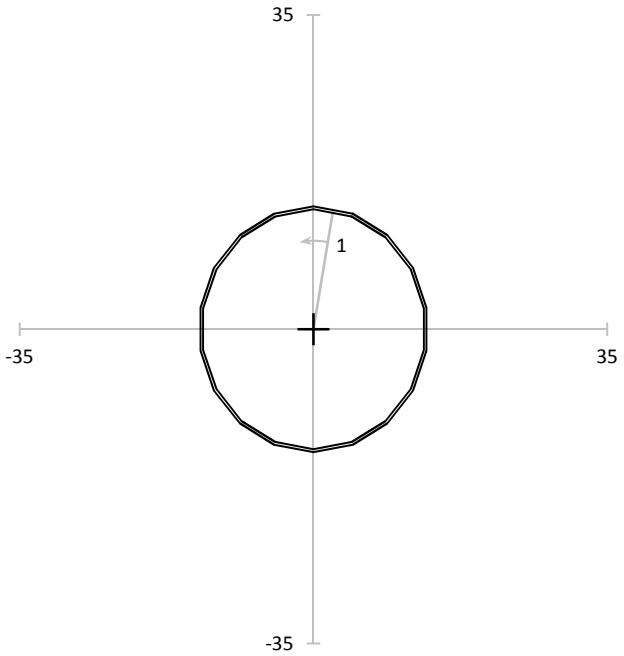
Equivalent Loads to Pole	
Axial:	11.0 k
Moment:	682.8 k·ft
Shear:	21.6 k
Torsion:	1.4 k·ft

Shear Flow N/A

Pole Info	
OD:	26.94 in
t:	0.3125 in
Pole A_G:	26.41 in^2
Pole I_G:	2,366.3 in^4

Controlling	
Angle:	**10.00°**
I_G:	2,366.3 in^4
A_G:	26.41 in^2

Minimum	
Angle:	**0.00°**
I_{MIN}:	2,366.3 in^4
t_{EFF}:	0.3125 in



Pole Segment: L2, F_Y = 65 ksi

POLE CAPACITY

Angle (°)	y_{CONT} (in)	I (in^4)	σ_A (ksi)	σ_B (ksi)	F_A (ksi)	F_B (ksi)	Capacity
10.00	13.69	2366.3	0.418	47.388	52.000	52.000	**91.9%**

MODIFICATION CAPACITIES

Mod Number	#	Angle (°)	y_{CONT} (in)	I (in^4)	σ_A (ksi)	σ_B (ksi)	F_T (ksi)	F_C (ksi)	Capacity

Elevation: 147.75-ft

Loads	
Axial:	6.9 k
Moment:	278.8 k·ft
Shear:	15.1 k
Torsion:	0.8 k·ft

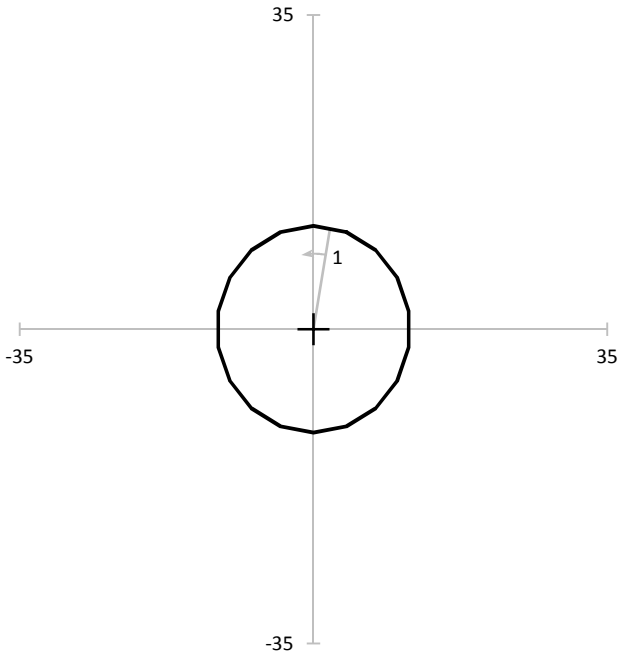
Equivalent Loads to Pole	
Axial:	6.9 k
Moment:	278.8 k·ft
Shear:	15.1 k
Torsion:	0.8 k·ft

Shear Flow N/A

Pole Info	
OD:	22.86 in
t:	0.1875 in
Pole A_G:	13.49 in^2
Pole I_G:	876.5 in^4

Controlling	
Angle:	**10.00°**
I_G:	876.5 in^4
A_G:	13.49 in^2

Minimum	
Angle:	**0.00°**
I_{MIN}:	876.5 in^4
t_{EFF}:	0.1875 in



Pole Segment: L1, F_Y = 65 ksi

POLE CAPACITY

Angle (°)	y_{CONT} (in)	I (in^4)	σ_A (ksi)	σ_B (ksi)	F_A (ksi)	F_B (ksi)	Capacity
10.00	11.61	876.5	0.510	44.322	52.000	52.000	**86.2%**

MODIFICATION CAPACITIES

Mod Number	#	Angle (°)	y_{CONT} (in)	I (in^4)	σ_A (ksi)	σ_B (ksi)	F_T (ksi)	F_C (ksi)	Capacity

Tower Engineering Professionals, Inc.
326 Tryon Road|Raleigh, NC 27603-3530|Office: (919) 661-6351|Fax: (919) 661-6350|www.tepgroup.net

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

TIA Rev F

Site Data

BU#: *876381*
Site Name: *Ward*
App #: *282674 Rev. 4*
Pole Manufacturer: *Other*

Reactions		
Moment:	4136	ft-kips
Axial:	49	kips
Shear:	32	kips

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

Anchor Rod Data		
Qty:	16	
Diam:	2.25	in
Rod Material:	A615-J	
Strength (Fu):	100	ksi
Yield (Fy):	75	ksi
Bolt Circle:	63	in

Anchor Rod Results

		Stiffened
Maximum Rod Tension:	193.9 Kips	Service, ASD
Allowable Tension:	195.0 Kips	Fty*ASIF
Anchor Rod Stress Ratio:	99.5% **Pass**	

Plate Data		
Diam:	69	in
Thick:	2	in
Grade:	60	ksi
Single-Rod B-eff:	10.71	in

Base Plate Results Flexural Check

		Stiffened
Base Plate Stress:	49.1 ksi	Service, ASD
Allowable Plate Stress:	60.0 ksi	0.75*Fy*ASIF
Base Plate Stress Ratio:	81.8% **Pass**	Y.L. Length: N/A, Roark

Stiffener Data (Welding at both sides)		
Config:	1	*
Weld Type:	Both	
Groove Depth:	0.375	in **
Groove Angle:	45	degrees
Fillet H. Weld:	0.3125	in
Fillet V. Weld:	0.3125	in
Width:	6.5	in
Height:	15	in
Thick:	0.75	in
Notch:	0.75	in
Grade:	65	ksi
Weld str.:	80	ksi

Stiffener Results

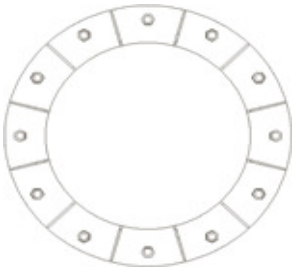
Horizontal Weld :	63.1% **Pass**
Vertical Weld:	72.0% **Pass**
Plate Flex+Shear, fb/Fb+(fv/Fv)^2:	25.2% **Pass**
Plate Tension+Shear, ft/Ft+(fv/Fv)^2:	61.6% **Pass**
Plate Comp. (AISC Bracket):	72.0% **Pass**

Pole Data		
Diam:	54	in
Thick:	0.375	in
Grade:	65	ksi
# of Sides:	18	"0" IF Round
Fu	80	ksi
Reinf. Fillet Weld	0	"0" if None

Pole Results

Pole Punching Shear Check:	22.2% **Pass**

Stress Increase Factor		
ASIF:	1.333	



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

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

		PASS	PASS			
	Results Summary:	LC1	LC2		Ward (BU 876381)	
	Soil Interaction:	51.8%	13.6%	TEP #:	51819.31710	
	Foundation Structural:	93.8%	24.4%	Analysis:	AAA	4/24/2015
Drilled Caisson Tool - Input				Check:	IVV	4/24/2015

Code Revisions: TIA-222-F ACI 318-05

Tower Type: Monopole

	LC1	LC2	
Moment:	4,136.00	1,089.00	kip-ft
Axial (download):	49.00	64.00	kip
Shear:	32.00	8.00	kip
Axial (uplift):			kip

Shaft Information

Diameter:	7.00	ft
Projection:	1.00	ft
Caisson Length:	30.00	ft
f'c:	4.000	ksi
Max εc:	0.003	in/in

Cage 1 Reinforcement

Tie Bar Size:	5	*(fy = 60.0 ksi)*
Clear Cover to Tie:	4.17	*in (Cage Ø = 73.00in)*
Tie Bar Spacing:	12.00	in
Vertical Bar Size:	11	
Vertical Bar Quantity:	24	*(ρ =0.676%)*
fy:	60.0	ksi
E:	29,000	ksi

Design Parameters

Soil Layer	Soil Type	Depth (ft) from	Depth (ft) to	Eff. Unit Weight (pcf)	Cohesion (psf)	Friction Angle ϕ (°)	All. Skin Friction (psf) Download	All. Skin Friction (psf) Uplift
1	Clay	0.00	3.50	130.0	0			
2	Sand	3.50	9.00	130.0		35.0		
3	Sand	9.00	30.00	67.6		35.0		

Notes: 1) Neglect lateral soil strength to a depth of:

i) ~~1/2 Pier Ø = 7.00ft / 2 = 3.50ft~~

ii) ~~Frost Depth = 40.0in / (12in/ft) = 3.33ft~~

iii) **Geotech Recommendation = 3.50ft**

2) Groundwater = 9.00ft

TOWER ENGINEERING PROFESSIONALS

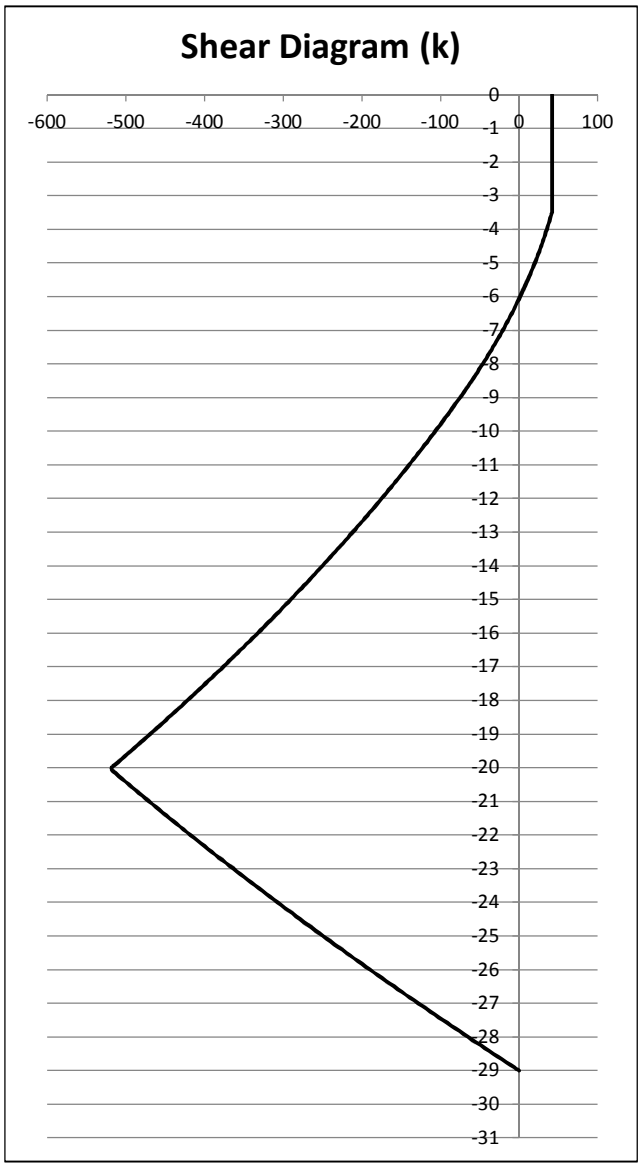
Ward (BU 876381)

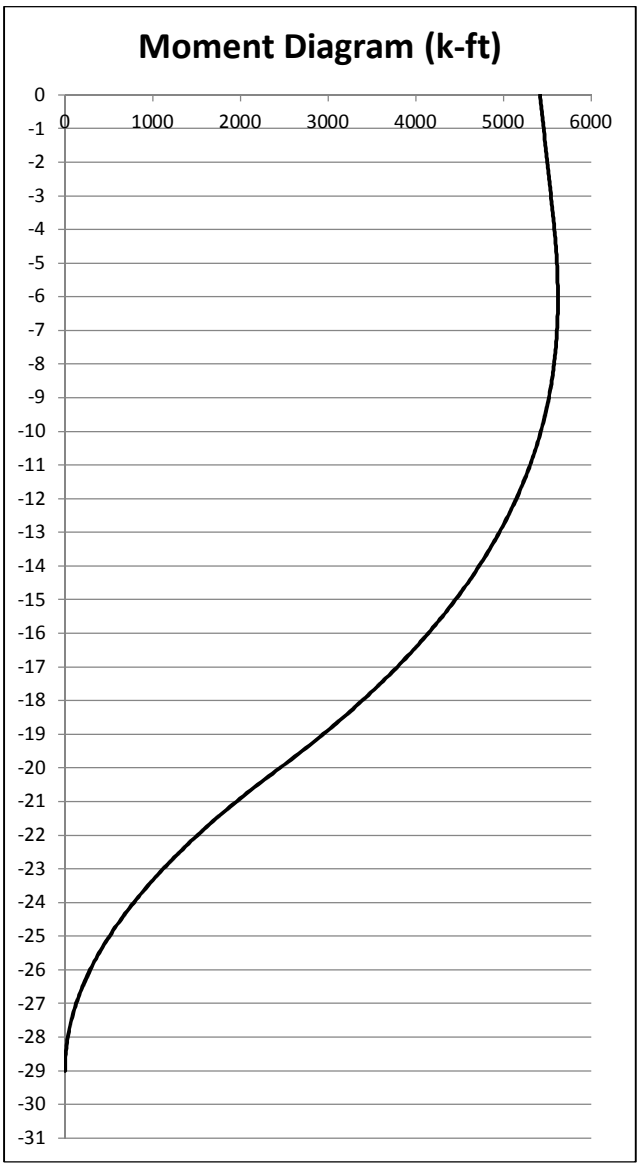
TEP #: 51819.31710

Analysis: AAA 4/24/2015

Check: IVV 4/24/2015

Soil Interaction: LC1





Max Unfactored Moment: **5622.1** **kip-ft**

@ **6.06** **ft below grade**

Additional Factor of Safety: **3.86**

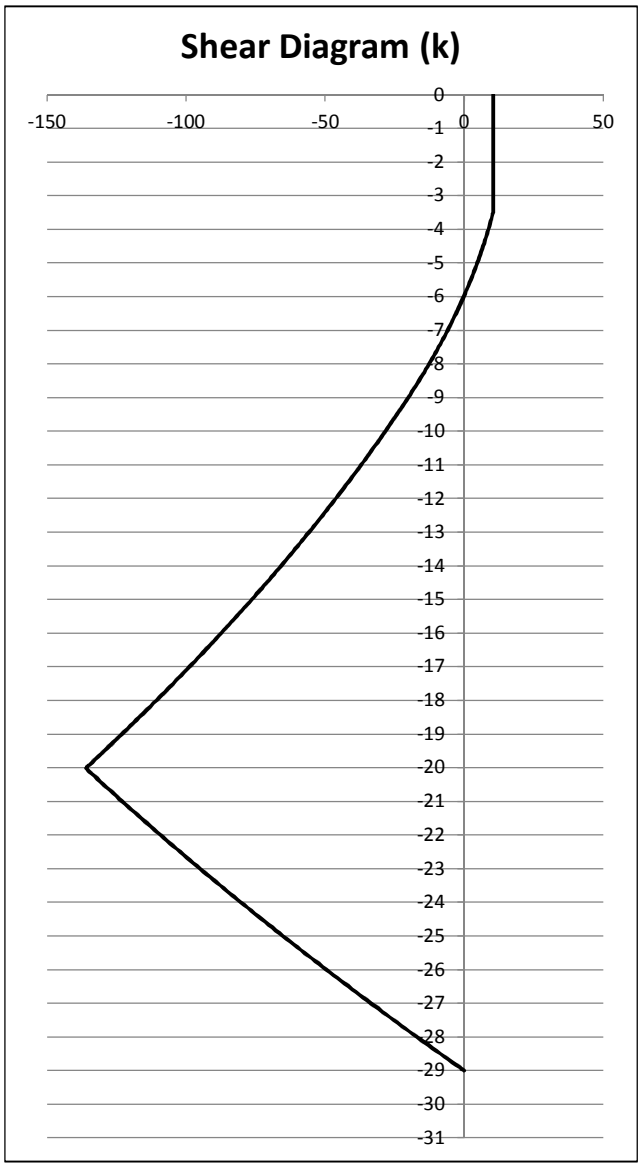
Capacity = **51.8%** **PASS**

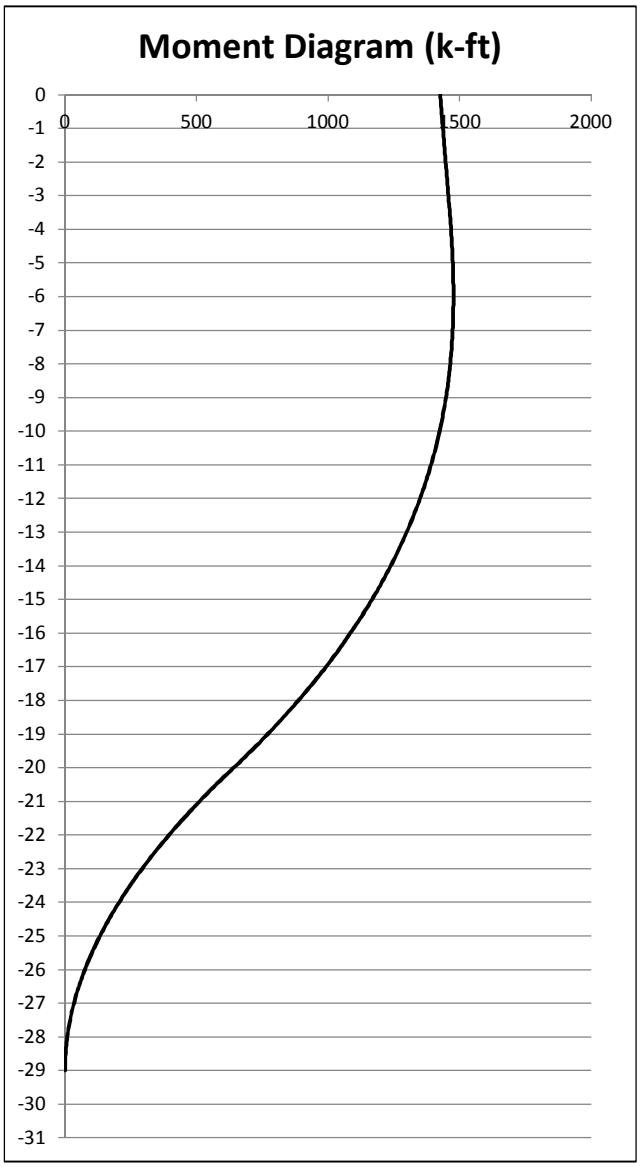
TOWER ENGINEERING PROFESSIONALS

Ward (BU 876381)

TEP #:	51819.31710	
Analysis:	AAA	4/24/2015
Check:	IVV	4/24/2015

Soil Interaction: LC2





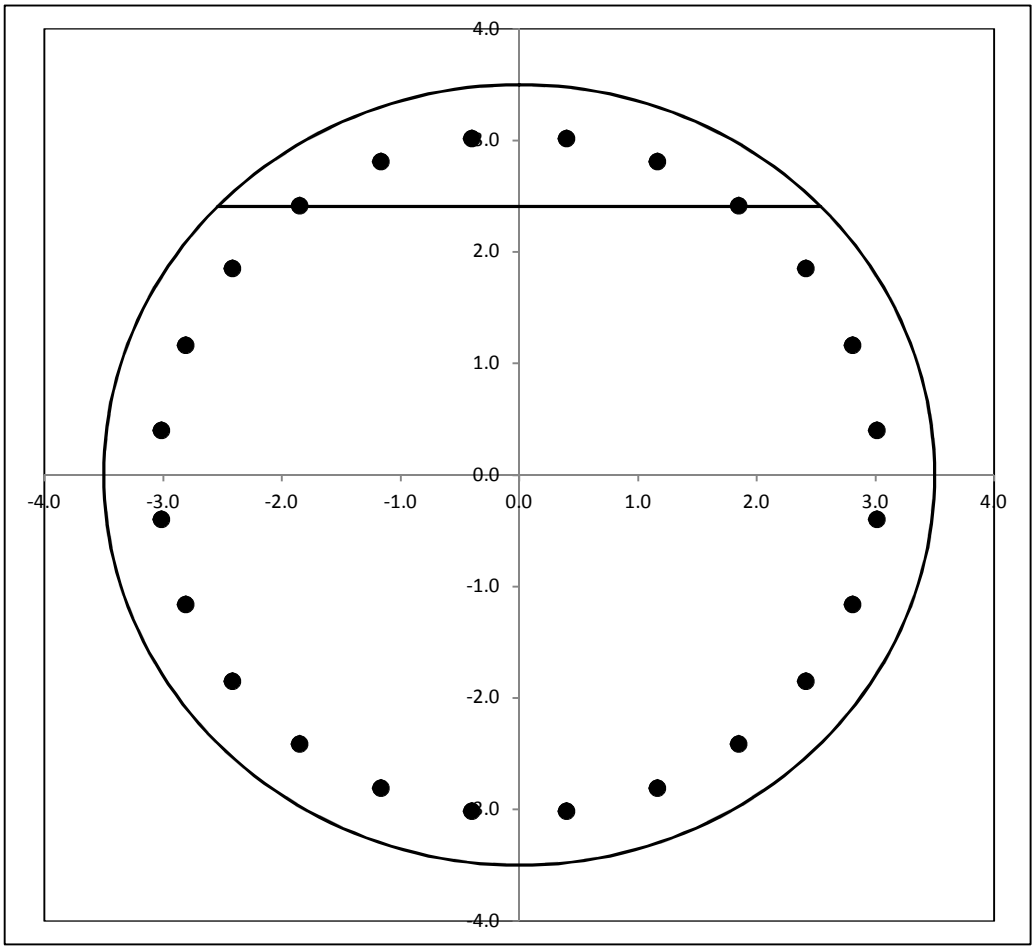
Max Unfactored Moment: **1476.5** **kip-ft**

@ **5.97** **ft below grade**

Additional Factor of Safety: **14.76**

Capacity = **13.6%** **PASS**

Reinforcement Capacity



		LC1	LC2	
	Vu =	519.6	136.1	kip
	Vc =	704.1	705.0	kip
fy,tie = 60.0	**Vs =**	242.4	242.4	kip
	ϕVn =	709.8	710.6	kip
	Capacity =	**73.2%**	**19.2%**	
		PASS	**PASS**	

	LC1	LC2	
Mu =	5622.1	1476.5	kip-ft
ϕMn =	5996.5	6045.2	kip-ft
Capacity =	**93.8%**	**24.4%**	
	PASS	**PASS**	

APPENDIX D

STRUCTURAL DESIGN DRAWINGS

STRUCTURAL DESIGN DRAWINGS

SITE NAME:

WARD

CROWN CASTLE BU NUMBER:

876381

APPLICATION NUMBER:

282674 REV. 4

SITE ADDRESS:

2365 LONG HILL RD.
GUILFORD, CT 06437
(NEW HAVEN COUNTY)
N 41° 20' 47.34", W 72° 43' 23.15"

MODIFICATION PROVISIONS

THE MODIFICATIONS DEPICTED ON THESE DRAWINGS ARE BASED ON THE RECOMMENDATIONS OUTLINED IN THE STRUCTURAL MODIFICATION ANALYSIS REPORT COMPLETED BY TOWER ENGINEERING PROFESSIONALS (TEP), JOB#: 51819.31710 DATED APRIL 24, 2015 (REV 0). THIS REPORT IS BASED ON A SPECIFIC ANTENNA LOADING AND COAX CONFIGURATION. SEE THE REPORT FOR THE ANTENNA AND COAX LOADING INFORMATION. ANY OTHER ANTENNA OR COAX CONFIGURATION REQUIRES REVIEW BY TEP. SATISFACTORY COMPLETION OF THE MODIFICATIONS INDICATED ON THESE DRAWINGS WILL RESULT IN THE STRUCTURE MEETING THE REQUIREMENTS OF THE SPECIFICATIONS UNDER WHICH THE STRUCTURAL WAS COMPLETED.

CONTRACTOR SHALL FIELD VERIFY ALL: DIMENSIONS, QUANTITIES, PART NUMBERS AND COAX/ANTENNA PLACEMENTS PRIOR TO: BIDDING ORDERING MATERIALS, AND CONSTRUCTION.

INDEX OF SHEETS

PROJECT TEAM

CCI MODIFICATION PROJECT MANAGER:

NAME	CROWN CASTLE
ADDRESS	3530 TORINGDON WAY, SUITE 300
CITY, STATE, ZIP	CHARLOTTE, NC 28277
CONTACT	JOHN MCGEE
PHONE	(704) 877-8397
EMAIL	JOHN.MCGEE@CROWNCASTLE.COM

ENGINEERING FIRM PROJECT MANAGER:

NAME	TOWER ENGINEERING PROFESSIONALS, INC.
ADDRESS	326 TRYON ROAD
CITY, STATE, ZIP	RALEIGH, NC 27603
CONTACT	JOHN S. COPPEDGE, E.I.
PHONE	(919) 661-6351
EMAIL	CMRP@TEPGROUP.NET

ATTENTION

ALL CONTRACTORS, ANYTIME YOU ACCESS A CROWN SITE FOR ANY REASON YOU ARE TO CALL THE CROWN NOC UPON ARRIVAL AND DEPARTURE, DAILY AT 800-788-7011.

PLANS PREPARED FOR:

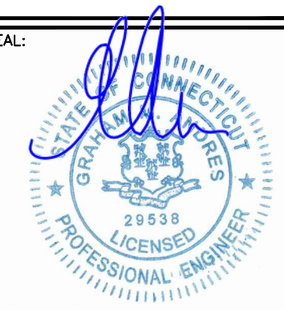
CROWN CASTLE

3530 TORINGDON WAY, SUITE 300
CHARLOTTE, NC 28277
OFFICE: (704) 877-8397

PLANS PREPARED BY:

TOWER ENGINEERING PROFESSIONALS
326 TRYON ROAD
RALEIGH, NC 27603
OFFICE: (919) 661-6351
www.tepgroup.net

SEAL:



Electronic Copy

April 24, 2015

REV	DATE	ISSUED FOR:
0	04-24-15	MODIFICATION DRAWINGS

DRAWN BY: RST | CHECKED BY: AAA

SHEET TITLE:

TITLE SHEET

SHEET NUMBER: **T-1**

REVISION: **0**

TEP #: 51819.31710

MI CHECKLIST

CONSTRUCTION/INSTALLATION INSPECTIONS AND TESTING REQUIRED (COMPLETED BY EOR)	REPORT ITEM
PRE-CONSTRUCTION	
X	MI CHECKLIST DRAWING
X	EOR APPROVAL
X	FABRICATION INSPECTION
NA	FABRICATOR CERTIFIED WELD INSPECTION
X	MATERIAL TEST REPORT (MTR)
NA	FABRICATOR NDE INSPECTION
NA	NDE REPORT OF MONOPOLE BASE PLATE PER ENG-SOW-10033
X	PACKING SLIPS
ADDITIONAL TESTING AND INSPECTIONS:	
CONSTRUCTION	
X	CONSTRUCTION INSPECTIONS
NA	CONTINUOUS FOUNDATION INSPECTIONS
NA	CONCRETE COMP. STRENGTH AND SLUMP TESTS
NA	GROUT COMP. STRENGTH (ASTM C109)
NA	POST INSTALLED ANCHOR ROD VERIFICATION
NA	BASE PLATE GROUT VERIFICATION
NA	CONTRACTOR'S CERTIFIED WELD INSPECTION AND NDE REPORTS
NA	EARTHWORK: LIFT AND DENSITY
X	ON SITE COLD GALVANIZING VERIFICATION
NA	GUY WIRE TENSION REPORT
X	GC AS-BUILT DOCUMENTS
X	NON-TENSION CONTROLLED BOLT INSPECTION. SEE SHEET N-4 FOR DETAILS.
ADDITIONAL TESTING AND INSPECTIONS:	
POST-CONSTRUCTION	
X	MI INSPECTOR REDLINE OR RECORD DRAWING(S)
NA	POST INSTALLED ANCHOR ROD PULL-OUT TESTING
X	PHOTOGRAPHS
ADDITIONAL TESTING AND INSPECTIONS:	

NOTE: X DENOTES A DOCUMENT NEEDED FOR THE PMI REPORT
NA DENOTES A DOCUMENT THAT IS NOT REQUIRED FOR THE PMI REPORT

MODIFICATION INSPECTION NOTES:

GENERAL

THE MODIFICATION INSPECTION (MI) IS A VISUAL INSPECTION OF TOWER MODIFICATIONS AND A REVIEW OF CONSTRUCTION INSPECTIONS AND OTHER REPORTS TO ENSURE THE INSTALLATION WAS CONSTRUCTED IN ACCORDANCE WITH THE CONTRACT DOCUMENTS, NAMELY THE MODIFICATION DRAWINGS, AS DESIGNED BY THE ENGINEER OF RECORD (EOR).

THE MI IS TO CONFIRM INSTALLATION CONFIGURATION AND WORKMANSHIP ONLY AND IS NOT A REVIEW OF THE MODIFICATION DESIGN ITSELF, NOR DOES THE MI INSPECTOR TAKE OWNERSHIP OF THE MODIFICATION DESIGN. OWNERSHIP OF THE STRUCTURAL MODIFICATION DESIGN EFFECTIVENESS AND INTEGRITY RESIDES WITH THE EOR AT ALL TIMES.

ALL MI'S SHALL BE CONDUCTED BY A CROWN ENGINEERING VENDOR (AEV) OR ENGINEERING SERVICE VENDOR (AESV) THAT IS APPROVED TO PERFORM ELEVATED WORK FOR CROWN. SEE ENG-BUL-10173 LIST OF APPROVED MI VENDORS.

TO ENSURE THAT THE REQUIREMENTS OF THE MI ARE MET IT IS VITAL THAT THE GENERAL CONTRACTOR (GC) AND THE MI INSPECTOR BEGIN COMMUNICATING AND COORDINATING AS SOON AS A PO IS RECEIVED. IT IS EXPECTED THAT EACH PARTY WILL BE PROACTIVE IN REACHING OUT TO THE OTHER PARTY. IF CONTACT INFORMATION IS NOT KNOWN, CONTACT YOUR CROWN POINT OF CONTACT (POC).

REFER TO ENG-SOW-10007: MODIFICATION INSPECTION SOW FOR FURTHER DETAILS AND REQUIREMENTS.

MI INSPECTOR

THE MI INSPECTOR IS REQUIRED TO CONTACT THE GC AS SOON AS RECEIVING A PO FOR THE MI TO, AT A MINIMUM:

- REVIEW THE REQUIREMENTS OF THE MI CHECKLIST
- WORK WITH THE GC TO DEVELOP A SCHEDULE TO CONDUCT ON-SITE INSPECTIONS, INCLUDING FOUNDATION INSPECTIONS

THE MI IS RESPONSIBLE FOR COLLECTING ALL GENERAL CONTRACTORS (GC) INSPECTION AND TEST REPORTS, REVIEWING THE DOCUMENTS FOR ADHERENCE TO THE CONTRACT DOCUMENTS, CONDUCTING THE IN-FIELD INSPECTIONS, AND SUBMITTING THE MI REPORT TO CROWN.

GENERAL CONTRACTOR

THE GC IS REQUIRED TO CONTACT THE MI INSPECTOR AS SOON AS RECEIVING A PO FOR THE MODIFICATION INSTALLATION OR TURNKEY PROJECT TO, AT A MINIMUM:

- REVIEW THE REQUIREMENTS OF THE MI CHECKLIST.
- WORK WITH THE MI INSPECTOR TO DEVELOP A SCHEDULE TO CONDUCT ON-SITE MI INSPECTIONS, INCLUDING FOUNDATION INSPECTIONS.
- BETTER UNDERSTAND ALL INSPECTION AND TESTING REQUIREMENTS.

THE GC SHALL PERFORM AND RECORD THE TEST AND INSPECTION RESULTS IN ACCORDANCE WITH THE REQUIREMENTS OF THE MI CHECKLIST AND ENG-SOW-10007.

RECOMMENDATIONS

THE FOLLOWING RECOMMENDATIONS AND SUGGESTIONS ARE OFFERED TO ENHANCE THE EFFICIENCY AND EFFECTIVENESS OF DELIVERING A MI REPORT:

- IT IS SUGGESTED THAT THE GC PROVIDE A MINIMUM OF 5 BUSINESS DAYS NOTICE, PREFERABLY 10, TO THE MI INSPECTOR AS TO WHEN THE SITE WILL BE READY FOR THE MI TO BE CONDUCTED.
- THE GC AND MI INSPECTOR COORDINATE CLOSELY THROUGHOUT THE ENTIRE PROJECT.
- WHEN POSSIBLE IT IS PREFERRED TO HAVE THE GC AND MI INSPECTOR ON-SITE SIMULTANEOUSLY FOR ANY GUY WIRE TENSIONING OR RE-TENSIONING OPERATIONS.
- IT MAY BE BENEFICIAL TO INSTALL ALL TOWER MODIFICATIONS PRIOR TO CONDUCTING THE FOUNDATION INSPECTIONS TO ALLOW FOUNDATION AND MI INSPECTION(S) TO COMMENCE WITH ONE SITE VISIT.

RECOMMENDATIONS (CONTINUED)

- WHEN POSSIBLE, IT IS PREFERRED TO HAVE THE GC AND MI INSPECTOR ON-SITE DURING THE MI TO HAVE ANY DEFICIENCIES CORRECTED DURING THE INITIAL MI, THEREFORE, THE GC MAY CHOOSE TO COORDINATE THE MI CAREFULLY TO ENSURE ALL CONSTRUCTION FACILTIES ARE AT THEIR DISPOSAL WHEN THE MI INSPECTOR IS ON SITE.

CANCELLATION OR DELAYS IN SCHEDULED MI

IF THE GC AND MI INSPECTOR AGREE TO A DATE ON WHICH THE MI WILL BE CONDUCTED, AND EITHER PARTY CANCELS OR DELAYS, CROWN SHALL NOT BE RESPONSIBLE FOR ANY COSTS, FEES, LOSS OF DEPOSITS AND/OR OTHER PENALTIES RELATED TO THE CANCELLATION OR DELAY INCURRED BY EITHER PARTY FOR ANY TIME (E.G. TRAVEL AND LODGING, COSTS OF KEEPING EQUIPMENT ON-SITE, ETC.). IF CROWN CONTRACTS DIRECTLY FOR A THIRD PARTY MI, EXCEPTIONS MAY BE MADE IN THE EVENT THAT THE DELAY/CANCELLATION IS CAUSED BY WEATHER OR OTHER CONDITIONS THAT MAY COMPROMISE THE SAFETY OF THE PARTIES INVOLVED.

CORRECTION OF FAILING MI'S

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

- CORRECT FAILING ISSUES TO COMPLY WITH THE SPECIFICATIONS CONTAINED IN THE ORIGINAL CONTRACT DOCUMENTS AND COORDINATE A SUPPLEMENT MI.
- OR, WITH CROWN'S APPROVAL, THE GC MAY WORK WITH EOR TO RE-ANALYZE THE MODIFICATION/REINFORCEMENT USING THE AS-BUILT CONDITION.

MI VERIFICATION INSPECTIONS

CROWN RESERVES THE RIGHT TO CONDUCT A MI VERIFICATION INSPECTION TO VERIFY THE ACCURACY AND COMPLETENESS OF PREVIOUSLY COMPLETED MI INSPECTION(S) ON TOWER MODIFICATION PROJECTS.

ALL VERIFICATION INSPECTIONS SHALL BE HELD TO THE SAME SPECIFICATIONS AND REQUIREMENTS IN THE CONTRACT DOCUMENTS IN ACCORDANCE WITH ENG-SOW-10007.

VERIFICATION INSPECTION MAY BE CONDUCTED BY AN INDEPENDENT AEV/AESV FIRM AFTER A MODIFICATION PROJECT IS COMPLETED, AS MARKED BY THE OF AN ACCEPTED "PASSING MI" OR "PASS AS NOTED MI" REPORT FOR THE ORIGINAL PROJECT.

REQUIRED PHOTOS

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

- PRE-CONSTRUCTION GENERAL SITE CONDITION
- PHOTOGRAPHS DURING THE REINFORCEMENT MODIFICATION CONSTRUCTION/ERECTIONS AND INSPECTION:
  - RAW MATERIALS
  - PHOTOS OF ALL CRITICAL DETAILS
  - FOUNDATION MODIFICATIONS
  - WELD PREPARATION
  - BOLT INSTALLATION AND TORQUE
  - FINAL INSTALLED CONDITION
  - SURFACE COATING REPAIR
- POST CONSTRUCTION PHOTOGRAPHS
  - FINAL IN FIELD CONDITION

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

THIS IS NOT A COMPLETE LIST OF REQUIRED PHOTOS, PLEASE REFER TO ENG-SOW-10007.

PLANS PREPARED FOR:

CROWN CASTLE

3530 TORINGDON WAY, SUITE 300
CHARLOTTE, NC 28277
OFFICE: (704) 877-8397

PROJECT INFORMATION:

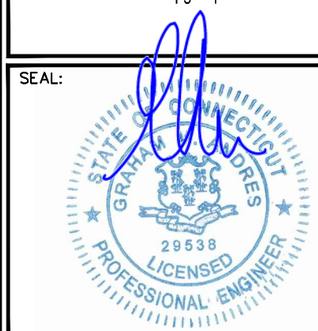
WARD
BU #: 876381

2365 LONG HILL RD.
GUILFORD, CT 06437
(NEW HAVEN COUNTY)

PLANS PREPARED BY:

TOWER ENGINEERING PROFESSIONALS
326 TRYON ROAD
RALEIGH, NC 27603
OFFICE: (919) 661-6351
www.tepgroup.net

SEAL:



Electronic Copy

April 24, 2015

REV	DATE	ISSUED FOR:
0	04-24-15	MODIFICATION DRAWINGS

DRAWN BY: RST | CHECKED BY: AAA

SHEET TITLE:

MI CHECKLIST AND NOTES

SHEET NUMBER: **N-1**

REVISION: **0**

TEP #: 51819.31710

GENERAL NOTES:

1. ALL REFERENCES TO THE OWNER IN THESE DOCUMENTS SHALL BE CONSIDERED CROWN CASTLE OR ITS DESIGNATED REPRESENTATIVE.

2. ALL WORK PRESENTED ON THESE DRAWINGS MUST BE COMPLETED BY THE CONTRACTOR UNLESS NOTED OTHERWISE. THE CONTRACTOR MUST HAVE CONSIDERABLE EXPERIENCE IN PERFORMANCE OF WORK SIMILAR TO THAT DESCRIBED HEREIN. BY ACCEPTANCE OF THIS ASSIGNMENT, THE CONTRACTOR IS ATTESTING THAT HE DOES HAVE SUFFICIENT EXPERIENCE AND ABILITY, THAT HE IS KNOWLEDGEABLE OF THE WORK TO BE PERFORMED AND THAT HE IS PROPERLY LICENSED AND PROPERLY REGISTERED TO DO THIS WORK IN THE STATE OF CONNECTICUT.

3. WORK SHALL BE COMPLETED IN ACCORDANCE WITH THE 2005 CONNECTICUT STATE BUILDING CODE.

4. UNLESS SHOWN OR NOTED OTHERWISE ON THE CONTRACT DRAWINGS, OR IN THE SPECIFICATIONS, THE FOLLOWING NOTES SHALL APPLY TO THE MATERIALS LISTED HEREIN, AND TO THE PROCEDURES TO BE USED ON THIS PROJECT.

5. ALL HARDWARE ASSEMBLY MANUFACTURER'S INSTRUCTIONS SHALL BE FOLLOWED EXACTLY AND SHALL SUPERSEDE ANY CONFLICTING NOTES ENCLOSED HEREIN.

6. IT IS THE CONTRACTOR'S SOLE RESPONSIBILITY TO DETERMINE ERECTION PROCEDURE AND SEQUENCE TO ENSURE THE SAFETY OF THE STRUCTURE AND ITS COMPONENT PARTS DURING ERECTION AND/OR FIELD MODIFICATIONS. THIS INCLUDES, BUT IS NOT LIMITED TO, THE ADDITION OF TEMPORARY BRACING, GUYS OR TIE DOWNS THAT MAY BE NECESSARY. SUCH MATERIAL SHALL BE REMOVED AND SHALL REMAIN THE PROPERTY OF THE CONTRACTOR AFTER THE COMPLETION OF THE PROJECT.

7. ALL DIMENSIONS, ELEVATIONS, AND EXISTING CONDITIONS SHOWN ON THE DRAWINGS SHALL BE FIELD VERIFIED BY THE CONTRACTOR PRIOR TO BEGINNING ANY MATERIALS ORDERING, FABRICATION OR CONSTRUCTION WORK ON THIS PROJECT. CONTRACTOR SHALL NOT SCALE CONTRACT DRAWINGS IN LIEU OF FIELD VERIFICATIONS. ANY DISCREPANCIES SHALL BE IMMEDIATELY BROUGHT TO THE ATTENTION OF THE OWNER AND THE OWNER'S ENGINEER. THE DISCREPANCIES MUST BE RESOLVED BEFORE THE CONTRACTOR IS TO PROCEED WITH THE WORK. THE CONTRACT DOCUMENTS DO NOT INDICATE THE METHOD OF CONSTRUCTION. THE CONTRACTOR SHALL SUPERVISE AND DIRECT THE WORK AND SHALL BE SOLELY RESPONSIBLE FOR ALL CONSTRUCTION MEANS, METHODS, TECHNIQUES, SEQUENCES, AND PROCEDURES. OBSERVATION VISITS TO THE SITE BY THE OWNER AND/OR THE ENGINEER SHALL NOT INCLUDE INSPECTION OF THE PROTECTIVE MEASURES OR THE PROCEDURES.

8. ALL MATERIALS AND EQUIPMENT FURNISHED SHALL BE NEW AND OF GOOD QUALITY, FREE FROM FAULTS AND DEFECTS AND IN CONFORMANCE WITH THE CONTRACT DOCUMENTS. ANY AND ALL SUBSTITUTIONS MUST BE PROPERLY APPROVED AND AUTHORIZED IN WRITING BY THE OWNER AND ENGINEER PRIOR TO INSTALLATION. THE CONTRACTOR SHALL FURNISH SATISFACTORY EVIDENCE AS TO THE KIND AND QUALITY OF THE MATERIALS AND EQUIPMENT BEING SUBSTITUTED.

9. THE CONTRACTOR SHALL BE RESPONSIBLE FOR INITIATING, MAINTAINING, AND SUPERVISING ALL SAFETY PRECAUTIONS AND PROGRAMS IN CONNECTION WITH THE WORK. THE CONTRACTOR IS RESPONSIBLE FOR ENSURING THAT THIS PROJECT AND RELATED WORK COMPLIES WITH ALL APPLICABLE LOCAL, STATE, AND FEDERAL SAFETY CODES AND REGULATIONS GOVERNING THIS WORK.

10. ACCESS TO THE PROPOSED WORK SITE MAY BE RESTRICTED. THE CONTRACTOR SHALL COORDINATE INTENDED CONSTRUCTION ACTIVITY, INCLUDING WORK SCHEDULE AND MATERIALS ACCESS, WITH THE RESIDENT LEASING AGENT FOR APPROVAL.

11. ALL PERMITS THAT MUST BE OBTAINED ARE THE RESPONSIBILITY OF THE CONTRACTOR. THE CONTRACTOR WILL BE RESPONSIBLE FOR ABIDING BY ALL CONDITIONS AND REQUIREMENTS OF THE PERMITS.

12. IF APPLICABLE, ALL CONCRETE WORK SHALL COMPLY TO LOCAL CODES AND THE ACI 318-05, "BUILDING REQUIREMENTS FOR STRUCTURAL CONCRETE".

13. 24 HOURS PRIOR TO THE BEGINNING OF ANY CONSTRUCTION, THE CONTRACTOR MUST NOTIFY THE APPLICABLE JURISDICTIONAL (STATE, COUNTY OR CITY) ENGINEER.

14. ALL MATERIALS AND WORKMANSHIP SHALL BE WARRANTED FOR ONE YEAR FROM ACCEPTANCE DATE.

15. ALL TOWER DIMENSIONS SHALL BE VERIFIED WITH THE PLANS (LATEST REVISION) PRIOR TO COMMENCING CONSTRUCTION. NOTIFY THE ENGINEER IMMEDIATELY IF ANY DISCREPANCIES ARE DISCOVERED. THE OWNER SHALL HAVE A SET OF APPROVED PLANS AVAILABLE AT THE SITE AT ALL TIMES WHILE WORK IS BEING PERFORMED. A DESIGNATED RESPONSIBLE EMPLOYEE SHALL BE AVAILABLE FOR CONTACT BY GOVERNING AGENCY INSPECTORS.

16. ALL TOWER MODIFICATION WORK SHALL BE IN ACCORDANCE WITH TIA-1019-A STANDARD FOR INSTALLATION, ALTERATION AND MAINTENANCE OF ANTENNA SUPPORTING STRUCTURES AND ANTENNAS.

17. THE CLIMBING FACILITIES, SAFETY CLIMB AND ALL PARTS THEREOF SHALL NOT BE IMPEDED, MODIFIED OR ALTERED WITHOUT THE EXPRESS WRITTEN APPROVAL OF THE TOWER OWNER OR ENGINEER OF RECORD.

PLANS PREPARED FOR:

CROWN CASTLE

3530 TORINGDON WAY, SUITE 300
CHARLOTTE, NC 28277
OFFICE: (704) 877-8397

PROJECT INFORMATION:

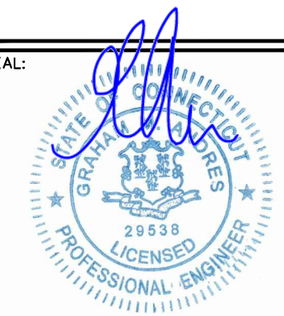
WARD
BU #: 876381

2365 LONG HILL RD.
GUILFORD, CT 06437
(NEW HAVEN COUNTY)

PLANS PREPARED BY:

TOWER ENGINEERING PROFESSIONALS
326 TRYON ROAD
RALEIGH, NC 27603
OFFICE: (919) 661-6351
www.tepgroup.net

SEAL:



Electronic Copy

April 24, 2015

REV	DATE	ISSUED FOR:
0	04-24-15	MODIFICATION DRAWINGS

DRAWN BY: RST | CHECKED BY: AAA

SHEET TITLE:

PROJECT NOTES I

SHEET NUMBER: **N-2**

REVISION: **0**

TEP #: 51819.31710

STRUCTURAL STEEL NOTES:

1. THE FABRICATION AND ERECTION OF STRUCTURAL STEEL SHALL CONFORM TO THE AISC SPECIFICATION FOR MANUAL OF STEEL CONSTRUCTION, ALLOWABLE STRESS DESIGN (ASD), 9TH EDITION.

2. UNLESS OTHERWISE NOTED, ALL STRUCTURAL ELEMENTS SHALL CONFORM TO THE FOLLOWING REQUIREMENTS:
   STRUCTURAL STEEL:
   - ANGLE: ASTM A36
   - PIPE/TUBE: ASTM A500-50
   - PLATE: ASTM A36 (SELF SUPPORTING AND GUYED TOWERS)
   - PLATE: ASTM A572-65 (MONOPOLE)

   A. ALL BOLTS, ASTM A325 TYPE I GALVANIZED HIGH STRENGTH BOLTS.
   B. ALL U-BOLTS, ASTM A193 GRADE B7
   C. ALL NUTS, ASTM A563 CARBON AND ALLOY STEEL NUTS.
   D. ALL WASHERS, ASTM F436 HARDENED STEEL WASHERS.

3. ALL CONNECTIONS NOT FULLY DETAILED ON THESE PLANS SHALL BE DETAILED BY THE STEEL FABRICATOR IN ACCORDANCE WITH AISC SPECIFICATION FOR MANUAL OF STEEL CONSTRUCTION, ASD, 9TH EDITION.

4. HOLES SHALL NOT BE FLAME CUT THRU STEEL UNLESS APPROVED BY THE ENGINEER.

5. HOT-DIP GALVANIZE ALL ITEMS UNLESS OTHERWISE NOTED, AFTER FABRICATION WHERE PRACTICABLE. GALVANIZING: ASTM A123, ASTM, A153/A153M OR ASTM A653/A653M, G90, AS APPLICABLE. ADDITIONALLY, ALL NEW STEEL SHALL BE PAINTED TO MATCH EXISTING STEEL. CONTRACTOR SHALL OBTAIN WRITTEN PERMISSION TO PROTECT STEEL BY ANY OTHER MEANS.

6. REPAIR DAMAGED SURFACES WITH GALVANIZING REPAIR METHOD AND PAINT CONFORMING TO ASTM A780 OR BY APPLICATION OF STICK OR THICK PASTED MATERIAL SPECIFICALLY DESIGNED FOR REPAIR OF GALVANIZING. CLEAN AREAS TO BE REPAIRED AND REMOVE SLAG FROM WELDS. HEAT SURFACES TO WHICH STICK OR PASTE MATERIAL IS APPLIED, WITH A TORCH TO A TEMPERATURE SUFFICIENT TO MELT THE METALLICS IN STICK OR PASTED; SPREAD MOLTEN MATERIAL UNIFORMLY OVER SURFACES TO BE COATED AND WIPE OFF EXCESS MATERIAL. AFTER REPAIR, STEEL SHALL BE REPAINTED TO MATCH EXISTING FINISH (IF APPLICABLE).

7. A NUT LOCKING DEVICE SHALL BE INSTALLED ON ALL PROPOSED AND/OR REPLACED BOLTS.

8. ALL PROPOSED AND/OR REPLACED BOLTS SHALL BE OF SUFFICIENT LENGTH TO EXCLUDE THE THREADS FROM THE SHEAR PLANE.

9. ALL PROPOSED AND/OR REPLACED BOLTS SHALL BE OF SUFFICIENT LENGTH SUCH THAT THE END OF THE BOLT BE AT LEAST FLUSH WITH THE FACE OF THE NUT. IT IS NOT PERMITTED FOR THE BOLT END TO BE BELOW THE FACE OF THE NUT AFTER TIGHTENING IS COMPLETED.

10. GALVANIZED ASTM A325 BOLTS SHALL NOT BE REUSED.

WELDING NOTES:

1. ALL WELDING SHALL BE IN ACCORDANCE WITH THE AWS D1.1/D1.1M: 2004 "STRUCTURAL WELDING CODE-STEEL".

2. ALL WELDING SHALL BE PERFORMED BY AWS CERTIFIED WELDERS.

3. CONTRACTOR SHALL RETAIN AN AWS CERTIFIED WELD INSPECTOR TO PERFORM VISUAL INSPECTIONS ON FIELD WELDS. A LETTER AND REPORT SHALL BE ISSUED TO THE CONTRACTOR. CONTRACTOR SHALL SUBMIT LETTER AND REPORT TO TOWER ENGINEERING PROFESSIONALS.

4. GRIND THE SURFACE ADJACENT TO THE WELD FOR A DISTANCE OF 2" MINIMUM ALL AROUND. GRIND THE SURFACE OF THE ROD TO BE INSTALLED FOR A DISTANCE OF 2" MINIMUM ALL AROUND THE AREA TO BE WELDED. ENSURE BOTH AREAS ARE 100% FREE OF ALL GALVANIZING. SURFACES TO BE WELDED SHALL BE FREE FROM SCALE, SLAG, RUST, MOISTURE, GREASE OR ANY OTHER FOREIGN MATERIAL THAT WOULD PREVENT PROPER WELDING.

5. DO NOT WELD IF THE TEMPERATURE OF THE STEEL IN THE VICINITY OF THE WELD AREA IS BELOW 0°F. THE MINIMUM PREHEAT AND INTERPASS TEMPERATURE REQUIREMENTS SHALL COMPLY WITH SECTION 3.5.1 AND TABLE 3.2 OF THE AWS D1.1/D1.1M:2004.

6. DO NOT WELD ON WET OR FROST-COVERED SURFACES & PROVIDE ADEQUATE PROTECTION FROM HIGH WINDS.

7. FOR ALL WELDING, USE 80 KSI LOW HYDROGEN ELECTRODES. ELECTRODES SHALL BE APPROPRIATE FOR THE WELDING POSITION REQUIRED TO MAKE THE JOINT.

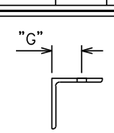
8. AFTER FINAL INSPECTION, THE AREA OF THE WELDS, THE INSTALLATION AND ALL SURFACES DAMAGED BY WELDING OR GRINDING SHALL RECEIVE A COLD-GALVANIZED COATING. THIS COATING SHALL BE APPLIED BY BRUSH. THE GALVANIZING COMPOUND SHALL CONTAIN A MINIMUM OF 95% ± PURE ZINC. THE FINISHED COATING SHALL BE A MINIMUM THICKNESS OF 3 MILS.

9. FOR MONOPOLE TOWERS FULL PENETRATION WELDS IN THE VICINITY OF THE BASE OF THE TOWER ARE REQUIRED TO BE 100% NDE INSPECTED BY ULTRASONIC TESTING (UT) IN ACCORDANCE WITH AWS D1.1.

10. FOR MONOPOLE TOWERS PARTIAL PENETRATION AND FILLET WELDS IN THE VICINITY OF THE BASE OF THE TOWER ARE REQUIRED TO BE 50% NDE INSPECTED BY MAGNETIC PARTICLE (MT) IN ACCORDANCE WITH AWS D1.1.

WORKABLE GAGES

LEG	4	3½	3	2½	2	1¾
G	2	1¾	1½	1¼	1	⅞



- WORKABLE GAGES GIVEN IN INCHES
- MATCH EXISTING WHEN APPLICABLE

BOLT TIGHTENING PROCEDURE:

1. TIGHTEN CONNECTION BOLTS BY AISC – "TURN OF THE NUT" METHOD, USING THE CHART BELOW.

BOLT LENGTHS UP TO AND INCLUDING FOUR DIA.

½"	BOLTS UP TO AND INCLUDING 2.0 INCH LENGTH	+⅓ TURN BEYOND SNUG TIGHT
⅝"	BOLTS UP TO AND INCLUDING 2.5 INCH LENGTH	+⅓ TURN BEYOND SNUG TIGHT
¾"	BOLTS UP TO AND INCLUDING 3.0 INCH LENGTH	+⅓ TURN BEYOND SNUG TIGHT
⅞"	BOLTS UP TO AND INCLUDING 3.5 INCH LENGTH	+⅓ TURN BEYOND SNUG TIGHT
1"	BOLTS UP TO AND INCLUDING 4.0 INCH LENGTH	+⅓ TURN BEYOND SNUG TIGHT

BOLT LENGTHS OVER FOUR DIA. BUT NOT EXCEEDING EIGHT DIA.

½"	BOLTS 2.25 TO 4.0 INCH LENGTH	+½ TURN BEYOND SNUG TIGHT
⅝"	BOLTS 2.75 TO 5.0 INCH LENGTH	+½ TURN BEYOND SNUG TIGHT
¾"	BOLTS 3.25 TO 6.0 INCH LENGTH	+½ TURN BEYOND SNUG TIGHT
⅞"	BOLTS 3.75 TO 7.0 INCH LENGTH	+½ TURN BEYOND SNUG TIGHT
1"	BOLTS 4.25 TO 8.0 INCH LENGTH	+½ TURN BEYOND SNUG TIGHT

2. CONNECTION BOLTS SUBJECT TO DIRECT TENSION SHALL BE INSTALLED AND TIGHTENED AS PER SECTION 8.2.1 OF THE AISC SPECIFICATION FOR STRUCTURAL JOINTS USING A325 OR A490 BOLTS, LOCATED IN THE AISC MANUAL OF STEEL CONSTRUCTION. THE INSTALLATION PROCEDURE IS PARAPHRASED AS FOLLOWS:

3. FASTENERS SHALL BE INSTALLED IN PROPERLY ALIGNED HOLES AND TIGHTENED BY ONE OF THE METHODS DESCRIBED IN SUBSECTION 8.2.1 THROUGH 8.2.4.

8.2.1 TURN-OF-THE-NUT TIGHTENING

BOLTS SHALL BE INSTALLED IN ALL HOLES OF THE CONNECTION AND BROUGHT TO A SNUG TIGHT CONDITION AS DEFINED IN SECTION 8.1, UNTIL ALL THE BOLTS ARE SIMULTANEOUSLY SNUG TIGHT AND THE CONNECTION IS FULLY COMPACTED. FOLLOWING THIS INITIAL OPERATION ALL BOLTS IN THE CONNECTION SHALL BE TIGHTENED FURTHER BY THE APPLICABLE AMOUNT OF ROTATION SPECIFIED ABOVE. DURING THE TIGHTENING OPERATION THERE SHALL BE NO ROTATION OF THE PART NOT TURNED BY THE WRENCH. TIGHTENING SHALL PROGRESS SYSTEMATICALLY FROM THE MOST RIGID PART OF THE JOINT IN A MANNER THAT WILL MINIMIZE RELAXATION OF PREVIOUSLY PRETENSIONED BOLTS.

4. ALL OTHER BOLTED CONNECTIONS SHALL BE BROUGHT TO A SNUG TIGHT CONDITION AS DEFINED IN SECTION 8.1 OF THE SPECIFICATION.

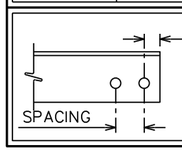
NOMINAL HOLE DIMENSIONS

BOLT DIAMETER	STANDARD HOLE	SHORT SLOT
½	9/16	9/16 X 1 1/16
⅝	1 1/16	1 1/16 X ⅞
¾	1 3/16	1 3/16 X 1
⅞	1 5/16	1 5/16 X 1⅛
1	1 1/16	1 1/16 X 1 5/16

– DIMENSIONS GIVEN IN INCHES

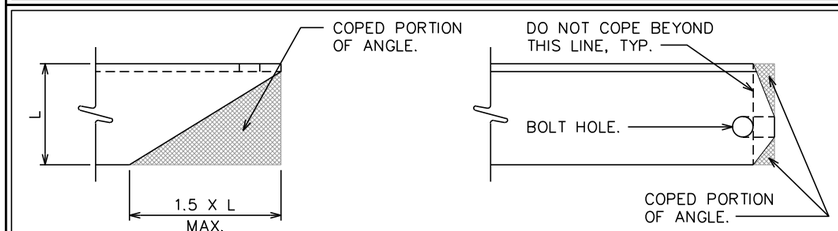
BOLT EDGE AND SPACING

BOLT DIAMETER	MIN. EDGE	SPACING
½	⅞	1½
⅝	1⅛	1⅞
¾	1¼	2¼
⅞	1½	2⅝
1	1¾	3



– DIMENSIONS GIVEN IN INCHES

ALLOWABLE ANGLE COPE



PLANS PREPARED FOR:

CROWN CASTLE

3530 TORINGDON WAY, SUITE 300
CHARLOTTE, NC 28277
OFFICE: (704) 877-8397

PROJECT INFORMATION:

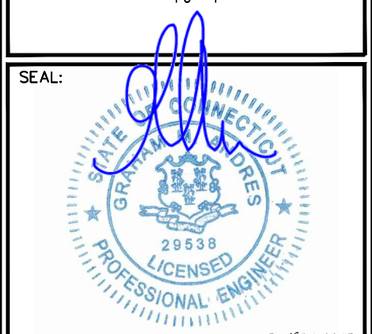
WARD
BU #: 876381

2365 LONG HILL RD.
GUILFORD, CT 06437
(NEW HAVEN COUNTY)

PLANS PREPARED BY:

TOWER ENGINEERING PROFESSIONALS
326 TRYON ROAD
RALEIGH, NC 27603
OFFICE: (919) 661-6351
www.tepgroup.net

SEAL:



Electronic Copy

April 24, 2015

REV	DATE	ISSUED FOR:
0	04-24-15	MODIFICATION DRAWINGS

DRAWN BY: XXX | CHECKED BY: XXX

SHEET TITLE:

PROJECT NOTES II

SHEET NUMBER: **N-3**

REVISION: **0**

TEP #: 51819.31710

BOLTS AND COMPONENTS SPECIFICATIONS:

BOLT:
AJAX M20 "ONE SIDE" BLIND BOLT

SHEAR SLEEVE:
Fu = 120 KSI (MINIMUM)
29mm O.D. X 20 mm I.D.
LENGTH = NOMINAL [GRIP−6mm] = [GRIP − 0.25"] (TOLERANCE: −0", +1/32")
SLEEVE SHALL BE ROUND, WITH ENDS CUT SQUARE AND DEBURRED.

SPECIAL WASHER:
ASTM F959 SQUIRTER® DTI M20 (EQUIVALENT TO A325 BOLT)
MANUFACTURER:
APPLIED BOLTING TECHNOLOGY PRODUCTS, INC.
1413 ROCKINGHAM ROAD BELLOW FALLS, VERMONT, USA 05101
PHONE: (800) 552−1999
WEBSITE: WWW.APPLIEDBOLTING.COM

DISTRIBUTORS OF SQUIRTER® DTI'S:
HTTP://WWW.APPLIEDBOLTING.COM/APPLIED−BOLTING−DISTRIBUTORS.HTML

WASHER:
ASTM F436 HARDENED FLAT WASHER M20

BOLT ASSEMBLY FINISHING:
SHEAR SLEEVE: COLD GALVANIZED AS PER CROWN ENG−BUL−10149 OR CADMIUM PLATED
ALL OTHER PARTS: HOT DIP GALVANIZED

BOLT INSTALLATION ASSEMBLY:
AS SHOWN ON THE DRAWING

INSTALLATION NOTES:
DTI WASHERS MUST BE PLACED DIRECTLY AGAINST THE OUTER AJAX WASHER WITH THE BUMPS FACING AWAY FROM THE AJAX WASHER. PLACE A HARDENED WASHER BETWEEN THE DTI AND THE AJAX NUT. THE DTI BUMPS SHALL BEAR AGAINST THE UNDERSIDE OF A HARDENED FLAT WASHER, NEVER DIRECTLY AGAINST THE NUT.

TIGHTEN THE BOLT ASSEMBLY UNTIL THE ORANGE SILICONE APPEARS FROM UNDER THE DTI'S SQUIRT LOCATIONS, THEN STOP TIGHTENING.

FOLLOW DTI MANUFACTURER'S INSTRUCTIONS FOR INSTALLATION, LUBRICATION, TIGHTENING, AND INSPECTION.

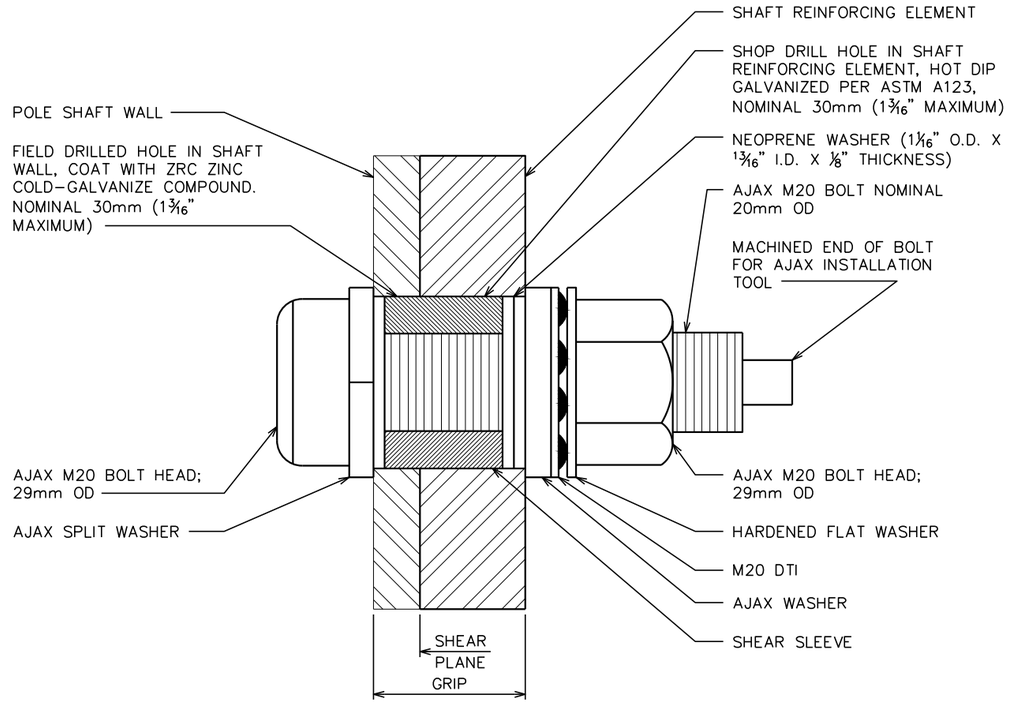
AS AN ALTERNATIVE TO USING THE DTI WASHER THE BOLTS MAY BE PRETENSIONED USING THE TURN−OF−NUT METHOD AS SPECIFIED IN SECTION 8.2.1 TURN−OF−NUT PRETENSIONING OF THE RCSC SPECIFICATION FOR STRUCTURAL JOINTS USING HIGH−STRENGTH BOLTS. ALL FASTENERS SHALL BE INSPECTED PER SECTION 9.2.1 OF THE RCSC SPECIFICATION. THE BOLTS SHALL BE MATCH MARKED WITH A PERMANENT MARKER TO FACILITATE THE INSPECTION.

INSPECTION:
ALL AJAX BOLTS WITH DTI'S SHALL BE VISUALLY INSPECTED ACCORDING TO THE DTI MANUFACTUER'S INSTRUCTIONS BOLT INSPECTOR SHALL PROVIDE PHOTO DOCUMENTATION OF BOLTS AFTER TIGHTENING CLEARLY SHOWING THE CONDITION OF THE DTI'S.

INSPECTION PROCEDURES:
- REVIEW MODIFICATION DESIGN DRAWINGS.
- ENSURE AISC PRE−TENSION REQUIREMENTS ARE INCLUDED.
- PHOTO (PREFERABLY VIDEO) OF THE FOLLOWING:
  - NOTE THE PRESENCE OF ANY LUBRICANT
  - NOTE THE PRESENCE OF ANY NUT/BOLT MARKINGS USED TO APPLY THE AISC "TURN OF THE NUT" METHOD PRIOR TO APPLYING NEW MARKINGS
  - BE SURE THAT ANY NEW MARKINGS MADE BY THE MI INSPECTOR ARE DISTINGUISHABLE (DIFFERENT COLOR) TO ANY ORIGINAL MARKINGS
  - MARK THE BOLT AND NUT WITH MARKER TO DOCUMENT POSITION UPON ARRIVAL. RUN THE MARK ONTO THE POLE AS WELL.
  - USE YOUR HAND TO FIRST ASSURE THE NUT IS TIGHT, TRYING TO TURN THE NUT IN ANY DIRECTION.
  - BOLT TYPES:
  - FOR AJAX, USING AJAX TOOL TO HOLD THE BOLT AND A SPUD WRENCH (OR SIMILAR) ON THE NUT. APPLY FIRM FORCE TO THE NUT IN THE CLOCKWISE DIRECTION (THIS IS NOT THE FULL EFFORT OF THE PERSON).
  - FOR OTHER STRUCTURAL BOLTS, ENSURE THE BOLT CAN BE HELD WHILECHECKING THE TIGHTNESS OF THE ASSEMBLY.
  - DOCUMENT BOLTS TESTED AND RESULTS, USE THE NUMBER CONVENTION BELOW AND WRITE ON THE POLE AND PHOTOGRAPH:
  - A THREE DIGIT CONVENTION SHALL BE USED (1, 3, 15)
  - THE FIRST DIGIT − THE FLAT NUMBER. ON ROUND POLES, THIS FIRST DIGIT SHALL BE REPLACED WITH THE HEADING (N, NE, E, SE, S, SW, W, N, NW)
  - THE SECOND DIGIT − THE NUMBER OF REINFORCING BARS ON THAT FLAT, STARTING WITH THE LOWEST BAR AS 1
  - THE THIRD DIGIT − THE NUMBER OF BOLTS ON THAT BAR STARTING WITH THE LOWEST BOLT AS 1
  - FLATS AND ROUND POLES ARE TO BE LABELED IN ACCORDANCE WITH THE MONOPOLE FLAT NUMBER PROCEDURE

INTERIOR OF POLE SHAFT

EXTERIOR OF POLE SHAFT



AJAX BOLT DETAILS

PLANS PREPARED FOR:

CROWN CASTLE

3530 TORINGDON WAY, SUITE 300
CHARLOTTE, NC 28277
OFFICE: (704) 877−8397

PROJECT INFORMATION:

WARD
BU #: 876381

2365 LONG HILL RD.
GUILFORD, CT 06437
(NEW HAVEN COUNTY)

PLANS PREPARED BY:

TOWER ENGINEERING PROFESSIONALS
326 TRYON ROAD
RALEIGH, NC 27603
OFFICE: (919) 661-6351
www.tepgroup.net

SEAL:

Electronic Copy

April 24, 2015

REV	DATE	ISSUED FOR:
0	04-24-15	MODIFICATION DRAWINGS

DRAWN BY: RST | CHECKED BY: AAA

SHEET TITLE:

AJAX BOLT INSTALLATION DETAILS

SHEET NUMBER: **N-4**

REVISION: **0**

TEP #: 51819.31710

NOTES:

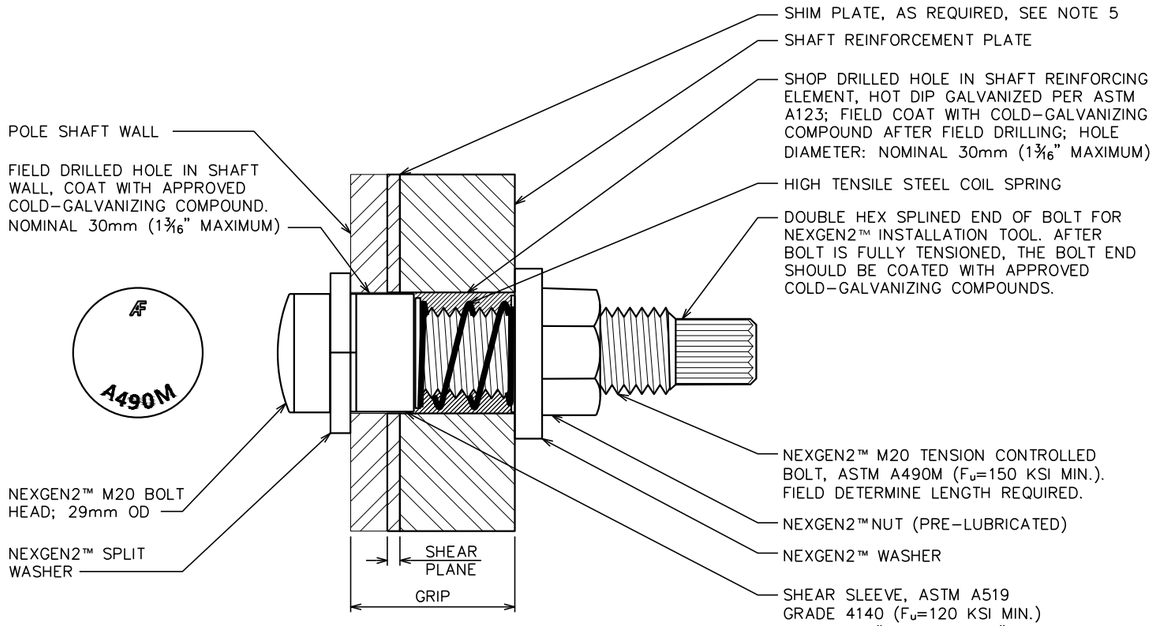
1. ALL SHOP AND FIELD DRILLED HOLES SHALL BE NOMINAL 30mm DIAMETER. THE MAXIMUM HOLE DIAMETER PERMITTED IS 1–3⁄16".
2. THE NEXTGEN2™ SHALL BE MAGNI 363 COATED PER ASTM F2833 AS APPROPRIATE.
3. INSTALL PER MANUFACTURER'S INSTRUCTIONS.
4. SHEAR SLEEVE MUST EXTEND BEYOND THE SHEAR PLANE.
5. SHIMS FOR MONOPOLE REINFORCEMENT MEMBER SHALL BE REQUIRED WHERE GAPS BETWEEN THE POLE SHAFT AND REINFORCING MEMBER EXIST AT FASTENER LOCATIONS. FOR INTERMEDIATE CONNECTIONS, THE MINIMUM SHIM LENGTH AND WIDTH SHALL BE THE WIDTH OF THE REINFORCING MEMBER. FOR TERMINATION CONNECTIONS, A CONTINUOUS SHIM PLATE (PREFERRED) OR EQUIVALENT INDIVIDUAL SHIM PLATES THE WIDTH OF THE REINFORCING MEMBER MAY BE USED. ADJACENT SHIM PLATE THICKNESSES MAY TAPER IN INCREMENTS OF 1⁄16" AND SHALL BE NO LESS THAN 1⁄16". STACKING OF SHIMS IS PERMITTED. SHIMS GREATER THAN 1⁄4" IN THICKNESS LOCATED WITHIN THE TERMINATION LENGTH OF THE SHAFT REINFORCEMENT PLATE SHALL BE WELDED TO THE SHAFT REINFORCEMENT PLATE.

INSPECTION NOTES AND PROCEDURES:

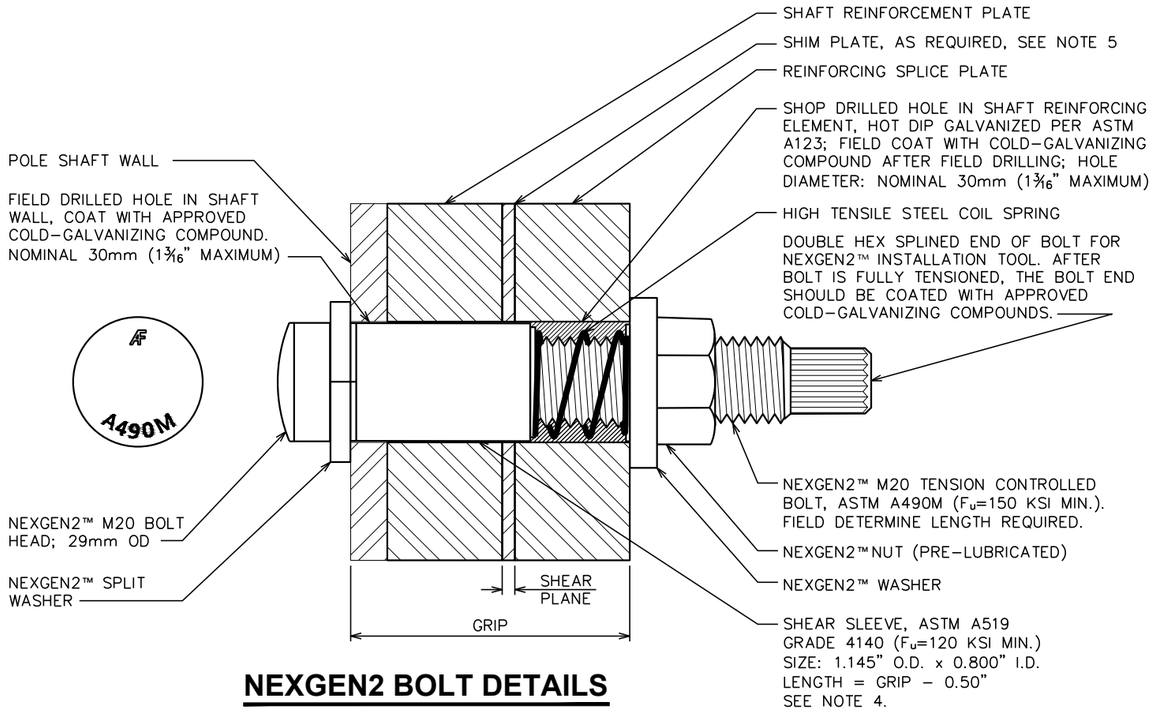
1. REVIEW STRUCTURAL DESIGN DRAWINGS.
2. VISUALLY INSPECT SHEARED BOLT ENDS TO ENSURE CORRECT TENSION WAS ACHEIVED.
3. VERIFY BOLT ENDS ARE SUFFICIENTLY COATED WITH APPROVED COLD–GALVANIZING COMPOUNDS.

INTERIOR OF POLE SHAFT

EXTERIOR OF POLE SHAFT



NEXGEN2 BOLT DETAILS



NEXGEN2 BOLT DETAILS

PLANS PREPARED FOR:

CROWN CASTLE

3530 TORINGDON WAY, SUITE 300
CHARLOTTE, NC 28277
OFFICE: (704) 877–8397

PROJECT INFORMATION:

WARD
BU #: 876381

2365 LONG HILL RD.
GUILFORD, CT 06437
(NEW HAVEN COUNTY)

PLANS PREPARED BY:

TOWER ENGINEERING PROFESSIONALS
326 TRYON ROAD
RALEIGH, NC 27603
OFFICE: (919) 661-6351
www.tepgroup.net

SEAL:

STATE OF CONNECTICUT · GRAHAM W. ANDRES · 29538 · LICENSED · PROFESSIONAL ENGINEER

Electronic Copy

April 24, 2015

REV	DATE	ISSUED FOR:
0	04-24-15	MODIFICATION DRAWINGS

DRAWN BY: RST | CHECKED BY: AAA

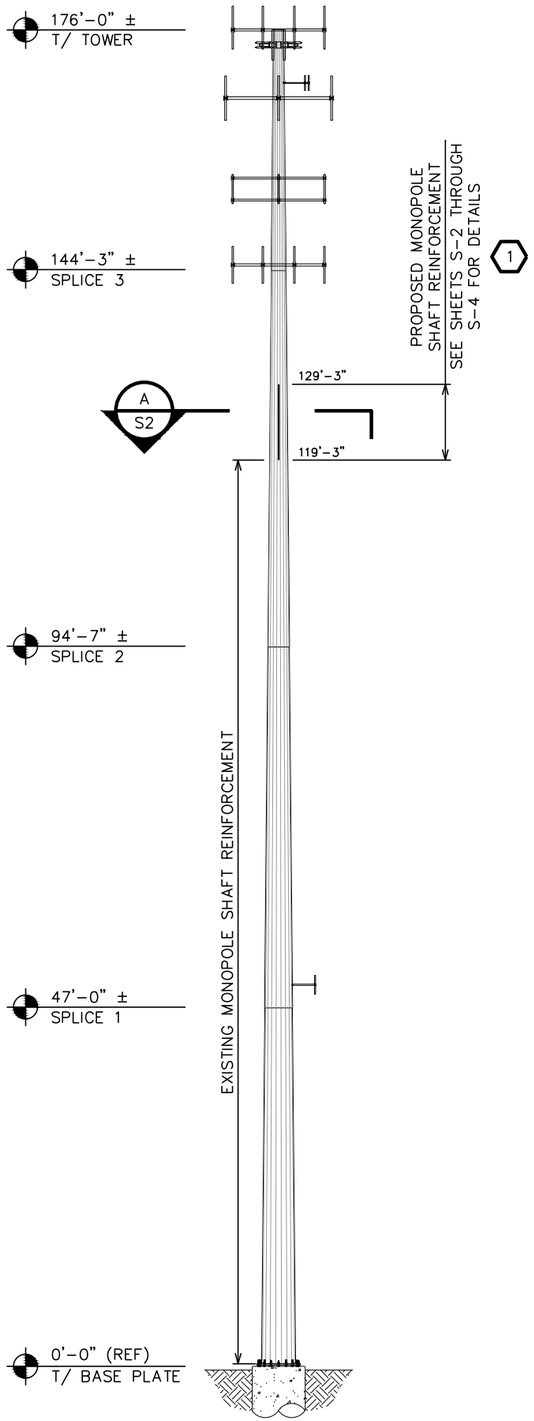
SHEET TITLE:

NEXGEN2 INSTALLATION DETAILS

SHEET NUMBER: **N-5**

REVISION: **0**

TEP #: 51819.31710



POLE SPECIFICATIONS

POLE SHAPE TYPE:	18-SIDED POLYGON
POLE SHAFT GRADE:	ASTM A572-65
BASE PLATE GRADE:	ASTM A572-60
ANCHOR BOLT GRADE:	ASTM A615-75

SHAFT SECTION	SECTION LENGTH (FT.)	SHAFT THICKNESS (IN.)	LAP SPLICE (FT.)	OUTER DIAMETER (IN.)	
				TOP	BOTTOM
1	31.75	0.188	3.50	16.500	23.650
2	53.17	0.313	4.83	22.487	34.330
3	52.46	0.375	6.08	32.629	44.300
4	53.04	0.375	–	42.197	54.000

ATTENTION

NO DETAILED INFORMATION REGARDING INTERFERENCES WAS PROVIDED. THEREFORE, CONTRACTOR SHALL FIELD VERIFY ALL EXISTING CONDITIONS AND DIMENSION BEFORE FABRICATING MATERIALS AND PROCEEDING WITH THE WORK. REPORT ANY AND ALL DISCREPANCIES TO TOWER ENGINEERING PROFESSIONALS, INC., AND CROWN CASTLE CONSTRUCTION MANAGER IMMEDIATELY.

MODIFICATION SCHEDULE

NO.	MODIFICATION DESCRIPTION	ELEVATION (FT.)
1	INSTALL PROPOSED MONOPOLE SHAFT REINFORCEMENT. SEE SHEETS S-2 THROUGH S-4 FOR DETAILS.	119.25 – 129.25
2	CROWN CASTLE WILL CONTRACT WITH A THIRD PARTY VENDOR TO PERFORM THE MODIFICATION INSPECTION. THE CONTRACTOR SHALL COORDINATE THE INSPECTION WITH THE MODIFICATION INSPECTOR AND CROWN CASTLE PROJECT MANAGER. SEE SHEET N-1 FOR DETAILS.	–

NOTES:

1. ANTENNAS AND OTHER APPURTENANCES MAY NEED TO BE TEMPORARILY REMOVED OR MOVED DURING THE INSTALLATION OF THE MODIFICATIONS SHOWN ABOVE.
2. CONTRACTOR SHALL ORDER AND INSTALL A NEW TOWER TAG IF THE EXISTING TOWER TAG IS MOVED OR DAMAGED DUE TO THE INSTALLATION OF THE MODIFICATION SHOWN ABOVE.
3. THE CLIMBING FACILITIES, SAFETY CLIMB AND ALL PARTS THEREOF SHALL NOT BE IMPEDED, MODIFIED OR ALTERED WITHOUT THE EXPRESS WRITTEN APPROVAL OF THE TOWER OWNER OR ENGINEER OF RECORD.

TOWER ELEVATION

SCALE: 1" = 20'-0"

0 20 40

SCALE IN FEET

PLANS PREPARED FOR:

CROWN CASTLE

3530 TORINGDON WAY, SUITE 300
CHARLOTTE, NC 28277
OFFICE: (704) 877-8397

PROJECT INFORMATION:

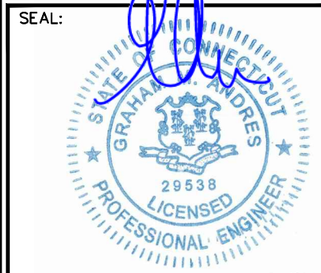
WARD
BU #: 876381

2365 LONG HILL RD.
GUILFORD, CT 06437
(NEW HAVEN COUNTY)

PLANS PREPARED BY:

TOWER ENGINEERING PROFESSIONALS
326 TRYON ROAD
RALEIGH, NC 27603
OFFICE: (919) 661-6351
www.tepgroup.net

SEAL:



Electronic Copy

April 24, 2015

REV	DATE	ISSUED FOR:
0	04-24-15	MODIFICATION DRAWINGS

DRAWN BY: RST | CHECKED BY: AAA

SHEET TITLE:

TOWER ELEVATION AND MODIFICATION SCHEDULE

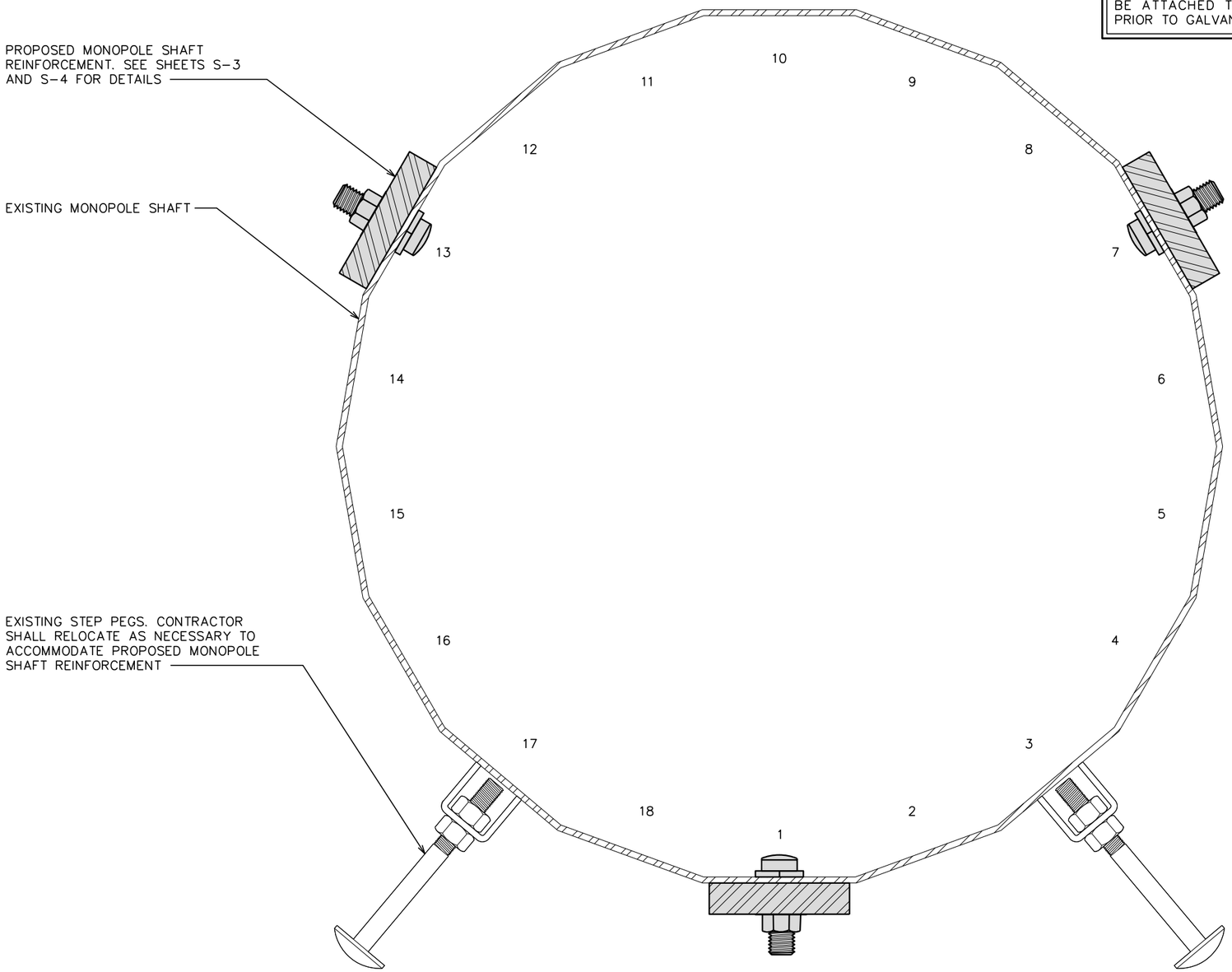
SHEET NUMBER: **S-1**

REVISION: **0**

TEP #: 51819.31710

ATTENTION

THE TOWER SAFETY CLIMB WAS ASSUMED TO BE LOCATED OFF FLAT 1. FIELD VERIFY SAFETY CLIMB AND STEP PEG LOCATION PRIOR TO INSTALLATION. CONTACT TOWER OWNER AND ENGINEER OF RECORD SHOULD ANY DISCREPANCIES ARISE. CONTRACTOR TO REMOVE AND RE-ATTACH SAFETY CLIMB AND STEP PEGS AS NECESSARY TO INSTALL PROPOSED REINFORCEMENT. IF STEP PEGS ARE REQUIRED TO BE ATTACHED TO PROPOSED REINFORCEMENT, IT SHALL BE DONE PRIOR TO GALVANIZATION.



SECTION (A)

SCALE: 3" = 1'-0"

0 3" 6" 9" 12"

SCALE IN INCHES

PLANS PREPARED FOR:

CROWN CASTLE

3530 TORINGDON WAY, SUITE 300
CHARLOTTE, NC 28277
OFFICE: (704) 877-8397

PROJECT INFORMATION:

WARD
BU #: 876381

2365 LONG HILL RD.
GUILFORD, CT 06437
(NEW HAVEN COUNTY)

PLANS PREPARED BY:

TOWER ENGINEERING PROFESSIONALS
326 TRYON ROAD
RALEIGH, NC 27603
OFFICE: (919) 661-6351
www.tepgroup.net

SEAL:

STATE OF CONNECTICUT
GRAHAM MARK ANDRES
29538
LICENSED
PROFESSIONAL ENGINEER

Electronic Copy

April 24, 2015

REV	DATE	ISSUED FOR:
0	04-24-15	MODIFICATION DRAWINGS

DRAWN BY: RST | CHECKED BY: AAA

SHEET TITLE:

SECTION DETAILS

SHEET NUMBER: **S-2**

REVISION: **0**

TEP #: 51819.31710

CROWN CASTLE 65KSI FLAT PLATE REINFORCEMENT SCHEDULE

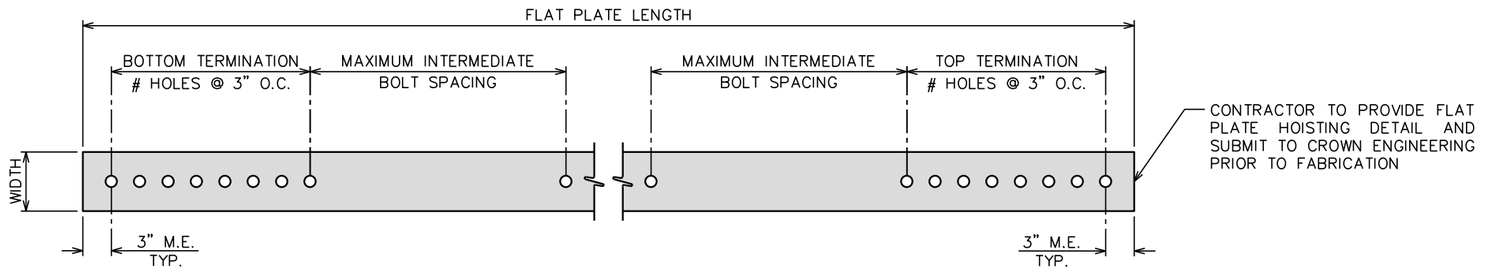
PART NUMBER	FLATS / ANGLES	BOTTOM ELEVATION (FT)	TOP ELEVATION (FT)	FLAT PLATE LENGTH (FT)	FLAT PLATE QUANTITY	TERMINATION BOLTS		MAXIMUM INTERMEDIATE BOLT SPACING (IN)	TOTAL BOLT QUANTITY	TOTAL STEEL WEIGHT (LB)	TERMINATION DETAIL	
						(BOT.)	(TOP)				(BOT.)	(TOP)
CCI-SFP-04510010	1 7 13	119.25	129.25	10.00	3	6	6	20.00	48	459.4	4	3A
								TOTALS:	48	459.4		

NOTES:

1. REFER TO SHEETS N-4 AND N-5 FOR BOLT INSTALLATION DETAILS.
2. SEE SHEET S-4 FOR TERMINATION DETAILS.
3. ELEVATIONS ARE NOMINAL. REFERENCE STANDARD DETAILS FOR VARIATIONS IN TOP AND BOTTOM ELEVATIONS
4. SHIMS FOR MONOPOLE REINFORCEMENT MEMBER SHALL BE REQUIRED WHERE GAPS BETWEEN THE POLE SHAFT AND REINFORCING MEMBER EXIST AT FASTENER LOCATIONS. FOR INTERMEDIATE CONNECTIONS, THE MINIMUM SHIM LENGTH AND WIDTH SHALL BE THE WIDTH OF THE REINFORCING MEMBER. FOR TERMINATION CONNECTIONS, A CONTINUOUS SHIM PLATE (PREFERRED) OR EQUIVALENT INDIVIDUAL SHIM PLATES THE WIDTH OF THE REINFORCING MEMBER MAY BE USED. ADJACENT SHIMS PLATE THICKNESSES MAY TAPER IN INCREMENTS OF $\frac{1}{16}$" AND SHALL BE NO LESS THAN $\frac{1}{16}$". STACKING OF SHIMS IS PERMITTED. SHIMS GREATER THAN $\frac{1}{4}$" IN THICKNESS LOCATED WITHIN THE TERMINATION LENGTH OF THE SHAFT REINFORCEMENT PLATE SHALL BE WELDED TO THE SHAFT REINFORCEMENT PLATE.
5. FASTENER WEIGHT, SHIM PLATE WEIGHT, AND REINFORCING SPLICE PLATE WEIGHT NOT TABULATED IN THE TOTAL STEEL WEIGHTS.
6. ALL MATERIAL QUANTITIES ARE APPROXIMATE AND SHALL BE FIELD VERIFIED

CCI PART NUMBER FORMAT: CCI-|XXX|-|XXX|XXX|XX|
(SEE CHART; WIDTH; THICKNESS; LENGTH)

FLAT PLATE STANDARD NOMENCLATURE		NOTES
CCI-SFP	STANDARD FLAT PLATE	SEE CMRP 65 KSI PARTS CATALOG - 2ND EDITION AND THIS SHEET FOR DETAILS
CCI-WSFP	WELDABLE STANDARD FLAT PLATE	
CCI-AFP	AUXILIARY FLAT PLATE	
CCI-WAFP	WELDABLE AUXILIARY FLAT PLATE	
CCI-CFP	CUSTOM FLAT PLATE	SEE THIS SHEET FOR DETAILS
CCI-WCFP	WELDABLE CUSTOM FLAT PLATE	



TYPICAL FLAT PLATE REINFORCEMENT DETAIL

SCALE: N.T.S.

PLANS PREPARED FOR:

CROWN CASTLE

3530 TORINGDON WAY, SUITE 300
CHARLOTTE, NC 28277
OFFICE: (704) 877-8397

PROJECT INFORMATION:

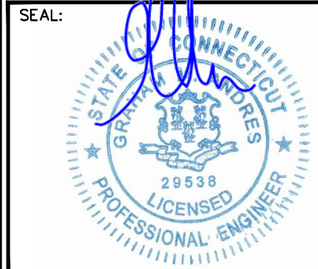
WARD
BU #: 876381

2365 LONG HILL RD.
GUILFORD, CT 06437
(NEW HAVEN COUNTY)

PLANS PREPARED BY:

TOWER ENGINEERING PROFESSIONALS
326 TRYON ROAD
RALEIGH, NC 27603
OFFICE: (919) 661-6351
www.tepgroup.net

SEAL:



Electronic Copy

April 24, 2015

REV	DATE	ISSUED FOR:
0	04-24-15	MODIFICATION DRAWINGS

DRAWN BY: RST | CHECKED BY: AAA

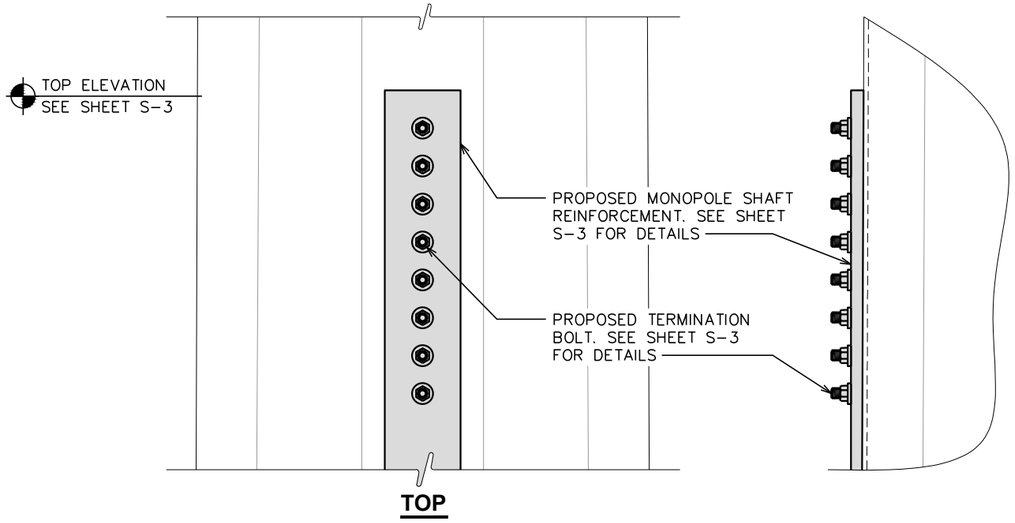
SHEET TITLE:

SHAFT REINFORCEMENT DETAILS

SHEET NUMBER: **S-3**

REVISION: **0**

TEP #: 51819.31710

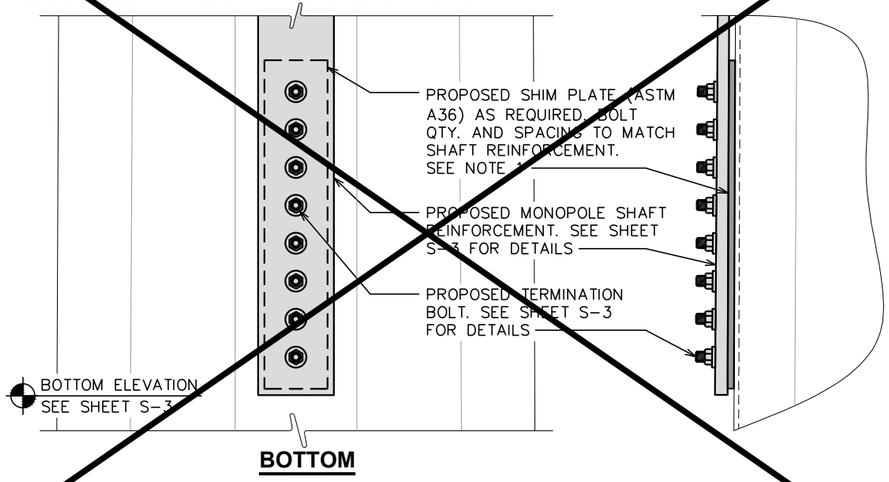


TOP TERMINATION DETAILS (3A)

SCALE: N.T.S.

NOTE:

1. SHIMS GREATER THAN ¼" IN THICKNESS LOCATED WITHIN THE TERMINATION LENGTH OF THE SHAFT REINFORCEMENT PLATE SHALL BE WELDED TO THE SHAFT REINFORCEMENT PLATE.

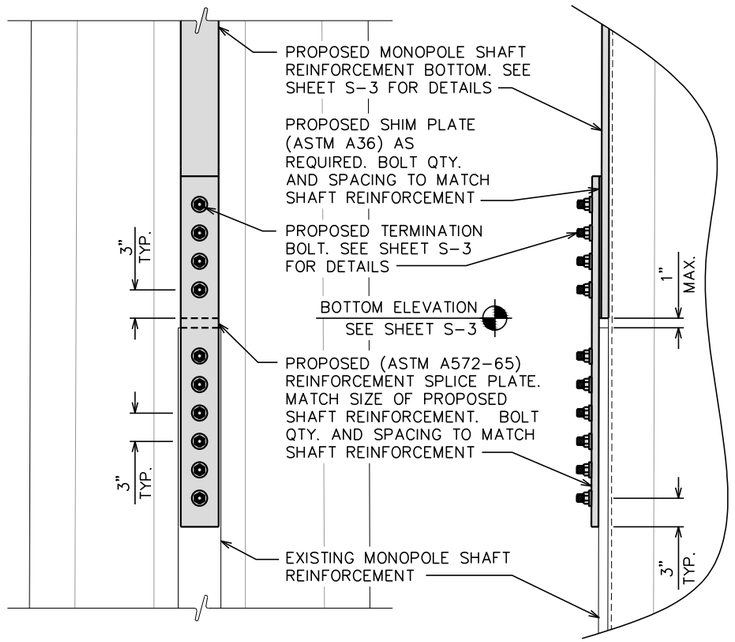


BOTTOM TERMINATION DETAILS (3B)

SCALE: N.T.S.

NOTE:

1. SHIMS GREATER THAN ¼" IN THICKNESS LOCATED BETWEEN THE SHAFT REINFORCEMENT PLATE AND THE REINFORCEMENT SPLICE PLATE SHALL BE WELDED TO THE SHAFT REINFORCEMENT PLATE.

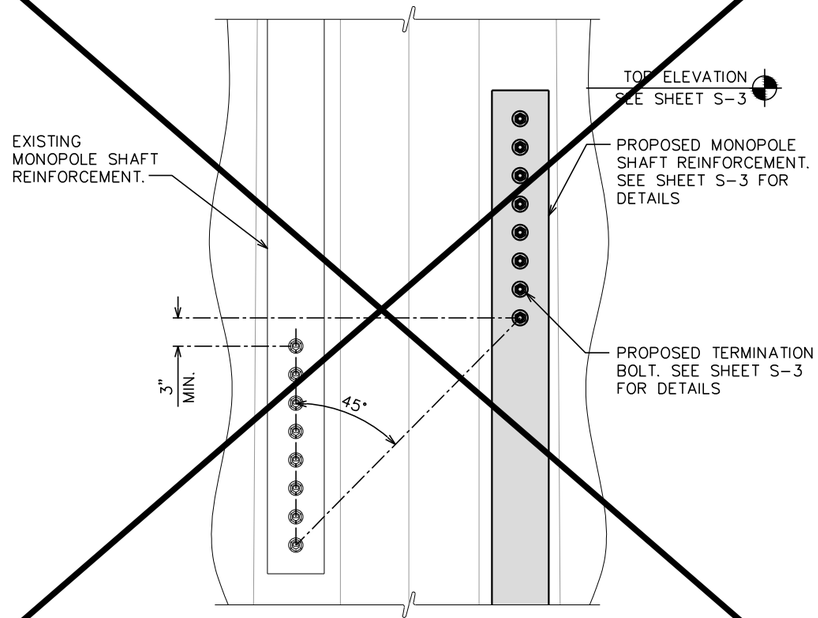


REINFORCEMENT SPLICE DETAILS (4)

SCALE: N.T.S.

NOTE:

1. SHIMS GREATER THAN ¼" IN THICKNESS LOCATED WITHIN THE TERMINATION LENGTH OF THE SHAFT REINFORCEMENT PLATE SHALL BE WELDED TO THE SHAFT REINFORCEMENT PLATE.



OVERLAP SPLICE DETAILS (5)

SCALE: N.T.S.

PLANS PREPARED FOR:

CROWN CASTLE

3530 TORINGDON WAY, SUITE 300
CHARLOTTE, NC 28277
OFFICE: (704) 877-8397

PROJECT INFORMATION:

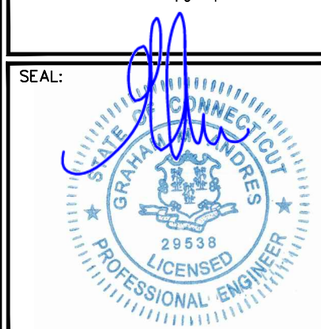
WARD
BU #: 876381

2365 LONG HILL RD.
GUILFORD, CT 06437
(NEW HAVEN COUNTY)

PLANS PREPARED BY:

TOWER ENGINEERING PROFESSIONALS
326 TRYON ROAD
RALEIGH, NC 27603
OFFICE: (919) 661-6351
www.tepgroup.net

SEAL:



Electronic Copy

April 24, 2015

REV	DATE	ISSUED FOR:
0	04-24-15	MODIFICATION DRAWINGS

DRAWN BY: RST | CHECKED BY: AAA

SHEET TITLE:

TYP. SHAFT REINFORCEMENT DETAILS

SHEET NUMBER: **S-4**

REVISION: **0**

TEP #: 51819.31710

EBI Consulting
environmental | engineering | due diligence

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

T-Mobile Existing Facility

Site ID: CT11393A

CT393/Global Guilford_MP2
2381 Long Hill Road
Guilford, CT 06437

May 12, 2015

EBI Project Number: 6215002875

Site Compliance Summary	
Compliance Status:	COMPLIANT
Site total MPE% of FCC general public allowable limit:	42.08 %

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

EBI Consulting
environmental | engineering | due diligence

May 12, 2015

T-Mobile USA
Attn: Jason Overbey, RF Manager
35 Griffin Road South
Bloomfield, CT 06002

Emissions Analysis for Site: **CT11393 – CT393/Global Guilford_MP2**

EBI Consulting was directed to analyze the proposed T-Mobile facility located at **2381 Long Hill Road, Guilford, CT**, for the purpose of determining whether the emissions from the Proposed T-Mobile Antenna Installation located on this property are within specified federal limits.

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

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

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

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

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

Additional details can be found in FCC OET 65.

CALCULATIONS

Calculations were done for the proposed T-Mobile Wireless antenna facility located at **2381 Long Hill Road, Guilford, CT**, using the equipment information listed below. All calculations were performed per the specifications under FCC OET 65. Since T-Mobile is proposing highly focused directional panel antennas, which project most of the emitted energy out toward the horizon, all calculations were performed assuming a lobe representing the maximum gain of the antenna per the antenna manufactures supplied specifications, minus 10 dB, was focused at the base of the tower. For this report the sample point is the top of a 6 foot person standing at the base of the tower.

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

1) 2 GSM channels (PCS Band - 1900 MHz) were considered for each sector of the proposed installation. These Channels have a transmit power of 30 Watts per Channel

2) 2 UMTS channels (AWS Band – 2100 MHz) were considered for each sector of the proposed installation. These Channels have a transmit power of 30 Watts per Channel.

3) 2 LTE channels (AWS Band – 2100 MHz) were considered for each sector of the proposed installation. These Channels have a transmit power of 60 Watts per Channel.

4) 1 LTE channel (700 MHz Band) was considered for each sector of the proposed installation. This channel has a transmit power of 30 Watts.

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

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

7) The antennas used in this modeling are the **Ericsson AIR21 B2A/B4P** for 1900 MHz (PCS) and 2100 MHz (AWS) channels and the **Ericsson AIR21 B4A/B12P** for 2100 MHz (AWS) and 700 MHz channels. This is based on feedback from the carrier with regards to anticipated antenna selection. The **Ericsson AIR21 B2A/B4P** has a maximum gain of **15.9 dBd** at its main lobe. The **Ericsson AIR21 B4A/B12P** has a maximum gain of **15.9 dBd** at its main lobe at 1900 MHz and 2100 MHz and has a maximum gain of **13.6 dBd** at its main lobe at 700 MHz. The maximum gain of the antenna per the antenna manufactures supplied specifications, minus 10 dB, was used for all calculations. This value is a very conservative estimate as gain reductions for these particular antennas are typically much higher in this direction.

8) The antenna mounting height centerline of the proposed antennas is **155 feet** above ground level (AGL).

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

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

T-Mobile Site Inventory and Power Data

Sector:	A	Sector:	B	Sector:	C
Antenna #:	**1**	Antenna #:	**1**	Antenna #:	**1**
Make / Model:	Ericsson AIR21 B2A/B4P	Make / Model:	Ericsson AIR21 B2A/B4P	Make / Model:	Ericsson AIR21 B2A/B4P
Gain:	15.9 dBd	Gain:	15.9 dBd	Gain:	15.9 dBd
Height (AGL):	155	Height (AGL):	155	Height (AGL):	155
Frequency Bands	1900 MHz(PCS) / 2100 MHz (AWS)	Frequency Bands	1900 MHz(PCS) / 2100 MHz (AWS)	Frequency Bands	1900 MHz(PCS) / 2100 MHz (AWS)
Channel Count	4	Channel Count	4	# PCS Channels:	4
Total TX Power:	120	Total TX Power:	120	# AWS Channels:	120
ERP (W):	4,668.54	ERP (W):	4,668.54	ERP (W):	4,668.54
Antenna A1 MPE%	0.76	Antenna B1 MPE%	0.76	Antenna C1 MPE%	0.76
Antenna #:	**2**	Antenna #:	**2**	Antenna #:	**2**
Make / Model:	Ericsson AIR21 B4A/B12P	Make / Model:	Ericsson AIR21 B4A/B12P	Make / Model:	Ericsson AIR21 B4A/B12P
Gain:	15.9 / 13.6 dBd	Gain:	15.9 / 13.6 dBd	Gain:	15.9 / 13.6 dBd
Height (AGL):	155	Height (AGL):	155	Height (AGL):	155
Frequency Bands	2100 MHz (AWS) / 700 MHz	Frequency Bands	2100 MHz (AWS) / 700 MHz	Frequency Bands	2100 MHz (AWS) / 700 MHz
Channel Count	3	Channel Count	3	Channel Count	3
Total TX Power:	150	Total TX Power:	150	Total TX Power:	150
ERP (W):	5,355.80	ERP (W):	5,355.80	ERP (W):	5,355.80
Antenna A2 MPE%	0.99	Antenna B2 MPE%	0.99	Antenna C2 MPE%	0.99

Site Composite MPE%	
Carrier	**MPE%**
T-Mobile	**5.25**
Sprint	3.93 %
AT&T	11.53 %
Verizon Wireless	21.37 %
Site Total MPE %:	**42.08 %**

T-Mobile Sector 1 Total:	1.75 %
T-Mobile Sector 2 Total:	1.75 %
T-Mobile Sector 3 Total:	1.75 %
Site Total:	42.08 %

EBI Consulting
environmental | engineering | due diligence

Summary

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

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

T-Mobile Sector	Power Density Value (%)
Sector 1:	1.75 %
Sector 2:	1.75 %
Sector 3 :	1.75 %
T-Mobile Total:	5.25 %
Site Total:	42.08 %
Site Compliance Status:	**COMPLIANT**

The anticipated composite MPE value for this site assuming all carriers present is **42.08%** of the allowable FCC established general public limit sampled at the ground level. This is based upon values listed in the Connecticut Siting Council database for existing carrier emissions.

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

Scott Heffernan
RF Engineering Director

EBI Consulting
21 B Street
Burlington, MA 01803