



Via Overnight Delivery

May 5, 2014

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

Re: Tower Share Application
Property Address: 345 Bushy Hill Road, Simsbury, CT 06070 (the
"Property")
Applicant: New Cingular Wireless PCS, LLC d/b/a AT&T ("AT&T")

Dear Ms. Bachman,

On behalf of AT&T, enclosed in connection with the shared use of a tower located on the Property, please find an original and fifteen (15) copies of a tower sharing application package along with a check in the amount of six hundred and twenty five (\$625.00) dollars.

Sincerely,

Steven J. Quinn

Enclosures

Cc w/enclosures:

Mary A. Glassman, First Selectman: Town of Simsbury
John Solury, Vice President: Simsbury Fire District

APPLICATION TO THE CONNECTICUT SITING COUNCIL
TO APPROVE THE SHARED USE OF AN EXISTING TOWER
PURSUANT TO CONNECTICUT GENERAL STATUTE §16-50aa

APPLICANT

New Cingular Wireless PCS, LLC (AT&T)
500 Enterprise Drive, Suite 3A
Rocky Hill, CT 06067

TOWER/PROPERTY ADDRESS

345 Bushy Hill Road
Simsbury, CT 06070

PREPARED BY: Steven J. Quinn
Real Estate and Land Use Specialist
Smartlink, LLC
33 Boston Post Road West
Marlborough, Massachusetts 01752
774-219-8022
steven.quinn@smartlinkllc.com

Date Submitted: May 5, 2014

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APPLICANT

New Cingular Wireless PCS, LLC (AT&T)
500 Enterprise Drive, Suite 3A
Rocky Hill, CT 06067

TOWER/PROPERTY ADDRESS

345 Busy Hill Road
Simsbury, CT 06070

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TAB 1



May 5, 2014

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

Re: Request for an Order to Approve the Shared Use of an Existing Tower
Property Address: 345 Bushy Hill Road, Simsbury, CT 06070 (the "Property")
Applicant: New Cingular Wireless PCS, LLC d/b/a AT&T ("AT&T")

Dear Ms. Bachman,

On behalf of AT&T, please accept this request pursuant to Connecticut General Statute §16-50aa, as amended (the "Statute"), for an order approving tower sharing at the above referenced tower site and facility.

I. The Facility

The Facility is owned by The Simsbury Fire District ("Simsbury Fire") and consists of an 80' monopole style tower (the "Tower") located on the Property, which is located at latitude 41° -50' -28.96" N and longitude -72° -51' -1.57" W. Tower is slated for extension to 107' per the approval of Verizon's petition (see Tab 6 and 7 for Approval and Staff Report). The Tower is currently shared by T-Mobile at a height of 77', Metro PCS at a height of 70' and town communication equipment (to be relocated to the top of the proposed extension).

II. The Proposal

AT&T proposes to install a total of twelve (12) panel antennas (4 per sector) and ancillary remote radio heads ("RRHs") on the tower (see attached plans). The antennas and RRHs will be mounted on the Tower at a centerline of 90'. For its ground equipment, AT&T proposes to install a 11'5" x 16' shelter on a 12' x 24' concrete pad just beyond the edge of the parking area (adjacent to Verizon's shelter) in the back-left rear corner of the fire station. The equipment shelter will be surrounded by a 16' x 31' 6" chain link fence. As noted above, in accordance with the approval of Petition No.1077 (see Tab 6), Verizon will be extending the

tower to a height of 107'. As such, no extension of the Tower will result from an approval this submission. No upgrades to the access road or parking area will be necessary.

III. Technical Feasibility

It is technically feasible for AT&T to install its equipment on the Tower. To confirm the structural integrity of the Tower, AT&T and Centek performed a structural study of the Tower with AT&T proposed modifications (see Tab 5). The study, dated April 10, 2014 and attached herewith, concludes that the "the subject tower with the reinforcements detailed... is adequate to support the proposed AT&T Mobility antenna configuration." Consequently, the shared use of the Facility is technically feasible.

IV. Legal Feasibility

Pursuant to the Statute, the Council has the authority to issue an order approving the shared use of the Facility. By issuing an order approving AT&T's use of the Facility, AT&T will be able to proceed with obtaining a building permit from the Town of Simsbury for the proposed installation on the Facility. Therefore, the shared use of the Facility is legally feasible.

V. Economic Feasibility

AT&T is a federally licensed telecommunications company providing service in areas of Connecticut, including the Town of Simsbury. AT&T has entered into an agreement with the Town of East Hartford for the purpose of locating AT&T equipment at the Facility. Consequently, the shared use of the Facility is economically feasible.

VI. Environmental Feasibility

Pursuant to the Statute, AT&T's proposed sharing of the Facility will be environmentally feasible for the following reasons:

- a. This proposal will not increase the height of the Tower (see Tabs 6, 7). Di minimis improvements may be made to the area at the edge of the parking lot adjacent to Verizon's equipment. Therefore, the proposed sharing of the Facility will have an insignificant incremental visual impact on the area surrounding the Tower and will no significant change or alter the physical or environmental characteristics of the Facility.
- b. The addition of AT&T equipment will not increase the noise levels by six (6) decibels or more.
- c. The addition of AT&T antennas will not exceed the RF emissions standard adopted by the Federal Communications Commission ("FCC"). The cumulative "worst-case" RF emissions for the operation of the existing antennas and the proposed AT&T antennas will be 23.80% of the FCC standards (see attached Power Density Table).

- d. The proposed installation will have no impact on the local wetlands or water resources.
- e. After installation, AT&T equipment will be unmanned and will only require monthly visits by maintenance personnel who will inspect the Facility to ensure it remains in good working order.
- f. AT&T's proposal will have no impact on water, sanitary or sewer systems or other municipal utilities. Additionally, the proposal complies with all applicable local, state and federal safety rules and regulations.

VII. Public Safety and Benefits

As referenced in Section III above, AT&T has performed a structural study of the Tower confirming that the Tower is structurally feasible to hold AT&T's additional equipment. Further, as referenced in Section VI.c above, AT&T has performed an analysis of the radio frequency emanating from its proposed antennas to ensure compliance with FCC standards. The analysis indicates that the maximum level of radio frequency energy emitting from the Facility after the installation of AT&T's antennas will be well below the FCC's exposure limits. Moreover, AT&T proposal is expected to enhance safety by improving wireless communications in the area of the Facility

VII. Conclusion

For the aforementioned reasons, AT&T proposed shared use of the Facility meet all of the requirements set forth in the Statute, and the proposal advances the Council's goal of preventing the unnecessary proliferation of towers in Connecticut. The proposal is technically, legally, economically and environmentally feasible and meets all public safety concerns. Consequently, AT&T respectfully requests that the Council issue an order approving the proposed sharing use of the Facility.

Sincerely,


Steven J. Quinn

TAB 2

CERTIFICATE OF SERVICE

This is to certify that on the 5th day of May, 2014, the foregoing application by AT&T for an Order to Approve the Shared Use of an Existing Tower was sent, via UPS, to the following:

Mary A. Glassman
First Selectman
Town of Simsbury
933 Hopmeadow Street
Simsbury, CT 06070

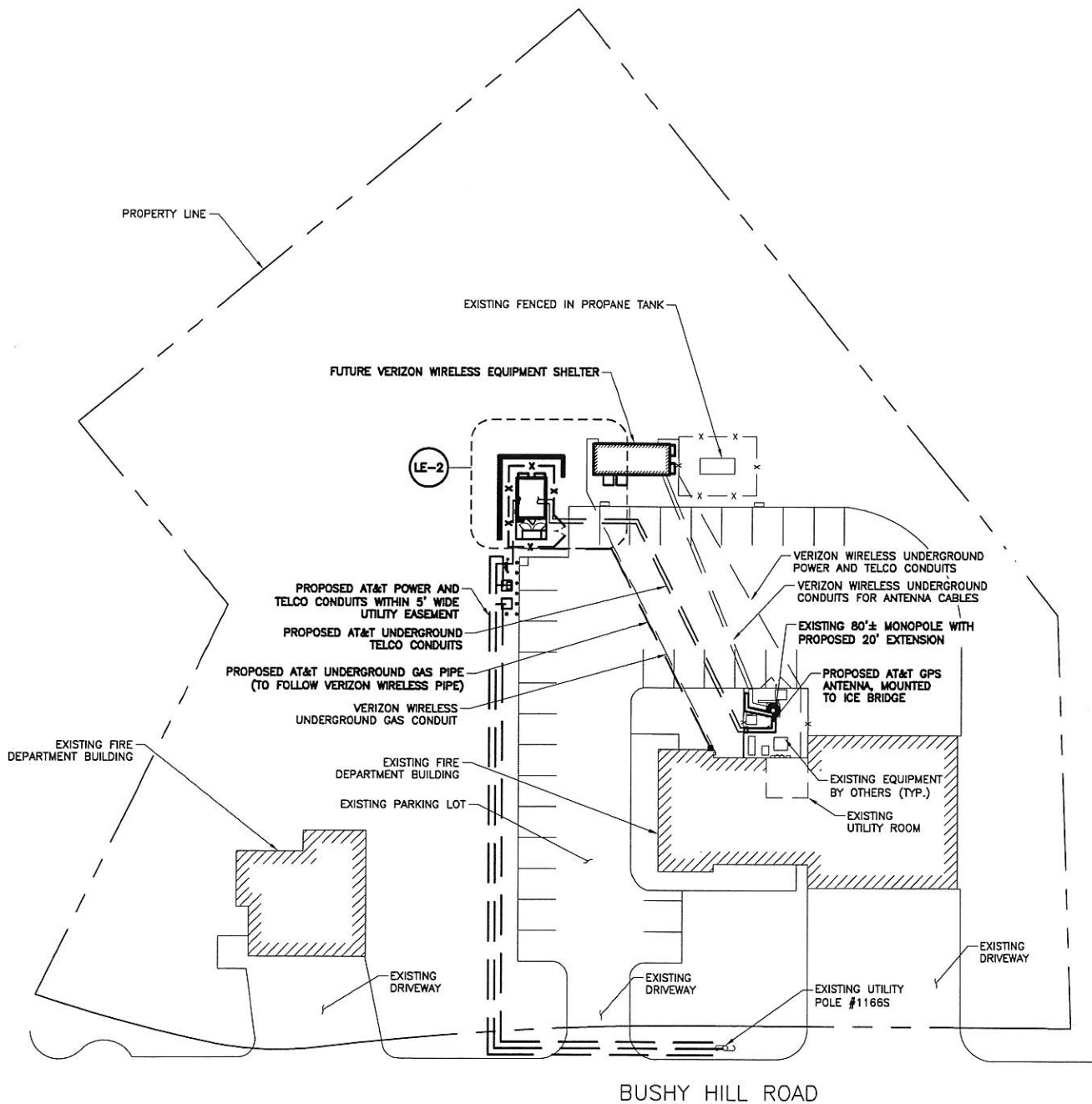
and

John Solury
Vice President
Simsbury Fire District
871 Hopmeadow Street
Simsbury, CT 06070

By: _____

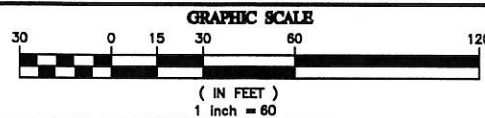
Steven J. Quinn

TAB 3



NOTE:
ALL EQUIPMENT LOCATIONS ARE
APPROXIMATE AND ARE SUBJECT TO
APPROVAL BY LESSEE/LICENSEE
STRUCTURAL AND RF ENGINEERS.

SITE PLAN



APPROX. NORTH

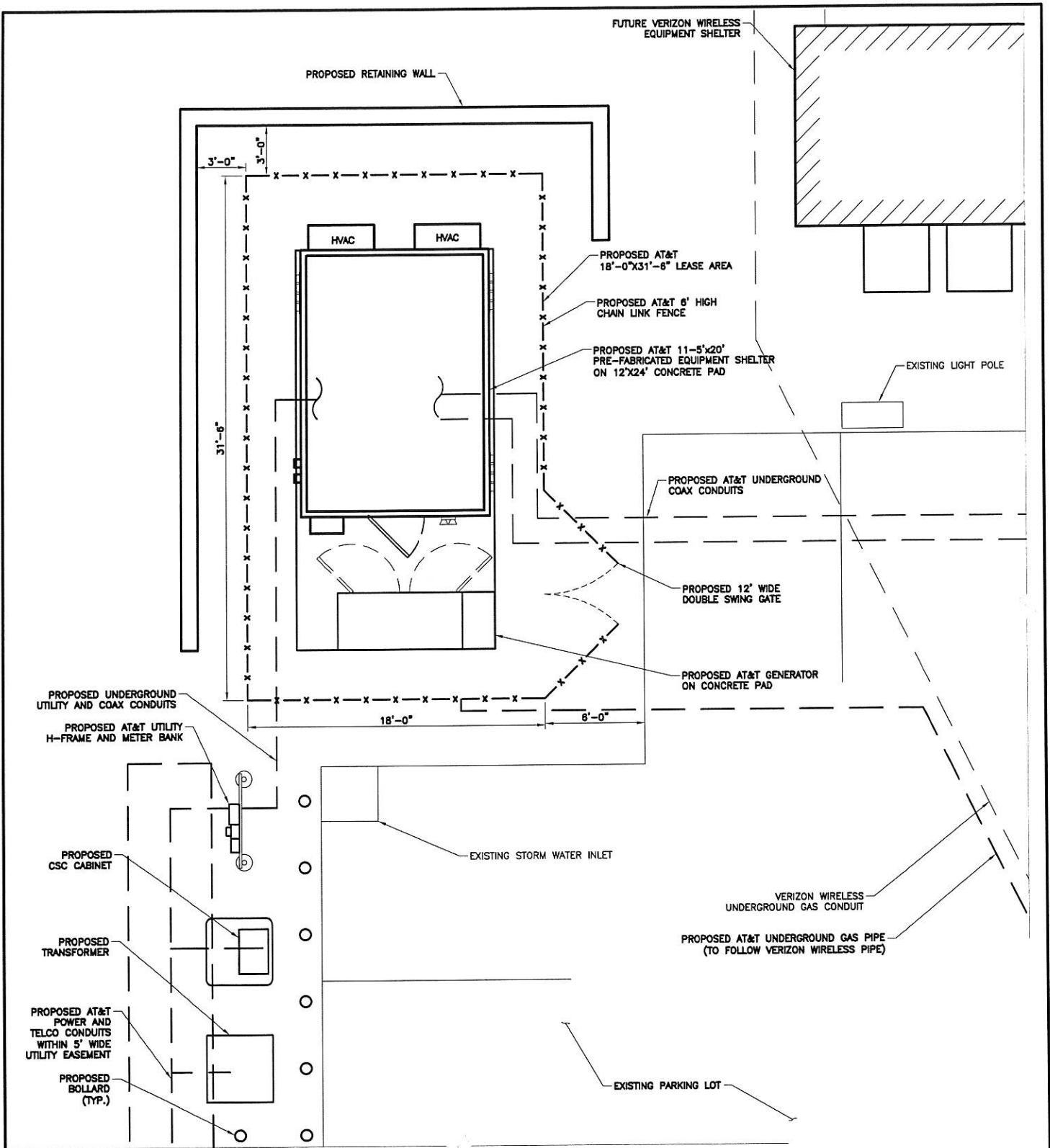
EBI Consulting
environmental · engineering · due diligence
218 Street
Burlington, MA 01803
Tel: 781.273.2500
Fax: 781.273.3311
www.ebiconsulting.com
EBI JOB NO.: 81130727

smartlink
1197 ANNAPOLIS EXCHANGE
PARKWAY, SUITE 289
ANNAPOLIS, MD 21401

at&t
Mobility
550 COCHITUATE ROAD
SUITE 13 & 14
FRAMINGHAM, MA 01701

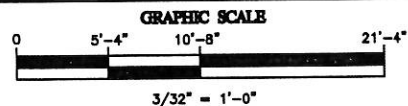
SITE INFO:
**SIMSBURY FIRE
STATION
CT2413S**
345 BUSHY HILL ROAD
SIMSBURY, CT 06070

SUBMITTALS					DRAWN BY:	SHEET NO:
NO.	DATE	DESCRIPTION	BY	JT	CHECKED BY:	
1	09/20/13	FOR REVIEW	JT		DD	
2	09/25/13	PER COMMENTS	JT			
3	10/07/13	PER COMMENTS	JT		DATE:	LE-1
4	04/17/14	SHELTER LAYOUT	JT		09/20/13	



NOTE:
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APPROVAL BY LESSEE/LICENSEE
STRUCTURAL AND RF ENGINEERS.

COMPOUND PLAN



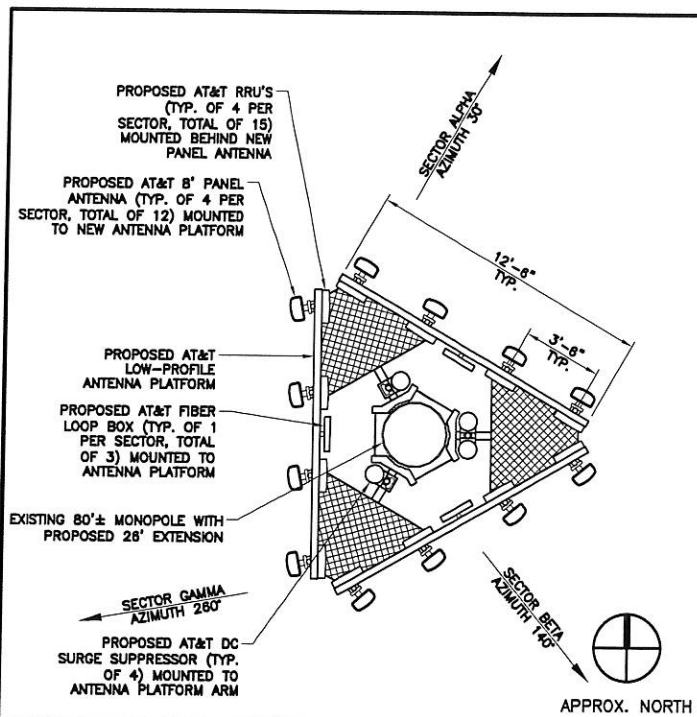
EBI Consulting
environmental | engineering | due diligence
21 B Street
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Tel: 781.273.2500
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EBI JOB NO.: 81130727

smartlink
1197 ANNAPOLIS EXCHANGE
PARKWAY, SUITE 299
ANNAPOLIS, MD 21401

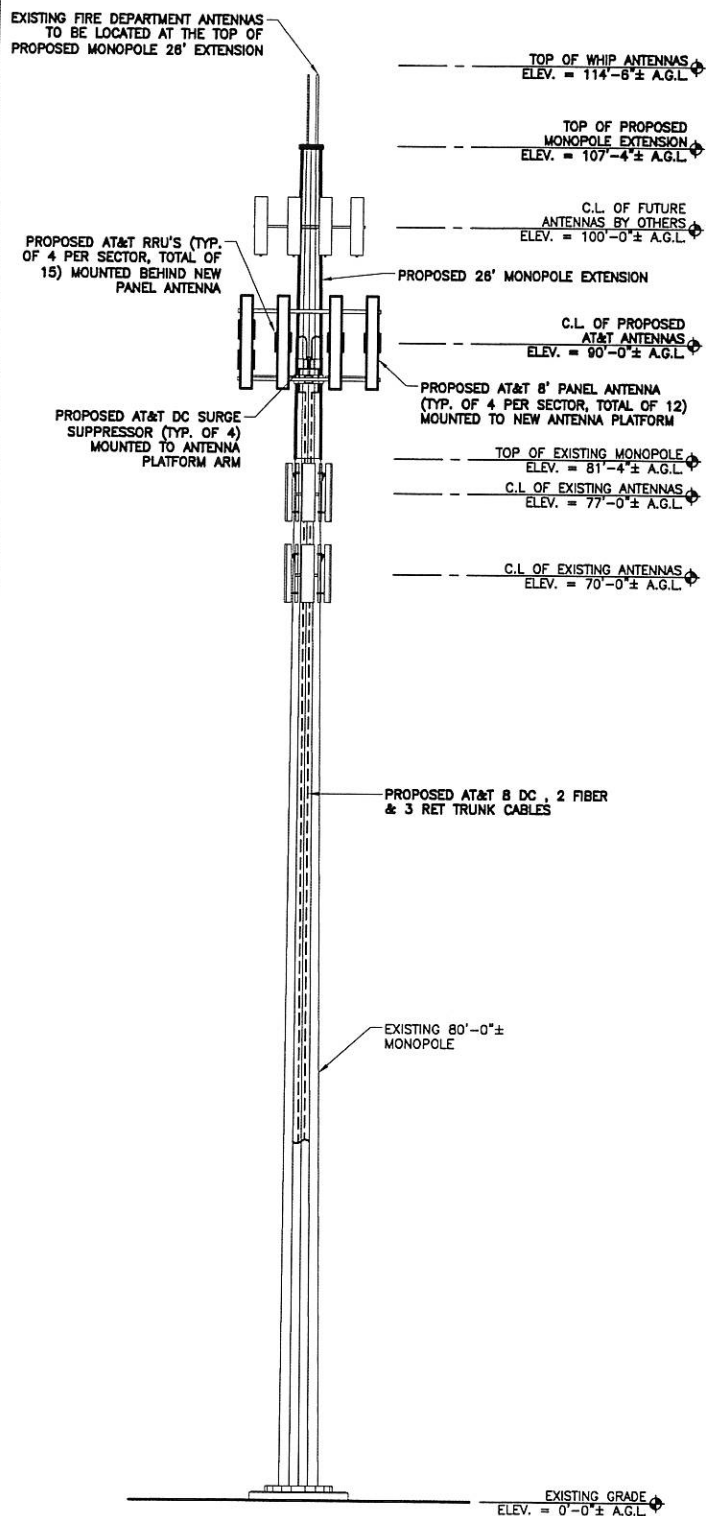
at&t
Mobility
550 COCHITUATE ROAD
SUITE 13 & 14
FRAMINGHAM, MA 01701

SITE INFO:
**SIMSBURY FIRE
STATION
CT2413S**
345 BUSHY HILL ROAD
SIMSBURY, CT 06070

SUBMITTALS				DRAWN BY:	SHEET NO:
NO.	DATE	DESCRIPTION	BY	JT	LE-2
1	09/20/13	FOR REVIEW	JT	CHECKED BY:	
2	09/25/13	PER COMMENTS	JT	DD	
3	10/07/13	PER COMMENTS	JT	DATE:	
4	04/17/14	SHELTER LAYOUT	JT	09/20/13	

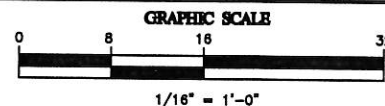


PROPOSED ANTENNA PLAN



NOTE:
ALL EQUIPMENT LOCATIONS ARE APPROXIMATE AND ARE SUBJECT TO APPROVAL BY LESSEE/LICENSEE STRUCTURAL AND RF ENGINEERS.

TOWER ELEVATION



EBI Consulting
environmental | engineering | due diligence
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Burlington, MA 01803
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1197 ANNAPOLIS EXCHANGE
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at&t
Mobility
550 COCHITUATE ROAD
SUITE 13 & 14
FRAMINGHAM, MA 01701

SITE INFO:
SIMSBURY FIRE STATION CT2413S
345 BUSHY HILL ROAD
SIMSBURY, CT 06070

SUBMITTALS				DRAWN BY:	SHEET NO:
NO.	DATE	DESCRIPTION	BY	JT	
1	09/20/13	FOR REVIEW	JT	CHECKED BY:	
2	09/25/13	PER COMMENTS	JT	DD	
3	10/07/13	PER COMMENTS	JT	DATE:	LE-3
4	04/17/14	SHELTER LAYOUT	JT	09/20/13	

TAB 4



TOWER MODIFICATION DESIGN

CT 2413 SIMSBURY

345 BUSHY HILL ROAD

SIMSBURY, CT 06070



VICINITY MAP

PROJECT SUMMARY

SITE ADDRESS: 345 BUSHY HILL ROAD
SIMSBURY, CT 06070

PROJECT COORDINATES:
LAT: 41°-50'-29.00"N
LON: 72°-51'-02.00"W
ELEV: ±368' AMSL

TOWER OWNER: SIMSBURY FIRE DEPARTMENT
345 BUSHY HILL ROAD,
SIMSBURY, CT

AT&T SITE REF.: CT 2413S SIMSBURY

AT&T CONTACT: GERRY BYRNES - SMARTLINK
201-213-8292

ENGINEER OF RECORD: CENTEK ENGINEERING, INC.
63-2 NORTH BRANFORD ROAD
BRANFORD, CT 06405

CENTEK CONTACT: CARLO F. CENTORE, PE
203.488.0580 ext. 122

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N-2	STRUCTURAL NOTES	1
N-3	STRUCTURAL NOTES	1
MI-1	MODIFICATION INSPECTION REQUIREMENTS	1
B-1	BOREHOLE LOG AND LOCATION PLAN	1
SP-1	SITE COMPOUND PLAN AND DETAIL	1
S-1	MONOPOLE REINFORCEMENT ELEVATION	1
S-2	MONOPOLE REINFORCEMENT DETAILS	1
S-3	MONOPOLE REINFORCEMENT DETAILS	1
S-4	MONOPOLE REINFORCEMENT PLANS	1
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DESIGNED BY: JAH	DATE: 03/29/14	345 BUSHY HILL ROAD, SIMSBURY, CT	CENTEK engineering www.CentekEng.com Centered on Solutions® 63-2 North Branford Road, Branford, CT 06405	PROPOSED TOWER REINFORCEMENT DESIGN CT2413 SIMSBURY	DATE: 03/29/14 SCALE: AS SHOWN JOB NO.: 13008.002	TITLE SHEET	SHEET NO. T-1 Sheet No. 1 of 12
DRAWN BY: JAH	CHECKED BY: CFC						

REV.	DATE	BY	DESCRIPTION
1	03/18/14	JAH	ISSUED FOR CONSTRUCTION
2	03/18/14	JAH	REVISED FOR CONSTRUCTION

NOT TO SCALE - DIMENSIONS ARE APPROXIMATE

DESIGN BASIS

- GOVERNING CODE: 2003 INTERNATIONAL BUILDING CODE AS MODIFIED BY THE 2005 CT STATE BUILDING CODE AND 2009 AMENDMENTS.
 - TIA/EIA-222-F-1996 "STRUCTURAL STANDARDS FOR STEEL ANTENNA TOWERS AND ANTENNA SUPPORTING STRUCTURES".
 - DESIGN CRITERIA
WIND LOAD: TIA/EIA-222-F-1996
BASIC WIND SPEED (V) = 80 MPH (FASTEST MILE)
WIND LOAD: (2005 CT STATE BUILDING CODE APPENDIX K)
BASIC WIND SPEED (V) = 95 MPH (3-SECOND GUST)
EQUIVALENT TO (V) = 77.5 MPH (FASTEST MILE)
TIA/EIA-222-F-1996 WIND SPEED CONTROLS
1. REFER TO DRAWING M-1 FOR INSPECTION REQUIREMENTS PRIOR TO COMMENCEMENT OF CONSTRUCTION RELATED ACTIVITIES.
2. RELOCATE EXISTING MONOPOLE STEP BOLTS AND SAFETY CLIMB DEVICES WHERE THEY COME INTO CONFLICT WITH REINFORCEMENT MATERIAL. REFER TO S-3 FOR FLAT LOCATIONS. CONTRACTOR TO ENSURE THAT ALL RELOCATED STEP BOLTS SHALL MEET OSHA REQUIREMENTS.
3. GRIND STEEL EDGES AFTER COMPLETION OF FIELD CUTTING TO REMOVE BURRS.
4. CLEAN SURFACE /TOUGH UP ABRASIONS AND NON-CALVANIZED SURFACES PER STRUCTURAL STEEL NOTE 7 SHEET N-1.

GENERAL DRAWING NOTES:

- REFER TO STRUCTURAL ANALYSIS AND MODIFICATION DESIGN REPORT PREPARED BY CENTEK ENGINEERING, DATED 04.10.14, REVISION #1 FOR ALL AT&T ANTENNA & APPURTENANCE INFORMATION. DESIGN LOADS ARE BASED ON THE ABOVE REPORT.
- TOWER GEOMETRY AND STRUCTURE MEMBER SIZES WERE OBTAINED FROM THE ORIGINAL TOWER DESIGN DRAWINGS PREPARED BY PAUL J. FORD AND COMPANY JOB #29204-0049, DATED FEBRUARY 24, 2004 AND VERIFIED IN FIELD. REFER TO CSB TOWER MAPPING REPORT, DATED 01/24/2014.
- REFER TO MONOPOLE EXTENSION DESIGN PREPARED BY CENTEK ENGINEERING FOR VERIZON WIRELESS, DATED 02.13.14, REVISION #3.
- MONOPOLE DESIGN TAPER = 0.14250 in./ft.
- CONTRACTOR SHALL BE RESPONSIBLE FOR PROCURING ALL NECESSARY PERMITS, LICENSES, APPROVALS AND OTHER REQUIREMENTS FOR CONSTRUCTION.
- THE INSTALLATION OF TOWER REINFORCEMENT SHALL BE CONDUCTED ONLY ON DAYS WHEN THE EXPECTED WEATHER CONDITION INDICATES LESS THAN 15 MPH WIND SPEED. HAND-TO-TOLE INSTALLATION SHALL BE COMPLETED ON SAME WORKING DAY. CONTRACTOR SHALL ENSURE THE STABILITY OF THE SUBJECT TOWER DURING MODIFICATION WORK.

GENERAL NOTES:

- ALL WORK SHALL BE IN ACCORDANCE WITH TIA/EIA-222 REVISION "F" "STRUCTURAL STANDARDS FOR STEEL ANTENNA TOWERS AND SUPPORTING STRUCTURES".
- THE CONTRACTOR IS SOLELY RESPONSIBLE TO DETERMINE CONSTRUCTION PROCEDURE AND SEQUENCE, AND TO ENSURE THE SAFETY OF THE EXISTING STRUCTURES AND ITS COMPONENT PARTS DURING CONSTRUCTION. THIS INCLUDES THE ADDITION OF WHATEVER SHORING, BRACING, UNDERPINNING, ETC. THAT MAY BE NECESSARY. MAINTAIN EXISTING SITE OPERATIONS, COORDINATE WORK WITH TOWER OWNER.
- DRAWINGS INDICATE THE MINIMUM STANDARDS, BUT IF ANY WORK SHOULD BE INDICATED TO BE SUBSTANDARD TO ANY ORDINANCES, LAWS, CODES, RULES, OR REGULATIONS BEARING ON THE WORK, THE CONTRACTOR SHALL INCLUDE IN HIS WORKSHEET AND SHALL EXECUTE THE WORK CORRECTLY IN ACCORDANCE WITH SUCH ORDINANCES, LAWS, CODES, RULES OR REGULATIONS WITH NO INCREASE IN COSTS.
- THE CONTRACTOR SHALL FIELD VERIFY ALL DIMENSIONS, ELEVATIONS, ANGLES, AND EXISTING CONDITIONS AT THE SITE, PRIOR TO FABRICATION AND/OR INSTALLATION OF ANY WORK IN THE CONTRACT AREA.
- ALL DAMAGE CAUSED TO ANY EXISTING STRUCTURE SHALL BE THE SOLE RESPONSIBILITY OF THE CONTRACTOR. THE CONTRACTOR WILL BE HELD LIABLE FOR ALL REPAIRS REQUIRED FOR EXISTING STRUCTURES IF DAMAGED DURING CONSTRUCTION ACTIVITIES.
- CONTRACTOR SHALL BE RESPONSIBLE FOR ALL ON-SITE SAFETY FROM THE TIME THE JOB IS AWARDED UNTIL ALL WORK IS COMPLETE AND ACCEPTED BY THE OWNER.
- CONTRACTOR SHALL TAKE FIELD MEASUREMENTS NECESSARY TO ASSURE PROPER FIT OF ALL FINISHED WORK.
- TOWER REINFORCING SHALL BE CONDUCTED BY FIELD CREWS EXPERIENCED IN THE ASSEMBLY AND ERECTION OF RADIO ANTENNAS AND SUPPORT STRUCTURES. ALL SAFETY PROCEDURES, RIGGING AND ERECTION METHODS SHALL BE STANDARD TO THE INDUSTRY AND IN COMPLIANCE WITH OSHA.
- EXISTING COAXIAL CABLES AND ALL ACCESSORIES SHALL BE RELOCATED AS NECESSARY AND REINSTALLED BY THE CONTRACTOR WITHOUT INTERRUPTION IN SERVICE WHERE THEY ARE IN CONFLICT WITH TOWER REINFORCEMENT.

EARTHWORK NOTES

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

SIEVE DESIGNATION	% PASSING
1 1/2"	100
No. 4	40-70
No. 100	5-20
No. 200	4-8
- CRUSHED STONE TO BE UNIFORMLY GRADED, CLEAN, HARD PROCESS AGGREGATE MEETING THE FOLLOWING GRADATION REQUIREMENTS:

SIEVE DESIGNATION	% PASSING
1"	100
3/4"	90-100
1/2"	0-15
3/8"	0-5
- SELECT BACKFILL FOR FOUNDATION WALLS SHALL BE FREE OF ORGANIC MATERIAL, TOPSOIL, DEBRIS AND BOULDERS LARGER THAN 6".
- GRAVEL AND GRANULAR FILL SHALL BE INSTALLED IN 10" MAX. LIFTS. COMPACTED TO 95% MIN. AT MAX. DRY DENSITY.
- NON WOVEN GEOTEXTILE FOR SEPARATION PURPOSES SHALL BE MIRAFI 140N, OR ENGINEER APPROVED EQUAL.

DESIGNED BY:	JRM
DRAWN BY:	JRM
CHECKED BY:	CFC
DATE:	03/27/14
SCALE:	AS SHOWN
SHEET NO.:	12/10/00
DATE:	03/27/14
SCALE:	AS SHOWN
SHEET NO.:	12/10/00



CENTEK Engineering, Inc.
www.CentekEng.com
12201 468-6550 Fax
432 North Benton Road, Branford, CT 06405

AT&T MOBILITY
CT2413
SIMSBURY
PROPOSED TOWER REINFORCEMENT DESIGN
345 BUSHY HILL ROAD, SIMSBURY, CT

DESIGN BASIS AND STRUCTURAL NOTES

SHEET NO. N-1
Sheet No. 2 of 12

FOUNDATION CONSTRUCTION NOTES

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

CONCRETE CONSTRUCTION

1. CONCRETE CONSTRUCTION SHALL CONFORM TO THE FOLLOWING STANDARDS:
ACI 211 - STANDARD PRACTICE FOR SELECTING PROPORTIONS FOR NORMAL AND HEAVYWEIGHT CONCRETE.
ACI 301 - SPECIFICATIONS FOR STRUCTURAL CONCRETE FOR BUILDINGS.
ACI 302 - GUIDE FOR CONCRETE FLOOR AND SLAB CONSTRUCTION
ACI 304 - RECOMMENDED PRACTICE FOR MEASURING, MIXING, TRANSPORTING, AND PLACING CONCRETE.
ACI 306.1 - STANDARD SPECIFICATION FOR COLD WEATHER CONCRETING
ACI 318 - BUILDING CODE REQUIREMENTS FOR REINFORCED CONCRETE.
2. CONCRETE SHALL BE AIR ENTRAINED AND SHALL DEVELOP COMPRESSIVE STRENGTH IN 28 DAYS AS FOLLOWS:
ALL CONCRETE 4,000 PSI
3. REINFORCING STEEL SHALL BE 60,000 PSI YIELD STRENGTH.
4. ALL DETAILING, FABRICATION, AND ERECTION OF REINFORCING BARS, UNLESS OTHERWISE NOTED, MUST FOLLOW THE LATEST ACI CODE AND LATEST ACI MANUAL OF STANDARD PRACTICE FOR DETAILING REINFORCED CONCRETE STRUCTURES.
5. CONCRETE COVER OVER REINFORCING SHALL BE 3 INCHES.
6. NO STEEL WIRE, METAL FORM TIES, OR ANY OTHER METAL SHALL REMAIN WITHIN THE REQUIRED COVER OF ANY CONCRETE SURFACE.
7. ALL REINFORCEMENT SHALL BE CONTINUOUS. SPLICES WILL NOT BE ALLOWED.
8. NO TACK WELDING OF REINFORCING WILL BE PERMITTED.
9. NO CALCIUM CHLORIDE OR ADMIXTURES CONTAINING MORE THAN 1 % CHLORIDE BY WEIGHT OF ADMIXTURE SHALL BE USED IN THE CONCRETE.
10. TOP OF FOOTING SURFACES SHALL RECEIVE A UNIFORM FLOAT FINISH. CURE FOOTING SURFACE WITH SONNEBORN KURE-N-SEAL WB OR APPROVED EQUAL, APPLIED AS RECOMMENDED BY MANUFACTURER.

CONCRETE CONSTRUCTION - CONTINUED

11. PREPARATION OF SURFACES WHERE NEW CONCRETE WILL INTERFACE WITH EXISTING CONCRETE:
THE PERIMETER OF THE EXISTING CAISSON SHALL BE THOROUGHLY CLEANED OF ALL DIRT AND DELETERIOUS MATERIALS PRIOR TO APPLICATION OF BONDING AGENT. CONTRACTOR SHALL NOTIFY ENGINEER OF RECORD 24 HOURS IN ADVANCE OF CLEANING.
SIKADUR 32, HI-MOD OR ENGINEER APPROVED EQUAL SHALL BE APPLIED, IN STRICT ACCORDANCE WITH MANUFACTURER'S INSTRUCTIONS, TO ALL INTERFACING SURFACES BEFORE CONCRETE IS PLACED.
CAULK JOINT BETWEEN EXISTING CONCRETE SURFACES AND NEW CONCRETE WITH SIKAFLEX 1-A BY SIKA CORP. OR ENGINEER APPROVED EQUAL.
SUBMIT MANUFACTURER'S PRODUCT SPECIFICATION DATA AND INSTALLATION INSTRUCTIONS FOR REVIEW AND APPROVAL BY OWNER.
12. NEW CONCRETE FOOTING SHALL BE ALLOWED TO CURE AT LEAST 14 DAYS BEFORE WIRELESS ANTENNA MOUNT, ANTENNAS, AND CABLES ARE INSTALLED.
13. INSPECTION AND TESTING OF CONCRETE WORK SHALL BE PERFORMED BY AN INDEPENDENT TESTING LABORATORY, APPROVED AND PAID BY THE OWNER. THE INSPECTOR SHALL OBSERVE THE CONDITION OF SOILS AND FORMWORK BEFORE FOOTINGS ARE PLACED, SIZE, SPACING AND LOCATION OF REINFORCEMENT, AND PLACEMENT OF CONCRETE.
14. THE TESTING COMPANY SHALL ALSO OBTAIN A MINIMUM OF THREE (3) COMPRESSIVE STRENGTH TEST SPECIMENS FOR EACH CONCRETE MIX DESIGN. ONE SPECIMEN TESTED AT 7 DAYS, ONE AT 28 DAYS, AND ONE HELD IN RESERVE FOR FUTURE TESTING, IF NEEDED.
15. FOUR COPIES OF ALL INSPECTION TEST REPORTS SHALL BE SUBMITTED TO THE OWNER WITHIN TEN (10) WORKING DAYS OF THE DATE OF INSPECTION.

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DRAWN BY:	JHM
CHECKED BY:	CFC
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STRUCTURAL STEEL NOTES:

- ALL STRUCTURAL STEEL IS DESIGNED BY ALLOWABLE STRESS DESIGN (ASD)
- STRUCTURAL STEEL (W SHAPES)---ASTM A992,
(FY = 50 KSI)
- REINFORCEMENT BARS---ASTM A572 Grade 50, (Fu = 65 KSI)
- STRUCTURAL HSS (RECTANGULAR SHAPES)---ASTM A500 GRADE B,
(FY = 46 KSI)
- STRUCTURAL HSS (ROUND SHAPES)---ASTM A500 GRADE B,
(FY = 42 KSI)
- CONNECTION BOLTS---ASTM A325-N
(FY = 42 KSI)
- ANCHOR RODS---ASTM F 1554
WELDING ELECTRODE---ASTM E 70XX
- STRUCTURAL STEEL SHALL BE DETAILED, FABRICATED AND ERECTED IN
ACCORDANCE WITH THE LATEST PROVISIONS OF AISC MANUAL OF STEEL
CONSTRUCTION.
- PROVIDE ALL PLATES, CLIP ANGLES, CLOSURE PIECES, STRAP ANCHORS,
MISCELLANEOUS PIECES AND HOLES REQUIRED TO COMPLETE THE
STRUCTURE.
- INSTALL FABRICATIONS PLUMB AND LEVEL, ACCURATELY FITTED, AND FREE
FROM DISTORTIONS OR DEFECTS.
- NOTIFY THE ENGINEER PRIOR TO FIELD CUTTING OR MODIFYING APPROVED
FABRICATIONS.
- ALL STEEL MATERIAL (EXPOSED TO WEATHER) SHALL BE GALVANIZED AFTER
FABRICATION IN ACCORDANCE WITH ASTM A123 "ZINC (HOT DIPPED
GALVANIZED) COATINGS" ON IRONS AND STEEL PRODUCTS.
- ALL BOLTS, ANCHORS AND MISCELLANEOUS HARDWARE SHALL BE
GALVANIZED IN ACCORDANCE WITH ASTM A153 "ZINC COATING (HOT-DIP)
ON IRON AND STEEL HARDWARE".
- CONTRACTOR SHALL COMPLY WITH AWS CODE FOR PROCEDURES
APPEARANCE AND QUALITY OF WELDS, AND WELDING PROCESSES SHALL BE
QUALIFIED IN ACCORDANCE WITH AWS "STANDARD QUALIFICATION
PROCEDURES". ALL WELDING SHALL BE DONE USING E70XX ELECTRODES
AND WELDING SHALL CONFORM TO AISC AND D1.1 WHERE FILLET WELD
SIZES ARE NOT SHOWN, PROVIDE THE MINIMUM SIZE PER TABLE J2.4 IN
THE AISC "MANUAL OF STEEL CONSTRUCTION" 9TH EDITION. AT THE
COMPLETION OF WELDING, ALL DAMAGE TO GALVANIZED COATING SHALL BE
REPAIRED.
- THE ENGINEER SHALL BE NOTIFIED OF ANY INCORRECTLY FABRICATED,
DAMAGED OR OTHERWISE MISFITTING OR NON CONFORMING MATERIALS OR
CONDITIONS TO REMEDIAL OR CORRECTIVE ACTION. ANY SUCH ACTION
SHALL REQUIRE ENGINEER REVIEW.
- COMMENCEMENT OF STRUCTURAL STEEL WORK WITHOUT NOTIFYING THE
ENGINEER OF ANY DISCREPANCIES WILL BE CONSIDERED ACCEPTANCE OF
PRECEDING WORK.
- FOUR COPIES OF ALL INSPECTION TEST REPORTS SHALL BE SUBMITTED TO
THE ENGINEER WITHIN TEN (10) WORKING DAYS OF THE DATE OF
INSPECTION.

AJAX BOLTS:

- ALL REINFORCEMENT BAR SPLICE AND TERMINATION BOLTS
SHALL BE 20mm ϕ 'ONESIDE' BOLTS BY AJAX FASTENERS w/
SLEEVES.
 - BOLTS SHALL MEET AS 1252, PC 8.8 (SIMILAR TO ASTM
A325); Fu = 120ksi.
 - BOLTS SHALL BE PROVIDED w/ 29mm O.D x 20mm I.D
SLEEVE (Fu = 120ksi).
 - HOLES IN REINFORCING BARS SHALL BE 31mm ϕ .
FIELD DRILL 30mm ϕ HOLES IN TOWER AT EACH
REINFORCING BAR HOLE LOCATION. ALL FIELD BOLTS TO
BE COATED w/ SILICONE PRIOR TO INSTALLATION.

SUPPLEMENTARY ANCHOR RODS:

- ALL ANCHOR BOLTS SHALL BE WILLIAMS ALL-THREAD BAR AND
CONFORM TO ASTM A772 (Fy = 127.7 KSI, Fu = 150 KSI).
- HEX NUTS AND JAM NUTS ARE TO BE ASTM A108 FOR ALL
ALL-THREAD ANCHOR ROD BAR GRADES.
- HARDENED WASHERS ARE TO BE ASTM F436 FOR
ALL -THREAD ANCHOR ROD BAR GRADES.
- THREADED ROD COUPLERS ARE NOT TO BE USED.
- CONTRACTOR SHALL VERIFY ADEQUATE DRILLING CLEARANCE AND
ACCESS AT EXISTING MONOPOLE PRIOR TO CONSTRUCTION. ANY
OBSTRUCTIONS SHALL BE REPORTED TO THE ENGINEER OF
RECORD IMMEDIATELY. NO WORK SHALL PROCEED UNTIL THE
ENGINEER OF RECORD HAS REVIEWED THE OBSTRUCTION(S) AND
A RESOLUTION HAS BEEN PROVIDED.
- ANCHOR ROD HOLES SHALL BE LOCATED AS INDICATED WITHIN
THESE DRAWINGS WITH A MINIMUM INSIDE EDGE DISTANCE OF
6" FROM FACE OF CAISSON OR PIER TO AVOID EXISTING REBAR
CAGE. CONTRACTOR SHALL DRILL WITH CAUTION.
- BASE PLATE HOLES (WHERE APPLICABLE) SHALL BE DRILLED
AND NOT TORCH CUT.
- PHOTOS SHALL BE TAKEN OF EACH ANCHOR ROD DRILLED
HOLE WITH A TAPE MEASURE INSERTED INTO THE HOLE TO
DOCUMENT FINAL DRILLED DEPTH OF HOLE. HOLES SHALL BE
NUMBERED WITH A MARKER RELATIVE TO THE FLAT FACE
SHOWN ON THE DRAWINGS FOR REFERENCE.
- DRILLED HOLES SHALL BE FREE OF DEBRIS AND MOISTURE;
CLEAN WITH VACUUM WHEN NECESSARY.

EPOXY ADHESIVE:

- A SLOW CURE HIGH STRENGTH EPOXY (MIN 1800 PSI BOND
STRENGTH ATTAINED AFTER 48 HOURS) SHALL BE USED TO SET
ANCHORS. INSTALL IN STRICT ACCORDANCE WITH
MANUFACTURERS INSTRUCTIONS WITH ATTENTION TO AMBIENT
DAILY TEMPERATURE AT TIME OF INTENDED INSTALLATION.
- CONTRACTOR SHALL SUBMIT EPOXY PRODUCT DATA SHEETS FOR
APPROVAL BY ENGINEER OF RECORD (EOR) PRIOR TO
PROCEEDING WITH CONSTRUCTION.

PULLOUT TESTING OF POST INSTALLED ANCHOR RODS:

- EPOXY AGENTS SHOULD BE FULLY CURED IN ACCORDANCE WITH
MANUFACTURERS REQUIREMENTS PRIOR TO PROCEEDING WITH
PULLOUT TESTING OF ANCHOR RODS.
- CONTRACTOR SHALL ENSURE THAT CONSTRUCTION DOES NOT
PROCEED BEYOND THE POINT WHERE THE ANCHOR RODS CAN
BE EFFECTIVELY TESTED. THE ANCHOR ROD SLEEVES AND
TRANSFER STIFFENER PLATES SHOULD BE INSTALLED AFTER
PULL-TESTING IS COMPLETE AND ENGINEER OF RECORD HAS
APPROVED THE RESULTS OF THE PULL TEST.
- CONTRACTOR SHALL TEST 50% OF POST INSTALLED ANCHOR
RODS WITH A MINIMUM OF FOUR (4), WHICH EVER IS GREATER.
- THE ANCHOR ROD(S) SHALL BE TESTED IN CONFORMANCE WITH
ASTM E488 'STANDARD TEST METHODS FOR STRENGTH OF
ANCHORS IN CONCRETE AND MASONRY ELEMENTS'
(RE-APPROVED 2003) UTILIZING THE STATIC TENSION TEST
PROCEDURE.
- PULL TEST ANCHORS TO A TARGET TENSION OF 80% OF THE
MATERIAL SPECIFIED MINIMUM YIELD (FY) STRENGTH ON THE
TENSILE STRESS (NET) AREA. THE TARGET TENSION FOR THIS
PROJECT IS 285 KIPS.
- MAINTAIN COMPLETE LOAD-DISPLACEMENT RECORDS
THROUGHOUT THE TEST. THE ANCHOR SHALL BE LOADED IN
INCREMENTS OF UP TO 15% OF THE TARGET TENSION.
- IF A DISPLACEMENT GREATER THAN 0.010" REMAINS AFTER THE
INITIAL TEST CYCLE, ADDITIONAL TESTING SHALL BE PERFORMED
UP TO A MAXIMUM OF FOUR (4) TEST CYCLES TO DETERMINE
IF THE MOVEMENT CONTINUES TO ACCUMULATE. INCREMENTAL
RESIDUAL MOVEMENT RECORDED FROM EACH TEST CYCLE MUST
BE DECREASING IN VALUE AND STABILIZE TO A VALUE NO
MORE THAN 0.010". OTHERWISE THE ANCHOR SHALL BE
CONSIDERED TO FAIL THE TEST. TOTAL RESIDUAL MOVEMENT
SHALL NOT BE GREATER THAN 0.10" OR THE ANCHOR SHALL
BE CONSIDERED TO FAIL THE TEST. THIS INFORMATION SHALL
BE RECORDED AND INCLUDED IN THE POST MODIFICATION
INSPECTION REPORT.
- CONTACT ENGINEER OF RECORD (EOR) IF ANY OF THE
ANCHORS FAIL THE PULL TEST.

DESIGNED BY:	JAM
DRAWN BY:	JAM
CHECKED BY:	CFC
DATE:	11/14/14
SCALE:	AS SHOWN
PROJECT NO.:	13080000
DATE:	11/14/14
SCALE:	AS SHOWN
PROJECT NO.:	13080000
DATE:	11/14/14
SCALE:	AS SHOWN
PROJECT NO.:	13080000



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(203) 468-0590
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AT&T MOBILITY	
PROPOSED TOWER REINFORCEMENT DESIGN	
DATE:	01/05/14
SCALE:	AS SHOWN
JOB NO.	13298.000
CT2413	
SIMSBURY	
345 BUSBY HILL ROAD, SIMSBURY, CT	

STRUCTURAL NOTES

SHEET NO.	N-3
Sheet No. 3 of 13	

MODIFICATION INSPECTION REPORT REQUIREMENTS

PRE-CONSTRUCTION		DURING CONSTRUCTION		POST-CONSTRUCTION	
SCHEDULED ITEM	REPORT ITEM	SCHEDULED ITEM	REPORT ITEM	SCHEDULED ITEM	REPORT ITEM
X	EOR MODIFICATION INSPECTION DRAWING	X	FOUNDATIONS	X	MODIFICATION INSPECTOR RECORD REDLINE DRAWING
X	EOR APPROVED SHOP DRAWINGS	X	EARTHWORK: BACKFILL MATERIAL & COMPACTION	X	POST-INSTALLED ANCHOR ROD PULL-OUT TEST
-	EOR APPROVED POST-INSTALLED ANCHOR MP/II	X	CONCRETE TESTING	X	PHOTOGRAPHS
-	FABRICATION INSPECTION	X	STEEL INSPECTION		
-	FABRICATOR CERTIFIED WELDER INSPECTION	X	POST INSTALLED ANCHOR ROD VERIFICATION		
X	MATERIAL CERTIFICATIONS	-	BASE PLATE GROUT VERIFICATION		
		X	CONTRACTOR'S CERTIFIED WELD INSPECTION		
		X	ON-SITE COLD GALVANIZING/PAINTING VERIFICATION		
		-	GUY WIRE TENSION REPORT		
		X	CONTRACTOR AS-BUILT REDLINE DRAWINGS		

NOTES:

1. REFER TO MODIFICATION INSPECTION NOTES FOR ADDITIONAL REQUIREMENTS
2. "X" DENOTES DOCUMENT REQUIRED FOR INCLUSION IN MODIFICATION INSPECTION FINAL REPORT.
3. "-" DENOTES DOCUMENT NOT REQUIRED FOR INCLUSION IN MODIFICATION INSPECTION FINAL REPORT.
4. EOR - ENGINEER OF RECORD
4. MP/II - "MANUFACTURER'S PRINTED INSTALLATION GUIDELINES"

GENERAL

1. THE MODIFICATION INSPECTION IS A VISUAL INSPECTION OF STRUCTURAL MODIFICATIONS, TO INCLUDE A REVIEW AND COMPIATION OF SPECIFIED SUBMITTALS AND CONSTRUCTION INSPECTIONS, AS AN ASSURANCE OF COMPLIANCE WITH THE CONSTRUCTION DOCUMENTS PREPARED UNDER THE DIRECTION OF THE ENGINEER OF RECORD (EOR).
2. THE MODIFICATION INSPECTION IS TO CONFIRM INSTALLATION CONFIGURATION AND GENERAL WORKMANSHIP AND IS NOT A REVIEW OF THE MODIFICATION DESIGN. OWNERSHIP OF THE MODIFICATION DESIGN EFFECTIVENESS AND INTENT RESIDES WITH THE ENGINEER OF RECORD.
3. TO ENSURE COMPLIANCE WITH THE MODIFICATION INSPECTION REQUIREMENTS THE GENERAL CONTRACTOR (GC) AND THE MODIFICATION INSPECTOR (MI) COMMENCE COMMUNICATION UPON AUTHORIZATION TO PROCEED BY THE CLIENT. EACH PARTY SHALL BE PROACTIVE IN CONTACTING THE OTHER. THE EOR SHALL BE CONTACTED IF SPECIFIC GC/MI CONTACT INFORMATION IS NOT MADE AVAILABLE.
4. THE GC SHALL PROVIDE THE MI WITH A MINIMUM OF 5 BUSINESS DAYS NOTICE OF IMPENDING INSPECTIONS.
5. WHEN POSSIBLE, THE GC AND MI SHALL BE ON SITE DURING THE MODIFICATION INSPECTION TO HAVE ANY NOTED DEFICIENCIES ADDRESSED DURING THE INITIAL MODIFICATION INSPECTION.

MODIFICATION INSPECTOR (MI)

1. THE MI SHALL CONTACT THE GC UPON AUTHORIZATION BY THE CLIENT TO:
 - REVIEW THE MODIFICATION INSPECTION REPORT REQUIREMENTS.
 - WORK WITH THE GC IN DEVELOPMENT OF A SCHEDULE FOR ON-SITE INSPECTIONS.

REQUIRED PHOTOGRAPHS

1. THE GC AND MI SHALL AT MINIMUM PHOTO DOCUMENT THE FOLLOWING FOR INCLUSION IN THE MODIFICATION INSPECTION REPORT:
 - PRE-CONSTRUCTION: GENERAL CONDITION OF THE SITE.
 - DURING CONSTRUCTION: RAW MATERIALS, CRITICAL DETAILS, WELD PREPARATION, BOLT INSTALLATION & TORQUE, FINAL INSTALLED CONDITION & SURFACE COATING REPAIRS.
 - POST-CONSTRUCTION: FINAL CONDITION OF THE SITE

GENERAL CONTRACTOR (GC)

1. THE GC IS REQUIRED TO CONTACT THE GC UPON AUTHORIZATION TO PROCEED WITH CONSTRUCTION BY THE CLIENT TO:
 - REVIEW THE MODIFICATION INSPECTION REPORT REQUIREMENTS.
 - WORK WITH THE MI IN DEVELOPMENT OF A SCHEDULE FOR ON-SITE INSPECTIONS.
 - DISCUSS CRITICAL INSPECTIONS AND PROJECT CONCERNS.
2. THE GC IS RESPONSIBLE FOR COORDINATING AND SCHEDULING IN ADVANCE ALL REQUIRED INSPECTIONS AND TESTS WITH THE MI.

CORRECTION OF FAILING MODIFICATION INSPECTION

1. SHOULD THE STRUCTURAL MODIFICATION NOT COMPLY WITH THE REQUIREMENTS OF THE CONSTRUCTION DOCUMENTS, THE GC SHALL WORK WITH THE MODIFICATION INSPECTOR IN A VIABLE REMEDIATION PLAN AS FOLLOWS:
 - CORRECT ALL DEFICIENCIES TO COMPLY WITH THE CONTRACT DOCUMENTS AND COORDINATE WITH THE MI FOR A FOLLOW UP INSPECTION.
 - WITH CLIENT AUTHORIZATION, THE GC MAY WORK WITH THE EOR TO REANALYZE THE MODIFICATION USING THE AS-BUILT CONDITION.

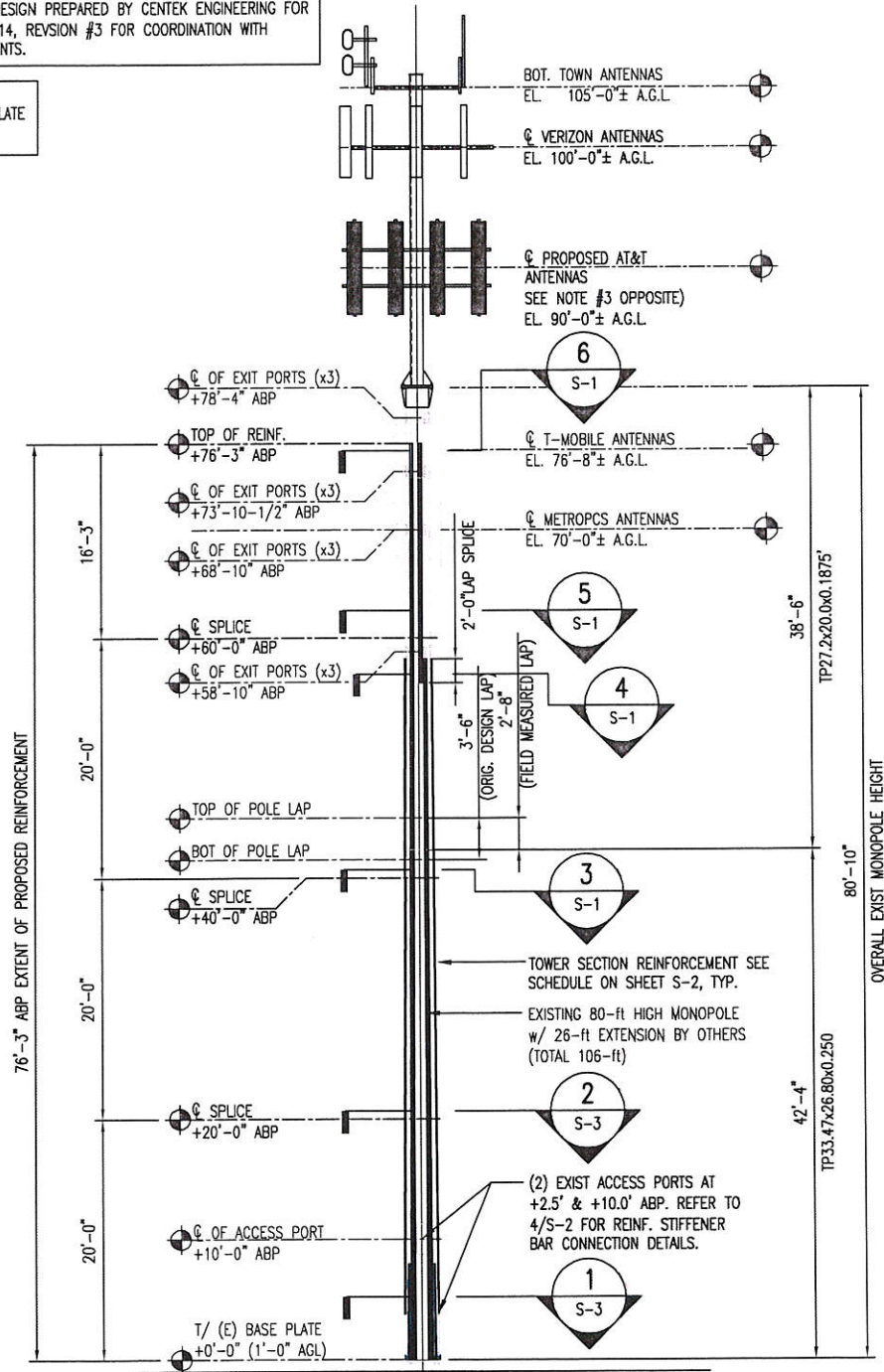
DESIGNED BY: JAM DRAWN BY: JAM CHECKED BY: JAM DATE: 07/14/14	345 BUSHY HILL ROAD, SIMSBURY, CT 06068 SIMSBURY, CT 06068 CT2413 PROPOSED TOWER REINFORCEMENT DESIGN AT&T MOBILITY	DATE: 07/14/14 SCALE: AS SHOWN JOB NO.: 13296.000	MODIFICATION INSPECTION REQUIREMENTS SHEET NO. 5 OF 14 MI-1	 CENTERK engineering 63-2 North Branford Road, Branford, CT 06405 (203) 486-6587 www.Centerk.com
--	---	---	---	---

NOTES:

1. RELOCATE EXISTING MONOPOLE STEP BOLTS WHERE THEY COME INTO CONFLICT WITH REINFORCEMENT MATERIAL. REFER TO S-3 FOR FLAT LOCATIONS. CONTRACTOR TO ENSURE THAT ALL RELOCATED STEP BOLTS SHALL MEET OSHA REQUIREMENTS.
2. TOWER GEOMETRY AND STRUCTURE MEMBER SIZES WERE OBTAINED FROM THE ORIGINAL TOWER DESIGN DRAWINGS PREPARED BY PAUL J. FORD AND COMPANY JOB #29204-0049, DATED FEBRUARY 24, 2004 AND VERIFIED IN FIELD. REFER TO CSB TOWER MAPPING REPORT, DATED 01/24/2014.
3. MONOPOLE DESIGN TAPER = 0.14250 in./ft.
4. REFER TO MONOPOLE EXTENSION DESIGN PREPARED BY CENTEK ENGINEERING FOR VERIZON WIRELESS, DATED 02.13.14, REVISION #3 FOR COORDINATION WITH MONOPOLE EXTENSION REQUIREMENTS.

KEY:

'ABP' DENOTES ABOVE TOP OF BASE PLATE
'AGL' DENOTES ABOVE GRADE LEVEL.



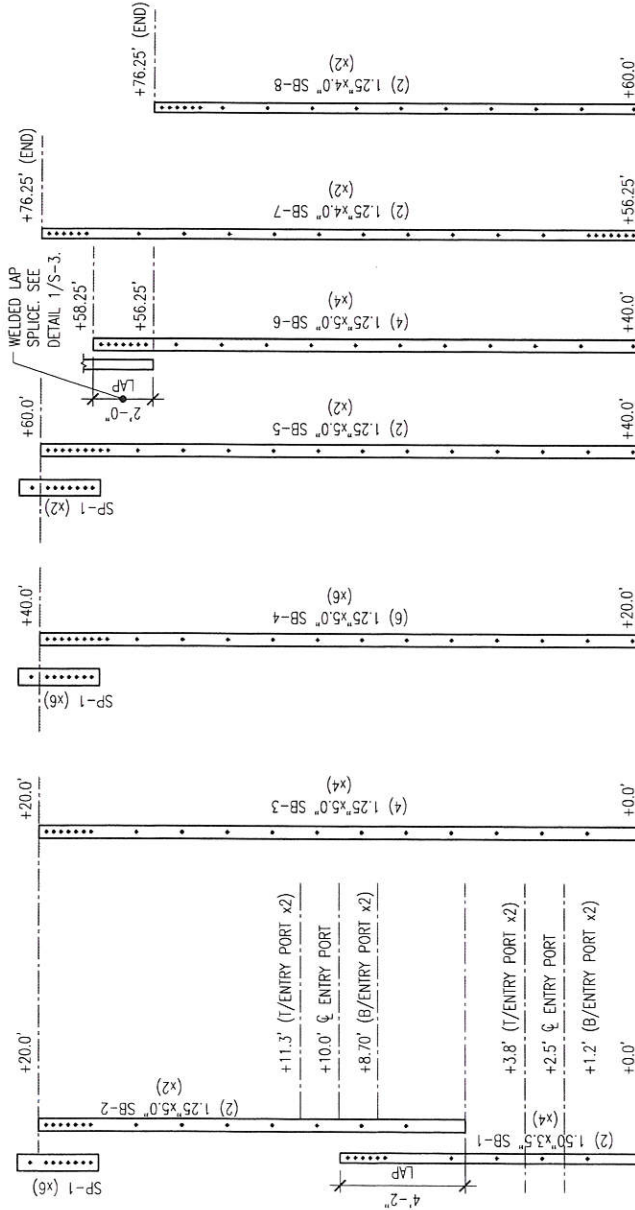
1 MONPOLE REINFORCEMENT ELEVATION
S-1 SCALE: 1" = 10'-0"

REINFORCEMENT SCHEDULE

SECTION NO.	SECTION DESCRIPTION	STIFFENER BAR MARK (SB-X)	SPLICE BAR MARK (SP-X)	REINFORCEMENT ELEVATION ABP	STIFFENER BAR SIZE	STIFFENER No./LENGTH	STIFFENER MATERIAL GRADE	AJAX BOLT DIA.	No. BOLTS AT SPLICE (TOP)	INTERMEDIATE BOLT SPACING (in)	AJAX BOLT LENGTH (MM)
L2	TP45.5x36.37x 0.375in	SB-1	SP-1	(0.0' - 15.0')	1.50"x3.5"	4 @ 10.0'	ASTM A572-65	20mm	6 @ 3" o.c	18" o.c	135mm
L2	TP45.5x36.37x 0.375in	SB-2	SP-1	(11.3' - 20.0')	1.25"x5.0"	2 @ 8.7'		20mm	7 @ 3" o.c	18" o.c	135mm
L2	TP45.5x36.37x 0.375in	SB-3	SP-1	(0.0' - 20.0')	1.25"x5.0"	4 @ 20.0'		20mm	7 @ 3" o.c	18" o.c	135mm
L2	TP45.5x36.37x 0.375in	SB-4	SP-1	(20.0' - 40.0')	1.25"x5.0"	6 @ 20.0'		20mm	7 @ 3" o.c	18" o.c	135mm
L1	TP38.125x28.935x0.375	SB-5	SP-1	(40.0' - 60.0')	1.25"x5.0"	2 @ 20.0'		20mm	7 @ 3" o.c	18" o.c	135mm
L1	TP38.125x28.935x0.375	SB-6	N/A	(40.0' - 58.25')	1.25"x5.0"	4 @ 18.25'		20mm	7 @ 3" o.c	18" o.c	135mm
L1	TP38.125x28.935x0.375	SB-7	N/A	(56.25' - 76.25')	1.25"x4.0"	2 @ 20.0'		20mm	6 @ 3" o.c	18" o.c	135mm
L1	TP38.125x28.935x0.375	SB-8	N/A	(60.0' - 76.25')	1.25"x4.0"	2 @ 16.25'		20mm	6 @ 3" o.c	18" o.c	135mm

NOTES:

- REINFORCEMENT OF THE EXISTING TOWER IS LIMITED TO TOWER SECTIONS L2 & L1 (PARTIAL) AS INDICATED HEREIN. CONTRACTOR IS RESPONSIBLE FOR COORDINATING TEMPORARY REMOVAL OF EXISTING EXTERNALLY MOUNTED ANTENNAS AND APPURTENANCES WHERE THEY COME INTO CONFLICT WITH REINFORCEMENT WORK. REINSTALL UPON COMPLETION OF WORK.
- ALL REINFORCEMENT BAR SPLICE AND TERMINATION BOLTS SHALL BE 20mm Ø "ONESIDE" BOLTS BY AJAX FASTENERS w/ SLEEVES.
 - BOLTS SHALL MEET AS 1252, PC 8.8 (SIMILAR TO ASTM A325); Fu = 120ksi.
 - BOLTS SHALL BE PROVIDED w/ 29mm O.D x 20MM I.D SLEEVE (Fu = 120ksi).
 - HOLES IN REINFORCING BARS SHALL BE 31mm Ø. FIELD HOLES IN REINFORCING BARS SHALL BE 30mm Ø. DRILL 30mm Ø HOLES IN TOWER AT EACH REINFORCING BAR HOLE LOCATION. ALL FIELD BOLTS TO BE COATED w/ SILICONE PRIOR TO INSTALLATION.



1 REINFORCING PLATE DETAILS

S-2 SCALE: 1/4" = 1'-0"

DESIGNED BY:	JAM
CHECKED BY:	JAM
DATE:	03/17/14
PROJECT:	AT&T MOBILITY
LOCATION:	345 BUSHY HILL ROAD, SIMSBURY, CT
PROJECT NO.:	CT2413
DATE:	03/02/14
SCALE:	AS SHOWN
JOB NO.:	13296.00



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 SIMSBURY
 PROPOSED TOWER REINFORCEMENT DESIGN
 345 BUSHY HILL ROAD, SIMSBURY, CT

MONOPOLE REINFORCEMENT DETAILS
 SHEET NO. S-2
 Sheet No. 8 of 13

DESIGNED BY:	JRM
DRAWN BY:	JRM
CHECKED BY:	CFC
DATE:	03/29/14
SCALE:	AS SHOWN
SHEET NO.	1
TOTAL SHEETS	1
PROJECT:	AT&T MOBILITY
LOCATION:	345 BUSBY HILL ROAD, SIMSBURY, CT
CONTRACT NO.	CT2413
CONTRACT DATE	12/01/13
CONTRACT VALUE	\$1,488,658.00
CONTRACT DESCRIPTION	PROPOSED TOWER REINFORCEMENT DESIGN
REVISION	NO. DATE DESCRIPTION
1	03/29/14 JRM REVISED - ISSUED FOR CONSTRUCTION
2	03/29/14 JRM ISSUED FOR CONSTRUCTION

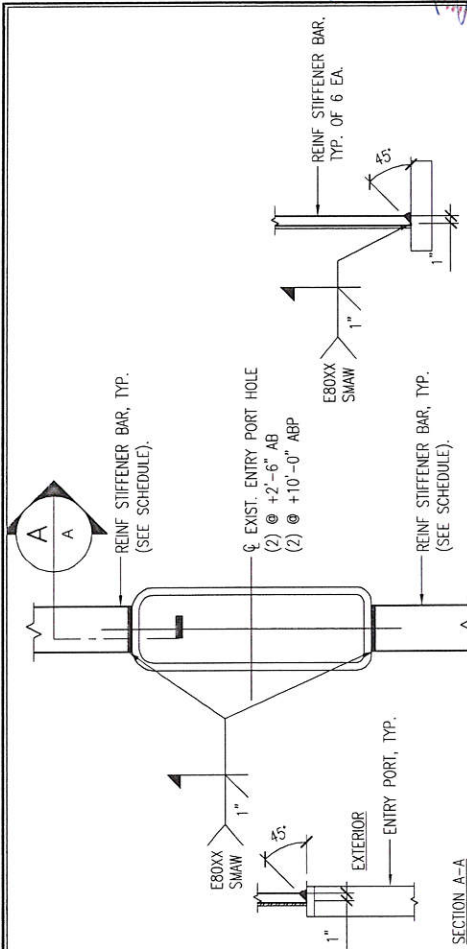


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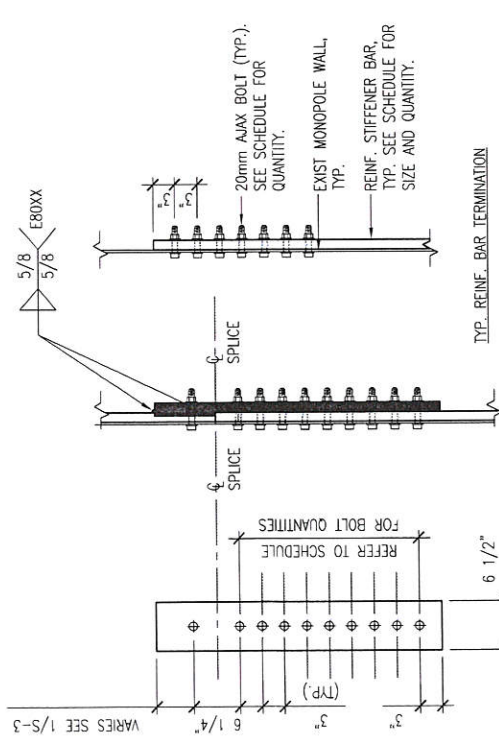
AT&T MOBILITY
CT2413
SIMSBURY
PROPOSED TOWER REINFORCEMENT DESIGN
345 BUSBY HILL ROAD, SIMSBURY, CT

MONOPOLE REINFORCEMENT DETAILS

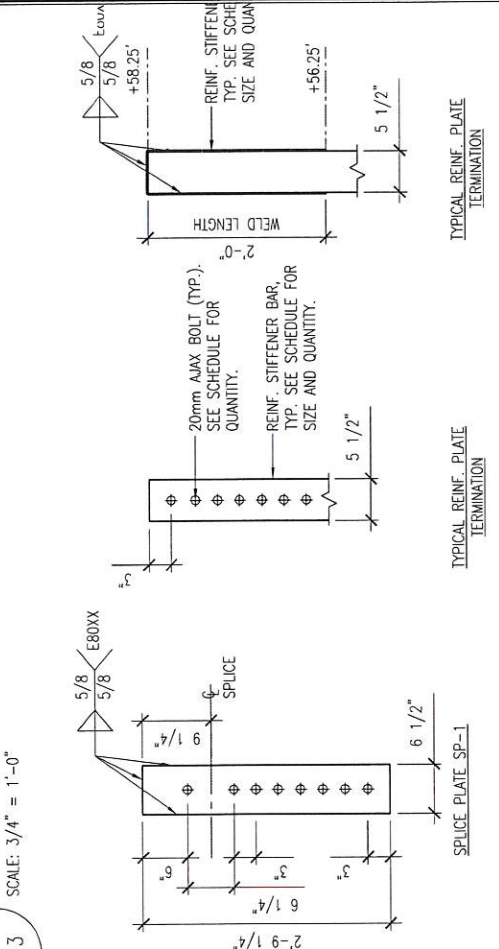
SHEET NO. **S-3**
Sheet No. 3 of 3



3 REIN. BAR END CONNECTION DETAILS
SCALE: 3/4" = 1'-0"

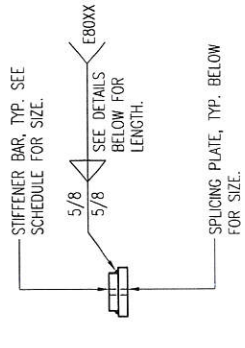


2 TYPICAL SPlice PLATE CONNECTION DETAILS
SCALE: 3/4" = 1'-0"



1 SPlice PLATE PIECE DETAILS
SCALE: 3/4" = 1'-0"

- NOTES:
1. FIELD DRILL 30mm ϕ HOLES IN TOWER FOR EACH AJAX FIELD BOLT.
 2. APPLY SILICONE TO FIELD BOLT PRIOR TO INSTALLATION.
 3. ALL PLATES TO BE HOT DIP GALVANIZED, ASTM A572 GRADE 65 THROUGHOUT.



PLAN VIEW OF SPlice PLATE WELDED CONNECTION TO REIN. STIFFENER BAR

DESIGNED BY:	JRM
DRAWN BY:	JRM
CHECKED BY:	CFC
DATE:	03/18/14
PROJECT:	AT&T MOBILITY
LOCATION:	345 BUSHY HILL ROAD, SIMSBURY, CT
CONTRACT NO.:	345 BUSHY HILL ROAD, SIMSBURY, CT
DATE:	03/18/14
SCALE:	AS SHOWN
JOB NO.:	1338.000

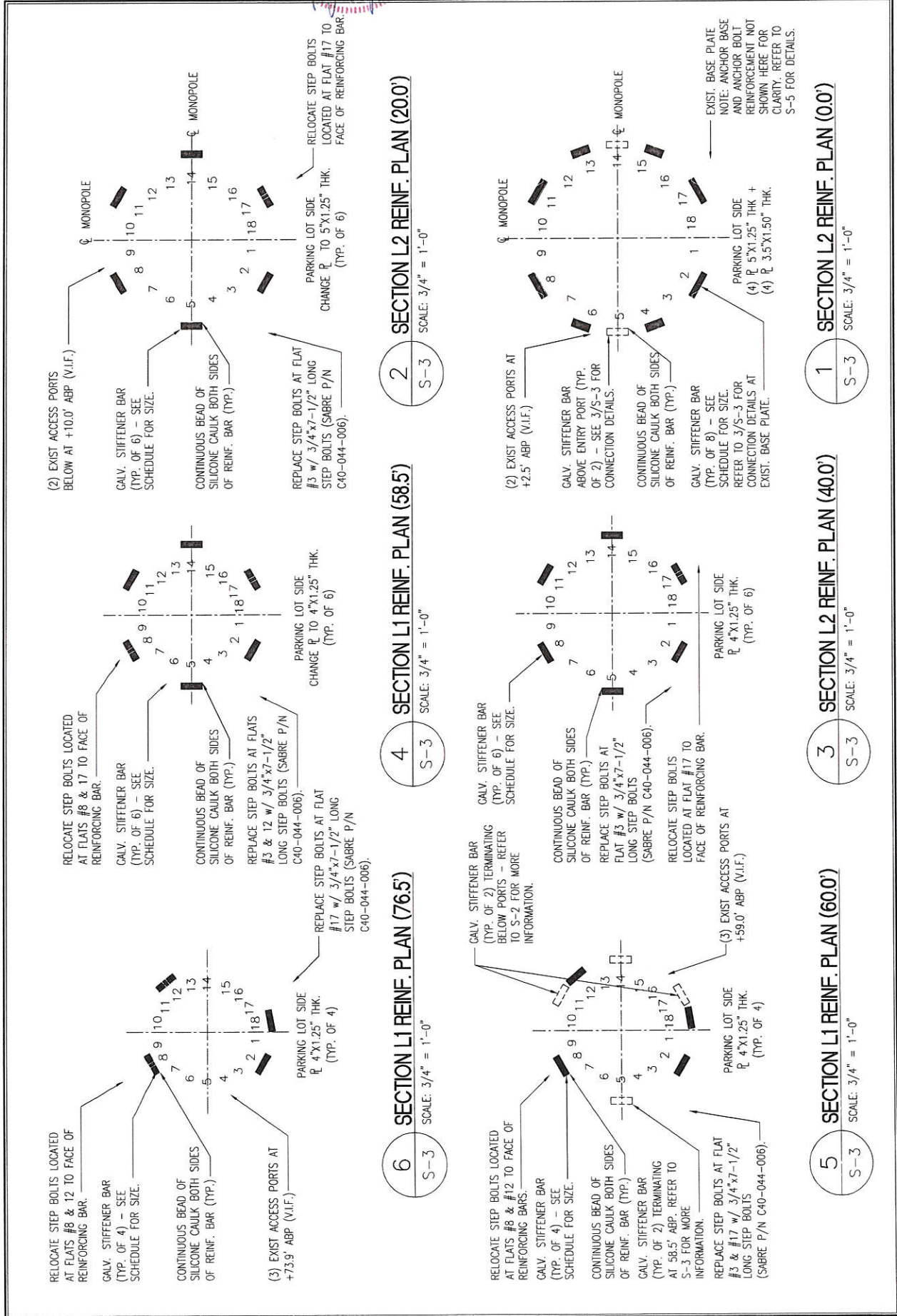


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PROPOSED TOWER REINFORCEMENT DESIGN
345 BUSHY HILL ROAD, SIMSBURY, CT

MONOPOLE REINFORCEMENT DETAILS

SHEET NO. **S-4**
Sheet No. 13 of 15



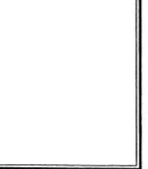
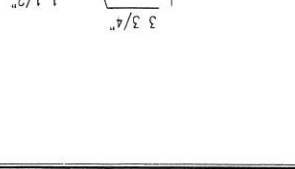
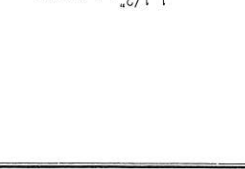
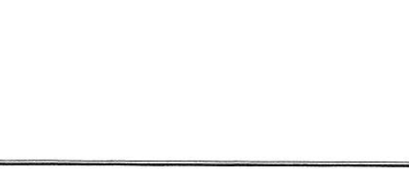
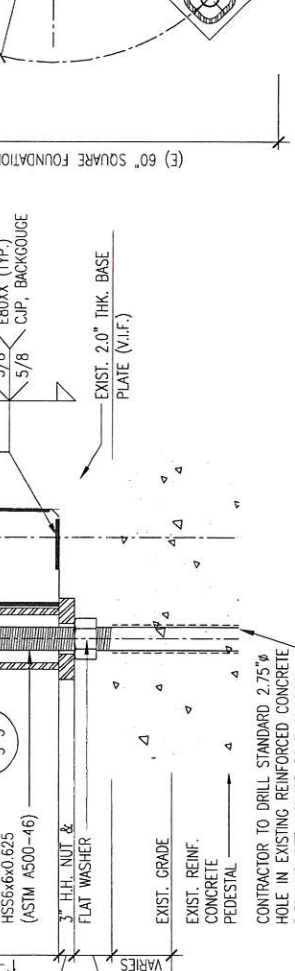
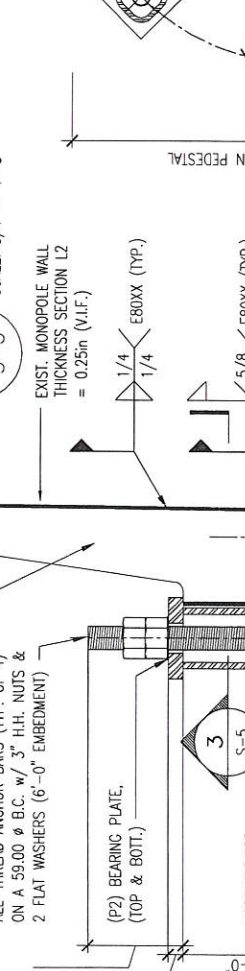
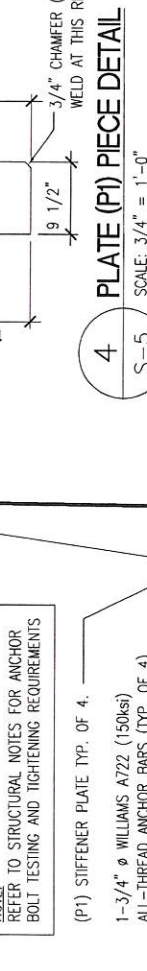
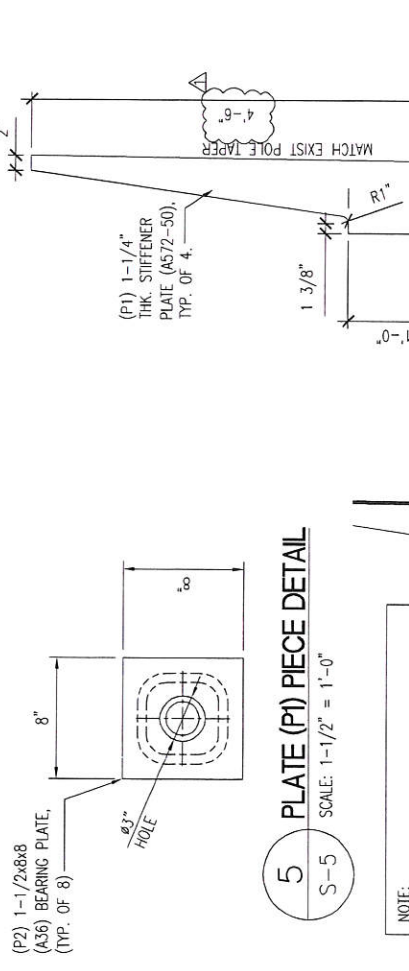
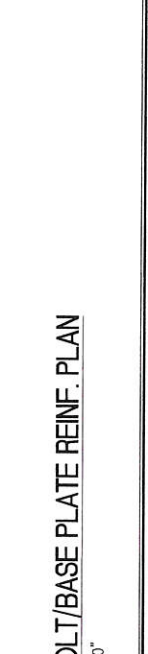
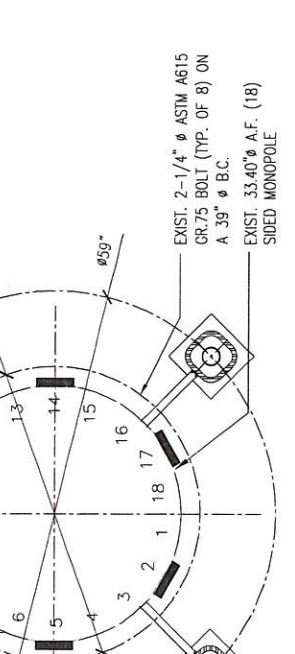
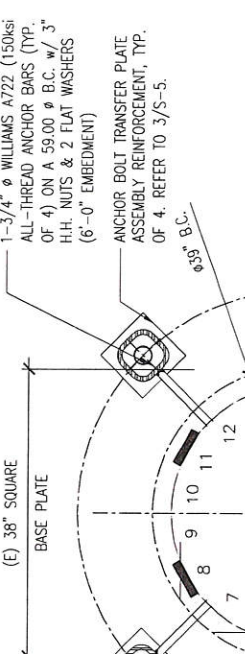
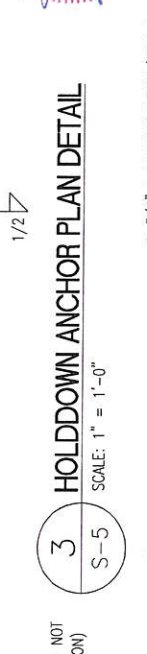
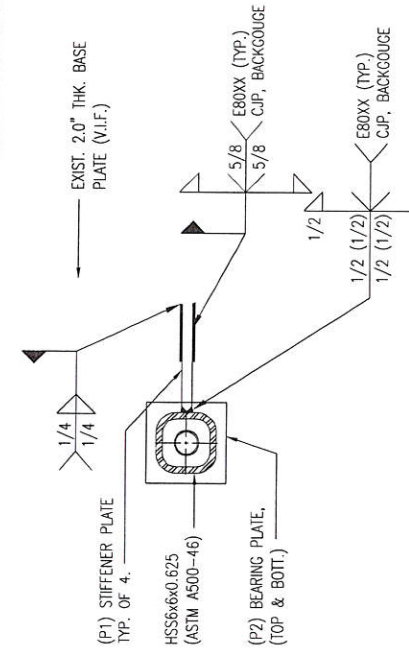
DESIGNED BY:	JAM
CHECKED BY:	JAM
DATE:	03/02/14
PROJECT:	AT&T MOBILITY
LOCATION:	345 BUSHY HILL ROAD, SIMSBURY, CT
SCALE:	AS SHOWN
JOB NO.:	13781.000
SHEET NO.:	13 of 15



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AT&T MOBILITY
 CT2413
 SIMSBURY
 PROPOSED TOWER REINFORCEMENT DESIGN
 DATE: 03/02/14
 SCALE: AS SHOWN
 JOB NO.: 13781.000

MONOPOLE REINFORCEMENT DETAILS
 SHEET NO. 13 of 15
S-5



TAB 5

Structural Analysis and
Reinforcement Design
Report

*80-ft Existing PennSummit
Monopole w/ 26-ft Extension*

*Proposed AT&T Mobility
Antenna Installation*

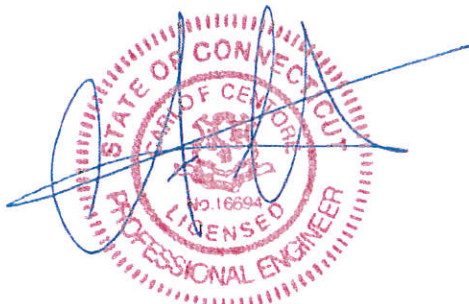
AT&T Site Ref: CT2413

*345 Bushy Hill Road
Simsbury, CT*

Centek Project No. 13298.000

~~Date: November 20, 2013~~

Rev 1: April 10, 2014



Prepared for:

AT&T Mobility
500 Enterprise Drive, Suite 3A
Rocky Hill, CT 06067

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- ANALYSIS.
- TOWER LOADING.
- TOWER CAPACITY.
- FOUNDATION AND ANCHORS.
- CONCLUSION.

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- STANDARD ENGINEERING CONDITIONS.
- GENERAL DESCRIPTION OF STRUCTURAL ANALYSIS PROGRAM.

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- tnxTower DETAILED OUTPUT – EXTENSION.
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- STIFFENER PLATE SECTION PROPERTIES.
- MATHCAD - MONOPOLE_REINF_SHELL LOCAL CHECK.
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- N-2 – STRUCTURAL NOTES
- N-3 – STRUCTURAL NOTES.
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- S-4 – MONOPOLE REINFORCEMENT PLANS.
- S-5 – MONOPOLE REINFORCEMENT DETAILS.
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- EQUIPMENT CUT SHEETS.
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Introduction

The purpose of this report is to summarize the results of the non-linear, P- Δ structural analysis of the antenna installation proposed by AT&T Mobility on the existing monopole (tower) located in Simsbury, CT.

The host tower is a 80-ft tall, two-section, eighteen sided, tapered monopole, originally designed by Paul J. Ford and Company and manufactured by PennSummit Tubular, LLC job no; 29204-0049 dated February 24, 2004 with a 26-ft extension designed by Centek; project no. 13135 dated September 16, 2013. The tower geometry, structure member sizes and foundation system information were obtained from the aforementioned PennSummit design documents and the aforementioned structural analysis report prepared by Centek.

Antenna and appurtenance information were obtained from the aforementioned Centek structural report, visual verification from grade by Centek personnel on July 17, 2013 and a AT&T RF data sheet.

The tower consists of two (2) tapered vertical steel sections conforming to ASTM A607-65 and one (1) HSS12"x0.625" pipe extension (by Verizon Wireless) conforming to ASTM A500-Gr. B (42 ksi). The vertical tower sections are slip joint connected. The extension is flange connected to the top of the tower. The diameter of the pole (flat-flat) is 22.00-in at the top and 33.40-in at the base.

AT&T proposes the installation of twelve (12) panel antennas, twenty-seven (27) Remote Radio Heads (RRU's) and four (4) surge arrestors mounted on a steel platform at the monopole extension. Refer to the Antenna and Appurtenance Summary below for a detailed description of the proposed antenna and appurtenance configuration.

Antenna and Appurtenance Summary

The existing, proposed and future loads considered in this analysis consist of the following:

- TOWN (RELOCATED TO EXTENSION):
Antennas: One (1) 6-ft Omni-directional whip, one (1) ground plane antenna and two (2) dipole antennas mounted on four (4) 4-ft standoff mounts with an elevation of 105-ft above grade.
Coax Cables: One (1) 1-1/4" \varnothing and three (3) 7/8" \varnothing coax cables running on the inside of the existing tower.
- VERIZON (RESERVED):
Antennas: Six (6) Antel BXA-70063-6CF panel antennas, six (6) Antel BXA-171063-12CF panel antennas, three (3) Alcatel-Lucent RRH2x40-07-U Remote Radio Heads, three (3) Alcatel-Lucent RRH2x40-AWS Remote Radio Heads and one (1) RFS DB-T1-6Z-8AB-0Z main distribution box mounted on three (3) T-Arms with a RAD center elevation of 100-ft above grade.
Cables: Two (2) 1-5/8" dia. Hybriflex Fiber feeder cables banded to the exterior of the tower.
- T-MOBILE (EXISTING):
Antennas: Three (3) RFS APX16DWV-16DWVS-E-A20 panel antennas and three (3) 10"x8"x3" TMA's flush mounted with a RAD center elevation of 77-ft above grade.
Coax Cables: Six (6) 1-5/8" \varnothing coax cables running on the inside of the existing tower.

- **METROPCS (EXISTING):**
Antennas: Three (3) RFS APXV18-206517-C panel antennas flush mounted with a RAD center elevation of 70-ft above grade.
Coax Cables: Six (6) 1-5/8" Ø coax cables running on the inside of the existing tower.
- **AT&T (PROPOSED):**
Antennas: Twelve (12) CCI HPA-65R-BUU-H8 panel antennas, twenty seven (27) Remote Radio Heads (RRU's) and four (4) Raycap DC6-48-60-18-8F surge arrestors mounted on a steel platform Commscope p/n MTC3607R with a RAD center elevation of 90-ft above existing grade.
Coax Cables: Two (2) fiber cable, eight (8) dc control cables and three (3) RET cables running on the exterior of the existing tower.

Primary Assumptions Used in the Analysis

- The tower structure's theoretical capacity not including any assessment of the condition of the tower.
- The tower carries the horizontal and vertical loads due to the weight of antennas, ice load and wind.
- Tower is properly installed and maintained.
- Tower is in plumb condition.
- Tower loading for antennas and mounts as listed in this report.
- All bolts are appropriately tightened providing the necessary connection continuity.
- All welds are fabricated with ER-70S-6 electrodes.
- All members are assumed to be as specified in the original tower design documents or reinforcement drawings.
- All members are "hot dipped" galvanized in accordance with ASTM A123 and ASTM A153 Standards.
- All member protective coatings are in good condition.
- All tower members were properly designed, detailed, fabricated, installed and have been properly maintained since erection.
- Any deviation from the analyzed antenna loading will require a new analysis for verification of structural adequacy.
- All existing coax cables to be installed as indicated in this report.

Analysis

The existing tower was analyzed using a comprehensive computer program entitled tnxTower. The program analyzes the tower, considering the worst case loading condition. The tower is considered as loaded by concentric forces along the tower shaft, and the model assumes that the shaft members are subjected to bending, axial, and shear forces.

The existing tower was analyzed for the controlling basic wind speed (fastest mile) with no ice and a 75% reduction of wind force with ½ inch accumulative ice to determine stresses in members as per guidelines of TIA/EIA-222-F-96 entitled "Structural Standards for Steel Antenna Towers and Antenna Supporting Structures", the American Institute of Steel Construction (AISC) and the Manual of Steel Construction; Allowable Stress Design (ASD).

The controlling wind speed is determined by evaluating the local available wind speed data as provided in Appendix K of the CSBC¹ and the wind speed data available in the TIA/EIA-222-F-96 Standard. The higher of the two wind speeds is utilized in preparation on the tower analysis.

Tower Loading

Tower loading was determined by the basic wind speed as applied to projected surface areas with modification factors per TIA/EIA-222-F, gravity loads of the tower structure and its components, and the application of ½" radial ice on the tower structure and its components.

Basic Wind Speed:	Hartford; v = 80 mph (fastest mile)	[Section 16 of TIA/EIA-222-F-96]
	Simsbury; v = 95 mph (3 second gust) equivalent to v = 77.5 mph (fastest mile)	[Appendix K of the 2005 CT Building Code Supplement]
	TIA/EIA wind speed controls.	
Load Cases:	<u>Load Case 1</u> ; 80 mph wind speed w/ no ice plus gravity load – used in calculation of tower stresses and rotation.	[Section 2.3.16 of TIA/EIA-222-F-96]
	<u>Load Case 2</u> ; 69 mph wind speed w/ ½" radial ice plus gravity load – used in calculation of tower stresses. The 69 mph wind speed velocity represents 75% of the wind pressure generated by the 80 mph wind speed.	[Section 2.3.16 of TIA/EIA-222-F-96]
	<u>Load Case 3</u> ; Seismic – not checked	[Section 1614.5 of State Bldg. Code 2005] does not control in the design of this structure type

¹ The 2005 Connecticut State Building Code as amended by the 2009 CT State Supplement. (CSBC)

Tower Capacity

Tower stresses were calculated utilizing the structural analysis software tnxTower. Allowable stresses were determined based on Table 5 of the TIA/EIA code with a 1/3 increase per Section 3.1.1.1 of the same code.

- Calculated stresses **with the reinforcements detailed in section 4 of this report were found** to be within allowable limits. In Load Case 1, per tnxTower "Section Capacity Table", this tower was found to be at **88.3%** of its total capacity.

Tower Section	Elevation	Stress Ratio (percentage of capacity)	Result
HSS12"x0.625" Tower Extension	80.0'-106.0	88.3%	PASS
Pole Shaft (L2)	0.00'-41.5'	64.0%	PASS
3.50"x1.50" Reinf. Bar (L2)	0.00'-41.5'	85.0%	PASS

Foundation and Anchors

The existing foundation consists of a 5.0-ft square x 3.5-ft long reinforced concrete pier on a 17.0-ft square x 3.0-ft thick reinforced concrete pad. The sub-grade conditions used in the analysis of the existing foundation were obtained from the aforementioned structural analysis report prepared by Paul J. Ford and Company job no. 31207-0026 dated March 20, 2007. The base of the tower is connected to the foundation by means of (8) 2.25"Ø, ASTM A615-75 anchor bolts embedded approximately 6-ft into the concrete foundation structure.

Review of the foundation and anchor design consisted of verification of applied loads obtained from the tower design calculations and code checks of allowable stresses:

- The tower base reactions developed from the governing Load Case 1 were used in the verification of the foundation and its anchors:

Location	Vector	Proposed Reactions
Base	Shear	20 kips
	Compression	16 kips
	Moment	1642 kip-ft

Note 1: Tower base reactions obtained from failing analysis dated November 20, 2013.

- The foundation was found to be within the allowable limits **with the reinforcements detailed in section 4 of this report.**

Foundation	Design Limit	IBC 2003/2005 CT State Building Code Section 3108.4.2 (FS) ⁽¹⁾	Proposed Loading (FS) ⁽¹⁾	Result
Reinforced Concrete Pad and Pier w/ Helical Anchors (x4)	OTM ⁽²⁾	2.00	2.16	PASS

Note 1: FS denotes Factor of Safety.

Note 2: OTM denotes Overturning Moment.

- The anchor bolts and base plate were found to be within the allowable limits **with the reinforcements detailed in section 4 of this report.**

Tower Component	Design Limit	Stress Ratio (percentage of capacity)	Result
Exist. 8 No. 2.25" dia. ASTM A615 Gr. 65 Anchor Bolts	Combined Axial and Bending	60.4%	PASS
Proposed 4 No. 1.75" dia. ASTM A722 Gr. 150 Anchor Bolts	Tension	75.3%	PASS
Base Plate	Bending	5.2%	PASS

Conclusion

This analysis shows that the subject tower **with the reinforcements detailed in section 4 of this report is adequate** to support the proposed AT&T Mobility antenna configuration.

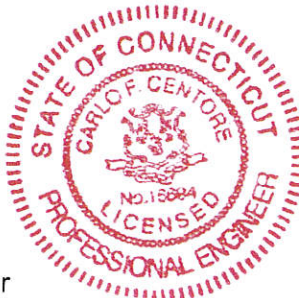
The analysis is based, in part, on the information provided to this office by AT&T Mobility. If the existing conditions are different than the information in this report, Centek Engineering, Inc. must be contacted for resolution of any potential issues.

Please feel free to call with any questions or comments.

Respectfully Submitted by:



Carlo F. Centore, PE
Principal ~ Structural Engineer

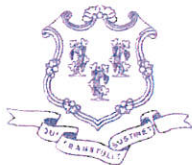


Prepared by:



Jason R. Mead
Structural Engineer

TAB 6



STATE OF CONNECTICUT
CONNECTICUT SITING COUNCIL

Ten Franklin Square, New Britain, CT 06051

Phone: (860) 827-2935 Fax: (860) 827-2950

E-Mail: siting.council@ct.gov

www.ct.gov/csc

**CERTIFIED MAIL
RETURN RECEIPT REQUESTED**

December 16, 2013

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

RE: PETITION NO. 1077 - Cellco Partnership d/b/a Verizon Wireless petition for a declaratory ruling that no Certificate of Environmental Compatibility and Public Need is required for the extension of an existing telecommunications facility at the Simsbury Volunteer Fire Department located at 345 Bushy Hill Road, Simsbury, Connecticut.

Dear Attorney Baldwin:

At a public meeting held on December 12, 2013, the Connecticut Siting Council (Council) considered and ruled that this proposal would not have a substantial adverse environmental effect, and pursuant to General Statutes § 16-50k would not require a Certificate of Environmental Compatibility and Public Need.

This decision is under the exclusive jurisdiction of the Council and is not applicable to any other modification or construction. All work is to be implemented as specified in the petition, dated October 11, 2013.

Enclosed for your information is a copy of the staff report on this project.

Very truly yours,

Robert Stein
Chairman

RS/CDM/jb

Enclosure: Staff Report dated December 12, 2013

c: The Honorable Mary A. Glassman, First Selectman, Town of Simsbury
Michael Paine, Chairman of the Planning Commission, Town of Simsbury

TAB 7



STATE OF CONNECTICUT

CONNECTICUT SITING COUNCIL

Ten Franklin Square, New Britain, CT 06051

Phone: (860) 827-2935 Fax: (860) 827-2950

E-Mail: siting_council@ct.gov

www.ct.gov/csc

Petition No. 1077

Verizon

Simsbury, Connecticut

Staff Report

December 12, 2013

On October 11, 2013, the Connecticut Siting Council (Council) received a petition from Cellco Partnership d/b/a Verizon Wireless (Verizon) for a declaratory ruling that no Certificate of Environmental Compatibility and Public Need is required for the extension of an existing telecommunications facility at 345 Bushy Hill Road in Simsbury, Connecticut. Council member Robert Hannon and Siting Analyst David Martin visited the site on November 12, 2013 to review the proposal. Attorney Kenneth Baldwin represented Verizon at the field review.

The existing telecommunications tower is 80 feet tall and is located behind the Simsbury Volunteer Fire Department (SVFD) station at 345 Bushy Hill Road. Currently, the SVFD has two six-foot whip antennas at the top of the existing tower; T-Mobile has three flush-mounted antennas at 77 feet; and MetroPCS has three flush-mounted antennas at 70 feet. Verizon proposes to extend the tower by 26 feet to a height of 106 feet in order to install 12 antennas (three LTE antennas, three cellular antennas, three PCS antennas, and three AWS antennas) on T-arms at a centerline height of 100 feet. SVFD would re-locate its antennas to the top of the extended tower. This relocation to a higher centerline is expected to improve the fire department's service in this section of Simsbury. AT&T has also submitted correspondence indicating that it would be interested in placing antennas at a centerline height of 90 feet should the tower be extended.

Verizon would install a 12-foot by 30-foot shelter just beyond the edge of the parking area in the rear of the fire station for its ground equipment. The shelter would include a natural gas-fueled backup generator—natural gas is available on the fire station property. The shelter at this location would require some filling to extend an embankment to accommodate it. A few trees would have to be taken down for this filling. AT&T would install an 11'6" by 20' shelter for its ground equipment. It would be located a short distance from Verizon's shelter along the back of the parking area.

Although the fire house is on a main road in Simsbury (State Route 167) and is surrounded by single family homes, the visibility of the existing tower is actually minimal due to the presence of mature coniferous and deciduous trees that ring the SVFD property. The proposed 26-foot extension is estimated to increase the year-round visibility of the tower by approximately 10% to 25 acres. It should not dramatically alter the tower's presence in the surrounding vicinity.

For this petition, Verizon hired C Squared Systems to take field measurements of RF levels at this facility. C Squared added calculations for Verizon's proposed antennas to its measured readings and estimated the expected power density to be approximately 4.8% of the FCC limit for maximum permissible exposure for the general public.

Verizon provided notice to the Town of Simsbury and abutting property owners on October 11, 2013. No comments or inquiries have been received. Mary Glassman, Simsbury First Selectwoman, has no objections to the Petition.

The proposed tower extension is not expected to have any substantial adverse environmental effects. Staff recommends approval.



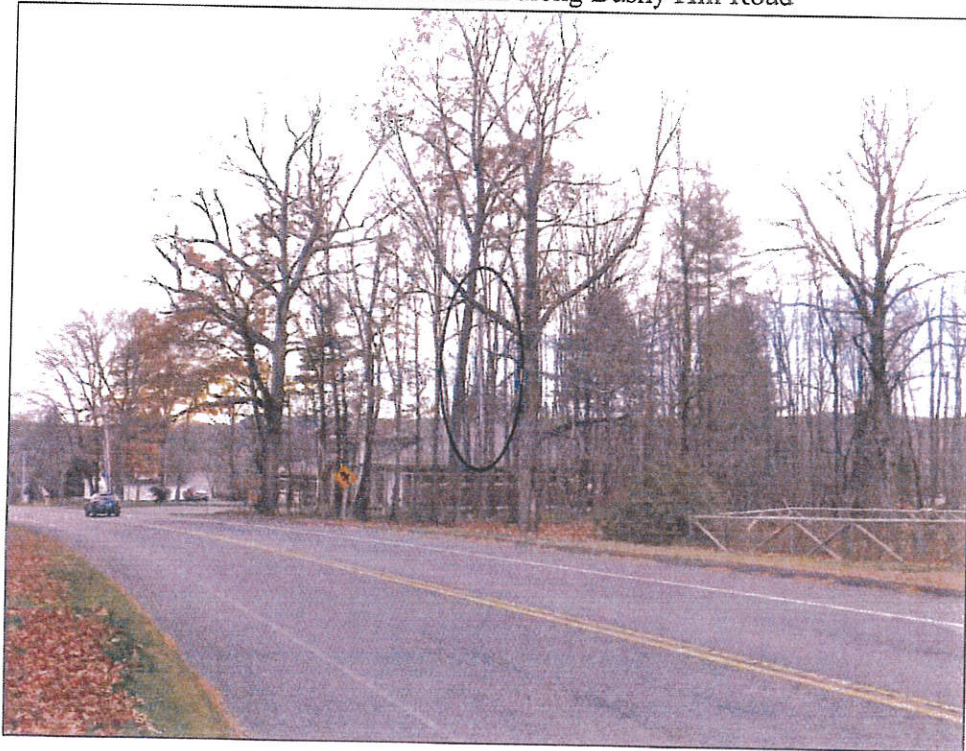
View of existing tower from behind fire house



View of existing tower from across Bushy Hill Road



View of tower from north along Bushy Hill Road



View of tower from south along Bushy Hill Road



TAB 8

Power Density Calculations

Applicant: New Cingular Wireless PCS, LLC d/b/a AT&T

Site ID: CT2413

Site Type: Existing 106' Monopole Tower

Address: 345 Bushy Hill Road, Simsbury, CT 06070

Date: May 5, 2014

1. Existing Power Density¹

Carrier	#Channels	ERP/Ch	Ant Ht	Power Density (mW/cm2)	Frequency MHz	Limit	%MPE
Verizon PCS	1	4288.2	100	0.1542	1900	1.0000	15.42%
Verizon cellular	1	5073.1	100	0.1824	850	0.5667	32.19%
Verizon AWS	1	3918	100	0.1409	2100	1.0000	14.09%
Verizon LTE	1	2009.5	100	0.0723	700	0.4667	15.48%
T-Mobile	8	157	77	0.0762	1945	1.0000	7.62%
Simsbury Fire			85		453.1625		3.99%
Simsbury Police			85		453.75		3.98%
Farm. Valley Health			85		453.7875		3.98%
Town Wide			85		453.55		3.99%
Metro PCS	3	631	70	0.1389	2130	1.0000	13.89%
Total							4.80%

Proposed AT&T Power Density²

Carrier	#Channels	ERP/Ch	Ant Ht	Power Density (mW/cm2)	Frequency MHz	Limit	%MPE
AT&T UMTS	2	500	90'	0.0444	800 Band	0.5867	7.57
AT&T UMTS	1	500	90'	0.0222	1900 Band	1.0000	2.22
AT&T LTE	1	500	90'	0.0222	700 Band	0.4667	4.76
AT&T LTE	1	500	90'	0.0222	1900 Band	1.0000	2.22
AT&T LTE	1	500	90'	0.0222	2300 Band	1.0000	2.22
TOTAL							19.00%

2. Cumulative Power Density Calculation Results

Verizon PCS	1	4288.2	100	0.1542	1900	1.0000	15.42%
Verizon cellular	1	5073.1	100	0.1824	850	0.5667	32.19%
Verizon AWS	1	3918	100	0.1409	2100	1.0000	14.09%
Verizon LTE	1	2009.5	100	0.0723	700	0.4667	15.48%
T-Mobile	8	157	77	0.0762	1945	1.0000	7.62%

¹ This Power Density information was taken from the Connecticut Siting Council database dated April 16, 2014: “%MPE number is result of field measurements and calculated levels of Verizon antennas/Csquared Systems – 9/23/13”

² This Power Density information is based on worse case assumptions from AT&T’s radio frequency engineers.

Simsbury Fire			85		453.1625		3.99%
Simsbury Police			85		453.75		3.98%
Farm. Valley Health			85		453.7875		3.98%
Town Wide			85		453.55		3.99%
Metro PCS	3	631	70	0.1389	2130	1.0000	13.89%
AT&T UMTS	2	500	90'	0.0444	800 Band	0.5867	7.57
AT&T UMTS	1	500	90'	0.0222	1900 Band	1.0000	2.22
AT&T LTE	1	500	90'	0.0222	700 Band	0.4667	4.76
AT&T LTE	1	500	90'	0.0222	1900 Band	1.0000	2.22
AT&T LTE	1	500	90'	0.0222	2300 Band	1.0000	2.22
Total							23.80%

3. Conclusion:

The addition of AT&T's antennas on the existing tower will result in the cumulative maximum permissible exposure (MPE) level of 23.80%. The proposal complies with the National Council on Radiation Protection and Measurements standard for MPE adopted by the Federal Communications Commission ("FCC"). Moreover, the maximum level of radio-frequency energy emitted from AT&T's installation will be well below the FCC's mandated radio frequency exposure limits.

Structural Analysis and
Reinforcement Design
Report

*80-ft Existing Penn Summit
Monopole w/ 26-ft Extension*

*Proposed AT&T Mobility
Antenna Installation*

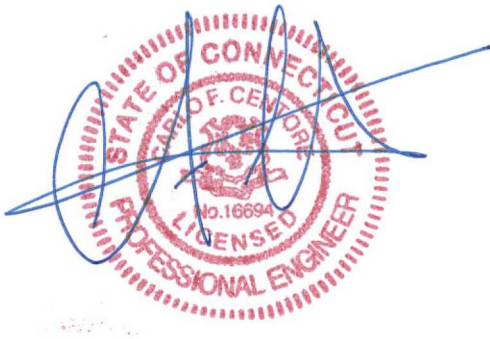
AT&T Site Ref: CT2413

*345 Bushy Hill Road
Simsbury, CT*

Centek Project No. 13298.000

~~*Date: November 20, 2013*~~

Rev 1: April 10, 2014



Prepared for:

AT&T Mobility
500 Enterprise Drive, Suite 3A
Rocky Hill, CT 06067

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I n t r o d u c t i o n

The purpose of this report is to summarize the results of the non-linear, P- Δ structural analysis of the antenna installation proposed by AT&T Mobility on the existing monopole (tower) located in Simsbury, CT.

The host tower is a 80-ft tall, two-section, eighteen sided, tapered monopole, originally designed by Paul J. Ford and Company and manufactured by PennSummit Tubular, LLC job no; 29204-0049 dated February 24, 2004 with a 26-ft extension designed by Centek; project no. 13135 dated September 16, 2013. The tower geometry, structure member sizes and foundation system information were obtained from the aforementioned PennSummit design documents and the aforementioned structural analysis report prepared by Centek.

Antenna and appurtenance information were obtained from the aforementioned Centek structural report, visual verification from grade by Centek personnel on July 17, 2013 and a AT&T RF data sheet.

The tower consists of two (2) tapered vertical steel sections conforming to ASTM A607-65 and one (1) HSS12"x0.625" pipe extension (by Verizon Wireless) conforming to ASTM A500-Gr. B (42 ksi). The vertical tower sections are slip joint connected. The extension is flange connected to the top of the tower. The diameter of the pole (flat-flat) is 22.00-in at the top and 33.40-in at the base.

AT&T proposes the installation of twelve (12) panel antennas, twenty-seven (27) Remote Radio Heads (RRU's) and four (4) surge arrestors mounted on a steel platform at the monopole extension. Refer to the Antenna and Appurtenance Summary below for a detailed description of the proposed antenna and appurtenance configuration.

A n t e n n a a n d A p p u r t e n a n c e S u m m a r y

The existing, proposed and future loads considered in this analysis consist of the following:

- **TOWN (RELOCATED TO EXTENSION):**
Antennas: One (1) 6-ft Omni-directional whip, one (1) ground plane antenna and two (2) dipole antennas mounted on four (4) 4-ft standoff mounts with an elevation of 105-ft above grade.
Coax Cables: One (1) 1-1/4" \varnothing and three (3) 7/8" \varnothing coax cables running on the inside of the existing tower.
- **VERIZON (RESERVED):**
Antennas: Six (6) Antel BXA-70063-6CF panel antennas, six (6) Antel BXA-171063-12CF panel antennas, three (3) Alcatel-Lucent RRH2x40-07-U Remote Radio Heads, three (3) Alcatel-Lucent RRH2x40-AWS Remote Radio Heads and one (1) RFS DB-T1-6Z-8AB-0Z main distribution box mounted on three (3) T-Arms with a RAD center elevation of 100-ft above grade.
Cables: Two (2) 1-5/8" dia. Hybriflex Fiber feeder cables banded to the exterior of the tower.
- **T-MOBILE (EXISTING):**
Antennas: Three (3) RFS APX16DWV-16DWVS-E-A20 panel antennas and three (3) 10"x8"x3" TMA's flush mounted with a RAD center elevation of 77-ft above grade.
Coax Cables: Six (6) 1-5/8" \varnothing coax cables running on the inside of the existing tower.

- **METROPCS (EXISTING):**
Antennas: Three (3) RFS APXV18-206517-C panel antennas flush mounted with a RAD center elevation of 70-ft above grade.
Coax Cables: Six (6) 1-5/8" Ø coax cables running on the inside of the existing tower.
- **AT&T (PROPOSED):**
Antennas: Twelve (12) CCI HPA-65R-BUU-H8 panel antennas, twenty seven (27) Remote Radio Heads (RRU's) and four (4) Raycap DC6-48-60-18-8F surge arrestors mounted on a steel platform Commscope p/n MTC3607R with a RAD center elevation of 90-ft above existing grade.
Coax Cables: Two (2) fiber cable, eight (8) dc control cables and three (3) RET cables running on the exterior of the existing tower.

Primary Assumptions Used in the Analysis

- The tower structure's theoretical capacity not including any assessment of the condition of the tower.
- The tower carries the horizontal and vertical loads due to the weight of antennas, ice load and wind.
- Tower is properly installed and maintained.
- Tower is in plumb condition.
- Tower loading for antennas and mounts as listed in this report.
- All bolts are appropriately tightened providing the necessary connection continuity.
- All welds are fabricated with ER-70S-6 electrodes.
- All members are assumed to be as specified in the original tower design documents or reinforcement drawings.
- All members are "hot dipped" galvanized in accordance with ASTM A123 and ASTM A153 Standards.
- All member protective coatings are in good condition.
- All tower members were properly designed, detailed, fabricated, installed and have been properly maintained since erection.
- Any deviation from the analyzed antenna loading will require a new analysis for verification of structural adequacy.
- All existing coax cables to be installed as indicated in this report.

A n a l y s i s

The existing tower was analyzed using a comprehensive computer program entitled tnxTower. The program analyzes the tower, considering the worst case loading condition. The tower is considered as loaded by concentric forces along the tower shaft, and the model assumes that the shaft members are subjected to bending, axial, and shear forces.

The existing tower was analyzed for the controlling basic wind speed (fastest mile) with no ice and a 75% reduction of wind force with ½ inch accumulative ice to determine stresses in members as per guidelines of TIA/EIA-222-F-96 entitled “Structural Standards for Steel Antenna Towers and Antenna Supporting Structures”, the American Institute of Steel Construction (AISC) and the Manual of Steel Construction; Allowable Stress Design (ASD).

The controlling wind speed is determined by evaluating the local available wind speed data as provided in Appendix K of the CSBC¹ and the wind speed data available in the TIA/EIA-222-F-96 Standard. The higher of the two wind speeds is utilized in preparation on the tower analysis.

T o w e r L o a d i n g

Tower loading was determined by the basic wind speed as applied to projected surface areas with modification factors per TIA/EIA-222-F, gravity loads of the tower structure and its components, and the application of ½” radial ice on the tower structure and its components.

Basic Wind Speed:	Hartford; v = 80 mph (fastest mile)	[Section 16 of TIA/EIA-222-F-96]
	Simsbury; v = 95 mph (3 second gust) equivalent to v = 77.5 mph (fastest mile)	[Appendix K of the 2005 CT Building Code Supplement]
	<i>TIA/EIA wind speed controls.</i>	
Load Cases:	<u>Load Case 1</u> ; 80 mph wind speed w/ no ice plus gravity load – used in calculation of tower stresses and rotation.	[Section 2.3.16 of TIA/EIA-222-F-96]
	<u>Load Case 2</u> ; 69 mph wind speed w/ ½” radial ice plus gravity load – used in calculation of tower stresses. The 69 mph wind speed velocity represents 75% of the wind pressure generated by the 80 mph wind speed.	[Section 2.3.16 of TIA/EIA-222-F-96]
	<u>Load Case 3</u> ; Seismic – not checked	[Section 1614.5 of State Bldg. Code 2005] does not control in the design of this structure type

¹ The 2005 Connecticut State Building Code as amended by the 2009 CT State Supplement. (CSBC)

Tower Capacity

Tower stresses were calculated utilizing the structural analysis software tnxTower. Allowable stresses were determined based on Table 5 of the TIA/EIA code with a 1/3 increase per Section 3.1.1.1 of the same code.

- Calculated stresses **with the reinforcements detailed in section 4 of this report were found** to be within allowable limits. In Load Case 1, per tnxTower "Section Capacity Table", this tower was found to be at **88.3%** of its total capacity.

Tower Section	Elevation	Stress Ratio (percentage of capacity)	Result
HSS12"x0.625" Tower Extension	80.0'-106.0	88.3%	PASS
Pole Shaft (L2)	0.00'-41.5'	64.0%	PASS
3.50"x1.50" Reinf. Bar (L2)	0.00'-41.5'	85.0%	PASS

Foundation and Anchors

The existing foundation consists of a 5.0-ft square x 3.5-ft long reinforced concrete pier on a 17.0-ft square x 3.0-ft thick reinforced concrete pad. The sub-grade conditions used in the analysis of the existing foundation were obtained from the aforementioned structural analysis report prepared by Paul J. Ford and Company job no. 31207-0026 dated March 20, 2007. The base of the tower is connected to the foundation by means of (8) 2.25"Ø, ASTM A615-75 anchor bolts embedded approximately 6-ft into the concrete foundation structure.

Review of the foundation and anchor design consisted of verification of applied loads obtained from the tower design calculations and code checks of allowable stresses:

- The tower base reactions developed from the governing Load Case 1 were used in the verification of the foundation and its anchors:

Location	Vector	Proposed Reactions
Base	Shear	20 kips
	Compression	16 kips
	Moment	1642 kip-ft

Note 1: Tower base reactions obtained from failing analysis dated November 20, 2013.

- The foundation **was** found to be within the allowable limits **with the reinforcements detailed in section 4 of this report.**

Foundation	Design Limit	IBC 2003/2005 CT State Building Code Section 3108.4.2 (FS) ⁽¹⁾	Proposed Loading (FS) ⁽¹⁾	Result
Reinforced Concrete Pad and Pier w/ Helical Anchors (x4)	OTM ⁽²⁾	2.00	2.16	PASS

Note 1: FS denotes Factor of Safety.

Note 2: OTM denotes Overturning Moment.

- The anchor bolts and base plate **were** found to be within the allowable limits **with the reinforcements detailed in section 4 of this report.**

Tower Component	Design Limit	Stress Ratio (percentage of capacity)	Result
Exist. 8 No. 2.25" dia. ASTM A615 Gr. 65 Anchor Bolts	Combined Axial and Bending	60.4%	PASS
Proposed 4 No. 1.75" dia. ASTM A722 Gr. 150 Anchor Bolts	Tension	75.3%	PASS
Base Plate	Bending	5.2%	PASS

Conclusion

This analysis shows that the subject tower **with the reinforcements detailed in section 4 of this report is adequate** to support the proposed AT&T Mobility antenna configuration.

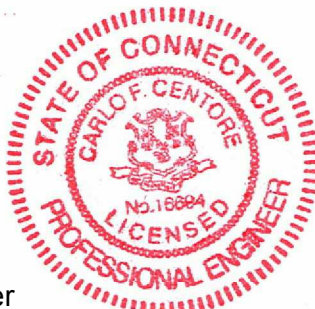
The analysis is based, in part, on the information provided to this office by AT&T Mobility. If the existing conditions are different than the information in this report, Centek Engineering, Inc. must be contacted for resolution of any potential issues.

Please feel free to call with any questions or comments.

Respectfully Submitted by:



Carlo F. Centore, PE
Principal ~ Structural Engineer



Prepared by:



Jason R. Mead
Structural Engineer

*Standard Conditions for Furnishing of
Professional Engineering Services on
Existing Structures*

All engineering services are performed on the basis that the information used is current and correct. This information may consist of, but is not necessarily limited to:

- Information supplied by the client regarding the structure itself, its foundations, the soil conditions, the antenna and feed line loading on the structure and its components, or other relevant information.
- Information from the field and/or drawings in the possession of CENTEK engineering, Inc. or generated by field inspections or measurements of the structure.
- It is the responsibility of the client to ensure that the information provide to CENTEK engineering, Inc. and used in the performance of our engineering services is correct and complete. In the absence of information to the contrary, we assume that all structures were constructed in accordance with the drawings and specifications and are in an un-corroded condition and have not deteriorated. It is therefore assumed that its capacity has not significantly changed from the “as new” condition.
- All services will be performed to the codes specified by the client, and we do not imply to meet any other codes or requirements unless explicitly agreed in writing. If wind and ice loads or other relevant parameters are to be different from the minimum values recommended by the codes, the client shall specify the exact requirement. In the absence of information to the contrary, all work will be performed in accordance with the latest revision of ANSI/ASCE10 & ANSI/EIA-222
- All services performed, results obtained, and recommendations made are in accordance with generally accepted engineering principles and practices. CENTEK engineering, Inc. is not responsible for the conclusions, opinions and recommendations made by others based on the information we supply.

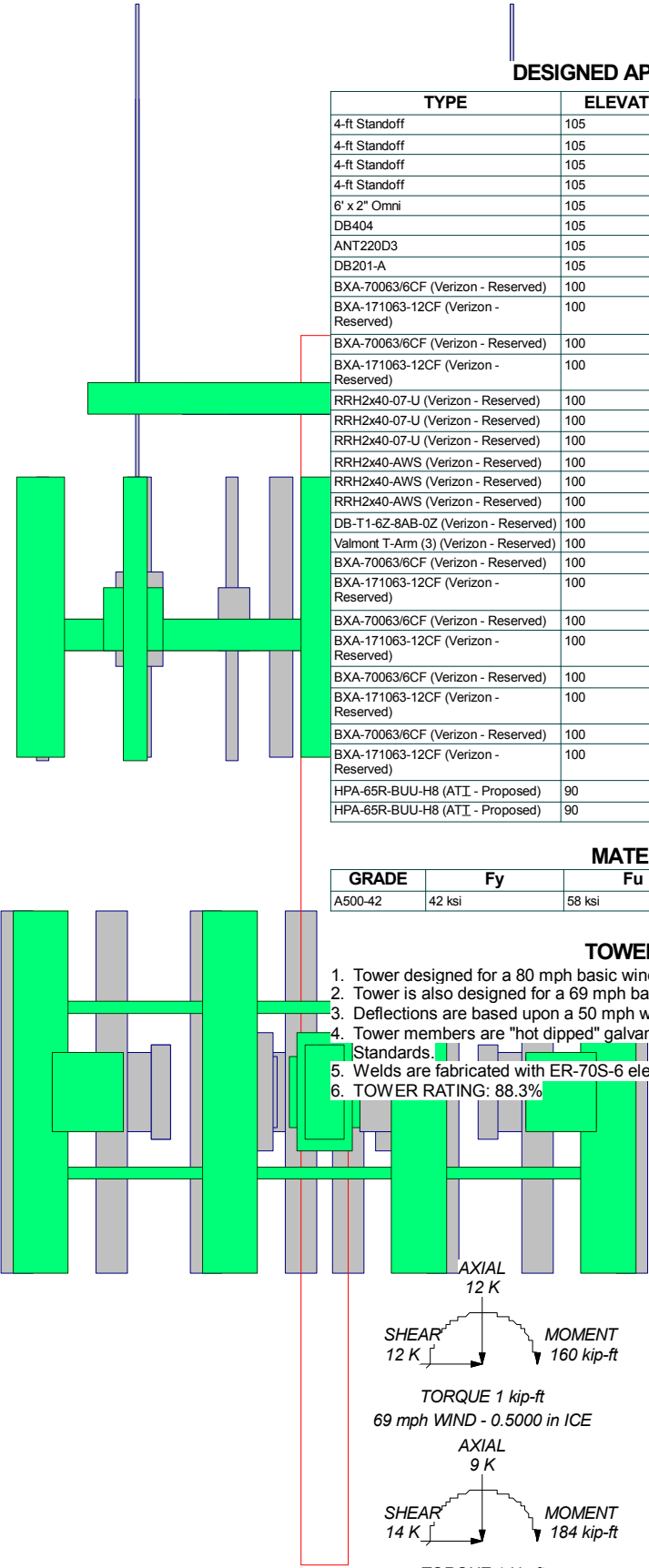
General Description of Structural Analysis Program

tnxTower, is an integrated structural analysis and design software package for Designed specifically for the telecommunications industry, tnxTower, formerly ERITower, automates much of the tower analysis and design required by the TIA/EIA 222 Standard.

tnxTower Features:

- tnxTower can analyze and design 3- and 4-sided guyed towers, 3- and 4-sided self-supporting towers and either round or tapered ground mounted poles with or without guys.
- The program analyzes towers using the TIA-222-G (2005) standard or any of the previous TIA/EIA standards back to RS-222 (1959). Steel design is checked using the AISC ASD 9th Edition or the AISC LRFD specifications.
- Linear and non-linear (P-delta) analyses can be used in determining displacements and forces in the structure. Wind pressures and forces are automatically calculated.
- Extensive graphics plots include material take-off, shear-moment, leg compression, displacement, twist, feed line, guy anchor and stress plots.
- tnxTower contains unique features such as True Cable behavior, hog rod take-up, foundation stiffness and much more.

1				
Section	Size	Length (ft)	Grade	Weight (K)
	HSS12.75x0.625	26.00	A500-42	2.1
				80.0 ft



DESIGNED APPURTENANCE LOADING

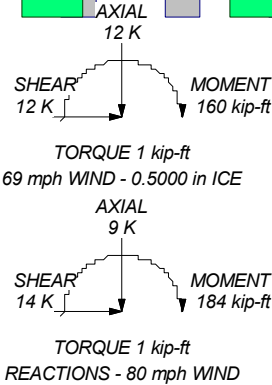
TYPE	ELEVATION	TYPE	ELEVATION
4-ft Standoff	105	HPA-65R-BUU-H8 (ATI - Proposed)	90
4-ft Standoff	105	HPA-65R-BUU-H8 (ATI - Proposed)	90
4-ft Standoff	105	HPA-65R-BUU-H8 (ATI - Proposed)	90
4-ft Standoff	105	HPA-65R-BUU-H8 (ATI - Proposed)	90
6' x 2" Omni	105	HPA-65R-BUU-H8 (ATI - Proposed)	90
DB404	105	HPA-65R-BUU-H8 (ATI - Proposed)	90
ANT220D3	105	HPA-65R-BUU-H8 (ATI - Proposed)	90
DB201-A	105	HPA-65R-BUU-H8 (ATI - Proposed)	90
BXA-70063/6CF (Verizon - Reserved)	100	HPA-65R-BUU-H8 (ATI - Proposed)	90
BXA-171063-12CF (Verizon - Reserved)	100	HPA-65R-BUU-H8 (ATI - Proposed)	90
BXA-70063/6CF (Verizon - Reserved)	100	(3) RRUS-11 (ATI - Proposed)	90
BXA-171063-12CF (Verizon - Reserved)	100	(3) RRUS-11 (ATI - Proposed)	90
RRH2x40-07-U (Verizon - Reserved)	100	(3) RRUS-11 (ATI - Proposed)	90
RRH2x40-07-U (Verizon - Reserved)	100	(2) RRUS-12 (ATI - Proposed)	90
RRH2x40-07-U (Verizon - Reserved)	100	(2) RRUS-12 (ATI - Proposed)	90
RRH2x40-07-U (Verizon - Reserved)	100	(2) RRUS-12 (ATI - Proposed)	90
RRH2x40-AWS (Verizon - Reserved)	100	RRUS-32 (ATI - Proposed)	90
RRH2x40-AWS (Verizon - Reserved)	100	RRUS-32 (ATI - Proposed)	90
RRH2x40-AWS (Verizon - Reserved)	100	RRUS-32 (ATI - Proposed)	90
DB-T1-6Z-8AB-0Z (Verizon - Reserved)	100	RRUS-E2 (ATI - Proposed)	90
Valmont T-Arm (3) (Verizon - Reserved)	100	RRUS-E2 (ATI - Proposed)	90
BXA-70063/6CF (Verizon - Reserved)	100	RRUS-E2 (ATI - Proposed)	90
BXA-171063-12CF (Verizon - Reserved)	100	(2) A2 (ATI - Proposed)	90
BXA-70063/6CF (Verizon - Reserved)	100	(2) A2 (ATI - Proposed)	90
BXA-171063-12CF (Verizon - Reserved)	100	(2) A2 (ATI - Proposed)	90
BXA-70063/6CF (Verizon - Reserved)	100	(2) A2 (ATI - Proposed)	90
BXA-171063-12CF (Verizon - Reserved)	100	DC6-48-60-18-8F Surge Arrestor (ATI - Proposed)	90
BXA-70063/6CF (Verizon - Reserved)	100	DC6-48-60-18-8F Surge Arrestor (ATI - Proposed)	90
BXA-171063-12CF (Verizon - Reserved)	100	DC6-48-60-18-8F Surge Arrestor (ATI - Proposed)	90
BXA-70063/6CF (Verizon - Reserved)	100	DC6-48-60-18-8F Surge Arrestor (ATI - Proposed)	90
BXA-171063-12CF (Verizon - Reserved)	100	DC6-48-60-18-8F Surge Arrestor (ATI - Proposed)	90
HPA-65R-BUU-H8 (ATI - Proposed)	90	Commscope MTC3607R Platform (ATI - Proposed)	90
HPA-65R-BUU-H8 (ATI - Proposed)	90		

MATERIAL STRENGTH

GRADE	Fy	Fu	GRADE	Fy	Fu
A500-42	42 ksi	58 ksi			

TOWER DESIGN NOTES

1. Tower designed for a 80 mph basic wind in accordance with the TIA/EIA-222-F Standard.
2. Tower is also designed for a 69 mph basic wind with 0.50 in ice.
3. Deflections are based upon a 50 mph wind.
4. Tower members are "hot dipped" galvanized in accordance with ASTM A123 and ASTM A153 Standards.
5. Welds are fabricated with ER-70S-6 electrodes.
6. TOWER RATING: 88.3%



Centek Engineering Inc.

63-2 N. Branford Road
Branford, CT 06405
Phone: (203) 488-0580
FAX: (203) 488-8587

Job: **13298.000 - CT2413**

Project: **80' PennSummit Monopole - 345 Bushy Hill Rd., Simsbury, CT**

Client: **AT&T Mobility**

Drawn by: **jrm**

App'd:

Code: **TIA/EIA-222-F**

Date: **04/08/14**

Scale: **NTS**

Path:

Dwg No. **E-1**

tnxTower Centek Engineering Inc. 63-2 N. Branford Road Branford, CT 06405 Phone: (203) 488-0580 FAX: (203) 488-8587	Job 13298.000 - CT2413	Page 1 of 17
	Project 80' PennSummit Monopole - 345 Bushy Hill Rd., Simsbury, CT	Date 15:08:20 04/08/14
	Client AT&T Mobility	Designed by jrm

Tower Input Data

There is a pole section.

This tower is designed using the TIA/EIA-222-F standard.

The following design criteria apply:

Basic wind speed of 80 mph.

Nominal ice thickness of 0.5000 in.

Ice density of 56.0 pcf.

A wind speed of 69 mph is used in combination with ice.

Temperature drop of 50 °F.

Deflections calculated using a wind speed of 50 mph.

Tower members are "hot dipped" galvanized in accordance with ASTM A123 and ASTM A153 Standards..

Welds are fabricated with ER-70S-6 electrodes..

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, feedline supports, and appurtenance mounts are not considered.

Options

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

Pole Section Geometry

Section	Elevation	Section Length	Pole Size	Pole Grade	Socket Length
	ft	ft			ft
L1	106.00-80.00	26.00	HSS12.75x0.625	A500-42 (42 ksi)	

Tower Elevation	Gusset Area (per face)	Gusset Thickness	Gusset Grade	Adjust. Factor A_f	Adjust. Factor A_r	Weight Mult.	Double Angle Stitch Bolt Spacing Diagonals	Double Angle Stitch Bolt Spacing Horizontals
ft	ft ²	in					in	in

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Tower Elevation	Gusset Area (per face)	Gusset Thickness	Gusset Grade	Adjust. Factor A_f	Adjust. Factor A_r	Weight Mult.	Double Angle Stitch Bolt Spacing Diagonals	Double Angle Stitch Bolt Spacing Horizontals
ft	ft ²	in					in	in
L1				1	1	1		
106.00-80.00								

Feed Line/Linear Appurtenances - Entered As Area

Description	Face or Leg	Allow Shield	Component Type	Placement ft	Total Number		$C_A A_A$ ft ² /ft	Weight plf
HYBRIFLEX 1-5/8" (Verizon - Reserved)	C	No	CaAa (Out Of Face)	100.00 - 80.00	2	No Ice	0.20	1.90
						1/2" Ice	0.30	3.41
Fiber Trunk	C	No	CaAa (Out Of Face)	90.00 - 80.00	2	No Ice	0.04	1.00
(AT&T - Proposed)						1/2" Ice	0.14	1.55
DC Trunk	C	No	CaAa (Out Of Face)	90.00 - 80.00	8	No Ice	0.00	0.11
(AT&T - Proposed)						1/2" Ice	0.00	0.66

Feed Line/Linear Appurtenances Section Areas

Tower Section	Tower Elevation ft	Face	A_R ft ²	A_F ft ²	$C_A A_A$ In Face ft ²	$C_A A_A$ Out Face ft ²	Weight K
L1	106.00-80.00	A	0.000	0.000	0.000	0.000	0.00
		B	0.000	0.000	0.000	0.000	0.00
		C	0.000	0.000	0.000	8.720	0.10

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	$C_A A_A$ In Face ft ²	$C_A A_A$ Out Face ft ²	Weight K
L1	106.00-80.00	A	0.500	0.000	0.000	0.000	0.000	0.00
		B		0.000	0.000	0.000	0.000	0.00
		C		0.000	0.000	0.000	14.720	0.22

Feed Line Center of Pressure

Section	Elevation ft	CP_X in	CP_Z in	CP_X Ice in	CP_Z Ice in
L1	106.00-80.00	-0.3311	0.1912	-0.4564	0.2635

Discrete Tower Loads

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	Project 80' PennSummit Monopole - 345 Bushy Hill Rd., Simsbury, CT	Date 15:08:20 04/08/14
	Client AT&T Mobility	Designed by jrm

<i>Description</i>	<i>Face or Leg</i>	<i>Offset Type</i>	<i>Offsets: Horz Lateral Vert ft ft ft</i>	<i>Azimuth Adjustment °</i>	<i>Placement ft</i>	<i>C_AA_A Front ft²</i>	<i>C_AA_A Side ft²</i>	<i>Weight K</i>	
BXA-70063/6CF (Verizon - Reserved)	A	From Face	4.00 6.00 0.00	0.0000	100.00	No Ice 1/2" Ice	7.73 8.27	4.16 4.60	0.02 0.06
BXA-171063-12CF (Verizon - Reserved)	A	From Face	4.00 4.00 0.00	0.0000	100.00	No Ice 1/2" Ice	4.79 5.24	3.62 4.06	0.02 0.04
BXA-70063/6CF (Verizon - Reserved)	A	From Face	4.00 0.00 0.00	0.0000	100.00	No Ice 1/2" Ice	7.73 8.27	4.16 4.60	0.02 0.06
BXA-171063-12CF (Verizon - Reserved)	A	From Face	4.00 -4.00 0.00	0.0000	100.00	No Ice 1/2" Ice	4.79 5.24	3.62 4.06	0.02 0.04
BXA-70063/6CF (Verizon - Reserved)	B	From Face	4.00 6.00 0.00	0.0000	100.00	No Ice 1/2" Ice	7.73 8.27	4.16 4.60	0.02 0.06
BXA-171063-12CF (Verizon - Reserved)	B	From Face	4.00 4.00 0.00	0.0000	100.00	No Ice 1/2" Ice	4.79 5.24	3.62 4.06	0.02 0.04
BXA-70063/6CF (Verizon - Reserved)	B	From Face	4.00 0.00 0.00	0.0000	100.00	No Ice 1/2" Ice	7.73 8.27	4.16 4.60	0.02 0.06
BXA-171063-12CF (Verizon - Reserved)	B	From Face	4.00 -4.00 0.00	0.0000	100.00	No Ice 1/2" Ice	4.79 5.24	3.62 4.06	0.02 0.04
BXA-70063/6CF (Verizon - Reserved)	C	From Face	4.00 6.00 0.00	0.0000	100.00	No Ice 1/2" Ice	7.73 8.27	4.16 4.60	0.02 0.06
BXA-171063-12CF (Verizon - Reserved)	C	From Face	4.00 4.00 0.00	0.0000	100.00	No Ice 1/2" Ice	4.79 5.24	3.62 4.06	0.02 0.04
BXA-70063/6CF (Verizon - Reserved)	C	From Face	4.00 0.00 0.00	0.0000	100.00	No Ice 1/2" Ice	7.73 8.27	4.16 4.60	0.02 0.06
BXA-171063-12CF (Verizon - Reserved)	C	From Face	4.00 -4.00 0.00	0.0000	100.00	No Ice 1/2" Ice	4.79 5.24	3.62 4.06	0.02 0.04
RRH2x40-07-U (Verizon - Reserved)	A	From Face	4.00 4.00 0.00	0.0000	100.00	No Ice 1/2" Ice	2.25 2.45	1.23 1.39	0.05 0.07
RRH2x40-07-U (Verizon - Reserved)	B	From Face	4.00 4.00 0.00	0.0000	100.00	No Ice 1/2" Ice	2.25 2.45	1.23 1.39	0.05 0.07
RRH2x40-07-U (Verizon - Reserved)	C	From Face	4.00 4.00 0.00	0.0000	100.00	No Ice 1/2" Ice	2.25 2.45	1.23 1.39	0.05 0.07
RRH2x40-AWS (Verizon - Reserved)	A	From Face	4.00 -4.00 0.00	0.0000	100.00	No Ice 1/2" Ice	2.52 2.75	1.59 1.80	0.04 0.06
RRH2x40-AWS (Verizon - Reserved)	B	From Face	4.00 -4.00 0.00	0.0000	100.00	No Ice 1/2" Ice	2.52 2.75	1.59 1.80	0.04 0.06
RRH2x40-AWS (Verizon - Reserved)	C	From Face	4.00 -4.00 0.00	0.0000	100.00	No Ice 1/2" Ice	2.52 2.75	1.59 1.80	0.04 0.06
DB-T1-6Z-8AB-0Z (Verizon - Reserved)	A	From Face	4.00 0.00	0.0000	100.00	No Ice 1/2" Ice	5.60 5.92	2.33 2.56	0.04 0.08

<i>tnxTower</i> Centek Engineering Inc. 63-2 N. Branford Road Branford, CT 06405 Phone: (203) 488-0580 FAX: (203) 488-8587	Job	13298.000 - CT2413	Page	4 of 17
	Project	80' PennSummit Monopole - 345 Bushy Hill Rd., Simsbury, CT	Date	15:08:20 04/08/14
	Client	AT&T Mobility	Designed by	jrm

<i>Description</i>	<i>Face or Leg</i>	<i>Offset Type</i>	<i>Offsets: Horz Lateral Vert ft ft ft</i>	<i>Azimuth Adjustment °</i>	<i>Placement ft</i>		<i>C_{AA} Front ft²</i>	<i>C_{AA} Side ft²</i>	<i>Weight K</i>
			0.00						
Valmont T-Arm (3)	C	None		0.0000	100.00	No Ice	21.00	21.00	1.01
(Verizon - Reserved)						1/2" Ice	29.00	29.00	1.24
4-ft Standoff	A	From Face	0.00	0.0000	105.00	No Ice	1.40	0.09	0.03
			0.00			1/2" Ice	1.73	0.13	0.04
4-ft Standoff	A	From Face	0.00	0.0000	105.00	No Ice	1.40	0.09	0.03
			0.00			1/2" Ice	1.73	0.13	0.04
4-ft Standoff	B	From Face	0.00	0.0000	105.00	No Ice	1.40	0.09	0.03
			0.00			1/2" Ice	1.73	0.13	0.04
4-ft Standoff	C	From Face	0.00	0.0000	105.00	No Ice	1.40	0.09	0.03
			0.00			1/2" Ice	1.73	0.13	0.04
6' x 2" Omni	A	From Face	4.00	0.0000	105.00	No Ice	1.20	1.20	0.02
			0.00			1/2" Ice	1.80	1.80	0.03
			3.00						
DB404	A	From Face	4.00	0.0000	105.00	No Ice	1.14	1.14	0.01
			0.00			1/2" Ice	2.05	2.05	0.02
			3.00						
ANT220D3	B	From Face	4.00	0.0000	105.00	No Ice	1.10	1.10	0.04
			0.00			1/2" Ice	1.50	1.50	0.05
			3.00						
DB201-A	C	From Face	4.00	0.0000	105.00	No Ice	1.10	1.10	0.03
			0.00			1/2" Ice	1.98	1.98	0.03
			3.00						
HPA-65R-BUU-H8	A	From Face	3.50	0.0000	90.00	No Ice	13.30	7.52	0.07
(AT&T - Proposed)			-6.00			1/2" Ice	13.99	8.09	0.14
			0.00						
HPA-65R-BUU-H8	A	From Face	3.50	0.0000	90.00	No Ice	13.30	7.52	0.07
(AT&T - Proposed)			-2.00			1/2" Ice	13.99	8.09	0.14
			0.00						
HPA-65R-BUU-H8	A	From Face	3.50	0.0000	90.00	No Ice	13.30	7.52	0.07
(AT&T - Proposed)			2.00			1/2" Ice	13.99	8.09	0.14
			0.00						
HPA-65R-BUU-H8	A	From Face	3.50	0.0000	90.00	No Ice	13.30	7.52	0.07
(AT&T - Proposed)			6.00			1/2" Ice	13.99	8.09	0.14
			0.00						
HPA-65R-BUU-H8	B	From Face	3.50	0.0000	90.00	No Ice	13.30	7.52	0.07
(AT&T - Proposed)			-6.00			1/2" Ice	13.99	8.09	0.14
			0.00						
HPA-65R-BUU-H8	B	From Face	3.50	0.0000	90.00	No Ice	13.30	7.52	0.07
(AT&T - Proposed)			-2.00			1/2" Ice	13.99	8.09	0.14
			0.00						
HPA-65R-BUU-H8	B	From Face	3.50	0.0000	90.00	No Ice	13.30	7.52	0.07
(AT&T - Proposed)			6.00			1/2" Ice	13.99	8.09	0.14
			0.00						
HPA-65R-BUU-H8	C	From Face	3.50	0.0000	90.00	No Ice	13.30	7.52	0.07
(AT&T - Proposed)			-6.00			1/2" Ice	13.99	8.09	0.14
			0.00						
HPA-65R-BUU-H8	C	From Face	3.50	0.0000	90.00	No Ice	13.30	7.52	0.07
(AT&T - Proposed)			-2.00			1/2" Ice	13.99	8.09	0.14
			0.00						

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<i>Description</i>	<i>Face or Leg</i>	<i>Offset Type</i>	<i>Offsets: Horz Lateral Vert ft ft ft</i>	<i>Azimuth Adjustment °</i>	<i>Placement ft</i>	<i>C_{AA} Front ft²</i>	<i>C_{AA} Side ft²</i>	<i>Weight K</i>
HPA-65R-BUU-H8 (AT&T - Proposed)	C	From Face	3.50 2.00 0.00	0.0000	90.00	No Ice 1/2" Ice 13.30 13.99	7.52 8.09	0.07 0.14
HPA-65R-BUU-H8 (AT&T - Proposed)	C	From Face	3.50 6.00 0.00	0.0000	90.00	No Ice 1/2" Ice 13.30 13.99	7.52 8.09	0.07 0.14
(3) RRUS-11 (AT&T - Proposed)	A	From Face	1.00 0.00 0.00	0.0000	90.00	No Ice 1/2" Ice 2.99 3.23	1.25 1.41	0.05 0.07
(3) RRUS-11 (AT&T - Proposed)	B	From Face	1.00 0.00 0.00	0.0000	90.00	No Ice 1/2" Ice 2.99 3.23	1.25 1.41	0.05 0.07
(3) RRUS-11 (AT&T - Proposed)	C	From Face	1.00 0.00 0.00	0.0000	90.00	No Ice 1/2" Ice 2.99 3.23	1.25 1.41	0.05 0.07
(2) RRUS-12 (AT&T - Proposed)	A	From Face	1.00 0.00 0.00	0.0000	90.00	No Ice 1/2" Ice 3.67 3.93	1.49 1.67	0.06 0.08
(2) RRUS-12 (AT&T - Proposed)	B	From Face	1.00 0.00 0.00	0.0000	90.00	No Ice 1/2" Ice 3.67 3.93	1.49 1.67	0.06 0.08
(2) RRUS-12 (AT&T - Proposed)	C	From Face	1.00 0.00 0.00	0.0000	90.00	No Ice 1/2" Ice 3.67 3.93	1.49 1.67	0.06 0.08
RRUS-32 (AT&T - Proposed)	A	From Face	1.00 0.00 0.00	0.0000	90.00	No Ice 1/2" Ice 3.87 4.15	2.76 3.02	0.08 0.10
RRUS-32 (AT&T - Proposed)	B	From Face	1.00 0.00 0.00	0.0000	90.00	No Ice 1/2" Ice 3.87 4.15	2.76 3.02	0.08 0.10
RRUS-32 (AT&T - Proposed)	C	From Face	1.00 0.00 0.00	0.0000	90.00	No Ice 1/2" Ice 3.87 4.15	2.76 3.02	0.08 0.10
RRUS-E2 (AT&T - Proposed)	A	From Face	1.00 0.00 0.00	0.0000	90.00	No Ice 1/2" Ice 0.00 0.00	1.49 1.67	0.06 0.08
RRUS-E2 (AT&T - Proposed)	B	From Face	1.00 0.00 0.00	0.0000	90.00	No Ice 1/2" Ice 0.00 0.00	1.49 1.67	0.06 0.08
RRUS-E2 (AT&T - Proposed)	C	From Face	1.00 0.00 0.00	0.0000	90.00	No Ice 1/2" Ice 0.00 0.00	1.49 1.67	0.06 0.08
(2) A2 (AT&T - Proposed)	A	From Face	1.00 0.00 0.00	0.0000	90.00	No Ice 1/2" Ice 0.00 0.00	0.54 0.67	0.02 0.03
(2) A2 (AT&T - Proposed)	B	From Face	1.00 0.00 0.00	0.0000	90.00	No Ice 1/2" Ice 0.00 0.00	0.54 0.67	0.02 0.03
(2) A2 (AT&T - Proposed)	C	From Face	1.00 0.00 0.00	0.0000	90.00	No Ice 1/2" Ice 0.00 0.00	0.54 0.67	0.02 0.03
DC6-48-60-18-8F Surge Arrestor (AT&T - Proposed)	A	From Face	3.50 0.00 0.00	0.0000	90.00	No Ice 1/2" Ice 2.23 2.45	2.23 2.45	0.02 0.04
DC6-48-60-18-8F Surge Arrestor (AT&T - Proposed)	A	From Face	3.50 0.00 0.00	0.0000	90.00	No Ice 1/2" Ice 2.23 2.45	2.23 2.45	0.02 0.04

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Description	Face or Leg	Offset Type	Offsets: Horz Lateral Vert ft ft ft	Azimuth Adjustment °	Placement ft		C _{AA} Front ft ²	C _{AA} Side ft ²	Weight K
DC6-48-60-18-8F Surge Arrestor (AT&T - Proposed)	B	From Face	3.50 0.00 0.00	0.0000	90.00	No Ice 1/2" Ice	2.23 2.45	2.23 2.45	0.02 0.04
DC6-48-60-18-8F Surge Arrestor (AT&T - Proposed)	C	From Face	3.50 0.00 0.00	0.0000	90.00	No Ice 1/2" Ice	2.23 2.45	2.23 2.45	0.02 0.04
Commscope MTC3607R Platform (AT&T - Proposed)	C	From Face	0.00 0.00 0.00	0.0000	90.00	No Ice 1/2" Ice	53.00 68.00	53.00 68.00	2.52 3.20

Tower Pressures - No Ice

$$G_H = 1.690$$

Section Elevation ft	z ft	K _Z	q _z psf	A _G ft ²	F a c e	A _F ft ²	A _R ft ²	A _{leg} ft ²	Leg %	C _{AA} In Face ft ²	C _{AA} Out Face ft ²
L1 106.00-80.00	93.00	1.345	22.03	27.625	A B C	0.000 0.000 0.000	27.625 27.625 27.625	27.625	100.00 100.00 100.00	0.000 0.000 0.000	0.000 0.000 8.720

Tower Pressure - With Ice

$$G_H = 1.690$$

Section Elevation ft	z ft	K _Z	q _z psf	t _z in	A _G ft ²	F a c e	A _F ft ²	A _R ft ²	A _{leg} ft ²	Leg %	C _{AA} In Face ft ²	C _{AA} Out Face ft ²
L1 106.00-80.00	93.00	1.345	16.52	0.5000	29.792	A B C	0.000 0.000 0.000	29.792 29.792 29.792	29.792	100.00 100.00 100.00	0.000 0.000 0.000	0.000 0.000 14.720

Tower Pressure - Service

$$G_H = 1.690$$

Section Elevation ft	z ft	K _Z	q _z psf	A _G ft ²	F a c e	A _F ft ²	A _R ft ²	A _{leg} ft ²	Leg %	C _{AA} In Face ft ²	C _{AA} Out Face ft ²
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Section Elevation	<i>z</i>	<i>K_Z</i>	<i>q_z</i>	<i>A_G</i>	<i>F_{a c e}</i>	<i>A_F</i>	<i>A_R</i>	<i>A_{leg}</i>	<i>Leg %</i>	<i>C_{AA}</i> <i>In Face</i>	<i>C_{AA}</i> <i>Out Face</i>
<i>ft</i>	<i>ft</i>		<i>psf</i>	<i>ft²</i>		<i>ft²</i>	<i>ft²</i>	<i>ft²</i>		<i>ft²</i>	<i>ft²</i>
L1	93.00	1.345	8.60	27.625	A	0.000	27.625	27.625	100.00	0.000	0.000
106.00-80.00					B	0.000	27.625		100.00	0.000	0.000
					C	0.000	27.625		100.00	0.000	8.720

Tower Forces - No Ice - Wind Normal To Face

Section Elevation	Add Weight	Self Weight	<i>F_{a c e}</i>	<i>e</i>	<i>C_F</i>	<i>R_R</i>	<i>D_F</i>	<i>D_R</i>	<i>A_E</i>	<i>F</i>	<i>w</i>	Ctrl. Face
<i>ft</i>	<i>K</i>	<i>K</i>							<i>ft²</i>	<i>K</i>	<i>plf</i>	
L1	0.10	2.11	A	1	0.59	1	1	1	27.625	0.93	35.82	C
106.00-80.00			B	1	0.59	1	1	1	27.625			
			C	1	0.59	1	1	1	27.625			
Sum Weight:	0.10	2.11						OTM	12.11 kip-ft	0.93		

Tower Forces - No Ice - Wind 60 To Face

Section Elevation	Add Weight	Self Weight	<i>F_{a c e}</i>	<i>e</i>	<i>C_F</i>	<i>R_R</i>	<i>D_F</i>	<i>D_R</i>	<i>A_E</i>	<i>F</i>	<i>w</i>	Ctrl. Face
<i>ft</i>	<i>K</i>	<i>K</i>							<i>ft²</i>	<i>K</i>	<i>plf</i>	
L1	0.10	2.11	A	1	0.59	1	1	1	27.625	0.93	35.82	C
106.00-80.00			B	1	0.59	1	1	1	27.625			
			C	1	0.59	1	1	1	27.625			
Sum Weight:	0.10	2.11						OTM	12.11 kip-ft	0.93		

Tower Forces - No Ice - Wind 90 To Face

Section Elevation	Add Weight	Self Weight	<i>F_{a c e}</i>	<i>e</i>	<i>C_F</i>	<i>R_R</i>	<i>D_F</i>	<i>D_R</i>	<i>A_E</i>	<i>F</i>	<i>w</i>	Ctrl. Face
<i>ft</i>	<i>K</i>	<i>K</i>							<i>ft²</i>	<i>K</i>	<i>plf</i>	
L1	0.10	2.11	A	1	0.59	1	1	1	27.625	0.93	35.82	C
106.00-80.00			B	1	0.59	1	1	1	27.625			
			C	1	0.59	1	1	1	27.625			
Sum Weight:	0.10	2.11						OTM	12.11 kip-ft	0.93		

Tower Forces - With Ice - Wind Normal To Face

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Section Elevation	Add Weight	Self Weight	F a c e	e	C _F	R _R	D _F	D _R	A _E	F	w	Ctrl. Face
ft	K	K							ft ²	K	plf	
L1	0.22	2.32	A	1	0.59	1	1	1	29.792	0.90	34.68	C
106.00-80.00			B	1	0.59	1	1	1	29.792			
			C	1	0.59	1	1	1	29.792			
Sum Weight:	0.22	2.32						OTM	11.72 kip-ft	0.90		

Tower Forces - With Ice - Wind 60 To Face

Section Elevation	Add Weight	Self Weight	F a c e	e	C _F	R _R	D _F	D _R	A _E	F	w	Ctrl. Face
ft	K	K							ft ²	K	plf	
L1	0.22	2.32	A	1	0.59	1	1	1	29.792	0.90	34.68	C
106.00-80.00			B	1	0.59	1	1	1	29.792			
			C	1	0.59	1	1	1	29.792			
Sum Weight:	0.22	2.32						OTM	11.72 kip-ft	0.90		

Tower Forces - With Ice - Wind 90 To Face

Section Elevation	Add Weight	Self Weight	F a c e	e	C _F	R _R	D _F	D _R	A _E	F	w	Ctrl. Face
ft	K	K							ft ²	K	plf	
L1	0.22	2.32	A	1	0.59	1	1	1	29.792	0.90	34.68	C
106.00-80.00			B	1	0.59	1	1	1	29.792			
			C	1	0.59	1	1	1	29.792			
Sum Weight:	0.22	2.32						OTM	11.72 kip-ft	0.90		

Tower Forces - Service - Wind Normal To Face

Section Elevation	Add Weight	Self Weight	F a c e	e	C _F	R _R	D _F	D _R	A _E	F	w	Ctrl. Face
ft	K	K							ft ²	K	plf	
L1	0.10	2.11	A	1	0.613	1	1	1	27.625	0.37	14.35	C
106.00-80.00			B	1	0.613	1	1	1	27.625			
			C	1	0.613	1	1	1	27.625			
Sum Weight:	0.10	2.11						OTM	4.85 kip-ft	0.37		

Tower Forces - Service - Wind 60 To Face

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Section Elevation	Add Weight	Self Weight	F a c e	e	C _F	R _R	D _F	D _R	A _E	F	w	Ctrl. Face
ft	K	K							ft ²	K	plf	
L1	0.10	2.11	A	1	0.613	1	1	1	27.625	0.37	14.35	C
106.00-80.00			B	1	0.613	1	1	1	27.625			
			C	1	0.613	1	1	1	27.625			
Sum Weight:	0.10	2.11						OTM	4.85 kip-ft	0.37		

Tower Forces - Service - Wind 90 To Face

Section Elevation	Add Weight	Self Weight	F a c e	e	C _F	R _R	D _F	D _R	A _E	F	w	Ctrl. Face
ft	K	K							ft ²	K	plf	
L1	0.10	2.11	A	1	0.613	1	1	1	27.625	0.37	14.35	C
106.00-80.00			B	1	0.613	1	1	1	27.625			
			C	1	0.613	1	1	1	27.625			
Sum Weight:	0.10	2.11						OTM	4.85 kip-ft	0.37		

Force Totals

Load Case	Vertical Forces	Sum of Forces X	Sum of Forces Z	Sum of Overturning Moments, M _x	Sum of Overturning Moments, M _z	Sum of Torques
	K	K	K	kip-ft	kip-ft	kip-ft
Leg Weight	2.11					
Bracing Weight	0.00					
Total Member Self-Weight	2.11			1.16	0.25	
Total Weight	8.78			1.16	0.25	
Wind 0 deg - No Ice		-0.08	-13.55	-178.45	1.88	-0.85
Wind 30 deg - No Ice		6.75	-11.69	-153.57	-89.08	-0.45
Wind 60 deg - No Ice		11.77	-6.71	-87.24	-156.11	0.07
Wind 90 deg - No Ice		13.63	0.08	2.79	-181.23	0.58
Wind 120 deg - No Ice		11.85	6.84	92.38	-157.73	0.93
Wind 150 deg - No Ice		6.88	11.77	157.52	-91.89	1.03
Wind 180 deg - No Ice		0.08	13.55	180.78	-1.37	0.85
Wind 210 deg - No Ice		-6.75	11.69	155.90	89.59	0.45
Wind 240 deg - No Ice		-11.77	6.71	89.56	156.61	-0.07
Wind 270 deg - No Ice		-13.63	-0.08	-0.46	181.74	-0.58
Wind 300 deg - No Ice		-11.85	-6.84	-90.05	158.24	-0.93
Wind 330 deg - No Ice		-6.88	-11.77	-155.20	92.40	-1.03
Member Ice	0.21					
Total Weight Ice	12.08			1.42	0.56	
Wind 0 deg - Ice		-0.06	-11.67	-155.05	1.89	-0.83
Wind 30 deg - Ice		5.82	-10.08	-133.42	-77.30	-0.40
Wind 60 deg - Ice		10.14	-5.78	-75.67	-135.62	0.13
Wind 90 deg - Ice		11.74	0.06	2.75	-157.45	0.62
Wind 120 deg - Ice		10.20	5.89	80.80	-136.95	0.95
Wind 150 deg - Ice		5.92	10.14	137.59	-79.60	1.03
Wind 180 deg - Ice		0.06	11.67	157.89	-0.78	0.83
Wind 210 deg - Ice		-5.82	10.08	136.26	78.41	0.40
Wind 240 deg - Ice		-10.14	5.78	78.50	136.73	-0.13
Wind 270 deg - Ice		-11.74	-0.06	0.09	158.56	-0.62
Wind 300 deg - Ice		-10.20	-5.89	-77.97	138.06	-0.95

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Load Case	Vertical Forces K	Sum of Forces X K	Sum of Forces Z K	Sum of Overturning Moments, M_x kip-ft	Sum of Overturning Moments, M_z kip-ft	Sum of Torques kip-ft
Wind 330 deg - Ice		-5.92	-10.14	-134.75	80.71	-1.03
Total Weight	8.78			1.16	0.25	
Wind 0 deg - Service		-0.03	-5.30	-69.15	0.84	-0.33
Wind 30 deg - Service		2.64	-4.58	-59.41	-34.75	-0.18
Wind 60 deg - Service		4.61	-2.62	-33.46	-60.98	0.03
Wind 90 deg - Service		5.33	0.03	1.77	-70.81	0.23
Wind 120 deg - Service		4.63	2.68	36.83	-61.61	0.36
Wind 150 deg - Service		2.69	4.61	62.32	-35.85	0.40
Wind 180 deg - Service		0.03	5.30	71.42	-0.43	0.33
Wind 210 deg - Service		-2.64	4.58	61.68	35.16	0.18
Wind 240 deg - Service		-4.61	2.62	35.73	61.39	-0.03
Wind 270 deg - Service		-5.33	-0.03	0.50	71.22	-0.23
Wind 300 deg - Service		-4.63	-2.68	-34.55	62.02	-0.36
Wind 330 deg - Service		-2.69	-4.61	-60.05	36.26	-0.40

Load Combinations

Comb. No.	Description
1	Dead Only
2	Dead+Wind 0 deg - No Ice
3	Dead+Wind 30 deg - No Ice
4	Dead+Wind 60 deg - No Ice
5	Dead+Wind 90 deg - No Ice
6	Dead+Wind 120 deg - No Ice
7	Dead+Wind 150 deg - No Ice
8	Dead+Wind 180 deg - No Ice
9	Dead+Wind 210 deg - No Ice
10	Dead+Wind 240 deg - No Ice
11	Dead+Wind 270 deg - No Ice
12	Dead+Wind 300 deg - No Ice
13	Dead+Wind 330 deg - No Ice
14	Dead+Ice+Temp
15	Dead+Wind 0 deg+Ice+Temp
16	Dead+Wind 30 deg+Ice+Temp
17	Dead+Wind 60 deg+Ice+Temp
18	Dead+Wind 90 deg+Ice+Temp
19	Dead+Wind 120 deg+Ice+Temp
20	Dead+Wind 150 deg+Ice+Temp
21	Dead+Wind 180 deg+Ice+Temp
22	Dead+Wind 210 deg+Ice+Temp
23	Dead+Wind 240 deg+Ice+Temp
24	Dead+Wind 270 deg+Ice+Temp
25	Dead+Wind 300 deg+Ice+Temp
26	Dead+Wind 330 deg+Ice+Temp
27	Dead+Wind 0 deg - Service
28	Dead+Wind 30 deg - Service
29	Dead+Wind 60 deg - Service
30	Dead+Wind 90 deg - Service
31	Dead+Wind 120 deg - Service
32	Dead+Wind 150 deg - Service
33	Dead+Wind 180 deg - Service
34	Dead+Wind 210 deg - Service
35	Dead+Wind 240 deg - Service
36	Dead+Wind 270 deg - Service
37	Dead+Wind 300 deg - Service

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<i>Comb.</i>	<i>Description</i>
<i>No.</i>	
38	Dead+Wind 330 deg - Service

Maximum Member Forces

<i>Section No.</i>	<i>Elevation ft</i>	<i>Component Type</i>	<i>Condition</i>	<i>Gov. Load Comb.</i>	<i>Force K</i>	<i>Major Axis Moment kip-ft</i>	<i>Minor Axis Moment kip-ft</i>
L1	106 - 80	Pole	Max Tension	14	0.00	0.00	0.00
			Max. Compression	14	-12.08	0.56	-1.43
			Max. M _x	11	-8.76	182.81	0.46
			Max. M _y	8	-8.76	-1.38	-181.84
			Max. V _y	11	-13.65	182.81	0.46
			Max. V _x	8	13.56	-1.38	-181.84
			Max. Torque	26			1.03

Maximum Reactions

<i>Location</i>	<i>Condition</i>	<i>Gov. Load Comb.</i>	<i>Vertical K</i>	<i>Horizontal, X K</i>	<i>Horizontal, Z K</i>
Pole	Max. Vert	24	12.08	11.74	0.06
	Max. H _x	11	8.78	13.63	0.08
	Max. H _z	2	8.78	0.08	13.55
	Max. M _x	2	179.50	0.08	13.55
	Max. M _z	5	182.30	-13.63	-0.08
	Max. Torsion	26	1.03	5.92	10.14
	Min. Vert	1	8.78	0.00	0.00
	Min. H _x	5	8.78	-13.63	-0.08
	Min. H _z	8	8.78	-0.08	-13.55
	Min. M _x	8	-181.84	-0.08	-13.55
	Min. M _z	11	-182.81	13.63	0.08
	Min. Torsion	20	-1.02	-5.92	-10.14

Tower Mast Reaction Summary

<i>Load Combination</i>	<i>Vertical K</i>	<i>Shear_x K</i>	<i>Shear_z K</i>	<i>Overturning Moment, M_x kip-ft</i>	<i>Overturning Moment, M_z kip-ft</i>	<i>Torque kip-ft</i>
Dead Only	8.78	0.00	0.00	1.17	0.26	-0.00
Dead+Wind 0 deg - No Ice	8.78	-0.08	-13.55	-179.50	1.89	-0.85
Dead+Wind 30 deg - No Ice	8.78	6.75	-11.69	-154.48	-89.61	-0.45
Dead+Wind 60 deg - No Ice	8.78	11.77	-6.71	-87.75	-157.03	0.07
Dead+Wind 90 deg - No Ice	8.78	13.63	0.08	2.81	-182.30	0.57
Dead+Wind 120 deg - No Ice	8.78	11.85	6.84	92.92	-158.66	0.92
Dead+Wind 150 deg - No Ice	8.78	6.88	11.77	158.46	-92.44	1.02
Dead+Wind 180 deg - No Ice	8.78	0.08	13.55	181.84	-1.38	0.85
Dead+Wind 210 deg - No Ice	8.78	-6.75	11.69	156.82	90.12	0.45
Dead+Wind 240 deg - No Ice	8.78	-11.77	6.71	90.09	157.54	-0.07
Dead+Wind 270 deg - No Ice	8.78	-13.63	-0.08	-0.46	182.81	-0.57
Dead+Wind 300 deg - No Ice	8.78	-11.85	-6.84	-90.58	159.17	-0.92
Dead+Wind 330 deg - No Ice	8.78	-6.88	-11.77	-156.11	92.95	-1.02

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Load Combination	Vertical K	Shear _x K	Shear _z K	Overturning Moment, M _x kip-ft	Overturning Moment, M _z kip-ft	Torque kip-ft
Dead+Ice+Temp	12.08	0.00	0.00	1.43	0.56	-0.00
Dead+Wind 0 deg+Ice+Temp	12.08	-0.06	-11.67	-156.32	1.91	-0.83
Dead+Wind 30 deg+Ice+Temp	12.08	5.82	-10.08	-134.51	-77.93	-0.40
Dead+Wind 60 deg+Ice+Temp	12.08	10.14	-5.78	-76.28	-136.73	0.12
Dead+Wind 90 deg+Ice+Temp	12.08	11.74	0.06	2.78	-158.74	0.62
Dead+Wind 120 deg+Ice+Temp	12.08	10.20	5.89	81.47	-138.07	0.95
Dead+Wind 150 deg+Ice+Temp	12.08	5.92	10.14	138.72	-80.25	1.02
Dead+Wind 180 deg+Ice+Temp	12.08	0.06	11.67	159.19	-0.78	0.83
Dead+Wind 210 deg+Ice+Temp	12.08	-5.82	10.08	137.38	79.05	0.40
Dead+Wind 240 deg+Ice+Temp	12.08	-10.14	5.78	79.14	137.85	-0.12
Dead+Wind 270 deg+Ice+Temp	12.08	-11.74	-0.06	0.09	159.87	-0.62
Dead+Wind 300 deg+Ice+Temp	12.08	-10.20	-5.89	-78.61	139.20	-0.95
Dead+Wind 330 deg+Ice+Temp	12.08	-5.92	-10.14	-135.86	81.38	-1.03
Dead+Wind 0 deg - Service	8.78	-0.03	-5.30	-69.53	0.89	-0.33
Dead+Wind 30 deg - Service	8.78	2.64	-4.58	-59.74	-34.91	-0.18
Dead+Wind 60 deg - Service	8.78	4.61	-2.62	-33.62	-61.29	0.03
Dead+Wind 90 deg - Service	8.78	5.33	0.03	1.81	-71.18	0.22
Dead+Wind 120 deg - Service	8.78	4.63	2.68	37.08	-61.93	0.36
Dead+Wind 150 deg - Service	8.78	2.69	4.61	62.72	-36.02	0.40
Dead+Wind 180 deg - Service	8.78	0.03	5.30	71.87	-0.38	0.33
Dead+Wind 210 deg - Service	8.78	-2.64	4.58	62.08	35.42	0.18
Dead+Wind 240 deg - Service	8.78	-4.61	2.62	35.97	61.80	-0.03
Dead+Wind 270 deg - Service	8.78	-5.33	-0.03	0.53	71.69	-0.22
Dead+Wind 300 deg - Service	8.78	-4.63	-2.68	-34.73	62.44	-0.36
Dead+Wind 330 deg - Service	8.78	-2.69	-4.61	-60.37	36.53	-0.40

Solution Summary

Load Comb.	Sum of Applied Forces			Sum of Reactions			% Error
	PX K	PY K	PZ K	PX K	PY K	PZ K	
1	0.00	-8.78	0.00	0.00	8.78	0.00	0.000%
2	-0.08	-8.78	-13.55	0.08	8.78	13.55	0.000%
3	6.75	-8.78	-11.69	-6.75	8.78	11.69	0.000%
4	11.77	-8.78	-6.71	-11.77	8.78	6.71	0.000%
5	13.63	-8.78	0.08	-13.63	8.78	-0.08	0.000%
6	11.85	-8.78	6.84	-11.85	8.78	-6.84	0.000%
7	6.88	-8.78	11.77	-6.88	8.78	-11.77	0.000%
8	0.08	-8.78	13.55	-0.08	8.78	-13.55	0.000%
9	-6.75	-8.78	11.69	6.75	8.78	-11.69	0.000%
10	-11.77	-8.78	6.71	11.77	8.78	-6.71	0.000%
11	-13.63	-8.78	-0.08	13.63	8.78	0.08	0.000%
12	-11.85	-8.78	-6.84	11.85	8.78	6.84	0.000%
13	-6.88	-8.78	-11.77	6.88	8.78	11.77	0.000%
14	0.00	-12.08	0.00	0.00	12.08	0.00	0.000%
15	-0.06	-12.08	-11.67	0.06	12.08	11.67	0.000%
16	5.82	-12.08	-10.08	-5.82	12.08	10.08	0.000%
17	10.14	-12.08	-5.78	-10.14	12.08	5.78	0.000%
18	11.74	-12.08	0.06	-11.74	12.08	-0.06	0.000%
19	10.20	-12.08	5.89	-10.20	12.08	-5.89	0.000%
20	5.92	-12.08	10.14	-5.92	12.08	-10.14	0.000%
21	0.06	-12.08	11.67	-0.06	12.08	-11.67	0.000%
22	-5.82	-12.08	10.08	5.82	12.08	-10.08	0.000%
23	-10.14	-12.08	5.78	10.14	12.08	-5.78	0.000%
24	-11.74	-12.08	-0.06	11.74	12.08	0.06	0.000%
25	-10.20	-12.08	-5.89	10.20	12.08	5.89	0.000%
26	-5.92	-12.08	-10.14	5.92	12.08	10.14	0.000%
27	-0.03	-8.78	-5.30	0.03	8.78	5.30	0.000%

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	Client	AT&T Mobility	Designed by	jrm

Load Comb.	Sum of Applied Forces			Sum of Reactions			% Error
	PX K	PY K	PZ K	PX K	PY K	PZ K	
28	2.64	-8.78	-4.58	-2.64	8.78	4.58	0.000%
29	4.61	-8.78	-2.62	-4.61	8.78	2.62	0.000%
30	5.33	-8.78	0.03	-5.33	8.78	-0.03	0.000%
31	4.63	-8.78	2.68	-4.63	8.78	-2.68	0.000%
32	2.69	-8.78	4.61	-2.69	8.78	-4.61	0.000%
33	0.03	-8.78	5.30	-0.03	8.78	-5.30	0.000%
34	-2.64	-8.78	4.58	2.64	8.78	-4.58	0.000%
35	-4.61	-8.78	2.62	4.61	8.78	-2.62	0.000%
36	-5.33	-8.78	-0.03	5.33	8.78	0.03	0.000%
37	-4.63	-8.78	-2.68	4.63	8.78	2.68	0.000%
38	-2.69	-8.78	-4.61	2.69	8.78	4.61	0.000%

Non-Linear Convergence Results

Load Combination	Converged?	Number of Cycles	Displacement Tolerance	Force Tolerance
1	Yes	4	0.00000001	0.00000001
2	Yes	4	0.00000001	0.00000001
3	Yes	4	0.00000001	0.00000001
4	Yes	4	0.00000001	0.00000001
5	Yes	4	0.00000001	0.00000001
6	Yes	4	0.00000001	0.00000001
7	Yes	4	0.00000001	0.00000001
8	Yes	4	0.00000001	0.00000001
9	Yes	4	0.00000001	0.00000001
10	Yes	4	0.00000001	0.00000001
11	Yes	4	0.00000001	0.00000001
12	Yes	4	0.00000001	0.00000001
13	Yes	4	0.00000001	0.00000001
14	Yes	4	0.00000001	0.00000001
15	Yes	4	0.00000001	0.00002361
16	Yes	4	0.00000001	0.00002488
17	Yes	4	0.00000001	0.00002468
18	Yes	4	0.00000001	0.00002139
19	Yes	4	0.00000001	0.00002778
20	Yes	4	0.00000001	0.00002712
21	Yes	4	0.00000001	0.00002405
22	Yes	4	0.00000001	0.00002701
23	Yes	4	0.00000001	0.00002504
24	Yes	4	0.00000001	0.00002157
25	Yes	4	0.00000001	0.00002601
26	Yes	4	0.00000001	0.00002863
27	Yes	4	0.00000001	0.00000001
28	Yes	4	0.00000001	0.00000001
29	Yes	4	0.00000001	0.00000001
30	Yes	4	0.00000001	0.00000001
31	Yes	4	0.00000001	0.00000001
32	Yes	4	0.00000001	0.00000001
33	Yes	4	0.00000001	0.00000001
34	Yes	4	0.00000001	0.00000001
35	Yes	4	0.00000001	0.00000001
36	Yes	4	0.00000001	0.00000001
37	Yes	4	0.00000001	0.00000001
38	Yes	4	0.00000001	0.00000001

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Maximum Tower Deflections - Service Wind

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
L1	106 - 80	1.529	32	0.3604	0.0049

Critical Deflections and Radius of Curvature - Service Wind

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
105.00	4-ft Standoff	32	1.471	0.3465	0.0047	Inf
100.00	BXA-70063/6CF	32	1.176	0.2772	0.0038	Inf
90.00	HPA-65R-BUU-H8	32	0.588	0.1386	0.0019	Inf

Maximum Tower Deflections - Design Wind

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
L1	106 - 80	3.884	6	0.9175	0.0128

Critical Deflections and Radius of Curvature - Design Wind

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
105.00	4-ft Standoff	6	3.735	0.8822	0.0123	Inf
100.00	BXA-70063/6CF	6	2.988	0.7058	0.0099	Inf
90.00	HPA-65R-BUU-H8	6	1.494	0.3529	0.0049	Inf

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 P P _a
L1	106 - 104.7 104.7 - 103.4	HSS12.75x0.625	26.00	0.00	0.0	25.200 25.200	23.8074 23.8074	-0.42 -0.54	599.95 599.95	0.001 0.001

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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 P P _a
	103.4 - 102.1					25.200	23.8074	-0.67	599.95	0.001
	102.1 - 100.8					25.200	23.8074	-0.79	599.95	0.001
	100.8 - 99.5					25.200	23.8074	-3.19	599.95	0.005
	99.5 - 98.2					25.200	23.8074	-2.37	599.95	0.004
	98.2 - 96.9					25.200	23.8074	-2.48	599.95	0.004
	96.9 - 95.6					25.200	23.8074	-2.60	599.95	0.004
	95.6 - 94.3					25.200	23.8074	-2.71	599.95	0.005
	94.3 - 93					25.200	23.8074	-2.82	599.95	0.005
	93 - 91.7					25.200	23.8074	-2.93	599.95	0.005
	91.7 - 90.4					25.200	23.8074	-3.04	599.95	0.005
	90.4 - 89.1					25.200	23.8074	-7.83	599.95	0.013
	89.1 - 87.8					25.200	23.8074	-7.96	599.95	0.013
	87.8 - 86.5					25.200	23.8074	-8.08	599.95	0.013
	86.5 - 85.2					25.200	23.8074	-8.21	599.95	0.014
	85.2 - 83.9					25.200	23.8074	-8.34	599.95	0.014
	83.9 - 82.6					25.200	23.8074	-8.48	599.95	0.014
	82.6 - 81.3					25.200	23.8074	-8.62	599.95	0.014
	81.3 - 80					25.200	23.8074	-8.76	599.95	0.015

Pole Bending Design Data

Section No.	Elevation ft	Size	Actual M _x kip-ft	Actual f _{bx} ksi	Allow. F _{bx} ksi	Ratio $\frac{f_{bx}}{F_{bx}}$	Actual M _y kip-ft	Actual f _{by} ksi	Allow. F _{by} ksi	Ratio $\frac{f_{by}}{F_{by}}$
L1	106 - 104.7	HSS12.75x0.625	0.84	0.147	27.720	0.005	0.00	0.000	27.720	0.000
	104.7 - 103.4		1.37	0.239	27.720	0.009	0.00	0.000	27.720	0.000
	103.4 - 102.1		1.98	0.345	27.720	0.012	0.00	0.000	27.720	0.000
	102.1 - 100.8		2.65	0.462	27.720	0.017	0.00	0.000	27.720	0.000
	100.8 - 99.5		5.38	0.939	27.720	0.034	0.00	0.000	27.720	0.000
	99.5 - 98.2		10.85	1.892	27.720	0.068	0.00	0.000	27.720	0.000
	98.2 - 96.9		16.59	2.893	27.720	0.104	0.00	0.000	27.720	0.000
	96.9 - 95.6		22.39	3.905	27.720	0.141	0.00	0.000	27.720	0.000
	95.6 - 94.3		28.26	4.928	27.720	0.178	0.00	0.000	27.720	0.000
	94.3 - 93		34.19	5.962	27.720	0.215	0.00	0.000	27.720	0.000
	93 - 91.7		40.17	7.006	27.720	0.253	0.00	0.000	27.720	0.000
	91.7 - 90.4		46.22	8.060	27.720	0.291	0.00	0.000	27.720	0.000
	90.4 - 89.1		60.36	10.526	27.720	0.380	0.00	0.000	27.720	0.000
	89.1 - 87.8		77.86	13.579	27.720	0.490	0.00	0.000	27.720	0.000
	87.8 - 86.5		95.42	16.641	27.720	0.600	0.00	0.000	27.720	0.000
	86.5 - 85.2		113.03	19.712	27.720	0.711	0.00	0.000	27.720	0.000
	85.2 - 83.9		130.68	22.790	27.720	0.822	0.00	0.000	27.720	0.000
	83.9 - 82.6		148.38	25.876	27.720	0.933	0.00	0.000	27.720	0.000
	82.6 - 81.3		166.11	28.968	27.720	1.045	0.00	0.000	27.720	0.000
	81.3 - 80		183.87	32.065	27.720	1.157	0.00	0.000	27.720	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	106 - 104.7	HSS12.75x0.625	0.38	0.032	16.800	0.002	0.19	0.017	16.800	0.001
	104.7 - 103.4		0.43	0.036	16.800	0.002	0.19	0.017	16.800	0.001

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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 $\frac{f_{vt}}{F_{vt}}$
	103.4 - 102.1		0.49	0.041	16.800	0.002	0.06	0.005	16.800	0.000
	102.1 - 100.8		0.54	0.045	16.800	0.003	0.06	0.005	16.800	0.000
	100.8 - 99.5		3.86	0.325	16.800	0.019	0.06	0.006	16.800	0.000
	99.5 - 98.2		4.39	0.369	16.800	0.022	0.01	0.001	16.800	0.000
	98.2 - 96.9		4.44	0.373	16.800	0.022	0.01	0.001	16.800	0.000
	96.9 - 95.6		4.49	0.377	16.800	0.022	0.01	0.001	16.800	0.000
	95.6 - 94.3		4.53	0.381	16.800	0.023	0.01	0.001	16.800	0.000
	94.3 - 93		4.58	0.385	16.800	0.023	0.01	0.001	16.800	0.000
	93 - 91.7		4.63	0.389	16.800	0.023	0.01	0.001	16.800	0.000
	91.7 - 90.4		4.67	0.393	16.800	0.023	0.02	0.001	16.800	0.000
	90.4 - 89.1		13.45	1.130	16.800	0.067	0.91	0.080	16.800	0.005
	89.1 - 87.8		13.49	1.134	16.800	0.067	0.91	0.080	16.800	0.005
	87.8 - 86.5		13.53	1.137	16.800	0.068	0.91	0.080	16.800	0.005
	86.5 - 85.2		13.57	1.140	16.800	0.068	0.92	0.080	16.800	0.005
	85.2 - 83.9		13.60	1.143	16.800	0.068	0.92	0.080	16.800	0.005
	83.9 - 82.6		13.63	1.145	16.800	0.068	0.92	0.080	16.800	0.005
	82.6 - 81.3		13.66	1.148	16.800	0.068	0.92	0.080	16.800	0.005
	81.3 - 80		13.69	1.150	16.800	0.068	0.92	0.080	16.800	0.005

Pole Interaction Design Data

Section No.	Elevation ft	Ratio $\frac{P}{P_a}$	Ratio $\frac{f_{bx}}{F_{bx}}$	Ratio $\frac{f_{by}}{F_{by}}$	Ratio $\frac{f_v}{F_v}$	Ratio $\frac{f_{vt}}{F_{vt}}$	Comb. Stress Ratio	Allow. Stress Ratio	Criteria
L1	106 - 104.7	0.001	0.005	0.000	0.002	0.001	0.006	1.333	H1-3+VT ✓
	104.7 - 103.4	0.001	0.009	0.000	0.002	0.001	0.010	1.333	H1-3+VT ✓
	103.4 - 102.1	0.001	0.012	0.000	0.002	0.000	0.014	1.333	H1-3+VT ✓
	102.1 - 100.8	0.001	0.017	0.000	0.003	0.000	0.018	1.333	H1-3+VT ✓
	100.8 - 99.5	0.005	0.034	0.000	0.019	0.000	0.040	1.333	H1-3+VT ✓
	99.5 - 98.2	0.004	0.068	0.000	0.022	0.000	0.073	1.333	H1-3+VT ✓
	98.2 - 96.9	0.004	0.104	0.000	0.022	0.000	0.109	1.333	H1-3+VT ✓
	96.9 - 95.6	0.004	0.141	0.000	0.022	0.000	0.146	1.333	H1-3+VT ✓
	95.6 - 94.3	0.005	0.178	0.000	0.023	0.000	0.183	1.333	H1-3+VT ✓
	94.3 - 93	0.005	0.215	0.000	0.023	0.000	0.220	1.333	H1-3+VT ✓
	93 - 91.7	0.005	0.253	0.000	0.023	0.000	0.258	1.333	H1-3+VT ✓
	91.7 - 90.4	0.005	0.291	0.000	0.023	0.000	0.296	1.333	H1-3+VT ✓
	90.4 - 89.1	0.013	0.380	0.000	0.067	0.005	0.398	1.333	H1-3+VT ✓

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	Client	AT&T Mobility	Designed by	jrm

Section No.	Elevation ft	Ratio P P_a	Ratio f_{bx} F_{bx}	Ratio f_{by} F_{by}	Ratio f_v F_v	Ratio f_{vt} F_{vt}	Comb. Stress Ratio	Allow. Stress Ratio	Criteria
	89.1 - 87.8	0.013	0.490	0.000	0.067	0.005	0.508	1.333	H1-3+VT
	87.8 - 86.5	0.013	0.600	0.000	0.068	0.005	0.619	1.333	H1-3+VT
	86.5 - 85.2	0.014	0.711	0.000	0.068	0.005	0.730	1.333	H1-3+VT
	85.2 - 83.9	0.014	0.822	0.000	0.068	0.005	0.841	1.333	H1-3+VT
	83.9 - 82.6	0.014	0.933	0.000	0.068	0.005	0.953	1.333	H1-3+VT
	82.6 - 81.3	0.014	1.045	0.000	0.068	0.005	1.065	1.333	H1-3+VT
	81.3 - 80	0.015	1.157	0.000	0.068	0.005	1.177	1.333	H1-3+VT

Section Capacity Table

Section No.	Elevation ft	Component Type	Size	Critical Element	P K	SF* P_{allow} K	% Capacity	Pass Fail
L1	106 - 80	Pole	HSS12.75x0.625	1	-8.76	799.73	88.3	Pass
							Summary	
							Pole (L1)	Pass
							RATING = 88.3	Pass



Job: 13298.000 - CT2413 w/ Prop Reinforcement		
Project: 80' PennSummit Monopole - 345 Bushy Hill Rd., Simsbury, CT		
Client: AT&T Mobility	Drawn by: jrm	App'd:
Code: TIA/EIA-22-2	Date: 04/10/14	Scale: NTS
Path:		Dwg No. E-1

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	Client AT&T Mobility	Designed by jrm

Tower Input Data

There is a pole section.

This tower is designed using the TIA/EIA-222-F standard.

The following design criteria apply:

Basic wind speed of 80 mph.

Nominal ice thickness of 0.5000 in.

Ice density of 56.0 pcf.

A wind speed of 69 mph is used in combination with ice.

Temperature drop of 50 °F.

Deflections calculated using a wind speed of 50 mph.

Tower members are "hot dipped" galvanized in accordance with ASTM A123 and ASTM A153 Standards..

Welds are fabricated with ER-70S-6 electrodes..

Monopole modeled with 26-ft HSS12.75x0.625 Extension (by Verizon Wireless - see Centek Proj No. 13135.000 Rev 3, dated 02.13.14)..

Monopole wall thicknesses adjusted to account for reinforcement design..

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, feedline supports, and appurtenance mounts are not considered.

Options

Consider Moments - Legs	Distribute Leg Loads As Uniform	Treat Feedline Bundles As Cylinder
Consider Moments - Horizontals	Assume Legs Pinned	Use ASCE 10 X-Brace Ly Rules
Consider Moments - Diagonals	√ Assume Rigid Index Plate	Calculate Redundant Bracing Forces
Use Moment Magnification	Use Clear Spans For Wind Area	Ignore Redundant Members in FEA
√ Use Code Stress Ratios	Use Clear Spans For KL/r	SR Leg Bolts Resist Compression
Use Code Safety Factors - Guys	Retention 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		

Tapered Pole Section Geometry

Section	Elevation	Section Length	Splice Length	Number of Sides	Top Diameter	Bottom Diameter	Wall Thickness	Bend Radius	Pole Grade
	ft	ft	ft		in	in	in	in	
L1	80.00-76.00	4.00	0.00	18	22.0000	22.5700	0.7379	2.9516	A607-65 (65 ksi)
L2	76.00-72.00	4.00	0.00	18	22.5700	23.1400	0.7202	2.8808	A607-65 (65 ksi)
L3	72.00-68.00	4.00	0.00	18	23.1400	23.7100	0.7036	2.8144	A607-65 (65 ksi)

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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	68.00-64.00	4.00	0.00	18	23.7100	24.2800	0.6880	2.7520	A607-65 (65 ksi)
L5	64.00-60.00	4.00	0.00	18	24.2800	24.8500	0.6735	2.6940	A607-65 (65 ksi)
L6	60.00-56.00	4.00	0.00	18	24.8500	25.4200	0.8984	3.5936	A607-65 (65 ksi)
L7	56.00-52.00	4.00	0.00	18	25.4200	25.9900	0.8778	3.5112	A607-65 (65 ksi)
L8	52.00-48.00	4.00	0.00	18	25.9900	26.5600	0.8584	3.4336	A607-65 (65 ksi)
L9	48.00-44.00	4.00	0.00	18	26.5600	27.1300	0.9144	3.6576	A607-65 (65 ksi)
L10	44.00-40.00	4.00	0.00	18	27.1300	27.7000	1.0728	4.2912	A607-65 (65 ksi)
L11	40.00-36.00	4.00	0.00	18	27.7000	28.2700	1.0506	4.2024	A607-65 (65 ksi)
L12	36.00-32.00	4.00	0.00	18	28.2700	28.8400	1.0296	4.1184	A607-65 (65 ksi)
L13	32.00-28.00	4.00	0.00	18	28.8400	29.4100	1.0098	4.0392	A607-65 (65 ksi)
L14	28.00-24.00	4.00	0.00	18	29.4100	29.9800	0.9910	3.9640	A607-65 (65 ksi)
L15	24.00-20.00	4.00	0.00	18	29.9800	30.5500	0.9732	3.8928	A607-65 (65 ksi)
L16	20.00-16.00	4.00	0.00	18	30.5500	31.1200	0.9563	3.8252	A607-65 (65 ksi)
L17	16.00-12.00	4.00	0.00	18	31.1200	31.6900	0.7818	3.1272	A607-65 (65 ksi)
L18	12.00-8.00	4.00	0.00	18	31.6900	32.2600	0.7703	3.0812	A607-65 (65 ksi)
L19	8.00-4.00	4.00	0.00	18	32.2600	32.8300	0.7594	3.0376	A607-65 (65 ksi)
L20	4.00-0.00	4.00		18	32.8300	33.4000	0.7489	2.9956	A607-65 (65 ksi)

Tapered Pole Properties

Section	Tip Dia. in	Area in ²	I in ⁴	r in	C in	I/C in ³	J in ⁴	It/Q in ³	w in	w/t
L1	22.3394	49.7978	2844.2014	7.5480	11.1760	254.4919	5692.1454	24.9037	2.5733	3.487
	22.9182	51.1328	3079.1328	7.7504	11.4656	268.5549	6162.3172	25.5713	2.6736	3.623
L2	22.9182	49.9468	3012.5890	7.7567	11.4656	262.7511	6029.1421	24.9781	2.7048	3.756
	23.4970	51.2498	3254.5631	7.9590	11.7551	276.8634	6513.4086	25.6297	2.8051	3.895
L3	23.4970	50.1056	3186.6160	7.9649	11.7551	271.0832	6377.4249	25.0575	2.8343	4.028
	24.0758	51.3785	3435.7077	8.1673	12.0447	285.2469	6875.9361	25.6941	2.9346	4.171
L4	24.0758	50.2734	3366.3709	8.1728	12.0447	279.4903	6737.1713	25.1415	2.9621	4.305
	24.6546	51.5181	3622.6559	8.3752	12.3342	293.7073	7250.0787	25.7640	3.0624	4.451
L5	24.6546	50.4634	3552.8492	8.3803	12.3342	288.0477	7110.3734	25.2365	3.0879	4.585
	25.2334	51.6818	3816.4736	8.5827	12.6238	302.3237	7637.9690	25.8458	3.1882	4.734
L6	25.2334	68.2985	4950.1426	8.5028	12.6238	392.1278	9906.7986	34.1557	2.7924	3.108
	25.8121	69.9239	5312.0301	8.7052	12.9134	411.3593	10631.0499	34.9686	2.8927	3.22
L7	25.8121	68.3779	5203.3186	8.7125	12.9134	402.9407	10413.4839	34.1955	2.9290	3.337
	26.3909	69.9660	5574.3500	8.9148	13.2029	422.2058	11156.0349	34.9897	3.0293	3.451
L8	26.3909	68.4726	5463.7963	8.9217	13.2029	413.8324	10934.7820	34.2428	3.0635	3.569
	26.9697	70.0256	5844.0586	9.1241	13.4925	433.1345	11695.8070	35.0194	3.1638	3.686
L9	26.9697	74.4314	6184.7078	9.1042	13.4925	458.3818	12377.5535	37.2228	3.0652	3.352

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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
L10	27.5485	76.0857	6606.3259	9.3065	13.7820	479.3431	13221.3446	38.0501	3.1655	3.462
	27.5485	88.7265	7611.0816	9.2503	13.7820	552.2464	15232.1780	44.3717	2.8868	2.691
	28.1273	90.6674	8121.5634	9.4527	14.0716	577.1599	16253.8133	45.3423	2.9871	2.784
L11	28.1273	88.8652	7973.4096	9.4605	14.0716	566.6313	15957.3109	44.4410	3.0261	2.88
	28.7061	90.7659	8496.0569	9.6629	14.3612	591.5996	17003.2931	45.3916	3.1265	2.976
L12	28.7061	89.0203	8345.5190	9.6703	14.3612	581.1173	16702.0192	44.5186	3.1634	3.072
	29.2849	90.8830	8880.4426	9.8727	14.6507	606.1438	17772.5704	45.4501	3.2637	3.17
L13	29.2849	89.1987	8728.2810	9.8797	14.6507	595.7578	17468.0470	44.6078	3.2986	3.267
	29.8637	91.0256	9275.6411	10.0821	14.9403	620.8479	18563.4872	45.5215	3.3989	3.366
L14	29.8637	89.3901	9121.0409	10.0887	14.9403	610.5000	18254.0835	44.7035	3.4320	3.463
	30.4425	91.1830	9680.9445	10.2911	15.2298	635.6563	19374.6274	45.6002	3.5323	3.564
L15	30.4425	89.6002	9524.5822	10.2974	15.2298	625.3895	19061.6971	44.8086	3.5636	3.662
	31.0213	91.3609	10097.1783	10.4998	15.5194	650.6165	20207.6428	45.6891	3.6640	3.765
L16	31.0213	89.8256	9938.8544	10.5058	15.5194	640.4149	19890.7866	44.9214	3.6937	3.863
	31.6001	91.5558	10524.2793	10.7081	15.8090	665.7161	21062.4068	45.7866	3.7940	3.967
L17	31.6001	75.2822	8754.0590	10.7701	15.8090	553.7403	17519.6368	37.6483	4.1012	5.246
	32.1789	76.6966	9256.8064	10.9724	16.0985	575.0098	18525.7931	38.3556	4.2015	5.374
L18	32.1789	75.5966	9130.8264	10.9765	16.0985	567.1842	18273.6673	37.8055	4.2217	5.481
	32.7577	76.9902	9645.1690	11.1788	16.3881	588.5478	19303.0293	38.5024	4.3220	5.611
L19	32.7577	75.9270	9518.5642	11.1827	16.3881	580.8224	19049.6532	37.9707	4.3412	5.717
	33.3365	77.3009	10044.6827	11.3851	16.6776	602.2844	20102.5824	38.6578	4.4415	5.849
L20	33.3365	76.2571	9915.5305	11.3888	16.6776	594.5404	19844.1082	38.1358	4.4600	5.955
	33.9152	77.6119	10453.4983	11.5911	16.9672	616.1004	20920.7516	38.8133	4.5603	6.089

Tower Elevation	Gusset Area (per face)	Gusset Thickness	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
ft	ft ²	in						
L1 80.00-76.00				1	1.02	1		
L2 76.00-72.00				1	1.02	1		
L3 72.00-68.00				1	1.02	1		
L4 68.00-64.00				1	1.02	1		
L5 64.00-60.00				1	1.02	1		
L6 60.00-56.00				1	1.02	1		
L7 56.00-52.00				1	1.02	1		
L8 52.00-48.00				1	1.02	1		
L9 48.00-44.00				1	1.02	1		
L10				1	1.02	1		
44.00-40.00								
L11				1	1.02	1		
40.00-36.00								
L12				1	1.02	1		
36.00-32.00								
L13				1	1.02	1		
32.00-28.00								
L14				1	1.02	1		
28.00-24.00								
L15				1	1.02	1		
24.00-20.00								
L16				1	1.02	1		
20.00-16.00								
L17				1	1.02	1		
16.00-12.00								
L18 12.00-8.00				1	1.02	1		
L19 8.00-4.00				1	1.02	1		
L20 4.00-0.00				1	1.02	1		

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Feed Line/Linear Appurtenances - Entered As Area

Description	Face or Leg	Allow Shield	Component Type	Placement ft	Total Number		C _A A _A ft ² /ft	Weight plf
1 5/8 (T-Mobile - Existing)	C	No	Inside Pole	77.00 - 0.00	6	No Ice	0.00	1.04
1 5/8 (MetroPCS - Existing)	C	No	Inside Pole	70.00 - 0.00	6	1/2" Ice	0.00	1.04
7/8	C	No	Inside Pole	80.00 - 0.00	3	No Ice	0.00	1.04
1 1/4	C	No	Inside Pole	80.00 - 0.00	1	1/2" Ice	0.00	0.54
HYBRIFLEX 1-5/8" (Verizon - Reserved)	C	No	CaAa (Out Of Face)	80.00 - 0.00	2	No Ice	0.00	0.66
Fiber Trunk (AT&T - Proposed)	C	No	CaAa (Out Of Face)	80.00 - 0.00	2	1/2" Ice	0.20	0.66
DC Trunk (AT&T - Proposed)	C	No	CaAa (Out Of Face)	80.00 - 0.00	8	No Ice	0.30	1.00
						1/2" Ice	0.04	1.55
						No Ice	0.14	0.11
						1/2" Ice	0.00	0.66

Feed Line/Linear Appurtenances Section Areas

Tower Section	Tower Elevation ft	Face	A _R ft ²	A _F ft ²	C _A A _A In Face ft ²	C _A A _A Out Face ft ²	Weight K
L1	80.00-76.00	A	0.000	0.000	0.000	0.000	0.00
		B	0.000	0.000	0.000	0.000	0.00
		C	0.000	0.000	0.000	1.904	0.04
L2	76.00-72.00	A	0.000	0.000	0.000	0.000	0.00
		B	0.000	0.000	0.000	0.000	0.00
		C	0.000	0.000	0.000	1.904	0.06
L3	72.00-68.00	A	0.000	0.000	0.000	0.000	0.00
		B	0.000	0.000	0.000	0.000	0.00
		C	0.000	0.000	0.000	1.904	0.07
L4	68.00-64.00	A	0.000	0.000	0.000	0.000	0.00
		B	0.000	0.000	0.000	0.000	0.00
		C	0.000	0.000	0.000	1.904	0.09
L5	64.00-60.00	A	0.000	0.000	0.000	0.000	0.00
		B	0.000	0.000	0.000	0.000	0.00
		C	0.000	0.000	0.000	1.904	0.09
L6	60.00-56.00	A	0.000	0.000	0.000	0.000	0.00
		B	0.000	0.000	0.000	0.000	0.00
		C	0.000	0.000	0.000	1.904	0.09
L7	56.00-52.00	A	0.000	0.000	0.000	0.000	0.00
		B	0.000	0.000	0.000	0.000	0.00
		C	0.000	0.000	0.000	1.904	0.09
L8	52.00-48.00	A	0.000	0.000	0.000	0.000	0.00
		B	0.000	0.000	0.000	0.000	0.00
		C	0.000	0.000	0.000	1.904	0.09
L9	48.00-44.00	A	0.000	0.000	0.000	0.000	0.00
		B	0.000	0.000	0.000	0.000	0.00
		C	0.000	0.000	0.000	1.904	0.09
L10	44.00-40.00	A	0.000	0.000	0.000	0.000	0.00
		B	0.000	0.000	0.000	0.000	0.00
		C	0.000	0.000	0.000	1.904	0.09
L11	40.00-36.00	A	0.000	0.000	0.000	0.000	0.00
		B	0.000	0.000	0.000	0.000	0.00
		C	0.000	0.000	0.000	1.904	0.09
L12	36.00-32.00	A	0.000	0.000	0.000	0.000	0.00
		B	0.000	0.000	0.000	0.000	0.00

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<i>Tower Section</i>	<i>Tower Elevation ft</i>	<i>Face</i>	<i>A_R</i> <i>ft²</i>	<i>A_F</i> <i>ft²</i>	<i>C_AA_A</i> <i>In Face ft²</i>	<i>C_AA_A</i> <i>Out Face ft²</i>	<i>Weight</i> <i>K</i>
L13	32.00-28.00	C	0.000	0.000	0.000	1.904	0.09
		A	0.000	0.000	0.000	0.000	0.00
		B	0.000	0.000	0.000	0.000	0.00
L14	28.00-24.00	C	0.000	0.000	0.000	1.904	0.09
		A	0.000	0.000	0.000	0.000	0.00
		B	0.000	0.000	0.000	0.000	0.00
L15	24.00-20.00	C	0.000	0.000	0.000	1.904	0.09
		A	0.000	0.000	0.000	0.000	0.00
		B	0.000	0.000	0.000	0.000	0.00
L16	20.00-16.00	C	0.000	0.000	0.000	1.904	0.09
		A	0.000	0.000	0.000	0.000	0.00
		B	0.000	0.000	0.000	0.000	0.00
L17	16.00-12.00	C	0.000	0.000	0.000	1.904	0.09
		A	0.000	0.000	0.000	0.000	0.00
		B	0.000	0.000	0.000	0.000	0.00
L18	12.00-8.00	C	0.000	0.000	0.000	1.904	0.09
		A	0.000	0.000	0.000	0.000	0.00
		B	0.000	0.000	0.000	0.000	0.00
L19	8.00-4.00	C	0.000	0.000	0.000	1.904	0.09
		A	0.000	0.000	0.000	0.000	0.00
		B	0.000	0.000	0.000	0.000	0.00
L20	4.00-0.00	C	0.000	0.000	0.000	1.904	0.09
		A	0.000	0.000	0.000	0.000	0.00
		B	0.000	0.000	0.000	0.000	0.00

Feed Line/Linear Appurtenances Section Areas - With Ice

<i>Tower Section</i>	<i>Tower Elevation ft</i>	<i>Face or Leg</i>	<i>Ice Thickness in</i>	<i>A_R</i> <i>ft²</i>	<i>A_F</i> <i>ft²</i>	<i>C_AA_A</i> <i>In Face ft²</i>	<i>C_AA_A</i> <i>Out Face ft²</i>	<i>Weight</i> <i>K</i>
L1	80.00-76.00	A	0.500	0.000	0.000	0.000	0.000	0.00
		B		0.000	0.000	0.000	0.000	0.00
		C		0.000	0.000	0.000	3.504	0.08
L2	76.00-72.00	A	0.500	0.000	0.000	0.000	0.000	0.00
		B		0.000	0.000	0.000	0.000	0.00
		C		0.000	0.000	0.000	3.504	0.09
L3	72.00-68.00	A	0.500	0.000	0.000	0.000	0.000	0.00
		B		0.000	0.000	0.000	0.000	0.00
		C		0.000	0.000	0.000	3.504	0.11
L4	68.00-64.00	A	0.500	0.000	0.000	0.000	0.000	0.00
		B		0.000	0.000	0.000	0.000	0.00
		C		0.000	0.000	0.000	3.504	0.12
L5	64.00-60.00	A	0.500	0.000	0.000	0.000	0.000	0.00
		B		0.000	0.000	0.000	0.000	0.00
		C		0.000	0.000	0.000	3.504	0.12
L6	60.00-56.00	A	0.500	0.000	0.000	0.000	0.000	0.00
		B		0.000	0.000	0.000	0.000	0.00
		C		0.000	0.000	0.000	3.504	0.12
L7	56.00-52.00	A	0.500	0.000	0.000	0.000	0.000	0.00
		B		0.000	0.000	0.000	0.000	0.00
		C		0.000	0.000	0.000	3.504	0.12
L8	52.00-48.00	A	0.500	0.000	0.000	0.000	0.000	0.00
		B		0.000	0.000	0.000	0.000	0.00
		C		0.000	0.000	0.000	3.504	0.12
L9	48.00-44.00	A	0.500	0.000	0.000	0.000	0.000	0.00
		B		0.000	0.000	0.000	0.000	0.00
		C		0.000	0.000	0.000	3.504	0.12

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Tower Section	Tower Elevation ft	Face or Leg	Ice Thickness in	A_R ft ²	A_F ft ²	$C_A A_A$ In Face ft ²	$C_A A_A$ Out Face ft ²	Weight K
L10	44.00-40.00	A	0.500	0.000	0.000	0.000	0.000	0.00
		B		0.000	0.000	0.000	0.000	0.00
		C		0.000	0.000	0.000	3.504	0.12
L11	40.00-36.00	A	0.500	0.000	0.000	0.000	0.000	0.00
		B		0.000	0.000	0.000	0.000	0.00
		C		0.000	0.000	0.000	3.504	0.12
L12	36.00-32.00	A	0.500	0.000	0.000	0.000	0.000	0.00
		B		0.000	0.000	0.000	0.000	0.00
		C		0.000	0.000	0.000	3.504	0.12
L13	32.00-28.00	A	0.500	0.000	0.000	0.000	0.000	0.00
		B		0.000	0.000	0.000	0.000	0.00
		C		0.000	0.000	0.000	3.504	0.12
L14	28.00-24.00	A	0.500	0.000	0.000	0.000	0.000	0.00
		B		0.000	0.000	0.000	0.000	0.00
		C		0.000	0.000	0.000	3.504	0.12
L15	24.00-20.00	A	0.500	0.000	0.000	0.000	0.000	0.00
		B		0.000	0.000	0.000	0.000	0.00
		C		0.000	0.000	0.000	3.504	0.12
L16	20.00-16.00	A	0.500	0.000	0.000	0.000	0.000	0.00
		B		0.000	0.000	0.000	0.000	0.00
		C		0.000	0.000	0.000	3.504	0.12
L17	16.00-12.00	A	0.500	0.000	0.000	0.000	0.000	0.00
		B		0.000	0.000	0.000	0.000	0.00
		C		0.000	0.000	0.000	3.504	0.12
L18	12.00-8.00	A	0.500	0.000	0.000	0.000	0.000	0.00
		B		0.000	0.000	0.000	0.000	0.00
		C		0.000	0.000	0.000	3.504	0.12
L19	8.00-4.00	A	0.500	0.000	0.000	0.000	0.000	0.00
		B		0.000	0.000	0.000	0.000	0.00
		C		0.000	0.000	0.000	3.504	0.12
L20	4.00-0.00	A	0.500	0.000	0.000	0.000	0.000	0.00
		B		0.000	0.000	0.000	0.000	0.00
		C		0.000	0.000	0.000	3.504	0.12

Feed Line Center of Pressure

Section	Elevation ft	CP_X in	CP_Z in	CP_X Ice in	CP_Z Ice in
L1	80.00-76.00	-0.4845	0.2797	-0.7401	0.4273
L2	76.00-72.00	-0.4869	0.2811	-0.7464	0.4309
L3	72.00-68.00	-0.4893	0.2825	-0.7525	0.4344
L4	68.00-64.00	-0.4915	0.2838	-0.7583	0.4378
L5	64.00-60.00	-0.4937	0.2850	-0.7640	0.4411
L6	60.00-56.00	-0.4958	0.2862	-0.7695	0.4443
L7	56.00-52.00	-0.4978	0.2874	-0.7748	0.4474
L8	52.00-48.00	-0.4997	0.2885	-0.7800	0.4503
L9	48.00-44.00	-0.5016	0.2896	-0.7850	0.4532
L10	44.00-40.00	-0.5034	0.2906	-0.7899	0.4560
L11	40.00-36.00	-0.5051	0.2916	-0.7946	0.4588
L12	36.00-32.00	-0.5068	0.2926	-0.7992	0.4614
L13	32.00-28.00	-0.5085	0.2936	-0.8037	0.4640
L14	28.00-24.00	-0.5100	0.2945	-0.8080	0.4665
L15	24.00-20.00	-0.5116	0.2954	-0.8122	0.4689
L16	20.00-16.00	-0.5130	0.2962	-0.8163	0.4713
L17	16.00-12.00	-0.5145	0.2970	-0.8203	0.4736
L18	12.00-8.00	-0.5159	0.2978	-0.8242	0.4759

tnxTower Centek Engineering Inc. 63-2 N. Branford Road Branford, CT 06405 Phone: (203) 488-0580 FAX: (203) 488-8587	Job	Page
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	Project 80' PennSummit Monopole - 345 Bushy Hill Rd., Simsbury, CT	Date 16:54:14 04/10/14
	Client AT&T Mobility	Designed by jrm

Section	Elevation	CP _X	CP _Z	CP _X	CP _Z
	ft	in	in	Ice in	Ice in
L19	8.00-4.00	-0.5172	0.2986	-0.8280	0.4780
L20	4.00-0.00	-0.5185	0.2994	-0.8317	0.4802

Discrete Tower Loads

Description	Face or Leg	Offset Type	Offsets: Horz Lateral Vert ft ft ft	Azimuth Adjustment °	Placement ft	C _{AA} Front ft ²	C _{AA} Side ft ²	Weight K
4-ft Standoff	A	From Face	0.00 0.00 0.00	0.0000	105.00	No Ice 1/2" Ice	1.40 1.73	0.03 0.04
4-ft Standoff	A	From Face	0.00 0.00 0.00	0.0000	105.00	No Ice 1/2" Ice	1.40 1.73	0.03 0.04
4-ft Standoff	B	From Face	0.00 0.00 0.00	0.0000	105.00	No Ice 1/2" Ice	1.40 1.73	0.03 0.04
4-ft Standoff	C	From Face	0.00 0.00 0.00	0.0000	105.00	No Ice 1/2" Ice	1.40 1.73	0.03 0.04
6' x 2" Omni	A	From Face	4.00 0.00 3.00	0.0000	105.00	No Ice 1/2" Ice	1.20 1.80	0.02 0.03
DB404	A	From Face	4.00 0.00 3.00	0.0000	105.00	No Ice 1/2" Ice	1.14 2.05	0.01 0.02
ANT220D3	B	From Face	4.00 0.00 3.00	0.0000	105.00	No Ice 1/2" Ice	1.10 1.50	0.04 0.05
DB201-A	C	From Face	4.00 0.00 3.00	0.0000	105.00	No Ice 1/2" Ice	1.10 1.98	0.03 0.03
APX16DWV-16DWVS-E-A 20 (T-Mobile - Existing)	A	From Face	0.50 0.00 0.00	0.0000	77.00	No Ice 1/2" Ice	7.07 7.52	0.04 0.07
APX16DWV-16DWVS-E-A 20 (T-Mobile - Existing)	B	From Face	0.50 0.00 0.00	0.0000	77.00	No Ice 1/2" Ice	7.07 7.52	0.04 0.07
APX16DWV-16DWVS-E-A 20 (T-Mobile - Existing)	C	From Face	0.50 0.00 0.00	0.0000	77.00	No Ice 1/2" Ice	7.07 7.52	0.04 0.07
TMA 10"x8"x3" (T-Mobile - Existing)	A	From Face	4.00 5.00 0.00	0.0000	77.00	No Ice 1/2" Ice	0.00 0.00	0.02 0.02
TMA 10"x8"x3" (T-Mobile - Existing)	A	From Face	4.00 5.00 0.00	0.0000	77.00	No Ice 1/2" Ice	0.00 0.00	0.02 0.02
TMA 10"x8"x3" (T-Mobile - Existing)	A	From Face	4.00 5.00 0.00	0.0000	77.00	No Ice 1/2" Ice	0.00 0.00	0.02 0.02
Valmont Uni-Tri Bracket (T-Mobile - Existing)	C	None		0.0000	77.00	No Ice 1/2" Ice	1.75 1.94	0.29 0.31

tnxTower Centek Engineering Inc. 63-2 N. Branford Road Branford, CT 06405 Phone: (203) 488-0580 FAX: (203) 488-8587	Job	13298.000 - CT2413 w/ Prop Reinforcement	Page	8 of 42
	Project	80' PennSummit Monopole - 345 Bushy Hill Rd., Simsbury, CT	Date	16:54:14 04/10/14
	Client	AT&T Mobility	Designed by	jrm

<i>Description</i>	<i>Face or Leg</i>	<i>Offset Type</i>	<i>Offsets: Horz Lateral Vert ft ft ft</i>	<i>Azimuth Adjustment °</i>	<i>Placement ft</i>	<i>C_{AA} Front ft²</i>	<i>C_{AA} Side ft²</i>	<i>Weight K</i>	
APXV18-206517-C (MetroPCS - Existing)	A	From Face	0.50 0.00 0.00	0.0000	70.00	No Ice 1/2" Ice	5.51 5.98	3.93 4.39	0.02 0.05
APXV18-206517-C (MetroPCS - Existing)	B	From Face	0.50 0.00 0.00	0.0000	70.00	No Ice 1/2" Ice	5.51 5.98	3.93 4.39	0.02 0.05
APXV18-206517-C (MetroPCS - Existing)	C	From Face	0.50 0.00 0.00	0.0000	70.00	No Ice 1/2" Ice	5.51 5.98	3.93 4.39	0.02 0.05
Valmont Uni-Tri Bracket (MetroPCS - Existing)	C	None		0.0000	70.00	No Ice 1/2" Ice	1.75 1.94	1.75 1.94	0.29 0.31
BXA-70063/6CF (Verizon - Reserved)	A	From Face	4.00 6.00 0.00	0.0000	100.00	No Ice 1/2" Ice	7.73 8.27	4.16 4.60	0.02 0.06
BXA-171063-12CF (Verizon - Reserved)	A	From Face	4.00 4.00 0.00	0.0000	100.00	No Ice 1/2" Ice	4.79 5.24	3.62 4.06	0.02 0.04
BXA-70063/6CF (Verizon - Reserved)	A	From Face	4.00 0.00 0.00	0.0000	100.00	No Ice 1/2" Ice	7.73 8.27	4.16 4.60	0.02 0.06
BXA-171063-12CF (Verizon - Reserved)	A	From Face	4.00 -4.00 0.00	0.0000	100.00	No Ice 1/2" Ice	4.79 5.24	3.62 4.06	0.02 0.04
BXA-70063/6CF (Verizon - Reserved)	B	From Face	4.00 6.00 0.00	0.0000	100.00	No Ice 1/2" Ice	7.73 8.27	4.16 4.60	0.02 0.06
BXA-171063-12CF (Verizon - Reserved)	B	From Face	4.00 4.00 0.00	0.0000	100.00	No Ice 1/2" Ice	4.79 5.24	3.62 4.06	0.02 0.04
BXA-70063/6CF (Verizon - Reserved)	B	From Face	4.00 0.00 0.00	0.0000	100.00	No Ice 1/2" Ice	7.73 8.27	4.16 4.60	0.02 0.06
BXA-171063-12CF (Verizon - Reserved)	B	From Face	4.00 -4.00 0.00	0.0000	100.00	No Ice 1/2" Ice	4.79 5.24	3.62 4.06	0.02 0.04
BXA-70063/6CF (Verizon - Reserved)	C	From Face	4.00 6.00 0.00	0.0000	100.00	No Ice 1/2" Ice	7.73 8.27	4.16 4.60	0.02 0.06
BXA-171063-12CF (Verizon - Reserved)	C	From Face	4.00 4.00 0.00	0.0000	100.00	No Ice 1/2" Ice	4.79 5.24	3.62 4.06	0.02 0.04
BXA-70063/6CF (Verizon - Reserved)	C	From Face	4.00 0.00 0.00	0.0000	100.00	No Ice 1/2" Ice	7.73 8.27	4.16 4.60	0.02 0.06
BXA-171063-12CF (Verizon - Reserved)	C	From Face	4.00 -4.00 0.00	0.0000	100.00	No Ice 1/2" Ice	4.79 5.24	3.62 4.06	0.02 0.04
RRH2x40-07-U (Verizon - Reserved)	A	From Face	4.00 4.00 0.00	0.0000	100.00	No Ice 1/2" Ice	2.25 2.45	1.23 1.39	0.05 0.07
RRH2x40-07-U (Verizon - Reserved)	B	From Face	4.00 4.00 0.00	0.0000	100.00	No Ice 1/2" Ice	2.25 2.45	1.23 1.39	0.05 0.07
RRH2x40-07-U (Verizon - Reserved)	C	From Face	4.00 4.00 0.00	0.0000	100.00	No Ice 1/2" Ice	2.25 2.45	1.23 1.39	0.05 0.07
RRH2x40-AWS	A	From Face	4.00	0.0000	100.00	No Ice	2.52	1.59	0.04

<i>tnxTower</i> Centek Engineering Inc. 63-2 N. Branford Road Branford, CT 06405 Phone: (203) 488-0580 FAX: (203) 488-8587	Job	13298.000 - CT2413 w/ Prop Reinforcement	Page	9 of 42
	Project	80' PennSummit Monopole - 345 Bushy Hill Rd., Simsbury, CT	Date	16:54:14 04/10/14
	Client	AT&T Mobility	Designed by	jrm

<i>Description</i>	<i>Face or Leg</i>	<i>Offset Type</i>	<i>Offsets: Horz Lateral Vert ft ft ft</i>	<i>Azimuth Adjustment °</i>	<i>Placement ft</i>	<i>C_{AA} Front ft²</i>	<i>C_{AA} Side ft²</i>	<i>Weight K</i>
(Verizon - Reserved)			-4.00 0.00		1/2" Ice	2.75	1.80	0.06
RRH2x40-AWS	B	From Face	4.00	0.0000	100.00	No Ice	2.52	0.04
(Verizon - Reserved)			-4.00 0.00		1/2" Ice	2.75	1.80	0.06
RRH2x40-AWS	C	From Face	4.00	0.0000	100.00	No Ice	2.52	0.04
(Verizon - Reserved)			-4.00 0.00		1/2" Ice	2.75	1.80	0.06
DB-T1-6Z-8AB-0Z	A	From Face	4.00	0.0000	100.00	No Ice	5.60	0.04
(Verizon - Reserved)			0.00 0.00		1/2" Ice	5.92	2.56	0.08
Valmont T-Arm (3)	C	None		0.0000	100.00	No Ice	21.00	1.01
(Verizon - Reserved)					1/2" Ice	29.00	29.00	1.24
12" x 26-ft Monopole	C	None		0.0000	93.00	No Ice	32.83	1.31
Extension					1/2" Ice	34.38	34.38	1.53
HPA-65R-BUU-H8	A	From Face	3.50	0.0000	90.00	No Ice	13.30	0.07
(AT&T - Proposed)			-6.00 0.00		1/2" Ice	13.99	8.09	0.14
HPA-65R-BUU-H8	A	From Face	3.50	0.0000	90.00	No Ice	13.30	0.07
(AT&T - Proposed)			-2.00 0.00		1/2" Ice	13.99	8.09	0.14
HPA-65R-BUU-H8	A	From Face	3.50	0.0000	90.00	No Ice	13.30	0.07
(AT&T - Proposed)			2.00 0.00		1/2" Ice	13.99	8.09	0.14
HPA-65R-BUU-H8	A	From Face	3.50	0.0000	90.00	No Ice	13.30	0.07
(AT&T - Proposed)			6.00 0.00		1/2" Ice	13.99	8.09	0.14
HPA-65R-BUU-H8	B	From Face	3.50	0.0000	90.00	No Ice	13.30	0.07
(AT&T - Proposed)			-6.00 0.00		1/2" Ice	13.99	8.09	0.14
HPA-65R-BUU-H8	B	From Face	3.50	0.0000	90.00	No Ice	13.30	0.07
(AT&T - Proposed)			-2.00 0.00		1/2" Ice	13.99	8.09	0.14
HPA-65R-BUU-H8	B	From Face	3.50	0.0000	90.00	No Ice	13.30	0.07
(AT&T - Proposed)			2.00 0.00		1/2" Ice	13.99	8.09	0.14
HPA-65R-BUU-H8	B	From Face	3.50	0.0000	90.00	No Ice	13.30	0.07
(AT&T - Proposed)			6.00 0.00		1/2" Ice	13.99	8.09	0.14
HPA-65R-BUU-H8	C	From Face	3.50	0.0000	90.00	No Ice	13.30	0.07
(AT&T - Proposed)			-6.00 0.00		1/2" Ice	13.99	8.09	0.14
HPA-65R-BUU-H8	C	From Face	3.50	0.0000	90.00	No Ice	13.30	0.07
(AT&T - Proposed)			-2.00 0.00		1/2" Ice	13.99	8.09	0.14
HPA-65R-BUU-H8	C	From Face	3.50	0.0000	90.00	No Ice	13.30	0.07
(AT&T - Proposed)			2.00 0.00		1/2" Ice	13.99	8.09	0.14
HPA-65R-BUU-H8	C	From Face	3.50	0.0000	90.00	No Ice	13.30	0.07
(AT&T - Proposed)			6.00 0.00		1/2" Ice	13.99	8.09	0.14
(3) RRUS-11	A	From Face	1.00	0.0000	90.00	No Ice	2.99	0.05
(AT&T - Proposed)			0.00 0.00		1/2" Ice	3.23	1.41	0.07
(3) RRUS-11	B	From Face	1.00	0.0000	90.00	No Ice	2.99	0.05
(AT&T - Proposed)			0.00 0.00		1/2" Ice	3.23	1.41	0.07

<i>tnxTower</i> Centek Engineering Inc. 63-2 N. Branford Road Branford, CT 06405 Phone: (203) 488-0580 FAX: (203) 488-8587	Job	13298.000 - CT2413 w/ Prop Reinforcement	Page	10 of 42
	Project	80' PennSummit Monopole - 345 Bushy Hill Rd., Simsbury, CT	Date	16:54:14 04/10/14
	Client	AT&T Mobility	Designed by	jrm

<i>Description</i>	<i>Face or Leg</i>	<i>Offset Type</i>	<i>Offsets: Horz Lateral Vert ft ft ft</i>	<i>Azimuth Adjustment °</i>	<i>Placement ft</i>	<i>C_{AA} Front ft²</i>	<i>C_{AA} Side ft²</i>	<i>Weight K</i>	
(3) RRUS-11 (AT&T - Proposed)	C	From Face	1.00 0.00 0.00	0.0000	90.00	No Ice 1/2" Ice	2.99 3.23	1.25 1.41	0.05 0.07
(2) RRUS-12 (AT&T - Proposed)	A	From Face	1.00 0.00 0.00	0.0000	90.00	No Ice 1/2" Ice	3.67 3.93	1.49 1.67	0.06 0.08
(2) RRUS-12 (AT&T - Proposed)	B	From Face	1.00 0.00 0.00	0.0000	90.00	No Ice 1/2" Ice	3.67 3.93	1.49 1.67	0.06 0.08
(2) RRUS-12 (AT&T - Proposed)	C	From Face	1.00 0.00 0.00	0.0000	90.00	No Ice 1/2" Ice	3.67 3.93	1.49 1.67	0.06 0.08
RRUS-32 (AT&T - Proposed)	A	From Face	1.00 0.00 0.00	0.0000	90.00	No Ice 1/2" Ice	3.87 4.15	2.76 3.02	0.08 0.10
RRUS-32 (AT&T - Proposed)	B	From Face	1.00 0.00 0.00	0.0000	90.00	No Ice 1/2" Ice	3.87 4.15	2.76 3.02	0.08 0.10
RRUS-32 (AT&T - Proposed)	C	From Face	1.00 0.00 0.00	0.0000	90.00	No Ice 1/2" Ice	3.87 4.15	2.76 3.02	0.08 0.10
RRUS-E2 (AT&T - Proposed)	A	From Face	1.00 0.00 0.00	0.0000	90.00	No Ice 1/2" Ice	0.00 0.00	1.49 1.67	0.06 0.08
RRUS-E2 (AT&T - Proposed)	B	From Face	1.00 0.00 0.00	0.0000	90.00	No Ice 1/2" Ice	0.00 0.00	1.49 1.67	0.06 0.08
RRUS-E2 (AT&T - Proposed)	C	From Face	1.00 0.00 0.00	0.0000	90.00	No Ice 1/2" Ice	0.00 0.00	1.49 1.67	0.06 0.08
(2) A2 (AT&T - Proposed)	A	From Face	1.00 0.00 0.00	0.0000	90.00	No Ice 1/2" Ice	0.00 0.00	0.54 0.67	0.02 0.03
(2) A2 (AT&T - Proposed)	B	From Face	1.00 0.00 0.00	0.0000	90.00	No Ice 1/2" Ice	0.00 0.00	0.54 0.67	0.02 0.03
(2) A2 (AT&T - Proposed)	C	From Face	1.00 0.00 0.00	0.0000	90.00	No Ice 1/2" Ice	0.00 0.00	0.54 0.67	0.02 0.03
DC6-48-60-18-8F Surge Arrestor (AT&T - Proposed)	A	From Face	3.50 0.00 0.00	0.0000	90.00	No Ice 1/2" Ice	2.23 2.45	2.23 2.45	0.02 0.04
DC6-48-60-18-8F Surge Arrestor (AT&T - Proposed)	A	From Face	3.50 0.00 0.00	0.0000	90.00	No Ice 1/2" Ice	2.23 2.45	2.23 2.45	0.02 0.04
DC6-48-60-18-8F Surge Arrestor (AT&T - Proposed)	B	From Face	3.50 0.00 0.00	0.0000	90.00	No Ice 1/2" Ice	2.23 2.45	2.23 2.45	0.02 0.04
DC6-48-60-18-8F Surge Arrestor (AT&T - Proposed)	C	From Face	3.50 0.00 0.00	0.0000	90.00	No Ice 1/2" Ice	2.23 2.45	2.23 2.45	0.02 0.04
Commscope MTC3607R Platform (AT&T - Proposed)	C	From Face	0.00 0.00 0.00	0.0000	90.00	No Ice 1/2" Ice	53.00 68.00	53.00 68.00	2.52 3.20

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	Project	80' PennSummit Monopole - 345 Bushy Hill Rd., Simsbury, CT	Date	16:54:14 04/10/14
	Client	AT&T Mobility	Designed by	jrm

Tower Pressures - No Ice

$$G_H = 1.690$$

Section Elevation	z	K _Z	q _z	A _G	F a c e	A _F	A _R	A _{leg}	Leg %	C _A A _A In Face ft ²	C _A A _A Out Face ft ²
ft	ft		psf	ft ²		ft ²	ft ²	ft ²			
L1 80.00-76.00	77.99	1.279	20.95	7.428	A	0.000	7.577	7.577	100.00	0.000	0.000
					B	0.000	7.577		100.00	0.000	0.000
					C	0.000	7.577		100.00	0.000	1.904
L2 76.00-72.00	73.99	1.259	20.64	7.618	A	0.000	7.771	7.771	100.00	0.000	0.000
					B	0.000	7.771		100.00	0.000	0.000
					C	0.000	7.771		100.00	0.000	1.904
L3 72.00-68.00	69.99	1.24	20.31	7.808	A	0.000	7.965	7.965	100.00	0.000	0.000
					B	0.000	7.965		100.00	0.000	0.000
					C	0.000	7.965		100.00	0.000	1.904
L4 68.00-64.00	65.99	1.219	19.97	7.998	A	0.000	8.158	8.158	100.00	0.000	0.000
					B	0.000	8.158		100.00	0.000	0.000
					C	0.000	8.158		100.00	0.000	1.904
L5 64.00-60.00	61.99	1.197	19.62	8.188	A	0.000	8.352	8.352	100.00	0.000	0.000
					B	0.000	8.352		100.00	0.000	0.000
					C	0.000	8.352		100.00	0.000	1.904
L6 60.00-56.00	57.99	1.175	19.25	8.378	A	0.000	8.546	8.546	100.00	0.000	0.000
					B	0.000	8.546		100.00	0.000	0.000
					C	0.000	8.546		100.00	0.000	1.904
L7 56.00-52.00	53.99	1.151	18.86	8.568	A	0.000	8.740	8.740	100.00	0.000	0.000
					B	0.000	8.740		100.00	0.000	0.000
					C	0.000	8.740		100.00	0.000	1.904
L8 52.00-48.00	49.99	1.126	18.45	8.758	A	0.000	8.934	8.934	100.00	0.000	0.000
					B	0.000	8.934		100.00	0.000	0.000
					C	0.000	8.934		100.00	0.000	1.904
L9 48.00-44.00	45.99	1.099	18.01	8.948	A	0.000	9.127	9.127	100.00	0.000	0.000
					B	0.000	9.127		100.00	0.000	0.000
					C	0.000	9.127		100.00	0.000	1.904
L10 44.00-40.00	41.99	1.071	17.55	9.138	A	0.000	9.321	9.321	100.00	0.000	0.000
					B	0.000	9.321		100.00	0.000	0.000
					C	0.000	9.321		100.00	0.000	1.904
L11 40.00-36.00	37.99	1.041	17.06	9.328	A	0.000	9.515	9.515	100.00	0.000	0.000
					B	0.000	9.515		100.00	0.000	0.000
					C	0.000	9.515		100.00	0.000	1.904
L12 36.00-32.00	33.99	1.009	16.52	9.518	A	0.000	9.709	9.709	100.00	0.000	0.000
					B	0.000	9.709		100.00	0.000	0.000
					C	0.000	9.709		100.00	0.000	1.904
L13 32.00-28.00	29.99	1	16.38	9.708	A	0.000	9.902	9.902	100.00	0.000	0.000
					B	0.000	9.902		100.00	0.000	0.000
					C	0.000	9.902		100.00	0.000	1.904
L14 28.00-24.00	25.99	1	16.38	9.898	A	0.000	10.096	10.096	100.00	0.000	0.000
					B	0.000	10.096		100.00	0.000	0.000
					C	0.000	10.096		100.00	0.000	1.904
L15 24.00-20.00	21.99	1	16.38	10.088	A	0.000	10.290	10.290	100.00	0.000	0.000
					B	0.000	10.290		100.00	0.000	0.000
					C	0.000	10.290		100.00	0.000	1.904
L16 20.00-16.00	17.99	1	16.38	10.278	A	0.000	10.484	10.484	100.00	0.000	0.000
					B	0.000	10.484		100.00	0.000	0.000
					C	0.000	10.484		100.00	0.000	1.904
L17 16.00-12.00	13.99	1	16.38	10.468	A	0.000	10.678	10.678	100.00	0.000	0.000
					B	0.000	10.678		100.00	0.000	0.000
					C	0.000	10.678		100.00	0.000	1.904
L18 12.00-8.00	9.99	1	16.38	10.658	A	0.000	10.871	10.871	100.00	0.000	0.000

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	Project 80' PennSummit Monopole - 345 Bushy Hill Rd., Simsbury, CT Client AT&T Mobility	Date 16:54:14 04/10/14 Designed by jrm

Section Elevation ft	z ft	K _Z	q _z psf	A _G ft ²	F a c e	A _F ft ²	A _R ft ²	A _{leg} ft ²	Leg %	C _A A _A In Face ft ²	C _A A _A Out Face ft ²
L19 8.00-4.00	5.99	1	16.38	10.848	B	0.000	10.871		100.00	0.000	0.000
					C	0.000	10.871		100.00	0.000	1.904
					A	0.000	11.065	11.065	100.00	0.000	0.000
					B	0.000	11.065		100.00	0.000	0.000
					C	0.000	11.065		100.00	0.000	1.904
L20 4.00-0.00	1.99	1	16.38	11.038	A	0.000	11.259	11.259	100.00	0.000	0.000
					B	0.000	11.259		100.00	0.000	0.000
					C	0.000	11.259		100.00	0.000	1.904

Tower Pressure - With Ice

$$G_H = 1.690$$

Section Elevation ft	z ft	K _Z	q _z psf	t _z in	A _G ft ²	F a c e	A _F ft ²	A _R ft ²	A _{leg} ft ²	Leg %	C _A A _A In Face ft ²	C _A A _A Out Face ft ²
L1 80.00-76.00	77.99	1.279	15.71	0.5000	7.762	A	0.000	7.917	7.917	100.00	0.000	0.000
						B	0.000	7.917		100.00	0.000	0.000
						C	0.000	7.917		100.00	0.000	3.504
L2 76.00-72.00	73.99	1.259	15.48	0.5000	7.952	A	0.000	8.111	8.111	100.00	0.000	0.000
						B	0.000	8.111		100.00	0.000	0.000
						C	0.000	8.111		100.00	0.000	3.504
L3 72.00-68.00	69.99	1.24	15.23	0.5000	8.142	A	0.000	8.305	8.305	100.00	0.000	0.000
						B	0.000	8.305		100.00	0.000	0.000
						C	0.000	8.305		100.00	0.000	3.504
L4 68.00-64.00	65.99	1.219	14.98	0.5000	8.332	A	0.000	8.498	8.498	100.00	0.000	0.000
						B	0.000	8.498		100.00	0.000	0.000
						C	0.000	8.498		100.00	0.000	3.504
L5 64.00-60.00	61.99	1.197	14.71	0.5000	8.522	A	0.000	8.692	8.692	100.00	0.000	0.000
						B	0.000	8.692		100.00	0.000	0.000
						C	0.000	8.692		100.00	0.000	3.504
L6 60.00-56.00	57.99	1.175	14.44	0.5000	8.712	A	0.000	8.886	8.886	100.00	0.000	0.000
						B	0.000	8.886		100.00	0.000	0.000
						C	0.000	8.886		100.00	0.000	3.504
L7 56.00-52.00	53.99	1.151	14.14	0.5000	8.902	A	0.000	9.080	9.080	100.00	0.000	0.000
						B	0.000	9.080		100.00	0.000	0.000
						C	0.000	9.080		100.00	0.000	3.504
L8 52.00-48.00	49.99	1.126	13.84	0.5000	9.092	A	0.000	9.274	9.274	100.00	0.000	0.000
						B	0.000	9.274		100.00	0.000	0.000
						C	0.000	9.274		100.00	0.000	3.504
L9 48.00-44.00	45.99	1.099	13.51	0.5000	9.282	A	0.000	9.467	9.467	100.00	0.000	0.000
						B	0.000	9.467		100.00	0.000	0.000
						C	0.000	9.467		100.00	0.000	3.504
L10 44.00-40.00	41.99	1.071	13.16	0.5000	9.472	A	0.000	9.661	9.661	100.00	0.000	0.000
						B	0.000	9.661		100.00	0.000	0.000
						C	0.000	9.661		100.00	0.000	3.504
L11 40.00-36.00	37.99	1.041	12.79	0.5000	9.662	A	0.000	9.855	9.855	100.00	0.000	0.000
						B	0.000	9.855		100.00	0.000	0.000
						C	0.000	9.855		100.00	0.000	3.504
L12 36.00-32.00	33.99	1.009	12.39	0.5000	9.852	A	0.000	10.049	10.049	100.00	0.000	0.000
						B	0.000	10.049		100.00	0.000	0.000
						C	0.000	10.049		100.00	0.000	3.504
L13 32.00-28.00	29.99	1	12.29	0.5000	10.042	A	0.000	10.243	10.243	100.00	0.000	0.000
						B	0.000	10.243		100.00	0.000	0.000
						C	0.000	10.243		100.00	0.000	3.504

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	Project 80' PennSummit Monopole - 345 Bushy Hill Rd., Simsbury, CT Client AT&T Mobility	Date 16:54:14 04/10/14 Designed by jrm

Section Elevation	z	K _Z	q _z	t _z	A _G	F a c e	A _F	A _R	A _{leg}	Leg %	C _A A _A In Face ft ²	C _A A _A Out Face ft ²
ft	ft		psf	in	ft ²		ft ²	ft ²	ft ²			
L14 28.00-24.00	25.99	1	12.29	0.5000	10.232	A	0.000	10.436	10.436	100.00	0.000	0.000
						B	0.000	10.436		100.00	0.000	0.000
						C	0.000	10.436		100.00	0.000	3.504
L15 24.00-20.00	21.99	1	12.29	0.5000	10.422	A	0.000	10.630	10.630	100.00	0.000	0.000
						B	0.000	10.630		100.00	0.000	0.000
						C	0.000	10.630		100.00	0.000	3.504
L16 20.00-16.00	17.99	1	12.29	0.5000	10.612	A	0.000	10.824	10.824	100.00	0.000	0.000
						B	0.000	10.824		100.00	0.000	0.000
						C	0.000	10.824		100.00	0.000	3.504
L17 16.00-12.00	13.99	1	12.29	0.5000	10.802	A	0.000	11.018	11.018	100.00	0.000	0.000
						B	0.000	11.018		100.00	0.000	0.000
						C	0.000	11.018		100.00	0.000	3.504
L18 12.00-8.00	9.99	1	12.29	0.5000	10.992	A	0.000	11.211	11.211	100.00	0.000	0.000
						B	0.000	11.211		100.00	0.000	0.000
						C	0.000	11.211		100.00	0.000	3.504
L19 8.00-4.00	5.99	1	12.29	0.5000	11.182	A	0.000	11.405	11.405	100.00	0.000	0.000
						B	0.000	11.405		100.00	0.000	0.000
						C	0.000	11.405		100.00	0.000	3.504
L20 4.00-0.00	1.99	1	12.29	0.5000	11.372	A	0.000	11.599	11.599	100.00	0.000	0.000
						B	0.000	11.599		100.00	0.000	0.000
						C	0.000	11.599		100.00	0.000	3.504

Tower Pressure - Service

$$G_H = 1.690$$

Section Elevation	z	K _Z	q _z	A _G	F a c e	A _F	A _R	A _{leg}	Leg %	C _A A _A In Face ft ²	C _A A _A Out Face ft ²
ft	ft		psf	ft ²		ft ²	ft ²	ft ²			
L1 80.00-76.00	77.99	1.279	8.18	7.428	A	0.000	7.577	7.577	100.00	0.000	0.000
					B	0.000	7.577		100.00	0.000	0.000
					C	0.000	7.577		100.00	0.000	1.904
L2 76.00-72.00	73.99	1.259	8.06	7.618	A	0.000	7.771	7.771	100.00	0.000	0.000
					B	0.000	7.771		100.00	0.000	0.000
					C	0.000	7.771		100.00	0.000	1.904
L3 72.00-68.00	69.99	1.24	7.93	7.808	A	0.000	7.965	7.965	100.00	0.000	0.000
					B	0.000	7.965		100.00	0.000	0.000
					C	0.000	7.965		100.00	0.000	1.904
L4 68.00-64.00	65.99	1.219	7.80	7.998	A	0.000	8.158	8.158	100.00	0.000	0.000
					B	0.000	8.158		100.00	0.000	0.000
					C	0.000	8.158		100.00	0.000	1.904
L5 64.00-60.00	61.99	1.197	7.66	8.188	A	0.000	8.352	8.352	100.00	0.000	0.000
					B	0.000	8.352		100.00	0.000	0.000
					C	0.000	8.352		100.00	0.000	1.904
L6 60.00-56.00	57.99	1.175	7.52	8.378	A	0.000	8.546	8.546	100.00	0.000	0.000
					B	0.000	8.546		100.00	0.000	0.000
					C	0.000	8.546		100.00	0.000	1.904
L7 56.00-52.00	53.99	1.151	7.37	8.568	A	0.000	8.740	8.740	100.00	0.000	0.000
					B	0.000	8.740		100.00	0.000	0.000
					C	0.000	8.740		100.00	0.000	1.904
L8 52.00-48.00	49.99	1.126	7.21	8.758	A	0.000	8.934	8.934	100.00	0.000	0.000
					B	0.000	8.934		100.00	0.000	0.000
					C	0.000	8.934		100.00	0.000	1.904
L9 48.00-44.00	45.99	1.099	7.04	8.948	A	0.000	9.127	9.127	100.00	0.000	0.000

tnxTower Centek Engineering Inc. 63-2 N. Branford Road Branford, CT 06405 Phone: (203) 488-0580 FAX: (203) 488-8587	Job	13298.000 - CT2413 w/ Prop Reinforcement	Page	14 of 42
	Project	80' PennSummit Monopole - 345 Bushy Hill Rd., Simsbury, CT	Date	16:54:14 04/10/14
	Client	AT&T Mobility	Designed by	jrm

Section Elevation ft	z ft	K _Z	q _z psf	A _G ft ²	F a c e	A _F ft ²	A _R ft ²	A _{leg} ft ²	Leg %	C _{AA} In Face ft ²	C _{AA} Out Face ft ²
L10 44.00-40.00	41.99	1.071	6.86	9.138	B	0.000	9.127		100.00	0.000	0.000
					C	0.000	9.127		100.00	0.000	1.904
					A	0.000	9.321	9.321	100.00	0.000	0.000
					B	0.000	9.321		100.00	0.000	0.000
L11 40.00-36.00	37.99	1.041	6.66	9.328	C	0.000	9.321		100.00	0.000	1.904
					A	0.000	9.515	9.515	100.00	0.000	0.000
					B	0.000	9.515		100.00	0.000	0.000
					C	0.000	9.515		100.00	0.000	1.904
L12 36.00-32.00	33.99	1.009	6.45	9.518	A	0.000	9.709	9.709	100.00	0.000	0.000
					B	0.000	9.709		100.00	0.000	0.000
					C	0.000	9.709		100.00	0.000	1.904
					A	0.000	9.902	9.902	100.00	0.000	0.000
L13 32.00-28.00	29.99	1	6.40	9.708	B	0.000	9.902		100.00	0.000	0.000
					C	0.000	9.902		100.00	0.000	1.904
					A	0.000	10.096	10.096	100.00	0.000	0.000
					B	0.000	10.096		100.00	0.000	0.000
L14 28.00-24.00	25.99	1	6.40	9.898	C	0.000	10.096		100.00	0.000	1.904
					A	0.000	10.290	10.290	100.00	0.000	0.000
					B	0.000	10.290		100.00	0.000	0.000
					C	0.000	10.290		100.00	0.000	1.904
L15 24.00-20.00	21.99	1	6.40	10.088	A	0.000	10.484	10.484	100.00	0.000	0.000
					B	0.000	10.484		100.00	0.000	0.000
					C	0.000	10.484		100.00	0.000	1.904
					A	0.000	10.678	10.678	100.00	0.000	0.000
L16 20.00-16.00	17.99	1	6.40	10.278	B	0.000	10.678		100.00	0.000	0.000
					C	0.000	10.678		100.00	0.000	1.904
					A	0.000	10.871	10.871	100.00	0.000	0.000
					B	0.000	10.871		100.00	0.000	0.000
L17 16.00-12.00	13.99	1	6.40	10.468	C	0.000	10.871		100.00	0.000	1.904
					A	0.000	11.065	11.065	100.00	0.000	0.000
					B	0.000	11.065		100.00	0.000	0.000
					C	0.000	11.065		100.00	0.000	1.904
L18 12.00-8.00	9.99	1	6.40	10.658	A	0.000	11.259	11.259	100.00	0.000	0.000
					B	0.000	11.259		100.00	0.000	0.000
					C	0.000	11.259		100.00	0.000	1.904
					A	0.000	11.259		100.00	0.000	0.000
L19 8.00-4.00	5.99	1	6.40	10.848	B	0.000	11.259		100.00	0.000	0.000
					C	0.000	11.259		100.00	0.000	1.904
					A	0.000	11.259		100.00	0.000	0.000
					B	0.000	11.259		100.00	0.000	0.000
L20 4.00-0.00	1.99	1	6.40	11.038	C	0.000	11.259		100.00	0.000	1.904
					A	0.000	11.259		100.00	0.000	0.000
					B	0.000	11.259		100.00	0.000	0.000
					C	0.000	11.259		100.00	0.000	1.904

Tower Forces - No Ice - Wind Normal To Face

Section Elevation ft	Add Weight K	Self Weight K	F a c e	e	C _F	R _R	D _F	D _R	A _E ft ²	F K	w plf	Ctrl. Face
L1 80.00-76.00	0.04	0.69	A	1	0.65	1	1	1	7.577	0.24	60.44	C
			B	1	0.65	1	1	1	7.577			
			C	1	0.65	1	1	1	7.577			
L2 76.00-72.00	0.06	0.69	A	1	0.65	1	1	1	7.771	0.24	60.64	C
			B	1	0.65	1	1	1	7.771			
			C	1	0.65	1	1	1	7.771			
L3 72.00-68.00	0.07	0.69	A	1	0.65	1	1	1	7.965	0.24	60.76	C
			B	1	0.65	1	1	1	7.965			
			C	1	0.65	1	1	1	7.965			
L4 68.00-64.00	0.09	0.69	A	1	0.65	1	1	1	8.158	0.24	60.81	C
			B	1	0.65	1	1	1	8.158			
			C	1	0.65	1	1	1	8.158			
L5 64.00-60.00	0.09	0.70	A	1	0.65	1	1	1	8.352	0.24	60.78	C
			B	1	0.65	1	1	1	8.352			
			C	1	0.65	1	1	1	8.352			

<i>tnxTower</i> Centek Engineering Inc. 63-2 N. Branford Road Branford, CT 06405 Phone: (203) 488-0580 FAX: (203) 488-8587	Job	Page
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	Project 80' PennSummit Monopole - 345 Bushy Hill Rd., Simsbury, CT Client AT&T Mobility	Date 16:54:14 04/10/14 Designed by jrm

Section Elevation	Add Weight	Self Weight	F a c e	e	C _F	R _R	D _F	D _R	A _E	F	w	Ctrl. Face
ft	K	K							ft ²	K	plf	
L6 60.00-56.00	0.09	0.94	A	1	0.65	1	1	1	8.546	0.24	60.66	C
			B	1	0.65	1	1	1	8.546			
			C	1	0.65	1	1	1	8.546			
L7 56.00-52.00	0.09	0.94	A	1	0.65	1	1	1	8.740	0.24	60.43	C
			B	1	0.65	1	1	1	8.740			
			C	1	0.65	1	1	1	8.740			
L8 52.00-48.00	0.09	0.94	A	1	0.65	1	1	1	8.934	0.24	60.10	C
			B	1	0.65	1	1	1	8.934			
			C	1	0.65	1	1	1	8.934			
L9 48.00-44.00	0.09	1.02	A	1	0.65	1	1	1	9.127	0.24	59.65	C
			B	1	0.65	1	1	1	9.127			
			C	1	0.65	1	1	1	9.127			
L10 44.00-40.00	0.09	1.22	A	1	0.65	1	1	1	9.321	0.24	59.05	C
			B	1	0.65	1	1	1	9.321			
			C	1	0.65	1	1	1	9.321			
L11 40.00-36.00	0.09	1.22	A	1	0.65	1	1	1	9.515	0.23	58.29	C
			B	1	0.65	1	1	1	9.515			
			C	1	0.65	1	1	1	9.515			
L12 36.00-32.00	0.09	1.22	A	1	0.65	1	1	1	9.709	0.23	57.35	C
			B	1	0.65	1	1	1	9.709			
			C	1	0.65	1	1	1	9.709			
L13 32.00-28.00	0.09	1.23	A	1	0.65	1	1	1	9.902	0.23	57.74	C
			B	1	0.65	1	1	1	9.902			
			C	1	0.65	1	1	1	9.902			
L14 28.00-24.00	0.09	1.23	A	1	0.65	1	1	1	10.096	0.23	58.61	C
			B	1	0.65	1	1	1	10.096			
			C	1	0.65	1	1	1	10.096			
L15 24.00-20.00	0.09	1.23	A	1	0.65	1	1	1	10.290	0.24	59.48	C
			B	1	0.65	1	1	1	10.290			
			C	1	0.65	1	1	1	10.290			
L16 20.00-16.00	0.09	1.23	A	1	0.65	1	1	1	10.484	0.24	60.35	C
			B	1	0.65	1	1	1	10.484			
			C	1	0.65	1	1	1	10.484			
L17 16.00-12.00	0.09	1.03	A	1	0.65	1	1	1	10.678	0.24	61.22	C
			B	1	0.65	1	1	1	10.678			
			C	1	0.65	1	1	1	10.678			
L18 12.00-8.00	0.09	1.04	A	1	0.65	1	1	1	10.871	0.25	62.10	C
			B	1	0.65	1	1	1	10.871			
			C	1	0.65	1	1	1	10.871			
L19 8.00-4.00	0.09	1.04	A	1	0.65	1	1	1	11.065	0.25	62.97	C
			B	1	0.65	1	1	1	11.065			
			C	1	0.65	1	1	1	11.065			
L20 4.00-0.00	0.09	1.05	A	1	0.65	1	1	1	11.259	0.26	63.84	C
			B	1	0.65	1	1	1	11.259			
			C	1	0.65	1	1	1	11.259			
Sum Weight:	1.63	20.06						OTM	192.15 kip-ft	4.82		

Tower Forces - No Ice - Wind 60 To Face

Section Elevation	Add Weight	Self Weight	F a c e	e	C _F	R _R	D _F	D _R	A _E	F	w	Ctrl. Face
ft	K	K							ft ²	K	plf	
L1 80.00-76.00	0.04	0.69	A	1	0.65	1	1	1	7.577	0.24	60.44	C
			B	1	0.65	1	1	1	7.577			

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	Project 80' PennSummit Monopole - 345 Bushy Hill Rd., Simsbury, CT	Date 16:54:14 04/10/14
	Client AT&T Mobility	Designed by jrm

Section Elevation	Add Weight	Self Weight	F a c e	e	C _F	R _R	D _F	D _R	A _E	F	w	Ctrl. Face
ft	K	K							ft ²	K	plf	
L2	0.06	0.69	C	1	0.65	1	1	1	7.577			
76.00-72.00			A	1	0.65	1	1	1	7.771	0.24	60.64	C
			B	1	0.65	1	1	1	7.771			
			C	1	0.65	1	1	1	7.771			
L3	0.07	0.69	A	1	0.65	1	1	1	7.965	0.24	60.76	C
72.00-68.00			B	1	0.65	1	1	1	7.965			
			C	1	0.65	1	1	1	7.965			
L4	0.09	0.69	A	1	0.65	1	1	1	8.158	0.24	60.81	C
68.00-64.00			B	1	0.65	1	1	1	8.158			
			C	1	0.65	1	1	1	8.158			
L5	0.09	0.70	A	1	0.65	1	1	1	8.352	0.24	60.78	C
64.00-60.00			B	1	0.65	1	1	1	8.352			
			C	1	0.65	1	1	1	8.352			
L6	0.09	0.94	A	1	0.65	1	1	1	8.546	0.24	60.66	C
60.00-56.00			B	1	0.65	1	1	1	8.546			
			C	1	0.65	1	1	1	8.546			
L7	0.09	0.94	A	1	0.65	1	1	1	8.740	0.24	60.43	C
56.00-52.00			B	1	0.65	1	1	1	8.740			
			C	1	0.65	1	1	1	8.740			
L8	0.09	0.94	A	1	0.65	1	1	1	8.934	0.24	60.10	C
52.00-48.00			B	1	0.65	1	1	1	8.934			
			C	1	0.65	1	1	1	8.934			
L9	0.09	1.02	A	1	0.65	1	1	1	9.127	0.24	59.65	C
48.00-44.00			B	1	0.65	1	1	1	9.127			
			C	1	0.65	1	1	1	9.127			
L10	0.09	1.22	A	1	0.65	1	1	1	9.321	0.24	59.05	C
44.00-40.00			B	1	0.65	1	1	1	9.321			
			C	1	0.65	1	1	1	9.321			
L11	0.09	1.22	A	1	0.65	1	1	1	9.515	0.23	58.29	C
40.00-36.00			B	1	0.65	1	1	1	9.515			
			C	1	0.65	1	1	1	9.515			
L12	0.09	1.22	A	1	0.65	1	1	1	9.709	0.23	57.35	C
36.00-32.00			B	1	0.65	1	1	1	9.709			
			C	1	0.65	1	1	1	9.709			
L13	0.09	1.23	A	1	0.65	1	1	1	9.902	0.23	57.74	C
32.00-28.00			B	1	0.65	1	1	1	9.902			
			C	1	0.65	1	1	1	9.902			
L14	0.09	1.23	A	1	0.65	1	1	1	10.096	0.23	58.61	C
28.00-24.00			B	1	0.65	1	1	1	10.096			
			C	1	0.65	1	1	1	10.096			
L15	0.09	1.23	A	1	0.65	1	1	1	10.290	0.24	59.48	C
24.00-20.00			B	1	0.65	1	1	1	10.290			
			C	1	0.65	1	1	1	10.290			
L16	0.09	1.23	A	1	0.65	1	1	1	10.484	0.24	60.35	C
20.00-16.00			B	1	0.65	1	1	1	10.484			
			C	1	0.65	1	1	1	10.484			
L17	0.09	1.03	A	1	0.65	1	1	1	10.678	0.24	61.22	C
16.00-12.00			B	1	0.65	1	1	1	10.678			
			C	1	0.65	1	1	1	10.678			
L18	0.09	1.04	A	1	0.65	1	1	1	10.871	0.25	62.10	C
12.00-8.00			B	1	0.65	1	1	1	10.871			
			C	1	0.65	1	1	1	10.871			
L19 8.00-4.00	0.09	1.04	A	1	0.65	1	1	1	11.065	0.25	62.97	C
			B	1	0.65	1	1	1	11.065			
			C	1	0.65	1	1	1	11.065			
L20 4.00-0.00	0.09	1.05	A	1	0.65	1	1	1	11.259	0.26	63.84	C
			B	1	0.65	1	1	1	11.259			
			C	1	0.65	1	1	1	11.259			
Sum Weight:	1.63	20.06						OTM	192.15 kip-ft	4.82		

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	Project 80' PennSummit Monopole - 345 Bushy Hill Rd., Simsbury, CT	Date 16:54:14 04/10/14
	Client AT&T Mobility	Designed by jrm

Tower Forces - No Ice - Wind 90 To Face

Section Elevation	Add Weight	Self Weight	F a c e	e	C _F	R _R	D _F	D _R	A _E	F	w	Ctrl. Face
ft	K	K							ft ²	K	plf	
L1 80.00-76.00	0.04	0.69	A	1	0.65	1	1	1	7.577	0.24	60.44	C
			B	1	0.65	1	1	1	7.577			
			C	1	0.65	1	1	1	7.577			
L2 76.00-72.00	0.06	0.69	A	1	0.65	1	1	1	7.771	0.24	60.64	C
			B	1	0.65	1	1	1	7.771			
			C	1	0.65	1	1	1	7.771			
L3 72.00-68.00	0.07	0.69	A	1	0.65	1	1	1	7.965	0.24	60.76	C
			B	1	0.65	1	1	1	7.965			
			C	1	0.65	1	1	1	7.965			
L4 68.00-64.00	0.09	0.69	A	1	0.65	1	1	1	8.158	0.24	60.81	C
			B	1	0.65	1	1	1	8.158			
			C	1	0.65	1	1	1	8.158			
L5 64.00-60.00	0.09	0.70	A	1	0.65	1	1	1	8.352	0.24	60.78	C
			B	1	0.65	1	1	1	8.352			
			C	1	0.65	1	1	1	8.352			
L6 60.00-56.00	0.09	0.94	A	1	0.65	1	1	1	8.546	0.24	60.66	C
			B	1	0.65	1	1	1	8.546			
			C	1	0.65	1	1	1	8.546			
L7 56.00-52.00	0.09	0.94	A	1	0.65	1	1	1	8.740	0.24	60.43	C
			B	1	0.65	1	1	1	8.740			
			C	1	0.65	1	1	1	8.740			
L8 52.00-48.00	0.09	0.94	A	1	0.65	1	1	1	8.934	0.24	60.10	C
			B	1	0.65	1	1	1	8.934			
			C	1	0.65	1	1	1	8.934			
L9 48.00-44.00	0.09	1.02	A	1	0.65	1	1	1	9.127	0.24	59.65	C
			B	1	0.65	1	1	1	9.127			
			C	1	0.65	1	1	1	9.127			
L10 44.00-40.00	0.09	1.22	A	1	0.65	1	1	1	9.321	0.24	59.05	C
			B	1	0.65	1	1	1	9.321			
			C	1	0.65	1	1	1	9.321			
L11 40.00-36.00	0.09	1.22	A	1	0.65	1	1	1	9.515	0.23	58.29	C
			B	1	0.65	1	1	1	9.515			
			C	1	0.65	1	1	1	9.515			
L12 36.00-32.00	0.09	1.22	A	1	0.65	1	1	1	9.709	0.23	57.35	C
			B	1	0.65	1	1	1	9.709			
			C	1	0.65	1	1	1	9.709			
L13 32.00-28.00	0.09	1.23	A	1	0.65	1	1	1	9.902	0.23	57.74	C
			B	1	0.65	1	1	1	9.902			
			C	1	0.65	1	1	1	9.902			
L14 28.00-24.00	0.09	1.23	A	1	0.65	1	1	1	10.096	0.23	58.61	C
			B	1	0.65	1	1	1	10.096			
			C	1	0.65	1	1	1	10.096			
L15 24.00-20.00	0.09	1.23	A	1	0.65	1	1	1	10.290	0.24	59.48	C
			B	1	0.65	1	1	1	10.290			
			C	1	0.65	1	1	1	10.290			
L16 20.00-16.00	0.09	1.23	A	1	0.65	1	1	1	10.484	0.24	60.35	C
			B	1	0.65	1	1	1	10.484			
			C	1	0.65	1	1	1	10.484			
L17 16.00-12.00	0.09	1.03	A	1	0.65	1	1	1	10.678	0.24	61.22	C
			B	1	0.65	1	1	1	10.678			
			C	1	0.65	1	1	1	10.678			
L18 12.00-8.00	0.09	1.04	A	1	0.65	1	1	1	10.871	0.25	62.10	C
			B	1	0.65	1	1	1	10.871			

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	Project 80' PennSummit Monopole - 345 Bushy Hill Rd., Simsbury, CT	Date 16:54:14 04/10/14
	Client AT&T Mobility	Designed by jrm

Section Elevation	Add Weight	Self Weight	F a c e	e	C _F	R _R	D _F	D _R	A _E	F	w	Ctrl. Face
ft	K	K							ft ²	K	plf	
L19 8.00-4.00	0.09	1.04	C	1	0.65	1	1	1	10.871			
			A	1	0.65	1	1	1	11.065	0.25	62.97	C
			B	1	0.65	1	1	1	11.065			
			C	1	0.65	1	1	1	11.065			
L20 4.00-0.00	0.09	1.05	A	1	0.65	1	1	1	11.259	0.26	63.84	C
			B	1	0.65	1	1	1	11.259			
			C	1	0.65	1	1	1	11.259			
Sum Weight:	1.63	20.06						OTM	192.15 kip-ft	4.82		

Tower Forces - With Ice - Wind Normal To Face

Section Elevation	Add Weight	Self Weight	F a c e	e	C _F	R _R	D _F	D _R	A _E	F	w	Ctrl. Face
ft	K	K							ft ²	K	plf	
L1	0.08	0.74	A	1	0.65	1	1	1	7.917	0.23	57.42	C
80.00-76.00			B	1	0.65	1	1	1	7.917			
			C	1	0.65	1	1	1	7.917			
L2	0.09	0.75	A	1	0.65	1	1	1	8.111	0.23	57.38	C
76.00-72.00			B	1	0.65	1	1	1	8.111			
			C	1	0.65	1	1	1	8.111			
L3	0.11	0.75	A	1	0.65	1	1	1	8.305	0.23	57.29	C
72.00-68.00			B	1	0.65	1	1	1	8.305			
			C	1	0.65	1	1	1	8.305			
L4	0.12	0.75	A	1	0.65	1	1	1	8.498	0.23	57.13	C
68.00-64.00			B	1	0.65	1	1	1	8.498			
			C	1	0.65	1	1	1	8.498			
L5	0.12	0.76	A	1	0.65	1	1	1	8.692	0.23	56.90	C
64.00-60.00			B	1	0.65	1	1	1	8.692			
			C	1	0.65	1	1	1	8.692			
L6	0.12	1.00	A	1	0.65	1	1	1	8.886	0.23	56.60	C
60.00-56.00			B	1	0.65	1	1	1	8.886			
			C	1	0.65	1	1	1	8.886			
L7	0.12	1.01	A	1	0.65	1	1	1	9.080	0.22	56.21	C
56.00-52.00			B	1	0.65	1	1	1	9.080			
			C	1	0.65	1	1	1	9.080			
L8	0.12	1.01	A	1	0.65	1	1	1	9.274	0.22	55.72	C
52.00-48.00			B	1	0.65	1	1	1	9.274			
			C	1	0.65	1	1	1	9.274			
L9	0.12	1.09	A	1	0.65	1	1	1	9.467	0.22	55.13	C
48.00-44.00			B	1	0.65	1	1	1	9.467			
			C	1	0.65	1	1	1	9.467			
L10	0.12	1.29	A	1	0.65	1	1	1	9.661	0.22	54.41	C
44.00-40.00			B	1	0.65	1	1	1	9.661			
			C	1	0.65	1	1	1	9.661			
L11	0.12	1.29	A	1	0.65	1	1	1	9.855	0.21	53.56	C
40.00-36.00			B	1	0.65	1	1	1	9.855			
			C	1	0.65	1	1	1	9.855			
L12	0.12	1.30	A	1	0.65	1	1	1	10.049	0.21	52.55	C
36.00-32.00			B	1	0.65	1	1	1	10.049			
			C	1	0.65	1	1	1	10.049			
L13	0.12	1.30	A	1	0.65	1	1	1	10.243	0.21	52.76	C
32.00-28.00			B	1	0.65	1	1	1	10.243			
			C	1	0.65	1	1	1	10.243			
L14	0.12	1.30	A	1	0.65	1	1	1	10.436	0.21	53.41	C

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	Project 80' PennSummit Monopole - 345 Bushy Hill Rd., Simsbury, CT Client AT&T Mobility	Date 16:54:14 04/10/14 Designed by jrm

Section Elevation	Add Weight	Self Weight	F a c e	e	C _F	R _R	D _F	D _R	A _E	F	w	Ctrl. Face
ft	K	K							ft ²	K	plf	
28.00-24.00			B	1	0.65	1	1	1	10.436			
			C	1	0.65	1	1	1	10.436			
L15	0.12	1.31	A	1	0.65	1	1	1	10.630	0.22	54.06	C
24.00-20.00			B	1	0.65	1	1	1	10.630			
			C	1	0.65	1	1	1	10.630			
L16	0.12	1.31	A	1	0.65	1	1	1	10.824	0.22	54.72	C
20.00-16.00			B	1	0.65	1	1	1	10.824			
			C	1	0.65	1	1	1	10.824			
L17	0.12	1.11	A	1	0.65	1	1	1	11.018	0.22	55.37	C
16.00-12.00			B	1	0.65	1	1	1	11.018			
			C	1	0.65	1	1	1	11.018			
L18	0.12	1.12	A	1	0.65	1	1	1	11.211	0.22	56.03	C
12.00-8.00			B	1	0.65	1	1	1	11.211			
			C	1	0.65	1	1	1	11.211			
L19 8.00-4.00	0.12	1.12	A	1	0.65	1	1	1	11.405	0.23	56.68	C
			B	1	0.65	1	1	1	11.405			
			C	1	0.65	1	1	1	11.405			
L20 4.00-0.00	0.12	1.13	A	1	0.65	1	1	1	11.599	0.23	57.33	C
			B	1	0.65	1	1	1	11.599			
			C	1	0.65	1	1	1	11.599			
Sum Weight:	2.32	21.45						OTM	178.84 kip-ft	4.44		

Tower Forces - With Ice - Wind 60 To Face

Section Elevation	Add Weight	Self Weight	F a c e	e	C _F	R _R	D _F	D _R	A _E	F	w	Ctrl. Face
ft	K	K							ft ²	K	plf	
L1	0.08	0.74	A	1	0.65	1	1	1	7.917	0.23	57.42	C
80.00-76.00			B	1	0.65	1	1	1	7.917			
			C	1	0.65	1	1	1	7.917			
L2	0.09	0.75	A	1	0.65	1	1	1	8.111	0.23	57.38	C
76.00-72.00			B	1	0.65	1	1	1	8.111			
			C	1	0.65	1	1	1	8.111			
L3	0.11	0.75	A	1	0.65	1	1	1	8.305	0.23	57.29	C
72.00-68.00			B	1	0.65	1	1	1	8.305			
			C	1	0.65	1	1	1	8.305			
L4	0.12	0.75	A	1	0.65	1	1	1	8.498	0.23	57.13	C
68.00-64.00			B	1	0.65	1	1	1	8.498			
			C	1	0.65	1	1	1	8.498			
L5	0.12	0.76	A	1	0.65	1	1	1	8.692	0.23	56.90	C
64.00-60.00			B	1	0.65	1	1	1	8.692			
			C	1	0.65	1	1	1	8.692			
L6	0.12	1.00	A	1	0.65	1	1	1	8.886	0.23	56.60	C
60.00-56.00			B	1	0.65	1	1	1	8.886			
			C	1	0.65	1	1	1	8.886			
L7	0.12	1.01	A	1	0.65	1	1	1	9.080	0.22	56.21	C
56.00-52.00			B	1	0.65	1	1	1	9.080			
			C	1	0.65	1	1	1	9.080			
L8	0.12	1.01	A	1	0.65	1	1	1	9.274	0.22	55.72	C
52.00-48.00			B	1	0.65	1	1	1	9.274			
			C	1	0.65	1	1	1	9.274			
L9	0.12	1.09	A	1	0.65	1	1	1	9.467	0.22	55.13	C
48.00-44.00			B	1	0.65	1	1	1	9.467			
			C	1	0.65	1	1	1	9.467			

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	Project 80' PennSummit Monopole - 345 Bushy Hill Rd., Simsbury, CT Client AT&T Mobility	Date 16:54:14 04/10/14 Designed by jrm

Section Elevation	Add Weight	Self Weight	F a c e	e	C _F	R _R	D _F	D _R	A _E	F	w	Ctrl. Face
ft	K	K							ft ²	K	plf	
L10 44.00-40.00	0.12	1.29	A	1	0.65	1	1	1	9.661	0.22	54.41	C
			B	1	0.65	1	1	1	9.661			
			C	1	0.65	1	1	1	9.661			
L11 40.00-36.00	0.12	1.29	A	1	0.65	1	1	1	9.855	0.21	53.56	C
			B	1	0.65	1	1	1	9.855			
			C	1	0.65	1	1	1	9.855			
L12 36.00-32.00	0.12	1.30	A	1	0.65	1	1	1	10.049	0.21	52.55	C
			B	1	0.65	1	1	1	10.049			
			C	1	0.65	1	1	1	10.049			
L13 32.00-28.00	0.12	1.30	A	1	0.65	1	1	1	10.243	0.21	52.76	C
			B	1	0.65	1	1	1	10.243			
			C	1	0.65	1	1	1	10.243			
L14 28.00-24.00	0.12	1.30	A	1	0.65	1	1	1	10.436	0.21	53.41	C
			B	1	0.65	1	1	1	10.436			
			C	1	0.65	1	1	1	10.436			
L15 24.00-20.00	0.12	1.31	A	1	0.65	1	1	1	10.630	0.22	54.06	C
			B	1	0.65	1	1	1	10.630			
			C	1	0.65	1	1	1	10.630			
L16 20.00-16.00	0.12	1.31	A	1	0.65	1	1	1	10.824	0.22	54.72	C
			B	1	0.65	1	1	1	10.824			
			C	1	0.65	1	1	1	10.824			
L17 16.00-12.00	0.12	1.11	A	1	0.65	1	1	1	11.018	0.22	55.37	C
			B	1	0.65	1	1	1	11.018			
			C	1	0.65	1	1	1	11.018			
L18 12.00-8.00	0.12	1.12	A	1	0.65	1	1	1	11.211	0.22	56.03	C
			B	1	0.65	1	1	1	11.211			
			C	1	0.65	1	1	1	11.211			
L19 8.00-4.00	0.12	1.12	A	1	0.65	1	1	1	11.405	0.23	56.68	C
			B	1	0.65	1	1	1	11.405			
			C	1	0.65	1	1	1	11.405			
L20 4.00-0.00	0.12	1.13	A	1	0.65	1	1	1	11.599	0.23	57.33	C
			B	1	0.65	1	1	1	11.599			
			C	1	0.65	1	1	1	11.599			
Sum Weight:	2.32	21.45						OTM	178.84 kip-ft	4.44		

Tower Forces - With Ice - Wind 90 To Face

Section Elevation	Add Weight	Self Weight	F a c e	e	C _F	R _R	D _F	D _R	A _E	F	w	Ctrl. Face
ft	K	K							ft ²	K	plf	
L1 80.00-76.00	0.08	0.74	A	1	0.65	1	1	1	7.917	0.23	57.42	C
			B	1	0.65	1	1	1	7.917			
			C	1	0.65	1	1	1	7.917			
L2 76.00-72.00	0.09	0.75	A	1	0.65	1	1	1	8.111	0.23	57.38	C
			B	1	0.65	1	1	1	8.111			
			C	1	0.65	1	1	1	8.111			
L3 72.00-68.00	0.11	0.75	A	1	0.65	1	1	1	8.305	0.23	57.29	C
			B	1	0.65	1	1	1	8.305			
			C	1	0.65	1	1	1	8.305			
L4 68.00-64.00	0.12	0.75	A	1	0.65	1	1	1	8.498	0.23	57.13	C
			B	1	0.65	1	1	1	8.498			
			C	1	0.65	1	1	1	8.498			
L5 64.00-60.00	0.12	0.76	A	1	0.65	1	1	1	8.692	0.23	56.90	C
			B	1	0.65	1	1	1	8.692			

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	Project 80' PennSummit Monopole - 345 Bushy Hill Rd., Simsbury, CT Client AT&T Mobility	Date 16:54:14 04/10/14 Designed by jrm

Section Elevation	Add Weight	Self Weight	F a c e	e	C _F	R _R	D _F	D _R	A _E	F	w	Ctrl. Face
ft	K	K							ft ²	K	plf	
L6	0.12	1.00	C	1	0.65	1	1	1	8.692			
60.00-56.00			A	1	0.65	1	1	1	8.886	0.23	56.60	C
			B	1	0.65	1	1	1	8.886			
			C	1	0.65	1	1	1	8.886			
L7	0.12	1.01	A	1	0.65	1	1	1	9.080	0.22	56.21	C
56.00-52.00			B	1	0.65	1	1	1	9.080			
			C	1	0.65	1	1	1	9.080			
L8	0.12	1.01	A	1	0.65	1	1	1	9.274	0.22	55.72	C
52.00-48.00			B	1	0.65	1	1	1	9.274			
			C	1	0.65	1	1	1	9.274			
L9	0.12	1.09	A	1	0.65	1	1	1	9.467	0.22	55.13	C
48.00-44.00			B	1	0.65	1	1	1	9.467			
			C	1	0.65	1	1	1	9.467			
L10	0.12	1.29	A	1	0.65	1	1	1	9.661	0.22	54.41	C
44.00-40.00			B	1	0.65	1	1	1	9.661			
			C	1	0.65	1	1	1	9.661			
L11	0.12	1.29	A	1	0.65	1	1	1	9.855	0.21	53.56	C
40.00-36.00			B	1	0.65	1	1	1	9.855			
			C	1	0.65	1	1	1	9.855			
L12	0.12	1.30	A	1	0.65	1	1	1	10.049	0.21	52.55	C
36.00-32.00			B	1	0.65	1	1	1	10.049			
			C	1	0.65	1	1	1	10.049			
L13	0.12	1.30	A	1	0.65	1	1	1	10.243	0.21	52.76	C
32.00-28.00			B	1	0.65	1	1	1	10.243			
			C	1	0.65	1	1	1	10.243			
L14	0.12	1.30	A	1	0.65	1	1	1	10.436	0.21	53.41	C
28.00-24.00			B	1	0.65	1	1	1	10.436			
			C	1	0.65	1	1	1	10.436			
L15	0.12	1.31	A	1	0.65	1	1	1	10.630	0.22	54.06	C
24.00-20.00			B	1	0.65	1	1	1	10.630			
			C	1	0.65	1	1	1	10.630			
L16	0.12	1.31	A	1	0.65	1	1	1	10.824	0.22	54.72	C
20.00-16.00			B	1	0.65	1	1	1	10.824			
			C	1	0.65	1	1	1	10.824			
L17	0.12	1.11	A	1	0.65	1	1	1	11.018	0.22	55.37	C
16.00-12.00			B	1	0.65	1	1	1	11.018			
			C	1	0.65	1	1	1	11.018			
L18	0.12	1.12	A	1	0.65	1	1	1	11.211	0.22	56.03	C
12.00-8.00			B	1	0.65	1	1	1	11.211			
			C	1	0.65	1	1	1	11.211			
L19 8.00-4.00	0.12	1.12	A	1	0.65	1	1	1	11.405	0.23	56.68	C
			B	1	0.65	1	1	1	11.405			
			C	1	0.65	1	1	1	11.405			
L20 4.00-0.00	0.12	1.13	A	1	0.65	1	1	1	11.599	0.23	57.33	C
			B	1	0.65	1	1	1	11.599			
			C	1	0.65	1	1	1	11.599			
Sum Weight:	2.32	21.45						OTM	178.84 kip-ft	4.44		

Tower Forces - Service - Wind Normal To Face

Section Elevation	Add Weight	Self Weight	F a c e	e	C _F	R _R	D _F	D _R	A _E	F	w	Ctrl. Face
ft	K	K							ft ²	K	plf	
L1	0.04	0.69	A	1	0.65	1	1	1	7.577	0.09	23.61	C

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	Project 80' PennSummit Monopole - 345 Bushy Hill Rd., Simsbury, CT Client AT&T Mobility	Date 16:54:14 04/10/14 Designed by jrm

Section Elevation	Add Weight	Self Weight	F a c e	e	C _F	R _R	D _F	D _R	A _E	F	w	Ctrl. Face
ft	K	K							ft ²	K	plf	
80.00-76.00			B	1	0.65	1	1	1	7.577			
			C	1	0.65	1	1	1	7.577			
L2	0.06	0.69	A	1	0.65	1	1	1	7.771	0.09	23.69	C
76.00-72.00			B	1	0.65	1	1	1	7.771			
			C	1	0.65	1	1	1	7.771			
L3	0.07	0.69	A	1	0.65	1	1	1	7.965	0.09	23.74	C
72.00-68.00			B	1	0.65	1	1	1	7.965			
			C	1	0.65	1	1	1	7.965			
L4	0.09	0.69	A	1	0.65	1	1	1	8.158	0.10	23.75	C
68.00-64.00			B	1	0.65	1	1	1	8.158			
			C	1	0.65	1	1	1	8.158			
L5	0.09	0.70	A	1	0.65	1	1	1	8.352	0.09	23.74	C
64.00-60.00			B	1	0.65	1	1	1	8.352			
			C	1	0.65	1	1	1	8.352			
L6	0.09	0.94	A	1	0.65	1	1	1	8.546	0.09	23.69	C
60.00-56.00			B	1	0.65	1	1	1	8.546			
			C	1	0.65	1	1	1	8.546			
L7	0.09	0.94	A	1	0.65	1	1	1	8.740	0.09	23.61	C
56.00-52.00			B	1	0.65	1	1	1	8.740			
			C	1	0.65	1	1	1	8.740			
L8	0.09	0.94	A	1	0.65	1	1	1	8.934	0.09	23.48	C
52.00-48.00			B	1	0.65	1	1	1	8.934			
			C	1	0.65	1	1	1	8.934			
L9	0.09	1.02	A	1	0.65	1	1	1	9.127	0.09	23.30	C
48.00-44.00			B	1	0.65	1	1	1	9.127			
			C	1	0.65	1	1	1	9.127			
L10	0.09	1.22	A	1	0.65	1	1	1	9.321	0.09	23.07	C
44.00-40.00			B	1	0.65	1	1	1	9.321			
			C	1	0.65	1	1	1	9.321			
L11	0.09	1.22	A	1	0.65	1	1	1	9.515	0.09	22.77	C
40.00-36.00			B	1	0.65	1	1	1	9.515			
			C	1	0.65	1	1	1	9.515			
L12	0.09	1.22	A	1	0.65	1	1	1	9.709	0.09	22.40	C
36.00-32.00			B	1	0.65	1	1	1	9.709			
			C	1	0.65	1	1	1	9.709			
L13	0.09	1.23	A	1	0.65	1	1	1	9.902	0.09	22.55	C
32.00-28.00			B	1	0.65	1	1	1	9.902			
			C	1	0.65	1	1	1	9.902			
L14	0.09	1.23	A	1	0.65	1	1	1	10.096	0.09	22.89	C
28.00-24.00			B	1	0.65	1	1	1	10.096			
			C	1	0.65	1	1	1	10.096			
L15	0.09	1.23	A	1	0.65	1	1	1	10.290	0.09	23.23	C
24.00-20.00			B	1	0.65	1	1	1	10.290			
			C	1	0.65	1	1	1	10.290			
L16	0.09	1.23	A	1	0.65	1	1	1	10.484	0.09	23.57	C
20.00-16.00			B	1	0.65	1	1	1	10.484			
			C	1	0.65	1	1	1	10.484			
L17	0.09	1.03	A	1	0.65	1	1	1	10.678	0.10	23.92	C
16.00-12.00			B	1	0.65	1	1	1	10.678			
			C	1	0.65	1	1	1	10.678			
L18	0.09	1.04	A	1	0.65	1	1	1	10.871	0.10	24.26	C
12.00-8.00			B	1	0.65	1	1	1	10.871			
			C	1	0.65	1	1	1	10.871			
L19 8.00-4.00	0.09	1.04	A	1	0.65	1	1	1	11.065	0.10	24.60	C
			B	1	0.65	1	1	1	11.065			
			C	1	0.65	1	1	1	11.065			
L20 4.00-0.00	0.09	1.05	A	1	0.65	1	1	1	11.259	0.10	24.94	C
			B	1	0.65	1	1	1	11.259			
			C	1	0.65	1	1	1	11.259			
Sum Weight:	1.63	20.06						OTM	75.06	1.88		

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	Project 80' PennSummit Monopole - 345 Bushy Hill Rd., Simsbury, CT Client AT&T Mobility	Date 16:54:14 04/10/14 Designed by jrm

Section Elevation	Add Weight	Self Weight	F a c e	e	C _F	R _R	D _F	D _R	A _E	F	w	Ctrl. Face
ft	K	K							ft ²	K	plf	
									kip-ft			

Tower Forces - Service - Wind 60 To Face

Section Elevation	Add Weight	Self Weight	F a c e	e	C _F	R _R	D _F	D _R	A _E	F	w	Ctrl. Face
ft	K	K							ft ²	K	plf	
L1	0.04	0.69	A	1	0.65	1	1	1	7.577	0.09	23.61	C
80.00-76.00			B	1	0.65	1	1	1	7.577			
			C	1	0.65	1	1	1	7.577			
L2	0.06	0.69	A	1	0.65	1	1	1	7.771	0.09	23.69	C
76.00-72.00			B	1	0.65	1	1	1	7.771			
			C	1	0.65	1	1	1	7.771			
L3	0.07	0.69	A	1	0.65	1	1	1	7.965	0.09	23.74	C
72.00-68.00			B	1	0.65	1	1	1	7.965			
			C	1	0.65	1	1	1	7.965			
L4	0.09	0.69	A	1	0.65	1	1	1	8.158	0.10	23.75	C
68.00-64.00			B	1	0.65	1	1	1	8.158			
			C	1	0.65	1	1	1	8.158			
L5	0.09	0.70	A	1	0.65	1	1	1	8.352	0.09	23.74	C
64.00-60.00			B	1	0.65	1	1	1	8.352			
			C	1	0.65	1	1	1	8.352			
L6	0.09	0.94	A	1	0.65	1	1	1	8.546	0.09	23.69	C
60.00-56.00			B	1	0.65	1	1	1	8.546			
			C	1	0.65	1	1	1	8.546			
L7	0.09	0.94	A	1	0.65	1	1	1	8.740	0.09	23.61	C
56.00-52.00			B	1	0.65	1	1	1	8.740			
			C	1	0.65	1	1	1	8.740			
L8	0.09	0.94	A	1	0.65	1	1	1	8.934	0.09	23.48	C
52.00-48.00			B	1	0.65	1	1	1	8.934			
			C	1	0.65	1	1	1	8.934			
L9	0.09	1.02	A	1	0.65	1	1	1	9.127	0.09	23.30	C
48.00-44.00			B	1	0.65	1	1	1	9.127			
			C	1	0.65	1	1	1	9.127			
L10	0.09	1.22	A	1	0.65	1	1	1	9.321	0.09	23.07	C
44.00-40.00			B	1	0.65	1	1	1	9.321			
			C	1	0.65	1	1	1	9.321			
L11	0.09	1.22	A	1	0.65	1	1	1	9.515	0.09	22.77	C
40.00-36.00			B	1	0.65	1	1	1	9.515			
			C	1	0.65	1	1	1	9.515			
L12	0.09	1.22	A	1	0.65	1	1	1	9.709	0.09	22.40	C
36.00-32.00			B	1	0.65	1	1	1	9.709			
			C	1	0.65	1	1	1	9.709			
L13	0.09	1.23	A	1	0.65	1	1	1	9.902	0.09	22.55	C
32.00-28.00			B	1	0.65	1	1	1	9.902			
			C	1	0.65	1	1	1	9.902			
L14	0.09	1.23	A	1	0.65	1	1	1	10.096	0.09	22.89	C
28.00-24.00			B	1	0.65	1	1	1	10.096			
			C	1	0.65	1	1	1	10.096			
L15	0.09	1.23	A	1	0.65	1	1	1	10.290	0.09	23.23	C
24.00-20.00			B	1	0.65	1	1	1	10.290			
			C	1	0.65	1	1	1	10.290			
L16	0.09	1.23	A	1	0.65	1	1	1	10.484	0.09	23.57	C
20.00-16.00			B	1	0.65	1	1	1	10.484			
			C	1	0.65	1	1	1	10.484			

tnxTower Centek Engineering Inc. 63-2 N. Branford Road Branford, CT 06405 Phone: (203) 488-0580 FAX: (203) 488-8587	Job	13298.000 - CT2413 w/ Prop Reinforcement	Page	24 of 42
	Project	80' PennSummit Monopole - 345 Bushy Hill Rd., Simsbury, CT	Date	16:54:14 04/10/14
	Client	AT&T Mobility	Designed by	jrm

Section Elevation	Add Weight	Self Weight	F a c e	e	C _F	R _R	D _F	D _R	A _E	F	w	Ctrl. Face
ft	K	K							ft ²	K	plf	
L17 16.00-12.00	0.09	1.03	A	1	0.65	1	1	1	10.678	0.10	23.92	C
			B	1	0.65	1	1	1	10.678			
			C	1	0.65	1	1	1	10.678			
L18 12.00-8.00	0.09	1.04	A	1	0.65	1	1	1	10.871	0.10	24.26	C
			B	1	0.65	1	1	1	10.871			
			C	1	0.65	1	1	1	10.871			
L19 8.00-4.00	0.09	1.04	A	1	0.65	1	1	1	11.065	0.10	24.60	C
			B	1	0.65	1	1	1	11.065			
			C	1	0.65	1	1	1	11.065			
L20 4.00-0.00	0.09	1.05	A	1	0.65	1	1	1	11.259	0.10	24.94	C
			B	1	0.65	1	1	1	11.259			
			C	1	0.65	1	1	1	11.259			
Sum Weight:	1.63	20.06						OTM	75.06 kip-ft	1.88		

Tower Forces - Service - Wind 90 To Face

Section Elevation	Add Weight	Self Weight	F a c e	e	C _F	R _R	D _F	D _R	A _E	F	w	Ctrl. Face
ft	K	K							ft ²	K	plf	
L1 80.00-76.00	0.04	0.69	A	1	0.65	1	1	1	7.577	0.09	23.61	C
			B	1	0.65	1	1	1	7.577			
			C	1	0.65	1	1	1	7.577			
L2 76.00-72.00	0.06	0.69	A	1	0.65	1	1	1	7.771	0.09	23.69	C
			B	1	0.65	1	1	1	7.771			
			C	1	0.65	1	1	1	7.771			
L3 72.00-68.00	0.07	0.69	A	1	0.65	1	1	1	7.965	0.09	23.74	C
			B	1	0.65	1	1	1	7.965			
			C	1	0.65	1	1	1	7.965			
L4 68.00-64.00	0.09	0.69	A	1	0.65	1	1	1	8.158	0.10	23.75	C
			B	1	0.65	1	1	1	8.158			
			C	1	0.65	1	1	1	8.158			
L5 64.00-60.00	0.09	0.70	A	1	0.65	1	1	1	8.352	0.09	23.74	C
			B	1	0.65	1	1	1	8.352			
			C	1	0.65	1	1	1	8.352			
L6 60.00-56.00	0.09	0.94	A	1	0.65	1	1	1	8.546	0.09	23.69	C
			B	1	0.65	1	1	1	8.546			
			C	1	0.65	1	1	1	8.546			
L7 56.00-52.00	0.09	0.94	A	1	0.65	1	1	1	8.740	0.09	23.61	C
			B	1	0.65	1	1	1	8.740			
			C	1	0.65	1	1	1	8.740			
L8 52.00-48.00	0.09	0.94	A	1	0.65	1	1	1	8.934	0.09	23.48	C
			B	1	0.65	1	1	1	8.934			
			C	1	0.65	1	1	1	8.934			
L9 48.00-44.00	0.09	1.02	A	1	0.65	1	1	1	9.127	0.09	23.30	C
			B	1	0.65	1	1	1	9.127			
			C	1	0.65	1	1	1	9.127			
L10 44.00-40.00	0.09	1.22	A	1	0.65	1	1	1	9.321	0.09	23.07	C
			B	1	0.65	1	1	1	9.321			
			C	1	0.65	1	1	1	9.321			
L11 40.00-36.00	0.09	1.22	A	1	0.65	1	1	1	9.515	0.09	22.77	C
			B	1	0.65	1	1	1	9.515			
			C	1	0.65	1	1	1	9.515			
L12 36.00-32.00	0.09	1.22	A	1	0.65	1	1	1	9.709	0.09	22.40	C
			B	1	0.65	1	1	1	9.709			

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	Client	AT&T Mobility	Designed by	jrm

Section Elevation	Add Weight	Self Weight	F a c e	e	C _F	R _R	D _F	D _R	A _E	F	w	Ctrl. Face
ft	K	K							ft ²	K	plf	
L13	0.09	1.23	C	1	0.65	1	1	1	9.709			
32.00-28.00			A	1	0.65	1	1	1	9.902	0.09	22.55	C
			B	1	0.65	1	1	1	9.902			
L14	0.09	1.23	C	1	0.65	1	1	1	9.902			
28.00-24.00			A	1	0.65	1	1	1	10.096	0.09	22.89	C
			B	1	0.65	1	1	1	10.096			
			C	1	0.65	1	1	1	10.096			
L15	0.09	1.23	A	1	0.65	1	1	1	10.290	0.09	23.23	C
24.00-20.00			B	1	0.65	1	1	1	10.290			
			C	1	0.65	1	1	1	10.290			
L16	0.09	1.23	A	1	0.65	1	1	1	10.484	0.09	23.57	C
20.00-16.00			B	1	0.65	1	1	1	10.484			
			C	1	0.65	1	1	1	10.484			
L17	0.09	1.03	A	1	0.65	1	1	1	10.678	0.10	23.92	C
16.00-12.00			B	1	0.65	1	1	1	10.678			
			C	1	0.65	1	1	1	10.678			
L18	0.09	1.04	A	1	0.65	1	1	1	10.871	0.10	24.26	C
12.00-8.00			B	1	0.65	1	1	1	10.871			
			C	1	0.65	1	1	1	10.871			
L19 8.00-4.00	0.09	1.04	A	1	0.65	1	1	1	11.065	0.10	24.60	C
			B	1	0.65	1	1	1	11.065			
			C	1	0.65	1	1	1	11.065			
L20 4.00-0.00	0.09	1.05	A	1	0.65	1	1	1	11.259	0.10	24.94	C
			B	1	0.65	1	1	1	11.259			
			C	1	0.65	1	1	1	11.259			
Sum Weight:	1.63	20.06						OTM	75.06 kip-ft	1.88		

Force Totals

Load Case	Vertical Forces	Sum of Forces X	Sum of Forces Z	Sum of Overturning Moments, M _x	Sum of Overturning Moments, M _z	Sum of Torques
	K	K	K	kip-ft	kip-ft	kip-ft
Leg Weight	20.06					
Bracing Weight	0.00					
Total Member Self-Weight	20.06			1.98	0.87	
Total Weight	30.39			1.98	0.87	
Wind 0 deg - No Ice		-0.08	-19.75	-1561.05	8.55	-1.10
Wind 30 deg - No Ice		9.85	-17.07	-1347.80	-778.43	-0.26
Wind 60 deg - No Ice		17.14	-9.81	-772.88	-1356.59	0.65
Wind 90 deg - No Ice		19.84	0.08	9.66	-1571.02	1.39
Wind 120 deg - No Ice		17.22	9.94	790.15	-1364.27	1.75
Wind 150 deg - No Ice		9.99	17.14	1359.45	-791.72	1.65
Wind 180 deg - No Ice		0.08	19.75	1565.01	-6.80	1.10
Wind 210 deg - No Ice		-9.85	17.07	1351.77	780.17	0.26
Wind 240 deg - No Ice		-17.14	9.81	776.85	1358.33	-0.65
Wind 270 deg - No Ice		-19.84	-0.08	-5.69	1572.77	-1.39
Wind 300 deg - No Ice		-17.22	-9.94	-786.18	1366.01	-1.75
Wind 330 deg - No Ice		-9.99	-17.14	-1355.48	793.47	-1.65
Member Ice	1.39					
Total Weight Ice	35.89			2.85	1.83	
Wind 0 deg - Ice		-0.06	-17.07	-1337.53	8.08	-1.16
Wind 30 deg - Ice		8.52	-14.75	-1154.83	-666.56	-0.27
Wind 60 deg - Ice		14.81	-8.48	-661.93	-1162.10	0.69
Wind 90 deg - Ice		17.14	0.06	9.10	-1345.77	1.46

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Load Case	Vertical Forces K	Sum of Forces X K	Sum of Forces Z K	Sum of Overturning Moments, M_x kip-ft	Sum of Overturning Moments, M_z kip-ft	Sum of Torques kip-ft
Wind 120 deg - Ice		14.88	8.59	678.45	-1168.35	1.85
Wind 150 deg - Ice		8.62	14.81	1166.78	-677.39	1.73
Wind 180 deg - Ice		0.06	17.07	1343.23	-4.42	1.16
Wind 210 deg - Ice		-8.52	14.75	1160.53	670.21	0.27
Wind 240 deg - Ice		-14.81	8.48	667.62	1165.76	-0.69
Wind 270 deg - Ice		-17.14	-0.06	-3.40	1349.43	-1.46
Wind 300 deg - Ice		-14.88	-8.59	-672.76	1172.01	-1.85
Wind 330 deg - Ice		-8.62	-14.81	-1161.08	681.04	-1.73
Total Weight	30.39			1.98	0.87	
Wind 0 deg - Service		-0.03	-7.72	-608.88	3.34	-0.43
Wind 30 deg - Service		3.85	-6.67	-525.59	-304.08	-0.10
Wind 60 deg - Service		6.70	-3.83	-301.01	-529.92	0.25
Wind 90 deg - Service		7.75	0.03	4.67	-613.68	0.54
Wind 120 deg - Service		6.73	3.88	309.55	-532.92	0.69
Wind 150 deg - Service		3.90	6.70	531.93	-309.27	0.64
Wind 180 deg - Service		0.03	7.72	612.23	-2.66	0.43
Wind 210 deg - Service		-3.85	6.67	528.93	304.75	0.10
Wind 240 deg - Service		-6.70	3.83	304.36	530.60	-0.25
Wind 270 deg - Service		-7.75	-0.03	-1.32	614.36	-0.54
Wind 300 deg - Service		-6.73	-3.88	-306.20	533.60	-0.69
Wind 330 deg - Service		-3.90	-6.70	-528.58	309.95	-0.64

Load Combinations

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

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<i>Comb. No.</i>	<i>Description</i>
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

<i>Section No.</i>	<i>Elevation ft</i>	<i>Component Type</i>	<i>Condition</i>	<i>Gov. Load Comb.</i>	<i>Force K</i>	<i>Major Axis Moment kip-ft</i>	<i>Minor Axis Moment kip-ft</i>
L1	80 - 76	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	14	-12.48	0.66	-2.18
			Max. Mx	11	-8.40	243.83	0.28
			Max. My	8	-8.41	-1.59	-242.93
			Max. Vy	11	-15.11	243.83	0.28
			Max. Vx	8	15.02	-1.59	-242.93
			Max. Torque	25			1.63
L2	76 - 72	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	14	-13.32	0.72	-2.22
			Max. Mx	11	-9.17	304.81	0.57
			Max. My	8	-9.17	-1.88	-303.54
			Max. Vy	11	-15.37	304.81	0.57
			Max. Vx	8	15.28	-1.88	-303.54
			Max. Torque	25			1.64
L3	72 - 68	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	14	-14.64	0.77	-2.26
			Max. Mx	11	-10.28	367.95	0.86
			Max. My	8	-10.28	-2.17	-366.32
			Max. Vy	11	-16.19	367.95	0.86
			Max. Vx	8	16.10	-2.17	-366.32
			Max. Torque	25			1.65
L4	68 - 64	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	14	-15.52	0.83	-2.29
			Max. Mx	11	-11.08	433.22	1.15
			Max. My	8	-11.09	-2.45	-431.22
			Max. Vy	11	-16.44	433.22	1.15
			Max. Vx	8	16.35	-2.45	-431.22
			Max. Torque	25			1.67
L5	64 - 60	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	14	-16.39	0.89	-2.33
			Max. Mx	11	-11.89	499.49	1.44
			Max. My	8	-11.90	-2.74	-497.11
			Max. Vy	11	-16.68	499.49	1.44
			Max. Vx	8	16.60	-2.74	-497.11
			Max. Torque	25			1.68
L6	60 - 56	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	14	-17.52	0.94	-2.37
			Max. Mx	11	-12.95	566.74	1.73
			Max. My	8	-12.95	-3.02	-564.00
			Max. Vy	11	-16.94	566.74	1.73
			Max. Vx	8	16.85	-3.02	-564.00
			Max. Torque	25			1.70
L7	56 - 52	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	14	-18.64	1.00	-2.40
			Max. Mx	11	-14.00	635.00	2.02

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Section No.	Elevation ft	Component Type	Condition	Gov. Load Comb.	Force K	Major Axis Moment kip-ft	Minor Axis Moment kip-ft
L8	52 - 48	Pole	Max. My	8	-14.01	-3.31	-631.89
			Max. Vy	11	-17.18	635.00	2.02
			Max. Vx	8	17.10	-3.31	-631.89
			Max. Torque	25			1.71
			Max Tension	1	0.00	0.00	0.00
			Max. Compression	14	-19.77	1.06	-2.43
			Max. Mx	11	-15.06	704.22	2.32
			Max. My	8	-15.07	-3.59	-700.74
			Max. Vy	11	-17.42	704.22	2.32
			Max. Vx	8	17.33	-3.59	-700.74
L9	48 - 44	Pole	Max. Torque	25			1.73
			Max Tension	1	0.00	0.00	0.00
			Max. Compression	14	-20.98	1.12	-2.47
			Max. Mx	11	-16.21	774.39	2.61
			Max. My	8	-16.21	-3.87	-770.55
			Max. Vy	11	-17.66	774.39	2.61
			Max. Vx	8	17.57	-3.87	-770.55
			Max. Torque	25			1.74
			Max Tension	1	0.00	0.00	0.00
			Max. Compression	14	-22.39	1.18	-2.50
L10	44 - 40	Pole	Max. Mx	11	-17.54	845.51	2.90
			Max. My	8	-17.55	-4.16	-841.29
			Max. Vy	11	-17.89	845.51	2.90
			Max. Vx	8	17.81	-4.16	-841.29
			Max. Torque	25			1.75
			Max Tension	1	0.00	0.00	0.00
			Max. Compression	14	-23.80	1.24	-2.54
			Max. Mx	11	-18.88	917.55	3.19
			Max. My	8	-18.89	-4.44	-912.96
			Max. Vy	11	-18.12	917.55	3.19
L11	40 - 36	Pole	Max. Vx	8	18.03	-4.44	-912.96
			Max. Torque	25			1.77
			Max Tension	1	0.00	0.00	0.00
			Max. Compression	14	-25.22	1.30	-2.57
			Max. Mx	11	-20.23	990.47	3.48
			Max. My	8	-20.23	-4.72	-985.52
			Max. Vy	11	-18.34	990.47	3.48
			Max. Vx	8	18.25	-4.72	-985.52
			Max. Torque	25			1.78
			Max Tension	1	0.00	0.00	0.00
L12	36 - 32	Pole	Max. Compression	14	-26.64	1.37	-2.61
			Max. Mx	11	-21.58	1064.25	3.78
			Max. My	8	-21.58	-5.00	-1058.93
			Max. Vy	11	-18.55	1064.25	3.78
			Max. Vx	8	18.46	-5.00	-1058.93
			Max. Torque	25			1.80
			Max Tension	1	0.00	0.00	0.00
			Max. Compression	14	-28.06	1.43	-2.65
			Max. Mx	11	-22.93	1138.86	4.07
			Max. My	8	-22.93	-5.29	-1133.17
L13	32 - 28	Pole	Max. Vy	11	-18.76	1138.86	4.07
			Max. Vx	8	18.67	-5.29	-1133.17
			Max. Torque	25			1.81
			Max Tension	1	0.00	0.00	0.00
			Max. Compression	14	-29.49	1.50	-2.69
			Max. Mx	11	-24.29	1214.29	4.36
			Max. My	8	-24.29	-5.56	-1208.23
			Max. Vy	11	-18.96	1214.29	4.36
			Max. Vx	8	18.87	-5.56	-1208.23
			Max. Torque	25			1.82
L14	28 - 24	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	14	-29.49	1.50	-2.69
L15	24 - 20	Pole	Max. Mx	11	-24.29	1214.29	4.36
			Max. My	8	-24.29	-5.56	-1208.23
			Max. Vy	11	-18.96	1214.29	4.36
			Max. Vx	8	18.87	-5.56	-1208.23
			Max. Torque	25			1.82
			Max Tension	1	0.00	0.00	0.00
			Max. Compression	14	-29.49	1.50	-2.69
			Max. Mx	11	-24.29	1214.29	4.36
			Max. My	8	-24.29	-5.56	-1208.23
			Max. Vy	11	-18.96	1214.29	4.36
L16	20 - 16	Pole	Max. Vx	8	18.87	-5.56	-1208.23
			Max. Torque	25			1.82

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Section No.	Elevation ft	Component Type	Condition	Gov. Load Comb.	Force K	Major Axis Moment kip-ft	Minor Axis Moment kip-ft
L17	16 - 12	Pole	Max. Compression	14	-30.92	1.57	-2.73
			Max. Mx	11	-25.65	1290.52	4.65
			Max. My	8	-25.65	-5.84	-1284.09
			Max. Vy	11	-19.16	1290.52	4.65
			Max. Vx	8	19.07	-5.84	-1284.09
			Max. Torque	25			1.84
			Max Tension	1	0.00	0.00	0.00
			Max. Compression	14	-32.16	1.63	-2.77
			Max. Mx	11	-26.82	1367.51	4.94
			Max. My	8	-26.83	-6.12	-1360.71
			Max. Vy	11	-19.34	1367.51	4.94
			Max. Vx	8	19.25	-6.12	-1360.71
			Max. Torque	25			1.85
			Max Tension	1	0.00	0.00	0.00
L18	12 - 8	Pole	Max. Compression	14	-33.39	1.70	-2.81
			Max. Mx	11	-28.00	1445.20	5.23
			Max. My	8	-28.00	-6.40	-1438.04
			Max. Vy	11	-19.51	1445.20	5.23
			Max. Vx	8	19.43	-6.40	-1438.04
			Max. Torque	25			1.87
			Max Tension	1	0.00	0.00	0.00
			Max. Compression	14	-34.64	1.78	-2.85
			Max. Mx	11	-29.19	1523.59	5.51
			Max. My	8	-29.19	-6.67	-1516.06
			Max. Vy	11	-19.69	1523.59	5.51
			Max. Vx	8	19.60	-6.67	-1516.06
			Max. Torque	25			1.89
			Max Tension	1	0.00	0.00	0.00
L20	4 - 0	Pole	Max. Compression	14	-35.89	1.85	-2.89
			Max. Mx	11	-30.38	1602.66	5.80
			Max. My	8	-30.38	-6.94	-1594.76
			Max. Vy	11	-19.85	1602.66	5.80
			Max. Vx	8	19.77	-6.94	-1594.76
			Max. Torque	25			1.90

Maximum Reactions

Location	Condition	Gov. Load Comb.	Vertical K	Horizontal, X K	Horizontal, Z K
Pole	Max. Vert	24	35.89	17.14	0.06
	Max. H _x	11	30.39	19.84	0.08
	Max. H _z	2	30.39	0.08	19.75
	Max. M _x	2	1590.69	0.08	19.75
	Max. M _z	5	1600.87	-19.84	-0.08
	Max. Torsion	25	1.90	14.88	8.59
	Min. Vert	1	30.39	0.00	0.00
	Min. H _x	5	30.39	-19.84	-0.08
	Min. H _z	8	30.39	-0.08	-19.75
	Min. M _x	8	-1594.76	-0.08	-19.75
	Min. M _z	11	-1602.66	19.84	0.08
	Min. Torsion	19	-1.90	-14.88	-8.59

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Tower Mast Reaction Summary

Load Combination	Vertical K	Shear _x K	Shear _z K	Overturning Moment, M _x kip-ft	Overturning Moment, M _z kip-ft	Torque kip-ft
Dead Only	30.39	0.00	0.00	1.99	0.88	-0.00
Dead+Wind 0 deg - No Ice	30.39	-0.08	-19.75	-1590.69	8.72	-1.13
Dead+Wind 30 deg - No Ice	30.39	9.85	-17.07	-1373.39	-793.21	-0.24
Dead+Wind 60 deg - No Ice	30.39	17.14	-9.81	-787.54	-1382.37	0.72
Dead+Wind 90 deg - No Ice	30.39	19.84	0.08	9.87	-1600.87	1.47
Dead+Wind 120 deg - No Ice	30.39	17.22	9.94	805.18	-1390.19	1.80
Dead+Wind 150 deg - No Ice	30.39	9.99	17.14	1385.29	-806.78	1.66
Dead+Wind 180 deg - No Ice	30.39	0.08	19.75	1594.76	-6.94	1.08
Dead+Wind 210 deg - No Ice	30.39	-9.85	17.07	1377.46	794.99	0.24
Dead+Wind 240 deg - No Ice	30.39	-17.14	9.81	791.61	1384.15	-0.67
Dead+Wind 270 deg - No Ice	30.39	-19.84	-0.08	-5.80	1602.66	-1.42
Dead+Wind 300 deg - No Ice	30.39	-17.22	-9.94	-801.11	1391.98	-1.80
Dead+Wind 330 deg - No Ice	30.39	-9.99	-17.14	-1381.22	808.56	-1.71
Dead+Ice+Temp	35.89	-0.00	0.00	2.89	1.85	-0.00
Dead+Wind 0 deg+Ice+Temp	35.89	-0.06	-17.07	-1370.15	8.30	-1.19
Dead+Wind 30 deg+Ice+Temp	35.89	8.52	-14.75	-1182.98	-682.82	-0.25
Dead+Wind 60 deg+Ice+Temp	35.89	14.81	-8.48	-678.05	-1190.46	0.75
Dead+Wind 90 deg+Ice+Temp	35.89	17.14	0.06	9.36	-1378.62	1.54
Dead+Wind 120 deg+Ice+Temp	35.89	14.88	8.59	695.04	-1196.88	1.90
Dead+Wind 150 deg+Ice+Temp	35.89	8.62	14.81	1195.28	-693.93	1.75
Dead+Wind 180 deg+Ice+Temp	35.89	0.06	17.07	1376.04	-4.54	1.15
Dead+Wind 210 deg+Ice+Temp	35.89	-8.52	14.75	1188.87	686.57	0.25
Dead+Wind 240 deg+Ice+Temp	35.89	-14.81	8.48	683.93	1194.22	-0.71
Dead+Wind 270 deg+Ice+Temp	35.89	-17.14	-0.06	-3.48	1382.38	-1.50
Dead+Wind 300 deg+Ice+Temp	35.89	-14.88	-8.59	-689.16	1200.63	-1.90
Dead+Wind 330 deg+Ice+Temp	35.89	-8.62	-14.81	-1189.40	697.69	-1.79
Dead+Wind 0 deg - Service	30.39	-0.03	-7.72	-620.30	3.95	-0.44
Dead+Wind 30 deg - Service	30.39	3.85	-6.67	-535.39	-309.39	-0.09
Dead+Wind 60 deg - Service	30.39	6.70	-3.83	-306.48	-539.60	0.28
Dead+Wind 90 deg - Service	30.39	7.75	0.03	5.10	-624.98	0.57
Dead+Wind 120 deg - Service	30.39	6.73	3.88	315.86	-542.66	0.71
Dead+Wind 150 deg - Service	30.39	3.90	6.70	542.53	-314.69	0.65
Dead+Wind 180 deg - Service	30.39	0.03	7.72	624.37	-2.17	0.43
Dead+Wind 210 deg - Service	30.39	-3.85	6.67	539.46	311.18	0.09
Dead+Wind 240 deg - Service	30.39	-6.70	3.83	310.55	541.38	-0.27
Dead+Wind 270 deg - Service	30.39	-7.75	-0.03	-1.02	626.76	-0.56
Dead+Wind 300 deg - Service	30.39	-6.73	-3.88	-311.78	544.44	-0.71
Dead+Wind 330 deg - Service	30.39	-3.90	-6.70	-538.45	316.48	-0.66

Solution Summary

Load Comb.	Sum of Applied Forces			Sum of Reactions			% Error
	PX K	PY K	PZ K	PX K	PY K	PZ K	
1	0.00	-30.39	0.00	0.00	30.39	0.00	0.000%
2	-0.08	-30.39	-19.75	0.08	30.39	19.75	0.000%
3	9.85	-30.39	-17.07	-9.85	30.39	17.07	0.000%
4	17.14	-30.39	-9.81	-17.14	30.39	9.81	0.000%
5	19.84	-30.39	0.08	-19.84	30.39	-0.08	0.000%
6	17.22	-30.39	9.94	-17.22	30.39	-9.94	0.000%
7	9.99	-30.39	17.14	-9.99	30.39	17.14	0.000%
8	0.08	-30.39	19.75	-0.08	30.39	-19.75	0.000%
9	-9.85	-30.39	17.07	9.85	30.39	-17.07	0.000%
10	-17.14	-30.39	9.81	17.14	30.39	-9.81	0.000%
11	-19.84	-30.39	-0.08	19.84	30.39	0.08	0.000%

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Load Comb.	Sum of Applied Forces			Sum of Reactions			% Error
	PX K	PY K	PZ K	PX K	PY K	PZ K	
12	-17.22	-30.39	-9.94	17.22	30.39	9.94	0.000%
13	-9.99	-30.39	-17.14	9.99	30.39	17.14	0.000%
14	0.00	-35.89	0.00	0.00	35.89	-0.00	0.000%
15	-0.06	-35.89	-17.07	0.06	35.89	17.07	0.000%
16	8.52	-35.89	-14.75	-8.52	35.89	14.75	0.000%
17	14.81	-35.89	-8.48	-14.81	35.89	8.48	0.000%
18	17.14	-35.89	0.06	-17.14	35.89	-0.06	0.000%
19	14.88	-35.89	8.59	-14.88	35.89	-8.59	0.000%
20	8.62	-35.89	14.81	-8.62	35.89	-14.81	0.000%
21	0.06	-35.89	17.07	-0.06	35.89	-17.07	0.000%
22	-8.52	-35.89	14.75	8.52	35.89	-14.75	0.000%
23	-14.81	-35.89	8.48	14.81	35.89	-8.48	0.000%
24	-17.14	-35.89	-0.06	17.14	35.89	0.06	0.000%
25	-14.88	-35.89	-8.59	14.88	35.89	8.59	0.000%
26	-8.62	-35.89	-14.81	8.62	35.89	14.81	0.000%
27	-0.03	-30.39	-7.72	0.03	30.39	7.72	0.000%
28	3.85	-30.39	-6.67	-3.85	30.39	6.67	0.000%
29	6.70	-30.39	-3.83	-6.70	30.39	3.83	0.000%
30	7.75	-30.39	0.03	-7.75	30.39	-0.03	0.000%
31	6.73	-30.39	3.88	-6.73	30.39	-3.88	0.000%
32	3.90	-30.39	6.70	-3.90	30.39	-6.70	0.000%
33	0.03	-30.39	7.72	-0.03	30.39	-7.72	0.000%
34	-3.85	-30.39	6.67	3.85	30.39	-6.67	0.000%
35	-6.70	-30.39	3.83	6.70	30.39	-3.83	0.000%
36	-7.75	-30.39	-0.03	7.75	30.39	0.03	0.000%
37	-6.73	-30.39	-3.88	6.73	30.39	3.88	0.000%
38	-3.90	-30.39	-6.70	3.90	30.39	6.70	0.000%

Non-Linear Convergence Results

Load Combination	Converged?	Number of Cycles	Displacement Tolerance	Force Tolerance
1	Yes	4	0.00000001	0.00000001
2	Yes	4	0.00000001	0.00026174
3	Yes	5	0.00000001	0.00004418
4	Yes	5	0.00000001	0.00004313
5	Yes	4	0.00000001	0.00034944
6	Yes	5	0.00000001	0.00005060
7	Yes	5	0.00000001	0.00004321
8	Yes	4	0.00000001	0.00019455
9	Yes	5	0.00000001	0.00004551
10	Yes	5	0.00000001	0.00004677
11	Yes	4	0.00000001	0.00028066
12	Yes	5	0.00000001	0.00004272
13	Yes	5	0.00000001	0.00004988
14	Yes	4	0.00000001	0.00001014
15	Yes	5	0.00000001	0.00006142
16	Yes	5	0.00000001	0.00010742
17	Yes	5	0.00000001	0.00010650
18	Yes	5	0.00000001	0.00006229
19	Yes	5	0.00000001	0.00011491
20	Yes	5	0.00000001	0.00010824
21	Yes	5	0.00000001	0.00006158
22	Yes	5	0.00000001	0.00010947
23	Yes	5	0.00000001	0.00011074
24	Yes	5	0.00000001	0.00006217

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25	Yes	5	0.00000001	0.00010760
26	Yes	5	0.00000001	0.00011390
27	Yes	4	0.00000001	0.00005095
28	Yes	4	0.00000001	0.00019105
29	Yes	4	0.00000001	0.00018231
30	Yes	4	0.00000001	0.00006791
31	Yes	4	0.00000001	0.00024996
32	Yes	4	0.00000001	0.00018365
33	Yes	4	0.00000001	0.00004646
34	Yes	4	0.00000001	0.00020430
35	Yes	4	0.00000001	0.00021673
36	Yes	4	0.00000001	0.00006290
37	Yes	4	0.00000001	0.00017968
38	Yes	4	0.00000001	0.00024206

Maximum Tower Deflections - Service Wind

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
L1	80 - 76	9.512	31	1.0491	0.0033
L2	76 - 72	8.646	31	1.0165	0.0030
L3	72 - 68	7.811	31	0.9773	0.0027
L4	68 - 64	7.011	31	0.9319	0.0024
L5	64 - 60	6.251	31	0.8806	0.0021
L6	60 - 56	5.537	31	0.8240	0.0019
L7	56 - 52	4.866	31	0.7776	0.0017
L8	52 - 48	4.235	31	0.7278	0.0015
L9	48 - 44	3.647	31	0.6749	0.0014
L10	44 - 40	3.104	31	0.6233	0.0012
L11	40 - 36	2.601	31	0.5773	0.0011
L12	36 - 32	2.137	31	0.5295	0.0010
L13	32 - 28	1.714	31	0.4801	0.0008
L14	28 - 24	1.333	31	0.4292	0.0007
L15	24 - 20	0.995	31	0.3769	0.0006
L16	20 - 16	0.702	31	0.3234	0.0005
L17	16 - 12	0.454	31	0.2688	0.0004
L18	12 - 8	0.256	31	0.2029	0.0003
L19	8 - 4	0.114	31	0.1361	0.0002
L20	4 - 0	0.029	31	0.0684	0.0001

Critical Deflections and Radius of Curvature - Service Wind

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
105.00	4-ft Standoff	31	9.512	1.0491	0.0033	6006
100.00	BXA-70063/6CF	31	9.512	1.0491	0.0033	6006
93.00	12" x 26-ft Monopole Extension	31	9.512	1.0491	0.0033	6006
90.00	HPA-65R-BUU-H8	31	9.512	1.0491	0.0033	6006
77.00	APX16DWV-16DWVS-E-A20	31	8.861	1.0251	0.0030	6006
70.00	APXV18-206517-C	31	7.406	0.9553	0.0025	5092

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Maximum Tower Deflections - Design Wind

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
L1	80 - 76	24.319	6	2.6817	0.0086
L2	76 - 72	22.108	6	2.5989	0.0078
L3	72 - 68	19.972	6	2.4988	0.0070
L4	68 - 64	17.928	6	2.3829	0.0063
L5	64 - 60	15.986	6	2.2519	0.0056
L6	60 - 56	14.160	6	2.1074	0.0050
L7	56 - 52	12.445	6	1.9887	0.0045
L8	52 - 48	10.832	6	1.8614	0.0040
L9	48 - 44	9.329	6	1.7262	0.0036
L10	44 - 40	7.939	6	1.5943	0.0032
L11	40 - 36	6.652	6	1.4767	0.0029
L12	36 - 32	5.466	6	1.3545	0.0026
L13	32 - 28	4.385	6	1.2281	0.0023
L14	28 - 24	3.410	6	1.0978	0.0020
L15	24 - 20	2.547	6	0.9641	0.0017
L16	20 - 16	1.796	6	0.8273	0.0014
L17	16 - 12	1.162	6	0.6876	0.0012
L18	12 - 8	0.656	6	0.5192	0.0008
L19	8 - 4	0.293	6	0.3483	0.0006
L20	4 - 0	0.073	6	0.1751	0.0003

Critical Deflections and Radius of Curvature - Design Wind

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
105.00	4-ft Standoff	6	24.319	2.6817	0.0086	2372
100.00	BXA-70063/6CF	6	24.319	2.6817	0.0086	2372
93.00	12" x 26-ft Monopole Extension	6	24.319	2.6817	0.0086	2372
90.00	HPA-65R-BUU-H8	6	24.319	2.6817	0.0086	2372
77.00	APX16DWV-16DWVS-E-A20	6	22.655	2.6208	0.0080	2372
70.00	APXV18-206517-C	6	18.938	2.4425	0.0067	2005

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 P/P _a
L1	80 - 79	TP22.57x22x0.7379	4.00	0.00	0.0	39.000	50.1316	-7.40	1955.13	0.004
	79 - 78					39.000	50.4653	-7.58	1968.15	0.004
	78 - 77					39.000	50.7991	-7.77	1981.16	0.004
	77 - 76					39.000	51.1328	-8.40	1994.18	0.004
	76 - 75					39.000	50.2725	-8.59	1960.63	0.004
L2	75 - 74	TP23.14x22.57x0.7202	4.00	0.00	0.0	39.000	50.5983	-8.78	1973.33	0.004

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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 P P _a
L3	74 - 73	TP23.71x23.14x0.7036	4.00	0.00	0.0	39.000	50.9240	-8.97	1986.04	0.005
	73 - 72					39.000	51.2498	-9.16	1998.74	0.005
	72 - 71					39.000	50.4238	-9.36	1966.53	0.005
	71 - 70					39.000	50.7420	-9.55	1978.94	0.005
	70 - 69					39.000	51.0603	-10.07	1991.35	0.005
L4	69 - 68	TP24.28x23.71x0.688	4.00	0.00	0.0	39.000	51.3785	-10.27	2003.76	0.005
	68 - 67					39.000	50.5846	-10.47	1972.80	0.005
	67 - 66					39.000	50.8958	-10.67	1984.94	0.005
	66 - 65					39.000	51.2070	-10.87	1997.07	0.005
	65 - 64					39.000	51.5181	-11.08	2009.21	0.006
L5	64 - 63	TP24.85x24.28x0.6735	4.00	0.00	0.0	39.000	50.7680	-11.28	1979.95	0.006
	63 - 62					39.000	51.0726	-11.48	1991.83	0.006
	62 - 61					39.000	51.3772	-11.69	2003.71	0.006
	61 - 60					39.000	51.6818	-11.89	2015.59	0.006
	60 - 59					39.000	68.7048	-12.15	2679.49	0.005
L6	59 - 58	TP25.42x24.85x0.8984	4.00	0.00	0.0	39.000	69.1112	-12.41	2695.34	0.005
	58 - 57					39.000	69.5175	-12.68	2711.18	0.005
	57 - 56					39.000	69.9239	-12.94	2727.03	0.005
	56 - 55					39.000	68.7750	-13.21	2682.22	0.005
	55 - 54					39.000	69.1720	-13.47	2697.71	0.005
L7	54 - 53	TP25.99x25.42x0.8778	4.00	0.00	0.0	39.000	69.5690	-13.73	2713.19	0.005
	53 - 52					39.000	69.9660	-14.00	2728.68	0.005
	52 - 51					39.000	68.8608	-14.26	2685.57	0.005
	51 - 50					39.000	69.2491	-14.53	2700.71	0.005
	50 - 49					39.000	69.6373	-14.79	2715.86	0.005
L8	49 - 48	TP26.56x25.99x0.8584	4.00	0.00	0.0	39.000	70.0256	-15.06	2731.00	0.006
	48 - 47					39.000	74.8449	-15.34	2918.95	0.005
	47 - 46					39.000	75.2585	-15.63	2935.08	0.005
	46 - 45					39.000	75.6721	-15.92	2951.21	0.005
	45 - 44					39.000	76.0857	-16.20	2967.34	0.005
L9	44 - 43	TP27.13x26.56x0.9144	4.00	0.00	0.0	39.000	89.2117	-16.54	3479.26	0.005
	43 - 42					39.000	89.6970	-16.87	3498.18	0.005
	42 - 41					39.000	90.1822	-17.20	3517.11	0.005
	41 - 40					39.000	90.6674	-17.54	3536.03	0.005
	40 - 39					39.000	89.3404	-17.87	3484.28	0.005
L10	39 - 38	TP28.27x27.7x1.0506	4.00	0.00	0.0	39.000	89.8156	-18.21	3502.81	0.005
	38 - 37					39.000	90.2907	-18.54	3521.34	0.005
	37 - 36					39.000	90.7659	-18.88	3539.87	0.005
	36 - 35					39.000	89.4860	-19.21	3489.95	0.006
	35 - 34					39.000	89.9516	-19.55	3508.11	0.006
L11	34 - 33	TP28.84x28.27x1.0296	4.00	0.00	0.0	39.000	90.4173	-19.89	3526.28	0.006
	33 - 32					39.000	90.8830	-20.23	3544.44	0.006
	32 - 31					39.000	89.6554	-20.56	3496.56	0.006
	31 - 30					39.000	90.1122	-20.90	3514.37	0.006
	30 - 29					39.000	90.5689	-21.23	3532.19	0.006
L12	29 - 28	TP29.41x28.84x1.0098	4.00	0.00	0.0	39.000	91.0256	-21.57	3550.00	0.006
	28 - 27					39.000	89.8383	-21.91	3503.69	0.006
	27 - 26					39.000	90.2865	-22.25	3521.18	0.006
	26 - 25					39.000	90.7348	-22.59	3538.66	0.006
	25 - 24					39.000	91.1830	-22.93	3556.14	0.006
L13	24 - 23	TP29.98x29.41x0.991	4.00	0.00	0.0	39.000	90.0403	-23.27	3511.57	0.007
	23 - 22					39.000	90.4805	-23.60	3528.74	0.007
	22 - 21					39.000	90.9207	-23.94	3545.91	0.007
	21 - 20					39.000	91.3609	-24.29	3563.07	0.007
	20 - 19					39.000	90.2582	-24.63	3520.07	0.007
L14	19 - 18	TP31.12x30.55x0.9563	4.00	0.00	0.0	39.000	90.6907	-24.97	3536.94	0.007
	18 - 17					39.000	91.1232	-25.31	3553.81	0.007
	17 - 16					39.000	91.5558	-25.65	3570.67	0.007
	16 - 15					39.000	75.6358	-25.94	2949.80	0.009
	15 - 14					39.000	75.9894	-26.23	2963.59	0.009

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	Project 80' PennSummit Monopole - 345 Bushy Hill Rd., Simsbury, CT Client AT&T Mobility	Date 16:54:14 04/10/14 Designed by jrm

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 P P _a
L18	14 - 13	TP32.26x31.69x0.7703	4.00	0.00	0.0	39.000	76.3430	-26.53	2977.38	0.009
	13 - 12					39.000	76.6966	-26.82	2991.17	0.009
	12 - 11					39.000	75.9450	-27.12	2961.85	0.009
	11 - 10					39.000	76.2934	-27.41	2975.44	0.009
	10 - 9					39.000	76.6418	-27.71	2989.03	0.009
L19	9 - 8	TP32.83x32.26x0.7594	4.00	0.00	0.0	39.000	76.9902	-28.00	3002.62	0.009
	8 - 7					39.000	76.2705	-28.30	2974.55	0.010
	7 - 6					39.000	76.6140	-28.59	2987.94	0.010
	6 - 5					39.000	76.9574	-28.89	3001.34	0.010
	5 - 4					39.000	77.3009	-29.19	3014.74	0.010
L20	4 - 3	TP33.4x32.83x0.7489	4.00	0.00	0.0	39.000	76.5958	-29.49	2987.24	0.010
	3 - 2					39.000	76.9345	-29.78	3000.45	0.010
	2 - 1					39.000	77.2732	-30.08	3013.66	0.010
	1 - 0					39.000	77.6119	-30.38	3026.87	0.010

Pole Bending Design Data

Section No.	Elevation ft	Size	Actual M _x kip-ft	Actual f _{bx} ksi	Allow. F _{bx} ksi	Ratio f _{bx} /F _{bx}	Actual M _y kip-ft	Actual f _{by} ksi	Allow. F _{by} ksi	Ratio f _{by} /F _{by}
L1	80 - 79	TP22.57x22x0.7379	201.40	9.368	39.000	0.240	0.00	0.000	39.000	0.000
	79 - 78		215.82	9.905	39.000	0.254	0.00	0.000	39.000	0.000
	78 - 77		230.30	10.429	39.000	0.267	0.00	0.000	39.000	0.000
	77 - 76		245.12	10.953	39.000	0.281	0.00	0.000	39.000	0.000
L2	76 - 75	TP23.14x22.57x0.7202	260.31	11.732	39.000	0.301	0.00	0.000	39.000	0.000
	75 - 74		275.56	12.258	39.000	0.314	0.00	0.000	39.000	0.000
	74 - 73		290.87	12.771	39.000	0.327	0.00	0.000	39.000	0.000
	73 - 72		306.25	13.274	39.000	0.340	0.00	0.000	39.000	0.000
L3	72 - 71	TP23.71x23.14x0.7036	321.69	14.059	39.000	0.360	0.00	0.000	39.000	0.000
	71 - 70		337.20	14.549	39.000	0.373	0.00	0.000	39.000	0.000
	70 - 69		353.34	15.053	39.000	0.386	0.00	0.000	39.000	0.000
	69 - 68		369.53	15.546	39.000	0.399	0.00	0.000	39.000	0.000
L4	68 - 67	TP24.28x23.71x0.688	385.79	16.358	39.000	0.419	0.00	0.000	39.000	0.000
	67 - 66		402.12	16.839	39.000	0.432	0.00	0.000	39.000	0.000
	66 - 65		418.50	17.310	39.000	0.444	0.00	0.000	39.000	0.000
	65 - 64		434.95	17.771	39.000	0.456	0.00	0.000	39.000	0.000
L5	64 - 63	TP24.85x24.28x0.6735	451.46	18.579	39.000	0.476	0.00	0.000	39.000	0.000
	63 - 62		468.03	19.029	39.000	0.488	0.00	0.000	39.000	0.000
	62 - 61		484.66	19.469	39.000	0.499	0.00	0.000	39.000	0.000
	61 - 60		501.35	19.900	39.000	0.510	0.00	0.000	39.000	0.000
L6	60 - 59	TP25.42x24.85x0.8984	518.11	15.665	39.000	0.402	0.00	0.000	39.000	0.000
	59 - 58		534.92	15.980	39.000	0.410	0.00	0.000	39.000	0.000
	58 - 57		551.80	16.289	39.000	0.418	0.00	0.000	39.000	0.000
	57 - 56		568.75	16.591	39.000	0.425	0.00	0.000	39.000	0.000
L7	56 - 55	TP25.99x25.42x0.8778	585.75	17.240	39.000	0.442	0.00	0.000	39.000	0.000
	55 - 54		602.82	17.536	39.000	0.450	0.00	0.000	39.000	0.000
	54 - 53		619.95	17.826	39.000	0.457	0.00	0.000	39.000	0.000
	53 - 52		637.14	18.109	39.000	0.464	0.00	0.000	39.000	0.000
L8	52 - 51	TP26.56x25.99x0.8584	654.39	18.759	39.000	0.481	0.00	0.000	39.000	0.000
	51 - 50		671.71	19.036	39.000	0.488	0.00	0.000	39.000	0.000
	50 - 49		689.08	19.308	39.000	0.495	0.00	0.000	39.000	0.000
	49 - 48		706.51	19.574	39.000	0.502	0.00	0.000	39.000	0.000
L9	48 - 47	TP27.13x26.56x0.9144	724.00	18.741	39.000	0.481	0.00	0.000	39.000	0.000
	47 - 46		741.54	18.981	39.000	0.487	0.00	0.000	39.000	0.000
	46 - 45		759.15	19.217	39.000	0.493	0.00	0.000	39.000	0.000
	45 - 44		776.82	19.447	39.000	0.499	0.00	0.000	39.000	0.000

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	Project 80' PennSummit Monopole - 345 Bushy Hill Rd., Simsbury, CT Client AT&T Mobility	Date 16:54:14 04/10/14 Designed by jrm

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	44 - 43	TP27.7x27.13x1.0728	794.54	17.074	39.000	0.438	0.00	0.000	39.000	0.000
	43 - 42		812.32	17.264	39.000	0.443	0.00	0.000	39.000	0.000
	42 - 41		830.17	17.450	39.000	0.447	0.00	0.000	39.000	0.000
	41 - 40		848.07	17.633	39.000	0.452	0.00	0.000	39.000	0.000
L11	40 - 39	TP28.27x27.7x1.0506	866.02	18.142	39.000	0.465	0.00	0.000	39.000	0.000
	39 - 38		884.04	18.321	39.000	0.470	0.00	0.000	39.000	0.000
	38 - 37		902.12	18.495	39.000	0.474	0.00	0.000	39.000	0.000
	37 - 36		920.24	18.666	39.000	0.479	0.00	0.000	39.000	0.000
L12	36 - 35	TP28.84x28.27x1.0296	938.43	19.174	39.000	0.492	0.00	0.000	39.000	0.000
	35 - 34		956.67	19.341	39.000	0.496	0.00	0.000	39.000	0.000
	34 - 33		974.96	19.505	39.000	0.500	0.00	0.000	39.000	0.000
	33 - 32		993.31	19.665	39.000	0.504	0.00	0.000	39.000	0.000
L13	32 - 31	TP29.41x28.84x1.0098	1011.71	20.168	39.000	0.517	0.00	0.000	39.000	0.000
	31 - 30		1030.16	20.324	39.000	0.521	0.00	0.000	39.000	0.000
	30 - 29		1048.67	20.477	39.000	0.525	0.00	0.000	39.000	0.000
	29 - 28		1067.22	20.628	39.000	0.529	0.00	0.000	39.000	0.000
L14	28 - 27	TP29.98x29.41x0.991	1085.83	21.127	39.000	0.542	0.00	0.000	39.000	0.000
	27 - 26		1104.49	21.274	39.000	0.545	0.00	0.000	39.000	0.000
	26 - 25		1123.20	21.418	39.000	0.549	0.00	0.000	39.000	0.000
	25 - 24		1141.97	21.558	39.000	0.553	0.00	0.000	39.000	0.000
L15	24 - 23	TP30.55x29.98x0.9732	1160.78	22.052	39.000	0.565	0.00	0.000	39.000	0.000
	23 - 22		1179.64	22.190	39.000	0.569	0.00	0.000	39.000	0.000
	22 - 21		1198.56	22.324	39.000	0.572	0.00	0.000	39.000	0.000
	21 - 20		1217.53	22.456	39.000	0.576	0.00	0.000	39.000	0.000
L16	20 - 19	TP31.12x30.55x0.9563	1236.54	22.945	39.000	0.588	0.00	0.000	39.000	0.000
	19 - 18		1255.61	23.074	39.000	0.592	0.00	0.000	39.000	0.000
	18 - 17		1274.72	23.200	39.000	0.595	0.00	0.000	39.000	0.000
	17 - 16		1293.89	23.323	39.000	0.598	0.00	0.000	39.000	0.000
L17	16 - 15	TP31.69x31.12x0.7818	1313.10	28.187	39.000	0.723	0.00	0.000	39.000	0.000
	15 - 14		1332.36	28.332	39.000	0.726	0.00	0.000	39.000	0.000
	14 - 13		1351.66	28.473	39.000	0.730	0.00	0.000	39.000	0.000
	13 - 12		1371.00	28.612	39.000	0.734	0.00	0.000	39.000	0.000
L18	12 - 11	TP32.26x31.69x0.7703	1390.39	29.144	39.000	0.747	0.00	0.000	39.000	0.000
	11 - 10		1409.83	29.279	39.000	0.751	0.00	0.000	39.000	0.000
	10 - 9		1429.31	29.411	39.000	0.754	0.00	0.000	39.000	0.000
	9 - 8		1448.83	29.540	39.000	0.757	0.00	0.000	39.000	0.000
L19	8 - 7	TP32.83x32.26x0.7594	1468.39	30.062	39.000	0.771	0.00	0.000	39.000	0.000
	7 - 6		1488.00	30.187	39.000	0.774	0.00	0.000	39.000	0.000
	6 - 5		1507.65	30.311	39.000	0.777	0.00	0.000	39.000	0.000
	5 - 4		1527.34	30.431	39.000	0.780	0.00	0.000	39.000	0.000
L20	4 - 3	TP33.4x32.83x0.7489	1547.08	30.947	39.000	0.794	0.00	0.000	39.000	0.000
	3 - 2		1566.86	31.064	39.000	0.797	0.00	0.000	39.000	0.000
	2 - 1		1586.68	31.179	39.000	0.799	0.00	0.000	39.000	0.000
	1 - 0		1606.53	31.291	39.000	0.802	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	80 - 79	TP22.57x22x0.7379	14.39	0.287	26.000	0.022	1.62	0.036	26.000	0.001
	79 - 78		14.45	0.286	26.000	0.022	1.62	0.035	26.000	0.001
	78 - 77		14.52	0.286	26.000	0.022	1.63	0.035	26.000	0.001
	77 - 76		15.16	0.296	26.000	0.023	1.61	0.034	26.000	0.001
L2	76 - 75	TP23.14x22.57x0.7202	15.22	0.303	26.000	0.023	1.62	0.035	26.000	0.001
	75 - 74		15.29	0.302	26.000	0.023	1.62	0.034	26.000	0.001

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Section No.	Elevation ft	Size	Actual V K	Actual f _v ksi	Allow. F _v ksi	Ratio f _v F _v	Actual T kip-ft	Actual f _{vt} ksi	Allow. F _{vt} ksi	Ratio f _{vt} F _{vt}
L3	74 - 73	TP23.71x23.14x0.7036	15.35	0.301	26.000	0.023	1.62	0.034	26.000	0.001
	73 - 72		15.42	0.301	26.000	0.023	1.62	0.034	26.000	0.001
	72 - 71		15.48	0.307	26.000	0.024	1.63	0.034	26.000	0.001
	71 - 70		15.55	0.306	26.000	0.024	1.63	0.034	26.000	0.001
	70 - 69		16.17	0.317	26.000	0.024	1.63	0.033	26.000	0.001
L4	69 - 68	TP24.28x23.71x0.688	16.23	0.316	26.000	0.024	1.63	0.033	26.000	0.001
	68 - 67		16.30	0.322	26.000	0.025	1.64	0.033	26.000	0.001
	67 - 66		16.36	0.321	26.000	0.025	1.64	0.033	26.000	0.001
	66 - 65		16.42	0.321	26.000	0.025	1.64	0.032	26.000	0.001
	65 - 64		16.49	0.320	26.000	0.025	1.64	0.032	26.000	0.001
L5	64 - 63	TP24.85x24.28x0.6735	16.55	0.326	26.000	0.025	1.65	0.032	26.000	0.001
	63 - 62		16.61	0.325	26.000	0.025	1.65	0.032	26.000	0.001
	62 - 61		16.67	0.324	26.000	0.025	1.65	0.032	26.000	0.001
	61 - 60		16.73	0.324	26.000	0.025	1.65	0.031	26.000	0.001
L6	60 - 59	TP25.42x24.85x0.8984	16.79	0.244	26.000	0.019	1.66	0.024	26.000	0.001
	59 - 58		16.86	0.244	26.000	0.019	1.66	0.023	26.000	0.001
	58 - 57		16.92	0.243	26.000	0.019	1.66	0.023	26.000	0.001
	57 - 56		16.98	0.243	26.000	0.019	1.66	0.023	26.000	0.001
L7	56 - 55	TP25.99x25.42x0.8778	17.04	0.248	26.000	0.019	1.67	0.023	26.000	0.001
	55 - 54		17.11	0.247	26.000	0.019	1.67	0.023	26.000	0.001
	54 - 53		17.17	0.247	26.000	0.019	1.67	0.023	26.000	0.001
	53 - 52		17.23	0.246	26.000	0.019	1.67	0.023	26.000	0.001
L8	52 - 51	TP26.56x25.99x0.8584	17.29	0.251	26.000	0.019	1.67	0.023	26.000	0.001
	51 - 50		17.35	0.251	26.000	0.019	1.68	0.023	26.000	0.001
	50 - 49		17.41	0.250	26.000	0.019	1.68	0.022	26.000	0.001
	49 - 48		17.47	0.249	26.000	0.019	1.68	0.022	26.000	0.001
L9	48 - 47	TP27.13x26.56x0.9144	17.53	0.234	26.000	0.018	1.68	0.021	26.000	0.001
	47 - 46		17.59	0.234	26.000	0.018	1.69	0.021	26.000	0.001
	46 - 45		17.64	0.233	26.000	0.018	1.69	0.020	26.000	0.001
	45 - 44		17.70	0.233	26.000	0.018	1.69	0.020	26.000	0.001
L10	44 - 43	TP27.7x27.13x1.0728	17.76	0.199	26.000	0.015	1.69	0.017	26.000	0.001
	43 - 42		17.82	0.199	26.000	0.015	1.70	0.017	26.000	0.001
	42 - 41		17.88	0.198	26.000	0.015	1.70	0.017	26.000	0.001
	41 - 40		17.94	0.198	26.000	0.015	1.70	0.017	26.000	0.001
L11	40 - 39	TP28.27x27.7x1.0506	18.00	0.201	26.000	0.015	1.70	0.017	26.000	0.001
	39 - 38		18.05	0.201	26.000	0.015	1.71	0.017	26.000	0.001
	38 - 37		18.11	0.201	26.000	0.015	1.71	0.017	26.000	0.001
	37 - 36		18.17	0.200	26.000	0.015	1.71	0.016	26.000	0.001
L12	36 - 35	TP28.84x28.27x1.0296	18.22	0.204	26.000	0.016	1.71	0.017	26.000	0.001
	35 - 34		18.27	0.203	26.000	0.016	1.72	0.016	26.000	0.001
	34 - 33		18.33	0.203	26.000	0.016	1.72	0.016	26.000	0.001
	33 - 32		18.38	0.202	26.000	0.016	1.72	0.016	26.000	0.001
L13	32 - 31	TP29.41x28.84x1.0098	18.44	0.206	26.000	0.016	1.72	0.016	26.000	0.001
	31 - 30		18.49	0.205	26.000	0.016	1.73	0.016	26.000	0.001
	30 - 29		18.54	0.205	26.000	0.016	1.73	0.016	26.000	0.001
	29 - 28		18.59	0.204	26.000	0.016	1.73	0.016	26.000	0.001
L14	28 - 27	TP29.98x29.41x0.991	18.65	0.208	26.000	0.016	1.73	0.016	26.000	0.001
	27 - 26		18.70	0.207	26.000	0.016	1.74	0.016	26.000	0.001
	26 - 25		18.75	0.207	26.000	0.016	1.74	0.016	26.000	0.001
	25 - 24		18.80	0.206	26.000	0.016	1.74	0.016	26.000	0.001
L15	24 - 23	TP30.55x29.98x0.9732	18.85	0.209	26.000	0.016	1.74	0.016	26.000	0.001
	23 - 22		18.90	0.209	26.000	0.016	1.75	0.016	26.000	0.001
	22 - 21		18.95	0.208	26.000	0.016	1.75	0.015	26.000	0.001
	21 - 20		19.00	0.208	26.000	0.016	1.75	0.015	26.000	0.001
L16	20 - 19	TP31.12x30.55x0.9563	19.05	0.211	26.000	0.016	1.75	0.015	26.000	0.001
	19 - 18		19.10	0.211	26.000	0.016	1.76	0.015	26.000	0.001
	18 - 17		19.15	0.210	26.000	0.016	1.76	0.015	26.000	0.001
	17 - 16		19.20	0.210	26.000	0.016	1.76	0.015	26.000	0.001
L17	16 - 15	TP31.69x31.12x0.7818	19.25	0.254	26.000	0.020	1.76	0.018	26.000	0.001
	15 - 14		19.29	0.254	26.000	0.020	1.77	0.018	26.000	0.001

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	Project 80' PennSummit Monopole - 345 Bushy Hill Rd., Simsbury, CT Client AT&T Mobility	Date 16:54:14 04/10/14 Designed by jrm

Section No.	Elevation ft	Size	Actual V K	Actual f _v ksi	Allow. F _v ksi	Ratio f _v / F _v	Actual T kip-ft	Actual f _{vt} ksi	Allow. F _{vt} ksi	Ratio f _{vt} / F _{vt}
L18	14 - 13	TP32.26x31.69x0.7703	19.34	0.253	26.000	0.019	1.77	0.018	26.000	0.001
	13 - 12		19.38	0.253	26.000	0.019	1.77	0.018	26.000	0.001
	12 - 11		19.43	0.256	26.000	0.020	1.77	0.018	26.000	0.001
	11 - 10		19.47	0.255	26.000	0.020	1.78	0.018	26.000	0.001
	10 - 9		19.51	0.255	26.000	0.020	1.78	0.018	26.000	0.001
L19	9 - 8	TP32.83x32.26x0.7594	19.56	0.254	26.000	0.020	1.78	0.017	26.000	0.001
	8 - 7		19.60	0.257	26.000	0.020	1.78	0.018	26.000	0.001
	7 - 6		19.64	0.256	26.000	0.020	1.79	0.017	26.000	0.001
	6 - 5		19.69	0.256	26.000	0.020	1.79	0.017	26.000	0.001
	5 - 4		19.73	0.255	26.000	0.020	1.79	0.017	26.000	0.001
L20	4 - 3	TP33.4x32.83x0.7489	19.77	0.258	26.000	0.020	1.79	0.017	26.000	0.001
	3 - 2		19.81	0.258	26.000	0.020	1.80	0.017	26.000	0.001
	2 - 1		19.85	0.257	26.000	0.020	1.80	0.017	26.000	0.001
	1 - 0		19.90	0.256	26.000	0.020	1.80	0.017	26.000	0.001

Pole Interaction Design Data

Section No.	Elevation ft	Ratio P P _a	Ratio f _{bx} F _{bx}	Ratio f _{by} F _{by}	Ratio f _v F _v	Ratio f _{vt} F _{vt}	Comb. Stress Ratio	Allow. Stress Ratio	Criteria
L1	80 - 79	0.004	0.240	0.000	0.022	0.001	0.244	1.333	H1-3+VT ✓
	79 - 78	0.004	0.254	0.000	0.022	0.001	0.258	1.333	H1-3+VT ✓
	78 - 77	0.004	0.267	0.000	0.022	0.001	0.271	1.333	H1-3+VT ✓
	77 - 76	0.004	0.281	0.000	0.023	0.001	0.285	1.333	H1-3+VT ✓
	76 - 75	0.004	0.301	0.000	0.023	0.001	0.305	1.333	H1-3+VT ✓
L2	75 - 74	0.004	0.314	0.000	0.023	0.001	0.319	1.333	H1-3+VT ✓
	74 - 73	0.005	0.327	0.000	0.023	0.001	0.332	1.333	H1-3+VT ✓
	73 - 72	0.005	0.340	0.000	0.023	0.001	0.345	1.333	H1-3+VT ✓
	72 - 71	0.005	0.360	0.000	0.024	0.001	0.365	1.333	H1-3+VT ✓
	71 - 70	0.005	0.373	0.000	0.024	0.001	0.378	1.333	H1-3+VT ✓
L3	70 - 69	0.005	0.386	0.000	0.024	0.001	0.391	1.333	H1-3+VT ✓
	69 - 68	0.005	0.399	0.000	0.024	0.001	0.404	1.333	H1-3+VT ✓
	68 - 67	0.005	0.419	0.000	0.025	0.001	0.425	1.333	H1-3+VT ✓
	67 - 66	0.005	0.432	0.000	0.025	0.001	0.437	1.333	H1-3+VT ✓
L4	66 - 65	0.005	0.444	0.000	0.025	0.001	0.449	1.333	H1-3+VT ✓

<i>tnxTower</i> Centek Engineering Inc. 63-2 N. Branford Road Branford, CT 06405 Phone: (203) 488-0580 FAX: (203) 488-8587	Job	13298.000 - CT2413 w/ Prop Reinforcement	Page	39 of 42
	Project	80' PennSummit Monopole - 345 Bushy Hill Rd., Simsbury, CT	Date	16:54:14 04/10/14
	Client	AT&T Mobility	Designed by	jrm

Section No.	Elevation ft	Ratio P P_a	Ratio f_{bx} F_{bx}	Ratio f_{by} F_{by}	Ratio f_v F_v	Ratio f_{vt} F_{vt}	Comb. Stress Ratio	Allow. Stress Ratio	Criteria
	65 - 64	0.006	0.456	0.000	0.025	0.001	0.461	1.333	H1-3+VT ✓
L5	64 - 63	0.006	0.476	0.000	0.025	0.001	0.482	1.333	H1-3+VT ✓
	63 - 62	0.006	0.488	0.000	0.025	0.001	0.494	1.333	H1-3+VT ✓
	62 - 61	0.006	0.499	0.000	0.025	0.001	0.505	1.333	H1-3+VT ✓
	61 - 60	0.006	0.510	0.000	0.025	0.001	0.516	1.333	H1-3+VT ✓
L6	60 - 59	0.005	0.402	0.000	0.019	0.001	0.406	1.333	H1-3+VT ✓
	59 - 58	0.005	0.410	0.000	0.019	0.001	0.414	1.333	H1-3+VT ✓
	58 - 57	0.005	0.418	0.000	0.019	0.001	0.422	1.333	H1-3+VT ✓
	57 - 56	0.005	0.425	0.000	0.019	0.001	0.430	1.333	H1-3+VT ✓
L7	56 - 55	0.005	0.442	0.000	0.019	0.001	0.447	1.333	H1-3+VT ✓
	55 - 54	0.005	0.450	0.000	0.019	0.001	0.455	1.333	H1-3+VT ✓
	54 - 53	0.005	0.457	0.000	0.019	0.001	0.462	1.333	H1-3+VT ✓
	53 - 52	0.005	0.464	0.000	0.019	0.001	0.470	1.333	H1-3+VT ✓
L8	52 - 51	0.005	0.481	0.000	0.019	0.001	0.486	1.333	H1-3+VT ✓
	51 - 50	0.005	0.488	0.000	0.019	0.001	0.494	1.333	H1-3+VT ✓
	50 - 49	0.005	0.495	0.000	0.019	0.001	0.501	1.333	H1-3+VT ✓
	49 - 48	0.006	0.502	0.000	0.019	0.001	0.508	1.333	H1-3+VT ✓
L9	48 - 47	0.005	0.481	0.000	0.018	0.001	0.486	1.333	H1-3+VT ✓
	47 - 46	0.005	0.487	0.000	0.018	0.001	0.492	1.333	H1-3+VT ✓
	46 - 45	0.005	0.493	0.000	0.018	0.001	0.498	1.333	H1-3+VT ✓
	45 - 44	0.005	0.499	0.000	0.018	0.001	0.504	1.333	H1-3+VT ✓
L10	44 - 43	0.005	0.438	0.000	0.015	0.001	0.443	1.333	H1-3+VT ✓
	43 - 42	0.005	0.443	0.000	0.015	0.001	0.448	1.333	H1-3+VT ✓
	42 - 41	0.005	0.447	0.000	0.015	0.001	0.452	1.333	H1-3+VT ✓
	41 - 40	0.005	0.452	0.000	0.015	0.001	0.457	1.333	H1-3+VT ✓
L11	40 - 39	0.005	0.465	0.000	0.015	0.001	0.470	1.333	H1-3+VT ✓

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	Project	80' PennSummit Monopole - 345 Bushy Hill Rd., Simsbury, CT	Date	16:54:14 04/10/14
	Client	AT&T Mobility	Designed by	jrm

Section No.	Elevation ft	Ratio P P_a	Ratio f_{bx} F_{bx}	Ratio f_{by} F_{by}	Ratio f_v F_v	Ratio f_{vt} F_{vt}	Comb. Stress Ratio	Allow. Stress Ratio	Criteria
	39 - 38	0.005	0.470	0.000	0.015	0.001	0.475	1.333	H1-3+VT ✓
	38 - 37	0.005	0.474	0.000	0.015	0.001	0.480	1.333	H1-3+VT ✓
	37 - 36	0.005	0.479	0.000	0.015	0.001	0.484	1.333	H1-3+VT ✓
L12	36 - 35	0.006	0.492	0.000	0.016	0.001	0.497	1.333	H1-3+VT ✓
	35 - 34	0.006	0.496	0.000	0.016	0.001	0.502	1.333	H1-3+VT ✓
	34 - 33	0.006	0.500	0.000	0.016	0.001	0.506	1.333	H1-3+VT ✓
	33 - 32	0.006	0.504	0.000	0.016	0.001	0.510	1.333	H1-3+VT ✓
L13	32 - 31	0.006	0.517	0.000	0.016	0.001	0.523	1.333	H1-3+VT ✓
	31 - 30	0.006	0.521	0.000	0.016	0.001	0.527	1.333	H1-3+VT ✓
	30 - 29	0.006	0.525	0.000	0.016	0.001	0.531	1.333	H1-3+VT ✓
	29 - 28	0.006	0.529	0.000	0.016	0.001	0.535	1.333	H1-3+VT ✓
L14	28 - 27	0.006	0.542	0.000	0.016	0.001	0.548	1.333	H1-3+VT ✓
	27 - 26	0.006	0.545	0.000	0.016	0.001	0.552	1.333	H1-3+VT ✓
	26 - 25	0.006	0.549	0.000	0.016	0.001	0.556	1.333	H1-3+VT ✓
	25 - 24	0.006	0.553	0.000	0.016	0.001	0.559	1.333	H1-3+VT ✓
L15	24 - 23	0.007	0.565	0.000	0.016	0.001	0.572	1.333	H1-3+VT ✓
	23 - 22	0.007	0.569	0.000	0.016	0.001	0.576	1.333	H1-3+VT ✓
	22 - 21	0.007	0.572	0.000	0.016	0.001	0.579	1.333	H1-3+VT ✓
	21 - 20	0.007	0.576	0.000	0.016	0.001	0.583	1.333	H1-3+VT ✓
L16	20 - 19	0.007	0.588	0.000	0.016	0.001	0.595	1.333	H1-3+VT ✓
	19 - 18	0.007	0.592	0.000	0.016	0.001	0.599	1.333	H1-3+VT ✓
	18 - 17	0.007	0.595	0.000	0.016	0.001	0.602	1.333	H1-3+VT ✓
	17 - 16	0.007	0.598	0.000	0.016	0.001	0.605	1.333	H1-3+VT ✓
L17	16 - 15	0.009	0.723	0.000	0.020	0.001	0.732	1.333	H1-3+VT ✓
	15 - 14	0.009	0.726	0.000	0.020	0.001	0.735	1.333	H1-3+VT ✓
	14 - 13	0.009	0.730	0.000	0.019	0.001	0.739	1.333	H1-3+VT ✓

tnxTower Centek Engineering Inc. 63-2 N. Branford Road Branford, CT 06405 Phone: (203) 488-0580 FAX: (203) 488-8587	Job	13298.000 - CT2413 w/ Prop Reinforcement	Page	41 of 42
	Project	80' PennSummit Monopole - 345 Bushy Hill Rd., Simsbury, CT	Date	16:54:14 04/10/14
	Client	AT&T Mobility	Designed by	jrm

Section No.	Elevation ft	Ratio P P_a	Ratio f_{bx} F_{bx}	Ratio f_{by} F_{by}	Ratio f_v F_v	Ratio f_{vt} F_{vt}	Comb. Stress Ratio	Allow. Stress Ratio	Criteria
	13 - 12	0.009	0.734	0.000	0.019	0.001	0.743	1.333	H1-3+VT ✓
L18	12 - 11	0.009	0.747	0.000	0.020	0.001	0.757	1.333	H1-3+VT ✓
	11 - 10	0.009	0.751	0.000	0.020	0.001	0.760	1.333	H1-3+VT ✓
	10 - 9	0.009	0.754	0.000	0.020	0.001	0.764	1.333	H1-3+VT ✓
	9 - 8	0.009	0.757	0.000	0.020	0.001	0.767	1.333	H1-3+VT ✓
L19	8 - 7	0.010	0.771	0.000	0.020	0.001	0.780	1.333	H1-3+VT ✓
	7 - 6	0.010	0.774	0.000	0.020	0.001	0.784	1.333	H1-3+VT ✓
	6 - 5	0.010	0.777	0.000	0.020	0.001	0.787	1.333	H1-3+VT ✓
	5 - 4	0.010	0.780	0.000	0.020	0.001	0.790	1.333	H1-3+VT ✓
L20	4 - 3	0.010	0.794	0.000	0.020	0.001	0.803	1.333	H1-3+VT ✓
	3 - 2	0.010	0.797	0.000	0.020	0.001	0.807	1.333	H1-3+VT ✓
	2 - 1	0.010	0.799	0.000	0.020	0.001	0.810	1.333	H1-3+VT ✓
	1 - 0	0.010	0.802	0.000	0.020	0.001	0.812	1.333	H1-3+VT ✓

Section Capacity Table

Section No.	Elevation ft	Component Type	Size	Critical Element	P K	SF* P_{allow} K	% Capacity	Pass Fail
L1	80 - 76	Pole	TP22.57x22x0.7379	1	-8.40	2658.24	21.4	Pass
L2	76 - 72	Pole	TP23.14x22.57x0.7202	2	-9.16	2664.32	25.9	Pass
L3	72 - 68	Pole	TP23.71x23.14x0.7036	3	-10.27	2671.01	30.3	Pass
L4	68 - 64	Pole	TP24.28x23.71x0.688	4	-11.08	2678.28	34.6	Pass
L5	64 - 60	Pole	TP24.85x24.28x0.6735	5	-11.89	2686.78	38.7	Pass
L6	60 - 56	Pole	TP25.42x24.85x0.8984	6	-12.94	3635.13	32.3	Pass
L7	56 - 52	Pole	TP25.99x25.42x0.8778	7	-14.00	3637.33	35.2	Pass
L8	52 - 48	Pole	TP26.56x25.99x0.8584	8	-15.06	3640.42	38.1	Pass
L9	48 - 44	Pole	TP27.13x26.56x0.9144	9	-16.20	3955.46	37.8	Pass
L10	44 - 40	Pole	TP27.7x27.13x1.0728	10	-17.54	4713.53	34.3	Pass
L11	40 - 36	Pole	TP28.27x27.7x1.0506	11	-18.88	4718.65	36.3	Pass
L12	36 - 32	Pole	TP28.84x28.27x1.0296	12	-20.23	4724.74	38.3	Pass
L13	32 - 28	Pole	TP29.41x28.84x1.0098	13	-21.57	4732.15	40.1	Pass
L14	28 - 24	Pole	TP29.98x29.41x0.991	14	-22.93	4740.33	42.0	Pass
L15	24 - 20	Pole	TP30.55x29.98x0.9732	15	-24.29	4749.57	43.7	Pass
L16	20 - 16	Pole	TP31.12x30.55x0.9563	16	-25.65	4759.70	45.4	Pass
L17	16 - 12	Pole	TP31.69x31.12x0.7818	17	-26.82	3987.23	55.7	Pass
L18	12 - 8	Pole	TP32.26x31.69x0.7703	18	-28.00	4002.49	57.5	Pass
L19	8 - 4	Pole	TP32.83x32.26x0.7594	19	-29.19	4018.65	59.3	Pass
L20	4 - 0	Pole	TP33.4x32.83x0.7489	20	-30.38	4034.82	61.0	Pass

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	Project 80' PennSummit Monopole - 345 Bushy Hill Rd., Simsbury, CT	Date 16:54:14 04/10/14
	Client AT&T Mobility	Designed by jrm

Section No.	Elevation ft	Component Type	Size	Critical Element	P K	SF*P _{allow} K	% Capacity	Pass Fail
						Summary		
						Pole (L20)	61.0	Pass
						RATING =	61.0	Pass

Program Version 6.0.0.8 - 9/7/2011 File:J:\Jobs\1329800.WI\04_Structural\Rev 1\Backup Documentation\Calcs\ERI Files\2 - Main Monopole Analysis w Bar Reinf\80' PennSummit Monopole Simsbury w_extension.eri

Reinforced Monopole Section Properties and Reinforcement Calculator

Project:	AT&T CT2413 - Simsbury
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Location:	345 Bushy Hill Road, Simsbury, CT.
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Job No.	13298.000
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4/7/2014

Prepared by:	JRM
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JRM

Max Steel Usage Prior to Reinforcement =	173.36	%
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Max Steel Usage with Reinforcement =	84.23 %
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Main Reinforcement

Height	Moment (ft-kips)	Axial Force (kips)	Shear Force (kips)	Diameter (in)	Distance to Vertex, Cpole (in)	Original Thickness, tpole (in)	Pole Bend Radius 4x Dia (in)	Width of Flat, w (in)	No. Of Sides	fy (ksi)	Reinf. Bar Symmetrical (Y/N)?	No. of Reinf. Plates (n)	Reinf. Plate Width (in)	Reinf. Plate Thickness (in)	Per Piece Area of Reinf Only (in2)	Per Piece Ix of Reinf Only (in4)
80	202.20	5.40	15.19	22.000	11.1760	0.1875	0.75	3.5420	18	65	N	4	4.00	1.25	5.000	0.651
78	238.20	5.66	15.31	22.285	11.3208	0.1875	0.75	3.5922	18	65	N	4	4.00	1.25	5.000	0.651
76.25	269.71	5.88	15.40	22.534	11.4475	0.1875	0.75	3.6361	18	65	N	4	4.00	1.25	5.000	0.651
76	274.10	5.91	15.42	22.570	11.4656	0.1875	0.75	3.6423	18	65	N	4	4.00	1.25	5.000	0.651
74	309.20	6.17	15.53	22.855	11.6103	0.1875	0.75	3.6925	18	65	N	4	4.00	1.25	5.000	0.651
72	344.31	6.42	15.65	23.140	11.7551	0.1875	0.75	3.7426	18	65	N	4	4.00	1.25	5.000	0.651
70	379.41	6.68	15.76	23.425	11.8999	0.1875	0.75	3.7928	18	65	N	4	4.00	1.25	5.000	0.651
68	414.51	6.93	15.87	23.710	12.0447	0.1875	0.75	3.8430	18	65	N	4	4.00	1.25	5.000	0.651
66	449.62	7.19	15.98	23.995	12.1895	0.1875	0.75	3.8931	18	65	N	4	4.00	1.25	5.000	0.651
64	484.72	7.44	16.10	24.280	12.3342	0.1875	0.75	3.9433	18	65	N	4	4.00	1.25	5.000	0.651
62	519.83	7.70	16.21	24.565	12.4790	0.1875	0.75	3.9934	18	65	N	4	4.00	1.25	5.000	0.651
60	554.93	7.95	16.32	24.850	12.6238	0.1875	0.75	4.0436	18	65	N	4	4.00	1.25	5.000	0.651
58.5	581.26	8.14	16.41	25.064	12.7324	0.1875	0.75	4.0812	18	65	Y	6	4.00	1.25	5.000	0.651
58	590.04	8.21	16.44	25.135	12.7686	0.1875	0.75	4.0938	18	65	Y	6	4.00	1.25	5.000	0.651
56	625.14	8.46	16.55	25.420	12.9134	0.1875	0.75	4.1439	18	65	Y	6	4.00	1.25	5.000	0.651
54	660.24	8.72	16.66	25.705	13.0581	0.1875	0.75	4.1941	18	65	Y	6	4.00	1.25	5.000	0.651
52	695.35	8.97	16.78	25.990	13.2029	0.1875	0.75	4.2442	18	65	Y	6	4.00	1.25	5.000	0.651
50	730.45	9.23	16.89	26.275	13.3477	0.1875	0.75	4.2944	18	65	Y	6	4.00	1.25	5.000	0.651
48	765.56	9.48	17.00	26.560	13.4925	0.1875	0.75	4.3446	18	65	Y	6	4.00	1.25	5.000	0.651
46	800.66	9.74	17.12	26.845	13.6373	0.250	1.00	4.2847	18	65	Y	6	4.00	1.25	5.000	0.651
45	818.21	9.87	17.17	26.988	13.7097	0.250	1.00	4.3098	18	65	Y	6	4.00	1.25	5.000	0.651
44	835.77	9.99	17.23	27.130	13.7820	0.250	1.00	4.3349	18	65	Y	6	4.00	1.25	5.000	0.651
42	870.87	10.25	17.34	27.415	13.9268	0.250	1.00	4.3850	18	65	Y	6	4.00	1.25	5.000	0.651
40	905.98	10.51	17.45	27.700	14.0716	0.250	1.00	4.4352	18	65	Y	6	5.00	1.25	6.250	0.814
38	941.08	10.76	17.57	27.985	14.2164	0.250	1.00	4.4854	18	65	Y	6	5.00	1.25	6.250	0.814
36	976.18	11.02	17.68	28.270	14.3612	0.250	1.00	4.5355	18	65	Y	6	5.00	1.25	6.250	0.814
34	1011.29	11.27	17.79	28.555	14.5059	0.250	1.00	4.5857	18	65	Y	6	5.00	1.25	6.250	0.814
32	1046.39	11.53	17.91	28.840	14.6507	0.250	1.00	4.6358	18	65	Y	6	5.00	1.25	6.250	0.814
30	1081.50	11.78	18.02	29.125	14.7955	0.250	1.00	4.6860	18	65	Y	6	5.00	1.25	6.250	0.814
28	1116.60	12.04	18.13	29.410	14.9403	0.250	1.00	4.7362	18	65	Y	6	5.00	1.25	6.250	0.814
26	1151.71	12.29	18.25	29.695	15.0851	0.250	1.00	4.7863	18	65	Y	6	5.00	1.25	6.250	0.814
24	1186.81	12.55	18.36	29.980	15.2298	0.250	1.00	4.8365	18	65	Y	6	5.00	1.25	6.250	0.814
22	1221.91	12.80	18.47	30.265	15.3746	0.250	1.00	4.8866	18	65	Y	6	5.00	1.25	6.250	0.814
20	1257.02	13.06	18.59	30.550	15.5194	0.250	1.00	4.9368	18	65	Y	6	5.00	1.25	6.250	0.814
18	1292.12	13.31	18.70	30.835	15.6642	0.250	1.00	4.9870	18	65	Y	6	5.00	1.25	6.250	0.814
16	1327.23	13.57	18.81	31.120	15.8090	0.250	1.00	5.0371	18	65	Y	6	5.00	1.25	6.250	0.814
14	1362.33	13.82	18.93	31.405	15.9537	0.250	1.00	5.0873	18	65	N	4	5.00	1.25	6.250	0.814
12	1397.44	14.08	19.04	31.690	16.0985	0.250	1.00	5.1374	18	65	N	4	5.00	1.25	6.250	0.814
10	1432.54	14.33	19.15	31.975	16.2433	0.250	1.00	5.1876	18	65	N	4	5.00	1.25	6.250	0.814
8	1467.65	14.59	19.26	32.260	16.3881	0.250	1.00	5.2378	18	65	N	4	5.00	1.25	6.250	0.814
6	1502.75	14.84	19.38	32.545	16.5329	0.250	1.00	5.2879	18	65	N	4	5.00	1.25	6.250	0.814
4	1537.85	15.10	19.49	32.830	16.6776	0.250	1.00	5.3381	18	65	N	4	5.00	1.25	6.250	0.814
2	1572.96	15.35	19.60	33.115	16.8224	0.250	1.00	5.3882	18	65	N	4	5.00	1.25	6.250	0.814
0	1642.38	15.61	19.83	33.400	16.9672	0.250	1.00	5.4384	18	65	N	4	5.00	1.25	6.250	0.814

			Reinforcing Plate and Connection Properties															
			Reinforcing Bar Yield Strength					65										
			Effective Length Factor (K)					1										
			Shear Lag Factor Bolts (U)					1										
			Shear Lag Factor Weld (U)					1										
			Reinf Plate Yield Strength (Fu)					65										
			Reinf Plate Ultimate Strength (Fu)					80										
			AJAX Bolt Ultimate Strength (Fu)					120										
			AJAX Bolt Yield Strength					92										
			AJAX Bolt Allowable Shear Strength					48										
			AJAX Bolt Diameter (in)					0.75										
			Weld Size in Sixteenths					10										
			Weld capacity per Linear inch					9.28										
Secondary Reinforcement										Original Monopole Properties			Reinforced Properties					
No. of Reinf. Plates (n)	Reinf. Plate Width (in)	Reinf. Plate Thickness (in)	Per Piece Area of Reinf Only (in2)	Per Piece Ix of Reinf Only (in4)	Connector Spacing (in)	Bolt Hole Diameter (in)	Sleeve Dia. (in)	Center Hole Spacing (in)	Dist. Face of Pole to Reinf. Bar Centroid (in)	Dist. Face of Pole Flat (in)	Area (in2)	Ix (in4)	Sx (in3)	Ax Total (in2)	Imod (in4)	Ix total (in4)	Sx total (in3)	Eq. Pole Inside Dia. (in)
			0.000	0.000	18	1.25	1.1417	3.00	0.625	11.000	12.9812	780.3007	139.6386303	32.9812	2072.9434	2853.2441	259.3858	20.4861
			0.000	0.000	18	1.25	1.1417	3.00	0.625	11.143	13.1508	811.2880	143.3272332	33.1508	2124.0754	2935.3635	263.4385	20.7905
			0.000	0.000	18	1.25	1.1417	3.00	0.625	11.267	13.2992	839.0658	146.5942075	33.2992	2169.3270	3008.3928	267.0048	21.0562
			0.000	0.000	18	1.25	1.1417	3.00	0.625	11.285	13.3204	843.0851	147.0639236	33.3204	2175.8304	3018.9155	267.5158	21.0942
			0.000	0.000	18	1.25	1.1417	3.00	0.625	11.428	13.4900	875.7024	150.8487013	33.4900	2228.2084	3103.9107	271.6177	21.3972
			0.000	0.000	18	1.25	1.1417	3.00	0.625	11.570	13.6596	909.1502	154.6815665	33.6596	2281.2093	3190.3595	275.7441	21.6997
			0.000	0.000	18	1.25	1.1417	3.00	0.625	11.713	13.8292	943.4391	158.5625191	33.8292	2334.8332	3278.2722	279.8952	22.0015
			0.000	0.000	18	1.25	1.1417	3.00	0.625	11.855	13.9988	978.5794	162.4915591	33.9988	2389.0800	3367.6594	284.0708	22.3028
			0.000	0.000	18	1.25	1.1417	3.00	0.625	11.998	14.1684	1014.5817	166.4686865	34.1684	2443.9498	3458.5315	288.2710	22.6036
			0.000	0.000	18	1.25	1.1417	3.00	0.625	12.140	14.3380	1051.4563	170.4939013	34.3380	2499.4425	3550.8989	292.4958	22.9039
			0.000	0.000	18	1.25	1.1417	3.00	0.625	12.283	14.5077	1089.2138	174.5672036	34.5077	2555.5583	3644.7721	296.7451	23.2037
			0.000	0.000	18	1.25	1.1417	3.00	0.625	12.425	14.6773	1127.8645	178.6885932	34.6773	2612.2970	3740.1615	301.0190	23.5031
			0.000	0.000	18	1.25	1.1417	3.00	0.625	12.532	14.8045	1157.4451	181.8111929	44.8045	3894.8256	5052.2706	403.1536	23.2399
			0.000	0.000	18	1.25	1.1417	3.00	0.625	12.568	14.8469	1167.4189	182.8580703	44.8469	3915.9463	5083.3652	404.4850	23.3167
			0.000	0.000	18	1.25	1.1417	3.00	0.625	12.710	15.0165	1207.8875	187.0756348	45.0165	4001.0001	5208.8876	409.8259	23.6233
			0.000	0.000	18	1.25	1.1417	3.00	0.625	12.853	15.1861	1249.2807	191.3412867	45.1861	4086.9676	5336.2483	415.1915	23.9292
			0.000	0.000	18	1.25	1.1417	3.00	0.625	12.995	15.3557	1291.6088	195.6550261	45.3557	4173.8490	5465.4578	420.5816	24.2345
			0.000	0.000	18	1.25	1.1417	3.00	0.625	13.138	15.5253	1334.8825	200.0168528	45.5253	4261.6441	5596.5266	425.9963	24.5391
			0.000	0.000	18	1.25	1.1417	3.00	0.625	13.280	15.6949	1379.1120	204.426767	45.6949	4350.3531	5729.4651	431.4356	24.8432
			0.000	0.000	18	1.25	1.1417	3.00	0.625	13.423	21.1031	1885.7511	276.558646	51.1031	4439.9758	6325.7268	471.2778	24.9976
			0.000	0.000	18	1.25	1.1417	3.00	0.625	13.494	21.2162	1916.2262	279.544146	51.2162	4485.1298	6401.3560	474.3941	25.1495
			0.000	0.000	18	1.25	1.1417	3.00	0.625	13.565	21.3293	1947.0279	282.5456751	51.3293	4530.5123	6477.5401	477.5186	25.3012
			0.000	0.000	18	1.25	1.1417	3.00	0.625	13.708	21.5554	2009.6180	288.5968208	51.5554	4621.9625	6631.5805	483.7921	25.6042
			0.000	0.000	18	1.25	1.1417	3.00	0.625	13.850	21.7816	2073.5353	294.712083	59.2816	5892.9082	7966.4435	575.1945	25.5544
			0.000	0.000	18	1.25	1.1417	3.00	0.625	13.993	22.0077	2138.7937	300.8914617	59.5077	6009.5055	8148.2992	582.3333	25.8619
			0.000	0.000	18	1.25	1.1417	3.00	0.625	14.135	22.2339	2205.4071	307.134957	59.7339	6127.2450	8332.6521	589.5049	26.1688
			0.000	0.000	18	1.25	1.1417	3.00	0.625	14.278	22.4600	2273.3895	313.4425688	59.9600	6246.1267	8519.5163	596.7092	26.4750
			0.000	0.000	18	1.25	1.1417	3.00	0.625	14.420	22.6862	2342.7549	319.8142971	60.1862	6366.1507	8708.9056	603.9463	26.7807
			0.000	0.000	18	1.25	1.1417	3.00	0.625	14.563	22.9123	2413.5170	326.250142	60.4123	6487.3169	8900.8339	611.2161	27.0858
			0.000	0.000	18	1.25	1.1417	3.00	0.625	14.705	23.1385	2485.6899	332.7501034	60.6385	6609.6253	9095.3152	618.5185	27.3904
			0.000	0.000	18	1.25	1.1417	3.00	0.625	14.848	23.3646	2559.2874	339.3141814	60.8646	6733.0760	9292.3633	625.8537	27.6944
			0.000	0.000	18	1.25	1.1417	3.00	0.625	14.990	23.5908	2634.3235	345.9423759	61.0908	6857.6688	9491.9923	633.2216	27.9979
			0.000	0.000	18	1.25	1.1417	3.00	0.625	15.133	23.8169	2710.8122	352.634687	61.3169	6983.4039	9694.2161	640.6222	28.3010
			0.000	0.000	18	1.25	1.1417	3.00	0.625	15.275	24.0431	2788.7672	359.3911146	61.5431	7110.2813	9899.0485	648.0555	28.6036
			0.000	0.000	18	1.25	1.1417	3.00	0.625	15.418	24.2692	2868.2027	366.2116587	61.7692	7238.3008	10106.5035	655.5215	28.9057
			0.000	0.000	18	1.25	1.1417	3.00	0.625	15.560	24.4953	2949.1324	373.0963195	61.9953	7367.4626	10316.5950	663.0202	29.2074
4	3.50	1.5	5.250	0.984	18	1.25	1.1417	3.00	0.625	15.703	24.7215	3031.5703	380.0450967	49.7215	6015.9042	9047.4745	576.1805	29.7982
4	3.50	1.5	5.250	0.984	18	1.25	1.1417	3.00	0.625	15.845	24.9476	3115.5304	387.0579905	49.9476	5955.7369	9071.2673	572.5003	30.1263
4	3.50	1.5	5.250	0.984	18	1.25	1.1417	3.00	0.625	15.988	25.1738	3201.0265	394.1350009	50.1738	6059.2419	9260.2685	579.2193	30.4230
4	3.50	1.5	5.250	0.984	18	1.25	1.1417	3.00	0.625	16.130	25.3999	3288.0726	401.2761278	50.3999	6163.6387	9451.7113	585.9709	30.7193
4	3.50	1.5	5.250	0.984	18	1.25	1.1417	3.00	0.625	16.273	25.6261	3376.6827	408.4813713	50.6261	6268.9271	9645.6097	592.7552	31.0154
4	3.50	1.5	5.250	0.984	18	1.25	1.1417	3.00	0.625	16.415	25.8522	3466.8705	415.7507313	50.8522	6375.1071	9841.9776	599.5722	31.3112
4	3.50	1.5	5.250	0.984	18	1.25	1.1417	3.00	0.625	16.558	26.0784	3558.6501	423.0842079	51.0784	6482.1789	10040.8290	606.4218	31.6069
4	3.50	1.5	5.250	0.984	18	1.25	1.1417	3.00	0.625	16.700	26.3045	3652.0354	430.4818011	51.3045	6590.1423	10242.1777	613.3041	31.9022

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Title :
Dsgnr:
Description :

Job #
Date: 2:06PM, 10 APR 14

Scope :

Rev: 580006
User: KW-0607028, Ver 5.8.0, 1-Dec-2003
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Built-Up Section Properties

Page 1
Stiffener Plate Section Prop.ecw:Calculations

Description Stiffener Plate Section Properties at Anchor Bolt End

General Information

Type...							
#1	Rectangular	Height	12.0000 in	Width	1.2500 in	X cg	Y cg
						0.0000 in	0.0000 in

Summary

Total Area	15.0000 in2	lxx	180.000 in4	r xx	3.4641 in
X cg Dist.	0.0000 in	lyy	1.953 in4	r yy	0.3608 in
Y cg Dist.	0.0000 in	Edge Distances from CG...			
		+X	0.6250 in	S left	3.1250 in3
		-X	-0.6250 in	S right	3.1250 in3
		+Y	6.0000 in	S top	30.0000 in3
		-Y	-6.0000 in	S bottom	30.0000 in3

Title :
Dsgnr:
Description :

Job #
Date: 2:03PM, 10 APR 14

Scope :

Rev: 580006
User: KW-0607028, Ver 5.8.0, 1-Dec-2003
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Built-Up Section Properties

Page 1
Stiffener Plate Section Prop.ecw:Calculations

Description Base Plate and Stiffener Section Properties at Pole Shell

General Information

Type...					X cg	Y cg
#1 Rectangular	Height	54.0000 in	Width	1.2500 in	0.0000 in	0.0000 in
#2 Rectangular	Height	2.0000 in	Width	19.7500 in	0.0000 in	-28.0000 in

Summary

Total Area	107.0000 in2	Ixx	35,951.555 in4	r xx	18.3302 in
X cg Dist.	0.0000 in	Iyy	1,292.745 in4	r yy	3.4759 in
Y cg Dist.	-10.3364 in	Edge Distances from CG...			
		+X	9.8750 in	S left	130.9109 in3
		-X	-9.8750 in	S right	130.9109 in3
		+Y	37.3364 in	S top	962.9077 in3
		-Y	-18.6636 in	S bottom	1,926.2976 in3

SHELL ANALYSIS BETWEEN BASE PLATE AND TRANSFER STIFFENER per AISC 9th Ed - ASD

Monopole Shell Analysis Calculation based on "Analysis of Some thin walled Structures", Von Karman, ASME paper AER-55-19C, Aer Eng Vol. 5, No. 4, 1933.:

Input Data:

Density of Steel =	$\gamma_s := 0.490 \text{ kcf}$	(User Input)
Youngs Modulus of Elasticity for Steel =	$E := 29500 \text{ ksi}$	(User Input)
Shell/Stiffener Yield Strength =	$F_y := 50 \text{ ksi}$	(User Input)
Monopole Shell Allowable Shear Stress =	$F_v := 26.00 \text{ ksi}$	(User Input)
Diameter of Monopole =	$OD_{\text{Monopole}} := 33.40 \text{ in}$	(User Input)
Radius of Monopole =	$r_c := \frac{OD_{\text{Monopole}}}{2} = 16.7 \text{ in}$	(User Input)
Distance From Face of Monopole to Clipped Corner of Base Plate =	$w_{bp} := 5.78 \text{ in}$	(User Input)
Width of Stiffener =	$w_g := 8.66 \text{ in}$	(User Input)
Thickness of Stiffener =	$t_g := 1.250 \text{ in}$	(User Input)
Monopole Wall Thickness at Base =	$t_s := 0.250 \text{ in}$	(User Input)
Thickness of Existing Base Plate =	$t_{bp} := 2.0 \text{ in}$	(User Input)
Number of Stiffeners =	$N_s := 4$	(User Input)
K Factor Between Hangers/Stiffeners in Calculating Tangential Tensile Forces and Bending Moment in Ring =	$k_1 := 0.500$	(User Input)
	$k_2 := 0.136$	(User Input)
Maximum Existing Anchor Bolt Force (P) =	$P_1 := 118 \text{ kips}$	(User Input)
Maximum Proposed Anchor Bolt Force (P) =	$P_2 := 181 \text{ kips}$	(User Input)
Radial Bolt Distance From Face of Monopole Shell to Centerline of Existing Anchor Bolt in inches (a) =	$a_1 := 2.80 \text{ in}$	(User Input)
Radial Bolt Distance From Face of Monopole Shell to Centerline of Proposed Anchor Bolt in inches (a) =	$a_2 := 12.80 \text{ in}$	(User Input)
Interior Pressure =	$p := 0 \text{ psi}$	(User Input)
Gussett Height in inches (h) =	$h := 54.00 \text{ in}$	(User Input)

Tensile Stress in the direction of the Tangent
 to the Circumference (Hoop Stress) =

$$\sigma_{cp} := \frac{(\rho \cdot r_c)}{t_s} = 0$$

Tensile Stress in the direction of the Meridian
 (Longitudinal Stress) =

$$\sigma_{mp} := \frac{(\rho \cdot r_c)}{2t_s} = 0$$

$$\sigma_r := 0$$

Moment on Shell Section from Forces
 Applied to Hanger/Stiffener

$$Ma_1 := P_1 \cdot a_1 = 330.4 \cdot \text{in} \cdot \text{kips}$$

$$Ma_2 := P_2 \cdot a_2 = 2316.8 \cdot \text{in} \cdot \text{kips}$$

$$Ma_{total} := Ma_1 + Ma_2 = 2647.2 \cdot \text{in} \cdot \text{kips}$$

Effective Width of Shell "e" Each Side of
 Hanger/Stiffener

$$e := \frac{(\sqrt{t_s \cdot r_c})}{2} = 1.022 \cdot \text{in}$$

Radial Force Applied to Top and Bottom of
 Stiffener =

$$F_1 := \frac{Ma_{total}}{h + e} = 48.11 \cdot \text{kips}$$

$$d := t_g + 2 \cdot e = 3.293 \cdot \text{in}$$

Area of Ring Section Tributary to Stiffener =

$$A_1 := d \cdot t_s = 0.823 \cdot \text{in}^2$$

Area of Ring Section Tributary to Stiffener =

$$A_2 := w_{bp} \cdot t_{bp} = 11.56 \cdot \text{in}^2$$

Total Area of Ring Section Tributary to Stiffener =

$$A_{total} := A_1 + A_2 = 12.38 \cdot \text{in}^2$$

$$d_1 := w_g$$

$$d_2 := \frac{w_{bp}}{2} = 2.89 \cdot \text{in}$$

$$M_1 := A_1 \cdot d_1 = 7.13 \cdot \text{in}^3$$

$$M_2 := A_2 \cdot d_2 = 33.408 \cdot \text{in}^3$$

$$M_{total} := M_1 + M_2 = 40.538 \cdot \text{in}^3$$

$$Ix_1 := M_1 \cdot d_1 = 61.75 \cdot \text{in}^4$$

$$Ix_2 := M_2 \cdot d_2 = 96.55 \cdot \text{in}^4$$

$$I_{g1} := \frac{d \cdot t_s^3}{12} = 0.004 \cdot \text{in}^4$$

$$I_{g2} := \frac{t_{bp} \cdot w_{bp}^3}{12} = 32.18 \cdot \text{in}^4$$

$$I_{x_{total}} := I_{x_1} + I_{x_2} + I_{g_1} + I_{g_2} = 190.48 \cdot \text{in}^4$$

Moment of Inertia About Neutral Axis =

$$I_{NA} := I_{x_{total}} - \frac{M_{total}^2}{A_{total}} = 57.78 \cdot \text{in}^4$$

Neutral Axis =

$$C_b := \frac{M_{total}}{A_{total}} = 3.27 \cdot \text{in}$$

$$T := k_1 \cdot F_1 = 24.06 \cdot \text{kips}$$

$$\sigma_{ct} := \frac{T}{A_{total}} = 1.943 \cdot \text{ksi}$$

$$M_r := k_2 \cdot F_1 \cdot r_c = 109.27 \cdot \text{in} \cdot \text{kips}$$

Maximum Bending Stress at Hanger/Stiffener =

$$\sigma_{cb} := \frac{(M_r \cdot C_b)}{I_{NA}} = 6.19 \cdot \text{ksi}$$

$$\sigma_{cpadj} := \sigma_{cp} \cdot \left(\frac{d \cdot t_s}{A_{total}} \right) = 0$$

Maximum Tangential (Circumferential) Stress in 1" Ring =

$$\sigma_c := \sigma_{cp} + \sigma_{ct} + \sigma_{cb} = 8.13 \cdot \text{ksi}$$

Maximum Shear Stress in 1" Ring (Equal to Half the
 Difference of the Two Principal Stresses) =

$$\tau_{max} := \frac{(\sigma_c - \sigma_r)}{2} = 4.07 \cdot \text{ksi}$$

Summary: Values within
 Allowable Limits - Okay By
 Inspection

Anchor Bolt and Base Plate Analysis:

Input Data:

Tower Reactions:

Overturning Moment =	OM := 1640-ft-kips	(Input From RisaTower)
Shear Force =	Shear := 20-kips	(Input From RisaTower)
Axial Force =	Axial := 16-kips	(Input From RisaTower)

Existing Anchor Bolt Data:

Use ASTM A615 Grade 75

Number of Anchor Bolts =	$N_b := 8$	(User Input)
Diameter of Bolt Circle =	$D_{bc} := 39.00\text{-in}$	(User Input)
Bolt "Column" Distance =	$l_c := 3.0\text{-in}$	(User Input)
Bolt Ultimate Strength =	$F_u := 100\text{-ksi}$	(User Input)
Bolt Yield Strength =	$F_y := 75\text{-ksi}$	(User Input)
Bolt Modulus =	$E := 29000\text{-ksi}$	(User Input)
Diameter of Anchor Bolts =	$D := 2.25\text{-in}$	(User Input)
Threads per Inch =	$n := 4.5$	(User Input)

Proposed Anchor Bolt Data:

Use ASTM A722 GR.B7

Number of Anchor Bolts =	$N_2 := 4$	(User Input)
Diameter of Bolt Circle =	$D_{bc2} := 62.22\text{-in}$	(User Input)
Bolt "Column" Distance =	$l_2 := 3.0\text{-in}$	(User Input)
Bolt Ultimate Strength =	$F_{u2} := 150\text{-ksi}$	(User Input)
Bolt Yield Strength =	$F_{y2} := 127.7\text{-ksi}$	(User Input)
Bolt Modulus =	$E_2 := 29000\text{-ksi}$	(User Input)
Diameter of Anchor Bolts =	$D_2 := 1.75\text{-in}$	(User Input)
Threads per Inch =	$n_2 := 3.5$	(User Input)

Base Plate Data:

Use ASTM A572 GR 60

Plate Yield Strength =	$F_{ybp} := 60\text{-ksi}$	(User Input)
Base Plate Thickness =	$t_{bp} := 2.00\text{-in}$	(User Input)
Base Plate Diameter =	$D_{bp} := 38.00\text{-in}$	(User Input)
Outer Pole Diameter =	$D_{pole} := 33.9863\text{-in}$	(User Input)
Reinforced Base Plate Section Modulus =	$S_{x_{bp}} := 962.83\text{-in}^3$	(User Input)

Geometric Layout Data:

Distance from Bolts to Centroid of Pole:

Distance to Bolts =	$d_1 := 19.25\text{-in}$	(User Input)
	$d_2 := 3.00\text{-in}$	(User Input)
	$d_3 := 29.50\text{-in}$	(User Input)
	$d_4 := 0\text{-in}$	(User Input)

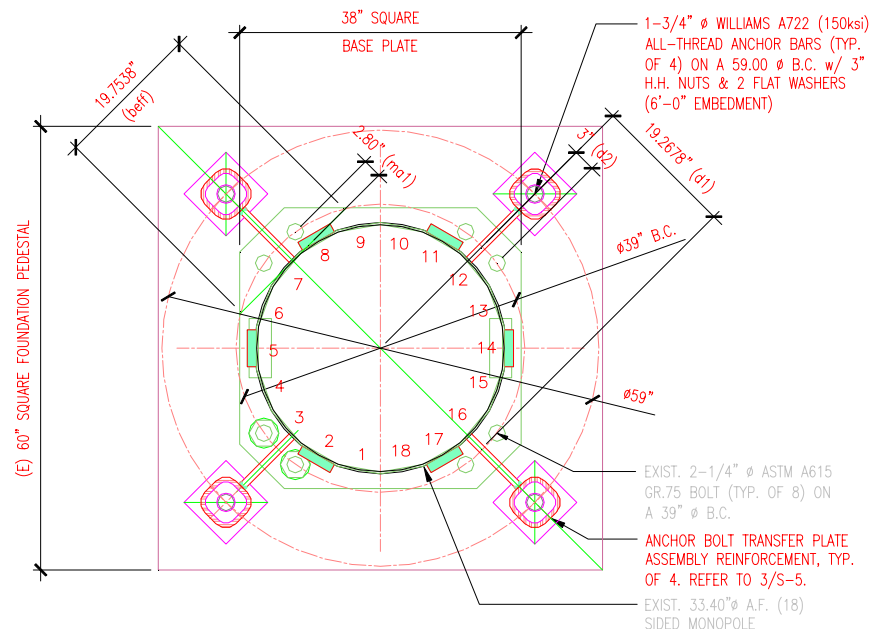
Number of Bolts per Group =	$N_1 := 4$	(User Input)
	$N_2 := 4$	(User Input)
	$N_3 := 2$	(User Input)
	$N_4 := 0$	(User Input)

Critical Distances For Bending in Plate:

Outer Pole Radius = $R_{\text{pole}} := \frac{D_{\text{pole}}}{2} = 16.993\text{-in}$

Moment Arms of Bolts about Neutral Axis =	$MA_1 := 2.80\text{-in}$	(User Input)
	$MA_2 := 12.80\text{-in}$	(User Input)
	$MA_3 := 0\text{-in}$	(User Input)
	$MA_4 := 0\text{-in}$	(User Input)

Effective Width of Baseplate for Bending = $B_{\text{eff}} := 19.75\text{in}$



Anchor Bolt Analysis:

Calculated Anchor Bolt Properties:

Existing Anchor Bolts:

$$\text{Gross Area of Bolt} = A_g := \frac{\pi}{4} \cdot D^2 = 3.976 \cdot \text{in}^2$$

$$\text{Net Area of Bolt} = A_n := \frac{\pi}{4} \cdot \left(D - \frac{0.9743 \cdot \text{in}}{n} \right)^2 = 3.248 \cdot \text{in}^2$$

$$\text{Net Diameter} = D_n := \frac{2 \cdot \sqrt{A_n}}{\sqrt{\pi}} = 2.033 \cdot \text{in}$$

$$\text{Radius of Gyration of Bolt} = r := \frac{D_n}{4} = 0.508 \cdot \text{in}$$

$$\text{Section Modulus of Bolt} = S_x := \frac{\pi \cdot D_n^3}{32} = 0.826 \cdot \text{in}^3$$

Proposed Anchor Bolts:

$$\text{Gross Area of Bolt} = A_{g2} := 3.14 \text{in}^2$$

$$\text{Net Area of Bolt} = A_{n2} := 2.60 \text{in}^2$$

$$\text{Net Diameter} = D_{n2} := \frac{2 \cdot \sqrt{A_{n2}}}{\sqrt{\pi}} = 1.819 \cdot \text{in}$$

$$\text{Radius of Gyration of Bolt} = r2 := \frac{D_{n2}}{4} = 0.455 \cdot \text{in}$$

$$\text{Section Modulus of Bolt} = S_{x2} := \frac{\pi \cdot D_{n2}^3}{32} = 0.591 \cdot \text{in}^3$$

$$\text{Total Polar Moment of Inertia} = I_p := d_1^2 \cdot N_1 + d_2^2 \cdot N_2 + d_3^2 \cdot N_3 + d_4^2 \cdot N_4 = 3258.7 \cdot \text{in}^2$$

ASTM A615 GR. 65 Bolts:

Check Inner Anchor Bolt Tension Force:

Maximum Tensile Force = $T_{Max} := OM \cdot \frac{d_1}{I_p} - \frac{Axial}{N + N2} = 114.9 \cdot \text{kips}$

Allowable Tensile Force = $T_{ALL.Gross} := 1.333 \cdot (0.33 \cdot A_g \cdot F_u) = 174.9 \cdot \text{kips}$ (1.333 increase allowed per TIA/EIA)

$T_{ALL.Net} := 1.333 \cdot (0.60 \cdot A_n \cdot F_y) = 194.812 \cdot \text{kips}$ (1.333 increase allowed per TIA/EIA)

Bolt Tension % of Capacity = $\frac{T_{Max}}{T_{ALL.Net}} = 59.0\%$ Bolts are "upset bolts". Use net area per AISC

Condition1 = $\text{Condition1} := \text{if} \left(\frac{T_{Max}}{T_{ALL.Net}} \leq 1.00, "OK", "Overstressed" \right)$

Condition1 = "OK"

Check Anchor Bolt Bending Stress:

Maximum Bending Moment = $M_x := \left(\frac{\text{Shear}}{N + N2} \right) \cdot l = 0.417 \cdot \text{ft-kips}$

Maximum Bending Stress = $f_{bx} := \frac{M_x}{S_x} = 6.1 \cdot \text{ksi}$

Allowable Bending Stress = $F_{bx} := 1.333 \cdot 0.6 \cdot F_y = 60 \cdot \text{ksi}$ (1.333 increase allowed per TIA/EIA)

Check Combined Stress Requirement:

Per ASCE Manual 72: "If the clearance between the base plate and concrete does not exceed two times the bolt diameter a bending stress analysis of the bolts is NOT normally required."

$l := \begin{cases} l & \text{if } l > 2 \cdot D_n \\ 0 & \text{otherwise} \end{cases} = 0 \cdot \text{in}$

$f_{bx} := \begin{cases} f_{bx} & \text{if } l > 2 \cdot D_n \\ 0 & \text{otherwise} \end{cases} = 0 \cdot \text{ksi}$

Check Anchor Bolt Compression/Combined Stress:

Maximum Compressive Force =

$$C_{Max} := OM \cdot \frac{d_1}{l_p} + \frac{Axial}{N + N2} = 117.6 \text{ kips}$$

Note: Calculation assumes that the total axial load is taken up in the original inner anchor bolts with no contribution from the external anchor bolts added as reinforcements.

Maximum Compressive Stress =

$$f_a := \frac{C_{Max}}{A_n} = 36.2 \text{ ksi}$$

$$K := 0.65$$

$$C_c := \sqrt{\frac{2 \cdot \pi^2 \cdot E}{F_y}} = 87.364$$

$$F_a := \begin{cases} \frac{\left[1 - \frac{\left(\frac{K \cdot l}{r} \right)^2}{2 \cdot C_c^2} \right] \cdot F_y}{\frac{5}{3} + \frac{3 \cdot \left(\frac{K \cdot l}{r} \right)}{8 \cdot C_c} - \frac{\left(\frac{K \cdot l}{r} \right)^3}{8 \cdot C_c^3}} & \text{if } \frac{K \cdot l}{r} \leq C_c \\ \frac{12 \cdot \pi^2 \cdot E}{23 \cdot \left(\frac{K \cdot l}{r} \right)^2} & \text{if } \frac{K \cdot l}{r} > C_c \end{cases} = 45 \text{ ksi}$$

Allowable Compressive Stress =

$$F_{a_{max}} := 1.333 \cdot F_a = 60 \text{ ksi} \quad (1.333 \text{ increase allowed per TIA/EIA})$$

Combined Stress % of Capacity =

$$\left(\frac{f_a}{F_a} + \frac{f_{bx}}{F_{bx}} \right) = 60.4\%$$

Condition 2 =

$$\text{Condition2} := \text{if} \left(\frac{f_a}{F_a} + \frac{f_{bx}}{F_{bx}} \leq 1.00, \text{"OK"}, \text{"Overstressed"} \right)$$

Condition2 = "OK"

ASTM A722 150ksi All Thread Anchor Bolts:

Check Anchor Bolt Tension Force:

Maximum Tensile Force = $T_{Max2} := OM \cdot \frac{d_3}{l_p} - \frac{Axial}{N} = 176.2 \text{ kips}$

Allowable Design Load (0.6 fpu) =

$T_{ALL} := 234 \text{ kips}$ Refer to Williams Form All-Thread Bar Table

Bolt Tension % of Capacity =

$\frac{T_{Max2}}{T_{ALL}} = 75.3\%$ Bolts are "upset bolts". Use net area per AISC

Condition 3 =

Condition3 := if $\left(\frac{T_{Max2}}{T_{ALL}} \leq 1.00, \text{"OK"}, \text{"Overstressed"} \right)$

Condition3 = "OK"

Check Anchor Bolt Bending Stress:

Maximum Bending Moment =

$M_{x2} := \left(\frac{\text{Shear}}{N + N2} \right) \cdot l2 = 0.417 \text{ ft-kips}$

Maximum Bending Stress =

$f_{bx2} := \frac{M_{x2}}{S_{x2}} = 8.5 \text{ ksi}$

Allowable Bending Stress =

$F_{bx2} := 1.333 \cdot 0.6 \cdot F_{y2} = 102.1 \text{ ksi}$ (1.333 increase allowed per TIA/EIA)

Check Combined Stress Requirement:

Per ASCE Manual 72: "If the clearance between the base plate and concrete does not exceed two times the bolt diameter a bending stress analysis of the bolts is NOT normally required."

$l2 := \begin{cases} l2 & \text{if } l2 > 2 \cdot D_{n2} \\ 0 & \text{otherwise} \end{cases} = 0 \text{ in}$

$f_{bx2} := \begin{cases} f_{bx2} & \text{if } l2 > 2 \cdot D_{n2} \\ 0 & \text{otherwise} \end{cases} = 0 \text{ ksi}$

Check Anchor Bolt Compression/Combined Stress:

Maximum Compressive Force =

$$C_{Max2} := OM \cdot \frac{d_3}{I_p} + \frac{Axial}{N} = 180.2 \text{ kips}$$

Note: Calculation assumes that the total axial load is taken up in the original inner anchor bolts with no contribution from the external anchor bolts added as reinforcements.

Maximum Compressive Stress =

$$f_{a2} := \frac{C_{Max2}}{A_{n2}} = 69.3 \text{ ksi}$$

$$K_2 := 0.65$$

$$C_{c2} := \sqrt{\frac{2 \cdot \pi^2 \cdot E2}{F_{y2}}} = 66.953$$

$$F_{a2} := \begin{cases} \frac{\left[1 - \frac{\left(\frac{K_2 \cdot l_2}{r_2} \right)^2}{2 \cdot C_{c2}^2} \right] \cdot F_{y2}}{\frac{5}{3} + \frac{3 \cdot \left(\frac{K_2 \cdot l_2}{r_2} \right)}{8 \cdot C_{c2}} - \frac{\left(\frac{K_2 \cdot l_2}{r_2} \right)^3}{8 \cdot C_{c2}^3}} & \text{if } \frac{K_2 \cdot l_2}{r_2} \leq C_{c2} \\ \frac{12 \cdot \pi^2 \cdot E2}{23 \cdot \left(\frac{K_2 \cdot l_2}{r_2} \right)^2} & \text{if } \frac{K_2 \cdot l_2}{r_2} > C_{c2} \end{cases} = 76.62 \text{ ksi}$$

Allowable Compressive Stress =

$$F_{a2} := F_{a2} = 76.6 \text{ ksi} \quad (1.333 \text{ increase allowed per TIA/EIA})$$

Combined Stress % of Capacity =

$$\left(\frac{f_{a2}}{F_{a2}} + \frac{f_{bx2}}{F_{bx2}} \right) = 90.4 \%$$

Condition 4 =

$$\text{Condition4} := \text{if} \left(\frac{f_{a2}}{F_{a2}} + \frac{f_{bx2}}{F_{bx2}} \leq 1.00, \text{"OK"}, \text{"Overstressed"} \right)$$

Condition4 = "OK"

Base Plate Analysis:

Note: Only the force from the original anchor bolts attributes to the baseplate bending.
 The anchor bolts located outside the edge of the baseplate provide additional anchor bolt capacity only.

Force from Bolts =

$$C_1 := \frac{OM \cdot d_1}{I_p} + \frac{Axial}{N} = 118.253 \text{ kips}$$

Force from Bolts =

$$C_2 := \frac{OM \cdot d_3}{I_p} + \frac{Axial}{N} = 180.154 \text{ kips}$$

Maximum Bending Stress in Plate =

$$f_{bp} := \frac{(2C_1 \cdot MA_1 + C_2 \cdot MA_2)}{(S_{x_{bp}})} = 3.1 \text{ ksi}$$

Allowable Bending Stress in Plate =

$$F_{bp} := 1.33 \cdot 0.75 \cdot F_{y_{bp}} = 59.9 \text{ ksi}$$

Plate Bending Stress % of Capacity =

$$\frac{f_{bp}}{F_{bp}} = 5.2 \%$$

Condition5 =

$$\text{Condition5} := \text{if} \left(\frac{f_{bp}}{F_{bp}} < 1.00, \text{"Ok"}, \text{"Overstressed"} \right)$$

Condition5 = "Ok"

Units:

Angular

$$\text{rad} \equiv 1$$

$$\text{deg} \equiv \pi \cdot \frac{\text{rad}}{180}$$

Weight

$$\text{lb} \equiv \text{lbf}$$

$$\text{kips} \equiv 1000 \cdot \text{lb}$$

$$\text{k} \equiv \text{kips}$$

$$\text{tons} \equiv 2000 \cdot \text{lb}$$

Unit Weight

$$\text{plf} \equiv \frac{\text{lb}}{\text{ft}}$$

$$\text{klf} \equiv \frac{\text{kips}}{\text{ft}}$$

Pressure

$$\text{psf} \equiv \frac{\text{lb}}{\text{ft}^2}$$

$$\text{psi} \equiv \frac{\text{lb}}{\text{in}^2}$$

$$\text{ksf} \equiv \frac{\text{kips}}{\text{ft}^2}$$

$$\text{ksi} \equiv \frac{\text{kips}}{\text{in}^2}$$

Density

$$\text{pcf} \equiv \frac{\text{lb}}{\text{ft}^3}$$

Monopole Foundation - Long Direction:

Input Data:

Tower Data

Overturning Moment =	OM := 1640-ft-kips	(User Input from tnxTower)
Shear Force =	Shear := 20-kip	(User Input from tnxTower)
Axial Force =	Axial := 16-kip	(User Input from tnxTower)
Tower Height =	H _t := 106-ft	(User Input)

Footing Data:

Overall Depth of Footing =	D _f := 6.0-ft	(User Input)
Length of Pier =	L _p := 3.5-ft	(User Input)
Extension of Pier Above Grade =	L _{pag} := 0.5-ft	(User Input)
Diameter of Pier =	d _p := 5.0-ft	(User Input)
Thickness of Footing =	T _f := 3.0-ft	(User Input)
Width of Footing =	W _f := 22.0-ft	(User Input)
Width of Footing =	B _f := 17.0-ft	(User Input)

Anchor Bolt Data:

Length of Anchor Bolts =	L _{st} := 72-in	(User Input)
Projection of Anchor Bolts Above Pier =	A _{BP} := 12.0-in	(User Input)
Anchor Bolt Diameter =	d _{anchor} := 2.25-in	(User Input)
Base Plate Bolt Circle =	MP := 66.0-in	(User Input)

Material Properties:

Concrete Compressive Strength =	f _c := 3000-psi	(User Input)
Steel Reinforcement Yield Strength =	f _{yy} := 60000-psi	(User Input)
Anchor Bolt Yield Strength =	f _{ya} := 75000-psi	(User Input)
Internal Friction Angle of Soil =	Φ _s := 34-deg	(User Input)
Allowable Soil Bearing Capacity =	q _s := 6000-psf	(User Input)
Unit Weight of Soil =	γ _{soil} := 125-pcf	(User Input)
Unit Weight of Concrete =	γ _{conc} := 150-pcf	(User Input)
Foundation Bouyancy =	Bouyancy := 0	(User Input) (Yes=1 / No=0)
Depth to Neglect =	n := 0-ft	(User Input)
Cohesion of Clay Type Soil =	c _{cc} := 0-ksf	(User Input) (Use 0 for Sandy Soil)
Seismic Zone Factor =	Z := 2	(User Input) (UBC-1997 Fig 23-2)
Coefficient of Friction Between Concrete =	μ := 0.45	(User Input)

Pier Reinforcement:

Bar Size =	$BS_{\text{pier}} := 11$	(User Input)	
Bar Diameter =	$d_{\text{bpier}} := 1.410\text{-in}$	(User Input)	
Number of Bars =	$NB_{\text{pier}} := 12$	(User Input)	
Clear Cover of Reinforcement =	$Cvr_{\text{pier}} := 3\text{-in}$	(User Input)	
Reinforcement Location Factor =	$\alpha_{\text{pier}} := 1.0$	(User Input)	(ACI-2008 12.2.4)
Coating Factor =	$\beta_{\text{pier}} := 1.0$	(User Input)	(ACI-2008 12.2.4)
Concrete Strength Factor =	$\lambda_{\text{pier}} := 1.0$	(User Input)	(ACI-2008 12.2.4)
Reinforcement Size Factor =	$\gamma_{\text{pier}} := 1.0$	(User Input)	(ACI-2008 12.2.4)
Diameter of Tie =	$d_{\text{Tie}} := 0.5\text{-in}$	(User Input)	

Pad Reinforcement:

Bar Size =	$BS_{\text{top}} := 8$	(User Input)	(Top of Pad)
Bar Diameter =	$d_{\text{btop}} := 1.000\text{-in}$	(User Input)	(Top of Pad)
Number of Bars =	$NB_{\text{top}} := 17$	(User Input)	(Top of Pad)
Bar Size =	$BS_{\text{bot}} := 8$	(User Input)	(Bottom of Pad)
Bar Diameter =	$d_{\text{bbot}} := 1.000\text{-in}$	(User Input)	(Bottom of Pad)
Number of Bars =	$NB_{\text{bot}} := 17$	(User Input)	(Bottom of Pad)
Clear Cover of Reinforcement =	$Cvr_{\text{pad}} := 3.0\text{-in}$	(User Input)	
Reinforcement Location Factor =	$\alpha_{\text{pad}} := 1.0$	(User Input)	(ACI-2008 12.2.4)
Coating Factor =	$\beta_{\text{pad}} := 1.0$	(User Input)	(ACI-2008 12.2.4)
Concrete Strength Factor =	$\lambda_{\text{pad}} := 1.0$	(User Input)	(ACI-2008 12.2.4)
Reinforcement Size Factor =	$\gamma_{\text{pad}} := 1.0$	(User Input)	(ACI-2008 12.2.4)

Calculated Factors:

Pier Reinforcement Bar Area =	$A_{\text{bpier}} := \frac{\pi \cdot d_{\text{bpier}}^2}{4} = 1.561\text{-in}^2$	
Pad Top Reinforcement Bar Area =	$A_{\text{btop}} := \frac{\pi \cdot d_{\text{btop}}^2}{4} = 0.785\text{-in}^2$	
Pad Bottom Reinforcement Bar Area =	$A_{\text{bbot}} := \frac{\pi \cdot d_{\text{bbot}}^2}{4} = 0.785\text{-in}^2$	
Coefficient of Lateral Soil Pressure =	$K_p := \frac{1 + \sin(\Phi_s)}{1 - \sin(\Phi_s)} = 3.537$	
Load Factor =	$LF := \begin{cases} 1.333 & \text{if } H_t \leq 700\text{-ft} \\ 1.7 & \text{if } H_t \geq 1200\text{-ft} \\ 1.333 + \left(\frac{H_t - 700\text{ft}}{1200\text{ft} - 700\text{ft}} \right) \cdot 0.4 & \text{otherwise} \end{cases}$	= 1.333

Stability of Footing:

Adjusted Concrete Unit Weight =

$$\gamma_c := \text{if}(\text{Bouyancy} = 1, \gamma_{\text{conc}} - 62.4 \text{pcf}, \gamma_{\text{conc}}) = 150 \text{pcf}$$

Adjusted Soil Unit Weight =

$$\gamma_s := \text{if}(\text{Bouyancy} = 1, \gamma_{\text{soil}} - 62.4 \text{pcf}, \gamma_{\text{soil}}) = 125 \text{pcf}$$

Passive Pressure =

$$P_{pn} := K_p \cdot \gamma_s \cdot n + c \cdot 2 \cdot \sqrt{K_p} = 0 \text{ksf}$$

$$P_{pt} := K_p \cdot \gamma_s \cdot (D_f - T_f) + c \cdot 2 \cdot \sqrt{K_p} = 1.326 \text{ksf}$$

$$P_{top} := \text{if}[n < (D_f - T_f), P_{pt}, P_{pn}] = 1.326 \text{ksf}$$

$$P_{bot} := K_p \cdot \gamma_s \cdot D_f + c \cdot 2 \cdot \sqrt{K_p} = 2.653 \text{ksf}$$

$$P_{ave} := \frac{P_{top} + P_{bot}}{2} = 1.99 \text{ksf}$$

$$T_p := \text{if}[n < (D_f - T_f), T_f, (D_f - n)] = 3$$

$$A_p := W_f \cdot T_p = 66$$

Ultimate Shear =

$$S_u := P_{ave} \cdot A_p = 131.316 \text{kip}$$

Weight of Concrete Pad =

$$WT_c := [(B_f \cdot W_f \cdot T_f) + d_p^2 \cdot L_p] \cdot \gamma_c = 181.425 \text{kip}$$

Weight of Soil Above Footing =

$$WT_{s1} := \left[\left[(B_f \cdot W_f) - d_p^2 \right] \cdot \begin{cases} (L_p - L_{pag} - n) & \text{if } (L_p - L_{pag} - n) \geq 0 \\ 0 & \text{if } (L_p - L_{pag} - n) \leq 0 \end{cases} \right] \cdot \gamma_s = 130.88$$

Weight of Soil Wedge at Back Face =

$$WT_{s2} := \left[\frac{(D_f - T_f)^2 \cdot \tan(\Phi_s)}{2} \cdot W_f \right] \cdot \gamma_s = 8.347 \text{kip}$$

Weight of Soil Wedge at back face Corners =

$$WT_{s3} := 2 \cdot \left[(D_f - T_f)^3 \cdot \frac{\tan(\Phi_s)}{3} \right] \cdot \gamma_s = 1.518 \text{kips}$$

Total Weight =

$$WT_{tot} := WT_c + WT_{s1} + \text{Axial} = 328.3 \text{kip}$$

Resisting Moment in Long Direction =

$$M_{rl} := (WT_{tot}) \cdot \frac{W_f}{2} + S_u \cdot \frac{T_f}{3} + \left[(WT_{s2} + WT_{s3}) \cdot \left[W_f + \frac{(D_f - T_f) \cdot \tan(\Phi_s)}{3} \right] \right] = 3966 \text{kip-ft}$$

Overturning Moment =

$$M_{otl} := OM + \text{Shear} \cdot (L_p + T_f) = 1770 \text{kip-ft}$$

Factor of Safety Actual =

$$FS_l := \frac{M_{rl}}{M_{otl}} = 2.24$$

Factor of Safety Required =

$$FS_{req} := 2$$

$$\text{OverTurning_Moment_Check_Long} := \text{if}(FS_l \geq FS_{req}, \text{"Okay"}, \text{"No Good"})$$

$$\text{OverTurning_Moment_Check_Long} = \text{"Okay"}$$

Resisting Moment in Short Direction =
$$M_{rs} := \left(W_{T_{tot}} \right) \cdot \frac{B_f}{2} + S_u \cdot \frac{T_f}{3} + \left[\left(W_{T_{s2}} + W_{T_{s3}} \right) \cdot \left[B_f + \frac{(D_f - T_f) \cdot \tan(\Phi_s)}{3} \right] \right] = 3096 \cdot \text{kip} \cdot \text{ft}$$

Overturning Moment =
$$M_{ots} := OM + \text{Shear} \cdot (L_p + T_f) = 1770 \cdot \text{kip} \cdot \text{ft}$$

Factor of Safety Actual =
$$FS_s := \frac{M_{rs}}{M_{ots}} = 1.75$$

OverTurning_Moment_Check_Short := if($FS_s \geq FS_{req}$, "Okay", "No Good")

OverTurning_Moment_Check_Short = "No Good"

Minimum Design Moment Required
 w/ F.O.S of 2.0 =
$$M_{reqd} := M_{ots} \cdot (FS_{req}) = 3540 \cdot \text{kips}$$

Net Moment Required =
$$M_{net} := M_{reqd} - M_{rs} = 443.78 \cdot \text{kips}$$

Provided Soil Anchor Spacing in
 Short Direction =
$$S_{anchor} := 12.0 \text{ft}$$

Numer of Soil Anchors Per Side in Short Direction =
$$N_{anchor} := 2.0$$

Minimum Required Anchor Resistance in Short
 Direction =
$$P_{reqd} := \frac{M_{net}}{S_{anchor} \cdot N_{anchor}} = 18.49 \text{kips}$$

Provided Anchor Resistance in Short Direction =
$$P_{prov} := 30 \text{kips}$$

Resisting Moment Provided in Short Direction =
$$M_{prov} := P_{prov} \cdot S_{anchor} \cdot N_{anchor} + M_{rs} = 3816.22 \text{kip} \cdot \text{ft}$$

Provided F.O.S. in Short Direction =
$$FS_{prov} := \frac{M_{prov}}{M_{ots}} = 2.16$$

Design Factor of Safety Actual = Design_OverTurning_Moment_Check_Short := if($FS_{prov} \geq FS_{req}$, "Okay", "No Good")

Design_OverTurning_Moment_Check_Short = "Okay"

Shear Capacity in Pier:

Shear Resistance of Pier =

$$S_p := \frac{\mu \cdot W_{T_{tot}}}{F_{S_{req}}} = 73.867 \text{ kips}$$

$$\text{Shear_Check} := \text{if}(S_p > \text{Shear}, \text{"Okay"}, \text{"No Good"})$$

Shear_Check = "Okay"

Bearing Pressure Caused by Footing :

Area of the Mat =

$$A_{mat} := B_f \cdot W_f = 374$$

Section Modulus of Mat =

$$S_{mat} := \frac{(B_f \cdot W_f^2)}{6} = 1371.33 \text{ ft}^3$$

Maximum Pressure in Mat =

$$P_{max} := \frac{W_{T_{tot}} + (P_{prov} \cdot N_{anchor})}{A_{mat}} + \frac{M_{otl}}{S} = 2.329 \text{ ksf}$$

$$\text{Max_Pressure_Check} := \text{if}(P_{max} < q_s, \text{"Okay"}, \text{"No Good"})$$

Max_Pressure_Check = "Okay"

Minimum Pressure in Mat =

$$P_{min} := \frac{W_{T_{tot}} + (P_{prov} \cdot N_{anchor})}{A_{mat}} - \frac{M_{otl}}{S} = -0.252 \text{ ksf}$$

$$\text{Min_Pressure_Check} := \text{if}((P_{min} \geq 0) \cdot (P_{min} < q_s), \text{"Okay"}, \text{"No Good"})$$

Min_Pressure_Check = "No Good"

Distance to Resultant of Pressure Distribution =

$$X_p := \frac{P_{max}}{P_{max} - P_{min}} \cdot \frac{1}{3} = 6.616$$

Distance to Kern =

$$X_k := \frac{W_f}{6} = 3.667$$

Since Resultant Force is Not in Kern, Area to which Pressure is Applied Must be Reduced.

Eccentricity =

$$e := \frac{M_{otl}}{W_{T_{tot}} + (P_{prov} \cdot N_{anchor})} = 4.558$$

Adjusted Soil Pressure =

$$P_a := \frac{2 \cdot W_{T_{tot}} + (P_{prov} \cdot N_{anchor})}{3 \cdot B_f \left(\frac{W_f}{2} - e \right)} = 2.181 \text{ ksf}$$

$$q_{adj} := \text{if}(P_{min} < 0, P_a, P_{max}) = 2.181 \text{ ksf}$$

$$\text{Pressure_Check} := \text{if}(q_{adj} < q_s, \text{"Okay"}, \text{"No Good"})$$

Pressure_Check = "Okay"

Concrete Bearing Capacity:

Strength Reduction Factor =

$$\Phi_c := 0.65 \quad (\text{ACI-2008 9.3.2.2})$$

Bearing Strength Between Pier and Pad =

$$P_b := \Phi_c \cdot 0.85 \cdot f_c \cdot \frac{\pi \cdot d_p^2}{4} = 4.686 \times 10^3 \cdot \text{kips} \quad (\text{ACI-2008 10.14})$$

$$\text{Bearing_Check} := \text{if}(P_b > \text{LF} \cdot \text{Axial}, \text{"Okay"}, \text{"No Good"})$$

$$\text{Bearing_Check} = \text{"Okay"}$$

Shear Strength of Concrete:

Beam Shear:

(Critical section located at a distance d from the face of Pier) (ACI 11.3.1.1)

$$\phi_c := 0.85 \quad (\text{ACI 9.3.2.5})$$

$$d := T_f - \text{Cvr}_{\text{pad}} - d_{\text{bbot}} = 32 \cdot \text{in}$$

$$d_1 := 51 \cdot \text{in}$$

Actual Distance to Face of Buttress

$$d_2 := d_1 - d$$

$$L := \left(\frac{W_f}{2} - e \right) \cdot 3$$

$$\text{Slope} := \text{if} \left(L > W_f, \frac{P_{\text{max}} - P_{\text{min}}}{W_f}, \frac{q_{\text{adj}}}{L} \right)$$

$$V_{\text{req}} := \text{LF} \cdot \left[(q_{\text{adj}} - \text{Slope} \cdot d_1) + \left(\frac{\text{Slope} \cdot d_1}{2} \right) \right] \cdot W_f \cdot d_1 \quad V_{\text{req}} = 241.969 \cdot \text{kips}$$

$$V_{\text{Avail}} := \phi_c \cdot 2 \cdot \sqrt{f_c \cdot \text{psi}} \cdot W_f \cdot d \quad V_{\text{Avail}} = 786.62 \cdot \text{kips} \quad (\text{ACI-2008 11.2.1.1})$$

$$\text{Beam_Shear_Check} := \text{if}(V_{\text{req}} < V_{\text{Avail}}, \text{"Okay"}, \text{"No Good"})$$

$$\text{Beam_Shear_Check} = \text{"Okay"}$$

Punching Shear:

(Critical Section Located at a distance of d/2 from the face of pier) (ACI 11.11.2)

Critical Perimeter of Punching Shear =

$$b_o := (d_p + d) \cdot \pi = 24.1$$

Area Included Inside Perimeter =

$$A_{bo} := \frac{\pi \cdot (d_p + d)^2}{4} = 46.2$$

Area Outside of Perimeter =

$$A_{\text{out}} := A_{\text{mat}} - A_{bo} = 327.8$$

Guess Value =

$$v_u := 1 \text{ ksf}$$

(From "Foundation Analysis and design", By Joseph Bowles, Eq. 8-9)

Given

$$d^2 + d_p \cdot d = \frac{W_{T_{tot}}}{\pi \cdot v_u}$$

$$v_{u_{avail}} := \text{Find}(v_u) = 5.1 \cdot \text{ksf}$$

$$V_u := v_u \cdot d \cdot W_f = 299.9 \cdot \text{kips}$$

Required Shear Strength =

$$V_{req} := LF \cdot V_u = 399.7 \cdot \text{kips}$$

Available Shear Strength =

$$V_{avail} := \phi_c \cdot 4 \cdot \sqrt{f_c \cdot \text{psi} \cdot b_o \cdot d} = 1722.4 \cdot \text{kip} \quad (\text{ACI-2008 11.11.2.1})$$

$$\text{Punching_Shear_Check} := \text{if}(V_{req} < V_{avail}, \text{"Okay"}, \text{"No Good"})$$

$$\text{Punching_Shear_Check} = \text{"Okay"}$$

Steel Reinforcement in Pad:

Required Reinforcement for Bending:

Strength Reduction Factor =

$$\phi_m := .90$$

(ACI-2008 9.3.2.1)

$$q_b := q_{adj} - d_1 \cdot \text{Slope} = 1.702 \cdot \text{ksf}$$

Maximum Bending at Face of Pier =

$$M_u := LF \cdot \left[(q_{adj} - q_b) \cdot \frac{d_1^2}{3} + q_b \cdot \frac{d_1^2}{2} \right] \cdot W_f = 535.4 \cdot \text{kip-ft}$$

$$\beta := \begin{cases} 0.85 & \text{if } 2500 \cdot \text{psi} \leq f_c \leq 4000 \cdot \text{psi} \\ 0.65 & \text{if } f_c > 8000 \cdot \text{psi} \end{cases} = 0.85$$

$$\left[\left[0.85 - \left[\frac{\left(\frac{f_c}{\text{psi}} - 4000 \right)}{1000} \right] \cdot 0.5 \right] \right] \text{ otherwise} \quad (\text{ACI-2008 10.2.7.3})$$

$$R_n := \frac{M_u}{\phi_m \cdot W_f \cdot d^2} = 26.4 \cdot \text{psi}$$

$$\rho := \frac{0.85 \cdot f_c}{f_y} \left(1 - \sqrt{1 - \frac{2 \cdot R_n}{0.85 \cdot f_c}} \right) = 0.0004$$

$$\rho_{min} := \rho = 0.00044$$

Required Reinforcement for Temperature and Shrinkage:

$$\rho_{sh} := \begin{cases} .0018 & \text{if } f_y \geq 60000 \text{ psi} \\ .0020 & \text{otherwise} \end{cases} \quad (\text{ACI -2008 7.12.2.1})$$

Check Bottom Bars:

$$A_s := \begin{cases} \rho_{min} \cdot W_f \cdot d & \text{if } \rho_{min} > \frac{\rho_{sh}}{2} = 7.603 \cdot \text{in}^2 \\ \rho_{sh} \cdot W_f \cdot \frac{d}{2} & \text{otherwise} \end{cases}$$

$$A_{s \text{ prov}} := A_{bbot} \cdot NB_{bot} = 13.4 \cdot \text{in}^2$$

$$Pad_Reinforcement_Bot := \text{if}(A_{s \text{ prov}} > A_s, \text{"Okay"}, \text{"No Good"})$$

$$Pad_Reinforcement_Bot = \text{"Okay"}$$

Check top Bars:

$$A_s := \rho_{sh} \left(W_f \cdot \frac{d}{2} \right) = 7.6 \cdot \text{in}^2$$

$$A_{s \text{ prov}} := A_{btop} \cdot NB_{top} = 13.4 \cdot \text{in}^2$$

$$Pad_Reinforcement_Top := \text{if}(A_{s \text{ prov}} > A_s, \text{"Okay"}, \text{"No Good"})$$

$$Pad_Reinforcement_Top = \text{"Okay"}$$

Development Length Pad Reinforcement:

Bar Spacing =

$$B_{sPad} := \frac{W_f - 2 \cdot C_{vr \text{ pad}} - NB_{bot} \cdot d_{bbot}}{NB_{bot} - 1} = 15.06 \cdot \text{in}$$

Spacing or Cover Dimension =

$$c := \text{if} \left(C_{vr \text{ pad}} < \frac{B_{sPad}}{2}, C_{vr \text{ pad}}, \frac{B_{sPad}}{2} \right) = 3 \cdot \text{in}$$

Transverse Reinforcement Index =

$$k_{tr} := 0 \quad (\text{ACI-2008 12.2.3})$$

$$L_{dbt} := \frac{3 \cdot f_y \cdot \alpha_{pad} \cdot \beta_{pad} \cdot \gamma_{pad} \cdot \lambda_{pad}}{40 \cdot \sqrt{f_c \cdot \text{psi}} \cdot \frac{c + k_{tr}}{d_{bbot}}} \cdot d_{bbot} = 27.4 \cdot \text{in}$$

Minimum Development Length =

$$L_{dbmin} := 12 \cdot \text{in} \quad (\text{ACI-2008 12.2.1})$$

$$L_{dbt \text{ Check}} := \text{if}(L_{dbt} \geq L_{dbmin}, \text{"Use } L_{dbt} \text{"}, \text{"Use } L_{dbmin} \text{"})$$

Available Length in Pad =

$$L_{Pad} := \frac{W_f}{2} - \frac{d_p}{2} - C_{vr \text{ pad}} = 99 \cdot \text{in}$$

$$L_{pad \text{ Check}} := \text{if}(L_{Pad} > L_{dbt}, \text{"Okay"}, \text{"No Good"})$$

$$L_{pad \text{ Check}} = \text{"Okay"}$$

Steel Reinforcement in Pier:

Area of Pier =

$$A_p := \frac{\pi \cdot d_p^2}{4} = 2827.43 \cdot \text{in}^2$$

$$A_{smin} := 0.01 \cdot 0.5 \cdot A_p = 14.14 \cdot \text{in}^2 \quad (\text{ACI-2008 10.8.4 \& 10.9.1})$$

$$A_{sprov} := N_{B_{pier}} \cdot A_{B_{pier}} = 18.74 \cdot \text{in}^2$$

$$\text{Steel_Area_Check} := \text{if}(A_{sprov} > A_{smin}, \text{"Okay"}, \text{"No Good"})$$

Steel_Area_Check = "Okay"

Bar Spacing In Pier =

$$B_{sPier} := \frac{d_p \cdot \pi}{N_{B_{pier}}} - d_{B_{pier}} = 14.298 \cdot \text{in}$$

Diameter of Reinforcement Cage =

$$\text{Diam}_{cage} := d_p - 2 \cdot C_{vr_{pier}} = 54 \cdot \text{in}$$

Maximum Moment in Pier =

$$M_p := \left[OM + \text{Shear} \cdot \left(L_p + \frac{A_{BP}}{2} \right) \right] \cdot LF = 27513.1 \cdot \text{in} \cdot \text{kips}$$

Pier Check evaluated from outside program and results are listed below;

$$\left(D \ N \ n \ P_u \ M_{xu} \right) := \left(d_p \cdot 12 \ N_{B_{pier}} \ B_{s_{pier}} \ \frac{\text{Axial} \cdot 1.333}{\text{kips}} \ \frac{M_p}{\text{in} \cdot \text{kips}} \right)$$

$$\left(D \ N \ n \ P_u \ M_{xu} \right) = \left(60 \ 12 \ 11 \ 21.328 \ 2.751 \times 10^4 \right)$$

$$\left(\phi P_n \ \phi M_{xn} \ f_{sp} \ \rho \right) := (0 \ 0 \ 0 \ 0)$$

$$\left(\phi P_n \ \phi M_{xn} \ f_{sp} \ \rho \right) := \phi P'_n (D, N, n, P_u, M_{xu})^T$$

$$\left(\phi P_n \ \phi M_{xn} \ f_{sp} \ \rho \right) = \left(19.18 \ 2.474 \times 10^4 \ -60 \ 6.621 \times 10^{-3} \right)$$

$$\text{Axial_Load_Check} := \text{if}(\phi P_n \geq P_u, \text{"Okay"}, \text{"No Good"})$$

Axial_Load_Check = "No Good"

$$\text{Bending_Check} := \text{if}(\phi M_{xn} \geq M_{xu}, \text{"Okay"}, \text{"No Good"})$$

Bending_Check = "No Good"

Development Length Pier Reinforcement:

Available Length in Foundation:

$$L_{\text{pier}} := L_p - C_{\text{vr}}_{\text{pier}} = 39 \cdot \text{in}$$

$$L_{\text{pad}} := T_f - C_{\text{vr}}_{\text{pad}} = 33 \cdot \text{in}$$

Tension:

(ACI-2008 12.2.3)

Spacing or Cover Dimension =

$$c := \text{if} \left(C_{\text{vr}}_{\text{pier}} < \frac{B_{\text{sPier}}}{2}, C_{\text{vr}}_{\text{pier}}, \frac{B_{\text{sPier}}}{2} \right) = 3 \cdot \text{in}$$

Transverse Reinforcement =

$$k_{\text{tr}} := 0 \quad (\text{ACI-2008 12.2.3})$$

$$L_{\text{dbt}} := \frac{3 \cdot f_y \cdot \alpha_{\text{pier}} \cdot \beta_{\text{pier}} \cdot \gamma_{\text{pier}} \cdot \lambda_{\text{pier}}}{40 \cdot \sqrt{f_c \cdot \text{psi}} \cdot \left(\frac{c + k_{\text{tr}}}{d_{\text{bpier}}} \right)} \cdot d_{\text{bpier}} = 54.45 \cdot \text{in}$$

Minimum Development Length =

Pier reinforcement bars are standard 90 degree hooks
 and therefore development in the pad is computed
 as follows:

$$L_{\text{dh}} := \frac{1200 \cdot d_{\text{bpier}}}{\sqrt{\frac{f_c}{\text{psi}}}} \cdot .7 = 21.624 \cdot \text{in} \quad (\text{ACI 12.2.1})$$

$$L_{\text{db}} := \max(L_{\text{dbt}}, L_{\text{dbmin}})$$

$$L_{\text{tension_Check}} := \text{if}(L_{\text{pier}} + L_{\text{pad}} > L_{\text{dbt}}, \text{"Okay"}, \text{"No Good"})$$

$$L_{\text{tension_Check}} = \text{"Okay"}$$

Compression:

(ACI-2008 12.3.2)

$$L_{\text{dbc1}} := \frac{.02 \cdot d_{\text{bpier}} \cdot f_y}{\sqrt{f_c \cdot \text{psi}}} = 30.892 \cdot \text{in}$$

$$L_{\text{dbmin}} := 0.0003 \cdot \frac{\text{in}^2}{\text{lb}} \cdot (d_{\text{bpier}} \cdot f_y) = 25.38 \cdot \text{in}$$

$$L_{\text{dbc}} := \text{if}(L_{\text{dbc1}} \geq L_{\text{dbmin}}, L_{\text{dbc1}}, L_{\text{dbmin}}) = 30.892 \cdot \text{in}$$

$$L_{\text{compression_Check}} := \text{if}(L_{\text{pier}} + L_{\text{pad}} > L_{\text{dbc}}, \text{"Okay"}, \text{"No Good"})$$

$$L_{\text{compression_Check}} = \text{"Okay"}$$

Tie Size and Spacing in Column:

Minimum Tie Size =

$$Tie_{min} := \text{if}(BS_{pier} \leq 10, 3, 4) = 4$$

Used #4 Ties

Seismic Factor =

$$z := \text{if}(Z \leq 2, 1, 0.5) = 1 \quad (\text{ACI-2008 21.10.5})$$

$$s_{lim1} := 16 \cdot d_{bpier} \cdot z = 22.56 \cdot \text{in}$$

$$s_{lim2} := 48 \cdot d_{Tie} \cdot z = 24 \cdot \text{in}$$

$$s_{lim3} := D_F \cdot z = 72 \cdot \text{in}$$

$$s_{lim4} := 18 \cdot \text{in}$$

Maximum Spacing =

$$s_{tie} := \min \left(\begin{matrix} s_{lim1} \\ s_{lim2} \\ s_{lim3} \\ s_{lim4} \end{matrix} \right) = 18 \cdot \text{in}$$

Number of Ties Required =

$$n_{tie} := \frac{L_{pier} - 3 \cdot \text{in}}{s_{tie}} + 1 = 3$$

Check Anchor Steel Embedment:

Depth Available =

$$D_{ab} := L_{st} - A_{BP} = 5 \cdot \text{ft}$$

Length of Anchor Bolt =

$$L_{anchor} := \frac{(0.11 \cdot f_{ya}) \cdot \text{in}}{\sqrt{f_c \cdot \text{psi}}} = 12.552 \cdot \text{ft}$$

$$\text{Depth_Check} := \text{if}(D_{ab} \geq L_{anchor}, \text{"Okay"}, \text{"No Good"})$$

Depth_Check = "No Good"

Note: Anchor plate is provided

Monopole Foundation - Short Direction:

Input Data:

Tower Data

Overturning Moment =	OM := 1640-ft-kips	(User Input from tnxTower)
Shear Force =	Shear := 20-kip	(User Input from tnxTower)
Axial Force =	Axial := 16-kip	(User Input from tnxTower)
Tower Height =	H _t := 106-ft	(User Input)

Footing Data:

Overall Depth of Footing =	D _f := 6.0-ft	(User Input)
Length of Pier =	L _p := 3.5-ft	(User Input)
Extension of Pier Above Grade =	L _{pag} := 0.5-ft	(User Input)
Diameter of Pier =	d _p := 5.0-ft	(User Input)
Thickness of Footing =	T _f := 3.0-ft	(User Input)
Width of Footing =	W _f := 22.0-ft	(User Input)
Width of Footing =	B _f := 17.0-ft	(User Input)

Anchor Bolt Data:

Length of Anchor Bolts =	L _{st} := 72-in	(User Input)
Projection of Anchor Bolts Above Pier =	A _{BP} := 12.0-in	(User Input)
Anchor Bolt Diameter =	d _{anchor} := 2.25-in	(User Input)
Base Plate Bolt Circle =	MP := 66.0-in	(User Input)

Material Properties:

Concrete Compressive Strength =	f _c := 3000-psi	(User Input)
Steel Reinforcement Yield Strength =	f _{yy} := 60000-psi	(User Input)
Anchor Bolt Yield Strength =	f _{ya} := 75000-psi	(User Input)
Internal Friction Angle of Soil =	Φ _s := 34-deg	(User Input)
Allowable Soil Bearing Capacity =	q _s := 6000-psf	(User Input)
Unit Weight of Soil =	γ _{soil} := 125-pcf	(User Input)
Unit Weight of Concrete =	γ _{conc} := 150-pcf	(User Input)
Foundation Bouyancy =	Bouyancy := 0	(User Input) (Yes=1 / No=0)
Depth to Neglect =	n := 0-ft	(User Input)
Cohesion of Clay Type Soil =	c _w := 0-ksf	(User Input) (Use 0 for Sandy Soil)
Seismic Zone Factor =	Z := 2	(User Input) (UBC-1997 Fig 23-2)
Coefficient of Friction Between Concrete =	μ := 0.45	(User Input)

Pier Reinforcement:

Bar Size =	$BS_{\text{pier}} := 11$	(User Input)	
Bar Diameter =	$d_{\text{bpier}} := 1.410\text{-in}$	(User Input)	
Number of Bars =	$NB_{\text{pier}} := 12$	(User Input)	
Clear Cover of Reinforcement =	$Cvr_{\text{pier}} := 3\text{-in}$	(User Input)	
Reinforcement Location Factor =	$\alpha_{\text{pier}} := 1.0$	(User Input)	(ACI-2008 12.2.4)
Coating Factor =	$\beta_{\text{pier}} := 1.0$	(User Input)	(ACI-2008 12.2.4)
Concrete Strength Factor =	$\lambda_{\text{pier}} := 1.0$	(User Input)	(ACI-2008 12.2.4)
Reinforcement Size Factor =	$\gamma_{\text{pier}} := 1.0$	(User Input)	(ACI-2008 12.2.4)
Diameter of Tie =	$d_{\text{Tie}} := 0.5\text{-in}$	(User Input)	

Pad Reinforcement:

Bar Size =	$BS_{\text{top}} := 8$	(User Input)	(Top of Pad)
Bar Diameter =	$d_{\text{btop}} := 1.000\text{-in}$	(User Input)	(Top of Pad)
Number of Bars =	$NB_{\text{top}} := 17$	(User Input)	(Top of Pad)
Bar Size =	$BS_{\text{bot}} := 8$	(User Input)	(Bottom of Pad)
Bar Diameter =	$d_{\text{bbot}} := 1.000\text{-in}$	(User Input)	(Bottom of Pad)
Number of Bars =	$NB_{\text{bot}} := 17$	(User Input)	(Bottom of Pad)
Clear Cover of Reinforcement =	$Cvr_{\text{pad}} := 3.0\text{-in}$	(User Input)	
Reinforcement Location Factor =	$\alpha_{\text{pad}} := 1.0$	(User Input)	(ACI-2008 12.2.4)
Coating Factor =	$\beta_{\text{pad}} := 1.0$	(User Input)	(ACI-2008 12.2.4)
Concrete Strength Factor =	$\lambda_{\text{pad}} := 1.0$	(User Input)	(ACI-2008 12.2.4)
Reinforcement Size Factor =	$\gamma_{\text{pad}} := 1.0$	(User Input)	(ACI-2008 12.2.4)

Calculated Factors:

Pier Reinforcement Bar Area =	$A_{\text{bpier}} := \frac{\pi \cdot d_{\text{bpier}}^2}{4} = 1.561\text{-in}^2$	
Pad Top Reinforcement Bar Area =	$A_{\text{btop}} := \frac{\pi \cdot d_{\text{btop}}^2}{4} = 0.785\text{-in}^2$	
Pad Bottom Reinforcement Bar Area =	$A_{\text{bbot}} := \frac{\pi \cdot d_{\text{bbot}}^2}{4} = 0.785\text{-in}^2$	
Coefficient of Lateral Soil Pressure =	$K_p := \frac{1 + \sin(\Phi_s)}{1 - \sin(\Phi_s)} = 3.537$	
Load Factor =	$LF := \begin{cases} 1.333 & \text{if } H_t \leq 700\text{-ft} \\ 1.7 & \text{if } H_t \geq 1200\text{-ft} \\ 1.333 + \left(\frac{H_t - 700\text{ft}}{1200\text{ft} - 700\text{ft}} \right) \cdot 0.4 & \text{otherwise} \end{cases}$	= 1.333

Stability of Footing:

Adjusted Concrete Unit Weight =

$$\gamma_c := \text{if}(\text{Bouyancy} = 1, \gamma_{\text{conc}} - 62.4 \text{pcf}, \gamma_{\text{conc}}) = 150 \text{pcf}$$

Adjusted Soil Unit Weight =

$$\gamma_s := \text{if}(\text{Bouyancy} = 1, \gamma_{\text{soil}} - 62.4 \text{pcf}, \gamma_{\text{soil}}) = 125 \text{pcf}$$

Passive Pressure =

$$P_{pn} := K_p \cdot \gamma_s \cdot n + c \cdot 2 \cdot \sqrt{K_p} = 0 \text{ksf}$$

$$P_{pt} := K_p \cdot \gamma_s \cdot (D_f - T_f) + c \cdot 2 \cdot \sqrt{K_p} = 1.326 \text{ksf}$$

$$P_{top} := \text{if}(n < (D_f - T_f), P_{pt}, P_{pn}) = 1.326 \text{ksf}$$

$$P_{bot} := K_p \cdot \gamma_s \cdot D_f + c \cdot 2 \cdot \sqrt{K_p} = 2.653 \text{ksf}$$

$$P_{ave} := \frac{P_{top} + P_{bot}}{2} = 1.99 \text{ksf}$$

$$T_p := \text{if}(n < (D_f - T_f), T_f, (D_f - n)) = 3$$

$$A_p := W_f \cdot T_p = 66$$

Ultimate Shear =

$$S_u := P_{ave} \cdot A_p = 131.316 \text{kip}$$

Weight of Concrete Pad =

$$WT_c := \left[(B_f \cdot W_f \cdot T_f) + d_p^2 \cdot L_p \right] \cdot \gamma_c = 181.425 \text{kip}$$

Weight of Soil Above Footing =

$$WT_{s1} := \left[\left[(B_f \cdot W_f) - d_p^2 \right] \cdot \begin{cases} (L_p - L_{pag} - n) & \text{if } (L_p - L_{pag} - n) \geq 0 \\ 0 & \text{if } (L_p - L_{pag} - n) \leq 0 \end{cases} \right] \cdot \gamma_s = 130.88$$

Weight of Soil Wedge at Back Face =

$$WT_{s2} := \left[\frac{(D_f - T_f)^2 \cdot \tan(\Phi_s)}{2} \cdot W_f \right] \cdot \gamma_s = 8.347 \text{kip}$$

Weight of Soil Wedge at back face Corners =

$$WT_{s3} := 2 \cdot \left[(D_f - T_f)^3 \cdot \frac{\tan(\Phi_s)}{3} \right] \cdot \gamma_s = 1.518 \text{kips}$$

Total Weight =

$$WT_{tot} := WT_c + WT_{s1} + \text{Axial} = 328.3 \text{kip}$$

Resisting Moment in Long Direction =

$$M_{rl} := (WT_{tot}) \cdot \frac{W_f}{2} + S_u \cdot \frac{T_f}{3} + \left[(WT_{s2} + WT_{s3}) \cdot \left[W_f + \frac{(D_f - T_f) \cdot \tan(\Phi_s)}{3} \right] \right] = 3966 \text{kip-ft}$$

Overturning Moment =

$$M_{otl} := OM + \text{Shear} \cdot (L_p + T_f) = 1770 \text{kip-ft}$$

Factor of Safety Actual =

$$FS_l := \frac{M_{rl}}{M_{otl}} = 2.24$$

Factor of Safety Required =

$$FS_{req} := 2$$

$$\text{OverTurning_Moment_Check_Long} := \text{if}(FS_l \geq FS_{req}, \text{"Okay"}, \text{"No Good"})$$

$$\text{OverTurning_Moment_Check_Long} = \text{"Okay"}$$

Resisting Moment in Short Direction =
$$M_{rs} := \left(W_{T_{tot}} \right) \cdot \frac{B_f}{2} + S_u \cdot \frac{T_f}{3} + \left[\left(W_{T_{s2}} + W_{T_{s3}} \right) \cdot \left[B_f + \frac{(D_f - T_f) \cdot \tan(\Phi_s)}{3} \right] \right] = 3096 \cdot \text{kip} \cdot \text{ft}$$

Overturning Moment =
$$M_{ots} := OM + \text{Shear} \cdot (L_p + T_f) = 1770 \cdot \text{kip} \cdot \text{ft}$$

Factor of Safety Actual =
$$FS_s := \frac{M_{rs}}{M_{ots}} = 1.75$$

OverTurning_Moment_Check_Short := if($FS_s \geq FS_{req}$, "Okay", "No Good")

OverTurning_Moment_Check_Short = "No Good"

Minimum Design Moment Required
 w/ F.O.S of 2.0 =
$$M_{reqd} := M_{ots} \cdot (FS_{req}) = 3540 \cdot \text{kips}$$

Net Moment Required =
$$M_{net} := M_{reqd} - M_{rs} = 443.78 \cdot \text{kips}$$

Provided Soil Anchor Spacing in
 Short Direction =
$$S_{anchor} := 12.0 \text{ft}$$

Numer of Soil Anchors Per Side in Short Direction =
$$N_{anchor} := 2.0$$

Minimum Required Anchor Resistance in Short
 Direction =
$$P_{reqd} := \frac{M_{net}}{S_{anchor} \cdot N_{anchor}} = 18.49 \cdot \text{kips}$$

Provided Anchor Resistance in Short Direction =
$$P_{prov} := 30 \text{kips}$$

Resisting Moment Provided in Short Direction =
$$M_{prov} := P_{prov} \cdot S_{anchor} \cdot N_{anchor} + M_{rs} = 3816.22 \cdot \text{kip} \cdot \text{ft}$$

Provided F.O.S. in Short Direction =
$$FS_{prov} := \frac{M_{prov}}{M_{ots}} = 2.16$$

Design Factor of Safety Actual = Design_OverTurning_Moment_Check_Short := if($FS_{prov} \geq FS_{req}$, "Okay", "No Good")

Design_OverTurning_Moment_Check_Short = "Okay"

Shear Capacity in Pier:

Shear Resistance of Pier =

$$S_p := \frac{\mu \cdot W_{T_{tot}}}{F_{S_{req}}} = 73.867 \text{ kips}$$

$$\text{Shear_Check} := \text{if}(S_p > \text{Shear}, \text{"Okay"}, \text{"No Good"})$$

Shear_Check = "Okay"

Bearing Pressure Caused by Footing :

Area of the Mat =

$$A_{mat} := B_f \cdot W_f = 374$$

Section Modulus of Mat =

$$S := \frac{(W_f \cdot B_f^2)}{6} = 1059.67 \cdot \text{ft}^3$$

Maximum Pressure in Mat =

$$P_{max} := \frac{W_{T_{tot}} + (P_{prov} \cdot N_{anchor})}{A_{mat}} + \frac{M_{ots}}{S} = 2.709 \text{ ksf}$$

$$\text{Max_Pressure_Check} := \text{if}(P_{max} < q_s, \text{"Okay"}, \text{"No Good"})$$

Max_Pressure_Check = "Okay"

Minimum Pressure in Mat =

$$P_{min} := \frac{W_{T_{tot}} + (P_{prov} \cdot N_{anchor})}{A_{mat}} - \frac{M_{ots}}{S} = -0.632 \text{ ksf}$$

$$\text{Min_Pressure_Check} := \text{if}((P_{min} \geq 0) \cdot (P_{min} < q_s), \text{"Okay"}, \text{"No Good"})$$

Min_Pressure_Check = "No Good"

Distance to Resultant of Pressure Distribution =

$$X_p := \frac{P_{max}}{P_{max} - P_{min}} \cdot \frac{1}{3} = 5.946$$

Distance to Kern =

$$X_k := \frac{B_f}{6} = 2.833$$

Since Resultant Force is Not in Kern, Area to which Pressure is Applied Must be Reduced.

Eccentricity =

$$e := \frac{M_{ots}}{W_{T_{tot}} + (P_{prov} \cdot N_{anchor})} = 4.558$$

Adjusted Soil Pressure =

$$P_a := \frac{2 \cdot W_{T_{tot}} + (P_{prov} \cdot N_{anchor})}{3 \cdot W_f \left(\frac{B_f}{2} - e \right)} = 2.755 \text{ ksf}$$

$$q_{adj} := \text{if}(P_{min} < 0, P_a, P_{max}) = 2.755 \text{ ksf}$$

$$\text{Pressure_Check} := \text{if}(q_{adj} < q_s, \text{"Okay"}, \text{"No Good"})$$

Pressure_Check = "Okay"

Concrete Bearing Capacity:

Strength Reduction Factor =

$$\Phi_c := 0.65 \quad (\text{ACI-2008 9.3.2.2})$$

Bearing Strength Between Pier and Pad =

$$P_b := \Phi_c \cdot 0.85 \cdot f_c \cdot \frac{\pi \cdot d_p^2}{4} = 4.686 \times 10^3 \text{ kips} \quad (\text{ACI-2008 10.14})$$

$$\text{Bearing_Check} := \text{if}(P_b > \text{LF} \cdot \text{Axial}, \text{"Okay"}, \text{"No Good"})$$

$$\text{Bearing_Check} = \text{"Okay"}$$

Shear Strength of Concrete:

Beam Shear:

(Critical section located at a distance d from the face of Pier) (ACI 11.3.1.1)

$$\phi_c := 0.85 \quad (\text{ACI 9.3.2.5})$$

$$d := T_f - \text{Cvr}_{\text{pad}} - d_{\text{bbot}} = 32 \text{ in}$$

$$d_1 := 6 \text{ in}$$

Actual Distance to Face of Butress

$$d_2 := d_1 - d$$

$$L := \left(\frac{W_f}{2} - e \right) \cdot 3$$

$$\text{Slope} := \text{if} \left(L > W_f, \frac{P_{\text{max}} - P_{\text{min}}}{W_f}, \frac{q_{\text{adj}}}{L} \right)$$

$$V_{\text{req}} := \text{LF} \cdot \left[(q_{\text{adj}} - \text{Slope} \cdot d_1) + \left(\frac{\text{Slope} \cdot d_1}{2} \right) \right] \cdot W_f \cdot d_1 \quad V_{\text{req}} = 39.868 \text{ kips}$$

$$V_{\text{Avail}} := \phi_c \cdot 2 \cdot \sqrt{f_c \cdot \text{psi}} \cdot W_f \cdot d \quad V_{\text{Avail}} = 786.62 \text{ kips} \quad (\text{ACI-2008 11.2.1.1})$$

$$\text{Beam_Shear_Check} := \text{if}(V_{\text{req}} < V_{\text{Avail}}, \text{"Okay"}, \text{"No Good"})$$

$$\text{Beam_Shear_Check} = \text{"Okay"}$$

Punching Shear:

(Critical Section Located at a distance of d/2 from the face of pier) (ACI 11.11.2)

Critical Perimeter of Punching Shear =

$$b_o := (d_p + d) \cdot \pi = 24.1$$

Area Included Inside Perimeter =

$$A_{bo} := \frac{\pi \cdot (d_p + d)^2}{4} = 46.2$$

Area Outside of Perimeter =

$$A_{\text{out}} := A_{\text{mat}} - A_{bo} = 327.8$$

Guess Value =

$$v_u := 1 \text{ ksf}$$

(From "Foundation Analysis
 and design", By Joseph
 Bowles, Eq. 8-9)

Given

$$d^2 + d_p \cdot d = \frac{W_{T_{\text{tot}}}}{\pi \cdot v_u}$$

$$v_u := \text{Find}(v_u) = 5.1 \cdot \text{ksf}$$

$$V_u := v_u \cdot d \cdot W_f = 299.9 \cdot \text{kips}$$

Required Shear Strength =

$$V_{\text{req}} := L F \cdot V_u = 399.7 \cdot \text{kips}$$

Available Shear Strength =

$$V_{\text{avail}} := \phi_c \cdot 4 \cdot \sqrt{f_c \cdot \text{psi} \cdot b_o \cdot d} = 1722.4 \cdot \text{kip} \quad (\text{ACI-2008 11.11.2.1})$$

$$\text{Punching_Shear_Check} := \text{if}(V_{\text{req}} < V_{\text{avail}}, \text{"Okay"}, \text{"No Good"})$$

$$\text{Punching_Shear_Check} = \text{"Okay"}$$

Steel Reinforcement in Pad:

Required Reinforcement for Bending:

Strength Reduction Factor =

$$\phi_m := .90$$

(ACI-2008 9.3.2.1)

$$q_b := q_{\text{adj}} - d_1 \cdot \text{Slope} = 2.683 \cdot \text{ksf}$$

Maximum Bending at Face of Pier =

$$M_u := L F \cdot \left[(q_{\text{adj}} - q_b) \cdot \frac{d_1^2}{3} + q_b \cdot \frac{d_1^2}{2} \right] \cdot W_f = 10 \cdot \text{kip-ft}$$

$$\beta := \begin{cases} 0.85 & \text{if } 2500 \cdot \text{psi} \leq f_c \leq 4000 \cdot \text{psi} \\ 0.65 & \text{if } f_c > 8000 \cdot \text{psi} \end{cases} = 0.85$$

$$\left[\left[0.85 - \left[\frac{\left(\frac{f_c}{\text{psi}} - 4000 \right)}{1000} \right] \cdot 0.5 \right] \right] \text{ otherwise} \quad (\text{ACI-2008 10.2.7.3})$$

$$R_n := \frac{M_u}{\phi_m \cdot W_f \cdot d^2} = 0.5 \cdot \text{psi}$$

$$\rho := \frac{0.85 \cdot f_c}{f_y} \left(1 - \sqrt{1 - \frac{2 \cdot R_n}{0.85 \cdot f_c}} \right) = 8.2296 \times 10^{-6}$$

$$\rho_{\text{min}} := \rho = 8.22961 \times 10^{-6}$$

Required Reinforcement for Temperature and Shrinkage:

$$\rho_{sh} := \begin{cases} .0018 & \text{if } f_y \geq 60000 \text{ psi} \\ .0020 & \text{otherwise} \end{cases} \quad (\text{ACI -2008 7.12.2.1})$$

Check Bottom Bars:

$$A_s := \begin{cases} \rho_{min} \cdot W_f \cdot d & \text{if } \rho_{min} > \frac{\rho_{sh}}{2} = 7.603 \cdot \text{in}^2 \\ \rho_{sh} \cdot W_f \cdot \frac{d}{2} & \text{otherwise} \end{cases}$$

$$A_{s\text{ prov}} := A_{bbot} \cdot NB_{bot} = 13.4 \cdot \text{in}^2$$

$$Pad_Reinforcement_Bot := \text{if}(A_{s\text{ prov}} > A_s, \text{"Okay"}, \text{"No Good"})$$

$$Pad_Reinforcement_Bot = \text{"Okay"}$$

Check top Bars:

$$A_s := \rho_{sh} \left(W_f \cdot \frac{d}{2} \right) = 7.6 \cdot \text{in}^2$$

$$A_{s\text{ prov}} := A_{btop} \cdot NB_{top} = 13.4 \cdot \text{in}^2$$

$$Pad_Reinforcement_Top := \text{if}(A_{s\text{ prov}} > A_s, \text{"Okay"}, \text{"No Good"})$$

$$Pad_Reinforcement_Top = \text{"Okay"}$$

Development Length Pad Reinforcement:

Bar Spacing =

$$B_{sPad} := \frac{W_f - 2 \cdot C_{vr\text{ pad}} - NB_{bot} \cdot d_{bbot}}{NB_{bot} - 1} = 15.06 \cdot \text{in}$$

Spacing or Cover Dimension =

$$c := \text{if} \left(C_{vr\text{ pad}} < \frac{B_{sPad}}{2}, C_{vr\text{ pad}}, \frac{B_{sPad}}{2} \right) = 3 \cdot \text{in}$$

Transverse Reinforcement Index =

$$k_{tr} := 0 \quad (\text{ACI-2008 12.2.3})$$

$$L_{dbt} := \frac{3 \cdot f_y \cdot \alpha_{pad} \cdot \beta_{pad} \cdot \gamma_{pad} \cdot \lambda_{pad}}{40 \cdot \sqrt{f_c \cdot \text{psi}} \cdot \frac{c + k_{tr}}{d_{bbot}}} \cdot d_{bbot} = 27.4 \cdot \text{in}$$

Minimum Development Length =

$$L_{dbmin} := 12 \cdot \text{in} \quad (\text{ACI-2008 12.2.1})$$

$$L_{dbt\text{ Check}} := \text{if}(L_{dbt} \geq L_{dbmin}, \text{"Use L.dbt"}, \text{"Use L.dbmin"})$$

Available Length in Pad =

$$L_{Pad} := \frac{W_f}{2} - \frac{d_p}{2} - C_{vr\text{ pad}} = 99 \cdot \text{in}$$

$$L_{pad_Check} := \text{if}(L_{Pad} > L_{dbt}, \text{"Okay"}, \text{"No Good"})$$

$$L_{pad_Check} = \text{"Okay"}$$

Steel Reinforcement in Pier:

Area of Pier =

$$A_p := \frac{\pi \cdot d_p^2}{4} = 2827.43 \cdot \text{in}^2$$

$$A_{smin} := 0.01 \cdot 0.5 \cdot A_p = 14.14 \cdot \text{in}^2 \quad (\text{ACI-2008 10.8.4 \& 10.9.1})$$

$$A_{sprov} := N_{B_{pier}} \cdot A_{B_{pier}} = 18.74 \cdot \text{in}^2$$

$$\text{Steel_Area_Check} := \text{if}(A_{sprov} > A_{smin}, \text{"Okay"}, \text{"No Good"})$$

Steel_Area_Check = "Okay"

Bar Spacing In Pier =

$$B_{sPier} := \frac{d_p \cdot \pi}{N_{B_{pier}}} - d_{B_{pier}} = 14.298 \cdot \text{in}$$

Diameter of Reinforcement Cage =

$$\text{Diam}_{cage} := d_p - 2 \cdot C_{vr_{pier}} = 54 \cdot \text{in}$$

Maximum Moment in Pier =

$$M_p := \left[OM + \text{Shear} \cdot \left(L_p + \frac{A_{BP}}{2} \right) \right] \cdot LF = 27513.1 \cdot \text{in} \cdot \text{kips}$$

Pier Check evaluated from outside program and results are listed below;

$$\left(D \ N \ n \ P_u \ M_{xu} \right) := \left(d_p \cdot 12 \ N_{B_{pier}} \ B_{s_{pier}} \ \frac{\text{Axial} \cdot 1.333}{\text{kips}} \ \frac{M_p}{\text{in} \cdot \text{kips}} \right)$$

$$\left(D \ N \ n \ P_u \ M_{xu} \right) = \left(60 \ 12 \ 11 \ 21.328 \ 2.751 \times 10^4 \right)$$

$$\left(\phi P_n \ \phi M_{xn} \ f_{sp} \ \rho \right) := (0 \ 0 \ 0 \ 0)$$

$$\left(\phi P_n \ \phi M_{xn} \ f_{sp} \ \rho \right) := \phi P'_n (D, N, n, P_u, M_{xu})^T$$

$$\left(\phi P_n \ \phi M_{xn} \ f_{sp} \ \rho \right) = \left(19.18 \ 2.474 \times 10^4 \ -60 \ 6.621 \times 10^{-3} \right)$$

$$\text{Axial_Load_Check} := \text{if}(\phi P_n \geq P_u, \text{"Okay"}, \text{"No Good"})$$

Axial_Load_Check = "No Good"

$$\text{Bending_Check} := \text{if}(\phi M_{xn} \geq M_{xu}, \text{"Okay"}, \text{"No Good"})$$

Bending_Check = "No Good"

Development Length Pier Reinforcement:

Available Length in Foundation:

$$L_{\text{pier}} := L_p - C_{\text{vr}}_{\text{pier}} = 39 \cdot \text{in}$$

$$L_{\text{pad}} := T_f - C_{\text{vr}}_{\text{pad}} = 33 \cdot \text{in}$$

Tension:

(ACI-2008 12.2.3)

Spacing or Cover Dimension =

$$c := \text{if} \left(C_{\text{vr}}_{\text{pier}} < \frac{B_{\text{sPier}}}{2}, C_{\text{vr}}_{\text{pier}}, \frac{B_{\text{sPier}}}{2} \right) = 3 \cdot \text{in}$$

Transverse Reinforcement =

$$k_{\text{tr}} := 0 \quad (\text{ACI-2008 12.2.3})$$

$$L_{\text{dbt}} := \frac{3 \cdot f_y \cdot \alpha_{\text{pier}} \cdot \beta_{\text{pier}} \cdot \gamma_{\text{pier}} \cdot \lambda_{\text{pier}}}{40 \cdot \sqrt{f_c \cdot \text{psi}} \cdot \left(\frac{c + k_{\text{tr}}}{d_{\text{bpier}}} \right)} \cdot d_{\text{bpier}} = 54.45 \cdot \text{in}$$

Minimum Development Length =

Pier reinforcement bars are standard 90 degree hooks
 and therefore development in the pad is computed
 as follows:

$$L_{\text{dh}} := \frac{1200 \cdot d_{\text{bpier}}}{\sqrt{\frac{f_c}{\text{psi}}}} \cdot .7 = 21.624 \cdot \text{in} \quad (\text{ACI 12.2.1})$$

$$L_{\text{db}} := \max(L_{\text{dbt}}, L_{\text{dbmin}})$$

$$L_{\text{tension_Check}} := \text{if}(L_{\text{pier}} + L_{\text{pad}} > L_{\text{dbt}}, \text{"Okay"}, \text{"No Good"})$$

$$L_{\text{tension_Check}} = \text{"Okay"}$$

Compression:

(ACI-2008 12.3.2)

$$L_{\text{dbc1}} := \frac{.02 \cdot d_{\text{bpier}} \cdot f_y}{\sqrt{f_c \cdot \text{psi}}} = 30.892 \cdot \text{in}$$

$$L_{\text{dbmin}} := 0.0003 \cdot \frac{\text{in}^2}{\text{lb}} \cdot (d_{\text{bpier}} \cdot f_y) = 25.38 \cdot \text{in}$$

$$L_{\text{dbc}} := \text{if}(L_{\text{dbc1}} \geq L_{\text{dbmin}}, L_{\text{dbc1}}, L_{\text{dbmin}}) = 30.892 \cdot \text{in}$$

$$L_{\text{compression_Check}} := \text{if}(L_{\text{pier}} + L_{\text{pad}} > L_{\text{dbc}}, \text{"Okay"}, \text{"No Good"})$$

$$L_{\text{compression_Check}} = \text{"Okay"}$$

Tie Size and Spacing in Column:

Minimum Tie Size = $Tie_{min} := \text{if}(BS_{pier} \leq 10, 3, 4) = 4$

Used #4 Ties

Seismic Factor = $z := \text{if}(Z \leq 2, 1, 0.5) = 1$ (ACI-2008 21.10.5)

$s_{lim1} := 16 \cdot d_{bpier} \cdot z = 22.56 \cdot \text{in}$

$s_{lim2} := 48 \cdot d_{Tie} \cdot z = 24 \cdot \text{in}$

$s_{lim3} := D_F \cdot z = 72 \cdot \text{in}$

$s_{lim4} := 18 \cdot \text{in}$

Maximum Spacing = $s_{tie} := \min \left(\begin{matrix} s_{lim1} \\ s_{lim2} \\ s_{lim3} \\ s_{lim4} \end{matrix} \right) = 18 \cdot \text{in}$

Number of Ties Required = $n_{tie} := \frac{L_{pier} - 3 \cdot \text{in}}{s_{tie}} + 1 = 3$

Check Anchor Steel Embedment:

Depth Available = $D_{ab} := L_{st} - A_{BP} = 5 \cdot \text{ft}$

Length of Anchor Bolt = $L_{anchor} := \frac{(0.11 \cdot f_{ya}) \cdot \text{in}}{\sqrt{f_c \cdot \text{psi}}} = 12.552 \cdot \text{ft}$

Depth_Check := $\text{if}(D_{ab} \geq L_{anchor}, \text{"Okay"}, \text{"No Good"})$

Depth_Check = "No Good"

Note: Anchor plate is provided

Title :
Dsgnr:
Description :

Job #
Date: 11:12AM, 8 APR 14

Scope :

Rev: 580010
User: KW-0607028, Ver 5.8.0, 1-Dec-2003
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Concrete Rectangular & Tee Beam Design

Page 1
anchor beam design.ecw:Calculations

Description Reinforced Concrete Anchor Beam Design 45% DL, 55% LL. Service Load Soil Bearing = 3,000psf. Beam Depth = 2.5-ft. Length = 17.00-ft.

General Information

Code Ref: ACI 318-02, 1997 UBC, 2003 IBC, 2003 NFPA 5000

Span	14.00 ft	f'c	4,000 psi
Depth	36.000 in	Fy	60,000 psi
Width	30.000 in	Concrete Wt.	145.0 pcf
		Seismic Zone	2
		End Fixity	Pinned-Pinned
Beam Weight Added Internally		Live Load acts with Short Term	

Reinforcing

Rebar @ Center of Beam...

	Count	Size	'd' from Top
#1	3	8	3.00in
#2	2	8	13.00 in
#3	2	8	23.00in
#4	3	8	33.00in

Rebar @ Left End of Beam...

	Count	Size	'd' from Top
#1	3	8	3.00 in
#2	2	8	13.00 in
#3	2	8	23.00 in
#4	3	8	33.00 in

Rebar @ Right End of Beam...

	Count	Size	'd' from Top
#1	3	8	3.00 in
#2	2	8	13.00 in
#3	2	8	23.00 in
#4	3	8	33.00 in

Load Factoring

Note: Load factoring supports 2003 IBC and 2003 NFPA 5000 by virtue of their references to ACI 318-02 for concrete design.
Factoring of entered loads to ultimate loads within this program is according to ACI 318-02 C.2

Uniform Loads

	Dead Load	Live Load	Short Term	Start	End
#1	3.375 k	k	4.125 k	0.000 ft	14.000 ft

Summary

Beam Design OK

Span = 14.00ft, Width= 30.00in Depth = 36.00in

Maximum Moment : Mu	242.92 k-ft	Maximum Deflection	-0.0177 in
Allowable Moment : Mn*phi	567.53 k-ft		
Maximum Shear : Vu	42.20 k	Max Reaction @ Left	60.11 k
Allowable Shear : Vn*phi	106.44 k	Max Reaction @ Right	60.11 k
Shear Stirrups...			
Stirrup Area @ Section	0.440 in2		
Region	0.000	2.333	4.667
Max. Spacing	Not Req'd	Not Req'd	Not Req'd
Max Vu	42.198	42.198	23.320
			22.765
			22.765
			41.643
			41.643 k

Bending & Shear Force Summary

Bending...	Mn*Phi	Mu, Eq. C-1	Mu, Eq. C-2	Mu, Eq. C-3
@ Center	567.53 k-ft	142.13 k-ft	214.99 k-ft	242.92 k-ft
@ Left End	567.53 k-ft	0.00 k-ft	0.00 k-ft	0.00 k-ft
@ Right End	567.53 k-ft	0.00 k-ft	0.00 k-ft	0.00 k-ft
Shear...	Vn*Phi	Vu, Eq. C-1	Vu, Eq. C-2	Vu, Eq. C-3
@ Left End	106.44 k	24.69 k	37.35 k	42.20 k
@ Right End	106.44 k	24.37 k	36.85 k	41.64 k

Deflection

Deflections...	Upward	Downward
DL + [Bm Wt]	0.0000 in at 14.0000 ft	-0.0092 in at 7.0000 ft
DL + LL + [Bm Wt]	0.0000 in at 14.0000 ft	-0.0092 in at 7.0000 ft
DL + LL + ST + [Bm Wt]	0.0000 in at 14.0000 ft	-0.0177 in at 7.0000 ft
Reactions...	@ Left	@ Right
DL + [Bm Wt]	31.237 k	31.237 k
DL + LL + [Bm Wt]	31.237 k	31.237 k
DL + LL + ST + [Bm Wt]	60.112 k	60.112 k

Title :
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Rev: 580010
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Concrete Rectangular & Tee Beam Design

Page 2
anchor beam design.ecw:Calculations

Description Reinforced Concrete Anchor Beam Design 45% DL, 55% LL. Service Load Soil Bearing = 3,000psf. Beam Depth = 2.5-ft. Length = 17.00-ft.

Section Analysis

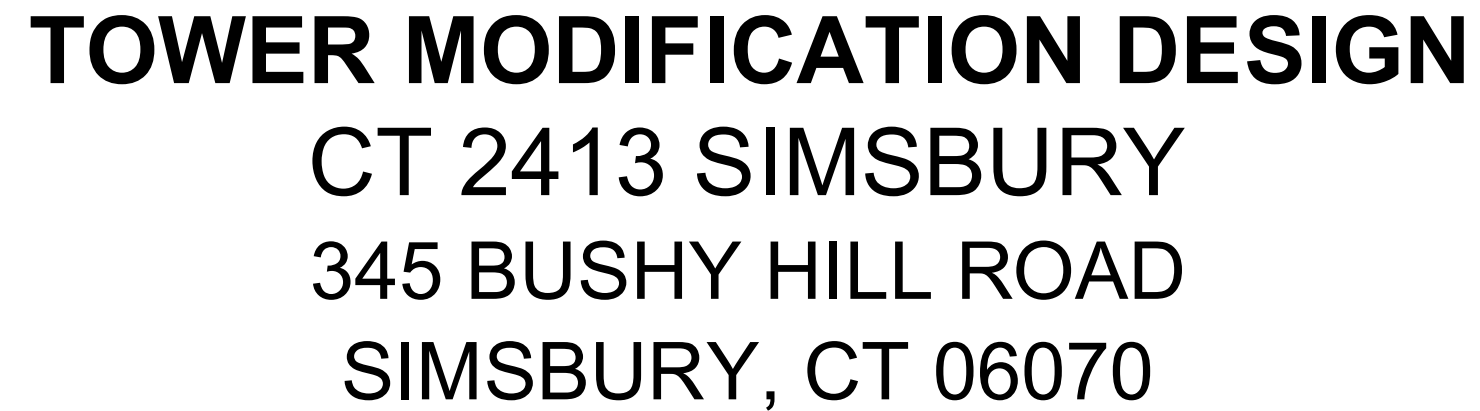
Evaluate Moment Capacity...	Center	Left End	Right End
X : Neutral Axis	3.550 in	3.550 in	3.550 in
a = beta * Xneutral	3.017 in	3.017 in	3.017 in
Compression in Concrete	307.785 k	307.785 k	307.785 k
Sum [Steel comp. forces]	23.887 k	23.887 k	23.887 k
Tension in Reinforcing	-331.800 k	-331.800 k	-331.800 k
Find Max As for Ductile Failure...			
X-Balanced	19.531 in	19.531 in	19.5306 in
Xmax = Xbal * 0.75	14.648 in	14.648 in	14.648 in
a-max = beta * Xbal	16.601 in	16.601 in	16.601 in
Compression in Concrete	1,269.978 k	1,269.978 k	1,269.978 k
Sum [Steel Comp Forces]	144.235 k	144.235 k	144.235 k
Total Compressive Force	1,414.213 k	1,414.213 k	1,414.213 k
AS Max = Tot Force / Fy	23.570 in ²	23.570 in ²	23.570 in ²
Actual Tension As	5.530 OK	0.000 OK	0.000 OK

Additional Deflection Calcs

Neutral Axis	6.870 in	Mcr	256.14 k-ft
Igross	116,640.00 in ⁴	Ms:Max DL + LL	210.39 k-ft
Icracked	20,329.74 in ⁴	R1 = (Ms:DL+LL)/Mcr	1.217
Elastic Modulus	3,605.0 ksi	Ms:Max DL+LL+ST	210.39 k-ft
Fr = 7.5 * f'c ^{0.5}	474.342 psi	R2 = (Ms:DL+LL+ST)/Mcr	1.217
Z:Cracking	241.970 k/in	I:eff... Ms(DL+LL)	116640.000 in ⁴
Z:cracking > 175 : No Good!		I:eff... Ms(DL+LL+ST)	116640.000 in ⁴
Eff. Flange Width	30.00 in		

ACI Factors (per ACI 318-02, applied internally to entered loads)

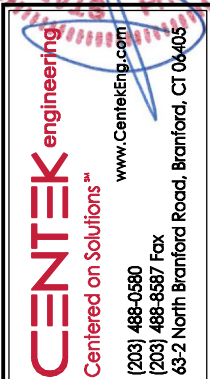
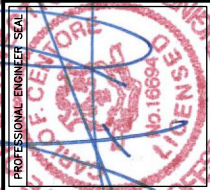
ACI C-1 & C-2 DL	1.300	ACI C-2 Group Factor	0.750	Add'l "1.4" Factor for Seismic	1.400
ACI C-1 & C-2 LL	1.300	ACI C-3 Dead Load Factor	0.900	Add'l "0.9" Factor for Seismic	0.900
ACI C-1 & C-2 ST	1.300	ACI C-3 Short Term Factor	1.300		
....seismic = ST * :	1.100				



SITE ADDRESS:	345 BUSHY HILL ROAD SIMSBURY, CT 06070
PROJECT COORDINATES:	LAT: 41°-50'-29.00"N LON: 72°-51'-02.00"W ELEV: ±368' AMSL
TOWER OWNER:	SIMSBURY FIRE DEPARTMENT 345 BUSHY HILL ROAD, SIMSBURY, CT
AT&T SITE REF.:	CT 2413S SIMSBURY
AT&T CONTACT:	GERRY BYRNES – SMARTLINK 201-213-8292
ENGINEER OF RECORD:	CEN TEK ENGINEERING, INC. 63-2 NORTH BRANFORD ROAD BRANFORD, CT 06405
CEN TEK CONTACT:	CARLO F. CENTORE, PE 203.488.0580 ext. 122

SHEET INDEX

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[illegible]

A & T MOBILITY	
PROPOSED TOWER REINFORCEMENT DESIGN	
CT2413 SIMSBURY	
345 BUSHY HILL ROAD, SIMSBURY, CT	
DATE:	03/05/14
SCALE:	AS SHOWN
JOB NO.	13298.000

TITLE SHEET

SHEET NO.

T-1

Sheet No. 1 of 14

1. GOVERNING CODE: 2003 INTERNATIONAL BUILDING CODE AS MODIFIED BY THE 2005 CT STATE BUILDING CODE AND 2009 AMENDMENTS.
2. TIA/EIA-222-F-1996 "STRUCTURAL STANDARDS FOR STEEL ANTENNA TOWERS AND ANTENNA SUPPORTING STRUCTURES".
3. DESIGN CRITERIA

BASIC WIND SPEED (V) = 80 MPH (FASTEST MILE)

EQUIVALENT TO (V) = 77.5 MPH (FASTEST MILE)

TIA/EIA-222-F-1996 WIND SPEED CONTROLS

1. REFER TO DRAWING MI-1 FOR INSPECTION REQUIREMENTS PRIOR TO COMMENCEMENT OF CONSTRUCTION RELATED ACTIVITIES.
2. RELOCATE EXISTING MONOPOLE STEP BOLTS AND SAFETY CLIMB DEVICES WHERE THEY COME INTO CONFLICT WITH REINFORCEMENT MATERIAL. REFER TO S-3 FOR FLAT LOCATIONS. CONTRACTOR TO ENSURE THAT ALL RELOCATED STEP BOLTS SHALL MEET OSHA REQUIREMENTS.
3. GRIND STEEL EDGES AFTER COMPLETION OF FIELD CUTTING TO REMOVE BURRS.
4. CLEAN SURFACE/TOUCH UP ABRASIONS AND NON-GALVANIZED SURFACES PER STRUCTURAL STEEL NOTE 7 SHEET N-1.

1. REFER TO STRUCTURAL ANALYSIS AND MODIFICATION DESIGN REPORT PREPARED BY CENTEK ENGINEERING, DATED 04.10.14, REVISION #1 FOR ALL AT&T ANTENNA & APPURTENENCE INFORMATION. DESIGN LOADS ARE BASED ON THE ABOVE REPORT.
2. TOWER GEOMETRY AND STRUCTURE MEMBER SIZES WERE OBTAINED FROM THE ORIGINAL TOWER DESIGN DRAWINGS PREPARED BY PAUL J. FORD AND COMPANY JOB #29204-0049, DATED FEBRUARY 24, 2004 AND VERIFIED IN FIELD. REFER TO CSB TOWER MAPPING REPORT, DATED 01/24/2014.
3. REFER TO MONPOLE EXTENSION DESIGN PREPARED BY CENTEK ENGINEERING FOR VERIZON WIRELESS, DATED 02.13.14, REVSION #3.
4. MONOPOLE DESIGN TAPER = 0.14250 in./ft.
5. CONTRACTOR SHALL BE RESPONSIBLE FOR PROCURING ALL NECESSARY PERMITS, LICENSES, APPROVALS AND OTHER REQUIREMENTS FOR CONSTRUCTION.
6. THE INSTALLATION OF TOWER REINFORCEMENT SHALL BE CONDUCTED ONLY ON DAYS WHEN THE EXPECTED WEATHER CONDION INDICATES LESS THAN 15 MPH WIND SPEED. HANDHOLE INSTALLATION SHALL BE COMPLETED ON SAME WORKING DAY. CONTRACTOR SHALL ENSURE THE STABILITY OF THE SUBJECT TOWER DURING MODIFICATION WORK.

1. ALL WORK SHALL BE IN ACCORDANCE WITH TIA/EIA-222 REVISION "F" "STRUCTURAL STANDARDS FOR STEEL ANTENNA TOWERS AND SUPPORTING STRUCTURES".
2. THE CONTRACTOR IS SOLELY RESPONSIBLE TO DETERMINE CONSTRUCTION PROCEDURE AND SEQUENCE, AND TO ENSURE THE SAFETY OF THE EXISTING STRUCTURES AND ITS COMPONENT PARTS DURING CONSTRUCTION. THIS INCLUDES THE ADDITION OF WHATEVER SHORING, BRACING, UNDERPINNING, ETC. THAT MAY BE NECESSARY. MAINTAIN EXISTING SITE OPERATIONS, COORDINATE WORK WITH TOWER OWNER.
3. DRAWINGS INDICATE THE MINIMUM STANDARDS, BUT IF ANY WORK SHOULD BE INDICATED TO BE SUBSTANDARD TO ANY ORDINANCES, LAWS, CODES, RULES, OR REGULATIONS BEARING ON THE WORK, THE CONTRACTOR SHALL INCLUDE IN HIS WOPSRK AND SHALL EXECUTE THE WORK CORRECTLY IN ACCORDANCE WITH SUCH ORDINANCES, LAWS, CODES, RULES OR REGULATIONS WITH NO INCREASE IN COSTS.
4. THE CONTRACTOR SHALL FIELD VERIFY ALL DIMENSIONS, ELEVATIONS, ANGLES, AND EXISTING CONDITIONS AT THE SITE, PRIOR TO FABRICATION AND/OR INSTALLATION OF ANY WORK IN THE CONTRACT AREA.
5. ALL DAMAGE CAUSED TO ANY EXISTING STRUCTURE SHALL BE THE SOLE RESPONSIBILITY OF THE CONTRACTOR. THE CONTRACTOR WILL BE HELD LIABLE FOR ALL REPAIRS REQUIRED FOR EXISTING STRUCTURES IF DAMAGED DURING CONSTRUCTION ACTIVITIES.
6. CONTRACTOR SHALL BE RESPONSIBLE FOR ALL ON-SITE SAFETY FROM THE TIME THE JOB IS AWARDED UNTIL ALL WORK IS COMPLETE AND ACCEPTED BY THE OWNER.
7. CONTRACTOR SHALL TAKE FIELD MEASUREMENTS NECESSARY TO ASSURE PROPER FIT OF ALL FINISHED WORK.
8. TOWER REINFORCING SHALL BE CONDUCTED BY FIELD CREWS EXPERIENCED IN THE ASSEMBLY AND ERECTION OF RADIO ANTENNAS AND SUPPORT STRUCTURES. ALL SAFETY PROCEDURES, RIGGING AND ERECTION METHODS SHALL BE STANDARD TO THE INDUSTRY AND IN COMPLIANCE WITH OSHA.
9. EXISTING COAXIAL CABLES AND ALL ACCESSORIES SHALL BE RELOCATED AS NECESSARY AND REINSTALLED BY THE CONTRACTOR WITHOUT INTERRUPTION IN SERVICE WHERE THEY ARE IN CONFLICT WITH TOWER REINFORCEMENT.

1. COMPACTED GRAVEL FILL SHALL BE FURNISHED AND PLACED AS A FOUNDATION FOR STRUCTURES, WHERE SHOWN ON THE CONTRACT DRAWINGS OR DIRECTED BY THE ENGINEER.

2. CRUSHED STONE FILL SHALL BE PLACED IN 12" MAX. LIFTS AND CONSOLIDATED USING A HAND OPERATED VIBRATORY PLATE COMPACTOR WITH A MINIMUM OF 2 PASSES OF COMPACTOR PER LIFT.

3. COMPACTED GRAVEL FILL TO BE WELL GRADED BANK RUN GRAVEL MEETING THE FOLLOWING GRADATION REQUIREMENTS:

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

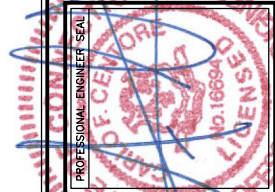
4. CRUSHED STONE TO BE UNIFORMLY GRADED, CLEAN, HARD PROCESS AGGREGATE MEETING THE FOLLOWING GRADATION REQUIREMENTS:

<u>SIEVE</u>	<u>DESIGNATION</u>	<u>% PASSING</u>
	1"	100
	3/4"	90-100
	1/2"	0-15
	3/8"	0-5

5. SELECT BACKFILL FOR FOUNDATION WALLS SHALL BE FREE OF ORGANIC MATERIAL, TOPSOIL, DEBRIS AND BOULDERS LARGER THAN 6".

6. GRAVEL AND GRANULAR FILL SHALL BE INSTALLED IN 10" MAX. LIFTS. COMPACTED TO 95% MIN. AT MAX. DRY DENSITY.

7. NON WOVEN GEOTEXTILE FOR SEPARATION PURPOSES SHALL BE MIRAFI 140N, OR ENGINEER APPROVED EQUAL.

[illegible]

AT&T MOBILITY	
PROPOSED TOWER REINFORCEMENT DESIGN	
CT2413 SIMSBURY	
345 BUSHY HILL ROAD, SIMSBURY, CT	
DATE:	03/05/14
SCALE:	AS SHOWN
JOB NO.	13298.000

DESIGN BASIS AND STRUCTURAL NOTES

SHEET NO.

N-1

Sheet No. 2 of 14

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

1. CONCRETE CONSTRUCTION SHALL CONFORM TO THE FOLLOWING STANDARDS:

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

ACI 301 – SPECIFICATIONS FOR STRUCTURAL CONCRETE FOR BUILDINGS.

ACI 302 – GUIDE FOR CONCRETE FLOOR AND SLAB CONSTRUCTION

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

ACI 306.1 – STANDARD SPECIFICATION FOR COLD WEATHER CONCRETING

ACI 318 – BUILDING CODE REQUIREMENTS FOR REINFORCED CONCRETE.
2. CONCRETE SHALL BE AIR ENTRAINED AND SHALL DEVELOP COMPRESSIVE STRENGTH IN 28 DAYS AS FOLLOWS:

ALL CONCRETE 4,000 PSI
3. REINFORCING STEEL SHALL BE 60,000 PSI YIELD STRENGTH.
4. ALL DETAILING, FABRICATION, AND ERECTION OF REINFORCING BARS, UNLESS OTHERWISE NOTED, MUST FOLLOW THE LATEST ACI CODE AND LATEST ACI "MANUAL OF STANDARD PRACTICE FOR DETAILING REINFORCED CONCRETE STRUCTURES".
5. CONCRETE COVER OVER REINFORCING SHALL BE 3 INCHES.
6. NO STEEL WIRE, METAL FORM TIES, OR ANY OTHER METAL SHALL REMAIN WITHIN THE REQUIRED COVER OF ANY CONCRETE SURFACE.
7. ALL REINFORCEMENT SHALL BE CONTINUOUS. SPLICES WILL NOT BE ALLOWED.
8. NO TACK WELDING OF REINFORCING WILL BE PERMITTED.
9. NO CALCIUM CHLORIDE OR ADMIXTURES CONTAINING MORE THAN 1 % CHLORIDE BY WEIGHT OF ADMIXTURE SHALL BE USED IN THE CONCRETE.
10. TOP OF FOOTING SURFACES SHALL RECEIVE A UNIFORM FLOAT FINISH. CURE FOOTING SURFACE WITH SONNEBORN KURE-N-SEAL WB OR APPROVED EQUAL, APPLIED AS RECOMMENDED BY MANUFACTURER.

11. PREPARATION OF SURFACES WHERE NEW CONCRETE WILL INTERFACE WITH EXISTING CONCRETE:
THE PERIMETER OF THE EXISTING CAISSON SHALL BE THOROUGHLY CLEANED OF ALL DIRT AND DELETERIOUS MATERIALS PRIOR TO APPLICATION OF BONDING AGENT. CONTRACTOR SHALL NOTIFY ENGINEER OF RECORD 24 HOURS IN ADVANCE OF CLEANING.

SIKADUR 32, HI-MOD OR ENGINEER APPROVED EQUAL SHALL BE APPLIED, IN STRICT ACCORDANCE WITH MANUFACTURER'S INSTRUCTIONS, TO ALL INTERFACING SURFACES BEFORE CONCRETE IS PLACED.

CAULK JOINT BETWEEN EXISTING CONCRETE SURFACES AND NEW CONCRETE WITH SIKAFLEX 1-A BY SIKA CORP. OR ENGINEER APPROVED EQUAL.

SUBMIT MANUFACTURER'S PRODUCT SPECIFICATION DATA AND INSTALLATION INSTRUCTIONS FOR REVIEW AND APPROVAL BY OWNER.
12. NEW CONCRETE FOOTING SHALL BE ALLOWED TO CURE AT LEAST 14 DAYS BEFORE WIRELESS ANTENNA MOUNT, ANTENNAS, AND CABLES ARE INSTALLED.
13. INSPECTION AND TESTING OF CONCRETE WORK SHALL BE PERFORMED BY AN INDEPENDENT TESTING LABORATORY, APPROVED AND PAID BY THE OWNER. THE INSPECTOR SHALL OBSERVE THE CONDITION OF SOILS AND FORMWORK BEFORE FOOTINGS ARE PLACED, SIZE, SPACING AND LOCATION OF REINFORCEMENT, AND PLACEMENT OF CONCRETE.
14. THE TESTING COMPANY SHALL ALSO OBTAIN A MINIMUM OF THREE (3) COMPRESSIVE STRENGTH TEST SPECIMENS FOR EACH CONCRETE MIX DESIGN. ONE SPECIMEN TESTED AT 7 DAYS, ONE AT 28 DAYS, AND ONE HELD IN RESERVE FOR FUTURE TESTING, IF NEEDED.
15. FOUR COPIES OF ALL INSPECTION TEST REPORTS SHALL BE SUBMITTED TO THE OWNER WITHIN TEN (10) WORKING DAYS OF THE DATE OF INSPECTION.

[illegible]

STRUCTURAL STEEL NOTES:

1. ALL STRUCTURAL STEEL IS DESIGNED BY ALLOWABLE STRESS DESIGN (ASD).
 - A. STRUCTURAL STEEL (W SHAPES)---ASTM A992, (FY = 50 KSI)
 - B. **REINFORCEMENT BARS**----ASTM A572 Grade 50, (Fu = 65 KSI)
 - C. STRUCTURAL HSS (RECTANGULAR SHAPES)---ASTM A500 GRADE B, (FY = 46 KSI)
 - D. STRUCTURAL HSS (ROUND SHAPES)---ASTM A500 GRADE B, (FY = 42 KSI)
 - C. CONNECTION BOLTS---ASTM A325-N
 - D. ANCHOR RODS---ASTM F 1554
 - E. WELDING ELECTRODE---ASTM E 70XX
2. STRUCTURAL STEEL SHALL BE DETAILED, FABRICATED AND ERECTED IN ACCORDANCE WITH THE LATEST PROVISIONS OF AISC MANUAL OF STEEL CONSTRUCTION.
3. PROVIDE ALL PLATES, CLIP ANGLES, CLOSURE PIECES, STRAP ANCHORS, MISCELLANEOUS PIECES AND HOLES REQUIRED TO COMPLETE THE STRUCTURE.
4. INSTALL FABRICATIONS PLUMB AND LEVEL, ACCURATELY FITTED, AND FREE FROM DISTORTIONS OR DEFECTS.
5. NOTIFY THE ENGINEER PRIOR TO FIELD CUTTING OR MODIFYING APPROVED FABRICATIONS.
6. ALL STEEL MATERIAL (EXPOSED TO WEATHER) SHALL BE GALVANIZED AFTER FABRICATION IN ACCORDANCE WITH ASTM A123 "ZINC (HOT DIPPED GALVANIZED) COATINGS" ON IRONS AND STEEL PRODUCTS.
7. ALL BOLTS, ANCHORS AND MISCELLANEOUS HARDWARE SHALL BE GALVANIZED IN ACCORDANCE WITH ASTM A153 "ZINC COATING (HOT-DIP) ON IRON AND STEEL HARDWARE".
8. CONTRACTOR SHALL COMPLY WITH AWS CODE FOR PROCEDURES APPEARANCE AND QUALITY OF WELDS, AND WELDING PROCESSES SHALL BE QUALIFIED IN ACCORDANCE WITH AWS "STANDARD QUALIFICATION PROCEDURES". ALL WELDING SHALL BE DONE USING E70XX ELECTRODES AND WELDING SHALL CONFORM TO AISC AND D1.1 WHERE FILLET WELD SIZES ARE NOT SHOWN, PROVIDE THE MINIMUM SIZE PER TABLE J2.4 IN THE AISC "MANUAL OF STEEL CONSTRUCTION" 9TH EDITION. AT THE COMPLETION OF WELDING, ALL DAMAGE TO GALVANIZED COATING SHALL BE REPAIRED.
9. THE ENGINEER SHALL BE NOTIFIED OF ANY INCORRECTLY FABRICATED, DAMAGED OR OTHERWISE MISFITTING OR NON CONFORMING MATERIALS OR CONDITIONS TO REMEDIAL OR CORRECTIVE ACTION. ANY SUCH ACTION SHALL REQUIRE ENGINEER REVIEW.
10. COMMENCEMENT OF STRUCTURAL STEEL WORK WITHOUT NOTIFYING THE ENGINEER OF ANY DISCREPANCIES WILL BE CONSIDERED ACCEPTANCE OF PRECEDING WORK.
11. FOUR COPIES OF ALL INSPECTION TEST REPORTS SHALL BE SUBMITTED TO THE ENGINEER WITHIN TEN (10) WORKING DAYS OF THE DATE OF INSPECTION.

AJAX BOLTS:

1. ALL REINFORCEMENT BAR SPLICE AND TERMINATION BOLTS SHALL BE 20mm ϕ 'ONESIDE' BOLTS BY AJAX FASTENERS w/ SLEEVES.
 - i) BOLTS SHALL MEET AS 1252, PC 8.8 (SIMILAR TO ASTM A325); $F_u = 120\text{ksi}$.
 - ii) BOLTS SHALL BE PROVIDED w/ 29mm O.D x 20MM I.D SLEEVE ($F_u = 120\text{ksi}$).
 - iii) HOLES IN REINFORCING BARS SHALL BE 31mm ϕ . FIELD DRILL 30mm ϕ HOLES IN TOWER AT EACH REINFORCING BAR HOLE LOCATION. ALL FIELD BOLTS TO BE COATED w/ SILICONE PRIOR TO INSTALLATION.

SUPPLEMENTARY ANCHOR RODS :

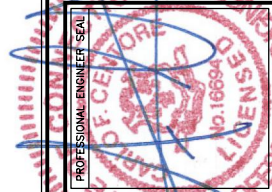
1. ALL ANCHOR BOLTS SHALL BE WILLIAMS ALL-THREAD BAR AND CONFORM TO ASTM A722 ($F_y = 127.7$ KSI, $F_u = 150$ KSI).
2. HEX NUTS AND JAM NUTS ARE TO BE ASTM A108 FOR ALL ALL-THREAD ANCHOR ROD BAR GRADES.
3. HARDENED WASHERS ARE TO BE ASTM F436 FOR ALL -THREAD ANCHOR ROD BAR GRADES.
4. THREADED ROD COUPLERS ARE NOT TO BE USED.
5. CONTRACTOR SHALL VERIFY ADEQUATE DRILLING CLEARANCE AND ACCESS AT EXISTING MONOPOLE PRIOR TO CONSTRUCTION. ANY OBSTRUCTIONS SHALL BE REPORTED TO THE ENGINEER OF RECORD IMMEDIATELY. NO WORK SHALL PROCEED UNTIL THE ENGINEER OF RECORD HAS REVIEWED THE OBSTRUCTION(S) AND A RESOLUTION HAS BEEN PROVIDED.
6. ANCHOR ROD HOLES SHALL BE LOCATED AS INDICATED WITHIN THESE DRAWINGS WITH A MINIMUM INSIDE EDGE DISTANCE OF 6" FROM FACE OF CAISSON OR PIER TO AVOID EXISTING REBAR CAGE. CONTRACTOR SHALL DRILL WITH CAUTION.
7. BASE PLATE HOLES (WHERE APPLICABLE) SHALL BE DRILLED AND NOT TORCH CUT.
8. PHOTOS SHALL BE TAKEN OF EACH ANCHOR ROD DRILLED HOLE WITH A TAPE MEASURE INSERTED INTO THE HOLE TO DOCUMENT FINAL DRILLED DEPTH OF HOLE. HOLES SHALL BE NUMBERED WITH A MARKER RELATIVE TO THE FLAT FACE SHOWN ON THE DRAWINGS FOR REFERENCE.
9. DRILLED HOLES SHALL BE FREE OF DEBRIS AND MOISTURE; CLEAN WITH VACUUM WHEN NECESSARY.

EPOXY ADHESIVE:

1. A SLOW CURE HIGH STRENGTH EPOXY (MIN 1800 PSI BOND STRENGTH ATTAINED AFTER 48 HOURS) SHALL BE USED TO SET ANCHORS. INSTALL IN STRICT ACCORDANCE WITH MANUFACTURERS INSTRUCTIONS WITH ATTENTION TO AMBIENT DAILY TEMPERATURE AT TIME OF INTENDED INSTALLATION.
2. CONTRACTOR SHALL SUBMIT EPOXY PRODUCT DATA SHEETS FOR APPROVAL BY ENGINEER OF RECORD (EOR) PRIOR TO PROCEEDING WITH CONSTRUCTION.

PULLOUT TESTING OF POST INSTALLED ANCHOR RODS:

1. EPOXY AGENTS SHOULD BE FULLY CURED IN ACCORDANCE WITH MANUFACTURERS REQUIREMENTS PRIOR TO PROCEEDING WITH PULLOUT TESTING OF ANCHOR RODS.
2. CONTRACTOR SHALL ENSURE THAT CONSTRUCTION DOES NOT PROCEED BEYOND THE POINT WHERE THE ANCHOR RODS CAN BE EFFECTIVELY TESTED. THE ANCHOR ROD SLEEVES AND TRANSFER STIFFENER PLATES SHOULD BE INSTALLED AFTER PULL-TESTING IS COMPLETE AND ENGINEER OF RECORD HAS APPROVED THE RESULTS OF THE PULL TEST.
3. CONTRACTOR SHALL TEST 50% OF POST INSTALLED ANCHOR RODS WITH A MINIMUM OF FOUR (4), WHICH EVER IS GREATER.
4. THE ANCHOR ROD(S) SHALL BE TESTED IN CONFORMANCE WITH ASTM E488 'STANDARD TEST METHODS FOR STRENGTH OF ANCHORS IN CONCRETE AND MASONRY ELEMENTS' (RE-APPROVED 2003) UTILIZING THE STATIC TENSION TEST PROCEDURE.
5. PULL TEST ANCHORS TO A TARGET TENSION OF 80% OF THE MATERIAL SPECIFIED MINIMUM YIELD (F_y) STRENGTH ON THE TENSILE STRESS (NET) AREA. THE TARGET TENSION FOR THIS PROJECT IS 265 KIPS.
6. MAINTAIN COMPLETE LOAD-DISPLACEMENT RECORDS THROUGHOUT THE TEST. THE ANCHOR SHALL BE LOADED IN INCREMENTS OF UP TO 15% OF THE TARGET TENSION.
7. IF A DISPLACEMENT GREATER THAN 0.010" REMAINS AFTER THE INITIAL TEST CYCLE, ADDITIONAL TESTING SHALL BE PERFORMED UP TO A MAXIMUM OF FOUR (4) TEST CYCLES TO DETERMINE IF THE MOVEMENT CONTINUES TO ACCUMULATE. INCREMENTAL RESIDUAL MOVEMENT RECORDED FROM EACH TEST CYCLE MUST BE DECREASING IN VALUE AND STABILIZE TO A VALUE NO MORE THAN 0.010", OTHERWISE THE ANCHOR SHALL BE CONSIDERED TO FAIL THE TEST. TOTAL RESIDUAL MOVEMENT SHALL NOT BE GREATER THAN 0.10" OR THE ANCHOR SHALL BE CONSIDERED TO FAIL THE TEST. THIS INFORMATION SHALL BE RECORDED AND INCLUDED IN THE POST MODIFICATION INSPECTION REPORT.
8. CONTACT ENGINEER OF RECORD (EOR) IF ANY OF THE ANCHORS FAIL THE PULL TEST.

[illegible]

AT&T MOBILITY	
PROPOSED TOWER REINFORCEMENT DESIGN	
CT2413 SIMSBURY	
345 BUSHY HILL ROAD, SIMSBURY, CT	
DATE:	03/05/14
SCALE:	AS SHOWN
JOB NO.	13298.000

STRUCTURAL NOTES

SHEET NO.
N-3
Sheet No. 4 of 14

MODIFICATION INSPECTION REPORT REQUIREMENTS

PRE-CONSTRUCTION		DURING CONSTRUCTION		POST-CONSTRUCTION	
SCHEDULED ITEM	REPORT ITEM	SCHEDULED ITEM	REPORT ITEM	SCHEDULED ITEM	REPORT ITEM
X	EOR MODIFICATION INSPECTION DRAWING	X	FOUNDATIONS	X	MODIFICATION INSPECTOR RECORD REDLINE DRAWING
X	EOR APPROVED SHOP DRAWINGS	X	EARTHWORK: BACKFILL MATERIAL & COMPACTION	X	POST-INSTALLED ANCHOR ROD PULL-OUT TEST
—	EOR APPROVED POST-INSTALLED ANCHOR MPIL	X	CONCRETE TESTING	X	PHOTOGRAPHS
—	FABRICATION INSPECTION	X	STEEL INSPECTION		
—	FABRICATOR CERTIFIED WELDER INSPECTION	X	POST INSTALLED ANCHOR ROD VERIFICATION		
X	MATERIAL CERTIFICATIONS	—	BASE PLATE GROUT VERIFICATION		
		X	CONTRACTOR'S CERTIFIED WELD INSPECTION		
		X	ON-SITE COLD GALVANIZING/PAINTING VERIFICATION		
		—	GUY WIRE TENSION REPORT		
		X	CONTRACTOR AS-BUILT REDLINE DRAWINGS		

NOTES:

- REFER TO MODIFICATION INSPECTION NOTES FOR ADDITIONAL REQUIREMENTS
- "X" DENOTES DOCUMENT REQUIRED FOR INCLUSION IN MODIFICATION INSPECTION FINAL REPORT.
- "—" DENOTES DOCUMENT NOT REQUIRED FOR INCLUSION IN MODIFICATION INSPECTION FINAL REPORT.
- EOR – ENGINEER OF RECORD
- MPIL – "MANUFACTURER'S PRINTED INSTALLATION GUIDELINES"

GENERAL

1. THE MODIFICATION INSPECTION IS A VISUAL INSPECTION OF STRUCTURAL MODIFICATIONS, TO INCLUDE A REVIEW AND COMPILATION OF SPECIFIED SUBMITTALS AND CONSTRUCTION INSPECTIONS, AS AN ASSURANCE OF COMPLIANCE WITH THE CONSTRUCTION DOCUMENTS PREPARED UNDER THE DIRECTION OF THE ENGINEER OF RECORD (EOR).
2. THE MODIFICATION INSPECTION IS TO CONFIRM INSTALLATION CONFIGURATION AND GENERAL WORKMANSHIP AND IS NOT A REVIEW OF THE MODIFICATION DESIGN. OWNERSHIP OF THE MODIFICATION DESIGN EFFECTIVENESS AND INTENT RESIDES WITH THE ENGINEER OF RECORD.
3. TO ENSURE COMPLIANCE WITH THE MODIFICATION INSPECTION REQUIREMENTS THE GENERAL CONTRACTOR (GC) AND THE MODIFICATION INSPECTOR (MI) COMMENCE COMMUNICATION UPON AUTHORIZATION TO PROCEED BY THE CLIENT. EACH PARTY SHALL BE PROACTIVE IN CONTACTING THE OTHER. THE EOR SHALL BE CONTACTED IF SPECIFIC GC/MI CONTACT INFORMATION IS NOT MADE AVAILABLE.
4. THE GC SHALL PROVIDE THE MI WITH A MINIMUM OF 5 BUSINESS DAYS NOTICE OF IMPENDING INSPECTIONS.
5. WHEN POSSIBLE, THE GC AND MI SHALL BE ON SITE DURING THE MODIFICATION INSPECTION TO HAVE ANY NOTED DEFICIENCIES ADDRESSED DURING THE INITIAL MODIFICATION INSPECTION.

MODIFICATION INSPECTOR (MI)

1. THE MI SHALL CONTACT THE GC UPON AUTHORIZATION BY THE CLIENT TO:
 - REVIEW THE MODIFICATION INSPECTION REPORT REQUIREMENTS.
 - WORK WITH THE GC IN DEVELOPMENT OF A SCHEDULE FOR ON-SITE INSPECTIONS.

- DISCUSS CRITICAL INSPECTIONS AND PROJECT CONCERNS.
2. THE MI IS RESPONSIBLE FOR COLLECTION OF ALL INSPECTION AND TEST REPORTS, REVIEWING REPORTS FOR ADHERENCE TO THE CONTRACT DOCUMENTS, CONDUCTING ON-SITE INSPECTIONS AND COMPILATION & SUBMISSION OF THE MODIFICATION INSPECTION REPORT TO THE CLIENT AND THE EOR.
- ## GENERAL CONTRACTOR (GC)
1. THE GC IS REQUIRED TO CONTACT THE GC UPON AUTHORIZATION TO PROCEED WITH CONSTRUCTION BY THE CLIENT TO:
 - REVIEW THE MODIFICATION INSPECTION REPORT REQUIREMENTS.
 - WORK WITH THE MI IN DEVELOPMENT OF A SCHEDULE FOR ON-SITE INSPECTIONS.
 - DISCUSS CRITICAL INSPECTIONS AND PROJECT CONCERNS.
 2. THE GC IS RESPONSIBLE FOR COORDINATING AND SCHEDULING IN ADVANCE ALL REQUIRED INSPECTIONS AND TESTS WITH THE MI.

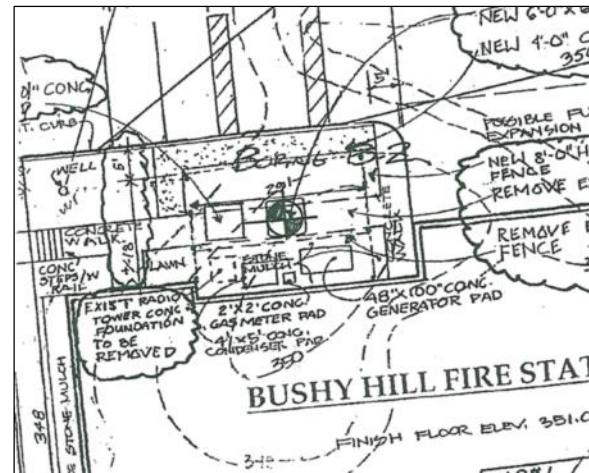
CORRECTION OF FAILING MODIFICATION INSPECTION

1. SHOULD THE STRUCTURAL MODIFICATION NOT COMPLY WITH THE REQUIREMENTS OF THE CONSTRUCTION DOCUMENTS, THE GC SHALL WORK WITH THE MODIFICATION INSPECTOR IN A VIABLE REMEDIATION PLAN AS FOLLOWS:
 - CORRECT ALL DEFICIENCIES TO COMPLY WITH THE CONTRACT DOCUMENTS AND COORDINATE WITH THE MI FOR A FOLLOW UP INSPECTION.
 - WITH CLIENT AUTHORIZATION, THE GC MAY WORK WITH THE EOR TO REANALYZE THE MODIFICATION USING THE AS-BUILT CONDITION.

REQUIRED PHOTOGRAPHS

1. THE GC AND MI SHALL AT MINIMUM PHOTO DOCUMENT THE FOLLOWING FOR INCLUSION IN THE MODIFICATION INSPECTION REPORT:
 - PRE-CONSTRUCTION: GENERAL CONDITION OF THE SITE.
 - DURING CONSTRUCTION: RAW MATERIALS, CRITICAL DETAILS, WELD PREPARATION, BOLT INSTALLATION & TORQUE, FINAL INSTALLED CONDITION & SURFACE COATING REPAIRS.
 - POST-CONSTRUCTION: FINAL CONDITION OF THE SITE

[illegible]



BOREHOLE KEY PLAN
NTS.

APPROX.
NORTH


B-1 DENOTES TEST BORING LOCATION
CONDUCTED BY CLARENCE WELTI &
ASSOCIATES. REFER TO S-7 FOR TEST
BORING LOG.

CLARENCE BELTI ASSOC., INC. P.O. BOX 387 GLASTONBURY, CONN 06033				CLIENT _____		PROJECT NAME MONOPOLE ANTENNA 345 BUSHY HILL ROAD SIMSBURY, CT				
SIMSBURY FIRE DISTRICT						LOCATION		HOLE NO.		B-2
TYPE	AUGER	CASING	SAMPLER	CORE BAR	OUTSET	SURFACE ELEV.				
SIZE I.D.	3.75"		SS		LINE & STA.	GROUND WATER OBSERVATIONS			START DATE	
HAMMER WT.			1.375"		N. COORDINATE	AT 15.0 FT. AFTER	0 HOURS		11/10/03	
HAMMER FALL			140lbs		E. COORDINATE	AT	FT. AFTER	HOURS	FINISH DATE	
			30"						11/10/03	
SAMPLE					STRATUM DESCRIPTION + REMARKS					ELEV.
DEPTH	NO.	BLOWS/FO'	12"/FT	A						
0	1	2-5-10-13	0.00'-2.00'		DARK BR. TOPSOIL					5.0
	2	7-5-9-10	2.00'-4.00'		GRAY/BR. FINE-CRS. SAND, LITTLE SILT & GRAVEL					
5	3	11-11-16-11	4.00'-6.00'							
10	4	49-31-27	10.00'-11.50'		RED/BR. FINE-MED. SAND, LITTLE SILT & GRAVEL					7.0
15	5	12-22-20	15.00'-16.50'		RED/BR. FINE-MED. SAND, SOME SILT & GRAVEL, LITTLE DECOMPOSED ROCK FRAGMENTS					16.0
20	6	60	20.00'-20.33'							
25	7	60	25.00'-25.08'		BOTTOM OF BORING @ 25.1'					25.1
30										
35										
LEGEND: COL. A:						DRILLER: BROMLEY				
SAMPLE TYPE: D-DRY A-A100R C-CORE U-UNDISTURBED PISTON S-SPLIT SPOON						INSPECTOR:				
PROPORTIONS USED: TRACE=0.10% LITTLE=10-20% SOME=20-30% AND=35-50%						SHEET 1 OF 1 HOLE NO. B-2				

1
B-1

BOREHOLE LOG (BH #2)

SCALE: NTS



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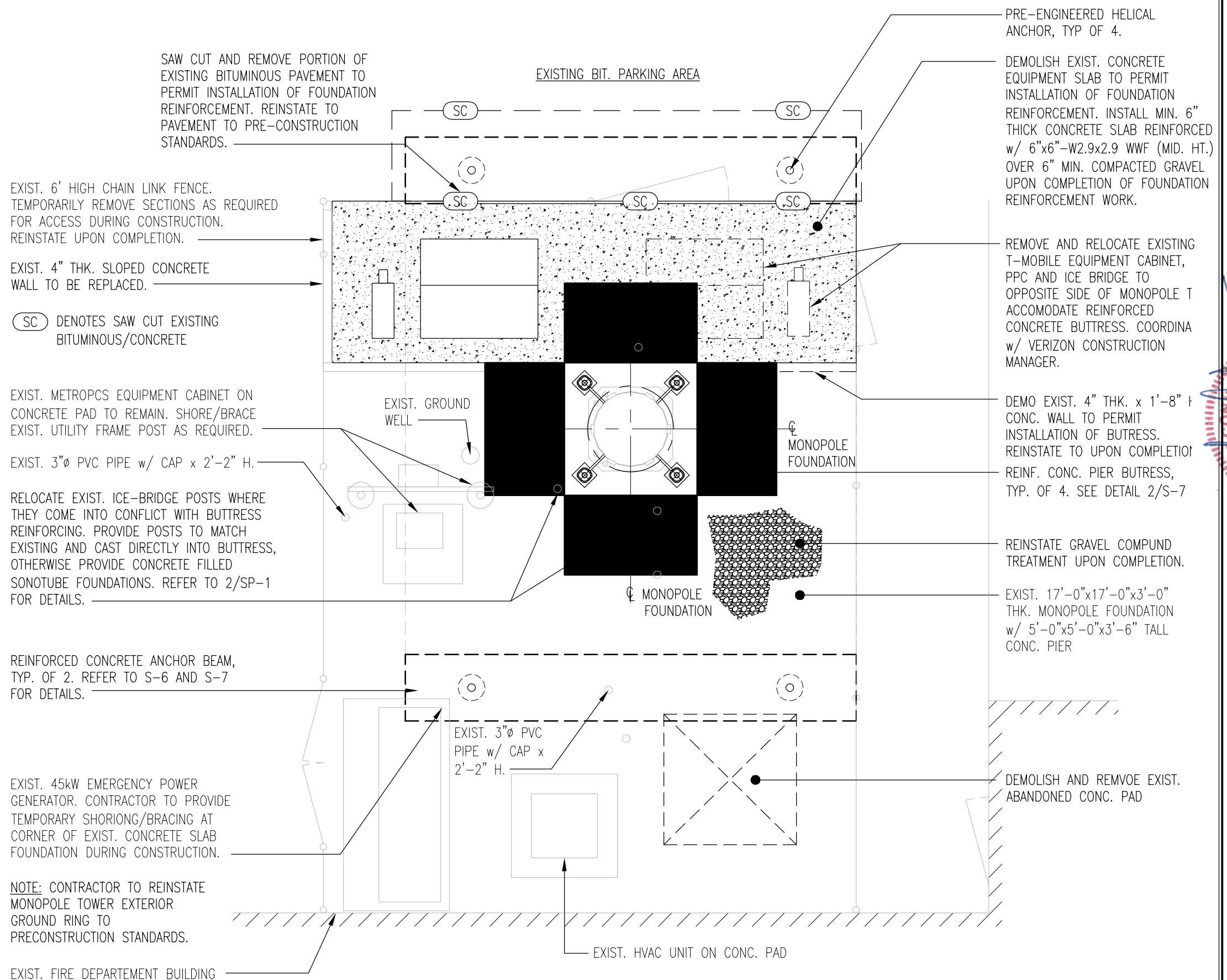
<p align="center">AT&T MOBILITY</p> <p align="center">PROPOSED TOWER REINFORCEMENT DESIGN</p>	
<p align="center">CT2413</p> <p align="center">SIMSBURY</p>	<p align="center">345 BUSHY HILL ROAD, SIMSBURY, CT</p>
DATE:	03/05/14
SCALE:	AS SHOWN
JOB NO.	13298.000

**BOREHOLE
LOG AND
LOCATION
PLAN**

SHEET NO.

B-1

Sheet No. 4 of 14



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

SCALE: $1/4'' = 1'-0''$



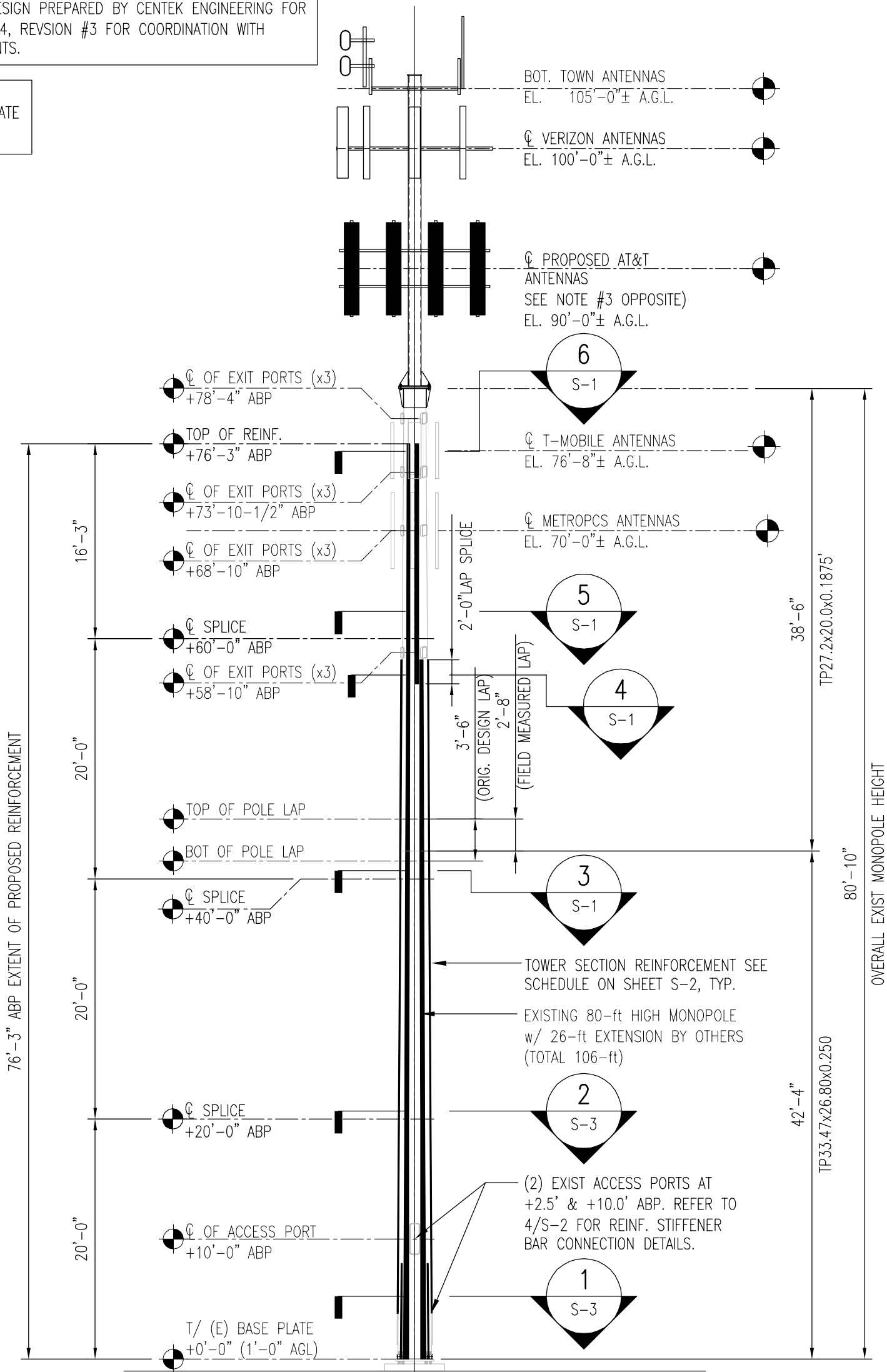
SHEET NO.
SP-1
Sheet No. 6 of 14

NOTES:

- RELOCATE EXISTING MONOPOLE STEP BOLTS WHERE THEY COME INTO CONFLICT WITH REINFORCEMENT MATERIAL. REFER TO S-3 FOR FLAT LOCATIONS. CONTRACTOR TO ENSURE THAT ALL RELOCATED STEP BOLTS SHALL MEET OSHA REQUIREMENTS.
- TOWER GEOMETRY AND STRUCTURE MEMBER SIZES WERE OBTAINED FROM THE ORIGINAL TOWER DESIGN DRAWINGS PREPARED BY PAUL J. FORD AND COMPANY JOB #29204-0049, DATED FEBRUARY 24, 2004 AND VERIFIED IN FIELD. REFER TO CSB TOWER MAPPING REPORT, DATED 01/24/2014.
- MONOPOLE DESIGN TAPER = 0.14250 in./ft.
- REFER TO MONPOLE EXTENSION DESIGN PREPARED BY CENTEK ENGINEERING FOR VERIZON WIRELESS, DATED 02.13.14, REVISION #3 FOR COORDINATION WITH MONOPOLE EXTENSION REQUIREMENTS.

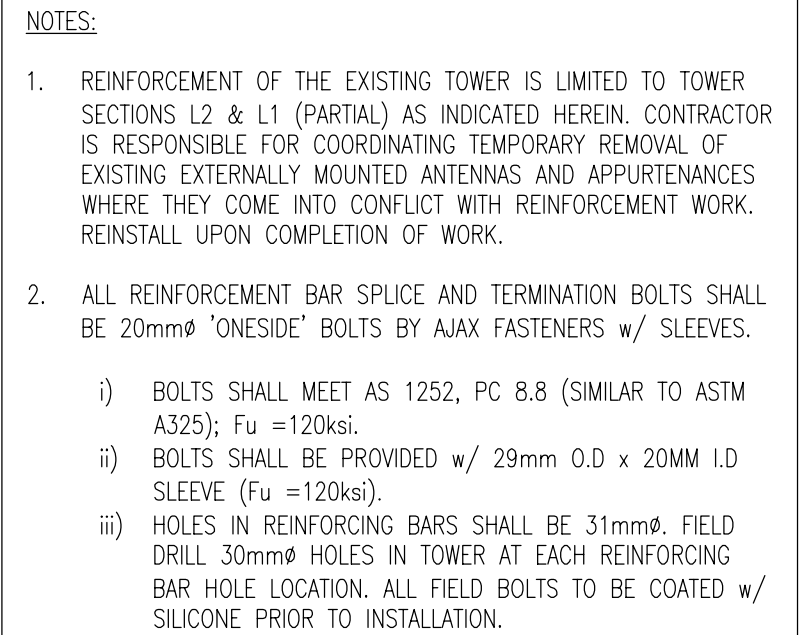
KEY:

'ABP' DENOTES ABOVE TOP OF BASE PLATE
'AGL' DENOTES ABOVE GRADE LEVEL.



1 MONPOLE REINFORCEMENT ELEVATION
S-1 SCALE: 1" = 10'-0"

REINFORCEMENT SCHEDULE											
SECTION NO.	SECTION DESCRIPTION	STIFFENER BAR MARK (SB-X)	SPLICE BAR MARK (SP-X)	REINFORCEMENT ELEVATION ABP	STIFFENER BAR SIZE	STIFFENER No./LENGTH	STIFFENER MATERIAL GRADE	AJAX BOLT DIA.	No. BOLTS AT SPLICE (TOP)	INTERMEDIATE BOLT SPACING (in)	AJAX BOLT LENGTH (MM)
L2	TP45.5x36.37x 0.375in	SB-1	SP-1	(0.0'-15.0')	1.50"X3.5"	4 @ 10.0'	ASTM A572-65	20mm	6 @ 3" o.c	18" o.c	135mm
L2	TP45.5x36.37x 0.375in	SB-2	SP-1	(11.3'-20.0')	1.25"X5.0"	2 @ 8.7'		20mm	7 @ 3" o.c	18" o.c	135mm
L2	TP45.5x36.37x 0.375in	SB-3	SP-1	(0.0'-20.0')	1.25"X5.0"	4 @ 20.0'		20mm	7 @ 3" o.c	18" o.c	135mm
L2	TP45.5x36.37x 0.375in	SB-4	SP-1	(20.0'-40.0')	1.25"X5.0"	6 @ 20.0'		20mm	7 @ 3" o.c	18" o.c	135mm
L1	TP38.125x28.935x0.375	SB-5	SP-1	(40.0'-60.0')	1.25"X5.0"	2 @ 20.0'		20mm	7 @ 3" o.c	18" o.c	135mm
L1	TP38.125x28.935x0.375	SB-6	N/A	(40.0'-58.25')	1.25"X5.0"	4 @ 18.25'		20mm	7 @ 3" o.c	18" o.c	135mm
L1	TP38.125x28.935x0.375	SB-7	N/A	(56.25'-76.25')	1.25"X4.0"	2 @ 20.0'		20mm	6 @ 3" o.c	18" o.c	135mm
L1	TP38.125x28.935x0.375	SB-8	N/A	(60.0'-76.25')	1.25"X4.0"	2 @ 16.25'		20mm	6 @ 3" o.c	18" o.c	135mm

[illegible]

PROFESSIONAL ENGINEER SEAL

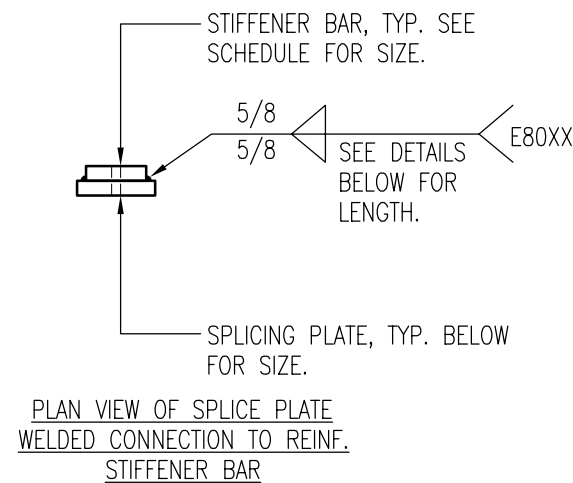


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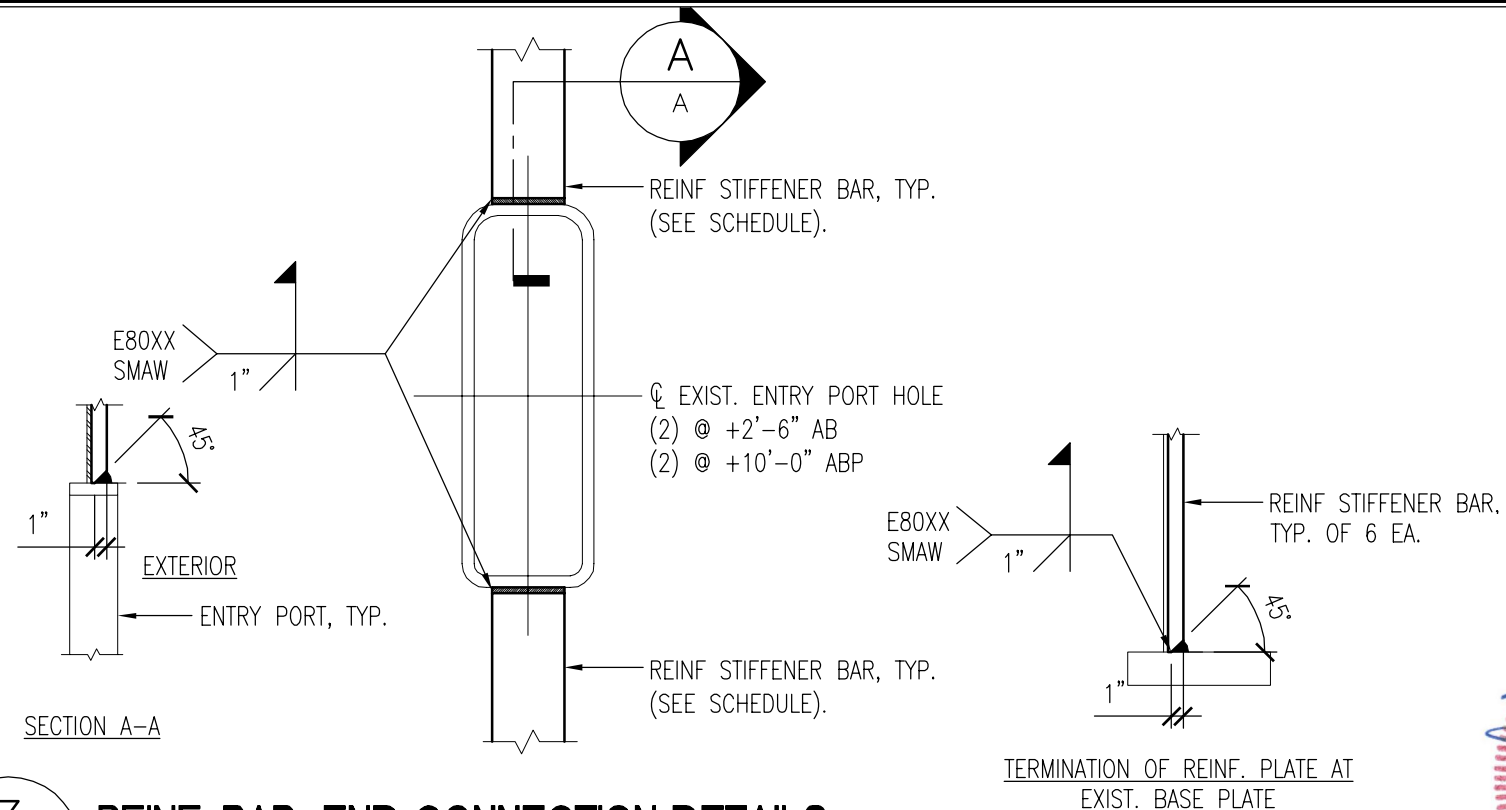
A&T MOBILITY	
PROPOSED TOWER REINFORCEMENT DESIGN	
CT2413 SIMSBURY	
345 BUSHY HILL ROAD, SIMSBURY, CT	
DATE:	03/05/14
SCALE:	AS SHOWN
JOB NO.	13298.000

**MONOPOLE
REINFORCEMENT
DETAILS**

SHEET NO.
S-2
Sheet No. 8 of 14

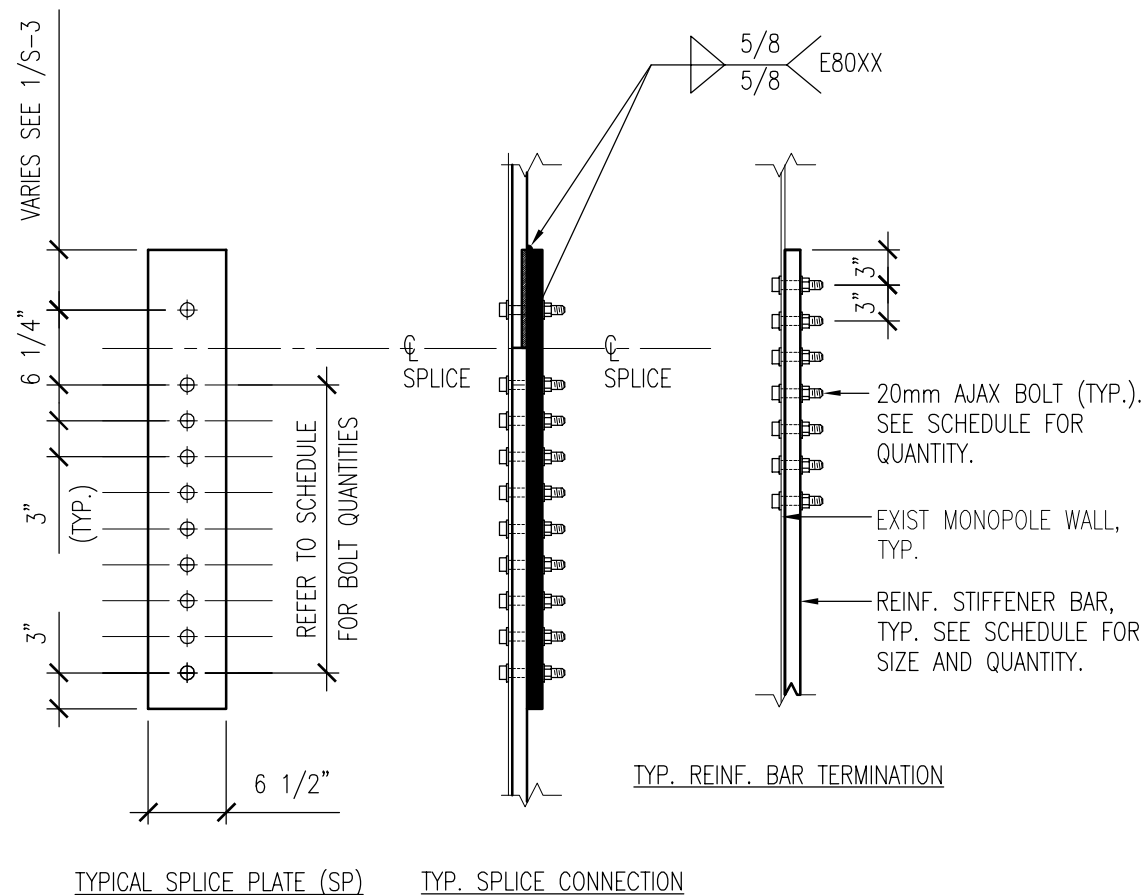


- NOTES:
1. FIELD DRILL 30mm ϕ HOLES IN TOWER FOR EACH AJAX FIELD BOLT.
 2. APPLY SILICONE TO FIELD BOLT PRIOR TO INSTALLATION.
 3. ALL PLATES TO BE HOT DIP GALVANIZED, ASTM A572 GRADE 65 THROUGHOUT.



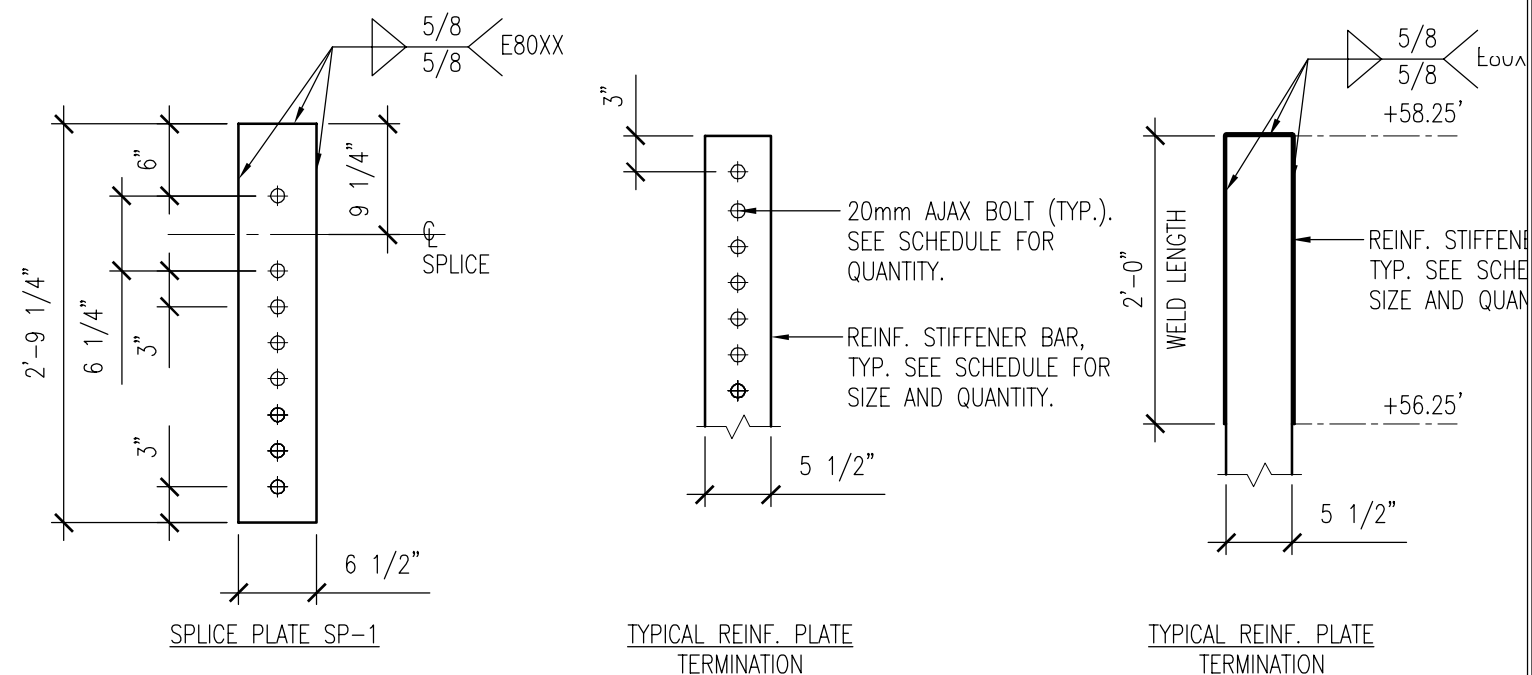
3 REINF. BAR END CONNECTION DETAILS

S-3 SCALE: 3/4" = 1'-0"



2 TYPICAL SPLICE PLATE CONNECTION DETAILS

S-3 SCALE: 3/4" = 1'-0"



1 SPLICE PLATE PIECE DETAILS

S-3 SCALE: 3/4" = 1'-0"

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DRAWN BY:	JRM
CHK'D BY:	CFC



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 JOB NO. 13298.000

MONOPOLE
 REINFORCEMENT
 DETAILS

SHEET NO.
S-3
 Sheet No. 9 of 14

RELOCATE STEP BOLTS LOCATED
AT FLATS #8 & 12 TO FACE OF
REINFORCING BAR.

GALV. STIFFENER BAR
(TYP. OF 4) - SEE
SCHEDULE FOR SIZE.

CONTINUOUS BEAD OF
SILICONE CAULK BOTH SIDES
OF REINF. BAR (TYP.)

(3) EXIST ACCESS PORTS AT
+73.9' ABP (V.I.F.)

PARKING LOT SIDE
4"x1.25" THK.
(TYP. OF 4)

REPLACE STEP BOLTS AT FLAT
#17 w/ 3/4"x7-1/2" LONG
STEP BOLTS (SABRE P/N
C40-044-006).

6

SECTION L1 REINF. PLAN (76.5')

S-3

SCALE: 3/4" = 1'-0"

RELOCATE STEP BOLTS LOCATED
AT FLATS #8 & 17 TO FACE OF
REINFORCING BAR.

GALV. STIFFENER BAR
(TYP. OF 6) - SEE
SCHEDULE FOR SIZE.

CONTINUOUS BEAD OF
SILICONE CAULK BOTH SIDES
OF REINF. BAR (TYP.)

REPLACE STEP BOLTS AT FLATS
#3 & 12 w/ 3/4"x7-1/2"
LONG STEP BOLTS (SABRE P/N
C40-044-006).

PARKING LOT SIDE
CHANGE 4" TO 4"x1.25" THK.
(TYP. OF 6)

4

SECTION L1 REINF. PLAN (58.5')

S-3

SCALE: 3/4" = 1'-0"

(2) EXIST ACCESS PORTS
BELOW AT +10.0' ABP (V.I.F.)

GALV. STIFFENER BAR
(TYP. OF 6) - SEE
SCHEDULE FOR SIZE.

CONTINUOUS BEAD OF
SILICONE CAULK BOTH SIDES
OF REINF. BAR (TYP.)

REPLACE STEP BOLTS AT FLAT
#3 w/ 3/4"x7-1/2" LONG
STEP BOLTS (SABRE P/N
C40-044-006).

PARKING LOT SIDE
CHANGE 4" TO 5"x1.25" THK.
(TYP. OF 6)

RELOCATE STEP BOLTS
LOCATED AT FLAT #17 TO
FACE OF REINFORCING BAR.

2

SECTION L2 REINF. PLAN (20.0')

S-3

SCALE: 3/4" = 1'-0"

RELOCATE STEP BOLTS LOCATED
AT FLATS #8 & #12 TO FACE OF
REINFORCING BARS.

GALV. STIFFENER BAR
(TYP. OF 4) - SEE
SCHEDULE FOR SIZE.

CONTINUOUS BEAD OF
SILICONE CAULK BOTH SIDES
OF REINF. BAR (TYP.)

GALV. STIFFENER BAR
(TYP. OF 2) TERMINATING
AT 58.5' ABP. REFER TO
S-3 FOR MORE
INFORMATION.

REPLACE STEP BOLTS AT FLAT
#3 & #17 w/ 3/4"x7-1/2"
LONG STEP BOLTS
(SABRE P/N C40-044-006).

PARKING LOT SIDE
4"x1.25" THK.
(TYP. OF 4)

GALV. STIFFENER BAR
(TYP. OF 2) TERMINATING
BELOW PORTS - REFER
TO S-2 FOR MORE
INFORMATION.

GALV. STIFFENER BAR
(TYP. OF 6) - SEE
SCHEDULE FOR SIZE.

CONTINUOUS BEAD OF
SILICONE CAULK BOTH SIDES
OF REINF. BAR (TYP.)

REPLACE STEP BOLTS AT
FLAT #3 w/ 3/4"x7-1/2"
LONG STEP BOLTS
(SABRE P/N C40-044-006).

RELOCATE STEP BOLTS
LOCATED AT FLAT #17 TO
FACE OF REINFORCING BAR.

PARKING LOT SIDE
4"x1.25" THK.
(TYP. OF 6)

5

SECTION L1 REINF. PLAN (60.0')

S-3

SCALE: 3/4" = 1'-0"

3

SECTION L2 REINF. PLAN (40.0')

S-3

SCALE: 3/4" = 1'-0"

(2) EXIST ACCESS PORTS AT
+2.5' ABP (V.I.F.)

GALV. STIFFENER BAR
ABOVE ENTRY PORT (TYP.
OF 2) - SEE 3/S-3 FOR
CONNECTION DETAILS.

CONTINUOUS BEAD OF
SILICONE CAULK BOTH SIDES
OF REINF. BAR (TYP.)

GALV. STIFFENER BAR
(TYP. OF 8) - SEE
SCHEDULE FOR SIZE.
REFER TO 3/S-3 FOR
CONNECTION DETAILS AT
EXIST. BASE PLATE.

PARKING LOT SIDE
(4) 5"x1.25" THK. +
(4) 3.5"x1.50" THK.

EXIST. BASE PLATE
NOTE: ANCHOR BASE
AND ANCHOR BOLT
REINFORCEMENT NOT
SHOWN HERE FOR
CLARITY. REFER TO
S-5 FOR DETAILS.

1

SECTION L2 REINF. PLAN (0.0')

S-3

SCALE: 3/4" = 1'-0"

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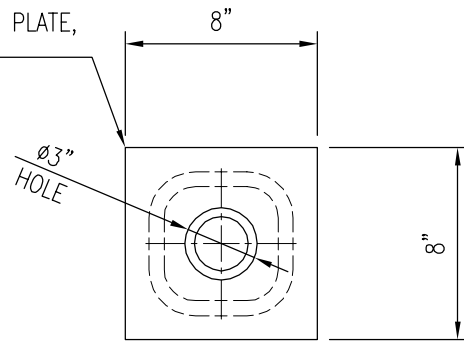


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SCALE:	AS SHOWN	
JOB NO.	13298.000	

MONOPOLE REINFORCEMENT DETAILS

(P2) 1-1/2x8x8
(A36) BEARING PLATE,
(TYP. OF 8)



5

PLATE (P1) PIECE DETAIL

S-5

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

NOTE:
REFER TO STRUCTURAL NOTES FOR ANCHOR
BOLT TESTING AND TIGHTENING REQUIREMENTS

(P1) STIFFENER PLATE TYP. OF 4.

1-3/4" ϕ WILLIAMS A722 (150ksi)
ALL-THREAD ANCHOR BARS (TYP. OF 4)
ON A 59.00 ϕ B.C. w/ 3" H.H. NUTS &
2 FLAT WASHERS (6'-0" EMBEDMENT)

(P2) BEARING PLATE,
(TOP & BOTT.)

HSS6x6x0.625
(ASTM A500-46)

3" H.H. NUT &
FLAT WASHER

EXIST. GRADE

EXIST. REINF.
CONCRETE
PEDESTAL

CONTRACTOR TO DRILL STANDARD 2.75" ϕ
HOLE IN EXISTING REINFORCED CONCRETE
PIER AND SET ANCHOR BOLT IN HILTI
RE-500-SD INJECTION ADHESIVE.

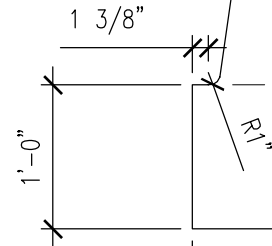
2

ANCHOR BOLT/BASE PLATE REINF. DETAIL

S-5

SCALE: 1" = 1'-0"

(P1) 1-1/4"
THK. STIFFENER
PLATE (A572-50),
TYP. OF 4.



4

PLATE (P1) PIECE DETAIL

S-5

SCALE: 3/4" = 1'-0"

EXIST. MONOPOLE WALL
THICKNESS SECTION L2
= 0.25in (V.I.F.)

1/4
1/4 E80XX (TYP.)

5/8
5/8 E80XX (TYP.)
CJP, BACKGOUGE

EXIST. 2.0" THK. BASE
PLATE (V.I.F.)

(E) 60" SQUARE FOUNDATION PEDESTAL

1

ANCHOR BOLT/BASE PLATE REINF. PLAN

S-5

SCALE: 3/4" = 1'-0"

(P1) STIFFENER PLATE
TYP. OF 4.

HSS6x6x0.625
(ASTM A500-46)

(P2) BEARING PLATE,
(TOP & BOTT.)

EXIST. 2.0" THK. BASE
PLATE (V.I.F.)

5/8 E80XX (TYP.)
5/8 CJP, BACKGOUGE

1/2 (1/2) E80XX (TYP.)
1/2 (1/2) CJP, BACKGOUGE

3

HOLDDOWN ANCHOR PLAN DETAIL

S-5

SCALE: 1" = 1'-0"

(E) 38" SQUARE
BASE PLATE

1-3/4" ϕ WILLIAMS A722 (150ksi)
ALL-THREAD ANCHOR BARS (TYP.
OF 4) ON A 59.00 ϕ B.C. w/ 3"
H.H. NUTS & 2 FLAT WASHERS
(6'-0" EMBEDMENT)

ANCHOR BOLT TRANSFER PLATE
ASSEMBLY REINFORCEMENT, TYP.
OF 4. REFER TO 3/S-5.

ϕ 39" B.C.

ϕ 59"

EXIST. 2-1/4" ϕ ASTM A615
GR.75 BOLT (TYP. OF 8) ON
A 39" ϕ B.C.

EXIST. 33.40" ϕ A.F. (18)
SIDED MONOPOLE

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DRAWN BY:		JRM
CHK'D BY:		CFC



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**MONOPOLE
REINFORCEMENT
DETAILS**
SHEET NO.
S-5
Sheet No. 11 of 14

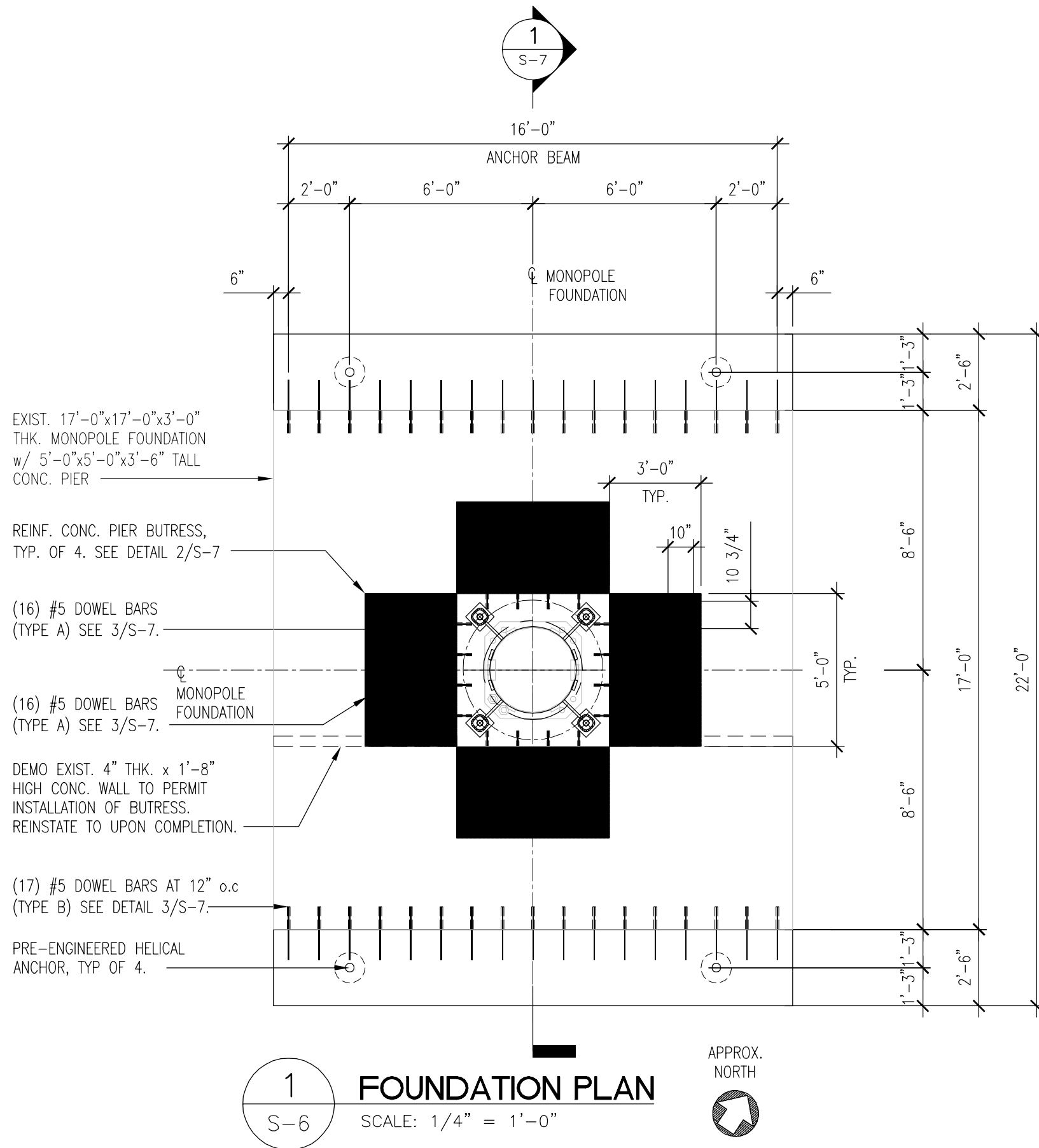
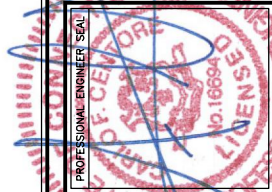
<u>FOUNDATION DESIGN REACTIONS</u>		
BASE REACTION TYPE	TIA/EIA-222-F	EIA-222-G ⁽¹⁾
SHEAR (kips)	16	21.6
AXIAL (kips)	20	27.0
BASE MOMENT (ft-kips)	1640	2214
<u>HELICAL ANCHOR DESIGN LOAD (SERVICE)</u>		
COMPRESSION/UPLIFT	30.0 kips	

NOTE:

1. TIA-222-G EQUIVALENT DESIGN REACTIONS DETERMINED BY MULTIPLYING TIA/EIA-222-F REACTIONS BY 1.35.

SOIL ANCHOR NOTES

1. EXISTING FOUNDATION DESIGN IS BASED ON TOWER STRUCTURE DESIGN CALCULATIONS PREPARED BY PAUL J. FORD, INC., PJF JOB No. 29204-0034, DESIGN No. 21698, FOR NORTHEAST TOWERS, DATED 02/24/2004 AND AS CONFIRMED BY NORTHEAST TOWERS.
2. SOILS INFORMATION OBTAINED FROM A GEOTECHNICAL SOILS STUDY PREPARED BY CLARENCE A. WELTI & ASSOC., DATED 11/12/2003 WITH A MAXIMUM ALLOWABLE SOIL BEARING PRESSURE OF 3 TONS/SF (6KSF).
3. SPECIALTY FOUNDATION CONTRACTOR SHALL BE LICENSED IN THE STATE OF CONNECTICUT WITH A MINIMUM OF FIVE (5) YEARS EXPERIENCE IN THE DESIGN AND INSTALLATION OF THE SPECIFIED ANCHOR SYSTEM.
4. HELICAL ANCHORS SHALL BE AS MANUFACTURED BY A.B. CHANCE (HUBELL POWER SYSTEMS) AND SHALL BE INSTALLED IN STRICT ACCORDANCE WITH THE MANUFACTURERS REQUIREMENTS.
5. ALL WORK SHALL BE SUBJECT TO SPECIAL INSPECTION RETAINED BY THE OWNER/CONTRACTOR AS PER THE 2005 CONNECTICUT STATE BUILDING CODE WITH 2009 SUPPLEMENT.
6. AN INDEPENDENT QUALIFIED INSPECTION/TESTING AGENCY SHALL BE RETAINED BY THE OWNER FOR THE PURPOSE OF INSPECTING, TESTING AND DOCUMENTING ALL FIELD WORK PERFORMED BY THE ROCK ANCHOR CONTRACTOR. ALL INSPECTION REPORTS AND DOCUMENTS SHALL BE SUBMITTED TO THE ENGINEER OF RECORD (CENTEK ENGINEERING INC.) FOR REVIEW.

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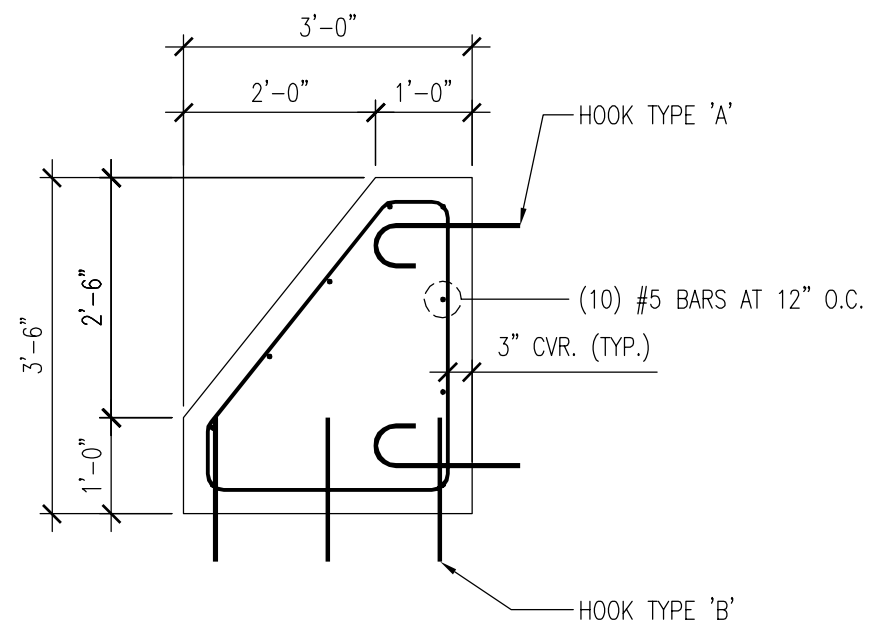
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DATE:	03/05/14
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JOB NO.	13298.000

**MONOPOLE
FOUNDATION
REINFORCEMENT
PLAN**

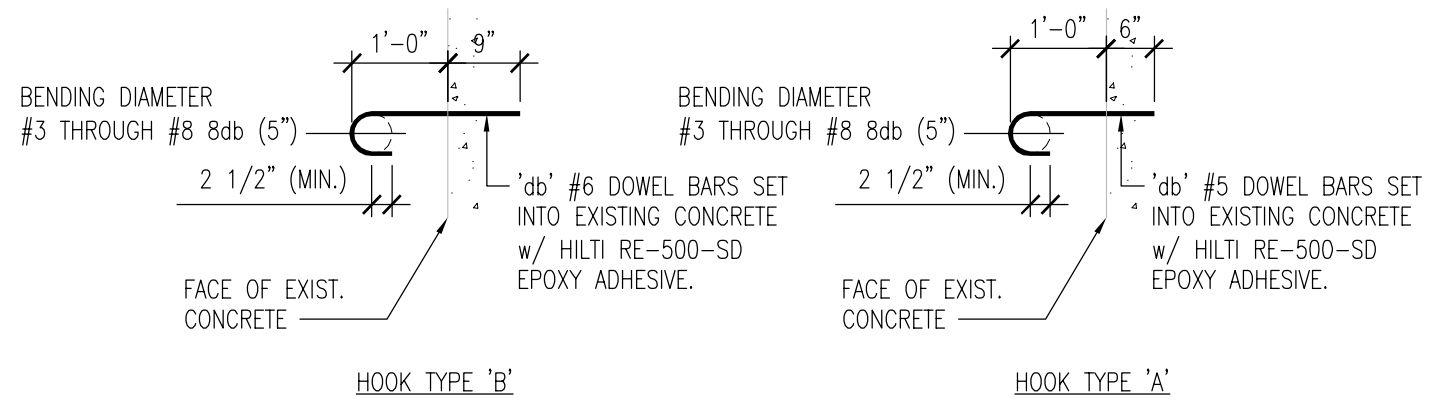
SHEET NO.

S-6

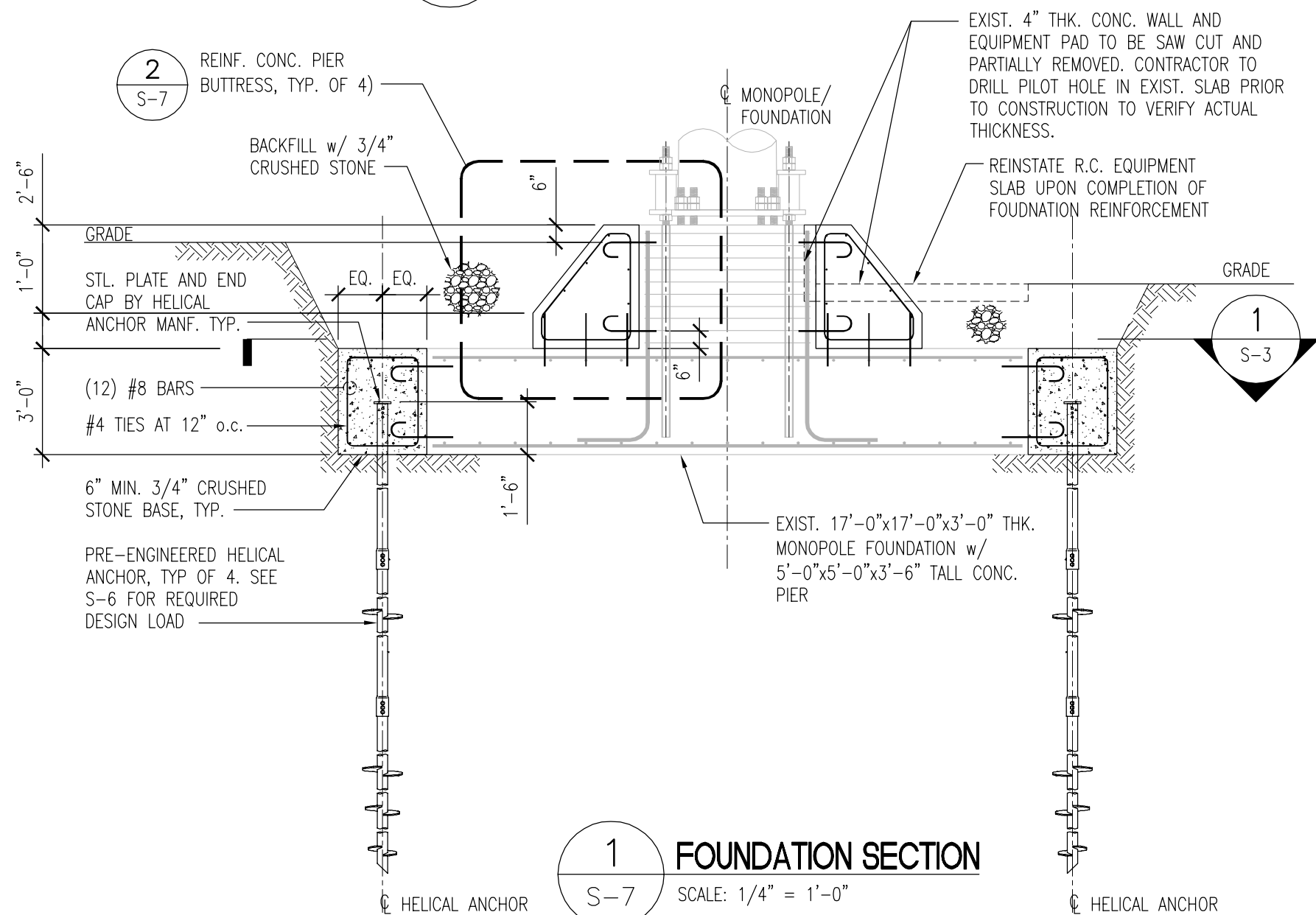
Sheet No. 12 of 14



2 BUTTRESS DETAIL
S-7 SCALE: 1/2"=1'-0"



3 BUTTRESS AND REBAR DETAILS
S-7 SCALE: 1/2"=1'-0"



1 FOUNDATION SECTION
S-7 SCALE: 1/4" = 1'-0"

DESIGNED BY:		JRM		
DRAWN BY:		JRM		
CHK'D BY:		CFC		
REV.	DATE	DRAWN BY	CHK'D BY	DESCRIPTION
1	04/08/14	JRM	CFC	REVISED - ISSUED FOR CONSTRUCTION
2	03/19/14	JRM	CFC	ISSUED FOR CONSTRUCTION
		</		



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MONOPOLE FOUNDATION REINFORCEMENT DETAILS

SHEET NO.
S-7
Sheet No. 13 of 14

Section 1 - RFDS GENERAL INFORMATION									
RFDS NAME:	CT2413S		DATE:	11/26/2013		RF DESIGN ENG:	Alu Kwamina		RF PERF ENG:
ISSUE:	Pre-construction		Approved? (Y/N):	Y		RF DESIGN PHONE:	860-513-7691		RF PERF PHONE:
REVISION:	V03		RF MANAGER:	Cameron Syme		RF DESIGN EMAIL:			RF PERF EMAIL:
INITIATIVE / PROJECT:	Pre-construction RFDS for leasing and zoning purposes, general design. It is not the finalized location, CL and azimuths. RRU positioning may be different based on the structural analysis.								TRIDENT:
								GSM FREQUENCY:	
								UMTS FREQUENCY:	
								LTE FREQUENCY:	
								I-PLAN JOB NUMBER:	
Section 2 - LOCATION INFORMATION									
USID:			FA LOCATION CODE:			LOCATION NAME:	SIMSBURY DEERFIELD LANE		ORACLE PROJECT #:
REGION:	NE		MARKET CLUSTER:	CT		MARKET:	NER		2051871061
ADDRESS:	345 Bushy Hill Road		CITY:	Simsbury		STATE:	CT		SEARCH RING NAME:
DIP CODE:	06070		COUNTY:	Hartford		NSA/RSA:			SEARCH RING ID:
LATITUDE (D-M-S):	41 50' 28.52" N		LONGITUDE (D-M-S):	72 50' 58.97" W		LAT (DEC DEG.):	41.841256		CT2413S
						LONG (DEC DEG.):	-72.849714		
						BORDER CELL WITH CONTOUR COORD:			
						AM STUDY RECD (Y/N):			
						FREQ COORD:			
Section 3 - LICENSE COVERAGE/FILING INFORMATION									
CGSA - NO FILING TRIGGERED:			CGSA LOS:			PCS REDUCED - UPS ZIP:			
CGSA - MINOR FILING NEEDED:			CGSA EXT AGMT NEEDED:			PCS POPs REDUCED:			
CGSA - MAJOR FILING NEEDED:			CGSA SCORECARD UPDATED:						
Section 4 - TOWER/REGULATORY INFORMATION									
STRUCTURE AT & OWNED?:			GROUND ELEVATION:			STRUCTURE TYPE:			MARKET LOCATION 850 MHZ CALL SIGN(S):
ADDITIONAL REGULATORY?:			HEIGHT OVERALL:			FCC ASR NUMBER:			MARKET LOCATION 1900 MHZ CALL SIGN(S):
SUB-LEASE RIGHTS?:			STRUCTURE HEIGHT:						MARKET LOCATION 700 MHZ CALL SIGN(S):
LIGHTING TYPE:									MARKET LOCATION AWS MHZ CALL SIGN(S):
Section 5 - E-911 INFORMATION									
PSAP NAME:			PSAP ID:			E911 PHASE:			MPC SVC PROVIDER:
ALPHA									LMU REQUIRED:
BETA									ESRN:
GAMMA									DATE LIVE PH1:
DELTA									DATE LIVE PH2:
EPSILON									
PSI									
Section 6 - RBS GENERAL INFORMATION									
4-DIGIT SITE ID:	CT2413S		COW OR TOY?:	No		CELLULAR NETWORK:			DISASTER PRIORITY:
CELL SITE TYPE:	Sectorized		SITE TYPE:			OPS DISTRICT:			OPS ZONE:
BTS LOCATION ID:			ORIGINATING CO:			RF DISTRICT:			RF ZONE:
Section 7 - RBS SPECIFIC INFORMATION									
MSC	GSM RBSs		UMTS 1ST CARRIER RBSs		UMTS 2ND CARRIER RBSs		UMTS 3RD CARRIER RBSs		UMTS 4TH CARRIER RBSs
BSC/RNC									LTE RBSs
IAC									
RAC									
EQUIPMENT VENDOR									
EQUIPMENT TYPE									
LOCATION									
CABINET LOCATION									
Section 8 - RBS INDIVIDUAL INFORMATION									
CELL ID/BCT	GSM 850 RBS	GSM 1900 RBS	UMTS 850 RBS	UMTS 1900 RBS	UMTS 2ND 850 RBS	UMTS 2ND 1900 RBS	UMTS 3RD 850 RBS	UMTS 3RD 1900 RBS	UMTS 4TH 850 RBS
CTS COMMON ID									UMTS 4TH 1900 RBS
									LTE 700 RBS
									LTE AWS RBS
Section 9 - SOFT SECTOR ID									
ALPHA (OR OMNI)	GSM 850 RBS	GSM 1900 RBS	UMTS 850 RBS	UMTS 1900 RBS	UMTS 2ND 850 RBS	UMTS 2ND 1900 RBS	UMTS 3RD 850 RBS	UMTS 3RD 1900 RBS	UMTS 4TH 850 RBS
BETA									UMTS 4TH 1900 RBS
GAMMA									LTE 700 RBS
DELTA									LTE AWS RBS
EPSILON									
PSI									
Section 10 - CHD/BAC									
ALPHA (OR OMNI)	GSM 850 RBS	GSM 1900 RBS	UMTS 850 RBS	UMTS 1900 RBS	UMTS 2ND 850 RBS	UMTS 2ND 1900 RBS	UMTS 3RD 850 RBS	UMTS 3RD 1900 RBS	UMTS 4TH 850 RBS
BETA									UMTS 4TH 1900 RBS
GAMMA									LTE 700 RBS
DELTA									LTE AWS RBS
EPSILON									
PSI									
Section 11 - CURRENT RADIO COUNTS (Existing)									
ALPHA (OR OMNI)	GSM 850 RBS	GSM 1900 RBS	UMTS 850 RBS	UMTS 1900 RBS	UMTS 2ND 850 RBS	UMTS 2ND 1900 RBS	UMTS 3RD 850 RBS	UMTS 3RD 1900 RBS	UMTS 4TH 850 RBS
BETA									UMTS 4TH 1900 RBS
GAMMA									LTE 700 RBS
DELTA									LTE AWS RBS
EPSILON									
PSI									
Section 12 - CURRENT T1 COUNTS (Existing)									
# T1s	GSM 1st Cabinet	GSM 2nd Cabinet	UMTS 1st Cabinet		UMTS 2nd Cabinet		LTE 1st Cabinet		LTE 2nd Cabinet
LINK PROFILE									
FIBER or ETHERNET?									
Tx Board Model									
Tx Board QTY									
RAV/ECU Board Model									
RAV/ECU Board QTY									
BBU Board Model									
BBU Board QTY									
RRU - location									
Section 13 - NEW/PROPOSED RADIO COUNTS									
ALPHA (OR OMNI)	GSM 850 RBS	GSM 1900 RBS	UMTS 850 RBS	UMTS 1900 RBS	UMTS 2ND 850 RBS	UMTS 2ND 1900 RBS	UMTS 3RD 850 RBS	UMTS 3RD 1900 RBS	UMTS 4TH 850 RBS
BETA									UMTS 4TH 1900 RBS
GAMMA									LTE 700 RBS
DELTA									LTE AWS RBS
EPSILON									
PSI									
Section 14 - NEW/PROPOSED T1 COUNTS									
# T1s	GSM 1st Cabinet	GSM 2nd Cabinet	UMTS 1st Cabinet		UMTS 2nd Cabinet		LTE 1st Cabinet		LTE 2nd Cabinet
LINK PROFILE									
FIBER or ETHERNET?									
Tx Board Model									
Tx Board QTY									
RAV/ECU Board Model									
RAV/ECU Board QTY									
BBU Board Model									
BBU Board QTY									
RRU - location									
Section 15A - CURRENT SECTOR/CELL INFORMATION - ALPHA (OR OMNI)									
ANTENNA CONFIG (FROM BACK):	ANTENNA 1 GSM, UMTS (850 / 1900) or LTE (700 / AWS)		ANTENNA 2 GSM, UMTS (850 / 1900) or LTE (700 / AWS)		ANTENNA 3 GSM, UMTS (850 / 1900) or LTE (700 / AWS)		ANTENNA 4 GSM, UMTS (850 / 1900) or LTE (700 / AWS)		ANTENNA 5 GSM, UMTS (850 / 1900) or LTE (700 / AWS)
TX/RX?									
TECHNOLOGY									
FEEDERS (# / TYPE / LENGTH)									
ANTENNA MAKE - MODEL									
ANTENNA VENDOR									
ANTENNA SIZE H*W*D"									
ANTENNA WEIGHT									
ANTENNA GAIN									
AZIMUTH									
RADIATION CENTER									
ANTENNA TIP HEIGHT									
MAGNETIC DECLINATION									
ELECTRICAL TILT (700/850/1900/AWS)									
MECHANICAL DOWNTILT									
SCPA/MCPA?									
MCPA MODULES									
HATCHPLATE POWER (Watts)									
ERP (Watts)									
NARROW BAND LLC (QTY/MODEL)									
HYBRID COMBINER (QTY/MODEL)									
TMA/LNA (TYPE/MODEL)									
CURRENT INJECTORS FOR TMA									
CURRENT INJECTR POWER CABLE									
ANTENNA SHARING KIT?									
BAS Filter									
DIPLEXER (QTY/MODEL)									
DIPLEXER (QTY/MODEL)									
SURGE ARRESTOR (QTY/MODEL)									
DC BLDCK (QTY/MODEL)									
RET EQUIPMENT (QTY/MODEL)									
ESG PDU FOR TMAS									
Section 15B - CURRENT SECTOR/CELL INFORMATION - BETA									

AZIMUTH					
RADIATION CENTER					
ANTENNA TIP HEIGHT					
MAGNETIC DECLINATION					
ELECTRICAL TILT (700/850/1900/AWS)					
MECHANICAL DOWNTILT					
SCPA/MCPA?					
MCPA MODULES					
HATCHPLATE POWER (Watts)					
ERP (Watts)					
NARROW BAND LLC (QTY/MODEL)					
HYBRID COMBINER (QTY/MODEL)					
TMA/LNA (TYPE/MODEL)					
CURRENT INJECTORS FOR TMA					
CURRENT INCTR POWER CABLE					
ANTENNA SHARING KIT?					
BAS Filter					
DIPLEXER (QTY/MODEL)					
DUPLEXER (QTY/MODEL)					
SURGE ARRESTOR (QTY/MODEL)					
DC BLOCK (QTY/MODEL)					
RET EQUIPMENT (QTY/MODEL)					
1900 PDU FOR TMAS					
Section 16A - NEW/PROPOSED SECTOR/CELL INFORMATION - ALPHA (OR OMNI)					
ANTENNA CONFIG (FROM BACK):	ANTENNA 1 GSM, UMTS (850 / 1900) or LTE (700 / AWS)	ANTENNA 2 GSM, UMTS (850 / 1900) or LTE (700 / AWS)	ANTENNA 3 GSM, UMTS (850 / 1900) or LTE (700 / AWS)	ANTENNA 4 GSM, UMTS (850 / 1900) or LTE (700 / AWS)	ANTENNA 5 GSM, UMTS (850 / 1900) or LTE (700 / AWS)
TX/RX?	TBD	TBD	TBD	TBD	TBD
TECHNOLOGY	UMTS-DB	LTE-DB	LTE-DB	LTE-DB	LTE-DB
FEEDERS (# / TYPE/LENGTH)	2 Optic Fiber w 8 DC lines per site	2 Optic Fiber w 8 DC lines per site	2 Optic Fiber w 8 DC lines per site	2 Optic Fiber w 8 DC lines per site	2 Optic Fiber w 8 DC lines per site
ANTENNA MAKE - MODEL	HFA-65R-BUJ-H8	HFA-65R-BUJ-H8	HFA-65R-BUJ-H8	HFA-65R-BUJ-H8	HFA-65R-BUJ-H8
ANTENNA VENDOR	CCI	CCI	CCI	CCI	CCI
ANTENNA SIZE H"xW"xD"	93 x 15 x 7	93 x 15 x 7	93 x 15 x 7	93 x 15 x 7	93 x 15 x 7
ANTENNA WEIGHT	68	68	68	68	68
ANTENNA GAIN	17.4 dBi (high band)	17.4 dBi (high band)	17.4 dBi (high band)	17.4 dBi (high band)	17.4 dBi (high band)
AZIMUTH	30 °	30 °	30 °	30 °	30 °
RADIATION CENTER	90 °	90 °	90 °	90 °	90 °
ANTENNA TIP HEIGHT	94	94	94	94	94
MAGNETIC DECLINATION					
ELECTRICAL TILT (700/850/1900/AWS)	5 °	4 °	3 °	3 °	
MECHANICAL DOWNTILT	0 °	0 °	0 °	0 °	0 °
SCPA/MCPA?					
MCPA MODULES					
HATCHPLATE POWER (Watts)					
ERP (Watts)					
NARROW BAND LLC (QTY/MODEL)					
HYBRID COMBINER (QTY/MODEL)					
RRH	850 RRUS11/1900 RRUS12/1900 RRUS-A2	700 RRUS-E2/WCS RRUS32	850 RRUS11	700 RRUS11/1900 RRUS12/1900 RRUS-A2	
CURRENT INJECTORS FOR TMA	n/a	n/a	n/a	n/a	n/a
CURRENT INCTR POWER CABLE	n/a	n/a	n/a	n/a	n/a
ANTENNA SHARING KIT?	n/a	n/a	n/a	n/a	n/a
BAS Filter	n/a	n/a	n/a	n/a	n/a
DIPLEXER (QTY/MODEL)	n/a	n/a	n/a	n/a	n/a
DUPLEXER (QTY/MODEL)	n/a	n/a	n/a	n/a	n/a
SURGE ARRESTOR (QTY/MODEL)	SQUID x 4 per site	SQUID x 4 per site	SQUID x 4 per site	SQUID x 4 per site	SQUID x 4 per site
DC BLOCK (QTY/MODEL)	n/a	n/a	n/a	n/a	n/a
RET EQUIPMENT (QTY/MODEL)	Home Run RET cable	n/a	n/a	n/a	n/a
1900 PDU FOR TMAS	CCU - Kathrein 860 10006	n/a	n/a	n/a	n/a
Section 16B - NEW/PROPOSED SECTOR/CELL INFORMATION - BETA					
ANTENNA CONFIG (FROM BACK):	ANTENNA 1 GSM, UMTS (850 / 1900) or LTE (700 / AWS)	ANTENNA 2 GSM, UMTS (850 / 1900) or LTE (700 / AWS)	ANTENNA 3 GSM, UMTS (850 / 1900) or LTE (700 / AWS)	ANTENNA 4 GSM, UMTS (850 / 1900) or LTE (700 / AWS)	ANTENNA 5 GSM, UMTS (850 / 1900) or LTE (700 / AWS)
TX/RX?	TBD	TBD	TBD	TBD	TBD
TECHNOLOGY	UMTS-DB	LTE-DB	LTE-DB	LTE-DB	LTE-DB
FEEDERS (# / TYPE/LENGTH)	2 Optic Fiber w 8 DC lines per site	2 Optic Fiber w 8 DC lines per site	2 Optic Fiber w 8 DC lines per site	2 Optic Fiber w 8 DC lines per site	2 Optic Fiber w 8 DC lines per site
ANTENNA MAKE - MODEL	HFA-65R-BUJ-H8	HFA-65R-BUJ-H8	HFA-65R-BUJ-H8	HFA-65R-BUJ-H8	HFA-65R-BUJ-H8
ANTENNA VENDOR	CCI	CCI	CCI	CCI	CCI
ANTENNA SIZE H"xW"xD"	93 x 15 x 7	93 x 15 x 7	93 x 15 x 7	93 x 15 x 7	93 x 15 x 7
ANTENNA WEIGHT	68	68	68	68	68
ANTENNA GAIN	17.4 dBi (high band)	17.4 dBi (high band)	17.4 dBi (high band)	17.4 dBi (high band)	17.4 dBi (high band)
AZIMUTH	140 °	140 °	140 °	140 °	140 °
RADIATION CENTER	90 °	90 °	90 °	90 °	90 °
ANTENNA TIP HEIGHT	94 *	94 *	94 *	94 *	94 *
MAGNETIC DECLINATION					
ELECTRICAL TILT (700/850/1900/AWS)	4 °	4 °	3 °	3 °	
MECHANICAL DOWNTILT	0 °	0 °	0 °	0 °	0 °
SCPA/MCPA?					
MCPA MODULES					
HATCHPLATE POWER (Watts)					
ERP (Watts)					
NARROW BAND LLC (QTY/MODEL)					
HYBRID COMBINER (QTY/MODEL)					
RRH	850 RRUS11/1900 RRUS12/1900 RRUS-A2	700 RRUS-E2/WCS RRUS32	850 RRUS11	700 RRUS11/1900 RRUS12/1900 RRUS-A2	
CURRENT INJECTORS FOR TMA	n/a	n/a	n/a	n/a	n/a
CURRENT INCTR POWER CABLE	n/a	n/a	n/a	n/a	n/a
ANTENNA SHARING KIT?	n/a	n/a	n/a	n/a	n/a
BAS Filter	n/a	n/a	n/a	n/a	n/a
DIPLEXER (QTY/MODEL)	n/a	n/a	n/a	n/a	n/a
DUPLEXER (QTY/MODEL)	n/a	n/a	n/a	n/a	n/a
SURGE ARRESTOR (QTY/MODEL)	SQUID x 4 per site	SQUID x 4 per site	SQUID x 4 per site	SQUID x 4 per site	SQUID x 4 per site
DC BLOCK (QTY/MODEL)	n/a	n/a	n/a	n/a	n/a
RET EQUIPMENT (QTY/MODEL)	Home Run RET cable	n/a	n/a	n/a	n/a
1900 PDU FOR TMAS	CCU - Kathrein 860 10006	n/a	n/a	n/a	n/a
Section 16C - NEW/PROPOSED SECTOR/CELL INFORMATION - GAMMA					
ANTENNA CONFIG (FROM BACK):	ANTENNA 1 GSM, UMTS (850 / 1900) or LTE (700 / AWS)	ANTENNA 2 GSM, UMTS (850 / 1900) or LTE (700 / AWS)	ANTENNA 3 GSM, UMTS (850 / 1900) or LTE (700 / AWS)	ANTENNA 4 GSM, UMTS (850 / 1900) or LTE (700 / AWS)	ANTENNA 5 GSM, UMTS (850 / 1900) or LTE (700 / AWS)
TX/RX?	TBD	TBD	TBD	TBD	TBD
TECHNOLOGY	UMTS-DB	LTE-DB	LTE-DB	LTE-DB	LTE-DB
FEEDERS (# / TYPE/LENGTH)	2 Optic Fiber w 8 DC lines per site	2 Optic Fiber w 8 DC lines per site	2 Optic Fiber w 8 DC lines per site	2 Optic Fiber w 8 DC lines per site	2 Optic Fiber w 8 DC lines per site
ANTENNA MAKE - MODEL	HFA-65R-BUJ-H8	HFA-65R-BUJ-H8	HFA-65R-BUJ-H8	HFA-65R-BUJ-H8	HFA-65R-BUJ-H8
ANTENNA VENDOR	CCI	CCI	CCI	CCI	CCI
ANTENNA SIZE H"xW"xD"	93 x 15 x 7	93 x 15 x 7	93 x 15 x 7	93 x 15 x 7	93 x 15 x 7
ANTENNA WEIGHT	68	68	68	68	68
ANTENNA GAIN	17.4 dBi (high band)	17.4 dBi (high band)	17.4 dBi (high band)	17.4 dBi (high band)	17.4 dBi (high band)
AZIMUTH	250 °	250 °	250 °	250 °	250 °
RADIATION CENTER	90 °	90 °	90 °	90 °	90 °
ANTENNA TIP HEIGHT	94 *	94 *	94 *	94 *	94 *
MAGNETIC DECLINATION					
ELECTRICAL TILT (700/850/1900/AWS)	4 °	4 °	3 °	3 °	
MECHANICAL DOWNTILT	0 °	0 °	0 °	0 °	0 °
SCPA/MCPA?					
MCPA MODULES					
HATCHPLATE POWER (Watts)					
ERP (Watts)					
NARROW BAND LLC (QTY/MODEL)					
HYBRID COMBINER (QTY/MODEL)					
RRH	850 RRUS11/1900 RRUS12/1900 RRUS-A2	700 RRUS-E2/WCS RRUS32	850 RRUS11	700 RRUS11/1900 RRUS12/1900 RRUS-A2	
CURRENT INJECTORS FOR TMA	n/a	n/a	n/a	n/a	n/a
CURRENT INCTR POWER CABLE	n/a	n/a	n/a	n/a	n/a
ANTENNA SHARING KIT?	n/a	n/a	n/a	n/a	n/a
BAS Filter	n/a	n/a	n/a	n/a	n/a
DIPLEXER (QTY/MODEL)	n/a	n/a	n/a	n/a	n/a
DUPLEXER (QTY/MODEL)	n/a	n/a	n/a	n/a	n/a
SURGE ARRESTOR (QTY/MODEL)	SQUID x 4 per site	SQUID x 4 per site	SQUID x 4 per site	SQUID x 4 per site	SQUID x 4 per site
DC BLOCK (QTY/MODEL)	n/a	n/a	n/a	n/a	n/a
RET EQUIPMENT (QTY/MODEL)	Home Run RET cable	n/a	n/a	n/a	n/a
1900 PDU FOR TMAS	CCU - Kathrein 860 10006	n/a	n/a	n/a	n/a

HexPORT Multi-Band ANTENNA

Model HPA-65R-BUU-H8



Hexport Multi-Band Antenna Array

Benefits

- ◆ Includes WCS Band
- ◆ Reduces tower loading
- ◆ Frees up space for tower mounted E-nodes
- ◆ Single radome with six ports
- ◆ All Band design simplifies radio assignments
- ◆ Sharp elevation beam eases network planning

The CCI Hexport Multi-Band Antenna Array is an industry first 6-port antenna with full WCS Band Coverage. With four high band ports and two low band ports, our hexport antenna is ready for 4X4 high band MIMO.

Modern networks demand high performance, consequently CCI has incorporated several new and innovative design techniques to provide an antenna with excellent side-lobe performance, sharp elevation beams, and high front to back ratio.

Multiple networks can now be connected to a single antenna, reducing tower loading and leasing expense, while decreasing deployment time and installation cost.

Full band capability for 700 MHz , Cellular 850 MHz, PCS 1900 MHz, AWS 1710/2170 MHz and WCS 2300 MHz coverage in a single enclosure.

Features

- ◆ High Band Ports include WCS Band
- ◆ Four High Band ports with two Low Band ports in one antenna
- ◆ Sharp elevation beam
- ◆ Excellent elevation side-lobe performance
- ◆ Excellent MIMO performance due to array spacing
- ◆ Excellent PIM Performance
- ◆ A multi-network solution in one radome

Applications

- ◆ 4x4 MIMO on High Band and 2x2 MIMO on Low Band
- ◆ Adding additional capacity without adding additional antennas
- ◆ Adding WCS Band without increasing antenna count



HexPORT Multi-Band ANTENNA

Model HPA-65R-BUU-H8

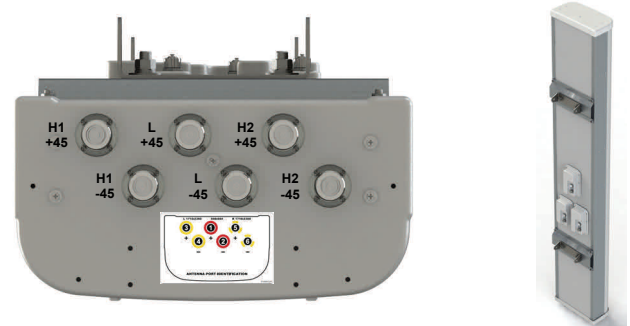
HPA-65R Multi-Band Antenna

Electrical Specifications

Frequency Range	2 X Low Band Ports which cover the full range from 698-894 MHz		4 X High Band Ports which cover the full range from 1710-2360 MHz			
	698-806 MHz	824-894 MHz	1850-1990 MHz	1710-1755/2110-2170 MHz	2305-2360 MHz	
Gain	15.3 dBi	16.2 dBi	17.1 dBi	16.3 dBi	17.4 dBi	17.7 dBi
Azimuth Beamwidth (-3dB)	65°	61°	62°	68°	64°	60°
Elevation Beamwidth (-3dB)	10.1°	8.4°	5.6°	6.2°	5.0°	4.5°
Electrical Downtilt	2° to 10°	2° to 10°	0° to 8°	0° to 8°	0° to 8°	0° to 8°
Elevation Sidelobes (1st Upper)	< -17 dB	< -17 dB	< -19 dB	< -18 dB	< -18 dB	< -17 dB
Front-to-Back Ratio @180°	> 29 dB	> 28 dB	> 35 dB	> 35 dB	> 35 dB	> 35 dB
Front-to-Back Ratio over ± 20°	> 28 dB	> 27 dB	> 28 dB	> 27 dB	> 28 dB	> 28 dB
Cross-Polar Discrimination (at Peak)	> 24 dB	> 20 dB	> 25 dB	> 25 dB	> 25 dB	> 25 dB
Cross-Polar Discrimination (at ± 60°)	> 16 dB	> 14 dB	> 18 dB	> 18 dB	> 18 dB	> 18 dB
Cross-Polar Port-to-Port Isolation	> 25 dB	> 25 dB	> 25 dB	> 25 dB	> 25 dB	> 25 dB
VSWR	< 1.5:1	< 1.5:1	< 1.5:1	< 1.5:1	< 1.5:1	< 1.5:1
Passive Intermodulation (2x20W)	≤ -150dBc	≤ -150dBc	≤ -150dBc	≤ -150dBc	≤ -150dBc	≤ -150dBc
Input Power	500 Watts CW	500 Watts CW	300 Watts CW	300 Watts CW	300 Watts CW	300 Watts CW
Polarization	Dual Pol 45°	Dual Pol 45°	Dual Pol 45°	Dual Pol 45°	Dual Pol 45°	Dual Pol 45°
Input Impedance	50 Ohms	50 Ohms	50 Ohms	50 Ohms	50 Ohms	50 Ohms
Lightning Protection	DC Ground	DC Ground	DC Ground	DC Ground	DC Ground	DC Ground

Mechanical Specifications

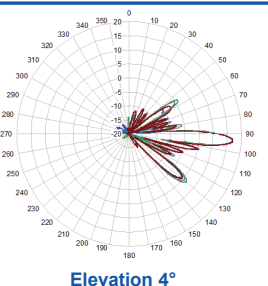
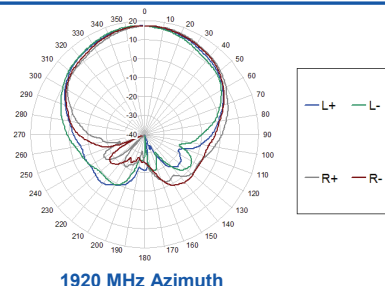
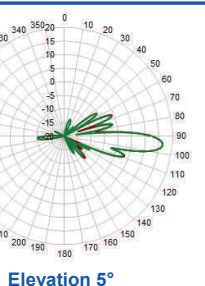
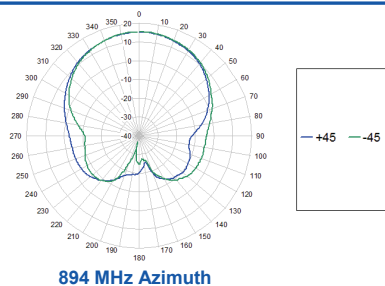
Dimensions (LxWxD)	92.4 x 14.8 x 7.4 inches (2348 x 376 x 189 mm)
Survival Wind Speed	> 150 mph
Front Wind Load	332 lbs (1479 N) @ 100 mph (161 kph)
Side Wind Load	193 lbs (860 N) @ 100 mph (161 kph)
Equivalent Flat Plate Area	13.0 ft ² (1.2 m ²)
Weight (without Mounting)	68 lbs (31 kg)
RET System Weight	5.0 lbs (2.25 kg)
Connector	6; 7-16 DIN female long neck
Mounting Pole	2-5 inches (5-12 cm)



Antenna Patterns*

Bottom View

Rear View



*Typical antenna patterns. For detail information on antenna pattern, please contact us at info@ccipproducts.com. All specifications are subject to change without notice.

RRUS 11

Frequency (AT&T)

- ✓ Band 12 (Lower 700 MHz)
- ✓ Band 4 (AWS, 17/2100 MHz) — 2Q2011

RF Characteristics

- ✓ Output power: 2x30 Watts
- ✓ 2x2 MIMO Capable
- ✓ IBW of 20 MHz
- ✓ Rx Sens.: Better than -105 dBm (5 MHz)

RET/TMA Support

- ✓ AISG 2.0 Compatible
- ✓ Via RET Port and Centre Conductor
- ✓ Cascading
- ✓ 30 VDC Bias

Environmental

- ✓ Self Convection
- ✓ Temperature -40 to 131 F

Power

- ✓ Input voltage: -48 VDC or AC (exemption)
- ✓ Fuse size: 13 – 32 A
 - Recommended: 25 A
- ✓ Power Consumption:
 - Typical 200 Watts
 - Max 310 Watts
 - Excl. RET and TMA load



RRUS 11 Mechanics

Wall and pole mounting brackets

- Reused from RRUW and RRU22
- Vertical Mount Only

Clearing distances:

- Above ≥ 16 in.
- Below ≥ 12 in.
- Side ≥ 0 mm

DC connector

- Bayonet
- Screw terminals in connector plug
- Supported outer cable diameter: 6-18 mm

CPRI connector

- LCD with proprietary cover
- Separate cover available from 1Q2011

Size & Weight

- Band 4: 44 lbs
- Band 12: 50 lbs
- 17.8" x 17.3" x 7.2" incl. sun shield



POWER

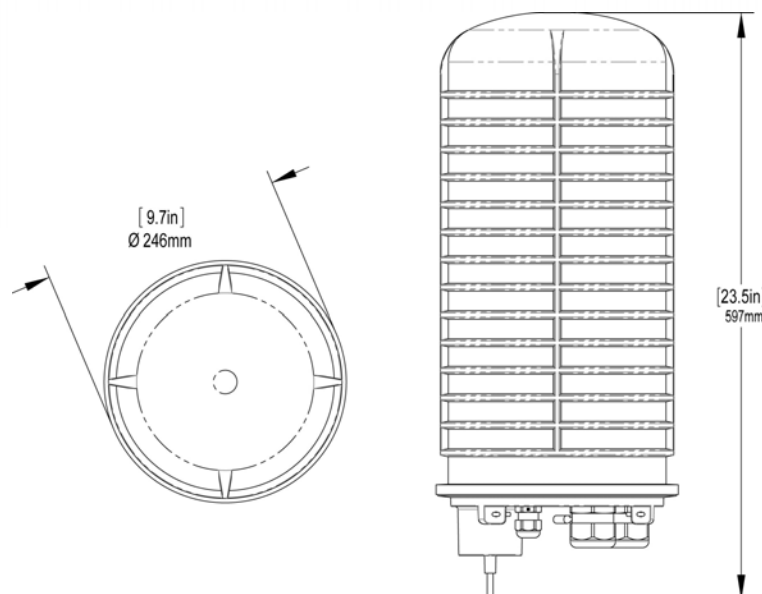
DC6-48-60-18-8F

DC Surge Suppression Solution

The DC6-48-60-18 is a dual chambered, DC surge suppression system for use in multi-circuit, Distributed Antenna Systems. The system will protect up to 6 Remote Radio Heads from voltage surges and lightning, and connect up to 18 fiber pairs. The system is enclosed in a NEMA 4 rated, waterproof enclosure.

FEATURES

- Protects up to 6 Remote Radio Heads, each with its own protection circuit.
- Flexible design allows for installation at the top of a tower for Remote Radio Head protection.
- Includes fiber connections for up to 18 pairs of fiber.
- LED indicators on individual circuits provide visual indication of suppressor status.
- Form 'C' relays allow for remote monitoring of the suppressor status.
- Patented Strikesorb technology provides over 60 kA of surge current capacity per circuit.
- Strikesorb suppression modules are fully recognized to UL 1449-3rd Edition Safety Standard, meeting all intermediate and high current fault requirements to facilitate use in OEM applications.
- Raycap recommends that DC protection system be installed within 2 meters or 6 feet of the radio.
- Dome design is lightweight and aerodynamic providing maximum flexibility for installation on top of towers.



Raycap



DC6-48-60-18-8F

DC Power Surge Protection

Electrical Specifications	
Model Number	DC6-48-60-18-8F
Nominal Operating Voltage	48 VDC
Nominal Discharge Current (I_n)	20 kA 8/20 μ s
Maximum Discharge Current (I_{max}) per NEMA LS-1	60 kA 8/20 μ s
Maximum Continuous Operating Voltage (U_c)	75 VDC
Voltage Protection Rating	400 V

Mechanical Specifications	
Suppression Connection Method	Compression lug, #2-#14 AWG Copper, #2-#12 Aluminum
Fiber Connection Method	LC-LC Single mode duplex
Environmental Rating	IP 68, 7m 72hrs
Operating Temperature	-40° C to + 80° C
Storage Temperature	-70° C to + 80° C
Cold Temperature Cycling	IEC 61300-2-22e -30° C to + 60° C 200 hrs @ 5 psi
Resistance to Aggressive Materials	CEI IEC 61073-2 including acids and bases
UV Protection	ISO 4892-2 Method A Xenon-Arc 2160 hrs
Weight	20 lbs without Mounting Bracket

STANDARDS

Strikesorb modules are compliant to the following Surge Protection Device (SPD) Standards:

- ANSI/UL 1449 – 3rd Edition
- IEEE C62.41
- NEMA LS-1, IEC 61643-1:2005 2nd Edition:2005
- IEC 61643-12
- EN 61643-11:2002 (including A11:2007)



Raycap

GS02-00-068 REV 050610



GS-07F-0435V



Certified to
ISO 9001:2000



TUV Rheinland
of North America

12 PAIR FIBER TRUNK

FTTA fiber trunks are fiber optical cable assemblies connecting base stations and remote radio heads in telecommunication applications. They can be used indoor and outdoor, are UV protected and riser rated. Connectors and fan-out are IP67 protected. This ensures easy handling in an outdoor environment. A pulling sock eases cable hoisting.

Part #	Diameter	Description	QTY
FB-L98B-002-15000 CEQ.32135	10mm	Preconnect Trunk with UL certified cable 12 channels, 24 fibers, single mode LC Duplex to LC Duplex, OD 10.0mm: 15 meter length.	Each
FB-L98B-002-30000 CEQ.32194	10mm	Preconnect Trunk with UL certified cable 12 channels, 24 fibers, single mode LC Duplex to LC Duplex, OD 10.0mm: 30 meter length.	Each
FB-L98B-002-50000 CEQ.32193	10mm	Preconnect Trunk with UL certified cable 12 channels, 24 fibers, single mode LC Duplex to LC Duplex, OD 10.0mm: 50 meter length.	Each
FB-L98B-002-75000 CEQ.32192	10mm	Preconnect Trunk with UL certified cable 12 channels, 24 fibers, single mode LC Duplex to LC Duplex, OD 10.0mm: 75 meter length.	Each
FB-L98B-002-100000 CEQ.32191	10mm	Preconnect Trunk with UL certified cable 12 channels, 24 fibers, single mode LC Duplex to LC Duplex, OD 10.0mm: 100 meter length.	Each
FB-L98B-002-125000 CEQ.32190	10mm	Preconnect Trunk with UL certified cable 12 channels, 24 fibers, single mode LC Duplex to LC Duplex, OD 10.0mm: 125 meter length.	Each



6 CONDUCTOR (3 PAIR) POWER CABLE

600 Volts Power Cable. UL Approved for direct burial or sunlight applications.

Part #	Diameter	Description	QTY
WR-VG86T CEQ.32182	19.2 mm	RSS 8-AWG 6 - Conductor Unshielded 600 Volts Power Cable -# 8 Tinned Copper (three traced red/black pairs) w/ #10 Bare Ground Wire.	Per FT
WR-VG86ST-BRD CEQ.32181	19.7 mm	RSS 8-AWG 6 - Conductor Shielded (Tinned Copper Braid and Aluminum Tape w/ Drain Wire) 600 Volts Power Cable -# 8 Tinned Copper (three traced red/black pairs) w/ #10 Bare Ground Wire.	Per FT

2 CONDUCTOR (SINGLE PAIR) SHIELDED POWER CABLE

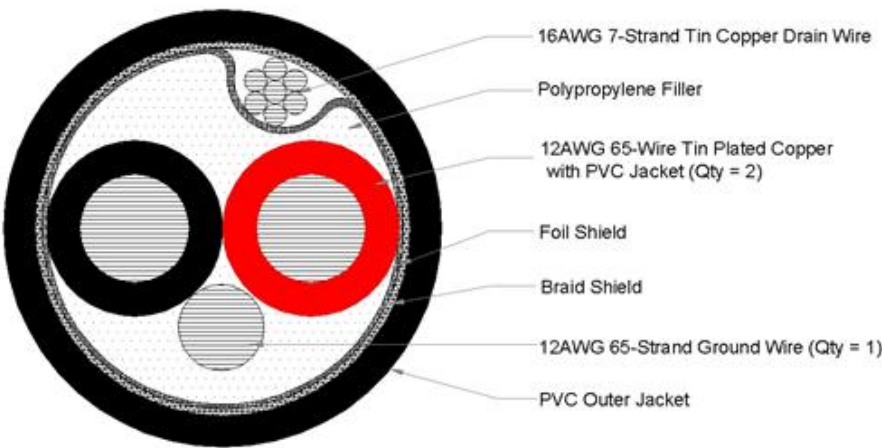
600 Volts Power Cable. UL Approved for direct burial or sunlight applications.

Part #	Diameter	Description	QTY
WR-VG122ST-BRDA CEQ.10224	9.8mm	RSS 12-AWG 2 - Flexible Conductor Shielded (Tinned Copper Braid and Aluminum Tape w/ Drain Wire) 600 Volts Power Cable -# 12 AWG 65 Strands Tinned Copper (red and black) w/ #12 Bare Ground Wire.	Per FT
WR-VG102ST-BRDA CEQ.10225	11.6mm	RSS 10-AWG 2 - Flexible Conductor Shielded (Tinned Copper Braid and Aluminum Tape w/ Drain Wire) 600 Volts Power Cable -# 10 AWG 105 Strands Tinned Copper (red and black) w/ #10 Bare Ground Wire.	Per FT
WR-VG82ST-BRDA CEQ.10226	15.4mm	RSS 8-AWG 2 - Flexible Conductor Shielded (Tinned Copper Braid and Aluminum Tape w/ Drain Wire) 600 Volts Power Cable -# 8 AWG 168 Strands Tinned Copper (red and black) w/ #10 Bare Ground Wire.	Per FT



PWRT-212-S
Remote Radio Head Power Cable, 2 conductor with shield, 12 AWG (3.31 mm²)

Cross Section Drawing



Construction Materials

Construction Type	Non-armored
Conductor Material	Tinned copper
Dielectric Material	PVC
Drain Wire Material	Tinned copper
Filler Material	Polypropylene
Ground Wire Material	Tinned copper
Insulation Material, singles	PVC
Jacket Material	PVC
Outer Shield (Braid) Coverage	65 %
Outer Shield (Braid) Gauge	36 AWG
Outer Shield (Braid) Material	Tinned copper
Outer Shield (Tape) Material	Aluminum/Poly, non-bonded

Dimensions

Cable Weight	0.16 kg/m 0.11 lb/ft
Diameter Over Conductor, singles	2.5654 mm per 65 strand 0.1010 in per 65 strand
Diameter Over Dielectric	3.5814 mm 0.1410 in
Diameter Over Drain Wire	1.5200 mm per 7 strand 0.0598 in per 7 strand
Diameter Over Ground Wire	2.565 mm 0.101 in
Diameter Over Jacket	10.109 mm 0.398 in

PWRT-212-S

POWERED BY



Diameter Over Shield (Braid)	7.823 mm		0.308 in
Jacket Thickness	1.143 mm		0.045 in

Electrical Specifications

Conductor dc Resistance	1.68 ohms/kft		5.51 ohms/km
Conductor dc Resistance Note	Maximum value based on a standard condition of 20 °C (68 °F)		
Safety Voltage Rating	600 V		

Environmental Specifications

Environmental Space	UV resistant for outdoor and/or direct burial installations
Operating Temperature	-40 °C to +90 °C (-40 °F to +194 °F)
Safety Standard	NEC Article 336 (Type TC)

General Specifications

Application	Industrial
Cable Type	Power
Jacket Color	Black
Conductor Gauge, singles	12 AWG
Conductor Type, singles	Stranded
Conductors, quantity	2
Drain Wire Gauge	16 AWG
Ground Wire Gauge	12 AWG
Ground Wire Type	Stranded
Jacket Color, singles	Black Red

Regulatory Compliance/Certifications

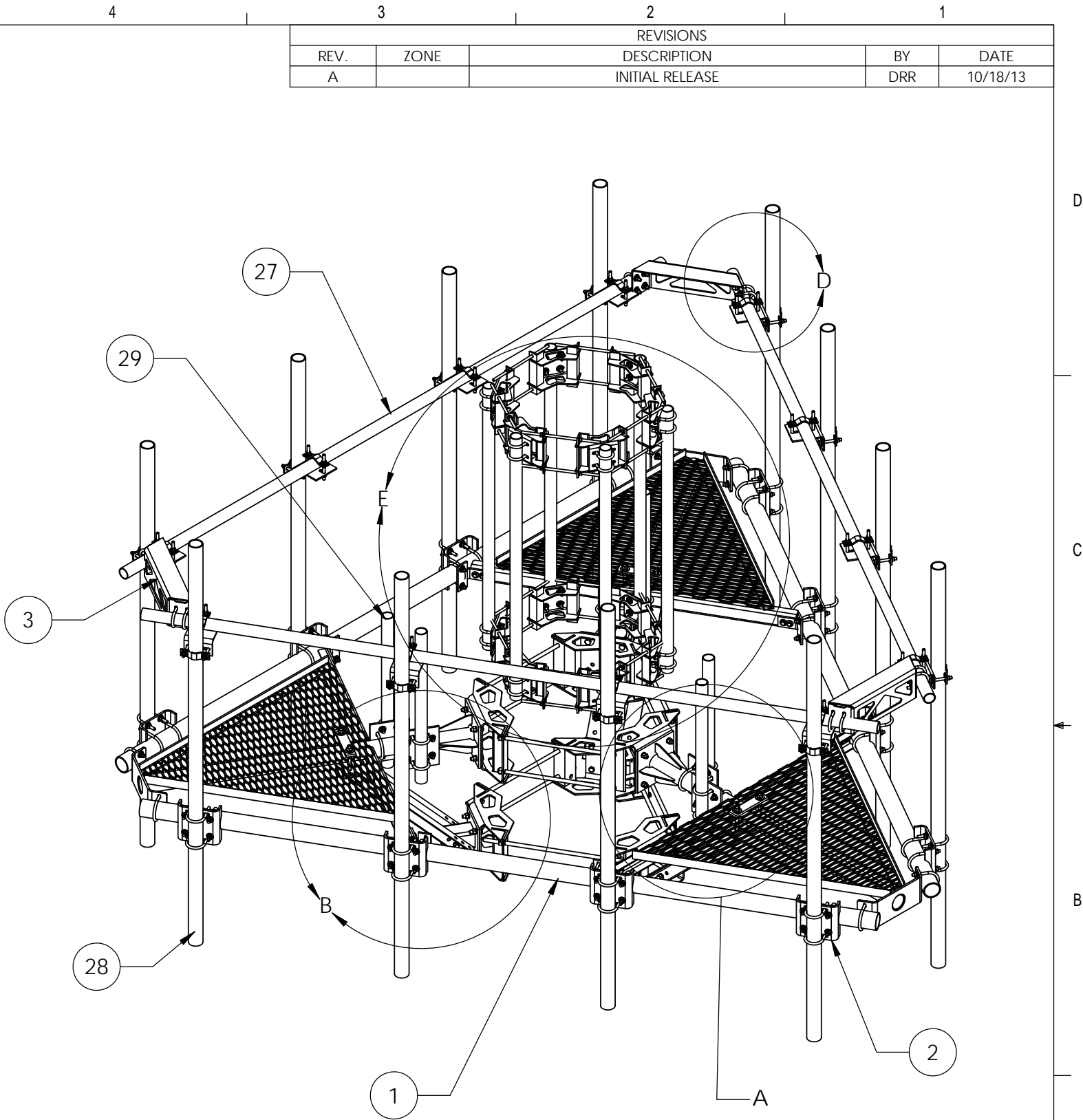
Agency	Classification
ISO 9001:2008	Designed, manufactured and/or distributed under this quality management system

ITEM	PART NO.	DESCRIPTION	QTY.	WEIGHT
1	MC-PK12S-B	LOW PROFILE CO-LOCATION PLATFORM KIT	1	859.05 LBS
2	MT-219M-H	3.5" OD X 2-7/8" OD Clamp Bracket Assembly	12	12.78 LBS
3	MT19525	Corner Weldment	3	14.76 LBS
4	GUB-4240	1/2" X 2-1/2" X 4" GALV U-BOLT	48	0.56 LBS
5	XAU01	Angle BRK	12	3.59 LBS
6	MTC323704	Clamp Bar	6	2.37 LBS
7	ACP10	1.5" - 3.5" O.D. CLAMP HALF	24	0.61 LBS
8	DCP10	SMALL CLAMP HALF	6	2.21 LBS
9	MT-379-6	1/2" X 6" GALV THREADED ROD	48	0.33 LBS
10	GWF-04	1/2" GALV FLAT WASHER	96	0.03 LBS
11	GWL-04	1/2" GALV LOCK WASHER	144	0.01 LBS
12	GN-04	1/2" GALV HEX NUT	144	0.04 LBS
13	MTC306503	CW 1030 Ringmount Weldment	3	28.02 LBS
14	MT38430B7	3/4" X 30" GALV THREADED ROD GRADE B7	6	3.73 LBS
15	GWL-06	3/4" GALV LOCK WASHER	12	0.04 LBS
16	GN-06	3/4" GALV HEX NUT	12	0.14 LBS
17	MTC313802	Kicker Mount Standoff	3	13.08 LBS
18	MTC323701	Left Kicker	3	14.36 LBS
19	MTC323702	Right Kicker	3	14.36 LBS
20	MT-381-8	5/8" X 8" GALV THREADED ROD	9	0.69 LBS
21	GB-0520A	5/8" X 2" GALV BOLT KIT (A325)	12	0.27 LBS
22	GWF-05	5/8" GALV FLAT WASHER	12	0.06 LBS
23	GWL-05	5/8" GALV LOCK WASHER	18	0.03 LBS
24	GN-05	5/8" GALV HEX NUT	18	0.08 LBS
25	XP2030.01	CROSSOVER PLATE ϕ 2-3/8" O.D. TO ϕ 3-1/2" O.D.	6	7.30 LBS
26	GUB-4355	1/2" X 3-5/8" X 5" GALV U-BOLT	12	0.71 LBS
27	MT-651-150	ϕ 2.375" OD x 150" PIPE	3	45.42 LBS
28	MT54696	ϕ 2.875" O.D. X 96 PIPE	12	46.51 LBS
29	MT-649	2 3/8" x 36" Pipe	6	10.90 LBS
30	MTC320001	RRU Ringmount	12	10.52 LBS
31	MT37916	1/2" X 16" GALV THREADED ROD	24	0.88 LBS
32	MT-650-63	ϕ 2.375" OD x 63" PIPE	6	19.08 LBS

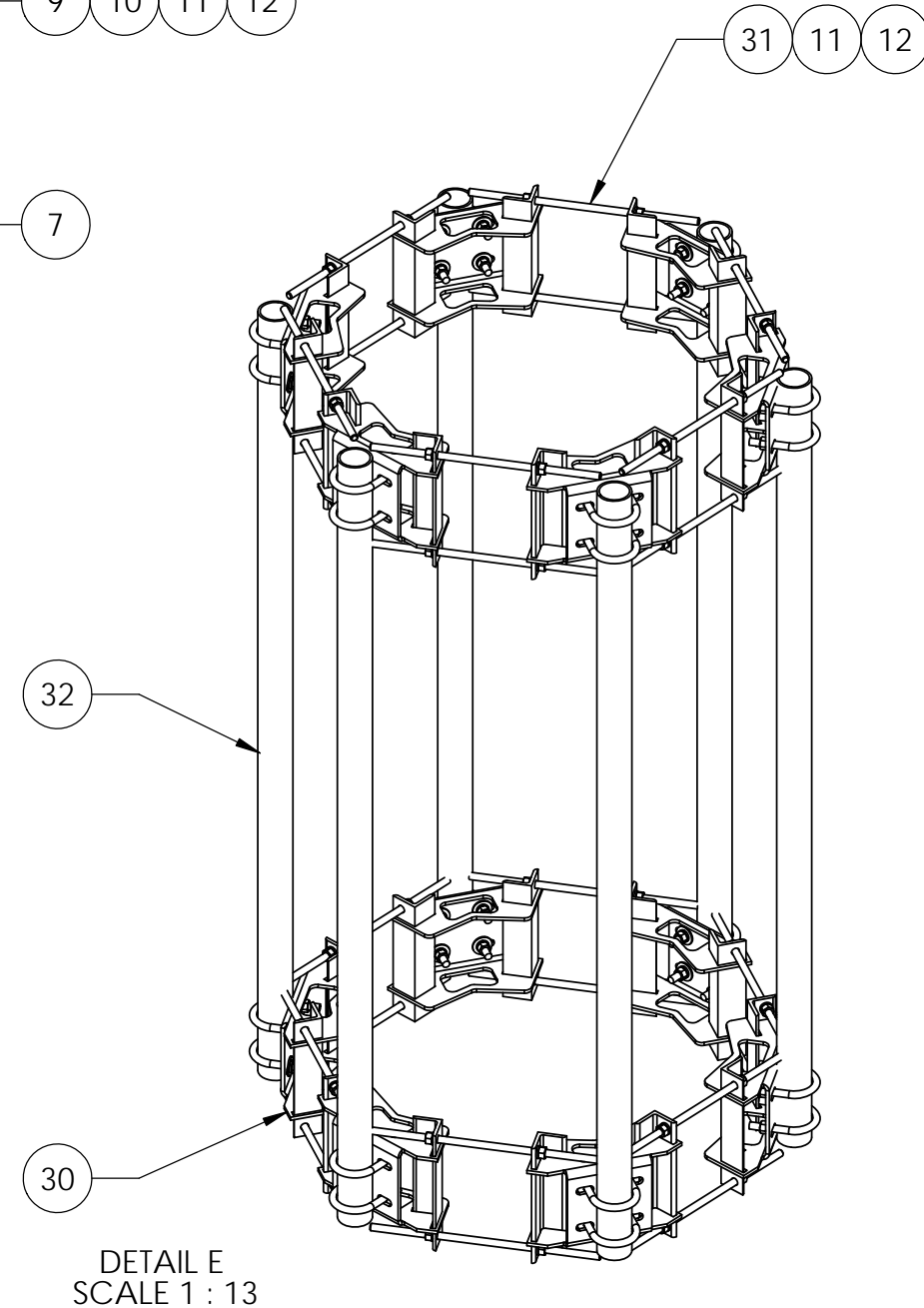
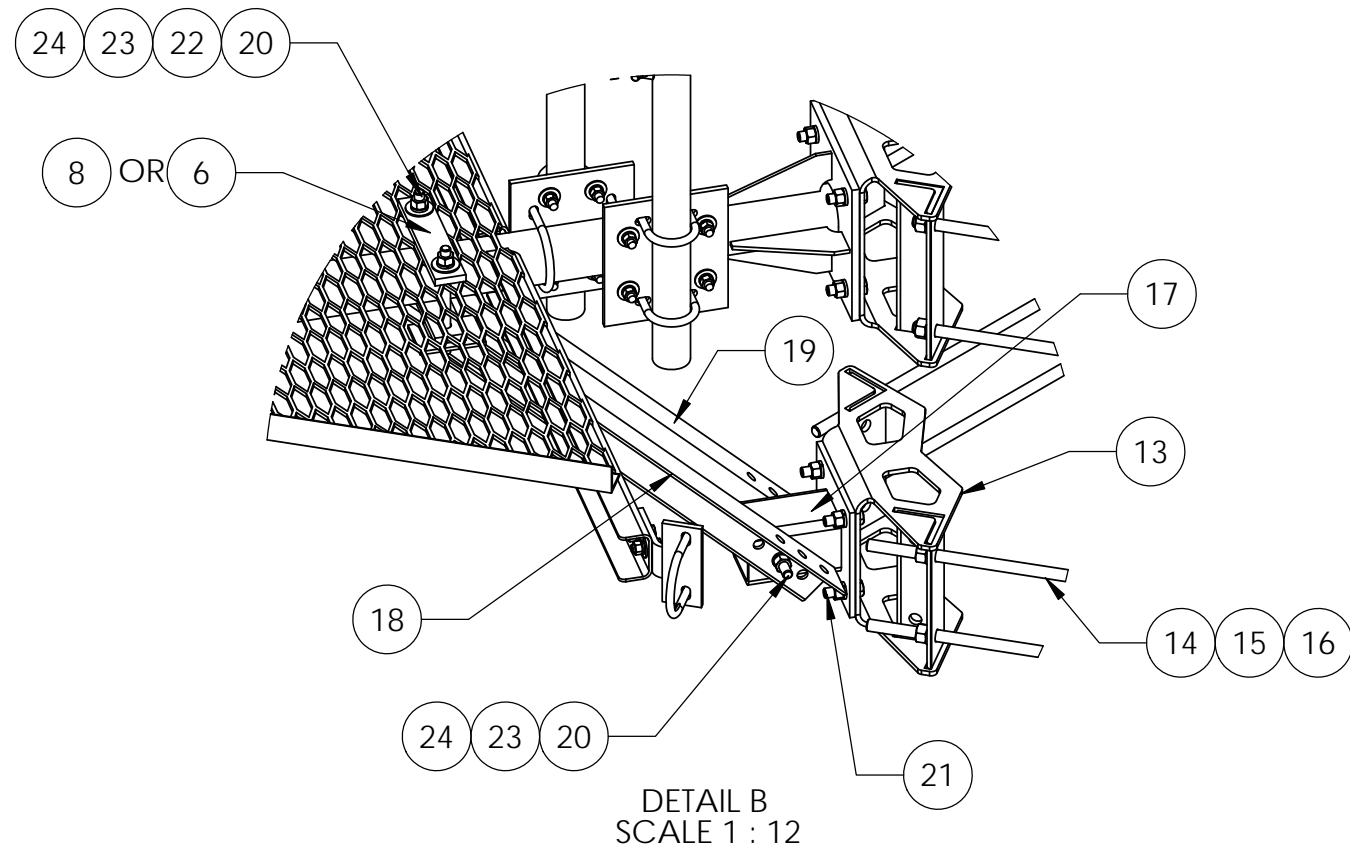
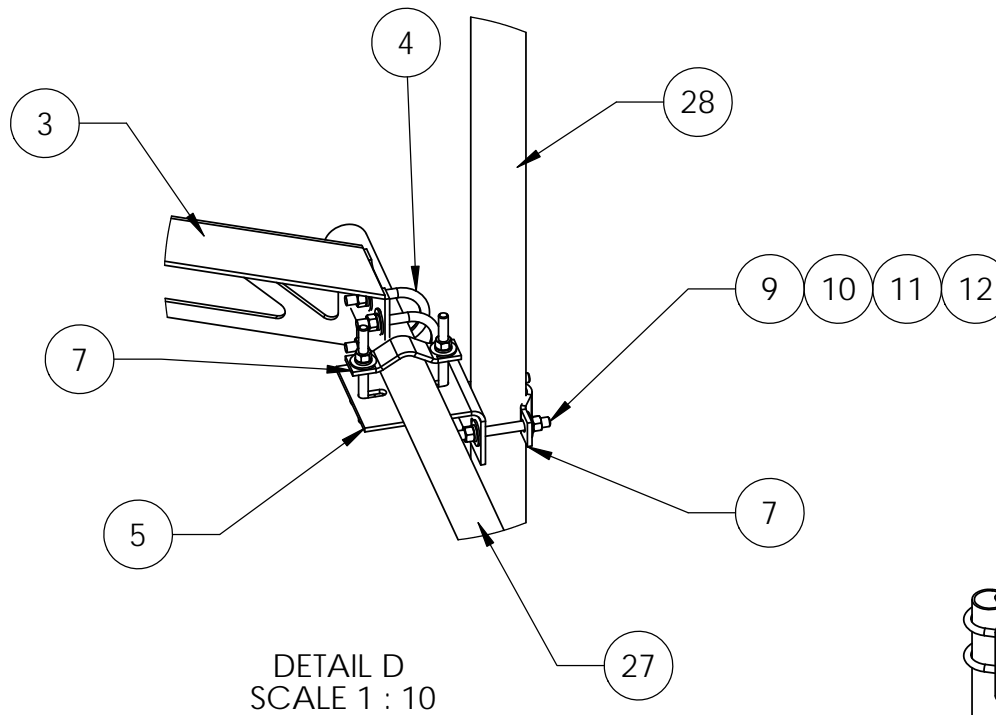
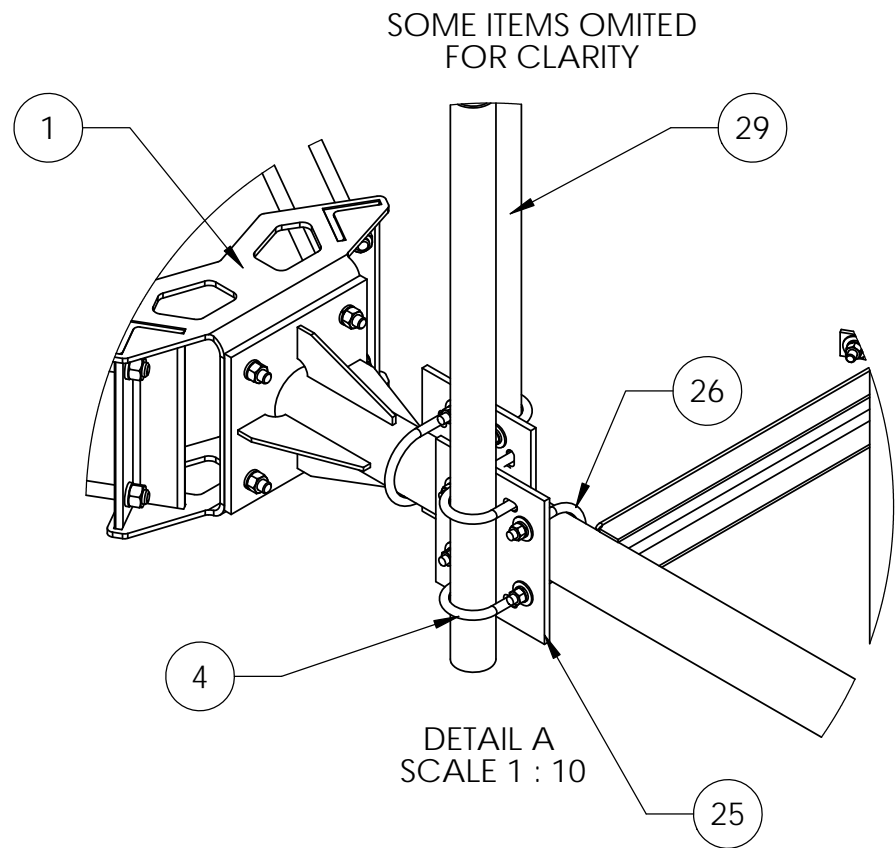
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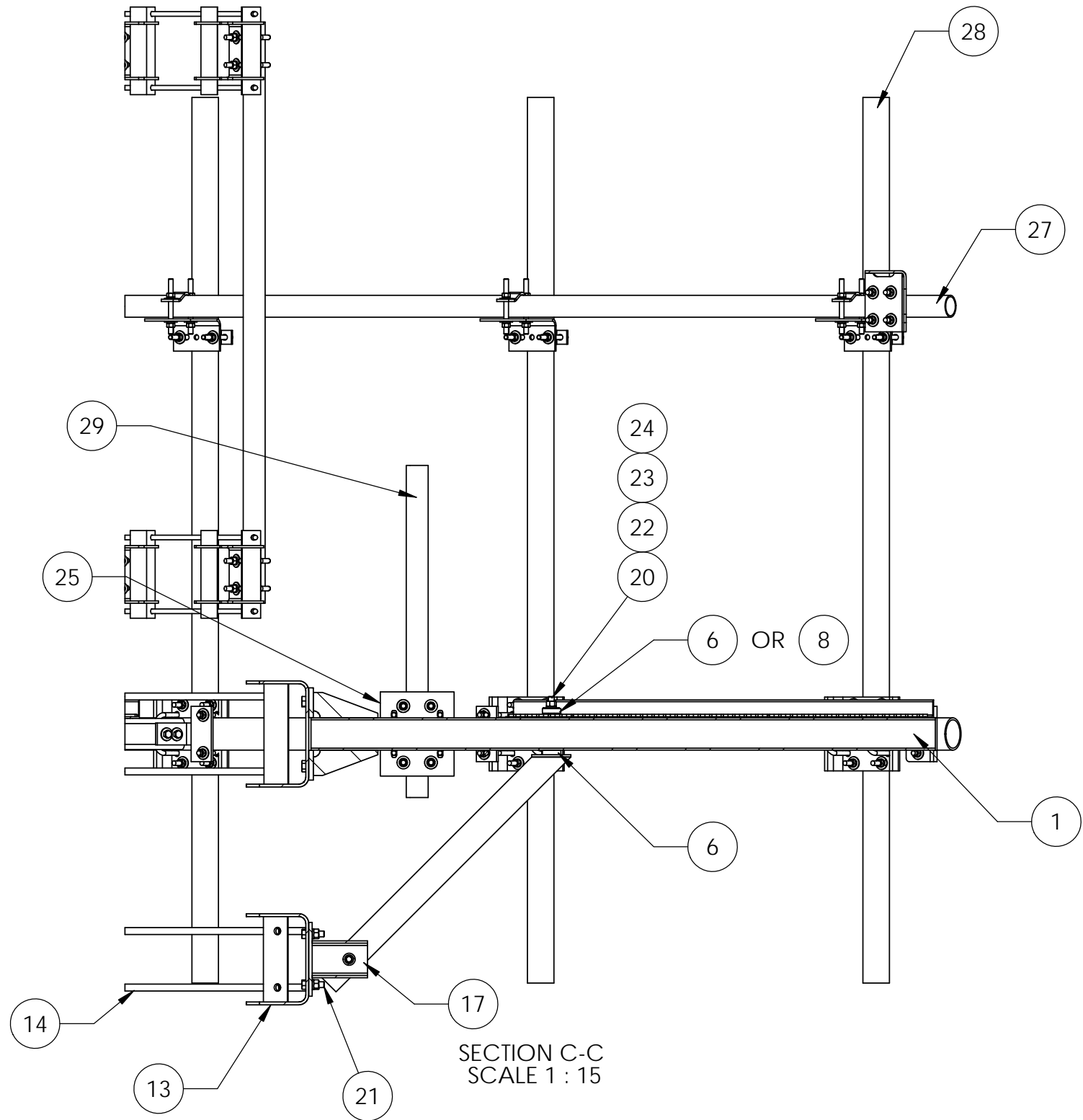
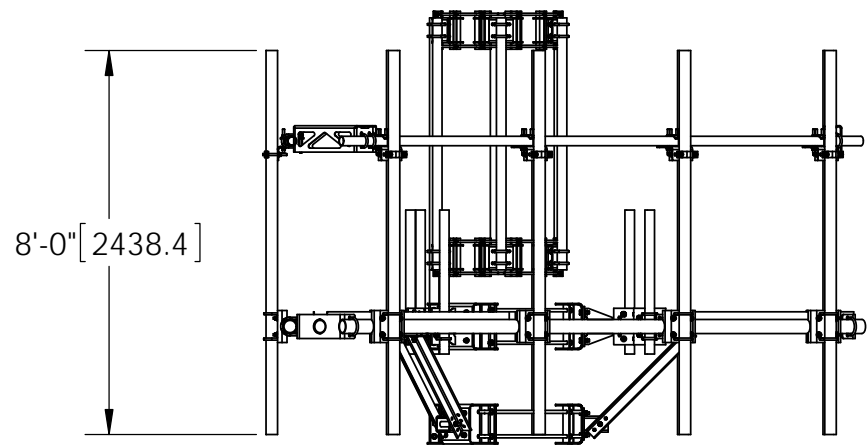
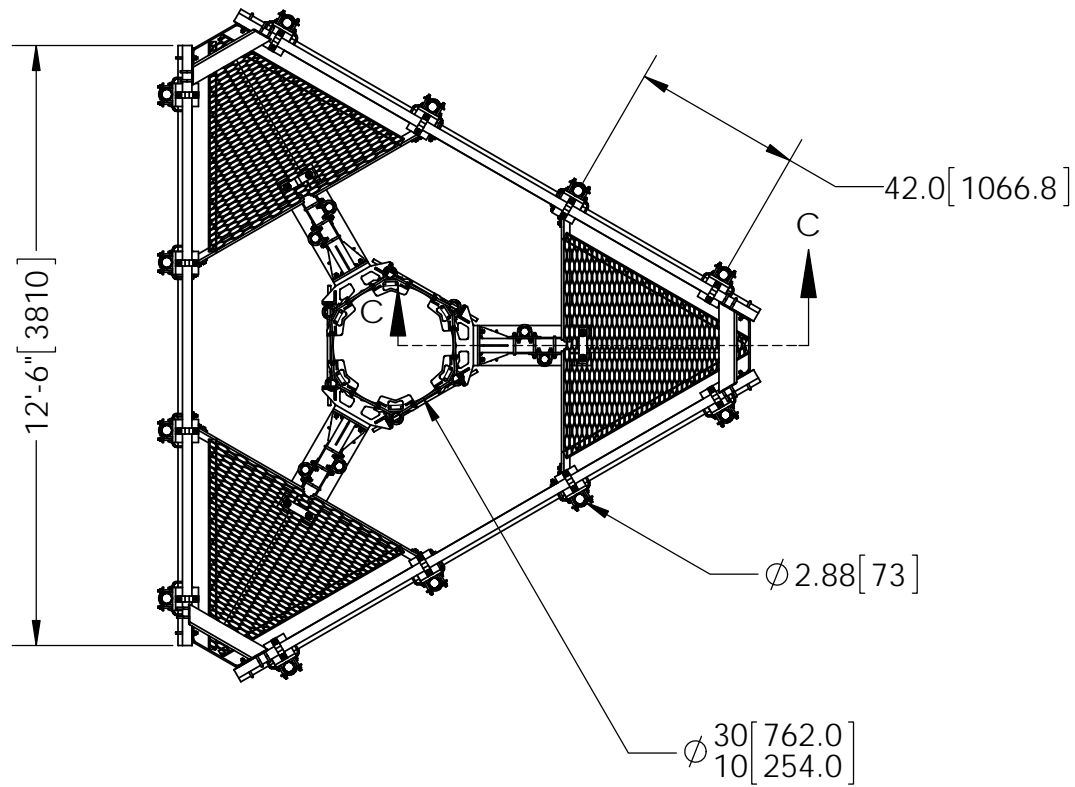
1. ALL METRIC DIMENSIONS ARE IN BRACKETS.
2. FITS MONOPOLES ϕ 10"— ϕ 30".



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	CHECKED BY: TP	SCALE: NTS	DESCRIPTION: Low Profile Co-Location Platform Kit
	DATE: 10/18/13	MATERIAL: A36, A500, A529	DRAWING TYPE: ASSEMBLY DRAWING
	REVISION: A	FINISH: Galv A123	COMMScope® Hickory, NC 28602 U.S.A.
ALL DIMENSIONS ARE IN INCHES U.O.S. TOLERANCES UNLESS OTHERWISE SPECIFIED: .X = ± .12 ANGLES ±2° .XX = ± .06 FRACTIONS ±1/32 .XXX= ± .031 REMOVE BURRS AND BREAK EDGES .005 DO NOT SCALE THIS PRINT	WEIGHT: 2528.27 LBS		



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	CHECKED BY: TP	SCALE: NTS	DESCRIPTION: Low Profile Co-Location Platform Kit
	DATE: 10/18/13	MATERIAL: A36, A500, A529	DRAWING TYPE: ASSEMBLY DRAWING
	REVISION: A	FINISH: Galv A123	COMMScope® Hickory, NC 28602 U.S.A.
		WEIGHT: 2528.27 LBS	



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	DATE: 10/18/13	MATERIAL: A36, A500, A529	DRAWING TYPE: ASSEMBLY DRAWING
	REVISION: A	FINISH: Galv A123	<p>Hickory, NC 28602 U.S.A.</p>
		WEIGHT: 2528.27 LBS	

