Crown Castle
3530 Toringdon Way Suite 300
Charlotte NC 28277

Tel (704) 405-6600

September 26, 2014

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

RE: **Metro PCS-Exempt Modification - Crown Site BU: 876316**
T-Mobile Site ID: CTNH509A
Located at: 21 Alcorn Road, Branford, CT 06405

Dear Ms. Bachman:

This letter and exhibits are submitted on behalf of Metro PCS. Metro PCS is making modifications to certain existing sites in its Connecticut system in order to implement their LTE technology. Please accept this letter and exhibits as notification, pursuant to § 16-50j-73 of the Regulations of Connecticut State Agencies ("R.C.S.A."), of construction that constitutes an exempt modification pursuant to R.C.S.A. § 16-50j-72(b)(2). In compliance with R.C.S.A. § 16-50j-73, a copy of this letter is being sent to Mr. James B. Cosgrove, First Selectman Town of Branford and Altrio Investment Group LLC, Property Owner.

Metro PCS plans to modify the existing wireless communications facility owned by Crown Castle and located at **21 Alcon Road, Branford, CT 06405**. Attached are a compound plan and elevation depicting the planned changes (Exhibit-1), and documentation of the structural sufficiency of the structure to accommodate the revised antenna configuration (Exhibit-2). Also included is a power density table report reflecting the modification to Metro PCS's operations at the site (Exhibit-3).

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

1. The proposed modifications will not result in an increase in the height of the existing tower. Metro PCS's replacement and new antennas will be located at the same elevation on the existing tower.

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

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

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

5. A Structural Modification Report confirming that the tower and foundation can support Metro PCS's proposed modifications is included as Exhibit-2.

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

Sincerely,

Jerry Feathers
Real Estate Specialist

Enclosure

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

cc: Mr. James B. Cosgrove, First Selectman
Town of Branford
1019 Main Street
Branford, CT 06405

cc: Altrio Investment Group LLC
P.O. Box 622
Branford, CT 06405

metroPCS

SITE NAME: CROWN BRANFORD ACORN RD MONOPOLE

SITE ID NUMBER: CTNH509A

SITE ADDRESS: 21 ACORN RD
BRANFORD, CT 06405

PROJECT SUMMARY

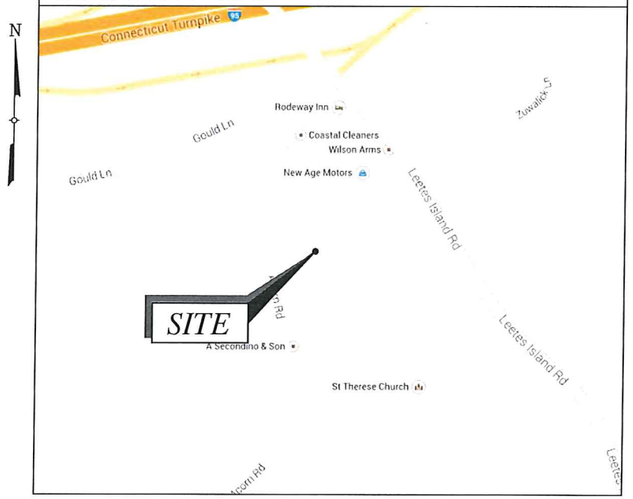
SITE ID NUMBER:	CTNH509A
SITE NAME:	CROWN BRANFORD ACORN RD MONOPOLE
CROWN BU#:	876316
SITE ADDRESS:	21 ACORN DR BRANFORD, CT 06406
COUNTY:	NEW HAVEN
PROPERTY OWNER:	CROWN CASTLE USA
APPLICANT:	metroPCS WIRELESS, INC. 35 GRIFFIN ROAD SOUTH BLOOMFIELD, CT 06002
ENGINEER:	TECTONIC ENGINEERING AND SURVEYING CONSULTANTS, P.C. 1279 ROUTE 300 NEWBURGH, NY 12550
CONTACT: PHONE:	JAMES QUICKSELL (845) 567-6656 EXT. 2835
SITE ACQUISITION:	CROWN CASTLE 1200 MACARTHUR BLVD SUITE 200 MAHWAH, NJ 07430
CONTACT: PHONE:	PETE TISI (201) 491-6009
PARCEL INFO:	H05/000/003/00010
LATITUDE: (NAD 83)	41.293017° N
LONGITUDE: (NAD 83)	72.762886° W

SITE DIRECTIONS

HEAD NORTHEAST ON GRIFFIN RD S TOWARD W NEWBERRY RD. TAKE THE SECOND RIGHT ONTO DAY HILL RD. MERGE ONTO I-91 S VIA THE RAMP TO HARTFORD. MERGE ONTO I-91 S. TAKE THE EXIST ON THE LEFT ONTO I-95 N TOWARD NEW LONDON. TAKE EXIST 56 FOR LEETES ISLAND RD TOWARD STONY CREEK. TURN RIGHT ONTO LEETES ISLAND RD. TAKETHE FIRST RIGHT ONTO GOULD LANE. TAKE THE FIRST LEFT ONTO ACORN RD. DESTINATION WILL BE ON THE LEFT.

LOCATION MAP

SCALE: NTS



SHEET INDEX

SHEET NO	DESCRIPTION	REV NO
T-1	TITLE SHEET	1
A-1	SITE PLAN	1
A-2	EQUIPMENT LAYOUT PLANS	1
A-3	ELEVATION & DETAIL	1
A-4	ANTENNA LAYOUT PLANS & DETAILS	1
A-5	DETAILS	1
A-6	DETAILS	1
A-7	NOTES & EQUIPMENT SCHEDULE	1
A-8	NOTES	1
A-9	NOTES	1

THIS SET OF PLANS SHALL NOT BE UTILIZED AS CONSTRUCTION DOCUMENTS UNTIL ALL ITEMS HAVE BEEN ADDRESSED AND EACH OF THE DRAWINGS HAS BEEN REVISED AND ISSUED "FOR CONSTRUCTION".

CALL TOLL FREE FOR CONNECTICUT
1-800-922-4455 OR DIAL 811
CALL TWO FULL WORKING DAYS IN ADVANCE TO LOCATE BURIED UTILITY PIPES AND CABLES

CONFIGURATION

5A

REFER TO LATEST T-MOBILE RF DATA SHEET FOR FINAL RF DESIGN & BOM.

0 1 2 3

ORIGINAL SIZE IN INCHES

TECTONIC
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NEWBURGH, NY 12550
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Fax: (845) 567-8703

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metroPCS WIRELESS, INC.
35 GRIFFIN ROAD SOUTH
BLOOMFIELD, CT 06002

CROWN CASTLE

APPROVALS

LANDLORD _____
RF _____
CONSTRUCTION _____
OPERATIONS _____
SITE ACQ. _____

PROJECT NUMBER	DESIGNED BY
7061.CTNH509A	JQ

REV	DATE	REVISION	DRAWN BY
0	07/08/14	FOR COMMENT	KA
1	08/14/14	FOR CONSTRUCTION	KA

ISSUED BY	DATE
JMQ	8/14/14

STATE OF CONNECTICUT
ANILKUMAR G. PATEL
No. 22938
LICENSED PROFESSIONAL ENGINEER

SITE INFORMATION

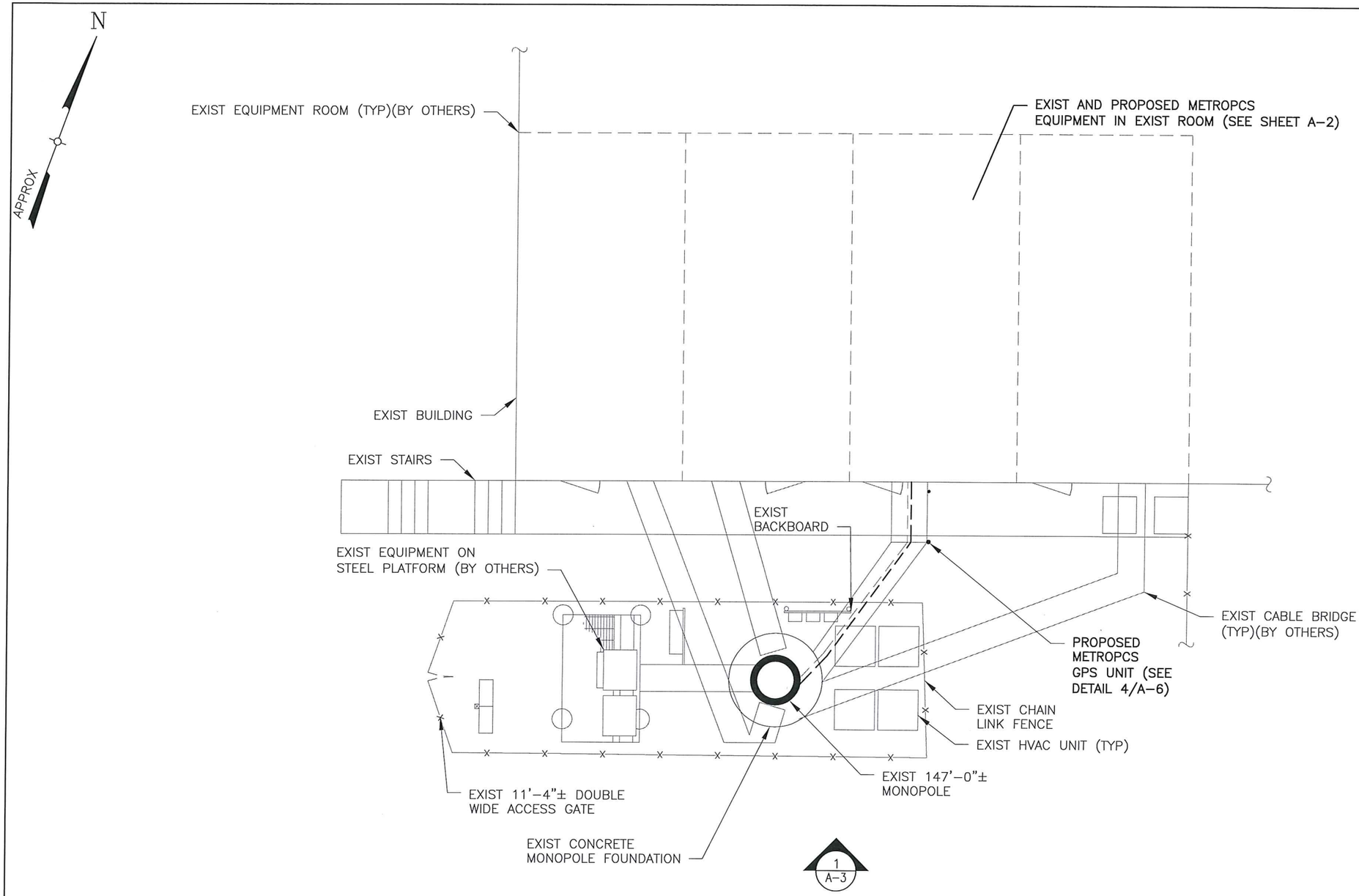
CTNH509A
CROWN BRANFORD ACORN RD
MONOPOLE
21 ACORN ROAD
BRANFORD, CT 06405

SHEET TITLE

TITLE SHEET

SHEET NUMBER

T-1



NOTES:

1. CONTRACTOR SHALL FIELD VERIFY THE ADEQUACY TO ROUTE THE HCS 9x18 MLE (FIBER) CABLE ALONG THE INTERIOR OF MONOPOLE PRIOR TO CONSTRUCTION.
2. CONTRACTOR TO MATCH ANTENNA AZIMUTHS AND DOWNTILTS TO EXISTING CONDITION AND NOTIFY RF ENGINEER OF ANY DISCREPANCY.
3. LOCK & TAG BREAKERS FOR ALL EQUIPMENT BEING TURNED OFF (WHEN APPLICABLE).
4. CONTRACTOR TO RE-VERIFY CABLE LENGTHS PRIOR TO CONSTRUCTION.
5. SEE RFDS FOR FINAL EQUIPMENT CONFIGURATION.

1 / A-1 SITE PLAN

SCALE: 1/8" = 1'-0'

CONFIGURATION
5A
REFER TO LATEST T-MOBILE RF DATA SHEET FOR FINAL RF DESIGN & BOM.

0 1 2 3

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CROWN CASTLE

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CTNH509A
CROWN BRANFORD ACORN RD
MONOPOLE
21 ACORN ROAD
BRANFORD, CT 06405

SHEET TITLE

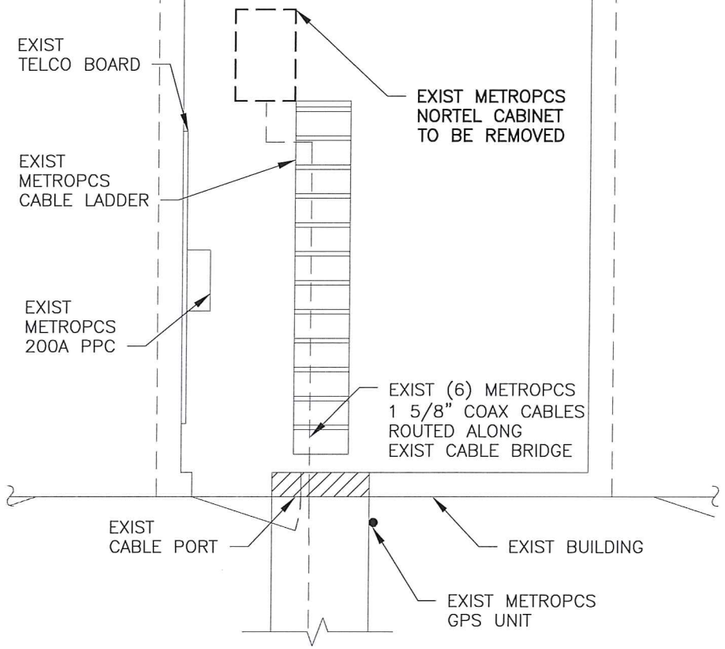
SITE PLAN

SHEET NUMBER

A-1

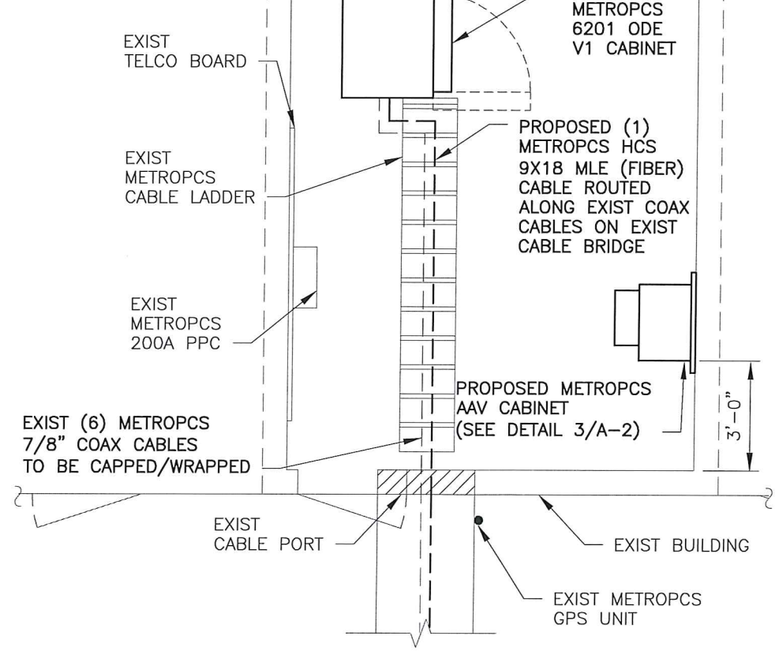
N

APPROX



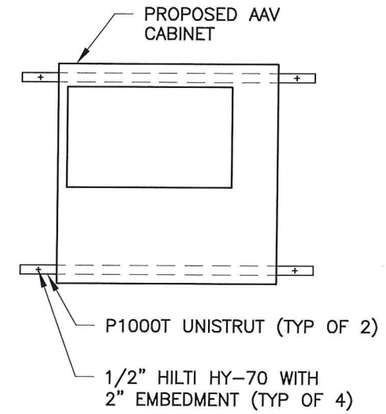
1 / A–2 EXIST EQUIPMENT PLAN

SCALE: 1/4" = 1'–0'



2 / A–2 PROPOSED EQUIPMENT PLAN

SCALE: 1/4" = 1'–0'



3 / A–2 AAV EQUIPMENT

SCALE: 3/4" = 1'–0'

HCS LENGTH			
FROM EQUIPMENT CABINET TO ANTENNA			
SECTOR	ALPHA	BETA	GAMMA
LENGTH	175'±	175'±	175'±
SIZE	1"		
HCS 9x18 MLE			

CONFIGURATION
5A
REFER TO LATEST T–MOBILE RF DATA SHEET FOR FINAL RF DESIGN & BOM.

0 1 2 3

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CROWN CASTLE

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CONSTRUCTION _____
OPERATIONS _____
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SITE INFORMATION

CTNH509A
CROWN BRANFORD ACORN RD
MONOPOLE
21 ACORN ROAD
BRANFORD, CT 06405

SHEET TITLE

EQUIPMENT LAYOUT PLANS

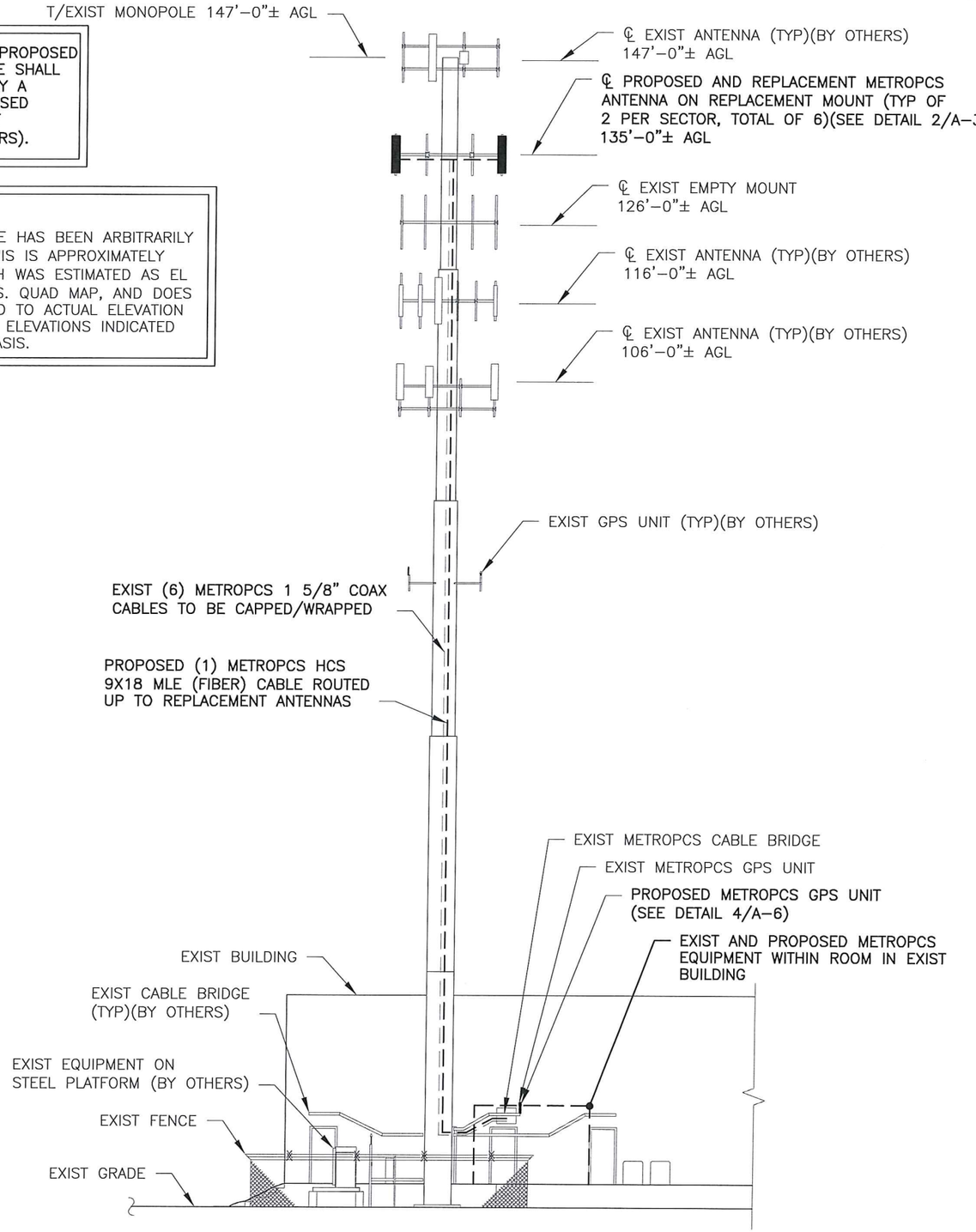
SHEET NUMBER

A–2

THE PROPOSED INSTALLATION, PROPOSED MOUNTS & EXISTING MONOPOLE SHALL BE STRUCTURALLY ANALYZED BY A PROFESSIONAL ENGINEER LICENSED IN THE STATE OF CONNECTICUT (TO BE COORDINATED BY OTHERS).

ELEVATION NOTE:

ELEVATION OF EXIST MONOPOLE HAS BEEN ARBITRARILY ASSIGNED AS EL 263–0"±. THIS IS APPROXIMATELY 147'–0"± ABOVE GRADE WHICH WAS ESTIMATED AS EL 116'–0"± TAKEN FROM U.S.G.S. QUAD MAP, AND DOES NOT NECESSARILY CORRESPOND TO ACTUAL ELEVATION ABOVE SEA LEVEL. ALL OTHER ELEVATIONS INDICATED WERE DETERMINED ON THIS BASIS.

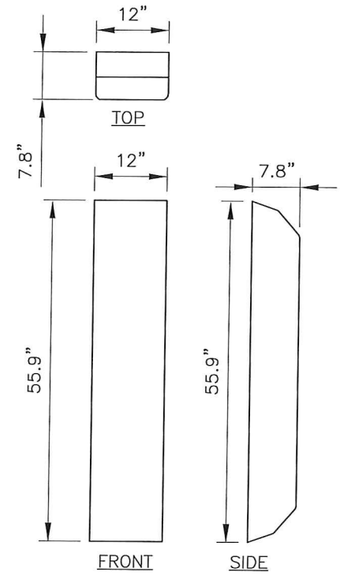


1 / A–3 ELEVATION

SCALE: 1/16" = 1'–0"

EXIST ANTENNA SCHEDULE				
SECTOR	MAKE	QUANTITY	MODEL#	SIZE
ALPHA	RFS	1	APXV18–206517S	53.1x6.9x3.15
BETA	RFS	1	APXV18–206517S	53.1x6.9x3.15
GAMMA	RFS	1	APXV18–206517S	53.1x6.9x3.15

PROPOSED ANTENNA SCHEDULE				
SECTOR	MAKE	QUANTITY	MODEL#	SIZE
ALPHA	ERICSSON	1	AIR21 B2A/B4P	12x8x56
	ERICSSON	1	AIR21 B4A/B2P	12x8x56
BETA	ERICSSON	1	AIR21 B2A/B4P	12x8x56
	ERICSSON	1	AIR21 B4A/B2P	12x8x56
GAMMA	ERICSSON	1	AIR21 B2A/B4P	12x8x56
	ERICSSON	1	AIR21 B4A/B2P	12x8x56



AIR 21

2 / A–3 DETAIL

SCALE: 1/2" = 1'–0"

CONFIGURATION
5A
REFER TO LATEST T–MOBILE RF DATA SHEET FOR FINAL RF DESIGN & BOM.

0 1 2 3

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CROWN CASTLE

APPROVALS

LANDLORD _____
RF _____
CONSTRUCTION _____
OPERATIONS _____
SITE ACQ. _____

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1	08/14/14	FOR CONSTRUCTION	KA

ISSUED BY: JMQ DATE: 8/14/14

STATE OF CONNECTICUT MANOJKUMAR PATEL NO. 22033 LICENSED PROFESSIONAL ENGINEER

SITE INFORMATION

CTNH509A
CROWN BRANFORD ACORN RD
MONOPOLE
21 ACORN ROAD
BRANFORD, CT 06405

SHEET TITLE

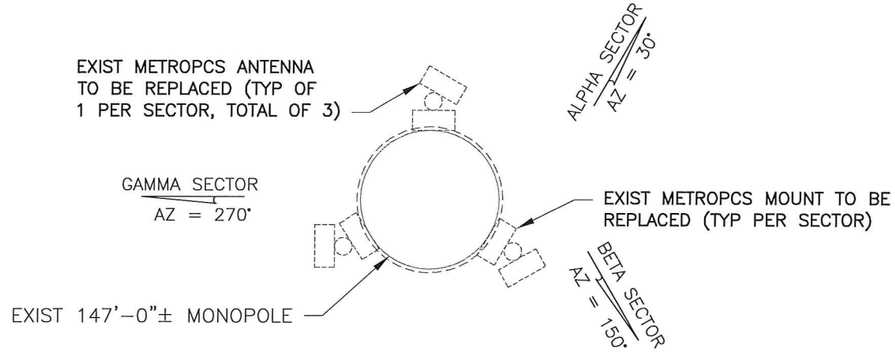
ELEVATION & DETAIL

SHEET NUMBER

A–3

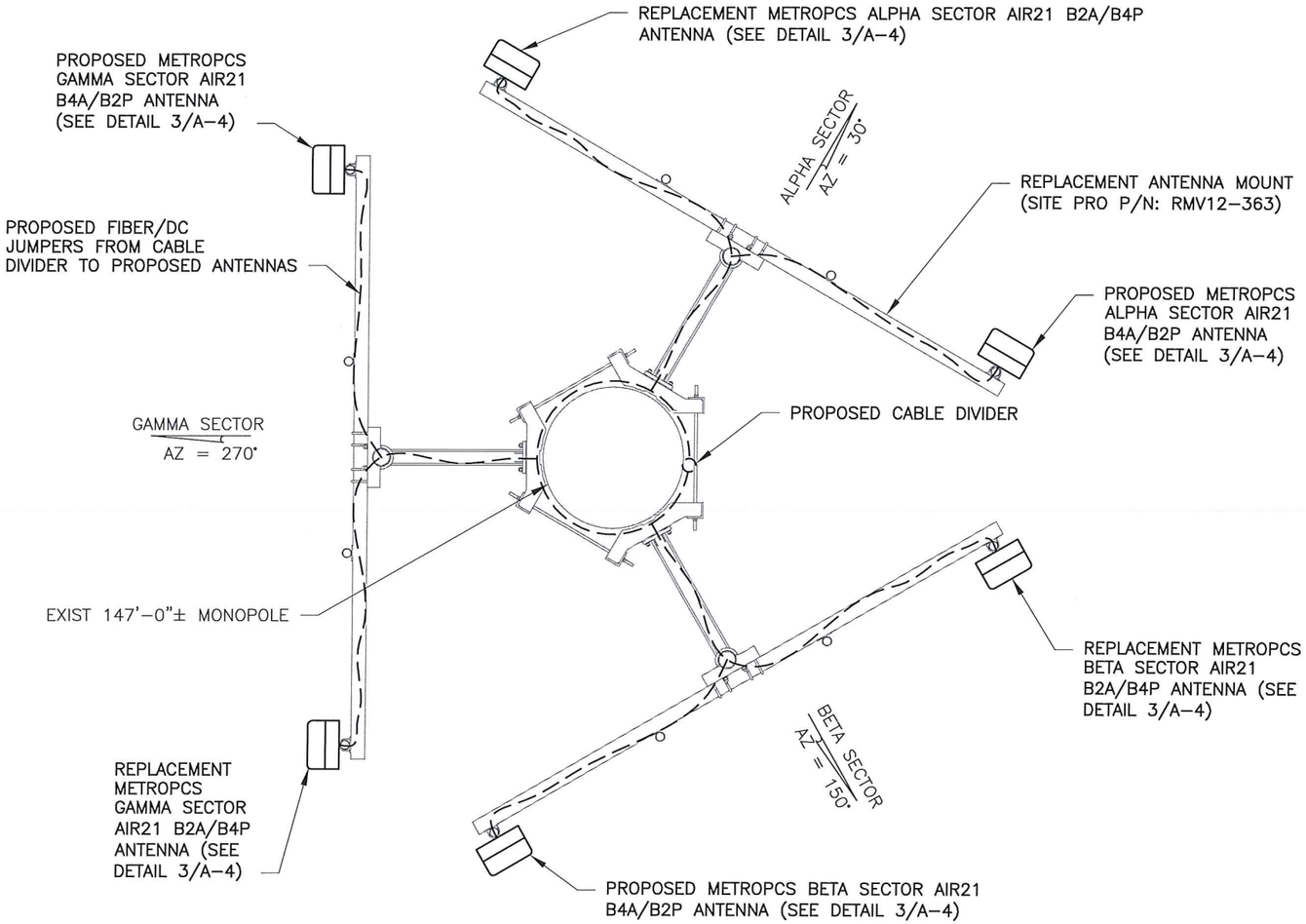
N

APPROX



1 / A-4 EXIST ANTENNA PLAN

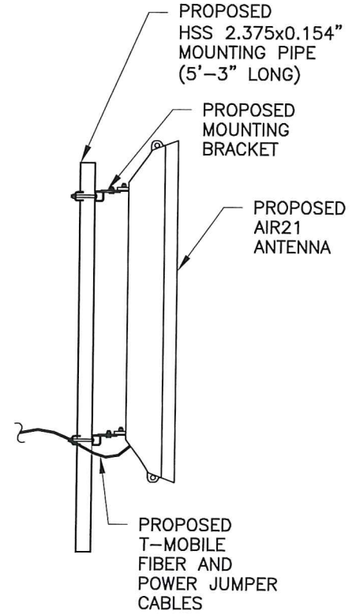
SCALE: 3/8" = 1'-0"



2 / A-4 PROPOSED ANTENNA PLAN

SCALE: 3/8" = 1'-0"

THE PROPOSED INSTALLATION, PROPOSED MOUNTS & EXISTING MONOPOLE SHALL BE STRUCTURALLY ANALYZED BY A PROFESSIONAL ENGINEER LICENSED IN THE STATE OF CONNECTICUT (TO BE COORDINATED BY OTHERS).



3 / A-4 ANTENNA DETAIL

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

CONFIGURATION
5A
REFER TO LATEST T-MOBILE RF DATA SHEET FOR FINAL RF DESIGN & BOM.

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35 GRIFFIN ROAD SOUTH
BLOOMFIELD, CT 06002

CROWN CASTLE

APPROVALS

LANDLORD _____
RF _____
CONSTRUCTION _____
OPERATIONS _____
SITE ACQ. _____

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ISSUED BY	DATE
JMQ	8/14/14

STATE OF CONNECTICUT
JOSEPH M. QUINTAVALLE
No. 22038
LICENSED PROFESSIONAL ENGINEER

SITE INFORMATION

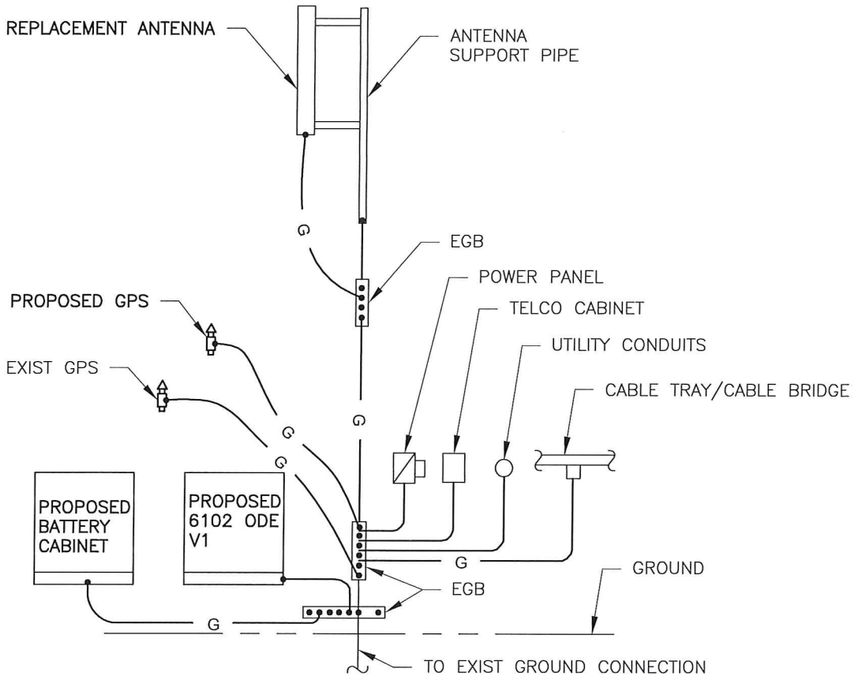
CTNH509A
CROWN BRANFORD ACORN RD
MONOPOLE
21 ACORN ROAD
BRANFORD, CT 06405

SHEET TITLE

ANTENNA LAYOUT PLANS & DETAILS

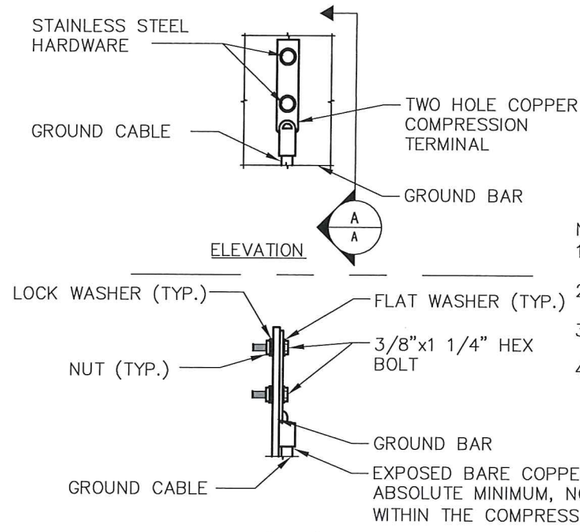
SHEET NUMBER

A-4



1 A–5 GROUNDING RISER DIAGRAM

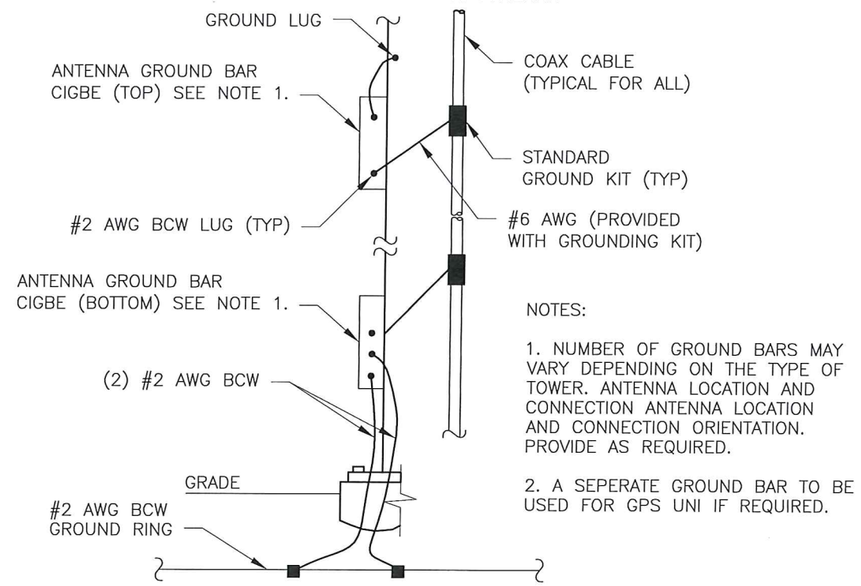
SCALE: NTS



NOTE:
1. "DOUBLING UP" OR "STACKING" OF CONNECTION IS NOT PERMITTED.
2. OXIDE INHIBITING COMPOUND TO BE USED AT ALL LOCATIONS.
3. CADWELD DOWNLEADS FROM UPPER EGB, LOWER EGB AND MGB.
4. ALL GROUND LUGS MUST NE HEAT SHRUNK AT WIRE/LUG CONNECTION.

2 A–5 GROUNDING BAR CONN. DETAIL

SCALE: NTS



NOTES:

1. NUMBER OF GROUND BARS MAY VARY DEPENDING ON THE TYPE OF TOWER. ANTENNA LOCATION AND CONNECTION ANTENNA LOCATION AND CONNECTION ORIENTATION. PROVIDE AS REQUIRED.

2. A SEPERATE GROUND BAR TO BE USED FOR GPS UNI IF REQUIRED.

3 A–5 ANTENNA CABLE GROUNDING

SCALE: NTS

CONFIGURATION

5A

REFER TO LATEST T–MOBILE RF DATA SHEET FOR FINAL RF DESIGN & BOM.

0 1 2 3

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CROWN CASTLE

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ISSUED BY: JMQ
DATE: 8/14/14

STATE OF CONNECTICUT
JOHN KUMAR PATEL
No. 29238
LICENSED PROFESSIONAL ENGINEER

SITE INFORMATION

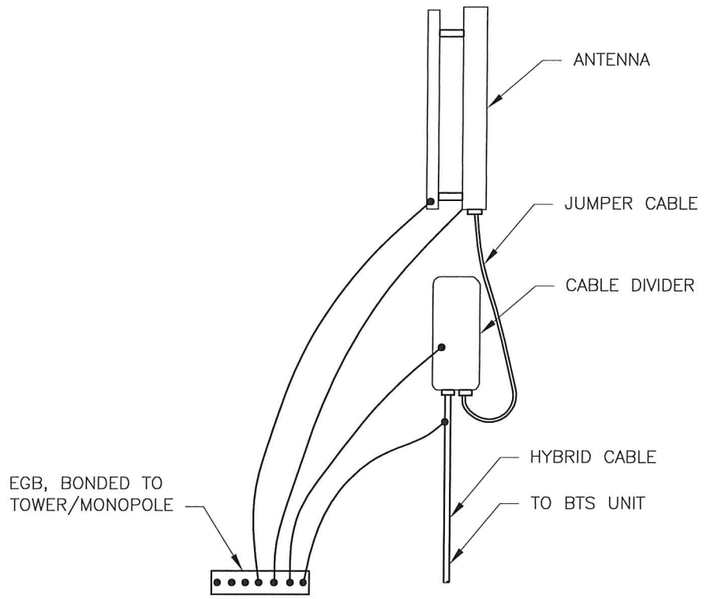
CTNH509A
CROWN BRANFORD ACORN RD
MONOPOLE
21 ACORN ROAD
BRANFORD, CT 06405

SHEET TITLE

DETAILS

SHEET NUMBER

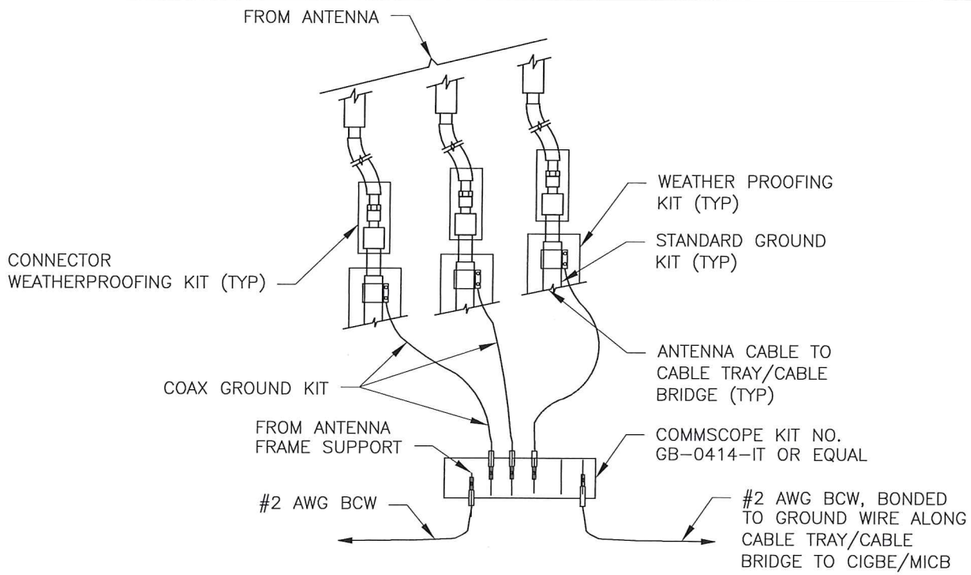
A–5



HYBRID CABLE CONNECTION AND GROUNDING DETAIL

1 / A–6

SCALE: NTS

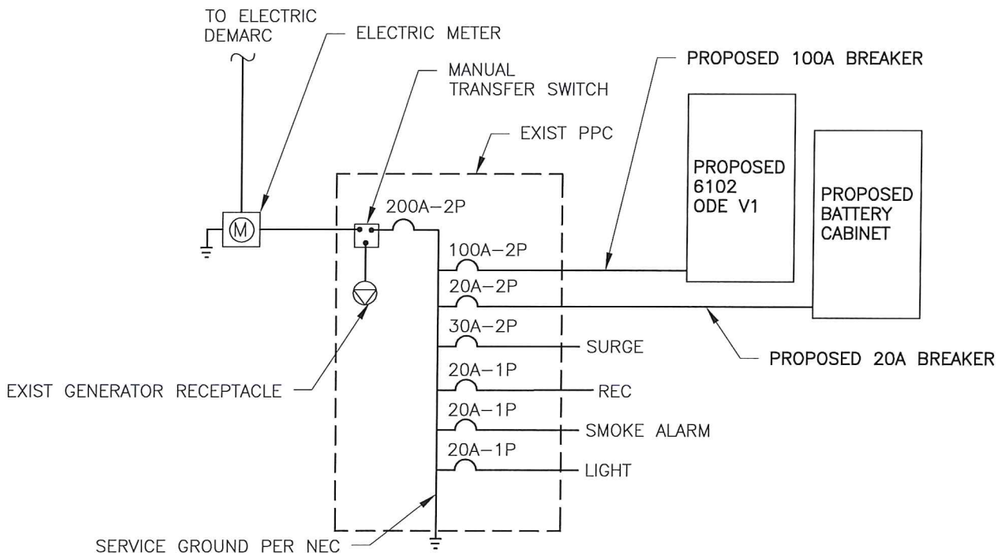


NOTE:
DO NOT INSTALL CABLE GROUND KIT AT A BEND AND ALWAYS DIRECT GROUND WIRE DOWN TO CIGBE.

GROUND WIRE TO GROUND BAR CONNECTION DETAIL

2 / A–6

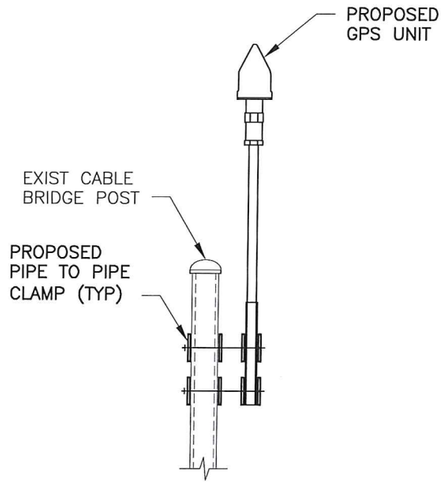
SCALE: NTS



ONE–LINE POWER DIAGRAM

3 / A–6

SCALE: NTS



DETAIL

4 / A–6

SCALE: 3/4" = 1'–0"

CONFIGURATION

5A

REFER TO LATEST T–MOBILE RF DATA SHEET FOR FINAL RF DESIGN & BOM.

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STATE OF CONNECTICUT · MICHAEL J. QUINN · No. 22033 · LICENSED PROFESSIONAL ENGINEER

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BRANFORD, CT 06405

SHEET TITLE

DETAILS

SHEET NUMBER

A–6

GROUNDING NOTES

1. THE ENTIRE ELECTRICAL INSTALLATION SHALL BE GROUNDED AS REQUIRED BY ALL APPLICABLE CODES.
2. ALL GROUNDING WORK SHALL BE IN ACCORDANCE WITH metroPCS STANDARD PRACTICE.
3. ALL BUS CONNECTORS SHALL BE TWO-HOLE, LONG-BARREL TYPE COMPRESSION LUGS, T&B OR EQUAL, UNLESS OTHERWISE NOTED ON DRAWINGS. ALL LUGS SHALL BE ATTACHED TO BUSSES USING BOLTS, NUTS, AND LOCK WASHERS. NO WASHERS ARE ALLOWED BETWEEN THE ITEMS BEING GROUNDED.
4. ALL CONNECTORS SHALL BE CRIMPED USING HYDRAULIC CRIMPING TOOLS, T&B #TBM 8 OR EQUIVALENT.
5. ALL CONNECTIONS SHALL BE MADE TO BARE METAL. ALL PAINTED SURFACES SHALL BE FILED TO ENSURE PROPER CONTACT. NO WASHERS ARE ALLOWED BETWEEN THE ITEMS BEING GROUNDED. ALL CONNECTIONS ARE TO HAVE A NON-OXIDIZING AGENT APPLIED PRIOR TO INSTALLATION.
6. ALL COPPER BUSSES SHALL BE CLEANED, POLISHED, AND A NON-OXIDIZING AGENT APPLIED. NO FINGERPRINTS OR DISCOLORED COPPER WILL BE PERMITTED.
7. ALL BENDS SHALL BE AS SHALLOW AS POSSIBLE, WITH NO TURN SHORTER THAN AN 8-INCH NOMINAL RADIUS.
8. GROUNDING CONDUCTORS SHALL BE SOLID TINNED COPPER AND ANNEALED #2. ALL GROUNDING CONDUCTORS SHALL RUN THROUGH PVC SLEEVES WHEREVER CONDUCTORS RUN THROUGH WALLS, FLOORS, OR CEILINGS. IF CONDUCTORS MUST RUN THROUGH EMT, BOTH ENDS OF CONDUIT SHALL BE GROUNDED. SEAL BOTH ENDS OF CONDUIT WITH SILICONE CAULK.
9. GROUNDING SYSTEM RESISTANCE SHALL NOT EXCEED 10 OHMS. IF THE RESISTANCE VALUE IS EXCEEDED, NOTIFY THE PROJECT MANAGER FOR FURTHER INSTRUCTION ON METHODS FOR REDUCING THE RESISTANCE VALUE.
10. ALL ROOF TOP ANTENNA MOUNTS SHALL BE GROUNDED WITH A #2 GROUND WIRE CONNECTED TO THE NEAREST GROUND BUS. ALL CONNECTIONS ARE TO BE CAD-WELDED IF POSSIBLE.
11. UPON COMPLETION OF WORK, CONDUCT CONTINUITY, SHORT CIRCUIT, AND FALL OF POTENTIAL GROUNDING TESTS FOR APPROVAL. SUBMIT TEST REPORTS TO THE PROJECT MANAGER.
12. GROUNDING CONNECTION TO TRAVEL IN A DOWNWARD DIRECTION.
13. ALL EXPOSED #2 WIRE MUST BE TINN NOT BTW.
14. TECTONIC TAKES NO RESPONSIBILITY OR LIABILITY FOR THE GROUNDING SYSTEM AS SHOWN ON THIS SITE. THIS IS A STANDARD GROUNDING SYSTEM.

Appendix A - Antenna, Feedline, TME Specifications

Antenna Specifications

Quantity	Manufacturer	Model	Type	Height	Width	Depth	Weight	Flat Plate Area
3	ERICSSON	ERICSSON AIR 21 B4A B2P	PANEL	55.9 IN	12.1 IN	7.87 IN	91.5 LBS	0.0
3	ERICSSON	ERICSSON AIR 21 B2A B4P	PANEL	56.0 IN	12.1 IN	7.87 IN	91.5 LBS	0.0

Feedline Specifications

Quantity	Manufacturer	Model	Nominal Size	Nominal O.D.
6	COMMSCOPE	CR 50 1873	1-5/8"	1.98 IN
1	HUBER AND SUHNER	1.2 Masterline Extreme Hybrid	1 9/16"	1.2 IN

1 / A-7 EQUIPMENT SCHEDULE

SCALE: NTS

CONFIGURATION

5A

REFER TO LATEST T-MOBILE RF DATA SHEET FOR FINAL RF DESIGN & BOM.

0 1 2 3

ORIGINAL SIZE IN INCHES

TECTONIC
• PLANNING • ENGINEERING • CONSTRUCTION MANAGEMENT • SURVEYING
TECTONIC Engineering and Surveying Consultants, P.C.
1279 ROUTE 300
NEWBURGH, NY 12550
Phone: (845) 567-6656
Fax: (845) 567-8703

metroPCS
metroPCS WIRELESS, INC.
35 GRIFFIN ROAD SOUTH
BLOOMFIELD, CT 06002

CROWN CASTLE

APPROVALS

LANDLORD _____
RF _____
CONSTRUCTION _____
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PROJECT NUMBER	DESIGNED BY
7061.CTNH509A	JQ

REV	DATE	REVISION	DRAWN BY
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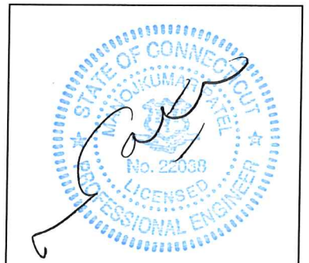
1	08/14/14	FOR CONSTRUCTION	KA

ISSUED BY	DATE



SITE INFORMATION

CTNH509A
CROWN BRANFORD ACORN RD
MONOPOLE
21 ACORN ROAD
BRANFORD, CT 06405

SHEET TITLE

NOTES & EQUIPMENT SCHEDULE

SHEET NUMBER

A-7

GENERAL NOTES

1. CONTRACTOR SHALL NOT COMMENCE ANY WORK UNTIL HE OBTAINS, AT HIS OWN EXPENSE, ALL INSURANCE REQUIRED BY MetroPCS, THE PROPERTY OWNER AND/OR PROPERTY MANAGEMENT COMPANY.
2. THIS SET OF PLANS HAS BEEN PREPARED FOR THE PURPOSES OF MUNICIPAL AND AGENCY REVIEW AND APPROVAL. THIS SET OF PLANS SHALL NOT BE UTILIZED AS CONSTRUCTION DOCUMENTS UNTIL ALL CONDITIONS OF APPROVAL HAVE BEEN SATISFIED AND EACH OF THE DRAWINGS HAVE BEEN REVISED TO INDICATE "ISSUED FOR PERMIT"
3. THIS PLAN IS SUBJECT TO ALL EASEMENTS AND RESTRICTIONS OF RECORD.
4. THE CONTRACTOR SHALL COMPLY WITH ALL APPLICABLE CODES, ORDINANCES, LAWS AND REGULATIONS OF ALL MUNICIPALITIES, UTILITIES OR OTHER PUBLIC AUTHORITIES.
5. THE CONTRACTOR SHALL BE RESPONSIBLE FOR OBTAINING ALL PERMITS AND INSPECTIONS THAT MAY BE REQUIRED BY ANY FEDERAL, STATE, COUNTY OR MUNICIPAL AUTHORITIES.
6. THE CONTRACTOR SHALL NOTIFY THE CONSTRUCTION MANAGER, IN WRITING, OF ANY CONFLICTS, ERRORS OR OMISSIONS PRIOR TO THE SUBMISSION OF BIDS OR PERFORMANCE OF WORK. MINOR OMISSIONS OR ERRORS IN THE BID DOCUMENTS SHALL NOT EXCUSE SAID CONTRACTOR FROM COMPLETING THIS PROJECT IN ACCORDANCE WITH THE OVERALL INTENT OF THESE DRAWINGS.
7. THE CONTRACTOR SHALL BE RESPONSIBLE FOR PROTECTING ALL EXISTING SITE IMPROVEMENTS PRIOR TO COMMENCING CONSTRUCTION. THE CONTRACTOR SHALL REPAIR ANY DAMAGE CAUSED AS A RESULT OF CONSTRUCTION OF THIS FACILITY.
8. THE SCOPE OF WORK FOR THIS PROJECT SHALL INCLUDE PROVIDING ALL MATERIALS, EQUIPMENT AND LABOR REQUIRED TO COMPLETE THIS PROJECT. ALL EQUIPMENT SHALL BE INSTALLED IN ACCORDANCE WITH THE MANUFACTURER'S RECOMMENDATIONS.
9. THE CONTRACTOR SHALL VISIT THE PROJECT SITE PRIOR TO SUBMITTING A BID TO VERIFY THAT THE PROJECT CAN BE CONSTRUCTED IN ACCORDANCE WITH THE CONTRACT DOCUMENTS.
10. POWER TO THE FACILITY IS MONITORED BY AN EXISTING METER.
11. ALL STRUCTURAL ELEMENTS SHALL BE HOT DIP GALVANIZED STEEL.
12. CONTRACTOR SHALL MAKE A UTILITY "ONE CALL" TO LOCATE ALL UTILITIES PRIOR TO EXCAVATING.
13. IF ANY PIPING EXISTS BENEATH THE SITE AREA, CONTRACTOR MUST LOCATE IT AND CONTACT OWNER'S REPRESENTATIVE.
14. THE CONTRACTOR IS SOLELY RESPONSIBLE FOR DETERMINING ALL CONSTRUCTION MEANS AND METHODS. THE CONTRACTOR IS ALSO RESPONSIBLE FOR ALL JOB SITE SAFETY.
15. 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 AND SUBMIT TO THE ENGINEER ANY DISCREPANCIES FROM THE DRAWINGS.
16. THE CONTRACTOR IS TO REVIEW ALL DRAWINGS AND SPECIFICATIONS IN THE CONTRACT DOCUMENT SET. THE CONTRACTOR SHALL COORDINATE ALL WORK SHOWN IN THE SET OF DRAWINGS. THE CONTRACTOR SHALL PROVIDE A COMPLETE SET OF DRAWINGS TO ALL SUB-CONTRACTORS AND RELATED PARTIES. THE SUB-CONTRACTOR SHALL EXAMINE ALL THE DRAWINGS AND SPECIFICATIONS FOR THE INFORMATION THAT AFFECTS THEIR WORK.
17. DETAILS ARE INTENDED TO SHOW END RESULT OF DESIGN. MINOR MODIFICATIONS MAY BE REQUIRED TO SUIT JOB DIMENSIONS OR CONDITIONS, AND SUCH MODIFICATIONS SHALL BE INCLUDED AS PART OF THE WORK.
18. ALL MATERIAL PROVIDED BY metroPCS IS TO BE REVIEWED BY THE CONTRACTOR AND ALL APPLICABLE SUB-CONTRACTORS PRIOR TO INSTALLATION. ANY DEFICIENCIES TO PROVIDE MATERIALS SHALL BE BROUGHT TO THE CONSTRUCTION MANAGER'S ATTENTION IMMEDIATELY.
19. THE MATERIALS INSTALLED SHALL MEET REQUIREMENTS OF CONTRACTORS DOCUMENTS. NO SUBSTITUTIONS ARE ALLOWED.
20. INCORRECTLY FABRICATED, DAMAGED OR OTHERWISE MISFITTING OR CONFORMING MATERIALS OR CONDITIONS SHALL BE REPORTED TO THE ENGINEER PRIOR TO REMEDIAL OR CORRECTIVE ACTION. ANY SUCH ACTION SHALL REQUIRE ENGINEER APPROVAL.

GENERAL NOTES

21. THE CONTRACTOR SHALL RECEIVE CLARIFICATION AND AUTHORIZATION IN WRITING TO PROCEED BEFORE STARTING WORK ON ANY ITEMS NOT CLEARLY DEFINED OR IDENTIFIED BY THE CONSTRUCTION DOCUMENTS.
22. THE CONTRACTOR SHALL NOTIFY THE CONSTRUCTION MANAGER OF ALL PRODUCTS OR ITEMS NOTED AS "EXISTING" WHICH ARE NOT FOUND TO BE IN THE FIELD.
23. ERECTION SHALL BE DONE IN A WORKMANLIKE MANNER BY COMPETENT EXPERIENCED WORKMEN IN ACCORDANCE WITH APPLICABLE CODES AND THE BEST-ACCEPTED PRACTICE. ALL MEMBERS SHALL BE LAID PLUMB AND TRUE AS INDICATED ON THE DRAWINGS.
24. THE CONTRACTOR SHALL COORDINATE HIS WORK AND SCHEDULE HIS ACTIVITIES AND WORKING HOURS IN ACCORDANCE WITH THE REQUIREMENTS OF THE PROPERTY OWNER AND/OR PROPERTY MANAGEMENT COMPANY.
25. THE CONTRACTOR SHALL BE RESPONSIBLE FOR COORDINATING HIS WORK WITH THE WORK OF OTHERS AS IT MAY RELATE TO RADIO EQUIPMENT, ANTENNAS AND ANY OTHER PORTIONS OF THE WORK.
26. THE CONTRACTOR SHALL INSTALL ALL EQUIPMENT AND MATERIALS IN ACCORDANCE WITH THE MANUFACTURER'S RECOMMENDATIONS UNLESS SPECIFICALLY INDICATED OR WHERE LOCAL CODES OR REGULATIONS MAY TAKE PRECEDENCE.
27. THE CONTRACTOR SHALL REPAIR ALL EXISTING SURFACES DAMAGED DURING CONSTRUCTION SUCH THAT THEY MATCH AND BLEND WITH ADJACENT SURFACES.
28. THE CONTRACTOR SHALL KEEP CONTRACT AREA CLEAN, HAZARD FREE AND DISPOSE OF ALL DEBRIS AND RUBBISH. EQUIPMENT NOT SPECIFIED AS REMAINING ON THE PROPERTY OF THE OWNER SHALL BE REMOVED. LEAVE PREMISES IN CLEAN CONDITIONS AND FREE FROM PAINT SPOTS, DUST OR SMUDGES OF ANY NATURE. THE CONTRACTOR SHALL BE RESPONSIBLE FOR MAINTAINING ALL ITEMS UNTIL COMPLETION OF CONSTRUCTION.
29. BEFORE FINAL ACCEPTANCE OF THE WORK, THE CONTRACTOR SHALL REMOVE ALL EQUIPMENT, TEMPORARY WORK, UNUSED AND USELESS MATERIALS, RUBBISH AND TEMPORARY STRUCTURES.
30. ALL WORK SHALL CONFORM TO THE REQUIREMENTS OF THE 2005 CONNECTICUT STATE BUILDING CODE (INCLUDING AMMENDMENTS), AND ALL OTHER APPLICABLE CODES AND ORDINANCES.
31. CONTRACTOR SHALL VISIT THE JOB SITE AND SHALL FAMILIARIZE HIMSELF WITH ALL CONDITIONS AFFECTING THE PROPOSED WORK AND SHALL MAKE PROVISIONS AS TO THE COST THEREOF. CONTRACTOR SHALL BE RESPONSIBLE FOR FAMILIARIZING HIMSELF WITH ALL CONTRACT DOCUMENTS, FIELD CONDITIONS AND DIMENSIONS AND CONFIRMING THAT THE WORK MAY BE ACCOMPLISHED AS SHOWN PRIOR TO PROCEEDING WITH CONSTRUCTION. ANY DISCREPANCIES SHALL BE BROUGHT TO THE ATTENTION OF THE ENGINEER PRIOR TO THE COMMENCEMENT OF WORK.
32. PLANS ARE NOT TO BE SCALED. THESE PLANS ARE INTENDED TO BE A DIAGRAMMATIC OUTLINE ONLY UNLESS OTHERWISE NOTED. THE WORK SHALL INCLUDE FURNISHING MATERIALS, EQUIPMENT AND APPURTENANCES, AND LABOR NECESSARY TO EFFECT ALL INSTALLATIONS AS INDICATED ON THE DRAWINGS.
33. CONTRACTOR SHALL BE RESPONSIBLE FOR THE SAFETY OF THE WORK AREA, ADJACENT AREAS AND BUILDING OCCUPANTS THAT ARE LIKELY TO BE AFFECTED BY THE WORK UNDER THIS CONTRACT. WORK SHALL CONFORM TO ALL OSHA REQUIREMENTS.
34. CONTRACTOR SHALL SUPERVISE AND DIRECT THE WORK USING THE BEST CONSTRUCTION SKILLS AND ATTENTION. CONTRACTOR SHALL BE SOLELY RESPONSIBLE FOR CONSTRUCTION MEANS, METHODS, TECHNIQUES, SEQUENCES AND PROCEDURES AND FOR COORDINATING ALL PORTIONS OF THE WORK UNDER CONTRACT, UNLESS OTHERWISE NOTED.

CONFIGURATION

5A

REFER TO LATEST T-MOBILE RF DATA SHEET FOR FINAL RF DESIGN & BOM.

0 1 2 3

ORIGINAL SIZE IN INCHES

TECTONIC

- PLANNING
- ENGINEERING
- CONSTRUCTION MANAGEMENT
- SURVEYING

TECTONIC Engineering and Surveying Consultants, P.C.
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NEWBURGH, NY 12550
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BLOOMFIELD, CT 06002

CROWN CASTLE

APPROVALS

LANDLORD _____
RF _____
CONSTRUCTION _____
OPERATIONS _____
SITE ACQ. _____

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7061.CTNH509A	JQ

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ISSUED BY	DATE
JMQ	8/14/14

STATE OF CONNECTICUT
MANOUCHEHR MOSHFEGH
No. 22038
LICENSED PROFESSIONAL ENGINEER

SITE INFORMATION
CTNH509A
CROWN BRANFORD ACORN RD
MONOPOLE
21 ACORN ROAD
BRANFORD, CT 06405

SHEET TITLE
NOTES

SHEET NUMBER
A-8

STRUCTURAL STEEL NOTES

1. DESIGN AND CONSTRUCTION OF STRUCTURAL STEEL SHALL CONFORM TO THE AMERICAN INSTITUTE OF STEEL CONSTRUCTION "SPECIFICATION FOR STRUCTURAL STEEL BUILDINGS, ALLOWABLE STRESS DESIGN AND PLASTIC DESIGN".
2. STRUCTURAL STEEL WIDE FLANGE SHAPES SHALL CONFORM TO ASTM A992, "STEEL FOR STRUCTURAL SHAPES FOR USE IN BUILDING FRAMING", GRADE 50, UNLESS OTHERWISE INDICATED. IF THE MEMBER SIZES INDICATED ARE NOT AVAILABLE IN THIS GRADE, ASTM A572 "HIGH-STRENGTH LOW-ALLOY COLUMBIUM-VANADIUM STRUCTURAL STEEL", GRADE 50, MAY BE SUBSTITUTED.
3. HOLLOW STRUCTURAL SECTIONS (HSS) SHALL CONFORM TO ASTM A500 "COLD-FORMED WELDED & SEAMLESS CARBON STEEL STRUCTURAL TUBING IN ROUNDS AND SHAPES", GRADE B.
4. MISCELLANEOUS STEEL, INCLUDING CHANNELS, ANGLES, PLATES, AND BARS SHALL CONFORM TO ASTM A36 "CARBON STRUCTURAL STEEL", UNLESS OTHERWISE INDICATED.
5. ANCHOR BOLTS SHALL CONFORM TO ASTM F1554 "ANCHOR BOLTS, STEEL, 36, 55, AND 105-KSI YIELD STRENGTH", GRADE 36.
6. STRUCTURAL CONNECTION BOLTS SHALL BE HIGH STRENGTH BOLTS CONFORMING TO ASTM A325 "STRUCTURAL BOLTS, STEEL, HEAT TREATED, 120/105 KSI MINIMUM TENSILE STRENGTH". BOLTS SHALL BE 3/4 INCH DIAMETER, TYPE X, UNLESS OTHERWISE NOTED.
7. MATCHING NUTS SHALL BE HEAVY HEX TYPE, CONFORMING TO ASTM A563 "CARBON AND ALLOY STEEL NUTS". WASHERS, WHERE REQUIRED, SHALL CONFORM TO ASTM F436 "HARDENED STEEL WASHERS".
8. FIELD CONNECTIONS SHALL BE BOLTED UNLESS OTHERWISE INDICATED. ALL BOLTED CONNECTIONS SHALL BE MADE WITH NOT LESS THAN TWO (2) HIGH STRENGTH BOLTS, OR EQUIVALENT WELD.
9. STRUCTURAL CONNECTIONS SHALL BE SNUG TIGHT IN ACCORDANCE WITH THE RESEARCH COUNCIL ON STRUCTURAL CONNECTIONS "SPECIFICATION FOR STRUCTURAL JOINTS USING ASTM A325 OR A490 BOLTS", UNLESS OTHERWISE NOTED.
10. BOLTS IN SLIP-CRITICAL CONNECTIONS SHALL BE FULLY PRETENSIONED BY THE TURN-OF-NUT METHOD IN ACCORDANCE WITH THE RESEARCH COUNCIL ON STRUCTURAL CONNECTIONS "SPECIFICATIONS FOR STRUCTURAL JOINTS USING ASTM A325 OR A490 BOLTS".
11. ANCHOR BOLTS SHALL BE TENSIONED BY THE TURN-OF-NUT METHOD AFTER GROUTING OF BASE PLATES.
12. CONTRACTOR SHALL COMPLY WITH AWS D1.1 "STRUCTURAL WELDING CODE – STEEL" FOR PROCEDURES, APPEARANCE AND QUALITY OF WELDS, AND FOR METHODS USED IN CORRECTING WELDING. ALL WELDERS AND WELDING PROCESSES SHALL BE QUALIFIED IN ACCORDANCE WITH AWS "STANDARD QUALIFICATION PROCEDURES".
13. GRATING SHALL BE TYPE "W/B" GALVANIZED WELDED STEEL BAR GRATING AS MANUFACTURED BY IKG BORDEN, OR APPROVED EQUAL. BEARING BARS SHALL BE AS FOLLOWS:
    GRATING 1" x 3/16" SERRATED
    BAND ALL EDGES, AND ATTACH TO SUPPORTING MEMBERS AT 18" ON CENTER WITH MODEL GG GALVANIZED G-CLIPS AS MANUFACTURED BY GRATING FASTENERS INC.
14. EXPANSION ANCHORS SHALL BE HILTI KWIK BOLT III OR APPROVED EQUAL. INSTALLATION SHALL BE IN ACCORDANCE WITH THE MANUFACTURER'S RECOMMENDATIONS. MINIMUM EMBEDMENT SHALL BE 4-3/4" UNLESS OTHERWISE NOTED.

STRUCTURAL STEEL NOTES

15. EPOXY ANCHOR ASSEMBLIES SHALL BE AS MANUFACTURED BY HILTI OR ENGINEER APPROVED EQUAL, AS FOLLOWS:

BASE MATERIAL	ANCHOR SYSTEM
CONCRETE OR GROUTED CMU	HIT HY-200
HOLLOW CMU	HIT HY-70

    INSTALLATION SHALL BE IN ACCORDANCE WITH THE MANUFACTURER'S WRITTEN INSTRUCTIONS.
16. ALL INTERIOR STRUCTURAL STEEL SHALL BE SHOP PRIME COATED WITH A RUST-INHIBITIVE PRIMER EXCEPT AREAS TO BE FIREPROOFED NEED NOT BE PAINTED. SURFACE PREPARATION SHALL BE IN ACCORDANCE WITH THE PAINT MANUFACTURER'S RECOMMENDATIONS. AREAS WHICH MAY BE INACCESSIBLE AFTER INSTALLATION SHALL RECEIVE TWO (2) COATS OF PRIMER. SEE ARCHITECTURAL DRAWINGS FOR FINISH PAINT.
17. FIELD CONNECTIONS AND DAMAGED OR ABRADED AREAS OF SHOP PRIME COAT SHALL BE TOUCH-UP PAINTED WITH COMPATIBLE FIELD PRIMER.
18. ALL EXTERIOR STEEL SHALL BE GALVANIZED AFTER FABRICATION IN ACCORDANCE WITH ASTM A123 "ZINC (HOT-DIP GALVANIZED) COATINGS ON IRON AND STEEL PRODUCTS", UNLESS OTHERWISE NOTED.
19. ALL EXTERIOR BOLTS AND MISCELLANEOUS HARDWARE SHALL BE GALVANIZED IN ACCORDANCE WITH ASTM A153 "ZINC COATING (HOT-DIP) ON IRON AND STEEL HARDWARE", UNLESS OTHERWISE NOTED.
20. DAMAGED GALVANIZED SURFACES SHALL BE REPAIRED BY COLD GALVANIZING IN ACCORDANCE WITH ASTM A780 "REPAIR OF DAMAGED AND UNCOATED AREAS OF HOT-DIP GALVANIZED COATINGS".
21. ALL STEEL WORK SHALL BE SUBJECT TO SPECIAL INSPECTIONS DURING CONSTRUCTION.
22. THE NOTES CONTAINED HEREIN ARE NOT PROJECT SPECIFIC. THE CONTRACTOR SHALL UTILIZE ALL NOTES WHICH SOLELY PERTAIN TO THE WORK DEPICTED ON THESE DRAWINGS.

CONFIGURATION
5A
REFER TO LATEST T-MOBILE RF DATA SHEET FOR FINAL RF DESIGN & BOM.

0 1 2 3
ORIGINAL SIZE IN INCHES

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CROWN CASTLE

APPROVALS

LANDLORD	
RF	
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OPERATIONS	
SITE ACQ.	

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ISSUED BY	DATE
JMQ	8/14/14

STATE OF CONNECTICUT · JOHN M. QUIGLEY · No. 22038 · LICENSED PROFESSIONAL ENGINEER

SITE INFORMATION
CTNH509A
CROWN BRANFORD ACORN RD
MONOPOLE
21 ACORN ROAD
BRANFORD, CT 06405

SHEET TITLE
NOTES

SHEET NUMBER
A-9

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

Date: **June 26, 2014**

Charles McGuirt
Crown Castle
3530 Toringdon Way, Suite 300
Charlotte, NC 28277

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

Subject: Structural Analysis Report

Carrier Designation:	***Metro PCS* Co-Locate**	
	Carrier Site Number:	NHC0213A
	Carrier Site Name:	N/A
Crown Castle Designation:	**Crown Castle BU Number:**	876316
	Crown Castle Site Name:	SECONDINO PROPERTY
	Crown Castle JDE Job Number:	295281
	Crown Castle Work Order Number:	780431
	Crown Castle Application Number:	252183 Rev. 1
Engineering Firm Designation:	**Paul J. Ford and Company Project Number:**	37514-0035.002.7805
Site Data:	**21 Acorn Road, BRANFORD, New Haven County, CT** **Latitude *41° 17' 35.06"*, Longitude *-72° 45' 46.4"*** **147 Foot - Monopole Tower**	

Dear Charles McGuirt,

Paul J. Ford and Company is pleased to submit this **"Structural Analysis Report"** to determine the structural integrity of the above mentioned tower. This analysis has been performed in accordance with the Crown Castle Structural 'Statement of Work' and the terms of Crown Castle Purchase Order Number 661146, in accordance with application 252183, revision 1.

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

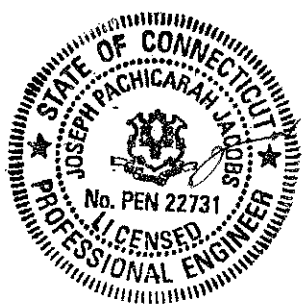
LC7: Existing + Reserved + Proposed Equipment **Sufficient Capacity**
Note: See Table I and Table II for the proposed and existing/reserved loading, respectively.

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

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

Respectfully submitted by:

Joey Meinerding, E.I.
Structural Designer



tnxTower Report - version 6.1.4.1

JUN 26 2014

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

Date: **June 26, 2014**

Charles McGuirt
Crown Castle
3530 Toringdon Way, Suite 300
Charlotte, NC 28277

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

Subject: Structural Analysis Report

Carrier Designation:	***Metro PCS* Co-Locate**	
	Carrier Site Number:	NHC0213A
	Carrier Site Name:	N/A
Crown Castle Designation:	**Crown Castle BU Number:**	876316
	Crown Castle Site Name:	SECONDINO PROPERTY
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Respectfully submitted by:

Joey Meinerding, E.I.
Structural Designer

TABLE OF CONTENTS

1) INTRODUCTION

This tower is a 147 ft. monopole tower designed by Summit in August of 1997. The tower was originally designed for a wind speed of 90 mph per TIA/EIA-222-F.

2) ANALYSIS CRITERIA

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

Table 1 - Proposed Antenna and Cable Information

Mounting Level (ft)	Center Line Elevation (ft)	Number of Antennas	Antenna Manufacturer	Antenna Model	Number of Feed Lines	Feed Line Size (in)	Note
135.0	135.0	3	ericsson	ERICSSON AIR 21 B2A B4P w/ Mount Pipe	1	1-3/16	--
		3	ericsson	ERICSSON AIR 21 B4A B2P w/ Mount Pipe			
		1	tower mounts	T-Arm Mount [TA 601-3]			

Table 2 - Existing and Reserved Antenna and Cable Information

Mounting Level (ft)	Center Line Elevation (ft)	Number of Antennas	Antenna Manufacturer	Antenna Model	Number of Feed Lines	Feed Line Size (in)	Note
147.0	147.0	3	alcatel lucent	TME-800MHZ RRH	--	--	3
		3	alcatel lucent	800MHZ RRH	1	5/8	2
		3	alcatel lucent	TD-RRH8x20-25			
		3	rfs celwave	APXVTM14-C-120 w/ Mount Pipe			
		9	rfs celwave	ACU-A20-N	3	1-1/4	1
		3	rfs celwave	APXVSPP18-C-A20 w/ Mount Pipe			
		3	alcatel lucent	1900MHz RRH (65MHz)			
		3	alcatel lucent	800 EXTERNAL NOTCH FILTER			
		1	tower mounts	Platform Mount [LP 712-1]			
	143.0	1	tower mounts	Miscellaneous (NA507-1)			
135.0	135.0	3	celwave	Celwave APXV18-206515L-03 w/Mount Pipe	--	--	3
		1	tower mounts	Pipe Mount [PM 601-3]			
		--	--	--	6	1-5/8	1
126.0	126.0	1	tower mounts	Platform Mount [LP 712-1]	--	--	1

Mounting Level (ft)	Center Line Elevation (ft)	Number of Antennas	Antenna Manufacturer	Antenna Model	Number of Feed Lines	Feed Line Size (in)	Note
116.0	116.0	3	alcatel lucent	RRH2x40-AWS	1	1-5/8	2
		3	antel	BXA-171063-12CF-EDIN-2 w/ Mount Pipe			
		1	rfs celwave	DB-T1-6Z-8AB-0Z			
		2	adc	ClearGain Dual Band 800/1900 MHz	12	1-5/8	1
		3	antel	BXA-171085-8BF-EDIN-2 w/ Mount Pipe			
		3	antel	BXA-70063-6CF-2 w/ Mount Pipe			
		2	antel	LPA-80063/6CF w/ Mount Pipe			
		2	antel	LPA-80080/4CF w/ Mount Pipe			
		2	rfs celwave	APL868013 w/ Mount Pipe			
		6	rfs celwave	FD9R6004/2C-3L			
		1	tower mounts	Platform Mount [LP 712-1]			
106.0	108.0	6	ericsson	RRUS-11	1 12 2 1	3/8 1-1/4 7/8 1/4	1
		3	kmw communications	AM-X-CD-14-65-00T-RET w/ Mount Pipe			
		6	powerwave technologies	Powerwave Technologies 7770 w/ Mount Pipe			
		12	powerwave technologies	Powerwave Technologies LGP2140X			
		1	raycap	DC6-48-60-18-8F			
	106.0	1	tower mounts	Platform Mount [LP 712-1]			
80.0	81.0	1	kathreinscala	Kathrein OG-860/1920/GPS-A	3	1/2	1
		2	lucent	KS24019-L112A			
	80.0	1	tower mounts	Side Arm Mount [SO 701-3]			

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

3) ANALYSIS PROCEDURE

Table 3 - Documents Provided

Document	Remarks	Reference	Source
4-GEOTECHNICAL REPORTS	Dr. Clarence Welti, 12/16/1996	1529736	CCISITES
4-POST-MODIFICATION INSPECTION	PJF, 41708-0180, 03/15/2009	2417887	CCISITES
4-TOWER FOUNDATION DRAWINGS/DESIGN/SPECS	Summit/PJF, 2737/29297-566, 09/29/1997	1632435	CCISITES
4-TOWER MANUFACTURER DRAWINGS	Summit/PJF, 2737-97/29297-566, 09/29/1997	1632399	CCISITES

3.1) Analysis Method

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

3.2) Assumptions

1) Tower and structures were built in accordance with the manufacturer's specifications.
2) The tower and structures have been maintained in accordance with the manufacturer's specification.
3) The configuration of antennas, transmission cables, mounts and other appurtenances are as specified in Tables 1 and 2 and the referenced drawings.
4) Monopole was reinforced in conformance with the referenced modification drawings.

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

4) ANALYSIS RESULTS

Table 4 - Section Capacity (Summary)

Section No.	Elevation (ft)	Component Type	Size	Critical Element	P (K)	SF*P_allow (K)	% Capacity	Pass / Fail
L1	147 - 105	Pole	TP29.141x22x0.25	1	-9.21	1075.85	62.6	Pass
L2	105 - 89.75	Pole	TP31.2343x28.0034x0.3125	2	-14.29	1471.82	89.8	Pass
L3	89.75 - 88.25	Pole	TP31.4893x31.2343x0.3125	3	-14.52	1464.66	93.4	Pass
L4	88.25 - 86	Pole	TP31.8719x31.4893x0.5085	4	-15.00	2314.39	62.9	Pass
L5	86 - 84.25	Pole	TP32.1695x31.8719x0.5063	5	-15.37	2304.61	65.5	Pass
L6	84.25 - 73.75	Pole	TP33.955x32.1695x0.455	6	-16.85	2207.19	76.7	Pass
L7	73.75 - 42.75	Pole	TP38.601x32.3223x0.537	7	-25.07	2922.04	88.7	Pass
L8	42.75 - 8.25	Pole	TP43.7172x36.6809x0.5757	8	-37.85	3650.30	98.1	Pass
L9	8.25 - 6.25	Pole	TP44.0573x43.7172x0.596	9	-38.53	3777.23	96.1	Pass
L10	6.25 - 0	Pole	TP45.12x44.0573x0.5918	10	-40.64	3837.49	98.0	Pass
							Summary	
						Pole (L8)	98.1	Pass
						Rating =	98.1	Pass

Table 5 - Tower Component Stresses vs. Capacity

Notes	Component	Elevation (ft)	% Capacity	Pass / Fail
1	Anchor Rods	0	98.9	Pass
1	Base Plate	0	74.1	Pass
1	Base Foundation Structural Steel	0	60.8	Pass
1,2	Base Foundation Soil Interaction	0	98.1	Pass

Structure Rating (max from all components) =	98.9%

Notes:
1) See additional documentation in “Appendix C – Additional Calculations” for calculations supporting the % capacity consumed.
2) Foundation Analysis Notes: According to the procedures prescribed and agreed to by the Crown Castle Engineering Foundation Committee, held in January 2010, the existing caisson foundation was analyzed using the methodology in the software ‘PLS-Caisson’ (Version 8.10, or newer, by Power Line Systems, Inc.). Per the methods in PLS-Caisson, the soil reactions of cohesive soils are calculated using 8CD independent of the depth of the soil layer. The depth of soil to be ignored at the top of the caisson is the greater of the geotechnical report’s recommendation, the frost depth of the site or half of the caisson diameter.

4.1) Recommendations

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

APPENDIX A

TNXTOWER OUTPUT

Tower Input Data

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

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

Options

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

Tapered Pole Section Geometry

Section	*Elevation*	*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	147.00-105.00	42.00	3.75	18	22.0000	29.1410	0.2500	1.0000	A607-60 (60 ksi)
L2	105.00-89.75	19.00	0.00	18	28.0034	31.2343	0.3125	1.2500	A607-60 (60 ksi)
L3	89.75-88.25	1.50	0.00	18	31.2343	31.4893	0.3125	1.2500	Reinf 59.22 ksi (59 ksi)
L4	88.25-86.00	2.25	0.00	18	31.4893	31.8719	0.5085	2.0338	Reinf 57.17 ksi (57 ksi)
L5	86.00-84.25	1.75	0.00	18	31.8719	32.1695	0.5063	2.0252	Reinf 56.63 ksi (57 ksi)
L6	84.25-73.75	10.50	4.25	18	32.1695	33.9550	0.4550	1.8200	Reinf 58.30 ksi (58 ksi)
L7	73.75-42.75	35.25	4.75	18	32.3223	38.6010	0.5370	2.1481	Reinf 57.59 ksi (58 ksi)
L8	42.75-8.25	39.25	0.00	18	36.6809	43.7172	0.5757	2.3026	Reinf 57.90 ksi (58 ksi)
L9	8.25-6.25	2.00	0.00	18	43.7172	44.0573	0.5960	2.3841	Reinf 57.44 ksi (57 ksi)
L10	6.25-0.00	6.25		18	44.0573	45.1200	0.5918	2.3670	Reinf 57.37 ksi (57 ksi)

Tapered Pole Properties

Section	Tip Dia. in	Area in^2	I in^4	r in	C in	I/C in^3	J in^4	It/Q in^2	w in	w/t
L1	22.3394	17.2586	1031.4832	7.7212	11.1760	92.2945	2064.3237	8.6310	3.4320	13.728
	29.5905	22.9250	2417.5313	10.2563	14.8036	163.3067	4838.2436	11.4647	4.6888	18.755
L2	29.0829	27.4659	2660.7623	9.8303	14.2257	187.0387	5325.0257	13.7356	4.3786	14.012
	31.7161	30.6705	3704.9933	10.9772	15.8670	233.5029	7414.8618	15.3382	4.9472	15.831
L3	31.7161	30.6705	3704.9933	10.9772	15.8670	233.5029	7414.8618	15.3382	4.9472	15.831
	31.9751	30.9235	3797.4379	11.0678	15.9966	237.3905	7599.8725	15.4647	4.9921	15.975
L4	31.9751	49.9986	6062.9281	10.9982	15.9966	379.0139	12133.8339	25.0040	4.6472	9.14
	32.3636	50.6160	6290.3368	11.1340	16.1909	388.5095	12588.9506	25.3128	4.7146	9.272
L5	32.3636	50.4045	6264.9089	11.1348	16.1909	386.9390	12538.0613	25.2070	4.7184	9.319
	32.6658	50.8827	6444.9201	11.2404	16.3421	394.3749	12898.3205	25.4462	4.7707	9.423
L6	32.6658	45.8012	5820.0967	11.2587	16.3421	356.1409	11647.8516	22.9049	4.8610	10.684
	34.4788	48.3797	6859.4641	11.8925	17.2491	397.6699	13727.9542	24.1944	5.1753	11.374
L7	33.5896	54.1791	6915.4595	11.2838	16.4197	421.1676	13840.0186	27.0947	4.7436	8.833
	39.1965	64.8813	11876.4096	13.5127	19.6093	605.6516	23768.4465	32.4468	5.8486	10.891
L8	38.1114	65.9694	10864.7579	12.8173	18.6339	583.0647	21743.8119	32.9910	5.4427	9.455
	44.3916	78.8258	18535.2035	15.3152	22.2083	834.6056	37094.7960	39.4204	6.6811	11.606
L9	44.3916	81.5766	19163.9090	15.3080	22.2083	862.9151	38353.0344	40.7960	6.6452	11.149
	44.7369	82.2200	19620.9094	15.4287	22.3811	876.6732	39267.6364	41.1178	6.7051	11.25
L10	44.7369	81.6376	19485.7703	15.4303	22.3811	870.6351	38997.1804	40.8266	6.7126	11.344
	45.8160	83.6336	20950.2650	15.8075	22.9210	914.0221	41928.0969	41.8247	6.8996	11.66

Tower Elevation ft	Gusset Area (per face) ft^2	Gusset Thickness in	Gusset Grade	Adjust. Factor A_f	Adjust. Factor A_r	Weight Mult.	Double Angle Stitch Bolt Spacing Diagonals in	Double Angle Stitch Bolt Spacing Horizontals in
L1 147.00-105.00				1	1	1		
L2 105.00-89.75				1	1	1		
L3 89.75-88.25				1	1	1		
L4 88.25-86.00				1	1	1		
L5 86.00-84.25				1	1	1		
L6 84.25-73.75				1	1	1		
L7 73.75-42.75				1	1	1		
L8 42.75-8.25				1	1	1		
L9 8.25-6.25				1	1	1		
L10 6.25-0.00				1	1	1		

Feed Line/Linear Appurtenances - Entered As Area

Description	Face or Leg	Allow Shield	Component Type	Placement ft	Total Number		C_AA_A ft^2/ft	Weight plf
HB114-1-0813U4-M5J(1 1/4")	C	No	Inside Pole	147.00 - 0.00	3	No Ice	0.00	1.20
						1/2" Ice	0.00	1.20
						1" Ice	0.00	1.20
						2" Ice	0.00	1.20
						4" Ice	0.00	1.20
HB058-M12-XXXF(5/8")	C	No	CaAa (Out Of Face)	147.00 - 0.00	1	No Ice	0.08	0.24
						1/2" Ice	0.18	1.06
						1" Ice	0.28	2.49
						2" Ice	0.48	7.18
						4" Ice	0.88	23.89
***								
CR 50 1873(1-5/8")	C	No	CaAa (Out Of Face)	135.00 - 0.00	5	No Ice	0.00	0.83
						1/2" Ice	0.00	2.34
						1" Ice	0.00	4.47
						2" Ice	0.00	10.55
						4" Ice	0.00	30.05
CR 50 1873(1-5/8")	C	No	CaAa (Out Of Face)	135.00 - 0.00	1	No Ice	0.20	0.83
						1/2" Ice	0.30	2.34
						1" Ice	0.40	4.47
						2" Ice	0.60	10.55
						4" Ice	1.00	30.05
1.2 Masterline Extreme Hybrid(1 3/16")	C	No	CaAa (Out Of Face)	135.00 - 0.00	1	No Ice	0.00	0.95
						1/2" Ice	0.00	1.99
						1" Ice	0.00	3.64
						2" Ice	0.00	8.77
						4" Ice	0.00	26.37
***								
LDF7-50A (1-5/8 FOAM)	C	No	Inside Pole	116.00 - 0.00	12	No Ice	0.00	0.82
						1/2" Ice	0.00	0.82
						1" Ice	0.00	0.82
						2" Ice	0.00	0.82
						4" Ice	0.00	0.82
HB158-1-08U8-S8J18(1-5/8)	C	No	Inside Pole	116.00 - 0.00	1	No Ice	0.00	1.30
						1/2" Ice	0.00	1.30
						1" Ice	0.00	1.30
						2" Ice	0.00	1.30
						4" Ice	0.00	1.30
***								
LDF2-50A(3/8")	C	No	Inside Pole	106.00 - 0.00	1	No Ice	0.00	0.08
						1/2" Ice	0.00	0.08
						1" Ice	0.00	0.08
						2" Ice	0.00	0.08
						4" Ice	0.00	0.08
LDF6-50A (1-1/4 FOAM)	C	No	Inside Pole	106.00 - 0.00	12	No Ice	0.00	0.66
						1/2" Ice	0.00	0.66
						1" Ice	0.00	0.66
						2" Ice	0.00	0.66
						4" Ice	0.00	0.66
2" (Nominal) Conduit	C	No	Inside Pole	106.00 - 0.00	1	No Ice	0.00	0.72
						1/2" Ice	0.00	0.72
						1" Ice	0.00	0.72
						2" Ice	0.00	0.72
						4" Ice	0.00	0.72
VXL5-50 (7/8 FOAM)	C	No	Inside Pole	106.00 - 0.00	2	No Ice	0.00	0.29
						1/2" Ice	0.00	0.29
						1" Ice	0.00	0.29
						2" Ice	0.00	0.29
						4" Ice	0.00	0.29
LDF1-50A (1/4 FOAM)	C	No	Inside Pole	106.00 - 0.00	1	No Ice	0.00	0.06
						1/2" Ice	0.00	0.06
						1" Ice	0.00	0.06
						2" Ice	0.00	0.06
						4" Ice	0.00	0.06
***								
LDF4RN-50A (1/2 FOAM)	C	No	Inside Pole	80.00 - 0.00	3	No Ice	0.00	0.15
						1/2" Ice	0.00	0.15
						1" Ice	0.00	0.15
						2" Ice	0.00	0.15
						4" Ice	0.00	0.15

Description	Face or Leg	Allow Shield	Component Type	Placement ft	Total Number		C_AA_A ft^2/ft	Weight plf
***								
Aero MP3-05	C	No	CaAa (Out Of Face)	90.50 - 0.00	1	No Ice	0.35	0.00
						1/2" Ice	0.40	0.00
						1" Ice	0.66	0.00
						2" Ice	0.88	0.00
						4" Ice	1.32	0.00

Feed Line/Linear Appurtenances Section Areas

Tower Section	Tower Elevation ft	Face	A_R ft^2	A_F ft^2	C_AA_A In Face ft^2	C_AA_A Out Face ft^2	Weight K
L1	147.00-105.00	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	9.468	0.47
L2	105.00-89.75	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	4.561	0.46
L3	89.75-88.25	A	0.000	0.000	0.000	0.000	0.00
		B	0.000	0.000	0.000	0.000	0.00
		C	0.000	0.000	0.000	0.945	0.05
L4	88.25-86.00	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	1.417	0.07
L5	86.00-84.25	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	1.102	0.05
L6	84.25-73.75	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	6.613	0.32
L7	73.75-42.75	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	19.524	0.95
L8	42.75-8.25	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	21.728	1.06
L9	8.25-6.25	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	1.260	0.06
L10	6.25-0.00	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	3.936	0.19

Feed Line/Linear Appurtenances Section Areas - With Ice

Tower Section	Tower Elevation ft	Face or Leg	Ice Thickness in	A_R ft^2	A_F ft^2	C_AA_A In Face ft^2	C_AA_A Out Face ft^2	Weight K
L1	147.00-105.00	A	0.880	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	22.143	1.18
L2	105.00-89.75	A	0.854	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	10.116	0.81
L3	89.75-88.25	A	0.845	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	1.795	0.08
L4	88.25-86.00	A	0.843	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	2.689	0.12
L5	86.00-84.25	A	0.840	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	2.087	0.09

Tower Section	Tower Elevation ft	Face or Leg	Ice Thickness in	A_R ft^2	A_F ft^2	C_AA_A In Face ft^2	C_AA_A Out Face ft^2	Weight K
L6	84.25-73.75	A	0.833	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	12.452	0.55
L7	73.75-42.75	A	0.803	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	36.762	1.62
L8	42.75-8.25	A	0.750	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	39.968	1.77
L9	8.25-6.25	A	0.750	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	2.221	0.10
L10	6.25-0.00	A	0.750	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	6.939	0.31

Feed Line Center of Pressure

Section	Elevation ft	CP_X in	CP_Z in	CP_X Ice in	CP_Z Ice in
L1	147.00-105.00	-0.2715	0.1567	-0.5308	0.3065
L2	105.00-89.75	-0.3478	0.2008	-0.6517	0.3763
L3	89.75-88.25	-0.6593	0.3806	-1.0284	0.5938
L4	88.25-86.00	-0.6606	0.3814	-1.0308	0.5952
L5	86.00-84.25	-0.6619	0.3822	-1.0333	0.5966
L6	84.25-73.75	-0.6659	0.3845	-1.0403	0.6006
L7	73.75-42.75	-0.6757	0.3901	-1.0672	0.6161
L8	42.75-8.25	-0.6898	0.3983	-1.0892	0.6288
L9	8.25-6.25	-0.6979	0.4030	-1.0782	0.6225
L10	6.25-0.00	-0.6996	0.4039	-1.0825	0.6250

Discrete Tower Loads

Description	Face or Leg	Offset Type	Offsets: Horz Lateral ft / Vert ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
APXVSPP18-C-A20 w/ Mount Pipe	A	From Leg	4.00 0.00 0.00	0.0000	147.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	8.50 9.15 9.77 11.03 13.68	6.95 8.13 9.02 10.84 14.85	0.08 0.15 0.23 0.41 0.91
APXVSPP18-C-A20 w/ Mount Pipe	B	From Leg	4.00 0.00 0.00	0.0000	147.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	8.50 9.15 9.77 11.03 13.68	6.95 8.13 9.02 10.84 14.85	0.08 0.15 0.23 0.41 0.91
APXVSPP18-C-A20 w/ Mount Pipe	C	From Leg	4.00 0.00 0.00	0.0000	147.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	8.50 9.15 9.77 11.03 13.68	6.95 8.13 9.02 10.84 14.85	0.08 0.15 0.23 0.41 0.91
800 EXTERNAL NOTCH FILTER	A	From Leg	4.00 0.00 0.00	0.0000	147.00	No Ice 1/2" Ice 1" Ice	0.77 0.89 1.02 1.30	0.37 0.46 0.56 0.79	0.01 0.02 0.02 0.04

Description	*Face or Leg*	*Offset Type*	*Offsets: Horz Lateral Vert* ft ft ft	*Azimuth Adjustment* °	*Placement* ft		C_AA_A *Front* ft^2	C_AA_A *Side* ft^2	*Weight* K
						2" Ice	1.97	1.34	0.11
						4" Ice			
800 EXTERNAL NOTCH FILTER	B	From Leg	4.00	0.0000	147.00	No Ice	0.77	0.37	0.01
			0.00			1/2"	0.89	0.46	0.02
			0.00			Ice	1.02	0.56	0.02
						1" Ice	1.30	0.79	0.04
						2" Ice	1.97	1.34	0.11
						4" Ice			
800 EXTERNAL NOTCH FILTER	C	From Leg	4.00	0.0000	147.00	No Ice	0.77	0.37	0.01
			0.00			1/2"	0.89	0.46	0.02
			0.00			Ice	1.02	0.56	0.02
						1" Ice	1.30	0.79	0.04
						2" Ice	1.97	1.34	0.11
						4" Ice			
(3) ACU-A20-N	A	From Leg	4.00	0.0000	147.00	No Ice	0.08	0.14	0.00
			0.00			1/2"	0.12	0.19	0.00
			0.00			Ice	0.17	0.25	0.00
						1" Ice	0.30	0.40	0.01
						2" Ice	0.67	0.80	0.04
						4" Ice			
(3) ACU-A20-N	B	From Leg	4.00	0.0000	147.00	No Ice	0.08	0.14	0.00
			0.00			1/2"	0.12	0.19	0.00
			0.00			Ice	0.17	0.25	0.00
						1" Ice	0.30	0.40	0.01
						2" Ice	0.67	0.80	0.04
						4" Ice			
(3) ACU-A20-N	C	From Leg	4.00	0.0000	147.00	No Ice	0.08	0.14	0.00
			0.00			1/2"	0.12	0.19	0.00
			0.00			Ice	0.17	0.25	0.00
						1" Ice	0.30	0.40	0.01
						2" Ice	0.67	0.80	0.04
						4" Ice			
1900MHz RRH (65MHz)	A	From Leg	4.00	0.0000	147.00	No Ice	2.71	2.61	0.06
			0.00			1/2"	2.95	2.84	0.08
			0.00			Ice	3.20	3.09	0.11
						1" Ice	3.72	3.61	0.17
						2" Ice	4.86	4.74	0.35
						4" Ice			
1900MHz RRH (65MHz)	B	From Leg	4.00	0.0000	147.00	No Ice	2.71	2.61	0.06
			0.00			1/2"	2.95	2.84	0.08
			0.00			Ice	3.20	3.09	0.11
						1" Ice	3.72	3.61	0.17
						2" Ice	4.86	4.74	0.35
						4" Ice			
1900MHz RRH (65MHz)	C	From Leg	4.00	0.0000	147.00	No Ice	2.71	2.61	0.06
			0.00			1/2"	2.95	2.84	0.08
			0.00			Ice	3.20	3.09	0.11
						1" Ice	3.72	3.61	0.17
						2" Ice	4.86	4.74	0.35
						4" Ice			
800MHZ RRH	A	From Leg	4.00	0.0000	147.00	No Ice	2.49	2.07	0.05
			0.00			1/2"	2.71	2.27	0.07
			0.00			Ice	2.93	2.48	0.10
						1" Ice	3.41	2.93	0.16
						2" Ice	4.46	3.93	0.32
						4" Ice			
800MHZ RRH	B	From Leg	4.00	0.0000	147.00	No Ice	2.49	2.07	0.05
			0.00			1/2"	2.71	2.27	0.07
			0.00			Ice	2.93	2.48	0.10
						1" Ice	3.41	2.93	0.16
						2" Ice	4.46	3.93	0.32
						4" Ice			
800MHZ RRH	C	From Leg	4.00	0.0000	147.00	No Ice	2.49	2.07	0.05
			0.00			1/2"	2.71	2.27	0.07
			0.00			Ice	2.93	2.48	0.10

Description	*Face or Leg*	*Offset Type*	*Offsets: Horz Lateral Vert* ft ft ft	*Azimuth Adjustment* °	*Placement* ft		C_AA_A *Front* ft^2	C_AA_A *Side* ft^2	*Weight* K
						1" Ice	3.41	2.93	0.16
						2" Ice	4.46	3.93	0.32
						4" Ice			
APXVTM14-C-120 w/ Mount Pipe	A	From Leg	4.00 0.00 0.00	0.0000	147.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	7.13 7.66 8.18 9.26 11.53	4.96 5.75 6.47 8.01 11.41	0.08 0.13 0.19 0.34 0.75
APXVTM14-C-120 w/ Mount Pipe	B	From Leg	4.00 0.00 0.00	0.0000	147.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	7.13 7.66 8.18 9.26 11.53	4.96 5.75 6.47 8.01 11.41	0.08 0.13 0.19 0.34 0.75
APXVTM14-C-120 w/ Mount Pipe	C	From Leg	4.00 0.00 0.00	0.0000	147.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	7.13 7.66 8.18 9.26 11.53	4.96 5.75 6.47 8.01 11.41	0.08 0.13 0.19 0.34 0.75
TD-RRH8x20-25	A	From Leg	4.00 0.00 0.00	0.0000	147.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	4.72 5.01 5.32 5.95 7.31	1.70 1.92 2.15 2.62 3.68	0.07 0.10 0.13 0.20 0.40
TD-RRH8x20-25	B	From Leg	4.00 0.00 0.00	0.0000	147.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	4.72 5.01 5.32 5.95 7.31	1.70 1.92 2.15 2.62 3.68	0.07 0.10 0.13 0.20 0.40
TD-RRH8x20-25	C	From Leg	4.00 0.00 0.00	0.0000	147.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	4.72 5.01 5.32 5.95 7.31	1.70 1.92 2.15 2.62 3.68	0.07 0.10 0.13 0.20 0.40
Platform Mount [LP 712-1]	C	None		0.0000	147.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	24.53 29.94 35.35 46.17 67.81	24.53 29.94 35.35 46.17 67.81	1.34 1.65 1.96 2.58 3.82
Miscellaneous (NA507-1)	C	From Leg	0.00 0.00 -4.00	0.0000	147.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	4.80 6.70 8.60 12.40 20.00	4.80 6.70 8.60 12.40 20.00	0.25 0.29 0.34 0.44 0.64
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ERICSSON AIR 21 B2A B4P w/ Mount Pipe	A	From Leg	4.00 0.00 0.00	0.0000	135.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	6.83 7.35 7.86 8.93 11.18	5.64 6.48 7.26 8.86 12.29	0.11 0.17 0.23 0.38 0.81
(2) ERICSSON AIR 21 B2A B4P w/ Mount Pipe	B	From Leg	4.00 0.00 0.00	0.0000	135.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	6.83 7.35 7.86 8.93 11.18	5.64 6.48 7.26 8.86 12.29	0.11 0.17 0.23 0.38 0.81
ERICSSON AIR 21 B4A	A	From Leg	4.00	0.0000	135.00	No Ice	6.82	5.63	0.11

Description	Face or Leg	Offset Type	Offsets: Horz Lateral Vert ft ft ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
B2P w/ Mount Pipe			0.00 0.00			1/2" Ice 1" Ice 2" Ice 4" Ice	7.34 7.85 8.92 11.16	6.47 7.25 8.85 12.28	0.17 0.23 0.38 0.81
(2) ERICSSON AIR 21 B4A B2P w/ Mount Pipe	C	From Leg	4.00 0.00 0.00	0.0000	135.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	6.82 7.34 7.85 8.92 11.16	5.63 6.47 7.25 8.85 12.28	0.11 0.17 0.23 0.38 0.81
T-Arm Mount [TA 601-3]	C	None		0.0000	135.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	10.90 14.65 18.40 25.90 40.90	10.90 14.65 18.40 25.90 40.90	0.73 0.93 1.13 1.52 2.32
***									
(4) 2.375" OD x 6' Mount Pipe	A	From Leg	4.00 0.00 0.00	0.0000	126.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	1.43 1.92 2.29 3.06 4.70	1.43 1.92 2.29 3.06 4.70	0.03 0.04 0.05 0.09 0.23
(4) 2.375" OD x 6' Mount Pipe	B	From Leg	4.00 0.00 0.00	0.0000	126.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	1.43 1.92 2.29 3.06 4.70	1.43 1.92 2.29 3.06 4.70	0.03 0.04 0.05 0.09 0.23
(4) 2.375" OD x 6' Mount Pipe	C	From Leg	4.00 0.00 0.00	0.0000	126.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	1.43 1.92 2.29 3.06 4.70	1.43 1.92 2.29 3.06 4.70	0.03 0.04 0.05 0.09 0.23
Platform Mount [LP 712-1]	C	None		0.0000	126.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	24.53 29.94 35.35 46.17 67.81	24.53 29.94 35.35 46.17 67.81	1.34 1.65 1.96 2.58 3.82
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(2) LPA-80080/4CF w/ Mount Pipe	A	From Face	4.00 0.00 0.00	0.0000	116.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	2.86 3.22 3.59 4.45 6.32	7.23 7.92 8.63 10.11 13.34	0.03 0.08 0.13 0.25 0.61
(2) LPA-80063/6CF w/ Mount Pipe	B	From Face	4.00 0.00 0.00	0.0000	116.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	10.58 11.24 11.87 13.16 15.87	10.67 11.93 12.91 14.92 19.16	0.05 0.14 0.25 0.48 1.09
(2) APL868013 w/ Mount Pipe	C	From Face	4.00 0.00 0.00	0.0000	116.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	3.10 3.48 3.88 4.76 6.66	4.92 5.60 6.28 7.71 10.83	0.02 0.06 0.11 0.22 0.54
BXA-70063-6CF-2 w/ Mount Pipe	A	From Face	4.00 0.00 0.00	0.0000	116.00	No Ice 1/2" Ice 1" Ice	7.97 8.61 9.22 10.46	5.80 6.95 7.82 9.60	0.04 0.10 0.17 0.34

Description	Face or Leg	Offset Type	Offsets: Horz Lateral Vert ft ft ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
						2" Ice	13.07	13.37	0.80
						4" Ice			
BXA-70063-6CF-2 w/ Mount Pipe	B	From Face	4.00 0.00 0.00	0.0000	116.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	7.97 8.61 9.22 10.46 13.07	5.80 6.95 7.82 9.60 13.37	0.04 0.10 0.17 0.34 0.80
BXA-70063/6CF-2 w/ Mount Pipe	C	From Face	4.00 0.00 0.00	0.0000	116.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	7.97 8.61 9.22 10.46 13.07	5.40 6.55 7.41 9.18 12.93	0.04 0.10 0.17 0.33 0.79
BXA-171085-8BF-EDIN-2 w/ Mount Pipe	A	From Face	4.00 0.00 0.00	0.0000	116.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	3.18 3.56 3.97 4.86 6.77	3.35 3.97 4.60 5.90 8.89	0.03 0.06 0.10 0.19 0.49
BXA-171085-8BF-EDIN-2 w/ Mount Pipe	B	From Face	4.00 0.00 0.00	0.0000	116.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	3.18 3.56 3.97 4.86 6.77	3.35 3.97 4.60 5.90 8.89	0.03 0.06 0.10 0.19 0.49
BXA-171085-8BF-EDIN-2 w/ Mount Pipe	C	From Face	4.00 0.00 0.00	0.0000	116.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	3.18 3.56 3.97 4.86 6.77	3.35 3.97 4.60 5.90 8.89	0.03 0.06 0.10 0.19 0.49
(2) FD9R6004/2C-3L	A	From Face	4.00 0.00 0.00	0.0000	116.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	0.37 0.45 0.54 0.75 1.28	0.08 0.14 0.20 0.34 0.74	0.00 0.01 0.01 0.02 0.06
(2) FD9R6004/2C-3L	B	From Face	4.00 0.00 0.00	0.0000	116.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	0.37 0.45 0.54 0.75 1.28	0.08 0.14 0.20 0.34 0.74	0.00 0.01 0.01 0.02 0.06
(2) FD9R6004/2C-3L	C	From Face	4.00 0.00 0.00	0.0000	116.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	0.37 0.45 0.54 0.75 1.28	0.08 0.14 0.20 0.34 0.74	0.00 0.01 0.01 0.02 0.06
(2) ClearGain Dual Band 800/1900 MHz	B	From Face	4.00 0.00 0.00	0.0000	116.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	1.54 1.71 1.89 2.27 3.14	0.80 0.94 1.08 1.39 2.11	0.02 0.03 0.05 0.08 0.18
BXA-171063-12CF-EDIN-2 w/ Mount Pipe	A	From Leg	4.00 0.00 0.00	0.0000	116.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	5.03 5.58 6.10 7.17 9.44	5.29 6.46 7.35 9.15 12.95	0.04 0.09 0.14 0.27 0.68
BXA-171063-12CF-EDIN-2 w/ Mount Pipe	B	From Leg	4.00 0.00 0.00	0.0000	116.00	No Ice 1/2" Ice	5.03 5.58 6.10	5.29 6.46 7.35	0.04 0.09 0.14

Description	*Face or Leg*	*Offset Type*	*Offsets: Horz Lateral Vert* ft ft ft	*Azimuth Adjustment* °	*Placement* ft		*C_AA_A Front* ft^2	*C_AA_A Side* ft^2	*Weight* K
						1" Ice	7.17	9.15	0.27
						2" Ice	9.44	12.95	0.68
						4" Ice			
BXA-171063-12CF-EDIN-2 w/ Mount Pipe	C	From Leg	4.00 0.00 0.00	0.0000	116.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	5.03 5.58 6.10 7.17 9.44	5.29 6.46 7.35 9.15 12.95	0.04 0.09 0.14 0.27 0.68
RRH2x40-AWS	A	From Leg	4.00 0.00 0.00	0.0000	116.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	2.52 2.75 2.99 3.50 4.61	1.59 1.80 2.01 2.46 3.48	0.04 0.06 0.08 0.13 0.28
RRH2x40-AWS	B	From Leg	4.00 0.00 0.00	0.0000	116.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	2.52 2.75 2.99 3.50 4.61	1.59 1.80 2.01 2.46 3.48	0.04 0.06 0.08 0.13 0.28
RRH2x40-AWS	C	From Leg	4.00 0.00 0.00	0.0000	116.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	2.52 2.75 2.99 3.50 4.61	1.59 1.80 2.01 2.46 3.48	0.04 0.06 0.08 0.13 0.28
DB-T1-6Z-8AB-0Z	A	From Leg	4.00 0.00 0.00	0.0000	116.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	5.60 5.92 6.24 6.91 8.37	2.33 2.56 2.79 3.28 4.37	0.04 0.08 0.12 0.21 0.45
Platform Mount [LP 712-1]	C	None		0.0000	116.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	24.53 29.94 35.35 46.17 67.81	24.53 29.94 35.35 46.17 67.81	1.34 1.65 1.96 2.58 3.82
***									
(2) Powerwave Technologies 7770 w/ Mount Pipe	A	From Face	4.00 0.00 2.00	0.0000	106.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	6.01 6.46 6.93 7.89 9.94	4.42 5.08 5.74 7.13 10.41	0.07 0.12 0.18 0.32 0.70
(2) Powerwave Technologies 7770 w/ Mount Pipe	B	From Face	4.00 0.00 2.00	0.0000	106.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	6.01 6.46 6.93 7.89 9.94	4.42 5.08 5.74 7.13 10.41	0.07 0.12 0.18 0.32 0.70
(2) Powerwave Technologies 7770 w/ Mount Pipe	C	From Face	4.00 0.00 2.00	0.0000	106.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	6.01 6.46 6.93 7.89 9.94	4.42 5.08 5.74 7.13 10.41	0.07 0.12 0.18 0.32 0.70
AM-X-CD-14-65-00T-RET w/ Mount Pipe	A	From Face	4.00 0.00 2.00	0.0000	106.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	5.74 6.20 6.66 7.62 9.67	4.02 4.63 5.28 6.68 9.74	0.05 0.10 0.15 0.27 0.63
AM-X-CD-14-65-00T-RET	B	From Face	4.00	0.0000	106.00	No Ice	5.74	4.02	0.05

Description	Face or Leg	Offset Type	Offsets: Horz Lateral Vert ft ft ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
w/ Mount Pipe			0.00 2.00			1/2" Ice 1" Ice 2" Ice 4" Ice	6.20 6.66 7.62 9.67	4.63 5.28 6.68 9.74	0.10 0.15 0.27 0.63
AM-X-CD-14-65-00T-RET w/ Mount Pipe	C	From Face	4.00 0.00 2.00	0.0000	106.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	5.74 6.20 6.66 7.62 9.67	4.02 4.63 5.28 6.68 9.74	0.05 0.10 0.15 0.27 0.63
(4) Powerwave Technologies LGP2140X	A	From Face	4.00 0.00 2.00	0.0000	106.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	1.23 1.38 1.54 1.89 2.69	0.37 0.48 0.60 0.87 1.51	0.02 0.02 0.03 0.06 0.14
(4) Powerwave Technologies LGP2140X	B	From Face	4.00 0.00 2.00	0.0000	106.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	1.23 1.38 1.54 1.89 2.69	0.37 0.48 0.60 0.87 1.51	0.02 0.02 0.03 0.06 0.14
(4) Powerwave Technologies LGP2140X	C	From Face	4.00 0.00 2.00	0.0000	106.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	1.23 1.38 1.54 1.89 2.69	0.37 0.48 0.60 0.87 1.51	0.02 0.02 0.03 0.06 0.14
DC6-48-60-18-8F	A	From Face	4.00 0.00 2.00	0.0000	106.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	2.57 2.80 3.04 3.54 4.66	2.57 2.80 3.04 3.54 4.66	0.02 0.04 0.07 0.13 0.30
(2) RRUS-11	A	From Face	4.00 0.00 2.00	0.0000	106.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	3.25 3.49 3.74 4.27 5.43	1.37 1.55 1.74 2.14 3.04	0.05 0.07 0.09 0.15 0.31
(2) RRUS-11	B	From Face	4.00 0.00 2.00	0.0000	106.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	3.25 3.49 3.74 4.27 5.43	1.37 1.55 1.74 2.14 3.04	0.05 0.07 0.09 0.15 0.31
(2) RRUS-11	C	From Face	4.00 0.00 2.00	0.0000	106.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	3.25 3.49 3.74 4.27 5.43	1.37 1.55 1.74 2.14 3.04	0.05 0.07 0.09 0.15 0.31
2.375" OD x 6' Mount Pipe	A	From Leg	4.00 0.00 0.00	0.0000	106.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	1.43 1.92 2.29 3.06 4.70	1.43 1.92 2.29 3.06 4.70	0.03 0.04 0.05 0.09 0.23
2.375" OD x 6' Mount Pipe	B	From Leg	4.00 0.00 0.00	0.0000	106.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	1.43 1.92 2.29 3.06 4.70	1.43 1.92 2.29 3.06 4.70	0.03 0.04 0.05 0.09 0.23

Description	Face or Leg	Offset Type	Offsets: Horz Lateral Vert ft ft ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
2.375" OD x 6' Mount Pipe	C	From Leg	4.00 0.00 0.00	0.0000	106.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	1.43 1.92 2.29 3.06 4.70	1.43 1.92 2.29 3.06 4.70	0.03 0.04 0.05 0.09 0.23
Platform Mount [LP 712-1]	C	None		0.0000	106.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	24.53 29.94 35.35 46.17 67.81	24.53 29.94 35.35 46.17 67.81	1.34 1.65 1.96 2.58 3.82
***									
KS24019-L112A	A	From Face	3.00 0.00 1.00	0.0000	80.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	0.10 0.18 0.26 0.42 0.74	0.10 0.18 0.26 0.42 0.74	0.01 0.01 0.01 0.01 0.02
Kathrein OG-860/1920/GPS-A	B	From Face	3.00 0.00 1.00	0.0000	80.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	0.14 0.23 0.33 0.57 1.17	0.14 0.23 0.33 0.57 1.17	0.00 0.00 0.01 0.02 0.05
KS24019-L112A	C	From Face	3.00 0.00 1.00	0.0000	80.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	0.10 0.18 0.26 0.42 0.74	0.10 0.18 0.26 0.42 0.74	0.01 0.01 0.01 0.01 0.02
Side Arm Mount [SO 701-3]	C	None		0.0000	80.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	2.83 3.92 5.01 7.19 11.55	2.83 3.92 5.01 7.19 11.55	0.20 0.24 0.28 0.36 0.53

Tower Pressures - No Ice

G_H = 1.690

Section Elevation ft	z ft	K_Z	q_z psf	A_G ft^2	Face	A_F ft^2	A_R ft^2	A_{leg} ft^2	Leg % 	C_AA_A In Face ft^2	C_AA_A Out Face ft^2
L1 147.00-105.00	125.27	1.464	27	89.497	A	0.000	89.497	89.497	100.00	0.000	0.000
					B	0.000	89.497		100.00	0.000	0.000
					C	0.000	89.497		100.00	0.000	9.468
L2 105.00-89.75	97.26	1.362	25	38.046	A	0.000	38.046	38.046	100.00	0.000	0.000
					B	0.000	38.046		100.00	0.000	0.000
					C	0.000	38.046		100.00	0.000	4.561
L3 89.75-88.25	89.00	1.328	25	3.920	A	0.000	3.920	3.920	100.00	0.000	0.000
					B	0.000	3.920		100.00	0.000	0.000
					C	0.000	3.920		100.00	0.000	0.945
L4 88.25-86.00	87.12	1.32	24	5.940	A	0.000	5.940	5.940	100.00	0.000	0.000
					B	0.000	5.940		100.00	0.000	0.000
					C	0.000	5.940		100.00	0.000	1.417
L5 86.00-84.25	85.12	1.311	24	4.670	A	0.000	4.670	4.670	100.00	0.000	0.000
					B	0.000	4.670		100.00	0.000	0.000
					C	0.000	4.670		100.00	0.000	1.102

Section Elevation ft	z ft	K_Z	q_z psf	A_G ft²	Face	A_F ft²	A_R ft²	A_{leg} ft²	Leg %	C_AA_A In Face ft²	C_AA_A Out Face ft²
L6 84.25-73.75	78.95	1.283	24	28.929	A	0.000	28.929	28.929	100.00	0.000	0.000
					B	0.000	28.929		100.00	0.000	0.000
					C	0.000	28.929		100.00	0.000	6.613
L7 73.75-42.75	58.15	1.176	22	92.587	A	0.000	92.587	92.587	100.00	0.000	0.000
					B	0.000	92.587		100.00	0.000	0.000
					C	0.000	92.587		100.00	0.000	19.524
L8 42.75-8.25	25.10	1	19	116.796	A	0.000	116.796	116.796	100.00	0.000	0.000
					B	0.000	116.796		100.00	0.000	0.000
					C	0.000	116.796		100.00	0.000	21.728
L9 8.25-6.25	7.25	1	18	7.315	A	0.000	7.315	7.315	100.00	0.000	0.000
					B	0.000	7.315		100.00	0.000	0.000
					C	0.000	7.315		100.00	0.000	1.260
L10 6.25-0.00	3.11	1	18	23.223	A	0.000	23.223	23.223	100.00	0.000	0.000
					B	0.000	23.223		100.00	0.000	0.000
					C	0.000	23.223		100.00	0.000	3.936

Tower Pressure - With Ice

G_H = 1.690

Section Elevation ft	z ft	K_Z	q_z psf	t_Z in	A_G ft²	Face	A_F ft²	A_R ft²	A_{leg} ft²	Leg %	C_AA_A In Face ft²	C_AA_A Out Face ft²
L1 147.00-105.00	125.27	1.464	5	0.8802	95.658	A	0.000	95.658	95.658	100.00	0.000	0.000
						B	0.000	95.658		100.00	0.000	0.000
						C	0.000	95.658		100.00	0.000	22.143
L2 105.00-89.75	97.26	1.362	5	0.8539	40.283	A	0.000	40.283	40.283	100.00	0.000	0.000
						B	0.000	40.283		100.00	0.000	0.000
						C	0.000	40.283		100.00	0.000	10.116
L3 89.75-88.25	89.00	1.328	5	0.8448	4.131	A	0.000	4.131	4.131	100.00	0.000	0.000
						B	0.000	4.131		100.00	0.000	0.000
						C	0.000	4.131		100.00	0.000	1.795
L4 88.25-86.00	87.12	1.32	5	0.8427	6.256	A	0.000	6.256	6.256	100.00	0.000	0.000
						B	0.000	6.256		100.00	0.000	0.000
						C	0.000	6.256		100.00	0.000	2.689
L5 86.00-84.25	85.12	1.311	5	0.8403	4.915	A	0.000	4.915	4.915	100.00	0.000	0.000
						B	0.000	4.915		100.00	0.000	0.000
						C	0.000	4.915		100.00	0.000	2.087
L6 84.25-73.75	78.95	1.283	5	0.8328	30.387	A	0.000	30.387	30.387	100.00	0.000	0.000
						B	0.000	30.387		100.00	0.000	0.000
						C	0.000	30.387		100.00	0.000	12.452
L7 73.75-42.75	58.15	1.176	4	0.8028	96.890	A	0.000	96.890	96.890	100.00	0.000	0.000
						B	0.000	96.890		100.00	0.000	0.000
						C	0.000	96.890		100.00	0.000	36.762
L8 42.75-8.25	25.10	1	4	0.7500	121.412	A	0.000	121.412	121.412	100.00	0.000	0.000
						B	0.000	121.412		100.00	0.000	0.000
						C	0.000	121.412		100.00	0.000	39.968
L9 8.25-6.25	7.25	1	4	0.7500	7.565	A	0.000	7.565	7.565	100.00	0.000	0.000
						B	0.000	7.565		100.00	0.000	0.000
						C	0.000	7.565		100.00	0.000	2.221
L10 6.25-0.00	3.11	1	4	0.7500	24.005	A	0.000	24.005	24.005	100.00	0.000	0.000
						B	0.000	24.005		100.00	0.000	0.000
						C	0.000	24.005		100.00	0.000	6.939

Tower Pressure - Service

G_H = 1.690

Section Elevation ft	z ft	K_Z	q_z psf	A_G ft²	Face	A_F ft²	A_R ft²	A_{leg} ft²	Leg %	C_AA_A In Face ft²	C_AA_A Out Face ft²
L1 147.00-105.00	125.27	1.464	9	89.497	A	0.000	89.497	89.497	100.00	0.000	0.000
					B	0.000	89.497		100.00	0.000	0.000
					C	0.000	89.497		100.00	0.000	9.468
L2 105.00-89.75	97.26	1.362	9	38.046	A	0.000	38.046	38.046	100.00	0.000	0.000
					B	0.000	38.046		100.00	0.000	0.000
					C	0.000	38.046		100.00	0.000	4.561
L3 89.75-88.25	89.00	1.328	8	3.920	A	0.000	3.920	3.920	100.00	0.000	0.000
					B	0.000	3.920		100.00	0.000	0.000
					C	0.000	3.920		100.00	0.000	0.945
L4 88.25-86.00	87.12	1.32	8	5.940	A	0.000	5.940	5.940	100.00	0.000	0.000
					B	0.000	5.940		100.00	0.000	0.000
					C	0.000	5.940		100.00	0.000	1.417
L5 86.00-84.25	85.12	1.311	8	4.670	A	0.000	4.670	4.670	100.00	0.000	0.000
					B	0.000	4.670		100.00	0.000	0.000
					C	0.000	4.670		100.00	0.000	1.102
L6 84.25-73.75	78.95	1.283	8	28.929	A	0.000	28.929	28.929	100.00	0.000	0.000
					B	0.000	28.929		100.00	0.000	0.000
					C	0.000	28.929		100.00	0.000	6.613
L7 73.75-42.75	58.15	1.176	7	92.587	A	0.000	92.587	92.587	100.00	0.000	0.000
					B	0.000	92.587		100.00	0.000	0.000
					C	0.000	92.587		100.00	0.000	19.524
L8 42.75-8.25	25.10	1	6	116.796	A	0.000	116.796	116.796	100.00	0.000	0.000
					B	0.000	116.796		100.00	0.000	0.000
					C	0.000	116.796		100.00	0.000	21.728
L9 8.25-6.25	7.25	1	6	7.315	A	0.000	7.315	7.315	100.00	0.000	0.000
					B	0.000	7.315		100.00	0.000	0.000
					C	0.000	7.315		100.00	0.000	1.260
L10 6.25-0.00	3.11	1	6	23.223	A	0.000	23.223	23.223	100.00	0.000	0.000
					B	0.000	23.223		100.00	0.000	0.000
					C	0.000	23.223		100.00	0.000	3.936

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
15	Dead+Wind 0 deg+Ice
16	Dead+Wind 30 deg+Ice
17	Dead+Wind 60 deg+Ice
18	Dead+Wind 90 deg+Ice
19	Dead+Wind 120 deg+Ice
20	Dead+Wind 150 deg+Ice
21	Dead+Wind 180 deg+Ice
22	Dead+Wind 210 deg+Ice
23	Dead+Wind 240 deg+Ice
24	Dead+Wind 270 deg+Ice
25	Dead+Wind 300 deg+Ice
26	Dead+Wind 330 deg+Ice
27	Dead+Wind 0 deg - Service
28	Dead+Wind 30 deg - Service
29	Dead+Wind 60 deg - Service
30	Dead+Wind 90 deg - Service

Comb. No.	Description
31	Dead+Wind 120 deg - Service
32	Dead+Wind 150 deg - Service
33	Dead+Wind 180 deg - Service
34	Dead+Wind 210 deg - Service
35	Dead+Wind 240 deg - Service
36	Dead+Wind 270 deg - Service
37	Dead+Wind 300 deg - Service
38	Dead+Wind 330 deg - Service

Maximum Member Forces

Section No.	Elevation ft	Component Type	Condition	Gov. Load Comb.	Force K	Major Axis Moment kip-ft	Minor Axis Moment kip-ft
L1	147 - 105	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	14	-18.38	-0.25	0.93
			Max. Mx	11	-9.25	382.57	-1.38
			Max. My	2	-9.23	-1.43	384.19
			Max. Vy	11	-17.97	382.57	-1.38
			Max. Vx	2	-18.14	-1.43	384.19
			Max. Torque	12			-2.86
L2	105 - 89.75	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	14	-26.56	0.58	0.77
			Max. Mx	11	-14.33	820.52	-5.19
			Max. My	2	-14.31	-5.13	825.21
			Max. Vy	11	-24.14	820.52	-5.19
			Max. Vx	2	-24.31	-5.13	825.21
			Max. Torque	12			-2.84
L3	89.75 - 88.25	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	14	-26.85	0.62	0.74
			Max. Mx	11	-14.55	856.83	-5.50
			Max. My	2	-14.53	-5.42	861.77
			Max. Vy	11	-24.28	856.83	-5.50
			Max. Vx	2	-24.45	-5.42	861.77
			Max. Torque	12			-2.80
L4	88.25 - 86	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	14	-27.42	0.70	0.70
			Max. Mx	11	-15.04	911.70	-5.95
			Max. My	2	-15.02	-5.86	917.00
			Max. Vy	11	-24.50	911.70	-5.95
			Max. Vx	2	-24.67	-5.86	917.00
			Max. Torque	12			-2.80
L5	86 - 84.25	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	14	-27.88	0.75	0.67
			Max. Mx	11	-15.41	954.73	-6.31
			Max. My	2	-15.39	-6.20	960.32
			Max. Vy	11	-24.68	954.73	-6.31
			Max. Vx	2	-24.85	-6.20	960.32
			Max. Torque	12			-2.78
L6	84.25 - 73.75	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	14	-29.70	0.97	0.55
			Max. Mx	11	-16.88	1111.09	-7.60
			Max. My	2	-16.86	-7.41	1117.67
			Max. Vy	11	-25.41	1111.09	-7.60
			Max. Vx	2	-25.58	-7.41	1117.67
			Max. Torque	12			-2.77
L7	73.75 - 42.75	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	14	-39.34	2.04	-0.08
			Max. Mx	11	-25.10	1930.08	-13.87
			Max. My	2	-25.08	-13.35	1941.60
			Max. Vy	11	-28.18	1930.08	-13.87
			Max. Vx	2	-28.35	-13.35	1941.60
			Max. Torque	12			-2.72
L8	42.75 - 8.25	Pole	Max Tension	1	0.00	0.00	0.00

Section No.	Elevation ft	Component Type	Condition	Gov. Load Comb.	Force K	Major Axis Moment kip-ft	Minor Axis Moment kip-ft
			Max. Compression	14	-53.74	3.55	-0.96
			Max. Mx	11	-37.86	3093.65	-21.90
			Max. My	8	-37.86	22.72	-3111.42
			Max. Vy	5	30.98	-3091.85	21.66
			Max. Vx	2	-31.15	-20.83	3111.38
			Max. Torque	11			-2.59
L9	8.25 - 6.25	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	14	-54.48	3.63	-1.00
			Max. Mx	11	-38.54	3155.70	-22.30
			Max. My	8	-38.54	23.13	-3173.80
			Max. Vy	5	31.10	-3153.86	22.04
			Max. Vx	2	-31.27	-21.21	3173.74
			Max. Torque	11			-2.49
L10	6.25 - 0	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	14	-56.81	3.88	-1.15
			Max. Mx	11	-40.64	3351.28	-23.56
			Max. My	8	-40.64	24.41	-3370.40
			Max. Vy	5	31.50	-3349.32	23.22
			Max. Vx	2	-31.67	-22.36	3370.27
			Max. Torque	11			-2.48

Maximum Reactions

Location	Condition	Gov. Load Comb.	Vertical K	Horizontal, X K	Horizontal, Z K
Pole	Max. Vert	14	56.81	-0.00	-0.00
	Max. H_x	11	40.65	31.48	-0.19
	Max. H_z	2	40.65	-0.19	31.65
	Max. M_x	2	3370.27	-0.19	31.65
	Max. M_z	5	3349.32	-31.48	0.19
	Max. Torsion	5	2.46	-31.48	0.19
	Min. Vert	8	40.65	0.19	-31.65
	Min. H_x	5	40.65	-31.48	0.19
	Min. H_z	8	40.65	0.19	-31.65
	Min. M_x	8	-3370.40	0.19	-31.65
	Min. M_z	11	-3351.28	31.48	-0.19
	Min. Torsion	11	-2.46	31.48	-0.19

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	40.65	-0.00	-0.00	0.15	0.98	0.00
Dead+Wind 0 deg - No Ice	40.65	0.19	-31.65	-3370.27	-22.36	0.39
Dead+Wind 30 deg - No Ice	40.65	15.91	-27.51	-2930.47	-1694.37	-0.89
Dead+Wind 60 deg - No Ice	40.65	27.36	-15.99	-1705.35	-2912.12	-1.93
Dead+Wind 90 deg - No Ice	40.65	31.48	-0.19	-23.22	-3349.32	-2.46
Dead+Wind 120 deg - No Ice	40.65	27.17	15.66	1665.24	-2888.83	-2.33
Dead+Wind 150 deg - No Ice	40.65	15.57	27.31	2907.50	-1653.90	-1.57
Dead+Wind 180 deg - No Ice	40.65	-0.19	31.65	3370.40	24.41	-0.39
Dead+Wind 210 deg - No Ice	40.65	-15.91	27.51	2930.77	1696.40	0.89
Dead+Wind 240 deg - No Ice	40.65	-27.36	15.99	1705.68	2914.14	1.93
Dead+Wind 270 deg - No Ice	40.65	-31.48	0.19	23.56	3351.28	2.46
Dead+Wind 300 deg - No Ice	40.65	-27.17	-15.66	-1664.89	2890.88	2.33
Dead+Wind 330 deg - No Ice	40.65	-15.57	-27.31	-2907.18	1655.97	1.57
Dead+Ice	56.81	0.00	0.00	1.15	3.88	0.00
Dead+Wind 0 deg+Ice	56.81	0.04	-7.83	-858.73	-0.39	-0.01
Dead+Wind 30 deg+Ice	56.81	3.93	-6.80	-745.78	-427.42	-0.25
Dead+Wind 60 deg+Ice	56.81	6.77	-3.95	-432.68	-738.84	-0.41

Load Combination	Vertical	$Shear_x$	$Shear_z$	Overturning Moment, M_x	Overturning Moment, M_z	Torque
	K	K	K	kip-ft	kip-ft	kip-ft
Dead+Wind 90 deg+Ice	56.81	7.80	-0.04	-3.34	-851.18	-0.47
Dead+Wind 120 deg+Ice	56.81	6.73	3.88	427.21	-734.35	-0.40
Dead+Wind 150 deg+Ice	56.81	3.87	6.77	743.59	-419.65	-0.22
Dead+Wind 180 deg+Ice	56.81	-0.04	7.83	861.03	8.59	0.01
Dead+Wind 210 deg+Ice	56.81	-3.93	6.80	748.08	435.63	0.25
Dead+Wind 240 deg+Ice	56.81	-6.77	3.95	434.98	747.04	0.41
Dead+Wind 270 deg+Ice	56.81	-7.80	0.04	5.64	859.38	0.47
Dead+Wind 300 deg+Ice	56.81	-6.73	-3.89	-424.95	742.64	0.40
Dead+Wind 330 deg+Ice	56.81	-3.87	-6.77	-741.29	427.86	0.22
Dead+Wind 0 deg - Service	40.65	0.07	-10.95	-1167.56	-7.08	0.14
Dead+Wind 30 deg - Service	40.65	5.51	-9.52	-1015.36	-586.46	-0.31
Dead+Wind 60 deg - Service	40.65	9.47	-5.53	-590.83	-1008.42	-0.68
Dead+Wind 90 deg - Service	40.65	10.89	-0.07	-7.95	-1159.69	-0.86
Dead+Wind 120 deg - Service	40.65	9.40	5.42	577.10	-1000.32	-0.81
Dead+Wind 150 deg - Service	40.65	5.39	9.45	1007.56	-572.42	-0.55
Dead+Wind 180 deg - Service	40.65	-0.07	10.95	1167.86	9.12	-0.14
Dead+Wind 210 deg - Service	40.65	-5.51	9.52	1015.66	588.50	0.31
Dead+Wind 240 deg - Service	40.65	-9.47	5.53	591.13	1010.46	0.68
Dead+Wind 270 deg - Service	40.65	-10.89	0.07	8.25	1161.72	0.86
Dead+Wind 300 deg - Service	40.65	-9.40	-5.42	-576.80	1002.36	0.81
Dead+Wind 330 deg - Service	40.65	-5.39	-9.45	-1007.26	574.47	0.55

Solution Summary

	Sum of Applied Forces			Sum of Reactions			
Load Comb.	PX	PY	PZ	PX	PY	PZ	% Error
	K	K	K	K	K	K	
1	0.00	-40.65	0.00	0.00	40.65	0.00	0.000%
2	0.19	-40.65	-31.65	-0.19	40.65	31.65	0.002%
3	15.91	-40.65	-27.51	-15.91	40.65	27.51	0.000%
4	27.36	-40.65	-15.99	-27.36	40.65	15.99	0.000%
5	31.48	-40.65	-0.19	-31.48	40.65	0.19	0.001%
6	27.17	-40.65	15.66	-27.17	40.65	-15.66	0.000%
7	15.57	-40.65	27.31	-15.57	40.65	-27.31	0.000%
8	-0.19	-40.65	31.65	0.19	40.65	-31.65	0.005%
9	-15.91	-40.65	27.51	15.91	40.65	-27.51	0.000%
10	-27.36	-40.65	15.99	27.36	40.65	-15.99	0.000%
11	-31.48	-40.65	0.19	31.48	40.65	-0.19	0.002%
12	-27.17	-40.65	-15.66	27.17	40.65	15.66	0.000%
13	-15.57	-40.65	-27.31	15.57	40.65	27.31	0.000%
14	0.00	-56.81	0.00	-0.00	56.81	-0.00	0.000%
15	0.04	-56.81	-7.83	-0.04	56.81	7.83	0.002%
16	3.93	-56.81	-6.80	-3.93	56.81	6.80	0.002%
17	6.77	-56.81	-3.95	-6.77	56.81	3.95	0.002%
18	7.80	-56.81	-0.04	-7.80	56.81	0.04	0.002%
19	6.73	-56.81	3.89	-6.73	56.81	-3.88	0.002%
20	3.87	-56.81	6.77	-3.87	56.81	-6.77	0.002%
21	-0.04	-56.81	7.83	0.04	56.81	-7.83	0.002%
22	-3.93	-56.81	6.80	3.93	56.81	-6.80	0.002%
23	-6.77	-56.81	3.95	6.77	56.81	-3.95	0.002%
24	-7.80	-56.81	0.04	7.80	56.81	-0.04	0.002%
25	-6.73	-56.81	-3.89	6.73	56.81	3.89	0.001%
26	-3.87	-56.81	-6.77	3.87	56.81	6.77	0.002%
27	0.07	-40.65	-10.95	-0.07	40.65	10.95	0.005%
28	5.51	-40.65	-9.52	-5.51	40.65	9.52	0.001%
29	9.47	-40.65	-5.53	-9.47	40.65	5.53	0.001%
30	10.89	-40.65	-0.07	-10.89	40.65	0.07	0.005%
31	9.40	-40.65	5.42	-9.40	40.65	-5.42	0.001%

Load Comb.	Sum of Applied Forces PX K	PY K	PZ K	Sum of Reactions PX K	PY K	PZ K	% Error
32	5.39	-40.65	9.45	-5.39	40.65	-9.45	0.001%
33	-0.07	-40.65	10.95	0.07	40.65	-10.95	0.005%
34	-5.51	-40.65	9.52	5.51	40.65	-9.52	0.001%
35	-9.47	-40.65	5.53	9.47	40.65	-5.53	0.001%
36	-10.89	-40.65	0.07	10.89	40.65	-0.07	0.005%
37	-9.40	-40.65	-5.42	9.40	40.65	5.42	0.001%
38	-5.39	-40.65	-9.45	5.39	40.65	9.45	0.001%

Non-Linear Convergence Results

Load Combination	Converged?	Number of Cycles	Displacement Tolerance	Force Tolerance
1	Yes	6	0.00000001	0.00000001
2	Yes	15	0.00000001	0.00006978
3	Yes	18	0.00000001	0.00012938
4	Yes	18	0.00000001	0.00013372
5	Yes	16	0.00000001	0.00006679
6	Yes	18	0.00000001	0.00012183
7	Yes	18	0.00000001	0.00012943
8	Yes	14	0.00005159	0.00007063
9	Yes	18	0.00000001	0.00013192
10	Yes	18	0.00000001	0.00012753
11	Yes	15	0.00000001	0.00009706
12	Yes	18	0.00000001	0.00013074
13	Yes	18	0.00000001	0.00012316
14	Yes	6	0.00000001	0.00000001
15	Yes	14	0.00011276	0.00002995
16	Yes	14	0.00011260	0.00013293
17	Yes	14	0.00011259	0.00014870
18	Yes	14	0.00011275	0.00004065
19	Yes	14	0.00011259	0.00012174
20	Yes	14	0.00011257	0.00014284
21	Yes	14	0.00011270	0.00002951
22	Yes	14	0.00011254	0.00014495
23	Yes	14	0.00011255	0.00013017
24	Yes	14	0.00011273	0.00003868
25	Yes	15	0.00000001	0.00006956
26	Yes	14	0.00011261	0.00012766
27	Yes	13	0.00013239	0.00008852
28	Yes	15	0.00000001	0.00011105
29	Yes	15	0.00000001	0.00012249
30	Yes	13	0.00013240	0.00013827
31	Yes	15	0.00000001	0.00009941
32	Yes	15	0.00000001	0.00011803
33	Yes	13	0.00013238	0.00008285
34	Yes	15	0.00000001	0.00011750
35	Yes	15	0.00000001	0.00010681
36	Yes	13	0.00013240	0.00012418
37	Yes	15	0.00000001	0.00012176
38	Yes	15	0.00000001	0.00010228

Maximum Tower Deflections - Service Wind

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
L1	147 - 105	36.167	34	2.0797	0.0054
L2	108.75 - 89.75	20.321	34	1.7734	0.0047
L3	89.75 - 88.25	13.823	34	1.4471	0.0028
L4	88.25 - 86	13.374	34	1.4141	0.0026
L5	86 - 84.25	12.715	34	1.3820	0.0025
L6	84.25 - 73.75	12.213	34	1.3567	0.0024
L7	78 - 42.75	10.506	34	1.2516	0.0021

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
L8	47.5 - 8.25	3.942	34	0.7687	0.0010
L9	8.25 - 6.25	0.114	34	0.1324	0.0001
L10	6.25 - 0	0.066	34	0.1003	0.0001

Critical Deflections and Radius of Curvature - Service Wind

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
147.00	APXVSPP18-C-A20 w/ Mount Pipe	34	36.167	2.0797	0.0055	30527
135.00	ERICSSON AIR 21 B2A B4P w/ Mount Pipe	34	30.988	2.0075	0.0055	12719
126.00	(4) 2.375" OD x 6' Mount Pipe	34	27.185	1.9440	0.0055	7267
116.00	(2) LPA-80080/4CF w/ Mount Pipe	34	23.120	1.8550	0.0052	4922
106.00	(2) Powerwave Technologies 7770 w/ Mount Pipe	34	19.299	1.7378	0.0045	3694
80.00	KS24019-L112A	34	11.038	1.2862	0.0022	3719

Maximum Tower Deflections - Design Wind

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
L1	147 - 105	104.074	9	5.9906	0.0154
L2	108.75 - 89.75	58.529	9	5.1116	0.0135
L3	89.75 - 88.25	39.831	9	4.1718	0.0079
L4	88.25 - 86	38.538	9	4.0767	0.0076
L5	86 - 84.25	36.641	9	3.9841	0.0072
L6	84.25 - 73.75	35.196	9	3.9113	0.0069
L7	78 - 42.75	30.279	9	3.6084	0.0059
L8	47.5 - 8.25	11.366	9	2.2167	0.0028
L9	8.25 - 6.25	0.330	9	0.3819	0.0004
L10	6.25 - 0	0.189	9	0.2892	0.0003

Critical Deflections and Radius of Curvature - Design Wind

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
147.00	APXVSPP18-C-A20 w/ Mount Pipe	9	104.074	5.9906	0.0161	10824
135.00	ERICSSON AIR 21 B2A B4P w/ Mount Pipe	9	89.192	5.7841	0.0161	4509
126.00	(4) 2.375" OD x 6' Mount Pipe	9	78.264	5.6019	0.0158	2574
116.00	(2) LPA-80080/4CF w/ Mount Pipe	9	66.578	5.3463	0.0149	1741
106.00	(2) Powerwave Technologies 7770 w/ Mount Pipe	9	55.590	5.0091	0.0129	1304
80.00	KS24019-L112A	9	31.812	3.7082	0.0062	1302

Compression Checks

Pole Design Data

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	F_a ksi	A in^2	Actual P K	Allow. P_a K	Ratio $\frac{P}{P_a}$
L1	147 - 105 (1)	TP29.141x22x0.25	42.00	0.00	0.0	36.000	22.4191	-9.21	807.09	0.011
L2	105 - 89.75 (2)	TP31.2343x28.0034x0.3125	19.00	0.00	0.0	36.000	30.6705	-14.29	1104.14	0.013
L3	89.75 - 88.25 (3)	TP31.4893x31.2343x0.3125	1.50	0.00	0.0	35.532	30.9235	-14.52	1098.77	0.013
L4	88.25 - 86 (4)	TP31.8719x31.4893x0.5085	2.25	0.00	0.0	34.302	50.6160	-15.00	1736.23	0.009
L5	86 - 84.25 (5)	TP32.1695x31.8719x0.5063	1.75	0.00	0.0	33.978	50.8827	-15.37	1728.89	0.009
L6	84.25 - 73.75 (6)	TP33.955x32.1695x0.455	10.50	0.00	0.0	34.980	47.3360	-16.85	1655.81	0.010
L7	73.75 - 42.75 (7)	TP38.601x32.3223x0.537	35.25	0.00	0.0	34.554	63.4392	-25.07	2192.08	0.011
L8	42.75 - 8.25 (8)	TP43.7172x36.6809x0.5757	39.25	0.00	0.0	34.740	78.8258	-37.85	2738.41	0.014
L9	8.25 - 6.25 (9)	TP44.0573x43.7172x0.596	2.00	0.00	0.0	34.464	82.2200	-38.53	2833.63	0.014
L10	6.25 - 0 (10)	TP45.12x44.0573x0.5918	6.25	0.00	0.0	34.422	83.6336	-40.64	2878.84	0.014

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	147 - 105 (1)	TP29.141x22x0.25	385.15	29.599	36.000	0.822	0.00	0.000	36.000	0.000
L2	105 - 89.75 (2)	TP31.2343x28.0034x0.3125	828.56	42.581	36.000	1.183	0.00	0.000	36.000	0.000
L3	89.75 - 88.25 (3)	TP31.4893x31.2343x0.3125	865.31	43.741	35.532	1.231	0.00	0.000	35.532	0.000
L4	88.25 - 86 (4)	TP31.8719x31.4893x0.5085	920.83	28.442	34.302	0.829	0.00	0.000	34.302	0.000
L5	86 - 84.25 (5)	TP32.1695x31.8719x0.5063	964.38	29.344	33.978	0.864	0.00	0.000	33.978	0.000
L6	84.25 - 73.75 (6)	TP33.955x32.1695x0.455	1122.53	35.394	34.980	1.012	0.00	0.000	34.980	0.000
L7	73.75 - 42.75 (7)	TP38.601x32.3223x0.537	1950.78	40.442	34.554	1.170	0.00	0.000	34.554	0.000
L8	42.75 - 8.25 (8)	TP43.7172x36.6809x0.5757	3126.24	44.949	34.740	1.294	0.00	0.000	34.740	0.000
L9	8.25 - 6.25 (9)	TP44.0573x43.7172x0.596	3188.89	43.650	34.464	1.267	0.00	0.000	34.464	0.000
L10	6.25 - 0 (10)	TP45.12x44.0573x0.5918	3386.32	44.458	34.422	1.292	0.00	0.000	34.422	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	147 - 105 (1)	TP29.141x22x0.25	18.28	0.815	24.000	0.068	0.02	0.001	24.000	0.000
L2	105 - 89.75 (2)	TP31.2343x28.0034x0.3125	24.45	0.797	24.000	0.066	0.63	0.016	24.000	0.001
L3	89.75 - 88.25 (3)	TP31.4893x31.2343x0.3125	24.59	0.795	23.688	0.067	0.63	0.016	23.688	0.001
L4	88.25 - 86 (4)	TP31.8719x31.4893x0.5085	24.81	0.490	22.868	0.043	0.64	0.010	22.868	0.000
L5	86 - 84.25 (5)	TP32.1695x31.8719x0.5063	24.98	0.491	22.652	0.043	0.64	0.009	22.652	0.000
L6	84.25 - 73.75	TP33.955x32.1695x0.455	25.72	0.543	23.320	0.047	0.66	0.010	23.320	0.000

Section No.	Elevation ft	Size	Actual V K	Actual f_v ksi	Allow. F_v ksi	Ratio $\frac{f_v}{F_v}$	Actual T kip-ft	Actual f_{vt} ksi	Allow. F_{vt} ksi	Ratio $\frac{f_{vt}}{F_{vt}}$
L7	73.75 - 42.75 (6)	TP38.601x32.3223x0.537	28.48	0.449	23.036	0.039	0.75	0.008	23.036	0.000
L8	42.75 - 8.25 (7)	TP43.7172x36.6809x0.5757	31.28	0.397	23.160	0.034	0.86	0.006	23.160	0.000
L9	8.25 - 6.25 (8)	TP44.0573x43.7172x0.596	31.39	0.382	22.976	0.033	0.87	0.006	22.976	0.000
L10	6.25 - 0 (9)	TP45.12x44.0573x0.5918	31.80	0.380	22.948	0.033	0.89	0.006	22.948	0.000

Pole Interaction Design Data

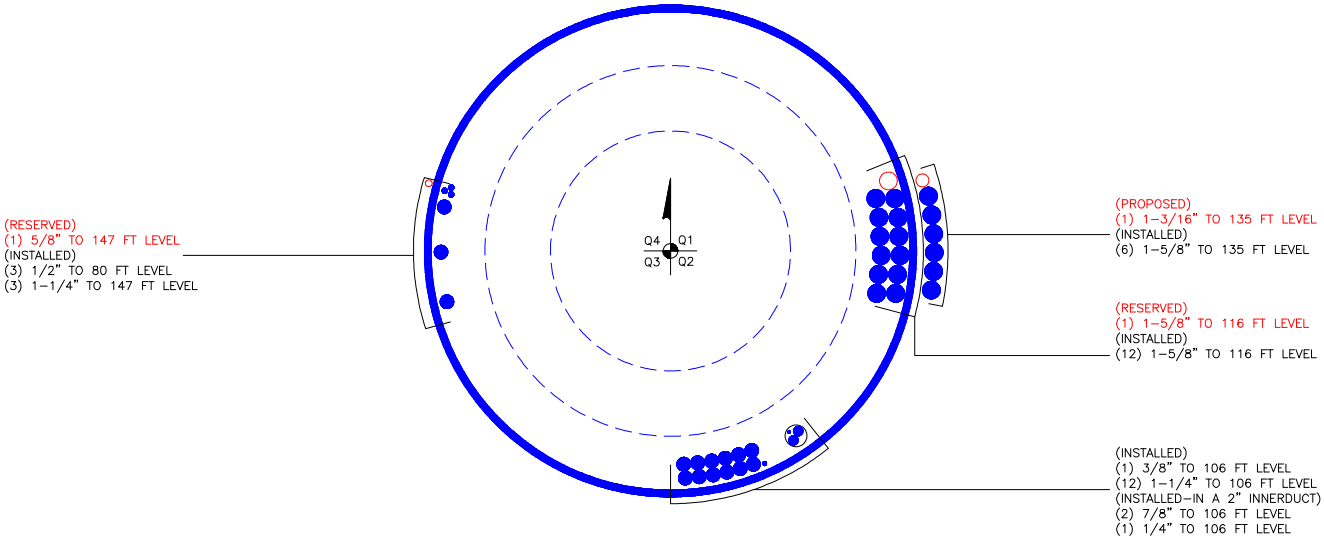
Section No.	Elevation ft	Ratio $\frac{P}{P_a}$	Ratio $\frac{f_{bx}}{F_{bx}}$	Ratio $\frac{f_{by}}{F_{by}}$	Ratio $\frac{f_v}{F_v}$	Ratio $\frac{f_{vt}}{F_{vt}}$	Comb. Stress Ratio	Allow. Stress Ratio	Criteria
L1	147 - 105 (1)	0.011	0.822	0.000	0.068	0.000	0.835 ✔	1.333	H1-3+VT ✔
L2	105 - 89.75 (2)	0.013	1.183	0.000	0.066	0.001	1.197 ✔	1.333	H1-3+VT ✔
L3	89.75 - 88.25 (3)	0.013	1.231	0.000	0.067	0.001	1.245 ✔	1.333	H1-3+VT ✔
L4	88.25 - 86 (4)	0.009	0.829	0.000	0.043	0.000	0.838 ✔	1.333	H1-3+VT ✔
L5	86 - 84.25 (5)	0.009	0.864	0.000	0.043	0.000	0.873 ✔	1.333	H1-3+VT ✔
L6	84.25 - 73.75 (6)	0.010	1.012	0.000	0.047	0.000	1.023 ✔	1.333	H1-3+VT ✔
L7	73.75 - 42.75 (7)	0.011	1.170	0.000	0.039	0.000	1.182 ✔	1.333	H1-3+VT ✔
L8	42.75 - 8.25 (8)	0.014	1.294	0.000	0.034	0.000	1.308 ✔	1.333	H1-3+VT ✔
L9	8.25 - 6.25 (9)	0.014	1.267	0.000	0.033	0.000	1.280 ✔	1.333	H1-3+VT ✔
L10	6.25 - 0 (10)	0.014	1.292	0.000	0.033	0.000	1.306 ✔	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	147 - 105	Pole	TP29.141x22x0.25	1	-9.21	1075.85	62.6	Pass
L2	105 - 89.75	Pole	TP31.2343x28.0034x0.3125	2	-14.29	1471.82	89.8	Pass
L3	89.75 - 88.25	Pole	TP31.4893x31.2343x0.3125	3	-14.52	1464.66	93.4	Pass
L4	88.25 - 86	Pole	TP31.8719x31.4893x0.5085	4	-15.00	2314.39	62.9	Pass
L5	86 - 84.25	Pole	TP32.1695x31.8719x0.5063	5	-15.37	2304.61	65.5	Pass
L6	84.25 - 73.75	Pole	TP33.955x32.1695x0.455	6	-16.85	2207.19	76.7	Pass
L7	73.75 - 42.75	Pole	TP38.601x32.3223x0.537	7	-25.07	2922.04	88.7	Pass
L8	42.75 - 8.25	Pole	TP43.7172x36.6809x0.5757	8	-37.85	3650.30	98.1	Pass
L9	8.25 - 6.25	Pole	TP44.0573x43.7172x0.596	9	-38.53	3777.23	96.1	Pass
L10	6.25 - 0	Pole	TP45.12x44.0573x0.5918	10	-40.64	3837.49	98.0	Pass
							Summary	
						Pole (L8)	98.1	Pass
						RATING =	**98.1**	**Pass**

APPENDIX B

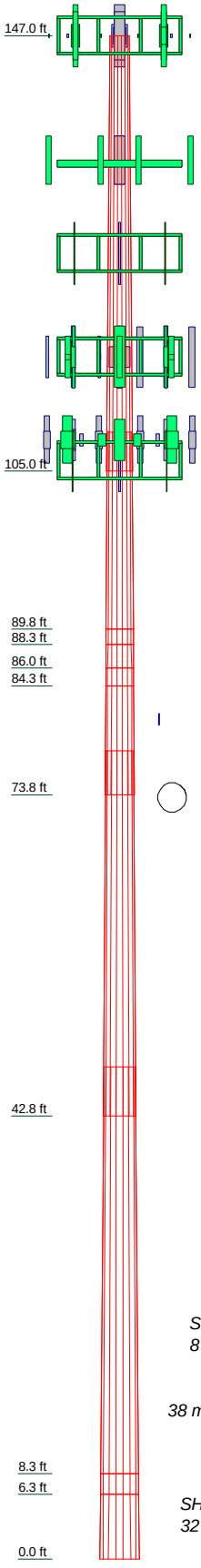
BASE LEVEL DRAWING


(RESERVED)
(1) 5/8" TO 147 FT LEVEL
(INSTALLED)
(3) 1/2" TO 80 FT LEVEL
(3) 1-1/4" TO 147 FT LEVEL
Q4
Q1
Q3
Q2
(PROPOSED)
(1) 1-3/16" TO 135 FT LEVEL
(INSTALLED)
(6) 1-5/8" TO 135 FT LEVEL
(RESERVED)
(1) 1-5/8" TO 116 FT LEVEL
(INSTALLED)
(12) 1-5/8" TO 116 FT LEVEL
(INSTALLED)
(1) 3/8" TO 106 FT LEVEL
(12) 1-1/4" TO 106 FT LEVEL
(INSTALLED-IN A 2" INNERDUCT)
(2) 7/8" TO 106 FT LEVEL
(1) 1/4" TO 106 FT LEVEL

APPENDIX C

ADDITIONAL CALCULATIONS

Section	1	2	3	4	5	6	7	8	9	10
Length (ft)	42.00	19.00	1.50	2.25	1.75	10.50	35.25	39.25	2.00	6.25
Number of Sides	18	18	18	18	18	18	18	18	18	18
Thickness (in)	0.2500	0.3125	0.3125	0.3125	0.3125	0.4550	0.5370	0.5757	0.5960	0.5918
Socket Length (ft)						4.25	4.75			
Top Dia (in)	22.0000	28.0034	28.0034	28.0034	28.0034	32.1695	32.3223	36.6809	37.7172	44.0573
Bot Dia (in)	29.1410	31.2343	31.2343	31.2343	31.2343	33.9550	38.6010	43.7172	44.0573	45.1200
Grade	A607-60	Reinf 59.22 ksi	Reinf 59.22 ksi	Reinf 59.22 ksi	Reinf 59.22 ksi	Reinf 56.63 ksi	Reinf 58.30 ksi	Reinf 57.59 ksi	Reinf 57.90 ksi	Reinf 57.44 ksi
Weight (K)	2.9	1.9	0.2	0.4	0.3	1.7	7.1	9.7	0.6	1.8



AXIAL
57 K
SHEAR
8 K
MOMENT
866 kip-ft
TORQUE 0 kip-ft
38 mph WIND - 0.7500 in ICE
AXIAL
41 K
SHEAR
32 K
MOMENT
3386 kip-ft
TORQUE 2 kip-ft
REACTIONS - 85 mph WIND

DESIGNED APPURTENANCE LOADING

TYPE	ELEVATION	TYPE	ELEVATION
APXVSPP18-C-A20 w/ Mount Pipe	147	(2) FD9R6004/2C-3L	116
APXVSPP18-C-A20 w/ Mount Pipe	147	(2) FD9R6004/2C-3L	116
APXVSPP18-C-A20 w/ Mount Pipe	147	(2) FD9R6004/2C-3L	116
800 EXTERNAL NOTCH FILTER	147	(2) ClearGain Dual Band 800/1900 MHz	116
800 EXTERNAL NOTCH FILTER	147	BXA-171063-12CF-EDIN-2 w/ Mount Pipe	116
800 EXTERNAL NOTCH FILTER	147	BXA-171063-12CF-EDIN-2 w/ Mount Pipe	116
(3) ACU-A20-N	147	BXA-171063-12CF-EDIN-2 w/ Mount Pipe	116
(3) ACU-A20-N	147	RRH2x40-AWS	116
(3) ACU-A20-N	147	RRH2x40-AWS	116
1900MHz RRH (65MHz)	147	RRH2x40-AWS	116
1900MHz RRH (65MHz)	147	DB-T1-6Z-8AB-0Z	116
1900MHz RRH (65MHz)	147	Platform Mount [LP 712-1]	116
800MHZ RRH	147	(2) Powerwave Technologies 7770 w/ Mount Pipe	106
800MHZ RRH	147	(2) Powerwave Technologies 7770 w/ Mount Pipe	106
800MHZ RRH	147	(2) Powerwave Technologies 7770 w/ Mount Pipe	106
APXVTM14-C-120 w/ Mount Pipe	147	AM-X-CD-14-65-00T-RET w/ Mount Pipe	106
APXVTM14-C-120 w/ Mount Pipe	147	AM-X-CD-14-65-00T-RET w/ Mount Pipe	106
APXVTM14-C-120 w/ Mount Pipe	147	AM-X-CD-14-65-00T-RET w/ Mount Pipe	106
TD-RRH8x20-25	147	(4) Powerwave Technologies LGP2140X	106
TD-RRH8x20-25	147	(4) Powerwave Technologies LGP2140X	106
TD-RRH8x20-25	147	(4) Powerwave Technologies LGP2140X	106
Platform Mount [LP 712-1]	147	DC6-48-60-18-8F	106
Miscellaneous (NA507-1)	147	(2) RRUS-11	106
ERICSSON AIR 21 B2A B4P w/ Mount Pipe	135	(2) RRUS-11	106
(2) ERICSSON AIR 21 B2A B4P w/ Mount Pipe	135	(2) RRUS-11	106
ERICSSON AIR 21 B4A B2P w/ Mount Pipe	135	2.375" OD x 6' Mount Pipe	106
(2) ERICSSON AIR 21 B4A B2P w/ Mount Pipe	135	2.375" OD x 6' Mount Pipe	106
T-Arm Mount [TA 601-3]	135	2.375" OD x 6' Mount Pipe	106
(4) 2.375" OD x 6' Mount Pipe	126	Platform Mount [LP 712-1]	106
(4) 2.375" OD x 6' Mount Pipe	126	KS24019-L112A	80
(4) 2.375" OD x 6' Mount Pipe	126	Kathrein OG-860/1920/GPS-A	80
Platform Mount [LP 712-1]	126	KS24019-L112A	80
(2) LPA-80080/4CF w/ Mount Pipe	116	Side Arm Mount [SO 701-3]	80
(2) LPA-80063/6CF w/ Mount Pipe	116		
(2) APL868013 w/ Mount Pipe	116		
BXA-70063-6CF-2 w/ Mount Pipe	116		
BXA-70063-6CF-2 w/ Mount Pipe	116		
BXA-70063/6CF-2 w/ Mount Pipe	116		
BXA-171085-8BF-EDIN-2 w/ Mount Pipe	116		
BXA-171085-8BF-EDIN-2 w/ Mount Pipe	116		
BXA-171085-8BF-EDIN-2 w/ Mount Pipe	116		

MATERIAL STRENGTH

GRADE	Fy	Fu	GRADE	Fy	Fu
A607-60	60 ksi	75 ksi	Reinf 57.59 ksi	58 ksi	72 ksi
Reinf 59.22 ksi	59 ksi	75 ksi	Reinf 57.90 ksi	58 ksi	73 ksi
Reinf 57.17 ksi	57 ksi	72 ksi	Reinf 57.44 ksi	57 ksi	72 ksi
Reinf 56.63 ksi	57 ksi	71 ksi	Reinf 57.37 ksi	57 ksi	72 ksi
Reinf 58.30 ksi	58 ksi	73 ksi			

TOWER DESIGN NOTES

1. Tower is located in New Haven County, Connecticut.
2. Tower designed for a 85 mph basic wind in accordance with the TIA/EIA-222-F Standard.
3. Tower is also designed for a 38 mph basic wind with 0.75 in ice. Ice is considered to increase in thickness with height.
4. Deflections are based upon a 50 mph wind.
5. TOWER RATING: 98.1%

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

Job: *147 ft Monopole / Secondino Property*			
Project: *PJF 37514-0035 / BU 876316*			
Client: CCI	Drawn by: Joey Meinerding	App'd:	
Code: TIA/EIA-222-F	Date: 06/26/14	Scale: NTS	
Path: T:\375_Crown_Castle\2014\37514-0035 BU 876316\WO 780431 BU 876316_SA 002\37514-0035-002.7805_Reinforced.eri		Dwg No. E-1	

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

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

Site Data

BU#: *876316*
Site Name: *Secondino Property*
App #:

Anchor Rod Data		
Qty:	16	
Diam:	2.25	in
Rod Material:	A615-J	
Yield, Fy:	75	ksi
Strength, Fu:	100	ksi
Bolt Circle:	52	in
Anchor Spacing:	6	in

Plate Data		
W=Side:	53	in
Thick:	3	in
Grade:	60	ksi
Clip Distance:	0	in

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

Pole Data		
Diam:	45.12	in
Thick:	0.4375	in
Grade:	65	ksi
# of Sides:	18	"0" IF Round

Stress Increase Factor		
ASD ASIF:	1.333	

Base Reactions		
TIA Revision:	F	
Unfactored Moment, M:	3386	ft-kips
Unfactored Axial, P:	41	kips
Unfactored Shear, V:	32	kips

Anchor Rod Results

TIA F --> Maximum Rod Tension	192.8 Kips
Allowable Tension:	195.0 Kips
Anchor Rod Stress Ratio:	98.9% **Pass**

Base Plate Results Flexural Check

Base Plate Stress:	44.4 ksi
Allowable PL Bending Stress:	60.0 ksi
Base Plate Stress Ratio:	74.1% **Pass**

PL Ref. Data
Yield Line (in):
29.83
Max PL Length:
29.83

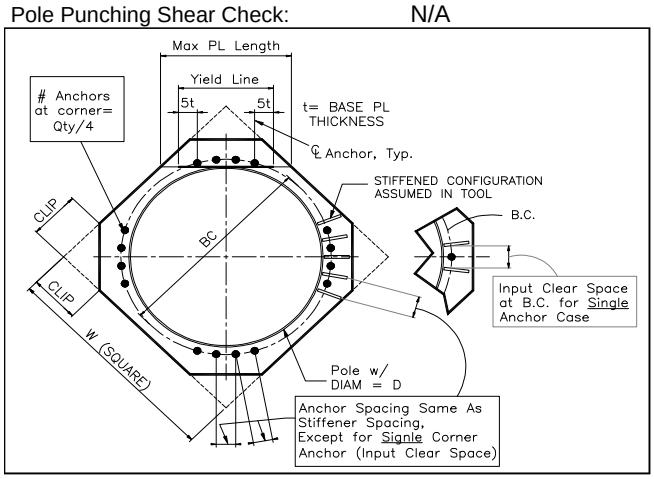
N/A - Unstiffened

Stiffener Results

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

Pole Results

Pole Punching Shear Check: N/A



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

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

Job Number: 37514-0035.002.7805
Site Number: 876316
Site Name: Secondino Property

By: JWM
Date: 6/26/2014

DRILLED PIER SOIL AND STEEL ANALYSIS - TIA/EIA-222-F

Unfactored Base Reactions from RISA

	Comp. (+)	Tension (-)	
Moment, M =	3386.0		k-ft
Shear, V =	32.0		kips
Axial Load, P =	41.0		kips
OTM =	3402.0	0.0	k-ft @ Ground

Safety Factors / Load Factors / Φ Factors

Tower Type =	Monopole DP
ACI Code =	ACI 318-02
Seismic Design Category =	D
Reference Standard =	TIA/EIA-222-F
Use 1.3 Load Factor?	Yes
Load Factor =	1.30

Drilled Pier Parameters

Diameter =	7	ft
Height Above Grade =	0.5	ft
Depth Below Grade =	22.5	ft
fc' =	3	ksi
εc =	0.003	in/in
Mat Ftdn. Cap Width =		ft
Mat Ftdn. Cap Length =		ft
Depth Below Grade =		ft

	Safety Factor	Φ Factor
Soil Lateral Resistance =	2.00	0.75
Skin Friction =	2.00	0.75
End Bearing =	2.00	0.75
Concrete Wt. Resist Uplift =	1.25	

Load Combinations Checked per TIA/EIA-222-F

1. Ult. Skin Friction/2.00 + Ult. End Bearing/2.00
 + Effective Soil Wt. - Buoyant Conc. Wt. ≥ Comp.
2. Ult. Skin Friction/2.00 + Buoyant Conc. Wt./1.25 ≥ Uplift
3. Ult. Skin Friction/1.50 + Buoyant Conc. Wt./1.50 ≥ Uplift

Steel Parameters

Number of Bars =	32	
Rebar Size =	#11	
Rebar Fy =	60	ksi
Rebar MOE =	29000	ksi
Tie Size =	#5	
Side Clear Cover to Ties =	4	in

Soil Parameters

Water Table Depth =	7.50	ft
Depth to Ignore Soil =	3.50	ft
Depth to Full Cohesion =	0	ft
Full Cohesion Starts at?	Ground	

Above Full Cohesion Lateral Resistance = 4(Cohesion)(Dia)(H)
Below Full Cohesion Lateral Resistance = 8(Cohesion)(Dia)(H)

Direct Embed Pole Shaft Parameters

Dia @ Grade =		in
Dia @ Depth Below Grade =		in
Number of Sides =		
Thickness =		in
Fy =		ksi
Backfill Condition =		

Maximum Capacity Ratios

Maximum Soil Ratio =	110.0%
Maximum Steel Ratio =	105.0%

Define Soil Layers

Note: Cohesion = Undrained Shear Strengh = Unconfined Compressive Strength / 2

Layer	Thickness ft	Unit Weight pcf	Cohesion psf	Friction Angle degrees	Soil Type	Ultimate End Bearing psf	Comp. Ult. Skin Friction psf	Tension Ult. Skin Friction psf	Depth ft
1	5	100	0	36	Sand				5
2	2.5	135	0	36	Sand				7.5
3	18.5	135	0	36	Sand	16000			26
4									
5									
6									
7									
8									
9									
10									
11									
12									

Soil Results: Overturning

Depth to COR =	15.91	ft, from Grade	Shear, V =	32.00	kips
Bending Moment, M =	3911.18	k-ft, from COR	Resisting Shear, Va =	32.62	kips
Resisting Moment, Ma =	3986.40	k-ft, from COR			

MOMENT RATIO = 98.1% OK **SHEAR RATIO = 98.1% OK**

Soil Results: Uplift

Uplift, T =	0.00	kips
Allowable Uplift Cap., Ta =	77.40	kips

UPLIFT RATIO = 0.0% OK

Soil Results: Compression

Compression, C =	41.00	kips
Allowable Comp. Cap., Ca =	285.27	kips

COMPRESSION RATIO = 14.4% OK

Steel Results (ACI 318-02):

Minimum Steel Area =	18.47	sq in	Axial Load, P =	72.75	kips @ 5.00 ft Below Grade
Actual Steel Area =	49.92	sq in	Moment, M =	3544.14	k-ft @ 5.00 ft Below Grade
			Allowable Moment, Ma =	5826.25	k-ft
Allowable Min Axial, Pa =	-2073.60	kips, Where Ma = 0 k-ft			
Allowable Max Axial, Pa =	6799.77	kips, Where Ma = 0 k-ft			

MOMENT RATIO = 60.8% OK

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Moment Capacity of Drilled Concrete Shaft (Caisson) for TIA Rev F or G

Note: Shaft assumed to have ties, not spiral, transverse reinforcing

Site Data

BU#: *876316*
Site Name: *Secondino Property*
App #:

Enter Load Factors Below:		
For M (WL)	1.3	<---- Enter Factor
For P (DL)	1.3	<---- Enter Factor

Pier Properties

Concrete:

Pier Diameter =	7.0	ft
Concrete Area =	5541.8	in^2

Reinforcement:

Clear Cover to **Tie**=	4.00	in
Horiz. **Tie** Bar Size=	5	
Vert. Cage Diameter =	6.11	ft
Vert. Cage Diameter =	73.34	in
Vertical Bar Size =	11	
Bar Diameter =	1.41	in
Bar Area =	1.56	in^2
Number of Bars =	32	
As Total=	49.92	in^2
A s/ Aconc, Rho:	0.0090	0.90%

ACI 10.5 , ACI 21.10.4, and IBC 1810.
Min As for Flexural, Tension Controlled, Shafts:
(3)*(Sqrt(f'c)/Fy: 0.0027
200 / Fy: 0.0033

Minimum Rho Check:

Actual Req'd Min. Rho:	0.33%	Flexural
Provided Rho:	0.90%	**OK**

Ref. Shaft Max Axial Capacities, ϕ Max(Pn or Tn):		
Max Pu = (φ=0.65) Pn.		
Pn per ACI 318 (10-2)	8839.70	kips
at Mu=(ϕ=0.65)Mn=	5309.39	ft-kips
Max Tu, (φ=0.9) Tn =	2695.68	kips
at Mu=ϕ=(0.90)Mn=	0.00	ft-kips

Maximum Shaft Superimposed Forces

TIA Revision:	F	
Max. Service Shaft M:	3544.14	ft-kips **(* Note)**
Max. Service Shaft P:	72.75	kips
Max Axial Force Type:	Comp.	

(*) Note: Max Shaft Superimposed Moment does not necessarily equal to the shaft top reaction moment

Load Factor	**Shaft Factored Loads**		
1.30	Mu:	4607.382	ft-kips
1.30	Pu:	94.575	kips

Material Properties

Concrete Comp. strength, f'c =	3000	psi
Reinforcement yield strength, Fy =	60	ksi
Reinforcing Modulus of Elasticity, E =	29000	ksi
Reinforcement yield strain =	0.00207	
Limiting compressive strain =	0.003	

ACI 318 Code

Select Analysis ACI Code= 2002

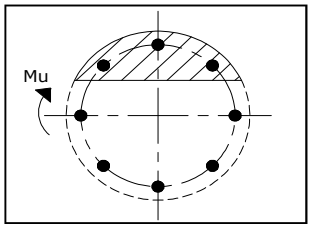
Seismic Properties

Seismic Design Category =	D
Seismic Risk =	**High**

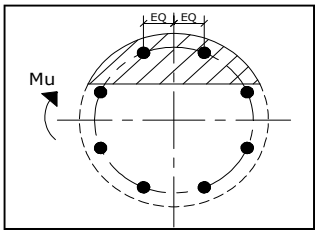
Solve (Run) <-- Press Upon Completing All Input

Results:

Governing Orientation Case: **2**



Case 1



Case 2

Dist. From Edge to Neutral Axis:	**17.11**	in
Extreme Steel Strain, ϵt:	**0.0108**	
	ϵt > 0.0050, Tension Controlled	
Reduction Factor,φ:	**0.900**	

Output Note: Negative Pu=Tension

For Axial Compression, φ Pn = Pu:	94.58	kips
Drilled Shaft Moment Capacity, φMn:	**7574.13**	ft-kips
Drilled Shaft Superimposed Mu:	**4607.38**	ft-kips

(Mu/φMn, Drilled Shaft Flexure CSR:	**60.8%**

EBI Consulting
environmental | engineering | due diligence

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

T-Mobile Existing Facility

Site ID: CTNH509A

Crown Branford Acorn Road Monopole

21 Acorn Road
Branford, CT 06405

August 14, 2014

EBI PROJECT NUMBER: 62144269

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

EBI Consulting
environmental | engineering | due diligence

August 14, 2014

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

Re: Emissions Values for Site: **CTNH509A - Crown Branford Acorn Road Monopole**

EBI Consulting was directed to analyze the proposed T-Mobile facility located at 21 Acorn Road, Branford, CT, for the purpose of determining whether the emissions from the Proposed T-Mobile Antenna Installation located on this property are within specified federal limits.

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

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

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

Public exposure to radio frequencies is regulated and enforced in units of microwatts per square centimeter (µW/cm2). The general population exposure limit for the cellular band is 567 µW/cm2, and the general population exposure limit for the PCS and AWS bands is 1000 µW/cm2. Because each carrier will be using different frequency bands, and each frequency band has different exposure limits, it is necessary to report percent of MPE rather than power density.

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

Additional details can be found in FCC OET 65.

CALCULATIONS

Calculations were done for the proposed T-Mobile Wireless antenna facility located at 21 Acorn Road, Branford, CT, using the equipment information listed below. All calculations were performed per the specifications under FCC OET 65. Since T-Mobile is proposing highly focused directional panel antennas, which project most of the emitted energy out toward the horizon, the actual antenna pattern gain value in the direction of the sample area was used. For this report the sample point is a 6 foot person standing at the base of the tower

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

1) 2 GSM channels (1935.000 MHz—to 1945.000 MHz / 1980.000 MHz—to 1985.000 MHz) were considered for each sector of the proposed installation.
2) 2 UMTS channels (2110.000 to 2120.000 MHz / 2140.000 MHz to 2145.000 MHz) were considered for each sector of the proposed installation.
3) 2 LTE channels (2110.000 to 2120.000 MHz / 2140.000 MHz to 2145.000 MHz) were considered for each sector of the proposed installation.
4) All radios at the proposed installation were considered to be running at full power and were uncombined in their RF transmissions paths per carrier prescribed configuration. Per FCC OET Bulletin No. 65 - Edition 97-01 recommendations to achieve the maximum anticipated value at each sample point, all power levels emitting from the proposed antenna installation are increased by a factor of 2.56 to account for possible in-phase reflections from the surrounding environment. This is rarely the case, and if so, is never continuous.
5) For the following calculations the sample point was the top of a six foot person standing at the base of the tower. The actual gain in this direction was used per the manufactures supplied specifications.
6) The antenna used in this modeling is the Ericsson AIR21 for LTE, UMTS and GSM. This is based on feedback from the carrier with regards to anticipated antenna selection. This antenna has a 15.6 dBd gain value at its main lobe. Actual antenna gain values were used for all calculations as per the manufacturers specifications

7) The antenna mounting height centerline of the proposed antennas is **135 feet** above ground level (AGL)
8) Emissions values for additional carriers were taken from the Connecticut Siting Council active database. Values in this database are provided by the individual carriers themselves.

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

Site ID	CTNH509A Crown Branford Acorn Road Monopole
Site Addresss	21 Acorn Road, Branford, CT 06405
Site Type	Monopole

Sector 1

Antenna Number	Antenna Make	Antenna Model	Status	Frequency Band	Technology	Power Out Per Channel (Watts)	Number of Channels	Composite Power	Antenna Gain in direction of sample point (dBd)	Antenna Height (ft)	analysis height	Cable Size	Cable Loss (dB)	Additional Loss	ERP	Power Density Value	Power Density Percentage
1a	Ericsson	AIR21 B4A/B2P	Active	AWS - 2100 MHz	LTE	60	2	120	-3.95	135	129	None	0	0	48.326044	1.044018	0.10440%
1b	Ericsson	AIR21 B4A/B2P	Not Used	-	-			0	-3.95	135	129	None	0	0	0	0	0.00000%
2a	Ericsson	AIR21 B2A / B4P	Active	PCS - 1950 MHz	GSM / UMTS	30	2	60	-3.95	135	129	1-5/8"	0	0	24.163022	0.522009	0.05220%
2B	Ericsson	AIR21 B2A / B4P	Passive	AWS - 2100 MHz	UMTS	30	2	60	-3.95	135	129	1-5/8"	0	0	24.163022	0.522009	0.05220%
														Sector total Power Density Value:		0.209%	

Sector 2

Antenna Number	Antenna Make	Antenna Model	Status	Frequency Band	Technology	Power Out Per Channel (Watts)	Number of Channels	Composite Power	Antenna Gain in direction of sample point (dBd)	Antenna Height (ft)	analysis height	Cable Size	Cable Loss (dB)	Additional Loss	ERP	Power Density Value	Power Density Percentage
1a	Ericsson	AIR21 B4A/B2P	Active	AWS - 2100 MHz	LTE	60	2	120	-3.95	135	129	None	0	0	48.326044	1.044018	0.10440%
1b	Ericsson	AIR21 B4A/B2P	Not Used	-	-			0	-3.95	135	129	None	0	0	0	0	0.00000%
2a	Ericsson	AIR21 B2A / B4P	Active	PCS - 1950 MHz	GSM / UMTS	30	2	60	-3.95	135	129	1-5/8"	0	0	24.163022	0.522009	0.05220%
2b	Ericsson	AIR21 B2A / B4P	Passive	AWS - 2100 MHz	UMTS	30	2	60	-3.95	135	129	1-5/8"	0	0	24.163022	0.522009	0.05220%
														Sector total Power Density Value:		0.209%	

Sector 3

Antenna Number	Antenna Make	Antenna Model	Status	Frequency Band	Technology	Power Out Per Channel (Watts)	Number of Channels	Composite Power	Antenna Gain in direction of sample point (dBd)	Antenna Height (ft)	analysis height	Cable Size	Cable Loss (dB)	Additional Loss	ERP	Power Density Value	Power Density Percentage
1a	Ericsson	AIR21 B4A/B2P	Active	AWS - 2100 MHz	LTE	60	2	120	-3.95	135	129	None	0	0	48.326044	1.044018	0.10440%
1b	Ericsson	AIR21 B4A/B2P	Not Used	-	-			0	-3.95	135	129	None	0	0	0	0	0.00000%
2a	Ericsson	AIR21 B2A / B4P	Active	PCS - 1950 MHz	GSM / UMTS	30	2	60	-3.95	135	129	1-5/8"	0	0	24.163022	0.522009	0.05220%
2b	Ericsson	AIR21 B2A / B4P	Passive	AWS - 2100 MHz	UMTS	30	2	60	-3.95	135	129	1-5/8"	0	0	24.163022	0.522009	0.05220%
														Sector total Power Density Value:		0.209%	

Site Composite MPE %

Carrier	MPE %
T-Mobile	0.626%
AT&T	46.910%
Verizon Wireless	27.060%
Sprint	2.960%
Nextel	3.380%
Total Site MPE %	**80.936%**

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Summary

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

The anticipated Maximum Composite contributions from the T-Mobile facility are **0.626% (0.209% from each sector)** of the allowable FCC established general public limit considering all three sectors simultaneously sampled at the ground level.

The anticipated composite MPE value for this site assuming all carriers present is **80.936%** of the allowable FCC established general public limit sampled at the ground level. This is based upon values listed in the Connecticut Siting Council database for existing carrier emissions.

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

Scott Heffernan
RF Engineering Director

EBI Consulting
21 B Street
Burlington, MA 01803