Crown Castle
3530 Toringdon Way
Suite 300
Charlotte, NC 28277

Tel: 704-405-6600

www.crowncastle.com

March 26, 2014

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

RE: **T-Mobile-Exempt Modification - Crown Site BU: 876313**
T-Mobile Site ID: CT11453C
Located at: 1394 Route 322, Southington, CT 06410

Dear Ms. Bachman:

This letter and exhibits are submitted on behalf of T-Mobile. T-Mobile is making modifications to certain existing sites in its Connecticut system in order to implement their Modernization 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. Garry Brumback, Town Manager for Town of Southington.

T-Mobile plans to modify the existing wireless communications facility owned by Crown Castle and located at **1394 Route 322, Southington, CT 06410**. Attached are a compound plan and elevation depicting the planned changes (Exhibit-1), and documentation of the structural sufficiency of the structure to accommodate the revised antenna configuration (Exhibit-2). Also included is a power density table report reflecting the modification to T-Mobile's operations at the site (Exhibit-3).

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

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

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

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

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

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

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

Sincerely,

Jeff Barbadora
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. Garry Brumback, Town Manager
Town of Southington
75 Main Street
Southington, CT 06489

T-Mobile

NORTHEAST LLC.

SITE NAME: **SOUTHINGTON-SPRINT**

SITE ID NUMBER: **CT11453C**

SITE ADDRESS: 1394 ROUTE 322
SOUTHINGTON, CT 06410

PROJECT SUMMARY

SITE ID NUMBER:	CT11453C
SITE NAME:	SOUTHINGTON-SPRINT
CROWN BU#:	876313
SITE ADDRESS:	1394 ROUTE 322 SOUTHINGTON, CT 06410
COUNTY:	HARTFORD
PROPERTY OWNER:	CROWN CASTLE USA
APPLICANT:	T-MOBILE NORTHEAST, LLC. 35 GRIFFIN ROAD SOUTH BLOOMFIELD, CT 0602 PHONE: (800) 692-7100
ENGINEER/ SURVEYOR/ STRUCTURAL ENG:	TECTONIC ENGINEERING CONSULTANTS P.C. 1279 ROUTE 300 NEWBURGH, NY 12550
CONTACT: PHONE:	TAMMY NOSEK (845) 567-6656 EXT. 2807
SITE ACQUISITION:	CROWN CASTLE 1200 MACARTHUR BLVD SUITE 200 MAHWAH, NJ 07430
CONTACT: PHONE:	PAUL HUGHES (585) 259-7604
PARCEL INFO:	MAP 31 LOT 141
LATITUDE: (NAD 83)	41.56430 N
LONGITUDE: (NAD 83)	72.89180 W

SITE DIRECTIONS

HEAD NORTHEAST ON GRIFFIN RD S TOWARD W NEWBERRY RD. TAKE THE 1ST RIGHT ONTO W NEWBERRY RD. TURN LEFT ONTO WOODLAND AVE. TAKE THE 1ST RIGHT ONTO CT-187 S/BLUE HILLS AVE. TURN LEFT ONTO CT-178 E/E WINTONBURY AVE. CONTINUE TO FOLLOW CT-178 E. TURN RIGHT TO MERGE ONTO I-91 S TOWARD HARTFORD. TAKE EXIT 32A-32B FOR I-84 W/TRUMBULL ST TOWARD WATERBURY. TAKE EXIT 32A ON THE LEFT FOR I-84 W TOWARD WATERBURY. MERGE ONTO I-84. TAKE EXIT 29 ON THE LEFT FOR CT-10 TOWARD MILLDALE. TURN RIGHT ONTO CT-10 S/S MAIN ST. TAKE THE 2ND RIGHT ONTO CLARK ST. TURN LEFT ONTO CT-322 W/MERIDEN-WATERBURY TURNPIKE. DESTINATION WILL BE ON YOUR RIGHT.

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	1
A-8	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".

Know what's **below.**
Call before you dig.

CONFIGURATION
2C
REFER TO LATEST T-MOBILE RF DATA SHEET FOR FINAL RF DESIGN & BOM.

0 1 2 3
ORIGINAL SIZE IN INCHES

TECTONIC
• PLANNING • CONSTRUCTION MANAGEMENT
• ENGINEERING
• SURVEYING
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NEWBURGH, NY 12550
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Fax: (845) 567-8703

T-Mobile
T-MOBILE NORTHEAST LLC.
35 GRIFFIN ROAD SOUTH
BLOOMFIELD, CT 06002
PHONE: (860) 692-7100

CROWN CASTLE

APPROVALS

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

PROJECT NUMBER	DESIGNED BY
7061.CT11453C	JQ

REV	DATE	REVISION	DRAWN BY
0	02/21/14	FOR COMMENT	MP
1	03/21/14	FOR CONSTRUCTION	MP

ISSUED BY	DATE
JMQ	3/24/14

STATE OF CONNECTICUT
ANTONIO A. GUALTIERI
No. 25486
LICENSED
PROFESSIONAL ENGINEER

SITE INFORMATION

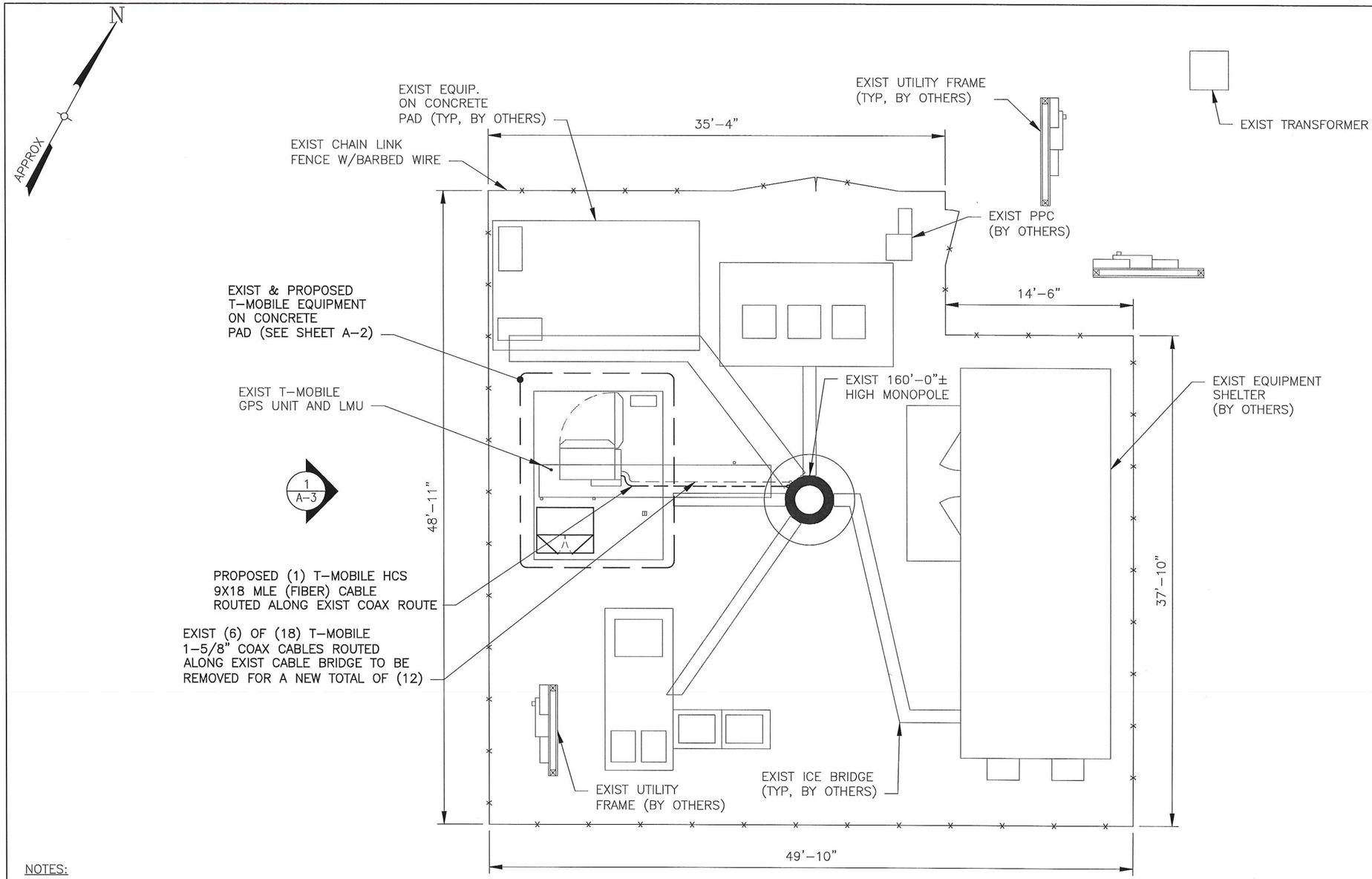
CT11453C
SOUTHINGTON-SPRINT
1394 ROUTE 322
SOUTHINGTON, CT 06410

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 EXTERIOR OF THE 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

2C

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

0 1 2 3

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- PLANNING
- ENGINEERING
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BLOOMFIELD, CT 06002
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CROWN CASTLE

APPROVALS

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RF _____
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ISSUED BY: JMQ — DATE: 3/21/14

STATE OF CONNECTICUT
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No. 25406
LICENSED
PROFESSIONAL ENGINEER

SITE INFORMATION

CT11453C
SOUTHINGTON-SPRINT
1394 ROUTE 322
SOUTHINGTON, CT 06410

SHEET TITLE

SITE PLAN

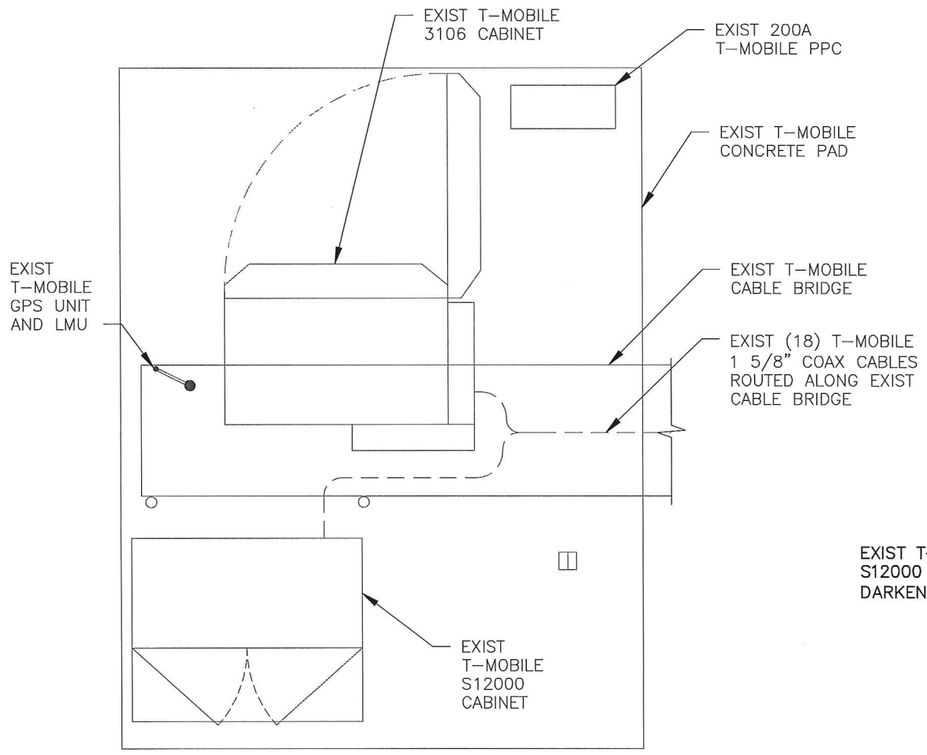
SHEET NUMBER

A-1

N

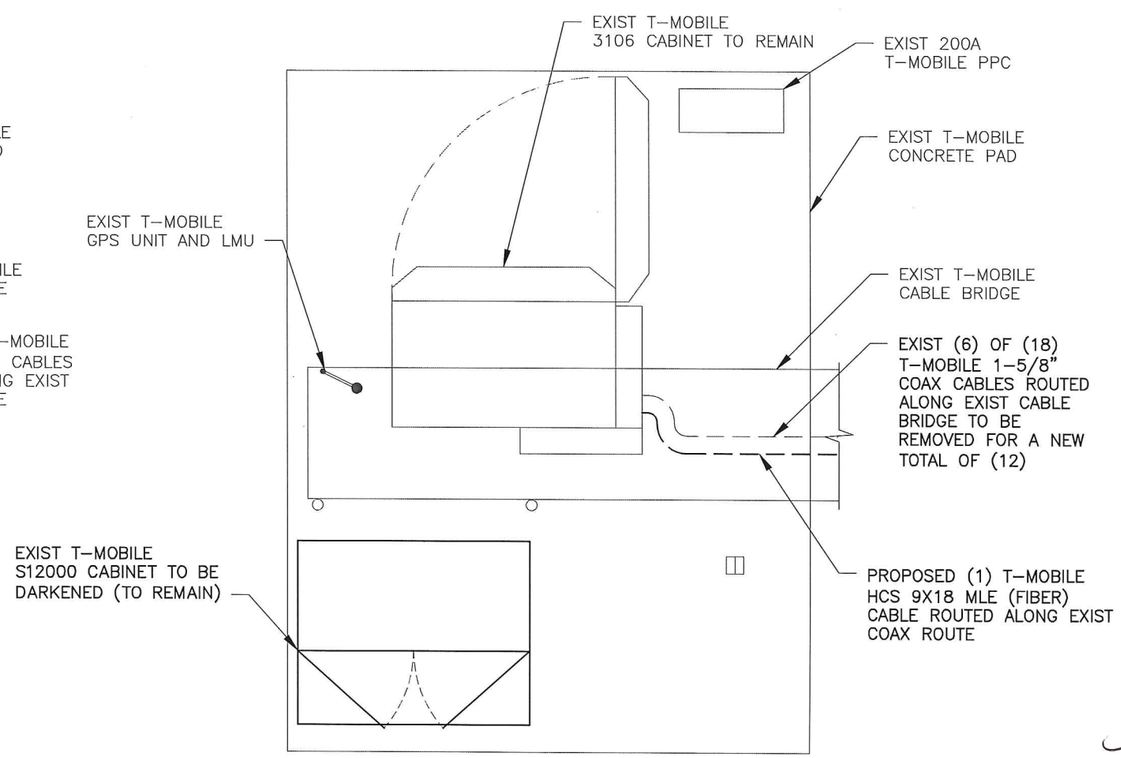
APPROX

HCS LENGTH			
FROM EQUIPMENT CABINET TO ANTENNA			
SECTOR	ALPHA	BETA	GAMMA
LENGTH	160'±	160'±	160'±
SIZE	1"		
HCS 9x18 MLE (1" OD, 1.03 LB/FT)			



1 / A-2 EXIST EQUIPMENT PLAN

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



2 / A-2 PROPOSED EQUIPMENT PLAN

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

CONFIGURATION
2C
REFER TO LATEST T-MOBILE RF DATA SHEET FOR FINAL RF DESIGN & BOM.

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CROWN CASTLE

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RF
CONSTRUCTION
OPERATIONS
SITE ACQ.

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ANTONIO A. GUALTIERI
STATE OF CONNECTICUT
No. 25406
LICENSED
PROFESSIONAL ENGINEER

SITE INFORMATION

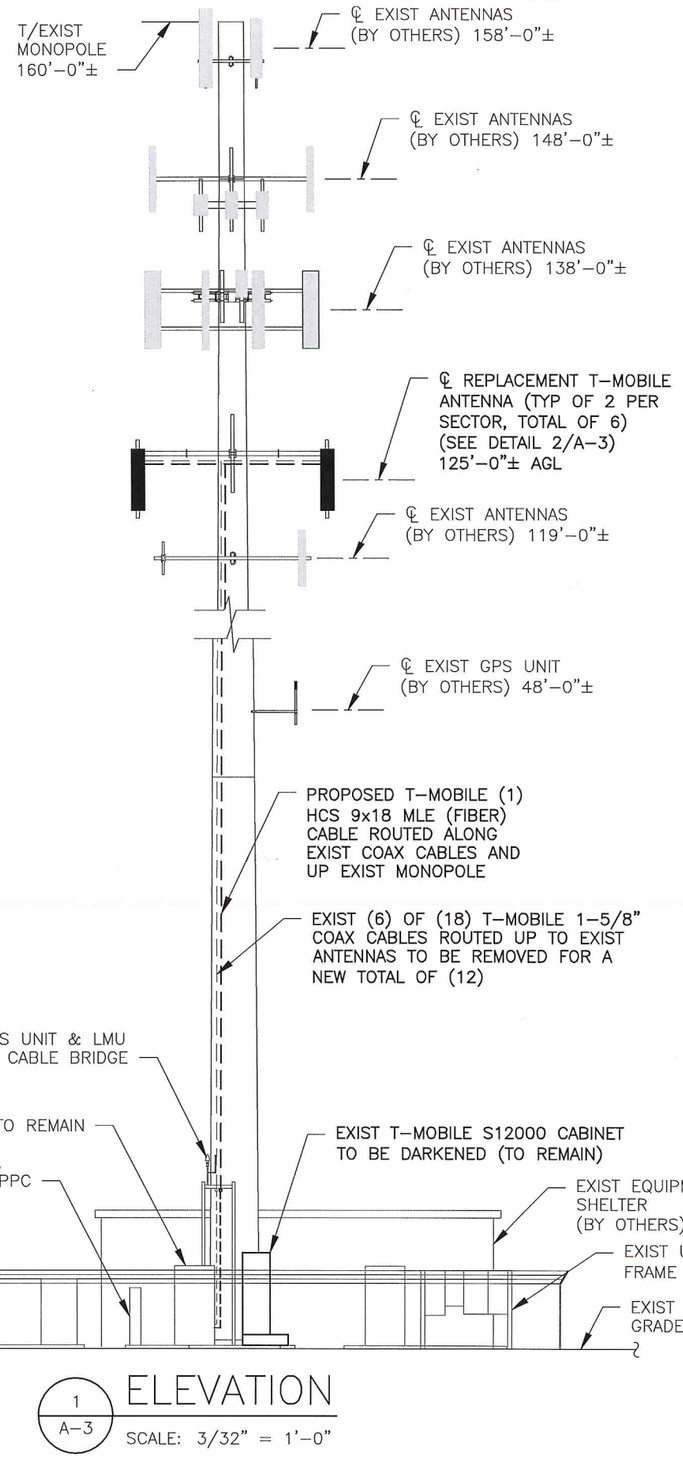
CT11453C
SOUTHINGTON-SPRINT
1394 ROUTE 322
SOUTHINGTON, CT 06410

SHEET TITLE

EQUIPMENT LAYOUT PLANS

SHEET NUMBER

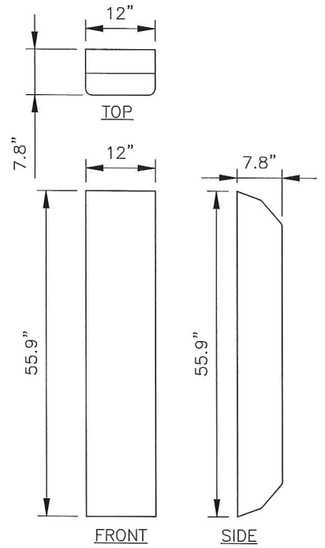
A-2



1/A–3 ELEVATION

SCALE: 3/32" = 1'–0"

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



AIR 21

2/A–3 ANTENNA DETAIL

SCALE: 1/2" = 1'–0"

ELEVATION NOTE:

ELEVATION OF EXIST MONOPOLE HAS BEEN ARBITRARILY ASSIGNED AS EL 286'–0"±. THIS IS APPROXIMATELY 160'–0"± ABOVE GRADE WHICH WAS ESTIMATED AS EL 126'–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.

CONFIGURATION

2C

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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T–Mobile
T–MOBILE NORTHEAST LLC.
35 GRIFFIN ROAD SOUTH
BLOOMFIELD, CT 06002
PHONE: (860) 692–7100

CROWN CASTLE

APPROVALS

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

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ISSUED BY	DATE
JMQ	3/21/14

STATE OF CONNECTICUT
ANTONIO A. GUALTIERI
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LICENSED
PROFESSIONAL ENGINEER

SITE INFORMATION

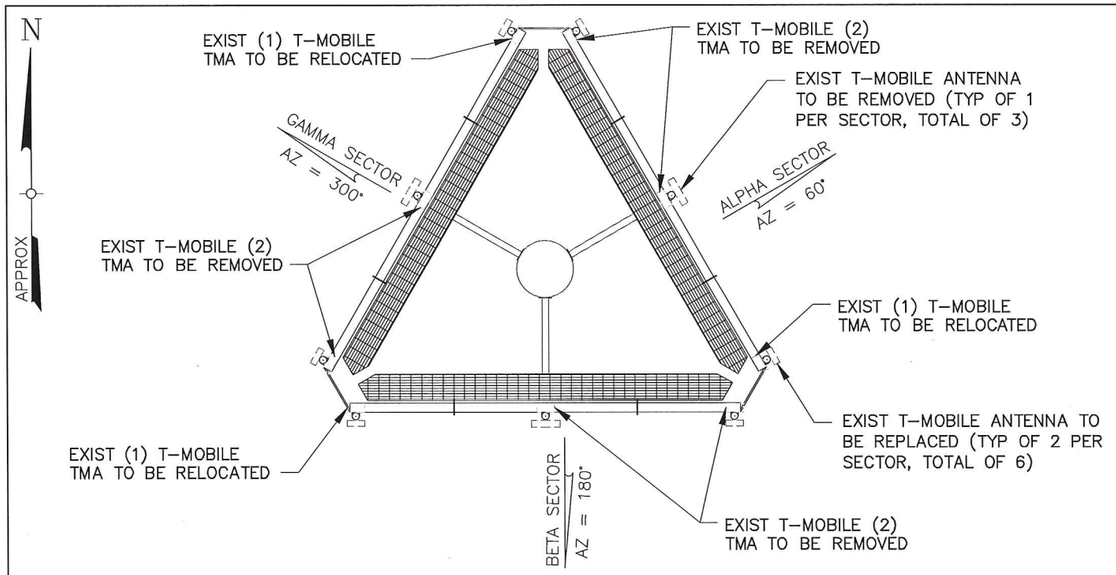
CT11453C
SOUTHINGTON–SPRINT
1394 ROUTE 322
SOUTHINGTON, CT 06410

SHEET TITLE

ELEVATION & DETAIL

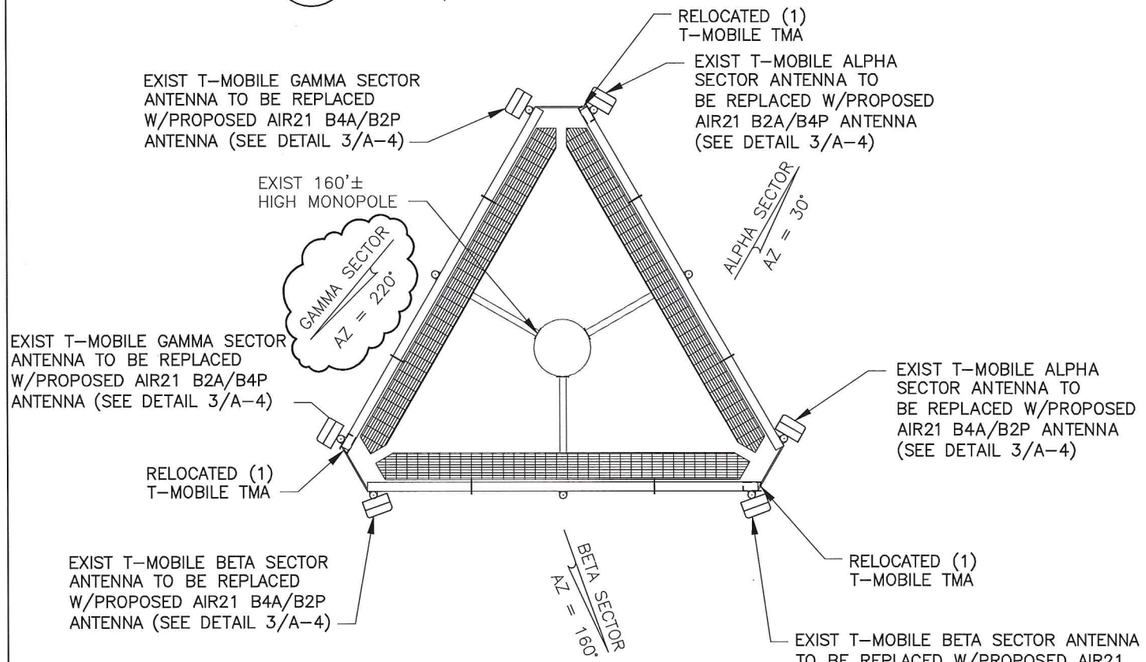
SHEET NUMBER

A–3



1 / A–4 EXIST ANTENNA PLAN

SCALE: 3/16" = 1'–0"



2 / A–4 PROPOSED ANTENNA PLAN

SCALE: 3/16" = 1'–0"

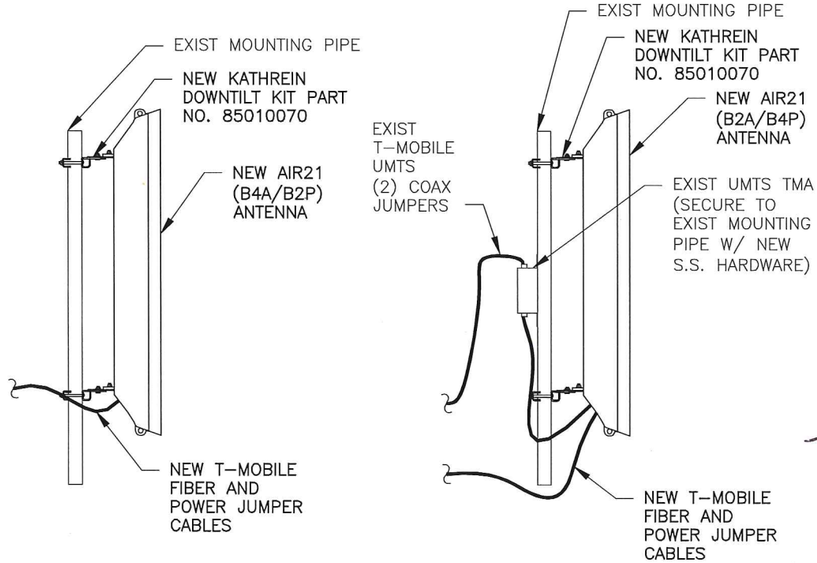
THE PROPOSED INSTALLATION & EXISTING MONOPOLE SHALL BE STRUCTURALLY ANALYZED BY A PROFESSIONAL ENGINEER LICENSED IN THE STATE OF CONNECTICUT (TO BE COORDINATED BY OTHERS).

EXIST ANTENNA SCHEDULE

SECTOR	MAKE	QUANTITY	MODEL#	SIZE
ALPHA	RFS	1	APX16DWV–16DWVS	55.9x13x3.15
	EMS	2	RR65–19–02DPL5	72x8x2.8
BETA	RFS	1	APX16DWV–16DWVS	55.9x13x3.15
	EMS	2	RR65–19–02DPL5	72x8x2.8
GAMMA	RFS	1	APX16DWV_16DWVS	55.9x13x3.15
	EMS	2	RR65–19–02DPL5	72x8x2.8

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



3 / A–4 ANTENNA DETAIL

SCALE: 1/2" = 1'–0"

CONFIGURATION

2C

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

T-Mobile

T–MOBILE NORTHEAST LLC.
35 GRIFFIN ROAD SOUTH
BLOOMFIELD, CT 06002
PHONE: (860) 692–7100

CROWN CASTLE

APPROVALS

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

PROJECT NUMBER	DESIGNED BY
7081.CT11453C	JQ

REV	DATE	REVISION	DRAWN BY
0	02/21/14	FOR COMMENT	MP
1	03/21/14	FOR CONSTRUCTION	MP

ISSUED BY: JMQ DATE: 3/21/14

STATE OF CONNECTICUT
ANTONIO A. GUALTIERI
No. 25406
LICENSED PROFESSIONAL ENGINEER

SITE INFORMATION

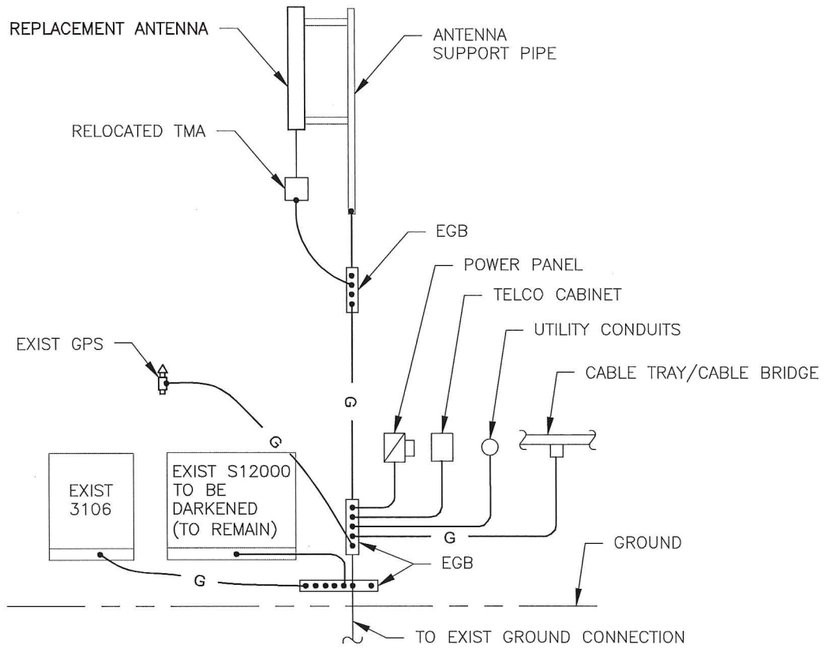
CT11453C
SOUTHINGTON–SPRINT
1394 ROUTE 322
SOUTHINGTON, CT 06410

SHEET TITLE

ANTENNA LAYOUT PLANS & DETAILS

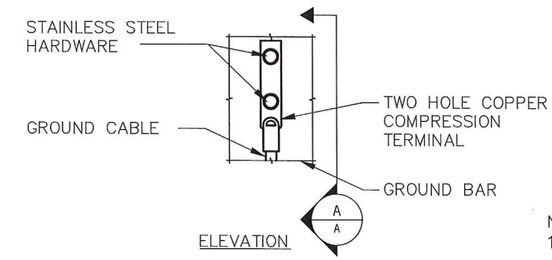
SHEET NUMBER

A–4



1 / A–5 GROUNDING RISER DIAGRAM

SCALE: NTS

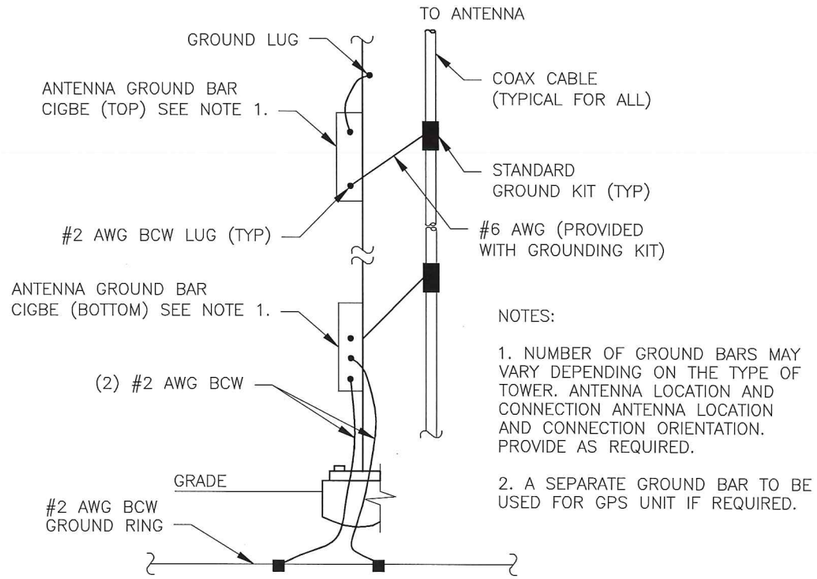


SECTION "A–A"

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 SEPARATE GROUND BAR TO BE USED FOR GPS UNIT IF REQUIRED.

3 / A–5 ANTENNA CABLE GROUNDING

SCALE: NTS

CONFIGURATION

2C

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

0 1 2 3

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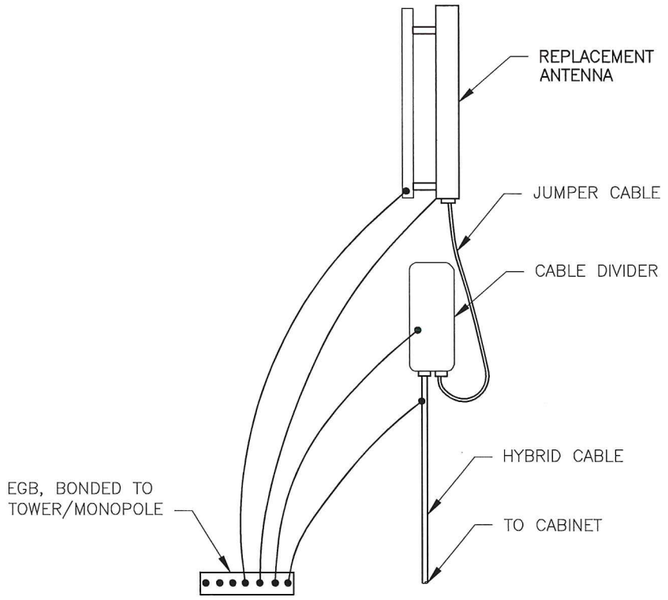
SHEET TITLE

DETAILS

SHEET NUMBER

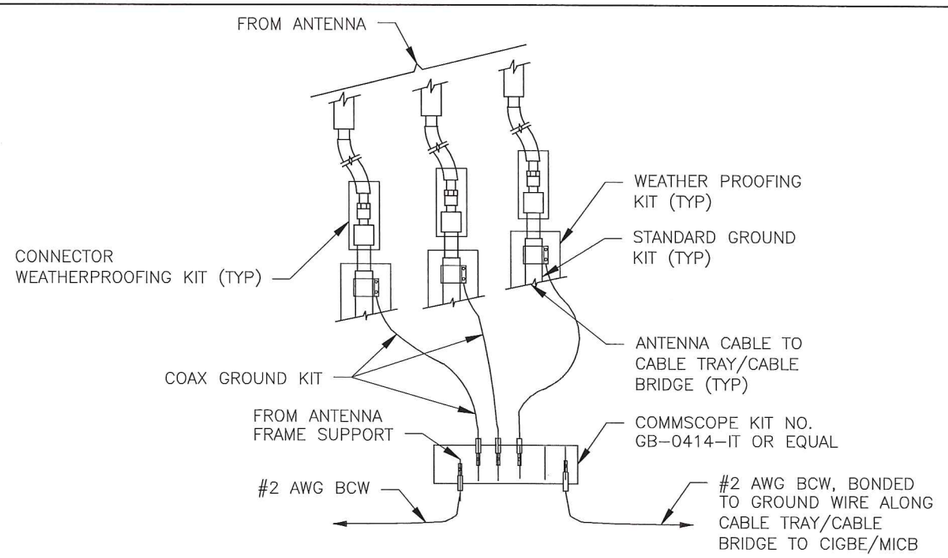
A–5



HYBRID CABLE CONNECTION AND GROUNDING DETAIL

1 / A-6

SCALE: NTS

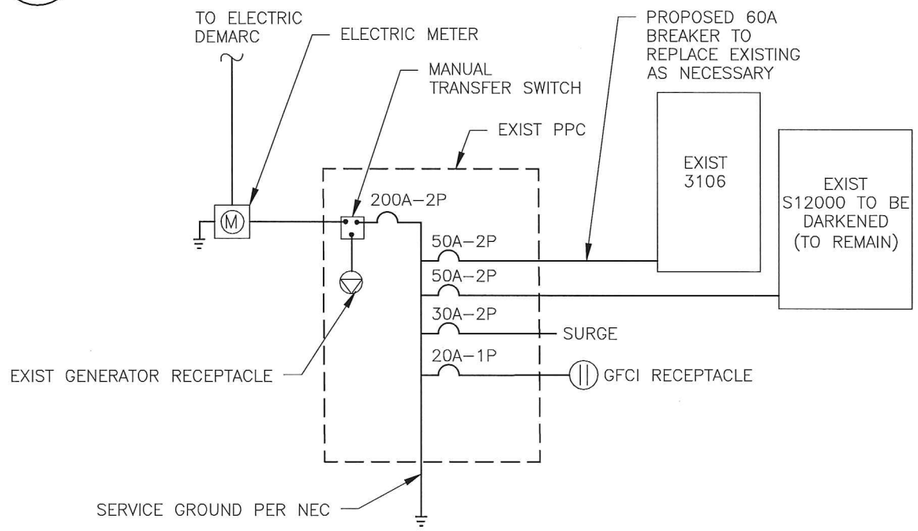


NOTE:
DO NOT INSTALL CABLE GROUND KIT AT A BEND AND ALWAYS DIRECT GROUND WIRE DOWN TO CIGBE.

GROUND WIRE TO GROUND BAR CONNECTION DETAIL

2 / A-6

SCALE: NTS



NOTE: CONTRACTOR TO VERIFY EXISTING CONDUCTORS ARE #6AWG OR LARGER FOR 60A CIRCUIT

ONE-LINE POWER DIAGRAM

3 / A-6

SCALE: NTS

CONFIGURATION

2C

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

0 1 2 3

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1394 ROUTE 322
SOUTHINGTON, CT 06410

SHEET TITLE

DETAILS

SHEET NUMBER

A-6

GENERAL NOTES

1. CONTRACTOR SHALL NOT COMMENCE ANY WORK UNTIL HE OBTAINS, AT HIS OWN EXPENSE, ALL INSURANCE REQUIRED BY T–MOBILE, 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 DIPPED 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 CONSTRUCTION CONTRACTOR IS SOLELY RESPONSIBLE FOR DETERMINING ALL CONSTRUCTION MEANS AND METHODS. THE CONSTRUCTION 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 T–MOBILE 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 LAND 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 AMENDMENTS) 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
2C
REFER TO LATEST T–MOBILE RF DATA SHEET FOR FINAL RF DESIGN & BOM.

0 1 2 3

ORIGINAL SIZE IN INCHES

TECTONIC
• PLANNING • CONSTRUCTION MANAGEMENT
• ENGINEERING
• SURVEYING
TECTONIC Engineering & Survey Consultants P.C.
1279 ROUTE 300
NEWBURGH, NY 12550
Phone: (845) 567–6656
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T–Mobile

T–MOBILE NORTHEAST LLC.
35 GRIFFIN ROAD SOUTH
BLOOMFIELD, CT 06002
PHONE: (860) 692–7100

CROWN CASTLE

APPROVALS

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

PROJECT NUMBER	DESIGNED BY
7061.CT11453C	JQ

REV	DATE	REVISION	DRAWN BY
0	02/21/14	FOR COMMENT	MP
1	03/21/14	FOR CONSTRUCTION	MP

ISSUED BY	DATE
JMQ	3/21/14

STATE OF CONNECTICUT
ANTONIO A. GUALTIERI
No. 25406
LICENSED PROFESSIONAL ENGINEER

SITE INFORMATION

CT11453C
SOUTHINGTON–SPRINT
1394 ROUTE 322
SOUTHINGTON, CT 06410

SHEET TITLE

NOTES

SHEET NUMBER

A–7

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 T–MOBILE 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.

TECTONIC
• PLANNING • CONSTRUCTION MANAGEMENT
• ENGINEERING
• SURVEYING
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CROWN CASTLE

APPROVALS

LANDLORD _____
RF _____
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PROJECT NUMBER	DESIGNED BY
7061.CT11453C	JQ

REV	DATE	REVISION	DRAWN BY
0	02/21/14	FOR COMMENT	MP
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ISSUED BY	DATE
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STATE OF CONNECTICUT
ANTONIO A. GUALTIERI
No. 25406
LICENSED
PROFESSIONAL ENGINEER

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CT11453C
SOUTHINGTON–SPRINT
1394 ROUTE 322
SOUTHINGTON, CT 06410

SHEET TITLE

NOTES

SHEET NUMBER

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CONFIGURATION

2C

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

0 1 2 3
ORIGINAL SIZE IN INCHES

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

Date: **March 11, 2014**

Patrick Byrum
Crown Castle
3530 Toringdon Way, Suite 300
Charlotte, NC 28277
704.405.6532

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

Subject: **Structural Analysis Report**

Carrier Designation:	***T-Mobile* Co-Locate**	
	Carrier Site Number:	CT11453C
	Carrier Site Name:	Sounthington - Sprint
Crown Castle Designation:	**Crown Castle BU Number:**	876313
	Crown Castle Site Name:	West Johnson Ave. Burnt House
	Crown Castle JDE Job Number:	260413
	Crown Castle Work Order Number:	724001
	Crown Castle Application Number:	217362 Rev. 0
Engineering Firm Designation:	**Paul J Ford and Company Project Number:**	37513-0756 R4
Site Data:	**1394 Meriden Waterbury Tpk, SOUTHINGTON, Hartford County, CT** **Latitude *41° 33' 51.39"*, Longitude *-72° 53' 30.7"*** **160 Foot - Monopole Tower**	

Dear Patrick Byrum,

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 624714, in accordance with application 217362, revision 0.

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

LC4.7: Modified Structure w/ 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 80 mph with no ice, 37.6 mph with 1 inch ice thickness and 50 mph under service loads.

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

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

Respectfully submitted by:

Bob Koors, E.I.
Structural Designer

tnxTower Report - version 6.1.4.1

STATE OF CONNECTICUT
JOSEPH PACHICARAH JACOBS
No. PEN 22731
LICENSED
PROFESSIONAL ENGINEER

MAR 1 1 2014

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

Date: **March 11, 2014**

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Subject: Structural Analysis Report

Carrier Designation:	***T-Mobile* Co-Locate**	
	Carrier Site Number:	CT11453C
	Carrier Site Name:	Sounthington - Sprint
Crown Castle Designation:	**Crown Castle BU Number:**	876313
	Crown Castle Site Name:	West Johnson Ave. Burnt House
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Respectfully submitted by:

Bob Koors, E.I.
Structural Designer

tnxTower Report - version 6.1.4.1

TABLE OF CONTENTS

1) INTRODUCTION

This tower is a 161 ft Monopole tower designed by SUMMIT in August of 1998.
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 80 mph with no ice, 37.6 mph with 1 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
127.0	128.0	3	ericsson	ERICSSON AIR 21 B2A B4P w/ Mount Pipe	1	1-5/8	-
		3	ericsson	ERICSSON AIR 21 B4A B2P w/ Mount Pipe			
		3	ericsson	KRY 112 144/1			

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
157.0	158.0	3	ericsson	RRUS-11	-	-	2
		1	andrew	SBNH-1D6565C w/ Mount Pipe	6 1 2	1-5/8 3/8 3/4	1
		3	ericsson	RRUS-11			
		3	kathrein	800 10121 w/ Mount Pipe			
		1	kmw communications	AM-X-CD-16-65-00T-RET w/ Mount Pipe			
		6	powerwave technologies	LGP21401			
		1	powerwave technologies	P65-17-XLH-RR w/ Mount Pipe			
		1	raycap	DC6-48-60-18-8F			
	157.0	1	tower mounts	Side Arm Mount [SO 101-3]			
148.0	148.0	3	rfs celwave	APXVSPP18-C-A20 w/ Mount Pipe	3	1-1/4	2
		3	rfs celwave	IBC1900BB-1			
		3	rfs celwave	IBC1900HG-2A			
		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
146.0	146.0	3	alcatel lucent	800MHz 2X50W RRH W/FILTER	-	-	2
		6	alcatel lucent	PCS 1900MHz 4x45W-65MHz			
		1	tower mounts	Side Arm Mount [SO 103-3]			
138.0	142.0	1	lucent	KS24019-L112A	12 1	1-5/8 1/2	1
	138.0	3	antel	BXA-171063-12BF-EDIN-X w/ Mount Pipe			
		3	antel	BXA-70063-6CF-EDIN-2 w/ Mount Pipe			
		6	antel	LPA-80063-6CF-EDIN-2 w/ Mount Pipe			
		6	rfs celwave	FD9R6004/2C-3L			
		1	tower mounts	Platform Mount [LP 712-1]			
127.0	128.0	3	andrew	ONEBASE TWIN DUAL DUPLEX TMA	6	1-5/8	3
		4	ems wireless	RR65-19-02DPL5 w/ Mount Pipe			
		6	remec	S20057A-1			
		3	rfs celwave	APX16DWV-16DWV-S-E-ACU w/ Mount Pipe			
	127.0	1	tower mounts	Platform Mount [LP 712-1]	12	1-5/8	1
119.0	119.0	3	andrew	HBX-6516DS-VTM w/ Mount Pipe	6 1	1-5/8 3/8	1
		1	tower mounts	T-Arm Mount [TA 602-3]			
48.0	50.0	1	lucent	KS24019-L112A	1	1/2	1
	48.0	1	tower mounts	Side Arm Mount [SO 701-1]			

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

3) ANALYSIS PROCEDURE

Table 3 - Documents Provided

Document	Remarks	Reference	Source
4-GEOTECHNICAL REPORTS	Goodkind & O'Dea, 08/27/1998	1529743	CCISITES
4-TOWER FOUNDATION DRAWINGS/DESIGN/SPECS	PJF, 29298-582, 08/27/1998	1633746	CCISITES
4-TOWER MANUFACTURER DRAWINGS	PJF, 29298-582, 08/27/1998	2134246	CCISITES
4-TOWER REINFORCEMENT DESIGN/DRAWINGS/DATA	GPD, 2012775.876313.01	3348783	CCISITES
FAB DRAWINGS	SABRE, 11/13/2013	-	PJF

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) Monopole was fabricated and installed in accordance with the manufacturer's specifications.
2) Monopole has been properly maintained in accordance with manufacturer's specifications.
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 modified in conformance with the referenced modification drawings.
5) Monopole will be reinforced in conformance with the referenced Sabre fab 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	160 - 148.5	Pole	TP10x10x0.349	1	-1.189	296.209	52.3	Pass
L2	148.5 - 148	Pole	TP23x10x0.349	2	-1.192	296.209	52.3	Pass
L3	148 - 111	Pole	TP28.994x23x0.25	3	-10.360	1071.395	81.6	Pass
L4	111 - 105.25	Pole	TP29.4254x27.8865x0.3125	4	-11.917	1385.720	84.1	Pass
L5	105.25 - 76.75	Pole	TP34.042x29.4254x0.4446	5	-16.587	2087.545	86.6	Pass
L6	76.75 - 70.75	Pole	TP34.3889x32.4643x0.375	6	-19.126	2104.700	99.1	Pass
L7	70.75 - 43	Pole	TP38.884x34.3889x0.5356	7	-24.945	2940.038	89.1	Pass
L8	43 - 27.25	Pole	TP40.6856x37.0028x0.6528	8	-32.685	3475.731	90.1	Pass
L9	27.25 - 7.375	Pole	TP43.9053x40.6856x0.647	9	-39.493	4093.163	85.9	Pass
L10	7.375 - 0	Pole	TP45.1x43.9053x0.661	10	-42.184	4578.148	79.9	Pass
							Summary	
						Pole (L6)	99.1	Pass
						Rating =	99.1	Pass

Table 5 - Tower Component Stresses vs. Capacity – LC4.7

Notes	Component	Elevation (ft)	% Capacity	Pass / Fail
1	Anchor Rods	0	95.7	Pass
1	Base Plate	0	86.4	Pass
1	Base Foundation Steel	0	79.1	Pass
1,2	Base Foundation Soil Interaction	0	87.7	Pass

Structure Rating (max from all components) =	99.1%

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 geotechnical report's recommendation, or the greater of the frost depth of the site or half of the caisson diameter.

4.1) Recommendations

Reinforce monopole in conformance with the referenced fab drawings.

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:

4) Tower is located in Hartford County, Connecticut.
5) Basic wind speed of 80 mph.
6) Nominal ice thickness of 1.0000 in.
7) Ice thickness is considered to increase with height.
8) Ice density of 56.000 pcf.
9) A wind speed of 38 mph is used in combination with ice.
10) Temperature drop of 50.000 °F.
11) Deflections calculated using a wind speed of 50 mph.
12) A non-linear (P-delta) analysis was used.
13) Pressures are calculated at each section.
14) Stress ratio used in pole design is 1.333.
15) Local bending stresses due to climbing loads, feed line supports, and appurtenance mounts are not considered.

Options

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

Tapered Pole Section Geometry

Section	*Elevation* *ft*	*Section Length* *ft*	*Splice Length* *ft*	*Number of Sides*	*Top Diameter* *in*	*Bottom Diameter* *in*	*Wall Thickness* *in*	*Bend Radius* *in*	*Pole Grade*
L1	160.000-148.500	11.500	0.000	Round	10.0000	10.0000	0.3490		A53-B-35 (35 ksi)
L2	148.500-148.000	0.500	0.000	Round	10.0000	23.0000	0.3490		A53-B-35 (35 ksi)
L3	148.000-111.000	37.000	3.750	18	23.0000	28.9940	0.2500	1.0000	A607-60 (60 ksi)
L4	111.000-105.250	9.500	0.000	18	27.8865	29.4254	0.3125	1.2500	A607-60 (60 ksi)
L5	105.250-76.750	28.500	4.250	18	29.4254	34.0420	0.4446	1.7785	Reinf 56.20 ksi (56 ksi)
L6	76.750-70.750	10.250	0.000	18	32.4643	34.3889	0.3750	1.5000	A607-65 (65 ksi)
L7	70.750-43.000	27.750	5.000	18	34.3889	38.8840	0.5356	2.1425	Reinf 57.60 ksi (58 ksi)
L8	43.000-27.250	20.750	0.000	18	37.0028	40.6856	0.6528	2.6113	Reinf 52.39 ksi (52 ksi)
L9	27.250-7.375	19.875	0.000	18	40.6856	43.9053	0.6470	2.5880	Reinf 57.61 ksi (58 ksi)

Section	Elevation ft	Section Length ft	Splice Length ft	Number of Sides	Top Diameter in	Bottom Diameter in	Wall Thickness in	Bend Radius in	Pole Grade
L10	7.375-0.000	7.375		18	43.9053	45.1000	0.6610	2.6438	Reinf 61.40 ksi (61 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	10.0000	10.5815	123.3587	3.4144	5.0000	24.6717	246.7174	5.2876	0.0000	0
	10.0000	10.5815	123.3587	3.4144	5.0000	24.6717	246.7174	5.2876	0.0000	0
L2	10.0000	10.5815	123.3587	3.4144	5.0000	24.6717	246.7174	5.2876	0.0000	0
	23.0000	24.8349	1593.1275	8.0093	11.5000	138.5328	3186.2550	12.4100	0.0000	0
L3	23.3548	18.0521	1180.3983	8.0762	11.6840	101.0269	2362.3498	9.0278	3.6080	14.432
	29.4413	22.8084	2380.8169	10.2041	14.7290	161.6420	4764.7665	11.4063	4.6629	18.652
L4	28.9335	27.3500	2627.2035	9.7888	14.1663	185.4539	5257.8639	13.6776	4.3580	13.946
	29.8793	28.8763	3092.0742	10.3351	14.9481	206.8541	6188.2170	14.4409	4.6289	14.812
L5	29.8793	40.8992	4339.8228	10.2882	14.9481	290.3262	8685.3560	20.4535	4.3963	9.888
	34.5672	47.4145	6761.7480	11.9271	17.2933	391.0031	13532.3933	23.7117	5.2088	11.715
L6	33.7754	38.1943	4968.8541	11.3917	16.4919	301.2913	9944.2464	19.1008	5.0537	13.477
	34.9194	40.4851	5917.6117	12.0749	17.4696	338.7380	11843.0099	20.2464	5.3925	14.38
L7	34.9194	57.5537	8333.2168	12.0179	17.4696	477.0130	16677.3986	28.7823	5.1097	9.54
	39.4838	65.1957	12112.9519	13.6137	19.7531	613.2186	24241.8423	32.6040	5.9009	11.017
L8	38.4747	75.3190	12573.3508	12.9042	18.7974	668.8866	25163.2460	37.6667	5.3635	8.216
	41.3132	82.9499	16795.1455	14.2116	20.6683	812.6055	33612.3906	41.4828	6.0117	9.209
L9	41.3132	82.2223	16652.6748	14.2137	20.6683	805.7123	33327.2617	41.1190	6.0219	9.307
	44.5826	88.8342	21001.7795	15.3567	22.3039	941.6201	42031.1937	44.4256	6.5886	10.183
L10	44.5826	90.7203	21433.8505	15.3517	22.3039	960.9921	42895.9042	45.3688	6.5641	9.931
	45.7957	93.2267	23259.8697	15.7759	22.9108	1015.2360	46550.3454	46.6222	6.7743	10.249

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 160.000-148.500				1	1	1		
L2 148.500-148.000				1	1	1		
L3 148.000-111.000				1	1	1		
L4 111.000-105.250				1	1	1		
L5 105.250-76.750				1	1	1		
L6 76.750-70.750				1	1	1		
L7 70.750-43.000				1	1	1		
L8 43.000-27.250				1	1	1		
L9 27.250-7.375				1	1	1		
L10 7.375-0.000				1	1	1		

Feed Line/Linear Appurtenances - Entered As Round Or Flat

Description	Face or Leg	Allow Shield	Component Type	Placement ft	Total Number	Number Per Row	Clear Spacing in	Width or Diameter in	Perimeter in	Weight klf
**										

Feed Line/Linear Appurtenances - Entered As Area

Description	Face or Leg	Allow Shield	Component Type	Placement ft	Total Number		C_AA_A ft^2/ft	Weight klf
LDF7-50A(1-5/8")	C	No	Inside Pole	157.000 - 0.000	6	No Ice	0.000	0.001
						1/2" Ice	0.000	0.001
						1" Ice	0.000	0.001
						2" Ice	0.000	0.001
						4" Ice	0.000	0.001
FB-L98B-002-75000(3/8")	C	No	Inside Pole	157.000 - 0.000	1	No Ice	0.000	0.000
						1/2" Ice	0.000	0.000
						1" Ice	0.000	0.000
						2" Ice	0.000	0.000
						4" Ice	0.000	0.000
WR-VG86ST-BRD(3/4)	C	No	Inside Pole	157.000 - 0.000	2	No Ice	0.000	0.001
						1/2" Ice	0.000	0.001
						1" Ice	0.000	0.001
						2" Ice	0.000	0.001
						4" Ice	0.000	0.001
**								
HB114-1-08U4-M5J(1 1/4")	C	No	Inside Pole	148.000 - 0.000	3	No Ice	0.000	0.001
						1/2" Ice	0.000	0.001
						1" Ice	0.000	0.001
						2" Ice	0.000	0.001
						4" Ice	0.000	0.001
**								
AL7-50(1 5/8)	C	No	Inside Pole	138.000 - 0.000	12	No Ice	0.000	0.001
						1/2" Ice	0.000	0.001
						1" Ice	0.000	0.001
						2" Ice	0.000	0.001
						4" Ice	0.000	0.001
LDF4-50A(1/2")	C	No	Inside Pole	138.000 - 0.000	1	No Ice	0.000	0.000
						1/2" Ice	0.000	0.000
						1" Ice	0.000	0.000
						2" Ice	0.000	0.000
						4" Ice	0.000	0.000
**								
LDF7-50A(1-5/8")	C	No	Inside Pole	127.000 - 0.000	7	No Ice	0.000	0.001
						1/2" Ice	0.000	0.001
						1" Ice	0.000	0.001
						2" Ice	0.000	0.001
						4" Ice	0.000	0.001
LDF7-50A(1-5/8")	C	No	CaAa (Out Of Face)	127.000 - 0.000	4	No Ice	0.000	0.001
						1/2" Ice	0.000	0.002
						1" Ice	0.000	0.004
						2" Ice	0.000	0.011
						4" Ice	0.000	0.030
LDF7-50A(1-5/8")	C	No	CaAa (Out Of Face)	127.000 - 0.000	1	No Ice	0.198	0.001
						1/2" Ice	0.298	0.002
						1" Ice	0.398	0.004
						2" Ice	0.598	0.011
						4" Ice	0.998	0.030
MLE Hybrid 9Power/18Fiber RL 2(1 5/8)	C	No	CaAa (Out Of Face)	127.000 - 0.000	1	No Ice	0.000	0.001
						1/2" Ice	0.000	0.002
						1" Ice	0.000	0.004
						2" Ice	0.000	0.010
						4" Ice	0.000	0.029

Description	Face or Leg	Allow Shield	Component Type	Placement ft	Total Number		C_AA_A ft^2/ft	Weight klf
**								
FXL-1873(1 5/8")	C	No	CaAa (Out Of Face)	119.000 - 0.000	5	No Ice	0.000	0.001
						1/2" Ice	0.000	0.002
						1" Ice	0.000	0.004
						2" Ice	0.000	0.010
						4" Ice	0.000	0.030
860 10033(3/8)	C	No	CaAa (Out Of Face)	119.000 - 0.000	1	No Ice	0.000	0.000
						1/2" Ice	0.000	0.001
						1" Ice	0.000	0.002
						2" Ice	0.000	0.006
						4" Ice	0.000	0.021
**								
LDF4-50A(1/2")	C	No	Inside Pole	48.000 - 0.000	1	No Ice	0.000	0.000
						1/2" Ice	0.000	0.000
						1" Ice	0.000	0.000
						2" Ice	0.000	0.000
						4" Ice	0.000	0.000
**								
Step Bolts	C	No	CaAa (Out Of Face)	148.000 - 0.000	1	No Ice	0.062	0.001
						1/2" Ice	0.163	0.002
						1" Ice	0.263	0.003
						2" Ice	0.463	0.008
						4" Ice	0.862	0.024
**								
1 1/4'' Flat Reinforcement	C	No	CaAa (Out Of Face)	106.750 - 0.000	1	No Ice	0.208	0.000
						1/2" Ice	0.319	0.000
						1" Ice	0.431	0.000
						2" Ice	0.653	0.000
						4" Ice	1.097	0.000
**								
1 1/4'' Flat Reinforcement	C	No	CaAa (Out Of Face)	49.500 - 24.500	1	No Ice	0.208	0.000
						1/2" Ice	0.319	0.000
						1" Ice	0.431	0.000
						2" Ice	0.653	0.000
						4" Ice	1.097	0.000
**								
LDF7-50A(1-5/8")	C	No	CaAa (Out Of Face)	119.000 - 0.000	1	No Ice	0.198	0.001
						1/2" Ice	0.298	0.002
						1" Ice	0.398	0.004
						2" Ice	0.598	0.011
						4" Ice	0.998	0.030
**								

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	160.000-148.500	A	0.000	0.000	0.000	0.000	0.000
		B	0.000	0.000	0.000	0.000	0.000
		C	0.000	0.000	0.000	0.000	0.052
L2	148.500-148.000	A	0.000	0.000	0.000	0.000	0.000
		B	0.000	0.000	0.000	0.000	0.000
		C	0.000	0.000	0.000	0.000	0.003
L3	148.000-111.000	A	0.000	0.000	0.000	0.000	0.000
		B	0.000	0.000	0.000	0.000	0.000
		C	0.000	0.000	0.000	7.064	0.777
L4	111.000-105.250	A	0.000	0.000	0.000	0.000	0.000
		B	0.000	0.000	0.000	0.000	0.000
		C	0.000	0.000	0.000	2.949	0.185
L5	105.250-76.750	A	0.000	0.000	0.000	0.000	0.000
		B	0.000	0.000	0.000	0.000	0.000
		C	0.000	0.000	0.000	19.005	0.918
L6	76.750-70.750	A	0.000	0.000	0.000	0.000	0.000
		B	0.000	0.000	0.000	0.000	0.000
		C	0.000	0.000	0.000	4.001	0.193

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
L7	70.750-43.000	A	0.000	0.000	0.000	0.000	0.000
		B	0.000	0.000	0.000	0.000	0.000
		C	0.000	0.000	0.000	19.859	0.894
L8	43.000-27.250	A	0.000	0.000	0.000	0.000	0.000
		B	0.000	0.000	0.000	0.000	0.000
		C	0.000	0.000	0.000	13.784	0.510
L9	27.250-7.375	A	0.000	0.000	0.000	0.000	0.000
		B	0.000	0.000	0.000	0.000	0.000
		C	0.000	0.000	0.000	13.826	0.643
L10	7.375-0.000	A	0.000	0.000	0.000	0.000	0.000
		B	0.000	0.000	0.000	0.000	0.000
		C	0.000	0.000	0.000	4.918	0.239

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	160.000-148.500	A	1.203	0.000	0.000	0.000	0.000	0.000
		B		0.000	0.000	0.000	0.000	0.000
		C		0.000	0.000	0.000	0.000	0.052
L2	148.500-148.000	A	1.198	0.000	0.000	0.000	0.000	0.000
		B		0.000	0.000	0.000	0.000	0.000
		C		0.000	0.000	0.000	0.000	0.003
L3	148.000-111.000	A	1.178	0.000	0.000	0.000	0.000	0.000
		B		0.000	0.000	0.000	0.000	0.000
		C		0.000	0.000	0.000	21.433	1.570
L4	111.000-105.250	A	1.153	0.000	0.000	0.000	0.000	0.000
		B		0.000	0.000	0.000	0.000	0.000
		C		0.000	0.000	0.000	7.405	0.537
L5	105.250-76.750	A	1.129	0.000	0.000	0.000	0.000	0.000
		B		0.000	0.000	0.000	0.000	0.000
		C		0.000	0.000	0.000	45.460	2.551
L6	76.750-70.750	A	1.101	0.000	0.000	0.000	0.000	0.000
		B		0.000	0.000	0.000	0.000	0.000
		C		0.000	0.000	0.000	9.570	0.537
L7	70.750-43.000	A	1.067	0.000	0.000	0.000	0.000	0.000
		B		0.000	0.000	0.000	0.000	0.000
		C		0.000	0.000	0.000	45.742	2.345
L8	43.000-27.250	A	1.007	0.000	0.000	0.000	0.000	0.000
		B		0.000	0.000	0.000	0.000	0.000
		C		0.000	0.000	0.000	31.334	1.333
L9	27.250-7.375	A	1.000	0.000	0.000	0.000	0.000	0.000
		B		0.000	0.000	0.000	0.000	0.000
		C		0.000	0.000	0.000	30.779	1.574
L10	7.375-0.000	A	1.000	0.000	0.000	0.000	0.000	0.000
		B		0.000	0.000	0.000	0.000	0.000
		C		0.000	0.000	0.000	10.982	0.584

Feed Line Center of Pressure

Section	Elevation ft	CP_X in	CP_Z in	CP_X Ice in	CP_Z Ice in
L1	160.000-148.500	0.0000	0.0000	0.0000	0.0000
L2	148.500-148.000	0.0000	0.0000	0.0000	0.0000
L3	148.000-111.000	-0.2392	0.1381	-0.5740	0.3314
L4	111.000-105.250	-0.5501	0.3176	-1.0370	0.5987
L5	105.250-76.750	-0.6918	0.3994	-1.2376	0.7145
L6	76.750-70.750	-0.7005	0.4044	-1.2692	0.7328
L7	70.750-43.000	-0.7555	0.4362	-1.3438	0.7759
L8	43.000-27.250	-0.8971	0.5179	-1.5550	0.8978

Section	Elevation	CP_X	CP_Z	CP_X Ice	CP_Z Ice
	ft	in	in	in	in
L9	27.250-7.375	-0.7537	0.4351	-1.3515	0.7803
L10	7.375-0.000	-0.7342	0.4239	-1.3373	0.7721

Discrete Tower Loads

Description	Face or Leg	Offset Type	Offsets: Horz Lateral Vert ft ft ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
Side Arm Mount [SO 101-3]	C	None		0.0000	157.000	No Ice	7.500	7.500	0.252
						1/2" Ice	8.900	8.900	0.333
						1" Ice	10.300	10.300	0.414
						2" Ice	13.100	13.100	0.576
						4" Ice	18.700	18.700	0.900
800 10121 w/ Mount Pipe	A	From Face	4.000 0.000 1.000	0.0000	157.000	No Ice	6.033	4.948	0.072
						1/2" Ice	6.714	6.022	0.123
						1" Ice	7.299	6.810	0.181
						2" Ice	8.500	8.459	0.321
						4" Ice	11.044	12.102	0.728
800 10121 w/ Mount Pipe	B	From Face	4.000 0.000 1.000	0.0000	157.000	No Ice	6.033	4.948	0.072
						1/2" Ice	6.714	6.022	0.123
						1" Ice	7.299	6.810	0.181
						2" Ice	8.500	8.459	0.321
						4" Ice	11.044	12.102	0.728
800 10121 w/ Mount Pipe	C	From Face	4.000 0.000 1.000	0.0000	157.000	No Ice	6.033	4.948	0.072
						1/2" Ice	6.714	6.022	0.123
						1" Ice	7.299	6.810	0.181
						2" Ice	8.500	8.459	0.321
						4" Ice	11.044	12.102	0.728
AM-X-CD-16-65-00T-RET w/ Mount Pipe	A	From Face	4.000 0.000 1.000	0.0000	157.000	No Ice	8.498	6.304	0.074
						1/2" Ice	9.149	7.479	0.139
						1" Ice	9.767	8.368	0.212
						2" Ice	11.031	10.179	0.385
						4" Ice	13.679	14.024	0.874
DC6-48-60-18-8F	B	From Face	4.000 0.000 1.000	0.0000	157.000	No Ice	2.567	2.567	0.019
						1/2" Ice	2.798	2.798	0.041
						1" Ice	3.038	3.038	0.067
						2" Ice	3.543	3.543	0.129
						4" Ice	4.658	4.658	0.299
P65-17-XLH-RR w/ Mount Pipe	B	From Face	4.000 0.000 1.000	0.0000	157.000	No Ice	11.823	9.056	0.094
						1/2" Ice	12.594	10.619	0.181
						1" Ice	13.375	12.205	0.278
						2" Ice	14.940	14.697	0.506
						4" Ice	18.334	19.643	1.144
SBNH-1D6565C w/ Mount Pipe	C	From Face	4.000 0.000 1.000	0.0000	157.000	No Ice	11.556	9.715	0.097
						1/2" Ice	12.223	11.186	0.185
						1" Ice	12.893	12.594	0.284
						2" Ice	14.291	14.869	0.514
						4" Ice	17.428	19.618	1.148
(2) LGP21401	A	From Face	4.000 0.000 1.000	0.0000	157.000	No Ice	1.288	0.233	0.014
						1/2" Ice	1.445	0.313	0.021
						1" Ice	1.611	0.403	0.030
						2" Ice	1.969	0.608	0.055
							2.788	1.121	0.135

Description	Face or Leg	Offset Type	Offsets: Horz Lateral Vert ft ft ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
						4" Ice			
(2) LGP21401	B	From Face	4.000 0.000 1.000	0.0000	157.000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	1.288 1.445 1.611 1.969 2.788	0.233 0.313 0.403 0.608 1.121	0.014 0.021 0.030 0.055 0.135
(2) LGP21401	C	From Face	4.000 0.000 1.000	0.0000	157.000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	1.288 1.445 1.611 1.969 2.788	0.233 0.313 0.403 0.608 1.121	0.014 0.021 0.030 0.055 0.135
RRUS-11	A	From Face	4.000 0.000 1.000	0.0000	157.000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	3.249 3.491 3.741 4.268 5.426	1.373 1.551 1.738 2.138 3.042	0.048 0.068 0.092 0.150 0.310
RRUS-11	B	From Face	4.000 0.000 1.000	0.0000	157.000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	3.249 3.491 3.741 4.268 5.426	1.373 1.551 1.738 2.138 3.042	0.048 0.068 0.092 0.150 0.310
RRUS-11	C	From Face	4.000 0.000 1.000	0.0000	157.000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	3.249 3.491 3.741 4.268 5.426	1.373 1.551 1.738 2.138 3.042	0.048 0.068 0.092 0.150 0.310
RRUS-11	A	From Face	4.000 0.000 1.000	0.0000	157.000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	3.249 3.491 3.741 4.268 5.426	1.373 1.551 1.738 2.138 3.042	0.048 0.068 0.092 0.150 0.310
RRUS-11	B	From Face	4.000 0.000 1.000	0.0000	157.000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	3.249 3.491 3.741 4.268 5.426	1.373 1.551 1.738 2.138 3.042	0.048 0.068 0.092 0.150 0.310
RRUS-11	C	From Face	4.000 0.000 1.000	0.0000	157.000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	3.249 3.491 3.741 4.268 5.426	1.373 1.551 1.738 2.138 3.042	0.048 0.068 0.092 0.150 0.310
**									
Platform Mount [LP 712-1]	C	None		0.0000	148.000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	24.530 29.940 35.350 46.170 67.810	24.530 29.940 35.350 46.170 67.810	1.335 1.646 1.956 2.577 3.820
APXVSPP18-C-A20 w/ Mount Pipe	A	From Face	4.000 0.000 0.000	0.0000	148.000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	8.498 9.149 9.767 11.031 13.679	6.946 8.127 9.021 10.844 14.851	0.083 0.151 0.227 0.406 0.909
APXVSPP18-C-A20 w/ Mount Pipe	B	From Face	4.000 0.000 0.000	0.0000	148.000	No Ice 1/2" Ice	8.498 9.149 9.767	6.946 8.127 9.021	0.083 0.151 0.227

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
							1" Ice	11.031	10.844	0.406
							2" Ice	13.679	14.851	0.909
							4" Ice			
APXVSPP18-C-A20 w/ Mount Pipe	C	From Face	4.000	0.000	0.0000	148.000	No Ice	8.498	6.946	0.083
							1/2" Ice	9.149	8.127	0.151
								9.767	9.021	0.227
							1" Ice	11.031	10.844	0.406
							2" Ice	13.679	14.851	0.909
							4" Ice			
IBC1900BB-1	A	From Face	4.000	0.000	0.0000	148.000	No Ice	1.127	0.533	0.022
							1/2" Ice	1.273	0.647	0.030
								1.427	0.770	0.039
							1" Ice	1.761	1.041	0.065
							2" Ice	2.534	1.688	0.147
							4" Ice			
IBC1900BB-1	B	From Face	4.000	0.000	0.0000	148.000	No Ice	1.127	0.533	0.022
							1/2" Ice	1.273	0.647	0.030
								1.427	0.770	0.039
							1" Ice	1.761	1.041	0.065
							2" Ice	2.534	1.688	0.147
							4" Ice			
IBC1900BB-1	C	From Face	4.000	0.000	0.0000	148.000	No Ice	1.127	0.533	0.022
							1/2" Ice	1.273	0.647	0.030
								1.427	0.770	0.039
							1" Ice	1.761	1.041	0.065
							2" Ice	2.534	1.688	0.147
							4" Ice			
IBC1900HG-2A	A	From Face	4.000	0.000	0.0000	148.000	No Ice	1.127	0.533	0.022
							1/2" Ice	1.273	0.647	0.030
								1.427	0.770	0.039
							1" Ice	1.761	1.041	0.065
							2" Ice	2.534	1.688	0.147
							4" Ice			
IBC1900HG-2A	B	From Face	4.000	0.000	0.0000	148.000	No Ice	1.127	0.533	0.022
							1/2" Ice	1.273	0.647	0.030
								1.427	0.770	0.039
							1" Ice	1.761	1.041	0.065
							2" Ice	2.534	1.688	0.147
							4" Ice			
IBC1900HG-2A	C	From Face	4.000	0.000	0.0000	148.000	No Ice	1.127	0.533	0.022
							1/2" Ice	1.273	0.647	0.030
								1.427	0.770	0.039
							1" Ice	1.761	1.041	0.065
							2" Ice	2.534	1.688	0.147
							4" Ice			
(2) 2.375" OD x 6' Mount Pipe	A	From Face	4.000	0.000	0.0000	148.000	No Ice	1.425	1.425	0.025
							1/2" Ice	1.925	1.925	0.036
								2.294	2.294	0.051
							1" Ice	3.060	3.060	0.093
							2" Ice	4.702	4.702	0.234
							4" Ice			
(2) 2.375" OD x 6' Mount Pipe	B	From Face	4.000	0.000	0.0000	148.000	No Ice	1.425	1.425	0.025
							1/2" Ice	1.925	1.925	0.036
								2.294	2.294	0.051
							1" Ice	3.060	3.060	0.093
							2" Ice	4.702	4.702	0.234
							4" Ice			
(2) 2.375" OD x 6' Mount Pipe	C	From Face	4.000	0.000	0.0000	148.000	No Ice	1.425	1.425	0.025
							1/2" Ice	1.925	1.925	0.036
								2.294	2.294	0.051
							1" Ice	3.060	3.060	0.093
							2" Ice	4.702	4.702	0.234
							4" Ice			
**										
Side Arm Mount [SO 103-	C	None			0.0000	146.000	No Ice	9.500	9.500	0.224

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
3]							1/2" Ice	11.800	11.800	0.317
							1" Ice	14.100	14.100	0.410
							2" Ice	18.700	18.700	0.596
							4" Ice	27.900	27.900	0.968
(2) PCS 1900MHz 4x45W-65MHz	A	From Face	4.000	0.000	0.0000	146.000	No Ice	2.709	2.611	0.060
			0.000				1/2" Ice	2.948	2.847	0.083
			0.000				1" Ice	3.195	3.092	0.110
							2" Ice	3.716	3.608	0.173
							4" Ice	4.862	4.744	0.347
(2) PCS 1900MHz 4x45W-65MHz	B	From Face	4.000	0.000	0.0000	146.000	No Ice	2.709	2.611	0.060
			0.000				1/2" Ice	2.948	2.847	0.083
			0.000				1" Ice	3.195	3.092	0.110
							2" Ice	3.716	3.608	0.173
							4" Ice	4.862	4.744	0.347
(2) PCS 1900MHz 4x45W-65MHz	C	From Face	4.000	0.000	0.0000	146.000	No Ice	2.709	2.611	0.060
			0.000				1/2" Ice	2.948	2.847	0.083
			0.000				1" Ice	3.195	3.092	0.110
							2" Ice	3.716	3.608	0.173
							4" Ice	4.862	4.744	0.347
800MHz 2X50W RRH W/FILTER	A	From Face	4.000	0.000	0.0000	146.000	No Ice	2.401	2.254	0.064
			0.000				1/2" Ice	2.613	2.460	0.086
			0.000				1" Ice	2.833	2.675	0.111
							2" Ice	3.300	3.132	0.172
							4" Ice	4.337	4.148	0.338
800MHz 2X50W RRH W/FILTER	B	From Face	4.000	0.000	0.0000	146.000	No Ice	2.401	2.254	0.064
			0.000				1/2" Ice	2.613	2.460	0.086
			0.000				1" Ice	2.833	2.675	0.111
							2" Ice	3.300	3.132	0.172
							4" Ice	4.337	4.148	0.338
800MHz 2X50W RRH W/FILTER	C	From Face	4.000	0.000	0.0000	146.000	No Ice	2.401	2.254	0.064
			0.000				1/2" Ice	2.613	2.460	0.086
			0.000				1" Ice	2.833	2.675	0.111
							2" Ice	3.300	3.132	0.172
							4" Ice	4.337	4.148	0.338
**										
**										
Platform Mount [LP 712-1]	C	None			0.0000	138.000	No Ice	24.530	24.530	1.335
							1/2" Ice	29.940	29.940	1.646
							1" Ice	35.350	35.350	1.956
							2" Ice	46.170	46.170	2.577
							4" Ice	67.810	67.810	3.820
(2) LPA-80063-6CF-EDIN-2 w/ Mount Pipe	A	From Face	4.000	0.000	0.0000	138.000	No Ice	10.745	10.700	0.052
			0.000				1/2" Ice	11.412	11.967	0.145
			0.000				1" Ice	12.045	12.948	0.247
							2" Ice	13.341	14.963	0.480
							4" Ice	16.054	19.208	1.095
(2) LPA-80063-6CF-EDIN-2 w/ Mount Pipe	B	From Face	4.000	0.000	0.0000	138.000	No Ice	10.745	10.700	0.052
			0.000				1/2" Ice	11.412	11.967	0.145
			0.000				1" Ice	12.045	12.948	0.247
							2" Ice	13.341	14.963	0.480
							4" Ice	16.054	19.208	1.095
(2) LPA-80063-6CF-EDIN-2 w/ Mount Pipe	C	From Face	4.000	0.000	0.0000	138.000	No Ice	10.745	10.700	0.052
			0.000				1/2" Ice	11.412	11.967	0.145
			0.000				1" Ice	12.045	12.948	0.247
							2" Ice	13.341	14.963	0.480

Description	Face or Leg	Offset Type	Offsets: Horz Lateral ft / Vert ft / ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
						2" Ice	16.054	19.208	1.095
						4" Ice			
BXA-70063-6CF-EDIN-2 w/ Mount Pipe	A	From Face	4.000 0.000 0.000	0.0000	138.000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	7.969 8.609 9.216 10.459 13.066	5.801 6.953 7.819 9.601 13.366	0.042 0.103 0.171 0.335 0.804
BXA-70063-6CF-EDIN-2 w/ Mount Pipe	B	From Face	4.000 0.000 0.000	0.0000	138.000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	7.969 8.609 9.216 10.459 13.066	5.801 6.953 7.819 9.601 13.366	0.042 0.103 0.171 0.335 0.804
BXA-70063-6CF-EDIN-2 w/ Mount Pipe	C	From Face	4.000 0.000 0.000	0.0000	138.000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	7.969 8.609 9.216 10.459 13.066	5.801 6.953 7.819 9.601 13.366	0.042 0.103 0.171 0.335 0.804
BXA-171063-12BF-EDIN-X w/ Mount Pipe	A	From Face	4.000 0.000 0.000	0.0000	138.000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	5.037 5.592 6.113 7.177 9.449	5.297 6.470 7.360 9.162 12.966	0.039 0.085 0.138 0.271 0.675
BXA-171063-12BF-EDIN-X w/ Mount Pipe	B	From Face	4.000 0.000 0.000	0.0000	138.000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	5.037 5.592 6.113 7.177 9.449	5.297 6.470 7.360 9.162 12.966	0.039 0.085 0.138 0.271 0.675
BXA-171063-12BF-EDIN-X w/ Mount Pipe	C	From Face	4.000 0.000 0.000	0.0000	138.000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	5.037 5.592 6.113 7.177 9.449	5.297 6.470 7.360 9.162 12.966	0.039 0.085 0.138 0.271 0.675
KS24019-L112A	C	From Face	4.000 0.000 4.000	0.0000	138.000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	0.156 0.225 0.302 0.484 0.951	0.156 0.225 0.302 0.484 0.951	0.005 0.007 0.009 0.018 0.056
(2) FD9R6004/2C-3L	A	From Face	4.000 0.000 0.000	0.0000	138.000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	0.367 0.451 0.543 0.755 1.281	0.085 0.136 0.196 0.343 0.740	0.003 0.005 0.009 0.020 0.063
(2) FD9R6004/2C-3L	B	From Face	4.000 0.000 0.000	0.0000	138.000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	0.367 0.451 0.543 0.755 1.281	0.085 0.136 0.196 0.343 0.740	0.003 0.005 0.009 0.020 0.063
(2) FD9R6004/2C-3L	C	From Face	4.000 0.000 0.000	0.0000	138.000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	0.367 0.451 0.543 0.755 1.281	0.085 0.136 0.196 0.343 0.740	0.003 0.005 0.009 0.020 0.063
** Platform Mount [LP 712-1]	C	None		0.0000	127.000	No Ice 1/2"	24.530 29.940	24.530 29.940	1.335 1.646

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
						Ice	35.350	35.350	1.956
						1" Ice	46.170	46.170	2.577
						2" Ice	67.810	67.810	3.820
						4" Ice			
ERICSSON AIR 21 B2A B4P w/ Mount Pipe	A	From Face	4.000 0.000 1.000	0.0000	127.000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	6.825 7.347 7.863 8.926 11.175	5.642 6.480 7.257 8.864 12.293	0.112 0.169 0.233 0.383 0.807
ERICSSON AIR 21 B2A B4P w/ Mount Pipe	B	From Face	4.000 0.000 1.000	0.0000	127.000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	6.825 7.347 7.863 8.926 11.175	5.642 6.480 7.257 8.864 12.293	0.112 0.169 0.233 0.383 0.807
ERICSSON AIR 21 B2A B4P w/ Mount Pipe	C	From Face	4.000 0.000 1.000	0.0000	127.000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	6.825 7.347 7.863 8.926 11.175	5.642 6.480 7.257 8.864 12.293	0.112 0.169 0.233 0.383 0.807
ERICSSON AIR 21 B4A B2P w/ Mount Pipe	A	From Face	4.000 0.000 1.000	0.0000	127.000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	6.815 7.337 7.853 8.916 11.165	5.633 6.472 7.248 8.854 12.280	0.112 0.169 0.232 0.383 0.806
ERICSSON AIR 21 B4A B2P w/ Mount Pipe	B	From Face	4.000 0.000 1.000	0.0000	127.000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	6.815 7.337 7.853 8.916 11.165	5.633 6.472 7.248 8.854 12.280	0.112 0.169 0.232 0.383 0.806
ERICSSON AIR 21 B4A B2P w/ Mount Pipe	C	From Face	4.000 0.000 1.000	0.0000	127.000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	6.815 7.337 7.853 8.916 11.165	5.633 6.472 7.248 8.854 12.280	0.112 0.169 0.232 0.383 0.806
KRY 112 144/1	A	From Face	4.000 0.000 1.000	0.0000	127.000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	0.408 0.497 0.594 0.815 1.359	0.204 0.273 0.351 0.533 0.999	0.011 0.014 0.019 0.032 0.082
KRY 112 144/1	B	From Face	4.000 0.000 1.000	0.0000	127.000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	0.408 0.497 0.594 0.815 1.359	0.204 0.273 0.351 0.533 0.999	0.011 0.014 0.019 0.032 0.082
KRY 112 144/1	C	From Face	4.000 0.000 1.000	0.0000	127.000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	0.408 0.497 0.594 0.815 1.359	0.204 0.273 0.351 0.533 0.999	0.011 0.014 0.019 0.032 0.082
**									
T-Arm Mount [TA 602-3]	C	None		0.0000	119.000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	11.590 15.440 19.290 26.990 42.390	11.590 15.440 19.290 26.990 42.390	0.774 0.990 1.206 1.639 2.503

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	A	From Face	4.000	0.0000	119.000	No Ice	1.425	1.425	0.025
			0.000			1/2" Ice	1.925	1.925	0.036
			0.000			1" Ice	2.294	2.294	0.051
						2" Ice	3.060	3.060	0.093
						4" Ice	4.702	4.702	0.234
2.375" OD x 6' Mount Pipe	A	From Face	4.000	0.0000	119.000	No Ice	1.425	1.425	0.025
			0.000			1/2" Ice	1.925	1.925	0.036
			0.000			1" Ice	2.294	2.294	0.051
						2" Ice	3.060	3.060	0.093
						4" Ice	4.702	4.702	0.234
2.375" OD x 6' Mount Pipe	A	From Face	4.000	0.0000	119.000	No Ice	1.425	1.425	0.025
			0.000			1/2" Ice	1.925	1.925	0.036
			0.000			1" Ice	2.294	2.294	0.051
						2" Ice	3.060	3.060	0.093
						4" Ice	4.702	4.702	0.234
HBX-6516DS-VTM w/ Mount Pipe	A	From Face	4.000	0.0000	119.000	No Ice	3.598	3.241	0.029
			0.000			1/2" Ice	3.998	3.914	0.062
			0.000			1" Ice	4.435	4.564	0.101
						2" Ice	5.368	5.914	0.199
						4" Ice	7.361	8.877	0.504
HBX-6516DS-VTM w/ Mount Pipe	B	From Face	4.000	0.0000	119.000	No Ice	3.598	3.241	0.029
			0.000			1/2" Ice	3.998	3.914	0.062
			0.000			1" Ice	4.435	4.564	0.101
						2" Ice	5.368	5.914	0.199
						4" Ice	7.361	8.877	0.504
HBX-6516DS-VTM w/ Mount Pipe	C	From Face	4.000	0.0000	119.000	No Ice	3.598	3.241	0.029
			0.000			1/2" Ice	3.998	3.914	0.062
			0.000			1" Ice	4.435	4.564	0.101
						2" Ice	5.368	5.914	0.199
						4" Ice	7.361	8.877	0.504
**									
KS24019-L112A	A	From Face	4.000	0.0000	48.000	No Ice	0.156	0.156	0.005
			0.000			1/2" Ice	0.225	0.225	0.007
			2.000			1" Ice	0.302	0.302	0.009
						2" Ice	0.484	0.484	0.018
						4" Ice	0.951	0.951	0.056
Side Arm Mount [SO 701-1]	C	None		0.0000	48.000	No Ice	0.850	1.670	0.065
						1/2" Ice	1.140	2.340	0.079
						1" Ice	1.430	3.010	0.093
						2" Ice	2.010	4.350	0.121
						4" Ice	3.170	7.030	0.177
**									

Tower Pressures - No Ice

$G_H = 1.690$

Section Elevation ft	z ft	K_Z	q_z ksf	A_G ft^2	Face	A_F ft^2	A_R ft^2	A_{leg} ft^2	Leg %	C_AA_A In Face ft^2	C_AA_A Out Face ft^2

Section Elevation ft	z ft	K_Z	q_z ksf	A_G ft^2	Face	A_F ft^2	A_R ft^2	A_{leg} ft^2	Leg %	C_AA_A In Face ft^2	C_AA_A Out Face ft^2
L1 160.000-148.500	154.250	1.554	0.025	9.583	A	0.000	9.583	9.583	100.00	0.000	0.000
					B	0.000	9.583		100.00	0.000	0.000
					C	0.000	9.583		100.00	0.000	0.000
L2 148.500-148.000	148.217	1.536	0.025	0.688	A	0.000	0.688	0.688	100.00	0.000	0.000
					B	0.000	0.688		100.00	0.000	0.000
					C	0.000	0.688		100.00	0.000	0.000
L3 148.000-111.000	128.978	1.476	0.024	80.157	A	0.000	80.157	80.157	100.00	0.000	0.000
					B	0.000	80.157		100.00	0.000	0.000
					C	0.000	80.157		100.00	0.000	7.064
L4 111.000-105.250	108.110	1.404	0.023	13.877	A	0.000	13.877	13.877	100.00	0.000	0.000
					B	0.000	13.877		100.00	0.000	0.000
					C	0.000	13.877		100.00	0.000	2.949
L5 105.250-76.750	90.654	1.335	0.022	75.368	A	0.000	75.368	75.368	100.00	0.000	0.000
					B	0.000	75.368		100.00	0.000	0.000
					C	0.000	75.368		100.00	0.000	19.005
L6 76.750-70.750	73.733	1.258	0.021	16.913	A	0.000	16.913	16.913	100.00	0.000	0.000
					B	0.000	16.913		100.00	0.000	0.000
					C	0.000	16.913		100.00	0.000	4.001
L7 70.750-43.000	56.591	1.167	0.019	84.722	A	0.000	84.722	84.722	100.00	0.000	0.000
					B	0.000	84.722		100.00	0.000	0.000
					C	0.000	84.722		100.00	0.000	19.859
L8 43.000-27.250	35.032	1.017	0.017	51.565	A	0.000	51.565	51.565	100.00	0.000	0.000
					B	0.000	51.565		100.00	0.000	0.000
					C	0.000	51.565		100.00	0.000	13.784
L9 27.250-7.375	17.186	1	0.016	70.052	A	0.000	70.052	70.052	100.00	0.000	0.000
					B	0.000	70.052		100.00	0.000	0.000
					C	0.000	70.052		100.00	0.000	13.826
L10 7.375-0.000	3.671	1	0.016	27.351	A	0.000	27.351	27.351	100.00	0.000	0.000
					B	0.000	27.351		100.00	0.000	0.000
					C	0.000	27.351		100.00	0.000	4.918

Tower Pressure - With Ice

G_H = 1.690

Section Elevation ft	z ft	K_Z	q_z ksf	t_Z in	A_G ft^2	Face	A_F ft^2	A_R ft^2	A_{leg} ft^2	Leg %	C_AA_A In Face ft^2	C_AA_A Out Face ft^2
L1 160.000-148.500	154.250	1.554	0.006	1.2033	11.890	A	0.000	11.890	11.890	100.00	0.000	0.000
						B	0.000	11.890		100.00	0.000	0.000
						C	0.000	11.890		100.00	0.000	0.000
L2 148.500-148.000	148.217	1.536	0.006	1.1975	0.787	A	0.000	0.787	0.787	100.00	0.000	0.000
						B	0.000	0.787		100.00	0.000	0.000
						C	0.000	0.787		100.00	0.000	0.000
L3 148.000-111.000	128.978	1.476	0.005	1.1777	87.420	A	0.000	87.420	87.420	100.00	0.000	0.000
						B	0.000	87.420		100.00	0.000	0.000
						C	0.000	87.420		100.00	0.000	21.433
L4 111.000-105.250	108.110	1.404	0.005	1.1530	15.005	A	0.000	15.005	15.005	100.00	0.000	0.000
						B	0.000	15.005		100.00	0.000	0.000
						C	0.000	15.005		100.00	0.000	7.405
L5 105.250-76.750	90.654	1.335	0.005	1.1289	80.730	A	0.000	80.730	80.730	100.00	0.000	0.000
						B	0.000	80.730		100.00	0.000	0.000
						C	0.000	80.730		100.00	0.000	45.460
L6 76.750-70.750	73.733	1.258	0.005	1.1013	18.042	A	0.000	18.042	18.042	100.00	0.000	0.000
						B	0.000	18.042		100.00	0.000	0.000
						C	0.000	18.042		100.00	0.000	9.570
L7 70.750-43.000	56.591	1.167	0.004	1.0669	89.656	A	0.000	89.656	89.656	100.00	0.000	0.000
						B	0.000	89.656		100.00	0.000	0.000
						C	0.000	89.656		100.00	0.000	45.742
L8 43.000-27.250	35.032	1.017	0.004	1.0072	54.366	A	0.000	54.366	54.366	100.00	0.000	0.000
						B	0.000	54.366		100.00	0.000	0.000
						C	0.000	54.366		100.00	0.000	31.334
L9 27.250-7.375	17.186	1	0.004	1.0000	73.364	A	0.000	73.364	73.364	100.00	0.000	0.000
						B	0.000	73.364		100.00	0.000	0.000

Section Elevation ft	z ft	K_Z	q_z ksf	t_Z in	A_G ft²	Face	A_F ft²	A_R ft²	A_{leg} ft²	Leg %	C_AA_A In Face ft²	C_AA_A Out Face ft²
						C	0.000	73.364		100.00	0.000	30.779
L10 7.375-0.000	3.671	1	0.004	1.0000	28.580	A	0.000	28.580	28.580	100.00	0.000	0.000
						B	0.000	28.580		100.00	0.000	0.000
						C	0.000	28.580		100.00	0.000	10.982

Tower Pressure - Service

G_H = 1.690

Section Elevation ft	z ft	K_Z	q_z ksf	A_G ft²	Face	A_F ft²	A_R ft²	A_{leg} ft²	Leg %	C_AA_A In Face ft²	C_AA_A Out Face ft²
L1 160.000-148.500	154.250	1.554	0.010	9.583	A	0.000	9.583	9.583	100.00	0.000	0.000
					B	0.000	9.583		100.00	0.000	0.000
					C	0.000	9.583		100.00	0.000	0.000
L2 148.500-148.000	148.217	1.536	0.010	0.688	A	0.000	0.688	0.688	100.00	0.000	0.000
					B	0.000	0.688		100.00	0.000	0.000
					C	0.000	0.688		100.00	0.000	0.000
L3 148.000-111.000	128.978	1.476	0.009	80.157	A	0.000	80.157	80.157	100.00	0.000	0.000
					B	0.000	80.157		100.00	0.000	0.000
					C	0.000	80.157		100.00	0.000	7.064
L4 111.000-105.250	108.110	1.404	0.009	13.877	A	0.000	13.877	13.877	100.00	0.000	0.000
					B	0.000	13.877		100.00	0.000	0.000
					C	0.000	13.877		100.00	0.000	2.949
L5 105.250-76.750	90.654	1.335	0.009	75.368	A	0.000	75.368	75.368	100.00	0.000	0.000
					B	0.000	75.368		100.00	0.000	0.000
					C	0.000	75.368		100.00	0.000	19.005
L6 76.750-70.750	73.733	1.258	0.008	16.913	A	0.000	16.913	16.913	100.00	0.000	0.000
					B	0.000	16.913		100.00	0.000	0.000
					C	0.000	16.913		100.00	0.000	4.001
L7 70.750-43.000	56.591	1.167	0.007	84.722	A	0.000	84.722	84.722	100.00	0.000	0.000
					B	0.000	84.722		100.00	0.000	0.000
					C	0.000	84.722		100.00	0.000	19.859
L8 43.000-27.250	35.032	1.017	0.007	51.565	A	0.000	51.565	51.565	100.00	0.000	0.000
					B	0.000	51.565		100.00	0.000	0.000
					C	0.000	51.565		100.00	0.000	13.784
L9 27.250-7.375	17.186	1	0.006	70.052	A	0.000	70.052	70.052	100.00	0.000	0.000
					B	0.000	70.052		100.00	0.000	0.000
					C	0.000	70.052		100.00	0.000	13.826
L10 7.375-0.000	3.671	1	0.006	27.351	A	0.000	27.351	27.351	100.00	0.000	0.000
					B	0.000	27.351		100.00	0.000	0.000
					C	0.000	27.351		100.00	0.000	4.918

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

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

Maximum Member Forces

Section No.	Elevation ft	Component Type	Condition	Gov. Load Comb.	Force K	Major Axis Moment kip-ft	Minor Axis Moment kip-ft
L1	160 - 148.5	Pole	Max Tension	11	0.000	-0.000	0.000
			Max. Compression	14	-3.553	-0.597	-0.025
			Max. Mx	5	-1.190	-32.779	0.103
			Max. My	8	-1.193	0.051	-32.383
			Max. Vy	11	-3.594	32.483	-0.103
			Max. Vx	8	3.567	0.051	-32.383
			Max. Torque	2			-0.881
L2	148.5 - 148	Pole	Max Tension	1	0.000	0.000	0.000
			Max. Compression	14	-3.599	-0.594	-0.027
			Max. Mx	5	-1.223	-34.580	0.109
			Max. My	8	-1.227	0.049	-34.170
			Max. Vy	11	-3.615	34.284	-0.110
			Max. Vx	8	3.587	0.049	-34.170
			Max. Torque	2			-0.881
L3	148 - 111	Pole	Max Tension	1	0.000	0.000	0.000
			Max. Compression	14	-24.117	1.188	-0.199
			Max. Mx	11	-10.361	498.610	-0.436
			Max. My	2	-10.368	-0.124	497.097
			Max. Vy	11	-19.510	498.610	-0.436
			Max. Vx	8	19.480	0.844	-496.970
			Max. Torque	2			-0.881
L4	111 - 105.25	Pole	Max Tension	1	0.000	0.000	0.000
			Max. Compression	14	-26.565	1.782	-0.535
			Max. Mx	11	-11.918	687.591	-0.591
			Max. My	2	-11.925	-0.147	685.666
			Max. Vy	11	-20.273	687.591	-0.591
			Max. Vx	8	20.243	1.040	-685.634
			Max. Torque	6			0.240
L5	105.25 - 76.75	Pole	Max Tension	1	0.000	0.000	0.000
			Max. Compression	14	-33.450	3.832	-1.703
			Max. Mx	11	-16.588	1204.981	-1.039
			Max. My	8	-16.592	1.626	-1202.178
			Max. Vy	11	-22.404	1204.981	-1.039
			Max. Vx	8	22.374	1.626	-1202.178
			Max. Torque	6			0.219

Section No.	Elevation ft	Component Type	Condition	Gov. Load Comb.	Force K	Major Axis Moment kip-ft	Minor Axis Moment kip-ft
L6	76.75 - 70.75	Pole	Max Tension	1	0.000	0.000	0.000
			Max. Compression	14	-37.099	4.726	-2.214
			Max. Mx	11	-19.127	1439.569	-1.232
			Max. My	8	-19.131	1.879	-1436.406
			Max. Vy	11	-23.294	1439.569	-1.232
			Max. Vx	8	23.265	1.879	-1436.406
			Max. Torque	15			0.153
L7	70.75 - 43	Pole	Max Tension	1	0.000	0.000	0.000
			Max. Compression	14	-44.849	6.739	-3.368
			Max. Mx	11	-24.945	1989.583	-1.678
			Max. My	8	-24.948	2.469	-1985.614
			Max. Vy	11	-25.058	1989.583	-1.678
			Max. Vx	8	25.029	2.469	-1985.614
			Max. Torque	8			-0.231
L8	43 - 27.25	Pole	Max Tension	1	0.000	0.000	0.000
			Max. Compression	14	-54.681	8.653	-4.417
			Max. Mx	11	-32.685	2528.320	-2.078
			Max. My	8	-32.686	3.042	-2523.578
			Max. Vy	11	-26.699	2528.320	-2.078
			Max. Vx	8	26.670	3.042	-2523.578
			Max. Torque	8			-0.383
L9	27.25 - 7.375	Pole	Max Tension	1	0.000	0.000	0.000
			Max. Compression	14	-63.101	10.381	-5.416
			Max. Mx	11	-39.493	3070.915	-2.484
			Max. My	8	-39.493	3.588	-3065.471
			Max. Vy	11	-27.893	3070.915	-2.484
			Max. Vx	8	27.865	3.588	-3065.471
			Max. Torque	8			-0.486
L10	7.375 - 0	Pole	Max Tension	1	0.000	0.000	0.000
			Max. Compression	14	-66.408	11.056	-5.806
			Max. Mx	11	-42.184	3278.196	-2.637
			Max. My	8	-42.184	3.793	-3272.493
			Max. Vy	11	-28.315	3278.196	-2.637
			Max. Vx	8	28.287	3.793	-3272.493
			Max. Torque	8			-0.525

Maximum Reactions

Location	Condition	Gov. Load Comb.	Vertical K	Horizontal, X K	Horizontal, Z K
Pole	Max. Vert	14	66.408	-0.001	0.000
	Max. H_x	11	42.194	28.300	-0.011
	Max. H_z	2	42.194	-0.011	28.272
	Max. M_x	2	3270.778	-0.011	28.272
	Max. M_z	5	3274.178	-28.300	0.011
	Max. Torsion	2	0.524	-0.011	28.272
	Min. Vert	11	42.194	28.300	-0.011
	Min. H_x	5	42.194	-28.300	0.011
	Min. H_z	8	42.194	0.011	-28.272
	Min. M_x	8	-3272.493	0.011	-28.272
	Min. M_z	11	-3278.196	28.300	-0.011
	Min. Torsion	8	-0.525	0.011	-28.272

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

Load Combination	Vertical	$Shear_x$	$Shear_z$	Overturning Moment, M_x	Overturning Moment, M_z	Torque
	K	K	K	kip-ft	kip-ft	kip-ft
Dead Only	42.195	-0.000	0.000	0.834	1.943	0.000
Dead+Wind 0 deg - No Ice	42.194	0.011	-28.272	-3270.778	0.240	-0.524
Dead+Wind 30 deg - No Ice	42.195	14.162	-24.494	-2833.968	-1637.986	-0.403
Dead+Wind 60 deg - No Ice	42.195	24.518	-14.148	-1636.850	-2836.765	-0.175
Dead+Wind 90 deg - No Ice	42.194	28.300	-0.011	-0.916	-3274.178	0.100
Dead+Wind 120 deg - No Ice	42.195	24.507	14.129	1635.499	-2834.998	0.349
Dead+Wind 150 deg - No Ice	42.195	14.143	24.483	2833.921	-1634.913	0.504
Dead+Wind 180 deg - No Ice	42.194	-0.011	28.272	3272.493	3.793	0.525
Dead+Wind 210 deg - No Ice	42.195	-14.162	24.494	2835.678	1642.014	0.404
Dead+Wind 240 deg - No Ice	42.195	-24.518	14.148	1638.563	2840.785	0.175
Dead+Wind 270 deg - No Ice	42.194	-28.300	0.011	2.637	3278.196	-0.101
Dead+Wind 300 deg - No Ice	42.195	-24.507	-14.129	-1633.773	2839.024	-0.350
Dead+Wind 330 deg - No Ice	42.195	-14.143	-24.483	-2832.197	1638.945	-0.505
Dead+Ice+Temp	66.408	0.001	-0.000	5.806	11.056	-0.000
Dead+Wind 0 deg+Ice+Temp	66.408	-0.001	-8.575	-1023.522	11.470	-0.375
Dead+Wind 30 deg+Ice+Temp	66.408	4.292	-7.426	-885.537	-504.139	-0.280
Dead+Wind 60 deg+Ice+Temp	66.408	7.435	-4.287	-508.642	-881.649	-0.110
Dead+Wind 90 deg+Ice+Temp	66.408	8.585	0.001	6.126	-1019.860	0.089
Dead+Wind 120 deg+Ice+Temp	66.408	7.436	4.289	520.834	-881.868	0.264
Dead+Wind 150 deg+Ice+Temp	66.408	4.294	7.427	897.565	-504.519	0.369
Dead+Wind 180 deg+Ice+Temp	66.408	0.001	8.575	1035.328	11.028	0.375
Dead+Wind 210 deg+Ice+Temp	66.408	-4.292	7.426	897.342	526.634	0.280
Dead+Wind 240 deg+Ice+Temp	66.408	-7.435	4.287	520.448	904.141	0.110
Dead+Wind 270 deg+Ice+Temp	66.408	-8.585	-0.001	5.684	1042.351	-0.089
Dead+Wind 300 deg+Ice+Temp	66.408	-7.436	-4.289	-509.022	904.364	-0.265
Dead+Wind 330 deg+Ice+Temp	66.408	-4.294	-7.427	-885.755	527.018	-0.369
Dead+Wind 0 deg - Service	42.195	0.004	-11.072	-1283.731	1.325	-0.204
Dead+Wind 30 deg - Service	42.195	5.546	-9.592	-1112.206	-641.906	-0.157
Dead+Wind 60 deg - Service	42.195	9.601	-5.540	-642.150	-1112.562	-0.068
Dead+Wind 90 deg - Service	42.195	11.083	-0.004	0.165	-1284.361	0.039
Dead+Wind 120 deg - Service	42.195	9.597	5.533	642.667	-1111.866	0.136
Dead+Wind 150 deg - Service	42.195	5.539	9.588	1113.232	-640.701	0.196
Dead+Wind 180 deg - Service	42.195	-0.004	11.072	1285.451	2.716	0.204
Dead+Wind 210 deg - Service	42.195	-5.546	9.592	1113.891	645.926	0.157
Dead+Wind 240 deg - Service	42.195	-9.602	5.541	643.890	1116.636	0.068
Dead+Wind 270 deg - Service	42.195	-11.083	0.004	1.556	1288.399	-0.039
Dead+Wind 300 deg - Service	42.195	-9.597	-5.533	-640.965	1115.941	-0.136
Dead+Wind 330 deg - Service	42.195	-5.539	-9.588	-1111.475	644.722	-0.196

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	0.000	-42.195	0.000	0.000	42.195	-0.000	0.000%
2	0.011	-42.195	-28.277	-0.011	42.194	28.272	0.011%

Load Comb.	Sum of Applied Forces PX K	PY K	PZ K	Sum of Reactions PX K	PY K	PZ K	% Error
3	14.162	-42.195	-24.494	-14.162	42.195	24.494	0.000%
4	24.518	-42.195	-14.148	-24.518	42.195	14.148	0.000%
5	28.305	-42.195	-0.011	-28.300	42.194	0.011	0.011%
6	24.508	-42.195	14.129	-24.507	42.195	-14.129	0.000%
7	14.143	-42.195	24.484	-14.143	42.195	-24.483	0.000%
8	-0.011	-42.195	28.277	0.011	42.194	-28.272	0.011%
9	-14.162	-42.195	24.494	14.162	42.195	-24.494	0.000%
10	-24.518	-42.195	14.148	24.518	42.195	-14.148	0.000%
11	-28.305	-42.195	0.011	28.300	42.194	-0.011	0.011%
12	-24.508	-42.195	-14.129	24.507	42.195	14.129	0.000%
13	-14.143	-42.195	-24.484	14.143	42.195	24.483	0.000%
14	0.000	-66.408	0.000	-0.001	66.408	0.000	0.001%
15	-0.001	-66.408	-8.576	0.001	66.408	8.575	0.001%
16	4.292	-66.408	-7.426	-4.292	66.408	7.426	0.000%
17	7.435	-66.408	-4.287	-7.435	66.408	4.287	0.000%
18	8.586	-66.408	0.001	-8.585	66.408	-0.001	0.001%
19	7.436	-66.408	4.289	-7.436	66.408	-4.289	0.000%
20	4.294	-66.408	7.428	-4.294	66.408	-7.427	0.000%
21	0.001	-66.408	8.576	-0.001	66.408	-8.575	0.001%
22	-4.292	-66.408	7.426	4.292	66.408	-7.426	0.000%
23	-7.435	-66.408	4.287	7.435	66.408	-4.287	0.000%
24	-8.586	-66.408	-0.001	8.585	66.408	0.001	0.001%
25	-7.436	-66.408	-4.289	7.436	66.408	4.289	0.000%
26	-4.294	-66.408	-7.428	4.294	66.408	7.427	0.000%
27	0.004	-42.195	-11.074	-0.004	42.195	11.072	0.005%
28	5.546	-42.195	-9.593	-5.546	42.195	9.592	0.001%
29	9.602	-42.195	-5.541	-9.601	42.195	5.540	0.001%
30	11.085	-42.195	-0.004	-11.083	42.195	0.004	0.005%
31	9.598	-42.195	5.533	-9.597	42.195	-5.533	0.001%
32	5.539	-42.195	9.588	-5.539	42.195	-9.588	0.001%
33	-0.004	-42.195	11.074	0.004	42.195	-11.072	0.005%
34	-5.546	-42.195	9.593	5.546	42.195	-9.592	0.001%
35	-9.602	-42.195	5.541	9.602	42.195	-5.541	0.001%
36	-11.085	-42.195	0.004	11.083	42.195	-0.004	0.005%
37	-9.598	-42.195	-5.533	9.597	42.195	5.533	0.001%
38	-5.539	-42.195	-9.588	5.539	42.195	9.588	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	16	0.00010997	0.00013774
3	Yes	22	0.00000001	0.00013340
4	Yes	22	0.00000001	0.00013268
5	Yes	16	0.00010995	0.00010421
6	Yes	22	0.00000001	0.00013232
7	Yes	22	0.00000001	0.00013300
8	Yes	16	0.00010997	0.00013099
9	Yes	22	0.00000001	0.00013278
10	Yes	22	0.00000001	0.00013368
11	Yes	16	0.00010993	0.00010492
12	Yes	22	0.00000001	0.00013307
13	Yes	22	0.00000001	0.00013220
14	Yes	11	0.00000001	0.00004076
15	Yes	19	0.00000001	0.00010189
16	Yes	20	0.00000001	0.00008273
17	Yes	20	0.00000001	0.00008288
18	Yes	19	0.00000001	0.00010151
19	Yes	20	0.00000001	0.00008416
20	Yes	20	0.00000001	0.00008378
21	Yes	19	0.00000001	0.00010289
22	Yes	20	0.00000001	0.00008608
23	Yes	20	0.00000001	0.00008603
24	Yes	19	0.00000001	0.00010353

25	Yes	20	0.00000001	0.00008488
26	Yes	20	0.00000001	0.00008517
27	Yes	16	0.00011676	0.00005609
28	Yes	19	0.00000001	0.00008021
29	Yes	18	0.00000001	0.00014831
30	Yes	16	0.00011676	0.00005323
31	Yes	18	0.00000001	0.00014801
32	Yes	19	0.00000001	0.00008001
33	Yes	16	0.00011676	0.00005587
34	Yes	18	0.00000001	0.00014884
35	Yes	19	0.00000001	0.00008062
36	Yes	16	0.00011675	0.00005341
37	Yes	19	0.00000001	0.00008007
38	Yes	18	0.00000001	0.00014789

Maximum Tower Deflections - Service Wind

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
L1	160 - 148.5	47.342	35	2.6948	0.0108
L2	148.5 - 148	40.941	35	2.5595	0.0022
L3	148 - 111	40.673	35	2.5583	0.0021
L4	114.75 - 105.25	24.057	35	2.0900	0.0003
L5	105.25 - 76.75	20.053	35	1.9071	0.0003
L6	81 - 70.75	11.554	35	1.4264	0.0002
L7	70.75 - 43	8.682	35	1.2116	0.0002
L8	48 - 27.25	3.968	35	0.7664	0.0001
L9	27.25 - 7.375	1.265	35	0.4490	0.0001
L10	7.375 - 0	0.090	35	0.1173	0.0000

Critical Deflections and Radius of Curvature - Service Wind

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
157.000	Side Arm Mount [SO 101-3]	35	45.644	2.6468	0.0077	5140
148.000	Platform Mount [LP 712-1]	35	40.673	2.5583	0.0022	4441
146.000	Side Arm Mount [SO 103-3]	35	39.605	2.5515	0.0020	6916
138.000	Platform Mount [LP 712-1]	35	35.384	2.4861	0.0014	6005
127.000	Platform Mount [LP 712-1]	35	29.801	2.3221	0.0007	3674
119.000	T-Arm Mount [TA 602-3]	35	25.980	2.1727	0.0004	2861
48.000	KS24019-L112A	35	3.968	0.7664	0.0001	3686

Maximum Tower Deflections - Design Wind

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
L1	160 - 148.5	120.059	11	6.8374	0.0274
L2	148.5 - 148	103.855	11	6.4931	0.0054
L3	148 - 111	103.177	11	6.4901	0.0053
L4	114.75 - 105.25	61.079	11	5.3064	0.0007
L5	105.25 - 76.75	50.925	11	4.8432	0.0007
L6	81 - 70.75	29.360	10	3.6243	0.0006
L7	70.75 - 43	22.067	10	3.0794	0.0005
L8	48 - 27.25	10.090	10	1.9486	0.0004
L9	27.25 - 7.375	3.216	10	1.1420	0.0002
L10	7.375 - 0	0.230	10	0.2983	0.0001

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °

Critical Deflections and Radius of Curvature - Design Wind

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
157.000	Side Arm Mount [SO 101-3]	11	115.762	6.7152	0.0197	2112
148.000	Platform Mount [LP 712-1]	11	103.177	6.4901	0.0055	1821
146.000	Side Arm Mount [SO 103-3]	11	100.472	6.4728	0.0052	2830
138.000	Platform Mount [LP 712-1]	11	89.782	6.3076	0.0037	2431
127.000	Platform Mount [LP 712-1]	11	75.639	5.8932	0.0017	1479
119.000	T-Arm Mount [TA 602-3]	11	65.956	5.5155	0.0010	1149
48.000	KS24019-L112A	10	10.090	1.9486	0.0004	1454

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	160 - 148.5 (1)	TP10x10x0.349	11.500	0.000	0.0	21.000	10.5815	-1.189	222.212	0.005
L2	148.5 - 148 (2)	TP23x10x0.349	0.500	0.000	0.0	21.000	10.5815	-1.192	222.212	0.005
L3	148 - 111 (3)	TP28.994x23x0.25	37.000	0.000	0.0	36.000	22.3263	-10.360	803.747	0.013
L4	111 - 105.25 (4)	TP29.4254x27.8865x0.3125	9.500	0.000	0.0	36.000	28.8763	-11.917	1039.550	0.011
L5	105.25 - 76.75 (5)	TP34.042x29.4254x0.4446	28.500	0.000	0.0	33.720	46.4429	-16.587	1566.050	0.011
L6	76.75 - 70.75 (6)	TP34.3889x32.4643x0.375	10.250	0.000	0.0	39.000	40.4851	-19.126	1578.920	0.012
L7	70.75 - 43 (7)	TP38.884x34.3889x0.5356	27.750	0.000	0.0	34.560	63.8187	-24.945	2205.580	0.011
L8	43 - 27.25 (8)	TP40.6856x37.0028x0.6528	20.750	0.000	0.0	31.434	82.9499	-32.685	2607.450	0.013
L9	27.25 - 7.375 (9)	TP43.9053x40.6856x0.647	19.875	0.000	0.0	34.566	88.8342	-39.493	3070.640	0.013
L10	7.375 - 0 (10)	TP45.1x43.9053x0.661	7.375	0.000	0.0	36.840	93.2267	-42.184	3434.470	0.012

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	160 - 148.5 (1)	TP10x10x0.349	32.785	15.946	23.100	0.690	0.000	0.000	23.100	0.000
L2	148.5 - 148 (2)	TP23x10x0.349	32.777	15.942	23.100	0.690	0.000	0.000	23.100	0.000
L3	148 - 111 (3)	TP28.994x23x0.25	498.750	38.650	36.000	1.074	0.000	0.000	36.000	0.000
L4	111 - 105.25 (4)	TP29.4254x27.8865x0.3125	687.808	39.901	36.000	1.108	0.000	0.000	36.000	0.000
L5	105.25 - 76.75 (5)	TP34.042x29.4254x0.4446	1205.425	38.569	33.720	1.144	0.000	0.000	33.720	0.000
L6	76.75 - 70.75 (6)	TP34.3889x32.4643x0.375	1440.108	51.017	39.000	1.308	0.000	0.000	39.000	0.000

Section No.	Elevation ft	Size	Actual M_x kip-ft	Actual f_{bx} ksi	Allow. F_{bx} ksi	Ratio $\frac{f_{bx}}{F_{bx}}$	Actual M_y kip-ft	Actual f_{by} ksi	Allow. F_{by} ksi	Ratio $\frac{f_{by}}{F_{by}}$
L7	70.75 - 43 (7)	TP38.884x34.3889x0.5356	1990.358	40.660	34.560	1.177	0.000	0.000	34.560	0.000
L8	43 - 27.25 (8)	TP40.6856x37.0028x0.6528	2529.308	37.351	31.434	1.188	0.000	0.000	31.434	0.000
L9	27.25 - 7.375 (9)	TP43.9053x40.6856x0.647	3072.117	39.151	34.566	1.133	0.000	0.000	34.566	0.000
L10	7.375 - 0 (10)	TP45.1x43.9053x0.661	3279.475	38.763	36.840	1.052	0.000	0.000	36.840	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	160 - 148.5 (1)	TP10x10x0.349	3.599	0.340	14.000	0.049	0.564	0.132	14.000	0.009
L2	148.5 - 148 (2)	TP23x10x0.349	3.649	0.345	14.000	0.021	0.564	0.132	14.000	0.009
L3	148 - 111 (3)	TP28.994x23x0.25	19.518	0.874	24.000	0.073	0.152	0.006	24.000	0.000
L4	111 - 105.25 (4)	TP29.4254x27.8865x0.3125	20.283	0.702	24.000	0.059	0.152	0.004	24.000	0.000
L5	105.25 - 76.75 (5)	TP34.042x29.4254x0.4446	22.414	0.483	22.480	0.043	0.152	0.002	22.480	0.000
L6	76.75 - 70.75 (6)	TP34.3889x32.4643x0.375	23.303	0.576	26.000	0.044	0.151	0.003	26.000	0.000
L7	70.75 - 43 (7)	TP38.884x34.3889x0.5356	25.066	0.393	23.040	0.034	0.151	0.001	23.040	0.000
L8	43 - 27.25 (8)	TP40.6856x37.0028x0.6528	26.706	0.322	20.956	0.031	0.175	0.001	20.956	0.000
L9	27.25 - 7.375 (9)	TP43.9053x40.6856x0.647	27.900	0.314	23.044	0.027	0.175	0.001	23.044	0.000
L10	7.375 - 0 (10)	TP45.1x43.9053x0.661	28.323	0.304	24.560	0.025	0.175	0.001	24.560	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	160 - 148.5 (1)	0.005	0.690	0.000	0.049	0.009	0.697 ✔	1.333	H1-3+VT ✔
L2	148.5 - 148 (2)	0.005	0.690	0.000	0.021	0.009	0.697 ✔	1.333	H1-3+VT ✔
L3	148 - 111 (3)	0.013	1.074	0.000	0.073	0.000	1.088 ✔	1.333	H1-3+VT ✔
L4	111 - 105.25 (4)	0.011	1.108	0.000	0.059	0.000	1.121 ✔	1.333	H1-3+VT ✔
L5	105.25 - 76.75 (5)	0.011	1.144	0.000	0.043	0.000	1.155 ✔	1.333	H1-3+VT ✔
L6	76.75 - 70.75 (6)	0.012	1.308	0.000	0.044	0.000	1.321 ✔	1.333	H1-3+VT ✔
L7	70.75 - 43 (7)	0.011	1.177	0.000	0.034	0.000	1.188 ✔	1.333	H1-3+VT ✔
L8	43 - 27.25 (8)	0.013	1.188	0.000	0.031	0.000	1.201 ✔	1.333	H1-3+VT ✔
L9	27.25 - 7.375 (9)	0.013	1.133	0.000	0.027	0.000	1.146 ✔	1.333	H1-3+VT ✔

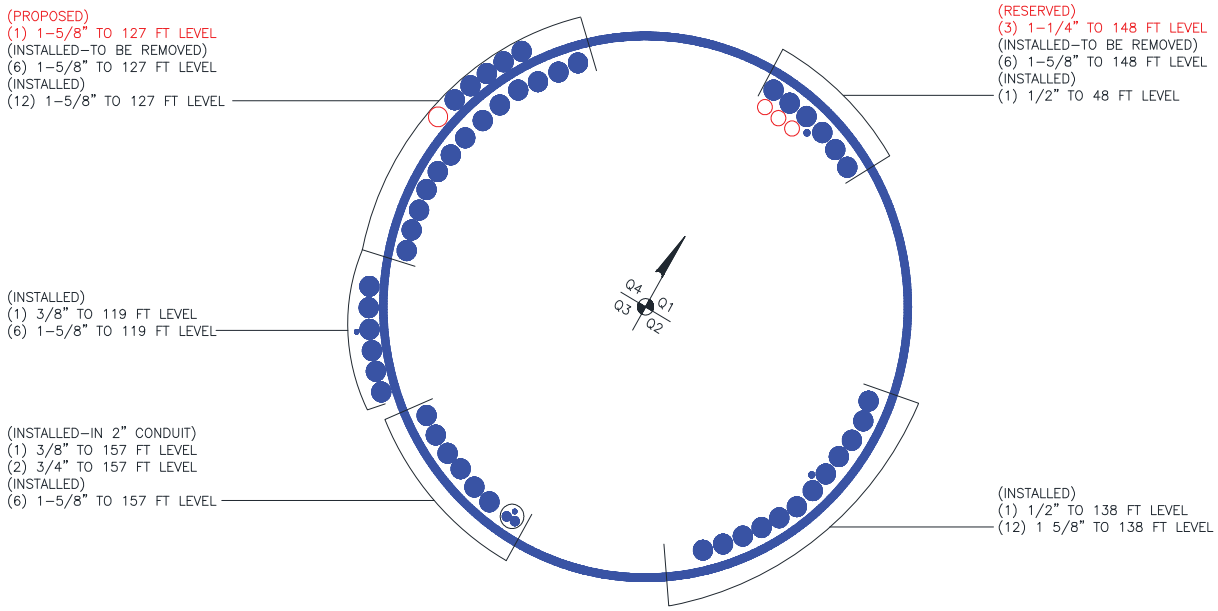
Section No.	Elevation ft	Ratio $\frac{P}{P_a}$	Ratio $\frac{f_{bx}}{F_{bx}}$	Ratio $\frac{f_{by}}{F_{by}}$	Ratio $\frac{f_v}{F_v}$	Ratio $\frac{f_{vt}}{F_{vt}}$	Comb. Stress Ratio	Allow. Stress Ratio	Criteria
L10	7.375 - 0 (10)	0.012	1.052	0.000	0.025	0.000	1.065 ✔	1.333	H1-3+VT ✔

Section Capacity Table

Section No.	Elevation ft	Component Type	Size	Critical Element	P K	$SF*P_{allow}$ K	% Capacity	Pass Fail
L1	160 - 148.5	Pole	TP10x10x0.349	1	-1.189	296.209	52.3	Pass
L2	148.5 - 148	Pole	TP23x10x0.349	2	-1.192	296.209	52.3	Pass
L3	148 - 111	Pole	TP28.994x23x0.25	3	-10.360	1071.395	81.6	Pass
L4	111 - 105.25	Pole	TP29.4254x27.8865x0.3125	4	-11.917	1385.720	84.1	Pass
L5	105.25 - 76.75	Pole	TP34.042x29.4254x0.4446	5	-16.587	2087.545	86.6	Pass
L6	76.75 - 70.75	Pole	TP34.3889x32.4643x0.375	6	-19.126	2104.700	99.1	Pass
L7	70.75 - 43	Pole	TP38.884x34.3889x0.5356	7	-24.945	2940.038	89.1	Pass
L8	43 - 27.25	Pole	TP40.6856x37.0028x0.6528	8	-32.685	3475.731	90.1	Pass
L9	27.25 - 7.375	Pole	TP43.9053x40.6856x0.647	9	-39.493	4093.163	85.9	Pass
L10	7.375 - 0	Pole	TP45.1x43.9053x0.661	10	-42.184	4578.148	79.9	Pass
							Summary	
						Pole (L6)	99.1	Pass
						RATING =	**99.1**	**Pass**

APPENDIX B

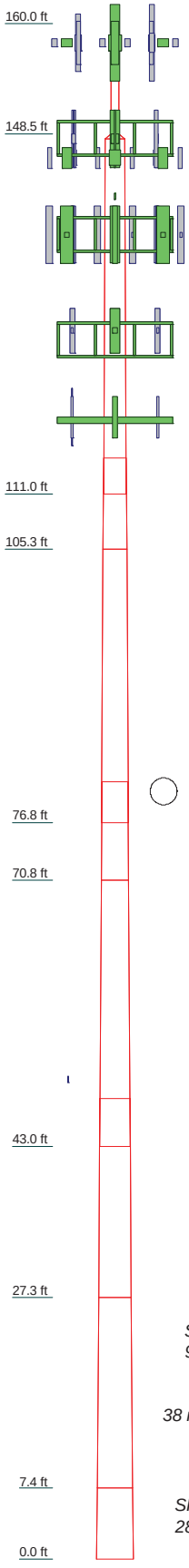
BASE LEVEL DRAWING

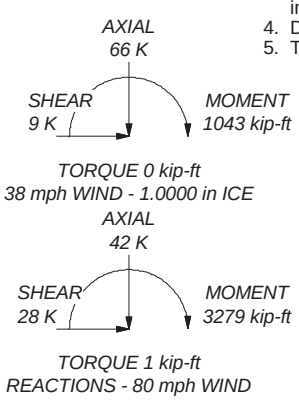

(PROPOSED)
(1) 1-5/8" TO 127 FT LEVEL
(INSTALLED-TO BE REMOVED)
(6) 1-5/8" TO 127 FT LEVEL
(INSTALLED)
(12) 1-5/8" TO 127 FT LEVEL
(RESERVED)
(3) 1-1/4" TO 148 FT LEVEL
(INSTALLED-TO BE REMOVED)
(6) 1-5/8" TO 148 FT LEVEL
(INSTALLED)
(1) 1/2" TO 48 FT LEVEL
(INSTALLED)
(1) 3/8" TO 119 FT LEVEL
(6) 1-5/8" TO 119 FT LEVEL
(INSTALLED-IN 2" CONDUIT)
(1) 3/8" TO 157 FT LEVEL
(2) 3/4" TO 157 FT LEVEL
(INSTALLED)
(6) 1-5/8" TO 157 FT LEVEL
(INSTALLED)
(1) 1/2" TO 138 FT LEVEL
(12) 1 5/8" TO 138 FT LEVEL
Q4
Q1
Q3
Q2

APPENDIX C

ADDITIONAL CALCULATIONS

Section	1	2	3	4	5	6	7	8	9	10
Length (ft)	11.500	0.500	37.000	9.500	28.500	10.250	27.750	20.750	19.875	7.375
Number of Sides	1	1	18	18	18	18	18	18	18	18
Thickness (in)	0.3490	0.3490	0.2500	0.3125	0.4446	0.3750	0.5356	0.6528	0.6470	0.6610
Socket Length (ft)			3.750		4.250		5.000			
Top Dia (in)	10.0000	10.0000	23.0000	27.8865	29.4254	32.4643	34.3889	37.0028	40.6856	43.9053
Bot Dia (in)	10.0000	23.0000	28.9940	29.4254	34.0420	34.3889	38.8840	40.6856	43.9053	45.1000
Grade	A53-B-35			A607-60		Reinf 56.20 ksi	A607-65	Reinf 57.60 ksi	Reinf 52.39 ksi	Reinf 57.61 ksi
Weight (K)	0.4	0.0	2.6	0.9	4.3	1.4	5.8	5.6	5.8	2.3





DESIGNED APPURTENANCE LOADING

TYPE	ELEVATION	TYPE	ELEVATION
Side Arm Mount [SO 101-3]	157	(2) LPA-80063-6CF-EDIN-2 w/ Mount Pipe	138
800 10121 w/ Mount Pipe	157	BXA-70063-6CF-EDIN-2 w/ Mount Pipe	138
800 10121 w/ Mount Pipe	157	BXA-70063-6CF-EDIN-2 w/ Mount Pipe	138
800 10121 w/ Mount Pipe	157	BXA-70063-6CF-EDIN-2 w/ Mount Pipe	138
AM-X-CD-16-65-00T-RET w/ Mount Pipe	157	BXA-171063-12BF-EDIN-X w/ Mount Pipe	138
DC6-48-60-18-8F	157	BXA-171063-12BF-EDIN-X w/ Mount Pipe	138
P65-17-XLH-RR w/ Mount Pipe	157	BXA-171063-12BF-EDIN-X w/ Mount Pipe	138
SBNH-1D6565C w/ Mount Pipe	157	KS24019-L112A	138
(2) LGP21401	157	(2) FD9R6004/2C-3L	138
(2) LGP21401	157	(2) FD9R6004/2C-3L	138
(2) LGP21401	157	(2) FD9R6004/2C-3L	138
RRUS-11	157	Platform Mount [LP 712-1]	127
RRUS-11	157	ERICSSON AIR 21 B2A B4P w/ Mount Pipe	127
RRUS-11	157	ERICSSON AIR 21 B2A B4P w/ Mount Pipe	127
RRUS-11	157	ERICSSON AIR 21 B2A B4P w/ Mount Pipe	127
RRUS-11	157	ERICSSON AIR 21 B4A B2P w/ Mount Pipe	127
Platform Mount [LP 712-1]	148	ERICSSON AIR 21 B4A B2P w/ Mount Pipe	127
APXVSPP18-C-A20 w/ Mount Pipe	148	ERICSSON AIR 21 B4A B2P w/ Mount Pipe	127
APXVSPP18-C-A20 w/ Mount Pipe	148	KRY 112 144/1	127
APXVSPP18-C-A20 w/ Mount Pipe	148	KRY 112 144/1	127
IBC1900BB-1	148	KRY 112 144/1	127
IBC1900BB-1	148	T-Arm Mount [TA 602-3]	119
IBC1900BB-1	148	2.375" OD x 6' Mount Pipe	119
IBC1900HG-2A	148	2.375" OD x 6' Mount Pipe	119
IBC1900HG-2A	148	2.375" OD x 6' Mount Pipe	119
IBC1900HG-2A	148	HBX-6516DS-VTM w/ Mount Pipe	119
(2) 2.375" OD x 6' Mount Pipe	148	HBX-6516DS-VTM w/ Mount Pipe	119
(2) 2.375" OD x 6' Mount Pipe	148	HBX-6516DS-VTM w/ Mount Pipe	119
(2) 2.375" OD x 6' Mount Pipe	148	KS24019-L112A	48
Side Arm Mount [SO 103-3]	146	Side Arm Mount [SO 701-1]	48
(2) PCS 1900MHz 4x45W-65MHz	146		
(2) PCS 1900MHz 4x45W-65MHz	146		
(2) PCS 1900MHz 4x45W-65MHz	146		
800MHz 2X50W RRH W/FILTER	146		
800MHz 2X50W RRH W/FILTER	146		
800MHz 2X50W RRH W/FILTER	146		
Platform Mount [LP 712-1]	138		
(2) LPA-80063-6CF-EDIN-2 w/ Mount Pipe	138		
(2) LPA-80063-6CF-EDIN-2 w/ Mount Pipe	138		

MATERIAL STRENGTH

GRADE	Fy	Fu	GRADE	Fy	Fu
A53-B-35	35 ksi	58 ksi	Reinf 57.60 ksi	58 ksi	72 ksi
A607-60	60 ksi	75 ksi	Reinf 52.39 ksi	52 ksi	66 ksi
Reinf 56.20 ksi	56 ksi	71 ksi	Reinf 57.61 ksi	58 ksi	65 ksi
A607-65	65 ksi	80 ksi	Reinf 61.40 ksi	61 ksi	77 ksi

TOWER DESIGN NOTES

1. Tower is located in Hartford County, Connecticut.
2. Tower designed for a 80 mph basic wind in accordance with the TIA/EIA-222-F Standard.
3. Tower is also designed for a 38 mph basic wind with 1.00 in ice. Ice is considered to increase in thickness with height.
4. Deflections are based upon a 50 mph wind.
5. TOWER RATING: 99.1%

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

Job:	***160' Monopole / Burnt House***		
Project:	***PJF 37513-0756 / BU 876313***		
Client: Crown Castle	Drawn by: John J Woolley		App'd:
Code: TIA/EIA-222-F	Date: 03/11/14		Scale: NTS
Path: G:\TOWER\375_Crown_Castle\201\37513-0756.BU 876313\WO 724001 BU 876313 - (7809)37513-0756 R4_SABRE 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#: 876313
Site Name:
App #:

Base Reactions		
TIA Revision:	F	
Unfactored Moment, M:	3279	ft-kips
Unfactored Axial, P:	42	kips
Unfactored Shear, V:	28	kips

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

Anchor Rod Results

TIA F --> Maximum Rod Tension	186.5	Kips
Allowable Tension:	195.0	Kips
Anchor Rod Stress Ratio:	95.7%	**Pass**

Plate Data		
W=Side:	53	in
Thick:	3	in
Grade:	50	ksi
Clip Distance:	0	in

Base Plate Results Flexural Check

Base Plate Stress:	43.2	ksi
Allowable PL Bending Stress:	50.0	ksi
Base Plate Stress Ratio:	86.4%	**Pass**

PL Ref. Data	
Yield Line (in):	29.85
Max PL Length:	29.85

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

N/A - Unstiffened

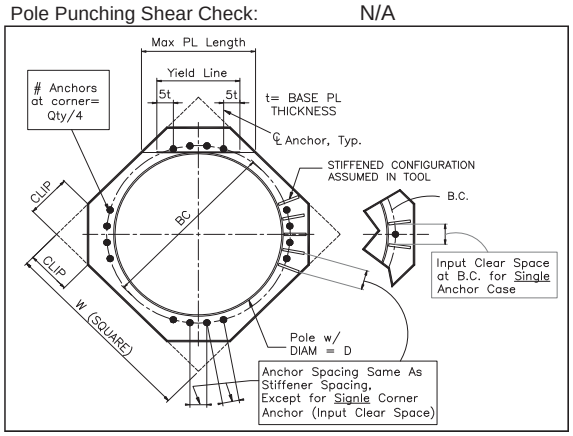
Stiffener Results

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

Pole Data		
Diam:	45.1	in
Thick:	0.4375	in
Grade:	65	ksi
# of Sides:	18	"0" IF Round



Stress Increase Factor		
ASD ASIF:	1.333	

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

foundation loads

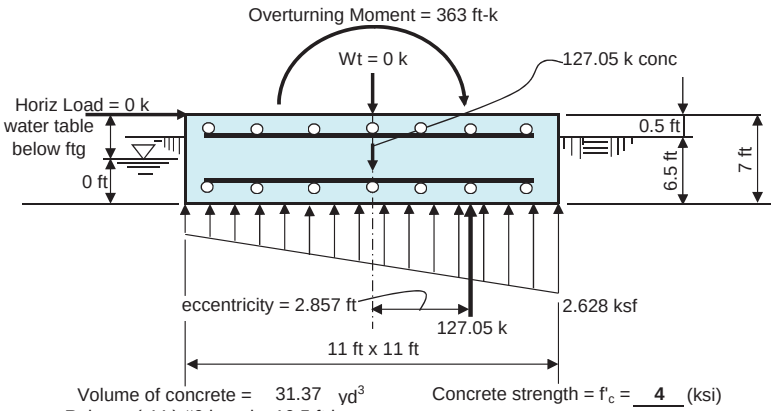
Tower or Pole Weight =	**0**	kips
Total Horizontal Force =	**0**	kips
Overturning Moment =	**363**	ft-kips

soil properties

Safety factor against overturning =	**1.5**	
Soil density =	**115**	pcf
Allowable soil bearing =	**3**	ksf
Depth to water table =	**7**	ft

mat dimensions

depth to bottom of footing =	**6.5**	ft
Footing thickness =	**7**	ft
Footing Width =	**11**	ft
Footing Length =	**11**	ft
Tower/Pole Center Offset =	**0**	ft



Volume of concrete = 31.37 yd^3 Concrete strength = f'_c = **4** (ksi)

Rebar = (44) #9 bars by 10.5 ft long

reinforcing steel = **(11) #9 @ 12.6 in o.c. ea way top and bottom**

Summary of analysis results

Overturning Moment: (Stress Ratio = 0.779)

Calculated Overturning Moment = 363 ft-kips

Resisting Moment = 698.8 ft-kips

Factor of Safety against overturning = 1.925 **> 1.5 okay**

Soil Bearing (Stress Ratio = 0.876) **< CONTROLLING CRITERIA**

Net Soil Bearing Resistance = 3 ksf

Calculated Soil Bearing Pressure = 2.628 **ksf < 3 ksf okay**

Bending Moment (Stress Ratio = 0.059)

Ultimate Bending Moment Resistance = 3890 ft-kips

Calculated Ultimate Bending Moment = 228 **ft-kips < 3890 ft-kips okay**

Bending Shear (Stress Ratio = 0.06)

Ultimate Bending Shear Resistance = 1126 kips

Calculated Ultimate Bending Shear = 68 **kips < 1126 kips okay**

Rebar strength = F_y = **60** (ksi)

minimum cover over rebar = **3** inches

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

Job Number: 37513-0756 R4
Site Number: 876313
Site Name: Site Name

By: RMK
Date: 3/11/2014

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

Unfactored Base Reactions from RISA

	Comp. (+)	Tension (-)	
Moment, M =	2916.0		k-ft
Shear, V =	28.0		kips
Axial Load, P =	42.0		kips
OTM =	2930.0	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 =	25.5	ft
fc' =	3	ksi
εc =	0.003	in/in
Mat Ftdn. Cap Width =	11	ft
Mat Ftdn. Cap Length =	11	ft
Depth Below Grade =	6.5	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 =	20	
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 =	7.00	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 =	100.0%
Maximum Steel Ratio =	100.0%

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	2	110		26	Sand				2
2	3	120		33	Sand				5
3	32	115		25	Sand	6000			37
4									
5									
6									
7									
8									
9									
10									
11									
12									

Soil Results: Overturning

Depth to COR =	17.08	ft, from Grade
Bending Moment, M =	3408.19	k-ft, from COR
Resisting Moment, Ma =	3885.99	k-ft, from COR

MOMENT RATIO = 87.7% OK

Shear, V =	28.00	kips
Resisting Shear, Va =	31.93	kips

SHEAR RATIO = 87.7% OK

Soil Results: Uplift

Uplift, T =	0.00	kips
Allowable Uplift Cap., Ta =	153.84	kips

UPLIFT RATIO = 0.0% OK

Soil Results: Compression

Compression, C =	42.00	kips
Allowable Comp. Cap., Ca =	301.41	kips

COMPRESSION RATIO = 13.9% OK

Steel Results (ACI 318-02):

Minimum Steel Area =	18.47	sq in
Actual Steel Area =	31.20	sq in
Allowable Min Axial, Pa =	-1296.00	kips, Where Ma = 0 k-ft
Allowable Max Axial, Pa =	6369.58	kips, Where Ma = 0 k-ft

Axial Load, P =	36.31	kips @ 6.50 ft Below Grade
Moment, M =	3006.91	k-ft @ 6.50 ft Below Grade
Allowable Moment, Ma =	3801.44	k-ft

MOMENT RATIO = 79.1% OK

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#: *876313*
Site Name: *Site Name*
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 =	20	
As Total=	31.2	in^2
A s/ Aconc, Rho:	0.0056	0.56%

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:	0.56%	OK

Ref. Shaft Max Axial Capacities, ϕ Max(Pn or Tn):		
Max Pu = (φ=0.65) Pn.		
Pn per ACI 318 (10-2)	8280.46	kips
at Mu=(ϕ=0.65)Mn=	5016.69	ft-kips
Max Tu, (φ=0.9) Tn =	1684.8	kips
at Mu=ϕ=(0.90)Mn=	0.00	ft-kips

Maximum Shaft Superimposed Forces

TIA Revision:	F	
Max. Service Shaft M:	3006.91	ft-kips **(* Note)**
Max. Service Shaft P:	36.31	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:	3908.983	ft-kips
1.30	Pu:	47.203	kips

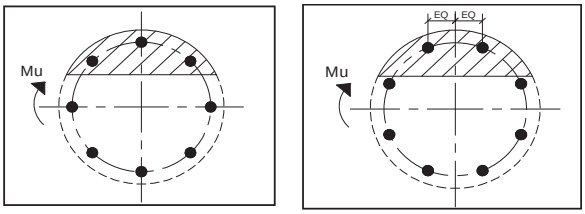
Material Properties

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: **1**



Case 1 Case 2

Dist. From Edge to Neutral Axis:	**13.64**	in
Extreme Steel Strain, ϵt:	**0.0143**	
ϵt > 0.0050, Tension Controlled		
Reduction Factor,φ:	**0.900**	

Output Note: Negative Pu=Tension

For Axial Compression, φ Pn = Pu:	47.20	kips
Drilled Shaft Moment Capacity, φMn:	**4941.85**	ft-kips
Drilled Shaft Superimposed Mu:	**3908.98**	ft-kips

(Mu/φMn, Drilled Shaft Flexure CSR:	**79.1%**

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

T-Mobile Existing Facility

Site ID: CT11453C

Southington (Sprint)

1394 Route 322
Southington, CT 06410

March 21, 2014

EBI Project Number: 62141636

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

EBI Consulting
environmental | engineering | due diligence

March 21, 2014

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

Re: Emissions Values for Site: **CT11453C - Southington (Sprint)**

EBI Consulting was directed to analyze the proposed T-Mobile facility located at 1394 Route 322, Southington, 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 band 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 1394 Route 322, Southington, 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) were considered for each sector of the proposed installation.
2) 2 UMTS channels (2110.000 MHz 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 MHz 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 **128 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 calculation were done with respect to uncontrolled / general public threshold limits

Site ID	CT11453C - Southington (Sprint)
Site Addresss	1394 Route 322, Southington, CT 06410
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	128	122	None	0	0	48.326044	1.16726	0.11673%
1b	Ericsson	AIR21 B4A/B2P	Not Used	-	-			0	-3.95	128	122	None	0	0	0	0	0.00000%
2a	Ericsson	AIR21 B2A / B4P	Active	PCS - 1950 MHz	GSM / UMTS	30	2	60	-3.95	128	122	1-5/8"	0	0	24.163022	0.58363	0.05836%
2B	Ericsson	AIR21 B2A / B4P	Passive	AWS - 2100 MHz	UMTS	30	2	60	-3.95	128	122	1-5/8"	0	0	24.163022	0.58363	0.05836%
														Sector total Power Density Value:		0.233%	

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	128	122	None	0	0	48.326044	1.16726	0.11673%
1b	Ericsson	AIR21 B4A/B2P	Not Used	-	-			0	-3.95	128	122	None	0	0	0	0	0.00000%
2a	Ericsson	AIR21 B2A / B4P	Active	PCS - 1950 MHz	GSM / UMTS	30	2	60	-3.95	128	122	1-5/8"	0	0	24.163022	0.58363	0.05836%
28	Ericsson	AIR21 B2A / B4P	Passive	AWS - 2100 MHz	UMTS	30	2	60	-3.95	128	122	1-5/8"	0	0	24.163022	0.58363	0.05836%
														Sector total Power Density Value:		0.233%	

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	128	122	None	0	0	48.326044	1.16726	0.11673%
1b	Ericsson	AIR21 B4A/B2P	Not Used	-	-			0	-3.95	128	122	None	0	0	0	0	0.00000%
2a	Ericsson	AIR21 B2A / B4P	Active	PCS - 1950 MHz	GSM / UMTS	30	2	60	-3.95	128	122	1-5/8"	0	0	24.163022	0.58363	0.05836%
28	Ericsson	AIR21 B2A / B4P	Passive	AWS - 2100 MHz	UMTS	30	2	60	-3.95	128	122	1-5/8"	0	0	24.163022	0.58363	0.05836%
														Sector total Power Density Value:		0.233%	

Site Composite MPE %

Carrier	MPE %
T-Mobile	0.700%
AT&T	14.160%
MetroPCS	8.580%
Verizon Wireless	17.040%
Sprint	6.910%
Total Site MPE %	**47.390%**

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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 **0.700% (0.233% 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 **47.390%** of the allowable FCC established general public limit sampled at the ground level. This is based upon values listed in the Connecticut Siting Council database for existing carrier emissions.

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

Scott Heffernan
RF Engineering Director

EBI Consulting
21 B Street
Burlington, MA 01803