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

April 17, 2017

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

RE: **Notice of Exempt Modification for AT&T/ LTE 3C Crown Site BU: 876347**
AT&T Site ID: CT5307
53 Slater Street, Manchester, CT 06040
Latitude: 41° 48' 18.0"/ Longitude: -72° 32' 1.0"

Dear Ms. Bachman:

AT&T currently maintains six (6) antennas at the 145-foot level of the existing 155-foot monopole tower at 53 Slater Street in Manchester, CT. The tower is owned by Crown Castle. The property is owned by 121 Connecticut Avenue Associates. AT&T intends to replace three (3) RRU11 with three (3) RRU32s B2s.

This facility was approved by the by the Town of Manchester Planning and Zoning Commission on July August 17, 1998. This approval was given without conditions.

Please accept this letter as notification pursuant to Regulations of Connecticut State Agencies § 16-50j-73, for construction that constitutes an exempt modification pursuant to R.C.S.A. § 16-50j-72(b)(2). In accordance with R.S.C.A. § 16-50j-73, a copy of this letter is being sent to The Honorable Jay Moran, Mayor, Town of Manchester, as well as the property owner, and Crown Castle is the tower owner.

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

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

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

4. The operation of the replacement antennas will not increase radio frequency emissions at the facility to a level at or above the Federal Communication Commission safety standard.

5. The proposed modifications will not cause a change or alteration in the physical or environmental characteristics of the site.

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

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

Sincerely,

Jeffrey Barbadora
Real Estate Specialist
12 Gill Street, Suite 5800, Woburn, MA 01801
781-729-0053
Jeff.Barbadora@crowncastle.com

Attachments:

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: The Honorable Jay Moran, Mayor,
Town of Manchester
41 Center Street
Manchester, CT 06040

121 Connecticut Avenue Associates
Attn: Jean Burns
9 Lake Lane
Ellington, CT 06029

Planning and Zoning Commission
Town of Manchester
41 Center Street
Manchester, CT 06040

VOL 2013 PG 259

TOWN OF MANCHESTER

PLANNING AND ZONING COMMISSION

CERTIFICATE OF APPROVAL OF SPECIAL EXCEPTION

Owner of record: Raglin Associates, c/o Sullivan Tile Dist.

Property Address: 53 Slater Street

Applicant: Sprint Spectrum LP

Regulation(s) cited: Article IV, Section 19.05

SPECIAL EXCEPTION GRANTED:

with modifications and the condition that a caveat addressing co-location requirements be submitted for staff review and filed on the land records by the applicant prior to any construction.

* ALL SITE WORK APPROVED BY THIS SPECIAL EXCEPTION MUST BE COMPLETED BY AUGUST 17, 2003 (5 yrs. From approval date). FAILURE TO COMPLETE ALL WORK WITHIN THE SPECIFIED TIME PERIOD WILL RESULT IN AUTOMATIC EXPIRATION OF THE APPROVAL.

* THIS CERTIFICATE MUST BE RECORDED IN THE LAND RECORDS IN THE OFFICE OF THE TOWN CLERK BEFORE THE SPECIAL EXCEPTION IS LAWFULLY EFFECTIVE.

CERTIFIED:

Frank Daversa

Secretary
Planning and Zoning Commission

*DATE ADOPTED: August 17, 1998

FILE NO. S-147

Received for Record on
SEP 11 1998 at 2:43 P.M.
Joseph V. Camposeo

Joseph V. Camposeo, Town Clerk

TOWN OF MANCHESTER
41 CENTER STREET - P.O. BOX 191
MANCHESTER, CT 06045-0191
(860) 647-3052 FAX: (860) 647-3144

ZONING PERMIT

CERTIFICATION OF ZONING COMPLIANCE REQUEST

PERMIT/APPLICATION NBR: 99 00000638 DATE APPLIED: 10/08/98
PERMIT TYPE: ZONE APP TYPE: DISH PREPARED BY: PAT21
DATE ISSUED: 11/03/98

PROPERTY ADDRESS:
3 SLATER STREET
TENANT:

LEGAL DESCRIPTION:

OWNER NAME/ADDRESS:
AGLIN ASSOCIATES
C/O SULLIVAN TILE DIST
5 RAILROAD AVE
EST HAVEN CT 06516

CONTRACTOR NAME/ADDRESS:

OTHER:
PRINT PCS

VALUATION:
OCCUPANCY TYPE: COMMERCIAL BUIL Certificate of O-C-U-P-T: C
Dimensions of structure: 150' Plans for building: YES

DESCRIPTION OF OTHER BUILDINGS NOT SHOWN:
CONDITIONS: REMARKS:
ADDTNL APPROVAL: ADDTNL PERMITS:

MISCELLANEOUS INFO: SITE DEVELOPMENT AND COLORS OF TOWER AND EQUIPMENT CABINETS TO BE AS APPRVD BY PZC ON 8/17/98

THIS IS TO CERTIFY THAT THE ABOVE STATED INFORMATION IS A PERMITTED AND LAWFUL USE AS CONTROLLED BY THE ZONING REGULATIONS OF THE TOWN OF MANCHESTER, CONNECTICUT, UPON AUTHORIZED SIGNATURE OF THE ZONING ENFORCEMENT OFFICER.

Thomas R. O'Meara
APPROVAL SIGNATURE

11/3/98
DATE

ORIGINAL

53 SLATER STREET

Location	53 SLATER STREET	**Mblu**	56/ 5140/ 53/ /
Acct#	514000053	**Owner**	ONE HUNDRED TWENTY ONE CONN-
Assessment	$1,690,200	**Appraisal**	$2,414,500
PID	14616	**Building Count**	4

Current Value

Appraisal			
Valuation Year	**Improvements**	**Land**	**Total**
2011	$1,689,400	$725,100	$2,414,500
Assessment			
Valuation Year	**Improvements**	**Land**	**Total**
2011	$1,182,600	$507,600	$1,690,200

Owner of Record

Owner	ONE HUNDRED TWENTY ONE CONN-ECTICUT AVENUE ASSOCIATES LLC	**Sale Price**	$1,180,000
		Certificate	C
Address	9 LAKE LANE ELLINGTON, CT 06029	**Book & Page**	2683/ 224
		Sale Date	07/17/2003
		Instrument	33

Ownership History

Ownership History					
Owner	**Sale Price**	**Certificate**	**Book & Page**	**Instrument**	**Sale Date**
ONE HUNDRED TWENTY ONE CONN-	$1,180,000	C	2683/ 224	33	07/17/2003
RAGLIN ASSOCIATES LLC	$0		2132/ 338		12/02/1999

Building Information

Building 1 : Section 1

Year Built: 1987
Living Area: 6333
Replacement Cost: $474,167
Replacement Cost Less Depreciation: $265,500

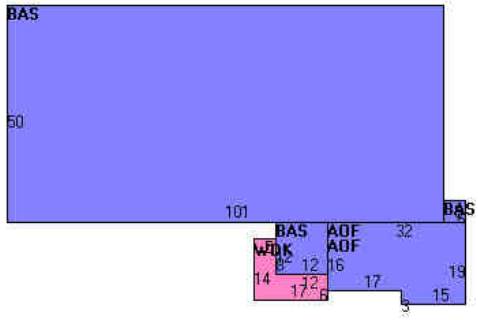
Building Attributes	
Field	**Description**
STYLE	Service Shop
MODEL	Ind/Comm

Building Photo

Grade	Average
Stories:	1
Occupancy	4
Exterior Wall 1	Pre-finsh Metl
Exterior Wall 2	Brick Veneer
Roof Structure	Gable/Hip
Roof Cover	Enam Mtl Shing
Interior Wall 1	Wall Brd/Wood
Interior Wall 2	Minim/Masonry
Interior Floor 1	Concr-Finished
Interior Floor 2	
Heating Fuel	Gas
Heating Type	Forced Air-Duc
AC Type	Partial
Bldg Use	Industrial 96
Total Rooms	
Total Bedrms	00
Total Baths	0
1st Floor Use:	300
Heat/AC	Heat/AC Packag
Frame Type	Steel
Baths/Plumbing	Average
Ceiling/Wall	Ceil & Min Wl
Rooms/Prtns	Average
Wall Height	14
% Comn Wall	0

(http://images.vgsi.com/photos/ManchesterCTPhotos//\00\03\43/03.jpg)

Building Layout



Building Sub-Areas (sq ft)			Legend
Code	**Description**	**Gross Area**	**Living Area**
BAS	First Floor	5219	5219
AOF	Office, (Average)	1114	1114
WDK	Wood Deck	142	0
		6475	6333

Building 2 : Section 1

Year Built: 1987
Living Area: 24306
Replacement Cost: $1,082,175
Replacement Cost Less Depreciation: $606,000

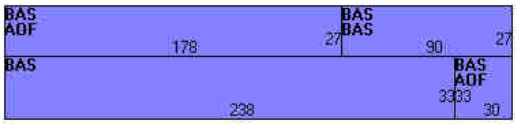
Building Photo

Building Attributes : Bldg 2 of 4	
Field	**Description**
STYLE	Pre-Eng Garage
MODEL	Ind/Comm
Grade	Average
Stories:	1
Occupancy	4
Exterior Wall 1	Pre-finsh Metl

Exterior Wall 2	Brick Veneer
Roof Structure	Gable/Hip
Roof Cover	Enam Mtl Shing
Interior Wall 1	Minim/Masonry
Interior Wall 2	
Interior Floor 1	Concr-Finished
Interior Floor 2	
Heating Fuel	Gas
Heating Type	Forced Air-Duc
AC Type	Partial
Bldg Use	Industrial 96
Total Rooms	
Total Bedrms	00
Total Baths	0
1st Floor Use:	300
Heat/AC	Heat AC Split
Frame Type	Steel
Baths/Plumbing	Average
Ceiling/Wall	Susp Ceil & Wl
Rooms/Prtns	Average
Wall Height	22
% Comn Wall	0

(http://images.vgsi.com/photos/ManchesterCTPhotos//\00\03\43/04.jpg)

Building Layout



Building Sub-Areas (sq ft)			Legend
Code	**Description**	**Gross Area**	**Living Area**
BAS	First Floor	18510	18510
AOF	Office, (Average)	5796	5796
		24306	24306

Building 3 : Section 1

Year Built: 1987
Living Area: 10320
Replacement Cost: $433,337
Replacement Cost Less Depreciation: $242,700

Building Attributes : Bldg 3 of 4	
Field	**Description**
STYLE	Pre-Eng Garage
MODEL	Ind/Comm
Grade	Average
Stories:	1
Occupancy	12
Exterior Wall 1	Pre-finsh Metl
Exterior Wall 2	Brick Veneer

Building Photo

(http://images.vgsi.com/photos/ManchesterCTPhotos//\00\03\43/05.jpg)

Roof Structure	Gable/Hip
Roof Cover	Enam Mtl Shing
Interior Wall 1	Minim/Masonry
Interior Wall 2	
Interior Floor 1	Concr-Finished
Interior Floor 2	
Heating Fuel	Electric
Heating Type	Hot Air-no Duc
AC Type	None
Bldg Use	Industrial 96
Total Rooms	
Total Bedrms	00
Total Baths	0
1st Floor Use:	300
Heat/AC	None
Frame Type	Steel
Baths/Plumbing	Average
Ceiling/Wall	Ceil & Min Wl
Rooms/Prtns	Average
Wall Height	18
% Comn Wall	0

Building Layout

Building Sub-Areas (sq ft)			Legend
Code	**Description**	**Gross Area**	**Living Area**
BAS	First Floor	10320	10320
		10320	10320

Building 4 : Section 1

Year Built: 2008
Living Area: 12000
Replacement Cost: $479,640
Replacement Cost Less Depreciation: $465,300

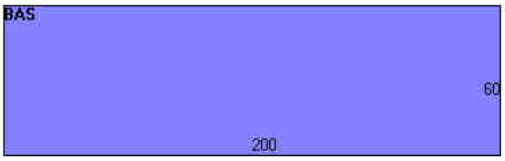
Building Attributes : Bldg 4 of 4	
Field	**Description**
STYLE	Pre-Eng Garage
MODEL	Ind/Comm
Grade	Average
Stories:	1
Occupancy	8
Exterior Wall 1	Pre-finsh Metl
Exterior Wall 2	Concr/Cinder
Roof Structure	Gable/Hip
Roof Cover	Enam Mtl Shing
Interior Wall 1	Minim/Masonry
Interior Wall 2	
Interior Floor 1	Concr-Finished
Interior Floor 2	
Heating Fuel	Gas

Building Photo

(http://images.vgsi.com/photos/ManchesterCTPhotos//\00\03\43/06.jpg)

Building Layout

Heating Type	Hot Air-no Duc
AC Type	None
Bldg Use	Industrial 96
Total Rooms	00
Total Bedrms	00
Total Baths	0
1st Floor Use:	
Heat/AC	None
Frame Type	Steel
Baths/Plumbing	Average
Ceiling/Wall	Ceil & Min Wl
Rooms/Prtns	Average
Wall Height	18
% Comn Wall	0



Building Sub-Areas (sq ft)			Legend
Code	**Description**	**Gross Area**	**Living Area**
BAS	First Floor	12000	12000
		12000	12000

Extra Features

Extra Features				Legend
Code	**Description**	**Size**	**Value**	**Bldg #**
A/C	Partial AC	5796 S.F.	$6,500	2

Land

Land Use

Use Code	300
Description	Industrial 96
Zone	IND
Neighborhood	5000
Alt Land Appr	No
Category	

Land Line Valuation

Size (Acres)	4.96
Frontage	0
Depth	0
Assessed Value	$507,600
Appraised Value	$725,100

Outbuildings

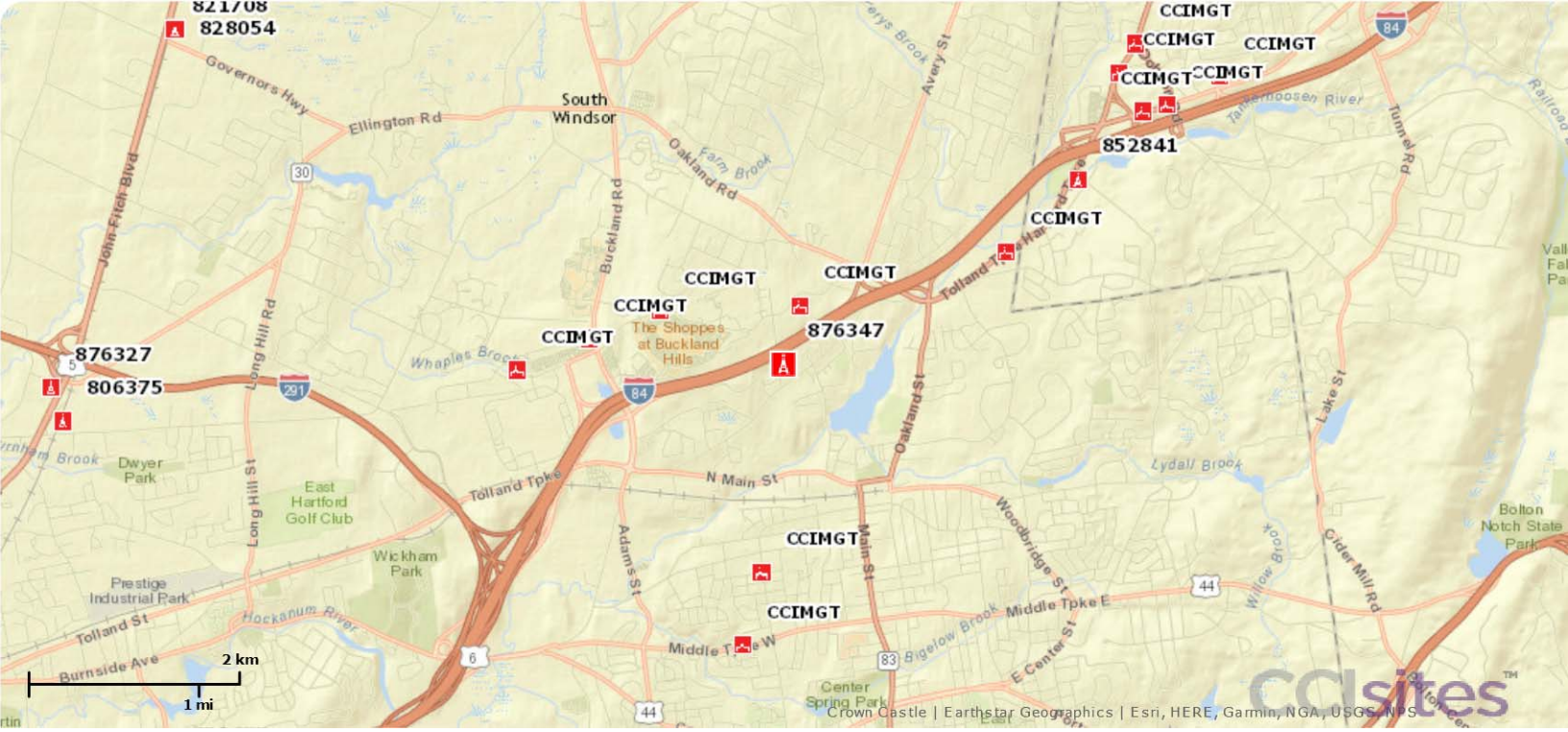
Outbuildings						Legend
Code	**Description**	**Sub Code**	**Sub Description**	**Size**	**Value**	**Bldg #**
PAV1	Paving Asphalt			13350 S.F.	$19,200	4
PAV1	Paving Asphalt			37000 S.F.	$17,800	1
FN3	Fence 6' Chain			300 L.F.	$2,000	1
PAV2	Paving Concrete			96 S.F.	$300	4
SHDT	Telephone Shed			319 S.F.	$31,600	1
FN4	Fence 8' Chain			54 L.F.	$900	1
SHDT	Telephone Shed			319 S.F.	$31,600	1

Valuation History

Appraisal

Valuation Year	Improvements	Land	Total
2010	$1,766,600	$760,300	$2,526,900
2005	$871,200	$540,700	$1,411,900
2000	$1,082,500	$540,700	$1,623,200

Assessment			
Valuation Year	**Improvements**	**Land**	**Total**
2010	$1,236,700	$532,300	$1,769,000
2005	$609,900	$378,500	$988,400
2000	$757,800	$378,500	$1,136,300


821708
828054
CCIMGT
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852841
CCIMGT
CCIMGT
CCIMGT
CCIMGT
876347
876327
806375
CCIMGT
CCIMGT
South Windsor
Ellington Rd
Governors Hwy
John Fitch Blvd
Buckland Rd
Oakland Rd
Farm Brook
Avery St
Tankerhoosen River
Tunnel Rd
Tolland Tpke
Long Hill Rd
Whaples Brook
The Shoppes at Buckland Hills
Oakland St
Lake St
Lydall Brook
Dwyer Park
East Hartford Golf Club
Tolland Tpke
N Main St
Long Hill St
Adams St
Main St
Woodbridge St
Bolton Notch State Park
Prestige Industrial Park
Wickham Park
Tolland St
Hockanum River
Burnside Ave
Middle Tpke W
Middle Tpke E
Bigelow Brook
Willow Brook
Cider Mill Rd
E Center St
Center Spring Park
2 km
1 mi
Crown Castle | Earthstar Geographics | Esri, HERE, Garmin, NGA, USGS, NPS

SITE NAME: MANCHESTER NORTH
FA NUMBER: 10071100
SITE NUMBER: CTL05307
4C-MRCTB018134
MULTI-CARRIER-MRCTB017161
53-73 SLATER STREET
MANCHESTER, CT 06040
HARTFORD COUNTY

CROWN CASTLE SITE NAME: BUCKLAND MALL
CROWN CASTLE SITE ID #: 876347

PROJECT TEAM

CLIENT REPRESENTATIVE

COMPANY: SMARTLINK, LLC
ADDRESS: 85 RANGEWAY ROAD,BUILDING 3, SUITE 140
CITY, STATE, ZIP: NORTH BILLERICA, MA 02862-2105
CONTACT: TODD OLIVER
E-MAIL: TODD.OLIVER@SMARTLINKLLC.COM

SITE ACQUISITION

COMPANY: SMARTLINK, LLC
ADDRESS: 85 RANGEWAY ROAD,BUILDING 3, SUITE 140
CITY, STATE, ZIP: NORTH BILLERICA, MA 02862-2105
CONTACT: TODD OLIVER
PHONE: (774) 369-3618
E-MAIL: TODD.OLIVER@SMARTLINKLLC.COM

ENGINEER

COMPANY: MASER CONSULTING CONNECTICUT
ADDRESS: 331 NEWMAN SPRINGS RD., SUITE 203
CITY, STATE, ZIP: RED BANK, NJ 07701-5699
CONTACT: FRANK PAZDEN
PHONE: (973) 398-3110 x4505
E-MAIL: FPAZDEN@MASERCONSULTING.COM

RF ENGINEER

COMPANY: NEW CINGULAR WIRELESS PCS, LLC
ADDRESS: 550 COCHITUATE RD.
CITY, STATE, ZIP: FRAMINGHAM, MA 01701
CONTACT: CAMERON SYME
E-MAIL: CS6970@ATT.COM

CONSTRUCTION MANAGER

COMPANY: SMARTLINK, LLC.
ADDRESS: 85 RANGEWAY ROAD,BUILDING 3, SUITE 140
CITY, STATE, ZIP: NORTH BILLERICA, MA 02862-2105
CONTACT: MARK DONNELLY
PHONE: (617) 515-2080
E-MAIL: MARK.DONNELLY@SMARTLINKLLC.COM

SITE INFORMATION

APPLICANT/LESSEE

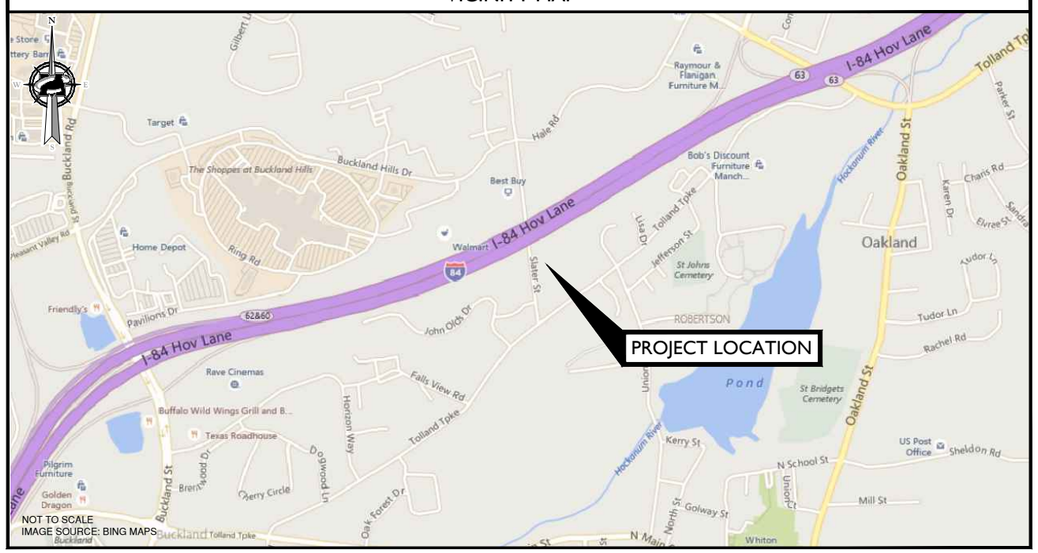
at&t

NEW CINGULAR WIRELESS PCS, LLC
550 COCHITUATE RD.
FRAMINGHAM, MA 01701

PROPERTY/TOWER OWNER:

NAME:	CROWN CASTLE
ADDRESS:	12 GILL STREET, SUITE 5800
CITY, STATE, ZIP:	WOBURN, MA 01801
SITE ID #:	876347
LATITUDE:	41.8049919° N
LONGITUDE:	72.5335989° W
LAT./LONG. TYPE:	NAD 83
AREA OF CONSTRUCTION:	EXISTING EQUIPMENT AND MONOPOLE
ZONING/JURISDICTION:	CITY OF MANCHESTER
CURRENT USE/PROPOSED USE:	UNMANNED TELECOMMUNICATIONS FACILITY
HANDICAP REQUIREMENTS:	FACILITY IS UNMANNED AND NOT FOR HUMAN HABITATION. HANDICAPPED ACCESS NOT REQUIRED.
CONSTRUCTION TYPE:	IIB
USE GROUP:	U

VICINITY MAP



CODE COMPLIANCE

ALL WORK AND MATERIALS SHALL BE PERFORMED AND INSTALLED IN ACCORDANCE WITH THE CURRENT EDITIONS OF THE FOLLOWING CODES AS ADOPTED BY THE LOCAL GOVERNING AUTHORITIES. NOTHING IN THESE PLANS IS TO BE CONSTRUED TO PERMIT WORK NOT CONFORMING TO THE LATEST EDITIONS OF THE FOLLOWING CODES.

1. 2016 CONNECTICUT STATE BUILDING CODE, INCORPORATING THE 2012 IBC
2. NATIONAL ELECTRIC CODE 2014
3. 2015 NFPA-1
4. LIGHTNING PROTECTION CODE 201
5. AMERICAN CONCRETE INSTITUTE 318
6. AMERICAN INSTITUTE OF STEEL CONSTRICTION 360-10
7. EIA/TIA-222 REVISION G
8. TIA 607 FOR GROUNDING
9. INSTITUTE FOR ELECTRICAL AND ELECTRONICS ENGINEERS 81
10. IEEE C2 LATEST EDITION
11. TELCORDIA GR-1275 12. ANSI T1.311

GENERAL CONTRACTOR NOTES

DO NOT SCALE DRAWINGS

CONTRACTOR SHALL VERIFY ALL PLANS AND EXISTING DIMENSIONS AND CONDITIONS ON THE JOB SITE AND SHALL IMMEDIATELY NOTIFY THE ARCHITECT/ENGINEER IN WRITING OF ANY DISCREPANCIES BEFORE PROCEEDING WITH THE WORK OR BE RESPONSIBLE FOR SAME.

GENERAL NOTES

THE FACILITY IS UNMANNED AND NOT FOR HUMAN HABITATION. A TECHNICIAN WILL VISIT THE SITE AS REQUIRED FOR ROUTINE MAINTENANCE. THE PROJECT WILL NOT RESULT IN ANY SIGNIFICANT DISTURBANCE OR EFFECT ON DRAINAGE; NO SANITARY SEWER SERVICE, POTABLE WATER, OR TRASH DISPOSAL IS REQUIRED AND NO COMMERCIAL SIGNAGE IS PROPOSED.

SHEET	DESCRIPTION
T-1	TITLE SHEET
GN-1	GENERAL NOTES
A-1	COMPOUND PLAN AND EQUIPMENT PLAN
A-2	ELEVATION VIEW AND ANTENNA SCHEDULE
A-3	ANTENNA LAYOUTS
A-4	DETAILS
A-5	RF PLUMBING DIAGRAMS
G-1	GROUNDING DETAILS

PROJECT DESCRIPTION/SCOPE OF WORK

THIS PROJECT WILL BE COMPRISED OF:

- (3) PROPOSED RRUS-32 B2 TO REPLACE (3) EXISTING RRUS-11, (1) PER SECTOR
- ADD (3) NEW RRUS-11, (1) PER SECTOR
- UPGRADE DUL TO DUS
- INSTALL XMU, IDL2 AND 2ND DUS

PROPOSED PROJECT SCOPE BASED ON RFDS ID #746367, VERSION 4.00, LAST UPDATED 07/25/16

MASER CONSULTING CONNECTICUT
Customer Loyalty *through* Client Satisfaction
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Engineers ■ Planners ■ Surveyors
Landscape Architects ■ Environmental Scientists

smartlink
85 RANGEWAY ROAD
BUILDING 3, SUITE 140
NORTH BILLERICA, MA 02862-2105
TEL: (774) 369-3613

at&t
NEW CINGULAR WIRELESS PCS, LLC
550 COCHITUATE ROAD
FRAMINGHAM, MA 01701

811 Know what's below. Call before you dig

PROTECT YOURSELF
ALL STATES REQUIRE NOTIFICATION OF EXCAVATORS, DESIGNERS, OR ANY PERSON PREPARING TO DISTURB THE EARTH'S SURFACE ANYWHERE IN ANY STATE

FOR STATE SPECIFIC DIRECT PHONE NUMBERS VISIT: WWW.CALL811.COM

SCALE :	JOB NUMBER :
AS SHOWN	16946032A

REV	DATE	DESCRIPTION	BY	CHECKED BY
1	03/24/17	FOR CONSTRUCTION	RA	FEP
0	01/24/17	ISSUED FOR REVIEW	AJC	FEP

STATE OF CONNECTICUT
FRANK E. PAZDEN
12
PROFESSIONAL ENGINEER

FRANK E. PAZDEN
CONNECTICUT PROFESSIONAL ENGINEER
LICENSE NO. PEN.0025688

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

SITE NAME:

MANCHESTER NORTH
FA# 10071100
SITE # CTL05307

53-73 SLATER STREET
MANCHESTER, CT 06040
HARTFORD COUNTY
CROWN SITE ID #: 876347

RED BANK OFFICE
331 Newman Springs Road
Suite 203
Red Bank, NJ 07701-5699
Phone: 732.383.1950
Fax: 732.383.1984
email: solutions@maserconsulting.com

SHEET TITLE :
TITLE SHEET

SHEET NUMBER :
T-1

1. THE SUBCONTRACTOR SHALL REVIEW AND INSPECT THE EXISTING FACILITY GROUNDING SYSTEM (AS DESIGNED AND INSTALLED) FOR STRICT COMPLIANCE WITH THE NEC (AS ADOPTED BY THE AHJ), THE SITE-SPECIFIC (UL, LPI, OR NFPA) LIGHTING PROTECTION CODE, AND GENERAL COMPLIANCE WITH TELCORDIA AND TIA GROUNDING STANDARDS. THE SUBCONTRACTOR SHALL REPORT ANY VIOLATIONS OR ADVERSE FINDINGS TO THE CONTRACTOR FOR RESOLUTION.
2. ALL GROUND ELECTRODE SYSTEMS (INCLUDING TELECOMMUNICATION, RADIO, LIGHTNING PROTECTION, AND AC POWER GES'S) SHALL BE BONDED TOGETHER, AT OR BELOW GRADE, BY TWO OR MORE COPPER BONDING CONDUCTORS IN ACCORDANCE WITH THE NEC.
3. THE SUBCONTRACTOR SHALL PERFORM IEEE FALL-OF-POTENTIAL RESISTANCE TO EARTH TESTING (PER IEEE 1100 AND 81) FOR GROUND ELECTRODE SYSTEMS. THE SUBCONTRACTOR SHALL FURNISH AND INSTALL SUPPLEMENTAL GROUND ELECTRODES AS NEEDED TO ACHIEVE A TEST RESULT OF 5O HMS OR LESS.
4. THE SUBCONTRACTOR IS RESPONSIBLE FOR PROPERLY SEQUENCING GROUNDING AND UNDERGROUND CONDUIT INSTALLATION AS TO PREVENT ANY LOSS OF CONTINUITY IN THE GROUNDING SYSTEM OR DAMAGE TO THE CONDUIT.
5. METAL CONDUIT AND TRAY SHALL BE GROUNDED AND MADE ELECTRICALLY CONTINUOUS WITH LISTED BONDING FITTINGS OR BY BONDING ACROSS THE DISCONTINUITY WITH #6 AWG COPPER WIRE UL APPROVED GROUNDING TYPE CONDUIT CLAMPS.
6. METAL RACEWAY SHALL NOT BE USED AS THE NEC REQUIRED EQUIPMENT GROUND CONDUCTOR. STRANDED COPPER CONDUCTORS WITH GREEN INSULATION, SIZED IN ACCORDANCE WITH THE NEC, SHALL BE FURNISHED AND INSTALLED WITH THE POWER CIRCUITS TO BTS EQUIPMENT.
7. EACH BTS CABINET FRAME SHALL BE DIRECTLY CONNECTED TO THE EQUIPMENT GROUND RING WITH GREEN INSULATED SUPPLEMENTAL EQUIPMENT GROUND WIRES, 6 AWG STRANDED COPPER OR LARGER FOR INDOOR BTS; 2 AWG STRANDED COPPER FOR OUTDOOR BTS.
8. CONNECTIONS TO THE GROUND BUS SHALL NOT BE DOUBLED UP OR STACKED. BACK TO BACK CONNECTIONS ON OPPOSITE SIDES OF THE GROUND BUS ARE PERMITTED.
9. ALL EXTERIOR GROUND CONDUCTORS BETWEEN EQUIPMENT/GROUND BARS AND THE GROUND RING, SHALL BE #2 AWG SOLID TINNED COPPER UNLESS OTHERWISE INDICATED.
10. ALUMINUM CONDUCTOR OR COPPER CLAD STEEL CONDUCTOR SHALL NOT BE USED FOR GROUNDING CONNECTIONS.
11. USE OF 90° BENDS IN THE PROTECTION GROUNDING CONDUCTORS SHALL BE AVOIDED WHEN 45° BENDS CAN BE ADEQUATELY SUPPORTED. ALL BENDS SHALL BE MADE WITH 12" RADIUS OR LARGER.
12. EXOTHERMIC WELDS SHALL BE USED FOR ALL GROUNDING CONNECTIONS BELOW GRADE.
13. ALL GROUND CONNECTIONS ABOVE GRADE (INTERIOR) SHALL BE FORMED USING HIGH PRESS CRIMPS EXCEPT FOR GROUND BAR CONNECTION FROM MGB TO OUTSIDE EXTERIOR GROUND SHALL ALL BE CADWELD CONNECTIONS.
14. COMPRESSION GROUND CONNECTIONS MAY BE REPLACED BY EXOTHERMIC WELD CONNECTIONS.
15. ICE BRIDGE BONDING CONDUCTORS SHALL BE EXOTHERMICALLY BONDED TO THE TOWER GROUND BAR.
16. APPROVED ANTIOXIDANT COATINGS (I.E. CONDUCTIVE GEL OR PASTE) SHALL BE USED ON ALL COMPRESSION AND BOLTED GROUND CONNECTIONS.
17. ALL EXTERIOR AND INTERIOR GROUND CONNECTIONS SHALL BE COATED WITH A CORROSION RESISTANT MATERIAL.
18. MISCELLANEOUS ELECTRICAL AND NON-ELECTRICAL METAL BOXES, FRAMES AND SUPPORTS SHALL BE BONDED TO THE GROUND RING, IN ACCORDANCE WITH THE NEC.
19. BOND ALL METALLIC OBJECTS WITHIN 6 FT OF MAIN GROUND WIRES WITH 1-#2 AWG TIN-PLATED COPPER GROUND CONDUCTOR.
20. GROUND CONDUCTORS USED IN THE FACILITY GROUND AND LIGHTNING PROTECTION SYSTEMS SHALL NOT BE ROUTED THROUGH METALLIC OBJECTS THAT FORM A RING AROUND THE CONDUCTOR, SUCH AS METALLIC CONDUITS, METAL SUPPORT CLIPS OR SLEEVES THROUGH WALLS OR FLOORS. WHEN IT IS REQUIRED TO BE HOUSED IN CONDUIT TO MEET CODE REQUIREMENTS OR LOCAL CONDITIONS, NON-METALLIC MATERIAL SUCH AS PVC PLASTIC CONDUIT SHALL BE USED. WHERE USE OF METAL CONDUIT IS UNAVOIDABLE (E.G. NON-METALLIC CONDUIT PROHIBITED BY LOCAL CODE) THE GROUND CONDUCTOR SHALL BE BONDED TO EACH END OF THE METAL CONDUIT.
21. ALL NEW STRUCTURES WITH A FOUNDATION AND/OR FOOTING HAVING 20 FT. OR MORE OF 1/4" IN. OR GREATER ELECTRICALLY CONDUCTIVE REINFORCING STEEL MUST HAVE IT BONDED TO THE GROUND RING USING AN EXOTHERMIC WELD CONNECTION USING #2 AWG SOLID BARE TINNED COPPER GROUND WIRE, PER NEC 250.50.

1. FOR THE PURPOSE OF CONSTRUCTION DRAWING, THE FOLLOWING DEFINITIONS SHALL APPLY:

   CONTRACTOR - SMARTLINK
   SUBCONTRACTOR - GENERAL CONTRACTOR (CONSTRUCTION)
   OWNER - AT&T (NEW CINGULAR WIRELESS PCS, LLC)

2. ALL SITE WORK SHALL BE COMPLETED AS INDICATED ON THE DRAWINGS AND PROJECT SPECIFICATIONS.
3. DRAWINGS PROVIDED HERE ARE NOT TO BE SCALED AND ARE INTENDED TO SHOW OUTLINE ONLY.
4. ALL MATERIALS FURNISHED AND INSTALLED SHALL BE IN STRICT ACCORDANCE WITH ALL APPLICABLE CODES, REGULATIONS, AND ORDINANCES. SUBCONTRACTOR SHALL ISSUE ALL APPROPRIATE NOTICES AND COMPLY WITH ALL LAWS, ORDINANCES, RULES, REGULATIONS, AND LAWFUL ORDERS OF ANY PUBLIC AUTHORITY REGARDING THE PERFORMANCE OF THE WORK.
5. ALL WORK CARRIED OUT SHALL COMPLY WITH ALL APPLICABLE MUNICIPAL AND UTILITY COMPANY SPECIFICATIONS AND LOCAL JURISDICTIONAL CODES, ORDINANCES AND APPLICABLE REGULATIONS.
6. UNLESS NOTED OTHERWISE, THE WORK SHALL INCLUDE FURNISHING MATERIALS, EQUIPMENT, APPURTENANCES, AND LABOR NECESSARY TO COMPLETE ALL INSTALLATIONS AS INDICATED ON THE DRAWINGS.
7. THE SUBCONTRACTOR SHALL INSTALL ALL EQUIPMENT AND MATERIALS IN ACCORDANCE WITH MANUFACTURER'S RECOMMENDATIONS UNLESS SPECIFICALLY STATED OTHERWISE.
8. IF THE SPECIFIED EQUIPMENT CANNOT BE INSTALLED AS SHOWN ON THESE DRAWINGS, THE SUBCONTRACTOR SHALL PROPOSE AN ALTERNATIVE INSTALLATION SPACE FOR APPROVAL BY THE CONTRACTOR.
9. THE SUBCONTRACTOR SHALL PROTECT EXISTING IMPROVEMENTS, PAVEMENTS, CURBS, LANDSCAPING AND STRUCTURES. ANY DAMAGED PART SHALL BE REPAIRED AT SUBCONTRACTOR'S EXPENSE TO THE SATISFACTION OF OWNER.
10. THE SUBCONTRACTOR SHALL CONTACT UTILITY LOCATING SERVICES PRIOR TO THE START OF CONSTRUCTION.
11. ALL EXISTING ACTIVE SEWER, WATER, GAS, ELECTRIC, AND OTHER UTILITIES WHERE ENCOUNTERED IN THE WORK, SHALL BE PROTECTED AT ALL TIMES, AND WHERE REQUIRED FOR THE PROPER EXECUTION OF THE WORK, SHALL BE RELOCATED AS DIRECTED BY THE RESPONSIBLE ENGINEER. EXTREME CAUTION SHOULD BE USED BY THE SUBCONTRACTOR WHEN EXCAVATING OR DRILLING PIERS AROUND OR NEAR UTILITIES. SUBCONTRACTOR SHALL PROVIDE SAFETY TRAINING FOR THE WORKING CREW. THIS WILL INCLUDE BUT NOT BE LIMITED TO A) FALL PROTECTION B) CONFINED SPACE C) ELECTRICAL SAFETY D) TRENCHING & EXCAVATION.
12. ALL EXISTING INACTIVE SEWER, WATER, GAS, ELECTRIC AND OTHER UTILITIES, WHICH INTERFERE WITH THE EXECUTION OF THE WORK, SHALL BE REMOVED AND/OR CAPPED, PLUGGED OR OTHERWISE DISCONTINUED AT POINTS WHICH WILL NOT INTERFERE WITH THE EXECUTION OF THE WORK, AS DIRECTED BY THE RESPONSIBLE ENGINEER, AND SUBJECT TO THE APPROVAL OF THE OWNER AND/OR LOCAL UTILITIES.
13. THE AREAS OF THE OWNER'S PROPERTY DISTURBED BY THE WORK AND NOT COVERED BY THE TOWER, EQUIPMENT OR DRIVEWAY SHALL BE GRADED TO A UNIFORM SLOPE AND STABILIZED TO PREVENT EROSION.
14. SUBCONTRACTOR SHALL MINIMIZE DISTURBANCE TO EXISTING SITE DURING CONSTRUCTION. EROSION CONTROL MEASURES, IF REQUIRED DURING CONSTRUCTION, SHALL BE IN CONFORMANCE WITH THE LOCAL GUIDELINES FOR EROSION AND SEDIMENT CONTROL.
15. NO FILL OR EMBANKMENT MATERIAL SHALL BE PLACED ON FROZEN GROUND. FROZEN MATERIALS, SNOW OR ICE SHALL NOT BE PLACED IN ANY FILL OR EMBANKMENT.
16. THE SUBGRADE SHALL BE COMPACTED AND BROUGHT TO A SMOOTH UNIFORM GRADE PRIOR TO FINISHED SURFACE APPLICATION.
17. THE SITE SHALL BE GRADED TO CAUSE SURFACE WATER TO FLOW AWAY FROM THE BTS EQUIPMENT AND TOWER AREAS.
18. IF NECESSARY, RUBBISH, STUMPS, DEBRIS, STICKS, STONES AND OTHER REFUSE SHALL BE REMOVED FROM THE SITE AND DISPOSED OF LEGALLY.
19. THE SUBCONTRACTOR SHALL PROVIDE SITE SIGNAGE IN ACCORDANCE WITH THE TECHNICAL SPECIFICATION FOR SITE SIGNAGE.
20. SUBCONTRACTOR SHALL LEAVE PREMISES IN CLEAN CONDITION.
21. PRIOR TO THE SUBMISSION OF BIDS, THE BIDDING SUBCONTRACTOR SHALL VISIT THE CELL SITE TO FAMILIARIZE WITH THE EXISTING CONDITIONS AND TO CONSTRUCTION DRAWINGS. ANY DISCREPANCY FOUND SHALL BE BROUGHT TO THE ATTENTION OF THE CONTRACTOR.
22. SUBCONTRACTOR SHALL DETERMINE ACTUAL ROUTING OF CONDUIT, POWER AND T1 CABLES, GROUNDING CABLES AS SHOWN ON THE POWER, GROUNDING AND TELCO PLAN DRAWING. SUBCONTRACTOR SHALL UTILIZE EXISTING TRAYS AND/OR SHALL ADD NEW TRAYS AS NECESSARY. SUBCONTRACTOR SHALL CONFIRM THE ACTUAL ROUTING WITH THE CONTRACTOR.
23. ALL CONCRETE REPAIR WORK SHALL BE DONE IN ACCORDANCE WITH AMERICAN CONCRETE INSTITUTE (ACI) 301.
24. ANY NEW CONCRETE NEEDED FOR THE CONSTRUCTION SHALL BE AIR-ENTRAINED AND SHALL HAVE 4000 PSI STRENGTH AT 28 DAYS.
25. ALL STRUCTURAL STEEL WORK SHALL BE DETAILED, FABRICATED AND ERECTED IN ACCORDANCE WITH AISC SPECIFICATIONS. ALL STRUCTURAL STEEL SHALL BE ASTM A36 (Fy = 36 ksi) UNLESS OTHERWISE NOTED. PIPES SHALL BE ASTM A53 TYPE E (Fy = 36 ksi). ALL STEEL EXPOSED TO WEATHER SHALL BE HOT DIPPED GALVANIZED. TOUCHUP ALL SCRATCHES AND OTHER MARKS IN THE FIELD AFTER STEEL IS ERECTED USING A COMPATIBLE ZINC RICH PAINT.
26. CONSTRUCTION SHALL COMPLY WITH SPECIFICATIONS AND "GENERAL CONSTRUCTION SERVICES FOR CONSTRUCTION OF AT&T MOBILITY SITES."
27. SUBCONTRACTOR SHALL VERIFY ALL EXISTING DIMENSIONS AND CONDITIONS PRIOR TO COMMENCING ANY WORK. ALL DIMENSIONS OF EXISTING CONSTRUCTION SHOWN ON THE DRAWINGS MUST BE VERIFIED. SUBCONTRACTOR SHALL NOTIFY THE CONTRACTOR OF ANY DISCREPANCIES PRIOR TO ORDERING MATERIAL OR PROCEEDING WITH CONSTRUCTION.
28. THE EXISTING CELL SITE IS IN FULL COMMERCIAL OPERATION, ANY CONSTRUCTION WORK BY SUBCONTRACTOR SHALL NOT DISRUPT THE EXISTING NORMAL OPERATION. ANY WORK ON EXISTING EQUIPMENT MUST BE COORDINATED WITH CONTRACTOR. ALSO, WORK SHOULD BE SCHEDULED FOR AN APPROPRIATE MAINTENANCE WINDOW USUALLY IN LOW TRAFFIC PERIODS AFTER MIDNIGHT.
29. SINCE THE CELL SITE IS ACTIVE, ALL SAFETY PRECAUTIONS MUST BE TAKEN WHEN WORKING AROUND HIGH LEVELS OF ELECTROMAGNETIC RADIATION. EQUIPMENT SHOULD BE SHUTDOWN PRIOR TO PERFORMING ANY WORK THAT COULD EXPOSE THE WORKERS TO DANGER. PERSONAL RF EXPOSURE MONITORS ARE ADVISED TO BE WORN ALERT OF DANGEROUS EXPOSURE LEVELS.

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STATE OF CONNECTICUT · FRANK E. PAZDEN · LICENSED · PROFESSIONAL ENGINEER

FRANK E. PAZDEN
CONNECTICUT PROFESSIONAL ENGINEER - LICENSE NUMBER: PEN.28188

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

SITE NAME:

MANCHESTER NORTH
FA# 10071100
SITE # CTL05307

53-73 SLATER STREET
MANCHESTER, CT 06040
HARTFORD COUNTY
CROWN SITE ID #: 876347

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Fax: 732.383.1984
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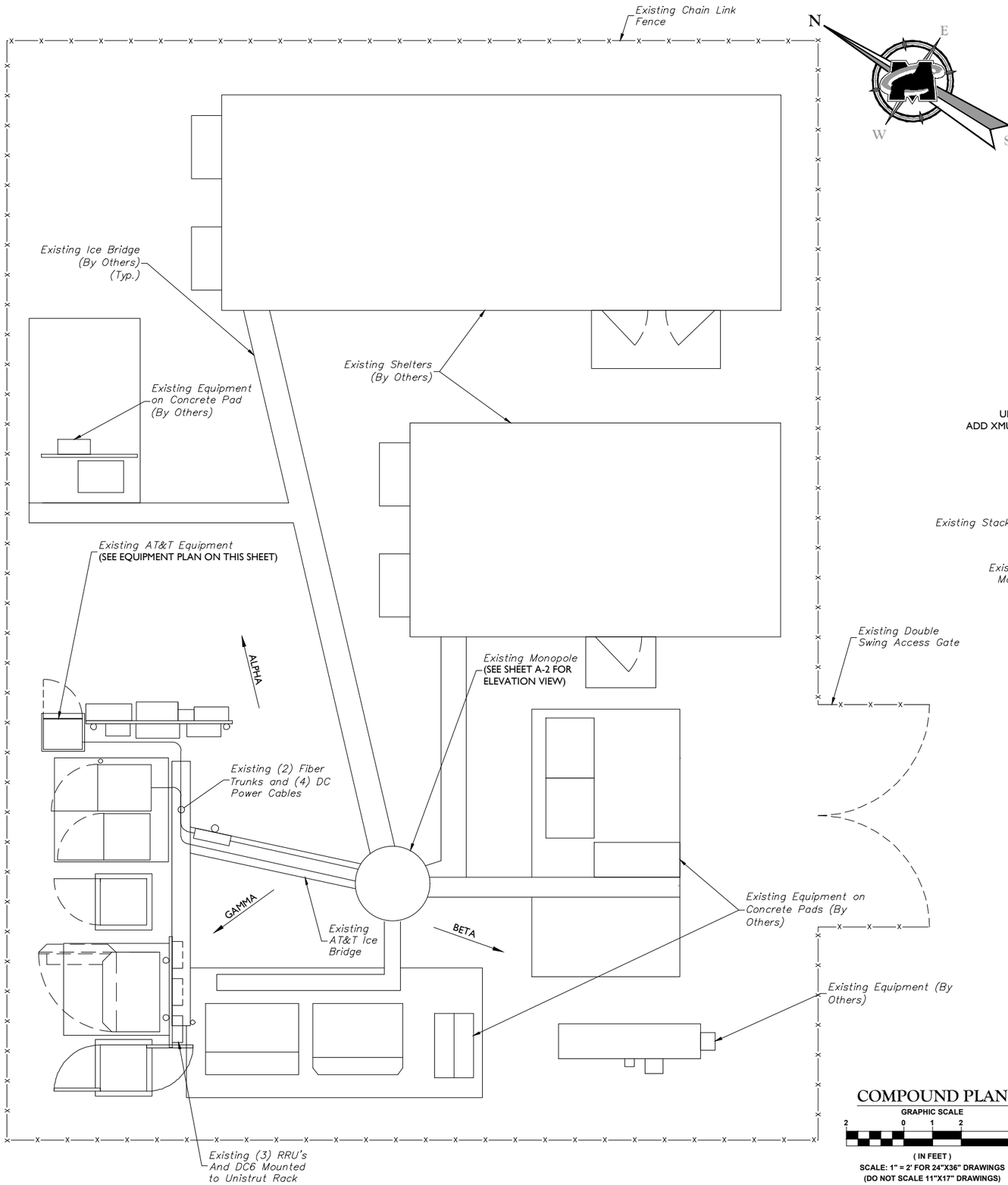
SHEET TITLE :
GENERAL NOTES

SHEET NUMBER :
GN-1



COMPOUND PLAN

GRAPHIC SCALE

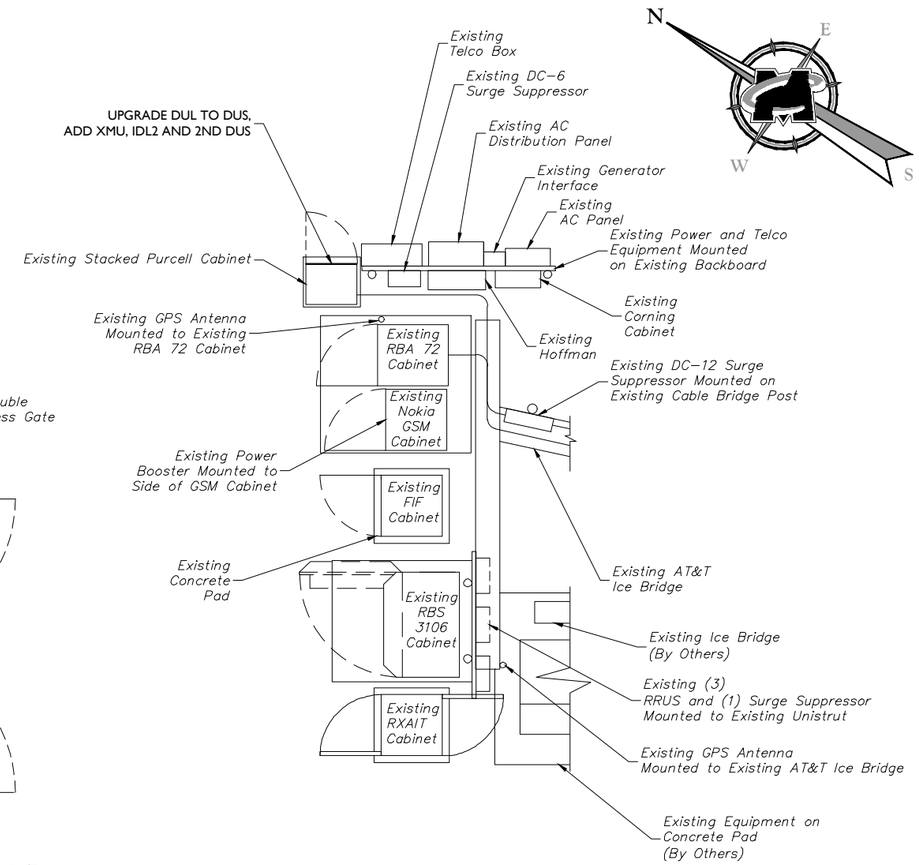
2 0 1 2 4

(IN FEET)

SCALE: 1" = 2' FOR 24"X36" DRAWINGS
(DO NOT SCALE 11"X17" DRAWINGS)

NOTE:

THESE PLANS WERE DESIGNED WITH THE ASSUMPTION THAT THE PREVIOUS PLANS PREPARED BY MASER CONSULTING CONNECTICUT DATED 11/30/15 WILL BE COMPLETED PRIOR TO THE CURRENT SCOPE OF WORK BEING INSTALLED. ANY CHANGES IN PREVIOUS DESIGN SHALL BE BROUGHT TO THE ATTENTION OF THE ENGINEER IMMEDIATELY.



EQUIPMENT PLAN

GRAPHIC SCALE

2 0 1 2 4

(IN FEET)

SCALE: 1" = 2' FOR 24"X36" DRAWINGS
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STATE OF CONNECTICUT
FRANK E. HAZDEN
LICENSED PROFESSIONAL ENGINEER

FRANK E. HAZDEN
CONNECTICUT PROFESSIONAL ENGINEER
LICENSE NUMBER: 23588

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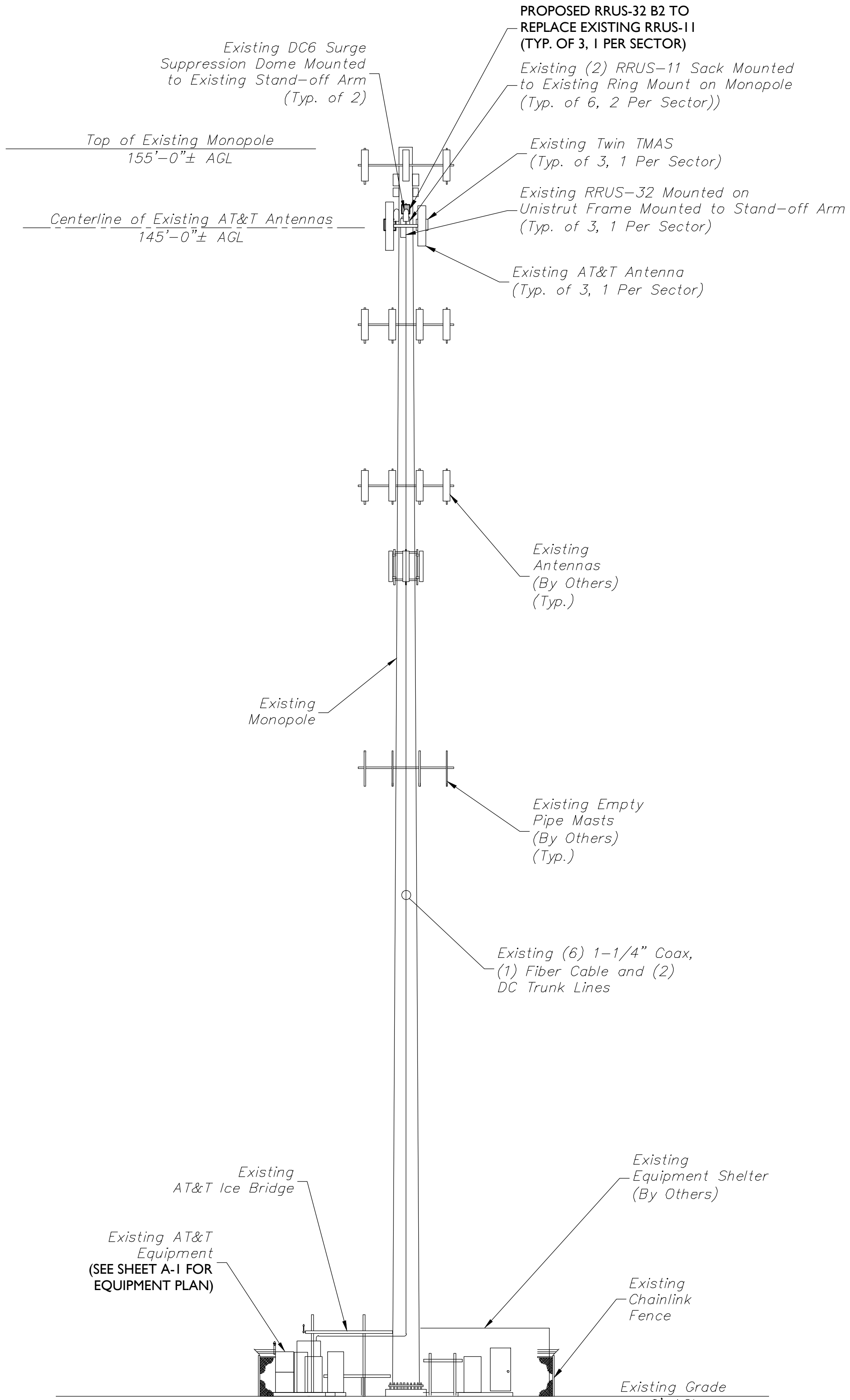
SHEET TITLE:
COMPOUND PLAN AND EQUIPMENT PLAN

SHEET NUMBER:
A-1



ELEVATION VIEW

GRAPHIC SCALE

10 0 5 10 20

(IN FEET)

SCALE: 1" = 10' FOR 24"X36" DRAWINGS
(DO NOT SCALE 11"X17" DRAWINGS)

PROPOSED ANTENNA AND RRUS CONFIGURATION

SECTOR		EXISTING ANTENNA CONFIGURATION	TECHNOLOGY	ANTENNA STATUS	HEIGHT (in)	WIDTH (in)	DEPTH (in)	WEIGHT (lbs)	ANTENNA AZIMUTH	ANT. CL. ELEV (ft.)	RRUS CONFIGURATION	STATUS
ALPHA	A1	Kathrein 80010121	UMTS/GSM	REMAIN	54.50	10.30	5.90	44.10	50°	145'	-	-
	A4	Quintel QS66512-2	LTE 700/PCS/WCS	REMAIN	72.00	12.00	9.60	111.00	50°	145'	(1) RRUS-11 (1) LTE RRUS-32 **(1) RRUS-11** **(1) RRUS-32 B2**	REMAIN REMAIN **NEW** **REPLACE**
BETA	B1	Kathrein 80010121	UMTS/GSM	REMAIN	54.50	10.30	5.90	44.10	170°	145'	-	-
	B4	Quintel QS66512-2	LTE 700/PCS/WCS	REMAIN	72.00	12.00	9.60	111.00	170°	145'	(1) RRUS-11 (1) LTE RRUS-32 **(1) RRUS-11** **(1) RRUS-32 B2**	REMAIN REMAIN **NEW** **REPLACE**
GAMMA	C1	Kathrein 80010121	UMTS/GSM	REMAIN	54.50	10.30	5.90	44.10	290°	145'	-	-
	C4	Quintel QS66512-2	LTE 700/PCS/WCS	REMAIN	72.00	12.00	9.60	111.00	290°	145'	(1) RRUS-11 (1) LTE RRUS-32 **(1) RRUS-11** **(1) RRUS-32 B2**	REMAIN REMAIN **NEW** **REPLACE**

NOTE:

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STRUCTURAL NOTES:

1. A STRUCTURAL ANALYSIS TO DETERMINE IF THE EXISTING TOWER, FOUNDATION AND ANTENNA MOUNTS CAN ADEQUATELY SUPPORT THE PROPOSED LOADING HAS NOT BEEN PREPARED/ANALYZED BY MASER AND IS TO BE PERFORMED BY OTHERS.
2. NO CONSTRUCTION OF THE PROPOSED LOADING SHOWN SHALL PROCEED UNTIL ADEQUACY OF EXISTING TOWER, FOUNDATION AND ANTENNA MOUNTS WITH PROPOSED LOADING CONDITIONS IS CONFIRMED BY SMARTLINK.
3. THE STRUCTURE AND ANTENNA MOUNTS ARE SHOWN FOR INFORMATIONAL PURPOSES ONLY AND MAY NOT REFLECT AS-BUILT FIELD CONDITIONS FOR ALL EXISTING INVENTORY LOADING/ANTENNAS/APPURTANENCES ON TOWER. REFER TO THE LATEST STRUCTURAL ANALYSIS FOR EXISTING TOWER LOADING/ANTENNA MOUNTING AND THE PROPOSED METHOD OF ATTACHMENT OF THE PROPOSED ANTENNAS/CABLES.
4. THE CONTRACTOR IS RESPONSIBLE TO CONFIRM THAT ANY IMPROVEMENTS AND REINFORCEMENTS REQUIRED BY THE STRUCTURAL ANALYSIS CERTIFICATION ARE PROPERLY INSTALLED PRIOR TO THE ADDITION OF ANTENNAS, CABLES, SUPPORTS AND APPURTENANCES PROPOSED ON THESE DRAWINGS OR OTHERWISE NOTED IN THE STRUCTURAL ANALYSIS.

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STATE OF CONNECTICUT
FRANK E. PAZDEN
LICENSED
PROFESSIONAL ENGINEER

FRANK E. PAZDEN
CONNECTICUT PROFESSIONAL
ENGINEER - LICENSE NUMBER: PEN.28188

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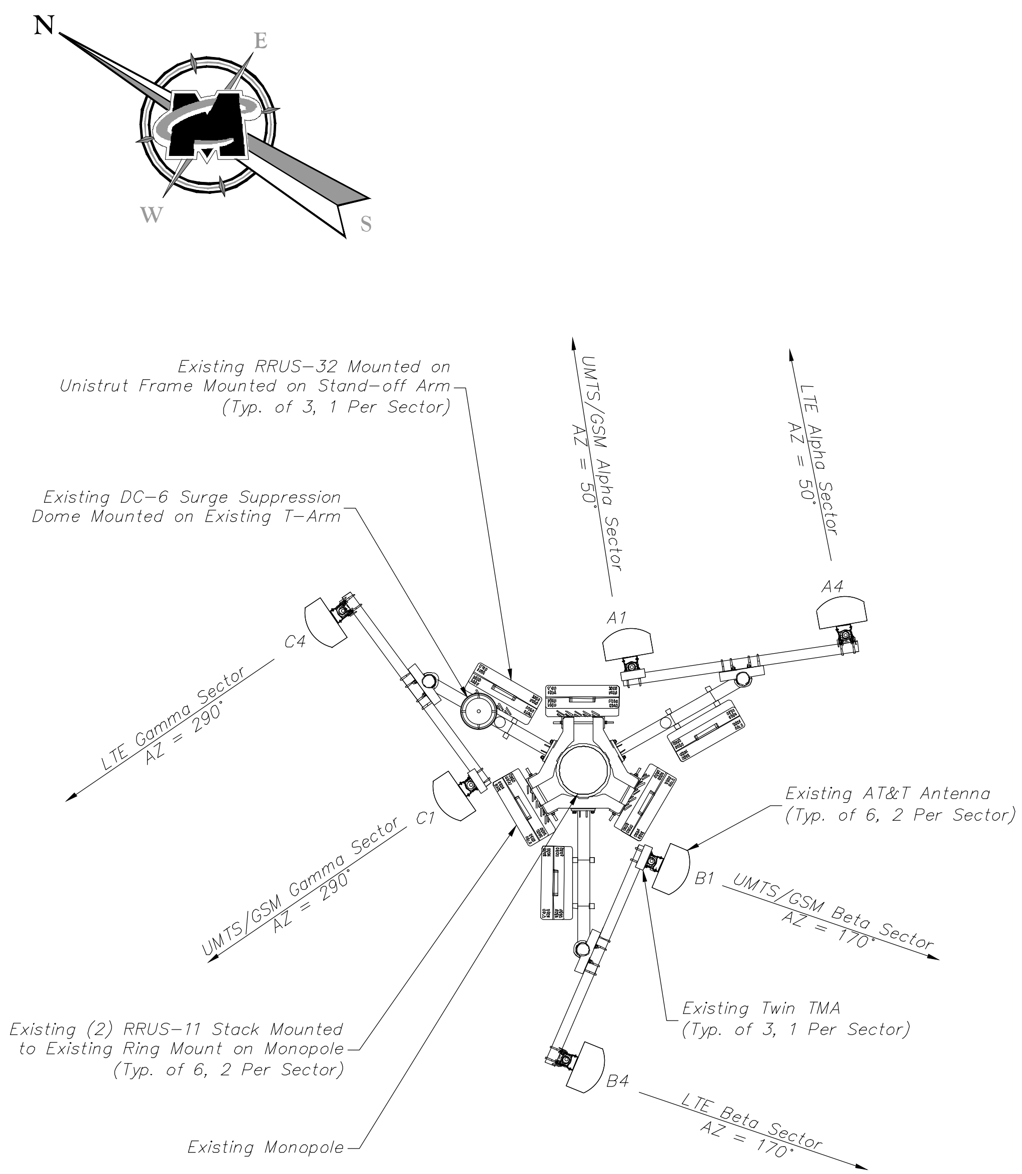
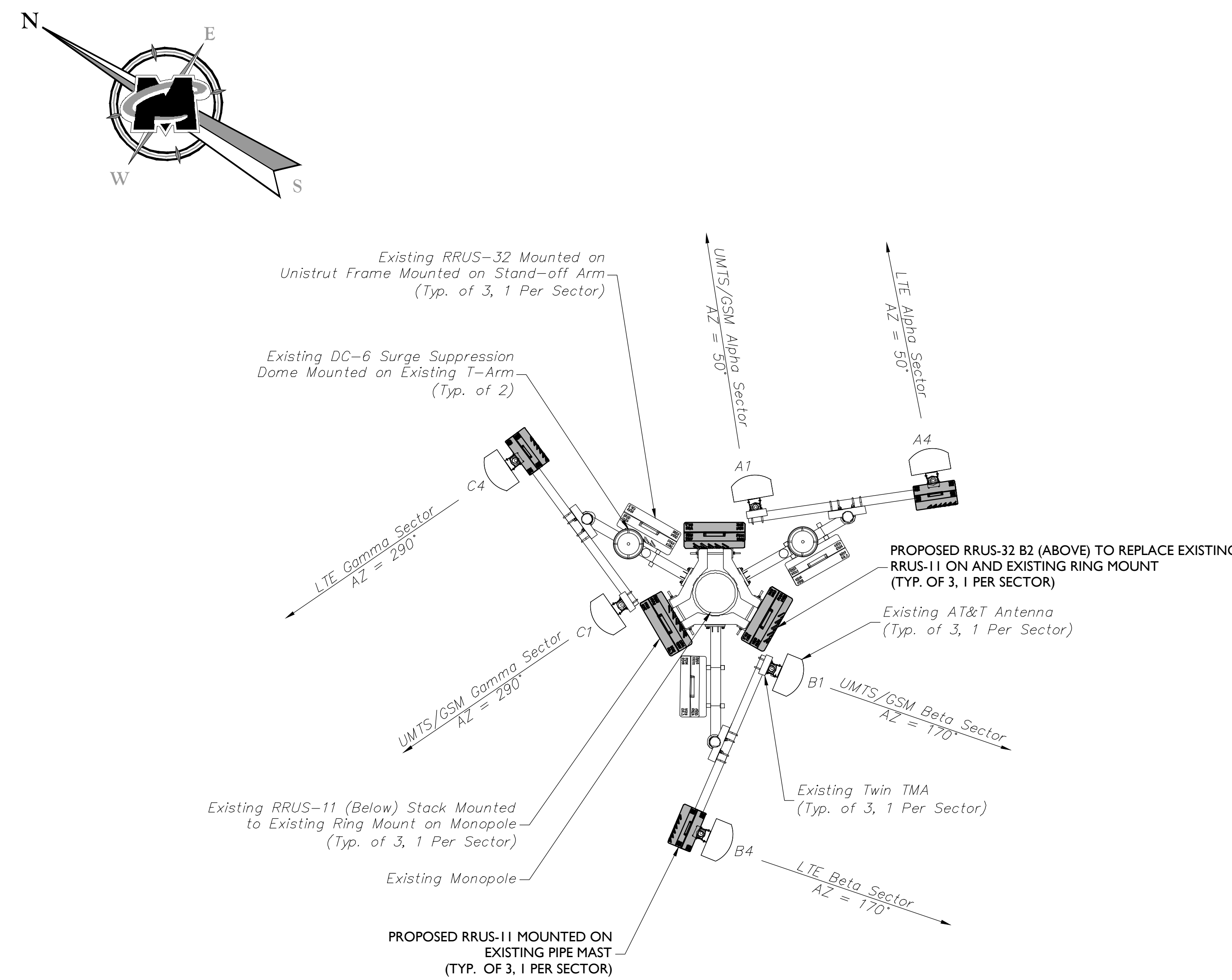
email: solutions@maserconsulting.com

SHEET TITLE :
ELEVATION VIEW AND
ANTENNA SCHEDULE

SHEET NUMBER :
A-2



EXISTING - ANTENNA LAYOUT
NOT TO SCALE



PROPOSED - ANTENNA LAYOUT
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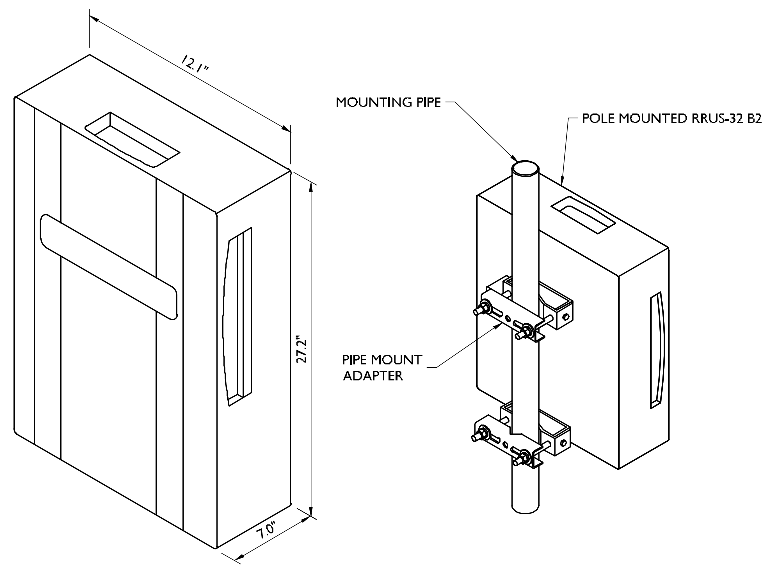
SHEET TITLE:
ANTENNA LAYOUTS

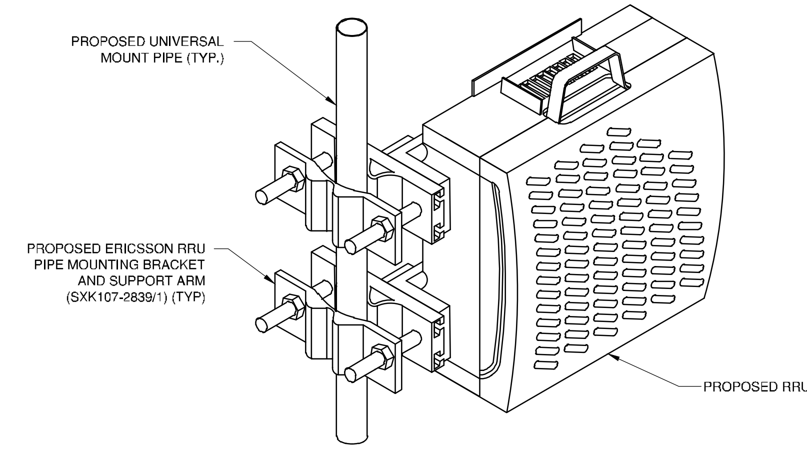
SHEET NUMBER:
A-3



RRUS–32 B2 DIMENSIONS (H X W X D): 27.2" X 12.1" X 7.0" (INCLUDES SUNSHIELD)
WEIGHT: 53 LBS

RRUS-32 B2 DETAIL

NOT TO SCALE

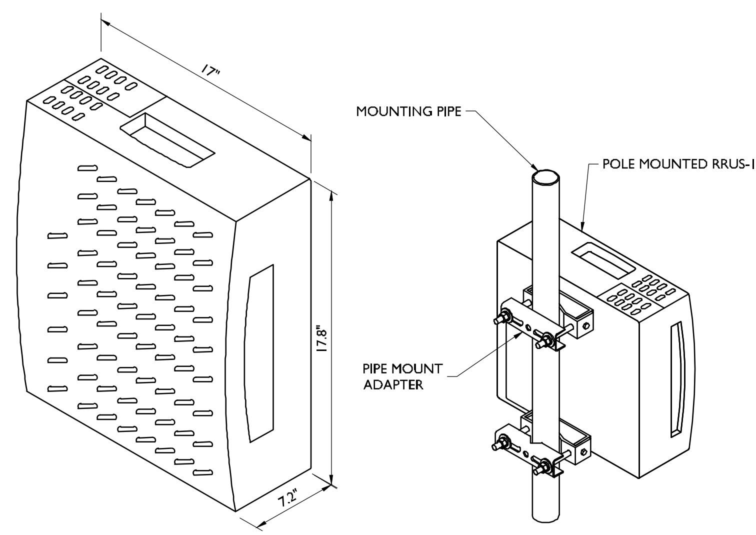


MOUNTING NOTES

REFER TO PRODUCT SPECS FOR BOLT SIZE AND PIPE DIAMETER TOLERANCES. THE PART NO. SXK107-2839/2 IS REQUIRED FOR 2 RRUs.

RRUS MOUNT DETAIL

NOT TO SCALE



RRUS–11 DIMENSIONS (H X W X D): 17.8" X 17" X 7.2" (INCLUDES SUNSHIELD)
WEIGHT: 55 LBS

RRUS-11 DETAIL

NOT TO SCALE

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FRANK E. FAZDEN
CONNECTICUT PROFESSIONAL ENGINEER
STATE OF CONNECTICUT FRANK E. FAZDEN LICENSED PROFESSIONAL ENGINEER

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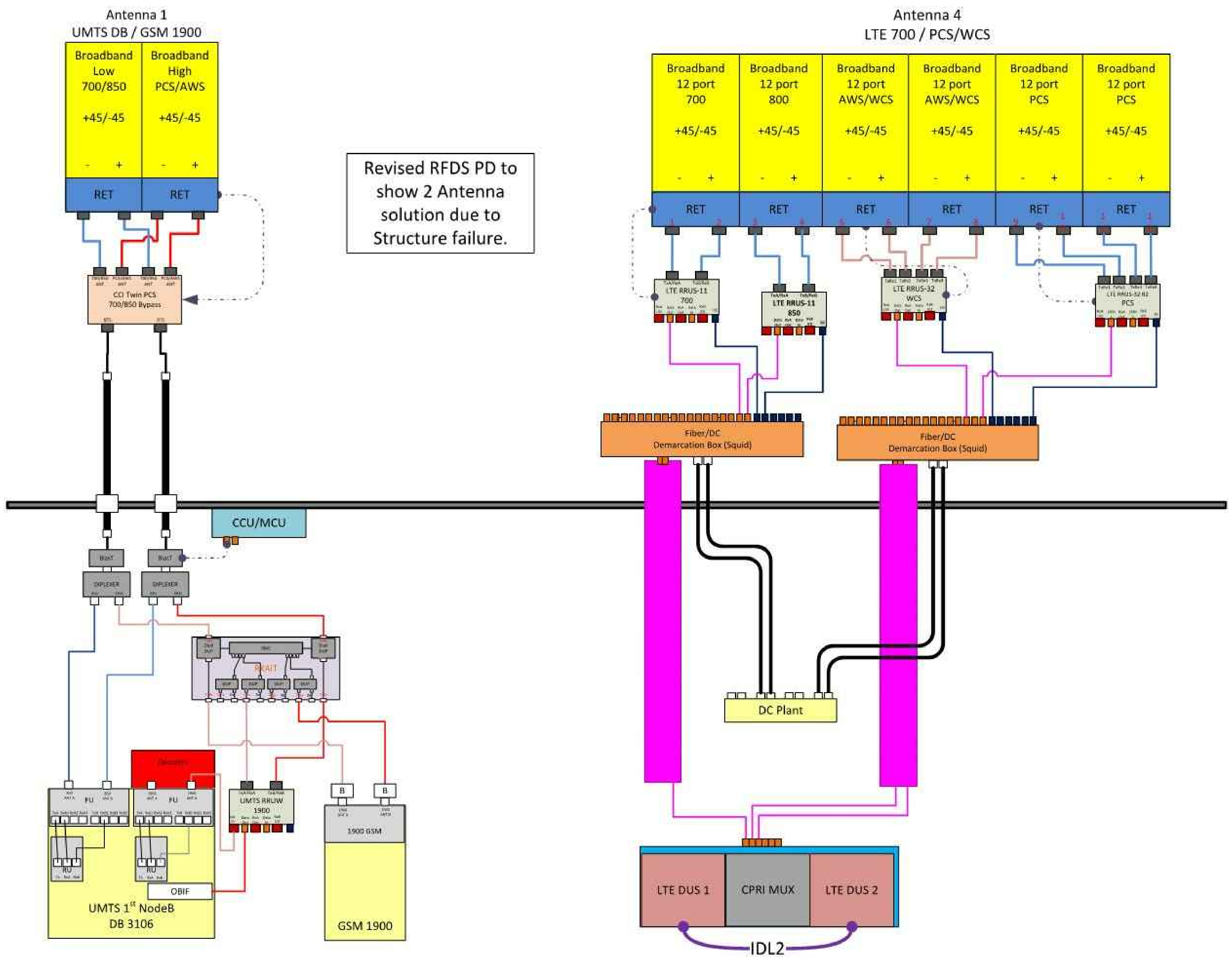
email: solutions@maserconsulting.com

SHEET TITLE:
DETAILS

SHEET NUMBER:
A-4

Diagram - Sector	A	Diagram File Name - CT5307_A_B_C_LTE_3C_WCS_BWE.vsd					
Atoll Site Name -	CTV5307	Location Name -	MANCHESTER NORTH	Market -	CONNECTICUT	Market Cluster -	NEW ENGLAND
Comments:							



ALL SECTORS

BASED ON RF ENGINEERING DESIGN ENTITLED "NEW-ENGLAND_CONNECTICUT_CTV5307_2016-LTE-Next-Carrier_LTE-3C_om636a_2051A02J05_10071100_25942_06-25-2015_Final-Approved_v4.00", LAST UPDATED 07/25/16

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SCALE :	JOB NUMBER :
AS SHOWN	16946032A

REV	DATE	DESCRIPTION	DRAWN BY	CHECKED BY
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.	.	.	.	.
1	03/24/17	FOR CONSTRUCTION	RA	FEP
0	01/24/17	ISSUED FOR REVIEW	AJC	FEP

STATE OF CONNECTICUT FRANK E. PAZDEN LICENSED PROFESSIONAL ENGINEER

FRANK E. PAZDEN
CONNECTICUT PROFESSIONAL ENGINEER

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

SITE NAME:

MANCHESTER NORTH
FA# 10071100
SITE # CTL05307

53-73 SLATER STREET
MANCHESTER, CT 06040
HARTFORD COUNTY
CROWN SITE ID #: 876347

RED BANK OFFICE
331 Newman Springs Road
Suite 203
Red Bank, NJ 07701-5699
Phone: 732.383.1950
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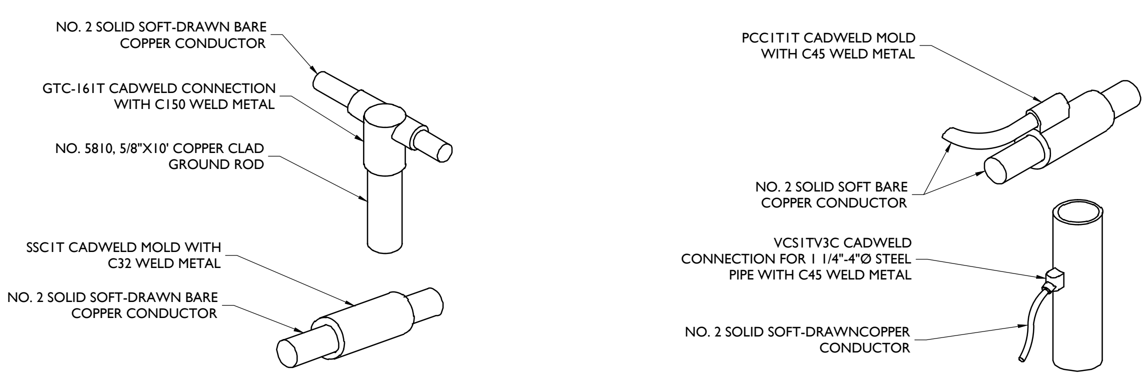
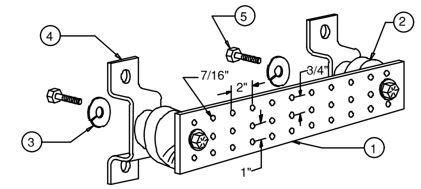
SHEET TITLE :
RF PLUMBING DIAGRAMS

SHEET NUMBER :
A-5



CADWELD DETAILS

NOT TO SCALE



LEGEND

1- TINNED COPPER GROUND BAR, 1/4"x4"x20", NEWTON INSTRUMENT CO. CAT. NO. B-6142 OR EQUAL. HOLE CENTERS TO MATCH NEMA DOUBLE LUG CONFIGURATION.

2- INSULATORS, NEWTON INSTRUMENT CAT. NO. 3061-4

3- 5/8" LOCKWASHERS, NEWTON INSTRUMENT CO. CAT. NO. 3015-8

4- WALL MOUNTING BRACKET, NEWTON INSTRUMENT CO. CAT NO. A-5056

5- 5/8-11 X 1" HHCS BOLTS, NEWTON INSTRUMENT CO. CAT NO. 3012-1

6- EACH GROUND CONDUCTOR TERMINATING ON ANY GROUND BAR HAVE AN IDENTIFICATION TAG ATTACHED AT EACH END THAT WILL IDENTIFY ITS ORIGIN AND DESTINATION.

SECTION "P" - SURGE PRODUCERS

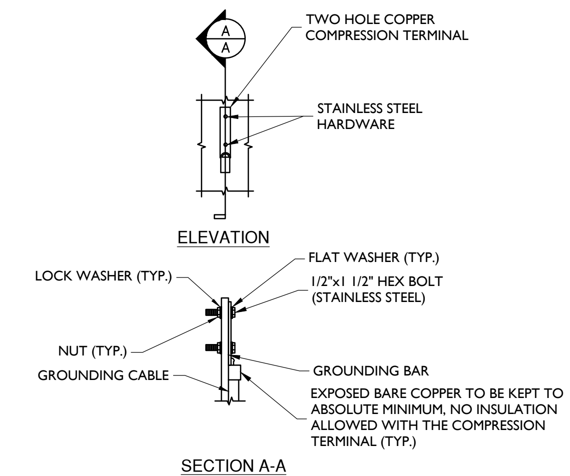
CABLE ENTRY PORTS (HATCH PLATES) (#2)
GENERATOR FRAMEWORK (IF AVAILABLE) (#2)
TELCO GROUND BAR
COMMERCIAL POWER COMMON NEUTRAL/GROUND BOND (#2)
+24V POWER SUPPLY RETURN BAR (#2)
-48V POWER SUPPLY RETURN BAR (#2)
RECTIFIER FRAMES.

SECTION "A" - SURGE ABSORBERS

INTERIOR GROUND RING (#2)
EXTERNAL EARTH GROUND FIELD (BURIED GROUND RING) (#2)
METALLIC COLD WATER PIPE (IF AVAILABLE) (#2)
BUILDING STEEL (IF AVAILABLE) (#2)

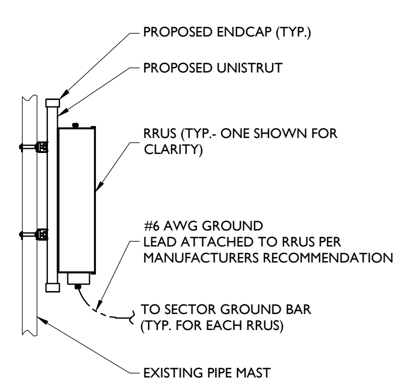
MASTER GROUND BAR

NOT TO SCALE



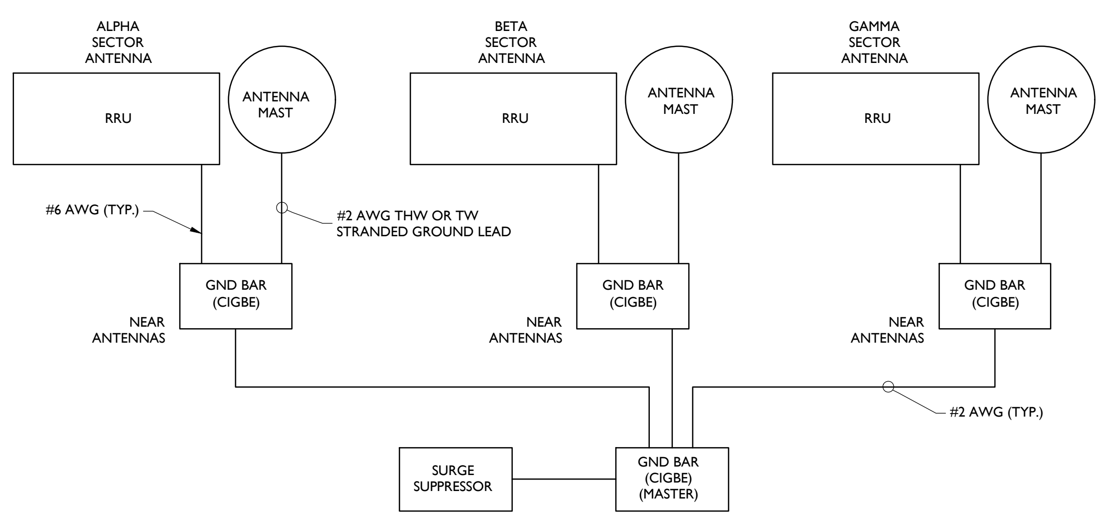
TYPICAL GROUND BAR CONNECTION DETAIL

NOT TO SCALE



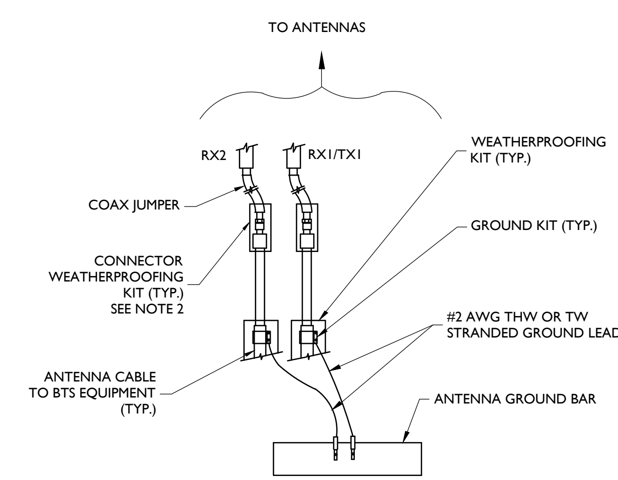
RRH GROUNDING

NOT TO SCALE



SCHEMATIC DIAGRAM GROUNDING SYSTEM

NOT TO SCALE



NOTES:

1. DO NOT INSTALL CABLE GROUND KIT AT A BEND AND ALWAYS DIRECT GROUND WIRE DOWN TO ANTENNA GROUND BAR.
2. WEATHER PROOFING SHALL BE TWO-PART TAPE KIT, COLD SHRINK SHALL NOT BE USED.

TYPICAL GROUND WIRE TO GROUNDING BAR

NOT TO SCALE

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STATE OF CONNECTICUT FRANK E. PAZDEN LICENSED PROFESSIONAL ENGINEER

FRANK E. PAZDEN
CONNECTICUT PROFESSIONAL ENGINEER - LICENSE NUMBER: PEN.28188

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Fax: 732.383.1984
email: solutions@maserconsulting.com

SHEET TITLE :
GROUNDING DETAILS

SHEET NUMBER :
G-1

PJF PAUL J. FORD & COMPANY

Date: **March 10, 2017**

Charles Trask
Crown Castle
3530 Toringdon Way, Suite 300
Charlotte, NC 28277
980.209.8228

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

Subject: **Structural Analysis Report**

Carrier Designation:	***AT&T Mobility* Co-Locate**	
	Carrier Site Number:	CTL05307
	Carrier Site Name:	Manchester North
Crown Castle Designation:	**Crown Castle BU Number:**	876347
	Crown Castle Site Name:	BUCKLAND MALL
	Crown Castle JDE Job Number:	383903
	Crown Castle Work Order Number:	1255944
	Crown Castle Application Number:	348128 Rev. 5
Engineering Firm Designation:	**Paul J. Ford and Company Project Number:**	37517-1326.001.7805
Site Data:	**53 Slater Street, MANCHESTER, Hartford County, CT** **Latitude *41° 48' 18"*, Longitude *-72° 32' 1"*** **155 Foot - Monopole Tower**	

Dear Charles Trask,

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 1012097, in accordance with application 348128, revision 5.

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:

LC5: Existing + Proposed Equipment **Sufficient Capacity**
Note: See Table I and Table II for the proposed and existing loading, respectively.

This analysis has been performed in accordance with the 2016 Connecticut State Building Code based upon an ultimate 3-second gust wind speed of 125 mph converted to a nominal 3-second gust wind speed of 97 mph per Section 1609.3 and Appendix N as required for use in the ANSI/TIA-222-G-2005 Standard, "Structural Standard for Antenna Supporting Structures and Antennas", with ANSI/TIA-222-G-1-2007 and ANSI/TIA-222-G-2-2009 Addenda per Exception #5 of Section 1609.1.1. Risk Category II and Exposure Category C were used in this analysis.

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

Respectfully submitted by:

Joey Meinerding, E.I.
Structural Designer

STATE OF CONNECTICUT JUSTIN T. KLINE No. 30031 LICENSED PROFESSIONAL ENGINEER

3.13.17

tnxTower Report - version 7.0.5.1

Date: **March 10, 2017**

Charles Trask
Crown Castle
3530 Toringdon Way, Suite 300
Charlotte, NC 28277
980.209.8228

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

Subject: Structural Analysis Report

Carrier Designation:	***AT&T Mobility* Co-Locate**	
	Carrier Site Number:	CTL05307
	Carrier Site Name:	Manchester North
Crown Castle Designation:	**Crown Castle BU Number:**	876347
	Crown Castle Site Name:	BUCKLAND MALL
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Respectfully submitted by:

Joey Meinerding, E.I.
Structural Designer

TABLE OF CONTENTS

1) INTRODUCTION

This tower is a 155 ft. monopole tower designed by Summit in February of 2002. The tower was originally designed for a wind speed of 80 mph per TIA/EIA-222-F.

2) ANALYSIS CRITERIA

This analysis has been performed in accordance with the 2016 Connecticut State Building Code based upon an ultimate 3-second gust wind speed of 125 mph converted to a nominal 3-second gust wind speed of 97 mph per Section 1609.3 and Appendix N as required for use in the ANSI/TIA-222-G-2005 Standard, "Structural Standard for Antenna Supporting Structures and Antennas", with ANSI/TIA-222-G-1-2007 and ANSI/TIA-222-G-2-2009 Addenda per Exception #5 of Section 1609.1.1. Risk Category II and Exposure Category C were used in this analysis.

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
143.0	145.0	3	cci antennas	DTMABP7819VG12A	1 2	3/8 3/4	--
		3	ericcson	RRUS 32 B30			
		3	ericsson	RRUS 11			
		3	ericsson	RRUS 32 B2			
		3	quintel technology	QS66512-2			
		1	raycap	DC6-48-60-18-8F			
	143.0	1	tower mounts	Platform Mount [LP 1301-1]			

Table 2 - Existing Antenna and Cable Information

Mounting Level (ft)	Center Line Elevation (ft)	Number of Antennas	Antenna Manufacturer	Antenna Model	Number of Feed Lines	Feed Line Size (in)	Note
155.0	155.0	3	alcatel lucent	TD-RRH8x20-25	3 5 1 1 3	5/16 1/2 5/8 3/4 1-1/4	1
		3	argus technologies	LPX310R w/ Mount Pipe			
		3	rfs celwave	APXVSPP18-C-A20 w/ Mount Pipe			
		3	rfs celwave	APXVTM14-C-120 w/ Mount Pipe			
		3	samsung telecommunications	WIMAX DAP HEAD			
		1	tower mounts	Miscellaneous [NA 510-1]			
		1	tower mounts	Platform Mount [LP 1201-1]			
	151.0	1	andrew	VHLP1-23			
		1	andrew	VHLP2-11			
		1	andrew	VHLP2.5-18			
		3	dragonwave	HORIZON COMPACT			
153.0	153.0	3	alcatel lucent	800MHz 2X50W RRH W/FILTER	--	--	1
		3	alcatel lucent	PCS 1900MHz 4x45W-65MHz			
		1	tower mounts	Pipe Mount [PM 601-3]			

Mounting Level (ft)	Center Line Elevation (ft)	Number of Antennas	Antenna Manufacturer	Antenna Model	Number of Feed Lines	Feed Line Size (in)	Note
145.0	147.0	3	ericsson	RRUS 11	--	--	1
	145.0	1	tower mounts	Pipe Mount [PM 601-3]			
143.0	145.0	3	ericsson	RRUS 11	1 2 6	3/8 3/4 1-1/4	1
		3	kathrein	800 10121			
		6	kathrein	860 10025			
		1	raycap	DC6-48-60-18-8F			
	143.0	3	kmw communications	AM-X-CD-16-65-00T-RET w/ Mount Pipe	--	--	2
		6	powerwave technologies	LGP21401			
		1	tower mounts	T-Arm Mount [TA 702-3]			
133.0	133.0	3	ericsson	ERICSSON AIR 21 B2A B4P w/ Mount Pipe	1 6	1-1/4 1-5/8	1
		3	ericsson	KRC 118 057/1 w/ Mount Pipe			
		3	ericsson	KRY 112 144/1			
		3	ericsson	RRUS 11 B12			
		1	tower mounts	Platform Mount [LP 403-1]			
113.0	113.0	3	alcatel lucent	RRH2X60-AWS	14	1-5/8	1
		3	alcatel lucent	RRH2x60-700			
		3	andrew	LNX-6512DS-T0M w/ Mount Pipe			
		3	antel	BXA-70063/6CFx2 w/ Mount Pipe			
		6	commscope	SBNHH-1D65B w/ Mount Pipe			
		1	rfs celwave	DB-T1-6Z-8AB-0Z			
		1	tower mounts	Platform Mount [LP 1201-1]			
60.0	60.0	1	tower mounts	Side Arm Mount [SO 701-1]	1	1/2	2

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

3) ANALYSIS PROCEDURE

Table 3 - Documents Provided

Document	Remarks	Reference	Source
4-GEOTECHNICAL REPORTS	FDH, 1204605EG1, 06/12/2012	1533476	CCISITES
4-TOWER FOUNDATION DRAWINGS/DESIGN/SPECS	PJF, 329298-597, 09/11/1998	1615406	CCISITES
4-TOWER MANUFACTURER DRAWINGS	PJF, A02-T0021, 02/18/2002	2068033	CCISITES

3.1) Analysis Method

tnxTower (version 7.0.5.1), a commercially available analysis software package, was used to create a three-dimensional model of the tower and calculate member stresses for various loading cases. Selected output from the analysis is included in Appendix A.

3.2) Assumptions

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

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	155 - 115.5	Pole	TP29.31x22x0.25	1	-12.88	1507.55	61.4	Pass
L2	115.5 - 79.25	Pole	TP35.51x28.11x0.31	2	-22.72	2469.71	88.1	Pass
L3	79.25 - 43.75	Pole	TP41.46x34.06x0.38	3	-32.09	3485.55	92.9	Pass
L4	43.75 - 0	Pole	TP48.8x39.73x0.44	4	-49.07	4858.33	91.9	Pass
							Summary	
						Pole (L3)	92.9	Pass
						Rating =	92.9	Pass

Table 5 - Tower Component Stresses vs. Capacity

Notes	Component	Elevation (ft)	% Capacity	Pass / Fail
1	Anchor Rods	0	93.3	Pass
1	Base Plate	0	75.6	Pass
1	Base Foundation Structural Steel	0	56.2	Pass
1	Base Foundation Soil Interaction	0	11.6	Pass

Structure Rating (max from all components) =	**93.3%**

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

4.1) Recommendations

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

APPENDIX A

TNXTOWER OUTPUT

Tower Input Data

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

1) Tower is located in Hartford County, Connecticut.
2) ASCE 7-10 Wind Data is used (wind speeds converted to nominal values).
3) Basic wind speed of 97.0 mph.
4) Structure Class II.
5) Exposure Category C.
6) Topographic Category 1.
7) Crest Height 0.00 ft.
8) Nominal ice thickness of 1.00 in.
9) Ice thickness is considered to increase with height.
10) Ice density of 56 pcf.
11) A wind speed of 50.0 mph is used in combination with ice.
12) Temperature drop of 50 °F.
13) Deflections calculated using a wind speed of 60.0 mph.
14) A non-linear (P-delta) analysis was used.
15) Pressures are calculated at each section.
16) Stress ratio used in pole design is 1.
17) Local bending stresses due to climbing loads, feed line supports, and appurtenance mounts are not considered.

Options

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

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	155.00-115.50	39.50	3.75	18	22.00	29.31	0.25	1.00	A607-60 (60 ksi)
L2	115.50-79.25	40.00	4.50	18	28.11	35.51	0.31	1.25	A607-65 (65 ksi)
L3	79.25-43.75	40.00	5.25	18	34.06	41.46	0.38	1.50	A607-65 (65 ksi)
L4	43.75-0.00	49.00		18	39.73	48.80	0.44	1.75	A607-65 (65 ksi)

Tapered Pole Properties

Section	Tip Dia. in	Area in^2	I in^4	r in	C in	I/C in^3	J in^4	It/Q in^3	w in	w/t
L1	22.34	17.26	1031.48	7.72	11.18	92.29	2064.32	8.63	3.43	13.728
	29.76	23.06	2459.70	10.32	14.89	165.21	4922.63	11.53	4.72	18.873
L2	29.25	27.58	2692.83	9.87	14.28	188.55	5389.20	13.79	4.40	14.074
	36.06	34.92	5466.10	12.50	18.04	302.98	10939.40	17.46	5.70	18.241
L3	35.43	40.09	5745.80	11.96	17.30	332.11	11499.17	20.05	5.33	14.224
	42.10	48.90	10425.54	14.58	21.06	495.05	20864.80	24.45	6.64	17.697
L4	41.33	54.57	10646.61	13.95	20.19	527.44	21307.22	27.29	6.22	14.225
	49.55	67.16	19844.89	17.17	24.79	800.51	39715.89	33.59	7.82	17.872

Tower Elevation ft	Gusset Area (per face) ft^2	Gusset Thickness in	Gusset Grade	Adjust. Factor A_f	Adjust. Factor A_r	Weight Mult.	Double Angle Stitch Bolt Spacing Diagonals in	Double Angle Stitch Bolt Spacing Horizontals in	Double Angle Stitch Bolt Spacing Redundants in
L1 155.00-115.50				1	1	1			
L2 115.50-79.25				1	1	1			
L3 79.25-43.75				1	1	1			
L4 43.75-0.00				1	1	1			

Feed Line/Linear Appurtenances - Entered As Area

Description	Face or Leg	Allow Shield	Component Type	Placement ft	Total Number		C_AA_A ft^2/ft	Weight plf
ATCB-B01-005(5/16)	C	No	Inside Pole	155.00 - 0.00	3	No Ice	0.00	0.07
						1/2" Ice	0.00	0.07
						1" Ice	0.00	0.07
FSJ4-50B(1/2")	C	No	CaAa (Out Of Face)	155.00 - 0.00	5	No Ice	0.00	0.14
						1/2" Ice	0.00	0.76
						1" Ice	0.00	2.00
2" (Nominal) Conduit	C	No	CaAa (Out Of Face)	155.00 - 0.00	1	No Ice	0.00	0.72
						1/2" Ice	0.00	2.48
						1" Ice	0.00	4.84
2" (Nominal) Conduit	C	No	CaAa (Out Of Face)	155.00 - 0.00	1	No Ice	0.24	0.72
						1/2" Ice	0.34	2.48
						1" Ice	0.44	4.84
9776(3/4")	C	No	Inside Pole	155.00 - 0.00	1	No Ice	0.00	0.31
						1/2" Ice	0.00	0.31
						1" Ice	0.00	0.31
HB058-M12-XXXF(5/8")	C	No	Inside Pole	155.00 - 0.00	1	No Ice	0.00	0.24
						1/2" Ice	0.00	0.24
						1" Ice	0.00	0.24
HB114-1-08U4-M5J(1 1/4")	C	No	Inside Pole	155.00 - 0.00	3	No Ice	0.00	1.08
						1/2" Ice	0.00	1.08
						1" Ice	0.00	1.08
***								
LDF6-50A(1-1/4")	C	No	Inside Pole	143.00 - 0.00	6	No Ice	0.00	0.66
						1/2" Ice	0.00	0.66
						1" Ice	0.00	0.66
FB-L98B-002-75000(3/8")	C	No	Inside Pole	143.00 - 0.00	1	No Ice	0.00	0.06
						1/2" Ice	0.00	0.06
						1" Ice	0.00	0.06
WR-VG86ST-BRD(3/4)	C	No	Inside Pole	143.00 - 0.00	2	No Ice	0.00	0.59
						1/2" Ice	0.00	0.59
						1" Ice	0.00	0.59
2" (Nominal) Conduit	C	No	Inside Pole	143.00 - 0.00	1	No Ice	0.00	0.72
						1/2" Ice	0.00	0.72

Description	Face or Leg	Allow Shield	Component Type	Placement ft	Total Number		C_AA_A ft^2/ft	Weight plf
						1" Ice	0.00	0.72
FB-L98B-034-XXXXXX(3/8)	C	No	CaAa (Out Of Face)	143.00 - 0.00	1	No Ice	0.00	0.05
						1/2" Ice	0.00	0.60
						1" Ice	0.00	1.75
WR-VG86ST-BRD(3/4)	C	No	CaAa (Out Of Face)	143.00 - 0.00	1	No Ice	0.00	0.59
						1/2" Ice	0.00	1.37
						1" Ice	0.00	2.76
WR-VG86ST-BRD(3/4)	C	No	CaAa (Out Of Face)	143.00 - 0.00	1	No Ice	0.08	0.59
						1/2" Ice	0.18	1.37
						1" Ice	0.28	2.76
***								
HB114-21U3M12-XXXF(1-1/4")	C	No	Inside Pole	133.00 - 0.00	1	No Ice	0.00	1.22
						1/2" Ice	0.00	1.22
						1" Ice	0.00	1.22
LCF158-50JA-A0(1 5/8")	C	No	Inside Pole	133.00 - 0.00	6	No Ice	0.00	0.08
						1/2" Ice	0.00	0.08
						1" Ice	0.00	0.08
***								
561(1-5/8")	C	No	Inside Pole	113.00 - 0.00	12	No Ice	0.00	1.35
						1/2" Ice	0.00	1.35
						1" Ice	0.00	1.35
HB158-1-08U8-S8J18(1-5/8)	C	No	Inside Pole	113.00 - 0.00	2	No Ice	0.00	1.30
						1/2" Ice	0.00	1.30
						1" Ice	0.00	1.30
***								

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	155.00-115.50	A	0.000	0.000	0.000	0.000	0.00
		B	0.000	0.000	0.000	0.000	0.00
		C	0.000	0.000	0.000	11.510	0.47
L2	115.50-79.25	A	0.000	0.000	0.000	0.000	0.00
		B	0.000	0.000	0.000	0.000	0.00
		C	0.000	0.000	0.000	11.415	1.18
L3	79.25-43.75	A	0.000	0.000	0.000	0.000	0.00
		B	0.000	0.000	0.000	0.000	0.00
		C	0.000	0.000	0.000	11.179	1.20
L4	43.75-0.00	A	0.000	0.000	0.000	0.000	0.00
		B	0.000	0.000	0.000	0.000	0.00
		C	0.000	0.000	0.000	13.777	1.48

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	155.00-115.50	A	2.302	0.000	0.000	0.000	0.000	0.00
		B		0.000	0.000	0.000	0.000	0.00
		C		0.000	0.000	0.000	42.352	3.98
L2	115.50-79.25	A	2.228	0.000	0.000	0.000	0.000	0.00
		B		0.000	0.000	0.000	0.000	0.00
		C		0.000	0.000	0.000	44.789	4.70
L3	79.25-43.75	A	2.128	0.000	0.000	0.000	0.000	0.00
		B		0.000	0.000	0.000	0.000	0.00
		C		0.000	0.000	0.000	42.810	4.42
L4	43.75-0.00	A	1.921	0.000	0.000	0.000	0.000	0.00
		B		0.000	0.000	0.000	0.000	0.00
		C		0.000	0.000	0.000	51.010	5.08

Feed Line Center of Pressure

Section	Elevation	CP_X	CP_Z	CP_X Ice	CP_Z Ice
	ft	in	in	in	in
L1	155.00-115.50	-0.33	0.19	-0.83	0.48
L2	115.50-79.25	-0.36	0.21	-0.99	0.57
L3	79.25-43.75	-0.37	0.21	-1.04	0.60
L4	43.75-0.00	-0.37	0.21	-1.06	0.61

Shielding Factor Ka

Tower Section	Feed Line Record No.	Description	Feed Line Segment Elev.	K_a No Ice	K_a Ice

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
LPX310R w/ Mount Pipe	A	From Leg	4.00 0.00 0.00	0.000	155.00	No Ice 1/2" Ice 1" Ice	2.31 2.64 2.97	2.34 2.87 3.41	0.03 0.05 0.08
LPX310R w/ Mount Pipe	B	From Leg	4.00 0.00 0.00	0.000	155.00	No Ice 1/2" Ice 1" Ice	2.31 2.64 2.97	2.34 2.87 3.41	0.03 0.05 0.08
LPX310R w/ Mount Pipe	C	From Leg	4.00 0.00 0.00	0.000	155.00	No Ice 1/2" Ice 1" Ice	2.31 2.64 2.97	2.34 2.87 3.41	0.03 0.05 0.08
HORIZON COMPACT	A	From Leg	4.00 0.00 -4.00	0.000	155.00	No Ice 1/2" Ice 1" Ice	0.72 0.83 0.94	0.37 0.45 0.54	0.01 0.02 0.03
HORIZON COMPACT	B	From Leg	4.00 0.00 -4.00	0.000	155.00	No Ice 1/2" Ice 1" Ice	0.72 0.83 0.94	0.37 0.45 0.54	0.01 0.02 0.03
HORIZON COMPACT	C	From Leg	4.00 0.00 -4.00	0.000	155.00	No Ice 1/2" Ice 1" Ice	0.72 0.83 0.94	0.37 0.45 0.54	0.01 0.02 0.03
WIMAX DAP HEAD	A	From Leg	4.00 0.00 0.00	0.000	155.00	No Ice 1/2" Ice 1" Ice	1.55 1.70 1.87	0.68 0.80 0.92	0.03 0.04 0.06
WIMAX DAP HEAD	B	From Leg	4.00 0.00 0.00	0.000	155.00	No Ice 1/2" Ice 1" Ice	1.55 1.70 1.87	0.68 0.80 0.92	0.03 0.04 0.06
WIMAX DAP HEAD	C	From Leg	4.00 0.00 0.00	0.000	155.00	No Ice 1/2" Ice 1" Ice	1.55 1.70 1.87	0.68 0.80 0.92	0.03 0.04 0.06
APXVSPP18-C-A20 w/ Mount Pipe	A	From Leg	4.00 0.00	0.000	155.00	No Ice 1/2"	8.26 8.82	6.95 8.13	0.08 0.15

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
			0.00			Ice 1" Ice	9.35	9.02	0.23
APXVSPP18-C-A20 w/ Mount Pipe	B	From Leg	4.00 0.00 0.00	0.000	155.00	No Ice 1/2" Ice 1" Ice	8.26 8.82 9.35	6.95 8.13 9.02	0.08 0.15 0.23
APXVSPP18-C-A20 w/ Mount Pipe	C	From Leg	4.00 0.00 0.00	0.000	155.00	No Ice 1/2" Ice 1" Ice	8.26 8.82 9.35	6.95 8.13 9.02	0.08 0.15 0.23
APXVTM14-C-120 w/ Mount Pipe	A	From Leg	4.00 0.00 0.00	0.000	155.00	No Ice 1/2" Ice 1" Ice	6.58 7.03 7.47	4.96 5.75 6.47	0.08 0.13 0.19
APXVTM14-C-120 w/ Mount Pipe	B	From Leg	4.00 0.00 0.00	0.000	155.00	No Ice 1/2" Ice 1" Ice	6.58 7.03 7.47	4.96 5.75 6.47	0.08 0.13 0.19
APXVTM14-C-120 w/ Mount Pipe	C	From Leg	4.00 0.00 0.00	0.000	155.00	No Ice 1/2" Ice 1" Ice	6.58 7.03 7.47	4.96 5.75 6.47	0.08 0.13 0.19
TD-RRH8x20-25	A	From Leg	4.00 0.00 0.00	0.000	155.00	No Ice 1/2" Ice 1" Ice	4.05 4.30 4.56	1.53 1.71 1.90	0.07 0.10 0.13
TD-RRH8x20-25	B	From Leg	4.00 0.00 0.00	0.000	155.00	No Ice 1/2" Ice 1" Ice	4.05 4.30 4.56	1.53 1.71 1.90	0.07 0.10 0.13
TD-RRH8x20-25	C	From Leg	4.00 0.00 0.00	0.000	155.00	No Ice 1/2" Ice 1" Ice	4.05 4.30 4.56	1.53 1.71 1.90	0.07 0.10 0.13
Miscellaneous [NA 510-1]	C	None		0.000	155.00	No Ice 1/2" Ice 1" Ice	6.00 8.50 11.00	6.00 8.50 11.00	0.26 0.34 0.42
Platform Mount [LP 1201-1]	C	None		0.000	155.00	No Ice 1/2" Ice 1" Ice	23.10 26.80 30.50	23.10 26.80 30.50	2.10 2.50 2.90
***									
800MHz 2X50W RRH W/FILTER	A	From Leg	1.00 0.00 0.00	0.000	153.00	No Ice 1/2" Ice 1" Ice	2.06 2.24 2.43	1.93 2.11 2.29	0.06 0.09 0.11
800MHz 2X50W RRH W/FILTER	B	From Leg	1.00 0.00 0.00	0.000	153.00	No Ice 1/2" Ice 1" Ice	2.06 2.24 2.43	1.93 2.11 2.29	0.06 0.09 0.11
800MHz 2X50W RRH W/FILTER	C	From Leg	1.00 0.00 0.00	0.000	153.00	No Ice 1/2" Ice 1" Ice	2.06 2.24 2.43	1.93 2.11 2.29	0.06 0.09 0.11
PCS 1900MHz 4x45W-65MHz	A	From Leg	1.00 0.00 0.00	0.000	153.00	No Ice 1/2" Ice 1" Ice	2.32 2.53 2.74	2.24 2.44 2.65	0.06 0.08 0.11
PCS 1900MHz 4x45W-65MHz	B	From Leg	1.00 0.00 0.00	0.000	153.00	No Ice 1/2" Ice 1" Ice	2.32 2.53 2.74	2.24 2.44 2.65	0.06 0.08 0.11
PCS 1900MHz 4x45W-65MHz	C	From Leg	1.00 0.00	0.000	153.00	No Ice 1/2"	2.32 2.53	2.24 2.44	0.06 0.08

Description	Face or Leg	Offset Type	Offsets: Horz Lateral Vert ft ft ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
			0.00			Ice	2.74	2.65	0.11
						1" Ice			
Pipe Mount [PM 601-3]	C	None		0.000	153.00	No Ice	4.39	4.39	0.20
						1/2" Ice	5.48	5.48	0.24
						1" Ice	6.57	6.57	0.28
***									
RRUS 11	A	From Leg	1.00 0.00 2.00	0.000	145.00	No Ice 1/2" Ice 1" Ice	2.79 3.00 3.21	1.19 1.34 1.50	0.05 0.07 0.10
RRUS 11	B	From Leg	1.00 0.00 2.00	0.000	145.00	No Ice 1/2" Ice 1" Ice	2.79 3.00 3.21	1.19 1.34 1.50	0.05 0.07 0.10
RRUS 11	C	From Leg	1.00 0.00 2.00	0.000	145.00	No Ice 1/2" Ice 1" Ice	2.79 3.00 3.21	1.19 1.34 1.50	0.05 0.07 0.10
Pipe Mount [PM 601-3]	C	None		0.000	145.00	No Ice 1/2" Ice 1" Ice	4.39 5.48 6.57	4.39 5.48 6.57	0.20 0.24 0.28
***									
800 10121	A	From Leg	4.00 0.00 2.00	0.000	143.00	No Ice 1/2" Ice 1" Ice	5.15 5.50 5.86	3.29 3.63 3.99	0.05 0.08 0.12
800 10121	B	From Leg	4.00 0.00 2.00	0.000	143.00	No Ice 1/2" Ice 1" Ice	5.15 5.50 5.86	3.29 3.63 3.99	0.05 0.08 0.12
800 10121	C	From Leg	4.00 0.00 2.00	0.000	143.00	No Ice 1/2" Ice 1" Ice	5.15 5.50 5.86	3.29 3.63 3.99	0.05 0.08 0.12
(2) 860 10025	A	From Leg	4.00 0.00 2.00	0.000	143.00	No Ice 1/2" Ice 1" Ice	0.14 0.19 0.25	0.12 0.17 0.23	0.00 0.00 0.01
(2) 860 10025	B	From Leg	4.00 0.00 2.00	0.000	143.00	No Ice 1/2" Ice 1" Ice	0.14 0.19 0.25	0.12 0.17 0.23	0.00 0.00 0.01
(2) 860 10025	C	From Leg	4.00 0.00 2.00	0.000	143.00	No Ice 1/2" Ice 1" Ice	0.14 0.19 0.25	0.12 0.17 0.23	0.00 0.00 0.01
RRUS 11	A	From Leg	4.00 0.00 2.00	0.000	143.00	No Ice 1/2" Ice 1" Ice	2.79 3.00 3.21	1.19 1.34 1.50	0.05 0.07 0.10
RRUS 11	B	From Leg	4.00 0.00 2.00	0.000	143.00	No Ice 1/2" Ice 1" Ice	2.79 3.00 3.21	1.19 1.34 1.50	0.05 0.07 0.10
RRUS 11	C	From Leg	4.00 0.00 2.00	0.000	143.00	No Ice 1/2" Ice 1" Ice	2.79 3.00 3.21	1.19 1.34 1.50	0.05 0.07 0.10
DC6-48-60-18-8F	A	From Leg	4.00 0.00 2.00	0.000	143.00	No Ice 1/2" Ice 1" Ice	0.92 1.46 1.64	0.92 1.46 1.64	0.02 0.04 0.06
QS66512-2	A	From Leg	4.00	0.000	143.00	No Ice	8.13	6.80	0.11

Description	Face or Leg	Offset Type	Offsets: Horz Lateral Vert ft ft ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
			0.00			1/2" Ice	8.59	7.27	0.17
			2.00			1" Ice	9.05	7.72	0.23
QS66512-2	B	From Leg	4.00	0.000	143.00	No Ice	8.13	6.80	0.11
			0.00			1/2" Ice	8.59	7.27	0.17
			2.00			1" Ice	9.05	7.72	0.23
QS66512-2	C	From Leg	4.00	0.000	143.00	No Ice	8.13	6.80	0.11
			0.00			1/2" Ice	8.59	7.27	0.17
			2.00			1" Ice	9.05	7.72	0.23
DTMABP7819VG12A	A	From Leg	4.00	0.000	143.00	No Ice	0.98	0.34	0.02
			0.00			1/2" Ice	1.10	0.42	0.03
			2.00			1" Ice	1.23	0.51	0.04
DTMABP7819VG12A	B	From Leg	4.00	0.000	143.00	No Ice	0.98	0.34	0.02
			0.00			1/2" Ice	1.10	0.42	0.03
			2.00			1" Ice	1.23	0.51	0.04
DTMABP7819VG12A	C	From Leg	4.00	0.000	143.00	No Ice	0.98	0.34	0.02
			0.00			1/2" Ice	1.10	0.42	0.03
			2.00			1" Ice	1.23	0.51	0.04
RRUS 32 B30	A	From Leg	4.00	0.000	143.00	No Ice	0.00	1.85	0.05
			0.00			1/2" Ice	3.46	2.08	0.07
			2.00			1" Ice	3.73	2.31	0.10
RRUS 32 B30	B	From Leg	4.00	0.000	143.00	No Ice	0.00	1.85	0.05
			0.00			1/2" Ice	3.46	2.08	0.07
			2.00			1" Ice	3.73	2.31	0.10
RRUS 32 B30	C	From Leg	4.00	0.000	143.00	No Ice	0.00	1.85	0.05
			0.00			1/2" Ice	3.46	2.08	0.07
			2.00			1" Ice	3.73	2.31	0.10
RRUS 32 B2	A	From Leg	4.00	0.000	143.00	No Ice	2.73	1.67	0.05
			0.00			1/2" Ice	2.95	1.86	0.07
			2.00			1" Ice	3.18	2.05	0.10
RRUS 32 B2	B	From Leg	4.00	0.000	143.00	No Ice	2.73	1.67	0.05
			0.00			1/2" Ice	2.95	1.86	0.07
			2.00			1" Ice	3.18	2.05	0.10
RRUS 32 B2	C	From Leg	4.00	0.000	143.00	No Ice	2.73	1.67	0.05
			0.00			1/2" Ice	2.95	1.86	0.07
			2.00			1" Ice	3.18	2.05	0.10
RRUS 11	A	From Leg	4.00	0.000	143.00	No Ice	2.79	1.19	0.05
			0.00			1/2" Ice	3.00	1.34	0.07
			2.00			1" Ice	3.21	1.50	0.10
RRUS 11	B	From Leg	4.00	0.000	143.00	No Ice	2.79	1.19	0.05
			0.00			1/2" Ice	3.00	1.34	0.07
			2.00			1" Ice	3.21	1.50	0.10
RRUS 11	C	From Leg	4.00	0.000	143.00	No Ice	2.79	1.19	0.05
			0.00			1/2" Ice	3.00	1.34	0.07
			2.00			1" Ice	3.21	1.50	0.10
DC6-48-60-18-8F	A	From Leg	4.00	0.000	143.00	No Ice	0.92	0.92	0.02
			0.00			1/2" Ice	1.46	1.46	0.04
			2.00			1" Ice	1.64	1.64	0.06
Platform Mount [LP 1301-1]	C	None		0.000	143.00	No Ice	51.70	51.70	2.26
						1/2"	62.70	62.70	2.94

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	73.70	73.70	3.61
						1" Ice			
***									
ERICSSON AIR 21 B2A B4P w/ Mount Pipe	A	From Leg	4.00 0.00 0.00	0.000	133.00	No Ice 1/2" Ice 1" Ice	6.33 6.78 7.21	5.64 6.43 7.13	0.11 0.17 0.23
ERICSSON AIR 21 B2A B4P w/ Mount Pipe	B	From Leg	4.00 0.00 0.00	0.000	133.00	No Ice 1/2" Ice 1" Ice	6.33 6.78 7.21	5.64 6.43 7.13	0.11 0.17 0.23
ERICSSON AIR 21 B2A B4P w/ Mount Pipe	C	From Leg	4.00 0.00 0.00	0.000	133.00	No Ice 1/2" Ice 1" Ice	6.33 6.78 7.21	5.64 6.43 7.13	0.11 0.17 0.23
KRC 118 057/1 w/ Mount Pipe	A	From Leg	4.00 0.00 0.00	0.000	133.00	No Ice 1/2" Ice 1" Ice	8.75 9.20 9.66	7.61 8.42 9.16	0.16 0.24 0.33
KRC 118 057/1 w/ Mount Pipe	B	From Leg	4.00 0.00 0.00	0.000	133.00	No Ice 1/2" Ice 1" Ice	8.75 9.20 9.66	7.61 8.42 9.16	0.16 0.24 0.33
KRC 118 057/1 w/ Mount Pipe	C	From Leg	4.00 0.00 0.00	0.000	133.00	No Ice 1/2" Ice 1" Ice	8.75 9.20 9.66	7.61 8.42 9.16	0.16 0.24 0.33
KRY 112 144/1	A	From Leg	4.00 0.00 0.00	0.000	133.00	No Ice 1/2" Ice 1" Ice	0.35 0.43 0.51	0.17 0.23 0.30	0.01 0.01 0.02
KRY 112 144/1	B	From Leg	4.00 0.00 0.00	0.000	133.00	No Ice 1/2" Ice 1" Ice	0.35 0.43 0.51	0.17 0.23 0.30	0.01 0.01 0.02
KRY 112 144/1	C	From Leg	4.00 0.00 0.00	0.000	133.00	No Ice 1/2" Ice 1" Ice	0.35 0.43 0.51	0.17 0.23 0.30	0.01 0.01 0.02
RRUS 11 B12	A	From Leg	4.00 0.00 0.00	0.000	133.00	No Ice 1/2" Ice 1" Ice	2.83 3.04 3.26	1.18 1.33 1.48	0.05 0.07 0.10
RRUS 11 B12	B	From Leg	4.00 0.00 0.00	0.000	133.00	No Ice 1/2" Ice 1" Ice	2.83 3.04 3.26	1.18 1.33 1.48	0.05 0.07 0.10
RRUS 11 B12	C	From Leg	4.00 0.00 0.00	0.000	133.00	No Ice 1/2" Ice 1" Ice	2.83 3.04 3.26	1.18 1.33 1.48	0.05 0.07 0.10
(2) 2.375" OD x 4' Mount Pipe	A	From Leg	4.00 0.00 0.00	0.000	133.00	No Ice 1/2" Ice 1" Ice	0.87 1.11 1.36	0.87 1.11 1.36	0.02 0.03 0.04
(2) 2.375" OD x 4' Mount Pipe	B	From Leg	4.00 0.00 0.00	0.000	133.00	No Ice 1/2" Ice 1" Ice	0.87 1.11 1.36	0.87 1.11 1.36	0.02 0.03 0.04
(2) 2.375" OD x 4' Mount Pipe	C	From Leg	4.00 0.00 0.00	0.000	133.00	No Ice 1/2" Ice 1" Ice	0.87 1.11 1.36	0.87 1.11 1.36	0.02 0.03 0.04
Platform Mount [LP 403-1]	C	None		0.000	133.00	No Ice 1/2"	18.85 24.30	18.85 24.30	1.50 1.80

Description	Face or Leg	Offset Type	Offsets: Horz Lateral ft Vert ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
						Ice	29.75	29.75	2.09
						1" Ice			
***									
BXA-70063/6CFx2 w/ Mount Pipe	A	From Leg	4.00 0.00	0.000	113.00	No Ice	7.81	5.40	0.04
						1/2" Ice	8.36	6.55	0.10
			0.00			1" Ice	8.87	7.41	0.17
BXA-70063/6CFx2 w/ Mount Pipe	B	From Leg	4.00 0.00	0.000	113.00	No Ice	7.81	5.40	0.04
						1/2" Ice	8.36	6.55	0.10
			0.00			1" Ice	8.87	7.41	0.17
BXA-70063/6CFx2 w/ Mount Pipe	C	From Leg	4.00 0.00	0.000	113.00	No Ice	7.81	5.40	0.04
						1/2" Ice	8.36	6.55	0.10
			0.00			1" Ice	8.87	7.41	0.17
LNX-6512DS-T0M w/ Mount Pipe	A	From Leg	4.00 0.00	0.000	113.00	No Ice	5.33	4.53	0.05
						1/2" Ice	5.72	5.15	0.09
			0.00			1" Ice	6.12	5.77	0.15
LNX-6512DS-T0M w/ Mount Pipe	B	From Leg	4.00 0.00	0.000	113.00	No Ice	5.33	4.53	0.05
						1/2" Ice	5.72	5.15	0.09
			0.00			1" Ice	6.12	5.77	0.15
LNX-6512DS-T0M w/ Mount Pipe	C	From Leg	4.00 0.00	0.000	113.00	No Ice	5.33	4.53	0.05
						1/2" Ice	5.72	5.15	0.09
			0.00			1" Ice	6.12	5.77	0.15
(2) SBNHH-1D65B w/ Mount Pipe	A	From Leg	4.00 0.00	0.000	113.00	No Ice	8.40	7.07	0.07
						1/2" Ice	8.96	8.26	0.14
			0.00			1" Ice	9.49	9.18	0.21
(2) SBNHH-1D65B w/ Mount Pipe	B	From Leg	4.00 0.00	0.000	113.00	No Ice	8.40	7.07	0.07
						1/2" Ice	8.96	8.26	0.14
			0.00			1" Ice	9.49	9.18	0.21
(2) SBNHH-1D65B w/ Mount Pipe	C	From Leg	4.00 0.00	0.000	113.00	No Ice	8.40	7.07	0.07
						1/2" Ice	8.96	8.26	0.14
			0.00			1" Ice	9.49	9.18	0.21
RRH2X60-AWS	A	From Leg	4.00 0.00	0.000	113.00	No Ice	1.88	1.24	0.04
						1/2" Ice	2.06	1.39	0.06
			0.00			1" Ice	2.24	1.54	0.08
RRH2X60-AWS	B	From Leg	4.00 0.00	0.000	113.00	No Ice	1.88	1.24	0.04
						1/2" Ice	2.06	1.39	0.06
			0.00			1" Ice	2.24	1.54	0.08
RRH2X60-AWS	C	From Leg	4.00 0.00	0.000	113.00	No Ice	1.88	1.24	0.04
						1/2" Ice	2.06	1.39	0.06
			0.00			1" Ice	2.24	1.54	0.08
RRH2x60-700	A	From Leg	4.00 0.00	0.000	113.00	No Ice	3.50	1.82	0.06
						1/2" Ice	3.76	2.05	0.08
			0.00			1" Ice	4.03	2.29	0.11
RRH2x60-700	B	From Leg	4.00 0.00	0.000	113.00	No Ice	3.50	1.82	0.06
						1/2" Ice	3.76	2.05	0.08
			0.00			1" Ice	4.03	2.29	0.11
RRH2x60-700	C	From Leg	4.00 0.00	0.000	113.00	No Ice	3.50	1.82	0.06
						1/2" Ice	3.76	2.05	0.08
			0.00			1" Ice	4.03	2.29	0.11
DB-T1-6Z-8AB-0Z	A	From Leg	4.00 0.00	0.000	113.00	No Ice	4.80	2.00	0.04
						1/2" Ice	5.07	2.19	0.08

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
			0.00			Ice	5.35	2.39	0.12
						1" Ice			
Platform Mount [LP 1201-1]	C	None		0.000	113.00	No Ice	23.10	23.10	2.10
						1/2" Ice	26.80	26.80	2.50
						1" Ice	30.50	30.50	2.90
***									

Dishes

Description	Face or Leg	Dish Type	Offset Type	Offsets: Horz Lateral ft / Vert ft	Azimuth Adjustment °	3 dB Beam Width °	Elevation ft	Outside Diameter ft		Aperture Area ft^2	Weight K
VHLP1-23	A	Paraboloid w/o Radome	From Leg	4.00	0.000		155.00	1.27	No Ice	1.28	0.01
				0.00					1/2" Ice	1.45	0.02
				-4.00					1" Ice	1.62	0.03
VHLP2.5-18	B	Paraboloid w/Shroud (HP)	From Leg	4.00	0.000		155.00	2.92	No Ice	6.68	0.05
				0.00					1/2" Ice	7.07	0.08
				-4.00					1" Ice	7.46	0.12
VHLP2-11	C	Paraboloid w/o Radome	From Leg	4.00	0.000		155.00	2.17	No Ice	3.72	0.03
				0.00					1/2" Ice	4.01	0.05
				-4.00					1" Ice	4.30	0.07

Tower Pressures - No Ice

G_H = 1.100

Section Elevation ft	z ft	K_Z	q_z psf	A_G ft^2	Face	A_F ft^2	A_R ft^2	A_{leg} ft^2	Leg %	C_AA_A In Face ft^2	C_AA_A Out Face ft^2
L1 155.00-115.50	134.46	1.347	31	85.747	A	0.000	85.747	85.747	100.00	0.000	0.000
					B	0.000	85.747		100.00	0.000	0.000
					C	0.000	85.747		100.00	0.000	11.510
L2 115.50-79.25	96.92	1.257	29	98.652	A	0.000	98.652	98.652	100.00	0.000	0.000
					B	0.000	98.652		100.00	0.000	0.000
					C	0.000	98.652		100.00	0.000	11.415
L3 79.25-43.75	61.26	1.142	26	114.669	A	0.000	114.669	114.669	100.00	0.000	0.000
					B	0.000	114.669		100.00	0.000	0.000
					C	0.000	114.669		100.00	0.000	11.179
L4 43.75-0.00	22.10	0.921	21	165.679	A	0.000	165.679	165.679	100.00	0.000	0.000
					B	0.000	165.679		100.00	0.000	0.000
					C	0.000	165.679		100.00	0.000	13.777

Tower Pressure - With Ice

G_H = 1.100

Section Elevation ft	z ft	K_Z	q_z psf	t_Z in	A_G ft²	Face	A_F ft²	A_R ft²	A_{leg} ft²	Leg %	C_AA_A In Face ft²	C_AA_A Out Face ft²
L1 155.00-115.50	134.46	1.347	8	2.30	100.900	A	0.000	100.900	100.900	100.00	0.000	0.000
						B	0.000	100.900		100.00	0.000	0.000
						C	0.000	100.900		100.00	0.000	42.352
L2 115.50-79.25	96.92	1.257	8	2.23	112.557	A	0.000	112.557	112.557	100.00	0.000	0.000
						B	0.000	112.557		100.00	0.000	0.000
						C	0.000	112.557		100.00	0.000	44.789
L3 79.25-43.75	61.26	1.142	7	2.13	127.848	A	0.000	127.848	127.848	100.00	0.000	0.000
						B	0.000	127.848		100.00	0.000	0.000
						C	0.000	127.848		100.00	0.000	42.810
L4 43.75-0.00	22.10	0.921	6	1.92	181.193	A	0.000	181.193	181.193	100.00	0.000	0.000
						B	0.000	181.193		100.00	0.000	0.000
						C	0.000	181.193		100.00	0.000	51.010

Tower Pressure - Service

G_H = 1.100

Section Elevation ft	z ft	K_Z	q_z psf	A_G ft²	Face	A_F ft²	A_R ft²	A_{leg} ft²	Leg %	C_AA_A In Face ft²	C_AA_A Out Face ft²
L1 155.00-115.50	134.46	1.347	11	85.747	A	0.000	85.747	85.747	100.00	0.000	0.000
					B	0.000	85.747		100.00	0.000	0.000
					C	0.000	85.747		100.00	0.000	11.510
L2 115.50-79.25	96.92	1.257	10	98.652	A	0.000	98.652	98.652	100.00	0.000	0.000
					B	0.000	98.652		100.00	0.000	0.000
					C	0.000	98.652		100.00	0.000	11.415
L3 79.25-43.75	61.26	1.142	9	114.669	A	0.000	114.669	114.669	100.00	0.000	0.000
					B	0.000	114.669		100.00	0.000	0.000
					C	0.000	114.669		100.00	0.000	11.179
L4 43.75-0.00	22.10	0.921	7	165.679	A	0.000	165.679	165.679	100.00	0.000	0.000
					B	0.000	165.679		100.00	0.000	0.000
					C	0.000	165.679		100.00	0.000	13.777

Load Combinations

Comb. No.	Description
1	Dead Only
2	1.2 Dead+1.6 Wind 0 deg - No Ice
3	0.9 Dead+1.6 Wind 0 deg - No Ice
4	1.2 Dead+1.6 Wind 30 deg - No Ice
5	0.9 Dead+1.6 Wind 30 deg - No Ice
6	1.2 Dead+1.6 Wind 60 deg - No Ice
7	0.9 Dead+1.6 Wind 60 deg - No Ice
8	1.2 Dead+1.6 Wind 90 deg - No Ice
9	0.9 Dead+1.6 Wind 90 deg - No Ice
10	1.2 Dead+1.6 Wind 120 deg - No Ice
11	0.9 Dead+1.6 Wind 120 deg - No Ice
12	1.2 Dead+1.6 Wind 150 deg - No Ice
13	0.9 Dead+1.6 Wind 150 deg - No Ice
14	1.2 Dead+1.6 Wind 180 deg - No Ice
15	0.9 Dead+1.6 Wind 180 deg - No Ice
16	1.2 Dead+1.6 Wind 210 deg - No Ice
17	0.9 Dead+1.6 Wind 210 deg - No Ice
18	1.2 Dead+1.6 Wind 240 deg - No Ice
19	0.9 Dead+1.6 Wind 240 deg - No Ice
20	1.2 Dead+1.6 Wind 270 deg - No Ice
21	0.9 Dead+1.6 Wind 270 deg - No Ice
22	1.2 Dead+1.6 Wind 300 deg - No Ice
23	0.9 Dead+1.6 Wind 300 deg - No Ice

Comb. No.	Description
24	1.2 Dead+1.6 Wind 330 deg - No Ice
25	0.9 Dead+1.6 Wind 330 deg - No Ice
26	1.2 Dead+1.0 Ice+1.0 Temp
27	1.2 Dead+1.0 Wind 0 deg+1.0 Ice+1.0 Temp
28	1.2 Dead+1.0 Wind 30 deg+1.0 Ice+1.0 Temp
29	1.2 Dead+1.0 Wind 60 deg+1.0 Ice+1.0 Temp
30	1.2 Dead+1.0 Wind 90 deg+1.0 Ice+1.0 Temp
31	1.2 Dead+1.0 Wind 120 deg+1.0 Ice+1.0 Temp
32	1.2 Dead+1.0 Wind 150 deg+1.0 Ice+1.0 Temp
33	1.2 Dead+1.0 Wind 180 deg+1.0 Ice+1.0 Temp
34	1.2 Dead+1.0 Wind 210 deg+1.0 Ice+1.0 Temp
35	1.2 Dead+1.0 Wind 240 deg+1.0 Ice+1.0 Temp
36	1.2 Dead+1.0 Wind 270 deg+1.0 Ice+1.0 Temp
37	1.2 Dead+1.0 Wind 300 deg+1.0 Ice+1.0 Temp
38	1.2 Dead+1.0 Wind 330 deg+1.0 Ice+1.0 Temp
39	Dead+Wind 0 deg - Service
40	Dead+Wind 30 deg - Service
41	Dead+Wind 60 deg - Service
42	Dead+Wind 90 deg - Service
43	Dead+Wind 120 deg - Service
44	Dead+Wind 150 deg - Service
45	Dead+Wind 180 deg - Service
46	Dead+Wind 210 deg - Service
47	Dead+Wind 240 deg - Service
48	Dead+Wind 270 deg - Service
49	Dead+Wind 300 deg - Service
50	Dead+Wind 330 deg - Service

Maximum Member Forces

Section No.	Elevation ft	Component Type	Condition	Gov. Load Comb.	Axial K	Major Axis Moment kip-ft	Minor Axis Moment kip-ft
L1	155 - 115.5	Pole	Max Tension	1	0.00	0	0
			Max. Compression	26	-40.84	4	-1
			Max. Mx	8	-12.89	-531	2
			Max. My	2	-12.90	-1	529
			Max. Vy	8	21.22	-531	2
			Max. Vx	2	-21.16	-1	529
			Max. Torque	4			-1
L2	115.5 - 79.25	Pole	Max Tension	1	0.00	0	0
			Max. Compression	26	-64.74	9	-3
			Max. Mx	20	-22.73	1516	10
			Max. My	2	-22.72	-2	1515
			Max. Vy	8	30.50	-1515	4
			Max. Vx	2	-30.56	-2	1515
			Max. Torque	12			-1
L3	79.25 - 43.75	Pole	Max Tension	1	0.00	0	0
			Max. Compression	26	-80.29	14	-6
			Max. Mx	20	-32.09	2634	16
			Max. My	2	-32.09	-3	2636
			Max. Vy	8	33.75	-2634	5
			Max. Vx	2	-33.81	-3	2636
			Max. Torque	12			-2
L4	43.75 - 0	Pole	Max Tension	1	0.00	0	0
			Max. Compression	26	-105.55	22	-10
			Max. Mx	20	-49.07	4379	23
			Max. My	2	-49.07	-5	4383
			Max. Vy	8	37.10	-4378	7
			Max. Vx	2	-37.15	-5	4383
			Max. Torque	12			-3

Maximum Reactions

Location	Condition	Gov. Load Comb.	Vertical K	Horizontal, X K	Horizontal, Z K
Pole	Max. Vert	26	105.55	-0.00	0.00
	Max. H_x	20	49.11	37.03	0.14
	Max. H_z	2	49.11	-0.03	37.09
	Max. M_x	2	4383	-0.03	37.09
	Max. M_z	8	4378	-37.03	0.05
	Max. Torsion	24	3	18.61	32.03
	Min. Vert	3	36.83	-0.03	37.09
	Min. H_x	8	49.11	-37.03	0.05
	Min. H_z	14	49.11	-0.11	-37.02
	Min. M_x	14	-4372	-0.11	-37.02
	Min. M_z	20	-4379	37.03	0.14
	Min. Torsion	12	-3	-18.50	-32.03

Tower Mast Reaction Summary

Load Combination	Vertical K	$Shear_x$ K	$Shear_z$ K	Overturning Moment, M_x kip-ft	Overturning Moment, M_z kip-ft	Torque kip-ft
Dead Only	40.93	-0.00	0.00	0	1	0
1.2 Dead+1.6 Wind 0 deg - No Ice	49.11	0.03	-37.09	-4383	-5	-2
0.9 Dead+1.6 Wind 0 deg - No Ice	36.83	0.03	-37.09	-4308	-5	-2
1.2 Dead+1.6 Wind 30 deg - No Ice	49.11	18.66	-32.01	-3778	-2212	-1
0.9 Dead+1.6 Wind 30 deg - No Ice	36.84	18.66	-32.01	-3713	-2174	-1
1.2 Dead+1.6 Wind 60 deg - No Ice	49.11	32.14	-18.46	-2177	-3803	0
0.9 Dead+1.6 Wind 60 deg - No Ice	36.84	32.14	-18.46	-2140	-3738	0
1.2 Dead+1.6 Wind 90 deg - No Ice	49.11	37.03	-0.05	-7	-4378	1
0.9 Dead+1.6 Wind 90 deg - No Ice	36.83	37.03	-0.05	-7	-4303	1
1.2 Dead+1.6 Wind 120 deg - No Ice	49.11	32.18	18.43	2174	-3810	2
0.9 Dead+1.6 Wind 120 deg - No Ice	36.84	32.18	18.43	2136	-3745	2
1.2 Dead+1.6 Wind 150 deg - No Ice	49.11	18.50	32.03	3781	-2187	3
0.9 Dead+1.6 Wind 150 deg - No Ice	36.84	18.50	32.03	3716	-2150	3
1.2 Dead+1.6 Wind 180 deg - No Ice	49.11	0.11	37.02	4372	-18	2
0.9 Dead+1.6 Wind 180 deg - No Ice	36.83	0.11	37.02	4297	-17	2
1.2 Dead+1.6 Wind 210 deg - No Ice	49.11	-18.38	32.10	3793	2167	1
0.9 Dead+1.6 Wind 210 deg - No Ice	36.84	-18.38	32.10	3728	2130	1
1.2 Dead+1.6 Wind 240 deg - No Ice	49.11	-32.10	18.42	2172	3797	0
0.9 Dead+1.6 Wind 240 deg - No Ice	36.84	-32.10	18.42	2135	3732	0
1.2 Dead+1.6 Wind 270 deg - No Ice	49.11	-37.03	-0.14	-23	4379	-1
0.9 Dead+1.6 Wind 270 deg - No Ice	36.83	-37.03	-0.14	-22	4304	-1
1.2 Dead+1.6 Wind 300 deg - No Ice	49.11	-32.09	-18.56	-2193	3796	-2
0.9 Dead+1.6 Wind 300 deg	36.84	-32.09	-18.56	-2156	3730	-2

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
- No Ice 1.2 Dead+1.6 Wind 330 deg	49.11	-18.61	-32.03	-3782	2205	-3
- No Ice 0.9 Dead+1.6 Wind 330 deg	36.84	-18.61	-32.03	-3717	2167	-3
- No Ice 1.2 Dead+1.0 Ice+1.0 Temp	105.55	0.00	-0.00	10	22	0
1.2 Dead+1.0 Wind 0 deg+1.0 Ice+1.0 Temp	105.55	0.01	-12.62	-1625	20	-2
1.2 Dead+1.0 Wind 30 deg+1.0 Ice+1.0 Temp	105.55	6.34	-10.91	-1401	-801	-1
1.2 Dead+1.0 Wind 60 deg+1.0 Ice+1.0 Temp	105.55	10.93	-6.29	-804	-1396	0
1.2 Dead+1.0 Wind 90 deg+1.0 Ice+1.0 Temp	105.55	12.61	-0.01	8	-1611	1
1.2 Dead+1.0 Wind 120 deg+1.0 Ice+1.0 Temp	105.55	10.94	6.29	824	-1397	2
1.2 Dead+1.0 Wind 150 deg+1.0 Ice+1.0 Temp	105.55	6.30	10.91	1423	-794	2
1.2 Dead+1.0 Wind 180 deg+1.0 Ice+1.0 Temp	105.55	0.02	12.61	1642	18	2
1.2 Dead+1.0 Wind 210 deg+1.0 Ice+1.0 Temp	105.55	-6.27	10.93	1426	833	1
1.2 Dead+1.0 Wind 240 deg+1.0 Ice+1.0 Temp	105.55	-10.92	6.29	824	1437	0
1.2 Dead+1.0 Wind 270 deg+1.0 Ice+1.0 Temp	105.55	-12.60	-0.03	5	1654	-1
1.2 Dead+1.0 Wind 300 deg+1.0 Ice+1.0 Temp	105.55	-10.92	-6.31	-807	1437	-2
1.2 Dead+1.0 Wind 330 deg+1.0 Ice+1.0 Temp	105.55	-6.32	-10.91	-1402	842	-2
Dead+Wind 0 deg - Service	40.93	0.01	-7.93	-930	-1	0
Dead+Wind 30 deg - Service	40.93	3.99	-6.85	-802	-469	0
Dead+Wind 60 deg - Service	40.93	6.88	-3.95	-462	-807	0
Dead+Wind 90 deg - Service	40.93	7.92	-0.01	-1	-929	0
Dead+Wind 120 deg - Service	40.93	6.89	3.94	462	-808	0
Dead+Wind 150 deg - Service	40.93	3.96	6.85	803	-464	0
Dead+Wind 180 deg - Service	40.93	0.02	7.92	928	-3	0
Dead+Wind 210 deg - Service	40.93	-3.93	6.87	805	461	0
Dead+Wind 240 deg - Service	40.93	-6.87	3.94	461	807	0
Dead+Wind 270 deg - Service	40.93	-7.92	-0.03	-5	930	0
Dead+Wind 300 deg - Service	40.93	-6.86	-3.97	-466	806	0
Dead+Wind 330 deg - Service	40.93	-3.98	-6.85	-803	469	0

Solution Summary

	Sum of Applied Forces			Sum of Reactions			
Load Comb.	PX	PY	PZ	PX	PY	PZ	% Error
	K	K	K	K	K	K	
1	0.00	-40.93	0.00	0.00	40.93	0.00	0.000%
2	0.03	-49.11	-37.09	-0.03	49.11	37.09	0.005%
3	0.03	-36.84	-37.09	-0.03	36.83	37.09	0.009%
4	18.66	-49.11	-32.01	-18.66	49.11	32.01	0.000%
5	18.66	-36.84	-32.01	-18.66	36.84	32.01	0.000%
6	32.14	-49.11	-18.46	-32.14	49.11	18.46	0.000%
7	32.14	-36.84	-18.46	-32.14	36.84	18.46	0.000%
8	37.04	-49.11	-0.05	-37.03	49.11	0.05	0.005%
9	37.04	-36.84	-0.05	-37.03	36.83	0.05	0.009%
10	32.18	-49.11	18.43	-32.18	49.11	-18.43	0.000%

Load Comb.	Sum of Applied Forces PX K	PY K	PZ K	Sum of Reactions PX K	PY K	PZ K	% Error
11	32.18	-36.84	18.43	-32.18	36.84	-18.43	0.000%
12	18.50	-49.11	32.03	-18.50	49.11	-32.03	0.000%
13	18.50	-36.84	32.03	-18.50	36.84	-32.03	0.000%
14	0.11	-49.11	37.02	-0.11	49.11	-37.02	0.005%
15	0.11	-36.84	37.02	-0.11	36.83	-37.02	0.009%
16	-18.38	-49.11	32.10	18.38	49.11	-32.10	0.000%
17	-18.38	-36.84	32.10	18.38	36.84	-32.10	0.000%
18	-32.10	-49.11	18.42	32.10	49.11	-18.42	0.000%
19	-32.10	-36.84	18.42	32.10	36.84	-18.42	0.000%
20	-37.03	-49.11	-0.14	37.03	49.11	0.14	0.005%
21	-37.03	-36.84	-0.14	37.03	36.83	0.14	0.009%
22	-32.09	-49.11	-18.56	32.09	49.11	18.56	0.000%
23	-32.09	-36.84	-18.56	32.09	36.84	18.56	0.000%
24	-18.61	-49.11	-32.03	18.61	49.11	32.03	0.000%
25	-18.61	-36.84	-32.03	18.61	36.84	32.03	0.000%
26	0.00	-105.55	0.00	-0.00	105.55	0.00	0.000%
27	0.01	-105.55	-12.63	-0.01	105.55	12.62	0.002%
28	6.34	-105.55	-10.91	-6.34	105.55	10.91	0.001%
29	10.93	-105.55	-6.29	-10.93	105.55	6.29	0.001%
30	12.61	-105.55	-0.01	-12.61	105.55	0.01	0.002%
31	10.94	-105.55	6.29	-10.94	105.55	-6.29	0.001%
32	6.30	-105.55	10.91	-6.30	105.55	-10.91	0.001%
33	0.02	-105.55	12.61	-0.02	105.55	-12.61	0.002%
34	-6.27	-105.55	10.93	6.27	105.55	-10.93	0.001%
35	-10.92	-105.55	6.29	10.92	105.55	-6.29	0.001%
36	-12.61	-105.55	-0.03	12.60	105.55	0.03	0.002%
37	-10.92	-105.55	-6.31	10.92	105.55	6.31	0.001%
38	-6.32	-105.55	-10.91	6.32	105.55	10.91	0.001%
39	0.01	-40.93	-7.94	-0.01	40.93	7.93	0.003%
40	3.99	-40.93	-6.85	-3.99	40.93	6.85	0.003%
41	6.88	-40.93	-3.95	-6.88	40.93	3.95	0.003%
42	7.92	-40.93	-0.01	-7.92	40.93	0.01	0.003%
43	6.89	-40.93	3.94	-6.89	40.93	-3.94	0.003%
44	3.96	-40.93	6.85	-3.96	40.93	-6.85	0.003%
45	0.02	-40.93	7.92	-0.02	40.93	-7.92	0.003%
46	-3.93	-40.93	6.87	3.93	40.93	-6.87	0.003%
47	-6.87	-40.93	3.94	6.87	40.93	-3.94	0.003%
48	-7.92	-40.93	-0.03	7.92	40.93	0.03	0.003%
49	-6.87	-40.93	-3.97	6.86	40.93	3.97	0.003%
50	-3.98	-40.93	-6.85	3.98	40.93	6.85	0.003%

Non-Linear Convergence Results

Load Combination	Converged?	Number of Cycles	Displacement Tolerance	Force Tolerance
1	Yes	6	0.00000001	0.00000001
2	Yes	16	0.00005620	0.00008722
3	Yes	15	0.00007707	0.00014291
4	Yes	21	0.00000001	0.00010148
5	Yes	20	0.00000001	0.00014353
6	Yes	21	0.00000001	0.00010069
7	Yes	20	0.00000001	0.00014242
8	Yes	16	0.00005620	0.00007039
9	Yes	15	0.00007706	0.00011846
10	Yes	21	0.00000001	0.00010157
11	Yes	20	0.00000001	0.00014369
12	Yes	21	0.00000001	0.00009940
13	Yes	20	0.00000001	0.00014058
14	Yes	16	0.00005626	0.00007425
15	Yes	15	0.00007714	0.00012447
16	Yes	21	0.00000001	0.00010008
17	Yes	20	0.00000001	0.00014162
18	Yes	21	0.00000001	0.00010030
19	Yes	20	0.00000001	0.00014186
20	Yes	16	0.00005620	0.00007249

21	Yes	15	0.00007706	0.00012038
22	Yes	21	0.00000001	0.00010047
23	Yes	20	0.00000001	0.00014203
24	Yes	21	0.00000001	0.00010216
25	Yes	20	0.00000001	0.00014456
26	Yes	14	0.00000001	0.00001596
27	Yes	18	0.00013652	0.00011787
28	Yes	20	0.00000001	0.00010453
29	Yes	20	0.00000001	0.00010550
30	Yes	18	0.00013656	0.00011388
31	Yes	20	0.00000001	0.00010996
32	Yes	20	0.00000001	0.00010405
33	Yes	18	0.00013646	0.00011884
34	Yes	20	0.00003774	0.00011390
35	Yes	20	0.00003774	0.00011246
36	Yes	18	0.00013644	0.00011720
37	Yes	20	0.00003775	0.00010859
38	Yes	20	0.00003775	0.00011409
39	Yes	15	0.00010418	0.00004426
40	Yes	15	0.00010394	0.00012495
41	Yes	15	0.00010396	0.00011966
42	Yes	15	0.00010420	0.00004431
43	Yes	15	0.00010396	0.00011796
44	Yes	15	0.00010394	0.00012071
45	Yes	15	0.00010417	0.00004415
46	Yes	15	0.00010394	0.00011636
47	Yes	15	0.00010395	0.00011941
48	Yes	15	0.00010419	0.00004411
49	Yes	15	0.00010395	0.00012254
50	Yes	15	0.00010394	0.00011862

Maximum Tower Deflections - Service Wind

Section No.	*Elevation*	*Horz. Deflection*	*Gov. Load*	*Tilt*	*Twist*
	ft	*in*	*Comb.*	*°*	*°*
L1	155 - 115.5	35.58	49	1.973	0.003
L2	119.25 - 79.25	21.41	49	1.724	0.001
L3	83.75 - 43.75	10.35	49	1.195	0.000
L4	49 - 0	3.49	49	0.660	0.000

Critical Deflections and Radius of Curvature - Service Wind

Elevation	*Appurtenance*	*Gov. Load*	*Deflection*	*Tilt*	*Twist*	*Radius of Curvature*
ft		*Comb.*	*in*	*°*	*°*	*ft*
155.00	LPX310R w/ Mount Pipe	49	35.58	1.973	0.003	30961
153.00	800MHz 2X50W RRH W/FILTER	49	34.75	1.964	0.002	30961
151.00	VHLP1-23	49	33.93	1.954	0.002	30961
145.00	RRUS 11	49	31.46	1.923	0.002	15480
143.00	800 10121	49	30.65	1.912	0.002	12900
133.00	ERICSSON AIR 21 B2A B4P w/ Mount Pipe	49	26.63	1.848	0.001	7036
113.00	BXA-70063/6CFx2 w/ Mount Pipe	49	19.19	1.648	0.001	4212

Maximum Tower Deflections - Design Wind

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
L1	155 - 115.5	167.18	2	9.310	0.009
L2	119.25 - 79.25	100.72	2	8.135	0.007
L3	83.75 - 43.75	48.76	10	5.637	0.005
L4	49 - 0	16.44	10	3.111	0.003

Critical Deflections and Radius of Curvature - Design Wind

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
155.00	LPX310R w/ Mount Pipe	2	167.18	9.310	0.010	6895
153.00	800MHz 2X50W RRH W/FILTER	2	163.31	9.263	0.009	6895
151.00	VHLP1-23	2	159.44	9.217	0.009	6895
145.00	RRUS 11	2	147.88	9.071	0.009	3445
143.00	800 10121	2	144.05	9.019	0.009	2870
133.00	ERICSSON AIR 21 B2A B4P w/ Mount Pipe	2	125.23	8.720	0.008	1562
113.00	BXA-70063/6CFx2 w/ Mount Pipe	10	90.32	7.777	0.007	927

Compression Checks

Pole Design Data

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	A in^2	P_u K	ϕP_n K	Ratio $\frac{P_u}{\phi P_n}$
L1	155 - 115.5 (1)	TP29.31x22x0.25	39.50	0.00	0.0	22.51	-12.88	1507.55	0.009
L2	115.5 - 79.25 (2)	TP35.51x28.11x0.31	40.00	0.00	0.0	34.09	-22.72	2469.71	0.009
L3	79.25 - 43.75 (3)	TP41.46x34.06x0.38	40.00	0.00	0.0	47.74	-32.09	3485.55	0.009
L4	43.75 - 0 (4)	TP48.8x39.73x0.44	49.00	0.00	0.0	67.16	-49.07	4858.33	0.010

Pole Bending Design Data

Section No.	Elevation ft	Size	M_{ux} kip-ft	ϕM_{nx} kip-ft	Ratio $\frac{M_{ux}}{\phi M_{nx}}$	M_{uy} kip-ft	ϕM_{ny} kip-ft	Ratio $\frac{M_{uy}}{\phi M_{ny}}$
L1	155 - 115.5 (1)	TP29.31x22x0.25	532	878	0.605	0	878	0.000
L2	115.5 - 79.25 (2)	TP35.51x28.11x0.31	1518	1743	0.871	0	1743	0.000
L3	79.25 - 43.75 (3)	TP41.46x34.06x0.38	2639	2871	0.919	0	2871	0.000
L4	43.75 - 0 (4)	TP48.8x39.73x0.44	4386	4826	0.909	0	4826	0.000

Pole Shear Design Data

Section No.	Elevation ft	Size	Actual V_u K	ϕV_n K	Ratio $\frac{V_u}{\phi V_n}$	Actual T_u kip-ft	ϕT_n kip-ft	Ratio $\frac{T_u}{\phi T_n}$
L1	155 - 115.5 (1)	TP29.31x22x0.25	21.25	753.77	0.028	0	1759	0.000
L2	115.5 - 79.25 (2)	TP35.51x28.11x0.31	30.56	1234.85	0.025	1	3491	0.000
L3	79.25 - 43.75 (3)	TP41.46x34.06x0.38	33.81	1742.77	0.019	1	5748	0.000
L4	43.75 - 0 (4)	TP48.8x39.73x0.44	37.15	2429.16	0.015	2	9664	0.000

Pole Interaction Design Data

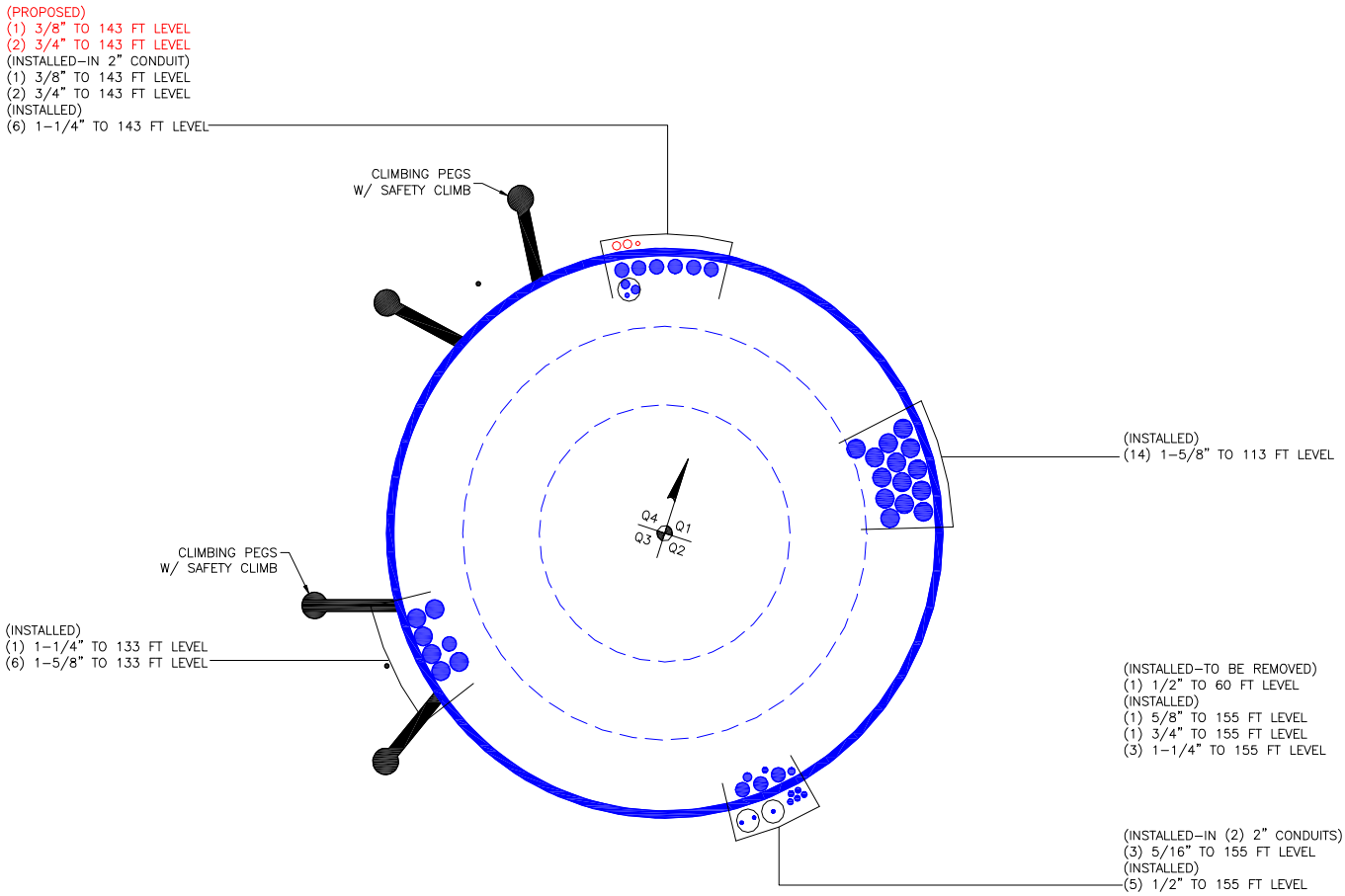
Section No.	Elevation ft	Ratio $\frac{P_u}{\phi P_n}$	Ratio $\frac{M_{ux}}{\phi M_{nx}}$	Ratio $\frac{M_{uy}}{\phi M_{ny}}$	Ratio $\frac{V_u}{\phi V_n}$	Ratio $\frac{T_u}{\phi T_n}$	Comb. Stress Ratio	Allow. Stress Ratio	Criteria
L1	155 - 115.5 (1)	0.009	0.605	0.000	0.028	0.000	0.614 ✔	1.000	4.8.2 ✔
L2	115.5 - 79.25 (2)	0.009	0.871	0.000	0.025	0.000	0.881 ✔	1.000	4.8.2 ✔
L3	79.25 - 43.75 (3)	0.009	0.919	0.000	0.019	0.000	0.929 ✔	1.000	4.8.2 ✔
L4	43.75 - 0 (4)	0.010	0.909	0.000	0.015	0.000	0.919 ✔	1.000	4.8.2 ✔

Section Capacity Table

Section No.	Elevation ft	Component Type	Size	Critical Element	P K	ϕP_{allow} K	% Capacity	Pass Fail
L1	155 - 115.5	Pole	TP29.31x22x0.25	1	-12.88	1507.55	61.4	Pass
L2	115.5 - 79.25	Pole	TP35.51x28.11x0.31	2	-22.72	2469.71	88.1	Pass
L3	79.25 - 43.75	Pole	TP41.46x34.06x0.38	3	-32.09	3485.55	92.9	Pass
L4	43.75 - 0	Pole	TP48.8x39.73x0.44	4	-49.07	4858.33	91.9	Pass
							Summary	
						Pole (L3)	92.9	Pass
						RATING =	**92.9**	**Pass**

APPENDIX B

BASE LEVEL DRAWING

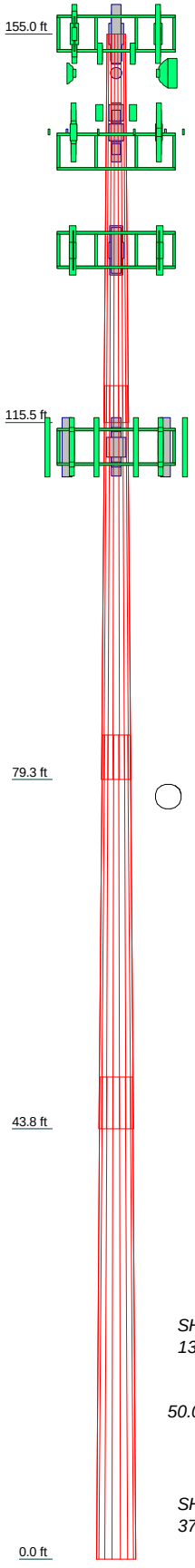

(PROPOSED)
(1) 3/8" TO 143 FT LEVEL
(2) 3/4" TO 143 FT LEVEL
(INSTALLED–IN 2" CONDUIT)
(1) 3/8" TO 143 FT LEVEL
(2) 3/4" TO 143 FT LEVEL
(INSTALLED)
(6) 1–1/4" TO 143 FT LEVEL
CLIMBING PEGS
W/ SAFETY CLIMB
(INSTALLED)
(14) 1–5/8" TO 113 FT LEVEL
Q4
Q1
Q3
Q2
CLIMBING PEGS
W/ SAFETY CLIMB
(INSTALLED)
(1) 1–1/4" TO 133 FT LEVEL
(6) 1–5/8" TO 133 FT LEVEL
(INSTALLED–TO BE REMOVED)
(1) 1/2" TO 60 FT LEVEL
(INSTALLED)
(1) 5/8" TO 155 FT LEVEL
(1) 3/4" TO 155 FT LEVEL
(3) 1–1/4" TO 155 FT LEVEL
(INSTALLED–IN (2) 2" CONDUITS)
(3) 5/16" TO 155 FT LEVEL
(INSTALLED)
(5) 1/2" TO 155 FT LEVEL

APPENDIX C

ADDITIONAL CALCULATIONS

Section	1	2	3	4
Length (ft)	39.50	40.00	40.00	49.00
Number of Sides	18	18	18	18
Thickness (in)	0.25	0.31	0.38	0.44
Socket Length (ft)	3.75	4.50	5.25	
Top Dia (in)	22.00	28.11	34.06	39.73
Bot Dia (in)	29.31	35.51	41.46	48.80
Grade	A607-60		A607-65	
Weight (K)	2.7	4.3	6.1	10.1

Total Weight (K) 23.2



ALL REACTIONS ARE FACTORED

AXIAL 106 K

SHEAR 13 K

MOMENT 1657 k-ft

TORQUE 2 kip-ft
50.0 mph WIND - 1.00 in ICE

AXIAL 49 K

SHEAR 37 K

MOMENT 4386 kip-ft

TORQUE 3 kip-ft
REACTIONS - 97.0 mph WIND

DESIGNED APPURTENANCE LOADING

TYPE	ELEVATION	TYPE	ELEVATION
LPX310R w/ Mount Pipe	155	RRUS 32 B30	143
LPX310R w/ Mount Pipe	155	RRUS 32 B2	143
LPX310R w/ Mount Pipe	155	RRUS 32 B2	143
HORIZON COMPACT	155	RRUS 32 B2	143
HORIZON COMPACT	155	RRUS 11	143
HORIZON COMPACT	155	RRUS 11	143
WIMAX DAP HEAD	155	RRUS 11	143
WIMAX DAP HEAD	155	DC6-48-60-18-8F	143
WIMAX DAP HEAD	155	Platform Mount [LP 1301-1]	143
APXVSPP18-C-A20 w/ Mount Pipe	155	800 10121	143
APXVSPP18-C-A20 w/ Mount Pipe	155	800 10121	143
APXVSPP18-C-A20 w/ Mount Pipe	155	800 10121	143
APXVTM14-C-120 w/ Mount Pipe	155	KRC 118 057/1 w/ Mount Pipe	133
APXVTM14-C-120 w/ Mount Pipe	155	KRC 118 057/1 w/ Mount Pipe	133
APXVTM14-C-120 w/ Mount Pipe	155	KRC 118 057/1 w/ Mount Pipe	133
TD-RRH8x20-25	155	KRY 112 144/1	133
TD-RRH8x20-25	155	KRY 112 144/1	133
TD-RRH8x20-25	155	KRY 112 144/1	133
Miscellaneous [NA 510-1]	155	RRUS 11 B12	133
Platform Mount [LP 1201-1]	155	RRUS 11 B12	133
VHLP1-23	155	RRUS 11 B12	133
VHLP2.5-18	155	(2) 2.375" OD x 4' Mount Pipe	133
VHLP2-11	155	(2) 2.375" OD x 4' Mount Pipe	133
PCS 1900MHz 4x45W-65MHz	153	(2) 2.375" OD x 4' Mount Pipe	133
PCS 1900MHz 4x45W-65MHz	153	Platform Mount [LP 403-1]	133
PCS 1900MHz 4x45W-65MHz	153	ERICSSON AIR 21 B2A B4P w/ Mount Pipe	133
Pipe Mount [PM 601-3]	153	ERICSSON AIR 21 B2A B4P w/ Mount Pipe	133
800MHz 2X50W RRH W/FILTER	153	ERICSSON AIR 21 B2A B4P w/ Mount Pipe	133
800MHz 2X50W RRH W/FILTER	153	LNX-6512DS-T0M w/ Mount Pipe	113
800MHz 2X50W RRH W/FILTER	153	LNX-6512DS-T0M w/ Mount Pipe	113
Pipe Mount [PM 601-3]	145	LNX-6512DS-T0M w/ Mount Pipe	113
RRUS 11	145	(2) SBNHH-1D65B w/ Mount Pipe	113
RRUS 11	145	(2) SBNHH-1D65B w/ Mount Pipe	113
RRUS 11	145	(2) SBNHH-1D65B w/ Mount Pipe	113
(2) 860 10025	143	RRH2X60-AWS	113
(2) 860 10025	143	RRH2X60-AWS	113
(2) 860 10025	143	RRH2X60-AWS	113
RRUS 11	143	RRH2x60-700	113
RRUS 11	143	RRH2x60-700	113
RRUS 11	143	RRH2x60-700	113
DC6-48-60-18-8F	143	DB-T1-6Z-8AB-0Z	113
QS66512-2	143	Platform Mount [LP 1201-1]	113
QS66512-2	143	BXA-70063/6CFx2 w/ Mount Pipe	113
QS66512-2	143	BXA-70063/6CFx2 w/ Mount Pipe	113
DTMABP7819VG12A	143	BXA-70063/6CFx2 w/ Mount Pipe	113
DTMABP7819VG12A	143		
DTMABP7819VG12A	143		
RRUS 32 B30	143		
RRUS 32 B30	143		

MATERIAL STRENGTH

GRADE	Fy	Fu	GRADE	Fy	Fu
A607-60	60 ksi	75 ksi	A607-65	65 ksi	80 ksi

TOWER DESIGN NOTES

1. Tower is located in Hartford County, Connecticut.
2. Tower designed for Exposure C to the TIA-222-G Standard.
3. Tower designed for a 97.0 mph basic wind in accordance with the TIA-222-G Standard.
4. Tower is also designed for a 50.0 mph basic wind with 1.00 in ice. Ice is considered to increase in thickness with height.
5. Deflections are based upon a 60.0 mph wind.
6. Tower Structure Class II.
7. Topographic Category 1 with Crest Height of 0.00 ft
8. TOWER RATING: 92.9%

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

Job:	***155 ft Monopole / Buckland Mall***		
Project:	***PJF 37517-1326 / BU 876347***		
Client: Crown Castle	Drawn by: Joey Meinerding		App'd:
Code: TIA-222-G	Date: 03/13/17		Scale: NTS
Path: G:\TOWER\375_Crown_Castle\2017\37517-1326_876347_Buckland Mall\37517-1326.001.7805_SA_1259944\37517-1326.001.7805.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#: *876347*
Site Name: *Buckland Mall*
App #:

Anchor Rod Data		
Eta Factor, η	0.5	TIA G (Fig. 4-4)
Qty:	16	
Diam:	2.25	in
Rod Material:	A615-J	
Yield, Fy:	75	ksi
Strength, Fu:	100	ksi
Bolt Circle:	56	in
Anchor Spacing:	6	in

Plate Data		
W=Side:	55	in
Thick:	3.25	in
Grade:	50	ksi
Clip Distance:	10	in

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

Pole Data		
Diam:	48.8	in
Thick:	0.4375	in
Grade:	65	ksi
# of Sides:	18	"0" IF Round

Base Reactions		
TIA Revision:	G	
Factored Moment, Mu:	4386	ft-kips
Factored Axial, Pu:	49	kips
Factored Shear, Vu:	37	kips

Anchor Rod Results

TIA G --> Max Rod (Cu+ Vu/η):	242.7	Kips
Axial Design Strength, Φ*Fu*Anet:	260.0	Kips
Anchor Rod Stress Ratio:	93.3%	**Pass**

Base Plate Results	Flexural Check	
Base Plate Stress:	34.0	ksi
PL Design Bending Strength, Φ*Fy:	45.0	ksi
Base Plate Stress Ratio:	75.6%	**Pass**

PL Ref. Data
Yield Line (in): 28.98
Max PL Length: 28.98

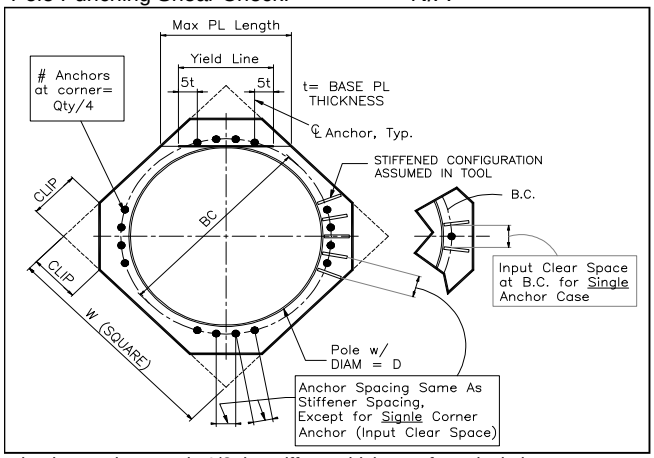
N/A - Unstiffened

Stiffener Results

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

Pole Results

Pole Punching Shear Check: N/A



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

PJF Job No. **37517-1326.001.7805** Project Name: **Buckland Mall** Engineer: JWM

Factored Foundation Loads:

	LC1	LC2	
Factored Axial Load (+Comp, -Ten) =	**49**	**36.75**	kips
Factored Horiz. Load at Top of Pier =	**37**	**37**	kips
Factored OTM at Top of Pier =	**4386**	**4386**	kips

LRFD Resistance and Load Factors:

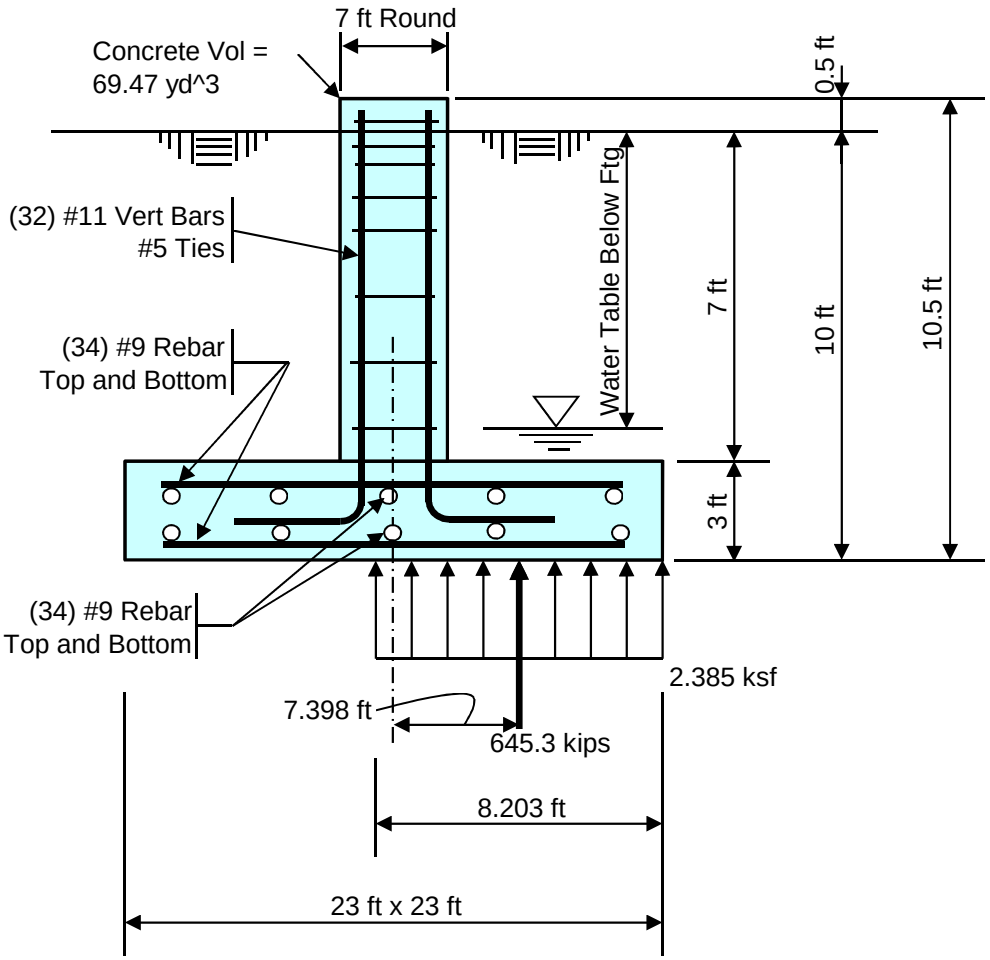
	Φ	Dead Load Factors	
Soil Bearing =	**0.75**		
Soil Weight =	**0.75**	1.2	0.9
Concrete Weight =	**0.75**	1.2	0.9

Soil Properties:

Depth to Water Table = **99** ft

Uplift Cone from **Top** of footing

Layer Thk ft	Soil Density pcf	Cohesion ksf	Friction Angle degrees	Ult Bearing ksf	Depth ft
10	**115**	**0**	**30**	**30**	**10.00**



Dimensions:

Pier Shape =	**Round**	
Pier Width =	**7**	ft Diameter
Pier Height above Grade =	**0.5**	ft
Depth to Bottom of Footing =	**10**	ft
Footing Thickness =	**3**	ft
Footing Width, B =	**23**	ft
Footing Length, L =	**23**	ft

Concrete:

Concrete Strength =	**3**	ksi
Rebar Strength =	**60**	ksi

Total Pad Reinf Stl =	**68.00**	in^2 >= 17.88 in^2 = Min Stl, OK
Total Pier Reinf Stl =	**49.92**	in^2 >= 27.71 in^2 = Min Stl, OK
Footing Thickness =	**3.00**	ft >= 2.05 ft = Min Ftg Thk, OK

Summary Results:

	Required		Available		
Maximum Net Soil Bearing =	**2.615**	ksf	**22.500**	ksf	Stress Ratio = **11.6%** in Soil Bearing
Uplift =	**0.0**	kips	**632.5**	kips	Stress Ratio = **0.0%** in Uplift
Punching Shear Stress =	**0.054**	ksi	**0.164**	ksi	Stress Ratio = **32.9%** in Punching Shear
Bending Shear Stress =	**301.6**	kips	**709.9**	kips	Stress Ratio = **42.5%** in Bending Shear
Bending Moment =	**1797.8**	k-ft	**4568.4**	k-ft	Stress Ratio = **39.4%** in Bending Moment
Conc Pier Reinforcing Steel =	**4663.5**	k-ft	**8294.8**	k-ft	Stress Ratio = **56.2%** in Pier Rebar

SITESAFE
RF COMPLIANCE EXPERTS
A BUSINESS OF FDH VELOCITEL

200 North Glebe Road, Suite 1000, Arlington, VA 22203-3728
703.276.1100 ● 703.276.1169 fax
info@sitesafe.com ● www.sitesafe.com

SmartLink, LLC on behalf of AT&T Mobility, LLC
Site FA – 10071100
Site ID – CT5307 (4C-MC)
Site Name – Manchester North
Site Compliance Report

53-73 Slater Street
Manchester, CT 06040

Latitude: N41-48-17.96
Longitude: W72-32-00.92
Structure Type: Monopole

Report generated date: April 7, 2017
Report by: Michelle Stone
Customer Contact: Kristen Smith

AT&T Mobility, LLC will be compliant when the remediation recommended in Section 5.2 or other appropriate remediation is implemented.

Table of Contents

1 General Site Summary

1.1 Report Summary

AT&T Mobility, LLC	Summary
Access to Antennas Locked?	Unknown
RF Sign(s) @ access point(s)	None
RF Sign(s) @ antennas	None
Barrier(s) @ sectors	None
Max cumulative simulated Radio Frequency Exposure (RFE) level on Ground	<1% of General Public limit
FCC & AT&T Compliant?	Will Be Compliant

Note: Data regarding all other carriers on site was unavailable and not included in the report.

The following documents were provided by the client and were utilized to create this report:

RFDS: NEW-ENGLAND_CONNECTICUT_CTV5307_2016-LTE-Next-Carrier_LTE-3C_om636a_2051A02J05_10071100_25942_06-25-2015_As-Built-In-Progress_v4.00

CD's: 10071100_AE201_170324_CTL05307_Rev1_CD_4C-MC

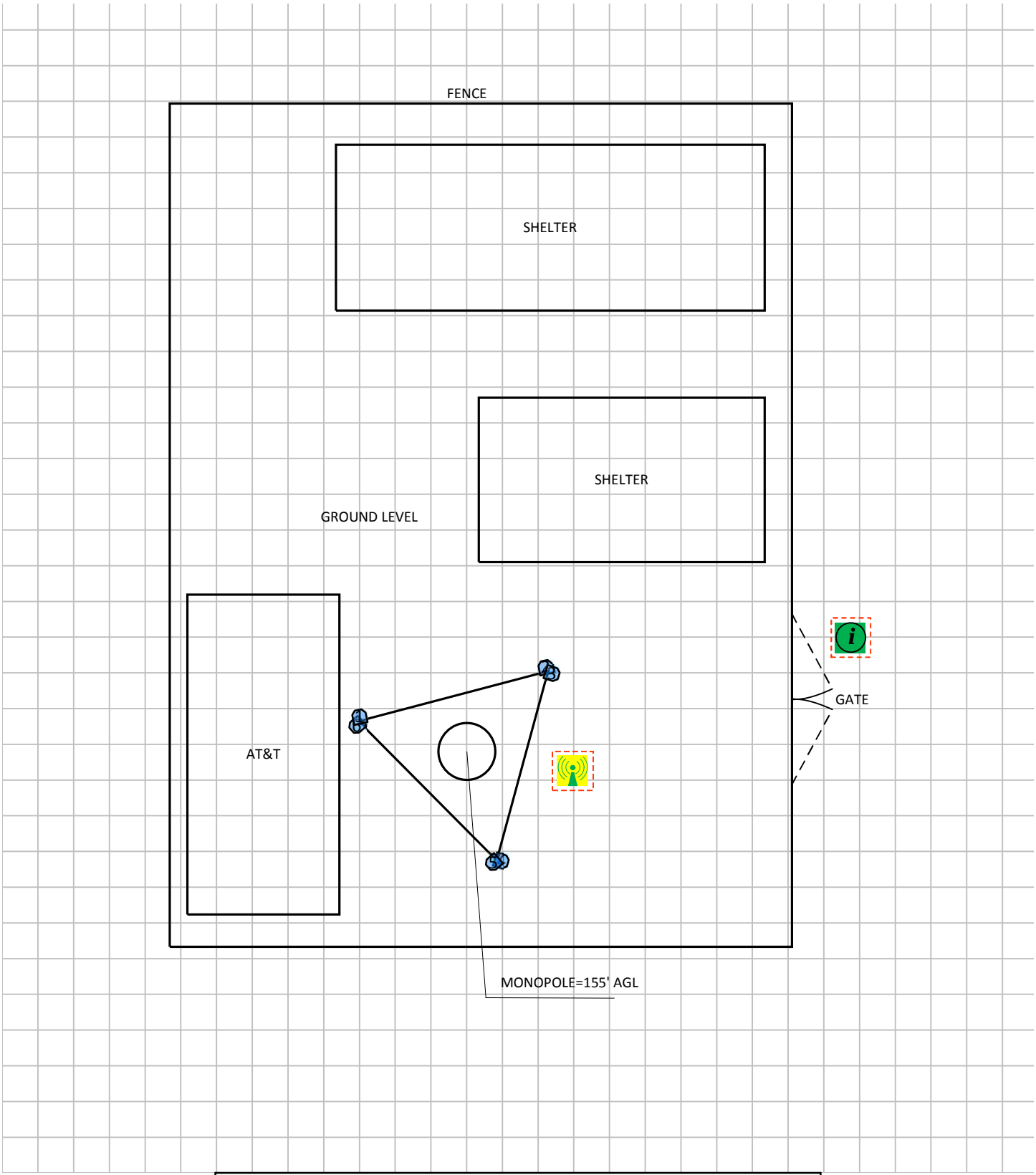
RF Powers Used: AT&T MOBILITY LLC (Proposed)

2 Scale Maps of Site

The following diagrams are included:

- Site Scale Map
- RF Exposure Diagram
- Elevation View

Site Scale Map For: Manchester North



Carrier Identification

AT&T MOBILITY LLC | VERIZON WIRELESS | T-MOBILE | SPRINT | UNKNOWN CARRIER

Sign Legend

Caution 1 | Caution 2 | Notice 2 | Notice 1 | Warning | Info 1 | Info 2

Barrier

Proposed Barriers/ Signs

(Feet)

0 4.8 9.6

www.sitesafe.com
Site Name:Manchester North
4/7/2017 9:22:19 AM

3 Antenna Inventory

The following antenna inventory on this and the following page, were obtained by the customer and were utilized to create the site model diagrams:

Ant ID	Operator	Antenna Make & Model	Type	TX Freq (MHz)	Az (Deg)	Hor BW (Deg)	Ant Len (ft)	Ant Gain (dBd)	2G GSM Radio(s)	3G UMTS Radio(s)	4G Radio(s)	Total ERP (Watts)	X	Y	Z AGL
1	AT&T MOBILITY LLC	Kathrein-Scala 800-10121	Panel	850	50	87.6	4.5	11.35	0	1	0	1091.7	25.2'	30.2'	142.7'
1	AT&T MOBILITY LLC	Kathrein-Scala 800-10121	Panel	1900	50	85.7	4.5	14.32	0	1	0	2163.2	25.2'	30.2'	142.7'
2	AT&T MOBILITY LLC (Proposed)	Quintel QS66512-2	Panel	850	50	63	6	10.96	0	0	1	748.4	38.2'	33.6'	142'
2	AT&T MOBILITY LLC (Proposed)	Quintel QS66512-2	Panel	737	50	69	6	11.46	0	0	1	839.8	38.2'	33.6'	142'
2	AT&T MOBILITY LLC (Proposed)	Quintel QS66512-2	Panel	1900	50	68	6	14.16	0	0	1	1563.7	38.2'	33.6'	142'
2	AT&T MOBILITY LLC (Proposed)	Quintel QS66512-2	Panel	2300	50	64	6	14.56	0	0	1	1714.6	38.2'	33.6'	142'
3	AT&T MOBILITY LLC	Kathrein-Scala 800-10121	Panel	850	170	87.6	4.5	11.35	0	1	0	1091.7	38.6'	33.2'	142.7'
3	AT&T MOBILITY LLC	Kathrein-Scala 800-10121	Panel	1900	170	85.7	4.5	14.32	0	1	0	2163.2	38.6'	33.2'	142.7'
4	AT&T MOBILITY LLC (Proposed)	Quintel QS66512-2	Panel	850	170	63	6	10.96	0	0	1	748.4	35.1'	20.1'	142'
4	AT&T MOBILITY LLC (Proposed)	Quintel QS66512-2	Panel	737	170	69	6	11.46	0	0	1	839.8	35.1'	20.1'	142'
4	AT&T MOBILITY LLC (Proposed)	Quintel QS66512-2	Panel	1900	170	68	6	14.16	0	0	1	1563.7	35.1'	20.1'	142'
4	AT&T MOBILITY LLC (Proposed)	Quintel QS66512-2	Panel	2300	170	64	6	14.56	0	0	1	1714.6	35.1'	20.1'	142'
5	AT&T MOBILITY LLC	Kathrein-Scala 800-10121	Panel	850	290	87.6	4.5	11.35	0	1	0	1091.7	34.5'	19.9'	142.7'
5	AT&T MOBILITY LLC	Kathrein-Scala 800-10121	Panel	1900	290	85.7	4.5	14.32	0	1	0	2163.2	34.5'	19.9'	142.7'
6	AT&T MOBILITY LLC (Proposed)	Quintel QS66512-2	Panel	850	290	63	6	10.96	0	0	1	748.4	25'	29.5'	142'
6	AT&T MOBILITY LLC (Proposed)	Quintel QS66512-2	Panel	737	290	69	6	11.46	0	0	1	839.8	25'	29.5'	142'
6	AT&T MOBILITY LLC (Proposed)	Quintel QS66512-2	Panel	1900	290	68	6	14.16	0	0	1	1563.7	25'	29.5'	142'
6	AT&T MOBILITY LLC (Proposed)	Quintel QS66512-2	Panel	2300	290	64	6	14.56	0	0	1	1714.6	25'	29.5'	142'

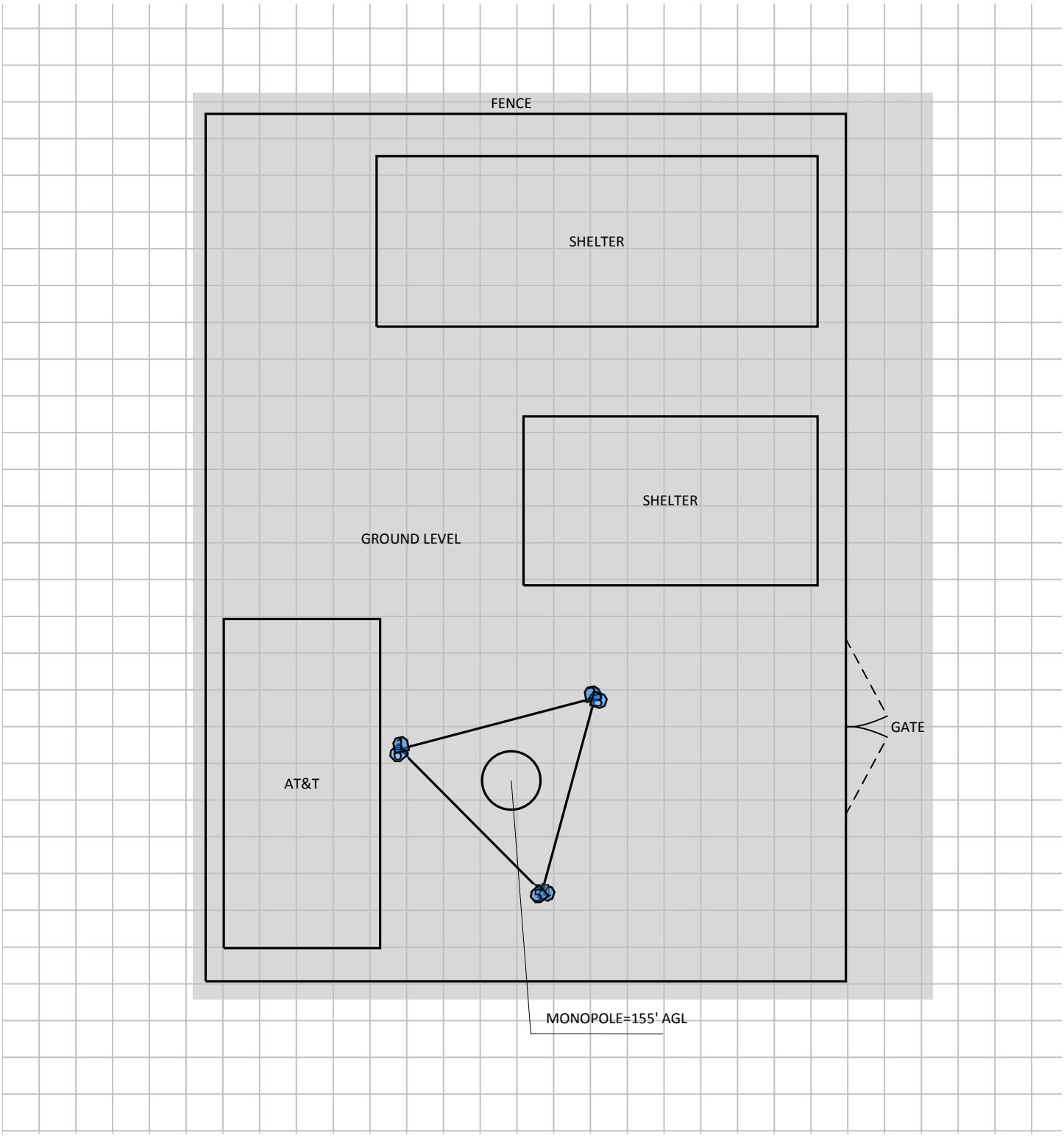
NOTE: X, Y and Z indicate relative position of the bottom of the antenna to the origin location on the site, displayed in the model results diagram. Specifically, the Z reference indicates the bottom of the antenna height above the main site level unless otherwise indicated. The distance to the bottom of the antenna is calculated by subtracting half of the length of the antenna from the antenna centerline. Effective Radiated Power (ERP) is provided by the operator or based on Sitesafe experience. The values used in the modeling may be greater than are currently deployed. For other operators at this site the use of "Generic" as an antenna model or "Unknown" for a wireless operator means the information with regard to operator, their FCC license and/or antenna information was not available nor could it be secured while on site. Other operator's equipment, antenna models and powers used for modeling are based on obtained information or Sitesafe experience.

4 Emission Predictions

In the RF Exposure Simulations below all heights are reflected with respect to main site level. In most rooftop cases this is the height of the main rooftop and in other cases this can be ground level. Each different height area, rooftop, or platform level is labeled with its height relative to the main site level. Emissions are calculated appropriately based on the relative height and location of that area to all antennas.

The Antenna Inventory heights are referenced to the same level.

RF Exposure Simulation For: Manchester North



% of FCC Public Exposure Limit
Spatial average 0' - 6'

% of FCC Public Exposure Limit

>= 5000	>= 500	>= 100	>= 5	< 5

Carrier Identification

AT&T MOBILITY LLC | VERIZON WIRELESS | T-MOBILE | SPRINT | UNKNOWN CARRIER

Sign Legend

Caution 1 | Caution 2 | Notice 2 | Notice 1 | Warning | Info 1 | Info 2

Barrier

Proposed Barriers/ Signs

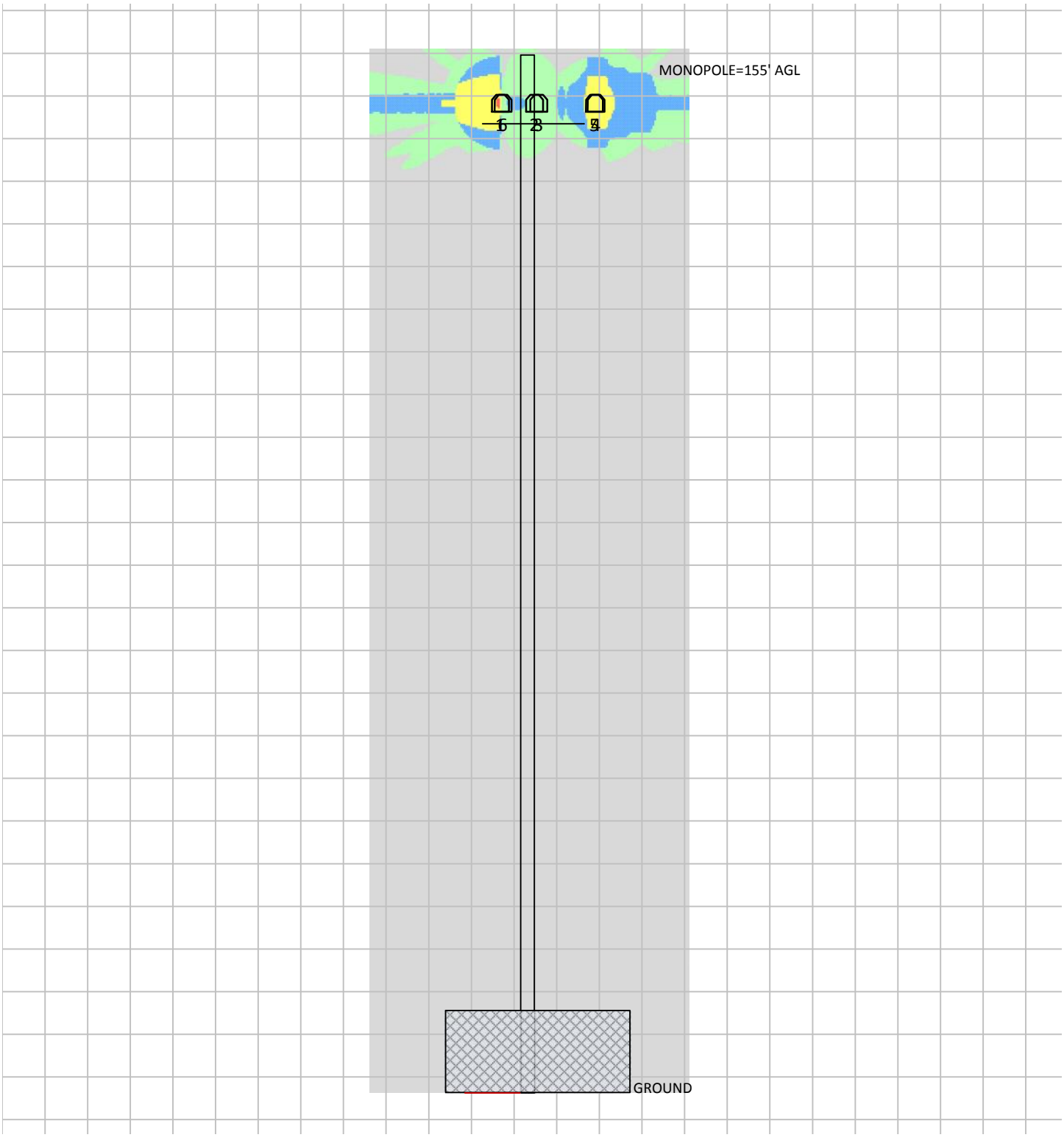
(Feet)

0 5.1 10.2

www.sitesafe.com
Site Name:Manchester North
4/7/2017 9:12:04 AM

SitesafeTC Version:1.0.0.0 - 0.0.0.259
Sitesafe OET-65 Model
Near Field Boundary: 1.5 * Aperture
Reflection Factor: 1
Spatially Averaged

RF Exposure Simulation For: Manchester North
Elevation View



% of FCC Public Exposure Limit

% of FCC Public Exposure Limit
>= 5000 | >= 500 | >= 100 | >= 5 | < 5

Carrier Identification
AT&T MOBILITY LLC | VERIZON WIRELESS | T-MOBILE | SPRINT | UNKNOWN CARRIER

Sign Legend
Caution 1 | Caution 2 | Notice 2 | Notice 1 | Warning | Info 1 | Info 2

Barrier | Proposed Barriers/ Signs

(Feet)
0 11 22

www.sitesafe.com
Site Name:Manchester North
4/11/2017 9:24:18 AM

SitesafeTC Version:1.0.0.0 - 0.0.0.259
Sitesafe OET-65 Model
Near Field Boundary: 1.5 * Aperture
Reflection Factor: 1
Single Level (0)

5 Site Compliance

5.1 Site Compliance Statement

Upon evaluation of the cumulative RF emission levels from all operators at this site, RF hazard signage and antenna locations, Sitesafe has determined that:

AT&T Mobility, LLC will be compliant when the remediation recommended in Section 5.2 or other appropriate remediation is implemented.

The compliance determination is based on General Public RFE levels derived from theoretical modeling, RF signage placement, proposed antenna inventory and the level of restricted access to the antennas at the site. Any deviation from the SmartLink, LLC's proposed deployment plan could result in the site being rendered non-compliant.

Modeling is used for determining compliance and the percentage of MPE contribution.

5.2 Actions for Site Compliance

Based on FCC regulations, common industry practice, and our understanding of AT&T Mobility, LLC RF Safety Policy requirements, this section provides a statement of recommendations for site compliance. Recommendations have been proposed based on our understanding of existing access restrictions, signage, and an analysis of predicted RFE levels.

AT&T Mobility, LLC will be made compliant if the following changes are implemented:

Site Access Gate

Information 1 sign required.

Site Access Monopole Base

Yellow Caution 2 sign required.

6 Reviewer Certification

The reviewer whose signature appears below hereby certifies and affirms:

That I am an employee of Sitesafe, Inc., in Arlington, Virginia, at which place the staff and I provide RF compliance services to clients in the wireless communications industry; and

That I am thoroughly familiar with the Rules and Regulations of the Federal Communications Commission (FCC) as well as the regulations of the Occupational Safety and Health Administration (OSHA), both in general and specifically as they apply to the FCC Guidelines for Human Exposure to Radio-frequency Radiation; and

That I have thoroughly reviewed this Site Compliance Report and believe it to be true and accurate to the best of my knowledge as assembled by and attested to by Michelle Stone.

April 7, 2017

Appendix A – Statement of Limiting Conditions

Sitesafe has provided computer generated model(s) in this Site Compliance Report to show approximate dimensions of the site, and the model is included to assist the reader of the compliance report to visualize the site area, and to provide supporting documentation for Sitesafe's recommendations.

Sitesafe may note in the Site Compliance Report any adverse physical conditions, such as needed repairs, that Sitesafe became aware of during the normal research involved in creating this report. Sitesafe will not be responsible for any such conditions that do exist or for any engineering or testing that might be required to discover whether such conditions exist. Because Sitesafe is not an expert in the field of mechanical engineering or building maintenance, the Site Compliance Report must not be considered a structural or physical engineering report.

Sitesafe obtained information used in this Site Compliance Report from sources that Sitesafe considers reliable and believes them to be true and correct. Sitesafe does not assume any responsibility for the accuracy of such items that were furnished by other parties. When conflicts in information occur between data collected by Sitesafe provided by a second party and data collected by Sitesafe, the data will be used.

Appendix B – Regulatory Background Information

FCC Rules and Regulations

In 1996, the Federal Communication Commission (FCC) adopted regulations for the evaluating of the effects of RF emissions in 47 CFR § 1.1307 and 1.1310. The guideline from the FCC Office of Engineering and Technology is Bulletin 65 ("OET Bulletin 65"), *Evaluating Compliance with FCC Guidelines for Human Exposure to Radio Frequency Electromagnetic Fields*, Edition 97-01, published August 1997. Since 1996 the FCC periodically reviews these rules and regulations as per their congressional mandate.

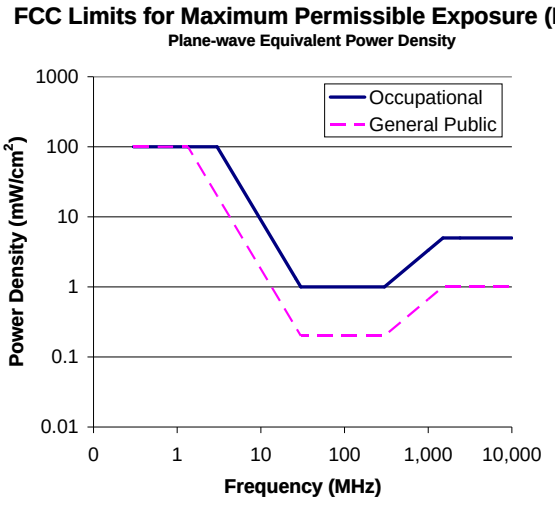
FCC regulations define two separate tiers of exposure limits: Occupational or "Controlled environment" and General Public or "Uncontrolled environment". The General Public limits are generally five times more conservative or restrictive than the Occupational limit. These limits apply to *accessible* areas where workers or the general public may be exposed to Radio Frequency (RF) electromagnetic fields.

Occupational or Controlled limits apply in situations in which persons are exposed as a consequence of their employment and where those persons exposed have been made fully aware of the potential for exposure and can exercise control over their exposure.

An area is considered a Controlled environment when access is limited to these aware personnel. Typical criteria are restricted access (i.e. locked or alarmed doors, barriers, etc.) to the areas where antennas are located coupled with proper RF warning signage. A site with Controlled environments is evaluated with Occupational limits.

All other areas are considered Uncontrolled environments. If a site has no access controls or no RF warning signage it is evaluated with General Public limits.

The theoretical modeling of the RF electromagnetic fields has been performed in accordance with OET Bulletin 65. The Maximum Permissible Exposure (MPE) limits utilized in this analysis are outlined in the following diagram:



Limits for Occupational/Controlled Exposure (MPE)

Frequency Range (MHz)	Electric Field Strength (E) (V/m)	Magnetic Field Strength (H) (A/m)	Power Density (S) (mW/cm^2)	Averaging Time $\|E\|^2$, $\|H\|^2$ or S (minutes)
0.3-3.0	614	1.63	(100)*	6
3.0-30	1842/f	4.89/f	($900/f^2$)*	6
30-300	61.4	0.163	1.0	6
300-1500	--	--	f/300	6
1500-100,000	--	--	5	6

Limits for General Population/Uncontrolled Exposure (MPE)

Frequency Range (MHz)	Electric Field Strength (E) (V/m)	Magnetic Field Strength (H) (A/m)	Power Density (S) (mW/cm^2)	Averaging Time $\|E\|^2$, $\|H\|^2$ or S (minutes)
0.3-1.34	614	1.63	(100)*	30
1.34-30	824/f	2.19/f	($180/f^2$)*	30
30-300	27.5	0.073	0.2	30
300-1500	--	--	f/1500	30
1500-100,000	--	--	1.0	30

f = frequency in MHz *Plane-wave equivalent power density

OSHA Statement

The General Duty clause of the OSHA Act (Section 5) outlines the occupational safety and health responsibilities of the employer and employee. The General Duty clause in Section 5 states:

(a) Each employer –

(1) shall furnish to each of his employees employment and a place of employment which are free from recognized hazards that are causing or are likely to cause death or serious physical harm to his employees;

(2) shall comply with occupational safety and health standards promulgated under this Act.

(b) Each employee shall comply with occupational safety and health standards and all rules, regulations, and orders issued pursuant to this Act which are applicable to his own actions and conduct.

OSHA has defined Radiofrequency and Microwave Radiation safety standards for workers who may enter hazardous RF areas. Regulation Standards 29 CFR § 1910.147 identify a generic Lock Out Tag Out procedure aimed to control the unexpected energization or start up of machines when maintenance or service is being performed.

Appendix C – Safety Plan and Procedures

The following items are general safety recommendations that should be administered on a site by site basis as needed by the carrier.

General Maintenance Work: Any maintenance personnel required to work immediately in front of antennas and / or in areas indicated as above 100% of the Occupational MPE limits should coordinate with the wireless operators to disable transmitters during their work activities.

Training and Qualification Verification: All personnel accessing areas indicated as exceeding the General Population MPE limits should have a basic understanding of EME awareness and RF Safety procedures when working around transmitting antennas. Awareness training increases a workers understanding to potential RF exposure scenarios. Awareness can be achieved in a number of ways (e.g. videos, formal classroom lecture or internet based courses).

Physical Access Control: Access restrictions to transmitting antennas locations is the primary element in a site safety plan. Examples of access restrictions are as follows:

- Locked door or gate
- Alarmed door
- Locked ladder access
- Restrictive Barrier at antenna (e.g. Chain link with posted RF Sign)

RF Signage: Everyone should obey all posted signs at all times. RF signs play an important role in properly warning a worker prior to entering into a potential RF Exposure area.

Assume all antennas are active: Due to the nature of telecommunications transmissions, an antenna transmits intermittently. Always assume an antenna is transmitting. Never stop in front of an antenna. If you have to pass by an antenna, move through as quickly and safely as possible thereby reducing any exposure to a minimum.

Maintain a 3 foot clearance from all antennas: There is a direct correlation between the strength of an EME field and the distance from the transmitting antenna. The further away from an antenna, the lower the corresponding EME field is.

Site RF Emissions Diagram: Section 4 of this report contains an RF Diagram that outlines various theoretical Maximum Permissible Exposure (MPE) areas at the site. The modeling is a worst case scenario assuming a duty cycle of 100% for each transmitting antenna at full power. This analysis is based on one of two access control criteria: General Public criteria means the access to the site is uncontrolled and anyone can gain access. Occupational criteria means the access is restricted and only properly trained individuals can gain access to the antenna locations.

Appendix D – RF Emissions

The RF Emissions Simulation(s) in this report display theoretical spatially averaged percentage of the Maximum Permissible Exposure for all systems at the site unless otherwise noted. These diagrams use modeling as prescribed in OET Bulletin 65 and assumptions detailed in Appendix E.

The key at the bottom of each RF Emissions Simulation indicates percentages displayed referenced to FCC General Public Maximum Permissible Exposure (MPE) limits. Color coding on the diagram is as follows:

- Areas indicated as Gray are predicted to be below 5% of the MPE limits. **Gray represents areas more than 20 times below the most conservative exposure limit**.
- Green represents areas are predicted to be between 5% and 100% of the MPE limits. **Green areas are accessible to anyone**.
- Blue represents areas predicted to exceed the General Public MPE limits but are less than Occupational limits. **Blue areas should be accessible only to RF trained workers**.
- Yellow represents areas predicted to exceed Occupational MPE limits. **Yellow areas should be accessible only to RF trained workers able to assess current exposure levels**.
- Red represents areas predicted to have exposure more than 10 times the Occupational MPE limits. **Red indicates that the RF levels must be reduced prior to access.** An RF Safety Plan is required which outlines how to reduce the RF energy in these areas prior to access.

Appendix E – Assumptions and Definitions

General Model Assumptions

In this site compliance report, it is assumed that all antennas are operating at **full power at all times**. Software modeling was performed for all transmitting antennas located on the site. Sitesafe has further assumed a 100% duty cycle and maximum radiated power.

The modeling is based on recommendations from the FCC's OET-65 bulletin with the following variances per AT&T guidance. Reflection has not been considered in the modeling, i.e. the reflection factor is 1.0. The near / far field boundary has been set to 1.5 times the aperture height of the antenna and modeling beyond that point is the lesser of the near field cylindrical model and the far field model taking into account the gain of the antenna.

The site has been modeled with these assumptions to show the maximum RF energy density. Areas modeled with exposure greater than 100% of the General Public MPE level may not actually occur, but are shown as a prediction that could be realized. Sitesafe believes these areas to be safe for entry by occupationally trained personnel utilizing appropriate personal protective equipment (in most cases, a personal monitor).

Use of Generic Antennas

For the purposes of this report, the use of "Generic" as an antenna model, or "Unknown" for an operator means the information about a carrier, their FCC license and/or antenna information was not provided and could not be obtained while on site. In the event of unknown information, Sitesafe will use our industry specific knowledge of equipment, antenna models, and transmit power to model the site. If more specific information can be obtained for the unknown measurement criteria, Sitesafe recommends remodeling of the site utilizing the more complete and accurate data. Information about similar facilities is used when the service is identified and associated with a particular antenna. If no information is available regarding the transmitting service associated with an unidentified antenna, using the antenna manufacturer's published data regarding the antenna's physical characteristics makes more conservative assumptions.

Where the frequency is unknown, Sitesafe uses the closest frequency in the antenna's range that corresponds to the highest Maximum Permissible Exposure (MPE), resulting in a conservative analysis.

Definitions

5% Rule – The rules adopted by the FCC specify that, in general, at multiple transmitter sites actions necessary to bring the area into compliance with the guidelines are the shared responsibility of all licensees whose transmitters produce field strengths or power density levels at the area in question in excess of 5% of the exposure limits. In other words, any wireless operator that contributes 5% or greater of the MPE limit in an area that is identified to be greater than 100% of the MPE limit is responsible taking corrective actions to bring the site into compliance.

Compliance – The determination of whether a site is safe or not with regards to Human Exposure to Radio Frequency Radiation from transmitting antennas.

Decibel (dB) – A unit for measuring power or strength of a signal.

Duty Cycle – The percent of pulse duration to the pulse period of a periodic pulse train. Also, may be a measure of the temporal transmission characteristic of an intermittently transmitting RF source such as a paging antenna by dividing average transmission duration by the average period for transmission. A duty cycle of 100% corresponds to continuous operation.

Effective (or Equivalent) Isotropic Radiated Power (EIRP) – The product of the power supplied to the antenna and the antenna gain in a given direction relative to an isotropic antenna.

Effective Radiated Power (ERP) – In a given direction, the relative gain of a transmitting antenna with respect to the maximum directivity of a half wave dipole multiplied by the net power accepted by the antenna from the connecting transmitter.

Gain (of an antenna) – The ratio of the maximum intensity in a given direction to the maximum radiation in the same direction from an isotropic radiator. Gain is a measure of the relative efficiency of a directional antennas as compared to an omni directional antenna.

General Population/Uncontrolled Environment – Defined by the FCC, as an area where exposure to RF energy may occur to persons who are **unaware** of the potential for exposure and who have no control of their exposure. General Population is also referenced as General Public.

Generic Antenna – For the purposes of this report, the use of "Generic" as an antenna model means the antenna information was not provided and could not be obtained while on site. In the event of unknown information, Sitesafe will use our industry specific knowledge of antenna models to select a worst case scenario antenna to model the site.

Isotropic Antenna – An antenna that is completely non-directional. In other words, an antenna that radiates energy equally in all directions.

Maximum Measurement – This measurement represents the single largest measurement recorded when performing a spatial average measurement.

Maximum Permissible Exposure (MPE) – The maximum levels of RF exposure a person may be exposed to without harmful effect and with acceptable safety factor.

Occupational/Controlled Environment – Defined by the FCC, as an area where Radio Frequency Radiation (RFR) exposure may occur to persons who are **aware** of the

potential for exposure as a condition of employment or specific activity and can exercise control over their exposure.

OET Bulletin 65 – Technical guideline developed by the FCC's Office of Engineering and Technology to determine the impact of Radio Frequency radiation on Humans. The guideline was published in August 1997.

OSHA (Occupational Safety and Health Administration) – Under the Occupational Safety and Health Act of 1970, employers are responsible for providing a safe and healthy workplace for their employees. OSHA's role is to promote the safety and health of America's working men and women by setting and enforcing standards; providing training, outreach and education; establishing partnerships; and encouraging continual process improvement in workplace safety and health. For more information, visit www.osha.gov.

Radio Frequency (RF) – The frequencies of electromagnetic waves which are used for radio communications. Approximately 3 kHz to 300 GHz.

Radio Frequency Exposure (RFE) – The amount of RF power density that a person is or might be exposed to.

Spatial Average Measurement – A technique used to average a minimum of ten (10) measurements taken in a ten (10) second interval from zero (0) to six (6) feet. This measurement is intended to model the average power density an average sized human will be exposed to at a location.

Transmitter Power Output (TPO) – The radio frequency output power of a transmitter's final radio frequency stage as measured at the output terminal while connected to a load.

Appendix F – References

The following references can be followed for further information about RF Health and Safety.

Sitesafe, Inc.
http://www.sitesafe.com
FCC Radio Frequency Safety
http://www.fcc.gov/encyclopedia/radio-frequency-safety
National Council on Radiation Protection and Measurements (NCRP)
http://www.ncrponline.org
Institute of Electrical and Electronics Engineers, Inc., (IEEE)
http://www.ieee.org
American National Standards Institute (ANSI)
http://www.ansi.org
Environmental Protection Agency (EPA)
http://www.epa.gov/radtown/wireless-tech.html
National Institutes of Health (NIH)
http://www.niehs.nih.gov/health/topics/agents/emf/
Occupational Safety and Health Agency (OSHA)
http://www.osha.gov/SLTC/radiofrequencyradiation/
International Commission on Non-Ionizing Radiation Protection (ICNIRP)
http://www.icnirp.org
World Health Organization (WHO)
http://www.who.int/peh-emf/en/
National Cancer Institute
http://www.cancer.gov/cancertopics/factsheet/Risk/cellphones
American Cancer Society (ACS)
http://www.cancer.org/docroot/PED/content/PED_1_3X_Cellular_Phone_Towers.asp?siteareа=PED
European Commission Scientific Committee on Emerging and Newly Identified Health Risks
http://ec.europa.eu/health/ph_risk/committees/04_scenihr/docs/scenihr_o_022.pdf
Fairfax County, Virginia Public School Survey
http://www.fcps.edu/fts/safety-security/RFEESurvey/
UK Health Protection Agency Advisory Group on Non-ionising Radiation
http://www.hpa.org.uk/webw/HPAweb&HPAwebStandard/HPAweb_C/1317133826368
Norwegian Institute of Public Health
http://www.fhi.no/dokumenter/545eea7147.pdf