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

September 21, 2016

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: 881534**
AT&T Site ID: CT1127
670 Captain Neville Drive, Waterbury, CT 06705
Latitude: 41° 32' 3.6"/ Longitude: -72° 58' 8.4"

Dear Ms. Bachman:

AT&T currently maintains nine (9) antennas at the 151-foot level of the existing 151-foot monopole tower at 670 Captain Neville Drive in Waterbury, CT. The tower is owned by Crown Castle. The property is owned by MW Cell Reit 1 LLC. AT&T now intends to replace three (3) antenna with three (3) new antennas. These antennas would be installed at the 151-foot level of the tower. AT&T also intends to install three (3) RRU32s, six (6) Triplexers, one (1) Raycap, two (2) DC, and one (1) Fiber.

The City of Waterbury could not provide original zoning approval.

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 Neil O'Leary, Mayor, City of Waterbury, 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 Neil O'Leary, Mayor
City of Waterbury
235 Grand Street 2nd Floor
Waterbury, CT 06702

MW Cell Reit 1 LLC
PO Box 842996
Los Angeles, CT 90084-2996

The Assessor's office is responsible for the maintenance of records on the ownership of properties. Assessments are computed at 70% of the estimated market value of real property at the time of the last revaluation which was 2012.

CITY OF WATERBURY

Information on the Property Records for the Municipality of Waterbury was last updated on 9/21/2016.

Parcel Information

Location:	670 CAPT NEVILLE DR	Property Use:	Industrial	Primary Use:	Light Industrial
Unique ID:	045004900070	Map Block Lot:	0450-0490-0070	Acres:	8.88
490 Acres:	0.00	Zone:	IP	Volume / Page:	3298/ 323
Developers Map / Lot:		Census:			

Value Information

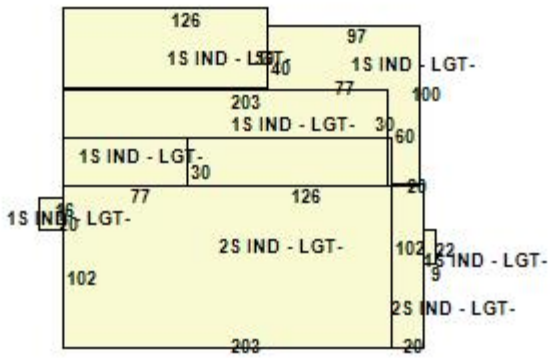
	Appraised Value	70% Assessed Value
Land	477,464	334,230

	Appraised Value	70% Assessed Value
Buildings	2,293,064	1,605,140
Detached Outbuildings	64,485	45,140
Total	2,835,013	1,984,510

Owner's Information

Owner's Data
M B REALTY LLC 670 CAPTAIN NEVILLE DR WATERBURY, CT 06705-0000

Building 1



Category:	Industrial	Use:	Light Industrial	GLA:	69,700
Stories:	2.00	Construction:	Average	Year Built:	1990
Heating:	Space Heater	Fuel:		Cooling Percent:	0%
Siding:	Concrete, Precast Panel	Roof Material:		Beds/Units:	0

Special Features

Sprinklers	100

Attached Components

Detached Outbuildings

Type:	Year Built:	Length:	Width:	Area:
Canopy Canopy	2001			400
Asphalt Paving	1996			25,452
Concrete Paving	1996			340
Concrete Block/Frame Shed	1996			176

Owner History - Sales

Owner Name	Volume	Page	Sale Date	Deed Type	Valid Sale	Sale Price
M B REALTY LLC	3298	323	01/17/1996		No	$475,000

Building Permits

Permit Number	Permit Type	Date Opened	Date Closed	Permit Status	Reason
2013.2357	Electrical	08/23/2013		Closed	UPGRADE SERVICE TO 3000AMPS ETC (MICROBEST)
2011.3119	Commercial Addition	02/03/2012		Closed	DIVING WALL/ ADD RESTROOM/ FILL IN LOADING DOCK
1554E	Comm Renovations	03/11/2010		Closed	INT FINISH
1287E	Commercial Addition	11/12/2009		Closed	ADDITION

Permit Number	Permit Type	Date Opened	Date Closed	Permit Status	Reason
0975E	Commercial Addition	08/03/2009		Closed	FOUND ONLY
0401E	Commercial Addition	12/29/2008		Closed	ADDITION 50X126
9081D	Commercial Addition	10/24/2007		Closed	

ROUTE 84 EB

m36.76

426-3

235

201.30

57.96

490

PROGRESS LANE

d87.11

ROUTE 84 WB

ROUTE 84 EB

449-31

359.92

d365.74

d464.15

CAPTAIN NEVILLE DR

m381.86

427-1

404-612

m48.03

91.92

156

136.83

125.26

73.17

229.76

212.27

320.25

404-611

621.77

147.60

d130.90

69
8.73 Ac

490

d197.91

d365.72

d84.28

701
10.45 Ac

70
8.88 Ac

572+/-

d196+/-

702
0.45 Ac

503

74.88

76.83

d76.97

d116.66

36.88

125

473-37

d233.66

d184.42

d527.09

d580.31

Map #
450

City of Waterbury
Assessor's Department

- Assessor Tax Map Grid
- Property Boundary
- Property Boundary (Off Map)
- Buildings
- Edge of Road
- #23 Developer Number
- 79 Lot Number
- 134 Block Number
- *0.27 Ac* Property Acreage
- 327-17 Map-Lot Number (Off Map)

City of Waterbury, Connecticut
Property Assessment Map

This map is for informational purposes only and has not been prepared for, or suitable for legal, engineering, or surveying purposes. Users of this information should review or consult the primary data and information sources to verify the usability of the information. The City of Waterbury makes no warranties, express or implied, as to the use of the information obtained herein.

0 50 100 200 Feet

1 inch = 50 feet

426	427	428
449	450	451
472	473	451

Map #
450

PROJECT:	LTE 3C
SITE NUMBER:	CTL01127
FA NUMBER:	10035324
PTN NUMBER:	2051A060CJ
PACE NUMBER:	MRCTB018114
CROWN BU#:	881534
SITE NAME:	WATERBURY CAPTAIN NEVILLE DR
SITE ADDRESS:	670 CAPTAIN NEVILLE DRIVE WATERBURY, CT 06705

PROJECT INFORMATION

SITE NAME:	WATERBURY CAPTAIN NEVILLE DR
SITE NUMBER:	CTL01127
SITE ADDRESS:	670 CAPTAIN NEVILLE DRIVE WATERBURY, CT 06705
FA NUMBER:	10035324
PTN NUMBER:	2051A060CJ
PACE NUMBER:	MRCTB018114
USID NUMBER:	46003
CROWN BU#:	881534
APPLICANT:	AT&T WIRELESS 550 COCHITUATE ROAD SUITE 550 13 AND 14 FRAMINGHAM, MA 01701
TOWER OWNER:	CROWN CASTLE INTERNATIONAL 12 GILL STREET, SUITE 5800 WOBURN, MA 01801
JURISDICTION:	CITY OF WATERBURY
COUNTY:	NEW HAVEN
SITE COORDINATES FROM	(RFDS)
LATITUDE:	41.534325°
LONGITUDE:	-72.968999°
GROUND ELEV.:	680'
PROPOSED USE:	TELECOMMUNICATIONS FACILITY
AT&T RF MANAGER:	CAMERON SYME
PHONE:	(508) 596-7146
EMAIL:	cs6970@att.com

PROJECT CONSULTANTS

PROJECT MANAGER:	SMARTLINK
ADDRESS:	85 RANGEWAY ROAD, SUITE 102 NORTH BILLERICA, MA 01862
CONTACT:	RYAN BURGDORFER (508) 665-8005
EMAIL:	Ryan.Burgdorfer@Smartlinkllc.com
SITE AQUISITION:	SMARTLINK
ADDRESS:	85 RANGEWAY ROAD, SUITE 102 NORTH BILLERICA, MA 01862
CONTACT:	SHARON KEEFE (978) 930-3918
EMAIL:	Sharon.Keefe@Smartlinkllc.com
ENGINEER/ARCHITECT:	FULLERTON ENGINEERING
ADDRESS:	1100 E. WOODFIELD ROAD, SUITE 500 SCHAUMBURG, IL 60173
CONTACT:	MILEN DIMITROV (847) 908-8439
EMAIL:	MDimitrov@fullertonengineering.com
CONSTRUCTION:	SMARTLINK
ADDRESS:	85 RANGEWAY ROAD, SUITE 102 NORTH BILLERICA, MA 01862
CONTACT:	MARK DONNELLY (617) 515-2080
EMAIL:	mark.donnelly@smartlinkllc.com

SCOPE OF WORK

LTE WCS WILL BE 3C AT THE SITE WITH BRONZE STANDARD CONFIGURATION.
PROPOSED 3C PROJECT SCOPE HEREIN BASED ON RFDS ID # 1107654, VERSION 2.00 LAST UPDATED 04/20/16.

- (3) NEW ANTENNAS TO REPLACE (3) EXISTING ANTENNAS
- (3) NEW RRUS-32
- (1) NEW DC-6 FIBER SQUID
- (1) FIBER CABLE AND (2) DC POWER CABLES
- (1) NEW XMU
- (1) NEW LTE DUS
- (6) NEW TRIPLEXERS

- CONTRACTOR SHALL FURNISH ALL MATERIAL WITH THE EXCEPTION OF AT&T SUPPLIED MATERIAL.
- ALL MATERIAL SHALL BE INSTALLED BY THE CONTRACTOR, UNLESS STATED OTHERWISE.

SITE LOCATION MAP

DIRECTIONS

SCAN QR CODE FOR LINK
TO SITE LOCATION MAP

APPLICABLE BUILDING CODES AND STANDARDS

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.

BUILDING CODE:	2003 INTERNATIONAL BUILDING CODE
ELECTRICAL CODE:	2011 NATIONAL ELECTRIC CODE

- FACILITY IS UNMANNED AND NOT FOR HUMAN HABITATION.
- ADA ACCESS REQUIREMENTS ARE NOT REQUIRED.
- THIS FACILITY DOES NOT REQUIRE POTABLE WATER AND WILL NOT PRODUCE ANY SEWAGE

DRAWING INDEX

NOTE: DRAWING SCALES ARE FOR 11"x17" SHEETS UNLESS OTHERWISE NOTED

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

smartlink
1362 MELLON ROAD
SUITE 140
HANOVER, MD 21076

FULLERTON
ENGINEERING · DESIGN
1100 E. WOODFIELD ROAD, SUITE 500
SCHAUMBURG, ILLINOIS 60173
TEL: 847-908-8400
COA# PEC.0001444
www.FullertonEngineering.com

REV	DATE	DESCRIPTION	BY
0	05/19/16	90% REVIEW	EB
1	08/11/16	FOR PERMIT	KC

I HEREBY CERTIFY THAT THESE DRAWING WERE PREPARED BY ME OR UNDER MY DIRECT SUPERVISION AND CONTROL, AND TO THE BEST OF MY KNOWLEDGE AND BELIEF COMPLY WITH THE REQUIREMENTS OF ALL APPLICABLE CODES.

SITE NAME
WATERBURY
CAPTAIN NEVILLE DR

SITE NUMBER:
CTL01127
CROWN BU# 881534

SITE ADDRESS
670 CAPTAIN NEVILLE DRIVE
WATERBURY, CT 06705

SHEET NAME
TITLE SHEET

SHEET NUMBER
T1

GENERAL CONSTRUCTION

1. FOR THE PURPOSE OF CONSTRUCTION DRAWINGS, THE FOLLOWING DEFINITIONS SHALL APPLY:
   CONTRACTOR/CM – SMARTLINK
   OWNER – AT&T WIRELESS

2. ALL SITE WORK SHALL BE COMPLETED AS INDICATED ON THE DRAWINGS AND AT&T PROJECT SPECIFICATIONS.

3. GENERAL CONTRACTOR SHALL VISIT THE SITE AND SHALL FAMILIARIZE HIMSELF WITH ALL CONDITIONS AFFECTING THE PROPOSED WORK AND SHALL MAKE PROVISIONS. GENERAL CONTRACTOR SHALL BE RESPONSIBLE FOR FAMILIARIZING HIMSELF WITH ALL CONTRACT DOCUMENTS, FIELD CONDITIONS, DIMENSIONS, AND CONFIRMING THAT THE WORK MAY BE ACCOMPLISHED AS SHOWN PRIOR TO PROCEEDING WITH CONSTRUCTION. ANY DISCREPANCIES SHALL BE BROUGHT TO THE ATTENTION OF THE ENGINEER PRIOR TO THE COMMENCEMENT OF WORK.

4. ALL MATERIALS FURNISHED AND INSTALLED SHALL BE IN STRICT ACCORDANCE WITH ALL APPLICABLE CODES, REGULATIONS, AND ORDINANCES. GENERAL CONTRACTOR SHALL ISSUE ALL APPROPRIATE NOTICES AND COMPLY WITH ALL LAWS, ORDINANCES, RULES, REGULATIONS, AND LAWFUL ORDERS OF ANY PUBLIC AUTHORITY REGARDING THE PERFORMANCE OF 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. PLANS ARE NOT TO BE SCALED. THESE PLANS ARE INTENDED TO BE A DIAGRAMMATIC OUTLINE ONLY UNLESS OTHERWISE NOTED. DIMENSIONS SHOWN ARE TO FINISH SURFACES UNLESS OTHERWISE NOTED. SPACING BETWEEN EQUIPMENT IS THE MINIMUM REQUIRED CLEARANCE. THEREFORE, IT IS CRITICAL TO FIELD VERIFY DIMENSIONS, SHOULD THERE BE ANY QUESTIONS REGARDING THE CONTRACT DOCUMENTS, THE CONTRACTOR SHALL BE RESPONSIBLE FOR OBTAINING A CLARIFICATION FROM THE ENGINEER PRIOR TO PROCEEDING WITH THE WORK. DETAILS ARE INTENDED TO SHOW DESIGN INTENT. MODIFICATIONS MAY BE REQUIRED TO SUIT JOB DIMENSIONS OR CONDITIONS AND SUCH MODIFICATIONS SHALL BE INCLUDED AS PART OF WORK AND PREPARED BY THE ENGINEER PRIOR TO PROCEEDING WITH WORK.

8. THE CONTRACTOR SHALL INSTALL ALL EQUIPMENT AND MATERIALS IN ACCORDANCE WITH MANUFACTURER'S RECOMMENDATIONS UNLESS SPECIFICALLY STATED OTHERWISE.

9. IF THE SPECIFIED EQUIPMENT CANNOT BE INSTALLED AS SHOWN ON THESE DRAWINGS, THE CONTRACTOR SHALL PROPOSE AN ALTERNATIVE INSTALLATION SPACE FOR APPROVAL BY THE ENGINEER PRIOR TO PROCEEDING.

10. GENERAL CONTRACTOR SHALL BE RESPONSIBLE FOR THE SAFETY OF WORK AREA, ADJACENT AREAS AND BUILDING OCCUPANTS THAT ARE LIKELY TO BE AFFECTED BY THE WORK UNDER THIS CONTRACT. WORK SHALL CONFIRM TO ALL OSHA REQUIREMENTS AND THE LOCAL JURISDICTION.

11. GENERAL CONTRACTOR SHALL COORDINATE WORK AND SCHEDULE WORK ACTIVITIES WITH OTHER DISCIPLINES.

12. ERECTION SHALL BE DONE IN A WORKMANLIKE MANNER BY COMPETENT EXPERIENCED WORKMAN IN ACCORDANCE WITH APPLICABLE CODES AND THE BEST ACCEPTED PRACTICE. ALL MEMBERS SHALL BE LAID PLUMB AND TRUE AS INDICATED ON THE DRAWINGS.

13. SEAL PENETRATIONS THROUGH FIRE RATED AREAS WITH UL LISTED MATERIALS APPROVED BY LOCAL JURISDICTION. CONTRACTOR SHALL KEEP AREA CLEAN, HAZARD FREE, AND DISPOSE OF ALL DEBRIS.

14. WORK PREVIOUSLY COMPLETED IS REPRESENTED BY LIGHT SHADED LINES AND NOTES. THE SCOPE OF WORK FOR THIS PROJECT IS REPRESENTED BY DARK SHADED LINES AND NOTES. CONTRACTOR SHALL NOTIFY THE GENERAL CONTRACTOR OF ANY EXISTING CONDITIONS THAT DEVIATE FROM THE DRAWINGS PRIOR TO BEGINNING CONSTRUCTION.

15. CONTRACTOR SHALL PROVIDE WRITTEN NOTICE TO THE CONSTRUCTION MANAGER 48 HOURS PRIOR TO COMMENCEMENT OF WORK.

16. THE CONTRACTOR SHALL PROTECT EXISTING IMPROVEMENTS, PAVEMENTS, CURBS, LANDSCAPING AND STRUCTURES. ANY DAMAGED PART SHALL BE REPAIRED AT CONTRACTOR'S EXPENSE TO THE SATISFACTION OF THE OWNER.

17. THE CONTRACTOR SHALL CONTACT UTILITY LOCATING SERVICES PRIOR TO THE START OF CONSTRUCTION.

18. GENERAL CONTRACTOR SHALL COORDINATE AND MAINTAIN ACCESS FOR ALL TRADES AND CONTRACTORS TO THE SITE AND/OR BUILDING.

19. THE GENERAL CONTRACTOR SHALL BE RESPONSIBLE FOR SECURITY OF THE SITE FOR THE DURATION OF CONSTRUCTION UNTIL JOB COMPLETION.

20. THE GENERAL CONTRACTOR SHALL MAINTAIN IN GOOD CONDITION ONE COMPLETE SET OF PLANS WITH ALL REVISIONS, ADDENDA, AND CHANGE ORDERS ON THE PREMISES AT ALL TIMES.

21. THE GENERAL CONTRACTOR SHALL PROVIDE PORTABLE FIRE EXTINGUISHERS WITH A RATING OF NOT LESS THAN 2–A OT 2–A:10–B:C AND SHALL BE WITHIN 25 FEET OF TRAVEL DISTANCE TO ALL PORTIONS OF WHERE THE WORK IS BEING COMPLETED DURING CONSTRUCTION.

22. ALL EXISTING ACTIVE SEWER, WATER, GAS, ELECTRIC, AND OTHER UTILITIES SHALL BE PROTECTED AT ALL TIMES, AND WHERE REQUIRED FOR THE PROPER EXECUTION OF THE WORK, SHALL BE RELOCATED AS DIRECTED BY THE ENGINEER. EXTREME CAUTION SHOULD BE USED BY THE CONTRACTOR WHEN EXCAVATING OR DRILLING PIERS AROUND OR NEAR UTILITIES. CONTRACTOR SHALL PROVIDE SAFETY TRAINING FOR THE WORKING CREW. THIS SHALL INCLUDE BUT NOT BE LIMITED TO A) FALL PROTECTION, B) CONFINED SPACE, C) ELECTRICAL SAFETY, AND D) TRENCHING & EXCAVATION.

23. ALL EXISTING INACTIVE SEWER, WATER, GAS, ELECTRIC, AND OTHER UTILITIES, WHICH INTERFERE WITH THE EXECUTION OF THE WORK, SHALL BE REMOVED, CAPPED, PLUGGED OR OTHERWISE DISCONNECTED 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.

24. 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.

25. CONTRACTOR SHALL MINIMIZE DISTURBANCE TO THE EXISTING SITE DURING CONSTRUCTION. EROSION CONTROL MEASURES, IF REQUIRED DURING CONSTRUCTION, SHALL BE IN CONFORMANCE WITH THE FEDERAL AND LOCAL JURISDICTION FOR EROSION AND SEDIMENT CONTROL.

26. NO FILL OR EMBANKMENT MATERIAL SHALL BE PLACED ON FROZEN GROUNDING. FROZEN MATERIALS, SNOW OR ICE SHALL NOT BE PLACED IN ANY FILL OR EMBANKMENT.

27. THE SUBGRADE SHALL BE BROUGHT TO A SMOOTH UNIFORM GRADE AND COMPACTED TO 95 PERCENT STANDARD PROCTOR DENSITY UNDER PAVEMENT AND STRUCTURES AND 80 PERCENT STANDARD PROCTOR DENSITY IN OPEN SPACE. ALL TRENCHES IN PUBLIC RIGHT OF WAY SHALL BE BACKFILLED WITH FLOWABLE FILL OR OTHER MATERIAL PRE–APPROVED BY THE LOCAL JURISDICTION.

28. ALL NECESSARY RUBBISH, STUMPS, DEBRIS, STICKS, STONES, AND OTHER REFUSE SHALL BE REMOVED FROM THE SITE AND DISPOSED OF IN A LAWFUL MANNER.

29. ALL BROCHURES, OPERATING AND MAINTENANCE MANUALS, CATALOGS, SHOP DRAWINGS, AND OTHER DOCUMENTS SHALL BE TURNED OVER TO THE GENERAL CONTRACTOR AT COMPLETION OF CONSTRUCTION AND PRIOR TO PAYMENT.

30. CONTRACTOR SHALL SUBMIT A COMPLETE SET OF AS–BUILT REDLINES TO THE GENERAL CONTRACTOR UPON COMPLETION OF PROJECT AND PRIOR TO FINAL PAYMENT.

31. CONTRACTOR SHALL LEAVE PREMISES IN A CLEAN CONDITION.

32. THE PROPOSED FACILITY WILL BE UNMANNED AND DOES NOT REQUIRE POTABLE WATER OR SEWER SERVICE, AND IS NOT FOR HUMAN HABITAT (NO HANDICAP ACCESS REQUIRED).

33. OCCUPANCY IS LIMITED TO PERIODIC MAINTENANCE AND INSPECTION, APPROXIMATELY 2 TIMES PER MONTH, BY AT&T TECHNICIANS.

34. NO OUTDOOR STORAGE OR SOLID WASTE CONTAINERS ARE PROPOSED.

35. ALL MATERIAL SHALL BE FURNISHED AND WORK SHALL BE PERFORMED IN ACCORDANCE WITH THE LATEST REVISION AT&T MOBILITY GROUNDING STANDARD "TECHNICAL SPECIFICATION FOR CONSTRUCTION OF GSM/GPRS WIRELESS SITES" AND "TECHNICAL SPECIFICATION FOR FACILITY GROUNDING". IN CASE OF A CONFLICT BETWEEN THE CONSTRUCTION SPECIFICATION AND THE DRAWINGS, THE DRAWINGS SHALL GOVERN.

36. CONTRACTORS SHALL BE RESPONSIBLE FOR OBTAINING ALL PERMITS AND INSPECTIONS REQUIRED FOR CONSTRUCTION. IF CONTRACTOR CANNOT OBTAIN A PERMIT, THEY MUST NOTIFY THE GENERAL CONTRACTOR IMMEDIATELY.

37. CONTRACTOR SHALL REMOVE ALL TRASH AND DEBRIS FROM THE SITE ON A DAILY BASIS.

38. INFORMATION SHOWN ON THESE DRAWINGS WAS OBTAINED FROM SITE VISITS AND/OR DRAWINGS PROVIDED BY THE SITE OWNER. CONTRACTORS SHALL NOTIFY THE ENGINEER OF ANY DISCREPANCIES PRIOR TO ORDERING MATERIAL OR PROCEEDING WITH CONSTRUCTION.

39. NO WHITE STROBE LIGHTS ARE PERMITTED. LIGHTING IF REQUIRED, WILL MEET FAA STANDARDS AND REQUIREMENTS.

ANTENNA MOUNTING

40. DESIGN AND CONSTRUCTION OF ANTENNA SUPPORTS SHALL CONFORM TO CURRENT ANSI/TIA–222 OR APPLICABLE LOCAL CODES.

41. ALL STEEL MATERIALS SHALL BE GALVANIZED AFTER FABRICATION IN ACCORDANCE WITH ASTM A123 "ZINC (HOT–DIP GALVANIZED) COATINGS ON IRON AND STEEL PRODUCTS", UNLESS NOTED OTHERWISE.

42. ALL BOLTS, ANCHORS AND MISCELLANEOUS HARDWARE SHALL BE GALVANIZED IN ACCORDANCE WITH ASTM A153 "ZINC–COATING (HOT–DIP) ON IRON AND STEEL HARDWARE", UNLESS NOTED OTHERWISE.

43. DAMAGED GALVANIZED SURFACES SHALL BE REPAIRED BY COLD GALVANIZING IN ACCORDANCE WITH ASTM A780.

44. ALL ANTENNA MOUNTS SHALL BE INSTALLED WITH LOCK NUTS, DOUBLE NUTS AND SHALL BE TORQUED TO MANUFACTURER'S RECOMMENDATIONS.

45. CONTRACTOR SHALL INSTALL ANTENNA PER MANUFACTURER'S RECOMMENDATION FOR INSTALLATION AND GROUNDING.

46. ALL UNUSED PORTS ON ANY ANTENNAS SHALL BE TERMINATED WITH A 50–OHM LOAD TO ENSURE ANTENNAS PERFORM AS DESIGNED.

47. PRIOR TO SETTING ANTENNA AZIMUTHS AND DOWNTILTS, ANTENNA CONTRACTOR SHALL CHECK THE ANTENNA MOUNT FOR TIGHTNESS AND ENSURE THAT THEY ARE PLUMB. ANTENNA AZIMUTHS SHALL BE SET FROM TRUE NORTH AND BE ORIENTED WITHIN +/– 5% AS DEFINED BY THE RFDS. ANTENNA DOWNTILTS SHALL BE WITHIN +/– 0.5% AS DEFINED BY THE RFDS. REFER TO ND–00246.

48. JUMPERS FROM THE TMA'S MUST TERMINATE TO OPPOSITE POLARIZATION'S IN EACH SECTOR.

49. CONTRACTOR SHALL RECORD THE SERIAL #, SECTOR, AND POSITION OF EACH ACTUATOR INSTALLED AT THE ANTENNAS AND PROVIDE THE INFORMATION TO AT&T.

50. TMA'S SHALL BE MOUNTED ON PIPE DIRECTLY BEHIND ANTENNAS AS CLOSE TO ANTENNA AS FEASIBLE IN A VERTICAL POSITION.

TORQUE REQUIREMENTS

51. ALL RF CONNECTIONS SHALL BE TIGHTENED BY A TORQUE WRENCH.

52. ALL RF CONNECTIONS, GROUNDING HARDWARE AND ANTENNA HARDWARE SHALL HAVE A TORQUE MARK INSTALLED IN A CONTINUOUS STRAIGHT LINE FROM BOTH SIDES OF THE CONNECTION.
   A. RF CONNECTION BOTH SIDES OF THE CONNECTOR.
   B. GROUNDING AND ANTENNA HARDWARE ON THE NUT SIDE STARTING FROM THE THREADS TO THE SOLID SURFACE. EXAMPLE OF SOLID SURFACE: GROUND BAR, ANTENNA BRACKET METAL.

FIBER & POWER CABLE MOUNTING

53. THE FIBER OPTIC TRUNK CABLES SHALL BE INSTALLED INTO CONDUITS, CHANNEL CABLE TRAYS, OR CABLE TRAY. WHEN INSTALLING FIBER OPTIC TRUNK CABLES INTO A CABLE TRAY SYSTEM, THEY SHALL BE INSTALLED INTO AN INTER DUCT AND A PARTITION BARRIER SHALL BE INSTALLED BETWEEN THE 600 VOLT CABLES AND THE INTER DUCT IN ORDER TO SEGREGATE CABLE TYPES. OPTIC FIBER TRUNK CABLES SHALL HAVE APPROVED CABLE RESTRAINTS EVERY (60) SIXTY FEET AND SECURELY FASTENED TO THE CABLE TRAY SYSTEM. NFPA 70 (NEC) ARTICLE 770 RULES SHALL APPLY.

54. THE TYPE TC–ER CABLES SHALL BE INSTALLED INTO CONDUITS, CHANNEL CABLE TRAYS, OR CABLE TRAY AND SHALL BE SECURED AT INTERVALS NOT EXCEEDING (6) SIX FEET. AN EXCEPTION; WHERE TYPE TC–ER CABLES ARE NOT SUBJECT TO PHYSICAL DAMAGE, CABLES SHALL BE PERMITTED TO MAKE A TRANSITION BETWEEN CONDUITS, CHANNEL CABLE TRAYS, OR CABLE TRAY WHICH ARE SERVING UTILIZATION EQUIPMENT OR DEVICES, A DISTANCE (6) SIX FEET SHALL NOT BE EXCEEDED WITHOUT CONTINUOUS SUPPORTING. NFPA 70 (NEC) ARTICLES 336 AND 392 RULES SHALL APPLY.

55. WHEN INSTALLING OPTIC FIBER TRUNK CABLES OR TYPE TC–ER CABLES INTO CONDUITS, NFPA 70 (NEC) ARTICLE 300 RULES SHALL APPLY.

COAXIAL CABLE NOTES

62. TYPES AND SIZES OF THE ANTENNA CABLE ARE BASED ON ESTIMATED LENGTHS. PRIOR TO

    ORDERING CABLE, CONTRACTOR SHALL VERIFY ACTUAL LENGTH BASED ON CONSTRUCTION LAYOUT AND NOTIFY THE PROJECT MANAGER IF ACTUAL LENGTHS EXCEED ESTIMATED LENGTHS.

63. CONTRACTOR SHALL VERIFY THE DOWN–TILT OF EACH ANTENNA WITH A DIGITAL LEVEL.

64. CONTRACTOR SHALL CONFIRM COAX COLOR CODING PRIOR TO CONSTRUCTION.

65. ALL JUMPERS TO THE ANTENNAS FROM THE MAIN TRANSMISSION LINE SHALL BE 1/2" DIA. LDF AND SHALL NOT EXCEED 6'–0".

66. ALL COAXIAL CABLE SHALL BE SECURED TO THE DESIGNED SUPPORT STRUCTURE, IN AN APPROVED MANNER, AT DISTANCES NOT TO EXCEED 4'–0" OC.

67. CONTRACTOR SHALL FOLLOW ALL MANUFACTURER'S RECOMMENDATIONS REGARDING BOTH THE INSTALLATION AND GROUNDING OF ALL COAXIAL CABLES, CONNECTORS, ANTENNAS, AND ALL OTHER EQUIPMENT.

68. CONTRACTOR SHALL GROUND ALL EQUIPMENT. INCLUDING ANTENNAS, RET MOTORS, TMA'S, COAX CABLES, AND RET CONTROL CABLES AS A COMPLETE SYSTEM. GROUNDING SHALL BE EXECUTED BY QUALIFIED WIREMEN IN COMPLIANCE WITH MANUFACTURER'S SPECIFICATION AND RECOMMENDATION.

69. CONTRACTOR SHALL PROVIDE STRAIN–RELIEF AND CABLE SUPPORTS FOR ALL CABLE ASSEMBLIES, COAX CABLES, AND RET CONTROL CABLES. CABLE STRAIN–RELIEFS AND CABLE SUPPORTS SHALL BE APPROVED FOR THE PURPOSE. INSTALLATION SHALL BE IN ACCORDANCE WITH MANUFACTURER'S SPECIFICATIONS AND RECOMMENDATIONS.

70. CONTRACTOR TO VERIFY THAT EXISTING COAX HANGERS ARE STACKABLE SNAP IN HANGERS. IF EXISTING HANGERS ARE NOT STACKABLE SNAP IN HANGERS THE CONTRACTOR SHALL REPLACE EXISTING HANGERS WITH NEW SNAP IN HANGERS IF APPLICABLE.

GENERAL CABLE AND EQUIPMENT NOTES

71. CONTRACTOR SHALL BE RESPONSIBLE TO VERIFY ANTENNA, TMAS, DIPLEXERS, AND COAX CONFIGURATION, MAKE AND MODELS PRIOR TO INSTALLATION.

72. ALL CONNECTIONS FOR HANGERS, SUPPORTS, BRACING, ETC. SHALL BE INSTALLED PER TOWER MANUFACTURER'S RECOMMENDATIONS.

73. CONTRACTOR SHALL REFERENCE THE TOWER STRUCTURAL ANALYSIS/DESIGN DRAWINGS FOR DIRECTIONS ON CABLE DISTRIBUTION/ROUTING.

74. ALL OUTDOOR RF CONNECTORS/CONNECTIONS SHALL BE WEATHERPROOFED, EXCEPT THE RET CONNECTORS, USING BUTYL TAPE AFTER INSTALLATION AND FINAL CONNECTIONS ARE MADE. BUTYL TAPE SHALL HAVE A MINIMUM OF ONE–HALF TAPE WIDTH OVERLAP ON EACH TURN AND EACH LAYER SHALL BE WRAPPED THREE TIMES. WEATHERPROOFING SHALL BE SMOOTH WITHOUT BUCKLING. BUTYL BLEEDING IS NOT ALLOWED.

75. IF REQUIRED TO PAINT ANTENNAS AND/OR COAX:
   A. TEMPERATURE SHALL BE ABOVE 50° F.
   B. PAINT COLOR MUST BE APPROVED BY BUILDING OWNER/LANDLORD.
   C. FOR REGULATED TOWERS, FAA/FCC APPROVED PAINT IS REQUIRED.
   D. DO NOT PAINT OVER COLOR CODING OR ON EQUIPMENT MODEL NUMBERS

76. ALL CABLES SHALL BE GROUNDED WITH COAXIAL CABLE GROUND KITS. FOLLOW THE MANUFACTURER'S RECOMMENDATIONS.
   A. GROUNDING AT THE ANTENNA LEVEL.
   B. GROUNDING AT MID LEVEL, TOWERS WHICH ARE OVER 200'–0", ADDITIONAL CABLE GROUNDING REQUIRED.
   C. GROUNDING AT BASE OF TOWER PRIOR TO TURNING HORIZONTAL.
   D. GROUNDING OUTSIDE THE EQUIPMENT SHELTER AT ENTRY PORT.
   E. GROUNDING INSIDE THE EQUIPMENT SHELTER AT THE ENTRY PORT.

77. ALL PROPOSED GROUND BAR DOWNLEADS ARE TO BE TERMINATED TO THE EXISTING ADJACENT GROUND BAR DOWNLEADS A MINIMUM DISTANCE OF 4'–0" BELOW GROUND BAR. TERMINATIONS MAY BE EXOTHERMIC OR COMPRESSION.

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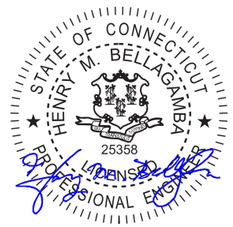


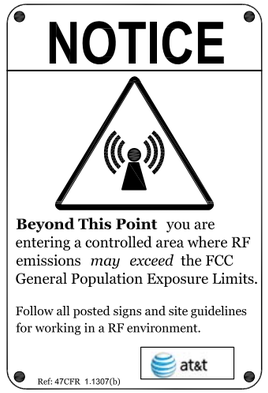
SITE NAME
WATERBURY
CAPTAIN NEVILLE DR

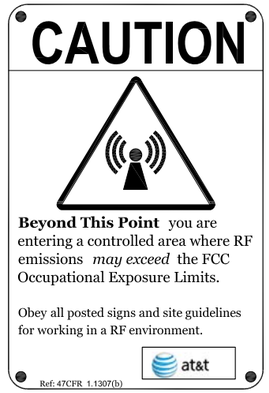
SITE NUMBER:
CTL01127
CROWN BU# 881534

SITE ADDRESS
670 CAPTAIN NEVILLE DRIVE
WATERBURY, CT 06705

SHEET NAME
NOTES AND SPECIFICATIONS

SHEET NUMBER
SP1

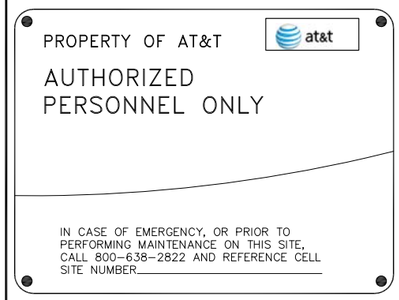


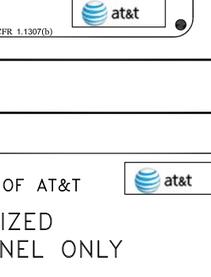


ALERTING SIGNS

ALERTING SIGN

INFO SIGN #4





INFO SIGN #1

INFO SIGN #2

INFO SIGN #3

ALERTING SIGN (FOR CELL SITE BATTERIES)

ALERTING SIGN (FOR DIESEL FUEL)

ALERTING SIGN (FOR PROPANE)

GENERAL SIGNAGE GUIDELINES

STRUCURE TYPLE	INFO SIGN #1	INFO SIGN #2	INFO SIGN #3	INFO SIGN #4	STRIPING	NOTICE SIGN	CAUTION SIGN
TOWERS							
MONOPOLE/MONOPINE/MONOPALM	ENTRANCE GATES, SHELTER DOORS OR ON THE OUTDOOR CABINETS	CLIMBING SIDE OF THE TOWER	ON BACKSIDE OF ANTENNAS	ENTRANCE GATES, SHELTER DOORS OR ON THE OUTDOOR CABINETS			AT THE HEIGHT OF THE FIRST CLIMBING STEP, MIN 9 FT ABOVE GROUND
SEC TOWERS/TOWERS WITH HIGH VOLTAGE	ENTRANCE GATES, SHELTER DOORS OR ON THE OUTDOOR CABINETS	CLIMBING SIDE OF THE TOWER	ON BACKSIDE OF ANTENNAS	ENTRANCE GATES, SHELTER DOORS OR ON THE OUTDOOR CABINETS			
LIGHT POLES/FLAG POLES	ENTRANCE GATES, SHELTER DOORS OR ON THE OUTDOOR CABINETS	ON THE POLE, NO LESS THAN 3FT BELOW THE ANTENNA AND LESS THAN 9FT ABOVE GROUND	ON BACKSIDE OF ANTENNAS	ENTRANCE GATES, SHELTER DOORS OR ON THE OUTDOOR CABINETS			
UTILITY WOOD POLES (JPA)	ENTRANCE GATES, SHELTER DOORS OR ON THE OUTDOOR CABINETS	ON THE POLE, NO LESS THAN 3FT BELOW THE ANTENNA AND LESS THAN 9FT ABOVE GROUND	ON BACKSIDE OF ANTENNAS	ENTRANCE GATES, SHELTER DOORS OR ON THE OUTDOOR CABINETS		IF GP MAX VALUE OF MPE AT ANTENNA LEVEL IS: 0-99%, NOTICE SIGN; OVER 99%: CAUTION SIGN AT NO LESS THAN 3FT BELOW ANTENNA AND 9FT ABOVE GROUND	
MICROCELLS MOUNTED ON NON-JPA POLES	ENTRANCE GATES, SHELTER DOORS OR ON THE OUTDOOR CABINETS	ON THE POLE, NO LESS THAN 3FT BELOW THE ANTENNA AND LESS THAN 9FT ABOVE GROUND	ON BACKSIDE OF ANTENNAS	ENTRANCE GATES, SHELTER DOORS OR ON THE OUTDOOR CABINETS		NOTICE OR CAUTION SIGN AT NO LESS THAN 9FT ABOVE GROUND: ONLY IF THE EXPOSURE EXCEEDS 90% OF THE GENERAL PUBLIC EXPOSURE AT EXPOSURE AT 6FT ABOVE GROUND OR AT OUTSIDE OF SURFACE OF ADJACENT BUILDING	
TOWERS							
AT ALL ACCESS POINTS TO THE ROOF	X			X			
ON ANTENNAS	X		X	X			
CONCEALED ANTENNAS	X	X		X			
ANTENNAS MOUNTED FACING OUTSIDE THE BUILDING	X	X		X			
ANTENNAS ON SUPPORT STRUCTURE	X	X		X			
ROOFVIEW GRAPH							
RADIATION AREA IS WITHIN 3FT FROM ANTENNA	X	ADJACENT TO EACH ANTENNA		X		EITHER NOTICE OR CAUTION SIGN (BASED ON ROOFVIEW RESULTS) AT ANTENNA /BARRIER	
RADIATION AREA IS BEYOND 3FT FROM ANTENNA	X	ADJACENT TO EACH ANTENNA		X	DIAGONAL, YELLOW STRIPING AS TO ROOFVIEW GRAPH		
CHURCH STEEPLES	ACCESS TO STEEPLE	ADJACENT TO ANTENNAS IF ANTENNAS ARE CONCEALED	ON BACKSIDE OF ANTENNAS	ACCESS TO STEEPLE			CAUTION SIGN AT THE ANTENNAS
WATER STATIONS	ACCESS TO LADDER	ADJACENT TO ANTENNAS IF ANTENNAS ARE CONCEALED	ON BACKSIDE OF ANTENNAS	ACCESS TO LADDER			CAUTION SIGN BESIDE INFO SIGN #1, MIN. 9FT ABOVE GROUND

NOTES FOR ROOFTOP SITES:

1. EITHER NOTICE OR CAUTION SIGNS NEED TO BE POSTED AT EACH SECTOR AS CLOSE AS POSSIBLE TO: THE OUTER EDGE OF THE STRIPED OFF AREA OR THE OUTER ANTENNAS OF THE SECTOR
2. IF ROOFVIEWS SHOWS: ONLY BLUE = NOTICE SIGN, BLUE AND YELLOW = CAUTION SIGN, ONLY YELLOW = CAUTION SIGN TO BE INSTALLED
3. SHOULD THE REQUIRED STRIPING AREAS INTERFERE WITH ANY STRUCTURE OR EQUIPMENT (A/C, VENTS, ROOF HATCH, DOORS, OTHER ANTENNAS, DISHES, ETC.). PLEASE NOTIFY AT&T TO MODIFY THE STRIPING AREA, PRIOR TO STARTING THE WORK.

SIGNAGE GUIDELINES CHART

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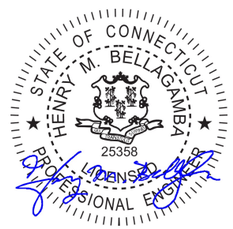

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NOTES AND SPECIFICATIONS

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SP2

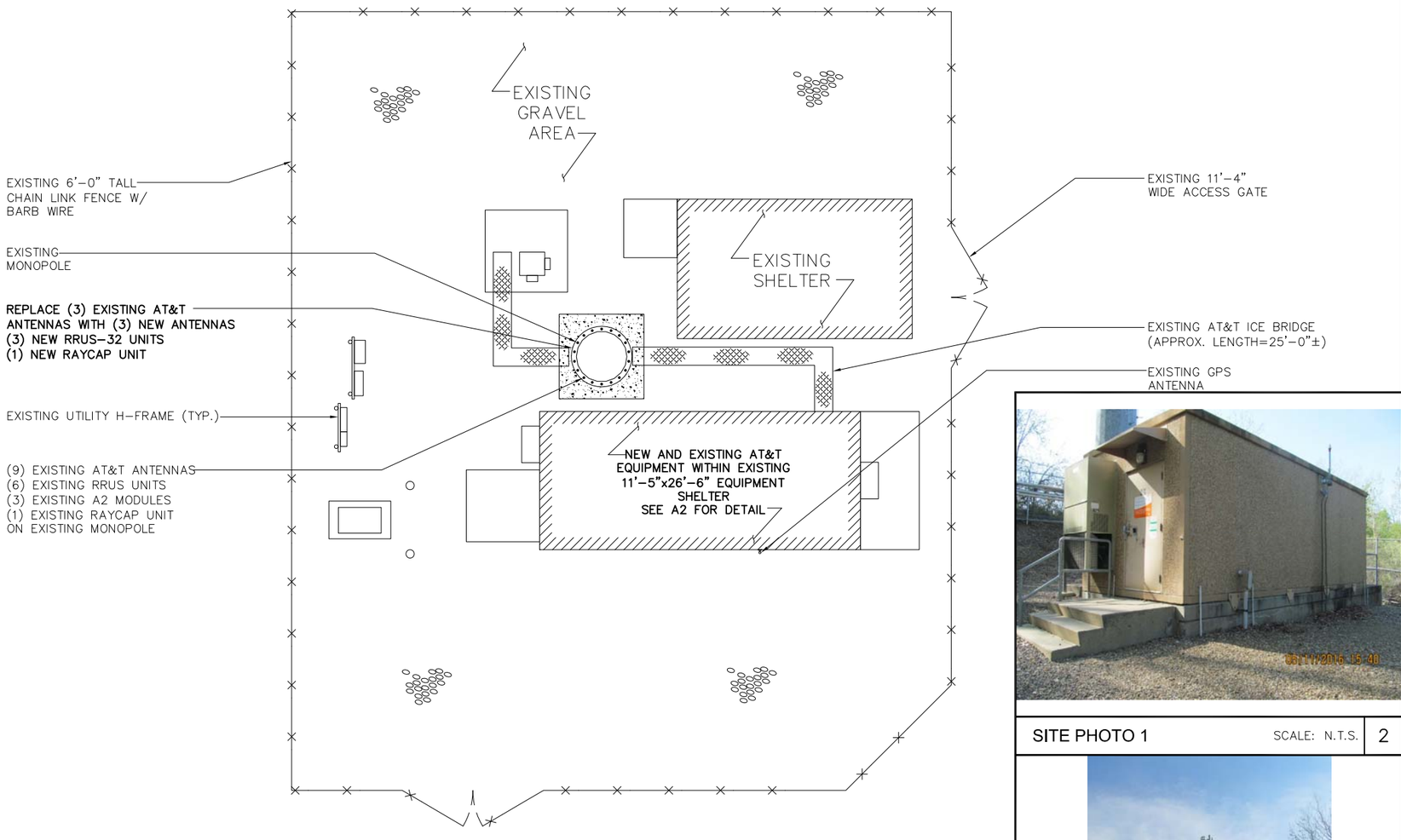
FEC# 2016.0200. 0006

ABBREVIATIONS

AFF	ABOVE FINISHED FLOOR
AGL	ABOVE GRADE LEVEL
AMSL	ABOVE MEAN SEA LEVEL
APPROX	APPROXIMATE
ATS	AUTOMATIC TRANSFER SWITCH
AWG	AMERICAN WIRE GAUGE
BLDG	BUILDING
BTS	BASE TRANSMISSION STATION
℄	CENTERLINE
CLR	CLEAR
COL	COLUMN
CONC	CONCRETE
CND	CONDUIT
DWG	DRAWING
FT	FOOT(FEET)
EGB	EQUIPMENT GROUND BAR
ELEC	ELECTRICAL
EMT	ELECTRICAL METALLIC TUBING
ELEV	ELEVATION
EQUIP	EQUIPMENT
(E)	EXISTING
EXT	EXTERIOR
FND	FOUNDATION
F	FIBER
FIF	FACILITY INTERFACE FRAME
GA	GAUGE
GALV	GALVANIZED
GPS	GLOBAL POSITIONING SYSTEM
GND	GROUND
GSM	GLOBAL SYSTEM FOR MOBILE COMMUNICATION
LTE	LONG TERM EVOLUTION
MAX	MAXIMUM
MCPA	MULTI-CARRIER POWER AMPLIFIER
MFR	MANUFACTURER
MGB	MASTER GROUND BAR
MIN	MINIMUM
MTS	MANUAL TRANSFER SWITCH
N.T.S.	NOT TO SCALE
O.C.	ON CENTER
OE/OT	OVERHEAD ELECTRIC/TELCO
PPC	POWER PROTECTION CABINET
PL	PROPERY LINE
RBS	RADIO BASED STATION
RET	REMOTE ELECTRIC TILT
RRU	REMOTE RADIO UNIT
RGS	RIGID GALVANIZED STEEL
IN	INCH(ES)
INT	INTERIOR
LB(S), #	POUND(S)
SF	SQUARE FOOT
STL	STEEL
TMA	TOWER MOUNTED AMPLIFIER
TYP	TYPICAL
UE/UT	UNDERGROUND ELECTRIC/TELCO
UNO	UNLESS NOTED OTHERWISE
UMTS	UNIVERSAL MOBILE TELE-COMMUNICATION SYSTEM
VIF	VERIFY IN FIELD
W/	WITH
XFMR	TRANSFORMER

SYMBOLS

- REVISION
- WORK POINT
- UTILITY POLE
- COMPRESSED STONE
- BRICK
- GRAVEL
- CONCRETE
- MASONRY
- EARTH
- STEEL
- CENTERLINE
- PROPERTY LINE
- LEASE LINE
- EASEMENT LINE
- CHAIN LINK FENCE
- WOOD FENCE
- UE — BELOW GRADE ELECTRIC
- UT — BELOW GRADE TELEPHONE
- OE/OT — OVERHEAD ELECTRIC/TELEPHONE
- SECTION REFERENCE (A / S-1)



COMPOUND PLAN — SCALE: 3/32" = 1'-0" — 1

SITE PHOTO 1 — SCALE: N.T.S. — 2

SITE PHOTO 2 — SCALE: N.T.S. — 3

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SITE NUMBER:
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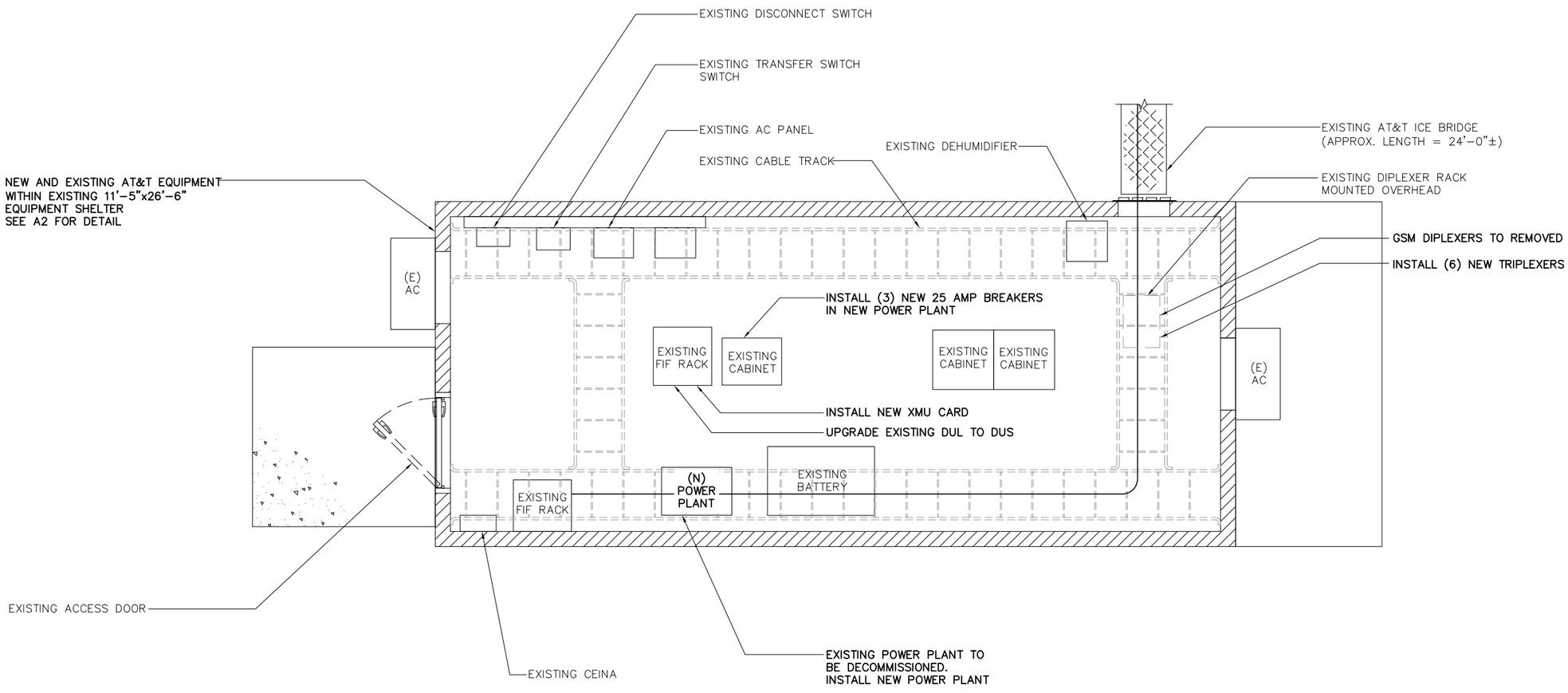
SHEET NAME
COMPOUND PLAN

SHEET NUMBER
A1

FEC# 2016.0200. 0006



EQUIPMENT PLAN

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

1

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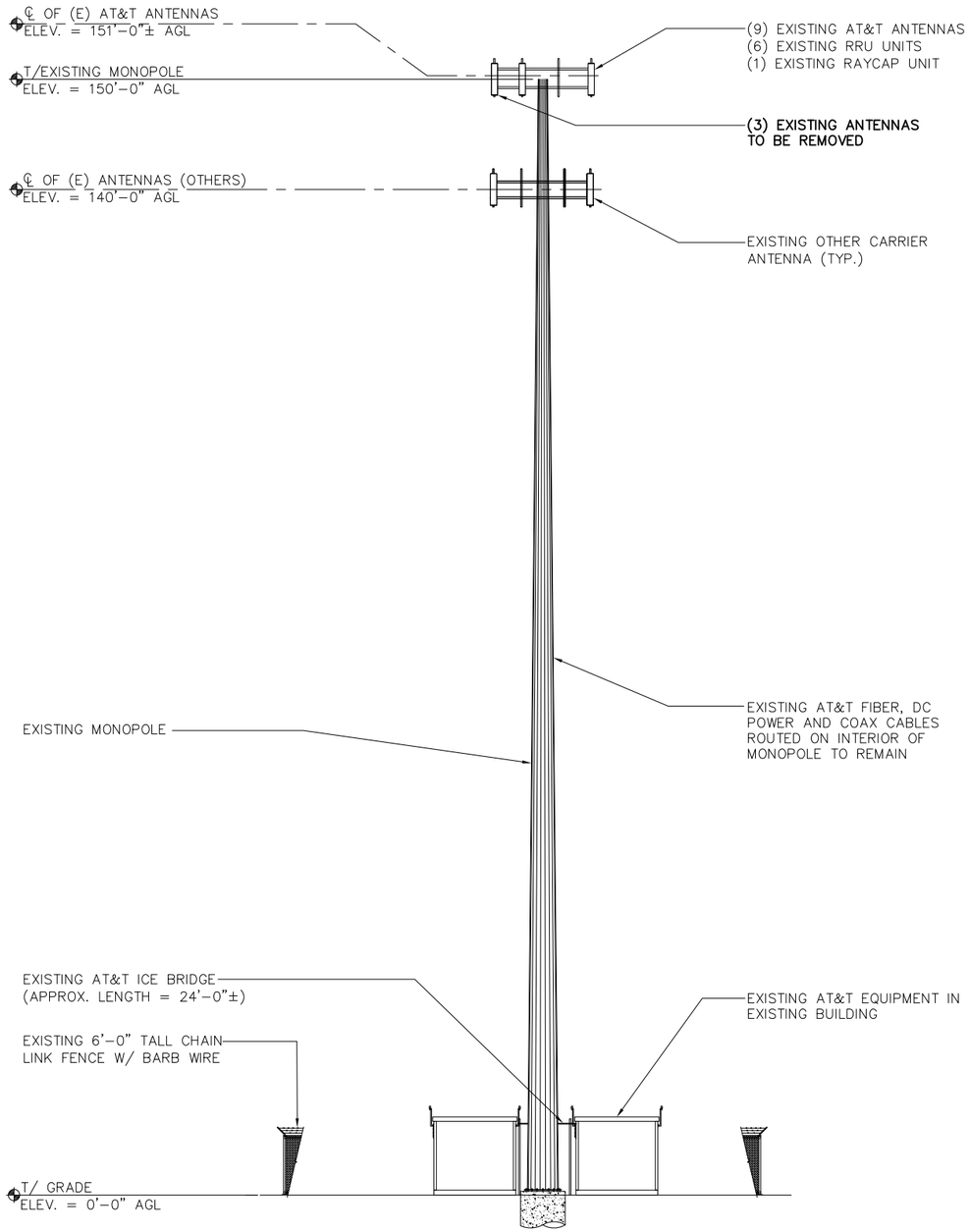
SHEET NAME
EQUIPMENT
PLAN

SHEET NUMBER
A2

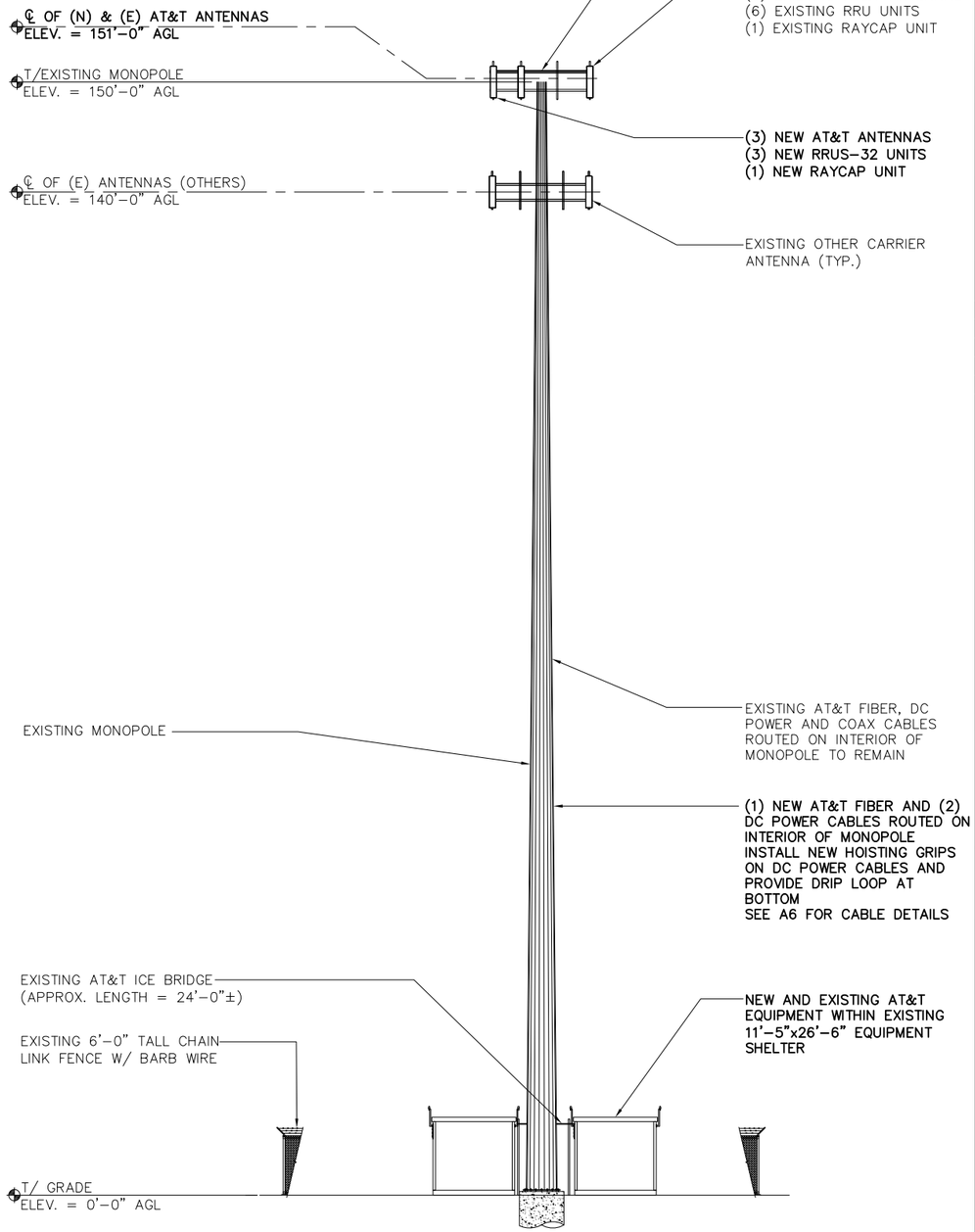
FEC# 2016.0200. 0006

NOTES:

1. CALCULATIONS FOR THE STRUCTURE WERE PREPARED BY OTHERS AND THOSE CALCULATIONS CERTIFY THE CAPACITY OF THE STRUCTURE TO SUPPORT THE NEW EQUIPMENT
2. CALCULATIONS FOR THE ANTENNA MOUNTS WERE PREPARED BY FULLERTON AND THOSE CALCULATIONS CERTIFY THE CAPACITY OF THE STRUCTURE TO SUPPORT THE NEW EQUIPMENT
3. CABLES NOT SHOWN FOR CLARITY



EXISTING ELEVATION — SCALE: 1" = 20'-0" — 1



NEW ELEVATION — SCALE: 1" = 20'-0" — 2

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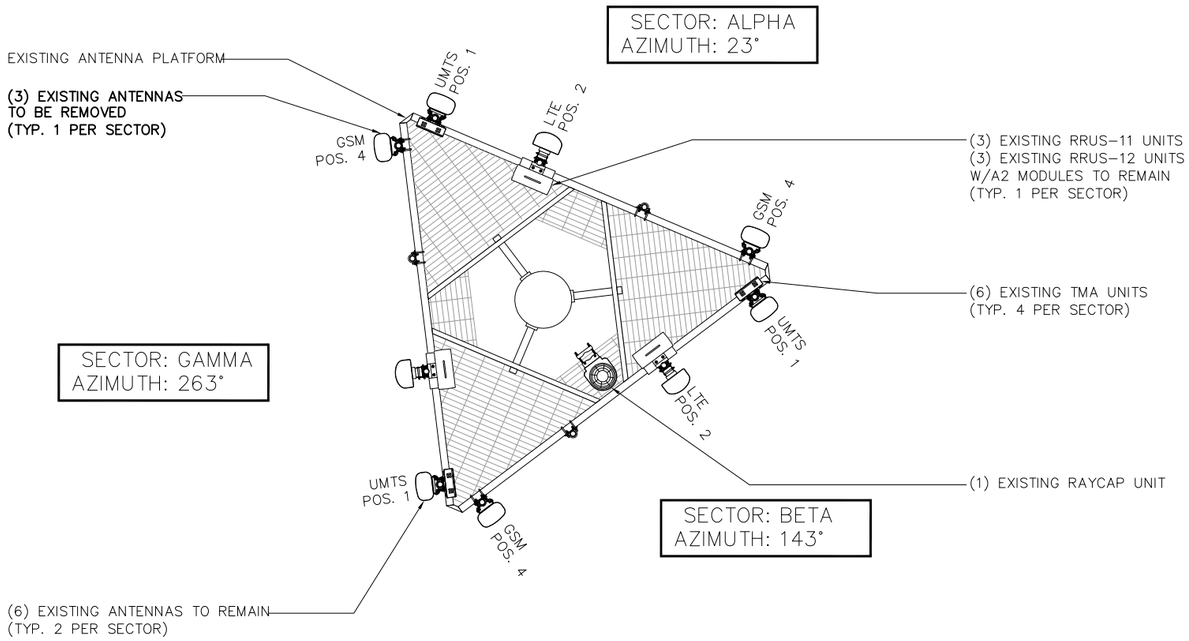
SHEET NAME
ELEVATIONS

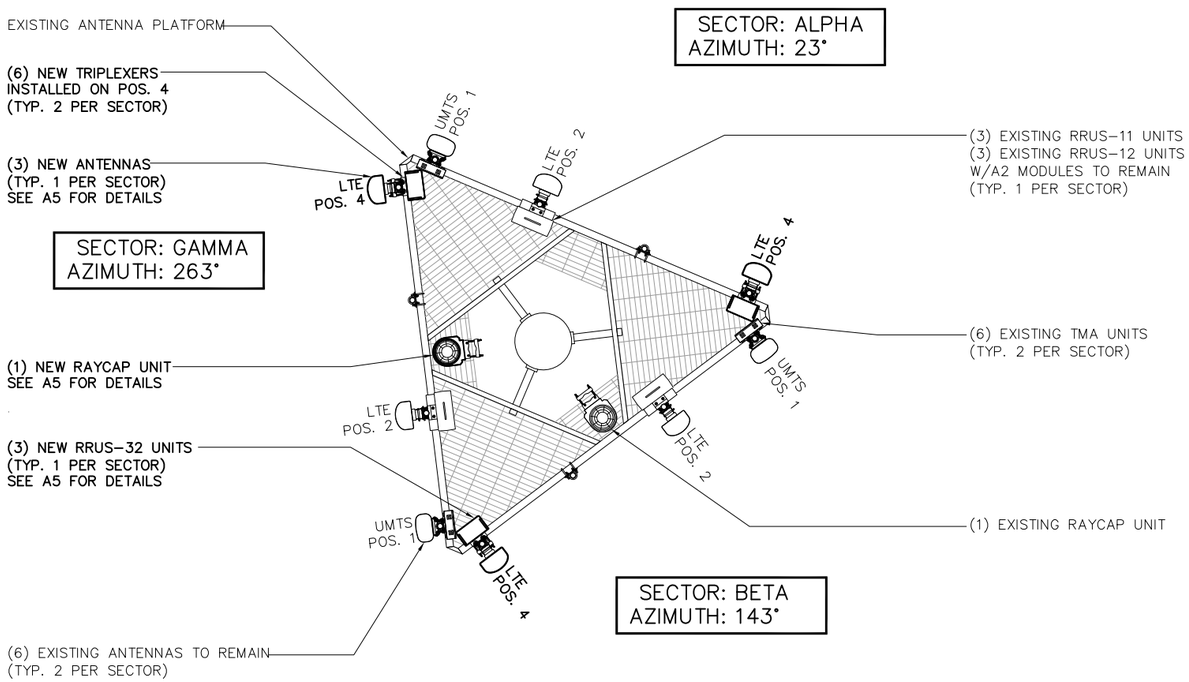
SHEET NUMBER
A3

FEC# 2016.0200. 0006



EXISTING ANTENNA PLAN

SCALE: 3/16" = 1'-0" | 1



FINAL ANTENNA PLAN

SCALE: 3/16" = 1'-0" | 2

NOTE:
ALL EQUIPMENT (ANTENNAS, LINES, ETC.) TO BE INSTALLED IN ACCORDANCE WITH PASSING STRUCTURAL ANALYSIS PROVIDED BY CROWN CASTLE

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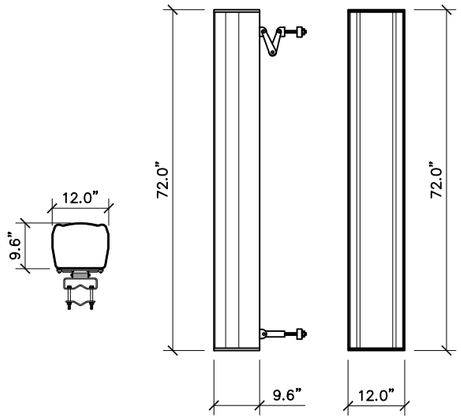
SHEET NAME
ANTENNA
PLANS

SHEET NUMBER
A4

SECTOR GAMMA



PLAN VIEW SIDE VIEW FRONT VIEW

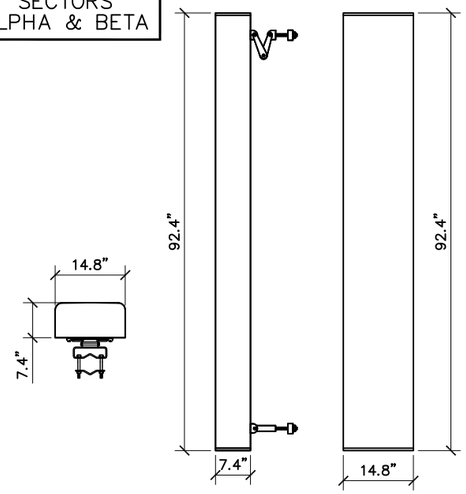
QUINTEL – QS66512-2

MULTISERVE MULITBAND 12 PORT ANTENNA
WITH QTILT AND INTERNAL RET

FREQUENCY RANGE	2x698–806 MHz 2x824–894 MHz 4x1850–1990 MHz 4x1695–1780 +2110–2400 MHz
ANTENNA	111 Lbs
BRACKET	15 Lbs
TOTAL WEIGHT	126 Lbs

ANTENNA SPEC SCALE: N.T.S. 1

SECTORS ALPHA & BETA



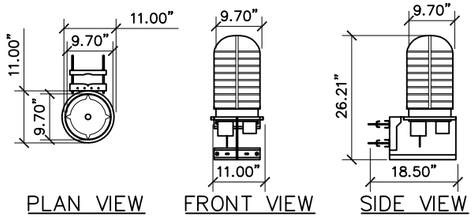
PLAN VIEW SIDE VIEW FRONT VIEW

TPA-65R-LCUUUU-H8

OCTOPORT MULTI-BAND ANTENNA

FREQUENCY RANGE	698–787 MHz 824–894 MHz 1850–1990 MHz 1710–1755/2110–2170 MHz 2305–2360 MHz
ANTENNA	88 Lbs
WITH BRACKET	98 Lbs

ANTENNA SPEC SCALE: N.T.S. 2



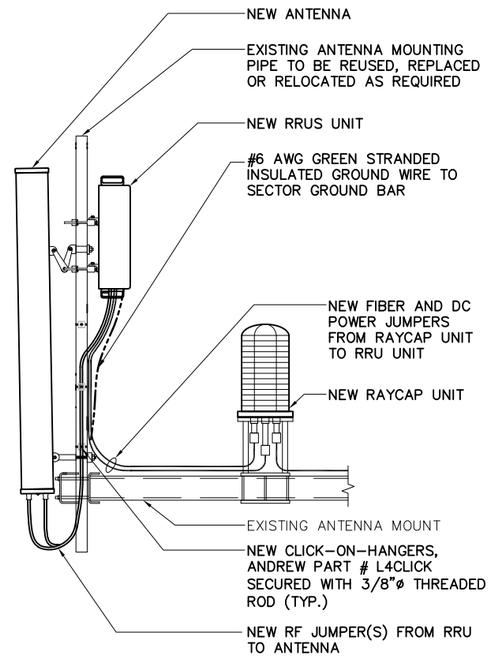
PLAN VIEW FRONT VIEW SIDE VIEW

RAYCAP – DC6-48-60-18-8F

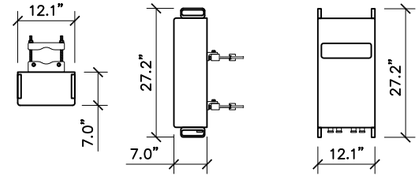
TOWER DC OVER VOLTAGE PROTECTION POWER CONNECTION SOLUTION

UNIT WEIGHT 32.8 Lbs

RAYCAP SPEC SCALE: N.T.S. 3



ANTENNA SCHEMATIC SCALE: N.T.S. 4



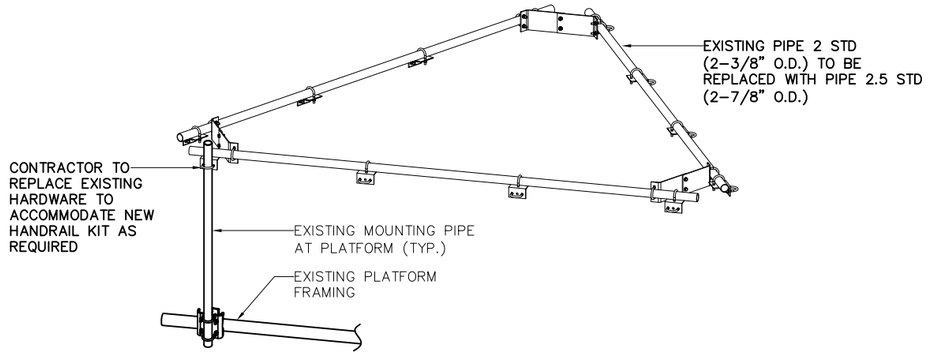
PLAN VIEW SIDE VIEW FRONT VIEW

ERICSSON – RRUS 32 B30

UNIT WEIGHT 60 Lbs

RRU SPEC SCALE: N.T.S. 5

NOT USED SCALE: N.T.S. 6



HANDRAIL DETAIL SCALE: N.T.S. 7

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WATERBURY, CT 06705

SHEET NAME
EQUIPMENT DETAILS

SHEET NUMBER
A5

FEC# 2016.0200. 0006

FINAL ANTENNA CONFIGURATION AND CABLE SCHEDULE
SUPPLIED BY AT&T WIRELESS, FROM RF CONFIG. DATED (04/20/16)

SECTOR	ANTENNA NUMBER	ANTENNA STATUS & TYPE	ANTENNA MODEL NUMBER	ANTENNA VENDOR	TMA/RRU UNIT (BY ANTENNAS)	TMA/RRU UNIT (BY EQUIPMENT)	AZIMUTH	ANTENNA CL FROM GROUND	CABLE FEEDER TYPE	CABLE FEEDER LENGTH	RAYCAP UNIT
ALPHA	A–1	(E) UMTS ANTENNA	800 10121	KATHREIN	(2) EXISTING TMA UNIT(S)	–	23°	151'–0"	1–5/8"ø LDF7–50A	190'–0"	(1) (E) DC6–48–60–18–8F UNIT **(1) (N) DC6–48–60–18–8F UNIT**
									1–5/8"ø LDF7–50A	190'–0"	
	A–2	(E) LTE ANTENNA	OPA–65R–LCUU–H6	CCI	(1) EXISTING RRUS–11 UNIT AND (1) NEW RRUS–12 UNIT W/ A2 MODULE	–	23°	151'–0"	(1) EXISTING FIBER CABLE	190'–0"	
									(2) EXISTING DC POWER CABLES	190'–0"	
	A–3	–	–	–	–	–	–	–	–		
	A–4	**(N) GSM/LTE3C ANTENNA**	**TPA–65R–LCUUUU –H8**	**CCI**	**(1) NEW RRUS–32 UNIT (2) NEW TRIPLEXERS**	–	**23°**	**151'–0"**	(2) 1–5/8"ø LDF7–50A	190'–0"	
									(1) NEW FIBER & (2) NEW DC NEW CABLES	**190'–0"**	
BETA	B–1	(E) UMTS ANTENNA	800 10121	KATHREIN	(2) EXISTING TMA UNIT(S)	–	143°	151'–0"	1–5/8"ø LDF7–50A	120'–0"	
									1–5/8"ø LDF7–50A	120'–0"	
	B–2	(E) LTE ANTENNA	OPA–65R–LCUU–H6	CCI	(1) EXISTING RRUS–11 UNIT AND (1) NEW RRUS–12 UNIT W/ A2 MODULE	–	143°	151'–0"	SEE ANTENNA A–3 FOR CABLE TYPE AND LENGTH		
	B–3	–	–	–	–	–	–	–	–		
	B–4	**(N) GSM/LTE3C ANTENNA**	**TPA–65R–LCUUUU –H8**	**CCI**	**(1) NEW RRUS–32 UNIT (2) NEW TRIPLEXERS**	–	**143°**	**151'–0"**	**SEE ANTENNA A–4 FOR CABLE TYPE AND LENGTH**		
GAMMA	C–1	(E) UMTS ANTENNA	800 10121	KATHREIN	(2) EXISTING TMA UNIT(S)	–	263°	151'–0"	1–5/8"ø LDF7–50A	120'–0"	
									1–5/8"ø LDF7–50A	120'–0"	
	C–2	(E) LTE ANTENNA	OPA–65R–LCUU–H6	CCI	(1) EXISTING RRUS–11 UNIT AND (1) NEW RRUS–12 UNIT W/ A2 MODULE	–	263°	151'–0"	SEE ANTENNA A–3 FOR CABLE TYPE AND LENGTH		
	C–3	–	–	–	–	–	–	–	–		
	C–4	**(N) GSM/LTE3C ANTENNA**	**QS66512–2**	**QUINTEL**	**(1) NEW RRUS–32 UNIT (2) NEW TRIPLEXERS**	–	**263°**	**151'–0"**	**SEE ANTENNA A–4 FOR CABLE TYPE AND LENGTH**		

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WATERBURY, CT 06705

SHEET NAME
ANTENNA & CABLE CONFIGURATION

SHEET NUMBER
A6

1. CONTRACTOR IS TO REFER TO AT&T'S MOST CURRENT RADIO FREQUENCY DATA SHEET (RFDS) PRIOR TO CONSTRUCTION.
2. THE SIZE, HEIGHT, AND DIRECTION OF THE ANTENNAS SHALL BE ADJUSTED TO ACHIEVE THE AZIMUTHS SPECIFIED AND LIMIT SHADOWING AND TO MEET THE SYSTEM REQUIREMENTS.
3. CONTRACTOR SHALL VERIFY THE HEIGHT OF THE ANTENNA WITH THE AT&T WIRELESS PROJECT MANAGER.
4. VERIFY TYPE AND SIZE OF TOWER LEG PRIOR TO ORDERING ANY ANTENNA MOUNT.
5. UNLESS NOTED OTHERWISE THE CONTRACTOR MUST PROVIDE ALL MATERIAL NECESSARY.
6. ANTENNA AZIMUTHS ARE DEGREES OFF OF TRUE NORTH, BEARING CLOCKWISE, IN WHICH ANTENNA FACE IS DIRECTED. ALL ANTENNAS (AND SUPPORTING STRUCTURES AS PRACTICAL) SHALL BE ACCURATELY ORIENTED IN THE SPECIFIED DIRECTION.
7. CONTRACTOR SHALL VERIFY ALL RF INFORMATION PRIOR TO CONSTRUCTION.
8. SWEEP TEST SHALL BE PERFORMED BY GENERAL CONTRACTOR AND SUBMITTED TO AT&T WIRELESS CONSTRUCTION SPECIALIST. TEST SHALL BE PERFORMED PER AT&T WIRELESS STANDARDS.
9. CABLE LENGTHS WERE DETERMINED BASED ON THE DESIGN DRAWING. CONTRACTOR TO VERIFY ACTUAL LENGTH DURING PRE-CONSTRUCTION WALK.
10. CONTRACTOR TO USE ROSENBERGER FIBER LINE HANGER COMPONENTS (OR ENGINEER APPROVED EQUAL).

ANTENNA AND CABLING NOTES

SCALE: N.T.S. | 1

RF, DC, & COAX CABLE MARKING LOCATIONS TABLE	
NO	LOCATIONS
1	EACH TOP-JUMPER SHALL BE COLOR CODED WITH (1) SET OF 3" WIDE BANDS.
2	EACH MAIN COAX SHALL BE COLOR CODED WITH (1) SET OF 3" WIDE BANDS NEAR THE TOP-JUMPER CONNECTION AND WITH (1) SET OF 3/4" WIDE COLOR BANDS JUST PRIOR TO ENTERING THE BTS OR TRANSMITTER BUILDING.
3	CABLE ENTRY PORT ON THE INTERIOR OF THE SHELTER.
4	ALL BOTTOM JUMPERS SHALL BE COLOR CODED WITH (1) SET OF 3/4" WIDE BANDS ON EACH END OF THE BOTTOM JUMPER.
5	ALL BOTTOM JUMPERS SHALL BE COLOR CODED WITH (1) SET OF 3/4" WIDE BANDS ON EACH END OF THE BOTTOM JUMPER.

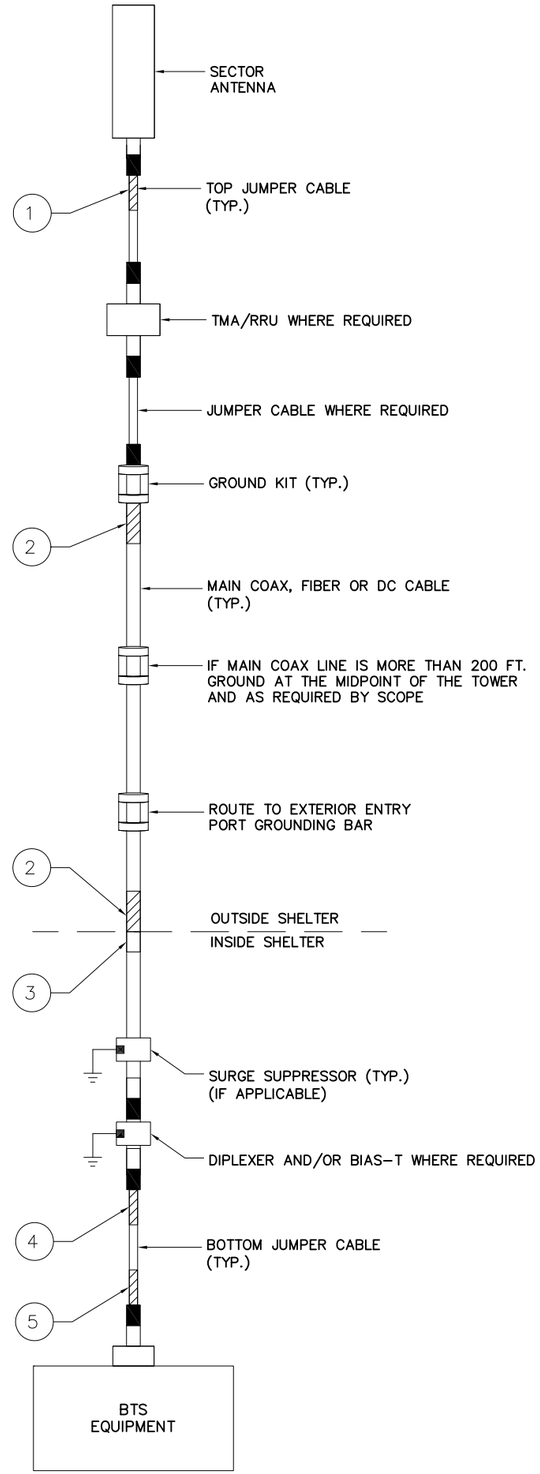
CABLE MARKING DIAGRAM

SCALE: N.T.S. | 2

1. THE ANTENNA SYSTEM COAX SHALL BE LABELED WITH VINYL TAPE.
2. THE STANDARD IS BASED ON EIGHT COLORED TAPES-RED, BLUE, GREEN, YELLOW, ORANGE, BROWN, WHITE, AND VIOLET. THESE TAPES MUST BE 3/4" WIDE & UV RESISTANT SUCH AS SCOTCH 35 VINYL ELECTRICAL COLOR CODING TAPE AND SHOULD BE READILY AVAILABLE TO THE ELECTRICIAN OR CONTRACTOR ON SITE.
3. USING COLOR BANDS ON THE CABLES, MARK ALL RF CABLE BY SECTOR AND CABLE NUMBER AS SHOWN ON "CABLE COLOR CHART".
4. WHEN AN EXISTING COAXIAL LINE THAT IS INTENDED TO BE A SHARED LINE BETWEEN TECHNOLOGIES IS ENCOUNTERED, THE CONTRACTOR SHALL REMOVE THE EXISTING COLOR CODING SCHEME AND REPLACE IT WITH THE COLOR CODING STANDARD. IN THE ABSENCE OF AN EXISTING COLOR CODING AND TAGGING SCHEME, OR WHEN INSTALLING PROPOSED COAXIAL CABLES, THIS GUIDELINE SHALL BE IMPLEMENTED AT THAT SITE REGARDLESS OF TECHNOLOGY.
5. ALL COLOR CODE TAPE SHALL BE 3M-35 AND SHALL BE INSTALLED USING A MINIMUM OF (3) THREE WRAPS OF TAPE AND SHALL BE NEATLY TRIMMED AND SMOOTHED OUT SO AS TO AVOID UNRAVELING.
6. ALL COLOR BANDS INSTALLED AT THE TOP OF THE TOWER SHALL BE A MINIMUM OF 3" WIDE, AND SHALL HAVE A MINIMUM OF 3/4" OF SPACE BETWEEN EACH COLOR.
7. ALL COLOR CODES SHALL BE INSTALLED SO AS TO ALIGN NEATLY WITH ONE ANOTHER FROM SIDE-TO-SIDE.
8. IF EXISTING CABLES AT THE SITE ALREADY HAVE A COLOR CODING SCHEME AND THEY ARE NOT INTENDED TO BE REUSED OR SHARED WITH THE NEW TECHNOLOGY, THE EXISTING COLOR CODING SCHEME SHALL REMAIN UNTOUCHED.

CABLE MARKING NOTES

SCALE: N.T.S. | 3



CABLE COLOR CODING DIAGRAM

SCALE: N.T.S. | 4

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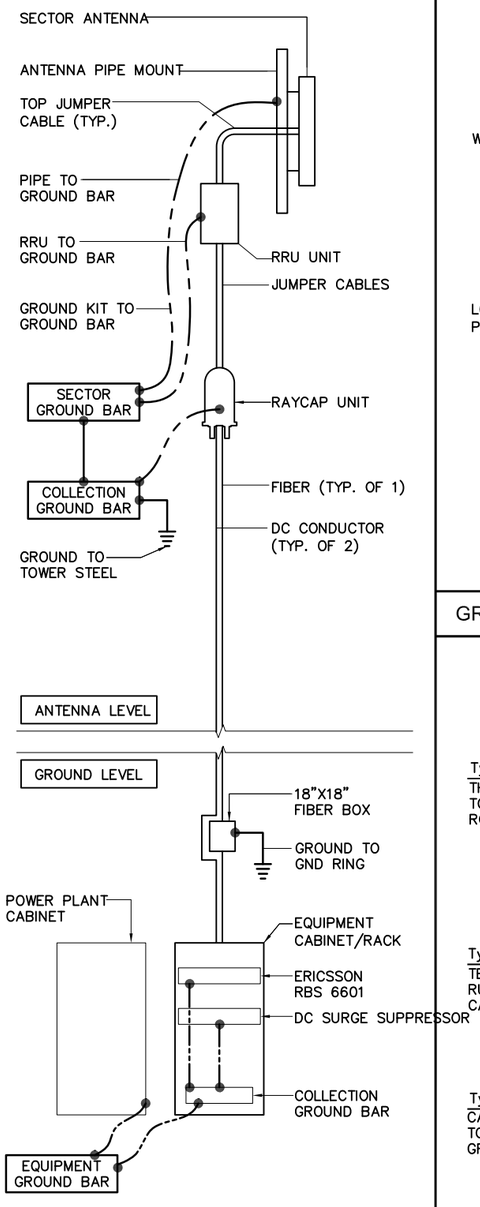
SHEET NAME
CABLE NOTES AND COLOR CODING

SHEET NUMBER
A7



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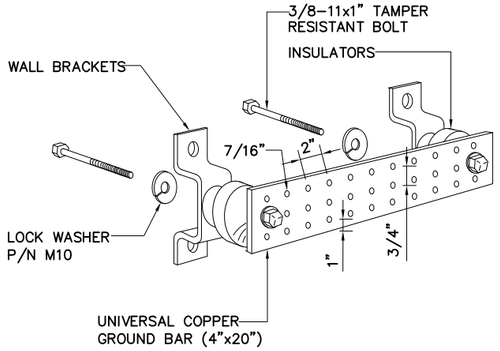
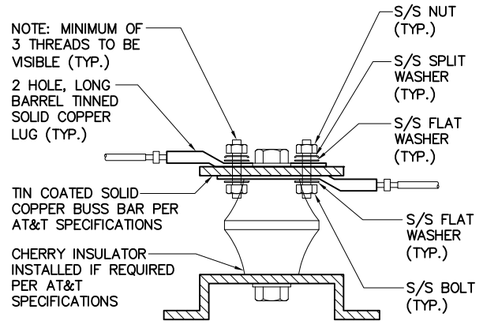


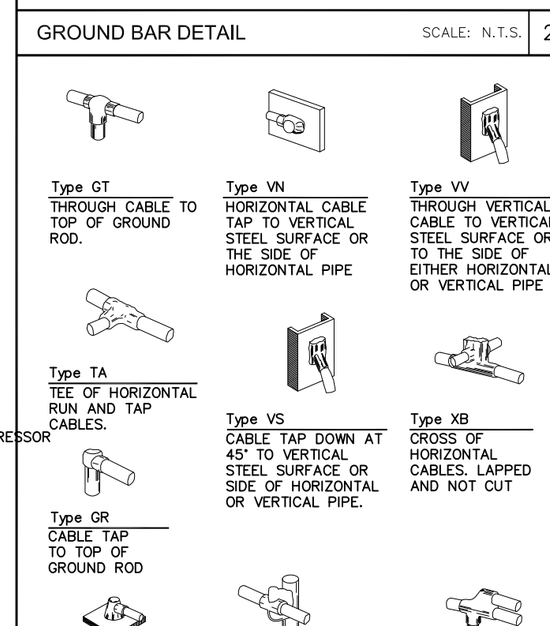
GROUND BAR DETAIL SCALE: N.T.S. 2



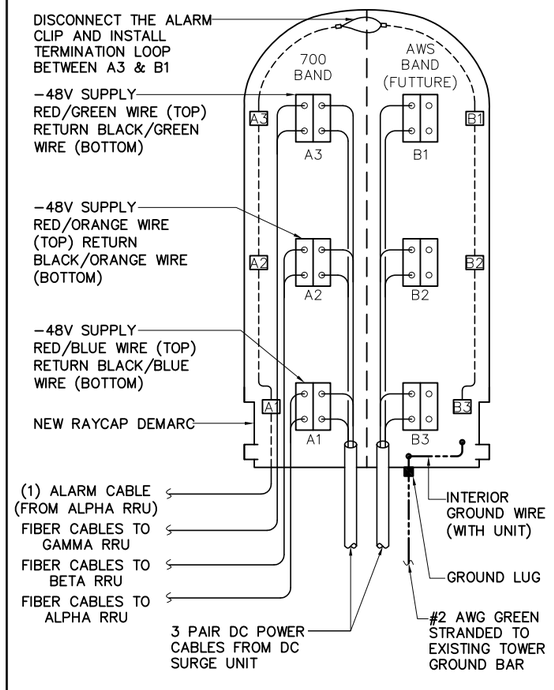
NOTES:

1. ALL HARDWARE 18-8 STAINLESS STEEL INCLUDING SPLIT WASHERS.
2. COAT WIRE END WITH ANTI-OXIDATION COMPOUND PRIOR TO INSERTION INTO LUG BARREL AND CRIMPING.
3. APPLY ANTI-OXIDATION COMPOUND BETWEEN ALL LUGS AND BUSS BARS PRIOR TO MATING AND BOLTING.

LUG DETAIL SCALE: N.T.S. 3



EXOTHERMIC WELD DETAILS SCALE: N.T.S. 4



RAYCAP DC POWER AND ALARM DET. SCALE: N.T.S. 5

NOT USED SCALE: N.T.S. 6

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SHEET NAME
GROUNDING DETAILS

SHEET NUMBER
A8

FEC# 2016.0200. 0006

Date: **August 5, 2016**

Charles McGuirt
Crown Castle
3530 Toringdon Way, Suite 300
Charlotte, NC 28277
(704) 405-6607

SSOE Group
1001 Madison Avenue
Toledo, OH 43604
(419) 255-3830
lsamson-akpan@ssoe.com

Subject:	**Structural Analysis Report**	
Carrier Designation:	***AT&T Mobility* Co-Locate**	
	Carrier Site Number:	CTL01127
	Carrier Site Name:	Waterbury Captain Neville Dr
Crown Castle Designation:	**Crown Castle BU Number:**	881534
	Crown Castle Site Name:	Waterbury Tower
	Crown Castle JDE Job Number:	383606
	Crown Castle Work Order Number:	1258932
	Crown Castle Application Number:	348072 Rev. 6
Engineering Firm Designation:	**SSOE Group Project Number:**	016-00010-00 BC 1708
Site Data:	**670 Captain Neville Drive, Waterbury, CT 06705, New Haven County** **Latitude *41° 32' 3.6"*, Longitude *-72° 58' 8.4"*** **150 Foot – EEI Monopole Tower**	

Dear Mr. Charles McGuirt,

SSOE Group 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 919461, in accordance with application 348072, revision 6.

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:

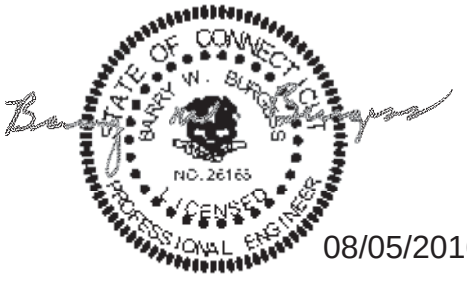
LC5: Existing + Proposed Equipment **Sufficient Capacity**
Note: See Table I and Table II for the proposed and existing/reserved loading, respectively.

The analysis has been performed in accordance with the TIA-222-G, as allowed by Sections 104.10 and 104.11 of the 2005 CT State Building Code with 2009 Amendments, based upon a wind speed of 95 mph 3-second gust, exposure category C.

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

Structural analysis prepared by: LaTasha Samson-Akpan, EI

Respectfully submitted by:



Barry W. Burgess, PE
Section Manager

08/05/2016

TABLE OF CONTENTS

1) INTRODUCTION

The existing 150' monopole has eighteen sides and is evenly tapered from 49.50" (flat-flat) at the base to 17.00" (flat-flat) at the top. It has four major sections, connected with slip joints. The structure is galvanized and has no tower lighting.

The tower was originally designed for Candid Communications by Engineered Endeavors, Inc. of Mentor, Ohio for an 85 mph wind speed with 0.5 inch radial ice in accordance with TIA/EIA-222-F.

2) ANALYSIS CRITERIA

The structural analysis was performed for this tower in accordance with the requirements of TIA-222-G Structural Standards for Steel Antenna Towers and Antenna Supporting Structures using a 3-second gust wind speed of 95 mph with no ice, 50 mph with 0.75 inch ice thickness and 60 mph under service loads, exposure category C.

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
150.0	151.0	2	CCI Antennas	TPA-65R-LCUUUU-H8	1 2	3/8 3/4	1
		6	CCI Antennas	TPX-070821			
		3	Ericsson	RRUS 32			
		1	Quintel Technology	QS66512-2			
		1	Raycap	DC6-48-60-18-8F			

Notes:
1) See Appendix B for the proposed coax layout.

Table 2 - Existing and Reserved Antenna and Cable Information

Mounting Level (ft)	Center Line Elevation (ft)	Number of Antennas	Antenna Manufacturer	Antenna Model	Number of Feed Lines	Feed Line Size (in)	Note
150.0	151.0	3	Kathrein	800 10121			1
		4	Powerwave	LGP13519			
		1	Powerwave	LGP21401			
		3	Ericsson	RRUS 12 W/O SOLAR SHIELD			
		3	CCI Antennas	OPA-65R-LCUU-H6	1 2 12	3/8 3/4 1-5/8	
		3	Communication Components Inc.	DTMABP7819VG12A			
		3	Ericsson	RRUS 11			
		3	Ericsson	RRUS 12 W/O SOLAR SHIELD			
		3	Ericsson	RRUS A2 MODULE			
		3	Kathrein	800 10121			
		3	Powerwave	LGP21401			
		1	Raycap	DC6-48-60-18-8F			
	150.0	1		Platform Mount [LP 1301-1]			

Mounting Level (ft)	Center Line Elevation (ft)	Number of Antennas	Antenna Manufacturer	Antenna Model	Number of Feed Lines	Feed Line Size (in)	Note
140.0	142.0	4	Andrew	VHLP2-11	3 3 3	1/2 1/4 5/16	
		4	Dragonwave	Horizon Compact			
		1	Motorola	TIMING 2000			
	140.0	3	Argus Technologies	LLPX310R w/ Mount Pipe			
		3	Samsung Telecommunications	WIMAX DAP HEAD			
		1		Platform Mount [LP 712-1]			

Notes:
1) Existing equipment to be removed, not considered in analysis.

Table 3 - Design Antenna and Cable Information

Mounting Level (ft)	Center Line Elevation (ft)	Number of Antennas	Antenna Manufacturer	Antenna Model	Number of Feed Lines	Feed Line Size (in)
150.0	150.0	12	Allgon	A-800-110		
		1		Low Profile Platform Mount		
140.0	140.0	12	Allgon	A-800-110		
		1		Low Profile Platform Mount		
130.0	130.0	12	Allgon	A-800-110		
		1		Low Profile Platform Mount		
120.0	120.0	9	Allgon	A-800-110		
		1		Low Profile Platform Mount		

3) ANALYSIS PROCEDURE

Table 4 - Documents Provided

Document	Remarks	Reference	Source
Original Tower Drawings	Engineered Endeavors, Inc. Job #: 6430, dated 2/17/00	Doc ID#: 1405785	Crown DMZ
Foundation Drawings	URS Greiner Woodward Clyde, Project #: F301877.00/F04, dated 1/28/00	Doc ID#:1406237	Crown DMZ
Geotechnical Reports	Clarence Welti Assoc., Project Name: Communications Tower Site, dated 11/30/99	Doc ID#: 1405752	Crown DMZ

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) The tower and foundation were constructed in accordance with their original design and maintained per the manufacturer's specifications, are in good condition, and the tower is twist free and plumb.
2) All member connections are assumed to have been designed to meet or exceed the load carrying capacity of the connected member unless otherwise specified in this report.
3) All equipment model numbers, quantities, and centerline elevations are as provided in the CCI CAD package, dated 5/1/15 with any adjustments as noted below.

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

4) ANALYSIS RESULTS

Table 5 - Section Capacity (Summary)

Section No.	Elevation (ft)	Component Type	Size	Critical Element	P (K)	SF*P_allow (K)	% Capacity	Pass / Fail
L1	150 - 123.29	Pole	TP23.17x17x0.1875	1	-6.82	936.21	54.6	Pass
L2	123.29 - 87.79	Pole	TP30.86x22.005x0.3125	2	-11.45	2176.98	52.3	Pass
L3	87.79 - 43.21	Pole	TP40.4x29.2294x0.375	3	-20.32	3398.73	51.8	Pass
L4	43.21 - 0	Pole	TP49.5x38.3779x0.4375	4	-34.69	4908.34	48.2	Pass
							Summary	
						Pole (L1)	54.6	Pass
						Rating =	**54.6**	**Pass**

Table 6 – Tower Component Stresses vs. Capacity – LC5

Notes	Component	Elevation (ft)	% Capacity	Pass / Fail
1	Anchor Rods		48.6%	Pass
1	Base Plate		60.9%	Pass
1	Foundation (Structural)		37.4%	Pass
1	Foundation (Soil Interaction)		32.9%	Pass

Structure Rating (max from all components) =	**60.9%**

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

4.1) Recommendations

The existing tower and its foundations are sufficient for the proposed loads and do not require modifications.

5) DISCLAIMER OF WARRANTIES

SSOE Group has not performed a site visit to the tower to verify member sizes or antenna/coax loading. SSOE Group shall be contacted immediately if the existing conditions are not as represented on the tower elevation contained in this report in order to evaluate the significance of the discrepancy. SSOE Group has not performed a condition assessment of the tower foundation. This report does not replace a full tower inspection

The engineering services rendered by SSOE Group in connection with this structural analysis are limited to an analysis of the tower structure and theoretical capacity of its main structural members. Miscellaneous items such as antenna mounts, etc., have not been designed or detailed as part of our work. We recommend that material of suitable size and strength be purchased from a reputable tower manufacturer.

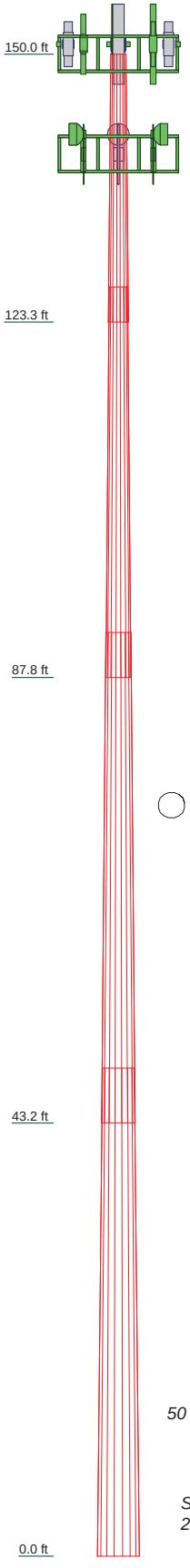
SSOE Group makes no warranties, expressed and/or implied, in connection with this report and disclaims any liability arising from material, fabrication, and erection of this tower. SSOE Group will not be responsible whatsoever for, or on account of, consequential or incidental damages sustained by any person, firm, or organization as a result of any data contained in this report. The maximum liability of SSOE Group pursuant to this report will be limited to the total fee received for preparation of this report.

APPENDIX A

TNXTOWER OUTPUT

Section	1	2	3	4
Length (ft)	26.71	38.92	49.00	48.79
Number of Sides	18	18	18	18
Thickness (in)	0.1875	0.3125	0.3750	0.4375
Socket Length (ft)	3.42	4.42	5.58	
Top Dia (in)	17.0000	22.0050	29.2294	38.3779
Bot Dia (in)	23.1700	30.8600	40.4000	49.5000
Grade	A572-65			
Weight (K)	1.1	3.4	6.8	10.0

Total Weight (K) 21.4



ALL REACTIONS ARE FACTORED

AXIAL 55 K

SHEAR 7 K *MOMENT 733 kip-ft*

TORQUE 0 kip-ft
50 mph WIND - 0.7500 in ICE

AXIAL 35 K

SHEAR 22 K *MOMENT 2350 kip-ft*

TORQUE 1 kip-ft
REACTIONS - 95 mph WIND

DESIGNED APPURTENANCE LOADING

TYPE	ELEVATION	TYPE	ELEVATION
Lighting Rod 3/4" x 5'	150	RRUS A2 MODULE	150
(2) 800 10121	150	DC6-48-60-18-8F	150
OPA-65R-LCUU-H6	150	RRUS 11	150
TPA-65R-LCUUUU-H8	150	RRUS 12 W/O SOLAR SHIELD	150
(2) LGP21401	150	(2) TPX-070821	150
(2) RRUS 32	150	Platform Mount [LP 1301-1]	150
DC6-48-60-18-8F	150	LLPX310R w/ Mount Pipe	140
RRUS A2 MODULE	150	WIMAX DAP HEAD	140
RRUS 12 W/O SOLAR SHIELD	150	Horizon Compact	140
RRUS 11	150	LLPX310R w/ Mount Pipe	140
(2) TPX-070821	150	WIMAX DAP HEAD	140
DTMABP7819VG12A	150	Horizon Compact	140
OPA-65R-LCUU-H6	150	LLPX310R w/ Mount Pipe	140
TPA-65R-LCUUUU-H8	150	TIMING 2000	140
800 10121	150	WIMAX DAP HEAD	140
RRUS 11	150	Horizon Compact	140
RRUS A2 MODULE	150	Horizon Compact	140
RRUS 12 W/O SOLAR SHIELD	150	(3) 6' x 2" mount pipe	140
(2) TPX-070821	150	(3) 6' x 2" mount pipe	140
LGP21401	150	(3) 6' x 2" mount pipe	140
DTMABP7819VG12A	150	Platform Mount [LP 712-1]	140
RRUS 32	150	VHLP2-11	140
DTMABP7819VG12A	150	VHLP2-11	140
OPA-65R-LCUU-H6	150	VHLP2-11	140
QS66512-2	150	VHLP2-11	140

MATERIAL STRENGTH

GRADE	Fy	Fu	GRADE	Fy	Fu
A572-65	65 ksi	80 ksi			

TOWER DESIGN NOTES

1. Tower is located in New Haven County, Connecticut.
2. Tower designed for Exposure C to the TIA-222-G Standard.
3. Tower designed for a 95 mph basic wind in accordance with the TIA-222-G Standard.
4. Tower is also designed for a 50 mph basic wind with 0.75 in ice. Ice is considered to increase in thickness with height.
5. Deflections are based upon a 60 mph wind.
6. Tower Structure Class II.
7. Topographic Category 1 with Crest Height of 0.00 ft
8. TOWER RATING: 54.6%

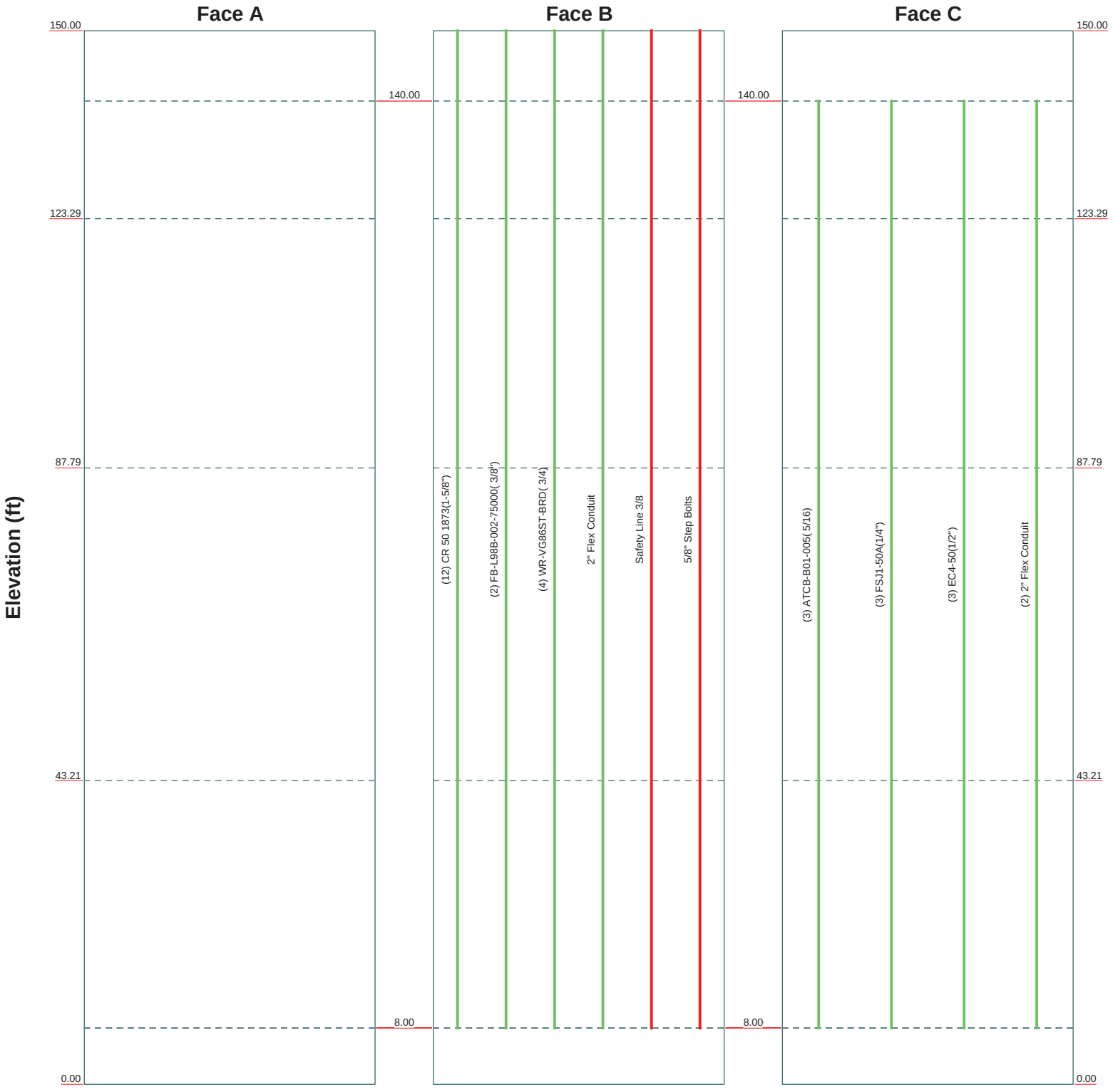
making clients successful by saving them time, trouble, and money

SSOE Group
1001 Madison Ave.
Toledo, OH 43604
Phone: (419) 255-3830
FAX: (419) 255-6101

Job: ***BU 881534 Waterbury Tower***			
Project: ***016-00010-00***			
Client: CCI	Drawn by: 15423	App'd:	
Code: TIA-222-G	Date: 08/05/16	Scale: NTS	
Path: C:\Users\15423\Desktop\SAs\7 July 2016\1 BU 881534\Working\tnx\881534.eri		Dwg No. E-1	

Feed Line Distribution Chart
0' - 150'

Round | Flat | App In Face | App Out Face | Truss Leg



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Client: CCI	Drawn by: 15423	App'd:
Code: TIA-222-G	Date: 08/05/16	Scale: NTS
Path: C:\Users\15423\Desktop\SAs\7 July 2016\1 BU 881534\Working\tnx\881534.eri		Dwg No. E-7

Tower Input Data

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

Tower is located in New Haven County, Connecticut.
Basic wind speed of 95 mph.
Structure Class II.
Exposure Category C.
Topographic Category 1.
Crest Height 0.00 ft.
Nominal ice thickness of 0.7500 in.
Ice thickness is considered to increase with height.
Ice density of 56 pcf.
A wind speed of 50 mph is used in combination with ice.
Temperature drop of 50 °F.
Deflections calculated using a wind speed of 60 mph.
A non-linear (P-delta) analysis was used.
Pressures are calculated at each section.
Stress ratio used in pole design is 1.
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	150.00-123.29	26.71	3.42	18	17.0000	23.1700	0.1875	0.7500	A572-65 (65 ksi)
L2	123.29-87.79	38.92	4.42	18	22.0050	30.8600	0.3125	1.2500	A572-65 (65 ksi)

Section	Elevation ft	Section Length ft	Splice Length ft	Number of Sides	Top Diameter in	Bottom Diameter in	Wall Thickness in	Bend Radius in	Pole Grade
L3	87.79-43.21	49.00	5.58	18	29.2294	40.4000	0.3750	1.5000	A572-65 (65 ksi)
L4	43.21-0.00	48.79		18	38.3779	49.5000	0.4375	1.7500	A572-65 (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^2	w in	w/t
L1	17.2623	10.0055	357.3078	5.9684	8.6360	41.3742	715.0858	5.0037	2.6620	14.197
	23.5274	13.6775	912.7198	8.1588	11.7704	77.5439	1826.6405	6.8400	3.7479	19.989
L2	23.1346	21.5162	1279.1518	7.7008	11.1785	114.4293	2559.9867	10.7602	3.3229	10.633
	31.3361	30.2993	3572.0820	10.8444	15.6769	227.8567	7148.8642	15.1525	4.8814	15.62
L3	30.7035	34.3439	3612.5207	10.2433	14.8485	243.2916	7229.7948	17.1752	4.4844	11.958
	41.0232	47.6398	9642.0563	14.2089	20.5232	469.8125	19296.7998	23.8244	6.4504	17.201
L4	40.2616	52.6850	9581.3939	13.4688	19.4960	491.4548	19175.3953	26.3475	5.9845	13.679
	50.2636	68.1294	20719.1270	17.4172	25.1460	823.9532	41465.5167	34.0712	7.9420	18.153

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 150.00-123.29				1	1	1			
L2 123.29-87.79				1	1	1			
L3 87.79-43.21				1	1	1			
L4 43.21-0.00				1	1	1			

Feed Line/Linear Appurtenances - Entered As Round Or Flat

Description	Sector	Component Type	Placement ft	Total Number	Number Per Row	Start/End Position	Width or Diameter in	Perimeter in	Weight plf
Safety Line 3/8	B	Surface Ar (CaAa)	150.00 - 8.00	1	1	0.000 0.000	0.3750		0.22
5/8" Step Bolts	B	Surface Ar (CaAa)	150.00 - 8.00	1	1	0.000 0.000	0.4167		1.00

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
CR 50 1873(1-5/8")	B	No	Inside Pole	150.00 - 8.00	12	No Ice	0.00	0.83
						1/2" Ice	0.00	0.83
						1" Ice	0.00	0.83
FB-L98B-002-75000(	B	No	Inside Pole	150.00 - 8.00	2	No Ice	0.00	0.06

Description	Face or Leg	Allow Shield	Component Type	Placement ft	Total Number		C_AA_A ft^2/ft	Weight plf
3/8")						1/2" Ice	0.00	0.06
						1" Ice	0.00	0.06
WR-VG86ST-BRD(3/4)	B	No	Inside Pole	150.00 - 8.00	4	No Ice	0.00	0.59
						1/2" Ice	0.00	0.59
						1" Ice	0.00	0.59
2" Flex Conduit	B	No	Inside Pole	150.00 - 8.00	1	No Ice	0.00	0.32
						1/2" Ice	0.00	0.32
						1" Ice	0.00	0.32
ATCB-B01-005(5/16)	C	No	Inside Pole	140.00 - 8.00	3	No Ice	0.00	0.07
						1/2" Ice	0.00	0.07
						1" Ice	0.00	0.07
FSJ1-50A(1/4")	C	No	Inside Pole	140.00 - 8.00	3	No Ice	0.00	0.04
						1/2" Ice	0.00	0.04
						1" Ice	0.00	0.04
EC4-50(1/2")	C	No	Inside Pole	140.00 - 8.00	3	No Ice	0.00	0.16
						1/2" Ice	0.00	0.16
						1" Ice	0.00	0.16
2" Flex Conduit	C	No	Inside Pole	140.00 - 8.00	2	No Ice	0.00	0.32
						1/2" Ice	0.00	0.32
						1" Ice	0.00	0.32

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	150.00-123.29	A	0.000	0.000	0.000	0.000	0.00
		B	0.000	0.000	2.115	0.000	0.37
		C	0.000	0.000	0.000	0.000	0.02
L2	123.29-87.79	A	0.000	0.000	0.000	0.000	0.00
		B	0.000	0.000	2.810	0.000	0.50
		C	0.000	0.000	0.000	0.000	0.05
L3	87.79-43.21	A	0.000	0.000	0.000	0.000	0.00
		B	0.000	0.000	3.529	0.000	0.62
		C	0.000	0.000	0.000	0.000	0.07
L4	43.21-0.00	A	0.000	0.000	0.000	0.000	0.00
		B	0.000	0.000	2.787	0.000	0.49
		C	0.000	0.000	0.000	0.000	0.05

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	150.00-123.29	A	1.728	0.000	0.000	0.000	0.000	0.00
		B		0.000	0.000	20.578	0.000	0.61
		C		0.000	0.000	0.000	0.000	0.02
L2	123.29-87.79	A	1.684	0.000	0.000	0.000	0.000	0.00
		B		0.000	0.000	27.350	0.000	0.81
		C		0.000	0.000	0.000	0.000	0.05
L3	87.79-43.21	A	1.605	0.000	0.000	0.000	0.000	0.00
		B		0.000	0.000	33.554	0.000	1.00
		C		0.000	0.000	0.000	0.000	0.07
L4	43.21-0.00	A	1.438	0.000	0.000	0.000	0.000	0.00
		B		0.000	0.000	25.389	0.000	0.77

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
		C		0.000	0.000	0.000	0.000	0.05

Feed Line Center of Pressure

Section	Elevation ft	CP_X in	CP_Z in	CP_X Ice in	CP_Z Ice in
L1	150.00-123.29	0.0987	-0.0570	0.6193	-0.3576
L2	123.29-87.79	0.0993	-0.0573	0.6821	-0.3938
L3	87.79-43.21	0.0998	-0.0576	0.7235	-0.4177
L4	43.21-0.00	0.0802	-0.0463	0.6057	-0.3497

Shielding Factor Ka

Tower Section	Feed Line Record No.	Description	Feed Line Segment Elev.	K_a No Ice	K_a Ice
L1	9	Safety Line 3/8	123.29 - 150.00	1.0000	1.0000
L1	10	5/8" Step Bolts	123.29 - 150.00	1.0000	1.0000
L2	9	Safety Line 3/8	87.79 - 123.29	1.0000	1.0000
L2	10	5/8" Step Bolts	87.79 - 123.29	1.0000	1.0000
L3	9	Safety Line 3/8	43.21 - 87.79	1.0000	1.0000
L3	10	5/8" Step Bolts	43.21 - 87.79	1.0000	1.0000

Discrete Tower Loads

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
Lighting Rod 3/4" x 5'	C	From Leg	0.00 / 0.00 / 2.50	0.0000	150.00	No Ice	0.38	0.38	0.03
						1/2" Ice	0.89	0.89	0.03
						1" Ice	1.36	1.36	0.04
(2) 800 10121	A	From Centroid-Leg	4.00 / 0.00 / 1.00	0.0000	150.00	No Ice	5.16	3.29	0.05
						1/2" Ice	5.51	3.64	0.08
						1" Ice	5.87	3.99	0.12
OPA-65R-LCUU-H6	A	From Centroid-Leg	4.00 / 0.00 / 1.00	0.0000	150.00	No Ice	0.00	0.00	0.00
						1/2" Ice	0.00	0.00	0.00
						1" Ice	0.00	0.00	0.00
TPA-65R-LCUUUU-H8	A	From	4.00	0.0000	150.00	No Ice	13.30	8.82	0.08

Description	Face or Leg	Offset Type	Offsets: Horz Lateral ft	Offsets: Vert ft	Offsets: ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
		Centroid-Le	0.00					1/2" Ice	13.90	9.42	0.16
		g	1.00					1" Ice	14.50	10.03	0.25
(2) LGP21401	A	From	4.00			0.0000	150.00	No Ice	1.10	0.21	0.01
		Centroid-Le	0.00					1/2" Ice	1.24	0.27	0.02
		g	1.00					1" Ice	1.38	0.35	0.03
(2) RRUS 32	A	From	4.00			0.0000	150.00	No Ice	2.86	1.78	0.06
		Centroid-Le	0.00					1/2" Ice	3.08	1.97	0.08
		g	1.00					1" Ice	3.32	2.17	0.10
DC6-48-60-18-8F	A	From	4.00			0.0000	150.00	No Ice	2.20	2.20	0.02
		Centroid-Le	0.00					1/2" Ice	2.40	2.40	0.04
		g	1.00					1" Ice	2.60	2.60	0.07
RRUS A2 MODULE	A	From	4.00			0.0000	150.00	No Ice	1.60	0.38	0.02
		Centroid-Le	0.00					1/2" Ice	1.76	0.47	0.03
		g	1.00					1" Ice	1.92	0.57	0.04
RRUS 12 W/O SOLAR	A	From	4.00			0.0000	150.00	No Ice	2.47	0.86	0.06
SHIELD		Centroid-Le	0.00					1/2" Ice	2.67	0.99	0.08
		g	1.00					1" Ice	2.87	1.13	0.10
RRUS 11	A	From	4.00			0.0000	150.00	No Ice	2.78	1.19	0.05
		Centroid-Le	0.00					1/2" Ice	2.99	1.33	0.07
		g	1.00					1" Ice	3.21	1.49	0.10
(2) TPX-070821	A	From	4.00			0.0000	150.00	No Ice	0.47	0.10	0.01
		Centroid-Le	0.00					1/2" Ice	0.56	0.15	0.01
		g	1.00					1" Ice	0.66	0.20	0.02
DTMABP7819VG12A	A	From	4.00			0.0000	150.00	No Ice	0.98	0.34	0.02
		Centroid-Le	0.00					1/2" Ice	1.10	0.42	0.03
		g	1.00					1" Ice	1.23	0.51	0.04
OPA-65R-LCUU-H6	B	From	4.00			0.0000	150.00	No Ice	0.00	0.00	0.00
		Centroid-Le	0.00					1/2" Ice	0.00	0.00	0.00
		g	1.00					1" Ice	0.00	0.00	0.00
TPA-65R-LCUUUU-H8	B	From	4.00			0.0000	150.00	No Ice	13.30	8.82	0.08
		Centroid-Le	0.00					1/2" Ice	13.90	9.42	0.16
		g	1.00					1" Ice	14.50	10.03	0.25
800 10121	B	From	4.00			0.0000	150.00	No Ice	5.16	3.29	0.05
		Centroid-Le	0.00					1/2" Ice	5.51	3.64	0.08
		g	1.00					1" Ice	5.87	3.99	0.12
RRUS 11	B	From	4.00			0.0000	150.00	No Ice	2.78	1.19	0.05
		Centroid-Le	0.00					1/2" Ice	2.99	1.33	0.07
		g	1.00					1" Ice	3.21	1.49	0.10
RRUS A2 MODULE	B	From	4.00			0.0000	150.00	No Ice	1.60	0.38	0.02
		Centroid-Le	0.00					1/2" Ice	1.76	0.47	0.03
		g	1.00					1" Ice	1.92	0.57	0.04
RRUS 12 W/O SOLAR	B	From	4.00			0.0000	150.00	No Ice	2.47	0.86	0.06
SHIELD		Centroid-Le	0.00					1/2" Ice	2.67	0.99	0.08
		g	1.00					1" Ice	2.87	1.13	0.10
(2) TPX-070821	B	From	4.00			0.0000	150.00	No Ice	0.47	0.10	0.01
		Centroid-Le	0.00					1/2" Ice	0.56	0.15	0.01
		g	1.00					1" Ice	0.66	0.20	0.02
LGP21401	B	From	4.00			0.0000	150.00	No Ice	1.10	0.21	0.01
		Centroid-Le	0.00					1/2" Ice	1.24	0.27	0.02
		g	1.00					1" Ice	1.38	0.35	0.03
DTMABP7819VG12A	B	From	4.00			0.0000	150.00	No Ice	0.98	0.34	0.02
		Centroid-Le	0.00					1/2" Ice	1.10	0.42	0.03
		g	1.00					1" Ice	1.23	0.51	0.04
RRUS 32	B	From	4.00			0.0000	150.00	No Ice	2.86	1.78	0.06
		Centroid-Le	0.00					1/2" Ice	3.08	1.97	0.08
		g	1.00					1" Ice	3.32	2.17	0.10
DTMABP7819VG12A	C	From	4.00			0.0000	150.00	No Ice	0.98	0.34	0.02

Description	Face or Leg	Offset Type	Offsets: Horz Lateral ft	Offsets: Vert ft	Offsets: ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
		Centroid-Le	0.00					1/2" Ice	1.10	0.42	0.03
		g	1.00					1" Ice	1.23	0.51	0.04
OPA-65R-LCUU-H6	C	From	4.00			0.0000	150.00	No Ice	0.00	0.00	0.00
		Centroid-Le	0.00					1/2" Ice	0.00	0.00	0.00
		g	1.00					1" Ice	0.00	0.00	0.00
QS66512-2	C	From	4.00			0.0000	150.00	No Ice	8.13	6.80	0.11
		Centroid-Le	0.00					1/2" Ice	8.59	7.27	0.17
		g	1.00					1" Ice	9.05	7.72	0.23
RRUS A2 MODULE	C	From	4.00			0.0000	150.00	No Ice	1.60	0.38	0.02
		Centroid-Le	0.00					1/2" Ice	1.76	0.47	0.03
		g	1.00					1" Ice	1.92	0.57	0.04
DC6-48-60-18-8F	C	From	4.00			0.0000	150.00	No Ice	2.20	2.20	0.02
		Centroid-Le	0.00					1/2" Ice	2.40	2.40	0.04
		g	1.00					1" Ice	2.60	2.60	0.07
RRUS 11	C	From	4.00			0.0000	150.00	No Ice	2.78	1.19	0.05
		Centroid-Le	0.00					1/2" Ice	2.99	1.33	0.07
		g	1.00					1" Ice	3.21	1.49	0.10
RRUS 12 W/O SOLAR	C	From	4.00			0.0000	150.00	No Ice	2.47	0.86	0.06
SHIELD		Centroid-Le	0.00					1/2" Ice	2.67	0.99	0.08
		g	1.00					1" Ice	2.87	1.13	0.10
(2) TPX-070821	C	From	4.00			0.0000	150.00	No Ice	0.47	0.10	0.01
		Centroid-Le	0.00					1/2" Ice	0.56	0.15	0.01
		g	1.00					1" Ice	0.66	0.20	0.02
Platform Mount [LP 1301-1]	C	None				0.0000	150.00	No Ice	51.70	51.70	2.26
								1/2" Ice	62.70	62.70	2.94
								1" Ice	73.70	73.70	3.61
LLPX310R w/ Mount Pipe	A	From	4.00			0.0000	140.00	No Ice	4.54	2.98	0.05
		Centroid-Le	0.00					1/2" Ice	4.89	3.53	0.08
		g	0.00					1" Ice	5.25	4.09	0.13
WIMAX DAP HEAD	A	From	4.00			0.0000	140.00	No Ice	1.55	0.68	0.03
		Centroid-Le	0.00					1/2" Ice	1.70	0.80	0.04
		g	0.00					1" Ice	1.87	0.92	0.06
Horizon Compact	A	From	4.00			0.0000	140.00	No Ice	0.72	0.37	0.01
		Centroid-Le	0.00					1/2" Ice	0.83	0.45	0.02
		g	2.00					1" Ice	0.94	0.54	0.03
LLPX310R w/ Mount Pipe	B	From	4.00			0.0000	140.00	No Ice	4.54	2.98	0.05
		Centroid-Le	0.00					1/2" Ice	4.89	3.53	0.08
		g	0.00					1" Ice	5.25	4.09	0.13
WIMAX DAP HEAD	B	From	4.00			0.0000	140.00	No Ice	1.55	0.68	0.03
		Centroid-Le	0.00					1/2" Ice	1.70	0.80	0.04
		g	0.00					1" Ice	1.87	0.92	0.06
Horizon Compact	B	From	4.00			0.0000	140.00	No Ice	0.72	0.37	0.01
		Centroid-Le	0.00					1/2" Ice	0.83	0.45	0.02
		g	2.00					1" Ice	0.94	0.54	0.03
LLPX310R w/ Mount Pipe	C	From	4.00			0.0000	140.00	No Ice	4.54	2.98	0.05
		Centroid-Le	0.00					1/2" Ice	4.89	3.53	0.08
		g	0.00					1" Ice	5.25	4.09	0.13
TIMING 2000	C	From	4.00			0.0000	140.00	No Ice	0.11	0.11	0.00
		Centroid-Le	0.00					1/2" Ice	0.15	0.15	0.00
		g	2.00					1" Ice	0.20	0.20	0.01
WIMAX DAP HEAD	C	From	4.00			0.0000	140.00	No Ice	1.55	0.68	0.03
		Centroid-Le	0.00					1/2" Ice	1.70	0.80	0.04
		g	0.00					1" Ice	1.87	0.92	0.06
Horizon Compact	C	From	4.00			0.0000	140.00	No Ice	0.72	0.37	0.01
		Centroid-Le	0.00					1/2" Ice	0.83	0.45	0.02
		g	2.00					1" Ice	0.94	0.54	0.03
Horizon Compact	C	From	4.00			0.0000	140.00	No Ice	0.72	0.37	0.01

Description	Face or Leg	Offset Type	Offsets: Horz Lateral ft / Vert ft / ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
		Centroid-Leg	0.00			1/2" Ice	0.83	0.45	0.02
			2.00			1" Ice	0.94	0.54	0.03
(3) 6' x 2" mount pipe	A	From Centroid-Leg	4.00 0.00 0.00	0.0000	140.00	No Ice 1/2" Ice 1" Ice	1.44 1.93 2.30	1.44 1.93 2.30	0.02 0.03 0.05
(3) 6' x 2" mount pipe	B	From Centroid-Leg	4.00 0.00 0.00	0.0000	140.00	No Ice 1/2" Ice 1" Ice	1.44 1.93 2.30	1.44 1.93 2.30	0.02 0.03 0.05
(3) 6' x 2" mount pipe	C	From Centroid-Leg	4.00 0.00 0.00	0.0000	140.00	No Ice 1/2" Ice 1" Ice	1.44 1.93 2.30	1.44 1.93 2.30	0.02 0.03 0.05
Platform Mount [LP 712-1]	C	None		0.0000	140.00	No Ice 1/2" Ice 1" Ice	24.53 29.94 35.35	24.53 29.94 35.35	1.34 1.65 1.96

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
VHLP2-11	A	Paraboloid w/Shroud (HP)	From Centroid -Leg	4.00 0.00 2.00	12.0000		140.00	2.17	No Ice 1/2" Ice 1" Ice	3.72 4.01 4.30	0.03 0.05 0.07
VHLP2-11	B	Paraboloid w/Shroud (HP)	From Centroid -Leg	4.00 0.00 2.00	83.0000		140.00	2.17	No Ice 1/2" Ice 1" Ice	3.72 4.01 4.30	0.03 0.05 0.07
VHLP2-11	C	Paraboloid w/Shroud (HP)	From Centroid -Leg	4.00 0.00 2.00	47.0000		140.00	2.17	No Ice 1/2" Ice 1" Ice	3.72 4.01 4.30	0.03 0.05 0.07
VHLP2-11	C	Paraboloid w/Shroud (HP)	From Centroid -Leg	4.00 0.00 2.00	75.0000		140.00	2.17	No Ice 1/2" Ice 1" Ice	3.72 4.01 4.30	0.03 0.05 0.07

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

Comb. No.	Description
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
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	150 - 123.29	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	26	-16.99	-0.83	2.72
			Max. Mx	8	-6.91	-219.33	-2.97
			Max. My	2	-6.84	4.56	229.09
			Max. Vy	8	11.39	-219.33	-2.97
			Max. Vx	14	11.80	-5.60	-228.04
			Max. Torque	22			-2.18
L2	123.29 - 87.79	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	26	-23.90	-1.26	3.12
			Max. Mx	8	-11.52	-654.53	-8.25
			Max. My	2	-11.47	11.98	677.60
			Max. Vy	8	13.88	-654.53	-8.25

Section No.	Elevation ft	Component Type	Condition	Gov. Load Comb.	Axial K	Major Axis Moment kip-ft	Minor Axis Moment kip-ft
			Max. Vx	14	14.30	-14.90	-677.54
			Max. Torque	22			-1.19
L3	87.79 - 43.21	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	26	-36.19	-1.87	3.55
			Max. Mx	8	-20.35	-1333.76	-14.84
			Max. My	14	-20.33	-26.54	-1374.68
			Max. Vy	8	17.41	-1333.76	-14.84
			Max. Vx	14	17.82	-26.54	-1374.68
			Max. Torque	22			-1.19
L4	43.21 - 0	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	26	-54.77	-2.46	3.89
			Max. Mx	8	-34.69	-2277.48	-22.06
			Max. My	14	-34.69	-39.27	-2337.99
			Max. Vy	8	21.12	-2277.48	-22.06
			Max. Vx	14	21.51	-39.27	-2337.99
			Max. Torque	22			-1.18

Maximum Reactions

Location	Condition	Gov. Load Comb.	Vertical K	Horizontal, X K	Horizontal, Z K
Pole	Max. Vert	27	54.77	0.04	6.74
	Max. H_x	20	34.71	21.00	0.14
	Max. H_z	2	34.71	0.20	21.46
	Max. M_x	2	2335.44	0.20	21.46
	Max. M_z	8	2277.48	-21.10	-0.15
	Max. Torsion	10	0.78	-18.31	-10.97
	Min. Vert	19	26.03	18.12	-10.62
	Min. H_x	8	34.71	-21.10	-0.15
	Min. H_z	15	26.03	-0.25	-21.49
	Min. M_x	14	-2337.99	-0.25	-21.49
	Min. M_z	20	-2262.77	21.00	0.14
	Min. Torsion	22	-1.18	18.24	10.88

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	28.92	0.00	0.00	-0.74	-0.29	0.00
1.2 Dead+1.6 Wind 0 deg - No Ice	34.71	-0.20	-21.46	-2335.44	31.36	0.30
0.9 Dead+1.6 Wind 0 deg - No Ice	26.03	-0.20	-21.46	-2310.44	31.07	0.29
1.2 Dead+1.6 Wind 30 deg - No Ice	34.71	10.37	-18.51	-2011.22	-1111.64	-0.20
0.9 Dead+1.6 Wind 30 deg - No Ice	26.03	10.37	-18.51	-1989.67	-1099.86	-0.19
1.2 Dead+1.6 Wind 60 deg - No Ice	34.71	18.18	-10.59	-1146.88	-1958.85	-0.08
0.9 Dead+1.6 Wind 60 deg - No Ice	26.03	18.18	-10.59	-1134.51	-1938.09	-0.07

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
1.2 Dead+1.6 Wind 90 deg - No Ice	34.71	21.10	0.15	22.06	-2277.48	-0.42
0.9 Dead+1.6 Wind 90 deg - No Ice	26.03	21.10	0.15	22.03	-2253.34	-0.40
1.2 Dead+1.6 Wind 120 deg - No Ice	34.71	18.31	10.97	1202.77	-1978.98	-0.78
0.9 Dead+1.6 Wind 120 deg - No Ice	26.03	18.31	10.97	1190.19	-1957.97	-0.75
1.2 Dead+1.6 Wind 150 deg - No Ice	34.71	10.68	18.74	2044.83	-1158.98	-0.49
0.9 Dead+1.6 Wind 150 deg - No Ice	26.03	10.68	18.74	2023.36	-1146.61	-0.47
1.2 Dead+1.6 Wind 180 deg - No Ice	34.71	0.25	21.49	2337.99	-39.27	0.09
0.9 Dead+1.6 Wind 180 deg - No Ice	26.03	0.25	21.49	2313.43	-38.70	0.10
1.2 Dead+1.6 Wind 210 deg - No Ice	34.71	-10.36	18.52	2010.71	1109.35	0.40
0.9 Dead+1.6 Wind 210 deg - No Ice	26.03	-10.36	18.52	1989.64	1097.78	0.39
1.2 Dead+1.6 Wind 240 deg - No Ice	34.71	-18.12	10.62	1148.84	1949.33	0.42
0.9 Dead+1.6 Wind 240 deg - No Ice	26.03	-18.12	10.62	1136.93	1928.86	0.40
1.2 Dead+1.6 Wind 270 deg - No Ice	34.71	-21.00	-0.14	-23.71	2262.77	0.87
0.9 Dead+1.6 Wind 270 deg - No Ice	26.03	-21.00	-0.14	-23.17	2238.98	0.84
1.2 Dead+1.6 Wind 300 deg - No Ice	34.71	-18.24	-10.88	-1191.30	1967.88	1.18
0.9 Dead+1.6 Wind 300 deg - No Ice	26.03	-18.24	-10.88	-1178.38	1947.18	1.16
1.2 Dead+1.6 Wind 330 deg - No Ice	34.71	-10.58	-18.68	-2037.31	1143.97	1.06
0.9 Dead+1.6 Wind 330 deg - No Ice	26.03	-10.58	-18.68	-2015.44	1131.96	1.04
1.2 Dead+1.0 Ice+1.0 Temp	54.77	0.00	-0.00	-3.89	-2.46	0.00
1.2 Dead+1.0 Wind 0 deg+1.0 Ice+1.0 Temp	54.77	-0.04	-6.74	-732.71	3.91	0.11
1.2 Dead+1.0 Wind 30 deg+1.0 Ice+1.0 Temp	54.77	3.30	-5.82	-632.85	-355.67	-0.06
1.2 Dead+1.0 Wind 60 deg+1.0 Ice+1.0 Temp	54.77	5.76	-3.34	-364.17	-621.07	-0.09
1.2 Dead+1.0 Wind 90 deg+1.0 Ice+1.0 Temp	54.77	6.67	0.03	0.44	-719.86	-0.20
1.2 Dead+1.0 Wind 120 deg+1.0 Ice+1.0 Temp	54.77	5.78	3.42	368.01	-624.86	-0.29
1.2 Dead+1.0 Wind 150 deg+1.0 Ice+1.0 Temp	54.77	3.36	5.87	632.23	-365.08	-0.20
1.2 Dead+1.0 Wind 180 deg+1.0 Ice+1.0 Temp	54.77	0.05	6.74	725.77	-10.61	-0.02
1.2 Dead+1.0 Wind 210 deg+1.0 Ice+1.0 Temp	54.77	-3.30	5.82	625.20	350.28	0.11
1.2 Dead+1.0 Wind 240 deg+1.0 Ice+1.0 Temp	54.77	-5.74	3.35	357.09	614.00	0.17
1.2 Dead+1.0 Wind 270 deg+1.0 Ice+1.0 Temp	54.77	-6.65	-0.03	-8.35	711.59	0.30
1.2 Dead+1.0 Wind 300 deg+1.0 Ice+1.0 Temp	54.77	-5.76	-3.40	-372.89	617.42	0.37
1.2 Dead+1.0 Wind 330 deg+1.0 Ice+1.0 Temp	54.77	-3.34	-5.85	-638.01	356.74	0.32

Load Combination	Vertical	$Shear_x$	$Shear_z$	Overturning Moment, M_x	Overturning Moment, M_z	Torque
	K	K	K	kip-ft	kip-ft	kip-ft
Dead+Wind 0 deg - Service	28.92	-0.05	-4.79	-518.62	6.73	0.07
Dead+Wind 30 deg - Service	28.92	2.31	-4.13	-446.68	-246.80	-0.04
Dead+Wind 60 deg - Service	28.92	4.06	-2.36	-254.95	-434.70	-0.01
Dead+Wind 90 deg - Service	28.92	4.71	0.03	4.32	-505.38	-0.09
Dead+Wind 120 deg - Service	28.92	4.08	2.45	266.21	-439.19	-0.18
Dead+Wind 150 deg - Service	28.92	2.38	4.18	453.02	-257.32	-0.11
Dead+Wind 180 deg - Service	28.92	0.06	4.79	518.05	-8.93	0.02
Dead+Wind 210 deg - Service	28.92	-2.31	4.13	445.42	245.85	0.09
Dead+Wind 240 deg - Service	28.92	-4.04	2.37	254.24	432.14	0.09
Dead+Wind 270 deg - Service	28.92	-4.68	-0.03	-5.83	501.66	0.19
Dead+Wind 300 deg - Service	28.92	-4.07	-2.43	-264.81	436.28	0.26
Dead+Wind 330 deg - Service	28.92	-2.36	-4.17	-452.49	253.54	0.24

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	-28.92	0.00	0.00	28.92	0.00	0.000%
2	-0.20	-34.71	-21.46	0.20	34.71	21.46	0.000%
3	-0.20	-26.03	-21.46	0.20	26.03	21.46	0.000%
4	10.37	-34.71	-18.51	-10.37	34.71	18.51	0.000%
5	10.37	-26.03	-18.51	-10.37	26.03	18.51	0.000%
6	18.18	-34.71	-10.59	-18.18	34.71	10.59	0.000%
7	18.18	-26.03	-10.59	-18.18	26.03	10.59	0.000%
8	21.10	-34.71	0.15	-21.10	34.71	-0.15	0.000%
9	21.10	-26.03	0.15	-21.10	26.03	-0.15	0.000%
10	18.31	-34.71	10.97	-18.31	34.71	-10.97	0.000%
11	18.31	-26.03	10.97	-18.31	26.03	-10.97	0.000%
12	10.68	-34.71	18.74	-10.68	34.71	-18.74	0.000%
13	10.68	-26.03	18.74	-10.68	26.03	-18.74	0.000%
14	0.25	-34.71	21.49	-0.25	34.71	-21.49	0.000%
15	0.25	-26.03	21.49	-0.25	26.03	-21.49	0.000%
16	-10.36	-34.71	18.52	10.36	34.71	-18.52	0.000%
17	-10.36	-26.03	18.52	10.36	26.03	-18.52	0.000%
18	-18.12	-34.71	10.62	18.12	34.71	-10.62	0.000%
19	-18.12	-26.03	10.62	18.12	26.03	-10.62	0.000%
20	-21.00	-34.71	-0.14	21.00	34.71	0.14	0.000%
21	-21.00	-26.03	-0.14	21.00	26.03	0.14	0.000%
22	-18.24	-34.71	-10.88	18.24	34.71	10.88	0.000%
23	-18.24	-26.03	-10.88	18.24	26.03	10.88	0.000%
24	-10.58	-34.71	-18.68	10.58	34.71	18.68	0.000%
25	-10.58	-26.03	-18.68	10.58	26.03	18.68	0.000%
26	0.00	-54.77	0.00	-0.00	54.77	0.00	0.000%
27	-0.04	-54.77	-6.74	0.04	54.77	6.74	0.000%
28	3.30	-54.77	-5.82	-3.30	54.77	5.82	0.000%
29	5.76	-54.77	-3.34	-5.76	54.77	3.34	0.000%
30	6.67	-54.77	0.03	-6.67	54.77	-0.03	0.000%
31	5.78	-54.77	3.42	-5.78	54.77	-3.42	0.000%
32	3.36	-54.77	5.87	-3.36	54.77	-5.87	0.000%
33	0.05	-54.77	6.74	-0.05	54.77	-6.74	0.000%
34	-3.30	-54.77	5.82	3.30	54.77	-5.82	0.000%
35	-5.74	-54.77	3.35	5.74	54.77	-3.35	0.000%
36	-6.65	-54.77	-0.03	6.65	54.77	0.03	0.000%
37	-5.76	-54.77	-3.40	5.76	54.77	3.40	0.000%
38	-3.34	-54.77	-5.85	3.34	54.77	5.85	0.000%
39	-0.05	-28.92	-4.79	0.05	28.92	4.79	0.000%
40	2.31	-28.92	-4.13	-2.31	28.92	4.13	0.000%

	Sum of Applied Forces			Sum of Reactions			
Load Comb.	PX K	PY K	PZ K	PX K	PY K	PZ K	% Error
41	4.06	-28.92	-2.36	-4.06	28.92	2.36	0.000%
42	4.71	-28.92	0.03	-4.71	28.92	-0.03	0.000%
43	4.08	-28.92	2.45	-4.08	28.92	-2.45	0.000%
44	2.38	-28.92	4.18	-2.38	28.92	-4.18	0.000%
45	0.06	-28.92	4.79	-0.06	28.92	-4.79	0.000%
46	-2.31	-28.92	4.13	2.31	28.92	-4.13	0.000%
47	-4.04	-28.92	2.37	4.04	28.92	-2.37	0.000%
48	-4.68	-28.92	-0.03	4.68	28.92	0.03	0.000%
49	-4.07	-28.92	-2.43	4.07	28.92	2.43	0.000%
50	-2.36	-28.92	-4.17	2.36	28.92	4.17	0.000%

Non-Linear Convergence Results

Load Combination	Converged?	Number of Cycles	Displacement Tolerance	Force Tolerance
1	Yes	4	0.00000001	0.00000001
2	Yes	4	0.00000001	0.00096645
3	Yes	4	0.00000001	0.00053086
4	Yes	6	0.00000001	0.00007963
5	Yes	5	0.00000001	0.00069581
6	Yes	6	0.00000001	0.00008009
7	Yes	5	0.00000001	0.00070037
8	Yes	4	0.00000001	0.00063408
9	Yes	4	0.00000001	0.00029188
10	Yes	6	0.00000001	0.00008156
11	Yes	5	0.00000001	0.00071303
12	Yes	6	0.00000001	0.00008578
13	Yes	5	0.00000001	0.00074897
14	Yes	5	0.00000001	0.00008304
15	Yes	4	0.00000001	0.00099309
16	Yes	6	0.00000001	0.00008095
17	Yes	5	0.00000001	0.00070871
18	Yes	6	0.00000001	0.00007799
19	Yes	5	0.00000001	0.00068340
20	Yes	5	0.00000001	0.00013977
21	Yes	5	0.00000001	0.00006250
22	Yes	6	0.00000001	0.00008609
23	Yes	5	0.00000001	0.00075314
24	Yes	6	0.00000001	0.00008017
25	Yes	5	0.00000001	0.00069944
26	Yes	4	0.00000001	0.00005659
27	Yes	5	0.00000001	0.00045629
28	Yes	5	0.00000001	0.00077032
29	Yes	5	0.00000001	0.00077700
30	Yes	5	0.00000001	0.00044649
31	Yes	5	0.00000001	0.00075793
32	Yes	5	0.00000001	0.00078819
33	Yes	5	0.00000001	0.00044602
34	Yes	5	0.00000001	0.00073694
35	Yes	5	0.00000001	0.00071917
36	Yes	5	0.00000001	0.00044398
37	Yes	5	0.00000001	0.00080160
38	Yes	5	0.00000001	0.00076644
39	Yes	4	0.00000001	0.00004126
40	Yes	4	0.00000001	0.00047419
41	Yes	4	0.00000001	0.00048454

42	Yes	4	0.00000001	0.00005786
43	Yes	4	0.00000001	0.00048433
44	Yes	4	0.00000001	0.00055562
45	Yes	4	0.00000001	0.00003906
46	Yes	4	0.00000001	0.00049625
47	Yes	4	0.00000001	0.00044563
48	Yes	4	0.00000001	0.00011855
49	Yes	4	0.00000001	0.00057983
50	Yes	4	0.00000001	0.00046924

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	150 - 123.29 (1)	TP23.17x17x0.1875	26.71	0.00	0.0	13.2073	-6.82	936.21	0.007
L2	123.29 - 87.79 (2)	TP30.86x22.005x0.3125	38.92	0.00	0.0	29.3018	-11.45	2176.98	0.005
L3	87.79 - 43.21 (3)	TP40.4x29.2294x0.375	49.00	0.00	0.0	46.1257	-20.32	3398.73	0.006
L4	43.21 - 0 (4)	TP49.5x38.3779x0.4375	48.79	0.00	0.0	68.1294	-34.69	4908.34	0.007

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	150 - 123.29 (1)	TP23.17x17x0.1875	229.84	426.99	0.538	0.00	426.99	0.000
L2	123.29 - 87.79 (2)	TP30.86x22.005x0.3125	682.27	1318.91	0.517	0.00	1318.91	0.000
L3	87.79 - 43.21 (3)	TP40.4x29.2294x0.375	1383.09	2703.53	0.512	0.00	2703.53	0.000
L4	43.21 - 0 (4)	TP49.5x38.3779x0.4375	2350.44	4946.76	0.475	0.00	4946.76	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	150 - 123.29 (1)	TP23.17x17x0.1875	11.89	468.11	0.025	0.50	855.02	0.001
L2	123.29 - 87.79 (2)	TP30.86x22.005x0.3125	14.38	1088.49	0.013	0.50	2641.04	0.000
L3	87.79 - 43.21 (3)	TP40.4x29.2294x0.375	17.91	1699.36	0.011	0.50	5413.67	0.000

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 $\frac{T_u}{\phi T_n}$
L4	43.21 - 0 (4)	TP49.5x38.3779x0.4375	21.59	2454.17	0.009	0.49	9905.58	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	150 - 123.29 (1)	0.007	0.538	0.000	0.025	0.001	0.546 ✔	1.000	4.8.2 ✔
L2	123.29 - 87.79 (2)	0.005	0.517	0.000	0.013	0.000	0.523 ✔	1.000	4.8.2 ✔
L3	87.79 - 43.21 (3)	0.006	0.512	0.000	0.011	0.000	0.518 ✔	1.000	4.8.2 ✔
L4	43.21 - 0 (4)	0.007	0.475	0.000	0.009	0.000	0.482 ✔	1.000	4.8.2 ✔

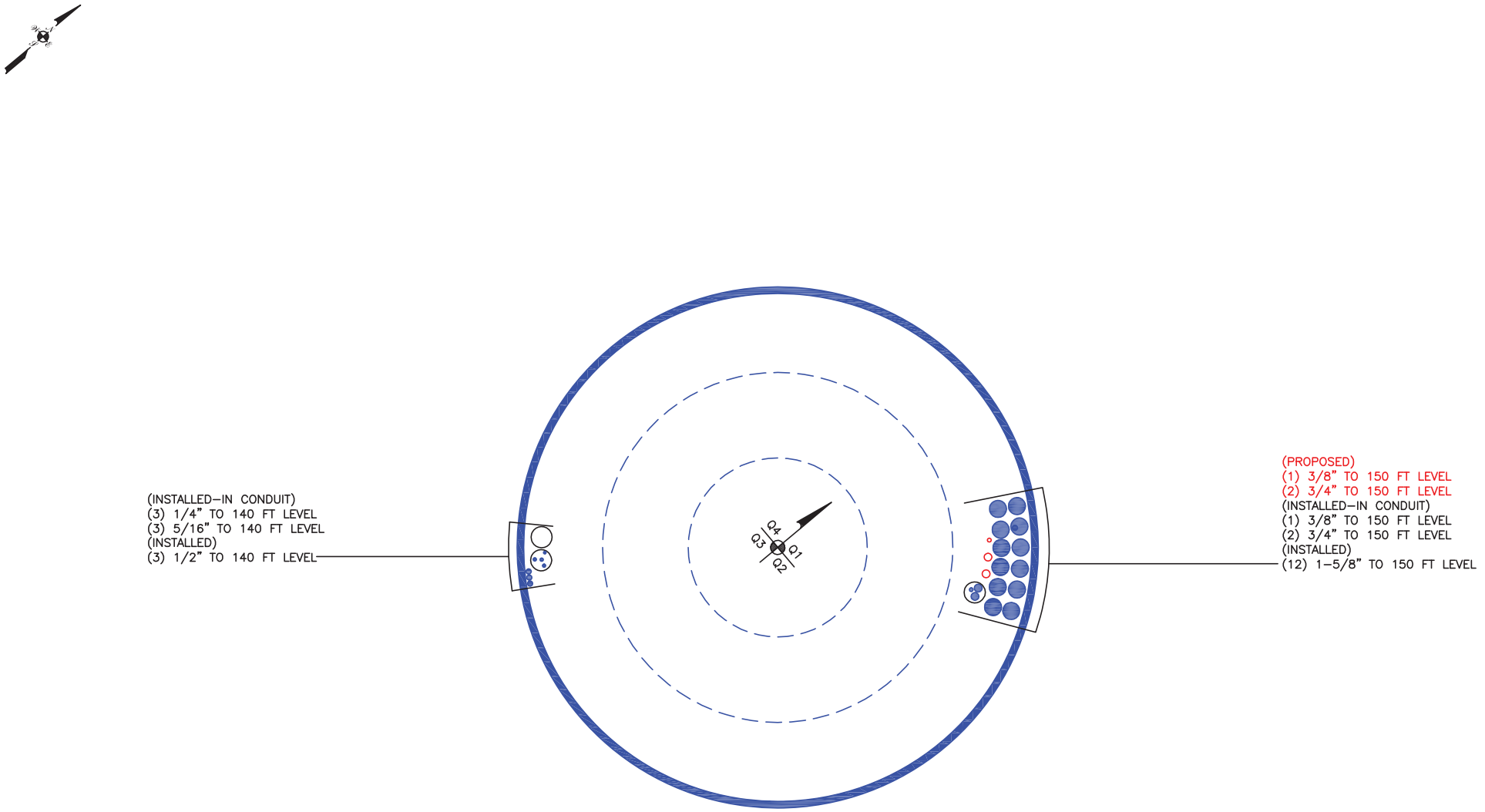
Section Capacity Table

Section No.	Elevation ft	Component Type	Size	Critical Element	P K	ϕP_{allow} K	% Capacity	Pass Fail
L1	150 - 123.29	Pole	TP23.17x17x0.1875	1	-6.82	936.21	54.6	Pass
L2	123.29 - 87.79	Pole	TP30.86x22.005x0.3125	2	-11.45	2176.98	52.3	Pass
L3	87.79 - 43.21	Pole	TP40.4x29.2294x0.375	3	-20.32	3398.73	51.8	Pass
L4	43.21 - 0	Pole	TP49.5x38.3779x0.4375	4	-34.69	4908.34	48.2	Pass

Summary	ELC:	Existing/Proposed (LC5)
Pole (L1)	54.6	Pass
Rating =	54.6	Pass

APPENDIX B

BASE LEVEL DRAWING



BUSINESS UNIT: 881534 TOWER ID: C_BASELEVEL

APPENDIX C

ADDITIONAL CALCULATIONS

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

TIA Rev G Assumption: Clear space between bottom of leveling nut and top of concrete **not** exceeding (1)*(Rod Diameter)

Site Data

BU#:	*881534*
Site Name:	*Waterbury Tower*
App #:	*348072 Rev. 6*
Pole Manufacturer:	*Other*

Reactions		
Mu:	2350	ft-kips
Axial, Pu:	35	kips
Shear, Vu:	22	kips
Eta Factor, η	0.5	TIA G (Fig. 4-4)

Anchor Rod Data		
Qty:	16	
Diam:	2.25	in
Rod Material:	A615-J	
Strength (Fu):	100	ksi
Yield (Fy):	75	ksi
Bolt Circle:	58	in

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

Anchor Rod Results

Max Rod (Cu+ Vu/ή):	126.5 Kips	Rigid
Allowable Axial, Φ*Fu*Anet:	260.0 Kips	AISC LRFD
Anchor Rod Stress Ratio:	48.6% **Pass**	φ*Tn

Plate Data		
Diam:	64	in
Thick:	2	in
Grade:	60	ksi
Single-Rod B-eff:	9.82	in

Base Plate Results Flexural Check

Base Plate Stress:	32.9 ksi	Rigid
Allowable Plate Stress:	54.0 ksi	AISC LRFD
Base Plate Stress Ratio:	60.9% **Pass**	φ*Fy
		Y.L. Length: 30.23

Stiffener Data (Welding at both sides)		
Config:	0	*
Weld Type:		
Groove Depth:		in **
Groove Angle:		degrees
Fillet H. Weld:		<-- Disregard
Fillet V. Weld:		in
Width:		in
Height:		in
Thick:		in
Notch:		in
Grade:		ksi
Weld str.:		ksi

n/a

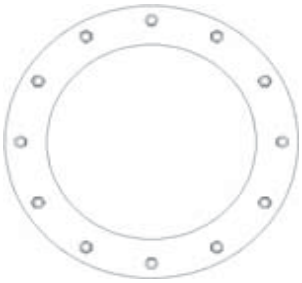
Stiffener Results

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

Pole Results

Pole Punching Shear Check: n/a

Pole Data		
Diam:	49.5	in
Thick:	0.4375	in
Grade:	65	ksi
# of Sides:	18	"0" IF Round
Fu	80	ksi
Reinf. Fillet Weld	0	"0" if None



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

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

(Bearing and Stability Checks) Tool for TIA Rev F or G - Application (MP, SST with unitbase)

Site Data

BU#: *881534*
Site Name: *Waterbury Tower*
App #: *348072 Rev. 6*

Loads Already Factored		
For P (DL)	1.2	<----Disregard
For P,V, and M (WL)	1.35	<----Disregard

Pad & Pier Data		
Base PL Dist. Above Pier:	3	in
Pier Dist. Above Grade:	12	in
Pad Bearing Depth, D:	8	ft
Pad Thickness, T:	4.5	ft
Pad Width=Length, L:	26	ft
Pier Cross Section Shape:	Square	<--Pull Down
Enter Pier Side Width:	6.5	ft
Concrete Density:	150.0	pcf
Pier Cross Section Area:	42.25	ft^2
Pier Height:	4.50	ft
Soil (above pad) Height:	3.50	ft

Soil Parameters		
Unit Weight, γ:	125.0	pcf
Ultimate Bearing Capacity, qn:	8.00	ksf
Strength Reduct. factor, ϕ:	0.75	
Angle of Friction, Φ:	34.0	degrees
Undrained Shear Strength, Cu:	0.00	ksf
Allowable Bearing: ϕ*qn:	6.00	ksf
Passive Pres. Coeff., Kp	3.54	

Forces/Moments due to Wind and Lateral Soil		
Minimum of (φ*Ultimate Pad Passive Force, Vu):	22.0	kips
Pad Force Location Above D:	1.96	ft
ϕ(Passive Pressure Moment):	43.04	ft-kips
Factored O.T. M(WL), "1.6W":	2553.5	ft-kips
Factored OT (MW-Msoil), M1	2510.46	ft-kips

Resistance due to Foundation Gravity		
Soil Wedge Projection grade, a:	2.36	ft
Sum of Soil Wedges Wt:	21.45	kips
Soil Wedges ecc, K1:	12.64	ft
Ftg+Soil above Pad wt:	762.1	kips
Unfactored (Total ftg-soil Wt):	783.54	kips
1.2D. **No Soil Wedges**.	949.50	kips
0.9D. **With Soil Wedges**	731.43	kips

Resistance due to Cohesion (Vertical)		
ϕ*(1/2*Cu)(Total Vert. Planes)	0.00	kips
Cohesion Force Eccentricity, K2	0.00	ft

Monopole Base Reaction Forces		
TIA Revision:	G	<--Pull Down
Factored DL Axial, PDu:	35	kips
Factored WL Axial, PWu:	0	kips
Factored WL Shear, Vu:	22	kips
Factored WL Moment, Mu:	2350	ft-kips

Load Factor	Shaft Factored Loads		
1.00	1.2D+1.6W, Pu:	35	kips
0.90	0.9D+1.6W, Pu:	26.25	kips
1.00	Vu:	22	kips
	Mu:	2350	ft-kips

1.2D+1.6W Load Combination, Bearing Results:

(**No Soil Wedges**) [Reaction+Conc+Soil]	949.50	P1="1.2D+1.6W" (Kips)
Factored "1.6W" Overturning Moment (MW-Msoil), M1	2510.46	ft-kips

Orthogonal Direction:

ecc1 = M1/P1 =	2.64	ft
Orthogonal qu=	1.98	ksf
qu/ϕ*qn Ratio=	**32.93%**	**Pass**

Diagonal Direction:

ecc2 = (0.707M1)/P1 =	1.87	ft
Diagonal qu=	1.92	ksf
qu/ϕ*qn Ratio=	**31.93%**	**Pass**

Run <-- Press Upon Completing All Input

Overturning Stability Check

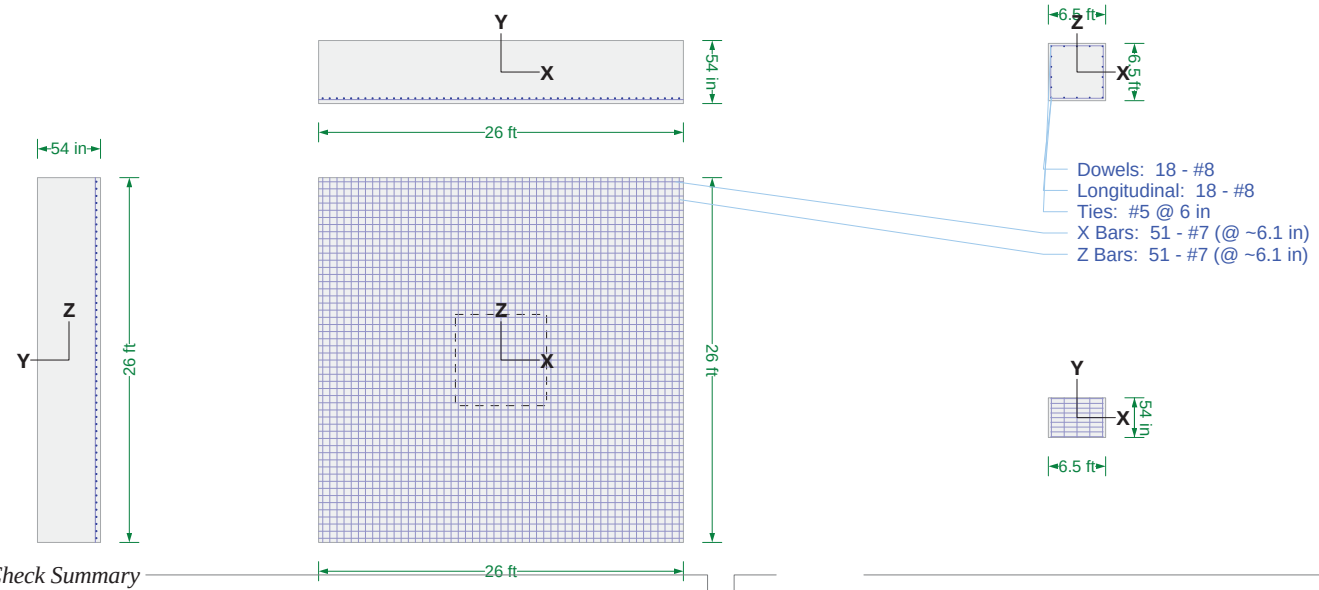
0.9D+1.6W Load Combination, Bearing Results:

(**w/ Soil Wedges**) [Reaction+Conc+Soil]	731.43	P2="0.9D+1.6W" (Kips)
Factored "1.6W" Overturning Moment (MW-Msoil) - 0.9(M of Wedge + M of Cohesion), M2	2266.50	ft-kips

Orthogonal ecc3 = M2/P2 =	3.10	ft
Ortho Non Bearing Length,NBL=	6.20	ft
Orthogonal qu=	1.60	ksf
Diagonal qu=	1.57	ksf

Max Reaction Moment (ft-kips) so that qu=φ*qn = 100% Capacity Rating			
Actual M:	2350.00		
M Orthogonal:	7982.95	**29.44%**	**Pass**
M Diagonal:	7903.11	**29.74%**	**Pass**

Design Detail



Check Summary

Ratio	Check	Provided	Required	Combination
----- Footing -----				
✓0.260	X Flexure (-Z)	6683 ft·k	1736 ft·k	
✓0.260	X Flexure (+Z)	6683 ft·k	1736 ft·k	
✓0.374	Z Flexure (-X)	6804 ft·k	2542 ft·k	
✓0.374	Z Flexure (+X)	6804 ft·k	2542 ft·k	
✓0.161	Shear (-Z)	1274 k	204.8 k	
✓0.161	Shear (+Z)	1274 k	204.8 k	
✓0.080	Shear (-X)	1296 k	103.6 k	
✓0.232	Shear (+X)	1296 k	300.8 k	
----- Pedestal -----				
✓	Axial	8492 k	69.22 k	
✓0.959	Biaxial Bending	0.959	1.000	
✓0.027	Shear X	819.6 k	22 k	
✓0.000	Shear Z	819.6 k	0 k	

A

	Ty		Mx		Vx	V		Footing Weight
Tower Reactions	Strength	69.22 k	0 ft·k	2350 ft·k	22 k	0 k	525 psf	547.6 k

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info@sitesafe.com ● www.sitesafe.com

Smartlink LLC on behalf of AT&T Mobility, LLC
Site FA – 10035324
Site ID – CT1127 (3C)
USID – 46003
Site Name – Waterbury East
Site Compliance Report

670 Captain Neville Drive
Waterbury, CT 06705

Latitude: N41-32-03.57
Longitude: W72-58-08.40
Structure Type: Monopole

Report generated date: September 16, 2016
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?	No
RF Sign(s) @ access point(s)	None
RF Sign(s) @ antennas	None
Barrier(s) @ sectors	N/A
Max cumulative simulated RFE level on the Ground	<1% General Public Limit
FCC & AT&T Compliant?	will be compliant

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

RFDS: NEW-ENGLAND_CONNECTICUT_CTV1127_2017-LTE-Next-Carrier_LTE-3C_om636a_PTN_10035324_46003_03-07-2016_Preliminary-Approved_v2.00

CD's: 10035324_AE201_160811_CTL01127_REV1.JW 8-13-12

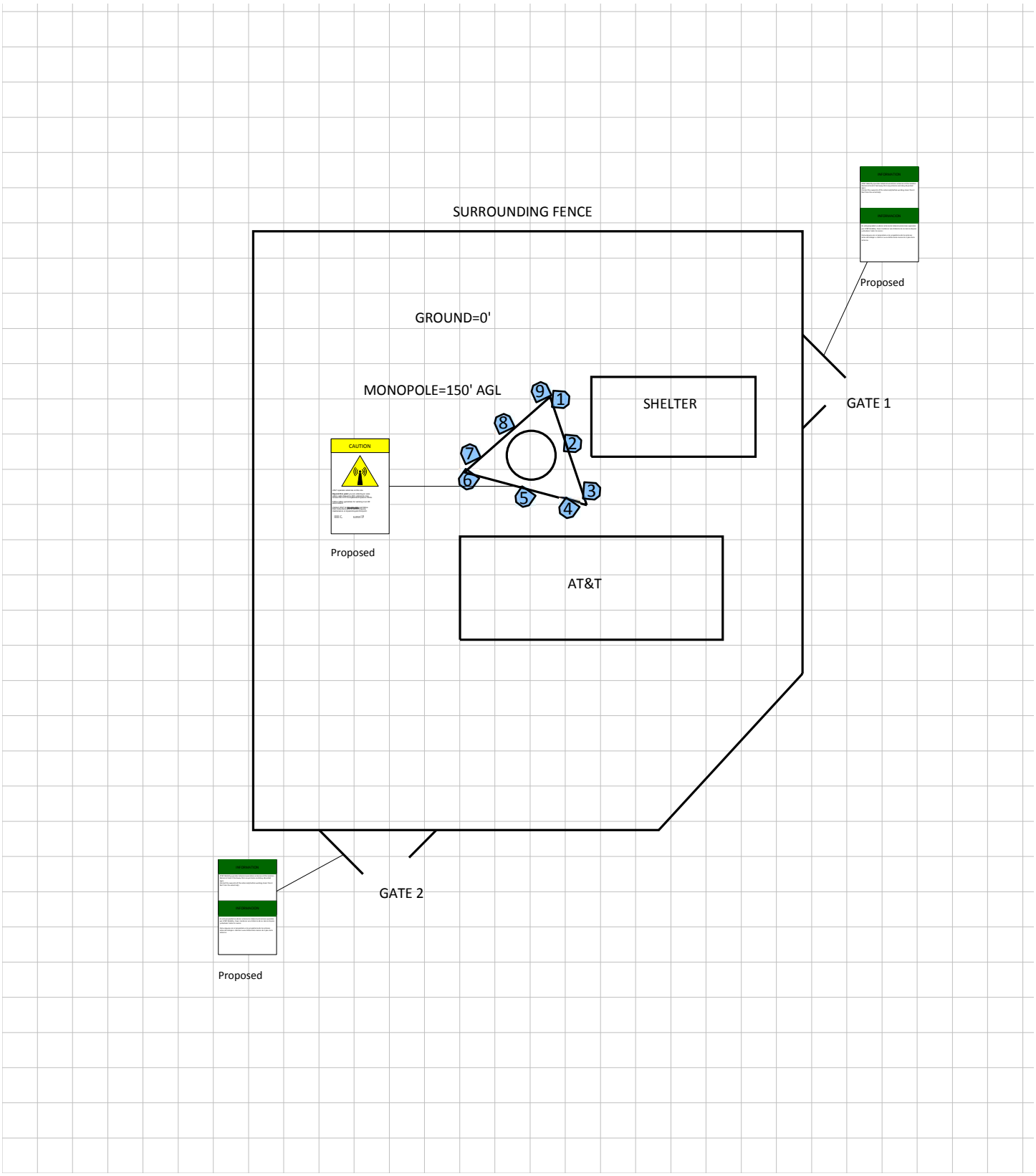
2 Scale Maps of Site

The following diagrams are included:

- Site Scale Map
- RF Exposure Diagram
- Elevation View

Scale Map Key		
 Existing Sign	Proposed Barrier	GPS Reading
 Proposed Sign	Existing Barrier	Anchor Point

Site Scale Map For: Waterbury East



(Feet)

0 7.3 14.7

www.sitesafe.com
Site Name:Waterbury East
9/16/2016 6:18:54 PM

AT&T MOBILITY LLC	VERIZON WIRELESS	T-MOBILE	METROPCS	CRICKET COMMUNICATIONS	CLEARWIRE	SPRINT

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	23	87.6	4.5	11.35	0	1	0	252.9	97.7'	148.1'	152.7'
1	AT&T MOBILITY LLC	Kathrein-Scala 800-10121	Panel	1900	23	85.7	4.5	14.32	0	1	0	547	97.7'	148.1'	152.7'
2	AT&T MOBILITY LLC	CCI Antennas OPA-65R-LCUU-H8	Panel	737	23	63.9	7.7	12.26	0	0	1	931.1	99'	143.4'	151.1'
2	AT&T MOBILITY LLC	CCI Antennas OPA-65R-LCUU-H8	Panel	1900	23	64.3	7.7	14.76	0	0	1	3380.1	99'	143.4'	151.1'
3	AT&T MOBILITY LLC (Proposed)	CCI Antennas TPA-65R-LCUUUU-H8	Panel	2300	23	65	8	14.36	0	0	1	1285.3	101.1'	138.4'	151'
4	AT&T MOBILITY LLC	Kathrein-Scala 800-10121	Panel	850	143	87.6	4.5	11.35	0	1	0	252.9	98.5'	136.4'	152.7'
4	AT&T MOBILITY LLC	Kathrein-Scala 800-10121	Panel	1900	143	85.7	4.5	14.32	0	1	0	547	98.5'	136.4'	152.7'
5	AT&T MOBILITY LLC	CCI Antennas OPA-65R-LCUU-H8	Panel	737	143	63.9	7.7	12.26	0	0	1	931.1	93.9'	137.6'	151.1'
5	AT&T MOBILITY LLC	CCI Antennas OPA-65R-LCUU-H8	Panel	1900	143	64.3	7.7	14.76	0	0	1	3380.1	93.9'	137.6'	151.1'
6	AT&T MOBILITY LLC (Proposed)	CCI Antennas TPA-65R-LCUUUU-H8	Panel	2300	143	65	8	14.36	0	0	1	1285.3	87.8'	139.5'	151'
7	AT&T MOBILITY LLC	Kathrein-Scala 800-10121	Panel	850	263	87.6	4.5	11.35	0	1	0	252.9	88'	142.4'	152.7'
7	AT&T MOBILITY LLC	Kathrein-Scala 800-10121	Panel	1900	263	85.7	4.5	14.32	0	1	0	547	88'	142.4'	152.7'
8	AT&T MOBILITY LLC	CCI Antennas OPA-65R-LCUU-H6	Panel	737	263	66	6	11.66	0	0	1	931.1	91.6'	145.6'	152'
8	AT&T MOBILITY LLC	CCI Antennas OPA-65R-LCUU-H6	Panel	1900	263	60	6	14.86	0	0	1	3380.1	91.6'	145.6'	152'
9	AT&T MOBILITY LLC (Proposed)	Quintel QS66512-2	Panel	2300	263	64	6	14.56	0	0	1	1285.3	95.6'	149'	152'

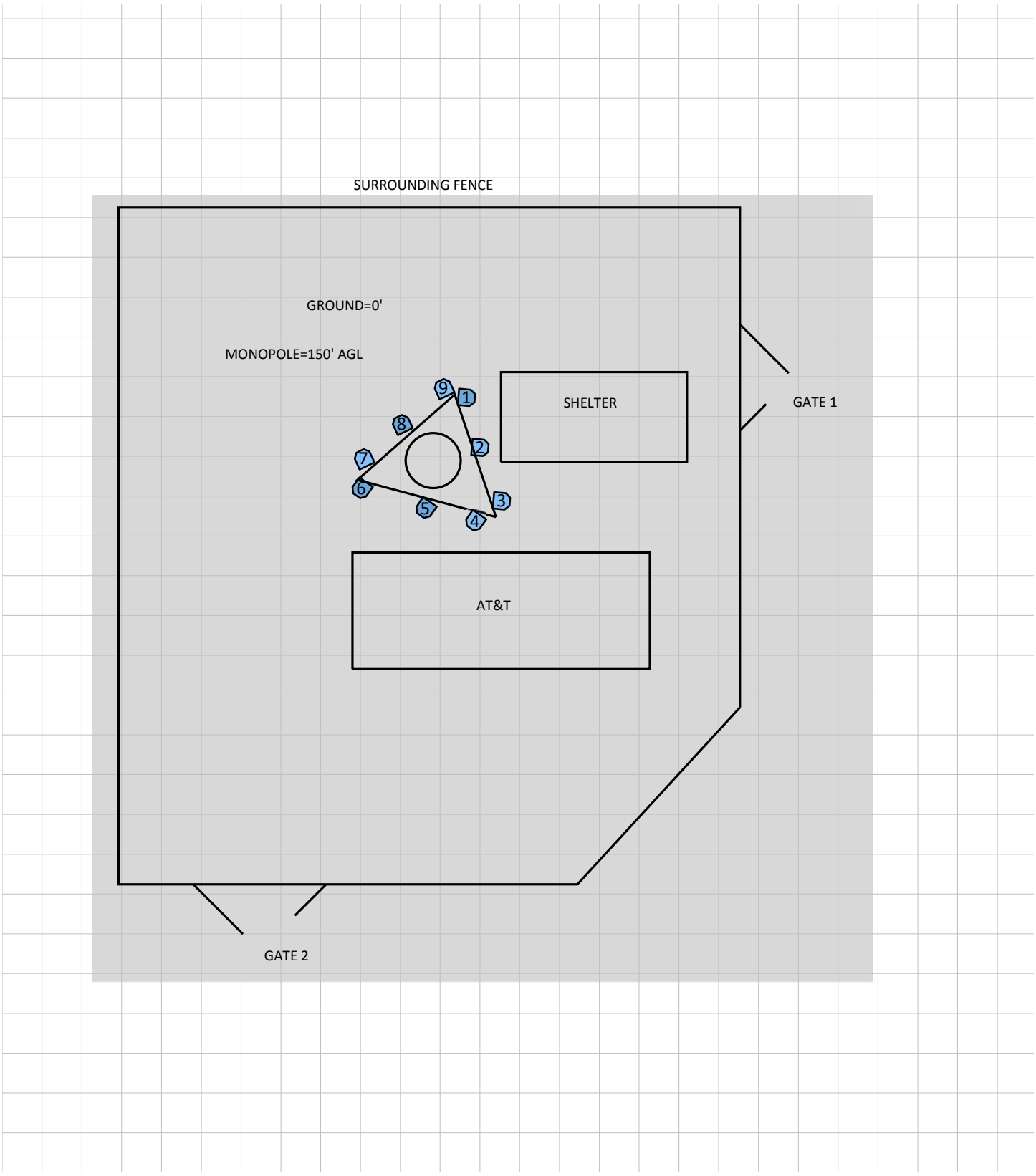
NOTE: X, Y and Z indicate relative position of the bottom of the antenna to the origin location on the site, displayed in the model results diagram. Specifically, the Z reference indicates the bottom of the antenna height above the main site level unless otherwise indicated. The distance to the bottom 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: Waterbury East



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

(Feet)

0 6.5 13

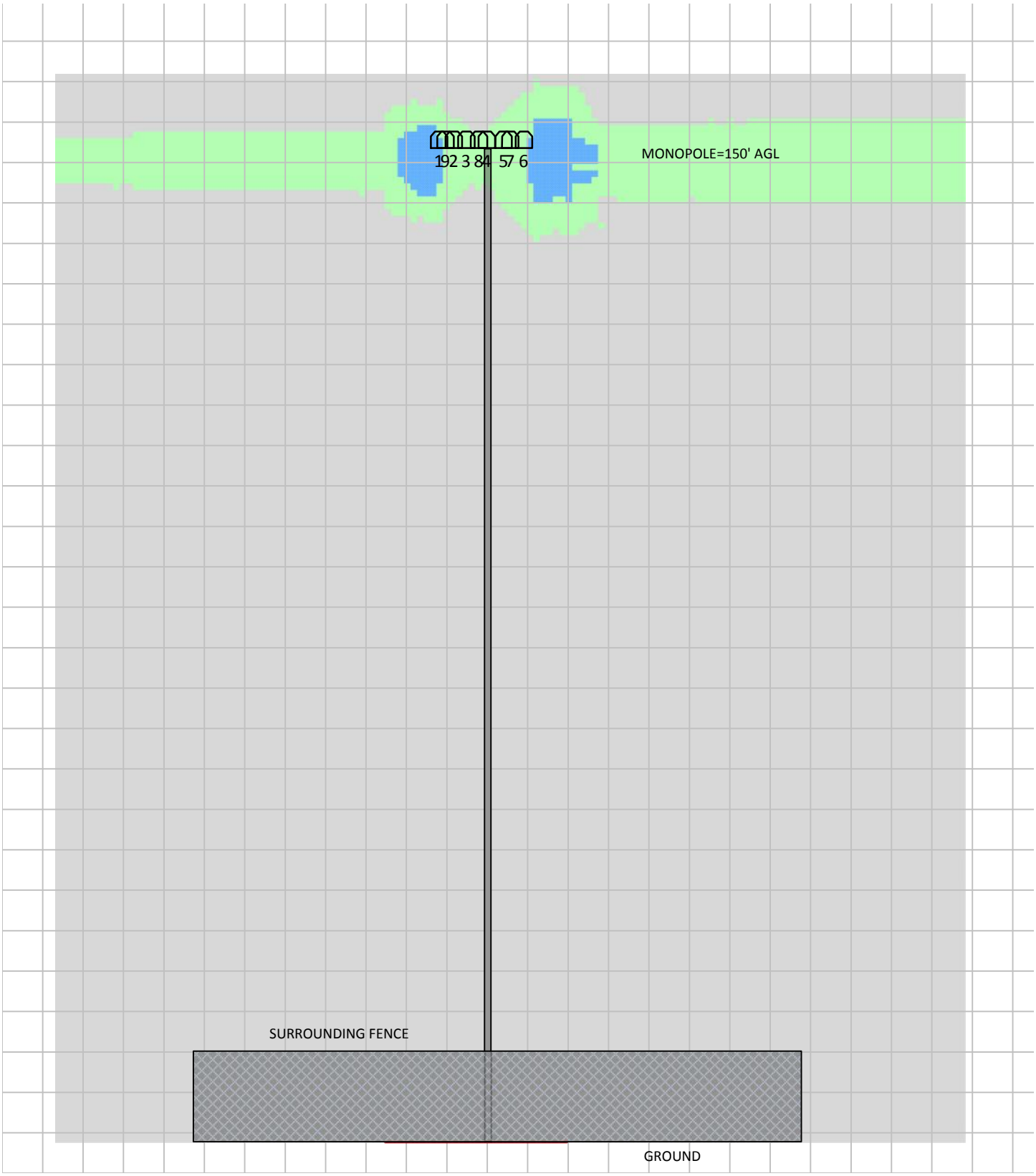
www.sitesafe.com
Site Name:Waterbury East
9/16/2016 6:19:48 PM

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

AT&T MOBILITY LLC	VERIZON WIRELESS	T-MOBILE	METROPCS	CRICKET COMMUNICATIONS	CLEARWIRE	SPRINT

SitesafeTC Version:1.0.0.0 - 0.0.0.249
Sitesafe OET-65 Model
Near Field Boundary: 1.5 * Aperture
Reflection Factor: 1
Spatially Averaged

RF Exposure Simulation For: Waterbury East
Elevation View



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

(Feet)

0 10.6 21.3

www.sitesafe.com
Site Name:Waterbury East
9/16/2016 6:22:31 PM

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

AT&T MOBILITY LLC	VERIZON WIRELESS	T-MOBILE	METROPCS	CRICKET COMMUNICATIONS	CLEARWIRE	SPRINT

SitesafeTC Version:1.0.0.0 - 0.0.0.249
Sitesafe OET-65 Model
Near Field Boundary: 1.5 * Aperture
Reflection Factor: 1
Spatially Averaged

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 AT&T Mobility, 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 1 Location

Information Sign 1 required.

Site Access Gate 2 Location

Information Sign 1 required.

Access (Base/Monopole)

Yellow Caution 2 sign required.

6 Engineer Certification

The professional engineer whose seal appears on the cover of this document hereby certifies and affirms that:

I am registered as a Professional Engineer in the jurisdiction indicated in the professional engineering stamp on the cover of this document; and

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.

September 16, 2016

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.

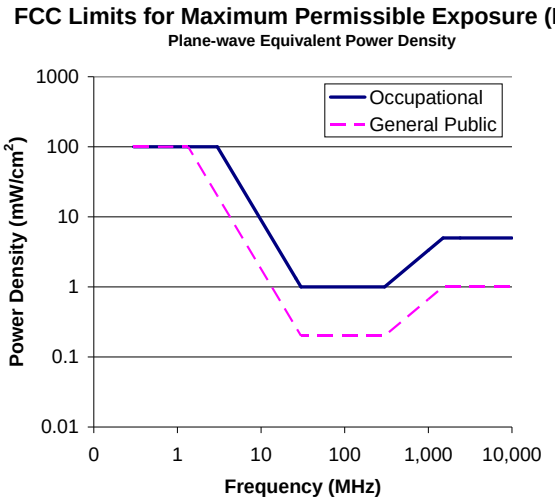
FCC regulations define two separate tiers of exposure limits: Occupational or "Controlled environment" and General Public or "Uncontrolled environment". The General Public limits are generally five times more conservative or restrictive than the Occupational limit. These limits apply to *accessible* 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