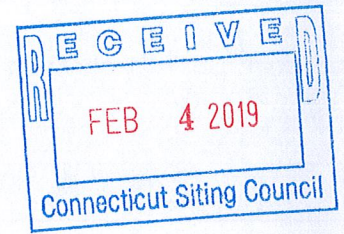




EM-AT&T-077-190204

January 25, 2019

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



Regarding: Notice of Exempt Modification – Antenna Modification
Property Address: 205 Spencer Street; Manchester, CT 06040, also known as 239
Spencer Street; Manchester, CT 06040 (the “Property”)
Applicant: AT&T Mobility (“AT&T”, Site # CT2154)

Dear Ms. Bachman:

AT&T currently maintains a (3) antenna wireless telecommunications facility on an existing 125-foot flagpole tower at the above-referenced address, latitude 41.76963333333333, longitude -72.56980555555555. Said monopole is owned by Crown Castle and the underlying property owner is the Wal-Mart Real Estate Business Trust.

AT&T desires to modify its existing telecommunications facility by swapping (3) antennas, removing (3) Tower-Mounted Amplifiers and replacing these with (6) new, similar Tower-Mounted Amplifiers. The centerline height of the existing antennas and ancillary tower-mounted equipment will be installed within the 10' flagpole canister section that has been modified by Crown Castle to a diameter of 31.875" from 95.5' to 105.5'. AT&T's antennas will have a centerline of approximately 102 feet within the structure, an adjustment from the existing 98 foot centerline.

Please accept this application as notification pursuant to R.C.S.A. §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.C.S.A. §16-50j-73, a copy of this letter is being sent to the Honorable Jay Moran, Mayor of the Town of Manchester; Scott Shanley, the Town's General Manager; James Davis, the Zoning Enforcement Officer; Gary Anderson, the Director of Planning and Economic Development, the underlying property owner, Wal-Mart Real Estate Business Trust; and the tower owner/operator, Crown Castle.

The planned modifications to AT&T's facility fall squarely within those activities explicitly provided for in R.C.S.A. §16-50j-72 (b)(2). Specifically:

1. The planned modification will not result in an increase in the height of the existing structure. The antennas to be swapped and the accessory equipment to be added will be installed within the 95.5' – 105.5' canister, with the antennas at the centerline height of 102 feet on the 125-foot flagpole.
2. The proposed modifications will not involve any changes to AT&T's ground-space footprint, and therefore and therefore will not require an extension of the site boundary.

AT&T @ 205 Spencer Street; Manchester, CT 06040,
also known as 239 Spencer Street; Manchester, CT 06040
January 25, 2019
Page 2 of 3

3. The proposed modification will not increase the noise level at the facility by six decibels or more, or to levels that exceed state and local criteria.
4. The operation of the modified facility will not increase radio frequency (RF) emissions at the facility to a level at or above Federal Communications Commission (FCC) safety standard. An RF emissions calculation (enclosed) for AT&T's modified facility is herein provided (Exhibit 4).
5. The proposed modifications will not cause a change or alteration in the physical or environmental characteristics of the site (Exhibit 2).
6. The existing structure and its foundation can support AT&T's proposed modifications. Please see enclosed structural analysis completed by Tower Engineering Professionals, dated January 9, 2019 (Exhibit 3).
7. A copy of the parcel map and property owner information is included in the attached (Exhibit 1). Proof of mailing this filing and enclosures to the applicable municipal officials, as well as the property owner, is also included (Exhibit 5).

For the foregoing reasons, AT&T respectfully requests that the proposed installation be allowed within the exempt modifications under R.C.S.A. §16-50j-72 (b)(2).

Sincerely,

Kristen White

Kristen White
Site Acquisition Specialist
Empire Telecom USA, LLC
kwhite@empiretelecomm.com

Enclosures: Exhibit 1 – Field Card and GIS Map; Exhibit 2 – Construction Drawings; Exhibit 3 – Structural Analysis; Exhibit 4 – RF Emissions Analysis Report Evaluation; Exhibit 5 – Receipt for mailing to municipal officials and property owner(s)

cc:

HON. JAY MORAN
MAYOR, MANCHESTER BOARD OF DIRECTORS
41 CENTER ST
P O BOX 191
MANCHESTER, CT 06040-5090

MR. SCOTT SHANLEY
TOWN OF MANCHESTER GENERAL MANAGER
41 CENTER ST
PO BOX 191
MANCHESTER, CT 06040-5090

[CONTINUED ON PAGE 3]

AT&T @ 205 Spencer Street; Manchester, CT 06040,
also known as 239 Spencer Street; Manchester, CT 06040
January 25, 2019
Page 2 of 3

MR. JAMES DAVIS
ZONING ENFORCEMENT OFFICER
494 MAIN ST
PO BOX 191
MANCHESTER, CT 06040-4102

MR. GARY ANDERSON
PLANNING AND ECONOMIC DEVELOPMENT
494 MAIN ST
PO BOX 191
MANCHESTER, CT 06040-4102

CROWN CASTLE
3 CORPORATE DR STE 101
HALFMOON, NY 12065-8635
ATTN: PAUL PEDICONE

WAL-MART REAL ESTATE BUSINESS TRUST
PROPERTY TAX DEPT STORE #5209
PO BOX 8050
ATTN: MS 0555
BENTONVILLE, AR 72712-8055

EXHIBIT 1



205 SPENCER STREET

Location 205 SPENCER STREET

Mblu 19/ 5190/ 205/ /

Acct# 519000205

Owner WAL-MART REAL ESTATE
BUSINESS TRUST

Assessment \$3,665,300

Appraisal \$5,236,000

PID 14844

Building Count 2

DISTRICT T

CONCRETE

Current Value

Appraisal			
Valuation Year	Improvements	Land	Total
2016	\$2,138,600	\$3,097,400	\$5,236,000
Assessment			
Valuation Year	Improvements	Land	Total
2016	\$1,497,100	\$2,168,200	\$3,665,300

Owner of Record

Owner WAL-MART REAL ESTATE BUSINESS TRUST
PROPERTY TAX DEPT STORE #5209

Sale Price \$9,800,000

Certificate

Address PO BOX 8050 ATTN: MS 0555
BENTONVILLE, AR 72712-8050

Book & Page 4296/ 86

Sale Date 11/06/2015

Instrument 03

Ownership History

Ownership History					
Owner	Sale Price	Certificate	Book & Page	Instrument	Sale Date
WAL-MART REAL ESTATE BUSINESS TRUST	\$9,800,000		4296/ 86	03	11/06/2015
GATEWAY LAUREN INC	\$7,700,000	C	3275/ 347	33	05/26/2006
KR MANCHESTER INC	\$4,178,680		1694/ 344		05/31/1994

Building Information

Building 1 : Section 1

Year Built: 1973

Living Area: 64,403

Replacement Cost: \$6,106,770

Replacement Cost
Less Depreciation: \$977,100

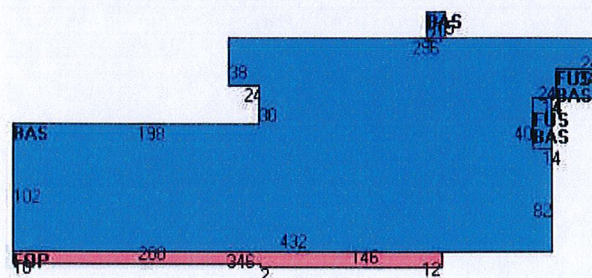
Building Attributes	
Field	Description
STYLE	Shop Center LO
MODEL	Ind/Comm
Grade	Average
Stories:	1
Occupancy	4
Exterior Wall 1	Concr/Cinder
Exterior Wall 2	
Roof Structure	Flat
Roof Cover	Tar + Gravel
Interior Wall 1	Minim/Masonry
Interior Wall 2	Drywall/Sheetr
Interior Floor 1	Concr-Finished
Interior Floor 2	Tile/Vinyl Cmp
Heating Fuel	Gas
Heating Type	Forced Air-Duc
AC Type	Central
Bldg Use	Commercial 96
Total Rooms	
Total Bedrms	00
Total Baths	0
1st Floor Use:	200I
Heat/AC	Heat/AC Packag
Frame Type	Masonry
Baths/Plumbing	Average
Ceiling/Wall	Susp Ceil & WI
Rooms/Prtns	Average
Wall Height	16
% Comn Wall	0

Building Photo



(<http://images.vgsi.com/photos2/ManchesterCTPhotos//\00\03\8>)

Building Layout



(<http://images.vgsi.com/photos2/ManchesterCTPhotos//Sketches>)

Building Sub-Areas (sq ft)			Legend
Code	Description	Gross Area	Living Area
BAS	First Floor	63,027	63,027
FUS	Upper Story, Finished	1,376	1,376
FOP	Porch, Open	3,752	0
		68,155	64,403

Building 2 : Section 1

Year Built: 1996
Living Area: 22,512
Replacement Cost: \$1,798,168
Replacement Cost
Less Depreciation: \$629,400

Building Attributes : Bldg 2 of 2	
Field	Description
STYLE	Chain Service Shop

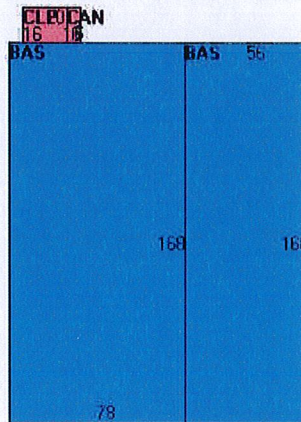
MODEL	Ind/Comm
Grade	Average
Stories:	1
Occupancy	1
Exterior Wall 1	Concr/Cinder
Exterior Wall 2	
Roof Structure	Flat
Roof Cover	Tar + Gravel
Interior Wall 1	Minim/Masonry
Interior Wall 2	
Interior Floor 1	Concr-Finished
Interior Floor 2	
Heating Fuel	Gas
Heating Type	Hot Air-no Duc
AC Type	None
Bldg Use	Commercial 96
Total Rooms	
Total Bedrms	00
Total Baths	0
1st Floor Use:	200I
Heat/AC	Heat/AC Packag
Frame Type	Masonry
Baths/Plumbing	Average
Ceiling/Wall	Ceiling & Wall
Rooms/Prtns	Average
Wall Height	18
% Comn Wall	0

Building Photo



(<http://images.vgsi.com/photos2/ManchesterCTPhotos//\00\01\7>)

Building Layout



(<http://images.vgsi.com/photos2/ManchesterCTPhotos//Sketches>)

Building Sub-Areas (sq ft)			Legend
Code	Description	Gross Area	Living Area
BAS	First Floor	22,512	22,512
CAN	Canopy	96	0
CLP	Loading Platform	320	0
		22,928	22,512

Extra Features

Extra Features				Legend
Code	Description	Size	Value	Bldg #
SPR1	Sprinklers-Wet	22512 S.F.	\$11,800	2
LDL2	Ld Lvlr-Manual	5 UNITS	\$800	1
MEZ3	Mezzanine Part Fin	775 S.F.	\$2,200	1
SPR1	Sprinklers-Wet	64100 S.F.	\$15,400	1

Land

Land Use

Use Code 200I
Description Commercial 96
Zone GB
Neighborhood 6000
Alt Land Appr Category No

Land Line Valuation

Size (Acres) 21.1
Frontage 0
Depth 0
Assessed Value \$2,168,200
Appraised Value \$3,097,400

Outbuildings

Outbuildings						Legend
Code	Description	Sub Code	Sub Description	Size	Value	Bldg #
FN1	Fence 4' Chain			120 L.F.	\$1,000	1
FN3	Fence 6' Chain			78 L.F.	\$900	1
PAV1	Paving Asphalt			400000 S.F.	\$500,000	1

Valuation History

Appraisal			
Valuation Year	Improvements	Land	Total
2015	\$2,139,800	\$3,006,300	\$5,146,100
2010	\$4,589,700	\$3,138,300	\$7,728,000
2005	\$4,001,300	\$2,199,800	\$6,201,100

Assessment			
Valuation Year	Improvements	Land	Total
2015	\$1,497,900	\$2,104,400	\$3,602,300
2010	\$3,213,200	\$2,196,800	\$5,410,000
2005	\$2,800,900	\$1,539,900	\$4,340,800

EXHIBIT 2



WIRELESS COMMUNICATIONS FACILITY

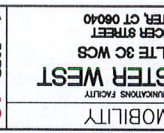
CT5245 - LTE 3C 850

MANCHESTER WEST

239 SPENCER STREET

MANCHESTER, CT 06040

REV.	DATE	BY	CHK'D BY	DESCRIPTION
0	02/17/18	KMKR	WJ	CONSTRUCTION DRAWINGS - ISSUED FOR CONSTRUCTION
1	12/08/18	ASC	WJ	CONSTRUCTION DRAWINGS - REVISED PER CLIENT COMMENTS
2	12/13/18	KMKR	WJ	CONSTRUCTION DRAWINGS - REVISED PER CLIENT COMMENTS



AT&T MOBILITY
 239 SPENCER STREET
 MANCHESTER WEST
 CT5245 - LTE 3C WCS
 MANCHESTER CT 06040

TITLE SHEET
 T-1
 Sheet No. 1 of 2

PROJECT SUMMARY

- THE PROPOSED SCOPE OF WORK CONSISTS OF A MODIFICATION TO THE EXISTING WIRELESS COMMUNICATIONS FACILITY INCLUDING THE FOLLOWING:
 - WORK AT EXISTING ALPHA/DIGITAL/DOMINA SITES
 - INSTALL (3) NEW ANTENNAS AND REPLACE WITH (3) KATHREIN
 - WORK WITHIN EXISTING LOCAL COMPOUND
 - INSTALL (1) ADDITIONAL XAU UNIT WITHIN EXISTING PURCELL CABINET
 - DECOMMISSION AND REMOVE EXISTING NOKIA GSM CABINET
 - INSTALL (1) EQUIPMENT RACK WITH (3) ERICSSON RRU5-12
 - REMOVE AND REFACE EXISTING CABINET 1000 MODULE WITHIN EXISTING RACK CABINET AND INSTALL A NEW RACK 550 MODULE WITH LOW-LEVEL CABINETS.

PROJECT INFORMATION

AT&T SITE NUMBER: CT5245
 AT&T SITE NAME: MANCHESTER WEST
 SITE ADDRESS: 239 SPENCER STREET, MANCHESTER, CT 06040
 LESSEE/APPLICANT: AT&T MOBILITY
 500 ENTERPRISE DRIVE, SUITE 3A
 ROCKY HILL, CT 06067
 AT&T PACE ID NUMBERS: WRCR018459
 AT&T FA LOCATION CODE: 10071104
 ENGINEER: JEFFREY S. CHAMBERS, P.E.
 63-2 NORTH BRANFORD RD.
 BRANFORD, CT 06405
 PROJECT COORDINATES: LATITUDE: 41°46'-10.708" N
 LONGITUDE: 71°57'-56.614" W
 SITE COORDINATES AND GROUND ELEVATION REFERENCED FROM GOOGLE EARTH.

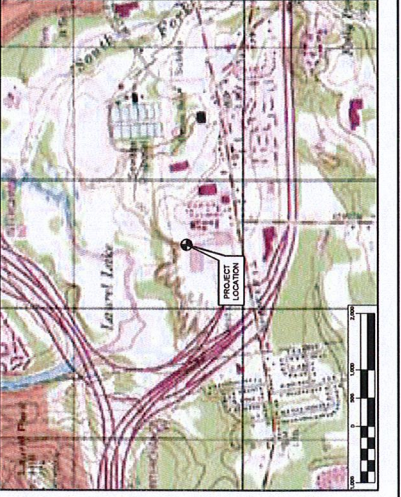
SHEET INDEX

SHEET NO.	DESCRIPTION	REV.
T-1	TITLE SHEET	2
N-1	NOTES, SPECIFICATIONS AND ANTENNA SCHEDULE	2
C-1	PLANS AND ELEVATION	2
C-2	EQUIPMENT LAYOUT PLANS	2
C-3	ANTENNA LAYOUT PLANS	2
C-4	DETAILS	2
E-1	LIE SCHEMATIC DIAGRAM AND NOTES	2
E-2	LIE WIRING DIAGRAM	2
E-3	TYPICAL ELECTRICAL DETAILS	2

SITE DIRECTIONS

- FROM: 500 ENTERPRISE DRIVE, ROCKY HILL, CONNECTICUT
- HEAD NORTHWEST ON ENTERPRISE DR TOWARD CAPITAL BLVD
 - TURN LEFT ON CAPITAL BLVD
 - TURN LEFT ON WEST ST
 - TURN LEFT ON WIDE AVENUE TO THE RIGHT TOWARD HARTFORD
 - TURN LEFT ON WIDE AVENUE TO THE RIGHT TOWARD W-44 L/C HARTFORD/ROSTON
 - CT-15 WALKER CROSS HWY N, RECORDS 1-84 10/16-6 1/2 WALKER CROSS HWY N
 - TAKE THE SPENCER STREET EXIT, LOT 1
 - TURN RIGHT ON SPENCER STREET
 - TURN LEFT ON SPENCER STREET
 - TO 239 SPENCER ST, MANCHESTER, CT 06040-6117, 239 SPENCER ST IS ON THE LEFT.

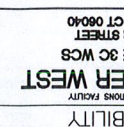
VICINITY MAP



GENERAL NOTES

- ALL WORK SHALL BE IN ACCORDANCE WITH THE 2015 INTERNATIONAL BUILDING CODE AS ADOPTED BY THE STATE OF CONNECTICUT, THE STATE BUILDING CODE, THE STATE ELECTRICAL CODE, THE STATE PLUMBING CODE, THE STATE MECHANICAL CODE, THE STATE FIRE CODE, THE STATE SAFETY CODE AND NATIONAL ELECTRICAL CODE AND LOCAL CODES.
- THE CONTRACTOR SHALL BE RESPONSIBLE FOR OBTAINING ALL NECESSARY PERMITS AND APPROVALS FROM ALL APPLICABLE AGENCIES AND AUTHORITIES. THE CONTRACTOR SHALL BE RESPONSIBLE FOR OBTAINING ALL NECESSARY PERMITS AND APPROVALS FROM ALL APPLICABLE AGENCIES AND AUTHORITIES. THE CONTRACTOR SHALL BE RESPONSIBLE FOR OBTAINING ALL NECESSARY PERMITS AND APPROVALS FROM ALL APPLICABLE AGENCIES AND AUTHORITIES.
- CONTRACTOR SHALL REVIEW ALL DRAWINGS AND SPECIFICATIONS IN THE CONTRACT DOCUMENT SET. CONTRACTOR SHALL COORDINATE WITH ALL SUBCONTRACTORS AND SUPPLIERS TO VERIFY ALL DIMENSIONS, ELEVATIONS, ANGLES, AND EXISTING CONDITIONS AT THE SITE PRIOR TO COMMENCEMENT OF WORK. CONTRACTOR SHALL BE RESPONSIBLE FOR OBTAINING ALL NECESSARY PERMITS AND APPROVALS FROM ALL APPLICABLE AGENCIES AND AUTHORITIES.
- CONTRACTOR SHALL PROVIDE A COMPLETE BUILD-OUT WITH ALL MATERIALS AND EQUIPMENT AS SHOWN ON DRAWINGS AND SPECIFICATIONS. CONTRACTOR SHALL BE RESPONSIBLE FOR OBTAINING ALL NECESSARY PERMITS AND APPROVALS FROM ALL APPLICABLE AGENCIES AND AUTHORITIES.
- CONTRACTOR SHALL FURNISH ALL MATERIAL, LABOR AND EQUIPMENT AS SHOWN ON DRAWINGS AND SPECIFICATIONS. CONTRACTOR SHALL BE RESPONSIBLE FOR OBTAINING ALL NECESSARY PERMITS AND APPROVALS FROM ALL APPLICABLE AGENCIES AND AUTHORITIES.
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REV	DATE	BY	DESCRIPTION
1	12/08/18	ASG	CONSTRUCTION DRAWINGS - ISSUED FOR CONSTRUCTION
2	12/13/18	KMKR	CONSTRUCTION DRAWINGS - REVISIONS PER CLIENT COMMENTS



AT&T MOBILITY
 WIRELESS COMMUNICATIONS FACILITY
 MANCHESTER WEST
 CT9245 - LTE 3C WCS
 230 SPRINGER STREET
 MANCHESTER, CT 06040

DATE: 03/07/18
 SCALE: AS SHOWN
 SHEET NO.: 2 OF 3

NOTES:
 SPECIFICATIONS &
 ANTENNA
 SCHEDULE

NOTES AND SPECIFICATIONS

DESIGN BASIS

CONCRETE SHALL BE IN COMPLIANCE WITH THE GOVERNING BUILDING CODE.

1. DESIGN CRITERIA:
 WIND LOAD: PER TA 222 G (ANTENNA MOUNTS) 90-105 MPH (3 SECOND GUST)
 WIND CATEGORY: I (BASED ON IBC APPROACH 1)
 SEISMIC LOAD (DOES NOT CONTROL): PER ASCE 7-10 MINIMUM DESIGN LOADS FOR BUILDING AND OTHER STRUCTURES.

GENERAL NOTES

1. ALL CONSTRUCTION SHALL BE IN COMPLIANCE WITH THE GOVERNING BUILDING CODE.

2. DIMENSIONS INDICATE THE MINIMUM SPACINGS, BUT IF ANY WORK SHOULD BE REQUIRED TO BE INSTALLED IN THE WORK, THE CONTRACTOR SHALL INCLUDE IN HIS SUBMITTALS THE NECESSARY DIMENSIONS, UNLESS OTHERWISE SPECIFIED IN THE DRAWINGS, UNLESS OTHERWISE SPECIFIED IN THE DRAWINGS, UNLESS OTHERWISE SPECIFIED IN THE DRAWINGS.

3. BEFORE BEGINNING THE WORK, THE CONTRACTOR IS RESPONSIBLE FOR MAKING SURE THAT ALL CONDITIONS ARE AS SHOWN ON THE DRAWINGS AND THAT THE SUBMITTALS AND CONDITIONS TO THE SITE WILL NOT AFFECT PERFORMANCE AND COST OF THE WORK.

4. DIMENSIONS AND DETAILS SHALL BE CHECKED AGAINST EXISTING FIELD CONDITIONS.

5. THE CONTRACTOR SHALL VERIFY AND CORRECTIVE THE SIZE AND LOCATION OF ALL OPENINGS, SIZES AND ANCHOR BOLTS AS REQUIRED BY ALL TRADES.

6. SURFACE AND SUBSTRATE CONDITIONS ARE APPROXIMATE. NO GUARANTEE IS MADE THAT THE CONTRACTOR SHALL VERIFY AND CORRECTIVE ALL DIMENSIONS, ELEVATIONS, ANGLES AND WITH ARCHITECTURAL AND SITE DRAWINGS BEFORE PROCEEDING WITH THE WORK.

7. AS THE WORK PROGRESSES, THE CONTRACTOR SHALL NOTIFY THE OWNER OF ANY CONDITIONS WHICH ARE IN CONFLICT OR OTHERWISE NOT CONSISTENT WITH THE DRAWINGS AND SHALL BE RESPONSIBLE FOR THE PROTECTION OF EXISTING PROPERTY, UTILITIES AND STRUCTURES. THE CONTRACTOR SHALL BE RESPONSIBLE FOR THE PROTECTION OF EXISTING PROPERTY, UTILITIES AND STRUCTURES.

8. THE CONTRACTOR IS SOLELY RESPONSIBLE TO DETERMINE CONSTRUCTION PROCEDURES AND SEQUENCE, AND TO ENSURE THE SAFETY OF THE EXISTING STRUCTURE AND TO PROTECT THE SAFETY OF THE EXISTING STRUCTURE AND TO PROTECT THE SAFETY OF THE EXISTING STRUCTURE AND TO PROTECT THE SAFETY OF THE EXISTING STRUCTURE.

9. THE CONTRACTOR SHALL BE RESPONSIBLE FOR THE PROTECTION OF EXISTING PROPERTY, UTILITIES AND STRUCTURES.

10. THE CONTRACTOR SHALL BE RESPONSIBLE FOR THE PROTECTION OF EXISTING PROPERTY, UTILITIES AND STRUCTURES.

11. THE CONTRACTOR SHALL BE RESPONSIBLE FOR THE PROTECTION OF EXISTING PROPERTY, UTILITIES AND STRUCTURES.

12. SHOP DRAWINGS, CONCRETE MIX DESIGNS, TEST REPORTS, AND OTHER SUBMITTALS SHALL BE SUBMITTED TO THE ARCHITECT FOR REVIEW AND APPROVAL BEFORE FABRICATION AND/OR INSTALLATION IS MADE. SHOP DRAWINGS SHALL BE SUBMITTED TO THE ARCHITECT FOR REVIEW AND APPROVAL BEFORE FABRICATION AND/OR INSTALLATION IS MADE. SHOP DRAWINGS SHALL BE SUBMITTED TO THE ARCHITECT FOR REVIEW AND APPROVAL BEFORE FABRICATION AND/OR INSTALLATION IS MADE. SHOP DRAWINGS SHALL BE SUBMITTED TO THE ARCHITECT FOR REVIEW AND APPROVAL BEFORE FABRICATION AND/OR INSTALLATION IS MADE.

13. NO DRILLING, WELDING OR TYPING ON PURCHASED OWNED EQUIPMENT.

14. REFER TO DRAWING T1 FOR ADDITIONAL NOTES AND REQUIREMENTS.

STRUCTURAL STEEL

1. ALL STRUCTURAL STEEL IS DESIGNED BY ALLOWABLE STRESS DESIGN (ASD)

A. STRUCTURAL STEEL (W SHAPES) - ASTM A992 (F_y = 50 ksi)
 B. STRUCTURAL STEEL (RECTANGULAR SHAPES) - ASTM A500 GRADE B (F_y = 48 ksi)
 C. ALL WELDS (ROUND SHAPES) - ASTM A500 GRADE B (F_y = 48 ksi)
 D. CONNECTION BOLTS - ASTM A325 - X (F_y = 58 ksi)
 E. WELDING ELECTRODE - E70XX

2. CONTRACTOR TO REVIEW ALL SHOP DRAWINGS AND SUBMIT COPY TO ENGINEER FOR REVIEW. THE ENGINEER FOR REVIEW SHOP DRAWINGS SHALL INCLUDE THE FOLLOWING: SIZE AND TYPE OF FACTORS AND ACCESSORIES, INCLUDE ERECTION DRAWINGS, ELEVATIONS AND DETAILS.

3. STRUCTURAL STEEL SHALL BE OF THE HEAVIEST AVAILABLE SIZE AND ERECTED IN ACCORDANCE WITH THE MANUFACTURER'S INSTRUCTIONS. ALL DIMENSIONS SHALL BE TO THE CENTERLINE UNLESS OTHERWISE NOTED.

4. PROVIDE ALL PLATES, CLIP ANGLES, CLOSE UP RIBS, STRAP ANCHORS, MISCELLANEOUS PIECES AND HOLES REQUIRED TO COMPLETE THE STRUCTURE.

5. FIT AND SHOP ASSEMBLY FABRICATIONS IN THE LARGEST PRACTICAL SECTIONS FOR DELIVERY TO SITE.

6. ALL DIMENSIONS SHALL BE TO THE CENTERLINE UNLESS OTHERWISE NOTED.

7. AFTER ERECTION OF STRUCTURES, TOUCHUP ALL WELDS, GRINDINGS AND NON-DAMAGED SURFACES WITH A 100 GRIT BRUSH AND ZINC RICH PAINT IN ACCORDANCE WITH THE MANUFACTURER'S INSTRUCTIONS.

8. ALL STEEL MATERIAL (EXCEPT TO WEAR) SHALL BE GALVANIZED AFTER FABRICATION IN ACCORDANCE WITH ASTM A153 ZINC (HOT DIPPED GALVANIZED) COATING ON IRON AND STEEL PRODUCTS.

9. ALL BOLTS, ANCHORS AND MISCELLANEOUS HARDWARE SHALL BE GALVANIZED IN ACCORDANCE WITH ASTM A153 ZINC COATING (HOT-DIP) ON IRON AND STEEL HARDWARE.

10. THE ENGINEER SHALL BE NOTIFIED OF ANY INCORRECTLY FABRICATED, DAMAGED OR DEFECTIVE CONNECTIONS OF MATERIAL. ANY SUCH MATERIAL SHALL REQUIRE ENGINEER REVIEW AND CORRECTIVE ACTION.

11. CONNECTION ANGLES SHALL HAVE A MINIMUM THICKNESS OF 1/4 INCHES.

12. STRUCTURAL CONNECTION BOLTS SHALL CONFORM TO ASTM A325. ALL BOLTS SHALL BE GALVANIZED UNLESS OTHERWISE NOTED.

13. LOCK WASHER ARE NOT PERMITTED FOR A325 STEEL ASSEMBLIES.

14. SHOP CONNECTIONS SHALL BE WELDED OR HIGH STRENGTH BOLTED.

15. ALL BEARING ENDS OF COLUMNS, STRUTTERS, AND OTHER BEARING SURFACES TO TRANSFER LOAD OVER OTHER CROSS SECTION.

16. FABRICATE BEAMS WITH FULL CAMBER UP.

17. LEVEL AND PLUMB INDIVIDUAL MEMBERS OF THE STRUCTURE TO AN ACCURACY OF 1:500, BUT NOT TO EXCEED 1/4" IN THE FULL HEIGHT OF THE COLUMN.

18. COMPLETION OF STRUCTURAL STEEL WORK WITHOUT NOTIFYING THE ENGINEER SHALL BE PROHIBITED. ALL WELDING AND HIGH STRENGTH BOLTING SHALL BE PERFORMED BY AN INDEPENDENT TESTING LABORATORY.

19. MEASUREMENTS AND TESTING OF ALL WELDING AND HIGH STRENGTH BOLTING SHALL BE PERFORMED BY AN INDEPENDENT TESTING LABORATORY.

20. FOUR COPIES OF ALL INSPECTION TEST REPORTS SHALL BE SUBMITTED TO THE ENGINEER WITHIN TEN (10) WORKING DAYS OF THE DATE OF INSPECTION.

PAINT NOTES

PAINTING SCHEDULE

1. ANTI-RUST TREATMENT

A. SURFACES TO BE TREATED WITH EXISTING TOWER STRUCTURE.

2. CORROSION RESISTANT PAINT

A. ONE COAT OF PRIMER (2-3 HRS. DRY TIME)
 B. TWO COATS OF PRIMER (2-3 HRS. DRY TIME)
 C. COLOR TO BE FIELD MATCHED WITH EXISTING STRUCTURE.

EXAMINATION AND PREPARATION:

DO NOT APPLY PAINT IN SHOW, WIND, FOG OR DUST OR WHEN RELATIVE HUMIDITY EXCEEDS 85%. SURFACES TO BE PAINTED SHALL BE CLEAN, DRY AND FREE OF OIL, GREASE, RUST, AND OTHER CONTAMINANTS. SURFACE TO BE PAINTED SHALL BE CLEAN, DRY AND FREE OF OIL, GREASE, RUST, AND OTHER CONTAMINANTS. SURFACE TO BE PAINTED SHALL BE CLEAN, DRY AND FREE OF OIL, GREASE, RUST, AND OTHER CONTAMINANTS. SURFACE TO BE PAINTED SHALL BE CLEAN, DRY AND FREE OF OIL, GREASE, RUST, AND OTHER CONTAMINANTS.

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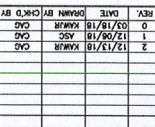
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ANTENNA SCHEDULE

SECTOR	EXISTING/PROPOSED	BAND	ANTENNA	SIZE (INCHES) (L x W x H)	ANTENNA HEIGHT	ADJUTH	MECHANICAL DETAILS	(E/P) TWR/FLEXOR/TPFLXDR (DT)	(E/P) RRU (DT)	FEEDER TYPE (CITY/LENGTH)	(E) RRU (DT)
A1	PROPOSED	LTE 700 BC/100/850/AMTS 850	MATHEIN 80010798	78.5 x 14.8 x 6.7	102'	30"	0	(E) TWR CO DTM4P7878PACT2A TWR PCS W/ 700-850BP (700) (1), (E) TRP-DR: TPR-079821 (2)	(E) RRU-12 (1), (E) RRU-12 (1), (E) RRU-12 (1)	ANDREW 1-1* (C) 2150FT	(E) RRU-12 (1)
B1	PROPOSED	LTE 700 BC/100/850/AMTS 850	MATHEIN 80010798	78.5 x 14.8 x 6.7	102'	150"	0	(E) TWR CO DTM4P7878PACT2A TWR PCS W/ 700-850BP (700) (1), (E) TRP-DR: TPR-079821 (2)	(E) RRU-12 (1), (E) RRU-12 (1), (E) RRU-12 (1)	ANDREW 1-1* (C) 2150FT	(E) RRU-12 (1)
C1	PROPOSED	LTE 700 BC/100/850/AMTS 850	MATHEIN 80010798	78.5 x 14.8 x 6.7	102'	270"	0	(E) TWR CO DTM4P7878PACT2A TWR PCS W/ 700-850BP (700) (1), (E) TRP-DR: TPR-079821 (2)	(E) RRU-12 (1), (E) RRU-12 (1), (E) RRU-12 (1)	ANDREW 1-1* (C) 2150FT	(E) RRU-12 (1)

APPENDIX

1. REFER TO DRAWING T1 FOR ADDITIONAL NOTES AND REQUIREMENTS.



AT&T MOBILITY
 WIRELESS COMMUNICATIONS FACILITY
 MANCHESTER WEST
 CT9245 - LTE 3C WCS
 230 SPRINGER STREET
 MANCHESTER, CT 06040

DATE: 03/07/18
 SCALE: AS SHOWN
 SHEET NO.: 2 OF 3

NOTES:
 SPECIFICATIONS &
 ANTENNA
 SCHEDULE

Sheet No. 2 OF 3

REV.	DATE	BY	DESCRIPTION
0	02/12/18	KMKR	ISSUED FOR CONSTRUCTION
1	12/05/18	ASC	CONSTRUCTION DRAWINGS - ISSUED FOR CONSTRUCTION
2	12/13/18	KMKR	CONSTRUCTION DRAWINGS - REVISION PER CLIENT COMMENTS



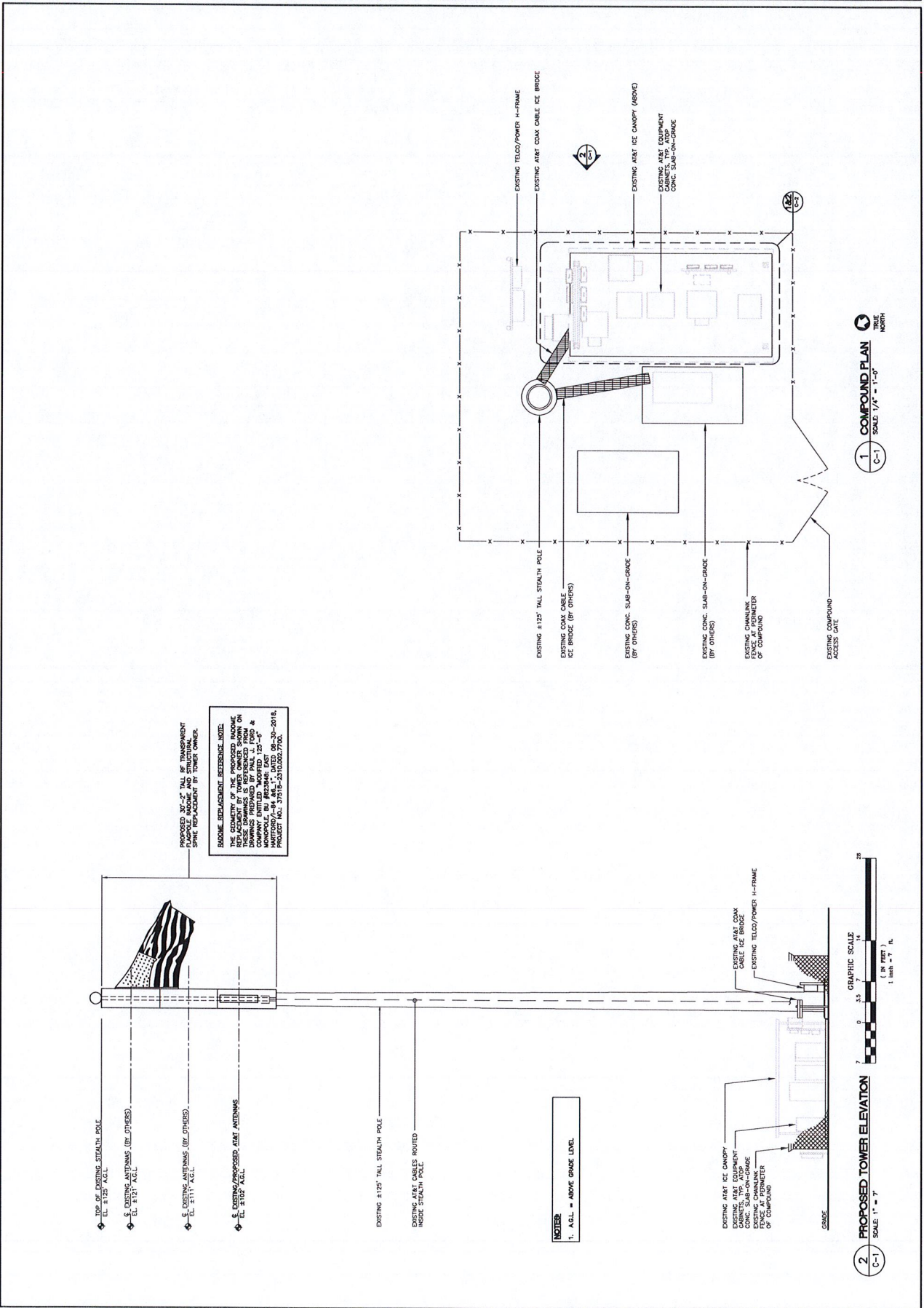
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 Wireless Communications
 1200 Main Street
 Boston, MA 02108
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AT&T MOBILITY
 WIRELESS COMMUNICATIONS FACILITY
 CT245 - LTE 3C WCS
 239 SPENCER STREET
 MANCHESTER, CT 06040

DATE: 02/07/18
 SCALE: AS SHOWN
 JOB NO.: 10022114

PLANS AND ELEVATION

C-1
 Sheet No. 2 of 2



1 COMPOUND PLAN
 SCALE: 1/4" = 1'-0"
 NORTH

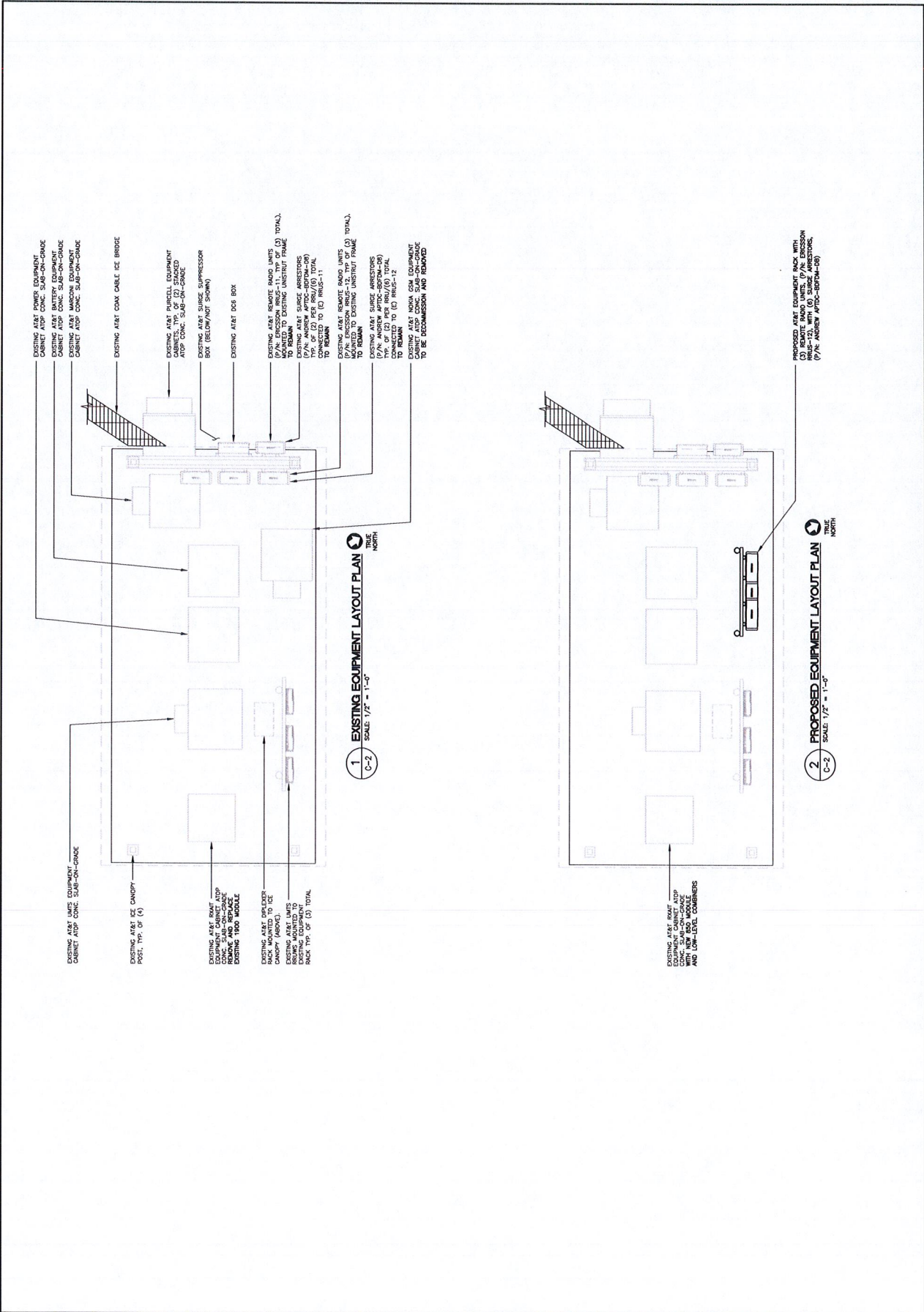
2 PROPOSED TOWER ELEVATION
 SCALE: 1" = 7'
 GRAPHIC SCALE
 0 3.5 7 14
 (IN FEET)
 1 inch = 7 ft.

REV.	DATE	BY	CHK'D	DESCRIPTION
0	12/19/18	KMFR		CONSTRUCTION DRAWINGS - ISSUED FOR CONSTRUCTION
1	12/13/18	KMFR		CONSTRUCTION DRAWINGS - REVISION PER CLIENT COMMENTS
2	12/13/18	KMFR		CONSTRUCTION DRAWINGS - REVISION PER CLIENT COMMENTS



DATE	03/27/18
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JOB NO.	18000114

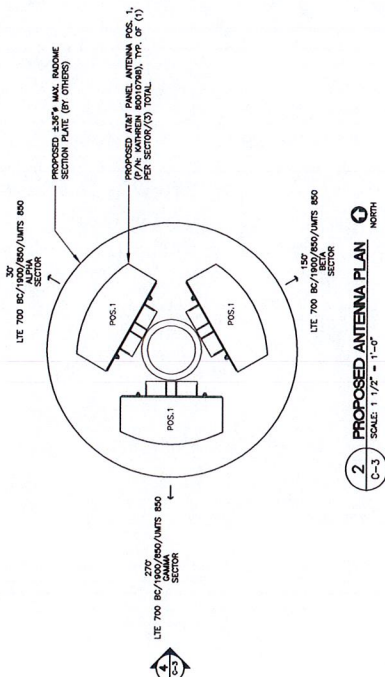
Sheet No. 1 of 1



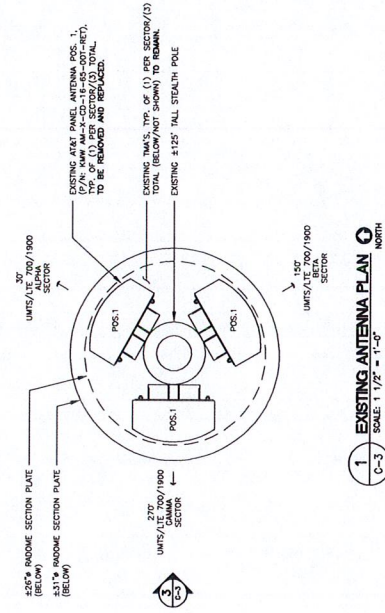
1 EXISTING EQUIPMENT LAYOUT PLAN
 SCALE: 1/2" = 1'-0"
 TRUE NORTH

2 PROPOSED EQUIPMENT LAYOUT PLAN
 SCALE: 1/2" = 1'-0"
 TRUE NORTH

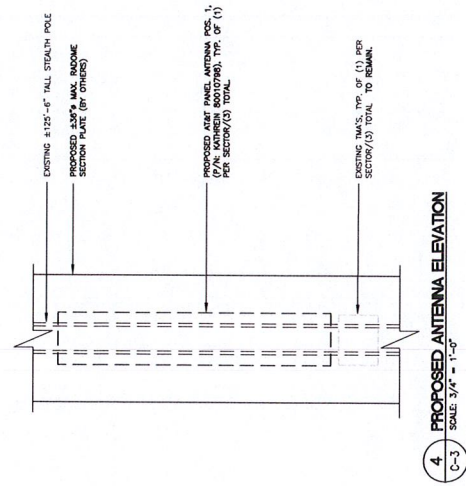
RAOOME REEVALUATION REFERENCE NOTE:
 THE GEOMETRY OF THE PROPOSED RAOOME
 STRUCTURE IS BASED ON THE INFORMATION
 PROVIDED BY THE CLIENT. THE CLIENT IS
 RESPONSIBLE FOR THE ACCURACY OF THE
 INFORMATION PROVIDED. THE ENGINEER
 HAS CONDUCTED VISUAL CHECKS OF THE
 DRAWINGS PREPARED BY PAUL J. FORD &
 ASSOCIATES, INC. (P/J/F) IN CHICAGO,
 ILLINOIS. THE ENGINEER HAS CONDUCTED
 VISUAL CHECKS OF THE DRAWINGS PREPARED
 BY PAUL J. FORD & ASSOCIATES, INC.
 IN CHICAGO, ILLINOIS. THE ENGINEER HAS
 CONDUCTED VISUAL CHECKS OF THE
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 ASSOCIATES, INC. IN CHICAGO, ILLINOIS.
 PROJECT NO. 7-2118-2310.002. 3/16/18.



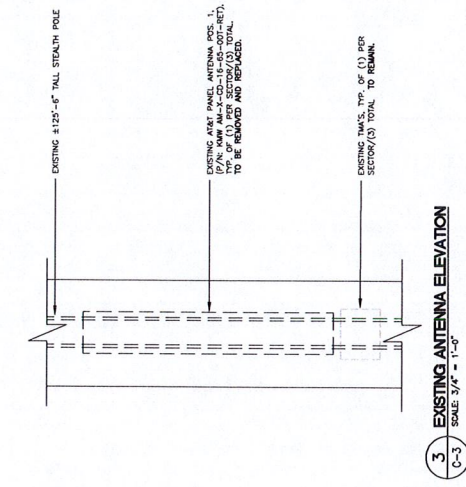
2 PROPOSED ANTENNA PLAN NORTH
 SCALE: 1/4" = 1'-0"
 C-3



1 EXISTING ANTENNA PLAN NORTH
 SCALE: 1/2" = 1'-0"
 C-3



4 PROPOSED ANTENNA ELEVATION
 SCALE: 3/4" = 1'-0"
 C-3



3 EXISTING ANTENNA ELEVATION
 SCALE: 3/4" = 1'-0"
 C-3

REV.	DATE	ISSUED BY	DESCRIPTION
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1	03/19/18	KAMR	CONSTRUCTION DIMENSIONS - ISSUED FOR CONSTRUCTION
2	12/13/18	KAMR	CONSTRUCTION DIMENSIONS - REVERSED PER CLIENT COMMENTS



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 312.467.8888

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MANCHESTER WEST
 CT5245 - LTE 3C WCS
 230 SPENCER STREET
 MANCHESTER CT 06040

DATE: 03/20/18
 SCALE: AS NOTED
 JOB NO. 18030.14
 ANTENNA LAYOUT PLANS
 Sheet No. 2 of 2

REV.	DATE	BY	CHK'D BY	DESCRIPTION
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2	12/06/18	ASC	CAG	CONSTRUCTION DRAWINGS - ISSUED FOR CONSTRUCTION
3	12/13/18	KM/R	CAG	CONSTRUCTION DRAWINGS - REVISED PER CLIENT COMMENTS



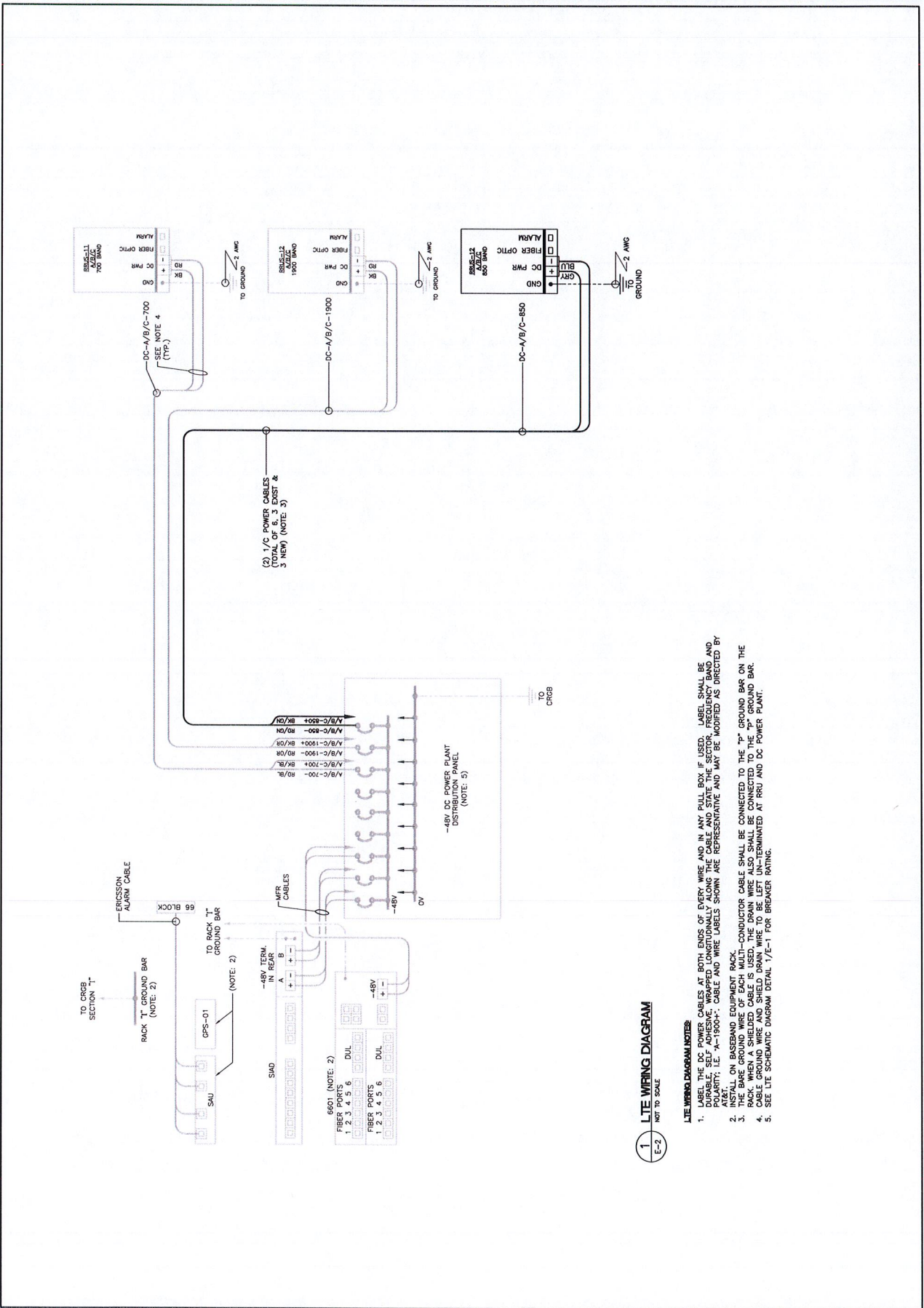
CENTEK Engineering, Inc.
 425 North Lincoln Road
 Suite 400
 Manahawatch, NJ 08050
 www.centek.com

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 WIRELESS COMMUNICATIONS FACILITY
MANCHESTER WEST
 CT5245 - LTE 3C WCS
 230 SPENCER STREET
 MANCHESTER CT 06040

DATE: 03/18/18
 SCALE: AS SHOWN
 JOB NO.: 1800012

LTE WIRING
 DIAGRAM

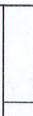
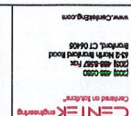
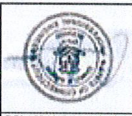
E-2
 Sheet No. 3 of 3



LTE WIRING DIAGRAM
 NOT TO SCALE

- LTE WIRING DIAGRAM NOTES:**
- THE CABLES AT BOTH ENDS OF EVERY WIRE AND IN ANY BULL RUN, IF USED, LABEL SHALL BE DURABLE SELF-ADHESIVE, WRAPPED LONGITUDINALLY ALONG THE CABLE AND STATE THE SECTOR, FREQUENCY BAND AND POLARITY; I.E. "A-1900H". CABLE AND WIRE LABELS SHOWN ARE REPRESENTATIVE AND MAY BE MODIFIED AS DIRECTED BY INSTALL ON BASEBAND EQUIPMENT RACK.
 - THE BARE GROUND WIRE OF EACH MULTI-CONDUCTOR CABLE SHALL BE CONNECTED TO THE "T" GROUND BAR ON THE RACK. WHEN A SHIELDED CABLE IS USED, THE DRAIN WIRE ALSO SHALL BE CONNECTED TO THE "T" GROUND BAR.
 - CABLE GROUND WIRE AND SHIELD DRAIN WIRE TO BE LEFT UN-TERMINATED AT RRU AND DC POWER PLANT.
 - SEE LTE SCHEMATIC DIAGRAM DETAIL 1/E-1 FOR BRACKET FORM.

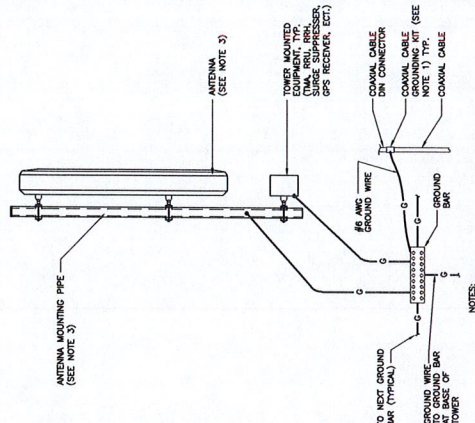
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1	12/06/18	ASC	CAG	CONSTRUCTION DIMENSIONS - ISSUED FOR CONSTRUCTION
0	10/19/18	KMAR	CAG	CONSTRUCTION DIMENSIONS - ISSUED FOR CONSTRUCTION



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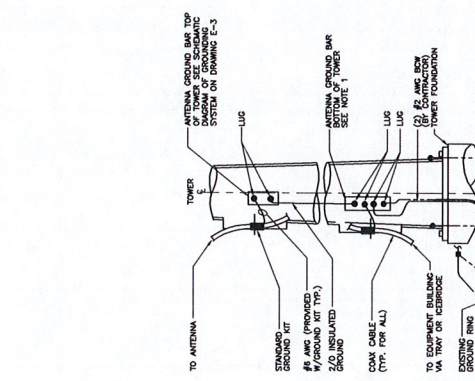
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 JOB NO.: 10000114

TYPICAL ELECTRICAL DETAILS
E-3
 Sheet No. 3 of 3



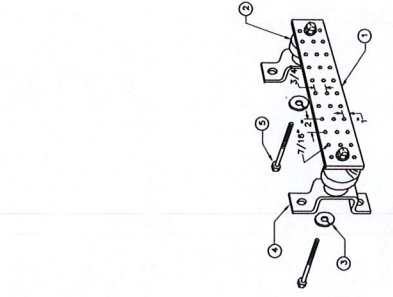
- NOTES:**
- BOND COAXIAL CABLE GROUND KITS TO EACH OTHER AND TO THE ENTIRE COAX RUN FROM ANTENNA TO SHALTER.
 - BOND ALL EQUIPMENT TO GROUND PER NEC AND MANUFACTURER'S SPECIFICATIONS.
 - DETAIL IS TYPICAL FOR ALL ANTENNA SECTORS, INCLUDING GPS ANTENNA.

1 TYPICAL ANTENNA GROUNDING DETAIL
 E-3 NOT TO SCALE



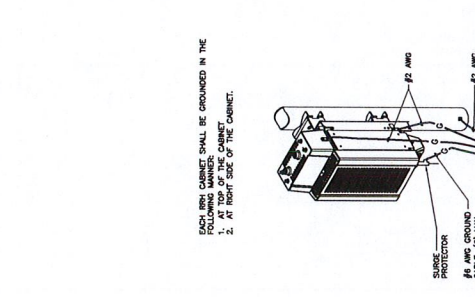
- NOTES:**
- LOCATION AND CONNECTION ORIENTATION PROVIDED AS REQUIRED.
 - A SEPARATE GROUND BAR TO BE USED FOR GPS ANTENNA IF REQUIRED.

2 ANTENNA CABLE GROUNDING - TOWER
 E-3 NOT TO SCALE



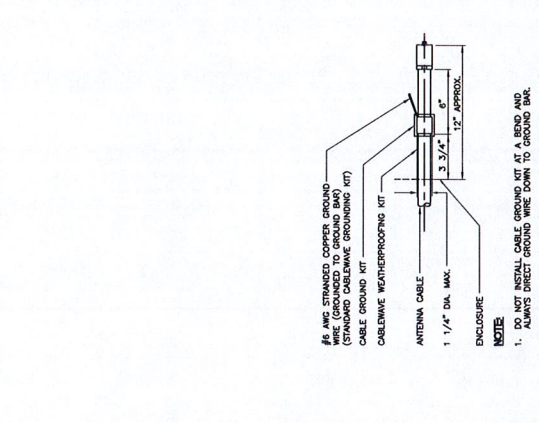
- LEGEND**
- TINED COPPER GROUND BAR, 1/4" x 4" x .20", NEMA DOUBLE TUD.
 - INSULATORS, NEWTON INSTRUMENT CAT. NO. 2.
 - 3.5/8" LOCK WASHERS, NEWTON INSTRUMENT CO. CAT. NO. 3013-B.
 - WALL MOUNTING BRACKET, NEWTON INSTRUMENT CO. CAT. NO. 3013-B.
 - STAINLESS STEEL SECURITY SCREWS.

3 GROUND BAR DETAIL
 E-3 NOT TO SCALE



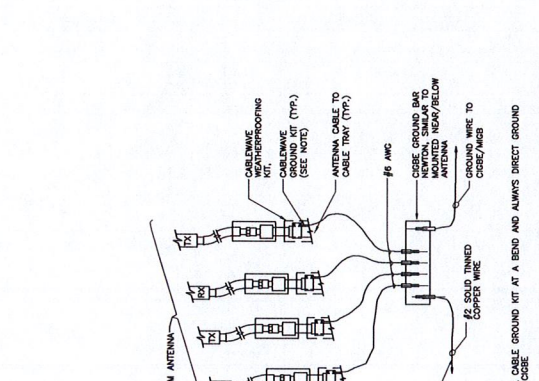
- NOTES:**
- GROUND WIRE TO TOWER BASE.

4 RRU POLE MOUNT GROUNDING
 E-3 NOT TO SCALE



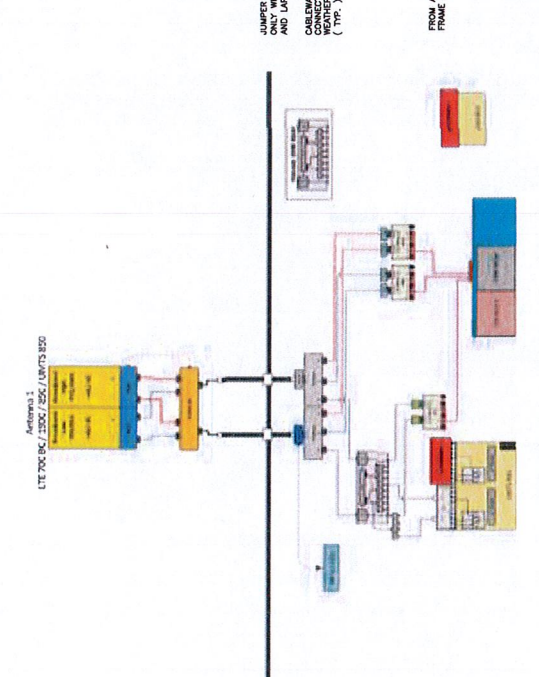
- NOTE:**
- DO NOT INSTALL CABLE GROUND KIT AT A BEND AND ALWAYS DIRECT GROUND WIRE DOWN TO GROUND BAR.

5 ANTENNA CABLE GROUNDING DETAIL
 E-3 NOT TO SCALE



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

6 CONNECTION OF GROUND WIRES TO GROUND BAR
 E-3 NOT TO SCALE



7 RF PLUMBING DIAGRAM
 E-3 NOT TO SCALE

EXHIBIT 3

Date: December 11, 2018

Rebecca Klein
Crown Castle
3530 Toringdon Way Suite 300
Charlotte, NC 28277



Crown Castle
2000 Corporate Drive
Canonsburg, PA 15317
(724) 416-2000

Subject: Structural Analysis Report

Carrier Designation: AT&T Mobility Co-Locate
Carrier Site Number: CT5245
Carrier Site Name: MANCHESTER WEST

Crown Castle Designation: Crown Castle BU Number: 823848
Crown Castle Site Name: East Hartford/ I-84 & 6_1
Crown Castle JDE Job Number: 544258
Crown Castle Work Order Number: 1661615
Crown Castle Order Number: 467460 Rev. 1

Engineering Firm Designation: Crown Castle Project Number: 1661615

Site Data: 205 Spencer Street, Manchester, Hartford County, CT
Latitude 41° 46' 10.769", Longitude -72° 34' 12.33"
125.5 Foot - Concealment Tower

Dear Rebecca Klein,

Crown Castle is pleased to submit this "Structural Analysis Report" to determine the structural integrity of the above mentioned tower.

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: Proposed Equipment Configuration **Sufficient Capacity**

This analysis utilizes an ultimate 3-second gust wind speed of 125 mph as required by the 2018 Connecticut State Building Code. Applicable Standard references and design criteria are listed in Section 2 - Analysis Criteria.

Structural analysis prepared by: Mahdis Arianpour / AJG

Respectfully submitted by:

A handwritten signature in blue ink that reads 'Maribel Dentinger'.

Maribel Dentinger, P.E.
Sr. Project Engineer



TABLE OF CONTENTS

1) INTRODUCTION

2) ANALYSIS CRITERIA

Table 1 - Proposed Equipment Configuration

Table 2 - Other Considered Equipment

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tnxTower Output

6) APPENDIX B

Base Level Drawing

7) APPENDIX C

Additional Calculations

1) INTRODUCTION

This tower is a 125.5 ft Concealment tower designed by FWT INC and mapped by TEP. The base tower is 95.5' and the canister section is from 95.5' to 125.5'. The canister section from 95.5' to 105.5' has been expanded to a diameter of 31.875".

2) ANALYSIS CRITERIA

TIA-222 Revision: TIA-222-H
Risk Category: II
Wind Speed: 125 mph
Exposure Category: C
Topographic Factor: 1
Ice Thickness: 2.0 in
Wind Speed with Ice: 50 mph
Service Wind Speed: 60 mph

Table 1 - Proposed Equipment Configuration

Mounting Level (ft)	Center Line Elevation (ft)	Number of Antennas	Antenna Manufacturer	Antenna Model	Number of Feed Lines	Feed Line Size (in)
101.0	102.0	3	kathrein	80010798 w/ Mount Pipe	6	1-5/8
	97.0	3	amplifier	TMA2117F00V1-1		
	96.0	3	amplifier	TMA2117F00V1-1		

Table 2 – Other Considered Equipment

Mounting Level (ft)	Center Line Elevation (ft)	Number of Antennas	Antenna Manufacturer	Antenna Model	Number of Feed Lines	Feed Line Size (in)
121.0	121.0	3	rfs/celwave	APXV18-209014-C	6	1-5/8
	116.0	3	ericsson	KRY 112 89/4		
120.5	120.5	1	generic	24.75" OD x 10' Concealment Shroud	-	-
111.0	111.0	3	rfs/celwave	APXV18-206516S-C	6	1-5/8
	107.0	3	ericsson	KRY 112 144/1		
110.5	110.5	1	generic	25.75" OD x 10' Concealment Shroud	-	-
100.5	100.5	1	generic	31.875" OD x 10' Concealment Shroud	-	-

3) ANALYSIS PROCEDURE

Table 3 - Documents Provided

Document	Remarks	Reference	Source
4-GEOTECHNICAL REPORTS	Dr. Clarence Welti	3553927	CCISITES
4-TOWER FOUNDATION DRAWINGS/DESIGN/SPECS	FWT	3843091	CCISITES
4-TOWER MANUFACTURER DRAWINGS	FWT& TEP (Mapping)	3553928	CCISITES

3.1) Analysis Method

tnxTower (version 8.0.4.0), 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 structures were built and have been maintained in accordance with the manufacturer's specification.
- 2) The configuration of antennas, transmission cables, mounts and other appurtenances are as specified in Tables 1 and 2 and the referenced drawings.
- 3) The existing base plate grout was not considered in this analysis.
- 4) It is assumed that the spine to flange plate weld has been designed for the full capacity of the spine mast pipe and the flange plate. The weld is considered sufficient.

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

4) ANALYSIS RESULTS

Table 4 - Section Capacity (Summary)

Section No.	Elevation (ft)	Component Type	Size	Critical Element	P (K)	SF*P_allow (K)	% Capacity	Pass / Fail
L1	125.5 - 95.5	Pole	TP5x5x0.5	1	-2.41	467.59	78.2	Pass
L2	95.5 - 48.67	Pole	TP33.025x26x0.1875	2	-6.66	1207.28	28.7	Pass
L3	48.67 - 0	Pole	TP39.95x32x0.1875	3	-12.73	1304.38	63.2	Pass
							Summary	
						Pole (L1)	78.2	Pass
						Rating =	78.2	Pass

Table 5 - Tower Component Stresses vs. Capacity – LC5

Notes	Component	Elevation (ft)	% Capacity	Pass / Fail
1	Flange Bolts	95.5	29.7	Pass
1,2	Flange Plates		86.0	Pass
1	Anchor Rods	0	74.2	Pass
1	Base Plate	0	51.5	Pass
1	Base Foundation (Structure)	0	23.0	Pass
1	Base Foundation (Soil Interaction)	0	49.9	Pass

Structure Rating (max from all components) =	86.0%
---	--------------

Notes:

- 1) See additional documentation in "Appendix C – Additional Calculations" for calculations supporting the % capacity consumed.
- 2) Flange Plate capacity has been determined by conducting a finite element analysis using ANSYS 19.2.

4.1) Recommendations

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

APPENDIX A
TNXTOWER OUTPUT

125.5 ft

Section	1	2	3
Length (ft)	30.00	46.83	53.00
Number of Sides	0	18	18
Thickness (in)	0.5000	0.1875	0.1875
Socket Length (ft)		4.33	
Top Dia (in)	5.0000	26.0000	32.0000
Bot Dia (in)	5.0000	33.0250	39.9500
Grade		ASTM A513 D.O.M., 70 KSI	A572-65
Weight (K)	0.7	2.8	3.8

95.5 ft

48.7 ft

0.0 ft



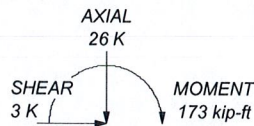
MATERIAL STRENGTH

GRADE	Fy	Fu	GRADE	Fy	Fu
ASTM A513 D.O.M. 70 KSI	70 ksi	80 ksi	A572-65	65 ksi	80 ksi

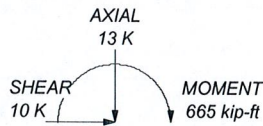
TOWER DESIGN NOTES

1. Tower is located in Hartford County, Connecticut.
2. Tower designed for Exposure C to the TIA-222-H Standard.
3. Tower designed for a 125 mph basic wind in accordance with the TIA-222-H Standard.
4. Tower is also designed for a 50 mph basic wind with 1.70 in ice. Ice is considered to increase in thickness with height.
5. Deflections are based upon a 60 mph wind.
6. Tower Risk Category II.
7. Topographic Category 1 with Crest Height of 0.00 ft
8. TIA-222-H Annex S
9. TOWER RATING: 78.2%


ALL REACTIONS
ARE FACTORED



50 mph WIND - 1.7000 in ICE



REACTIONS - 125 mph WIND

 Crown Castle 2000 Corporate Drive Canonsburg, PA 15317 The Pathway to Possible Phone: (724) 416-2000 FAX:	Job: BU# 823848	
	Project:	
	Client:	Drawn by: AGreguric
	Code: TIA-222-H	Date: 12/06/18
	Path:	Scale: NTS
	Dwg No. E-1	

R:\SA Models - Letters\Work Area\WIP\SA\WIP\823848 WD 1661616\CA\823848.dwg

Tower Input Data

The tower is a monopole.

This tower is designed using the TIA-222-H standard.

The following design criteria apply:

- 1) Tower is located in Hartford County, Connecticut.
- 2) Tower base elevation above sea level: 120.00 ft.
- 3) Basic wind speed of 125 mph.
- 4) Risk Category II.
- 5) Exposure Category C.
- 6) Simplified Topographic Factor Procedure for wind speed-up calculations is used.
- 7) Topographic Category: 1.
- 8) Crest Height 0.00 ft.
- 9) Nominal ice thickness of 1.7000 in.
- 10) Ice thickness is considered to increase with height.
- 11) Ice density of 56 pcf.
- 12) A wind speed of 50 mph is used in combination with ice.
- 13) Temperature drop of 50 °F.
- 14) Deflections calculated using a wind speed of 60 mph.
- 15) TIA-222-H Annex S.
- 16) A non-linear (P-delta) analysis was used.
- 17) Pressures are calculated at each section.
- 18) Stress ratio used in pole design is 1.05.
- 19) Local bending stresses due to climbing loads, feed line supports, and appurtenance mounts are not considered.

Options

Consider Moments - Legs Consider Moments - Horizontals Consider Moments - Diagonals Use Moment Magnification Use Code Stress Ratios ✓ Use Code Safety Factors - Guys Escalate Ice Always Use Max Kz Use Special Wind Profile Include Bolts In Member Capacity Leg Bolts Are At Top Of Section Secondary Horizontal Braces Leg Use Diamond Inner Bracing (4 Sided) SR Members Have Cut Ends SR Members Are Concentric	Distribute Leg Loads As Uniform Assume Legs Pinned ✓ Assume Rigid Index Plate ✓ Use Clear Spans For Wind Area Use Clear Spans For KL/r Retension Guys To Initial Tension ✓ Bypass Mast Stability Checks ✓ Use Azimuth Dish Coefficients ✓ Project Wind Area of Appurt. Autocalc Torque Arm Areas Add IBC .6D+W Combination ✓ Sort Capacity Reports By Component Triangulate Diamond Inner Bracing Treat Feed Line Bundles As Cylinder Ignore KL/ry For 60 Deg. Angle Legs	Use ASCE 10 X-Brace Ly Rules Calculate Redundant Bracing Forces Ignore Redundant Members in FEA SR Leg Bolts Resist Compression All Leg Panels Have Same Allowable Offset Girt At Foundation ✓ Consider Feed Line Torque Include Angle Block Shear Check Use TIA-222-H Bracing Resist. Exemption Use TIA-222-H Tension Splice Exemption Poles ✓ Include Shear-Torsion Interaction Always Use Sub-Critical Flow Use Top Mounted Sockets Pole Without Linear Attachments Pole With Shroud Or No Appurtenances Outside and Inside Corner Radii Are Known
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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	125.50-95.50	30.00	0.00	Round	5.0000	5.0000	0.5000		ASTM A513 D.O.M. 70 KSI (70 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
L2	95.50-48.67	46.83	4.33	18	26.0000	33.0250	0.1875	0.7500	A572-65 (65 ksi)
L3	48.67-0.00	53.00		18	32.0000	39.9500	0.1875	0.7500	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	I/Q in ²	w in	w/t
L1	5.0000	7.0686	18.1132	1.6008	2.5000	7.2453	36.2265	3.5322	0.0000	0
	5.0000	7.0686	18.1132	1.6008	2.5000	7.2453	36.2265	3.5322	0.0000	0
L2	26.3722	15.3617	1293.1111	9.1634	13.2080	97.9036	2587.9238	7.6823	4.2460	22.645
	33.5055	19.5424	2662.2933	11.6573	16.7767	158.6899	5328.0897	9.7731	5.4824	29.239
L3	33.1242	18.9324	2420.6893	11.2934	16.2560	148.9105	4844.5637	9.4680	5.3020	28.277
	40.5374	23.6637	4726.7942	14.1157	20.2946	232.9090	9459.8080	11.8341	6.7012	35.74

Tower Elevation ft	Gusset Area (per face) ft ²	Gusset Thickness in	Gusset Grade	Adjust. Factor A _r	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 125.50-95.50				1	0	1			
L2 95.50-48.67				1	1	1			
L3 48.67-0.00				1	1	1			

Feed Line/Linear Appurtenances - Entered As Round Or Flat

Description	Face or Leg	Allow Shield	Exclude From Torque Calculation	Component Type	Placement ft	Total Number	Number Per Row	Clear Spacing in	Width or Diameter r in	Perimeter r in	Weight plf

Feed Line/Linear Appurtenances - Entered As Area

Description	Face or Leg	Allow Shield	Exclude From Torque Calculation	Component Type	Placement ft	Total Number	C _A A _A ft ² /ft	Weight plf	
LDF7-50A(1-5/8)	A	No	No	Inside Pole	121.00 - 0.00	6	No Ice	0.00	0.82
							1/2" Ice	0.00	0.82
							1" Ice	0.00	0.82
							2" Ice	0.00	0.82
LDF7-50A(1-5/8)	A	No	No	Inside Pole	111.00 - 0.00	6	No Ice	0.00	0.82
							1/2" Ice	0.00	0.82
							1" Ice	0.00	0.82
							2" Ice	0.00	0.82
LDF7-50A(1-5/8)	C	No	No	Inside Pole	101.00 - 0.00	6	No Ice	0.00	0.82
							1/2" Ice	0.00	0.82
							1" Ice	0.00	0.82
							2" Ice	0.00	0.82
ATCB-B01-005(1/4)	A	No	No	Inside Pole	111.00 - 0.00	1	No Ice	0.00	0.00
							1/2" Ice	0.00	0.00
							1" Ice	0.00	0.00
							2" Ice	0.00	0.00

Description	Face or Leg	Allow Shield	Exclude From Torque Calculation	Component Type	Placement ft	Total Number		C _{AA} A _A ft ² /ft	Weight plf
ATCB-B01-005(1/4)	C	No	No	Inside Pole	101.00 - 0.00	1	No Ice	0.00	0.00
							1/2" Ice	0.00	0.00
							1" Ice	0.00	0.00
							2" Ice	0.00	0.00

Feed Line/Linear Appurtenances Section Areas

Tower Section	Tower Elevation ft	Face	A _R ft ²	A _F ft ²	C _{AA} A _A In Face ft ²	C _{AA} A _A Out Face ft ²	Weight K
L1	125.50-95.50	A	0.000	0.000	0.000	0.000	0.20
		B	0.000	0.000	0.000	0.000	0.00
		C	0.000	0.000	0.000	0.000	0.03
L2	95.50-48.67	A	0.000	0.000	0.000	0.000	0.46
		B	0.000	0.000	0.000	0.000	0.00
		C	0.000	0.000	0.000	0.000	0.23
L3	48.67-0.00	A	0.000	0.000	0.000	0.000	0.48
		B	0.000	0.000	0.000	0.000	0.00
		C	0.000	0.000	0.000	0.000	0.24

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 _A In Face ft ²	C _{AA} A _A Out Face ft ²	Weight K
L1	125.50-95.50	A	1.918	0.000	0.000	0.000	0.000	0.20
		B		0.000	0.000	0.000	0.000	0.00
		C		0.000	0.000	0.000	0.000	0.03
L2	95.50-48.67	A	1.837	0.000	0.000	0.000	0.000	0.46
		B		0.000	0.000	0.000	0.000	0.00
		C		0.000	0.000	0.000	0.000	0.23
L3	48.67-0.00	A	1.651	0.000	0.000	0.000	0.000	0.48
		B		0.000	0.000	0.000	0.000	0.00
		C		0.000	0.000	0.000	0.000	0.24

Feed Line Center of Pressure

Section	Elevation ft	CP _x in	CP _z in	CP _x Ice in	CP _z Ice in
L1	125.50-95.50	0.0000	0.0000	0.0000	0.0000
L2	95.50-48.67	0.0000	0.0000	0.0000	0.0000
L3	48.67-0.00	0.0000	0.0000	0.0000	0.0000

Note: For pole sections, center of pressure calculations do not consider feed line shielding.

Shielding Factor Ka

Tower Section	Feed Line Record No.	Description	Feed Line Segment Elev.	K _a No Ice	K _a Ice
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User Defined Loads

Description	Elevation	Offset From Centroid	Azimuth Angle	Weight	F _x	F _z	Wind Force	C _A A _c	
	ft	ft	°	K	K	K	K	ft ²	
Flag	125.50	0.00	0.0000	No Ice	0.02	0.00	0.00	0.49	9.27
				Ice	0.81	0.00	0.00	0.08	9.69
				Service	0.02	0.00	0.00	0.11	10.36

Discrete Tower Loads

Description	Face or Leg	Offset Type	Offsets: Horz Lateral Vert	Azimuth Adjustmen t	Placement	C _A A _A Front	C _A A _A Side	Weight	
			ft ft ft	°	ft	ft ²	ft ²	K	
Canister Load1	C	None		0.0000	125.50	No Ice	4.64	4.64	0.06
						1/2" Ice	4.83	4.83	0.14
						1" Ice	5.02	5.02	0.22
						2" Ice	5.39	5.39	0.39
Canister Load2	C	None		0.0000	115.50	No Ice	9.47	9.47	0.16
						1/2" Ice	9.84	9.84	0.32
						1" Ice	10.22	10.22	0.48
						2" Ice	10.97	10.97	0.83
Canister Load3	C	None		0.0000	105.50	No Ice	13.20	13.20	0.18
						1/2" Ice	13.65	13.65	0.36
						1" Ice	14.10	14.10	0.55
						2" Ice	15.00	15.00	0.94
Canister Load4	C	None		0.0000	95.50	No Ice	8.37	8.37	0.49
						1/2" Ice	8.63	8.63	0.58
						1" Ice	8.89	8.89	0.69
						2" Ice	9.42	9.42	0.90
Truck Ball	C	None		0.0000	126.17	No Ice	0.70	0.70	0.05
						1/2" Ice	1.10	1.10	0.06
						1" Ice	1.24	1.24	0.08
						2" Ice	1.53	1.53	0.12
* 24.75" OD x 10' Concealment Shroud	C	None		0.0000	120.50	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
						2" Ice	0.00	0.00	0.00
25.75" OD x 10' Concealment Shroud	C	None		0.0000	110.50	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
						2" Ice	0.00	0.00	0.00
31.875" OD x 10' Concealment Shroud	C	None		0.0000	100.50	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
						2" Ice	0.00	0.00	0.00
**** APXV18-209014-C	A	From Leg	0.25	0.0000	121.00	No Ice	0.00	0.00	0.02

Description	Face or Leg	Offset Type	Offsets: Horz Lateral Vert ft ft ft	Azimuth Adjustment t °	Placement ft	C _{AA} Front ft ²	C _{AA} Side ft ²	Weight K
			0.00			1/2"	0.00	0.04
			0.00			Ice	0.00	0.06
						1" Ice	0.00	0.12
						2" Ice		
APXV18-209014-C	B	From Leg	0.25	0.0000	121.00	No Ice	0.00	0.02
			0.00			1/2"	0.00	0.04
			0.00			Ice	0.00	0.06
						1" Ice	0.00	0.12
						2" Ice		
APXV18-209014-C	C	From Leg	0.25	0.0000	121.00	No Ice	0.00	0.02
			0.00			1/2"	0.00	0.04
			0.00			Ice	0.00	0.06
						1" Ice	0.00	0.12
						2" Ice		
KRY 112 89/4	A	From Leg	0.25	0.0000	121.00	No Ice	0.00	0.02
			0.00			1/2"	0.00	0.02
			-5.00			Ice	0.00	0.03
						1" Ice	0.00	0.05
						2" Ice		
KRY 112 89/4	B	From Leg	0.25	0.0000	121.00	No Ice	0.00	0.02
			0.00			1/2"	0.00	0.02
			-5.00			Ice	0.00	0.03
						1" Ice	0.00	0.05
						2" Ice		
KRY 112 89/4	C	From Leg	0.25	0.0000	121.00	No Ice	0.00	0.02
			0.00			1/2"	0.00	0.02
			-5.00			Ice	0.00	0.03
						1" Ice	0.00	0.05
						2" Ice		

APXV18-206516S-C	A	From Leg	0.25	0.0000	111.00	No Ice	0.00	0.02
			0.00			1/2"	0.00	0.04
			0.00			Ice	0.00	0.06
						1" Ice	0.00	0.13
						2" Ice		
APXV18-206516S-C	B	From Leg	0.25	0.0000	111.00	No Ice	0.00	0.02
			0.00			1/2"	0.00	0.04
			0.00			Ice	0.00	0.06
						1" Ice	0.00	0.13
						2" Ice		
APXV18-206516S-C	C	From Leg	0.25	0.0000	111.00	No Ice	0.00	0.02
			0.00			1/2"	0.00	0.04
			0.00			Ice	0.00	0.06
						1" Ice	0.00	0.13
						2" Ice		
KRY 112 144/1	A	From Leg	0.25	0.0000	111.00	No Ice	0.00	0.01
			0.00			1/2"	0.00	0.01
			-4.00			Ice	0.00	0.02
						1" Ice	0.00	0.03
						2" Ice		
KRY 112 144/1	B	From Leg	0.25	0.0000	111.00	No Ice	0.00	0.01
			0.00			1/2"	0.00	0.01
			-4.00			Ice	0.00	0.02
						1" Ice	0.00	0.03
						2" Ice		
KRY 112 144/1	C	From Leg	0.25	0.0000	111.00	No Ice	0.00	0.01
			0.00			1/2"	0.00	0.01
			-4.00			Ice	0.00	0.02
						1" Ice	0.00	0.03
						2" Ice		

80010798 w/ Mount Pipe	A	From Leg	0.25	0.0000	101.00	No Ice	0.00	0.11
			0.00			1/2"	0.00	0.19
			1.00			Ice	0.00	0.28
						1" Ice	0.00	0.49

Description	Face or Leg	Offset Type	Offsets: Horz Lateral Vert ft ft ft	Azimuth Adjustment t °	Placement ft	C _A A _A Front ft ²	C _A A _A Side ft ²	Weight K	
80010798 w/ Mount Pipe	B	From Leg	0.25 0.00 1.00	0.0000	101.00	2" Ice			
						No Ice	0.00	0.00	0.11
						1/2" Ice	0.00	0.00	0.19
						1" Ice	0.00	0.00	0.28
						2" Ice	0.00	0.00	0.49
80010798 w/ Mount Pipe	C	From Leg	0.25 0.00 1.00	0.0000	101.00	2" Ice			
						No Ice	0.00	0.00	0.11
						1/2" Ice	0.00	0.00	0.19
						1" Ice	0.00	0.00	0.28
						2" Ice	0.00	0.00	0.49
TMA2117F00V1-1	A	From Leg	0.25 0.00 -4.00	0.0000	101.00	2" Ice			
						No Ice	0.00	0.00	0.02
						1/2" Ice	0.00	0.00	0.02
						1" Ice	0.00	0.00	0.03
						2" Ice	0.00	0.00	0.06
TMA2117F00V1-1	A	From Leg	0.25 0.00 -5.00	0.0000	101.00	2" Ice			
						No Ice	0.00	0.00	0.02
						1/2" Ice	0.00	0.00	0.02
						1" Ice	0.00	0.00	0.03
						2" Ice	0.00	0.00	0.06
TMA2117F00V1-1	B	From Leg	0.25 0.00 -4.00	0.0000	101.00	2" Ice			
						No Ice	0.00	0.00	0.02
						1/2" Ice	0.00	0.00	0.02
						1" Ice	0.00	0.00	0.03
						2" Ice	0.00	0.00	0.06
TMA2117F00V1-1	B	From Leg	0.25 0.00 -5.00	0.0000	101.00	2" Ice			
						No Ice	0.00	0.00	0.02
						1/2" Ice	0.00	0.00	0.02
						1" Ice	0.00	0.00	0.03
						2" Ice	0.00	0.00	0.06
TMA2117F00V1-1	C	From Leg	0.25 0.00 -4.00	0.0000	101.00	2" Ice			
						No Ice	0.00	0.00	0.02
						1/2" Ice	0.00	0.00	0.02
						1" Ice	0.00	0.00	0.03
						2" Ice	0.00	0.00	0.06
TMA2117F00V1-1	C	From Leg	0.25 0.00 -5.00	0.0000	101.00	2" Ice			
						No Ice	0.00	0.00	0.02
						1/2" Ice	0.00	0.00	0.02
						1" Ice	0.00	0.00	0.03
						2" Ice	0.00	0.00	0.06

Load Combinations

Comb. No.	Description
1	Dead Only
2	1.2 Dead+1.0 Wind 0 deg - No Ice
3	0.9 Dead+1.0 Wind 0 deg - No Ice
4	1.2 Dead+1.0 Wind 30 deg - No Ice
5	0.9 Dead+1.0 Wind 30 deg - No Ice
6	1.2 Dead+1.0 Wind 60 deg - No Ice
7	0.9 Dead+1.0 Wind 60 deg - No Ice
8	1.2 Dead+1.0 Wind 90 deg - No Ice
9	0.9 Dead+1.0 Wind 90 deg - No Ice
10	1.2 Dead+1.0 Wind 120 deg - No Ice
11	0.9 Dead+1.0 Wind 120 deg - No Ice
12	1.2 Dead+1.0 Wind 150 deg - No Ice

Comb. No.	Description
13	0.9 Dead+1.0 Wind 150 deg - No Ice
14	1.2 Dead+1.0 Wind 180 deg - No Ice
15	0.9 Dead+1.0 Wind 180 deg - No Ice
16	1.2 Dead+1.0 Wind 210 deg - No Ice
17	0.9 Dead+1.0 Wind 210 deg - No Ice
18	1.2 Dead+1.0 Wind 240 deg - No Ice
19	0.9 Dead+1.0 Wind 240 deg - No Ice
20	1.2 Dead+1.0 Wind 270 deg - No Ice
21	0.9 Dead+1.0 Wind 270 deg - No Ice
22	1.2 Dead+1.0 Wind 300 deg - No Ice
23	0.9 Dead+1.0 Wind 300 deg - No Ice
24	1.2 Dead+1.0 Wind 330 deg - No Ice
25	0.9 Dead+1.0 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	125.5 - 95.5	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	26	-7.54	0.00	0.00
			Max. Mx	8	-2.41	-43.52	0.00
			Max. My	2	-2.41	0.00	43.52
			Max. Vy	8	2.14	-34.14	0.00
			Max. Vx	2	-2.14	0.00	34.14
			Max. Torque	4			-0.00
			Max Tension	1	0.00	0.00	0.00
			Max. Compression	26	-15.28	0.00	0.00
			Max. Mx	8	-6.66	-224.93	0.00
L2	95.5 - 48.67	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	26	-6.66	0.00	0.00
			Max. Mx	8	-6.66	-224.93	0.00
			Max. My	2	-6.66	0.00	224.93
			Max. Vy	8	6.12	-224.93	0.00
			Max. Vx	2	-6.12	0.00	224.93
			Max. Torque	4			-0.00
			Max Tension	1	0.00	0.00	0.00
			Max. Compression	26	-25.58	0.00	0.00
			Max. Mx	8	-12.73	-664.98	0.00
L3	48.67 - 0	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	26	-12.73	0.00	0.00
			Max. Mx	8	-12.73	-664.98	0.00
			Max. My	2	-12.73	0.00	664.98
			Max. Vy	8	10.33	-664.98	0.00
			Max. Vx	2	-10.33	0.00	664.98
			Max. Torque	6			0.00

Maximum Reactions

Location	Condition	Gov. Load Comb.	Vertical K	Horizontal, X K	Horizontal, Z K
Pole	Max. Vert	30	25.58	-2.76	0.00
	Max. H _x	21	9.55	10.32	0.00
	Max. H _z	2	12.73	0.00	10.32
	Max. M _x	2	664.98	0.00	10.32
	Max. M _z	8	664.98	-10.32	0.00
	Max. Torsion	6	0.00	-8.94	5.16
	Min. Vert	7	9.55	-8.94	5.16
	Min. H _x	8	12.73	-10.32	0.00
	Min. H _z	14	12.73	0.00	-10.32
	Min. M _x	14	-664.98	0.00	-10.32
	Min. M _z	20	-664.98	10.32	0.00
	Min. Torsion	10	-0.00	-8.94	-5.16

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	10.61	0.00	0.00	0.00	0.00	0.00
1.2 Dead+1.0 Wind 0 deg - No Ice	12.73	0.00	-10.32	-664.98	0.00	0.00
0.9 Dead+1.0 Wind 0 deg - No Ice	9.55	0.00	-10.32	-659.76	0.00	0.00
1.2 Dead+1.0 Wind 30 deg - No Ice	12.73	5.16	-8.94	-575.89	-332.49	0.00
0.9 Dead+1.0 Wind 30 deg - No Ice	9.55	5.16	-8.94	-571.37	-329.88	0.00
1.2 Dead+1.0 Wind 60 deg - No Ice	12.73	8.94	-5.16	-332.49	-575.89	-0.00
0.9 Dead+1.0 Wind 60 deg - No Ice	9.55	8.94	-5.16	-329.88	-571.37	-0.00
1.2 Dead+1.0 Wind 90 deg - No Ice	12.73	10.32	0.00	0.00	-664.98	0.00
0.9 Dead+1.0 Wind 90 deg - No Ice	9.55	10.32	0.00	0.00	-659.76	0.00
1.2 Dead+1.0 Wind 120 deg - No Ice	12.73	8.94	5.16	332.49	-575.89	0.00
0.9 Dead+1.0 Wind 120 deg - No Ice	9.55	8.94	5.16	329.88	-571.37	0.00
1.2 Dead+1.0 Wind 150 deg - No Ice	12.73	5.16	8.94	575.89	-332.49	-0.00
0.9 Dead+1.0 Wind 150 deg - No Ice	9.55	5.16	8.94	571.37	-329.88	-0.00
1.2 Dead+1.0 Wind 180 deg - No Ice	12.73	0.00	10.32	664.98	0.00	0.00
0.9 Dead+1.0 Wind 180 deg - No Ice	9.55	0.00	10.32	659.76	0.00	0.00
1.2 Dead+1.0 Wind 210 deg - No Ice	12.73	-5.16	8.94	575.89	332.49	0.00
0.9 Dead+1.0 Wind 210 deg - No Ice	9.55	-5.16	8.94	571.37	329.88	0.00
1.2 Dead+1.0 Wind 240 deg - No Ice	12.73	-8.94	5.16	332.49	575.89	-0.00
0.9 Dead+1.0 Wind 240 deg - No Ice	9.55	-8.94	5.16	329.88	571.37	-0.00
1.2 Dead+1.0 Wind 270 deg - No Ice	12.73	-10.32	0.00	0.00	664.98	0.00
0.9 Dead+1.0 Wind 270 deg - No Ice	9.55	-10.32	0.00	0.00	659.76	0.00
1.2 Dead+1.0 Wind 300 deg - No Ice	12.73	-8.94	-5.16	-332.49	575.89	0.00

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
0.9 Dead+1.0 Wind 300 deg - No Ice	9.55	-8.94	-5.16	-329.88	571.37	0.00
1.2 Dead+1.0 Wind 330 deg - No Ice	12.73	-5.16	-8.94	-575.89	332.49	-0.00
0.9 Dead+1.0 Wind 330 deg - No Ice	9.55	-5.16	-8.94	-571.37	329.88	-0.00
1.2 Dead+1.0 Ice+1.0 Temp	25.58	0.00	0.00	0.00	0.00	0.00
1.2 Dead+1.0 Wind 0 deg+1.0 Ice+1.0 Temp	25.58	0.00	-2.76	-173.19	0.00	0.00
1.2 Dead+1.0 Wind 30 deg+1.0 Ice+1.0 Temp	25.58	1.38	-2.39	-149.99	-86.59	0.00
1.2 Dead+1.0 Wind 60 deg+1.0 Ice+1.0 Temp	25.58	2.39	-1.38	-86.59	-149.99	-0.00
1.2 Dead+1.0 Wind 90 deg+1.0 Ice+1.0 Temp	25.58	2.76	0.00	0.00	-173.19	0.00
1.2 Dead+1.0 Wind 120 deg+1.0 Ice+1.0 Temp	25.58	2.39	1.38	86.59	-149.99	0.00
1.2 Dead+1.0 Wind 150 deg+1.0 Ice+1.0 Temp	25.58	1.38	2.39	149.99	-86.59	-0.00
1.2 Dead+1.0 Wind 180 deg+1.0 Ice+1.0 Temp	25.58	0.00	2.76	173.19	0.00	0.00
1.2 Dead+1.0 Wind 210 deg+1.0 Ice+1.0 Temp	25.58	-1.38	2.39	149.99	86.59	0.00
1.2 Dead+1.0 Wind 240 deg+1.0 Ice+1.0 Temp	25.58	-2.39	1.38	86.59	149.99	-0.00
1.2 Dead+1.0 Wind 270 deg+1.0 Ice+1.0 Temp	25.58	-2.76	0.00	0.00	173.19	0.00
1.2 Dead+1.0 Wind 300 deg+1.0 Ice+1.0 Temp	25.58	-2.39	-1.38	-86.59	149.99	0.00
1.2 Dead+1.0 Wind 330 deg+1.0 Ice+1.0 Temp	25.58	-1.38	-2.39	-149.99	86.59	-0.00
Dead+Wind 0 deg - Service	10.61	0.00	-2.14	-138.03	0.00	0.00
Dead+Wind 30 deg - Service	10.61	1.07	-1.85	-119.54	-69.02	0.00
Dead+Wind 60 deg - Service	10.61	1.85	-1.07	-69.02	-119.54	-0.00
Dead+Wind 90 deg - Service	10.61	2.14	0.00	0.00	-138.03	0.00
Dead+Wind 120 deg - Service	10.61	1.85	1.07	69.02	-119.54	0.00
Dead+Wind 150 deg - Service	10.61	1.07	1.85	119.54	-69.02	-0.00
Dead+Wind 180 deg - Service	10.61	0.00	2.14	138.03	0.00	0.00
Dead+Wind 210 deg - Service	10.61	-1.07	1.85	119.54	69.02	0.00
Dead+Wind 240 deg - Service	10.61	-1.85	1.07	69.02	119.54	-0.00
Dead+Wind 270 deg - Service	10.61	-2.14	0.00	0.00	138.03	0.00
Dead+Wind 300 deg - Service	10.61	-1.85	-1.07	-69.02	119.54	0.00
Dead+Wind 330 deg - Service	10.61	-1.07	-1.85	-119.54	69.02	-0.00

Solution Summary

Load Comb.	Sum of Applied Forces			Sum of Reactions			% Error
	PX K	PY K	PZ K	PX K	PY K	PZ K	
1	0.00	-10.61	0.00	0.00	10.61	0.00	0.000%
2	0.00	-12.73	-10.32	0.00	12.73	10.32	0.000%
3	0.00	-9.55	-10.32	0.00	9.55	10.32	0.000%
4	5.16	-12.73	-8.94	-5.16	12.73	8.94	0.000%
5	5.16	-9.55	-8.94	-5.16	9.55	8.94	0.000%
6	8.94	-12.73	-5.16	-8.94	12.73	5.16	0.000%
7	8.94	-9.55	-5.16	-8.94	9.55	5.16	0.000%
8	10.32	-12.73	0.00	-10.32	12.73	0.00	0.000%
9	10.32	-9.55	0.00	-10.32	9.55	0.00	0.000%

Load Comb.	Sum of Applied Forces			Sum of Reactions			% Error
	PX K	PY K	PZ K	PX K	PY K	PZ K	
10	8.94	-12.73	5.16	-8.94	12.73	-5.16	0.000%
11	8.94	-9.55	5.16	-8.94	9.55	-5.16	0.000%
12	5.16	-12.73	8.94	-5.16	12.73	-8.94	0.000%
13	5.16	-9.55	8.94	-5.16	9.55	-8.94	0.000%
14	0.00	-12.73	10.32	0.00	12.73	-10.32	0.000%
15	0.00	-9.55	10.32	0.00	9.55	-10.32	0.000%
16	-5.16	-12.73	8.94	5.16	12.73	-8.94	0.000%
17	-5.16	-9.55	8.94	5.16	9.55	-8.94	0.000%
18	-8.94	-12.73	5.16	8.94	12.73	-5.16	0.000%
19	-8.94	-9.55	5.16	8.94	9.55	-5.16	0.000%
20	-10.32	-12.73	0.00	10.32	12.73	0.00	0.000%
21	-10.32	-9.55	0.00	10.32	9.55	0.00	0.000%
22	-8.94	-12.73	-5.16	8.94	12.73	5.16	0.000%
23	-8.94	-9.55	-5.16	8.94	9.55	5.16	0.000%
24	-5.16	-12.73	-8.94	5.16	12.73	8.94	0.000%
25	-5.16	-9.55	-8.94	5.16	9.55	8.94	0.000%
26	0.00	-25.58	0.00	0.00	25.58	0.00	0.000%
27	0.00	-25.58	-2.76	0.00	25.58	2.76	0.000%
28	1.38	-25.58	-2.39	-1.38	25.58	2.39	0.000%
29	2.39	-25.58	-1.38	-2.39	25.58	1.38	0.000%
30	2.76	-25.58	0.00	-2.76	25.58	0.00	0.000%
31	2.39	-25.58	1.38	-2.39	25.58	-1.38	0.000%
32	1.38	-25.58	2.39	-1.38	25.58	-2.39	0.000%
33	0.00	-25.58	2.76	0.00	25.58	-2.76	0.000%
34	-1.38	-25.58	2.39	1.38	25.58	-2.39	0.000%
35	-2.39	-25.58	1.38	2.39	25.58	-1.38	0.000%
36	-2.76	-25.58	0.00	2.76	25.58	0.00	0.000%
37	-2.39	-25.58	-1.38	2.39	25.58	1.38	0.000%
38	-1.38	-25.58	-2.39	1.38	25.58	2.39	0.000%
39	0.00	-10.61	-2.14	0.00	10.61	2.14	0.000%
40	1.07	-10.61	-1.85	-1.07	10.61	1.85	0.000%
41	1.85	-10.61	-1.07	-1.85	10.61	1.07	0.000%
42	2.14	-10.61	0.00	-2.14	10.61	0.00	0.000%
43	1.85	-10.61	1.07	-1.85	10.61	-1.07	0.000%
44	1.07	-10.61	1.85	-1.07	10.61	-1.85	0.000%
45	0.00	-10.61	2.14	0.00	10.61	-2.14	0.000%
46	-1.07	-10.61	1.85	1.07	10.61	-1.85	0.000%
47	-1.85	-10.61	1.07	1.85	10.61	-1.07	0.000%
48	-2.14	-10.61	0.00	2.14	10.61	0.00	0.000%
49	-1.85	-10.61	-1.07	1.85	10.61	1.07	0.000%
50	-1.07	-10.61	-1.85	1.07	10.61	1.85	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	5	0.00000001	0.00002165
3	Yes	5	0.00000001	0.00000001
4	Yes	5	0.00000001	0.00076730
5	Yes	5	0.00000001	0.00028449
6	Yes	5	0.00000001	0.00076730
7	Yes	5	0.00000001	0.00028449
8	Yes	5	0.00000001	0.00002165
9	Yes	5	0.00000001	0.00000001
10	Yes	5	0.00000001	0.00076730
11	Yes	5	0.00000001	0.00028449
12	Yes	5	0.00000001	0.00076730
13	Yes	5	0.00000001	0.00028449
14	Yes	5	0.00000001	0.00002165
15	Yes	5	0.00000001	0.00000001
16	Yes	5	0.00000001	0.00076730
17	Yes	5	0.00000001	0.00028449
18	Yes	5	0.00000001	0.00076730
19	Yes	5	0.00000001	0.00028449

20	Yes	5	0.00000001	0.00002165
21	Yes	5	0.00000001	0.00000001
22	Yes	5	0.00000001	0.00076730
23	Yes	5	0.00000001	0.00028449
24	Yes	5	0.00000001	0.00076730
25	Yes	5	0.00000001	0.00028449
26	Yes	4	0.00000001	0.00000001
27	Yes	6	0.00026545	0.00025815
28	Yes	6	0.00026370	0.00027866
29	Yes	6	0.00026370	0.00027866
30	Yes	6	0.00026545	0.00025815
31	Yes	6	0.00026370	0.00027866
32	Yes	6	0.00026370	0.00027866
33	Yes	6	0.00026545	0.00025815
34	Yes	6	0.00026370	0.00027866
35	Yes	6	0.00026370	0.00027866
36	Yes	6	0.00026545	0.00025815
37	Yes	6	0.00026370	0.00027866
38	Yes	6	0.00026370	0.00027866
39	Yes	4	0.00000001	0.00031085
40	Yes	4	0.00000001	0.00033379
41	Yes	4	0.00000001	0.00033379
42	Yes	4	0.00000001	0.00031085
43	Yes	4	0.00000001	0.00033379
44	Yes	4	0.00000001	0.00033379
45	Yes	4	0.00000001	0.00031085
46	Yes	4	0.00000001	0.00033379
47	Yes	4	0.00000001	0.00033379
48	Yes	4	0.00000001	0.00031085
49	Yes	4	0.00000001	0.00033379
50	Yes	4	0.00000001	0.00033379

Maximum Tower Deflections - Service Wind

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
L1	125.5 - 95.5	17.398	39	2.3016	0.0000
L2	95.5 - 48.67	6.249	39	0.5208	0.0000
L3	53 - 0	2.213	42	0.3626	0.0000

Critical Deflections and Radius of Curvature - Service Wind

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
126.17	Truck Ball	39	17.398	2.3016	0.0000	6153
125.50	Canister Load1	39	17.398	2.3016	0.0000	6153
121.00	APXV18-209014-C	39	15.468	1.9796	0.0000	6153
120.50	24.75" OD x 10' Concealment Shroud	39	15.255	1.9442	0.0000	6153
115.50	Canister Load2	39	13.161	1.5972	0.0000	3076
111.00	APXV18-206516S-C	39	11.358	1.3023	0.0000	2121
110.50	25.75" OD x 10' Concealment Shroud	39	11.164	1.2709	0.0000	2050
105.50	Canister Load3	39	9.314	0.9758	0.0000	1537
101.00	80010798 w/ Mount Pipe	39	7.815	0.7455	0.0000	1255
100.50	31.875" OD x 10' Concealment Shroud	39	7.660	0.7223	0.0000	1230
95.50	Canister Load4	39	6.249	0.5208	0.0000	1077

Maximum Tower Deflections - Design Wind

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
L1	125.5 - 95.5	82.162	8	10.7547	0.0000
L2	95.5 - 48.67	30.032	8	2.4972	0.0000
L3	53 - 0	10.652	8	1.7441	0.0000

Critical Deflections and Radius of Curvature - Design Wind

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
126.17	Truck Ball	8	82.162	10.7547	0.0000	1382
125.50	Canister Load1	8	82.162	10.7547	0.0000	1382
121.00	APXV18-209014-C	8	73.150	9.2620	0.0000	1382
120.50	24.75" OD x 10' Concealment Shroud	8	72.156	9.0977	0.0000	1382
115.50	Canister Load2	8	62.375	7.4889	0.0000	689
111.00	APXV18-206516S-C	8	53.953	6.1218	0.0000	474
110.50	25.75" OD x 10' Concealment Shroud	8	53.047	5.9763	0.0000	458
105.50	Canister Load3	8	44.396	4.6081	0.0000	341
101.00	80010798 w/ Mount Pipe	8	37.377	3.5399	0.0000	277
100.50	31.875" OD x 10' Concealment Shroud	8	36.649	3.4323	0.0000	271
95.50	Canister Load4	8	30.032	2.4972	0.0000	236

Compression Checks

Pole Design Data

Section No.	Elevation ft	Size	L ft	L _v ft	Kl/r	A in ²	P _u K	φP _n K	Ratio $\frac{P_u}{\phi P_n}$
L1	125.5 - 95.5 (1)	TP5x5x0.5	30.00	0.00	0.0	7.0686	-2.41	445.32	0.005
L2	95.5 - 48.67 (2)	TP33.025x26x0.1875	46.83	0.00	0.0	19.155 9	-6.66	1149.79	0.006
L3	48.67 - 0 (3)	TP39.95x32x0.1875	53.00	0.00	0.0	23.663 7	-12.73	1242.27	0.010

Pole Bending Design Data

Section No.	Elevation ft	Size	M _{ux} kip-ft	φM _{nx} kip-ft	Ratio $\frac{M_{ux}}{\phi M_{nx}}$	M _{uy} kip-ft	φM _{ny} kip-ft	Ratio $\frac{M_{uy}}{\phi M_{ny}}$
L1	125.5 - 95.5 (1)	TP5x5x0.5	43.52	53.38	0.815	0.00	53.38	0.000
L2	95.5 - 48.67 (2)	TP33.025x26x0.1875	224.93	762.58	0.295	0.00	762.58	0.000
L3	48.67 - 0 (3)	TP39.95x32x0.1875	664.98	1018.92	0.653	0.00	1018.92	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	125.5 - 95.5 (1)	TP5x5x0.5	2.05	133.60	0.015	0.00	52.85	0.000
L2	95.5 - 48.67 (2)	TP33.025x26x0.1875	6.12	336.19	0.018	0.00	936.65	0.000
L3	48.67 - 0 (3)	TP39.95x32x0.1875	10.33	415.30	0.025	0.00	1432.54	0.000

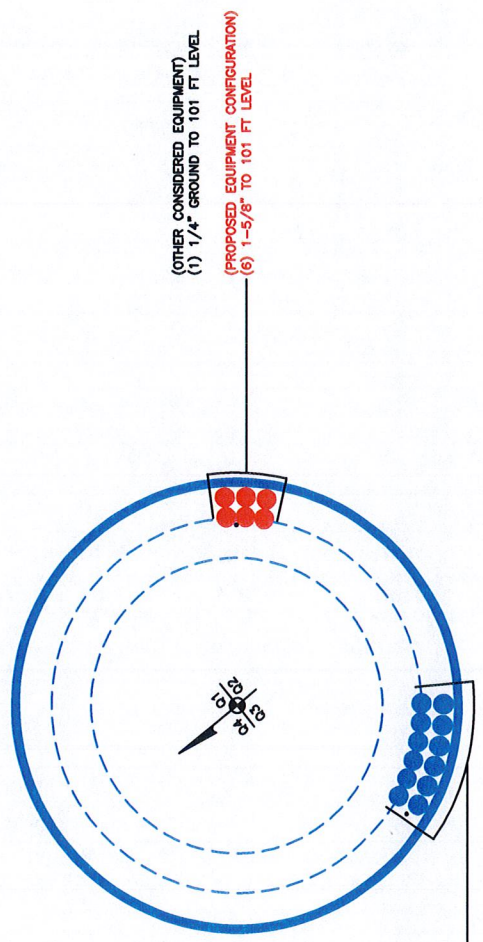
Pole Interaction Design Data

Section No.	Elevation ft	Ratio P_u ϕP_n	Ratio M_{ux} ϕM_{nx}	Ratio M_{uy} ϕM_{ny}	Ratio V_u ϕV_n	Ratio T_u ϕT_n	Comb. Stress Ratio	Allow. Stress Ratio	Criteria
L1	125.5 - 95.5 (1)	0.005	0.815	0.000	0.015	0.000	0.821	1.050	4.8.2
L2	95.5 - 48.67 (2)	0.006	0.295	0.000	0.018	0.000	0.301	1.050	4.8.2
L3	48.67 - 0 (3)	0.010	0.653	0.000	0.025	0.000	0.663	1.050	4.8.2

Section Capacity Table

Section No.	Elevation ft	Component Type	Size	Critical Element	P K	ϕP_{allow} K	% Capacity	Pass Fail
L1	125.5 - 95.5	Pole	TP5x5x0.5	1	-2.41	467.59	78.2	Pass
L2	95.5 - 48.67	Pole	TP33.025x26x0.1875	2	-6.66	1207.28	28.7	Pass
L3	48.67 - 0	Pole	TP39.95x32x0.1875	3	-12.73	1304.38	63.2	Pass
Summary								
Pole (L1)							78.2	Pass
RATING =							78.2	Pass

APPENDIX B
BASE LEVEL DRAWING



(OTHER CONSIDERED EQUIPMENT)
(1) 1/4" GROUND TO 101 FT LEVEL
(PROPOSED EQUIPMENT CONFIGURATION)
(6) 1-5/8" TO 101 FT LEVEL

(OTHER CONSIDERED EQUIPMENT)
(1) 1/4" GROUND TO 111 FT LEVEL
(OTHER CONSIDERED EQUIPMENT)
(6) 1-5/8" TO 111 FT LEVEL
(6) 1-5/8" TO 121 FT LEVEL

BUSINESS UNIT: 823848 TOWER ID: C_BASELEVEL

APPENDIX C
ADDITIONAL CALCULATIONS

Monopole Flange Plate Connection

Elevation = 95.5 ft.

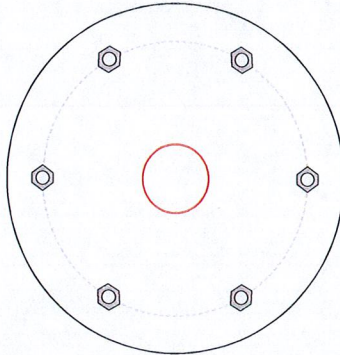


BU #	823848
Site Name	East Hartford / I-8486
Order #	467460 Rev. 1
TIA-222 Revision	H

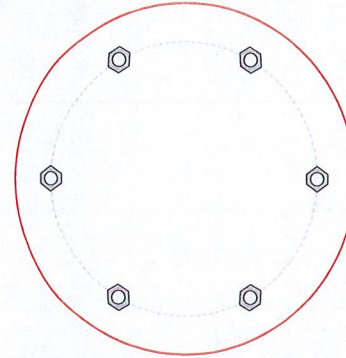
Applied Loads	
Moment (kip-ft)	43.52
Axial Force (kips)	2.41
Shear Force (kips)	2.05

*TIA-222-H Section 15.5 Applied

Top Plate - External



Bottom Plate - Internal



Connection Properties

Bolt Data

(6) 1" ϕ bolts (A325 N; Fy=92 ksi, Fu=120 ksi) on 20" BC

Top Plate Data

25.5" OD x 2.5" Plate (A572-50; Fy=50 ksi, Fu=65 ksi)

Bottom Plate Data

25.625" ID x 2.5" Plate (A572-60; Fy=60 ksi, Fu=75 ksi)

Top Stiffener Data

N/A

Bottom Stiffener Data

N/A

Top Pole Data

5" x 0.5" round pole (ASTM A513 D.O.M. 70 KSI; Fy=70 ksi, Fu=80 ksi)

Bottom Pole Data

26" x 0.1875" 18-sided pole (A572-65; Fy=65 ksi, Fu=80 ksi)

Analysis Results

Bolt Capacity

Max Load (kips)	16.99
Allowable (kips)	54.54
Stress Rating:	29.7% Pass

Top Plate Capacity

Max Stress (ksi):	-
Allowable Stress (ksi):	-
Stress Rating:	N/A
Tension Side Stress Rating:	N/A

Bottom Plate Capacity

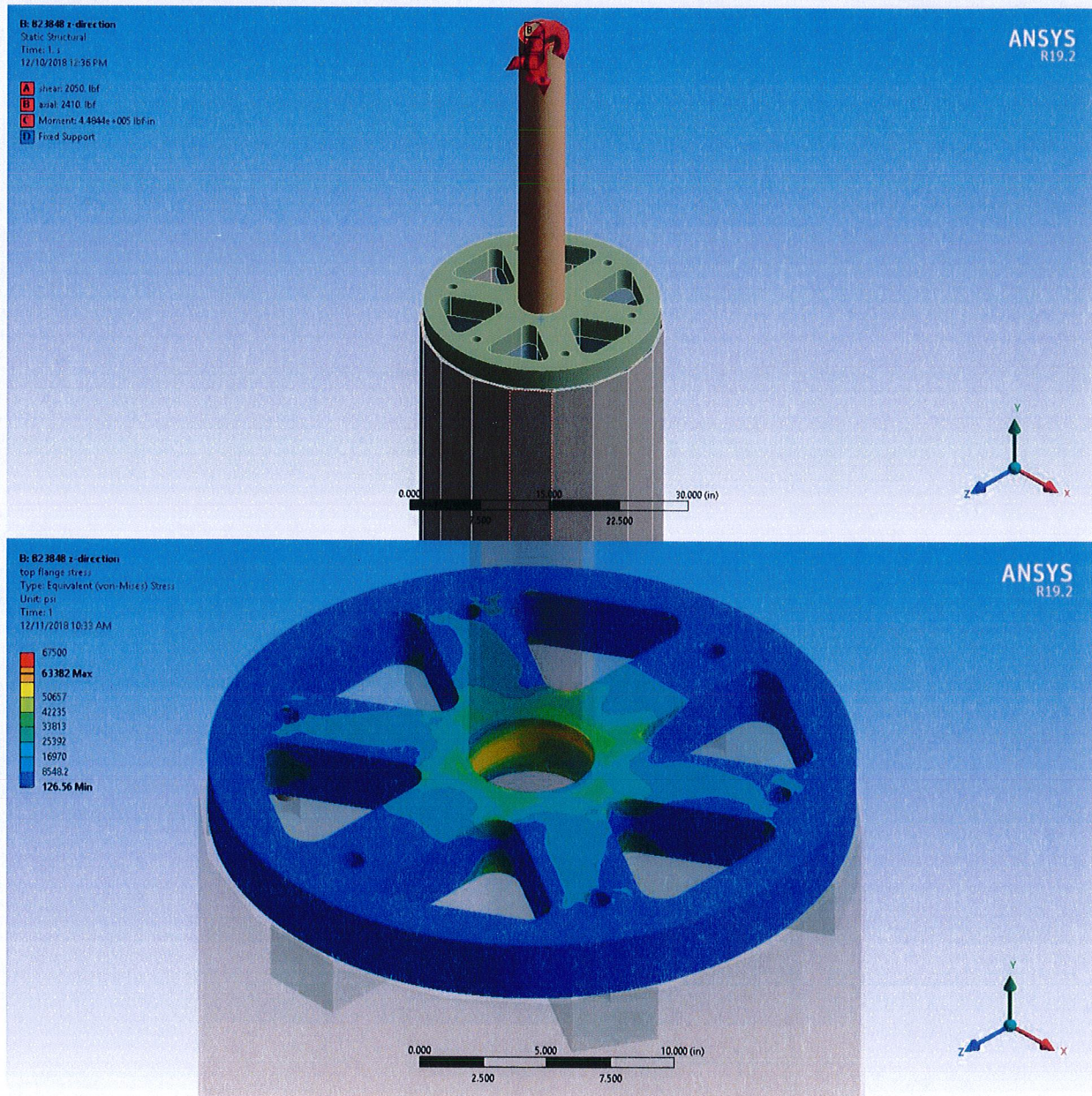
Max Stress (ksi):	-
Allowable Stress (ksi):	-
Stress Rating:	N/A
Tension Side Stress Rating:	N/A

Finite Element Analysis- 95.5' Flange Plate Connection

Controlling Component: Top Flange

Status: **Pass**

A finite element analysis was completed on the 95.5ft flange plate connection. The purpose of this analysis was to determine the suitability of the tower's flange plate connection using the corresponding level reactions provided by trnXTower (see Appendix A). A 3D solid model was created of the 95.5ft flange plate connection using SpaceClaim. A full analysis was performed of all components of the flange plate connection using ANSYS Structural (version 19.2). The images illustrate the controlling force direction and stress gradient of the controlling component.



Monopole Base Plate Connection

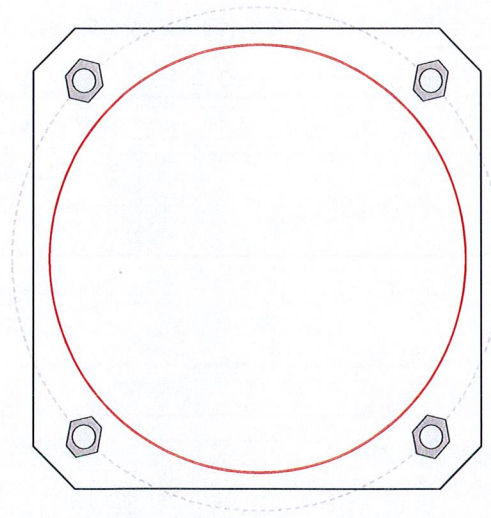


Site Info	
BU #	823848
Site Name	East Hartford / I-8486-
Order #	467460 Rev. 1

Analysis Considerations	
TIA-222 Revision	H
Grout Considered:	No
l_{ar} (in)	3.875

Applied Loads	
Moment (kip-ft)	664.98
Axial Force (kips)	12.73
Shear Force (kips)	10.33

*TIA-222-H Section 15.5 Applied



Connection Properties	Analysis Results		
Anchor Rod Data	Anchor Rod Summary (units of kips, kip-in)		
(4) 2-1/4" ϕ bolts (A615-75 N; Fy=75 ksi, Fu=100 ksi) on 47" BC	$Pu_c = 172.8$	$\phi Pn_c = 243.75$	Stress Rating
Base Plate Data	$Vu = 2.58$	$\phi Vn = 73.13$	74.2%
43" OD x 2" Plate (A572-60; Fy=60 ksi, Fu=75 ksi)	$Mu = 6.51$	$\phi Mn = 94.7$	Pass
Stiffener Data	Base Plate Summary		
N/A	Max Stress (ksi):	29.2	(Flexural)
Pole Data	Allowable Stress (ksi):	54	
39.95" x 0.1875" 18-sided pole (A572-65; Fy=65 ksi, Fu=80 ksi)	Stress Rating:	51.5%	Pass

Drilled Pier Foundation

BU #: 823848
 Site Name: East Hartford / I-84 & 6
 Order Number: 467460 Rev.1

TIA-222 Revision: H
 Tower Type: Monopole



Applied Loads	
Comp.	Uplift
Moment (kip-ft)	665
Axial Force (kips)	13
Shear Force (kips)	10

Material Properties	
Concrete Strength, f _c	3 ksi
Rebar Strength, F _y	60 ksi

Pier Design Data	
Depth	15 ft
Ext. Above Grade	0.5 ft
Pier Section 1	
<i>From 0.5' above grade to 15' below grade</i>	
Pier Diameter	6 ft
Rebar Quantity	14
Rebar Size	11
Clear Cover to Ties	4 in
Tie Size	5

Analysis Results		
Soil Lateral Capacity	Compression	Uplift
D ₅₀ (ft from TOC)	4.79	-
Soil Safety Factor	2.54	-
Max Moment (kip-ft)	708.92	-
Rating*	49.9%	-
Soil Vertical Capacity	Compression	Uplift
Skin Friction (kips)	198.01	-
End Bearing (kips)	508.94	-
Weight of Concrete (kips)	78.89	-
Total Capacity (kips)	706.95	-
Axial (kips)	91.89	-
Rating*	12.4%	-
Reinforced Concrete Capacity	Compression	Uplift
Critical Depth (ft from TOC)	4.73	-
Critical Moment (kip-ft)	708.89	-
Critical Moment Capacity	2933.15	-
Rating*	23.0%	-
Soil Interaction Rating* 49.9%		
Structural Foundation Rating* 23.0%		
*Rating per TIA-222-H Section 15.5		

Soil Profile	
Groundwater Depth	15 ft
# of Layers	2

Layer	Top (ft)	Bottom (ft)	Thickness (ft)	γ _{soil} (pcf)	γ _{concrete} (pcf)	Cohesion (ksf)	Angle of Friction (degrees)	Calculated Ultimate Skin Friction Comp (ksf)	Calculated Ultimate Skin Friction Uplift (ksf)	Ultimate Skin Friction Comp Override (ksf)	Ultimate Skin Friction Uplift Override (ksf)	Ult. Gross Bearing Capacity (ksf)	SPT Blow Count	Soil Type
1	0	3.33	3.33	120	150	0	0	0.000	0.000	0.00	0.00	24	21	Cohesionless
2	3.33	15	11.67	120	150	0	32	1.200	1.200	0.00	0.00	24	21	Cohesionless

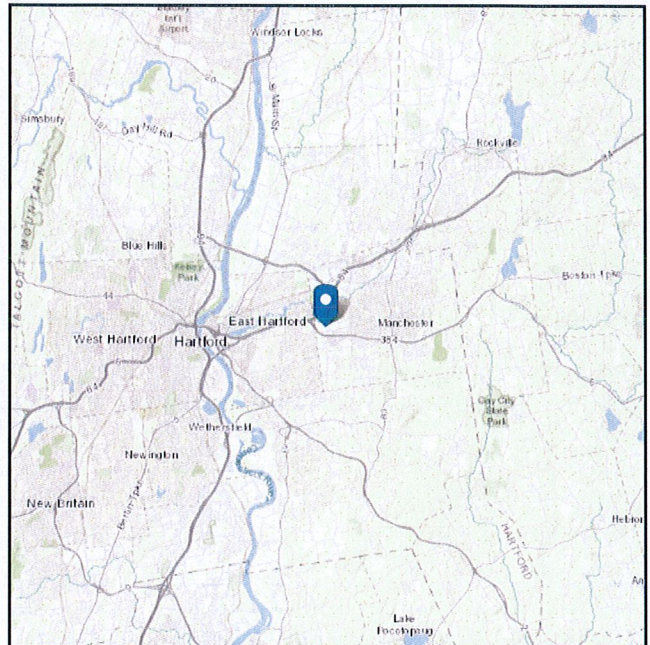
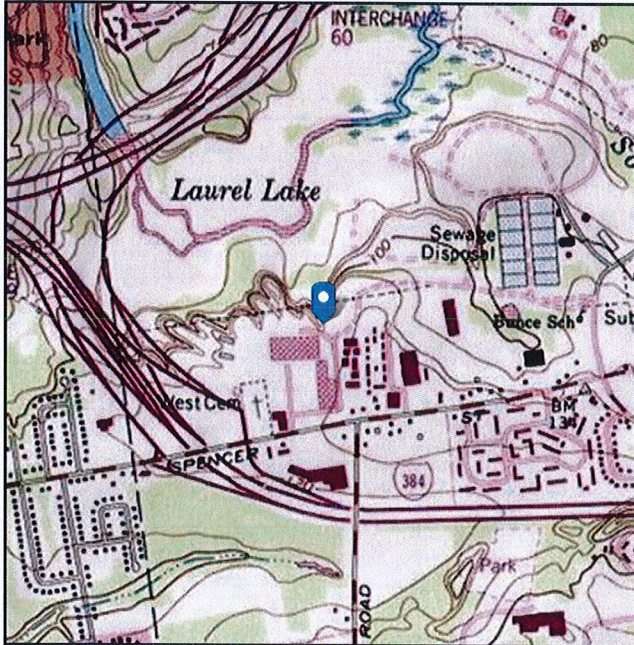
Check Limitation
 Apply TIA-222-H Section 15.5:

ASCE 7 Hazards Report

Address:
No Address at This
Location

Standard: ASCE/SEI 7-10
Risk Category: II
Soil Class: D - Stiff Soil

Elevation: 119.46 ft (NAVD 88)
Latitude: 41.769658
Longitude: -72.570092



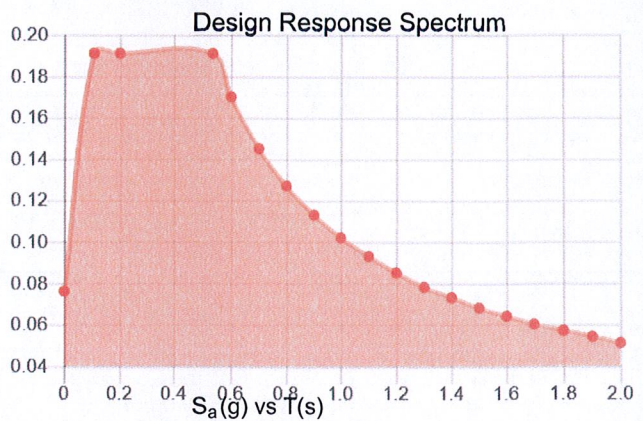
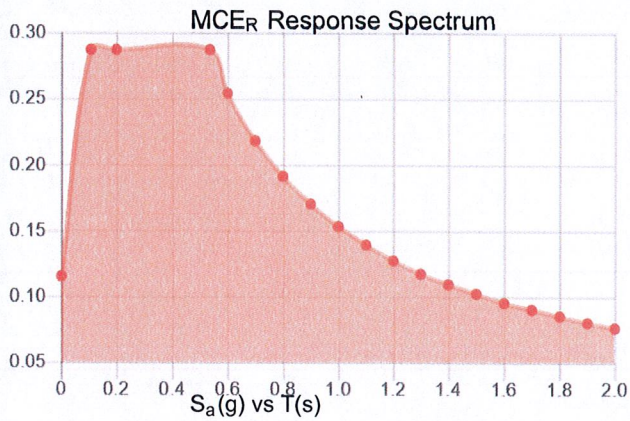
Seismic

Site Soil Class: D - Stiff Soil

Results:

S_s :	0.179	S_{DS} :	0.191
S_1 :	0.064	S_{D1} :	0.102
F_a :	1.600	T_L :	6.000
F_v :	2.400	PGA :	0.090
S_{MS} :	0.287	PGA _M :	0.144
S_{M1} :	0.153	F_{PGA} :	1.600
		I_e :	1

Seismic Design Category B



Data Accessed:

Tue Dec 04 2018

Date Source:

USGS Seismic Design Maps based on ASCE/SEI 7-10, incorporating Supplement 1 and errata of March 31, 2013, and ASCE/SEI 7-10 Table 1.5-2. Additional data for site-specific ground motion procedures in accordance with ASCE/SEI 7-10 Ch. 21 are available from USGS.

Ice

Results:

Ice Thickness: 1.00 in.
Concurrent Temperature: 5 F
Gust Speed: 50 mph

Data Source: Standard ASCE/SEI 7-10, Figs. 10-2 through 10-8

Date Accessed: Tue Dec 04 2018

Ice thicknesses on structures in exposed locations at elevations higher than the surrounding terrain and in valleys and gorges may exceed the mapped values.

Values provided are equivalent radial ice thicknesses due to freezing rain with concurrent 3-second gust speeds, for a 50-year mean recurrence interval, and temperatures concurrent with ice thicknesses due to freezing rain. Thicknesses for ice accretions caused by other sources shall be obtained from local meteorological studies. Ice thicknesses in exposed locations at elevations higher than the surrounding terrain and in valleys and gorges may exceed the mapped values.

The ASCE 7 Hazard Tool is provided for your convenience, for informational purposes only, and is provided "as is" and without warranties of any kind. The location data included herein has been obtained from information developed, produced, and maintained by third party providers; or has been extrapolated from maps incorporated in the ASCE 7 standard. While ASCE has made every effort to use data obtained from reliable sources or methodologies, ASCE does not make any representations or warranties as to the accuracy, completeness, reliability, currency, or quality of any data provided herein. Any third-party links provided by this Tool should not be construed as an endorsement, affiliation, relationship, or sponsorship of such third-party content by or from ASCE.

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EXHIBIT 4



Radio Frequency Emissions Analysis Report

AT&T Existing Facility

Site ID: CT5245

FA#: 10071104

Manchester West
239 Spencer Street
Manchester, CT 6040

January 10, 2019

Centerline Communications Project Number: 950006-166

Site Compliance Summary	
Compliance Status:	COMPLIANT
Site total MPE% of FCC general population allowable limit:	8.40 %



January 10, 2019

AT&T Mobility – New England
Attn: John Benedetto, RF Manager
550 Cochituate Road
Suite 550 – 13&14
Framingham, MA 06040

Emissions Analysis for Site: **CT5245 – Manchester West**

Centerline Communications, LLC (“Centerline”) was directed to analyze the proposed AT&T facility located at **239 Spencer Street, Manchester, CT**, for the purpose of determining whether the emissions from the Proposed AT&T Antenna Installation located on this property are within specified federal limits.

All information used in this report was analyzed as a percentage of current Maximum Permissible Exposure (% MPE) as listed in the FCC OET Bulletin 65 Edition 97-01 and ANSI/IEEE Std C95.1. The FCC regulates Maximum Permissible Exposure in units of microwatts per square centimeter ($\mu\text{W}/\text{cm}^2$). The number of $\mu\text{W}/\text{cm}^2$ calculated at each sample point is called the power density. The exposure limit for power density varies depending upon the frequencies being utilized. Wireless Carriers and Paging Services use different frequency bands each with different exposure limits, therefore it is necessary to report results and limits in terms of percent MPE rather than power density.

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

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

Population exposure to radio frequencies is regulated and enforced in units of microwatts per square centimeter ($\mu\text{W}/\text{cm}^2$). The general population exposure limits for the 700 and 850 MHz Bands are approximately $467 \mu\text{W}/\text{cm}^2$ and $567 \mu\text{W}/\text{cm}^2$ respectively. The general population exposure limit for the 1900 MHz (PCS), 2100 MHz (AWS) and 2300 MHz (WCS) bands is $1000 \mu\text{W}/\text{cm}^2$. Because each carrier will be using different frequency bands, and each frequency band has different exposure limits, it is necessary to report percent of MPE rather than power density.



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

Additional details can be found in FCC OET 65.

CALCULATIONS

Calculations were performed for the proposed AT&T Wireless antenna facility located at **239 Spencer Street, Manchester, CT**, using the equipment information listed below. All calculations were performed per the specifications under FCC OET 65. Since AT&T is proposing highly focused directional panel antennas, which project most of the emitted energy out toward the horizon, all calculations were performed assuming a lobe representing the maximum gain of the antenna per the antenna manufactures supplied specifications, minus 10 dB, was focused at the base of the tower. For this report the sample point is the top of a 6-foot person standing at the base of the tower.

Per FCC OET Bulletin No. 65 - Edition 97-01 recommendations to achieve the maximum anticipated value at each sample point, all power levels emitting from the proposed antenna installation are increased by a factor of 2.56 to account for possible in-phase reflections from the surrounding environment. All power values expressed and analyzed are maximum power levels expected to be used on all radios.

All emissions values for additional carriers were taken from the Connecticut Siting Council (CSC) active MPE database. Values in this database are provided by the individual carriers themselves

For each sector the following channel counts, frequency bands and power levels were utilized as shown in *Table 1*:

Technology	Frequency Band	Channel Count	Transmit Power per Channel (W)
LTE	700 MHz	2	40
UMTS	850 MHz	2	30
LTE	1900 MHz (PCS)	4	40
LTE	850 MHz	2	40
5G	850 MHz	2	25
LTE	2300 MHz (WCS)	4	30

Table 1: Channel Data Table



The following antennas listed in *Table 2* were used in the modeling for transmission in the 700 MHz, 850 MHz, 1900 MHz (PCS) and 2300 MHz (WCS) frequency bands. This is based on feedback from the carrier with regards to anticipated antenna selection. Maximum gain values for all antennas are listed in the Inventory and Power Data table below. The maximum gain of the antenna per the antenna manufactures supplied specifications, minus 10 dB, was used for all calculations. This value is a very conservative estimate as gain reductions for these particular antennas are typically much higher in this direction.

Sector	Antenna Number	Antenna Make / Model	Antenna Centerline (ft)
A	1	Kathrein 800-10798	102
B	1	Kathrein 800-10798	102
C	1	Kathrein 800-10798	102

Table 2: Antenna Data

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



RESULTS

Per the calculations completed for the proposed AT&T configurations *Table 3* shows resulting emissions power levels and percentages of the FCC's allowable general population limit.

Antenna ID	Antenna Make / Model	Frequency Bands	Antenna Gain (dBd)	Channel Count	Total TX Power (W)	ERP (W)	MPE %
Antenna A1	Kathrein 800-10798	700 MHz / 850 MHz / 1900 MHz (PCS) / 2300 MHz (WCS)	13.05 / 4.35 / 13.65 / 15.15	16	550	14,302.15	7.61
Sector A Composite MPE%							7.61
Antenna B1	Kathrein 800-10798	700 MHz / 850 MHz / 1900 MHz (PCS) / 2300 MHz (WCS)	13.05 / 13.65 / 14.35 / 13.65	16	550	14,302.15	7.61
Sector B Composite MPE%							7.61
Antenna C1	Kathrein 800-10798	700 MHz / 850 MHz / 1900 MHz (PCS) / 2300 MHz (WCS)	13.05 / 13.65 / 14.35 / 13.65	16	550	14,302.15	7.61
Sector C Composite MPE%							7.61

Table 3: AT&T Emissions Levels



The Following table (*table 4*) shows all additional carriers on site and their MPE% as recorded in the CSC active MPE database for this facility along with the newly calculated maximum AT&T MPE contributions per this report. FCC OET 65 specifies that for carriers utilizing directional antennas that the highest recorded sector value be used for composite site MPE values due to their greatly reduced emissions contributions in the directions of the adjacent sectors. For this site, all three sectors have the same configuration yielding the same results on all three sectors. *Table 5* below shows a summary for each AT&T Sector as well as the composite MPE value for the site.

Site Composite MPE%	
Carrier	MPE%
AT&T – Max Per Sector Value	7.61 %
T-Mobile	0.79 %
Site Total MPE %:	8.40 %

Table 4: All Carrier MPE Contributions

AT&T Sector A Total:	7.61 %
AT&T Sector B Total:	7.61 %
AT&T Sector C Total:	7.61 %
Site Total:	
	8.40 %

Table 5: Site MPE Summary



FCC OET 65 specifies that for carriers utilizing directional antennas that the highest recorded sector value be used for composite site MPE values due to their greatly reduced emissions contributions in the directions of the adjacent sectors. *Table 6* below details a breakdown by frequency band and technology for the MPE power values for the maximum calculated AT&T sector(s). For this site, all three sectors have the same configuration yielding the same results on all three sectors.

AT&T _ Frequency Band / Technology Max Power Values (Per Sector)	# Channels	Watts ERP (Per Channel)	Height (feet)	Total Power Density ($\mu\text{W}/\text{cm}^2$)	Frequency (MHz)	Allowable MPE ($\mu\text{W}/\text{cm}^2$)	Calculated % MPE
AT&T 700 MHz LTE – Antenna 1	2	807.35	102	6.30	700 MHz	467	1.35%
AT&T 850 MHz UMTS – Antenna 1	2	695.22	102	5.42	850 MHz	567	0.96%
AT&T 1900 MHz (PCS) LTE – Antenna 1	4	1,089.08	102	16.99	1900 MHz (PCS)	1000	1.70%
AT&T 850 MHz LTE – Antenna 1	2	926.96	102	7.23	850 MHz	567	1.28%
AT&T 850 MHz 5G – Antenna 1	2	579.35	102	4.52	850 MHz	567	0.80%
AT&T 2300 MHz (WCS) LTE – Antenna 1	4	982.02	102	15.32	2300 MHz (WCS)	1000	1.53%
						Total:	7.61%

Table 6: AT&T Maximum Sector MPE Power Values



Summary

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

The anticipated maximum composite contributions from the AT&T facility as well as the site composite emissions value with regards to compliance with FCC's allowable limits for general population exposure to RF Emissions are shown here:

AT&T Sector	Power Density Value (%)
Sector A:	7.61 %
Sector B:	7.61 %
Sector C:	7.61 %
AT&T Maximum Total (per sector):	7.61 %
Site Total:	8.40 %
Site Compliance Status:	COMPLIANT

The anticipated composite MPE value for this site assuming all carriers present is **8.40 %** of the allowable FCC established general population limit sampled at the ground level. This is based upon values listed in the Connecticut Siting Council database for existing carrier emissions.

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

A handwritten signature in black ink, appearing to read 'Scott Heffernan', is written over a horizontal line.

Scott Heffernan
RF Engineering Director
Centerline Communications, LLC
95 Ryan Drive, Suite 1
Raynham, MA 02767

EXHIBIT 5



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N BILLERICA MA 01862-2527

0006

Carrier -- Leave if No Response

C004

SHIP HON. JAY MORAN

TO: MAYOR, MANCHESTER BOARD OF DIRECTORS

41 CENTER ST

P O BOX 191

MANCHESTER CT 06040-5090

USPS TRACKING #



9405 5036 9930 0399 2142 78

Electronic Rate Approved #038555749





UNITED STATES
POSTAL SERVICE®

Click-N-Ship®

P

usps.com 9405 5036 9930 0399 2143 08 0067 0000 0020 6040
US POSTAGE \$6.70
Flat Rate Env
01/25/2019 Mailed from 01862 062S0000001301



PRIORITY MAIL 2-DAY™

KRISTEN WHITE
EMPIRE TELECOM
16 ESQUIRE RD
N BILLERICA MA 01862-2527
Expected Delivery Date: 01/28/19
0006

Carrier -- Leave if No Response

C009

SHIP MR. JAMES DAVIS
TO: ZONING ENFORCEMENT OFFICER
494 MAIN ST
PO BOX 191
MANCHESTER CT 06040-4102

USPS TRACKING #



9405 5036 9930 0399 2143 08

Electronic Rate Approved #038555749

Cut on dotted line.



UNITED STATES
POSTAL SERVICE®

Click-N-Ship®

P

usps.com 9405 5036 9930 0399 2143 22 0067 0000 0067 2712
US POSTAGE \$6.70
Flat Rate Env
01/25/2019 Mailed from 01862 062S0000001311



PRIORITY MAIL 3-DAY™

KRISTEN WHITE
EMPIRE TELECOM
16 ESQUIRE RD
N BILLERICA MA 01862-2527
Expected Delivery Date: 01/28/19
0006

Carrier -- Leave if No Response

B050

SHIP WAL-MART REAL ESTATE BUSINESS TRUST
TO: PROPERTY TAX DEPT STORE #5209
PO BOX 8050
ATTN: MS 0555
BENTONVILLE AR 72712-8055

USPS TRACKING #



9405 5036 9930 0399 2143 22

Electronic Rate Approved #038555749





UNITED STATES
POSTAL SERVICE®

Click-N-Ship®

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usps.com

9405 5036 9930 0399 2143 46 0067 0000 0020 6040

US POSTAGE

Flat Rate Env



01/25/2019

Mailed from 01862 062S0000001301

PRIORITY MAIL 2-DAY™

KRISTEN WHITE
EMPIRE TELECOM
16 ESQUIRE RD
N BILLERICA MA 01862-2527

Expected Delivery Date: 01/28/19

0006

Carrier -- Leave if No Response

C009

SHIP GARY ANDERSON
TO: DIRECTOR OF PLANNING AND ECON. DEV.
494 MAIN ST
PO BOX 191
MANCHESTER CT 06040-4102

USPS TRACKING #



9405 5036 9930 0399 2143 46

Electronic Rate Approved #038555749

Cut on dotted line.



UNITED STATES
POSTAL SERVICE®

Click-N-Ship®

P

usps.com

9405 5036 9930 0399 2143 53 0067 0000 0021 2065

US POSTAGE

Flat Rate Env



01/25/2019

Mailed from 01862 062S0000001308

PRIORITY MAIL 2-DAY™

KRISTEN WHITE
EMPIRE TELECOM
16 ESQUIRE RD
N BILLERICA MA 01862-2527

Expected Delivery Date: 01/28/19

0006

Carrier -- Leave if No Response

R032

SHIP PAUL PEDICONE
TO: CROWN CASTLE
3 CORPORATE DR STE 101
HALFMOON NY 12065-8635

USPS TRACKING #



9405 5036 9930 0399 2143 53

Electronic Rate Approved #038555749



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Track Another Package +

Tracking Number: 9405503699300399214353

Remove X

On Time

Expected Delivery on

WEDNESDAY

30 JANUARY
2019 ⓘ

by
8:00pm ⓘ

Feedback

 **Delivered**

January 30, 2019 at 11:38 am
Delivered, Front Door/Porch
CLIFTON PARK, NY 12065

Tower Owner, Crown Castle

Get Updates ∨

Text & Email Updates ∨

Tracking History ∨

Product Information ∨

See Less ^

Tracking Number: 9405503699300399214346

Remove X

On Time

Expected Delivery on

WEDNESDAY

30 JANUARY
2019 ⓘ

by
8:00pm ⓘ

✓ **Delivered**

January 30, 2019 at 8:10 am
Delivered, PO Box
MANCHESTER, CT 06040

Gary Anderson; Town of Manchester
DIRECTOR OF PLANNING AND ECON. DEV.

Get Updates ▾

See More ▾

Feedback

Tracking Number: 9405503699300399214308

Remove X

On Time

Expected Delivery on

WEDNESDAY

30 JANUARY
2019 ⓘ

by
8:00pm ⓘ

✓ **Delivered**

January 30, 2019 at 8:10 am
Delivered, PO Box
MANCHESTER, CT 06040

James Davis, Town of Manchester
ZONING ENFORCEMENT OFFICER

Get Updates ▾

Get updates ▾

See More ▾

Tracking Number: 9405503699300399214278

Remove X

On Time

Expected Delivery on

WEDNESDAY

30 JANUARY 2019 ⓘ by **8:00pm** ⓘ

✓ **Delivered**

January 30, 2019 at 8:10 am
Delivered, PO Box
MANCHESTER, CT 06040

Hon. Jay Moran, Town of Manchester
MAYOR, MANCHESTER BOARD OF DIRECTORS

Feedback

Get updates ▾

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Tracking Number: 9405503699300399214261

Remove X

On Time

Expected Delivery on

WEDNESDAY

30 JANUARY 2019 ⓘ by **8:00pm** ⓘ

 **Delivered**

January 30, 2019 at 8:10 am
Delivered, PO Box
MANCHESTER, CT 06040

Get Updates 

Scott Shanley, Town of Manchester
GENERAL MANAGER

See More 



Tracking Number: 9405503699300399214322

Remove 

On Time

Expected Delivery on

THURSDAY

31 JANUARY 2019  by **8:00pm** 

Feedback

 **Delivered**

January 31, 2019 at 9:35 am
Delivered, To Agent
BENTONVILLE, AR 72712

Get Updates 

Property Owner,
WAL-MART REAL ESTATE BUSINESS TRUST
PROPERTY TAX DEPT STORE #5209
PO BOX 8050
ATTN: MS 0555
BENTONVILLE, AR 72712-8055

See More 

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