



QC Development

PO Box 916

Storrs, CT 06268

860-670-9068

Mark.Roberts@QCDevelopment.net

March 22, 2018

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

Notice of Exempt Modification – New Cingular Wireless PCS, LLC (AT&T) – CT5841
143R Old Blue Hills Road, Durham, CT 06422
N 41-27-33.69
W 72-39-45.82

Dear Ms. Bachman:

AT&T currently maintains six (6) antennas at the 116-foot level of the existing 120-foot Monopole at 143R Old Blue Hills Road, Durham, CT. The tower is owned by Crown Castle. The property is owned by Frances E. Behrens Jr. and Marie C. Castano. AT&T now intends to install three (3) new Andrew SBNHH-1D65A antennas, also at the 110-foot level of the tower. AT&T also intends to remove (3) Ericsson RRUS-32 B32 Remote Radio Units (RRU) and install three (3) Ericsson RRUS-32 and three (3) Ericsson RRUS-B2, also at the 116-foot level.

This facility was approved by the Connecticut Siting Council in Docket # 161 on March 11, 1994 and later approved for extension of the monopole to 120' AGL (132' with appurtenances) per Petition # 697 on May 11, 2005. Since no further modification to the overall facility height is proposed, this modification therefore complies with the aforementioned approvals.

Please accept this letter as notification pursuant to Regulations of Connecticut State Agencies § 16-50j-73, for construction that constitutes an exempt modification pursuant to R.C.S.A. § 16-50j-72(b)(2). In accordance with R.C.S.A. § 16-50j-73, a copy of this letter is being sent to Laura L. Francis, First Selectman of the Town of Durham, and the Durham Building & Zoning Department,

as well as the property owner and the tower owner.

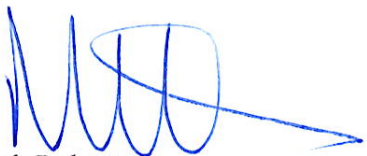
The planned modifications to the facility fall squarely within those activities explicitly provided for in R.C.S.A. § 16-50j-72(b)(2).

1. The proposed modifications will not result in an increase in the height of the existing structure.
2. The proposed modifications will not require the extension of the site boundary.
3. The proposed modifications will not increase noise levels at the facility by six decibels or more, or to levels that exceed state and local criteria.
4. The operation of the replacement antennas will not increase radio frequency emissions at the facility to a level at or above the Federal Communications Commission safety standard.
5. The proposed modifications will not cause a change or alteration in the physical or environmental characteristics of the site.
6. The existing structure and its foundation can support the proposed loading.

For the foregoing reasons, AT&T respectfully submits that the proposed modifications to the above-referenced telecommunications facility constitute an exempt modification under R.C.S.A. § 16-50j-72(b)(2).

Please feel free to call me at (860) 670-9068 with any questions regarding this matter. Thank you for your consideration.

Sincerely,



Mark Roberts
QC Development
Consultant for AT&T

Attachments

cc: Laura L. Francis- as Elected Official
Dick McManus – Building Inspector
Crown Castle - Tower Owner (via e-mail)
Frances E. Behrens Jr. and Marie C. Castano - Property Owners

Power Density

Existing Loading on Tower

Carrier	# of Channels	ERP/Ch (W)	Antenna Centerline Height (ft)	Power Density (mW/cm ²)	Freq. Band (MHz ^{**})	Limit S (mW/cm ²)	%MPE
Other Carriers*							14.12%
AT&T UMTS	2	299	114	0.0184	880	0.5867	0.31%
AT&T LTE	2	1119	114	0.0690	734	0.4893	1.41%
AT&T LTE	2	3304	114	0.2037	1900	1.0000	2.04%
Site Total							17.88%

*Per CSC Records (available upon request, includes calculation formulas)

** If a range of frequencies are used, such as 880-894, enter the lowest value, i.e. 880

Proposed Loading on Tower

Carrier	# of Channels	ERP/Ch (W)	Antenna Centerline Height (ft)	Power Density (mW/cm ²)	Freq. Band (MHz ^{**})	Limit S (mW/cm ²)	%MPE
Other Carriers*							14.12%
AT&T UMTS	1	299	116	0.0178	850	0.5667	0.31%
AT&T LTE	1	1476	116	0.0877	700	0.4667	1.88%
AT&T LTE	3	4842	116	0.2878	1900	1.0000	2.88%
AT&T LTE	1	1285	116	0.0764	2300	1.0000	0.76%
Site Total							19.95%

*Per CSC Records (available upon request, includes calculation formulas)

** If a range of frequencies are used, such as 880-894, enter the lowest value, i.e. 880

PROJECT INFORMATION

SCOPE OF WORK: ITEMS TO BE MOUNTED ON THE EXISTING TOWER:
 • NEW AT&T ANTENNAS: (SBNHH-1D65A) MOUNTED @ POSITION 2 (TYP. OF 1 PER SECTOR, TOTAL OF 3).
 • NEW AT&T RRUS: RRUS 32 (WCS) MOUNTED @ POSITION 2 (TYP. OF 1 PER SECTOR, TOTAL OF 3).
 • NEW AT&T RRUS: B25 4415 (PCS) MOUNTED @ POSITION 1 (TYP. OF 1 PER SECTOR, TOTAL OF 3).
ITEMS TO BE MOUNTED AT EQUIPMENT LOCATION:
 • SWAP DC6 FOR DC12.
ITEMS TO REMAIN:
 • (6) ANTENNAS, (6) RRU'S, (1) SURGE ARRESTOR (6) COAX CABLES, (3) RET CABLES, (2) DC POWER & (1) FIBER.
SQUID ALARMING (NOT TO BE DAISY CHAINED).
 - THE 1ST SQUID INSTALLED WILL BE ALARMED TO THE LOWEST BAND (OR FIRST INSTALLED RRH/RRU ON THE ALPHA SECTOR, IN THE EVENT THE ALARM CABLE CANNOT BE CONNECTED TO ALPHA IT WILL BE ACCEPTABLE TO ALARM TO THE CLOSEST PHYSICAL SECTOR ON AN EXCEPTION BASIS.
 - 2ND SQUID INSTALLED WILL BE ALARMED TO THE LOWEST BAND (OR FIRST INSTALLED) RRH/RRU ON THE BETA SECTOR.
 - 3RD SQUID INSTALLED WILL BE ALARMED TO THE LOWEST BAND (OR FIRST INSTALLED) RRH/RRU ON THE GAMMA SECTOR.
 SITE ADDRESS: 143 R OLD BLUE HILLS ROAD
 DURHAM, CT 06422
 LATITUDE: 41.459491 N, 41' 27' 34.17" N
 LONGITUDE: 72.662698 W, 72' 39' 45.71" W
 TYPE OF SITE: MONOPOLE / OUTDOOR EQUIPMENT
 STRUCTURE HEIGHT: 120'-0"±
 RAD CENTER: 116'-0"±
 CURRENT USE: TELECOMMUNICATIONS FACILITY
 PROPOSED USE: TELECOMMUNICATIONS FACILITY



SITE NUMBER: CT5841

SITE NAME: DURHAM CENTRAL

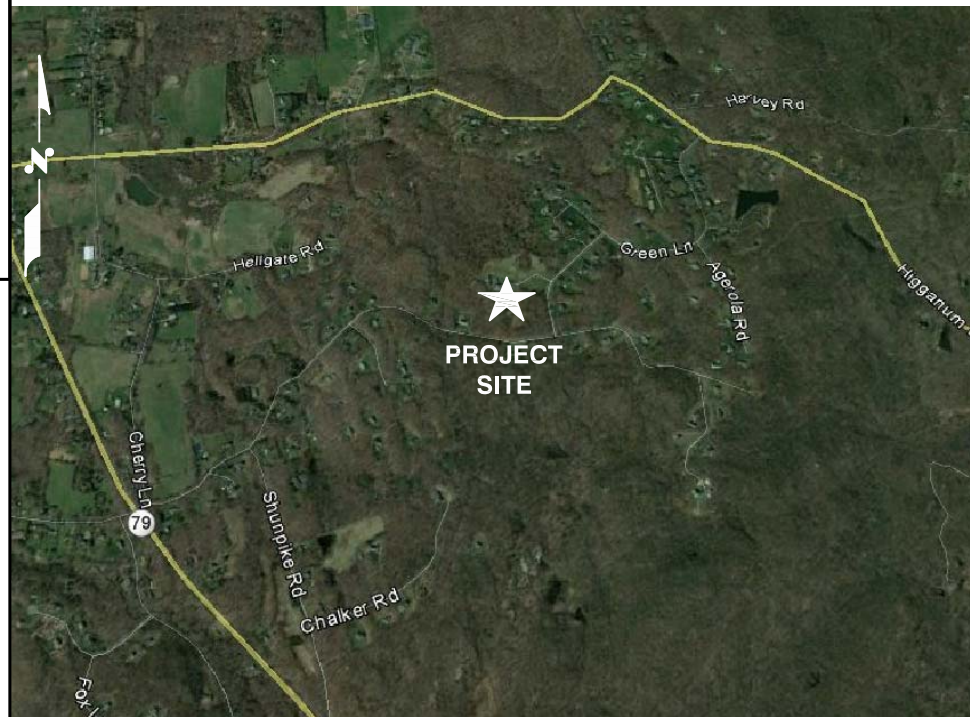
PROJECT: LTE 3C/ANTENNA MODS 2018 UPGRADE

DRAWING INDEX

SHEET NO.	DESCRIPTION	REV.
T-1	TITLE SHEET	1
GN-1	GENERAL NOTES	1
A-1	COMPOUND & EQUIPMENT PLAN	1
A-2	ANTENNA LAYOUTS & ELEVATION	1
A-3	DETAILS	1
RF-1	RF PLUMBING DIAGRAM	1
G-1	GROUNDING DETAILS	1

VICINITY MAP

DIRECTIONS TO SITE:
 I-91 NORTH TO EXIT 15, ROUTE 68. BEAR RIGHT AFTER EXITING RAMP AND MERGE ONTO RTE 68 EAST AND CONTINUE FOR ABOUT 5 MILES TO THE END OF RTE 68. TURN RIGHT AT THIS INTERSECTION AND HEAD SOUTH ON RTE 17. HEAD SOUTH AND BEAR LEFT AT RTE 79 SOUTH. ABOUT HALF A MILE DOWN, YOU WILL SEE AN INTERSECTION SIGN. AT THIS INTERSECTION, MAKE LEFT AND TAKE OLD BLUE HILLS RD. PROCEED ON THIS ROAD TO #186, WHICH WILL BE ON YOUR LEFT. IMMEDIATELY AFTER THIS HOUSE, LOOK FOR PAVED ROAD ON YOUR RIGHT AND PROCEED UP THE HILL TO SITE COMPOUND. SITE LOCATED BEHIND MONOPOLE.



GENERAL NOTES

1. THIS DOCUMENT IS THE CREATION, DESIGN, PROPERTY AND COPYRIGHTED WORK OF AT&T. ANY DUPLICATION OR USE WITHOUT EXPRESS WRITTEN CONSENT IS STRICTLY PROHIBITED. DUPLICATION AND USE BY GOVERNMENT AGENCIES FOR THE PURPOSES OF CONDUCTING THEIR LAWFULLY AUTHORIZED REGULATORY AND ADMINISTRATIVE FUNCTIONS IS SPECIFICALLY ALLOWED.
2. THE FACILITY IS AN UNMANNED PRIVATE AND SECURED EQUIPMENT INSTALLATION. IT IS ONLY ACCESSED BY TRAINED TECHNICIANS FOR PERIODIC ROUTINE MAINTENANCE AND THEREFORE DOES NOT REQUIRE ANY WATER OR SANITARY SEWER SERVICE. THE FACILITY IS NOT GOVERNED BY REGULATIONS REQUIRING PUBLIC ACCESS PER ADA REQUIREMENTS.
3. CONTRACTOR SHALL VERIFY ALL PLANS AND EXISTING DIMENSIONS AND CONDITIONS ON THE JOB SITE AND SHALL IMMEDIATELY NOTIFY THE AT&T MOBILITY REPRESENTATIVE IN WRITING OF DISCREPANCIES BEFORE PROCEEDING WITH THE WORK OR BE RESPONSIBLE FOR SAME.
4. CONSTRUCTION DRAWINGS ARE VALID FOR SIX MONTHS AFTER ENGINEER OF RECORD'S STAMPED AND SIGNED SUBMITTAL DATE LISTED HEREIN.

CCI SITE NAME: HRT 106 (B) 943202
CCI SITE #: 806364

72 HOURS



CALL BEFORE YOU DIG



CALL TOLL FREE **1-800-922-4455**

OR CALL **811**

UNDERGROUND SERVICE ALERT

45 BEECHWOOD DRIVE
 NORTH ANDOVER, MA 01845
 TEL: (978) 557-5553
 FAX: (978) 336-5586

12 INDUSTRIAL WAY
 SALEM, NH 03079

SITE NUMBER: CT5841
SITE NAME: DURHAM CENTRAL
CCI SITE #: 806364
 143 R OLD BLUE HILLS ROAD
 DURHAM, CT 06422
 MIDDLESEX COUNTY

500 ENTERPRISE DRIVE, SUITE 3A
 ROCKY HILL, CT 06067

NO.	DATE	REVISIONS	BY	CHK	APP'D
1	03/01/18	ISSUED FOR CONSTRUCTION	AN	AT	EB
A	01/22/18	ISSUED FOR REVIEW	EB	AT	DJC

SCALE: AS SHOWN DESIGNED BY: AT DRAWN BY: EB

AT&T	
TITLE SHEET (LTE 3C/ANTENNA MOD)	
SITE NUMBER	DRAWING NUMBER
CT5841	T-1
REV	1

GROUNDING NOTES

1. THE SUBCONTRACTOR SHALL REVIEW AND INSPECT THE EXISTING FACILITY GROUNDING SYSTEM AND LIGHTNING PROTECTION SYSTEM (AS DESIGNED AND INSTALLED) FOR STRICT COMPLIANCE WITH THE NEC (AS ADOPTED BY THE AHJ), THE SITE-SPECIFIC (UL, LPI, OR NFPA) LIGHTING PROTECTION CODE, AND GENERAL COMPLIANCE WITH TELCORDIA AND TIA GROUNDING STANDARDS. THE SUBCONTRACTOR SHALL REPORT ANY VIOLATIONS OR ADVERSE FINDINGS TO THE CONTRACTOR FOR RESOLUTION.
2. ALL GROUND ELECTRODE SYSTEMS (INCLUDING TELECOMMUNICATION, RADIO, LIGHTNING PROTECTION, AND AC POWER GES'S) SHALL BE BONDED TOGETHER, AT OR BELOW GRADE, BY TWO OR MORE COPPER BONDING CONDUCTORS IN ACCORDANCE WITH THE NEC.
3. THE SUBCONTRACTOR SHALL PERFORM IEEE FALL-OF-POTENTIAL RESISTANCE TO EARTH TESTING (PER IEEE 1100 AND 81) FOR NEW GROUND ELECTRODE SYSTEMS. THE SUBCONTRACTOR SHALL FURNISH AND INSTALL SUPPLEMENTAL GROUND ELECTRODES AS NEEDED TO ACHIEVE A TEST RESULT OF 5 OHMS OR LESS.
4. METAL RACEWAY SHALL NOT BE USED AS THE NEC REQUIRED EQUIPMENT GROUND CONDUCTOR. STRANDED COPPER CONDUCTORS WITH GREEN INSULATION, SIZED IN ACCORDANCE WITH THE NEC, SHALL BE FURNISHED AND INSTALLED WITH THE POWER CIRCUITS TO BTS EQUIPMENT.
5. EACH BTS CABINET FRAME SHALL BE DIRECTLY CONNECTED TO THE MASTER GROUND BAR WITH GREEN INSULATED SUPPLEMENTAL EQUIPMENT GROUND WIRES, 6 AWG STRANDED COPPER OR LARGER FOR INDOOR BTS 2 AWG STRANDED COPPER FOR OUTDOOR BTS.
6. EXOTHERMIC WELDS SHALL BE USED FOR ALL GROUNDING CONNECTIONS BELOW GRADE.
7. APPROVED ANTIOXIDANT COATINGS (I.E., CONDUCTIVE GEL OR PASTE) SHALL BE USED ON ALL COMPRESSION AND BOLTED GROUND CONNECTIONS.
8. ICE BRIDGE BONDING CONDUCTORS SHALL BE EXOTHERMICALLY BONDED OR BOLTED TO GROUND BAR.
9. ALUMINUM CONDUCTOR OR COPPER CLAD STEEL CONDUCTOR SHALL NOT BE USED FOR GROUNDING CONNECTIONS.
10. MISCELLANEOUS ELECTRICAL AND NON-ELECTRICAL METAL BOXES, FRAMES AND SUPPORTS SHALL BE BONDED TO THE GROUND RING, IN ACCORDANCE WITH THE NEC.
11. METAL CONDUIT SHALL BE MADE ELECTRICALLY CONTINUOUS WITH LISTED BONDING FITTINGS OR BY BONDING ACROSS THE DISCONTINUITY WITH 6 AWS COPPER WIRE UL APPROVED GROUNDING TYPE CONDUIT CLAMPS.
12. ALL NEW STRUCTURES WITH A FOUNDATION AND/OR FOOTING HAVING 20 FT. OR MORE OF 1/2 IN. OR GREATER ELECTRICALLY CONDUCTIVE REINFORCING STEEL MUST HAVE IT BONDED TO THE GROUND RING USING AN EXOTHERMIC WELD CONNECTION USING #2 AWG SOLID BARE TINNED COPPER GROUND WIRE, PER NEC 250.50

GENERAL NOTES

1. FOR THE PURPOSE OF CONSTRUCTION DRAWING, THE FOLLOWING DEFINITIONS SHALL APPLY:
 CONTRACTOR – SAI
 SUBCONTRACTOR – GENERAL CONTRACTOR (CONSTRUCTION)
 OWNER – AT&T MOBILITY
2. PRIOR TO THE SUBMISSION OF BIDS, THE BIDDING SUBCONTRACTOR SHALL VISIT THE CELL SITE TO FAMILIARIZE WITH THE EXISTING CONDITIONS AND TO CONFIRM THAT THE WORK CAN BE ACCOMPLISHED AS SHOWN ON THE CONSTRUCTION DRAWINGS. ANY DISCREPANCY FOUND SHALL BE BROUGHT TO THE ATTENTION OF CONTRACTOR.
3. ALL MATERIALS FURNISHED AND INSTALLED SHALL BE IN STRICT ACCORDANCE WITH ALL APPLICABLE CODES, REGULATIONS, AND ORDINANCES. SUBCONTRACTOR SHALL ISSUE ALL APPROPRIATE NOTICES AND COMPLY WITH ALL LAWS, ORDINANCES, RULES, REGULATIONS, AND LAWFUL ORDERS OF ANY PUBLIC AUTHORITY REGARDING THE PERFORMANCE OF THE WORK. ALL WORK CARRIED OUT SHALL COMPLY WITH ALL APPLICABLE MUNICIPAL AND UTILITY COMPANY SPECIFICATIONS AND LOCAL JURISDICTIONAL CODES, ORDINANCES AND APPLICABLE REGULATIONS.
4. DRAWINGS PROVIDED HERE ARE NOT TO BE SCALED AND ARE INTENDED TO SHOW OUTLINE ONLY.
5. UNLESS NOTED OTHERWISE, THE WORK SHALL INCLUDE FURNISHING MATERIALS, EQUIPMENT, APPURTENANCES, AND LABOR NECESSARY TO COMPLETE ALL INSTALLATIONS AS INDICATED ON THE DRAWINGS.
6. "KITTING LIST" SUPPLIED WITH THE BID PACKAGE IDENTIFIES ITEMS THAT WILL BE SUPPLIED BY CONTRACTOR. ITEMS NOT INCLUDED IN THE BILL OF MATERIALS AND KITTING LIST SHALL BE SUPPLIED BY THE SUBCONTRACTOR.
7. THE SUBCONTRACTOR SHALL INSTALL ALL EQUIPMENT AND MATERIALS IN ACCORDANCE WITH MANUFACTURER'S RECOMMENDATIONS UNLESS SPECIFICALLY STATED OTHERWISE.
8. IF THE SPECIFIED EQUIPMENT CANNOT BE INSTALLED AS SHOWN ON THESE DRAWINGS, THE SUBCONTRACTOR SHALL PROPOSE AN ALTERNATIVE INSTALLATION SPACE FOR APPROVAL BY THE CONTRACTOR.
9. SUBCONTRACTOR SHALL DETERMINE ACTUAL ROUTING OF CONDUIT, POWER AND T1 CABLES, GROUNDING CABLES AS SHOWN ON THE POWER, GROUNDING AND TELCO PLAN DRAWING. SUBCONTRACTOR SHALL UTILIZE EXISTING TRAYS AND/OR SHALL ADD NEW TRAYS AS NECESSARY. SUBCONTRACTOR SHALL CONFIRM THE ACTUAL ROUTING WITH THE CONTRACTOR.
10. THE SUBCONTRACTOR SHALL PROTECT EXISTING IMPROVEMENTS, PAVEMENTS, CURBS, LANDSCAPING AND STRUCTURES. ANY DAMAGED PART SHALL BE REPAIRED AT SUBCONTRACTOR'S EXPENSE TO THE SATISFACTION OF OWNER.
11. SUBCONTRACTOR SHALL LEGALLY AND PROPERLY DISPOSE OF ALL SCRAP MATERIALS SUCH AS COAXIAL CABLES AND OTHER ITEMS REMOVED FROM THE EXISTING FACILITY. ANTENNAS REMOVED SHALL BE RETURNED TO THE OWNER'S DESIGNATED LOCATION.
12. SUBCONTRACTOR SHALL LEAVE PREMISES IN CLEAN CONDITION.
13. ALL CONCRETE REPAIR WORK SHALL BE DONE IN ACCORDANCE WITH AMERICAN CONCRETE INSTITUTE (ACI) 301.

14. ANY NEW CONCRETE NEEDED FOR THE CONSTRUCTION SHALL BE AIR-ENTRAINED AND SHALL HAVE 4000 PSI STRENGTH AT 28 DAYS. ALL CONCRETE WORK SHALL BE DONE IN ACCORDANCE WITH ACI 318 CODE REQUIREMENTS.
15. ALL STRUCTURAL STEEL WORK SHALL BE DETAILED, FABRICATED AND ERECTED IN ACCORDANCE WITH AISC SPECIFICATIONS. ALL STRUCTURAL STEEL SHALL BE ASTM A36 (Fy = 36 ksi) UNLESS OTHERWISE NOTED. PIPES SHALL BE ASTM A53 TYPE E (Fy = 36 ksi). ALL STEEL EXPOSED TO WEATHER SHALL BE HOT DIPPED GALVANIZED. TOUCHUP ALL SCRATCHES AND OTHER MARKS IN THE FIELD AFTER STEEL IS ERECTED USING A COMPATIBLE ZINC RICH PAINT.
16. CONSTRUCTION SHALL COMPLY WITH SPECIFICATIONS AND "GENERAL CONSTRUCTION SERVICES FOR CONSTRUCTION OF AT&T SITES."
17. SUBCONTRACTOR SHALL VERIFY ALL EXISTING DIMENSIONS AND CONDITIONS PRIOR TO COMMENCING ANY WORK. ALL DIMENSIONS OF EXISTING CONSTRUCTION SHOWN ON THE DRAWINGS MUST BE VERIFIED. SUBCONTRACTOR SHALL NOTIFY THE CONTRACTOR OF ANY DISCREPANCIES PRIOR TO ORDERING MATERIAL OR PROCEEDING WITH CONSTRUCTION.
18. THE EXISTING CELL SITE IS IN FULL COMMERCIAL OPERATION. ANY CONSTRUCTION WORK BY SUBCONTRACTOR SHALL NOT DISRUPT THE EXISTING NORMAL OPERATION. ANY WORK ON EXISTING EQUIPMENT MUST BE COORDINATED WITH CONTRACTOR. ALSO, WORK SHOULD BE SCHEDULED FOR AN APPROPRIATE MAINTENANCE WINDOW USUALLY IN LOW TRAFFIC PERIODS AFTER MIDNIGHT.
19. SINCE THE CELL SITE IS ACTIVE, ALL SAFETY PRECAUTIONS MUST BE TAKEN WHEN WORKING AROUND HIGH LEVELS OF ELECTROMAGNETIC RADIATION. EQUIPMENT SHOULD BE SHUTDOWN PRIOR TO PERFORMING ANY WORK THAT COULD EXPOSE THE WORKERS TO DANGER. PERSONAL RF EXPOSURE MONITORS ARE ADVISED TO BE WORN TO ALERT OF ANY DANGEROUS EXPOSURE LEVELS.
20. APPLICABLE BUILDING CODES:
 SUBCONTRACTOR'S WORK SHALL COMPLY WITH ALL APPLICABLE NATIONAL, STATE, AND LOCAL CODES AS ADOPTED BY THE LOCAL AUTHORITY HAVING JURISDICTION (AHJ) FOR THE LOCATION. THE EDITION OF THE AHJ ADOPTED CODES AND STANDARDS IN EFFECT ON THE DATE OF CONTRACT AWARD SHALL GOVERN THE DESIGN.
 BUILDING CODE: IBC 2012 WITH 2016 CT BUILDING CODE AMENDMENTS
 ELECTRICAL CODE: REFER TO ELECTRICAL DRAWINGS
 LIGHTNING CODE: REFER TO ELECTRICAL DRAWINGS

SUBCONTRACTOR'S WORK SHALL COMPLY WITH THE LATEST EDITION OF THE FOLLOWING STANDARDS:

AMERICAN CONCRETE INSTITUTE (ACI) 318; BUILDING CODE REQUIREMENTS FOR STRUCTURAL CONCRETE;

AMERICAN INSTITUTE OF STEEL CONSTRUCTION (AISC)

MANUAL OF STEEL CONSTRUCTION, ASD, FOURTEENTH EDITION;

TELECOMMUNICATIONS INDUSTRY ASSOCIATION (TIA) 222-G, STRUCTURAL STANDARDS FOR STEEL

EQUIPMENT AND ANTENNA SUPPORTING STRUCTURES; REFER TO ELECTRICAL DRAWINGS FOR SPECIFIC ELECTRICAL STANDARDS.

FOR ANY CONFLICTS BETWEEN SECTIONS OF LISTED CODES AND STANDARDS REGARDING MATERIAL, METHODS OF CONSTRUCTION, OR OTHER REQUIREMENTS, THE MOST RESTRICTIVE REQUIREMENT SHALL GOVERN. WHERE THERE IS CONFLICT BETWEEN A GENERAL REQUIREMENT AND A SPECIFIC REQUIREMENT, THE SPECIFIC REQUIREMENT SHALL GOVERN.

ABBREVIATIONS

AGL	ABOVE GRADE LEVEL	EQ	EQUAL	REQ	REQUIRED
AWG	AMERICAN WIRE GAUGE	GC	GENERAL CONTRACTOR	RF	RADIO FREQUENCY
BBU	BATTERY BACKUP UNIT	GRC	GALVANIZED RIGID CONDUIT	TBD	TO BE DETERMINED
BTCW	BARE TINNED SOLID COPPER WIRE	MGB	MASTER GROUND BAR	TBR	TO BE REMOVED
BGR	BURIED GROUND RING	MIN	MINIMUM	TBRR	TO BE REMOVED AND REPLACED
BTS	BASE TRANSCEIVER STATION	P	PROPOSED	TYP	TYPICAL
E	EXISTING	NTS	NOT TO SCALE	UG	UNDER GROUND
EGB	EQUIPMENT GROUND BAR	RAD	RADIATION CENTER LINE (ANTENNA)	VIF	VERIFY IN FIELD
EGR	EQUIPMENT GROUND RING	REF	REFERENCE		



45 BEECHWOOD DRIVE
NORTH ANDOVER, MA 01845
TEL: (978) 557-5553
FAX: (978) 336-5586



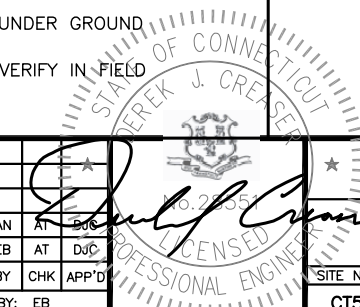
12 INDUSTRIAL WAY
SALEM, NH 03079

SITE NUMBER: CT5841
SITE NAME: DURHAM CENTRAL
CCI SITE #:806364
 143 R OLD BLUE HILLS ROAD
 DURHAM, CT 06422
 MIDDLESEX COUNTY



500 ENTERPRISE DRIVE, SUITE 3A
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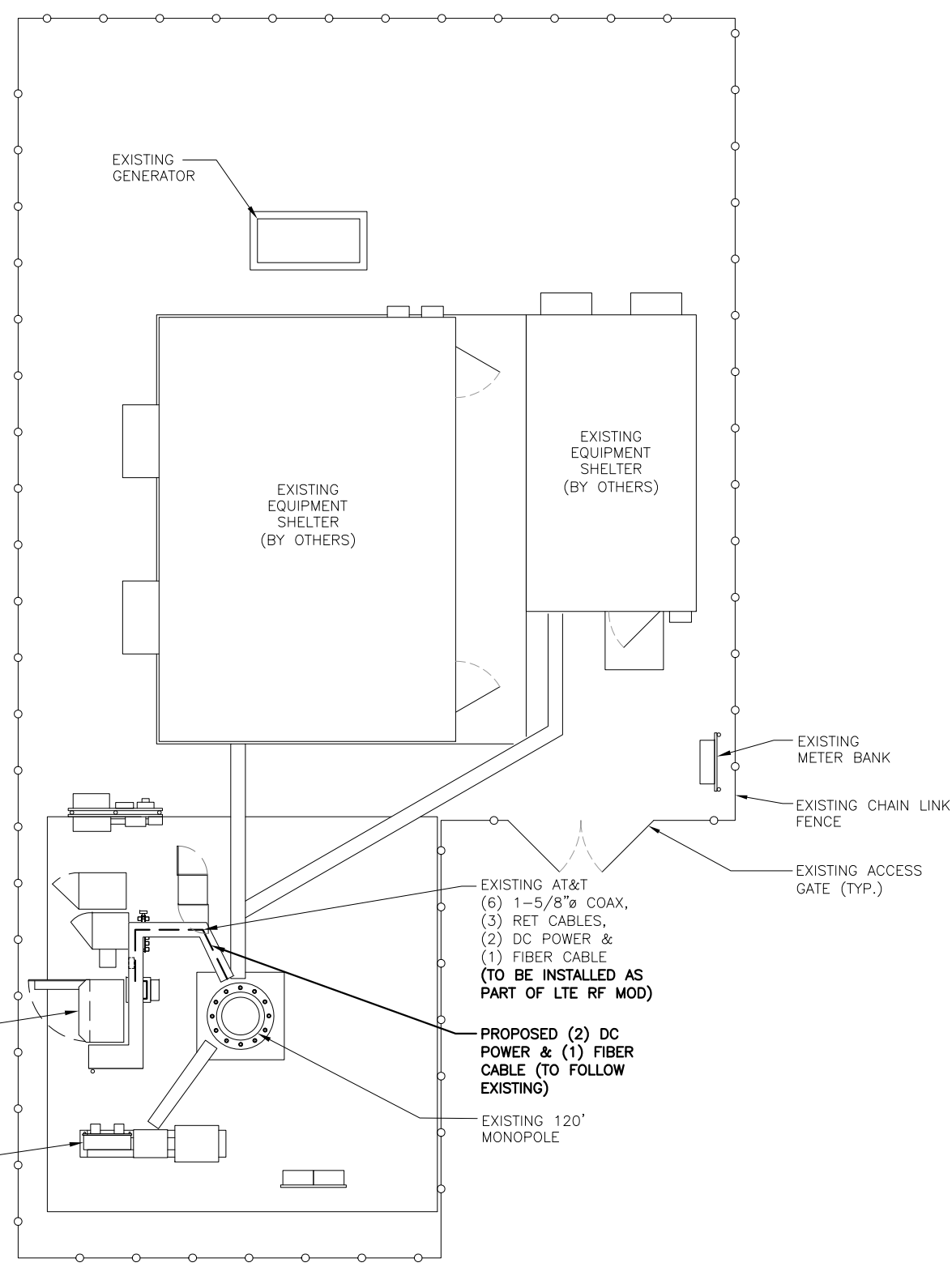
NO.	DATE	REVISIONS	BY	CHK	APP'D
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A	01/22/18	ISSUED FOR REVIEW	EB	AT	DJC
SCALE:		AS SHOWN	DESIGNED BY:	AT	DRAWN BY:
				EB	



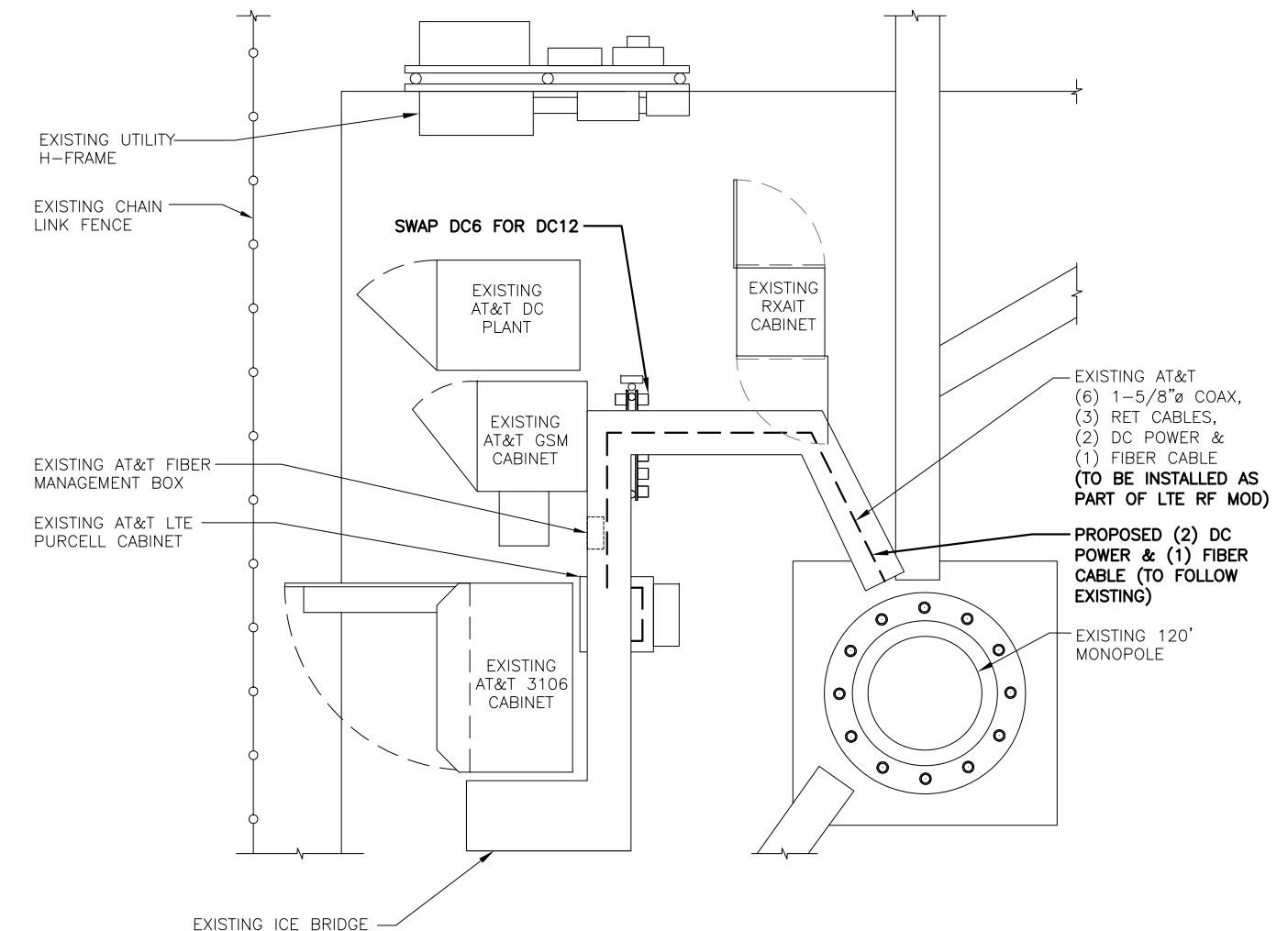
AT&T

GENERAL NOTES
(LTE 3C/ANTENNA MOD)

SITE NUMBER	DRAWING NUMBER	REV
CT5841	GN-1	1



COMPOUND PLAN
 22x34 SCALE: 3/16"=1'-0"
 11x17 SCALE: 3/32"=1'-0"
 1 A-1



EQUIPMENT PLAN
 22x34 SCALE: 1/2"=1'-0"
 11x17 SCALE: 1/4"=1'-0"
 2 A-1

SPECIAL CONSTRUCTION/PLANNING NOTE:
 EQUIPMENT SHOWN AS "TO BE INSTALLED AS PART OF RF MOD DESIGN PROJECT" REFERS TO RECORD DRAWINGS AND NOT ACTUAL FIELD CONDITIONS. DEPLOYMENT OF EQUIPMENT "TO BE INSTALLED AS PART OF RF MOD DESIGN PROJECT" UNDER A SEPARATE BUILDING PERMIT PRIOR TO CONSTRUCTION START OF THIS PROJECT.

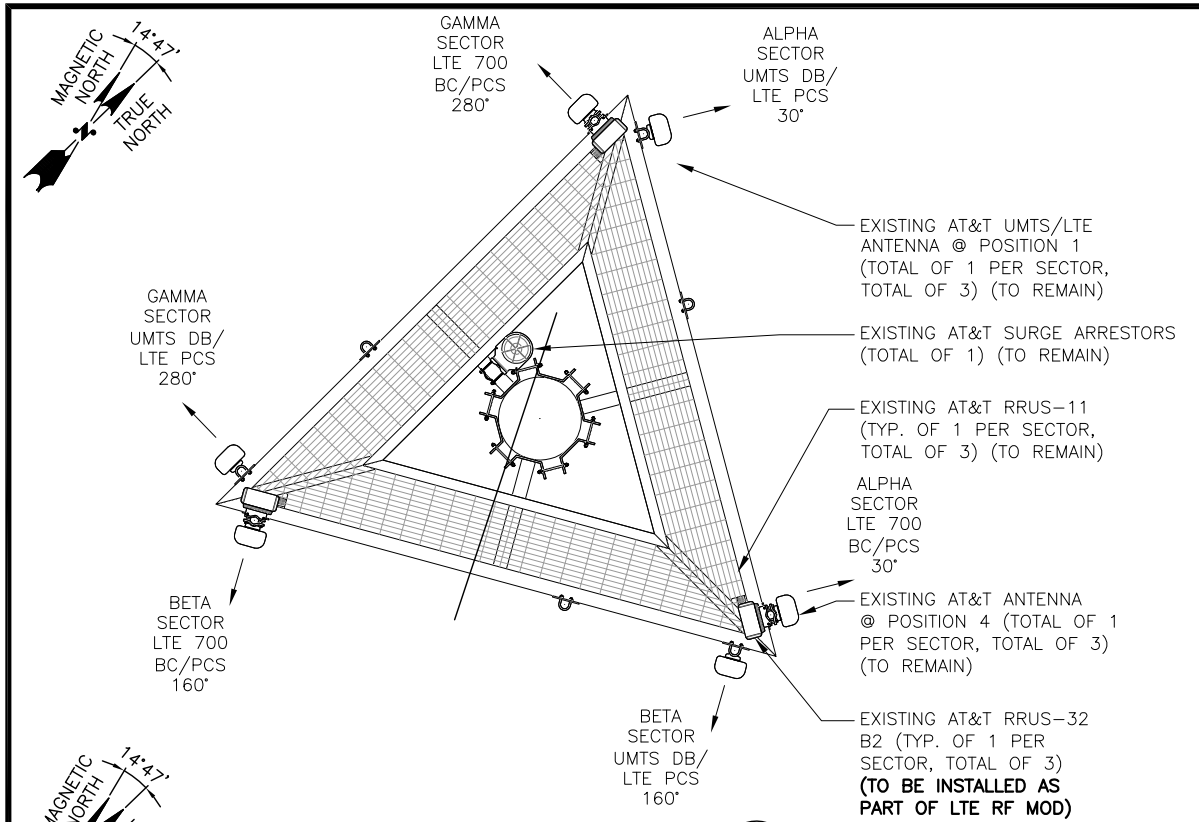
NOTE:
 AN ANALYSIS FOR THE CAPACITY OF THE EXISTING ANTENNA MOUNT TO SUPPORT THE PROPOSED LOADING HAS BEEN COMPLETED BY: HUDSON DESIGN GROUP, LLC. DATED: JANUARY 24, 2018

NOTE:
 REFER TO THE FINAL RF DATA SHEET FOR FINAL ANTENNA SETTINGS.

NOTE:
 ALL ANTENNAS AND LINES TO BE INSTALLED IN ACCORDANCE WITH STRUCTURAL ANALYSIS PROVIDED BY CROWN CASTLE AND FINAL AT&T RF DATA SHEET.

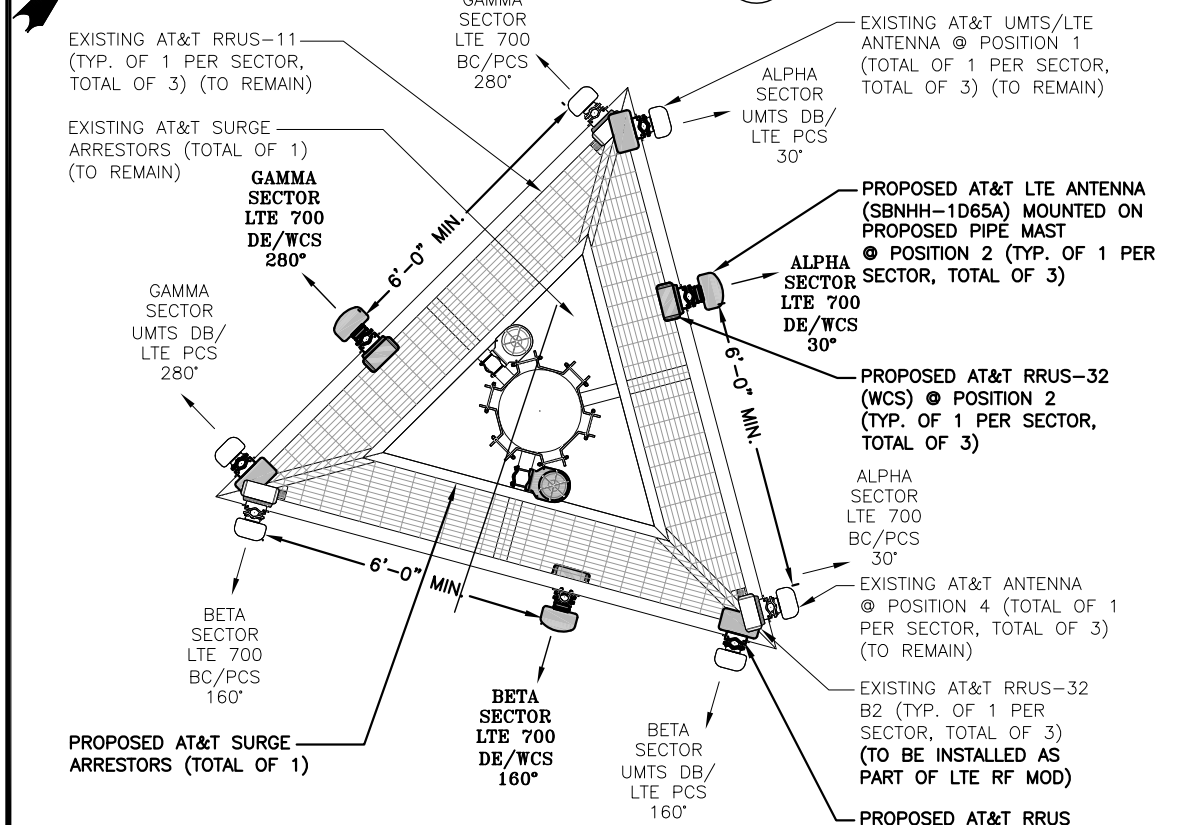
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SCALE: AS SHOWN DESIGNED BY: AT DRAWN BY: EB



EXISTING ANTENNA LAYOUT
SCALE: N.T.S.

1
A-2



PROPOSED ANTENNA LAYOUT
SCALE: N.T.S.

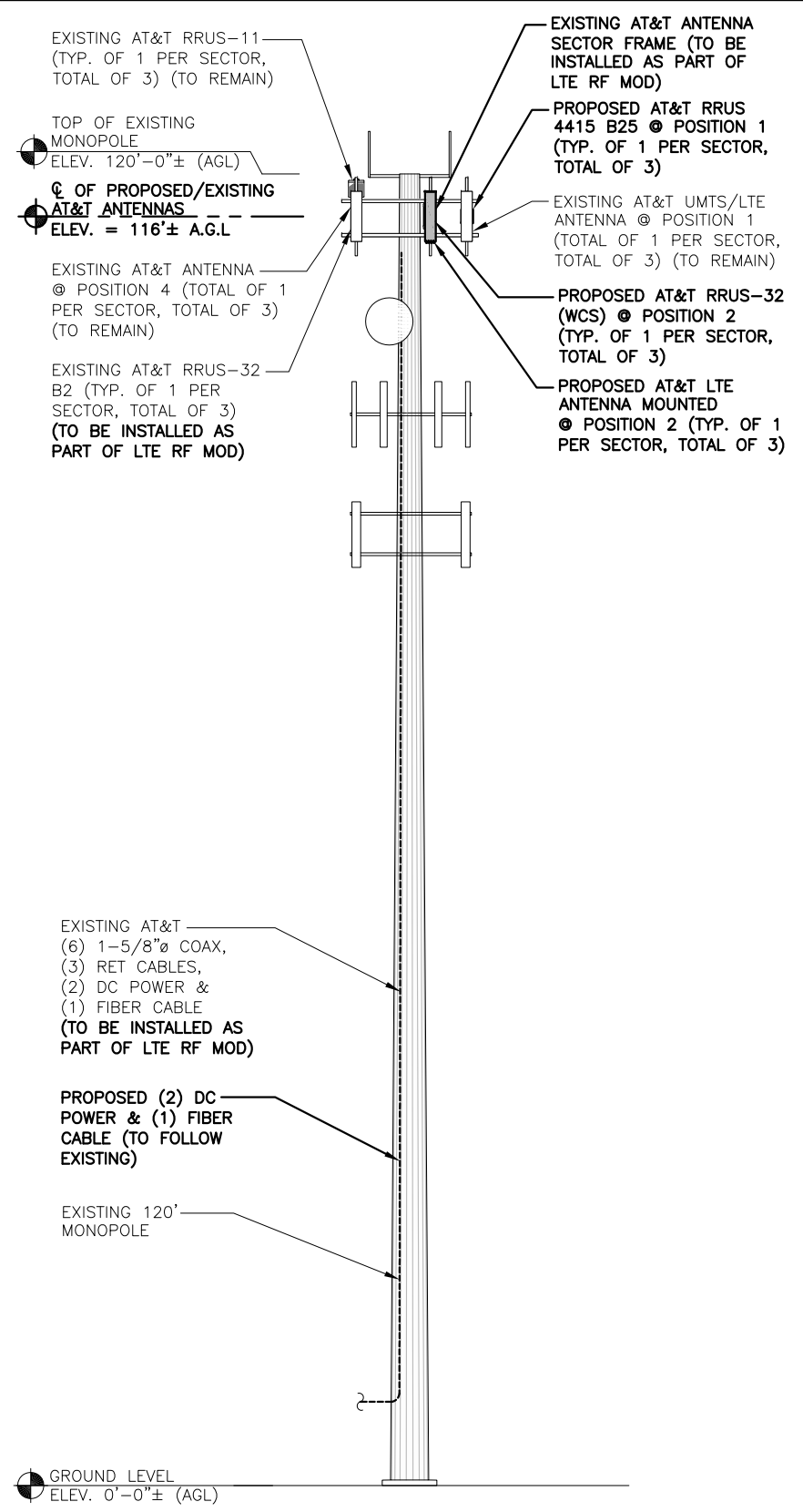
2
A-2

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NOTE:
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SPECIAL CONSTRUCTION/PLANNING NOTE:
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ELEVATION
22x34 SCALE: 1/8"=1'-0"
11x17 SCALE: 1/16"=1'-0"

3
A-2

HDG HUDSON Design Group LLC
45 BEECHWOOD DRIVE
NORTH ANDOVER, MA 01845
TEL: (978) 557-5553
FAX: (978) 336-5586

SAI
12 INDUSTRIAL WAY
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A	01/22/18	ISSUED FOR REVIEW	EB	AT	DJC

SCALE: AS SHOWN DESIGNED BY: AT DRAWN BY: EB



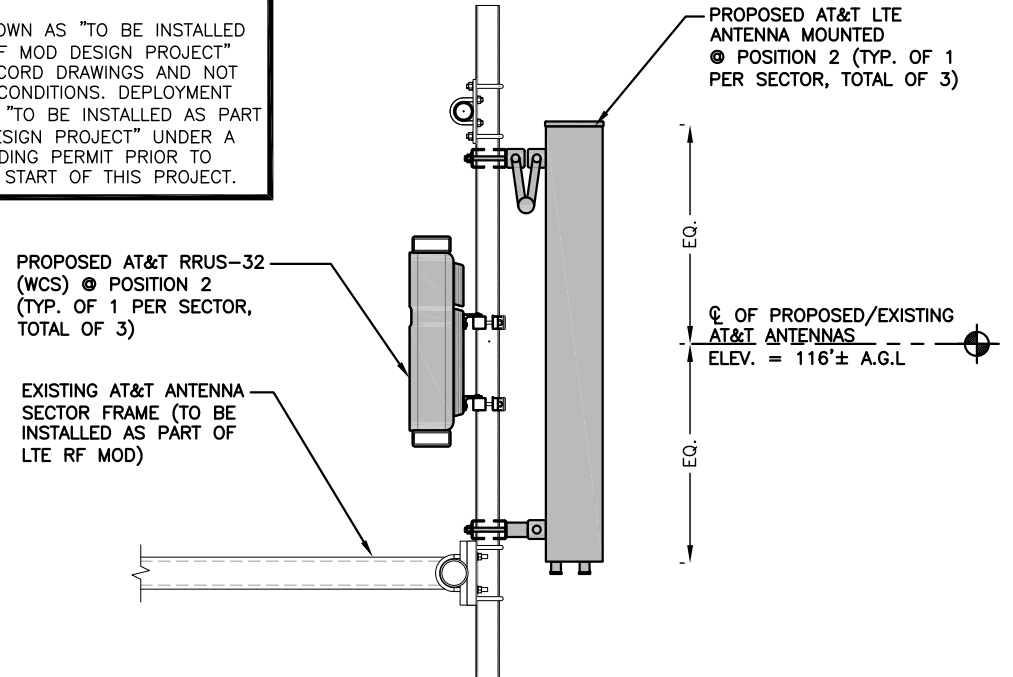
AT&T
ANTENNA LAYOUTS & ELEVATION
(LTE 3C/ANTENNA MOD)
SITE NUMBER: CT5841 DRAWING NUMBER: A-2 REV: 1

FINAL ANTENNA SCHEDULE													
SECTOR	BAND	ANTENNA	SIZE (INCHES) (L X W X D)	RAD CENTER	AZIMUTH	TMA'S	COMBINER	RRU'S	SIZE (INCHES) (L X W X D)	COAX JUMPERS	FIBER JUMPERS	COAX	
ALPHA	UMTS DB/LTE PCS	EXISTING	SBNHH-1D65A	55X11.9X7.1	116'-0"±	30°	-	PROPOSED	B25 4415 (PCS)	15X13.2X7.4	1*	2**	(2) 1-5/8"
	LTE 700 DE/WCS	PROPOSED	SBNHH-1D65A	55X11.9X7.1	116'-0"±	30°	-	PROPOSED	RRUS-32 (WCS)	27.2X12.1X7.0	1*	1**	
	-	-	-	-	-	-	-	-	-	-	-	-	-
BETA	UMTS DB/LTE PCS	EXISTING	SBNHH-1D65A	55X11.9X7.1	116'-0"±	160°	-	EXISTING	RRUS-32 B2(PCS)	15X13.2X7.4	1*	2**	(2) 1-5/8"
	LTE 700 DE/WCS	PROPOSED	SBNHH-1D65A	55X11.9X7.1	116'-0"±	160°	-	PROPOSED	RRUS-11 (700)	27.2X12.1X7.0	1*	1**	
	-	-	-	-	-	-	-	-	-	-	-	-	-
GAMMA	UMTS DB/LTE PCS	EXISTING	SBNHH-1D65A	55X11.9X7.1	116'-0"±	280°	-	EXISTING	RRUS-32 B2(PCS)	15X13.2X7.4	1*	2**	(2) 1-5/8"
	LTE 700 DE/WCS	PROPOSED	SBNHH-1D65A	55X11.9X7.1	116'-0"±	280°	-	PROPOSED	RRUS-11 (700)	27.2X12.1X7.0	1*	1**	
	-	-	-	-	-	-	-	-	-	-	-	-	-

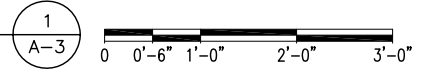
FINAL ANTENNA CONFIGURATION TABLE

4
A-3

SPECIAL CONSTRUCTION/PLANNING NOTE:
EQUIPMENT SHOWN AS "TO BE INSTALLED AS PART OF RF MOD DESIGN PROJECT" REFERS TO RECORD DRAWINGS AND NOT ACTUAL FIELD CONDITIONS. DEPLOYMENT OF EQUIPMENT "TO BE INSTALLED AS PART OF RF MOD DESIGN PROJECT" UNDER A SEPARATE BUILDING PERMIT PRIOR TO CONSTRUCTION START OF THIS PROJECT.



PROPOSED LTE ANTENNA & RRU MOUNTING DETAIL
22x34 SCALE: 1"=1'-0"
11x17 SCALE: 1/2"=1'-0"



RRU CHART				
QUANTITY	MODEL	L	W	D
3(E)	RRUS-11	19.7"	17.0"	7.2"
3(P)3(E)	RRUS-32	27.2"	12.1"	7.0"
3(P)	B25.4415	15.0"	13.2"	7.4"

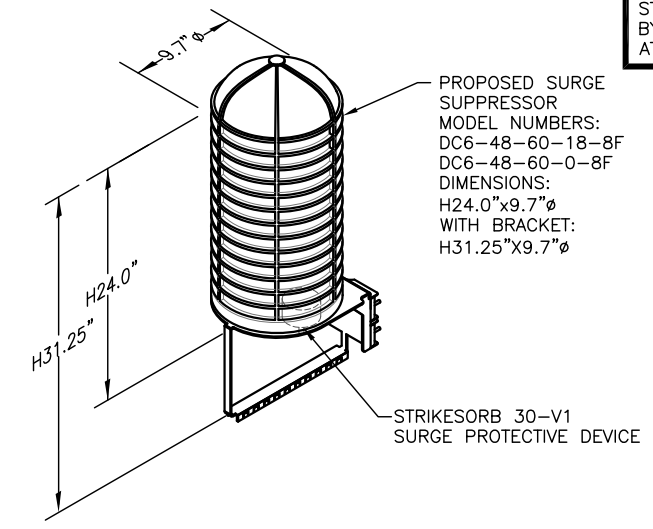
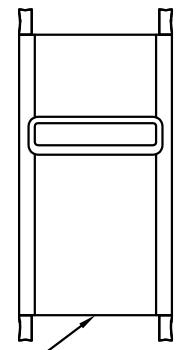
NOTE:
MOUNT PER MANUFACTURER'S SPECIFICATIONS

NOTE:
SEE RFDS FOR RRH FREQUENCY AND MODEL NUMBER

PROPOSED RRU REFER TO THE FINAL RFDS AND CHART FOR QUANTITY, MODEL AND DIMENSIONS

NOTE:
MOUNT PER MANUFACTURER'S SPECIFICATIONS.

PROPOSED RRUS DETAIL
SCALE: N.T.S



NOTE:
MOUNT PER MANUFACTURER'S SPECIFICATIONS.

DC SURGE SUPPRESSOR DETAIL
SCALE: N.T.S

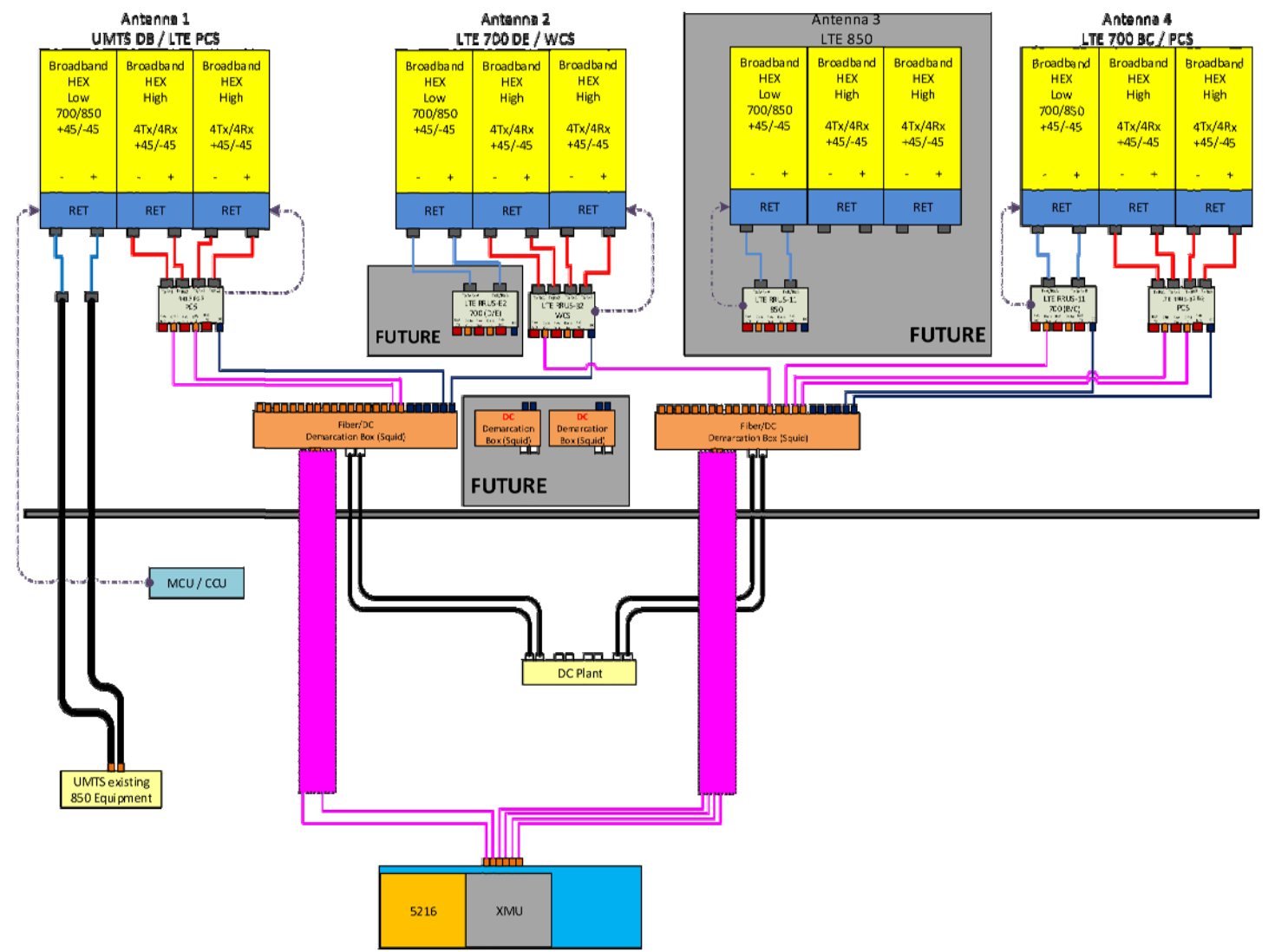
NOTE:
AN ANALYSIS FOR THE CAPACITY OF THE EXISTING ANTENNA MOUNT TO SUPPORT THE PROPOSED LOADING HAS BEEN COMPLETED BY: HUDSON DESIGN GROUP, LLC. DATED: JANUARY 24, 2018

*COAX JUMPER NOTE:
COAX JUMPERS (2) PER SECTOR, FROM EACH RRU (TOTAL OF 6).

**FIBER JUMPER NOTE:
FIBER JUMPERS (3) PER SECTOR, FROM THE SQUID TO EACH RRU (TOTAL OF 9).

NOTE:
REFER TO THE FINAL RF DATA SHEET FOR FINAL ANTENNA SETTINGS.

NOTE:
ALL ANTENNAS AND LINES TO BE INSTALLED IN ACCORDANCE WITH STRUCTURAL ANALYSIS PROVIDED BY CROWN CASTLE AND FINAL AT&T RF DATA SHEET.



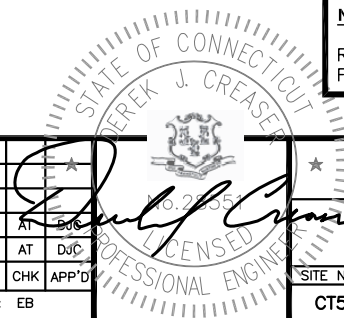
RF PLUMBING DIAGRAM 1
SCALE: N.T.S. RF-1

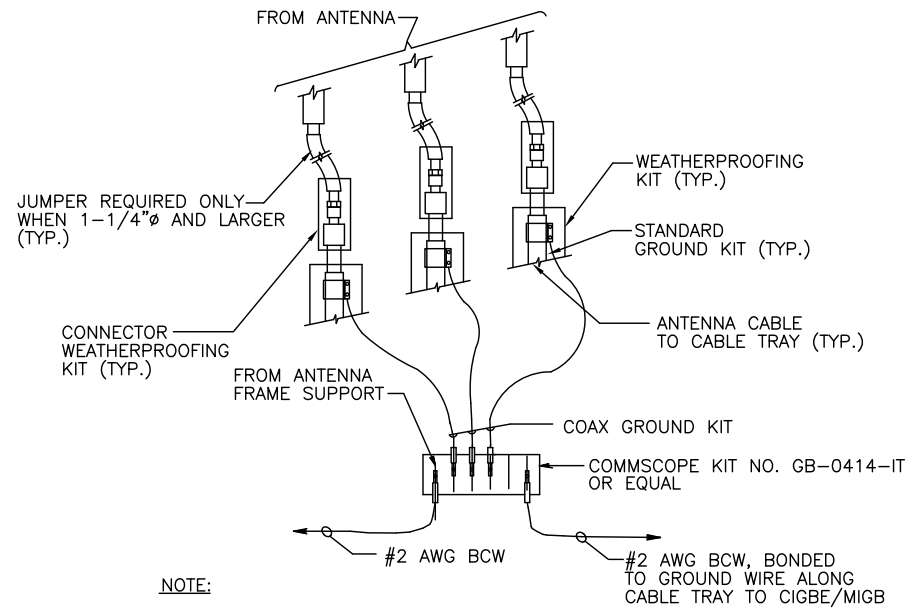
NOTE:
1. CONTRACTOR TO CONFIRM ALL PARTS.
2. INSTALL ALL EQUIPMENT TO MANUFACTURER'S RECOMMENDATIONS

NOTE:
REFER TO THE FINAL RF DATA SHEET FOR FINAL ANTENNA SETTINGS.

NO.	DATE	REVISIONS	BY	CHK	APP'D
1	03/01/18	ISSUED FOR CONSTRUCTION	AN	AT	EB
A	01/22/18	ISSUED FOR REVIEW	EB	AT	DJC

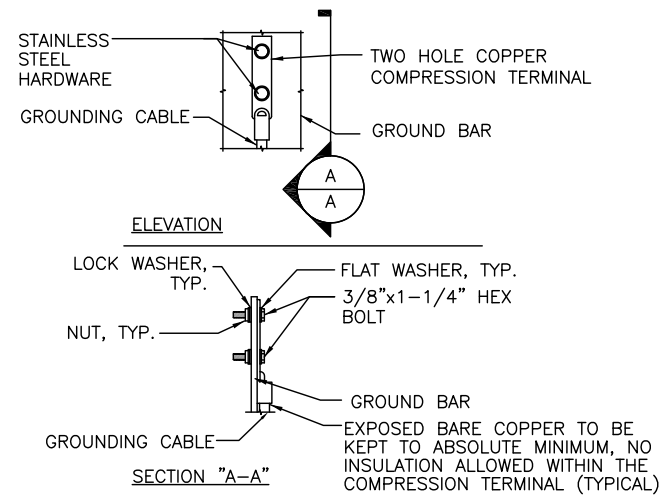
SCALE: AS SHOWN DESIGNED BY: AT DRAWN BY: EB





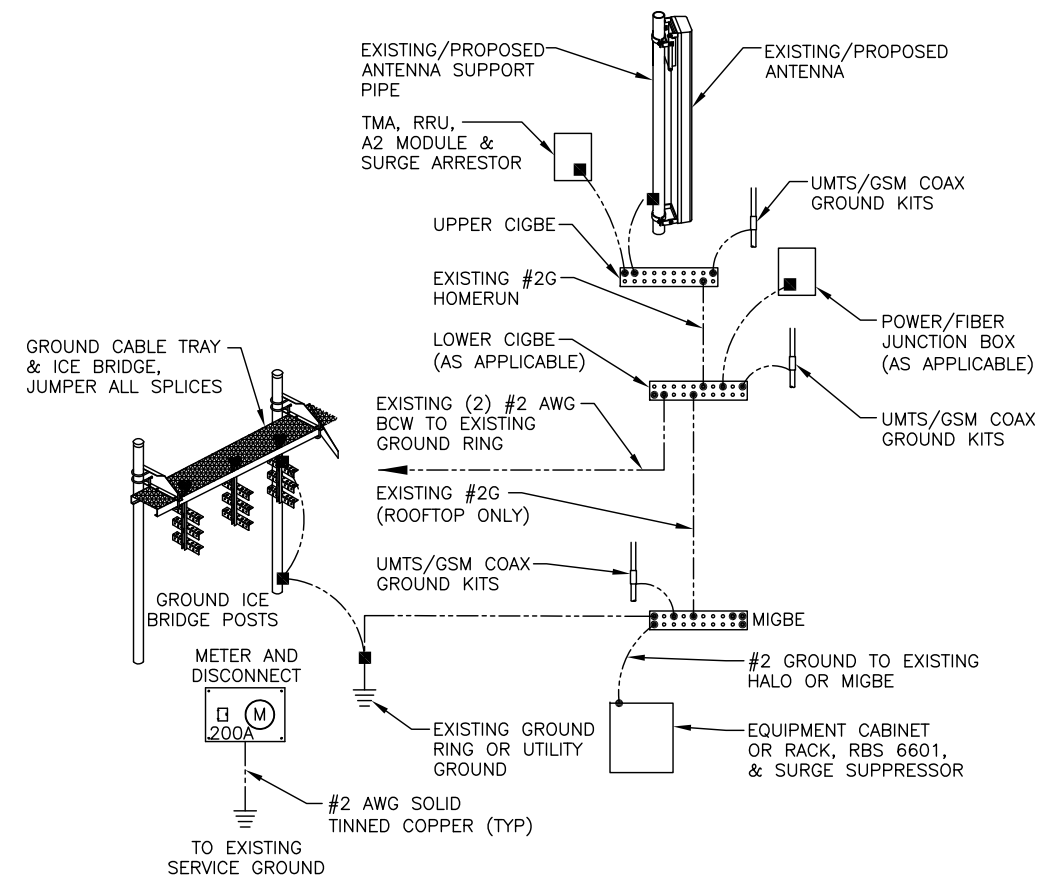
NOTE:
 1. DO NOT INSTALL CABLE GROUND KIT AT A BEND AND ALWAYS DIRECT GROUND WIRE DOWN TO CIGBE.

GROUND WIRE TO GROUND BAR CONNECTION DETAIL 1
 SCALE: N.T.S. G-1



NOTE:
 1. "DOUBLING UP" OR "STACKING" OF CONNECTION IS NOT PERMITTED.
 2. OXIDE INHIBITING COMPOUND TO BE USED AT ALL LOCATION.
 3. CADWELD DOWNLEADS FROM UPPER EGB, LOWER EGB, AND MGB

TYPICAL GROUND BAR CONNECTION DETAIL 3
 SCALE: N.T.S. G-1



GROUNDING RISER DIAGRAM 2
 SCALE: N.T.S. G-1

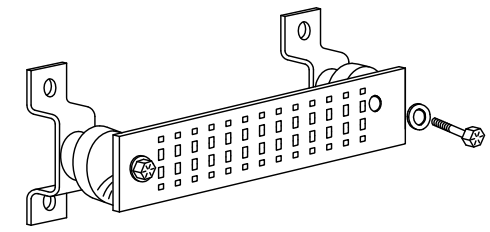
EACH GROUND CONDUCTOR TERMINATING ON ANY GROUND BAR SHALL HAVE AN IDENTIFICATION TAG ATTACHED AT EACH END THAT WILL IDENTIFY ITS ORIGIN AND DESTINATION.

SECTION "P" - SURGE PRODUCERS

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

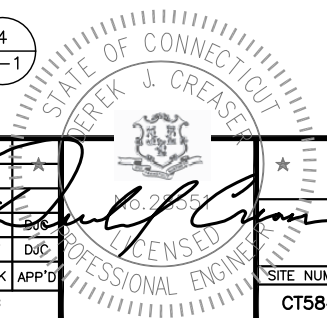
SECTION "A" - SURGE ABSORBERS

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



GROUND BAR - DETAIL 4
 SCALE: N.T.S. G-1

NO.	DATE	REVISIONS	BY	CHK	APP'D
1	03/01/18	ISSUED FOR CONSTRUCTION	AN	AT	EB
A	01/22/18	ISSUED FOR REVIEW	EB	AT	DJC
SCALE: AS SHOWN		DESIGNED BY: AT	DRAWN BY: EB		





ENGINEERING INNOVATION

Velocitel, Inc. d.b.a. FDH Velocitel
6521 Meridien Drive, Suite 107
Raleigh, North Carolina 27616
919.755.1012

Date: **March 8, 2018**

Marianne Dunst
Crown Castle
3530 Toringdon Way Suite 300
Charlotte, NC 28277

Subject: Structural Analysis Report

Carrier Designation: **AT&T Mobility Co-Locate**
Carrier Site Number: CT5841
Carrier Site Name: DURHAM CENTRAL

Crown Castle Designation: **Crown Castle BU Number:** 806364
Crown Castle Site Name: HRT 106(B) 943202
Crown Castle JDE Job Number: 478168
Crown Castle Work Order Number: 1534312
Crown Castle Application Number: 421283 Rev. 11

Engineering Firm Designation: **FDH Velocitel Project Number:** 18PFLK1400

Site Data: **143 R Old Blue Hill Road, DURHAM, Middlesex County, CT**
Latitude 41° 27' 33.67", Longitude -72° 39' 45.83"
120 Foot - Monopole Tower

Dear Marianne Dunst,

FDH Velocitel is pleased to submit this “**Structural Analysis Report**” to determine the structural integrity of the above mentioned tower. This analysis has been performed in accordance with the Crown Castle Structural ‘Statement of Work’ and the terms of Crown Castle Purchase Order Number 1151000, in accordance with application 421283, revision 11.

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

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

This analysis has been performed in accordance with the 2016 Connecticut State Building Code based upon an ultimate 3-second gust wind speed of 130 mph converted to a nominal 3-second gust wind speed of 101 mph per section 1609.3.1 as required for use in the TIA-222-G Standard per Exception #5 of Section 1609.1.1. Exposure Category B with a topographic category 1 and Risk Category II were used in this analysis.

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

Respectfully submitted by:

Alex Carrillo
Project Engineer I

Reviewed by:

Dennis D. Abel, PE
Director of New Product Development
CT PE License No. 23247



03-08-2018

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1) INTRODUCTION

This tower is a 120 ft Monopole tower designed by VALMONT in March of 1994. The tower was originally designed for a wind speed of 90 mph per TIA/EIA-222-E.

2) ANALYSIS CRITERIA

The structural analysis was performed for this tower in accordance with the requirements of TIA-222-G Structural Standard for Antenna Supporting Structures and Antennas using a 3-second gust wind speed of 101 mph with no ice, 50 mph with 0.75 inch ice thickness and 60 mph under service loads, exposure category B with topographic category 1.

Table 1 - Proposed Antenna and Cable Information

Mounting Level (ft)	Center Line Elevation (ft)	Number of Antennas	Antenna Manufacturer	Antenna Model	Number of Feed Lines	Feed Line Size (in)	Note		
116.0	116.0	9	andrew	SBNHH-1D65A	12	7/8	-		
		1	-	Miscellaneous [NA 507-1]					
		1	-	Platform Mount [LP 601-1]					
		1	-	Side Arm Mount [SO 102-3]					
		3	ericsson	RRUS 11				4	3/4
		3	ericsson	RRUS 32				2	3/8
		6	ericsson	RRUS 32 B2					
		1	raycap	DC6-48-60-18-8C					
		1	raycap	DC6-48-60-18-8F					

Table 2 - Existing and Reserved Antenna and Cable Information

Mounting Level (ft)	Center Line Elevation (ft)	Number of Antennas	Antenna Manufacturer	Antenna Model	Number of Feed Lines	Feed Line Size (in)	Note		
119.0	125.0	1	decibel	DB809MT3-XT	2	7/8	1		
	123.0	1	decibel	DB201-A					
	119.0	1	-	Side Arm Mount [SO 102-3]					
		2	-	Side Arm Mount [SO 701-1]					
107.0	107.0	1	-	Pipe Mount [PM 601-1]	1	7/8	1		
		1	gabriel electronics	GLF6-450					
98.0	100.0	3	alcatel lucent	B13 RRH4X30-4R	12	7/8	1		
		3	alcatel lucent	B66A RRH4X45					
		3	alcatel lucent	RRH2X60-PCS					
		6	andrew	SBNHH-1D65B				2	1-5/8
		6	antel	LPA-80080/6CF				1	1/2
		2	raycap	RXXDC-3315-PF-48					
	98.0	1	-	Platform Mount [LP 602-1]					

Mounting Level (ft)	Center Line Elevation (ft)	Number of Antennas	Antenna Manufacturer	Antenna Model	Number of Feed Lines	Feed Line Size (in)	Note
87.0	87.0	1	sitepro1	PRK-1245	3 1	1-1/4 7/8	2
		3	kmw comm	ETCR-654L12H6			
		3	alcatel lucent	PCS 1900MHZ 4X45W-65MHZ			
		6	alcatel lucent	RRH2X50-800			
		3	alcatel lucent	TD-RRH8X20-25			
		1	-	Platform Mount [LP 602-1]	-	-	1
73.0	79.0	1	decibel	DB636-C	1	7/8	1
	73.0	3	sitepro1	Sector Mount (P/N: VFA12-HD)	10 1	1-5/8 1/2	2
		1	commscope	SHP2-13			
		3	ericsson	AIR 21 B2A/B4P			
		3	ericsson	AIR32 DB B66AA B2A			
		3	ericsson	KRY 112 144/1			
		3	ericsson	RADIO 4449			
		3	rfs celwave	APXVAA24_43-U-A20			
50.0	57.0	1	rfs celwave	PD1142-1			
	54.0	1	decibel	ASP-655			
	53.0	1	celwave	PD1121-6			
	50.0	1	-	Side Arm Mount [SO 701-3]			
		1	decibel	DB492A			
40.0	41.0	1	tekelec systemes	EPSILON GPS ANTENNA 35 DB	1	1/2	1
	40.0	1	-	Side Arm Mount [SO 701-1]			

Notes:

- 1) Existing Equipment
- 2) Reserved Equipment, Considered in Analysis

Table 3 - Design Antenna and Cable Information

Mounting Level (ft)	Center Line Elevation (ft)	Number of Antennas	Antenna Manufacturer	Antenna Model	Number of Feed Lines	Feed Line Size (in)
97	97	12	-	8RL41OC4R105	-	-
87	87	9	-	8RL41OC4R105	-	-
75	75	1	-	ASP710	-	-
		1	Telewave	450F6 Antenna		
50	50	2	-	ASP701	-	-

3) ANALYSIS PROCEDURE

Table 4 - Documents Provided

Document	Remarks	Reference	Source
4-GEOTECHNICAL REPORTS	Clarence Welti Assoc., Inc.	262150	CCISITES
4-TOWER FOUNDATION DRAWINGS/DESIGN/SPECS	SAC Engineering, Inc.	297341	CCISITES
4-TOWER MANUFACTURER DRAWINGS	Valmont	262153	CCISITES
4-TOWER STRUCTURAL ANALYSIS REPORTS	Crown Castle	7366968	CCISITES

3.1) Analysis Method

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

3.2) Assumptions

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

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

4) ANALYSIS RESULTS

Table 5 - Section Capacity (Summary)

Section No.	Elevation (ft)	Component Type	Size	Critical Element	P (K)	SF*P_allow (K)	% Capacity	Pass / Fail
L1	120 - 100	Pole	TP20.263x15.403x0.1875	1	-4.06	829.59	33.2	Pass
L2	100 - 47.0833	Pole	TP33.13x20.263x0.2813	2	-19.46	1920.74	90.1	Pass
L3	47.0833 - 0	Pole	TP44x31.372x0.375	3	-33.03	3477.10	85.4	Pass
							Summary	
						Pole (L2)	90.1	Pass
						Rating =	90.1	Pass

Table 6 - Tower Component Stresses vs. Capacity – LC7

Notes	Component	Elevation (ft)	% Capacity	Pass / Fail
1	Anchor Rods	0	80.1	Pass
1	Base Plate	0	43.4	Pass
1	Base Foundation	0	10.0	Pass
1	Base Foundation Soil Interaction	0	38.5	Pass
1	Flange Connection	100	49.0	Pass

Structure Rating (max from all components) =	90.1%
---	--------------

Notes:

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

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

DESIGNED APPURTENANCE LOADING

TYPE	ELEVATION	TYPE	ELEVATION
DB809MT3-XT	119	ETCR-654L12H6 w/ Mount Pipe	87
DB201-A	119	ETCR-654L12H6 w/ Mount Pipe	87
6' x 2" Mount Pipe	119	PCS 1900MHZ 4X45W-65MHZ	87
6' x 2" Mount Pipe	119	PCS 1900MHZ 4X45W-65MHZ	87
Side Arm Mount [SO 102-3]	119	PCS 1900MHZ 4X45W-65MHZ	87
Side Arm Mount [SO 701-1]	119	(2) RRH2X50-800	87
Side Arm Mount [SO 701-1]	119	(2) RRH2X50-800	87
(3) SBNHH-1D65A w/ Mount Pipe	116	(2) RRH2X50-800	87
(3) SBNHH-1D65A w/ Mount Pipe	116	TD-RRH8X20-25	87
(3) SBNHH-1D65A w/ Mount Pipe	116	TD-RRH8X20-25	87
RRUS 32	116	TD-RRH8X20-25	87
RRUS 32	116	6' x 2" Mount Pipe	87
RRUS 32	116	6' x 2" Mount Pipe	87
(2) RRUS 32 B2	116	6' x 2" Mount Pipe	87
(2) RRUS 32 B2	116	sitepro 1 (P/N: PRK-1245)	87
(2) RRUS 32 B2	116	Platform Mount [LP 602-1]	87
RRUS 11	116	ETCR-654L12H6 w/ Mount Pipe	87
RRUS 11	116	AIR 21 B2A/B4P w/ Mount Pipe	73
RRUS 11	116	AIR 21 B2A/B4P w/ Mount Pipe	73
DC6-48-60-18-8F	116	AIR 21 B2A/B4P w/ Mount Pipe	73
DC6-48-60-18-8C	116	AIR32 DB B66AA B2A w/ Mount Pipe	73
Miscellaneous [NA 507-1]	116	AIR32 DB B66AA B2A w/ Mount Pipe	73
Side Arm Mount [SO 102-3]	116	AIR32 DB B66AA B2A w/ Mount Pipe	73
Platform Mount [LP 601-1]	116	APXVAA24_43-U-A20 w/ Mount Pipe	73
Pipe Mount [PM 601-1]	107	APXVAA24_43-U-A20 w/ Mount Pipe	73
GLF6-450	107	APXVAA24_43-U-A20 w/ Mount Pipe	73
(2) LPA-80080/6CF w/ Mount Pipe	98	KRY 112 144/1	73
(2) LPA-80080/6CF w/ Mount Pipe	98	KRY 112 144/1	73
(2) SBNHH-1D65B w/ Mount Pipe	98	KRY 112 144/1	73
(2) SBNHH-1D65B w/ Mount Pipe	98	RADIO 4449	73
(2) SBNHH-1D65B w/ Mount Pipe	98	RADIO 4449	73
B13 RRH4X30-4R	98	RADIO 4449	73
B13 RRH4X30-4R	98	(3) sitepro1 Sector Mount (P/N: VFA12-HD)	73
B13 RRH4X30-4R	98	DB636-C	73
B66A RRH4X45	98	SHP2-13	73
B66A RRH4X45	98	ASP-655	50
RRH2X60-PCS	98	PD1121-6	50
RRH2X60-PCS	98	Side Arm Mount [SO 701-3]	50
RRH2X60-PCS	98	PD1142-1	50
(2) RXXDC-3315-PF-48	98	DB492A	50
Platform Mount [P 602-1]	98	EPSILON GPS ANTENNA 35 DB	40
(2) LPA-80080/6CF w/ Mount Pipe	98	Side Arm Mount [SO 701-1]	40

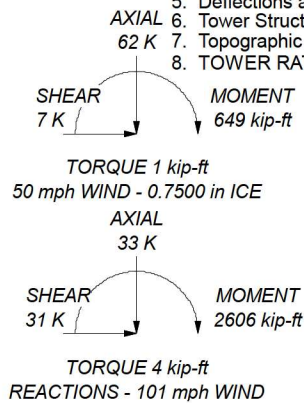
MATERIAL STRENGTH

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

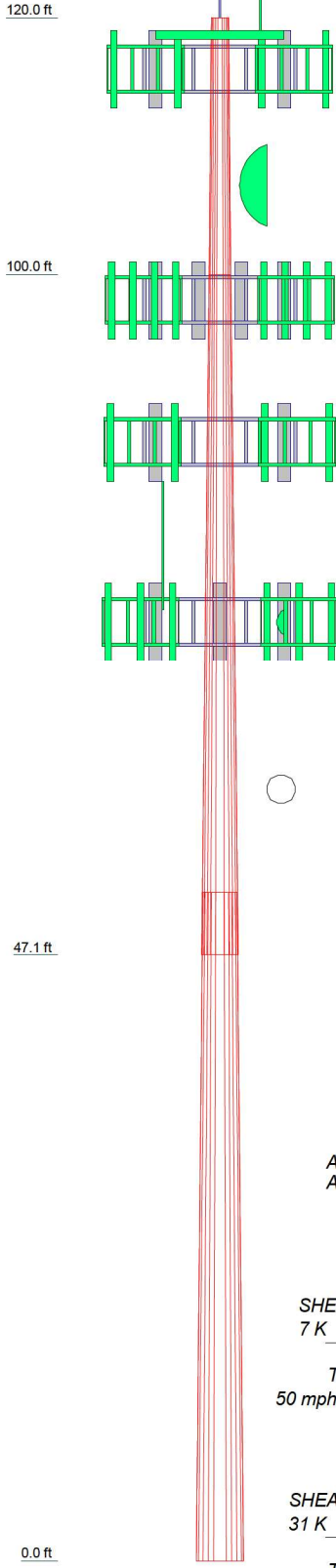
TOWER DESIGN NOTES

1. Tower is located in Middlesex County, Connecticut.
2. Tower designed for Exposure B to the TIA-222-G Standard.
3. Tower designed for a 101 mph basic wind in accordance with the TIA-222-G Standard.
4. Tower is also designed for a 50 mph basic wind with 0.75 in ice. Ice is considered to increase in thickness with height.
5. Deflections are based upon a 60 mph wind.
6. Tower Structure Class II.
7. Topographic Category 1 with Crest Height of 0.00 ft
8. TOWER RATING: 90.1%

ALL REACTIONS ARE FACTORED



Section	1	2	3	
Length (ft)	20.00	52.92	52.00	
Number of Sides	12	12	12	
Thickness (in)	0.1875	0.2813	0.3750	
Socket Length (ft)		4.92		
Top Dia (in)	15.4030	20.2630	31.3720	
Bot Dia (in)	20.2630	33.1300	44.0000	
Grade		A572-65		
Weight (K)	0.7	4.3	8.0	13.0



FDH Velocitel
 6521 Meridien Drive, Suite 107
 Raleigh, North Carolina 27616
 Tower Analysis Phone: 9197551012 FAX: 9197551031

Job: **806364 HRT 106(B) 943202**
 Project: **18PFLK1400**
 Client: Crown Castle Drawn by: ACarrillo App'd:
 Code: TIA-222-G Date: 03/08/18 Scale: NTS
 Path: Dwg No. E-1

Tower Input Data

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

- 1) Tower is located in Middlesex County, Connecticut.
- 2) ASCE 7-10 Wind Data is used (wind speeds converted to nominal values).
- 3) Basic wind speed of 101 mph.
- 4) Structure Class II.
- 5) Exposure Category B.
- 6) Topographic Category 1.
- 7) Crest Height 0.00 ft.
- 8) Nominal ice thickness of 0.7500 in.
- 9) Ice thickness is considered to increase with height.
- 10) Ice density of 56.00 pcf.
- 11) A wind speed of 50 mph is used in combination with ice.
- 12) Temperature drop of 50 °F.
- 13) Deflections calculated using a wind speed of 60 mph.
- 14) A non-linear (P-delta) analysis was used.
- 15) Pressures are calculated at each section.
- 16) Stress ratio used in pole design is 1.
- 17) Local bending stresses due to climbing loads, feed line supports, and appurtenance mounts are not considered.

Options

Consider Moments - Legs 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	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-G Bracing Resist. Exemption Use TIA-222-G Tension Splice Exemption <div style="text-align: center; background-color: #e0e0e0; padding: 2px;">Poles</div> ✓ Include Shear-Torsion Interaction Always Use Sub-Critical Flow Use Top Mounted Sockets
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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	120.00-100.00	20.00	0.00	12	15.4030	20.2630	0.1875	0.7500	A572-65 (65 ksi)
L2	100.00-47.08	52.92	4.92	12	20.2630	33.1300	0.2813	1.1250	A572-65 (65 ksi)
L3	47.08-0.00	52.00		12	31.3720	44.0000	0.3750	1.5000	A572-65 (65 ksi)

Tapered Pole Properties

Section	Tip Dia. in	Area in ²	I in ⁴	r in	C in	I/C in ³	J in ⁴	It/Q in ²	w in	w/t
L1	15.9464	9.1864	271.4575	5.4471	7.9788	34.0225	550.0464	4.5212	3.6255	19.336
	20.9778	12.1206	623.5083	7.1870	10.4962	59.4030	1263.3968	5.9654	4.9280	26.283
L2	20.9778	18.0960	922.2208	7.1535	10.4962	87.8621	1868.6694	8.9063	4.6767	16.628
	34.2987	29.7486	4097.2352	11.7599	17.1613	238.7480	8302.1094	14.6414	8.1251	28.889
L3	33.7148	37.4288	4590.1943	11.0969	16.2507	282.4616	9300.9781	18.4213	7.4027	19.741
	45.5522	52.6772	12796.152	15.6177	22.7920	561.4318	25928.474	25.9261	10.7870	28.765
6										
				3						

Tower Elevation	Gusset Area (per face)	Gusset Thickness	Gusset Grade	Adjust. Factor A _r	Adjust. Factor A _r	Weight Mult.	Double Angle Stitch Bolt Spacing Diagonals	Double Angle Stitch Bolt Spacing Horizontals	Double Angle Stitch Bolt Spacing Redundants
ft	ft ²	in					in	in	in
L1 120.00-100.00				1	1	1			
L2 100.00-47.08				1	1	1			
L3 47.08-0.00				1	1	1			

Feed Line/Linear Appurtenances - Entered As Round Or Flat

Description	Section	Component Type	Placement	Total Number	Number Per Row	Start/End Position	Width or Diameter	Perimeter	Weight
			ft				in	in	klf
2" Rigid Conduit	C	Surface Ar (CaAa)	40.00 - 7.00	1	1	0.400 0.400	2.0000		0.00
*** Safety Line 3/8	C	Surface Ar (CaAa)	120.00 - 7.00	1	1	0.000 0.000	0.3750		0.00

Feed Line/Linear Appurtenances - Entered As Area

Description	Face or Leg	Allow Shield	Component Type	Placement	Total Number	C _A A _A	Weight
				ft		ft ² /ft	klf
118							
LDF5-50A(7/8)	A	No	Inside Pole	119.00 - 7.00	2	No Ice 1/2" Ice 1" Ice	0.00 0.00 0.00
110							
LDF2-50(3/8)	B	No	Inside Pole	116.00 - 7.00	2	No Ice 1/2" Ice 1" Ice	0.00 0.00 0.00
LDF5-50A(7/8)	B	No	Inside Pole	116.00 - 7.00	12	No Ice 1/2" Ice 1" Ice	0.00 0.00 0.00
WR-VG86ST-BRD(3/4)	B	No	Inside Pole	116.00 - 7.00	4	No Ice 1/2" Ice 1" Ice	0.00 0.00 0.00
107							
VXL5-50(7/8)	A	No	Inside Pole	107.00 - 7.00	1	No Ice 1/2" Ice 1" Ice	0.00 0.00 0.00
98							
LDF5-50A(7/8)	A	No	Inside Pole	98.00 - 7.00	12	No Ice 1/2" Ice	0.00 0.00

Description	Face or Leg	Allow Shield	Component Type	Placement ft	Total Number		C _{AA} ft ² /ft	Weight klf
HB158-1-08U8-S8J18(1-5/8)	A	No	Inside Pole	98.00 - 7.00	2	1" Ice	0.00	0.00
						No Ice	0.00	0.00
						1/2" Ice	0.00	0.00
LCF12-50J(1/2")	A	No	Inside Pole	98.00 - 7.00	1	1" Ice	0.00	0.00
						No Ice	0.00	0.00
						1/2" Ice	0.00	0.00
87								
HB114-08U3M12-XXXF(7/8)	C	No	Inside Pole	87.00 - 7.00	1	No Ice	0.00	0.00
						1/2" Ice	0.00	0.00
						1" Ice	0.00	0.00
HB114-1-08U4-M5F(1-1/4)	C	No	Inside Pole	87.00 - 7.00	3	No Ice	0.00	0.00
						1/2" Ice	0.00	0.00
						1" Ice	0.00	0.00
73								
LDF4-75A(1/2)	B	No	Inside Pole	73.00 - 7.00	1	No Ice	0.00	0.00
						1/2" Ice	0.00	0.00
						1" Ice	0.00	0.00
LDF7-50A(1-5/8)	B	No	Inside Pole	73.00 - 7.00	10	No Ice	0.00	0.00
						1/2" Ice	0.00	0.00
						1" Ice	0.00	0.00
50								
LDF4-50A(1/2)	A	No	Inside Pole	50.00 - 7.00	1	No Ice	0.00	0.00
						1/2" Ice	0.00	0.00
						1" Ice	0.00	0.00
LDF5-50A(7/8)	A	No	Inside Pole	50.00 - 7.00	3	No Ice	0.00	0.00
						1/2" Ice	0.00	0.00
						1" Ice	0.00	0.00
40								
LDF4-50A(1/2)	C	No	Inside Pole	40.00 - 7.00	1	No Ice	0.00	0.00
						1/2" Ice	0.00	0.00
						1" Ice	0.00	0.00

Feed Line/Linear Appurtenances Section Areas

Tower Sectio n	Tower Elevation ft	Face	A _R ft ²	A _F ft ²	C _{AA} In Face ft ²	C _{AA} Out Face ft ²	Weight K
L1	120.00-100.00	A	0.000	0.000	0.000	0.000	0.01
		B	0.000	0.000	0.000	0.000	0.10
		C	0.000	0.000	0.750	0.000	0.00
L2	100.00-47.08	A	0.000	0.000	0.000	0.000	0.40
		B	0.000	0.000	0.000	0.000	0.56
		C	0.000	0.000	1.984	0.000	0.19
L3	47.08-0.00	A	0.000	0.000	0.000	0.000	0.35
		B	0.000	0.000	0.000	0.000	0.59
		C	0.000	0.000	8.103	0.000	0.29

Feed Line/Linear Appurtenances Section Areas - With Ice

Tower Sectio n	Tower Elevation ft	Face or Leg	Ice Thickness in	A _R ft ²	A _F ft ²	C _{AA} In Face ft ²	C _{AA} Out Face ft ²	Weight K
L1	120.00-100.00	A	1.691	0.000	0.000	0.000	0.000	0.01
		B		0.000	0.000	0.000	0.000	0.10
		C		0.000	0.000	7.515	0.000	0.09
L2	100.00-47.08	A	1.622	0.000	0.000	0.000	0.000	0.40
		B		0.000	0.000	0.000	0.000	0.56
		C		0.000	0.000	19.150	0.000	0.40
L3	47.08-0.00	A	1.444	0.000	0.000	0.000	0.000	0.35
		B		0.000	0.000	0.000	0.000	0.59

Tower Section	Tower Elevation ft	Face or Leg	Ice Thickness in	A_R ft ²	A_F ft ²	C_{AA} In Face ft ²	C_{AA} Out Face ft ²	Weight K
		C		0.000	0.000	31.810	0.000	0.69

Feed Line Center of Pressure

Section	Elevation ft	CP_x in	CP_z in	CP_x Ice in	CP_z Ice in
L1	120.00-100.00	0.0000	0.0542	0.0000	0.3894
L2	100.00-47.08	0.0000	0.0542	0.0000	0.4172
L3	47.08-0.00	-0.1510	0.1794	-0.3238	0.6342

Shielding Factor Ka

Tower Section	Feed Line Record No.	Description	Feed Line Segment Elev.	K_a No Ice	K_a Ice
L1	31	Safety Line 3/8	100.00 - 120.00	1.0000	1.0000
L2	31	Safety Line 3/8	47.08 - 100.00	1.0000	1.0000
L2	29	2" Rigid Conduit	47.08 - 40.00	1.0000	1.0000

Discrete Tower Loads

Description	Face or Leg	Offset Type	Offsets: Horz Lateral Vert ft ft ft	Azimuth Adjustmen t °	Placement ft	C_{AA} Front ft ²	C_{AA} Side ft ²	Weight K
118 DB809MT3-XT	A	From Leg	3.00 0.00 6.00	0.00	119.00	No Ice 2.84 1/2" 4.29 Ice 5.75	2.84 4.29 5.75	0.03 0.05 0.08
DB201-A	B	From Leg	3.00 0.00 4.00	0.00	119.00	No Ice 1.10 1/2" 1.98 Ice 2.86	1.10 1.98 2.86	0.03 0.03 0.04
6' x 2" Mount Pipe	A	From Leg	3.00 0.00 0.00	0.00	119.00	No Ice 1.43 1/2" 1.92 Ice 2.29	1.43 1.92 2.29	0.02 0.03 0.05
6' x 2" Mount Pipe	B	From Leg	3.00 0.00 0.00	0.00	119.00	No Ice 1.43 1/2" 1.92 Ice 2.29	1.43 1.92 2.29	0.02 0.03 0.05
Side Arm Mount [SO 102-3]	B	None		0.00	119.00	No Ice 3.00 1/2" 3.48 Ice 3.96 1" Ice	3.00 3.48 3.96	0.08 0.11 0.14

Description	Face or Leg	Offset Type	Offsets:		Azimuth Adjustment	Placement	C _{AA} _{Front}	C _{AA} _{Side}	Weight	
			Horz	Lateral						Vert
			ft	ft	°	ft	ft ²	ft ²	K	
Side Arm Mount [SO 701-1]	A	From Leg	1.50	0.00	0.00	119.00	No Ice	0.85	1.67	0.07
			0.00	0.00			1/2"	1.14	2.34	0.08
			0.00	0.00			Ice	1.43	3.01	0.09
Side Arm Mount [SO 701-1]	B	From Leg	1.50	0.00	0.00	119.00	No Ice	0.85	1.67	0.07
			0.00	0.00			1/2"	1.14	2.34	0.08
			0.00	0.00			Ice	1.43	3.01	0.09
* (3) SBNHH-1D65A w/ Mount Pipe	A	From Leg	4.00	0.00	0.00	116.00	No Ice	5.99	5.19	0.06
			0.00	0.00			1/2"	6.38	5.85	0.12
			0.00	0.00			Ice	6.78	6.52	0.18
(3) SBNHH-1D65A w/ Mount Pipe	B	From Leg	4.00	0.00	0.00	116.00	No Ice	5.99	5.19	0.06
			0.00	0.00			1/2"	6.38	5.85	0.12
			0.00	0.00			Ice	6.78	6.52	0.18
(3) SBNHH-1D65A w/ Mount Pipe	C	From Leg	4.00	0.00	0.00	116.00	No Ice	5.99	5.19	0.06
			0.00	0.00			1/2"	6.38	5.85	0.12
			0.00	0.00			Ice	6.78	6.52	0.18
RRUS 32	A	From Leg	4.00	0.00	0.00	116.00	No Ice	2.86	1.78	0.06
			0.00	0.00			1/2"	3.08	1.97	0.08
			0.00	0.00			Ice	3.32	2.17	0.10
RRUS 32	B	From Leg	4.00	0.00	0.00	116.00	No Ice	2.86	1.78	0.06
			0.00	0.00			1/2"	3.08	1.97	0.08
			0.00	0.00			Ice	3.32	2.17	0.10
RRUS 32	C	From Leg	4.00	0.00	0.00	116.00	No Ice	2.86	1.78	0.06
			0.00	0.00			1/2"	3.08	1.97	0.08
			0.00	0.00			Ice	3.32	2.17	0.10
(2) RRUS 32 B2	A	From Leg	4.00	0.00	0.00	116.00	No Ice	2.76	1.69	0.05
			0.00	0.00			1/2"	2.98	1.88	0.07
			0.00	0.00			Ice	3.22	2.07	0.10
(2) RRUS 32 B2	B	From Leg	4.00	0.00	0.00	116.00	No Ice	2.76	1.69	0.05
			0.00	0.00			1/2"	2.98	1.88	0.07
			0.00	0.00			Ice	3.22	2.07	0.10
(2) RRUS 32 B2	C	From Leg	4.00	0.00	0.00	116.00	No Ice	2.76	1.69	0.05
			0.00	0.00			1/2"	2.98	1.88	0.07
			0.00	0.00			Ice	3.22	2.07	0.10
RRUS 11	A	From Leg	4.00	0.00	0.00	116.00	No Ice	2.78	1.19	0.05
			0.00	0.00			1/2"	2.99	1.33	0.07
			0.00	0.00			Ice	3.21	1.49	0.10
RRUS 11	B	From Leg	4.00	0.00	0.00	116.00	No Ice	2.78	1.19	0.05
			0.00	0.00			1/2"	2.99	1.33	0.07
			0.00	0.00			Ice	3.21	1.49	0.10
RRUS 11	C	From Leg	4.00	0.00	0.00	116.00	No Ice	2.78	1.19	0.05
			0.00	0.00			1/2"	2.99	1.33	0.07
			0.00	0.00			Ice	3.21	1.49	0.10
DC6-48-60-18-8F	A	From Leg	4.00	0.00	0.00	116.00	No Ice	1.21	1.21	0.03
			0.00	0.00			1/2"	1.89	1.89	0.05
			0.00	0.00			Ice	2.11	2.11	0.08
DC6-48-60-18-8C	C	From Leg	4.00	0.00	0.00	116.00	No Ice	1.14	1.14	0.03
			0.00	0.00			1/2"	1.79	1.79	0.05
			0.00	0.00			Ice	2.00	2.00	0.07
						1" Ice				

Description	Face or Leg	Offset Type	Offsets: Horz Lateral Vert ft ft ft	Azimuth Adjustment °	Placement ft		C _{AA} Front ft ²	C _{AA} Side ft ²	Weight K
Miscellaneous [NA 507-1]	A	None		0.00	116.00	No Ice	4.80	4.80	0.25
						1/2"	6.70	6.70	0.29
						Ice	8.60	8.60	0.34
						1" Ice			
Side Arm Mount [SO 102-3]	A	None		0.00	116.00	No Ice	3.00	3.00	0.08
						1/2"	3.48	3.48	0.11
						Ice	3.96	3.96	0.14
						1" Ice			
Platform Mount [LP 601-1]	A	None		0.00	116.00	No Ice	28.47	28.47	1.12
						1/2"	33.59	33.59	1.51
						Ice	38.71	38.71	1.91
						1" Ice			
107 Pipe Mount [PM 601-1]	B	From Leg	0.50 0.00 0.00	0.00	107.00	No Ice	3.00	0.90	0.07
						1/2"	3.74	1.12	0.08
						Ice	4.48	1.34	0.09
						1" Ice			
98 (2) LPA-80080/6CF w/ Mount Pipe	A	From Leg	4.00 0.00 2.00	0.00	98.00	No Ice	4.56	10.26	0.05
						1/2"	5.11	11.43	0.11
						Ice	5.61	12.31	0.19
						1" Ice			
(2) LPA-80080/6CF w/ Mount Pipe	B	From Leg	4.00 0.00 2.00	0.00	98.00	No Ice	4.56	10.26	0.05
						1/2"	5.11	11.43	0.11
						Ice	5.61	12.31	0.19
						1" Ice			
(2) LPA-80080/6CF w/ Mount Pipe	C	From Leg	4.00 0.00 2.00	0.00	98.00	No Ice	4.56	10.26	0.05
						1/2"	5.11	11.43	0.11
						Ice	5.61	12.31	0.19
						1" Ice			
(2) SBNHH-1D65B w/ Mount Pipe	A	From Leg	4.00 0.00 2.00	0.00	98.00	No Ice	8.62	7.30	0.07
						1/2"	9.28	8.58	0.14
						Ice	9.91	9.72	0.22
						1" Ice			
(2) SBNHH-1D65B w/ Mount Pipe	B	From Leg	4.00 0.00 2.00	0.00	98.00	No Ice	8.62	7.30	0.07
						1/2"	9.28	8.58	0.14
						Ice	9.91	9.72	0.22
						1" Ice			
(2) SBNHH-1D65B w/ Mount Pipe	C	From Leg	4.00 0.00 2.00	0.00	98.00	No Ice	8.62	7.30	0.07
						1/2"	9.28	8.58	0.14
						Ice	9.91	9.72	0.22
						1" Ice			
B13 RRH4X30-4R	A	From Leg	4.00 0.00 2.00	0.00	98.00	No Ice	2.16	1.62	0.06
						1/2"	2.35	1.79	0.08
						Ice	2.55	1.97	0.10
						1" Ice			
B13 RRH4X30-4R	B	From Leg	4.00 0.00 2.00	0.00	98.00	No Ice	2.16	1.62	0.06
						1/2"	2.35	1.79	0.08
						Ice	2.55	1.97	0.10
						1" Ice			
B13 RRH4X30-4R	C	From Leg	4.00 0.00 2.00	0.00	98.00	No Ice	2.16	1.62	0.06
						1/2"	2.35	1.79	0.08
						Ice	2.55	1.97	0.10
						1" Ice			
B66A RRH4X45	A	From Leg	4.00 0.00 2.00	0.00	98.00	No Ice	2.58	1.63	0.06
						1/2"	2.79	1.81	0.08
						Ice	3.01	2.00	0.10
						1" Ice			
B66A RRH4X45	B	From Leg	4.00 0.00 2.00	0.00	98.00	No Ice	2.58	1.63	0.06
						1/2"	2.79	1.81	0.08
						Ice	3.01	2.00	0.10
						1" Ice			
B66A RRH4X45	C	From Leg	4.00 0.00 2.00	0.00	98.00	No Ice	2.58	1.63	0.06
						1/2"	2.79	1.81	0.08
						Ice	3.01	2.00	0.10

Description	Face or Leg	Offset Type	Offsets:			Azimuth Adjustment	Placement	C _{AA} _{Front}	C _{AA} _{Side}	Weight	
			Horz	Lateral	Vert						ft
RRH2X60-PCS	A	From Leg	4.00			0.00	98.00	1" Ice			
			0.00					No Ice	2.20	1.65	0.05
			2.00					1/2" Ice	2.39	1.83	0.07
RRH2X60-PCS	B	From Leg	4.00			0.00	98.00	1" Ice			
			0.00					No Ice	2.20	1.65	0.05
			2.00					1/2" Ice	2.39	1.83	0.07
RRH2X60-PCS	C	From Leg	4.00			0.00	98.00	1" Ice			
			0.00					No Ice	2.20	1.65	0.05
			2.00					1/2" Ice	2.39	1.83	0.07
(2) RXXDC-3315-PF-48	C	From Leg	4.00			0.00	98.00	1" Ice			
			0.00					No Ice	3.36	2.19	0.03
			2.00					1/2" Ice	3.60	2.39	0.06
Platform Mount [LP 602-1]	C	None				0.00	98.00	1" Ice			
								No Ice	32.03	32.03	1.34
								1/2" Ice	38.71	38.71	1.80
								Ice	45.39	45.39	2.26
87 ETCR-654L12H6 w/ Mount Pipe	A	From Leg	4.00			0.00	87.00	1" Ice			
			0.00					No Ice	13.27	6.54	0.10
			0.00					1/2" Ice	13.88	7.71	0.19
ETCR-654L12H6 w/ Mount Pipe	B	From Leg	4.00			0.00	87.00	1" Ice			
			0.00					No Ice	13.27	6.54	0.10
			0.00					1/2" Ice	13.88	7.71	0.19
ETCR-654L12H6 w/ Mount Pipe	C	From Leg	4.00			0.00	87.00	1" Ice			
			0.00					No Ice	13.27	6.54	0.10
			0.00					1/2" Ice	13.88	7.71	0.19
PCS 1900MHZ 4X45W-65MHZ	A	From Leg	4.00			0.00	87.00	1" Ice			
			0.00					No Ice	2.32	2.24	0.06
			0.00					1/2" Ice	2.53	2.44	0.08
PCS 1900MHZ 4X45W-65MHZ	B	From Leg	4.00			0.00	87.00	1" Ice			
			0.00					No Ice	2.32	2.24	0.06
			0.00					1/2" Ice	2.53	2.44	0.08
PCS 1900MHZ 4X45W-65MHZ	C	From Leg	4.00			0.00	87.00	1" Ice			
			0.00					No Ice	2.32	2.24	0.06
			0.00					1/2" Ice	2.53	2.44	0.08
(2) RRH2X50-800	A	From Leg	4.00			0.00	87.00	1" Ice			
			0.00					No Ice	2.13	1.79	0.05
			0.00					1/2" Ice	2.32	1.96	0.07
(2) RRH2X50-800	B	From Leg	4.00			0.00	87.00	1" Ice			
			0.00					No Ice	2.13	1.79	0.05
			0.00					1/2" Ice	2.32	1.96	0.07
(2) RRH2X50-800	C	From Leg	4.00			0.00	87.00	1" Ice			
			0.00					No Ice	2.13	1.79	0.05
			0.00					1/2" Ice	2.32	1.96	0.07
TD-RRH8X20-25	A	From Leg	4.00			0.00	87.00	1" Ice			
			0.00					No Ice	3.70	1.29	0.07
			0.00					1/2" Ice	3.95	1.46	0.09
TD-RRH8X20-25	B	From Leg	4.00			0.00	87.00	1" Ice			
			0.00					No Ice	3.70	1.29	0.07
			0.00					1/2" Ice	3.95	1.46	0.09

Description	Face or Leg	Offset Type	Offsets:			Azimuth Adjustment	Placement	C _{AA} Front	C _{AA} Side	Weight	
			Horz	Lateral	Vert						ft
TD-RRH8X20-25	C	From Leg	4.00	0.00	0.00	0.00	87.00	1" Ice			
			0.00					No Ice	3.70	1.29	0.07
			0.00					1/2" Ice	3.95	1.46	0.09
6' x 2" Mount Pipe	A	From Leg	4.00	0.00	0.00	0.00	87.00	1" Ice			
			0.00					No Ice	1.43	1.43	0.02
			0.00					1/2" Ice	1.92	1.92	0.03
6' x 2" Mount Pipe	B	From Leg	4.00	0.00	0.00	0.00	87.00	1" Ice			
			0.00					No Ice	1.43	1.43	0.02
			0.00					1/2" Ice	1.92	1.92	0.03
6' x 2" Mount Pipe	C	From Leg	4.00	0.00	0.00	0.00	87.00	1" Ice			
			0.00					No Ice	1.43	1.43	0.02
			0.00					1/2" Ice	1.92	1.92	0.03
sitepro 1 (P/N: PRK-1245)	C	None				0.00	87.00	1" Ice			
								No Ice	11.84	11.84	0.28
								1/2" Ice	16.96	16.96	0.30
Platform Mount [LP 602-1]	C	None				0.00	87.00	1" Ice			
								No Ice	32.03	32.03	1.34
								1/2" Ice	38.71	38.71	1.80
73 DB636-C	C	From Leg	4.00	0.00	0.00	0.00	73.00	1" Ice			
			0.00					No Ice	2.51	2.51	0.03
			6.00					1/2" Ice	3.59	3.59	0.05
AIR 21 B2A/B4P w/ Mount Pipe	A	From Leg	4.00	0.00	0.00	0.00	73.00	1" Ice			
			0.00					No Ice	6.41	5.72	0.11
			0.00					1/2" Ice	6.89	6.57	0.17
AIR 21 B2A/B4P w/ Mount Pipe	B	From Leg	4.00	0.00	0.00	0.00	73.00	1" Ice			
			0.00					No Ice	6.41	5.72	0.11
			0.00					1/2" Ice	6.89	6.57	0.17
AIR 21 B2A/B4P w/ Mount Pipe	C	From Leg	4.00	0.00	0.00	0.00	73.00	1" Ice			
			0.00					No Ice	6.41	5.72	0.11
			0.00					1/2" Ice	6.89	6.57	0.17
AIR32 DB B66AA B2A w/ Mount Pipe	A	From Leg	4.00	0.00	0.00	0.00	73.00	1" Ice			
			0.00					No Ice	6.75	6.07	0.13
			0.00					1/2" Ice	7.20	6.87	0.19
AIR32 DB B66AA B2A w/ Mount Pipe	B	From Leg	4.00	0.00	0.00	0.00	73.00	1" Ice			
			0.00					No Ice	6.75	6.07	0.13
			0.00					1/2" Ice	7.20	6.87	0.19
AIR32 DB B66AA B2A w/ Mount Pipe	C	From Leg	4.00	0.00	0.00	0.00	73.00	1" Ice			
			0.00					No Ice	6.75	6.07	0.13
			0.00					1/2" Ice	7.20	6.87	0.19
APXVAA24_43-U-A20 w/ Mount Pipe	A	From Leg	4.00	0.00	0.00	0.00	73.00	1" Ice			
			0.00					No Ice	20.50	10.88	0.13
			0.00					1/2" Ice	21.26	12.41	0.27
APXVAA24_43-U-A20 w/ Mount Pipe	B	From Leg	4.00	0.00	0.00	0.00	73.00	1" Ice			
			0.00					No Ice	20.50	10.88	0.13
			0.00					1/2" Ice	21.26	12.41	0.27
APXVAA24_43-U-A20 w/ Mount Pipe	B	From Leg	4.00	0.00	0.00	0.00	73.00	1" Ice			
			0.00					No Ice	20.50	10.88	0.13
			0.00					1/2" Ice	21.26	12.41	0.27

Description	Face or Leg	Offset Type	Offsets: Horz Lateral Vert ft ft ft	Azimuth Adjustment °	Placement ft		C _A A _A Front ft ²	C _A A _A Side ft ²	Weight K
KRY 112 144/1	A	From Leg	4.00 0.00 0.00	0.00	73.00	1" Ice	0.35	0.16	0.01
						No Ice	0.43	0.22	0.01
						1/2" Ice	0.51	0.28	0.02
KRY 112 144/1	A	From Leg	4.00 0.00 0.00	0.00	73.00	1" Ice	0.35	0.16	0.01
						No Ice	0.43	0.22	0.01
						1/2" Ice	0.51	0.28	0.02
KRY 112 144/1	A	From Leg	4.00 0.00 0.00	0.00	73.00	1" Ice	0.35	0.16	0.01
						No Ice	0.43	0.22	0.01
						1/2" Ice	0.51	0.28	0.02
RADIO 4449	A	From Leg	4.00 0.00 0.00	0.00	73.00	1" Ice	3.50	2.36	0.09
						No Ice	3.74	2.57	0.11
						1/2" Ice	3.99	2.78	0.15
RADIO 4449	A	From Leg	4.00 0.00 0.00	0.00	73.00	1" Ice	3.50	2.36	0.09
						No Ice	3.74	2.57	0.11
						1/2" Ice	3.99	2.78	0.15
RADIO 4449	A	From Leg	4.00 0.00 0.00	0.00	73.00	1" Ice	3.50	2.36	0.09
						No Ice	3.74	2.57	0.11
						1/2" Ice	3.99	2.78	0.15
(3) sitepro1 Sector Mount (P/N: VFA12-HD)	C	None		0.00	73.00	1" Ice	33.02	33.02	1.67
						No Ice	47.36	47.36	2.22
						1/2" Ice	61.70	61.70	2.77
						1" Ice			
50 PD1142-1	A	From Leg	3.00 0.00 7.00	0.00	50.00	1" Ice	1.32	1.32	0.01
						No Ice	3.21	3.21	0.02
						1/2" Ice	5.12	5.12	0.05
DB492A	A	From Leg	3.00 0.00 0.00	0.00	50.00	1" Ice	1.10	1.10	0.01
						No Ice	1.98	1.98	0.01
						1/2" Ice	2.86	2.86	0.01
ASP-655	B	From Leg	3.00 0.00 4.00	0.00	50.00	1" Ice	0.56	0.56	0.00
						No Ice	1.02	1.02	0.01
						1/2" Ice	1.30	1.30	0.01
PD1121-6	C	From Leg	3.00 0.00 3.00	0.00	50.00	1" Ice	0.23	0.23	0.00
						No Ice	0.41	0.41	0.00
						1/2" Ice	0.60	0.60	0.00
Side Arm Mount [SO 701-3]	C	None		0.00	50.00	1" Ice	2.83	2.83	0.20
						No Ice	3.92	3.92	0.24
						1/2" Ice	5.01	5.01	0.28
40 EPSILON GPS ANTENNA 35 DB	A	From Leg	3.00 0.00 1.00	0.00	40.00	1" Ice	0.11	0.11	0.00
						No Ice	0.16	0.16	0.00
						1/2" Ice	0.21	0.21	0.00
Side Arm Mount [SO 701-1]	A	None		0.00	40.00	1" Ice	0.85	1.67	0.07
						No Ice	1.14	2.34	0.08
						1/2" Ice	1.43	3.01	0.09

Dishes

Description	Face or Leg	Dish Type	Offset Type	Offsets: Horz Lateral Vert ft	Azimuth Adjustment °	3 dB Beam Width °	Elevation ft	Outside Diameter ft	Aperture Area ft ²	Weight K
107										
GLF6-450	B	Grid	From Leg	1.00 0.00 0.00	0.00		107.00	6.40	No Ice 1/2" Ice 1" Ice	0.20 0.37 0.54
73										
SHP2-13	B	Paraboloid w/o Radome	From Leg	4.00 0.00 0.00	0.00		73.00	2.00	No Ice 1/2" Ice 1" Ice	0.10 0.13 0.17

Load Combinations

Comb. No.	Description
1	Dead Only
2	1.2 Dead+1.6 Wind 0 deg - No Ice
3	0.9 Dead+1.6 Wind 0 deg - No Ice
4	1.2 Dead+1.6 Wind 30 deg - No Ice
5	0.9 Dead+1.6 Wind 30 deg - No Ice
6	1.2 Dead+1.6 Wind 60 deg - No Ice
7	0.9 Dead+1.6 Wind 60 deg - No Ice
8	1.2 Dead+1.6 Wind 90 deg - No Ice
9	0.9 Dead+1.6 Wind 90 deg - No Ice
10	1.2 Dead+1.6 Wind 120 deg - No Ice
11	0.9 Dead+1.6 Wind 120 deg - No Ice
12	1.2 Dead+1.6 Wind 150 deg - No Ice
13	0.9 Dead+1.6 Wind 150 deg - No Ice
14	1.2 Dead+1.6 Wind 180 deg - No Ice
15	0.9 Dead+1.6 Wind 180 deg - No Ice
16	1.2 Dead+1.6 Wind 210 deg - No Ice
17	0.9 Dead+1.6 Wind 210 deg - No Ice
18	1.2 Dead+1.6 Wind 240 deg - No Ice
19	0.9 Dead+1.6 Wind 240 deg - No Ice
20	1.2 Dead+1.6 Wind 270 deg - No Ice
21	0.9 Dead+1.6 Wind 270 deg - No Ice
22	1.2 Dead+1.6 Wind 300 deg - No Ice
23	0.9 Dead+1.6 Wind 300 deg - No Ice
24	1.2 Dead+1.6 Wind 330 deg - No Ice
25	0.9 Dead+1.6 Wind 330 deg - No Ice
26	1.2 Dead+1.0 Ice+1.0 Temp
27	1.2 Dead+1.0 Wind 0 deg+1.0 Ice+1.0 Temp
28	1.2 Dead+1.0 Wind 30 deg+1.0 Ice+1.0 Temp
29	1.2 Dead+1.0 Wind 60 deg+1.0 Ice+1.0 Temp
30	1.2 Dead+1.0 Wind 90 deg+1.0 Ice+1.0 Temp
31	1.2 Dead+1.0 Wind 120 deg+1.0 Ice+1.0 Temp
32	1.2 Dead+1.0 Wind 150 deg+1.0 Ice+1.0 Temp
33	1.2 Dead+1.0 Wind 180 deg+1.0 Ice+1.0 Temp
34	1.2 Dead+1.0 Wind 210 deg+1.0 Ice+1.0 Temp
35	1.2 Dead+1.0 Wind 240 deg+1.0 Ice+1.0 Temp
36	1.2 Dead+1.0 Wind 270 deg+1.0 Ice+1.0 Temp
37	1.2 Dead+1.0 Wind 300 deg+1.0 Ice+1.0 Temp
38	1.2 Dead+1.0 Wind 330 deg+1.0 Ice+1.0 Temp
39	Dead+Wind 0 deg - Service
40	Dead+Wind 30 deg - Service
41	Dead+Wind 60 deg - Service
42	Dead+Wind 90 deg - Service
43	Dead+Wind 120 deg - Service
44	Dead+Wind 150 deg - Service
45	Dead+Wind 180 deg - Service
46	Dead+Wind 210 deg - Service

Comb. No.	Description
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	120 - 100	Pole	Max Tension	30	0.00	0.00	-0.00
			Max. Compression	26	-11.71	-1.70	0.20
			Max. Mx	8	-4.08	-110.13	-0.58
			Max. My	14	-4.12	-1.45	-107.33
			Max. Vy	8	7.73	-110.13	-0.58
			Max. Vx	14	7.46	-1.45	-107.33
			Max. Torque	24			-1.62
L2	100 - 47.0833	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	26	-45.33	-7.33	2.27
			Max. Mx	8	-19.50	-1091.37	-8.97
			Max. My	2	-19.53	11.68	1075.49
			Max. Vy	20	-26.28	1088.33	11.15
			Max. Vx	2	-26.04	11.68	1075.49
			Max. Torque	14			3.89
L3	47.0833 - 0	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	26	-62.17	-7.18	2.11
			Max. Mx	20	-33.03	2577.85	31.84
			Max. My	2	-33.03	38.19	2552.54
			Max. Vy	20	-30.77	2577.85	31.84
			Max. Vx	2	-30.54	38.19	2552.54
			Max. Torque	12			3.98

Maximum Reactions

Location	Condition	Gov. Load Comb.	Vertical K	Horizontal, X K	Horizontal, Z K
Pole	Max. Vert	37	62.17	6.23	3.61
	Max. H _x	21	24.80	30.73	0.39
	Max. H _z	2	33.07	0.50	30.50
	Max. M _x	2	2552.54	0.50	30.50
	Max. M _z	8	2577.60	-30.67	-0.34
	Max. Torsion	12	3.97	-15.63	-26.66
	Min. Vert	5	24.80	-14.96	26.04
	Min. H _x	9	24.80	-30.67	-0.34
	Min. H _z	14	33.07	-0.40	-30.47
	Min. M _x	14	-2548.10	-0.40	-30.47
	Min. M _z	20	-2577.85	30.73	0.39
	Min. Torsion	24	-3.75	15.70	26.69

Tower Mast Reaction Summary

Load Combination	Vertical K	Shear _x K	Shear _z K	Overturing Moment, M _x kip-ft	Overturing Moment, M _z kip-ft	Torque kip-ft
Dead Only	27.56	0.00	0.00	-1.04	-1.67	0.00
1.2 Dead+1.6 Wind 0 deg - No Ice	33.07	-0.50	-30.50	-2552.54	38.19	3.73

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+1.6 Wind 0 deg - No Ice	24.80	-0.50	-30.50	-2526.03	38.37	3.73
1.2 Dead+1.6 Wind 30 deg - No Ice	33.07	14.96	-26.04	-2175.88	-1257.31	2.58
0.9 Dead+1.6 Wind 30 deg - No Ice	24.80	14.96	-26.04	-2153.22	-1243.83	2.57
1.2 Dead+1.6 Wind 60 deg - No Ice	33.07	26.32	-14.89	-1246.39	-2210.29	1.36
0.9 Dead+1.6 Wind 60 deg - No Ice	24.80	26.32	-14.89	-1233.25	-2187.02	1.35
1.2 Dead+1.6 Wind 90 deg - No Ice	33.07	30.67	0.34	27.20	-2577.60	-0.42
0.9 Dead+1.6 Wind 90 deg - No Ice	24.80	30.67	0.34	27.28	-2550.56	-0.42
1.2 Dead+1.6 Wind 120 deg - No Ice	33.07	26.81	15.63	1308.51	-2253.96	-2.53
0.9 Dead+1.6 Wind 120 deg - No Ice	24.80	26.81	15.63	1295.42	-2230.26	-2.54
1.2 Dead+1.6 Wind 150 deg - No Ice	33.07	15.63	26.66	2231.66	-1314.47	-3.97
0.9 Dead+1.6 Wind 150 deg - No Ice	24.80	15.63	26.66	2209.08	-1300.46	-3.97
1.2 Dead+1.6 Wind 180 deg - No Ice	33.07	0.40	30.47	2548.10	-36.22	-3.90
0.9 Dead+1.6 Wind 180 deg - No Ice	24.80	0.40	30.47	2522.27	-35.36	-3.90
1.2 Dead+1.6 Wind 210 deg - No Ice	33.07	-14.83	26.11	2181.45	1239.12	-2.59
0.9 Dead+1.6 Wind 210 deg - No Ice	24.80	-14.83	26.11	2159.38	1226.88	-2.58
1.2 Dead+1.6 Wind 240 deg - No Ice	33.07	-26.39	14.82	1239.52	2210.85	-1.20
0.9 Dead+1.6 Wind 240 deg - No Ice	24.80	-26.39	14.82	1227.08	2188.63	-1.19
1.2 Dead+1.6 Wind 270 deg - No Ice	33.07	-30.73	-0.39	-31.84	2577.85	0.64
0.9 Dead+1.6 Wind 270 deg - No Ice	24.80	-30.73	-0.39	-31.24	2551.86	0.65
1.2 Dead+1.6 Wind 300 deg - No Ice	33.07	-26.79	-15.62	-1308.75	2245.87	2.54
0.9 Dead+1.6 Wind 300 deg - No Ice	24.80	-26.79	-15.62	-1295.02	2223.31	2.54
1.2 Dead+1.6 Wind 330 deg - No Ice	33.07	-15.70	-26.69	-2236.93	1314.37	3.75
0.9 Dead+1.6 Wind 330 deg - No Ice	24.80	-15.70	-26.69	-2213.65	1301.41	3.75
1.2 Dead+1.0 Ice+1.0 Temp	62.17	0.00	-0.00	-2.11	-7.18	0.00
1.2 Dead+1.0 Wind 0 deg+1.0 Ice+1.0 Temp	62.17	-0.37	-7.04	-638.19	34.17	0.58
1.2 Dead+1.0 Wind 30 deg+1.0 Ice+1.0 Temp	62.17	3.41	-5.93	-533.76	-314.04	0.63
1.2 Dead+1.0 Wind 60 deg+1.0 Ice+1.0 Temp	62.17	6.02	-3.41	-307.78	-550.08	0.30
1.2 Dead+1.0 Wind 90 deg+1.0 Ice+1.0 Temp	62.17	7.00	0.04	1.49	-639.65	-0.15
1.2 Dead+1.0 Wind 120 deg+1.0 Ice+1.0 Temp	62.17	6.12	3.55	318.09	-560.94	-0.75
1.2 Dead+1.0 Wind 150 deg+1.0 Ice+1.0 Temp	62.17	3.54	6.07	544.68	-326.59	-1.15
1.2 Dead+1.0 Wind 180 deg+1.0 Ice+1.0 Temp	62.17	0.07	6.94	621.62	-14.45	-1.05
1.2 Dead+1.0 Wind 210 deg+1.0 Ice+1.0 Temp	62.17	-3.41	5.93	529.84	298.93	-0.63
1.2 Dead+1.0 Wind 240 deg+1.0 Ice+1.0 Temp	62.17	-6.26	3.20	280.02	563.34	0.17
1.2 Dead+1.0 Wind 270 deg+1.0 Ice+1.0 Temp	62.17	-7.12	-0.24	-28.47	639.12	0.61
1.2 Dead+1.0 Wind 300 deg+1.0 Ice+1.0 Temp	62.17	-6.23	-3.61	-329.80	559.34	0.75

Load Combination	Vertical	Shear _x	Shear _z	Overturning Moment, M _x	Overturning Moment, M _z	Torque
	K	K	K	kip-ft	kip-ft	kip-ft
1.2 Dead+1.0 Wind 330 deg+1.0 Ice+1.0 Temp	62.17	-3.77	-6.08	-549.70	338.74	0.69
Dead+Wind 0 deg - Service	27.56	-0.10	-6.02	-502.00	6.19	0.75
Dead+Wind 30 deg - Service	27.56	2.95	-5.14	-428.02	-248.16	0.51
Dead+Wind 60 deg - Service	27.56	5.19	-2.94	-245.53	-435.28	0.27
Dead+Wind 90 deg - Service	27.56	6.05	0.07	4.53	-507.43	-0.08
Dead+Wind 120 deg - Service	27.56	5.29	3.08	256.13	-443.90	-0.51
Dead+Wind 150 deg - Service	27.56	3.09	5.26	437.39	-259.41	-0.79
Dead+Wind 180 deg - Service	27.56	0.08	6.01	499.50	-8.42	-0.78
Dead+Wind 210 deg - Service	27.56	-2.93	5.15	427.49	241.98	-0.52
Dead+Wind 240 deg - Service	27.56	-5.21	2.92	242.56	432.78	-0.24
Dead+Wind 270 deg - Service	27.56	-6.06	-0.08	-7.07	504.87	0.13
Dead+Wind 300 deg - Service	27.56	-5.29	-3.08	-257.80	439.70	0.51
Dead+Wind 330 deg - Service	27.56	-3.10	-5.27	-440.06	256.78	0.75

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	-27.56	0.00	0.00	27.56	0.00	0.000%
2	-0.50	-33.07	-30.50	0.50	33.07	30.50	0.000%
3	-0.50	-24.80	-30.50	0.50	24.80	30.50	0.000%
4	14.96	-33.07	-26.04	-14.96	33.07	26.04	0.000%
5	14.96	-24.80	-26.04	-14.96	24.80	26.04	0.000%
6	26.32	-33.07	-14.89	-26.32	33.07	14.89	0.000%
7	26.32	-24.80	-14.89	-26.32	24.80	14.89	0.000%
8	30.67	-33.07	0.34	-30.67	33.07	-0.34	0.000%
9	30.67	-24.80	0.34	-30.67	24.80	-0.34	0.000%
10	26.81	-33.07	15.63	-26.81	33.07	-15.63	0.000%
11	26.81	-24.80	15.63	-26.81	24.80	-15.63	0.000%
12	15.63	-33.07	26.66	-15.63	33.07	-26.66	0.000%
13	15.63	-24.80	26.66	-15.63	24.80	-26.66	0.000%
14	0.40	-33.07	30.47	-0.40	33.07	-30.47	0.000%
15	0.40	-24.80	30.47	-0.40	24.80	-30.47	0.000%
16	-14.83	-33.07	26.11	14.83	33.07	-26.11	0.000%
17	-14.83	-24.80	26.11	14.83	24.80	-26.11	0.000%
18	-26.39	-33.07	14.82	26.39	33.07	-14.82	0.000%
19	-26.39	-24.80	14.82	26.39	24.80	-14.82	0.000%
20	-30.73	-33.07	-0.39	30.73	33.07	0.39	0.000%
21	-30.73	-24.80	-0.39	30.73	24.80	0.39	0.000%
22	-26.79	-33.07	-15.62	26.79	33.07	15.62	0.000%
23	-26.79	-24.80	-15.62	26.79	24.80	15.62	0.000%
24	-15.70	-33.07	-26.69	15.70	33.07	26.69	0.000%
25	-15.70	-24.80	-26.69	15.70	24.80	26.69	0.000%
26	0.00	-62.17	0.00	-0.00	62.17	0.00	0.000%
27	-0.37	-62.17	-7.04	0.37	62.17	7.04	0.000%
28	3.41	-62.17	-5.93	-3.41	62.17	5.93	0.000%
29	6.02	-62.17	-3.41	-6.02	62.17	3.41	0.000%
30	7.00	-62.17	0.04	-7.00	62.17	-0.04	0.000%
31	6.12	-62.17	3.55	-6.12	62.17	-3.55	0.000%
32	3.54	-62.17	6.07	-3.54	62.17	-6.07	0.000%
33	0.07	-62.17	6.94	-0.07	62.17	-6.94	0.000%
34	-3.41	-62.17	5.93	3.41	62.17	-5.93	0.000%
35	-6.26	-62.17	3.20	6.26	62.17	-3.20	0.000%
36	-7.12	-62.17	-0.24	7.12	62.17	0.24	0.000%
37	-6.23	-62.17	-3.61	6.23	62.17	3.61	0.000%
38	-3.77	-62.17	-6.08	3.77	62.17	6.08	0.000%

Load Comb.	Sum of Applied Forces			Sum of Reactions			% Error
	PX K	PY K	PZ K	PX K	PY K	PZ K	
39	-0.10	-27.56	-6.02	0.10	27.56	6.02	0.000%
40	2.95	-27.56	-5.14	-2.95	27.56	5.14	0.000%
41	5.19	-27.56	-2.94	-5.19	27.56	2.94	0.000%
42	6.05	-27.56	0.07	-6.05	27.56	-0.07	0.000%
43	5.29	-27.56	3.08	-5.29	27.56	-3.08	0.000%
44	3.09	-27.56	5.26	-3.09	27.56	-5.26	0.000%
45	0.08	-27.56	6.01	-0.08	27.56	-6.01	0.000%
46	-2.93	-27.56	5.15	2.93	27.56	-5.15	0.000%
47	-5.21	-27.56	2.92	5.21	27.56	-2.92	0.000%
48	-6.06	-27.56	-0.08	6.06	27.56	0.08	0.000%
49	-5.29	-27.56	-3.08	5.29	27.56	3.08	0.000%
50	-3.10	-27.56	-5.27	3.10	27.56	5.27	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	0.00013875
3	Yes	5	0.00000001	0.00005987
4	Yes	6	0.00000001	0.00007999
5	Yes	5	0.00000001	0.00069704
6	Yes	6	0.00000001	0.00007389
7	Yes	5	0.00000001	0.00064071
8	Yes	5	0.00000001	0.00004983
9	Yes	4	0.00000001	0.00062812
10	Yes	6	0.00000001	0.00007586
11	Yes	5	0.00000001	0.00065572
12	Yes	6	0.00000001	0.00008498
13	Yes	5	0.00000001	0.00073967
14	Yes	5	0.00000001	0.00025861
15	Yes	5	0.00000001	0.00011064
16	Yes	6	0.00000001	0.00007115
17	Yes	5	0.00000001	0.00061827
18	Yes	6	0.00000001	0.00007861
19	Yes	5	0.00000001	0.00068507
20	Yes	5	0.00000001	0.00004759
21	Yes	4	0.00000001	0.00057821
22	Yes	6	0.00000001	0.00008216
23	Yes	5	0.00000001	0.00071410
24	Yes	6	0.00000001	0.00007305
25	Yes	5	0.00000001	0.00063139
26	Yes	4	0.00000001	0.00005694
27	Yes	5	0.00000001	0.00034259
28	Yes	5	0.00000001	0.00064388
29	Yes	5	0.00000001	0.00060749
30	Yes	5	0.00000001	0.00034048
31	Yes	5	0.00000001	0.00062962
32	Yes	5	0.00000001	0.00070622
33	Yes	5	0.00000001	0.00037594
34	Yes	5	0.00000001	0.00054317
35	Yes	5	0.00000001	0.00056315
36	Yes	5	0.00000001	0.00036339
37	Yes	5	0.00000001	0.00069378
38	Yes	5	0.00000001	0.00064764
39	Yes	4	0.00000001	0.00021060
40	Yes	4	0.00000001	0.00051070
41	Yes	4	0.00000001	0.00039531
42	Yes	4	0.00000001	0.00003142
43	Yes	4	0.00000001	0.00041825
44	Yes	4	0.00000001	0.00059608
45	Yes	4	0.00000001	0.00023816
46	Yes	4	0.00000001	0.00035374
47	Yes	4	0.00000001	0.00046777
48	Yes	4	0.00000001	0.00002991
49	Yes	4	0.00000001	0.00052610
50	Yes	4	0.00000001	0.00039513

Maximum Tower Deflections - Service Wind

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
L1	120 - 100	19.02	43	1.37	0.01
L2	100 - 47.0833	13.41	43	1.27	0.01
L3	52 - 0	3.46	43	0.63	0.00

Critical Deflections and Radius of Curvature - Service Wind

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
119.00	DB809MT3-XT	43	18.74	1.37	0.01	25185
116.00	(3) SBNHH-1D65A w/ Mount Pipe	43	17.88	1.36	0.01	25185
107.00	GLF6-450	43	15.33	1.32	0.01	9686
98.00	(2) LPA-80080/6CF w/ Mount Pipe	43	12.88	1.26	0.01	6085
87.00	ETCR-654L12H6 w/ Mount Pipe	43	10.11	1.14	0.00	4986
73.00	SHP2-13	43	7.00	0.95	0.00	4070
50.00	PD1142-1	43	3.21	0.60	0.00	3336
40.00	EPSILON GPS ANTENNA 35 DB	43	2.13	0.46	0.00	4147

Maximum Tower Deflections - Design Wind

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
L1	120 - 100	96.46	10	6.95	0.04
L2	100 - 47.0833	68.08	10	6.46	0.02
L3	52 - 0	17.62	10	3.20	0.01

Critical Deflections and Radius of Curvature - Design Wind

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
119.00	DB809MT3-XT	10	95.01	6.94	0.04	5141
116.00	(3) SBNHH-1D65A w/ Mount Pipe	10	90.66	6.88	0.04	5141
107.00	GLF6-450	10	77.77	6.69	0.03	1975
98.00	(2) LPA-80080/6CF w/ Mount Pipe	10	65.38	6.38	0.03	1237
87.00	ETCR-654L12H6 w/ Mount Pipe	10	51.32	5.79	0.02	1007
73.00	SHP2-13	10	35.58	4.82	0.02	814
50.00	PD1142-1	10	16.31	3.05	0.01	660
40.00	EPSILON GPS ANTENNA 35 DB	10	10.85	2.36	0.01	819

Compression Checks

Pole Design Data

Section No.	Elevation ft	Size	L ft	L _u ft	Kl/r	A in ²	P _u K	φP _n K	Ratio $\frac{P_u}{\phi P_n}$
L1	120 - 100 (1)	TP20.263x15.403x0.1875	20.00	0.00	0.0	12.120	-4.06	829.59	0.005
L2	100 - 47.0833 (2)	TP33.13x20.263x0.2813	52.92	0.00	0.0	28.666 0	-19.46	1920.74	0.010
L3	47.0833 - 0 (3)	TP44x31.372x0.375	52.00	0.00	0.0	52.677 2	-33.03	3477.10	0.009

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	120 - 100 (1)	TP20.263x15.403x0.1875	110.66	338.82	0.327	0.00	338.82	0.000
L2	100 - 47.0833 (2)	TP33.13x20.263x0.2813	1101.03	1237.43	0.890	0.00	1237.43	0.000
L3	47.0833 - 0 (3)	TP44x31.372x0.375	2606.25	3088.23	0.844	0.00	3088.23	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	120 - 100 (1)	TP20.263x15.403x0.1875	7.84	414.80	0.019	0.78	687.02	0.001
L2	100 - 47.0833 (2)	TP33.13x20.263x0.2813	26.59	960.37	0.028	2.29	2509.12	0.001
L3	47.0833 - 0 (3)	TP44x31.372x0.375	31.07	1738.55	0.018	2.53	6261.97	0.000

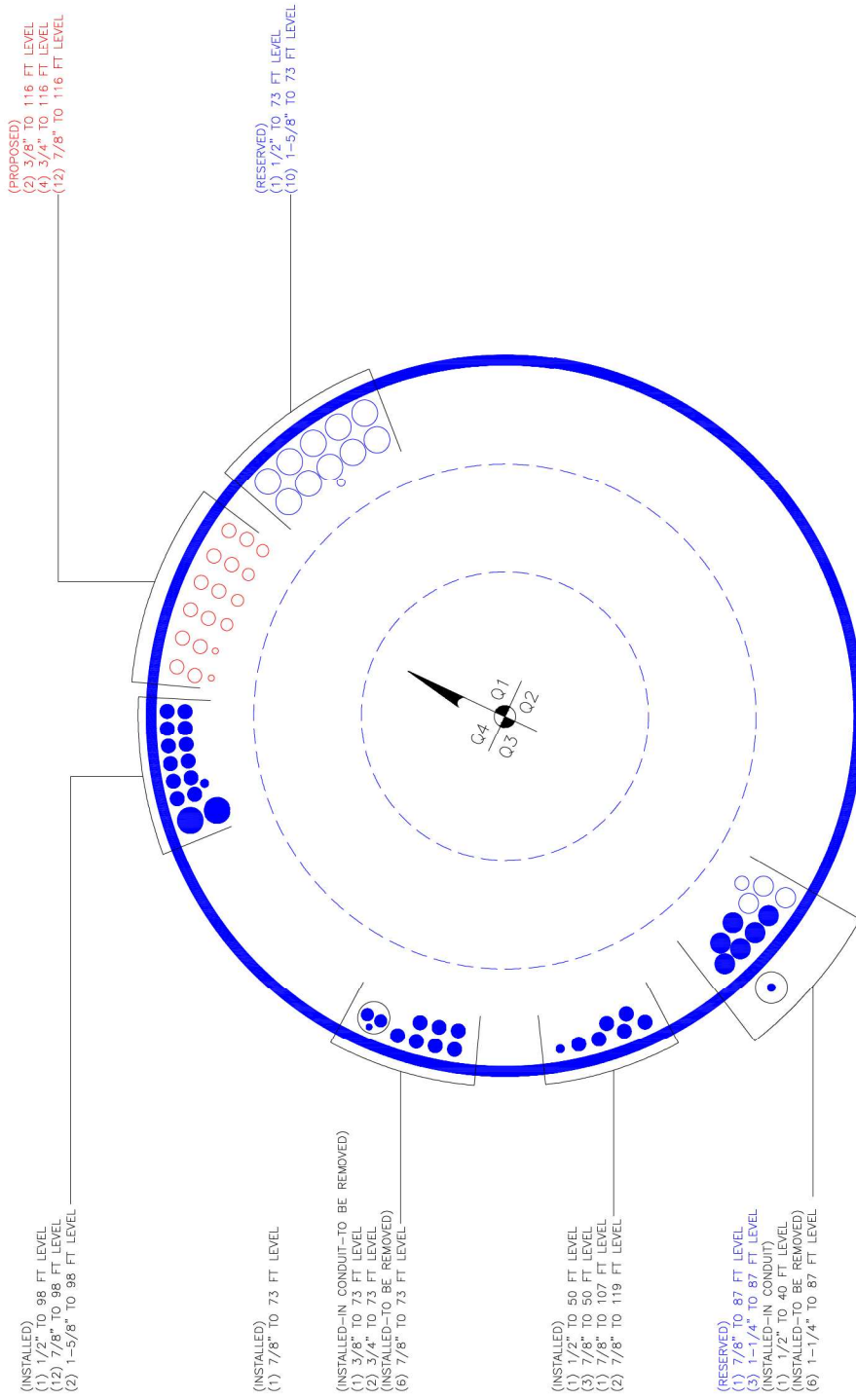
Pole Interaction Design Data

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	120 - 100 (1)	0.005	0.327	0.000	0.019	0.001	0.332	1.000	4.8.2
L2	100 - 47.0833 (2)	0.010	0.890	0.000	0.028	0.001	0.901	1.000	4.8.2
L3	47.0833 - 0 (3)	0.009	0.844	0.000	0.018	0.000	0.854	1.000	4.8.2

Section Capacity Table

Section No.	Elevation ft	Component Type	Size	Critical Element	P K	φP _{allow} K	% Capacity	Pass Fail
L1	120 - 100	Pole	TP20.263x15.403x0.1875	1	-4.06	829.59	33.2	Pass
L2	100 - 47.0833	Pole	TP33.13x20.263x0.2813	2	-19.46	1920.74	90.1	Pass
L3	47.0833 - 0	Pole	TP44x31.372x0.375	3	-33.03	3477.10	85.4	Pass
Summary								
Pole (L2)							90.1	Pass
RATING =							90.1	Pass

APPENDIX B
BASE LEVEL DRAWING



APPENDIX C
ADDITIONAL CALCULATIONS

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

TIA Rev G

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

Site Data

BU#: 806364
Site Name: HRT 106(B) 943202
App #: 421283 Rev .11
Pole Manufacturer: <i>Other</i>

Anchor Rod Data

Qty:	12	
Diam:	2.25	in
Rod Material:	A615-J	
Strength (Fu):	100	ksi
Yield (Fy):	75	ksi
Bolt Circle:	52.05	in

Plate Data

Diam:	58.05	in
Thick:	2.75	in
Grade:	60	ksi
Single-Rod B-eff:	11.79	in

Stiffener Data (Welding at both sides)

Config:	0	*
Weld Type:		
Groove Depth:		<-- Disregard
Groove Angle:		<-- Disregard
Fillet H. Weld:		in
Fillet V. Weld:		in
Width:		in
Height:		in
Thick:		in
Notch:		in
Grade:		ksi
Weld str.:		ksi

Pole Data

Diam:	44	in
Thick:	0.375	in
Grade:	65	ksi
# of Sides:	12	"0" IF Round
Fu	80	ksi
Reinf. Fillet Weld	0	"0" if None

Reactions

Mu:	2606	ft-kips
Axial, Pu:	33	kips
Shear, Vu:	31	kips
Eta Factor, η	0.5	TIA G (Fig. 4-4)

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

Anchor Rod Results

Max Rod (Cu+ Vu/rj): 208.2 Kips
 Allowable Axial, $\Phi * F_u * A_{net}$: 260.0 Kips
 Anchor Rod Stress Ratio: 80.1% **Pass**

Rigid
AISC LRFD
$\phi * T_n$

Base Plate Results

Base Plate Stress: 23.4 ksi
 Allowable Plate Stress: 54.0 ksi
 Base Plate Stress Ratio: 43.4% **Pass**

Flexural Check

Rigid
AISC LRFD
$\phi * F_y$
Y.L. Length: 27.81

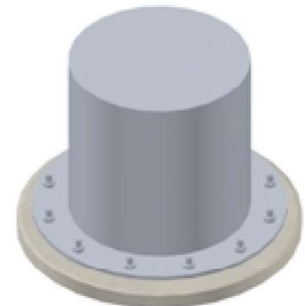
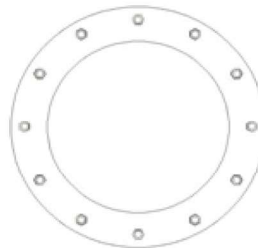
n/a

Stiffener Results

Horizontal Weld : n/a
 Vertical Weld: n/a
 Plate Flex+Shear, $f_b/F_b + (f_v/F_v)^2$: n/a
 Plate Tension+Shear, $f_t/F_t + (f_v/F_v)^2$: n/a
 Plate Comp. (AISC Bracket): n/a

Pole Results

Pole Punching Shear Check: n/a



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

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

Stiffened or Unstiffened, Exterior Flange Plate - Any Bolt Material TIA Rev G

Site Data

BU#: 806364
 Site Name: HRT 106(B) 943202
 App #: 421283 Rev .11

Reactions		
Mu	110.66	ft-kips
Axial, Pu:	4.06	kips
Shear, Vu:	7.84	kips
Elevation:	100	feet

Bolt Threads:
X-Excluded
$\phi V_n = \phi(0.55 \cdot A_b \cdot F_u)$
$\phi = 0.75, \phi \cdot V_n$ (kips):
38.88

Pole Manufacturer:	Other
--------------------	-------

If No stiffeners, Criteria: **TIA G** <-Only Applicable to Unstiffened Cases

Bolt Data		
Qty:	8	
Diameter (in.):	1	Bolt Fu: 120
Bolt Material:	A325	Bolt Fy: 92
N/A:	100	<-- Disregard
N/A:	75	<-- Disregard
Circle (in.):	24.41	

Flange Bolt Results	
Bolt Tension Capacity, $\phi \cdot T_n, B1$:	54.54 kips
Adjusted $\phi \cdot T_n$ (due to $V_u = V_u / Q_t$), B :	54.52 kips
Max Bolt directly applied Tu:	26.69 Kips
Min. PL "tc" for B cap. w/o Pry :	0.799 in
Min PL "treq" for actual T w/ Pry :	0.409 in
Min PL "t1" for actual T w/o Pry :	0.559 in
T allowable w/o Prying:	54.54 kips
Prying Force, q:	0.00 kips
Total Bolt Tension = Tu + q:	26.69 kips
Non-Prying Bolt Stress Ratio, Tu/B:	49.0% Pass

Rigid
$\phi \cdot T_n$
$\phi T_n [(1 - (V_u / \phi V_n)^2)^{0.5}]$

Plate Data		
Diam:	26.91	in
Thick, t:	1.5	in
Grade (Fy):	60	ksi
Strength, Fu:	75	ksi
Single-Rod B-eff:	8.14	in

Exterior Flange Plate Results	
Flexural Check	
Compression Side Plate Stress:	7.1 ksi
Allowable Plate Stress:	54.0 ksi
Compression Plate Stress Ratio:	13.2% Pass
No Prying	
Tension Side Stress Ratio, $(treq/t)^2$:	7.4% Pass

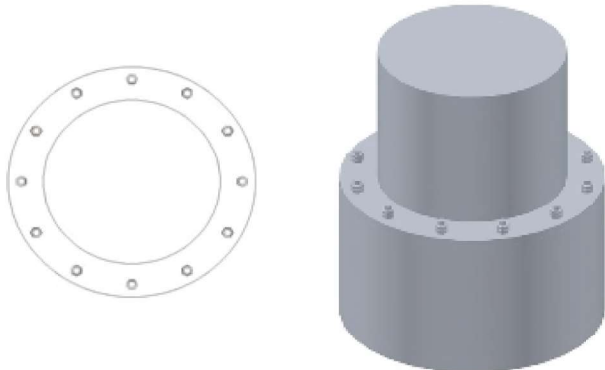
$\alpha' < 0$ case

Rigid
TIA G
$\phi \cdot F_y$
Comp. Y.L. Length:
13.61

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

Stiffener Results	
Horizontal Weld :	n/a
Vertical Weld:	n/a
Plate Flex+Shear, $f_b / F_b + (f_v / F_v)^2$:	n/a
Plate Tension+Shear, $f_t / F_t + (f_v / F_v)^2$:	n/a
Plate Comp. (AISC Bracket):	n/a
Pole Results	
Pole Punching Shear Check:	n/a

Pole Data		
Diam:	20.263	in
Thick:	0.1875	in
Grade:	65	ksi
# of Sides:	12	"0" IF Round
Fu	80	ksi
Reinf. Fillet Weld	0	"0" if None



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

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

Pier and Pad Foundation



BU #: 806364
 Site Name: HRT 106(B) 94320
 App. Number: 421283 Rev. 11

TIA-222 Revision: G
 Tower Type: Monopole

Block Foundation?:

Superstructure Analysis Reactions		
Compression, P_{comp} :	33	kips
Base Shear, V_{u_comp} :	31	kips
Moment, M_u :	2606	ft-kips
Tower Height, H :	120	ft
BP Dist. Above Fdn, bp_{dist} :	2.25	in
Bolt Circle / Bearing Plate Width, BC :	52.05	in

Foundation Analysis Checks				
	Capacity	Demand	Rating	Check
<i>Lateral (Sliding) (kips)</i>	304.22	31.00	10.2%	Pass
<i>Bearing Pressure (ksf)</i>	6.56	1.69	25.7%	Pass
<i>Overturing (kip*ft)</i>	7265.68	2797.81	38.5%	Pass
<i>Pad Flexure (kip*ft)</i>	11458.68	1143.17	10.0%	Pass
<i>Pad Shear - 1-way (kips)</i>	1963.65	114.90	5.9%	Pass
<i>Pad Shear - 2-way (ksi)</i>	0.19	0.00	0.6%	Pass

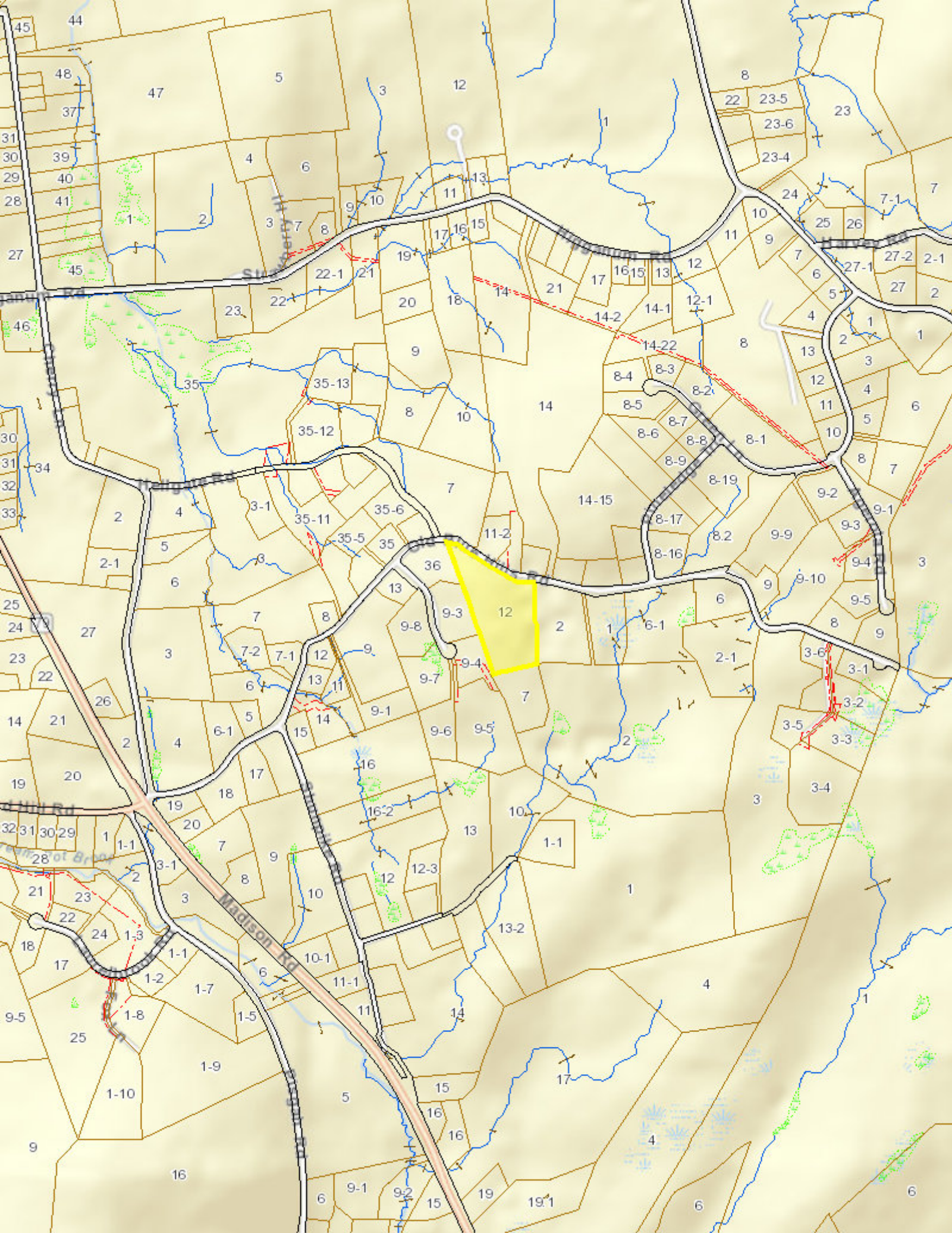
Soil Rating: 38.5%
 Structural Rating: 10.0%

Pad Properties		
Depth, D :	6.0	ft
Pad Width, W :	27.0	ft
Pad Thickness, T :	6.0	ft
Pad Rebar Size, Sp :	11	
Pad Rebar Quantity, mp :	26	
Pad Clear Cover, cc_{pad} :	6	in

Material Properties		
Rebar Grade, F_y :	60000	psi
Concrete Compressive Strength, F'_c :	4000	psi
Dry Concrete Density, δ_c :	150	pcf

Soil Properties		
Total Soil Unit Weight, γ :	125	pcf
Ultimate Net Bearing, Q_{net} :	8.000	ksf
Cohesion, C_u :	0.000	ksf
Friction Angle, ϕ :	34	degrees
SPT Blow Count, N_{blows} :	25	
Base Friction, μ :		
Neglected Depth, N :	3.33	ft
Foundation Bearing on Rock?	No	
Groundwater Depth, gw :	N/A	ft

<--Toggle between Gross and Net



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Parcel ID	Card	Routing No	Location	Zoning	State Class	Acres
B0016900	1	69 12	143R OLD BLUE HILLS RD	FR	130 - Developable Land	6.310
Living Units						
0						

Owner Information

Behrens Francis E Jr Castano Marie C
109 Old Blue Hills Rd
Durham CT 06422-3005

Deed Information

Book/Page: 100/255
Deed Date: 1984/08/24

Dwelling Information

Style:
Story Height: 0
Attic:
Basement:
Year Built: 0
Ground Flr Area: 0
Tot Living Area: 0
Rooms: 0
Bedrooms: 0
Full Baths: 0
Half Baths: 0

Property Picture



Valuation

Land: \$126,400
Building: \$0
Total: \$2,900
Net Assessment: \$2,030

Sales History

Book/Page	Date	Price	Type	Validity
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Out Building Information

Type	Qty	Year	Size1	Size2	Grade	Cond
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Building Sketch

	<u>Descriptor/Area</u>
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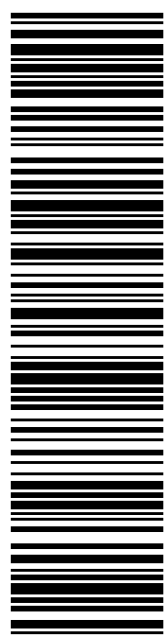
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 QC DEVELOPMENT
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4. To mail your package with PC Postage®, you may schedule a Package Pickup online, hand to your letter carrier, take to a Post Office™, or drop in a USPS collection box.
5. Mail your package on the "Ship Date" you selected when creating this label.

Click-N-Ship® Label Record

**USPS TRACKING # / Insurance Number:
 9405 8036 9930 0610 2363 18**

Trans. #:	430474198	Priority Mail® Postage:	\$6.70
Print Date:	03/21/2018	Insurance Fee	\$0.00
Ship Date:	03/22/2018	Total	\$6.70
Expected Delivery Date:	03/23/2018		
Insured Value:	\$50.00		

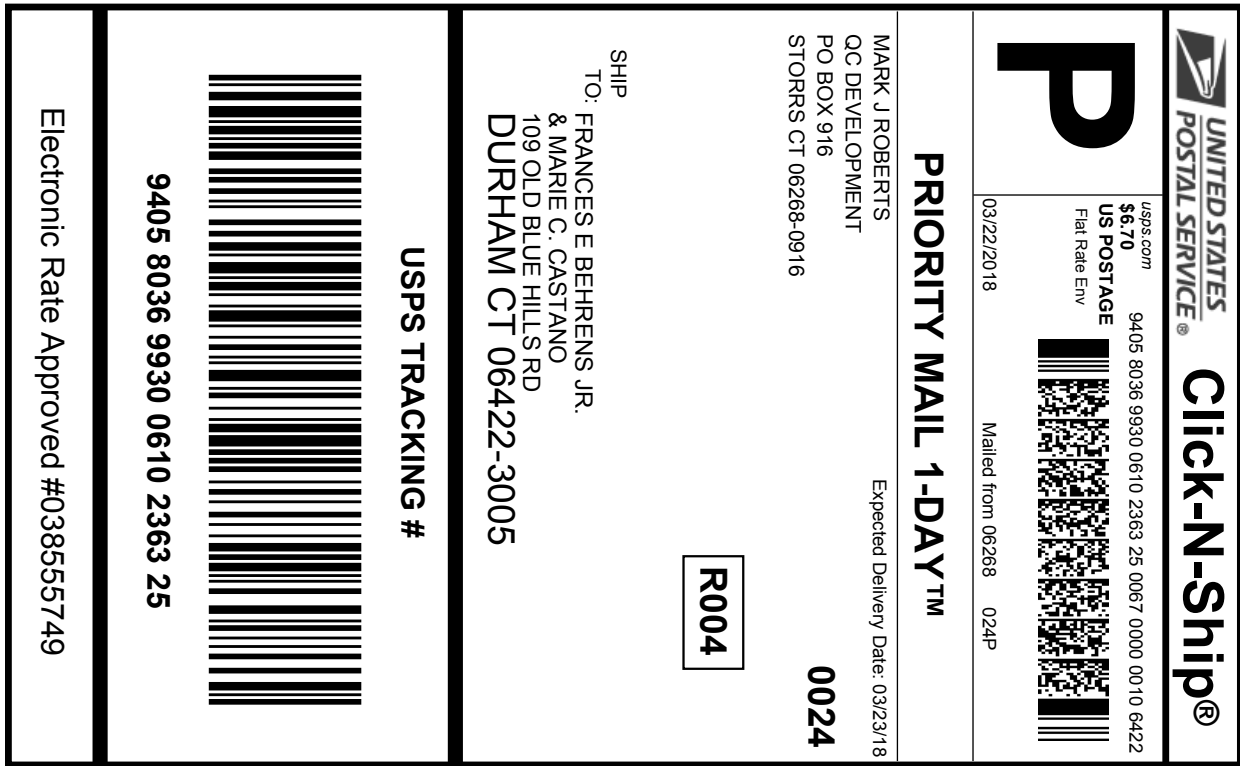
From: MARK J ROBERTS
 QC DEVELOPMENT
 PO BOX 916
 STORRS CT 06268-0916

To: LAURA L FRANCIS
 TOWN OF DURHAM
 30 TOWN HOUSE RD
 DURHAM CT 06422-2118

* Retail Pricing Priority Mail rates apply. There is no fee for USPS Tracking® service on Priority Mail service with use of this electronic rate shipping label. Refunds for unused postage paid labels can be requested online 30 days from the print date.



Thank you for shipping with the United States Postal Service!
 Check the status of your shipment on the USPS Tracking® page at usps.com



Cut on dotted line.

Instructions

- Each Click-N-Ship® label is unique. Labels are to be used as printed and used only once. DO NOT PHOTO COPY OR ALTER LABEL.
- Place your label so it does not wrap around the edge of the package.
- Adhere your label to the package. A self-adhesive label is recommended. If tape or glue is used, DO NOT TAPE OVER BARCODE. Be sure all edges are secure.
- To mail your package with PC Postage®, you may schedule a Package Pickup online, hand to your letter carrier, take to a Post Office™, or drop in a USPS collection box.
- Mail your package on the "Ship Date" you selected when creating this label.

Click-N-Ship® Label Record

USPS TRACKING # / Insurance Number:
9405 8036 9930 0610 2363 25

Trans. #:	430474198	Priority Mail® Postage:	\$6.70
Print Date:	03/21/2018	Insurance Fee	\$0.00
Ship Date:	03/22/2018	Total	\$6.70
Expected Delivery Date:	03/23/2018		
Insured Value:	\$50.00		

From: MARK J ROBERTS
 QC DEVELOPMENT
 PO BOX 916
 STORRS CT 06268-0916

To: FRANCES E BEHRENS JR.
 & MARIE C. CASTANO
 109 OLD BLUE HILLS RD
 DURHAM CT 06422-3005

* Retail Pricing Priority Mail rates apply. There is no fee for USPS Tracking® service on Priority Mail service with use of this electronic rate shipping label. Refunds for unused postage paid labels can be requested online 30 days from the print date.



Thank you for shipping with the United States Postal Service!
 Check the status of your shipment on the USPS Tracking® page at usps.com