



QC Development
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860-670-9068
Mark.Roberts@QCDevelopment.net

March 16, 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) – CT2057
7 Sherwood Forest Lane, Killingworth, CT 06419
N 41-20-17.16
W 72-33-23.61

Dear Ms. Bachman:

AT&T currently maintains nine (9) antennas at the 143-foot level of the existing 150-foot Monopole at 7 Sherwood Forest Lane - aka 78 Clinton Rd (Rte. 81) -, Killingworth, CT. The tower is owned by Crown Castle and the property is owned by Sherwood and Diane Anderson (Trustees). AT&T now intends to remove three (3) Powerwave antennas and replace them with three (3) CCI antennas. AT&T also intends to add (3) Ericsson RRUS-32 B32 Remote Radio Units (RRU). The replacement antennas and new RRUs would be installed at the 143-foot level.

This facility was approved by the Planning and Zoning Commission of the Town of Killingworth on March 21, 2000. The Special Exception approval included conditions relating to the fall zone and facility lighting. Since no modification to the overall facility height or lighting is proposed, this modification 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 Catherine Lino, First Selectwoman of the Town of Killingworth, and the Killingworth Land Use 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: Catherine Lino - as Elected Official
Cathie Jefferson – Zoning Enforcement Officer
Crown Castle - Tower Owner (via e-mail)
Sherwood & Diane Anderson - 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*							4.35%
AT&T GSM	1	283	143	0.0054	880	0.5867	0.09%
AT&T UMTS	2	565	143	0.0217	880	0.5867	0.37%
AT&T UMTS	4	525	143	0.0402	1900	1.0000	0.40%
AT&T LTE	1	1615	143	0.0309	734	0.4893	0.63%
AT&T LTE	2	875	143	0.0335	1900	1.0000	0.34%
Site Total							6.18%

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

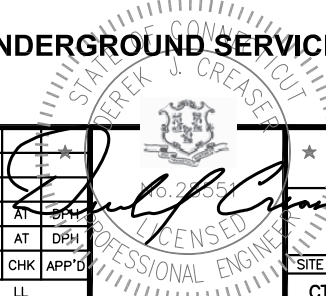
** If a range of frequencies are used, such as 880-894, enter the lowest value, i.e. 880

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*							4.35%
AT&T GSM	1	283	143	0.0054	850	0.5667	0.10%
AT&T UMTS	2	401	143	0.0154	850	0.5667	0.27%
AT&T LTE	1	1476	143	0.0283	700	0.4667	0.61%
AT&T LTE	2	3664	143	0.1404	1900	1.0000	1.40%
Site Total							6.72%

*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 MONOPOLE: - NEW AT&T RRUS: RRUS-32 (PCS) (TYP. OF 1 PER SECTOR, TOTAL OF 3). - NEW JUMPER CABLES: COAX JUMPER (1) PER SECTOR FROM EACH RRU (TOTAL OF 3) - NEW FIBER JUMPERS: FIBER JUMPERS (2) FROM THE SQUID TO EACH RRU (TOTAL OF 6) - NEW ANTENNA: (1) HPA-65R-BUU-H6 & (2) HPA-65R-BUU-H8 (TOTAL OF 3) ITEMS TO BE MOUNTED INSIDE EXISTING EQUIPMENT SHELTER: (1) DC MODULE, (1) RBS 5216 & (1) XMU ITEMS TO REMAIN: (6) ANTENNAS, (3) RRU'S, (1) SURGE ARRESTORS, (2) DC POWER CABLES, & (1) FIBER RUNS. SITE ADDRESS: 78 CLINTON ROAD KILLINGWORTH, CT 06419 LATITUDE: 41.33801° N 41° 20' 16.8" N LONGITUDE: 72.55650° W 72° 33' 23.4" W TYPE OF SITE: MONOPOLE / INDOOR EQUIPMENT TOWER HEIGHT: 150'-0"± RAD CENTER: 143'-0"± JURISDICTION: NATIONAL, STATE & LOCAL CODES OR ORDINANCES CURRENT USE: TELECOMMUNICATIONS FACILITY PROPOSED USE: TELECOMMUNICATIONS FACILITY			 SITE NUMBER: CT2057 SITE NAME: KILLINGWORTH - CLINTON ROAD PROJECT: LTE 2C 2018 UPGRADE																																								
DRAWING INDEX <table><tr><th>SHEET NO.</th><th>DESCRIPTION</th><th>REV.</th></tr><tr><td>T-1</td><td>TITLE SHEET</td><td>B</td></tr><tr><td>GN-1</td><td>GENERAL NOTES</td><td>B</td></tr><tr><td>A-1</td><td>COMPOUND & EQUIPMENT PLAN</td><td>B</td></tr><tr><td>A-2</td><td>ELEVATION & ANTENNA LAYOUTS</td><td>B</td></tr><tr><td>A-3</td><td>DETAILS</td><td>B</td></tr><tr><td>RF-1</td><td>RF-PLUMBING DIAGRAM</td><td>B</td></tr><tr><td>G-1</td><td>GROUNDING DETAILS</td><td>B</td></tr></table> CROWN SITE NAME: CLINTON/ANDERSONS PROPERTY CROWN SITE #: 876383			SHEET NO.	DESCRIPTION	REV.	T-1	TITLE SHEET	B	GN-1	GENERAL NOTES	B	A-1	COMPOUND & EQUIPMENT PLAN	B	A-2	ELEVATION & ANTENNA LAYOUTS	B	A-3	DETAILS	B	RF-1	RF-PLUMBING DIAGRAM	B	G-1	GROUNDING DETAILS	B	VICINITY MAP DIRECTIONS TO SITE: START OUT GOING WEST I-90 W/MASSACHUSETTS TURNPIKE, HEAD NORTHEAST TOWARD LEGGATT MCCALL CONN, TURN LEFT ONTO LEGGATT MCCALL CONN, CONTINUE ONTO BURR ST, TURN LEFT ONTO COCHITUATE RD, USE THE RIGHT LANE TO TAKE THE RAMP TO I-90 E/MASSPIKE W/SPRINGFIELD/BOSTON, TOLL ROAD, KEEP LEFT AT THE FORK, FOLLOW SIGNS FOR INTERSTATE 90 W/MASSACHUSETTS TURNPIKE/WORCHESTER/SPRINGFIELD AND MERGE ONTO I-90 W/MASSACHUSETTS TURNPIKE, TOLL ROAD, FOLLOW I-90 W/MASSACHUSETTS TURNPIKE, I-395 S AND I-95 S TO CT-81 N IN CLINTON. TAKE EXIT 63 FROM I-95 S, MERGE ONTO I-90 W/MASSACHUSETTS TURNPIKE, PARTIAL TOLL ROAD, TAKE EXIT 10 TOWARD MA-12 N/AUBURN/WORCESTER, PARTIAL TOLL ROAD, KEEP RIGHT AT THE FORK, FOLLOW SIGNS FOR I-395 S/US-20 E/NORWICH CT, CONTINUE ONTO I-395 S, ENTERING CONNECTICUT, MERGE ONTO I-95 S, TAKE EXIT 63 FOR CT-81 TOWARD KILLINGWORTH/CLINTON, TURN LEFT ONTO CT-81 N 		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.														
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			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: CT2057 SITE NAME: KILLINGWORTH - CLINTON ROAD CROWN SITE #: 876383 78 CLINTON ROAD KILLINGWORTH, CT 06419 MIDDLESEX COUNTY		 500 ENTERPRISE DRIVE, SUITE 3A ROCKY HILL, CT 06067 <table><tr><td></td><td></td><td></td><td></td><td></td><td></td></tr><tr><td>B</td><td>03/07/18</td><td>ISSUED FOR PERMITTING</td><td>MR</td><td>AT</td><td>DPH</td></tr><tr><td>A</td><td>01/16/18</td><td>ISSUED FOR REVIEW</td><td>SF</td><td>AT</td><td>DPH</td></tr><tr><td>NO.</td><td>DATE</td><td>REVISIONS</td><td>BY</td><td>CHK</td><td>APP'D</td></tr><tr><td colspan="2">SCALE: AS SHOWN</td><td>DESIGNED BY: AT</td><td colspan="3">DRAWN BY: LL</td></tr></table>								B	03/07/18	ISSUED FOR PERMITTING	MR	AT	DPH	A	01/16/18	ISSUED FOR REVIEW	SF	AT	DPH	NO.	DATE	REVISIONS	BY	CHK	APP'D	SCALE: AS SHOWN		DESIGNED BY: AT	DRAWN BY: LL			AT&T TITLE SHEET LTE 2C 2018 UPGRADE <table><tr><td>SITE NUMBER</td><td>DRAWING NUMBER</td><td>REV</td></tr><tr><td>CT2057</td><td>T-1</td><td>B</td></tr></table>		SITE NUMBER	DRAWING NUMBER	REV	CT2057	T-1	B
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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 LTE 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
LIGHTENING 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.

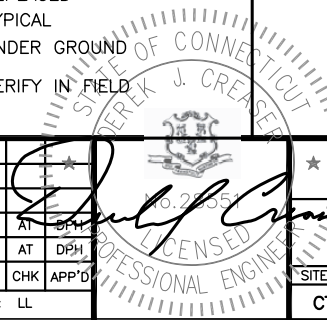
ABBREVIATIONS

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		

SITE NUMBER: CT2057
SITE NAME: KILLINGWORTH
- CLINTON ROAD
CROWN SITE #: 876383
78 CLINTON ROAD
KILLINGWORTH, CT 06419
MIDDLESEX COUNTY

 **at&t**
500 ENTERPRISE DRIVE, SUITE 3A
ROCKY HILL, CT 06067

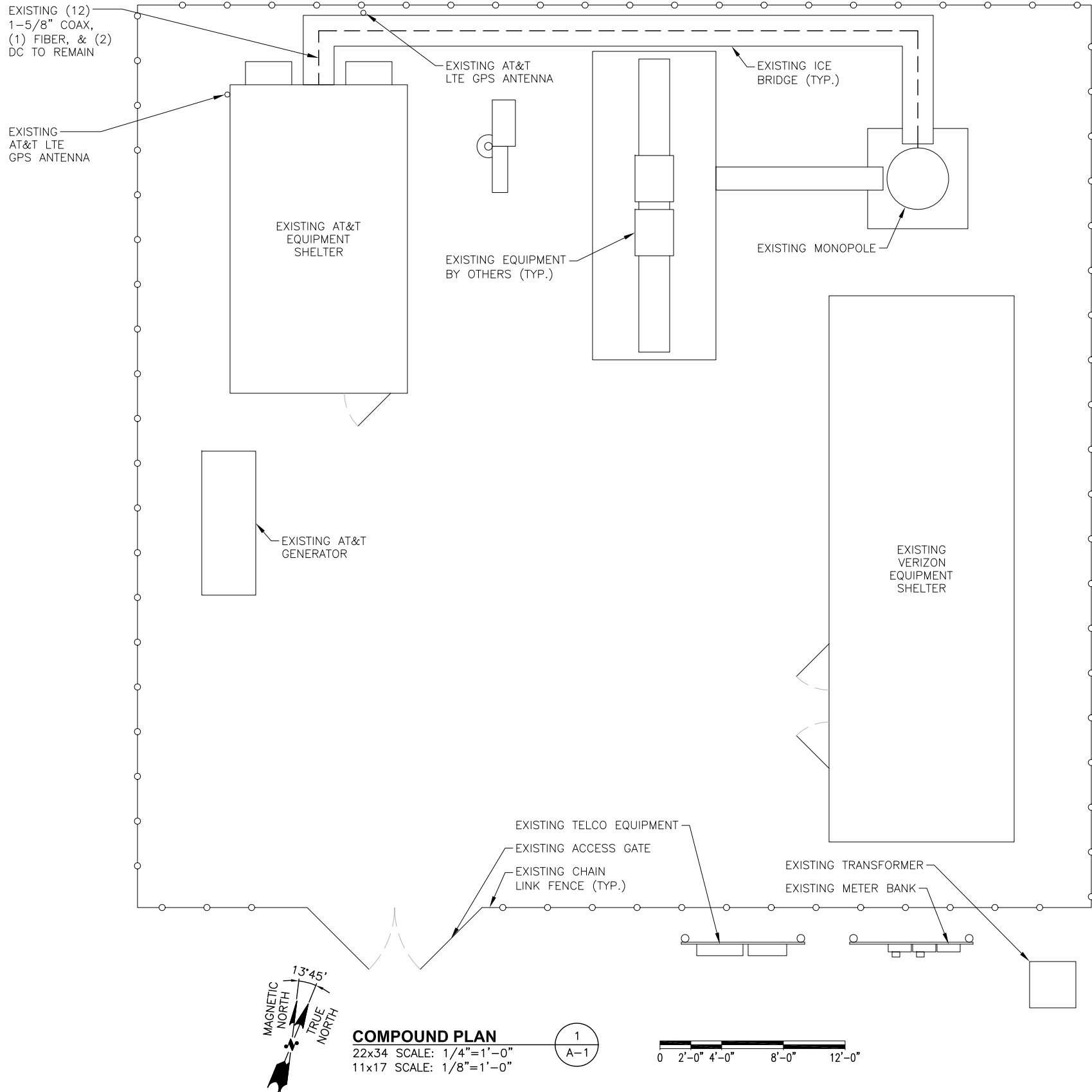
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AT&T		
GENERAL NOTES LTE 2C 2018 UPGRADE		
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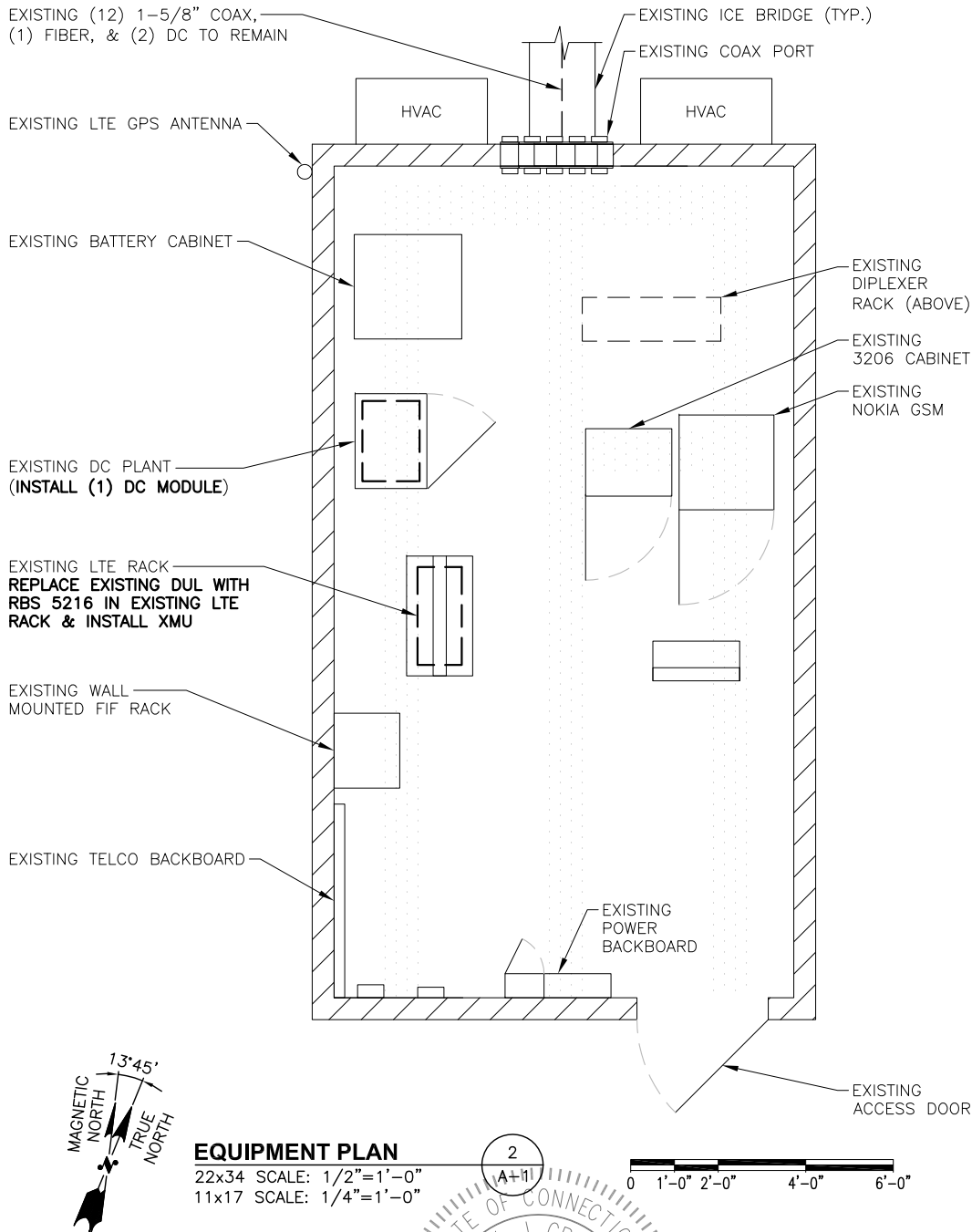
 **HUDSON**
Design Group LLC
45 BEECHWOOD DRIVE
NORTH ANDOVER, MA 01845
TEL: (978) 557-5553
FAX: (978) 336-5586


12 INDUSTRIAL WAY
SALEM, NH 03079



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.

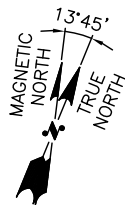
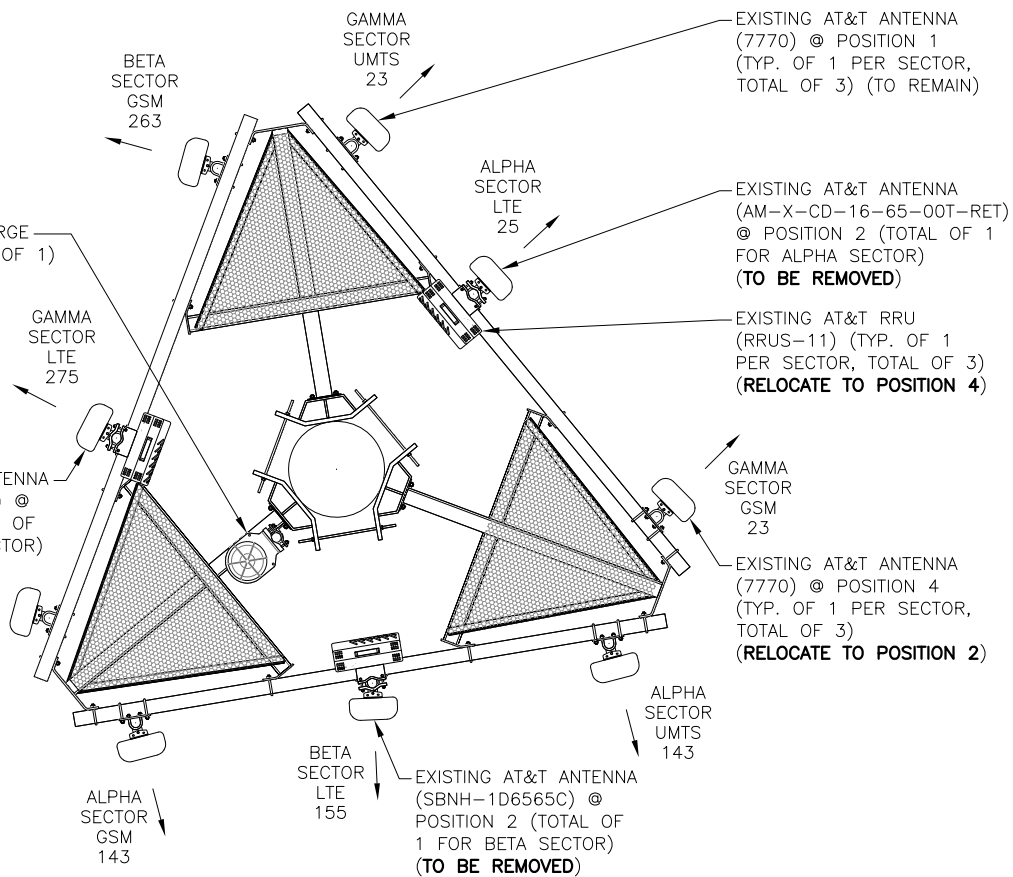
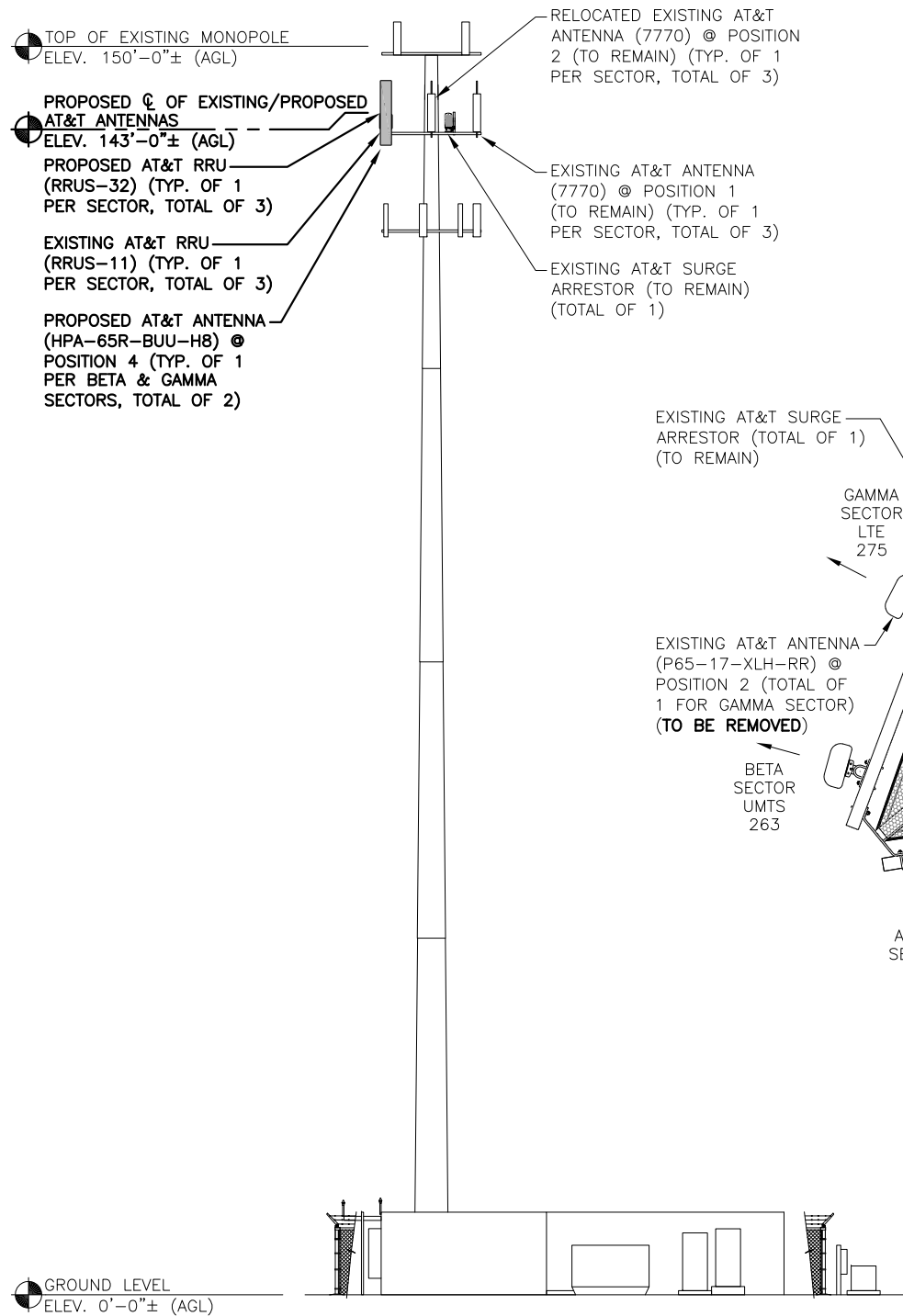


NOTE:

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

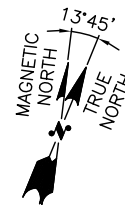
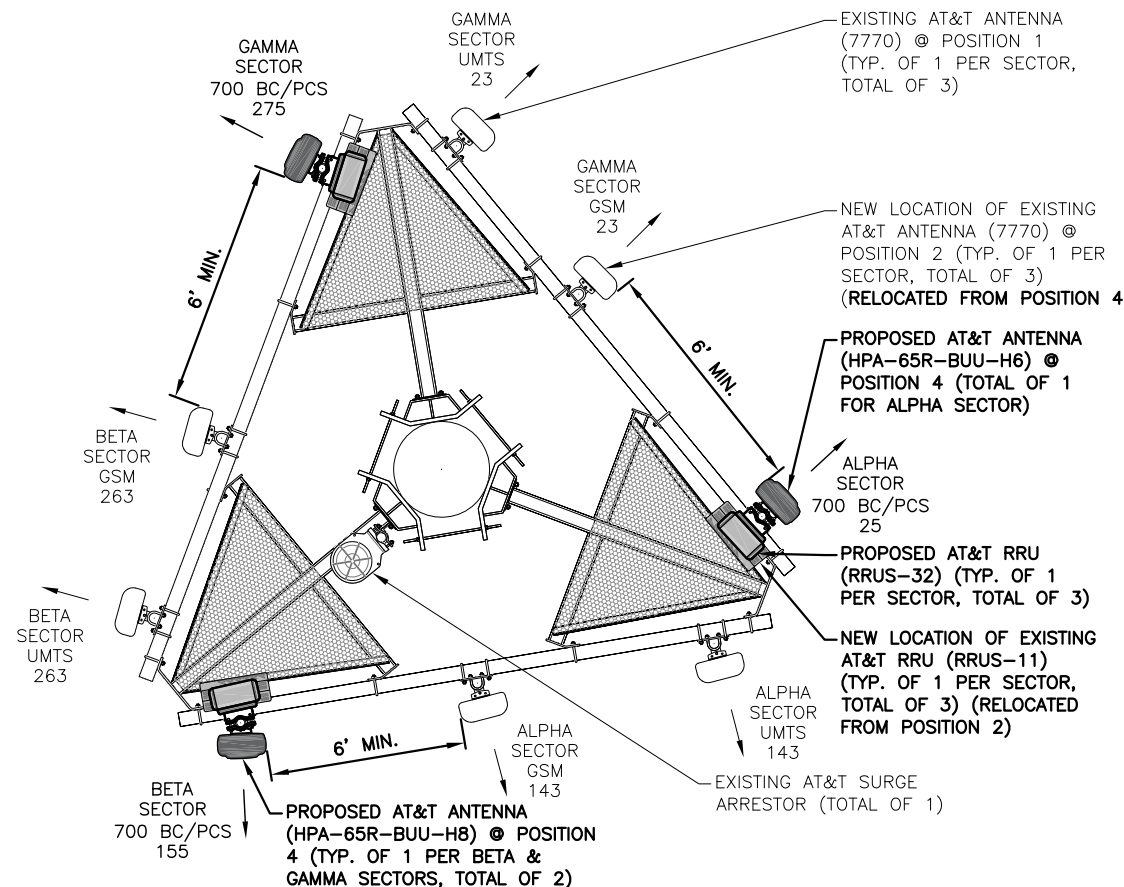
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REFER TO THE FINAL RF DATA SHEET FOR FINAL ANTENNA SETTINGS.



EXISTING ANTENNA LAYOUT
SCALE: N.T.S.

2
A-2



PROPOSED ANTENNA LAYOUT
SCALE: N.T.S.

3
A-2

ELEVATION

22x34 SCALE: 3/32"=1'-0"
11x17 SCALE: 3/64"=1'-0"

1
A-2

0 5'-4" 10'-8" 21'-4" 32'-0"



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



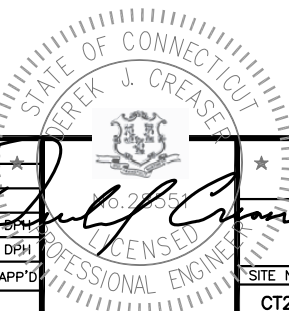
12 INDUSTRIAL WAY
SALEM, NH 03079

SITE NUMBER: CT2057
SITE NAME: KILLINGWORTH
- CLINTON ROAD
CROWN SITE #: 876383
78 CLINTON ROAD
KILLINGWORTH, CT 06419
MIDDLESEX COUNTY



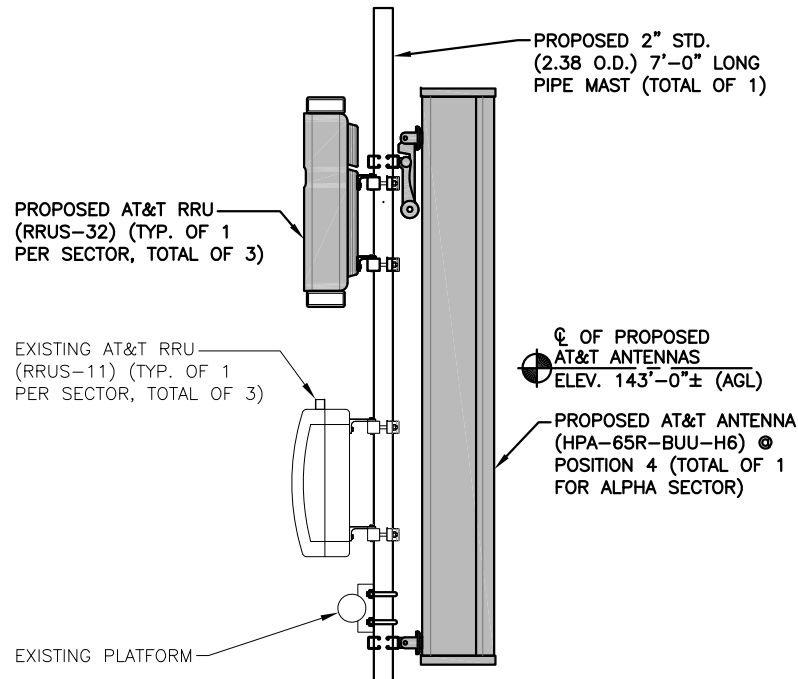
500 ENTERPRISE DRIVE, SUITE 3A
ROCKY HILL, CT 06067

NO.	DATE	REVISIONS	BY	CHK	APP'D
B	03/07/18	ISSUED FOR PERMITTING	MR	AT	DPH
A	01/16/18	ISSUED FOR REVIEW	SF	AT	DPH
SCALE:	AS SHOWN	DESIGNED BY:	AT	DRAWN BY:	LL



AT&T
ELEVATION & ANTENNA LAYOUTS
LTE 2C 2018 UPGRADE

SITE NUMBER	DRAWING NUMBER	REV
CT2057	A-2	B

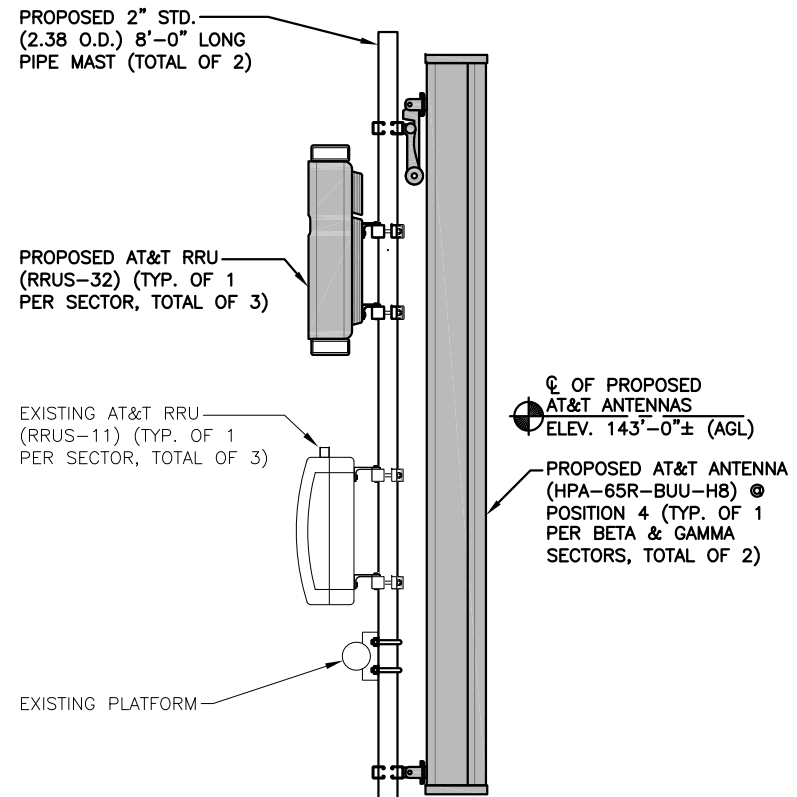


PROPOSED ANTENNA & RRH MOUNTING DETAIL (ALPHA SECTOR)

22x34 SCALE: 1"=1'-0"
11x17 SCALE: 1/2"=1'-0"

1
A-3

0 0'-6" 1'-0" 2'-0" 3'-0"



PROPOSED ANTENNA & RRH MOUNTING DETAIL (BETA & GAMMA SECTOR)

22x34 SCALE: 1"=1'-0"
11x17 SCALE: 1/2"=1'-0"

2
A-3

0 0'-6" 1'-0" 2'-0" 3'-0"

NOTE:

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

NOTE:

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

*COAX JUMPER NOTE:

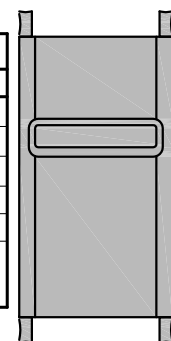
COAX JUMPERS (1) PER SECTOR, FROM EACH RRU (TOTAL OF 3).

**FIBER JUMPER NOTE:

FIBER JUMPERS (2) PER SECTOR, FROM THE SQUID TO EACH RRU (TOTAL OF 6).

RRU CHART				
QUANTITY	MODEL	L	W	D
3(E)	RRUS-11	19.7"	17.0"	7.2"
-	RRUS-12	20.4"	18.5"	7.5"
3(P)	RRUS-32	27.2"	12.1"	7.0"
-	RRUS-E2	20.4"	18.5"	7.5"
-	LTE-A2	16.4"	15.2"	3.4"

NOTE:
MOUNT PER MANUFACTURER'S SPECIFICATIONS



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

NOTE:
MOUNT PER MANUFACTURER'S SPECIFICATIONS.

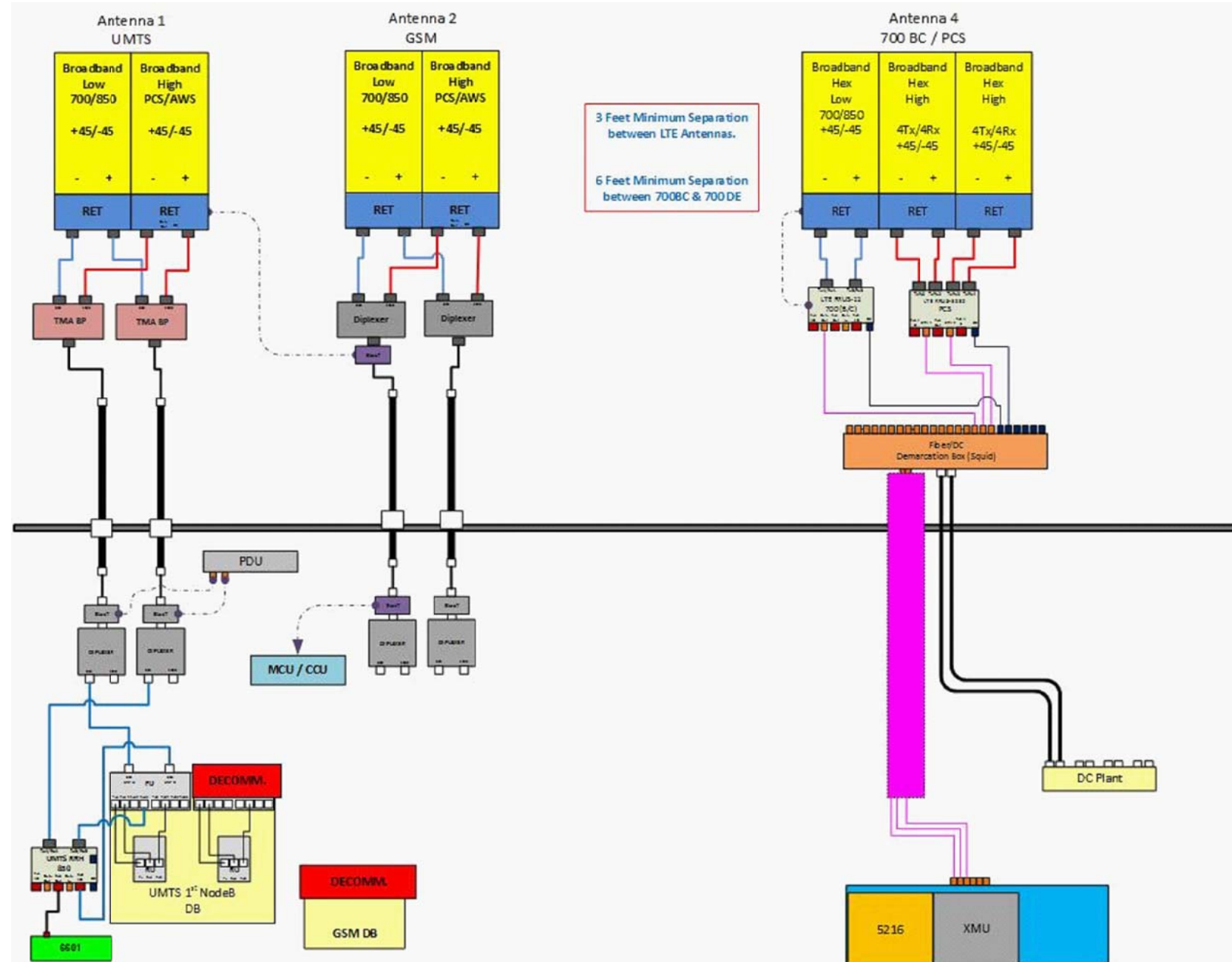
RRUS DETAIL
SCALE: N.T.S.

3
A-3

FINAL ANTENNA SCHEDULE														
SECTOR	BAND	ANTENNA		SIZE (INCHES) (L X W X D)	RAD CENTER	AZIMUTH	TMA'S		RRU'S		SIZE (INCHES) (L X W X D)	COAX JUMPERS	FIBER JUMPERS	COAX
ALPHA	UMTS	EXISTING	7770	55X11X5	141'-0"±	143°	EXISTING	(2) LGP21401	-	-	-	-	-	(2) 1-5/8"
	GSM	EXISTING	7770	55X11X5	141'-0"±	143°	-	-	-	-	-	-	-	(2) 1-5/8"
	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	700 BC / PCS	PROPOSED	HPA-65R-BUU-H6	72X14.8X9	141'-0"±	25°	-	-	EXISTING PROPOSED	RRUS-11 700 RRUS-32 (PCS)	27.2X12.1X7.0	1*	2**	-
BETA	UMTS	EXISTING	7770	55X11X5	141'-0"±	263°	EXISTING	(2) LGP21401	-	-	-	-	-	(2) 1-5/8"
	GSM	EXISTING	7770	55X11X5	141'-0"±	263°	-	-	-	-	-	-	-	(2) 1-5/8"
	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	700 BC / PCS	PROPOSED	HPA-65R-BUU-H8	92.4X14.8X7.4	141'-0"±	155°	-	-	EXISTING PROPOSED	RRUS-11 700 RRUS-32 (PCS)	27.2X12.1X7.0	1*	2**	-
GAMMA	UMTS	EXISTING	7770	55X11X5	141'-0"±	23°	EXISTING	(2) LGP21401	-	-	-	-	-	(2) 1-5/8"
	GSM	EXISTING	7770	55X11X5	141'-0"±	23°	-	-	-	-	-	-	-	(2) 1-5/8"
	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	700 BC / PCS	PROPOSED	HPA-65R-BUU-H8	92.4X14.8X7.4	141'-0"±	275°	-	-	EXISTING PROPOSED	RRUS-11 700 RRUS-32 (PCS)	27.2X12.1X7.0	1*	2**	-

FINAL ANTENNA CONFIGURATION
SCALE: N.T.S.

4
A-3

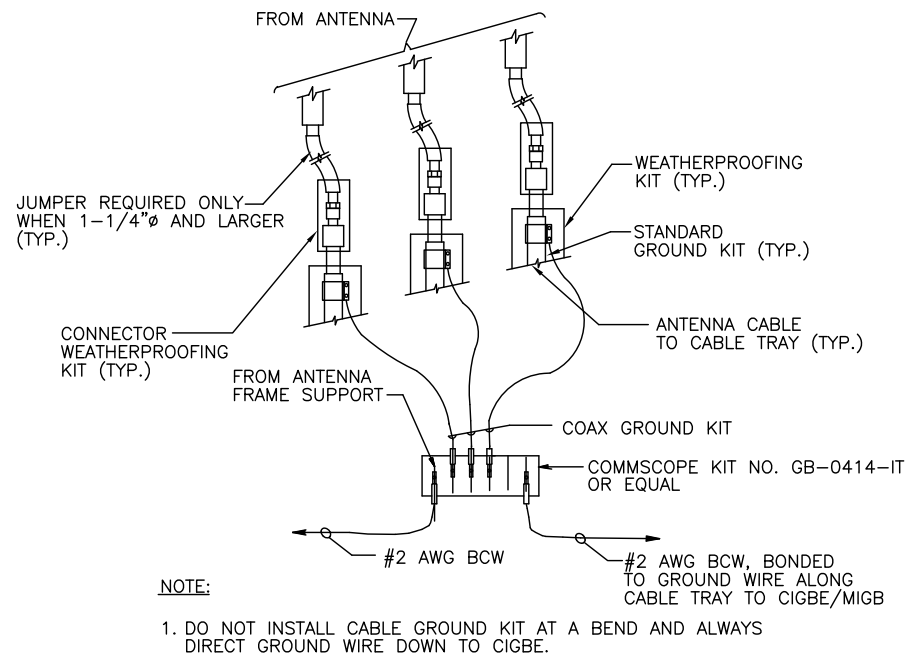


RF PLUMBING DIAGRAM
SCALE: N.T.S.

1
RF-1

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

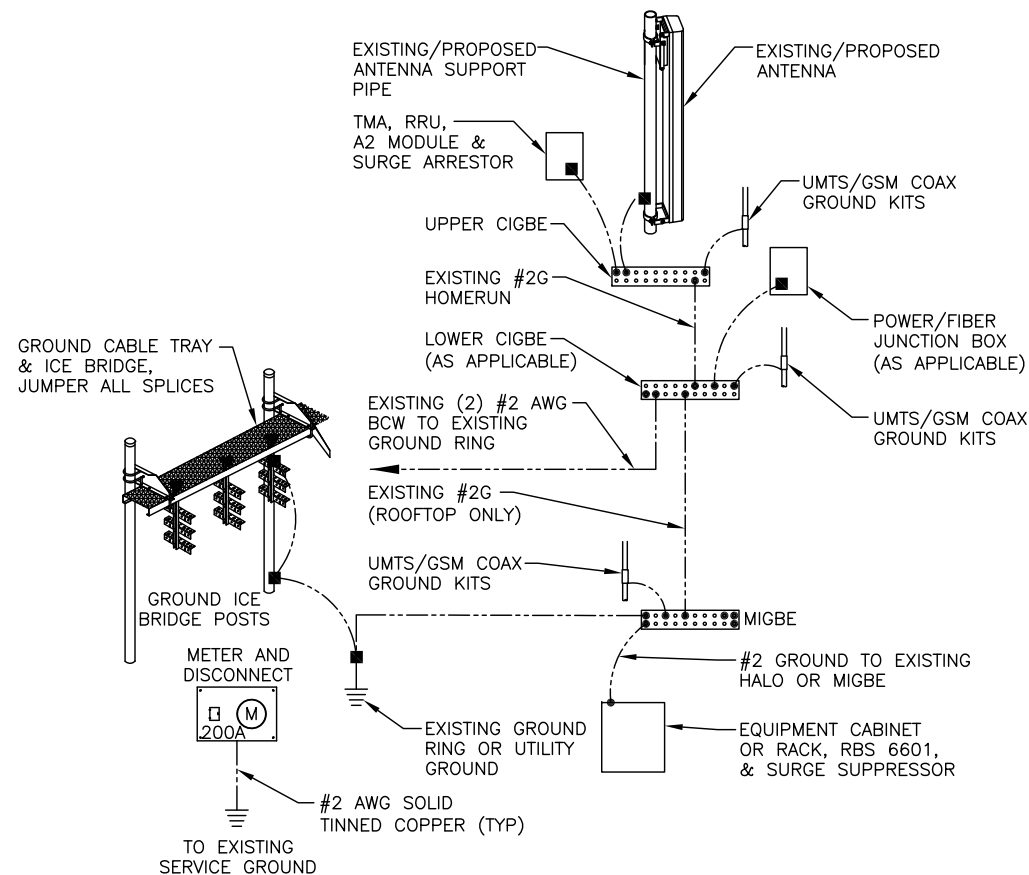
NOTE:
1. CONTRACTOR TO CONFIRM ALL PARTS.
2. INSTALL ALL EQUIPMENT TO
MANUFACTURER'S RECOMMENDATIONS



GROUND WIRE TO GROUND BAR CONNECTION DETAIL

SCALE: N.T.S.

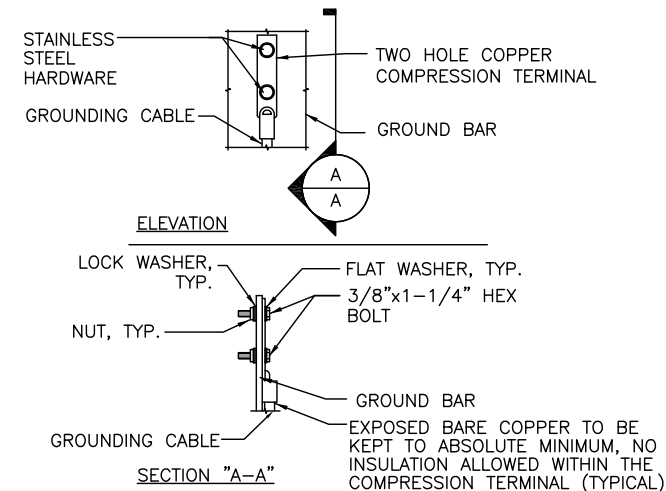
1
G-1



GROUNDING RISER DIAGRAM

SCALE: N.T.S.

2
G-1



TYPICAL GROUND BAR CONNECTION DETAIL

SCALE: N.T.S.

3
G-1

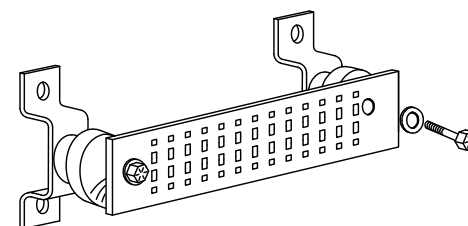
EACH GROUND CONDUCTOR TERMINATING ON ANY GROUND BAR SHALL HAVE AN IDENTIFICATION TAG ATTACHED AT EACH END THAT WILL IDENTIFY ITS ORIGIN AND DESTINATION.

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

SCALE: N.T.S.

4
G-1

Date: **January 23, 2018**

Chanhdara Ratsavong
Crown Castle
3530 Toringdon Way Suite 300
Charlotte, NC 28277

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Black & Veatch Corp.
6800 W. 115th St., Suite 2292
Overland Park, KS 66211
(913) 458-8145

Subject: Structural Analysis Report

Carrier Designation: **AT&T Mobility Co-Locate**
Carrier Site Number: CT2057
Carrier Site Name: KILLINGWORTH - CLINTON RD

Crown Castle Designation: **Crown Castle BU Number:** 876383
Crown Castle Site Name: CLINTON / ANDERSON'S PROPERTY
Crown Castle JDE Job Number: 477481
Crown Castle Work Order Number: 1515004
Crown Castle Application Number: 420710 Rev. 1

Engineering Firm Designation: **Black & Veatch Corp. Project Number:** 194393

Site Data: **7 Sherwood Forest Lane, Killingworth, Middlesex County, CT**
Latitude 41° 20' 17.24", Longitude -72° 33' 23.44"
149.854 Foot - Monopole Tower

Dear Chanhdara Ratsavong,

Black & Veatch Corp. 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 1130838, in accordance with application 420710, revision 1.

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 and Appendix N as required for use in the TIA-222-G Standard per Exception #5 of Section 1609.1.1. Exposure Category B with a maximum topographic factor, Kzt, of 1.000 and Risk Category II were used in this analysis. Seismic forces have been evaluated based on Site Class D with spectral response factors S_s of 0.172g and S₁ of 0.060g.

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

Structural analysis prepared by: Neeraj Jog / Gayatri Chiniwal

Respectfully submitted by:

Ping Jiang, P.E.
Professional Engineer



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Base Level Drawing

7) APPENDIX C

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1) INTRODUCTION

This tower is a 150 ft Monopole tower designed by Engineered Endeavors, Inc. in April of 2000. The tower was originally designed for a wind speed of 90 mph per TIA/EIA-222-F.

The tower has been modified per reinforcement drawings prepared by Paul J. Ford and Company, in July of 2009. Reinforcement consists of addition of base plate stiffeners at elevation 0'. Refer to Post Construction Observation Report by Paul J. Ford and Company in August of 2009. This modification has been considered effective in this analysis.

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 and crest height of 0 feet. Seismic forces have been evaluated based on Site Class D with spectral response factors S_s of 0.172g and S_1 of 0.060g.

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
140.0	143.0	1	cci antennas	HPA-65R-BUU-H6 w/ Mount Pipe	-	-	-
		2	cci antennas	HPA-65R-BUU-H8 w/ Mount Pipe			
		3	ericsson	RRUS 11			
		3	ericsson	RRUS 32 B2			

Table 2 - Existing and Reserved Antenna and Cable Information

Mounting Level (ft)	Center Line Elevation (ft)	Number of Antennas	Antenna Manufacturer	Antenna Model	Number of Feed Lines	Feed Line Size (in)	Note
150.0	152.0	3	alcatel lucent	PCS 1900MHz 4x45W-65MHz	4	1 1/4	2
		6	alcatel lucent	RRH2X50-800			
		3	alcatel lucent	TD-RRH8x20-25			
		3	kmw communications	ETCR-654L12H6 w/ Mount Pipe			
	150.0	1	cci tower mounts	Platform Mount [10' LP 601-1]	-	-	1
140.0	143.0	3	ericsson	RRUS 11 B12	-	-	3
		3	kmw communications	AM-X-CD-16-65-00T-RET w/ Mount Pipe			
		2	powerwave technologies	LGP21901			
		6	powerwave technologies	7770.00 w/ Mount Pipe	12 2 1 1	1 5/8 7/16 3/8 2 Conduit	1
		6	powerwave technologies	LGP21401			
		4	powerwave technologies	LGP21901			

Mounting Level (ft)	Center Line Elevation (ft)	Number of Antennas	Antenna Manufacturer	Antenna Model	Number of Feed Lines	Feed Line Size (in)	Note
		1	raycap	DC6-48-60-18-8F			
	140.0	1	cci tower mounts	Platform Mount [LP 304-1]			
128.0	128.0	3	alcatel lucent	RRH2x40-AWS	19	1 5/8	1
		6	andrew	DB846F65ZAXY w/ Mount Pipe			
		3	antel	BXA-70063/6CF w/ Mount Pipe			
		1	cci tower mounts	T-Arm Mount [TA 602-3]			
		6	kathrein	742 213 w/ Mount Pipe			
		1	rfs celwave	DB-T1-6Z-8AB-0Z			
50.0	51.0	1	lucent	KS24019-L112A	1	1/2	1
	50.0	1	cci tower mounts	Side Arm Mount [2' SO 701-1]			

Notes:

- 1) Existing Equipment
- 2) Reserved Equipment
- 3) Existing Equipment To Be Removed; Not Considered in This Analysis

Table 3 - Design Antenna and Cable Information

Mounting Level (ft)	Center Line Elevation (ft)	Number of Antennas	Antenna Manufacturer	Antenna Model	Number of Feed Lines	Feed Line Size (in)
150.0	150.0	12	dapa	48000	-	-
140.0	140.0	12	dapa	48000	-	-
130.0	130.0	12	dapa	48000	-	-

3) ANALYSIS PROCEDURE

Table 4 - Documents Provided

Document	Remarks	Reference	Source
4-GEOTECHNICAL REPORTS	Goodkind & O'Dea, Inc.	2122536	CCISITES
4-TOWER FOUNDATION DRAWINGS/DESIGN/SPECS	Engineered Endeavors, Inc.	1440547	CCISITES
4-TOWER MANUFACTURER DRAWINGS	Engineered Endeavors, Inc.	1613582	CCISITES
4-TOWER REINFORCEMENT DESIGN/DRAWINGS/DATA	Paul J. Ford and Company.	2418226	CCISITES
4-POST-MODIFICATION INSPECTION	Paul J. Ford and Company.	2471721	CCISITES
4-TOWER STRUCTURAL ANALYSIS REPORTS	Black & Veatch Corp.	7183158	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.
- 4) The existing base plate grout was not considered in this analysis.
- 5) This analysis was performed under the assumption that all information provided to Black & Veatch is current and correct. This is to include site data, existing/proposed appurtenance loading, tower/foundation details, and geotechnical data. The existing/proposed loading on the structure is based on CAD level drawings and carrier applications provided by the owner. If any of this information is not current and correct, this report should be considered obsolete and further analysis will be required.

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

4) ANALYSIS RESULTS

4.1) Wind 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	149.854 - 111.934	Pole	TP26.59x18x0.1875	1	-8.29	1026.75	68.1	Pass
L2	111.934 - 76.434	Pole	TP34.14x25.3474x0.3125	2	-14.05	2384.60	59.1	Pass
L3	76.434 - 43.014	Pole	TP40.97x32.4352x0.3125	3	-21.06	2713.66	71.8	Pass
L4	43.014 - 0	Pole	TP50x39.0798x0.375	4	-34.57	4033.20	64.7	Pass
							Summary	
						Pole (L3)	71.8	Pass
						Rating =	71.8	Pass

Table 6 - Tower Component Stresses vs. Capacity – LC7

Notes	Component	Elevation (ft)	% Capacity	Pass / Fail
1	Anchor Rods	0	71.2	Pass
	Base Plate		69.7	Pass
	Plate Stiffeners		43.1	Pass
	Pole Punching Shear		8.6	Pass
1	Base Foundation	0	58.9	Pass
	Base Foundation Soil Interaction		60.5	Pass

4.2) Seismic Results

Tower and foundation have been analyzed based on the seismic criteria outlined in section 2 of this report. Based on the analysis, seismic loading is not governing the tower and foundation stress. Wind loading is governing the tower and foundation stress.

Structure Rating (max from all components) =	71.8%
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Notes:

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

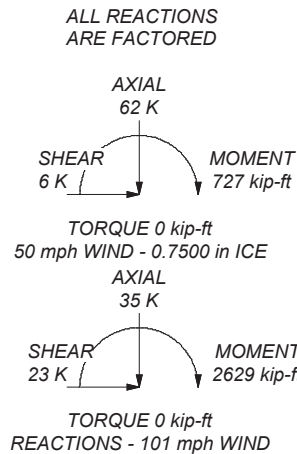
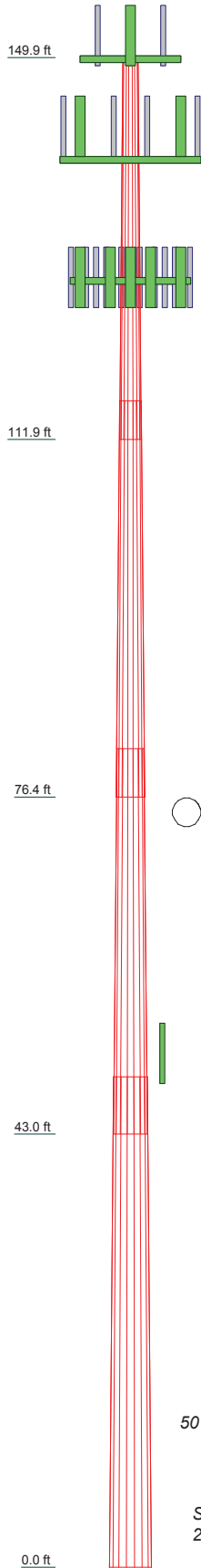
4.3) Recommendations

The tower, its base plate, anchor rods and foundation have sufficient capacity to carry the existing, reserved and proposed loads. No modifications are required at this time.

APPENDIX A

TNXTOWER OUTPUT

Section	1	2	3	4	
Length (ft)	37.92	39.33	38.25	48.68	
Number of Sides	18	18	18	18	
Thickness (in)	0.1875	0.3125	0.3125	0.3750	
Socket Length (ft)	3.83	4.83	5.67	39.0798	
Top Dia (in)	18.0000	25.3474	32.4352	50.0000	
Bot Dia (in)	26.5900	34.1400	40.9700		
Grade	A572-65				
Weight (K)	1.7	3.9	4.7	8.7	19.0



DESIGNED APPURTENANCE LOADING

TYPE	ELEVATION	TYPE	ELEVATION
Platform Mount [10' LP 601-1]	150	RRUS 32 B2	140
(2) 6"x2" Mount Pipe	150	(2) LGP21901	140
(2) 6"x2" Mount Pipe	150	(2) LGP21901	140
(2) 6"x2" Mount Pipe	150	RRUS 11	140
ETCR-654L12H6 w/ Mount Pipe	150	RRUS 11	140
ETCR-654L12H6 w/ Mount Pipe	150	RRUS 11	140
ETCR-654L12H6 w/ Mount Pipe	150	DC6-48-60-18-8F	140
(2) RRH2X50-800	150	T-Arm Mount [TA 602-3]	128
(2) RRH2X50-800	150	(2) DB846F65ZAXY w/ Mount Pipe	128
(2) RRH2X50-800	150	(2) DB846F65ZAXY w/ Mount Pipe	128
TD-RRH8x20-25	150	(2) DB846F65ZAXY w/ Mount Pipe	128
TD-RRH8x20-25	150	742 213 w/ Mount Pipe	128
TD-RRH8x20-25	150	742 213 w/ Mount Pipe	128
PCS 1900MHz 4x45W-65MHz	150	742 213 w/ Mount Pipe	128
PCS 1900MHz 4x45W-65MHz	150	742 213 w/ Mount Pipe	128
PCS 1900MHz 4x45W-65MHz	150	742 213 w/ Mount Pipe	128
Platform Mount [LP 304-1]	140	742 213 w/ Mount Pipe	128
(2) 7770.00 w/ Mount Pipe	140	BXA-70063/6CF w/ Mount Pipe	128
(2) 7770.00 w/ Mount Pipe	140	BXA-70063/6CF w/ Mount Pipe	128
(2) 7770.00 w/ Mount Pipe	140	BXA-70063/6CF w/ Mount Pipe	128
HPA-65R-BUU-H6 w/ Mount Pipe	140	RRH2x40-AWS	128
HPA-65R-BUU-H8 w/ Mount Pipe	140	RRH2x40-AWS	128
HPA-65R-BUU-H8 w/ Mount Pipe	140	RRH2x40-AWS	128
(2) LGP21401	140	DB-T1-6Z-8AB-0Z	128
(2) LGP21401	140	Side Arm Mount [2' SO 701-1]	50
(2) LGP21401	140	2' x 2" Pipe Mount	50
RRUS 32 B2	140	KS24019-L112A	50
RRUS 32 B2	140		

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: 71.8%

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Overland Park, KS 66211
Phone: (913) 458-8145
FAX:

Job: **CLINTON / ANDERSON'S PROPERTY (BU# 876383)**
Project: **194393 (876383.1515004)**
Client: Crown Castle
Code: TIA-222-G
Path: Y:\TEL\COM\2018\Engineering\Projects\CCUSA Sites\876383\876383.1515004 - TIA\Structural\876383.1515004 Structural Analysis.dwg
Drawn by: Neeraj Jog
Date: 01/23/18
Scale: NTS
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. Basic wind speed of 101 mph.
3. Structure Class II.
4. Exposure Category B.
5. Topographic Category 1.
6. Crest Height 0.00 ft.
7. Nominal ice thickness of 0.7500 in.
8. Ice thickness is considered to increase with height.
9. Ice density of 56 pcf.
10. A wind speed of 50 mph is used in combination with ice.
11. Temperature drop of 50 °F.
12. Deflections calculated using a wind speed of 60 mph.
13. A non-linear (P-delta) analysis was used.
14. Pressures are calculated at each section.
15. Stress ratio used in pole design is 1.
16. Local bending stresses due to climbing loads, feed line supports, and appurtenance mounts are not considered.

Options

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

Tapered Pole Section Geometry

Section	Elevation ft	Section Length ft	Splice Length ft	Number of Sides	Top Diameter in	Bottom Diameter in	Wall Thickness in	Bend Radius in	Pole Grade
L1	149.85-111.93	37.92	3.83	18	18.0000	26.5900	0.1875	0.7500	A572-65 (65 ksi)
L2	111.93-76.43	39.33	4.83	18	25.3474	34.1400	0.3125	1.2500	A572-65 (65 ksi)
L3	76.43-43.01	38.25	5.67	18	32.4352	40.9700	0.3125	1.2500	A572-65 (65 ksi)
L4	43.01-0.00	48.68		18	39.0798	50.0000	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	18.2777	10.6007	424.9328	6.3234	9.1440	46.4712	850.4248	5.3013	2.8380	15.136
	27.0002	15.7128	1383.8238	9.3729	13.5077	102.4469	2769.4685	7.8579	4.3498	23.199
L2	26.6079	24.8315	1966.2175	8.8874	12.8765	152.6984	3935.0222	12.4181	3.9111	12.516
	34.6667	33.5527	4850.6965	12.0088	17.3431	279.6900	9707.7757	16.7795	5.4586	17.468
L3	34.0299	31.8617	4153.6583	11.4036	16.4771	252.0870	8312.7820	15.9339	5.1586	16.508
	41.6020	40.3272	8422.0227	14.4334	20.8128	404.6567	16855.127	20.1674	6.6607	21.314
							3			
L4	40.9742	46.0684	8719.0978	13.7402	19.8526	439.1926	17449.668	23.0386	6.2181	16.581
							3			
	50.7713	59.0662	18377.109	17.6169	25.4000	723.5082	36778.399	29.5387	8.1400	21.707
			4				8			

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 149.85- 111.93				1	1	1			
L2 111.93- 76.43				1	1	1			
L3 76.43- 43.01				1	1	1			
L4 43.01-0.00				1	1	1			

Feed Line/Linear Appurtenances - Entered As Round Or Flat

Description	Sector	Component Type	Placement ft	Total Number	Number Per Row	Start/End Position	Width or Diameter r in	Perimeter r in	Weight plf
Safety Line 3/8	B	Surface Ar (CaAa)	149.85 - 10.00	1	1	0.000 0.020	0.3750		0.22
(6) AVA7-50(1-5/8) + (1) HB158-1-08U8-S8J18(1-5/8) ***	B	Surface Ar (CaAa)	128.00 - 10.00	7	6	0.050 0.458	2.0100		0.70

Feed Line/Linear Appurtenances - Entered As Area

Description	Face or Leg	Allow Shield	Component Type	Placement ft	Total Number	C _A A _A ft ² /ft	Weight plf

HB114-1-0813U4- M5J(1-1/4)	C	No	Inside Pole	149.85 - 10.00	3	No Ice 1/2" Ice 1" Ice	0.00 0.00 1.20
HB114-13U3M12- XXXF(1-1/4)	C	No	Inside Pole	149.85 - 10.00	1	No Ice 1/2" Ice 1" Ice	0.00 0.00 0.99

LDF7-50A(1-5/8)	A	No	Inside Pole	140.00 - 3.00	10	No Ice 1/2" Ice 1" Ice	0.00 0.00 0.82
LCF158-50A(1-5/8)	A	No	Inside Pole	140.00 - 3.00	2	No Ice 1/2" Ice 1" Ice	0.00 0.00 0.80
FB-L98B-002- 75000(3/8)	A	No	Inside Pole	140.00 - 3.00	1	No Ice 1/2" Ice 1" Ice	0.00 0.00 0.06
WR-VG122ST- BRDA(7/16)	A	No	Inside Pole	140.00 - 3.00	2	No Ice 1/2" Ice	0.00 0.14

Description	Face or Leg	Allow Shield	Component Type	Placement ft	Total Number		$C_A A_A$ ft ² /ft	Weight plf
2" innerduct conduit	A	No	Inside Pole	140.00 - 3.00	1	1" Ice No Ice 1/2" Ice 1" Ice	0.00 0.00 0.00 0.00	0.14 0.20 0.20 0.20
*** AVA7-50(1-5/8)	B	No	Inside Pole	128.00 - 10.00	12	No Ice 1/2" Ice 1" Ice	0.00 0.00 0.00	0.70 0.70 0.70
*** LDF4-50A(1/2)	C	No	Inside Pole	50.00 - 10.00	1	No Ice 1/2" Ice 1" Ice	0.00 0.00 0.00	0.15 0.15 0.15

Feed Line/Linear Appurtenances Section Areas

Tower Section n	Tower Elevation ft	Face	A_R ft ²	A_F ft ²	$C_A A_A$ In Face ft ²	$C_A A_A$ Out Face ft ²	Weight K
L1	149.85-111.93	A	0.000	0.000	0.000	0.000	0.29
		B	0.000	0.000	20.798	0.000	0.22
		C	0.000	0.000	0.000	0.000	0.17
L2	111.93-76.43	A	0.000	0.000	0.000	0.000	0.37
		B	0.000	0.000	44.144	0.000	0.48
		C	0.000	0.000	0.000	0.000	0.16
L3	76.43-43.01	A	0.000	0.000	0.000	0.000	0.35
		B	0.000	0.000	41.558	0.000	0.45
		C	0.000	0.000	0.000	0.000	0.15
L4	43.01-0.00	A	0.000	0.000	0.000	0.000	0.41
		B	0.000	0.000	41.053	0.000	0.45
		C	0.000	0.000	0.000	0.000	0.16

Feed Line/Linear Appurtenances Section Areas - With Ice

Tower Section n	Tower Elevation ft	Face or Leg	Ice Thickness in	A_R ft ²	A_F ft ²	$C_A A_A$ In Face ft ²	$C_A A_A$ Out Face ft ²	Weight K
L1	149.85-111.93	A	1.720	0.000	0.000	0.000	0.000	0.29
		B		0.000	0.000	45.597	0.000	0.80
		C		0.000	0.000	0.000	0.000	0.17
L2	111.93-76.43	A	1.665	0.000	0.000	0.000	0.000	0.37
		B		0.000	0.000	82.328	0.000	1.54
		C		0.000	0.000	0.000	0.000	0.16
L3	76.43-43.01	A	1.591	0.000	0.000	0.000	0.000	0.35
		B		0.000	0.000	76.672	0.000	1.41
		C		0.000	0.000	0.000	0.000	0.15
L4	43.01-0.00	A	1.433	0.000	0.000	0.000	0.000	0.41
		B		0.000	0.000	74.644	0.000	1.34
		C		0.000	0.000	0.000	0.000	0.16

Feed Line Center of Pressure

Section	Elevation ft	CP_x in	CP_z in	CP_x Ice in	CP_z Ice in
L1	149.85-111.93	0.7934	-0.0147	1.0647	-0.1354
L2	111.93-76.43	1.3906	-0.0068	1.6365	-0.1083
L3	76.43-43.01	1.4504	-0.0075	1.7914	-0.1183
L4	43.01-0.00	1.1937	-0.0064	1.6003	-0.1039

Shielding Factor Ka

Tower Section	Feed Line Record No.	Description	Feed Line Segment Elev.	K _a No Ice	K _a Ice
L1	1	Safety Line 3/8	111.93 - 149.85	1.0000	1.0000
L1	15	(6) AVA7-50(1-5/8) + (1) HB158-1-08U8-S8J18(1-5/8)	111.93 - 128.00	1.0000	1.0000
L2	1	Safety Line 3/8	76.43 - 111.93	1.0000	1.0000
L2	15	(6) AVA7-50(1-5/8) + (1) HB158-1-08U8-S8J18(1-5/8)	76.43 - 111.93	1.0000	1.0000
L3	1	Safety Line 3/8	43.01 - 76.43	1.0000	1.0000
L3	15	(6) AVA7-50(1-5/8) + (1) HB158-1-08U8-S8J18(1-5/8)	43.01 - 76.43	1.0000	1.0000

Discrete Tower Loads

Description	Face or Leg	Offset Type	Offsets: Horiz 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

Platform Mount [10' LP 601-1]	C	None		0.0000	150.00	No Ice	23.73	23.73	0.94
						1/2"	27.99	27.99	1.26
						Ice	32.26	32.26	1.59
						1" Ice			
(2) 6"x2" Mount Pipe	A	From Face	3.00 0.00 0.00	0.0000	150.00	No Ice	1.43	1.43	0.02
						1/2"	1.92	1.92	0.03
						Ice	2.29	2.29	0.05
						1" Ice			
(2) 6"x2" Mount Pipe	B	From Face	3.00 0.00 0.00	0.0000	150.00	No Ice	1.43	1.43	0.02
						1/2"	1.92	1.92	0.03
						Ice	2.29	2.29	0.05
						1" Ice			
(2) 6"x2" Mount Pipe	C	From Face	3.00 0.00 0.00	0.0000	150.00	No Ice	1.43	1.43	0.02
						1/2"	1.92	1.92	0.03
						Ice	2.29	2.29	0.05
						1" Ice			
ETCR-654L12H6 w/ Mount Pipe	A	From Face	3.00 0.00 2.00	0.0000	150.00	No Ice	13.27	6.54	0.10
						1/2"	13.88	7.71	0.19
						Ice	14.45	8.61	0.29
						1" Ice			
ETCR-654L12H6 w/ Mount Pipe	B	From Face	3.00 0.00 2.00	0.0000	150.00	No Ice	13.27	6.54	0.10
						1/2"	13.88	7.71	0.19
						Ice	14.45	8.61	0.29
						1" Ice			
ETCR-654L12H6 w/ Mount Pipe	C	From Face	3.00 0.00 2.00	0.0000	150.00	No Ice	13.27	6.54	0.10
						1/2"	13.88	7.71	0.19
						Ice	14.45	8.61	0.29
						1" Ice			
(2) RRH2X50-800	A	From Face	3.00 0.00 2.00	0.0000	150.00	No Ice	1.70	1.28	0.05
						1/2"	1.86	1.43	0.07
						Ice	2.03	1.58	0.09

Description	Face or Leg	Offset Type	Offsets: Horz Lateral Vert ft ft ft	Azimuth Adjustmen t °	Placement ft		C _A A _A Front ft ²	C _A A _A Side ft ²	Weight K
(2) RRH2X50-800	B	From Face	3.00 0.00 2.00	0.0000	150.00	1" Ice No Ice 1/2" Ice	1.70 1.86 2.03	1.28 1.43 1.58	0.05 0.07 0.09
(2) RRH2X50-800	C	From Face	3.00 0.00 2.00	0.0000	150.00	1" Ice No Ice 1/2" Ice	1.70 1.86 2.03	1.28 1.43 1.58	0.05 0.07 0.09
TD-RRH8x20-25	A	From Face	3.00 0.00 2.00	0.0000	150.00	1" Ice No Ice 1/2" Ice	4.05 4.30 4.56	1.53 1.71 1.90	0.07 0.10 0.13
TD-RRH8x20-25	B	From Face	3.00 0.00 2.00	0.0000	150.00	1" Ice No Ice 1/2" Ice	4.05 4.30 4.56	1.53 1.71 1.90	0.07 0.10 0.13
TD-RRH8x20-25	C	From Face	3.00 0.00 2.00	0.0000	150.00	1" Ice No Ice 1/2" Ice	4.05 4.30 4.56	1.53 1.71 1.90	0.07 0.10 0.13
PCS 1900MHz 4x45W- 65MHz	A	From Face	3.00 0.00 2.00	0.0000	150.00	1" Ice No Ice 1/2" Ice	2.32 2.53 2.74	2.24 2.44 2.65	0.06 0.08 0.11
PCS 1900MHz 4x45W- 65MHz	B	From Face	3.00 0.00 2.00	0.0000	150.00	1" Ice No Ice 1/2" Ice	2.32 2.53 2.74	2.24 2.44 2.65	0.06 0.08 0.11
PCS 1900MHz 4x45W- 65MHz	C	From Face	3.00 0.00 2.00	0.0000	150.00	1" Ice No Ice 1/2" Ice	2.32 2.53 2.74	2.24 2.44 2.65	0.06 0.08 0.11
***						1" Ice			
Platform Mount [LP 304-1]	C	None		0.0000	140.00	No Ice 1/2" Ice	17.46 22.44 27.42	17.46 22.44 27.42	1.35 1.62 1.90
(2) 7770.00 w/ Mount Pipe	A	From Face	4.00 0.00 3.00	25.0000	140.00	1" Ice No Ice 1/2" Ice	5.75 6.18 6.61	4.25 5.01 5.71	0.06 0.10 0.16
(2) 7770.00 w/ Mount Pipe	B	From Face	4.00 0.00 3.00	35.0000	140.00	1" Ice No Ice 1/2" Ice	5.75 6.18 6.61	4.25 5.01 5.71	0.06 0.10 0.16
(2) 7770.00 w/ Mount Pipe	C	From Face	4.00 0.00 3.00	35.0000	140.00	1" Ice No Ice 1/2" Ice	5.75 6.18 6.61	4.25 5.01 5.71	0.06 0.10 0.16
HPA-65R-BUU-H6 w/ Mount Pipe	A	From Face	4.00 2.50 3.00	25.0000	140.00	1" Ice No Ice 1/2" Ice	9.90 10.47 11.01	8.11 9.30 10.21	0.08 0.16 0.25
HPA-65R-BUU-H8 w/ Mount Pipe	B	From Face	4.00 2.50 3.00	35.0000	140.00	1" Ice No Ice 1/2" Ice	13.21 13.90 14.59	9.58 11.05 12.50	0.10 0.20 0.30
HPA-65R-BUU-H8 w/ Mount Pipe	C	From Face	4.00 2.50 3.00	35.0000	140.00	1" Ice No Ice 1/2" Ice	13.21 13.90 14.59	9.58 11.05 12.50	0.10 0.20 0.30
(2) LGP21401	A	From Face	4.00 0.00 3.00	0.0000	140.00	1" Ice No Ice 1/2" Ice	1.10 1.24 1.38	0.35 0.44 0.54	0.01 0.02 0.03
(2) LGP21401	B	From Face	4.00	0.0000	140.00	1" Ice No Ice	1.10	0.35	0.01

Description	Face or Leg	Offset Type	Offsets: Horz Lateral Vert ft ft ft	Azimuth Adjustmen t °	Placement ft		C _A A _A Front ft ²	C _A A _A Side ft ²	Weight K
			0.00			1/2"	1.24	0.44	0.02
			3.00			Ice	1.38	0.54	0.03
						1" Ice			
(2) LGP21401	C	From Face	4.00	0.0000	140.00	No Ice	1.10	0.35	0.01
			0.00			1/2"	1.24	0.44	0.02
			3.00			Ice	1.38	0.54	0.03
						1" Ice			
RRUS 32 B2	A	From Face	4.00	0.0000	140.00	No Ice	2.73	1.67	0.05
			0.00			1/2"	2.95	1.86	0.07
			3.00			Ice	3.18	2.05	0.10
						1" Ice			
RRUS 32 B2	B	From Face	4.00	0.0000	140.00	No Ice	2.73	1.67	0.05
			0.00			1/2"	2.95	1.86	0.07
			3.00			Ice	3.18	2.05	0.10
						1" Ice			
RRUS 32 B2	C	From Face	4.00	0.0000	140.00	No Ice	2.73	1.67	0.05
			0.00			1/2"	2.95	1.86	0.07
			3.00			Ice	3.18	2.05	0.10
						1" Ice			
(2) LGP21901	A	From Face	4.00	0.0000	140.00	No Ice	0.23	0.16	0.01
			0.00			1/2"	0.29	0.21	0.01
			3.00			Ice	0.36	0.28	0.01
						1" Ice			
(2) LGP21901	C	From Face	4.00	0.0000	140.00	No Ice	0.23	0.16	0.01
			0.00			1/2"	0.29	0.21	0.01
			3.00			Ice	0.36	0.28	0.01
						1" Ice			
RRUS 11	A	From Face	4.00	0.0000	140.00	No Ice	2.78	1.19	0.05
			0.00			1/2"	2.99	1.33	0.07
			3.00			Ice	3.21	1.49	0.10
						1" Ice			
RRUS 11	B	From Face	4.00	0.0000	140.00	No Ice	2.78	1.19	0.05
			0.00			1/2"	2.99	1.33	0.07
			3.00			Ice	3.21	1.49	0.10
						1" Ice			
RRUS 11	C	From Face	4.00	0.0000	140.00	No Ice	2.78	1.19	0.05
			0.00			1/2"	2.99	1.33	0.07
			3.00			Ice	3.21	1.49	0.10
						1" Ice			
DC6-48-60-18-8F	B	From Face	1.00	0.0000	140.00	No Ice	0.92	0.92	0.02
			0.00			1/2"	1.46	1.46	0.04
			3.00			Ice	1.64	1.64	0.06
						1" Ice			

T-Arm Mount [TA 602-3]	C	None		0.0000	128.00	No Ice	11.59	11.59	0.77
						1/2"	15.44	15.44	0.99
						Ice	19.29	19.29	1.21
						1" Ice			
(2) DB846F65ZAXY w/ Mount Pipe	A	From Face	3.00	-10.0000	128.00	No Ice	7.27	7.82	0.05
			0.00			1/2"	7.83	9.01	0.11
			0.00			Ice	8.35	9.91	0.19
						1" Ice			
(2) DB846F65ZAXY w/ Mount Pipe	B	From Face	3.00	40.0000	128.00	No Ice	7.27	7.82	0.05
			0.00			1/2"	7.83	9.01	0.11
			0.00			Ice	8.35	9.91	0.19
						1" Ice			
(2) DB846F65ZAXY w/ Mount Pipe	C	From Face	3.00	20.0000	128.00	No Ice	7.27	7.82	0.05
			0.00			1/2"	7.83	9.01	0.11
			0.00			Ice	8.35	9.91	0.19
						1" Ice			
742 213 w/ Mount Pipe	A	From Face	3.00	-10.0000	128.00	No Ice	5.37	4.62	0.05
			-2.00			1/2"	5.95	6.00	0.09
			0.00			Ice	6.50	6.98	0.15
						1" Ice			
742 213 w/ Mount Pipe	A	From Face	3.00	-10.0000	128.00	No Ice	5.37	4.62	0.05
			2.00			1/2"	5.95	6.00	0.09
			0.00			Ice	6.50	6.98	0.15

Description	Face or Leg	Offset Type	Offsets: Horz Lateral Vert ft ft ft	Azimuth Adjustmen t °	Placement ft		C _A A _A Front ft ²	C _A A _A Side ft ²	Weight K
742 213 w/ Mount Pipe	B	From Face	3.00 -2.00 0.00	40.0000	128.00	1" Ice No Ice 1/2" Ice	5.37 5.95 6.50	4.62 6.00 6.98	0.05 0.09 0.15
742 213 w/ Mount Pipe	B	From Face	3.00 2.00 0.00	40.0000	128.00	1" Ice No Ice 1/2" Ice	5.37 5.95 6.50	4.62 6.00 6.98	0.05 0.09 0.15
742 213 w/ Mount Pipe	C	From Face	3.00 -2.00 0.00	20.0000	128.00	1" Ice No Ice 1/2" Ice	5.37 5.95 6.50	4.62 6.00 6.98	0.05 0.09 0.15
742 213 w/ Mount Pipe	C	From Face	3.00 2.00 0.00	20.0000	128.00	1" Ice No Ice 1/2" Ice	5.37 5.95 6.50	4.62 6.00 6.98	0.05 0.09 0.15
BXA-70063/6CF w/ Mount Pipe	A	From Face	3.00 0.00 0.00	-10.0000	128.00	1" Ice No Ice 1/2" Ice	7.82 8.37 8.89	5.41 6.56 7.42	0.04 0.10 0.17
BXA-70063/6CF w/ Mount Pipe	B	From Face	3.00 0.00 0.00	40.0000	128.00	1" Ice No Ice 1/2" Ice	7.82 8.37 8.89	5.41 6.56 7.42	0.04 0.10 0.17
BXA-70063/6CF w/ Mount Pipe	C	From Face	3.00 0.00 0.00	20.0000	128.00	1" Ice No Ice 1/2" Ice	7.82 8.37 8.89	5.41 6.56 7.42	0.04 0.10 0.17
RRH2x40-AWS	A	From Face	3.00 0.00 0.00	0.0000	128.00	1" Ice No Ice 1/2" Ice	2.16 2.36 2.57	1.42 1.59 1.77	0.04 0.06 0.08
RRH2x40-AWS	B	From Face	3.00 0.00 0.00	0.0000	128.00	1" Ice No Ice 1/2" Ice	2.16 2.36 2.57	1.42 1.59 1.77	0.04 0.06 0.08
RRH2x40-AWS	C	From Face	3.00 0.00 0.00	0.0000	128.00	1" Ice No Ice 1/2" Ice	2.16 2.36 2.57	1.42 1.59 1.77	0.04 0.06 0.08
DB-T1-6Z-8AB-0Z	A	From Face	3.00 0.00 0.00	0.0000	128.00	1" Ice No Ice 1/2" Ice	4.80 5.07 5.35	2.00 2.19 2.39	0.04 0.08 0.12
*** Side Arm Mount [2' SO 701-1]	B	From Leg	0.00 0.00 0.00	0.0000	50.00	1" Ice No Ice 1/2" Ice	0.57 0.76 0.95	1.11 1.56 2.00	0.04 0.05 0.06
2' x 2" Pipe Mount	B	From Leg	2.00 0.00 0.00	0.0000	50.00	1" Ice No Ice 1/2" Ice	0.02 0.05 0.09	0.02 0.05 0.09	0.01 0.01 0.01
KS24019-L112A	B	From Leg	2.00 0.00 1.00	0.0000	50.00	1" Ice No Ice 1/2" Ice 1" Ice	0.14 0.20 0.26	0.14 0.20 0.26	0.01 0.01 0.01

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
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	149.854 - 111.934	Pole	Max Tension	33	0.00	0.00	0.00
			Max. Compression	26	-24.44	-0.39	0.04
			Max. Mx	8	-8.29	-362.39	-0.62
			Max. My	14	-8.33	-0.57	-357.77
			Max. Vy	8	15.45	-362.39	-0.62
			Max. Vx	2	-15.19	0.60	357.72
			Max. Torque	17			0.42
			Max Tension	1	0.00	0.00	0.00
L2	111.934 - 76.434	Pole	Max. Compression	26	-33.27	-2.21	0.14
			Max. Mx	8	-14.05	-937.80	-2.57

Section No.	Elevation ft	Component Type	Condition	Gov. Load Comb.	Axial K	Major Axis Moment kip-ft	Minor Axis Moment kip-ft
L3	76.434 - 43.014	Pole	Max. My	14	-14.06	-2.83	-927.10
			Max. Vy	8	17.90	-937.80	-2.57
			Max. Vx	2	-17.84	2.25	927.05
			Max. Torque	25			-0.39
			Max Tension	1	0.00	0.00	0.00
			Max. Compression	26	-43.61	-4.46	0.12
			Max. Mx	8	-21.07	-1559.03	-4.46
			Max. My	14	-21.07	-5.13	-1547.77
			Max. Vy	8	20.17	-1559.03	-4.46
			Max. Vx	2	-20.20	3.61	1547.58
L4	43.014 - 0	Pole	Max. Torque	25			-0.43
			Max Tension	1	0.00	0.00	0.00
			Max. Compression	26	-61.89	-6.94	0.24
			Max. Mx	8	-34.57	-2615.04	-6.74
			Max. My	14	-34.57	-7.88	-2605.30
			Max. Vy	8	23.14	-2615.04	-6.74
			Max. Vx	2	-23.18	5.42	2605.12
			Max. Torque	25			-0.43

Maximum Reactions

Location	Condition	Gov. Load Comb.	Vertical K	Horizontal, X K	Horizontal, Z K
Pole	Max. Vert	30	61.89	-6.12	0.00
	Max. H _x	20	34.59	23.11	0.05
	Max. H _z	2	34.59	0.05	23.15
	Max. M _x	2	2605.12	0.05	23.15
	Max. M _z	8	2615.04	-23.11	-0.05
	Max. Torsion	13	0.42	-11.79	-20.17
	Min. Vert	19	25.94	19.99	-11.40
	Min. H _x	8	34.59	-23.11	-0.05
	Min. H _z	15	25.94	-0.05	-23.15
	Min. M _x	14	-2605.30	-0.05	-23.15
	Min. M _z	20	-2612.57	23.11	0.05
	Min. Torsion	25	-0.43	11.79	20.17

Tower Mast Reaction Summary

Load Combination	Vertical K	Shear _x K	Shear _z K	Overturning Moment, M _x kip-ft	Overturning Moment, M _z kip-ft	Torque kip-ft
Dead Only	28.82	0.00	0.00	0.07	-0.99	0.00
1.2 Dead+1.6 Wind 0 deg - No Ice	34.59	-0.05	-23.15	-2605.12	5.42	0.38
0.9 Dead+1.6 Wind 0 deg - No Ice	25.94	-0.05	-23.15	-2574.70	5.66	0.38
1.2 Dead+1.6 Wind 30 deg - No Ice	34.59	11.64	-20.00	-2250.18	-1313.69	0.23
0.9 Dead+1.6 Wind 30 deg - No Ice	25.94	11.64	-20.00	-2223.88	-1298.01	0.23
1.2 Dead+1.6 Wind 60 deg - No Ice	34.59	19.99	-11.40	-1284.00	-2261.60	0.02
0.9 Dead+1.6 Wind 60 deg - No Ice	25.94	19.99	-11.40	-1268.97	-2234.77	0.02
1.2 Dead+1.6 Wind 90 deg - No Ice	34.59	23.11	0.05	6.74	-2615.04	-0.19
0.9 Dead+1.6 Wind 90 deg - No Ice	25.94	23.11	0.05	6.63	-2584.07	-0.18
1.2 Dead+1.6 Wind 120 deg - No Ice	34.59	20.04	11.48	1295.66	-2268.21	-0.34
0.9 Dead+1.6 Wind 120 deg	25.94	20.04	11.48	1280.45	-2241.30	-0.34

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
- No Ice						
1.2 Dead+1.6 Wind 150 deg	34.59	11.79	20.17	2267.49	-1331.26	-0.42
- No Ice						
0.9 Dead+1.6 Wind 150 deg	25.94	11.79	20.17	2240.99	-1315.40	-0.42
- No Ice						
1.2 Dead+1.6 Wind 180 deg	34.59	0.05	23.15	2605.30	-7.88	-0.38
- No Ice						
0.9 Dead+1.6 Wind 180 deg	25.94	0.05	23.15	2574.82	-7.49	-0.38
- No Ice						
1.2 Dead+1.6 Wind 210 deg	34.59	-11.64	20.00	2250.34	1311.22	-0.25
- No Ice						
0.9 Dead+1.6 Wind 210 deg	25.94	-11.64	20.00	2224.00	1296.17	-0.25
- No Ice						
1.2 Dead+1.6 Wind 240 deg	34.59	-19.99	11.40	1284.17	2259.13	-0.04
- No Ice						
0.9 Dead+1.6 Wind 240 deg	25.94	-19.99	11.40	1269.09	2232.94	-0.04
- No Ice						
1.2 Dead+1.6 Wind 270 deg	34.59	-23.11	-0.05	-6.57	2612.57	0.19
- No Ice						
0.9 Dead+1.6 Wind 270 deg	25.94	-23.11	-0.05	-6.51	2582.24	0.18
- No Ice						
1.2 Dead+1.6 Wind 300 deg	34.59	-20.04	-11.48	-1295.49	2265.74	0.36
- No Ice						
0.9 Dead+1.6 Wind 300 deg	25.94	-20.04	-11.48	-1280.33	2239.47	0.36
- No Ice						
1.2 Dead+1.6 Wind 330 deg	34.59	-11.79	-20.17	-2267.32	1328.80	0.43
- No Ice						
0.9 Dead+1.6 Wind 330 deg	25.94	-11.79	-20.17	-2240.87	1313.57	0.43
- No Ice						
1.2 Dead+1.0 Ice+1.0 Temp	61.89	0.00	-0.00	-0.24	-6.94	-0.00
1.2 Dead+1.0 Wind 0	61.89	0.00	-6.13	-702.41	-7.12	-0.03
deg+1.0 Ice+1.0 Temp						
1.2 Dead+1.0 Wind 30	61.89	3.06	-5.31	-608.38	-357.17	0.03
deg+1.0 Ice+1.0 Temp						
1.2 Dead+1.0 Wind 60	61.89	5.30	-3.07	-351.38	-613.42	0.09
deg+1.0 Ice+1.0 Temp						
1.2 Dead+1.0 Wind 90	61.89	6.12	-0.00	-0.29	-707.17	0.13
deg+1.0 Ice+1.0 Temp						
1.2 Dead+1.0 Wind 120	61.89	5.30	3.07	350.81	-613.37	0.13
deg+1.0 Ice+1.0 Temp						
1.2 Dead+1.0 Wind 150	61.89	3.17	5.50	627.28	-368.32	0.09
deg+1.0 Ice+1.0 Temp						
1.2 Dead+1.0 Wind 180	61.89	-0.00	6.13	701.92	-7.02	0.03
deg+1.0 Ice+1.0 Temp						
1.2 Dead+1.0 Wind 210	61.89	-3.06	5.31	607.89	343.04	-0.03
deg+1.0 Ice+1.0 Temp						
1.2 Dead+1.0 Wind 240	61.89	-5.30	3.07	350.89	599.28	-0.09
deg+1.0 Ice+1.0 Temp						
1.2 Dead+1.0 Wind 270	61.89	-6.12	0.00	-0.20	693.04	-0.13
deg+1.0 Ice+1.0 Temp						
1.2 Dead+1.0 Wind 300	61.89	-5.30	-3.07	-351.30	599.23	-0.13
deg+1.0 Ice+1.0 Temp						
1.2 Dead+1.0 Wind 330	61.89	-3.17	-5.50	-627.77	354.18	-0.09
deg+1.0 Ice+1.0 Temp						
Dead+Wind 0 deg - Service	28.82	-0.01	-4.57	-511.11	0.28	0.08
Dead+Wind 30 deg - Service	28.82	2.30	-3.95	-441.46	-258.55	0.05
Dead+Wind 60 deg - Service	28.82	3.95	-2.25	-251.89	-444.54	0.01
Dead+Wind 90 deg - Service	28.82	4.56	0.01	1.37	-513.90	-0.04
Dead+Wind 120 deg - Service	28.82	3.95	2.26	254.28	-445.84	-0.07
Dead+Wind 150 deg - Service	28.82	2.33	3.98	444.98	-262.01	-0.08
Dead+Wind 180 deg - Service	28.82	0.01	4.57	511.25	-2.33	-0.08
Dead+Wind 210 deg - Service	28.82	-2.30	3.95	441.60	256.49	-0.05
Dead+Wind 240 deg - Service	28.82	-3.95	2.25	252.02	442.49	-0.01
Dead+Wind 270 deg - Service	28.82	-4.56	-0.01	-1.24	511.85	0.04
Dead+Wind 300 deg -	28.82	-3.95	-2.26	-254.14	443.79	0.07

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
Service Dead+Wind 330 deg - Service	28.82	-2.33	-3.98	-444.84	259.95	0.09

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	-28.82	0.00	0.00	28.82	0.00	0.000%
2	-0.05	-34.59	-23.15	0.05	34.59	23.15	0.000%
3	-0.05	-25.94	-23.15	0.05	25.94	23.15	0.000%
4	11.64	-34.59	-20.00	-11.64	34.59	20.00	0.000%
5	11.64	-25.94	-20.00	-11.64	25.94	20.00	0.000%
6	19.99	-34.59	-11.40	-19.99	34.59	11.40	0.000%
7	19.99	-25.94	-11.40	-19.99	25.94	11.40	0.000%
8	23.11	-34.59	0.05	-23.11	34.59	-0.05	0.000%
9	23.11	-25.94	0.05	-23.11	25.94	-0.05	0.000%
10	20.04	-34.59	11.48	-20.04	34.59	-11.48	0.000%
11	20.04	-25.94	11.48	-20.04	25.94	-11.48	0.000%
12	11.79	-34.59	20.17	-11.79	34.59	-20.17	0.000%
13	11.79	-25.94	20.17	-11.79	25.94	-20.17	0.000%
14	0.05	-34.59	23.15	-0.05	34.59	-23.15	0.000%
15	0.05	-25.94	23.15	-0.05	25.94	-23.15	0.000%
16	-11.64	-34.59	20.00	11.64	34.59	-20.00	0.000%
17	-11.64	-25.94	20.00	11.64	25.94	-20.00	0.000%
18	-19.99	-34.59	11.40	19.99	34.59	-11.40	0.000%
19	-19.99	-25.94	11.40	19.99	25.94	-11.40	0.000%
20	-23.11	-34.59	-0.05	23.11	34.59	0.05	0.000%
21	-23.11	-25.94	-0.05	23.11	25.94	0.05	0.000%
22	-20.04	-34.59	-11.48	20.04	34.59	11.48	0.000%
23	-20.04	-25.94	-11.48	20.04	25.94	11.48	0.000%
24	-11.79	-34.59	-20.17	11.79	34.59	20.17	0.000%
25	-11.79	-25.94	-20.17	11.79	25.94	20.17	0.000%
26	0.00	-61.89	0.00	-0.00	61.89	0.00	0.000%
27	0.00	-61.89	-6.13	-0.00	61.89	6.13	0.000%
28	3.06	-61.89	-5.31	-3.06	61.89	5.31	0.000%
29	5.30	-61.89	-3.07	-5.30	61.89	3.07	0.000%
30	6.12	-61.89	-0.00	-6.12	61.89	0.00	0.000%
31	5.30	-61.89	3.07	-5.30	61.89	-3.07	0.000%
32	3.17	-61.89	5.50	-3.17	61.89	-5.50	0.000%
33	-0.00	-61.89	6.13	0.00	61.89	-6.13	0.000%
34	-3.06	-61.89	5.31	3.06	61.89	-5.31	0.000%
35	-5.30	-61.89	3.07	5.30	61.89	-3.07	0.000%
36	-6.12	-61.89	0.00	6.12	61.89	-0.00	0.000%
37	-5.30	-61.89	-3.07	5.30	61.89	3.07	0.000%
38	-3.17	-61.89	-5.50	3.17	61.89	5.50	0.000%
39	-0.01	-28.82	-4.57	0.01	28.82	4.57	0.000%
40	2.30	-28.82	-3.95	-2.30	28.82	3.95	0.000%
41	3.95	-28.82	-2.25	-3.95	28.82	2.25	0.000%
42	4.56	-28.82	0.01	-4.56	28.82	-0.01	0.000%
43	3.95	-28.82	2.26	-3.95	28.82	-2.26	0.000%
44	2.33	-28.82	3.98	-2.33	28.82	-3.98	0.000%
45	0.01	-28.82	4.57	-0.01	28.82	-4.57	0.000%
46	-2.30	-28.82	3.95	2.30	28.82	-3.95	0.000%
47	-3.95	-28.82	2.25	3.95	28.82	-2.25	0.000%
48	-4.56	-28.82	-0.01	4.56	28.82	0.01	0.000%
49	-3.95	-28.82	-2.26	3.95	28.82	2.26	0.000%
50	-2.33	-28.82	-3.98	2.33	28.82	3.98	0.000%

Non-Linear Convergence Results

Load Combination	Converged?	Number of Cycles	Displacement Tolerance	Force Tolerance
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1	Yes	4	0.00000001	0.00000001
2	Yes	4	0.00000001	0.00073584
3	Yes	4	0.00000001	0.00026374
4	Yes	6	0.00000001	0.00011046
5	Yes	5	0.00000001	0.00092138
6	Yes	6	0.00000001	0.00010932
7	Yes	5	0.00000001	0.00091192
8	Yes	4	0.00000001	0.00069841
9	Yes	4	0.00000001	0.00021606
10	Yes	6	0.00000001	0.00010941
11	Yes	5	0.00000001	0.00091234
12	Yes	6	0.00000001	0.00011220
13	Yes	5	0.00000001	0.00093516
14	Yes	5	0.00000001	0.00004518
15	Yes	4	0.00000001	0.00054392
16	Yes	6	0.00000001	0.00010940
17	Yes	5	0.00000001	0.00091261
18	Yes	6	0.00000001	0.00010921
19	Yes	5	0.00000001	0.00091125
20	Yes	4	0.00000001	0.00090328
21	Yes	4	0.00000001	0.00041242
22	Yes	6	0.00000001	0.00011096
23	Yes	5	0.00000001	0.00092569
24	Yes	6	0.00000001	0.00011023
25	Yes	5	0.00000001	0.00091875
26	Yes	4	0.00000001	0.00006046
27	Yes	5	0.00000001	0.00087629
28	Yes	6	0.00000001	0.00017219
29	Yes	6	0.00000001	0.00017135
30	Yes	5	0.00000001	0.00088197
31	Yes	6	0.00000001	0.00017215
32	Yes	6	0.00000001	0.00017779
33	Yes	5	0.00000001	0.00087572
34	Yes	6	0.00000001	0.00016776
35	Yes	6	0.00000001	0.00016833
36	Yes	5	0.00000001	0.00086572
37	Yes	6	0.00000001	0.00016768
38	Yes	6	0.00000001	0.00017455
39	Yes	4	0.00000001	0.00006387
40	Yes	4	0.00000001	0.00049559
41	Yes	4	0.00000001	0.00048407
42	Yes	4	0.00000001	0.00006110
43	Yes	4	0.00000001	0.00048099
44	Yes	4	0.00000001	0.00051404
45	Yes	4	0.00000001	0.00006615
46	Yes	4	0.00000001	0.00047928
47	Yes	4	0.00000001	0.00048143
48	Yes	4	0.00000001	0.00006215
49	Yes	4	0.00000001	0.00050059
50	Yes	4	0.00000001	0.00048428

Maximum Tower Deflections - Service Wind

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
L1	149.854 - 111.934	22.905	42	1.4619	0.0012
L2	115.764 - 76.434	13.254	44	1.1541	0.0006
L3	81.264 - 43.014	6.226	44	0.7709	0.0003
L4	48.684 - 0	2.128	44	0.4103	0.0001

Critical Deflections and Radius of Curvature - Service Wind

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
150.00	Platform Mount [10' LP 601-1]	42	22.905	1.4619	0.0012	27760
140.00	Platform Mount [LP 304-1]	42	19.961	1.3777	0.0010	14085
128.00	T-Arm Mount [TA 602-3]	44	16.499	1.2713	0.0008	6351
50.00	Side Arm Mount [2' SO 701-1]	44	2.243	0.4236	0.0001	4676

Maximum Tower Deflections - Design Wind

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
L1	149.854 - 111.934	116.519	8	7.4468	0.0056
L2	115.764 - 76.434	67.461	12	5.8805	0.0030
L3	81.264 - 43.014	31.712	12	3.9304	0.0014
L4	48.684 - 0	10.839	12	2.0912	0.0006

Critical Deflections and Radius of Curvature - Design Wind

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
150.00	Platform Mount [10' LP 601-1]	8	116.519	7.4468	0.0064	5610
140.00	Platform Mount [LP 304-1]	8	101.558	7.0183	0.0051	2845
128.00	T-Arm Mount [TA 602-3]	8	83.945	6.4772	0.0039	1280
50.00	Side Arm Mount [2' SO 701-1]	12	11.427	2.1588	0.0006	920

Compression Checks

Pole Design Data

Section No.	Elevation ft	Size	L ft	L _u ft	KI/r	A in ²	P _u K	φP _n K	Ratio $\frac{P_u}{\phi P_n}$
L1	149.854 - 111.934 (1)	TP26.59x18x0.1875	37.92	0.00	0.0	15.196 5	-8.29	1026.75	0.008
L2	111.934 - 76.434 (2)	TP34.14x25.3474x0.3125	39.33	0.00	0.0	32.481 6	-14.05	2384.60	0.006
L3	76.434 - 43.014 (3)	TP40.97x32.4352x0.3125	38.25	0.00	0.0	39.072 3	-21.06	2713.66	0.008
L4	43.014 - 0 (4)	TP50x39.0798x0.375	48.68	0.00	0.0	59.066 2	-34.57	4033.20	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	149.854 - 111.934 (1)	TP26.59x18x0.1875	362.39	539.40	0.672	0.00	539.40	0.000
L2	111.934 - 76.434 (2)	TP34.14x25.3474x0.3125	937.81	1603.11	0.585	0.00	1603.11	0.000
L3	76.434 -	TP40.97x32.4352x0.3125	1561.06	2198.00	0.710	0.00	2198.00	0.000

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 $\frac{M_{uy}}{\phi M_{ny}}$
L4	43.014 (3) 43.014 - 0 (4)	TP50x39.0798x0.375	2629.41	4116.93	0.639	0.00	4116.93	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	149.854 - 111.934 (1)	TP26.59x18x0.1875	15.45	513.37	0.030	0.23	1080.13	0.000
L2	111.934 - 76.434 (2)	TP34.14x25.3474x0.3125	17.90	1192.30	0.015	0.23	3210.14	0.000
L3	76.434 - 43.014 (3)	TP40.97x32.4352x0.3125	20.41	1356.83	0.015	0.42	4401.38	0.000
L4	43.014 - 0 (4)	TP50x39.0798x0.375	23.40	2016.60	0.012	0.42	8243.93	0.000

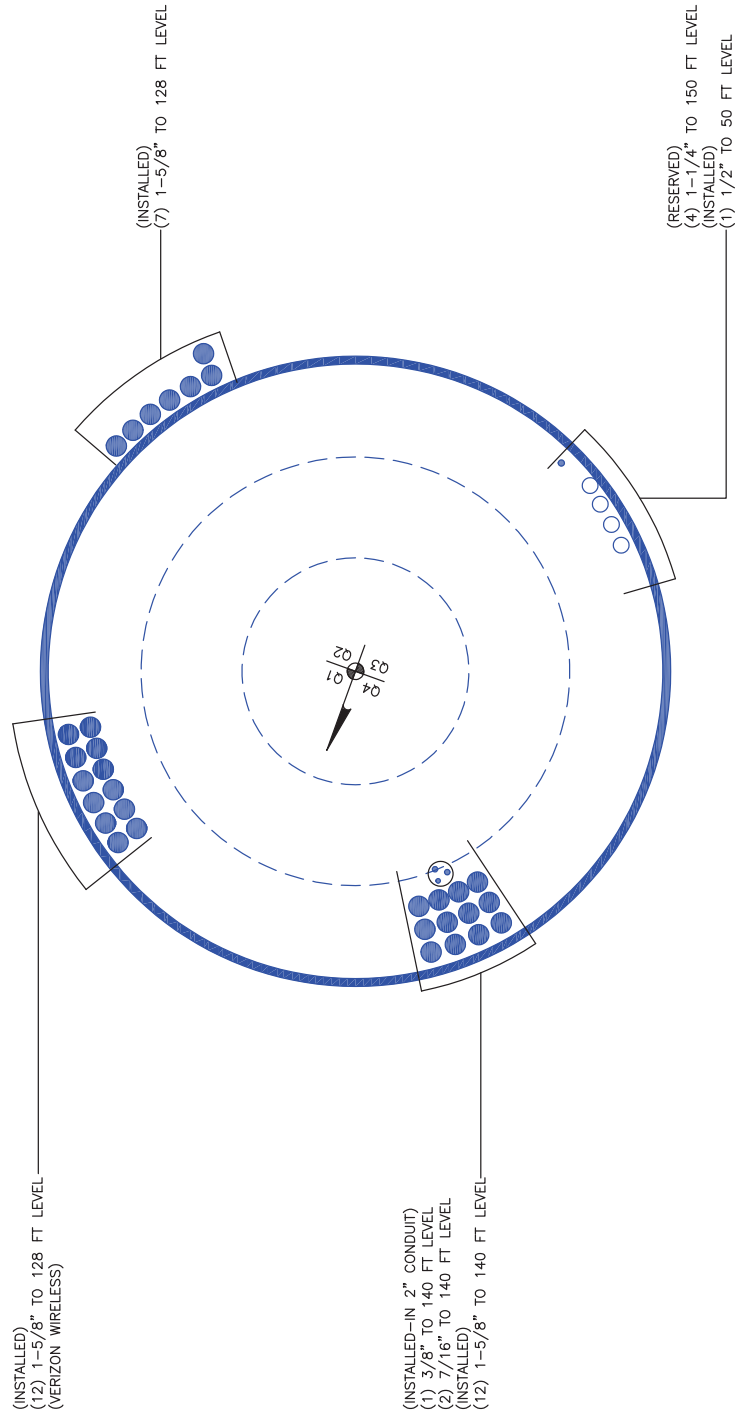
Pole Interaction Design Data

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	149.854 - 111.934 (1)	0.008	0.672	0.000	0.030	0.000	0.681	1.000	4.8.2
L2	111.934 - 76.434 (2)	0.006	0.585	0.000	0.015	0.000	0.591	1.000	4.8.2
L3	76.434 - 43.014 (3)	0.008	0.710	0.000	0.015	0.000	0.718	1.000	4.8.2
L4	43.014 - 0 (4)	0.009	0.639	0.000	0.012	0.000	0.647	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	149.854 - 111.934	Pole	TP26.59x18x0.1875	1	-8.29	1026.75	68.1	Pass
L2	111.934 - 76.434	Pole	TP34.14x25.3474x0.3125	2	-14.05	2384.60	59.1	Pass
L3	76.434 - 43.014	Pole	TP40.97x32.4352x0.3125	3	-21.06	2713.66	71.8	Pass
L4	43.014 - 0	Pole	TP50x39.0798x0.375	4	-34.57	4033.20	64.7	Pass
							Summary	
							Pole (L3)	Pass
							RATING = 71.8	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#:	876383
Site Name:	CLINTON / ANDERSON'S PROPER
App #:	420710 Rev. 1
Pole Manufacturer:	Other

Anchor Rod Data

Qty:	12	
Diam:	2.25	in
Rod Material:	A615-J	
Strength (Fu):	100	ksi
Yield (Fy):	75	ksi
Bolt Circle:	59	in

Plate Data

Diam:	65	in
Thick:	1.75	in
Grade:	60	ksi
Single-Rod B-eff:	13.22	in

Stiffener Data (Welding at both sides)

Config:	3	*
Weld Type:	Both	
Groove Depth:	0.5	in **
Groove Angle:	45	degrees
Fillet H. Weld:	0.5	in
Fillet V. Weld:	0.375	in
Width:	6	in
Height:	18	in
Thick:	1.25	in
Notch:	0.75	in
Grade:	50	ksi
Weld str.:	70	ksi
Clear Space between	6	in

Pole Data

Diam:	50	in
Thick:	0.375	in
Grade:	65	ksi
# of Sides:	18	"0" IF Round
Fu	80	ksi
Reinf. Fillet Weld	0	"0" if None

Reactions

Mu:	2629	ft-kips
Axial, Pu:	35	kips
Shear, Vu:	23	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/η): 185.0 Kips
 Allowable Axial, $\Phi \cdot F_u \cdot A_{net}$: 260.0 Kips
 Anchor Rod Stress Ratio: 71.2% **Pass**

Stiffened
AISC LRFD
$\phi \cdot T_n$

Base Plate Results

Base Plate Stress: 37.6 ksi
 Allowable Plate Stress: 54.0 ksi
 Base Plate Stress Ratio: 69.7% **Pass**

Flexural Check

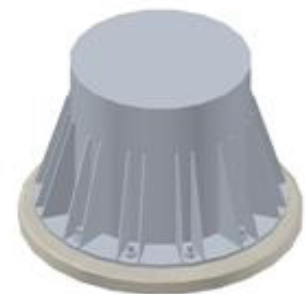
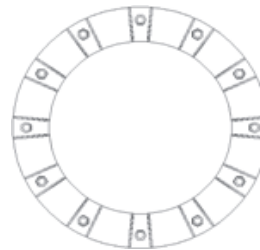
Stiffened
AISC LRFD
$\phi \cdot F_y$
Y.L. Length:
N/A, Roark

Stiffener Results

Horizontal Weld : 43.1% **Pass**
 Vertical Weld: 28.7% **Pass**
 Plate Flex+Shear, $f_b/F_b + (f_v/F_v)^2$: 5.6% **Pass**
 Plate Tension+Shear, $f_t/F_t + (f_v/F_v)^2$: 26.0% **Pass**
 Plate Comp. (AISC Bracket): 27.3% **Pass**

Pole Results

Pole Punching Shear Check: 8.6% **Pass**



* 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 # : 876383
 Site Name: CLINTON / ANDEF
 App. Number: 420710 Rev. 1

TIA-222 Revision: G
 Tower Type: Monopole

Block Foundation?: ☐

Superstructure Analysis Reactions		
Compression, P_{comp} :	35	kips
Base Shear, V_{u_comp} :	23	kips
Moment, M_u :	2629	ft-kips
Tower Height, H :	149.854	ft
BP Dist. Above Fdn, bp_{dist} :	4.25	in

Pier Properties		
Pier Shape:	Square	
Pier Diameter, $dpier$:	6.5	ft
Ext. Above Grade, E :	0.50	ft
Pier Rebar Size, Sc :	8	
Pier Rebar Quantity, mc :	39	
Pier Tie/Spiral Size, St :	4	
Pier Tie/Spiral Quantity, mt :	3	
Pier Reinforcement Type:	Tie	
Pier Clear Cover, cc_{pier} :	4	in

Pad Properties		
Depth, D :	5.0	ft
Pad Width, W :	24.5	ft
Pad Thickness, T :	3.0	ft
Pad Rebar Size, Sp :	8	
Pad Rebar Quantity, mp :	40	
Pad Clear Cover, cc_{pad} :	3	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 :	100	pcf
Ultimate Gross Bearing, Q_{ult} :	20.000	ksf
Cohesion, C_u :		ksf
Friction Angle, ϕ :	30	degrees
SPT Blow Count, N_{blows} :	6	
Base Friction, μ :		
Neglected Depth, N :	3.30	ft
Foundation Bearing on Rock?	Yes	
Groundwater Depth, gw :	N/A	ft

Foundation Analysis Checks				
	Capacity	Demand	Rating	Check
Lateral (Sliding) (kips)	143.73	23.00	16.0%	Pass
Bearing Pressure (ksf)	15.00	2.65	17.7%	Pass
Overturing (kip*ft)	4569.61	2763.65	60.5%	Pass
Pier Flexure (Comp.) (kip*ft)	4560.67	2686.50	58.9%	Pass
Pier Compression (kip)	26891.28	54.01	0.2%	Pass
Pad Flexure (kip*ft)	4344.44	1065.30	24.5%	Pass
Pad Shear - 1-way (kips)	878.58	163.69	18.6%	Pass
Pad Shear - 2-way (ksi)	0.19	0.03	14.9%	Pass

Soil Rating:	60.5%
Structural Rating:	58.9%

<--Toggle between Gross and Net

The Assessor's office is responsible for the maintenance of records on the ownership of properties. Assessments are computed at 70% of the estimated market value of real property at the time of the last revaluation which was 2016.



Information on the Property Records for the Municipality of Killingworth was last updated on 2/10/2018.

Parcel Information

Location:	7 SHERWOOD FOREST LANE	Property Use:	Residential	Primary Use:	Residential
Unique ID:	00247300	Map Block Lot:	37-03	Acres:	2.14
490 Acres:	0.00	Zone:	R-2	Volume / Page:	0218/0491
Developers Map / Lot:	SM1902/SPRINT E	Census:	6401		

Value Information

	Appraised Value	Assessed Value
Land	247,499	173,250

	Appraised Value	Assessed Value
Buildings	0	0
Detached Outbuildings	0	0
Total	247,499	173,250

Owner's Information

Owner's Data

ANDERSON SHERWOOD & DIAN TRUSTEES
GLOBAL SIGNAL ACQ II LLC
PMB 331, 4017 WASHINGTON RD
MCMURRAY, PA 15317

Owner History - Sales

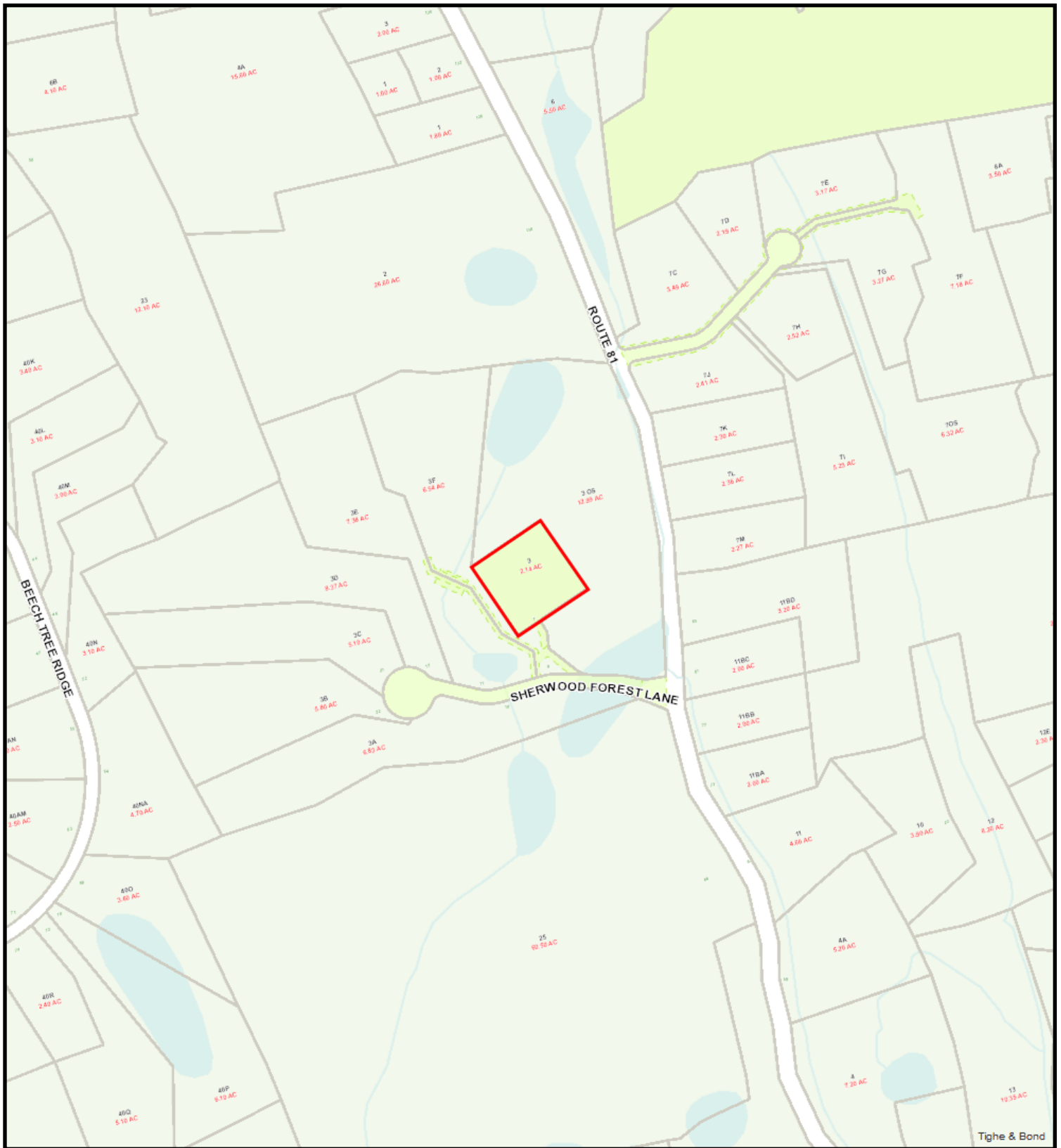
Owner Name	Volume	Page	Sale Date	Deed Type	Valid Sale	Sale Price
ANDERSON SHERWOOD & DIAN TRUSTEES	0218	0491	06/07/2006	Warranty Deed	Yes	\$0
ANDERSON SHERWOOD R	0218	0225	05/26/2005		No	\$0
ANDERSON SHERWOOD R	0087	0642	11/06/1985		No	\$0

Building Permits

Permit Number	Permit Type	Date Opened	Date Closed	Permit Status	Reason
14-062	Electrical	04/22/2014		Closed	REPLACE 6 ANTENNAS
12-397	Commercial	12/11/2012		Closed	CELL TOWER MAINTENANCE

Permit Number	Permit Type	Date Opened	Date Closed	Permit Status	Reason
12-377	Building	12/05/2012		Closed	
12-071	Building	03/03/2012		Closed	ADD 6 LINES TO EXISTING INSTALLATION
09-E032		07/25/2009		Closed	ELECTRICAL INSTALL;
09-C002		07/05/2009		Closed	ADDITION TO CELL TOWER;

Information Published With Permission From The Assessor



2/15/2018 1:35:48 PM

Scale: 1"=500'

Scale is approximate

The information depicted on this map is for planning purposes only.
It is not adequate for legal boundary definition, regulatory
interpretation, or parcel-level analyses.



VOL. 160 PAGE 392

IN RE APPLICATION
SPECIAL EXCEPTION
SPRINT SPECTRUM L.P.

KILLINGWORTH PLANNING
AND ZONING COMMISSION
MARCH 21, 2000

MEMORANDUM OF DECISION

An application #149 of SPRINT SPECTRUM L.P. for a Special Exception under Section 120 of the Zoning Regulations for Communication Tower was submitted to the Planning & Zoning Commission at its meeting of February 1, 2000. The property is located at Route 81 and is shown on Tax Map 37, Parcel 3. The owner as recorded in the Killingworth Land Records (Volume 87, Page 642) is Sherwood R. Anderson. The application was considered under the standards prescribed in Section 120G of the Zoning Regulations.

The Commission, at its meeting of March 21, 2000, voted to approve the application for Special Exception with the following conditions:

1. Leased area must encompass the full zone of the tower.
2. Lighting be limited to time of service repairs.

Charles E. Martens
Charles E. Martens, Chairman

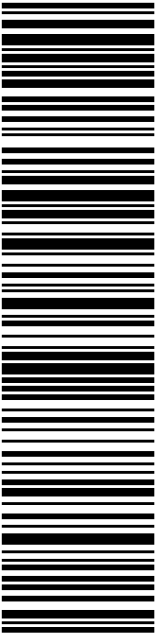
Dated at Killingworth, Connecticut this 3rd day of April, 2000.

Certified a true and correct copy of that
which is on file with the Killingworth
Planning & Zoning Commission

Date: 4/5/00 Time: 12:50 PM

Clerk of KP&ZC: Judith R. Brown

Received for record April 6, 2000
at 10 h 00 m A M and recorded by
[Signature] Town Clerk

 UNITED STATES POSTAL SERVICE®		Click-N-Ship®	
P		usps.com US POSTAGE Flat Rate Env \$6.70	
03/17/2018		9405 8036 9930 0608 1308 88 0067 0000 0010 6419 	
PRIORITY MAIL 1-DAY™		Mailed from 06268 024P	
MARK J ROBERTS QC DEVELOPMENT PO BOX 916 STORRS CT 06268-0916		Expected Delivery Date: 03/19/18 0024	
R005			
SHIP CATHERINE LINO TO: TOWN OF KILLINGWORTH 323 ROUTE 81 SELECTMANS OFFICE KILLINGWORTH CT 06419-1218			
USPS TRACKING #			
			
9405 8036 9930 0608 1308 88			
Electronic Rate Approved #038555749			



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 0608 1308 88

Trans. #:	430130260	Priority Mail® Postage:	\$6.70
Print Date:	03/17/2018	Insurance Fee	\$0.00
Ship Date:	03/17/2018	Total	\$6.70
Expected			
Delivery Date:	03/19/2018		
Insured Value:	\$50.00		

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

To: CATHERINE LINO
TOWN OF KILLINGWORTH
323 ROUTE 81
SELECTMANS OFFICE
KILLINGWORTH CT 06419-1218

* 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



Shipment Confirmation Acceptance Notice

A. Mailer Action

Note To Mailer: The labels and volume associated to this form online, **must** match the labeled packages being presented to the USPS® employee with this form.

Shipment Date: 03/17/18

Shipped From:

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

Type of Mail	Volume
Priority Mail®	7
Priority Mail Express™*	0
International Mail*	0
Other	0
Total Volume	7

*Start time for products with service guarantees will begin when mail arrives at the local Post Office™ and items receive individual processing and acceptance scans.

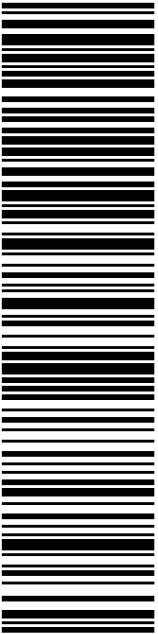
B. USPS Action

- USPS EMPLOYEE: Please scan upon pickup or receipt of mail. Leave form with customer or in customer's mail receptacle.
- Employee verifies the package volume count on the Package Pickup Carrier Manifest.
 - If the volume on the manifest matches the volume being collected from the customer, the employee should make the **1:YES** selection by pressing the number 1 on the keypad of the handheld scanner, or on the keyboard of the POS ONE terminal.
 - If the volume on the manifest does not match the volume being collected from the customer, the employee should make the **2:NO** selection. The mail should still be collected and dispatched as normal.

USPS SCAN



9475 7036 9930 0264 5734 10

 Click-N-Ship®		P
USPS.com US POSTAGE Flat Rate Env 9405 8036 9930 0608 1308 95 0067 0000 0041 5317 03/17/2018		
PRIORITY MAIL 3-DAY™		Mailed from 06268 024P
MARK J ROBERTS QC DEVELOPMENT PO BOX 916 STORRS CT 06268-0916		Expected Delivery Date: 03/20/18 0006
SHIP TO: SHERWOOD & DIANE ANDERSON (TRUSTEES) GLOBAL SIGNAL ACQ II LLC 4017 WASHINGTON RD PMB 331 MCMURRAY PA 15317-2520		
USPS TRACKING # 		
9405 8036 9930 0608 1308 95		
Electronic Rate Approved #038555749		

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 0608 1308 95

Trans. #:	430130260	Priority Mail® Postage:	\$6.70
Print Date:	03/17/2018	Insurance Fee	\$0.00
Ship Date:	03/17/2018	Total	\$6.70
Expected			
Delivery Date:	03/20/2018		
Insured Value:	\$50.00		

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

To: SHERWOOD & DIANE ANDERSON (TRUSTEES)
 GLOBAL SIGNAL ACQ II LLC
 4017 WASHINGTON RD
 PMB 331
 MCMURRAY PA 15317-2520

* 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



Shipment Confirmation Acceptance Notice

A. Mailer Action

Note To Mailer: The labels and volume associated to this form online, **must** match the labeled packages being presented to the USPS® employee with this form.

Shipment Date: 03/17/18

Shipped From:

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

Type of Mail	Volume
Priority Mail®	7
Priority Mail Express™*	0
International Mail*	0
Other	0
Total Volume	7

*Start time for products with service guarantees will begin when mail arrives at the local Post Office™ and items receive individual processing and acceptance scans.

B. USPS Action

- USPS EMPLOYEE: Please scan upon pickup or receipt of mail. Leave form with customer or in customer's mail receptacle.
- Employee verifies the package volume count on the Package Pickup Carrier Manifest.
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USPS SCAN



9475 7036 9930 0264 5734 10