EMPIRE telecom

November 8, 2018

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

Regarding:	Notice of Exempt Modification – Antenna Modification
Property Address:	223 Brainard Rd., Hartford, CT 06114-2102
Applicant:	AT&T Mobility ("AT&T", Site# CT5126

Dear Ms. Bachman:

AT&T currently maintains a wireless telecommunications facility on an existing 100-foot monopole at the above-referenced address, latitude 41.732997°, longitude -72.662047°. Said monopole is owned by Crown Castle and the underlying property owner is the Metropolitan District.

AT&T desires to modify its existing telecommunications facility by adding three (3) antennas, replacing (3) antennas and its ancillary equipment, and adding (9) Nine remote-radio heads ("RRHs"). The centerline height of the existing antennas is and will remain at 103 feet.

Please accept this application as notification pursuant to R.C.S.A. §16-50j-73, for construction that constitutes an exempt modification pursuant to R.C.S.A. §16-50j-72 (b)(2). In accordance with R.C.S.A. §16-50j-73, a copy of this letter is being sent to the Honorable Luke Bronin, Mayor of the City of Hartford, Caitlin Palmer, as Chief of Zoning Administration with the City of Hartford, the Metropolitan District, and as property owner and the tower owner, Crown Castle.

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

1. The planned modification will not result in an increase in the height of the existing structure. The added antennas and accessory equipment along with equipment to be swapped will be installed at the existing height of 103 feet on the 100-foot monopole.

2. The proposed modifications will not involve any changes to ground-mounted equipment, and therefore will not require an extension of the site boundary.

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

4. The operation of the modified facility will not increase radio frequency (RF) emissions at the facility to a level at or above Federal Communications Commission (FCC) safety standard. An RF emissions calculation (enclosed) for AT&T's modified facility is herein provided.

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 AT&T's proposed modifications (please see enclosed structural analysis completed by Black and Veach, Corp., dated February 27th, 2018; Stamped on September 06, 2018

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

Sincerely,

Nora Oliver

Nora Oliver
Site Acquisition Manager
noliver@empiretelecomm.com

Enclosures: Exhibit 1 – Field Card and GIS Map
Exhibit 2 – Construction Drawings
Exhibit 3 – Structural Analysis
Exhibit 4 – RF Emissions Analysis Report Evaluation

cc: Honorable Luke Bronin, Mayor of the City of Hartford
Caitlin Palmer, as Chief of Zoning Administration with the City of Hartford
Property Owner; Crown Castle, As Tower Owner

Unofficial Property Record Card - City of Hartford, CT

General Property Data

Parcel ID 317-817-002
Prior Parcel ID
Property Owner THE METROPOLITAN DISTRICT
Mailing Address 555 MAIN ST
City HARTFORD
Mailing State CT Zip 06103-2915
ParcelZoning ID-1

Account Number
Property Location 221 BRAINARD RD HARTFORD
Property Use SPECIAL ACTS
Most Recent Sale Date 12/16/2010
Legal Reference 06402-0246
Grantor 221-223 BRAINARD ROAD LLC
Sale Price 4,705,000
Land Area 121,500.000 square feet

Current Property Assessment

Card 1 Value	Building Value	Xtra Features Value	Land Value	Total Value
	1,543,500	66,640	518,840	2,128,980

Building Description

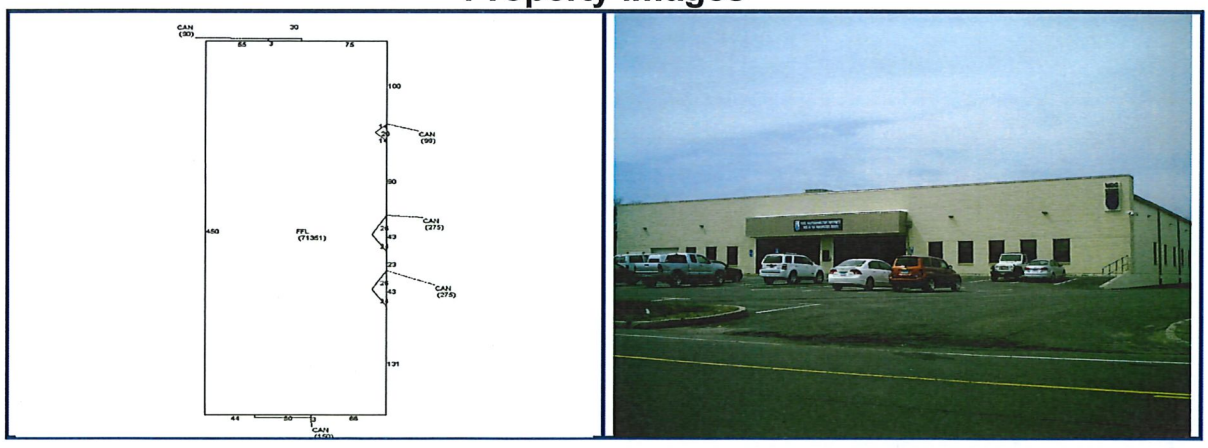
Building Style WAREHSE	Foundation Type Concrete	Flooring Type COMBINATION
# of Living Units 0	Frame Type Steel	Basement Floor N/A
Year Built 1975	Roof Structure FLAT	Heating Type Warm Air
Building Grade Average	Roof Cover Membrane	Heating Fuel Gas
Building Condition N/A	Siding Conc Block	Air Conditioning 32%
Finished Area (SF) 71351	Interior Walls DRYWALL	# of Bsmt Garages 0
Number Rooms 0	# of Bedrooms 0	# of Full Baths 0
# of 3/4 Baths 0	# of 1/2 Baths 0	# of Other Fixtures 0

Legal Description

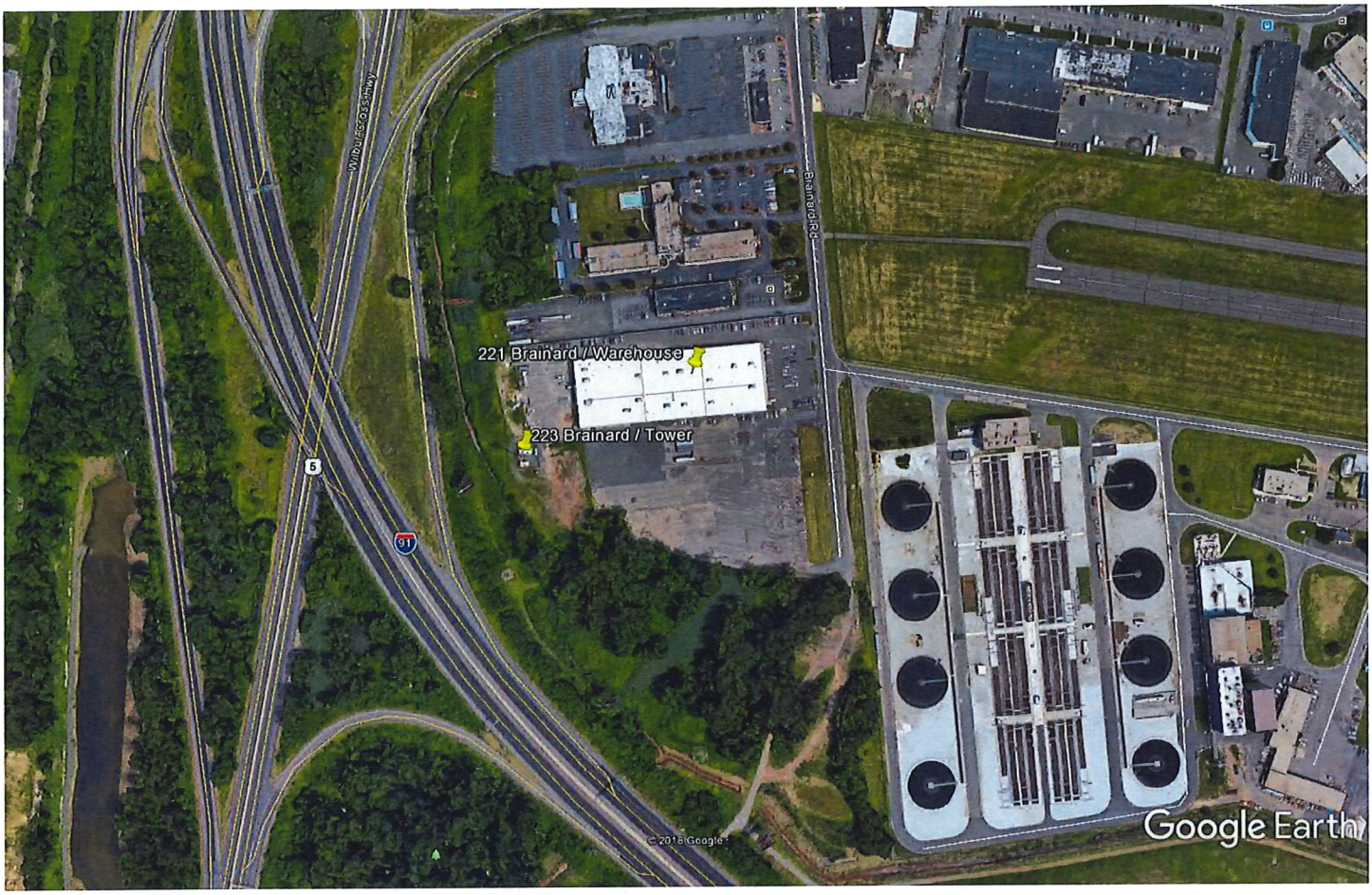
Narrative Description of Property

This property contains 121,500.000 square feet of land mainly classified as SPECIAL ACTS with a(n) WAREHSE style building, built about 1975 , having Conc Block exterior and Membrane roof cover, with 0 commercial unit(s) and 0 residential unit(s), 0 room(s), 0 bedroom(s), 0 bath(s), 0 half bath(s).

Property Images



Disclaimer: This information is believed to be correct but is subject to change and is not warranteed.



Google Earth

feet 1000
meters 500

Radio Frequency Emissions Analysis Report

AT&T Existing Facility

Site ID: CT5126

FA#: 10071011
USID: 4539

East Hartford Hochanum
223 Brainerd Road
Hartford, CT 06114

April 19, 2018

Centerline Communications Project Number: 950006-115

Site Compliance Summary	
Compliance Status:	**COMPLIANT**
Site total MPE% of FCC general population allowable limit:	**38.60 %**

April 19, 2018

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

Emissions Analysis for Site: **CT5126 – East Hartford Hochanum**

Centerline Communications, LLC ("Centerline") was directed to analyze the proposed AT&T facility located at **223 Brainerd Road, Hartford, CT**, for the purpose of determining whether the emissions from the Proposed AT&T Antenna Installation located on this property are within specified federal limits.

All information used in this report was analyzed as a percentage of current Maximum Permissible Exposure (% MPE) as listed in the FCC OET Bulletin 65 Edition 97-01and ANSI/IEEE Std C95.1. The FCC regulates Maximum Permissible Exposure in units of microwatts per square centimeter (μW/cm2). The number of $\mu W/cm^2$ calculated at each sample point is called the power density. The exposure limit for power density varies depending upon the frequencies being utilized. Wireless Carriers and Paging Services use different frequency bands each with different exposure limits, therefore it is necessary to report results and limits in terms of percent MPE rather than power density.

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

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

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

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

Additional details can be found in FCC OET 65.

CALCULATIONS

Calculations were performed for the proposed AT&T Wireless antenna facility located at **223 Brainerd Road, Hartford, CT**, using the equipment information listed below. All calculations were performed per the specifications under FCC OET 65. Since AT&T is proposing highly focused directional panel antennas, which project most of the emitted energy out toward the horizon, all calculations were performed assuming a lobe representing the maximum gain of the antenna per the antenna manufactures supplied specifications, minus 10 dB, was focused at the base of the tower. For this report the sample point is the top of a 6-foot person standing at the base of the tower.

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

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

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

Technology	Frequency Band	Channel Count	Transmit Power per Channel (W)
UMTS	850 MHz	2	30
UMTS	1900 MHz (PCS)	2	30
LTE	700 MHz	2	40
LTE	1900 MHz (PCS)	4	40
LTE	700 MHz (Band 14)	4	40
LTE	2100 MHz (AWS)	4	30
LTE	2300 MHz (WCS)	4	30

Table 1: Channel Data Table

The following antennas listed in *Table 2* were used in the modeling for transmission in the 700 MHz, 850 MHz, 1900 MHz (PCS), 2100 MHz (AWS) and 2300 MHz (WCS) frequency bands. This is based on feedback from the carrier with regards to anticipated antenna selection. Maximum gain values for all antennas are listed in the Inventory and Power Data table below. The maximum gain of the antenna per the antenna manufactures supplied specifications, minus 10 dB, was used for all calculations. This value is a very conservative estimate as gain reductions for these particular antennas are typically much higher in this direction.

Sector	Antenna Number	Antenna Make / Model	Antenna Centerline (ft)
A	1	Powerwave 7770	101
A	2	CCI HPA-65R-BUU-H6	101
A	3	Kathrein 800-10965	101
A	4	CCI OPA-65R-LCUU-H6	101
B	1	Powerwave 7770	101
B	2	CCI HPA-65R-BUU-H6	101
B	3	Kathrein 800-10965	101
B	4	CCI OPA-65R-LCUU-H6	101
C	1	Powerwave 7770	101
C	2	CCI HPA-65R-BUU-H6	101
C	3	Kathrein 800-10965	101
C	4	CCI OPA-65R-LCUU-H6	101

Table 2: Antenna Data

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

RESULTS

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

Antenna ID	Antenna Make / Model	Frequency Bands	Antenna Gain (dBd)	Channel Count	Total TX Power (W)	ERP (W)	MPE %
Antenna A1	Powerwave 7770	850 MHz / 1900 MHz (PCS)	11.4 / 13.4	4	120	2,140.89	1.10
Antenna A2	CCI HPA-65R-BUU-H6	700 MHz / 1900 MHz (PCS)	11.95 / 14.75	6	200	4,835.86	2.50
Antenna A3	Kathrein 800-10965	700 MHz (Band 14) / 2100 MHz (AWS)	12.65 / 15.95	8	280	7,667.84	4.39
Antenna A4	CCI OPA-65R-LCUU-H6	2300 MHz (WCS)	15.45	4	120	4,209.02	1.68
						Sector A Composite MPE%	**9.67**
Antenna B1	Powerwave 7770	850 MHz / 1900 MHz (PCS)	11.4 / 13.4	4	120	2,140.89	1.10
Antenna B2	CCI HPA-65R-BUU-H6	700 MHz / 1900 MHz (PCS)	11.95 / 14.75	6	200	4,835.86	2.50
Antenna B3	Kathrein 800-10965	700 MHz (Band 14) / 2100 MHz (AWS)	12.65 / 15.95	8	280	7,667.84	4.39
Antenna B4	CCI OPA-65R-LCUU-H6	2300 MHz (WCS)	15.45	4	120	4,209.02	1.68
						Sector B Composite MPE%	**9.67**
Antenna C1	Powerwave 7770	850 MHz / 1900 MHz (PCS)	11.4 / 13.4	4	120	2,140.89	1.10
Antenna C2	CCI HPA-65R-BUU-H6	700 MHz / 1900 MHz (PCS)	11.95 / 14.75	6	200	4,835.86	2.50
Antenna C3	Kathrein 800-10965	700 MHz (Band 14) / 2100 MHz (AWS)	12.65 / 15.95	8	280	7,667.84	4.39
Antenna C4	CCI OPA-65R-LCUU-H6	2300 MHz (WCS)	15.45	4	120	4,209.02	1.68
						Sector C Composite MPE%	**9.67**

Table 3: AT&T Emissions Levels

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

Site Composite MPE%	
Carrier	**MPE%**
AT&T – Max Sector Value	**9.67 %**
Verizon Wireless	28.59 %
Clearwire	0.34 %
Site Total MPE %:	**38.60 %**

Table 4: All Carrier MPE Contributions

AT&T Sector A Total:	9.67 %
AT&T Sector B Total:	9.67 %
AT&T Sector C Total:	9.67 %
Site Total:	38.60 %

Table 5: Site MPE Summary

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

AT&T _ Frequency Band / Technology Max Power Values (Per Sector)	# Channels	Watts ERP (Per Channel)	Height (feet)	Total Power Density ($\mu W/cm^2$)	Frequency (MHz)	Allowable MPE ($\mu W/cm^2$)	Calculated % MPE
AT&T 850 MHz UMTS (Antenna 1)	2	414.12	101	3.30	850 MHz	567	0.58%
AT&T 1900 MHz (PCS) UMTS (Antenna 1)	2	656.33	101	5.23	1900 MHz (PCS)	1000	0.52%
AT&T 700 MHz LTE (Antenna 2)	2	626.70	101	4.99	700 MHz	467	1.07%
AT&T 1900 MHz (PCS) LTE (Antenna 2)	4	895.61	101	14.27	1900 MHz (PCS)	1000	1.43%
AT&T 700 MHz LTE – Band 14 (Antenna 3)	4	736.31	101	11.73	700 MHz	467	2.51%
AT&T 2100 MHz (AWS) LTE (Antenna 3)	4	1,180.65	101	18.81	2100 MHz (AWS)	1000	1.88%
AT&T 2300 MHz (WCS) LTE (Antenna 4)	4	1,052.26	101	16.77	2300 MHz (WCS)	1000	1.68%
						Total:	**9.67%**

Table 6: AT&T Maximum Sector MPE Power Values

Summary

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

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

AT&T Sector	Power Density Value (%)
Sector A:	9.67 %
Sector B:	9.67 %
Sector C:	9.67 %
AT&T Maximum Total (per sector):	9.67 %
Site Total:	38.60 %
Site Compliance Status:	**COMPLIANT**

The anticipated composite MPE value for this site assuming all carriers present is **38.60 %** of the allowable FCC established general population limit sampled at the ground level. This is based upon values listed in the Connecticut Siting Council database for existing carrier emissions.

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

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

WIRELESS COMMUNICATIONS FACILITY
CT5126 - LTE 3C/4C/5C/RETRO/6C
EAST HARTFORD HOCHANUM
CROWN CASTLE SITE NO.: 842861
223 BRAINARD ROAD
HARTFORD, CT 06114

GENERAL NOTES

1. ALL WORK SHALL BE IN ACCORDANCE WITH THE 2012 INTERNATIONAL BUILDING CODE AS MODIFIED BY THE 2016 CONNECTICUT STATE BUILDING CODE, INCLUDING THE TIA-222 REVISION "G" STRUCTURAL STANDARDS FOR STEEL ANTENNA TOWERS AND SUPPORTING STRUCTURES, 2016 CONNECTICUT FIRE SAFETY CODE AND, NATIONAL ELECTRICAL CODE AND LOCAL CODES.
2. THE COMPOUND, TOWER, PRIMARY GROUND RING, ELECTRICAL SERVICE TO THE METER BANK AND TELEPHONE SERVICE TO THE DEMARCATION POINT ARE PROVIDED BY SITE OWNER. AS BUILT FIELD CONDITIONS REGARDING THESE ITEMS SHALL BE CONFIRMED BY THE CONTRACTOR. SHOULD ANY FIELD CONDITIONS PRECLUDE COMPLIANCE WITH THE DRAWINGS, THE CONTRACTOR SHALL IMMEDIATELY NOTIFY THE ENGINEER AND SHALL NOT PROCEED WITH ANY AFFECTED WORK.
3. CONTRACTOR SHALL REVIEW ALL DRAWINGS AND SPECIFICATIONS IN THE CONTRACT DOCUMENT SET. CONTRACTOR SHALL COORDINATE ALL WORK SHOWN IN THE SET OF DRAWINGS. THE CONTRACTOR SHALL PROVIDE A COMPLETE SET OF DRAWINGS TO ALL SUBCONTRACTORS AND ALL RELATED PARTIES. THE SUBCONTRACTORS SHALL EXAMINE ALL THE DRAWINGS AND SPECIFICATIONS FOR THE INFORMATION THAT AFFECTS THEIR WORK.
4. CONTRACTOR SHALL PROVIDE A COMPLETE BUILD-OUT WITH ALL FINISHES, STRUCTURAL, MECHANICAL, AND ELECTRICAL COMPONENTS AND PROVIDE ALL ITEMS AS SHOWN OR INDICATED ON THE DRAWINGS OR IN THE WRITTEN SPECIFICATIONS.
5. CONTRACTOR SHALL FURNISH ALL MATERIAL, LABOR AND EQUIPMENT TO COMPLETE THE WORK AND FURNISH A COMPLETED JOB ALL IN ACCORDANCE WITH LOCAL AND STATE GOVERNING AUTHORITIES AND OTHER AUTHORITIES HAVING LAWFUL JURISDICTION OVER THE WORK.
6. CONTRACTOR SHALL SECURE AND PAY FOR ALL PERMITS AND ALL INSPECTIONS REQUIRED AND SHALL ALSO PAY FEES REQUIRED FOR THE GENERAL CONSTRUCTION, PLUMBING, ELECTRICAL AND HVAC. PERMITS SHALL BE PAID FOR BY THE RESPECTIVE SUBCONTRACTORS.
7. CONTRACTOR SHALL MAINTAIN A CURRENT SET OF DRAWINGS AND SPECIFICATIONS ON SITE AT ALL TIMES AND INSURE DISTRIBUTION OF NEW DRAWINGS TO SUBCONTRACTORS AND OTHER RELEVANT PARTIES AS SOON AS THEY ARE MADE AVAILABLE. ALL OLD DRAWINGS SHALL BE MARKED VOID AND REMOVED FROM THE CONTRACT AREA. THE CONTRACTOR SHALL FURNISH AN "AS-BUILT" SET OF DRAWINGS TO OWNER UPON COMPLETION OF PROJECT.
8. LOCATION OF EQUIPMENT, AND WORK SUPPLIED BY OTHERS THAT IS DIAGRAMMATICALLY INDICATED ON THE DRAWINGS SHALL BE DETERMINED BY THE CONTRACTOR. THE CONTRACTOR SHALL DETERMINE LOCATIONS AND DIMENSIONS SUBJECT TO STRUCTURAL CONDITIONS AND WORK OF THE SUBCONTRACTORS.
9. THE CONTRACTOR IS SOLELY RESPONSIBLE TO DETERMINE CONSTRUCTION PROCEDURE AND SEQUENCE, AND TO ENSURE THE SAFETY OF THE EXISTING STRUCTURES AND ITS COMPONENT PARTS DURING CONSTRUCTION. THIS INCLUDES THE ADDITION OF WHATEVER SHORING, BRACING, UNDERPINNING, ETC. THAT MAY BE NECESSARY. MAINTAIN EXISTING BUILDING'S/PROPERTY'S OPERATIONS, COORDINATE WORK WITH BUILDING/PROPERTY OWNER.
10. DRAWINGS INDICATE THE MINIMUM STANDARDS, BUT IF ANY WORK SHOULD BE INDICATED TO BE SUBSTANDARD TO ANY ORDINANCES, LAWS, CODES, RULES, OR REGULATIONS BEARING ON THE WORK, THE CONTRACTOR SHALL INCLUDE IN HIS WORK AND SHALL EXECUTE THE WORK CORRECTLY IN ACCORDANCE WITH SUCH ORDINANCES, LAWS, CODES, RULES OR REGULATIONS WITH NO INCREASE IN COSTS.
11. ALL UTILITY WORK SHALL BE IN ACCORDANCE WITH LOCAL UTILITY COMPANY REQUIREMENTS AND SPECIFICATIONS.
12. ALL EQUIPMENT AND PRODUCTS PURCHASED ARE TO BE REVIEWED BY CONTRACTOR AND ALL APPLICABLE SUBCONTRACTORS FOR ANY CONDITION PER MFR.'S RECOMMENDATIONS. CONTRACTOR TO SUPPLY THESE ITEMS AT NO COST TO OWNER OR CONSTRUCTION MANAGER.
13. ANY AND ALL ERRORS, DISCREPANCIES, AND 'MISSED" ITEMS ARE TO BE BROUGHT TO THE ATTENTION OF THE AT&T CONSTRUCTION MANAGER DURING THE BIDDING PROCESS BY THE CONTRACTOR. ALL THESE ITEMS ARE TO BE INCLUDED IN THE BID. NO 'EXTRA' WILL BE ALLOWED FOR MISSED ITEMS.
14. CONTRACTOR SHALL BE RESPONSIBLE FOR ALL ON-SITE SAFETY FROM THE TIME THE JOB IS AWARDED UNTIL ALL WORK IS COMPLETE AND ACCEPTED BY THE OWNER.
15. CONTRACTOR TO REVIEW ALL SHOP DRAWINGS AND SUBMIT COPY TO ENGINEER FOR APPROVAL. DRAWINGS MUST BEAR THE CHECKER'S INITIALS BEFORE SUBMITTING TO THE CONSTRUCTION MANAGER FOR REVIEW.
16. THE CONTRACTOR SHALL FIELD VERIFY ALL DIMENSIONS, ELEVATIONS, ANGLES, AND EXISTING CONDITIONS AT THE SITE, PRIOR TO FABRICATION AND/OR INSTALLATION OF ANY WORK IN THE CONTRACT AREA.
17. COORDINATION, LAYOUT, FURNISHING AND INSTALLATION OF CONDUIT AND ALL APPURTENANCES REQUIRED FOR PROPER INSTALLATION OF ELECTRICAL AND TELECOMMUNICATION SERVICE SHALL BE THE SOLE RESPONSIBILITY OF THE CONTRACTOR.
18. ALL EQUIPMENT AND PRODUCTS PURCHASED ARE TO BE REVIEWED BY CONTRACTOR AND ALL APPLICABLE SUB-CONTRACTORS FOR ANY CONDITION PER THE MANUFACTURER'S RECOMMENDATIONS. CONTRACTOR TO SUPPLY THESE ITEMS AT NO COST TO OWNER OR CONSTRUCTION MANAGER.
19. ALL DAMAGE CAUSED TO ANY EXISTING STRUCTURE SHALL BE THE SOLE RESPONSIBILITY OF THE CONTRACTOR. THE CONTRACTOR WILL BE HELD LIABLE FOR ALL REPAIRS REQUIRED FOR EXISTING STRUCTURES IF DAMAGED DURING CONSTRUCTION ACTIVITIES.
20. THE CONTRACTOR SHALL CONTACT "CALL BEFORE YOU DIG" AT LEAST 48 HOURS PRIOR TO ANY EXCAVATIONS AT 1-800-922-4455. ALL UTILITIES SHALL BE IDENTIFIED AND CLEARLY MARKED PRIOR TO ANY EXCAVATION WORK. CONTRACTOR SHALL MAINTAIN AND PROTECT MARKED UTILITIES THROUGHOUT PROJECT COMPLETION.
21. CONTRACTOR SHALL COMPLY WITH OWNERS ENVIRONMENTAL ENGINEER ON ALL METHODS AND PROVISIONS FOR ALL EXCAVATION ACTIVITIES INCLUDING SOIL DISPOSAL. ALL BACKFILL MATERIALS TO BE PROVIDED BY THE CONTRACTOR.

SITE DIRECTIONS

FROM: 500 ENTERPRISE DRIVE, ROCKY HILL, CONNECTICUT

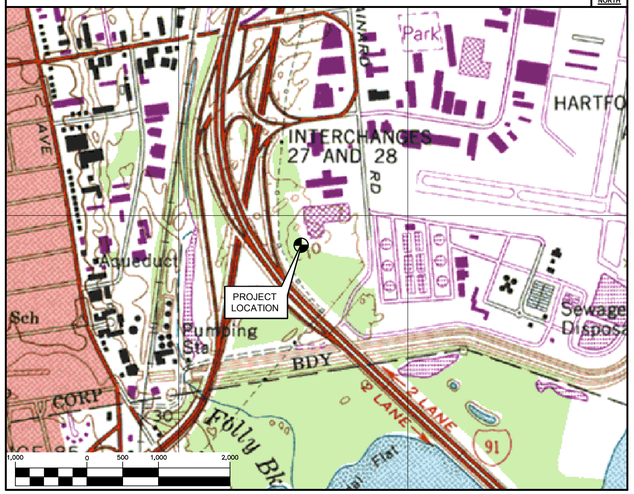
TO: 223 BRAINARD ROAD, HARTFORD, CONNECTICUT

1.	HEAD NORTHEAST ON ENTERPRISE DR TOWARD CAPITAL BLVD	0.36 MI
2.	TURN LEFT ONTO CAPITAL BLVD	0.27 MI
3.	TURN LEFT ONTO WEST ST	0.16 MI
4.	TURN LEFT TO MERGE ONTO I-91 N TOWARD HARTFORD	6.50 MI
5.	TURN RIGHT ONTO BRAINARD RD	0.55 MI
6.	ARRIVE AT 223 BRAINARD RD	

VICINITY MAP

SCALE: 1" = 1000'

NORTH



PROJECT SUMMARY

1. THE PROPOSED SCOPE OF WORK CONSISTS OF A MODIFICATION TO THE EXISTING UNMANNED TELECOMMUNICATIONS FACILITY INCLUDING THE FOLLOWING:

A. AT ANTENNAS SECTORS

- REMOVE (3) POWERWAVE 7770 ANTENNAS FROM POSITION 4 (1 ANTENNA PER SECTOR).
- INSTALL (3) NEW OCTO-PORT ANTENNAS, (1) PER SECTOR ON POSITION 3.
- INSTALL (3) NEW OCTO-PORT ANTENNAS, (1) PER SECTOR ON POSITION 4.
- INSTALL (3) NEW LOW BAND COMBINERS
- INSTALL (3) NEW RRUS-32 B2 BEHIND POSITION 2 ANTENNAS, (1) PER SECTOR.
- INSTALL (3) NEW RRUS-B14 4478 BEHIND POSITION 3 ANTENNAS, (1) PER SECTOR.
- INSTALL (3) NEW RRUS-32 B66 BEHIND POSITION 3 ANTENNAS, (1) PER SECTOR.
- INSTALL (3) NEW RRUS-32 BEHIND POSITION 4 ANTENNAS, (1) PER SECTOR.
- INSTALL (1) NEW DC SQUID ARRESTOR AT POS.3 (ALPHA)
- INSTALL (1) NEW DC/FIBER SQUID AT POS.2 (ALPHA)
- REMOVE (3) RRUS-12+RRUS-A2, FROM POSITION 2.

B. WORK WITHIN EXISTING AT&T EQUIPMENT SHELTER

- INSTALL (3) NEW RRUS-12 AND (6) SURGE ARRESTORS
- INSTALL (2) NEW XMU + IDLE UNITS INSIDE AT&T LTE RACK
- DECOMMISSION & REMOVE EXISTING GSM EQUIPMENT CABINETS, TYP. OF (2).
- DECOMMISSION AND REMOVE EXISTING DC POWER PLANT
- DECOMMISSION AND REMOVE EXISTING BATTERY RACK
- INSTALL (1) NEW EMERSON NETSURE 721 DC POWER PLANT
- INSTALL (1) NEW EMERSON NETSURE 721 DC BATTERY RACK
- INSTALL (3) NEW LOWBAND COMBINERS

PROJECT INFORMATION

AT&T SITE NUMBER:	CT5126
AT&T SITE NAME:	EAST HARTFORD HOCHANUM
SITE ADDRESS:	CROWN CASTLE SITE NO.: 842861 223 BRAINARD ROAD HARTFORD, CT 06114
LESSEE/APPLICANT:	AT&T MOBILITY 500 ENTERPRISE DRIVE, SUITE 3A ROCKY HILL, CT 06067
ENGINEER:	CENTEK ENGINEERING, INC. 63-2 NORTH BRANFORD RD. BRANFORD, CT 06405
PROJECT COORDINATES:	LATITUDE: 41°-43'-58.77" N LONGITUDE: 72°-39'-43.37" W GROUND ELEVATION: ±9' AMSL SITE COORDINATES AND GROUND ELEVATION REFERENCED FROM GOOGLE EARTH.

SHEET INDEX

SHT. NO.	DESCRIPTION	REV.
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N-1	NOTES, SPECIFICATIONS AND ANTENNA SCEHDULES	1
C-1	COMPOUND PLAN AND ELEVATION	1
C-2	DETAILS	1
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REV.	DATE	DRAWN BY	CHK'D BY	DESCRIPTION
1	11/02/18	DMD	CAG	CONSTRUCTION DRAWINGS - REVISED FOR CONSTRUCTION
0	05/31/18	DMD	CAG	CONSTRUCTION DRAWINGS - ISSUED FOR CONSTRUCTION

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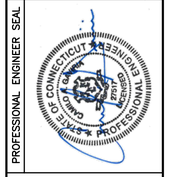

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HARTFORD, CT 06114

DATE: 01/02/19
SCALE: AS NOTED
JOB NO. 18000.09

TITLE SHEET

T-1

NOTES AND SPECIFICATIONS

DESIGN BASIS:

GOVERNING CODE: 2012 INTERNATIONAL BUILDING (IBC) AS MODIFIED BY THE 2016 CT STATE BUILDING CODE AND AMENDMENTS.

1. DESIGN CRITERIA:

- WIND LOAD: PER TIA 222 G (ANTENNA MOUNTS): 90–105 MPH (3 SECOND GUST)
- RISK CATEGORY: II (BASED ON IBC TABLE 1604.5)
- NOMINAL DESIGN SPEED (OTHER STRUCTURE): 97 MPH (Vasd) (EXPOSURE C/IMPORTANCE FACTOR 1.0 BASED ON ASCE 7–10) PER 2012 INTERNATIONAL BUILDING CODE (IBC) AS MODIFIED BY THE 2016 CONNECTICUT STATE BUILDING CODE.
- SEISMIC LOAD (DOES NOT CONTROL): PER ASCE 7–10 MINIMUM DESIGN LOADS FOR BUILDING AND OTHER STRUCTURES.

GENERAL NOTES:

1. ALL CONSTRUCTION SHALL BE IN COMPLIANCE WITH THE GOVERNING BUILDING CODE.
2. DRAWINGS INDICATE THE MINIMUM STANDARDS, BUT IF ANY WORK SHOULD BE INDICATED TO BE SUBSTANDARD TO ANY ORDINANCES, LAWS, CODES, RULES, OR REGULATIONS BEARING ON THE WORK, THE CONTRACTOR SHALL INCLUDE IN HIS WORK AND SHALL EXECUTE THE WORK CORRECTLY IN ACCORDANCE WITH SUCH ORDINANCES, LAWS, CODES, RULES OR REGULATIONS WITH NO INCREASE IN COSTS.
3. BEFORE BEGINNING THE WORK, THE CONTRACTOR IS RESPONSIBLE FOR MAKING SUCH INVESTIGATIONS CONCERNING PHYSICAL CONDITIONS (SURFACE AND SUBSURFACE) AT OR CONTIGUOUS TO THE SITE WHICH MAY AFFECT PERFORMANCE AND COST OF THE WORK.
4. DIMENSIONS AND DETAILS SHALL BE CHECKED AGAINST EXISTING FIELD CONDITIONS.
5. THE CONTRACTOR SHALL VERIFY AND COORDINATE THE SIZE AND LOCATION OF ALL OPENINGS, SLEEVES AND ANCHOR BOLTS AS REQUIRED BY ALL TRADES.
6. ALL DIMENSIONS, ELEVATIONS, AND OTHER REFERENCES TO EXISTING STRUCTURES, SURFACE, AND SUBSURFACE CONDITIONS ARE APPROXIMATE. NO GUARANTEE IS MADE FOR THE ACCURACY OR COMPLETENESS OF THE INFORMATION SHOWN. THE CONTRACTOR SHALL VERIFY AND COORDINATE ALL DIMENSIONS, ELEVATIONS, ANGLES WITH EXISTING CONDITIONS AND WITH ARCHITECTURAL AND SITE DRAWINGS BEFORE PROCEEDING WITH ANY WORK.
7. AS THE WORK PROGRESSES, THE CONTRACTOR SHALL NOTIFY THE OWNER OF ANY CONDITIONS WHICH ARE IN CONFLICT OR OTHERWISE NOT CONSISTENT WITH THE CONSTRUCTION DOCUMENTS AND SHALL NOT PROCEED WITH SUCH WORK UNTIL THE CONFLICT IS SATISFACTORILY RESOLVED.
8. THE CONTRACTOR SHALL COMPLY WITH ALL APPLICABLE SAFETY CODES AND REGULATIONS DURING ALL PHASES OF CONSTRUCTION. THE CONTRACTOR IS SOLELY RESPONSIBLE FOR PROVIDING AND MAINTAINING ADEQUATE SHORING, BRACING, AND BARRICADES AS MAY BE REQUIRED FOR THE PROTECTION OF EXISTING PROPERTY, CONSTRUCTION WORKERS, AND FOR PUBLIC SAFETY.
9. THE CONTRACTOR IS SOLELY RESPONSIBLE TO DETERMINE CONSTRUCTION PROCEDURE AND SEQUENCE, AND TO ENSURE THE SAFETY OF THE EXISTING STRUCTURES AND ITS COMPONENT PARTS DURING CONSTRUCTION. THIS INCLUDES THE ADDITION OF WHATEVER SHORING, BRACING, UNDERPINNING, ETC. THAT MAY BE NECESSARY. MAINTAIN EXISTING SITE OPERATIONS, COORDINATE WORK WITH NORTHEAST UTILITIES
10. THE STRUCTURE IS DESIGNED TO BE SELF–SUPPORTING AND STABLE AFTER FOUNDATION REMEDIATION WORK IS COMPLETE. IT IS THE CONTRACTOR'S SOLE RESPONSIBILITY TO DETERMINE ERECTION PROCEDURE AND SEQUENCE AND TO ENSURE THE SAFETY OF THE STRUCTURE AND ITS COMPONENT PARTS DURING ERECTION. THIS INCLUDES THE ADDITION OF WHATEVER SHORING, TEMPORARY BRACING, GUYS OR TIEDOWNS, WHICH MIGHT BE NECESSARY.
11. ALL DAMAGE CAUSED TO ANY EXISTING STRUCTURE SHALL BE THE SOLE RESPONSIBILITY OF THE CONTRACTOR. THE CONTRACTOR WILL BE HELD LIABLE FOR ALL REPAIRS REQUIRED FOR EXISTING STRUCTURES IF DAMAGED DURING CONSTRUCTION ACTIVITIES.
12. SHOP DRAWINGS, CONCRETE MIX DESIGNS, TEST REPORTS, AND OTHER SUBMITTALS PERTAINING TO STRUCTURAL WORK SHALL BE FORWARDED TO THE OWNER FOR REVIEW BEFORE FABRICATION AND/OR INSTALLATION IS MADE. SHOP DRAWINGS SHALL INCLUDE ERECTION DRAWINGS AND COMPLETE DETAILS OF CONNECTIONS AS WELL AS MANUFACTURER'S SPECIFICATION DATA WHERE APPROPRIATE. SHOP DRAWINGS SHALL BE CHECKED BY THE CONTRACTOR AND BEAR THE CHECKER'S INITIALS BEFORE BEING SUBMITTED FOR REVIEW.
13. NO DRILLING WELDING OR TAPING ON EVERSOURCE OWNED EQUIPMENT.
14. REFER TO DRAWING T1 FOR ADDITIONAL NOTES AND REQUIREMENTS.

STRUCTURAL STEEL

1. ALL STRUCTURAL STEEL IS DESIGNED BY ALLOWABLE STRESS DESIGN (ASD)
   - A. STRUCTURAL STEEL (W SHAPES)–––ASTM A992 (FY = 50 KSI)
   - B. STRUCTURAL STEEL (OTHER SHAPES)–––ASTM A36 (FY = 36 KSI)
   - C. STRUCTURAL HSS (RECTANGULAR SHAPES)–––ASTM A500 GRADE B, (FY = 46 KSI)
   - D. STRUCTURAL HSS (ROUND SHAPES)–––ASTM A500 GRADE B, (FY = 42 KSI)
   - E. PIPE–––ASTM A53 (FY = 35 KSI)
   - F. CONNECTION BOLTS–––ASTM A325–N
   - G. U–BOLTS–––ASTM A36
   - H. ANCHOR RODS–––ASTM F 1554
   - I. WELDING ELECTRODE–––ASTM E 70XX
2. CONTRACTOR TO REVIEW ALL SHOP DRAWINGS AND SUBMIT COPY TO ENGINEER FOR APPROVAL. DRAWINGS MUST BEAR THE CHECKER'S INITIALS BEFORE SUBMITTING TO THE ENGINEER FOR REVIEW. SHOP DRAWINGS SHALL INCLUDE THE FOLLOWING: SECTION PROFILES, SIZES, CONNECTION ATTACHMENTS, REINFORCING, ANCHORAGE, SIZE AND TYPE OF FASTENERS AND ACCESSORIES. INCLUDE ERECTION DRAWINGS, ELEVATIONS AND DETAILS.
3. STRUCTURAL STEEL SHALL BE DETAILED, FABRICATED AND ERECTED IN ACCORDANCE WITH THE LATEST PROVISIONS OF AISC MANUAL OF STEEL CONSTRUCTION.
4. PROVIDE ALL PLATES, CLIP ANGLES, CLOSURE PIECES, STRAP ANCHORS, MISCELLANEOUS PIECES AND HOLES REQUIRED TO COMPLETE THE STRUCTURE.
5. FIT AND SHOP ASSEMBLE FABRICATIONS IN THE LARGEST PRACTICAL SECTIONS FOR DELIVERY TO SITE.
6. INSTALL FABRICATIONS PLUMB AND LEVEL, ACCURATELY FITTED, AND FREE FROM DISTORTIONS OR DEFECTS.
7. AFTER ERECTION OF STRUCTURES, TOUCHUP ALL WELDS, ABRASIONS AND NON–GALVANIZED SURFACES WITH A 95% ORGANIC ZINC RICH PAINT IN ACCORDANCE WITH ASTM 780.
8. ALL STEEL MATERIAL (EXPOSED TO WEATHER) SHALL BE GALVANIZED AFTER FABRICATION IN ACCORDANCE WITH ASTM A123 "ZINC (HOT DIPPED GALVANIZED) COATINGS" ON IRONS AND STEEL PRODUCTS.
9. ALL BOLTS, ANCHORS AND MISCELLANEOUS HARDWARE SHALL BE GALVANIZED IN ACCORDANCE WITH ASTM A153 "ZINC COATING (HOT–DIP) ON IRON AND STEEL HARDWARE".
10. THE ENGINEER SHALL BE NOTIFIED OF ANY INCORRECTLY FABRICATED, DAMAGED OR OTHERWISE MISFITTING OR NON CONFORMING MATERIALS OR CONDITIONS TO REMEDIAL OR CORRECTIVE ACTION. ANY SUCH ACTION SHALL REQUIRE ENGINEER REVIEW.
11. CONNECTION ANGLES SHALL HAVE A MINIMUM THICKNESS OF 1/4 INCHES.
12. STRUCTURAL CONNECTION BOLTS SHALL CONFORM TO ASTM A325. ALL BOLTS SHALL BE 3/4" DIAMETER MINIMUM AND SHALL HAVE A MINIMUM OF TWO BOLTS, UNLESS OTHERWISE ON THE DRAWINGS.
13. LOCK WASHER ARE NOT PERMITTED FOR A325 STEEL ASSEMBLIES.
14. SHOP CONNECTIONS SHALL BE WELDED OR HIGH STRENGTH BOLTED.
15. MILL BEARING ENDS OF COLUMNS, STIFFENERS, AND OTHER BEARING SURFACES TO TRANSFER LOAD OVER ENTIRE CROSS SECTION.
16. FABRICATE BEAMS WITH MILL CAMBER UP.
17. LEVEL AND PLUMB INDIVIDUAL MEMBERS OF THE STRUCTURE TO AN ACCURACY OF 1:500, BUT NOT TO EXCEED 1/4" IN THE FULL HEIGHT OF THE COLUMN.
18. COMMENCEMENT OF STRUCTURAL STEEL WORK WITHOUT NOTIFYING THE ENGINEER OF ANY DISCREPANCIES WILL BE CONSIDERED ACCEPTANCE OF PRECEDING WORK.
19. INSPECTION AND TESTING OF ALL WELDING AND HIGH STRENGTH BOLTING SHALL BE PERFORMED BY AN INDEPENDENT TESTING LABORATORY.
20. FOUR COPIES OF ALL INSPECTION TEST REPORTS SHALL BE SUBMITTED TO THE ENGINEER WITHIN TEN (10) WORKING DAYS OF THE DATE OF INSPECTION.

PAINT NOTES

PAINTING SCHEDULE:

1. ANTENNA PANELS:
   - A. SHERWIN WILLIAMS POLANE–B
   - B. COLOR TO BE MATCHED WITH EXISTING TOWER STRUCTURE.
2. COAXIAL CABLES:
   - A. ONE COAT OF DTM BONDING PRIMER (2–5 MILS. DRY FINISH)
   - B. TWO COATS OF DTM ACRYLIC PRIMER/FINISH (2.5–5 MILS. DRY FINISH)
   - C. COLOR TO BE FIELD MATCHED WITH EXISTING STRUCTURE.

EXAMINATION AND PREPARATION:

1. DO NOT APPLY PAINT IN SNOW, RAIN, FOG OR MIST OR WHEN RELATIVE HUMIDITY EXCEEDS 85%. DO NOT APPLY PAINT TO DAMP OR WET SURFACES.
2. VERIFY THAT SUBSTRATE CONDITIONS ARE READY TO RECEIVE WORK. EXAMINE SURFACE SCHEDULED TO BE FINISHED PRIOR TO COMMENCEMENT OF WORK. REPORT ANY CONDITION THAT MAY POTENTIALLY AFFECT PROPER APPLICATION.
3. TEST SHOP APPLIED PRIMER FOR COMPATIBILITY WITH SUBSEQUENT COVER MATERIALS.
4. PERFORM PREPARATION AND CLEANING PROCEDURE IN STRICT ACCORDANCE WITH COATING MANUFACTURER'S INSTRUCTIONS FOR EACH SUBSTRATE CONDITION.
5. CORRECT DEFECTS AND CLEAN SURFACES WHICH AFFECT WORK OF THIS SECTION. REMOVE EXISTING COATINGS THAT EXHIBIT LOOSE SURFACE DEFECTS.
6. IMPERVIOUS SURFACE: REMOVE MILDEW BY SCRUBBING WITH SOLUTION OF TRI–SODIUM PHOSPHATE AND BLEACH. RINSE WITH CLEAN WATER AND ALLOW SURFACE TO DRY.
7. ALUMINUM SURFACE SCHEDULED FOR PAINT FINISH: REMOVE SURFACE CONTAMINATION BY STEAM OR HIGH–PRESSURE WATER. REMOVE OXIDATION WITH ACID ETCH AND SOLVENT WASHING. APPLY ETCHING PRIMER IMMEDIATELY FOLLOWING CLEANING.
8. FERROUS METALS: CLEAN UNGALVANIZED FERROUS METAL SURFACES THAT HAVE NOT BEEN SHOP COATED; REMOVE OIL, GREASE, DIRT, LOOSE MILL SCALE, AND OTHER FOREIGN SUBSTANCES. USE SOLVENT OR MECHANICAL CLEANING METHODS THAT COMPLY WITH THE STEEL STRUCTURES PAINTING COUNCIL'S (SSPC) RECOMMENDATIONS. TOUCH UP BARE AREAS AND SHOP APPLIED PRIME COATS THAT HAVE BEEN DAMAGED. WIRE BRUSH, CLEAN WITH SOLVENTS RECOMMENDED BY PAINT MANUFACTURER, AND TOUCH UP WITH THE SAME PRIMER AS THE SHOP COAT.
9. GALVANIZED SURFACES: CLEAN GALVANIZED SURFACES WITH NON–PETROLEUM–BASED SOLVENTS SO SURFACE IS FREE OF OIL AND SURFACE CONTAMINANTS. REMOVE PRETREATMENT FROM GALVANIZED SHEET METAL FABRICATED FROM COIL STOCK BY MECHANICAL METHODS.
10. ANTENNA PANELS: REMOVE ALL OIL, DUST, GREASE, DIRT, AND OTHER FOREIGN MATERIAL TO ENSURE ADEQUATE ADHESION. PANELS MUST BE WIPED WITH METHYL ETHYL KETONE (MEK).
11. COAXIAL CABLES: REMOVE ALL OIL, DUST, GREASE. DIRT, AND OTHER FOREIGN MATERIAL TO ENSURE ADEQUATE ADHESION.

CLEANING:

1. COLLECT WASTE MATERIAL, WHICH MAY CONSTITUTE A FIRE HAZARD, PLACE IN CLOSED METAL CONTAINERS AND REMOVE DAILY FROM SITE.

APPLICATION:

1. APPLY PRODUCTS IN ACCORDANCE WITH MANUFACTURER'S INSTRUCTIONS.
2. DO NOT APPLY FINISHES TO SURFACES THAT ARE NOT DRY.
3. APPLY EACH COAT TO UNIFORM FINISH.
4. APPLY EACH COAT OF PAINT SLIGHTLY DARKER THAN PRECEDING COAT UNLESS OTHERWISE APPROVED.
5. SAND METAL LIGHTLY BETWEEN COATS TO ACHIEVE REQUIRED FINISH.
6. VACUUM CLEAN SURFACES FREE OF LOOSE PARTICLES. USE TACK CLOTH JUST PRIOR TO APPLYING NEXT COAT.
7. ALLOW APPLIED COAT TO DRY BEFORE NEXT COAT IS APPLIED.

COMPLETED WORK:

1. SAMPLES: PREPARE 24" X 24" SAMPLE AREA FOR REVIEW.
2. MATCH APPROVED SAMPLES FOR COLOR, TEXTURE AND COVERAGE. REMOVE REFINISH OR REPAINT WORK NOT IN COMPLIANCE WITH SPECIFIED REQUIREMENTS.

PROPOSED ANTENNA AND APPURTENANCE SCHEDULE

SECTOR	EXISTING/PROPOSED	BAND	ANTENNA	SIZE (INCHES) (L x W x D)	ANTENNA ℄ HEIGHT	AZIMUTH	(E/P) TMA/DIPLEXER/TRIPLEXER (QTY)	(E/P) RRU (QTY)	FEEDER	(E/P) RAYCAP (QTY)
A1	EXISTING	UMTS 850/1900	7770	55X11X5	±103'	0°	(E) POWERWAVE / LGP 21401 (DUAL BAND – 850 BYPASS) (2) | (E) POWERWAVE / LGP 21901 (2)		(2) 1–5/8"ø COAX	
A2	PROPOSED	LTE 700/1900	HPA–65R–BUU–H6	72X14.8X9	±103'	0°		(E) RRUS–11 (1), (P) RRUS–32 B2 (1)	FIBER AND DC POWER	(E) RAYCAP DC6–48–60–18–8C (1)
A3	PROPOSED	LTE 700/AWS	800–10965	78.7X20X6.9	±103'	0°		(P) RRUS–32 B66 (1), (P) B14 4478 (1)	FIBER AND DC POWER	(P) RAYCAP DC6–48–60–18–8C (1)
A4	EXISTING	LTE 850/WCS	OPA–65R–LCUU–H6	72X14.8X7.4	±103'	0°	(E) POWERWAVE / LGP 21901 (2) | (P) KAELUS DBC0061F1V51–2 (2)	(P) RUUS–12 (1), (P) RRUS–32	(2) 1–5/8"ø COAX	(P) RAYCAP DC6–48–60–18–8C (1)
B1	EXISTING	UMTS 850/1900	7770	55X11X5	±103'	120°	(E) POWERWAVE / LGP 21401 (DUAL BAND – 850 BYPASS) (2) | (E) POWERWAVE / LGP 21901 (2)		(2) 1–5/8"ø COAX	
B2	PROPOSED	LTE 700/1900	HPA–65R–BUU–H6	72X14.8X9	±103'	120°		(E) RRUS–11 (1), (P) RRUS–32 B2 (1)	FIBER AND DC POWER	
B3	PROPOSED	LTE 700/AWS	800–10965	78.7X20X6.9	±103'	120°		(P) RRUS–32 B66 (1), (P) B14 4478 (1)	FIBER AND DC POWER	
B4	EXISTING	LTE 850/WCS	OPA–65R–LCUU–H6	72X14.8X7.4	±103'	120°	(E) POWERWAVE / LGP 21901 (2) | (P) KAELUS DBC0061F1V51–2 (2)	(P) RUUS–12 (1), (P) RRUS–32	(2) 1–5/8"ø COAX	
C1	EXISTING	UMTS 850/1900	7770	55X11X5	±103'	240°	(E) POWERWAVE / LGP 21401 (DUAL BAND – 850 BYPASS) (2) | (E) POWERWAVE / LGP 21901 (2)		(2) 1–5/8"ø COAX	
C2	PROPOSED	LTE 700/1900	HPA–65R–BUU–H6	72X14.8X9	±103'	240°		(E) RRUS–11 (1), (P) RRUS–32 B2 (1)	FIBER AND DC POWER	
C3	PROPOSED	LTE 700/AWS	800–10965	78.7X20X6.9	±103'	240°		(P) RRUS–32 B66 (1), (P) B14 4478 (1)	FIBER AND DC POWER	
C4	EXISTING	LTE 850/WCS	OPA–65R–LCUU–H6	72X14.8X7.4	±103'	240°	(E) POWERWAVE / LGP 21901 (2) | (P) KAELUS DBC0061F1V51–2 (2)	(P) RUUS–12 (1), (P) RRUS–32	(2) 1–5/8"ø COAX	

RRU	SIZE (INCHES) (L x W x D)
RRUS–11	19.7 x 17 x 7.2
RRUS–32 B2	27.2 x 12.1 x 7
RRUS–32	27.2 x 12.1 x 7
RRUS–32 B66	27.2 x 12.1 x 7
RRUS–12	20.4 x 18.5 x 7.5
B14–4478	14.9 x 13.1 x 7.3

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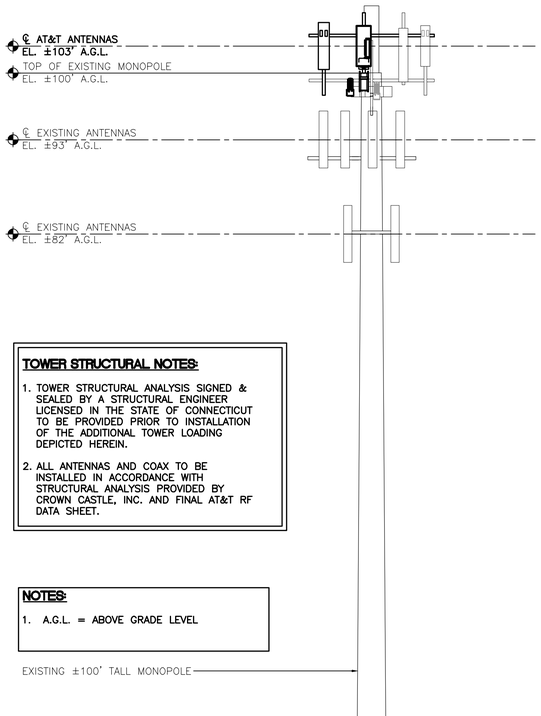
NOTES, SPECIFICATIONS AND ANTENNA SCHEDULE

N-1

Sheet No. 2 of 9



TOWER STRUCTURAL NOTES:

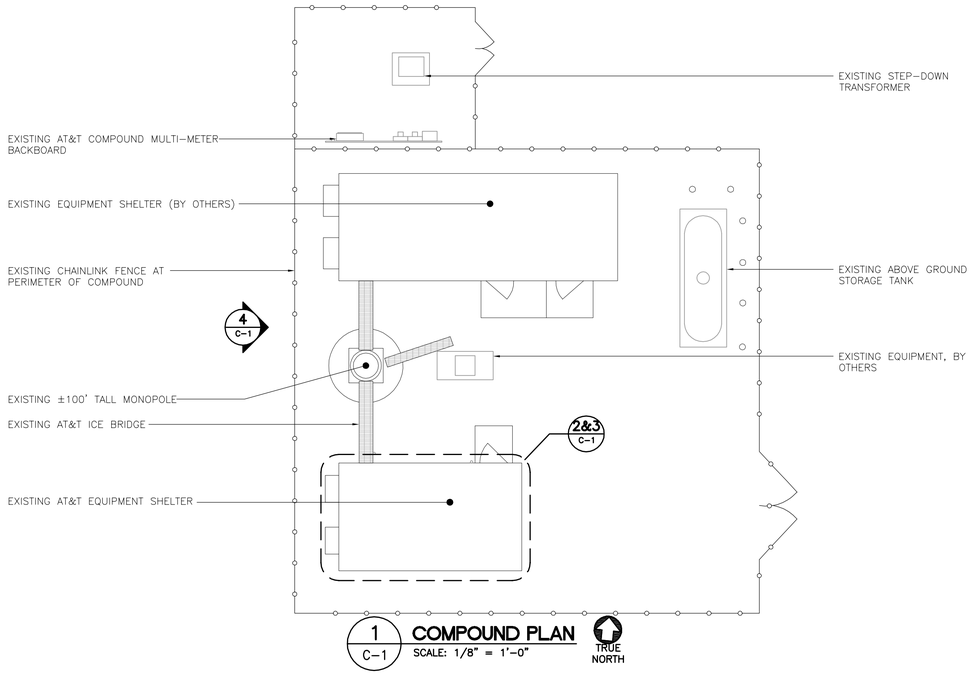
1. TOWER STRUCTURAL ANALYSIS SIGNED & SEALED BY A STRUCTURAL ENGINEER LICENSED IN THE STATE OF CONNECTICUT TO BE PROVIDED PRIOR TO INSTALLATION OF THE ADDITIONAL TOWER LOADING DEPICTED HEREIN.
2. ALL ANTENNAS AND COAX TO BE INSTALLED IN ACCORDANCE WITH STRUCTURAL ANALYSIS PROVIDED BY CROWN CASTLE, INC. AND FINAL AT&T RF DATA SHEET.

NOTES:

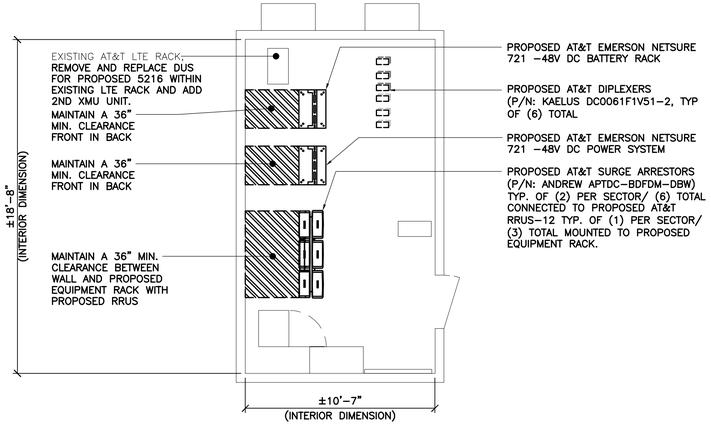
1. A.G.L. = ABOVE GRADE LEVEL

4 C-1 **PROPOSED TOWER ELEVATION**
SCALE: 1/8" = 1'-0"

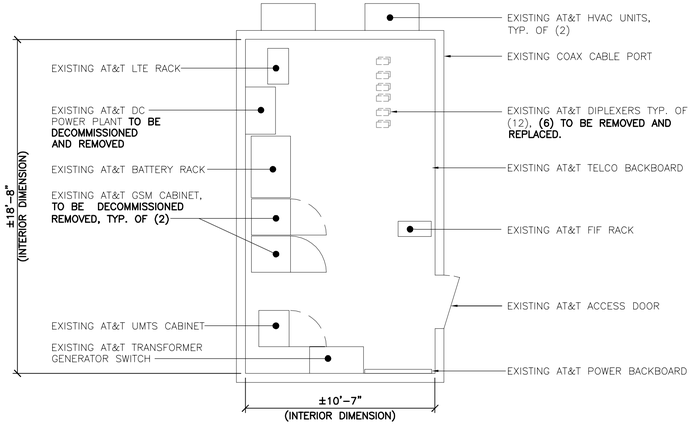
GRAPHIC SCALE
8 0 4 8 16 32
(IN FEET)
1 inch = 8 ft.



1 C-1 **COMPOUND PLAN**
SCALE: 1/8" = 1'-0"
TRUE NORTH



3 C-1 **PROPOSED EQUIPMENT LAYOUT PLAN**
SCALE: 1/4" = 1'-0"
TRUE NORTH



2 C-1 **EXISTING EQUIPMENT LAYOUT PLAN**
SCALE: 1/4" = 1'-0"
TRUE NORTH

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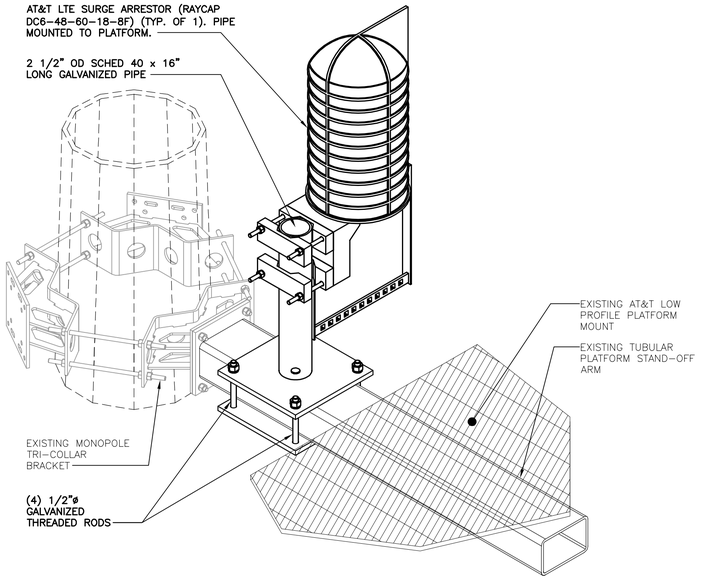
COMPOUND PLAN AND ELEVATION

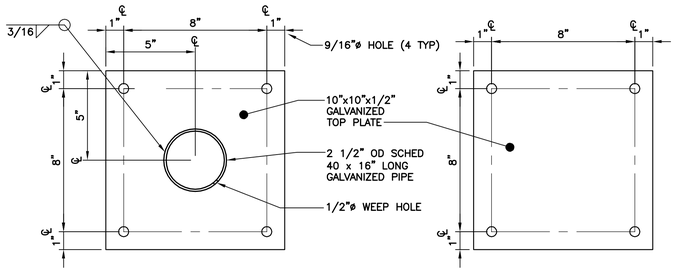
C-1

Sheet No. 3 of 9



ISOMETRIC

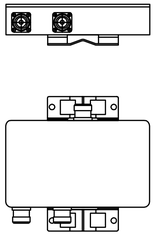
ELEVATION



TOP PLATE (PLAN VIEW)

BOTTOM PLATE (PLAN VIEW)

1 C-2 **RAYCAP DC6 MOUNTING DETAIL**
SCALE: 1 1/2" = 1'-0"



FRONT VIEW

DIPLEXER		
EQUIPMENT	DIMENSIONS	WEIGHT
MAKE: KAELUS MODEL: DBC0061F1V51-2	8.0"H x 6.2"W x 3.2"D	9.5 LBS.

NOTES:
1. CONTRACTOR TO COORDINATE FINAL EQUIPMENT MODEL SELECTION WITH AT&T CONSTRUCTION MANAGER PRIOR TO ORDERING.

2 C-2 **DIPLEXER DETAIL**
SCALE: NONE

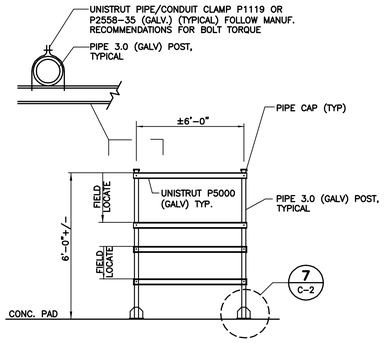
ELEVATION

5 C-2 **PROPOSED EQUIPMENT RACK**
SCALE: 1/2" = 1'-0"

SURGE ARESSTOR		
EQUIPMENT	DIMENSIONS	WEIGHT
MAKE: ANDREW MODEL: APTDC-BDFDM-DBW	3.46"H x 3.46"W x 1.65"D	1.32 LBS.

NOTES:
1. CONTRACTOR TO COORDINATE FINAL EQUIPMENT MODEL SELECTION WITH AT&T CONSTRUCTION MANAGER PRIOR TO ORDERING.

3 C-2 **ANDREW APTDC-BDFDM-DBW DETAIL**
SCALE: NOT TO SCALE

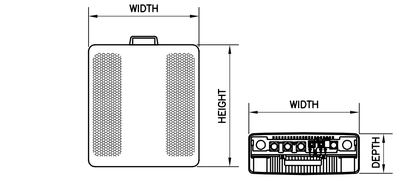


6 C-2 **PROPOSED EQUIPMENT FRAME DETAIL**
SCALE: NOT TO SCALE

ISOMETRIC VIEW

NOTES:
1. AT&T SHALL SUPPLY RRU, AND RRU POLE-MOUNTING BRACKET. CONTRACTOR SHALL SUPPLY POLE/PIPE AND INSTALL ALL MOUNTING HARDWARE INCLUDING ERICSSON RRU POLE-MOUNTING BRACKET. CONTRACTOR SHALL INSTALLS RRU AND MAKES CABLE TERMINATIONS.
2. NO PAINTING OF THE RRU OR SOLAR SHIELD IS ALLOWED.

8 C-2 **TYPICAL RRUS MOUNTING DETAILS**
SCALE: NTS

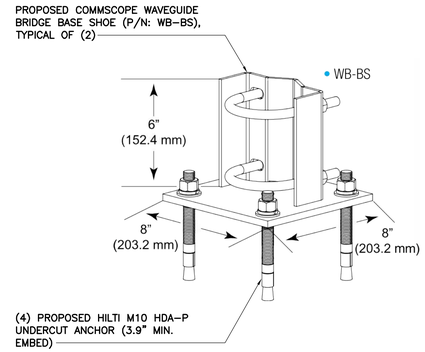


FRONT VIEW BOTTOM VIEW

RRU (REMOTE RADIO UNIT)			
EQUIPMENT	DIMENSIONS	WEIGHT	CLEARANCES
MAKE: ERICSSON MODEL: RRUS 12	20.4"L x 18.5"W x 7.5"D	50 LBS.	ABOVE: 16" MIN. BELOW: 12" MIN. FRONT: 36" MIN.

NOTES:
1. CONTRACTOR TO COORDINATE FINAL EQUIPMENT MODEL SELECTION WITH AT&T CONSTRUCTION MANAGER PRIOR TO ORDERING.

4 C-2 **ERICSSON RRUS 12 DETAIL**
SCALE: 1" = 1'-0"



7 C-2 **EQUIPMENT FRAME POST ATTACHMENT DETAIL**
SCALE: NOT TO SCALE

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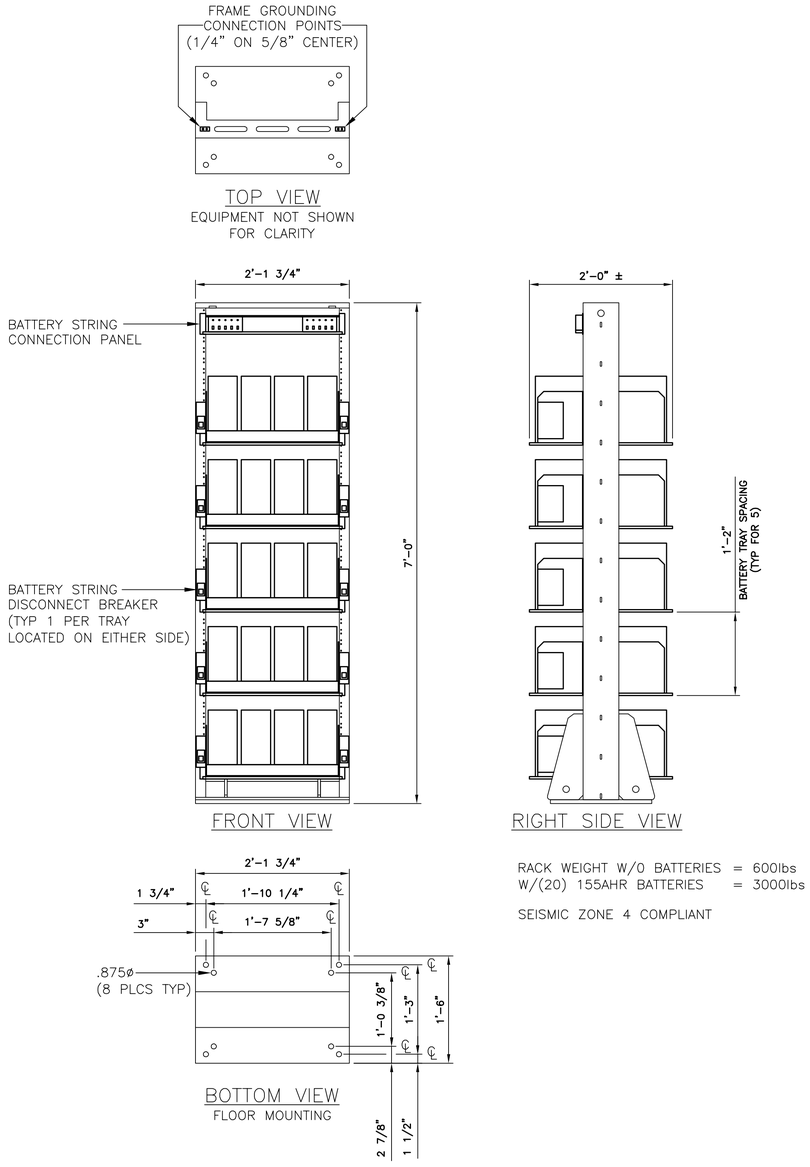
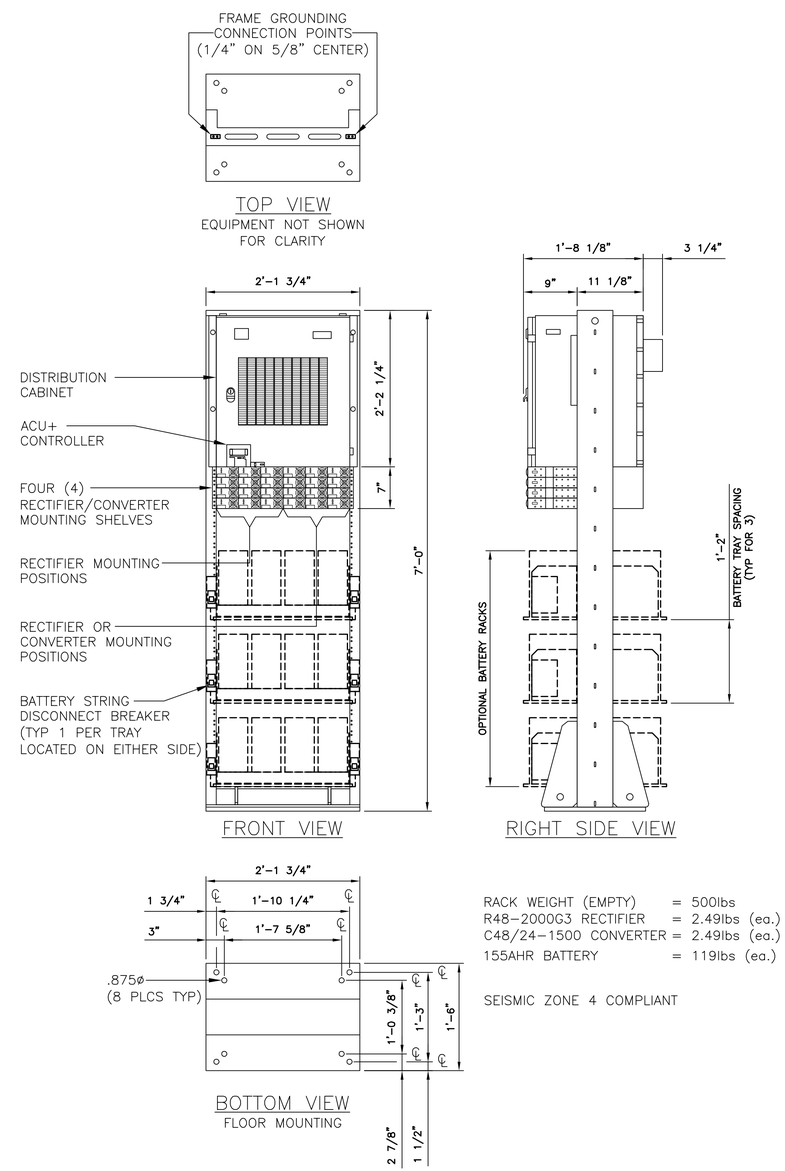


RACK WEIGHT W/O BATTERIES = 600lbs
W/(20) 155AHR BATTERIES = 3000lbs

SEISMIC ZONE 4 COMPLIANT

1 C-3 **EMERSON NETSURE 721 -48V DC BATTERY RACK**
SCALE: 1" = 1'-0"



RACK WEIGHT (EMPTY) = 500lbs
R48-2000G3 RECTIFIER = 2.49lbs (ea.)
C48/24-1500 CONVERTER = 2.49lbs (ea.)
155AHR BATTERY = 119lbs (ea.)

SEISMIC ZONE 4 COMPLIANT

2 C-3 **EMERSON NETSURE 721 -48V DC POWER SYSTEM**
SCALE: 1" = 1'-0"

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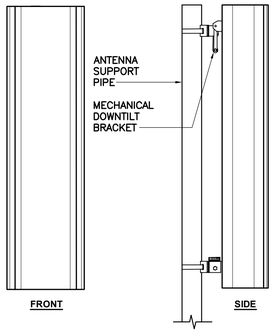
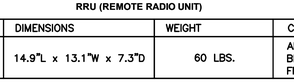


BOTTOM
CCI
OPA-65R-BUU-H6

BOTTOM
KATHREIN
800-10965

ALPHA/BETA/GAMMA ANTENNA			
EQUIPMENT		DIMENSIONS	WEIGHT
MAKE: MODEL:	CCI OPA-65R-BUU-H6	72.0"L x 14.8"W x 7.4"D	73.0 LBS.
MAKE: MODEL:	KATHREIN 800-10965	78.7"L x 20.0"W x 6.9"D	108.6 LBS.

5 C-4 PROPOSED ANTENNA DETAIL
SCALE: 1/2" = 1'-0"

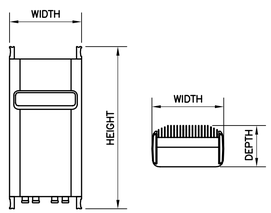


B14 4478

RRU (REMOTE RADIO UNIT)			
EQUIPMENT	DIMENSIONS	WEIGHT	CLEARANCES
MAKE: ERICSSON MODEL: B14 4478	14.9"L x 13.1"W x 7.3"D	60 LBS.	ABOVE: 16" MIN. BELOW: 12" MIN. FRONT: 36" MIN.

NOTES:
1. CONTRACTOR TO COORDINATE FINAL EQUIPMENT MODEL SELECTION WITH AT&T CONSTRUCTION MANAGER PRIOR TO ORDERING.

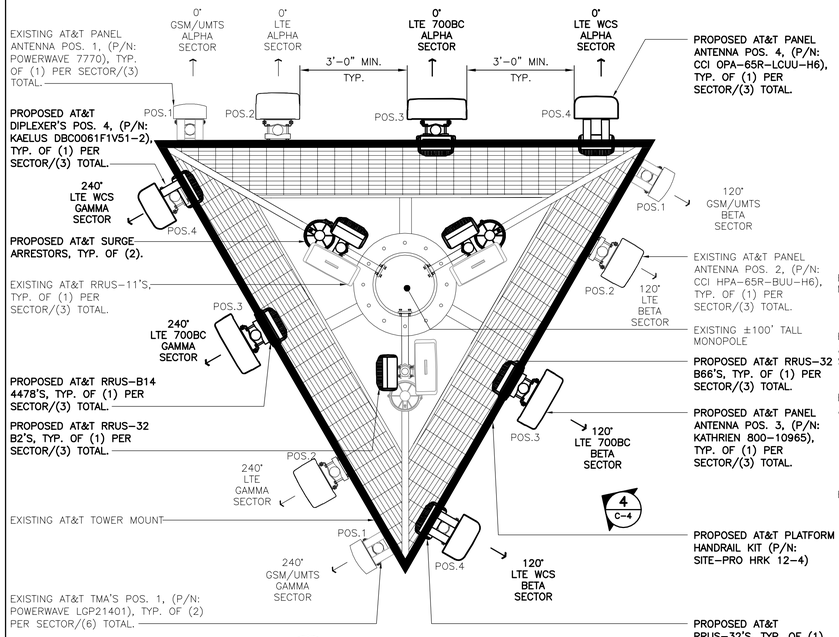
6 C-4 ERICSSON B14 4478 DETAIL
SCALE: 1" = 1'-0"



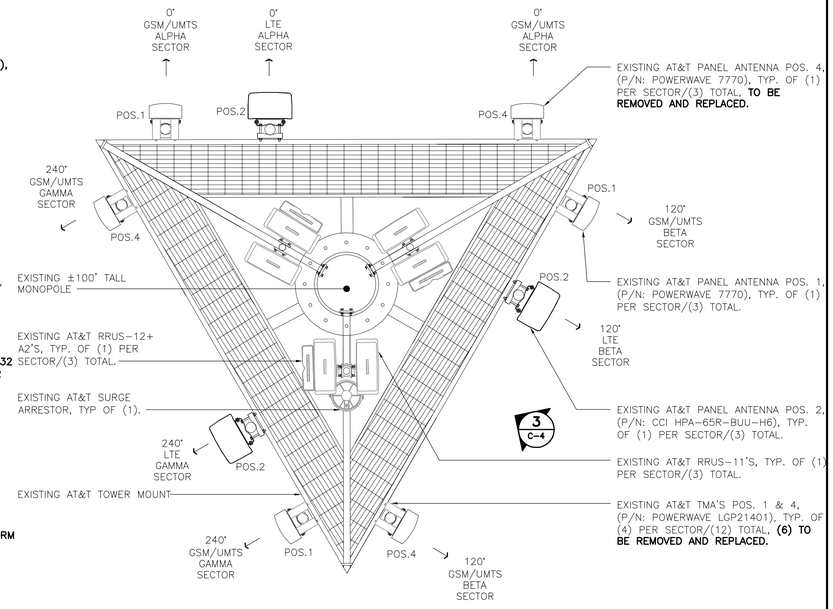
RRU (REMOTE RADIO UNIT)			
EQUIPMENT	DIMENSIONS	WEIGHT	CLEARANCES
MAKE: ERICSSON MODEL: RRUS 32 B66	27.17"H x 12.05"W x 7.01"D	52.91 LBS.	ABOVE: 16" MIN. BELOW: 12" MIN. FRONT: 36" MIN.
MAKE: ERICSSON MODEL: RRUS-32 B2	27.17"H x 12.05"W x 7.01"D	52.91 LBS.	ABOVE: 16" MIN. BELOW: 12" MIN. FRONT: 36" MIN.

NOTES:
1. CONTRACTOR TO COORDINATE FINAL EQUIPMENT MODEL SELECTION WITH AT&T CONSTRUCTION MANAGER PRIOR TO ORDERING.

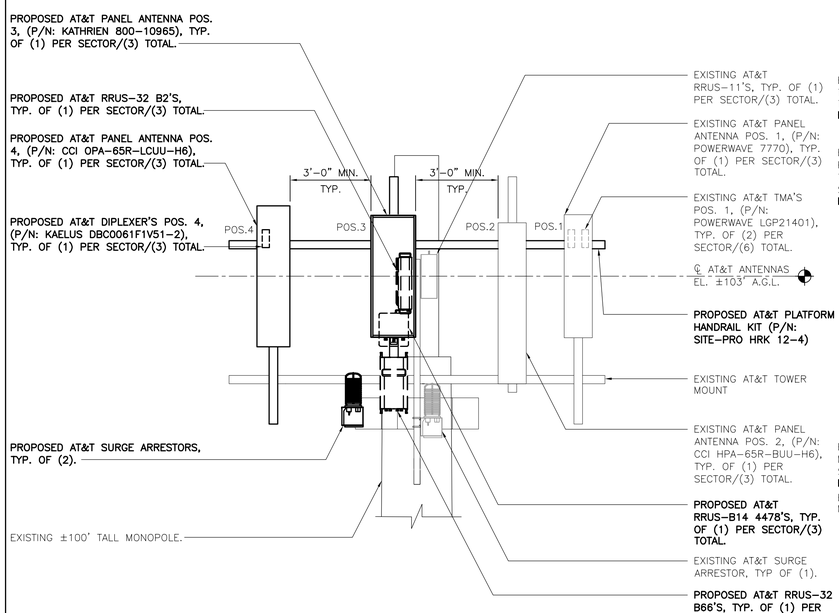
7 C-4 ERICSSON REMOTE RADIO UNITS
SCALE: 1" = 1'-0"



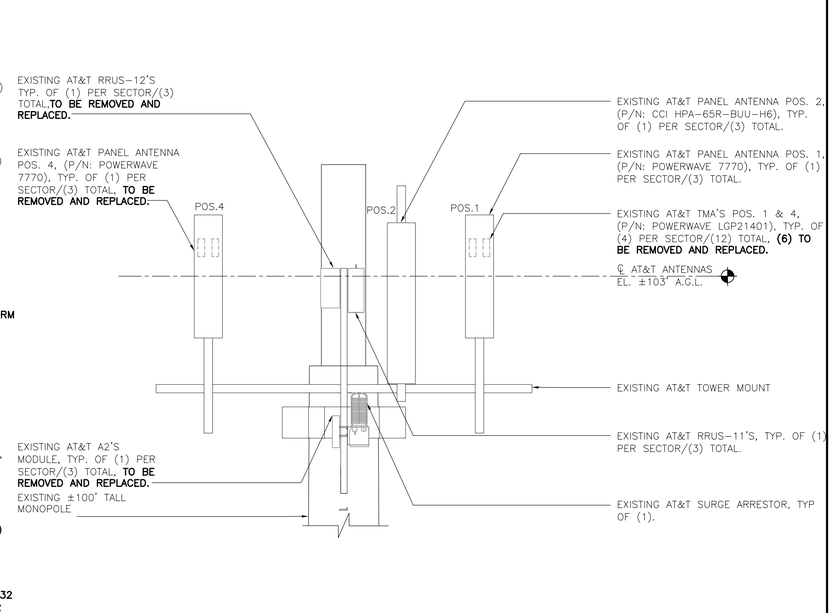
2 C-4 PROPOSED ANTENNA PLAN
SCALE: 1/2"= 1'-0" NORTH



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



4 C-4 PROPOSED ANTENNA ELEVATION
SCALE: 3/8" = 1'-0"



3 C-4 EXISTING ANTENNA ELEVATION
SCALE: 3/8" = 1'-0"

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3C/4C/5C/RETRO/6C
ANTENNA
LAYOUTS

C-4

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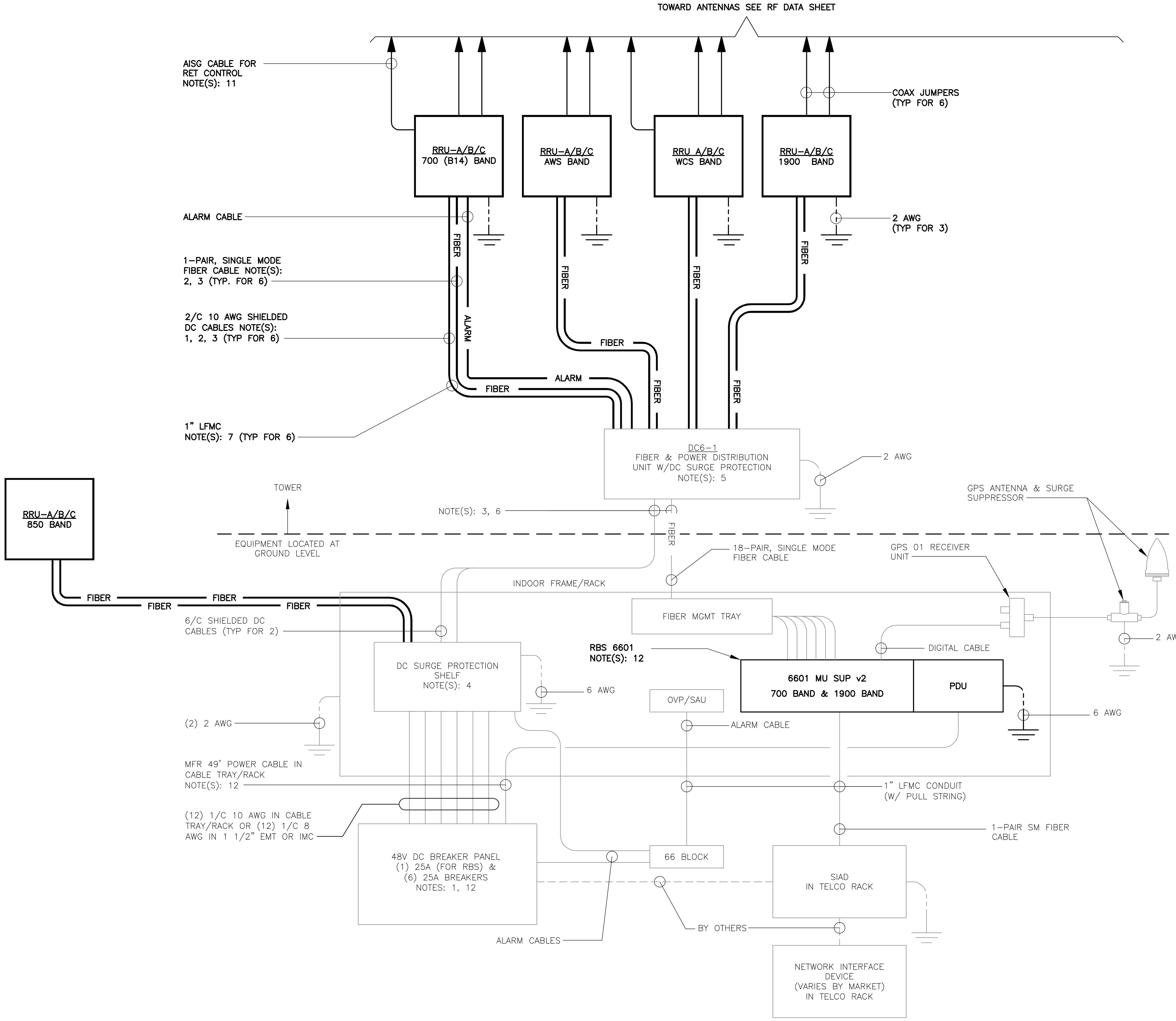

1 / E-1 **LTE SCHEMATIC DIAGRAM**

NOT TO SCALE

LTE SCHEMATIC DIAGRAM NOTES:

1. BREAKERS TO BE TAGGED AND LOCKED OUT. A 20A (MIN.) OR 30A (MAX.) BREAKER FOR RRUs MAY BE SUBSTITUTED FOR THE RECOMMENDED 25A BREAKER. SIZE 12 CONDUCTORS MAY BE USED ONLY WITH 20A BREAKERS.
2. LEAVE COILED AND PROTECTED UNTIL TERMINATED.
3. DC AND FIBER CABLE SHALL BE ROUTED WITH THE EXISTING COAX CABLE.
4. DC SURGE PROTECTION SHELF SHALL BE RAYCAP DCx-48-60-RM.
5. FIBER & DC DISTRIBUTION BOX W/DC SURGE PROTECTION SHALL BE RAYCAP DC6-48-60-18-8F.
6. SUPPORT FIBER & DC POWER CABLES WITH SNAP-IN HANGERS SPACED NO GREATER THAN 3 FEET APART ON TOWER. SUPPORT FIBER AND DC POWER CABLES INSIDE MONOPOLE WITH CABLE HOISTING GRIPS AT 250 FT MAXIMUM INTERVALS. DRESS CABLES TO PREVENT CONTACT WITH ENTRANCE AND EXIT OPENINGS.
7. CONDUIT TO BE USED ON A TOWER IF THE RRU IS MORE THAN 10' FROM THE DISTRIBUTION UNITS. MAX CABLE LENGTH IS 16 FEET.
8. SINGLE-CONDUCTOR DC POWER CABLES SHALL BE TELCOFLEX® OR KS24194™, COPPER, UL LISTED RHH NON-HALOGEN, LOW SMOKE WITH BRAIDED COVER, TYPE TC (1/0 AND LARGER). UNLESS OTHERWISE NOTED, STRANDING SHALL BE CLASS B (TYPE III) FOR CABLES SIZES 14, 12 & 10 AWG AND CLASS I (TYPE IV) FOR SIZES 8 AWG AND LARGER. CABLES SHALL BE COLOR CODED RED FOR +24V, BLUE FOR -48V AND GRAY FOR 24V AND 48V RETURN CONDUCTORS. MULTI-CONDUCTOR DC POWER CABLES SHALL BE COPPER, CLASS B STRANDING WITH FLAME RETARDANT PVC JACKET, TYPE TC, UL LISTED FOR 90°C DRY/ 75°C WET INSTALLATION.
9. GROUNDING WIRES SHALL BE COPPER, GREEN THHN/THWN UL LISTED FOR 90°C DRY/75°C WET INSTALLATION. MINIMUM SIZE IS 6 AWG UNLESS NOTED OTHERWISE.
10. FIBER OPTIC CABLES SHALL BE INSTALLED IN FLEXIBLE CONDUIT AS SCOPED BY MARKET.
11. RET CONTROL FROM THE RRU IS AN OPTIONAL METHOD OF CONNECTION. REFER TO RF DATA SHEET FOR APPLICABILITY.
12. RBS 6601 VARIANT 2 REQUIRES A 25A BREAKER AND 10 AWG (MIN.) CONDUCTORS. REPLACE EXISTING 15A OR 20A BREAKERS AND 12 AWG CONDUCTORS WHEN UPGRADING AN EXISTING RBS 6601 VARIANT 1.

ELECTRICAL NOTES

1. PRIOR TO START OF CONSTRUCTION CONTRACTOR SHALL COORDINATE WITH OWNER FOR ALL CONSTRUCTION STANDARDS AND SPECIFICATIONS, AND ALL MANUFACTURER DOCUMENTATION FOR ALL EQUIPMENT TO BE INSTALLED.
2. INSTALL ALL EQUIPMENT IN ACCORDANCE WITH LOCAL BUILDING CODE, NATIONAL ELECTRIC CODE, OWNER AND MANUFACTURER'S SPECIFICATIONS.
3. CONNECT ALL NEW EQUIPMENT TO EXISTING TELCO AS REQUIRED BY MANUFACTURER.
4. MAINTAIN ALL CLEARANCES REQUIRED BY NEC AND EQUIPMENT MANUFACTURER.
5. PRIOR TO INSTALLATION CONTRACTOR SHALL MEASURE EXISTING ELECTRICAL LOAD AND VERIFY EXISTING AVAILABLE CAPACITY FOR PROPOSED INSTALLATION. IF INADEQUATE CAPACITY IS AVAILABLE, CONTRACTOR SHALL COORDINATE WITH LOCAL ELECTRIC UTILITY COMPANY TO UPGRADE EXISTING ELECTRIC SERVICE.
6. CONTRACTOR SHALL INSPECT EXISTING GROUNDING AND LIGHTNING PROTECTION SYSTEM AND ENSURE THAT IT IS IN COMPLIANCE WITH NEC, AND SITE OWNER'S SPECIFICATIONS. THE RESULTS OF THIS INSPECTION SHALL BE PRESENTED TO OWNERS REPRESENTATIVE, AND ANY DEFICIENCIES SHALL BE CORRECTED.
7. ALL TRANSMISSION TOWER SITES CONTAIN AN EXTENSIVE BURIED GROUNDING SYSTEM. ALL GROUNDING WORK MUST BE COORDINATED WITH, AND APPROVED BY, THE TOWER OWNER'S SITE REPRESENTATIVE. ALL OF THE TOWER OWNER'S SPECIFICATIONS MUST BE STRICTLY FOLLOWED.
8. PROVIDE AND INSTALL GROUND KITS FOR ALL NEW COAXIAL CABLES AND BOND TO EXISTING OWNERS GROUNDING SYSTEM PER OWNERS SPECIFICATIONS AND NEC.
9. ALL CONDUCTORS SHALL BE TYPE THWN (INT. APPLICATION) AND XHHW (EXT. APPLICATION), 75 DEGREE C, 600 VOLT INSULATION, SOFT ANNEALED STRANDED COPPER. #10 AWG AND SMALLER SHALL BE SPLICED USING ACCEPTABLE SOLDERLESS PRESSURE CONNECTORS. #8 AWG AND LARGER SHALL BE SPLICED USING COMPRESSION SPLIT-BOLT TYPE CONNECTORS, #12 AWG SHALL BE THE MINIMUM SIZE CONDUCTOR FOR LINE VOLTAGE BRANCH CIRCUITS. REFER TO PANEL SCHEDULE FOR BRANCH CIRCUIT CONDUCTOR SIZE(S). CONDUCTORS SHALL BE COLOR CODED FOR CONSISTENT PHASE IDENTIFICATION:
10. MINIMUM BENDING RADIUS FOR CONDUCTORS SHALL BE 12 TIMES THE LARGEST DIAMETER OF BRANCH CIRCUIT CONDUCTOR.
11. THE ENTIRE ELECTRICAL INSTALLATION SHALL BE MADE IN STRICT ACCORDANCE WITH ALL LOCAL, STATE AND NATIONAL CODES AND REGULATIONS WHICH MAY APPLY AND NOTHING IN THE DRAWINGS OR SPECIFICATIONS SHALL BE INTERPRETED AS AN INFRINGEMENT OF SUCH CODES OR REGULATIONS.
12. THE ELECTRICAL CONTRACTOR IS TO BE RESPONSIBLE FOR THE COMPLETE INSTALLATION AND COORDINATION OF THE ENTIRE ELECTRICAL SYSTEM. ALL ACTIVITIES TO BE COORDINATED THROUGH OWNER'S REPRESENTATIVE, DESIGN ENGINEER AND OTHER AUTHORITIES HAVING JURISDICTION OF TRADES.
13. THE CONTRACTOR SHALL BE RESPONSIBLE FOR OBTAINING ALL PERMITS AND PAY ALL FEES AS MAY BE REQUIRED FOR THE ELECTRICAL WORK AND FOR SCHEDULING OF ALL INSPECTIONS AS MAY BE REQUIRED BY THE LOCAL AUTHORITY.
14. THE CONTRACTOR SHALL BE RESPONSIBLE FOR COORDINATION WITH THE SITE AND/OR BUILDING OWNER FOR NEW AND/OR DEMOLITION WORK INVOLVED.
15. THE CONTRACTOR SHALL GUARANTEE ALL NEW WORK FOR A PERIOD OF ONE YEAR FROM THE ACCEPTANCE DATE BY THE OWNER. THE CONTRACTOR SHALL BE RESPONSIBLE FOR OBTAINING WARRANTIES FROM ALL EQUIPMENT MANUFACTURERS FOR SUBMISSION TO THE OWNER.
16. DRAWINGS INDICATE GENERAL ARRANGEMENT OF WORK INCLUDED IN CONTRACT. CONTRACTOR SHALL WITHOUT EXTRA CHARGE, MAKE MODIFICATIONS TO THE LAYOUT OF THE WORK TO PREVENT CONFLICT WITH WORK OF OTHER TRADES AND FOR THE PROPER INSTALLATION OF WORK. CHECK ALL DRAWINGS AND VISIT JOB SITE TO VERIFY SPACE AND TYPE OF EXISTING CONDITIONS IN WHICH WORK WILL BE DONE, PRIOR TO SUBMITTAL OF BID.
17. ALL NON-CURRENT CARRYING PARTS OF THE ELECTRICAL AND TELEPHONE CONDUIT SYSTEMS SHALL BE MECHANICALLY AND ELECTRICALLY CONNECTED TO PROVIDE AN INDEPENDENT RETURN PATH TO THE EQUIPMENT GROUNDING SOURCES.
18. GROUNDING SYSTEM WILL BE IN ACCORDANCE WITH THE LATEST ACCEPTABLE EDITION OF THE NATIONAL ELECTRICAL CODE AND REQUIREMENTS PER LOCAL INSPECTOR HAVING JURISDICTION.
19. EACH EQUIPMENT GROUND CONDUCTOR SHALL BE SIZED IN ACCORDANCE WITH THE N.E.C. ARTICLE 250-122. (MIN. #12 AWG).
20. CONTRACTOR SHALL PROVIDE A CELLULAR GROUNDING SYSTEM WITH THE MAXIMUM AC RESISTANCE TO GROUND OF 5 OHM BETWEEN ANY POINT ON THE GROUNDING SYSTEM AS MEASURED BY 3-POINT GROUNDING TEST. (REFER TO SECTION 16960).

TESTS BY INDEPENDENT ELECTRICAL TESTING FIRM

A. CONTRACTOR SHALL RETAIN THE SERVICES OF A LOCAL INDEPENDENT ELECTRICAL TESTING FIRM (WITH MINIMUM 5 YEARS COMMERCIAL EXPERIENCE IN THE ELECTRICAL TESTING INDUSTRY) AS SPECIFIED BY OWNER TO PERFORM:

TEST 1: RESISTANCE TO GROUND TEST ON THE CELLULAR GROUNDING SYSTEM.

THE TESTING FIRM SHALL INCLUDE THE FOLLOWING INFORMATION WITH THE REPORT:

1. TESTING PROCEDURE INCLUDING THE MAKE AND MODEL OF TEST EQUIPMENT.
2. CERTIFICATION OF TESTING EQUIPMENT CALIBRATION WITHIN SIX (6) MONTHS OF DATE OF TESTING. INCLUDE CERTIFICATION LAB ADDRESS AND TELEPHONE NUMBER.
3. GRAPHICAL DESCRIPTION OF TESTING METHOD ACTUALLY IMPLEMENTED.

B. TESTING SHALL BE PERFORMED IN THE PRESENCE AND TO THE SATISFACTION OF OWNERS CONSTRUCTION REPRESENTATIVE. TESTING DATA SHALL BE INITIALED AND DATED BY THE CONSTRUCTION AND INCLUDED WITH THE WRITTEN REPORT/ANALYSIS.

C. THE CONTRACTOR SHALL FORWARD SIX (6) COPIES OF THE INDEPENDENT ELECTRICAL TESTING FIRM REPORT/ANALYSIS TO ENGINEER A MINIMUM OF TEN (10) WORKING DAYS PRIOR TO THE JOB TURNOVER.

D. CONTRACTOR TO PROVIDE A MINIMUM OF ONE (1) WEEK NOTICE TO OWNER AND ENGINEER FOR ALL TESTS REQUIRING WITNESSING.

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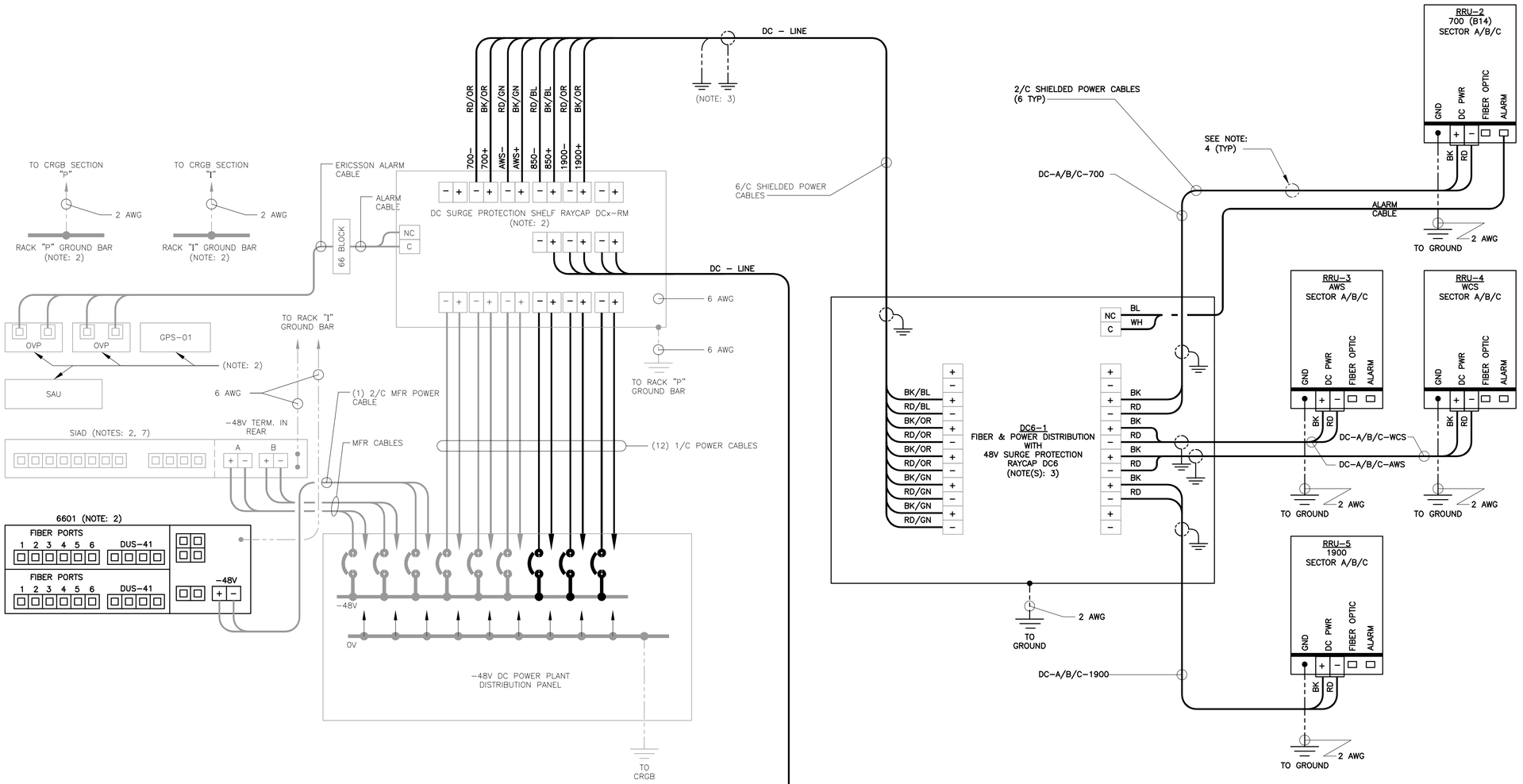
LTE SCHEMATIC DIAGRAM AND NOTES

E-1



1 / E–2 LTE WIRING DIAGRAM

NOT TO SCALE

LTE WIRING DIAGRAM NOTES:

1. LABEL THE DC POWER CABLES AT BOTH ENDS OF EVERY WIRE AND IN ANY PULL BOX IF USED. LABEL SHALL BE DURABLE, SELF ADHESIVE, WRAPPED LONGITUDINALLY ALONG THE CABLE AND STATE THE SECTOR, FREQUENCY BAND AND POLARITY; I.E. "A–1900+". CABLE AND WIRE LABELS SHOWN ARE REPRESENTATIVE AND MAY BE MODIFIED AS DIRECTED BY AT&T.
2. INSTALL ON BASEBAND EQUIPMENT RACK.
3. THE BARE GROUND WIRE OF EACH MULTI–CONDUCTOR CABLE SHALL BE CONNECTED TO THE "P" GROUND BAR ON THE RACK. WHEN A SHIELDED CABLE IS USED, THE DRAIN WIRE ALSO SHALL BE CONNECTED TO THE "P" GROUND BAR.
4. CABLE GROUND WIRE AND SHIELD DRAIN WIRE TO BE LEFT UN–TERMINATED AT RRU AND DC POWER PLANT.
5. SEE LTE SCHEMATIC DIAGRAM DETAIL 1/E–1 FOR BREAKER RATING.

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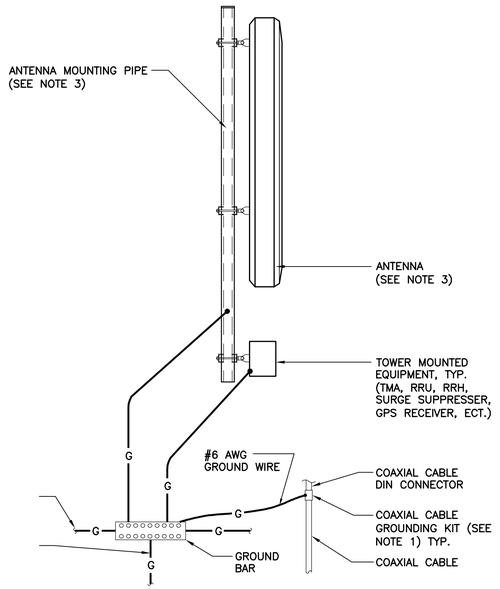
JOB NO. 18000.09

LTE WIRING DIAGRAM

E–2

Sheet No. 8 of 9

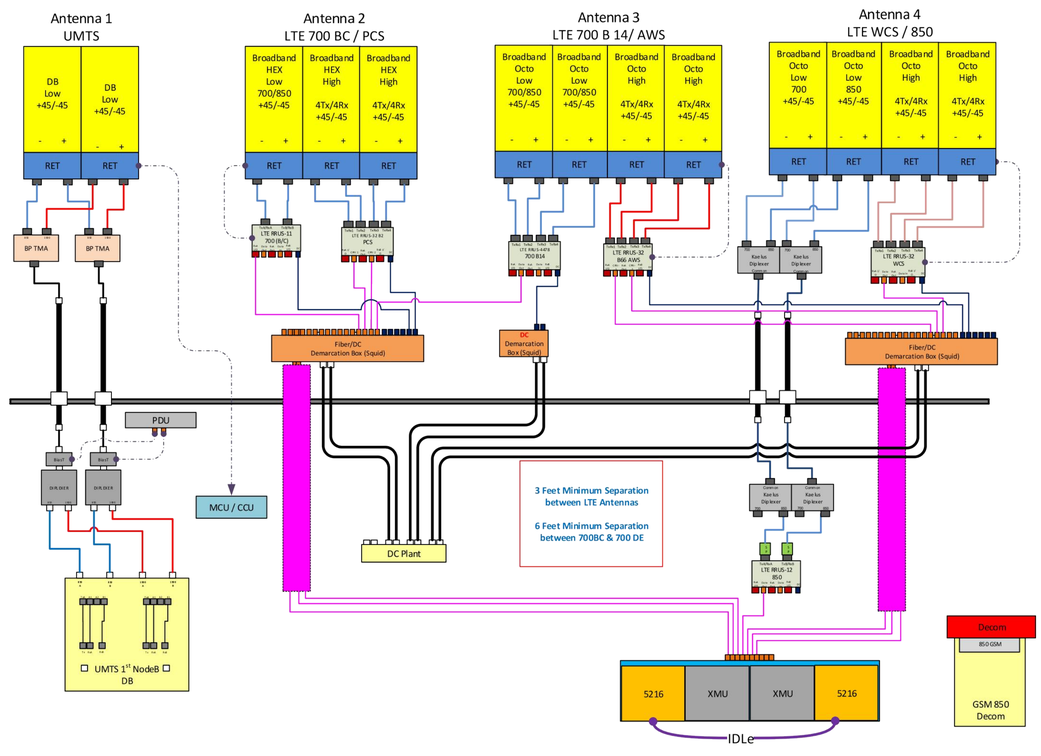


NOTES:

1. BOND COAXIAL CABLE GROUND KITS TO EACH OWNER'S GROUND BAR ALONG ENTIRE COAX RUN FROM ANTENNA TO SHELTER.
2. BOND ALL EQUIPMENT TO GROUND PER NEC AND MANUFACTURERS SPECIFICATIONS.
3. DETAIL IS TYPICAL FOR ALL ANTENNA SECTORS, INCLUDING GPS ANTENNA.

1 E-3 TYPICAL ANTENNA GROUNDING DETAIL

NOT TO SCALE

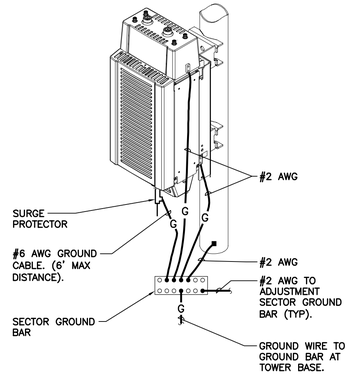


3 E-3 RF PLUMBING DIAGRAM

NOT TO SCALE

EACH RRH CABINET SHALL BE GROUNDED IN THE FOLLOWING MANNER:

1. AT TOP OF THE CABINET
2. AT RIGHT SIDE OF THE CABINET.



2 E-3 RRU POLE MOUNT GROUNDING

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TYPICAL ELECTRICAL DETAILS

E-3

Sheet No. 9 of 9

Date: **February 27, 2018**

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

Black & Veatch Corp.
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Overland Park, KS 66211
(913) 458-8145

Subject:	**Structural Analysis Report**	
Carrier Designation:	***AT&T Mobility* Co-Locate**	
	Carrier Site Number:	CT5126
	Carrier Site Name:	10071011
Crown Castle Designation:	**Crown Castle BU Number:**	842861
	Crown Castle Site Name:	EAST HARTFORD HOCHANUM
	Crown Castle JDE Job Number:	480520
	Crown Castle Work Order Number:	1524534
	Crown Castle Application Number:	422653 Rev. 4
Engineering Firm Designation:	**Black & Veatch Corp. Project Number:**	194393
Site Data:	**223 Brainard Road, Hartford, Hartford County, CT** **Latitude *41° 43' 59"*, Longitude *-72° 39' 43.1"*** **96.83 Foot - Monopole Tower**	

Dear Charles McGuirt,

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 1145674, in accordance with application 422653, revision 4.

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

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

This analysis has been performed in accordance with the 2018 Connecticut State Building Code based upon an ultimate 3-second gust wind speed of 125 mph converted to a nominal 3-second gust wind speed of 97 mph per Section 1609.3 and Appendix N as required for use in the TIA-222-G Standard per Exception #5 of Section 1609.1.1. Exposure Category C with a maximum topographic factor, K_{zt}, of 1.0 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 0.181g and S_1 of 0.064g.

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: Patdanai Chongcharoenkamon / Mahesh K. Jadhav

Respectfully submitted by:

Ping Jiang, P.E.

Professional Engineer

STATE OF CONNECTICUT
PING JIANG
30767
LICENSED
PROFESSIONAL ENGINEER

Sep 06, 2018

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1) INTRODUCTION

This is 96.83 ft Monopole tower mapped by Tower Engineering Professionals in January of 2016. The original design standard and wind speed are unknown.

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 97 mph with no ice, 50 mph with 1 inch ice thickness and 60 mph under service loads, exposure category C 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 0.181g and S_1 of 0.064g.

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
100.0	101.0	3	cci antennas	OPA-65R-LCUU-H6 w/ Mount Pipe	1 4 1	3/8 3/4 Conduit	1,2
		3	ericsson	RRUS 11			
		3	ericsson	RRUS 32			
		3	ericsson	RRUS 32 B2			
		3	ericsson	RRUS 32 B66			
		3	ericsson	RRUS 4478 B14			
		6	kaelus	DBC0061F1V51-2			
		3	kathrein	80010965 w/ Mount Pipe			
		6	powerwave technologies	7020.00			
		1	raycap	DC6-48-60-0-8F			
		1	raycap	DC6-48-60-18-8F			

Notes:
1) See Appendix B for proposed coax configuration
2) (4) 3/4" Coax are Routed in Proposed Conduit and (1) 3/8" Coax is Routed in Existing Conduit

Table 2 - Existing Antenna and Cable Information

Mounting Level (ft)	Center Line Elevation (ft)	Number of Antennas	Antenna Manufacturer	Antenna Model	Number of Feed Lines	Feed Line Size (in)	Note
100.0	101.0	3	ericsson	RBS 6601	2	1/2	2,4
		6	ericsson	RRUS 12 B4/RRUS A2			
		3	powerwave technologies	7770.00 w/ Mount Pipe			
		3	cci antennas	HPA-65R-BUU-H6 w/ Mount Pipe	3 5 2 12 1	3/8 1/2 3/4 1-1/4 Conduit	1,3
		3	powerwave technologies	7770.00 w/ Mount Pipe			
		12	powerwave technologies	LGP21401			
		1	raycap	DC6-48-60-18-8F			
	100.0	1	cci tower mounts	Platform Mount [LP 1201-1]			

Mounting Level (ft)	Center Line Elevation (ft)	Number of Antennas	Antenna Manufacturer	Antenna Model	Number of Feed Lines	Feed Line Size (in)	Note
93.0	93.0	1	cci tower mounts	Side Arm Mount [SO 102-3]	-	-	1
		1	raycap	DC6-48-60-18-8F			
86.0	88.0	3	alcatel lucent	RRH2X40-AWS	1 18	1-1/4 1-5/8	1
		5	antel	BXA-171063-12BF w/ Mount Pipe			
		1	antel	BXA-171063-8BF-2 w/ Mount Pipe			
		2	antel	BXA-70063/4CF w/ Mount Pipe			
		1	rfs celwave	DB-T1-6Z-8AB-0Z			
		2	swedcom	SCCP 2x6015 w/ Mount Pipe			
		2	swedcom	SLCP 2x6015 w/ Mount Pipe			
	86.0	1	cci tower mounts	Platform Mount [LP 303-1]			
79.0	80.0	1	andrew	VHLP2-23	6 2 2	5/16 1/2 Conduit	1,5
		3	argus technologies	LLPX310R w/ Mount Pipe			
		1	dragonwave	HORIZON DUO			
		1	ericsson	RRU22 20 W			
		3	samsung telecommunications	FDD_R6_RRH			
	79.0	1	cci tower mounts	Side Arm Mount [SO 101-3]			

Notes:
1) Existing Equipment
2) Existing Equipment To Be Removed; Not Considered in This Analysis
3) (2) 3/8" Coax are Routed in Conduit
4) (1) 1/2" Coax is Removed from Conduit
5) (6) 5/16" and (1) 1/2" Coax are Routed in Conduits

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)
-	-	-	-	-	-	-

3) ANALYSIS PROCEDURE

Table 4 - Documents Provided

Document	Remarks	Reference	Source
4-GEOTECHNICAL REPORTS	Tower Engineering Professionals, Inc.	6049468	CCISITES
4-TOWER FOUNDATION DRAWINGS/DESIGN/SPECS	Tower Engineering Professionals, Inc. (Mapped)	6049752	CCISITES
4-TOWER MANUFACTURER DRAWINGS	Tower Engineering Professionals, Inc. (Mapped)	6071711	CCISITES
4-TOWER STRUCTURAL ANALYSIS REPORTS	Black & Veatch Corp.	6053122	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) 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	96.83 - 76.5	Pole	TP28.875x25.75x0.1875	1	-8.60	1087.51	37.4	Pass
L2	76.5 - 39.92	Pole	TP33.375x27.9236x0.2188	2	-14.25	1474.68	88.7	Pass
L3	39.92 - 0	Pole	TP39x32.363x0.2813	3	-22.61	2325.77	96.2	Pass
							Summary	
						Pole (L3)	96.2	Pass
						Rating =	96.2	Pass

Table 6 - Tower Component Stresses vs. Capacity – LC5

Notes	Component	Elevation (ft)	% Capacity	Pass / Fail
1	Anchor Rods	0	93.9	Pass
1	Base Plate	0	61.8	Pass
1	Base Foundation	0	42.1	Pass

Structure Rating (max from all components) =	96.2%

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

4.2) Seismic Result

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.

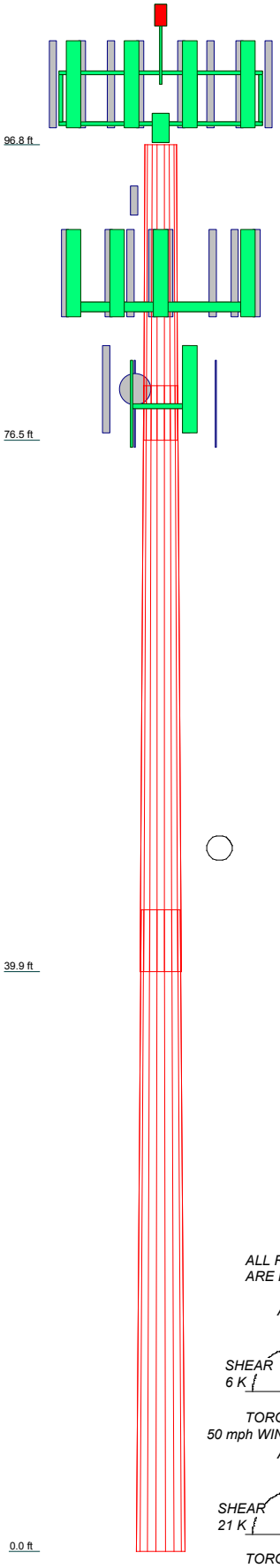
4.3) Recommendations

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

Section	Length (ft)	Number of Sides	Thickness (in)	Socket Length (ft)	Top Dia (in)	Bot Dia (in)	Grade	Weight (K)
1	20.33	18	0.1875	3.75	25.7500	28.8750		1.1
2	40.33	18	0.2188	4.25	27.9236	33.3750	A572-65	2.9
3	44.17	18	0.2813		32.3630	39.0000		4.7
								8.8



ALL REACTIONS ARE FACTORED

AXIAL 54 K

SHEAR 6 K *MOMENT 539 kip-ft*

TORQUE 0 kip-ft
50 mph WIND - 1.0000 in ICE

AXIAL 23 K

SHEAR 21 K *MOMENT 1765 kip-ft*

TORQUE 2 kip-ft
REACTIONS - 97 mph WIND

DESIGNED APPURTENANCE LOADING

TYPE	ELEVATION	TYPE	ELEVATION
Flash Beacon Lighting	105	DC6-48-60-18-8F	100
4' x 3" Pipe Mount	103	DC6-48-60-18-8F	100
Beacon Stand	100	(4) LGP21401	100
Platform Mount [LP 1201-1]	100	(4) LGP21401	100
14' Hor x 2.5" x 2.5" Angle Mount Handrail	100	(4) LGP21401	100
14' Hor x 2.5" x 2.5" Angle Mount Handrail	100	14" x 2' Top Hat	98
14' Hor x 2.5" x 2.5" Angle Mount Handrail	100	Side Arm Mount [SO 102-3]	93
80010965 w/ Mount Pipe	100	4' x 2" Pipe Mount	93
80010965 w/ Mount Pipe	100	4' x 2" Pipe Mount	93
80010965 w/ Mount Pipe	100	4' x 2" Pipe Mount	93
OPA-65R-LCUU-H6 w/ Mount Pipe	100	DC6-48-60-18-8F	93
OPA-65R-LCUU-H6 w/ Mount Pipe	100	Platform Mount [LP 303-1]	86
OPA-65R-LCUU-H6 w/ Mount Pipe	100	BXA-70063/4CF w/ Mount Pipe	86
7770.00 w/ Mount Pipe	100	BXA-70063/4CF w/ Mount Pipe	86
7770.00 w/ Mount Pipe	100	BXA-171063-12BF w/ Mount Pipe	86
7770.00 w/ Mount Pipe	100	BXA-171063-8BF-2 w/ Mount Pipe	86
HPA-65R-BUU-H6 w/ Mount Pipe	100	SLCP 2x6015 w/ Mount Pipe	86
HPA-65R-BUU-H6 w/ Mount Pipe	100	SCCP 2x6015 w/ Mount Pipe	86
HPA-65R-BUU-H6 w/ Mount Pipe	100	BXA-171063-12BF w/ Mount Pipe	86
(2) 7020.00	100	BXA-171063-12BF w/ Mount Pipe	86
(2) 7020.00	100	SLCP 2x6015 w/ Mount Pipe	86
(2) 7020.00	100	SCCP 2x6015 w/ Mount Pipe	86
RRUS 11	100	BXA-171063-12BF w/ Mount Pipe	86
RRUS 11	100	BXA-171063-12BF w/ Mount Pipe	86
RRUS 11	100	RRH2X40-AWS	86
RRUS 32 B2	100	DB-T1-6Z-8AB-0Z	86
RRUS 32 B2	100	RRH2X40-AWS	86
RRUS 32 B2	100	RRH2X40-AWS	86
RRUS 4478 B14	100	Side Arm Mount [SO 101-3]	79
RRUS 4478 B14	100	6' x 2" Mount Pipe	79
RRUS 4478 B14	100	6' x 2" Mount Pipe	79
RRUS 32 B66	100	6' x 2" Mount Pipe	79
RRUS 32 B66	100	LLPX310R w/ Mount Pipe	79
RRUS 32 B66	100	LLPX310R w/ Mount Pipe	79
RRUS 32	100	LLPX310R w/ Mount Pipe	79
RRUS 32	100	FDD_R6_RRH	79
RRUS 32	100	FDD_R6_RRH	79
(2) DBC0061F1V51-2	100	FDD_R6_RRH	79
(2) DBC0061F1V51-2	100	HORIZON DUO	79
(2) DBC0061F1V51-2	100	RRU22 20 W	79
DC6-48-60-0-8F	100	VHLP2-23	79

MATERIAL STRENGTH

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

TOWER DESIGN NOTES

1. Tower is located in Hartford County, Connecticut.
2. Tower designed for Exposure C to the TIA-222-G Standard.
3. Tower designed for a 97 mph basic wind in accordance with the TIA-222-G Standard.
4. Tower is also designed for a 50 mph basic wind with 1.00 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: 96.2%

BLACK & VEATCH
Building a world of difference.

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Overland Park, KS 66211
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Job:	***EAST HARTFORD HOCHANUM (BU# 842861***		
Project:	***194393 (842861.1524534)***		
Client: Crown Castle	Drawn by: Brennan J. Sedlacek	App'd:	
Code: TIA-222-G	Date: 02/27/18	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 Hartford County, Connecticut.
2) Basic wind speed of 97 mph.
3) Structure Class II.
4) Exposure Category C.
5) Topographic Category 1.
6) Crest Height 0.00 ft.
7) Nominal ice thickness of 1.0000 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	96.83-76.50	20.33	3.75	18	25.7500	28.8750	0.1875	0.7500	A572-65 (65 ksi)
L2	76.50-39.92	40.33	4.25	18	27.9236	33.3750	0.2188	0.8750	A572-65 (65 ksi)
L3	39.92-0.00	44.17		18	32.3630	39.0000	0.2813	1.1250	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	26.1472	15.2129	1255.9016	9.0747	13.0810	96.0096	2513.4558	7.6079	4.2020	22.411
	29.3204	17.0726	1775.1038	10.1841	14.6685	121.0147	3552.5433	8.5379	4.7520	25.344
L2	28.8690	19.2358	1865.3426	9.8352	14.1852	131.4994	3733.1396	9.6197	4.5295	20.707
	33.8899	23.0208	3197.3387	11.7705	16.9545	188.5835	6398.8846	11.5126	5.4890	25.093
L3	33.5107	28.6390	3724.0207	11.3890	16.4404	226.5162	7452.9415	14.3222	5.2009	18.492
	39.6016	34.5637	6546.3751	13.7452	19.8120	330.4247	13101.3641	17.2852	6.3690	22.645

Tower Elevation ft	Gusset Area (per face) ft^2	Gusset Thickness in	Gusset Grade	Adjust. Factor A_f	Adjust. Factor A_r	Weight Mult.	Double Angle Stitch Bolt Spacing Diagonals in	Double Angle Stitch Bolt Spacing Horizontals in	Double Angle Stitch Bolt Spacing Redundants in
L1 96.83-76.50				1	1	1			
L2 76.50-39.92				1	1	1			
L3 39.92-0.00				1	1	1			

Feed Line/Linear Appurtenances - Entered As Round Or Flat

Description	Sector	Component Type	Placement ft	Total Number	Number Per Row	Start/End Position	Width or Diameter in	Perimeter in	Weight plf
Safety Line 3/8	B	Surface Ar (CaAa)	96.83 - 12.00	1	1	-0.361 -0.350	0.3750		0.22
MLE HYBRID 3POWER/6FIBER RL 2(1-1/4)	A	Surface Ar (CaAa)	86.00 - 8.00	1	1	0.140 0.177	1.2500		0.68
LDF7-50A(1-5/8) **********	A	Surface Ar (CaAa)	86.00 - 8.00	6	6	-0.170 0.178	1.9800		0.82

Feed Line/Linear Appurtenances - Entered As Area

Description	Face or Leg	Allow Shield	Component Type	Placement ft	Total Number		C_AA_A ft^2/ft	Weight plf
Face A								
LDF7-50A(1-5/8)	A	No	Inside Pole	86.00 - 8.00	12	No Ice	0.00	0.82
						1/2" Ice	0.00	0.82
						1" Ice	0.00	0.82
Face B								
2" innerduct conduit	B	No	Inside Pole	79.00 - 3.00	2	No Ice	0.00	0.20
						1/2" Ice	0.00	0.20
						1" Ice	0.00	0.20
9207(5/16)	B	No	Inside Pole	79.00 - 3.00	6	No Ice	0.00	0.06
						1/2" Ice	0.00	0.06
						1" Ice	0.00	0.06
LDF4-50A(1/2)	B	No	Inside Pole	79.00 - 3.00	1	No Ice	0.00	0.15
						1/2" Ice	0.00	0.15
						1" Ice	0.00	0.15
LDF4-50A(1/2)	B	No	Inside Pole	79.00 - 3.00	1	No Ice	0.00	0.15
						1/2" Ice	0.00	0.15
						1" Ice	0.00	0.15
Face C								
2" innerduct conduit	C	No	Inside Pole	96.83 - 8.00	1	No Ice	0.00	0.20
						1/2" Ice	0.00	0.20
						1" Ice	0.00	0.20
WR-VG86ST-BRD(3/4)	C	No	Inside Pole	96.83 - 8.00	4	No Ice	0.00	0.58
						1/2" Ice	0.00	0.58
						1" Ice	0.00	0.58
2" innerduct conduit	C	No	Inside Pole	96.83 - 8.00	1	No Ice	0.00	0.20

Description	Face or Leg	Allow Shield	Component Type	Placement ft	Total Number		C_AA_A ft^2/ft	Weight plf
						1/2" Ice	0.00	0.20
						1" Ice	0.00	0.20
FB-L98B-034-XXX(3/8)	C	No	Inside Pole	96.83 - 8.00	1	No Ice	0.00	0.06
						1/2" Ice	0.00	0.06
						1" Ice	0.00	0.06
LDF2-50(3/8)	C	No	Inside Pole	96.83 - 8.00	2	No Ice	0.00	0.08
						1/2" Ice	0.00	0.08
						1" Ice	0.00	0.08
Tower Lighting(1/2)	C	No	Inside Pole	96.83 - 8.00	1	No Ice	0.00	0.15
						1/2" Ice	0.00	0.15
						1" Ice	0.00	0.15
FB-L98B-034-XXX(3/8)	C	No	Inside Pole	96.83 - 8.00	1	No Ice	0.00	0.06
						1/2" Ice	0.00	0.06
						1" Ice	0.00	0.06
LDF4-50A(1/2)	C	No	Inside Pole	96.83 - 8.00	5	No Ice	0.00	0.15
						1/2" Ice	0.00	0.15
						1" Ice	0.00	0.15
WR-VG86ST-BRD(3/4)	C	No	Inside Pole	96.83 - 8.00	2	No Ice	0.00	0.58
						1/2" Ice	0.00	0.58
						1" Ice	0.00	0.58
LDF6-50A(1-1/4)	C	No	Inside Pole	96.83 - 8.00	12	No Ice	0.00	0.60
						1/2" Ice	0.00	0.60
						1" Ice	0.00	0.60
**********								

Feed Line/Linear Appurtenances Section Areas

Tower Section	Tower Elevation ft	Face	A_R ft^2	A_F ft^2	C_AA_A In Face ft^2	C_AA_A Out Face ft^2	Weight K
L1	96.83-76.50	A	0.000	0.000	12.474	0.000	0.15
		B	0.000	0.000	0.762	0.000	0.01
		C	0.000	0.000	0.000	0.000	0.25
L2	76.50-39.92	A	0.000	0.000	48.030	0.000	0.56
		B	0.000	0.000	1.372	0.000	0.05
		C	0.000	0.000	0.000	0.000	0.45
L3	39.92-0.00	A	0.000	0.000	41.911	0.000	0.49
		B	0.000	0.000	1.047	0.000	0.05
		C	0.000	0.000	0.000	0.000	0.39

Feed Line/Linear Appurtenances Section Areas - With Ice

Tower Section	Tower Elevation ft	Face or Leg	Ice Thickness in	A_R ft^2	A_F ft^2	C_AA_A In Face ft^2	C_AA_A Out Face ft^2	Weight K
L1	96.83-76.50	A	2.202	0.000	0.000	24.710	0.000	0.52
		B		0.000	0.000	9.717	0.000	0.15
		C		0.000	0.000	0.000	0.000	0.25
L2	76.50-39.92	A	2.116	0.000	0.000	95.145	0.000	2.00
		B		0.000	0.000	17.483	0.000	0.30
		C		0.000	0.000	0.000	0.000	0.45
L3	39.92-0.00	A	1.903	0.000	0.000	81.787	0.000	1.68
		B		0.000	0.000	12.863	0.000	0.23
		C		0.000	0.000	0.000	0.000	0.39

Feed Line Center of Pressure

Section	Elevation ft	CP_X in	CP_Z in	CP_X Ice in	CP_Z Ice in
L1	96.83-76.50	-0.6426	-0.4547	-0.6810	-0.8704

Section	Elevation	CP_X	CP_Z	CP_X Ice	CP_Z Ice
	ft	in	in	in	in
L2	76.50-39.92	-1.1331	-0.7559	-1.1873	-1.1292
L3	39.92-0.00	-0.9922	-0.6572	-1.1541	-1.0482

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	76.50 - 96.83	1.0000	1.0000
L1	4	MLE HYBRID 3POWER/6FIBER RL 2(1-1/4)	76.50 - 86.00	1.0000	1.0000
L1	5	LDF7-50A(1-5/8)	76.50 - 86.00	1.0000	1.0000
L2	1	Safety Line 3/8	39.92 - 76.50	1.0000	1.0000
L2	4	MLE HYBRID 3POWER/6FIBER RL 2(1-1/4)	39.92 - 76.50	1.0000	1.0000
L2	5	LDF7-50A(1-5/8)	39.92 - 76.50	1.0000	1.0000

Discrete Tower Loads

Description	Face or Leg	Offset Type	Offsets: Horz Lateral Vert ft ft ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
Flash Beacon Lighting	C	None		0.0000	105.00	No Ice	2.70	2.70	0.05
						1/2" Ice	3.10	3.10	0.07
						1" Ice	3.50	3.50	0.09
4' x 3" Pipe Mount	C	None		0.0000	103.00	No Ice	1.00	1.00	0.03
						1/2" Ice	1.25	1.25	0.04
						1" Ice	1.50	1.50	0.05
Beacon Stand	C	None		0.0000	100.00	No Ice	0.58	0.58	0.11
						1/2" Ice	0.91	0.91	0.13
						1" Ice	1.24	1.24	0.15
14" x 2' Top Hat ***100***	C	None		0.0000	98.00	No Ice	1.17	1.17	0.11
						1/2" Ice	1.82	1.82	0.13
						1" Ice	2.02	2.02	0.16
Platform Mount [LP 1201-1]	C	None		0.0000	100.00	No Ice	23.10	23.10	2.10
						1/2" Ice	26.80	26.80	2.50
						1" Ice	30.50	30.50	2.90
14' Hor x 2.5" x 2.5" Angle Mount Handrail	A	None		0.0000	100.00	No Ice	0.88	0.05	0.08
						1/2" Ice	1.11	0.08	0.11
						1" Ice	1.35	0.12	0.15
14' Hor x 2.5" x 2.5" Angle	B	None		0.0000	100.00	No Ice	0.88	0.05	0.08

Description	Face or Leg	Offset Type	Offsets: Horz Lateral ft Vert ft ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
Mount Handrail						1/2" Ice	1.11 1.35	0.08 0.12	0.11 0.15
						1" Ice			
14' Hor x 2.5" x 2.5" Angle Mount Handrail	C	None		0.0000	100.00	No Ice 1/2" Ice 1" Ice	0.88 1.11 1.35	0.05 0.08 0.12	0.08 0.11 0.15
80010965 w/ Mount Pipe	A	From Face	4.00 2.00 1.00	0.0000	100.00	No Ice 1/2" Ice 1" Ice	14.05 14.69 15.30	7.63 8.90 9.96	0.13 0.22 0.33
80010965 w/ Mount Pipe	B	From Face	4.00 2.00 1.00	0.0000	100.00	No Ice 1/2" Ice 1" Ice	14.05 14.69 15.30	7.63 8.90 9.96	0.13 0.22 0.33
80010965 w/ Mount Pipe	C	From Face	4.00 2.00 1.00	0.0000	100.00	No Ice 1/2" Ice 1" Ice	14.05 14.69 15.30	7.63 8.90 9.96	0.13 0.22 0.33
OPA-65R-LCUU-H6 w/ Mount Pipe	A	From Face	4.00 6.00 1.00	0.0000	100.00	No Ice 1/2" Ice 1" Ice	9.90 10.47 11.01	7.18 8.36 9.26	0.10 0.18 0.26
OPA-65R-LCUU-H6 w/ Mount Pipe	B	From Face	4.00 6.00 1.00	0.0000	100.00	No Ice 1/2" Ice 1" Ice	9.90 10.47 11.01	7.18 8.36 9.26	0.10 0.18 0.26
OPA-65R-LCUU-H6 w/ Mount Pipe	C	From Face	4.00 6.00 1.00	0.0000	100.00	No Ice 1/2" Ice 1" Ice	9.90 10.47 11.01	7.18 8.36 9.26	0.10 0.18 0.26
7770.00 w/ Mount Pipe	A	From Face	4.00 -6.00 1.00	0.0000	100.00	No Ice 1/2" Ice 1" Ice	5.75 6.18 6.61	4.25 5.01 5.71	0.06 0.10 0.16
7770.00 w/ Mount Pipe	B	From Face	4.00 -6.00 1.00	0.0000	100.00	No Ice 1/2" Ice 1" Ice	5.75 6.18 6.61	4.25 5.01 5.71	0.06 0.10 0.16
7770.00 w/ Mount Pipe	C	From Face	4.00 -6.00 1.00	0.0000	100.00	No Ice 1/2" Ice 1" 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 -2.00 1.00	0.0000	100.00	No Ice 1/2" Ice 1" Ice	9.90 10.47 11.01	8.11 9.30 10.21	0.08 0.16 0.25
HPA-65R-BUU-H6 w/ Mount Pipe	B	From Face	4.00 -2.00 1.00	0.0000	100.00	No Ice 1/2" Ice 1" Ice	9.90 10.47 11.01	8.11 9.30 10.21	0.08 0.16 0.25
HPA-65R-BUU-H6 w/ Mount Pipe	C	From Face	4.00 -2.00 1.00	0.0000	100.00	No Ice 1/2" Ice 1" Ice	9.90 10.47 11.01	8.11 9.30 10.21	0.08 0.16 0.25
(2) 7020.00	A	From Face	4.00 0.00 1.00	0.0000	100.00	No Ice 1/2" Ice 1" Ice	0.10 0.15 0.20	0.17 0.24 0.31	0.00 0.01 0.01
(2) 7020.00	B	From Face	4.00 0.00 1.00	0.0000	100.00	No Ice 1/2" Ice 1" Ice	0.10 0.15 0.20	0.17 0.24 0.31	0.00 0.01 0.01
(2) 7020.00	C	From Face	4.00 0.00 1.00	0.0000	100.00	No Ice 1/2" Ice 1" Ice	0.10 0.15 0.20	0.17 0.24 0.31	0.00 0.01 0.01

Description	Face or Leg	Offset Type	Offsets: Horz Lateral ft Vert ft ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
RRUS 11	A	From Face	4.00	0.0000	100.00	No Ice	2.78	1.19	0.05
			0.00			1/2" Ice	2.99	1.33	0.07
			1.00			1" Ice	3.21	1.49	0.10
RRUS 11	B	From Face	4.00	0.0000	100.00	No Ice	2.78	1.19	0.05
			0.00			1/2" Ice	2.99	1.33	0.07
			1.00			1" Ice	3.21	1.49	0.10
RRUS 11	C	From Face	4.00	0.0000	100.00	No Ice	2.78	1.19	0.05
			0.00			1/2" Ice	2.99	1.33	0.07
			1.00			1" Ice	3.21	1.49	0.10
RRUS 32 B2	A	From Face	4.00	0.0000	100.00	No Ice	2.73	1.67	0.05
			0.00			1/2" Ice	2.95	1.86	0.07
			1.00			1" Ice	3.18	2.05	0.10
RRUS 32 B2	B	From Face	4.00	0.0000	100.00	No Ice	2.73	1.67	0.05
			0.00			1/2" Ice	2.95	1.86	0.07
			1.00			1" Ice	3.18	2.05	0.10
RRUS 32 B2	C	From Face	4.00	0.0000	100.00	No Ice	2.73	1.67	0.05
			0.00			1/2" Ice	2.95	1.86	0.07
			1.00			1" Ice	3.18	2.05	0.10
RRUS 4478 B14	A	From Face	4.00	0.0000	100.00	No Ice	1.84	1.06	0.06
			0.00			1/2" Ice	2.01	1.20	0.08
			1.00			1" Ice	2.19	1.34	0.09
RRUS 4478 B14	B	From Face	4.00	0.0000	100.00	No Ice	1.84	1.06	0.06
			0.00			1/2" Ice	2.01	1.20	0.08
			1.00			1" Ice	2.19	1.34	0.09
RRUS 4478 B14	C	From Face	4.00	0.0000	100.00	No Ice	1.84	1.06	0.06
			0.00			1/2" Ice	2.01	1.20	0.08
			1.00			1" Ice	2.19	1.34	0.09
RRUS 32 B66	A	From Face	4.00	0.0000	100.00	No Ice	2.74	1.67	0.05
			0.00			1/2" Ice	2.96	1.86	0.07
			1.00			1" Ice	3.19	2.05	0.10
RRUS 32 B66	B	From Face	4.00	0.0000	100.00	No Ice	2.74	1.67	0.05
			0.00			1/2" Ice	2.96	1.86	0.07
			1.00			1" Ice	3.19	2.05	0.10
RRUS 32 B66	C	From Face	4.00	0.0000	100.00	No Ice	2.74	1.67	0.05
			0.00			1/2" Ice	2.96	1.86	0.07
			1.00			1" Ice	3.19	2.05	0.10
RRUS 32	A	From Face	4.00	0.0000	100.00	No Ice	2.86	1.78	0.06
			0.00			1/2" Ice	3.08	1.97	0.08
			1.00			1" Ice	3.32	2.17	0.10
RRUS 32	B	From Face	4.00	0.0000	100.00	No Ice	2.86	1.78	0.06
			0.00			1/2" Ice	3.08	1.97	0.08
			1.00			1" Ice	3.32	2.17	0.10
RRUS 32	C	From Face	4.00	0.0000	100.00	No Ice	2.86	1.78	0.06
			0.00			1/2" Ice	3.08	1.97	0.08
			1.00			1" Ice	3.32	2.17	0.10
(2) DBC0061F1V51-2	A	From Face	4.00	0.0000	100.00	No Ice	0.43	0.41	0.03
			0.00			1/2" Ice	0.51	0.50	0.03
			1.00			1" Ice	0.61	0.59	0.04
(2) DBC0061F1V51-2	B	From Face	4.00	0.0000	100.00	No Ice	0.43	0.41	0.03
			0.00			1/2" Ice	0.51	0.50	0.03
			1.00			Ice	0.61	0.59	0.04

Description	Face or Leg	Offset Type	Offsets: Horz Lateral Vert ft ft ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
						1" Ice			
(2) DBC0061F1V51-2	C	From Face	4.00 0.00 1.00	0.0000	100.00	No Ice 1/2" Ice 1" Ice	0.43 0.51 0.61	0.41 0.50 0.59	0.03 0.03 0.04
DC6-48-60-0-8F	A	From Face	1.00 0.00 1.00	0.0000	100.00	No Ice 1/2" Ice 1" Ice	0.92 1.46 1.64	0.92 1.46 1.64	0.02 0.04 0.06
DC6-48-60-18-8F	A	From Face	1.00 0.00 1.00	0.0000	100.00	No Ice 1/2" Ice 1" Ice	0.92 1.46 1.64	0.92 1.46 1.64	0.02 0.04 0.06
DC6-48-60-18-8F	A	From Face	1.00 0.00 1.00	0.0000	100.00	No Ice 1/2" Ice 1" Ice	0.92 1.46 1.64	0.92 1.46 1.64	0.02 0.04 0.06
(4) LGP21401	A	From Face	4.00 0.00 1.00	0.0000	100.00	No Ice 1/2" Ice 1" Ice	0.00 0.00 0.00	0.35 0.44 0.54	0.01 0.02 0.03
(4) LGP21401	B	From Face	4.00 0.00 1.00	0.0000	100.00	No Ice 1/2" Ice 1" Ice	0.00 0.00 0.00	0.35 0.44 0.54	0.01 0.02 0.03
(4) LGP21401	C	From Face	4.00 0.00 1.00	0.0000	100.00	No Ice 1/2" Ice 1" Ice	0.00 0.00 0.00	0.35 0.44 0.54	0.01 0.02 0.03
93									
Side Arm Mount [SO 102-3]	C	None		0.0000	93.00	No Ice 1/2" Ice 1" Ice	3.00 3.48 3.96	3.00 3.48 3.96	0.08 0.11 0.14
4' x 2" Pipe Mount	A	From Face	0.00 0.00 1.00	0.0000	93.00	No Ice 1/2" Ice 1" Ice	0.79 1.03 1.28	0.79 1.03 1.28	0.03 0.04 0.04
4' x 2" Pipe Mount	B	From Face	0.00 0.00 1.00	0.0000	93.00	No Ice 1/2" Ice 1" Ice	0.79 1.03 1.28	0.79 1.03 1.28	0.03 0.04 0.04
4' x 2" Pipe Mount	C	From Face	0.00 0.00 1.00	0.0000	93.00	No Ice 1/2" Ice 1" Ice	0.79 1.03 1.28	0.79 1.03 1.28	0.03 0.04 0.04
DC6-48-60-18-8F	A	From Face	1.00 0.00 0.00	0.0000	93.00	No Ice 1/2" Ice 1" Ice	0.92 1.46 1.64	0.92 1.46 1.64	0.02 0.04 0.06
86									
Platform Mount [LP 303-1]	C	None		0.0000	86.00	No Ice 1/2" Ice 1" Ice	14.66 18.87 23.08	14.66 18.87 23.08	1.25 1.48 1.71
BXA-70063/4CF w/ Mount Pipe	A	From Face	3.00 -6.00 2.00	0.0000	86.00	No Ice 1/2" Ice 1" Ice	4.95 5.32 5.71	3.62 4.22 4.83	0.03 0.07 0.12
BXA-70063/4CF w/ Mount Pipe	A	From Face	3.00 0.00 2.00	0.0000	86.00	No Ice 1/2" Ice 1" Ice	4.95 5.32 5.71	3.62 4.22 4.83	0.03 0.07 0.12
BXA-171063-12BF w/ Mount Pipe	A	From Face	3.00 3.00 2.00	0.0000	86.00	No Ice 1/2" Ice 1" Ice	4.97 5.52 6.04	5.23 6.39 7.26	0.04 0.09 0.14

Description	Face or Leg	Offset Type	Offsets: Horz Lateral Vert ft ft ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
BXA-171063-8BF-2 w/ Mount Pipe	A	From Face	3.00 6.00 2.00	0.0000	86.00	No Ice 1/2" Ice 1" Ice	3.18 3.56 3.93	3.35 3.97 4.60	0.03 0.06 0.10
SLCP 2x6015 w/ Mount Pipe	B	From Face	3.00 -6.00 2.00	-30.0000	86.00	No Ice 1/2" Ice 1" Ice	10.22 10.82 11.39	10.00 11.24 12.26	0.06 0.15 0.25
SCCP 2x6015 w/ Mount Pipe	B	From Face	3.00 0.00 2.00	-30.0000	86.00	No Ice 1/2" Ice 1" Ice	8.64 9.17 9.68	7.95 8.99 9.81	0.05 0.13 0.21
BXA-171063-12BF w/ Mount Pipe	B	From Face	3.00 3.00 2.00	-30.0000	86.00	No Ice 1/2" Ice 1" Ice	4.97 5.52 6.04	5.23 6.39 7.26	0.04 0.09 0.14
BXA-171063-12BF w/ Mount Pipe	B	From Face	3.00 6.00 2.00	-30.0000	86.00	No Ice 1/2" Ice 1" Ice	4.97 5.52 6.04	5.23 6.39 7.26	0.04 0.09 0.14
SLCP 2x6015 w/ Mount Pipe	C	From Face	3.00 -6.00 2.00	30.0000	86.00	No Ice 1/2" Ice 1" Ice	10.22 10.82 11.39	10.00 11.24 12.26	0.06 0.15 0.25
SCCP 2x6015 w/ Mount Pipe	C	From Face	3.00 0.00 2.00	30.0000	86.00	No Ice 1/2" Ice 1" Ice	8.64 9.17 9.68	7.95 8.99 9.81	0.05 0.13 0.21
BXA-171063-12BF w/ Mount Pipe	C	From Face	3.00 3.00 2.00	30.0000	86.00	No Ice 1/2" Ice 1" Ice	4.97 5.52 6.04	5.23 6.39 7.26	0.04 0.09 0.14
BXA-171063-12BF w/ Mount Pipe	C	From Face	3.00 6.00 2.00	30.0000	86.00	No Ice 1/2" Ice 1" Ice	4.97 5.52 6.04	5.23 6.39 7.26	0.04 0.09 0.14
RRH2X40-AWS	A	From Face	3.00 0.00 2.00	0.0000	86.00	No Ice 1/2" Ice 1" 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 2.00	0.0000	86.00	No Ice 1/2" Ice 1" Ice	4.80 5.07 5.35	2.00 2.19 2.39	0.04 0.08 0.12
RRH2X40-AWS	B	From Face	3.00 0.00 2.00	0.0000	86.00	No Ice 1/2" Ice 1" 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 2.00	0.0000	86.00	No Ice 1/2" Ice 1" Ice	2.16 2.36 2.57	1.42 1.59 1.77	0.04 0.06 0.08
79									
Side Arm Mount [SO 101-3]	C	None		0.0000	79.00	No Ice 1/2" Ice 1" Ice	7.50 8.90 10.30	7.50 8.90 10.30	0.25 0.33 0.41
6' x 2" Mount Pipe	A	From Face	2.00 2.00 0.00	0.0000	79.00	No Ice 1/2" Ice 1" Ice	1.43 1.92 2.29	1.43 1.92 2.29	0.02 0.03 0.05
6' x 2" Mount Pipe	B	From Face	2.00 2.00 0.00	0.0000	79.00	No Ice 1/2" Ice 1" Ice	1.43 1.92 2.29	1.43 1.92 2.29	0.02 0.03 0.05
6' x 2" Mount Pipe	C	From Face	2.00 2.00	0.0000	79.00	No Ice 1/2"	1.43 1.92	1.43 1.92	0.02 0.03

Description	Face or Leg	Offset Type	Offsets: Horz Lateral ft	Vert ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
			0.00				Ice	2.29	2.29	0.05
							1" Ice			
LLPX310R w/ Mount Pipe	A	From Face	2.00	30.0000	79.00		No Ice	4.54	2.98	0.05
			-2.00				1/2"	4.89	3.53	0.08
			1.00				Ice	5.25	4.09	0.13
							1" Ice			
LLPX310R w/ Mount Pipe	B	From Face	2.00	30.0000	79.00		No Ice	4.54	2.98	0.05
			-2.00				1/2"	4.89	3.53	0.08
			1.00				Ice	5.25	4.09	0.13
							1" Ice			
LLPX310R w/ Mount Pipe	C	From Face	2.00	30.0000	79.00		No Ice	4.54	2.98	0.05
			-2.00				1/2"	4.89	3.53	0.08
			1.00				Ice	5.25	4.09	0.13
							1" Ice			
FDD_R6_RRH	A	From Face	2.00	0.0000	79.00		No Ice	1.53	0.68	0.03
			0.00				1/2"	1.69	0.80	0.04
			1.00				Ice	1.85	0.92	0.06
							1" Ice			
FDD_R6_RRH	B	From Face	2.00	0.0000	79.00		No Ice	1.53	0.68	0.03
			0.00				1/2"	1.69	0.80	0.04
			1.00				Ice	1.85	0.92	0.06
							1" Ice			
FDD_R6_RRH	C	From Face	2.00	0.0000	79.00		No Ice	1.53	0.68	0.03
			0.00				1/2"	1.69	0.80	0.04
			1.00				Ice	1.85	0.92	0.06
							1" Ice			
HORIZON DUO	A	From Face	2.00	0.0000	79.00		No Ice	0.00	0.29	0.01
			0.00				1/2"	0.00	0.37	0.01
			1.00				Ice	0.00	0.44	0.02
							1" Ice			
RRU22 20 W	C	From Face	2.00	0.0000	79.00		No Ice	2.22	1.73	0.06
			0.00				1/2"	2.40	1.90	0.09
			0.00				Ice	2.60	2.08	0.11
							1" Ice			
**********										

Dishes

Description	Face or Leg	Dish Type	Offset Type	Offsets: Horz Lateral ft	Vert ft	Azimuth Adjustment °	3 dB Beam Width °	Elevation ft	Outside Diameter ft		Aperture Area ft^2	Weight K
VHLP2-23	A	Paraboloid w/Shroud (HP)	From Face	2.00		0.0000		79.00	2.17	No Ice	3.70	0.04
				2.00						1/2" Ice	3.99	0.06
				1.00						1" Ice	4.28	0.08
**********												

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

Comb. No.	Description
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	96.83 - 76.5	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	26	-28.34	-0.42	1.32
			Max. Mx	20	-8.61	229.44	0.88
			Max. My	2	-8.62	0.82	228.90
			Max. Vy	8	14.82	-229.32	-0.39
			Max. Vx	2	-14.73	0.82	228.90
			Max. Torque	3			-1.91
L2	76.5 - 39.92	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	26	-40.39	1.77	3.03
			Max. Mx	8	-14.25	-864.63	-5.54
			Max. My	2	-14.27	6.34	859.58
			Max. Vy	8	18.93	-864.63	-5.54
			Max. Vx	14	18.80	-6.99	-859.26
			Max. Torque	15			1.95
L3	39.92 - 0	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	26	-53.62	3.76	4.82
			Max. Mx	8	-22.61	-1759.34	-11.66
			Max. My	2	-22.61	12.94	1748.63
			Max. Vy	8	21.39	-1759.34	-11.66

Section No.	Elevation ft	Component Type	Condition	Gov. Load Comb.	Axial K	Major Axis Moment kip-ft	Minor Axis Moment kip-ft
			Max. Vx	14	21.26	-14.92	-1748.32
			Max. Torque	15			1.94

Maximum Reactions

Location	Condition	Gov. Load Comb.	Vertical K	Horizontal, X K	Horizontal, Z K
Pole	Max. Vert	35	53.62	5.56	-3.14
	Max. H_x	20	22.64	21.31	0.13
	Max. H_z	2	22.64	0.14	21.22
	Max. M_x	2	1748.63	0.14	21.22
	Max. M_z	8	1759.34	-21.36	-0.14
	Max. Torsion	15	1.94	-0.18	-21.23
	Min. Vert	13	16.98	-10.80	-18.44
	Min. H_x	8	22.64	-21.36	-0.14
	Min. H_z	14	22.64	-0.18	-21.23
	Min. M_x	14	-1748.32	-0.18	-21.23
	Min. M_z	20	-1757.17	21.31	0.13
	Min. Torsion	3	-1.83	0.14	21.22

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	18.86	0.00	0.00	-0.46	0.62	0.00
1.2 Dead+1.6 Wind 0 deg - No Ice	22.64	-0.14	-21.22	-1748.63	12.94	1.82
0.9 Dead+1.6 Wind 0 deg - No Ice	16.98	-0.14	-21.22	-1730.57	12.62	1.83
1.2 Dead+1.6 Wind 30 deg - No Ice	22.64	10.55	-18.34	-1510.75	-868.46	1.48
0.9 Dead+1.6 Wind 30 deg - No Ice	16.98	10.55	-18.34	-1495.13	-859.76	1.49
1.2 Dead+1.6 Wind 60 deg - No Ice	22.64	18.46	-10.46	-861.43	-1520.34	0.76
0.9 Dead+1.6 Wind 60 deg - No Ice	16.98	18.46	-10.46	-852.45	-1504.96	0.77
1.2 Dead+1.6 Wind 90 deg - No Ice	22.64	21.36	0.14	11.66	-1759.34	-0.09
0.9 Dead+1.6 Wind 90 deg - No Ice	16.98	21.36	0.14	11.69	-1741.51	-0.08
1.2 Dead+1.6 Wind 120 deg - No Ice	22.64	18.55	10.72	882.76	-1527.87	-0.95
0.9 Dead+1.6 Wind 120 deg - No Ice	16.98	18.55	10.72	873.86	-1512.41	-0.95
1.2 Dead+1.6 Wind 150 deg - No Ice	22.64	10.80	18.44	1518.95	-889.87	-1.64
0.9 Dead+1.6 Wind 150 deg - No Ice	16.98	10.80	18.44	1503.53	-880.95	-1.64
1.2 Dead+1.6 Wind 180 deg - No Ice	22.64	0.18	21.23	1748.32	-14.92	-1.93
0.9 Dead+1.6 Wind 180 deg - No Ice	16.98	0.18	21.23	1730.55	-14.96	-1.94
1.2 Dead+1.6 Wind 210 deg - No Ice	22.64	-10.59	18.32	1507.96	872.86	-1.40
0.9 Dead+1.6 Wind 210 deg - No Ice	16.98	-10.59	18.32	1492.65	863.72	-1.41
1.2 Dead+1.6 Wind 240 deg - No Ice	22.64	-18.43	10.49	862.92	1519.39	-0.82
0.9 Dead+1.6 Wind 240 deg - No Ice	16.98	-18.43	10.49	854.23	1503.64	-0.83

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
1.2 Dead+1.6 Wind 270 deg - No Ice	22.64	-21.31	-0.13	-11.67	1757.17	-0.05
0.9 Dead+1.6 Wind 270 deg - No Ice	16.98	-21.31	-0.13	-11.41	1738.99	-0.05
1.2 Dead+1.6 Wind 300 deg - No Ice	22.64	-18.51	-10.69	-882.06	1526.25	0.86
0.9 Dead+1.6 Wind 300 deg - No Ice	16.98	-18.51	-10.69	-872.89	1510.42	0.86
1.2 Dead+1.6 Wind 330 deg - No Ice	22.64	-10.77	-18.41	-1517.43	888.60	1.59
0.9 Dead+1.6 Wind 330 deg - No Ice	16.98	-10.77	-18.41	-1501.75	879.30	1.59
1.2 Dead+1.0 Ice+1.0 Temp	53.62	-0.00	-0.00	-4.82	3.76	-0.00
1.2 Dead+1.0 Wind 0 deg+1.0 Ice+1.0 Temp	53.62	-0.06	-6.14	-527.64	9.54	0.15
1.2 Dead+1.0 Wind 30 deg+1.0 Ice+1.0 Temp	53.62	3.05	-5.30	-455.30	-255.65	0.08
1.2 Dead+1.0 Wind 60 deg+1.0 Ice+1.0 Temp	53.62	5.57	-3.14	-268.43	-465.64	-0.01
1.2 Dead+1.0 Wind 90 deg+1.0 Ice+1.0 Temp	53.62	6.20	0.06	0.90	-525.21	-0.08
1.2 Dead+1.0 Wind 120 deg+1.0 Ice+1.0 Temp	53.62	5.40	3.12	261.21	-456.80	-0.14
1.2 Dead+1.0 Wind 150 deg+1.0 Ice+1.0 Temp	53.62	3.15	5.35	450.65	-265.71	-0.18
1.2 Dead+1.0 Wind 180 deg+1.0 Ice+1.0 Temp	53.62	0.07	6.14	518.11	-2.81	-0.18
1.2 Dead+1.0 Wind 210 deg+1.0 Ice+1.0 Temp	53.62	-3.06	5.29	445.17	263.92	-0.06
1.2 Dead+1.0 Wind 240 deg+1.0 Ice+1.0 Temp	53.62	-5.56	3.14	259.33	472.63	-0.00
1.2 Dead+1.0 Wind 270 deg+1.0 Ice+1.0 Temp	53.62	-6.19	-0.06	-10.36	531.90	0.05
1.2 Dead+1.0 Wind 300 deg+1.0 Ice+1.0 Temp	53.62	-5.39	-3.11	-270.51	463.62	0.12
1.2 Dead+1.0 Wind 330 deg+1.0 Ice+1.0 Temp	53.62	-3.15	-5.34	-459.75	272.61	0.16
Dead+Wind 0 deg - Service	18.86	-0.03	-4.54	-372.56	3.23	0.39
Dead+Wind 30 deg - Service	18.86	2.26	-3.92	-321.92	-184.38	0.32
Dead+Wind 60 deg - Service	18.86	3.95	-2.24	-183.71	-323.14	0.17
Dead+Wind 90 deg - Service	18.86	4.57	0.03	2.13	-374.02	-0.01
Dead+Wind 120 deg - Service	18.86	3.97	2.29	187.55	-324.75	-0.20
Dead+Wind 150 deg - Service	18.86	2.31	3.95	322.97	-188.95	-0.36
Dead+Wind 180 deg - Service	18.86	0.04	4.54	371.79	-2.70	-0.42
Dead+Wind 210 deg - Service	18.86	-2.27	3.92	320.62	186.27	-0.30
Dead+Wind 240 deg - Service	18.86	-3.94	2.24	183.33	323.89	-0.17
Dead+Wind 270 deg - Service	18.86	-4.56	-0.03	-2.84	374.51	-0.01
Dead+Wind 300 deg - Service	18.86	-3.96	-2.29	-188.11	325.36	0.19
Dead+Wind 330 deg - Service	18.86	-2.30	-3.94	-323.36	189.62	0.34

Solution Summary

Load Comb.	Sum of Applied Forces PX K	PY K	PZ K	Sum of Reactions PX K	PY K	PZ K	% Error
1	0.00	-18.86	0.00	0.00	18.86	0.00	0.000%
2	-0.14	-22.64	-21.22	0.14	22.64	21.22	0.000%
3	-0.14	-16.98	-21.22	0.14	16.98	21.22	0.000%
4	10.55	-22.64	-18.34	-10.55	22.64	18.34	0.000%
5	10.55	-16.98	-18.34	-10.55	16.98	18.34	0.000%

Load Comb.	Sum of Applied Forces PX K	PY K	PZ K	Sum of Reactions PX K	PY K	PZ K	% Error
6	18.46	-22.64	-10.46	-18.46	22.64	10.46	0.000%
7	18.46	-16.98	-10.46	-18.46	16.98	10.46	0.000%
8	21.36	-22.64	0.14	-21.36	22.64	-0.14	0.000%
9	21.36	-16.98	0.14	-21.36	16.98	-0.14	0.000%
10	18.55	-22.64	10.72	-18.55	22.64	-10.72	0.000%
11	18.55	-16.98	10.72	-18.55	16.98	-10.72	0.000%
12	10.80	-22.64	18.44	-10.80	22.64	-18.44	0.000%
13	10.80	-16.98	18.44	-10.80	16.98	-18.44	0.000%
14	0.18	-22.64	21.23	-0.18	22.64	-21.23	0.000%
15	0.18	-16.98	21.23	-0.18	16.98	-21.23	0.000%
16	-10.59	-22.64	18.32	10.59	22.64	-18.32	0.000%
17	-10.59	-16.98	18.32	10.59	16.98	-18.32	0.000%
18	-18.43	-22.64	10.49	18.43	22.64	-10.49	0.000%
19	-18.43	-16.98	10.49	18.43	16.98	-10.49	0.000%
20	-21.31	-22.64	-0.13	21.31	22.64	0.13	0.000%
21	-21.31	-16.98	-0.13	21.31	16.98	0.13	0.000%
22	-18.51	-22.64	-10.69	18.51	22.64	10.69	0.000%
23	-18.51	-16.98	-10.69	18.51	16.98	10.69	0.000%
24	-10.77	-22.64	-18.41	10.77	22.64	18.41	0.000%
25	-10.77	-16.98	-18.41	10.77	16.98	18.41	0.000%
26	0.00	-53.62	0.00	0.00	53.62	0.00	0.000%
27	-0.06	-53.62	-6.14	0.06	53.62	6.14	0.000%
28	3.05	-53.62	-5.30	-3.05	53.62	5.30	0.000%
29	5.57	-53.62	-3.14	-5.57	53.62	3.14	0.000%
30	6.20	-53.62	0.06	-6.20	53.62	-0.06	0.000%
31	5.40	-53.62	3.12	-5.40	53.62	-3.12	0.000%
32	3.15	-53.62	5.35	-3.15	53.62	-5.35	0.000%
33	0.07	-53.62	6.14	-0.07	53.62	-6.14	0.000%
34	-3.06	-53.62	5.29	3.06	53.62	-5.29	0.000%
35	-5.56	-53.62	3.14	5.56	53.62	-3.14	0.000%
36	-6.19	-53.62	-0.06	6.19	53.62	0.06	0.000%
37	-5.39	-53.62	-3.11	5.39	53.62	3.11	0.000%
38	-3.15	-53.62	-5.34	3.15	53.62	5.34	0.000%
39	-0.03	-18.86	-4.54	0.03	18.86	4.54	0.000%
40	2.26	-18.86	-3.92	-2.26	18.86	3.92	0.000%
41	3.95	-18.86	-2.24	-3.95	18.86	2.24	0.000%
42	4.57	-18.86	0.03	-4.57	18.86	-0.03	0.000%
43	3.97	-18.86	2.29	-3.97	18.86	-2.29	0.000%
44	2.31	-18.86	3.95	-2.31	18.86	-3.95	0.000%
45	0.04	-18.86	4.54	-0.04	18.86	-4.54	0.000%
46	-2.27	-18.86	3.92	2.27	18.86	-3.92	0.000%
47	-3.94	-18.86	2.24	3.94	18.86	-2.24	0.000%
48	-4.56	-18.86	-0.03	4.56	18.86	0.03	0.000%
49	-3.96	-18.86	-2.29	3.96	18.86	2.29	0.000%
50	-2.30	-18.86	-3.94	2.30	18.86	3.94	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	0.00017111
3	Yes	5	0.00000001	0.00007623
4	Yes	6	0.00000001	0.00011084
5	Yes	6	0.00000001	0.00003268
6	Yes	6	0.00000001	0.00010295
7	Yes	5	0.00000001	0.00098843
8	Yes	4	0.00000001	0.00089383
9	Yes	4	0.00000001	0.00051850
10	Yes	6	0.00000001	0.00010451
11	Yes	6	0.00000001	0.00003022
12	Yes	6	0.00000001	0.00011295
13	Yes	6	0.00000001	0.00003310
14	Yes	5	0.00000001	0.00028347
15	Yes	5	0.00000001	0.00012447
16	Yes	6	0.00000001	0.00010149

17	Yes	5	0.00000001	0.00097418
18	Yes	6	0.00000001	0.00010858
19	Yes	6	0.00000001	0.00003188
20	Yes	4	0.00000001	0.00084959
21	Yes	4	0.00000001	0.00046080
22	Yes	6	0.00000001	0.00011023
23	Yes	6	0.00000001	0.00003217
24	Yes	6	0.00000001	0.00010284
25	Yes	5	0.00000001	0.00098605
26	Yes	4	0.00000001	0.00010238
27	Yes	6	0.00000001	0.00014592
28	Yes	6	0.00000001	0.00026025
29	Yes	6	0.00000001	0.00027094
30	Yes	6	0.00000001	0.00014488
31	Yes	6	0.00000001	0.00026085
32	Yes	6	0.00000001	0.00026546
33	Yes	6	0.00000001	0.00014316
34	Yes	6	0.00000001	0.00025627
35	Yes	6	0.00000001	0.00026563
36	Yes	6	0.00000001	0.00014714
37	Yes	6	0.00000001	0.00027814
38	Yes	6	0.00000001	0.00027315
39	Yes	4	0.00000001	0.00029841
40	Yes	5	0.00000001	0.00004237
41	Yes	4	0.00000001	0.00082289
42	Yes	4	0.00000001	0.00006266
43	Yes	4	0.00000001	0.00084476
44	Yes	5	0.00000001	0.00004396
45	Yes	4	0.00000001	0.00035000
46	Yes	4	0.00000001	0.00080080
47	Yes	4	0.00000001	0.00096091
48	Yes	4	0.00000001	0.00006283
49	Yes	4	0.00000001	0.00099315
50	Yes	4	0.00000001	0.00082841

Maximum Tower Deflections - Service Wind

Section No.	*Elevation*	*Horz. Deflection*	*Gov. Load*	*Tilt*	*Twist*
	ft	*in*	*Comb.*	*°*	*°*
L1	96.83 - 76.5	14.312	49	1.2022	0.0038
L2	80.25 - 39.92	10.248	49	1.1208	0.0033
L3	44.17 - 0	3.246	49	0.6611	0.0012

Critical Deflections and Radius of Curvature - Service Wind

Elevation	*Appurtenance*	*Gov. Load*	*Deflection*	*Tilt*	*Twist*	*Radius of Curvature*
ft		*Comb.*	*in*	*°*	*°*	*ft*
105.00	Flash Beacon Lighting	49	14.312	1.2022	0.0041	26931
103.00	4' x 3" Pipe Mount	49	14.312	1.2022	0.0041	26931
100.00	Beacon Stand	49	14.312	1.2022	0.0041	26931
98.00	14" x 2' Top Hat	49	14.312	1.2022	0.0041	26931
93.00	Side Arm Mount [SO 102-3]	49	13.358	1.1879	0.0040	26931
86.00	Platform Mount [LP 303-1]	49	11.632	1.1568	0.0038	12433
80.00	VHLP2-23	49	10.188	1.1189	0.0036	8075
79.00	Side Arm Mount [SO 101-3]	49	9.953	1.1112	0.0035	7663

Maximum Tower Deflections - Design Wind

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
L1	96.83 - 76.5	67.105	10	5.6425	0.0177
L2	80.25 - 39.92	48.072	10	5.2631	0.0153
L3	44.17 - 0	15.239	10	3.1056	0.0057

Critical Deflections and Radius of Curvature - Design Wind

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
105.00	Flash Beacon Lighting	10	67.105	5.6425	0.0192	5867
103.00	4' x 3" Pipe Mount	10	67.105	5.6425	0.0192	5867
100.00	Beacon Stand	10	67.105	5.6425	0.0192	5867
98.00	14" x 2' Top Hat	10	67.105	5.6425	0.0192	5867
93.00	Side Arm Mount [SO 102-3]	10	62.640	5.5763	0.0186	5867
86.00	Platform Mount [LP 303-1]	10	54.555	5.4313	0.0176	2708
80.00	VHLP2-23	10	47.795	5.2544	0.0165	1757
79.00	Side Arm Mount [SO 101-3]	10	46.690	5.2181	0.0162	1666

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	96.83 - 76.5 (1)	TP28.875x25.75x0.1875	20.33	0.00	0.0	16.7296	-8.60	1087.51	0.008
L2	76.5 - 39.92 (2)	TP33.375x27.9236x0.2188	40.33	0.00	0.0	22.6219	-14.25	1474.68	0.010
L3	39.92 - 0 (3)	TP39x32.363x0.2813	44.17	0.00	0.0	34.5637	-22.61	2325.77	0.010

Pole Bending Design Data

Section No.	Elevation ft	Size	M_{ux} kip-ft	ϕM_{nx} kip-ft	Ratio $\frac{M_{ux}}{\phi M_{nx}}$	M_{uy} kip-ft	ϕM_{ny} kip-ft	Ratio $\frac{M_{uy}}{\phi M_{ny}}$
L1	96.83 - 76.5 (1)	TP28.875x25.75x0.1875	229.90	629.39	0.365	0.00	629.39	0.000
L2	76.5 - 39.92 (2)	TP33.375x27.9236x0.2188	867.15	989.14	0.877	0.00	989.14	0.000
L3	39.92 - 0 (3)	TP39x32.363x0.2813	1764.55	1852.83	0.952	0.00	1852.83	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	96.83 - 76.5 (1)	TP28.875x25.75x0.1875	14.86	543.76	0.027	0.67	1260.31	0.001
L2	76.5 - 39.92 (2)	TP33.375x27.9236x0.2188	19.00	737.34	0.026	0.95	1980.70	0.000

Section No.	Elevation ft	Size	Actual V_u K	ϕV_n K	Ratio $\frac{V_u}{\phi V_n}$	Actual T_u kip-ft	ϕT_n kip-ft	Ratio $\frac{T_u}{\phi T_n}$
L3	39.92 - 0 (3)	TP39x32.363x0.2813	21.45	1162.88	0.018	0.95	3710.20	0.000

Pole Interaction Design Data

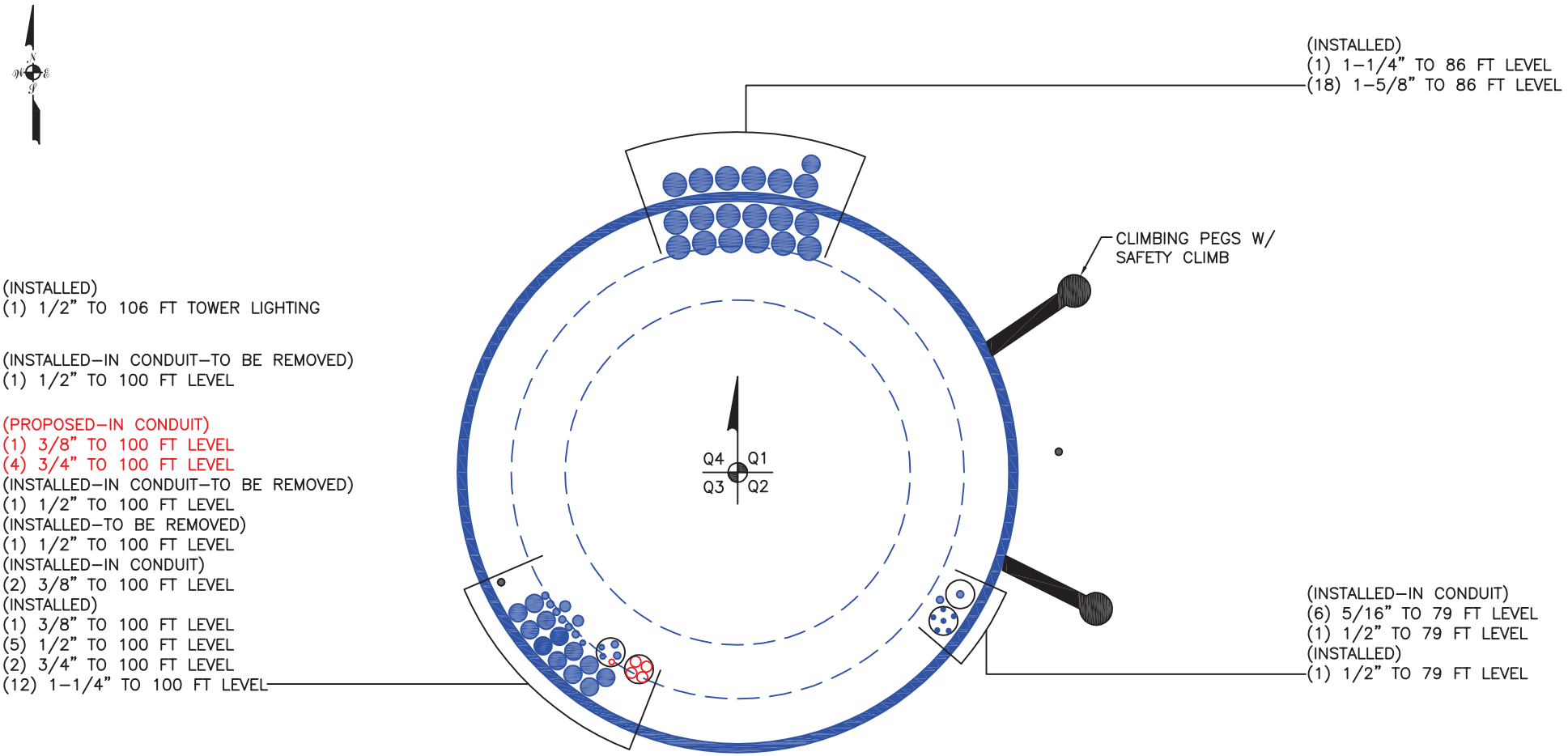
Section No.	Elevation ft	Ratio $\frac{P_u}{\phi P_n}$	Ratio $\frac{M_{ux}}{\phi M_{nx}}$	Ratio $\frac{M_{uy}}{\phi M_{ny}}$	Ratio $\frac{V_u}{\phi V_n}$	Ratio $\frac{T_u}{\phi T_n}$	Comb. Stress Ratio	Allow. Stress Ratio	Criteria
L1	96.83 - 76.5 (1)	0.008	0.365	0.000	0.027	0.001	0.374	1.000	4.8.2
L2	76.5 - 39.92 (2)	0.010	0.877	0.000	0.026	0.000	0.887	1.000	4.8.2
L3	39.92 - 0 (3)	0.010	0.952	0.000	0.018	0.000	0.962	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	96.83 - 76.5	Pole	TP28.875x25.75x0.1875	1	-8.60	1087.51	37.4	Pass
L2	76.5 - 39.92	Pole	TP33.375x27.9236x0.2188	2	-14.25	1474.68	88.7	Pass
L3	39.92 - 0	Pole	TP39x32.363x0.2813	3	-22.61	2325.77	96.2	Pass
							Summary	
						Pole (L3)	96.2	Pass
						RATING =	**96.2**	**Pass**

APPENDIX B

BASE LEVEL DRAWING



BUSINESS UNIT: 842861 TOWER ID: C_BASELEVEL

APPENDIX C

ADDITIONAL CALCULATIONS

Square, Stiffened / Unstiffened Base Plate, Any Rod Material - Rev. F /G

Assumptions: 1) Rod groups at corners. Total # rods divisible by 4. Maximum total # of rods = 48 (12 per Corner).
2) Rod Spacing = Straight Center-to-Center distance between any (2) adjacent rods (same corner)
3) Clear space between bottom of leveling nut and top of concrete **not** exceeding (1)*(Rod Diameter)

Site Data

BU#: *842861*
Site Name: *EAST HARTFORD HOCHANI*
App #: *422653 Rev.4*

Anchor Rod Data		
Eta Factor, η	0.5	TIA G (Fig. 4-4)
Qty:	8	
Diam:	2.25	in
Rod Material:	A615-J	
Yield, Fy:	75	ksi
Strength, Fu:	100	ksi
Bolt Circle:	44.878	in
Anchor Spacing:	6	in

Plate Data		
W=Side:	45	in
Thick:	2.75	in
Grade:	50	ksi
Clip Distance:	7.0710678	in

Stiffener Data (Welding at both sides)		
Configuration:	Unstiffened	
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:	39	in
Thick:	0.28125	in
Grade:	65	ksi
# of Sides:	18	"0" IF Round

Base Reactions		
TIA Revision:	G	
Factored Moment, Mu:	1765	ft-kips
Factored Axial, Pu:	23	kips
Factored Shear, Vu:	21	kips

Anchor Rod Results

TIA G --> Max Rod (Cu+ Vu/η):	244.1 Kips
Axial Design Strength, Φ*Fu*Anet:	260.0 Kips
Anchor Rod Stress Ratio:	93.9% **Pass**

Base Plate Results	Flexural Check
Base Plate Stress:	27.8 ksi
PL Design Bending Strength, Φ*Fy:	45.0 ksi
Base Plate Stress Ratio:	61.8% **Pass**

PL Ref. Data
Yield Line (in):
24.64
Max PL Length:
24.64

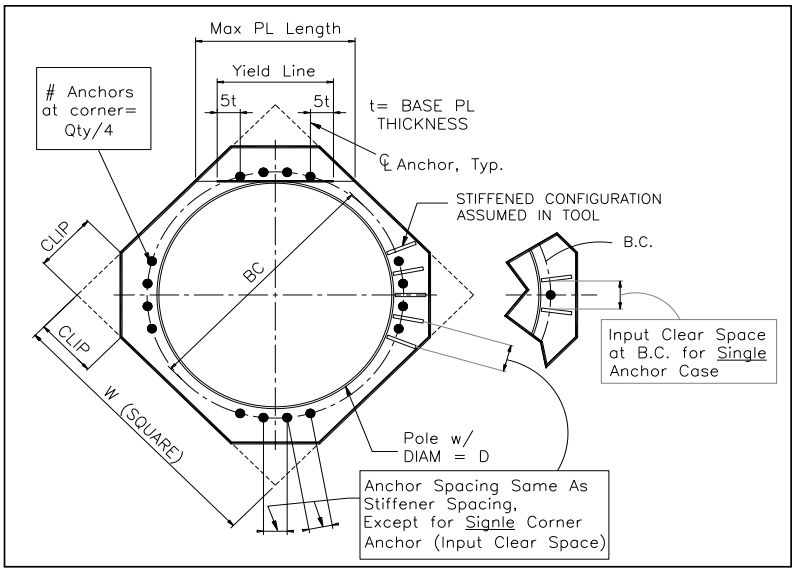
N/A - Unstiffened

Stiffener Results

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

Pole Results

Pole Punching Shear Check:	N/A



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

LPile for Windows, Version 2016-09.007

Analysis of Individual Piles and Drilled Shafts
Subjected to Lateral Loading Using the p-y Method

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Files Used for Analysis

Path to file locations:
\TELECOM\2018\Engineering\Projects\CCI\SA Sites\842861\842861.1524534 - TSA\Structural\Verification\

Name of input data file:
842861.1524534 Foundation Analysis.lp9d

Name of output report file:
842861.1524534 Foundation Analysis.lp9o

Name of plot output file:
842861.1524534 Foundation Analysis.lp9p

Name of runtime message file:
842861.1524534 Foundation Analysis.lp9r

Date and Time of Analysis

Date: February 27, 2018 Time: 17:34:29

Problem Title

Project Name: EAST HARTFORD HOCHANUM

Job Number: 194393 (842861.1524534)

Client: Crown Castle

Engineer: Patdanai Chongcharoenkamon

Description: Foundation Analysis

Program Options and Settings

Computational Options:
- Use unfactored loads in computations (conventional analysis)

Engineering Units Used for Data Input and Computations:
- US Customary System Units (pounds, feet, inches)

Analysis Control Options:

- Maximum number of iterations allowed	=	500
- Deflection tolerance for convergence	=	1.0000E-05 in
- Maximum allowable deflection	=	100.0000 in
- Number of pile increments	=	100

Loading Type and Number of Cycles of Loading:
- Static loading specified

- Use of p-y modification factors for p-y curves not selected
- No distributed lateral loads are entered
- Loading by lateral soil movements acting on pile not selected
- Analysis includes tip shear resistance for short pile or shaft
- Computation of pile-head foundation stiffness matrix not selected
- Push-over analysis of pile not selected
- Buckling analysis of pile not selected

Output Options:
- Output files use decimal points to denote decimal symbols.
- Report only summary tables of pile-head deflection, maximum bending moment, and maximum shear force in output report file.
- No p-y curves to be computed and reported for user-specified depths
- Print using wide report formats

Pile Structural Properties and Geometry

Number of pile sections defined	=	1
Total length of pile	=	45.000 ft
Depth of ground surface below top of pile	=	0.2500 ft

Pile diameters used for p-y curve computations are defined using 2 points.

p-y curves are computed using pile diameter values interpolated with depth over the length of the pile. A summary of values of pile diameter vs. depth follows.

Point No.	Depth Below Pile Head feet	Pile Diameter inches
1	0.000	84.0000

2 45.000 84.0000

Input Structural Properties for Pile Sections:

Pile Section No. 1:

Section 1 is a round drilled shaft, bored pile, or CIDH pile

Length of section	=	45.000000 ft
Shaft Diameter	=	84.000000 in
Shear capacity of section	=	0.0000 lbs

Ground Slope and Pile Batter Angles

Ground Slope Angle	=	0.000 degrees
	=	0.000 radians
Pile Batter Angle	=	0.000 degrees
	=	0.000 radians

Soil and Rock Layering Information

The soil profile is modelled using 13 layers

Layer 1 is soft clay, p-y criteria by Matlock, 1970

Distance from top of pile to top of layer	=	0.250000 ft
Distance from top of pile to bottom of layer	=	1.250000 ft
Effective unit weight at top of layer	=	108.000000 pcf
Effective unit weight at bottom of layer	=	108.000000 pcf
Undrained cohesion at top of layer	=	1.000000 psf
Undrained cohesion at bottom of layer	=	1.000000 psf
Epsilon-50 at top of layer	=	0.0000
Epsilon-50 at bottom of layer	=	0.0000

NOTE: Default values for Epsilon-50 will be computed for this layer.

Layer 2 is soft clay, p-y criteria by Matlock, 1970

Distance from top of pile to top of layer	=	1.250000 ft
Distance from top of pile to bottom of layer	=	3.750000 ft
Effective unit weight at top of layer	=	114.000000 pcf
Effective unit weight at bottom of layer	=	114.000000 pcf
Undrained cohesion at top of layer	=	1.000000 psf
Undrained cohesion at bottom of layer	=	1.000000 psf
Epsilon-50 at top of layer	=	0.0000
Epsilon-50 at bottom of layer	=	0.0000

NOTE: Default values for Epsilon-50 will be computed for this layer.

Layer 3 is stiff clay without free water

Distance from top of pile to top of layer	=	3.750000 ft
Distance from top of pile to bottom of layer	=	6.250000 ft
Effective unit weight at top of layer	=	110.000000 pcf
Effective unit weight at bottom of layer	=	110.000000 pcf
Undrained cohesion at top of layer	=	775.000000 psf

Undrained cohesion at bottom of layer	=	775.000000 psf
Epsilon-50 at top of layer	=	0.0000
Epsilon-50 at bottom of layer	=	0.0000

NOTE: Default values for Epsilon-50 will be computed for this layer.

Layer 4 is sand, p-y criteria by Reese et al., 1974

Distance from top of pile to top of layer	=	6.250000 ft
Distance from top of pile to bottom of layer	=	8.750000 ft
Effective unit weight at top of layer	=	112.000000 pcf
Effective unit weight at bottom of layer	=	112.000000 pcf
Friction angle at top of layer	=	34.000000 deg.
Friction angle at bottom of layer	=	34.000000 deg.
Subgrade k at top of layer	=	0.0000 pci
Subgrade k at bottom of layer	=	0.0000 pci

NOTE: Default values for subgrade k will be computed for this layer.

Layer 5 is sand, p-y criteria by Reese et al., 1974

Distance from top of pile to top of layer	=	8.750000 ft
Distance from top of pile to bottom of layer	=	9.350000 ft
Effective unit weight at top of layer	=	112.000000 pcf
Effective unit weight at bottom of layer	=	112.000000 pcf
Friction angle at top of layer	=	34.000000 deg.
Friction angle at bottom of layer	=	34.000000 deg.
Subgrade k at top of layer	=	0.0000 pci
Subgrade k at bottom of layer	=	0.0000 pci

NOTE: Default values for subgrade k will be computed for this layer.

Layer 6 is sand, p-y criteria by Reese et al., 1974

Distance from top of pile to top of layer	=	9.350000 ft
Distance from top of pile to bottom of layer	=	13.750000 ft
Effective unit weight at top of layer	=	49.600000 pcf
Effective unit weight at bottom of layer	=	49.600000 pcf
Friction angle at top of layer	=	34.000000 deg.
Friction angle at bottom of layer	=	34.000000 deg.
Subgrade k at top of layer	=	0.0000 pci
Subgrade k at bottom of layer	=	0.0000 pci

NOTE: Default values for subgrade k will be computed for this layer.

Layer 7 is sand, p-y criteria by Reese et al., 1974

Distance from top of pile to top of layer	=	13.750000 ft
Distance from top of pile to bottom of layer	=	18.750000 ft
Effective unit weight at top of layer	=	50.600000 pcf
Effective unit weight at bottom of layer	=	50.600000 pcf
Friction angle at top of layer	=	38.000000 deg.
Friction angle at bottom of layer	=	38.000000 deg.
Subgrade k at top of layer	=	0.0000 pci
Subgrade k at bottom of layer	=	0.0000 pci

NOTE: Default values for subgrade k will be computed for this layer.

Layer 8 is sand, p-y criteria by Reese et al., 1974

Distance from top of pile to top of layer	=	18.750000 ft
Distance from top of pile to bottom of layer	=	23.750000 ft
Effective unit weight at top of layer	=	51.600000 pcf
Effective unit weight at bottom of layer	=	51.600000 pcf
Friction angle at top of layer	=	45.000000 deg.
Friction angle at bottom of layer	=	45.000000 deg.
Subgrade k at top of layer	=	0.0000 pci
Subgrade k at bottom of layer	=	0.0000 pci

NOTE: Default values for subgrade k will be computed for this layer.

Layer 9 is sand, p-y criteria by Reese et al., 1974

Distance from top of pile to top of layer	=	23.750000	ft
Distance from top of pile to bottom of layer	=	28.750000	ft
Effective unit weight at top of layer	=	50.600000	pcf
Effective unit weight at bottom of layer	=	50.600000	pcf
Friction angle at top of layer	=	35.000000	deg.
Friction angle at bottom of layer	=	35.000000	deg.
Subgrade k at top of layer	=	0.0000	pci
Subgrade k at bottom of layer	=	0.0000	pci

NOTE: Default values for subgrade k will be computed for this layer.

Layer 10 is stiff clay without free water

Distance from top of pile to top of layer	=	28.750000	ft
Distance from top of pile to bottom of layer	=	33.750000	ft
Effective unit weight at top of layer	=	47.600000	pcf
Effective unit weight at bottom of layer	=	47.600000	pcf
Undrained cohesion at top of layer	=	800.000000	psf
Undrained cohesion at bottom of layer	=	800.000000	psf
Epsilon-50 at top of layer	=	0.0000	
Epsilon-50 at bottom of layer	=	0.0000	

NOTE: Default values for Epsilon-50 will be computed for this layer.

Layer 11 is soft clay, p-y criteria by Matlock, 1970

Distance from top of pile to top of layer	=	33.750000	ft
Distance from top of pile to bottom of layer	=	38.750000	ft
Effective unit weight at top of layer	=	47.600000	pcf
Effective unit weight at bottom of layer	=	47.600000	pcf
Undrained cohesion at top of layer	=	250.000000	psf
Undrained cohesion at bottom of layer	=	250.000000	psf
Epsilon-50 at top of layer	=	0.0000	
Epsilon-50 at bottom of layer	=	0.0000	

NOTE: Default values for Epsilon-50 will be computed for this layer.

Layer 12 is soft clay, p-y criteria by Matlock, 1970

Distance from top of pile to top of layer	=	38.750000	ft
Distance from top of pile to bottom of layer	=	43.750000	ft
Effective unit weight at top of layer	=	47.600000	pcf
Effective unit weight at bottom of layer	=	47.600000	pcf
Undrained cohesion at top of layer	=	200.000000	psf
Undrained cohesion at bottom of layer	=	200.000000	psf
Epsilon-50 at top of layer	=	0.0000	
Epsilon-50 at bottom of layer	=	0.0000	

NOTE: Default values for Epsilon-50 will be computed for this layer.

Layer 13 is soft clay, p-y criteria by Matlock, 1970

Distance from top of pile to top of layer	=	43.750000	ft
Distance from top of pile to bottom of layer	=	45.000000	ft
Effective unit weight at top of layer	=	47.600000	pcf
Effective unit weight at bottom of layer	=	47.600000	pcf
Undrained cohesion at top of layer	=	450.000000	psf
Undrained cohesion at bottom of layer	=	450.000000	psf
Epsilon-50 at top of layer	=	0.0000	
Epsilon-50 at bottom of layer	=	0.0000	

NOTE: Default values for Epsilon-50 will be computed for this layer.

(Depth of the lowest soil layer extends 0.000 ft below the pile tip)

Summary of Input Soil Properties

Layer Num.	Soil Type Name (p-y Curve Type)	Layer Depth ft	Effective Unit Wt. pcf	Undrained Cohesion psf	Angle of Friction deg.	E50 or kpy krm pci
1	Soft Clay	0.2500	108.0000	1.0000	--	default
	(Reese, et al.)	1.2500	108.0000	1.0000	--	default
2	Soft Clay	1.2500	114.0000	1.0000	--	default
	(Reese, et al.)	3.7500	114.0000	1.0000	--	default
3	Stiff Clay w/o Free Water	3.7500	110.0000	775.0000	--	default
	(Reese, et al.)	6.2500	110.0000	775.0000	--	default
4	Sand	6.2500	112.0000	--	34.0000	--
	(Reese, et al.)	8.7500	112.0000	--	34.0000	--
5	Sand	8.7500	112.0000	--	34.0000	--
	(Reese, et al.)	9.3500	112.0000	--	34.0000	--
6	Sand	9.3500	49.6000	--	34.0000	--
	(Reese, et al.)	13.7500	49.6000	--	34.0000	--
7	Sand	13.7500	50.6000	--	38.0000	--
	(Reese, et al.)	18.7500	50.6000	--	38.0000	--
8	Sand	18.7500	51.6000	--	45.0000	--
	(Reese, et al.)	23.7500	51.6000	--	45.0000	--
9	Sand	23.7500	50.6000	--	35.0000	--
	(Reese, et al.)	28.7500	50.6000	--	35.0000	--
10	Stiff Clay w/o Free Water	28.7500	47.6000	800.0000	--	default
		33.7500	47.6000	800.0000	--	default
11	Soft Clay	33.7500	47.6000	250.0000	--	default
		38.7500	47.6000	250.0000	--	default
12	Soft Clay	38.7500	47.6000	200.0000	--	default
		43.7500	47.6000	200.0000	--	default
13	Soft	43.7500	47.6000	450.0000	--	

default	--				
	Clay	45.0000	47.6000	450.0000	--
default	--				

Static Loading Type

Static loading criteria were used when computing p-y curves for all analyses.

Pile-head Loading and Pile-head Fixity Conditions

Number of loads specified = 2

Load No.	Load Type	Condition 1	Condition 2	Axial Thrust Force, lbs	Compute Top y vs. Pile Length
1	1	V = 23000. lbs	M = 21180000. in-lbs	21000.	No
2	1	V = 23000. lbs	M = 21180000. in-lbs	15750.	No

V = shear force applied normal to pile axis
M = bending moment applied to pile head
y = lateral deflection normal to pile axis
S = pile slope relative to original pile batter angle
R = rotational stiffness applied to pile head
Values of top y vs. pile lengths can be computed only for load types with specified shear loading (Load Types 1, 2, and 3).
Thrust force is assumed to be acting axially for all pile batter angles.

Shear Resistance Curve at Pile Tip

Point No.	Displacement in	Tip Shear Force lbs
1	0.000	0.000
2	0.120	9524.916
3	10.000	9524.916

Computations of Nominal Moment Capacity and Nonlinear Bending Stiffness

Axial thrust force values were determined from pile-head loading conditions

Number of Pile Sections Analyzed = 1

Pile Section No. 1:

Dimensions and Properties of Drilled Shaft (Bored Pile):

Length of Section	=	45.000000 ft
Shaft Diameter	=	84.000000 in
Concrete Cover Thickness	=	1.500000 in
Number of Reinforcing Bars	=	22 bars
Yield Stress of Reinforcing Bars	=	60000. psi
Modulus of Elasticity of Reinforcing Bars	=	29000000. psi
Gross Area of Shaft	=	5542. sq. in.
Total Area of Reinforcing Steel	=	27.940000 sq. in.
Area Ratio of Steel Reinforcement	=	0.50 percent
Edge-to-Edge Bar Spacing	=	10.076762 in
Maximum Concrete Aggregate Size	=	0.750000 in
Ratio of Bar Spacing to Aggregate Size	=	13.44
Offset of Center of Rebar Cage from Center of Pile	=	0.0000 in

Axial Structural Capacities:

Nom. Axial Structural Capacity = 0.85 Fc Ac + Fy As	=	15736.665 kips
Tensile Load for Cracking of Concrete	=	-2090.084 kips
Nominal Axial Tensile Capacity	=	-1676.400 kips

Reinforcing Bar Dimensions and Positions Used in Computations:

Bar Number	Bar Diam. inches	Bar Area sq. in.	X inches	Y inches
1	1.270000	1.270000	39.865000	0.00000
2	1.270000	1.270000	38.250187	11.231268
3	1.270000	1.270000	33.536572	21.552646
4	1.270000	1.270000	26.106023	30.127957
5	1.270000	1.270000	16.560519	36.262479
6	1.270000	1.270000	5.673381	39.459232
7	1.270000	1.270000	-5.673381	39.459232
8	1.270000	1.270000	-16.560519	36.262479
9	1.270000	1.270000	-26.106023	30.127957
10	1.270000	1.270000	-33.536572	21.552646
11	1.270000	1.270000	-38.250187	11.231268
12	1.270000	1.270000	-39.865000	0.00000
13	1.270000	1.270000	-38.250187	-11.231268
14	1.270000	1.270000	-33.536572	-21.552646
15	1.270000	1.270000	-26.106023	-30.127957
16	1.270000	1.270000	-16.560519	-36.262479
17	1.270000	1.270000	-5.673381	-39.459232
18	1.270000	1.270000	5.673381	-39.459232
19	1.270000	1.270000	16.560519	-36.262479
20	1.270000	1.270000	26.106023	-30.127957
21	1.270000	1.270000	33.536572	-21.552646
22	1.270000	1.270000	38.250187	-11.231268

NOTE: The positions of the above rebars were computed by LPile

Minimum spacing between any two bars not equal to zero = 10.077 inches
between bars 19 and 20.

Ratio of bar spacing to maximum aggregate size = 13.44

Concrete Properties:

Compressive Strength of Concrete	=	3000. psi
Modulus of Elasticity of Concrete	=	3122019. psi
Modulus of Rupture of Concrete	=	-410.791918 psi
Compression Strain at Peak Stress	=	0.001634
Tensile Strain at Fracture of Concrete	=	-0.0001160

Maximum Coarse Aggregate Size = 0.750000 in

Number of Axial Thrust Force Values Determined from Pile-head Loadings = 2

Number	Axial Thrust Force kips
1	15.750
2	21.000

Summary of Results for Nominal (Unfactored) Moment Capacity for Section 1

Moment values interpolated at maximum compressive strain = 0.003
or maximum developed moment if pile fails at smaller strains.

Load No.	Axial Thrust kips	Nominal Mom. Cap. in-kip	Max. Comp. Strain
1	15.750	61389.202	0.00300000
2	21.000	61557.657	0.00300000

Note that the values of moment capacity in the table above are not factored by a strength reduction factor (phi-factor).

In ACI 318, the value of the strength reduction factor depends on whether the transverse reinforcing steel bars are tied hoops (0.65) or spirals (0.70).

The above values should be multiplied by the appropriate strength reduction factor to compute ultimate moment capacity according to ACI 318, Section 9.3.2.2 or the value required by the design standard being followed.

The following table presents factored moment capacities and corresponding bending stiffnesses computed for common resistance factor values used for reinforced concrete sections.

Axial Load No.	Resist. Factor for Moment	Nominal Moment Cap in-kips	Ult. (Fac) Ax. Thrust kips	Ult. (Fac) Moment Cap in-kips	Bend. Stiff. at Ult Mom kip-in^2
1	0.65	61389.	10.237500	39903.	1.3378E+09
2	0.65	61558.	13.650000	40012.	1.3420E+09
1	0.70	61389.	11.025000	42972.	1.3348E+09
2	0.70	61558.	14.700000	43090.	1.3387E+09
1	0.75	61389.	11.812500	46042.	1.2930E+09
2	0.75	61558.	15.750000	46168.	1.2972E+09

Layering Correction Equivalent Depths of Soil & Rock Layers

Layer No.	Top of Layer Below Pile Head ft	Equivalent Top Depth Below Grnd Surf ft	Same Layer Type As Layer Above	Layer is Rock or is Below Rock Layer	F0 Integral for Layer lbs	F1 Integral for Layer lbs
1	0.2500	0.00	N.A.	No	0.00	61.8304
2	1.2500	1.0000	Yes	No	61.8304	253.4583
3	3.7500	Not-a-Nu	No	No	315.2887	121859.
4	6.2500	5.2793	No	No	122175.	173750.

5	8.7500	7.7793	Yes	No	295925.	51842.
6	9.3500	8.3793	Yes	No	347767.	442028.
7	13.7500	12.7793	Yes	No	789795.	808281.
8	18.7500	17.7793	Yes	No	1598076.	1637802.
9	23.7500	22.7793	Yes	No	3235878.	852579.
10	28.7500	93.6960	No	No	4088457.	251711.
11	33.7500	33.5000	No	No	4340169.	79012.
12	38.7500	38.5000	Yes	No	4419181.	63157.
13	43.7500	43.5000	Yes	No	4482339.	N.A.

Notes: The F0 integral of Layer n+1 equals the sum of the F0 and F1 integrals
for Layer n. Layering correction equivalent depths are computed only
for soil types with both shallow-depth and deep-depth expressions for
peak lateral load transfer. These soil types are soft and stiff clays,
non-liquefied sands, and cemented c-phi soil.

Summary of Pile-head Responses for Conventional Analyses

Definitions of Pile-head Loading Conditions:

Load Type 1: Load 1 = Shear, V, lbs, and Load 2 = Moment, M, in-lbs
Load Type 2: Load 1 = Shear, V, lbs, and Load 2 = Slope, S, radians
Load Type 3: Load 1 = Shear, V, lbs, and Load 2 = Rot. Stiffness, R, in-lbs/rad.
Load Type 4: Load 1 = Top Deflection, y, inches, and Load 2 = Moment, M, in-lbs
Load Type 5: Load 1 = Top Deflection, y, inches, and Load 2 = Slope, S, radians

Load Case No.	Load Type	Pile-head Load 1	Load Type 2	Pile-head Load 2	Axial Loading lbs	Pile-head Deflection inches	Pile-head Rotation radians	Max Shear in Pile 1 lbs	Max Moment in Pile 1 in-lbs
1	V, lb	23000.	M, in-lb	2.12E+07	21000.	0.1237	-7.85E-04	-99418.	2.25E+07
2	V, lb	23000.	M, in-lb	2.12E+07	15750.	0.1237	-7.85E-04	-99414.	2.25E+07

Maximum pile-head deflection = 0.1237020833 inches
Maximum pile-head rotation = -0.0007851865 radians = -0.044988 deg.

The analysis ended normally.

(2.25E+07/12000)/((61389.202/12)X0.87)=0.42

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C003

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FROM: Empire Telecom USA - Behalf of AT&T
16 Esquire Rd
Billerica, MA 01862

TO: City of Hartford
Attn: Caitlin Palmer - Chief of Zoning
250 Constitution Plaza
4th floor
Hartford, CT 06103

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C006

USPS SIGNATURE TRACKING NUMBER

9510 8124 4476 8313 1688 65

FROM: Empire Telecom USA - behalf of AT&T
16 Esquire Rd
Billerica, MA 01862

TO:
City of Hartford
Attn: Luke Bronin - Mayor of the City of Hartford
550 Main St
Room 200
Hartford, CT 06103

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FROM: Empire Telecom USA - Behalf of AT&T
16 Esquire Rd
Billerica, MA 01862

TO: Crow Castle
Attn: Paul Pedicone
3 Corporate Dive, Suite 101
Clifton Park, NY 12065

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EXPECTED DELIVERY DAY: 11/13/2018 C006

USPS SIGNATURE TRACKING NUMBER

9510 8124 4476 8313 1688 89

FROM: Empire Telecom USA - Behalf of AT&T
16 Esquire Rd
Billerica, MA 01862

TO: The metropolitan District
555 Main St
Hartford, CT, 06103-2915

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On Time

Expected Delivery on

TUESDAY
13 NOVEMBER 2018

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Feedback

Delivered

November 13, 2018 at 10:42 am
Delivered
HARTFORD, CT 06103

Get Updates

Text & Email Updates

Proof of Delivery

Tracking History

Product Information

Postal Product:	Features:	
Priority Mail®	Insured Signature Confirmation™	Signed for By: L CRESPO // HARTFORD, CT 06103 // 10:42 am

See Less

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Tracking Number: 9510812444768313168865

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On Time

Expected Delivery on

TUESDAY
13 NOVEMBER 2018

See Product Information

Feedback

Delivered

November 13, 2018 at 12:57 pm
Delivered
HARTFORD, CT 06103

Get Updates

Text & Email Updates

Proof of Delivery

Tracking History

Product Information

Postal Product:	Features:	
Priority Mail®	Insured Signature Confirmation™	Signed for By: M MILNER // HARTFORD, CT 06103 // 12:57 pm

See Less ^

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Track Another Package +

Tracking Number: 9510812444768313168889

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On Time

Expected Delivery on

TUESDAY
13 NOVEMBER 2018

See Product Information

Feedback

Delivered

November 13, 2018 at 4:03 am
Delivered
HARTFORD, CT 06103

Get Updates

Text & Email Updates

Proof of Delivery

Tracking History

Product Information

Postal Product:	Features:	
Priority Mail®	Insured Signature Confirmation™	Signed for By: M ECHAVARRIA // HARTFORD, CT 06103 // 4:03 am

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Track Another Package +

Tracking Number: 9510812444768313168872

Remove ×

Expected Delivery on

THURSDAY

15 NOVEMBER 2018 ⓘ

by **8:00pm** ⓘ

Feedback

Delivered

November 15, 2018 at 1:40 pm
Delivered
CLIFTON PARK, NY 12065

Get Updates ⌄

Text & Email Updates ⌄

Proof of Delivery ⌄

Tracking History ⌄

Product Information ⌃

Postal Product:	**Features:**	
Priority Mail®	Insured Signature Confirmation™	Signed for By: A ATHAN // CLIFTON PARK, NY 12065 // 1:40 pm

See Less ^

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Go to our FAQs section to find answers to your tracking questions.

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