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

January 17, 2017

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

RE: **Notice of Exempt Modification for AT&T/ LTE 3C Crown Site BU: 876326**
AT&T Site ID: CT5140
440 Hayden Station Road, Windsor, CT 06095
Latitude: 41° 53' 52.2" / Longitude: -72° 38' 38.7"

Dear Ms. Bachman:

AT&T currently maintains nine (9) antennas at the 92-foot level of the existing 96-foot monopole at 440 Hayden Station Road in Windsor, CT. The tower and property is owned by the Crown Castle. AT& intends to replace (3) RRU12/A2s with three (3) RRU32/B2s and install six (6) TMSs.

This facility was approved by the Windsor Zoning Board of Appeals on September 18, 1996. This approval included no conditional statements.

Please accept this letter as notification pursuant to Regulations of Connecticut State Agencies § 16-50j-73, for construction that constitutes an exempt modification pursuant to R.C.S.A. § 16-50j-72(b)(2). In accordance with R.S.C.A. § 16-50j-73, a copy of this letter is being sent to The Honorable Donald S. Trinks, Mayor, Town of Windsor, as well as the property owner, and Crown Castle is the tower owner.

1. The proposed modifications will not result in an increase in the height of the existing tower.

2. The proposed modifications will not require the extension of the site boundary.

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

4. The operation of the replacement antennas will not increase radio frequency emissions at the facility to a level at or above the Federal Communication Commission safety standard.

5. The proposed modifications will not cause a change or alteration in the physical or environmental characteristics of the site.

6. The existing structure and its foundation can support the proposed loading.

For the foregoing reasons, AT&T respectfully submits that the proposed modifications to the above-reference telecommunications facility constitutes an exempt modification under R.C.S.A. § 16-50j-72(b)(2). Please send approval/rejection letter to Attn: Jeffrey Barbadora.

Sincerely,

Jeffrey Barbadora
Real Estate Specialist
12 Gill Street, Suite 5800, Woburn, MA 01801
781-729-0053
Jeff.Barbadora@crowncastle.com

Attachments:

Tab 1: Exhibit-1: Compound plan and elevation depicting the planned changes
Tab 2: Exhibit-2: Structural Modification Report
Tab 3: Exhibit-3: General Power Density Table Report (RF Emissions Analysis Report)

cc: The Honorable Donald S. Trinks, Mayor, Town of Windsor
Town of Windsor
275 Broad Street
Windsor, CT 06095

SITE 065 ZONING HAYDEN STATION

TOWN OF WINDSOR • CONNECTICUT
FIRST IN STATE • FIRST IN SERVICE • FIRST IN VALUE

October 3, 1996

Sprint Spectrum L.P.
C/O John Stevens
450 Murdock Road
Meriden, Connecticut 06450

Subject: 440 Hayden Station Road
Variance Request

Dear Mr. Stevens,

The Windsor Zoning Board of Appeals at it's business meeting following the public hearing held at 7:00 P.M. on Wednesday September 18, 1996, approved your request for a variance of Section 3.4.2F(I).

In accordance with Public Act 75-317 of the Connecticut General Statutes, the enclosed form must be **filed with the Town Clerk** of Windsor before said grant becomes effective. There is a filing fee of $10.00. The paperwork must be filed by the record owner of the property within six months, according to Section 6.6 of the Zoning Board of Appeals By Laws, or the grant is null and void.

Very truly yours,

Helene H. Shay
Secretary
WINDSOR ZONING BOARD OF APPEALS

Encl.

Certified Mail No. P 433 581 779

275 Broad Street • Windsor, Connecticut 06095-2994
FAX: (860) 285-1909 http://www.state.ct.us/MUNIC/WINDSOR/windsor.htm

WINDSOR ZONING BOARD OF APPEALS

I, Helene H. Shay, Secretary of the Windsor Zoning Board of Appeals, hereby certify that on Wednesday, September 18, 1996, the Zoning Board of Appeals of the Town of Windsor granted to:

Owner of Record: Jeffrey R. Wannamaker
(The Coast Distribution System, Inc.)

Located at: 440 Hayden Station Road

and more particularly bounded and described as follows:

Map No. 49, Block No. 471, Lot No. 109
in Volume 998, Page 108

the following variances to the Windsor Zoning Regulations:

Section 3.4.2F(1) - Parking Reduction
for Erection of Tower Antenna

Dated at Windsor, Connecticut, this 3rd day of October, 1996.

Helene H. Shay, Secretary
Windsor Zoning Board of Appeals

Received for the Record:

TOP SECTION TO BE FILLED IN BY Z.B.A. CLERK: clerk's name Karen

within 500' of other town? No date submitted 8.27.96

fee amount $110.00. date sign given 8.27.96

receipt number # 1874 official date rec'd 8.27.96

(APPLICANT, DO NOT WRITE ABOVE THIS LINE)

ZONING VARIANCE APPLICATION

1.1)) PROPERTY INFORMATION ((

79 Lamberton Road, Windsor — Street Address

I-1 — Zone

43	108	5	642	151
Map No.	Block No.	Lot No.	Volume No.	Page No.

1.2)) OWNER INFORMATION ((

Jerome M. Scharr

Name(s) as they appear on the deed of record

40 East Newberry Road — Street Address; Bloomfield — City; CT — State; 06002 — Zip

1.3)) APPLICANT INFORMATION ((

Sprint Spectrum, L.P. c/o John Stevens

Name of applicant

450 Murdock Ave. — Street Address; Meriden — City; CT — State; 06450 — Zip

1.4 Applicant's interest in the subject parcel? Lessee
(such as owner, agent, lessee, optionee, tenant)

1.5 Phone no. where applicant can be reached in the daytime 203-238-6910

1.6 Were any variances ever requested for this parcel in the past? No

1.7 Does the subject parcel have any existing non-conformities? No
(if so, describe them briefly)

1.8 Is the subject parcel vacant? No
(if not vacant, what is the parcel's existing use? Business Use - golfing range currently operating on the parcel.

2.1 Complete the following table only for "SIZE VARIANCES", or "DISTANCE VARIANCES", or "LOCATION VARIANCES"...

ZONING REGULATION SECTION NO. #1	DISTANCE REQUIRED BY REGULATIONS #2	LOCATION OF VARIANCE (side?, front?, rear?) #3	DISTANCE REQUESTED BY APPLICANT #4	NET AMOUNT OF VARIANCE (#2 - #4 = #5) #5
10.5.10C	240'	side	10'	230'
10.5.10C	240"	rear	5' approx.	235' approx.

2.2 For all other types of variances, state the Section Number of the Zoning Regulations and describe precisely what is being requested...

2.3 (FIRST TEST) How is this request in HARMONY with the intent of the Zoning Regulations?...

The requested set back variances will permit reasonable development of industrially zoned land with a compatible use which recognizes and promotes the public health, safety and welfare purposes of the regulations.

2.4 (SECOND TEST) How are the Zoning Regulations restricting the use of the subject parcel in a manner different than similarly-zoned parcels throughout Town? (In other words: What is the LEGAL HARDSHIP?)

The purpose of the distance requirements is to provide a safety area should the tower fall. Although current construction techniques make such fall zones unnecessary, this parcel's unique characteristics make the imposition of the regulations a hardship. Wetlands and water courses to the west of the site make development within the fall zone a highly regulated activity while the Terry Steam complex to the north precludes development there.

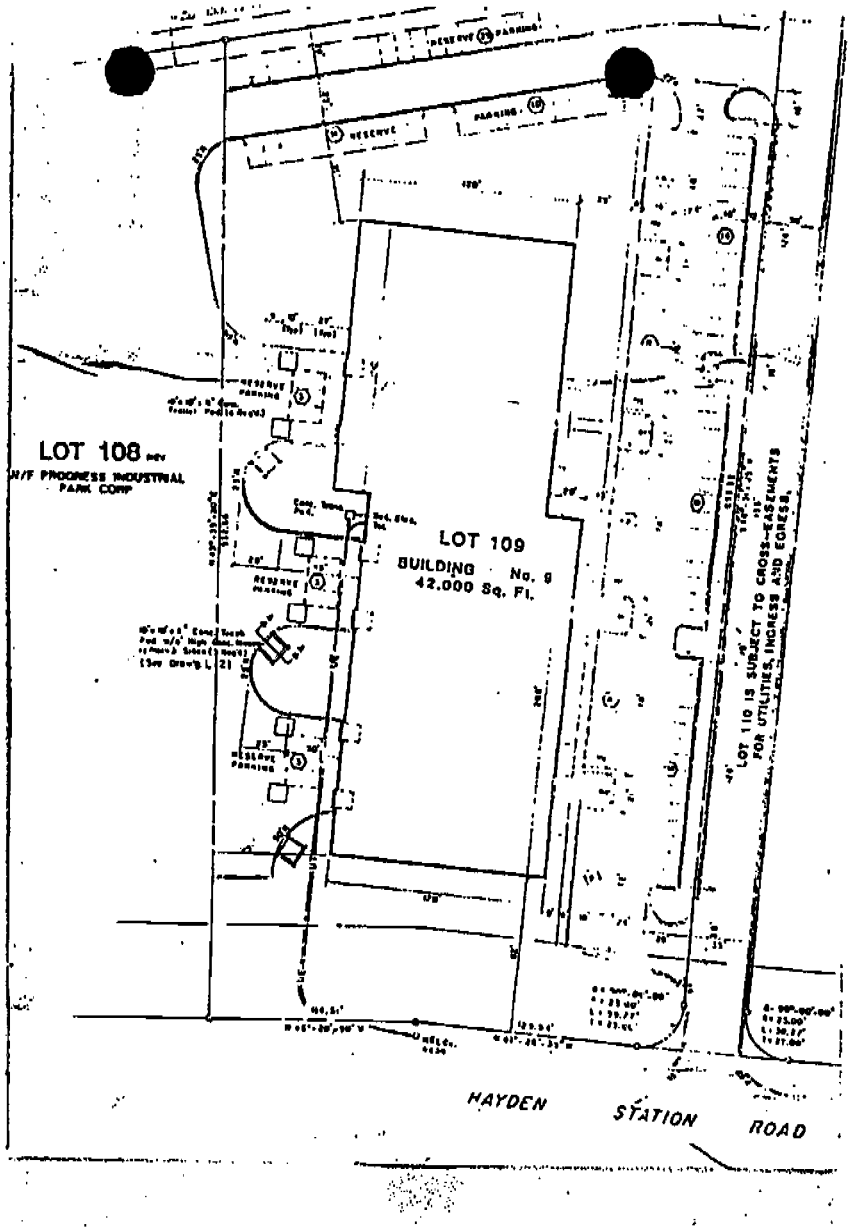
3.1 List the names and addresses of ALL abutting landowners.

You MUST include ANY parcel which has ANY part of it within 100 feet of the subject parcel.

You MUST include these parcels even if they are separated from the subject parcel by streets, roads, rights-of-way, rivers, streams, buildings, railroad tracks, or anything else.

NAME	ADDRESS
ALL ON MAP 43 Wilkos, Walter Block-106 Lot-4	295 Pigeon Hill Rd.
Wilkos, Theodore Block 106 Lot-4A	337 Pigeon Hill Rd.
Caesar, Carolyn Block-106 Lot-5	321 Pigeon Hill Rd.
Dresser-Rand Co. Block-108 Lot 1A	Baron Stenben Place, Corning, NY 14830
Dudack Ignatz Block-108 Lot 6	400 Pigeon Hill Rd.
80 and 82 Lamberton Rd. LP c/o Farley Co. Block-109 Lot 43B	100 Pearl St. Hartford, CT 06103
Caesar, Carolyn Block-109 Lot 45	280 Pigeon Hill Rd.

4.1 USE THIS PAGE TO INCLUDE ANY OTHER INFORMATION WHICH CAN NOT FIT ANYWHERE ELSE ON THIS APPLICATION.



5.1 (PLOT PLAN) YOU MUST SUBMIT 10 COPIES OF A SURVEYOR'S PLOT PLAN OF THE SUBJECT PARCEL. THE PLOT PLAN MUST SHOW:

- ...ALL PROPOSED ADDITIONS OR CHANGES WITH DOTTED LINES
- ...ALL RELEVANT DIMENSIONS
- ...A NORTH ARROW
- ...THE SCALE OF THE DRAWING
- ...A PROPER LABEL WITH THE STREET ADDRESS

IF YOUR VARIANCE REQUEST IS FOR ANY DIMENSIONAL REQUIREMENT, SUCH AS A SET-BACK FROM A PROPERTY LINE, THE SURVEYOR'S PLOT PLAN MUST BE CERTIFIED TO BE ACCURATE TO AT LEAST AN "A-2" QUALITY STANDARD.

R E A D T H E F O L L O W I N G S T A T E M E N T S
B E F O R E S I G N I N G :

5.2 IT IS THE APPLICANT'S RESPONSIBILITY TO BE AWARE OF THE HEARING DATE.

5.3 THE APPLICANT MAY WITHDRAW THIS APPLICATION AT ANY TIME. IF EXPENSES HAVE BEEN INCURRED THE FEE WILL NOT BE REFUNDED.

5.4 IF A VARIANCE IS GRANTED, IT WILL NOT BECOME EFFECTIVE UNTIL THE APPLICANT FILES A CERTIFIED COPY OF THE VARIANCE WITH THE TOWN CLERK.

5.5 THE APPLICANT MUST POST THE SUPPLIED PLACARD SIGN ON THE SUBJECT PARCEL (not on a public utility pole!) AT LEAST 10 DAYS PRIOR TO THE HEARING...AND...MUST REMOVE IT 5 DAYS AFTER THE HEARING (or else the variance may be nullified).

5.6 THIS IS THE APPLICANT'S APPLICATION ONLY. THE STAFF IS NOT PERMITTED TO HELP COMPLETE THE APPLICATION. THE APPLICANT ASSUMES SOLE RESPONSIBILITY FOR ITS COMPLETENESS AND ACCURACY.

(COMPLETE EVERYTHING BELOW THIS LINE IN THE PRESENCE OF A NOTARY)

The undersigned applicant assumes sole responsibility for the completeness and accuracy of this application and, further, acknowledges that he/she has read and understands the above statements numbered 5.2 through 5.6:

(Applicant's Signature) _____

(To be filled in by Notary) On this date August 22, 1990, the above-signed applicant did personally appear before me and proved to my satisfaction to be the person who is herein referred to as the applicant; in witness whereof I hereunto set my hand and seal:

(Notary's Signature) _____
(And Seal)

THOMAS F. FLYNN III
Commissioner of
The Superior Court

My Commission Expires: _____

Property Cards

Address Search : 6739 Submit Clear Search

Your search returned multiple addresses

Additional addresses:

440 HAYDEN STATION RD

440 Hayden Station Rd

Property Owner:
Cb Baggs Llp

Property Co-Owner

Mailing Address:
440 Hayden Station Rd
Windsor, CT
06095

File Code
6739

Map:
49

Block:
471

Lot:
109

Census Tract:
4735.02

Property Type:
Ind Whses

Land Area (Acres):
3.71

Zone:
I

Click to Enlarge

Construction Details

Year Built:
1982

Building Style:
Warehouse

Stories:
1

Living Area:
0 Sq/Ft

Building ID
4624

Grade
Average

Exterior Wall
Pre-Finish Metl

Total Rooms:

Bedrooms:

Bathrooms:

Half Baths:

Heating Type
Hot Air-No Duc

Heating Fuel
Gas

AC Type
Central

Valuation

Assessed Land Value:
$246,050

Assessed Building Value:
$786,380

Total Assessed Value:
$1,032,430

Appraised Land Value:
$351,500

Appraised Building Value:
$1,123,400

Total Appraised Value:
$1,474,900

Last Sale

Last Sale Date:
Friday, October 6th, 2000

Last Sale Price:
$1,500,000

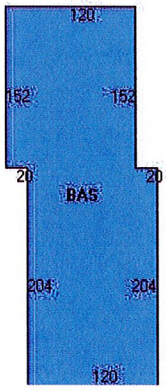
Qualified Sale:
Q

Book/Page:
1243/ 531

Prior Owners

Sale Date	Owner Name	Sale Price	Book / Page
2000/10/6	ADFM ASSOCIATES LLC	666483	1243/ 522
1994/4/15	COAST DISTRIBUTION SYSTEM INC	0	998/ 108
1989/8/31	COAST DISTRIBUTION SYS	0	758/ 213

Parcel Sketch



Sub Area Detail

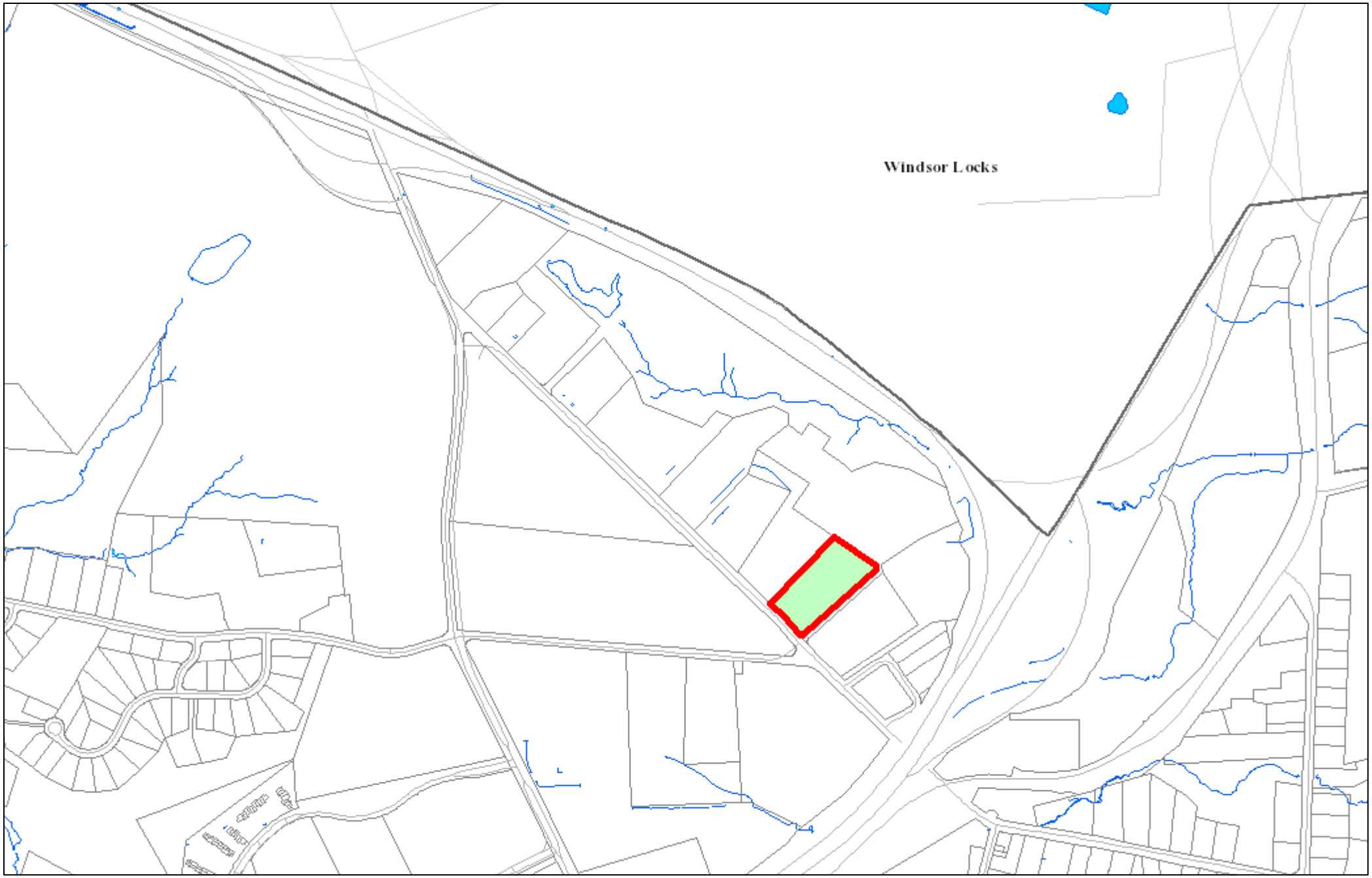
Code	Gross Area (Sq Ft)	Living Area (Sq Ft)
BAS	42720	42720

Outbuildings & Extra Features

Code	Description	Appraised Value	Assessed Value
PAV1	PAVING-ASPHALT	$20800.00	$14560.00
LDL1	LOAD LEVELERS	$17000.00	$11900.00
SPR1	SPRINKLERS-WET	$70900.00	$49630.00
VLT2	VAULT-GOOD	$60800.00	$42560.00

AOF Office Area
APT Apartment
BAS First Floor
CAN Canopy
CDN Canopy (Det)
CLP Loading Platform (Finished)
EAF Attic (Expan)(Finished)
EAU Attic (Expan)(Unfinished)
FAT Attic (Finished)
FBM Basement (Finished)
FCB Cabana (Encl)(Finished)
FCP Carport (Framed)
FDC Carport (Det)(Framed)
FDS Porch (Scrn)(Det)(Finished)
FDU Utility (Det)(Finished)

~~**FEP** Porch (Encl)(Finished)~~	~~**FGR** Garage (Framed)~~	~~**FHS** Half-Story (Finished)~~
FLL Lower Level (Finished)	**FOP** Porch (Open)(Finished)	**FSP** Porch (Screen)(Finished)
FST Utility (Finished)	**FUS** Upper-Story (Finished)	**PTO** Patio
SDA Store Display Area	**SFB** Base (Semi-Finished)	**SPA** Service Prod Area
TQS Three-Qtr Story	**UAT** Attic (Unifinished)	**UBM** Basement (Unfinished)
UCB Cabana (Encl)(Unfinished)	**UDS** Porch (Scrn)(Dedt)(Unifinished)	**UDU** Utility (Det)(Unifinished)
UEP Porch (Encl)(Unfinished)	**UHS** Half-Story (Unfinished)	**ULP** Loading Platform (Unfinished)
UOP Porch (Open)(Unfinished)	**USP** Porch (Scrn)(Unfinished)	**UST** Utility (Strg)(Unfinished)
UUS Upper-Story (Unfinished)	**WDK** Wood Deck	



Hartford County, Connecticut

Horizontal Datum is Connecticut State Plane Feet, NAD83

1 inch = 987 feet

0 410 820 1,640 Feet

Property Boundaries not legally binding for title or zoning purposes.

The Town of Windsor makes no warranty as to th accuracy, reliability, or completeness of the information and is not responsible for any error or omissions for results obtained from the use of the information.

WIRELESS COMMUNICATIONS FACILITY
CT5140 - LTE BWE
WINDSOR BREAKNECK
CROWN CASTLE BU NO. 876326
440 HAYDEN STATION RD
WINDSOR, CT 06095

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

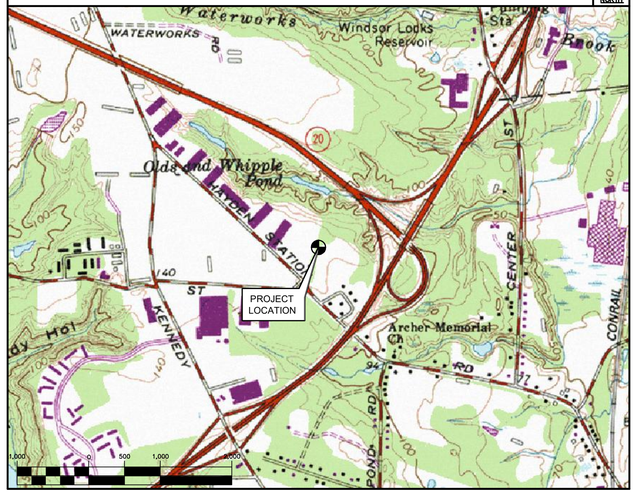
FROM: 500 ENTERPRISE DRIVE, ROCKY HILL, CONNECTICUT
TO: 440 HAYDEN STATION RD, WINDSOR, CONNECTICUT

1.	HEAD NORTHEAST ON ENTERPRISE DR TOWARD CAPITAL BLVD	0.3 MI
2.	TURN LEFT ONTO CAPITAL BLVD	0.2 MI
3.	USE LEFT LANE TO TURN LEFT ONTO STATE HWY 411	0.2 MI
4.	TURN LEFT TO MERGE ONTO I-91 N	0.4 MI
5.	MERGE ONTO I-91 N	17.9 MI
6.	TAKE EXIT 39-41 FOR KENNEDY RD TOWARD CENTER ST	0.2 MI
7.	CONTINUE ONTO ARCHER RD	0.4 MI
8.	TURN LEFT ONTO HAYDEN STATION RD AND DESTINATION WILL BE ON THE RIGHT	0.3 MI

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. REPLACE EXISTING RRUS-12+A2 WITH RRUS-32 B2, (1) PER SECTOR FOR A TOTAL OF (3) BEHIND ANTENNA POSITION 2.

PROJECT INFORMATION

AT&T SITE NUMBER:	CT5140
AT&T SITE NAME:	WINDSOR BREAKNECK
CROWN CASTLE BU NO.:	876326
SITE ADDRESS:	440 HAYDEN STATION RD WINDSOR, CT 06095
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°-53'-52.05084" N LONGITUDE: 72°-38'-41.99604" W GROUND ELEVATION: ±144' AMSL GROUND ELEVATION REFERENCED FROM GOOGLE EARTH. COORDINATES REFERENCED FROM RFDS DOCUMENTS.

SHEET INDEX

SHT. NO.	DESCRIPTION	REV.
T-1	TITLE SHEET	0
N-1	NOTES AND SPECIFICATIONS	0
C-1	PLANS, ELEVATION AND DETAILS	0
C-2	BWE EQUIPMENT DETAILS	0
E-1	ELECTRICAL DETAILS AND NOTES	0

REV.	DATE	DRAWN BY	CHK'D BY	DESCRIPTION
0	11/22/16	HMR	CAG	CONSTRUCTION DOCUMENTS - ISSUED FOR CONSTRUCTION

PROFESSIONAL ENGINEER SEAL

STATE OF CONNECTICUT — LICENSED PROFESSIONAL ENGINEER

at&t

EMPIRE telecom

CENTEK engineering
Centered on Solutions℠
(203) 488-0580
(203) 488-8587 Fax
63-2 North Branford Road
Branford, CT 06405
www.CentekEng.com

AT&T MOBILITY
WIRELESS COMMUNICATIONS FACILITY
WINDSOR BREAKNECK
CT5140 - LTE BWE
440 HAYDEN STATION RD
WINDSOR, CT 06095

DATE:	11/08/16
SCALE:	AS NOTED
JOB NO.	16071.75

TITLE SHEET

T-1

Sheet No. 1 of 5

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 B/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 CL&P 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.

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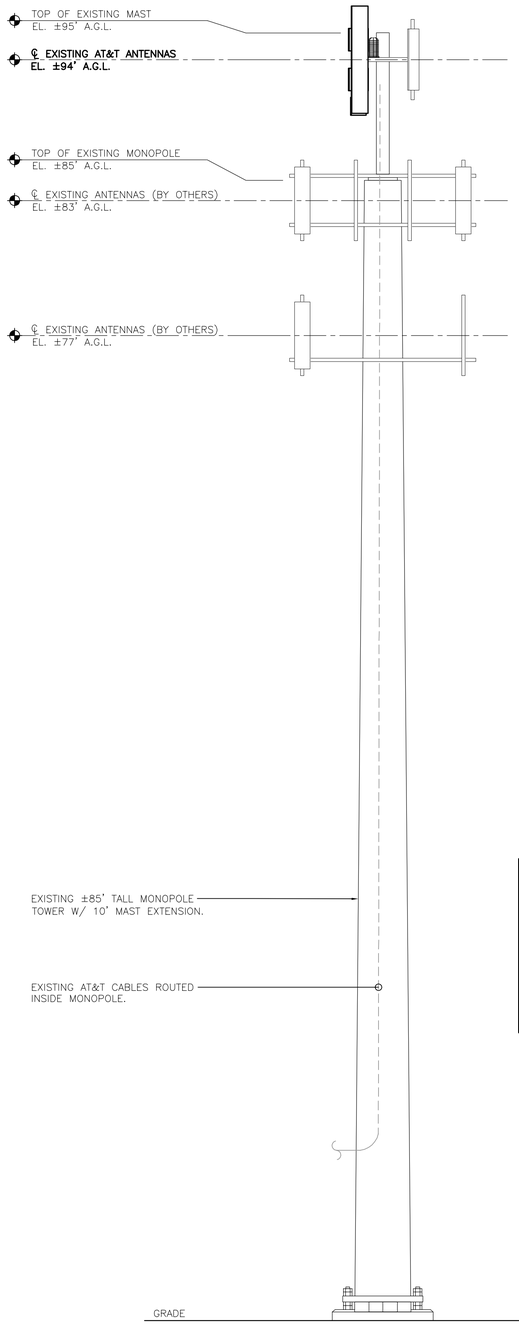
NOTES AND SPECIFICATIONS

N–1

Sheet No. 2 of 5



3 C-1 **TOWER ELEVATION**
SCALE: 3/16" = 1'-0"

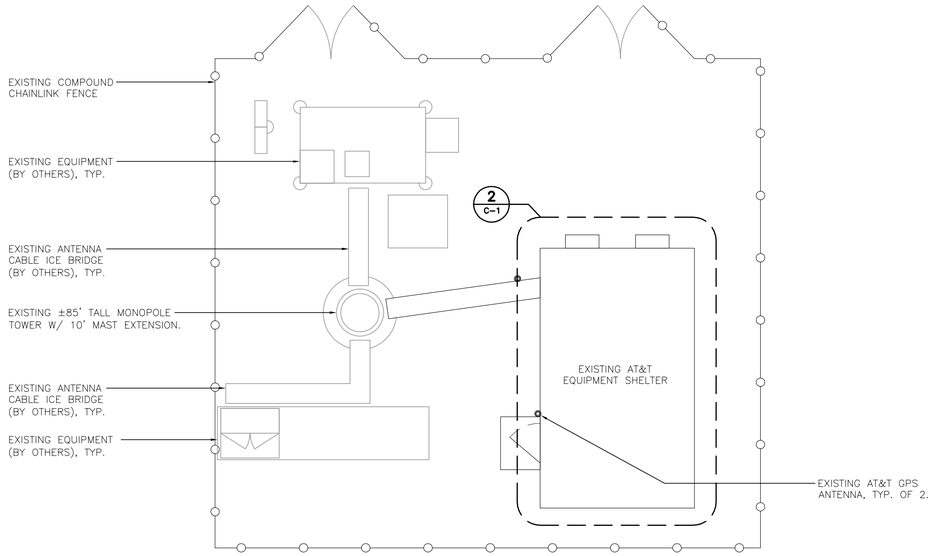
TOWER STRUCTURAL NOTES:

1. TOWER STRUCTURAL ANALYSIS SIGNED AND 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.

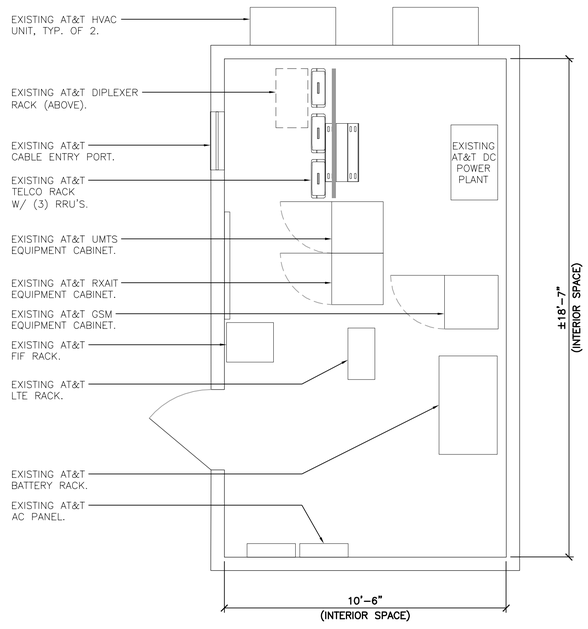
NOTES:

1. OTHER CARRIER EQUIPMENT NOT SHOWN FOR CLARITY
2. A.G.L. = ABOVE GRADE LEVEL

NOTE:
GROUND EQUIPMENT NOT SHOWN FOR CLARITY.



1 C-1 **COMPOUND PLAN**
SCALE: 3/16" = 1'-0"
TRUE NORTH



2 C-1 **EQUIPMENT LAYOUT PLAN**
SCALE: 3/8" = 1'-0"
TRUE NORTH

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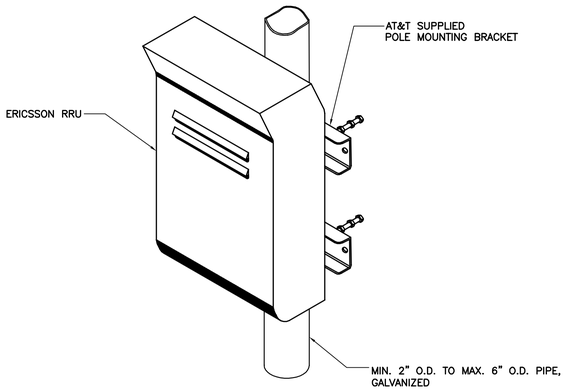
PLANS, ELEVATION AND DETAILS

C-1

Sheet No. 3 of 5



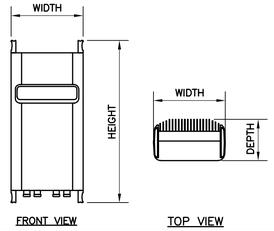
ISOMETRIC VIEW

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.

5 C–2 TYPICAL RRUS MOUNTING DETAILS

SCALE: NTS



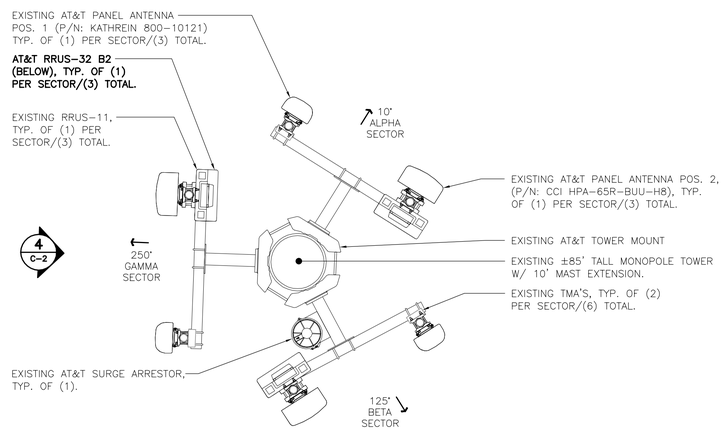
FRONT VIEW TOP VIEW

RRU (REMOTE RADIO UNIT)			
EQUIPMENT	DIMENSIONS	WEIGHT	CLEARANCES
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.

6 C–2 ERICSSON RRUS 32 B2 DETAIL

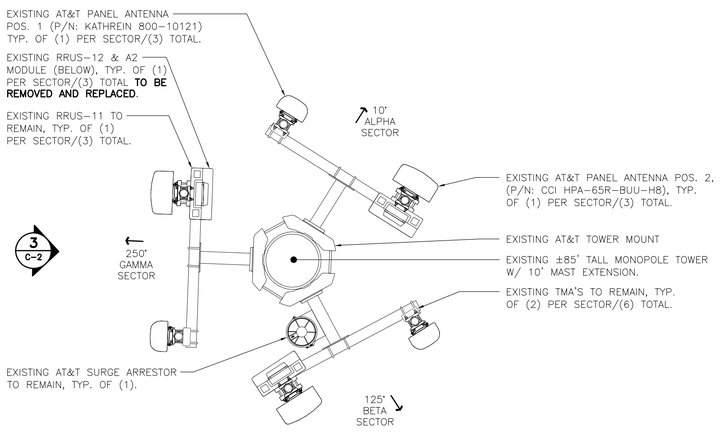
SCALE: 1" = 1'–0"



2 C–2 PROPOSED ANTENNA PLAN

SCALE: 1/2" = 1'–0"

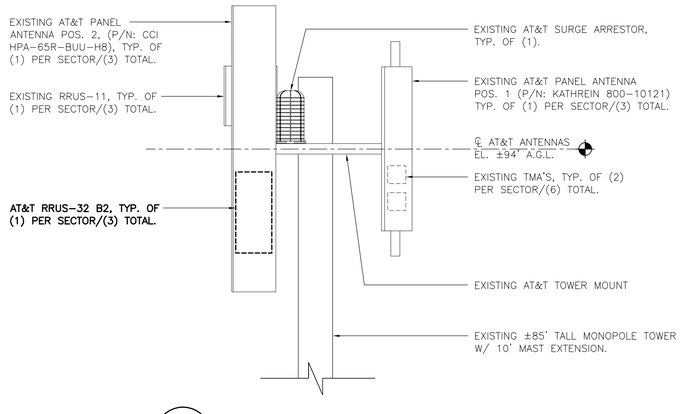
NORTH



1 C–2 EXISTING ANTENNA PLAN

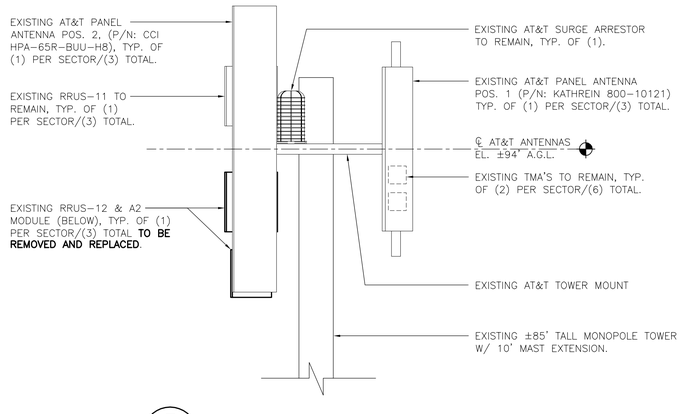
SCALE: 1/2" = 1'–0"

NORTH



4 C–2 PROPOSED ANTENNA ELEVATION

SCALE: 1/2" = 1'–0"



3 C–2 EXISTING ANTENNA ELEVATION

SCALE: 1/2" = 1'–0"

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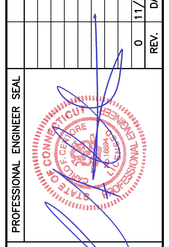

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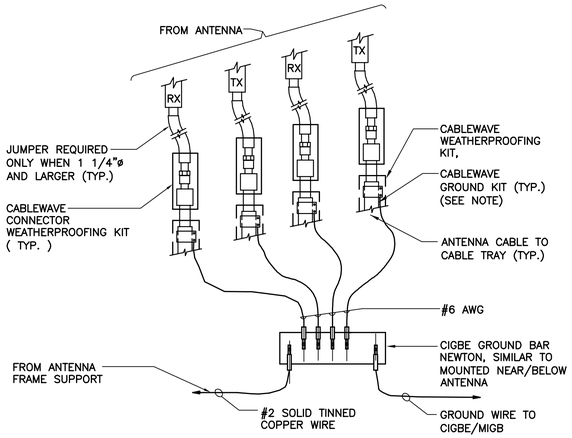
BWE EQUIPMENT DETAILS

C–2

Sheet No. 4 of 5

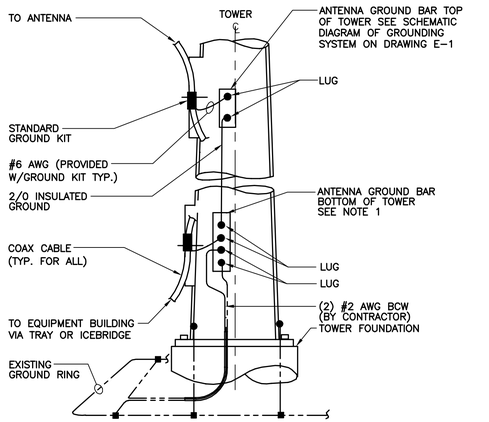


NOTE:

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

5 E-1 CONNECTION OF GROUND WIRES TO GROUND BAR

NOT TO SCALE

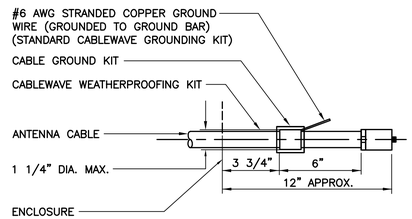


NOTES:

1. NUMBER OF GROUND BARS MAY VARY DEPENDING ON THE TYPE OF TOWER, LOCATION AND CONNECTION ORIENTATION. PROVIDE AS REQUIRED.
2. A SEPARATE GROUND BAR TO BE USED FOR GPS ANTENNA IF REQUIRED.

2 E-1 ANTENNA CABLE GROUNDING - TOWER

NOT TO SCALE

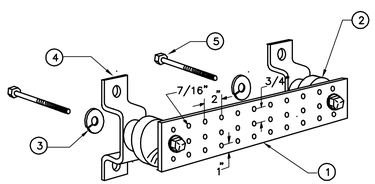


NOTE:

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

4 E-1 ANTENNA CABLE GROUNDING DETAIL

NOT TO SCALE

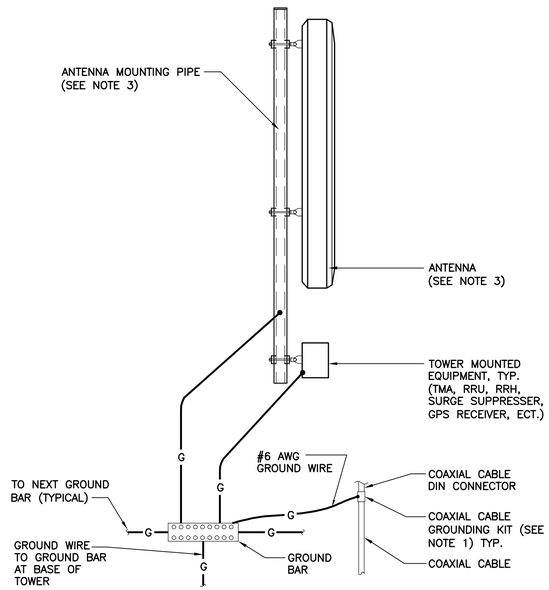


LEGEND

1. TINNED COPPER GROUND BAR, 1/4"x 4"x 20", NEWTON INSTRUMENT CO. HOLE CENTERS TO MATCH NEMA DOUBLE LUG .
2. INSULATORS, NEWTON INSTRUMENT CAT. NO. 2. 3061-4.
3. 3. 5/8" LOCK WASHERS, NEWTON INSTRUMENT CO. CAT. NO. 3015-8.
4. WALL MOUNTING BRACKET, NEWTON INSTRUMENT CO. 4. CAT NO. A-6056.
5. STAINLESS STEEL SECURITY SCREWS.

3 E-1 GROUND BAR DETAIL

NOT TO SCALE



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-1 TYPICAL ANTENNA GROUNDING DETAIL

NOT TO SCALE

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 SERVICE. 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.

REV.	DATE	DRAWN BY	CHK'D BY	DESCRIPTION
0	11/22/16	HMR	CAG	CONSTRUCTION DOCUMENTS - ISSUED FOR CONSTRUCTION

PROFESSIONAL ENGINEER SEAL

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WINDSOR BREAKNECK

CT5140 - LTE BWE

440 HAYDEN STATION RD

WINDSOR, CT 06095

DATE: 11/08/16

SCALE: AS NOTED

JOB NO. 16071.75

ELECTRICAL DETAILS AND NOTES

E-1

Sheet No. 5 of 5

Date: **December 28, 2016**

Debra Elliott
Crown Castle
3530 Toringdon Way Suite 300
Charlotte, NC 28277

FDH Velocitel
6521 Meridien Drive, Suite 107
Raleigh, North Carolina 27616
9197551012

Subject: Structural Analysis Report

Carrier Designation:	***AT&T Mobility* Co-Locate**	
	Carrier Site Number:	CT5140
	Carrier Site Name:	Windsor Breakneck
Crown Castle Designation:	**Crown Castle BU Number:**	876326
	Crown Castle Site Name:	HAYDEN STATION
	Crown Castle JDE Job Number:	409604
	Crown Castle Work Order Number:	1340476
	Crown Castle Application Number:	369275 Rev. 1
Engineering Firm Designation:	**FDH Velocitel Project Number:**	16PYKX1400
Site Data:	**440 Hayden Station Road, WINDSOR, Hartford County, CT** **Latitude *41° 53' 52.2"*, Longitude *-72° 38' 38.7"*** **96 Foot - Monopole Tower**	

Dear Debra Elliott,

FDH Velocitel is pleased to submit this **"Structural Analysis Report"** to determine the structural integrity of the above mentioned tower. This analysis has been performed in accordance with the Crown Castle Structural 'Statement of Work' and the terms of Crown Castle Purchase Order Number 984795, in accordance with application 369275, revision 1.

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

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

This analysis has been performed in accordance with the 2016 Connecticut State Building Code based upon an ultimate 3-second gust wind speed of 121 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 1 and Risk Category II was used in this analysis

All modifications and equipment proposed in this report shall be installed in accordance with the attached drawings for the determined available structural capacity to be effective.

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

Respectfully submitted by:

Colleen Brophy, EI
Project Engineer I

Reviewed by:

Dennis D. Abel, PE
Director – Structural Engineering
CT PE License No. 23247

12-28-2016

STATE OF CONNECTICUT · DENNIS D. ABEL · No. 23247 · LICENSED PROFESSIONAL ENGINEER

tnxTower Report - version 7.0.5.1

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1) INTRODUCTION

This tower is a 96 ft Monopole tower designed by ROHN in January of 1997. The tower was originally designed for a wind speed of 80 mph per TIA/EIA-222-F.

2) ANALYSIS CRITERIA

The structural analysis was performed for this tower in accordance with the requirements of TIA-222-G Structural Standards for 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.

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
92.0	92.0	3	ericsson	RRUS 32 B2	-	-	-
		6	kathrein	860 10025			

Table 2 - Existing and Reserved Antenna and Cable Information

Mounting Level (ft)	Center Line Elevation (ft)	Number of Antennas	Antenna Manufacturer	Antenna Model	Number of Feed Lines	Feed Line Size (in)	Note
92.0	92.0	3	ericsson	RRUS12/RRUS A2	-	-	3
		3	cci antennas	HPA-65R-BUU-H8 w/ Mount Pipe	6 2 1	1-5/8 3/4 3/8	1
		1	crown mounts	T-Arm Mount [TA 702-3]			
		1	raycap	DC6-48-60-18-8F			
		3	ericsson	RRUS-11			
		3	kathrein	800 10121 w/ Mount Pipe			
		6	powerwave technologies	LGP21401			
83.0	86.0	1	andrew	VHLP2-180	6 4 1 3 2	5/16 1/2 5/8 1-1/4 2” Conduit	1
		2	dragonwave	A-ANT-11G-4-C			
	83.0	3	alcatel lucent	TD-RRH8x20-25			
		1	crown mounts	Platform Mount [LP 502-1]			
		3	dragonwave	Horizon DUO			
		3	rfs celwave	APXVSPP18-C-A20 w/ Mount Pipe			
		3	rfs celwave	APXVTM14-C-120 w/ Mount Pipe			
		3	samsung telecommunications	WIMAX DAP HEAD			
	82.0	3	kathrein	840 10045 w/ Mount Pipe			
79.0	80.0	3	alcatel lucent	800MHz 2X50W RRH W/FILTER	-	-	1
	79.0	1	crown mounts	Side Arm Mount [SO 104-3]			
	77.0	3	alcatel lucent	PCS 1900MHz 4x45W-65MHz			

Mounting Level (ft)	Center Line Elevation (ft)	Number of Antennas	Antenna Manufacturer	Antenna Model	Number of Feed Lines	Feed Line Size (in)	Note
75.0	75.0	3	andrew	LNX-6515DS-A1M w/ Mount Pipe	-	-	2
		3	ericsson	RRUS 11 B12			
		1	crown mounts	Platform Mount [LP 303-1]	12 1	7/8 1-5/8	1
		3	ericsson	ERICSSON AIR 21 B2A B4P w/ Mount Pipe			
		3	ericsson	ERICSSON AIR 21 B4A B2P w/ Mount Pipe			
		3	ericsson	KRY 112 144/1			
57.0	57.0	1	gps	GPS_A	1	1/2	1
		1	crown mounts	4.5' x 2" horizontal mount pipe			

Notes:
1) Existing Equipment
2) Reserved Equipment
3) Equipment To Be Removed; Not considered in this analysis

Table 3 - Design Antenna and Cable Information

Mounting Level (ft)	Center Line Elevation (ft)	Number of Antennas	Antenna Manufacturer	Antenna Model	Number of Feed Lines	Feed Line Size (in)
85	85	12	swedcom	ALP9212	12	1 5/8
75	75	12	swedcom	ALP9212	12	1 5/8
60	60	12	swedcom	ALP9212	12	1 5/8

3) ANALYSIS PROCEDURE

Table 4 - Documents Provided

Document	Remarks	Reference	Source
4-GEOTECHNICAL REPORTS	Clough, Harbor, & Associates LLP	1530918	CCISITES
4-TOWER FOUNDATION DRAWINGS/DESIGN/SPECS	Rohn, Inc.	1640630	CCISITES
4-TOWER MANUFACTURER DRAWINGS	Rohn, Inc.	1639483	CCISITES
4-TOWER STRUCTURAL ANALYSIS REPORTS	URS	1771083	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) Tower extension geometry was taken from the previous analysis
5) Base and flange plate design methodology of the manufacturer has been reviewed and found to be an acceptable means of designing to resist the full capacity of the bolts and shaft.

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

4) ANALYSIS RESULTS

Table 5 - Section Capacity (Summary)

Section No.	Elevation (ft)	Component Type	Size	Critical Element	P (K)	SF*P_allow (K)	% Capacity	Pass / Fail
L1	96 - 85	Pole	P12x.5	1	-2.89	606.13	14.9	Pass
L2	85 - 65	Pole	P42x3/8	2	-13.59	1668.87	16.5	Pass
L3	65 - 32.5	Pole	P48x3/8	3	-22.04	1847.49	38.6	Pass
L4	32.5 - 0	Pole	P48x1/2	4	-32.95	2649.06	50.1	Pass
							Summary	
						Pole (L4)	50.1	Pass
						Rating =	50.1	Pass

Table 6 - Tower Component Stresses vs. Capacity – LC7

Notes	Component	Elevation (ft)	% Capacity	Pass / Fail
1	Anchor Rods	0	59.7	Pass
1,2	Base Plate	0	59.7	Pass
1	Base Foundation	0	36.6	Pass
1	Base Foundation Soil Interaction	0	13.3	Pass
1,2	Flange Plate	32.5	38.6	Pass
1	Flange Bolts	32.5	34.0	Pass
1,2	Flange Plate	65	16.5	Pass
1	Flange Bolts	65	10.7	Pass
1,2	Flange Plate	85	14.9	Pass
1	Flange Bolts	85	2.1	Pass

Structure Rating (max from all components) =	**59.7%**

Notes:
1) See additional documentation in "Appendix C – Additional Calculations" for calculations supporting the % capacity consumed.
2) Base and flange plate design methodology of the manufacturer has been reviewed and found to be an acceptable means of designing to resist the full capacity of the bolts and shaft.

4.1) Recommendations

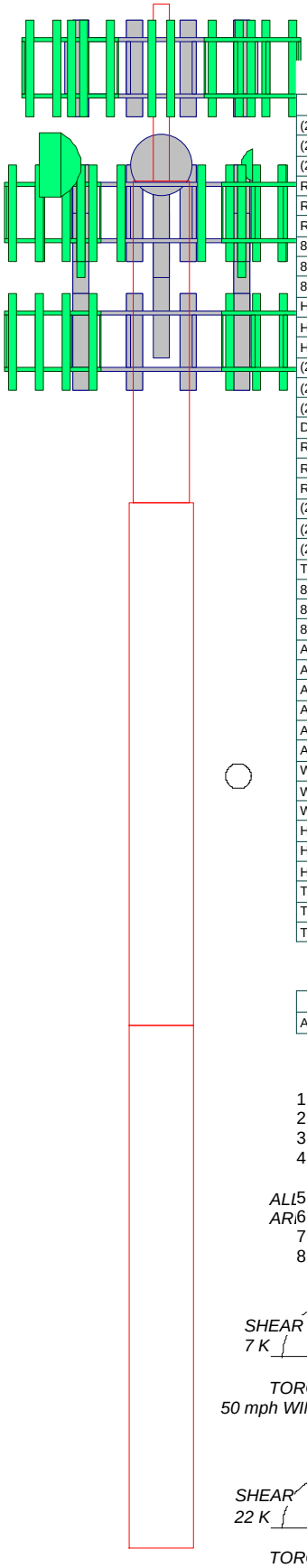
The tower and its foundation have sufficient capacity to carry the existing and proposed loads. No modifications are required at this time.

APPENDIX A

TNXTOWER OUTPUT

Section	Size	Length (ft)	Grade	Weight (K)
1	P12x.5	11.00	A53-B-35	0.7
2	P42x3/8	20.00	A53-B-42	3.3
3	P48x3/8	32.50		6.2
4	P48x1/2	32.50		8.3
				18.5

96.0 ft
85.0 ft
65.0 ft
32.5 ft
0.0 ft



DESIGNED APPURTENANCE LOADING

TYPE	ELEVATION	TYPE	ELEVATION
(2) 860 10025	92	(2) 4' x 2" Pipe Mount	83
(2) 860 10025	92	(2) 4' x 2" Pipe Mount	83
(2) 860 10025	92	(2) 4' x 2" Pipe Mount	83
RRUS 32 B2	92	Platform Mount [LP 502-1]	83
RRUS 32 B2	92	A-ANT-11G-4-C	83
RRUS 32 B2	92	VHLP2-180	83
800 10121 w/ Mount Pipe	92	A-ANT-11G-4-C	83
800 10121 w/ Mount Pipe	92	PCS 1900MHz 4x45W-65MHz	79
800 10121 w/ Mount Pipe	92	PCS 1900MHz 4x45W-65MHz	79
HPA-65R-BUU-H8 w/ Mount Pipe	92	PCS 1900MHz 4x45W-65MHz	79
HPA-65R-BUU-H8 w/ Mount Pipe	92	4' x 2" Pipe Mount	79
HPA-65R-BUU-H8 w/ Mount Pipe	92	4' x 2" Pipe Mount	79
(2) LGP21401	92	4' x 2" Pipe Mount	79
(2) LGP21401	92	Side Arm Mount [SO 104-3]	79
(2) LGP21401	92	800MHz 2X50W RRH W/FILTER	79
DC6-48-60-18-8F	92	800MHz 2X50W RRH W/FILTER	79
RRUS-11	92	800MHz 2X50W RRH W/FILTER	79
RRUS-11	92	ERICSSON AIR 21 B4A B2P w/ Mount Pipe	75
RRUS-11	92		
(2) 4' x 2" Pipe Mount	92	ERICSSON AIR 21 B4A B2P w/ Mount Pipe	75
(2) 4' x 2" Pipe Mount	92	ERICSSON AIR 21 B4A B2P w/ Mount Pipe	75
(2) 4' x 2" Pipe Mount	92	KRY 112 144/1	75
T-Arm Mount [TA 702-3]	92	KRY 112 144/1	75
840 10045 w/ Mount Pipe	83	KRY 112 144/1	75
840 10045 w/ Mount Pipe	83	LNX-6515DS-A1M w/ Mount Pipe	75
840 10045 w/ Mount Pipe	83	LNX-6515DS-A1M w/ Mount Pipe	75
APXVSPP18-C-A20 w/ Mount Pipe	83	LNX-6515DS-A1M w/ Mount Pipe	75
APXVSPP18-C-A20 w/ Mount Pipe	83	RRUS 11 B12	75
APXVSPP18-C-A20 w/ Mount Pipe	83	RRUS 11 B12	75
APXVTM14-C-120 w/ Mount Pipe	83	RRUS 11 B12	75
APXVTM14-C-120 w/ Mount Pipe	83	Platform Mount [LP 303-1]	75
APXVTM14-C-120 w/ Mount Pipe	83	ERICSSON AIR 21 B2A B4P w/ Mount Pipe	75
WIMAX DAP HEAD	83		
WIMAX DAP HEAD	83	ERICSSON AIR 21 B2A B4P w/ Mount Pipe	75
WIMAX DAP HEAD	83		
Horizon DUO	83	ERICSSON AIR 21 B2A B4P w/ Mount Pipe	75
Horizon DUO	83		
Horizon DUO	83	4.5' x 2" horizontal mount pipe	57
TD-RRH8x20-25	83	GPS_A	57
TD-RRH8x20-25	83		
TD-RRH8x20-25	83		

MATERIAL STRENGTH

GRADE	Fy	Fu	GRADE	Fy	Fu
A53-B-35	35 ksi	63 ksi	A53-B-42	42 ksi	63 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: 50.1%

ALL
ARI

63 K

SHEAR 7 K *MOMENT 490 kip-ft*

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

AXIAL 33 K

SHEAR 22 K *MOMENT 1551 kip-ft*

TORQUE 2 kip-ft
REACTIONS - 97 mph WIND

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

Tower Analysis

Job: ***BU# 876326 - Hayden Station***		
Project: ***16PYKX1400***		
Client: Crown Castle	Drawn by: cbrophy	App'd:
Code: TIA-222-G	Date: 12/28/16	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:

Tower is located in Hartford County, Connecticut.
Basic wind speed of 97 mph.
Structure Class II.
Exposure Category C.
Topographic Category 1.
Crest Height 0.00 ft.
Nominal ice thickness of 1.0000 in.
Ice thickness is considered to increase with height.
Ice density of 56 pcf.
A wind speed of 50 mph is used in combination with ice.
Temperature drop of 50 °F.
Deflections calculated using a wind speed of 60 mph.
A non-linear (P-delta) analysis was used.
Pressures are calculated at each section.
Stress ratio used in pole design is 1.
Local bending stresses due to climbing loads, feed line supports, and appurtenance mounts are not considered.

Options

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

Pole Section Geometry

Section	*Elevation* *ft*	*Section Length* *ft*	*Pole Size*	*Pole Grade*	*Socket Length* *ft*
L1	96.00-85.00	11.00	P12x.5	A53-B-35 (35 ksi)	
L2	85.00-65.00	20.00	P42x3/8	A53-B-42 (42 ksi)	

Section	Elevation ft	Section Length ft	Pole Size	Pole Grade	Socket Length ft
L3	65.00-32.50	32.50	P48x3/8	A53-B-42 (42 ksi)	
L4	32.50-0.00	32.50	P48x1/2	A53-B-42 (42 ksi)	

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 96.00-85.00				1	1	1			
L2 85.00-65.00				1	1	1			
L3 65.00-32.50				1	1	1			
L4 32.50-0.00				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
FSJ4-50B(1/2")	A	Surface Ar (CaAa)	83.00 - 0.00	3	3	0.250 0.270	0.5200		0.14
HB114-1-08U4-M5J(1-1/4")	A	Surface Ar (CaAa)	83.00 - 0.00	3	3	0.200 0.230	1.5400		1.08
2" Rigid Conduit	A	Surface Ar (CaAa)	83.00 - 2.00	2	2	0.300 0.320	2.0000		2.80
AVA7-50(1-5/8")	B	Surface Ar (CaAa)	75.00 - 2.00	1	1	0.400 0.410	2.0100		0.70
*****									

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
LDF7-50A(1-5/8")	B	No	Inside Pole	92.00 - 8.00	6	No Ice	0.00	0.82
						1/2" Ice	0.00	0.82
						1" Ice	0.00	0.82
FB-L98B-002-75000(3/8")	B	No	Inside Pole	92.00 - 8.00	1	No Ice	0.00	0.06
						1/2" Ice	0.00	0.06
						1" Ice	0.00	0.06
WR-VG86ST-BRD(3/4)	B	No	Inside Pole	92.00 - 8.00	2	No Ice	0.00	0.58
						1/2" Ice	0.00	0.58
						1" Ice	0.00	0.58
2" Rigid Conduit	B	No	Inside Pole	92.00 - 0.00	1	No Ice	0.00	2.80
						1/2" Ice	0.00	2.80
						1" Ice	0.00	2.80
*								
ATCB-B01-001(5/16")	A	No	Inside Pole	83.00 - 0.00	6	No Ice	0.00	0.07
						1/2" Ice	0.00	0.07
						1" Ice	0.00	0.07
LDF4-50A(1/2")	A	No	Inside Pole	83.00 - 0.00	1	No Ice	0.00	0.15

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	0.15
						1" Ice	0.00	0.15
HB058-M12-XXXF(5/8")	A	No	Inside Pole	83.00 - 0.00	1	No Ice	0.00	0.24
						1/2" Ice	0.00	0.24
						1" Ice	0.00	0.24
****								
AVA5-50(7/8)	B	No	Inside Pole	75.00 - 2.00	12	No Ice	0.00	0.30
						1/2" Ice	0.00	0.30
						1" Ice	0.00	0.30
*								
LDF4-50A(1/2")	C	No	Inside Pole	57.00 - 0.00	1	No Ice	0.00	0.15
						1/2" Ice	0.00	0.15
						1" Ice	0.00	0.15
*****								

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	96.00-85.00	A	0.000	0.000	0.000	0.000	0.00
		B	0.000	0.000	0.000	0.000	0.06
		C	0.000	0.000	0.000	0.000	0.00
L2	85.00-65.00	A	0.000	0.000	18.324	0.000	0.18
		B	0.000	0.000	2.010	0.000	0.22
		C	0.000	0.000	0.000	0.000	0.00
L3	65.00-32.50	A	0.000	0.000	33.085	0.000	0.33
		B	0.000	0.000	6.532	0.000	0.43
		C	0.000	0.000	0.000	0.000	0.00
L4	32.50-0.00	A	0.000	0.000	32.285	0.000	0.32
		B	0.000	0.000	6.130	0.000	0.37
		C	0.000	0.000	0.000	0.000	0.00

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	96.00-85.00	A	2.212	0.000	0.000	0.000	0.000	0.00
		B		0.000	0.000	0.000	0.000	0.06
		C		0.000	0.000	0.000	0.000	0.00
L2	85.00-65.00	A	2.171	0.000	0.000	52.215	0.000	0.89
		B		0.000	0.000	6.352	0.000	0.33
		C		0.000	0.000	0.000	0.000	0.00
L3	65.00-32.50	A	2.081	0.000	0.000	92.076	0.000	1.53
		B		0.000	0.000	20.058	0.000	0.77
		C		0.000	0.000	0.000	0.000	0.00
L4	32.50-0.00	A	1.868	0.000	0.000	84.951	0.000	1.32
		B		0.000	0.000	17.524	0.000	0.64
		C		0.000	0.000	0.000	0.000	0.00

Feed Line Center of Pressure

Section	Elevation	CP_X	CP_Z	CP_X Ice	CP_Z Ice
	ft	in	in	in	in
L1	96.00-85.00	0.0000	0.0000	0.0000	0.0000
L2	85.00-65.00	-0.4151	-0.9242	-0.5887	-1.3581
L3	65.00-32.50	-0.3529	-0.9770	-0.4789	-1.4263
L4	32.50-0.00	-0.3581	-0.9614	-0.4902	-1.3958

Shielding Factor Ka

Tower Section	Feed Line Record No.	Description	Feed Line Segment Elev.	K_a No Ice	K_a Ice
L2	8	FSJ4-50B(1/2")	65.00 - 83.00	1.0000	1.0000
L2	11	HB114-1-08U4-M5J(1-1/4")	65.00 - 83.00	1.0000	1.0000
L2	12	2" Rigid Conduit	65.00 - 83.00	1.0000	1.0000
L2	15	AVA7-50(1-5/8)	65.00 - 75.00	1.0000	1.0000
L3	8	FSJ4-50B(1/2")	32.50 - 65.00	1.0000	1.0000
L3	11	HB114-1-08U4-M5J(1-1/4")	32.50 - 65.00	1.0000	1.0000
L3	12	2" Rigid Conduit	32.50 - 65.00	1.0000	1.0000
L3	15	AVA7-50(1-5/8)	32.50 - 65.00	1.0000	1.0000
L4	8	FSJ4-50B(1/2")	0.00 - 32.50	1.0000	1.0000
L4	11	HB114-1-08U4-M5J(1-1/4")	0.00 - 32.50	1.0000	1.0000
L4	12	2" Rigid Conduit	2.00 - 32.50	1.0000	1.0000
L4	15	AVA7-50(1-5/8)	2.00 - 32.50	1.0000	1.0000

Discrete Tower Loads

Description	Face or Leg	Offset Type	Offsets: Horz Lateral Vert	Azimuth Adjustment	Placement		C_AA_A Front	C_AA_A Side	Weight
			ft ft ft	°	ft		ft^2	ft^2	K
(2) 860 10025	A	From Leg	2.00 0.00 0.00	10.0000	92.00	No Ice 1/2" Ice 1" Ice	0.14 0.20 0.26	0.12 0.17 0.23	0.00 0.00 0.01
(2) 860 10025	B	From Leg	2.00 0.00 0.00	10.0000	92.00	No Ice 1/2" Ice 1" Ice	0.14 0.20 0.26	0.12 0.17 0.23	0.00 0.00 0.01
(2) 860 10025	C	From Leg	2.00 0.00 0.00	10.0000	92.00	No Ice 1/2" Ice 1" Ice	0.14 0.20 0.26	0.12 0.17 0.23	0.00 0.00 0.01
RRUS 32 B2	A	From Leg	2.00 0.00 0.00	10.0000	92.00	No Ice 1/2" Ice 1" Ice	2.76 2.98 3.22	1.69 1.88 2.07	0.05 0.07 0.10
RRUS 32 B2	B	From Leg	2.00 0.00	10.0000	92.00	No Ice 1/2" Ice	2.76 2.98	1.69 1.88	0.05 0.07

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
			0.00			1" Ice	3.22	2.07	0.10
RRUS 32 B2	C	From Leg	2.00	10.0000	92.00	No Ice	2.76	1.69	0.05
			0.00			1/2" Ice	2.98	1.88	0.07
			0.00			1" Ice	3.22	2.07	0.10
800 10121 w/ Mount Pipe	A	From Leg	3.00	0.0000	92.00	No Ice	5.39	4.60	0.07
			0.00			1/2" Ice	5.81	5.35	0.11
			0.00			1" Ice	6.23	6.05	0.17
800 10121 w/ Mount Pipe	B	From Leg	3.00	0.0000	92.00	No Ice	5.39	4.60	0.07
			0.00			1/2" Ice	5.81	5.35	0.11
			0.00			1" Ice	6.23	6.05	0.17
800 10121 w/ Mount Pipe	C	From Leg	3.00	0.0000	92.00	No Ice	5.39	4.60	0.07
			0.00			1/2" Ice	5.81	5.35	0.11
			0.00			1" Ice	6.23	6.05	0.17
HPA-65R-BUU-H8 w/ Mount Pipe	A	From Leg	3.00	0.0000	92.00	No Ice	12.98	9.18	0.09
			0.00			1/2" Ice	13.56	10.48	0.19
			0.00			1" Ice	14.15	11.49	0.29
HPA-65R-BUU-H8 w/ Mount Pipe	B	From Leg	3.00	0.0000	92.00	No Ice	12.98	9.18	0.09
			0.00			1/2" Ice	13.56	10.48	0.19
			0.00			1" Ice	14.15	11.49	0.29
HPA-65R-BUU-H8 w/ Mount Pipe	C	From Leg	3.00	0.0000	92.00	No Ice	12.98	9.18	0.09
			0.00			1/2" Ice	13.56	10.48	0.19
			0.00			1" Ice	14.15	11.49	0.29
(2) LGP21401	A	From Leg	3.00	0.0000	92.00	No Ice	1.10	0.35	0.01
			0.00			1/2" Ice	1.24	0.44	0.02
			0.00			1" Ice	1.38	0.54	0.03
(2) LGP21401	B	From Leg	3.00	0.0000	92.00	No Ice	1.10	0.35	0.01
			0.00			1/2" Ice	1.24	0.44	0.02
			0.00			1" Ice	1.38	0.54	0.03
(2) LGP21401	C	From Leg	3.00	0.0000	92.00	No Ice	1.10	0.35	0.01
			0.00			1/2" Ice	1.24	0.44	0.02
			0.00			1" Ice	1.38	0.54	0.03
DC6-48-60-18-8F	A	From Leg	3.00	0.0000	92.00	No Ice	0.85	0.85	0.03
			0.00			1/2" Ice	1.36	1.36	0.05
			0.00			1" Ice	1.53	1.53	0.07
RRUS-11	B	From Leg	3.00	0.0000	92.00	No Ice	2.52	1.07	0.06
			0.00			1/2" Ice	2.72	1.21	0.07
			0.00			1" Ice	2.92	1.36	0.10
RRUS-11	C	From Leg	3.00	0.0000	92.00	No Ice	2.52	1.07	0.06
			0.00			1/2" Ice	2.72	1.21	0.07
			0.00			1" Ice	2.92	1.36	0.10
RRUS-11	A	From Leg	3.00	0.0000	92.00	No Ice	2.52	1.07	0.06
			0.00			1/2" Ice	2.72	1.21	0.07
			0.00			1" Ice	2.92	1.36	0.10
(2) 4' x 2" Pipe Mount	A	From Leg	4.00	0.0000	92.00	No Ice	0.79	0.79	0.03
			0.00			1/2" Ice	1.03	1.03	0.04
			0.00			1" Ice	1.28	1.28	0.04
(2) 4' x 2" Pipe Mount	B	From Leg	4.00	0.0000	92.00	No Ice	0.79	0.79	0.03
			0.00			1/2" Ice	1.03	1.03	0.04
			0.00			1" Ice	1.28	1.28	0.04
(2) 4' x 2" Pipe Mount	C	From Leg	4.00	0.0000	92.00	No Ice	0.79	0.79	0.03
			0.00			1/2" Ice	1.03	1.03	0.04
			0.00			1" Ice	1.28	1.28	0.04
T-Arm Mount [TA 702-3]	C	None		0.0000	92.00	No Ice	5.64	5.64	0.34
						1/2" Ice	6.55	6.55	0.43
						1" Ice	7.46	7.46	0.52
****									
840 10045 w/ Mount Pipe	A	From Leg	4.00	0.0000	83.00	No Ice	3.58	3.58	0.06

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
			0.00			1/2" Ice	5.31	5.31	0.11
			-1.00			1" Ice	6.02	6.02	0.17
840 10045 w/ Mount Pipe	B	From Leg	4.00	0.0000	83.00	No Ice	3.58	3.58	0.06
			0.00			1/2" Ice	5.31	5.31	0.11
			-1.00			1" Ice	6.02	6.02	0.17
840 10045 w/ Mount Pipe	C	From Leg	4.00	0.0000	83.00	No Ice	3.58	3.58	0.06
			0.00			1/2" Ice	5.31	5.31	0.11
			-1.00			1" Ice	6.02	6.02	0.17
APXVSPP18-C-A20 w/ Mount Pipe	A	From Leg	4.00	0.0000	83.00	No Ice	8.26	7.47	0.09
			0.00			1/2" Ice	8.82	8.66	0.16
			0.00			1" Ice	9.35	9.56	0.24
APXVSPP18-C-A20 w/ Mount Pipe	B	From Leg	4.00	0.0000	83.00	No Ice	8.26	7.47	0.09
			0.00			1/2" Ice	8.82	8.66	0.16
			0.00			1" Ice	9.35	9.56	0.24
APXVSPP18-C-A20 w/ Mount Pipe	C	From Leg	4.00	0.0000	83.00	No Ice	8.26	7.47	0.09
			0.00			1/2" Ice	8.82	8.66	0.16
			0.00			1" Ice	9.35	9.56	0.24
APXVTM14-C-120 w/ Mount Pipe	A	From Leg	4.00	0.0000	83.00	No Ice	6.58	4.96	0.08
			0.00			1/2" Ice	7.03	5.75	0.13
			0.00			1" Ice	7.47	6.47	0.19
APXVTM14-C-120 w/ Mount Pipe	B	From Leg	4.00	0.0000	83.00	No Ice	6.58	4.96	0.08
			0.00			1/2" Ice	7.03	5.75	0.13
			0.00			1" Ice	7.47	6.47	0.19
APXVTM14-C-120 w/ Mount Pipe	C	From Leg	4.00	0.0000	83.00	No Ice	6.58	4.96	0.08
			0.00			1/2" Ice	7.03	5.75	0.13
			0.00			1" Ice	7.47	6.47	0.19
WIMAX DAP HEAD	A	From Leg	4.00	0.0000	83.00	No Ice	1.55	0.68	0.03
			0.00			1/2" Ice	1.70	0.80	0.04
			0.00			1" Ice	1.87	0.92	0.06
WIMAX DAP HEAD	B	From Leg	4.00	0.0000	83.00	No Ice	1.55	0.68	0.03
			0.00			1/2" Ice	1.70	0.80	0.04
			0.00			1" Ice	1.87	0.92	0.06
WIMAX DAP HEAD	C	From Leg	4.00	0.0000	83.00	No Ice	1.55	0.68	0.03
			0.00			1/2" Ice	1.70	0.80	0.04
			0.00			1" Ice	1.87	0.92	0.06
Horizon DUO	A	From Leg	4.00	0.0000	83.00	No Ice	0.47	0.29	0.01
			0.00			1/2" Ice	0.56	0.37	0.01
			0.00			1" Ice	0.65	0.44	0.02
Horizon DUO	B	From Leg	4.00	0.0000	83.00	No Ice	0.47	0.29	0.01
			0.00			1/2" Ice	0.56	0.37	0.01
			0.00			1" Ice	0.65	0.44	0.02
Horizon DUO	C	From Leg	4.00	0.0000	83.00	No Ice	0.47	0.29	0.01
			0.00			1/2" Ice	0.56	0.37	0.01
			0.00			1" Ice	0.65	0.44	0.02
TD-RRH8x20-25	A	From Leg	4.00	0.0000	83.00	No Ice	3.70	1.29	0.07
			0.00			1/2" Ice	3.95	1.46	0.09
			0.00			1" Ice	4.20	1.64	0.12
TD-RRH8x20-25	B	From Leg	4.00	0.0000	83.00	No Ice	3.70	1.29	0.07
			0.00			1/2" Ice	3.95	1.46	0.09
			0.00			1" Ice	4.20	1.64	0.12
TD-RRH8x20-25	C	From Leg	4.00	0.0000	83.00	No Ice	3.70	1.29	0.07
			0.00			1/2" Ice	3.95	1.46	0.09
			0.00			1" Ice	4.20	1.64	0.12
(2) 4' x 2" Pipe Mount	A	From Leg	4.00	0.0000	83.00	No Ice	0.79	0.79	0.03
			0.00			1/2" Ice	1.03	1.03	0.04
			0.00			1" Ice	1.28	1.28	0.04
(2) 4' x 2" Pipe Mount	B	From Leg	4.00	0.0000	83.00	No Ice	0.79	0.79	0.03

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
			0.00			1/2" Ice	1.03	1.03	0.04
			0.00			1" Ice	1.28	1.28	0.04
(2) 4' x 2" Pipe Mount	C	From Leg	4.00	0.0000	83.00	No Ice	0.79	0.79	0.03
			0.00			1/2" Ice	1.03	1.03	0.04
			0.00			1" Ice	1.28	1.28	0.04
Platform Mount [LP 502-1]	C	None		0.0000	83.00	No Ice	32.35	32.35	0.93
						1/2" Ice	45.67	45.67	1.19
						1" Ice	58.99	58.99	1.46
***									
800MHz 2X50W RRH W/FILTER	A	From Leg	1.00	0.0000	79.00	No Ice	2.06	1.93	0.06
			0.00			1/2" Ice	2.24	2.11	0.09
			1.00			1" Ice	2.43	2.29	0.11
800MHz 2X50W RRH W/FILTER	B	From Leg	1.00	0.0000	79.00	No Ice	2.06	1.93	0.06
			0.00			1/2" Ice	2.24	2.11	0.09
			1.00			1" Ice	2.43	2.29	0.11
800MHz 2X50W RRH W/FILTER	C	From Leg	1.00	0.0000	79.00	No Ice	2.06	1.93	0.06
			0.00			1/2" Ice	2.24	2.11	0.09
			1.00			1" Ice	2.43	2.29	0.11
PCS 1900MHz 4x45W-65MHz	A	From Leg	1.00	0.0000	79.00	No Ice	2.32	2.24	0.06
			0.00			1/2" Ice	2.53	2.44	0.08
			-2.00			1" Ice	2.74	2.65	0.11
PCS 1900MHz 4x45W-65MHz	B	From Leg	1.00	0.0000	79.00	No Ice	2.32	2.24	0.06
			0.00			1/2" Ice	2.53	2.44	0.08
			-2.00			1" Ice	2.74	2.65	0.11
PCS 1900MHz 4x45W-65MHz	C	From Leg	1.00	0.0000	79.00	No Ice	2.32	2.24	0.06
			0.00			1/2" Ice	2.53	2.44	0.08
			-2.00			1" Ice	2.74	2.65	0.11
4' x 2" Pipe Mount	A	From Leg	1.00	0.0000	79.00	No Ice	0.79	0.79	0.03
			0.00			1/2" Ice	1.03	1.03	0.04
			0.00			1" Ice	1.28	1.28	0.04
4' x 2" Pipe Mount	B	From Leg	1.00	0.0000	79.00	No Ice	0.79	0.79	0.03
			0.00			1/2" Ice	1.03	1.03	0.04
			0.00			1" Ice	1.28	1.28	0.04
4' x 2" Pipe Mount	C	From Leg	1.00	0.0000	79.00	No Ice	0.79	0.79	0.03
			0.00			1/2" Ice	1.03	1.03	0.04
			0.00			1" Ice	1.28	1.28	0.04
Side Arm Mount [SO 104-3]	C	None		0.0000	79.00	No Ice	3.30	3.30	0.29
						1/2" Ice	4.13	4.13	0.32
						1" Ice	4.96	4.96	0.35
***									
ERICSSON AIR 21 B2A B4P w/ Mount Pipe	A	From Leg	4.00	0.0000	75.00	No Ice	6.33	5.64	0.11
			0.00			1/2" Ice	6.78	6.43	0.17
			0.00			1" Ice	7.21	7.13	0.23
ERICSSON AIR 21 B2A B4P w/ Mount Pipe	B	From Leg	4.00	0.0000	75.00	No Ice	6.33	5.64	0.11
			0.00			1/2" Ice	6.78	6.43	0.17
			0.00			1" Ice	7.21	7.13	0.23
ERICSSON AIR 21 B2A B4P w/ Mount Pipe	C	From Leg	4.00	0.0000	75.00	No Ice	6.33	5.64	0.11
			0.00			1/2" Ice	6.78	6.43	0.17
			0.00			1" Ice	7.21	7.13	0.23
ERICSSON AIR 21 B4A B2P w/ Mount Pipe	A	From Leg	4.00	0.0000	75.00	No Ice	6.33	5.64	0.11
			0.00			1/2" Ice	6.78	6.43	0.17
			0.00			1" Ice	7.21	7.13	0.23
ERICSSON AIR 21 B4A B2P w/ Mount Pipe	B	From Leg	4.00	0.0000	75.00	No Ice	6.33	5.64	0.11
			0.00			1/2" Ice	6.78	6.43	0.17
			0.00			1" Ice	7.21	7.13	0.23
ERICSSON AIR 21 B4A B2P w/ Mount Pipe	C	From Leg	4.00	0.0000	75.00	No Ice	6.33	5.64	0.11
			0.00			1/2" Ice	6.78	6.43	0.17

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
			0.00			1" Ice	7.21	7.13	0.23
KRY 112 144/1	A	From Leg	4.00	0.0000	75.00	No Ice	0.35	0.16	0.01
			0.00			1/2" Ice	0.43	0.22	0.01
			0.00			1" Ice	0.51	0.28	0.02
KRY 112 144/1	B	From Leg	4.00	0.0000	75.00	No Ice	0.35	0.16	0.01
			0.00			1/2" Ice	0.43	0.22	0.01
			0.00			1" Ice	0.51	0.28	0.02
KRY 112 144/1	C	From Leg	4.00	0.0000	75.00	No Ice	0.35	0.16	0.01
			0.00			1/2" Ice	0.43	0.22	0.01
			0.00			1" Ice	0.51	0.28	0.02
LNX-6515DS-A1M w/ Mount Pipe	A	From Leg	4.00	0.0000	75.00	No Ice	11.75	10.85	0.12
			0.00			1/2" Ice	12.46	12.32	0.22
			0.00			1" Ice	13.14	13.47	0.33
LNX-6515DS-A1M w/ Mount Pipe	B	From Leg	4.00	0.0000	75.00	No Ice	11.75	10.85	0.12
			0.00			1/2" Ice	12.46	12.32	0.22
			0.00			1" Ice	13.14	13.47	0.33
LNX-6515DS-A1M w/ Mount Pipe	C	From Leg	4.00	0.0000	75.00	No Ice	11.75	10.85	0.12
			0.00			1/2" Ice	12.46	12.32	0.22
			0.00			1" Ice	13.14	13.47	0.33
RRUS 11 B12	A	From Leg	4.00	0.0000	75.00	No Ice	2.83	1.18	0.05
			0.00			1/2" Ice	3.04	1.33	0.07
			0.00			1" Ice	3.26	1.48	0.10
RRUS 11 B12	B	From Leg	4.00	0.0000	75.00	No Ice	2.83	1.18	0.05
			0.00			1/2" Ice	3.04	1.33	0.07
			0.00			1" Ice	3.26	1.48	0.10
RRUS 11 B12	C	From Leg	4.00	0.0000	75.00	No Ice	2.83	1.18	0.05
			0.00			1/2" Ice	3.04	1.33	0.07
			0.00			1" Ice	3.26	1.48	0.10
Platform Mount [LP 303-1]	C	None		0.0000	75.00	No Ice	14.66	14.66	1.25
						1/2" Ice	18.87	18.87	1.48
						1" Ice	23.08	23.08	1.71
***									
GPS_A	B	From Leg	3.00	0.0000	57.00	No Ice	0.26	0.26	0.00
			0.00			1/2" Ice	0.32	0.32	0.00
			1.00			1" Ice	0.39	0.39	0.01
4.5' x 2" horizontal mount pipe	B	From Leg	0.00	0.0000	57.00	No Ice	0.90	0.90	0.03
			0.00			1/2" Ice	1.21	1.21	0.04
			0.00			1" Ice	1.49	1.49	0.05
******									

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
A-ANT-11G-4-C	A	Paraboloid w/Shroud (HP)	From Leg	4.00	0.0000		83.00	3.92	No Ice	14.08	0.12
				0.00					1/2" Ice	14.63	0.20
				3.00					1" Ice	15.19	0.27
VHLP2-180	B	Paraboloid w/o	From	4.00	0.0000		83.00	2.00	No Ice	3.14	0.03

Description	Face or Leg	Dish Type	Offset Type	Offsets: Horz Lateral / Vert (ft)	Azimuth Adjustment (°)	3 dB Beam Width (°)	Elevation (ft)	Outside Diameter (ft)		Aperture Area (ft^2)	Weight (K)
		Radome	Leg	0.00					1/2" Ice	3.41	0.04
				3.00					1" Ice	3.68	0.06
A-ANT-11G-4-C	C	Paraboloid w/Shroud (HP)	From Leg	4.00	0.0000		83.00	3.92	No Ice	14.08	0.12
				0.00					1/2" Ice	14.63	0.20
				3.00					1" Ice	15.19	0.27
***											

Load Combinations

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

Comb. No.	Description
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 - 85	Pole	Max Tension	40	0.00	-0.00	-0.00
			Max. Compression	26	-8.39	1.46	1.32
			Max. Mx	20	-2.89	28.29	0.32
			Max. My	2	-2.89	0.17	28.38
			Max. Vy	8	5.26	-27.54	0.70
			Max. Vx	14	5.36	0.66	-27.70
			Max. Torque	20			-1.69
L2	85 - 65	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	26	-33.36	2.05	2.74
			Max. Mx	8	-13.59	-277.65	8.07
			Max. My	14	-13.59	5.87	-279.77
			Max. Vy	8	16.09	-277.65	8.07
			Max. Vx	14	16.19	5.87	-279.77
			Max. Torque	20			-1.69
L3	65 - 32.5	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	26	-47.51	2.57	5.15
			Max. Mx	8	-22.04	-858.33	20.17
			Max. My	14	-22.04	14.34	-863.52
			Max. Vy	8	19.55	-858.33	20.17
			Max. Vx	14	19.65	14.34	-863.52
			Max. Torque	20			-1.69
L4	32.5 - 0	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	26	-63.23	3.31	7.40
			Max. Mx	8	-32.95	-1537.70	32.21
			Max. My	14	-32.95	22.81	-1545.99
			Max. Vy	8	22.16	-1537.70	32.21
			Max. Vx	14	22.27	22.81	-1545.99
			Max. Torque	20			-1.63

Maximum Reactions

Location	Condition	Gov. Load Comb.	Vertical K	Horizontal, X K	Horizontal, Z K
Pole	Max. Vert	26	63.23	-0.00	-0.00
	Max. H_x	21	24.72	22.05	-0.03
	Max. H_z	3	24.72	-0.24	22.19
	Max. M_x	2	1543.92	-0.24	22.19
	Max. M_z	8	1537.70	-22.15	0.35
	Max. Torsion	24	1.42	11.00	19.11
	Min. Vert	15	24.72	0.25	-22.26
	Min. H_x	9	24.72	-22.15	0.35
	Min. H_z	15	24.72	0.25	-22.26
	Min. M_x	14	-1545.99	0.25	-22.26

Location	Condition	Gov. Load Comb.	Vertical K	Horizontal, X K	Horizontal, Z K
	Min. M_z	20	-1531.08	22.05	-0.03
	Min. Torsion	20	-1.63	22.05	-0.03

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	27.47	-0.00	-0.00	-1.60	0.89	0.00
1.2 Dead+1.6 Wind 0 deg - No Ice	32.96	0.24	-22.19	-1543.92	-19.68	-0.89
0.9 Dead+1.6 Wind 0 deg - No Ice	24.72	0.24	-22.19	-1539.73	-19.90	-0.88
1.2 Dead+1.6 Wind 30 deg - No Ice	32.96	11.19	-19.26	-1341.37	-777.74	-0.98
0.9 Dead+1.6 Wind 30 deg - No Ice	24.72	11.19	-19.26	-1337.66	-776.14	-0.98
1.2 Dead+1.6 Wind 60 deg - No Ice	32.96	19.15	-11.35	-794.73	-1328.62	-1.31
0.9 Dead+1.6 Wind 60 deg - No Ice	24.72	19.15	-11.35	-792.33	-1325.70	-1.31
1.2 Dead+1.6 Wind 90 deg - No Ice	32.96	22.15	-0.35	-32.21	-1537.70	-1.41
0.9 Dead+1.6 Wind 90 deg - No Ice	24.72	22.15	-0.35	-31.64	-1534.28	-1.41
1.2 Dead+1.6 Wind 120 deg - No Ice	32.96	19.08	11.02	762.41	-1322.81	-0.12
0.9 Dead+1.6 Wind 120 deg - No Ice	24.72	19.08	11.02	761.06	-1319.90	-0.12
1.2 Dead+1.6 Wind 150 deg - No Ice	32.96	10.77	19.36	1345.83	-742.11	1.20
0.9 Dead+1.6 Wind 150 deg - No Ice	24.72	10.77	19.36	1343.07	-740.59	1.20
1.2 Dead+1.6 Wind 180 deg - No Ice	32.96	-0.25	22.26	1545.99	22.81	1.19
0.9 Dead+1.6 Wind 180 deg - No Ice	24.72	-0.25	22.26	1542.76	22.48	1.19
1.2 Dead+1.6 Wind 210 deg - No Ice	32.96	-11.09	19.32	1342.26	771.66	0.98
0.9 Dead+1.6 Wind 210 deg - No Ice	24.72	-11.09	19.32	1339.51	769.53	0.98
1.2 Dead+1.6 Wind 240 deg - No Ice	32.96	-19.10	11.30	787.04	1326.11	1.00
0.9 Dead+1.6 Wind 240 deg - No Ice	24.72	-19.10	11.30	785.63	1322.66	1.00
1.2 Dead+1.6 Wind 270 deg - No Ice	32.96	-22.05	0.03	0.33	1531.08	1.63
0.9 Dead+1.6 Wind 270 deg - No Ice	24.72	-22.05	0.03	0.81	1527.14	1.62
1.2 Dead+1.6 Wind 300 deg - No Ice	32.96	-19.08	-11.02	-766.23	1324.87	0.12
0.9 Dead+1.6 Wind 300 deg - No Ice	24.72	-19.08	-11.02	-763.90	1321.41	0.12
1.2 Dead+1.6 Wind 330 deg - No Ice	32.96	-11.00	-19.11	-1328.11	764.13	-1.42
0.9 Dead+1.6 Wind 330 deg - No Ice	24.72	-11.00	-19.11	-1324.43	762.02	-1.42

Load Combination	Vertical	$Shear_x$	$Shear_z$	Overturning Moment, M_x	Overturning Moment, M_z	Torque
	K	K	K	kip-ft	kip-ft	kip-ft
1.2 Dead+1.0 Ice+1.0 Temp	63.23	0.00	0.00	-7.40	3.31	-0.00
1.2 Dead+1.0 Wind 0 deg+1.0 Ice+1.0 Temp	63.23	0.04	-6.96	-481.33	-0.13	-0.15
1.2 Dead+1.0 Wind 30 deg+1.0 Ice+1.0 Temp	63.23	3.49	-6.03	-418.38	-234.90	-0.18
1.2 Dead+1.0 Wind 60 deg+1.0 Ice+1.0 Temp	63.23	6.17	-3.62	-255.73	-418.04	-0.25
1.2 Dead+1.0 Wind 90 deg+1.0 Ice+1.0 Temp	63.23	6.95	-0.07	-13.51	-469.69	-0.28
1.2 Dead+1.0 Wind 120 deg+1.0 Ice+1.0 Temp	63.23	6.00	3.46	228.03	-404.65	-0.05
1.2 Dead+1.0 Wind 150 deg+1.0 Ice+1.0 Temp	63.23	3.41	6.05	405.12	-227.99	0.20
1.2 Dead+1.0 Wind 180 deg+1.0 Ice+1.0 Temp	63.23	-0.05	6.97	467.21	7.60	0.20
1.2 Dead+1.0 Wind 210 deg+1.0 Ice+1.0 Temp	63.23	-3.47	6.04	404.22	240.02	0.18
1.2 Dead+1.0 Wind 240 deg+1.0 Ice+1.0 Temp	63.23	-6.16	3.61	239.52	424.30	0.20
1.2 Dead+1.0 Wind 270 deg+1.0 Ice+1.0 Temp	63.23	-6.93	0.00	-7.47	474.92	0.34
1.2 Dead+1.0 Wind 300 deg+1.0 Ice+1.0 Temp	63.23	-6.00	-3.46	-243.23	411.59	0.05
1.2 Dead+1.0 Wind 330 deg+1.0 Ice+1.0 Temp	63.23	-3.46	-6.00	-415.96	239.08	-0.25
Dead+Wind 0 deg - Service	27.47	0.05	-4.75	-330.93	-3.53	-0.19
Dead+Wind 30 deg - Service	27.47	2.39	-4.12	-287.67	-165.43	-0.21
Dead+Wind 60 deg - Service	27.47	4.10	-2.43	-170.93	-283.08	-0.28
Dead+Wind 90 deg - Service	27.47	4.74	-0.07	-8.08	-327.73	-0.30
Dead+Wind 120 deg - Service	27.47	4.08	2.36	161.62	-281.84	-0.03
Dead+Wind 150 deg - Service	27.47	2.30	4.14	286.22	-157.82	0.26
Dead+Wind 180 deg - Service	27.47	-0.05	4.76	328.97	5.54	0.25
Dead+Wind 210 deg - Service	27.47	-2.37	4.13	285.46	165.47	0.21
Dead+Wind 240 deg - Service	27.47	-4.09	2.42	166.89	283.88	0.21
Dead+Wind 270 deg - Service	27.47	-4.72	0.01	-1.13	327.73	0.35
Dead+Wind 300 deg - Service	27.47	-4.08	-2.36	-164.84	283.61	0.03
Dead+Wind 330 deg - Service	27.47	-2.35	-4.09	-284.84	163.86	-0.30

Solution Summary

	Sum of Applied Forces			Sum of Reactions			
Load Comb.	PX	PY	PZ	PX	PY	PZ	% Error
	K	K	K	K	K	K	
1	0.00	-27.47	0.00	0.00	27.47	0.00	0.000%
2	0.24	-32.96	-22.19	-0.24	32.96	22.19	0.001%
3	0.24	-24.72	-22.19	-0.24	24.72	22.19	0.001%
4	11.19	-32.96	-19.26	-11.19	32.96	19.26	0.000%
5	11.19	-24.72	-19.26	-11.19	24.72	19.26	0.000%
6	19.15	-32.96	-11.35	-19.15	32.96	11.35	0.000%
7	19.15	-24.72	-11.35	-19.15	24.72	11.35	0.000%
8	22.15	-32.96	-0.35	-22.15	32.96	0.35	0.001%
9	22.15	-24.72	-0.35	-22.15	24.72	0.35	0.001%
10	19.08	-32.96	11.02	-19.08	32.96	-11.02	0.000%
11	19.08	-24.72	11.02	-19.08	24.72	-11.02	0.000%
12	10.77	-32.96	19.36	-10.77	32.96	-19.36	0.000%
13	10.77	-24.72	19.36	-10.77	24.72	-19.36	0.001%
14	-0.25	-32.96	22.26	0.25	32.96	-22.26	0.001%
15	-0.25	-24.72	22.26	0.25	24.72	-22.26	0.001%

Load Comb.	Sum of Applied Forces PX K	PY K	PZ K	Sum of Reactions PX K	PY K	PZ K	% Error
16	-11.09	-32.96	19.32	11.09	32.96	-19.32	0.000%
17	-11.09	-24.72	19.32	11.09	24.72	-19.32	0.000%
18	-19.10	-32.96	11.30	19.10	32.96	-11.30	0.000%
19	-19.10	-24.72	11.30	19.10	24.72	-11.30	0.000%
20	-22.05	-32.96	0.03	22.05	32.96	-0.03	0.001%
21	-22.05	-24.72	0.03	22.05	24.72	-0.03	0.001%
22	-19.08	-32.96	-11.02	19.08	32.96	11.02	0.000%
23	-19.08	-24.72	-11.02	19.08	24.72	11.02	0.000%
24	-11.00	-32.96	-19.11	11.00	32.96	19.11	0.000%
25	-11.00	-24.72	-19.11	11.00	24.72	19.11	0.000%
26	0.00	-63.23	0.00	-0.00	63.23	-0.00	0.000%
27	0.04	-63.23	-6.96	-0.04	63.23	6.96	0.000%
28	3.49	-63.23	-6.03	-3.49	63.23	6.03	0.000%
29	6.17	-63.23	-3.62	-6.17	63.23	3.62	0.000%
30	6.95	-63.23	-0.07	-6.95	63.23	0.07	0.000%
31	6.00	-63.23	3.46	-6.00	63.23	-3.46	0.000%
32	3.41	-63.23	6.05	-3.41	63.23	-6.05	0.000%
33	-0.05	-63.23	6.97	0.05	63.23	-6.97	0.000%
34	-3.47	-63.23	6.04	3.47	63.23	-6.04	0.000%
35	-6.16	-63.23	3.61	6.16	63.23	-3.61	0.000%
36	-6.93	-63.23	0.00	6.93	63.23	-0.00	0.000%
37	-6.00	-63.23	-3.46	6.00	63.23	3.46	0.000%
38	-3.46	-63.23	-6.00	3.46	63.23	6.00	0.000%
39	0.05	-27.47	-4.75	-0.05	27.47	4.75	0.005%
40	2.39	-27.47	-4.12	-2.39	27.47	4.12	0.005%
41	4.10	-27.47	-2.43	-4.10	27.47	2.43	0.005%
42	4.74	-27.47	-0.07	-4.74	27.47	0.07	0.004%
43	4.08	-27.47	2.36	-4.08	27.47	-2.36	0.004%
44	2.31	-27.47	4.14	-2.30	27.47	-4.14	0.004%
45	-0.05	-27.47	4.76	0.05	27.47	-4.76	0.004%
46	-2.37	-27.47	4.13	2.37	27.47	-4.13	0.005%
47	-4.09	-27.47	2.42	4.09	27.47	-2.42	0.005%
48	-4.72	-27.47	0.01	4.72	27.47	-0.01	0.001%
49	-4.08	-27.47	-2.36	4.08	27.47	2.36	0.004%
50	-2.35	-27.47	-4.09	2.35	27.47	4.09	0.004%

Non-Linear Convergence Results

Load Combination	Converged?	Number of Cycles	Displacement Tolerance	Force Tolerance
1	Yes	6	0.00000001	0.00000001
2	Yes	9	0.00000001	0.00005494
3	Yes	9	0.00000001	0.00004789
4	Yes	10	0.00000001	0.00004640
5	Yes	10	0.00000001	0.00003825
6	Yes	10	0.00000001	0.00006382
7	Yes	10	0.00000001	0.00005309
8	Yes	9	0.00000001	0.00009732
9	Yes	9	0.00000001	0.00008343
10	Yes	10	0.00000001	0.00004859
11	Yes	10	0.00000001	0.00004030
12	Yes	10	0.00000001	0.00004239
13	Yes	9	0.00000001	0.00014084
14	Yes	9	0.00000001	0.00008368
15	Yes	9	0.00000001	0.00007192
16	Yes	10	0.00000001	0.00006016

17	Yes	10	0.00000001	0.00005001
18	Yes	10	0.00000001	0.00004649
19	Yes	10	0.00000001	0.00003838
20	Yes	9	0.00000001	0.00009879
21	Yes	9	0.00000001	0.00008476
22	Yes	10	0.00000001	0.00005086
23	Yes	10	0.00000001	0.00004210
24	Yes	10	0.00000001	0.00006286
25	Yes	10	0.00000001	0.00005237
26	Yes	6	0.00000001	0.00001015
27	Yes	10	0.00000001	0.00008553
28	Yes	10	0.00000001	0.00008707
29	Yes	10	0.00000001	0.00008907
30	Yes	10	0.00000001	0.00008300
31	Yes	10	0.00000001	0.00008360
32	Yes	10	0.00000001	0.00008368
33	Yes	10	0.00000001	0.00008248
34	Yes	10	0.00000001	0.00008512
35	Yes	10	0.00000001	0.00008835
36	Yes	10	0.00000001	0.00008434
37	Yes	10	0.00000001	0.00008706
38	Yes	10	0.00000001	0.00008739
39	Yes	7	0.00000001	0.00014929
40	Yes	7	0.00000001	0.00014269
41	Yes	7	0.00000001	0.00014538
42	Yes	7	0.00000001	0.00014942
43	Yes	7	0.00000001	0.00013925
44	Yes	7	0.00000001	0.00014115
45	Yes	7	0.00000001	0.00014921
46	Yes	7	0.00000001	0.00014401
47	Yes	7	0.00000001	0.00014157
48	Yes	8	0.00000001	0.00004358
49	Yes	7	0.00000001	0.00014096
50	Yes	7	0.00000001	0.00014555

Maximum Tower Deflections - Service Wind

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
L1	96 - 85	2.769	40	0.2152	0.0013
L2	85 - 65	2.281	40	0.1989	0.0007
L3	65 - 32.5	1.470	40	0.1832	0.0005
L4	32.5 - 0	0.421	40	0.1130	0.0002

Critical Deflections and Radius of Curvature - Service Wind

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
92.00	(2) 860 10025	40	2.590	0.2087	0.0010	80803
86.00	A-ANT-11G-4-C	40	2.325	0.2001	0.0007	42794
83.00	840 10045 w/ Mount Pipe	40	2.196	0.1968	0.0006	39832
79.00	800MHz 2X50W RRH W/FILTER	40	2.028	0.1935	0.0006	44218
75.00	ERICSSON AIR 21 B2A B4P w/ Mount Pipe	40	1.864	0.1908	0.0005	51097

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
57.00	GPS_A	40	1.169	0.1724	0.0004	37486

Maximum Tower Deflections - Design Wind

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
L1	96 - 85	12.931	4	1.0036	0.0059
L2	85 - 65	10.656	4	0.9289	0.0033
L3	65 - 32.5	6.869	4	0.8559	0.0022
L4	32.5 - 0	1.967	4	0.5279	0.0009

Critical Deflections and Radius of Curvature - Design Wind

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
92.00	(2) 860 10025	4	12.094	0.9737	0.0048	17873
86.00	A-ANT-11G-4-C	4	10.858	0.9343	0.0035	9461
83.00	840 10045 w/ Mount Pipe	4	10.256	0.9193	0.0030	8788
79.00	800MHz 2X50W RRH W/FILTER	4	9.473	0.9039	0.0026	9705
75.00	ERICSSON AIR 21 B2A B4P w/ Mount Pipe	4	8.709	0.8915	0.0024	11144
57.00	GPS_A	4	5.461	0.8052	0.0020	8015

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 - 95	P12x.5	11.00	0.00	0.0	19.2423	-0.13	606.13	0.000 [1]
	95 - 94					19.2423	-0.17	606.13	0.000
	94 - 93					19.2423	-0.25	606.13	0.000
	93 - 92					19.2423	-0.34	606.13	0.001
	92 - 91					19.2423	-2.07	606.13	0.003
	91 - 90					19.2423	-2.16	606.13	0.004
	90 - 89					19.2423	-2.24	606.13	0.004
	89 - 88					19.2423	-2.33	606.13	0.004
	88 - 87					19.2423	-2.42	606.13	0.004
	87 - 86					19.2423	-2.50	606.13	0.004
	86 - 85					19.2423	-2.89	606.13	0.005
L2	85 - 84	P42x3/8	20.00	0.00	0.0	49.0383	-3.11	1668.87	0.002
	84 - 83					49.0383	-3.34	1668.87	0.002
	83 - 82					49.0383	-6.03	1668.87	0.004

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	A in^2	P_u K	ϕP_n K	Ratio $\frac{P_u}{\phi P_n}$
	82 - 81					49.0383	-6.25	1668.87	0.004
	81 - 80					49.0383	-6.47	1668.87	0.004
	80 - 79					49.0383	-6.70	1668.87	0.004
	79 - 78					49.0383	-7.79	1668.87	0.005
	78 - 77					49.0383	-8.01	1668.87	0.005
	77 - 76					49.0383	-8.24	1668.87	0.005
	76 - 75					49.0383	-8.46	1668.87	0.005
	75 - 74					49.0383	-11.57	1668.87	0.007
	74 - 73					49.0383	-11.79	1668.87	0.007
	73 - 72					49.0383	-12.01	1668.87	0.007
	72 - 71					49.0383	-12.24	1668.87	0.007
	71 - 70					49.0383	-12.46	1668.87	0.007
	70 - 69					49.0383	-12.69	1668.87	0.008
	69 - 68					49.0383	-12.91	1668.87	0.008
	68 - 67					49.0383	-13.14	1668.87	0.008
	67 - 66					49.0383	-13.36	1668.87	0.008
	66 - 65					49.0383	-13.59	1668.87	0.008
L3	65 - 63.375	P48x3/8	32.50	0.00	0.0	56.1069	-14.00	1847.49	0.008
	63.375 - 61.75					56.1069	-14.42	1847.49	0.008
	61.75 - 60.125					56.1069	-14.84	1847.49	0.008
	60.125 - 58.5					56.1069	-15.26	1847.49	0.008
	58.5 - 56.875					56.1069	-15.71	1847.49	0.009
	56.875 - 55.25					56.1069	-16.13	1847.49	0.009
	55.25 - 53.625					56.1069	-16.55	1847.49	0.009
	53.625 - 52					56.1069	-16.97	1847.49	0.009
	52 - 50.375					56.1069	-17.39	1847.49	0.009
	50.375 - 48.75					56.1069	-17.81	1847.49	0.010
	48.75 - 47.125					56.1069	-18.23	1847.49	0.010
	47.125 - 45.5					56.1069	-18.66	1847.49	0.010
	45.5 - 43.875					56.1069	-19.08	1847.49	0.010
	43.875 - 42.25					56.1069	-19.50	1847.49	0.011
	42.25 - 40.625					56.1069	-19.92	1847.49	0.011
	40.625 - 39					56.1069	-20.34	1847.49	0.011
	39 - 37.375					56.1069	-20.77	1847.49	0.011
	37.375 - 35.75					56.1069	-21.19	1847.49	0.011
	35.75 - 34.125					56.1069	-21.62	1847.49	0.012
	34.125 - 32.5					56.1069	-22.04	1847.49	0.012
L4	32.5 - 30.875	P48x1/2	32.50	0.00	0.0	74.6128	-22.58	2649.06	0.009
	30.875 - 29.25					74.6128	-23.13	2649.06	0.009
	29.25 - 27.625					74.6128	-23.67	2649.06	0.009
	27.625 - 26					74.6128	-24.21	2649.06	0.009
	26 - 24.375					74.6128	-24.76	2649.06	0.009
	24.375 - 22.75					74.6128	-25.30	2649.06	0.010
	22.75 - 21.125					74.6128	-25.84	2649.06	0.010
	21.125 - 19.5					74.6128	-26.39	2649.06	0.010
	19.5 - 17.875					74.6128	-26.93	2649.06	0.010
	17.875 - 16.25					74.6128	-27.48	2649.06	0.010
	16.25 - 14.625					74.6128	-28.02	2649.06	0.011
	14.625 - 13					74.6128	-28.57	2649.06	0.011
	13 - 11.375					74.6128	-29.12	2649.06	0.011
	11.375 - 9.75					74.6128	-29.66	2649.06	0.011
	9.75 - 8.125					74.6128	-30.21	2649.06	0.011
	8.125 - 6.5					74.6128	-30.76	2649.06	0.012
	6.5 - 4.875					74.6128	-31.31	2649.06	0.012
	4.875 - 3.25					74.6128	-31.86	2649.06	0.012
	3.25 - 1.625					74.6128	-32.40	2649.06	0.012
	1.625 - 0					74.6128	-32.95	2649.06	0.012

[1] $P_u / \phi P_n$ controls

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 - 95	P12x.5	0.01	197.07	0.000	0.00	197.07	0.000
	95 - 94		0.07	197.07	0.000	0.00	197.07	0.000
	94 - 93		0.15	197.07	0.001	0.00	197.07	0.000
	93 - 92		0.27	197.07	0.001	0.00	197.07	0.000
	92 - 91		4.05	197.07	0.021	0.00	197.07	0.000
	91 - 90		7.75	197.07	0.039	0.00	197.07	0.000
	90 - 89		11.48	197.07	0.058	0.00	197.07	0.000
	89 - 88		15.24	197.07	0.077	0.00	197.07	0.000
	88 - 87		19.03	197.07	0.097	0.00	197.07	0.000
	87 - 86		22.85	197.07	0.116	0.00	197.07	0.000
	86 - 85		28.40	197.07	0.144	0.00	197.07	0.000
L2	85 - 84	P42x3/8	33.74	1796.56	0.019	0.00	1796.56	0.000
	84 - 83		39.21	1796.56	0.022	0.00	1796.56	0.000
	83 - 82		48.73	1796.56	0.027	0.00	1796.56	0.000
	82 - 81		58.79	1796.56	0.033	0.00	1796.56	0.000
	81 - 80		68.95	1796.56	0.038	0.00	1796.56	0.000
	80 - 79		79.22	1796.56	0.044	0.00	1796.56	0.000
	79 - 78		90.06	1796.56	0.050	0.00	1796.56	0.000
	78 - 77		101.30	1796.56	0.056	0.00	1796.56	0.000
	77 - 76		112.64	1796.56	0.063	0.00	1796.56	0.000
	76 - 75		124.09	1796.56	0.069	0.00	1796.56	0.000
	75 - 74		139.33	1796.56	0.078	0.00	1796.56	0.000
	74 - 73		154.67	1796.56	0.086	0.00	1796.56	0.000
	73 - 72		170.12	1796.56	0.095	0.00	1796.56	0.000
	72 - 71		185.67	1796.56	0.103	0.00	1796.56	0.000
	71 - 70		201.32	1796.56	0.112	0.00	1796.56	0.000
	70 - 69		217.08	1796.56	0.121	0.00	1796.56	0.000
	69 - 68		232.94	1796.56	0.130	0.00	1796.56	0.000
	68 - 67		248.90	1796.56	0.139	0.00	1796.56	0.000
	67 - 66		264.97	1796.56	0.147	0.00	1796.56	0.000
	66 - 65		281.13	1796.56	0.156	0.00	1796.56	0.000
L3	65 - 63.375	P48x3/8	307.64	2321.11	0.133	0.00	2321.11	0.000
	63.375 - 61.75		334.45	2321.11	0.144	0.00	2321.11	0.000
	61.75 - 60.125		361.55	2321.11	0.156	0.00	2321.11	0.000
	60.125 - 58.5		388.94	2321.11	0.168	0.00	2321.11	0.000
	58.5 - 56.875		416.64	2321.11	0.180	0.00	2321.11	0.000
	56.875 - 55.25		444.69	2321.11	0.192	0.00	2321.11	0.000
	55.25 - 53.625		473.04	2321.11	0.204	0.00	2321.11	0.000
	53.625 - 52		501.66	2321.11	0.216	0.00	2321.11	0.000
	52 - 50.375		530.57	2321.11	0.229	0.00	2321.11	0.000
	50.375 - 48.75		559.75	2321.11	0.241	0.00	2321.11	0.000
	48.75 - 47.125		589.22	2321.11	0.254	0.00	2321.11	0.000
	47.125 - 45.5		618.96	2321.11	0.267	0.00	2321.11	0.000
	45.5 - 43.875		648.97	2321.11	0.280	0.00	2321.11	0.000
	43.875 - 42.25		679.25	2321.11	0.293	0.00	2321.11	0.000
	42.25 - 40.625		709.80	2321.11	0.306	0.00	2321.11	0.000
	40.625 - 39		740.62	2321.11	0.319	0.00	2321.11	0.000
	39 - 37.375		771.70	2321.11	0.332	0.00	2321.11	0.000
	37.375 - 35.75		803.04	2321.11	0.346	0.00	2321.11	0.000
	35.75 - 34.125		834.63	2321.11	0.360	0.00	2321.11	0.000
	34.125 - 32.5		866.48	2321.11	0.373	0.00	2321.11	0.000
L4	32.5 - 30.875	P48x1/2	898.58	3173.47	0.283	0.00	3173.47	0.000
	30.875 - 29.25		930.92	3173.47	0.293	0.00	3173.47	0.000
	29.25 - 27.625		963.50	3173.47	0.304	0.00	3173.47	0.000
	27.625 - 26		996.31	3173.47	0.314	0.00	3173.47	0.000

Section No.	Elevation ft	Size	M_{ux} kip-ft	ϕM_{nx} kip-ft	Ratio $\frac{M_{ux}}{\phi M_{nx}}$	M_{uy} kip-ft	ϕM_{ny} kip-ft	Ratio $\frac{M_{uy}}{\phi M_{ny}}$
	26 - 24.375		1029.35	3173.47	0.324	0.00	3173.47	0.000
	24.375 - 22.75		1062.62	3173.47	0.335	0.00	3173.47	0.000
	22.75 - 21.125		1096.11	3173.47	0.345	0.00	3173.47	0.000
	21.125 - 19.5		1129.83	3173.47	0.356	0.00	3173.47	0.000
	19.5 - 17.875		1163.75	3173.47	0.367	0.00	3173.47	0.000
	17.875 - 16.25		1197.90	3173.47	0.377	0.00	3173.47	0.000
	16.25 - 14.625		1232.26	3173.47	0.388	0.00	3173.47	0.000
	14.625 - 13		1266.83	3173.47	0.399	0.00	3173.47	0.000
	13 - 11.375		1301.61	3173.47	0.410	0.00	3173.47	0.000
	11.375 - 9.75		1336.58	3173.47	0.421	0.00	3173.47	0.000
	9.75 - 8.125		1371.77	3173.47	0.432	0.00	3173.47	0.000
	8.125 - 6.5		1407.14	3173.47	0.443	0.00	3173.47	0.000
	6.5 - 4.875		1442.71	3173.47	0.455	0.00	3173.47	0.000
	4.875 - 3.25		1478.47	3173.47	0.466	0.00	3173.47	0.000
	3.25 - 1.625		1514.41	3173.47	0.477	0.00	3173.47	0.000
	1.625 - 0		1550.53	3173.47	0.489	0.00	3173.47	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 - 95	P12x.5	0.01	303.07	0.000	0.00	297.74	0.000
	95 - 94		0.07	303.07	0.000	0.00	297.74	0.000
	94 - 93		0.10	303.07	0.000	0.00	297.74	0.000
	93 - 92		0.13	303.07	0.000	0.00	297.74	0.000
	92 - 91		3.68	303.07	0.012	0.00	297.74	0.000
	91 - 90		3.71	303.07	0.012	0.00	297.74	0.000
	90 - 89		3.74	303.07	0.012	0.00	297.74	0.000
	89 - 88		3.78	303.07	0.012	0.00	297.74	0.000
	88 - 87		3.81	303.07	0.013	0.00	297.74	0.000
	87 - 86		3.84	303.07	0.013	0.00	297.74	0.000
	86 - 85		5.16	303.07	0.017	1.48	297.74	0.005
L2	85 - 84	P42x3/8	5.40	834.44	0.006	1.00	2868.84	0.000
	84 - 83		5.51	834.44	0.007	1.00	2868.84	0.000
	83 - 82		10.00	834.44	0.012	1.11	2868.84	0.000
	82 - 81		10.10	834.44	0.012	1.11	2868.84	0.000
	81 - 80		10.21	834.44	0.012	1.11	2868.84	0.000
	80 - 79		10.31	834.44	0.012	1.11	2868.84	0.000
	79 - 78		11.18	834.44	0.013	1.11	2868.84	0.000
	78 - 77		11.28	834.44	0.014	1.11	2868.84	0.000
	77 - 76		11.39	834.44	0.014	1.11	2868.84	0.000
	76 - 75		11.49	834.44	0.014	1.11	2868.84	0.000
	75 - 74		15.28	834.44	0.018	1.11	2868.84	0.000
	74 - 73		15.39	834.44	0.018	1.11	2868.84	0.000
	73 - 72		15.49	834.44	0.019	1.11	2868.84	0.000
	72 - 71		15.59	834.44	0.019	1.11	2868.84	0.000
	71 - 70		15.70	834.44	0.019	1.11	2868.84	0.000
	70 - 69		15.80	834.44	0.019	1.11	2868.84	0.000
	69 - 68		15.90	834.44	0.019	1.11	2868.84	0.000
	68 - 67		16.00	834.44	0.019	1.11	2868.84	0.000
	67 - 66		16.11	834.44	0.019	1.11	2868.84	0.000
	66 - 65		16.21	834.44	0.019	1.11	2868.84	0.000
L3	65 - 63.375	P48x3/8	16.39	923.75	0.018	1.11	3637.70	0.000
	63.375 - 61.75		16.58	923.75	0.018	1.11	3637.70	0.000
	61.75 - 60.125		16.76	923.75	0.018	1.11	3637.70	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 $\frac{T_u}{\phi T_n}$
	60.125 - 58.5		16.94	923.75	0.018	1.11	3637.70	0.000
	58.5 - 56.875		17.16	923.75	0.019	1.11	3637.70	0.000
	56.875 - 55.25		17.34	923.75	0.019	0.98	3637.70	0.000
	55.25 - 53.625		17.52	923.75	0.019	0.98	3637.70	0.000
	53.625 - 52		17.69	923.75	0.019	0.98	3637.70	0.000
	52 - 50.375		17.86	923.75	0.019	0.98	3637.70	0.000
	50.375 - 48.75		18.04	923.75	0.020	0.98	3637.70	0.000
	48.75 - 47.125		18.21	923.75	0.020	0.98	3637.70	0.000
	47.125 - 45.5		18.38	923.75	0.020	0.98	3637.70	0.000
	45.5 - 43.875		18.54	923.75	0.020	0.98	3637.70	0.000
	43.875 - 42.25		18.71	923.75	0.020	0.98	3637.70	0.000
	42.25 - 40.625		18.87	923.75	0.020	0.98	3637.70	0.000
	40.625 - 39		19.04	923.75	0.021	0.98	3637.70	0.000
	39 - 37.375		19.20	923.75	0.021	0.98	3637.70	0.000
	37.375 - 35.75		19.36	923.75	0.021	0.98	3637.70	0.000
	35.75 - 34.125		19.52	923.75	0.021	0.98	3637.70	0.000
	34.125 - 32.5		19.67	923.75	0.021	0.98	3637.70	0.000
L4	32.5 - 30.875	P48x1/2	19.82	1324.53	0.015	0.98	5188.89	0.000
	30.875 - 29.25		19.97	1324.53	0.015	0.98	5188.89	0.000
	29.25 - 27.625		20.11	1324.53	0.015	0.98	5188.89	0.000
	27.625 - 26		20.25	1324.53	0.015	0.98	5188.89	0.000
	26 - 24.375		20.39	1324.53	0.015	0.98	5188.89	0.000
	24.375 - 22.75		20.53	1324.53	0.016	0.98	5188.89	0.000
	22.75 - 21.125		20.67	1324.53	0.016	0.98	5188.89	0.000
	21.125 - 19.5		20.81	1324.53	0.016	0.98	5188.89	0.000
	19.5 - 17.875		20.94	1324.53	0.016	0.98	5188.89	0.000
	17.875 - 16.25		21.07	1324.53	0.016	0.98	5188.89	0.000
	16.25 - 14.625		21.20	1324.53	0.016	0.98	5188.89	0.000
	14.625 - 13		21.33	1324.53	0.016	0.98	5188.89	0.000
	13 - 11.375		21.46	1324.53	0.016	0.98	5188.89	0.000
	11.375 - 9.75		21.58	1324.53	0.016	0.98	5188.89	0.000
	9.75 - 8.125		21.70	1324.53	0.016	0.98	5188.89	0.000
	8.125 - 6.5		21.82	1324.53	0.016	0.98	5188.89	0.000
	6.5 - 4.875		21.94	1324.53	0.017	0.98	5188.89	0.000
	4.875 - 3.25		22.06	1324.53	0.017	0.98	5188.89	0.000
	3.25 - 1.625		22.17	1324.53	0.017	0.98	5188.89	0.000
	1.625 - 0		22.29	1324.53	0.017	0.98	5188.89	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 - 95	0.000	0.000	0.000	0.000	0.000	0.000 [1] ✔	1.000	4.8.2 ✔
	95 - 94	0.000	0.000	0.000	0.000	0.000	0.001 ✔	1.000	4.8.2 ✔
	94 - 93	0.000	0.001	0.000	0.000	0.000	0.001 ✔	1.000	4.8.2 ✔
	93 - 92	0.001	0.001	0.000	0.000	0.000	0.002 ✔	1.000	4.8.2 ✔
	92 - 91	0.003	0.021	0.000	0.012	0.000	0.024 ✔	1.000	4.8.2 ✔

Section No.	Elevation ft	Ratio $P_u/\phi P_n$	Ratio $M_{ux}/\phi M_{nx}$	Ratio $M_{uy}/\phi M_{ny}$	Ratio $V_u/\phi V_n$	Ratio $T_u/\phi T_n$	Comb. Stress Ratio	Allow. Stress Ratio	Criteria
	91 - 90	0.004	0.039	0.000	0.012	0.000	0.043 ✔	1.000	4.8.2 ✔
	90 - 89	0.004	0.058	0.000	0.012	0.000	0.062 ✔	1.000	4.8.2 ✔
	89 - 88	0.004	0.077	0.000	0.012	0.000	0.081 ✔	1.000	4.8.2 ✔
	88 - 87	0.004	0.097	0.000	0.013	0.000	0.101 ✔	1.000	4.8.2 ✔
	87 - 86	0.004	0.116	0.000	0.013	0.000	0.120 ✔	1.000	4.8.2 ✔
	86 - 85	0.005	0.144	0.000	0.017	0.005	0.149 ✔	1.000	4.8.2 ✔
L2	85 - 84	0.002	0.019	0.000	0.006	0.000	0.021 ✔	1.000	4.8.2 ✔
	84 - 83	0.002	0.022	0.000	0.007	0.000	0.024 ✔	1.000	4.8.2 ✔
	83 - 82	0.004	0.027	0.000	0.012	0.000	0.031 ✔	1.000	4.8.2 ✔
	82 - 81	0.004	0.033	0.000	0.012	0.000	0.037 ✔	1.000	4.8.2 ✔
	81 - 80	0.004	0.038	0.000	0.012	0.000	0.042 ✔	1.000	4.8.2 ✔
	80 - 79	0.004	0.044	0.000	0.012	0.000	0.048 ✔	1.000	4.8.2 ✔
	79 - 78	0.005	0.050	0.000	0.013	0.000	0.055 ✔	1.000	4.8.2 ✔
	78 - 77	0.005	0.056	0.000	0.014	0.000	0.061 ✔	1.000	4.8.2 ✔
	77 - 76	0.005	0.063	0.000	0.014	0.000	0.068 ✔	1.000	4.8.2 ✔
	76 - 75	0.005	0.069	0.000	0.014	0.000	0.074 ✔	1.000	4.8.2 ✔
	75 - 74	0.007	0.078	0.000	0.018	0.000	0.085 ✔	1.000	4.8.2 ✔
	74 - 73	0.007	0.086	0.000	0.018	0.000	0.094 ✔	1.000	4.8.2 ✔
	73 - 72	0.007	0.095	0.000	0.019	0.000	0.102 ✔	1.000	4.8.2 ✔
	72 - 71	0.007	0.103	0.000	0.019	0.000	0.111 ✔	1.000	4.8.2 ✔
	71 - 70	0.007	0.112	0.000	0.019	0.000	0.120 ✔	1.000	4.8.2 ✔
	70 - 69	0.008	0.121	0.000	0.019	0.000	0.129 ✔	1.000	4.8.2 ✔
	69 - 68	0.008	0.130	0.000	0.019	0.000	0.138 ✔	1.000	4.8.2 ✔
	68 - 67	0.008	0.139	0.000	0.019	0.000	0.147 ✔	1.000	4.8.2 ✔
	67 - 66	0.008	0.147	0.000	0.019	0.000	0.156 ✔	1.000	4.8.2 ✔
	66 - 65	0.008	0.156	0.000	0.019	0.000	0.165 ✔	1.000	4.8.2 ✔

Section No.	Elevation ft	Ratio $P_u/\phi P_n$	Ratio $M_{ux}/\phi M_{nx}$	Ratio $M_{uy}/\phi M_{ny}$	Ratio $V_u/\phi V_n$	Ratio $T_u/\phi T_n$	Comb. Stress Ratio	Allow. Stress Ratio	Criteria
L3	65 - 63.375	0.008	0.133	0.000	0.018	0.000	0.140 ✔	1.000	4.8.2 ✔
	63.375 - 61.75	0.008	0.144	0.000	0.018	0.000	0.152 ✔	1.000	4.8.2 ✔
	61.75 - 60.125	0.008	0.156	0.000	0.018	0.000	0.164 ✔	1.000	4.8.2 ✔
	60.125 - 58.5	0.008	0.168	0.000	0.018	0.000	0.176 ✔	1.000	4.8.2 ✔
	58.5 - 56.875	0.009	0.180	0.000	0.019	0.000	0.188 ✔	1.000	4.8.2 ✔
	56.875 - 55.25	0.009	0.192	0.000	0.019	0.000	0.201 ✔	1.000	4.8.2 ✔
	55.25 - 53.625	0.009	0.204	0.000	0.019	0.000	0.213 ✔	1.000	4.8.2 ✔
	53.625 - 52	0.009	0.216	0.000	0.019	0.000	0.226 ✔	1.000	4.8.2 ✔
	52 - 50.375	0.009	0.229	0.000	0.019	0.000	0.238 ✔	1.000	4.8.2 ✔
	50.375 - 48.75	0.010	0.241	0.000	0.020	0.000	0.251 ✔	1.000	4.8.2 ✔
	48.75 - 47.125	0.010	0.254	0.000	0.020	0.000	0.264 ✔	1.000	4.8.2 ✔
	47.125 - 45.5	0.010	0.267	0.000	0.020	0.000	0.277 ✔	1.000	4.8.2 ✔
	45.5 - 43.875	0.010	0.280	0.000	0.020	0.000	0.290 ✔	1.000	4.8.2 ✔
	43.875 - 42.25	0.011	0.293	0.000	0.020	0.000	0.304 ✔	1.000	4.8.2 ✔
	42.25 - 40.625	0.011	0.306	0.000	0.020	0.000	0.317 ✔	1.000	4.8.2 ✔
	40.625 - 39	0.011	0.319	0.000	0.021	0.000	0.331 ✔	1.000	4.8.2 ✔
	39 - 37.375	0.011	0.332	0.000	0.021	0.000	0.344 ✔	1.000	4.8.2 ✔
	37.375 - 35.75	0.011	0.346	0.000	0.021	0.000	0.358 ✔	1.000	4.8.2 ✔
	35.75 - 34.125	0.012	0.360	0.000	0.021	0.000	0.372 ✔	1.000	4.8.2 ✔
	34.125 - 32.5	0.012	0.373	0.000	0.021	0.000	0.386 ✔	1.000	4.8.2 ✔
L4	32.5 - 30.875	0.009	0.283	0.000	0.015	0.000	0.292 ✔	1.000	4.8.2 ✔
	30.875 - 29.25	0.009	0.293	0.000	0.015	0.000	0.302 ✔	1.000	4.8.2 ✔
	29.25 - 27.625	0.009	0.304	0.000	0.015	0.000	0.313 ✔	1.000	4.8.2 ✔
	27.625 - 26	0.009	0.314	0.000	0.015	0.000	0.323 ✔	1.000	4.8.2 ✔
	26 - 24.375	0.009	0.324	0.000	0.015	0.000	0.334 ✔	1.000	4.8.2 ✔
	24.375 - 22.75	0.010	0.335	0.000	0.016	0.000	0.345 ✔	1.000	4.8.2 ✔

Section No.	Elevation ft	Ratio P_u / ϕP_n	Ratio M_{ux} / ϕM_{nx}	Ratio M_{uy} / ϕM_{ny}	Ratio V_u / ϕV_n	Ratio T_u / ϕT_n	Comb. Stress Ratio	Allow. Stress Ratio	Criteria
	22.75 - 21.125	0.010	0.345	0.000	0.016	0.000	0.355 ✔	1.000	4.8.2 ✔
	21.125 - 19.5	0.010	0.356	0.000	0.016	0.000	0.366 ✔	1.000	4.8.2 ✔
	19.5 - 17.875	0.010	0.367	0.000	0.016	0.000	0.377 ✔	1.000	4.8.2 ✔
	17.875 - 16.25	0.010	0.377	0.000	0.016	0.000	0.388 ✔	1.000	4.8.2 ✔
	16.25 - 14.625	0.011	0.388	0.000	0.016	0.000	0.399 ✔	1.000	4.8.2 ✔
	14.625 - 13	0.011	0.399	0.000	0.016	0.000	0.410 ✔	1.000	4.8.2 ✔
	13 - 11.375	0.011	0.410	0.000	0.016	0.000	0.421 ✔	1.000	4.8.2 ✔
	11.375 - 9.75	0.011	0.421	0.000	0.016	0.000	0.433 ✔	1.000	4.8.2 ✔
	9.75 - 8.125	0.011	0.432	0.000	0.016	0.000	0.444 ✔	1.000	4.8.2 ✔
	8.125 - 6.5	0.012	0.443	0.000	0.016	0.000	0.455 ✔	1.000	4.8.2 ✔
	6.5 - 4.875	0.012	0.455	0.000	0.017	0.000	0.467 ✔	1.000	4.8.2 ✔
	4.875 - 3.25	0.012	0.466	0.000	0.017	0.000	0.478 ✔	1.000	4.8.2 ✔
	3.25 - 1.625	0.012	0.477	0.000	0.017	0.000	0.490 ✔	1.000	4.8.2 ✔
	1.625 - 0	0.012	0.489	0.000	0.017	0.000	0.501 ✔	1.000	4.8.2 ✔

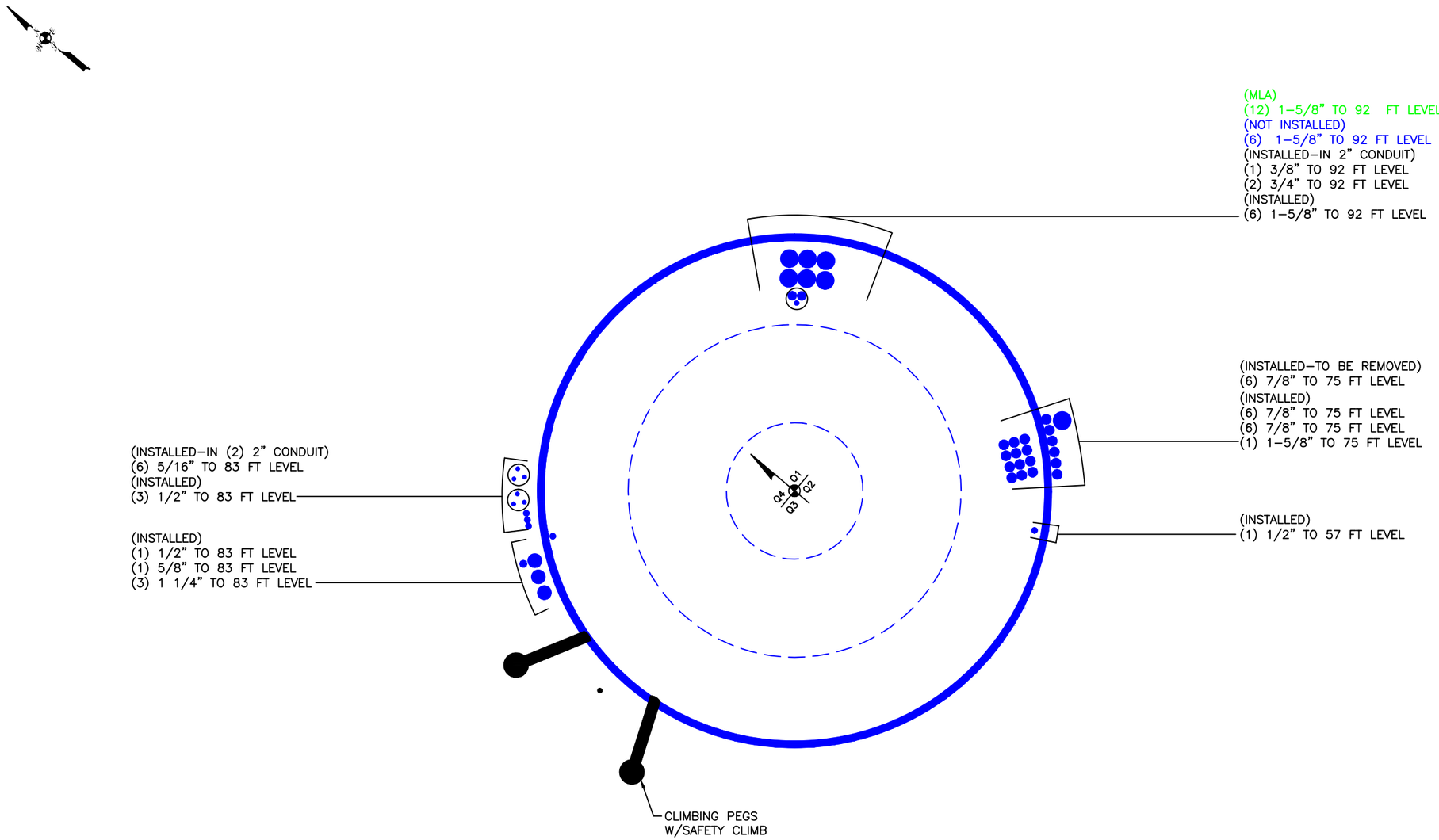
[1] P_u / ϕP_n controls

Section Capacity Table

Section No.	Elevation ft	Component Type	Size	Critical Element	P K	ϕP_{allow} K	% Capacity	Pass Fail
L1	96 - 85	Pole	P12x.5	1	-2.89	606.13	14.9	Pass
L2	85 - 65	Pole	P42x3/8	2	-13.59	1668.87	16.5	Pass
L3	65 - 32.5	Pole	P48x3/8	3	-22.04	1847.49	38.6	Pass
L4	32.5 - 0	Pole	P48x1/2	4	-32.95	2649.06	50.1	Pass
							Summary	
						Pole (L4)	50.1	Pass
						RATING =	**50.1**	**Pass**

APPENDIX B

BASE LEVEL DRAWING



BUSINESS UNIT: 876326 TOWER ID: C_BASELEVEL

APPENDIX C

ADDITIONAL CALCULATIONS

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

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

Site Data

BU#:	*876326*
Site Name:	*Hayden Station*
App #:	*16PYKX1400*
Pole Manufacturer:	*Rohn*

Reactions		
Mu:	1551	ft-kips
Axial, Pu:	33	kips
Shear, Vu:	22	kips
Eta Factor, η	0.5	TIA G (Fig. 4-4)

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

Anchor Rod Data		
Qty:	20	
Diam:	1.5	in
Rod Material:	Other	
Strength (Fu):	109	ksi
Yield (Fy):	125	ksi
Bolt Circle:	53.5	in

Anchor Rod Results

Max Rod (Cu+ Vu/ń):	73.4	Kips
Allowable Axial, Φ*Fu*Anet:	123.0	Kips
Anchor Rod Stress Ratio:	59.7%	**Pass**

Rigid
AISC LRFD
φ*Tn

Plate Data		
Diam:	59	in
Thick:	2	in
Grade:	36	ksi
Single-Rod B-eff:	7.54	in

Base Plate Results Flexural Check

Base Plate Stress:	Rohn/Pirod,	OK
Allowable Plate Stress:	32.4	ksi
Base Plate Stress Ratio:	Rohn/Pirod,	OK

Rigid
AISC LRFD
φ*Fy
Y.L. Length: 23.63

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

n/a

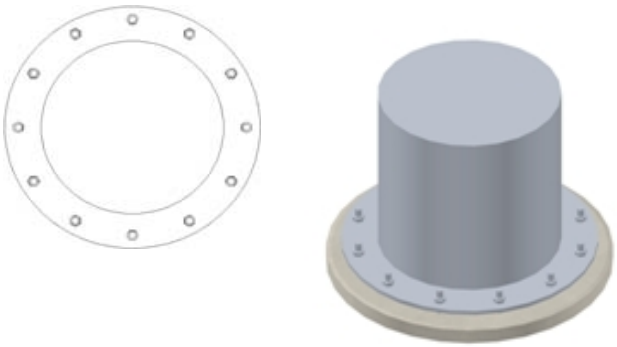
Stiffener Results N/A for Rohn / Pirod

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

Pole Results

Pole Punching Shear Check: N/A

Pole Data		
Diam:	48	in
Thick:	0.5	in
Grade:	42	ksi
# of Sides:	0	"0" IF Round
Fu	63	ksi
Reinf. Fillet Weld	0	"0" if None



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

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

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

Site Data

BU#: *876326*
Site Name: *Hayden Station*
App #: *16PYKX1400*

Reactions		
Mu	866.49	ft-kips
Axial, Pu:	22.04	kips
Shear, Vu:	19.67	kips
Elevation:	32.5	feet

Bolt Threads:
X-Excluded
φVn=φ(0.55*Ab*Fu)
φ=0.75, φ*Vn (kips):
76.54

Pole Manufacturer:	Rohn

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

Bolt Data				
Qty:	20			
Diameter (in.):	1.5	Bolt Fu:	105	
Bolt Material:	A325	Bolt Fy:	81	
N/A:	100	<-- Disregard		
N/A:	75	<-- Disregard		
Circle (in.):	53.5			

Plate Data		
Diam:	59	in
Thick, t:	2	in
Grade (Fy):	36	ksi
Strength, Fu:	58	ksi
Single-Rod B-eff:	7.54	in

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

Pole Data		
Diam:	48	in
Thick:	0.375	in
Grade:	42	ksi
# of Sides:	0	"0" IF Round
Fu	63	ksi
Reinf. Fillet Weld	0	"0" if None

Flange Bolt Results

Bolt Tension Capacity, φ*Tn,**B1**:	111.04	kips	Rigid: φ*Tn
Adjusted φ*Tn (due to Vu=Vu/Qty), **B**:	111.03	kips	φTn[(1-(Vu/φVn)^2]^0.5
Max Bolt directly applied Tu:	37.77	Kips	
Min. PL "tc" for **B** cap. **w/o** Pry:	1.502	in	
Min PL "treq" for actual **T w/ Pry**:	0.654	in	
Min PL "t1" for actual **T w/o Pry**:	0.876	in	
T allowable w/o Prying:	111.04	kips	α'<0 case
Prying Force, q:	0.00	kips	
Total Bolt Tension=Tu+q:	37.77	kips	
Non-Prying Bolt Stress Ratio, Tu/B:	34.0%	**Pass**	

Exterior Flange Plate Results Flexural Check — Rigid: TIA G

Compression Side Plate Stress:	Rohn/Piroc OK	φ*Fy
Allowable Plate Stress:	32.4 ksi	Comp. Y.L. Length: 23.63
Compression Plate Stress Ratio:	Rohn/Piroc OK	

No Prying

Tension Side Stress Ratio, (treq/t)^2: Rohn/Pirod OK

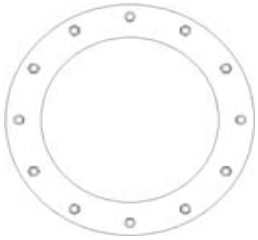
n/a

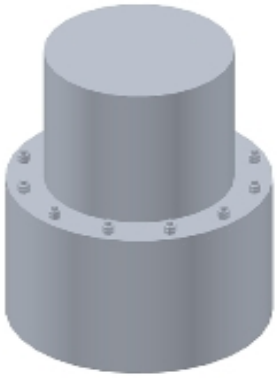
Stiffener Results N/A for Rohn / Pirod

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





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

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

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

Site Data

BU#: *876326*
Site Name: *Hayden Station*
App #: *16PYKX1400*

Reactions		
Mu	281.13	ft-kips
Axial, Pu:	13.59	kips
Shear, Vu:	16.21	kips
Elevation:	65	feet

Bolt Threads:
X-Excluded
φVn=φ(0.55*Ab*Fu)
φ=0.75, φ*Vn (kips):
76.54

Pole Manufacturer:	Rohn

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

Bolt Data			
Qty:	20		
Diameter (in.):	1.5	Bolt Fu:	105
Bolt Material:	A325	Bolt Fy:	81
N/A:	100	<-- Disregard	
N/A:	75	<-- Disregard	
Circle (in.):	53.5		

Plate Data		
Diam:	59	in
Thick, t:	2	in
Grade (Fy):	36	ksi
Strength, Fu:	58	ksi
Single-Rod B-eff:	6.60	in

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

Pole Data		
Diam:	42	in
Thick:	0.375	in
Grade:	42	ksi
# of Sides:	0	"0" IF Round
Fu	63	ksi
Reinf. Fillet Weld	0	"0" if None

Flange Bolt Results

			Rigid
Bolt Tension Capacity, φ*Tn,**B1**:	111.04	kips	φ*Tn
Adjusted φ*Tn (due to Vu=Vu/Qty), **B**:	111.03	kips	φTn[(1-(Vu/φVn)^2]^0.5
Max Bolt directly applied Tu:	11.93	Kips	
Min. PL "tc" for **B** cap. **w/o** Pry:	2.538	in	
Min PL "treq" for actual **T w/ Pry**:	0.627	in	
Min PL "t1" for actual **T w/o Pry**:	0.832	in	
T allowable with Prying:	86.27	kips	0≤α'≤1 case
Prying Force, q:	0.00	kips	
Total Bolt Tension=Tu+q:	11.93	kips	
Prying Bolt Stress Ratio=(Tu+q)/(B):	10.7%	**Pass**	

Exterior Flange Plate Results Flexural Check

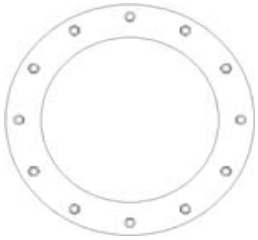
		Rigid
Compression Side Plate Stress:	Rohn/Piroc OK	TIA G
Allowable Plate Stress:	32.4 ksi	φ*Fy
Compression Plate Stress Ratio:	Rohn/Piroc OK	Comp. Y.L. Length: 33.14

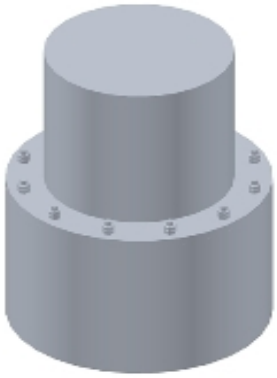
No Prying

Tension Side Stress Ratio, (treq/t)^2: Rohn/Pirod OK

n/a

Stiffener Results	N/A for Rohn / Pirod
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





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

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

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

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

Site Data

BU#:	*876326*
Site Name:	*Hayden Station*
App #:	*16PYKX1400*
Pole Manufacturer:	*Rohn*

Reactions		
Mu:	1551	ft-kips
Axial, Pu:	33	kips
Shear, Vu:	22	kips
Eta Factor, η	0.5	TIA G (Fig. 4-4)

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

Anchor Rod Data		
Qty:	20	
Diam:	1.5	in
Rod Material:	Other	
Strength (Fu):	109	ksi
Yield (Fy):	125	ksi
Bolt Circle:	53.5	in

Anchor Rod Results

Max Rod (Cu+ Vu/ń):	73.4	Kips
Allowable Axial, Φ*Fu*Anet:	123.0	Kips
Anchor Rod Stress Ratio:	59.7%	**Pass**

Rigid
AISC LRFD
φ*Tn

Plate Data		
Diam:	59	in
Thick:	2	in
Grade:	36	ksi
Single-Rod B-eff:	7.54	in

Base Plate Results Flexural Check

Base Plate Stress:	Rohn/Pirod,	OK
Allowable Plate Stress:	32.4	ksi
Base Plate Stress Ratio:	Rohn/Pirod,	OK

Rigid
AISC LRFD
φ*Fy
Y.L. Length: 23.63

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

n/a

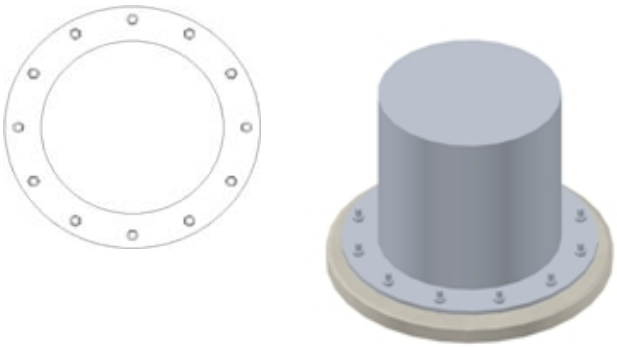
Stiffener Results N/A for Rohn / Pirod

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

Pole Results

Pole Punching Shear Check: N/A

Pole Data		
Diam:	48	in
Thick:	0.5	in
Grade:	42	ksi
# of Sides:	0	"0" IF Round
Fu	63	ksi
Reinf. Fillet Weld	0	"0" if None



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

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

Project Title: Hayden Station BU 876326

Calculation Method: Full 8CD

******* I N P U T D A T A

Pier Properties

Diameter (ft)	Distance of Top of Pier above Ground (ft)	Concrete Strength (ksi)	Steel Yield Strength (ksi)
7.00	0.50	3.00	60.00

Soil Properties

Layer	Type	Thickness (ft)	Depth at Top of Layer (ft)	Density (lbs/ft^3)	CU (psf)	KP	PHI (deg)
1	Clay	3.50	0.00	120.0	0.0		
2	Sand	27.50	3.50	120.0		3.250	31.97
3	Sand	16.00	31.00	58.0		3.250	31.97

Design (Factored) Loads at Top of Pier

Moment (ft-k)	Axial Load (kips)	Shear Load (kips)	Additional Safety Factor Against Soil Failure
1551.0	33.0	22.00	10.00

******* R E S U L T S

Calculated Pier Properties

Length (ft)	Weight (kips)	Pressure Due To Axial Load (psf)	Pressure Due To Weight (psf)	Total End-Bearing Pressure (psf)
30.500	176.067	857.5	4575.0	5432.5

Ultimate Resisting Forces Along Pier

Type	Distance of Top of Layer to Top of Pier (ft)	Thickness (ft)	Density (lbs/ft^3)	CU (psf)	KP	Force (kips)	Arm (ft)
Clay	0.50	3.50	120.0	0.0		0.00	2.25
Sand	4.00	18.48	120.0		3.250	1928.01	15.47
Sand	22.48	8.02	120.0		3.250	-1707.33	26.70

Shear and Moments Along Pier

Distance below Top of Pier (ft)	Shear (with Safety Factor) (kips)	Moment (with Safety Factor) (ft-k)	Shear (without Safety Factor) (kips)	Moment (without Safety Factor) (ft-k)
0.00	220.7	15746.1	22.1	1574.6
3.05	220.7	16419.2	22.1	1641.9
6.10	142.4	17016.4	14.2	1701.6
9.15	-35.6	17198.7	-3.6	1719.9
12.20	-289.7	16722.1	-29.0	1672.2
15.25	-620.1	15354.0	-62.0	1535.4
18.30	-1026.6	12862.2	-102.7	1286.2
21.35	-1509.3	9014.2	-150.9	901.4
24.40	-1346.4	4261.4	-134.6	426.1
27.45	-711.3	1104.1	-71.1	110.4
30.50	0.0	-0.0	0.0	-0.0

Moment Capacity of Drilled Concrete Shaft (Caisson) for TIA Rev F or G

Note: Shaft assumed to have ties, not spiral, transverse reinforcing

Site Data

BU#: *876326*
Site Name: *Hayden Station*
App #: *16PYKX1400*

Loads Already Factored		
For M (WL)	1.3	<----Disregard
For P (DL)	1.3	<----Disregard

Pier Properties

Concrete:

Pier Diameter =	7	ft
Concrete Area =	5541.8	in^2

Reinforcement:

Clear Cover to **Tie**=	3	in
Horiz. **Tie** Bar Size=	5	
Vert. Cage Diameter =	6.29	ft
Vert. Cage Diameter =	75.48	in
Vertical Bar Size =	10	
Bar Diameter =	1.27	in
Bar Area =	1.27	in^2
Number of Bars =	24	
As Total=	30.48	in^2
A s/ Aconc, Rho:	0.0055	0.55%

ACI 10.5 , ACI 21.10.4, and IBC 1810.
Min As for Flexural, Tension Controlled, Shafts:
(3)*(Sqrt(f'c)/Fy: 0.0027
200 / Fy: 0.0033

Minimum Rho Check:

Actual Req'd Min. Rho:	0.33%	Flexural
Provided Rho:	0.55%	**OK**

Ref. Shaft Max Axial Capacities, ϕ Max(Pn or Tn):		
Max Pu = (φ=0.65) Pn.		
Pn per ACI 318 (10-2)	8258.95	kips
at Mu=(ϕ=0.65)Mn=	5046.05	ft-kips
Max Tu, (φ=0.9) Tn =	1645.92	kips
at Mu=ϕ=(0.90)Mn=	0.00	ft-kips

Maximum Shaft Superimposed Forces

TIA Revision:	G	
Max. Factored Shaft Mu:	1719.9	ft-kips **(* Note)**
Max. Factored Shaft Pu:	33	kips
Max Axial Force Type:	Tension	

(*) Note: Max Shaft Superimposed Moment does not necessarily equal to the shaft top reaction moment

Load Factor	Shaft Factored Loads		
1.00	Mu:	1719.9	ft-kips
1.00	Pu:	33	kips

Material Properties

Concrete Comp. strength, f'c =	3000	psi
Reinforcement yield strength, Fy =	60	ksi
Reinforcing Modulus of Elasticity, E =	29000	ksi
Reinforcement yield strain =	0.00207	
Limiting compressive strain =	0.003	

ACI 318 Code

Select Analysis ACI Code= 2008

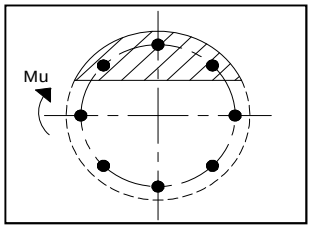
Seismic Properties

Seismic Design Category =	B
Seismic Risk =	**Low**

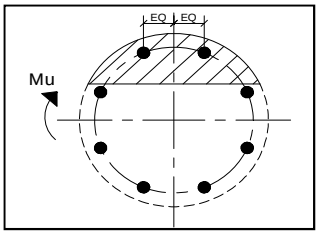
Solve (Run) <-- Press Upon Completing All Input

Results:

Governing Orientation Case: **2**



Case 1



Case 2

Dist. From Edge to Neutral Axis:	**12.67**	in
Extreme Steel Strain, εt:	**0.0158**	
	εt > 0.0050, Tension Controlled	
Reduction Factor,φ:	**0.900**	

Output Note: Negative Pu=Tension

For Axial Compression, φ Pn = Pu:	-33.00	kips
Drilled Shaft Moment Capacity, φMn:	**4701.34**	ft-kips
Drilled Shaft Superimposed Mu:	**1719.90**	ft-kips

(Mu/φMn, Drilled Shaft Flexure CSR:	**36.6%**

EBI Consulting
environmental | engineering | due diligence

RADIO FREQUENCY EMISSIONS ANALYSIS REPORT
EVALUATION OF HUMAN EXPOSURE POTENTIAL TO NON-IONIZING EMISSIONS

AT&T Existing Facility

Site ID: CT5140

Windsor Breakneck
440 Hayden Station Rd
Windsor, CT 06095

December 5, 2016

EBI Project Number: 6216005594

Site Compliance Summary	
Compliance Status:	COMPLIANT
Site total MPE% of FCC general public allowable limit:	7.76 %

21 B Street · Burlington, MA 01803 · Tel: (781) 273.2500 · Fax: (781) 273.3311

EBI Consulting
environmental | engineering | due diligence

December 5, 2016

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

Emissions Analysis for Site: **CT5140 – Windsor Breakneck**

EBI Consulting was directed to analyze the proposed AT&T facility located at **440 Hayden Station Rd, Windsor, 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 public 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 public 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.

Public 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 done for the proposed AT&T Wireless antenna facility located at **440 Hayden Station Rd, Windsor, 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.

For all calculations, all equipment was calculated using the following assumptions:

1) 2 UMTS channels (850 MHz) were considered for each sector of the proposed installation. These Channels have a transmit power of 30 Watts per Channel.

2) 2 UMTS channels (1900 MHz (PCS)) were considered for each sector of the proposed installation. These Channels have a transmit power of 30 Watts per Channel.

3) 2 LTE channels (700 MHz) were considered for each sector of the proposed installation. These Channels have a transmit power of 60 Watts per Channel.

4) 2 LTE channels (1900 MHz (PCS)) were considered for each sector of the proposed installation. These Channels have a transmit power of 60 Watts per Channel.

5) All radios at the proposed installation were considered to be running at full power and were uncombined in their RF transmissions paths per carrier prescribed configuration. 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. This is rarely the case, and if so, is never continuous.

6) For the following calculations the sample point was the top of a 6-foot person standing at the base of the tower. The maximum gain of the antenna per the antenna manufactures supplied specifications minus 10 dB was used in this direction. This value is a very conservative estimate as gain reductions for these particular antennas are typically much higher in this direction.

7) The antennas used in this modeling are the **Kathrein 800-10121 and the CCI HPA-65R-BUU-H8** for transmission in the 700 MHz, 850 MHz and 1900 MHz (PCS) 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.

8) The antenna mounting height centerlines of the proposed antennas are **94 feet** above ground level (AGL) for **Sector A**, **94 feet** above ground level (AGL) for **Sector B** and **94 feet** above ground level (AGL) for Sector C.

9) Emissions values for additional carriers were taken from the Connecticut Siting Council active database. Values in this database are provided by the individual carriers themselves.

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

AT&T Site Inventory and Power Data by Antenna

Sector:	A	Sector:	B	Sector:	C
Antenna #:	**1**	Antenna #:	**1**	Antenna #:	**1**
Make / Model:	Kathrein 800-10121	Make / Model:	Kathrein 800-10121	Make / Model:	Kathrein 800-10121
Gain:	11.45 / 14.35 dBd	Gain:	11.45 / 14.35 dBd	Gain:	11.45 / 14.35 dBd
Height (AGL):	**94 feet**	Height (AGL):	**94 feet**	Height (AGL):	**94 feet**
Frequency Bands	850 MHz / 1900 MHz (PCS)	Frequency Bands	850 MHz / 1900 MHz (PCS)	Frequency Bands	850 MHz / 1900 MHz (PCS)
Channel Count	4	Channel Count	4	Channel Count	4
Total TX Power(W):	120 Watts	Total TX Power(W):	120 Watts	Total TX Power(W):	120 Watts
ERP (W):	2,471.44	ERP (W):	2,471.44	ERP (W):	2,471.44
Antenna A1 MPE%	**1.44 %**	Antenna B1 MPE%	**1.44 %**	Antenna C1 MPE%	**1.44 %**
Antenna #:	**2**	Antenna #:	**2**	Antenna #:	**2**
Make / Model:	CCI HPA-65R-BUU-H8	Make / Model:	CCI HPA-65R-BUU-H8	Make / Model:	CCI HPA-65R-BUU-H8
Gain:	13.15 / 14.95 dBd	Gain:	13.15 / 14.95 dBd	Gain:	13.15 / 14.95 dBd
Height (AGL):	**94 feet**	Height (AGL):	**94 feet**	Height (AGL):	**94 feet**
Frequency Bands	700 MHz / 1900 MHz (PCS)	Frequency Bands	700 MHz / 1900 MHz (PCS)	Frequency Bands	700 MHz / 1900 MHz (PCS)
Channel Count	4	Channel Count	4	Channel Count	4
Total TX Power(W):	240 Watts	Total TX Power(W):	240 Watts	Total TX Power(W):	240 Watts
ERP (W):	6,229.75	ERP (W):	6,229.75	ERP (W):	6,229.75
Antenna A2 MPE%	**4.21 %**	Antenna B2 MPE%	**4.21 %**	Antenna C2 MPE%	**4.21 %**

Site Composite MPE%	
Carrier	**MPE%**
AT&T – Max per sector	**5.65 %**
T-Mobile	0.07 %
Clearwire	0.31 %
Sprint	1.73 %
Site Total MPE %:	**7.76 %**

AT&T Sector A Total:	5.65 %
AT&T Sector B Total:	5.65 %
AT&T Sector C Total:	5.65 %
Site Total:	7.76 %

AT&T _ Frequency Band / Technology 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	2	418.91	94	3.89	850 MHz	567	0.69%
AT&T 1900 MHz (PCS) UMTS	2	816.81	94	7.58	1900 MHz (PCS)	1000	0.76%
AT&T 700 MHz LTE	2	1,239.23	94	11.51	700 MHz	467	2.46%
AT&T 1900 MHz (PCS) LTE	2	1,875.65	94	17.41	1900 MHz (PCS)	1000	1.74%
						Total:	5.65%

Summary

All calculations performed for this analysis yielded results that were **within** the allowable limits for general public 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 public exposure to RF Emissions are shown here:

AT&T Sector	Power Density Value (%)
Sector A:	5.65 %
Sector B:	5.65 %
Sector C:	5.65 %
AT&T Maximum Total (per sector):	5.65 %
Site Total:	7.76 %
Site Compliance Status:	**COMPLIANT**

The anticipated composite MPE value for this site assuming all carriers present is **7.76 %** of the allowable FCC established general public 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.