STATE OF CONNECTICUT
CONNECTICUT SITING COUNCIL

IN RE:	:	
	:	
A PETITION OF CELLCO PARTNERSHIP	:	SUB-PETITION NO. 1133
D/B/A VERIZON WIRELESS FOR A	:	330 POKORNY ROAD
DECLARATORY RULING FOR	:	HADDAM, CT
APPROVAL OF AN ELIGIBLE FACILITY	:	
REQUEST FOR MODIFICATIONS TO AN	:	
EXISTING TELECOMMUNICATIONS	:	
TOWER AT 330 POKORNY ROAD,	:	
HADDAM, CONNECTICUT	:	SEPTEMBER 9, 2016

SUB-PETITION FOR DECLARATORY RULING:
ELIGIBLE FACILITIES REQUEST FOR MODIFICATIONS
THAT WILL NOT SUBSTANTIALLY CHANGE THE
PHYSICAL DIMENSIONS OF AN EXISTING TOWER

I. Introduction

Pursuant to Section 6409(a) of the Middle Class Tax Relief and Job Creation Act of 2012, codified at 47 U.S.C. § 1455(a) ("Section 6409(a)") and the October 21, 2014 Report and Order (FCC-14-153) issued by the Federal Communications Commission ("FCC") (the "FCC Order"), Cellco Partnership d/b/a Verizon Wireless ("Cellco") hereby petitions the Connecticut Siting Council (the "Council") for a declaratory ruling ("Sub-Petition") that the proposed modifications to an existing Eversource tower at 330 Pokorny Road in Haddam, Connecticut constitutes an Eligible Facilities Request ("EFR") under the FCC Order. Cellco has designated this site as its "Higganum South Facility".

II. Factual Background

Eversource maintains a 280-foot self-supporting lattice tower on a 3.7-acre parcel at 330 Pokorny Road in Haddam, Connecticut (the "Property"). *See* Attachment 1 – Site Vicinity Map and Site Schematic (Aerial Photograph). The existing tower is shared by Eversource, along with

municipal and private communications providers at various levels on the tower. The tower is also shared by Sprint, with antennas at the 155-foot level and T-Mobile, with antennas at the 164.5-foot level. Equipment associated with all of the antennas is located near the base of the tower within a fenced compound area.

III. Proposed Higganum South Facility

Cellco intends to install a total of twelve (12) antennas and nine (9) remote radio heads ("RRHs") on the Eversource tower at a height of 145 feet above ground level ("AGL"). Cellco will also install a 12' x 26' steel platform with a roof canopy to support its equipment cabinets, battery back-up system and a 15 kW propane-fueled generator. A 1,000 gallon propane tank will be installed adjacent to Cellco's equipment platform adjacent to an existing 1,000 gallon propane tank owned by Eversource. Power and telephone service will extend from the existing utility backboard at the tower site. Project Plans for the Higganum South Facility are included in Attachment 2. Specifications for Cellco's antennas, RRHs and generator are included in Attachment 3. A Structural Analysis Report confirming that the tower can accommodate Cellco's proposed modifications is included in Attachment 4.

IV. Discussion

A. The Proposed Modification Will Not Cause a Substantial Change to the Physical Dimensions of the Existing Tower or Base Station

Section 6409(a) provides, in relevant part, that "a State or local government may not deny, and shall approve, any eligible facilities request for a modification of an existing wireless tower or base station that does not substantially change the physical dimensions of such tower or base station." Pursuant to the FCC Order, the proposed modification does not substantially change the physical dimensions of the tower or base station if the following criteria are satisfied.

1. *The proposed modified facility will not increase the height of the tower by more than ten (10) percent or by the height of one additional antenna array with separation from the nearest existing antenna not to exceed twenty (20) feet, whichever is greater.* Cellco proposes to install antennas and RRHs at 145 feet AGL on the existing 280-foot tower.

2. *The proposed facility will not protrude from the edge of the structure more than six (6) feet.* The proposed antennas and RRHs will protrude approximately 4'-7" from the face of the tower.

3. *The proposed facility does not involve installation of more than the standard number of new equipment cabinets for the technology involved, but not to exceed four cabinets.* Cellco intends to install three (3) equipment cabinets to house its radio equipment.

4. *The proposed facility does not entail any excavation or deployment outside the current site of the base station.* All of Cellco's site improvements including the installation of the proposed propane tank will remain within the limits of the Property.

5. *The proposed facility does not defeat the existing concealment elements of the base station.* None of the existing antennas on the Eversource tower are concealed in any fashion. Likewise, Cellco's antennas and related equipment will not be concealed.

6. *The proposed facility complies with conditions associated with the prior approval of construction or modification of the base station.* Cellco is not aware of any conditions associated with the original Eversource tower approval that conflict with Cellco's proposed shared use. Cellco's proposed facility modifications are consistent with other similar antenna installations on the tower. A search of the Town records indicate that the tower was constructed by CL&P in 1970 without any local land use approvals from the Town.

B. FCC Compliance

Operation of Cellco's small cell facility antennas will not increase the radio frequency ("RF") emissions at the Eversource tower site to a level at or above the FCC Safety standard. A cumulative General Power Density table, including Cellco's proposed antennas is included in Attachment 5.

C. Notice to the Town, Property Owner and Abutting Landowners

On September 9, 2016, a copy of this Sub-Petition was sent to the Haddam First Selectman Lizz Milardo and Eversource, the owner of the Property and the tower. Copies of the letters sent to Ms. Milardo and Eversource are included in Attachment 6. A copy of this Sub-Petition was also sent to each owner of land that abuts the Property. A sample abutter's cover letter and the list of those abutting landowners who were sent notice and a copy of the Sub-Petition is included in Attachment 7.

V. Conclusion

Based on the information provided above, Cellco respectfully submits that the proposed modification of the existing base station at the Property constitutes an "eligible facilities request" under Section 6409(a) and the FCC Order.

Respectfully submitted,

CELLCO PARTNERSHIP d/b/a VERIZON WIRELESS

By _____

Kenneth C. Baldwin, Esq.
Robinson & Cole LLP
280 Trumbull Street
Hartford, CT 06103-3597
(860) 275-8200
Its Attorneys

ATTACHMENT 1

Legend

- Proposed Verizon Wireless Facility
- Surrounding Verizon Wireless Facilities
- Municipal Boundary
- Waterbody

Base Map Source: 2012 Aerial Photograph (CTECO)
Map Scale: 1 inch = 5,400 feet
Map Date: August 2016

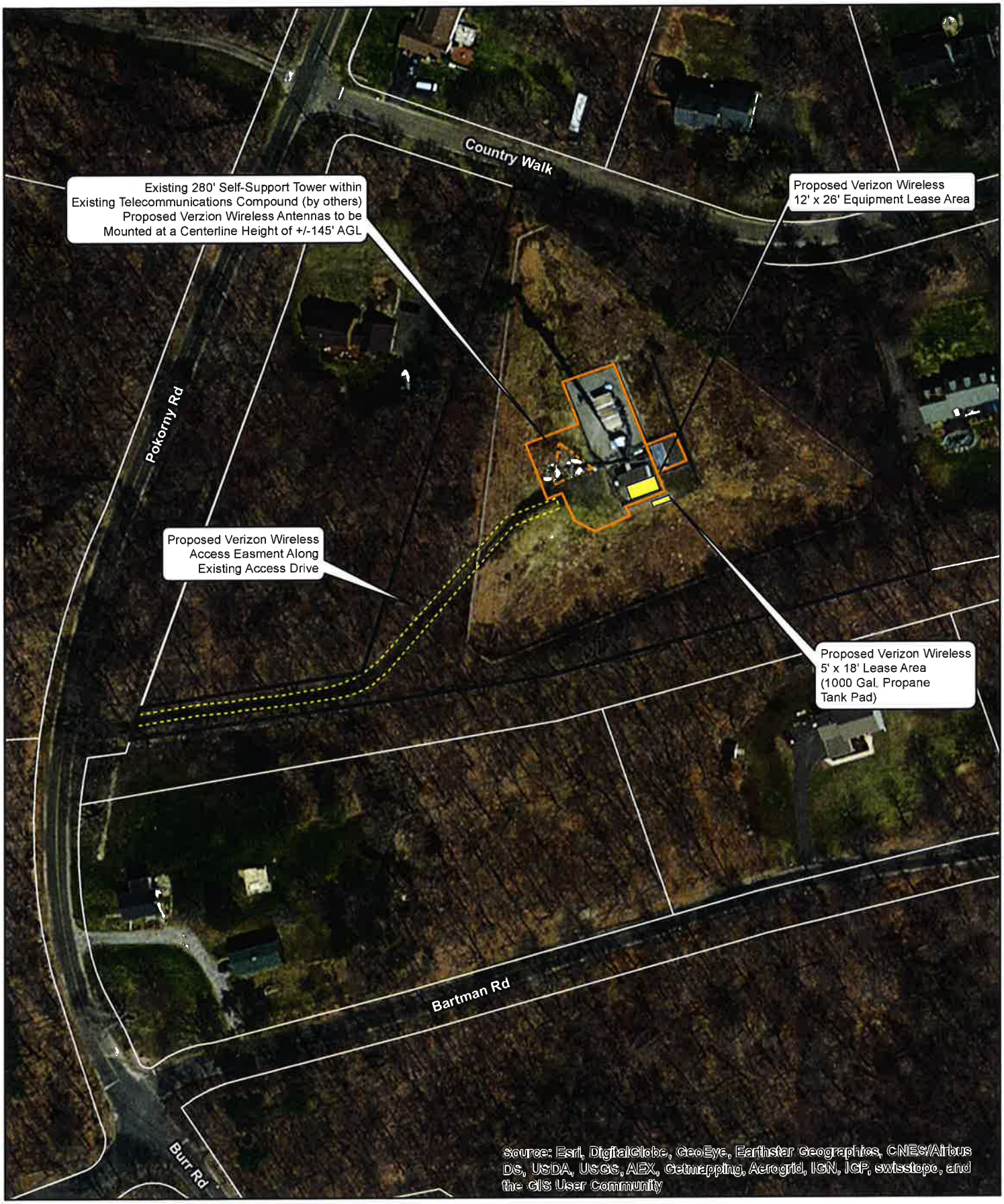
5,000 2,500 0 5,000 Feet

Site Vicinity Map

Proposed Wireless
Telecommunications Facility
Higganum South CT
330 Pokorny Road
Haddam, Connecticut

verizon

ALL-POINTS TECHNOLOGY CORPORATION



Legend

- Proposed Verizon Wireless Lease Areas
- Existing Self-Support Tower (By Others)
- Existing Compound Area (By Others)
- Subject Property
- Approximate Parcel Boundary (CTDEEP GIS Parcels Last Updated 2010)

N
W E
S

100 50 0 100 Feet

Site Schematic

Proposed Wireless
Telecommunications Facility
Higganum South CT
330 Pokorny Road
Haddam, Connecticut

verizon

ALL-POINTS TECHNOLOGY CORPORATION

Map Notes:
Base Map Source: ESRI World Imagery
Map Scale: 1 inch = 120 feet
Map Date: August 2016

ATTACHMENT 2

verizon

WIRELESS COMMUNICATIONS FACILITY

HIGGANUM SOUTH CT
330 POKORNY ROAD
HADDAM, CONNECTICUT

SITE DIRECTIONS

FROM: 99 EAST RIVER DRIVE, EAST HARTFORD, CONNECTICUT **TO:** 330 POKORNY ROAD, HADDAM, CONNECTICUT

1.	GET ON CT-15 S/US-5 S	1.5 MI
2.	HEAD SOUTHWEST ON E RIVER DR TOWARD PITKIN ST	0.9 MI
3.	CONTINUE ONTO E RIVER DRIVE EXTENSION	0.3 MI
4.	TURN RIGHT TO MERGE ONTO CT-15 S/US-5 S TOWARD NEW HAVEN/INTERSTATE 91 S	0.2 MI
5.	FOLLOW I-91 S AND CT-9 S TO YOUR DESTINATION IN HADDAM. TAKE EXIT 9 FROM CT-9 S	23.9 MI
6.	MERGE ONTO CT-15 S/US-5 S	0.8 MI
7.	TAKE EXIT 86 TO MERGE ONTO I-91 S TOWARD NEW HAVEN/NEW YORK CITY	8.9 MI
8.	USE THE LEFT LANE TO TAKE EXIT 22S TO MERGE ONTO CT-9 S TOWARD MIDDLETOWN/OLD SAYBROOK	13.9 MI
9.	TAKE EXIT 9 FOR CT-81 TOWARD KILLINGWORTH/CLINTON	0.2 MI
10.	DRIVE TO POKORNY RD	2.2 MI
11.	TURN RIGHT ONTO CT-81 S/KILLINGWORTH RD	0.7 MI
12.	TURN RIGHT ONTO POKORNY RD	1.4 MI

GENERAL NOTES

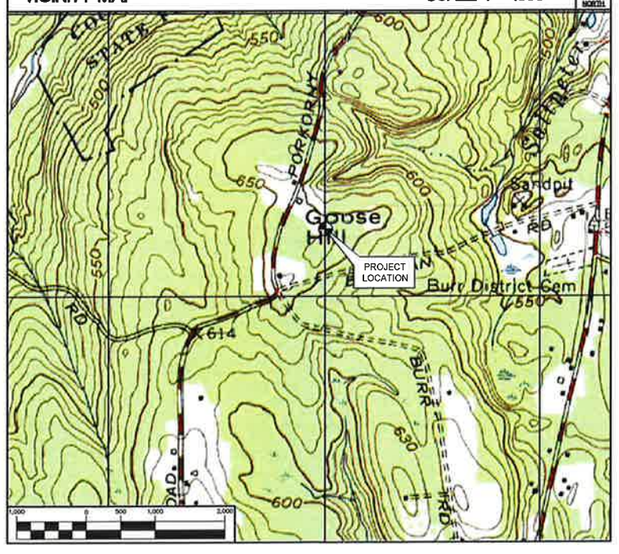
1. PROPOSED ANTENNA LOCATIONS AND HEIGHTS PROVIDED BY CELLCO PARTNERSHIP.

PROJECT SCOPE

1. THE PROPOSED SCOPE OF WORK GENERALLY INCLUDES THE INSTALLATION OF (3) SECTORS WITH (4) ANTENNAS EACH, FOR A TOTAL OF (12) ANTENNAS, ASSOCIATED CABLES AND APPURTENANCES MOUNTED TO EXISTING MONOPOLE TOWER.
2. PROPOSED CELLCO PARTNERSHIP EQUIPMENT CABINETS AND BACKUP POWER GENERATOR TO BE INSTALLED ATOP PROPOSED STEEL GRATING PLATFORM ATOP CONC. PIERS W/ STAND ALONE ROOF CANOPY WITHIN EXISTING FENCED COMPOUND.
3. POWER AND TELCO UTILITIES DEPICTED HEREIN ARE TENTATIVE. FINAL ROUTING TO BE DETERMINED DURING THE CONSTRUCTION DOCUMENT PHASE OF PROJECT.
4. THE PROPOSED WIRELESS FACILITY INSTALLATION WILL BE DESIGNED IN ACCORDANCE WITH THE 2003 INTERNATIONAL BUILDING CODE AS MODIFIED BY THE 2009 CONNECTICUT SUPPLEMENT.

VICINITY MAP

SCALE: 1" = 1000'



PROJECT SUMMARY

SITE NAME:	HIGGANUM SOUTH CT
SITE ADDRESS:	330 POKORNY ROAD HADDAM, CONNECTICUT
LESSEE/TENANT:	CELLCO PARTNERSHIP d.b.a. VERIZON WIRELESS 99 EAST RIVER DRIVE EAST HARTFORD, CT 06108
VERIZON SITE ACQUISITION CONTACT:	DOUG TALMADGE CELLCO PARTNERSHIP (860) 549-6116
LEGAL/REGULATORY COUNSEL:	KENNETH C. BALDWIN, ESQ. ROBINSON & COLE (860) 257-8345
TOWER COORDINATES:	LATITUDE: 41°-26'-36.95"N LONGITUDE: 72°-33'-58.63"W GROUND ELEVATION: ±656.5' A.M.S.L.
	COORDINATES REFERENCED FROM CT SITING COUNCIL WEB LOG.

SHEET INDEX

SHT. NO.	DESCRIPTION	REV. NO.
T-1	TITLE SHEET	1
C-1	ABUTTERS MAP	1
C-2	PART. COMPOUND PLAN, ELEVATION AND ANTENNA CONFIG.	1

REV.	DATE	DRAWN BY	CHK'D BY	DESCRIPTION
1	09/02/16	HMR	CPC	ISSUED FOR CSC
0	08/26/16	DBA	HMR	ISSUED FOR CSC-CLIENT REVIEW

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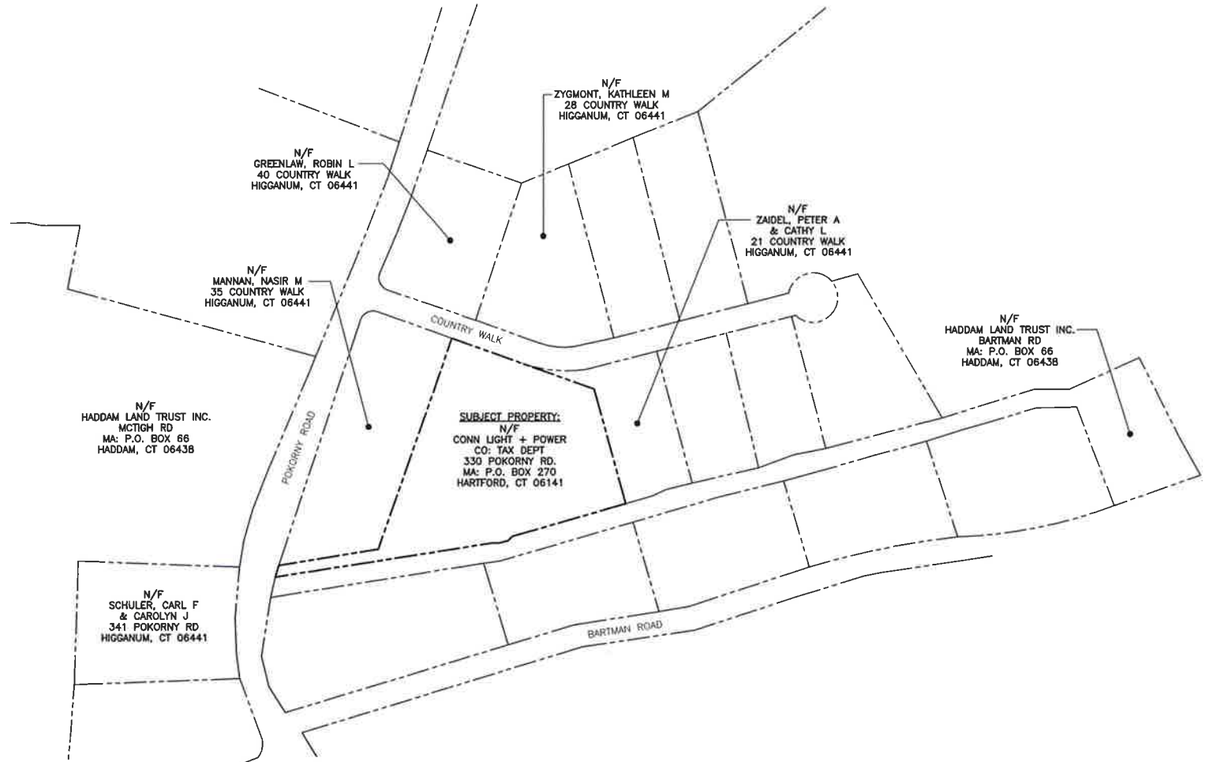
Cellco Partnership d/b/a Verizon Wireless
WIRELESS COMMUNICATIONS FACILITY
HIGGANUM SOUTH CT
330 POKORNY ROAD
HADDAM, CT 06441

DATE: 08/23/16
SCALE: AS NOTED
JOB NO. 15078.000

TITLE SHEET

T-1

Sheet No. 1 of 3



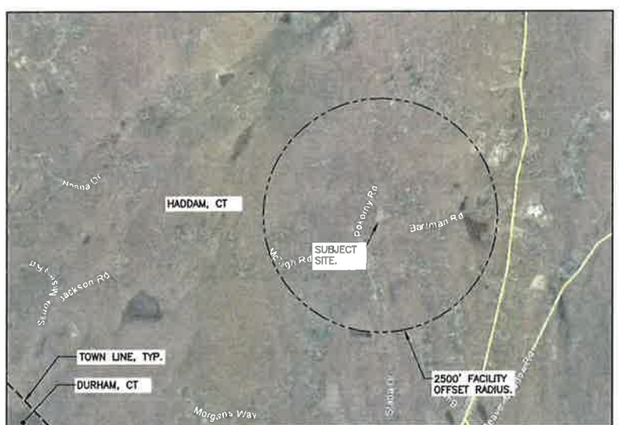
1 / C-1 **ABUTTERS MAP**
SCALE: 1" = 150'

APPROXIMATE NORTH

GRAPHIC SCALE
150 0 75 150 300 600
(IN FEET)
1 inch = 150 ft.

MAP REFERENCE NOTE:

PROPERTY LINES AND PROPERTY OWNER INFORMATION SHOWN HEREIN ARE REFERENCED FROM THE TOWN OF HADDAM GIS DATA BASE. SITE FEATURES SHOWN HEREIN ARE REFERENCED FROM AVAILABLE MAPPING ON GOOGLE EARTH PRO.



MUNICIPALITY NOTIFICATION LIMIT MAP

REV.	DATE	DRAWN BY	CHK'D BY	DESCRIPTION
1	09/02/16	HAR	CFC	ISSUED FOR CSC
0	06/28/16	DRA	HAR	ISSUED FOR CSC-CLIENT REVIEW

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Cellco Partnership d/b/a Verizon Wireless
WIRELESS COMMUNICATIONS FACILITY

HIGGANUM SOUTH CT

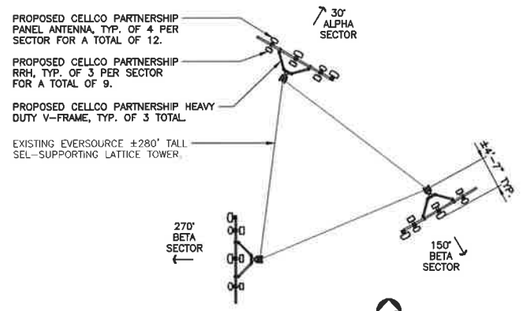
330 POKORNY ROAD
HADDAM, CT 06441

DATE: 08/23/16
SCALE: AS NOTED
JOB NO. 15078.000

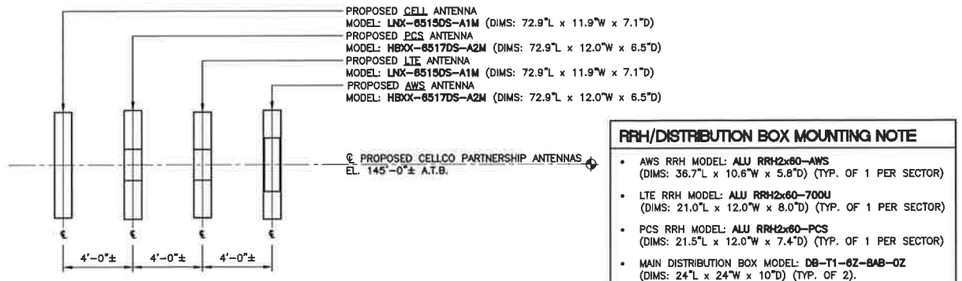
ABUTTERS MAP

C-1

Sheet No. 2 of 3



PLAN



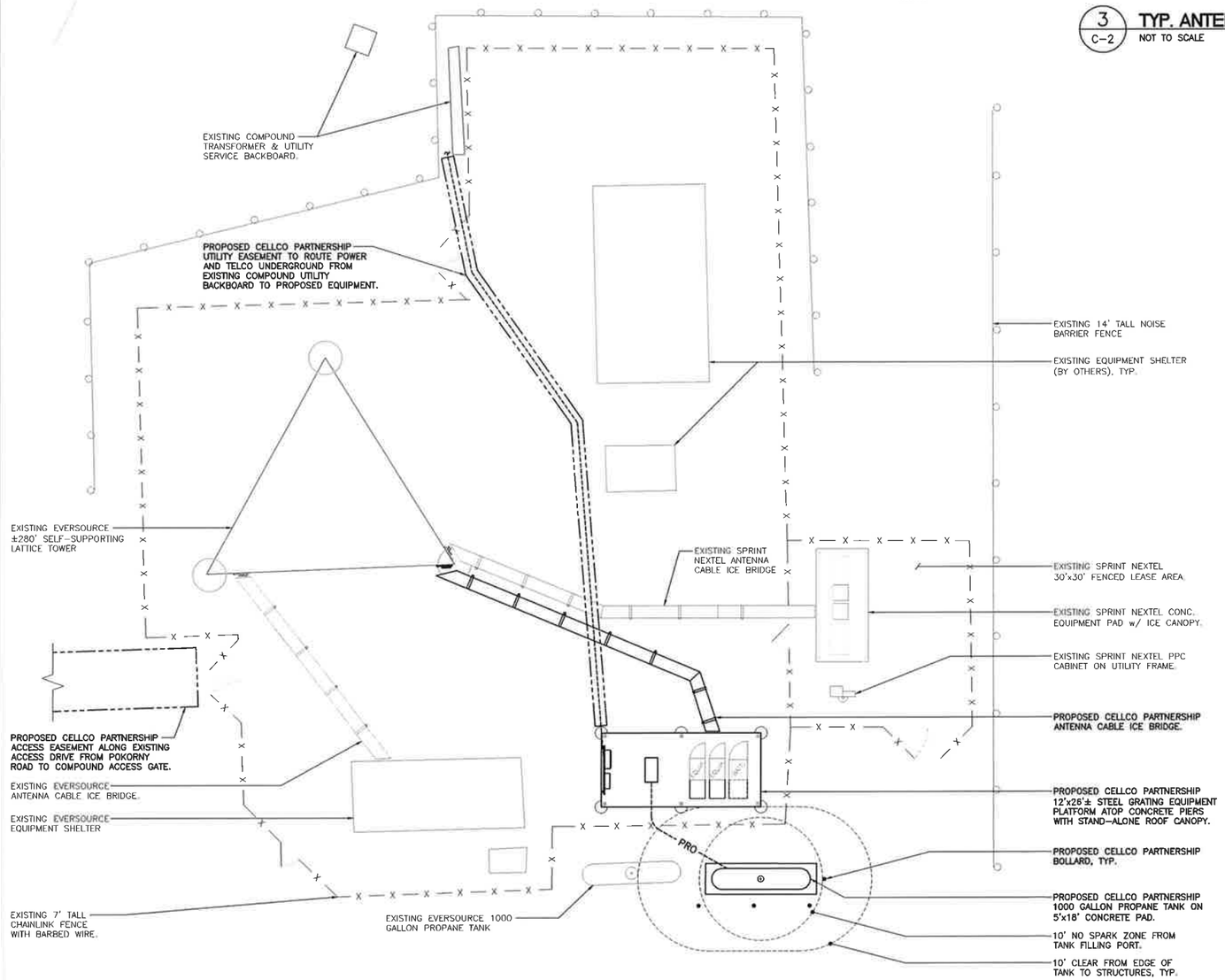
ELEVATION

RRH/DISTRIBUTION BOX MOUNTING NOTE

- AWS RRH MODEL: **ALU RRH2x60-AWS** (DIMS: 36.7"L x 10.6"W x 5.8"D) (TYP. OF 1 PER SECTOR)
- LTE RRH MODEL: **ALU RRH2x60-700U** (DIMS: 21.0"L x 12.0"W x 8.0"D) (TYP. OF 1 PER SECTOR)
- PCS RRH MODEL: **ALU RRH2x60-PCS** (DIMS: 21.5"L x 12.0"W x 7.4"D) (TYP. OF 1 PER SECTOR)
- MAIN DISTRIBUTION BOX MODEL: **DB-T1-6Z-8AB-0Z** (DIMS: 24"L x 24"W x 10"D) (TYP. OF 2).

ANTENNAS, RRHs AND MAIN DISTIBUTION BOXES MOUNTED TO LOW PROFILE ANTENNA MOUNTING PLATFORM ASSEMBLY.

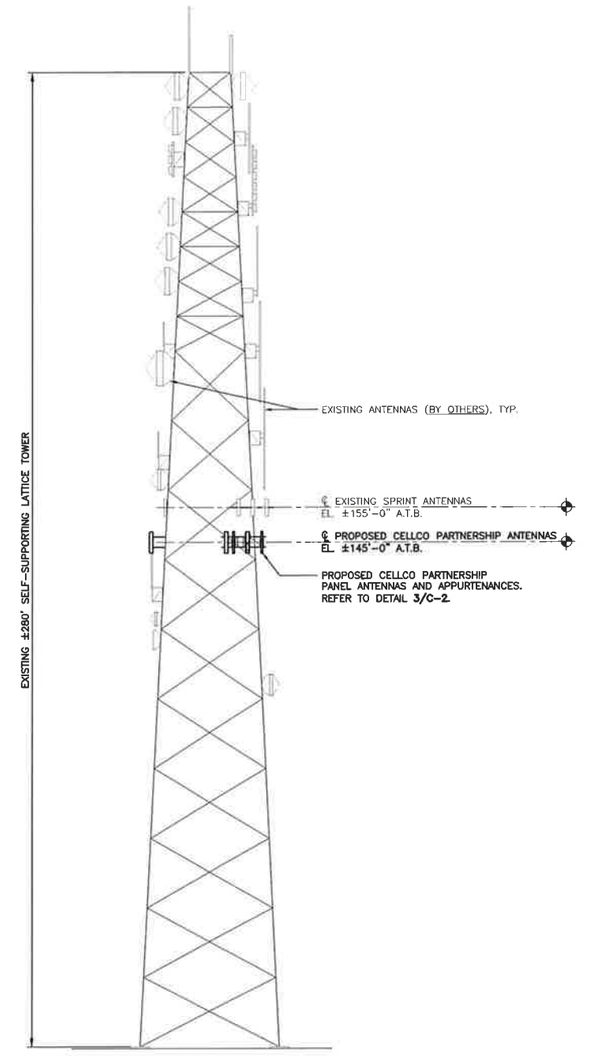
3 / C-2 **TYP. ANTENNA MOUNTING CONFIGURATION**
NOT TO SCALE



1 / C-2 **PARTIAL COMPOUND PLAN**
SCALE: 1" = 10'

APPROX. NORTH

GRAPHIC SCALE
10 0 5 10 20 40
(IN FEET)
1 inch = 10 ft.



2 / C-2 **TOWER ELEVATION**
SCALE: 1" = 20'

GRAPHIC SCALE
20 0 10 20 40 80
(IN FEET)
1 inch = 20 ft.

REV.	DATE	DRAWN BY	CHK'D BY	DESCRIPTION
1	09/02/16	HMR	CFC	ISSUED FOR CSC
0	08/26/16	DRA	HMR	ISSUED FOR CSC-CLIENT REVIEW

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HIGGANUM SOUTH CT

330 POKORNY ROAD
HADDAM, CT 06441

DATE:	08/23/16
SCALE:	AS NOTED
JOB NO.	15078.000

PART COMPOUND PLAN, ELEVATION & ANTENNA CONFIG.

C-2

Sheet No. 3 of 3

ATTACHMENT 3

Product Specifications

COMMSCOPE®

LNX-6515DS-VTM | LNX-6515DS-A1M

Single Band Antenna, 698–896 MHz, 65° horizontal beamwidth, RET compatible

- Excellent choice to maximize both coverage and capacity in suburban and rural applications
- Fully compatible with Andrew remote electrical tilt system for greater OpEx savings
- Exceptional horizontal pattern roll-off and strong front-to-back ratio
- Extended bandwidth allows one antenna to serve multiple frequency allocations
- Great solution to maximize network coverage and capacity
- The RF connectors are designed for IP67 rating and the radome for IP56 rating

Electrical Specifications

Frequency Band, MHz	**698–806**	**806–896**
Gain, dBi	16.7	17.6
Beamwidth, Horizontal, degrees	65	64
Beamwidth, Vertical, degrees	9.7	8.6
Beam Tilt, degrees	0–8	0–8
USLS (First Lobe), dB	17	17
Front-to-Back Ratio at 180°, dB	32	27
CPR at Boresight, dB	24	27
CPR at Sector, dB	15	13
Isolation, dB	30	30
VSWR | Return Loss, dB	1.4 | 15.6	1.4 | 15.6
PIM, 3rd Order, 2 x 20 W, dBc	-153	-153
Input Power per Port, maximum, watts	400	400
Polarization	±45°	±45°
Impedance	50 ohm	50 ohm

Electrical Specifications, BASTA*

Frequency Band, MHz	**698–806**	**806–896**
Gain by all Beam Tilts, average, dBi	16.6	16.9
Gain by all Beam Tilts Tolerance, dB	±0.4	±0.3
Gain by Beam Tilt, average, dBi	0 ° | 16.6	0 ° | 17.0
	4 ° | 16.6	4 ° | 17.0
	8 ° | 16.4	8 ° | 16.8
Beamwidth, Horizontal Tolerance, degrees	±1	±0.9
Beamwidth, Vertical Tolerance, degrees	±0.6	±0.4
USLS, beampeak to 20° above beampeak, dB	18	18
Front-to-Back Total Power at 180° ± 30°, dB	25	23
CPR at Boresight, dB	24	27
CPR at Sector, dB	15	13

* CommScope® supports NGMN recommendations on Base Station Antenna Standards (BASTA). To learn more about the benefits of BASTA, download the whitepaper Time to Raise the Bar on BSAs.

General Specifications

Antenna Type	Sector
Band	Single band
Brand	DualPol®
Operating Frequency Band	698 – 896 MHz

Product Specifications

LNX-6515DS-VTM | LNX-6515DS-A1M

Performance Note	Outdoor usage

Mechanical Specifications

Color	Light gray
Lightning Protection	dc Ground
Radiator Material	Aluminum
Radome Material	Fiberglass, UV resistant
RF Connector Interface	7-16 DIN Female
RF Connector Location	Bottom
RF Connector Quantity, total	2
Wind Loading, frontal	878.0 N @ 150 km/h 197.4 lbf @ 150 km/h
Wind Loading, lateral	273.0 N @ 150 km/h 61.4 lbf @ 150 km/h
Wind Loading, rear	1033.0 N @ 150 km/h 232.2 lbf @ 150 km/h
Wind Speed, maximum	241 km/h | 150 mph

Dimensions

Depth	180.5 mm | 7.1 in
Length	2453.0 mm | 96.6 in
Width	301.0 mm | 11.9 in
Net Weight, without mounting kit	19.8 kg | 43.7 lb

Remote Electrical Tilt (RET) Information

Model with Factory Installed AISG 2.0 Actuator LNX-6515DS-A1M

Packed Dimensions

Depth	295.0 mm | 11.6 in
Length	2718.0 mm | 107.0 in
Width	392.0 mm | 15.4 in
Shipping Weight	36.9 kg | 81.4 lb

Regulatory Compliance/Certifications

Agency	Classification
RoHS 2011/65/EU	Compliant by Exemption
China RoHS SJ/T 11364-2006	Above Maximum Concentration Value (MCV)
ISO 9001:2008	Designed, manufactured and/or distributed under this quality management system

Included Products

DB380-3 — Pipe Mounting Kit for 2.4 - 4.5 in (60 - 115 mm) OD round members. Used for wide panel antennas. Includes

three clamp sets.

DB5083D — Downtilt Mounting Kit for 2.4"-4.5" (60-115 mm) OD round members. Consists of two DB5083 heavy-duty, galvanized steel downtilt mounting brackets. This kit is compatible with the DB380-3 pipe mount for panel antennas with three mounting points.

* Footnotes

Performance Note	Severe environmental conditions may degrade optimum performance

Product Specifications

COMMSCOPE®

HBXX-6517DS-VTM | HBXX-6517DS-A2M

Andrew® Quad Port Antenna, 1710–2180 MHz, 65° horizontal beamwidth, RET compatible

- Superior azimuth tracking and pattern symmetry with excellent passive intermodulation suppression

Electrical Specifications

Frequency Band, MHz	1710–1880	1850–1990	1920–2180
Gain, dBi	19.0	19.1	19.2
Beamwidth, Horizontal, degrees	67	66	65
Beamwidth, Vertical, degrees	5.0	4.7	4.4
Beam Tilt, degrees	0–6	0–6	0–6
USLS (First Lobe), dB	18	18	18
Front-to-Back Ratio at 180°, dB	30	30	30
CPR at Boresight, dB	21	22	21
CPR at Sector, dB	10	11	9
Isolation, dB	30	30	30
VSWR | Return Loss, dB	1.4 | 15.6	1.4 | 15.6	1.4 | 15.6
PIM, 3rd Order, 2 x 20 W, dBc	-153	-153	-153
Input Power per Port, maximum, watts	350	350	350
Polarization	±45°	±45°	±45°
Impedance	50 ohm	50 ohm	50 ohm

Electrical Specifications, BASTA*

Frequency Band, MHz	1710–1880	1850–1990	1920–2180
Gain by all Beam Tilts, average, dBi	18.5	18.6	18.8
Gain by all Beam Tilts Tolerance, dB	±0.4	±0.3	±0.4
Gain by Beam Tilt, average, dBi	0 ° | 18.4	0 ° | 18.4	0 ° | 18.7
	3 ° | 18.7	3 ° | 18.7	3 ° | 18.9
	6 ° | 18.4	6 ° | 18.5	6 ° | 18.6
Beamwidth, Horizontal Tolerance, degrees	±2.4	±1.7	±2.9
Beamwidth, Vertical Tolerance, degrees	±0.3	±0.3	±0.3
USLS, beampeak to 20° above beampeak, dB	18	19	19
Front-to-Back Total Power at 180° ± 30°, dB	25	26	26
CPR at Boresight, dB	22	23	22
CPR at Sector, dB	10	10	9

* CommScope® supports NGMN recommendations on Base Station Antenna Standards (BASTA). To learn more about the benefits of BASTA, download the whitepaper Time to Raise the Bar on BSAs.

General Specifications

Antenna Brand	Andrew®
Antenna Type	DualPol® quad
Band	Single band
Brand	DualPol®
Operating Frequency Band	1710 – 2180 MHz

Product Specifications

HBXX-6517DS-VTM | HBXX-6517DS-A2M

Performance Note	Outdoor usage

Mechanical Specifications

Color	Light gray
Lightning Protection	dc Ground
Radiator Material	Low loss circuit board
Radome Material	PVC, UV resistant
RF Connector Interface	7-16 DIN Female
RF Connector Location	Bottom
RF Connector Quantity, total	4
Wind Loading, frontal	668.0 N @ 150 km/h 150.2 lbf @ 150 km/h
Wind Loading, lateral	175.0 N @ 150 km/h 39.3 lbf @ 150 km/h
Wind Loading, rear	777.0 N @ 150 km/h 174.7 lbf @ 150 km/h
Wind Speed, maximum	241 km/h | 150 mph

Dimensions

Depth	166.0 mm | 6.5 in
Length	1906.0 mm | 75.0 in
Width	305.0 mm | 12.0 in
Net Weight, without mounting kit	18.5 kg | 40.8 lb

Remote Electrical Tilt (RET) Information

Model with Factory Installed AISG 2.0 Actuator	HBXX-6517DS-A2M

Packed Dimensions

Depth	292.0 mm | 11.5 in
Length	2036.0 mm | 80.2 in
Width	402.0 mm | 15.8 in
Shipping Weight	28.2 kg | 62.2 lb

Regulatory Compliance/Certifications

Agency	Classification
RoHS 2011/65/EU	Compliant by Exemption
China RoHS SJ/T 11364-2006	Above Maximum Concentration Value (MCV)
ISO 9001:2008	Designed, manufactured and/or distributed under this quality management system

Included Products

600899A-2 — Downtilt Mounting Kit for 2.4 - 4.5 in (60 - 115 mm) OD round members. Kit contains one scissor top bracket

set and one bottom bracket set.

* Footnotes

Performance Note	Severe environmental conditions may degrade optimum performance

ALCATEL-LUCENT B13 RRH4X30-4R

Alcatel-Lucent B13 Remote Radio Head 4x30-4R is the newest addition of Remote Radio Head to the extended product line of Alcatel-Lucent's distributed Base Station solutions, aimed at facilitating smooth RF site acquisition and related civil engineering.

Supporting 2Tx/4Tx MIMO and 4-way Rx diversity, Alcatel-Lucent B13 RRH4x30-4R allows operators to have a compact radio solution to deploy LTE in the 700U band (700 MHz, 3GPP band 13), providing them with the means to achieve high capacity, high quality and high coverage with minimum site requirements.

The Alcatel-Lucent B13 RRH4x30-4R product has four transmit RF paths, offering the possibility to **select, via software only, 2Tx or 4Tx MIMO configurations** with either 2x60 W or 4x30 W RF output power. It supports also 4-way Rx diversity and up to 10MHz instantaneous bandwidth.

The Alcatel-Lucent B13 RRH4x30-4R is a near zero-footprint solution and operates noise free, simplifying negotiations with site property owners and minimizing environmental impacts.

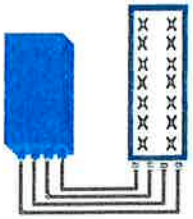
Its compactness and slim design makes the Alcatel-Lucent B13 RRH4x30-4R easy to install close to the antenna: operators can therefore locate this Remote Radio Head where RF design conditions are deemed ideal, minimizing trade-offs between available sites and RF optimum sites, together with reducing the RF feeder needs and installation costs.

FEATURES

- Supporting LTE in 700 MHz band (700U, 3GPP band 13)
- LTE 2Tx or 4Tx MIMO (SW switchable)
- Output power: Up to 2x60W or 4x30W
- 10MHz LTE carrier with 4Rx Diversity
- Convection-cooled (fan-less)
- Supports AISG 2.0 ALD devices (RET, TMA) through RS485 or RF ports

BENEFITS

- Compact to reduce additional footprint when adding LTE in 700U band
- MIMO scheme operation selection (2Tx or 4Tx) by software only
- Improves downlink spectral efficiency through MIMO4
- Increases LTE coverage thanks to 4Rx diversity capability and best in class Rx sensitivity
- Flexible mounting options: Pole or Wall



4x30W with 4T4R
or
2x60W with 2T4R

Can be switched between modes via SW w/o site visit

Alcatel·Lucent

Features & performance	
Number of TX/RX paths	4 duplexed (either 4T4R or 2T4R by SW)
Frequency band	U700 (C) (3GPP bands 13): DL: 746 - 756 MHz / UL: 777 - 787 MHz
Instantaneous bandwidth - #carriers	10MHz – 1 LTE carrier (in 10MHz occupied bandwidth)
LTE carrier bandwidth	10 MHz
RF output power	2x60W or 4x30W (by SW)
Noise figure – RX Diversity scheme	2 dB typ. (<2.5 dB max) – 2 or 4 way Rx diversity
Sizes (HxWxD) in mm (in.) Volume in L Weight in kg (lb) (w/o mounting HW)	550 x 305 x 230 (21.6" x 12.0" x 9") (with solar shield) 38 (with solar shield) 26 (57.2) (with solar shield)
DC voltage range DC power consumption	-40.5 to -57V at full performance, -38 to -57V with relaxation on power consumption 550W typical @100% RF load (in 2Tx or 4TX mode)
Environmental conditions Wind load (@150km/h or 93mph)	-40°C (-40°F) /+55°C (+131°F) IP65 Frontal:<200N / Lateral :<150N
Antenna ports	4 ports 7/16 DIN female (50 ohms) VSWR < 1.5
CPRI ports	2 CPRI ports (HW ready for Rate7, 9.8 Gbps) SFP single mode dual fiber
AISG interfaces	1 AISG2.0 output (RS485) Integrated Smart Bias Tees (x2)
Misc. Interfaces	4 external alarms (1 connector) – 4 RF Tx & 4 RF Rx monitor ports - 1 DC connector (2 pins)
Installation conditions	Pole and wall mounting
Regulatory compliance	3GPP 36.141 / 3GPP 36.113 / GR-1089-CORE / GR-3108-CORE / UL 60950-1 / FCC Part 27

ALCATEL-LUCENT
WIRELESS PRODUCT DATASHEET
RRH2X60-1900A-4R FOR BAND 2/25 APPLICATIONS

The Alcatel-Lucent RRH2x60-1900A-4R is a high power, small form factor Remote Radio Head operating in the PCS 1900MHz frequency band for WCDMA and LTE technologies. It is designed with an eco-efficient approach, providing operators with the means to achieve high quality and high capacity coverage with minimum site requirements and efficient operation.

A distributed Node B expands the deployment options by using two components, a Base Band Unit (BBU) containing the digital assets and a separate RRH containing the radio-frequency (RF) elements. This modular design optimizes available space and allows the main components of a Node B to be installed separately, within the same site or several kilometers apart.

The Alcatel-Lucent RRH2x60-1900A-4R is linked to the BBU by an optical-fiber connection carrying downlink and uplink digital radio signals along with operations, administration and maintenance (OA&M) information.

SUPERIOR RF PERFORMANCE

The Alcatel-Lucent RRH2x60-1900A-4R integrates all the latest technologies. This allows operators to offer best-in-class characteristics.

It delivers an outstanding 120 watts of total RF power thanks to its two transmit RF paths of 60 W each.

It is ideally suited to support multiple-input multiple-output (MIMO) 2x2 operation.

It includes four RF receivers to natively support 4-way uplink reception diversity. This improves the radio uplink coverage and this can be used to extend the cell radius commensurate with 2x2MIMO 2x60 W for the downlink.

The latest generation power amplifiers (PA) used in this product achieve high efficiency (>40%), resulting in improved power consumption figures.

OPTIMIZED TCO

The Alcatel-Lucent RRH2x60-1900A-4R is designed to make available all the benefits of a distributed Node B, with excellent RF characteristics, with low capital expenditures (CAPEX) and low operating expenditures (OPEX).

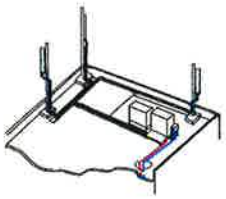
The Alcatel-Lucent RRH2x60-1900A-4R is a very cost-effective solution to deploy LTE MIMO.

EASY INSTALLATION

The limited space available in some sites may prevent the installation of traditional single-cabinet BTS equipment. However, many of these sites can host an Alcatel-Lucent RRH2x60-1900A-4R installation, providing more flexible site selection and improved network quality along with greatly reduced installation time and costs.

The Alcatel-Lucent RRH2x60-1900A-4R is a zero-footprint solution and is convection cooled without fans for silent operation, simplifying negotiations with site property owners and minimizing environmental impacts.

Installation can easily be done by a single person as the Alcatel–Lucent RRH2x60-190A-4R is compact and weighs about 21 kg, eliminating the need for a crane to hoist the BTS cabinet to the rooftop. A site can be in operation in less than one day.



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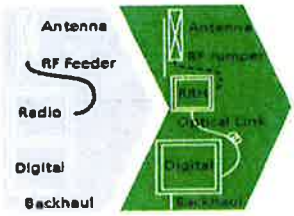
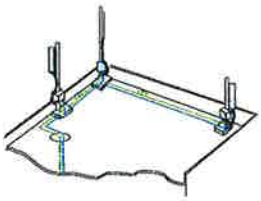


RRH for space-constrained cell sites



Distributed

FEATURES

- RRH2x60-1900A-4R integrates two power amplifiers of 60W rating (at each antenna connector)
- RRH2x60-1900A-4R can operate WCDMA only, LTE only or a mix of WCDMA and LTE
- RRH2x60-1900A-4R offers the possibility for WCDMA (non MIMO) to operate the two radio chains independently (2 blocks of 20 MHz anywhere in the band)
- RRH2x60-1900A-4R is a very compact and lightweight product
- Advanced power management techniques are embedded to provide power savings, such as PA bias control

BENEFITS

- MIMO deployment and/or WCDMA and LTE simultaneous operation with only one single unit per sector
- Improved uplink coverage with built-in 4-way receive diversity capability
- RRH can be mounted close to the antenna, eliminating nearly all losses in RF cables and thus reducing power consumption by 50% compared to conventional solutions
- Distributed configurations provide easily deployable and cost-effective solutions, near zero footprint and silent solutions, with minimum impact on the neighborhood, which ease the deployment
- RETA and TMA support without additional hardware thanks to the AISG v2.0 port and the integrated Bias-Tees. Bias-Tees support AISG DC supply and signaling.

TECHNICAL SPECIFICATIONS

Specifications listed are hardware capabilities. Some capabilities depend on support in a specific software release or future release.

Dimensions and weights

- HxWxD : 500x285x208 mm (30l with solar shield)
- Weight : 21 kg (46 lbs) (with solar shield)

Electrical Data

- Power Supply : -48V DC (-40.5 to -57V)
- Power Consumption: 460W typ. @2x60W (100%RF)

RF Characteristics

- Supported spectrum: DL 1930-1990 / UL 1850-1910
- Frequency band: 3GPP band 2/25
- Output power: 2x60W at antenna connectors
- Technology supported: W-CDMA and LTE
- Instantaneous bandwidth: 20 MHz (MIMO) or 2x20 MHz (non MIMO)
- Rx diversity: 2-way and 4-way uplink reception
- Typical sensitivity without Rx diversity: -124.8dBm for WCDMA and -105 dBm for LTE

Connectivity

- Two CPRI optical ports for daisychaining and up to six RRHs per fiber
- Type of optical fiber: Single-Mode (SM) and Multi-Mode (MM) SFPs
- Optical fiber length: up to 500m using MM fiber, up to 15km using SM fiber
- TMA/RETA: AISG 2.0 (RS485 connector and internal Bias-Tee)
- Six external alarms
- Surge protection for all external ports (DC and RF)

Environmental specifications

- Operating temperature: -40°C to 55°C including solar load
- Operating relative humidity: 8% to 100%
- Environmental Conditions: ETS300-019-1-4 class4.1E
- Ingress Protection: IEC 60529 IP65
- Acoustic Noise : Noiseless (natural convection cooling)

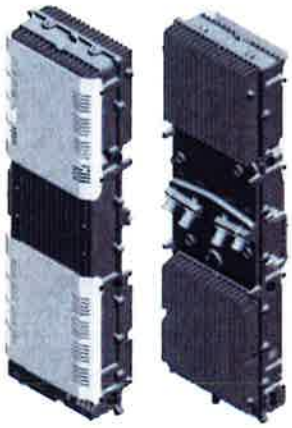
Safety and Regulatory Data

- EMC : 3GPP 25113, EN 301 489-1, EN 301 489-23, GR 1089
- Safety : IEC60950-1, EN 60825-1
- Regulatory: CE Mark-European Directive 2002/95/EC (RoHS), 2002/96/EC (WEEE), 1999/5/EC (R&TTE)
- Health : EN 50385

Alcatel·Lucent

ALCATEL-LUCENT
WIRELESS PRODUCT DATASHEET
B4 RRH2X60-4R FOR AWS BAND APPLICATIONS

The Alcatel-Lucent B4 RRH2x60-4R is a high power, small form factor Remote Radio Head operating in the AWS frequency band (3GPP Band 4) for LTE technology. It is designed with an eco-efficient approach, providing operators with the means to achieve high quality and high capacity coverage with minimum site requirements and efficient operation.



A distributed Node B expands the deployment options by using two components, a Base Band Unit (BBU) containing the digital assets and a separate RRH containing the radio-frequency (RF) elements. This modular design optimizes available space and allows the main components of a Node B to be installed separately, within the same site or several kilometers apart.

The Alcatel-Lucent B4 RRH2x60-4R is linked to the BBU by an optical-fiber connection carrying downlink and uplink digital radio signals along with operations, administration and maintenance (OA&M) information.

SUPERIOR RF PERFORMANCE

The Alcatel-Lucent B4 RRH2x60-4R integrates all the latest technologies. This allows operators to offer best-in-class characteristics.

It delivers an outstanding 120 watts of total RF power thanks to its two transmit RF paths of 60 W each.

It is ideally suited to support multiple-input multiple-output (MIMO) 2x2 operation.

It includes four RF receivers to natively support 4-way uplink reception diversity. This improves the radio uplink coverage and this can be used to extend the cell radius commensurate with 2x2MIMO 2x60 W for the downlink.

It supports multiple discontinuous LTE carriers within an instantaneous bandwidth of 45 MHz corresponding to the entire AWS B4 spectrum.

The latest generation power amplifiers (PA) used in this product achieve high efficiency (>40%), resulting in improved power consumption figures.

OPTIMIZED TCO

The Alcatel-Lucent B4 RRH2x60-4R is designed to make available all the benefits of a distributed Node B, with excellent RF characteristics, with low capital expenditures (CAPEX) and low operating expenditures (OPEX).

The Alcatel-Lucent B4 RRH2x60-4R is a very cost-effective solution to deploy LTE MIMO.

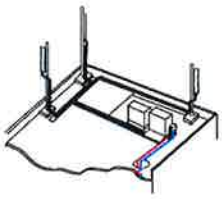
EASY INSTALLATION

The B4 RRH2x60-4R includes a reversible mounting bracket which allows for ease of installation behind an antenna, or on a rooftop knee wall while providing easy access to the mid body RF connectors.

The limited space available in some sites may prevent the installation of traditional single-cabinet BTS equipment. However, many of these sites can host an Alcatel-Lucent B4 RRH2x60-4R installation, providing more flexible site selection and improved network quality along with greatly reduced installation time and costs.

The Alcatel-Lucent B4 RRH2x60-4R is a zero-footprint solution and is convection cooled without fans for silent operation, simplifying negotiations with site property owners and minimizing environmental impacts.

Installation can easily be done by a single person as the Alcatel–Lucent B4 RRH2x60-4R is compact and weighs about 25 kg, eliminating the need for a crane to hoist the BTS cabinet to the rooftop. A site can be in operation in less than one day.



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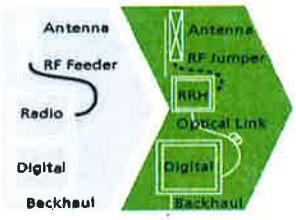
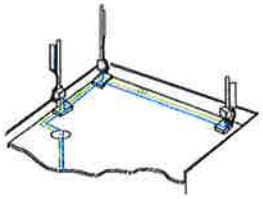


RRH for space-constrained cell sites



Distributed

FEATURES

- B4 RRH2x60-4R integrates two power amplifiers of 60W rating (at each antenna connector)
- Support multiple carriers over the entire 3GPP band 4
- B4 RRH2x60-4R is optimized for LTE operation
- B4 RRH2x60-4R is a very compact and lightweight product
- Advanced power management techniques are embedded to provide power savings, such as PA bias control

BENEFITS

- MIMO LTE operation with only one single unit per sector
- Improved uplink coverage with built-in 4-way receive diversity capability
- RRH can be mounted close to the antenna, eliminating nearly all losses in RF cables and thus reducing power consumption by 50% compared to conventional solutions
- Distributed configurations provide easily deployable and cost-effective solutions, near zero footprint and silent solutions, with minimum impact on the neighborhood, which ease the deployment
- RETA and TMA support without additional hardware thanks to the AISG v2.0 port and the integrated Bias-Tees. Bias-Tees support AISG DC supply and signaling.

TECHNICAL SPECIFICATIONS

Specifications listed are hardware capabilities. Some capabilities depend on support in a specific software release or future release.

Dimensions and weights

- HxWxD : 930x270x146 mm (with solar shield)
- Weight : 25 kg (55 lbs) (with solar shield)

Electrical Data

- Power Supply : -48V DC (-38 to -57V)
- Power Consumption: 346W typ. @2x30W (100%RF), 560W typ. @2x60W (100%RF)

RF Characteristics

- Frequency band: 1710-1755, UL / 2110-2155 MHz, DL (3GPP band 4)
- Output power: 2x60W at antenna connectors
- Technology supported: LTE
- Instantaneous bandwidth: 45 MHz
- Rx diversity: 2-way and 4-way uplink reception
- Typical sensitivity without Rx diversity: -105 dBm for LTE

Connectivity

- Two CPRI (3-6) optical ports for daisychaining and up to six RRHs per fiber
- Type of optical fiber: Single-Mode (SM) and Multi-Mode (MM) SFPs
- Optical fiber length: up to 300m using MM fiber, up to 15km using SM fiber
- TMA/RETA : AISG 2.0 (RS485 connector and internal Bias-Tee)
- Four external alarms
- Surge protection for all external ports (DC and RF)

Environmental specifications

- Operating temperature: -40°C to 55°C including solar load
- Operating relative humidity: 8% to 100%
- Environmental Conditions : ETS 300 019-1-4 class 4.1E
- Ingress Protection : IEC 60529 IP65
- Acoustic Noise : Noiseless (natural convection cooling)

Safety and Regulatory Data

- EMC : 3GPP 25113, EN 301 489-1, EN 301 489-23, GR 1089, GR 3108, OET-65
- Safety : IEC60950-1, EN 60825-1, UL, ANSI/NFPA 70, CAN/CSA-C22.2
- Regulatory : FCC Part 15 Class B
- Health : EN 50385

Alcatel·Lucent

8220-603 series

Reliability through Simplicity

POLAR POWER INC.

Back-up DC Generator Set

Founded in 1979 Polar Power specialized in solar photovoltaic systems, solar air conditioning and refrigeration. We developed and provided photovoltaic charging controls for telecommunications in the 1980s along with DC generators for the military. In 1994 we were first to provide DC generators with remote control and monitoring to the telecommunications industry.

Polar's success is based on engineering generators to meet the very specific needs of each application. Telecom site optimization is best met with the DC generator technology as the loads and batteries are DC. It makes no sense to install an AC generator and convert the output to DC. The AC generators are designed for a wide range of applications and they are not specifically produced for telecom applications so there are issues with reliability, space, and fuel efficiency.

Polar can save you considerable time and cost in permitting, installing, purchasing, and maintaining a backup generator. We reduce CAPEX and OPEX costs while improving backup reliability.

Intertek 4003706

Conforms to UL STD 2200

Certified to CSA STD C22.2 No. 100

Meets EPA Emission Regulations
CA/MA Emissions Compliant

Available Models:

- **8220-603-NG-12** Natural Gas 12 kW -48 VDC
- **8340-603-NG-15** Natural Gas 15 kW -48 VDC
- **8220-603-LP-12** LPG 12 kW -48 VDC
- **8340-603-LP-15** LPG 15 kW -48 VDC

2 year standard warranty, extended 5-10 year warranty available

Made in USA

The concepts and features behind Polar's backup generator for telecommunications include:

SMALL FOOTPRINT. Polar's DC generator is considerably smaller in size than an AC generator. You can now backup sites that could not accommodate an AC generator. Smaller also means less cost for space leasing.

LOW ACOUSTIC NOISE. <59 dBA @ 7 meters, and low vibration so as not to disturb the local residents or building landlords. Quieter than other generators with lower noise ratings.

LIGHTWEIGHT. Up to 1/3 the weight of a comparable AC generator. Facilitates roof top installations.

RODENT RESISTANT. Small animals can quickly destroy a generator set by gnawing on wires, fuel lines, radiator hoses, etc. Cooling air inlets and outlets have perforated aluminum screens to keep small rodents and large insects out. Stainless steel wire braid is placed over fuel and radiator lines for increased reliability and safety.

CORROSION RESISTANT. All-aluminum enclosure with stainless hardware for low maintenance, and long service life.

SUPERCAPACITOR STARTER. Failure to start is the number one problem plaguing generator reliability. Polar's unique design has replaced the starting battery with a Super Capacitor. Capacitors are more reliable and last longer than batteries (10-15 year life).

LONG LIFE. Controls and wire harnesses are designed to exceed a 20 year life. Higher grade, longer life electrical wire (UL 3173), weather tight connectors, gold plated connector pins on signal circuits. Controls and wire harness are easily replaceable.

ADVANCED MONITORING. Remote diagnostics, control, and monitoring. Ethernet and RS232 standard, with optional SNMP.

SIMPLICITY. Transfer switch, rectifier, and starting battery are not required.

POLAR POWER INC.
application and engineering data

COMPARING THE COST OF AC vs DC

	AC	DC
Transfer switch required	Yes	No
Permitting costs	$$	$
Shipping to site and installation cost	$$	$
Site preparation/reinforcing structures	$$$	$
Ethernet/RS232 remote control and monitoring	Extra	Standard

PERMITTING IS FACILITATED

- Small engine horsepower
- DC generator is fully isolated from the utility grid
- No transfer switch
- Low acoustic noise
- Incorporates all requirements made by local Fire Marshals

8220 ALTERNATOR FEATURES

- No mechanical adjustments
- Very lightweight
- High quality electrical output
- Voltage and current regulation
- Up to 94% efficiency
- Class 220° C insulation
- Anodized type III process for aluminum parts
- Nickel plating for steel parts
- Stator is varnished

8220 ALTERNATOR SPECIFICATIONS

Type	Permanent Magnets, NdFeB
Weight (lb/kg)	46.5/21
Regulation Type	Variable engine speed
Stator	3 phase/32 poles
Overcurrent Protection (A)	12 kW - 250 15 kW - 350
Disconnect Means	Pull fuse block, sized for each generator kW
Voltage Range (VDC)	44 to 62
Alternator Exhaust Flow (cfm/cmm)	130 to 180 / 3.68 to 5.1
MTBF (hr)	100,000+

ENCLOSURE

Model	88-25-0603
Type	Weather Protective
Materials	Marine Grade Aluminum
Door Hardware	Three Point with Padlock Hasp, and Removable Side Panels
Mounting	Secure Mounting Tabs

STARTER SUPERCAPACITOR SPECIFICATIONS

Model	20-16-0001
Storage Rating (Farads)	500
Voltage (VDC)	13-14.4
Weight (lb/kg)	12.1/5.5
Operating Temperature (°C/°F)	-40 to 65 / -40 to 149
Service Life (year)	10 to 15

CHARGER SPECIFICATIONS

Model	00-10-0015
Input Voltage (VDC)	28.8 to 60
Output Voltage (VDC)	14 to 14.4
Recharge time from 0 VDC (min)	10
Recharge time from 8 VDC (min)	2
Weight (lb/kg)	2.2/1

SOUND EMISSIONS

Contact us for current sound data.

WEIGHTS AND DIMENSIONS

	Natural Gas	LPG
Dry Weight (lb/kg)	765/347	770/350
Dimensions (LxWxH) (in/cm)	32 x 50 x 72 / 81.3 x 127 x 183	

ENGINE SPECIFICATIONS: 12 - 15 KW NATURAL GAS and LPG

Engine Model	Natural Gas - Kubota DG972 LPG - Kubota WG972
Cylinders	3 In-line
Displacement (L)	0.962
Bore (in./mm)	2.93/74.5
Stroke (in./mm)	2.9/73.6
Intake Air System	Naturally Aspirated
Engine HP	18
Emissions Compliance	EPA and CARB Certified
Variable RPM	2300 to 3150

ENVIRONMENTAL

Operating Temperature (°C/°F)	-40 to 72 or -40 to 162
Operating Humidity %	100
Cold Start Aids	Glow Plugs

PROPANE ENGINE FUEL CONSUMPTION

	Output (kW)	gal/hr	L/hr
Kubota 972	4	0.97	3.67
	5	1.1	4.16
	6	1.26	4.77
	7	1.475	5.58
	8	1.69	6.4
	9	1.945	7.36
	10	2.2	8.33
	12	2.52	9.54
	15	3.55	13.44

ENGINE LUBRICATION SYSTEM

Oil Filter Type	Full flow spin-on canister
Oil Capacity	3.7 L - DG972/WG972
Oil Pressure Switch	Yes
Oil Pressure Transducer	Optional

ENGINE COOLING SYSTEM

Type	Pressurized Aluminum Radiator
Water Pump	Belt-driven, Pre-lubed, self-sealing
Fan Type	Electric Fans
Airflow CFM or M³/hr	1300 or 2200
Fan Mode	Pusher
Temperature Switch	Yes

FUEL SYSTEM

Type	Natural Gas or Propane
Fuel Tank/Line	Supplied By Customer
Max Fuel Flow Rate (BTU/hr)	12 kW - 241,000 15 kW - 340,000

Pressure Chart

Minimum	Recommended	Maximum
0.14 psi	0.39 psi	0.5 psi
4 in H2O	11 in H2O	13.9 in H2O
10 mbar	27.4 mbar	34.5 mbar

POWER ADJUSTMENT FOR AMBIENT CONDITIONS

Temperature Deration	1% derate for every 5.6 °C (10 °F) above 25 °C (77 °F)
Altitude Deration	3% derate for every 300 m (1000 ft) above 91 m (300 ft)

POLAR POWER INC.
operating data

ENGINE COOLING

	Natural Gas	LPG
System coolant capacity (gal/L)	2.2/8.3	
Maximum operation air temperature on radiator (°C/°F)	54/129	
Maximum ambient temperature (°C/°F)	49/120	

COMBUSTION REQUIREMENTS

	Natural Gas	LPG
Flow at rated power (cfm/cmm)	47/1.34	

EXHAUST

	Natural Gas	LPG
Exhaust flow at rated output (cfm/cmm)	90/2.55	
Exhaust temperature at rated output (°C/°F)	480/900	

CONTROLLER FEATURES

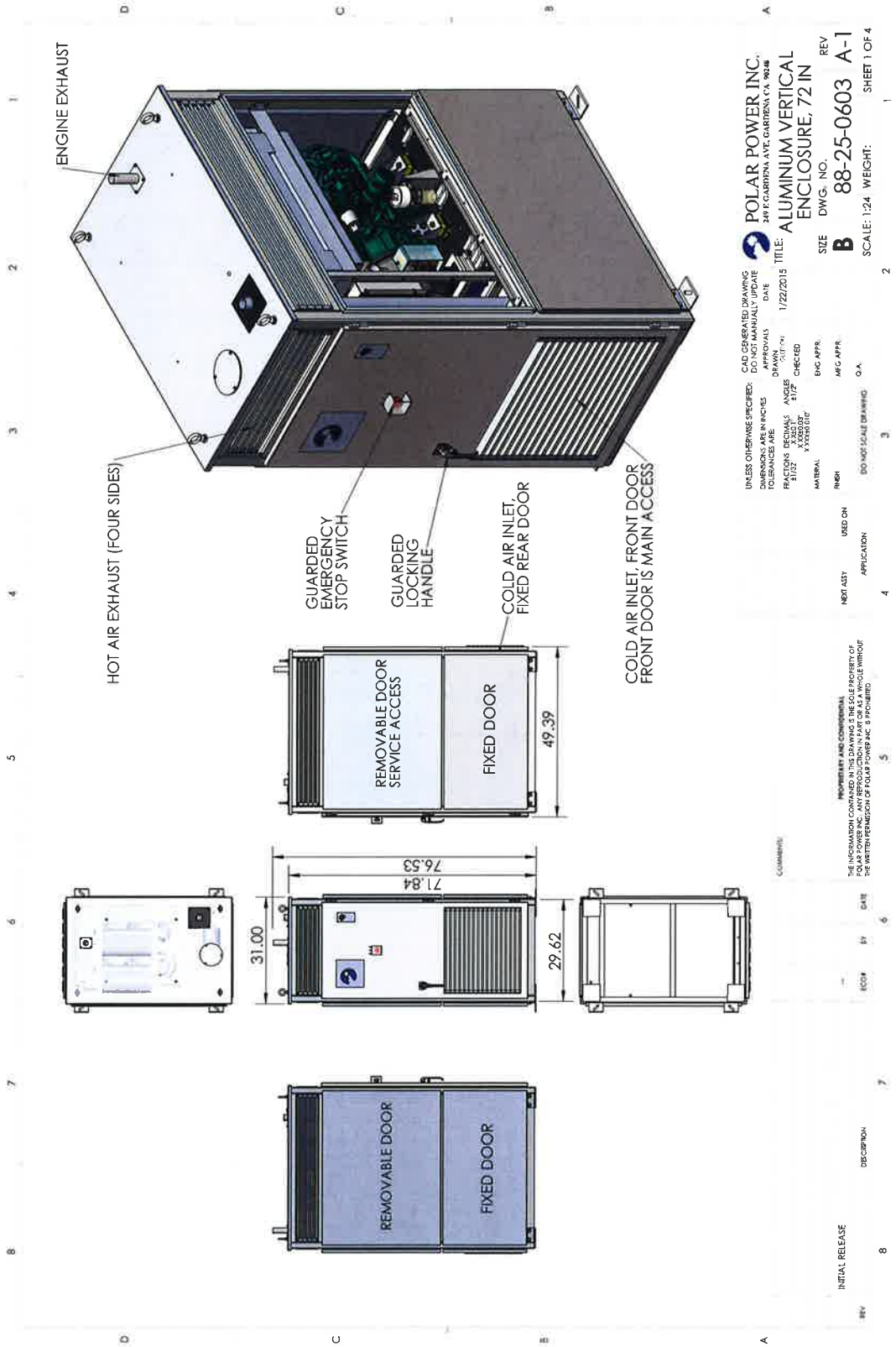
Controller Type.....Supra Model 250
4-Line Plain Text LCD Display.....Simple user interface for ease of operation
Engine Run Hours Indication.....Standard
Programmable Start Delay.....Standard
Run/Alarm/Maintenance Logs.....Standard
Engine Start Sequence.....Cyclic cranking: 5 sec on, 45 sec rest (3 attempts maximum)
Starter Supercapacitor Charger.....Standard
Automatic Voltage Regulation with Over and Under Voltage Protection.....Standard
Automatic Low Oil Pressure/High Oil Temperature Shutdown.....Standard
Overcrank/Overspeed.....Standard
Automatic High Engine Temperature Shutdown.....Standard
Field Upgradeable Firmware.....Standard
Glow Plug Delay .....Automatic With Temperature
Engine Start Delay.....Adjustable, Set at 60 sec
Return to Utility Delay.....Adjustable, Set at 60 sec
Engine Cooldown.....Adjustable, Set at 60 sec
Exerciser.....Programmable, weekly/bi-weekly

WARNING ALARMS

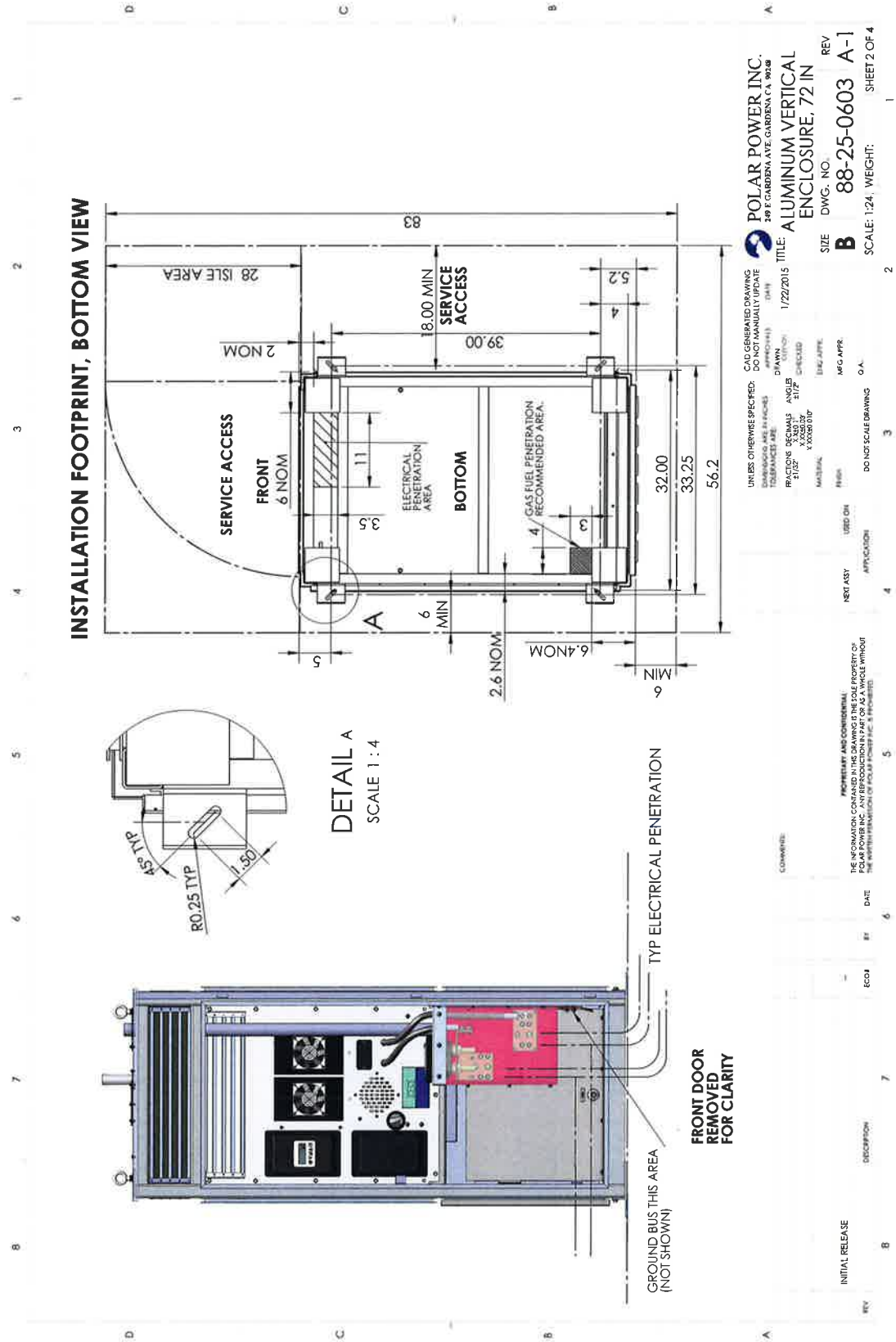
Low Diesel Fuel Level.....Standard
Diesel Fuel Tank Rapture Basin.....Standard
Low/High Supercapacitor Voltage.....Standard
High Water Temperature.....Standard
Low Oil Pressure.....Standard

CONTACT CLOSURE FOR REMOTE INDICATION (PN 84-12-0640)

Shutdown Alarm.....Optional
Warning Alarm.....Optional
Engine Run.....Optional
Low Diesel Fuel Level.....Optional
Diesel Fuel Leak.....Optional
E-Stop Depressed.....Optional
Fuel Level Over 90%.....Optional


ENGINE EXHAUST
HOT AIR EXHAUST (FOUR SIDES)
GUARDED EMERGENCY STOP SWITCH
GUARDED LOCKING HANDLE
COLD AIR INLET, FIXED REAR DOOR
COLD AIR INLET, FRONT DOOR FRONT DOOR IS MAIN ACCESS
REMOVABLE DOOR SERVICE ACCESS
FIXED DOOR
49.39
76.53
71.84
31.00
29.62
REMOVABLE DOOR
FIXED DOOR
POLAR POWER INC.
249 E GARDENA AVE, GARDENA CA 90248
TITLE: ALUMINUM VERTICAL ENCLOSURE, 72 IN
SIZE B
DWG. NO. 88-25-0603
REV A-1
SCALE: 1:24 WEIGHT:
SHEET 1 OF 4
INITIAL RELEASE
PROPRIETARY AND CONFIDENTIAL
THE INFORMATION CONTAINED IN THIS DRAWING IS THE SOLE PROPERTY OF POLAR POWER INC. ANY REPRODUCTION IN PART OR AS A WHOLE WITHOUT THE WRITTEN PERMISSION OF POLAR POWER INC. IS PROHIBITED

POLAR POWER INC.
installation layout



ATTACHMENT 4

CENTEK engineering

Centered on Solutions℠

Structural Analysis Report

280' Existing Valmont Lattice Tower

Proposed Verizon Wireless
Antenna Installation

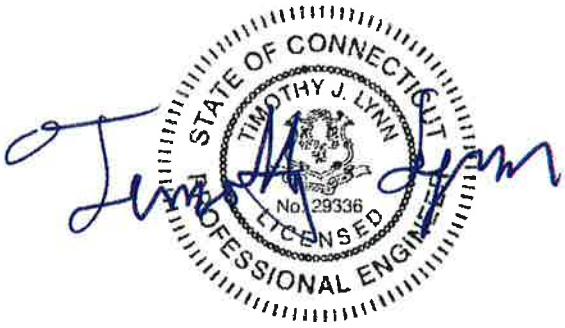
Verizon Site Ref: Higganum South

Eversource Site Ref: Goose Hill

330 Pokorny Road
Haddam, CT

CENTEK Project No. 15078.000

Date: April 9, 2015



Prepared for:

Verizon Wireless
99 East River Road, 9th Floor
East Hartford, CT 06108

Table of Contents

Introduction

The purpose of this report is to summarize the results of the non-linear, P-Δ structural analysis of the antenna installation proposed by Verizon Wireless on the existing lattice tower located in Haddam, Connecticut.

The host tower is a 280-ft, three legged, lattice tower originally manufactured by Valmont eng. file no. A-175068 dated 5/14/2012. The tower geometry, structure member sizes and foundation information were taken from the original design documents.

Antenna and appurtenance inventory were taken from a previous structural analysis report prepared by Centek job no. 14316.000 dated February 3, 2015, a tower inventory list provided by Eversource, visual verification from grade conducted by Centek personnel on December 10, 2014 and a Verizon RF data sheet.

The tower consists of fourteen (14) vertical sections consisting of steel truss legs conforming to ASTM A572 Gr. 50 and lateral bracing conforming to ASTM A36. The vertical tower sections are connected by bolted flange plates with the diagonal and horizontal bracing to pipe legs consisting of bolted connections. The width of the tower face is 12-ft at the top and 40-ft at the bottom.

Verizon Wireless proposes the installation of twelve (12) panel antennas, nine (9) remote radio heads and two (2) distribution boxes mounted on three (3) 12-ft T-Frames. Refer to the Antenna and Appurtenance Summary below for a detailed description of the proposed antenna and appurtenance configuration.

Antenna and Appurtenance Summary

The existing and proposed loads considered in the analysis consist of the following:

- UNKNOWN (Existing):
  Antenna: Lighting mounted to the top of the tower.
  Cable: One (1) 3/8" ∅ cable running on a leg/face of the existing tower as specified in Section 3 of this report.
- VSC (Existing):
  Antenna: One (1) Celwave PD1142-2C Omni-directional whip antenna leg mounted with an elevation of ±279-ft above grade level.
  Coax Cable: One (1) 1-5/8" ∅ coax cable running on a leg/face of the existing tower as specified in Section 3 of this report.
- Eversource (Existing):
  Antenna: One (1) Decibel DB538 Omni-directional whip antenna leg mounted with an elevation of ±279-ft above grade level.
  Coax Cable: One (1) 7/8" ∅ coax cable running on a leg/face of the existing tower as specified in Section 3 of this report.
- Eversource (Existing):
  Antenna: One (1) Telewave ANT150F6 Omni-directional whip antenna leg mounted with an elevation of ±279-ft above grade level.
  Coax Cable: One (1) 7/8" ∅ coax cable running on a leg/face of the existing tower as specified in Section 3 of this report.

- EVERSOURCE (Existing):
  Antenna: Two (2) 8-ft microwave dishes pipe mounted with an elevation of ±276-ft above grade level.
  Cables: Two (2) EW63 cables running on a leg/face of the existing tower as specified in Section 3 of this report.
- EVERSOURCE (Reserved):
  Antenna: One (1) 8-ft microwave dish pipe mounted with an elevation of ±276-ft above grade level.
  Cables: One (1) EW63 cable running on a leg/face of the existing tower as specified in Section 3 of this report.
- EVERSOURCE (Existing):
  Antenna: One (1) 8-ft microwave dish pipe mounted with an elevation of ±266-ft above grade level.
  Cables: One (1) EW63 cables running on a leg/face of the existing tower as specified in Section 3 of this report.
- EVERSOURCE (Existing):
  Antenna: One (1) 8-ft microwave dish pipe mounted with an elevation of ±266-ft above grade level.
  Cables: One (1) EW63 cables running on a leg/face of the existing tower as specified in Section 3 of this report.
- VSC (Existing):
  Antenna: One (1) 10-ft dipole mounted on one (1) 6-ft side arm with an elevation of ±161-ft above grade level.
  Coax Cable: Two (2) 7/8" ∅ coax cables running on a leg/face of the existing tower as specified in Section 3 of this report.
- EVERSOURCE (Existing):
  Antenna: Two (2) Decibel DB589-Y Omni-directional whip antennas (one upright and one inverted) and one (1) 12"x16"x6" TMA mounted on one (1) 6-ft side arm with an elevation of ±260-ft above grade level.
  Coax Cable: Two (2) 1-5/8" ∅ and one (1) 1/2" ∅ coax cables running on a leg/face of the existing tower as specified in Section 3 of this report.
- EVERSOURCE (Existing):
  Antenna: One (1) Decibel DB212-C dipole antenna mounted on one (1) 6-ft side arm with an elevation of ±255-ft above grade level.
  Coax Cable: One (1) 7/8" ∅ coax cable running on a leg/face of the existing tower as specified in Section 3 of this report.
- EVERSOURCE (Existing):
  Antenna: One (1) Sinclair SD110-SFXPASNM dipole antenna mounted on one (1) 6-ft side arm with an elevation of ±241-ft above grade level.
  Coax Cable: One (1) 7/8" ∅ coax cable running on a leg/face of the existing tower as specified in Section 3 of this report.

- EVERSOURCE (Existing):
  Antenna: One (1) Kreco CO-36A Omni-directional whip antenna mounted on one (1) 6-ft side arm with an elevation of ±240-ft above grade level.
  Coax Cable: One (1) 7/8" ∅ coax cable running on a leg/face of the existing tower as specified in Section 3 of this report.
- EVERSOURCE (Reserved):
  Antenna: One (1) 8-ft microwave dish pipe mounted with an elevation of ±240-ft above grade level.
  Cables: One (1) EW63 cable running on a leg/face of the existing tower as specified in Section 3 of this report.
- CSP (Existing):
  Antenna: Two (2) Sinclair SE419-SF3P4LDF panel antennas (one upright and one inverted) and one (1) 12"x16"x6" TMA mounted on one (1) 6-ft side arm with an elevation of ±235-ft above grade level.
  Coax Cable: Two (2) 1-5/8" ∅ and two (2) 1/2" ∅ coax cables running on a leg/face of the existing tower as specified in Section 3 of this report.
- EVERSOURCE (Reserved):
  Antenna: One (1) 8-ft microwave dish pipe mounted with an elevation of ±230-ft above grade level.
  Cables: One (1) EW63 cable running on a leg/face of the existing tower as specified in Section 3 of this report.
- EVERSOURCE (Existing):
  Antenna: One (1) Comprod 531-70HD dipole antenna mounted on one (1) 3-ft side arm with an elevation of ±230-ft above grade level.
  Coax Cable: One (1) 7/8" ∅ coax cable running on a leg/face of the existing tower as specified in Section 3 of this report.
- EVERSOURCE (Existing):
  Antenna: One (1) 8-ft microwave dish pipe mounted with an elevation of ±220-ft above grade level.
  Cables: One (1) EW63 cables running on a leg/face of the existing tower as specified in Section 3 of this report.
- EVERSOURCE (Existing):
  Antenna: One (1) Sinclair SD110-SFXPASNM dipole antenna mounted on one (1) 6-ft side arm with an elevation of ±216-ft above grade level.
  Coax Cable: One (1) 7/8" ∅ coax cable running on a leg/face of the existing tower as specified in Section 3 of this report.
- VSC (Existing):
  Antenna: One (1) Telewave ANT450F10 Omni-directional whip antenna mounted on one (1) 6-ft side arm with an elevation of ±216-ft above grade level.
  Coax Cable: One (1) 7/8" ∅ coax cable running on a leg/face of the existing tower as specified in Section 3 of this report.

- EVERSOURCE (Reserved):
  Antenna: One (1) 10-ft microwave dish pipe mounted with an elevation of ±205.5-ft above grade level.
  Cables: One (1) EW63 cable running on a leg/face of the existing tower as specified in Section 3 of this report.
- CSP (Existing):
  Antenna: Two (2) Sinclair SC479 Omni-directional whip antennas (one upright and one inverted) and one (1) 12"x16"x6" TMA mounted on one (1) 6-ft side arm with an elevation of ±200-ft above grade level.
  Coax Cable: Two (2) 1-5/8" ∅ and one (1) 1/2" ∅ coax cables running on a leg/face of the existing tower as specified in Section 3 of this report.
- CSP (Existing):
  Antenna: One (1) Sinclair SC479 Omni-directional whip antenna (inverted) mounted on one (1) 3-ft side arm with an elevation of ±200-ft above grade level.
  Coax Cable: One (1) 1-5/8" ∅ cable running on a leg/face of the existing tower as specified in Section 3 of this report.
- CSP (Existing):
  Antenna: One (1) 6-ft microwave dish pipe mounted with an elevation of ±197-ft above grade level.
  Cables: One (1) EW63 cable running on a leg/face of the existing tower as specified in Section 3 of this report.
- CSP (Existing):
  Antenna: One (1) 10-ft microwave dish pipe mounted with an elevation of ±195-ft above grade level.
  Cables: One (1) EW63 cable running on a leg/face of the existing tower as specified in Section 3 of this report.
- CSP (Existing):
  Antenna: Two (2) Sinclair SC479 Omni-directional whip antennas (one upright and one inverted) mounted on one (1) 6-ft side arm with an elevation of ±175-ft above grade level.
  Coax Cable: Two (2) 1-5/8" ∅ coax cables running on a leg/face of the existing tower as specified in Section 3 of this report.
- CSP (Existing):
  Antenna: One (1) Antel BCR-80010-90 Omni-directional whip antenna with reflector (upright), one (1) Antel BCD-80609 Omni-directional whip antenna (inverted) and one (1) 12"x16"x6" TMA mounted on one (1) 3-ft side arm with an elevation of ±175-ft above grade level.
  Coax Cable: Two (2) 1-5/8" ∅ and two (2) 1/2" ∅ coax cables running on a leg/face of the existing tower as specified in Section 3 of this report.
- Town of Haddam (Existing):
  Antenna: One (1) Telewave ANT450F6 Omni-directional whip antenna mounted on one (1) 3-ft side arm with an elevation of ±168-ft above grade level.
  Coax Cable: One (1) 7/8" ∅ coax cable running on a leg/face of the existing tower as specified in Section 3 of this report.

- CSP (Existing):
  Antenna: One (1) 6-ft microwave dish pipe mounted with an elevation of ±163-ft above grade level.
  Cables: One (1) EW63 cable running on a leg/face of the existing tower as specified in Section 3 of this report.
- SPRINT (Existing/Reserved):
  Antenna: Twelve (12) Andrew DB980H90E-M panel antennas mounted on three (3) 12-ft frames with a RAD center elevation of ±155-ft above grade level.
  Coax Cable: Eighteen (18) 1-5/8" ∅ coax cables running on a leg/face of the existing tower as specified in Section 3 of this report.
- VSC (Existing):
  Antenna: One (1) Kreco CO-36A Omni-directional whip antenna mounted on one (1) 6-ft side arm with an elevation of ±130-ft above grade level.
  Coax Cable: One (1) 7/8" ∅ coax cable running on a leg/face of the existing tower as specified in Section 3 of this report.
- VSC (Existing):
  Antenna: One (1) Kathrein PR-950 paraflector mounted on one (1) 6-ft side arm with an elevation of ±126-ft above grade level.
  Coax Cable: One (1) 7/8" ∅ coax cable running on a leg/face of the existing tower as specified in Section 3 of this report.
- VSC (Existing):
  Antenna: One (1) Telewave ANT450F6 Omni-directional whip antenna mounted on one (1) 6-ft side arm with an elevation of ±124-ft above grade level.
  Coax Cable: One (1) 7/8" ∅ coax cable running on a leg/face of the existing tower as specified in Section 3 of this report.
- EVERSOURCE (Proposed):
  Antenna: One (1) RFS SBX4-W60 microwave dish pipe mounted with an elevation of ±123-ft above grade level on leg "C".
  Cables: One (1) E60 cable running on a leg/face of the existing tower as specified in Section 3 of this report.
- VSC (Existing):
  Antenna: One (1) grid dish mounted on one (1) 3-ft side arm with an elevation of ±117-ft above grade level.
  Coax Cable: One (1) 7/8" ∅ coax cable running on a leg/face of the existing tower as specified in Section 3 of this report.
- VSC (Existing):
  Antenna: One (1) Browning BR6155 Omni-directional whip antenna mounted on one (1) 3-ft side arm with an elevation of ±116-ft above grade level.
  Coax Cable: One (1) 7/8" ∅ coax cable running on a leg/face of the existing tower as specified in Section 3 of this report.
- CSP (Existing):
  Antenna: One (1) Telewave ANT400D dipole antenna mounted on the 3-ft side arm (above) with an elevation of ±116-ft above grade level.
  Coax Cable: One (1) 7/8" ∅ coax cable running on a leg/face of the existing tower as specified in Section 3 of this report.

- CSP (Existing):
  Antenna: One (1) 6-ft microwave dish pipe mounted with an elevation of ±104-ft above grade level.
  Cables: One (1) EW63 cable running on a leg/face of the existing tower as specified in Section 3 of this report.
- VSC (Existing):
  Antenna: One (1) Browning BR6155 Omni-directional whip antenna mounted on one (1) 3-ft side arm with an elevation of ±97-ft above grade level.
  Coax Cable: One (1) 7/8" ∅ coax cable running on a leg/face of the existing tower as specified in Section 3 of this report.
- CSP (Existing):
  Antenna: One (1) 5-ft dipole antenna mounted on one (1) 3-ft side arm with an elevation of ±55-ft above grade level.
  Coax Cable: One (1) 7/8" ∅ coax cable running on a leg/face of the existing tower as specified in Section 3 of this report.
- **VERIZON (PROPOSED):**
  Antennas: Six (6) Andrew HBXX-6517DS panel antennas, six (6) Andrew LNX-6515DS panel antennas, three (3) Alcatel-Lucet RRH-2x60-LTE remote radio heads, three (3) Alcatel-Lucet RRH-2x60-AWS remote radio heads, three (3) Alcatel-Lucet RRH-2x60-PCS remote radio heads and two (2) RFS DB-T1-6Z-8AB main distribution boxes mounted on three (3) 12-ft frames with a RAD center elevation of ±145-ft above grade level.
  Coax Cables: Two (2) 1-5/8" ∅ fiber cables running on a leg/face of the existing tower as specified in Section 3 of this report.

Primary Assumptions Used in the Analysis

- The tower structure's theoretical capacity not including any assessment of the condition of the tower.
- The tower carries the horizontal and vertical loads due to the weight of antennas, ice load and wind.
- Tower is properly installed and maintained.
- Tower is in plumb condition.
- Tower loading for antennas and mounts as listed in this report.
- All bolts are appropriately tightened providing the necessary connection continuity.
- All welds are fabricated with ER-70S-6 electrodes.
- All members are assumed to be as specified in the original tower design documents.
- All members are "hot dipped" galvanized in accordance with ASTM A123 and ASTM A153 Standards.
- All member protective coatings are in good condition.
- All tower members were properly designed, detailed, fabricated, installed and have been properly maintained since erection.
- Any deviation from the analyzed antenna loading will require a new analysis for verification of structural adequacy.
- All coax cables should be routed as specified in section 3 of this report.

Analysis

The existing tower was analyzed using a comprehensive computer program entitled tnxTower. The program analyzes the tower, considering the worst case loading condition. The tower is considered as loaded by concentric forces along the tower legs, and the model assumes that the leg members are subjected to bending, axial, and shear forces.

The existing tower was analyzed for 85mph basic wind speed (fastest mile) with no ice and 85mph with ½ inch accumulative ice to determine stresses in members as per guidelines of Northeast Utilities Substation Standard (NU SUB-090), TIA/EIA-222-F-96 entitled "Structural Standards for Steel Antenna Towers and Antenna Supporting Structures", the American Institute of Steel Construction (AISC) and the Manual of Steel Construction; Allowable Stress Design (ASD).

Tower Loading

Tower loading was determined by the basic wind speed as applied to projected surface areas with modification factors per TIA/EIA-222-F, gravity loads of the tower structure and its components, and the application of ½" radial ice tower structure and its components.

Basic Wind Speed:	Middlesex; v = 85 mph (fastest mile)	[Section 16 of TIA/EIA-222-F-96]
	NU SUB-090; v = 85 mph (fastest mile)	[Northeast Utilities Substation Standard 090]
	Haddam; v = 110 mph (3 second gust) equivalent to v = 90 mph (fastest mile)	[Appendix K of the 2005 CT Building Code Supplement]
	NU–SUB-090 wind speed controls	
Load Cases:	Load Case 1; 85 mph wind speed w/ no ice plus gravity load – used in calculation of tower stresses and rotation. This load case typically controls the design.	[Northeast Utilities Substation Standard 090]
	Load Case 2; 85 mph wind speed w/ ½" radial ice plus gravity load – used in calculation of tower stresses. This load case typically controls the design of lattice towers.	[Northeast Utilities Substation Standard 090]
	Load Case 3; Seismic – not checked	[Section 1614.5 of State Bldg. Code 2005] does not control in the design of this structure type

Tower Capacity

Tower stresses were calculated utilizing the structural analysis software tnxTower. Allowable stresses were determined based on Table 5 of the TIA/EIA code with a 1/3 increase per Section 3.1.1.1 of the same code.

The tower deflection was evaluated with a wind velocity of 85 mph concurrent with 0.5" ice to determine twist (rotation) and sway (deflection) in accordance with NU SUB-90 requirements.

- Calculated stresses were found to be within allowable limits. In Load Case 2, per tnxTower "Section Capacity Table", this tower was found to be at **77.5%** of its total capacity.

Tower Section	Elevation	Stress Ratio (percentage of capacity)	Result
Diagonal Bolts (T8)	120'-0"-140'-0"	77.5%	**PASS**
Leg (T14)	0'-0"-20'-0"	76.3%	**PASS**
Mid Girt (T3)	220'-0"-240'-0"	72.4%	**PASS**

- The tower combined deflection is **0.4896 degrees**.

Deflection Criteria	Proposed (degrees)	Allowable (degrees)	Result
Sway (Tilt)	0.4869	0.5	**n/a**
Twist	0.0517	0.5	**n/a**
Combined	0.4896	0.5	**PASS** (1)

Note 1: Tower deflection per NU SUB-090.

Foundation and Anchors

The existing foundation consists of three (3) 5.5-ft ∅ x 4.25-ft long piers on a 49.5-ft square x 2.25-ft thick reinforced concrete mat. The base of the tower is connected to the foundation by means of (12) 1.25"∅, ASTM F1554-105 anchor bolts per leg embedded approximately 5-ft into the concrete foundation structure.

- The tower reactions developed from the governing Load Case 2 were used in the verification of the foundation:

Reactions	Vector	Proposed Base Reactions
Base	Shear	**137 kips**
	Compression	**184 kips**
	Moment	**20246 kip-ft**
Leg	Shear	**79 kips**
	Uplift	**497 kips**
	Compression	**646 kips**

- The anchor bolts were found to be within allowable limits.

Tower Component	Design Limit	Stress Ratio (percentage of capacity)	Result
Anchor Bolts	Tension	56.1%	**PASS**

- The foundation was found to be within allowable limits.

Foundation	Design Limit	IBC 2003/2005 CT State Building Code Section 3108.4.2 (FS)[1]	Proposed Loading (FS)[1]	Result
Reinforced Concrete Piers (3) and Mat	OM[2]	2.0	2.49	**PASS**

Note 1: FS denotes Factor of Safety
Note 2: OM denotes Overturning Moment.

Conclusion and Recommendations

This analysis shows that the subject tower **is adequate** to support the proposed modified antenna configuration with the below recommendations.

- **All coax cables routed as specified in Section 3 of this report.**

The analysis is based, in part, on the information provided to this office by Verizon Wireless. If the existing conditions are different than the information in this report, Centek Engineering, Inc. must be contacted for resolution of any potential issues.

Please feel free to call with any questions or comments.

Respectfully Submitted by:

Timothy J. Lynn, PE
Structural Engineer

Standard Conditions for Furnishing of Professional Engineering Services on Existing Structures

All engineering services are performed on the basis that the information used is current and correct. This information may consist of, but is not necessarily limited to:

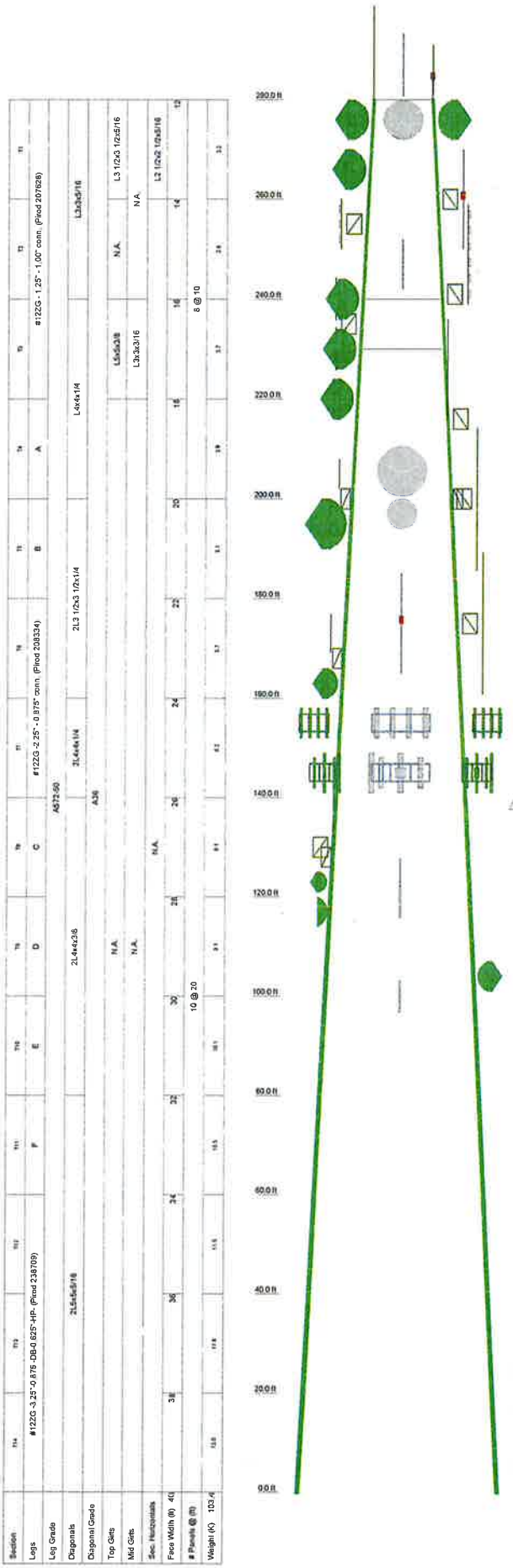
- Information supplied by the client regarding the structure itself, its foundations, the soil conditions, the antenna and feed line loading on the structure and its components, or other relevant information.
- Information from the field and/or drawings in the possession of Centek Engineering, Inc. or generated by field inspections or measurements of the structure.
- It is the responsibility of the client to ensure that the information provided to Centek Engineering, Inc. and used in the performance of our engineering services is correct and complete. In the absence of information to the contrary, we assume that all structures were constructed in accordance with the drawings and specifications and are in an un-corroded condition and have not deteriorated. It is therefore assumed that its capacity has not significantly changed from the "as new" condition.
- All services will be performed to the codes specified by the client, and we do not imply to meet any other codes or requirements unless explicitly agreed in writing. If wind and ice loads or other relevant parameters are to be different from the minimum values recommended by the codes, the client shall specify the exact requirement. In the absence of information to the contrary, all work will be performed in accordance with the latest revision of ANSI/ASCE10 & ANSI/EIA-222
- All services performed, results obtained, and recommendations made are in accordance with generally accepted engineering principles and practices. Centek Engineering, Inc. is not responsible for the conclusions, opinions and recommendations made by others based on the information we supply.

GENERAL DESCRIPTION OF STRUCTURAL ANALYSIS PROGRAM

tnxTower, is an integrated structural analysis and design software package for Designed specifically for the telecommunications industry, tnxTower, formerly RISATower, automates much of the tower analysis and design required by the TIA/EIA 222 Standard.

tnxTower Features:

- tnxTower can analyze and design 3- and 4-sided guyed towers, 3- and 4-sided self-supporting towers and either round or tapered ground mounted poles with or without guys.
- The program analyzes towers using the TIA-222-G (2005) standard or any of the previous TIA/EIA standards back to RS-222 (1959). Steel design is checked using the AISC ASD 9th Edition or the AISC LRFD specifications.
- Linear and non-linear (P-delta) analyses can be used in determining displacements and forces in the structure. Wind pressures and forces are automatically calculated.
- Extensive graphics plots include material take-off, shear-moment, leg compression, displacement, twist, feed line, guy anchor and stress plots.
- tnxTower contains unique features such as True Cable behavior, hog rod take-up, foundation stiffness and much more.



DESIGNED APPURTENANCE LOADING

TYPE	ELEVATION	TYPE	ELEVATION
Beacon Extender (4') 803062	280	6' Solid w/ Radome (CSP)	163
Beacon	280	(4) DB980H90E-M (Sprint)	155
DB538 (Eversource)	279	(4) 2" x 60" Sch. 40 (Sprint)	155
ANT150F6 -138-151 MHZ (Eversource)	279	12' V Frame (Sprint)	155
1142-2C (VSC)	279	(4) DB980H90E-M (Sprint)	155
8' Solid w/ Radome (Eversource)	276	(4) 2" x 60" Sch. 40 (Sprint)	155
8' Solid w/ Radome (Eversource)	276	12' V Frame (Sprint)	155
8' Solid w/ Radome (Eversource)	276	(4) DB980H90E-M (Sprint)	155
8' Solid w/ Radome (Eversource)	266	(4) 2" x 60" Sch. 40 (Sprint)	155
10' Dipole (VSC)	261	12' V Frame (Sprint)	155
6' Pivot Side Arm (50" pipe) (VSC)	261	RRH2x60-07-U (Verizon - Proposed)	145
DB589-Y (Eversource)	260	RRH2x60-07-U (Verizon - Proposed)	145
DB589-Y (Eversource)	260	DB-T1-6Z-8AB-0Z (Verizon - Proposed)	145
TMA (12"x16"x6") (Eversource)	260	DB-T1-6Z-8AB-0Z (Verizon - Proposed)	145
6' Pivot Side Arm (50" pipe) (Eversource)	260	12' V Frame (Verizon - Proposed)	145
DB212-1-C (Eversource)	255	12' V Frame (Verizon - Proposed)	145
6' Pivot Side Arm (50" pipe) (Eversource)	255	12' V Frame (Verizon - Proposed)	145
SD110-SFXPASNM (Eversource)	241	LNX-6515DS (Verizon - Proposed)	145
6' Pivot Side Arm (50" pipe) (Eversource)	241	HBXX-6517DS (Verizon - Proposed)	145
KRECO CO-36A (Eversource)	240	LNX-6515DS (Verizon - Proposed)	145
6' Pivot Side Arm (50" pipe) (Eversource)	240	HBXX-6517DS (Verizon - Proposed)	145
8' Solid w/ Radome (Eversource)	240	RRH2x60-AWS (Verizon - Proposed)	145
TMA (12"x16"x6") (CSP)	235	LNX-6515DS (Verizon - Proposed)	145
SE419-SF3P4LDF (CSP)	235	HBXX-6517DS (Verizon - Proposed)	145
SE419-SF3P4LDF (CSP)	235	LNX-6515DS (Verizon - Proposed)	145
6' Pivot Side Arm (50" pipe) (CSP)	235	HBXX-6517DS (Verizon - Proposed)	145
531-70HD (Eversource)	230	LNX-6515DS (Verizon - Proposed)	145
3' Pivot Side Arm (50" pipe) (Eversource)	230	RRH2x60-AWS (Verizon - Proposed)	145
6' Solid w/ Radome (Eversource)	230	RRH2x60-AWS (Verizon - Proposed)	145
8' Solid w/ Radome (Eversource)	220	HBXX-6517DS (Verizon - Proposed)	145
ANT450F10 (VSC)	216	LNX-6515DS (Verizon - Proposed)	145
6' Pivot Side Arm (50" pipe) (VSC)	216	RRH2x60-PCS (Verizon - Proposed)	145
SD110-SFXPASNM (Eversource)	216	RRH2x60-PCS (Verizon - Proposed)	145
6' Pivot Side Arm (50" pipe) (Eversource)	216	RRH2x60-PCS (Verizon - Proposed)	145
10' Solid w/ Radome (Eversource)	205.5	RRH2x60-07-U (Verizon - Proposed)	145
SC479 (CSP)	200	HBXX-6517DS (Verizon - Proposed)	145
3' Pivot Side Arm (50" pipe) (CSP)	200	KRECO CO-38A (VSC)	130
SC479 (CSP)	200	6' Pivot Side Arm (50" pipe) (VSC)	130
3' Pivot Side Arm (50" pipe) (CSP)	200	3' Pivot Side Arm (50" pipe) (VSC)	128
SC479 (CSP)	200	PR-950 (VSC)	126
6' Pivot Side Arm (50" pipe) (CSP)	200	6' Pivot Side Arm (50" pipe) (VSC)	126
TMA (12"x16"x6") (CSP)	200	ANT450F6 (VSC)	124
ANT900D6-9 (CSP)	200	6' Pivot Side Arm (50" pipe) (VSC)	124
6' Solid w/ Radome (CSP)	197	SBX4-W60 (Eversource)	123
10' Solid w/ Radome (CSP)	195	6' Grid Dish (VSC)	117
6' Pivot Side Arm (50" pipe) (CSP)	175	BR-6155 (VSC)	116
BCR-80010-90 (CSP)	175	ANT400D (CSP)	116
BCD-80909 (CSP)	175	3' Pivot Side Arm (50" pipe) (VSC/CSP)	116
TMA (12"x16"x6") (CSP)	175	6' Solid w/ Radome (Eversource)	104
3' Pivot Side Arm (50" pipe) (CSP)	175	BR-6155 (VSC)	97
SC479 (CSP)	175	3' Pivot Side Arm (50" pipe) (VSC)	97
SC479 (CSP)	175	5-ft dipole (CSP)	55
ANT450F6 (Town of Haddam)	168	3' Pivot Side Arm (50" pipe) (CSP)	55
3' Pivot Side Arm (50" pipe) (Town of Haddam)	168		

SYMBOL LIST

MARK	SIZE	MARK	SIZE
A	#122G - 1.75" - 1.00" conn. (Pinod 195957)	D	#122G -2.75"-0.875 -DB-0.625"-HP- (Pinod 238706)
B	#122G -2.00" - 0.875" conn.-Trans (Pinod 211843)	E	#122G -3.00"-0.875 -DB-0.625"-HP-Trans- (Pinod 238707)
C	#122G - 2.50" - 0.875" conn. (Pinod 208335)	F	#122G -3.00"-0.875 -DB-0.625"-HP- (Pinod 238709)

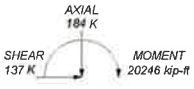
MATERIAL STRENGTH

GRADE	Fy	Fu	GRADE	Fy	Fu
A572-50	50 ksi	65 ksi	A36	36 ksi	58 ksi

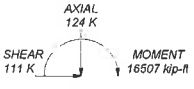
TOWER DESIGN NOTES

1. Tower designed for a 85 mph basic wind in accordance with the TIA/EIA-222-F Standard.
2. Tower is also designed for a 85 mph basic wind with 0.50 in ice.
3. Deflections are based upon a 85 mph wind.
4. TOWER RATING: 77.5%

MAX. CORNER REACTIONS AT BASE:
DOWN: 646 K
UPLIFT: -497 K
SHEAR: 79 K



TORQUE 71 kip-ft
85 mph WIND - 0.5000 in ICE

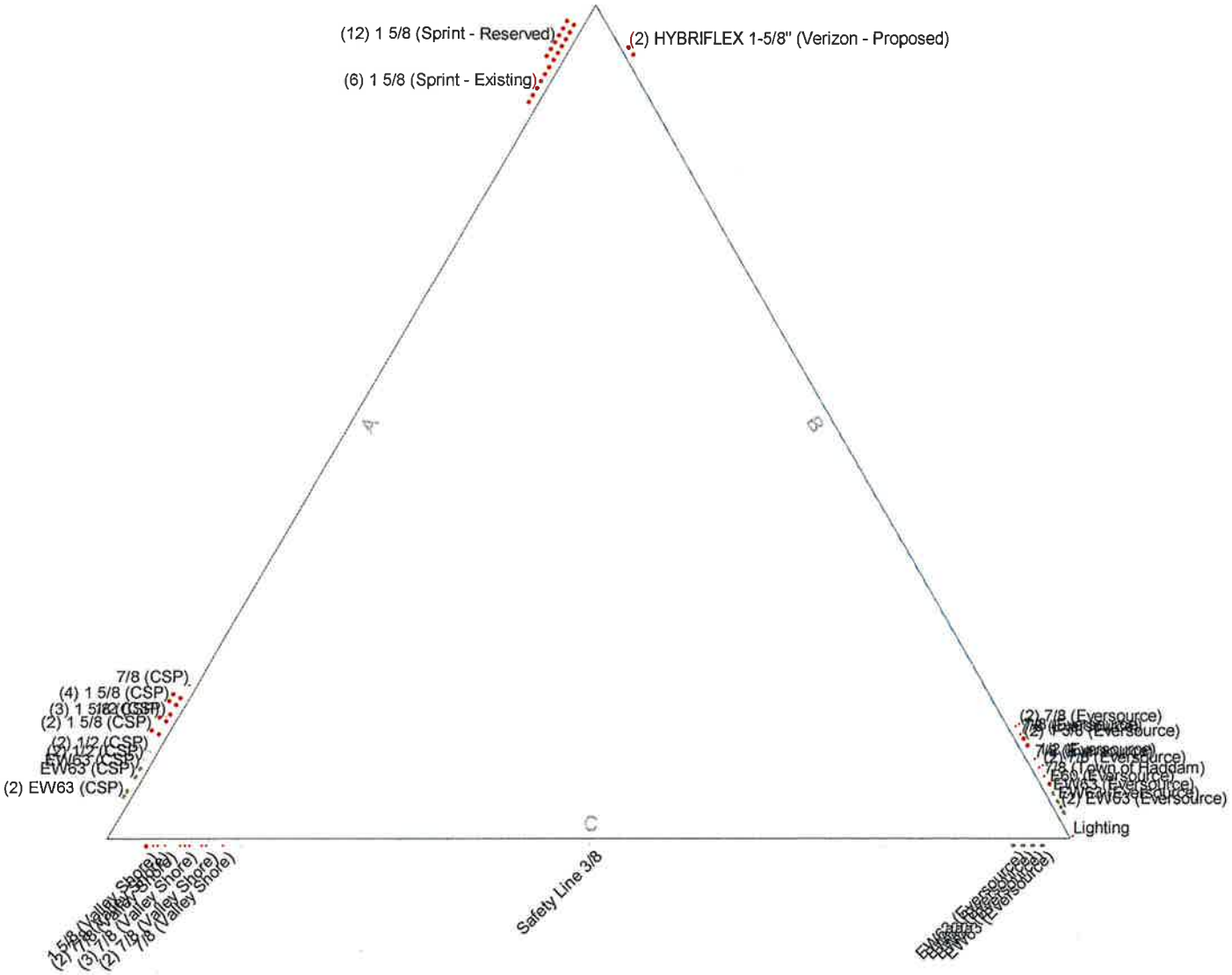


TORQUE 68 kip-ft
REACTIONS - 85 mph WIND

Centek Engineering Inc.
63-2 North Branford Rd.
Branford, CT 06405
Phone: (203) 488-0580
FAX: (203) 488-8587

Job: 15078 - Higganum South			
Project: U-40 x 280' - Haddam - Goose Hill, CT			
Client: Verizon Wireless	Drawn by: TJL	Appd:	
Code: TIA/EIA-222-F	Date: 04/09/15	Scale: NTS	
Path:		Dwg No. E-1	

Round Flat App In Face App Out Face Truss-Leg

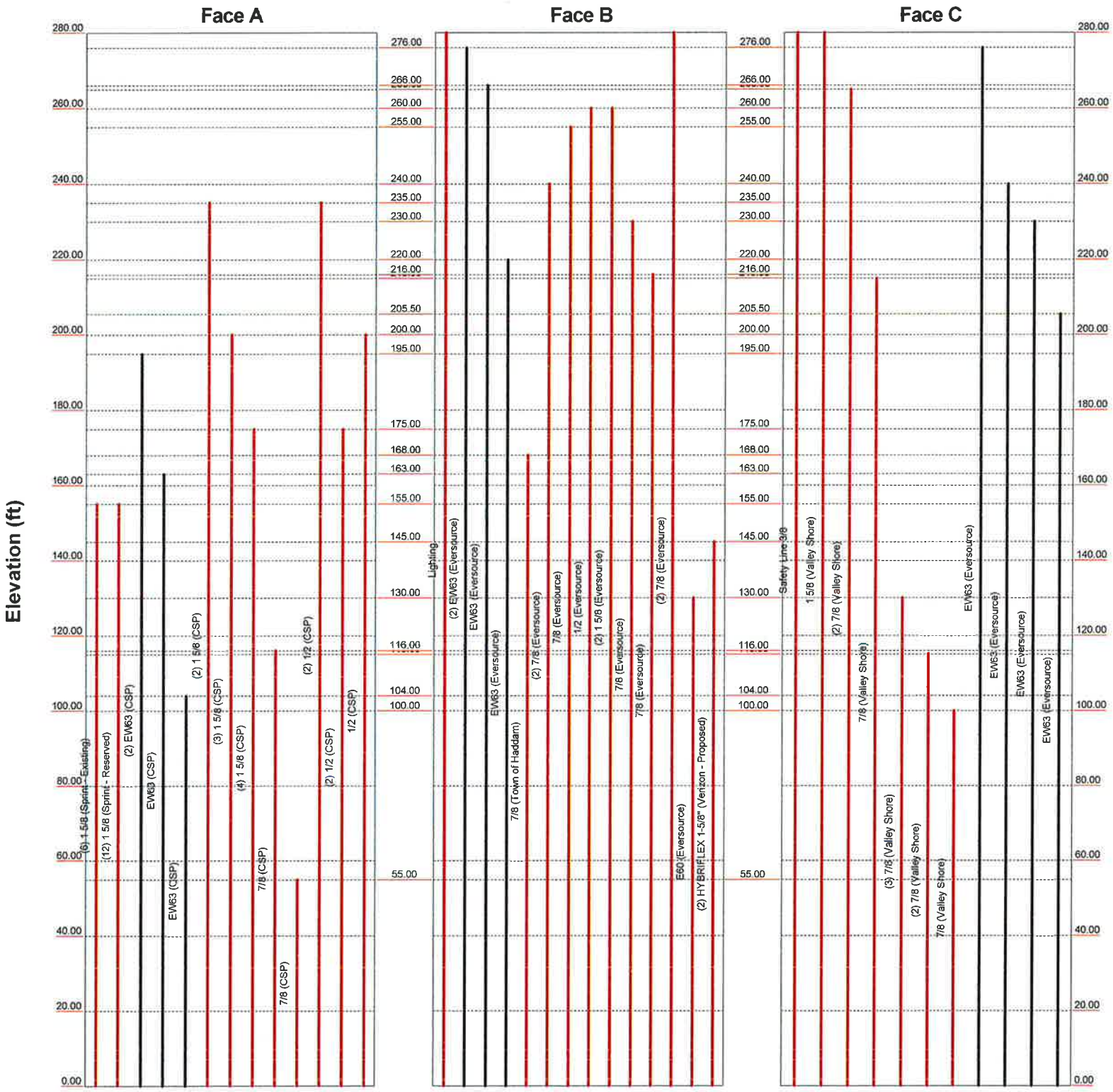


Centek Engineering Inc.
63-2 North Branford Rd.
Branford, CT 06405
Phone: (203) 488-0580
FAX: (203) 488-8587

Job: **15078 - Higganum South**			
Project: ***U-40 x 280' - Haddam - Goose Hill, CT***			
Client: Verizon Wireless	Drawn by: TJL	App'd:	
Code: TIA/EIA-222-F	Date: 04/09/15	Scale: N	
Path:		Dwg No.	

0' - 280'

Round | Flat | App In Face | App Out Face | Truss Leg



Centek Engineering Inc.
63-2 North Branford Rd.
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Phone: (203) 488-0580
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Job: **15078 - Higganum South**			
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Client: Verizon Wireless	Drawn by: TJL	App'd:	
Code: TIA/EIA-222-F	Date: 04/09/15	Scale: N	
Path:		Dwg No.	

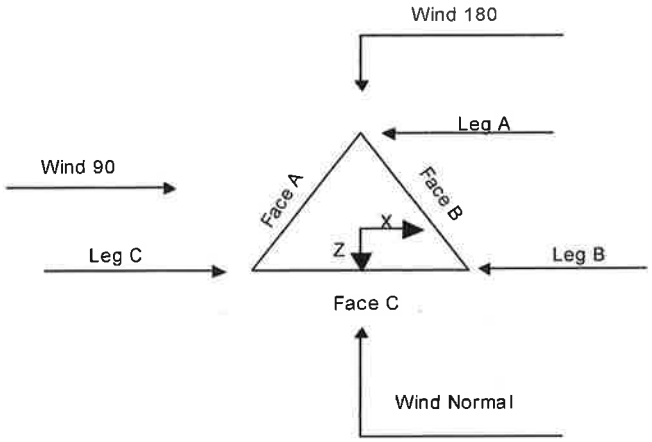
Tower Input Data

The main tower is a 3x free standing tower with an overall height of 280.00 ft above the ground line.
The base of the tower is set at an elevation of 0.00 ft above the ground line.
The face width of the tower is 12.00 ft at the top and 40.00 ft at the base.
This tower is designed using the TIA/EIA-222-F standard.
The following design criteria apply:

Basic wind speed of 85 mph.
Nominal ice thickness of 0.5000 in.
Ice density of 56 pcf.
A wind speed of 85 mph is used in combination with ice.
Temperature drop of 50 °F.
Deflections calculated using a wind speed of 85 mph.
A non-linear (P-delta) analysis was used.
Pressures are calculated at each section.
Stress ratio used in tower member design is 1.333.
Local bending stresses due to climbing loads, feedline supports, and appurtenance mounts are not considered.

Options

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



Triangular Tower

Tower Section Geometry

Tower Section	Tower Elevation ft	Assembly Database	Description	Section Width ft	Number of Sections	Section Length ft
T1	280.00-260.00		PiRod 12BD Truss Leg	12.00	1	20.00
T2	260.00-240.00		PiRod 12BD Truss Leg	14.00	1	20.00
T3	240.00-220.00		PiRod 12BD Truss Leg	16.00	1	20.00
T4	220.00-200.00		PiRod 12BD Truss Leg	18.00	1	20.00
T5	200.00-180.00		PiRod 12BDH Truss Leg	20.00	1	20.00
T6	180.00-160.00		PiRod 12BDH Truss Leg	22.00	1	20.00
T7	160.00-140.00		PiRod 12BDH Truss Leg	24.00	1	20.00
T8	140.00-120.00		PiRod 12BDH Truss Leg	26.00	1	20.00
T9	120.00-100.00		PiRod 12BDH Truss Leg	28.00	1	20.00
T10	100.00-80.00		PiRod 12BDH Truss Leg	30.00	1	20.00
T11	80.00-60.00		PiRod 12BDH Truss Leg	32.00	1	20.00
T12	60.00-40.00		PiRod 12BDH Truss Leg	34.00	1	20.00
T13	40.00-20.00		PiRod 18BD Truss Leg	36.00	1	20.00
T14	20.00-0.00		PiRod 18BD Truss Leg	38.00	1	20.00

Tower Section Geometry *(cont'd)*

Tower Section	Tower Elevation ft	Diagonal Spacing ft	Bracing Type	Has K Brace End Panels	Has Horizontals	Top Girt Offset in	Bottom Girt Offset in
T1	280.00-260.00	10.00	X Brace	No	Yes	0.0000	0.0000

Tower Section	Tower Elevation ft	Diagonal Spacing ft	Bracing Type	Has K Brace End Panels	Has Horizontals	Top Girt Offset in	Bottom Girt Offset in
T2	260.00-240.00	10.00	X Brace	No	No	0.0000	0.0000
T3	240.00-220.00	10.00	X Brace	No	No	0.0000	0.0000
T4	220.00-200.00	10.00	X Brace	No	Yes	0.0000	0.0000
T5	200.00-180.00	20.00	X Brace	No	No	0.0000	0.0000
T6	180.00-160.00	20.00	X Brace	No	No	0.0000	0.0000
T7	160.00-140.00	20.00	X Brace	No	No	0.0000	0.0000
T8	140.00-120.00	20.00	X Brace	No	No	0.0000	0.0000
T9	120.00-100.00	20.00	X Brace	No	No	0.0000	0.0000
T10	100.00-80.00	20.00	X Brace	No	No	0.0000	0.0000
T11	80.00-60.00	20.00	X Brace	No	No	0.0000	0.0000
T12	60.00-40.00	20.00	X Brace	No	No	0.0000	0.0000
T13	40.00-20.00	20.00	X Brace	No	No	0.0000	0.0000
T14	20.00-0.00	20.00	X Brace	No	No	0.0000	0.0000

Tower Section Geometry *(cont'd)*

Tower Elevation ft	Leg Type	Leg Size	Leg Grade	Diagonal Type	Diagonal Size	Diagonal Grade
T1 280.00-260.00	Truss Leg	#12ZG - 1.25" - 1.00" conn. (Pirod 207628)	A572-50 (50 ksi)	Equal Angle	L3x3x5/16	A36 (36 ksi)
T2 260.00-240.00	Truss Leg	#12ZG - 1.25" - 1.00" conn. (Pirod 207628)	A572-50 (50 ksi)	Equal Angle	L3x3x5/16	A36 (36 ksi)
T3 240.00-220.00	Truss Leg	#12ZG - 1.25" - 1.00" conn. (Pirod 207628)	A572-50 (50 ksi)	Equal Angle	L4x4x1/4	A36 (36 ksi)
T4 220.00-200.00	Truss Leg	#12ZG - 1.75" - 1.00" conn. (Pirod 195557)	A572-50 (50 ksi)	Equal Angle	L4x4x1/4	A36 (36 ksi)
T5 200.00-180.00	Truss Leg	#12ZG -2.00" - 0.875" conn.-Trans (Pirod 211843)	A572-50 (50 ksi)	Double Equal Angle	2L3 1/2x3 1/2x1/4	A36 (36 ksi)
T6 180.00-160.00	Truss Leg	#12ZG -2.25" - 0.875" conn. (Pirod 208334)	A572-50 (50 ksi)	Double Equal Angle	2L3 1/2x3 1/2x1/4	A36 (36 ksi)
T7 160.00-140.00	Truss Leg	#12ZG -2.25" - 0.875" conn. (Pirod 208334)	A572-50 (50 ksi)	Double Equal Angle	2L4x4x1/4	A36 (36 ksi)
T8 140.00-120.00	Truss Leg	#12ZG - 2.50" - 0.875" conn. (Pirod 208335)	A572-50 (50 ksi)	Double Equal Angle	2L4x4x3/8	A36 (36 ksi)
T9 120.00-100.00	Truss Leg	#12ZG -2.75"-0.875 -DB-0.625"-HP- (Pirod 238706)	A572-50 (50 ksi)	Double Equal Angle	2L4x4x3/8	A36 (36 ksi)
T10 100.00-80.00	Truss Leg	#12ZG -3.00"-0.875 -DB-0.625"-HP-Trans- (Pirod 238707)	A572-50 (50 ksi)	Double Equal Angle	2L4x4x3/8	A36 (36 ksi)
T11 80.00-60.00	Truss Leg	#12ZG -3.00"-0.875 -DB-0.625"-HP- (Pirod 238708)	A572-50 (50 ksi)	Double Equal Angle	2L5x5x5/16	A36 (36 ksi)
T12 60.00-40.00	Truss Leg	#12ZG -3.25"-0.875 -DB-0.625"-HP- (Pirod 238709)	A572-50 (50 ksi)	Double Equal Angle	2L5x5x5/16	A36 (36 ksi)
T13 40.00-20.00	Truss Leg	#12ZG -3.25"-0.875 -DB-0.625"-HP- (Pirod 238709)	A572-50 (50 ksi)	Double Equal Angle	2L5x5x5/16	A36 (36 ksi)
T14 20.00-0.00	Truss Leg	#12ZG -3.25"-0.875 -DB-0.625"-HP- (Pirod 238709)	A572-50 (50 ksi)	Double Equal Angle	2L5x5x5/16	A36 (36 ksi)

Tower Section Geometry *(cont'd)*

Tower Elevation ft	Top Girt Type	Top Girt Size	Top Girt Grade	Bottom Girt Type	Bottom Girt Size	Bottom Girt Grade
T1 280.00-260.00	Equal Angle	L3 1/2x3 1/2x5/16	A36 (36 ksi)	Solid Round		A36 (36 ksi)
T3 240.00-220.00	Equal Angle	L5x5x3/8	A36 (36 ksi)	Solid Round		A36 (36 ksi)

Tower Section Geometry *(cont'd)*

Tower Elevation ft	No. of Mid Girts	Mid Girt Type	Mid Girt Size	Mid Girt Grade	Horizontal Type	Horizontal Size	Horizontal Grade
T3 240.00-220.00	1	Equal Angle	L3x3x3/16	A36 (36 ksi)	Solid Round		A572-50 (50 ksi)

Tower Section Geometry *(cont'd)*

Tower Elevation ft	Secondary Horizontal Type	Secondary Horizontal Size	Secondary Horizontal Grade	Inner Bracing Type	Inner Bracing Size	Inner Bracing Grade
T1 280.00-260.00	Equal Angle	L2 1/2x2 1/2x5/16	A36 (36 ksi)	Solid Round		A36 (36 ksi)

Tower Section Geometry *(cont'd)*

Tower Elevation ft	Gusset Area (per face) ft²	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
T1 280.00-260.00	0.00	0.5000	A36 (36 ksi)	1	1	1.05	36.0000	36.0000
T2 260.00-240.00	0.00	0.5000	A36 (36 ksi)	1	1	1.05	36.0000	36.0000
T3 240.00-220.00	0.00	0.5000	A36 (36 ksi)	1	1	1.05	36.0000	36.0000
T4 220.00-200.00	0.00	0.5000	A36 (36 ksi)	1	1	1.05	36.0000	36.0000
T5 200.00-180.00	0.00	0.6250	A36 (36 ksi)	1	1	1.05	36.0000	36.0000
T6 180.00-160.00	0.00	0.6250	A36 (36 ksi)	1	1	1.05	36.0000	36.0000
T7	0.00	0.6250	A36	1	1	1.05	36.0000	36.0000

Tower Elevation ft	Gusset Area (per face) ft²	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
160.00-140.00			(36 ksi)					
T8	0.00	0.6250	A36	1	1	1.05	36.0000	36.0000
140.00-120.00			(36 ksi)					
T9	0.00	0.6250	A36	1	1	1.05	36.0000	36.0000
120.00-100.00			(36 ksi)					
T10	0.00	0.6250	A36	1	1	1.05	36.0000	36.0000
100.00-80.00			(36 ksi)					
T11	0.00	0.6250	A36	1	1	1.05	36.0000	36.0000
80.00-60.00			(36 ksi)					
T12	0.00	0.6250	A36	1	1	1.05	36.0000	36.0000
60.00-40.00			(36 ksi)					
T13	0.00	0.6250	A36	1	1	1.05	36.0000	36.0000
40.00-20.00			(36 ksi)					
T14 20.00-0.00	0.00	0.6250	A36	1	1	1.05	36.0000	36.0000
			(36 ksi)					

Tower Section Geometry *(cont'd)*

Tower Elevation ft	Calc K Single Angles	Calc K Solid Rounds	K Factors[1] Legs	X Brace Diags X Y	K Brace Diags X Y	Single Diags X Y	Girts X Y	Horiz. X Y	Sec. Horiz. X Y	Inner Brace X Y
T1	Yes	Yes	1	1	1	1	1	1	1	1
280.00-260.00				1	1	1	1	1	1	1
T2	Yes	Yes	1	1	1	1	1	1	1	1
260.00-240.00				1	1	1	1	1	1	1
T3	Yes	Yes	1	1	1	1	1	1	1	1
240.00-220.00				1	1	1	1	1	1	1
T4	Yes	Yes	1	1	1	1	1	1	1	1
220.00-200.00				1	1	1	1	1	1	1
T5	Yes	Yes	1	1	1	1	1	1	1	1
200.00-180.00				1	1	1	1	1	1	1
T6	Yes	Yes	1	1	1	1	1	1	1	1
180.00-160.00				1	1	1	1	1	1	1
T7	Yes	Yes	1	1	1	1	1	1	1	1
160.00-140.00				1	1	1	1	1	1	1
T8	Yes	Yes	1	1	1	1	1	1	1	1
140.00-120.00				1	1	1	1	1	1	1
T9	Yes	Yes	1	1	1	1	1	1	1	1
120.00-100.00				1	1	1	1	1	1	1
T10	Yes	Yes	1	1	1	1	1	1	1	1
100.00-80.00				1	1	1	1	1	1	1
T11	Yes	Yes	1	1	1	1	1	1	1	1
80.00-60.00				1	1	1	1	1	1	1
T12	Yes	Yes	1	1	1	1	1	1	1	1
60.00-40.00				1	1	1	1	1	1	1
T13	Yes	Yes	1	1	1	1	1	1	1	1
40.00-20.00				1	1	1	1	1	1	1
T14	Yes	Yes	1	1	1	1	1	1	1	1
20.00-0.00				1	1	1	1	1	1	1

[1] *Note: K factors are applied to member segment lengths. K-braces without inner supporting members will have the K factor in the out-of-plane direction applied to the overall length.*

Tower Section Geometry *(cont'd)*

Tower Elevation ft	Truss-Leg K Factors: Truss-Legs Used As Leg Members: Leg Panels	X Brace Diagonals	Z Brace Diagonals	Truss-Legs Used As Inner Members: Leg Panels	X Brace Diagonals	Z Brace Diagonals
T1 280.00-260.00	1	0.5	0.7	1	0.5	0.7
T2 260.00-240.00	1	0.5	0.7	1	0.5	0.7
T3 240.00-220.00	1	0.5	0.7	1	0.5	0.7
T4 220.00-200.00	1	0.5	0.7	1	0.5	0.7
T5 200.00-180.00	1	0.5	0.7	1	0.5	0.7
T6 180.00-160.00	1	0.5	0.7	1	0.5	0.7
T7 160.00-140.00	1	0.5	0.7	1	0.5	0.7
T8 140.00-120.00	1	0.5	0.7	1	0.5	0.7
T9 120.00-100.00	1	0.5	0.7	1	0.5	0.7
T10 100.00-80.00	1	0.5	0.7	1	0.5	0.7
T11 80.00-60.00	1	0.5	0.7	1	0.5	0.7
T12 60.00-40.00	1	0.5	0.7	1	0.5	0.7
T13 40.00-20.00	1	0.5	0.7	1	0.5	1
T14 20.00-0.00	1	0.5	0.7	1	0.5	1

Tower Section Geometry *(cont'd)*

Tower Elevation ft	Leg: Net Width Deduct in	U	Diagonal: Net Width Deduct in	U	Top Girt: Net Width Deduct in	U	Bottom Girt: Net Width Deduct in	U	Mid Girt: Net Width Deduct in	U	Long Horizontal: Net Width Deduct in	U	Short Horizontal: Net Width Deduct in	U
T1 280.00-260.00	0.0000	1	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75
T2 260.00-240.00	0.0000	1	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75
T3 240.00-220.00	0.0000	1	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75
T4 220.00-200.00	0.0000	1	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75
T5 200.00-180.00	0.0000	1	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75

Tower Elevation ft	Leg		Diagonal		Top Girt		Bottom Girt		Mid Girt		Long Horizontal		Short Horizontal	
	Net Width Deduct in	U	Net Width Deduct in	U	Net Width Deduct in	U	Net Width Deduct in	U	Net Width Deduct in	U	Net Width Deduct in	U	Net Width Deduct in	U
T6 180.00-160.00	0.0000	1	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75
T7 160.00-140.00	0.0000	1	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75
T8 140.00-120.00	0.0000	1	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75
T9 120.00-100.00	0.0000	1	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75
T10 100.00-80.00	0.0000	1	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75
T11 80.00-60.00	0.0000	1	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75
T12 60.00-40.00	0.0000	1	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75
T13 40.00-20.00	0.0000	1	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75
T14 20.00-0.00	0.0000	1	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75

Tower Section Geometry *(cont'd)*

Tower Elevation	Connection Offsets							
	Diagonal				K-Bracing			
	Vert. Top	Horiz. Top	Vert. Bot.	Horiz. Bot.	Vert. Top	Horiz. Top	Vert. Bot.	Horiz. Bot.
ft	in	in	in	in	in	in	in	in
T1 280.00-260.00	5.0000	10.7500	5.0000	10.7500	0.0000	0.0000	0.0000	0.0000
T2 260.00-240.00	5.0000	10.7500	5.0000	10.7500	0.0000	0.0000	0.0000	0.0000
T3 240.00-220.00	5.0000	10.7500	5.0000	10.7500	0.0000	0.0000	0.0000	0.0000
T4 220.00-200.00	5.0000	10.7500	5.0000	10.7500	0.0000	0.0000	0.0000	0.0000
T5 200.00-180.00	5.0000	11.5000	5.0000	11.5000	0.0000	0.0000	0.0000	0.0000
T6 180.00-160.00	5.0000	11.5000	5.0000	11.5000	0.0000	0.0000	0.0000	0.0000
T7 160.00-140.00	5.0000	11.5000	5.0000	11.5000	0.0000	0.0000	0.0000	0.0000
T8 140.00-120.00	5.0000	11.5000	5.0000	11.5000	0.0000	0.0000	0.0000	0.0000
T9 120.00-100.00	5.0000	11.5000	5.0000	11.5000	0.0000	0.0000	0.0000	0.0000
T10 100.00-80.00	5.0000	11.5000	5.0000	11.5000	0.0000	0.0000	0.0000	0.0000
T11 80.00-60.00	5.0000	11.5000	5.0000	11.5000	0.0000	0.0000	0.0000	0.0000
T12 60.00-40.00	5.0000	11.5000	5.0000	11.5000	0.0000	0.0000	0.0000	0.0000

Tower Elevation	Connection Offsets							
	Diagonal				K-Bracing			
	Vert. Top	Horiz. Top	Vert. Bot.	Horiz. Bot.	Vert. Top	Horiz. Top	Vert. Bot.	Horiz. Bot.
ft	in	in	in	in	in	in	in	in
T13 40.00-20.00	5.0000	11.5000	5.0000	11.5000	0.0000	0.0000	0.0000	0.0000
T14 20.00-0.00	5.0000	11.5000	5.0000	11.5000	0.0000	0.0000	0.0000	0.0000

Tower Section Geometry *(cont'd)*

Tower Elevation ft	Leg Connection Type	Leg		Diagonal		Top Girt		Bottom Girt		Mid Girt		Long Horizontal		Short Horizontal	
		Bolt Size in	No.	Bolt Size in	No.	Bolt Size in	No.	Bolt Size in	No.	Bolt Size in	No.	Bolt Size in	No.	Bolt Size in	No.
T1 280.00-260.00	Flange	1.0000 A325N	6	1.0000 A325N	1	1.0000 A325N	1	1.0000 A325N	0	1.0000 A325N	0	1.0000 A325N	0	1.0000 A325N	0
T2 260.00-240.00	Flange	1.0000 A325N	6	1.0000 A325N	1	0.0000 A325N	0	1.0000 A325N	0	1.0000 A325N	0	1.0000 A325N	0	1.0000 A325N	0
T3 240.00-220.00	Flange	1.0000 A325N	6	1.0000 A325N	1	1.0000 A325N	1	1.0000 A325N	0	1.0000 A325N	1	1.0000 A325N	0	1.0000 A325N	0
T4 220.00-200.00	Flange	1.0000 A325N	6	1.0000 A325N	1	0.0000 A325N	0	1.0000 A325N	0	1.0000 A325N	0	1.0000 A325N	0	1.0000 A325N	0
T5 200.00-180.00	Flange	1.0000 A325N	12	0.8750 A325N	1	0.0000 A325N	0	1.0000 A325N	0	1.0000 A325N	0	1.0000 A325N	0	1.0000 A325N	0
T6 180.00-160.00	Flange	1.0000 A325N	12	0.8750 A325N	1	0.0000 A325N	0	1.0000 A325N	0	1.0000 A325N	0	1.0000 A325N	0	1.0000 A325N	0
T7 160.00-140.00	Flange	1.0000 A325N	12	0.8750 A325N	1	0.0000 A325N	0	1.0000 A325N	0	1.0000 A325N	0	1.0000 A325N	0	1.0000 A325N	0
T8 140.00-120.00	Flange	1.0000 A325N	12	0.8750 A325N	1	0.0000 A325N	0	1.0000 A325N	0	1.0000 A325N	0	1.0000 A325N	0	1.0000 A325N	0
T9 120.00-100.00	Flange	1.0000 A325N	12	0.8750 A325N	2	0.0000 A325N	0	1.0000 A325N	0	1.0000 A325N	0	1.0000 A325N	0	1.0000 A325N	0
T10 100.00-80.00	Flange	1.2500 A325N	12	0.8750 A325N	2	0.0000 A325N	0	1.0000 A325N	0	1.0000 A325N	0	1.0000 A325N	0	1.0000 A325N	0
T11 80.00-60.00	Flange	1.2500 A325N	12	0.8750 A325N	2	0.0000 A325N	0	1.0000 A325N	0	1.0000 A325N	0	1.0000 A325N	0	1.0000 A325N	0
T12 60.00-40.00	Flange	1.2500 A325N	12	0.8750 A325N	2	0.0000 A325N	0	1.0000 A325N	0	1.0000 A325N	0	1.0000 A325N	0	1.0000 A325N	0
T13 40.00-20.00	Flange	1.2500 A325N	12	0.8750 A325N	2	0.0000 A325N	0	1.0000 A325N	0	1.0000 A325N	0	1.0000 A325N	0	1.0000 A325N	0
T14 20.00-0.00	Flange	1.2500 F1554-105	12	0.8750 A325N	2	0.0000 A325N	0	1.0000 A325N	0	1.0000 A325N	0	1.0000 A325N	0	1.0000 A325N	0

Feed Line/Linear Appurtenances - Entered As Round Or Flat

Description	Face or Leg	Allow Shield	Component Type	Placement ft	Face Offset in	Lateral Offset (Frac FW)	#	# Per Row	Clear Spacing in	Width or Diameter in	Perimeter in	Weight plf
Safety Line 3/8	C	Yes	Ar (CfAe)	280.00 - 0.00	3.0000	0	1	1	0.3750	0.3750		0.22
Lighting	B	Yes	Ar (CfAe)	280.00 - 0.00	1.0000	0.5	1	1	0.8700	0.8700		0.15

Description	Face or Leg	Allow Shield	Component Type	Placement ft	Face Offset in	Lateral Offset (Frac FW)	#	# Per Row	Clear Spacing in	Width or Diameter in	Perimeter in	Weight plf
1 5/8 (Sprint - Existing)	A	Yes	Ar (CfAe)	155.00 - 0.00	3.0000	0.4	6	6	1.9800	1.9800		1.04
1 5/8 (Sprint - Reserved)	A	Yes	Ar (CfAe)	155.00 - 0.00	3.0000	0.45	12	6	1.9800	1.9800		1.04
EW63 (CSP)	A	Yes	Af (CfAe)	195.00 - 0.00	3.0000	-0.45	2	2	1.5742	1.5742	5.0668	0.51
EW63 (CSP)	A	Yes	Af (CfAe)	163.00 - 0.00	3.0000	-0.43	1	1	1.5742	1.5742	5.0668	0.51
EW63 (CSP)	A	Yes	Af (CfAe)	104.00 - 0.00	3.0000	-0.42	1	1	1.5742	1.5742	5.0668	0.51
1 5/8 (CSP)	A	Yes	Ar (CfAe)	235.00 - 0.00	3.0000	-0.38	2	1	1.9800	1.9800		1.04
1 5/8 (CSP)	A	Yes	Ar (CfAe)	200.00 - 0.00	3.0000	-0.36	3	2	1.9800	1.9800		1.04
1 5/8 (CSP)	A	Yes	Ar (CfAe)	175.00 - 0.00	3.0000	-0.34	4	2	1.9800	1.9800		1.04
1 5/8 (Valley Shore)	C	Yes	Ar (CfAe)	280.00 - 0.00	3.0000	0.46	1	1	1.9800	1.9800		1.04
7/8 (Valley Shore)	C	Yes	Ar (CfAe)	265.00 - 0.00	3.0000	0.45	2	2	1.1100	1.1100		0.54
7/8 (Valley Shore)	C	Yes	Ar (CfAe)	215.00 - 0.00	3.0000	0.44	1	1	1.1100	1.1100		0.54
7/8 (Valley Shore)	C	Yes	Ar (CfAe)	130.00 - 0.00	3.0000	0.42	3	3	1.1100	1.1100		0.54
7/8 (Valley Shore)	C	Yes	Ar (CfAe)	115.00 - 0.00	3.0000	0.4	2	2	1.1100	1.1100		0.54
7/8 (Valley Shore)	C	Yes	Ar (CfAe)	100.00 - 0.00	3.0000	0.38	1	1	1.1100	1.1100		0.54
EW63 (Eversource)	B	Yes	Af (CfAe)	276.00 - 0.00	3.0000	0.47	2	2	1.5742	1.5742	5.0668	0.51
EW63 (Eversource)	B	Yes	Af (CfAe)	266.00 - 0.00	3.0000	0.46	1	1	1.5742	1.5742	5.0668	0.51
EW63 (Eversource)	B	Yes	Af (CfAe)	220.00 - 0.00	3.0000	0.45	1	1	1.5742	1.5742	5.0668	0.51
7/8 (Town of Haddam)	B	Yes	Ar (CfAe)	168.00 - 0.00	3.0000	0.43	1	1	1.1100	1.1100		0.54
7/8 (Eversource)	B	Yes	Ar (CfAe)	240.00 - 0.00	3.0000	0.42	2	1	1.1100	1.1100		0.54
7/8 (Eversource)	B	Yes	Ar (CfAe)	255.00 - 0.00	3.0000	0.41	1	1	1.1100	1.1100		0.54
1/2 (Eversource)	B	Yes	Ar (CfAe)	260.00 - 0.00	5.0000	0.41	1	1	0.5800	0.5800		0.25
1 5/8 (Eversource)	B	Yes	Ar (CfAe)	260.00 - 0.00	3.0000	0.39	2	2	1.9800	1.9800		1.04
7/8 (Eversource)	B	Yes	Ar (CfAe)	230.00 - 0.00	3.0000	0.38	1	1	1.1100	1.1100		0.54
7/8 (Eversource)	B	Yes	Ar (CfAe)	216.00 - 0.00	5.0000	0.38	1	1	1.1100	1.1100		0.54
7/8 (Eversource)	B	Yes	Ar (CfAe)	280.00 - 0.00	3.0000	0.37	2	1	1.1100	1.1100		0.54
7/8 (CSP)	A	Yes	Ar (CfAe)	116.00 - 0.00	3.0000	-0.32	1	1	1.1100	1.1100		0.54
7/8 (CSP)	A	Yes	Ar (CfAe)	55.00 - 0.00	3.0000	-0.32	1	1	1.1100	1.1100		0.54
1/2 (CSP)	A	Yes	Ar (CfAe)	235.00 - 0.00	3.0000	-0.41	2	1	0.5800	0.5800		0.25
1/2 (CSP)	A	Yes	Ar (CfAe)	175.00 - 0.00	3.0000	-0.4	2	1	0.5800	0.5800		0.25

Description	Face or Leg	Allow Shield	Component Type	Placement ft	Face Offset in	Lateral Offset (Frac FW)	#	# Per Row	Clear Spacing in	Width or Diameter in	Perimeter in	Weight plf
1/2 (CSP)	A	Yes	Ar (CfAe)	200.00 - 0.00	5.0000	-0.36	1	1	0.5800	0.5800		0.25
E60 (Eversource)	B	Yes	Ar (CfAe)	130.00 - 0.00	3.0000	0.44	1	1	2.2000	2.2000		0.68
EW63 (Eversource)	C	Yes	Af (CfAe)	276.00 - 0.00	3.0000	-0.47	1	1	1.5742	1.5742	5.0668	0.51
EW63 (Eversource)	C	Yes	Af (CfAe)	240.00 - 0.00	3.0000	-0.46	1	1	1.5742	1.5742	5.0668	0.51
EW63 (Eversource)	C	Yes	Af (CfAe)	230.00 - 0.00	3.0000	-0.45	1	1	1.5742	1.5742	5.0668	0.51
EW63 (Eversource)	C	Yes	Af (CfAe)	205.50 - 0.00	3.0000	-0.44	1	1	1.5742	1.5742	5.0668	0.51
HYBRIFLEX 1-5/8" (Verizon - Proposed)	B	Yes	Ar (CfAe)	145.00 - 0.00	3.0000	-0.44	2	2	1.9800	1.9800		1.90

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
T1	280.00-260.00	A	0.000	0.000	0.000	0.000	0.00
		B	5.150	4.985	0.000	0.000	0.04
		C	4.850	2.099	0.000	0.000	0.04
T2	260.00-240.00	A	0.000	0.000	0.000	0.000	0.00
		B	14.104	7.871	0.000	0.000	0.11
		C	7.625	2.624	0.000	0.000	0.06
T3	240.00-220.00	A	6.400	0.000	0.000	0.000	0.04
		B	19.192	7.871	0.000	0.000	0.14
		C	7.625	6.559	0.000	0.000	0.07
T4	220.00-200.00	A	8.533	0.000	0.000	0.000	0.05
		B	21.597	10.495	0.000	0.000	0.16
		C	9.012	8.593	0.000	0.000	0.09
T5	200.00-180.00	A	19.400	3.936	0.000	0.000	0.13
		B	21.967	10.495	0.000	0.000	0.17
		C	9.475	10.495	0.000	0.000	0.10
T6	180.00-160.00	A	30.325	5.641	0.000	0.000	0.21
		B	22.707	10.495	0.000	0.000	0.17
		C	9.475	10.495	0.000	0.000	0.10
T7	160.00-140.00	A	76.532	7.871	0.000	0.000	0.52
		B	25.467	10.495	0.000	0.000	0.20
		C	9.475	10.495	0.000	0.000	0.10
T8	140.00-120.00	A	90.721	7.871	0.000	0.000	0.62
		B	32.250	10.495	0.000	0.000	0.26
		C	12.250	10.495	0.000	0.000	0.11
T9	120.00-100.00	A	92.201	8.396	0.000	0.000	0.63
		B	34.083	10.495	0.000	0.000	0.27
		C	17.800	10.495	0.000	0.000	0.15
T10	100.00-80.00	A	92.571	10.495	0.000	0.000	0.64
		B	34.083	10.495	0.000	0.000	0.27
		C	20.575	10.495	0.000	0.000	0.16
T11	80.00-60.00	A	92.571	10.495	0.000	0.000	0.64
		B	34.083	10.495	0.000	0.000	0.27
		C	20.575	10.495	0.000	0.000	0.16
T12	60.00-40.00	A	93.958	10.495	0.000	0.000	0.65
		B	34.083	10.495	0.000	0.000	0.27

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
		C	20.575	10.495	0.000	0.000	0.16
T13	40.00-20.00	A	94.421	10.495	0.000	0.000	0.65
		B	34.083	10.495	0.000	0.000	0.27
		C	20.575	10.495	0.000	0.000	0.16
T14	20.00-0.00	A	94.421	10.495	0.000	0.000	0.65
		B	34.083	10.495	0.000	0.000	0.27
		C	20.575	10.495	0.000	0.000	0.16

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
T1	280.00-260.00	A	0.500	0.000	0.000	0.000	0.000	0.00
		B		10.150	7.096	0.000	0.000	0.15
		C		9.017	2.988	0.000	0.000	0.11
T2	260.00-240.00	A	0.500	0.000	0.000	0.000	0.000	0.00
		B		25.354	11.204	0.000	0.000	0.34
		C		14.292	3.735	0.000	0.000	0.16
T3	240.00-220.00	A	0.500	10.875	0.000	0.000	0.000	0.10
		B		35.025	11.204	0.000	0.000	0.42
		C		14.292	9.337	0.000	0.000	0.22
T4	220.00-200.00	A	0.500	14.500	0.000	0.000	0.000	0.14
		B		39.597	14.939	0.000	0.000	0.50
		C		16.929	12.231	0.000	0.000	0.27
T5	200.00-180.00	A	0.500	31.434	5.602	0.000	0.000	0.37
		B		40.300	14.939	0.000	0.000	0.50
		C		17.808	14.939	0.000	0.000	0.31
T6	180.00-160.00	A	0.500	45.584	8.030	0.000	0.000	0.57
		B		41.707	14.939	0.000	0.000	0.51
		C		17.808	14.939	0.000	0.000	0.31
T7	160.00-140.00	A	0.500	101.616	11.204	0.000	0.000	1.35
		B		46.300	14.939	0.000	0.000	0.57
		C		17.808	14.939	0.000	0.000	0.31
T8	140.00-120.00	A	0.500	118.721	11.204	0.000	0.000	1.58
		B		56.417	14.939	0.000	0.000	0.69
		C		23.083	14.939	0.000	0.000	0.35
T9	120.00-100.00	A	0.500	121.534	11.951	0.000	0.000	1.61
		B		59.083	14.939	0.000	0.000	0.72
		C		33.633	14.939	0.000	0.000	0.44
T10	100.00-80.00	A	0.500	122.238	14.939	0.000	0.000	1.65
		B		59.083	14.939	0.000	0.000	0.72
		C		38.908	14.939	0.000	0.000	0.49
T11	80.00-60.00	A	0.500	122.238	14.939	0.000	0.000	1.65
		B		59.083	14.939	0.000	0.000	0.72
		C		38.908	14.939	0.000	0.000	0.49
T12	60.00-40.00	A	0.500	124.875	14.939	0.000	0.000	1.67
		B		59.083	14.939	0.000	0.000	0.72
		C		38.908	14.939	0.000	0.000	0.49
T13	40.00-20.00	A	0.500	125.754	14.939	0.000	0.000	1.68
		B		59.083	14.939	0.000	0.000	0.72
		C		38.908	14.939	0.000	0.000	0.49
T14	20.00-0.00	A	0.500	125.754	14.939	0.000	0.000	1.68
		B		59.083	14.939	0.000	0.000	0.72
		C		38.908	14.939	0.000	0.000	0.49

Feed Line Shielding

Section	Elevation	Face	A_R	A_R Ice	A_F	A_F Ice
	ft		ft^2	ft^2	ft^2	ft^2
T1	280.00-260.00	A	0.000	0.000	0.000	0.000
		B	0.000	0.496	0.816	1.457
		C	0.000	0.418	0.685	1.227
T2	260.00-240.00	A	0.000	0.000	0.000	0.000
		B	0.000	0.696	1.210	2.087
		C	0.000	0.372	0.616	1.117
T3	240.00-220.00	A	0.000	0.158	0.354	0.631
		B	0.000	1.131	2.586	4.523
		C	0.000	0.692	1.570	2.769
T4	220.00-200.00	A	0.000	0.143	0.321	0.573
		B	0.000	0.937	2.139	3.747
		C	0.000	0.584	1.327	2.334
T5	200.00-180.00	A	0.000	0.306	0.635	1.071
		B	0.000	0.580	1.158	2.031
		C	0.000	0.402	0.804	1.408
T6	180.00-160.00	A	0.000	0.429	0.895	1.500
		B	0.000	0.572	1.140	2.003
		C	0.000	0.386	0.772	1.351
T7	160.00-140.00	A	0.000	0.964	2.432	3.854
		B	0.000	0.602	1.377	2.409
		C	0.000	0.373	0.852	1.493
T8	140.00-120.00	A	0.000	1.091	2.774	4.364
		B	0.000	0.690	1.620	2.760
		C	0.000	0.417	0.943	1.669
T9	120.00-100.00	A	0.000	1.102	2.789	4.408
		B	0.000	0.701	1.655	2.802
		C	0.000	0.514	1.146	2.057
T10	100.00-80.00	A	0.000	1.121	2.830	4.483
		B	0.000	0.686	1.621	2.745
		C	0.000	0.556	1.232	2.224
T11	80.00-60.00	A	0.000	1.101	3.476	5.506
		B	0.000	0.674	1.992	3.372
		C	0.000	0.546	1.514	2.732
T12	60.00-40.00	A	0.000	1.110	3.490	5.550
		B	0.000	0.664	1.962	3.321
		C	0.000	0.538	1.491	2.691
T13	40.00-20.00	A	0.000	1.104	3.467	5.519
		B	0.000	0.656	1.936	3.278
		C	0.000	0.531	1.472	2.656
T14	20.00-0.00	A	0.000	1.091	3.427	5.456
		B	0.000	0.648	1.914	3.241
		C	0.000	0.525	1.455	2.625

Feed Line Center of Pressure

Section	Elevation	CP_X	CP_Z	CP_X Ice	CP_Z Ice
	ft	in	in	in	in
T1	280.00-260.00	3.6633	3.9917	3.9339	4.3544
T2	260.00-240.00	9.5191	8.6244	9.7693	9.3304
T3	240.00-220.00	8.0632	9.3750	8.6454	10.5616
T4	220.00-200.00	11.1142	13.4258	11.5618	14.8860

Section	Elevation	CP_X	CP_Z	CP_X Ice	CP_Z Ice
	ft	in	in	in	in
T5	200.00-180.00	6.1282	19.8551	6.4494	21.1263
T6	180.00-160.00	-0.1337	22.4232	1.2853	23.7030
T7	160.00-140.00	-4.2624	-3.1717	-2.3054	3.1122
T8	140.00-120.00	-4.8289	-11.4600	-3.1980	-3.8488
T9	120.00-100.00	-7.0511	-9.2087	-6.2314	-0.9568
T10	100.00-80.00	-9.3961	-8.0874	-8.8818	0.6274
T11	80.00-60.00	-9.3716	-8.0857	-9.0115	0.6562
T12	60.00-40.00	-10.2068	-8.1010	-10.0382	0.9548
T13	40.00-20.00	-10.8173	-8.3592	-10.7324	1.1136
T14	20.00-0.00	-11.2327	-8.6786	-11.1743	1.1929

Discrete Tower Loads

Description	Face or Leg	Offset Type	Offsets: Horz Lateral Vert ft ft ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
Beacon Extender (4') 803062	B	From Leg	0.00 0.00 2.00	0.0000	280.00	No Ice 1/2" Ice	1.11 1.32	1.11 1.32	0.03 0.04
Beacon	B	From Leg	0.00 0.00 4.00	0.0000	280.00	No Ice 1/2" Ice	2.40 2.67	2.40 2.67	0.07 0.10
DB538 (Eversource)	B	From Leg	0.00 0.00 7.00	0.0000	279.00	No Ice 1/2" Ice	2.25 4.46	2.25 4.46	0.01 0.02
DB589-Y (Eversource)	B	From Leg	6.00 0.00 5.00	0.0000	260.00	No Ice 1/2" Ice	1.83 2.75	1.83 2.75	0.01 0.03
DB589-Y (Eversource)	B	From Leg	6.00 0.00 -5.00	0.0000	260.00	No Ice 1/2" Ice	1.83 2.75	1.83 2.75	0.01 0.03
TMA (12"x16"x6"") (Eversource)	B	From Leg	6.00 0.00 0.00	0.0000	260.00	No Ice 1/2" Ice	2.53 2.71	1.20 1.33	0.02 0.04
6' Pivot Side Arm (50" pipe) (Eversource)	B	From Leg	3.00 0.00 0.00	0.0000	260.00	No Ice 1/2" Ice	1.91 2.67	3.93 4.99	0.13 0.17
SD110-SFXPASNM (Eversource)	B	From Leg	6.00 0.00 8.00	0.0000	241.00	No Ice 1/2" Ice	2.43 4.46	2.43 4.46	0.03 0.04
6' Pivot Side Arm (50" pipe) (Eversource)	B	From Leg	3.00 0.00 0.00	0.0000	241.00	No Ice 1/2" Ice	1.91 2.67	3.93 4.99	0.13 0.17
ANT450F10 (VSC)	B	From Leg	0.00 0.00 10.00	0.0000	216.00	No Ice 1/2" Ice	5.59 7.63	5.59 7.63	0.04 0.08
6' Pivot Side Arm (50" pipe) (VSC)	B	From Leg	3.00 0.00 0.00	0.0000	216.00	No Ice 1/2" Ice	1.91 2.67	3.93 4.99	0.13 0.17
TMA (12"x16"x6"") (CSP)	B	From Leg	6.00 0.00 0.00	0.0000	200.00	No Ice 1/2" Ice	2.53 2.71	1.20 1.33	0.02 0.04

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
SC479 (CSP)	B	From Leg	6.00 0.00 7.00	0.0000	200.00	No Ice 1/2" Ice	5.06 6.54	5.06 6.54	0.03 0.07
SC479 (CSP)	B	From Leg	6.00 0.00 -7.00	0.0000	200.00	No Ice 1/2" Ice	5.06 6.54	5.06 6.54	0.03 0.07
6' Pivot Side Arm (50" pipe) (CSP)	B	From Leg	3.00 0.00 0.00	0.0000	200.00	No Ice 1/2" Ice	1.91 2.67	3.93 4.99	0.13 0.17
SC479 (CSP)	B	From Leg	6.00 0.00 -7.00	0.0000	200.00	No Ice 1/2" Ice	5.06 6.54	5.06 6.54	0.03 0.07
3' Pivot Side Arm (50" pipe) (CSP)	B	From Leg	1.50 0.00 0.00	0.0000	200.00	No Ice 1/2" Ice	1.91 2.70	2.49 3.30	0.11 0.13
SC479 (CSP)	B	From Leg	6.00 0.00 7.00	0.0000	175.00	No Ice 1/2" Ice	5.06 6.54	5.06 6.54	0.03 0.07
SC479 (CSP)	B	From Leg	6.00 0.00 -7.00	0.0000	175.00	No Ice 1/2" Ice	5.06 6.54	5.06 6.54	0.03 0.07
6' Pivot Side Arm (50" pipe) (CSP)	B	From Leg	3.00 0.00 0.00	0.0000	175.00	No Ice 1/2" Ice	1.91 2.67	3.93 4.99	0.13 0.17
PR-950 (VSC)	A	From Leg	3.00 0.00 0.00	0.0000	126.00	No Ice 1/2" Ice	6.35 11.43	6.35 11.43	0.04 0.05
6' Pivot Side Arm (50" pipe) (VSC)	A	From Leg	3.00 0.00 0.00	0.0000	126.00	No Ice 1/2" Ice	1.91 2.67	3.93 4.99	0.13 0.17
ANT150F6 -138-151 MHZ (Eversource)	C	From Leg	0.00 0.00 10.00	0.0000	279.00	No Ice 1/2" Ice	5.87 8.00	5.87 8.00	0.03 0.07
DB212-1-C (Eversource)	C	From Leg	6.00 0.00 0.00	0.0000	255.00	No Ice 1/2" Ice	2.61 5.38	2.61 5.38	0.01 0.03
6' Pivot Side Arm (50" pipe) (Eversource)	C	From Leg	3.00 0.00 0.00	0.0000	255.00	No Ice 1/2" Ice	1.91 2.67	3.93 4.99	0.13 0.17
TMA (12"x16"x6"") (CSP)	C	From Leg	6.00 0.00 0.00	0.0000	235.00	No Ice 1/2" Ice	2.53 2.71	1.20 1.33	0.02 0.04
SE419-SF3P4LDF (CSP)	C	From Leg	6.00 0.00 5.00	0.0000	235.00	No Ice 1/2" Ice	4.12 5.11	0.04 1.00	0.04 0.05
SE419-SF3P4LDF (CSP)	C	From Leg	6.00 0.00 -5.00	0.0000	235.00	No Ice 1/2" Ice	4.12 5.11	0.04 1.00	0.04 0.05
6' Pivot Side Arm (50" pipe) (CSP)	C	From Leg	3.00 0.00 0.00	0.0000	235.00	No Ice 1/2" Ice	1.91 2.67	3.93 4.99	0.13 0.17
ANT900D6-9 (CSP)	C	From Leg	3.00 0.00 5.00	0.0000	200.00	No Ice 1/2" Ice	1.39 2.03	1.39 2.03	0.01 0.03
3' Pivot Side Arm (50" pipe) (CSP)	C	From Leg	1.50 0.00 0.00	0.0000	200.00	No Ice 1/2" Ice	1.91 2.70	2.49 3.30	0.11 0.13

Description	Face or Leg	Offset Type	Offsets: Horz Lateral Vert ft ft ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
ANT450F6	C	From Leg	3.00	0.0000	168.00	No Ice	1.86	1.86	0.02
(Town of Haddam)			0.00			1/2" Ice	2.67	2.67	0.04
			5.00						
3' Pivot Side Arm (50" pipe)	C	From Leg	1.50	0.0000	168.00	No Ice	1.91	2.49	0.11
(Town of Haddam)			0.00			1/2" Ice	2.70	3.30	0.13
			0.00						
KRECO CO-36A	C	From Leg	0.00	0.0000	130.00	No Ice	5.87	5.87	0.03
(VSC)			0.00			1/2" Ice	8.00	8.00	0.07
			7.00						
6' Pivot Side Arm (50" pipe)	C	From Leg	3.00	0.0000	130.00	No Ice	1.91	3.93	0.13
(VSC)			0.00			1/2" Ice	2.67	4.99	0.17
			0.00						
3' Pivot Side Arm (50" pipe)	C	From Leg	1.50	0.0000	128.00	No Ice	1.91	2.49	0.11
(VSC)			0.00			1/2" Ice	2.70	3.30	0.13
			0.00						
(4) DB980H90E-M	A	From Leg	3.00	0.0000	155.00	No Ice	3.90	2.29	0.01
(Sprint)			0.00			1/2" Ice	4.18	2.53	0.03
			0.00						
(4) 2" x 60" Sch. 40	A	From Leg	3.00	0.0000	155.00	No Ice	0.00	1.19	0.02
(Sprint)			0.00			1/2" Ice	0.00	1.46	0.03
			0.00						
12' V Frame	A	From Leg	3.00	0.0000	155.00	No Ice	9.22	3.08	0.30
(Sprint)			0.00			1/2" Ice	12.97	6.17	0.39
			0.00						
(4) DB980H90E-M	C	From Leg	3.00	0.0000	155.00	No Ice	3.90	2.29	0.01
(Sprint)			0.00			1/2" Ice	4.18	2.53	0.03
			0.00						
(4) 2" x 60" Sch. 40	C	From Leg	3.00	0.0000	155.00	No Ice	0.00	1.19	0.02
(Sprint)			0.00			1/2" Ice	0.00	1.46	0.03
			0.00						
12' V Frame	C	From Leg	3.00	0.0000	155.00	No Ice	9.22	3.08	0.30
(Sprint)			0.00			1/2" Ice	12.97	6.17	0.39
			0.00						
(4) DB980H90E-M	B	From Leg	3.00	0.0000	155.00	No Ice	3.90	2.29	0.01
(Sprint)			0.00			1/2" Ice	4.18	2.53	0.03
			0.00						
(4) 2" x 60" Sch. 40	B	From Leg	3.00	0.0000	155.00	No Ice	0.00	1.19	0.02
(Sprint)			0.00			1/2" Ice	0.00	1.46	0.03
			0.00						
12' V Frame	B	From Leg	3.00	0.0000	155.00	No Ice	9.22	3.08	0.30
(Sprint)			0.00			1/2" Ice	12.97	6.17	0.39
			0.00						
LNX-6515DS	A	From Leg	3.00	0.0000	145.00	No Ice	11.45	7.70	0.06
(Verizon - Proposed)			-6.00			1/2" Ice	12.06	8.29	0.12
			0.00						
HBXX-6517DS	A	From Leg	3.00	0.0000	145.00	No Ice	8.74	5.24	0.05
(Verizon - Proposed)			-4.00			1/2" Ice	9.31	5.71	0.10
			0.00						
LNX-6515DS	A	From Leg	3.00	0.0000	145.00	No Ice	11.45	7.70	0.06
(Verizon - Proposed)			0.00			1/2" Ice	12.06	8.29	0.12
			0.00						
HBXX-6517DS	A	From Leg	3.00	0.0000	145.00	No Ice	8.74	5.24	0.05
(Verizon - Proposed)			4.00			1/2" Ice	9.31	5.71	0.10
			0.00						
LNX-6515DS	B	From Leg	3.00	0.0000	145.00	No Ice	11.45	7.70	0.06
(Verizon - Proposed)			-6.00			1/2" Ice	12.06	8.29	0.12
			0.00						

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
HBXX-6517DS	B	From Leg	3.00	0.0000	145.00	No Ice	8.74	5.24	0.05
(Verizon - Proposed)			-4.00			1/2" Ice	9.31	5.71	0.10
			0.00						
LNX-6515DS	B	From Leg	3.00	0.0000	145.00	No Ice	11.45	7.70	0.06
(Verizon - Proposed)			0.00			1/2" Ice	12.06	8.29	0.12
			0.00						
HBXX-6517DS	B	From Leg	3.00	0.0000	145.00	No Ice	8.74	5.24	0.05
(Verizon - Proposed)			4.00			1/2" Ice	9.31	5.71	0.10
			0.00						
LNX-6515DS	C	From Leg	3.00	0.0000	145.00	No Ice	11.45	7.70	0.06
(Verizon - Proposed)			-6.00			1/2" Ice	12.06	8.29	0.12
			0.00						
HBXX-6517DS	C	From Leg	3.00	0.0000	145.00	No Ice	8.74	5.24	0.05
(Verizon - Proposed)			-4.00			1/2" Ice	9.31	5.71	0.10
			0.00						
LNX-6515DS	C	From Leg	3.00	0.0000	145.00	No Ice	11.45	7.70	0.06
(Verizon - Proposed)			0.00			1/2" Ice	12.06	8.29	0.12
			0.00						
HBXX-6517DS	C	From Leg	3.00	0.0000	145.00	No Ice	8.74	5.24	0.05
(Verizon - Proposed)			4.00			1/2" Ice	9.31	5.71	0.10
			0.00						
RRH2x60-AWS	A	From Leg	3.00	0.0000	145.00	No Ice	3.78	2.07	0.06
(Verizon - Proposed)			-4.00			1/2" Ice	4.09	2.35	0.08
			0.00						
RRH2x60-AWS	B	From Leg	3.00	0.0000	145.00	No Ice	3.78	2.07	0.06
(Verizon - Proposed)			-4.00			1/2" Ice	4.09	2.35	0.08
			0.00						
RRH2x60-AWS	C	From Leg	3.00	0.0000	145.00	No Ice	3.78	2.07	0.06
(Verizon - Proposed)			-4.00			1/2" Ice	4.09	2.35	0.08
			0.00						
RRH2x60-PCS	A	From Leg	3.00	0.0000	145.00	No Ice	2.51	1.55	0.06
(Verizon - Proposed)			4.00			1/2" Ice	2.73	1.74	0.07
			0.00						
RRH2x60-PCS	B	From Leg	3.00	0.0000	145.00	No Ice	2.51	1.55	0.06
(Verizon - Proposed)			4.00			1/2" Ice	2.73	1.74	0.07
			0.00						
RRH2x60-PCS	C	From Leg	3.00	0.0000	145.00	No Ice	2.51	1.55	0.06
(Verizon - Proposed)			4.00			1/2" Ice	2.73	1.74	0.07
			0.00						
RRH2x60-07-U	A	From Leg	3.00	0.0000	145.00	No Ice	2.45	1.63	0.05
(Verizon - Proposed)			0.00			1/2" Ice	2.67	1.83	0.07
			0.00						
RRH2x60-07-U	B	From Leg	3.00	0.0000	145.00	No Ice	2.45	1.63	0.05
(Verizon - Proposed)			0.00			1/2" Ice	2.67	1.83	0.07
			0.00						
RRH2x60-07-U	C	From Leg	3.00	0.0000	145.00	No Ice	2.45	1.63	0.05
(Verizon - Proposed)			0.00			1/2" Ice	2.67	1.83	0.07
			0.00						
DB-T1-6Z-8AB-0Z	A	From Leg	3.00	0.0000	145.00	No Ice	5.60	2.33	0.04
(Verizon - Proposed)			0.00			1/2" Ice	5.92	2.56	0.08
			0.00						
DB-T1-6Z-8AB-0Z	B	From Leg	3.00	0.0000	145.00	No Ice	5.60	2.33	0.04
(Verizon - Proposed)			0.00			1/2" Ice	5.92	2.56	0.08
			0.00						
12' V Frame	A	From Leg	3.00	0.0000	145.00	No Ice	9.22	3.08	0.30
(Verizon - Proposed)			0.00			1/2" Ice	12.97	6.17	0.39
			0.00						

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
12' V Frame	B	From Leg	3.00	0.0000	145.00	No Ice	9.22	3.08	0.30
(Verizon - Proposed)			0.00			1/2" Ice	12.97	6.17	0.39
			0.00						
12' V Frame	C	From Leg	3.00	0.0000	145.00	No Ice	9.22	3.08	0.30
(Verizon - Proposed)			0.00			1/2" Ice	12.97	6.17	0.39
			0.00						
1142-2C	A	From Leg	0.00	0.0000	279.00	No Ice	2.09	2.09	0.02
(VSC)			0.00			1/2" Ice	3.37	3.37	0.04
			8.00						
10' Dipole	A	From Leg	3.00	0.0000	261.00	No Ice	4.00	4.00	0.05
(VSC)			0.00			1/2" Ice	6.00	6.00	0.07
			5.00						
6' Pivot Side Arm (50" pipe)	A	From Leg	3.00	0.0000	261.00	No Ice	1.91	3.93	0.13
(VSC)			0.00			1/2" Ice	2.67	4.99	0.17
			0.00						
KRECO CO-36A	A	From Leg	0.00	0.0000	240.00	No Ice	5.87	5.87	0.03
(Eversource)			0.00			1/2" Ice	8.00	8.00	0.07
			7.00						
6' Pivot Side Arm (50" pipe)	A	From Leg	3.00	0.0000	240.00	No Ice	1.91	3.93	0.13
(Eversource)			0.00			1/2" Ice	2.67	4.99	0.17
			0.00						
531-70HD	A	From Leg	6.00	0.0000	230.00	No Ice	6.00	6.00	0.04
(Eversource)			0.00			1/2" Ice	6.90	6.90	0.05
			0.00						
3' Pivot Side Arm (50" pipe)	A	From Leg	1.50	0.0000	230.00	No Ice	1.91	2.49	0.11
(Eversource)			0.00			1/2" Ice	2.70	3.30	0.13
			0.00						
SD110-SFXPASNM	A	From Leg	6.00	0.0000	216.00	No Ice	2.43	2.43	0.03
(Eversource)			0.00			1/2" Ice	4.46	4.46	0.04
			0.00						
6' Pivot Side Arm (50" pipe)	A	From Leg	3.00	0.0000	216.00	No Ice	1.91	3.93	0.13
(Eversource)			0.00			1/2" Ice	2.67	4.99	0.17
			0.00						
BCR-80010-90	A	From Leg	6.00	0.0000	175.00	No Ice	4.86	4.86	0.04
(CSP)			0.00			1/2" Ice	5.99	5.99	0.07
			5.00						
BCD-80609	A	From Leg	6.00	0.0000	175.00	No Ice	2.95	2.95	0.03
(CSP)			0.00			1/2" Ice	4.08	4.08	0.05
			-5.00						
TMA (12"x16"x6"")	A	From Leg	6.00	0.0000	175.00	No Ice	2.53	1.20	0.02
(CSP)			0.00			1/2" Ice	2.71	1.33	0.04
			0.00						
3' Pivot Side Arm (50" pipe)	A	From Leg	1.50	0.0000	175.00	No Ice	1.91	2.49	0.11
(CSP)			0.00			1/2" Ice	2.70	3.30	0.13
			0.00						
ANT450F6	A	From Leg	6.00	0.0000	124.00	No Ice	1.86	1.86	0.02
(VSC)			0.00			1/2" Ice	2.67	2.67	0.04
			0.00						
6' Pivot Side Arm (50" pipe)	A	From Leg	3.00	0.0000	124.00	No Ice	1.91	3.93	0.13
(VSC)			0.00			1/2" Ice	2.67	4.99	0.17
			0.00						
BR-6155	A	From Leg	1.50	0.0000	116.00	No Ice	1.90	1.90	0.01
(VSC)			0.00			1/2" Ice	2.29	2.29	0.02
			3.00						
ANT400D	A	From Leg	3.00	0.0000	116.00	No Ice	0.34	0.34	0.01
(CSP)			0.00			1/2" Ice	0.40	0.40	0.18
			-1.00						

Description	Face or Leg	Offset Type	Offsets: Horz Lateral Vert ft ft ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
3' Pivot Side Arm (50" pipe) (VSC/CSP)	A	From Leg	1.50 0.00 0.00	0.0000	116.00	No Ice 1/2" Ice	1.91 2.70	2.49 3.30	0.11 0.13
BR-6155 (VSC)	A	From Leg	1.50 0.00 3.00	0.0000	97.00	No Ice 1/2" Ice	1.90 2.29	1.90 2.29	0.01 0.02
3' Pivot Side Arm (50" pipe) (VSC)	A	From Leg	1.50 0.00 0.00	0.0000	97.00	No Ice 1/2" Ice	1.91 2.70	2.49 3.30	0.11 0.13
5-ft dipole (CSP)	A	From Leg	3.00 0.00 0.00	0.0000	55.00	No Ice 1/2" Ice	2.70 4.50	2.70 4.50	0.01 0.03
3' Pivot Side Arm (50" pipe) (CSP)	A	From Leg	1.50 0.00 0.00	0.0000	55.00	No Ice 1/2" Ice	1.91 2.70	2.49 3.30	0.11 0.13

Dishes

Description	Face or Leg	Dish Type	Offset Type	Offsets: Horz Lateral Vert ft	Azimuth Adjustment °	3 dB Beam Width °	Elevation ft	Outside Diameter ft		Aperture Area ft^2	Weight K
8' Solid w/ Radome (Eversource)	C	Paraboloid w/Radome	From Leg	1.00 0.00 0.00	0.0000		276.00	8.00	No Ice 1/2" Ice	50.27 51.32	0.30 0.62
8' Solid w/ Radome (Eversource)	B	Paraboloid w/Radome	From Leg	1.00 0.00 0.00	0.0000		276.00	8.00	No Ice 1/2" Ice	50.27 51.32	0.30 0.62
8' Solid w/ Radome (Eversource)	A	Paraboloid w/Radome	From Leg	1.00 0.00 0.00	0.0000		276.00	8.00	No Ice 1/2" Ice	50.27 51.32	0.30 0.62
8' Solid w/ Radome (Eversource)	C	Paraboloid w/Radome	From Leg	1.00 0.00 0.00	0.0000		266.00	8.00	No Ice 1/2" Ice	50.27 51.32	0.30 0.62
8' Solid w/ Radome (Eversource)	C	Paraboloid w/Radome	From Leg	1.00 0.00 0.00	0.0000		240.00	8.00	No Ice 1/2" Ice	50.27 51.32	0.30 0.62
8' Solid w/ Radome (Eversource)	C	Paraboloid w/Radome	From Leg	1.00 0.00 0.00	0.0000		230.00	8.00	No Ice 1/2" Ice	50.27 51.32	0.30 0.62
8' Solid w/ Radome (Eversource)	C	Paraboloid w/Radome	From Leg	1.00 0.00 0.00	0.0000		220.00	8.00	No Ice 1/2" Ice	50.27 51.32	0.30 0.62
10' Solid w/ Radome (Eversource)	A	Paraboloid w/Radome	From Leg	1.00 0.00 0.00	0.0000		205.50	10.00	No Ice 1/2" Ice	78.54 79.85	0.40 0.81
6' Solid w/ Radome (CSP)	A	Paraboloid w/Radome	From Leg	1.00 0.00 0.00	0.0000		197.00	6.00	No Ice 1/2" Ice	28.27 29.07	0.16 0.32
10' Solid w/ Radome	C	Paraboloid	From	1.00	0.0000		195.00	10.00	No Ice	78.54	0.40

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)
(CSP)		w/Radome	Leg	0.00 0.00					1/2" Ice	79.85	0.81
6' Solid w/ Radome (CSP)	C	Paraboloid w/Radome	From Leg	1.00 0.00 0.00	0.0000		163.00	6.00	No Ice 1/2" Ice	28.27 29.07	0.16 0.32
SBX4-W60 (Eversource)	C	Paraboloid w/Radome	From Leg	1.00 0.00 0.00	0.0000		123.00	4.00	No Ice 1/2" Ice	12.57 13.10	0.08 0.14
6' Solid w/ Radome (Eversource)	B	Paraboloid w/Radome	From Leg	1.00 0.00 0.00	0.0000		104.00	6.00	No Ice 1/2" Ice	28.27 29.07	0.16 0.32
6' Grid Dish (VSC)	C	Grid	From Leg	0.50 0.00 0.00	0.0000		117.00	6.00	No Ice 1/2" Ice	28.27 29.07	0.08 0.23

Truss-Leg Properties

Section Designation	Area (in^2)	Area Ice (in^2)	Self Weight (K)	Ice Weight (K)	Equiv. Diameter (in)	Equiv. Diameter Ice (in)	Leg Area (in^2)
#12ZG - 1.25" - 1.00" conn. (Pirod 207628)	2164.8882	3473.3500	0.46	0.43	7.5170	12.0602	3.6816
#12ZG - 1.25" - 1.00" conn. (Pirod 207628)	2164.8882	3473.3500	0.46	0.43	7.5170	12.0602	3.6816
#12ZG - 1.25" - 1.00" conn. (Pirod 207628)	2164.8882	3473.3500	0.46	0.43	7.5170	12.0602	3.6816
#12ZG - 1.75" - 1.00" conn. (Pirod 195557)	2421.2670	3827.8965	0.71	0.46	8.4072	13.2913	7.2158
#12ZG -2.00" - 0.875" conn.-Trans (Pirod 211843)	2550.9192	4005.7116	1.05	0.48	8.8574	13.9087	9.4248
#12ZG -2.25" - 0.875" conn. (Pirod 208334)	2686.5516	4204.3432	1.22	0.49	9.3283	14.5984	11.9282
#12ZG -2.25" - 0.875" conn. (Pirod 208334)	2686.5516	4204.3432	1.22	0.49	9.3283	14.5984	11.9282
#12ZG - 2.50" - 0.875" conn. (Pirod 208335)	2826.7749	4412.4398	1.42	0.51	9.8152	15.3210	14.7262
#12ZG -2.75"-0.875 -DB-0.625"-HP- (Pirod 238706)	3044.1575	4767.7312	1.69	0.54	10.5700	16.5546	17.8187
#12ZG -3.00"-0.875 -DB-0.625"-HP-Trans- (Pirod 238707)	3198.8474	5001.9048	1.93	0.56	11.1071	17.3677	21.2058
#12ZG -3.00"-0.875 -DB-0.625"-HP- (Pirod 238708)	3198.8474	5001.9048	1.93	0.56	11.1071	17.3677	21.2058
#12ZG -3.25"-0.875 -DB-0.625"-HP-	3360.5698	5246.4301	2.19	0.57	11.6686	18.2168	24.8873

Section Designation	Area	Area Ice	Self Weight	Ice Weight	Equiv. Diameter	Equiv. Diameter Ice	Leg Area
	in^2	in^2	K	K	in	in	in^2
(Pirod 238709) #12ZG -3.25"-0.875 -DB-0.625"-HP- (Pirod 238709)	3360.5698	5246.4301	2.19	0.57	11.6686	18.2168	24.8873
#12ZG -3.25"-0.875 -DB-0.625"-HP- (Pirod 238709)	3360.5698	5246.4301	2.19	0.57	11.6686	18.2168	24.8873

Tower Pressures - No Ice

$G_H = 1.092$

Section Elevation	z	K_Z	q_z	A_G	Face	A_F	A_R	A_{leg}	Leg %	C_AA_A In Face	C_AA_A Out Face
ft	ft		psf	ft^2		ft^2	ft^2	ft^2		ft^2	ft^2
T1 280.00-260.00	270.00	1.823	34	282.111	A	22.686	25.098	25.098	52.52	0.000	0.000
					B	26.854	30.248		43.95	0.000	0.000
					C	24.100	29.948		46.44	0.000	0.000
T2 260.00-240.00	250.00	1.783	33	322.111	A	16.082	25.098	25.098	60.95	0.000	0.000
					B	22.744	39.202		40.52	0.000	0.000
					C	18.090	32.723		49.39	0.000	0.000
T3 240.00-220.00	230.00	1.741	32	362.111	A	33.578	31.498	25.098	38.57	0.000	0.000
					B	39.217	44.290		30.06	0.000	0.000
					C	38.921	32.723		35.03	0.000	0.000
T4 220.00-200.00	210.00	1.697	31	402.945	A	25.680	36.604	28.071	45.07	0.000	0.000
					B	34.357	49.667		33.41	0.000	0.000
					C	33.267	37.083		39.90	0.000	0.000
T5 200.00-180.00	190.00	1.649	30	443.362	A	19.081	48.974	29.574	43.46	0.000	0.000
					B	25.117	51.540		38.58	0.000	0.000
					C	25.471	39.049		45.84	0.000	0.000
T6 180.00-160.00	170.00	1.597	30	483.780	A	21.371	61.471	31.146	37.60	0.000	0.000
					B	25.979	53.853		39.01	0.000	0.000
					C	26.347	40.621		46.51	0.000	0.000
T7 160.00-140.00	150.00	1.541	29	523.780	A	25.445	107.678	31.146	23.40	0.000	0.000
					B	29.124	56.613		36.33	0.000	0.000
					C	29.648	40.621		44.32	0.000	0.000
T8 140.00-120.00	130.00	1.48	27	564.197	A	26.146	123.492	32.772	21.90	0.000	0.000
					B	29.924	65.022		34.52	0.000	0.000
					C	30.600	45.022		43.34	0.000	0.000
T9 120.00-100.00	110.00	1.411	26	604.614	A	27.730	127.493	35.292	22.74	0.000	0.000
					B	30.962	69.375		35.17	0.000	0.000
					C	31.472	53.092		41.73	0.000	0.000
T10 100.00-80.00	90.00	1.332	25	645.031	A	30.888	129.656	37.085	23.10	0.000	0.000
					B	32.097	71.169		35.91	0.000	0.000
					C	32.486	57.660		41.14	0.000	0.000
T11 80.00-60.00	70.00	1.24	23	685.031	A	37.454	129.656	37.085	22.19	0.000	0.000
					B	38.938	71.169		33.68	0.000	0.000
					C	39.416	57.660		38.20	0.000	0.000
T12 60.00-40.00	50.00	1.126	21	725.448	A	38.870	132.918	38.960	22.68	0.000	0.000
					B	40.399	73.044		34.34	0.000	0.000
					C	40.869	59.535		38.80	0.000	0.000
T13 40.00-20.00	30.00	1	18	765.448	A	40.346	133.381	38.960	22.43	0.000	0.000
					B	41.877	73.044		33.90	0.000	0.000
					C	42.341	59.535		38.24	0.000	0.000
T14 20.00-0.00	10.00	1	18	805.448	A	41.857	133.381	38.960	22.23	0.000	0.000

Section Elevation ft	z ft	K_Z	q_z psf	A_G ft²	Face	A_F ft²	A_R ft²	A_{leg} ft²	Leg %	C_AA_A In Face ft²	C_AA_A Out Face ft²
					B	43.370	73.044		33.47	0.000	0.000
					C	43.829	59.535		37.69	0.000	0.000

Tower Pressure - With Ice

$G_H = 1.092$

Section Elevation ft	z ft	K_Z	q_z psf	t_Z in	A_G ft²	Face	A_F ft²	A_R ft²	A_{leg} ft²	Leg %	C_AA_A In Face ft²	C_AA_A Out Face ft²
T1 280.00-260.00	270.00	1.823	34	0.5000	283.780	A	22.686	48.010	40.268	56.96	0.000	0.000
						B	28.325	57.664		46.83	0.000	0.000
						C	24.447	56.609		49.68	0.000	0.000
T2 260.00-240.00	250.00	1.783	33	0.5000	323.780	A	16.082	45.629	40.268	65.25	0.000	0.000
						B	25.200	70.287		42.17	0.000	0.000
						C	18.700	59.548		51.46	0.000	0.000
T3 240.00-220.00	230.00	1.741	32	0.5000	363.780	A	33.301	59.489	40.268	43.40	0.000	0.000
						B	40.613	82.666		32.66	0.000	0.000
						C	40.499	62.371		39.14	0.000	0.000
T4 220.00-200.00	210.00	1.697	31	0.5000	404.614	A	25.429	65.235	44.378	48.95	0.000	0.000
						B	37.194	89.538		35.02	0.000	0.000
						C	35.898	67.224		43.03	0.000	0.000
T5 200.00-180.00	190.00	1.649	30	0.5000	445.031	A	20.312	82.076	46.440	45.36	0.000	0.000
						B	28.689	90.668		38.91	0.000	0.000
						C	29.312	68.354		47.55	0.000	0.000
T6 180.00-160.00	170.00	1.597	30	0.5000	485.448	A	23.154	98.648	48.742	40.02	0.000	0.000
						B	29.560	94.627		39.25	0.000	0.000
						C	30.212	70.914		48.20	0.000	0.000
T7 160.00-140.00	150.00	1.541	29	0.5000	525.448	A	27.356	154.396	48.742	26.82	0.000	0.000
						B	32.536	99.442		36.93	0.000	0.000
						C	33.452	71.179		46.58	0.000	0.000
T8 140.00-120.00	130.00	1.48	27	0.5000	565.866	A	27.889	174.047	51.155	25.33	0.000	0.000
						B	33.228	112.144		35.19	0.000	0.000
						C	34.319	79.083		45.11	0.000	0.000
T9 120.00-100.00	110.00	1.411	26	0.5000	606.283	A	29.666	181.237	55.274	26.21	0.000	0.000
						B	34.260	119.187		36.02	0.000	0.000
						C	35.005	93.924		42.87	0.000	0.000
T10 100.00-80.00	90.00	1.332	25	0.5000	646.700	A	33.680	184.912	57.989	26.53	0.000	0.000
						B	35.418	122.192		36.79	0.000	0.000
						C	35.939	102.147		41.99	0.000	0.000
T11 80.00-60.00	70.00	1.24	23	0.5000	686.700	A	39.868	185.212	57.989	25.76	0.000	0.000
						B	42.002	122.485		35.25	0.000	0.000
						C	42.642	102.438		39.97	0.000	0.000
T12 60.00-40.00	50.00	1.126	21	0.5000	727.117	A	41.255	190.962	60.824	26.19	0.000	0.000
						B	43.483	125.616		35.97	0.000	0.000
						C	44.114	105.567		40.64	0.000	0.000
T13 40.00-20.00	30.00	1	18	0.5000	767.117	A	42.738	192.138	60.824	25.90	0.000	0.000
						B	44.979	125.915		35.59	0.000	0.000
						C	45.601	105.864		40.16	0.000	0.000
T14 20.00-0.00	10.00	1	18	0.5000	807.117	A	44.272	192.445	60.824	25.69	0.000	0.000
						B	46.488	126.217		35.22	0.000	0.000
						C	47.103	106.165		39.68	0.000	0.000

Tower Pressure - Service

$G_H = 1.092$

Section Elevation ft	z ft	K_Z	q_z psf	A_G ft²	Face	A_F ft²	A_R ft²	A_{leg} ft²	Leg %	C_AA_A In Face ft²	C_AA_A Out Face ft²
T1	270.00	1.823	34	282.111	A	22.686	25.098	25.098	52.52	0.000	0.000
280.00-260.00					B	26.854	30.248		43.95	0.000	0.000
					C	24.100	29.948		46.44	0.000	0.000
T2	250.00	1.783	33	322.111	A	16.082	25.098	25.098	60.95	0.000	0.000
260.00-240.00					B	22.744	39.202		40.52	0.000	0.000
					C	18.090	32.723		49.39	0.000	0.000
T3	230.00	1.741	32	362.111	A	33.578	31.498	25.098	38.57	0.000	0.000
240.00-220.00					B	39.217	44.290		30.06	0.000	0.000
					C	38.921	32.723		35.03	0.000	0.000
T4	210.00	1.697	31	402.945	A	25.680	36.604	28.071	45.07	0.000	0.000
220.00-200.00					B	34.357	49.667		33.41	0.000	0.000
					C	33.267	37.083		39.90	0.000	0.000
T5	190.00	1.649	30	443.362	A	19.081	48.974	29.574	43.46	0.000	0.000
200.00-180.00					B	25.117	51.540		38.58	0.000	0.000
					C	25.471	39.049		45.84	0.000	0.000
T6	170.00	1.597	30	483.780	A	21.371	61.471	31.146	37.60	0.000	0.000
180.00-160.00					B	25.979	53.853		39.01	0.000	0.000
					C	26.347	40.621		46.51	0.000	0.000
T7	150.00	1.541	29	523.780	A	25.445	107.678	31.146	23.40	0.000	0.000
160.00-140.00					B	29.124	56.613		36.33	0.000	0.000
					C	29.648	40.621		44.32	0.000	0.000
T8	130.00	1.48	27	564.197	A	26.146	123.492	32.772	21.90	0.000	0.000
140.00-120.00					B	29.924	65.022		34.52	0.000	0.000
					C	30.600	45.022		43.34	0.000	0.000
T9	110.00	1.411	26	604.614	A	27.730	127.493	35.292	22.74	0.000	0.000
120.00-100.00					B	30.962	69.375		35.17	0.000	0.000
					C	31.472	53.092		41.73	0.000	0.000
T10	90.00	1.332	25	645.031	A	30.888	129.656	37.085	23.10	0.000	0.000
100.00-80.00					B	32.097	71.169		35.91	0.000	0.000
					C	32.486	57.660		41.14	0.000	0.000
T11	70.00	1.24	23	685.031	A	37.454	129.656	37.085	22.19	0.000	0.000
80.00-60.00					B	38.938	71.169		33.68	0.000	0.000
					C	39.416	57.660		38.20	0.000	0.000
T12	50.00	1.126	21	725.448	A	38.870	132.918	38.960	22.68	0.000	0.000
60.00-40.00					B	40.399	73.044		34.34	0.000	0.000
					C	40.869	59.535		38.80	0.000	0.000
T13	30.00	1	18	765.448	A	40.346	133.381	38.960	22.43	0.000	0.000
40.00-20.00					B	41.877	73.044		33.90	0.000	0.000
					C	42.341	59.535		38.24	0.000	0.000
T14 20.00-0.00	10.00	1	18	805.448	A	41.857	133.381	38.960	22.23	0.000	0.000
					B	43.370	73.044		33.47	0.000	0.000
					C	43.829	59.535		37.69	0.000	0.000

Tower Forces - No Ice - Wind Normal To Face

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	R_R	D_F	D_R	A_E ft²	F K	w plf	Ctrl. Face
T1	0.08	3.17	A	0.169	2.701	0.585	1	1	37.359	4.26	213.13	B

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	R_R	D_F	D_R	A_E ft²	F K	w plf	Ctrl. Face
280.00-260.00			B	0.202	2.588	0.591	1	1	44.728			
			C	0.192	2.624	0.589	1	1	41.731			
T2	0.17	2.62	A	0.128	2.855	0.578	1	1	30.598	4.33	216.43	B
260.00-240.00			B	0.192	2.622	0.589	1	1	45.829			
			C	0.158	2.743	0.583	1	1	37.158			
T3	0.25	3.68	A	0.18	2.665	0.586	1	1	52.050	5.77	288.37	B
240.00-220.00			B	0.231	2.497	0.597	1	1	65.663			
			C	0.198	2.603	0.59	1	1	58.226			
T4	0.30	3.76	A	0.155	2.755	0.582	1	1	46.990	5.61	280.60	B
220.00-200.00			B	0.209	2.568	0.592	1	1	63.768			
			C	0.175	2.683	0.586	1	1	54.981			
T5	0.40	5.10	A	0.153	2.759	0.582	1	1	47.585	4.95	247.56	B
200.00-180.00			B	0.173	2.689	0.585	1	1	55.281			
			C	0.146	2.788	0.581	1	1	48.151			
T6	0.48	5.74	A	0.171	2.695	0.585	1	1	57.329	5.03	251.70	B
180.00-160.00			B	0.165	2.717	0.584	1	1	57.423			
			C	0.138	2.815	0.58	1	1	49.898			
T7	0.82	6.17	A	0.254	2.425	0.603	1	1	90.369	6.82	341.13	A
160.00-140.00			B	0.164	2.722	0.584	1	1	62.166			
			C	0.134	2.831	0.579	1	1	53.175			
T8	0.99	8.15	A	0.265	2.393	0.606	1	1	100.967	7.22	360.97	A
140.00-120.00			B	0.168	2.705	0.584	1	1	67.925			
			C	0.134	2.831	0.579	1	1	56.675			
T9	1.04	9.14	A	0.257	2.417	0.604	1	1	104.686	7.21	360.53	A
120.00-100.00			B	0.166	2.714	0.584	1	1	71.481			
			C	0.14	2.809	0.58	1	1	62.264			
T10	1.07	10.06	A	0.249	2.441	0.602	1	1	108.889	7.15	357.53	A
100.00-80.00			B	0.16	2.735	0.583	1	1	73.593			
			C	0.14	2.81	0.58	1	1	65.927			
T11	1.07	10.53	A	0.244	2.456	0.6	1	1	115.293	7.09	354.49	A
80.00-60.00			B	0.161	2.732	0.583	1	1	80.442			
			C	0.142	2.802	0.58	1	1	72.873			
T12	1.08	11.54	A	0.237	2.478	0.599	1	1	118.435	6.67	333.72	A
60.00-40.00			B	0.156	2.748	0.582	1	1	82.944			
			C	0.138	2.815	0.58	1	1	75.386			
T13	1.08	11.76	A	0.227	2.508	0.596	1	1	119.877	6.07	303.69	A
40.00-20.00			B	0.15	2.771	0.581	1	1	84.351			
			C	0.133	2.835	0.579	1	1	76.814			
T14	1.08	11.99	A	0.218	2.538	0.594	1	1	121.104	6.21	310.46	A
20.00-0.00			B	0.145	2.792	0.581	1	1	85.783			
			C	0.128	2.853	0.578	1	1	78.265			
Sum Weight:	9.90	103.42						OTM	11007.50 kip-ft	84.41		

Tower Forces - No Ice - Wind 60 To Face

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	R_R	D_F	D_R	A_E ft²	F K	w plf	Ctrl. Face
T1	0.08	3.17	A	0.169	2.701	0.585	0.8	1	32.822	3.75	187.54	B
280.00-260.00			B	0.202	2.588	0.591	0.8	1	39.357			
			C	0.192	2.624	0.589	0.8	1	36.911			
T2	0.17	2.62	A	0.128	2.855	0.578	0.8	1	27.381	3.90	194.94	B
260.00-240.00			B	0.192	2.622	0.589	0.8	1	41.280			
			C	0.158	2.743	0.583	0.8	1	33.540			

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	R_R	D_F	D_R	A_E ft²	F K	w plf	Ctrl. Face
T3	0.25	3.68	A	0.18	2.665	0.586	0.8	1	45.335	5.08	253.92	B
240.00-220.00			B	0.231	2.497	0.597	0.8	1	57.820			
			C	0.198	2.603	0.59	0.8	1	50.442			
T4	0.30	3.76	A	0.155	2.755	0.582	0.8	1	41.854	5.01	250.37	B
220.00-200.00			B	0.209	2.568	0.592	0.8	1	56.897			
			C	0.175	2.683	0.586	0.8	1	48.328			
T5	0.40	5.10	A	0.153	2.759	0.582	0.8	1	43.769	4.50	225.06	B
200.00-180.00			B	0.173	2.689	0.585	0.8	1	50.258			
			C	0.146	2.788	0.581	0.8	1	43.057			
T6	0.48	5.74	A	0.171	2.695	0.585	0.8	1	53.055	4.61	230.66	A
180.00-160.00			B	0.165	2.717	0.584	0.8	1	52.227			
			C	0.138	2.815	0.58	0.8	1	44.629			
T7	0.82	6.17	A	0.254	2.425	0.603	0.8	1	85.280	6.44	321.92	A
160.00-140.00			B	0.164	2.722	0.584	0.8	1	56.342			
			C	0.134	2.831	0.579	0.8	1	47.245			
T8	0.99	8.15	A	0.265	2.393	0.606	0.8	1	95.738	6.85	342.28	A
140.00-120.00			B	0.168	2.705	0.584	0.8	1	61.941			
			C	0.134	2.831	0.579	0.8	1	50.555			
T9	1.04	9.14	A	0.257	2.417	0.604	0.8	1	99.140	6.83	341.43	A
120.00-100.00			B	0.166	2.714	0.584	0.8	1	65.288			
			C	0.14	2.809	0.58	0.8	1	55.970			
T10	1.07	10.06	A	0.249	2.441	0.602	0.8	1	102.711	6.74	337.24	A
100.00-80.00			B	0.16	2.735	0.583	0.8	1	67.174			
			C	0.14	2.81	0.58	0.8	1	59.430			
T11	1.07	10.53	A	0.244	2.456	0.6	0.8	1	107.802	6.63	331.46	A
80.00-60.00			B	0.161	2.732	0.583	0.8	1	72.654			
			C	0.142	2.802	0.58	0.8	1	64.990			
T12	1.08	11.54	A	0.237	2.478	0.599	0.8	1	110.661	6.24	311.81	A
60.00-40.00			B	0.156	2.748	0.582	0.8	1	74.865			
			C	0.138	2.815	0.58	0.8	1	67.212			
T13	1.08	11.76	A	0.227	2.508	0.596	0.8	1	111.808	5.67	283.25	A
40.00-20.00			B	0.15	2.771	0.581	0.8	1	75.976			
			C	0.133	2.835	0.579	0.8	1	68.346			
T14	1.08	11.99	A	0.218	2.538	0.594	0.8	1	112.733	5.78	289.00	A
20.00-0.00			B	0.145	2.792	0.581	0.8	1	77.109			
			C	0.128	2.853	0.578	0.8	1	69.499			
Sum Weight:	9.90	103.42						OTM	10063.95 kip-ft	78.02		

Tower Forces - No Ice - Wind 90 To Face

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	R_R	D_F	D_R	A_E ft²	F K	w plf	Ctrl. Face
T1	0.08	3.17	A	0.169	2.701	0.585	0.85	1	33.956	3.88	193.94	B
280.00-260.00			B	0.202	2.588	0.591	0.85	1	40.700			
			C	0.192	2.624	0.589	0.85	1	38.116			
T2	0.17	2.62	A	0.128	2.855	0.578	0.85	1	28.185	4.01	200.31	B
260.00-240.00			B	0.192	2.622	0.589	0.85	1	42.417			
			C	0.158	2.743	0.583	0.85	1	34.444			
T3	0.25	3.68	A	0.18	2.665	0.586	0.85	1	47.014	5.25	262.53	B
240.00-220.00			B	0.231	2.497	0.597	0.85	1	59.781			
			C	0.198	2.603	0.59	0.85	1	52.388			
T4	0.30	3.76	A	0.155	2.755	0.582	0.85	1	43.138	5.16	257.92	B
220.00-200.00			B	0.209	2.568	0.592	0.85	1	58.615			

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	R_R	D_F	D_R	A_E ft²	F K	w plf	Ctrl. Face
			C	0.175	2.683	0.586	0.85	1	49.991			
T5	0.40	5.10	A	0.153	2.759	0.582	0.85	1	44.723	4.61	230.69	B
200.00-180.00			B	0.173	2.689	0.585	0.85	1	51.514			
			C	0.146	2.788	0.581	0.85	1	44.330			
T6	0.48	5.74	A	0.171	2.695	0.585	0.85	1	54.123	4.71	235.30	A
180.00-160.00			B	0.165	2.717	0.584	0.85	1	53.526			
			C	0.138	2.815	0.58	0.85	1	45.946			
T7	0.82	6.17	A	0.254	2.425	0.603	0.85	1	86.552	6.53	326.72	A
160.00-140.00			B	0.164	2.722	0.584	0.85	1	57.798			
			C	0.134	2.831	0.579	0.85	1	48.728			
T8	0.99	8.15	A	0.265	2.393	0.606	0.85	1	97.045	6.94	346.95	A
140.00-120.00			B	0.168	2.705	0.584	0.85	1	63.437			
			C	0.134	2.831	0.579	0.85	1	52.085			
T9	1.04	9.14	A	0.257	2.417	0.604	0.85	1	100.527	6.92	346.20	A
120.00-100.00			B	0.166	2.714	0.584	0.85	1	66.836			
			C	0.14	2.809	0.58	0.85	1	57.543			
T10	1.07	10.06	A	0.249	2.441	0.602	0.85	1	104.255	6.85	342.31	A
100.00-80.00			B	0.16	2.735	0.583	0.85	1	68.779			
			C	0.14	2.81	0.58	0.85	1	61.054			
T11	1.07	10.53	A	0.244	2.456	0.6	0.85	1	109.675	6.74	337.21	A
80.00-60.00			B	0.161	2.732	0.583	0.85	1	74.601			
			C	0.142	2.802	0.58	0.85	1	66.961			
T12	1.08	11.54	A	0.237	2.478	0.599	0.85	1	112.604	6.35	317.29	A
60.00-40.00			B	0.156	2.748	0.582	0.85	1	76.885			
			C	0.138	2.815	0.58	0.85	1	69.256			
T13	1.08	11.76	A	0.227	2.508	0.596	0.85	1	113.825	5.77	288.36	A
40.00-20.00			B	0.15	2.771	0.581	0.85	1	78.070			
			C	0.133	2.835	0.579	0.85	1	70.463			
T14	1.08	11.99	A	0.218	2.538	0.594	0.85	1	114.825	5.89	294.37	A
20.00-0.00			B	0.145	2.792	0.581	0.85	1	79.278			
			C	0.128	2.853	0.578	0.85	1	71.690			
Sum Weight:	9.90	103.42						OTM	10297.75 kip-ft	79.60		

Tower Forces - With Ice - Wind Normal To Face

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	R_R	D_F	D_R	A_E ft²	F K	w plf	Ctrl. Face
T1	0.26	5.22	A	0.249	2.44	0.602	1	1	51.571	5.38	269.17	B
280.00-260.00			B	0.303	2.288	0.617	1	1	63.894			
			C	0.286	2.335	0.612	1	1	59.069			
T2	0.50	4.43	A	0.191	2.628	0.589	1	1	42.936	5.69	284.47	B
260.00-240.00			B	0.295	2.31	0.614	1	1	68.382			
			C	0.242	2.463	0.6	1	1	54.416			
T3	0.74	6.06	A	0.255	2.422	0.603	1	1	69.183	7.16	357.83	B
240.00-220.00			B	0.339	2.198	0.629	1	1	92.574			
			C	0.283	2.343	0.611	1	1	78.594			
T4	0.91	5.96	A	0.224	2.518	0.596	1	1	64.283	7.19	359.29	B
220.00-200.00			B	0.313	2.261	0.62	1	1	92.710			
			C	0.255	2.423	0.603	1	1	76.443			
T5	1.18	7.28	A	0.23	2.499	0.597	1	1	69.311	6.65	332.30	B
200.00-180.00			B	0.268	2.384	0.607	1	1	83.696			
			C	0.219	2.532	0.595	1	1	69.953			
T6	1.39	8.01	A	0.251	2.435	0.602	1	1	82.551	6.77	338.34	B

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	R_R	D_F	D_R	A_E ft²	F K	w plf	Ctrl. Face
180.00-160.00			B	0.256	2.42	0.603	1	1	86.656			
			C	0.208	2.568	0.592	1	1	72.203			
T7	2.23	8.58	A	0.346	2.181	0.631	1	1	124.783	8.47	423.64	A
160.00-140.00			B	0.251	2.434	0.602	1	1	92.418			
			C	0.199	2.599	0.59	1	1	75.464			
T8	2.63	10.65	A	0.357	2.156	0.635	1	1	138.401	8.92	445.81	A
140.00-120.00			B	0.257	2.417	0.604	1	1	100.924			
			C	0.2	2.595	0.59	1	1	81.016			
T9	2.77	11.79	A	0.348	2.176	0.632	1	1	144.156	8.94	446.97	A
120.00-100.00			B	0.253	2.428	0.603	1	1	106.090			
			C	0.213	2.554	0.593	1	1	90.708			
T10	2.86	12.81	A	0.338	2.2	0.628	1	1	149.854	8.87	443.45	A
100.00-80.00			B	0.244	2.456	0.6	1	1	108.768			
			C	0.214	2.551	0.593	1	1	96.538			
T11	2.86	13.58	A	0.328	2.225	0.625	1	1	155.587	8.67	433.37	A
80.00-60.00			B	0.24	2.469	0.599	1	1	115.403			
			C	0.211	2.559	0.593	1	1	103.364			
T12	2.88	14.70	A	0.319	2.246	0.622	1	1	160.037	8.17	408.73	A
60.00-40.00			B	0.233	2.491	0.598	1	1	118.549			
			C	0.206	2.577	0.592	1	1	106.569			
T13	2.89	14.99	A	0.306	2.28	0.618	1	1	161.443	7.43	371.70	A
40.00-20.00			B	0.223	2.522	0.595	1	1	119.938			
			C	0.197	2.605	0.59	1	1	108.049			
T14	2.89	15.28	A	0.293	2.314	0.614	1	1	162.408	7.59	379.55	A
20.00-0.00			B	0.214	2.55	0.593	1	1	121.379			
			C	0.19	2.63	0.588	1	1	109.570			
Sum Weight:	26.97	139.33						OTM	13969.94 kip-ft	105.89		

Tower Forces - With Ice - Wind 60 To Face

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	R_R	D_F	D_R	A_E ft²	F K	w plf	Ctrl. Face
T1	0.26	5.22	A	0.249	2.44	0.602	0.8	1	47.034	4.91	245.31	B
280.00-260.00			B	0.303	2.288	0.617	0.8	1	58.229			
			C	0.286	2.335	0.612	0.8	1	54.180			
T2	0.50	4.43	A	0.191	2.628	0.589	0.8	1	39.720	5.27	263.51	B
260.00-240.00			B	0.295	2.31	0.614	0.8	1	63.342			
			C	0.242	2.463	0.6	0.8	1	50.676			
T3	0.74	6.06	A	0.255	2.422	0.603	0.8	1	62.523	6.53	326.43	B
240.00-220.00			B	0.339	2.198	0.629	0.8	1	84.451			
			C	0.283	2.343	0.611	0.8	1	70.494			
T4	0.91	5.96	A	0.224	2.518	0.596	0.8	1	59.197	6.61	330.46	B
220.00-200.00			B	0.313	2.261	0.62	0.8	1	85.272			
			C	0.255	2.423	0.603	0.8	1	69.263			
T5	1.18	7.28	A	0.23	2.499	0.597	0.8	1	65.248	6.19	309.52	B
200.00-180.00			B	0.268	2.384	0.607	0.8	1	77.958			
			C	0.219	2.532	0.595	0.8	1	64.090			
T6	1.39	8.01	A	0.251	2.435	0.602	0.8	1	77.920	6.31	315.25	B
180.00-160.00			B	0.256	2.42	0.603	0.8	1	80.744			
			C	0.208	2.568	0.592	0.8	1	66.160			
T7	2.23	8.58	A	0.346	2.181	0.631	0.8	1	119.312	8.10	405.07	A
160.00-140.00			B	0.251	2.434	0.602	0.8	1	85.910			
			C	0.199	2.599	0.59	0.8	1	68.773			

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	R_R	D_F	D_R	A_E ft²	F K	w plf	Ctrl. Face
T8	2.63	10.65	A	0.357	2.156	0.635	0.8	1	132.823	8.56	427.85	A
140.00-120.00			B	0.257	2.417	0.604	0.8	1	94.279			
			C	0.2	2.595	0.59	0.8	1	74.152			
T9	2.77	11.79	A	0.348	2.176	0.632	0.8	1	138.223	8.57	428.57	A
120.00-100.00			B	0.253	2.428	0.603	0.8	1	99.238			
			C	0.213	2.554	0.593	0.8	1	83.707			
T10	2.86	12.81	A	0.338	2.2	0.628	0.8	1	143.118	8.47	423.52	A
100.00-80.00			B	0.244	2.456	0.6	0.8	1	101.685			
			C	0.214	2.551	0.593	0.8	1	89.350			
T11	2.86	13.58	A	0.328	2.225	0.625	0.8	1	147.614	8.22	411.16	A
80.00-60.00			B	0.24	2.469	0.599	0.8	1	107.002			
			C	0.211	2.559	0.593	0.8	1	94.835			
T12	2.88	14.70	A	0.319	2.246	0.622	0.8	1	151.786	7.75	387.66	A
60.00-40.00			B	0.233	2.491	0.598	0.8	1	109.853			
			C	0.206	2.577	0.592	0.8	1	97.746			
T13	2.89	14.99	A	0.306	2.28	0.618	0.8	1	152.895	7.04	352.02	A
40.00-20.00			B	0.223	2.522	0.595	0.8	1	110.942			
			C	0.197	2.605	0.59	0.8	1	98.929			
T14	2.89	15.28	A	0.293	2.314	0.614	0.8	1	153.554	7.18	358.86	A
20.00-0.00			B	0.214	2.55	0.593	0.8	1	112.081			
			C	0.19	2.63	0.588	0.8	1	100.149			
Sum Weight:	26.97	139.33						OTM	13058.78 kip-ft	99.70		

Tower Forces - With Ice - Wind 90 To Face

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	R_R	D_F	D_R	A_E ft²	F K	w plf	Ctrl. Face
T1	0.26	5.22	A	0.249	2.44	0.602	0.85	1	48.168	5.03	251.27	B
280.00-260.00			B	0.303	2.288	0.617	0.85	1	59.645			
			C	0.286	2.335	0.612	0.85	1	55.402			
T2	0.50	4.43	A	0.191	2.628	0.589	0.85	1	40.524	5.37	268.75	B
260.00-240.00			B	0.295	2.31	0.614	0.85	1	64.602			
			C	0.242	2.463	0.6	0.85	1	51.611			
T3	0.74	6.06	A	0.255	2.422	0.603	0.85	1	64.188	6.69	334.28	B
240.00-220.00			B	0.339	2.198	0.629	0.85	1	86.482			
			C	0.283	2.343	0.611	0.85	1	72.519			
T4	0.91	5.96	A	0.224	2.518	0.596	0.85	1	60.469	6.75	337.67	B
220.00-200.00			B	0.313	2.261	0.62	0.85	1	87.131			
			C	0.255	2.423	0.603	0.85	1	71.058			
T5	1.18	7.28	A	0.23	2.499	0.597	0.85	1	66.264	6.30	315.21	B
200.00-180.00			B	0.268	2.384	0.607	0.85	1	79.393			
			C	0.219	2.532	0.595	0.85	1	65.556			
T6	1.39	8.01	A	0.251	2.435	0.602	0.85	1	79.077	6.42	321.02	B
180.00-160.00			B	0.256	2.42	0.603	0.85	1	82.222			
			C	0.208	2.568	0.592	0.85	1	67.671			
T7	2.23	8.58	A	0.346	2.181	0.631	0.85	1	120.679	8.19	409.71	A
160.00-140.00			B	0.251	2.434	0.602	0.85	1	87.537			
			C	0.199	2.599	0.59	0.85	1	70.446			
T8	2.63	10.65	A	0.357	2.156	0.635	0.85	1	134.217	8.65	432.34	A
140.00-120.00			B	0.257	2.417	0.604	0.85	1	95.940			
			C	0.2	2.595	0.59	0.85	1	75.868			
T9	2.77	11.79	A	0.348	2.176	0.632	0.85	1	139.706	8.66	433.17	A
120.00-100.00			B	0.253	2.428	0.603	0.85	1	100.951			

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	R_R	D_F	D_R	A_E ft²	F K	w plf	Ctrl. Face
			C	0.213	2.554	0.593	0.85	1	85.457			
T10	2.86	12.81	A	0.338	2.2	0.628	0.85	1	144.802	8.57	428.50	A
100.00-80.00			B	0.244	2.456	0.6	0.85	1	103.456			
			C	0.214	2.551	0.593	0.85	1	91.147			
T11	2.86	13.58	A	0.328	2.225	0.625	0.85	1	149.607	8.33	416.72	A
80.00-60.00			B	0.24	2.469	0.599	0.85	1	109.102			
			C	0.211	2.559	0.593	0.85	1	96.968			
T12	2.88	14.70	A	0.319	2.246	0.622	0.85	1	153.848	7.86	392.93	A
60.00-40.00			B	0.233	2.491	0.598	0.85	1	112.027			
			C	0.206	2.577	0.592	0.85	1	99.952			
T13	2.89	14.99	A	0.306	2.28	0.618	0.85	1	155.032	7.14	356.94	A
40.00-20.00			B	0.223	2.522	0.595	0.85	1	113.191			
			C	0.197	2.605	0.59	0.85	1	101.209			
T14	2.89	15.28	A	0.293	2.314	0.614	0.85	1	155.767	7.28	364.03	A
20.00-0.00			B	0.214	2.55	0.593	0.85	1	114.406			
			C	0.19	2.63	0.588	0.85	1	102.504			
Sum Weight:	26.97	139.33						OTM	13286.57 kip-ft	101.25		

Tower Forces - Service - Wind Normal To Face

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	R_R	D_F	D_R	A_E ft²	F K	w plf	Ctrl. Face
T1	0.08	3.17	A	0.169	2.701	0.585	1	1	37.359	4.26	213.13	B
280.00-260.00			B	0.202	2.588	0.591	1	1	44.728			
			C	0.192	2.624	0.589	1	1	41.731			
T2	0.17	2.62	A	0.128	2.855	0.578	1	1	30.598	4.33	216.43	B
260.00-240.00			B	0.192	2.622	0.589	1	1	45.829			
			C	0.158	2.743	0.583	1	1	37.158			
T3	0.25	3.68	A	0.18	2.665	0.586	1	1	52.050	5.77	288.37	B
240.00-220.00			B	0.231	2.497	0.597	1	1	65.663			
			C	0.198	2.603	0.59	1	1	58.226			
T4	0.30	3.76	A	0.155	2.755	0.582	1	1	46.990	5.61	280.60	B
220.00-200.00			B	0.209	2.568	0.592	1	1	63.768			
			C	0.175	2.683	0.586	1	1	54.981			
T5	0.40	5.10	A	0.153	2.759	0.582	1	1	47.585	4.95	247.56	B
200.00-180.00			B	0.173	2.689	0.585	1	1	55.281			
			C	0.146	2.788	0.581	1	1	48.151			
T6	0.48	5.74	A	0.171	2.695	0.585	1	1	57.329	5.03	251.70	B
180.00-160.00			B	0.165	2.717	0.584	1	1	57.423			
			C	0.138	2.815	0.58	1	1	49.898			
T7	0.82	6.17	A	0.254	2.425	0.603	1	1	90.369	6.82	341.13	A
160.00-140.00			B	0.164	2.722	0.584	1	1	62.166			
			C	0.134	2.831	0.579	1	1	53.175			
T8	0.99	8.15	A	0.265	2.393	0.606	1	1	100.967	7.22	360.97	A
140.00-120.00			B	0.168	2.705	0.584	1	1	67.925			
			C	0.134	2.831	0.579	1	1	56.675			
T9	1.04	9.14	A	0.257	2.417	0.604	1	1	104.686	7.21	360.53	A
120.00-100.00			B	0.166	2.714	0.584	1	1	71.481			
			C	0.14	2.809	0.58	1	1	62.264			
T10	1.07	10.06	A	0.249	2.441	0.602	1	1	108.889	7.15	357.53	A
100.00-80.00			B	0.16	2.735	0.583	1	1	73.593			
			C	0.14	2.81	0.58	1	1	65.927			
T11	1.07	10.53	A	0.244	2.456	0.6	1	1	115.293	7.09	354.49	A

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	R_R	D_F	D_R	A_E ft²	F K	w plf	Ctrl. Face
80.00-60.00			B	0.161	2.732	0.583	1	1	80.442			
			C	0.142	2.802	0.58	1	1	72.873			
T12	1.08	11.54	A	0.237	2.478	0.599	1	1	118.435	6.67	333.72	A
60.00-40.00			B	0.156	2.748	0.582	1	1	82.944			
			C	0.138	2.815	0.58	1	1	75.386			
T13	1.08	11.76	A	0.227	2.508	0.596	1	1	119.877	6.07	303.69	A
40.00-20.00			B	0.15	2.771	0.581	1	1	84.351			
			C	0.133	2.835	0.579	1	1	76.814			
T14	1.08	11.99	A	0.218	2.538	0.594	1	1	121.104	6.21	310.46	A
20.00-0.00			B	0.145	2.792	0.581	1	1	85.783			
			C	0.128	2.853	0.578	1	1	78.265			
Sum Weight:	9.90	103.42						OTM	11007.50 kip-ft	84.41		

Tower Forces - Service - Wind 60 To Face

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	R_R	D_F	D_R	A_E ft²	F K	w plf	Ctrl. Face
T1	0.08	3.17	A	0.169	2.701	0.585	0.8	1	32.822	3.75	187.54	B
280.00-260.00			B	0.202	2.588	0.591	0.8	1	39.357			
			C	0.192	2.624	0.589	0.8	1	36.911			
T2	0.17	2.62	A	0.128	2.855	0.578	0.8	1	27.381	3.90	194.94	B
260.00-240.00			B	0.192	2.622	0.589	0.8	1	41.280			
			C	0.158	2.743	0.583	0.8	1	33.540			
T3	0.25	3.68	A	0.18	2.665	0.586	0.8	1	45.335	5.08	253.92	B
240.00-220.00			B	0.231	2.497	0.597	0.8	1	57.820			
			C	0.198	2.603	0.59	0.8	1	50.442			
T4	0.30	3.76	A	0.155	2.755	0.582	0.8	1	41.854	5.01	250.37	B
220.00-200.00			B	0.209	2.568	0.592	0.8	1	56.897			
			C	0.175	2.683	0.586	0.8	1	48.328			
T5	0.40	5.10	A	0.153	2.759	0.582	0.8	1	43.769	4.50	225.06	B
200.00-180.00			B	0.173	2.689	0.585	0.8	1	50.258			
			C	0.146	2.788	0.581	0.8	1	43.057			
T6	0.48	5.74	A	0.171	2.695	0.585	0.8	1	53.055	4.61	230.66	A
180.00-160.00			B	0.165	2.717	0.584	0.8	1	52.227			
			C	0.138	2.815	0.58	0.8	1	44.629			
T7	0.82	6.17	A	0.254	2.425	0.603	0.8	1	85.280	6.44	321.92	A
160.00-140.00			B	0.164	2.722	0.584	0.8	1	56.342			
			C	0.134	2.831	0.579	0.8	1	47.245			
T8	0.99	8.15	A	0.265	2.393	0.606	0.8	1	95.738	6.85	342.28	A
140.00-120.00			B	0.168	2.705	0.584	0.8	1	61.941			
			C	0.134	2.831	0.579	0.8	1	50.555			
T9	1.04	9.14	A	0.257	2.417	0.604	0.8	1	99.140	6.83	341.43	A
120.00-100.00			B	0.166	2.714	0.584	0.8	1	65.288			
			C	0.14	2.809	0.58	0.8	1	55.970			
T10	1.07	10.06	A	0.249	2.441	0.602	0.8	1	102.711	6.74	337.24	A
100.00-80.00			B	0.16	2.735	0.583	0.8	1	67.174			
			C	0.14	2.81	0.58	0.8	1	59.430			
T11	1.07	10.53	A	0.244	2.456	0.6	0.8	1	107.802	6.63	331.46	A
80.00-60.00			B	0.161	2.732	0.583	0.8	1	72.654			
			C	0.142	2.802	0.58	0.8	1	64.990			
T12	1.08	11.54	A	0.237	2.478	0.599	0.8	1	110.661	6.24	311.81	A
60.00-40.00			B	0.156	2.748	0.582	0.8	1	74.865			
			C	0.138	2.815	0.58	0.8	1	67.212			

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	R_R	D_F	D_R	A_E ft²	F K	w plf	Ctrl. Face
T13	1.08	11.76	A	0.227	2.508	0.596	0.8	1	111.808	5.67	283.25	A
40.00-20.00			B	0.15	2.771	0.581	0.8	1	75.976			
			C	0.133	2.835	0.579	0.8	1	68.346			
T14	1.08	11.99	A	0.218	2.538	0.594	0.8	1	112.733	5.78	289.00	A
20.00-0.00			B	0.145	2.792	0.581	0.8	1	77.109			
			C	0.128	2.853	0.578	0.8	1	69.499			
Sum Weight:	9.90	103.42						OTM	10063.95 kip-ft	78.02		

Tower Forces - Service - Wind 90 To Face

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	R_R	D_F	D_R	A_E ft²	F K	w plf	Ctrl. Face
T1	0.08	3.17	A	0.169	2.701	0.585	0.85	1	33.956	3.88	193.94	B
280.00-260.00			B	0.202	2.588	0.591	0.85	1	40.700			
			C	0.192	2.624	0.589	0.85	1	38.116			
T2	0.17	2.62	A	0.128	2.855	0.578	0.85	1	28.185	4.01	200.31	B
260.00-240.00			B	0.192	2.622	0.589	0.85	1	42.417			
			C	0.158	2.743	0.583	0.85	1	34.444			
T3	0.25	3.68	A	0.18	2.665	0.586	0.85	1	47.014	5.25	262.53	B
240.00-220.00			B	0.231	2.497	0.597	0.85	1	59.781			
			C	0.198	2.603	0.59	0.85	1	52.388			
T4	0.30	3.76	A	0.155	2.755	0.582	0.85	1	43.138	5.16	257.92	B
220.00-200.00			B	0.209	2.568	0.592	0.85	1	58.615			
			C	0.175	2.683	0.586	0.85	1	49.991			
T5	0.40	5.10	A	0.153	2.759	0.582	0.85	1	44.723	4.61	230.69	B
200.00-180.00			B	0.173	2.689	0.585	0.85	1	51.514			
			C	0.146	2.788	0.581	0.85	1	44.330			
T6	0.48	5.74	A	0.171	2.695	0.585	0.85	1	54.123	4.71	235.30	A
180.00-160.00			B	0.165	2.717	0.584	0.85	1	53.526			
			C	0.138	2.815	0.58	0.85	1	45.946			
T7	0.82	6.17	A	0.254	2.425	0.603	0.85	1	86.552	6.53	326.72	A
160.00-140.00			B	0.164	2.722	0.584	0.85	1	57.798			
			C	0.134	2.831	0.579	0.85	1	48.728			
T8	0.99	8.15	A	0.265	2.393	0.606	0.85	1	97.045	6.94	346.95	A
140.00-120.00			B	0.168	2.705	0.584	0.85	1	63.437			
			C	0.134	2.831	0.579	0.85	1	52.085			
T9	1.04	9.14	A	0.257	2.417	0.604	0.85	1	100.527	6.92	346.20	A
120.00-100.00			B	0.166	2.714	0.584	0.85	1	66.836			
			C	0.14	2.809	0.58	0.85	1	57.543			
T10	1.07	10.06	A	0.249	2.441	0.602	0.85	1	104.255	6.85	342.31	A
100.00-80.00			B	0.16	2.735	0.583	0.85	1	68.779			
			C	0.14	2.81	0.58	0.85	1	61.054			
T11	1.07	10.53	A	0.244	2.456	0.6	0.85	1	109.675	6.74	337.21	A
80.00-60.00			B	0.161	2.732	0.583	0.85	1	74.601			
			C	0.142	2.802	0.58	0.85	1	66.961			
T12	1.08	11.54	A	0.237	2.478	0.599	0.85	1	112.604	6.35	317.29	A
60.00-40.00			B	0.156	2.748	0.582	0.85	1	76.885			
			C	0.138	2.815	0.58	0.85	1	69.256			
T13	1.08	11.76	A	0.227	2.508	0.596	0.85	1	113.825	5.77	288.36	A
40.00-20.00			B	0.15	2.771	0.581	0.85	1	78.070			
			C	0.133	2.835	0.579	0.85	1	70.463			
T14	1.08	11.99	A	0.218	2.538	0.594	0.85	1	114.825	5.89	294.37	A
20.00-0.00			B	0.145	2.792	0.581	0.85	1	79.278			

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	R_R	D_F	D_R	A_E ft^2	F K	w plf	Ctrl. Face
Sum Weight:	9.90	103.42	C	0.128	2.853	0.578	0.85	1 OTM	71.690 10297.75 kip-ft	79.60		

Force Totals

Load Case	Vertical Forces K	Sum of Forces X K	Sum of Forces Z K	Sum of Overturning Moments, M_x kip-ft	Sum of Overturning Moments, M_z kip-ft	Sum of Torques kip-ft
Leg Weight	57.46					
Bracing Weight	45.95					
Total Member Self-Weight	103.42			-23.30	30.30	
Total Weight	123.81			-23.30	30.30	
Wind 0 deg - No Ice		1.31	-110.66	-16314.83	-267.74	-66.39
Wind 30 deg - No Ice		53.93	-93.35	-13890.63	-7983.02	-68.22
Wind 60 deg - No Ice		91.13	-52.46	-7768.40	-13436.65	-33.95
Wind 90 deg - No Ice		107.37	0.33	47.78	-15876.77	9.19
Wind 120 deg - No Ice		96.29	54.40	7911.66	-14173.40	32.76
Wind 150 deg - No Ice		53.16	88.80	12823.53	-7815.52	44.34
Wind 180 deg - No Ice		0.14	101.19	14627.63	-4.39	62.20
Wind 210 deg - No Ice		-53.49	91.22	13364.32	7940.14	65.89
Wind 240 deg - No Ice		-96.41	55.98	8265.17	14250.22	33.62
Wind 270 deg - No Ice		-104.52	1.12	231.52	15288.12	-7.12
Wind 300 deg - No Ice		-86.52	-49.96	-7203.62	12449.64	-28.25
Wind 330 deg - No Ice		-49.88	-89.78	-13094.39	7123.55	-44.08
Member Ice	35.91					
Total Weight Ice	184.04			-21.86	58.30	
Wind 0 deg - Ice		2.39	-136.26	-20016.53	-369.94	-61.49
Wind 30 deg - Ice		67.47	-115.48	-17101.62	-9898.96	-38.46
Wind 60 deg - Ice		113.76	-65.52	-9654.37	-16677.94	6.87
Wind 90 deg - Ice		133.30	-0.33	-27.02	-19600.10	51.20
Wind 120 deg - Ice		119.01	66.27	9652.80	-17415.73	71.08
Wind 150 deg - Ice		65.83	110.61	15989.71	-9627.59	65.93
Wind 180 deg - Ice		0.08	126.57	18308.16	31.76	61.80
Wind 210 deg - Ice		-66.24	113.29	16566.97	9819.75	43.21
Wind 240 deg - Ice		-118.45	68.71	10111.79	17470.83	-9.59
Wind 270 deg - Ice		-129.99	1.13	238.13	19008.17	-56.21
Wind 300 deg - Ice		-108.51	-62.58	-9031.41	15662.45	-68.67
Wind 330 deg - Ice		-62.43	-111.65	-16266.52	8969.53	-65.66
Total Weight	123.81			-23.30	30.30	
Wind 0 deg - Service		1.31	-110.66	-16296.19	-283.58	-66.39
Wind 30 deg - Service		53.93	-93.35	-13871.98	-7998.87	-68.22
Wind 60 deg - Service		91.13	-52.46	-7749.76	-13452.49	-33.95
Wind 90 deg - Service		107.37	0.33	66.42	-15892.62	9.19
Wind 120 deg - Service		96.29	54.40	7930.31	-14189.24	32.76
Wind 150 deg - Service		53.16	88.80	12842.18	-7831.36	44.34
Wind 180 deg - Service		0.14	101.19	14646.28	-20.24	62.20
Wind 210 deg - Service		-53.49	91.22	13382.96	7924.30	65.89
Wind 240 deg - Service		-96.41	55.98	8283.81	14234.37	33.62
Wind 270 deg - Service		-104.52	1.12	250.17	15272.27	-7.12
Wind 300 deg - Service		-86.52	-49.96	-7184.98	12433.80	-28.25
Wind 330 deg - Service		-49.88	-89.78	-13075.75	7107.70	-44.08

Load Combinations

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

Maximum Member Forces

Section No.	Elevation ft	Component Type	Condition	Gov. Load Comb.	Force K	Major Axis Moment kip-ft	Minor Axis Moment kip-ft
T1	280 - 260	Leg	Max Tension	17	4.99	-2.93	-0.01
			Max. Compression	23	-10.03	2.29	0.01
			Max. Mx	17	1.03	-4.25	-0.06
			Max. My	22	-0.72	-1.70	-2.56
			Max. Vy	17	1.47	-4.25	-0.06
			Max. Vx	16	0.82	-1.66	-1.78
		Diagonal	Max Tension	18	3.72	0.00	0.00
			Max. Compression	18	-4.23	0.00	0.00
			Max. Mx	23	0.55	0.06	-0.01
			Max. My	25	-2.91	0.05	0.01
			Max. Vy	22	0.04	0.06	-0.01

Section No.	Elevation ft	Component Type	Condition	Gov. Load Comb.	Force K	Major Axis Moment kip-ft	Minor Axis Moment kip-ft
			Max. Vx	19	0.00	0.00	0.00
		Secondary Horizontal	Max Tension	23	0.66	0.00	0.00
			Max. Compression	23	-0.17	0.00	0.00
			Max. Mx	14	0.50	-0.17	0.00
			Max. My	19	0.35	0.00	0.00
			Max. Vy	14	0.05	0.00	0.00
			Max. Vx	19	-0.00	0.00	0.00
		Top Girt	Max Tension	15	0.60	0.00	0.00
			Max. Compression	12	-0.22	0.00	0.00
			Max. Mx	14	0.37	-0.19	0.00
			Max. My	19	0.23	0.00	0.01
			Max. Vy	14	0.06	0.00	0.00
			Max. Vx	19	-0.00	0.00	0.00
T2	260 - 240	Leg	Max Tension	17	20.26	0.09	-0.07
			Max. Compression	19	-30.93	2.61	-0.16
			Max. Mx	23	-30.88	2.68	0.20
			Max. My	16	-3.37	-0.47	-1.77
			Max. Vy	23	-0.65	2.68	0.20
			Max. Vx	16	0.54	0.25	-1.25
		Diagonal	Max Tension	18	5.88	0.00	0.00
			Max. Compression	18	-6.30	0.00	0.00
			Max. Mx	23	3.88	0.09	0.01
			Max. My	18	2.46	0.08	-0.01
			Max. Vy	22	0.04	0.09	0.01
			Max. Vx	18	0.00	0.00	0.00
T3	240 - 220	Leg	Max Tension	17	42.09	-0.08	-0.06
			Max. Compression	23	-60.75	1.67	0.16
			Max. Mx	23	-43.33	2.77	0.16
			Max. My	22	-5.81	-0.46	2.37
			Max. Vy	17	-0.74	0.42	-0.08
			Max. Vx	15	0.87	0.40	0.06
		Diagonal	Max Tension	18	9.54	0.00	0.00
			Max. Compression	18	-9.95	0.00	0.00
			Max. Mx	23	6.35	0.15	0.01
			Max. My	25	-7.23	0.06	0.03
			Max. Vy	17	0.06	0.14	-0.01
			Max. Vx	25	-0.00	0.00	0.00
		Top Girt	Max Tension	21	2.52	0.00	0.00
			Max. Compression	6	-0.82	0.00	0.00
			Max. Mx	14	1.43	-0.55	0.00
			Max. My	19	1.90	0.00	0.02
			Max. Vy	14	-0.14	0.00	0.00
			Max. Vx	19	0.00	0.00	0.00
		Mid Girt	Max Tension	17	2.62	0.00	0.00
			Max. Compression	10	-0.99	0.00	0.00
			Max. Mx	14	1.30	-0.24	0.00
			Max. My	19	1.95	0.00	0.01
			Max. Vy	14	0.06	0.00	0.00
			Max. Vx	19	-0.00	0.00	0.00
T4	220 - 200	Leg	Max Tension	17	71.36	0.26	0.21
			Max. Compression	23	-97.63	5.62	-0.14
			Max. Mx	17	70.86	-7.37	-0.01
			Max. My	20	-8.15	-1.28	-5.61
			Max. Vy	21	1.22	-6.67	-0.82
			Max. Vx	20	1.01	-1.28	-5.61
		Diagonal	Max Tension	18	11.61	0.00	0.00
			Max. Compression	18	-11.58	0.00	0.00
			Max. Mx	23	9.32	0.16	-0.01
			Max. My	18	-11.32	0.07	-0.04
			Max. Vy	18	0.06	0.15	-0.02

Section No.	Elevation ft	Component Type	Condition	Gov. Load Comb.	Force K	Major Axis Moment kip-ft	Minor Axis Moment kip-ft
			Max. Vx	18	0.01	0.00	0.00
T5	200 - 180	Leg	Max Tension	17	96.78	1.73	0.33
			Max. Compression	23	-127.36	12.90	0.82
			Max. Mx	23	-127.36	12.90	0.82
			Max. My	16	-12.24	0.75	-7.54
			Max. Vy	15	-1.40	12.83	0.60
			Max. Vx	16	-1.41	-0.82	-0.39
		Diagonal	Max Tension	18	17.32	0.00	0.00
			Max. Compression	18	-18.56	0.00	0.00
			Max. Mx	17	13.51	-0.36	0.04
			Max. My	18	-18.39	-0.23	0.10
			Max. Vy	17	-0.11	-0.36	0.04
			Max. Vx	18	-0.01	0.00	0.00
T6	180 - 160	Leg	Max Tension	17	132.59	6.39	-0.18
			Max. Compression	23	-175.19	14.94	0.72
			Max. Mx	17	130.37	-16.30	-0.72
			Max. My	16	-17.11	-0.90	-9.35
			Max. Vy	17	1.98	-16.30	-0.72
			Max. Vx	19	1.25	-9.06	-8.75
		Diagonal	Max Tension	18	19.55	0.00	0.00
			Max. Compression	18	-18.89	0.00	0.00
			Max. Mx	17	13.68	-0.39	0.06
			Max. My	19	-0.95	-0.36	0.07
			Max. Vy	17	-0.12	-0.39	0.06
			Max. Vx	19	-0.01	0.00	0.00
T7	160 - 140	Leg	Max Tension	17	169.84	0.17	0.02
			Max. Compression	23	-220.53	17.80	0.07
			Max. Mx	23	-220.53	17.80	0.07
			Max. My	20	-16.21	1.13	-10.90
			Max. Vy	19	-2.77	17.78	-0.65
			Max. Vx	20	2.30	1.13	-10.90
		Diagonal	Max Tension	18	21.52	0.00	0.00
			Max. Compression	18	-23.14	0.00	0.00
			Max. Mx	17	16.29	-0.55	0.07
			Max. My	18	-22.95	-0.35	0.10
			Max. Vy	17	-0.15	-0.55	0.07
			Max. Vx	18	-0.01	0.00	0.00
T8	140 - 120	Leg	Max Tension	17	210.30	2.13	0.47
			Max. Compression	23	-275.66	10.72	-0.23
			Max. Mx	17	208.03	-14.67	0.26
			Max. My	20	-21.17	-2.43	-6.99
			Max. Vy	17	1.60	-14.67	0.26
			Max. Vx	18	-0.91	-1.97	6.96
		Diagonal	Max Tension	18	26.09	0.00	0.00
			Max. Compression	18	-25.44	0.00	0.00
			Max. Mx	17	21.76	-0.78	-0.09
			Max. My	19	0.04	-0.71	0.12
			Max. Vy	17	-0.21	-0.78	-0.09
			Max. Vx	19	-0.01	0.00	0.00
T9	120 - 100	Leg	Max Tension	17	256.53	1.79	0.63
			Max. Compression	23	-330.44	16.92	0.27
			Max. Mx	23	-330.44	16.92	0.27
			Max. My	16	-29.75	4.10	-7.30
			Max. Vy	23	-1.72	16.92	0.27
			Max. Vx	16	0.92	4.10	-7.30
		Diagonal	Max Tension	18	26.33	0.00	0.00
			Max. Compression	18	-28.20	0.00	0.00
			Max. Mx	17	20.57	-0.90	0.11
			Max. My	19	-0.64	-0.84	0.12
			Max. Vy	17	-0.23	-0.90	0.11
			Max. Vx	19	0.01	0.00	0.00

Section No.	Elevation ft	Component Type	Condition	Gov. Load Comb.	Force K	Major Axis Moment kip-ft	Minor Axis Moment kip-ft
T10	100 - 80	Leg	Max Tension	17	299.92	5.37	0.01
			Max. Compression	23	-390.22	6.57	-0.07
			Max. Mx	17	297.43	-17.57	0.04
			Max. My	20	-30.35	-5.88	-6.60
			Max. Vy	17	1.60	-17.57	0.04
			Max. Vx	20	0.69	-5.88	-6.60
		Diagonal	Max Tension	18	29.63	0.00	0.00
			Max. Compression	18	-27.76	0.00	0.00
			Max. Mx	17	23.60	-0.92	0.11
			Max. My	25	-21.72	-0.76	-0.13
			Max. Vy	17	-0.24	-0.92	0.11
			Max. Vx	25	-0.01	0.00	0.00
T11	80 - 60	Leg	Max Tension	17	348.49	-4.25	0.20
			Max. Compression	23	-444.77	18.86	-0.08
			Max. Mx	23	-444.77	18.86	-0.08
			Max. My	18	-39.20	8.68	8.54
			Max. Vy	19	-1.61	18.83	-0.42
			Max. Vx	20	0.73	8.55	-8.40
		Diagonal	Max Tension	18	27.69	0.00	0.00
			Max. Compression	18	-32.10	0.00	0.00
			Max. Mx	17	21.33	-1.30	0.15
			Max. My	25	-26.27	-1.02	-0.18
			Max. Vy	17	-0.29	-1.30	0.15
			Max. Vx	25	0.02	0.00	0.00
T12	60 - 40	Leg	Max Tension	17	387.91	8.28	0.16
			Max. Compression	23	-507.15	-0.20	-0.08
			Max. Mx	17	385.11	-22.54	0.08
			Max. My	18	-47.29	6.58	4.88
			Max. Vy	17	1.98	-22.54	0.08
			Max. Vx	18	0.57	6.58	4.88
		Diagonal	Max Tension	18	33.52	0.00	0.00
			Max. Compression	18	-28.33	0.00	0.00
			Max. Mx	17	27.58	-1.18	0.15
			Max. My	24	16.61	-1.15	-0.15
			Max. Vy	17	-0.30	-1.18	0.15
			Max. Vx	19	0.02	0.00	0.00
T13	40 - 20	Leg	Max Tension	17	439.23	-12.69	0.14
			Max. Compression	23	-559.17	21.16	-0.06
			Max. Mx	23	-559.17	21.16	-0.06
			Max. My	16	-50.14	12.53	-12.24
			Max. Vy	19	-1.80	21.15	-0.44
			Max. Vx	20	0.98	12.36	-12.04
		Diagonal	Max Tension	18	27.31	0.00	0.00
			Max. Compression	18	-35.98	0.00	0.00
			Max. Mx	17	20.08	-1.62	0.18
			Max. My	18	-35.70	-1.28	0.27
			Max. Vy	17	-0.33	-1.62	0.18
			Max. Vx	18	-0.02	0.00	0.00
T14	20 - 0	Leg	Max Tension	17	471.89	9.14	0.08
			Max. Compression	23	-622.39	3.48	0.01
			Max. Mx	23	-619.51	11.57	-0.09
			Max. My	18	-61.91	10.23	9.58
			Max. Vy	21	1.02	-3.35	-0.06
			Max. Vx	20	-0.77	10.23	-9.16
		Diagonal	Max Tension	18	37.30	0.00	0.00
			Max. Compression	18	-28.28	0.00	0.00
			Max. Mx	16	35.55	-1.32	0.16
			Max. My	24	16.96	-1.28	-0.18
			Max. Vy	16	-0.33	-1.32	0.16
			Max. Vx	24	-0.02	0.00	0.00

Maximum Reactions

Location	Condition	Gov. Load Comb.	Vertical K	Horizontal, X K	Horizontal, Z K
Leg C	Max. Vert	23	645.79	66.04	-38.01
	Max. H_x	23	645.79	66.04	-38.01
	Max. H_z	16	-434.43	-57.91	40.71
	Min. Vert	17	-496.59	-68.68	39.50
	Min. H_x	17	-496.59	-68.68	39.50
	Min. H_z	23	645.79	66.04	-38.01
Leg B	Max. Vert	19	637.76	-66.13	-36.82
	Max. H_x	25	-462.09	65.94	36.91
	Max. H_z	26	-399.02	55.36	37.48
	Min. Vert	25	-462.09	65.94	36.91
	Min. H_x	19	637.76	-66.13	-36.82
	Min. H_z	19	637.76	-66.13	-36.82
Leg A	Max. Vert	15	640.87	-1.08	75.77
	Max. H_x	24	54.44	10.57	-3.80
	Max. H_z	15	640.87	-1.08	75.77
	Min. Vert	21	-468.71	0.88	-76.34
	Min. H_x	18	62.12	-10.88	-2.94
	Min. H_z	21	-468.71	0.88	-76.34

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	123.81	0.00	-0.00	-23.32	30.26	-0.00
Dead+Wind 0 deg - No Ice	123.81	1.31	-110.66	-16348.01	-268.29	-66.46
Dead+Wind 30 deg - No Ice	123.81	53.93	-93.35	-13919.00	-7999.24	-68.28
Dead+Wind 60 deg - No Ice	123.81	91.13	-52.46	-7784.16	-13463.97	-34.00
Dead+Wind 90 deg - No Ice	123.81	107.37	0.33	48.02	-15909.15	9.16
Dead+Wind 120 deg - No Ice	123.81	96.29	54.40	7927.83	-14202.21	32.81
Dead+Wind 150 deg - No Ice	123.81	53.16	88.80	12849.47	-7831.36	44.44
Dead+Wind 180 deg - No Ice	123.81	0.14	101.19	14657.12	-4.32	62.28
Dead+Wind 210 deg - No Ice	123.81	-53.49	91.22	13391.43	7956.40	65.94
Dead+Wind 240 deg - No Ice	123.81	-96.41	55.98	8282.07	14279.24	33.69
Dead+Wind 270 deg - No Ice	123.81	-104.52	1.12	232.20	15319.10	-7.08
Dead+Wind 300 deg - No Ice	123.81	-86.52	-49.96	-7217.99	12474.68	-28.28
Dead+Wind 330 deg - No Ice	123.81	-49.88	-89.78	-13120.83	7137.87	-44.18
Dead+Ice+Temp	184.04	0.00	-0.00	-21.88	58.33	0.00
Dead+Wind 0 deg+Ice+Temp	184.04	2.39	-136.26	-20075.43	-370.97	-61.70
Dead+Wind 30 deg+Ice+Temp	184.04	67.47	-115.48	-17152.09	-9928.16	-38.57
Dead+Wind 60 deg+Ice+Temp	184.04	113.76	-65.52	-9682.61	-16727.11	6.83
Dead+Wind 90 deg+Ice+Temp	184.04	133.30	-0.33	-26.71	-19657.99	51.24
Dead+Wind 120 deg+Ice+Temp	184.04	119.00	66.27	9681.56	-17466.97	71.24
Dead+Wind 150 deg+Ice+Temp	184.04	65.83	110.61	16036.68	-9655.86	66.14
Dead+Wind 180 deg+Ice+Temp	184.04	0.08	126.57	18361.75	31.92	61.99
Dead+Wind 210 deg+Ice+Temp	184.04	-66.24	113.29	16615.82	9848.76	43.31
Dead+Wind 240 deg+Ice+Temp	184.04	-118.45	68.71	10141.89	17522.38	-9.54
Dead+Wind 270 deg+Ice+Temp	184.04	-129.99	1.13	239.25	19064.01	-56.24
Dead+Wind 300 deg+Ice+Temp	184.04	-108.51	-62.58	-9057.46	15708.13	-68.83
Dead+Wind 330 deg+Ice+Temp	184.04	-62.43	-111.65	-16314.06	8995.71	-65.88
Dead+Wind 0 deg - Service	123.81	1.31	-110.66	-16348.01	-268.29	-66.46

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
Dead+Wind 30 deg - Service	123.81	53.93	-93.35	-13919.00	-7999.24	-68.28
Dead+Wind 60 deg - Service	123.81	91.13	-52.46	-7784.16	-13463.97	-34.00
Dead+Wind 90 deg - Service	123.81	107.37	0.33	48.02	-15909.15	9.16
Dead+Wind 120 deg - Service	123.81	96.29	54.40	7927.83	-14202.21	32.81
Dead+Wind 150 deg - Service	123.81	53.16	88.80	12849.47	-7831.36	44.44
Dead+Wind 180 deg - Service	123.81	0.14	101.19	14657.12	-4.32	62.28
Dead+Wind 210 deg - Service	123.81	-53.49	91.22	13391.43	7956.40	65.94
Dead+Wind 240 deg - Service	123.81	-96.41	55.98	8282.07	14279.24	33.69
Dead+Wind 270 deg - Service	123.81	-104.52	1.12	232.20	15319.10	-7.08
Dead+Wind 300 deg - Service	123.81	-86.52	-49.96	-7217.99	12474.68	-28.28
Dead+Wind 330 deg - Service	123.81	-49.88	-89.78	-13120.83	7137.87	-44.18

Solution Summary

	Sum of Applied Forces			Sum of Reactions			
Load Comb.	PX K	PY K	PZ K	PX K	PY K	PZ K	% Error
1	0.00	-123.81	0.00	-0.00	123.81	0.00	0.000%
2	1.31	-123.81	-110.66	-1.31	123.81	110.66	0.000%
3	53.93	-123.81	-93.35	-53.93	123.81	93.35	0.000%
4	91.13	-123.81	-52.46	-91.13	123.81	52.46	0.000%
5	107.37	-123.81	0.33	-107.37	123.81	-0.33	0.000%
6	96.29	-123.81	54.40	-96.29	123.81	-54.40	0.000%
7	53.16	-123.81	88.80	-53.16	123.81	-88.80	0.000%
8	0.14	-123.81	101.19	-0.14	123.81	-101.19	0.000%
9	-53.49	-123.81	91.22	53.49	123.81	-91.22	0.000%
10	-96.41	-123.81	55.98	96.41	123.81	-55.98	0.000%
11	-104.52	-123.81	1.12	104.52	123.81	-1.12	0.000%
12	-86.52	-123.81	-49.96	86.52	123.81	49.96	0.000%
13	-49.88	-123.81	-89.78	49.88	123.81	89.78	0.000%
14	0.00	-184.04	0.00	-0.00	184.04	0.00	0.000%
15	2.39	-184.04	-136.26	-2.39	184.04	136.26	0.000%
16	67.47	-184.04	-115.48	-67.47	184.04	115.48	0.000%
17	113.76	-184.04	-65.52	-113.76	184.04	65.52	0.000%
18	133.30	-184.04	-0.33	-133.30	184.04	0.33	0.000%
19	119.01	-184.04	66.27	-119.00	184.04	-66.27	0.000%
20	65.83	-184.04	110.61	-65.83	184.04	-110.61	0.000%
21	0.08	-184.04	126.57	-0.08	184.04	-126.57	0.000%
22	-66.24	-184.04	113.29	66.24	184.04	-113.29	0.000%
23	-118.45	-184.04	68.71	118.45	184.04	-68.71	0.000%
24	-129.99	-184.04	1.13	129.99	184.04	-1.13	0.000%
25	-108.51	-184.04	-62.58	108.51	184.04	62.58	0.000%
26	-62.43	-184.04	-111.65	62.43	184.04	111.65	0.000%
27	1.31	-123.81	-110.66	-1.31	123.81	110.66	0.000%
28	53.93	-123.81	-93.35	-53.93	123.81	93.35	0.000%
29	91.13	-123.81	-52.46	-91.13	123.81	52.46	0.000%
30	107.37	-123.81	0.33	-107.37	123.81	-0.33	0.000%
31	96.29	-123.81	54.40	-96.29	123.81	-54.40	0.000%
32	53.16	-123.81	88.80	-53.16	123.81	-88.80	0.000%
33	0.14	-123.81	101.19	-0.14	123.81	-101.19	0.000%
34	-53.49	-123.81	91.22	53.49	123.81	-91.22	0.000%
35	-96.41	-123.81	55.98	96.41	123.81	-55.98	0.000%
36	-104.52	-123.81	1.12	104.52	123.81	-1.12	0.000%
37	-86.52	-123.81	-49.96	86.52	123.81	49.96	0.000%
38	-49.88	-123.81	-89.78	49.88	123.81	89.78	0.000%

Non-Linear Convergence Results

Load Combination	Converged?	Number of Cycles	Displacement Tolerance	Force Tolerance
1	Yes	6	0.00000001	0.00007052
2	Yes	9	0.00000001	0.00004759
3	Yes	9	0.00000001	0.00004869
4	Yes	9	0.00000001	0.00004953
5	Yes	9	0.00000001	0.00004872
6	Yes	9	0.00000001	0.00004766
7	Yes	9	0.00000001	0.00004830
8	Yes	9	0.00000001	0.00004909
9	Yes	9	0.00000001	0.00004855
10	Yes	9	0.00000001	0.00004774
11	Yes	9	0.00000001	0.00004851
12	Yes	9	0.00000001	0.00004900
13	Yes	9	0.00000001	0.00004822
14	Yes	6	0.00000001	0.00010453
15	Yes	9	0.00000001	0.00005142
16	Yes	9	0.00000001	0.00005281
17	Yes	9	0.00000001	0.00005394
18	Yes	9	0.00000001	0.00005288
19	Yes	9	0.00000001	0.00005156
20	Yes	9	0.00000001	0.00005257
21	Yes	9	0.00000001	0.00005366
22	Yes	9	0.00000001	0.00005282
23	Yes	9	0.00000001	0.00005168
24	Yes	9	0.00000001	0.00005271
25	Yes	9	0.00000001	0.00005373
26	Yes	9	0.00000001	0.00005239
27	Yes	9	0.00000001	0.00004759
28	Yes	9	0.00000001	0.00004869
29	Yes	9	0.00000001	0.00004953
30	Yes	9	0.00000001	0.00004872
31	Yes	9	0.00000001	0.00004766
32	Yes	9	0.00000001	0.00004830
33	Yes	9	0.00000001	0.00004909
34	Yes	9	0.00000001	0.00004855
35	Yes	9	0.00000001	0.00004774
36	Yes	9	0.00000001	0.00004851
37	Yes	9	0.00000001	0.00004900
38	Yes	9	0.00000001	0.00004822

Maximum Tower Deflections - Service Wind

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
T1	280 - 260	13.962	35	0.4008	0.0423
T2	260 - 240	12.154	35	0.4000	0.0410
T3	240 - 220	10.408	35	0.3806	0.0370
T4	220 - 200	8.793	35	0.3413	0.0298
T5	200 - 180	7.324	35	0.3110	0.0215
T6	180 - 160	5.946	35	0.2809	0.0173
T7	160 - 140	4.720	35	0.2508	0.0129
T8	140 - 120	3.639	35	0.2149	0.0101
T9	120 - 100	2.728	35	0.1811	0.0088

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
T10	100 - 80	1.960	35	0.1497	0.0071
T11	80 - 60	1.315	35	0.1208	0.0057
T12	60 - 40	0.799	35	0.0894	0.0043
T13	40 - 20	0.413	35	0.0611	0.0029
T14	20 - 0	0.131	35	0.0310	0.0015

Critical Deflections and Radius of Curvature - Service Wind

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
280.00	Beacon Extender (4') 803062	35	13.962	0.4008	0.0423	321561
279.00	DB538	35	13.871	0.4009	0.0423	321561
276.00	8' Solid w/ Radome	35	13.598	0.4013	0.0421	321561
266.00	8' Solid w/ Radome	35	12.693	0.4014	0.0416	114843
261.00	10' Dipole	35	12.243	0.4003	0.0411	84085
260.00	DB589-Y	35	12.154	0.4000	0.0410	79450
255.00	DB212-1-C	35	11.709	0.3974	0.0403	60857
241.00	SD110-SFXPASNM	35	10.493	0.3822	0.0372	36438
240.00	8' Solid w/ Radome	35	10.408	0.3806	0.0370	35609
235.00	TMA (12"x16"x6"")	35	9.990	0.3716	0.0355	32851
230.00	8' Solid w/ Radome	35	9.581	0.3614	0.0338	30796
220.00	8' Solid w/ Radome	35	8.793	0.3413	0.0298	28520
216.00	ANT450F10	35	8.489	0.3343	0.0281	32163
205.50	10' Solid w/ Radome	35	7.718	0.3188	0.0235	59343
200.00	TMA (12"x16"x6"")	35	7.324	0.3110	0.0215	85220
197.00	6' Solid w/ Radome	35	7.111	0.3067	0.0206	71844
195.00	10' Solid w/ Radome	35	6.970	0.3037	0.0201	59914
175.00	SC479	35	5.625	0.2735	0.0162	28241
168.00	ANT450F6	35	5.192	0.2633	0.0147	32327
163.00	6' Solid w/ Radome	35	4.894	0.2556	0.0136	35960
155.00	(4) DB980H90E-M	35	4.435	0.2422	0.0118	34094
145.00	LNX-6515DS	35	3.894	0.2240	0.0105	27506
130.00	KRECO CO-36A	35	3.163	0.1976	0.0094	29432
128.00	3' Pivot Side Arm (50" pipe)	35	3.073	0.1942	0.0093	30490
126.00	PR-950	35	2.985	0.1909	0.0092	31626
124.00	ANT450F6	35	2.898	0.1876	0.0090	32847
123.00	SBX4-W60	35	2.855	0.1860	0.0090	33473
117.00	6' Grid Dish	35	2.605	0.1762	0.0085	36172
116.00	BR-6155	35	2.564	0.1746	0.0084	36401
104.00	6' Solid w/ Radome	35	2.103	0.1557	0.0074	39029
97.00	BR-6155	35	1.855	0.1453	0.0068	39640
55.00	5-ft dipole	35	0.691	0.0821	0.0039	37889

Maximum Tower Deflections - Design Wind

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
T1	280 - 260	17.029	23	0.4869	0.0517
T2	260 - 240	14.835	23	0.4859	0.0498
T3	240 - 220	12.713	23	0.4632	0.0450

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
T4	220 - 200	10.747	23	0.4159	0.0372
T5	200 - 180	8.958	23	0.3793	0.0288
T6	180 - 160	7.279	23	0.3429	0.0236
T7	160 - 140	5.781	23	0.3064	0.0183
T8	140 - 120	4.459	23	0.2629	0.0136
T9	120 - 100	3.345	23	0.2216	0.0109
T10	100 - 80	2.404	23	0.1834	0.0087
T11	80 - 60	1.613	23	0.1480	0.0067
T12	60 - 40	0.980	23	0.1096	0.0048
T13	40 - 20	0.506	23	0.0749	0.0032
T14	20 - 0	0.161	23	0.0380	0.0016

Critical Deflections and Radius of Curvature - Design Wind

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
280.00	Beacon Extender (4') 803062	23	17.029	0.4869	0.0517	280582
279.00	DB538	23	16.918	0.4870	0.0516	280582
276.00	8' Solid w/ Radome	23	16.588	0.4874	0.0514	280582
266.00	8' Solid w/ Radome	23	15.489	0.4876	0.0506	100208
261.00	10' Dipole	23	14.943	0.4863	0.0499	73214
260.00	DB589-Y	23	14.835	0.4859	0.0498	69055
255.00	DB212-1-C	23	14.294	0.4830	0.0488	52162
241.00	SD110-SFXPASNM	23	12.816	0.4651	0.0453	30553
240.00	8' Solid w/ Radome	23	12.713	0.4632	0.0450	29832
235.00	TMA (12"x16"x6"")	23	12.205	0.4524	0.0434	27425
230.00	8' Solid w/ Radome	23	11.707	0.4402	0.0415	25634
220.00	8' Solid w/ Radome	23	10.747	0.4159	0.0372	23627
216.00	ANT450F10	23	10.377	0.4075	0.0354	26612
205.50	10' Solid w/ Radome	23	9.438	0.3887	0.0309	48799
200.00	TMA (12"x16"x6"")	23	8.958	0.3793	0.0288	69801
197.00	6' Solid w/ Radome	23	8.699	0.3740	0.0279	59255
195.00	10' Solid w/ Radome	23	8.527	0.3704	0.0273	49654
175.00	SC479	23	6.886	0.3340	0.0223	23637
168.00	ANT450F6	23	6.358	0.3216	0.0204	26880
163.00	6' Solid w/ Radome	23	5.994	0.3123	0.0191	29724
155.00	(4) DB980H90E-M	23	5.433	0.2960	0.0170	27976
145.00	LNX-6515DS	23	4.770	0.2739	0.0146	22476
130.00	KRECO CO-36A	23	3.877	0.2418	0.0121	24173
128.00	3' Pivot Side Arm (50" pipe)	23	3.767	0.2377	0.0119	25082
126.00	PR-950	23	3.659	0.2336	0.0116	26062
124.00	ANT450F6	23	3.552	0.2296	0.0114	27119
123.00	SBX4-W60	23	3.500	0.2276	0.0113	27662
117.00	6' Grid Dish	23	3.194	0.2157	0.0106	29941
116.00	BR-6155	23	3.144	0.2137	0.0105	30117
104.00	6' Solid w/ Radome	23	2.580	0.1907	0.0091	32061
97.00	BR-6155	23	2.275	0.1780	0.0083	32422
55.00	5-ft dipole	23	0.849	0.1006	0.0044	31159

Bolt Design Data

Section No.	Elevation ft	Component Type	Bolt Grade	Bolt Size in	Number Of Bolts	Maximum Load per Bolt K	Allowable Load K	Ratio Load / Allowable	Allowable Ratio	Criteria
T1	280	Leg	A325N	1.0000	6	0.83	34.56	0.024 ✓	1.333	Bolt Tension
		Diagonal	A325N	1.0000	1	4.23	16.49	0.257 ✓	1.333	Bolt Shear
		Top Girt	A325N	1.0000	1	0.60	16.29	0.037 ✓	1.333	Member Bearing
T2	260	Leg	A325N	1.0000	6	3.38	34.56	0.098 ✓	1.333	Bolt Tension
		Diagonal	A325N	1.0000	1	6.30	16.49	0.382 ✓	1.333	Bolt Shear
T3	240	Leg	A325N	1.0000	6	6.92	34.56	0.200 ✓	1.333	Bolt Tension
		Diagonal	A325N	1.0000	1	9.54	13.03	0.732 ✓	1.333	Member Bearing
		Top Girt	A325N	1.0000	1	2.52	16.49	0.153 ✓	1.333	Bolt Shear
		Mid Girt	A325N	1.0000	1	2.62	2.72	0.965 ✓	1.333	Member Bearing
T4	220	Leg	A325N	1.0000	6	11.89	34.56	0.344 ✓	1.333	Bolt Tension
		Diagonal	A325N	1.0000	1	11.61	13.03	0.891 ✓	1.333	Member Bearing
T5	200	Leg	A325N	1.0000	12	8.06	34.56	0.233 ✓	1.333	Bolt Tension
		Diagonal	A325N	0.8750	1	18.56	25.26	0.735 ✓	1.333	Bolt Shear
T6	180	Leg	A325N	1.0000	12	11.05	34.56	0.320 ✓	1.333	Bolt Tension
		Diagonal	A325N	0.8750	1	19.55	25.26	0.774 ✓	1.333	Bolt Shear
T7	160	Leg	A325N	1.0000	12	14.15	34.55	0.410 ✓	1.333	Bolt Tension
		Diagonal	A325N	0.8750	1	23.14	25.26	0.916 ✓	1.333	Bolt Shear
T8	140	Leg	A325N	1.0000	12	17.53	34.56	0.507 ✓	1.333	Bolt Tension
		Diagonal	A325N	0.8750	1	26.09	25.26	1.033 ✓	1.333	Bolt Shear
T9	120	Leg	A325N	1.0000	12	21.38	34.56	0.619 ✓	1.333	Bolt Tension
		Diagonal	A325N	0.8750	2	14.10	25.26	0.558 ✓	1.333	Bolt Shear
T10	100	Leg	A325N	1.2500	12	24.99	54.00	0.463 ✓	1.333	Bolt Tension
		Diagonal	A325N	0.8750	2	14.81	25.26	0.587 ✓	1.333	Bolt Shear
T11	80	Leg	A325N	1.2500	12	29.04	54.00	0.538 ✓	1.333	Bolt Tension
		Diagonal	A325N	0.8750	2	16.05	25.26	0.636 ✓	1.333	Bolt Shear
T12	60	Leg	A325N	1.2500	12	32.33	53.99	0.599 ✓	1.333	Bolt Tension
		Diagonal	A325N	0.8750	2	16.76	25.26	0.664 ✓	1.333	Bolt Shear
T13	40	Leg	A325N	1.2500	12	36.60	54.00	0.678 ✓	1.333	Bolt Tension
		Diagonal	A325N	0.8750	2	17.99	25.26	0.712 ✓	1.333	Bolt Shear
T14	20	Leg	F1554-105	1.2500	12	39.32	50.62	0.777 ✓	1.333	Bolt Tension
		Diagonal	A325N	0.8750	2	18.65	25.26	0.738 ✓	1.333	Bolt Shear

Compression Checks

Leg Design Data (Compression)

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	F_a ksi	A in^2	Actual P K	Allow. P_a K	Ratio P / P_a
T1	280 - 260	#12ZG - 1.25" - 1.00" conn. (Pirod 207628)	20.03	10.02	45.0 K=1.00	25.111	3.6816	-10.03	92.45	0.108 ✔
T2	260 - 240	#12ZG - 1.25" - 1.00" conn. (Pirod 207628)	20.03	10.02	45.0 K=1.00	25.111	3.6816	-30.93	92.45	0.335 ✔
T3	240 - 220	#12ZG - 1.25" - 1.00" conn. (Pirod 207628)	20.03	10.02	45.0 K=1.00	25.111	3.6816	-60.75	92.45	0.657 ✔
T4	220 - 200	#12ZG - 1.75" - 1.00" conn. (Pirod 195557)	20.03	10.02	31.9 K=1.00	26.920	7.2158	-97.63	194.25	0.503 ✔
T5	200 - 180	#12ZG -2.00" - 0.875" conn.-Trans (Pirod 211843)	20.03	20.03	48.8 K=1.00	24.534	9.4248	-127.36	231.23	0.551 ✔
T6	180 - 160	#12ZG -2.25" - 0.875" conn. (Pirod 208334)	20.03	20.03	48.8 K=1.00	24.544	11.9282	-175.19	292.77	0.598 ✔
T7	160 - 140	#12ZG -2.25" - 0.875" conn. (Pirod 208334)	20.03	20.03	48.8 K=1.00	24.544	11.9282	-220.53	292.77	0.753 ✔
T8	140 - 120	#12ZG - 2.50" - 0.875" conn. (Pirod 208335)	20.03	20.03	48.7 K=1.00	24.555	14.7262	-275.66	361.61	0.762 ✔
T9	120 - 100	#12ZG -2.75"-0.875 -DB-0.625"-HP- (Pirod 238706)	20.03	20.03	48.6 K=1.00	24.568	17.8187	-330.44	437.77	0.755 ✔
T10	100 - 80	#12ZG -3.00"-0.875 -DB-0.625"-HP-Trans- (Pirod 238707)	20.03	20.03	48.5 K=1.00	24.582	21.2057	-390.22	521.27	0.749 ✔
T11	80 - 60	#12ZG -3.00"-0.875 -DB-0.625"-HP- (Pirod 238708)	20.03	20.03	48.5 K=1.00	24.582	21.2057	-444.77	521.27	0.853 ✔
T12	60 - 40	#12ZG -3.25"-0.875 -DB-0.625"-HP- (Pirod 238709)	20.03	20.03	48.4 K=1.00	24.596	24.8873	-507.15	612.14	0.828 ✔
T13	40 - 20	#12ZG -3.25"-0.875 -DB-0.625"-HP- (Pirod 238709)	20.03	20.03	48.4 K=1.00	24.596	24.8873	-559.17	612.14	0.913 ✔
T14	20 - 0	#12ZG -3.25"-0.875 -DB-0.625"-HP- (Pirod 238709)	20.03	20.03	48.4 K=1.00	24.596	24.8873	-622.39	612.14	1.017 ✔

Truss-Leg Diagonal Data

Section No.	Elevation ft	Diagonal Size	L_d ft	Kl/r	F_a ksi	A in^2	Actual V K	Allow. V_a K	Stress Ratio
T1	280 - 260	0.5	1.48	99.1	13.088	0.1963	1.49	2.89	0.515 ✔
T2	260 - 240	0.5	1.48	99.1	13.088	0.1963	0.68	2.89	0.234 ✔
T3	240 - 220	0.5	1.48	99.1	13.088	0.1963	0.94	2.89	0.327 ✔
T4	220 - 200	0.5	1.44	96.9	13.368	0.1963	1.34	2.97	0.450 ✔
T5	200 - 180	0.5	1.39	93.2	13.816	0.1963	1.58	3.15	0.500 ✔
T6	180 - 160	0.5	1.38	92.4	13.917	0.1963	1.98	3.17	0.626 ✔

Section No.	Elevation ft	Diagonal Size	L_d ft	Kl/r	F_a ksi	A in^2	Actual V K	Allow. V_a K	Stress Ratio
T7	160 - 140	0.5	1.38	92.4	13.917	0.1963	2.77	3.17	0.875 ✓
T8	140 - 120	0.5	1.36	91.6	14.015	0.1963	1.62	3.19	0.506 ✓
T9	120 - 100	0.625	1.35	72.6	16.156	0.3068	1.75	5.75	0.304 ✓
T10	100 - 80	0.625	1.34	72.0	16.223	0.3068	1.61	5.78	0.278 ✓
T11	80 - 60	0.625	1.34	72.0	16.223	0.3068	1.62	5.78	0.280 ✓
T12	60 - 40	0.625	1.33	71.4	16.288	0.3068	1.98	5.80	0.341 ✓
T13	40 - 20	0.625	1.33	71.4	16.288	0.3068	1.80	5.80	0.310 ✓
T14	20 - 0	0.625	1.33	71.4	16.288	0.3068	1.09	5.80	0.187 ✓

Diagonal Design Data (Compression)

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	F_a ksi	A in^2	Actual P K	Allow. P_a K	Ratio $\frac{P}{P_a}$
T1	280 - 260	L3x3x5/16	14.87	7.52	153.2 K=1.00	6.362	1.7800	-4.23	11.32	0.374 ✓
T2	260 - 240	L3x3x5/16	16.49	8.32	169.5 K=1.00	5.196	1.7800	-6.30	9.25	0.681 ✓
T3	240 - 220	L4x4x1/4	18.19	9.16	138.3 K=1.00	7.806	1.9400	-9.95	15.14	0.657 ✓
T4	220 - 200	L4x4x1/4	19.94	10.04	151.5 K=1.00	6.508	1.9400	-11.37	12.63	0.900 ✓
T5	200 - 180	2L3 1/2x3 1/2x1/4	27.05	13.98	153.9 K=1.00	6.301	3.3800	-18.56	21.30	0.871 ✓
T6	180 - 160	2L3 1/2x3 1/2x1/4	28.50	14.68	161.6 K=1.00	5.716	3.3800	-18.89	19.32	0.978 ✓
T7	160 - 140	2L4x4x1/4	30.01	15.42	148.0 K=1.00	6.817	3.8800	-23.14	26.45	0.875 ✓
T8	140 - 120	2L4x4x3/8	31.57	16.18	157.9 K=1.00	5.990	5.7200	-25.44	34.26	0.742 ✓
T9	120 - 100	2L4x4x3/8	33.18	16.87	154.0 K=0.94	6.297	5.7200	-28.20	36.02	0.783 ✓
T10	100 - 80	2L4x4x3/8	34.84	17.68	160.1 K=0.93	5.829	5.7200	-27.76	33.34	0.832 ✓
T11	80 - 60	2L5x5x5/16	36.52	18.52	136.4 K=0.96	8.021	6.0500	-32.10	48.52	0.662 ✓
T12	60 - 40	2L5x5x5/16	38.24	19.37	141.4 K=0.96	7.468	6.0500	-28.33	45.18	0.627 ✓
T13	40 - 20	2L5x5x5/16	39.98	20.23	146.4 K=0.95	6.963	6.0500	-35.98	42.13	0.854 ✓
T14	20 - 0	2L5x5x5/16	41.75	21.11	151.6 K=0.94	6.501	6.0500	-28.28	39.33	0.719 ✓

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	F_a ksi	A in^2	Actual P K	Allow. P_a K	Ratio $\frac{P}{P_a}$

Secondary Horizontal Design Data (Compression)

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	F_a ksi	A in^2	Actual P K	Allow. P_a K	Ratio $\frac{P}{P_a}$
T1	280 - 260	L2 1/2x2 1/2x5/16	13.48	12.48	242.7 K=0.79	2.534	1.4600	-0.17	3.70	0.047 ✔

Top Girt Design Data (Compression)

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	F_a ksi	A in^2	Actual P K	Allow. P_a K	Ratio $\frac{P}{P_a}$
T1	280 - 260	L3 1/2x3 1/2x5/16	12.00	10.62	184.6 K=1.00	4.380	2.0900	-0.22	9.15	0.024 ✔
T3	240 - 220	L5x5x3/8	16.00	14.62	177.2 K=1.00	4.757	3.6100	-0.82	17.17	0.048 ✔

Mid Girt Design Data (Compression)

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	F_a ksi	A in^2	Actual P K	Allow. P_a K	Ratio $\frac{P}{P_a}$
T3	240 - 220	L3x3x3/16	17.00	15.63	314.6 K=1.00	1.509	1.0900	-0.99	1.64	0.602 ✔
		KL/R > 200 (C) - 47								

Tension Checks

Leg Design Data (Tension)

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	F_a ksi	A in^2	Actual P K	Allow. P_a K	Ratio $\frac{P}{P_a}$
T1	280 - 260	#12ZG - 1.25" - 1.00" conn. (Pirod 207628)	20.03	10.02	45.0	30.000	3.6816	4.99	110.45	0.045 ✔
T2	260 - 240	#12ZG - 1.25" - 1.00" conn. (Pirod 207628)	20.03	10.02	45.0	30.000	3.6816	20.26	110.45	0.183 ✔
T3	240 - 220	#12ZG - 1.25" - 1.00" conn.	20.03	10.02	45.0	30.000	3.6816	41.49	110.45	0.376

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	F_a ksi	A in^2	Actual P K	Allow. P_a K	Ratio $\frac{P}{P_a}$
		(Pirod 207628)								✓
T4	220 - 200	#12ZG - 1.75" - 1.00" conn. (Pirod 195557)	20.03	10.02	31.9	30.000	7.2158	71.36	216.47	0.330 ✓
T5	200 - 180	#12ZG -2.00" - 0.875" conn.-Trans (Pirod 211843)	20.03	20.03	48.8	30.000	9.4248	96.78	282.74	0.342 ✓
T6	180 - 160	#12ZG -2.25" - 0.875" conn. (Pirod 208334)	20.03	20.03	48.8	30.000	11.9282	132.59	357.85	0.371 ✓
T7	160 - 140	#12ZG -2.25" - 0.875" conn. (Pirod 208334)	20.03	20.03	48.8	30.000	11.9282	169.84	357.85	0.475 ✓
T8	140 - 120	#12ZG - 2.50" - 0.875" conn. (Pirod 208335)	20.03	20.03	48.7	30.000	14.7262	210.30	441.79	0.476 ✓
T9	120 - 100	#12ZG -2.75"-0.875 -DB-0.625"-HP- (Pirod 238706)	20.03	20.03	48.6	30.000	17.8187	256.53	534.56	0.480 ✓
T10	100 - 80	#12ZG -3.00"-0.875 -DB-0.625"-HP-Trans- (Pirod 238707)	20.03	20.03	48.5	30.000	21.2057	299.92	636.17	0.471 ✓
T11	80 - 60	#12ZG -3.00"-0.875 -DB-0.625"-HP- (Pirod 238708)	20.03	20.03	48.5	30.000	21.2057	348.49	636.17	0.548 ✓
T12	60 - 40	#12ZG -3.25"-0.875 -DB-0.625"-HP- (Pirod 238709)	20.03	20.03	48.4	30.000	24.8873	387.91	746.62	0.520 ✓
T13	40 - 20	#12ZG -3.25"-0.875 -DB-0.625"-HP- (Pirod 238709)	20.03	20.03	48.4	30.000	24.8873	439.23	746.62	0.588 ✓
T14	20 - 0	#12ZG -3.25"-0.875 -DB-0.625"-HP- (Pirod 238709)	20.03	20.03	48.4	30.000	24.8873	471.89	746.62	0.632 ✓

Truss-Leg Diagonal Data

Section No.	Elevation ft	Diagonal Size	L_d ft	Kl/r	F_a ksi	A in^2	Actual V K	Allow. V_a K	Stress Ratio
T1	280 - 260	0.5	1.48	99.1	13.088	0.1963	1.49	2.89	0.515 ✓
T2	260 - 240	0.5	1.48	99.1	13.088	0.1963	0.68	2.89	0.234 ✓
T3	240 - 220	0.5	1.48	99.1	13.088	0.1963	0.94	2.89	0.327 ✓
T4	220 - 200	0.5	1.44	96.9	13.368	0.1963	1.34	2.97	0.450 ✓
T5	200 - 180	0.5	1.39	93.2	13.816	0.1963	1.58	3.15	0.500 ✓
T6	180 - 160	0.5	1.38	92.4	13.917	0.1963	1.98	3.17	0.626 ✓
T7	160 - 140	0.5	1.38	92.4	13.917	0.1963	2.77	3.17	0.875 ✓
T8	140 - 120	0.5	1.36	91.6	14.015	0.1963	1.62	3.19	0.506 ✓
T9	120 - 100	0.625	1.35	72.6	16.156	0.3068	1.75	5.75	0.304

Section No.	Elevation ft	Diagonal Size	L_d ft	Kl/r	F_a ksi	A in^2	Actual V K	Allow. V_a K	Stress Ratio
T10	100 - 80	0.625	1.34	72.0	16.223	0.3068	1.61	5.78	0.278
T11	80 - 60	0.625	1.34	72.0	16.223	0.3068	1.62	5.78	0.280
T12	60 - 40	0.625	1.33	71.4	16.288	0.3068	1.98	5.80	0.341
T13	40 - 20	0.625	1.33	71.4	16.288	0.3068	1.80	5.80	0.310
T14	20 - 0	0.625	1.33	71.4	16.288	0.3068	1.09	5.80	0.187

Diagonal Design Data (Tension)

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	F_a ksi	A in^2	Actual P K	Allow. P_a K	Ratio $\frac{P}{P_a}$
T1	280 - 260	L3x3x5/16	14.87	7.52	100.4	29.000	1.0713	3.72	31.07	0.120
T2	260 - 240	L3x3x5/16	16.49	8.32	110.8	29.000	1.0713	5.88	31.07	0.189
T3	240 - 220	L4x4x1/4	18.19	9.16	89.8	29.000	1.2441	9.54	36.08	0.264
T4	220 - 200	L4x4x1/4	19.94	10.04	98.2	29.000	1.2441	11.61	36.08	0.322
T5	200 - 180	2L3 1/2x3 1/2x1/4	27.05	13.98	156.0	29.000	2.1600	17.32	62.64	0.276
T6	180 - 160	2L3 1/2x3 1/2x1/4	28.50	14.68	163.7	29.000	2.1600	19.55	62.64	0.312
T7	160 - 140	2L4x4x1/4	30.01	15.42	149.8	29.000	2.5350	21.52	73.52	0.293
T8	140 - 120	2L4x4x3/8	31.57	16.18	159.7	29.000	3.7275	26.09	108.10	0.241
T9	120 - 100	2L4x4x3/8	33.18	16.87	167.5	29.000	3.7275	26.33	108.10	0.244
T10	100 - 80	2L4x4x3/8	34.84	17.68	175.4	29.000	3.7275	29.63	108.10	0.274
T11	80 - 60	2L5x5x5/16	36.52	18.52	143.8	29.000	4.0687	27.69	117.99	0.235
T12	60 - 40	2L5x5x5/16	38.24	19.37	150.3	29.000	4.0687	33.52	117.99	0.284
T13	40 - 20	2L5x5x5/16	39.98	20.23	156.9	29.000	4.0687	27.31	117.99	0.231
T14	20 - 0	2L5x5x5/16	41.75	21.11	163.6	29.000	4.0687	37.30	117.99	0.316

Secondary Horizontal Design Data (Tension)

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	F_a ksi	A in^2	Actual P K	Allow. P_a K	Ratio $\frac{P}{P_a}$
T1	280 - 260	L2 1/2x2 1/2x5/16	13.48	12.48	196.8	21.600	1.4600	0.50	31.54	0.016* ✔

* DL controls

Top Girt Design Data (Tension)

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	F_a ksi	A in^2	Actual P K	Allow. P_a K	Ratio $\frac{P}{P_a}$
T1	280 - 260	L3 1/2x3 1/2x5/16	12.00	10.62	122.2	29.000	1.3038	0.60	37.81	0.016 ✔
T3	240 - 220	L5x5x3/8	16.00	14.62	115.4	29.000	2.3911	2.52	69.34	0.036 ✔

Mid Girt Design Data (Tension)

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	F_a ksi	A in^2	Actual P K	Allow. P_a K	Ratio $\frac{P}{P_a}$
T3	240 - 220	L3x3x3/16	17.00	15.63	204.5	29.000	0.6593	2.62	19.12	0.137 ✔

Section Capacity Table

Section No.	Elevation ft	Component Type	Size	Critical Element	P K	$SF*P_{allow}$ K	% Capacity	Pass Fail
T1	280 - 260	Leg	#12ZG - 1.25" - 1.00" conn. (Pirod 207628)	1	-2.58	123.23	38.6	Pass
T2	260 - 240	Leg	#12ZG - 1.25" - 1.00" conn. (Pirod 207628)	26	-30.93	123.23	25.1	Pass
T3	240 - 220	Leg	#12ZG - 1.25" - 1.00" conn. (Pirod 207628)	40	-60.75	123.23	49.3	Pass
T4	220 - 200	Leg	#12ZG - 1.75" - 1.00" conn. (Pirod 195557)	61	-97.63	258.94	37.7	Pass
T5	200 - 180	Leg	#12ZG -2.00" - 0.875" conn.-Trans (Pirod 211843)	76	-127.36	308.22	41.3	Pass
T6	180 - 160	Leg	#12ZG -2.25" - 0.875" conn. (Pirod 208334)	85	-175.19	390.26	46.9	Pass
T7	160 - 140	Leg	#12ZG -2.25" - 0.875" conn. (Pirod 208334)	95	-216.33	390.26	65.6	Pass
T8	140 - 120	Leg	#12ZG - 2.50" - 0.875" conn. (Pirod 208335)	103	-275.66	482.03	57.2	Pass
T9	120 - 100	Leg	#12ZG -2.75"-0.875 -DB-0.625"-HP- (Pirod 238706)	112	-330.44	583.55	56.6	Pass
T10	100 - 80	Leg	#12ZG -3.00"-0.875	121	-390.22	694.86	56.2	Pass

Section No.	Elevation ft	Component Type	Size	Critical Element	P K	SF*P_{allow} K	% Capacity	Pass Fail
			-DB-0.625"-HP-Trans- (Pirod 238707)					
T11	80 - 60	Leg	#12ZG -3.00"-0.875 -DB-0.625"-HP- (Pirod 238708)	130	-444.77	694.86	64.0	Pass
T12	60 - 40	Leg	#12ZG -3.25"-0.875 -DB-0.625"-HP- (Pirod 238709)	139	-507.15	815.98	62.2	Pass
T13	40 - 20	Leg	#12ZG -3.25"-0.875 -DB-0.625"-HP- (Pirod 238709)	148	-559.17	815.98	68.5	Pass
T14	20 - 0	Leg	#12ZG -3.25"-0.875 -DB-0.625"-HP- (Pirod 238709)	157	-622.39	815.98	76.3	Pass
T1	280 - 260	Diagonal	L3x3x5/16	8	-4.23	15.09	28.1	Pass
T2	260 - 240	Diagonal	L3x3x5/16	29	-6.30	12.33	51.1	Pass
T3	240 - 220	Diagonal	L4x4x1/4	50	-9.95	20.19	49.3 54.9 (b)	Pass
T4	220 - 200	Diagonal	L4x4x1/4	65	-11.37	16.83	67.5	Pass
T5	200 - 180	Diagonal	2L3 1/2x3 1/2x1/4	80	-18.56	28.39	65.4	Pass
T6	180 - 160	Diagonal	2L3 1/2x3 1/2x1/4	89	-18.89	25.75	73.3	Pass
T7	160 - 140	Diagonal	2L4x4x1/4	98	-23.14	35.26	65.6 68.7 (b)	Pass
T8	140 - 120	Diagonal	2L4x4x3/8	107	-25.44	45.67	55.7 77.5 (b)	Pass
T9	120 - 100	Diagonal	2L4x4x3/8	116	-28.20	48.01	58.7	Pass
T10	100 - 80	Diagonal	2L4x4x3/8	125	-27.76	44.45	62.4	Pass
T11	80 - 60	Diagonal	2L5x5x5/16	134	-32.10	64.68	49.6	Pass
T12	60 - 40	Diagonal	2L5x5x5/16	143	-28.33	60.23	47.0 49.8 (b)	Pass
T13	40 - 20	Diagonal	2L5x5x5/16	152	-35.98	56.15	64.1	Pass
T14	20 - 0	Diagonal	2L5x5x5/16	161	-28.28	52.43	53.9 55.4 (b)	Pass
T1	280 - 260	Secondary Horizontal	L2 1/2x2 1/2x5/16	15	-0.17	4.93	3.5	Pass
T1	280 - 260	Top Girt	L3 1/2x3 1/2x5/16	6	-0.22	12.20	1.8 2.8 (b)	Pass
T3	240 - 220	Top Girt	L5x5x3/8	45	-0.82	22.89	3.6 11.5 (b)	Pass
T3	240 - 220	Mid Girt	L3x3x3/16	47	-0.99	2.19	45.1 72.4 (b)	Pass
							Summary	
						Leg (T14)	76.3	Pass
						Diagonal (T8)	77.5	Pass
						Secondary Horizontal (T1)	3.5	Pass
						Top Girt (T3)	11.5	Pass
						Mid Girt (T3)	72.4	Pass
						Bolt Checks	77.5	Pass
						RATING =	**77.5**	**Pass**

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Subject:	Anchor Bolt Analysis
Location:	Haddam, CT
Rev. 0: 4/9/15	Prepared by: T.J.L. Checked by: C.F.C. Job No. 15078.000

Tower Anchor Bolt Analysis

Max Leg Reactions:

Uplift = $Uplift := 497 \cdot kips$ (User Input)

Shear = $Shear := 79 \cdot kips$ (User Input)

Compression = $Compression := 646 \cdot kips$ (User Input)

Anchor Bolt Data:

Use ASTM F1554 (Per Valmont Drawing 240898 Page 8 of 9)

Number of Anchor Bolts = $N := 12$ (User Input)

Bolt Ultimate Strength = $F_u := 150ksi$ (User Input)

Bolt Yield Strength = $F_y := 105ksi$ (User Input)

Diameter of Bolts = $D := 1.25in$ (User Input)

Threads per Inch = $n := 7$ (User Input)

Coefficient of Friction = $\mu := 0.5$ (User Input)

Anchor Bolt Area:

Net Area of Bolt = $A_n := \frac{\pi}{4} \cdot \left(D - \frac{0.974 \cdot in}{n}\right)^2 = 0.969 \cdot in^2$ (ASCE 10-97 Eq. 7.4-3)

Check Anchor Bolt Area:

Based on the ASCE 10-97 Design of Latticed Steel Transmission Structures

Required Area = $A_{s1} := \frac{Uplift}{F_y} + \frac{Shear}{\mu \cdot .85 \cdot F_y} = 6.5 \cdot in^2$ (ASCE 10-97 Eq. 7.4-2)

$A_{s2} := \left[\frac{Shear - (0.3 \cdot Compression)}{\mu \cdot .85 \cdot F_y}\right] = -2.573 \cdot in^2$ (ASCE 10-97 Eq. 7.4-4)

Provided Area = $A_{sprovided} := A_n \cdot N = 11.6 \cdot in^2$

$Condition1 := if\left(\frac{A_{s1}}{A_{sprovided}} \le 1.00, "OK", "Overstressed"\right)$

Condition1 = "OK"

$Condition2 := if\left(\frac{A_{s2}}{A_{sprovided}} \le 1.00, "OK", "Overstressed"\right)$

Condition2 = "OK"

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Subject:	FOUNDATION ANALYSIS
Location:	Haddam, CT
Rev. 0: 4/9/15	Prepared by: T.J.L. Checked by: C.F.C. Job No. 15078.000

Mat Foundation Analysis:

Input Data:

Tower Data

Overturning Moment =	$OM := 20246 \cdot ft \cdot kips$	(User Input from tnxTower)	
Shear Force =	$S_t := 137 \cdot kip$	(User Input from tnxTower)	
Axial Force =	$WT_t := 184 \cdot kip$	(User Input from tnxTower)	
Max Compression Force =	$C_t := 646 \cdot kip$	(User Input from tnxTower)	
Max Uplift Force =	$U_t := 497 \cdot kip$	(User Input from tnxTower)	
Tower Height =	$H_t := 280 \cdot ft$	(User Input)	
Tower Width =	$W_t := 40 \cdot ft$	(User Input)	
Tower Position on Foundation (1=offset, 2=centered) =	$Pos_t := 1$	(User Input)	

Footing Data:

Overall Depth of Footing =	$D_f := 6 \cdot ft$	(User Input)	
Thickness of Footing =	$T_f := 2.25 \cdot ft$	(User Input)	
Width of Footing =	$W_f := 49.5 \cdot ft$	(User Input)	
Length of Pier =	$L_p := 4.25 \cdot ft$	(User Input)	
Extension of Pier Above Grade =	$L_{pag} := 0.5 \cdot ft$	(User Input)	
Diameter of Pier =	$d_p := 5.5 \cdot ft$	(User Input)	

Material Properties:

Concrete Compressive Strength =	$f_c := 4000 \cdot psi$	(User Input)	
Steel Reinforcment Yield Strength =	$f_y := 60000 \cdot psi$	(User Input)	
Internal Friction Angle of Soil =	$\Phi_s := 30 \cdot deg$	(User Input)	
Allowable Soil Bearing Capacity =	$q_s := 6000 \cdot psf$	(User Input)	
Unit Weight of Soil =	$\gamma_{soil} := 125 \cdot pcf$	(User Input)	
Unit Weight of Concrete =	$\gamma_{conc} := 150 \cdot pcf$	(User Input)	
Foundation Bouyancy =	$Bouyancy := 0$	(User Input)	(Yes=1 / No=0)
Depth to Neglect =	$n := 0 \cdot ft$	(User Input)	
Cohesion of Clay Type Soil =	$c := 0 \cdot ksf$	(User Input)	(Use 0 for Sandy Soil)
Seismic Zone Factor =	$Z := 2$	(User Input)	(UBC-1997 Fig 23-2)
Coefficient of Friction Between Concrete =	$\mu := 0.45$	(User Input)	

Pier Reinforcement:

Bar Size =	$BS_{pier} := 9$	(User Input)	
Bar Diameter =	$d_{bpier} := 1.128 \cdot in$	(User Input)	
Number of Bars =	$NB_{pier} := 26$	(User Input)	
Clear Cover of Reinforcement =	$Cvr_{pier} := 3.0 \cdot in$	(User Input)	
Reinforcement Location Factor =	$\alpha_{pier} := 1.0$	(User Input)	(ACI-2008 12.2.4)
Coating Factor =	$\beta_{pier} := 1.0$	(User Input)	(ACI-2008 12.2.4)
Concrete Strength Factor =	$\lambda_{pier} := 1.0$	(User Input)	(ACI-2008 12.2.4)
Reinforcement Size Factor =	$\gamma_{pier} := 1.0$	(User Input)	(ACI-2008 12.2.4)
Diameter of Tie =	$d_{Tie} := 3 \cdot in$	(User Input)	

Pad Reinforcement:

Bar Size =	$BS_{top} := 11$	(User Input)	(Top of Pad)
Bar Diameter =	$d_{btop} := 1.41 \cdot in$	(User Input)	(Top of Pad)
Number of Bars =	$NB_{top} := 91$	(User Input)	(Top of Pad)
Bar Size =	$BS_{bot} := 11$	(User Input)	(Bottom of Pad)
Bar Diameter =	$d_{bbot} := 1.41 \cdot in$	(User Input)	(Bottom of Pad)
Number of Bars =	$NB_{bot} := 91$	(User Input)	(Bottom of Pad)
Clear Cover of Reinforcement =	$Cvr_{pad} := 3.0 \cdot in$	(User Input)	
Reinforcement Location Factor =	$\alpha_{pad} := 1.3$	(User Input)	(ACI-2008 12.2.4)
Coating Factor =	$\beta_{pad} := 1.0$	(User Input)	(ACI-2008 12.2.4)
Concrete Strength Factor =	$\lambda_{pad} := 1.0$	(User Input)	(ACI-2008 12.2.4)
Reinforcement Size Factor =	$\gamma_{pad} := 1.0$	(User Input)	(ACI-2008 12.2.4)

Calculated Factors:

Pier Reinforcement Bar Area =
$$A_{bpier} := \frac{\pi \cdot d_{bpier}^2}{4} = 0.999 \cdot in^2$$

Pad Top Reinforcement Bar Area =
$$A_{btop} := \frac{\pi \cdot d_{btop}^2}{4} = 1.561 \cdot in^2$$

Pad Bottom Reinforcement Bar Area =
$$A_{bbot} := \frac{\pi \cdot d_{bbot}^2}{4} = 1.561 \cdot in^2$$

Coefficient of Lateral Soil Pressure =
$$K_p := \frac{1 + \sin(\Phi_s)}{1 - \sin(\Phi_s)} = 3$$

Load Factor =
$$LF := \begin{cases} 1.333 & \text{if } H_t \le 700 \cdot ft \\ 1.7 & \text{if } H_t \ge 1200 \cdot ft \\ 1.333 + \left(\frac{H_t - 700ft}{1200ft - 700ft}\right) \cdot 0.4 & \text{otherwise} \end{cases} = 1.333$$

Stability of Footing:

Adjusted Concrete Unit Weight = $\gamma_c := if(Bouyancy = 1, \gamma_{conc} - 62.4pcf, \gamma_{conc}) = 150 \cdot pcf$

Adjusted Soil Unit Weight = $\gamma_s := if(Bouyancy = 1, \gamma_{soil} - 62.4pcf, \gamma_{soil}) = 125 \cdot pcf$

Passive Pressure = $P_{pn} := K_p \cdot \gamma_s \cdot n + c \cdot 2 \cdot \sqrt{K_p} = 0 \cdot ksf$

$P_{pt} := K_p \cdot \gamma_s \cdot (D_f - T_f) + c \cdot 2 \cdot \sqrt{K_p} = 1.406 \cdot ksf$

$P_{top} := if[n < (D_f - T_f), P_{pt}, P_{pn}] = 1.406 \cdot ksf$

$P_{bot} := K_p \cdot \gamma_s \cdot D_f + c \cdot 2 \cdot \sqrt{K_p} = 2.25 \cdot ksf$

$P_{ave} := \frac{P_{top} + P_{bot}}{2} = 1.828 \cdot ksf$

$T_p := if[n < (D_f - T_f), T_f, (D_f - n)] = 2.25$

$A_p := W_f \cdot T_p = 111.375$

Ultimate Shear = $S_u := P_{ave} \cdot A_p = 203.607 \cdot kip$

Weight of Concrete Pad = $WT_{pad} := \left(W_f^2 \cdot T_f\right) \cdot \gamma_c = 826.959 \cdot kip$

Weight of Concrete Piers = $WT_{pier} := 3 \cdot \left[\left(L_p \cdot \frac{d_p^2 \cdot \pi}{4}\right) \cdot \gamma_c\right] = 45.438 \cdot kip$

Total Weight of Concrete = $WT_c := WT_{pad} + WT_{pier} = 872 \cdot kip$

Weight of Soil Above Footing = $WT_{s1} := \left(W_f^2 - 3 \cdot \frac{d_p^2 \cdot \pi}{4}\right) \cdot (L_p - L_{pag}) \cdot \gamma_s = 1 \times 10^3 \cdot kip$

Weight of Soil Back Face = $WT_{s2} := \left[\frac{\tan(\Phi_s) \cdot (D_f)^2}{2} \cdot W_f\right] \cdot \gamma_s = 64 \cdot kip$

Tower Offset = $X_{t1} := \left[\frac{W_f}{2} - \frac{(W_t \cdot \cos(30 \cdot deg))}{2}\right]$ $X_{t2} := \frac{W_f}{2} - \frac{(W_t \cdot \cos(30 \cdot deg))}{3}$

$X_t := if(Pos_t, X_{t1}, X_{t2}) = 7.429$

$X_{off} := \frac{W_f}{2} - \left[\frac{(W_t \cdot \cos(30 \cdot deg))}{3} + X_t\right] = 5.774$

Resisting Moment = $M_r := \left(WT_c + WT_{s1}\right) \cdot \frac{W_f}{2} + S_u \cdot \frac{T_f}{3} + WT_{s2} \cdot \left[W_f + \frac{\tan(\Phi_s) \cdot (L_p - L_{pag})}{3}\right] = 52574 \cdot ki$

Overturning Moment = $M_{ot} := OM + S_t \cdot (L_p + T_f) = 21136.5 \cdot kip \cdot ft$

Factor of Safety Actual = $FS := \frac{M_r}{M_{ot}} = 2.49$

Factor of Safety Required = $FS_{req} := 2$

$OverTurning\_Moment\_Check := if(FS \geq FS_{req}, "Okay", "No Good")$

OverTurning_Moment_Check = "Okay"

Bearing Pressure Caused by Footing:

Total Load = $Load_{tot} := WT_c + WT_{s1} + WT_t = 2172 \cdot kip$

Area of the Mat = $A_{mat} := W_f^2 = 2.45 \times 10^3$

Section Modulus of Mat = $S := \frac{W_f^3}{6} = 2.02 \times 10^4 \cdot ft^3$

Maximum Pressure in Mat = $P_{max} := \frac{Load_{tot}}{A_{mat}} + \frac{M_{ot}}{S} = 1.932 \cdot ksf$

$Max\_Pressure\_Check := if\left(P_{max} < q_s, "Okay", "No Good"\right)$

Max_Pressure_Check = "Okay"

Minimum Pressure in Mat = $P_{min} := \frac{Load_{tot}}{A_{mat}} - \frac{M_{ot}}{S} = -0.159 \cdot ksf$

$Min\_Pressure\_Check := if\left[\left(P_{min} \geq 0\right) \cdot \left(P_{min} < q_s\right), "Okay", "No Good"\right]$

Min_Pressure_Check = "No Good"

Distance to Resultant of Pressure Distribution = $X_p := \frac{P_{max}}{\frac{P_{max} - P_{min}}{W_f}} \cdot \frac{1}{3} = 15.243$

Distance to Kern = $X_k := \frac{W_f}{6} = 8.25$

Since Resultant Force is Not in Kern, Area to which Pressure is Applied Must be Reduced.

Eccentricity = $e := \frac{M_{ot}}{Load_{tot}} = 9.733$

Adjusted Soil Pressure = $P_a := \frac{2 \cdot Load_{tot}}{3 \cdot W_f \left(\frac{W_f}{2} - e\right)} = 1.948 \cdot ksf$

$q_{adj} := if\left(P_{min} < 0, P_a, P_{max}\right) = 1.948 \cdot ksf$

$Pressure\_Check := if\left(q_{adj} < q_s, "Okay", "No Good"\right)$

Pressure_Check = "Okay"

Concrete Bearing Capacity:

Strength Reduction Factor = $\Phi_c := 0.65$ (ACI-2008 9.3.2.2)

Bearing Strength Between Pier and Pad = $P_b := \Phi_c \cdot 0.85 \cdot f_c \cdot \frac{\pi \cdot d_p^2}{4} = 7.561 \times 10^3 \cdot kips$ (ACI-2008 10.14)

$Bearing\_Check := if\left(P_b > LF \cdot C_t, "Okay", "No Good"\right)$

Bearing_Check = "Okay"

Shear Strength of Concrete:

Beam Shear: (Critical section located at a distance d from the face of Pier) (ACI 11.3.1.1)

$\phi_c := 0.85$ (ACI 9.3.2.5)

$d := T_f - Cvr_{pad} - \frac{d_{bbot}}{2} = 23.295 \cdot in$

$FL := \frac{C_t}{W_f^2} = 0.2636 \cdot ksf$

$V_{req} := LF \cdot FL \cdot \left(X_t - 0.5 \cdot d_p - d\right) \cdot W_f = 47.635 \cdot kip$

$V_{Avail} := \phi_c \cdot 2 \cdot \sqrt{f_c \cdot psi} \cdot W_f \cdot d = 1488 \cdot kip$ (ACI-2008 11.2.1.1)

$Beam\_Shear\_Check := if\left(V_{req} < V_{Avail}, "Okay", "No Good"\right)$

Beam_Shear_Check = "Okay"

Punching Shear: (Critical Section Located at a distance of d/2 from the face of pier) (ACI 11.11.1.2)

Critical Perimeter of Punching Shear = $b_o := \left(d_p + d\right) \cdot \pi = 23.4$

Required Shear Strength = $V_{req} := LF \cdot FL \cdot \left[W_f^2 - \left(d_p + d\right)^2 \cdot \frac{\pi}{4}\right] = 845.8 \cdot kips$

Available Shear Strength = $V_{Avail} := \phi_c \cdot 4 \cdot \sqrt{f_c \cdot psi} \cdot b_o \cdot d = 1405.2 \cdot kip$ (ACI-2008 11.11.2.1)

$Punching\_Shear\_Check := if\left(V_{req} < V_{Avail}, "Okay", "No Good"\right)$

Punching_Shear_Check = "Okay"

Steel Reinforcement in Pad:

Required Reinforcement for Bending:

Strength Reduction Factor = $\phi_m := .90$ (ACI-2008 9.3.2.1)

$$M_{nT} := LF\cdot\left[U_t\cdot\left(W_t\cdot\sin(60\cdot deg) - \frac{d_p}{2}\right) + S_t\cdot\left(D_f + L_{pag}\right)\right] - WT_t\cdot X_{off} = 21253\cdot ft\cdot k$$

$$M_{nS} := -1\cdot\left[\frac{1}{2}\cdot\left(\frac{W_f}{2} + \frac{W_t}{3}\cdot\cos(30\cdot deg) - \frac{d_p}{2}\right)^2\cdot W_t\cdot\left[\gamma_s\cdot\left(T_p - T_f\right)\right] + WT_{s2}\cdot\left[\frac{W_f}{2} + \frac{W_t}{3}\cdot\cos(30\cdot deg) - \frac{d_p}{2} + \left(D_f - n\right)\cdot\tan\left(\Phi_s\right)\right]\right] = -2$$

$$M_{nC} := -1\cdot\left[\frac{1}{2}\cdot\left(\frac{W_f}{2} + \frac{W_t}{3}\cdot\cos(30\cdot deg) - \frac{d_p}{2}\right)^2\cdot W_t\cdot\left(\gamma_c\cdot T_f\right)\right]$$

Design Moment = $M_n := \frac{M_{nT} + M_{nS} + M_{nC}}{\phi_m} = 12529.09\cdot kips\cdot ft$

$$\beta := \begin{cases} 0.85 \text{ if } 2500\cdot psi \le f_c \le 4000\cdot psi \\ 0.65 \text{ if } f_c > 8000\cdot psi \\ \left[\left[0.85 - \left[\frac{\left(\frac{f_c}{psi} - 4000\right)}{1000}\right]\cdot 0.5\right]\right] \text{ otherwise} \end{cases} = 0.85$$

(ACI-200810.2.7.3)

$b_{eff} := W_t\cdot\cos(30\cdot deg) + d_p = 481.692\cdot in$

$d := T_f - Cvr_{pad} - d_{bbot} = 22.59\cdot in$

$A_s := \frac{M_n}{\left(f_y\cdot d\right)} = 110.926\cdot in^2$

$a := \frac{A_s\cdot f_y}{\beta\cdot f_c\cdot b_{eff}} = 4.064\cdot in$

$A_s := \frac{M_n}{f_y\cdot\left(d - \frac{a}{2}\right)} = 121.89\cdot in^2$

$\rho := \frac{A_s}{b_{eff}\,d} = 0.0112$

Required Reinforcement for Temperature and Shrinkage:

$$\rho_{sh} := \begin{cases} .0018 & \text{if } f_y \geq 60000 \cdot psi \\ .0020 & \text{otherwise} \end{cases} = 0.0018 \qquad \text{(ACI -2008 7.12.2.1)}$$

Check Bottom Bars:

$$As := \begin{cases} \left(\rho \cdot b_{eff} \cdot d\right) & \text{if } \left(\rho \cdot b_{eff} \cdot d\right) > \rho_{sh} \cdot \frac{b_{eff}}{2} \cdot d \\ \rho_{sh} \cdot \frac{b_{eff}}{2} \cdot d & \text{otherwise} \end{cases} = 121.89 \cdot in^2$$

$$As_{prov} := A_{bbot} \cdot NB_{bot} = 142.1 \cdot in^2$$

$$Pad\_Reinforcement\_Bot := if\left(As_{prov} > As, "Okay", "No\ Good"\right)$$

Pad_Reinforcement_Bot = "Okay"

Check top Bars:

$$As := if\left(\rho \geq \rho_{sh}, A_s, \rho_{sh} \cdot \frac{b_{eff}}{2} \cdot d\right) = 121.9 \cdot in^2$$

$$As_{prov} := A_{btop} \cdot NB_{top} = 142.1 \cdot in^2$$

$$Pad\_Reinforcement\_Top := if\left(As_{prov} > As, "Okay", "No\ Good"\right)$$

Pad_Reinforcement_Top = "Okay"

Developement Length Pad Reinforcement:

Bar Spacing =

$$B_{sPad} := \frac{W_f - 2 \cdot Cvr_{pad} - NB_{bot} \cdot d_{bbot}}{NB_{bot} - 1} = 5.11 \cdot in$$

Spacing or Cover Dimension =

$$c := if\left(Cvr_{pad} < \frac{B_{sPad}}{2}, Cvr_{pad}, \frac{B_{sPad}}{2}\right) = 2.554 \cdot in$$

Transverse Reinforcement Index =

$$k_{tr} := 0 \qquad \text{(ACI-2008 12.2.3)}$$

$$L_{dbt} := \frac{3 \cdot f_y \alpha_{pad} \cdot \beta_{pad} \cdot \gamma_{pad} \cdot \lambda_{pad}}{40 \cdot \sqrt{f_c \cdot psi} \cdot c} \cdot d_{bbot} = 52.2 \cdot in$$

Minimum Development Length =

$$L_{dbmin} := 12 \cdot in \qquad \text{(ACI-2008 12.2.1)}$$

$$L_{dbtCheck} := if\left(L_{dbt} \geq L_{dbmin}, "Use\ L.dbt", "Use\ L.dbmin"\right) = "Use\ L.dbt"$$

Available Length in Pad =

$$L_{Pad} := \frac{W_f}{2} - \frac{W_t}{2} - Cvr_{pad} = 54 \cdot in$$

$$Lpad\_Check := if\left(L_{Pad} > L_{dbt}, "Okay", "No\ Good"\right)$$

Lpad_Check = "Okay"

Steel Reinforcement in Pier:

Area of Pier =

$$A_p := \frac{\pi \cdot d_p^2}{4} = 3421.19 \cdot in^2$$

$$A_{smin} := 0.01 \cdot 0.5 \cdot A_p = 17.11 \cdot in^2$$ (ACI-2008 10.8.4 & 10.9.1)

$$A_{sprov} := NB_{pier} \cdot A_{bpier} = 25.98 \cdot in^2$$

$$Steel\_Area\_Check := if(A_{sprov} > A_{smin}, "Okay", "No Good")$$

Steel_Area_Check = "Okay"

Bar Spacing In Pier =

$$B_{sPier} := \frac{d_p \cdot \pi}{NB_{pier}} - d_{bpier} = 6.847 \cdot in$$

Diameter of Reinforcement Cage =

$$Diam_{cage} := d_p - 2 \cdot Cvr_{pier} = 60 \cdot in$$

Maximum Moment in Pier =

$$M_p := \left[S_t \cdot \left(L_p + \frac{A_{BP}}{2} \right) \right] \cdot LF = 10089.8 \cdot in \cdot kips$$

Pier Check evaluated from outside program and results are listed below;

$$(D \ N \ n \ P_u \ M_{xu}) := \left(d_p \cdot 12 \ \ NB_{pier} \ \ BS_{pier} \ \ \frac{C_t \cdot 1.333}{kips} \ \ \frac{M_p}{in \cdot kips} \right)$$

$$(D \ N \ n \ P_u \ M_{xu}) = (66 \ \ 26 \ \ 9 \ \ 861.1 \ \ 10089.8)$$

$$(\phi P_n \ \ \phi M_{xn} \ \ f_{sp} \ \ \rho) := (0 \ \ 0 \ \ 0 \ \ 0)$$

$$(\phi P_n \ \ \phi M_{xn} \ \ f_{sp} \ \ \rho) := \phi P'_n(D, N, n, P_u, M_{xu})^T$$

$$(\phi P_n \ \ \phi M_{xn} \ \ f_{sp} \ \ \rho) = (4411.9 \ \ 51694.8 \ \ -40.6 \ \ 0)$$

$$Axial\_Load\_Check := if(\phi P_n \geq P_u, "Okay", "No Good")$$

Axial_Load_Check = "Okay"

$$Bending\_Check := if(\phi M_{xn} \geq M_{xu}, "Okay", "No Good")$$

Bending_Check = "Okay"

Development Length Pier Reinforcement:

Available Length in Foundation:

$L_{pier} := L_p - Cvr_{pier} = 48 \cdot in$

$L_{pad} := T_f - Cvr_{pad} = 24 \cdot in$

Tension: (ACI-2008 12.2.3)

Spacing or Cover Dimension =

$c := if\left(Cvr_{pier} < \frac{B_{sPier}}{2}, Cvr_{pier}, \frac{B_{sPier}}{2}\right) = 3 \cdot in$

Transverse Reinforcement =

$k_{tr} := 0$ (ACI-2008 12.2.3)

$L_{dbt} := \frac{3 \cdot f_y \alpha_{pier} \cdot \beta_{pier} \cdot \gamma_{pier} \cdot \lambda_{pier}}{40 \cdot \sqrt{f_c \cdot psi} \cdot \left(\frac{c + k_{tr}}{d_{bpier}}\right)} \cdot d_{bpier} = 30.18 \cdot in$

Minimum Development Length =

$L_{dh} := \frac{1200 \cdot d_{bpier}}{\sqrt{\frac{f_c}{psi}}} \cdot .7 = 14.982 \cdot in$ (ACI 12.2.1)

Pier reinforcement bars are standard 90 degree hooks and therefore developement in the pad is computed as follows:

$L_{db} := \max\left(L_{dbt}, L_{dbmin}\right)$

$L_{tension\_Check} := if\left(L_{pier} + L_{pad} > L_{dbt}, "Okay", "No Good"\right)$

$L_{tension\_Check} = "Okay"$

Compression: (ACI-2008 12.3.2)

$L_{dbc1} := \frac{.02 \cdot d_{bpier} \cdot f_y}{\sqrt{f_c \cdot psi}} = 21.402 \cdot in$

$L_{dbmin} := 0.0003 \cdot \frac{in^2}{lb} \cdot \left(d_{bpier} \cdot f_y\right) = 20.304 \cdot in$

$L_{dbc} := if\left(L_{dbc1} \geq L_{dbmin}, L_{dbc1}, L_{dbmin}\right) = 21.402 \cdot in$

$L_{compression\_Check} := if\left(L_{pier} + L_{pad} > L_{dbc}, "Okay", "No Good"\right)$

$L_{compression\_Check} = "Okay"$

Tie Size and Spacing in Column:

Minimum Tie Size = $Tie_{min} := if(BS_{pier} \le 10, 3, 4) = 3$

Used #3 Ties

Seismic Factor = $z := if(Z \le 2, 1, 0.5) = 1$ (ACI-2008 21.10.5)

$s_{lim1} := 16 \cdot d_{bpier} \cdot z = 18.048 \cdot in$

$s_{lim2} := \frac{48 \cdot d_{Tie}}{8} \cdot z = 18 \cdot in$

$s_{lim3} := D_f \cdot z = 72 \cdot in$

$s_{lim4} := 18in$

Maximum Spacing = $s_{tie} := \min\left(\begin{pmatrix} s_{lim1} \\ s_{lim2} \\ s_{lim3} \\ s_{lim4} \end{pmatrix}\right) = 18 \cdot in$

Number of Ties Required = $n_{tie} := \frac{L_{pier} - 3 \cdot in}{s_{tie}} + 1 = 3.5$

SITE NAME	HIGGANUM SOUTH CT	ECP & CELL #	2	0069
Note: New Cell Build.		LATITUDE	41-26-36.97 N	
		LONGITUDE	72-33-58.49 W	
		STRUCTURE TYPE	Monopole	

700 MHz LTE SITE INFO	ALPHA		BETA		GAMMA	
EQUIPMENT TYPE	LTE-700 BBU+RRH		LTE-700 BBU+RRH		LTE-700 BBU+RRH	
ANTENNA TYPE	LNX-6515DS-A1M_4DT_750MHZ		LNX-6515DS-A1M_4DT_750MHZ		LNX-6515DS-A1M_4DT_750MHZ	
QTY OF ANTENNAS PER FACE	1		1		1	
ORIENTATION (DEG)	30		150		270	
DOWN TILT (MECH/DEG)	0		0		0	
RAD CTR (FT AGL)	145 (approx)		145 (approx)		145 (approx)	
TMA - QTY / MODEL						
DIPLEXER - QTY / MODEL						
RRH - QTY/MODEL	1	ALU RH_2X60-700U	1	ALU RH_2X60-700U	1	ALU RH_2X60-700U
SECTOR DISTRIBUTION BOX - QTY / MODEL						
MAIN DISTRIBUTION BOX - QTY / MODEL	1	DB-T1-6Z-8AB-0Z				

850 MHz CELLULAR SITE INFO	ALPHA		BETA		GAMMA	
EQUIPMENT TYPE	N/A		N/A		N/A	
ANTENNA TYPE	LNX-6515DS-A1M_2DT_850MHZ		LNX-6515DS-A1M_2DT_850MHZ		LNX-6515DS-A1M_2DT_850MHZ	
QTY OF ANTENNAS PER FACE	1		1		1	
ORIENTATION (DEG)	30		150		270	
DOWN TILT (MECH/DEG)	0		0		0	
RAD CTR (FT AGL)	145 (approx)		145 (approx)		145 (approx)	
TMA - QTY / MODEL						
DIPLEXER - QTY / MODEL						

1900 MHz PCS SITE INFO	ALPHA		BETA		GAMMA	
EQUIPMENT TYPE	N/A		N/A		N/A	
ANTENNA TYPE	HBXX-6517DS-A2M_PORT 3 - +45_02DT_1910		HBXX-6517DS-A2M_PORT 3 - +45_02DT_1910		HBXX-6517DS-A2M_PORT 3 - +45_02DT_1910	
QTY OF ANTENNAS PER FACE	1		1		1	
ORIENTATION (DEG)	30		150		270	
DOWN TILT (MECH/DEG)	0		0		0	
RAD CTR (FT AGL)	145 (approx)		145 (approx)		145 (approx)	
TMA - QTY / MODEL						
DIPLEX WITH CELLULAR CABLE	NO		NO		NO	
RRH - QTY / MODEL	1	ALU RH_2X60-PCS	1	ALU RH_2X60-PCS	1	ALU RH_2X60-PCS
SECTOR DISTRIBUTION BOX						
MAIN DISTRIBUTION BOX						

2100 MHz AWS LTE SITE INFO	ALPHA		BETA		GAMMA	
EQUIPMENT TYPE	N/A		N/A		N/A	
ANTENNA TYPE	HBXX-6517DS-A2M_PORT 3 - +45_02DT_2110		HBXX-6517DS-A2M_PORT 3 - +45_02DT_2110		HBXX-6517DS-A2M_PORT 3 - +45_02DT_2110	
QTY OF ANTENNAS PER FACE	1		1		1	
ORIENTATION (DEG)	30		150		270	
DOWN TILT (MECH/DEG)	0		0		0	
RAD CTR (FT AGL)	145 (approx)		145 (approx)		145 (approx)	
TMA - QTY / MODEL						
DIPLEX WITH LTE CABLE	NO		NO		NO	
RRH - QTY / MODEL	1	ALU RH_2X60-AWS	1	ALU RH_2X60-AWS	1	ALU RH_2X60-AWS
SECTOR DISTRIBUTION BOX						
MAIN DISTRIBUTION BOX						

NUMBER OF CABLES NEEDED				FIBER LINES MODEL NUMBER			
TOTAL # FIBER LINES	1	TOTAL # OF MAIN COAX LINES	0	FIBER LINE MODEL #		HB158-1-08U8-S8J18	
TOTAL # FIBER TOP JUMPERS	3	TOTAL # OF TOP JUMPERS	24	FIBER TOP JUMPER MODEL #		HB114-1-08U4-S4J18	
EQUIPMENT CABLE ORDERING		MAIN CABLE #	0	+	0	TOP JUMPER #	24 + 0

TX / RX FREQUENCIES			TX POWER OUTPUT	
Cellular-A Band	PCS-F/AWS Band	700 MHz C-Block	Cellular (Watts)	20
TX: 869-880/890-891.5 MHz	TX: 1970-1975/2145-2155 MHz	TX: 746-757 MHz	PCS (Watts)	16
RX: 824-835/845-846.5 MHz	RX: 1890-1895/1745-1755 MHz	RX: 776-787 MHz	LTE 700/AWS/PCS (Watts)	40/60/60

ALPHA				BETA				GAMMA			
Ant.	Freq.	Func.	Color Code	Ant.	Freq.	Func.	Color Code	Ant.	Freq.	Func.	Color Code
A1-A	800	Tx1/Rx0	RED	A5-A	800	Tx2/Rx0	BLUE	A9-A	800	Tx3/Rx0	GREEN
A1-B	1900	Tx1/Rx0	RED/WHITE	A5-B	1900	Tx2/Rx0	BLUE/ WHITE	A9-B	1900	Tx3/Rx0	GREEN/WHITE
A2	700	Tx1/Rx0	RED/ORANGE	A6	700	Tx2/Rx0	BLUE/ ORANGE	A10	700	Tx3/Rx0	GREEN/ORANGE
A3	700	Tx4/Rx1	RED/RED/ORANGE	A7	700	Tx5/Rx1	BLUE/BLUE/ORANGE	A11	700	Tx6/Rx1	GREEN/GREEN/ORANGE
A4-B	1900	Tx4/Rx1	RED/RED/WHITE	A8-B	1900	Tx5/Rx1	BLUE/BLUE/WHITE	A12-B	1900	Tx6/Rx1	GREEN/GREEN/WHITE
A4-A	800	Tx4/Rx1	RED/RED	A8-A	800	Tx5/Rx1	BLUE/BLUE	A12-A	800	Tx6/Rx1	GREEN/GREEN
F1-A	1700	Tx/Rx	RED/BROWN	F1-B	1700	Tx/Rx	BLUE/BROWN	F1-C	1700	Tx/Rx	GREEN/BROWN
F1-D	1700	Tx/Rx	RED/RED/BROWN	F1-E	1700	Tx/Rx	BLUE/BLUE/BROWN	F1-F	1700	Tx/Rx	GREEN/GREEN/BROWN

RF ENGINEER	RF MANAGER	INITIALS	DATE
Prepared by: Jaime Laredo	Robert Hesselbach	JL	3/16/2015

Product Specifications

COMMSCOPE®

POWERED BY ANDREW

LNX-6515DS-T4M

Andrew® Antenna, 698–896 MHz, 65° horizontal beamwidth, fixed electrical tilt

- Excellent front-to-back ratio, USLS, VSWR, and PIM specifications to enhance network quality
- Ideal solution to maximize coverage and capacity in suburban and rural areas
- Excellent solution for site sharing and maximizing capacity
- Great solution to maximize network coverage and capacity
- Vertical beam optimized for capacity efficiency

Electrical Specifications

Frequency Band, MHz	**698–806**	**806–896**
Gain, dBi	17.0	17.5
Beamwidth, Horizontal, degrees	65	65
Beamwidth, Vertical, degrees	9.5	9.0
Beam Tilt, degrees	4	4
USLS, typical, dB	18	18
Front-to-Back Ratio at 180°, dB	32	32
Isolation, dB	30	30
VSWR | Return Loss, dB	1.35 | 16.5	1.35 | 16.5
PIM, 3rd Order, 2 x 20 W, dBc	-153	-153
Input Power per Port, maximum, watts	500	500
Polarization	±45°	±45°
Impedance	50 ohm	50 ohm

General Specifications

Antenna Brand	Andrew®
Antenna Type	DualPol®
Band	Single band
Brand	DualPol®
Operating Frequency Band	698 – 896 MHz

Mechanical Specifications

Color	Light gray
Connector Interface	7-16 DIN Female
Connector Location	Bottom
Connector Quantity, total	2
Lightning Protection	dc Ground
Radiator Material	Aluminum
Radome Material	PVC, UV resistant
Wind Loading, maximum	879.0 N @ 150 km/h 197.6 lbf @ 150 km/h
Wind Speed, maximum	241.0 km/h | 149.8 mph

Dimensions

Depth	181.0 mm | 7.1 in
Length	2449.0 mm | 96.4 in
Width	301.0 mm | 11.9 in

Product Specifications

LNX-6515DS-T4M

Net Weight	22.0 kg | 48.5 lb

Regulatory Compliance/Certifications

Agency	Classification
RoHS 2011/65/EU	Compliant by Exemption
China RoHS SJ/T 11364-2006	Above Maximum Concentration Value (MCV)
ISO 9001:2008	Designed, manufactured and/or distributed under this quality management system

Included Products

DB380-3 — Pipe Mounting Kit for 2.4 - 4.5 in (60 - 115 mm) OD round members. Used for wide panel antennas. Includes three clamp sets.

DB5083D — Downtilt Mounting Kit for 2.4"-4.5" (60-115 mm) OD round members. Consists of two DB5083 heavy-duty, galvanized steel downtilt mounting brackets. This kit is compatible with the DB380-3 pipe mount for panel antennas with three mounting points.

Product Specifications

COMMSCOPE®

POWERED BY ANDREW.

HBXX-6517DS-VTM

Andrew® Quad Port Teletilt® Antenna, 1710–2180 MHz, 65° horizontal beamwidth, RET compatible

- Superior azimuth tracking and pattern symmetry with excellent passive intermodulation suppression
- The values presented on this datasheet have been calculated based on N-P-BASTA White Paper version 9.6 by the NGMN Alliance

Electrical Specifications

Frequency Band, MHz	**1710–1880**	**1850–1990**	**1920–2180**
Gain by all Beam Tilts, average, dBi	18.5	18.6	18.8
Gain by all Beam Tilts Tolerance, dB	±0.4	±0.3	±0.4
Gain by Beam Tilt, average, dBi	0 ° | 18.4 3 ° | 18.7 6 ° | 18.4	0 ° | 18.4 3 ° | 18.7 6 ° | 18.5	0 ° | 18.7 3 ° | 18.9 6 ° | 18.6
Beamwidth, Horizontal, degrees	67	66	65
Beamwidth, Horizontal Tolerance, degrees	±2.4	±1.7	±2.9
Beamwidth, Vertical, degrees	5.0	4.7	4.4
Beamwidth, Vertical Tolerance, degrees	±0.3	±0.3	±0.3
Beam Tilt, degrees	0–6	0–6	0–6
USLS, dB	18	19	19
Front-to-Back Total Power at 180° ± 30°, dB	25	26	26
CPR at Boresight, dB	22	23	22
CPR at Sector, dB	10	10	9
Isolation, dB	30	30	30
VSWR | Return Loss, dB	1.4 | 15.6	1.4 | 15.6	1.4 | 15.6
PIM, 3rd Order, 2 x 20 W, dBc	-153	-153	-153
Input Power per Port, maximum, watts	350	350	350
Polarization	±45°	±45°	±45°
Impedance	50 ohm	50 ohm	50 ohm

General Specifications

Antenna Brand	Andrew®
Antenna Type	DualPol® single band, quad
Band	Single band
Brand	DualPol® | Teletilt®
Operating Frequency Band	1710 – 2180 MHz
Number of Ports, all types	4

Mechanical Specifications

Color	Light gray
Lightning Protection	dc Ground
Radiator Material	Low loss circuit board
Radome Material	PVC, UV resistant
RF Connector Interface	7-16 DIN Female
RF Connector Location	Bottom

Product Specifications

HBXX-6517DS-VTM

RF Connector Quantity, total	4
Wind Loading, maximum	668.0 N @ 150 km/h 150.2 lbf @ 150 km/h
Wind Speed, maximum	241.0 km/h | 149.8 mph

Dimensions

Depth	166.0 mm | 6.5 in
Length	1903.0 mm | 74.9 in
Width	305.0 mm | 12.0 in
Net Weight	19.5 kg | 43.0 lb

Remote Electrical Tilt (RET) Information

Model with Factory Installed AISG 1.1 Actuator	HBXX-6517DS-R2M
Model with Factory Installed AISG 2.0 Actuator	HBXX-6517DS-A2M
RET System	Teletilt®

Regulatory Compliance/Certifications

Agency	Classification
RoHS 2011/65/EU	Compliant by Exemption
China RoHS SJ/T 11364-2006	Above Maximum Concentration Value (MCV)
ISO 9001:2008	Designed, manufactured and/or distributed under this quality management system

Included Products

600899A-2 — Downtilt Mounting Kit for 2.4 - 4.5 in (60 - 115 mm) OD round members. Kit contains one scissor top bracket set and one bottom bracket set.

ALCATEL-LUCENT
WIRELESS PRODUCT DATASHEET
RRH2X60-AWS FOR BAND 4 APPLICATIONS

The Alcatel-Lucent RRH2x60-AWS is a high power, small form factor Remote Radio Head operating in the AWS frequency band (3GPP Band 4) for LTE technology. It is designed with an eco-efficient approach, providing operators with the means to achieve high quality and high capacity coverage with minimum site requirements and efficient operation.

A distributed Node B expands the deployment options by using two components, a Base Band Unit (BBU) containing the digital assets and a separate RRH containing the radio-frequency (RF) elements. This modular design optimizes available space and allows the main components of a Node B to be installed separately, within the same site or several kilometers apart.

The Alcatel-Lucent RRH2x60-AWS is linked to the BBU by an optical-fiber connection carrying downlink and uplink digital radio signals along with operations, administration and maintenance (OA&M) information.

SUPERIOR RF PERFORMANCE

The Alcatel-Lucent RRH2x60-AWS integrates all the latest technologies. This allows to offer best-in-class characteristics.

It delivers an outstanding 120 watts of total RF power thanks to its two transmit RF paths of 60 W each.

It is ideally suited to support multiple-input multiple-output (MIMO) 2x2 operation.

It includes four RF receivers to natively support 4-way uplink reception diversity. This improves the radio uplink coverage and this can be used to extend the cell radius commensurate with 2x2MIMO 2x60 W for the downlink.

It supports multiple discontinuous LTE carriers within an instantaneous bandwidth of 45 MHz corresponding to the entire AWS B4 spectrum.

The latest generation power amplifiers (PA) used in this product achieve high efficiency (>40%), resulting in improved power consumption figures.

OPTIMIZED TCO

The Alcatel-Lucent RRH2x60-AWS is designed to make available all the benefits of a distributed Node B, with excellent RF characteristics, with low capital expenditures (CAPEX) and low operating expenditures (OPEX).

The Alcatel-Lucent RRH2x60-AWS is a very cost-effective solution to deploy LTE MIMO.

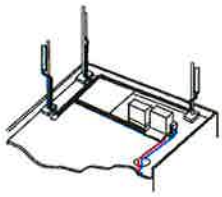
EASY INSTALLATION

The RRH2x60-AWS includes a reversible mounting bracket which allows for ease of installation behind an antenna, or on a rooftop knee wall while providing easy access to the mid body RF connectors.

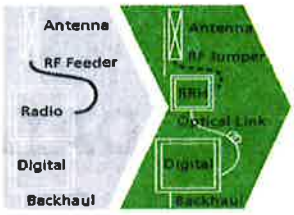
The limited space available in some sites may prevent the installation of traditional single-cabinet BTS equipment. However, many of these sites can host an Alcatel-Lucent RRH2x60-AWS installation, providing more flexible site selection and improved network quality along with greatly reduced installation time and costs.

The Alcatel-Lucent RRH2x60-AWS is a zero-footprint solution and is convection cooled without fans for silent operation, simplifying negotiations with site property owners and minimizing environmental impacts.

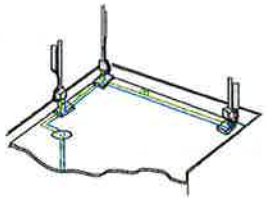
Installation can easily be done by a single person as the Alcatel–Lucent RRH2x60-AWS is compact and weighs about 20 kg, eliminating the need for a crane to hoist the BTS cabinet to the rooftop. A site can be in operation in less than one day.



Macro



RRH for space-constrained cell sites



Distributed

FEATURES

- RRH2x60-AWS integrates two power amplifiers of 60W rating (at each antenna connector)
- Support multiple carriers over the entire 3GPP band 4
- RRH2x60-AWS is optimized for LTE operation
- RRH2x60-AWS is a very compact and lightweight product
- Advanced power management techniques are embedded to provide power savings, such as PA bias control

BENEFITS

- MIMO LTE operation with only one single unit per sector
- Improved uplink coverage with built-in 4-way receive diversity capability
- RRH can be mounted close to the antenna, eliminating nearly all losses in RF cables and thus reducing power consumption by 50% compared to conventional solutions
- Distributed configurations provide easily deployable and cost-effective solutions, near zero footprint and silent solutions, with minimum impact on the neighborhood, which ease the deployment
- RETA and TMA support without additional hardware thanks to the AISG v2.0 port and the integrated Bias-Tees. Bias-Tees support AISG DC supply and signaling.

TECHNICAL SPECIFICATIONS

Specifications listed are hardware capabilities. Some capabilities depend on support in a specific software release or future release.

Dimensions and weights

- HxWxD : 510x285x186mm (27 l with solar shield)
- Weight : 20 kg (44 lbs)

Electrical Data

- Power Supply : -48V DC (-40.5 to -57V)
- Power Consumption (ETSI average traffic load reference) : 250W @2x60W

RF Characteristics

- Frequency band: 1710-1755, UL / 2110-2155 MHz, DL (3GPP band 4)
- Output power: 2x60W at antenna connectors
- Technology supported: LTE
- Instantaneous bandwidth: 45 MHz
- Rx diversity: 2-way and 4-way uplink reception
- Typical sensitivity without Rx diversity: -105 dBm for LTE

Connectivity

- Two CPRI optical ports for daisychaining and up to six RRHs per fiber
- Type of optical fiber: Single-Mode (SM) and Multi-Mode (MM) SFPs
- Optical fiber length: up to 500m using MM fiber, up to 20km using SM fiber
- TMA/RETA : AISG 2.0 (RS485 connector and internal Bias-Tee)
- Six external alarms
- Surge protection for all external ports (DC and RF)

Environmental specifications

- Operating temperature: -40°C to 55°C including solar load
- Operating relative humidity: 8% to 100%
- Environmental Conditions : ETS 300 019-1-4 class 4.1E
- Ingress Protection : IEC 60529 IP65
- Acoustic Noise : Noiseless (natural convection cooling)

Safety and Regulatory Data

- EMC : 3GPP 25113, EN 301 489-1, EN 301 489-23, GR 1089, GR 3108, OET-65
- Safety : IEC60950-1, EN 60825-1, UL, ANSI/NFPA 70, CAN/CSA-C22.2
- Regulatory : FCC Part 15 Class B, CE Mark – European Directive : 2002/95/EC (ROHS); 2002/96/EC (WEEE); 1999/5/EC (R&TTE)
- Health : EN 50385

Alcatel·Lucent

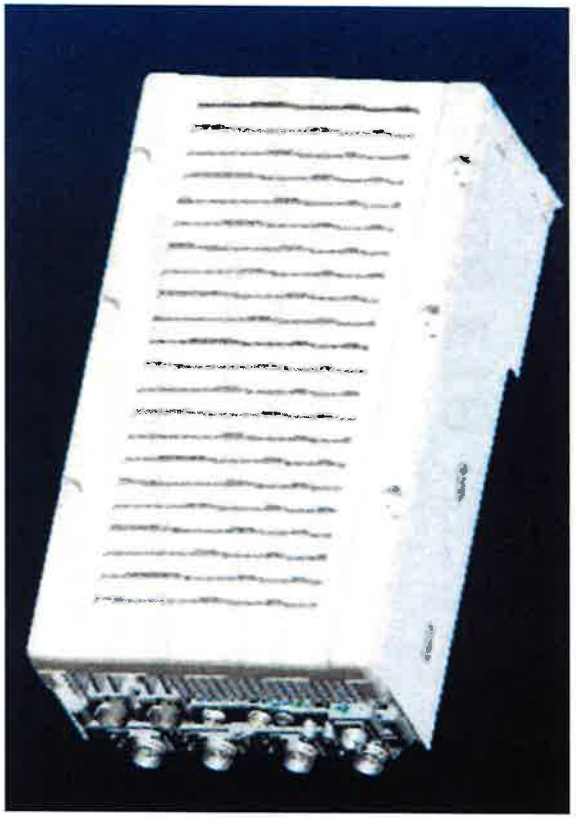
AT THE SPEED OF IDEAS™

NEW PCS RF MODULES FOR VZW

RRH2X60 - HW CHARACTERISTICS

LR14.3

	RRH2x60
RF Output Power	2x60W (4x30W HW Ready)
Instantaneous Bandwidth	60MHz
Target Reliability (Annual Return Rate)	<2%
Receiver	4 Branch Rx
Features	AISG 2.0 for RET/TMA
Power	-48VDC
	Internal Smart Bias-T
CPRI Ports	2 CPRI Rate 5 Ports
External Alarms	4 External User Alarms
Monitor Ports	TX, RX
Environmental	GR487 Compliance
RF Connectors	7/16 DIN (downward facing)
Dimensions	22"(h) x 12"(w)x 9.4" (d)**
Weight	55lb**



**- Includes solar shield but not mounting brackets (8 lbs.)

ALCATEL-LUCENT B13 RRH4X30-4R

Alcatel-Lucent B13 Remote Radio Head 4x30-4R is the newest addition of Remote Radio Head to the extended product line of Alcatel-Lucent's distributed Base Station solutions, aimed at facilitating smooth RF site acquisition and related civil engineering.

Supporting 2Tx/4Tx MIMO and 4-way Rx diversity, Alcatel-Lucent B13 RRH4x30-4R allows operators to have a compact radio solution to deploy LTE in the 700U band (700 MHz, 3GPP band 13), providing them with the means to achieve high capacity, high quality and high coverage with minimum site requirements.

The Alcatel-Lucent B13 RRH4x30-4R product has four transmit RF paths, offering the possibility to **select, via software only, 2Tx or 4Tx MIMO configurations** with either 2x60 W or 4x30 W RF output power. It supports also 4-way Rx diversity and up to 10MHz instantaneous bandwidth.

The Alcatel-Lucent B13 RRH4x30-4R is a near zero-footprint solution and operates noise free, simplifying negotiations with site property owners and minimizing environmental impacts.

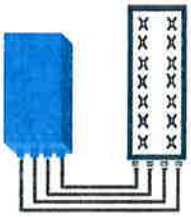
Its compactness and slim design makes the Alcatel-Lucent B13 RRH4x30-4R easy to install close to the antenna: operators can therefore locate this Remote Radio Head where RF design conditions are deemed ideal, minimizing trade-offs between available sites and RF optimum sites, together with reducing the RF feeder needs and installation costs.

FEATURES

- Supporting LTE in 700 MHz band (700U, 3GPP band 13)
- LTE 2Tx or 4Tx MIMO (SW switchable)
- Output power: Up to 2x60W or 4x30W
- 10MHz LTE carrier with 4Rx Diversity
- Convection-cooled (fan-less)
- Supports AISG 2.0 ALD devices (RET, TMA) through RS485 or RF ports

BENEFITS

- Compact to reduce additional footprint when adding LTE in 700U band
- MIMO scheme operation selection (2Tx or 4Tx) by software only
- Improves downlink spectral efficiency through MIMO4
- Increases LTE coverage thanks to 4Rx diversity capability and best in class Rx sensitivity
- Flexible mounting options: Pole or Wall



4x30W with 4T4R
or
2x60W with 2T4R

Can be switched between modes via SW w/o site visit

Alcatel·Lucent

TECHNICAL SPECIFICATIONS

Features & performance	
Number of TX/RX paths	4 duplexed (either 4T4R or 2T4R by SW)
Frequency band	U700 (C) (3GPP bands 13): DL: 746 - 756 MHz / UL: 777 - 787 MHz
Instantaneous bandwidth - #carriers	10MHz – 1 LTE carrier (in 10MHz occupied bandwidth)
LTE carrier bandwidth	10 MHz
RF output power	2x60W or 4x30W (by SW)
Noise figure – RX Diversity scheme	2 dB typ. (<2.5 dB max) – 2 or 4 way Rx diversity
Sizes (HxWxD) in mm (in.) Volume in L Weight in kg (lb) (w/o mounting HW)	550 x 305 x 230 (21.6" x 12.0" x 9") (with solar shield) 38 (with solar shield) 26 (57.2) (with solar shield)
DC voltage range DC power consumption	-40.5 to -57V at full performance, -38 to -57V with relaxation on power consumption 550W typical @100% RF load (in 2Tx or 4TX mode)
Environmental conditions Wind load (@150km/h or 93mph)	-40°C (-40°F) /+55°C (+131°F) IP65 Frontal: <200N / Lateral : <150N
Antenna ports	4 ports 7/16 DIN female (50 ohms) VSWR < 1.5
CPRI ports	2 CPRI ports (HW ready for Rate7, 9.8 Gbps) SFP single mode dual fiber
AISG interfaces	1 AISG2.0 output (RS485) Integrated Smart Bias Tees (x2)
Misc. Interfaces	4 external alarms (1 connector) – 4 RF Tx & 4 RF Rx monitor ports - 1 DC connector (2 pins)
Installation conditions	Pole and wall mounting
Regulatory compliance	3GPP 36.141 / 3GPP 36.113 / GR-1089-CORE / GR-3108-CORE / UL 60950-1 / FCC Part 27

Product Data Sheet DB-B1 and DB-T1 Series

DC and Fiber Management Distribution Boxes for HYBRIFLEX™ Cable

Product Description

The RFS Distribution Box design comes with the option for pluggable over voltage protection (OVP) for up to 6 remote radios and the connection for 6 pairs of optical fiber with LC optical fiber cable management. There is a hybrid cable input with a jumper configuration for power and optical fiber to the remote radio heads (RRHs). A custom wall, a 2-inch pole, and an H-Frame mounting bracket are included. Both the compact and standard design are available with lightening protection.

Features/Benefits

- Designed to accommodate varying diameters of HYBRIFLEX™ (combined power and fiber optic) cables – up to 2 inches
- Supports Single- and Multi-Mode Optical fiber
- NEMA 4x rated enclosure – allows **flexibility for indoor or outdoor installation** on a roof or tower top
- Weatherproof enclosure and ports – **improves system reliability**
- Modular design – makes replacement or addition of OVP easy without removal of other components within the box
- Strikesorb OVP technology – protects equipment from damaging surges up to 60 kA on an 8/20 waveform and up to 5 kA on a 10/350 waveform (certain models only)
- Low residual voltage and high impedance – **ideally suited for RRH technology** – won't shut down the RRH the way spark gap technology does (certain models only)

Technical Specifications

Mechanical Specifications

Model Number	DB-B1-6C-8AB-0Z	DB-T1-6Z-8AB-0Z
Enclosure Design	Standard, 6 OVP's	Standard without OVP
Dimensions - H x W x D, mm (in)	610 x 610 x 254 (24 x 24 x 10)	610 x 610 x 254 (24 x 24 x 10)
Weight, kg (lb)	20 (44)	20 (44)
Suppression Connection Method	Compression lug, #2-#14 AWG Copper, #2-#12 Aluminum	
Fiber Connection Method	LC-LC Single- or Multi-mode duplex	
Environmental Rating	NEMA 4x	
Operating Temperature, °C (°F)	-40 to +80 (-40 to +176)	
UV Protection	ISO 4892-2 Method A Xenon-Arc 2160 hrs	

Electrical Specifications

Nominal Operating Voltage	48 VDC	
Nominal Discharge Current (I_n) per UL 1449 3rd Ed	20 kA 8/20 µs	N/A
Maximum Discharge Current (I_{max}) per NEMA LS-1	60 kA 8/20 µs	N/A
Maximum Impulse (Lightning) Current (I_{imp}) per IEC 61643-1	5 kA 10/350 µs	N/A
Maximum Continuous Operating Voltage (U_c)	75 VDC	N/A
Voltage Protection Rating per UL1449 3rd Ed	400 V	N/A
Protection Class as per IEC 61643-1	Class 1	N/A
Strikesorb OVP Compliance	ANSI/UL 1449-3rd Ed	N/A
	IEEE C62.41	N/A
	NEMA LS-1	N/A
	IEC 61643-1	N/A
	IEC 61643-12	N/A
	EN 61643-11	N/A

* This data is provisional and subject to change.

SITE NAME	HIGGANUM SOUTH CT	ECP & CELL #	2	0069
Note: New Cell Build.		LATITUDE	41-26-36.97 N	
		LONGITUDE	72-33-58.49 W	
		STRUCTURE TYPE	Monopole	

700 MHz LTE SITE INFO	ALPHA		BETA		GAMMA	
EQUIPMENT TYPE	LTE-700 BBU+RRH		LTE-700 BBU+RRH		LTE-700 BBU+RRH	
ANTENNA TYPE	LNX-6515DS-A1M_4DT_750MHZ		LNX-6515DS-A1M_4DT_750MHZ		LNX-6515DS-A1M_4DT_750MHZ	
QTY OF ANTENNAS PER FACE	1		1		1	
ORIENTATION (DEG)	30		150		270	
DOWN TILT (MECH/DEG)	0		0		0	
RAD CTR (FT AGL)	145 (approx)		145 (approx)		145 (approx)	
TMA - QTY / MODEL						
DIPLEXER - QTY / MODEL						
RRH - QTY/MODEL	1	ALU RH_2X60-700U	1	ALU RH_2X60-700U	1	ALU RH_2X60-700U
SECTOR DISTRIBUTION BOX - QTY / MODEL						
MAIN DISTRIBUTION BOX - QTY / MODEL	1		DB-T1-6Z-8AB-0Z			

850 MHz CELLULAR SITE INFO	ALPHA		BETA		GAMMA	
EQUIPMENT TYPE	N/A		N/A		N/A	
ANTENNA TYPE	LNX-6515DS-A1M_2DT_850MHZ		LNX-6515DS-A1M_2DT_850MHZ		LNX-6515DS-A1M_2DT_850MHZ	
QTY OF ANTENNAS PER FACE	1		1		1	
ORIENTATION (DEG)	30		150		270	
DOWN TILT (MECH/DEG)	0		0		0	
RAD CTR (FT AGL)	145 (approx)		145 (approx)		145 (approx)	
TMA - QTY / MODEL						
DIPLEXER - QTY / MODEL						

1900 MHz PCS SITE INFO	ALPHA		BETA		GAMMA	
EQUIPMENT TYPE	N/A		N/A		N/A	
ANTENNA TYPE	HBXX-6517DS-A2M_PORT 3 - +45_02DT_1910		HBXX-6517DS-A2M_PORT 3 - +45_02DT_1910		HBXX-6517DS-A2M_PORT 3 - +45_02DT_1910	
QTY OF ANTENNAS PER FACE	1		1		1	
ORIENTATION (DEG)	30		150		270	
DOWN TILT (MECH/DEG)	0		0		0	
RAD CTR (FT AGL)	145 (approx)		145 (approx)		145 (approx)	
TMA - QTY / MODEL						
DIPLEX WITH CELLULAR CABLE	NO		NO		NO	
RRH - QTY / MODEL	1	ALU RH_2X60-PCS	1	ALU RH_2X60-PCS	1	ALU RH_2X60-PCS
SECTOR DISTRIBUTION BOX						
MAIN DISTRIBUTION BOX						

2100 MHz AWS LTE SITE INFO	ALPHA		BETA		GAMMA	
EQUIPMENT TYPE	N/A		N/A		N/A	
ANTENNA TYPE	HBXX-6517DS-A2M_PORT 3 - +45_02DT_2110		HBXX-6517DS-A2M_PORT 3 - +45_02DT_2110		HBXX-6517DS-A2M_PORT 3 - +45_02DT_2110	
QTY OF ANTENNAS PER FACE	1		1		1	
ORIENTATION (DEG)	30		150		270	
DOWN TILT (MECH/DEG)	0		0		0	
RAD CTR (FT AGL)	145 (approx)		145 (approx)		145 (approx)	
TMA - QTY / MODEL						
DIPLEX WITH LTE CABLE	NO		NO		NO	
RRH - QTY / MODEL	1	ALU RH_2X60-AWS	1	ALU RH_2X60-AWS	1	ALU RH_2X60-AWS
SECTOR DISTRIBUTION BOX						
MAIN DISTRIBUTION BOX						

NUMBER OF CABLES NEEDED				FIBER LINES MODEL NUMBER	
TOTAL # FIBER LINES	1	TOTAL # OF MAIN COAX LINES	0	FIBER LINE MODEL #	HB158-1-08U8-S8J18
TOTAL # FIBER TOP JUMPERS	3	TOTAL # OF TOP JUMPERS	24	FIBER TOP JUMPER MODEL #	HB114-1-08U4-S4J18

EQUIPMENT CABLE ORDERING	MAIN CABLE #	0	+	0	TOP JUMPER #	24	+	0

TX / RX FREQUENCIES			TX POWER OUTPUT	
Cellular-A Band	PCS-F/AWS Band	700 MHz C-Block	Cellular (Watts)	20
TX: 869-880/890-891.5 MHz	TX: 1970-1975/2145-2155 MHz	TX: 746-757 MHz	PCS (Watts)	16
RX: 824-835/845-846.5 MHz	RX: 1890-1895/1745-1755 MHz	RX: 776-787 MHz	LTE 700/AWS/PCS (Watts)	40/60/60

ALPHA				BETA				GAMMA			
Ant.	Freq.	Func.	Color Code	Ant.	Freq.	Func.	Color Code	Ant.	Freq.	Func.	Color Code

A1-A	800	Tx1/Rx0	RED	A5-A	800	Tx2/Rx0	BLUE	A9-A	800	Tx3/Rx0	GREEN
A1-B	1900	Tx1/Rx0	RED/WHITE	A5-B	1900	Tx2/Rx0	BLUE/ WHITE	A9-B	1900	Tx3/Rx0	GREEN/WHITE
A2	700	Tx1/Rx0	RED/ORANGE	A6	700	Tx2/Rx0	BLUE/ ORANGE	A10	700	Tx3/Rx0	GREEN/ORANGE
A3	700	Tx4/Rx1	RED/RED/ORANGE	A7	700	Tx5/Rx1	BLUE/BLUE/ORANGE	A11	700	Tx6/Rx1	GREEN/GREEN/ORANGE
A4-B	1900	Tx4/Rx1	RED/RED/WHITE	A8-B	1900	Tx5/Rx1	BLUE/BLUE/WHITE	A12-B	1900	Tx6/Rx1	GREEN/GREEN/WHITE
A4-A	800	Tx4/Rx1	RED/RED	A8-A	800	Tx5/Rx1	BLUE/BLUE	A12-A	800	Tx6/Rx1	GREEN/GREEN
F1-A	1700	Tx/Rx	RED/BROWN	F1-B	1700	Tx/Rx	BLUE/BROWN	F1-C	1700	Tx/Rx	GREEN/BROWN
F1-D	1700	Tx/Rx	RED/RED/BROWN	F1-E	1700	Tx/Rx	BLUE/BLUE/BROWN	F1-F	1700	Tx/Rx	GREEN/GREEN/BROWN

RF ENGINEER	RF MANAGER	INITIALS	DATE
Prepared by: Jaime Laredo	Robert Hesselbach	JL	3/16/2015

ATTACHMENT 5

	General	Power	Density					
Site Name: Higganum S (Haddam)								
Tower Height: 280Ft.								
CARRIER	**# OF CHAN.**	**WATTS ERP**	**HEIGHT**	**CALC. POWER DENS**	**FREQ.**	**MAX. PERMISS. EXP.**	**FRACTION MPE**	**Total**
*Eversource Energy	1	776	123	2145	0.0204	1.0000	0.20%	
*Sprint	11	433	144	1950	0.0074	1.0000	0.07%	
*Northeast	1	501	251	37.1	0.0010	0.2000	0.05%	
*Northeast	1	335	274	150	0.0006	0.2000	0.03%	
*Northeast	1	335	274	166	0.0006	0.2000	0.03%	
*Northeast	1	2500	274	450	0.0011	0.3000	0.04%	
*Northeast	1	335	154	157	0.0018	0.2000	0.09%	
*Northeast	1	1005	214	150	0.0028	0.2000	0.14%	
*Northeast	1	100	74	47.96	0.0024	0.2000	0.12%	
*Middlesex Fire	1	100	274	45.98	0.0002	0.2000	0.01%	
*Haddam Fire	1	316	64	46.24	0.0100	0.2000	0.50%	
*Operations	1	178	214	42.06	0.0005	0.2000	0.03%	
*NL County Fire	1	316	111	33.76	0.0033	0.2000	0.17%	
*MED 9	1	150	244	460	0.0001	0.3067	0.00%	
*Hi-Band TRP-TRP	1	878	144	150	0.0055	0.2000	0.27%	
*Operations	1	398	114	450	0.0010	0.3000	0.03%	
*MS to Talcott	1	9927	269	6805	0.0005	1.0000	0.00%	
*MW to CT Yankee	1	9957	269	6815	0.0005	1.0000	0.00%	
*MW to Madison	1	9869	269	6785	0.0005	1.0000	0.00%	
*MW to Talcott	1	845	194	6000	0.0001	1.0000	0.00%	
*MW to Millstone	2	9782	194	6000	0.0019	1.0000	0.02%	
*MW to Troop F	1	5413	187	6525	0.0006	1.0000	0.01%	
*MW to Mt. Beseck	1	5413	185	6525	0.0006	1.0000	0.01%	
*MW to Jenks Hill	1	18741	94	17700	0.0076	1.0000	0.08%	
*Troop F 800 MHz	5	200	169	866	0.0005	0.5773	0.01%	
*Troop K 800 MHz	5	200	234	866	0.0005	0.5773	0.01%	
*Interop 800 MHz	5	200	169	866	0.0005	0.5773	0.01%	
*Educational TV	1	151	234	2500	0.0000	1.0000	0.00%	
*VoiceStream	8	208	125	1930	0.0423	1.0000	0.42%	
*Northeast Utilities								
Verizon PCS	**1**	**3055**	**145**	**0.0522**	**1970**	**1.0000**	**5.22%**	
Verizon Cellular	**9**	**453**	**145**	**0.0697**	**869**	**0.5793**	**12.04%**	
Verizon AWS	**1**	**5613**	**145**	**0.0960**	**2145**	**1.0000**	**9.60%**	
Verizon 700	**1**	**2631**	**145**	**0.0450**	**746**	**0.4973**	**9.05%**	
								38.26%
* Source: Siting Council								

ATTACHMENT 6

Robinson+Cole

KENNETH C. BALDWIN

280 Trumbull Street
Hartford, CT 06103-3597
Main (860) 275-8200
Fax (860) 275-8299
kbaldwin@rc.com
Direct (860) 275-8345

Also admitted in Massachusetts

September 9, 2016

Via Certificate of Mailing

Lizz Milardo
First Selectman
Town of Haddam
30 Field Park Drive
Haddam, CT 06438

Re: **Sub-Petition for Declaratory Ruling Filed with the Connecticut Siting Council for the Installation of a Wireless Telecommunications Facility at 330 Pokorny Road, Haddam, Connecticut**

Dear Ms. Milardo:

This firm represents Cellco Partnership d/b/a Verizon Wireless ("Cellco"). Today, Cellco filed a Sub-Petition for Declaratory Ruling ("Sub-Petition") with the Connecticut Siting Council ("Council") seeking approval to install a new wireless telecommunications facility at 330 Pokorny Road in Haddam (the "Property"). The facility will consist of twelve (12) antennas and nine (9) remote radio heads attached at the 145-foot level of the existing 280-foot tower at the Property. Equipment associated with Cellco's antennas and a propane-fueled back-up generator will be located on a 12' x 26' steel platform with a roof canopy. A 1,000 gallon propane tank will be installed adjacent to Cellco's equipment platform and an existing Eversource 1,000 gallon propane tank.

As presented in the Sub-Petition, the proposed "small cell" facility improvements at the Property constitute an eligible facility request pursuant to Section 6409(a) of the Federal Middle Class Tax Relief and Job Creation act of 2012 (47 U.S.C. § 1455(a)) and the October 21, 2014 Order of the Federal Communications Commission (FCC-14-533). A copy of the full Sub-Petition is attached for your review. Landowners whose property abuts the Property were also sent a copy of this Sub-Petition.

Pursuant to its decision in Petition No. 1133, comments or concerns regarding this proposal should be submitted to the Council within thirty (30) days of the date of the attached Sub-Petition.

Please contact me if you have any questions regarding this proposal.

Sincerely,

Kenneth C. Baldwin

Attachment
Copy to:
Elizabeth Jamieson

Robinson+Cole

KENNETH C. BALDWIN

280 Trumbull Street
Hartford, CT 06103-3597
Main (860) 275-8200
Fax (860) 275-8299
kbaldwin@rc.com
Direct (860) 275-8345

Also admitted in Massachusetts

September 9, 2016

Via Certificate of Mailing

Eversource
P.O. Box 270
Hartford, CT 06141

Re: **Sub-Petition for Declaratory Ruling Filed with the Connecticut Siting Council for the Installation of a Wireless Telecommunications Facility at 330 Pokorny Road, Haddam, Connecticut**

Dear Sirs:

This firm represents Cellco Partnership d/b/a Verizon Wireless ("Cellco"). Today, Cellco filed a Sub-Petition for Declaratory Ruling ("Sub-Petition") with the Connecticut Siting Council ("Council") seeking approval to install a new wireless telecommunications facility at 330 Pokorny Road in Haddam (the "Property"). The facility will consist of twelve (12) antennas and nine (9) remote radio heads attached at the 145-foot level of the existing 280-foot tower at the Property. Equipment associated with Cellco's antennas and a propane-fueled back-up generator will be located on a 12' x 26' steel platform with a roof canopy. A 1,000 gallon propane tank will be installed adjacent to Cellco's equipment platform and an existing Eversource 1,000 gallon propane tank.

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Sincerely,

Kenneth C. Baldwin

Attachment
Copy to:
Elizabeth Jamieson

ATTACHMENT 7

KENNETH C. BALDWIN

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September 9, 2016

Via Certificate of Mailing

«Name_and_Address»

Re: **Sub-Petition for Declaratory Ruling Filed with the Connecticut Siting Council for the Installation of a Wireless Telecommunications Facility at 330 Pokorny Road, Haddam, Connecticut**

Dear «Salutation»:

This firm represents Cellco Partnership d/b/a Verizon Wireless ("Cellco"). Today, Cellco filed a Sub-Petition for Declaratory Ruling ("Sub-Petition") with the Connecticut Siting Council ("Council") seeking approval to install a new wireless telecommunications facility at 330 Pokorny Road in Haddam (the "Property"). The facility will consist of twelve (12) antennas and nine (9) remote radio heads attached at the 145-foot level of the existing 280-foot tower at the Property. Equipment associated with Cellco's antennas and a propane-fueled back-up generator will be located on a 12' x 26' steel platform with a roof canopy. A 1,000 gallon propane tank will be installed adjacent to Cellco's equipment platform and an existing Eversource 1,000 gallon propane tank.

The facility improvements constitute a eligible facility request pursuant to Section 6409(a) of the Federal Middle Class Tax Relief and Job Creation Act of 2012 (47 U.S.C. § 1455(a)) and the October 21, 2014 Order of the Federal Communications Commission (FCC-14-533). A copy of the full Sub-Petition is attached for your review.

Pursuant to its decision in Petition No. 1133, comments or concerns regarding this proposal should be submitted to the Council within thirty (30) days of the date of the Sub-Petition.

This notice is being sent to you because you are listed as an owner of land that abuts the Property. If you have any questions regarding the Sub-Petition, the Council's process for reviewing the Sub-Petition or the details of the filing itself, please feel free to contact me at the number listed above. You may also contact the Council directly at 860-827-2935.

Sincerely,

Kenneth C. Baldwin

Attachment
Copy to:
Elizabeth Jamieson

CELLCO PARTNERSHIP D/B/A VERIZON WIRELESS

ABUTTING PROPERTY OWNERS

330 POKORNY ROAD
HADDAM, CONNECTICUT

	Property Address	Owner's and Mailing Address
1.	Bartman Road	Haddam Land Trust Inc. P.O. Box 66 Haddam, CT 06438
2.	21 Country Walk	Cathy L. and Peter A. Zaidel 21 Country Walk Higganum, CT 06441
3.	28 Country Walk	Kathleen M. Zygmont 28 Country Walk Higganum, CT 06441
4.	40 Country Walk	Robin Greenlawn 40 Country Walk Higganum, CT 06441
5.	35 Country Walk	Nasir M. Mannon 35 Country Walk Higganum, CT 06441
6.	McTigh Road	Haddam Land Trust Inc. P.O. Box 66 Haddam, CT 06438
7.	341 Pokorny Road	Carolyn J. and Carl F. Schuler 341 Pokorny Road Higganum, CT 06441