

September 29, 2014

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

Re: **Notice of Exempt Modification – Facility Modification  
93 Roxbury Road, East Lyme, Connecticut**

Dear Ms. Bachman:

Cellco Partnership d/b/a Verizon Wireless (“Cellco”) currently maintains twelve (12) antennas at the 149-foot level of the existing 151-foot self-supporting lattice tower at 93 Roxbury Road in East Lyme, Connecticut (the Property”). The tower is owned by Crown Castle. The Council approved Cellco’s use of this tower in 1994 (Docket No. 116). Cellco now intends to modify its facility by replacing all of its existing antennas with three (3) model LNX-6514DS-VTM, 700 MHz antennas; three (3) model LNX-6514DS-VTM, 850 MHz antennas; three (3) model HBXX-6517DS-VTM, 1900 MHz antennas; and three (3) HBXX-6517DS-VTM, 2100 MHz antennas, all at the same 149-foot level on the tower. Cellco also intends to install nine (9) remote radio heads (“RRHs”), three (3) each behind its 700 MHz, 1900 MHz and 2100 MHz antennas and two (2) HYBRIFLEX™ antenna cables. Included in Attachment 1 are specifications for Cellco’s new antennas, RRHs and HYBRIFLEX™ cables.

Please accept this letter as notification pursuant to R.C.S.A. § 16-50j-73, for construction that constitutes an exempt modification pursuant to R.C.S.A. § 16-50j-72(b)(2). In accordance with R.C.S.A. § 16-50j-73, a copy of this letter is being sent to Paul Formica, First Selectman for the Town of East Lyme. The Town of East Lyme is the owner of the Property.

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

13154172-v1

# Robinson+Cole

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1. The proposed modifications will not result in an increase in the height of the existing tower. Cellco's replacement antennas and RRHs will be installed at the 149-foot level on the existing 151-foot lattice tower.
2. The proposed modifications will not involve any change to ground-mounted equipment and, therefore, will not require the extension of the site boundary.
3. The proposed modifications will not increase noise levels at the facility by six decibels or more, or to levels that exceed state and local criteria.
4. The operation of the replacement antennas will not increase radio frequency (RF) emissions at the facility to a level at or above the Federal Communications Commission (FCC) safety standard. A cumulative General Power Density table for Cellco's modified facility is included in Attachment 2.
5. The proposed modifications will not cause a change or alteration in the physical or environmental characteristics of the site.
6. The tower and its foundation can support Cellco's proposed modifications. (*See Structural Analysis Report included in Attachment 3*).

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

Sincerely,



Kenneth C. Baldwin

Enclosures

Copy to:

Paul Formica, East Lyme First Selectman  
Sandy M. Carter

# **ATTACHMENT 1**

# Product Specifications

COMMSCOPE®

LNX-6514DS-VTM

Andrew® Antenna, 698–896 MHz, 65° horizontal beamwidth, RET compatible

POWERED BY



## Electrical Specifications

Frequency Band, MHz	698–806	806–896
Gain, dBi	15.7	16.3
Beamwidth, Horizontal, degrees	65	65
Beamwidth, Horizontal Tolerance, degrees	±3	±3
Beamwidth, Vertical, degrees	12.5	11.2
Beam Tilt, degrees	0–10	0–10
USLS, typical, dB	17	18
Front-to-Back Ratio at 180°, dB	32	30
CPR at Boresight, dB	20	20
CPR at Sector, dB	10	10
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°

## Mechanical Specifications

Color   Radome Material	Light gray   Fiberglass, UV resistant
Connector Interface   Location   Quantity	7-16 DIN Female   Bottom   2
Wind Loading, maximum	617.7 N @ 150 km/h 138.9 lbf @ 150 km/h
Wind Speed, maximum	241.0 km/h   149.8 mph
Antenna Dimensions, L x W x D	1847.0 mm x 301.0 mm x 181.0 mm   72.7 in x 11.9 in x 7.1 in
Net Weight	17.6 kg   38.8 lb

Model with factory installed AISG 2.0 RET LNX-6514DS-A1M



# Product Specifications

HBXX-6517DS-VTM

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

POWERED BY



## 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°

\*Values calculated using NGMN Alliance N-P-BASTA v9.6

## Mechanical Specifications

Color   Radome Material	Light gray   PVC, UV resistant
Connector Interface   Location   Quantity	7-16 DIN Female   Bottom   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
Antenna Dimensions, L x W x D	1903.0 mm x 305.0 mm x 166.0 mm   74.9 in x 12.0 in x 6.5 in
Net Weight	19.5 kg   43.0 lb
Model with factory installed AISG 2.0 RET	HBXX-6517DS-A2M



## Alcatel-Lucent RRH2x40-07-U

### REMOTE RADIO HEAD

The Alcatel-Lucent RRH2x40-07-U is a high-power, small form-factor Remote Radio Head (RRH) operating in the North American Digital Dividend / 700MHz frequency band (3GPP Band 13). The Alcatel-Lucent RRH2x40-07-U is designed with an eco-efficient approach, providing operators with the means to achieve high quality and capacity coverage with minimum site requirements.



A distributed eNodeB expands 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 an eNodeB to be installed separately, within the same site or several kilometres apart.

The Alcatel-Lucent RRH2x40-07-U 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. The Alcatel-Lucent RRH2x40-07-U has two transmit RF paths, 40 W RF output power per transmit path, and is designed to manage up to two-way receive diversity. The device is ideally suited to support macro coverage, with multiple-input multiple-output (MIMO) 2x2 operation in up to 10 MHz of bandwidth.

The Alcatel-Lucent RRH2x40-07-U is designed to make available all the benefits of a distributed eNodeB, with excellent RF characteristics, with low

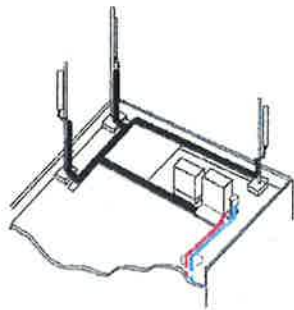
capital expenditures (CAPEX) and low operating expenditures (OPEX). The limited space available in some sites may prevent the installation of traditional single-cabinet BTS equipment or require costly cranes to be employed, leaving coverage holes. However, many of these sites can host an Alcatel-Lucent RRH2x40-07-U installation, providing more flexible site selection and improved network quality along with greatly reduced installation time and costs.

#### Fast, low-cost installation and deployment

The Alcatel-Lucent RRH2x40-07-U is a zero-footprint solution and operates noise-free, simplifying negotiations with site property owners and minimizing environmental impacts. Installation can easily be done by a single person because the Alcatel-Lucent RRH2x40-07-U is compact and weighs less than 23 kg (50 lb), 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 — a fraction of the time required for a traditional BTS.

## Excellent RF performance

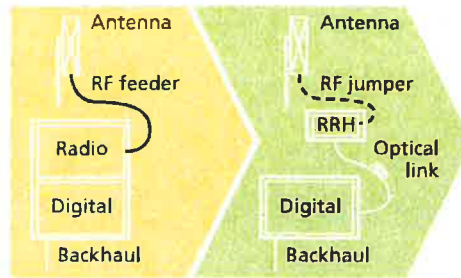
Because of its small size and weight, the Alcatel-Lucent RRH2x40-07-U can be installed close to the antenna. Operators can therefore locate the Alcatel-Lucent RRH2x40-07-U where RF engineering is deemed ideal, minimizing trade-offs between available sites and RF optimum sites. The RF feeder cost and installation costs are reduced or eliminated, and there is no need for a Tower Mounted Amplifier (TMA) because losses introduced by the RF feeder are greatly reduced. The Alcatel-Lucent RRH2x40-07-U provides more RF power while at the same time consuming less electricity.



Macro

## Features

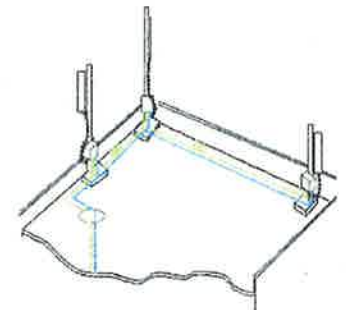
- Zero-footprint deployment
- Easy installation, with a lightweight unit can be carried and set up by one person
- Optimized RF power, with flexible site selection and elimination of a TMA
- Convection-cooled (fanless), noise-free, and heaterless unit
- Best-in-class power efficiency, with significantly reduced energy consumption



RRH for space-constrained cell sites

## Benefits

- Leverages existing real estate with lower site costs
- Reduces installation costs, with fewer installation materials and simplified logistics
- Decreases power costs and minimizes environmental impacts, with the potential for eco-sustainable power options
- Improves RF performance and adds flexibility to network planning



Distributed

## Technical specifications

### Physical dimensions

- Height: 390 mm (15.4 in.)
- Width: 380 mm (15 in.)
- Depth: 210 mm (8.2 in.)
- Weight (without mounting kit): less than 23 kg (50 lb)

### Power

- Power supply: -48V

### Operating environment

- Outdoor temperature range:
  - With solar load: -40°C to +50°C (-40°F to +122°F)
  - Without solar load: -40°C to +55°C (-40°F to +131°F)
- Passive convection cooling (no fans)

- Enclosure protection
  - IP65 (International Protection rating)

### RF characteristics

- Frequency band: 700 MHz; 3GPP Band 13
- Bandwidth: up to 10 MHz
- RF output power at antenna port:
  - 40 W nominal RF power for each Tx port
- Rx diversity: 2-way or 4-way
- Noise figure: below 2.5 dB typical
- ALD features
  - TMA
  - Remote electrical tilt (RET) support (AISG v2.0)

### Optical characteristics

#### Type/number of fibers

- Up to 3.12 Gb/s line bit rate
- Single-mode variant
  - One SM fiber (9/125 μm) per RRH2x, carrying UL and DL using CWDM (at 1550/1310 nm)
- Multi-mode variant
  - Two MM fibers (50/125 μm) per RRH2x: one carrying UL, the other carrying DL (at 850 nm)

### Optical fiber length

- Up to 500 m (0.31 mi), using MM fiber
- Up to 20 km (12.43 mi), using SM fiber

### Alarms and ports

- Six external alarms
- Two optical ports to support daisy-chaining

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# PCS RF MODULES

## RRH1900 2X60 - HW CHARACTERISTICS

LA6.0.1/13.3

RRH2x60	
RF Output Power	2x60W
Instantaneous Bandwidth	20MHz
Transmitter	2 TX
Receiver	2 Branch RX – LA6.0.1 4 Branch RX – LR13.3
Features	AISG 2.0 for RET/TMA Internal Smart Bias-T
Power	-48VDC
CPRI Ports	2 CPRI Rate 3 Ports
External Alarms	4 External User Alarms
Monitor Ports	TX
Environmental	GR487 Compliance
RF Connectors	7/16 DIN (top mounted)



\*\* Not a Verizon Wireless deployed product

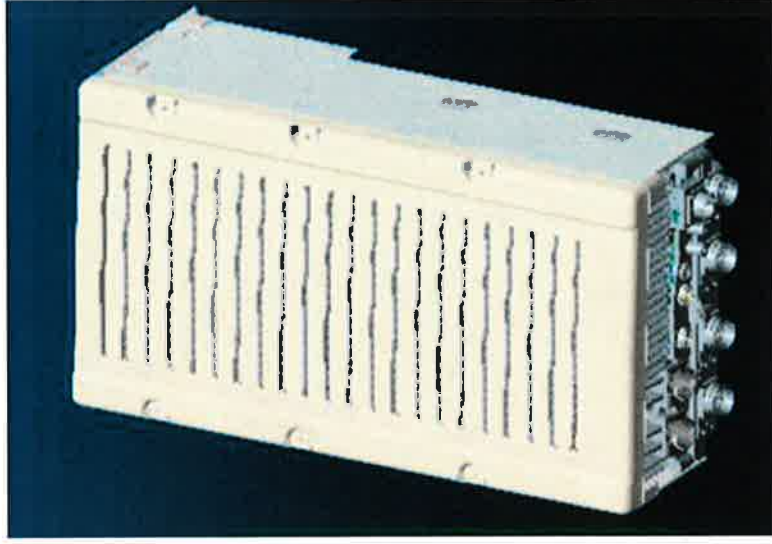


# NEW PCS RF MODULES FOR VZW

## 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 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.

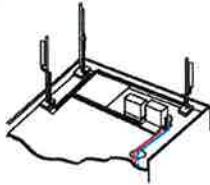
#### EASY INSTALLATION

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.

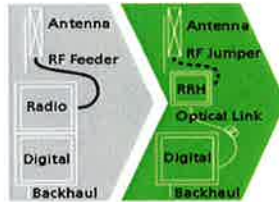
The limited space available in some sites may prevent the installation of traditional single-cabinet BTS equipment. However, many of these sites can host an Alcatel-Lucent RRH2x60-AWS installation, providing more flexible site selection and improved network quality along with greatly reduced installation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

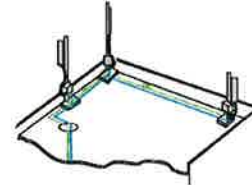
Installation can easily be done by a single person as the Alcatel-Lucent RRH2x60-AWS is compact and weighs about 20 kg, eliminating the need for a crane to hoist the BTS cabinet to the rooftop. A site can be in operation in less than one day.



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 daisy chaining 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

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**HYBRIFLEX™ RRH Hybrid Feeder Cabling Solution, 1-5/8", Single-Mode Fiber**

**Product Description**

RFS' HYBRIFLEX Remote Radio Head (RRH) hybrid feeder cabling solution combines optical fiber and DC power for RRHs in a single lightweight aluminum corrugated cable, making it the world's most innovative solution for RRH deployments.

It was developed to reduce installation complexity and costs at Cellular sites, HYBRIFLEX allows mobile operators deploying an RRH architecture to standardize the RRH installation process and eliminate the need for and cost of cable grounding. HYBRIFLEX combines optical fiber (multi-mode or single-mode) and power in a single corrugated cable. It eliminates the need for junction boxes and can connect multiple RRHs with a single feeder. Standard RFS CELLFLEX® accessories can be used with HYBRIFLEX cable. Both pre-connectorized and on-site options are available.

**Features/Benefits**

- Aluminum corrugated armor with outstanding bending characteristics - minimizes installation time and enables mechanical protection and shielding
- Same accessories as 1 5/8" coaxial cable
- Outer conductor grounding - eliminates typical grounding requirements and saves on installation costs
- Lightweight solution and compact design - Decreases tower loading
- Robust cabling - eliminates need for expensive cable trays and ducts
- Installation of tight bundled fiber optic cable pairs directly to the RRH - Reduces CAPEX and wind load by eliminating need for interconnection
- Optical fiber and power cables housed in single corrugated cable - Saves CAPEX by standardizing RRH cable installation and reducing installation requirements
- Outdoor polyethylene jacket - Ensures long-lasting cable protection

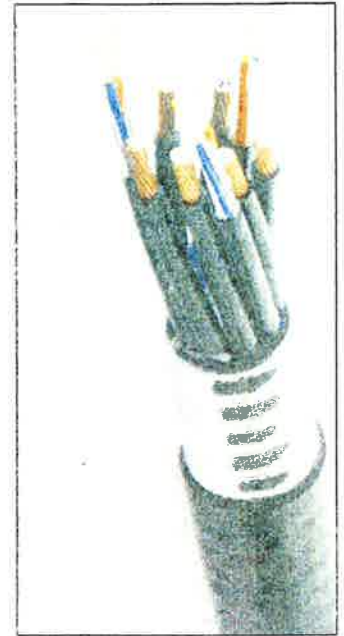


Figure 1: HYBRIFLEX Series

**Technical Specifications**

Outer Conductor Armor	Corrugated Aluminum	[mm (in.)]	46.5 (1.83)
Jacket	Polyethylene, PE	[mm (in.)]	50.3 (1.98)
UV-Protection	Individual and External Jacket		Yes

Weight, Approximate		[kg/m (lb/ft)]	1.9 (1.30)
Minimum Bending Radius, Single Bending		[mm (in.)]	200 (8)
Minimum Bending Radius, Repeated Bending		[mm (in.)]	500 (20)
Recommended/Maximum Clamp Spacing		[m (ft)]	1.0 / 1.2 (3.25 / 4.0)

DC-Resistance Outer Conductor Armor		[Ω/km (Ω/1000ft)]	0.68 (0.205)
DC-Resistance Power Cable: 8 4mm <sup>2</sup> (8AWG)		[Ω/km (Ω/1000ft)]	2.1 (0.307)

Version			Single-mode OM3
Quantity, Fiber Count			16 (8 pairs)
Core/Clad		[μm]	50/125
Primary Coating (Acrylate)		[μm]	245
Buffer Diameter, Nominal		[μm]	900
Secondary Protection, Jacket, Nominal		[mm (in.)]	2.0 (0.08)
Minimum Bending Radius		[mm (in.)]	104 (4.1)
Insertion Loss @ wavelength 850nm		dB/km	3.0
Insertion Loss @ wavelength 1310nm		dB/km	1.0
Standards (Meets or exceeds)			UL94-V0, UL1666 RoHS Compliant

Size (Power)		[mm (AWG)]	8.4 (8)
Quantity, Wire Count (Power)			16 (8 pairs)
Size (Alarm)		[mm (AWG)]	0.8 (18)
Quantity, Wire Count (Alarm)			4 (2 pairs)
Type			UV protected
Strands			19
Primary Jacket Diameter, Nominal		[mm (in.)]	6.8 (0.27)
Standards (Meets or exceeds)			NFPA 130, ICEA S-95-658 UL Type XHHW-2, UL 44 UL-L5 Limited Smoke, UL VW-1 IEEE-383 (1974), IEEE1292/FT4 RoHS Compliant

Installation Temperature		[°C (°F)]	-40 to +65 (-40 to 149)
Operation Temperature		[°C (°F)]	-40 to +65 (-40 to 149)

\* This data is provisional and subject to change

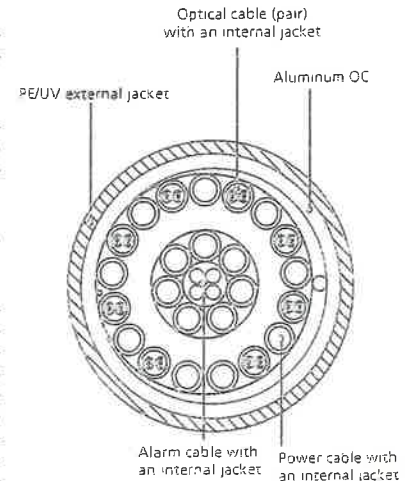


Figure 2: Construction Detail

All information contained in the present datasheet is subject to confirmation at time of ordering

# **ATTACHMENT 2**

Site Name: East Lyme Tower Height: Verizon @ 151 ft		General		Power		Density							
CARRIER	# OF CHAN.	WATTS ERP	HEIGHT	CALC. POWER DENS	FREQ.	MAX. PERMISS. EXP.	FRACTION MPE	Total					
*T-Mobile GSM/UMTS	2	12	103	0.0008	1950	1.0000	0.08%						
*T-Mobile UMTS	2	12	103	0.0008	2100	1.0000	0.08%						
*T-Mobile LTE	2	24	103	0.0016	2100	1.0000	0.16%						
*MetroPCS	3	727	134	0.0437	2140	1.0000	4.37%						
*Sprint CDMA/LTE	3	693	122	0.0502	1900	1.0000	5.02%						
*Sprint CDMA/LTE	1	390	122	0.0094	850	0.5667	1.66%						
*Sprint CDMA/LTE	2	693	122	0.0335	2500	1.0000	3.35%						
*Nextel	9	100	112.5	0.0143	851	0.5673	2.52%						
*Town			155	0.0015		0.2000	0.75%						
<b>Verizon</b>	<b>15</b>	<b>470</b>	<b>149</b>	<b>0.1142</b>	<b>1970</b>	<b>1.0000</b>	<b>11.42%</b>						
<b>Verizon</b>	<b>9</b>	<b>422</b>	<b>149</b>	<b>0.0615</b>	<b>869</b>	<b>0.5793</b>	<b>10.62%</b>						
<b>Verizon</b>	<b>1</b>	<b>1750</b>	<b>149</b>	<b>0.0283</b>	<b>2145</b>	<b>1.0000</b>	<b>2.83%</b>						
<b>Verizon</b>	<b>1</b>	<b>1050</b>	<b>149</b>	<b>0.0170</b>	<b>698</b>	<b>0.4973</b>	<b>3.42%</b>						<b>46.29%</b>
* Source: Siting Council													

# **ATTACHMENT 3**



**PAUL J. FORD AND COMPANY**  
**STRUCTURAL ENGINEERS**  
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Date: **August 07, 2014**

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 Crown Castle  
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 Charlotte, NC 28277

Paul J Ford and Company  
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 614-221-6679

**Subject: Structural Analysis Report**

**Carrier Designation:** *Verizon Wireless Co-Locate*  
**Carrier Site Number:** 117878  
**Carrier Site Name:** East Lyme CT

**Crown Castle Designation:**  
**Crown Castle BU Number:** 806384  
**Crown Castle Site Name:** NLN 136 943455  
**Crown Castle JDE Job Number:** 301022  
**Crown Castle Work Order Number:** 903257  
**Crown Castle Application Number:** 259799 Rev. 0

**Engineering Firm Designation:** Paul J Ford and Company Project Number: 37513-1269.003.8700

**Site Data:** **93 ROXBURY ROAD, EAST LYME, New London County, CT**  
**Latitude 41° 20' 8.35", Longitude -72° 13' 18.28"**  
**151.292 Foot - Self Support Tower**

Dear Sean Dempsey,

Paul J Ford and Company is pleased to submit this "Structural Analysis Report" to determine the structural integrity of the above mentioned tower. This analysis has been performed in accordance with the Crown Castle Structural 'Statement of Work' and the terms of Crown Castle Purchase Order Number 676868, in accordance with application 259799, revision 0.

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


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

The analysis has been performed in accordance with the TIA/EIA-222-F standard and 2005 CT State Building Code with 2009 amendment with an importance factor of 1.15 based upon a wind speed of 91.2 mph fastest mile with no ice, 37.6 mph with 0.9375 inch ice thickness and 50 mph under service loads.

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

Respectfully submitted by:

  
 Christina Hedges, PE  
 Project Engineer





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## 1) INTRODUCTION

This tower is a 151.292 ft Self Support tower designed by ROHN in March of 1990. The tower was originally designed for a wind speed of 85 mph per EIA-222-D.

## 2) ANALYSIS CRITERIA

The structural analysis was performed for this tower in accordance with the requirements of TIA/EIA-222-F Structural Standards for Steel Antenna Towers and Antenna Supporting Structures using a fastest mile wind speed of 91.2 mph with no ice, 37.6 mph with 0.9375 inch ice thickness and 50 mph under service loads.

**Table 1 - Proposed Antenna and Cable Information**

Mounting Level (ft)	Center Line Elevation (ft)	Number of Antennas	Antenna Manufacturer	Antenna Model	Number of Feed Lines	Feed Line Size (in)	Note
148.0	149.0	3	alcatel lucent	RRH 2X40 700 MHz UPPER	2	1 5/8	
		3	alcatel lucent	RRH2X60-AWS			
		3	alcatel lucent	RRH2X60-PCS			
		6	commscope	HBXX-6517DS-A2M w/ Mount Pipe			
		6	commscope	LNX-6514DS-AIM w/ Mount Pipe			
		2	rfs celwave	DB-T1-6Z-8AB-0Z			

**Table 2 - Existing and Reserved Antenna and Cable Information**

Mounting Level (ft)	Center Line Elevation (ft)	Number of Antennas	Antenna Manufacturer	Antenna Model	Number of Feed Lines	Feed Line Size (in)	Note
150.0	157.0	1	telewave	ANT150F2	2 1	7/8 5/16	1
	152.0	1	motorola	WB2618			
	150.0	1	tower mounts	Side Arm Mount [SO 304-1]			
148.0	149.0	3	antel	BXA-70063-6CF-2 w/ Mount Pipe	6 6	7/8 1 5/8	3
		4	antel	LPA-80063/6CF w/ Mount Pipe			
		2	decibel	DB846H80E-SX w/ Mount Pipe			
		6	rfs celwave	FD9R6004/2C-3L			
		6	rymsa wireless	MG V5-800TX w/ Mount Pipe			
	148.0	1	tower mounts	Sector Mount [SM 510-3]			
143.0	143.0	1	andrew	PL6-59W	1	EW52	1
		1	tower mounts	Pipe Mount [PM 601-1]			
133.0	133.0	3	kathrein	800 10504 w/ Mount Pipe	6	1 5/8	1
		1	tower mounts	Sector Mount [SM 104-3]			
128.0	130.0	1	til-tek	TA-2450	1	7/8	1

Mounting Level (ft)	Center Line Elevation (ft)	Number of Antennas	Antenna Manufacturer	Antenna Model	Number of Feed Lines	Feed Line Size (in)	Note	
	128.0	1	tower mounts	Side Arm Mount [SO 305-1]				
126.0	126.0	1	motorola	WB2618	1	5/16	1	
		1	tower mounts	Side Arm Mount [SO 305-1]				
121.0	122.0	3	alcatel lucent	TD-RRH8x20-25	1	1 1/4	2	
		3	rfs celwave	APXVTM14-C-120 w/ Mount Pipe				
		1	rfs celwave	APXV9ERR18-C-A20 w/ Mount Pipe				
	121.0	121.0	2	rfs celwave	APXVSP18-C-A20 w/ Mount Pipe	3	1 1/4	1
			3	alcatel lucent	1900MHz RRH (65MHz)			
			3	alcatel lucent	800MHz 2X50W RRH W/FILTER			
		1	tower mounts	Sector Mount [SM 505-3]				
112.0	112.0	9	decibel	DB844H90E-XY w/Mount Pipe	9	7/8	3	
		1	tower mounts	Sector Mount [SM 510-3]				
103.0	103.0	3	ericsson	ERICSSON AIR 21 B2A B4P w/ Mount Pipe	1	1 5/8	2	
		3	ericsson	ERICSSON AIR 21 B4A B2P w/ Mount Pipe				
		3	ericsson	KRY 112 144/1				
		1	tower mounts	Sector Mount [SM 701-3]				
95.0	94.0	1	motorola	WB2618	1	5/16	1	
90.0	96.0	1	sinclair	SRL-217 Ground Plane 10.67' x 4.83'	1	7/8	1	
	90.0	1	tower mounts	Side Arm Mount [SO 302-1]				
85.0	90.0	1	telewave	ANT150D3	1	7/8	1	
	85.0	1	tower mounts	Side Arm Mount [SO 305-1]				
61.0	61.0	1	bluewave	BW246Y	1	1/4	1	
50.0	52.0	1	lucent	KS24019-L112A	1	1/2	1	
	50.0	1	tower mounts	Side Arm Mount [SO 305-1]				

- Notes:  
 1) Existing Equipment  
 2) Future Equipment  
 3) Equipment to be Removed

### 3) ANALYSIS PROCEDURE

Table 3 - Documents Provided

Document	Remarks	Reference	Source
Tower Drawings	March 5, 1990, Rohn	24792JC	258359
Foundation Drawings	March 5, 1990, Rohn	24792JC	958525
Geotechnical Report	July 19, 1989, Dr. Clarence Welti	-	258373
Modification Drawings	January 16, 2003, All Points	CT105761	801526

Document	Remarks	Reference	Source
	Technology		
Modification Drawings	February 26, 2008, (Revised July 9, 2008) Vertical Structures	2008-004-030	2215933
Modification Drawings	May 14, 2009, PJF	41709-0057	2457486
Modification Drawings	May 10, 2011, PJF	37511-0187Mod	2883931
Structural Analysis	May 10, 2011, PJF	37511-0187Mod	2883926

### 3.1) Analysis Method

tnxTower (version 6.1.4.1), a commercially available analysis software package, was used to create a three-dimensional model of the tower and calculate member stresses for various loading cases. Selected output from the analysis is included in Appendix A.

### 3.2) Assumptions

- 1) Tower and structures were built in accordance with the manufacturer's specifications.
- 2) The tower and structures have been maintained in accordance with the manufacturer's specification.
- 3) The configuration of antennas, transmission cables, mounts and other appurtenances are as specified in Tables 1 and 2 and the referenced drawings.
- 4) When applicable, transmission cables are considered as structural components for calculating wind loads as allowed by TIA/EIA-222-F.

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

## 4) ANALYSIS RESULTS

**Table 4 - Section Capacity (Summary)**

Section No.	Elevation (ft)	Component Type	Size	Critical Element	P (lb)	SF*P_allow (lb)	% Capacity	Pass / Fail
T1	151.292 - 146.229	Leg	ROHN 2.5 STD	2	-2835.69	37965.40	18.9	Pass
T2	146.229 - 141.167	Leg	ROHN 2.5 STD	14	-9310.30	50607.87	22.5	Pass
T3	141.167 - 121.042	Leg	ROHN 2.5 EH	23	-34553.00	52977.02	65.2	Pass
T4	121.042 - 114.313	Leg	ROHN 2.5 EH (GR)	47	-40387.80	61869.99	65.3	Pass
T5	114.313 - 107.646	Leg	ROHN 2.5 EH (GR)	56	-52472.50	61867.72	84.8	Pass
T6	107.646 - 100.917	Leg	ROHN 2.5 EH (GR)	65	-70641.90	91492.98	77.2	Pass
T7	100.917 - 94.2014	Leg	ROHN 3 EH (GR)	77	-76340.10	102414.52	74.5	Pass
T8	94.2014 - 87.4861	Leg	ROHN 3 EH (GR)	86	-88418.80	132155.48	66.9	Pass
T9	87.4861 - 80.7708	Leg	ROHN 3 EH (GR)	98	-107482.00	132524.46	81.1	Pass
T10	80.7708 - 70.6875	Leg	ROHN 4 EH (GR)	110	-116111.00	136793.79	84.9	Pass
T11	70.6875 - 60.6041	Leg	ROHN 4 EH (GR)	119	-133871.00	193618.24	69.1 80.9 (b)	Pass
T12	60.6041 - 50.5104	Leg	ROHN 4 EH (GR)	131	-161827.00	194567.34	83.2	Pass

Section No.	Elevation (ft)	Component Type	Size	Critical Element	P (lb)	SF*P_allow (lb)	% Capacity	Pass / Fail
T13	50.5104 - 40.4166	Leg	ROHN 4 EH (GR)	143	-179528.00	194647.32	92.2	Pass
T14	40.4166 - 30.3125	Leg	ROHN 5 EH (GR)	155	-187809.00	231920.66	81.0	Pass
T15	30.3125 - 20.2083	Leg	ROHN 5 EH (GR)	163	182358.00	244417.54	74.6 89.2 (b)	Pass
T16	20.2083 - 10.1041	Leg	ROHN 5 EH (GR)	175	188813.00	244417.54	77.2	Pass
T17	10.1041 - 0	Leg	ROHN 5 EH (GR)	187	210563.00	244417.54	86.1	Pass
T1	151.292 - 146.229	Diagonal	L 1.5 x 1.5 x 3/16	9	-1022.92	2936.81	34.8	Pass
T2	146.229 - 141.167	Diagonal	L 2 x 2 x 3/16	18	-3716.68	7183.02	51.7 55.6 (b)	Pass
T3	141.167 - 121.042	Diagonal	L2 1/2x2 1/2x3/16	30	-5001.78	8577.46	58.3 91.0 (b)	Pass
T4	121.042 - 114.313	Diagonal	L2 1/2x2 1/2x3/16	51	-6477.12	7802.10	83.0	Pass
T5	114.313 - 107.646	Diagonal	L2 1/2x2 1/2x3/16	60	-6720.50	7121.94	94.4	Pass
T6	107.646 - 100.917	Diagonal	2L 2.5 x 2.5 x 3/16 (3/16)	69	-7730.83	27668.41	27.9 70.3 (b)	Pass
T7	100.917 - 94.2014	Diagonal	L3x3x3/16	81	-8174.15	10656.04	76.7	Pass
T8	94.2014 - 87.4861	Diagonal	L3x3x3/16	90	-8379.17	9740.18	86.0	Pass
T9	87.4861 - 80.7708	Diagonal	2L 3 x 3 x 3/16 (1/4)	102	-8966.10	35614.03	25.2 81.6 (b)	Pass
T10	80.7708 - 70.6875	Diagonal	2L3x3x3/16x1/4	114	-10158.00	29260.28	34.7 88.3 (b)	Pass
T11	70.6875 - 60.6041	Diagonal	2L3x3x3/16x1/4	123	-10718.40	26882.74	39.9 89.6 (b)	Pass
T12	60.6041 - 50.5104	Diagonal	2L3x3x1/4x1/4	135	-10928.90	32676.90	33.4 93.8 (b)	Pass
T13	50.5104 - 40.4166	Diagonal	2L3x3x1/4x1/4	147	-11524.40	29874.53	38.6 67.1 (b)	Pass
T14	40.4166 - 30.3125	Diagonal	2L3 1/2x3 1/2x1/4x1/4	159	-11746.40	43629.75	26.9 68.4 (b)	Pass
T15	30.3125 - 20.2083	Diagonal	2L3 1/2x3 1/2x1/4x1/4	168	-12664.30	40231.14	31.5 73.7 (b)	Pass
T16	20.2083 - 10.1041	Diagonal	2L 4 x 4 x 1/4 (1/4)	180	-12541.00	55366.02	22.7 73.0 (b)	Pass
T17	10.1041 - 0	Diagonal	2L 4 x 4 x 1/4 (1/4)	192	-13863.80	51311.17	27.0 80.7 (b)	Pass
T6	107.646 - 100.917	Secondary Horizontal	L 2 x 2 x 3/16	73	-1225.12	4253.63	28.8	Pass
T8	94.2014 - 87.4861	Secondary Horizontal	L 2 x 2 x 3/16	94	-1533.52	3443.41	44.5	Pass
T9	87.4861 - 80.7708	Secondary Horizontal	L 2 x 2 x 3/16	107	-1864.15	3111.40	59.9	Pass
T11	70.6875 - 60.6041	Secondary Horizontal	L2 1/2x2 1/2x3/16	128	-2321.56	4890.70	47.5	Pass
T12	60.6041 - 50.5104	Secondary Horizontal	L3x3x1/4	140	-2806.61	9857.64	28.5 51.1 (b)	Pass
T13	50.5104 - 40.4166	Secondary Horizontal	L3x3x1/4	151	-3113.61	8745.97	35.6 56.6 (b)	Pass
T15	30.3125 - 20.2083	Secondary Horizontal	L 3 x 3 x 3/16	172	-3727.55	5467.17	68.2	Pass
T16	20.2083 - 10.1041	Secondary Horizontal	L3x3x3/16	184	-3868.05	4943.07	78.3	Pass

Section No.	Elevation (ft)	Component Type	Size	Critical Element	P (lb)	SF*P_allow (lb)	% Capacity	Pass / Fail
T17	10.1041 - 0	Secondary Horizontal	L 3.5 x 3.5 x 1/4	196	-4339.57	9469.10	45.8 50.5 (b)	Pass
T1	151.292 - 146.229	Top Girt	L2 1/2x2 1/2x3/16	6	-182.32	4410.47	4.1	Pass
T3	141.167 - 121.042	Top Girt	L2 1/2x2 1/2x3/16	25	-790.74	4403.90	18.0	Pass
							Summary	
							Leg (T13)	92.2 Pass
							Diagonal (T5)	94.4 Pass
							Secondary Horizontal (T16)	78.3 Pass
							Top Girt (T3)	18.0 Pass
							Bolt Checks	93.8 Pass
							Rating =	94.4 Pass

**Table 5 - Tower Component Stresses vs. Capacity – LC7**

Notes	Component	Elevation (ft)	% Capacity	Pass / Fail
1	Anchor Rods		81.2	Pass
1	Base Foundation		42.0	Pass
1	Base Foundation Soil Interaction		97.9	Pass

<b>Structure Rating (max from all components) =</b>	<b>97.9%</b>
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Notes:

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

## APPENDIX A

### TNXTOWER OUTPUT

#### Tower Input Data

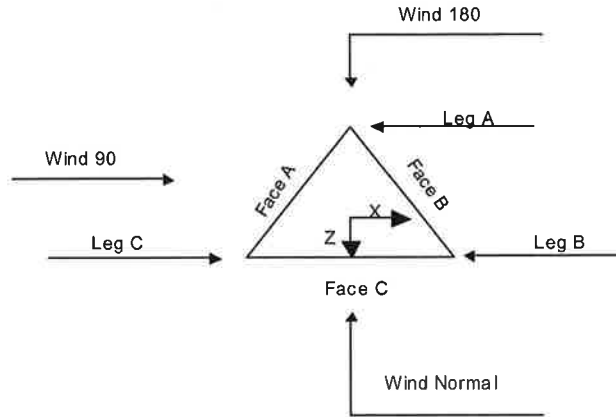
The main tower is a 3x free standing tower with an overall height of 151.29 ft above the ground line.  
The base of the tower is set at an elevation of 0.00 ft above the ground line.  
The face width of the tower is 8.56 ft at the top and 22.78 ft at the base.  
This tower is designed using the TIA/EIA-222-F standard.

The following design criteria apply:

- 4) Tower is located in New London County, Connecticut.
- 5) Basic wind speed of 91 mph.
- 6) Nominal ice thickness of 0.9375 in.
- 7) Ice thickness is considered to increase with height.
- 8) Ice density of 56 pcf.
- 9) A wind speed of 38 mph is used in combination with ice.
- 10) Deflections calculated using a wind speed of 50 mph.
- 11) A non-linear (P-delta) analysis was used.
- 12) Grouted pipe  $f_c$  is 7 ksi.
- 13) Pressures are calculated at each section.
- 14) Stress ratio used in tower member design is 1.333.
- 15) Local bending stresses due to climbing loads, feed line supports, and appurtenance mounts are not considered.

#### Options

Consider Moments - Legs	Distribute Leg Loads As Uniform	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	Use TIA-222-G Tension Splice	
	Capacity Exemption	



**Triangular Tower**

**Tower Section Geometry**

Tower Section	Tower Elevation	Assembly Database	Description	Section Width	Number of Sections	Section Length
	ft			ft		ft
T1	151.29-146.23			8.56	1	5.06
T2	146.23-141.17			8.56	1	5.06
T3	141.17-121.04			8.56	1	20.13
T4	121.04-114.31			10.56	1	6.73
T5	114.31-107.65			11.24	1	6.67
T6	107.65-100.92			11.92	1	6.73
T7	100.92-94.20			12.60	1	6.72
T8	94.20-87.49			13.30	1	6.72
T9	87.49-80.77			14.00	1	6.72
T10	80.77-70.69			14.70	1	10.08
T11	70.69-60.60			15.70	1	10.08
T12	60.60-50.51			16.70	1	10.09
T13	50.51-40.42			17.73	1	10.09
T14	40.42-30.31			18.77	1	10.10
T15	30.31-20.21			19.78	1	10.10
T16	20.21-10.10			20.78	1	10.10
T17	10.10-0.00			21.78	1	10.10

**Tower Section Geometry (cont'd)**

Tower Section	Tower Elevation	Diagonal Spacing	Bracing Type	Has K Brace End Panels	Has Horizontals	Top Girt Offset	Bottom Girt Offset
	ft	ft				in	in
T1	151.29-146.23	4.94	X Brace	No	No	0.7500	0.7500
T2	146.23-141.17	4.94	X Brace	No	No	0.7500	0.7500
T3	141.17-121.04	6.67	X Brace	No	No	0.7500	0.7500
T4	121.04-114.31	6.67	X Brace	No	No	0.7500	0.0000
T5	114.31-107.65	6.67	X Brace	No	No	0.0000	0.0000
T6	107.65-100.92	6.67	X Brace	No	Yes	0.0000	0.7500



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
T7	100.92-94.20	6.65	X Brace	No	No	0.7500	0.0000
T8	94.20-87.49	6.72	X Brace	No	Yes	0.0000	0.0000
T9	87.49-80.77	6.63	X Brace	No	Yes	0.0000	1.0000
T10	80.77-70.69	10.00	X Brace	No	No	1.0000	0.0000
T11	70.69-60.60	10.08	X Brace	No	Yes	0.0000	0.0000
T12	60.60-50.51	9.91	X Brace	No	Yes	1.0000	1.2500
T13	50.51-40.42	9.91	X Brace	No	Yes	1.0000	1.2500
T14	40.42-30.31	10.00	X Brace	No	No	1.2500	0.0000
T15	30.31-20.21	10.00	X Brace	No	Yes	0.0000	1.2500
T16	20.21-10.10	10.00	X Brace	No	Yes	1.2500	0.0000
T17	10.10-0.00	10.00	X Brace	No	Yes	0.0000	1.2500

### Tower Section Geometry (cont'd)

Tower Elevation ft	Leg Type	Leg Size	Leg Grade	Diagonal Type	Diagonal Size	Diagonal Grade
T1 151.29-146.23	Pipe	ROHN 2.5 STD	A572-50 (50 ksi)	Single Angle	L 1.5 x 1.5 x 3/16	A36 (36 ksi)
T2 146.23-141.17	Pipe	ROHN 2.5 STD	A572-50 (50 ksi)	Single Angle	L 2 x 2 x 3/16	A36 (36 ksi)
T3 141.17-121.04	Pipe	ROHN 2.5 EH	A572-50 (50 ksi)	Single Angle	L2 1/2x2 1/2x3/16	A36 (36 ksi)
T4 121.04-114.31	Grouted Pipe	ROHN 2.5 EH	A572-50 (50 ksi)	Single Angle	L2 1/2x2 1/2x3/16	A36 (36 ksi)
T5 114.31-107.65	Grouted Pipe	ROHN 2.5 EH	A572-50 (50 ksi)	Single Angle	L2 1/2x2 1/2x3/16	A36 (36 ksi)
T6 107.65-100.92	Grouted Pipe	ROHN 2.5 EH	A572-50 (50 ksi)	Double Angle	2L 2.5 x 2.5 x 3/16 (3/16)	A36 (36 ksi)
T7 100.92-94.20	Grouted Pipe	ROHN 3 EH	A572-50 (50 ksi)	Single Angle	L3x3x3/16	A36 (36 ksi)
T8 94.20-87.49	Grouted Pipe	ROHN 3 EH	A572-50 (50 ksi)	Single Angle	L3x3x3/16	A36 (36 ksi)
T9 87.49-80.77	Grouted Pipe	ROHN 3 EH	A572-50 (50 ksi)	Double Angle	2L 3 x 3 x 3/16 (1/4)	A36 (36 ksi)
T10 80.77-70.69	Grouted Pipe	ROHN 4 EH	A572-50 (50 ksi)	Double Angle	2L3x3x3/16x1/4	A36 (36 ksi)
T11 70.69-60.60	Grouted Pipe	ROHN 4 EH	A572-50 (50 ksi)	Double Angle	2L3x3x3/16x1/4	A36 (36 ksi)
T12 60.60-50.51	Grouted Pipe	ROHN 4 EH	A572-50 (50 ksi)	Double Angle	2L3x3x1/4x1/4	A572-50 (50 ksi)
T13 50.51-40.42	Grouted Pipe	ROHN 4 EH	A572-50 (50 ksi)	Double Angle	2L3x3x1/4x1/4	A572-50 (50 ksi)
T14 40.42-30.31	Grouted Pipe	ROHN 5 EH	A572-50 (50 ksi)	Double Angle	2L3 1/2x3 1/2x1/4x1/4	A572-50 (50 ksi)
T15 30.31-20.21	Grouted Pipe	ROHN 5 EH	A572-50 (50 ksi)	Double Angle	2L3 1/2x3 1/2x1/4x1/4	A572-50 (50 ksi)
T16 20.21-10.10	Grouted Pipe	ROHN 5 EH	A572-50 (50 ksi)	Double Angle	2L 4 x 4 x 1/4 (1/4)	A572-50 (50 ksi)
T17 10.10-0.00	Grouted Pipe	ROHN 5 EH	A572-50 (50 ksi)	Double Angle	2L 4 x 4 x 1/4 (1/4)	A572-50 (50 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 151.29-146.23	Single Angle	L2 1/2x2 1/2x3/16	A36 (36 ksi)	Single Angle		A36 (36 ksi)
T3 141.17-	Single Angle	L2 1/2x2 1/2x3/16	A36	Single Angle		A36

Tower Elevation ft	Top Girt Type	Top Girt Size	Top Girt Grade	Bottom Girt Type	Bottom Girt Size	Bottom Girt Grade
121.04			(36 ksi)			(36 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
T6 107.65-100.92	Single Angle	L 2 x 2 x 3/16	A36 (36 ksi)	Single Angle		A36 (36 ksi)
T8 94.20-87.49	Single Angle	L 2 x 2 x 3/16	A36 (36 ksi)	Single Angle		A36 (36 ksi)
T9 87.49-80.77	Single Angle	L 2 x 2 x 3/16	A36 (36 ksi)	Single Angle		A36 (36 ksi)
T11 70.69-60.60	Single Angle	L2 1/2x2 1/2x3/16	A36 (36 ksi)	Single Angle		A36 (36 ksi)
T12 60.60-50.51	Single Angle	L3x3x1/4	A36 (36 ksi)	Single Angle		A36 (36 ksi)
T13 50.51-40.42	Single Angle	L3x3x1/4	A36 (36 ksi)	Single Angle		A36 (36 ksi)
T15 30.31-20.21	Single Angle	L 3 x 3 x 3/16	A36 (36 ksi)	Single Angle		A36 (36 ksi)
T16 20.21-10.10	Single Angle	L3x3x3/16	A36 (36 ksi)	Single Angle		A36 (36 ksi)
T17 10.10-0.00	Single Angle	L 3.5 x 3.5 x 1/4	A36 (36 ksi)	Single Angle		A36 (36 ksi)

### Tower Section Geometry (cont'd)

Tower Elevation ft	Gusset Area (per face) ft <sup>2</sup>	Gusset Thickness in	Gusset Grade	Adjust. Factor A <sub>r</sub>	Adjust. Factor A <sub>r</sub>	Weight Mult.	Double Angle Stitch Bolt Spacing Diagonals in	Double Angle Stitch Bolt Spacing Horizontals in
T1 151.29-146.23	0.30	0.1875	A36 (36 ksi)	1	1	1	Mid-Pt	30.0000
T2 146.23-141.17	0.30	0.1875	A36 (36 ksi)	1	1	1	Mid-Pt	30.0000
T3 141.17-121.04	0.80	0.1875	A36 (36 ksi)	1	1	1	Mid-Pt	30.0000
T4 121.04-114.31	0.27	0.4375	A36 (36 ksi)	1	1	1	Mid-Pt	30.0000
T5 114.31-107.65	0.27	0.4375	A36 (36 ksi)	1	1	1	Mid-Pt	30.0000
T6 107.65-100.92	1.25	0.4375	A36 (36 ksi)	1	1	1	Mid-Pt	30.0000
T7 100.92-94.20	0.93	0.4375	A36 (36 ksi)	1	1	1	Mid-Pt	30.0000
T8 94.20-87.49	0.47	0.4375	A36 (36 ksi)	1	1	1	Mid-Pt	30.0000
T9 87.49-80.77	0.47	0.4375	A36 (36 ksi)	1	1	1	Mid-Pt	30.0000
T10 80.77-70.69	0.45	0.2500	A36 (36 ksi)	1	1	1	Mid-Pt	30.0000
T11 70.69-60.60	0.45	0.2500	A36 (36 ksi)	1	1	1	Mid-Pt	30.0000
T12 60.60-50.51	0.45	0.2500	A36 (36 ksi)	1	1	1	Mid-Pt	30.0000
T13 50.51-40.42	0.45	0.5000	A36 (36 ksi)	1	1	1	Mid-Pt	30.0000

Tower Elevation	Gusset Area (per face)	Gusset Thickness	Gusset Grade	Adjust. Factor $A_r$	Adjust. Factor $A_r$	Weight Mult.	Double Angle Stitch Bolt Spacing Diagonals	Double Angle Stitch Bolt Spacing Horizontals
ft	ft <sup>2</sup>	in					in	in
T14 40.42-30.31	0.45	0.5000	A36 (36 ksi)	1	1	1	Mid-Pt	30.0000
T15 30.31-20.21	0.45	0.5000	A36 (36 ksi)	1	1	1	Mid-Pt	30.0000
T16 20.21-10.10	1.50	0.5000	A36 (36 ksi)	1	1	1	Mid-Pt	30.0000
T17 10.10-0.00	1.50	0.5000	A36 (36 ksi)	1	1	1	Mid-Pt	30.0000

### Tower Section Geometry (cont'd)

Tower Elevation	Calc K Single Angles	Calc K Solid Rounds	K Factors <sup>1</sup>								
			Legs	X Brace Diags	K Brace Diags	Single Diags	Girts	Horiz.	Sec. Horiz.	Inner Brace	
				X Y	X Y	X Y	X Y	X Y	X Y	X Y	X Y
T1 151.29-146.23	No	No	1	1	1	1	1	1	1	1	1
T2 146.23-141.17	No	No	1	1	1	1	1	1	1	1	1
T3 141.17-121.04	No	No	1	1	1	1	1	1	1	1	1
T4 121.04-114.31	No	No	1	1	1	1	1	1	1	1	1
T5 114.31-107.65	No	No	1	1	1	1	1	1	1	1	1
T6 107.65-100.92	No	No	1	1	1	1	1	1	0.5	0.5	1
T7 100.92-94.20	No	No	1	1	1	1	1	1	1	1	1
T8 94.20-87.49	No	No	1	1	1	1	1	1	0.5	0.5	1
T9 87.49-80.77	No	No	1	1	1	1	1	1	0.5	0.5	1
T10 80.77-70.69	No	No	1	1	1	1	1	1	1	1	1
T11 70.69-60.60	No	No	1	1	1	1	1	1	0.5	0.5	1
T12 60.60-50.51	No	No	1	1	1	1	1	1	0.5	0.5	1
T13 50.51-40.42	No	No	1	1	1	1	1	1	0.5	0.5	1
T14 40.42-30.31	No	No	1	1	1	1	1	1	1	1	1
T15 30.31-20.21	No	No	1	1	1	1	1	1	0.5	0.5	1
T16 20.21-10.10	No	No	1	1	1	1	1	1	0.5	0.5	1
T17 10.10-0.00	No	No	1	1	1	1	1	1	0.5	0.5	1

<sup>1</sup>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	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
T1 151.29-146.23	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 146.23-141.17	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 141.17-121.04	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 121.04-114.31	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 114.31-107.65	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
T6 107.65-100.92	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 100.92-94.20	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 94.20-87.49	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 87.49-80.77	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 80.77-70.69	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 70.69-60.60	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 60.60-50.51	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 50.51-40.42	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 40.42-30.31	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
T15 30.31-20.21	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
T16 20.21-10.10	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
T17 10.10-0.00	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 ft	Connection Offsets							
	Diagonal				K-Bracing			
	Vert. Top in	Horiz. Top in	Vert. Bot. in	Horiz. Bot. in	Vert. Top in	Horiz. Top in	Vert. Bot. in	Horiz. Bot. in
T1 151.29-146.23	2.5000	3.0000	2.5000	3.0000	0.0000	0.0000	0.0000	0.0000
T2 146.23-141.17	2.5000	3.0000	2.5000	3.0000	0.0000	0.0000	0.0000	0.0000
T3 141.17-121.04	2.5000	3.0000	2.5000	3.0000	0.0000	0.0000	0.0000	0.0000
T4 121.04-114.31	2.5000	3.0000	2.5000	3.0000	0.0000	0.0000	0.0000	0.0000
T5 114.31-107.65	2.5000	3.0000	2.5000	3.0000	0.0000	0.0000	0.0000	0.0000
T6 107.65-100.92	2.5000	3.0000	2.5000	3.0000	0.0000	0.0000	0.0000	0.0000
T7 100.92-94.20	2.5000	3.8438	2.5000	3.8438	0.0000	0.0000	0.0000	0.0000
T8 94.20-87.49	2.5000	3.8438	2.5000	3.8438	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
T9 87.49-80.77	2.5000	3.8438	2.5000	3.8438	0.0000	0.0000	0.0000	0.0000
T10 80.77-70.69	2.5000	4.3438	2.5000	4.3438	0.0000	0.0000	0.0000	0.0000
T11 70.69-60.60	2.5000	4.3438	2.5000	4.3438	0.0000	0.0000	0.0000	0.0000
T12 60.60-50.51	2.5000	4.3438	2.5000	4.3438	0.0000	0.0000	0.0000	0.0000
T13 50.51-40.42	2.5000	4.3438	2.5000	4.3438	0.0000	0.0000	0.0000	0.0000
T14 40.42-30.31	2.5000	4.8750	2.5000	4.8750	0.0000	0.0000	0.0000	0.0000
T15 30.31-20.21	2.5000	4.8750	2.5000	4.8750	0.0000	0.0000	0.0000	0.0000
T16 20.21-10.10	2.5000	4.8750	2.5000	4.8750	0.0000	0.0000	0.0000	0.0000
T17 10.10-0.00	2.5000	4.8750	2.5000	4.8750	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	No.	Bolt Size	No.	Bolt Size	No.	Bolt Size	No.	Bolt Size	No.	Bolt Size	No.	Bolt Size	No.
		in		in		in		in		in		in		in	
T1 151.29-146.23	Flange	0.6250	0	0.5000	1	0.5000	1	0.0000	0	0.6250	0	0.6250	0	0.6250	1
		A325N		A325N		A325N		A325N		A325N		A325N		A325N	
T2 146.23-141.17	Flange	0.6250	4	0.5000	1	0.6250	0	0.6250	0	0.6250	0	0.6250	0	0.6250	1
		A325N		A325X		A325N		A325N		A325N		A325N		A325N	
T3 141.17-121.04	Flange	0.6250	4	0.5000	1	0.5000	1	0.6250	0	0.6250	0	0.6250	0	0.6250	1
		A325N		A325N		A325N		A325N		A325N		A325N		A325N	
T4 121.04-114.31	Flange	0.7500	0	0.5000	2	0.6250	0	0.0000	0	0.6250	0	0.6250	0	0.6250	1
		A325N		A325N		A325N		A325N		A325N		A325N		A325N	
T5 114.31-107.65	Flange	0.7500	0	0.5000	2	0.6250	0	0.0000	0	0.6250	0	0.6250	0	0.6250	1
		A325N		A325N		A325N		A325N		A325N		A325N		A325N	
T6 107.65-100.92	Flange	0.7500	4	0.5000	1	0.6250	0	0.6250	0	0.6250	0	0.6250	0	0.6250	1
		A325N		A325N		A325N		A325N		A325N		A325N		A325N	
T7 100.92-94.20	Flange	0.8750	0	0.5000	2	0.6250	0	0.0000	0	0.6250	0	0.6250	0	0.6250	1
		A325N		A325N		A325N		A325N		A325N		A325N		A325N	
T8 94.20-87.49	Flange	0.8750	0	0.5000	2	0.6250	0	0.0000	0	0.6250	0	0.6250	0	0.6250	1
		A325N		A325N		A325N		A325N		A325N		A325N		A325N	
T9 87.49-80.77	Flange	0.8750	4	0.5000	1	0.6250	0	0.0000	0	0.6250	0	0.6250	0	0.6250	1
		A325N		A325N		A325N		A325N		A325N		A325N		A325N	
T10 80.77-70.69	Flange	0.8750	0	0.6250	1	0.6250	0	0.0000	0	0.6250	0	0.6250	0	0.6250	1
		A325N		A325N		A325N		A325N		A325N		A325N		A325N	
T11 70.69-60.60	Flange	0.8750	4	0.6250	1	0.6250	0	0.6250	0	0.6250	0	0.6250	0	0.6250	1
		A325N		A325N		A325N		A325N		A325N		A325N		A325N	
T12 60.60-50.51	Flange	1.0000	0	0.6250	1	0.6250	0	0.0000	0	0.6250	0	0.6250	0	0.5000	1
		A325N		A325N		A325N		A325N		A325N		A325N		A325N	
T13 50.51-40.42	Flange	1.0000	4	0.6250	1	0.6250	0	0.6250	0	0.6250	0	0.6250	0	0.5000	1
		A325N		A325N		A325N		A325N		A325N		A325N		A325N	
T14 40.42-30.31	Flange	1.0000	0	0.6250	1	0.6250	0	0.0000	0	0.6250	0	0.6250	0	0.6250	1
		A325N		A325N		A325N		A325N		A325N		A325N		A325N	
T15 30.31-20.21	Flange	1.0625	4	0.6250	1	0.6250	0	0.6250	0	0.6250	0	0.6250	0	0.6250	1
		A325N		A325N		A325N		A325N		A325N		A325N		A325N	
T16 20.21-10.10	Flange	1.0000	0	0.6250	1	0.6250	0	0.0000	0	0.6250	0	0.6250	0	0.6250	1
		A325N		A325N		A325N		A325N		A325N		A325N		A325N	
T17 10.10-0.00	Flange	1.0000	6	0.6250	1	0.6250	0	0.6250	0	0.6250	0	0.6250	0	0.6250	1
		A354-BC		A325N		A325N		A325N		A325N		A325N		A325N	

### Grouted Pipe Properties

Size	$F_y$ ksi	$A_s$ in <sup>2</sup>	$A_g$ in <sup>2</sup>	Wt plf	$E_c$ ksi	$E_m$ ksi	$F_{ym}$ ksi
ROHN 2.5 EH (GR)	50	2.2535	4.2383	16.498	4769	36175	61
ROHN 3 EH (GR)	50	3.0159	6.6052	24.023	4769	37356	63
ROHN 4 EH (GR)	50	4.4074	11.4969	38.949	4769	38952	66
ROHN 5 EH (GR)	50	6.1120	18.1937	58.701	4769	40357	68

### Feed Line/Linear Appurtenances - Entered As Round Or Flat

Description	Face or Shield Leg	Allow	Component Type	Placement ft	Face Offset in	Lateral Offset (Frac FW)	#	# Per Row	Clear Spacing in	Width or Diameter in	Perimeter r in	Weight plf
**												
1.5" flat Cable Ladder Rail	B	Yes	Af (CfAe)	103.00 - 8.00	0.0000	0.45	2	2	12.0000 1.5000	1.5000	6.0000	1.80
LDF7-50A (1-5/8 FOAM)	B	Yes	Ar (CfAe)	103.00 - 8.00	0.0000	0.45	13	7	0.2700	1.9800		0.82
LDF4P-50A (1/2 FOAM)	B	Yes	Ar (CfAe)	50.00 - 8.00	-1.0000	0.49	1	1	0.6300	0.6300		0.15
**												
LDF5-50A (7/8 FOAM)	B	Yes	Ar (CfAe)	90.00 - 8.00	-1.0000	-0.4	8	8	1.0000	1.0900		0.33
LDF5-50A (7/8 FOAM)	B	Yes	Ar (CfAe)	148.00 - 90.00	-1.0000	-0.4	7	7	1.0000	1.0900		0.33
LDF7-50A (1-5/8 FOAM)	B	Yes	Ar (CfAe)	148.00 - 8.00	2.0000	-0.45	3	2	0.2700 1.0000	1.9800		0.82
LDF7-50A (1-5/8 FOAM)	B	Yes	Ar (CfAe)	148.00 - 8.00	2.0000	-0.35	5	3	0.2700 1.0000	1.9800		0.82
1.5" flat Cable Ladder Rail	B	Yes	Af (CfAe)	148.00 - 8.00	0.0000	-0.4	2	2	30.0000 1.5000	1.5000	6.0000	1.80
1.5" flat Cable Ladder Rail	B	Yes	Af (CfAe)	121.00 - 8.00	-1.0000	-0.35	1	1	30.0000 1.5000	1.5000	6.0000	1.80
HB114-1-08U4-M5J(1 1/4")	B	Yes	Ar (CfAe)	121.00 - 8.00	-2.0000	-0.35	4	4	0.7600 1.5400	1.5400		1.08
**												
1.5" flat Cable Ladder Rail	A	Yes	Af (CfAe)	133.00 - 8.00	0.0000	0.4	2	2	12.0000 1.5000	1.5000	6.0000	1.80
LDF5-50A (7/8 FOAM)	A	Yes	Ar (CfAe)	85.00 - 8.00	0.0000	0.45	2	2	1.0000	1.0900		0.33
LDF5-50A (7/8 FOAM)	A	Yes	Ar (CfAe)	128.00 - 85.00	0.0000	0.45	1	1	1.0000	1.0900		0.33
9207 (5/16")	A	Yes	Ar (CfAe)	95.00 - 8.00	0.0000	0.4	3	3	0.3300	0.3300		0.06
9207 (5/16")	A	Yes	Ar (CfAe)	126.00 - 8.00	0.0000	0.4	2	2	0.3300	0.3300		0.06
9207 (5/16")	A	Yes	Ar (CfAe)	151.29 - 8.00	0.0000	0.4	1	1	0.3300	0.3300		0.06
FXL 1873 PE(1 5/8")	A	Yes	Ar (CfAe)	133.00 - 8.00	0.0000	0.4	6	6	0.2700	1.9800		0.01
**												

### Feed Line/Linear Appurtenances - Entered As Area

Description	Face or Shield Leg	Allow Shield	Component Type	Placement ft	Face Offset in	Lateral Offset (Frac FW)	#	C <sub>A</sub> A <sub>A</sub> ft <sup>2</sup> /ft	Weight plf	
EW52	B	No	CaAa (In Face)	143.00 - 8.00	0.0000	-0.35	1	No Ice	0.00	0.59
								1/2" Ice	0.00	1.95
								1" Ice	0.00	3.93
								2" Ice	0.00	9.71
								4" Ice	0.00	28.60
**										

### Discrete Tower Loads

Description	Face or Leg	Offset Type	Offsets: Horz Lateral Vert ft ft ft	Azimuth Adjustmen t	Placement ft	C <sub>A</sub> A <sub>A</sub> Front ft <sup>2</sup>	C <sub>A</sub> A <sub>A</sub> Side ft <sup>2</sup>	Weight lb	
Side Arm Mount [SO 304-1]	A	From Leg	1.00 0.00 0.00	0.0000	150.00	No Ice	0.63	0.94	23.00
						1/2" Ice	1.00	1.45	31.92
						Ice	1.37	1.96	40.83
						1" Ice	2.11	2.98	58.66
						2" Ice	3.59	5.02	94.32
WB2618	A	From Leg	2.00 0.00 2.00	0.0000	150.00	No Ice	2.04	0.53	12.10
						1/2" Ice	2.24	0.65	23.53
						Ice	2.44	0.78	37.28
						1" Ice	2.87	1.07	72.51
						2" Ice	3.82	1.75	179.32
ANT150F2	A	From Leg	2.00 0.00 7.00	0.0000	150.00	No Ice	1.29	1.29	13.00
						1/2" Ice	1.60	1.60	23.28
						Ice	1.91	1.91	37.06
						1" Ice	2.57	2.57	75.67
						2" Ice	4.06	4.06	201.46
Sector Mount [SM 510-3]	B	None		0.0000	148.00	No Ice	40.10	40.10	2396.40
						1/2" Ice	57.33	57.33	3089.00
						Ice	74.56	74.56	3781.60
						1" Ice	109.02	109.02	5166.80
						2" Ice	177.94	177.94	7937.20
(2) LNX-6514DS-AIM w/ Mount Pipe	A	From Face	4.00 0.00 1.00	0.0000	148.00	No Ice	8.65	7.08	64.56
						1/2" Ice	9.31	8.27	133.71
						Ice	9.93	9.18	210.90
						1" Ice	11.20	11.02	393.00
						2" Ice	13.87	15.06	902.39
(2) LNX-6514DS-AIM w/ Mount Pipe	B	From Face	4.00 0.00 1.00	0.0000	148.00	No Ice	8.65	7.08	64.56
						1/2" Ice	9.31	8.27	133.71
						Ice	9.93	9.18	210.90
						1" Ice	11.20	11.02	393.00
						2" Ice	13.87	15.06	902.39
(2) LNX-6514DS-AIM w/ Mount Pipe	C	From Face	4.00 0.00 1.00	0.0000	148.00	No Ice	8.65	7.08	64.56
						1/2" Ice	9.31	8.27	133.71
						Ice	9.93	9.18	210.90
						1" Ice	11.20	11.02	393.00
						2" Ice	13.87	15.06	902.39
(2) HBXX-6517DS-A2M w/ Mount Pipe	A	From Face	4.00 0.00 1.00	0.0000	148.00	No Ice	8.98	6.96	67.23
						1/2" Ice	9.65	8.18	136.85
						Ice	10.29	9.14	214.64
						1" Ice	11.59	11.02	398.47
						2" Ice			

Description	Face or Leg	Offset Type	Offsets: Horz Lateral Vert ft ft ft	Azimuth Adjustment t °	Placement ft	C <sub>AA</sub> Front ft <sup>2</sup>	C <sub>AA</sub> Side ft <sup>2</sup>	Weight lb	
						2" Ice	14.32	15.03	913.98
(2) HBXX-6517DS-A2M w/ Mount Pipe	B	From Face	4.00 0.00 1.00	0.0000	148.00	4" Ice	8.98	6.96	67.23
						No Ice	8.98	6.96	67.23
						1/2" Ice	9.65	8.18	136.85
						1" Ice	10.29	9.14	214.64
						2" Ice	11.59	11.02	398.47
(2) HBXX-6517DS-A2M w/ Mount Pipe	C	From Face	4.00 0.00 1.00	0.0000	148.00	4" Ice	14.32	15.03	913.98
						No Ice	8.98	6.96	67.23
						1/2" Ice	9.65	8.18	136.85
						1" Ice	10.29	9.14	214.64
						2" Ice	11.59	11.02	398.47
RRH 2X40 700 MHz UPPER	A	From Face	4.00 0.00 1.00	0.0000	148.00	4" Ice	3.20	1.92	50.70
						No Ice	3.20	1.92	50.70
						1/2" Ice	3.44	2.12	74.82
						1" Ice	3.69	2.33	102.16
						2" Ice	4.21	2.76	167.23
RRH 2X40 700 MHz UPPER	B	From Face	4.00 0.00 1.00	0.0000	148.00	4" Ice	5.37	3.74	344.42
						No Ice	3.20	1.92	50.70
						1/2" Ice	3.44	2.12	74.82
						1" Ice	3.69	2.33	102.16
						2" Ice	4.21	2.76	167.23
RRH 2X40 700 MHz UPPER	C	From Face	4.00 0.00 1.00	0.0000	148.00	4" Ice	5.37	3.74	344.42
						No Ice	3.20	1.92	50.70
						1/2" Ice	3.44	2.12	74.82
						1" Ice	3.69	2.33	102.16
						2" Ice	4.21	2.76	167.23
RRH2X60-AWS	A	From Face	4.00 0.00 1.00	0.0000	148.00	4" Ice	3.96	2.16	60.00
						No Ice	3.96	2.16	60.00
						1/2" Ice	4.27	2.44	84.31
						1" Ice	4.60	2.73	112.31
						2" Ice	5.27	3.34	180.17
RRH2X60-AWS	B	From Face	4.00 0.00 1.00	0.0000	148.00	4" Ice	6.72	4.66	368.78
						No Ice	3.96	2.16	60.00
						1/2" Ice	4.27	2.44	84.31
						1" Ice	4.60	2.73	112.31
						2" Ice	5.27	3.34	180.17
RRH2X60-AWS	C	From Face	4.00 0.00 1.00	0.0000	148.00	4" Ice	6.72	4.66	368.78
						No Ice	3.96	2.16	60.00
						1/2" Ice	4.27	2.44	84.31
						1" Ice	4.60	2.73	112.31
						2" Ice	5.27	3.34	180.17
RRH2X60-PCS	A	From Face	4.00 0.00 1.00	0.0000	148.00	4" Ice	2.57	2.01	55.00
						No Ice	2.57	2.01	55.00
						1/2" Ice	2.79	2.22	75.35
						1" Ice	3.02	2.43	98.71
						2" Ice	3.52	2.89	155.23
RRH2X60-PCS	B	From Face	4.00 0.00 1.00	0.0000	148.00	4" Ice	4.61	3.92	312.91
						No Ice	2.57	2.01	55.00
						1/2" Ice	2.79	2.22	75.35
						1" Ice	3.02	2.43	98.71
						2" Ice	3.52	2.89	155.23
RRH2X60-PCS	C	From Face	4.00 0.00 1.00	0.0000	148.00	4" Ice	4.61	3.92	312.91
						No Ice	2.57	2.01	55.00
						1/2" Ice	2.79	2.22	75.35
						1" Ice	3.02	2.43	98.71
						2" Ice	3.52	2.89	155.23



Description	Face or Leg	Offset Type	Offsets: Horz Lateral Vert ft ft ft	Azimuth Adjustment °	Placement ft		C <sub>AA</sub> Front ft <sup>2</sup>	C <sub>AA</sub> Side ft <sup>2</sup>	Weight lb
						1" Ice	3.52	2.89	155.23
						2" Ice	4.61	3.92	312.91
						4" Ice			
(2) DB-T1-6Z-8AB-0Z	A	From Face	0.50 0.00 1.00	0.0000	148.00	No Ice	5.60	2.33	44.00
						1/2"	5.92	2.56	80.13
						Ice	6.24	2.79	120.22
						1" Ice	6.91	3.28	213.04
						2" Ice	8.37	4.37	454.67
						4" Ice			
** Pipe Mount [PM 601-1]	A	From Leg	0.50 0.00 0.00	0.0000	143.00	No Ice	3.00	0.90	65.00
						1/2"	3.74	1.12	79.14
						Ice	4.48	1.34	93.27
						1" Ice	5.96	1.78	121.55
						2" Ice	8.92	2.66	178.10
						4" Ice			
** Sector Mount [SM 104-3]	A	None		0.0000	133.00	No Ice	30.02	30.02	952.50
						1/2"	40.48	40.48	1404.60
						Ice	50.94	50.94	1856.70
						1" Ice	71.86	71.86	2760.90
						2" Ice	113.70	113.70	4569.30
						4" Ice			
800 10504 w/ Mount Pipe	A	From Leg	3.50 3.50 0.00	44.0000	133.00	No Ice	3.59	3.18	37.75
						1/2"	4.01	3.91	70.42
						Ice	4.42	4.58	108.95
						1" Ice	5.34	5.98	206.66
						2" Ice	7.38	8.98	513.56
						4" Ice			
800 10504 w/ Mount Pipe	B	From Leg	3.50 3.50 0.00	44.0000	133.00	No Ice	3.59	3.18	37.75
						1/2"	4.01	3.91	70.42
						Ice	4.42	4.58	108.95
						1" Ice	5.34	5.98	206.66
						2" Ice	7.38	8.98	513.56
						4" Ice			
800 10504 w/ Mount Pipe	C	From Leg	3.50 3.50 0.00	44.0000	133.00	No Ice	3.59	3.18	37.75
						1/2"	4.01	3.91	70.42
						Ice	4.42	4.58	108.95
						1" Ice	5.34	5.98	206.66
						2" Ice	7.38	8.98	513.56
						4" Ice			
** Side Arm Mount [SO 305-1]	C	From Leg	1.50 0.00 0.00	0.0000	128.00	No Ice	0.94	1.41	30.00
						1/2"	1.48	2.17	43.27
						Ice	2.02	2.93	56.54
						1" Ice	3.10	4.45	83.07
						2" Ice	5.26	7.49	136.14
						4" Ice			
TA-2450	C	From Leg	3.00 0.00 2.00	0.0000	128.00	No Ice	0.84	0.84	15.00
						1/2"	1.08	1.08	21.99
						Ice	1.34	1.34	31.80
						1" Ice	1.87	1.87	60.52
						2" Ice	3.19	3.19	158.57
						4" Ice			
Side Arm Mount [SO 305-1]	A	From Leg	1.50 0.00 0.00	0.0000	126.00	No Ice	0.94	1.41	30.00
						1/2"	1.48	2.17	43.27
						Ice	2.02	2.93	56.54
						1" Ice	3.10	4.45	83.07
						2" Ice	5.26	7.49	136.14
						4" Ice			
WB2618	A	From Leg	3.00 0.00 0.00	0.0000	126.00	No Ice	2.04	0.53	12.10
						1/2"	2.24	0.65	23.53
						Ice	2.44	0.78	37.28
						1" Ice	2.87	1.07	72.51
						2" Ice	3.82	1.75	179.32

Description	Face or Leg	Offset Type	Offsets: Horz Lateral Vert ft ft ft	Azimuth Adjustment	Placement ft		C <sub>AA</sub> Front ft <sup>2</sup>	C <sub>AA</sub> Side ft <sup>2</sup>	Weight lb
						4" Ice			
**									
Sector Mount [SM 505-3]	A	None		0.0000	121.00	No Ice	34.86	34.86	1725.30
						1/2"	49.79	49.79	2316.90
						Ice	64.72	64.72	2908.50
						1" Ice	94.58	94.58	4091.70
						2" Ice	154.30	154.30	6458.10
						4" Ice			
1900MHz RRH (65MHz)	A	From Leg	4.00 0.00 0.00	0.0000	121.00	No Ice	2.71	2.61	59.50
						1/2"	2.95	2.84	82.62
						Ice	3.20	3.09	108.98
						1" Ice	3.72	3.61	172.17
						2" Ice	4.86	4.74	345.91
						4" Ice			
800MHz 2X50W RRH W/FILTER	A	From Leg	4.00 0.00 0.00	0.0000	121.00	No Ice	2.40	2.25	64.00
						1/2"	2.61	2.46	86.12
						Ice	2.83	2.68	111.30
						1" Ice	3.30	3.13	171.62
						2" Ice	4.34	4.15	337.52
						4" Ice			
APXVSPP18-C-A20 w/ Mount Pipe	A	From Leg	4.00 0.00 1.00	0.0000	121.00	No Ice	8.50	6.95	82.55
						1/2"	9.15	8.13	150.56
						Ice	9.77	9.02	226.53
						1" Ice	11.03	10.84	405.98
						2" Ice	13.68	14.85	908.95
						4" Ice			
1900MHz RRH (65MHz)	B	From Leg	4.00 0.00 0.00	0.0000	121.00	No Ice	2.71	2.61	59.50
						1/2"	2.95	2.84	82.62
						Ice	3.20	3.09	108.98
						1" Ice	3.72	3.61	172.17
						2" Ice	4.86	4.74	345.91
						4" Ice			
800MHz 2X50W RRH W/FILTER	B	From Leg	4.00 0.00 0.00	0.0000	121.00	No Ice	2.40	2.25	64.00
						1/2"	2.61	2.46	86.12
						Ice	2.83	2.68	111.30
						1" Ice	3.30	3.13	171.62
						2" Ice	4.34	4.15	337.52
						4" Ice			
APXV9ERR18-C-A20 w/ Mount Pipe	B	From Leg	4.00 0.00 1.00	0.0000	121.00	No Ice	8.50	7.47	87.55
						1/2"	9.15	8.66	158.03
						Ice	9.77	9.56	236.54
						1" Ice	11.03	11.39	421.23
						2" Ice	13.68	15.53	935.37
						4" Ice			
1900MHz RRH (65MHz)	C	From Leg	4.00 0.00 0.00	0.0000	121.00	No Ice	2.71	2.61	59.50
						1/2"	2.95	2.84	82.62
						Ice	3.20	3.09	108.98
						1" Ice	3.72	3.61	172.17
						2" Ice	4.86	4.74	345.91
						4" Ice			
800MHz 2X50W RRH W/FILTER	C	From Leg	4.00 0.00 0.00	0.0000	121.00	No Ice	2.40	2.25	64.00
						1/2"	2.61	2.46	86.12
						Ice	2.83	2.68	111.30
						1" Ice	3.30	3.13	171.62
						2" Ice	4.34	4.15	337.52
						4" Ice			
APXVSPP18-C-A20 w/ Mount Pipe	C	From Leg	4.00 0.00 1.00	0.0000	121.00	No Ice	8.50	6.95	82.55
						1/2"	9.15	8.13	150.56
						Ice	9.77	9.02	226.53
						1" Ice	11.03	10.84	405.98
						2" Ice	13.68	14.85	908.95
						4" Ice			
TD-RRH8x20-25	A	From Leg	4.00 0.00 1.00	0.0000	121.00	No Ice	4.72	1.70	70.00
						1/2"	5.01	1.92	97.15
						Ice	5.32	2.15	127.83

Description	Face or Leg	Offset Type	Offsets: Horz Lateral Vert ft ft ft	Azimuth Adjustment	Placement ft	C <sub>AA</sub> Front ft <sup>2</sup>	C <sub>AA</sub> Side ft <sup>2</sup>	Weight lb
APXVTM14-C-120 w/ Mount Pipe	A	From Leg	4.00 0.00 1.00	0.0000	121.00	1" Ice	5.95	200.54
						2" Ice	7.31	396.84
						4" Ice		
						No Ice	7.13	76.77
						1/2"	7.66	131.38
						Ice	8.18	192.68
						1" Ice	9.26	338.48
TD-RRH8x20-25	B	From Leg	4.00 0.00 1.00	0.0000	121.00	2" Ice	11.53	752.45
						4" Ice		
						No Ice	4.72	70.00
						1/2"	5.01	97.15
						Ice	5.32	127.83
						1" Ice	5.95	200.54
						2" Ice	7.31	396.84
APXVTM14-C-120 w/ Mount Pipe	B	From Leg	4.00 0.00 1.00	0.0000	121.00	4" Ice		
						No Ice	7.13	76.77
						1/2"	7.66	131.38
						Ice	8.18	192.68
						1" Ice	9.26	338.48
						2" Ice	11.53	752.45
						4" Ice		
TD-RRH8x20-25	C	From Leg	4.00 0.00 1.00	0.0000	121.00	No Ice	4.72	70.00
						1/2"	5.01	97.15
						Ice	5.32	127.83
						1" Ice	5.95	200.54
						2" Ice	7.31	396.84
						4" Ice		
						No Ice	7.13	76.77
APXVTM14-C-120 w/ Mount Pipe	C	From Leg	4.00 0.00 1.00	0.0000	121.00	1/2"	7.66	131.38
						Ice	8.18	192.68
						1" Ice	9.26	338.48
						2" Ice	11.53	752.45
						4" Ice		
						No Ice	7.13	76.77
						1/2"	7.66	131.38
Sector Mount [SM 510-3]	B	None		0.0000	112.00	No Ice	40.10	2396.40
						1/2"	57.33	3089.00
						Ice	74.56	3781.60
						1" Ice	109.02	5166.80
						2" Ice	177.94	7937.20
						4" Ice		
						No Ice	19.73	825.00
Sector Mount [SM 701-3]	A	None		0.0000	103.00	1/2"	27.41	1165.99
						Ice	35.09	1506.98
						1" Ice	50.45	2188.96
						2" Ice	81.17	3552.92
						4" Ice		
						No Ice	6.83	112.18
						1/2"	7.35	169.02
ERICSSON AIR 21 B2A B4P w/ Mount Pipe	A	From Leg	1.50 0.00 0.00	0.0000	103.00	Ice	7.86	232.59
						1" Ice	8.93	383.07
						2" Ice	11.18	806.82
						4" Ice		
						No Ice	6.82	112.18
						1/2"	7.34	168.96
						Ice	7.85	232.45
ERICSSON AIR 21 B4A B2P w/ Mount Pipe	A	From Leg	1.50 0.00 0.00	0.0000	103.00	1" Ice	8.92	382.76
						2" Ice	11.17	806.09
						4" Ice		
						No Ice	6.82	112.18
						1/2"	7.34	168.96
						Ice	7.85	232.45
						1" Ice	8.92	382.76
KRY 112 144/1	A	From Leg	1.50 0.00 0.00	0.0000	103.00	2" Ice	11.17	806.09
						4" Ice		
						No Ice	0.41	11.00
						1/2"	0.50	14.18
						Ice	0.59	18.58
						1" Ice	0.81	31.87
						2" Ice	1.36	81.78

Description	Face or Leg	Offset Type	Offsets:		Azimuth Adjustment	Placement	C <sub>AA</sub> Front	C <sub>AA</sub> Side	Weight
			Horz	Lateral					
			ft	ft			ft <sup>2</sup>	ft <sup>2</sup>	lb
ERICSSON AIR 21 B2A B4P w/ Mount Pipe	B	From Leg	1.50	0.0000	103.00	No Ice	6.83	5.64	112.18
			0.00			1/2"	7.35	6.48	169.02
			0.00			Ice	7.86	7.26	232.59
						1" Ice	8.93	8.86	383.07
						2" Ice	11.18	12.29	806.82
ERICSSON AIR 21 B4A B2P w/ Mount Pipe	B	From Leg	1.50	0.0000	103.00	No Ice	6.82	5.63	112.18
			0.00			1/2"	7.34	6.47	168.96
			0.00			Ice	7.85	7.25	232.45
						1" Ice	8.92	8.85	382.76
						2" Ice	11.17	12.28	806.09
KRY 112 144/1	B	From Leg	1.50	0.0000	103.00	No Ice	0.41	0.20	11.00
			0.00			1/2"	0.50	0.27	14.18
			0.00			Ice	0.59	0.35	18.58
						1" Ice	0.81	0.53	31.87
						2" Ice	1.36	1.00	81.78
ERICSSON AIR 21 B2A B4P w/ Mount Pipe	C	From Leg	1.50	0.0000	103.00	No Ice	6.83	5.64	112.18
			0.00			1/2"	7.35	6.48	169.02
			0.00			Ice	7.86	7.26	232.59
						1" Ice	8.93	8.86	383.07
						2" Ice	11.18	12.29	806.82
ERICSSON AIR 21 B4A B2P w/ Mount Pipe	C	From Leg	1.50	0.0000	103.00	No Ice	6.82	5.63	112.18
			0.00			1/2"	7.34	6.47	168.96
			0.00			Ice	7.85	7.25	232.45
						1" Ice	8.92	8.85	382.76
						2" Ice	11.17	12.28	806.09
KRY 112 144/1	C	From Leg	1.50	0.0000	103.00	No Ice	0.41	0.20	11.00
			0.00			1/2"	0.50	0.27	14.18
			0.00			Ice	0.59	0.35	18.58
						1" Ice	0.81	0.53	31.87
						2" Ice	1.36	1.00	81.78
3'x2" Pipe Mount	A	From Leg	1.50	0.0000	95.00	No Ice	0.52	0.52	27.00
			0.00			1/2"	0.71	0.71	31.81
			0.00			Ice	0.90	0.90	38.81
						1" Ice	1.33	1.33	59.99
						2" Ice	2.44	2.44	135.33
WB2618	A	From Leg	3.00	0.0000	95.00	No Ice	2.04	0.53	12.10
			0.00			1/2"	2.24	0.65	23.53
			-1.00			Ice	2.44	0.78	37.28
						1" Ice	2.87	1.07	72.51
						2" Ice	3.82	1.75	179.32
10'x2" Pipe Mount	A	From Leg	3.00	0.0000	95.00 - 85.00	No Ice	2.00	2.00	70.00
			0.00			1/2"	3.02	3.02	85.50
			0.00			Ice	4.07	4.07	107.47
						1" Ice	5.70	5.70	171.40
						2" Ice	8.26	8.26	383.58
Side Arm Mount [SO 305-1]	A	From Leg	1.50	0.0000	85.00	No Ice	0.94	1.41	30.00
			0.00			1/2"	1.48	2.17	43.27
			0.00			Ice	2.02	2.93	56.54
						1" Ice	3.10	4.45	83.07
						2" Ice	5.26	7.49	136.14
ANT150D3	A	From Leg	3.00	0.0000	85.00	No Ice	1.60	1.60	18.00
			0.00			1/2"	2.88	2.88	23.40
			5.00			Ice	4.16	4.16	28.80
						1" Ice	6.72	6.72	39.60

Description	Face or Leg	Offset Type	Offsets: Horz Lateral Vert ft ft ft	Azimuth Adjustment °	Placement ft		C <sub>AA</sub> <sub>Front</sub> ft <sup>2</sup>	C <sub>AA</sub> <sub>Side</sub> ft <sup>2</sup>	Weight lb
						2" Ice	11.84	11.84	61.20
						4" Ice			
** Side Arm Mount [SO 302-1]	B	From Leg	2.00 0.00 0.00	0.0000	90.00	No Ice	1.67	3.27	55.00
						1/2"	2.51	4.99	88.07
						Ice	3.35	6.71	121.14
						1" Ice	5.03	10.15	187.28
						2" Ice	8.39	17.03	319.57
						4" Ice			
SRL-217 Ground Plane 10.67' x 4.83'	B	From Leg	4.00 0.00 6.00	0.0000	90.00	No Ice	2.21	2.21	6.50
						1/2"	3.30	3.30	23.49
						Ice	4.41	4.41	47.35
						1" Ice	6.27	6.27	116.33
						2" Ice	8.98	8.98	343.56
						4" Ice			
BW246Y	A	From Leg	1.50 0.00 0.00	0.0000	61.00	No Ice	1.35	0.39	7.00
						1/2"	2.73	0.88	24.00
						Ice	4.11	1.36	41.00
						1" Ice	6.88	2.32	75.00
						2" Ice	12.41	4.25	143.00
						4" Ice			
** Side Arm Mount [SO 305-1]	B	From Leg	1.50 0.00 0.00	0.0000	50.00	No Ice	0.94	1.41	30.00
						1/2"	1.48	2.17	43.27
						Ice	2.02	2.93	56.54
						1" Ice	3.10	4.45	83.07
						2" Ice	5.26	7.49	136.14
						4" Ice			
**									

### Dishes

Description	Face or Leg	Dish Type	Offset Type	Offsets: Horz Lateral Vert ft ft ft	Azimuth Adjustment °	3 dB Beam Width °	Elevation ft	Outside Diameter ft	Aperture Area ft <sup>2</sup>	Weight lb	
PL6-59W	A	Paraboloid w/Radome	From Leg	1.00 0.00 0.00	-90.0000		143.00	6.00	No Ice	28.27	143.00
									1/2" Ice	29.05	292.13
									1" Ice	29.83	441.25
									2" Ice	31.39	739.50
									4" Ice	34.51	1336.01

### 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

Comb. No.	Description
13	Dead+Wind 330 deg - No Ice
14	Dead+Ice
15	Dead+Wind 0 deg+Ice
16	Dead+Wind 30 deg+Ice
17	Dead+Wind 60 deg+Ice
18	Dead+Wind 90 deg+Ice
19	Dead+Wind 120 deg+Ice
20	Dead+Wind 150 deg+Ice
21	Dead+Wind 180 deg+Ice
22	Dead+Wind 210 deg+Ice
23	Dead+Wind 240 deg+Ice
24	Dead+Wind 270 deg+Ice
25	Dead+Wind 300 deg+Ice
26	Dead+Wind 330 deg+Ice
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 Reactions**

Location	Condition	Gov. Load Comb.	Vertical lb	Horizontal, X lb	Horizontal, Z lb
Leg C	Max. Vert	10	244395.53	26305.65	-16723.03
	Max. H <sub>x</sub>	10	244395.53	26305.65	-16723.03
	Max. H <sub>z</sub>	4	-209337.10	-22813.36	14612.02
	Min. Vert	4	-209337.10	-22813.36	14612.02
	Min. H <sub>x</sub>	4	-209337.10	-22813.36	14612.02
	Min. H <sub>z</sub>	10	244395.53	26305.65	-16723.03
Leg B	Max. Vert	6	248874.81	-26189.16	-17515.48
	Max. H <sub>x</sub>	12	-207204.10	22409.28	15072.24
	Max. H <sub>z</sub>	12	-207204.10	22409.28	15072.24
	Min. Vert	12	-207204.10	22409.28	15072.24
	Min. H <sub>x</sub>	6	248874.81	-26189.16	-17515.48
	Min. H <sub>z</sub>	6	248874.81	-26189.16	-17515.48
Leg A	Max. Vert	2	246327.57	650.69	31175.38
	Max. H <sub>x</sub>	11	16129.26	5718.32	1280.78
	Max. H <sub>z</sub>	2	246327.57	650.69	31175.38
	Min. Vert	8	-204855.78	-629.83	-26827.22
	Min. H <sub>x</sub>	5	14775.82	-5721.96	1175.97
	Min. H <sub>z</sub>	8	-204855.78	-629.83	-26827.22

**Maximum Tower Deflections - Service Wind**

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
T1	151.292 - 146.229	3.673	27	0.2065	0.0384
T2	146.229 - 141.167	3.459	27	0.2062	0.0384
T3	141.167 - 121.042	3.239	27	0.2044	0.0373
T4	121.042 -	2.397	31	0.1864	0.0297

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
T5	114.313 114.313 - 107.646	2.132	31	0.1774	0.0269
T6	107.646 - 100.917	1.885	31	0.1664	0.0239
T7	100.917 - 94.2014	1.658	31	0.1533	0.0223
T8	94.2014 - 87.4861	1.438	31	0.1428	0.0194
T9	87.4861 - 80.7708	1.236	31	0.1310	0.0164
T10	80.7708 - 70.6875	1.055	31	0.1179	0.0148
T11	70.6875 - 60.6041	0.807	31	0.1038	0.0125
T12	60.6041 - 50.5104	0.594	31	0.0885	0.0102
T13	50.5104 - 40.4166	0.413	31	0.0719	0.0083
T14	40.4166 - 30.3125	0.271	31	0.0545	0.0063
T15	30.3125 - 20.2083	0.159	31	0.0415	0.0047
T16	20.2083 - 10.1041	0.078	31	0.0282	0.0030
T17	10.1041 - 0	0.021	31	0.0142	0.0015

### Critical Deflections and Radius of Curvature - Service Wind

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
150.00	Side Arm Mount [SO 304-1]	27	3.619	0.2065	0.0384	40408
148.00	Sector Mount [SM 510-3]	27	3.535	0.2065	0.0385	40408
143.00	PL6-59W	27	3.319	0.2053	0.0378	144201
133.00	Sector Mount [SM 104-3]	27	2.888	0.1990	0.0346	66763
128.00	Side Arm Mount [SO 305-1]	27	2.679	0.1943	0.0326	68653
126.00	Side Arm Mount [SO 305-1]	27	2.597	0.1922	0.0318	69183
121.00	Sector Mount [SM 505-3]	31	2.395	0.1864	0.0297	63611
112.00	Sector Mount [SM 510-3]	31	2.044	0.1738	0.0258	27730
103.00	Sector Mount [SM 701-3]	31	1.727	0.1572	0.0228	54732
95.00	3'x2" Pipe Mount	31	1.464	0.1440	0.0198	34447
90.00	10'x2" Pipe Mount	31	1.309	0.1357	0.0174	23294
85.00	10'x2" Pipe Mount	31	1.167	0.1261	0.0157	28227
61.00	BW246Y	31	0.601	0.0891	0.0103	40394
50.00	Side Arm Mount [SO 305-1]	31	0.405	0.0710	0.0082	28842

### Maximum Tower Deflections - Design Wind

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
T1	151.292 - 146.229	12.209	6	0.6834	0.1276
T2	146.229 - 141.167	11.502	6	0.6827	0.1275
T3	141.167 - 121.042	10.770	6	0.6773	0.1240
T4	121.042 - 114.313	7.970	6	0.6190	0.0988
T5	114.313 -	7.089	6	0.5890	0.0894

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
T6	107.646 107.646 - 100.917	6.267	6	0.5526	0.0796
T7	100.917 - 94.2014	5.510	6	0.5093	0.0740
T8	94.2014 - 87.4861	4.779	6	0.4742	0.0645
T9	87.4861 - 80.7708	4.105	6	0.4353	0.0546
T10	80.7708 - 70.6875	3.505	6	0.3918	0.0491
T11	70.6875 - 60.6041	2.681	6	0.3449	0.0416
T12	60.6041 - 50.5104	1.971	6	0.2940	0.0338
T13	50.5104 - 40.4166	1.370	6	0.2388	0.0275
T14	40.4166 - 30.3125	0.899	6	0.1809	0.0210
T15	30.3125 - 20.2083	0.529	6	0.1379	0.0155
T16	20.2083 - 10.1041	0.257	6	0.0936	0.0099
T17	10.1041 - 0	0.069	6	0.0472	0.0049

**Critical Deflections and Radius of Curvature - Design Wind**

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
150.00	Side Arm Mount [SO 304-1]	6	12.030	0.6835	0.1277	12345
148.00	Sector Mount [SM 510-3]	6	11.752	0.6833	0.1278	12345
143.00	PL6-59W	6	11.036	0.6798	0.1257	44915
133.00	Sector Mount [SM 104-3]	6	9.606	0.6599	0.1149	20581
128.00	Side Arm Mount [SO 305-1]	6	8.912	0.6448	0.1083	20952
126.00	Side Arm Mount [SO 305-1]	6	8.638	0.6379	0.1055	21000
121.00	Sector Mount [SM 505-3]	6	7.965	0.6188	0.0987	19168
112.00	Sector Mount [SM 510-3]	6	6.796	0.5773	0.0857	8334
103.00	Sector Mount [SM 701-3]	6	5.740	0.5222	0.0758	16733
95.00	3'x2" Pipe Mount	6	4.864	0.4783	0.0658	10275
90.00	10'x2" Pipe Mount	6	4.349	0.4509	0.0579	7009
85.00	10'x2" Pipe Mount	6	3.876	0.4188	0.0522	8481
61.00	BW246Y	6	1.997	0.2961	0.0341	11977
50.00	Side Arm Mount [SO 305-1]	6	1.344	0.2358	0.0272	8778

**Bolt Design Data**

Section No.	Elevation ft	Component Type	Bolt Grade	Bolt Size in	Number Of Bolts	Maximum Load per Bolt lb	Allowable Load lb	Ratio Load Allowable	Allowable Ratio	Criteria
T1	151.292	Diagonal	A325N	0.5000	1	1082.37	3126.56	0.346 ✓	1.333	Member Block Shear
		Top Girt	A325N	0.5000	1	182.32	4123.34	0.044 ✓	1.333	Bolt Shear
T2	146.229	Leg	A325N	0.6250	4	1621.34	13268.50	0.122 ✓	1.333	Bolt Tension
		Diagonal	A325X	0.5000	1	3524.38	4757.81	0.741 ✓	1.333	Member Bearing
T3	141.167	Leg	A325N	0.6250	4	7222.63	13194.80	0.547 ✓	1.333	Bolt Tension
		Diagonal	A325N	0.5000	1	5001.78	4123.34	1.213 ✓	1.333	Bolt Shear
		Top Girt	A325N	0.5000	1	922.81	4078.13	0.226 ✓	1.333	Member



Section No.	Elevation ft	Component Type	Bolt Grade	Bolt Size in	Number Of Bolts	Maximum Load per Bolt lb	Allowable Load lb	Ratio Load Allowable	Allowable Ratio	Criteria
T4	121.042	Diagonal	A325N	0.5000	2	3238.56	4123.34	0.785 ✓	1.333	Bearing Bolt Shear
T5	114.313	Diagonal	A325N	0.5000	2	3360.25	4123.34	0.815 ✓	1.333	Bolt Shear
T6	107.646	Leg	A325N	0.7500	4	14470.70	18824.70	0.769 ✓	1.333	Bolt Tension
		Diagonal	A325N	0.5000	1	7730.83	8246.68	0.937 ✓	1.333	Bolt Shear
		Secondary Horizontal	A325N	0.6250	1	1225.12	4553.91	0.269 ✓	1.333	Member Block Shear
T7	100.917	Diagonal	A325N	0.5000	2	4109.73	4123.34	0.997 ✓	1.333	Bolt Shear
T8	94.2014	Diagonal	A325N	0.5000	2	4189.59	4123.34	1.016 ✓	1.333	Bolt Shear
		Secondary Horizontal	A325N	0.6250	1	1533.52	4553.91	0.337 ✓	1.333	Member Block Shear
T9	87.4861	Leg	A325N	0.8750	4	22729.30	25902.90	0.877 ✓	1.333	Bolt Tension
		Diagonal	A325N	0.5000	1	8966.10	8246.68	1.087 ✓	1.333	Bolt Shear
		Secondary Horizontal	A325N	0.6250	1	1864.15	4553.91	0.409 ✓	1.333	Member Block Shear
T10	80.7708	Diagonal	A325N	0.6250	1	10132.80	8609.38	1.177 ✓	1.333	Gusset Bearing
T11	70.6875	Leg	A325N	0.8750	4	28532.90	26457.90	1.078 ✓	1.333	Bolt Tension
		Diagonal	A325N	0.6250	1	10287.70	8609.38	1.195 ✓	1.333	Gusset Bearing
		Secondary Horizontal	A325N	0.6250	1	2321.56	5097.66	0.455 ✓	1.333	Member Bearing
T12	60.6041	Diagonal	A325N	0.6250	1	10761.80	8609.38	1.250 ✓	1.333	Gusset Bearing
		Secondary Horizontal	A325N	0.5000	1	2806.61	4123.34	0.681 ✓	1.333	Bolt Shear
T13	50.5104	Leg	A325N	1.0000	4	38285.40	33944.00	1.128 ✓	1.333	Bolt Tension
		Diagonal	A325N	0.6250	1	11524.40	12885.40	0.894 ✓	1.333	Bolt Shear
		Secondary Horizontal	A325N	0.5000	1	3113.61	4123.34	0.755 ✓	1.333	Bolt Shear
T14	40.4166	Diagonal	A325N	0.6250	1	11746.40	12885.40	0.912 ✓	1.333	Bolt Shear
T15	30.3125	Leg	A325N	1.0625	4	45589.60	38357.30	1.189 ✓	1.333	Bolt Tension
		Diagonal	A325N	0.6250	1	12664.30	12885.40	0.983 ✓	1.333	Bolt Shear
		Secondary Horizontal	A325N	0.6250	1	3727.55	5097.66	0.731 ✓	1.333	Member Bearing
T16	20.2083	Diagonal	A325N	0.6250	1	12541.00	12885.40	0.973 ✓	1.333	Bolt Shear
		Secondary Horizontal	A325N	0.6250	1	3868.05	5097.66	0.759 ✓	1.333	Member Bearing
T17	10.1041	Leg	A354-BC	1.0000	6	35093.80	32397.70	1.083 ✓	1.333	Bolt Tension
		Diagonal	A325N	0.6250	1	13863.80	12885.40	1.076 ✓	1.333	Bolt Shear
		Secondary Horizontal	A325N	0.6250	1	4339.57	6442.72	0.674 ✓	1.333	Bolt Shear

**Compression Checks**

**Leg Design Data (Compression)**

Section No.	Elevation ft	Size	L ft	L <sub>v</sub> ft	Kl/r	F <sub>a</sub> ksi	A in <sup>2</sup>	Actual P lb	Allow. P <sub>a</sub> lb	Ratio P P <sub>a</sub>
T1	151.292 - 146.229	ROHN 2.5 STD	5.06	4.94	62.5 K=1.00	22.279	1.7040	-3261.88	37965.40	0.086 ✓
T2	146.229 -	ROHN 2.5 STD	5.06	4.94	62.5	22.279	1.7040	-9518.99	37965.40	0.251

Section No.	Elevation ft	Size	L ft	$L_u$ ft	$Kl/r$	$F_a$ ksi	A in <sup>2</sup>	Actual P lb	Allow. $P_a$ lb	Ratio $\frac{P}{P_a}$
	141.167				K=1.00					
T3	141.167 - 121.042	ROHN 2.5 EH	20.16	6.68	86.7	17.636	2.2535	-34553.00	39742.70	0.869
					K=1.00					
T4	121.042 - 114.313	ROHN 2.5 EH (GR)	6.74	6.68	86.7	20.596	2.2535	-40387.80	46414.10	0.870
					K=1.00					
T5	114.313 - 107.646	ROHN 2.5 EH (GR)	6.68	6.68	86.7	20.595	2.2535	-52472.50	46412.40	1.131
					K=1.00					
T6	107.646 - 100.917	ROHN 2.5 EH (GR)	6.74	3.43	44.6	30.457	2.2535	-70641.90	68636.90	1.029
					K=1.00					
T7	100.917 - 94.2014	ROHN 3 EH (GR)	6.73	6.66	70.4	25.475	3.0159	-76340.10	76830.10	0.994
					K=1.00					
T8	94.2014 - 87.4861	ROHN 3 EH (GR)	6.73	3.45	36.4	32.873	3.0159	-88418.80	99141.40	0.892
					K=1.00					
T9	87.4861 - 80.7708	ROHN 3 EH (GR)	6.73	3.40	35.9	32.964	3.0159	-	99418.20	1.081
					K=1.00			107482.00		
T10	80.7708 - 70.6875	ROHN 4 EH (GR)	10.10	10.02	81.4	23.284	4.4074	-	102621.00	1.131
					K=1.00			116111.00		
T11	70.6875 - 60.6041	ROHN 4 EH (GR)	10.10	5.21	42.3	32.956	4.4074	-	145250.00	0.922
					K=1.00			133871.00		
T12	60.6041 - 50.5104	ROHN 4 EH (GR)	10.11	5.11	41.5	33.117	4.4074	-	145962.00	1.109
					K=1.00			161827.00		
T13	50.5104 - 40.4166	ROHN 4 EH (GR)	10.11	5.10	41.4	33.131	4.4074	-	146022.00	1.229
					K=1.00			179528.00		
T14	40.4166 - 30.3125	ROHN 5 EH (GR)	10.12	10.02	65.4	28.466	6.1120	-	173984.00	1.079
					K=1.00			187809.00		
T15	30.3125 - 20.2083	ROHN 5 EH (GR)	10.12	5.13	33.5	35.792	6.1120	-	218759.00	0.983
					K=1.00			214944.00		
T16	20.2083 - 10.1041	ROHN 5 EH (GR)	10.12	5.12	33.4	35.800	6.1120	-	218809.00	1.019
					K=1.00			223049.00		
T17	10.1041 - 0	ROHN 5 EH (GR)	10.12	5.12	33.4	35.807	6.1120	-	218848.00	1.143
					K=1.00			250239.00		

\* DL controls

### Diagonal Design Data (Compression)

Section No.	Elevation ft	Size	L ft	$L_u$ ft	$Kl/r$	$F_a$ ksi	A in <sup>2</sup>	Actual P lb	Allow. $P_a$ lb	Ratio $\frac{P}{P_a}$
T1	151.292 - 146.229	L 1.5 x 1.5 x 3/16	9.24	4.62	189.1	4.178	0.5273	-1022.92	2203.16	0.464
					K=1.00					
T2	146.229 - 141.167	L 2 x 2 x 3/16	9.24	4.62	140.8	7.537	0.7150	-3716.68	5388.61	0.690
					K=1.00					
T3	141.167 - 121.042	L2 1/2x2 1/2x3/16	11.56	5.97	144.7	7.134	0.9020	-5001.78	6434.70	0.777
					K=1.00					
T4	121.042 - 114.313	L2 1/2x2 1/2x3/16	12.14	6.26	151.7	6.489	0.9020	-6477.12	5853.04	1.107
					K=1.00					
T5	114.313 - 107.646	L2 1/2x2 1/2x3/16	12.73	6.55	158.8	5.923	0.9020	-6720.50	5342.79	1.258
					K=1.00					
T6	107.646 - 100.917	2L 2.5 x 2.5 x 3/16 (3/16)	13.32	6.84	111.3	11.501	1.8047	-7730.83	20756.50	0.372
					K=1.00					
T7	100.917 - 94.2014	2L 'a' > 39.1618 in - 69 L3x3x3/16	13.81	7.09	142.7	7.334	1.0900	-8174.15	7994.03	1.023
					K=1.00					
T8	94.2014 - 87.4861	L3x3x3/16	14.46	7.41	149.3	6.704	1.0900	-8379.17	7306.96	1.147
					K=1.00					
T9	87.4861 - 0	2L 3 x 3 x 3/16 (1/4)	15.05	7.71	104.1	12.257	2.1797	-8966.10	26717.20	0.336

Section No.	Elevation ft	Size	L ft	$L_u$ ft	$Kl/r$	$F_a$ ksi	A $in^2$	Actual P lb	Allow. $P_a$ lb	Ratio $\frac{P}{P_a}$
	80.7708				K=1.00					✓
T10	80.7708 - 70.6875	2L 'a' > 44.0220 in - 102 2L3x3x3/16x1/4	17.36	8.97	121.1 K=1.00	10.071	2.1797	-10158.00	21950.70	0.463
T11	70.6875 - 60.6041	2L 'a' > 51.2231 in - 114 2L3x3x3/16x1/4	18.25	9.41	127.0 K=1.00	9.252	2.1797	-10718.40	20167.10	0.531
T12	60.6041 - 50.5104	2L 'a' > 53.7356 in - 123 2L3x3x1/4x1/4	19.03	9.80	132.3 K=1.00	8.527	2.8750	-10928.90	24513.80	0.446
T13	50.5104 - 40.4166	2L 'a' > 56.1325 in - 135 2L3x3x1/4x1/4	19.93	10.24	138.4 K=1.00	7.795	2.8750	-11524.40	22411.50	0.514
T14	40.4166 - 30.3125	2L 'a' > 58.7062 in - 147 2L3 1/2x3 1/2x1/4x1/4	20.81	10.67	124.1 K=1.00	9.698	3.3750	-11746.40	32730.50	0.359
T15	30.3125 - 20.2083	2L 'a' > 61.0427 in - 159 2L3 1/2x3 1/2x1/4x1/4	21.69	11.11	129.2 K=1.00	8.942	3.3750	-12664.30	30180.90	0.420
T16	20.2083 - 10.1041	2L 'a' > 63.5688 in - 168 2L 4 x 4 x 1/4 (1/4)	22.61	11.57	118.0 K=1.00	10.719	3.8750	-12541.00	41534.90	0.302
T17	10.1041 - 0	2L 'a' > 66.0834 in - 180 2L 4 x 4 x 1/4 (1/4)	23.51	12.01	122.6 K=1.00	9.934	3.8750	-13863.80	38493.00	0.360
		2L 'a' > 68.6449 in - 192								✓

### 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 lb	Allow. $P_a$ lb	Ratio $\frac{P}{P_a}$
T6	107.646 - 100.917	L 2 x 2 x 3/16	12.25	12.01	182.9 K=0.50	4.463	0.7150	-1225.12	3191.02	0.384
T8	94.2014 - 87.4861	L 2 x 2 x 3/16	13.64	13.35	203.3 K=0.50	3.613	0.7150	-1533.52	2583.20	0.594
T9	87.4861 - 80.7708	L 2 x 2 x 3/16	14.34	14.04	213.9 K=0.50	3.265	0.7150	-1864.15	2334.13	0.799
T11	70.6875 - 60.6041	L2 1/2x2 1/2x3/16	16.18	15.81	191.6 K=0.50	4.068	0.9020	-2321.56	3668.94	0.633
T12	60.6041 - 50.5104	L3x3x1/4	17.20	16.82	170.5 K=0.50	5.135	1.4400	-2806.61	7395.08	0.380
T13	50.5104 - 40.4166	L3x3x1/4	18.24	17.86	181.0 K=0.50	4.556	1.4400	-3113.61	6561.12	0.475
T15	30.3125 - 20.2083	L 3 x 3 x 3/16	20.26	19.80	199.2 K=0.50	3.763	1.0898	-3727.55	4101.40	0.909
T16	20.2083 - 10.1041	L3x3x3/16	21.27	20.81	209.5 K=0.50	3.402	1.0900	-3868.05	3708.23	1.043
T17	10.1041 - 0	L 3.5 x 3.5 x 1/4	22.27	21.80	188.5 K=0.50	4.203	1.6900	-4339.57	7103.60	0.611

### 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 lb	Allow. $P_a$ lb	Ratio $\frac{P}{P_a}$
T1	151.292 - 146.229	L2 1/2x2 1/2x3/16	8.56	8.32	201.8 K=1.00	3.668	0.9020	-182.32	3308.68	0.055 ✓
T3	141.167 - 121.042	KL/R > 200 (C) - 6 L2 1/2x2 1/2x3/16 KL/R > 200 (C) - 25	8.57	8.33	201.9 K=1.00	3.663	0.9020	-790.74	3303.75	0.239 ✓

### 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 lb	Allow. $P_a$ lb	Ratio $\frac{P}{P_a}$
T1	151.292 - 146.229	ROHN 2.5 STD	5.06	4.94	62.5	30.000	1.7040	789.29	51121.50	0.015 ✓
T2	146.229 - 141.167	ROHN 2.5 STD	5.06	4.94	62.5	30.000	1.7040	6485.36	51121.50	0.127 ✓
T3	141.167 - 121.042	ROHN 2.5 EH	20.16	6.68	86.7	30.000	2.2535	28890.50	67606.20	0.427 ✓
T4	121.042 - 114.313	ROHN 2.5 EH (GR)	6.74	6.68	86.7	30.000	2.2535	32554.10	67606.20	0.482 ✓
T5	114.313 - 107.646	ROHN 2.5 EH (GR)	6.68	6.68	86.7	30.000	2.2535	43060.00	67606.20	0.637 ✓
T6	107.646 - 100.917	ROHN 2.5 EH (GR)	6.74	3.43	44.6	30.000	2.2535	57882.90	67606.20	0.856 ✓
T7	100.917 - 94.2014	ROHN 3 EH (GR)	6.73	6.66	70.4	30.000	3.0159	62925.70	90477.90	0.695 ✓
T8	94.2014 - 87.4861	ROHN 3 EH (GR)	6.73	3.45	36.4	30.000	3.0159	73951.00	90477.90	0.817 ✓
T9	87.4861 - 80.7708	ROHN 3 EH (GR)	6.73	3.40	35.9	30.000	3.0159	90917.30	90477.90	1.005 ✓
T10	80.7708 - 70.6875	ROHN 4 EH (GR)	10.10	10.02	81.4	30.000	4.4074	98413.00	132223.00	0.744 ✓
T11	70.6875 - 60.6041	ROHN 4 EH (GR)	10.10	5.21	42.3	30.000	4.4074	114273.00	132223.00	0.864 ✓
T12	60.6041 - 50.5104	ROHN 4 EH (GR)	10.11	5.11	41.5	30.000	4.4074	138211.00	132223.00	1.045 ✓
T13	50.5104 - 40.4166	ROHN 4 EH (GR)	10.11	5.10	41.4	30.000	4.4074	153142.00	132223.00	1.158 ✓
T14	40.4166 - 30.3125	ROHN 5 EH (GR)	10.12	10.02	65.4	30.000	6.1120	159991.00	183359.00	0.873 ✓
T15	30.3125 - 20.2083	ROHN 5 EH (GR)	10.12	5.13	33.5	30.000	6.1120	182358.00	183359.00	0.995 ✓
T16	20.2083 - 10.1041	ROHN 5 EH (GR)	10.12	5.12	33.4	30.000	6.1120	188813.00	183359.00	1.030 ✓
T17	10.1041 - 0	ROHN 5 EH (GR)	10.12	5.12	33.4	30.000	6.1120	210563.00	183359.00	1.148 ✓

### Diagonal Design Data (Tension)

Section No.	Elevation ft	Size	L ft	$L_u$ ft	$Kl/r$	$F_a$ ksi	A $in^2$	Actual P lb	Allow. $P_a$ lb	Ratio $\frac{P}{P_a}$
T1	151.292 - 146.229	L 1.5 x 1.5 x 3/16	9.24	4.62	121.4	29.000	0.3076	1082.37	8920.90	0.121 ✓
T2	146.229 - 141.167	L 2 x 2 x 3/16	9.24	4.62	89.9	29.000	0.4484	3524.38	13002.40	0.271 ✓
T3	141.167 - 121.042	L2 1/2x2 1/2x3/16	11.56	5.97	92.1	29.000	0.5886	4783.96	17069.70	0.280 ✓
T4	121.042 - 114.313	L2 1/2x2 1/2x3/16	12.14	6.26	96.5	29.000	0.5886	6243.18	17069.70	0.366 ✓
T5	114.313 - 107.646	L2 1/2x2 1/2x3/16	12.73	6.55	101.0	29.000	0.5886	6623.16	17069.70	0.388 ✓
T6	107.646 - 100.917	2L 2.5 x 2.5 x 3/16 (3/16)	13.32	6.84	105.5	29.000	1.1777	7300.12	34154.30	0.214 ✓
T7	100.917 - 94.2014	2L 'a' > 39.1618 in - 70 L3x3x3/16	13.81	7.09	90.6	29.000	0.7296	8219.46	21158.70	0.388 ✓
T8	94.2014 - 87.4861	L3x3x3/16	14.46	7.41	94.7	29.000	0.7296	8180.46	21158.70	0.387 ✓
T9	87.4861 - 80.7708	2L 3 x 3 x 3/16 (1/4)	15.05	7.71	98.4	29.000	1.4590	8852.10	42310.50	0.209 ✓
T10	80.7708 - 70.6875	2L 'a' > 44.0220 in - 103 2L3x3x3/16x1/4	17.36	8.97	114.5	29.000	1.4238	10132.80	41291.00	0.245 ✓
T11	70.6875 - 60.6041	2L 'a' > 51.2231 in - 115 2L3x3x3/16x1/4	18.25	9.41	120.2	29.000	1.4238	10287.70	41291.00	0.249 ✓
T12	60.6041 - 50.5104	2L 'a' > 53.7356 in - 124 2L3x3x1/4x1/4	19.03	9.80	126.3	32.500	1.8750	10761.80	60937.50	0.177 ✓
T13	50.5104 - 40.4166	2L 'a' > 56.1325 in - 136 2L3x3x1/4x1/4	19.93	10.24	132.1	32.500	1.8750	11179.50	60937.50	0.183 ✓
T14	40.4166 - 30.3125	2L 'a' > 58.7062 in - 148 2L3 1/2x3 1/2x1/4x1/4	20.81	10.67	117.3	32.500	2.2500	11636.60	73125.00	0.159 ✓
T15	30.3125 - 20.2083	2L 'a' > 61.0427 in - 160 2L3 1/2x3 1/2x1/4x1/4	21.69	11.11	122.2	32.500	2.2500	11930.40	73125.00	0.163 ✓
T16	20.2083 - 10.1041	2L 'a' > 63.5688 in - 169 2L 4 x 4 x 1/4 (1/4)	22.61	11.57	110.8	32.500	2.6250	12494.70	85312.50	0.146 ✓
T17	10.1041 - 0	2L 'a' > 66.0834 in - 181 2L 4 x 4 x 1/4 (1/4)	23.51	12.01	115.1	32.500	2.6250	12698.20	85312.50	0.149 ✓
		2L 'a' > 68.6449 in - 193								✓

### 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 lb	Allow. $P_a$ lb	Ratio $\frac{P}{P_a}$
T6	107.646 - 100.917	L 2 x 2 x 3/16	12.25	12.01	233.6	29.000	0.4308	1225.12	12492.70	0.098 ✓
T8	94.2014 - 87.4861	L 2 x 2 x 3/16	13.64	13.35	259.7	29.000	0.4308	1533.52	12492.70	0.123 ✓
T9	87.4861 - 80.7708	L 2 x 2 x 3/16	14.34	14.04	273.2	29.000	0.4308	1864.15	12492.70	0.149 ✓
T11	70.6875 - 60.6041	L2 1/2x2 1/2x3/16	16.18	15.81	243.8	29.000	0.5710	2321.56	16559.90	0.140 ✓

Section No.	Elevation ft	Size	L ft	L <sub>v</sub> ft	Kl/r	F <sub>a</sub> ksi	A in <sup>2</sup>	Actual P lb	Allow. P <sub>a</sub> lb	Ratio $\frac{P}{P_a}$
T12	60.6041 - 50.5104	L3x3x1/4	17.20	16.82	217.1	29.000	0.9628	2806.61	27921.60	0.101 ✓
T13	50.5104 - 40.4166	L3x3x1/4	18.24	17.86	230.5	29.000	0.9628	3113.61	27921.60	0.112 ✓
T15	30.3125 - 20.2083	L 3 x 3 x 3/16	20.26	19.80	252.9	29.000	0.7119	3727.55	20645.50	0.181 ✓
T16	20.2083 - 10.1041	L3x3x3/16	21.27	20.81	266.0	29.000	0.7120	3868.05	20648.90	0.187 ✓
T17	10.1041 - 0	L 3.5 x 3.5 x 1/4	22.27	21.80	239.9	29.000	1.1269	4339.57	32679.40	0.133 ✓

### Top Girt Design Data (Tension)

Section No.	Elevation ft	Size	L ft	L <sub>v</sub> ft	Kl/r	F <sub>a</sub> ksi	A in <sup>2</sup>	Actual P lb	Allow. P <sub>a</sub> lb	Ratio $\frac{P}{P_a}$
T1	151.292 - 146.229	L2 1/2x2 1/2x3/16	8.56	8.32	128.4	29.000	0.5886	134.65	17069.70	0.008 ✓
T3	141.167 - 121.042	L2 1/2x2 1/2x3/16	8.57	8.33	128.5	29.000	0.5886	922.81	17069.70	0.054 ✓

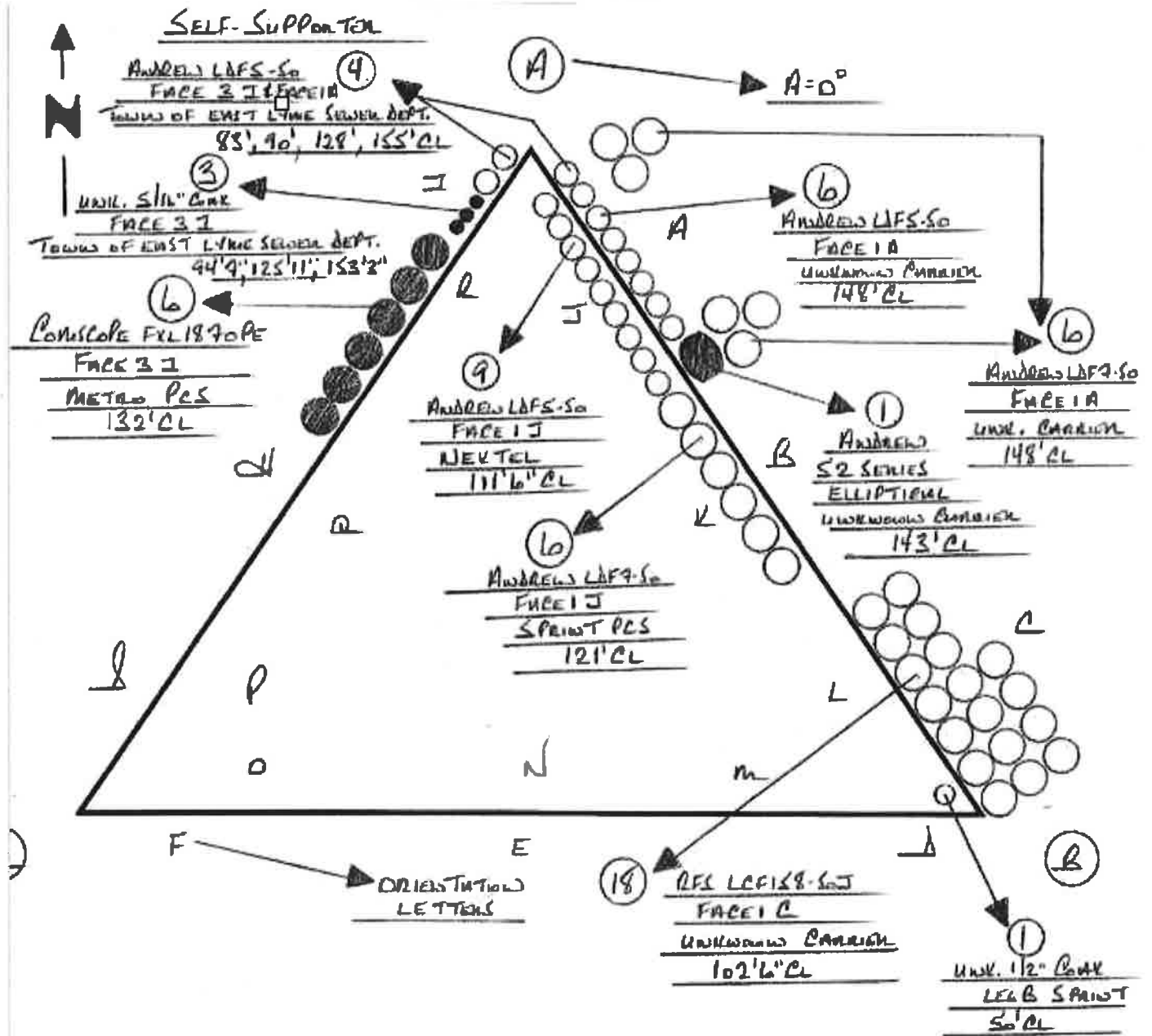
### Section Capacity Table

Section No.	Elevation ft	Component Type	Size	Critical Element	P lb	SF*P <sub>allow</sub> lb	% Capacity	Pass Fail
T1	151.292 - 146.229	Leg	ROHN 2.5 STD	2	-2835.69	37965.40	18.9	Pass
T2	146.229 - 141.167	Leg	ROHN 2.5 STD	14	-9310.30	50607.87	22.5	Pass
T3	141.167 - 121.042	Leg	ROHN 2.5 EH	23	-34553.00	52977.02	65.2	Pass
T4	121.042 - 114.313	Leg	ROHN 2.5 EH (GR)	47	-40387.80	61869.99	65.3	Pass
T5	114.313 - 107.646	Leg	ROHN 2.5 EH (GR)	56	-52472.50	61867.72	84.8	Pass
T6	107.646 - 100.917	Leg	ROHN 2.5 EH (GR)	65	-70641.90	91492.98	77.2	Pass
T7	100.917 - 94.2014	Leg	ROHN 3 EH (GR)	77	-76340.10	102414.52	74.5	Pass
T8	94.2014 - 87.4861	Leg	ROHN 3 EH (GR)	86	-88418.80	132155.48	66.9	Pass
T9	87.4861 - 80.7708	Leg	ROHN 3 EH (GR)	98	-107482.00	132524.46	81.1	Pass
T10	80.7708 - 70.6875	Leg	ROHN 4 EH (GR)	110	-116111.00	136793.79	84.9	Pass
T11	70.6875 - 60.6041	Leg	ROHN 4 EH (GR)	119	-133871.00	193618.24	69.1	Pass
T12	60.6041 - 50.5104	Leg	ROHN 4 EH (GR)	131	-161827.00	194567.34	80.9 (b) 83.2	Pass
T13	50.5104 - 40.4166	Leg	ROHN 4 EH (GR)	143	-179528.00	194647.32	92.2	Pass
T14	40.4166 - 30.3125	Leg	ROHN 5 EH (GR)	155	-187809.00	231920.66	81.0	Pass
T15	30.3125 - 20.2083	Leg	ROHN 5 EH (GR)	163	182358.00	244417.54	74.6	Pass
T16	20.2083 - 10.1041	Leg	ROHN 5 EH (GR)	175	188813.00	244417.54	77.2	Pass
T17	10.1041 - 0	Leg	ROHN 5 EH (GR)	187	210563.00	244417.54	86.1	Pass
T1	151.292 -	Diagonal	L 1.5 x 1.5 x 3/16	9	-1022.92	2936.81	34.8	Pass

Section No.	Elevation ft	Component Type	Size	Critical Element	P lb	SF*P <sub>allow</sub> lb	% Capacity	Pass Fail
T2	146.229 - 141.167	Diagonal	L 2 x 2 x 3/16	18	-3716.68	7183.02	51.7	Pass
T3	141.167 - 121.042	Diagonal	L2 1/2x2 1/2x3/16	30	-5001.78	8577.46	55.6 (b) 58.3 91.0 (b)	Pass
T4	121.042 - 114.313	Diagonal	L2 1/2x2 1/2x3/16	51	-6477.12	7802.10	83.0	Pass
T5	114.313 - 107.646	Diagonal	L2 1/2x2 1/2x3/16	60	-6720.50	7121.94	94.4	Pass
T6	107.646 - 100.917	Diagonal	2L 2.5 x 2.5 x 3/16 (3/16)	69	-7730.83	27668.41	27.9 70.3 (b)	Pass
T7	100.917 - 94.2014	Diagonal	L3x3x3/16	81	-8174.15	10656.04	76.7	Pass
T8	94.2014 - 87.4861	Diagonal	L3x3x3/16	90	-8379.17	9740.18	86.0	Pass
T9	87.4861 - 80.7708	Diagonal	2L 3 x 3 x 3/16 (1/4)	102	-8966.10	35614.03	25.2 81.6 (b)	Pass
T10	80.7708 - 70.6875	Diagonal	2L3x3x3/16x1/4	114	-10158.00	29260.28	34.7 88.3 (b)	Pass
T11	70.6875 - 60.6041	Diagonal	2L3x3x3/16x1/4	123	-10718.40	26882.74	39.9 89.6 (b)	Pass
T12	60.6041 - 50.5104	Diagonal	2L3x3x1/4x1/4	135	-10928.90	32676.90	33.4 93.8 (b)	Pass
T13	50.5104 - 40.4166	Diagonal	2L3x3x1/4x1/4	147	-11524.40	29874.53	38.6 67.1 (b)	Pass
T14	40.4166 - 30.3125	Diagonal	2L3 1/2x3 1/2x1/4x1/4	159	-11746.40	43629.75	26.9 68.4 (b)	Pass
T15	30.3125 - 20.2083	Diagonal	2L3 1/2x3 1/2x1/4x1/4	168	-12664.30	40231.14	31.5 73.7 (b)	Pass
T16	20.2083 - 10.1041	Diagonal	2L 4 x 4 x 1/4 (1/4)	180	-12541.00	55366.02	22.7 73.0 (b)	Pass
T17	10.1041 - 0	Diagonal	2L 4 x 4 x 1/4 (1/4)	192	-13863.80	51311.17	27.0 80.7 (b)	Pass
T6	107.646 - 100.917	Secondary Horizontal	L 2 x 2 x 3/16	73	-1225.12	4253.63	28.8	Pass
T8	94.2014 - 87.4861	Secondary Horizontal	L 2 x 2 x 3/16	94	-1533.52	3443.41	44.5	Pass
T9	87.4861 - 80.7708	Secondary Horizontal	L 2 x 2 x 3/16	107	-1864.15	3111.40	59.9	Pass
T11	70.6875 - 60.6041	Secondary Horizontal	L2 1/2x2 1/2x3/16	128	-2321.56	4890.70	47.5	Pass
T12	60.6041 - 50.5104	Secondary Horizontal	L3x3x1/4	140	-2806.61	9857.64	28.5 51.1 (b)	Pass
T13	50.5104 - 40.4166	Secondary Horizontal	L3x3x1/4	151	-3113.61	8745.97	35.6 56.6 (b)	Pass
T15	30.3125 - 20.2083	Secondary Horizontal	L 3 x 3 x 3/16	172	-3727.55	5467.17	68.2	Pass
T16	20.2083 - 10.1041	Secondary Horizontal	L3x3x3/16	184	-3868.05	4943.07	78.3	Pass
T17	10.1041 - 0	Secondary Horizontal	L 3.5 x 3.5 x 1/4	196	-4339.57	9469.10	45.8 50.5 (b)	Pass
T1	151.292 - 146.229	Top Girt	L2 1/2x2 1/2x3/16	6	-182.32	4410.47	4.1	Pass
T3	141.167 - 121.042	Top Girt	L2 1/2x2 1/2x3/16	25	-790.74	4403.90	18.0	Pass
							Summary	
						Leg (T13)	92.2	Pass
						Diagonal (T5)	94.4	Pass
						Secondary Horizontal (T16)	78.3	Pass
						Top Girt (T3)	18.0	Pass
						Bolt Checks	93.8	Pass
						<b>RATING =</b>	<b>94.4</b>	<b>Pass</b>

APPENDIX B

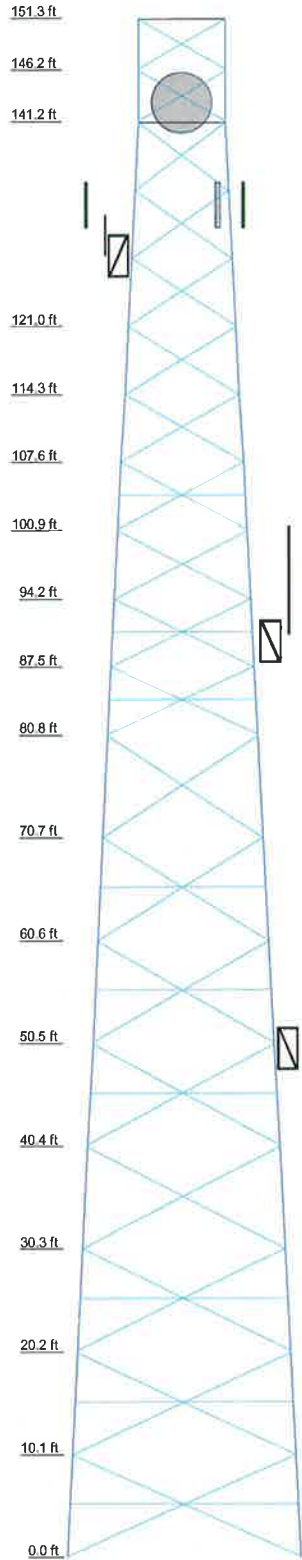
BASE LEVEL DRAWING





**APPENDIX C**  
**ADDITIONAL CALCULATIONS**

Section	T17	T16	T15	T14	T13	T12	T11	T10	T9	T8	T7	T6	T5	T4	T3	T2	T1
Legs																	ROHN 2.5 STD
Leg Grade																	
Diagonals																	
Diagonal Grade																	
Top Girts																	
Sec. Horizontals																	
Face Width (ft)	22.7813	21.7613	20.7413	19.7213	18.7013	17.6813	16.6613	15.6413	14.6213	13.6013	12.5813	11.5613	10.5413	9.5213	8.5013	7.4813	8.5625
# Panels @ (ft)	1 @ 9.99997	2 @ 9.99997	3 @ 10	3 @ 10	2 @ 9.90625	1 @ 10.0833	1 @ 10	1 @ 10	1 @ 10.0833	14	13.302	12.6041	11.9236	11.243	10.5625	6 @ 6.66667	2 @ 4.9375
Weight (lb)	26549.4	5462.7	3324.1	2854.8	2201.8	1792.1	1403.8	1005.5	703.2	401.5	891.5	497.7	482.2	1168.5	229.9	273.3	



**DESIGNED APPURTENANCE LOADING**

TYPE	ELEVATION	TYPE	ELEVATION
Side Arm Mount [SO 304-1]	150	1900MHz RRH (65MHz)	121
WB2618	150	800MHz 2X50W RRH W/FILTER	121
ANT150F2	150	APXVSP18-C-A20 w/ Mount Pipe	121
Sector Mount [SM 510-3]	148	TD-RRH8x20-25	121
(2) LNX-6514DS-AIM w/ Mount Pipe	148	APXVTM14-C-120 w/ Mount Pipe	121
(2) LNX-6514DS-AIM w/ Mount Pipe	148	TD-RRH8x20-25	121
(2) LNX-6514DS-AIM w/ Mount Pipe	148	APXVTM14-C-120 w/ Mount Pipe	121
(2) HBXX-6517DS-A2M w/ Mount Pipe	148	TD-RRH8x20-25	121
(2) HBXX-6517DS-A2M w/ Mount Pipe	148	APXVTM14-C-120 w/ Mount Pipe	121
(2) HBXX-6517DS-A2M w/ Mount Pipe	148	Sector Mount [SM 505-3]	121
RRH 2X40 700 MHz UPPER	148	Sector Mount [SM 510-3]	112
RRH 2X40 700 MHz UPPER	148	ERICSSON AIR 21 B2A B4P w/ Mount Pipe	103
RRH 2X40 700 MHz UPPER	148	ERICSSON AIR 21 B4A B2P w/ Mount Pipe	103
RRH2X60-AWS	148	KRY 112 144/1	103
RRH2X60-AWS	148	ERICSSON AIR 21 B2A B4P w/ Mount Pipe	103
RRH2X60-PCS	148	ERICSSON AIR 21 B4A B2P w/ Mount Pipe	103
RRH2X60-PCS	148	KRY 112 144/1	103
(2) DB-T1-6Z-8AB-0Z	148	ERICSSON AIR 21 B2A B4P w/ Mount Pipe	103
Pipe Mount [PM 601-1]	143	ERICSSON AIR 21 B4A B2P w/ Mount Pipe	103
PL6-59W	143	ERICSSON AIR 21 B4A B2P w/ Mount Pipe	103
800 10504 w/ Mount Pipe	133	KRY 112 144/1	103
800 10504 w/ Mount Pipe	133	Sector Mount [SM 701-3]	103
800 10504 w/ Mount Pipe	133	WB2618	95
Sector Mount [SM 104-3]	133	10'x2" Pipe Mount	95 - 85
TA-2450	128	3'x2" Pipe Mount	95
Side Arm Mount [SO 305-1]	128	Side Arm Mount [SO 302-1]	90
WB2618	126	SRL-217 Ground Plane 10.67' x 4.83'	90
Side Arm Mount [SO 305-1]	126	ANT150D3	85
1900MHz RRH (65MHz)	121	Side Arm Mount [SO 305-1]	85
800MHz 2X50W RRH W/FILTER	121	BW246Y	61
APXVSP18-C-A20 w/ Mount Pipe	121	Side Arm Mount [SO 305-1]	50
1900MHz RRH (65MHz)	121		
800MHz 2X50W RRH W/FILTER	121		
APXV9ERR18-C-A20 w/ Mount Pipe	121		

**SYMBOL LIST**

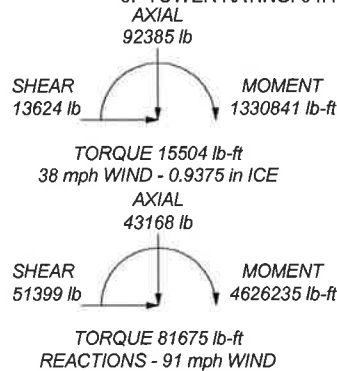
MARK	SIZE	MARK	SIZE
A	L 1.5 x 1.5 x 3/16	D	2L 3 x 3 x 3/16 (1/4)
B	L 2 x 2 x 3/16	E	L 2 1/2x2 1/2x3/16
C	2L 2.5 x 2.5 x 3/16 (3/16)		

**MATERIAL STRENGTH**

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

**TOWER DESIGN NOTES**

1. Tower is located in New London County, Connecticut.
2. Tower is designed for a 91 mph basic wind in accordance with the TIA/EIA-222-F Standard.
3. Tower is also designed for a 38 mph basic wind with 0.94 in ice. Ice is considered to increase in thickness with height.
4. Deflections are based upon a 50 mph wind.
5. Grouted pipe Fc is 7 ksi.
6. TOWER RATING: 94.4%



<b>Paul J Ford and Company</b>		Job: <b>Modified 152-ft S/S Tower; East Lyme, CT</b>	
250 E. Broad St Suite 600 Columbus, OH 43215		Project: <b>BU #806384 (PJF #37513-1269)</b>	
Phone: 614-221-6679	FAX: 614-448-4105	Client: Crown Castle	Drawn by: chedges
		Code: TIA/EIA-222-F	Date: 08/07/14
		Path:	Scale: NTS
			Dwg No. E-1

**Foundation Loads:**

Tower leg compression = **248.88** (kips)  
 Tower leg tension = **209.34** (kips)  
 Horizontal load at top of pier = **0** (kips)  
 Overturning moment at top of pier = **0** (ft-kips)

**Design criteria:**

Safety factor against overturning = **1.5**  
 Uplift safety factor: conc. weight = **1.25**  
 Uplift safety factor for soil weight = **2**

**Soil Properties:**

Soil density = **125** (pcf)  
 Allowable soil bearing = **6** (ksf)  
 Soil cone of uplift = **31** (degrees)  
 Uplift cone from top or bottom of ftg = **B** ("T" or "B")  
 Depth to water table = **99** (ft)

**Dimensions:**

Pier shape (round or square) = **R** ("R" or "S")  
 Pier width = **3** (ft)  
 Pier height above grade = **0.5** (ft)  
 depth to bottom of footing = **12** (ft)  
 Footing thickness = **2** (ft)  
 Footing width = **8.25** (ft)  
 Footing length = **8.25** (ft)

**Concrete:**

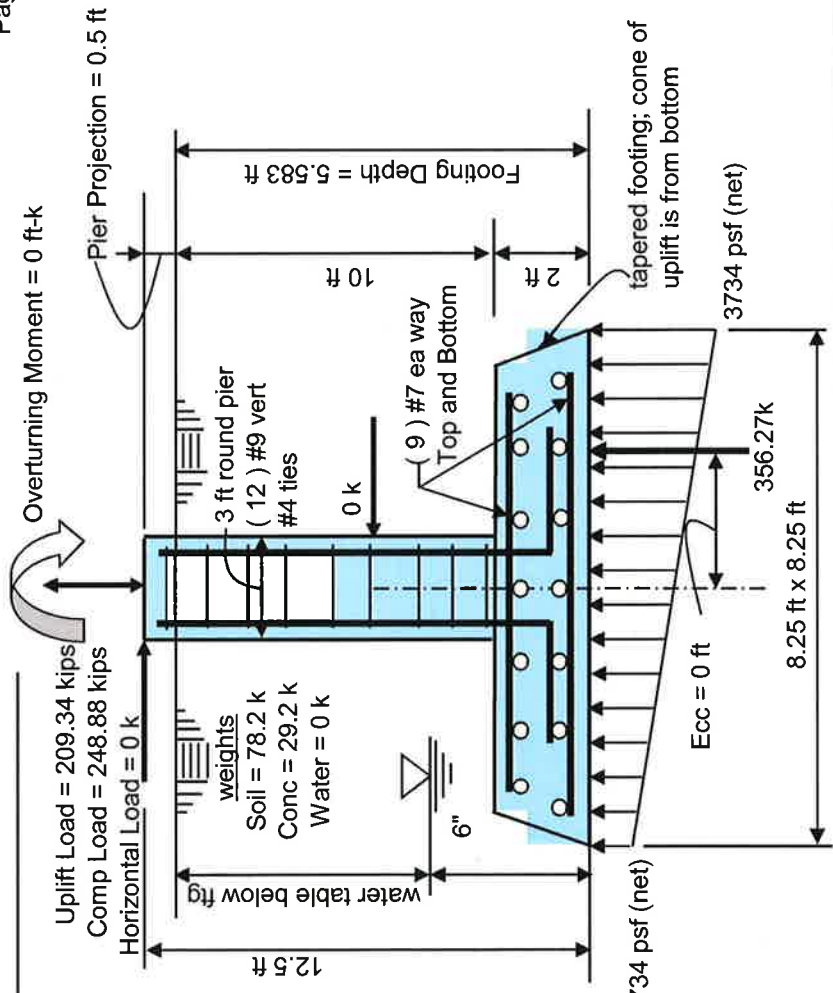
Concrete strength = **3** (ksi)  
 Rebar strength = **60** (ksi)  
 ultimate load factor = **1.3**

**Reinforcing Steel:**

minimum cover over rebar = **3** inches  
 size of pad rebar = **#7** bar  
 quantity of pad rebar = **9** (ea direction)  
 size of vert rebar in pier = **#9** bar  
 vertical rebar quantity = **12**  
 size of pier ties = **#4** bar  
 minimum cover over rebar = **3** inches

Total volume of concrete = **7.2** cu yd each

( Total volume of concrete = 21.6 cu yd for 3 )



Summary of analysis results	
Maximum Net Soil Bearing = 3.734 ksf	Ult Punching Shear Capacity = 641 kips
Allowable Net Soil Bearing = 6 ksf	Ult Punching Shear Force = 127 kips
<b>Soil Bearing Stress Ratio = 0.62 Okay</b>	<b>Punching Shear Stress Ratio = 0.2 OK</b>
Net Ftg Uplift Resistance = 213.8 kips	Ult Bending Shear Capacity = 110 psi
Uplift Force = 209.337 kips	Ult Bending Shear Stress = 43 psi
Net Uplift Safety Factor = 1.89	<b>Bending Shear Stress Ratio = 0.39 Okay</b>
<b>Ratio to Required Safety factor = 0.98 OK</b>	Pad Bending Moment Capacity = 463 ft-k
Ftg Overturning Resistance = 1470 ft-kips	Pad Bending Moment = 136 ft-k
Overturning Moment = 0 ft-kips	<b>Bending Moment Stress Ratio = 0.29 OK</b>
Required Overturning Safety Factor = 1.5	Allow Tension in Pier Rebar = 41.54 ksi
Overturning Safety Factor = 999	Calc Vert Rebar Tension = 17.44 ksi
<b>Ratio = 0 Okay</b>	<b>Ratio = 0.42 Okay</b>