Robinson+Cole

KENNETH C. BALDWIN

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

Also admitted in Massachusetts

October 8, 2015

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

Re: **Notice of Exempt Modification – Facility Modification**
61 Lowell Davis Road, Thompson, Connecticut

Dear Ms. Bachman:

On August 4, 2014, the Council acknowledged the Cellco Partnership d/b/a Verizon Wireless ("Cellco") notice of intent to modify its facility at 61 Lowell Davis Road in Thompson, Connecticut (EM-VER-141-140714). To date, the work described in that filing has not been completed. Cellco has since revised the scope of its planned modifications to the 61 Lowell Davis Road facility and submits this modified notice for your review.

Cellco currently maintains nine (9) antennas at the 243-foot level of the existing 250-foot tower at 61 Lowell Davis Road in Thompson, Connecticut (the "Property"). The tower is owned by Central States Tower II, LLC. The Council approved Cellco's use of this tower in 1991. Cellco now intends to replace three (3) of its existing antennas with three (3) model SBNHH-1D65B, 1900 MHz antennas and add three (3) model SBNHH-1D65B, 700/2100 MHz antennas, for a total of twelve (12) antennas, all at the same 243-foot level on the tower. Cellco also intends to install nine (9) remote radio heads ("RRHs") and two (2) HYBRIFLEX™ fiber optic antenna cables. Included in Attachment 1 are specifications for Cellco's replacement 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 A. Lenky, First Selectman for the Town of Thompson. A copy of this letter is also being sent to NUMA Tool Company, the owner of the Property and Central States Towers II, LLC, the tower owner.

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

1. The proposed modifications will not result in an increase in the height of the existing tower. Cellco's replacement antennas and RRH's will be located on its existing pipe mounts at the 243-foot level on the 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 A. Lenky, Thompson First Selectman
NUMA Tool Company
Central States Towers II, LLC
Tim Parks

ATTACHMENT 1

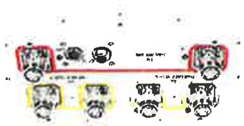
Product Specifications

COMMSCOPE®

POWERED BY ANDREW.

SBNHH-1D65B

Andrew® Tri-band Antenna, 698–896 and 2x 1695–2360 MHz, 65° horizontal beamwidth, internal RET. Both high bands share the same electrical tilt.



- Interleaved dipole technology providing for attractive, low wind load mechanical package

Electrical Specifications

Frequency Band, MHz	698–806	806–896	1695–1880	1850–1990	1920–2200	2300–2360
Gain, dBi	14.9	14.7	17.7	18.2	18.6	18.6
Beamwidth, Horizontal, degrees	68	66	69	66	63	58
Beamwidth, Vertical, degrees	12.1	10.7	5.6	5.2	5.0	4.5
Beam Tilt, degrees	0–14	0–14	0–7	0–7	0–7	0–7
USLS, dB	14	13	15	15	15	13
Front-to-Back Ratio at 180°, dB	27	29	28	28	28	27
CPR at Boresight, dB	20	23	20	20	17	21
CPR at Sector, dB	14	10	12	10	9	1
Isolation, dB	25	25	25	25	25	25
Isolation, Intersystem, dB	30	30	30	30	30	30
VSWR | Return Loss, dB	1.5 | 14.0	1.5 | 14.0	1.5 | 14.0	1.5 | 14.0	1.5 | 14.0	1.5 | 14.0
PIM, 3rd Order, 2 x 20 W, dBc	-153	-153	-153	-153	-153	-153
Input Power per Port, maximum, watts	350	350	350	350	350	300
Polarization	±45°	±45°	±45°	±45°	±45°	±45°
Impedance	50 ohm	50 ohm	50 ohm	50 ohm	50 ohm	50 ohm

Electrical Specifications, BASTA*

Frequency Band, MHz	698–806	806–896	1695–1880	1850–1990	1920–2200	2300–2360
Gain by all Beam Tilts, average, dBi	14.5	14.3	17.4	17.9	18.2	18.3
Gain by all Beam Tilts Tolerance, dB	±0.5	±0.8	±0.4	±0.3	±0.5	±0.3
	0 ° | 14.6	0 ° | 14.5	0 ° | 17.4	0 ° | 17.8	0 ° | 18.1	0 ° | 18.2
Gain by Beam Tilt, average, dBi	7 ° | 14.6	7 ° | 14.4	3 ° | 17.5	3 ° | 17.9	3 ° | 18.3	3 ° | 18.4
	14 ° | 14.2	14 ° | 13.6	7 ° | 17.4	7 ° | 17.9	7 ° | 18.2	7 ° | 18.4
Beamwidth, Horizontal Tolerance, degrees	±2.2	±3.4	±2	±4.6	±5.7	±4.3
Beamwidth, Vertical Tolerance, degrees	±0.8	±1	±0.3	±0.2	±0.3	±0.2
USLS, dB	16	14	16	16	16	15
Front-to-Back Total Power at 180° ± 30°, dB	25	26	27	26	26	26
CPR at Boresight, dB	22	23	21	20	20	22
CPR at Sector, dB	13	11	16	12	11	4

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

General Specifications

Antenna Brand	Andrew®
Antenna Type	DualPol® multiband with internal RET
Band	Multiband
Brand	DualPol® | Teletilt®
Operating Frequency Band	1695 – 2360 MHz | 698 – 896 MHz
Performance Note	Outdoor usage

Product Specifications

COMMSCOPE®

POWERED BY ANDREW.

SBNHH-1D65B

Mechanical Specifications

Color	Light gray
Lightning Protection	dc Ground
Radiator Material	Aluminum | Low loss circuit board
Radome Material	Fiberglass, UV resistant
Reflector Material	Aluminum
RF Connector Interface	7-16 DIN Female
RF Connector Location	Bottom
RF Connector Quantity, total	6
Wind Loading, maximum	617.7 N @ 150 km/h 138.9 lbf @ 150 km/h
Wind Speed, maximum	241.4 km/h | 150.0 mph

Dimensions

Depth	181.0 mm | 7.1 in
Length	1851.0 mm | 72.9 in
Width	301.0 mm | 11.9 in
Net Weight	18.4 kg | 40.6 lb

Remote Electrical Tilt (RET) Information

Input Voltage	10–30 Vdc
Power Consumption, idle state, maximum	2.0 W
Power Consumption, normal conditions, maximum	13.0 W
Protocol	3GPP/AISG 2.0 (Multi-RET)
RET Interface	8-pin DIN Female | 8-pin DIN Male
RET Interface, quantity	1 female | 1 male
RET System	Teletilt®

Packed Dimensions

Depth	299.0 mm | 11.8 in
Length	1970.0 mm | 77.6 in
Width	409.0 mm | 16.1 in
Shipping Weight	31.0 kg | 68.3 lb

Regulatory Compliance/Certifications

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

Included Products

BSAMNT-1 — Wide Profile Antenna Downtilt Mounting Kit for 2.4 - 4.5 in (60 - 115 mm) OD round members. Kit contains one scissor top bracket set and one bottom bracket set.

* Footnotes

Performance Note	Severe environmental conditions may degrade optimum performance

ALCATEL-LUCENT B13 RRH4X30-4R

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

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

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

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

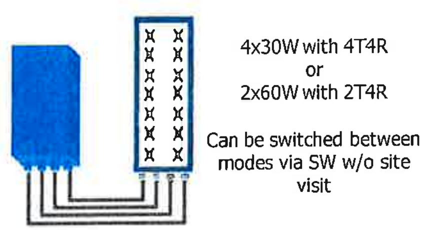
Its compactness and slim design makes the Alcatel-Lucent B13 RRH4x30-4R easy to install close to the antenna: operators can therefore locate this Remote Radio Head where RF design conditions are deemed ideal, minimizing trade-offs between available sites and RF optimum sites, together with reducing the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

FEATURES

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

BENEFITS

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



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

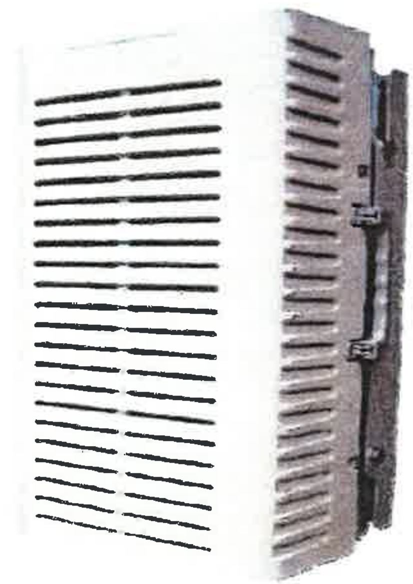
Alcatel·Lucent

PCS RF MODULES

RRH1900 2X60 - HW CHARACTERISTICS

LA6.0.1/13.3

	RRH2x60
RF Output Power	2x60W
Instantaneous Bandwidth	20MHz
Transmitter	2 TX
Receiver 1900 HW version 1900A HW version	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)

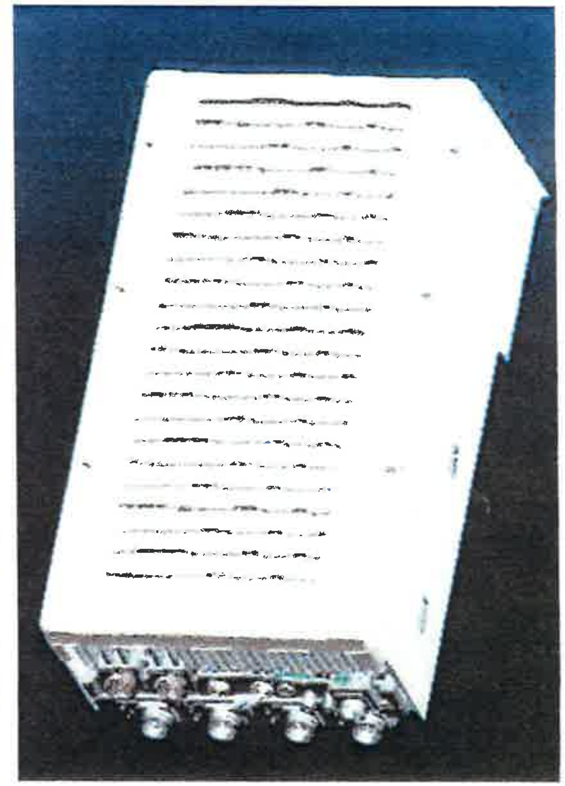


** Not a Verizon Wireless deployed product

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**

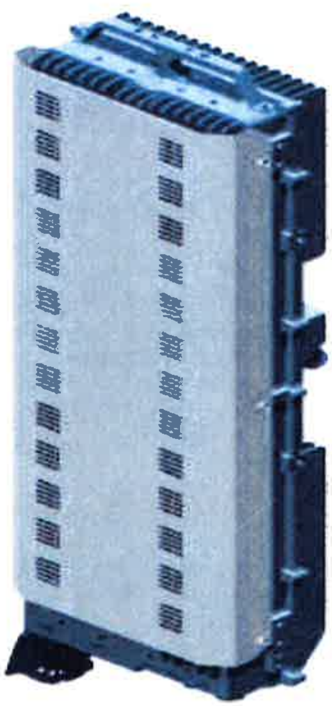


**- Includes solar shield but not mounting brackets (8 lbs.)

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.

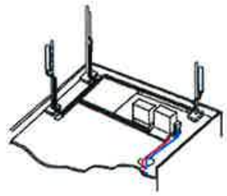
EASY INSTALLATION

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.

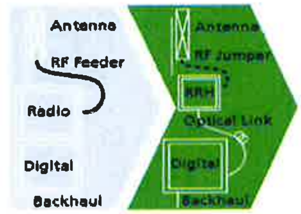
The limited space available in some sites may prevent the installation of traditional single-cabinet BTS equipment. However, many of these sites can host an Alcatel-Lucent RRH2x60-AWS installation, providing more flexible site selection and improved network quality along with greatly reduced installation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

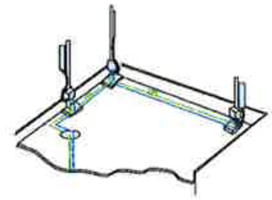
Installation can easily be done by a single person as the Alcatel–Lucent RRH2x60-AWS is compact and weighs about 20 kg, eliminating the need for a crane to hoist the BTS cabinet to the rooftop. A site can be in operation in less than one day.



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

Environmental specifications

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

Safety and Regulatory Data

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

Product Data Sheet HB158-1-08U8-S8J18

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.

Figure 1: HYBRIFLEX Series

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

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)]	.068 (0.205)
DC-Resistance Power Cable, 8.4mm² (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-LS Limited Smoke, UL VW-1 IEEE-383 (1974), IEEE1202/FT4 RoHS Compliant
Installation Temperature		[°C (°F)]	-40 to +65 (-40 to149)
Operation Temperature		[°C (°F)]	-40 to +65 (-40 to149)

* This data is provisional and subject to change

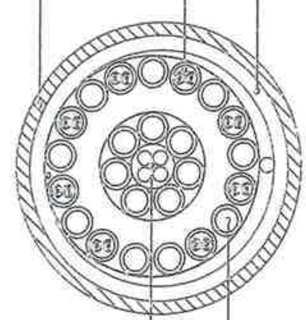


Figure 2: Construction Detail

ATTACHMENT 2

	General	Power	Density					
Site Name: Thompson								
Tower Height: 250'								
CARRIER	**# OF CHAN.**	**WATTS ERP**	**HEIGHT**	**CALC. POWER DENS**	**FREQ.**	**MAX. PERMISS. EXP.**	**FRACTION MPE**	**Total**
*AT&T UMTS	2	565	205	0.0103	880	0.5867	0.17%	
*AT&T UMTS	2	875	205	0.0159	1900	1.0000	0.16%	
*AT&T GSM	1	283	205	0.0026	880	0.5867	0.04%	
*AT&T GSM	4	525	205	0.0191	1900	1.0000	0.19%	
*AT&T LTE	1	1771	205	0.0161	734	0.4893	0.33%	
*MetroPCS	3	444	215	0.0110	2140	1.0000	0.11%	
*CONN-2 (Metro Mobile)	1	5130	235	0.0352	875	0.5833	0.60%	
*Nextel	9	100	190	0.0096	851	0.5673	0.17%	
*Paging	1	500	188	0.0054	928	0.6187	0.09%	
*EMS/Town	3	500	172	0.0196	450	0.3000	0.65%	
*Town	1	500	160	0.0076	66	0.2000	0.38%	
Verizon	**11**	**338**	**243**	**0.0226**	**1970**	**1.0000**	**2.26%**	
Verizon	**9**	**357**	**243**	**0.0196**	**869**	**0.5793**	**3.38%**	
Verizon	**1**	**2302**	**243**	**0.0140**	**2145**	**1.0000**	**1.40%**	
Verizon	**1**	**723**	**243**	**0.0044**	**698**	**0.4973**	**0.89%**	
								10.8%
* Source: Siting Council								

ATTACHMENT 3

GPD Engineering and Architecture Professional Corporation

STRUCTURAL ANALYSIS REPORT

250′ Guyed Tower

61 Lowell Davis Road,
Thompson, CT 06277

Central States Tower Site Name: Thompson
Central States Tower Number: CT-00-3701

Verizon Wireless Collocation

GPD Project Number: 2015705.87

Analysis Results

Tower Components	88.0%	Sufficient
Foundation	96.1%	Sufficient

September 23, 2015

Respectfully submitted by:

STATE OF CONNECTICUT CHRISTOPHER J. SCHEKS No. 300[illegible] LICENSED PROFESSIONAL ENGINEER

9/23/15
Christopher J. Scheks, P.E.
Connecticut #: 0030026

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Executive Summary

The purpose of this analysis is to verify whether the existing guyed tower is structurally capable of carrying the proposed antenna and coax loads identified by Verizon Wireless to Central States Tower. This report was commissioned by Yuri Dobrowolsky of Central States Tower.

The existing structure and its foundations have been analyzed per the following requirements:

Governing Code/s	TIA -222-G, ASCE7-10, & 2012 IBC
Wind Speed*	98 MPH Nominal 3-Second Gust Wind Speed
Wind Speed w/ Ice	50 MPH Nominal 3-Second Gust Wind Speed
Radial Ice Thickness	3/4"
Risk Category	II
Exposure Category	B
Topographic Category	1

*Wind Speed in nominal form is equivalent to a 127 MPH Ultimate 3-Second Gust.

Conclusions & Recommendations

The designs of the tower and foundations are sufficient for the proposed loading in accordance with the above loading criteria and will not require modification.

Tower Description

The existing 250' Guyed Tower is located in Thompson, CT. The original design loading was not provided. All loading and structural information was taken from the documents shown in the following table:

Documents Provided:

Document Type	Remarks	Source
Tower Mapping Report	GPD Job #: 2012816.10 Dated: 10/19/2012	GPD
Foundation NDT Mapping Report	GPD Job #: 2012816.10 Dated: 11/16/2012	GPD
Geotechnical Report	GPD Job #: 2012816.10 Dated: 11/16/2012	GPD
Previous Structural Analysis	GPD Project #: 2014702.19 Dated: 04/18/2014	GPD
Proposed Loading	Central States Tower Email Correspondence Dated: 08/26/2015	CST

Tower Materials: (Assumed)

Structural Components	Material Strength
Legs	ASTM 572 (50 KSI Yield Strength)
Bracing	ASTM A36 (36 KSI Yield Strength)
Bolts	A325
Guy Wires	EHS Strands

Tower Loading

The following data shows the major loading that the tower supports. All loading information was provided by Central States Tower, or taken from the previous structural analysis.

Existing/Leased Loading

Carrier	Mounting Level (ft)	Center Line Elevation (ft)	# of Antennas	Antenna Manufacture	Antenna/Mount Model	# of Coax	Coax Size (in)	Note
Verizon Wireless	243	243	3	Antel	BXA 70063/6CF	12	1-5/8	
			3	Antel	BXA 80063/6CF			
			3	Antel	BXA 171063/12CF			
			6	RFS	FD9R6004/2C-3L			
			3		Sector Mount			
AT&T	205	205	3	KMW	AM-X-CD-17-65-00T	12 1 1	1-5/8 7/8 Power 1/2 Fiber	1
			6	Powerwave	7770.0			
			6	Powerwave	LGP 21401 TMA			
			6	Powerwave	LGP 21901 TMA			
			6	Ericsson	RRUS-11			
			1	Raycap	DC6-48-60-18-8F Surge Protection			
			3		Sector Mount			
Unknown	200	205	1	Unknown	120" x 3" Omni	1	1-5/8	
			1		Standoff Mount			

Notes:

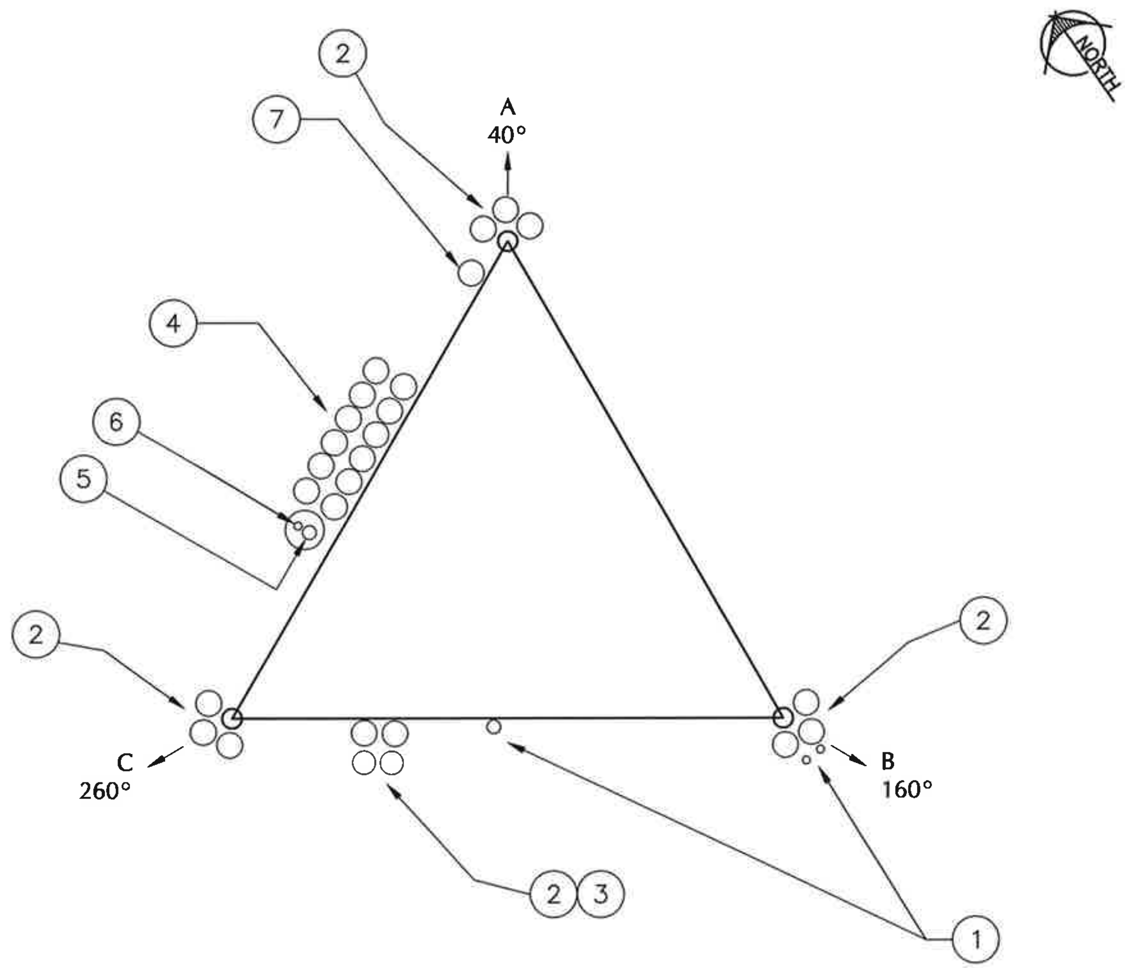
1) The 7/8" Power and 1/2" Fiber cables run inside one 3" flex conduit.

Final Loading Configuration

Carrier	Mounting Level (ft)	Center Line Elevation (ft)	# of Antennas	Antenna Manufacture	Antenna/Mount Model	# of Coax	Coax Size (in)	Note
Verizon Wireless	243	243	6	Commscope	SBNHH-1D65B	11 2	1-5/8 1-5/8 Hybrid	1
			3	Antel	BXA-70063-6CF			
			3	Antel	BXA-80063-6BF			
			6	RFS	FD9R6004/2C-3L TMA			
			3	Alcatel-Lucent	RHH-2X60-AWS			
			3	Alcatel-Lucent	RRH-2x60-LTE			
			3	Alcatel-Lucent	RRH-2x60-PCS			
			2	RFS	DB-T1-6Z-8AB-OZ Fiber Distribution Box			
			3		Sector Mount			
AT&T	205	205	3	KMW	AM-X-CD-17-65-00T	12 1 1	1-5/8 7/8 Power 1/2 Fiber	2
			6	Powerwave	7770.0			
			6	Powerwave	LGP 21401 TMA			
			6	Powerwave	LGP 21901 TMA			
			6	Ericsson	RRUS-11			
			1	Raycap	DC6-48-60-18-8F Surge Protection			
			3		Sector Mount			
Unknown	200	205	1	Unknown	120" x 3" Omni	1	1-5/8	
			1		Standoff Mount			

Notes:

1) This represents the final loading configuration for Verizon Wireless. See the next page for the proposed coax layout.
2) The 7/8" Power and 1/2" Fiber cables run inside one 3" flex conduit.



#	CARRIER	SIZE	QTY.	ELEVATION	NOTES
1	Tower Lighting	1/2" & 1"	2 & 1	124' & 250'	(1) 1/2" to 124'
2	Verizon	1-5/8"	11	243'	
3	Verizon	1-5/8"	2	243'	Proposed Hybrid
4	AT&T	1-5/8"	12	205'	
5	AT&T	7/8"	1	205'	DC Power within Flex Conduit
6	AT&T	1/2"	1	205'	Fiber within Flex Conduit
7	Unkown	1-5/8"	1	200'	

Assumptions

This structural analysis is based on the theoretical capacity of the members and is not a condition assessment of the tower. This analysis is from information supplied, and therefore, its results are based on and are as accurate as that supplied data. GPD has made no independent determination, nor is it required to, of its accuracy. The following assumptions were made for this structural analysis.

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 the Existing/Reserved Loading and Proposed Loading Tables, and the specified documents.
4) All mounts, if applicable, are considered adequate to support the loading. No actual analysis of the mount(s) is performed. This analysis is limited to analyzing the tower only.
5) Mount sizes, weights, and manufacturers are best estimates based on photos provided and determined without the benefit of a site visit by GPD.
6) The existing coax layout has been modeled based on the previous structural analysis.
7) The proposed coax shall be installed as illustrated in this report.
8) Tower leg azimuths have been taken from the previous structural analysis.
9) Structural material grades were assumed based on prior experience with similar guyed towers.
10) All member connections and foundation steel reinforcing are assumed designed to meet or exceed the load carrying capacity of the connected member and surrounding soils respectively unless otherwise specified in this report.

If any of these assumptions are not valid or have been made in error, this analysis may be affected, and GPD should be allowed to review any new information to determine its effect on the structural integrity of the tower.

Tower Section Results

Capacity Summary of Structural Components

Section No.	Elevation ft	Component Type	Size	Critical Element	P K	øP_{allow} K	% Capacity	Pass/ Fail
T1	250 - 240	Leg	P2.5 STD	1	-6.4	67.6	11.5	Pass
T2	240 - 220	Leg	P2.5 STD	37	-39.5	67.5	58.6	Pass
T3	220 - 200	Leg	P2.5 STD	103	-44.3	67.5	65.7	Pass
T4	200 - 180	Leg	P2.5 STD	169	-40.8	67.5	60.5	Pass
T5	180 - 160	Leg	P2.5 STD	236	-36.2	67.5	53.7	Pass
T6	160 - 140	Leg	P2.5 STD	302	-36.5	67.5	54.2	Pass
T7	140 - 120	Leg	P2.5 STD	367	-46.0	67.5	68.2	Pass
T8	120 - 100	Leg	P2.5 STD	433	-46.0	67.5	68.2	Pass
T9	100 - 80	Leg	P2.5 STD	499	-50.3	67.5	74.6	Pass
T10	80 - 60	Leg	P2.5 STD	565	-52.4	67.5	77.7	Pass
T11	60 - 40	Leg	P2.5 STD	631	-58.7	67.5	87.0	Pass
T12	40 - 20	Leg	P2.5 STD	697	-59.4	67.5	88.0	Pass
T13	20 - 6.75	Leg	P2.5 STD	763	-59.4	67.6	87.8	Pass
T14	6.75 - 0	Leg	P2.5 STD	809	-58.8	72.0	81.7	Pass
T1	250 - 240	Diagonal	1 1/4	13	-1.9	26.9	6.9	Pass
T2	240 - 220	Diagonal	3/4	96	-3.7	6.9	54.6	Pass
T3	220 - 200	Diagonal	3/4	115	-3.3	6.9	48.9	Pass
T4	200 - 180	Diagonal	3/4	190	-3.8	6.9	54.8	Pass
T5	180 - 160	Diagonal	3/4	295	-3.0	6.9	44.3	Pass
T6	160 - 140	Diagonal	3/4	311	-3.2	6.9	46.2	Pass
T7	140 - 120	Diagonal	3/4	379	-3.9	6.9	56.9	Pass
T8	120 - 100	Diagonal	3/4	496	-4.0	6.9	57.7	Pass
T9	100 - 80	Diagonal	3/4	559	-3.1	6.9	45.8	Pass
T10	80 - 60	Diagonal	3/4	575	-2.9	6.9	42.4	Pass
T11	60 - 40	Diagonal	3/4	691	-3.5	6.9	51.2	Pass
T12	40 - 20	Diagonal	3/4	707	-3.1	6.9	44.9	Pass
T13	20 - 6.75	Diagonal	3/4	772	-3.8	6.9	54.9	Pass
T14	6.75 - 0	Diagonal	3/4	822	-6.6	8.4	79.6	Pass
T1	250 - 240	Horizontal	1 1/4	17	-0.9	26.2	3.5	Pass
T2	240 - 220	Horizontal	5/8	94	-1.4	3.1	43.4	Pass
T3	220 - 200	Horizontal	5/8	130	-1.0	3.1	30.9	Pass
T4	200 - 180	Horizontal	5/8	225	2.8	9.9	28.4	Pass
T5	180 - 160	Horizontal	5/8	251	3.2	9.9	32.1	Pass
T6	160 - 140	Horizontal	5/8	357	3.2	9.9	32.3	Pass
T7	140 - 120	Horizontal	5/8	383	3.3	9.9	33.3	Pass
T8	120 - 100	Horizontal	5/8	449	3.4	9.9	33.9	Pass
T9	100 - 80	Horizontal	5/8	515	3.4	9.9	34.1	Pass
T10	80 - 60	Horizontal	5/8	581	3.4	9.9	34.5	Pass
T11	60 - 40	Horizontal	5/8	687	4.0	9.9	39.8	Pass
T12	40 - 20	Horizontal	5/8	723	3.5	9.9	35.3	Pass
T13	20 - 6.75	Horizontal	5/8	779	4.1	9.9	40.7	Pass
T14	6.75 - 0	Horizontal	2 x 1/4	812	6.2	16.2	38.5	Pass
T1	250 - 240	Secondary Horizontal	5/8	26	0.0	9.9	0.4	Pass
T2	240 - 220	Secondary Horizontal	5/8	102	0.0	9.9	0.4	Pass
T3	220 - 200	Secondary Horizontal	5/8	168	0.0	9.9	0.3	Pass
T4	200 - 180	Secondary Horizontal	5/8	224	0.0	9.9	0.2	Pass
T5	180 - 160	Secondary Horizontal	5/8	250	0.0	9.9	0.5	Pass
T6	160 - 140	Secondary Horizontal	5/8	316	0.0	9.9	0.5	Pass
T7	140 - 120	Secondary Horizontal	5/8	382	0.0	9.9	0.6	Pass
T8	120 - 100	Secondary Horizontal	5/8	498	0.0	9.9	0.8	Pass
T9	100 - 80	Secondary Horizontal	5/8	514	0.0	9.9	0.9	Pass
T10	80 - 60	Secondary Horizontal	5/8	630	0.0	9.9	0.9	Pass

Section No.	Elevation ft	Component Type	Size	Critical Element	P K	$øP_{allow}$ K	% Capacity	Pass/ Fail
T11	60 - 40	Secondary Horizontal	5/8	696	0.0	9.9	1.4	Pass
T12	40 - 20	Secondary Horizontal	5/8	712	0.0	9.9	1.1	Pass
T13	20 - 6.75	Secondary Horizontal	5/8	778	0.0	9.9	1.3	Pass
T1	250 - 240	Top Girt	L2x1 1/2x3/16	4	-0.0	10.5	0.3	Pass
T2	240 - 220	Top Girt	L2x1 1/2x3/16	40	-2.1	10.5	20.1	Pass
T3	220 - 200	Top Girt	L2x1 1/2x3/16	106	1.3	20.1	6.7	Pass
T4	200 - 180	Top Girt	L2x1 1/2x3/16	172	1.6	20.1	8.1	Pass
T5	180 - 160	Top Girt	L2x1 1/2x3/16	238	3.0	20.1	14.8	Pass
T6	160 - 140	Top Girt	L2x1 1/2x3/16	304	1.7	20.1	8.5	Pass
T7	140 - 120	Top Girt	L2x1 1/2x3/16	370	1.7	20.1	8.5	Pass
T8	120 - 100	Top Girt	L2x1 1/2x3/16	436	2.9	20.1	14.4	Pass
T9	100 - 80	Top Girt	L2x1 1/2x3/16	502	1.8	20.1	8.7	Pass
T10	80 - 60	Top Girt	L2x1 1/2x3/16	568	1.8	20.1	8.7	Pass
T11	60 - 40	Top Girt	L2x1 1/2x3/16	634	2.9	20.1	14.3	Pass
T12	40 - 20	Top Girt	L2x1 1/2x3/16	700	1.8	20.1	8.9	Pass
T13	20 - 6.75	Top Girt	L2x1 1/2x3/16	766	1.8	20.1	9.1	Pass
T2	240 - 220	Bottom Girt	L2x1 1/2x3/16	44	1.4	20.1	6.9	Pass
T3	220 - 200	Bottom Girt	L2x1 1/2x3/16	109	1.6	20.1	7.8	Pass
T5	180 - 160	Bottom Girt	L2x1 1/2x3/16	241	1.7	20.1	8.5	Pass
T6	160 - 140	Bottom Girt	L2x1 1/2x3/16	307	1.7	20.1	8.4	Pass
T8	120 - 100	Bottom Girt	L2x1 1/2x3/16	439	1.8	20.1	8.7	Pass
T9	100 - 80	Bottom Girt	L2x1 1/2x3/16	505	1.8	20.1	8.8	Pass
T11	60 - 40	Bottom Girt	L2x1 1/2x3/16	637	1.8	20.1	8.9	Pass
T12	40 - 20	Bottom Girt	L2x1 1/2x3/16	703	1.8	20.1	9.0	Pass
T13	20 - 6.75	Bottom Girt	2 x 1/4	769	5.9	16.2	36.7	Pass
T1	250 - 240	Guy A@240.083	9/16	846	11.2	21.0	53.6	Pass
T4	200 - 180	Guy A@180.083	9/16	853	15.8	21.0	75.4	Pass
T7	140 - 120	Guy A@120.083	1/2	856	12.7	16.1	78.4	Pass
T10	80 - 60	Guy A@60.0833	3/8	859	6.4	9.2	69.7	Pass
T1	250 - 240	Guy B@240.083	9/16	839	11.2	21.0	53.2	Pass
T4	200 - 180	Guy B@180.083	9/16	852	15.8	21.0	75.0	Pass
T7	140 - 120	Guy B@120.083	1/2	855	12.6	16.1	78.4	Pass
T10	80 - 60	Guy B@60.0833	3/8	858	6.4	9.2	69.6	Pass
T1	250 - 240	Guy C@240.083	9/16	833	11.3	21.0	53.8	Pass
T4	200 - 180	Guy C@180.083	9/16	851	15.9	21.0	75.7	Pass
T7	140 - 120	Guy C@120.083	1/2	854	12.7	16.1	78.8	Pass
T10	80 - 60	Guy C@60.0833	3/8	857	6.5	9.2	70.0	Pass
T1	250 - 240	Top Guy Pull-Off@240.083	L2x1 1/2x3/16	8	5.2	20.1	25.6	Pass
T4	200 - 180	Top Guy Pull-Off@180.083	L2x1 1/2x3/16	176	4.3	20.1	21.2	Pass
T7	140 - 120	Top Guy Pull-Off@120.083	L2x1 1/2x3/16	373	4.1	20.1	20.3	Pass
T10	80 - 60	Top Guy Pull-Off@60.0833	L2x1 1/2x3/16	571	3.4	20.1	17.0	Pass
T1	250 - 240	Torque Arm Top@240.083	L2x2x1/4	836	13.3	30.4	43.9	Pass
T1	250 - 240	Torque Arm Bottom@240.0 83	L2x2x1/4	838	-14.8	19.3	76.5	Pass
							Summary	

Section No.	Elevation ft	Component Type	Size	Critical Element	P K	øP allow K	% Capacity	Pass/ Fail
						Leg (T12)	88.0	Pass
						Diagonal (T14)	79.6	Pass
						Horizontal (T2)	43.4	Pass
						Secondary Horizontal (T11)	1.4	Pass
						Top Girt (T2)	20.1	Pass
						Bottom Girt (T13)	36.7	Pass
						Guy A (T7)	78.4	Pass
						Guy B (T7)	78.4	Pass
						Guy C (T7)	78.8	Pass
						Top Guy Pull-Off (T1)	25.6	Pass
						Torque Arm Top (T1)	43.9	Pass
						Torque Arm Bottom (T1)	76.5	Pass
						Bolt Checks	23.5	Pass
						RATING =	**88.0**	**Pass**

Additional Capacities

Notes	Component	Elevation (ft)	% Capacity	Pass / Fail
	Anchor Block	0	96.1	Pass
	Tower Base Foundation	0	57.0	Pass

Disclaimer of Warranties

GPD has not performed a recent site visit to the tower to verify the member sizes or antenna/coax loading. If the existing conditions are not as represented on the tower elevation contained in this report, we should be contacted immediately to evaluate the significance of the discrepancy. This is not a condition assessment of the tower or foundation. This report does not replace a full tower inspection. The tower and foundations are assumed to have been properly fabricated, erected, maintained, in good condition, twist free, and plumb.

The engineering services rendered by GPD in connection with this Structural Analysis are limited to a computer analysis of the tower structure and theoretical capacity of its main structural members. No allowance was made for any damaged, bent, missing, loose, or rusted members (above and below ground). No allowance was made for loose bolts or cracked welds.

This analysis is limited to the designated maximum wind and seismic conditions per the governing tower standards and code. Wind forces resulting in tower vibrations near the structure's resonant frequencies were not considered in this analysis and are outside the scope of this analysis. Lateral loading from any dynamic response was not evaluated under a time-domain based fatigue analysis.

GPD does not analyze the fabrication of the structure (including welding). It is not possible to have all the very detailed information needed to perform a thorough analysis of every structural sub-component and connection of an existing tower. GPD provides a limited scope of service in that we cannot verify the adequacy of every weld, plate connection detail, etc. The purpose of this report is to assess the capability of adding appurtenances usually accompanied by transmission lines to the structure.

It is the owner's responsibility to determine the amount of ice accumulation in excess of the code specified amount, if any, that should be considered in the structural analysis.

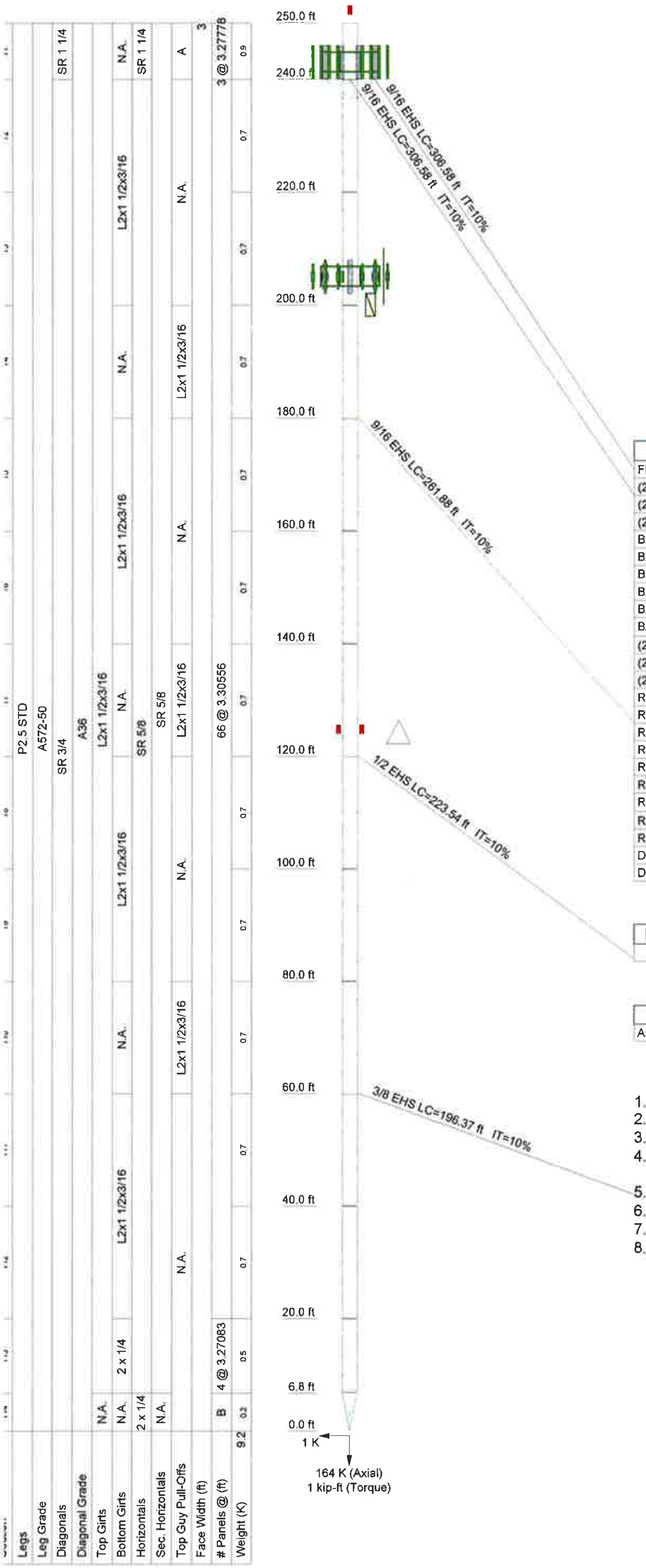
The attached sketches are a schematic representation of the analyzed tower. If any material is fabricated from these sketches, the contractor shall be responsible for field verifying the existing conditions, proper fit, and clearance in the field. Any mentions of structural modifications are reasonable estimates and should not be used as a precise construction document. Precise modification drawings are obtainable from GPD, but are beyond the scope of this report.

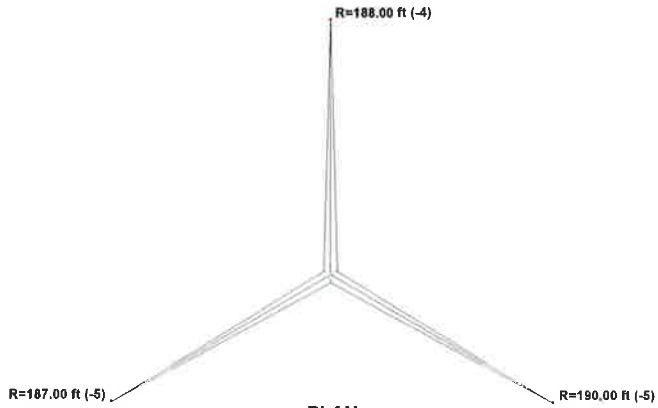
Miscellaneous items such as antenna mounts, etc., have not been designed or detailed as a part of our work. We recommend that material of adequate size and strength be purchased from a reputable tower manufacturer.

Towers are designed to carry gravity, wind, and ice loads. All members, legs, diagonals, struts, and redundant members provide structural stability to the tower with little redundancy. Absence or removal of a member can trigger catastrophic failure unless a substitute is provided before any removal. Legs carry axial loads and derive their strength from shorter unbraced lengths by the presence of redundant members and their connection to the diagonals with bolts or welds. If the bolts or welds are removed without providing any substitute to the frame, the leg is subjected to a higher unbraced length that immediately reduces its load carrying capacity. If a diagonal is also removed in addition to the connection, the unbraced length of the leg is greatly increased, jeopardizing its load carrying capacity. Failure of one leg can result in a tower collapse because there is no redundancy. Redundant members and diagonals are critical to the stability of the tower.

GPD makes no warranties, expressed and/or implied, in connection with this report and disclaims any liability arising from material, fabrication, and erection of this tower. GPD will not be responsible whatsoever for, or on account of, consequential or incidental damages sustained by any person, firm, or organization as a result of any data or conclusions contained in this report. The maximum liability of GPD pursuant to this report will be limited to the total fee received for preparation of this report.

TNX TOWER OUTPUT





PLAN

DESIGNED APPURTENANCE LOADING

TYPE	ELEVATION	TYPE	ELEVATION
Flash Beacon	250	(3) 12' Lightweight T-Frame	243
(2) SBNHH-1D65B w/ Mount Pipe	243	AM-X-CD-17-65-00T w/ Mount Pipe	205
(2) SBNHH-1D65B w/ Mount Pipe	243	AM-X-CD-17-65-00T w/ Mount Pipe	205
(2) SBNHH-1D65B w/ Mount Pipe	243	AM-X-CD-17-65-00T w/ Mount Pipe	205
BXA-70063-6CF w/ Mount Pipe	243	(2) 7770.00 w/Mount Pipe	205
BXA-70063-6CF w/ Mount Pipe	243	(2) 7770.00 w/Mount Pipe	205
BXA-70063-6CF w/ Mount Pipe	243	(2) 7770.00 w/Mount Pipe	205
BXA-80063-6BF w/ Mount Pipe	243	(2) LGP21401	205
BXA-80063-6BF w/ Mount Pipe	243	(2) LGP21401	205
BXA-80063-6BF w/ Mount Pipe	243	(2) LGP21401	205
(2) FD9R6004/2C-3L	243	(2) LGP21901	205
(2) FD9R6004/2C-3L	243	(2) LGP21901	205
(2) FD9R6004/2C-3L	243	(2) LGP21901	205
RRH2X60-AWS	243	(2) RRUS-11	205
RRH2X60-AWS	243	(2) RRUS-11	205
RRH2X60-AWS	243	(2) RRUS-11	205
RRH2X60-LTE	243	DC6-48-60-18-8F Surge Suppression Unit	205
RRH2X60-LTE	243	(3) 12' T-Frame	205
RRH2X60-LTE	243	3" Dia 10' Omni w/mount pipe	200
RRH2X60-PCS	243	72" Standoff	200
RRH2X60-PCS	243	Side Light	124
RRH2X60-PCS	243	Side Light	124
DB-T1-6Z-8AB-0Z	243		
DB-T1-6Z-8AB-0Z	243		

SYMBOL LIST

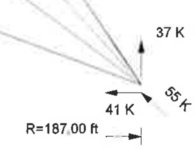
MARK	SIZE	MARK	SIZE
A	L2x1 1/2x3/16	B	3 @ 2.25

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 Windham County, Connecticut.
2. Tower designed for Exposure B to the TIA-222-G Standard.
3. Tower designed for a 98 mph basic wind in accordance with the TIA-222-G Standard.
4. Tower is also designed for a 50 mph basic wind with 0.75 in ice. Ice is considered to increase in thickness with height.
5. Deflections are based upon a 60 mph wind.
6. Tower Structure Class II.
7. Topographic Category 1 with Crest Height of 0.00 ft
8. TOWER RATING: 88%



ALL REACTIONS ARE FACTORED

GPD
520 South Main Street, Ste 2531
Akron, OH 44311
Phone: (330) 572-2100
FAX: (330) 572-2101

Job: CT-00-3701 Thompson			
Project: 2015705.87			
Client: Central States Tower	Drawn by: dmeunier	App'd:	
Code: TIA-222-G	Date: 09/23/15	Scale: N	
Path: O:\2015\2015705\CENTRAL STATES TOWER\Thompson\Structural Analysis\tnx\CT Thompson.eri		Dwg No.	

Tower Input Data

The main tower is a 3x guyed tower with an overall height of 250.00 ft above the ground line.
The base of the tower is set at an elevation of 0.00 ft above the ground line.
The face width of the tower is 3.00 ft at the top and tapered at the base.
This tower is designed using the TIA-222-G standard.
The following design criteria apply:

- Tower is located in Windham County, Connecticut.
- Basic wind speed of 98 mph.
- Structure Class II.
- Exposure Category B.
- Topographic Category 1.
- Crest Height 0.00 ft.
- Nominal ice thickness of 0.7500 in.
- Ice thickness is considered to increase with height.
- Ice density of 56 pcf.
- A wind speed of 50 mph is used in combination with ice.
- Temperature drop of 50 °F.
- Deflections calculated using a wind speed of 60 mph.
- Pressures are calculated at each section.
- Safety factor used in guy design is 1.
- Stress ratio used in tower member design is 1.
- Local bending stresses due to climbing loads, feed line supports, and appurtenance mounts are not considered.

Options

Consider Moments - Legs
Consider Moments - Horizontals
Consider Moments - Diagonals
Use Moment Magnification
√ Use Code Stress Ratios
√ Use Code Safety Factors - Guys
Escalate Ice
Always Use Max Kz
Use Special Wind Profile
√ Include Bolts In Member Capacity
Leg Bolts Are At Top Of Section
√ Secondary Horizontal Braces Leg
Use Diamond Inner Bracing (4 Sided)
Add IBC .6D+W Combination

Distribute Leg Loads As Uniform
Assume Legs Pinned
√ Assume Rigid Index Plate
√ Use Clear Spans For Wind Area
√ Use Clear Spans For KL/r
√ Retension Guys To Initial Tension
√ Bypass Mast Stability Checks
√ Use Azimuth Dish Coefficients
√ Project Wind Area of Appurt.
√ Autocalc Torque Arm Areas
SR Members Have Cut Ends
√ Sort Capacity Reports By Component
Triangulate Diamond Inner Bracing
Use TIA-222-G Tension Splice Capacity Exemption

Treat Feedline Bundles As Cylinder
Use ASCE 10 X-Brace Ly Rules
√ Calculate Redundant Bracing Forces
Ignore Redundant Members in FEA
SR Leg Bolts Resist Compression
√ All Leg Panels Have Same Allowable
Offset Girt At Foundation
√ Consider Feedline Torque
√ Include Angle Block Shear Check

Poles

Include Shear-Torsion Interaction
Always Use Sub-Critical Flow
Use Top Mounted Sockets

Feed Line/Linear Appurtenances - Entered As Round Or Flat

Description	*Face or Leg*	*Allow Shield*	*Component Type*	*Placement* *ft*	*Face Offset* *in*	*Lateral Offset (Frac FW)*	*#*	*# Per Row*	*Clear Spacing* *in*	*Width or Diameter* *in*	*Perimeter* *in*	*Weight* *plf*
LDF4-50A (1/2 FOAM)	C	No	Ar (CaAa)	124.00 - 8.00	0.0000	-0.5	2	2	0.6300	0.6300		0.15
LDF4-50A (1/2 FOAM)	C	No	Ar (CaAa)	250.00 - 124.00	0.0000	-0.5	1	1	0.6300	0.6300		0.15
1" Rigid Conduit	C	No	Ar (CaAa)	250.00 - 8.00	0.0000	0	1	1	1.0000	1.0000		0.50
******												
LDF7-50A (1-5/8 FOAM)	A	No	Ar (CaAa)	243.00 - 8.00	0.0000	0.5	3	3	1.0000	1.9800		0.82
LDF7-50A (1-5/8 FOAM)	A	No	Ar (CaAa)	243.00 - 8.00	0.0000	-0.5	3	3	1.0000	1.9800		0.82
LDF7-50A (1-5/8 FOAM)	C	No	Ar (CaAa)	243.00 - 8.00	0.0000	-0.5	3	3	1.0000	1.9800		0.82
LDF7-50A (1-5/8 FOAM)	C	No	Ar (CaAa)	243.00 - 8.00	0.0000	0.25	2	2	1.0000	1.9800		0.82
1-5/8" Fiber Cable	C	No	Ar (CaAa)	243.00 - 8.00	2.0000	0.25	2	2	1.0000	1.6250		0.82
*****												
LDF7-50A (1-5/8 FOAM)	A	No	Ar (CaAa)	205.00 - 8.00	0.0000	0	12	6	1.0000	1.9800		0.82
******												
LDF7-50A (1-5/8 FOAM)	A	No	Ar (CaAa)	200.00 - 8.00	0.0000	0.4	1	1	1.0000	1.9800		0.82
******												
Safety Line 3/8	B	No	Ar (CaAa)	250.00 - 8.00	0.0000	-0.2	1	1	0.3750	0.3750		0.22
*****												
7/8" DC Power Cable	A	No	Ar (CaAa)	205.00 - 8.00	0.0000	-0.3	1	1	0.8750	0.8750		0.60
1/2" Fiber Cable	A	No	Ar (CaAa)	205.00 - 8.00	0.0000	-0.3	1	1	0.6300	0.6300		0.15
3" Flex Conduit	A	No	Ar (CaAa)	205.00 - 8.00	0.0000	-0.3	1	1	3.0000	3.0000		0.48

Discrete Tower Loads

Description	*Face or Leg*	*Offset Type*	*Offsets: Horz Lateral Vert* *ft ft ft*	*Azimuth Adjustment* *°*	*Placement* *ft*		*C_AA_A Front* *ft^2*	*C_AA_A Side* *ft^2*	*Weight* *K*
Flash Beacon	A	From Leg	0.00	0.0000	250.00	No Ice	3.00	3.00	0.1
			0.00			1/2" Ice	4.50	4.50	0.1
			1.50			1" Ice	6.00	6.00	0.2
Side Light	B	From Leg	1.00	0.0000	124.00	No Ice	0.33	0.33	0.0
			0.00			1/2" Ice	0.47	0.47	0.0
			0.00			1" Ice	0.60	0.60	0.0
Side Light	C	From Leg	1.00	0.0000	124.00	No Ice	0.33	0.33	0.0
			0.00			1/2" Ice	0.47	0.47	0.0
			0.00			1" Ice	0.60	0.60	0.0
******									
(2) SBNHH-1D65B w/ Mount Pipe	A	From Leg	4.00	0.0000	243.00	No Ice	8.40	6.31	0.1
			0.00			1/2" Ice	8.95	7.01	0.1
			0.00			1" Ice	9.51	7.72	0.2

Description	*Face or Leg*	*Offset Type*	*Offsets: Horz Lateral Vert* *ft ft ft*	*Azimuth Adjustment* °	*Placement* *ft*		C_AA_A *Front* *ft²*	C_AA_A *Side* *ft²*	*Weight* *K*
(2) SBNHH-1D65B w/	B	From Leg	4.00	0.0000	243.00	No Ice	8.40	6.31	0.1
Mount Pipe			0.00			1/2" Ice	8.95	7.01	0.1
			0.00			1" Ice	9.51	7.72	0.2
(2) SBNHH-1D65B w/	C	From Leg	4.00	0.0000	243.00	No Ice	8.40	6.31	0.1
Mount Pipe			0.00			1/2" Ice	8.95	7.01	0.1
			0.00			1" Ice	9.51	7.72	0.2
BXA-70063-6CF w/ Mount	A	From Leg	4.00	0.0000	243.00	No Ice	7.73	5.49	0.0
Pipe			0.00			1/2" Ice	8.27	6.23	0.1
			0.00			1" Ice	8.81	6.99	0.2
BXA-70063-6CF w/ Mount	B	From Leg	4.00	0.0000	243.00	No Ice	7.73	5.49	0.0
Pipe			0.00			1/2" Ice	8.27	6.23	0.1
			0.00			1" Ice	8.81	6.99	0.2
BXA-70063-6CF w/ Mount	C	From Leg	4.00	0.0000	243.00	No Ice	7.73	5.49	0.0
Pipe			0.00			1/2" Ice	8.27	6.23	0.1
			0.00			1" Ice	8.81	6.99	0.2
BXA-80063-6BF w/ Mount	A	From Leg	4.00	0.0000	243.00	No Ice	7.54	5.46	0.0
Pipe			0.00			1/2" Ice	8.08	6.38	0.1
			0.00			1" Ice	8.63	7.18	0.2
BXA-80063-6BF w/ Mount	B	From Leg	4.00	0.0000	243.00	No Ice	7.54	5.46	0.0
Pipe			0.00			1/2" Ice	8.08	6.38	0.1
			0.00			1" Ice	8.63	7.18	0.2
BXA-80063-6BF w/ Mount	C	From Leg	4.00	0.0000	243.00	No Ice	7.54	5.46	0.0
Pipe			0.00			1/2" Ice	8.08	6.38	0.1
			0.00			1" Ice	8.63	7.18	0.2
(2) FD9R6004/2C-3L	A	From Leg	4.00	0.0000	243.00	No Ice	0.37	0.08	0.0
			0.00			1/2" Ice	0.45	0.14	0.0
			0.00			1" Ice	0.54	0.20	0.0
(2) FD9R6004/2C-3L	B	From Leg	4.00	0.0000	243.00	No Ice	0.37	0.08	0.0
			0.00			1/2" Ice	0.45	0.14	0.0
			0.00			1" Ice	0.54	0.20	0.0
(2) FD9R6004/2C-3L	C	From Leg	4.00	0.0000	243.00	No Ice	0.37	0.08	0.0
			0.00			1/2" Ice	0.45	0.14	0.0
			0.00			1" Ice	0.54	0.20	0.0
RRH2X60-AWS	A	From Leg	0.50	0.0000	243.00	No Ice	2.19	1.43	0.0
			0.00			1/2" Ice	2.40	1.61	0.1
			0.00			1" Ice	2.61	1.80	0.1
RRH2X60-AWS	B	From Leg	0.50	0.0000	243.00	No Ice	2.19	1.43	0.0
			0.00			1/2" Ice	2.40	1.61	0.1
			0.00			1" Ice	2.61	1.80	0.1
RRH2X60-AWS	C	From Leg	0.50	0.0000	243.00	No Ice	2.19	1.43	0.0
			0.00			1/2" Ice	2.40	1.61	0.1
			0.00			1" Ice	2.61	1.80	0.1
RRH2X60-LTE	A	From Leg	0.50	0.0000	243.00	No Ice	2.19	1.41	0.0
			0.00			1/2" Ice	2.39	1.59	0.1
			0.00			1" Ice	2.61	1.78	0.1
RRH2X60-LTE	B	From Leg	0.50	0.0000	243.00	No Ice	2.19	1.41	0.0
			0.00			1/2" Ice	2.39	1.59	0.1
			0.00			1" Ice	2.61	1.78	0.1
RRH2X60-LTE	C	From Leg	0.50	0.0000	243.00	No Ice	2.19	1.41	0.0
			0.00			1/2" Ice	2.39	1.59	0.1
			0.00			1" Ice	2.61	1.78	0.1
RRH2X60-PCS	A	From Leg	0.50	0.0000	243.00	No Ice	2.57	2.01	0.1
			0.00			1/2" Ice	2.79	2.22	0.1
			0.00			1" Ice	3.02	2.43	0.1
RRH2X60-PCS	B	From Leg	0.50	0.0000	243.00	No Ice	2.57	2.01	0.1
			0.00			1/2" Ice	2.79	2.22	0.1
			0.00			1" Ice	3.02	2.43	0.1

Description	Face or Leg	Offset Type	Offsets: Horz Lateral Vert ft ft ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
RRH2X60-PCS	C	From Leg	0.50 0.00 0.00	0.0000	243.00	No Ice 1/2" Ice 1" Ice	2.57 2.79 3.02	2.01 2.22 2.43	0.1 0.1 0.1
DB-T1-6Z-8AB-0Z	A	From Leg	0.50 0.00 0.00	0.0000	243.00	No Ice 1/2" Ice 1" Ice	5.60 5.92 6.24	2.33 2.56 2.79	0.0 0.1 0.1
DB-T1-6Z-8AB-0Z	B	From Leg	0.50 0.00 0.00	0.0000	243.00	No Ice 1/2" Ice 1" Ice	5.60 5.92 6.24	2.33 2.56 2.79	0.0 0.1 0.1
(3) 12' Lightweight T-Frame	C	None		0.0000	243.00	No Ice 1/2" Ice 1" Ice	19.83 29.41 38.99	19.83 29.41 38.99	0.9 1.3 1.7
*****									
AM-X-CD-17-65-00T w/ Mount Pipe	A	From Leg	4.00 0.00 0.00	0.0000	205.00	No Ice 1/2" Ice 1" Ice	11.31 11.93 12.55	9.10 10.52 11.60	0.1 0.2 0.3
AM-X-CD-17-65-00T w/ Mount Pipe	B	From Leg	4.00 0.00 0.00	0.0000	205.00	No Ice 1/2" Ice 1" Ice	11.31 11.93 12.55	9.10 10.52 11.60	0.1 0.2 0.3
AM-X-CD-17-65-00T w/ Mount Pipe	C	From Leg	4.00 0.00 0.00	0.0000	205.00	No Ice 1/2" Ice 1" Ice	11.31 11.93 12.55	9.10 10.52 11.60	0.1 0.2 0.3
(2) 7770.00 w/Mount Pipe	A	From Leg	4.00 0.00 0.00	0.0000	205.00	No Ice 1/2" Ice 1" Ice	5.88 6.31 6.75	4.10 4.73 5.37	0.1 0.1 0.2
(2) 7770.00 w/Mount Pipe	B	From Leg	4.00 0.00 0.00	0.0000	205.00	No Ice 1/2" Ice 1" Ice	5.88 6.31 6.75	4.10 4.73 5.37	0.1 0.1 0.2
(2) 7770.00 w/Mount Pipe	C	From Leg	4.00 0.00 0.00	0.0000	205.00	No Ice 1/2" Ice 1" Ice	5.88 6.31 6.75	4.10 4.73 5.37	0.1 0.1 0.2
(2) LGP21401	A	From Leg	4.00 0.00 0.00	0.0000	205.00	No Ice 1/2" Ice 1" Ice	1.29 1.45 1.61	0.23 0.31 0.40	0.0 0.0 0.0
(2) LGP21401	B	From Leg	4.00 0.00 0.00	0.0000	205.00	No Ice 1/2" Ice 1" Ice	1.29 1.45 1.61	0.23 0.31 0.40	0.0 0.0 0.0
(2) LGP21401	C	From Leg	4.00 0.00 0.00	0.0000	205.00	No Ice 1/2" Ice 1" Ice	1.29 1.45 1.61	0.23 0.31 0.40	0.0 0.0 0.0
(2) LGP21901	A	From Leg	4.00 0.00 0.00	0.0000	205.00	No Ice 1/2" Ice 1" Ice	0.27 0.34 0.43	0.18 0.25 0.32	0.0 0.0 0.0
(2) LGP21901	B	From Leg	4.00 0.00 0.00	0.0000	205.00	No Ice 1/2" Ice 1" Ice	0.27 0.34 0.43	0.18 0.25 0.32	0.0 0.0 0.0
(2) LGP21901	C	From Leg	4.00 0.00 0.00	0.0000	205.00	No Ice 1/2" Ice 1" Ice	0.27 0.34 0.43	0.18 0.25 0.32	0.0 0.0 0.0
(2) RRUS-11	A	From Leg	4.00 0.00 0.00	0.0000	205.00	No Ice 1/2" Ice 1" Ice	3.25 3.49 3.74	1.37 1.55 1.74	0.0 0.1 0.1
(2) RRUS-11	B	From Leg	4.00 0.00 0.00	0.0000	205.00	No Ice 1/2" Ice 1" Ice	3.25 3.49 3.74	1.37 1.55 1.74	0.0 0.1 0.1
(2) RRUS-11	C	From Leg	4.00 0.00	0.0000	205.00	No Ice 1/2" Ice	3.25 3.49	1.37 1.55	0.0 0.1

Description	Face or Leg	Offset Type	Offsets: Horz Lateral Vert ft ft ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft²	C_AA_A Side ft²	Weight K
			0.00			1" Ice	3.74	1.74	0.1
DC6-48-60-18-8F Surge Suppression Unit	C	From Leg	0.00 0.00 0.00	0.0000	205.00	No Ice 1/2" Ice 1" Ice	1.47 1.67 1.88	1.47 1.67 1.88	0.0 0.0 0.1
(3) 12' T-Frame	C	None		0.0000	205.00	No Ice 1/2" Ice 1" Ice	30.02 40.48 50.94	30.02 40.48 50.94	1.0 1.4 1.9
*****									
3" Dia 10' Omni w/mount pipe	B	From Leg	6.00 0.00 5.00	0.0000	200.00	No Ice 1/2" Ice 1" Ice	4.11 5.39 6.64	4.11 5.39 6.64	0.1 0.1 0.2
72" Standoff	B	From Leg	3.00 0.00 0.00	0.0000	200.00	No Ice 1/2" Ice 1" Ice	0.98 1.70 2.42	3.03 5.22 7.41	0.1 0.1 0.1

Critical Deflections and Radius of Curvature - Service Wind

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
250.00	Flash Beacon	29	1.731	0.1554	0.0208	163622
243.00	(2) SBNHH-1D65B w/ Mount Pipe	29	1.919	0.1579	0.0207	121608
240.08	Guy	29	1.998	0.1574	0.0211	139437
205.00	AM-X-CD-17-65-00T w/ Mount Pipe	29	2.649	0.0319	0.0356	11339
200.00	3" Dia 10' Omni w/mount pipe	29	2.649	0.0145	0.0382	11954
180.08	Guy	29	2.488	0.0375	0.0536	41341
124.00	Side Light	31	1.988	0.0457	0.0809	20854
120.08	Guy	31	1.954	0.0382	0.0819	17822
60.08	Guy	31	1.499	0.0681	0.0861	288717

Bolt Design Data

Section No.	Elevation ft	Component Type	Bolt Grade	Bolt Size in	Number Of Bolts	Maximum Load per Bolt K	Allowable Load K	Ratio Load / Allowable	Allowable Ratio	Criteria
T1	250	Leg	A325N	0.7500	3	1.4	29.8	0.045 ✔	1	Bolt Tension
T2	240	Leg	A325N	0.7500	3	6.1	29.8	0.206 ✔	1	Bolt Tension
T3	220	Leg	A325N	0.7500	3	7.0	29.8	0.235 ✔	1	Bolt Tension
T4	200	Leg	A325N	0.7500	3	3.6	29.8	0.121 ✔	1	Bolt Tension
T5	180	Leg	A325N	0.7500	3	4.0	29.8	0.135 ✔	1	Bolt Tension
T6	160	Leg	A325N	0.7500	3	4.1	29.8	0.136 ✔	1	Bolt Tension
T7	140	Leg	A325N	0.7500	3	5.1	29.8	0.172 ✔	1	Bolt Tension
T8	120	Leg	A325N	0.7500	3	5.0	29.8	0.169 ✔	1	Bolt Tension
T9	100	Leg	A325N	0.7500	3	5.6	29.8	0.187 ✔	1	Bolt Tension
T10	80	Leg	A325N	0.7500	3	5.8	29.8	0.195 ✔	1	Bolt Tension
T11	60	Leg	A325N	0.7500	3	6.5	29.8	0.219 ✔	1	Bolt Tension

Section No.	Elevation ft	Component Type	Bolt Grade	Bolt Size in	Number Of Bolts	Maximum Load per Bolt K	Allowable Load K	Ratio Load / Allowable	Allowable Ratio	Criteria
T12	40	Leg	A325N	0.7500	3	6.6	29.8	0.221 ✔	1	Bolt Tension
T13	20	Leg	A325N	0.7500	3	6.3	29.8	0.212 ✔	1	Bolt Tension

Guy Design Data

Section No.	Elevation ft	Size	Initial Tension K	Breaking Load K	Actual T_u K	Allowable ϕT_n K	Required S.F.	Actual S.F.
T1	240.08 (A) (845)	9/16 EHS	3.5	35.0	11.2	21.0	1.000	1.870 ✔
	240.08 (A) (846)	9/16 EHS	3.5	35.0	11.2	21.0	1.000	1.867 ✔
	240.08 (B) (839)	9/16 EHS	3.5	35.0	11.2	21.0	1.000	1.878 ✔
	240.08 (B) (840)	9/16 EHS	3.5	35.0	11.2	21.0	1.000	1.879 ✔
	240.08 (C) (833)	9/16 EHS	3.5	35.0	11.3	21.0	1.000	1.860 ✔
	240.08 (C) (834)	9/16 EHS	3.5	35.0	11.3	21.0	1.000	1.862 ✔
T4	180.08 (A) (853)	9/16 EHS	3.5	35.0	15.8	21.0	1.000	1.327 ✔
	180.08 (B) (852)	9/16 EHS	3.5	35.0	15.8	21.0	1.000	1.333 ✔
	180.08 (C) (851)	9/16 EHS	3.5	35.0	15.9	21.0	1.000	1.321 ✔
T7	120.08 (A) (856)	1/2 EHS	2.7	26.9	12.7	16.1	1.000	1.275 ✔
	120.08 (B) (855)	1/2 EHS	2.7	26.9	12.6	16.1	1.000	1.276 ✔
	120.08 (C) (854)	1/2 EHS	2.7	26.9	12.7	16.1	1.000	1.269 ✔
T10	60.08 (A) (859)	3/8 EHS	1.5	15.4	6.4	9.2	1.000	1.435 ✔
	60.08 (B) (858)	3/8 EHS	1.5	15.4	6.4	9.2	1.000	1.436 ✔
	60.08 (C) (857)	3/8 EHS	1.5	15.4	6.5	9.2	1.000	1.429 ✔

Compression Checks

Leg Design Data (Compression)

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	A in^2	P_u K	ϕP_n K	Ratio P_u / ϕP_n

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	A in^2	P_u K	ϕP_n K	Ratio $\frac{P_u}{\phi P_n}$
T1	250 - 240	P2.5 STD	10.00	3.28	41.5 K=1.00	1.7040	-6.6	67.6	0.098 [1] ✔
T2	240 - 220	P2.5 STD	20.00	3.31	41.9 K=1.00	1.7040	-39.5	67.5	0.586 [1] ✔
T3	220 - 200	P2.5 STD	20.00	3.31	41.9 K=1.00	1.7040	-44.3	67.5	0.657 [1] ✔
T4	200 - 180	P2.5 STD	20.00	3.31	41.9 K=1.00	1.7040	-40.8	67.5	0.605 [1] ✔
T5	180 - 160	P2.5 STD	20.00	3.31	41.9 K=1.00	1.7040	-36.2	67.5	0.537 [1] ✔
T6	160 - 140	P2.5 STD	20.00	3.31	41.9 K=1.00	1.7040	-36.5	67.5	0.542 [1] ✔
T7	140 - 120	P2.5 STD	20.00	3.31	41.9 K=1.00	1.7040	-46.0	67.5	0.682 [1] ✔
T8	120 - 100	P2.5 STD	20.00	3.31	41.9 K=1.00	1.7040	-46.0	67.5	0.682 [1] ✔
T9	100 - 80	P2.5 STD	20.00	3.31	41.9 K=1.00	1.7040	-50.3	67.5	0.746 [1] ✔
T10	80 - 60	P2.5 STD	20.00	3.31	41.9 K=1.00	1.7040	-52.4	67.5	0.777 [1] ✔
T11	60 - 40	P2.5 STD	20.00	3.31	41.9 K=1.00	1.7040	-58.7	67.5	0.870 [1] ✔
T12	40 - 20	P2.5 STD	20.00	3.31	41.9 K=1.00	1.7040	-59.4	67.5	0.880 [1] ✔
T13	20 - 6.75	P2.5 STD	13.25	3.27	41.4 K=1.00	1.7040	-59.4	67.6	0.878 [1] ✔
T14	6.75 - 0	P2.5 STD	6.97	2.32	29.4 K=1.00	1.7040	-58.8	72.0	0.817 [1] ✔

[1] P_u / ϕP_n controls

Diagonal Design Data (Compression)

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	A in^2	P_u K	ϕP_n K	Ratio $\frac{P_u}{\phi P_n}$
T1	250 - 240	1 1/4	4.44	2.04	86.4 K=1.10	1.2272	-1.9	26.9	0.069 [1] ✔
T2	240 - 220	3/4	4.46	2.05	118.3 K=0.90	0.4418	-3.7	6.9	0.546 [1] ✔
T3	220 - 200	3/4	4.46	2.05	118.3 K=0.90	0.4418	-3.3	6.9	0.489 [1] ✔
T4	200 - 180	3/4	4.46	2.05	118.3 K=0.90	0.4418	-3.8	6.9	0.548 [1] ✔
T5	180 - 160	3/4	4.46	2.05	118.3 K=0.90	0.4418	-3.0	6.9	0.443 [1] ✔
T6	160 - 140	3/4	4.46	2.05	118.3 K=0.90	0.4418	-3.2	6.9	0.462 [1] ✔
T7	140 - 120	3/4	4.46	2.05	118.3 K=0.90	0.4418	-3.9	6.9	0.569 [1]

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	A in^2	P_u K	ϕP_n K	Ratio $\frac{P_u}{\phi P_n}$
T8	120 - 100	3/4	4.46	2.05	118.3 K=0.90	0.4418	-4.0	6.9	0.577 [1] ✔
T9	100 - 80	3/4	4.46	2.05	118.3 K=0.90	0.4418	-3.1	6.9	0.458 [1] ✔
T10	80 - 60	3/4	4.46	2.05	118.3 K=0.90	0.4418	-2.9	6.9	0.424 [1] ✔
T11	60 - 40	3/4	4.46	2.05	118.3 K=0.90	0.4418	-3.5	6.9	0.512 [*1] ✔
T12	40 - 20	3/4	4.46	2.05	118.3 K=0.90	0.4418	-3.1	6.9	0.449 [1] ✔
T13	20 - 6.75	3/4	4.44	2.04	117.6 K=0.90	0.4418	-3.8	6.9	0.549 [*1] ✔
T14	6.75 - 0	3/4	2.72	1.60	101.2 K=0.99	0.4418	-6.6	8.4	0.796 [1] ✔

[*] DL controls
[1] P_u / ϕP_n controls

Horizontal Design Data (Compression)

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	A in^2	P_u K	ϕP_n K	Ratio $\frac{P_u}{\phi P_n}$
T1	250 - 240	1 1/4	3.00	2.76	89.0 K=0.84	1.2272	-0.9	26.2	0.035 [1] ✔
T2	240 - 220	5/8	3.00	2.76	148.4 K=0.70	0.3068	-1.4	3.1	0.434 [1] ✔
T3	220 - 200	5/8	3.00	2.76	148.4 K=0.70	0.3068	-1.0	3.1	0.309 [1] ✔
T4	200 - 180	5/8	3.00	2.76	148.4 K=0.70	0.3068	-0.1	3.1	0.047 [1] ✔

[1] P_u / ϕP_n controls

Secondary Horizontal Design Data (Compression)

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	A in^2	P_u K	ϕP_n K	Ratio $\frac{P_u}{\phi P_n}$
T1	250 - 240	5/8	1.50	1.38	89.0 K=0.84	0.3068	-0.0	6.5	0.000 [1] ✔
T2	240 - 220	5/8	1.50	1.38	89.0 K=0.84	0.3068	-0.0	6.5	0.000 [1] ✔
T3	220 - 200	5/8	1.50	1.38	89.0 K=0.84	0.3068	-0.0	6.5	0.000 [1] ✔

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	A in^2	P_u K	ϕP_n K	Ratio $\frac{P_u}{\phi P_n}$
T4	200 - 180	5/8	1.50	1.38	89.0 K=0.84	0.3068	-0.0	6.5	0.000 [1] ✔
T5	180 - 160	5/8	1.50	1.38	89.0 K=0.84	0.3068	-0.0	6.5	0.000 [1] ✔
T6	160 - 140	5/8	1.50	1.38	89.0 K=0.84	0.3068	-0.0	6.5	0.000 [1] ✔
T7	140 - 120	5/8	1.50	1.38	89.0 K=0.84	0.3068	-0.0	6.5	0.000 [1] ✔
T8	120 - 100	5/8	1.50	1.38	89.0 K=0.84	0.3068	-0.0	6.5	0.000 [1] ✔
T9	100 - 80	5/8	1.50	1.38	89.0 K=0.84	0.3068	-0.0	6.5	0.000 [1] ✔
T10	80 - 60	5/8	1.50	1.38	89.0 K=0.84	0.3068	-0.0	6.5	0.000 [1] ✔
T11	60 - 40	5/8	1.50	1.38	89.0 K=0.84	0.3068	-0.0	6.5	0.000 [1] ✔
T12	40 - 20	5/8	1.50	1.38	89.0 K=0.84	0.3068	-0.0	6.5	0.000 [1] ✔
T13	20 - 6.75	5/8	1.50	1.38	89.0 K=0.84	0.3068	-0.0	6.5	0.000 [1] ✔

[1] P_u / ϕP_n controls

Top Girt Design Data (Compression)

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	A in^2	P_u K	ϕP_n K	Ratio $\frac{P_u}{\phi P_n}$
T1	250 - 240	L2x1 1/2x3/16	3.00	2.76	111.4 K=1.08	0.6211	-0.0	10.5	0.002 [1] ✔
T2	240 - 220	L2x1 1/2x3/16	3.00	2.76	111.4 K=1.08	0.6211	-2.1	10.5	0.201 [1] ✔
T3	220 - 200	L2x1 1/2x3/16	3.00	2.76	111.4 K=1.08	0.6211	-0.3	10.5	0.027 [1] ✔
T4	200 - 180	L2x1 1/2x3/16	3.00	2.76	111.4 K=1.08	0.6211	-0.3	10.5	0.030 [1] ✔

[1] P_u / ϕP_n controls

Bottom Girt Design Data (Compression)

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	A in^2	P_u K	ϕP_n K	Ratio $\frac{P_u}{\phi P_n}$
T2	240 - 220	L2x1 1/2x3/16	3.00	2.76	111.4 K=1.08	0.6211	-0.4	10.5	0.036 [1] ✔
T3	220 - 200	L2x1 1/2x3/16	3.00	2.76	111.4	0.6211	-0.1	10.5	0.013 [1]

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	A in^2	P_u K	ϕP_n K	Ratio $\frac{P_u}{\phi P_n}$
					K=1.08				✔

[1] P_u / ϕP_n controls

Top Guy Pull-Off Design Data (Compression)

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	A in^2	P_u K	ϕP_n K	Ratio $\frac{P_u}{\phi P_n}$
T1	250 - 240	L2x1 1/2x3/16	3.00	2.76	102.9 K=1.00	0.6211	-2.2	11.5	0.189 [1] ✔

[1] P_u / ϕP_n controls

Torque-Arm Bottom Design Data

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	A in^2	P_u K	ϕP_n K	Ratio $\frac{P_u}{\phi P_n}$
T1	250 - 240 (837)	L2x2x1/4	6.20	6.05	92.8 K=0.50	0.9375	-14.7	19.3	0.764 [1] ✔
T1	250 - 240 (838)	L2x2x1/4	6.20	6.05	92.8 K=0.50	0.9375	-14.8	19.3	0.765 [1] ✔
T1	250 - 240 (843)	L2x2x1/4	6.20	6.05	92.8 K=0.50	0.9375	-14.7	19.3	0.760 [1] ✔
T1	250 - 240 (844)	L2x2x1/4	6.20	6.05	92.8 K=0.50	0.9375	-14.8	19.3	0.765 [1] ✔
T1	250 - 240 (849)	L2x2x1/4	6.20	6.05	92.8 K=0.50	0.9375	-14.5	19.3	0.753 [1] ✔
T1	250 - 240 (850)	L2x2x1/4	6.20	6.05	92.8 K=0.50	0.9375	-14.7	19.3	0.759 [1] ✔

[1] P_u / ϕP_n controls

Tension Checks

Leg Design Data (Tension)

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	A in^2	P_u K	ϕP_n K	Ratio $\frac{P_u}{\phi P_n}$
T1	250 - 240	P2.5 STD	10.00	3.28	41.5	1.7040	4.1	76.7	0.053 [1]

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	A in^2	P_u K	ϕP_n K	Ratio $\frac{P_u}{\phi P_n}$
T2	240 - 220	P2.5 STD	20.00	3.31	41.9	1.7040	18.4	76.7	0.240 [1] ✔
T3	220 - 200	P2.5 STD	20.00	3.31	41.9	1.7040	26.9	76.7	0.351 [1] ✔
T4	200 - 180	P2.5 STD	20.00	3.31	41.9	1.7040	21.0	76.7	0.274 [1] ✔
T7	140 - 120	P2.5 STD	20.00	3.31	41.9	1.7040	4.5	76.7	0.058 [1] ✔

[1] P_u / ϕP_n controls

Diagonal Design Data (Tension)

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	A in^2	P_u K	ϕP_n K	Ratio $\frac{P_u}{\phi P_n}$
T1	250 - 240	1 1/4	4.44	2.04	78.5	1.2272	2.2	39.8	0.055 [1] ✔
T2	240 - 220	3/4	4.46	2.05	131.4	0.4418	3.3	14.3	0.231 [1] ✔
T3	220 - 200	3/4	4.46	2.05	131.4	0.4418	1.1	14.3	0.080 [1] ✔
T4	200 - 180	3/4	4.46	2.05	131.4	0.4418	2.6	14.3	0.178 [1] ✔
T5	180 - 160	3/4	4.46	2.05	131.4	0.4418	0.4	14.3	0.027 [1] ✔
T7	140 - 120	3/4	4.46	2.05	131.4	0.4418	1.1	14.3	0.077 [1] ✔
T8	120 - 100	3/4	4.46	2.05	131.4	0.4418	0.6	14.3	0.044 [1] ✔

[1] P_u / ϕP_n controls

Horizontal Design Data (Tension)

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	A in^2	P_u K	ϕP_n K	Ratio $\frac{P_u}{\phi P_n}$
T1	250 - 240	1 1/4	3.00	2.76	106.0	1.2272	0.8	39.8	0.021 [1] ✔
T2	240 - 220	5/8	3.00	2.76	212.0	0.3068	2.4	9.9	0.244 [1] ✔
T3	220 - 200	5/8	3.00	2.76	212.0	0.3068	3.0	9.9	0.301 [1] ✔
T4	200 - 180	5/8	3.00	2.76	212.0	0.3068	2.8	9.9	0.284 [1]

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	A in^2	P_u K	ϕP_n K	Ratio $\frac{P_u}{\phi P_n}$
T5	180 - 160	5/8	3.00	2.76	212.0	0.3068	3.2	9.9	0.321 [1] ✔
T6	160 - 140	5/8	3.00	2.76	212.0	0.3068	3.2	9.9	0.323 [1] ✔
T7	140 - 120	5/8	3.00	2.76	212.0	0.3068	3.3	9.9	0.333 [1] ✔
T8	120 - 100	5/8	3.00	2.76	212.0	0.3068	3.4	9.9	0.339 [*1] ✔
T9	100 - 80	5/8	3.00	2.76	212.0	0.3068	3.4	9.9	0.341 [*1] ✔
T10	80 - 60	5/8	3.00	2.76	212.0	0.3068	3.4	9.9	0.345 [*1] ✔
T11	60 - 40	5/8	3.00	2.76	212.0	0.3068	4.0	9.9	0.398 [*1] ✔
T12	40 - 20	5/8	3.00	2.76	212.0	0.3068	3.5	9.9	0.353 [*1] ✔
T13	20 - 6.75	5/8	3.00	2.76	212.0	0.3068	4.1	9.9	0.407 [*1] ✔
T14	6.75 - 0	2 x 1/4	3.00	2.76	459.0	0.5000	6.2	16.2	0.385 [*1] ✔

[*] DL controls
[1] P_u / ϕP_n controls

Secondary Horizontal Design Data (Tension)

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	A in^2	P_u K	ϕP_n K	Ratio $\frac{P_u}{\phi P_n}$
T1	250 - 240	5/8	1.50	1.38	106.0	0.3068	0.0	9.9	0.000 [1] ✔
T2	240 - 220	5/8	1.50	1.38	106.0	0.3068	0.0	9.9	0.000 [1] ✔
T3	220 - 200	5/8	1.50	1.38	106.0	0.3068	0.0	9.9	0.000 [1] ✔
T4	200 - 180	5/8	1.50	1.38	106.0	0.3068	0.0	9.9	0.000 [1] ✔
T5	180 - 160	5/8	1.50	1.38	106.0	0.3068	0.0	9.9	0.000 [1] ✔
T6	160 - 140	5/8	1.50	1.38	106.0	0.3068	0.0	9.9	0.000 [1] ✔
T7	140 - 120	5/8	1.50	1.38	106.0	0.3068	0.0	9.9	0.000 [1] ✔
T8	120 - 100	5/8	1.50	1.38	106.0	0.3068	0.0	9.9	0.000 [1] ✔
T9	100 - 80	5/8	1.50	1.38	106.0	0.3068	0.0	9.9	0.000 [1] ✔
T10	80 - 60	5/8	1.50	1.38	106.0	0.3068	0.0	9.9	0.000 [1]

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	A in^2	P_u K	ϕP_n K	Ratio P_u / ϕP_n
T11	60 - 40	5/8	1.50	1.38	106.0	0.3068	0.0	9.9	0.000*1 ✔
T12	40 - 20	5/8	1.50	1.38	106.0	0.3068	0.0	9.9	0.000 1 ✔
T13	20 - 6.75	5/8	1.50	1.38	106.0	0.3068	0.0	9.9	0.000*1 ✔

* DL controls
1 P_u / ϕP_n controls

Top Girt Design Data (Tension)

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	A in^2	P_u K	ϕP_n K	Ratio P_u / ϕP_n
T1	250 - 240	L2x1 1/2x3/16	3.00	2.76	75.4	0.6211	0.0	20.1	0.002 1 ✔
T2	240 - 220	L2x1 1/2x3/16	3.00	2.76	75.4	0.6211	3.9	20.1	0.194 1 ✔
T3	220 - 200	L2x1 1/2x3/16	3.00	2.76	75.4	0.6211	1.3	20.1	0.067 1 ✔
T4	200 - 180	L2x1 1/2x3/16	3.00	2.76	75.4	0.6211	1.6	20.1	0.081 1 ✔
T5	180 - 160	L2x1 1/2x3/16	3.00	2.76	75.4	0.6211	3.0	20.1	0.148 1 ✔
T6	160 - 140	L2x1 1/2x3/16	3.00	2.76	75.4	0.6211	1.7	20.1	0.085 1 ✔
T7	140 - 120	L2x1 1/2x3/16	3.00	2.76	75.4	0.6211	1.7	20.1	0.085 1 ✔
T8	120 - 100	L2x1 1/2x3/16	3.00	2.76	75.4	0.6211	2.9	20.1	0.144 1 ✔
T9	100 - 80	L2x1 1/2x3/16	3.00	2.76	75.4	0.6211	1.8	20.1	0.087*1 ✔
T10	80 - 60	L2x1 1/2x3/16	3.00	2.76	75.4	0.6211	1.8	20.1	0.087*1 ✔
T11	60 - 40	L2x1 1/2x3/16	3.00	2.76	75.4	0.6211	2.9	20.1	0.143*1 ✔
T12	40 - 20	L2x1 1/2x3/16	3.00	2.76	75.4	0.6211	1.8	20.1	0.089*1 ✔
T13	20 - 6.75	L2x1 1/2x3/16	3.00	2.76	75.4	0.6211	1.8	20.1	0.091*1 ✔

* DL controls
1 P_u / ϕP_n controls

Bottom Girt Design Data (Tension)

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	A in^2	P_u K	ϕP_n K	Ratio $\frac{P_u}{\phi P_n}$
T2	240 - 220	L2x1 1/2x3/16	3.00	2.76	75.4	0.6211	1.4	20.1	0.069 [1] ✔
T3	220 - 200	L2x1 1/2x3/16	3.00	2.76	75.4	0.6211	1.6	20.1	0.078 [1] ✔
T5	180 - 160	L2x1 1/2x3/16	3.00	2.76	75.4	0.6211	1.7	20.1	0.085 [1] ✔
T6	160 - 140	L2x1 1/2x3/16	3.00	2.76	75.4	0.6211	1.7	20.1	0.084 [1] ✔
T8	120 - 100	L2x1 1/2x3/16	3.00	2.76	75.4	0.6211	1.8	20.1	0.087 [*1] ✔
T9	100 - 80	L2x1 1/2x3/16	3.00	2.76	75.4	0.6211	1.8	20.1	0.088 [*1] ✔
T11	60 - 40	L2x1 1/2x3/16	3.00	2.76	75.4	0.6211	1.8	20.1	0.089 [*1] ✔
T12	40 - 20	L2x1 1/2x3/16	3.00	2.76	75.4	0.6211	1.8	20.1	0.090 [*1] ✔
T13	20 - 6.75	2 x 1/4	3.00	2.76	459.0	0.5000	5.9	16.2	0.367 [*1] ✔

[*] DL controls
[1] P_u / ϕP_n controls

Top Guy Pull-Off Design Data (Tension)

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	A in^2	P_u K	ϕP_n K	Ratio $\frac{P_u}{\phi P_n}$
T1	250 - 240	L2x1 1/2x3/16	3.00	2.76	75.4	0.6211	5.2	20.1	0.256 [1] ✔
T4	200 - 180	L2x1 1/2x3/16	3.00	2.76	75.4	0.6211	4.3	20.1	0.212 [1] ✔
T7	140 - 120	L2x1 1/2x3/16	3.00	2.76	75.4	0.6211	4.1	20.1	0.203 [1] ✔
T10	80 - 60	L2x1 1/2x3/16	3.00	2.76	75.4	0.6211	3.4	20.1	0.170 [1] ✔

[1] P_u / ϕP_n controls

Torque-Arm Top Design Data

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	A in^2	P_u K	ϕP_n K	Ratio $\frac{P_u}{\phi P_n}$
T1	250 - 240 (835)	L2x2x1/4	5.13	5.01	98.8	0.9375	13.3	30.4	0.439 [1]

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	A in^2	P_u K	ϕP_n K	Ratio $\frac{P_u}{\phi P_n}$
T1	250 - 240 (836)	L2x2x1/4	5.13	5.01	98.8	0.9375	13.3	30.4	0.439 [1] ✔
T1	250 - 240 (841)	L2x2x1/4	5.13	5.01	98.8	0.9375	13.3	30.4	0.437 [1] ✔
T1	250 - 240 (842)	L2x2x1/4	5.13	5.01	98.8	0.9375	13.3	30.4	0.438 [1] ✔
T1	250 - 240 (847)	L2x2x1/4	5.13	5.01	98.8	0.9375	13.3	30.4	0.439 [1] ✔
T1	250 - 240 (848)	L2x2x1/4	5.13	5.01	98.8	0.9375	13.3	30.4	0.439 [1] ✔

[1] P_u / ϕP_n controls

Section Capacity Table

Section No.	Elevation ft	Component Type	Size	Critical Element	P K	ϕP_{allow} K	% Capacity	Pass Fail
T1	250 - 240	Leg	P2.5 STD	1	-6.4	67.6	11.5	Pass
T2	240 - 220	Leg	P2.5 STD	37	-39.5	67.5	58.6	Pass
T3	220 - 200	Leg	P2.5 STD	103	-44.3	67.5	65.7	Pass
T4	200 - 180	Leg	P2.5 STD	169	-40.8	67.5	60.5	Pass
T5	180 - 160	Leg	P2.5 STD	236	-36.2	67.5	53.7	Pass
T6	160 - 140	Leg	P2.5 STD	302	-36.5	67.5	54.2	Pass
T7	140 - 120	Leg	P2.5 STD	367	-46.0	67.5	68.2	Pass
T8	120 - 100	Leg	P2.5 STD	433	-46.0	67.5	68.2	Pass
T9	100 - 80	Leg	P2.5 STD	499	-50.3	67.5	74.6	Pass
T10	80 - 60	Leg	P2.5 STD	565	-52.4	67.5	77.7	Pass
T11	60 - 40	Leg	P2.5 STD	631	-58.7	67.5	87.0	Pass
T12	40 - 20	Leg	P2.5 STD	697	-59.4	67.5	88.0	Pass
T13	20 - 6.75	Leg	P2.5 STD	763	-59.4	67.6	87.8	Pass
T14	6.75 - 0	Leg	P2.5 STD	809	-58.8	72.0	81.7	Pass
T1	250 - 240	Diagonal	1 1/4	13	-1.9	26.9	6.9	Pass
T2	240 - 220	Diagonal	3/4	96	-3.7	6.9	54.6	Pass
T3	220 - 200	Diagonal	3/4	115	-3.3	6.9	48.9	Pass
T4	200 - 180	Diagonal	3/4	190	-3.8	6.9	54.8	Pass
T5	180 - 160	Diagonal	3/4	295	-3.0	6.9	44.3	Pass
T6	160 - 140	Diagonal	3/4	311	-3.2	6.9	46.2	Pass
T7	140 - 120	Diagonal	3/4	379	-3.9	6.9	56.9	Pass
T8	120 - 100	Diagonal	3/4	496	-4.0	6.9	57.7	Pass
T9	100 - 80	Diagonal	3/4	559	-3.1	6.9	45.8	Pass
T10	80 - 60	Diagonal	3/4	575	-2.9	6.9	42.4	Pass
T11	60 - 40	Diagonal	3/4	691	-3.5	6.9	51.2	Pass
T12	40 - 20	Diagonal	3/4	707	-3.1	6.9	44.9	Pass
T13	20 - 6.75	Diagonal	3/4	772	-3.8	6.9	54.9	Pass
T14	6.75 - 0	Diagonal	3/4	822	-6.6	8.4	79.6	Pass
T1	250 - 240	Horizontal	1 1/4	17	-0.9	26.2	3.5	Pass
T2	240 - 220	Horizontal	5/8	94	-1.4	3.1	43.4	Pass
T3	220 - 200	Horizontal	5/8	130	-1.0	3.1	30.9	Pass
T4	200 - 180	Horizontal	5/8	225	2.8	9.9	28.4	Pass
T5	180 - 160	Horizontal	5/8	251	3.2	9.9	32.1	Pass
T6	160 - 140	Horizontal	5/8	357	3.2	9.9	32.3	Pass
T7	140 - 120	Horizontal	5/8	383	3.3	9.9	33.3	Pass
T8	120 - 100	Horizontal	5/8	449	3.4	9.9	33.9	Pass

Section No.	Elevation ft	Component Type	Size	Critical Element	P K	ϕP_{allow} K	% Capacity	Pass Fail
T9	100 - 80	Horizontal	5/8	515	3.4	9.9	34.1	Pass
T10	80 - 60	Horizontal	5/8	581	3.4	9.9	34.5	Pass
T11	60 - 40	Horizontal	5/8	687	4.0	9.9	39.8	Pass
T12	40 - 20	Horizontal	5/8	723	3.5	9.9	35.3	Pass
T13	20 - 6.75	Horizontal	5/8	779	4.1	9.9	40.7	Pass
T14	6.75 - 0	Horizontal	2 x 1/4	812	6.2	16.2	38.5	Pass
T1	250 - 240	Secondary Horizontal	5/8	26	0.0	9.9	0.4	Pass
T2	240 - 220	Secondary Horizontal	5/8	102	0.0	9.9	0.4	Pass
T3	220 - 200	Secondary Horizontal	5/8	168	0.0	9.9	0.3	Pass
T4	200 - 180	Secondary Horizontal	5/8	224	0.0	9.9	0.2	Pass
T5	180 - 160	Secondary Horizontal	5/8	250	0.0	9.9	0.5	Pass
T6	160 - 140	Secondary Horizontal	5/8	316	0.0	9.9	0.5	Pass
T7	140 - 120	Secondary Horizontal	5/8	382	0.0	9.9	0.6	Pass
T8	120 - 100	Secondary Horizontal	5/8	498	0.0	9.9	0.8	Pass
T9	100 - 80	Secondary Horizontal	5/8	514	0.0	9.9	0.9	Pass
T10	80 - 60	Secondary Horizontal	5/8	630	0.0	9.9	0.9	Pass
T11	60 - 40	Secondary Horizontal	5/8	696	0.0	9.9	1.4	Pass
T12	40 - 20	Secondary Horizontal	5/8	712	0.0	9.9	1.1	Pass
T13	20 - 6.75	Secondary Horizontal	5/8	778	0.0	9.9	1.3	Pass
T1	250 - 240	Top Girt	L2x1 1/2x3/16	4	-0.0	10.5	0.3	Pass
T2	240 - 220	Top Girt	L2x1 1/2x3/16	40	-2.1	10.5	20.1	Pass
T3	220 - 200	Top Girt	L2x1 1/2x3/16	106	1.3	20.1	6.7	Pass
T4	200 - 180	Top Girt	L2x1 1/2x3/16	172	1.6	20.1	8.1	Pass
T5	180 - 160	Top Girt	L2x1 1/2x3/16	238	3.0	20.1	14.8	Pass
T6	160 - 140	Top Girt	L2x1 1/2x3/16	304	1.7	20.1	8.5	Pass
T7	140 - 120	Top Girt	L2x1 1/2x3/16	370	1.7	20.1	8.5	Pass
T8	120 - 100	Top Girt	L2x1 1/2x3/16	436	2.9	20.1	14.4	Pass
T9	100 - 80	Top Girt	L2x1 1/2x3/16	502	1.8	20.1	8.7	Pass
T10	80 - 60	Top Girt	L2x1 1/2x3/16	568	1.8	20.1	8.7	Pass
T11	60 - 40	Top Girt	L2x1 1/2x3/16	634	2.9	20.1	14.3	Pass
T12	40 - 20	Top Girt	L2x1 1/2x3/16	700	1.8	20.1	8.9	Pass
T13	20 - 6.75	Top Girt	L2x1 1/2x3/16	766	1.8	20.1	9.1	Pass
T2	240 - 220	Bottom Girt	L2x1 1/2x3/16	44	1.4	20.1	6.9	Pass
T3	220 - 200	Bottom Girt	L2x1 1/2x3/16	109	1.6	20.1	7.8	Pass
T5	180 - 160	Bottom Girt	L2x1 1/2x3/16	241	1.7	20.1	8.5	Pass
T6	160 - 140	Bottom Girt	L2x1 1/2x3/16	307	1.7	20.1	8.4	Pass
T8	120 - 100	Bottom Girt	L2x1 1/2x3/16	439	1.8	20.1	8.7	Pass
T9	100 - 80	Bottom Girt	L2x1 1/2x3/16	505	1.8	20.1	8.8	Pass
T11	60 - 40	Bottom Girt	L2x1 1/2x3/16	637	1.8	20.1	8.9	Pass
T12	40 - 20	Bottom Girt	L2x1 1/2x3/16	703	1.8	20.1	9.0	Pass
T13	20 - 6.75	Bottom Girt	2 x 1/4	769	5.9	16.2	36.7	Pass
T1	250 - 240	Guy A@240.083	9/16	846	11.2	21.0	53.6	Pass
T4	200 - 180	Guy A@180.083	9/16	853	15.8	21.0	75.4	Pass
T7	140 - 120	Guy A@120.083	1/2	856	12.7	16.1	78.4	Pass
T10	80 - 60	Guy A@60.0833	3/8	859	6.4	9.2	69.7	Pass
T1	250 - 240	Guy B@240.083	9/16	839	11.2	21.0	53.2	Pass
T4	200 - 180	Guy B@180.083	9/16	852	15.8	21.0	75.0	Pass
T7	140 - 120	Guy B@120.083	1/2	855	12.6	16.1	78.4	Pass
T10	80 - 60	Guy B@60.0833	3/8	858	6.4	9.2	69.6	Pass
T1	250 - 240	Guy C@240.083	9/16	833	11.3	21.0	53.8	Pass
T4	200 - 180	Guy C@180.083	9/16	851	15.9	21.0	75.7	Pass
T7	140 - 120	Guy C@120.083	1/2	854	12.7	16.1	78.8	Pass
T10	80 - 60	Guy C@60.0833	3/8	857	6.5	9.2	70.0	Pass
T1	250 - 240	Top Guy Pull-Off@240.083	L2x1 1/2x3/16	8	5.2	20.1	25.6	Pass
T4	200 - 180	Top Guy Pull-Off@180.083	L2x1 1/2x3/16	176	4.3	20.1	21.2	Pass
T7	140 - 120	Top Guy Pull-Off@120.083	L2x1 1/2x3/16	373	4.1	20.1	20.3	Pass
T10	80 - 60	Top Guy Pull-Off@60.0833	L2x1 1/2x3/16	571	3.4	20.1	17.0	Pass

GPD
520 South Main Street, Ste 2531
Akron, OH 44311
Phone: (330) 572-2100
FAX: (330) 572-2101

Section No.	Elevation ft	Component Type	Size	Critical Element	P K	$øP_{allow}$ K	% Capacity	Pass Fail
T1	250 - 240	Torque Arm Top@240.083	L2x2x1/4	836	13.3	30.4	43.9	Pass
T1	250 - 240	Torque Arm Bottom@240.083	L2x2x1/4	838	-14.8	19.3	76.5	Pass
							Summary	
						Leg (T12)	88.0	Pass
						Diagonal (T14)	79.6	Pass
						Horizontal (T2)	43.4	Pass
						Secondary Horizontal (T11)	1.4	Pass
						Top Girt (T2)	20.1	Pass
						Bottom Girt (T13)	36.7	Pass
						Guy A (T7)	78.4	Pass
						Guy B (T7)	78.4	Pass
						Guy C (T7)	78.8	Pass
						Top Guy Pull-Off (T1)	25.6	Pass
						Torque Arm Top (T1)	43.9	Pass
						Torque Arm Bottom (T1)	76.5	Pass
						Bolt Checks	23.5	Pass
						RATING =	**88.0**	**Pass**

ADDITIONAL CALCULATIONS

Guyed Tower Base Foundation

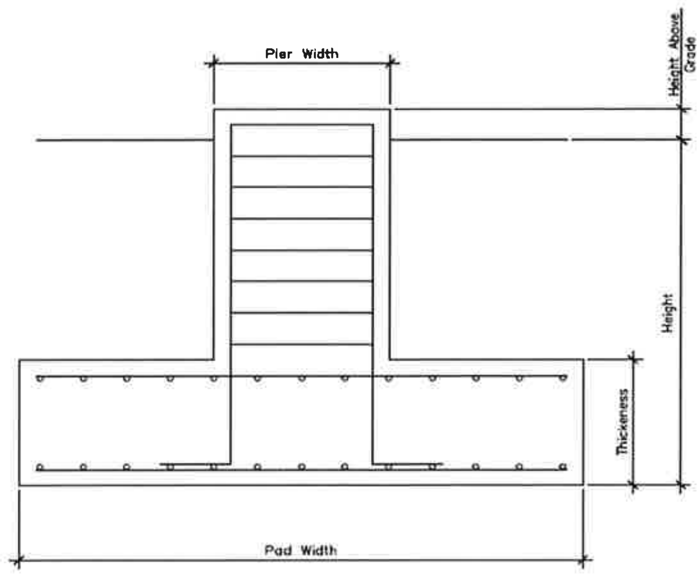
Code: TIA-222-G

Tower Reactions		
Axial	164	k
Shear	1	k

Overall Capacities		
Bearing Capacity	57.0%	OK
Reinforcement Capacity	26.0%	OK
As Min Met?	Yes	
Controlling Capacity	**57.0%**	**OK**

<--- Reinforcing steel unknown - minimums assumed (see report), field verification is recommended.

Pad & Pier Geometry		
Height	4	ft
Height above Grade	2	ft
Pad Width	8	ft
Pad Thickness	2	ft
Pier Shape	Round	
Round Pier Diameter	2.5	ft



Pad & Pier Reinforcing	
Reinforcing Known	No

Soil Properties		
Concrete Unit Weight	150	pcf
Soil Unit Weight	120	pcf
Dead Load Factor	1.2	
Bearing Type	Net	
Ultimate Bearing	9	ksf
ϕ (soil)	0.6	

Bearing Capacity Calculations		
V_s	118.18	ft^3
V_c	147.63	ft^3
Ws (factored)	17.02	k
Wc (factored)	26.57	k
Q_{max}	3.31	ksf
Q_{max} @ 45°	3.34	ksf
ϕQu	5.69	ksf

Reinforcing Calculations			
Pad Moment Capacity			
ϕ (bending)=	0.90		
M_u=	10.23	k-ft	
ϕM_n=	47.86	k-ft	
Moment Capacity	21.4%		OK
One-Way (Wide-Beam) Shear			
V_u=	15.33	psi	
ϕV_n=	82.16	psi	
Shear Capacity	18.7%		OK
Two-Way (Punching) Shear			
V_u=	42.68	psi	
ϕV_n=	164.32	psi	
Shear Capacity	26.0%		OK
Pier Compression			
P_u=	164	k	
ϕP_n=	1136.79	k	
Compression Capacity	14.4%		OK

Guyed Tower Anchor Foundation TIA-222-G

Guy Anchor Location	
Azimuth/Leg	*A/B/C*
Radius	*Varies*

Tower Reactions		
Vertical	37	k
Horizontal	41	k

Capacity Summary		
Soil Capacity=	96.1%	OK
Reinforcing Capacity=	9.3%	OK
Controlling Capacity=	**96.1%**	**OK**

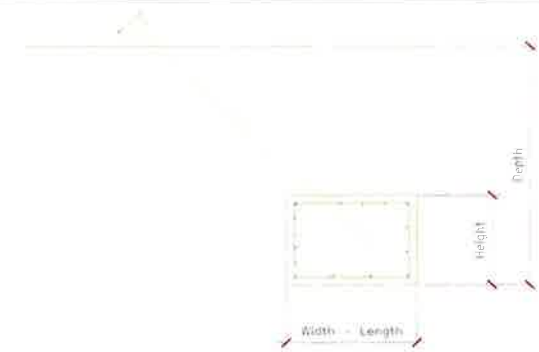
Minimum steel has been assumed

Anchor Block Geometry		
Width	5	ft
Height	4	ft
Length	12	ft
Depth	6	ft
Dead Load Factor	0.9	

Soil Properties					
ϕ (uplift)		0.75	(TIA-222-G-1 Section 9.4.1)		
ϕ (friction/lateral)		0.75			
Layer	C, psf	ϕ, degrees	γ_{soil}, pcf	$\gamma_{concrete}$, pcf	d, ft
1	0	0	110	150	2
2	0	34	120	150	5
3					
4					
Ignored Depth	2 ft		Consider soil for uplift		
Water Table	2 ft		Granular		

0 deg

Soil Capacity Calculations		
W_s	13.20 k	
W_c	21.02 k	
$LF*W_s$	11.88 k	
$LF*W_c$	18.92 k	
Uplift Resistance	50.95 k	
Horizontal Resistance	42.68 k	
Uplift Capacity=	72.6%	OK
Horizontal Capacity=	96.1%	OK



Anchor Block Reinforcement		
Is Reinforcement Known?	assume min	
fc'	3	ksi
Fy	60	ksi

Block Moment and Shear Calculations					
Moment Check					
M_{ux}=	55.50 k-ft		M_{uy}=	61.50 k-ft	
ϕM_{nx}=	1681.98 k-ft		ϕM_{ny}=	2176.98 k-ft	
Capacity	3.3%	OK	Capacity	2.8%	OK
Shear Check					
V_{ux}=	18.50 k		V_{uy}=	20.50 k	
ϕV_{nx}=	217.514321 k		ϕV_{ny}=	221.3347 k	
Capacity	8.5%	OK	Capacity	9.3%	OK