Robinson+Cole

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Also admitted in Massachusetts

August 13, 2015

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

Re: **Notice of Exempt Modification – Facility Modification**
467 South Quaker Lane, West Hartford, Connecticut

Dear Ms. Bachman:

Cellco Partnership d/b/a Verizon Wireless ("Cellco") currently maintains twelve (12) antennas at the 100-foot level of the existing 119-foot tower at 467 South Quaker Lane in West Hartford, Connecticut (the "Property"). The tower is owned by Crown Castle. The Council approved Cellco's use of this tower in 2001. Cellco now intends to replace six (6) of its existing antennas with three (3) model SBNHH-1DS65B, 1900 MHz antennas and three (3) model SBNHH-1DS65B, 2100 MHz antennas, all at the same 100-foot level on the tower. Cellco also intends to replace three (3) of its existing remote radio heads ("RRHs") with new RRHs and install six (6) additional RRHs behind its antennas and two (2) HYBRIFLEX™ fiber optic antenna cables attached to the outside of the monopole. 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 Ronald Van Winkle, Town Manager for the Town of West Hartford. A copy of this letter is also being sent Crown Castle, the owner of the tower and to the Church of the St. Mark the Evangelist, 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).

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 at the 100-foot level on the 119-foot 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 worst-case 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:
Ronald Van Winkle, Town Manager
Church of the St. Mark the Evangelist
Crown Castle
Tim Parks, Verizon Wireless

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	1920–2180	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	1920–2180	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
Gain by Beam Tilt, average, dBi	0 ° | 14.6	0 ° | 14.5	0 ° | 17.4	0 ° | 17.8	0 ° | 18.1	0 ° | 18.2
	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

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®

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.

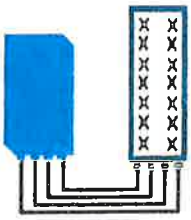
Its compactness and slim design makes the Alcatel-Lucent B13 RRH4x30-4R easy to install close to the antenna: operators can therefore locate this Remote Radio Head where RF design conditions are deemed ideal, minimizing trade-offs between available sites and RF optimum sites, together with reducing the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



4x30W with 4T4R
or
2x60W with 2T4R

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

Alcatel·Lucent

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

PCS RF MODULES

RRH1900 2X60 - HW CHARACTERISTICS

LA6.0.1/13.3

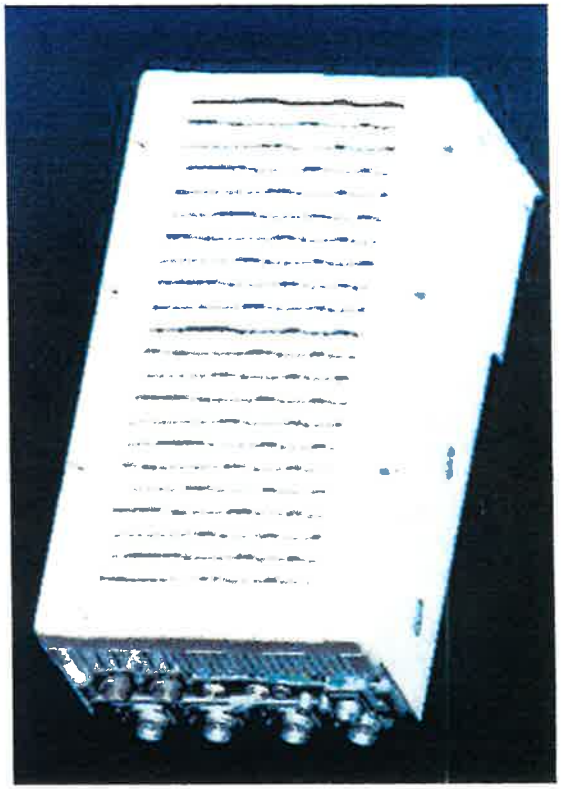
	RRH2x60
RF Output Power	2x60W
Instantaneous Bandwidth	20MHz
Transmitter	2 TX
Receiver 1900 HW version 1900A HW version	2 Branch RX – LA6.0.1 4 Branch RX – LR13.3
Features	AISG 2.0 for RET/TMA
	Internal Smart Bias-T
Power	-48VDC
CPRI Ports	2 CPRI Rate 3 Ports
External Alarms	4 External User Alarms
Monitor 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.)

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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.

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.

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).

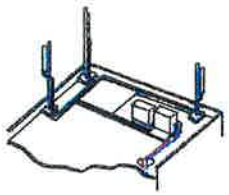
The Alcatel-Lucent RRH2x60-AWS is a very cost-effective solution to deploy LTE MIMO.

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.

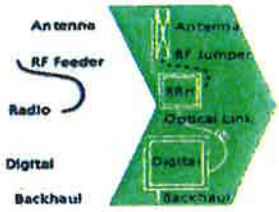
The limited space available in some sites may prevent the installation of traditional single-cabinet BTS equipment. However, many of these sites can host an Alcatel-Lucent RRH2x60-AWS installation, providing more flexible site selection and improved network quality along with greatly reduced installation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

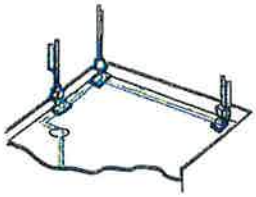
Installation can easily be done by a single person as the Alcatel-Lucent RRH2x60-AWS is compact and weighs about 20 kg, eliminating the need for a crane to hoist the BTS cabinet to the rooftop. A site can be in operation in less than one day.



Macro



RRH for space-constrained cell sites



Distributed

- 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
- 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.

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

Dimensions and weights

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

Electrical Data

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

RF Characteristics

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

Connectivity

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

Environmental specifications

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

Safety and Regulatory Data

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

Alcatel·Lucent

AT THE SPEED OF IDEAS™

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 CELLFLEX³ 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)		[mm² (AWG)]	8.4 (8)
Quantity, Wire Count (Power)			16 (8 pairs)
Size (Alarm)		[mm² (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)

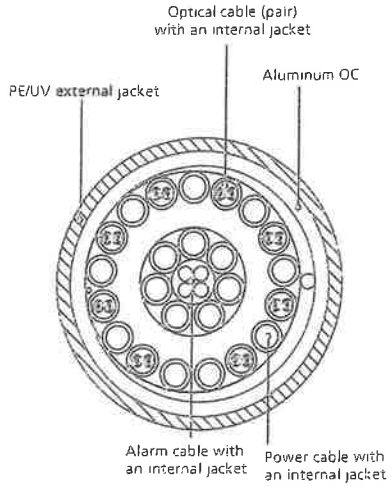


Figure 2: Construction Detail

* This data is provisional and subject to change

ATTACHMENT 2

	General	Power	Density					
Site Name: West Hartford 2								
Tower Height: 119Ft.								
CARRIER	**# OF CHAN.**	**WATTS ERP**	**HEIGHT**	**CALC. POWER DENS**	**FREQ.**	**MAX. PERMISS. EXP.**	**FRACTION MPE**	**Total**
*AT&T UMTS	2	565	110	0.0336	880	0.5867	5.72%	
*AT&T UMTS	2	875	110	0.0520	1900	1.0000	5.20%	
*AT&T GSM	1	283	110	0.0084	880	0.5867	1.43%	
*AT&T GSM	4	525	110	0.0624	1900	1.0000	6.24%	
*AT&T LTE	1	1375	110	0.0409	734	0.4893	8.35%	
*Clearwire	2	153	80	0.0172	2496	1.0000	1.72%	
*Clearwire	1	211	80	0.0119	11 GHz	1.0000	1.19%	
*T-Mobile PCS/AWS	2	953	120	0.0476	1900	1.0000	4.76%	
*T-Mobile PCS/AWS	4	477	120	0.0476	2100	1.0000	4.76%	
*T-Mobile LTE	1	445	120	0.0111	700	0.4667	2.38%	
Verizon PCS	**3**	**459**	**100**	**0.0495**	**1970**	**1.0000**	**4.95%**	
Verizon Cellular	**7**	**416**	**100**	**0.1047**	**869**	**0.5793**	**18.07%**	
Verizon AWS	**1**	**3500**	**100**	**0.1258**	**2145**	**1.0000**	**12.58%**	
Verizon 700	**1**	**2100**	**100**	**0.0755**	**746**	**0.4973**	**15.18%**	
								92.55%
* Source: Siting Council								

ATTACHMENT 3

Date: **July 1, 2015**

Rebecca Klein
Crown Castle
525 Alderman Lane
Fort Mill, SC 29715
(704) 405-6525

Tower Engineering Professionals
326 Tryon Road
Raleigh, NC 27603
(919) 661-6351
crown@tepgroup.net

Subject: **Structural Analysis Report**

Carrier Designation:	***Verizon Wireless* Co-Locate**	
	Carrier Site Number:	N/A
	Carrier Site Name:	West Hartford 2
Crown Castle Designation:	**Crown Castle BU Number:**	829013
	Crown Castle Site Name:	West Hartford/I-84/X43
	Crown Castle JDE Job Number:	337922
	Crown Castle Work Order Number:	1078102
	Crown Castle Application Number:	300644 Rev. 1
Engineering Firm Designation:	**TEP Project Number:**	25680.34354
Site Data:	**467 South Quaker Lane (Church of St. Mark)** **West Hartford, Hartford County, CT 06110** **Latitude *41° 44' 55.59"*, Longitude *-72° 43' 52.86"*** **119 Foot - Monopole Tower**	

Dear Rebecca Klein,

Tower Engineering Professionals 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 801583, in accordance with application 300644, revision 1.

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

LC4.7: Existing + Reserved + Proposed Equipment with Proposed Modifications **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 Structural Standards for Steel Antenna Towers and Antenna Supporting Structures and the 2005 Connecticut State Building Code with 2013 Amendments (2003 International Building Code) based upon a wind speed of 80 mph fastest mile.

All modifications and equipment proposed in this report shall be installed in accordance with the appurtenances listed in Tables 1 and 2 and the attached drawing for the determined available structural capacity to be effective.

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

Structural analysis prepared by: Thomas P. Garrighan, P.E. / ZRH

Respectfully submitted by:

Graham M. Andres, P.E.

STATE OF CONNECTICUT
GRAHAM M. ANDRES
29538
LICENSED
PROFESSIONAL ENGINEER
7/1/15

Electronic Copy

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1) INTRODUCTION

This tower is a 119-ft monopole tower designed by Pirod, Inc. in May of 2000. The tower was originally designed for a wind speed of 80 mph per EIA/TIA-222-F for the appurtenances listed in Table 3. The tower has been modified per reinforcement drawings prepared by Natcomm, LLC in November of 2006. The proposed reinforcement by TEP in April of 2015 was considered in this analysis. TEP visited the site on July of 2014 to perform a Rebar Mapping. All information provided to TEP was assumed to be accurate and complete.

2) ANALYSIS CRITERIA

The analysis has been performed in accordance with the TIA/EIA-222-F Structural Standards for Steel Antenna Towers and Antenna Supporting Structures and ASCE 7-05 Minimum Design Loads for Buildings and Other Structures using a fastest mile wind speed of 80 mph with no ice, 37.6 mph with 1.0 inch escalating 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
100.0	100.0	6	Commscope	SBNHH-1D65B w/ Mount Pipe	2	1-5/8	1
		3	Alcatel Lucent	RRH2X60-PCS			
		3	Alcatel Lucent	RRH2x60-AWS			
		1	RFS Celwave	DB-T1-6Z-8AB-0Z			
		3	Alcatel Lucent	RRH2x60-700			

Notes:
1) See "Appendix B – Base Level Drawing" for assumed feed line configuration.

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
120.0	120.0	3	Commscope	LNX-6515DS-VTM w/ Mount Pipe	-	-	1
		3	Ericsson	RRUS 11 B12			
		1	RFS Celwave	APXV18-206517S-C w/ Mount Pipe			
		3	Ericsson	Air 21 B2A B4P w/ Mount Pipe	13	1-5/8	2
		3	Ericsson	Air 21 B4A B2P w/ Mount Pipe			
		3	Ericsson	KRY 112 144/1			
		1	Tower Mounts	Platform Mount [LP 403-1]			
115.0	115.0	1	Andrew	VHLP2-18	1	1/2	2
		1	Tower Mounts	Side Arm Mount [SO 102-3]			

Mounting Level (ft)	Center Line Elevation (ft)	Number of Antennas	Antenna Manufacturer	Antenna Model	Number of Feed Lines	Feed Line Size (in)	Note
110.0	110.0	1	Andrew	SBNH-1D6565C w/ Mount Pipe	1 2 12	3/8 7/16 1-5/8	2
		2	KMW Communications	AM-X-CD-16-65-00T-RET w/ Mount Pipe			
		6	Powerwave Technologies	7770.00 w/ Mount Pipe			
		1	Raycap	DC6-48-60-18-8F			
		6	Ericsson	RRUS 11			
		4	Powerwave Technologies	LGP21903			
		1	Tower Mounts	Platform Mount [LP 712-1]			
100.0	100.0	3	Antel	BXA-171063/8CF w/ Mount Pipe	-	-	3
		3	Antel	BXA-185063/8CF w/ Mount Pipe			
		3	Alcatel Lucent	RRH2X40-AWS			
		6	RFS Celwave	FD9R6004/2C-3L			
		3	Amphenol	BXA-80063-4BF-EDIN-X w/ Mount Pipe	12	1-5/8	2
		2	Andrew	LNX-6514DS-T4M w/ Mount Pipe			
		1	Antel	BXA-70063-6CF-EDIN-0 w/ Mount Pipe			
		1	RFS Celwave	DB-T1-6Z-8AB-0Z			
		1	Tower Mounts	Platform Mount [LP 403-1]			
90.0	90.0	3	Kathrein	742 213 w/ Mount Pipe	6	1-5/8	2
80.0	83.0	1	Andrew	VHLP2-23	3 1 3 3	1/4 5/16 1/2 5/8	2
		1	Clearwire	CW Junction Box			
	81.0	3	Argus Technologies	LLPX310R w/ Mount Pipe			
		3	Samsung Telecom.	Wimax Dap Head			
	80.0	1	Tower Mounts	Side Arm Mount [SO 101-3]			

Notes:
1) Reserved equipment
2) Existing equipment
3) Existing equipment to be removed; not considered in this analysis

Table 3 - Design Antenna and Cable Information

Mounting Level (ft)	Center Line Elevation (ft)	Number of Antennas	Antenna Manufacturer	Antenna Model	Number of Feed Lines	Feed Line Size (in)
120.0	120.0	12	Generic	1'x4' Panels	12	1-5/8
110.0	110.0	12	Generic	1'x4' Panels	12	1-5/8
100.0	100.0	12	Generic	1'x4' Panels	12	1-5/8

3) ANALYSIS PROCEDURE

Table 4 - Documents Provided

Document	Remarks	Reference	Source
Supplemental Geotechnical Report	Tower Engineering Professionals	3636697	CCISites
Tower Foundation Drawings	Pirod, Inc.	3636698	CCISites
Rebar Mapping	Tower Engineering Professionals	3636698	CCISites
Tower Manufacturer Drawings	Pirod, Inc.	3525378	CCISites
Tower Reinforcement Drawings	Natcomm Consulting Engineers, Inc.	3525386	CCISites
Post Modification Inspection	Natcomm Consulting Engineers, Inc.	3974228	CCISites
Tower Reinforcement Drawings	Tower Engineering Professionals	5650111	CCISites

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.

RISA-3D (version 13.0.0), a commercially available analysis software package, was used to create a three-dimensional model of the tower foundation. Selected output from the analysis is included in Appendix C.

3.2) Assumptions

1) The tower and foundation were built in accordance with the manufacturer's specifications.
2) The tower and foundation 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 "Appendix B – Base Level Drawing".
4) When applicable, transmission cables are considered as structural components for calculating wind loads as allowed by the standard.
5) All tower components are in sufficient condition to carry their full design capacity.
6) Serviceability with respect to antenna twist, tilt, roll, or lateral translation, is not checked and is left to the carrier or tower owner to ensure conformance.
7) All antenna mounts and mounting hardware are structurally sufficient to carry the full design capacity requirements of appurtenance wind area and weight as provided by the original manufacturer specifications. It is the carrier's responsibility to ensure compliance to the structural limitations of the existing and/or proposed antenna mounts. TEP did not perform a site visit to verify the size, condition or capacity of the antenna mounts and did not analyze antennas supporting mounts as part of this structural analysis report.

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

4) ANALYSIS RESULTS

Table 5 - Section Capacity (Summary)

Section No.	Elevation (ft)	Component Type	Size	Critical Element	P (lb)	SF*P_{allow} (lb)	% Capacity	Pass / Fail
L1	119.083 - 101.083	Pole	TP26x22.13x0.25	1	-5837	1036362	20.8	Pass
L2	101.083 - 66.5	Pole	TP34.063x24.873x0.313	2	-14017	1691870	59.0	Pass
L3	66.5 - 32.8333	Pole	TP41.75x32.498x0.375	3	-20995	2488938	66.1	Pass
L4	32.8333 - 0	Pole	TP49.063x39.849x0.375	4	-30576	3012660	74.3	Pass
							Summary	
						Pole (L4)	74.3	Pass
						RATING =	**74.3**	**Pass**

Table 6 - Tower Component Stresses vs. Capacity

Notes	Component	Elevation (ft)	% Capacity	Pass / Fail
1	Anchor Rods	-	72.3	Pass
1	Base Plate	-	61.9	Pass
1	Base Foundation Soil Interaction	-	65.9	Pass
1	Base Foundation Structural	-	54.2	Pass
1	Rock Anchors	-	81.1	Pass

Structure Rating (max from all components) =	**81.1%**

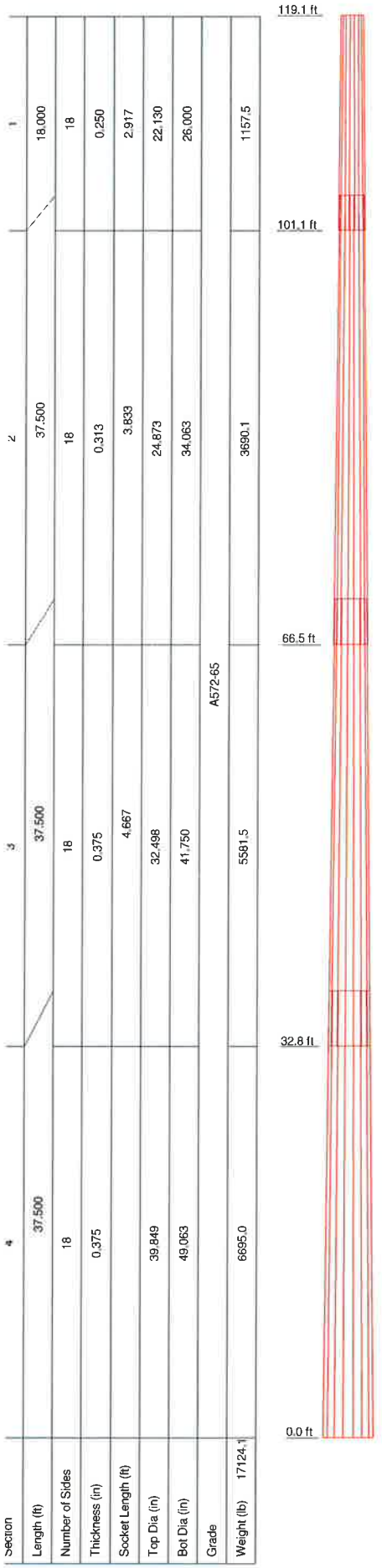
Notes:
1) See additional documentation in "Appendix C - Additional Calculations" for calculations supporting the % capacity listed.

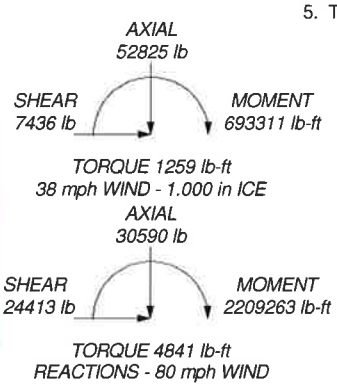
4.1) Recommendations

1) If the load differs from that described in Tables 1 and 2 of this report, "Appendix B – Base Level Drawing" or the provisions of this analysis are found to be invalid, another structural analysis should be performed.
2) The tower and its foundation have sufficient capacity to carry the existing, reserved, and proposed loads. No modifications are required at this time.

APPENDIX A

TNXTOWER OUTPUT





DESIGNED APPURTENANCE LOADING

TYPE	ELEVATION	TYPE	ELEVATION
2.4-in x 6-ft Mount Pipe	123	DC6-48-60-18-8F	110
LNX-6515DS-VTM w/ Mount Pipe	120	Platform Mount [LP 712-1]	110
LNX-6515DS-VTM w/ Mount Pipe	120	(2) 7770.00 w/ Mount Pipe	110
LNX-6515DS-VTM w/ Mount Pipe	120	LNX-6514DS-T4M w/ Mount Pipe	100
APXV18-206517S-C w/ Mount Pipe	120	BXA-70063-6CF-EDIN-0 w/ Mount Pipe	100
RRUS 11 B12	120	BXA-80063-4BF-EDIN-X w/ Mount Pipe	100
RRUS 11 B12	120		
RRUS 11 B12	120	BXA-80063-4BF-EDIN-X w/ Mount Pipe	100
ERICSSON AIR 21 B2A B4P w/ Mount Pipe	120	BXA-80063-4BF-EDIN-X w/ Mount Pipe	100
ERICSSON AIR 21 B2A B4P w/ Mount Pipe	120	DB-T1-6Z-8AB-0Z	100
ERICSSON AIR 21 B2A B4P w/ Mount Pipe	120	(2) SBNHH-1D65B w/ Mount Pipe	100
ERICSSON AIR 21 B4A B2P w/ Mount Pipe	120	(2) SBNHH-1D65B w/ Mount Pipe	100
ERICSSON AIR 21 B4A B2P w/ Mount Pipe	120	(2) SBNHH-1D65B w/ Mount Pipe	100
ERICSSON AIR 21 B4A B2P w/ Mount Pipe	120	RRH2x60-700	100
KRY 112 144/1	120	RRH2x60-700	100
KRY 112 144/1	120	RRH2x60-700	100
KRY 112 144/1	120	RRH2x60-AWS	100
2.4" Dia. x 6' Mount Pipe	120	RRH2x60-AWS	100
2.4" Dia. x 6' Mount Pipe	120	RRH2x60-AWS	100
Platform Mount [LP 403-1]	120	RRH2X60-PCS	100
Side Arm Mount [SO 102-3]	115	RRH2X60-PCS	100
2.4" Dia. x 6' Mount Pipe	115	RRH2X60-PCS	100
VHLP2-18	115	DB-T1-6Z-8AB-0Z	100
(2) 7770.00 w/ Mount Pipe	110	Platform Mount [LP 403-1]	100
(2) 7770.00 w/ Mount Pipe	110	LNX-6514DS-T4M w/ Mount Pipe	100
AM-X-CD-16-65-00T-RET w/ Mount Pipe	110	2'x3' Ice Shield	97
		2'x3' Ice Shield	95
SBNH-1D6565C w/ Mount Pipe	110	742 213 w/ Mount Pipe	90
AM-X-CD-16-65-00T-RET w/ Mount Pipe	110	742 213 w/ Mount Pipe	90
		742 213 w/ Mount Pipe	90
(2) RRUS 11	110	LLPX310R w/ Mount Pipe	80
(2) RRUS 11	110	LLPX310R w/ Mount Pipe	80
(2) RRUS 11	110	WIMAX DAP HEAD	80
(2) LGP21903	110	WIMAX DAP HEAD	80
(2) LGP21903	110	WIMAX DAP HEAD	80
2.4" Dia. x 6' Mount Pipe	110	CW JUNCTION BOX	80
2.4" Dia. x 6' Mount Pipe	110	2.4" Dia. x 6' Mount Pipe	80
2.4" Dia. x 6' Mount Pipe	110	2.4" Dia. x 6' Mount Pipe	80
		2.4" Dia. x 6' Mount Pipe	80
		Side Arm Mount [SO 101-3]	80
		LLPX310R w/ Mount Pipe	80
		VHLP2-23	80

MATERIAL STRENGTH

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

TOWER DESIGN NOTES

1. Tower is located in Hartford County, Connecticut.
2. Tower designed for a 80 mph basic wind in accordance with the TIA/EIA-222-F Standard.
3. Tower is also designed for a 38 mph basic wind with 1.00 in ice. Ice is considered to increase in thickness with height.
4. Deflections are based upon a 50 mph wind.
5. TOWER RATING: 74.3%

Tower Engineering Professionals
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326 Tryon Road
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Phone: (919) 661-6351
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Job:	*West Hartford/I-84/X43 (BU 8290*		
Project:	*TEP No. 25680.34354*		
Client: Crown Castle	Drawn by: tgarrighan	App'd:	
Code: TIA/EIA-222-F	Date: 07/01/15	Scale: N	
Path: C:\Users\tgarrighan\Desktop\tnx\25680\829013_LC4.7.er		Dwg No.	

Tower Input Data

There is a pole section.
This tower is designed using the TIA/EIA-222-F standard.
The following design criteria apply:

Tower is located in Hartford County, Connecticut.
Basic wind speed of 80 mph.
Nominal ice thickness of 1.000 in.
Ice thickness is considered to increase with height.
Ice density of 56 pcf.
A wind speed of 38 mph is used in combination with ice.
Temperature drop of 50 °F.
Deflections calculated using a wind speed of 50 mph.
A non-linear (P-delta) analysis was used.
Pressures are calculated at each section.
Stress ratio used in pole design is 1.333.
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		

Tapered Pole Section Geometry

Section	*Elevation* ft	*Section Length* ft	*Splice Length* ft	*Number of Sides*	*Top Diameter* in	*Bottom Diameter* in	*Wall Thickness* in	*Bend Radius* in	*Pole Grade*
L1	119.083-101.083	18.000	2.917	18	22.130	26.000	0.250	1.000	A572-65 (65 ksi)
L2	101.083-66.500	37.500	3.833	18	24.873	34.063	0.313	1.250	A572-65 (65 ksi)
L3	66.500-32.833	37.500	4.667	18	32.498	41.750	0.375	1.500	A572-65 (65 ksi)
L4	32.833-0.000	37.500		18	39.849	49.063	0.375	1.500	A572-65 (65 ksi)

Tapered Pole Properties

Section	Tip Dia. in	Area in^2	I in^4	r in	C in	I/C in^3	J in^4	It/Q in^2	w in	w/t
L1	22.471	17.362	1050.090	7.767	11.242	93.407	2101.561	8.683	3.455	13.82
	26.401	20.433	1711.654	9.141	13.208	129.592	3425.561	10.218	4.136	16.544
L2	25.982	24.361	1856.528	8.719	12.635	146.930	3715.500	12.183	3.828	12.248
	34.588	33.476	4817.433	11.981	17.304	278.404	9641.206	16.741	5.445	17.424
L3	33.960	38.235	4984.583	11.404	16.509	301.930	9975.724	19.121	5.060	13.492
	42.394	49.247	10650.982	14.688	21.209	502.192	21315.979	24.628	6.688	17.835
L4	41.628	46.984	9249.061	14.013	20.243	456.899	18510.293	23.496	6.353	16.942
	49.819	57.950	17355.138	17.284	24.924	696.329	34733.112	28.981	7.975	21.267

Tower Elevation ft	Gusset Area (per face) ft^2	Gusset Thickness in	Gusset Grade	Adjust. Factor A_f	Adjust. Factor A_r	Weight Mult.	Double Angle Stitch Bolt Spacing Diagonals in	Double Angle Stitch Bolt Spacing Horizontals in
L1 119.083-101.083				1	1	1		
L2 101.083-66.500				1	1	1		
L3 66.500-32.833				1	1	1		
L4 32.833-0.000				1	1	1		

Feed Line/Linear Appurtenances - Entered As Round Or Flat

Description	Face or Leg	Allow Shield	Component Type	Placement ft	Total Number	Number Per Row	Clear Spacing in	Width or Diameter in	Perimeter in	Weight plf
****										

Feed Line/Linear Appurtenances - Entered As Area

Description	Face or Leg	Allow Shield	Component Type	Placement ft	Total Number		C_AA_A ft^2/ft	Weight plf
Safety Line 3/8	C	No	CaAa (Out Of Face)	119.000 - 0.000	1	No Ice	0.037	0.220
						1/2" Ice	0.137	0.750
						1" Ice	0.238	1.280
						2" Ice	0.437	2.340
						4" Ice	0.838	4.460
Rung 5/8" SR (12.5"w, 16"s)	C	No	CaAa (Out Of Face)	119.000 - 0.000	1	No Ice	0.049	0.816
						1/2" Ice	0.149	1.420
						1" Ice	0.249	2.634
						2" Ice	0.449	6.895
						4" Ice	0.849	22.749
119								
LDF7-50A(1-5/8")	B	No	Inside Pole	119.083 - 0.000	11	No Ice	0.000	0.820

Description	Face or Leg	Allow Shield	Component Type	Placement ft	Total Number		C_AA_A ft^2/ft	Weight plf
						1/2" Ice	0.000	0.820
						1" Ice	0.000	0.820
						2" Ice	0.000	0.820
						4" Ice	0.000	0.820
LDF7-50A(1-5/8")	B	No	CaAa (Out Of Face)	119.083 - 0.000	1	No Ice	0.198	0.820
						1/2" Ice	0.298	2.335
						1" Ice	0.398	4.461
						2" Ice	0.598	10.545
						4" Ice	0.998	30.044
LDF7-50A(1-5/8")	B	No	CaAa (Out Of Face)	119.083 - 0.000	1	No Ice	0.000	0.820
						1/2" Ice	0.000	2.335
						1" Ice	0.000	4.461
						2" Ice	0.000	10.545
						4" Ice	0.000	30.044
110								
LDF7-50A(1-5/8")	A	No	Inside Pole	110.000 - 0.000	12	No Ice	0.000	0.820
						1/2" Ice	0.000	0.820
						1" Ice	0.000	0.820
						2" Ice	0.000	0.820
						4" Ice	0.000	0.820
WR-VG102ST-BRDA(7/16")	A	No	Inside Pole	110.000 - 0.000	2	No Ice	0.000	0.201
						1/2" Ice	0.000	0.201
						1" Ice	0.000	0.201
						2" Ice	0.000	0.201
						4" Ice	0.000	0.201
WR-VG122ST-BRDA(3/8)	A	No	Inside Pole	110.000 - 0.000	1	No Ice	0.000	0.200
						1/2" Ice	0.000	0.200
						1" Ice	0.000	0.200
						2" Ice	0.000	0.200
						4" Ice	0.000	0.200
3" Flexible Conduit	A	No	Inside Pole	110.000 - 0.000	1	No Ice	0.000	1.040
						1/2" Ice	0.000	1.040
						1" Ice	0.000	1.040
						2" Ice	0.000	1.040
						4" Ice	0.000	1.040
100								
LDF7-50A(1-5/8")	A	No	Inside Pole	100.000 - 0.000	12	No Ice	0.000	0.820
						1/2" Ice	0.000	0.820
						1" Ice	0.000	0.820
						2" Ice	0.000	0.820
						4" Ice	0.000	0.820
LDF7-50A(1-5/8")	C	No	CaAa (Out Of Face)	80.000 - 0.000	2	No Ice	0.000	0.820
						1/2" Ice	0.000	2.335
						1" Ice	0.000	4.461
						2" Ice	0.000	10.545
						4" Ice	0.000	30.044
LDF7-50A(1-5/8")	C	No	CaAa (Out Of Face)	100.000 - 80.000	1	No Ice	0.000	0.820
						1/2" Ice	0.000	2.335
						1" Ice	0.000	4.461
						2" Ice	0.000	10.545
						4" Ice	0.000	30.044
LDF7-50A(1-5/8")	C	No	CaAa (Out Of Face)	100.000 - 80.000	1	No Ice	0.198	0.820
						1/2" Ice	0.298	2.335
						1" Ice	0.398	4.461
						2" Ice	0.598	10.545
						4" Ice	0.998	30.044
90								
LDF7-50A(1-5/8")	A	No	CaAa (Out Of Face)	90.000 - 0.000	6	No Ice	0.000	0.820
						1/2" Ice	0.000	2.335
						1" Ice	0.000	4.461
						2" Ice	0.000	10.545

Description	Face or Leg	Allow Shield	Component Type	Placement ft	Total Number		C_AA_A ft^2/ft	Weight plf
						4" Ice	0.000	30.044
80								
FSJ1-50A(1/4")	C	No	Inside Pole	80.000 - 0.000	3	No Ice	0.000	0.045
						1/2" Ice	0.000	0.045
						1" Ice	0.000	0.045
						2" Ice	0.000	0.045
						4" Ice	0.000	0.045
HJ4.5-50(5/8")	C	No	Inside Pole	80.000 - 0.000	3	No Ice	0.000	0.400
						1/2" Ice	0.000	0.400
						1" Ice	0.000	0.400
						2" Ice	0.000	0.400
						4" Ice	0.000	0.400
9207(5/16")	C	No	Inside Pole	80.000 - 0.000	1	No Ice	0.000	0.600
						1/2" Ice	0.000	0.600
						1" Ice	0.000	0.600
						2" Ice	0.000	0.600
						4" Ice	0.000	0.600
2" Flexible Conduit	C	No	CaAa (Out Of Face)	80.000 - 0.000	1	No Ice	0.000	0.340
						1/2" Ice	0.000	1.867
						1" Ice	0.000	4.005
						2" Ice	0.000	10.114
						4" Ice	0.000	29.662
2" Flexible Conduit	C	No	CaAa (Out Of Face)	80.000 - 0.000	1	No Ice	0.200	0.340
						1/2" Ice	0.300	1.867
						1" Ice	0.400	4.005
						2" Ice	0.600	10.114
						4" Ice	1.000	29.662
FSJ4-50B(1/2")	C	No	CaAa (Out Of Face)	80.000 - 0.000	4	No Ice	0.000	0.140
						1/2" Ice	0.000	0.763
						1" Ice	0.000	1.997
						2" Ice	0.000	6.298
						4" Ice	0.000	22.229
***								
FSJ4-50B(1/2")	C	No	CaAa (Out Of Face)	115.000 - 80.000	1	No Ice	0.052	0.140
						1/2" Ice	0.152	0.763
						1" Ice	0.252	1.997
						2" Ice	0.452	6.298
						4" Ice	0.852	22.229
****								

Feed Line/Linear Appurtenances Section Areas

Tower Section	Tower Elevation ft	Face	A_R ft^2	A_F ft^2	C_AA_A In Face ft^2	C_AA_A Out Face ft^2	Weight lb
L1	119.083-101.083	A	0.000	0.000	0.000	0.000	102
		B	0.000	0.000	0.000	3.564	192
		C	0.000	0.000	0.000	2.270	21
L2	101.083-66.500	A	0.000	0.000	0.000	0.000	842
		B	0.000	0.000	0.000	6.847	369
		C	0.000	0.000	0.000	10.741	137
L3	66.500-32.833	A	0.000	0.000	0.000	0.000	883
		B	0.000	0.000	0.000	6.666	359
		C	0.000	0.000	0.000	9.639	197
L4	32.833-0.000	A	0.000	0.000	0.000	0.000	862
		B	0.000	0.000	0.000	6.501	350
		C	0.000	0.000	0.000	9.400	192

Feed Line/Linear Appurtenances Section Areas - With Ice

Tower Section	Tower Elevation ft	Face or Leg	Ice Thickness in	A_R ft^2	A_F ft^2	C_AA_A In Face ft^2	C_AA_A Out Face ft^2	Weight lb
L1	119.083-101.083	A	1.155	0.000	0.000	0.000	0.000	102
		B		0.000	0.000	0.000	7.723	357
		C		0.000	0.000	0.000	13.764	122
L2	101.083-66.500	A	1.117	0.000	0.000	0.000	0.000	1489
		B		0.000	0.000	0.000	14.838	686
		C		0.000	0.000	0.000	39.333	886
L3	66.500-32.833	A	1.050	0.000	0.000	0.000	0.000	1763
		B		0.000	0.000	0.000	14.190	652
		C		0.000	0.000	0.000	32.210	1221
L4	32.833-0.000	A	1.000	0.000	0.000	0.000	0.000	1638
		B		0.000	0.000	0.000	13.394	609
		C		0.000	0.000	0.000	30.080	1087

Feed Line Center of Pressure

Section	Elevation ft	CP_X in	CP_Z in	CP_X Ice in	CP_Z Ice in
L1	119.083-101.083	0.080	0.210	-0.261	0.531
L2	101.083-66.500	-0.121	0.316	-0.533	0.685
L3	66.500-32.833	-0.099	0.315	-0.464	0.689
L4	32.833-0.000	-0.102	0.322	-0.472	0.710

Discrete Tower Loads

Description	Face or Leg	Offset Type	Offsets: Horz Lateral ft / Vert ft / ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight lb
2.4-in x 6-ft Mount Pipe	C	None		0.000	123.000	No Ice	1.440	1.440	22
						1/2" Ice	1.933	1.933	33
						1" Ice	2.302	2.302	48
						2" Ice	3.068	3.068	91
						4" Ice	4.711	4.711	232
120									
LNX-6515DS-VTM w/ Mount Pipe	A	From Centroid-Face	4.000 7.000 0.000	30.000	120.000	No Ice	11.683	9.842	83
						1/2" Ice	12.404	11.366	173
						1" Ice	13.135	12.914	273
						2" Ice	14.601	15.267	506
						4" Ice	17.875	20.139	1151
LNX-6515DS-VTM w/ Mount Pipe	B	From Centroid-Face	4.000 -3.750 0.000	30.000	120.000	No Ice	11.683	9.842	83
						1/2" Ice	12.404	11.366	173
						1" Ice	13.135	12.914	273
						2" Ice	14.601	15.267	506

Description	Face or Leg	Offset Type	Offsets: Horz Lateral ft Vert ft ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight lb
						4" Ice	17.875	20.139	1151
LNX-6515DS-VTM w/ Mount Pipe	C	From Centroid-Face	4.000 -3.750 0.000	30.000	120.000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	11.683 12.404 13.135 14.601 17.875	9.842 11.366 12.914 15.267 20.139	83 173 273 506 1151
APXV18-206517S-C w/ Mount Pipe	B	From Centroid-Face	4.000 7.000 0.000	30.000	120.000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	5.404 5.960 6.481 7.547 9.919	4.700 5.860 6.734 8.515 12.277	52 97 150 280 679
RRUS 11 B12	A	From Centroid-Face	4.000 7.000 0.000	30.000	120.000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	3.306 3.550 3.802 4.334 5.501	1.361 1.540 1.728 2.130 3.038	51 72 95 153 314
RRUS 11 B12	B	From Centroid-Face	4.000 -3.750 0.000	30.000	120.000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	3.306 3.550 3.802 4.334 5.501	1.361 1.540 1.728 2.130 3.038	51 72 95 153 314
RRUS 11 B12	C	From Centroid-Face	4.000 -3.750 0.000	30.000	120.000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	3.306 3.550 3.802 4.334 5.501	1.361 1.540 1.728 2.130 3.038	51 72 95 153 314
ERICSSON AIR 21 B2A B4P w/ Mount Pipe	A	From Centroid-Face	4.000 -7.000 0.000	30.000	120.000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	6.825 7.347 7.863 8.926 11.175	5.642 6.480 7.257 8.864 12.293	112 169 233 383 807
ERICSSON AIR 21 B2A B4P w/ Mount Pipe	B	From Centroid-Face	4.000 -7.000 0.000	30.000	120.000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	6.825 7.347 7.863 8.926 11.175	5.642 6.480 7.257 8.864 12.293	112 169 233 383 807
ERICSSON AIR 21 B2A B4P w/ Mount Pipe	C	From Centroid-Face	4.000 -7.000 0.000	30.000	120.000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	6.825 7.347 7.863 8.926 11.175	5.642 6.480 7.257 8.864 12.293	112 169 233 383 807
ERICSSON AIR 21 B4A B2P w/ Mount Pipe	A	From Centroid-Face	4.000 3.750 0.000	30.000	120.000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	6.825 7.347 7.863 8.926 11.175	5.642 6.480 7.257 8.864 12.293	112 169 233 383 807
ERICSSON AIR 21 B4A B2P w/ Mount Pipe	B	From Centroid-Face	4.000 3.750 0.000	30.000	120.000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	6.825 7.347 7.863 8.926 11.175	5.642 6.480 7.257 8.864 12.293	112 169 233 383 807
ERICSSON AIR 21 B4A B2P w/ Mount Pipe	C	From Centroid-Face	4.000 7.000 0.000	30.000	120.000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	6.825 7.347 7.863 8.926 11.175	5.642 6.480 7.257 8.864 12.293	112 169 233 383 807
KRY 112 144/1	A	From	4.000	30.000	120.000	No Ice	0.411	0.189	11

Description	Face or Leg	Offset Type	Offsets: Horz Lateral ft / Vert ft / ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight lb
		Centroid-Face	-7.000 0.000			1/2" Ice 1" Ice	0.500 0.597	0.256 0.332	14 18
						2" Ice 4" Ice	0.818 1.363	0.510 0.970	32 81
KRY 112 144/1	B	From Centroid-Face	4.000 -7.000 0.000	30.000	120.000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	0.411 0.500 0.597 0.818 1.363	0.189 0.256 0.332 0.510 0.970	11 14 18 32 81
KRY 112 144/1	C	From Centroid-Face	4.000 -7.000 0.000	30.000	120.000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	0.411 0.500 0.597 0.818 1.363	0.189 0.256 0.332 0.510 0.970	11 14 18 32 81
2.4" Dia. x 6' Mount Pipe	A	From Centroid-Face	4.000 0.000 0.000	0.000	120.000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	1.425 1.931 2.316 3.149 5.058	1.425 1.931 2.316 3.149 5.058	22 38 56 100 252
2.4" Dia. x 6' Mount Pipe	C	From Centroid-Face	4.000 0.000 0.000	0.000	120.000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	1.425 1.931 2.316 3.149 5.058	1.425 1.931 2.316 3.149 5.058	22 38 56 100 252
Platform Mount [LP 403-1]	C	None		0.000	120.000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	18.850 24.300 29.750 40.650 62.450	18.850 24.300 29.750 40.650 62.450	1500 1797 2093 2686 3872
****115***									
Side Arm Mount [SO 102-3]	C	None		0.000	115.000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	3.000 3.480 3.960 4.920 6.840	3.000 3.480 3.960 4.920 6.840	81 111 141 201 321
2.4" Dia. x 6' Mount Pipe	C	From Leg	0.500 0.000 0.000	0.000	115.000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	1.425 1.931 2.316 3.149 5.058	1.425 1.931 2.316 3.149 5.058	22 38 56 100 252
110									
(2) 7770.00 w/ Mount Pipe	A	From Centroid-Face	4.000 -4.000 0.000	30.000	110.000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	6.119 6.626 7.128 8.164 10.360	4.254 5.014 5.711 7.155 10.412	55 103 157 287 665
(2) 7770.00 w/ Mount Pipe	B	From Centroid-Face	4.000 -4.000 0.000	20.000	110.000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	6.119 6.626 7.128 8.164 10.360	4.254 5.014 5.711 7.155 10.412	55 103 157 287 665
(2) 7770.00 w/ Mount Pipe	C	From Centroid-Face	4.000 -4.000 0.000	30.000	110.000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	6.119 6.626 7.128 8.164 10.360	4.254 5.014 5.711 7.155 10.412	55 103 157 287 665
AM-X-CD-16-65-00T-RET	A	From	4.000	30.000	110.000	No Ice	8.498	6.304	74

Description	Face or Leg	Offset Type	Offsets: Horz Lateral ft / Vert ft / ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight lb
w/ Mount Pipe		Centroid-Face	6.000 0.000			1/2" Ice 1" Ice 2" Ice 4" Ice	9.149 9.767 11.031 13.679	7.479 8.368 10.179 14.024	139 212 385 874
SBNH-1D6565C w/ Mount Pipe	B	From Centroid-Face	4.000 6.000 0.000	20.000	110.000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	11.695 12.421 13.157 14.630 17.917	9.854 11.383 12.936 15.305 20.189	99 189 289 523 1169
AM-X-CD-16-65-00T-RET w/ Mount Pipe	C	From Centroid-Face	4.000 6.000 0.000	30.000	110.000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	8.498 9.149 9.767 11.031 13.679	6.304 7.479 8.368 10.179 14.024	74 139 212 385 874
(2) RRUS 11	A	From Centroid-Face	4.000 0.000 0.000	30.000	110.000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	2.942 3.172 3.410 3.913 5.023	1.246 1.412 1.587 1.963 2.819	55 74 97 151 302
(2) RRUS 11	B	From Centroid-Face	4.000 0.000 0.000	20.000	110.000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	2.942 3.172 3.410 3.913 5.023	1.246 1.412 1.587 1.963 2.819	55 74 97 151 302
(2) RRUS 11	C	From Centroid-Face	4.000 0.000 0.000	30.000	110.000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	2.942 3.172 3.410 3.913 5.023	1.246 1.412 1.587 1.963 2.819	55 74 97 151 302
(2) LGP21903	A	From Centroid-Face	4.000 6.000 0.000	30.000	110.000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	0.270 0.343 0.425 0.616 1.101	0.184 0.248 0.322 0.494 0.943	11 13 17 28 72
(2) LGP21903	B	From Centroid-Face	4.000 6.000 0.000	20.000	110.000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	0.270 0.343 0.425 0.616 1.101	0.184 0.248 0.322 0.494 0.943	11 13 17 28 72
2.4" Dia. x 6' Mount Pipe	A	From Centroid-Face	4.000 -2.000 0.000	0.000	110.000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	1.425 1.931 2.316 3.149 5.058	1.425 1.931 2.316 3.149 5.058	22 38 56 100 252
2.4" Dia. x 6' Mount Pipe	B	From Centroid-Face	4.000 -2.000 0.000	0.000	110.000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	1.425 1.931 2.316 3.149 5.058	1.425 1.931 2.316 3.149 5.058	22 38 56 100 252
2.4" Dia. x 6' Mount Pipe	C	From Centroid-Face	4.000 -2.000 0.000	0.000	110.000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	1.425 1.931 2.316 3.149 5.058	1.425 1.931 2.316 3.149 5.058	22 38 56 100 252
DC6-48-60-18-8F	B	From Centroid-Face	4.000 -6.000 0.000	20.000	110.000	No Ice 1/2" Ice 1" Ice	1.266 1.456 1.658	1.266 1.456 1.658	20 35 53

Description	Face or Leg	Offset Type	Offsets: Horz Lateral ft / Vert ft / ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight lb
						2" Ice	2.093	2.093	95
						4" Ice	3.098	3.098	215
Platform Mount [LP 712-1]	C	None		0.000	110.000	No Ice	24.530	24.530	1335
						1/2" Ice	29.940	29.940	1646
						1" Ice	35.350	35.350	1956
						2" Ice	46.170	46.170	2577
						4" Ice	67.810	67.810	3820
100									
LNX-6514DS-T4M w/ Mount Pipe	A	From Centroid-Face	4.000 -3.000 0.000	0.000	100.000	No Ice	8.682	7.418	79
						1/2" Ice	9.312	8.452	152
						1" Ice	9.931	9.345	233
						2" Ice	11.198	11.181	420
						4" Ice	13.852	15.216	938
LNX-6514DS-T4M w/ Mount Pipe	B	From Centroid-Face	4.000 -3.000 0.000	0.000	100.000	No Ice	8.682	7.418	79
						1/2" Ice	9.312	8.452	152
						1" Ice	9.931	9.345	233
						2" Ice	11.198	11.181	420
						4" Ice	13.852	15.216	938
BXA-70063-6CF-EDIN-0 w/ Mount Pipe	C	From Centroid-Face	4.000 -3.000 0.000	0.000	100.000	No Ice	7.969	5.801	42
						1/2" Ice	8.609	6.953	103
						1" Ice	9.216	7.819	171
						2" Ice	10.459	9.601	335
						4" Ice	13.066	13.366	804
BXA-80063-4BF-EDIN-X w/ Mount Pipe	A	From Centroid-Face	4.000 7.000 0.000	0.000	100.000	No Ice	5.089	3.472	30
						1/2" Ice	5.515	4.045	70
						1" Ice	5.953	4.640	116
						2" Ice	6.859	5.957	227
						4" Ice	8.816	8.886	554
BXA-80063-4BF-EDIN-X w/ Mount Pipe	B	From Centroid-Face	4.000 7.000 0.000	0.000	100.000	No Ice	5.089	3.472	30
						1/2" Ice	5.515	4.045	70
						1" Ice	5.953	4.640	116
						2" Ice	6.859	5.957	227
						4" Ice	8.816	8.886	554
BXA-80063-4BF-EDIN-X w/ Mount Pipe	C	From Centroid-Face	4.000 7.000 0.000	0.000	100.000	No Ice	5.089	3.472	30
						1/2" Ice	5.515	4.045	70
						1" Ice	5.953	4.640	116
						2" Ice	6.859	5.957	227
						4" Ice	8.816	8.886	554
DB-T1-6Z-8AB-0Z	C	From Centroid-Face	4.000 3.000 0.000	0.000	100.000	No Ice	5.600	2.333	44
						1/2" Ice	5.915	2.558	80
						1" Ice	6.240	2.791	120
						2" Ice	6.914	3.284	213
						4" Ice	8.365	4.373	455
(2) SBNHH-1D65B w/ Mount Pipe	A	From Centroid-Face	4.000 -3.000 0.000	0.000	100.000	No Ice	8.533	7.004	76
						1/2" Ice	9.184	8.185	145
						1" Ice	9.803	9.081	221
						2" Ice	11.067	10.904	401
						4" Ice	13.716	14.926	906
(2) SBNHH-1D65B w/ Mount Pipe	B	From Centroid-Face	4.000 -3.000 0.000	0.000	100.000	No Ice	8.533	7.004	76
						1/2" Ice	9.184	8.185	145
						1" Ice	9.803	9.081	221
						2" Ice	11.067	10.904	401
						4" Ice	13.716	14.926	906
(2) SBNHH-1D65B w/ Mount Pipe	C	From Centroid-Face	4.000 -3.000 0.000	0.000	100.000	No Ice	8.533	7.004	76
						1/2" Ice	9.184	8.185	145
						1" Ice	9.803	9.081	221
						2" Ice	11.067	10.904	401

Description	Face or Leg	Offset Type	Offsets: Horz Lateral ft / Vert ft / ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight lb
						4" Ice	13.716	14.926	906
RRH2x60-700	A	From Centroid-Face	4.000 -3.000 0.000	0.000	100.000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	3.957 4.272 4.596 5.271 6.722	1.816 2.075 2.360 2.957 4.253	60 83 109 173 354
RRH2x60-700	B	From Centroid-Face	4.000 -3.000 0.000	0.000	100.000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	3.957 4.272 4.596 5.271 6.722	1.816 2.075 2.360 2.957 4.253	60 83 109 173 354
RRH2x60-700	C	From Centroid-Face	4.000 -3.000 0.000	0.000	100.000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	3.957 4.272 4.596 5.271 6.722	1.816 2.075 2.360 2.957 4.253	60 83 109 173 354
RRH2x60-AWS	A	From Centroid-Face	4.000 3.000 0.000	0.000	100.000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	3.957 4.272 4.596 5.271 6.722	1.816 2.075 2.360 2.957 4.253	60 83 109 173 354
RRH2x60-AWS	B	From Centroid-Face	4.000 3.000 0.000	0.000	100.000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	3.957 4.272 4.596 5.271 6.722	1.816 2.075 2.360 2.957 4.253	60 83 109 173 354
RRH2x60-AWS	C	From Centroid-Face	4.000 3.000 0.000	0.000	100.000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	3.957 4.272 4.596 5.271 6.722	1.816 2.075 2.360 2.957 4.253	60 83 109 173 354
RRH2X60-PCS	A	From Centroid-Face	4.000 -7.000 0.000	0.000	100.000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	2.567 2.791 3.025 3.517 4.606	2.011 2.218 2.435 2.894 3.915	55 75 99 155 313
RRH2X60-PCS	B	From Centroid-Face	4.000 -7.000 0.000	0.000	100.000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	2.567 2.791 3.025 3.517 4.606	2.011 2.218 2.435 2.894 3.915	55 75 99 155 313
RRH2X60-PCS	C	From Centroid-Face	4.000 -7.000 0.000	0.000	100.000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	2.567 2.791 3.025 3.517 4.606	2.011 2.218 2.435 2.894 3.915	55 75 99 155 313
DB-T1-6Z-8AB-0Z	A	From Centroid-Face	4.000 -3.000 0.000	0.000	100.000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	5.600 5.915 6.240 6.914 8.365	2.333 2.558 2.791 3.284 4.373	44 80 120 213 455
Platform Mount [LP 403-1]	C	None		0.000	100.000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	18.850 24.300 29.750 40.650 62.450	18.850 24.300 29.750 40.650 62.450	1500 1797 2093 2686 3872

90

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 lb
742 213 w/ Mount Pipe	A	From Leg	0.500 0.000 0.000	30.000	90.000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	5.373 5.950 6.501 7.611 9.933	4.620 6.000 6.982 8.852 12.794	49 94 146 277 683
742 213 w/ Mount Pipe	B	From Leg	0.500 0.000 0.000	0.000	90.000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	5.373 5.950 6.501 7.611 9.933	4.620 6.000 6.982 8.852 12.794	49 94 146 277 683
742 213 w/ Mount Pipe	C	From Leg	0.500 0.000 0.000	-10.000	90.000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	5.373 5.950 6.501 7.611 9.933	4.620 6.000 6.982 8.852 12.794	49 94 146 277 683
2'x3' Ice Shield	C	From Leg	0.500 0.000 0.000	-10.000	95.000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	0.720 0.990 1.260 1.800 2.880	1.180 1.610 2.040 2.900 4.620	72 132 192 312 552
2'x3' Ice Shield	C	From Leg	0.500 0.000 0.000	-10.000	97.000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	0.720 0.990 1.260 1.800 2.880	1.180 1.610 2.040 2.900 4.620	72 132 192 312 552
*** ***80***									
LLPX310R w/ Mount Pipe	A	From Leg	1.000 -2.000 1.000	30.000	80.000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	4.982 5.376 5.780 6.618 8.437	2.874 3.398 3.937 5.125 7.894	44 81 123 227 531
LLPX310R w/ Mount Pipe	B	From Leg	1.000 -2.000 1.000	30.000	80.000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	4.982 5.376 5.780 6.618 8.437	2.874 3.398 3.937 5.125 7.894	44 81 123 227 531
LLPX310R w/ Mount Pipe	C	From Leg	1.000 -2.000 1.000	30.000	80.000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	4.982 5.376 5.780 6.618 8.437	2.874 3.398 3.937 5.125 7.894	44 81 123 227 531
WIMAX DAP HEAD	A	From Leg	1.000 2.000 1.000	30.000	80.000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	1.804 1.988 2.180 2.589 3.512	0.778 0.918 1.067 1.391 2.143	33 45 58 94 201
WIMAX DAP HEAD	B	From Leg	1.000 -2.000 1.000	30.000	80.000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	1.804 1.988 2.180 2.589 3.512	0.778 0.918 1.067 1.391 2.143	33 45 58 94 201
WIMAX DAP HEAD	C	From Leg	1.000 -2.000 1.000	30.000	80.000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	1.804 1.988 2.180 2.589 3.512	0.778 0.918 1.067 1.391 2.143	33 45 58 94 201

Description	Face or Leg	Offset Type	Offsets: Horz Lateral ft / Vert ft / ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight lb
CW JUNCTION BOX	A	From Leg	1.000 2.000 3.000	30.000	80.000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	1.400 1.560 1.728 2.091 2.921	0.700 0.821 0.951 1.236 1.910	0 10 23 55 153
2.4" Dia. x 6' Mount Pipe	A	From Leg	1.000 2.000 0.000	0.000	80.000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	1.425 1.931 2.316 3.149 5.058	1.425 1.931 2.316 3.149 5.058	22 38 56 100 252
2.4" Dia. x 6' Mount Pipe	B	From Leg	1.000 2.000 0.000	0.000	80.000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	1.425 1.931 2.316 3.149 5.058	1.425 1.931 2.316 3.149 5.058	22 38 56 100 252
2.4" Dia. x 6' Mount Pipe	C	From Leg	1.000 2.000 0.000	0.000	80.000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	1.425 1.931 2.316 3.149 5.058	1.425 1.931 2.316 3.149 5.058	22 38 56 100 252
Side Arm Mount [SO 101-3]	C	None		0.000	80.000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	7.500 8.900 10.300 13.100 18.700	7.500 8.900 10.300 13.100 18.700	252 333 414 576 900
***									

Dishes

Description	Face or Leg	Dish Type	Offset Type	Offsets: Horz Lateral ft / Vert ft	Azimuth Adjustment °	3 dB Beam Width °	Elevation ft	Outside Diameter ft		Aperture Area ft^2	Weight lb
115'											
VHLP2-18	C	Paraboloid w/Shroud (HP)	From Leg	1.000 0.000 0.000	0.000		115.000	2.000	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	3.140 3.410 3.680 4.210 5.280	31 49 66 101 171
80'											
VHLP2-23	A	Paraboloid w/Shroud (HP)	From Leg	1.000 2.000 3.000	-30.000		80.000	2.180	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	3.730 4.020 4.310 4.900 6.060	30 50 70 110 200
***											

Compression Checks

Pole Design Data

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 $\frac{P}{P_a}$
L1	119.083 - 101.083 (1)	TP26x22.13x0.25	18.000	0.000	0.0	39.000	19.935	-5837	777466	0.008
L2	101.083 - 66.5 (2)	TP34.063x24.873x0.313	37.500	0.000	0.0	39.000	32.544	-14017	1269220	0.011
L3	66.5 - 32.8333 (3)	TP41.75x32.498x0.375	37.500	0.000	0.0	39.000	47.876	-20995	1867170	0.011
L4	32.8333 - 0 (4)	TP49.063x39.849x0.375	37.500	0.000	0.0	39.000	57.950	-30576	2260060	0.014

Pole Bending Design Data

Section No.	Elevation ft	Size	Actual M_x lb-ft	Actual f_{bx} ksi	Allow. F_{bx} ksi	Ratio $\frac{f_{bx}}{F_{bx}}$	Actual M_y lb-ft	Actual f_{by} ksi	Allow. F_{by} ksi	Ratio $\frac{f_{by}}{F_{by}}$
L1	119.083 - 101.083 (1)	TP26x22.13x0.25	107779	10.487	39.000	0.269	0	0.000	39.000	0.000
L2	101.083 - 66.5 (2)	TP34.063x24.873x0.313	662074	30.203	39.000	0.774	0	0.000	39.000	0.000
L3	66.5 - 32.8333 (3)	TP41.75x32.498x0.375	1341367	33.922	39.000	0.870	0	0.000	39.000	0.000
L4	32.8333 - 0 (4)	TP49.063x39.849x0.375	2209267	38.073	39.000	0.976	0	0.000	39.000	0.000

Pole Shear Design Data

Section No.	Elevation ft	Size	Actual V lb	Actual f_v ksi	Allow. F_v ksi	Ratio $\frac{f_v}{F_v}$	Actual T lb-ft	Actual f_{vt} ksi	Allow. F_{vt} ksi	Ratio $\frac{f_{vt}}{F_{vt}}$
L1	119.083 - 101.083 (1)	TP26x22.13x0.25	9869	0.495	26.000	0.038	838	0.040	26.000	0.002
L2	101.083 - 66.5 (2)	TP34.063x24.873x0.313	19450	0.598	26.000	0.046	1686	0.037	26.000	0.001
L3	66.5 - 32.8333 (3)	TP41.75x32.498x0.375	21874	0.457	26.000	0.035	1699	0.021	26.000	0.001
L4	32.8333 - 0 (4)	TP49.063x39.849x0.375	24407	0.421	26.000	0.032	1716	0.014	26.000	0.001

Pole Interaction Design Data

Section No.	Elevation ft	Ratio $\frac{P}{P_a}$	Ratio $\frac{f_{bx}}{F_{bx}}$	Ratio $\frac{f_{by}}{F_{by}}$	Ratio $\frac{f_v}{F_v}$	Ratio $\frac{f_{vt}}{F_{vt}}$	Comb. Stress Ratio	Allow. Stress Ratio	Criteria
L1	119.083 -	0.008	0.269	0.000	0.038	0.002	0.277	1.333	H1-3+VT

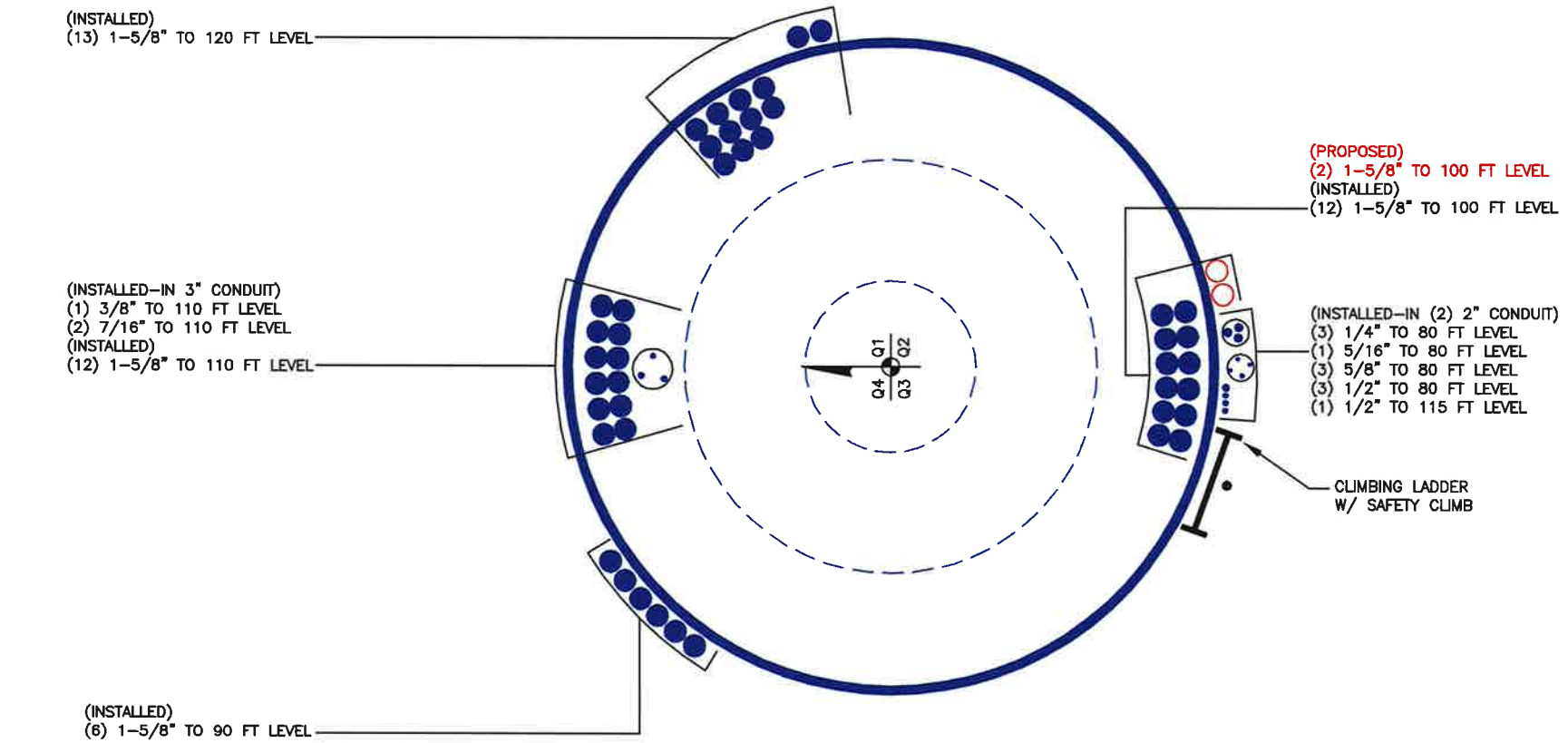
Section No.	Elevation ft	Ratio $\frac{P}{P_a}$	Ratio $\frac{f_{bx}}{F_{bx}}$	Ratio $\frac{f_{by}}{F_{by}}$	Ratio $\frac{f_v}{F_v}$	Ratio $\frac{f_{vt}}{F_{vt}}$	Comb. Stress Ratio	Allow. Stress Ratio	Criteria
	101.083 (1)								
L2	101.083 - 66.5 (2)	0.011	0.774	0.000	0.046	0.001	0.786	1.333	H1-3+VT
L3	66.5 - 32.8333 (3)	0.011	0.870	0.000	0.035	0.001	0.881	1.333	H1-3+VT
L4	32.8333 - 0 (4)	0.014	0.976	0.000	0.032	0.001	0.990	1.333	H1-3+VT

Section Capacity Table

Section No.	Elevation ft	Component Type	Size	Critical Element	P lb	$SF*P_{allow}$ lb	% Capacity	Pass Fail
L1	119.083 - 101.083	Pole	TP26x22.13x0.25	1	-5837	1036362	20.8	Pass
L2	101.083 - 66.5	Pole	TP34.063x24.873x0.313	2	-14017	1691870	59.0	Pass
L3	66.5 - 32.8333	Pole	TP41.75x32.498x0.375	3	-20995	2488938	66.1	Pass
L4	32.8333 - 0	Pole	TP49.063x39.849x0.375	4	-30576	3012660	74.3	Pass
							Summary	
						Pole (L4)	74.3	Pass
						RATING =	**74.3**	**Pass**

APPENDIX B

BASE LEVEL DRAWING



BUSINESS UNIT: 829013 TOWER ID: C_BASELEVEL

APPENDIX C

ADDITIONAL CALCULATIONS

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

TIA Rev F

Site Data

BU#: *829013*
Site Name: *West Hartford/I-84/X43*
App #: *300644 Rev. 1*

Pole Manufacturer:	*Other*

Reactions		
Moment:	2209.263	ft-kips
Axial:	30.59	kips
Shear:	24.413	kips

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

Anchor Rod Data		
Qty:	33	
Diam:	1.25	in
Rod Material:	Other	
Strength (Fu):	150	ksi
Yield (Fy):	105	ksi
Bolt Circle:	54	in

Plate Data		
Diam:	58	in
Thick:	1.5	in
Grade:	50	ksi
Single-Rod B-eff:	4.72	in

Stiffener Data (Welding at both sides)		
Config:	1	*
Weld Type:	Fillet	
Groove Depth:		<-- Disregard
Groove Angle:		<-- Disregard
Fillet H. Weld:	0.5	in
Fillet V. Weld:	0.25	in
Width:	4	in
Height:	12	in
Thick:	0.75	in
Notch:	0.5	in
Grade:	36	ksi
Weld str.:	70	ksi

Pole Data		
Diam:	49.0625	in
Thick:	0.375	in
Grade:	65	ksi
# of Sides:	18	"0" IF Round
Fu	80	ksi
Reinf. Fillet Weld	0	"0" if None

Stress Increase Factor		
ASIF:	1.333	

Anchor Rod Results

		Stiffened
Maximum Rod Tension:	58.6 Kips	Service, ASD
Allowable Tension:	81.0 Kips	Fty*ASIF
Anchor Rod Stress Ratio:	72.3% Pass	

Base Plate Results Flexural Check

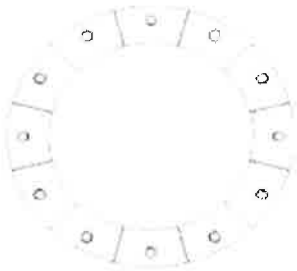
		Stiffened
Base Plate Stress:	30.9 ksi	Service, ASD
Allowable Plate Stress:	50.0 ksi	0.75*Fy*ASIF
Base Plate Stress Ratio:	61.9% Pass	Y.L. Length: N/A, Roark

Stiffener Results

Horizontal Weld :	58.5% Pass
Vertical Weld:	38.9% Pass
Plate Flex+Shear, fb/Fb+(fv/Fv)^2:	14.0% Pass
Plate Tension+Shear, ft/Ft+(fv/Fv)^2:	56.3% Pass
Plate Comp. (AISC Bracket):	57.3% Pass

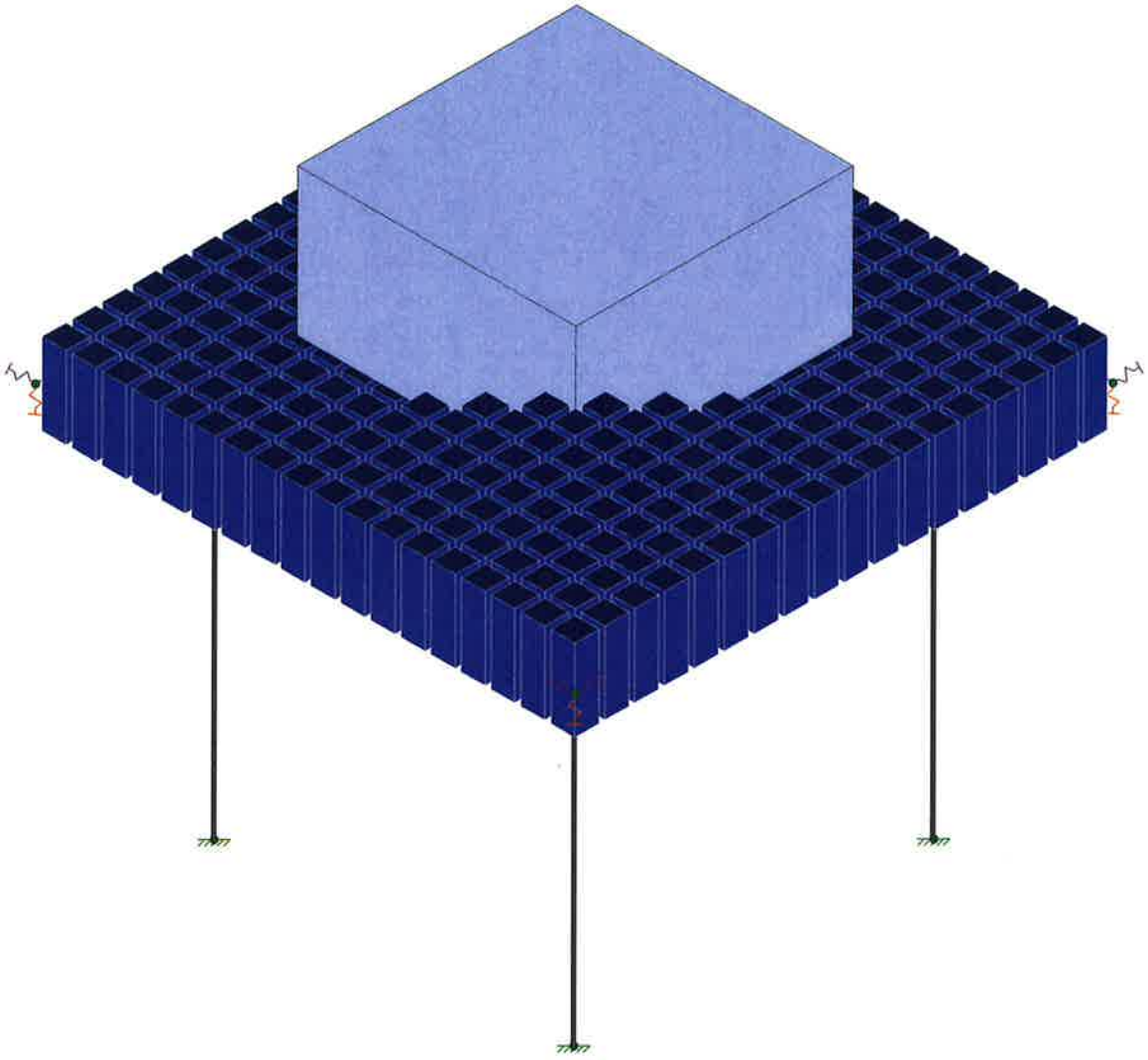
Pole Results

Pole Punching Shear Check:	7.0% Pass



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

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



TEP	West Hartford/I-84/X43 (BU 829013)	SK - 2
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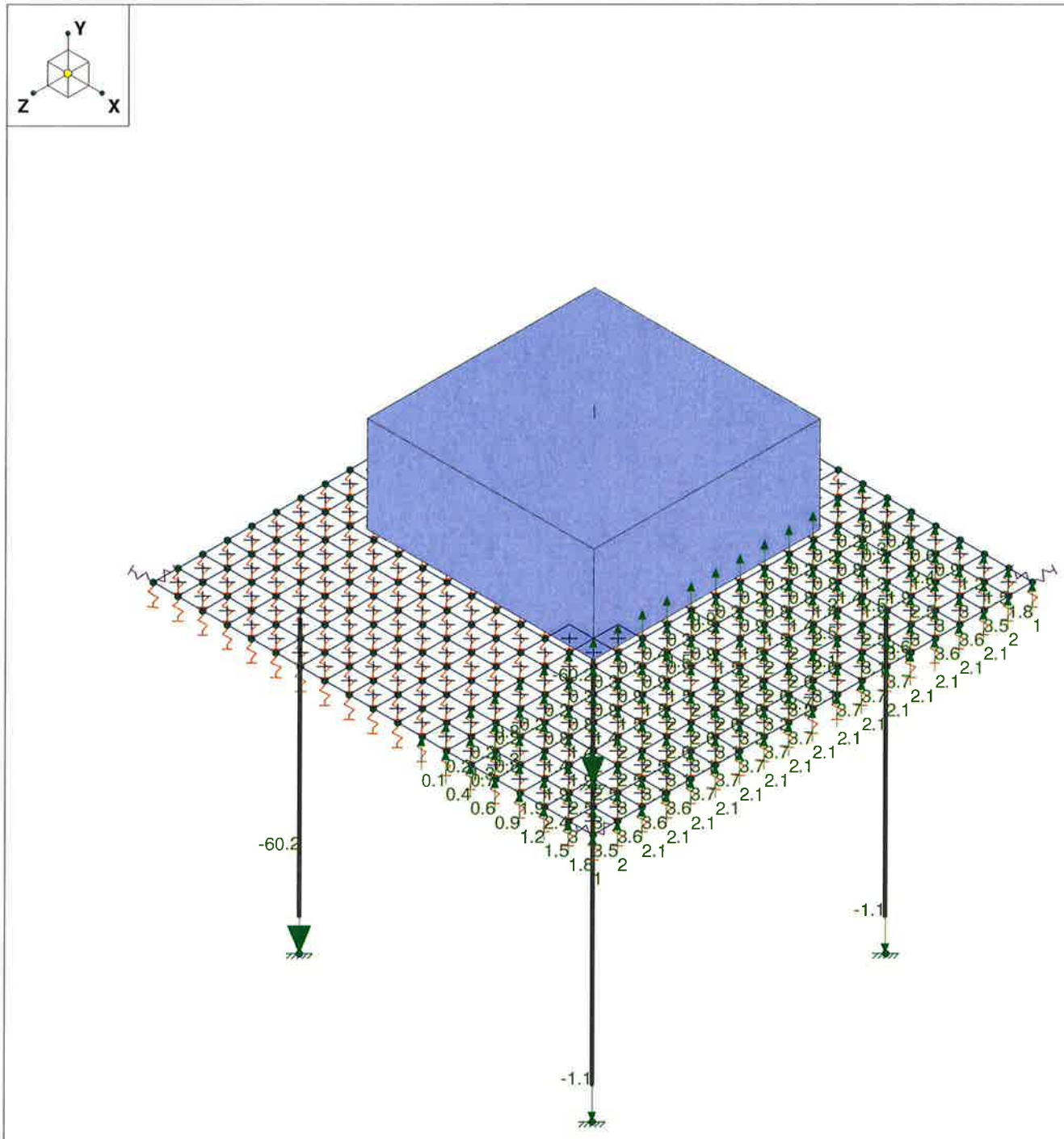


Y-direction Reaction Units are k and k-ft

TEP	West Hartford/I-84/X43 (BU 829013)	SK - 1
TPG		July 1, 2015 at 1:56 PM
25680.34354		829013.02S_Foundation.r3d

Concrete Properties

	Label	E [ksi]	G [ksi]	Nu	Therm (\1E...	Density[lb/f...	f'c[ksi]	Lambda	Flex Steel[...	Shear Stee...
1	Conc3000NW	3156	1372	.15	.6	145	3	1	60	60
2	Conc3500NW	3409	1482	.15	.6	145	3.5	1	60	60
3	Conc4000NW	3644	1584	.15	.6	145	4	1	60	60
4	Conc3000LW	2085	907	.15	.6	109.999	3	.75	60	60
5	Conc3500LW	2252	979	.15	.6	109.999	3.5	.75	60	60
6	Conc4000LW	2408	1047	.15	.6	109.999	4	.75	60	60

Member Primary Data

	Label	I Joint	J Joint	K Joint	Rotate(deg)	Section/Shape	Type	Design List	Material	Design Rules
1	M1	N8	N12			1" WF Rock	Column	None	A722	Typical
2	M2	N7	N11			1" WF Rock	Column	None	A722	Typical
3	M3	N6	N10			1" WF Rock	Column	None	A722	Typical
4	M4	N5	N9			1" WF Rock	Column	None	A722	Typical
5	M5	TL1	N367			CRECT102X1...	Column	Rectangular	Conc3000...	Typical
6	M6	N367	TOWER			6' rigid offset	Column	None	RIGID	Typical

Joint Loads and Enforced Displacements (BLC 1 : Dead)

	Joint Label	L,D,M	Direction	Magnitude[(k,k-ft), (in,rad), (k*s^2/ft, k*s^2*ft)]
1	TL1	L	Y	-30.59

Joint Loads and Enforced Displacements (BLC 2 : Wind 0)

	Joint Label	L,D,M	Direction	Magnitude[(k,k-ft), (in,rad), (k*s^2/ft, k*s^2*ft)]
1	TL1	L	X	24.413
2	TL1	L	Mz	-2209.263

Joint Loads and Enforced Displacements (BLC 3 : Wind 90)

	Joint Label	L,D,M	Direction	Magnitude[(k,k-ft), (in,rad), (k*s^2/ft, k*s^2*ft)]
1	TL1	L	Z	24.413
2	TL1	L	Mx	2209.263

Basic Load Cases

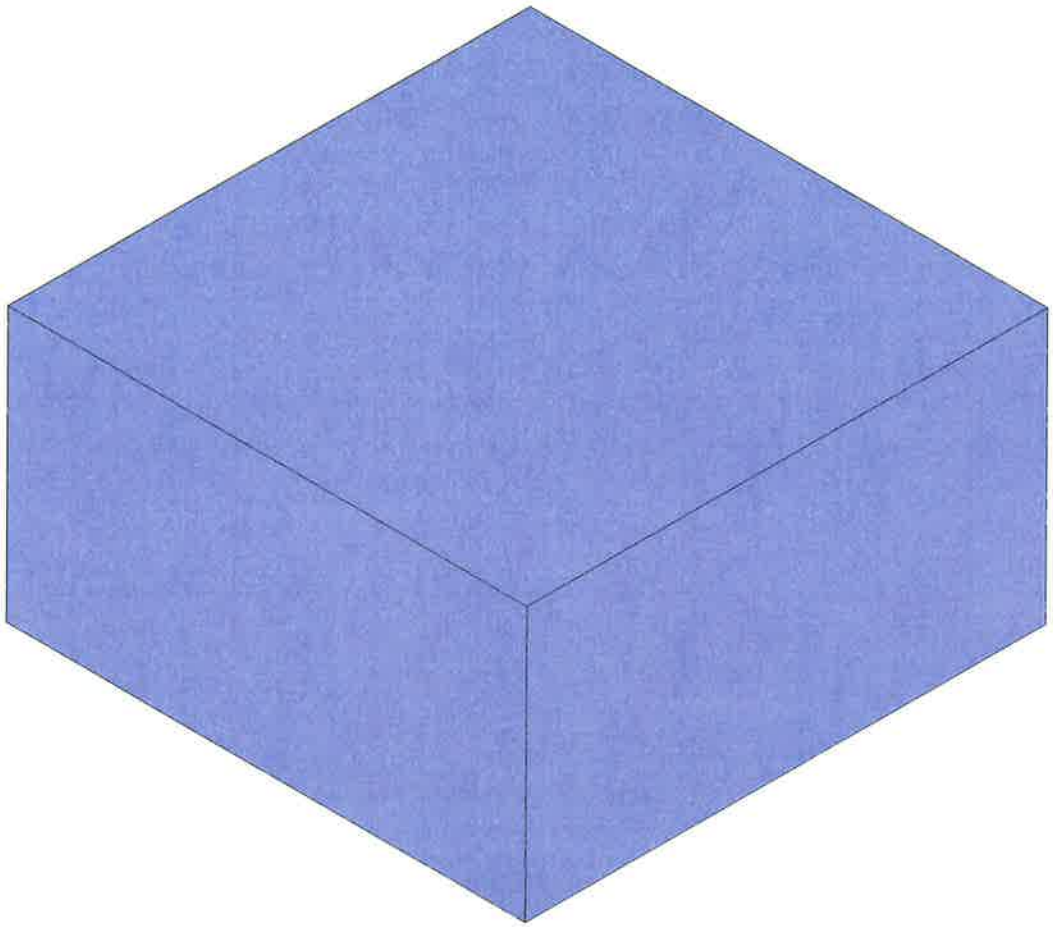
	BLC Description	Category	X Gravity	Y Gravity	Z Gravity	Joint	Point	Distributed	Area(Me...	Surface(P...
1	Dead	None		-1		1				324
2	Wind 0	None				2				
3	Wind 90	None				2				
4	Prestress	None						4		

Load Combinations

	Description	Sol...	PD...	SR...	BLC	Fact...	BLC	Fact...	BLC	Fact...	BLC	Fact...	BLC	Fact...	BLC	Fact...	BLC	Fact...	BLC	Fact...	BLC	Fact...	BLC	Fact...	BLC	Fact...
1	D+W0	Yes	Y		1	1	2	1	4	1																
2	D-W0	Yes	Y		1	1	2	-1	4	1																
3	Prestress	Yes	Y				4	1																		
4	0.6D+W0	Yes	Y		1	.6	2	1	4	1																
5	0.6D-W0	Yes	Y		1	.6	2	-1	4	1																

Load Combinations (Continued)

	Description	Sol..	PD..	SR..	BLC	Fact...	BLC	Fact...	BLC	Fact...	BLC	Fact...	BLC	Fact...	BLC	Fact...	BLC	Fact...	BLC	Fact...	BLC	Fact...	BLC	Fact...	BLC	Fact...
6	D+W90	Yes	Y		1	1	3	1	4	1																
7	D-W90	Yes	Y		1	1	3	-1	4	1																
8	0.6D+W90	Yes	Y		1	.6	3	1	4	1																
9	0.6D-W90	Yes	Y		1	.6	3	-1	4	1																
10	D+0.707(...	Yes	Y		1	1	2	.707	3	.707	4	1														
11	D+0.707(...	Yes	Y		1	1	2	.707	3	-.707	4	1														
12	D-0.707(...	Yes	Y		1	1	2	-.707	3	.707	4	1														
13	D+0.707(-...	Yes	Y		1	1	2	-.707	3	-.707	4	1														
14	0.6D+0.70...	Yes	Y		1	.6	2	.707	3	.707	4	1														
15	0.6D+0.70...	Yes	Y		1	.6	2	.707	3	-.707	4	1														
16	0.6D-0.70...	Yes	Y		1	.6	2	-.707	3	.707	4	1														
17	0.6D+0.70...	Yes	Y		1	.6	2	-.707	3	-.707	4	1														

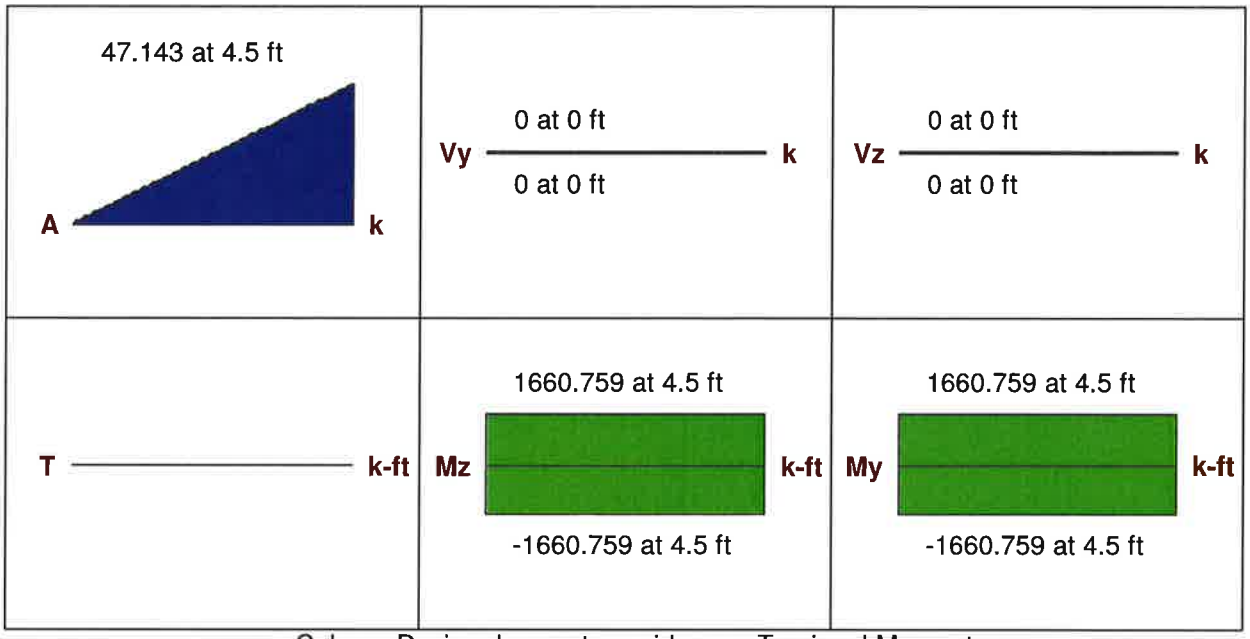


TEP	West Hartford/I-84/X43 (BU 829013)	SK - 5
TPG		July 1, 2015 at 1:53 PM
25680.34354		Collar.r3d

Column: ***M5***

Shape:	**CRECT102X102**	Concrete Stress Block:	**Rectangular**
Material:	**Conc3000NW**	Cracked Sections Used:	**Yes**
Length:	**4.5 ft**	Cracked 'I' Factor:	**.70**
I Joint:	**TL1**	Effective 'I':	**6.31419e+6 in^4**
J Joint:	**N367**	Biaxial Bending Solution:	**PCA Load Contour**

Code Check: **0.427 (bending)**
Report Based On 97 Sections



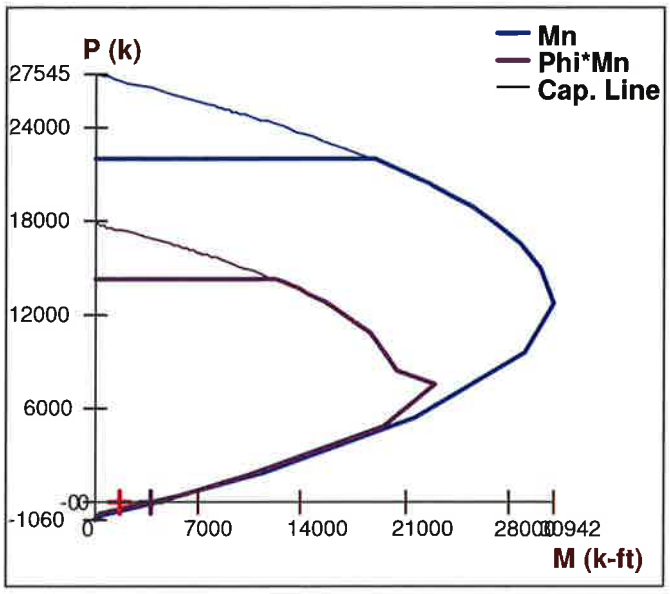
Column Design does not consider any Torsional Moments

Warning: Exact Integration selected but PCA method used
Custom rebar layout does not meet min steel (As,min) per Global Parameters

ACI 318-05 Code Check

		Bending Check	**0.427**	Shear Check	**0.000 (y)**
Gov LC	**7**	Location	**4.5 ft**	Location	**0 ft**
Gov Pu	**0 k**	Gov Muy	**1660.759 k-ft**	Gov Vuy	**0 k**
phi*Pn		Gov Muz	**0 k-ft**	Gov Vuz	**0 k**
Phi eff.	**.9**	phi*Mnoy	**-.9 k-ft**	phi*Vny	**1111.305 k**
		phi*Mnoz		phi*Vnz	**1111.305 k**
Tension Bar Fy	**60 ksi**	Concrete Weight	**145 lb/ft^3**		
Shear Bar Fy	**60 ksi**	Concrete Type	**Normal WT**	Sway yy	**No**
F'c	**3 ksi**	E_Concrete	**3156 ksi**	Sway zz	**No**
Flex. Rebar Set	**ASTM A615**	Shear Rebar Set	**ASTM A615**	Thres. Torsion	**917.543k-ft(LC:1)**
Flex. Bars	**9 #6 , 9 #6 , 11 #6 , 11 #6**				
Shear Bars	**#4 @6in**				

Column Interaction Diagram



Span Information

Span	Span Length (ft)	I-Face Dist. (in)	J-Face Dist. (in)
1	0 - 4.5	0	0

Column Steel

Span	Main Bars	UC Max	Gov LC	Loc (ft)	Pu (k)	Muy (k-ft)	Muz (k-ft)
1	40 #6	0.427	7	4.5 ft	0	1660.759	0

Axial Span Results

Span	Phi_eff	Pn (k)	Po (k)	Rho Gross	As Prvd (in^2)
1	.9		27545.425	.0017	17.671

Bending Span Results

Span	ecc. y (ft)	ecc. z (ft)	NA y-y (ft)	NA z-z (ft)	Mny (k-ft)	Mnz (k-ft)	Mnoy (k-ft)	Mnoz (k-ft)
1	0	0		3.949	4319.59			

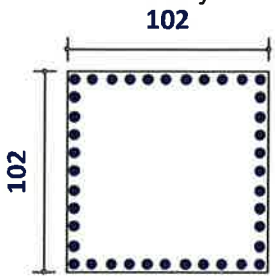
Slender Bending Span Results

Span	KL/r yy	KL/r zz	Cm yy	Cm zz	Lu yy (ft)	Lu zz (ft)	Mcy (k-ft)	Mcz (k-ft)
1	2	2	.6	1	4.5	4.5		

Rebar Detailing

Span	Region(ft)	Shear Steel
1	4.5 -	9 #4 @6in
	0 -	

Flexural Layout



Total No. of Bars - Top : 4.5 ft
11#6 Top
9#6 Left
9#6 Right
11#6 Bottom

Total No. of Bars - Middle : 2.25 ft
11#6 Top
9#6 Left
9#6 Right
11#6 Bottom

Total No. of Bars - Bottom : 0 ft
11#6 Top
9#6 Left
9#6 Right
11#6 Bottom

Monopole on Mat Foundation with Rock Anchors - TIA-222-F

Site Data	
Site Name:	West Hartford/I-84/X43
CCI Number:	829013
TEP Job Number:	25680.34354

ASIF	1.333

Unfactored Reactions from TNX		
Axial	30.59	k
Shear	24.413	k
Moment	2209.263	k-ft

Soil Properties		
Allowable Bearing q_a	8.1	ksf
Mat Subgrade, ks	293	kcf
Wt Soil Above Mat	113	pcf

Mat and Pier Properties		
Mat Width	16.5	ft
Mat Length	16.5	ft
Mat Depth	2.5	ft
Pier Type	Square	
Pier Width/Diam.	8.5	ft
Pier Height	4.5	ft

Rock Anchor Properties		
Diameter	1	in
Net Area	0.85	in^2
Yield Stress	127.7	ksi

Rock Geotechnical Properties		
Wt of Rock	160	pcf
Angle of Rock Cone	30	deg
Steel/Grout Bond[1]	190	psi
Grout/Rock Bond[1]	50	psi
Drilled Shaft Diam.	3.75	in

[1]Allowable Bond Values

Mat Foundation Results

Bearing Stress	7.1	ksf
Allowable Bearing	10.8	ksf
% Capacity	65.9%	Pass

Mat Structural Results

Bending Moment	624.0	kft
Allowable Bending	1151.0	kft
% Capacity	54.2%	Pass

Rock Anchor Steel Results

Load Reaction	70.47	k
Allowable Design Load	86.84	k
% Capacity	81.1%	Pass

Rock Anchor Pullout Results

Req. Bond Length, ld	9.97	ft
Load Reaction	70.47	k
Allowable Pullout	107.28	k
% Capacity	65.7%	Pass

		PASS	PASS			
	Results Summary:	LC1	LC2	West Hartford/I-84/X43 (BU 829013)		
	Soil Interaction:	N/A	N/A	TEP #:	25680.34354	
Drilled Caisson Tool - Pier	Foundation Structural:	33.7%	10.3%	Analysis:	TPG	7/1/2015
				Check:	MKL	7/1/2015

Code Revisions: TIA-222-F ACI 318-02

Tower Type: Monopole

	LC1	LC2	
Moment:	658.37	205.59	kip-ft
Axial (download):	30.59	52.83	kip
Shear:	24.41	7.44	kip
Axial (uplift):			kip

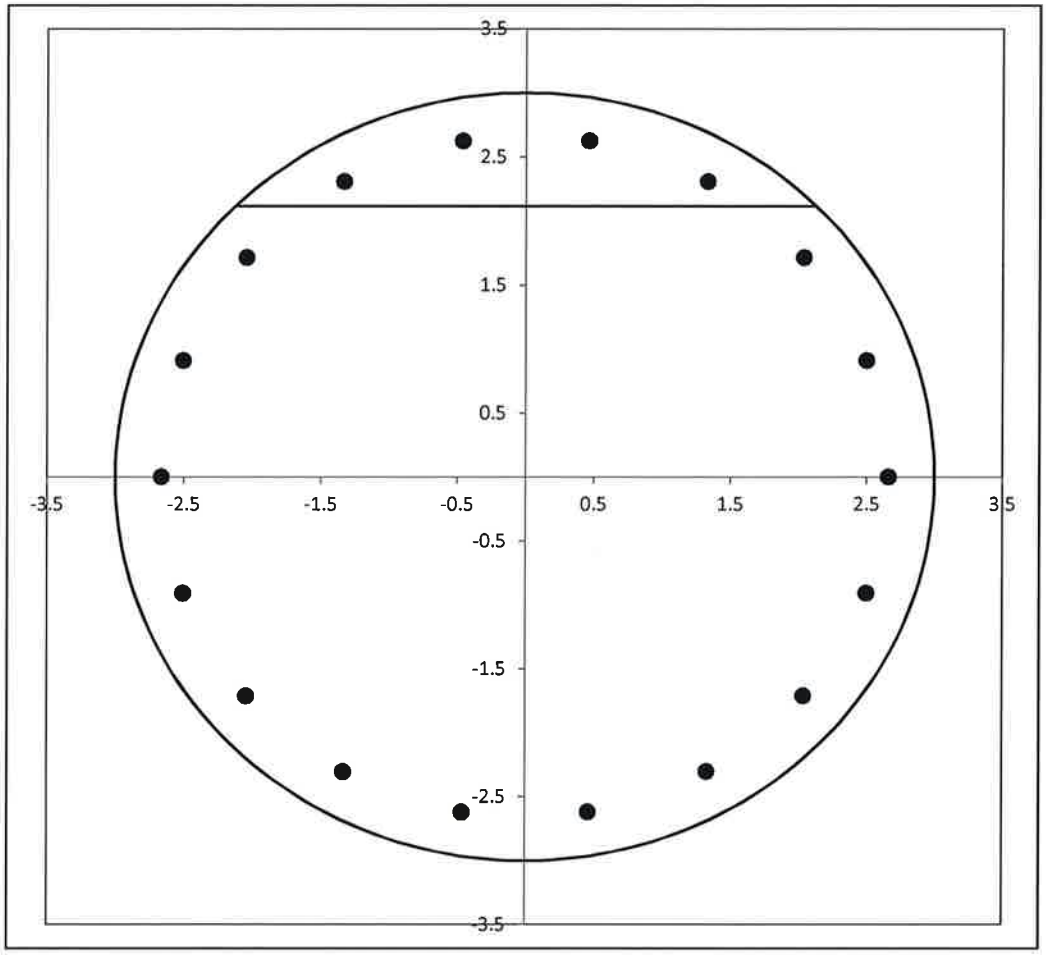
Shaft Information

Diameter:	6.00	ft
Projection:	0.50	ft
Caisson Length:	4.50	ft
f'c:	3.000	ksi
Max εc:	0.003	in/in

Cage 1 Reinforcement

Tie Bar Size:	4	*(fy = 60.0 ksi)*
Clear Cover to Tie:	3.00	*in (Cage Ø = 63.87in)*
Tie Bar Spacing:	6.00	in
Vertical Bar Size:	9	
Vertical Bar Quantity:	18	*(ρ =0.442%)*
fy:	60.0	ksi
E:	29,000	ksi

Reinforcement Capacity



		LC1	LC2	
	Vu =	31.7	31.7	kip
	Vc =	447.7	448.9	kip
fy,tie = 60.0	Vs =	269.8	269.8	kip
	ϕVn =	538.1	539.0	kip
	Capacity =	5.9%	5.9%	
		PASS	PASS	

		LC1	LC2	
	Mu =	855.9	267.3	kip-ft
	ϕMn =	2542.4	2605.7	kip-ft
	Capacity =	33.7%	10.3%	
		PASS	PASS	