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Also admitted in Massachusetts

August 2, 2013

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

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

Dear Ms. Bachman:

Cellco Partnership d/b/a Verizon Wireless ("Cellco") currently maintains twelve (12) wireless telecommunications antennas at the 100-foot level of the existing 119-foot tower at the above-referenced address. The tower is owned by Crown Castle. The Council approved Cellco's shared use of this tower in 2001. Cellco now intends to replace nine (9) of its existing antennas with three (3) model BXA-80063-4BF cellular antennas; three (3) model BXA-185063-8CF PCS antennas; and three (3) model BXA-171063-8CF AWS antennas, all at the same 100-foot level on the tower. Cellco also intends to install three (3) remote radio heads ("RRHs") and six (6) coax cable diplexers behind its antenna and attach one (1) HYBRIFLEX™ antenna cable to the outside the monopole tower. Attached behind Tab 1 are the specifications for Cellco's replacement antennas, RRHs and HYBRIFLEX™ cable.

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 to the Church of the St. Mark the Evangelist, the owner of the property on which the tower is located.

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 proposed replacement antennas, RRHs and cable diplexers will be located at the 100-foot level of 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 modified facility 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 behind Tab 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 attached behind Tab 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
Sandy M. Carter

TAB 1

BXA-80063-4BF-EDIN-X

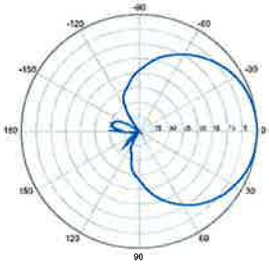
X-Pol | FET Panel | 63° | 13.0 dBd

Replace "X" with desired electrical downtilt.

Antenna is also available with N connector(s). Replace "EDIN" with "N" in the model number when ordering.

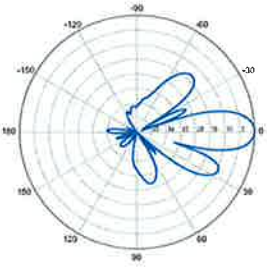
Electrical Characteristics				
Frequency bands	806-900 MHz*			
*Optional frequency band for iDEN	806-941 MHz (specify when ordering)			
Polarization	±45°			
Horizontal beamwidth	63°			
Vertical beamwidth	15°			
Gain	13.0 dBd (15.1 dBi)			
Electrical downtilt (X)	0, 2, 3, 4, 5, 6, 8, 9, 10, 12, 14			
Impedance	50Ω			
VSWR	≤1.4:1			
Upper sidelobe suppression (0°)	-22.1 dB			
Front-to-back ratio (+/-30°)	-34.9 dB			
Null fill	5% (-26.02 dB)			
Isolation between ports	< -30 dB			
Input power with EDIN connectors	500 W			
Input power with N connectors	300 W			
Lightning protection	Direct Ground			
Connector(s)	2 Ports / EDIN or N / Female / Bottom			
Mechanical Characteristics				
Dimensions Length x Width x Depth	1134 x 285 x 135 mm		44.6 x 11.2 x 5.3 in	
Depth with z-brackets	175 mm		6.9 in	
Weight without mounting brackets	5.7 kg		12.6 lbs	
Survival wind speed	> 201 km/hr		> 125 mph	
Wind area	Front: 0.32 m^2 Side: 0.15 m^2		Front: 3.5 ft^2 Side: 1.7 ft^2	
Wind load @ 161 km/hr (100 mph)	Front: 469 N Side: 249 N		Front: 104 lbf Side: 53 lbf	
Mounting Options	Part Number	Fits Pipe Diameter	Weight	
2-Point Mounting & Downtilt Bracket Kit	36210006	40-115 mm 1.57-4.5 in	4.1 kg	9 lbs
Concealment Configurations	For concealment configurations, order BXA-80063-4BF-EDIN-X-FP			

BXA-80063-4BF-EDIN-X



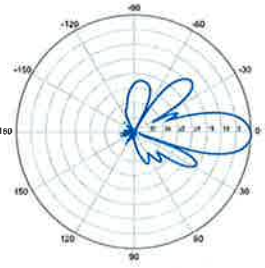
Horizontal

BXA-80063-4BF-EDIN-0



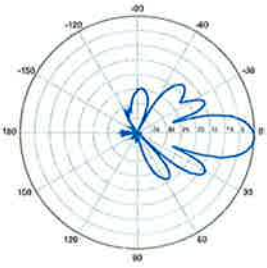
0° | Vertical

BXA-80063-4BF-EDIN-2



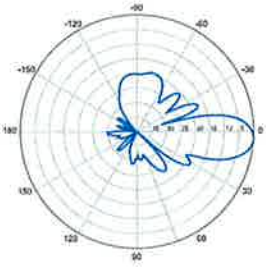
2° | Vertical

BXA-80063-4BF-EDIN-3



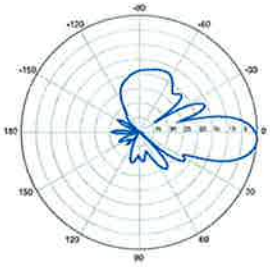
3° | Vertical

BXA-80063-4BF-EDIN-4



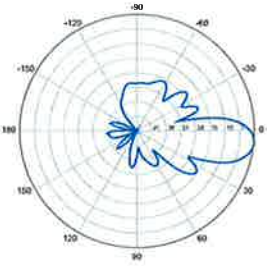
4° | Vertical

BXA-80063-4BF-EDIN-5



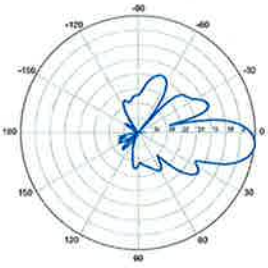
5° | Vertical

BXA-80063-4BF-EDIN-6



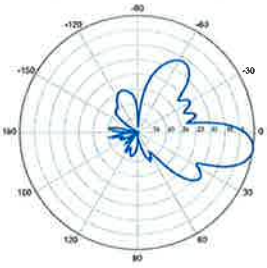
6° | Vertical

BXA-80063-4BF-EDIN-8



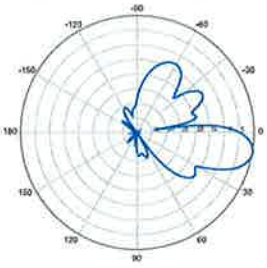
8° | Vertical

BXA-80063-4BF-EDIN-9



9° | Vertical

BXA-80063-4BF-EDIN-10



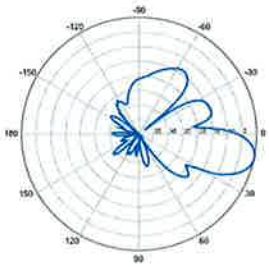
10° | Vertical

Quoted performance parameters are provided to offer typical or range values only and may vary as a result of normal manufacturing and operational conditions. Extreme operational conditions and/or stress on structural supports is beyond our control. Such conditions may result in damage to this product. Improvements to product may be made without notice.

BXA-80063-4BF-EDIN-X

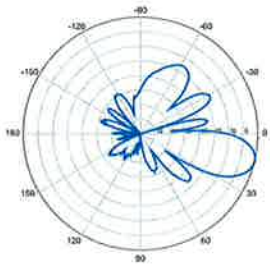
X-Pol | FET Panel | 63° | 13.0 dBd

BXA-80063-4BF-EDIN-12



12° | Vertical

BXA-80063-4BF-EDIN-14



14° | Vertical

BXA-185063-8CF-EDIN-X

X-Pol | FET Panel | 63° | 18.5 dBi

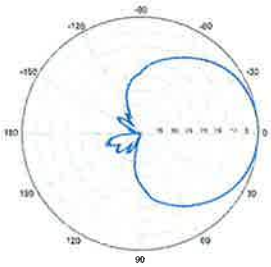
Replace "X" with desired electrical downtilt

Antenna is also available with NE connector(s). Replace "EDIN" with "NE" in the model number when ordering

Electrical Characteristics				
Frequency bands	1850-1990 MHz			
Polarization	±45°			
Horizontal beamwidth	63°			
Vertical beamwidth	7°			
Gain	16.4 dBd (18.5 dBi)			
Electrical downtilt (X)	0, 2, 4, 6			
Impedance	50Ω			
VSWR	≤1.4:1			
Null fill	5% (-26.02 dB)			
Isolation between ports	< -30 dB			
Input power	250 W			
Lightning protection	Direct Ground			
Connector(s)	2 Ports / EDIN or NE / Female / Center (Back)			
Mechanical Characteristics				
Dimensions Length x Width x Depth	1238 x 154 x 80 mm		48.8 x 6.1 x 3.2 in	
Depth with t-brackets	108 mm		4.3 in	
Weight without mounting brackets	4.5 kg		10.0 lbs	
Survival wind speed	> 201 km/hr		> 125 mph	
Wind area	Front: 0.19 m^2 Side: 0.10 m^2		Front: 2.1 ft^2 Side: 1.1 ft^2	
Wind load @ 161 km/hr (100 mph)	Front: 288 N Side: 170 N		Front: 65 lbf Side: 38 lbf	

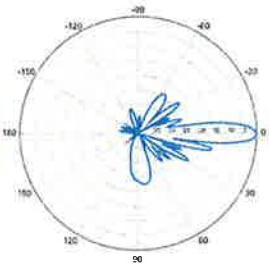
Mounting Options	Part Number	Fits Pipe Diameter	Weight
2-Point Mounting Bracket Kit	26799997	50-102 mm 2.0-4.0 in	2.3 kg 5.0 lbs
2-Point Mounting & Downtilt Bracket Kit	26799999	50-102 mm 2.0-4.0 in	3.6 kg 8.0 lbs
Concealment Configurations	For concealment configurations, order BXA-185063-8CF-EDIN-X-FP		

BXA-185063-8CF-EDIN-X



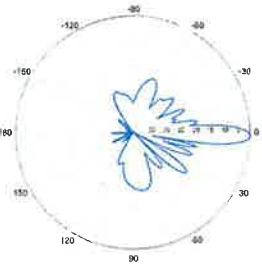
Horizontal

BXA-185063-8CF-EDIN-0



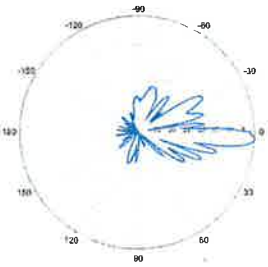
0° | Vertical

BXA-185063-8CF-EDIN-2



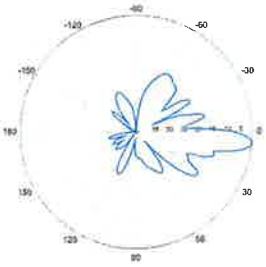
2° | Vertical

BXA-185063-8CF-EDIN-4



4° | Vertical

BXA-185063-8CF-EDIN-6



6° | Vertical

BXA-171063-8CF-EDIN-X

X-Pol | FET Panel | 63° | 17.4 dBi

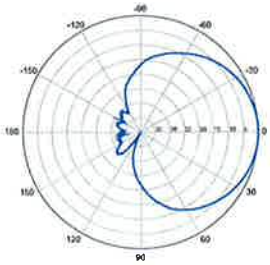
Replace "X" with desired electrical downtilt.

Antenna is also available with NE connector(s). Replace "EDIN" with "NE" in the model number when ordering.

Electrical Characteristics	1710-2170 MHz		
Frequency bands	1710-1880 MHz	1850-1990 MHz	1920-2170 MHz
Polarization	±45°	±45°	±45°
Horizontal beamwidth	68°	65°	60°
Vertical beamwidth	7°	7°	7°
Gain	14.5 dBd / 16.6 dBi	14.9 dBd / 17.0 dBi	15.3 dBd / 17.4 dBi
Electrical downtilt (X)	0, 2, 4, 6, 8		
Impedance	50Ω		
VSWR	≤1.5:1		
First upper sidelobe	< -17 dB		
Front-to-back ratio	> 30 dB		
In-band isolation	> 25 dB		
IM3 (20W carrier)	< -150 dBc		
Input power	300 W		
Lightning protection	Direct Ground		
Connector(s)	2 Ports / EDIN or NE / Female / Center (Back)		
Operating temperature	-40° to +60° C / -40° to +140° F		
Mechanical Characteristics			
Dimensions Length x Width x Depth	1225 x 154 x 105 mm		48.2 x 6.1 x 4.1 in
Depth with t-brackets	133 mm		5.2 in
Weight without mounting brackets	4.2 kg		9.2 lbs
Survival wind speed	296 km/hr		184 mph
Wind area	Front: 0.19 m² Side: 0.14 m²		Front: 2.0 ft² Side: 1.5 ft²
Wind load @ 161 km/hr (100 mph)	Front: 281 N Side: 223 N		Front: 63 lbf Side: 50 lbf

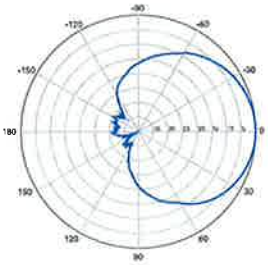
Mounting Options	Part Number	Fits Pipe Diameter	Weight
2-Point Mounting Bracket Kit	26799997	50-102 mm 2.0-4.0 in	2.3 kg 5 lbs
2-Point Mounting & Downtilt Bracket Kit	26799999	50-102 mm 2.0-4.0 in	3.6 kg 8 lbs
Concealment Configurations	For concealment configurations, order BXA-171063-8CF-EDIN-X-FP		

BXA-171063-8CF-EDIN-X



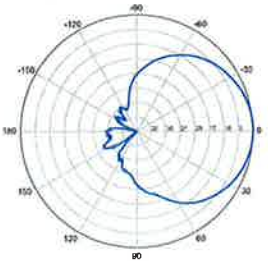
Horizontal | 1710-1880 MHz

BXA-171063-8CF-EDIN-X



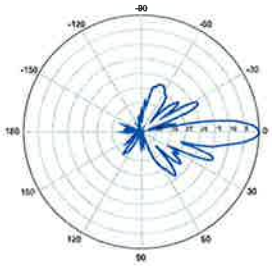
Horizontal | 1850-1990 MHz

BXA-171063-8CF-EDIN-X



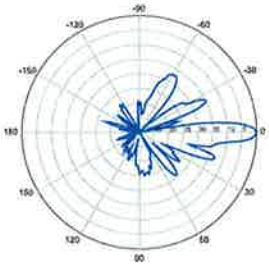
Horizontal | 1920-2170 MHz

BXA-171063-8CF-EDIN-0



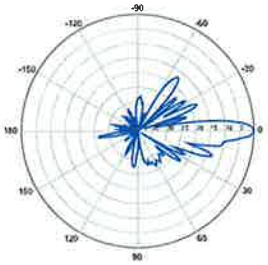
0° | Vertical | 1710-1880 MHz

BXA-171063-8CF-EDIN-0



0° | Vertical | 1850-1990 MHz

BXA-171063-8CF-EDIN-0

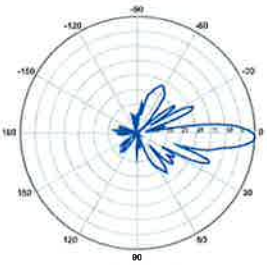


0° | Vertical | 1920-2170 MHz

BXA-171063-8CF-EDIN-X

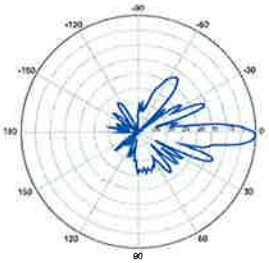
X-Pol | FET Panel | 63° | 17.4 dBi

BXA-171063-8CF-EDIN-2



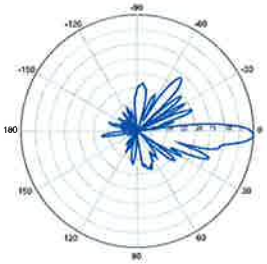
2° | Vertical | 1710-1880 MHz

BXA-171063-8CF-EDIN-2



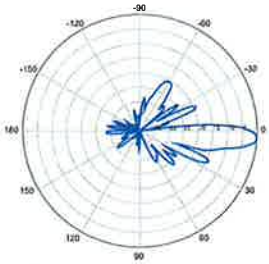
2° | Vertical | 1850-1990 MHz

BXA-171063-8CF-EDIN-2



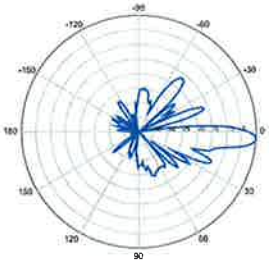
2° | Vertical | 1920-2170 MHz

BXA-171063-8CF-EDIN-4



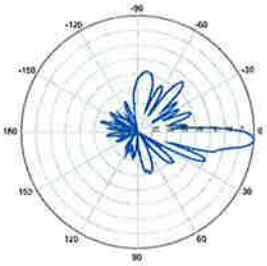
4° | Vertical | 1710-1880 MHz

BXA-171063-8CF-EDIN-4



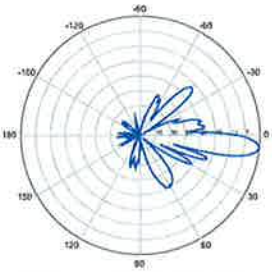
4° | Vertical | 1850-1990 MHz

BXA-171063-8CF-EDIN-4



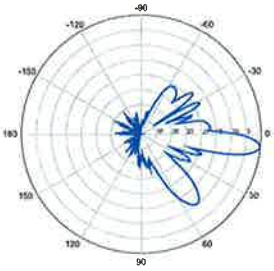
4° | Vertical | 1920-2170 MHz

BXA-171063-8CF-EDIN-6



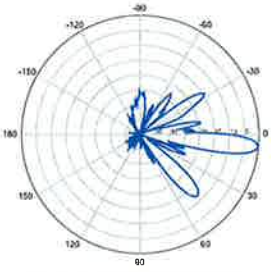
6° | Vertical | 1710-1880 MHz

BXA-171063-8CF-EDIN-6



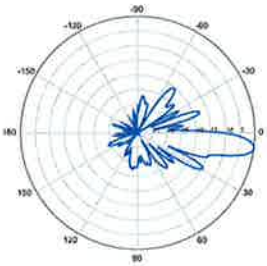
6° | Vertical | 1850-1990 MHz

BXA-171063-8CF-EDIN-6



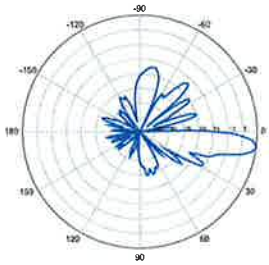
6° | Vertical | 1920-2170 MHz

BXA-171063-8CF-EDIN-8



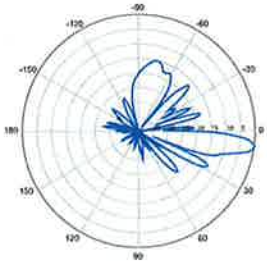
8° | Vertical | 1710-1880 MHz

BXA-171063-8CF-EDIN-8



8° | Vertical | 1850-1990 MHz

BXA-171063-8CF-EDIN-8



8° | Vertical | 1920-2170 MHz

Product Data Sheet FD9R6004/2C-3L

ShareLite Wideband Diplexer – In-line 698-960 MHz/1710-2200 MHz, DC pass in high frequency path

Product Description

The ShareLite FD9R6004 Series of diplexers are designed to enable feeder sharing between systems in the 698-960 MHz range and in the 1710-2200 MHz range. The diplexer is equipped with in-line connector placement so it can be installed in the BTS cabinet or at the tower top. This is especially valuable in crowded sites or when the feeders are not easily accessible. Due to its wideband design, the FD9R6004 Series can accommodate many combining solutions between 698-960 MHz and 1710-2200 MHz systems such as LTE 700 MHz, Cellular 800 MHz with PCS, GSM900 with GSM1800, or GSM900 with UMTS. This diplexer features a highly selective filter. It provides a high level of isolation between ports, while keeping the insertion loss on both paths at an extremely low level. The FD9R6004 diplexers are available with various DC pass options, helpful in configurations with or without the Tower Mount Amplifiers installed.

Features/Benefits

- **LTE ready design**
- **Extremely Low Insertion Loss**
- **High level of Rejection between bands – Protection against interferences**
- **Extremely High Power Handling Capability**
- **Integrated DC block/bypass versions available**
- **Very compact & small size design – Easy installation and reduced tower load**
- **In-line long-neck connectors for easy connection & waterproofing**
- **Exceptional reliability & environmental protection (IP 67)**
- **Equipped with 1 * Breathable Vent – Prevent any humidity inside the product**
- **Mounting hardware for Wall and Pole mount provided (P/N SEM2-1A)**
- **Grounding already provided through the mounting bracket**
- **Kit available for easy dual mount**

Technical Specifications

Product Type	Diplexer/Cross Band Coupler
Application	LTE700, GSM900, UMTS, GSM1800, Cellular 800, PCS
Frequency Range 1, MHz	698-960
Frequency Range 2, MHz	1710-2200
Configuration	Sharelite Single diplexer, outdoor, DC pass in the 1710-2170MHz path, with mounting hardware SEM2-1A
Mounting	Wall Mounting: With 4 screws (maximum 6mm diameter); Pole Mounting: With included clamp set 40-110mm (1.57-4.33)
Return Loss All Ports Min/Typ, dB	19/23
Power Handling Continuous, Max, W	1250 at common port; 750 in low frequency path & 500 in high frequency path
Power Handling Peak, Max, W	15000 in low frequency path & 8000 in high frequency path
Impedance, Ohms	50
Insertion Loss, Path 1, dB	0.07 typ.
Insertion Loss, Path 2, dB	0.13 typ.
Rejection Between Bands Min/Typ, dB	58/64@698-960MHz; 57/70@1710-2200MHz
IMP Level at the COM Port, Typ, dBm	-112 @ 2x43
DC Pass in Low Frequency Path	No
DC Pass in High Frequency Path	Yes
Temperature Range, °C (°F)	-40 to +60 (-40 to +140)
Environmental	ETSI 300-019-2-4 Class 4.1E
Ingress Protection	IP 67
Lightning Protection	EN/IEC61000-4-5 Level 4
Connectors	In-line long-neck 7-16-Female
Weight, kg (lb)	1.2 (2.6)
Shipping Weight, kg (lb)	3.2 (7) for 2 * single units in 1 * box, 9.8 (21.6) for 6 * units = 3 * Boxes in 1 * overwrap
Dimensions, H x W x D, mm (in)	147 x 164 x 37 (5.8 x 6.5 x 1.5)
Shipping Dimensions, H x W x D, mm (in)	254 x 406 x 82 (10 x 16 x 3.2) for 2 * Single Units in 1 * box, 280 x 406 x 241 (11 x 16 x 9.5) for 6 * units = 3 * Boxes in 1 * overwrap
Volume, L	0.43
Housing	Aluminum

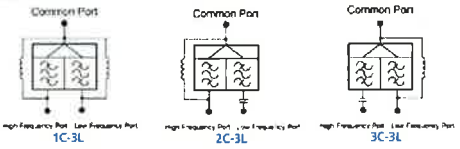
Notes

ShareLite Wideband Diplexer – In-line 698-960 MHz/1710-2200 MHz, DC pass in high frequency path

Other Documentation

FD9R6004/2C-3L Installation Instructions: Wideband_Diplexer_Installation_Rev5.pdf

Selection Guide Diplexer 698-960 / 1710-2200MHz					
	Model Number	Full DC Pass	DC Pass High Band	DC Pass Low Band	Mounting Hardware Included
Single	FD9R6004/1C-3L				X
	FD9R6004/2C-3L				X
	FD9R6004/3C-3L				X
Dual	KIT-FD9R6004/1C-DL				X
	KIT-FD9R6004/2C-DL				X
	KIT-FD9R6004/3C-DL				X



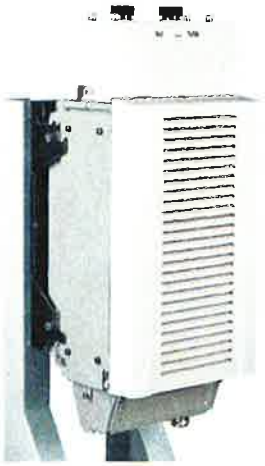
The FD9R6004 Series is upgradeable to a Dual Diplexer kit by means of 2 diplexers and mounting hardware kits SEM2-1A and SEM2-3

Mounting Hardware and Ground Cable Ordering Information		
Model Number	Description	
SEM2-1A	Mounting Hardware, Pole mount ø40-110mm (Included with the Single and Dual Diplexer) Wall Screws M6 (Not included with the product)	
SEM2-3	Assembly kit for 2 pcs of FD9R6004/xC-3L (Can be ordered separately but included with the Dual Diplexer Kit)	
CA020-2	Ground Cable, 2m, Includes lugs (Optional)	
CA030-2	Ground Cable, 2m, Includes lugs (Optional)	
SEM6	Mounting Hardware for 6 Diplexers, Tower Base (Optional)	

Alcatel-Lucent RRH2x40-AWS

REMOTE RADIO HEAD

The Alcatel-Lucent RRH2x40-AWS is a high-power, small form-factor Remote Radio Head (RRH) operating in the AWS frequency band (1700/2100MHz - 3GPP Band 4). The Alcatel-Lucent RRH2x40-AWS is designed with an eco-efficient approach, providing operators with the means to achieve high quality and capacity coverage with minimum site requirements.



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

The Alcatel-Lucent RRH2x40-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 RRH2x40-AWS has two transmit RF paths, 40 W RF output power per transmit path, and is designed to manage up to four-way receive diversity. The device is ideally suited to support macro coverage, with multiple-input multiple-output (MIMO) 2x2 operation in up to 20 MHz of bandwidth.

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

Fast, low-cost installation and deployment

The Alcatel-Lucent RRH2x40-AWS is a zero-footprint solution and operates noise-free, simplifying negotiations with site property owners and minimizing environmental impacts. Installation can easily be done by a single person because the Alcatel-Lucent RRH2x40-AWS is compact and weighs less than 20 kg (44 lb), eliminating the need for a crane to hoist the BTS cabinet to the rooftop. A site can be in operation in less than one day — a fraction of the time required for a traditional BTS.

Excellent RF performance

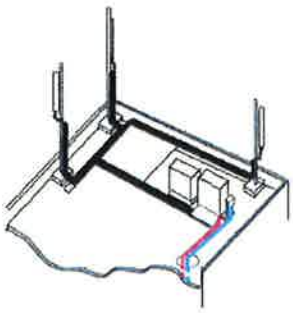
Because of its small size and weight, the Alcatel-Lucent RRH2x40-AWS can be installed close to the antenna. Operators can therefore locate the Alcatel-Lucent RRH2x40-AWS where RF engineering is deemed ideal, minimizing trade-offs between available sites and RF optimum sites. The RF feeder cost and installation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

Features

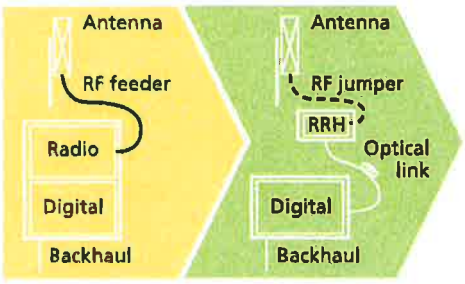
- Zero-footprint deployment
- Easy installation, with a lightweight unit can be carried and set up by one person
- Optimized RF power, with flexible site selection and elimination of a TMA
- Convection-cooled (fanless)
- Noise-free
- Best-in-class power efficiency, with significantly reduced energy consumption

Benefits

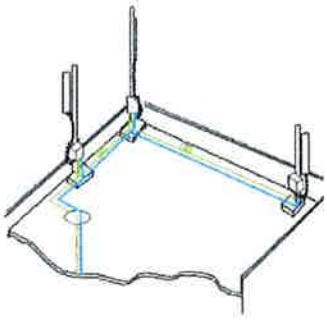
- Leverages existing real estate with lower site costs
- Reduces installation costs, with fewer installation materials and simplified logistics
- Decreases power costs and minimizes environmental impacts, with the potential for eco-sustainable power options
- Improves RF performance and adds flexibility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



Macro



RRH for space-constrained cell sites



Distributed

Technical specifications

Physical dimensions

- Height: 620 mm (24.4 in.)
- Width: 270 mm (10.63 in.)
- Depth: 170m (6.7 in.)
- Weight (without mounting kit): less than 20 kg (44 lb)

Power

- Power supply: -48VDC

Operating environment

- Outdoor temperature range:
  - ¬ With solar load: -40°C to +50°C (-40°F to +122°F)
  - ¬ Without solar load: -40°C to +55°C (-40°F to +131°F)
- Passive convection cooling (no fans)
- Enclosure protection
  - ¬ IP65 (International Protection rating)

RF characteristics

- Frequency band: 1700/2100 MHz (AWS); 3GPP Band 4
- Bandwidth: up to 20 MHz
- RF output power at antenna port: 40 W nominal RF power for each Tx port
- Rx diversity: 2-way or 4-way with optional Rx Diversity module
- Noise figure: below 2.0 dB typical
- Antenna Line Device features
  - ¬ TMA and Remote electrical tilt (RET) support via AISG v2.0

Optical characteristics

Type/number of fibers

- Single-mode variant
  - ¬ One Single Mode Single Fiber per RRH2x, carrying UL and DL using CWDM
  - ¬ Single mode dual fiber (SM/DF)
- Multi-mode variant
  - ¬ Two Multi-mode fibers per RRH2x: one carrying UL, the other carrying DL

Optical fiber length

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

Digital Ports and Alarms

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

Alcatel·Lucent

TAB 2

	General	Power	Density					
Site Name: West Hartford 2								
Tower Height: Verizon @ 100ft								
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 (GSM/UMTS)	2	12.0815	120	0.0006	1950	1.0000	0.06%	
*T-Mobile AWS (UMTS)	2	12.0815	120	0.0006	2100	1.0000	0.06%	
*T-Mobile AWS (LTE)	2	24.16301	120	0.0012	2100	1.0000	0.12%	
*MetroPCS CMDA	3	727	90	0.0968	2135	1.0000	9.68%	
*MetroPCS LTE	1	1200	90	0.0533	2130	1.0000	5.33%	
Verizon PCS	**11**	**268**	**100**	**0.1060**	**1970**	**1.0000**	**10.60%**	
Verizon Cellular	**9**	**268**	**100**	**0.0867**	**869**	**0.5793**	**14.97%**	
Verizon AWS	**1**	**1750**	**100**	**0.0629**	**2145**	**1.0000**	**6.29%**	
Verizon 700	**1**	**875**	**100**	**0.0315**	**698**	**0.4653**	**6.76%**	
								83.73%
* Source: Siting Council								

TAB 3

Date: **June 28, 2013**

Veronica Harris
Crown Castle
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Mahwah, NJ 07430
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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
Crown Castle Designation:	**Crown Castle BU Number:**	829013
	Crown Castle Site Name:	West Hartford/I-84/X43
	Crown Castle JDE Job Number:	225424
	Crown Castle Work Order Number:	620595
	Crown Castle Application Number:	180522 Rev. 11
Engineering Firm Designation:	**TEP Project Number:**	25680.6351
Site Data:	**467 South Quaker Lane (Church of St. Mark)** **West Hartford, Hartford County, CT 06110** **Latitude *41° 44' 55.75"*, Longitude *-72° 43' 52.75"*** **119 Foot - Monopole Tower**	

Dear Veronica Harris,

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 556945, in accordance with application 180522, revision 11.

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:

LC5: Existing + Proposed Equipment **Sufficient Capacity**
Note: See Table I and Table II for the proposed and existing 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, ASCE 7-05 Minimum Design Loads for Buildings and Other Structures and the 2005 Connecticut State Building Code (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: John Liu, P.E. / TWM

Respectfully submitted by:

William H. Martin, P.E., S.E.

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TABLE OF CONTENTS

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. TEP did not visit the site. 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	3	Alcatel Lucent	RRH2X40-AWS	1	1-5/8	1
		3	Amphenol	BXA-80063-4BF-EDIN-X w/ Mount Pipe			
		3	Antel	BXA-171063/8CF w/ Mount Pipe			
		3	Antel	BXA-185063/8CF w/ Mount Pipe			
		1	RFS Celwave	DB-T1-6Z-8AB-0Z			
		6	RFS Celwave	FD9R6004/2C-3L			

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

Table 2 - Existing 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	Andrew	ETW190VS12UB	16	1-5/8	1
		2	Andrew	VHLP2-11			
		9	Ericsson	AIR 21 w/ Mount Pipe			
		3	Ericsson	AIR 33 w/ Mount Pipe			
		1	Tower Mounts	Platform Mount [LP 403-1]			
		-	-	-	27	1-5/8	2

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	12 3	1-5/8 7/16	1
		3	Ericsson	RRU-11			
		2	KMW Communications	AM-X-CD-16-65-00T-RET w/ Mount Pipe			
		6	Powerwave Technologies	7770.00 w/ Mount Pipe			
		6	Powerwave Technologies	LGP 21403			
		6	Powerwave Technologies	LGP21903			
		1	Raycap	DC6-48-60-18-8F			
		1	Tower Mounts	Platform Mount [LP 712-1]			
100.0	100.0	2	Andrew	LNX-6514DS-T4M w/ Mount Pipe	12	1-5/8	1
		1	Antel	BXA-70063-6CF-EDIN-0 w/ Mount Pipe			
		1	Tower Mounts	Platform Mount [LP 403-1]			
		6	Antel	LPA-80080/4CF w/ Mount Pipe	-	-	3
		3	Rymsa Wireless	MG D3-800Tx w/ Mount Pipe			
90.0	90.0	3	Kathrein	742 213 w/ Mount Pipe	6	1-5/8	1
80.0	83.0	1	Andrew	VHLP2-23	3 1 3 4	1/4 5/16 5/8 1/2	1
	80.0	3	Argus Technologies	LLPX310R w/ Mount Pipe			
		1	Clearwire	CW JUNCTION BOX			
		3	Samsung Telecommunications	WIMAX DAP HEAD			
		1	Tower Mounts	Side Arm Mount [SO 101-3]			

Notes:
1) Existing equipment
2) MLA coax considered; Includes (16) 1-5/8 existing lines
3) Existing equipment; to be removed

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
Geotechnical Report	Clarence Welti Associates, Inc.	3774465	CCISites
Supplemental Geotechnical Report	Tower Engineering Professionals	3636697	CCISites
Tower Foundation Drawings	Pirod, Inc.	3636698	CCISites
Tower Manufacturer Drawings	Pirod, Inc.	3525378	CCISites
Tower Reinforcement Drawings	Natcomm Consulting Engineers, Inc.	3525386	CCISites
Previous Structural Analysis	Tower Engineering Professionals	3682077	CCISites

3.1) Analysis Method

tnxTower (version 6.0.4.0), 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 11.0.0), 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 (K)	SF*P_allow (K)	% Capacity	Pass / Fail
L1	119.083 - 101.083	Pole	TP26x22.13x0.25	1	-6.20	1041.59	19.3	Pass
L2	101.083 - 66.5	Pole	TP34.06x24.87x0.31	2	-14.12	1700.40	56.6	Pass
L3	66.5 - 32.8333	Pole	TP41.75x32.5x0.38	3	-21.47	2501.48	65.4	Pass
L4	32.8333 - 0	Pole	TP49.06x39.85x0.38	4	-31.54	3027.84	75.7	Pass
							Summary	
						Pole (L4)	75.7	Pass
						Rating =	**75.7**	**Pass**

Table 6 - Tower Component Stresses vs. Capacity

Notes	Component	Elevation (ft)	% Capacity	Pass / Fail
1,2,3	Anchor Rods & Base Plate	-	88.6	Pass
1	Base Foundation Soil Interaction	-	55.8	Pass
1	Rock Anchors	-	77.4	Pass

Structure Rating (max from all components) =	**88.6%**

Notes:
1) See additional documentation in "Appendix C - Additional Calculations" for calculations supporting the % capacity listed.
2) Base design methodology of the manufacturer has been reviewed and found to be an acceptable means of designing to resist the full capacity of the bolts and shaft.
3) Base plates have the same capacity as their respective splice bolts.

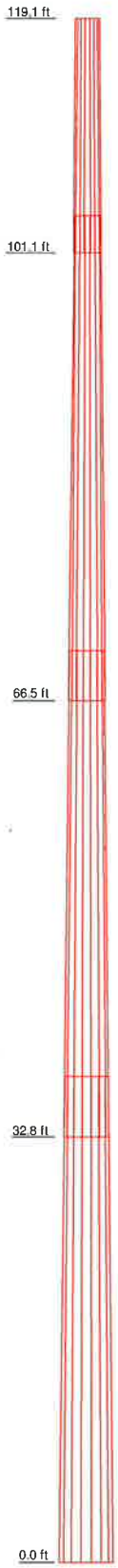
4.1) Recommendations

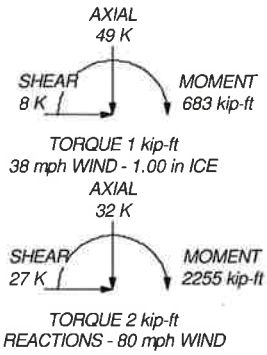
1) If the load differs from that described in Tables 1 and 2 of this report, "Appendix B – Base Level Drawing" or the provisions of this analysis are found to be invalid, another structural analysis should be performed.
2) The tower and its foundation have sufficient capacity to carry the existing and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

APPENDIX A

TNXTOWER OUTPUT

Section	Length (ft)	Number of Sides	Thickness (in)	Socket Length (ft)	Top Dia (in)	Bot Dia (in)	Grade	Weight (K)
1	18.00	16	0.25	2.92	22.13	26.00		1.2
2	37.50	16	0.31	3.83	24.87	34.06		3.7
3	37.50	16	0.38	4.67	32.50	41.75	A572-65	5.6
4	37.50	16	0.38		39.85	49.06		6.7
								17.2





DESIGNED APPURTENANCE LOADING

TYPE	ELEVATION	TYPE	ELEVATION
ETW190VS12UB	120	BXA-171063/8CF w/ Mount Pipe	100
ETW190VS12UB	120	BXA-171063/8CF w/ Mount Pipe	100
ETW190VS12UB	120	BXA-185063/8CF w/ Mount Pipe	100
(3) AIR 21 w/ Mount Pipe	120	BXA-185063/8CF w/ Mount Pipe	100
(3) AIR 21 w/ Mount Pipe	120	BXA-185063/8CF w/ Mount Pipe	100
(3) AIR 21 w/ Mount Pipe	120	BXA-80063/8CF w/ Mount Pipe	100
AIR 33 w/ Mount Pipe	120	BXA-80063/8CF w/ Mount Pipe	100
AIR 33 w/ Mount Pipe	120	BXA-80063/8CF w/ Mount Pipe	100
AIR 33 w/ Mount Pipe	120	BXA-80063-4BF-EDIN-X w/ Mount Pipe	100
Platform Mount [LP 403-1]	120		
VHLP2-11	120	BXA-80063-4BF-EDIN-X w/ Mount Pipe	100
VHLP2-11	120		
(2) 7770.00 w/ Mount Pipe	110	BXA-80063-4BF-EDIN-X w/ Mount Pipe	100
SBNH-1D6565C w/ Mount Pipe	110		
AM-X-CD-16-65-00T-RET w/ Mount Pipe	110	DB-T1-6Z-8AB-0Z	100
		(2) FD9R6004/2C-3L	100
AM-X-CD-16-65-00T-RET w/ Mount Pipe	110	(2) FD9R6004/2C-3L	100
		(2) FD9R6004/2C-3L	100
(2) RRU-11	110	Platform Mount [LP 403-1]	100
(2) RRU-11	110	LNX-6514DS-T4M w/ Mount Pipe	100
(2) RRU-11	110	BXA-70063-6CF-EDIN-0 w/ Mount Pipe	100
(2) LGP 21403	110	742 213 w/ Mount Pipe	90
(2) LGP 21403	110	742 213 w/ Mount Pipe	90
(2) LGP 21403	110	742 213 w/ Mount Pipe	90
DC6-48-60-18-8F	110	LLPX310R w/ Mount Pipe	80
(2) LGP21903	110	Horizon DUO	80
(2) LGP21903	110	Horizon DUO	80
(2) LGP21903	110	Horizon DUO	80
6' x 2" Pipe mount	110	WIMAX DAP HEAD	80
6' x 2" Pipe mount	110	WIMAX DAP HEAD	80
6' x 2" Pipe mount	110	WIMAX DAP HEAD	80
Platform Mount [LP 712-1]	110	CW JUNCTION BOX	80
(2) 7770.00 w/ Mount Pipe	110	2.4" Dia. x 6' Mount Pipe	80
(2) 7770.00 w/ Mount Pipe	110	2.4" Dia. x 6' Mount Pipe	80
LNX-6514DS-T4M w/ Mount Pipe	100	2.4" Dia. x 6' Mount Pipe	80
RRH2X40-AWS	100	Side Arm Mount [SO 101-3]	80
RRH2X40-AWS	100	LLPX310R w/ Mount Pipe	80
RRH2X40-AWS	100	LLPX310R w/ Mount Pipe	80
BXA-171063/8CF w/ Mount Pipe	100	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: 75.7%

Tower Engineering Professionals
3703 Junction Blvd.
Raleigh, NC 27603
Phone: (919) 661-6339
FAX: (919) 661-6350

Job:	West Hartford/I-84/X43 (BU 829013)
Project:	TEP No. 25680.6351
Client: Crown Castle	Drawn by: Timothy W. Moonly / App'd:
Code: TIA/EIA-222-F	Date: 06/28/13 / Scale: NTS
Path: C:\Users\tmoonly\Desktop\Current TNX\829013\829013_LC5.eri	Dwg No. E-1

tnxTower	Job	Page
	West Hartford/I-84/X43 (BU 829013)	1 of 17
Tower Engineering Professionals 3703 Junction Blvd. Raleigh, NC 27603 Phone: (919) 661-6339 FAX: (919) 661-6350	**Project** TEP No. 25680.6351	**Date** 16:00:24 06/28/13
	Client Crown Castle	**Designed by** Timothy W. Moonly

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 1.00 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, feedline supports, and appurtenance mounts are not considered.

Options

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

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	119.08-101.08	18.00	2.92	16	22.13	26.00	0.25	1.00	A572-65 (65 ksi)
L2	101.08-66.50	37.50	3.83	16	24.87	34.06	0.31	1.25	A572-65 (65 ksi)
L3	66.50-32.83	37.50	4.67	16	32.50	41.75	0.38	1.50	A572-65 (65 ksi)
L4	32.83-0.00	37.50		16	39.85	49.06	0.38	1.50	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	22.56	17.45	1055.33	7.79	11.29	93.51	2126.63	8.63	3.91	15.625
	26.51	20.54	1720.19	9.17	13.26	129.73	3466.43	10.15	4.68	18.706
L2	26.09	24.48	1865.79	8.74	12.69	147.08	3759.83	12.11	4.33	13.849
	34.73	33.64	4841.46	12.02	17.37	278.70	9756.23	16.64	6.16	19.701
L3	34.10	38.43	5009.44	11.44	16.57	302.25	10094.74	19.00	5.72	15.256
	42.57	49.49	10704.10	14.73	21.29	502.72	21570.28	24.47	7.56	20.165
L4	41.80	47.22	9295.19	14.05	20.32	457.38	18731.12	23.35	7.18	19.156
	50.02	58.24	17441.70	17.33	25.02	697.06	35147.48	28.80	9.02	24.046

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 119.08-101.08				1	1	1		
L2 101.08-66.50				1	1	1		
L3 66.50-32.83				1	1	1		
L4 32.83-0.00				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)	119.00 - 0.00	1	No Ice	0.04	0.22
						1/2" Ice	0.14	0.75
						1" Ice	0.24	1.28
						2" Ice	0.44	2.34
						4" Ice	0.84	4.46
Climbing ladder rungs(8 per sec.)	C	No	CaAa (Out Of Face)	119.00 - 0.00	1	No Ice	0.08	1.03
						1/2" Ice	0.17	1.79
						1" Ice	0.28	3.17
						2" Ice	0.47	7.75
						4" Ice	0.88	24.24
119 LDF7-50A(1-5/8")	B	No	Inside Pole	119.08 - 0.00	25	No Ice	0.00	0.82
						1/2" Ice	0.00	0.82
						1" Ice	0.00	0.82
						2" Ice	0.00	0.82
						4" Ice	0.00	0.82

Description	Face or Leg	Allow Shield	Component Type	Placement ft	Total Number		C_AA_A ft^2/ft	Weight plf
LDF7-50A(1-5/8")	B	No	CaAa (Out Of Face)	119.08 - 0.00	1	No Ice	0.20	0.82
						1/2" Ice	0.30	2.33
						1" Ice	0.40	4.46
						2" Ice	0.60	10.54
						4" Ice	1.00	30.04
LDF7-50A(1-5/8")	B	No	CaAa (Out Of Face)	119.08 - 0.00	1	No Ice	0.00	0.82
						1/2" Ice	0.00	2.33
						1" Ice	0.00	4.46
						2" Ice	0.00	10.54
						4" Ice	0.00	30.04
110								
LDF7-50A(1-5/8")	A	No	Inside Pole	110.00 - 0.00	12	No Ice	0.00	0.82
						1/2" Ice	0.00	0.82
						1" Ice	0.00	0.82
						2" Ice	0.00	0.82
						4" Ice	0.00	0.82
WR-VG102ST-BRDA(7/16")	A	No	Inside Pole	110.00 - 0.00	3	No Ice	0.00	0.20
						1/2" Ice	0.00	0.20
						1" Ice	0.00	0.20
						2" Ice	0.00	0.20
						4" Ice	0.00	0.20
WR-VG122ST-BRDA(7/16)	A	No	Inside Pole	110.00 - 0.00	2	No Ice	0.00	0.14
						1/2" Ice	0.00	0.14
						1" Ice	0.00	0.14
						2" Ice	0.00	0.14
						4" Ice	0.00	0.14
3" Flexible Conduit	A	No	Inside Pole	110.00 - 0.00	1	No Ice	0.00	1.04
						1/2" Ice	0.00	1.04
						1" Ice	0.00	1.04
						2" Ice	0.00	1.04
						4" Ice	0.00	1.04
100								
LDF7-50A(1-5/8")	A	No	Inside Pole	100.00 - 0.00	12	No Ice	0.00	0.82
						1/2" Ice	0.00	0.82
						1" Ice	0.00	0.82
						2" Ice	0.00	0.82
						4" Ice	0.00	0.82
HB158-1-08U8-S8J18(1-5/8)	A	No	CaAa (Out Of Face)	100.00 - 80.00	1	No Ice	0.20	1.30
						1/2" Ice	0.30	2.81
						1" Ice	0.40	4.94
						2" Ice	0.60	11.02
						4" Ice	1.00	30.52
HB158-1-08U8-S8J18(1-5/8)	A	No	CaAa (Out Of Face)	80.00 - 0.00	1	No Ice	0.00	1.30
						1/2" Ice	0.00	2.81
						1" Ice	0.00	4.94
						2" Ice	0.00	11.02
						4" Ice	0.00	30.52
90								
LDF7-50A(1-5/8")	A	No	Inside Pole	90.00 - 0.00	6	No Ice	0.00	0.82
						1/2" Ice	0.00	0.82
						1" Ice	0.00	0.82
						2" Ice	0.00	0.82
						4" Ice	0.00	0.82
80								
FSJ1-50A(1/4")	C	No	Inside Pole	80.00 - 0.00	3	No Ice	0.00	0.04
						1/2" Ice	0.00	0.04
						1" Ice	0.00	0.04
						2" Ice	0.00	0.04
						4" Ice	0.00	0.04
HJ4.5-50(5/8")	C	No	Inside Pole	80.00 - 0.00	3	No Ice	0.00	0.40
						1/2" Ice	0.00	0.40

Description	Face or Leg	Allow Shield	Component Type	Placement ft	Total Number		C_AA_A ft^2/ft	Weight plf
						1" Ice	0.00	0.40
						2" Ice	0.00	0.40
						4" Ice	0.00	0.40
9207(5/16")	C	No	Inside Pole	80.00 - 0.00	1	No Ice	0.00	0.60
						1/2" Ice	0.00	0.60
						1" Ice	0.00	0.60
						2" Ice	0.00	0.60
						4" Ice	0.00	0.60
2" Flexible Conduit	C	No	CaAa (Out Of Face)	80.00 - 0.00	1	No Ice	0.20	0.34
						1/2" Ice	0.30	1.87
						1" Ice	0.40	4.01
						2" Ice	0.60	10.11
						4" Ice	1.00	29.66
2" Flexible Conduit	C	No	Inside Pole	80.00 - 0.00	1	No Ice	0.00	0.34
						1/2" Ice	0.00	0.34
						1" Ice	0.00	0.34
						2" Ice	0.00	0.34
						4" Ice	0.00	0.34
FSJ4-50B(1/2")	C	No	Inside Pole	80.00 - 0.00	4	No Ice	0.00	0.14
						1/2" Ice	0.00	0.14
						1" Ice	0.00	0.14
						2" Ice	0.00	0.14
						4" Ice	0.00	0.14
***								

Feed Line/Linear Appurtenances Section Areas

Tower Section	Tower Elevation ft	Face	A_R ft^2	A_F ft^2	C_AA_A In Face ft^2	C_AA_A Out Face ft^2	Weight K
L1	119.08-101.08	A	0.000	0.000	0.000	0.000	0.10
		B	0.000	0.000	0.000	3.564	0.40
		C	0.000	0.000	0.000	2.016	0.02
L2	101.08-66.50	A	0.000	0.000	0.000	3.960	0.90
		B	0.000	0.000	0.000	6.847	0.77
		C	0.000	0.000	0.000	6.591	0.09
L3	66.50-32.83	A	0.000	0.000	0.000	0.000	0.94
		B	0.000	0.000	0.000	6.666	0.75
		C	0.000	0.000	0.000	10.521	0.15
L4	32.83-0.00	A	0.000	0.000	0.000	0.000	0.91
		B	0.000	0.000	0.000	6.501	0.73
		C	0.000	0.000	0.000	10.261	0.15

Feed Line/Linear Appurtenances Section Areas - With Ice

Tower Section	Tower Elevation ft	Face or Leg	Ice Thickness in	A_R ft^2	A_F ft^2	C_AA_A In Face ft^2	C_AA_A Out Face ft^2	Weight K
L1	119.08-101.08	A	1.155	0.000	0.000	0.000	0.000	0.10
		B		0.000	0.000	0.000	7.723	0.56
		C		0.000	0.000	0.000	10.295	0.10
L2	101.08-66.50	A	1.117	0.000	0.000	0.000	8.581	1.05
		B		0.000	0.000	0.000	14.838	1.08
		C		0.000	0.000	0.000	25.691	0.29
L3	66.50-32.83	A	1.050	0.000	0.000	0.000	0.000	1.08

Tower Section	Tower Elevation ft	Face or Leg	Ice Thickness in	A_R ft^2	A_F ft^2	C_AA_A In Face ft^2	C_AA_A Out Face ft^2	Weight K
		B		0.000	0.000	0.000	14.190	1.04
		C		0.000	0.000	0.000	33.092	0.43
L4	32.83-0.00	A	1.000	0.000	0.000	0.000	0.000	1.04
		B		0.000	0.000	0.000	13.394	0.99
		C		0.000	0.000	0.000	30.941	0.39

Feed Line Center of Pressure

Section	Elevation ft	CP_X in	CP_Z in	CP_X Ice in	CP_Z Ice in
L1	119.08-101.08	0.10	0.20	-0.12	0.47
L2	101.08-66.50	0.00	0.11	-0.26	0.33
L3	66.50-32.83	-0.13	0.33	-0.48	0.70
L4	32.83-0.00	-0.13	0.34	-0.49	0.72

Discrete Tower Loads

Description	Face or Leg	Offset Type	Offsets: Horz Lateral ft / Vert ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
120									
ETW190VS12UB	A	From Centroid-Leg	4.00 -7.50 0.00	30.00	120.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	0.66 0.78 0.90 1.17 1.82	0.37 0.46 0.56 0.80 1.36	0.01 0.02 0.03 0.04 0.11
ETW190VS12UB	B	From Centroid-Leg	4.00 -7.50 0.00	30.00	120.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	0.66 0.78 0.90 1.17 1.82	0.37 0.46 0.56 0.80 1.36	0.01 0.02 0.03 0.04 0.11
ETW190VS12UB	C	From Centroid-Leg	4.00 -7.50 0.00	30.00	120.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	0.66 0.78 0.90 1.17 1.82	0.37 0.46 0.56 0.80 1.36	0.01 0.02 0.03 0.04 0.11
(3) AIR 21 w/ Mount Pipe	A	From Centroid-Leg	4.00 2.50 0.00	30.00	120.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	6.53 6.98 7.43 8.37 10.34	5.33 6.02 6.73 8.20 11.46	0.11 0.16 0.22 0.36 0.76
(3) AIR 21 w/ Mount Pipe	B	From Centroid-Leg	4.00 2.50 0.00	30.00	120.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	6.53 6.98 7.43 8.37 10.34	5.33 6.02 6.73 8.20 11.46	0.11 0.16 0.22 0.36 0.76
(3) AIR 21 w/ Mount Pipe	C	From	4.00	30.00	120.00	No Ice	6.53	5.33	0.11

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 K
		Centroid-Le	2.50			1/2" Ice	6.98	6.02	0.16
		g	0.00			1" Ice	7.43	6.73	0.22
						2" Ice	8.37	8.20	0.36
						4" Ice	10.34	11.46	0.76
AIR 33 w/ Mount Pipe	A	From	4.00	30.00	120.00	No Ice	6.39	5.18	0.12
		Centroid-Le	-7.50			1/2" Ice	6.82	5.86	0.17
		g	0.00			1" Ice	7.26	6.56	0.23
						2" Ice	8.18	8.01	0.37
						4" Ice	10.11	11.23	0.77
AIR 33 w/ Mount Pipe	B	From	4.00	30.00	120.00	No Ice	6.39	5.18	0.12
		Centroid-Le	-7.50			1/2" Ice	6.82	5.86	0.17
		g	0.00			1" Ice	7.26	6.56	0.23
						2" Ice	8.18	8.01	0.37
						4" Ice	10.11	11.23	0.77
AIR 33 w/ Mount Pipe	C	From	4.00	30.00	120.00	No Ice	6.39	5.18	0.12
		Centroid-Le	-7.50			1/2" Ice	6.82	5.86	0.17
		g	0.00			1" Ice	7.26	6.56	0.23
						2" Ice	8.18	8.01	0.37
						4" Ice	10.11	11.23	0.77
Platform Mount [LP 403-1]	C	None		0.00	120.00	No Ice	18.85	18.85	1.50
						1/2" Ice	24.30	24.30	1.80
						1" Ice	29.75	29.75	2.09
						2" Ice	40.65	40.65	2.69
						4" Ice	62.45	62.45	3.87
110									
(2) 7770.00 w/ Mount Pipe	A	From	4.00	30.00	110.00	No Ice	6.12	4.25	0.06
		Centroid-Le	0.00			1/2" Ice	6.63	5.01	0.10
		g	0.00			1" Ice	7.13	5.71	0.16
						2" Ice	8.16	7.16	0.29
						4" Ice	10.36	10.41	0.66
(2) 7770.00 w/ Mount Pipe	B	From	4.00	30.00	110.00	No Ice	6.12	4.25	0.06
		Centroid-Le	0.00			1/2" Ice	6.63	5.01	0.10
		g	0.00			1" Ice	7.13	5.71	0.16
						2" Ice	8.16	7.16	0.29
						4" Ice	10.36	10.41	0.66
(2) 7770.00 w/ Mount Pipe	C	From	4.00	30.00	110.00	No Ice	6.12	4.25	0.06
		Centroid-Le	0.00			1/2" Ice	6.63	5.01	0.10
		g	0.00			1" Ice	7.13	5.71	0.16
						2" Ice	8.16	7.16	0.29
						4" Ice	10.36	10.41	0.66
SBNH-1D6565C w/ Mount Pipe	B	From	4.00	30.00	110.00	No Ice	11.69	9.85	0.10
		Centroid-Le	2.00			1/2" Ice	12.42	11.38	0.19
		g	0.00			1" Ice	13.16	12.94	0.29
						2" Ice	14.63	15.31	0.52
						4" Ice	17.92	20.19	1.17
AM-X-CD-16-65-00T-RET w/ Mount Pipe	A	From	4.00	30.00	110.00	No Ice	8.50	6.30	0.07
		Centroid-Le	2.00			1/2" Ice	9.15	7.48	0.14
		g	0.00			1" Ice	9.77	8.37	0.21
						2" Ice	11.03	10.18	0.38
						4" Ice	13.68	14.02	0.87
AM-X-CD-16-65-00T-RET w/ Mount Pipe	C	From	4.00	30.00	110.00	No Ice	8.50	6.30	0.07
		Centroid-Le	2.00			1/2" Ice	9.15	7.48	0.14
		g	0.00			1" Ice	9.77	8.37	0.21
						2" Ice	11.03	10.18	0.38
						4" Ice	13.68	14.02	0.87
(2) RRU-11	A	From	4.00	30.00	110.00	No Ice	1.91	1.47	0.04
		Centroid-Le	0.00			1/2" Ice	2.10	1.65	0.06

Description	Face or Leg	Offset Type	Offsets: Horz Lateral ft / Vert ft / ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
		g	0.00			1" Ice	2.30	1.83	0.08
						2" Ice	2.72	2.22	0.12
						4" Ice	3.68	3.10	0.25
(2) RRU-11	B	From Centroid-Le g	4.00 0.00 0.00	30.00	110.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	1.91 2.10 2.30 2.72 3.68	1.47 1.65 1.83 2.22 3.10	0.04 0.06 0.08 0.12 0.25
(2) RRU-11	C	From Centroid-Le g	4.00 0.00 0.00	30.00	110.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	1.91 2.10 2.30 2.72 3.68	1.47 1.65 1.83 2.22 3.10	0.04 0.06 0.08 0.12 0.25
(2) LGP 21403	A	From Centroid-Le g	4.00 0.00 0.00	30.00	110.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	0.95 1.09 1.24 1.57 2.32	0.37 0.48 0.60 0.87 1.51	0.02 0.02 0.03 0.05 0.12
(2) LGP 21403	B	From Centroid-Le g	4.00 0.00 0.00	30.00	110.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	0.95 1.09 1.24 1.57 2.32	0.37 0.48 0.60 0.87 1.51	0.02 0.02 0.03 0.05 0.12
(2) LGP 21403	C	From Centroid-Le g	4.00 0.00 0.00	30.00	110.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	0.95 1.09 1.24 1.57 2.32	0.37 0.48 0.60 0.87 1.51	0.02 0.02 0.03 0.05 0.12
DC6-48-60-18-8F	A	From Centroid-Le g	4.00 -6.00 0.00	30.00	110.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	1.27 1.46 1.66 2.09 3.10	1.27 1.46 1.66 2.09 3.10	0.02 0.04 0.05 0.10 0.21
(2) LGP21903	A	From Centroid-Le g	4.00 0.00 0.00	30.00	110.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	0.27 0.34 0.43 0.62 1.10	0.18 0.25 0.32 0.49 0.94	0.01 0.01 0.02 0.03 0.07
(2) LGP21903	B	From Centroid-Le g	4.00 0.00 0.00	30.00	110.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	0.27 0.34 0.43 0.62 1.10	0.18 0.25 0.32 0.49 0.94	0.01 0.01 0.02 0.03 0.07
(2) LGP21903	C	From Centroid-Le g	4.00 0.00 0.00	30.00	110.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	0.27 0.34 0.43 0.62 1.10	0.18 0.25 0.32 0.49 0.94	0.01 0.01 0.02 0.03 0.07
6' x 2" Pipe mount	A	From Centroid-Le g	4.00 -2.00 0.00	0.00	110.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	1.20 1.80 2.17 2.93 4.57	1.20 1.80 2.17 2.93 4.57	0.02 0.03 0.04 0.08 0.22
6' x 2" Pipe mount	B	From Centroid-Le g	4.00 -2.00 0.00	0.00	110.00	No Ice 1/2" Ice 1" Ice 2" Ice	1.20 1.80 2.17 2.93	1.20 1.80 2.17 2.93	0.02 0.03 0.04 0.08

Description	Face or Leg	Offset Type	Offsets: Horz Lateral ft / Vert ft / ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
						4" Ice	4.57	4.57	0.22
6' x 2" Pipe mount	C	From Centroid-Leg	4.00 -2.00 0.00	0.00	110.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	1.20 1.80 2.17 2.93 4.57	1.20 1.80 2.17 2.93 4.57	0.02 0.03 0.04 0.08 0.22
Platform Mount [LP 712-1]	C	None		0.00	110.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	24.53 29.94 35.35 46.17 67.81	24.53 29.94 35.35 46.17 67.81	1.34 1.65 1.96 2.58 3.82
100									
LNX-6514DS-T4M w/ Mount Pipe	A	From Centroid-Leg	4.00 -2.00 0.00	60.00	100.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	8.68 9.31 9.93 11.20 13.85	7.42 8.45 9.34 11.18 15.22	0.08 0.15 0.23 0.42 0.94
BXA-70063-6CF-EDIN-0 w/ Mount Pipe	B	From Centroid-Leg	4.00 -2.00 0.00	60.00	100.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	7.97 8.61 9.22 10.46 13.07	5.80 6.95 7.82 9.60 13.37	0.04 0.10 0.17 0.34 0.80
LNX-6514DS-T4M w/ Mount Pipe	C	From Centroid-Leg	4.00 -2.00 0.00	60.00	100.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	8.68 9.31 9.93 11.20 13.85	7.42 8.45 9.34 11.18 15.22	0.08 0.15 0.23 0.42 0.94
RRH2X40-AWS	A	From Centroid-Leg	4.00 -7.50 0.00	60.00	100.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	2.52 2.75 2.99 3.50 4.61	1.59 1.80 2.01 2.46 3.48	0.04 0.06 0.08 0.13 0.28
RRH2X40-AWS	B	From Centroid-Leg	4.00 -7.50 0.00	60.00	100.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	2.52 2.75 2.99 3.50 4.61	1.59 1.80 2.01 2.46 3.48	0.04 0.06 0.08 0.13 0.28
RRH2X40-AWS	C	From Centroid-Leg	4.00 -7.50 0.00	60.00	100.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	2.52 2.75 2.99 3.50 4.61	1.59 1.80 2.01 2.46 3.48	0.04 0.06 0.08 0.13 0.28
BXA-171063/8CF w/ Mount Pipe	A	From Centroid-Leg	4.00 -7.50 0.00	60.00	100.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	3.14 3.52 3.92 4.80 6.71	3.51 4.13 4.76 6.06 9.09	0.03 0.06 0.10 0.20 0.49
BXA-171063/8CF w/ Mount Pipe	B	From Centroid-Leg	4.00 -7.50 0.00	60.00	100.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	3.14 3.52 3.92 4.80 6.71	3.51 4.13 4.76 6.06 9.09	0.03 0.06 0.10 0.20 0.49
BXA-171063/8CF w/ Mount Pipe	C	From Centroid-Leg	4.00 -7.50 0.00	60.00	100.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	3.14 3.52 3.92 4.80 6.71	3.51 4.13 4.76 6.06 9.09	0.03 0.06 0.10 0.20 0.49

Description	Face or Leg	Offset Type	Offsets: Horz Lateral ft / Vert ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
BXA-185063/8CF w/ Mount Pipe	A	From Centroid-Leg	4.00 2.00 0.00	60.00	100.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	3.19 3.56 3.96 4.85 6.76	3.12 3.73 4.35 5.64 8.57	0.04 0.07 0.11 0.21 0.50
BXA-185063/8CF w/ Mount Pipe	B	From Centroid-Leg	4.00 2.00 0.00	60.00	100.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	3.19 3.56 3.96 4.85 6.76	3.12 3.73 4.35 5.64 8.57	0.04 0.07 0.11 0.21 0.50
BXA-185063/8CF w/ Mount Pipe	C	From Centroid-Leg	4.00 2.00 0.00	60.00	100.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	3.19 3.56 3.96 4.85 6.76	3.12 3.73 4.35 5.64 8.57	0.04 0.07 0.11 0.21 0.50
BXA-80063/8CF w/ Mount Pipe	A	From Centroid-Leg	4.00 7.50 0.00	60.00	100.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	10.91 11.61 12.33 13.70 16.91	7.64 9.13 10.63 12.90 17.64	0.06 0.13 0.22 0.43 1.01
BXA-80063/8CF w/ Mount Pipe	B	From Centroid-Leg	4.00 7.50 0.00	60.00	100.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	10.91 11.61 12.33 13.70 16.91	7.64 9.13 10.63 12.90 17.64	0.06 0.13 0.22 0.43 1.01
BXA-80063/8CF w/ Mount Pipe	C	From Centroid-Leg	4.00 7.50 0.00	60.00	100.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	10.91 11.61 12.33 13.70 16.91	7.64 9.13 10.63 12.90 17.64	0.06 0.13 0.22 0.43 1.01
BXA-80063-4BF-EDIN-X w/ Mount Pipe	A	From Leg	4.00 7.50 0.00	60.00	100.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	5.09 5.52 5.95 6.86 8.82	3.47 4.04 4.64 5.96 8.89	0.03 0.07 0.11 0.23 0.55
BXA-80063-4BF-EDIN-X w/ Mount Pipe	B	From Leg	4.00 7.50 0.00	60.00	100.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	5.09 5.52 5.95 6.86 8.82	3.47 4.04 4.64 5.96 8.89	0.03 0.07 0.11 0.23 0.55
BXA-80063-4BF-EDIN-X w/ Mount Pipe	C	From Leg	4.00 7.50 0.00	60.00	100.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	5.09 5.52 5.95 6.86 8.82	3.47 4.04 4.64 5.96 8.89	0.03 0.07 0.11 0.23 0.55
DB-T1-6Z-8AB-0Z	C	From Centroid-Leg	4.00 7.50 0.00	60.00	100.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	5.60 5.92 6.24 6.91 8.37	2.33 2.56 2.79 3.28 4.37	0.04 0.08 0.12 0.21 0.45
(2) FD9R6004/2C-3L	A	From Centroid-Leg	4.00 0.00 0.00	60.00	100.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	0.37 0.45 0.54 0.75 1.28	0.08 0.14 0.20 0.34 0.74	0.00 0.01 0.01 0.02 0.06
(2) FD9R6004/2C-3L	B	From Centroid-Le	4.00 0.00	60.00	100.00	No Ice 1/2" Ice	0.37 0.45	0.08 0.14	0.00 0.01

Description	Face or Leg	Offset Type	Offsets: Horz Lateral ft / Vert ft / ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
		g	0.00			1" Ice	0.54	0.20	0.01
						2" Ice	0.75	0.34	0.02
						4" Ice	1.28	0.74	0.06
(2) FD9R6004/2C-3L	C	From Centroid-Le g	4.00 0.00 0.00	60.00	100.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	0.37 0.45 0.54 0.75 1.28	0.08 0.14 0.20 0.34 0.74	0.00 0.01 0.01 0.02 0.06
Platform Mount [LP 403-1]	C	None		0.00	100.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	18.85 24.30 29.75 40.65 62.45	18.85 24.30 29.75 40.65 62.45	1.50 1.80 2.09 2.69 3.87
90									
742 213 w/ Mount Pipe	A	From Leg	0.50 0.00 0.00	30.00	90.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	5.37 5.95 6.50 7.61 9.93	4.62 6.00 6.98 8.85 12.79	0.05 0.09 0.14 0.28 0.68
742 213 w/ Mount Pipe	B	From Leg	0.50 0.00 0.00	0.00	90.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	5.37 5.95 6.50 7.61 9.93	4.62 6.00 6.98 8.85 12.79	0.05 0.09 0.14 0.28 0.68
742 213 w/ Mount Pipe	C	From Leg	0.50 0.00 0.00	-10.00	90.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	5.37 5.95 6.50 7.61 9.93	4.62 6.00 6.98 8.85 12.79	0.05 0.09 0.14 0.28 0.68
*** ***80***									
LLPX310R w/ Mount Pipe	A	From Leg	1.00 -2.00 0.00	30.00	80.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	4.98 5.38 5.78 6.62 8.44	2.87 3.40 3.94 5.12 7.89	0.04 0.08 0.12 0.23 0.53
LLPX310R w/ Mount Pipe	B	From Leg	1.00 -2.00 0.00	30.00	80.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	4.98 5.38 5.78 6.62 8.44	2.87 3.40 3.94 5.12 7.89	0.04 0.08 0.12 0.23 0.53
LLPX310R w/ Mount Pipe	C	From Leg	1.00 -2.00 0.00	30.00	80.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	4.98 5.38 5.78 6.62 8.44	2.87 3.40 3.94 5.12 7.89	0.04 0.08 0.12 0.23 0.53
Horizon DUO	A	From Leg	1.00 2.00 0.00	30.00	80.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	0.55 0.65 0.76 1.00 1.60	0.34 0.43 0.52 0.73 1.25	0.01 0.01 0.02 0.04 0.10
Horizon DUO	B	From Leg	1.00 2.00 0.00	30.00	80.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	0.55 0.65 0.76 1.00 1.60	0.34 0.43 0.52 0.73 1.25	0.01 0.01 0.02 0.04 0.10
Horizon DUO	C	From Leg	1.00	30.00	80.00	No Ice	0.55	0.34	0.01

Description	Face or Leg	Offset Type	Offsets: Horz Lateral ft / Vert ft / ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
			2.00			1/2" Ice	0.65	0.43	0.01
			0.00			1" Ice	0.76	0.52	0.02
						2" Ice	1.00	0.73	0.04
						4" Ice	1.60	1.25	0.10
WIMAX DAP HEAD	A	From Leg	1.00	30.00	80.00	No Ice	1.80	0.78	0.03
			-2.00			1/2" Ice	1.99	0.92	0.04
			0.00			1" Ice	2.18	1.07	0.06
						2" Ice	2.59	1.39	0.09
						4" Ice	3.51	2.14	0.20
WIMAX DAP HEAD	B	From Leg	1.00	30.00	80.00	No Ice	1.80	0.78	0.03
			-2.00			1/2" Ice	1.99	0.92	0.04
			0.00			1" Ice	2.18	1.07	0.06
						2" Ice	2.59	1.39	0.09
						4" Ice	3.51	2.14	0.20
WIMAX DAP HEAD	C	From Leg	1.00	30.00	80.00	No Ice	1.80	0.78	0.03
			-2.00			1/2" Ice	1.99	0.92	0.04
			0.00			1" Ice	2.18	1.07	0.06
						2" Ice	2.59	1.39	0.09
						4" Ice	3.51	2.14	0.20
CW JUNCTION BOX	A	From Leg	1.00	30.00	80.00	No Ice	1.40	0.70	0.00
			2.00			1/2" Ice	1.56	0.82	0.01
			0.00			1" Ice	1.73	0.95	0.02
						2" Ice	2.09	1.24	0.05
						4" Ice	2.92	1.91	0.15
2.4" Dia. x 6' Mount Pipe	A	From Leg	1.00	0.00	80.00	No Ice	1.43	1.43	0.02
			2.00			1/2" Ice	1.93	1.93	0.04
			0.00			1" Ice	2.32	2.32	0.05
						2" Ice	3.15	3.15	0.10
						4" Ice	5.06	5.06	0.25
2.4" Dia. x 6' Mount Pipe	B	From Leg	1.00	0.00	80.00	No Ice	1.43	1.43	0.02
			2.00			1/2" Ice	1.93	1.93	0.04
			0.00			1" Ice	2.32	2.32	0.05
						2" Ice	3.15	3.15	0.10
						4" Ice	5.06	5.06	0.25
2.4" Dia. x 6' Mount Pipe	C	From Leg	1.00	0.00	80.00	No Ice	1.43	1.43	0.02
			2.00			1/2" Ice	1.93	1.93	0.04
			0.00			1" Ice	2.32	2.32	0.05
						2" Ice	3.15	3.15	0.10
						4" Ice	5.06	5.06	0.25
Side Arm Mount [SO 101-3)	C	None		0.00	80.00	No Ice	7.50	7.50	0.25
						1/2" Ice	8.90	8.90	0.33
						1" Ice	10.30	10.30	0.41
						2" Ice	13.10	13.10	0.58
						4" Ice	18.70	18.70	0.90

Dishes

Description	Face or Leg	Dish Type	Offset Type	Offsets: Horz Lateral Vert ft	Azimuth Adjustment °	3 dB Beam Width °	Elevation ft	Outside Diameter ft		Aperture Area ft²	Weight K
120'											
VHLP2-11	A	Paraboloid w/Radome	From Centroid -Leg	4.00 -7.50 0.00	0.00		120.00	2.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	3.72 4.01 4.30 4.88 6.04	0.03 0.05 0.07 0.11 0.19
VHLP2-11	A	Paraboloid w/Radome	From Centroid -Leg	4.00 -2.00 0.00	0.00		120.00	2.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	3.72 4.01 4.30 4.88 6.04	0.03 0.05 0.07 0.11 0.19
80'											
VHLP2-23	A	Paraboloid w/Radome	From Leg	1.00 0.00 3.00	-30.00		80.00	2.18	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	3.73 4.02 4.31 4.90 6.06	0.03 0.05 0.07 0.11 0.20
***											

Load Combinations

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

Comb. No.	Description
34	Dead+Wind 210 deg - Service
35	Dead+Wind 240 deg - Service
36	Dead+Wind 270 deg - Service
37	Dead+Wind 300 deg - Service
38	Dead+Wind 330 deg - Service

Maximum Member Forces

Section No.	Elevation ft	Component Type	Condition	Gov. Load Comb.	Force K	Major Axis Moment kip-ft	Minor Axis Moment kip-ft
L1	119.083 - 101.083	Pole	Max Tension	14	0.00	-0.00	-0.00
			Max. Compression	14	-12.49	0.82	0.42
			Max. Mx	11	-6.21	98.25	-0.50
			Max. My	8	-6.20	0.31	-99.90
			Max. Vy	11	-9.44	98.25	-0.50
			Max. Vx	8	9.58	0.31	-99.90
			Max. Torque	9			-1.52
L2	101.083 - 66.5	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	14	-26.82	1.95	1.14
			Max. Mx	11	-14.14	629.50	-0.65
			Max. My	8	-14.12	-0.29	-634.99
			Max. Vy	5	19.16	-628.36	-2.83
			Max. Vx	8	19.30	-0.29	-634.99
			Max. Torque	9			-2.24
L3	66.5 - 32.8333	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	14	-36.37	1.92	0.93
			Max. Mx	5	-21.47	-1315.09	-5.47
			Max. My	8	-21.47	-1.17	-1326.47
			Max. Vy	5	22.63	-1315.09	-5.47
			Max. Vx	8	22.77	-1.17	-1326.47
			Max. Torque	9			-2.20
L4	32.8333 - 0	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	14	-49.02	1.89	0.65
			Max. Mx	5	-31.54	-2235.31	-8.46
			Max. My	8	-31.54	-2.19	-2252.01
			Max. Vy	5	26.48	-2235.31	-8.46
			Max. Vx	8	26.62	-2.19	-2252.01
			Max. Torque	9			-2.18

Maximum Reactions

Location	Condition	Gov. Load Comb.	Vertical K	Horizontal, X K	Horizontal, Z K
Pole	Max. Vert	21	49.02	-0.01	-7.82
	Max. H_x	11	31.56	26.43	-0.02
	Max. H_z	2	31.56	0.03	26.51
	Max. M_x	2	2243.34	0.03	26.51
	Max. M_z	5	2235.31	-26.46	-0.08
	Max. Torsion	3	1.80	-13.22	22.90
	Min. Vert	1	31.56	0.00	0.00
	Min. H_x	5	31.56	-26.46	-0.08
	Min. H_z	8	31.56	-0.03	-26.60

Location	Condition	Gov. Load Comb.	Vertical K	Horizontal, X K	Horizontal, Z K
	Min. M_x	8	-2252.01	-0.03	-26.60
	Min. M_z	11	-2233.98	26.43	-0.02
	Min. Torsion	9	-2.17	13.26	-23.01

Tower Mast Reaction Summary

Load Combination	Vertical K	$Shear_x$ K	$Shear_z$ K	Overturning Moment, M_x kip-ft	Overturning Moment, M_z kip-ft	Torque kip-ft
Dead Only	31.56	0.00	0.00	-0.39	0.78	0.00
Dead+Wind 0 deg - No Ice	31.56	-0.03	-26.51	-2243.34	3.77	-1.72
Dead+Wind 30 deg - No Ice	31.56	13.22	-22.90	-1936.39	-1116.34	-1.80
Dead+Wind 60 deg - No Ice	31.56	22.89	-13.16	-1110.51	-1932.66	-1.22
Dead+Wind 90 deg - No Ice	31.56	26.46	0.08	8.46	-2235.31	-0.51
Dead+Wind 120 deg - No Ice	31.56	23.00	13.32	1127.89	-1944.57	0.24
Dead+Wind 150 deg - No Ice	31.56	13.33	23.05	1952.09	-1128.46	1.19
Dead+Wind 180 deg - No Ice	31.56	0.03	26.60	2252.01	-2.19	1.91
Dead+Wind 210 deg - No Ice	31.56	-13.26	23.01	1947.86	1123.04	2.17
Dead+Wind 240 deg - No Ice	31.56	-22.91	13.26	1121.67	1938.36	1.62
Dead+Wind 270 deg - No Ice	31.56	-26.43	0.02	2.14	2233.98	0.85
Dead+Wind 300 deg - No Ice	31.56	-22.92	-13.23	-1117.76	1937.87	0.01
Dead+Wind 330 deg - No Ice	31.56	-13.28	-22.96	-1942.32	1124.08	-0.95
Dead+Ice+Temp	49.02	-0.00	-0.00	-0.65	1.89	-0.00
Dead+Wind 0 deg+Ice+Temp	49.02	-0.01	-7.80	-681.63	2.83	-0.55
Dead+Wind 30 deg+Ice+Temp	49.02	3.89	-6.74	-588.64	-337.42	-0.50
Dead+Wind 60 deg+Ice+Temp	49.02	6.73	-3.87	-338.06	-585.54	-0.27
Dead+Wind 90 deg+Ice+Temp	49.02	7.79	0.02	1.75	-677.41	-0.02
Dead+Wind 120 deg+Ice+Temp	49.02	6.77	3.92	341.66	-588.79	0.21
Dead+Wind 150 deg+Ice+Temp	49.02	3.92	6.78	591.75	-340.77	0.45
Dead+Wind 180 deg+Ice+Temp	49.02	0.01	7.82	682.79	1.11	0.60
Dead+Wind 210 deg+Ice+Temp	49.02	-3.90	6.77	590.55	342.74	0.59
Dead+Wind 240 deg+Ice+Temp	49.02	-6.74	3.90	339.89	590.60	0.38
Dead+Wind 270 deg+Ice+Temp	49.02	-7.78	0.00	-0.07	680.58	0.11
Dead+Wind 300 deg+Ice+Temp	49.02	-6.75	-3.89	-340.10	590.52	-0.14
Dead+Wind 330 deg+Ice+Temp	49.02	-3.91	-6.75	-590.28	343.12	-0.39
Dead+Wind 0 deg - Service	31.56	-0.01	-10.36	-877.05	1.97	-0.67
Dead+Wind 30 deg - Service	31.56	5.16	-8.95	-757.08	-435.81	-0.71
Dead+Wind 60 deg - Service	31.56	8.94	-5.14	-434.29	-754.86	-0.48
Dead+Wind 90 deg - Service	31.56	10.34	0.03	3.05	-873.15	-0.20
Dead+Wind 120 deg - Service	31.56	8.98	5.20	440.58	-759.53	0.09
Dead+Wind 150 deg - Service	31.56	5.21	9.01	762.72	-440.56	0.47
Dead+Wind 180 deg - Service	31.56	0.01	10.39	879.94	-0.35	0.75
Dead+Wind 210 deg - Service	31.56	-5.18	8.99	761.06	439.44	0.85
Dead+Wind 240 deg - Service	31.56	-8.95	5.18	438.14	758.10	0.64
Dead+Wind 270 deg - Service	31.56	-10.32	0.01	0.58	873.63	0.33
Dead+Wind 300 deg - Service	31.56	-8.95	-5.17	-437.12	757.90	0.00
Dead+Wind 330 deg - Service	31.56	-5.19	-8.97	-759.40	439.84	-0.37

Solution Summary

	Sum of Applied Forces			Sum of Reactions			
Load Comb.	PX K	PY K	PZ K	PX K	PY K	PZ K	% Error
1	0.00	-31.56	0.00	0.00	31.56	0.00	0.000%

	Sum of Applied Forces			Sum of Reactions			
Load Comb.	PX K	PY K	PZ K	PX K	PY K	PZ K	% Error
2	-0.03	-31.56	-26.51	0.03	31.56	26.51	0.000%
3	13.22	-31.56	-22.90	-13.22	31.56	22.90	0.000%
4	22.89	-31.56	-13.16	-22.89	31.56	13.16	0.000%
5	26.46	-31.56	0.08	-26.46	31.56	-0.08	0.000%
6	23.00	-31.56	13.32	-23.00	31.56	-13.32	0.000%
7	13.33	-31.56	23.05	-13.33	31.56	-23.05	0.000%
8	0.03	-31.56	26.60	-0.03	31.56	-26.60	0.000%
9	-13.26	-31.56	23.01	13.26	31.56	-23.01	0.000%
10	-22.91	-31.56	13.26	22.91	31.56	-13.26	0.000%
11	-26.43	-31.56	0.02	26.43	31.56	-0.02	0.000%
12	-22.92	-31.56	-13.23	22.92	31.56	13.23	0.000%
13	-13.28	-31.56	-22.96	13.28	31.56	22.96	0.000%
14	0.00	-49.02	0.00	0.00	49.02	0.00	0.000%
15	-0.01	-49.02	-7.80	0.01	49.02	7.80	0.000%
16	3.89	-49.02	-6.74	-3.89	49.02	6.74	0.000%
17	6.73	-49.02	-3.87	-6.73	49.02	3.87	0.000%
18	7.79	-49.02	0.02	-7.79	49.02	-0.02	0.000%
19	6.77	-49.02	3.92	-6.77	49.02	-3.92	0.000%
20	3.92	-49.02	6.78	-3.92	49.02	-6.78	0.000%
21	0.01	-49.02	7.82	-0.01	49.02	-7.82	0.000%
22	-3.90	-49.02	6.77	3.90	49.02	-6.77	0.000%
23	-6.74	-49.02	3.90	6.74	49.02	-3.90	0.000%
24	-7.78	-49.02	0.00	7.78	49.02	-0.00	0.000%
25	-6.75	-49.02	-3.89	6.75	49.02	3.89	0.000%
26	-3.91	-49.02	-6.75	3.91	49.02	6.75	0.000%
27	-0.01	-31.56	-10.36	0.01	31.56	10.36	0.000%
28	5.16	-31.56	-8.95	-5.16	31.56	8.95	0.000%
29	8.94	-31.56	-5.14	-8.94	31.56	5.14	0.000%
30	10.34	-31.56	0.03	-10.34	31.56	-0.03	0.000%
31	8.98	-31.56	5.20	-8.98	31.56	-5.20	0.000%
32	5.21	-31.56	9.01	-5.21	31.56	-9.01	0.000%
33	0.01	-31.56	10.39	-0.01	31.56	-10.39	0.000%
34	-5.18	-31.56	8.99	5.18	31.56	-8.99	0.000%
35	-8.95	-31.56	5.18	8.95	31.56	-5.18	0.000%
36	-10.32	-31.56	0.01	10.32	31.56	-0.01	0.000%
37	-8.95	-31.56	-5.17	8.95	31.56	5.17	0.000%
38	-5.19	-31.56	-8.97	5.19	31.56	8.97	0.000%

Non-Linear Convergence Results

Load Combination	Converged?	Number of Cycles	Displacement Tolerance	Force Tolerance
1	Yes	4	0.00000001	0.00000001
2	Yes	4	0.00000001	0.00095207
3	Yes	5	0.00000001	0.00021084
4	Yes	5	0.00000001	0.00023558
5	Yes	4	0.00000001	0.00024268
6	Yes	5	0.00000001	0.00023004
7	Yes	5	0.00000001	0.00022039
8	Yes	5	0.00000001	0.00003304
9	Yes	5	0.00000001	0.00025236
10	Yes	5	0.00000001	0.00021337
11	Yes	4	0.00000001	0.00050623
12	Yes	5	0.00000001	0.00022716
13	Yes	5	0.00000001	0.00023663
14	Yes	4	0.00000001	0.00001124

15	Yes	5	0.00000001	0.00011395
16	Yes	5	0.00000001	0.00013945
17	Yes	5	0.00000001	0.00014121
18	Yes	5	0.00000001	0.00011171
19	Yes	5	0.00000001	0.00014112
20	Yes	5	0.00000001	0.00014038
21	Yes	5	0.00000001	0.00011386
22	Yes	5	0.00000001	0.00014578
23	Yes	5	0.00000001	0.00014101
24	Yes	5	0.00000001	0.00011318
25	Yes	5	0.00000001	0.00014252
26	Yes	5	0.00000001	0.00014455
27	Yes	4	0.00000001	0.00020431
28	Yes	4	0.00000001	0.00057750
29	Yes	4	0.00000001	0.00072070
30	Yes	4	0.00000001	0.00007081
31	Yes	4	0.00000001	0.00066764
32	Yes	4	0.00000001	0.00061175
33	Yes	4	0.00000001	0.00022841
34	Yes	4	0.00000001	0.00082203
35	Yes	4	0.00000001	0.00058853
36	Yes	4	0.00000001	0.00011708
37	Yes	4	0.00000001	0.00066202
38	Yes	4	0.00000001	0.00071700

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 K	Allow. P_a K	Ratio $\frac{P}{P_a}$
L1	119.083 - 101.083 (1)	TP26x22.13x0.25	18.00	0.00	0.0	39.00	20.04	-6.20	781.39	0.008
L2	101.083 - 66.5 (2)	TP34.06x24.87x0.31	37.50	0.00	0.0	39.00	32.71	-14.12	1275.62	0.011
L3	66.5 - 32.8333 (3)	TP41.75x32.5x0.38	37.50	0.00	0.0	39.00	48.12	-21.47	1876.58	0.011
L4	32.8333 - 0 (4)	TP49.06x39.85x0.38	37.50	0.00	0.0	39.00	58.24	-31.54	2271.45	0.014

Pole Bending Design Data

Section No.	Elevation ft	Size	Actual M_x kip-ft	Actual f_{bx} ksi	Allow. F_{bx} ksi	Ratio $\frac{f_{bx}}{F_{bx}}$	Actual M_y kip-ft	Actual f_{by} ksi	Allow. F_{by} ksi	Ratio $\frac{f_{by}}{F_{by}}$
L1	119.083 - 101.083 (1)	TP26x22.13x0.25	100.14	9.73	39.00	0.250	0.00	0.00	39.00	0.000
L2	101.083 - 66.5 (2)	TP34.06x24.87x0.31	635.83	28.97	39.00	0.743	0.00	0.00	39.00	0.000
L3	66.5 - 32.8333 (3)	TP41.75x32.5x0.38	1328.22	33.55	39.00	0.860	0.00	0.00	39.00	0.000
L4	32.8333 - 0 (4)	TP49.06x39.85x0.38	2254.79	38.82	39.00	0.995	0.00	0.00	39.00	0.000

Pole Shear Design Data

Section No.	Elevation ft	Size	Actual V K	Actual f_v ksi	Allow. F_v ksi	Ratio $\frac{f_v}{F_v}$	Actual T kip-ft	Actual f_{vt} ksi	Allow. F_{vt} ksi	Ratio $\frac{f_{vt}}{F_{vt}}$
L1	119.083 - 101.083 (1)	TP26x22.13x0.25	9.58	0.48	26.00	0.037	1.31	0.06	26.00	0.002
L2	101.083 - 66.5 (2)	TP34.06x24.87x0.31	19.33	0.59	26.00	0.046	1.02	0.02	26.00	0.001
L3	66.5 - 32.8333 (3)	TP41.75x32.5x0.38	22.80	0.47	26.00	0.037	1.09	0.01	26.00	0.001
L4	32.8333 - 0 (4)	TP49.06x39.85x0.38	26.65	0.46	26.00	0.036	1.19	0.01	26.00	0.000

Pole Interaction Design Data

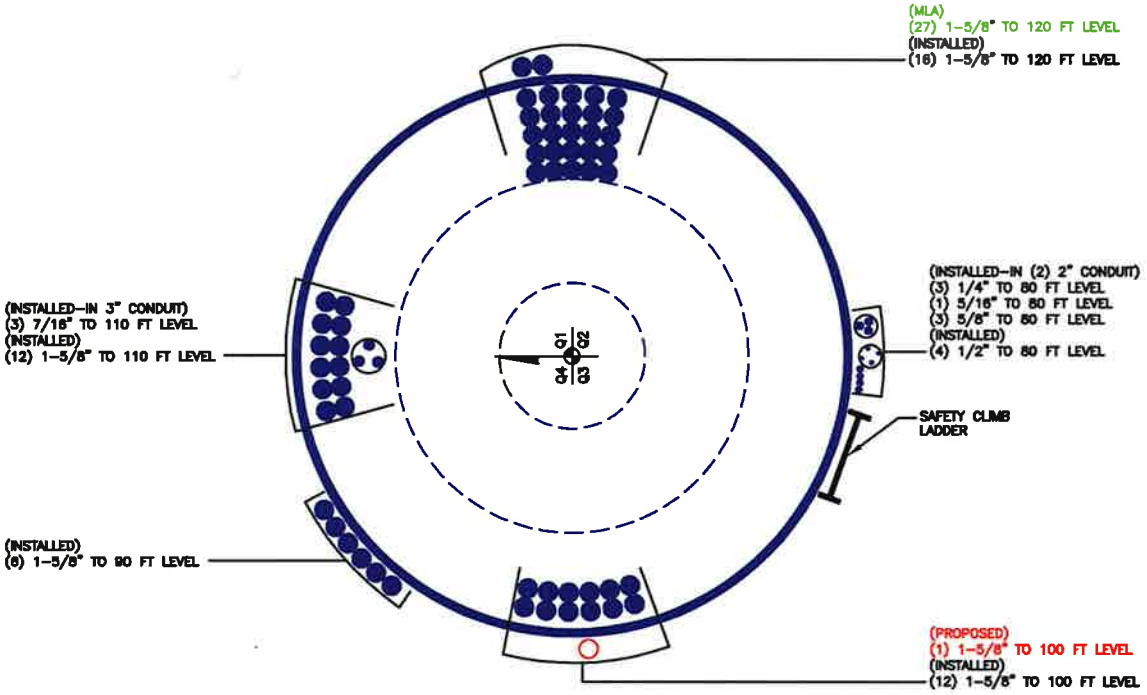
Section No.	Elevation ft	Ratio $\frac{P}{P_a}$	Ratio $\frac{f_{bx}}{F_{bx}}$	Ratio $\frac{f_{by}}{F_{by}}$	Ratio $\frac{f_v}{F_v}$	Ratio $\frac{f_{vt}}{F_{vt}}$	Comb. Stress Ratio	Allow. Stress Ratio	Criteria
L1	119.083 - 101.083 (1)	0.008	0.250	0.000	0.037	0.002	0.258	1.333	H1-3+VT
L2	101.083 - 66.5 (2)	0.011	0.743	0.000	0.046	0.001	0.755	1.333	H1-3+VT
L3	66.5 - 32.8333 (3)	0.011	0.860	0.000	0.037	0.001	0.872	1.333	H1-3+VT
L4	32.8333 - 0 (4)	0.014	0.995	0.000	0.036	0.000	1.010	1.333	H1-3+VT

Section Capacity Table

Section No.	Elevation ft	Component Type	Size	Critical Element	P K	$SF*P_{allow}$ K	% Capacity	Pass Fail
L1	119.083 - 101.083	Pole	TP26x22.13x0.25	1	-6.20	1041.59	19.3	Pass
L2	101.083 - 66.5	Pole	TP34.06x24.87x0.31	2	-14.12	1700.40	56.6	Pass
L3	66.5 - 32.8333	Pole	TP41.75x32.5x0.38	3	-21.47	2501.48	65.4	Pass
L4	32.8333 - 0	Pole	TP49.06x39.85x0.38	4	-31.54	3027.84	75.7	Pass
							Summary	
						Pole (L4)	75.7	Pass
						RATING =	**75.7**	**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 #: *180522 Rev. 11*

Pole Manufacturer:	*Pirod*

Reactions		
Moment:	2255	ft-kips
Axial:	32	kips
Shear:	27	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):	125	ksi
Yield (Fy):	105	ksi
Bolt Circle:	54	in

Plate Data		
Diam:	60	in
Thick:	1.25	in
Grade:	50	ksi
Single-Rod B-eff:	4.73	in

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

Pole Data		
Diam:	49.0625	in
Thick:	0.375	in
Grade:	65	ksi
# of Sides:	16	"0" IF Round
Fu	80	ksi
Reinf. Fillet Weld	0	"0" if None

Stress Increase Factor		
ASIF:	1.333	

Anchor Rod Results

Maximum Rod Tension:	59.8 Kips	Rigid
Allowable Tension:	67.5 Kips	Service, ASD
Anchor Rod Stress Ratio:	88.6% Pass	Fty*ASIF

Base Plate Results

Base Plate Stress:	Flexural Check Rohn/Pirod, OK	Rigid
Allowable Plate Stress:	50.0 ksi	Service ASD
Base Plate Stress Ratio:	Rohn/Pirod, OK	0.75*Fy*ASIF
		Y.L. Length: 22.56

n/a

Stiffener Results N/A for Rohn / Pirod

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

Pole Results

Pole Punching Shear Check: N/A

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

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

Monopole on Mat Foundation - TIA-222-F

Site Data	
Site Name:	West Hartford/I-84/X43
CCI Number:	BU# 829013
TEP Job Number:	25680.6351

Unfactored Reactions from TNX		
Axial	32	k
Shear	27	k
Moment	2255	k-ft

Soil Properties		
q_a	12	ksf
Wt of Backfill	125	pcf
Wt Soil Below Mat	135	pcf
Wt of Rock	160	pcf
Angle of Rock Cone	30	deg
Mat Subgrade, ks	800	kcf
Square Mat Dim.	16.5	ft
Mat Depth	2.5	ft
Square Pier Dim.	6.0	ft
Pier Length	4.5	ft

Rock Anchor Properties		
Diameter	1	in
Net Area	0.85	in^2
Allow. Design Load	81.6	k
Ultimate Stress	150	ksi

Grout to Rock Bond Properties		
Allowable Bond Stress	50	psi
Drilled Shaft Diameter	3.75	in

Pad & Pier Foundation Results

Bearing Stress	6.70	ksf
Allowable Bearing	12.00	ksf
% Capacity	55.8%	Pass

Rock Anchor Steel Results

Load Reaction	63.14	k
Allowable Design Load	81.6	k
% Capacity	77.4%	Pass

Rock Anchor Pullout Results

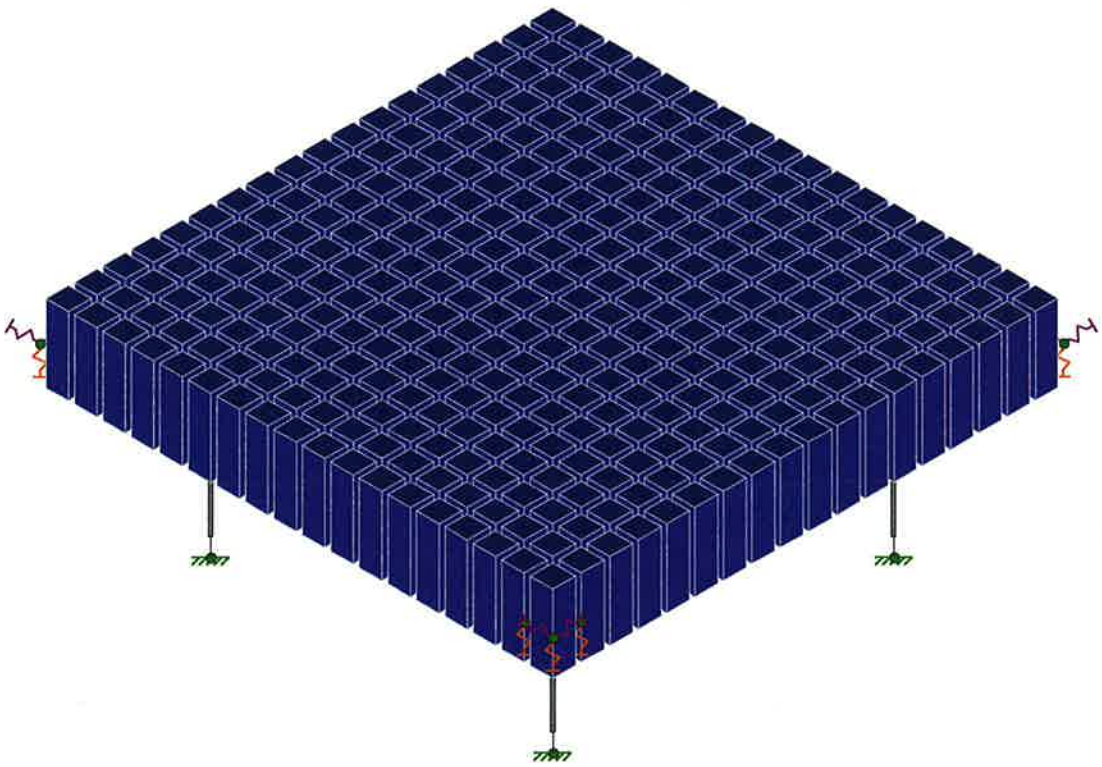
Development Length* 8.93 ft

*This is the length required to develop the actual load in anchor, not the design capacity of anchor.

See results summary for each rock anchor below.

Rock Anchor Pullout Results Summary (refer to sketch for labeled dimensions)

	"A"	"B"	"C"	"D"	"E"					
#	Depth to Bedrock (ft)	Rock Embed (ft)	Soil Below Mat (ft)	Depth Cone (ft)	Radius (ft)	Wt Cone (k)	Wt Soil (k)	Pullout Resist (k)	% Capacity	
1	10	15	3.5	10.53	6.08	65.3	54.90	120.2	52.5%	Pass
2	9.5	18.5	3	14.03	8.10	154.4	83.53	237.9	26.5%	Pass
3	8	20	1.5	15.53	8.97	209.3	51.17	260.5	24.2%	Pass
4	8.5	19.5	2	15.03	8.68	189.8	63.90	253.7	24.9%	Pass



Solution: Envelope

TEP	West Hartford/I-84/X43 Mat Foundation	SK - 1
TWM		June 28, 2013 at 4:14 PM
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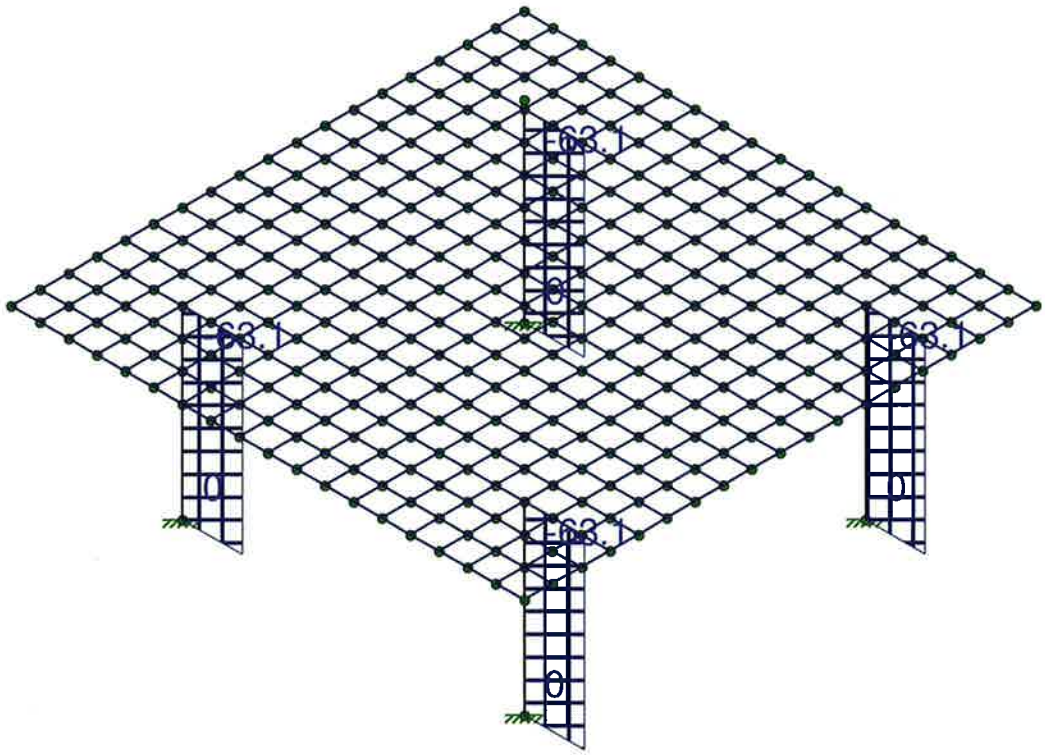
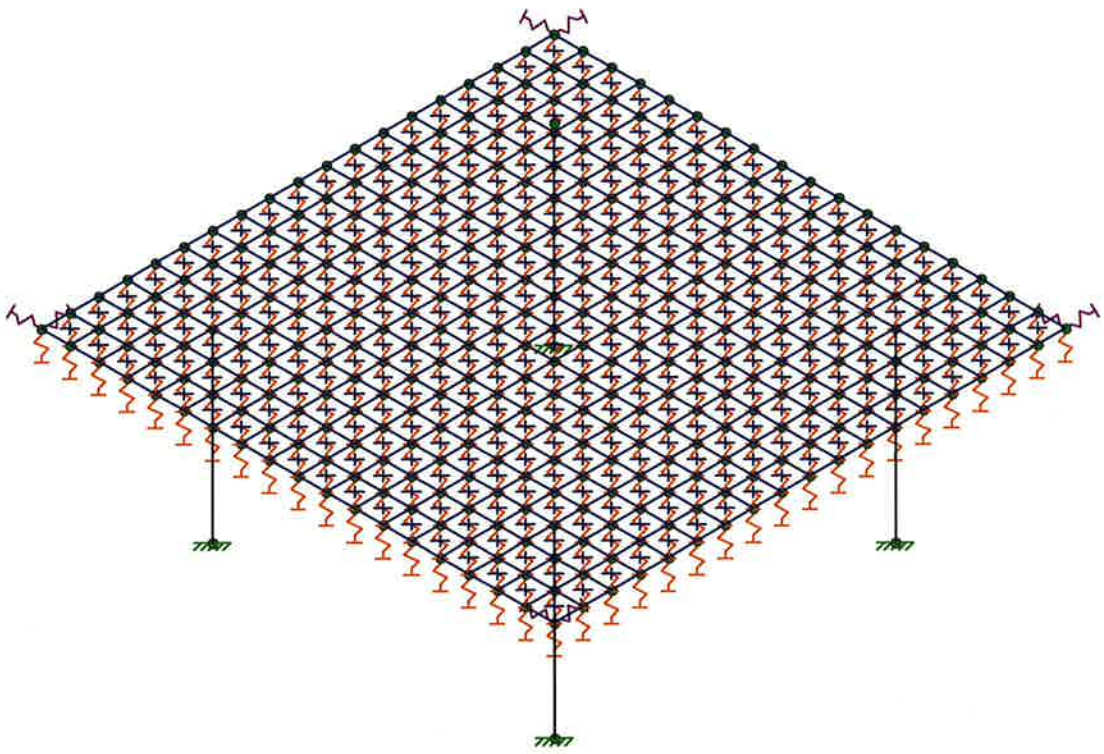


Loads: LC 17, 0.6D+0.707(-W0+W90)
Solution: Envelope
Member Axial Forces (k)

TEP		SK - 2
TWM	West Hartford/I-84/X43	June 28, 2013 at 4:24 PM
48006.6499	Controlling Rock Anchor Tension	829013.02S_Foundation.r3d



Solution: Envelope

TEP	West Hartford/I-84/X43	SK - 3 2
TWM		June 28, 2013 at 3:33 PM
48006.6499		829013.02S_Foundation.r3d

Hot Rolled Steel Properties

	Label	E [ksi]	G [ksi]	Nu	Therm (\1E...	Density[lb/f...	Yield[ksi]	Ry	Fu[ksi]	Rt
1	A36 Gr.36	29000	11154	.3	.65	490	36	1.5	58	1.2
2	A572 Gr.50	29000	11154	.3	.65	490	50	1.1	65	1.1
3	A992	29000	11154	.3	.65	490	50	1.1	65	1.1
4	A500 Gr.42	29000	11154	.3	.65	490	42	1.4	58	1.3
5	A500 Gr.46	29000	11154	.3	.65	490	46	1.4	58	1.3
6	A615	29000	11154	.3	.65	490	60	1.5	90	1.2
7	A722	29000	11154	.3	.65	490	120	1.5	150	1.2

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

Joint Loads and Enforced Displacements (BLC 1 : Dead)

	Joint Label	L,D,M	Direction	Magnitude[(k,k-ft), (in,rad), (k*s^2/f...
1	TOWER	L	Y	-32

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

	Joint Label	L,D,M	Direction	Magnitude[(k,k-ft), (in,rad), (k*s^2/f...
1	TOWER	L	X	27
2	TOWER	L	Mz	-2255

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

	Joint Label	L,D,M	Direction	Magnitude[(k,k-ft), (in,rad), (k*s^2/f...
1	TOWER	L	Z	27
2	TOWER	L	Mx	2255

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	Solve	PD...	SR...	BLC	Factor	BLC	Factor	BLC	Factor	BLC	Factor	BLC	Factor	BLC	Factor	BLC	Factor	BLC	Factor
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	Solve	PD...	SR...	BLC	Factor	BLC	Factor	BLC	Factor	BLC	Factor	BLC	Factor	BLC	Factor	BLC	Factor	BLC	Factor
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(W0...	Yes	Y		1	1	2	.707	3	.707	4	1								
11	D+0.707(W0...	Yes	Y		1	1	2	.707	3	-.707	4	1								
12	D-0.707(W0...	Yes	Y		1	1	2	-.707	3	.707	4	1								
13	D+0.707(-W...	Yes	Y		1	1	2	-.707	3	-.707	4	1								
14	0.6D+0.707(...	Yes	Y		1	.6	2	.707	3	.707	4	1								
15	0.6D+0.707(...	Yes	Y		1	.6	2	.707	3	-.707	4	1								
16	0.6D-0.707(...	Yes	Y		1	.6	2	-.707	3	.707	4	1								
17	0.6D+0.707(...	Yes	Y		1	.6	2	-.707	3	-.707	4	1								

Envelope Member Section Forces

	Member	Sec		Axial[k]	LC	y Shear[k]	LC	z Shear[k]	LC	Torque[k-ft]	LC	y-y Momen...	LC	z-z Momen...	LC
1	M1	1	max	-.013	16	.029	2	.029	7	0	1	.085	6	.085	2
2			min	-63.142	15	-.029	1	-.029	6	0	1	-.084	7	-.084	1
3		2	max	-.011	16	.029	2	.029	7	0	1	.042	6	.042	2
4			min	-63.14	15	-.029	1	-.029	6	0	1	-.042	7	-.042	1
5		3	max	-.008	16	.029	2	.029	7	0	1	.002	9	.002	4
6			min	-63.137	15	-.029	1	-.029	6	0	1	-.002	8	-.002	5
7		4	max	-.006	16	.029	2	.029	7	0	1	.044	7	.044	1
8			min	-63.135	15	-.029	1	-.029	6	0	1	-.044	6	-.044	2
9		5	max	-.003	16	.029	2	.029	7	0	1	.087	7	.087	1
10			min	-63.132	15	-.029	1	-.029	6	0	1	-.088	6	-.088	2
11	M2	1	max	-.013	14	.029	2	.029	7	0	1	.085	6	.084	2
12			min	-63.142	17	-.029	1	-.029	6	0	1	-.084	7	-.085	1
13		2	max	-.011	14	.029	2	.029	7	0	1	.042	6	.042	2
14			min	-63.14	17	-.029	1	-.029	6	0	1	-.042	7	-.042	1
15		3	max	-.008	14	.029	2	.029	7	0	1	.002	9	.002	4
16			min	-63.137	17	-.029	1	-.029	6	0	1	-.002	8	-.002	5
17		4	max	-.006	14	.029	2	.029	7	0	1	.044	7	.044	1
18			min	-63.135	17	-.029	1	-.029	6	0	1	-.044	6	-.044	2
19		5	max	-.003	14	.029	2	.029	7	0	1	.087	7	.088	1
20			min	-63.132	17	-.029	1	-.029	6	0	1	-.088	6	-.087	2
21	M3	1	max	-.013	15	.029	2	.029	7	0	1	.084	6	.084	2
22			min	-63.142	16	-.029	1	-.029	6	0	1	-.085	7	-.085	1
23		2	max	-.011	15	.029	2	.029	7	0	1	.042	6	.042	2
24			min	-63.14	16	-.029	1	-.029	6	0	1	-.042	7	-.042	1
25		3	max	-.008	15	.029	2	.029	7	0	1	.002	9	.002	4
26			min	-63.137	16	-.029	1	-.029	6	0	1	-.002	8	-.002	5
27		4	max	-.006	15	.029	2	.029	7	0	1	.044	7	.044	1
28			min	-63.135	16	-.029	1	-.029	6	0	1	-.044	6	-.044	2
29		5	max	-.003	15	.029	2	.029	7	0	1	.088	7	.088	1
30			min	-63.132	16	-.029	1	-.029	6	0	1	-.087	6	-.087	2
31	M4	1	max	-.013	17	.029	2	.029	7	0	1	.084	6	.085	2
32			min	-63.142	14	-.029	1	-.029	6	0	1	-.085	7	-.084	1
33		2	max	-.011	17	.029	2	.029	7	0	1	.042	6	.042	2
34			min	-63.14	14	-.029	1	-.029	6	0	1	-.042	7	-.042	1
35		3	max	-.008	17	.029	2	.029	7	0	1	.002	9	.002	4
36			min	-63.137	14	-.029	1	-.029	6	0	1	-.002	8	-.002	5

Envelope Member Section Forces (Continued)

	Member	Sec		Axial[k]	LC	y Shear[k]	LC	z Shear[k]	LC	Torque[k-ft]	LC	y-y Momen...	LC	z-z Momen...	LC
37		4	max	-.006	17	.029	2	.029	7	0	1	.044	7	.044	1
38			min	-63.135	14	-.029	1	-.029	6	0	1	-.044	6	-.044	2
39		5	max	-.003	17	.029	2	.029	7	0	1	.088	7	.087	1
40			min	-63.132	14	-.029	1	-.029	6	0	1	-.087	6	-.088	2