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Hartford, CT 06103-3597
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kbaldwin@rc.com
Direct (860) 275-8345

Also admitted in Massachusetts

December 13, 2013

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

**Re: Notice of Exempt Modification – Antenna Swap
265 Benham Street, Hamden, Connecticut**

Dear Ms. Bachman:

Cellco Partnership d/b/a Verizon Wireless (“Cellco”) currently maintains fifteen (15) wireless telecommunications antennas at the 63.5-foot level on an existing 65-foot roof-mounted guyed lattice tower at the above-referenced address. The roof-top tower and the building are owned by the Apostles of the Sacred Heart of Jesus, Inc. The Council approved Cellco’s shared use of this tower in 2000. Cellco now intends to replace three (3) of its antennas with two (2) model BXA-70063-6CF LTE antennas and three (3) model BXA-70040-6CF LTE antennas at the same 63.5-foot level. Attached behind Attachment 1 are the specifications for the replacement antennas.

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 Scott D. Jackson, Mayor for the Town of Hamden. A copy of this letter is also being sent to the Apostles of the Sacred Heart of Jesus, Inc.

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 will be located at the 63.5-foot level on the 65-foot roof-top tower.



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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) adopted safety standard. Far Field Approximation tables for each of Cellco's operating frequencies are included behind Attachment 2. The Far Field calculations demonstrate that Cellco's modified facility will operate well with the RF emissions limits established by the FCC.

5. The proposed modifications will not cause a change or alteration in the physical or environmental characteristics of the site.

6. The tower can support Cellco's proposed modifications. (See Structural Analysis Report attached behind 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:

Scott D. Jackson, Hamden Mayor
Apostles of the Sacred Heart of Jesus, Inc.
Sandy M. Carter



ATTACHMENT 1

BXA-70063-6CF-EDIN-X

X-Pol | FET Panel | 63° | 14.5 dB

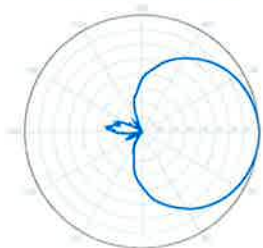
Replace "X" with desired electrical downtilt.

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

Electrical Characteristics	696-900 MHz			
Frequency bands	696-806 MHz		806-900 MHz	
Polarization	±45°			
Horizontal beamwidth	65°		63°	
Vertical beamwidth	13°		11°	
Gain	14.0 dBd (16.1 dBi)		14.5 dBd (16.6 dBi)	
Electrical downtilt (X)	0, 2, 3, 4, 5, 6, 8, 10			
Impedance	50Ω			
VSWR	≤1.35:1			
Upper sidelobe suppression (0°)	-18.3 dB		-18.2 dB	
Front-to-back ratio (+/-30°)	-33.4 dB		-36.3 dB	
Null fill	5% (-26.02 dB)			
Isolation between ports	< -25 dB			
Input power with EDIN connectors	500 W			
Input power with NE connectors	300 W			
IM3 (2x20W carriers)	< -153 dBc			
Lightning protection	Direct Ground			
Connector(s)	2 Ports / EDIN or NE / Female / Center (Back)			
Mechanical Characteristics				
Dimensions Length x Width x Depth	1804 x 285 x 132 mm		71.0 x 11.2 x 5.2 in	
Depth with z-brackets	172 mm		6.8 in	
Weight without mounting brackets	7.9 kg		17 lbs	
Survival wind speed	> 201 km/hr		> 125 mph	
Wind area	Front: 0.51 m²	Side: 0.24 m²	Front: 5.5 ft²	Side: 2.6 ft²
Wind load @ 161 km/hr (100 mph)	Front: 759 N	Side: 391 N	Front: 169 lbf	Side: 89 lbf
Mounting Options	Part Number	Fits Pipe Diameter		Weight
3-Point Mounting & Downtilt Bracket Kit	36210008	40-115 mm	1.57-4.5 in	6.9 kg 15.2 lbs
Concealment Configurations	For concealment configurations, order BXA-70063-6CF-EDIN-X-FP			

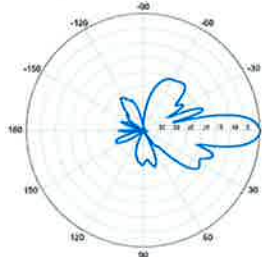


BXA-70063-6CF-EDIN-X



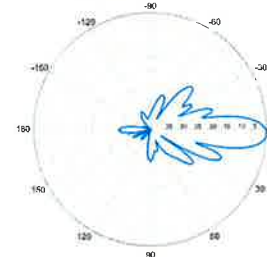
Horizontal | 750 MHz

BXA-70063-6CF-EDIN-0

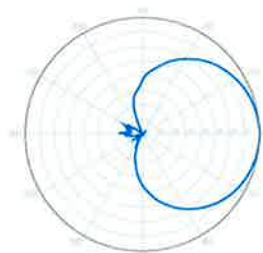


0° | Vertical | 750 MHz

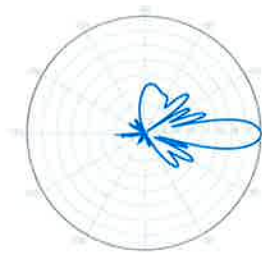
BXA-70063-6CF-EDIN-2



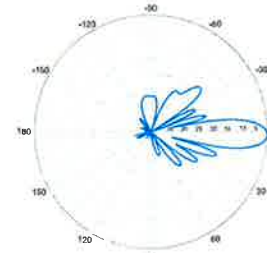
2° | Vertical | 750 MHz



Horizontal | 850 MHz



0° | Vertical | 850 MHz



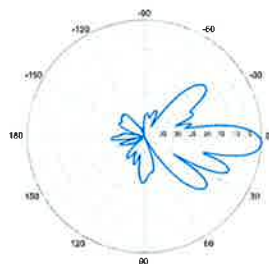
2° | Vertical | 850 MHz

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-70063-6CF-EDIN-X

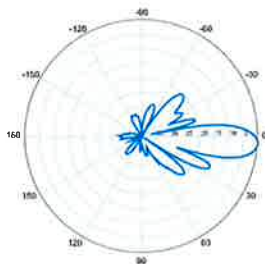
X-Pol | FET Panel | 63° | 14.5 dBd

BXA-70063-6CF-EDIN-3



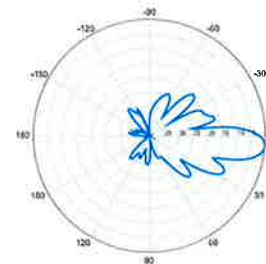
3° | Vertical | 750 MHz

BXA-70063-6CF-EDIN-4

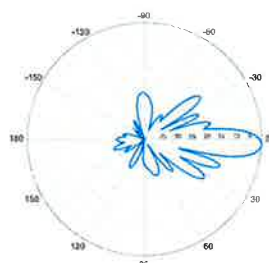


4° | Vertical | 750 MHz

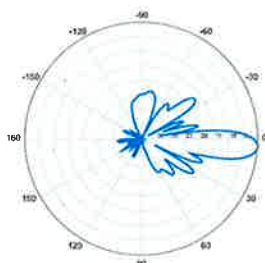
BXA-70063-6CF-EDIN-5



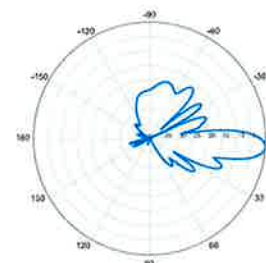
5° | Vertical | 750 MHz



3° | Vertical | 850 MHz

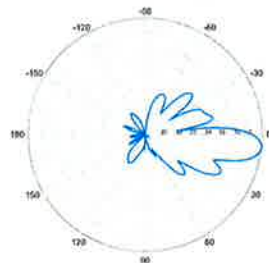


4° | Vertical | 850 MHz



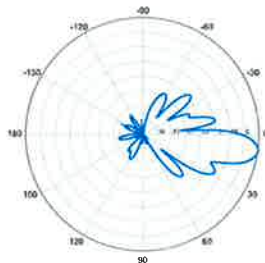
5° | Vertical | 850 MHz

BXA-70063-6CF-EDIN-6



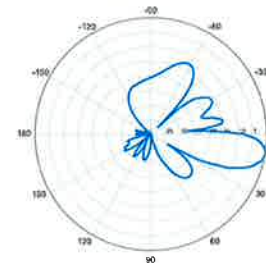
6° | Vertical | 750 MHz

BXA-70063-6CF-EDIN-8

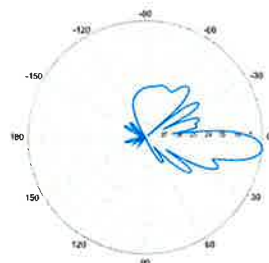


8° | Vertical | 750 MHz

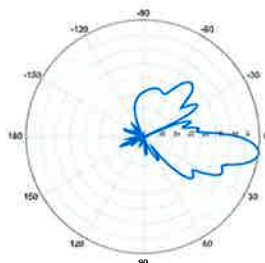
BXA-70063-6CF-EDIN-10



10° | Vertical | 750 MHz



6° | Vertical | 850 MHz



8° | Vertical | 850 MHz



10° | Vertical | 850 MHz

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.

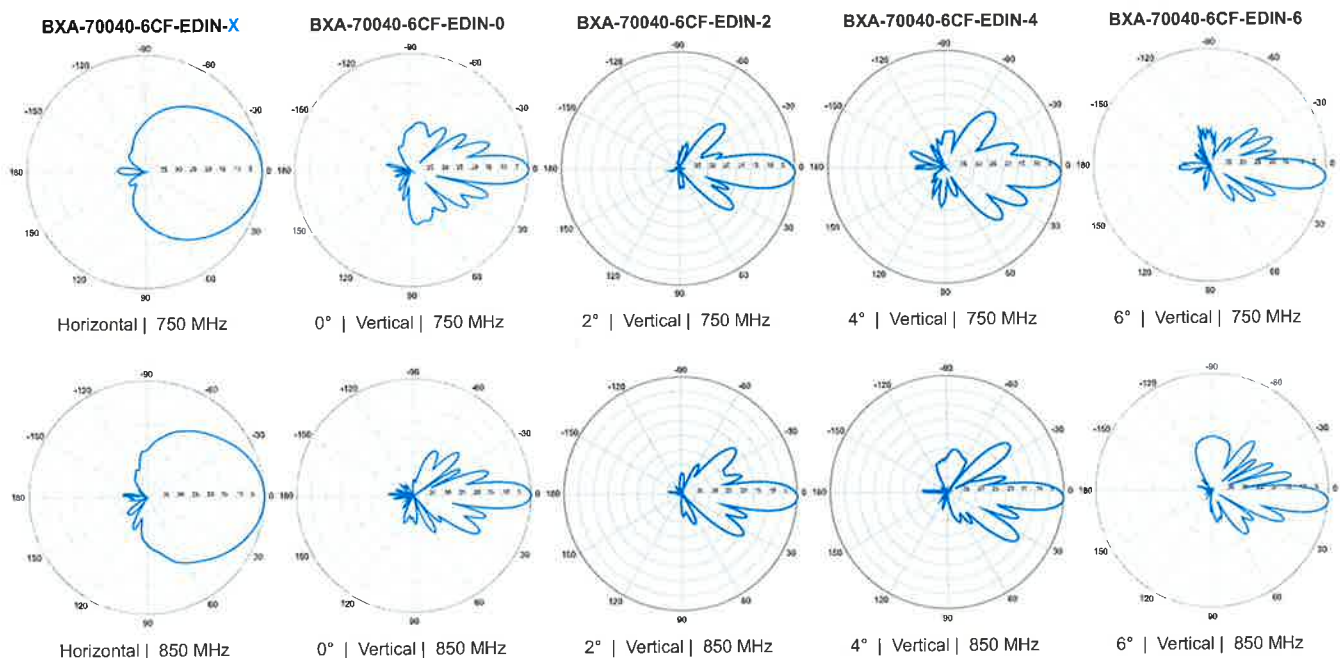
BXA-70040-6CF-EDIN-X

X-Pol | FET Panel | 40° | 16.0 dBd

Replace 'X' with desired electrical downtilt

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

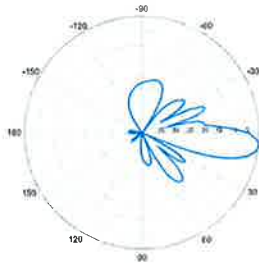
Electrical Characteristics	696-900 MHz					
Frequency bands	696-806 MHz		806-900 MHz			
Polarization	±45°					
Horizontal beamwidth	42°		40°			
Vertical beamwidth	12°		10°			
Gain	15.5 dBd (17.6 dBi)		16.0 dBd (18.1 dBi)			
Electrical downtilt (X)	0, 2, 4, 6, 8, 10					
Impedance	50Ω					
VSWR	≤1.35:1					
Upper sidelobe suppression (0°)	-12.1 dB		-13.4 dB			
Front-to-back ratio (+/-30°)	-35.8 dB		-38.0 dB			
Null fill	5% (-26.02 dB)					
Isolation between ports	< -25 dB					
Input power with EDIN connectors	500 W					
Input power with NE connectors	300 W					
Lightning protection	Direct Ground					
Connector(s)	2 Ports / EDIN or NE / Female / Center (Back)					
Mechanical Characteristics						
Dimensions Length x Width x Depth	1806 x 606 x 200 mm		71.1 x 23.9 x 7.9 in			
Depth with z-brackets	240 mm		9.4 in			
Weight without mounting brackets	17 kg		38 lbs			
Survival wind speed	> 201 km/hr		> 125 mph			
Wind area	Front: 1.09 m²	Side: 0.36 m²	Front: 11.8 ft²	Side: 3.9 ft²		
Wind load @ 161 km/hr (100 mph)	Front: 1564 N	Side: 547 N	Front: 350 lbf	Side: 123 lbf		
Mounting Options	Part Number		Fits Pipe Diameter		Weight	
3-Point Mounting & Downtilt Bracket Kit	36210008		40-115 mm 1.57-4.5 in		6.9 kg 15.2 lbs	
Concealment Configurations	This model cannot be used in a standard FP concealment configuration					



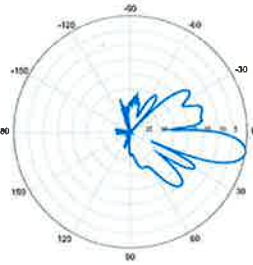
Quoted performance parameters are provided to offer typical or range values only and may vary as a result of normal manufacturing and operational conditions. Extreme operational conditions and/or stress on structural supports is beyond our control. Such conditions may result in damage to this product.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

BXA-70040-6CF-EDIN-X

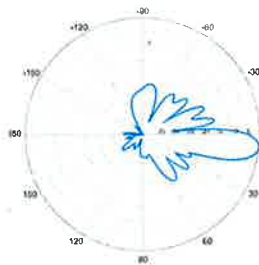
X-Pol | FET Panel | 40° | 16.0 dBd

BXA-70040-6CF-EDIN-8

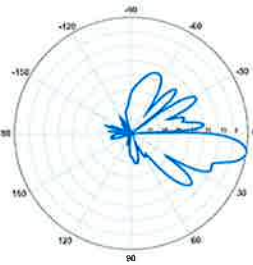
8° | Vertical | 750 MHz

BXA-70040-6CF-EDIN-10

10° | Vertical | 750 MHz



8° | Vertical | 850 MHz



10° | Vertical | 850 MHz

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.

ATTACHMENT 2

Far Field Approximation with downtilt variation

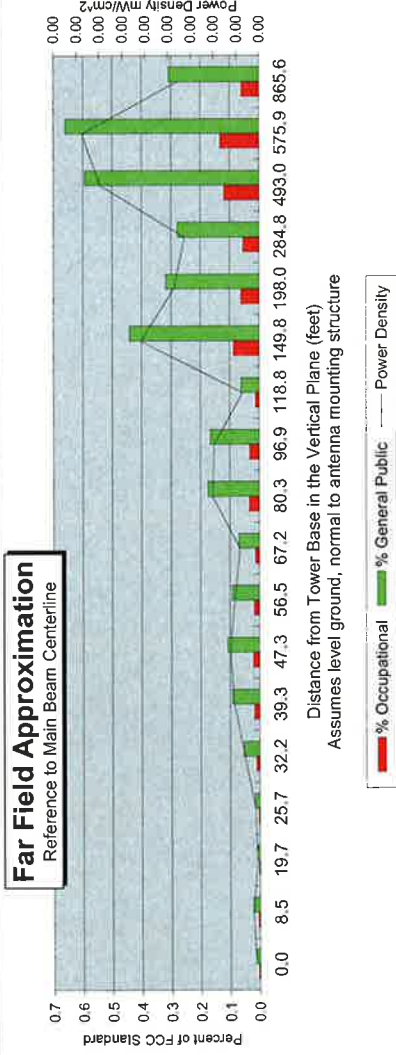
Estimated Radiated Emission

Single Emitter Far Field Model

Dipole / Wire/ Yagi Antenna Types



Location:	Hamden 2 CT
Site #:	2-0058
Date:	12/10/13
Name:	Jaime Laredo
File Name:	HAMDEN 2. CT - FF POWER
Operating Freq. (MHz)	878.5
Antenna Height (ft):	63.5
Antenna Gain (dBi):	13.5
Antenna Size (in.):	48.0
Downtilt (degrees):	2.0
Feedline Loss (dB):	1.0
Power @ J4 (w):	348



This approximation is only valid in the far field, which begins at: 28.7 Feet

Enter Main Beam
Distance in feet below:

Calc Angle	90.0	82.0	72.0	67.0	62.0	57.0	52.0	47.0	42.0	37.0	32.0	27.0	22.0	17.0	12.0	7.0	6.0	4.0	
Solve for r, dx to antenna	60.5	61.1	63.6	65.7	68.5	72.2	76.8	82.8	90.5	100.6	114.2	133.3	161.6	207.0	291.1	496.7	579.1	867.7	
Distance from Antenna Structure Base in Horizontal plane	0.0	8.5	19.7	25.7	32.2	39.3	47.3	56.5	67.2	80.3	96.9	118.8	149.8	198.0	284.8	493.0	575.9	865.6	#NUM!
Angle from Main Beam (reference to horizontal plane)	90	80	70	65	60	55	50	45	40	35	30	25	20	15	10	5	4	2	0
dB down from centerline (referenced to centerline)	36.76	34.35	38.52	35.34	29.54	26.8	25.59	25.63	25.99	21.21	20.29	23.24	13.03	12.3	9.92	2	0.2	0	0
Reflection Coefficient (1 to 4, 2.56 typical)	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56
Power Density (mW/cm^2)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	#NUM!
Percent of Occupational Standard	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.1	0.1	0.1	0.1	#NUM!
Percent of General Population Standard	0.0	0.0	0.0	0.0	0.1	0.1	0.1	0.1	0.1	0.2	0.2	0.1	0.4	0.3	0.3	0.6	0.7	0.3	#NUM!

Antenna Type DB844G65ZAXY_H
Max% 0.66%

Instructions:

- 1) Fill in Site Location, Site number, Date, Name of Person Responsible for Date, and enter File Name to be saved as.
- 2) References to J4 refer to a point where the transmission line exits the equipment shelter and proceeds to the antenna(s). There is typically a connector located here where power measurements are made.
- 3) Enter Antenna Height (in feet to bottom of antenna), Antenna Gain (expressed as dBi, add 2.17 to dBd to obtain dBi), Antenna Size (vertical size in inches), Downtilt (in Degrees, enter zero if none), Feedline loss from J4 to Antenna, and J4 Pt
- 4) From manufacturer's plots, or data sheet, input Angle from mainbeam and dB below mainbeam centerline.
- 5) Enter Reflection coefficient (2.56 would be typical, 1 for free space)
- 6) Spreadsheet calculates actual power density, then relates as Occupational or General Population percentage of FCC Standard.
- 7) An odd distance may be entered in the rightmost column of the lower table.

Far Field Approximation with downtilt variation

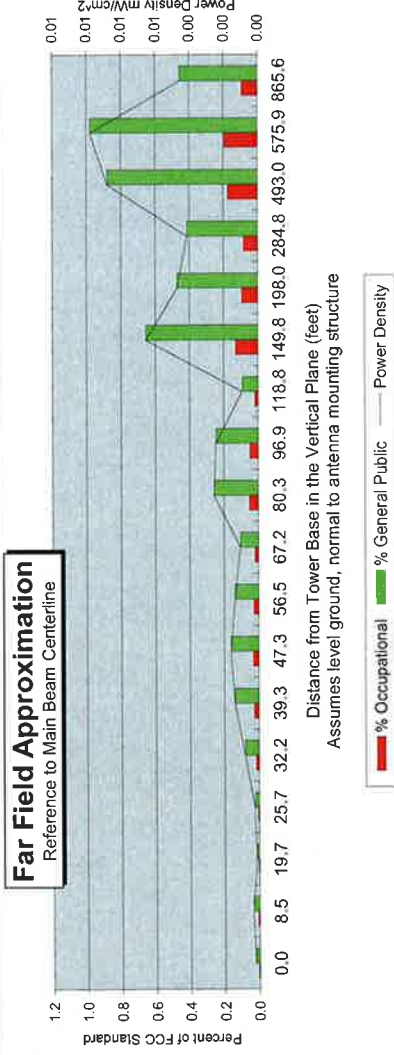
Estimated Radiated Emission

Single Emitter Far Field Model

Dipole / Wire/ Yagi Antenna Types



Location:	Hamden 2 CT
Site #:	2-0058
Date:	12/10/13
Name:	Jaime Laredo
File Name:	HAMDEN 2, CT - FF POWER
Operating Freq. (MHz)	1973.75
Antenna Height (ft):	63.5
Antenna Gain (dBi):	16.5
Antenna Size (in.):	72.4
Downtilt (degrees):	2.0
Feedline Loss (dB):	1.5
Power @ J4 (w):	500



This approximation is only valid in the far field, which begins at: **65.2 Feet**

Enter Main Beam
Distance in feet below:

Calc Angle	90.0	82.0	72.0	67.0	62.0	57.0	52.0	47.0	42.0	37.0	32.0	27.0	22.0	17.0	12.0	7.0	6.0	4.0	
Solve for r, dx to antenna	60.5	61.1	63.6	65.7	68.5	72.2	76.8	82.8	90.5	100.6	114.2	133.3	161.6	207.0	291.1	496.7	579.1	867.7	
Distance from Antenna Structure Base in Horizontal plane	0.0	8.5	19.7	25.7	32.2	39.3	47.3	56.5	67.2	80.3	96.9	118.8	149.8	198.0	284.8	493.0	575.9	865.6	#NUM!
Angle from Main Beam (reference to horizontal plane)	90	80	70	65	60	55	50	45	40	35	30	25	20	15	10	5	4	2	0
dB down from centerline (referenced to centerline)	36.76	34.35	38.52	35.34	29.54	26.8	25.59	25.63	25.99	21.21	20.29	23.24	13.03	12.3	9.92	2	0.2	0	0
Reflection Coefficient (1 to 4, 2.56 typical)	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56
Power Density (mW/cm²)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.01	0.01	0.00	#NUM!
Percent of Occupational Standard	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.1	0.1	0.1	0.2	0.2	0.1	#NUM!
Percent of General Population Standard	0.0	0.0	0.0	0.0	0.1	0.1	0.2	0.1	0.1	0.3	0.2	0.1	0.7	0.5	0.4	0.9	1.0	0.5	#NUM!

Antenna Type	BXA-171063-12CF-EDIN-2
Max%	0.98%

Instructions:

- 1) Fill in Site Location, Site number, Date, Name of Person Responsible for Date, and enter File Name to be saved as.
- 2) References to J4 refer to a point where the transmission line exits the equipment shelter and proceeds to the antenna(s). There is typically a connector located here where power measurements are made.
- 3) Enter Antenna Height (in feet to bottom of antenna), Antenna Gain (expressed as dBi, add 2.17 to dBd to obtain dBi), Antenna Size (vertical size in inches), Downtilt (in Degrees, enter zero if none), Feedline loss from J4 to Antenna, and J4 Pt
- 4) From manufacturer's plots, or data sheet, input Angle from mainbeam and dB below mainbeam centerline.
- 5) Enter Reflection coefficient (2.56 would be typical, 1 for free space)
- 6) Spreadsheet calculates actual power density, then relates as Occupational or General Population percentage of FCC Standard.
- 7) An odd distance may be entered in the rightmost column of the lower table.

Far Field Approximation with downtilt variation

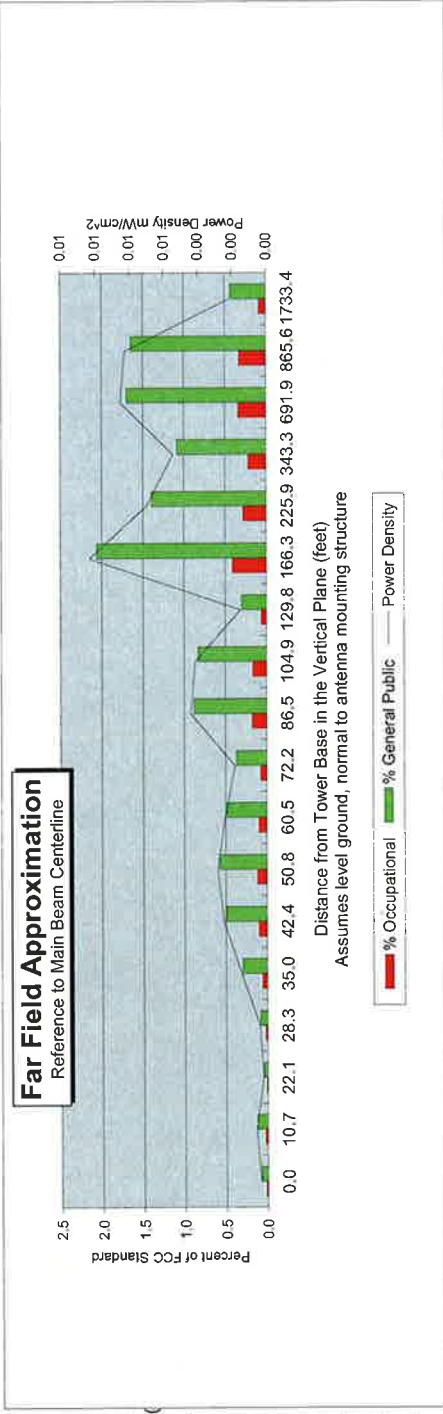
Estimated Radiated Emission

Single Emitter Far Field Model

Dipole / Wire/ Yagi Antenna Types



Location:	Hamden 2 CT
Site #:	2-0058
Date:	12/10/13
Name:	Jaime Laredo
File Name:	HAMDEN 2, CT - FF POWER
Operating Freq. (MHz)	751.0
Antenna Height (ft):	63.5
Antenna Gain (dBi):	16.2
Antenna Size (in.):	71.0
Downtilt (degrees):	0.0
Feedline Loss (dB):	1.0
Power @ J4 (w):	897.9



This approximation is only valid in the far field, which begins at: **62.6 Feet**

Enter Main Beam
Distance in feet below:

Calc Angle	90.0	80.0	70.0	65.0	60.0	55.0	50.0	45.0	40.0	35.0	30.0	25.0	20.0	15.0	10.0	5.0	4.0	2.0	
Solve for r, dx to antenna	60.5	61.4	64.4	66.8	69.9	73.9	79.0	85.6	94.2	105.5	121.1	143.2	177.0	233.9	348.6	694.5	867.7	1734.4	
Distance from Antenna Structure Base in Horizontal plane	0.0	10.7	22.1	28.3	35.0	42.4	50.8	60.5	72.2	86.5	104.9	129.8	166.3	225.9	343.3	691.9	865.6	1733.4	#NUM!
Angle from Main Beam (reference to horizontal plane)	90	80	70	65	60	55	50	45	40	35	30	25	20	15	10	5	4	2	0
dB down from centerline (referenced to centerline)	36.76	34.35	38.52	35.34	29.54	26.8	25.59	25.63	25.99	21.21	20.29	23.24	13.03	12.3	9.92	2	0.2	0	0
Reflection Coefficient (1 to 4, 2.56 typical)	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56
Power Density (mW/cm²)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.01	0.01	0.01	0.01	0.00	#NUM!
Percent of Occupational Standard	0.0	0.0	0.0	0.0	0.1	0.1	0.1	0.1	0.1	0.2	0.2	0.1	0.4	0.3	0.2	0.3	0.3	0.1	#NUM!
Percent of General Population Standard	0.1	0.1	0.0	0.1	0.3	0.5	0.6	0.5	0.4	0.9	0.8	0.3	2.1	1.4	1.1	1.7	1.6	0.4	#NUM!

Antenna Type BXA-70063/6CF
Max% 2.06%

Instructions:

- 1) Fill in Site Location, Site number, Date, Name of Person Responsible for Date, and enter File Name to be saved as.
- 2) References to J4 refer to a point where the transmission line exits the equipment shelter and proceeds to the antenna(s). There is typically a connector located here where power measurements are made.
- 3) Enter Antenna Height (in feet to bottom of antenna), Antenna Gain (expressed as dBi, add 2.17 to dBd to obtain dBi), Antenna Size (vertical size in inches), Downtilt (in Degrees, enter zero if none), Feedline loss from J4 to Antenna, and J4 Pt
- 4) From manufacturer's plots, or data sheet, input Angle from mainbeam and dB below mainbeam centerline.
- 5) Enter Reflection coefficient (2.56 would be typical, 1 for free space)
- 6) Spreadsheet calculates actual power density, then relates as Occupational or General Population percentage of FCC Standard.
- 7) An odd distance may be entered in the rightmost column of the lower table.

Far Field Approximation
with downtilt variation

Estimated Radiated Emission

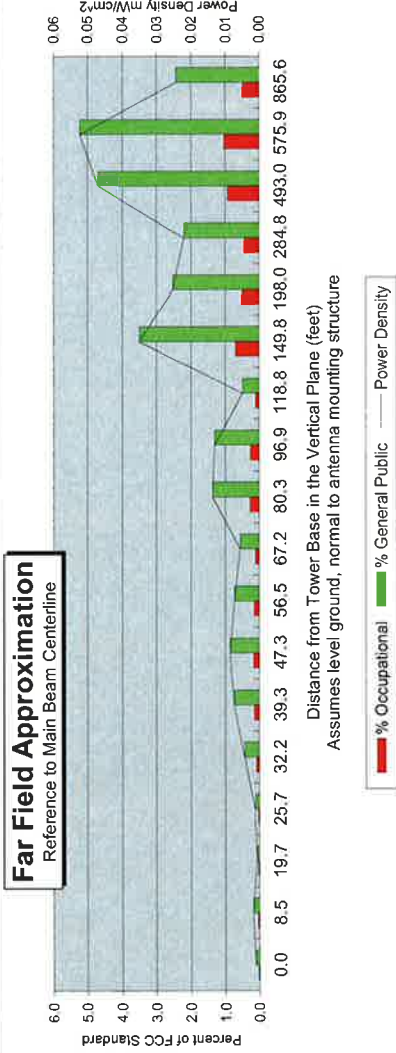
Single Emitter Far Field Model

Dipole / Wire/ Yagi Antenna Types



Location:	Hamden 2 CT
Site #:	2-0058
Date:	12/10/13
Name:	Jaime Laredo
File Name:	HAMDEN 2. CT - FF POWER

Operating Freq. (MHz)	2120.00
Antenna Height (ft):	63.5
Antenna Gain (dBi):	16.9
Antenna Size (in.):	72.4
Downtilt (degrees):	2.0
Feedline Loss (dB):	0.3
Power @ J4 (w):	1828



This approximation is only valid in the far field, which begins at: 65.2 Feet

Enter Main Beam
Distance in feet below:

Calc Angle	90.0	82.0	72.0	67.0	62.0	57.0	52.0	47.0	42.0	37.0	32.0	27.0	22.0	17.0	12.0	7.0	5.0	4.0	
Solve for r, dx to antenna	60.5	61.1	63.6	65.7	68.5	72.2	76.8	82.8	90.5	100.6	114.2	133.3	161.6	207.0	291.1	496.7	579.1	867.7	
Distance from Antenna Structure Base in Horizontal plane	0.0	8.5	19.7	25.7	32.2	39.3	47.3	56.5	67.2	80.3	96.9	118.8	149.8	198.0	284.8	493.0	575.9	865.6	#NUM!
Angle from Main Beam (reference to horizontal plane)	90	80	70	65	60	55	50	45	40	35	30	25	20	15	10	5	4	2	0
dB down from centerline (referenced to centerline)	36.76	34.35	38.52	35.34	29.54	26.8	25.59	25.63	25.99	21.21	20.29	23.24	13.03	12.3	9.92	2	0.2	0	0
Reflection Coefficient (1 to 4, 2.56 typical)	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56
Power Density (mW/cm²)	0.00	0.00	0.00	0.00	0.00	0.01	0.01	0.01	0.01	0.01	0.01	0.00	0.03	0.03	0.02	0.05	0.05	0.02	#NUM!
Percent of Occupational Standard	0.0	0.0	0.0	0.0	0.1	0.1	0.2	0.1	0.1	0.3	0.3	0.1	0.7	0.5	0.4	0.9	1.0	0.5	#NUM!
Percent of General Population Standard	0.1	0.2	0.1	0.1	0.4	0.7	0.9	0.7	0.6	1.4	1.3	0.5	3.5	2.5	2.2	4.7	5.2	2.4	#NUM!

Antenna Type BXA-171063-12CF-EDIN-2
Max% 5.22%

Instructions:

- 1) Fill in Site Location, Site number, Date, Name of Person Responsible for Data, and enter File Name to be saved as.
- 2) References to J4 refer to a point where the transmission line exits the equipment shelter and proceeds to the antenna(s). There is typically a connector located here where power measurements are made.
- 3) Enter Antenna Height (in feet to bottom of antenna), Antenna Gain (expressed as dBi, add 2.17 to dBd to obtain dBi), Antenna Size (vertical size in inches), Downtilt (in Degrees, enter zero if none), Feedline loss from J4 to Antenna, and J4 Power.
- 4) From manufacturer's plots, or data sheet, input Angle from mainbeam and dB below mainbeam centerline.
- 5) Enter Reflection coefficient (2.56 would be typical, 1 for free space)
- 6) Spreadsheet calculates actual power density, then relates as Occupational or General Population percentage of FCC Standard.
- 7) An odd distance may be entered in the rightmost column of the lower table.

ATTACHMENT 3

Structural Analysis Report

*65-ft Existing Roof Top Mounted NUDD
Guyed Lattice Tower*

*Proposed Verizon Wireless
Antenna Upgrade*

Verizon Site Ref: Hamden 2

*Apostles of the Sacred Heart of Jesus
265 Benham Street
Hamden, CT 06514*

CEN TEK Project No. 13075.034

Date: September 27, 2013



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

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- TOWER LOADING.
- TOWER CAPACITY.
- GUY ANCHORS AND TOWER BASE
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Introduction

The purpose of this report is to summarize the results of the non-linear, P- Δ structural analysis of the antenna installation/modification proposed by Verizon Wireless on the existing guyed lattice (tower) located in Hamden, CT.

The host tower is a 65-ft, four-section, three legged guyed lattice tower originally designed and manufactured by Fred A Nudd Corporation. The tower type, geometry and structure member sizes were taken from a previous structural analysis report prepared by Centek Engineering project no. 12124.CO3, Rev. 1 dated January 11, 2013.

Antenna and appurtenance inventory were taken from the aforementioned Centek structural analysis report and a Verizon RF data sheet.

The tower is made up of four (4) vertical sections consisting of A36 MOD-50 solid steel legs. Diagonal and horizontal bracing consists of A36 solid round and steel angle construction. The vertical tower legs are connected together with bolted flanges while bracing is connected by fully welded connections. The width of the tower face is 2'-6".

Verizon proposes the removal of three (3) panel antennas and the installation of three (3) panel antennas mounted to the three (3) existing 12-ft boom gates. Refer to the Antenna and Appurtenance Summary below for a detailed description of the proposed antenna and appurtenance configuration.

Antenna and Appurtenance Summary

The existing tower was designed to support several communication antennas. The existing, proposed and future loads considered in this analysis consist of the following:

- MUNICIPAL (Existing):
Appurtenance: One (1) 17-ft Omni-directional whip antenna mounted on a 2-ft side arm with an elevation of 91-ft above grade (64-ft above tower base).
Cable: One (1) 7/8" dia. coax cable running on the face of the existing tower as specified in Section 3 of this report.
- MUNICIPAL (Existing):
Appurtenance: One (1) 20-ft Omni-directional whip antenna mounted on a 3-ft side arm with an elevation of 91-ft above grade (64-ft above tower base).
Cable: One (1) 7/8" dia. coax cable running on the face of the existing tower as specified in Section 3 of this report.
- MUNICIPAL (Existing):
Appurtenance: One (1) 8-ft Omni-directional whip antenna mounted on a 2-ft side arm with an elevation of 76.5-ft above grade (49.5-ft above tower base).
Cable: One (1) 7/8" dia. coax cable.
- MUNICIPAL (Existing):
Appurtenance: One (1) 21-ft 8-Bay Dipole antenna mounted on a 3-ft side arm with an elevation of 69-ft above grade (42-ft above tower base).
Cable: One (1) 7/8" dia. coax cable running on the face of the existing tower as specified in Section 3 of this report.

- **AT&T (Existing):**
Antennas: Six (6) KMW AMX-CD-16-65-00T-RET panel antennas, three (3) CCI DTMAPB7819VG12A TMA's and six (6) Ericsson RRUS-11 mounted on (3) Primus tower stand-off sector frames (P/N SF-SU10-B) with a RAD center elevation of 54.5-ft above existing grade (27.5-ft above tower base).
Misc. Equipment: One (1) Raycap DC6-48-60-18-8F surge arrestor leg mounted with an elevation of elevation of 56-ft above exiting grade (29-ft above tower base).
Coax Cables: Twelve (12) 1-5/8" Ø coax cables and six (6) RET cables, one (1) fiber cable and two (2) dc control cables running on a face of the existing tower as specified in Section 3 of this report.
- **VERIZON (Existing to Remain):**
Antennas: Four (4) Andrew DB844G65ZAXY panel antennas, two (2) RFS APL866513 panel antennas, six (6) Antel BXA-171063-12CF panel antennas and three (3) Alcatel-Lucent RRH2x40-AWS Remote Radio Heads mounted to existing boom gates with a RAD center elevation of 63.5-ft above existing grade (36.5-ft above tower base).
Misc Equipment: One (1) RFS DB-T1-6Z-8AB-0Z main distribution box leg mounted with a RAD center elevation of 63.5-ft above existing grade (36.5-ft above tower base).
Coax Cables: Twelve (12) 1-5/8" Ø coax cables and one (1) 1-5/8" Ø fiber line running on the face of the existing tower as specified in Section 3 of this report.
- **VERIZON (Existing to Remove):**
Antennas: One (1) Powerwave P65-16-XL-2 and two (2) Andrew LNX-6514DS-T4M panel antennas mounted to three (3) existing 12-ft boom gates with a RAD center elevation of 63.5-ft above existing grade (36.5-ft above tower base).
- **VERIZON (Proposed):**
Antennas: Two (2) Antel BXA-70063-6CF and one (1) Antel BXA-70040-6CF panel antennas mounted to three (3) existing 12-ft boom gates noted above with a RAD center elevation of 63.5-ft above existing grade (36.5-ft above tower base).

Primary Assumptions Used in the Analysis

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

Analysis

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

The existing tower was analyzed for the controlling basic wind speed (fastest mile) with no ice and a 75% reduction of wind force with ½ inch accumulative ice to determine stresses in members as per guidelines of TIA/EIA-222-F-96 entitled "Structural Standards for Steel Antenna Towers and Antenna Supporting Structures", the American Institute of Steel Construction (AISC) and the Manual of Steel Construction; Allowable Stress Design (ASD).

The controlling wind speed is determined by evaluating the local available wind speed data as provided in Appendix K of the CSBC¹ and the wind speed data available in the TIA/EIA-222-F-96 Standard. The higher of the two wind speeds is utilized in preparation on the tower analysis.

Tower Loading

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

Basic Wind Speed:	New Haven; v = 85 mph (fastest mile)	[Section 16 of TIA/EIA-222-F-96]
	Hamden; v = 105 mph (3 second gust) equivalent to v = 85 mph (fastest mile)	[Appendix K of the 2005 CT Building Code Supplement]
	TIA/EIA-222-F and Appendix K wind speeds are equal.	
Load Cases:	<u>Load Case 1</u> ; 85 mph wind speed w/ no ice plus gravity load – used in calculation of tower stresses and rotation.	[Section 2.3.16 of TIA/EIA-222-F-96]
	<u>Load Case 2</u> ; 74 mph wind speed w/ ½" radial ice plus gravity load – used in calculation of tower stresses. The 74 mph wind speed velocity represents 75% of the wind pressure generated by the 85 mph wind speed.	[Section 2.3.16 of TIA/EIA-222-F-96]
	<u>Load Case 3</u> ; Seismic – not checked	[Section 1614.5 of State Bldg. Code 2005] does not control in the design of this structure type

¹ The 2005 Connecticut State Building Code as amended by the 2009 CT State Supplement. (CSBC)

Tower Capacity

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

Calculated stresses were found to be within allowable limits. In Load Case 2, per tnxTower "Section Capacity Table", this tower was found to be at **97.4%** of its total capacity.

Tower Section	Elevation	Stress Ratio (percentage of capacity)	Result
Diagonal (T3)	47'-67' (20'-40')	97.4%	PASS
Leg (T4)	27'-47' (0'-20')	49.3%	PASS
Guy A	47' (20')	44.5%	PASS
Guy B	47' (20')	55.3%	PASS
Guy C	47' (20')	52.7%	PASS

Existing Guy Anchors and Tower Base

Guy forces are transferred to the existing building structure via six (6) 9/16" and three (3) 3/4" Ø galvanized steel guy wires with turnbuckles. All guy anchorage posts are positively attached to the existing building structure and consist of 6"x6"x1/4" tube steel with 1/2" thick guy connection plates with three 5/8" Ø A325-N bolts in double shear. Connections to the existing building were originally designed by Natcomm for Verizon Wireless on October 02, 2000, reference project no. 985094.

The guyed tower base is pin connected to a 1-3/4" thick x 24" square base plate welded to an existing W8 steel dunnage frame. Frame loads are then transferred down onto the existing concrete roof structure via four (4) 6"x6"x1/4" tube steel posts with 1-1/4" thick x 12in square base plates.

Review of the anchor and tower base connections consisted of verification of applied loads obtained from the tower design calculations and code checks of allowable stresses:

CEN TEK Engineering, Inc.

Structural Analysis – 65-ft Existing NUDD G30WRAR Guyed Tower
Verizon Wireless Antenna Upgrade – Hamden 2
Hamden, CT
September 27, 2013

- The tower base and guy anchor reactions developed from the governing Load Case 2 were used in the verification of the anchors:

The guy anchor bolts and tower base plate **were found** to be within allowable limits.

Tower Component	Load (kips)	Load Effect	Stress Ratio (percentage of capacity)	Result
Guy Anchor B @ 19.5'	26.3 (Vert)	Shear	80%	PASS
	16.4 (Horz)	Shear		

Conclusions

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

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

Please feel free to call with any questions or comments.

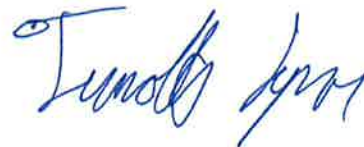
Respectfully Submitted by:



Carlo F. Centore, PE
Principal ~ Structural Engineer



Prepared by:



Timothy J. Lynn, PE
Structural Engineer

Standard Conditions for Furnishing of
Professional Engineering Services on
Existing Structures

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

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

General Description of Structural Analysis Program

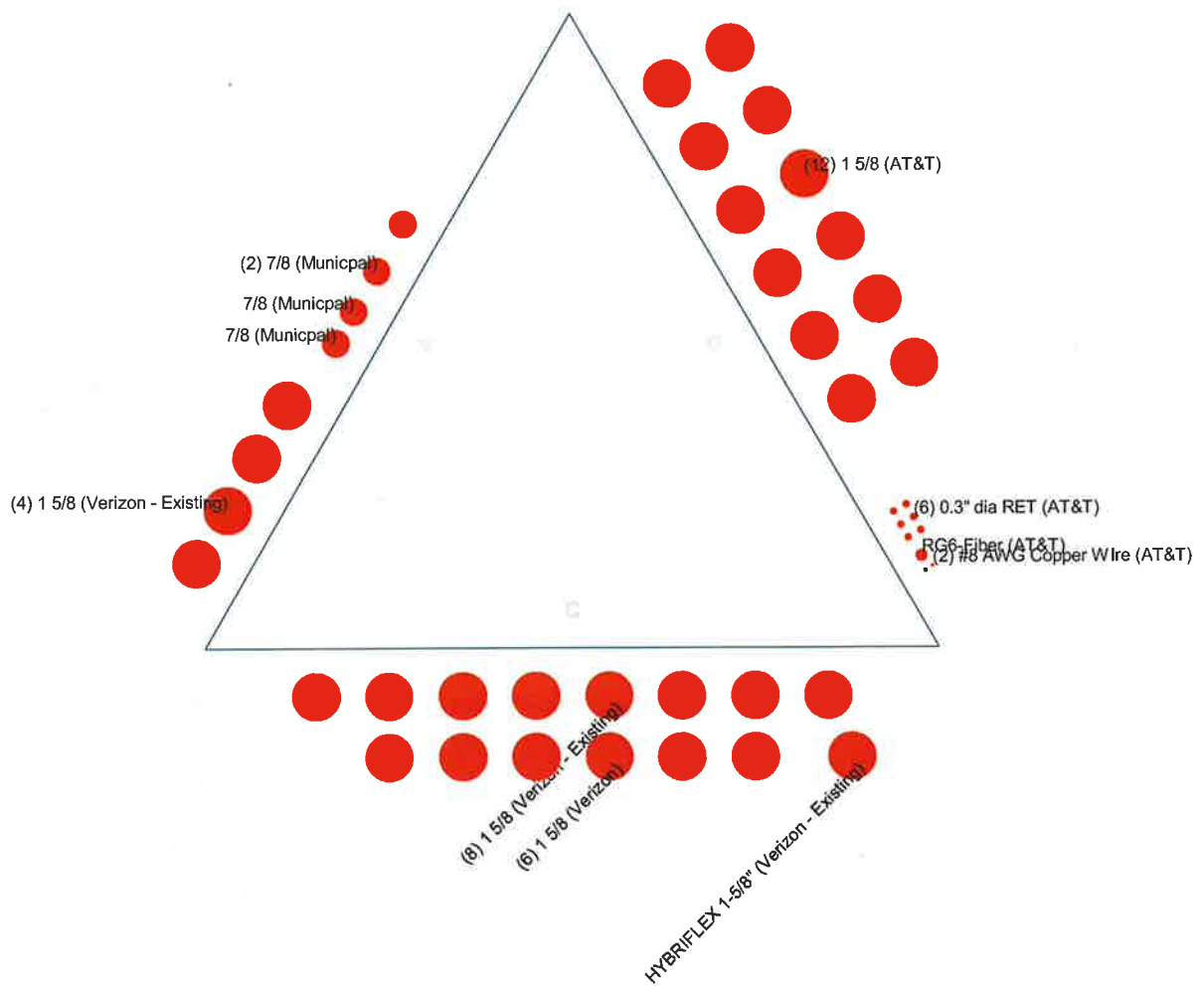
tnxTower, is an integrated structural analysis and design software package for Designed specifically for the telecommunications industry, tnxTower, formerly RISATower, automates much of the tower analysis and design required by the TIA/EIA 222 Standard.

tnxTower Features:

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

Feedline Plan

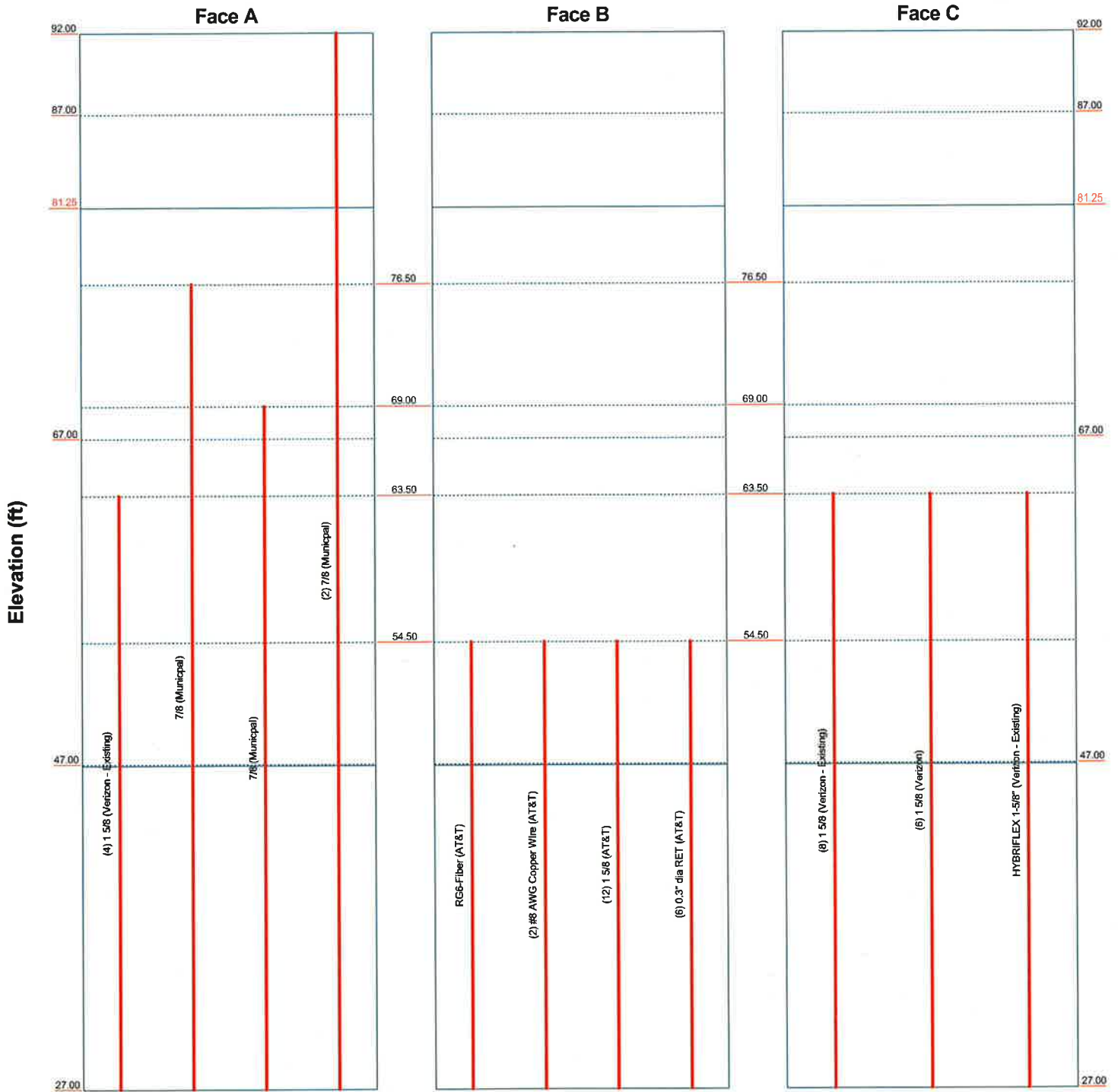
Round Flat App In Face App Out Face



Centek Engineering Inc.		Job: 13075.034 - Hamden 2	
63-2 North Branford Rd.		Project: 65-ft NUDD Guyed Tower - 265 Benham Street - Hamden, CT	
Branford, CT 06405		Client: Verizon Wireless	Drawn by: T.JL
Phone: (203) 488-0580		Code: TIA/EIA-222-F	Date: 09/27/13
FAX: (203) 488-8587		Path:	Scale: NTS
			Dwg No. E-7

Feedline Distribution Chart 27' - 92'

Round Flat App In Face App Out Face Truss Leg



Centek Engineering Inc.

63-2 North Branford Rd.
Branford, CT 06405
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FAX: (203) 488-8587

Job: 13075.034 - Hamden 2

Project: 65-ft NUDD Guyed Tower - 265 Benham Street - Hamden, CT

Client: Verizon Wireless

Drawn by: TJL

App'd:

Code: TIA/EIA-222-F

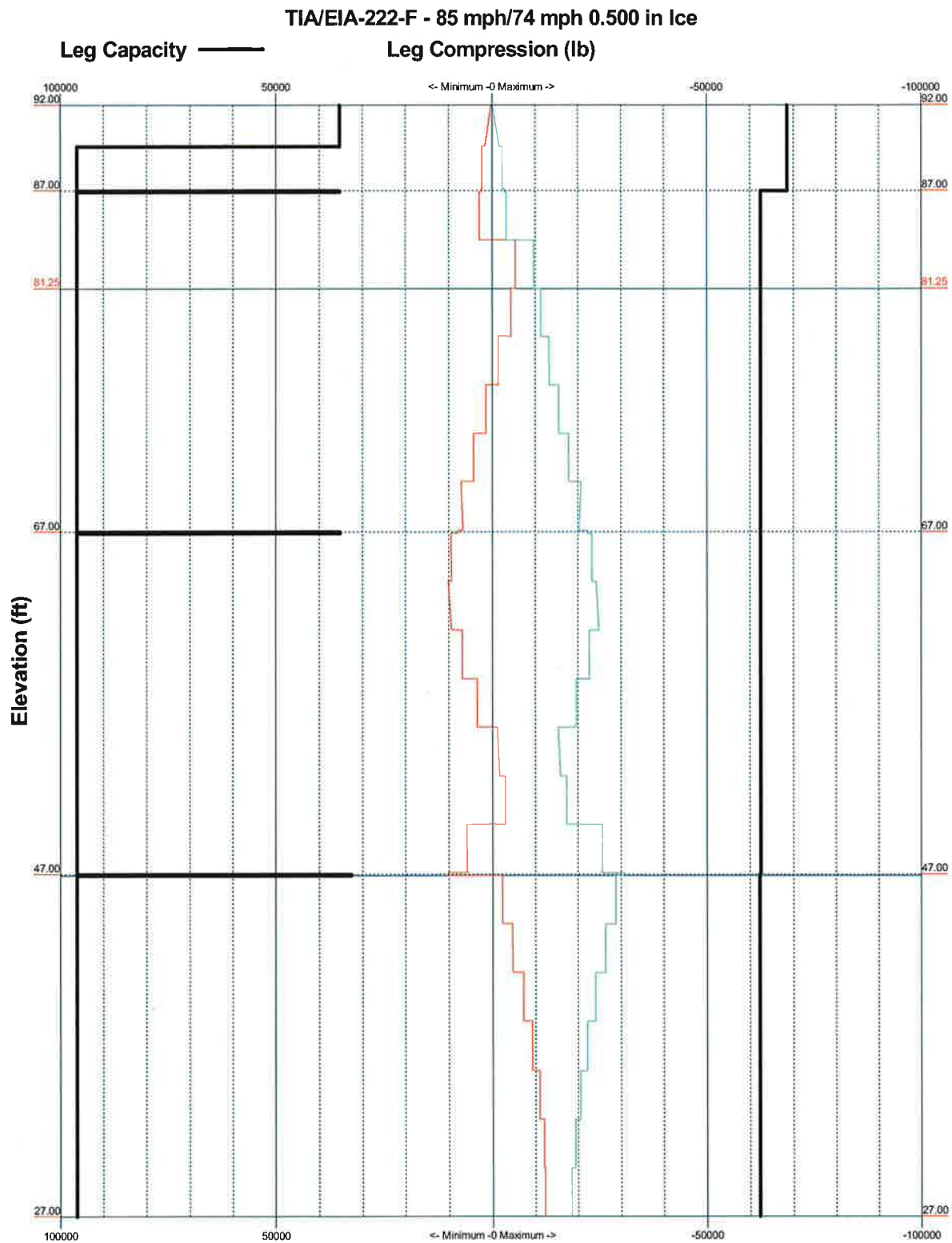
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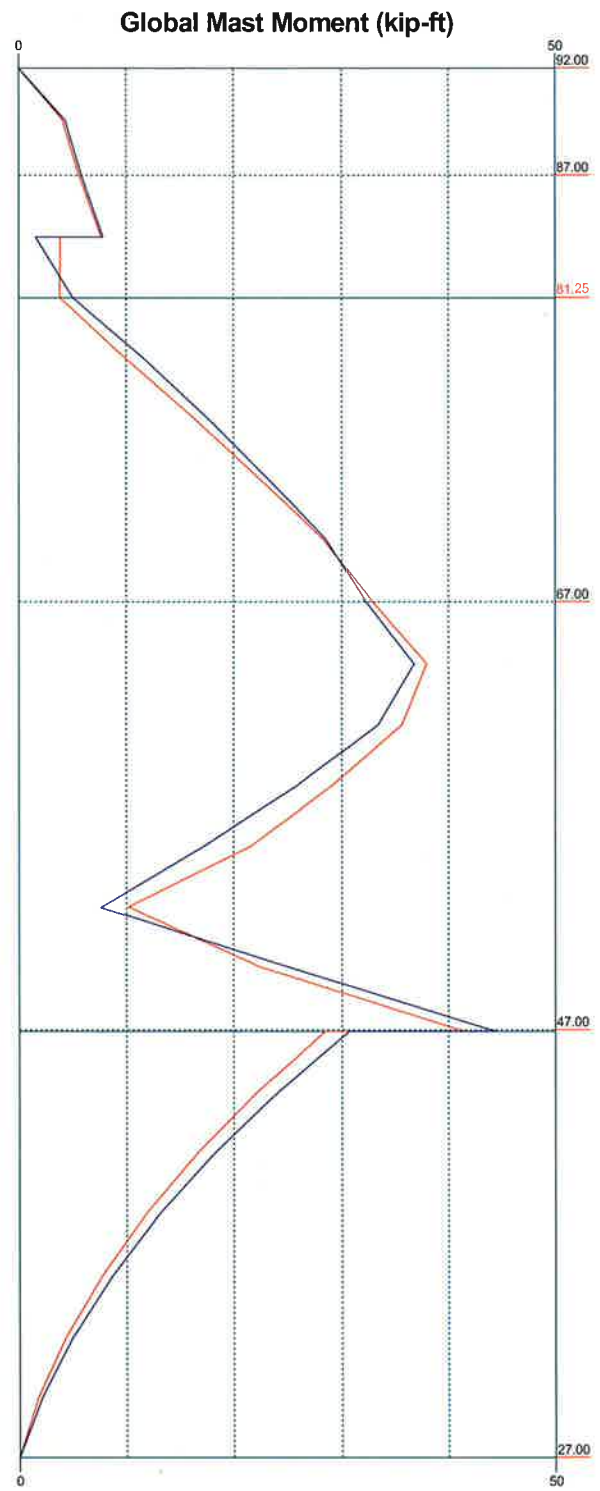
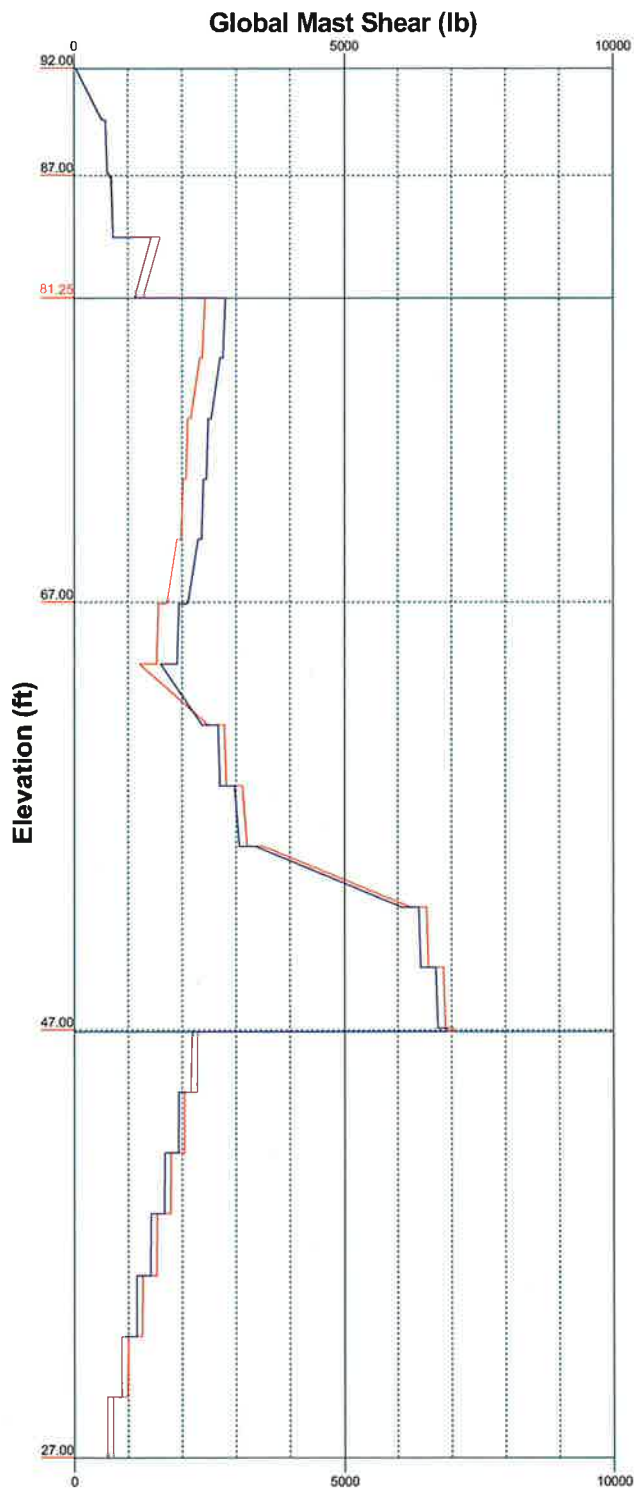


Centek Engineering Inc.
 63-2 North Branford Rd.
 Branford, CT 06405
 Phone: (203) 488-0580
 FAX: (203) 488-8587

Job: 13075.034 - Hamden 2		
Project: 65-ft NUDD Guyed Tower - 265 Benham Street - Hamden, CT		
Client: Verizon Wireless	Drawn by: T.JL	App'd:
Code: TIA/EIA-222-F	Date: 09/27/13	Scale: NTS
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— Vx — Vz

— Mx — Mz



Centek Engineering Inc.

63-2 North Branford Rd.

Branford, CT 06405

Phone: (203) 488-0580

FAX: (203) 488-8587

Job: **13075.034 - Hamden 2**

Project: **65-ft NUDD Guyed Tower - 265 Benham Street - Hamden, CT**

Client: Verizon Wireless

Drawn by: T.J.L.

App'd:

Code: TIA/EIA-222-F

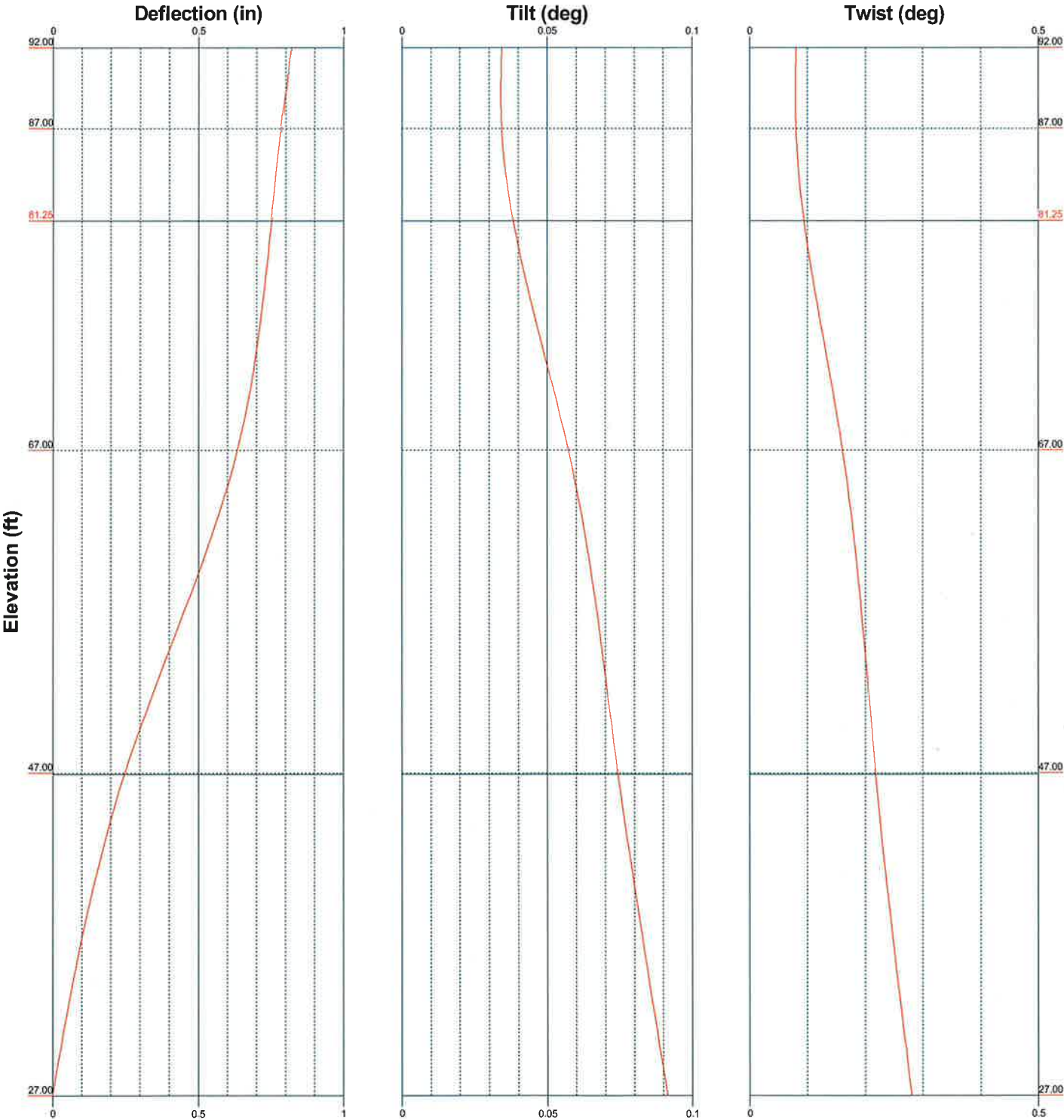
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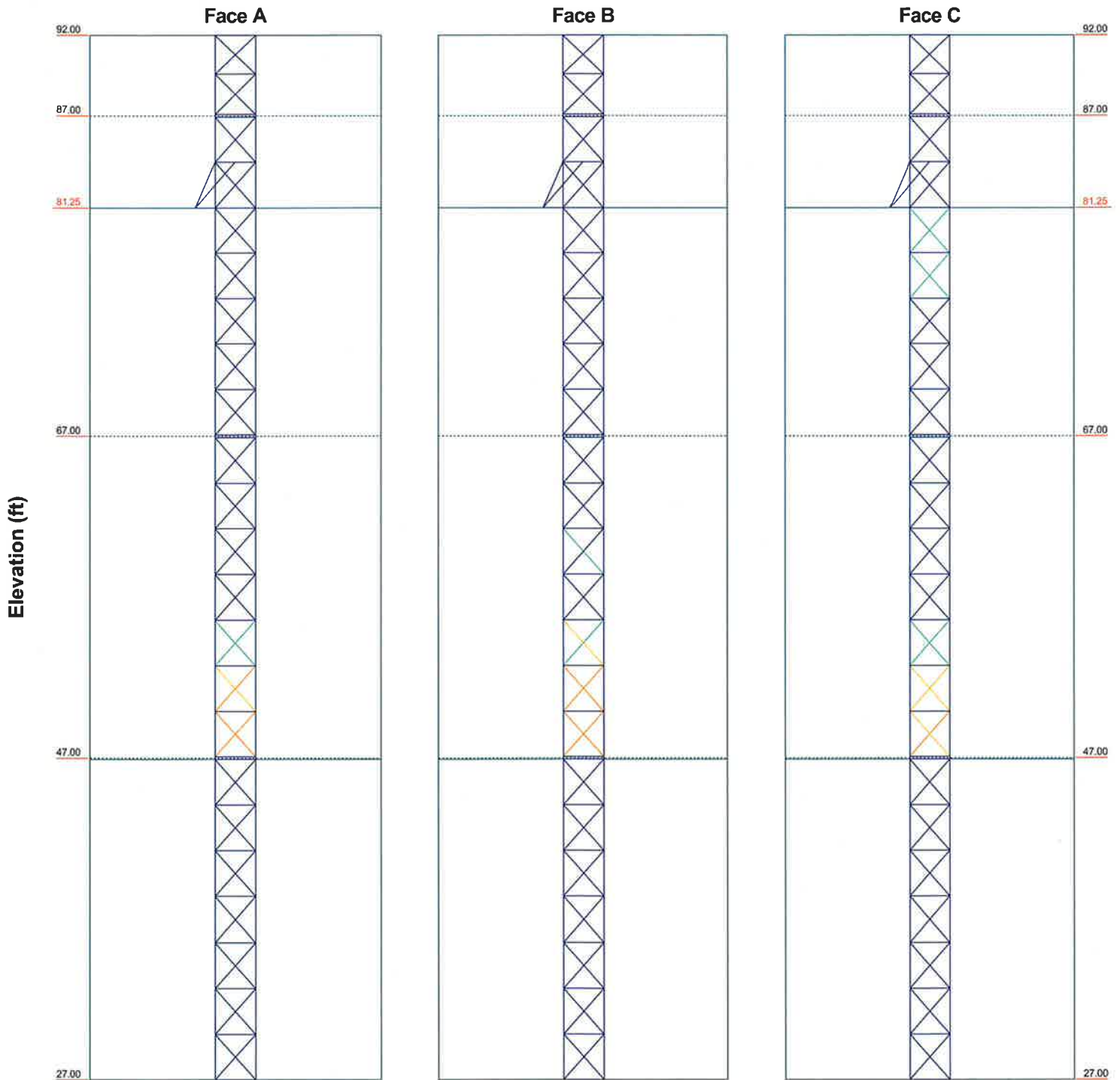
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Dwg No. E-4



Stress Distribution Chart 27' - 92'

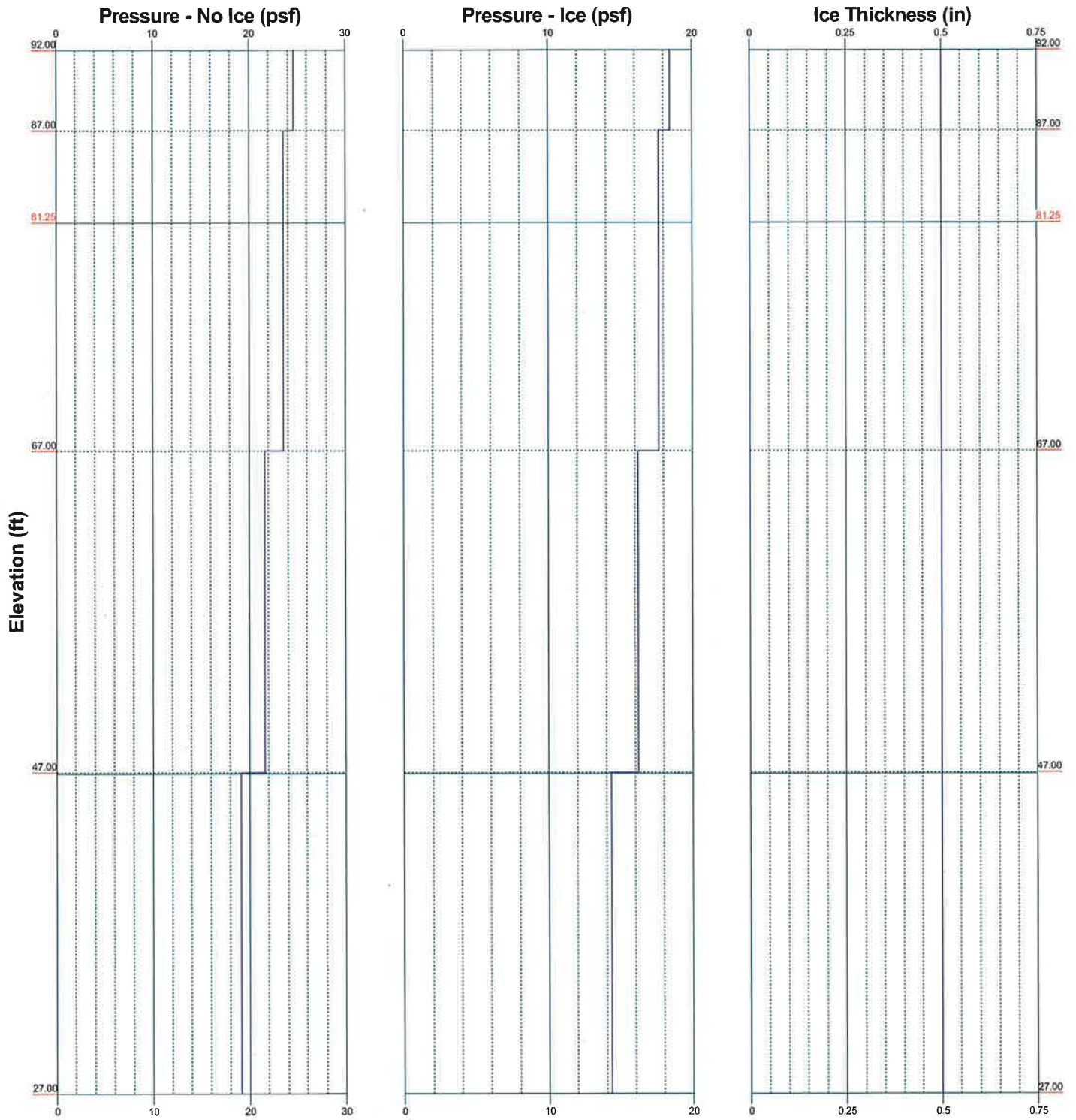
■ > 100%
 ■ 90%-100%
 ■ 75%-90%
 ■ 50%-75%
 ■ < 50% Overstress



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

Job: 13075.034 - Hamden 2		
Project: 65-ft NUDD Guyed Tower - 265 Benham Street - Hamden, CT		
Client: Verizon Wireless	Drawn by: T.JL	App'd:
Code: TIA/EIA-222-F	Date: 09/27/13	Scale: NTS
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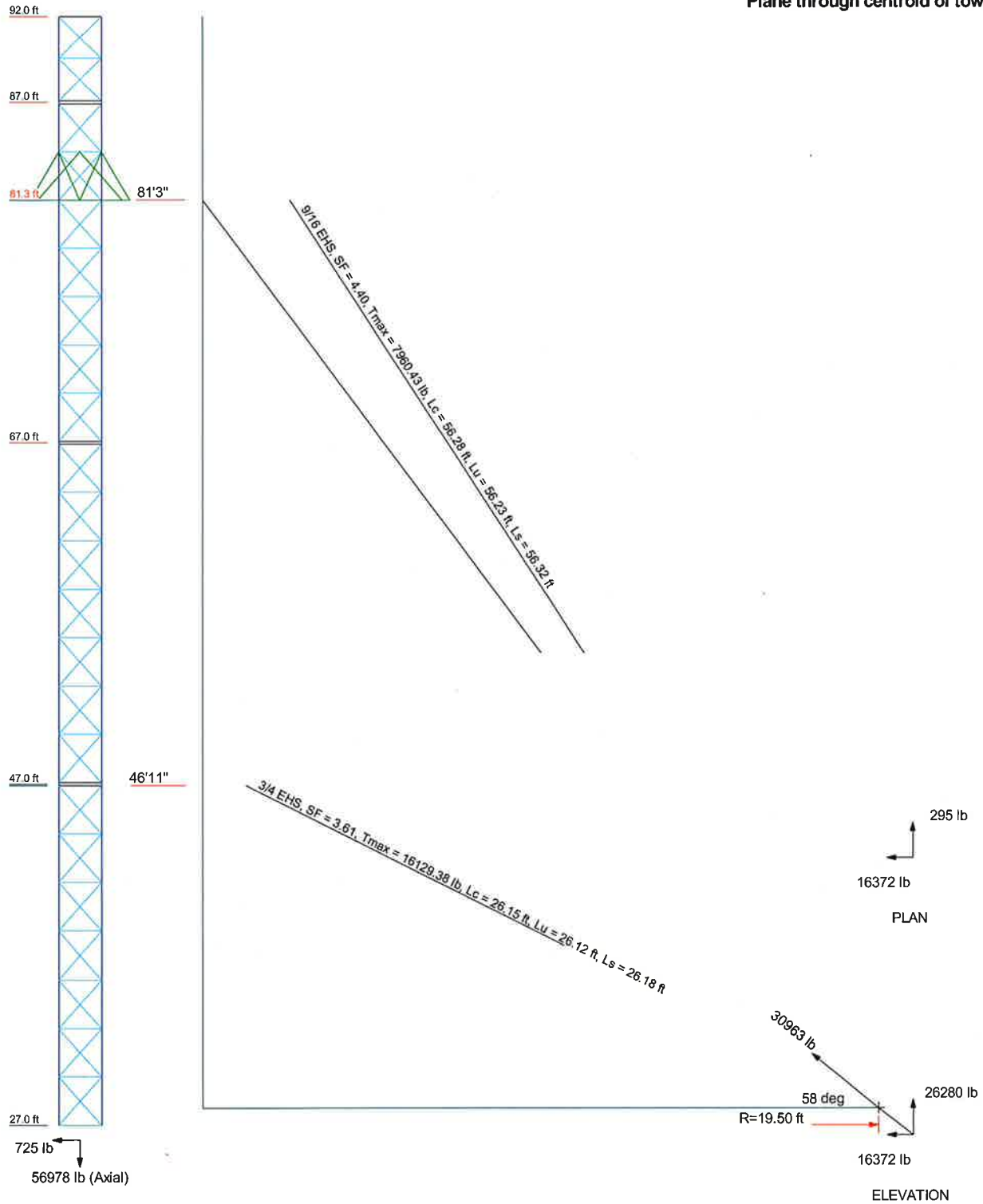
Wind Pressures and Ice Thickness
TIA/EIA-222-F - 85 mph/74 mph 0.500 in Ice



Centek Engineering Inc.		Job: 13075.034 - Hamden 2	
63-2 North Branford Rd.		Project: 65-ft NUDD Guyed Tower - 265 Benham Street - Hamden, CT	
Branford, CT 06405		Client: Verizon Wireless	Drawn by: T.JL
Phone: (203) 488-0580		Code: TIA/EIA-222-F	Date: 09/27/13
FAX: (203) 488-8587		Path: J:\Users\1307500\W034 - Hamden 2\Calcs\ER1100 MDD Guyed Tow Hamden CT.dwg	App'd:
			Scale: NTS
			Dwg No: E-9

Guy Tensions and Tower Reactions TIA/EIA-222-F - 85 mph/74 mph 0.500 in Ice

Maximum Values
Anchor 'B'@19.5 ft Azimuth 120 deg Elev 28 ft
Plane through centroid of tower



Centek Engineering Inc.		Job: 13075.034 - Hamden 2	
63-2 North Branford Rd.		Project: 65-ft NUDD Guyed Tower - 265 Benham Street - Hamden, CT	
Branford, CT 06405		Client: Verizon Wireless	Drawn by: T.JL
Phone: (203) 488-0580		Code: TIA/EIA-222-F	Date: 09/27/13
FAX: (203) 488-8587		Scale: NTS	Dwg No. E-6
		Path: J:\Users\1307500\Work\1307500 - Hamden 2\Calc\ER100 MDD Guyed Tower Hamden, CT.dwg	

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Tower Input Data

The main tower is a 3x guyed tower with an overall height of 92.00 ft above the ground line.

The base of the tower is set at an elevation of 27.00 ft above the ground line.

The face width of the tower is 2.50 ft at the top and 2.50 ft at the base.

This tower is designed using the TIA/EIA-222-F standard.

The following design criteria apply:

Tower is located in New Haven County, Connecticut.

Basic wind speed of 85 mph.

Nominal ice thickness of 0.500 in.

Ice density of 56 pcf.

A wind speed of 74 mph is used in combination with ice.

Temperature drop of 50 °F.

Deflections calculated using a wind speed of 50 mph.

Pressures are calculated at each section.

Safety factor used in guy design is 2.

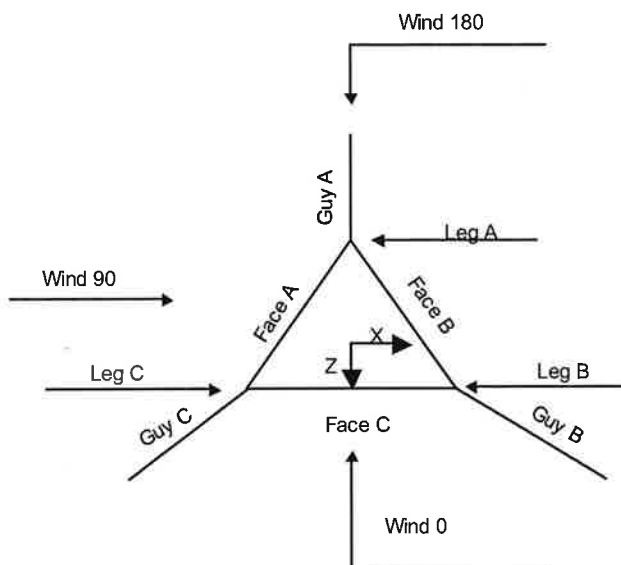
Stress ratio used in tower member design is 1.333.

Local bending stresses due to climbing loads, feedline supports, and appurtenance mounts are not considered.

Options

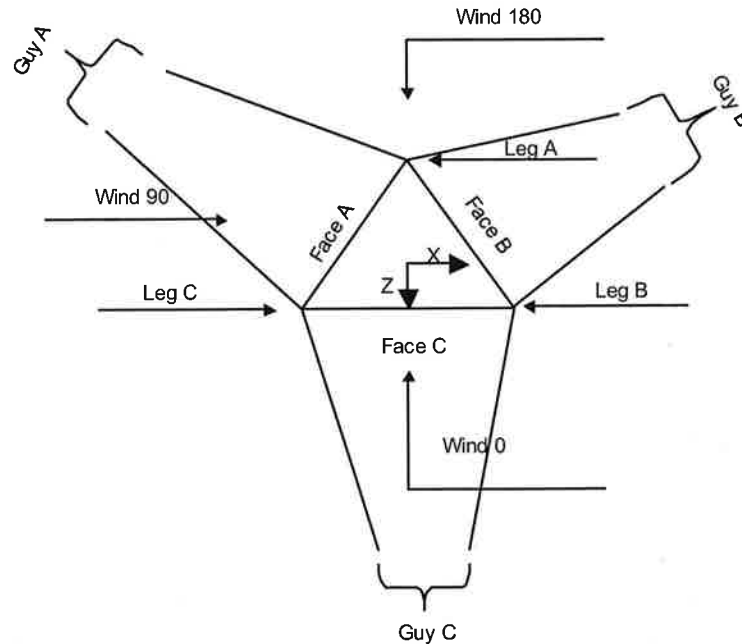
Consider Moments - Legs	Distribute Leg Loads As Uniform	Treat Feedline Bundles As Cylinder
Consider Moments - Horizontals	Assume Legs Pinned	Use ASCE 10 X-Brace Ly Rules
Consider Moments - Diagonals	Assume Rigid Index Plate	Calculate Redundant Bracing Forces
Use Moment Magnification	✓ Use Clear Spans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

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Corner & Starmount Guyed Tower

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Face Guyed

Tower Section Geometry

Tower Section	Tower Elevation	Assembly Database	Description	Section Width	Number of Sections	Section Length
	ft			ft		ft
T1	92.00-87.00			2.50	1	5.00
T2	87.00-67.00			2.50	1	20.00
T3	67.00-47.00			2.50	1	20.00
T4	47.00-27.00			2.50	1	20.00

Tower Section Geometry (cont'd)

Tower Section	Tower Elevation	Diagonal Spacing	Bracing Type	Has K Brace End Panels	Has Horizontals	Top Girt Offset	Bottom Girt Offset
	ft	ft				in	in
T1	92.00-87.00	2.46	X Brace	No	Yes	0.000	1.000

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Tower Section	Tower Elevation <i>ft</i>	Diagonal Spacing <i>ft</i>	Bracing Type	Has K Brace End Panels	Has Horizontals	Top Girt Offset <i>in</i>	Bottom Girt Offset <i>in</i>
T2	87.00-67.00	2.83	X Brace	No	Yes	1.000	1.000
T3	67.00-47.00	2.83	X Brace	No	Yes	1.000	1.000
T4	47.00-27.00	2.85	X Brace	No	Yes	1.000	0.000

Tower Section Geometry (cont'd)

Tower Elevation <i>ft</i>	Leg Type	Leg Size	Leg Grade	Diagonal Type	Diagonal Size	Diagonal Grade
T1 92.00-87.00	Solid Round	1 3/4	A36M-50 (50 ksi)	Solid Round	1/2	A36 (36 ksi)
T2 87.00-67.00	Solid Round	1 3/4	A36M-50 (50 ksi)	Solid Round	1/2	A36 (36 ksi)
T3 67.00-47.00	Solid Round	1 3/4	A36M-50 (50 ksi)	Solid Round	1/2	A36 (36 ksi)
T4 47.00-27.00	Solid Round	1 3/4	A36M-50 (50 ksi)	Solid Round	1/2	A36 (36 ksi)

Tower Section Geometry (cont'd)

Tower Elevation <i>ft</i>	Top Girt Type	Top Girt Size	Top Girt Grade	Bottom Girt Type	Bottom Girt Size	Bottom Girt Grade
T1 92.00-87.00	Single Angle	L1 1/4x1 1/4x3/16	A36 (36 ksi)	Single Angle	L1 1/4x1 1/4x3/16	A36 (36 ksi)
T2 87.00-67.00	Single Angle	L1 1/4x1 1/4x3/16	A36 (36 ksi)	Single Angle	L1 1/4x1 1/4x3/16	A36 (36 ksi)
T3 67.00-47.00	Single Angle	L1 1/4x1 1/4x3/16	A36 (36 ksi)	Single Angle	L1 1/4x1 1/4x3/16	A36 (36 ksi)
T4 47.00-27.00	Single Angle	L1 1/4x1 1/4x3/16	A36 (36 ksi)	Single Angle	L1 1/4x1 1/4x3/16	A36 (36 ksi)

Tower Section Geometry (cont'd)

Tower Elevation <i>ft</i>	No. of Mid Girts	Mid Girt Type	Mid Girt Size	Mid Girt Grade	Horizontal Type	Horizontal Size	Horizontal Grade
T1 92.00-87.00	None	Flat Bar		A36 (36 ksi)	Single Angle	L1 1/4x1 1/4x3/16	A36 (36 ksi)
T2 87.00-67.00	None	Flat Bar		A36 (36 ksi)	Single Angle	L1 1/4x1 1/4x3/16	A36 (36 ksi)
T3 67.00-47.00	None	Flat Bar		A36 (36 ksi)	Single Angle	L1 1/4x1 1/4x3/16	A36 (36 ksi)
T4 47.00-27.00	None	Flat Bar		A36 (36 ksi)	Single Angle	L1 1/4x1 1/4x3/16	A36 (36 ksi)

Tower Section Geometry (cont'd)	
1	2
3	4
5	6
7	8
9	10
11	12
13	14
15	16
17	18
19	20
21	22
23	24
25	26
27	28
29	30
31	32
33	34
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37	38
39	40
41	42
43	44
45	46
47	48
49	50
51	52
53	54
55	56
57	58
59	60
61	62
63	64
65	66
67	68
69	70
71	72
73	74
75	76
77	78
79	80
81	82
83	84
85	86
87	88
89	90
91	92
93	94
95	96
97	98
99	100

Tower Section Geometry (*cont'd*)

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

[illegible][illegible]

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Tower Section Geometry (cont'd)

Tower Elevation ft	Leg Connection Type	Leg		Diagonal		Top Girt		Bottom Girt		Mid Girt		Long Horizontal		Short Horizontal	
		Bolt Size in	No.	Bolt Size in	No.	Bolt Size in	No.	Bolt Size in	No.	Bolt Size in	No.	Bolt Size in	No.	Bolt Size in	No.
T1 92.00-87.00	Flange	0.875	1	0.000	0	0.625	0	0.000	0	0.625	0	0.000	0	0.625	0
		A325N		A325N		A325N		A325N		A325N		A325N		A325N	
T2 87.00-67.00	Flange	0.875	1	0.000	0	0.625	0	0.000	0	0.625	0	0.000	0	0.625	0
		A325N		A325N		A325N		A325N		A325N		A325N		A325N	
T3 67.00-47.00	Flange	0.875	1	0.000	0	0.500	0	0.000	0	0.625	0	0.000	0	0.625	0
		A325N		A325N		A325N		A325N		A325N		A325N		A325N	
T4 47.00-27.00	Flange	0.875	1	0.000	0	0.625	0	0.000	0	0.625	0	0.000	0	0.625	0
		A325N		A325N		A325N		A325N		A325N		A325N		A325N	

Guy Data

Guy Elevation ft	Guy Grade	Guy Size	Initial Tension lb	%	Guy Modulus ksi	Guy Weight plf	L _w ft	Anchor Radius ft	Anchor Azimuth Adj. °	Anchor Elevation ft	End Fitting Efficiency %
81.25	EHS	A 9/16	3500.00	10%	21000	0.671	59.60	28.20	0.0000	28.00	100%
		B 9/16	3500.00	10%	21000	0.671	56.24	19.50	0.0000	28.00	100%
		C 9/16	3500.00	10%	21000	0.671	56.71	20.92	0.0000	28.00	100%
46.9167	EHS	A 3/4	5830.00	10%	19000	1.155	32.74	28.20	0.0000	28.00	100%
		B 3/4	5830.00	10%	19000	1.155	26.13	19.50	0.0000	28.00	100%
		C 3/4	5830.00	10%	19000	1.155	27.13	20.92	0.0000	28.00	100%

Guy Data(cont'd)

Guy Elevation ft	Mount Type	Torque-Arm Spread ft	Torque-Arm Leg Angle °	Torque-Arm Style	Torque-Arm Grade	Torque-Arm Type	Torque-Arm Size
81.25	Torque Arm	5.00	45.0000	Dog Ear	A36 (36 ksi)	Single Angle	L2x2x5/16 L3x3x1/4
46.9167	Corner						

Guy Data (cont'd)

Guy Elevation ft	Diagonal Grade	Diagonal Type	Upper Diagonal Size	Lower Diagonal Size	Is Strap.	Pull-Off Grade	Pull-Off Type	Pull-Off Size
81.25	A36 (36 ksi)	Solid Round				A36 (36 ksi)	Single Angle	
46.92	A36 (36 ksi)	Solid Round				A36 (36 ksi)	Single Angle	

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Guy Data (cont'd)

Guy Elevation	Cable Weight A	Cable Weight B	Cable Weight C	Cable Weight D	Tower Intercept A	Tower Intercept B	Tower Intercept C	Tower Intercept D
ft	lb	lb	lb	lb	ft	ft	ft	ft
81.25	39.99	37.73	38.05		0.34	0.30	0.31	
					1.0 sec/pulse	0.9 sec/pulse	1.0 sec/pulse	
46.9167	37.81	30.18	31.33		0.11	0.07	0.07	
					0.6 sec/pulse	0.4 sec/pulse	0.5 sec/pulse	

Guy Data (cont'd)

Guy Elevation ft	Calc K Single Angles	Calc K Solid Rounds	Torque Arm		Pull Off		Diagonal	
			K _x	K _y	K _x	K _y	K _x	K _y
81.25	Yes	Yes	1	1	1	1	1	1
46.9167	No	No			1	1	1	1

Guy Data (cont'd)

Guy Elevation ft	Torque-Arm				Pull Off				Diagonal			
	Bolt Size in	Number	Net Width Deduct in	U	Bolt Size in	Number	Net Width Deduct in	U	Bolt Size in	Number	Net Width Deduct in	U
81.25	0.000 A325N	0	0.000	1	0.625 A325N	0	0.000	0.75	0.625 A325N	0	0.000	0.75
46.9167	0.000 A325N	0	0.000	1	0.625 A325N	0	0.000	0.75	0.625 A325N	0	0.000	0.75

Guy Pressures

Guy Elevation ft	Guy Location	z ft	q _z psf	q _z Ice psf	Ice Thickness in
81.25	A	54.63	21	16	0.500
	B	54.63	21	16	0.500
	C	54.63	21	16	0.500
46.9167	A	37.46	19	14	0.500
	B	37.46	19	14	0.500
	C	37.46	19	14	0.500

Guy-Mast Forces (Excluding Wind) - No Ice

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Guy Elevation	Guy Location	Chord Angle	Guy Tension Top Bottom lb	F_x	F_y	F_z	M_x	M_y	M_z
ft		°		lb	lb	lb	kip-ft	kip-ft	kip-ft
81.25	A	63.2217	3535.70	-147.44	3160.57	-1578.04	-4.56	4.16	-7.90
			3500.00						
	A	63.2217	3535.70	147.44	3160.57	-1578.04	-4.56	-4.16	7.90
			3500.00						
	B	71.1026	3535.70	1055.49	3347.10	428.96	9.66	3.05	0.00
			3500.00						
	B	71.1026	3535.70	899.24	3347.10	699.60	-4.83	-3.05	-8.37
			3500.00						
	C	69.7581	3535.70	-967.99	3319.61	737.80	-4.79	3.24	8.30
			3500.00						
	C	69.7581	3535.70	-1122.95	3319.61	469.41	9.58	-3.24	0.00
			3500.00						
46.9167			Sum:	-136.21	19654.57	-820.32	0.50	0.00	-0.07
	A	35.2599	5851.83	0.00	3390.76	-4769.35	-4.89	0.00	0.00
			5830.00						
	B	46.3325	5851.83	3492.66	4240.16	2016.49	3.06	0.00	-5.30
			5830.00						
	C	44.1644	5851.83	-3628.59	4085.14	2094.97	2.95	-0.00	5.11
			5830.00						
			Sum:	-135.93	11716.06	-657.89	1.11	0.00	-0.19

Guy-Mast Forces (Excluding Wind) - Ice

Guy Elevation	Guy Location	Chord Angle	Guy Tension Top Bottom lb	F_x	F_y	F_z	M_x	M_y	M_z
ft		°		lb	lb	lb	kip-ft	kip-ft	kip-ft
81.25	A	63.2217	4885.70	-203.30	4369.71	-2175.85	-6.31	5.73	-10.92
			4815.47						
	A	63.2217	4885.70	203.30	4369.71	-2175.85	-6.31	-5.73	10.92
			4815.47						
	B	71.1026	4882.79	1454.48	4623.50	591.12	13.35	4.20	0.00
			4812.56						
	B	71.1026	4882.79	1239.16	4623.50	964.06	-6.67	-4.20	-11.56
			4812.56						
	C	69.7581	4883.17	-1334.00	4586.06	1016.77	-6.62	4.47	11.47
			4812.94						
	C	69.7581	4883.17	-1547.55	4586.06	646.90	13.24	-4.47	0.00
			4812.94						
46.9167			Sum:	-187.91	27158.55	-1132.86	0.68	0.00	-0.09
	A	35.2599	7939.17	0.00	4604.11	-6467.82	-6.65	0.00	0.00
			7902.91						
	B	46.3325	7937.17	4735.30	5753.37	2733.93	4.15	0.00	-7.19
			7900.91						
	C	44.1644	7937.49	-4919.78	5543.59	2840.44	4.00	-0.00	6.93
			7901.23						
			Sum:	-184.48	15901.07	-893.45	1.51	0.00	-0.26

Guy-Mast Forces (Excluding Wind) - Service

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Guy Elevation	Guy Location	Chord Angle	Guy Tension Top Bottom lb	F _x	F _y	F _z	M _x	M _y	M _z
ft		°		lb	lb	lb	kip-ft	kip-ft	kip-ft
81.25	A	63.2217	3535.70	-147.44	3160.57	-1578.04	-4.56	4.16	-7.90
			3500.00						
	A	63.2217	3535.70	147.44	3160.57	-1578.04	-4.56	-4.16	7.90
			3500.00						
	B	71.1026	3535.70	1055.49	3347.10	428.96	9.66	3.05	0.00
			3500.00						
46.9167	B	71.1026	3535.70	899.24	3347.10	699.60	-4.83	-3.05	-8.37
			3500.00						
	C	69.7581	3535.70	-967.99	3319.61	737.80	-4.79	3.24	8.30
			3500.00						
	C	69.7581	3535.70	-1122.95	3319.61	469.41	9.58	-3.24	0.00
			3500.00						
			Sum:	-136.21	19654.57	-820.32	0.50	0.00	-0.07
	A	35.2599	5851.83	0.00	3390.76	-4769.35	-4.89	0.00	0.00
			5830.00						
	B	46.3325	5851.83	3492.66	4240.16	2016.49	3.06	0.00	-5.30
			5830.00						
	C	44.1644	5851.83	-3628.59	4085.14	2094.97	2.95	-0.00	5.11
			5830.00						
			Sum:	-135.93	11716.06	-657.89	1.11	0.00	-0.19

Guy-Tensioning Information

Temperature At Time Of Tensioning																	
Guy Elevation ft	H	V	0 F		20 F		40 F		60 F		80 F		100 F		120 F		
			Initial Tension lb	Intercept	Initial Tension lb	Intercept	Initial Tension lb	Intercept	Initial Tension lb	Intercept	Initial Tension lb	Intercept	Initial Tension lb	Intercept	Initial Tension lb	Intercept	
			ft	ft	ft	ft	ft	ft	ft	ft	ft	ft	ft	ft	ft	ft	ft
81.25	A	26.87	53.25	3823	0.31	3715	0.32	3608	0.33	3500	0.34	3393	0.35	3285	0.36	3178	0.37
	B	18.23	53.25	3667	0.29	3611	0.29	3556	0.30	3500	0.30	3444	0.31	3389	0.31	3333	0.32
	C	19.64	53.25	3691	0.29	3627	0.30	3563	0.30	3500	0.31	3437	0.31	3373	0.32	3310	0.32
46.9167	A	26.76	18.92	7488	0.08	6935	0.09	6382	0.10	5830	0.11	5278	0.12	4728	0.13	4178	0.15
	B	18.06	18.92	7017	0.06	6621	0.06	6225	0.06	5830	0.07	5435	0.07	5040	0.08	4645	0.08
	C	19.48	18.92	7111	0.06	6684	0.06	6257	0.07	5830	0.07	5403	0.08	4977	0.09	4551	0.09

Feed Line/Linear Appurtenances - Entered As Round Or Flat

Description	Face or Leg	Allow Shield	Component Type	Placement ft	Face Offset in	Lateral Offset (Frac FW)	#	# Per Row	Clear Spacing in	Width or Diameter in	Perimeter in	Weight plf
1 5/8 (Verizon - Existing)	A	Yes	Ar (CfAe)	63.50 - 27.00	1.000	-0.28	4	4	0.500	1.980		1.04
1 5/8 (Verizon - Existing)	C	Yes	Ar (CfAe)	63.50 - 27.00	1.000	0	8	8	1.000 1.980	1.980		1.04
7/8 (Municipal)	A	Yes	Ar (CfAe)	76.50 - 27.00	1.000	-0.05	1	1	1.110	1.110		0.54
7/8 (Municipal)	A	Yes	Ar (CfAe)	69.00 - 27.00	1.000	0	1	1	1.110	1.110		0.54
7/8	A	Yes	Ar (CfAe)	92.00 - 27.00	1.000	0.1	2	2	1.110	1.110		0.54

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Description	Face or Leg	Allow Shield	Component Type	Placement ft	Face Offset in	Lateral Offset (Frac FW)	#	# Per Row	Clear Spacing in	Width or Diameter in	Perimeter in	Weight plf
(Municipal) 1 5/8 (Verizon)	C	Yes	Ar (CfAe)	63.50 - 27.00	3.500	0	6	6	1.000	1.980		1.04
RG6-Fiber (AT&T)	B	Yes	Ar (CfAe)	54.50 - 27.00	1.000	0.38	1	1	0.500	0.500		1.00
#8 AWG Copper Wlre (AT&T)	B	Yes	Ar (CfAe)	54.50 - 27.00	1.000	0.4	2	1	0.250	0.129		0.05
1 5/8 (AT&T)	B	Yes	Ar (CfAe)	54.50 - 27.00	1.000	-0.1	12	6	1.000	1.980		1.04
0.3" dia RET (AT&T)	B	Yes	Ar (CfAe)	54.50 - 27.00	1.000	0.33	6	3	0.300	0.300		0.00
HYBRIFLEX 1-5/8" (Verizon - Existing)	C	Yes	Ar (CfAe)	63.50 - 27.00	3.500	-0.38	1	1	0.000	1.980		1.90

Feed Line/Linear Appurtenances Section Areas

Tower Section	Tower Elevation ft	Face	A _R ft ²	A _F ft ²	C _{AFA} In Face ft ²	C _{AFA} Out Face ft ²	Weight lb
T1	92.00-87.00	A	0.925	0.000	0.000	0.000	5.40
		B	0.000	0.000	0.000	0.000	0.00
		C	0.000	0.000	0.000	0.000	0.00
T2	87.00-67.00	A	4.764	0.000	0.000	0.000	27.81
		B	0.000	0.000	0.000	0.000	0.00
		C	0.000	0.000	0.000	0.000	0.00
T3	67.00-47.00	A	18.290	0.000	0.000	0.000	111.84
		B	8.380	0.000	0.000	0.000	101.94
		C	40.837	0.000	0.000	0.000	271.59
T4	47.00-27.00	A	20.600	0.000	0.000	0.000	126.40
		B	22.348	0.000	0.000	0.000	271.84
		C	49.500	0.000	0.000	0.000	329.20

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 _{AFA} In Face ft ²	C _{AFA} Out Face ft ²	Weight lb
T1	92.00-87.00	A	0.500	1.758	0.000	0.000	0.000	15.23
		B		0.000	0.000	0.000	0.000	0.00
		C		0.000	0.000	0.000	0.000	0.00
T2	87.00-67.00	A	0.500	9.055	0.000	0.000	0.000	78.46
		B		0.000	0.000	0.000	0.000	0.00
		C		0.000	0.000	0.000	0.000	0.00
T3	67.00-47.00	A	0.500	18.164	10.230	0.000	0.000	298.51
		B		4.318	10.063	0.000	0.000	315.77
		C		12.293	49.170	0.000	0.000	793.28
T4	47.00-27.00	A	0.500	19.033	12.400	0.000	0.000	335.98
		B		11.514	26.833	0.000	0.000	842.05
		C		14.900	59.600	0.000	0.000	961.55

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Feed Line Shielding

Section	Elevation	Face	A_R	$A_{R_{Ice}}$	A_F	$A_{F_{Ice}}$
	ft		ft ²	ft ²	ft ²	ft ²
T1	92.00-87.00	A	0.043	0.335	0.058	0.110
		B	0.000	0.000	0.000	0.000
		C	0.000	0.000	0.000	0.000
T2	87.00-67.00	A	0.210	1.499	0.198	0.377
		B	0.000	0.000	0.000	0.000
		C	0.000	0.000	0.000	0.000
T3	67.00-47.00	A	0.806	4.702	0.762	1.183
		B	0.369	2.381	0.349	0.599
		C	1.800	10.177	1.702	2.561
T4	47.00-27.00	A	0.910	5.215	0.858	1.310
		B	0.987	6.362	0.931	1.598
		C	2.187	12.359	2.063	3.104

Feed Line Center of Pressure

Section	Elevation	CP_X	CP_Z	$CP_{X_{Ice}}$	$CP_{Z_{Ice}}$
	ft	in	in	in	in
T1	92.00-87.00	-0.668	-0.701	-0.564	-0.592
T2	87.00-67.00	-1.003	-0.883	-0.878	-0.773
T3	67.00-47.00	-0.963	3.988	-0.467	2.669
T4	47.00-27.00	0.106	3.237	0.398	2.273

Discrete Tower Loads

Description	Face or Leg	Offset Type	Offsets: Horz Lateral Vert	Azimuth Adjustment	Placement	$C_{AA_{Front}}$	$C_{AA_{Side}}$	Weight
			ft ft ft	°	ft	ft ²	ft ²	lb
DB844G65ZAXY (Verizon - Existing)	A	From Leg	4.00	0.0000	63.50	No Ice	4.67	16.00
			6.00			1/2" Ice	5.05	48.76
			0.00					
DB844G65ZAXY (Verizon - Existing)	A	From Leg	4.00	0.0000	63.50	No Ice	4.67	16.00
			-6.00			1/2" Ice	5.05	48.76
			0.00					
APL866513-42T0 (Verizon - Existing)	B	From Leg	4.00	0.0000	63.50	No Ice	4.29	16.00
			6.00			1/2" Ice	4.67	47.29
			0.00					
APL866513-42T0 (Verizon - Existing)	B	From Leg	4.00	0.0000	63.50	No Ice	4.29	16.00
			-6.00			1/2" Ice	4.67	47.29
			0.00					
DB844G65ZAXY (Verizon - Existing)	C	From Leg	4.00	0.0000	63.50	No Ice	4.67	16.00
			6.00			1/2" Ice	5.05	48.76
			0.00					

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Description	Face or Leg	Offset Type	Offsets: Horz Lateral Vert ft ft ft	Azimuth Adjustment	Placement ft		C _{AA} Front ft ²	C _{AA} Side ft ²	Weight lb
DB844G65ZAXY (Verizon - Existing)	C	From Leg	4.00 -6.00 0.00	0.0000	63.50	No Ice 1/2" Ice	4.67 5.05	3.73 4.10	16.00 48.76
DC6-48-60-18-8F Surge Arrestor (AT&T) (2)	C	From Face	0.50 0.50 0.00	0.0000	56.00	No Ice 1/2" Ice	2.23 2.45	2.23 2.45	20.00 39.36
AM-X-CD-16-65-00T-RET(7 2") (AT&T) (2)	A	From Face	2.00 0.00 0.00	0.0000	54.50	No Ice 1/2" Ice	8.26 8.81	4.64 5.09	50.00 96.50
AM-X-CD-16-65-00T-RET(7 2") (AT&T) (2)	B	From Face	2.00 0.00 0.00	0.0000	54.50	No Ice 1/2" Ice	8.26 8.81	4.64 5.09	50.00 96.50
AM-X-CD-16-65-00T-RET(7 2") (AT&T) (2)	C	From Face	2.00 0.00 0.00	0.0000	54.50	No Ice 1/2" Ice	8.26 8.81	4.64 5.09	50.00 96.50
DTMABP7819VG12A TMA (AT&T)	A	From Face	2.00 5.00 0.00	0.0000	54.50	No Ice 1/2" Ice	1.59 1.76	0.58 0.70	20.00 29.77
DTMABP7819VG12A TMA (AT&T)	B	From Face	2.00 5.00 0.00	0.0000	54.50	No Ice 1/2" Ice	1.59 1.76	0.58 0.70	20.00 29.77
DTMABP7819VG12A TMA (AT&T)	C	From Face	2.00 5.00 0.00	0.0000	54.50	No Ice 1/2" Ice	1.59 1.76	0.58 0.70	20.00 29.77
(2) RRUS-11 (AT&T)	A	From Face	2.00 -2.00 0.00	0.0000	54.50	No Ice 1/2" Ice	2.99 3.23	1.25 1.41	50.00 69.57
(2) RRUS-11 (AT&T)	B	From Face	2.00 -2.00 0.00	0.0000	54.50	No Ice 1/2" Ice	2.99 3.23	1.25 1.41	50.00 69.57
(2) RRUS-11 (AT&T)	C	From Face	2.00 -2.00 0.00	0.0000	54.50	No Ice 1/2" Ice	2.99 3.23	1.25 1.41	50.00 69.57
Andrew SF-SU10-3-72 (AT&T)	A	From Leg	2.25 0.00 0.00	0.0000	54.50	No Ice 1/2" Ice	16.80 21.90	16.80 21.90	423.00 592.00
Andrew SF-SU10-3-72 (AT&T)	B	From Leg	2.25 0.00 0.00	0.0000	54.50	No Ice 1/2" Ice	16.80 21.90	16.80 21.90	423.00 592.00
Andrew SF-SU10-3-72 (AT&T)	C	From Leg	2.25 0.00 0.00	0.0000	54.50	No Ice 1/2" Ice	16.80 21.90	16.80 21.90	423.00 592.00
17' x 3" Dia Omni (Municipal)	A	From Leg	3.00 0.00 7.50	0.0000	91.00	No Ice 1/2" Ice	5.10 6.83	5.10 6.83	47.60 84.35
3' Side arm mount (Municipal)	A	From Leg	1.50 0.00 0.00	0.0000	91.00	No Ice 1/2" Ice	2.00 2.60	2.00 2.60	70.00 82.00
20' x 3" Dia Omni (Municipal)	B	From Leg	3.00 0.00 10.00	0.0000	91.00	No Ice 1/2" Ice	6.00 8.03	6.00 8.03	50.00 93.17
2' Side arm mount (Municipal)	B	From Leg	1.00 0.00 0.00	0.0000	91.00	No Ice 1/2" Ice	2.00 2.60	2.00 2.60	70.00 82.00

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Description	Face or Leg	Offset Type	Offsets: Horz Lateral Vert ft ft ft	Azimuth Adjustment °	Placement ft		C _{AA} Front ft ²	C _{AA} Side ft ²	Weight lb
21-ft 8-Bay Dipole (Municipal)	C	From Leg	3.00 0.00 10.60	0.0000	69.00	No Ice 1/2" Ice	3.15 5.67	3.15 5.67	32.00 41.60
3' Side arm mount (Municipal)	C	From Leg	1.50 0.00 0.00	0.0000	69.00	No Ice 1/2" Ice	2.00 2.60	2.00 2.60	70.00 82.00
3' Pipe Brace (Municipal)	C	From Leg	1.50 0.00 0.00	0.0000	80.00	No Ice 1/2" Ice	0.58 0.77	0.58 0.77	10.95 16.37
8' x 3" Dia Omni (Municipal)	B	From Leg	2.00 0.00 4.00	0.0000	76.50	No Ice 1/2" Ice	2.40 3.19	2.40 3.19	25.00 42.51
2' Side arm mount (Municipal)	B	From Leg	1.00 0.00 0.00	0.0000	76.50	No Ice 1/2" Ice	2.00 2.60	2.00 2.60	70.00 82.00
BXA-171063-12CF (Verizon - Existing)	A	From Leg	4.00 -4.00 0.00	0.0000	63.50	No Ice 1/2" Ice	4.79 5.24	3.62 4.06	15.00 42.45
BXA-171063-12CF (Verizon - Existing)	B	From Leg	4.00 -4.00 0.00	0.0000	63.50	No Ice 1/2" Ice	4.79 5.24	3.62 4.06	15.00 42.45
BXA-171063-12CF (Verizon - Existing)	C	From Leg	4.00 -4.00 0.00	0.0000	63.50	No Ice 1/2" Ice	4.79 5.24	3.62 4.06	15.00 42.45
BXA-171063-12CF (Verizon - Existing)	A	From Leg	4.00 4.00 0.00	0.0000	63.50	No Ice 1/2" Ice	4.79 5.24	3.62 4.06	15.00 42.45
BXA-171063-12CF (Verizon - Existing)	B	From Leg	4.00 4.00 0.00	0.0000	63.50	No Ice 1/2" Ice	4.79 5.24	3.62 4.06	15.00 42.45
BXA-171063-12CF (Verizon - Existing)	C	From Leg	4.00 4.00 0.00	0.0000	63.50	No Ice 1/2" Ice	4.79 5.24	3.62 4.06	15.00 42.45
RRH2x40-AWS (Verizon - Existing)	A	From Face	3.50 0.00 0.00	0.0000	63.50	No Ice 1/2" Ice	2.52 2.75	1.59 1.80	44.00 61.40
RRH2x40-AWS (Verizon - Existing)	B	From Face	3.50 0.00 0.00	0.0000	63.50	No Ice 1/2" Ice	2.52 2.75	1.59 1.80	44.00 61.40
RRH2x40-AWS (Verizon - Existing)	C	From Face	3.50 0.00 0.00	0.0000	63.50	No Ice 1/2" Ice	2.52 2.75	1.59 1.80	44.00 61.40
DB-T1-6Z-8AB-0Z (Verizon - Existing)	C	From Face	0.50 0.00 0.00	0.0000	63.50	No Ice 1/2" Ice	5.60 5.92	2.33 2.56	44.00 80.13
BXA-70063/6CF (Verizon - Proposed)	A	From Leg	4.00 0.00 0.00	0.0000	63.50	No Ice 1/2" Ice	7.73 8.27	4.16 4.60	17.00 59.49
BXA-70040-6CF (Verizon - Proposed)	B	From Leg	4.00 0.00 0.00	0.0000	63.50	No Ice 1/2" Ice	16.52 17.14	5.72 6.17	38.00 120.76
BXA-70063/6CF (Verizon - Proposed)	C	From Leg	4.00 0.00 0.00	0.0000	63.50	No Ice 1/2" Ice	7.73 8.27	4.16 4.60	17.00 59.49
Rohn 6' x 12' Boom Gate (1) (Verizon - Existing)	A	From Leg	2.00 0.00 0.00	0.0000	62.50	No Ice 1/2" Ice	16.60 19.80	16.60 19.80	560.00 700.00

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Description	Face or Leg	Offset Type	Offsets: Horz Lateral Vert ft ft ft	Azimuth Adjustment °	Placement ft		C _A A _A Front ft ²	C _A A _A Side ft ²	Weight lb
Rohn 6' x 12' Boom Gate (1) (Verizon - Existing)	B	From Leg	2.00 0.00 0.00	0.0000	62.50	No Ice 1/2" Ice	16.60 19.80	16.60 19.80	560.00 700.00
Rohn 6' x 12' Boom Gate (1) (Verizon - Existing)	C	From Leg	2.00 0.00 0.00	0.0000	62.50	No Ice 1/2" Ice	16.60 19.80	16.60 19.80	560.00 700.00

Tower Pressures - No Ice

$$G_H = 1.195$$

Section Elevation ft	z ft	K _Z	q _z psf	A _G ft ²	F a c e ft ²	A _F ft ²	A _R ft ²	A _{leg} ft ²	Leg % %	C _A A _A In Face ft ²	C _A A _A Out Face ft ²
T1 92.00-87.00	89.50	1.33	25	13.229	A B C	0.678 0.736 0.736	2.890 2.009 2.009	1.458	40.87 53.14 53.14	0.000 0.000 0.000	0.000 0.000 0.000
T2 87.00-67.00	77.00	1.274	24	52.917	A B C	1.763 1.962 1.962	12.463 7.909 7.909	5.833	41.00 59.10 59.10	0.000 0.000 0.000	0.000 0.000 0.000
T3 67.00-47.00	57.00	1.169	22	52.917	A B C	1.200 1.613 0.260	25.393 15.920 46.946	5.833	21.94 33.27 12.36	0.000 0.000 0.000	0.000 0.000 0.000
T4 47.00-27.00	37.00	1.033	19	52.917	A B C	1.103 1.031 0.000	27.604 29.274 55.227	5.833	20.32 19.25 10.56	0.000 0.000 0.000	0.000 0.000 0.000

Tower Pressure - With Ice

$$G_H = 1.195$$

Section Elevation ft	z ft	K _Z	q _z psf	t _z in	A _G ft ²	F a c e ft ²	A _F ft ²	A _R ft ²	A _{leg} ft ²	Leg % %	C _A A _A In Face ft ²	C _A A _A Out Face ft ²
T1 92.00-87.00	89.50	1.33	18	0.500	13.646	A B C	0.626 0.736 0.736	5.955 4.531 4.531	2.292	34.82 43.51 43.51	0.000 0.000 0.000	0.000 0.000 0.000
T2 87.00-67.00	77.00	1.274	18	0.500	54.583	A B C	1.584 1.962 1.962	24.519 16.963 16.963	9.167	35.12 48.44 48.44	0.000 0.000 0.000	0.000 0.000 0.000
T3 67.00-47.00	57.00	1.169	16	0.500	54.583	A B C	11.009 11.425 48.571	30.425 18.900 19.078	9.167	22.12 30.23 13.55	0.000 0.000 0.000	0.000 0.000 0.000
T4 47.00-27.00	37.00	1.033	14	0.500	54.583	A B	13.052 27.197	30.796 22.130	9.167	20.91 18.58	0.000 0.000	0.000 0.000

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Section Elevation	z	K _z	q _z	t _z	A _G	F a c e	A _F	A _R	A _{leg}	Leg %	C _A A _A In Face ft ²	C _A A _A Out Face ft ²
ft	ft		psf	in	ft ²		ft ²	ft ²	ft ²			
						C	58.458	19.518		11.76	0.000	0.000

Tower Pressure - Service

$$G_H = 1.195$$

Section Elevation	z	K _z	q _z	A _G	F a c e	A _F	A _R	A _{leg}	Leg %	C _A A _A In Face ft ²	C _A A _A Out Face ft ²
ft	ft		psf	ft ²		ft ²	ft ²	ft ²			
T1 92.00-87.00	89.50	1.33	9	13.229	A	0.678	2.890	1.458	40.87	0.000	0.000
					B	0.736	2.009		53.14	0.000	0.000
					C	0.736	2.009		53.14	0.000	0.000
T2 87.00-67.00	77.00	1.274	8	52.917	A	1.763	12.463	5.833	41.00	0.000	0.000
					B	1.962	7.909		59.10	0.000	0.000
					C	1.962	7.909		59.10	0.000	0.000
T3 67.00-47.00	57.00	1.169	7	52.917	A	1.200	25.393	5.833	21.94	0.000	0.000
					B	1.613	15.920		33.27	0.000	0.000
					C	0.260	46.946		12.36	0.000	0.000
T4 47.00-27.00	37.00	1.033	7	52.917	A	1.103	27.604	5.833	20.32	0.000	0.000
					B	1.031	29.274		19.25	0.000	0.000
					C	0.000	55.227		10.56	0.000	0.000

Tower Forces - No Ice - Wind Normal To Face

Section Elevation	Add Weight	Self Weight	F a c e	e	C _F	R _R	D _F	D _R	A _E	F	w	Ctrl. Face
ft	lb	lb							ft ²	lb	plf	
T1	5.40	184.08	A	0.27	2.38	0.607	1	1	2.433	170.10	34.02	A
92.00-87.00			B	0.207	2.571	0.592	1	1	1.925			
			C	0.207	2.571	0.592	1	1	1.925			
T2	27.81	685.64	A	0.269	2.382	0.607	1	1	9.326	625.37	31.27	A
87.00-67.00		TA 162.22	B	0.187	2.642	0.588	1	1	6.610			
			C	0.187	2.642	0.588	1	1	6.610			
T3	485.37	685.64	A	0.503	1.897	0.699	1	1	18.944	2276.61	113.83	C
67.00-47.00			B	0.331	2.216	0.626	1	1	11.578			
			C	0.892	1.913	0.976	1	1	46.074			
T4	727.44	685.89	A	0.542	1.851	0.72	1	1	20.981	2416.17*	120.81	C
47.00-27.00			B	0.573	1.823	0.737	1	1	22.613			
			C	1	2.1	1	1	1	55.227			
Sum Weight:	1246.02	2403.47			*2A _B limit					5488.24		

Tower Forces - No Ice - Wind 45 To Face

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Section Elevation	Add Weight	Self Weight	F a c e	e	C _F	R _R	D _F	D _R	A _E	F	w	Ctrl. Face
ft	lb	lb							ft ²	lb	plf	
T1	5.40	184.08	A	0.27	2.38	0.607	0.825	1	2.314	161.80	32.36	A
92.00-87.00			B	0.207	2.571	0.592	0.825	1	1.796			
			C	0.207	2.571	0.592	0.825	1	1.796			
T2	27.81	685.64	A	0.269	2.382	0.607	0.825	1	9.018	604.68	30.23	A
87.00-67.00		TA 162.22	B	0.187	2.642	0.588	0.825	1	6.267			
			C	0.187	2.642	0.588	0.825	1	6.267			
T3	485.37	685.64	A	0.503	1.897	0.699	0.825	1	18.734	2274.36	113.72	C
67.00-47.00			B	0.331	2.216	0.626	0.825	1	11.296			
			C	0.892	1.913	0.976	0.825	1	46.028			
T4	727.44	685.89	A	0.542	1.851	0.72	0.825	1	20.788	2416.17*	120.81	C
47.00-27.00			B	0.573	1.823	0.737	0.825	1	22.433			
			C	1	2.1	1	0.825	1	55.227			
Sum Weight:	1246.02	2403.47			*2A _g limit					5457.00		

Tower Forces - No Ice - Wind 60 To Face

Section Elevation	Add Weight	Self Weight	F a c e	e	C _F	R _R	D _F	D _R	A _E	F	w	Ctrl. Face
ft	lb	lb							ft ²	lb	plf	
T1	5.40	184.08	A	0.27	2.38	0.607	0.8	1	2.297	160.62	32.12	A
92.00-87.00			B	0.207	2.571	0.592	0.8	1	1.778			
			C	0.207	2.571	0.592	0.8	1	1.778			
T2	27.81	685.64	A	0.269	2.382	0.607	0.8	1	8.974	601.72	30.09	A
87.00-67.00		TA 162.22	B	0.187	2.642	0.588	0.8	1	6.218			
			C	0.187	2.642	0.588	0.8	1	6.218			
T3	485.37	685.64	A	0.503	1.897	0.699	0.8	1	18.704	2274.04	113.70	C
67.00-47.00			B	0.331	2.216	0.626	0.8	1	11.256			
			C	0.892	1.913	0.976	0.8	1	46.022			
T4	727.44	685.89	A	0.542	1.851	0.72	0.8	1	20.760	2416.17*	120.81	C
47.00-27.00			B	0.573	1.823	0.737	0.8	1	22.407			
			C	1	2.1	1	0.8	1	55.227			
Sum Weight:	1246.02	2403.47			*2A _g limit					5452.54		

Tower Forces - No Ice - Wind 90 To Face

Section Elevation	Add Weight	Self Weight	F a c e	e	C _F	R _R	D _F	D _R	A _E	F	w	Ctrl. Face
ft	lb	lb							ft ²	lb	plf	
T1	5.40	184.08	A	0.27	2.38	0.607	0.85	1	2.331	162.99	32.60	A
92.00-87.00			B	0.207	2.571	0.592	0.85	1	1.814			
			C	0.207	2.571	0.592	0.85	1	1.814			
T2	27.81	685.64	A	0.269	2.382	0.607	0.85	1	9.062	607.63	30.38	A
87.00-67.00		TA 162.22	B	0.187	2.642	0.588	0.85	1	6.316			
			C	0.187	2.642	0.588	0.85	1	6.316			
T3	485.37	685.64	A	0.503	1.897	0.699	0.85	1	18.764	2274.68	113.73	C
67.00-47.00			B	0.331	2.216	0.626	0.85	1	11.336			
			C	0.892	1.913	0.976	0.85	1	46.035			

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Section Elevation	Add Weight	Self Weight	F a c e	e	C _F	R _R	D _F	D _R	A _E	F	w	Ctrl. Face
ft	lb	lb							ft ²	lb	plf	
T4 47.00-27.00	727.44	685.89	A B C	0.542 0.573 1	1.851 1.823 2.1 *2A _g limit	0.72 0.737 1	0.85 0.85 0.85	1 1 1	20.815 22.459 55.227	2416.17*	120.81	C
Sum Weight:	1246.02	2403.47								5461.46		

Tower Forces - With Ice - Wind Normal To Face

Section Elevation	Add Weight	Self Weight	F a c e	e	C _F	R _R	D _F	D _R	A _E	F	w	Ctrl. Face
ft	lb	lb							ft ²	lb	plf	
T1 92.00-87.00	15.23	260.86	A B C	0.482 0.386 0.386	1.924 2.092 2.092	0.689 0.646 0.646	1 1 1	1 1 1	4.726 3.663 3.663	200.42	40.08	A
T2 87.00-67.00	78.46	946.29 TA 246.87	A B C	0.478 0.347 0.347	1.93 2.179 2.179	0.687 0.631 0.631	1 1 1	1 1 1	18.420 12.671 12.671	750.47	37.52	A
T3 67.00-47.00	1407.56	946.29	A B C	0.759 0.556 1	1.791 1.838 2.1	0.864 0.727 1	1 1 1	1 1 1	37.293 25.173 67.649	2114.84*	105.74	C
T4 47.00-27.00	2139.58	946.77	A B C	0.803 0.904 1	1.819 1.929 2.1 *2A _g limit	0.899 0.987 1	1 1 1	1 1 1	40.742 49.029 77.976	1869.20*	93.46	C
Sum Weight:	3640.84	3347.09								4934.93		

Tower Forces - With Ice - Wind 45 To Face

Section Elevation	Add Weight	Self Weight	F a c e	e	C _F	R _R	D _F	D _R	A _E	F	w	Ctrl. Face
ft	lb	lb							ft ²	lb	plf	
T1 92.00-87.00	15.23	260.86	A B C	0.482 0.386 0.386	1.924 2.092 2.092	0.689 0.646 0.646	0.825 0.825 0.825	1 1 1	4.617 3.534 3.534	195.77	39.15	A
T2 87.00-67.00	78.46	946.29 TA 246.87	A B C	0.478 0.347 0.347	1.93 2.179 2.179	0.687 0.631 0.631	0.825 0.825 0.825	1 1 1	18.143 12.327 12.327	739.18	36.96	A
T3 67.00-47.00	1407.56	946.29	A B C	0.759 0.556 1	1.791 1.838 2.1	0.864 0.727 1	0.825 0.825 0.825	1 1 1	35.366 23.174 59.149	2114.84*	105.74	C
T4 47.00-27.00	2139.58	946.77	A B C	0.803 0.904 1	1.819 1.929 2.1 *2A _g limit	0.899 0.987 1	0.825 0.825 0.825	1 1 1	38.458 44.269 67.746	1869.20*	93.46	C
Sum Weight:	3640.84	3347.09								4918.99		

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Tower Forces - With Ice - Wind 60 To Face

Section Elevation	Add Weight	Self Weight	F a c e	e	C _F	R _R	D _F	D _R	A _E	F	w	Ctrl. Face
ft	lb	lb							ft ²	lb	plf	
T1 92.00-87.00	15.23	260.86	A	0.482	1.924	0.689	0.8	1	4.601	195.11	39.02	A
			B	0.386	2.092	0.646	0.8	1	3.515			
			C	0.386	2.092	0.646	0.8	1	3.515			
T2 87.00-67.00	78.46	946.29	A	0.478	1.93	0.687	0.8	1	18.103	737.56	36.88	A
		TA 246.87	B	0.347	2.179	0.631	0.8	1	12.278			
			C	0.347	2.179	0.631	0.8	1	12.278			
T3 67.00-47.00	1407.56	946.29	A	0.759	1.791	0.864	0.8	1	35.091	2114.84*	105.74	C
			B	0.556	1.838	0.727	0.8	1	22.888			
			C	1	2.1	1	0.8	1	57.935			
T4 47.00-27.00	2139.58	946.77	A	0.803	1.819	0.899	0.8	1	38.131	1869.20*	93.46	C
			B	0.904	1.929	0.987	0.8	1	43.589			
			C	1	2.1	1	0.8	1	66.284			
Sum Weight:	3640.84	3347.09			*2A _R limit					4916.71		

Tower Forces - With Ice - Wind 90 To Face

Section Elevation	Add Weight	Self Weight	F a c e	e	C _F	R _R	D _F	D _R	A _E	F	w	Ctrl. Face
ft	lb	lb							ft ²	lb	plf	
T1 92.00-87.00	15.23	260.86	A	0.482	1.924	0.689	0.85	1	4.632	196.44	39.29	A
			B	0.386	2.092	0.646	0.85	1	3.552			
			C	0.386	2.092	0.646	0.85	1	3.552			
T2 87.00-67.00	78.46	946.29	A	0.478	1.93	0.687	0.85	1	18.182	740.79	37.04	A
		TA 246.87	B	0.347	2.179	0.631	0.85	1	12.376			
			C	0.347	2.179	0.631	0.85	1	12.376			
T3 67.00-47.00	1407.56	946.29	A	0.759	1.791	0.864	0.85	1	35.641	2114.84*	105.74	C
			B	0.556	1.838	0.727	0.85	1	23.459			
			C	1	2.1	1	0.85	1	60.363			
T4 47.00-27.00	2139.58	946.77	A	0.803	1.819	0.899	0.85	1	38.784	1869.20*	93.46	C
			B	0.904	1.929	0.987	0.85	1	44.949			
			C	1	2.1	1	0.85	1	69.207			
Sum Weight:	3640.84	3347.09			*2A _R limit					4921.27		

Tower Forces - Service - Wind Normal To Face

Section Elevation	Add Weight	Self Weight	F a c e	e	C _F	R _R	D _F	D _R	A _E	F	w	Ctrl. Face
ft	lb	lb							ft ²	lb	plf	
T1 92.00-87.00	5.40	184.08	A	0.27	2.38	0.607	1	1	2.433	58.86	11.77	A
			B	0.207	2.571	0.592	1	1	1.925			
			C	0.207	2.571	0.592	1	1	1.925			
T2 87.00-67.00	27.81	685.64	A	0.269	2.382	0.607	1	1	9.326	216.39	10.82	A
		TA 162.22	B	0.187	2.642	0.588	1	1	6.610			
			C	0.187	2.642	0.588	1	1	6.610			

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Section Elevation	Add Weight	Self Weight	F a c e	e	C _F	R _R	D _F	D _R	A _E	F	w	Ctrl. Face
ft	lb	lb							ft ²	lb	plf	
T3 67.00-47.00	485.37	685.64	A	0.503	1.897	0.699	1	1	18.944	787.75	39.39	C
			B	0.331	2.216	0.626	1	1	11.578			
			C	0.892	1.913	0.976	1	1	46.074			
T4 47.00-27.00	727.44	685.89	A	0.542	1.851	0.72	1	1	20.981	836.04*	41.80	C
			B	0.573	1.823	0.737	1	1	22.613			
			C	1	2.1	1	1	1	55.227			
Sum Weight:	1246.02	2403.47			*2A _g limit					1899.04		

Tower Forces - Service - Wind 45 To Face

Section Elevation	Add Weight	Self Weight	F a c e	e	C _F	R _R	D _F	D _R	A _E	F	w	Ctrl. Face
ft	lb	lb							ft ²	lb	plf	
T1 92.00-87.00	5.40	184.08	A	0.27	2.38	0.607	0.825	1	2.314	55.99	11.20	A
			B	0.207	2.571	0.592	0.825	1	1.796			
			C	0.207	2.571	0.592	0.825	1	1.796			
T2 87.00-67.00	27.81	685.64 TA 162.22	A	0.269	2.382	0.607	0.825	1	9.018	209.23	10.46	A
			B	0.187	2.642	0.588	0.825	1	6.267			
			C	0.187	2.642	0.588	0.825	1	6.267			
T3 67.00-47.00	485.37	685.64	A	0.503	1.897	0.699	0.825	1	18.734	786.97	39.35	C
			B	0.331	2.216	0.626	0.825	1	11.296			
			C	0.892	1.913	0.976	0.825	1	46.028			
T4 47.00-27.00	727.44	685.89	A	0.542	1.851	0.72	0.825	1	20.788	836.04*	41.80	C
			B	0.573	1.823	0.737	0.825	1	22.433			
			C	1	2.1	1	0.825	1	55.227			
Sum Weight:	1246.02	2403.47			*2A _g limit					1888.24		

Tower Forces - Service - Wind 60 To Face

Section Elevation	Add Weight	Self Weight	F a c e	e	C _F	R _R	D _F	D _R	A _E	F	w	Ctrl. Face
ft	lb	lb							ft ²	lb	plf	
T1 92.00-87.00	5.40	184.08	A	0.27	2.38	0.607	0.8	1	2.297	55.58	11.12	A
			B	0.207	2.571	0.592	0.8	1	1.778			
			C	0.207	2.571	0.592	0.8	1	1.778			
T2 87.00-67.00	27.81	685.64 TA 162.22	A	0.269	2.382	0.607	0.8	1	8.974	208.21	10.41	A
			B	0.187	2.642	0.588	0.8	1	6.218			
			C	0.187	2.642	0.588	0.8	1	6.218			
T3 67.00-47.00	485.37	685.64	A	0.503	1.897	0.699	0.8	1	18.704	786.86	39.34	C
			B	0.331	2.216	0.626	0.8	1	11.256			
			C	0.892	1.913	0.976	0.8	1	46.022			
T4 47.00-27.00	727.44	685.89	A	0.542	1.851	0.72	0.8	1	20.760	836.04*	41.80	C
			B	0.573	1.823	0.737	0.8	1	22.407			
			C	1	2.1	1	0.8	1	55.227			
Sum Weight:	1246.02	2403.47			*2A _g limit					1886.69		

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Tower Forces - Service - Wind 90 To Face

Section Elevation	Add Weight	Self Weight	F a c e	e	C _F	R _R	D _F	D _R	A _E	F	w	Ctrl. Face
ft	lb	lb							ft ²	lb	plf	
T1	5.40	184.08	A	0.27	2.38	0.607	0.85	1	2.331	56.40	11.28	A
92.00-87.00			B	0.207	2.571	0.592	0.85	1	1.814			
			C	0.207	2.571	0.592	0.85	1	1.814			
T2	27.81	685.64	A	0.269	2.382	0.607	0.85	1	9.062	210.25	10.51	A
87.00-67.00		TA 162.22	B	0.187	2.642	0.588	0.85	1	6.316			
			C	0.187	2.642	0.588	0.85	1	6.316			
T3	485.37	685.64	A	0.503	1.897	0.699	0.85	1	18.764	787.09	39.35	C
67.00-47.00			B	0.331	2.216	0.626	0.85	1	11.336			
			C	0.892	1.913	0.976	0.85	1	46.035			
T4	727.44	685.89	A	0.542	1.851	0.72	0.85	1	20.815	836.04*	41.80	C
47.00-27.00			B	0.573	1.823	0.737	0.85	1	22.459			
			C	1	2.1	1	0.85	1	55.227			
Sum Weight:	1246.02	2403.47			*2A _R limit					1889.78		

Force Totals (Does not include forces on guys)

Load Case	Vertical Forces	Sum of Forces X	Sum of Forces Z	Sum of Torques
	lb	lb	lb	kip-ft
Leg Weight	1596.01			
Bracing Weight	807.45			
Total Member Self-Weight	2403.47			
Guy Weight	330.87			
Total Weight	8488.90			
Wind 0 deg - No Ice		-74.75	-12782.95	0.57
Wind 30 deg - No Ice		6313.00	-11009.79	1.36
Wind 45 deg - No Ice		8963.46	-8963.96	1.62
Wind 60 deg - No Ice		11001.45	-6308.89	1.78
Wind 90 deg - No Ice		12755.47	74.75	1.72
Wind 120 deg - No Ice		11107.12	6456.21	1.21
Wind 135 deg - No Ice		9069.18	9069.68	0.81
Wind 150 deg - No Ice		6442.47	11084.55	0.37
Wind 180 deg - No Ice		74.75	12747.25	-0.57
Wind 210 deg - No Ice		-6313.00	11009.79	-1.36
Wind 225 deg - No Ice		-8963.46	8963.96	-1.62
Wind 240 deg - No Ice		-11032.37	6326.74	-1.77
Wind 270 deg - No Ice		-12755.47	-74.75	-1.72
Wind 300 deg - No Ice		-11076.21	-6438.36	-1.21
Wind 315 deg - No Ice		-9069.18	-9069.68	-0.81
Wind 330 deg - No Ice		-6442.47	-11084.55	-0.37
Member Ice	943.62			
Guy Ice	289.63			
Total Weight Ice	14263.89			
Wind 0 deg - Ice		-56.56	-11384.28	0.54
Wind 30 deg - Ice		5635.44	-9818.96	1.05
Wind 45 deg - Ice		7997.39	-7998.64	1.20
Wind 60 deg - Ice		9813.49	-5634.05	1.27
Wind 90 deg - Ice		11368.85	56.56	1.15

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Load Case	Vertical Forces <i>lb</i>	Sum of Forces <i>X</i> <i>lb</i>	Sum of Forces <i>Z</i> <i>lb</i>	Sum of Torques <i>kip-ft</i>
Wind 120 deg - Ice		9885.82	5741.12	0.72
Wind 135 deg - Ice		8077.37	8078.62	0.43
Wind 150 deg - Ice		5733.41	9875.52	0.10
Wind 180 deg - Ice		56.56	11366.06	-0.55
Wind 210 deg - Ice		-5635.44	9818.96	-1.05
Wind 225 deg - Ice		-7997.39	7998.64	-1.20
Wind 240 deg - Ice		-9829.26	5643.16	-1.27
Wind 270 deg - Ice		-11368.85	-56.56	-1.15
Wind 300 deg - Ice		-9870.05	-5732.01	-0.72
Wind 315 deg - Ice		-8077.37	-8078.62	-0.43
Wind 330 deg - Ice		-5733.41	-9875.52	-0.10
Total Weight	8488.90			
Wind 0 deg - Service		-25.87	-4423.17	0.20
Wind 30 deg - Service		2184.43	-3809.62	0.47
Wind 45 deg - Service		3101.54	-3101.72	0.56
Wind 60 deg - Service		3806.73	-2183.01	0.62
Wind 90 deg - Service		4413.66	25.87	0.60
Wind 120 deg - Service		3843.29	2233.98	0.42
Wind 135 deg - Service		3138.12	3138.30	0.28
Wind 150 deg - Service		2229.23	3835.48	0.13
Wind 180 deg - Service		25.87	4410.81	-0.20
Wind 210 deg - Service		-2184.43	3809.62	-0.47
Wind 225 deg - Service		-3101.54	3101.72	-0.56
Wind 240 deg - Service		-3817.43	2189.18	-0.61
Wind 270 deg - Service		-4413.66	-25.87	-0.60
Wind 300 deg - Service		-3832.60	-2227.81	-0.42
Wind 315 deg - Service		-3138.12	-3138.30	-0.28
Wind 330 deg - Service		-2229.23	-3835.48	-0.13

Load Combinations

Comb. No.	Description
1	Dead Only
2	Dead+Wind 0 deg - No Ice+Guy
3	Dead+Wind 30 deg - No Ice+Guy
4	Dead+Wind 45 deg - No Ice+Guy
5	Dead+Wind 60 deg - No Ice+Guy
6	Dead+Wind 90 deg - No Ice+Guy
7	Dead+Wind 120 deg - No Ice+Guy
8	Dead+Wind 135 deg - No Ice+Guy
9	Dead+Wind 150 deg - No Ice+Guy
10	Dead+Wind 180 deg - No Ice+Guy
11	Dead+Wind 210 deg - No Ice+Guy
12	Dead+Wind 225 deg - No Ice+Guy
13	Dead+Wind 240 deg - No Ice+Guy
14	Dead+Wind 270 deg - No Ice+Guy
15	Dead+Wind 300 deg - No Ice+Guy
16	Dead+Wind 315 deg - No Ice+Guy
17	Dead+Wind 330 deg - No Ice+Guy
18	Dead+Ice+Temp+Guy
19	Dead+Wind 0 deg+Ice+Temp+Guy
20	Dead+Wind 30 deg+Ice+Temp+Guy
21	Dead+Wind 45 deg+Ice+Temp+Guy

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<i>Comb.</i> <i>No.</i>	<i>Description</i>
22	Dead+Wind 60 deg+Ice+Temp+Guy
23	Dead+Wind 90 deg+Ice+Temp+Guy
24	Dead+Wind 120 deg+Ice+Temp+Guy
25	Dead+Wind 135 deg+Ice+Temp+Guy
26	Dead+Wind 150 deg+Ice+Temp+Guy
27	Dead+Wind 180 deg+Ice+Temp+Guy
28	Dead+Wind 210 deg+Ice+Temp+Guy
29	Dead+Wind 225 deg+Ice+Temp+Guy
30	Dead+Wind 240 deg+Ice+Temp+Guy
31	Dead+Wind 270 deg+Ice+Temp+Guy
32	Dead+Wind 300 deg+Ice+Temp+Guy
33	Dead+Wind 315 deg+Ice+Temp+Guy
34	Dead+Wind 330 deg+Ice+Temp+Guy
35	Dead+Wind 0 deg - Service+Guy
36	Dead+Wind 30 deg - Service+Guy
37	Dead+Wind 45 deg - Service+Guy
38	Dead+Wind 60 deg - Service+Guy
39	Dead+Wind 90 deg - Service+Guy
40	Dead+Wind 120 deg - Service+Guy
41	Dead+Wind 135 deg - Service+Guy
42	Dead+Wind 150 deg - Service+Guy
43	Dead+Wind 180 deg - Service+Guy
44	Dead+Wind 210 deg - Service+Guy
45	Dead+Wind 225 deg - Service+Guy
46	Dead+Wind 240 deg - Service+Guy
47	Dead+Wind 270 deg - Service+Guy
48	Dead+Wind 300 deg - Service+Guy
49	Dead+Wind 315 deg - Service+Guy
50	Dead+Wind 330 deg - Service+Guy

Maximum Member Forces

<i>Section</i> <i>No.</i>	<i>Elevation</i> <i>ft</i>	<i>Component</i> <i>Type</i>	<i>Condition</i>	<i>Gov.</i> <i>Load</i> <i>Comb.</i>	<i>Force</i> <i>lb</i>	<i>Major Axis</i> <i>Moment</i> <i>kip-ft</i>	<i>Minor Axis</i> <i>Moment</i> <i>kip-ft</i>
T1	92 - 87	Leg	Max Tension	22	2544.89	0.03	-0.02
			Max. Compression	19	-2826.26	-0.01	-0.01
			Max. Mx	16	-1269.82	-0.16	0.03
			Max. My	27	-1042.21	0.02	0.16
			Max. Vy	29	-288.56	-0.01	0.00
		Diagonal	Max. Vx	26	376.24	-0.00	0.02
			Max Tension	34	649.62	0.00	0.00
			Max. Compression	34	-670.32	0.00	0.00
			Max. Mx	20	126.53	-0.00	0.00
			Max. My	17	-651.73	-0.00	0.00
		Horizontal	Max. Vy	20	1.02	-0.00	0.00
			Max. Vx	17	-0.19	-0.00	0.00
			Max Tension	30	40.19	0.00	0.00
			Max. Compression	32	-25.44	0.00	0.00
			Max. Mx	18	3.83	-0.00	0.00
		Top Girt	Max. My	20	5.06	0.00	0.00
			Max. Vy	18	3.54	0.00	0.00
			Max. Vx	20	-0.00	0.00	0.00
			Max Tension	30	35.95	0.00	0.00
			Max. Compression	32	-34.43	0.00	0.00
			Max. Mx	18	-0.56	-0.00	0.00
			Max. My	20	1.73	0.00	0.00
			Max. Vy	18	3.54	0.00	0.00
			Max. Vx	20	-0.00	0.00	0.00

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	Client	Verizon Wireless	Designed by	TJL

Section No.	Elevation ft	Component Type	Condition	Gov. Load Comb.	Force lb	Major Axis Moment kip-ft	Minor Axis Moment kip-ft
T2	87 - 67	Bottom Girt	Max Tension	27	44.70	0.00	0.00
			Max. Compression	7	-40.45	0.00	0.00
			Max. Mx	18	4.08	-0.00	0.00
			Max. Vy	18	3.54	0.00	0.00
			Max. Vx	20	-0.00	0.00	0.00
		Leg	Max Tension	7	7818.00	-0.03	0.02
			Max. Compression	10	-22399.34	0.02	0.06
			Max. Mx	32	-2154.21	-0.06	0.03
			Max. My	34	-7662.06	0.02	-0.09
			Max. Vy	7	-883.08	-0.03	0.02
			Max. Vx	10	-949.80	0.02	-0.02
		Diagonal	Max Tension	6	1591.02	0.00	0.00
			Max. Compression	6	-2063.86	0.00	0.00
			Max. Mx	27	360.78	-0.00	0.00
			Max. My	2	-486.27	-0.00	0.00
			Max. Vy	27	1.12	-0.00	0.00
			Max. Vx	2	-2.41	-0.00	0.00
		Horizontal	Max Tension	10	1397.41	0.00	0.00
			Max. Compression	19	-896.01	0.00	0.00
			Max. Mx	26	644.02	-0.00	0.00
			Max. My	31	404.95	0.00	-0.00
			Max. Vy	26	3.54	0.00	0.00
		Top Girt	Max. Vx	31	0.00	0.00	0.00
			Max Tension	30	26.67	0.00	0.00
			Max. Compression	32	-29.02	0.00	0.00
			Max. Mx	18	-2.14	-0.00	0.00
		Bottom Girt	Max. Vy	18	3.54	0.00	0.00
			Max. Vx	20	-0.00	0.00	0.00
			Max Tension	7	466.41	0.00	0.00
			Max. Compression	10	-108.49	0.00	0.00
			Max. Mx	28	389.71	-0.00	0.00
		Guy A	Max. My	31	192.25	0.00	-0.00
			Max. Vy	28	3.54	0.00	0.00
			Max. Vx	31	0.00	0.00	0.00
			Bottom Tension	27	6714.16		
			Top Tension	27	6784.09		
			Top Cable Vert	27	6091.10		
			Top Cable Norm	27	2987.03		
			Top Cable Tan	27	6.28		
			Bot Cable Vert	27	-5948.66		
			Bot Cable Norm	27	3113.41		
		Guy B	Bot Cable Tan	27	8.53		
			Bottom Tension	31	7890.81		
			Top Tension	31	7960.43		
			Top Cable Vert	31	7549.38		
			Top Cable Norm	31	2524.82		
			Top Cable Tan	31	22.80		
			Bot Cable Vert	31	-7429.62		
			Bot Cable Norm	31	2657.83		
			Bot Cable Tan	31	37.59		
		Guy C	Bottom Tension	22	7758.72		
			Top Tension	22	7828.43		
			Top Cable Vert	22	7367.14		
			Top Cable Norm	22	2647.58		
			Top Cable Tan	22	6.03		
			Bot Cable Vert	22	-7241.01		
			Bot Cable Norm	22	2786.63		
			Bot Cable Tan	22	14.25		
		Torque Arm Top	Max Tension	34	8127.73	0.00	0.00
			Max. Compression	1	0.00	0.00	0.00
			Max. Mx	34	6193.37	-0.01	0.00

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	Project	65-ft NUDD Guyed Tower - 265 Benham Street - Hamden, CT	Date	09:18:21 09/27/13
	Client	Verizon Wireless	Designed by	TJL

Section No.	Elevation ft	Component Type	Condition	Gov. Load Comb.	Force lb	Major Axis Moment kip-ft	Minor Axis Moment kip-ft
T3	67 - 47	Torque Arm Bottom	Max. My	20	3799.84	0.00	-0.00
			Max. Vy	34	7.33	0.00	0.00
			Max. Vx	20	-0.03	0.00	0.00
			Max Tension	12	445.11	0.00	0.00
			Max. Compression	31	-6072.27	0.00	0.00
			Max. Mx	23	-4991.93	-0.01	0.00
			Max. My	30	-3794.39	0.00	0.00
			Max. Vy	23	9.52	0.00	0.00
			Max. Vx	30	-0.00	0.00	0.00
			Max Tension	15	10211.23	-0.24	-0.15
		Leg	Max. Compression	19	-30652.12	0.00	-0.06
			Max. Mx	6	-11399.51	0.42	-0.00
			Max. My	10	-15082.25	0.00	0.42
			Max. Vy	14	-4225.80	0.11	0.01
			Max. Vx	10	4527.24	-0.00	-0.10
			Max Tension	16	3370.16	0.00	0.00
			Max. Compression	17	-3843.15	0.00	0.00
			Max. Mx	31	2919.43	-0.00	-0.00
			Max. My	31	-2136.52	-0.00	0.01
			Max. Vy	31	1.17	-0.00	-0.00
		Diagonal	Max. Vx	31	3.88	0.00	0.00
			Max Tension	7	1279.03	0.00	0.00
			Max. Compression	10	-546.30	0.00	0.00
			Max. Mx	29	926.67	-0.00	0.00
			Max. My	31	480.33	0.00	-0.00
			Max. Vy	29	3.54	0.00	0.00
			Max. Vx	31	0.00	0.00	0.00
			Max Tension	30	267.70	0.00	0.00
			Max. Compression	1	0.00	0.00	0.00
			Max. Mx	28	252.20	-0.00	0.00
		Horizontal	Max. My	31	220.31	0.00	-0.00
			Max. Vy	28	3.54	0.00	0.00
			Max. Vx	31	0.00	0.00	0.00
			Max Tension	2	1211.96	0.00	0.00
			Max. Compression	1	0.00	0.00	0.00
			Max. Mx	18	974.30	-0.00	0.00
			Max. My	31	1076.45	0.00	-0.00
			Max. Vy	18	3.54	0.00	0.00
			Max. Vx	31	0.00	0.00	0.00
			Max Tension	15	10209.85	0.11	0.05
T4	47 - 27	Leg	Max. Compression	19	-30652.04	0.00	0.25
			Max. Mx	14	-5324.00	0.47	0.17
			Max. My	10	-4826.11	-0.00	-0.48
			Max. Vy	14	-4227.18	0.47	0.17
			Max. Vx	10	4527.89	-0.00	-0.48
		Diagonal	Max Tension	15	910.93	0.00	0.00
			Max. Compression	31	-1691.13	0.00	0.00
			Max. Mx	31	-1501.16	-0.00	0.00
			Max. My	32	-586.93	-0.00	0.01
			Max. Vy	31	1.23	-0.00	0.00
			Max. Vx	32	5.58	0.00	0.00
			Max Tension	27	887.72	0.00	0.00
			Max. Compression	1	0.00	0.00	0.00
			Max. Mx	18	760.26	-0.00	0.00
			Max. My	31	645.05	0.00	-0.00
		Horizontal	Max. Vy	18	3.54	0.00	0.00
			Max. Vx	31	0.00	0.00	0.00
			Max Tension	2	4291.83	0.00	0.00
			Max. Compression	1	0.00	0.00	0.00
			Max. Mx	18	2416.02	-0.00	0.00
			Max. My	31	2605.92	0.00	-0.00

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	Client	Verizon Wireless	Designed by	TJL

Section No.	Elevation ft	Component Type	Condition	Gov. Load Comb.	Force lb	Major Axis Moment kip-ft	Minor Axis Moment kip-ft
		Bottom Girt	Max. Vy	18	3.54	0.00	0.00
			Max. Vx	31	0.00	0.00	0.00
			Max. Tension	2	51.83	0.00	0.00
			Max. Compression	1	0.00	0.00	0.00
			Max. Mx	18	28.15	-0.00	0.00
		Guy A	Max. My	14	11.18	0.00	-0.00
			Max. Vy	18	3.54	0.00	0.00
			Max. Vx	14	0.00	0.00	0.00
			Bottom Tension	27	12927.75		
			Top Tension	27	12963.94		
		Guy B	Top Cable Vert	27	7509.95		
			Top Cable Norm	27	10567.13		
			Top Cable Tan	27	0.09		
			Bot Cable Vert	27	-7420.36		
			Bot Cable Norm	27	10586.07		
		Guy C	Bot Cable Tan	27	0.09		
			Bottom Tension	32	16093.24		
			Top Tension	32	16129.38		
			Top Cable Vert	32	11675.97		
			Top Cable Norm	32	11127.83		
		Base Beam	Top Cable Tan	32	2.91		
			Bot Cable Vert	32	-11597.46		
			Bot Cable Norm	32	11157.56		
			Bot Cable Tan	32	2.91		
			Bottom Tension	22	15330.52		
			Top Tension	22	15366.67		
			Top Cable Vert	22	10718.82		
			Top Cable Norm	22	11010.97		
			Top Cable Tan	22	3.02		
			Bot Cable Vert	22	-10638.38		
			Bot Cable Norm	22	11038.56		
			Bot Cable Tan	22	3.02		
			Max. Tension	32	994.26	-24.69	-0.01
			Max. Compression	1	0.00	0.00	0.00
			Max. Mx	19	-19004.58	-27.42	0.00
			Max. My	23	-17246.88	-24.88	-0.16
			Max. Vy	19	-19004.58	-27.42	0.00
			Max. Vx	23	-112.26	-24.88	-0.16

Maximum Reactions

Location	Condition	Gov. Load Comb.	Vertical lb	Horizontal, X lb	Horizontal, Z lb
Guy C @ 20.92 ft Elev 28 ft Azimuth 240 deg	Max. Vert	13	-1170.90	-310.42	187.60
	Max. H _x	13	-1170.90	-310.42	187.60
	Max. H _z	22	-24780.82	-14247.84	8206.51
	Min. Vert	22	-24780.82	-14247.84	8206.51
	Min. H _x	22	-24780.82	-14247.84	8206.51
Guy B @ 19.5 ft Elev 28 ft Azimuth 120 deg	Min. H _z	13	-1170.90	-310.42	187.60
	Max. Vert	7	-1378.03	345.93	206.59
	Max. H _x	32	-26280.33	14182.32	8179.41
	Max. H _z	32	-26280.33	14182.32	8179.41

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Location	Condition	Gov. Load Comb.	Vertical lb	Horizontal, X lb	Horizontal, Z lb
Guy A @ 28.2 ft Elev 28 ft Azimuth 0 deg	Min. Vert	32	-26280.33	14182.32	8179.41
	Min. H _x	7	-1378.03	345.93	206.59
	Min. H _z	7	-1378.03	345.93	206.59
	Max. Vert	2	-633.01	0.99	-296.84
Mast	Max. H _x	31	-9803.20	252.36	-8337.13
	Max. H _z	2	-633.01	0.99	-296.84
	Min. Vert	27	-19138.70	-8.50	-16696.35
	Min. H _x	23	-10131.58	-249.97	-8581.41
	Min. H _z	27	-19138.70	-8.50	-16696.35
	Max. Vert	19	56978.17	-38.98	-665.58
	Max. H _x	23	51722.64	694.43	8.02
	Max. H _z	27	49290.02	24.88	269.40
	Max. M _x	1	0.00	-11.60	-51.34
	Max. M _z	1	0.00	-11.60	-51.34
	Max. Torsion	1	0.00	-11.60	-51.34
	Min. Vert	43	39292.17	-2.79	-84.53
	Min. H _x	31	52424.82	-724.05	-42.12
	Min. H _z	19	56978.17	-38.98	-665.58
	Min. M _x	1	0.00	-11.60	-51.34
	Min. M _z	1	0.00	-11.60	-51.34
	Min. Torsion	1	0.00	-11.60	-51.34

Tower Mast Reaction Summary

Load Combination	Vertical lb	Shear _x lb	Shear _z lb	Overturning Moment, M _x kip-ft	Overturning Moment, M _z kip-ft	Torque kip-ft
Dead Only	39408.89	11.60	51.34	0.00	0.00	0.00
Dead+Wind 0 deg - No Ice+Guy	50362.69	52.68	23.68	0.00	0.00	0.00
Dead+Wind 30 deg - No Ice+Guy	45889.80	-73.21	-38.49	0.00	0.00	0.00
Dead+Wind 45 deg - No Ice+Guy	42446.52	-130.48	-5.37	0.00	0.00	0.00
Dead+Wind 60 deg - No Ice+Guy	40907.42	-180.58	27.95	0.00	0.00	0.00
Dead+Wind 90 deg - No Ice+Guy	43801.52	-69.13	131.34	0.00	0.00	0.00
Dead+Wind 120 deg - No Ice+Guy	45564.91	21.53	211.24	0.00	0.00	0.00
Dead+Wind 135 deg - No Ice+Guy	44292.67	55.23	223.10	0.00	0.00	0.00
Dead+Wind 150 deg - No Ice+Guy	42186.75	29.84	194.08	0.00	0.00	0.00
Dead+Wind 180 deg - No Ice+Guy	39553.05	-13.60	129.26	0.00	0.00	0.00
Dead+Wind 210 deg - No Ice+Guy	42264.97	-45.65	218.03	0.00	0.00	0.00
Dead+Wind 225 deg - No Ice+Guy	44643.22	-49.47	254.12	0.00	0.00	0.00
Dead+Wind 240 deg - No Ice+Guy	46193.76	8.30	247.31	0.00	0.00	0.00
Dead+Wind 270 deg - No Ice+Guy	44572.43	112.07	182.70	0.00	0.00	0.00
Dead+Wind 300 deg - No Ice+Guy	41186.69	246.80	77.75	0.00	0.00	0.00

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<i>Load Combination</i>	<i>Vertical</i>	<i>Shear_x</i>	<i>Shear_y</i>	<i>Overturning Moment, M_x</i>	<i>Overturning Moment, M_y</i>	<i>Torque</i>
	<i>lb</i>	<i>lb</i>	<i>lb</i>	<i>kip-ft</i>	<i>kip-ft</i>	<i>kip-ft</i>
Ice+Guy						
Dead+Wind 315 deg - No	43123.70	205.68	33.08	0.00	0.00	0.00
Ice+Guy						
Dead+Wind 330 deg - No	46679.59	161.82	8.12	0.00	0.00	0.00
Ice+Guy						
Dead+Ice+Temp+Guy	47784.25	-7.12	8.03	0.00	0.00	0.00
Dead+Wind 0	56978.17	38.98	665.58	0.00	0.00	0.00
deg+Ice+Temp+Guy						
Dead+Wind 30	53825.68	-270.58	561.62	0.00	0.00	0.00
deg+Ice+Temp+Guy						
Dead+Wind 45	51846.91	-415.77	442.09	0.00	0.00	0.00
deg+Ice+Temp+Guy						
Dead+Wind 60	50992.17	-551.08	260.39	0.00	0.00	0.00
deg+Ice+Temp+Guy						
Dead+Wind 90	51722.64	-694.43	-8.02	0.00	0.00	0.00
deg+Ice+Temp+Guy						
Dead+Wind 120	52784.73	-596.91	-141.04	0.00	0.00	0.00
deg+Ice+Temp+Guy						
Dead+Wind 135	51801.80	-502.60	-198.63	0.00	0.00	0.00
deg+Ice+Temp+Guy						
Dead+Wind 150	50304.05	-399.18	-255.55	0.00	0.00	0.00
deg+Ice+Temp+Guy						
Dead+Wind 180	49290.02	-24.88	-269.40	0.00	0.00	0.00
deg+Ice+Temp+Guy						
Dead+Wind 210	50457.40	368.34	-234.80	0.00	0.00	0.00
deg+Ice+Temp+Guy						
Dead+Wind 225	52151.28	489.14	-169.11	0.00	0.00	0.00
deg+Ice+Temp+Guy						
Dead+Wind 240	53311.66	605.18	-106.00	0.00	0.00	0.00
deg+Ice+Temp+Guy						
Dead+Wind 270	52424.82	724.05	42.12	0.00	0.00	0.00
deg+Ice+Temp+Guy						
Dead+Wind 300	51342.13	602.99	321.85	0.00	0.00	0.00
deg+Ice+Temp+Guy						
Dead+Wind 315	52325.89	472.84	503.89	0.00	0.00	0.00
deg+Ice+Temp+Guy						
Dead+Wind 330	54428.41	336.93	605.49	0.00	0.00	0.00
deg+Ice+Temp+Guy						
Dead+Wind 0 deg - Service+Guy	39594.03	21.43	20.24	0.00	0.00	0.00
Dead+Wind 30 deg - Service+Guy	39583.45	-13.04	19.63	0.00	0.00	0.00
Dead+Wind 45 deg - Service+Guy	39565.98	-28.84	23.90	0.00	0.00	0.00
Dead+Wind 60 deg - Service+Guy	39539.65	-40.96	29.46	0.00	0.00	0.00
Dead+Wind 90 deg - Service+Guy	39464.63	-55.02	44.41	0.00	0.00	0.00
Dead+Wind 120 deg - Service+Guy	39382.21	-52.72	59.82	0.00	0.00	0.00
Dead+Wind 135 deg - Service+Guy	39346.17	-40.92	68.97	0.00	0.00	0.00
Dead+Wind 150 deg - Service+Guy	39318.41	-29.03	75.40	0.00	0.00	0.00
Dead+Wind 180 deg - Service+Guy	39292.17	2.79	84.53	0.00	0.00	0.00
Dead+Wind 210 deg - Service+Guy	39310.35	36.98	83.90	0.00	0.00	0.00
Dead+Wind 225 deg - Service+Guy	39334.94	51.74	81.00	0.00	0.00	0.00
Dead+Wind 240 deg -	39368.09	67.30	74.65	0.00	0.00	0.00

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Load Combination	Vertical lb	Shear _x lb	Shear _y lb	Overturning Moment, M _x kip-ft	Overturning Moment, M _y kip-ft	Torque kip-ft
Service+Guy						
Dead+Wind 270 deg -	39449.84	79.00	61.29	0.00	0.00	0.00
Service+Guy						
Dead+Wind 300 deg -	39527.93	74.44	43.89	0.00	0.00	0.00
Service+Guy						
Dead+Wind 315 deg -	39556.39	66.25	35.59	0.00	0.00	0.00
Service+Guy						
Dead+Wind 330 deg -	39576.36	54.06	28.19	0.00	0.00	0.00
Service+Guy						

Solution Summary

Load Comb.	Sum of Applied Forces			Sum of Reactions			% Error
	PX lb	PY lb	PZ lb	PX lb	PY lb	PZ lb	
1	-0.00	-8488.86	-0.00	-1.62	8489.14	-3.74	0.048%
2	-76.82	-8483.60	-13301.08	76.81	8483.53	13298.33	0.017%
3	6582.68	-8477.11	-11458.55	-6583.87	8477.04	11452.92	0.037%
4	9349.49	-8473.35	-9331.06	-9350.53	8473.32	9328.83	0.016%
5	11478.85	-8474.26	-6568.87	-11477.82	8474.24	6564.28	0.030%
6	13312.44	-8491.68	76.48	-13309.71	8491.64	-73.95	0.024%
7	11587.56	-8508.28	6720.34	-11583.26	8508.23	-6717.91	0.031%
8	9458.99	-8508.32	9441.05	-9454.14	8508.27	-9438.93	0.033%
9	6716.23	-8503.43	11536.91	-6712.79	8503.41	-11535.85	0.023%
10	76.82	-8494.12	13265.39	-77.27	8494.10	-13259.23	0.039%
11	-6582.68	-8500.61	11458.55	6578.79	8500.59	-11457.38	0.026%
12	-9349.49	-8504.38	9331.06	9343.18	8504.32	-9328.22	0.044%
13	-11509.65	-8503.60	6586.67	11503.66	8503.52	-6583.13	0.044%
14	-13312.44	-8486.04	-76.48	13308.12	8485.98	80.46	0.037%
15	-11556.65	-8469.44	-6702.49	11556.03	8469.43	6699.16	0.021%
16	-9458.99	-8469.41	-9441.05	9460.50	8469.36	9437.33	0.025%
17	-6716.23	-8474.29	-11536.91	6717.74	8474.20	11529.55	0.048%
18	-0.00	-14263.81	-0.00	-0.97	14263.82	-4.46	0.032%
19	-60.55	-14250.82	-12435.12	60.58	14250.62	12435.01	0.001%
20	6181.77	-14239.47	-10729.26	-6181.35	14239.35	10730.30	0.006%
21	8778.85	-14233.08	-8743.35	-8779.12	14233.06	8743.46	0.002%
22	10779.43	-14235.52	-6161.50	-10779.59	14235.48	6161.42	0.001%
23	12495.28	-14269.60	59.92	-12496.09	14269.61	-60.39	0.005%
24	10857.69	-14302.02	6276.59	-10858.36	14301.92	-6277.00	0.004%
25	8866.19	-14302.65	8831.57	-8866.86	14302.57	-8831.89	0.004%
26	6287.63	-14293.95	10792.76	-6287.82	14293.92	-10793.11	0.002%
27	60.55	-14276.80	12416.90	-61.46	14276.78	-12411.53	0.029%
28	-6181.77	-14288.15	10729.26	6181.84	14288.13	-10729.64	0.002%
29	-8778.85	-14294.54	8743.35	8779.48	14294.46	-8743.70	0.004%
30	-10795.21	-14292.11	6170.61	10795.76	14292.00	-6171.02	0.004%
31	-12495.28	-14258.02	-59.92	12495.84	14257.90	59.22	0.005%
32	-10841.91	-14225.61	-6267.48	10842.14	14225.57	6267.45	0.001%
33	-8866.19	-14224.98	-8831.57	8866.39	14224.94	8831.53	0.001%
34	-6287.63	-14233.68	-10792.76	6287.19	14233.55	10793.74	0.006%
35	-26.58	-8487.04	-4602.45	26.19	8487.03	4593.30	0.095%
36	2277.74	-8484.80	-3964.90	-2274.33	8484.79	3957.23	0.087%
37	3235.12	-8483.49	-3228.74	-3232.53	8483.49	3225.39	0.044%
38	3971.92	-8483.81	-2272.96	-3968.58	8483.81	2270.30	0.044%
39	4606.38	-8489.84	26.46	-4602.02	8489.84	-27.09	0.046%
40	4009.54	-8495.58	2325.38	-4005.86	8495.58	-2324.34	0.040%
41	3273.01	-8495.59	3266.80	-3268.02	8495.59	-3264.21	0.058%
42	2323.95	-8493.90	3992.01	-2320.62	8493.90	-3989.35	0.044%
43	26.58	-8490.68	4590.10	-26.85	8490.68	-4587.45	0.028%

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Load Comb.	Sum of Applied Forces			Sum of Reactions			% Error
	PX lb	PY lb	PZ lb	PX lb	PY lb	PZ lb	
44	-2277.74	-8492.93	3964.90	2273.90	8492.92	-3962.21	0.049%
45	-3235.12	-8494.23	3228.74	3229.56	8494.23	-3226.06	0.064%
46	-3982.62	-8493.92	2279.14	3978.44	8493.91	-2278.10	0.045%
47	-4606.38	-8487.89	-26.46	4601.11	8487.89	25.56	0.055%
48	-3998.84	-8482.14	-2319.20	3994.49	8482.14	2316.17	0.055%
49	-3273.01	-8482.13	-3266.80	3269.46	8482.13	3263.11	0.053%
50	-2323.95	-8483.82	-3992.01	2321.27	8483.82	3988.00	0.050%

Non-Linear Convergence Results

Load Combination	Converged?	Number of Cycles	Displacement Tolerance	Force Tolerance
1	Yes	8	0.00000001	0.00036172
2	Yes	21	0.00096157	0.00042809
3	Yes	17	0.00088937	0.00031457
4	Yes	15	0.00097244	0.00031648
5	Yes	9	0.00080358	0.00050564
6	Yes	15	0.00090438	0.00022707
7	Yes	16	0.00087966	0.00019051
8	Yes	15	0.00094893	0.00017446
9	Yes	14	0.00086350	0.00010603
10	Yes	6	0.00089631	0.00049651
11	Yes	14	0.00084782	0.00011723
12	Yes	15	0.00095441	0.00023364
13	Yes	16	0.00092144	0.00027288
14	Yes	15	0.00099678	0.00035070
15	Yes	10	0.00079891	0.00038908
16	Yes	15	0.00098682	0.00043701
17	Yes	17	0.00095165	0.00036916
18	Yes	5	0.00000001	0.00022556
19	Yes	23	0.00094048	0.00093232
20	Yes	30	0.00099225	0.00064453
21	Yes	25	0.00097081	0.00037939
22	Yes	26	0.00098536	0.00038225
23	Yes	33	0.00098225	0.00043718
24	Yes	30	0.00089865	0.00053945
25	Yes	33	0.00097955	0.00048766
26	Yes	27	0.00098187	0.00029300
27	Yes	8	0.00099585	0.00049564
28	Yes	26	0.00097038	0.00029455
29	Yes	32	0.00097096	0.00051283
30	Yes	29	0.00083137	0.00055965
31	Yes	33	0.00086433	0.00055042
32	Yes	23	0.00094784	0.00047351
33	Yes	22	0.00096022	0.00048333
34	Yes	28	0.00095301	0.00069986
35	Yes	5	0.00000001	0.00044934
36	Yes	5	0.00000001	0.00088050
37	Yes	6	0.00000001	0.00068578
38	Yes	6	0.00000001	0.00079378
39	Yes	6	0.00000001	0.00084098
40	Yes	6	0.00000001	0.00063915
41	Yes	5	0.00000001	0.00078749
42	Yes	5	0.00000001	0.00051217
43	Yes	5	0.00000001	0.00021366
44	Yes	5	0.00000001	0.00062250

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45	Yes	5	0.00000001	0.00092054
46	Yes	6	0.00000001	0.00073985
47	Yes	6	0.00000001	0.00094769
48	Yes	6	0.00000001	0.00086385
49	Yes	6	0.00000001	0.00072387
50	Yes	6	0.00000001	0.00056541

Maximum Tower Deflections - Service Wind

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
T1	92 - 87	0.823	48	0.0352	0.0795
T2	87 - 67	0.785	48	0.0341	0.0785
T3	67 - 47	0.634	49	0.0595	0.1578
T4	47 - 27	0.249	49	0.0758	0.2184

Critical Deflections and Radius of Curvature - Service Wind

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
91.00	17' x 3" Dia Omni	48	0.815	0.0348	0.0789	24150
81.25	Guy	48	0.751	0.0377	0.0891	72796
80.00	3' Pipe Brace	48	0.745	0.0392	0.0928	109629
76.50	8' x 3" Dia Omni	48	0.725	0.0443	0.1094	29149
69.00	21-ft 8-Bay Dipole	48	0.660	0.0566	0.1484	11616
63.50	DB844G65ZAXY	49	0.579	0.0638	0.1720	13286
62.50	Rohn 6' x 12' Boom Gate (1)	49	0.561	0.0648	0.1757	14530
56.00	DC6-48-60-18-8F Surge Arrestor	49	0.431	0.0701	0.1955	40179
54.50	(2) AM-X-CD-16-65-00T-RET(72")	49	0.399	0.0711	0.1994	67809
46.92	Guy	49	0.247	0.0758	0.2186	16638

Maximum Tower Deflections - Design Wind

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
T1	92 - 87	2.950	19	0.1722	0.2991
T2	87 - 67	2.766	19	0.1675	0.2962
T3	67 - 47	2.224	2	0.2197	0.5385
T4	47 - 27	0.990	2	0.2712	0.6985

Critical Deflections and Radius of Curvature - Design Wind

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Elevation	Appurtenance	Gov. Load Comb.	Deflection	Tilt	Twist	Radius of Curvature
ft			in	°	°	ft
91.00	17' x 3" Dia Omni	19	2.912	0.1708	0.2975	9295
81.25	Guy	2	2.612	0.1744	0.3434	41774
80.00	3' Pipe Brace	2	2.587	0.1775	0.3585	49037
76.50	8' x 3" Dia Omni	2	2.516	0.1879	0.4056	10532
69.00	21-ft 8-Bay Dipole	2	2.305	0.2136	0.5128	4051
63.50	DB844G65ZAXY	2	2.051	0.2284	0.5770	4491
62.50	Rohn 6' x 12' Boom Gate (1)	2	1.995	0.2304	0.5867	4942
56.00	DC6-48-60-18-8F Surge Arrestor	2	1.585	0.2406	0.6390	15003
54.50	(2) AM-X-CD-16-65-00T-RET(72")	2	1.484	0.2424	0.6493	25638
46.92	Guy	2	0.985	0.2716	0.6990	5384

Bolt Design Data

Section No.	Elevation	Component Type	Bolt Grade	Bolt Size	Number Of Bolts	Maximum Load per Bolt	Allowable Load	Ratio Load Allowable	Allowable Ratio	Criteria
	ft			in		lb	lb			
T1	92	Leg	A325N	0.875	1	1651.62	26457.50	0.062 ✓	1.333	Bolt Tension
T2	87	Leg	A325N	0.875	1	2544.07	26449.80	0.096 ✓	1.333	Bolt Tension
T3	67	Leg	A325N	0.875	1	7817.32	26386.40	0.296 ✓	1.333	Bolt Tension
T4	47	Leg	A325N	0.875	1	10209.80	24441.70	0.418 ✓	1.333	Bolt Tension

Guy Design Data

Section No.	Elevation	Size	Initial Tension	Breaking Load	Actual T	Allowable T _a	Required S.F.	Actual S.F.
	ft		lb	lb	lb	lb		
T2	81.25 (A) (244)	9/16 EHS	3500.00	35000.04	6784.09	17500.00	2.000	5.159 ✓
	81.25 (A) (245)	9/16 EHS	3500.00	35000.04	6583.09	17500.00	2.000	5.317 ✓
	81.25 (B) (238)	9/16 EHS	3500.00	35000.04	7960.43	17500.00	2.000	4.397 ✓
	81.25 (B) (239)	9/16 EHS	3500.00	35000.04	7806.70	17500.00	2.000	4.483 ✓
	81.25 (C) (232)	9/16 EHS	3500.00	35000.04	7465.39	17500.00	2.000	4.688 ✓
	81.25 (C) (233)	9/16 EHS	3500.00	35000.04	7828.43	17500.00	2.000	4.471 ✓
T4	46.92 (A) (252)	3/4 EHS	5830.00	58299.91	12963.90	29150.00	2.000	4.497 ✓
	46.92 (B) (251)	3/4 EHS	5830.00	58299.91	16129.40	29150.00	2.000	3.615 ✓
	46.92 (C) (250)	3/4 EHS	5830.00	58299.91	15366.70	29150.00	2.000	3.794 ✓

Compression Checks

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Leg Design Data (Compression)

Section No.	Elevation ft	Size	L ft	L _u ft	Kl/r	Mast Stability Index	F _a ksi	A in ²	Actual P lb	Allow. P _a lb	Ratio P P _a
T1	92 - 87	1 3/4	5.00	2.46	67.4 K=1.00	1.00	21.409	2.405	-2826.26	51495.40	0.055 ✓
T2	87 - 67	1 3/4	20.00	2.83	77.7 K=1.00	1.00	19.465	2.405	-22399.30	46819.90	0.478 ✓
T3	67 - 47	1 3/4	20.00	2.83	77.7 K=1.00	1.00	19.465	2.405	-30652.10	46819.90	0.655 ✓
T4	47 - 27	1 3/4	20.00	2.85	78.0 K=1.00	1.00	19.401	2.405	-30652.00	46665.30	0.657 ✓

Diagonal Design Data (Compression)

Section No.	Elevation ft	Size	L ft	L _u ft	Kl/r	F _a ksi	A in ²	Actual P lb	Allow. P _a lb	Ratio P P _a
T1	92 - 87	1/2	3.51	1.65	79.2 K=0.50	15.440	0.196	-670.32	3031.57	0.221 ✓
T2	87 - 67	1/2	3.78	1.78	82.5 K=0.48	15.073	0.196	-2063.86	2959.56	0.697 ✓
T3	67 - 47	1/2	3.78	1.78	82.5 K=0.48	15.073	0.196	-3843.15	2959.56	1.299 ✓
T4	47 - 27	1/2	3.79	1.78	82.6 K=0.48	15.063	0.196	-1691.13	2957.62	0.572 ✓

Horizontal Design Data (Compression)

Section No.	Elevation ft	Size	L ft	L _u ft	Kl/r	F _a ksi	A in ²	Actual P lb	Allow. P _a lb	Ratio P P _a
T1	92 - 87	L1 1/4x1 1/4x3/16	2.50	2.35	118.0 K=1.02	10.571	0.434	-25.44	4583.43	0.006 ✓
T2	87 - 67	L1 1/4x1 1/4x3/16	2.50	2.35	118.0 K=1.02	10.571	0.434	-896.01	4583.43	0.195 ✓
T3	67 - 47	L1 1/4x1 1/4x3/16	2.50	2.35	118.0 K=1.02	10.571	0.434	-546.30	4583.43	0.119 ✓

Top Girt Design Data (Compression)

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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 P P _a
T1	92 - 87	L1 1/4x1 1/4x3/16	2.50	2.35	118.0 K=1.02	10.571	0.434	-34.43	4583.43	0.008 ✓
T2	87 - 67	L1 1/4x1 1/4x3/16	2.50	2.35	118.0 K=1.02	10.571	0.434	-29.02	4583.43	0.006 ✓

Bottom Girt Design Data (Compression)

Section No.	Elevation ft	Size	L ft	L _u ft	Kl/r	F _a ksi	A in ²	Actual P lb	Allow. P _a lb	Ratio P P _a
T1	92 - 87	L1 1/4x1 1/4x3/16	2.50	2.35	118.0 K=1.02	10.571	0.434	-40.45	4583.43	0.009 ✓
T2	87 - 67	L1 1/4x1 1/4x3/16	2.50	2.35	118.0 K=1.02	10.571	0.434	-108.49	4583.43	0.024 ✓

Torque-Arm Bottom 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 P P _a
T2	87 - 67 (236)	L3x3x1/4	2.50	2.43	84.6 K=1.72	14.836	1.440	-5462.56	21363.20	0.256 ✓
T2	87 - 67 (237)	L3x3x1/4	2.50	2.43	84.6 K=1.72	14.836	1.440	-4952.07	21363.20	0.232 ✓
T2	87 - 67 (242)	L3x3x1/4	2.50	2.43	84.6 K=1.72	14.836	1.440	-6072.27	21363.20	0.284 ✓
T2	87 - 67 (243)	L3x3x1/4	2.50	2.43	84.6 K=1.72	14.836	1.440	-5943.67	21363.20	0.278 ✓
T2	87 - 67 (248)	L3x3x1/4	2.50	2.43	84.6 K=1.72	14.836	1.440	-5673.51	21363.20	0.266 ✓
T2	87 - 67 (249)	L3x3x1/4	2.50	2.43	84.6 K=1.72	14.836	1.440	-4956.85	21363.20	0.232 ✓

Tension Checks

Leg Design Data (Tension)

Section No.	Elevation ft	Size	L ft	L _u ft	Kl/r	F _a ksi	A in ²	Actual P lb	Allow. P _a lb	Ratio P P _a
T1	92 - 87	1 3/4	5.00	2.46	67.4	30.000	2.405	2544.89	72158.50	0.035 ✓
T2	87 - 67	1 3/4	20.00	2.83	77.7	30.000	2.405	7818.00	72158.50	0.108

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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 P P _a
T3	67 - 47	1 3/4	20.00	2.83	77.7	30.000	2.405	10211.20	72158.50	0.142 ✓
T4	47 - 27	1 3/4	20.00	2.85	78.0	30.000	2.405	10209.80	72158.50	0.141 ✓

Diagonal Design Data (Tension)

Section No.	Elevation ft	Size	L ft	L _u ft	Kl/r	F _a ksi	A in ²	Actual P lb	Allow. P _a lb	Ratio P P _a
T1	92 - 87	1/2	3.51	1.65	158.5	21.600	0.196	649.62	4241.15	0.153 ✓
T2	87 - 67	1/2	3.78	1.78	170.8	21.600	0.196	1591.02	4241.15	0.375 ✓
T3	67 - 47	1/2	3.78	1.78	170.8	21.600	0.196	3370.16	4241.15	0.795 ✓
T4	47 - 27	1/2	3.79	1.78	171.2	21.600	0.196	910.93	4241.15	0.215 ✓

Horizontal Design Data (Tension)

Section No.	Elevation ft	Size	L ft	L _u ft	Kl/r	F _a ksi	A in ²	Actual P lb	Allow. P _a lb	Ratio P P _a
T1	92 - 87	L1 1/4x1 1/4x3/16	2.50	2.35	75.0	21.600	0.434	40.19	9365.63	0.004 ✓
T2	87 - 67	L1 1/4x1 1/4x3/16	2.50	2.35	75.0	21.600	0.434	1397.41	9365.63	0.149 ✓
T3	67 - 47	L1 1/4x1 1/4x3/16	2.50	2.35	75.0	21.600	0.434	1279.03	9365.63	0.137 ✓
T4	47 - 27	L1 1/4x1 1/4x3/16	2.50	2.35	75.0	21.600	0.434	761.18	9365.63	0.081 ✓

* DL controls

Top Girt Design Data (Tension)

Section No.	Elevation ft	Size	L ft	L _u ft	Kl/r	F _a ksi	A in ²	Actual P lb	Allow. P _a lb	Ratio P P _a
T1	92 - 87	L1 1/4x1 1/4x3/16	2.50	2.35	75.0	21.600	0.434	35.95	9365.63	0.004 ✓
T2	87 - 67	L1 1/4x1 1/4x3/16	2.50	2.35	75.0	21.600	0.434	26.67	9365.63	0.003 ✓

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	Project 65-ft NUDD Guyed Tower - 265 Benham Street - Hamden, CT Client Verizon Wireless	Date 09:18:21 09/27/13 Designed by TJL

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 $\frac{P}{P_a}$
T3	67 - 47	L1 1/4x1 1/4x3/16	2.50	2.35	75.0	21.600	0.434	267.70	9365.63	0.029 ✓
T4	47 - 27	L1 1/4x1 1/4x3/16	2.50	2.35	75.0	21.600	0.434	4291.83	9365.63	0.458 ✓

Bottom Girt Design Data (Tension)

Section No.	Elevation ft	Size	L ft	L _u ft	Kl/r	F _a ksi	A in ²	Actual P lb	Allow. P _a lb	Ratio $\frac{P}{P_a}$
T1	92 - 87	L1 1/4x1 1/4x3/16	2.50	2.35	75.0	21.600	0.434	44.70	9365.63	0.005 ✓
T2	87 - 67	L1 1/4x1 1/4x3/16	2.50	2.35	75.0	21.600	0.434	466.41	9365.63	0.050 ✓
T3	67 - 47	L1 1/4x1 1/4x3/16	2.50	2.35	75.0	21.600	0.434	992.55	9365.63	0.106 ✓
T4	47 - 27	L1 1/4x1 1/4x3/16	2.50	2.35	75.0	21.600	0.434	51.83	9365.63	0.006 ✓

* DL controls

Torque-Arm Top 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 $\frac{P}{P_a}$
T2	87 - 67 (234)	L2x2x5/16	3.78	3.67	73.2	21.600	1.150	7796.19	24840.00	0.314 ✓
T2	87 - 67 (235)	L2x2x5/16	3.78	3.67	73.2	21.600	1.150	6825.17	24840.00	0.275 ✓
T2	87 - 67 (240)	L2x2x5/16	3.78	3.67	73.2	21.600	1.150	8127.73	24840.00	0.327 ✓
T2	87 - 67 (241)	L2x2x5/16	3.78	3.67	73.2	21.600	1.150	7496.56	24840.00	0.302 ✓
T2	87 - 67 (246)	L2x2x5/16	3.78	3.67	73.2	21.600	1.150	8015.56	24840.00	0.323 ✓
T2	87 - 67 (247)	L2x2x5/16	3.78	3.67	73.2	21.600	1.150	6492.48	24840.00	0.261 ✓

Torque-Arm Bottom Design Data

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	Project 65-ft NUDD Guyed Tower - 265 Benham Street - Hamden, CT Client Verizon Wireless	Date 09:18:21 09/27/13 Designed by TJL

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 $\frac{P}{P_a}$
T2	87 - 67 (236)	L3x3x1/4	2.50	2.43	31.3	21.600	1.440	445.11	31104.00	0.014
T2	87 - 67 (237)	L3x3x1/4	2.50	2.43	31.3	21.600	1.440	282.45	31104.00	0.009
T2	87 - 67 (242)	L3x3x1/4	2.50	2.43	31.3	21.600	1.440	193.21	31104.00	0.006
T2	87 - 67 (243)	L3x3x1/4	2.50	2.43	31.3	21.600	1.440	132.34	31104.00	0.004
T2	87 - 67 (248)	L3x3x1/4	2.50	2.43	31.3	21.600	1.440	347.87	31104.00	0.011
T2	87 - 67 (249)	L3x3x1/4	2.50	2.43	31.3	21.600	1.440	55.35	31104.00	0.002

Section Capacity Table

Section No.	Elevation ft	Component Type	Size	Critical Element	P lb	SF*P _{allow} lb	% Capacity	Pass Fail
T1	92 - 87	Leg	1 3/4	3	-2826.26	68643.36	4.1	Pass
							4.7 (b)	
T2	87 - 67	Leg	1 3/4	27	-22399.30	62410.92	35.9	Pass
T3	67 - 47	Leg	1 3/4	96	-30652.10	62410.92	49.1	Pass
T4	47 - 27	Leg	1 3/4	165	-30652.00	62204.84	49.3	Pass
T1	92 - 87	Diagonal	1/2	13	-670.32	4041.08	16.6	Pass
T2	87 - 67	Diagonal	1/2	70	-2063.86	3945.09	52.3	Pass
T3	67 - 47	Diagonal	1/2	106	-3843.15	3945.09	97.4	Pass
T4	47 - 27	Diagonal	1/2	218	-1691.13	3942.51	42.9	Pass
T1	92 - 87	Horizontal	L1 1/4x1 1/4x3/16	18	-25.44	6109.71	0.4	Pass
T2	87 - 67	Horizontal	L1 1/4x1 1/4x3/16	85	-896.01	6109.71	14.7	Pass
T3	67 - 47	Horizontal	L1 1/4x1 1/4x3/16	156	1279.03	12484.38	10.2	Pass
T4	47 - 27	Horizontal	L1 1/4x1 1/4x3/16	180	761.18	9365.63	8.1	Pass
T1	92 - 87	Top Girt	L1 1/4x1 1/4x3/16	6	-34.43	6109.71	0.6	Pass
T2	87 - 67	Top Girt	L1 1/4x1 1/4x3/16	30	-29.02	6109.71	0.5	Pass
T3	67 - 47	Top Girt	L1 1/4x1 1/4x3/16	98	267.70	12484.38	2.1	Pass
T4	47 - 27	Top Girt	L1 1/4x1 1/4x3/16	166	4291.83	12484.38	34.4	Pass
T1	92 - 87	Bottom Girt	L1 1/4x1 1/4x3/16	9	-40.45	6109.71	0.7	Pass
T2	87 - 67	Bottom Girt	L1 1/4x1 1/4x3/16	33	466.41	12484.38	3.7	Pass
T3	67 - 47	Bottom Girt	L1 1/4x1 1/4x3/16	102	992.55	9365.63	10.6	Pass
T4	47 - 27	Bottom Girt	L1 1/4x1 1/4x3/16	169	51.83	12484.38	0.4	Pass
T2	87 - 67	Guy A@81.25	9/16	244	6784.09	17500.00	38.8	Pass
T4	47 - 27	Guy A@46.9167	3/4	252	12963.90	29150.00	44.5	Pass
T2	87 - 67	Guy B@81.25	9/16	238	7960.43	17500.00	45.5	Pass
T4	47 - 27	Guy B@46.9167	3/4	251	16129.40	29150.00	55.3	Pass
T2	87 - 67	Guy C@81.25	9/16	233	7828.43	17500.00	44.7	Pass
T4	47 - 27	Guy C@46.9167	3/4	250	15366.70	29150.00	52.7	Pass
T2	87 - 67	Torque Arm Top@81.25	L2x2x5/16	240	8127.73	33111.72	24.5	Pass
T2	87 - 67	Torque Arm Bottom@81.25	L3x3x1/4	242	-6072.27	28477.14	21.3	Pass
							Summary	
							Leg (T4)	49.3 Pass
							Diagonal (T3)	97.4 Pass
							Horizontal (T2)	14.7 Pass
							Top Girt	34.4 Pass

tnxTower Centek Engineering Inc. 63-2 North Branford Rd. Branford, CT 06405 Phone: (203) 488-0580 FAX: (203) 488-8587	Job 13075.034 - Hamden 2	Page 37 of 37
	Project 65-ft NUDD Guyed Tower - 265 Benham Street - Hamden, CT	Date 09:18:21 09/27/13
	Client Verizon Wireless	Designed by TJL

Section No.	Elevation ft	Component Type	Size	Critical Element	P lb	SF*P _{allow} lb	% Capacity	Pass Fail
						(T4)		
						Bottom Girt	10.6	Pass
						(T3)		
						Guy A (T4)	44.5	Pass
						Guy B (T4)	55.3	Pass
						Guy C (T4)	52.7	Pass
						Torque Arm	24.5	Pass
						Top (T2)		
						Torque Arm	21.3	Pass
						Bottom (T2)		
						Bolt Checks	31.3	Pass
						RATING =	97.4	Pass

Guy Anchor Connection Bolts Capacity Check:

Input Data:

Guy Anchor Reactions:

Guy Anchor B @ 19.5ft:

Horz Force (H) =

F_H := 16.4 kips

(Input From RisaTower)

Vertical Force (V) =

F_V := 26.3 kips

(Input From RisaTower)

Resultant Force (R) =

F_R := 31.0 kips

(Input From RisaTower)

NOTE: Analysis considers a single 5/8" dia thru bolt at anchor rod connection to anchor plate as critical failure point. (Existing anchor steel connection to existing structure considered adequate by inspection).

Guy Anchor B Connection Bolt Data:

Use ASTM A325 Steel

Bolt Ultimate Strength =

F_u := 120 ksi

(ASD 9th Ed)

Bolt Yield Strength =

F_y := 92 ksi

(User Input)

Diameter of Bolt =

D := 0.625 in

(User Input)

Calculated Bolt Properties:

Gross Area of Bolt =

A_g := $\frac{\pi}{4} \cdot D^2 = 0.307 \cdot \text{in}^2$

Number of Shear Planes =

N_{sp} := 6

(3 Bolts in Double Shear Considered)

Check Anchor Connection Bolt Shear Force:

Maximum Shear Stress in 1 Bolt =

f_v := $\frac{F_R}{(A_g \cdot N_{sp})}$ f_v = 16.84 ksi

Bolt Allowable Shear Stress:

F_v := 21.0 ksi Ref Table I-D, pg 4-5 ASD 9th Ed

Note: (Allowable shear stress may be increased by 1.333 under transient loading per Section A5.2, ASD 9th Ed)

Condition1 =

Condition1 := if $\left(\frac{f_v}{F_v} \leq 1.00, \text{"OK"}, \text{"Overstressed"} \right)$

$\frac{f_v}{F_v} = 0.8$

Condition1 = "OK"

SITE NAME		HAMDEN 2 CT		ECP - CELL #		0	2	58
LATITUDE		41-22-12.70 N		LONGITUDE		72-55-53.40 W		
Additional Comments:				SAVE BUTTON		MONOPOLE		
				STRUCTURE TYPE				
700 Mhz - LTE Current Config		ALPHA		BETA		GAMMA		
EQUIPMENT TYPE		700 eNodeB		700 eNodeB		700 eNodeB		
ANTENNA TYPE		P65-16-XL-2_2_790_-2		LNx-6514DS-T4M-750_4		LNx-6514DS-T4M-750_4		
QTY OF ANTENNAS PER FACE		1		1		1		
ORIENTATION (DEG)		30		150		270		
DOWN TILT (MECH/DEG)		0		0		0		
RAD CTR (FT AGL)		63.5		63.5		63.5		
TMA - QTY / MODEL								
DIPLEXER - QTY / MODEL								
700 Mhz - LTE Future Config		ALPHA		BETA		GAMMA		
EQUIPMENT TYPE		700 eNodeB		700 eNodeB		700 eNodeB		
ANTENNA TYPE		BXA-70063/6CF		BXA-70040/6CF_4°		BXA-70063/6CF		
QTY OF ANTENNAS PER FACE		1		1		1		
ORIENTATION (DEG)		0		160		270		
DOWN TILT (MECH/DEG)		0		0		0		
RAD CTR (FT AGL)		63.5		63.5		63.5		
TMA - QTY / MODEL								
DIPLEXER - QTY / MODEL								
850 Cellular - Current Config		ALPHA		BETA		GAMMA		
EQUIPMENT TYPE		Cellular Mod 4.0B		Cellular Mod 4.0B		Cellular Mod 4.0B		
ANTENNA TYPE		DB844G65ZAXY_H		APL866513		DB844G65ZAXY_H		
QTY OF ANTENNAS PER FACE		2		2		2		
ORIENTATION (DEG)		30		150		270		
DOWN TILT (MECH/DEG)		2		2		4		
RAD CTR (FT AGL)		63.5		63.5		63.5		
TMA - QTY / MODEL								
DIPLEXER - QTY / MODEL								
850 Cellular - Future Config		ALPHA		BETA		GAMMA		
EQUIPMENT TYPE		Cellular Mod 4.0B		Cellular Mod 4.0B		Cellular Mod 4.0B		
ANTENNA TYPE		DB844G65ZAXY_H		APL866513		DB844G65ZAXY_H		
QTY OF ANTENNAS PER FACE		2		2		2		
ORIENTATION (DEG)		30		150		270		
DOWN TILT (MECH/DEG)		2		2		4		
RAD CTR (FT AGL)		63.5		63.5		63.5		
TMA - QTY / MODEL								
DIPLEXER - QTY / MODEL								
DIPLEX WITH LTE CABLE								
1900 PCS - Current Config		ALPHA		BETA		GAMMA		
EQUIPMENT TYPE		PCS Mod 4.0B		PCS Mod 4.0B		PCS Mod 4.0B		
ANTENNA TYPE		948F85T2E-M_2		948F85T2E-M_2		948F85T2E-M_2		
QTY OF ANTENNAS PER FACE		2		2		2		
ORIENTATION (DEG)		30		150		270		
DOWN TILT (MECH/DEG)		0		0		0		
RAD CTR (FT AGL)		63.5		63.5		63.5		
TMA - QTY / MODEL								
DIPLEXER - QTY / MODEL								
1900 PCS - Future Config		ALPHA		BETA		GAMMA		
EQUIPMENT TYPE		PCS Mod 4.0B		PCS Mod 4.0B		PCS Mod 4.0B		
ANTENNA TYPE		948F85T2E-M_2		948F85T2E-M_2		948F85T2E-M_2		
QTY OF ANTENNAS PER FACE		2		2		2		
ORIENTATION (DEG)		30		150		270		
DOWN TILT (MECH/DEG)		0		0		0		
RAD CTR (FT AGL)		63.5		63.5		63.5		
TMA - QTY / MODEL								
DIPLEX WITH CELLULAR CABLE								

TX / RX FREQUENCIES								TX POWER OUTPUT			
Cellular A-Band				PCS F / AWS-Band		700 Mhz C - B		Cellular (Watts)			20
TX - 869-880,890-891.5 MHz				TX - 1970-1975 / 2145-21		TX - 746-757		PCS (Watts)			16
RX - 824-835,845-846.5 MHz				RX - 1890-1895 / 1745-17		RX - 776-787		LTE/ AWS (Watts)			40
ALPHA				BETA				GAMMA			
Ant.	Freq.	Func.	Color Code	Ant.	Freq.	Func.	Color Code	Ant.	Freq.	Func.	Color Code
A1	800	Tx1/Rx0	RED	A7	800	Tx2/Rx0	BLUE	A13	800	Tx3/Rx0	GREEN
A2	1900	Tx1/Rx0	RED/ WHITE	A8	1900	Tx2/Rx0	BLUE/ WHITE	A14	1900	Tx3/Rx0	GREEN/WHITE
A3	700	Tx1/Rx0	RED/ ORANGE	A9	700	Tx2/Rx0	BLUE/ ORANGE	A15	700	Tx3/Rx0	GREEN/ORANGE
A4	700	Tx4/Rx1	RED/RED/ ORANGE	A10	700	Tx5/Rx1	BLUE/BLUE/ ORANGE	A16	700	Tx6/Rx1	GREEN/GREEN/ ORANGE
A5	1900	Tx4/Rx1	RED/RED/ WHITE	A11	1900	Tx5/Rx1	BLUE/BLUE/ WHITE	A17	1900	Tx6/Rx1	GREEN/GREEN/ WHITE
A6	800	Tx4/Rx1	RED/RED	A12	800	Tx5/Rx1	BLUE/BLUE	A18	800	Tx6/Rx1	GREEN/GREEN
F1-A	1700	Tx/Rx	RED/ BROWN	F1-B	1700	Tx/Rx	BLUE/BROWN	F1-C	1700	Tx/Rx	GREEN/BROWN
F1-D	1700	Tx/Rx	RED/RED/ BROWN	F1-E	1700	Tx/Rx	BLUE/BLUE/BR OWN	F1-F	1700	Tx/Rx	GREEN/GREEN/BROWN
RF ENGINEER						RF MANAGER		INITIALS		DATE	
Prepared By: Maria Montrose						Robert Hesselbach				8/4/2013	

BXA-70063-6CF-EDIN-X

X-Pol | FET Panel | 63° | 14.5 dBd

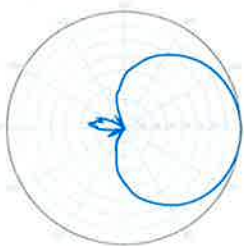
Replace "X" with desired electrical downtilt.

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

Electrical Characteristics	696-900 MHz			
Frequency bands	696-806 MHz		806-900 MHz	
Polarization	±45°			
Horizontal beamwidth	65°		63°	
Vertical beamwidth	13°		11°	
Gain	14.0 dBd (16.1 dBi)		14.5 dBd (16.6 dBi)	
Electrical downtilt (X)	0, 2, 3, 4, 5, 6, 8, 10			
Impedance	50Ω			
VSWR	≤1.35:1			
Upper sidelobe suppression (0°)	-18.3 dB		-18.2 dB	
Front-to-back ratio (+/-30°)	-33.4 dB		-36.3 dB	
Null fill	5% (-26.02 dB)			
Isolation between ports	< -25 dB			
Input power with EDIN connectors	500 W			
Input power with NE connectors	300 W			
Lightning protection	Direct Ground			
Connector(s)	2 Ports / EDIN or NE / Female / Center (Back)			
Mechanical Characteristics				
Dimensions Length x Width x Depth	1804 x 285 x 132 mm		71.0 x 11.2 x 5.2 in	
Depth with z-brackets	172 mm		6.8 in	
Weight without mounting brackets	7.9 kg		17 lbs	
Survival wind speed	> 201 km/hr		> 125 mph	
Wind area	Front: 0.51 m ²	Side: 0.24 m ²	Front: 5.5 ft ²	Side: 2.6 ft ²
Wind load @ 161 km/hr (100 mph)	Front: 759 N	Side: 391 N	Front: 169 lbf	Side: 89 lbf
Mounting Options	Part Number	Fits Pipe Diameter		Weight
3-Point Mounting & Downtilt Bracket Kit	36210008	40-115 mm 1.57-4.5 in		6.9 kg 15.2 lbs
Concealment Configurations	For concealment configurations, order BXA-70063-6CF-EDIN-X-FP			

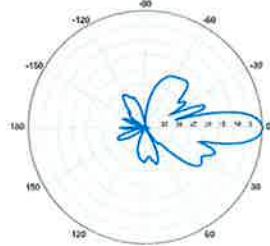


BXA-70063-6CF-EDIN-X



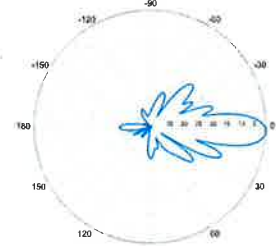
Horizontal | 750 MHz

BXA-70063-6CF-EDIN-0

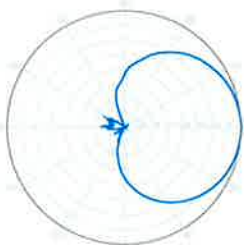


0° | Vertical | 750 MHz

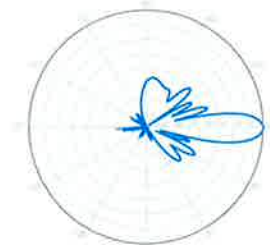
BXA-70063-6CF-EDIN-2



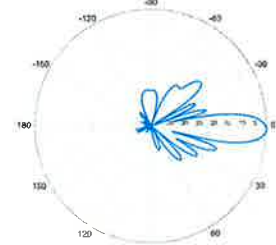
2° | Vertical | 750 MHz



Horizontal | 850 MHz



0° | Vertical | 850 MHz



2° | Vertical | 850 MHz

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-70040-6CF-EDIN-X

X-Pol | FET Panel | 40° | 16.0 dBd

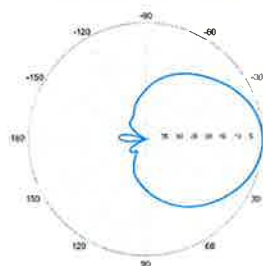
Replace "X" with desired electrical downtilt.

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

Electrical Characteristics	696-900 MHz			
Frequency bands	696-806 MHz		806-900 MHz	
Polarization	±45°			
Horizontal beamwidth	42°		40°	
Vertical beamwidth	12°		10°	
Gain	15.5 dBd (17.6 dBi)		16.0 dBd (18.1 dBi)	
Electrical downtilt (X)	0, 2, 4, 6, 8, 10			
Impedance	50Ω			
VSWR	≤1.35:1			
Upper sidelobe suppression (0°)	-12.1 dB		-13.4 dB	
Front-to-back ratio (+/-30°)	-35.8 dB		-38.0 dB	
Null fill	5% (-26.02 dB)			
Isolation between ports	< -27 dB			
Input power with EDIN connectors	500 W			
Input power with NE connectors	300 W			
Lightning protection	Direct Ground			
Connector(s)	2 Ports / EDIN or NE / Female / Center (Back)			
Mechanical Characteristics				
Dimensions Length x Width x Depth	1806 x 606 x 200 mm		71.1 x 23.9 x 7.9 in	
Depth with z-brackets	240 mm		9.4 in	
Weight without mounting brackets	17 kg		38 lbs	
Survival wind speed	> 201 km/hr		> 125 mph	
Wind area	Front: 1.09 m²	Side: 0.36 m²	Front: 11.8 ft²	Side: 3.9 ft²
Wind load @ 161 km/hr (100 mph)	Front: 1564 N	Side: 547 N	Front: 350 lbf	Side: 123 lbf
Mounting Options	Part Number	Fits Pipe Diameter		Weight
3-Point Mounting & Downtilt Bracket Kit	36210008	40-115 mm 1.57-4.5 in		6.9 kg 15.2 lbs
Concealment Configurations	This model cannot be used in a standard FP concealment configuration			

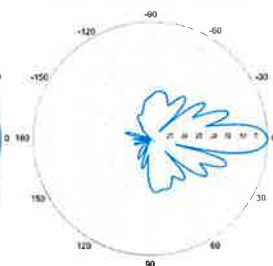


BXA-70040-6CF-EDIN-X



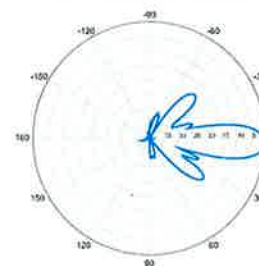
Horizontal | 750 MHz

BXA-70040-6CF-EDIN-0



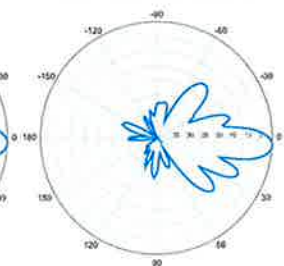
0° | Vertical | 750 MHz

BXA-70040-6CF-EDIN-2

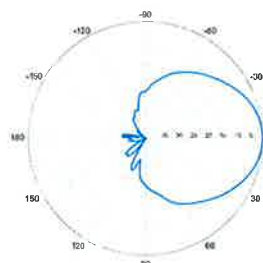


2° | Vertical | 750 MHz

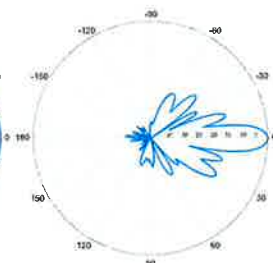
BXA-70040-6CF-EDIN-4



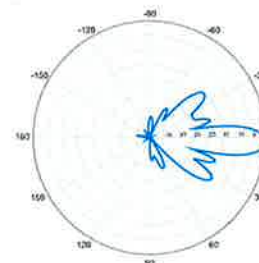
4° | Vertical | 750 MHz



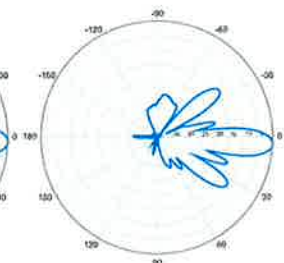
Horizontal | 850 MHz



0° | Vertical | 850 MHz



2° | Vertical | 850 MHz



4° | Vertical | 850 MHz

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.