

November 10, 2016

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

Re: **Notice of Exempt Modification – Facility Modification
101 (143) Old Blue Hills Road, Durham, Connecticut**

Dear Ms. Bachman:

Cellco Partnership d/b/a Verizon Wireless (“Cellco”) currently maintains fifteen (15) antennas at the 100-foot level of the existing 120-foot tower at 101 (143) Old Blue Hills Road in Durham, Connecticut (the “Property”). The tower is owned by Crown Castle (“Crown”). The Council approved Cellco’s use of this tower in 1994 (Docket No. 161). Cellco now intends to modify its facility by replacing ten (10) of its antennas with seven (7) new antennas (three (3) model SBNHH-1D65B, 700/1900 MHz antennas; three (3) model SBNHH-1D65B, 2100 MHz antennas; and one (1) model LPA-80080/6CF, 850 MHz antenna), all at the same 100-foot level on the tower.¹ Cellco also intends to replace three (3) remote radio heads (“RRHs”) and install three (3) new RRHs and one (1) HYBRIFLEX™ fiber optic antenna cable. Included in Attachment 1 are specifications for Cellco’s replacement antennas, RRHs and HYBRIFLEX™ cable.

Please accept this letter as notification pursuant to R.C.S.A. § 16-50j-73, for construction that constitutes an exempt modification pursuant to R.C.S.A. § 16-50j-72(b)(2). In accordance with R.C.S.A. § 16-50j-73, a copy of this notice is being sent to Durham’s First Selectman, Laura L. Francis. A copy of this letter is also being sent to Frances Behrens, the owner of the Property and Crown, the tower owner.

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 Cellco will reduce the total number of antennas at the facility from fifteen (15) to twelve (12).

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1. The proposed modifications will not result in an increase in the height of the existing structure. Cellco's new antennas and RRHs will be installed on its existing platform at a centerline height of 100 feet on the 120-foot tower.

2. The proposed modifications will not involve any change to ground-mounted equipment and, therefore, will not require the extension of the site boundary.

3. The proposed modifications will not increase noise levels at the facility by six decibels or more, or to levels that exceed state and local criteria.

4. The operation of the replacement antennas will not increase radio frequency (RF) emissions at the facility to a level at or above the Federal Communications Commission (FCC) safety standard. A cumulative General Power Density table for Cellco's modified facility is included in Attachment 2.

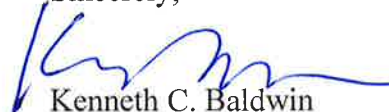
5. The proposed modifications will not cause a change or alteration in the physical or environmental characteristics of the site.

6. The tower and its foundation can support Cellco's proposed modifications. (*See Structural Analysis Report included in Attachment 3*).

A copy of the Town Assessor's Parcel Map and property owner information is included in Attachment 4.

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:

Laura L. Francis, Durham First Selectman
Frances Behrens
Crown
Tim Parks

ATTACHMENT 1



SBNHH-1D65B

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

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

Electrical Specifications

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

Electrical Specifications, BASTA*

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

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

General Specifications

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

Mechanical Specifications

Color	Light gray
Lightning Protection	dc Ground

SBNHH-1D65B

Radiator Material	Aluminum Low loss circuit board
Radome Material	Fiberglass, UV resistant
Reflector Material	Aluminum
RF Connector Interface	7-16 DIN Female
RF Connector Location	Bottom
RF Connector Quantity, total	6
Wind Loading, frontal	618.0 N @ 150 km/h 138.9 lbf @ 150 km/h
Wind Loading, lateral	197.0 N @ 150 km/h 44.3 lbf @ 150 km/h
Wind Loading, rear	728.0 N @ 150 km/h 163.7 lbf @ 150 km/h
Wind Speed, maximum	241 km/h 150 mph

Dimensions

Depth	180.0 mm 7.1 in
Length	1851.0 mm 72.9 in
Width	301.0 mm 11.9 in
Net Weight, without mounting kit	18.4 kg 40.6 lb

Remote Electrical Tilt (RET) Information

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

Packed Dimensions

Depth	296.0 mm 11.7 in
Length	2025.0 mm 79.7 in
Width	390.0 mm 15.4 in
Shipping Weight	31.0 kg 68.3 lb

Regulatory Compliance/Certifications

Agency

RoHS 2011/65/EU
China RoHS SJ/T 11364-2006
ISO 9001:2008

Classification

Compliant by Exemption
Above Maximum Concentration Value (MCV)
Designed, manufactured and/or distributed under this quality management system



SBNHH-1D65B

Included Products

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

* Footnotes

Performance Note Severe environmental conditions may degrade optimum performance

Mechanical specifications

Length	1800 mm	70.9 in
Width	140 mm	5.5 in
Depth	335 mm	13.2 in
Depth with z-bracket	375 mm	14.8 in
Weight ⁴⁾	9.5 kg	21.0 lbs
Wind Area Fore/Aft ⁶⁾	0.25 m ²	2.7 ft ²
Wind Area Side ⁶⁾	0.61 m ²	6.6 ft ²
Max Wind Survivability ⁶⁾	>201 km/hr	>125 mph
Wind Load @ 100 mph (161 km/hr) ⁶⁾		
Fore/Aft	415 N	93 lbf
Side	878 N	198 lbf

Antenna consisting of aluminum alloy with brass feedlines covered by a gray, UV safe fiberglass radome. RoHS compliant.

Mounting & Downtilting

Mounting hardware attaches to pipe diameter Ø50-102 mm; Ø2.0-4.0 in. If the lock-down brace is used, the maximum diameter is Ø88.9 mm (3.5 in).

Mechanical downtilt angle 0-22°

Mounting & Downtilt Bracket Kit 21700000

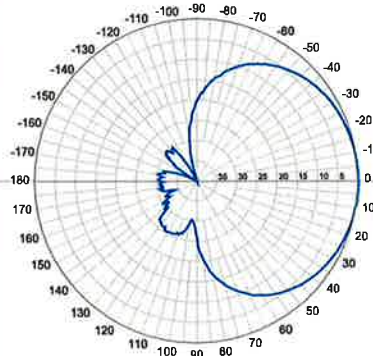
Electrical specifications

Frequency Range	806-960 MHz
Impedance	50Ω
Connector ³⁾	NE or E-DIN Female 1 port / Center
VSWR ¹⁾	≤ 1.4:1
Polarization	Vertical
Gain ¹⁾	14 dBd
Power Rating ²⁾	500 W
Half Power Angle ¹⁾	
Horizontal Beamwidth	80°
Vertical Beamwidth	10°
Electrical downtilt ⁵⁾	0°
Null fill ¹⁾	10%
Lightning protection	Direct ground

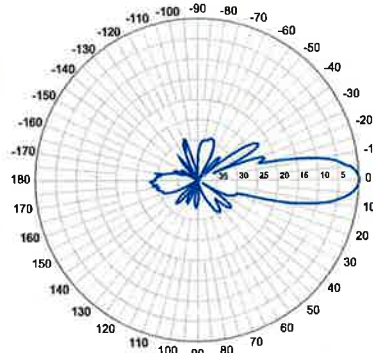
1) Typical values.
2) Power rating limited by connector only.
3) NE indicates an elongated N connector.
E-DIN indicates an elongated DIN connector.
4) Antenna weight does not include brackets.
5) Add'l downtilts may be available. Check website for details.
6) Values reflect installation with all three brackets utilized.

Improvements to mechanical and/or electrical performance of the antenna may be made without notice.

Radiation-pattern⁶⁾



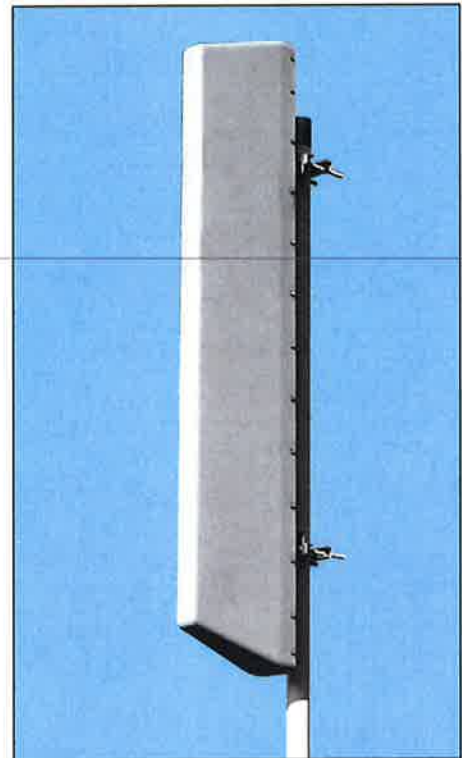
Horizontal



Vertical

Radiation patterns for all antennas are measured with the antenna mounted on a fiberglass pole.

Mounting on a metal pole will typically improve the front-to-back ratio.



LPA-80080/6CF

When ordering replace " _ " with connector type.



Featuring our Exclusive
3T Technology™
Antenna Design:

- True log-periodic design allows for superior front-to-side characteristics to minimize sector overlap.
- Unique feedline design eliminates the need for conventional solder joints in the signal path.
- A non-collinear system with access to every radiating element for broad bandwidth and superior performance.
- Air as insulation for virtually no internal signal loss.

Warranty:

This antenna is under a five-year limited warranty for repair or replacement.

Revision Date: 08/18/08

806-960 MHz

ALCATEL-LUCENT B13 RRH4X30-4R

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

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

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

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

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

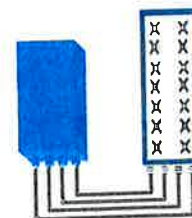


FEATURES

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

BENEFITS

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



4x30W with 4T4R
or
2x60W with 2T4R
Can be switched between
modes via SW w/o site
visit

TECHNICAL SPECIFICATIONS

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

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ALCATEL-LUCENT B66A RRH4X45

The Alcatel-Lucent B66a Remote Radio Head 4x45 is the newest addition of Remote Radio Head to the extended product line of Alcatel-Lucent's distributed Base Station solutions, aimed at facilitating smooth RF site acquisition and related civil engineering. Its operational range covers beyond that of B4 (AWS) and B10 (AWS+).

Supporting 2Tx/4Tx MIMO and 2-way/4-way Rx diversity, the Alcatel-Lucent B66a RRH4x45 allows operators to have a compact radio solution to deploy LTE in the 2100 band (3GPP band 4, 10, and 66), providing them with the means to achieve high capacity, high quality, high reliability, large instantaneous bandwidth, and high coverage with minimum site requirements.

The Alcatel-Lucent B66a RRH4x45 product has four transmit RF paths, offering the possibility to **select, via software only, 2Tx or 4Tx MIMO configurations** with either 2x90W or 4x45W RF output power. It also supports 4-way Rx diversity at the 70 MHz instantaneous bandwidth.

The Alcatel-Lucent B66a RRH4x45 is a compact (near zero-footprint) solution and operates noise free, simplifying negotiations with site property owners and minimizing environmental impacts.

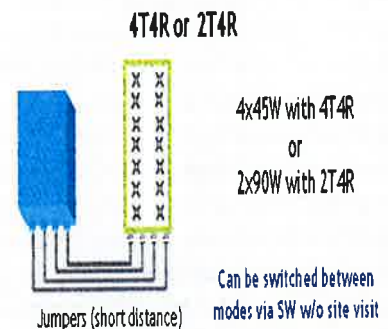
Its compactness and slim design makes the Alcatel-Lucent B66a RRH4x45 easy to install close to the antenna: operators can therefore locate this Remote Radio Head where RF design conditions are deemed ideal, minimizing trade-offs between available sites and RF optimum sites, together with reducing the RF feeder needs and installation costs.

FEATURES

- Supporting LTE in 2110 - 2180 MHz band/DL, 1710-1780MHz/UL (3GPP band 4, 10, and 66a)
- LTE 2Tx or 4Tx MIMO (SW selectable)
- Configuration: 2T2R/2T4R/4T4R
- Output power: Up to 2x90W or 4x45W (SW configurable)
- 70MHz LTE carrier with 4Rx Diversity
- Convection-cooled (fan-less)
- Supports AISG 2.0 ALD devices (RET, TMA) through RS485 or RF ports

BENEFITS

- Compact to reduce additional footprint when adding LTE in AWS 1-3 band
- Selection of MIMO configuration (2Tx or 4Tx) by software only
- Improves downlink spectral efficiency through 4Tx MIMO
- Increases LTE coverage thanks to 4Rx diversity capability and best in class Rx sensitivity
- Flexible mounting options: Pole or Wall



TECHNICAL SPECIFICATIONS

Features & Performance	
Number of TX/RX paths	4 duplexed (either 4T4R or 2T4R selectable by SW)
Frequency band	AWS 1-3, B4/B66a DL: 2110-2180 MHz / UL: 1710-1780 MHz
Instantaneous bandwidth - #carriers	70 MHz – 4 LTE MIMO carriers (in 70 MHz occupied bandwidth)
LTE carrier bandwidth	5, 10, 15, 20 MHz
RF output power	2x90W or 4x45W (selectable by SW)
Noise figure – RX Diversity scheme	2 dB typical (<2.5 dB max) – 2 or 4 way Rx diversity
Receiver Sensivity (FRC A1-3)	-104.5 dBm maximum
Sizes (HxWxD) in mm (in.)	655x299x182 (25.8x11.8x7.2) (with solar shield) 640x290x160 (25.2x11.4x6.3) (without solar shield)
Volume in Liters	35.5 (with solar shield) 29.7 (without solar shield)
Weight in kg (lb) (w/o mounting HW)	25.8kg (56.8lb) (with solar shield)
DC voltage range	Nominal: -48V, -40.5 to -57V at full performance, -38 to -57V with relaxation on power consumption
DC power consumption	750W typical @100% RF load (in 2Tx or 4Tx mode); Add 58W for 2A*29V for AISG
Environmental conditions	-40°C (-40°F) / +55°C (+131°F) UL50E Type 4 Enclosure
Wind load (@150km/h or 93mph)	250N (56lb) Frontal/150N (34lb) Lateral
Antenna ports	4 ports 4.3-10 female (50 ohms) VSWR < 1.5
CPRI ports	2 CPRI ports (HW ready for Rate 7, 9.8 Gbps) SFP: SMDF (HW supports also SMSF and MMDF)
AISG interfaces	1 AISG 2.0 output (RS485) Integrated Smart Bias Tees (x2)
Misc. Interfaces	4 external alarms (1 connector) 1 DC connector (2 pins)
Installation conditions	Pole and wall mounting
Regulatory compliance	3GPP 36.141 / 3GPP 36.113 / GR-487 / GR-1089-CORE / GR-3108-CORE / UL 60950-1 / FCC Part 27 / FCC Part 15 / GR-3178-CORE

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

Product Description

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

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

Features/Benefits

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



Figure 1: HYBRIFLEX Series

Technical Specifications

Outer Conductor Armor	Corrugated Aluminum	(mm (in))	46.5 (1.83)
Jacket	Polyethylene, PE	(mm (in))	50.3 (1.98)
UV-Protection	Individual and External Jacket		Yes
Weight, Approximate		(kg/m (lb/ft))	1.9 (1.30)
Minimum Bending Radius, Single Bending		(mm (in))	200 (8)
Minimum Bending Radius, Repeated Bending		(mm (in))	500 (20)
Recommended/Maximum Clamp Spacing		(m (ft))	1.0 / 1.2 (3.25 / 4.0)
DC-Resistance Outer Conductor Armor		(Ω/km (Ω/1000ft))	0.68 (0.205)
DC-Resistance Power Cable, 8 4mm ² (8AWG)		(Ω/km (Ω/1000ft))	2.1 (0.307)
Version			Single-mode OM3
Quantity, Fiber Count			16 (8 pairs)
Core/Clad		(μm)	50/125
Primary Coating (Acrylate)		(μm)	245
Buffer Diameter, Nominal		(μm)	900
Secondary Protection, Jacket, Nominal		(mm (in))	2.0 (0.08)
Minimum Bending Radius		(mm (in))	104 (4.1)
Insertion Loss @ wavelength 850nm		dB/km	3.0
Insertion Loss @ wavelength 1310nm		dB/km	1.0
Standards (Meets or exceeds)			UL94-V0, UL1666 RoHS Compliant
Size (Power)		(mm (AWG))	8.4 (8)
Quantity, Wire Count (Power)			16 (8 pairs)
Size (Alarm)		(mm (AWG))	0.8 (18)
Quantity, Wire Count (Alarm)			4 (2 pairs)
Type			UV protected
Strands			19
Primary Jacket Diameter, Nominal		(mm (in))	6.8 (0.27)
Standards (Meets or exceeds)			NFPA 130, ICEA S-95-658 UL Type XHHW-2, UL 44 UL-LS Limited Smoke, UL VW-1 IEEE-383 (1974), IEEE 1202/FT4 RoHS Compliant
Installation Temperature		(°C (°F))	-40 to +65 (-40 to 149)
Operation Temperature		(°C (°F))	-40 to +65 (-40 to 149)

* This data is provisional and subject to change

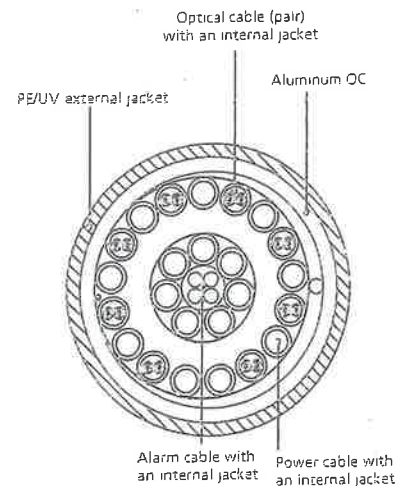


Figure 2: Construction Detail

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

ATTACHMENT 2

Site Name: Durham Tower Height: 120'		General		Power		Density							
CARRIER	# OF CHAN.	WATTS ERP	HEIGHT	CALC. POWER DENS	FREQ.	PERMISS. EXP.	FRACTION MPE	Total					
*AT&T	2	875	74	1900	0.1361	1.0000	1.36%						
*AT&T	2	565	74	880	0.0879	0.5867	1.50%						
*AT&T	1	283	74	880	0.0220	0.5867	0.38%						
*AT&T	4	525	74	1900	0.1633	1.0000	1.63%						
*AT&T	1	1313	74	734	0.1021	0.4893	2.09%						
*Nextel	12	100	120	851	0.0332	0.5673	0.59%						
*Town	4	400	75	450	0.1209	0.3000	4.03%						
*Sprint	11	250	90	1950	0.1402	1.0000	1.40%						
Verizon	1	3548	100	0.1276	1970	1.0000	12.76%						
Verizon	9	393	100	0.1272	869	0.5793	21.95%						
Verizon	1	6719	100	0.2416	2145	1.0000	24.16%						
Verizon	1	1759	100	0.0632	746	0.4973	12.72%						
													84.6%
* Source: Siting Council													

ATTACHMENT 3

Date: October 04, 2016

Charles McGuirt
Crown Castle
3530 Toringdon Way Suite 300
Charlotte, NC 28277



Crown Castle
2000 Corporate Drive
Canonsburg, PA, 15317
724-416-2000

Subject: Structural Analysis Report

Carrier Designation: Verizon Wireless Co-Locate

Carrier Site Number: 119686
Carrier Site Name: Durham CT

Crown Castle Designation:

Crown Castle BU Number: 806364
Crown Castle Site Name: HRT 106(B) 943202
Crown Castle JDE Job Number: 396440
Crown Castle Work Order Number: 1308390
Crown Castle Application Number: 361327 Rev. 2

Engineering Firm Designation:

Crown Castle Project Number: 1308390

Site Data:

101 R OLD BLUE HILL ROAD, DURHAM, Middlesex County, CT
Latitude 41° 27' 33.67", Longitude -72° 39' 45.83"
120 Foot - Monopole Tower

Dear Charles McGuirt,

Crown Castle is pleased to submit this "Structural Analysis Report" to determine the structural integrity of the above mentioned tower. This analysis has been performed in accordance with the Crown Castle Structural 'Statement of Work' and the terms of Crown Castle Purchase Order Number 1308390, in accordance with application 361327, revision 2.

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

LC7: Existing + Reserved + Proposed Equipment

Sufficient Capacity

Note: See Table I and Table II for the proposed and existing/reserved loading, respectively.

This analysis has been performed in accordance with the 2016 Connecticut State Building Code based upon an ultimate 3-second gust wind speed of 130 mph converted to a nominal 3-second gust wind speed of 101 mph per Section 1609.3 and Appendix N as required for use in the TIA-222-G Standard per Exception #5 of Section 1609.1.1. Exposure Category B and Risk Category II were used in this analysis.

All modifications and equipment proposed in this report shall be installed in accordance with the attached drawings for the determined available structural capacity to be effective.

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

Structural analysis prepared by: Michael Lopienski, E.I.T./ AGH

Respectfully submitted by:

Maham Barimani, P.E.
Sr. Project Engineer
tnxTower Report - version

7.0.5.1



10-05-2016

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1) INTRODUCTION

This tower is a 120 ft Monopole tower designed by VALMONT in March of 1994. The tower was originally designed for a wind speed of 90 mph per TIA/EIA-222-E.

2) ANALYSIS CRITERIA

The structural analysis was performed for this tower in accordance with the requirements of TIA-222-G Structural Standards for Steel Antenna Towers and Antenna Supporting Structures using a 3-second gust wind speed of 101 mph with no ice, 50 mph with 0.75 inch ice thickness and 60 mph under service loads, exposure category B.

Table 1 - Proposed Antenna and Cable Information

Mounting Level (ft)	Center Line Elevation (ft)	Number of Antennas	Antenna Manufacturer	Antenna Model	Number of Feed Lines	Feed Line Size (in)	Note
98.0	100.0	3	alcatel lucent	B13 RRH4X30-4R	1	1-5/8	-
		3	alcatel lucent	B66A RRH4X45			
		6	andrew	SBNHH-1D65B w/ Mount Pipe			
		1	antel	LPA-80080/6CF w/ Mount Pipe			
		2	raycap	RXXDC-3315-PF-48			

Table 2 - Existing and Reserved Antenna and Cable Information

Mounting Level (ft)	Center Line Elevation (ft)	Number of Antennas	Antenna Manufacturer	Antenna Model	Number of Feed Lines	Feed Line Size (in)	Note
118.0	125.0	1	decibel	DB809MT3-XT	3	7/8	1
	123.0	1	decibel	DB201-A			
	118.0	2	tower mounts	Side Arm Mount [SO 701-1]			
107.0	107.0	1	gabriel electronics	GLF6-450	1	7/8	1
		1	tower mounts	Pipe Mount [PM 601-1]			
98.0	100.0	3	alcatel lucent	RRH2X60-AWS	6	7/8	3
		3	andrew	HBXX-6517DS-A2M w/ Mount Pipe			
		3	andrew	HBXX-6517DS-VTM w/ Mount Pipe			
		3	andrew	LNx-6514DS-A1M w/ Mount Pipe			
		1	antel	LPA-80080/6CF w/ Mount Pipe			
		1	rfs celwave	DB-T1-6Z-8AB-0Z			
	3	alcatel lucent	RRH2X60-PCS	12 1	7/8 1-5/8	1	
	5	antel	LPA-80080/6CF w/ Mount Pipe				
98.0	98.0	1	tower mounts	Platform Mount [LP 602-1]			
87.0	89.0	6	decibel	DB980H90E-M w/ Mount Pipe	6	1-1/4	1

Mounting Level (ft)	Center Line Elevation (ft)	Number of Antennas	Antenna Manufacturer	Antenna Model	Number of Feed Lines	Feed Line Size (in)	Note
	87.0	1	radwin	RADWIN 2000C	1	1/4	2
		1	tower mounts	Platform Mount [LP 602-1]	-	-	1
73.0	79.0	1	decibel	DB636-C			
	74.0	1	ericsson	RRUS 11			
		3	kmw communications	AM-X-CD-16-65-00T-RET w/ Mount Pipe			
		6	powerwave technologies	7770.00 w/ Mount Pipe	1	3/8	1
	1	raycap	DC6-48-60-18-8F	2	3/4		
	5	ericsson	RRUS 11	13	7/8		
	6	powerwave technologies	LGP21401	1	2" Conduit		
6	powerwave technologies	LGP21903					
1	tower mounts	Platform Mount [LP 1201-1]					
50.0	57.0	1	rfs celwave	PD1142-1			
50.0	54.0	1	decibel	ASP-655			
	53.0	1	celwave	PD1121-6	1	1/2	1
	1	decibel	DB492A	3	7/8		
	50.0	1	tower mounts	Side Arm Mount [SO 701-3]			
40.0	41.0	1	tekelec systemes	EPSILON GPS ANTENNA 35 DB	1	1/2	
40.0	40.0	1	tower mounts	Side Arm Mount [SO 701-1]			

- Notes:
 1) Existing Equipment
 2) Reserved Equipment
 3) Equipment to be Removed, Not Considered in this Analysis

Table 3 - Design Antenna and Cable Information

Mounting Level (ft)	Center Line Elevation (ft)	Number of Antennas	Antenna Manufacturer	Antenna Model	Number of Feed Lines	Feed Line Size (in)
97	97	12	-	8RL41OC4R105	-	-
87	87	9	-	8RL41OC4R105	-	-
75	75	1	-	A8P710	-	-
		1	Telewave	450F6 Antenna		
50	50	1	-	A8P701	-	-
		1	-	A8P710		

3) ANALYSIS PROCEDURE

Table 4 - Documents Provided

Document	Remarks	Reference	Source
4-GEOTECHNICAL REPORTS	Clarence Welti	262150	CCISITES
4-TOWER FOUNDATION DRAWINGS/DESIGN/SPECS	SAC	297341	CCISITES
4-TOWER MANUFACTURER DRAWINGS	Valmont	262153	CCISITES
4-TOWER EXTENSION DESIGN	Valmont	942187	CCISITES

3.1) Analysis Method

tnxTower (version 7.0.5.1), a commercially available analysis software package, was used to create a three-dimensional model of the tower and calculate member stresses for various loading cases. Selected output from the analysis is included in Appendix A.

3.2) Assumptions

- 1) Tower and structures were built in accordance with the manufacturer's specifications.
- 2) The tower and structures have been maintained in accordance with the manufacturer's specification.
- 3) The configuration of antennas, transmission cables, mounts and other appurtenances are as specified in Tables 1 and 2 and the referenced drawings.
- 4) The existing base plate grout was not considered in this analysis.

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

4) ANALYSIS RESULTS

Table 5 - Section Capacity (Summary)

Section No.	Elevation (ft)	Component Type	Size	Critical Element	P (K)	SF*P_allow (K)	% Capacity	Pass / Fail
L1	120 - 100	Pole	TP20.263x15.0403x0.1875	1	-1.37	829.59	9.7	Pass
L2	100 - 47.0833	Pole	TP33.13x20.263x0.2813	2	-15.18	1920.74	56.6	Pass
L3	47.0833 - 0	Pole	TP44x31.372x0.375	3	-27.67	3477.10	58.6	Pass
							Summary	
						Pole (L3)	58.6	Pass
						Rating =	58.6	Pass

Table 6 - Tower Component Stresses vs. Capacity - LC7

Notes	Component	Elevation (ft)	% Capacity	Pass / Fail
1	Anchor Rods	0	55.1	Pass
1	Base Plate	0	29.8	Pass
1	Base Foundation	0	22.4	Pass
1	Base Foundation Soil Interaction	0	24.4	Pass
1	Flange Connection 'Anls. OK sd(100	14.3/3.9	Pass

Structure Rating (max from all components) =	58.6%
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Notes:

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

4.1) Recommendations

The tower and its foundation have sufficient capacity to carry the existing, reserved, and proposed loads. No modifications are required at this time.

APPENDIX A
TNXTOWER OUTPUT

DESIGNED APPURTENANCE LOADING

TYPE	ELEVATION	TYPE	ELEVATION
DB809MT3-XT	118	(2) DB980H90E-M w/ Mount Pipe	87
DB201-A	118	RADWIN 2000C	87
6' x 2" Mount Pipe	118	AM-X-CD-16-65-00T-RET w/ Mount Pipe	73
6' x 2" Mount Pipe	118	(2) 7770.00 w/ Mount Pipe	73
Side Arm Mount [SO 102-3]	118	(2) 7770.00 w/ Mount Pipe	73
Side Arm Mount [SO 701-1]	118	(2) 7770.00 w/ Mount Pipe	73
Side Arm Mount [SO 701-1]	118	(2) 7770.00 w/ Mount Pipe	73
Pipe Mount [PM 601-1]	107	DB636-C	73
GLF6-450	107	RRUS 11	73
(2) LPA-80080/6CF w/ Mount Pipe	98	RRUS 11	73
LPA-80080/6CF w/ Mount Pipe	98	(2) RRUS 11	73
RRH2X60-PCS	98	(2) RRUS 11	73
RRH2X60-PCS	98	(4) LGP21903	73
RRH2X60-PCS	98	(2) LGP21903	73
(2) SBNHH-1D65B w/ Mount Pipe	98	(2) LGP21401	73
(2) SBNHH-1D65B w/ Mount Pipe	98	(2) LGP21401	73
(2) SBNHH-1D65B w/ Mount Pipe	98	(2) LGP21401	73
LPA-80080/6CF w/ Mount Pipe	98	DC6-48-80-18-8F	73
B13 RRH4X30-4R	98	Platform Mount [LP 1201-1]	73
B13 RRH4X30-4R	98	AM-X-CD-16-65-00T-RET w/ Mount Pipe	73
B13 RRH4X30-4R	98	AM-X-CD-16-65-00T-RET w/ Mount Pipe	73
B66A RRH4X45	98	ASP-655	50
B66A RRH4X45	98	PD1121-6	50
B66A RRH4X45	98	Side Arm Mount [SO 701-3]	50
(2) RXXDC-3315-PF-48	98	PD1142-1	50
Platform Mount [LP 602-1]	98	DB492A	50
(2) LPA-80080/6CF w/ Mount Pipe	98	EPSILON GPS ANTENNA 35 DB	40
(2) DB980H90E-M w/ Mount Pipe	87	Side Arm Mount [SO 701-1]	40
(2) DB980H90E-M w/ Mount Pipe	87		
6' x 2" Mount Pipe	87		
Platform Mount [LP 602-1]	87		

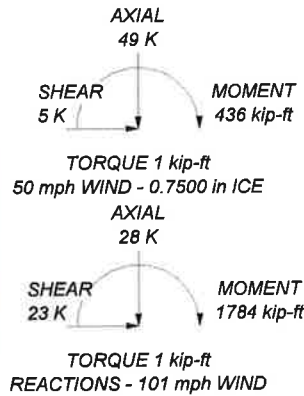
MATERIAL STRENGTH

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

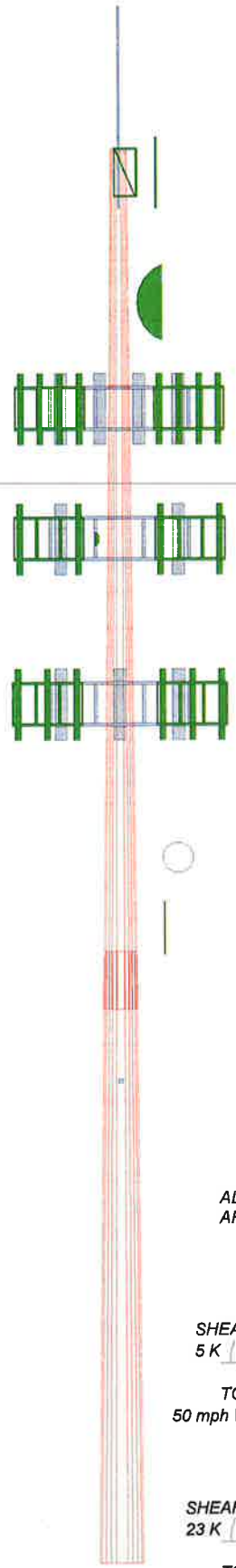
TOWER DESIGN NOTES

1. Tower is located in Middlesex County, Connecticut.
2. Tower designed for Exposure B to the TIA-222-G Standard.
3. Tower designed for a 101 mph basic wind in accordance with the TIA-222-G Standard.
4. Tower is also designed for a 50 mph basic wind with 0.75 in ice. Ice is considered to increase in thickness with height.
5. Deflections are based upon a 60 mph wind.
6. Tower Structure Class II.
7. Topographic Category 1 with Crest Height of 0.00 ft
8. TOWER RATING: 58.6%

ALL REACTIONS ARE FACTORED



Section	Length (ft)	Number of Sides	Thickness (in)	Socket Length (ft)	Top Dia (in)	Bot Dia (in)	Grade	Weight (K)
1	20.00	12	0.1875	15.0403	20.2630		A572-65	0.7
2	52.92	12	0.2913	4.92	20.2630	33.1300	A572-65	4.3
3	52.00	12	0.3750	31.3720	44.0000		A572-65	8.0
								13.0



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Job: **BU# 806364**
 Project:
 Client: CCI Drawn by: agholami App'd:
 Code: TIA-222-G Date: 10/04/16 Scale: N
 Path:
 X:\ENR Work Area\85\enr\85\WVP\200354 WD 1308380\DA AGH\05284.rvt

Tower Input Data

There is a pole section.

This tower is designed using the TIA-222-G standard.

The following design criteria apply:

- 4) Tower is located in Middlesex County, Connecticut.
- 5) Basic wind speed of 101 mph.
- 6) Structure Class II.
- 7) Exposure Category B.
- 8) Topographic Category 1.
- 9) Crest Height 0.00 ft.
- 10) Nominal ice thickness of 0.7500 in.
- 11) Ice thickness is considered to increase with height.
- 12) Ice density of 56.00 pcf.
- 13) A wind speed of 50 mph is used in combination with ice.
- 14) Deflections calculated using a wind speed of 60 mph.
- 15) A non-linear (P-delta) analysis was used.
- 16) Pressures are calculated at each section.
- 17) Stress ratio used in pole design is 1.
- 18) Local bending stresses due to climbing loads, feed line supports, and appurtenance mounts are not considered.

Options

Consider Moments - Legs Consider Moments - Horizontals Consider Moments - Diagonals Use Moment Magnification ✓ Use Code Stress Ratios ✓ Use Code Safety Factors - Guys Escalate Ice Always Use Max Kz Use Special Wind Profile Include Bolts In Member Capacity Leg Bolts Are At Top Of Section Secondary Horizontal Braces Leg Use Diamond Inner Bracing (4 Sided) SR Members Have Cut Ends SR Members Are Concentric	Distribute Leg Loads As Uniform Assume Legs Pinned ✓ Assume Rigid Index Plate ✓ Use Clear Spans For Wind Area Use Clear Spans For KL/r Retension Guys To Initial Tension ✓ Bypass Mast Stability Checks ✓ Use Azimuth Dish Coefficients ✓ Project Wind Area of Appurt. Autocalc Torque Arm Areas Add IBC .6D+W Combination ✓ Sort Capacity Reports By Component Triangulate Diamond Inner Bracing Treat Feed Line Bundles As Cylinder	Use ASCE 10 X-Brace Ly Rules Calculate Redundant Bracing Forces Ignore Redundant Members in FEA SR Leg Bolts Resist Compression All Leg Panels Have Same Allowable Offset Girt At Foundation ✓ Consider Feed Line Torque Include Angle Block Shear Check Use TIA-222-G Bracing Resist. Exemption Use TIA-222-G Tension Splice Exemption <div style="text-align: center; border: 1px solid gray; padding: 2px;">Poles</div> ✓ Include Shear-Torsion Interaction Always Use Sub-Critical Flow Use Top Mounted Sockets
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Tapered Pole Section Geometry

Section	Elevation ft	Section Length ft	Splice Length ft	Number of Sides	Top Diameter in	Bottom Diameter in	Wall Thickness in	Bend Radius in	Pole Grade
L1	120.00-100.00	20.00	0.00	12	15.0403	20.2630	0.1875	0.7500	A572-65 (65 ksi)
L2	100.00-47.08	52.92	4.92	12	20.2630	33.1300	0.2813	1.1250	A572-65 (65 ksi)
L3	47.08-0.00	52.00		12	31.3720	44.0000	0.3750	1.5000	A572-65 (65 ksi)

Tapered Pole Properties

120 Ft Monopole Tower Structural Analysis
Project Number 1308390, Application 361327, Revision 2

Section	Tip Dia. in	Area in ²	I in ⁴	r in	C in	I/C in ³	J in ⁴	I/Q in ²	w in	w/t
L1	15.5709	8.9674	252.5039	5.3173	7.7909	32.4102	511.6414	4.4135	3.5283	18.818
	20.9778	12.1206	623.5083	7.1870	10.4962	59.4030	1263.3968	5.9654	4.9280	26.283
L2	20.9778	18.0960	922.2208	7.1535	10.4962	87.8621	1868.6694	8.9063	4.6767	16.628
	34.2987	29.7486	4097.2352	11.7599	17.1613	238.7480	8302.1094	14.6414	8.1251	28.889
L3	33.7148	37.4288	4590.1943	11.0969	16.2507	282.4616	9300.9781	18.4213	7.4027	19.741
	45.5522	52.6772	12796.152	15.6177	22.7920	561.4318	25928.474	25.9261	10.7870	28.765

Tower Elevation	Gusset Area (per face)	Gusset Thickness	Gusset Grade	Adjust. Factor A _r	Adjust. Factor A _r	Weight Mult.	Double Angle Stitch Bolt Spacing Diagonals	Double Angle Stitch Bolt Spacing Horizontals	Double Angle Stitch Bolt Spacing Redundants
ft	ft ²	in					in	in	in
L1 120.00-100.00				1	1	1			
L2 100.00-47.08				1	1	1			
L3 47.08-0.00				1	1	1			

Feed Line/Linear Appurtenances - Entered As Round Or Flat

Description	Section	Component Type	Placement ft	Total Number	Number Per Row	Start/End Position	Width or Diameter in	Perimeter in	Weight klf
04-001-55(23/64")	C	Surface Ar (CaAa)	87.00 - 0.00	1	1	0.000 0.200	0.3600		0.00
2" Rigid Conduit	C	Surface Ar (CaAa)	40.00 - 0.00	1	1	0.200 0.500	2.0000		0.00

Feed Line/Linear Appurtenances - Entered As Area

Description	Face or Leg	Allow Shield	Component Type	Placement ft	Total Number	C _A A _A ft ² /ft	Weight klf
LDF5-50A(7/8")	A	No	Inside Pole	118.00 - 0.00	3	No Ice 1/2" Ice 1" Ice	0.00 0.00 0.00

VXL5-50(7/8")	A	No	Inside Pole	107.00 - 0.00	1	No Ice 1/2" Ice 1" Ice	0.00 0.00 0.00

LDF5-50A(7/8")	C	No	Inside Pole	98.00 - 0.00	12	No Ice 1/2" Ice 1" Ice	0.00 0.00 0.00
HB158-1-08U8-S8J18(1-5/8)	C	No	Inside Pole	98.00 - 0.00	2	No Ice 1/2" Ice 1" Ice	0.00 0.00 0.00

LDF6-50A(1-1/4")	C	No	Inside Pole	87.00 - 0.00	6	No Ice 1/2" Ice 1" Ice	0.00 0.00 0.00

LDF5-50A(7/8")	A	No	Inside Pole	73.00 - 0.00	12	No Ice 1/2" Ice 1" Ice	0.00 0.00 0.00
VXL5-50(7/8")	A	No	Inside Pole	73.00 - 0.00	1	No Ice 1/2" Ice 1" Ice	0.00 0.00 0.00
L98B-002-XXX_DB(3/8")	A	No	Inside Pole	73.00 - 0.00	1	No Ice 1/2" Ice	0.00 0.00

Description	Face or Leg	Allow Shield	Component Type	Placement ft	Total Number		C _A A _A ft ² /ft	Weight kif
WR-VG86ST-BRD(3/4)	A	No	Inside Pole	73.00 - 0.00	2	1" Ice	0.00	0.00
						No Ice	0.00	0.00
						1/2" Ice	0.00	0.00
2" Conduit	A	No	Inside Pole	73.00 - 0.00	1	1" Ice	0.00	0.00
						No Ice	0.00	0.00
						1/2" Ice	0.00	0.00

LDF4-50A(1/2")	A	No	Inside Pole	50.00 - 0.00	1	No Ice	0.00	0.00
						1/2" Ice	0.00	0.00
						1" Ice	0.00	0.00
LDF5-50A(7/8")	A	No	Inside Pole	50.00 - 0.00	3	No Ice	0.00	0.00
						1/2" Ice	0.00	0.00
						1" Ice	0.00	0.00

LDF4-50A(1/2")	C	No	Inside Pole	40.00 - 0.00	1	No Ice	0.00	0.00
						1/2" Ice	0.00	0.00
						1" Ice	0.00	0.00

Feed Line/Linear Appurtenances Section Areas

Tower Section n	Tower Elevation ft	Face	A _R ft ²	A _F ft ²	C _A A _A In Face ft ²	C _A A _A Out Face ft ²	Weight K
L1	120.00-100.00	A	0.000	0.000	0.000	0.000	0.02
		B	0.000	0.000	0.000	0.000	0.00
		C	0.000	0.000	0.000	0.000	0.00
L2	100.00-47.08	A	0.000	0.000	0.000	0.000	0.24
		B	0.000	0.000	0.000	0.000	0.00
		C	0.000	0.000	1.437	0.000	0.49
L3	47.08-0.00	A	0.000	0.000	0.000	0.000	0.43
		B	0.000	0.000	0.000	0.000	0.00
		C	0.000	0.000	9.695	0.000	0.62

Feed Line/Linear Appurtenances Section Areas - With Ice

Tower Section n	Tower Elevation ft	Face or Leg	Ice Thickness in	A _R ft ²	A _F ft ²	C _A A _A In Face ft ²	C _A A _A Out Face ft ²	Weight K
L1	120.00-100.00	A	1.691	0.000	0.000	0.000	0.000	0.02
		B		0.000	0.000	0.000	0.000	0.00
		C		0.000	0.000	0.000	0.000	0.00
L2	100.00-47.08	A	1.622	0.000	0.000	0.000	0.000	0.24
		B		0.000	0.000	0.000	0.000	0.00
		C		0.000	0.000	14.385	0.000	0.65
L3	47.08-0.00	A	1.444	0.000	0.000	0.000	0.000	0.43
		B		0.000	0.000	0.000	0.000	0.00
		C		0.000	0.000	37.944	0.000	1.09

Feed Line Center of Pressure

Section	Elevation ft	CP _x in	CP _z in	CP _x Ice in	CP _z Ice in
L1	120.00-100.00	0.0000	0.0000	0.0000	0.0000
L2	100.00-47.08	-0.0087	0.0408	-0.0711	0.3345
L3	47.08-0.00	-0.1770	0.2336	-0.4327	0.7777

Shielding Factor Ka

Tower Section	Feed Line Record No.	Description	Feed Line Segment Elev.	K _a No Ice	K _a Ice
L2	9	04-001-55(23/64")	47.08 - 87.00	1.0000	1.0000
L2	21	2" Rigid Conduit	47.08 - 40.00	1.0000	1.0000

Discrete Tower Loads

Description	Face or Leg	Offset Type	Offsets: Horz Lateral Vert ft ft ft	Azimuth Adjustment t °	Placement ft	C _{AA} Front ft ²	C _{AA} Side ft ²	Weight K		
DB809MT3-XT	A	From Leg	3.00	0.00	118.00	No Ice	2.84	2.84	0.03	
			0.00			1/2"	4.29	4.29	0.05	
			7.00			Ice	5.75	5.75	0.08	
DB201-A	B	From Leg	3.00	0.00	118.00	1" Ice	1.10	1.10	0.03	
			0.00			1/2"	1.98	1.98	0.03	
			5.00			Ice	2.86	2.86	0.04	
6' x 2" Mount Pipe	A	From Leg	3.00	0.00	118.00	1" Ice	1.43	1.43	0.02	
			0.00			1/2"	1.92	1.92	0.03	
			0.00			Ice	2.29	2.29	0.05	
6' x 2" Mount Pipe	B	From Leg	3.00	0.00	118.00	1" Ice	1.43	1.43	0.02	
			0.00			1/2"	1.92	1.92	0.03	
			0.00			Ice	2.29	2.29	0.05	
Side Arm Mount [SO 102-3]	B	None		0.00	118.00	1" Ice	3.00	3.00	0.08	
						No Ice	3.48	3.48	0.11	
						1/2"	3.96	3.96	0.14	
Side Arm Mount [SO 701-1]	A	From Leg	0.00	0.00	118.00	1" Ice	0.85	1.67	0.07	
			0.00			1/2"	1.14	2.34	0.08	
			0.00			Ice	1.43	3.01	0.09	
Side Arm Mount [SO 701-1]	B	From Leg	0.00	0.00	118.00	1" Ice	0.85	1.67	0.07	
			0.00			1/2"	1.14	2.34	0.08	
			0.00			Ice	1.43	3.01	0.09	
***	Pipe Mount [PM 601-1]	B	None	0.00	107.00	1" Ice	3.00	0.90	0.07	
						1/2"	3.74	1.12	0.08	
						Ice	4.48	1.34	0.09	
***	(2) LPA-80080/6CF w/ Mount Pipe	A	From Leg	4.00	0.00	98.00	1" Ice	4.56	10.26	0.05
							1/2"	5.11	11.43	0.11
							2.00	Ice	5.61	12.31
(2) LPA-80080/6CF w/ Mount Pipe	B	From Leg	4.00	0.00	98.00	1" Ice	4.56	10.26	0.05	
			0.00			1/2"	5.11	11.43	0.11	
			2.00			Ice	5.61	12.31	0.19	

Description	Face or Leg	Offset Type	Offsets: Horz Lateral Vert ft ft ft	Azimuth Adjustment °	Placement ft		C _{AA} A Front ft ²	C _{AA} A Side ft ²	Weight K
LPA-80080/6CF w/ Mount Pipe	C	From Leg	4.00 0.00 2.00	0.00	98.00	1" Ice			
						No Ice	4.56	10.26	0.05
						1/2" Ice	5.11	11.43	0.11
RRH2X60-PCS	A	From Leg	4.00 0.00 2.00	0.00	98.00	1" Ice			
						No Ice	2.20	1.72	0.06
						1/2" Ice	2.39	1.90	0.08
RRH2X60-PCS	B	From Leg	4.00 0.00 2.00	0.00	98.00	1" Ice			
						No Ice	2.20	1.72	0.06
						1/2" Ice	2.39	1.90	0.08
RRH2X60-PCS	C	From Leg	4.00 0.00 2.00	0.00	98.00	1" Ice			
						No Ice	2.20	1.72	0.06
						1/2" Ice	2.39	1.90	0.08
(2) SBNHH-1D65B w/ Mount Pipe	A	From Leg	4.00 0.00 2.00	0.00	98.00	1" Ice			
						No Ice	8.39	7.08	0.08
						1/2" Ice	8.95	8.28	0.15
(2) SBNHH-1D65B w/ Mount Pipe	B	From Leg	4.00 0.00 2.00	0.00	98.00	1" Ice			
						No Ice	8.39	7.08	0.08
						1/2" Ice	8.95	8.28	0.15
(2) SBNHH-1D65B w/ Mount Pipe	C	From Leg	4.00 0.00 2.00	0.00	98.00	1" Ice			
						No Ice	8.39	7.08	0.08
						1/2" Ice	8.95	8.28	0.15
LPA-80080/6CF w/ Mount Pipe	C	From Leg	4.00 0.00 2.00	0.00	98.00	1" Ice			
						No Ice	4.56	10.26	0.05
						1/2" Ice	5.11	11.43	0.11
B13 RRH4X30-4R	A	From Leg	4.00 0.00 2.00	0.00	98.00	1" Ice			
						No Ice	2.16	1.62	0.06
						1/2" Ice	2.35	1.79	0.08
B13 RRH4X30-4R	B	From Leg	4.00 0.00 2.00	0.00	98.00	1" Ice			
						No Ice	2.16	1.62	0.06
						1/2" Ice	2.35	1.79	0.08
B13 RRH4X30-4R	C	From Leg	4.00 0.00 2.00	0.00	98.00	1" Ice			
						No Ice	2.16	1.62	0.06
						1/2" Ice	2.35	1.79	0.08
B66A RRH4X45	A	From Leg	4.00 0.00 2.00	0.00	98.00	1" Ice			
						No Ice	2.58	1.63	0.07
						1/2" Ice	2.79	1.81	0.09
B66A RRH4X45	B	From Leg	4.00 0.00 2.00	0.00	98.00	1" Ice			
						No Ice	2.58	1.63	0.07
						1/2" Ice	2.79	1.81	0.09
B66A RRH4X45	C	From Leg	4.00 0.00 2.00	0.00	98.00	1" Ice			
						No Ice	2.58	1.63	0.07
						1/2" Ice	2.79	1.81	0.09
(2) RXXDC-3315-PF-48	C	From Leg	4.00 0.00 2.00	0.00	98.00	1" Ice			
						No Ice	3.01	1.96	0.02
						1/2" Ice	3.23	2.15	0.05
Platform Mount [LP 602-1]	C	None		0.00	98.00	1" Ice			
						No Ice	32.03	32.03	1.34
						1/2" Ice	38.71	38.71	1.80
						Ice	45.39	45.39	2.26
						1" Ice			

Description	Face or Leg	Offset Type	Offsets:		Azimuth Adjustment	Placement	C _A A _A Front	C _A A _A Side	Weight	
			Horz	Vert						
			ft	ft		ft	ft ²	ft ²	K	
			ft	ft						

(2) DB980H90E-M w/ Mount Pipe	A	From Leg	4.00	0.00	0.00	87.00	No Ice	4.04	3.62	0.03
			0.00				1/2"	4.50	4.48	0.07
			2.00				Ice	4.95	5.22	0.11
(2) DB980H90E-M w/ Mount Pipe	B	From Leg	4.00	0.00	0.00	87.00	1" Ice	4.04	3.62	0.03
			0.00				No Ice	4.50	4.48	0.07
			2.00				1/2"	4.95	5.22	0.11
(2) DB980H90E-M w/ Mount Pipe	C	From Leg	4.00	0.00	0.00	87.00	Ice	4.04	3.62	0.03
			0.00				1/2"	4.50	4.48	0.07
			2.00				Ice	4.95	5.22	0.11
6' x 2" Mount Pipe	C	From Leg	0.00	0.00	0.00	87.00	1" Ice	1.43	1.43	0.02
			0.00				No Ice	1.92	1.92	0.03
			0.00				1/2"	2.29	2.29	0.05
Platform Mount [LP 602-1]	C	None			0.00	87.00	1" Ice	32.03	32.03	1.34
							No Ice	38.71	38.71	1.80
							1/2"	45.39	45.39	2.26

AM-X-CD-16-65-00T-RET w/ Mount Pipe	A	From Leg	4.00	0.00	0.00	73.00	No Ice	8.26	6.30	0.07
			0.00				1/2"	8.82	7.48	0.14
			1.00				Ice	9.35	8.37	0.21
AM-X-CD-16-65-00T-RET w/ Mount Pipe	B	From Leg	4.00	0.00	0.00	73.00	1" Ice	8.26	6.30	0.07
			0.00				No Ice	8.82	7.48	0.14
			1.00				1/2"	9.35	8.37	0.21
AM-X-CD-16-65-00T-RET w/ Mount Pipe	C	From Leg	4.00	0.00	0.00	73.00	Ice	8.26	6.30	0.07
			0.00				1/2"	8.82	7.48	0.14
			1.00				Ice	9.35	8.37	0.21
(2) 7770.00 w/ Mount Pipe	A	From Leg	4.00	0.00	0.00	73.00	1" Ice	5.75	4.25	0.06
			0.00				No Ice	6.18	5.01	0.10
			1.00				1/2"	6.61	5.71	0.16
(2) 7770.00 w/ Mount Pipe	B	From Leg	4.00	0.00	0.00	73.00	Ice	5.75	4.25	0.06
			0.00				No Ice	6.18	5.01	0.10
			1.00				1/2"	6.61	5.71	0.16
(2) 7770.00 w/ Mount Pipe	C	From Leg	4.00	0.00	0.00	73.00	1" Ice	5.75	4.25	0.06
			0.00				No Ice	6.18	5.01	0.10
			1.00				1/2"	6.61	5.71	0.16
DB636-C	B	From Leg	4.00	0.00	0.00	73.00	Ice	2.51	2.51	0.03
			0.00				No Ice	3.59	3.59	0.05
			6.00				1/2"	4.68	4.68	0.07
RRUS 11	A	From Leg	4.00	0.00	0.00	73.00	1" Ice	2.78	1.19	0.05
			0.00				No Ice	2.99	1.33	0.07
			0.00				Ice	3.21	1.49	0.09
RRUS 11	A	From Leg	4.00	0.00	0.00	73.00	1" Ice	2.78	1.19	0.05
			0.00				No Ice	2.99	1.33	0.07
			1.00				Ice	3.21	1.49	0.09
(2) RRUS 11	B	From Leg	4.00	0.00	0.00	73.00	1" Ice	2.78	1.19	0.05
			0.00				No Ice	2.99	1.33	0.07
			0.00				Ice	3.21	1.49	0.09
(2) RRUS 11	C	From Leg	4.00	0.00	0.00	73.00	1" Ice	2.78	1.19	0.05
			0.00				No Ice	2.99	1.33	0.07
			0.00				Ice	3.21	1.49	0.09

Description	Face or Leg	Offset Type	Offsets:		Azimuth Adjustment	Placement	C _A A _A Front	C _A A _A Side	Weight	
			Horz	Lateral						Vert
			ft	ft						
(4) LGP21903	A	From Leg	4.00	0.00	0.00	73.00	1" Ice	0.23	0.16	0.01
			0.00	0.00			No Ice	0.29	0.21	0.01
			0.00	0.00			1/2" Ice	0.36	0.28	0.02
(2) LGP21903	C	From Leg	4.00	0.00	0.00	73.00	1" Ice	0.23	0.16	0.01
			0.00	0.00			No Ice	0.29	0.21	0.01
			0.00	0.00			1/2" Ice	0.36	0.28	0.02
(2) LGP21401	A	From Leg	4.00	0.00	0.00	73.00	1" Ice	1.10	0.21	0.01
			0.00	0.00			No Ice	1.24	0.27	0.02
			0.00	0.00			1/2" Ice	1.38	0.35	0.03
(2) LGP21401	B	From Leg	4.00	0.00	0.00	73.00	1" Ice	1.10	0.21	0.01
			0.00	0.00			No Ice	1.24	0.27	0.02
			0.00	0.00			1/2" Ice	1.38	0.35	0.03
(2) LGP21401	C	From Leg	4.00	0.00	0.00	73.00	1" Ice	1.10	0.21	0.01
			0.00	0.00			No Ice	1.24	0.27	0.02
			0.00	0.00			1/2" Ice	1.38	0.35	0.03
DC6-48-60-18-8F	A	From Leg	4.00	0.00	1.00	73.00	1" Ice	0.79	0.79	0.02
			0.00	0.00			No Ice	1.27	1.27	0.04
			1.00	0.00			1/2" Ice	1.45	1.45	0.05
Platform Mount [LP 1201-1]	C	None			0.00	73.00	1" Ice	23.10	23.10	2.10
							No Ice	26.80	26.80	2.50
							1/2" Ice	30.50	30.50	2.90

PD1142-1	A	From Leg	3.00	0.00	7.00	50.00	1" Ice	1.32	1.32	0.01
			0.00	0.00			No Ice	3.21	3.21	0.02
			7.00	0.00			1/2" Ice	5.12	5.12	0.05
DB492A	A	From Leg	3.00	0.00	0.00	50.00	1" Ice	1.10	1.10	0.01
			0.00	0.00			No Ice	1.98	1.98	0.01
			0.00	0.00			1/2" Ice	2.86	2.86	0.01
ASP-655	B	From Leg	3.00	0.00	4.00	50.00	1" Ice	0.56	0.56	0.00
			0.00	0.00			No Ice	1.02	1.02	0.01
			4.00	0.00			1/2" Ice	1.30	1.30	0.01
PD1121-6	C	From Leg	3.00	0.00	3.00	50.00	1" Ice	0.23	0.23	0.00
			0.00	0.00			No Ice	0.41	0.41	0.00
			3.00	0.00			1/2" Ice	0.60	0.60	0.00
Side Arm Mount [SO 701-3]	C	None			0.00	50.00	1" Ice	2.83	2.83	0.20
							No Ice	3.92	3.92	0.24
							1/2" Ice	5.01	5.01	0.28

EPSILON GPS ANTENNA 35 DB	A	From Leg	3.00	0.00	1.00	40.00	1" Ice	0.11	0.11	0.00
			0.00	0.00			No Ice	0.16	0.16	0.00
			1.00	0.00			1/2" Ice	0.21	0.21	0.00
Side Arm Mount [SO 701-1]	A	None			0.00	40.00	1" Ice	0.85	1.67	0.07
							No Ice	1.14	2.34	0.08
							1/2" Ice	1.43	3.01	0.09
*										

Dishes

Description	Face or Leg	Dish Type	Offset Type	Offsets:		Azimuth Adjustment	3 dB Beam Width	Elevation	Outside Diameter	Aperture Area	Weight
				Horz Lateral	Vert						
				ft	°	°	ft	ft	ft ²	K	
GLF6-450	B	Grid	From Leg	1.00	0.00	0.00	107.00	6.40	No Ice	32.17	0.20
				0.00					1/2" Ice	33.01	0.37
				0.00					1" Ice	33.86	0.54
RADWIN 2000C	C	Paraboloid w/o Radome	From Leg	1.00	0.00	0.00	87.00	1.22	No Ice	1.16	0.01
				0.00					1/2" Ice	1.33	0.01
				0.00					1" Ice	1.49	0.02

Tower Pressures - No Ice

$G_H = 1.100$

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	$C_A A_A$ Out Face
ft	ft		ksf	ft ²		ft ²	ft ²	ft ²		ft ²	ft ²
L1 120.00-100.00	109.51	1.014	0.03	30.457	A	0.000	30.457	30.457	100.00	0.000	0.000
					B	0.000	30.457	100.00	0.000	0.000	
					C	0.000	30.457	100.00	0.000	0.000	
L2 100.00-47.08	72.10	0.9	0.02	121.877	A	0.000	121.877	121.877	100.00	0.000	0.000
					B	0.000	121.877	100.00	0.000	0.000	
					C	0.000	121.877	100.00	1.437	0.000	
L3 47.08-0.00	22.63	0.7	0.02	155.506	A	0.000	155.506	155.506	100.00	0.000	0.000
					B	0.000	155.506	100.00	0.000	0.000	
					C	0.000	155.506	100.00	9.695	0.000	

Tower Pressure - With Ice

$G_H = 1.100$

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	$C_A A_A$ Out Face
ft	ft		ksf	in	ft ²		ft ²	ft ²	ft ²		ft ²	ft ²
L1 120.00-100.00	109.51	1.014	0.01	1.6912	36.094	A	0.000	36.094	36.094	100.00	0.000	0.000
						B	0.000	36.094	100.00	0.000	0.000	
						C	0.000	36.094	100.00	0.000	0.000	
L2 100.00-47.08	72.10	0.9	0.01	1.6219	136.182	A	0.000	136.182	136.182	100.00	0.000	0.000
						B	0.000	136.182	100.00	0.000	0.000	
						C	0.000	136.182	100.00	14.385	0.000	
L3 47.08-0.00	22.63	0.7	0.00	1.4445	168.234	A	0.000	168.234	168.234	100.00	0.000	0.000
						B	0.000	168.234	100.00	0.000	0.000	
						C	0.000	168.234	100.00	37.944	0.000	

Tower Pressure - Service

$G_H = 1.100$

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	$C_A A_A$ Out Face
ft	ft		ksf	ft ²		ft ²	ft ²	ft ²		ft ²	ft ²

120 Ft Monopole Tower Structural Analysis
 Project Number 1308390, Application 361327, Revision 2

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		ksf	ft ²		ft ²	ft ²	ft ²			
L1 120.00- 100.00	109.51	1.014	0.01	30.457	A	0.000	30.457	30.457	100.00	0.000	0.000
					B	0.000	30.457	100.00	0.000	0.000	
					C	0.000	30.457	100.00	0.000	0.000	
L2 100.00- 47.08	72.10	0.9	0.01	121.877	A	0.000	121.877	121.877	100.00	0.000	0.000
					B	0.000	121.877	100.00	0.000	0.000	
					C	0.000	121.877	100.00	1.437	0.000	
L3 47.08-0.00	22.63	0.7	0.01	155.506	A	0.000	155.506	155.506	100.00	0.000	0.000
					B	0.000	155.506	100.00	0.000	0.000	
					C	0.000	155.506	100.00	9.695	0.000	

Load Combinations

Comb. No.	Description
1	Dead Only
2	1.2 Dead+1.6 Wind 0 deg - No Ice
3	0.9 Dead+1.6 Wind 0 deg - No Ice
4	1.2 Dead+1.6 Wind 30 deg - No Ice
5	0.9 Dead+1.6 Wind 30 deg - No Ice
6	1.2 Dead+1.6 Wind 60 deg - No Ice
7	0.9 Dead+1.6 Wind 60 deg - No Ice
8	1.2 Dead+1.6 Wind 90 deg - No Ice
9	0.9 Dead+1.6 Wind 90 deg - No Ice
10	1.2 Dead+1.6 Wind 120 deg - No Ice
11	0.9 Dead+1.6 Wind 120 deg - No Ice
12	1.2 Dead+1.6 Wind 150 deg - No Ice
13	0.9 Dead+1.6 Wind 150 deg - No Ice
14	1.2 Dead+1.6 Wind 180 deg - No Ice
15	0.9 Dead+1.6 Wind 180 deg - No Ice
16	1.2 Dead+1.6 Wind 210 deg - No Ice
17	0.9 Dead+1.6 Wind 210 deg - No Ice
18	1.2 Dead+1.6 Wind 240 deg - No Ice
19	0.9 Dead+1.6 Wind 240 deg - No Ice
20	1.2 Dead+1.6 Wind 270 deg - No Ice
21	0.9 Dead+1.6 Wind 270 deg - No Ice
22	1.2 Dead+1.6 Wind 300 deg - No Ice
23	0.9 Dead+1.6 Wind 300 deg - No Ice
24	1.2 Dead+1.6 Wind 330 deg - No Ice
25	0.9 Dead+1.6 Wind 330 deg - No Ice
26	1.2 Dead+1.0 Ice
27	1.2 Dead+1.0 Wind 0 deg+1.0 Ice
28	1.2 Dead+1.0 Wind 30 deg+1.0 Ice
29	1.2 Dead+1.0 Wind 60 deg+1.0 Ice
30	1.2 Dead+1.0 Wind 90 deg+1.0 Ice
31	1.2 Dead+1.0 Wind 120 deg+1.0 Ice
32	1.2 Dead+1.0 Wind 150 deg+1.0 Ice
33	1.2 Dead+1.0 Wind 180 deg+1.0 Ice
34	1.2 Dead+1.0 Wind 210 deg+1.0 Ice
35	1.2 Dead+1.0 Wind 240 deg+1.0 Ice
36	1.2 Dead+1.0 Wind 270 deg+1.0 Ice
37	1.2 Dead+1.0 Wind 300 deg+1.0 Ice
38	1.2 Dead+1.0 Wind 330 deg+1.0 Ice
39	Dead+Wind 0 deg - Service
40	Dead+Wind 30 deg - Service
41	Dead+Wind 60 deg - Service
42	Dead+Wind 90 deg - Service
43	Dead+Wind 120 deg - Service
44	Dead+Wind 150 deg - Service
45	Dead+Wind 180 deg - Service
46	Dead+Wind 210 deg - Service
47	Dead+Wind 240 deg - Service
48	Dead+Wind 270 deg - Service
49	Dead+Wind 300 deg - Service
50	Dead+Wind 330 deg - Service

Maximum Member Forces

Section No.	Elevation ft	Component Type	Condition	Gov. Load Comb.	Axial K	Major Axis Moment kip-ft	Minor Axis Moment kip-ft
L1	120 - 100	Pole	Max Tension	36	0.00	0.00	-0.00
			Max. Compression	26	-3.46	-1.76	-0.10
			Max. Mx	8	-1.38	-31.96	-0.38
			Max. My	14	-1.40	-1.11	-29.69
			Max. Vy	8	2.88	-31.96	-0.38
			Max. Vx	14	2.66	-1.11	-29.69
			Max. Torque	2			-1.62
L2	100 - 47.0833	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	26	-32.72	-0.87	-0.47
			Max. Mx	8	-15.18	-687.47	-0.90
			Max. My	14	-15.21	-4.77	-671.60
			Max. Vy	8	18.35	-687.47	-0.90
			Max. Vx	2	-18.06	-0.35	671.34
			Max. Torque	2			-1.62
L3	47.0833 - 0	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	26	-49.36	-0.40	-0.86
			Max. Mx	8	-27.67	-1778.72	-1.04
			Max. My	14	-27.67	-8.45	-1748.13
			Max. Vy	8	23.42	-1778.72	-1.04
			Max. Vx	2	-23.14	-1.46	1747.79
			Max. Torque	2			-1.34

Maximum Reactions

Location	Condition	Gov. Load Comb.	Vertical K	Horizontal, X K	Horizontal, Z K
Pole	Max. Vert	37	49.36	4.66	2.68
	Max. H _x	20	27.69	23.37	-0.01
	Max. H _z	2	27.69	-0.02	23.12
	Max. M _x	2	1747.79	-0.02	23.12
	Max. M _z	8	1778.72	-23.40	-0.00
	Max. Torsion	14	1.28	-0.07	-23.11
	Min. Vert	5	20.77	-11.64	19.86
	Min. H _x	8	27.69	-23.40	-0.00
	Min. H _z	14	27.69	-0.07	-23.11
	Min. M _x	14	-1748.13	-0.07	-23.11
	Min. M _z	20	-1776.25	23.37	-0.01
	Min. Torsion	2	-1.34	-0.02	23.12

Tower Mast Reaction Summary

Load Combination	Vertical K	Shear _x K	Shear _z K	Overtuning Moment, M _x kip-ft	Overtuning Moment, M _z kip-ft	Torque kip-ft
Dead Only	23.07	0.00	0.00	0.08	-0.19	0.00
1.2 Dead+1.6 Wind 0 deg - No Ice	27.69	0.02	-23.12	-1747.79	-1.46	1.34
0.9 Dead+1.6 Wind 0 deg - No Ice	20.77	0.02	-23.12	-1736.24	-1.39	1.33
1.2 Dead+1.6 Wind 30 deg - No Ice	27.69	11.64	-19.86	-1495.69	-882.77	0.91
0.9 Dead+1.6 Wind 30 deg - No Ice	20.77	11.64	-19.86	-1485.83	-876.85	0.90
1.2 Dead+1.6 Wind 60 deg - No Ice	27.69	20.19	-11.51	-868.18	-1532.00	0.82

120 Ft Monopole Tower Structural Analysis
 Project Number 1308390, Application 361327, Revision 2

Load Combination	Vertical K	Shear _x K	Shear _z K	Overturing Moment, M _x kip-ft	Overturing Moment, M _z kip-ft	Torque kip-ft
0.9 Dead+1.6 Wind 60 deg - No Ice	20.77	20.19	-11.51	-862.46	-1521.77	0.81
1.2 Dead+1.6 Wind 90 deg - No Ice	27.69	23.40	0.00	1.04	-1778.72	0.34
0.9 Dead+1.6 Wind 90 deg - No Ice	20.77	23.40	0.00	1.00	-1766.84	0.34
1.2 Dead+1.6 Wind 120 deg - No Ice	27.69	20.35	11.63	882.71	-1550.22	-0.50
0.9 Dead+1.6 Wind 120 deg - No Ice	20.77	20.35	11.63	876.82	-1539.85	-0.49
1.2 Dead+1.6 Wind 150 deg - No Ice	27.69	11.71	20.11	1524.46	-891.14	-1.20
0.9 Dead+1.6 Wind 150 deg - No Ice	20.77	11.71	20.11	1514.32	-885.15	-1.19
1.2 Dead+1.6 Wind 180 deg - No Ice	27.69	0.07	23.11	1748.13	-8.45	-1.28
0.9 Dead+1.6 Wind 180 deg - No Ice	20.77	0.07	23.11	1736.53	-8.32	-1.27
1.2 Dead+1.6 Wind 210 deg - No Ice	27.69	-11.48	19.93	1503.70	864.73	-0.86
0.9 Dead+1.6 Wind 210 deg - No Ice	20.77	-11.48	19.93	1493.73	859.07	-0.85
1.2 Dead+1.6 Wind 240 deg - No Ice	27.69	-20.13	11.53	870.26	1525.74	-0.84
0.9 Dead+1.6 Wind 240 deg - No Ice	20.77	-20.13	11.53	864.48	1515.69	-0.84
1.2 Dead+1.6 Wind 270 deg - No Ice	27.69	-23.37	0.01	0.82	1776.25	-0.47
0.9 Dead+1.6 Wind 270 deg - No Ice	20.77	-23.37	0.01	0.79	1764.51	-0.47
1.2 Dead+1.6 Wind 300 deg - No Ice	27.69	-20.24	-11.62	-881.31	1537.85	0.46
0.9 Dead+1.6 Wind 300 deg - No Ice	20.77	-20.24	-11.62	-875.49	1527.69	0.46
1.2 Dead+1.6 Wind 330 deg - No Ice	27.69	-11.67	-20.13	-1526.69	886.49	1.28
0.9 Dead+1.6 Wind 330 deg - No Ice	20.77	-11.67	-20.13	-1516.58	880.66	1.27
1.2 Dead+1.0 Ice	49.36	0.00	0.00	0.86	-0.40	-0.00
1.2 Dead+1.0 Wind 0 deg+1.0 Ice	49.36	-0.28	-5.26	-422.65	32.13	0.16
1.2 Dead+1.0 Wind 30 deg+1.0 Ice	49.36	2.57	-4.41	-350.16	-205.98	0.33
1.2 Dead+1.0 Wind 60 deg+1.0 Ice	49.36	4.51	-2.56	-202.90	-362.36	0.19
1.2 Dead+1.0 Wind 90 deg+1.0 Ice	49.36	5.23	-0.01	0.01	-421.22	-0.03
1.2 Dead+1.0 Wind 120 deg+1.0 Ice	49.36	4.57	2.61	210.62	-368.98	-0.40
1.2 Dead+1.0 Wind 150 deg+1.0 Ice	49.36	2.61	4.50	361.82	-210.26	-0.66
1.2 Dead+1.0 Wind 180 deg+1.0 Ice	49.36	0.03	5.16	412.98	-3.42	-0.58
1.2 Dead+1.0 Wind 210 deg+1.0 Ice	49.36	-2.56	4.42	352.25	203.61	-0.32
1.2 Dead+1.0 Wind 240 deg+1.0 Ice	49.36	-4.72	2.37	183.34	385.97	0.24
1.2 Dead+1.0 Wind 270 deg+1.0 Ice	49.36	-5.34	-0.18	-19.38	432.39	0.42
1.2 Dead+1.0 Wind 300 deg+1.0 Ice	49.36	-4.66	-2.68	-216.29	378.72	0.39
1.2 Dead+1.0 Wind 330 deg+1.0 Ice	49.36	-2.82	-4.51	-360.68	233.32	0.26
Dead+Wind 0 deg - Service	23.07	0.00	-4.56	-343.56	-0.45	0.26
Dead+Wind 30 deg - Service	23.07	2.30	-3.92	-294.00	-173.71	0.18
Dead+Wind 60 deg - Service	23.07	3.98	-2.27	-170.63	-301.36	0.16
Dead+Wind 90 deg - Service	23.07	4.62	0.00	0.26	-349.87	0.07
Dead+Wind 120 deg - Service	23.07	4.02	2.29	173.61	-304.94	-0.10

Load Combination	Vertical	Shear _x	Shear _z	Overturing Moment, M _x	Overturing Moment, M _z	Torque
	K	K	K	kip-ft	kip-ft	kip-ft
Dead+Wind 150 deg - Service	23.07	2.31	3.97	299.78	-175.36	-0.24
Dead+Wind 180 deg - Service	23.07	0.01	4.56	343.75	-1.82	-0.25
Dead+Wind 210 deg - Service	23.07	-2.26	3.93	295.69	169.85	-0.17
Dead+Wind 240 deg - Service	23.07	-3.97	2.27	171.16	299.81	-0.17
Dead+Wind 270 deg - Service	23.07	-4.61	0.00	0.22	349.06	-0.09
Dead+Wind 300 deg - Service	23.07	-3.99	-2.29	-173.21	302.19	0.09
Dead+Wind 330 deg - Service	23.07	-2.30	-3.97	-300.10	174.13	0.25

Solution Summary

Load Comb.	Sum of Applied Forces			Sum of Reactions			% Error
	PX K	PY K	PZ K	PX K	PY K	PZ K	
1	0.00	-23.07	0.00	0.00	23.07	0.00	0.000%
2	0.02	-27.69	-23.12	-0.02	27.69	23.12	0.000%
3	0.02	-20.77	-23.12	-0.02	20.77	23.12	0.000%
4	11.64	-27.69	-19.86	-11.64	27.69	19.86	0.000%
5	11.64	-20.77	-19.86	-11.64	20.77	19.86	0.000%
6	20.19	-27.69	-11.51	-20.19	27.69	11.51	0.000%
7	20.19	-20.77	-11.51	-20.19	20.77	11.51	0.000%
8	23.40	-27.69	0.00	-23.40	27.69	-0.00	0.000%
9	23.40	-20.77	0.00	-23.40	20.77	-0.00	0.000%
10	20.35	-27.69	11.63	-20.35	27.69	-11.63	0.000%
11	20.35	-20.77	11.63	-20.35	20.77	-11.63	0.000%
12	11.71	-27.69	20.11	-11.71	27.69	-20.11	0.000%
13	11.71	-20.77	20.11	-11.71	20.77	-20.11	0.000%
14	0.07	-27.69	23.11	-0.07	27.69	-23.11	0.000%
15	0.07	-20.77	23.11	-0.07	20.77	-23.11	0.000%
16	-11.48	-27.69	19.93	11.48	27.69	-19.93	0.000%
17	-11.48	-20.77	19.93	11.48	20.77	-19.93	0.000%
18	-20.13	-27.69	11.53	20.13	27.69	-11.53	0.000%
19	-20.13	-20.77	11.53	20.13	20.77	-11.53	0.000%
20	-23.37	-27.69	0.01	23.37	27.69	-0.01	0.000%
21	-23.37	-20.77	0.01	23.37	20.77	-0.01	0.000%
22	-20.24	-27.69	-11.62	20.24	27.69	11.62	0.000%
23	-20.24	-20.77	-11.62	20.24	20.77	11.62	0.000%
24	-11.67	-27.69	-20.13	11.67	27.69	20.13	0.000%
25	-11.67	-20.77	-20.13	11.67	20.77	20.13	0.000%
26	0.00	-49.36	0.00	0.00	49.36	0.00	0.000%
27	-0.28	-49.36	-5.26	0.28	49.36	5.26	0.000%
28	2.57	-49.36	-4.41	-2.57	49.36	4.41	0.000%
29	4.51	-49.36	-2.56	-4.51	49.36	2.56	0.000%
30	5.23	-49.36	-0.01	-5.23	49.36	0.01	0.000%
31	4.57	-49.36	2.61	-4.57	49.36	-2.61	0.000%
32	2.61	-49.36	4.50	-2.61	49.36	-4.50	0.000%
33	0.03	-49.36	5.16	-0.03	49.36	-5.16	0.000%
34	-2.56	-49.36	4.42	2.56	49.36	-4.42	0.000%
35	-4.72	-49.36	2.37	4.72	49.36	-2.37	0.000%
36	-5.34	-49.36	-0.18	5.34	49.36	0.18	0.000%
37	-4.66	-49.36	-2.68	4.66	49.36	2.68	0.000%
38	-2.82	-49.36	-4.51	2.82	49.36	4.51	0.000%
39	0.00	-23.07	-4.56	-0.00	23.07	4.56	0.000%
40	2.30	-23.07	-3.92	-2.30	23.07	3.92	0.000%
41	3.98	-23.07	-2.27	-3.98	23.07	2.27	0.000%
42	4.62	-23.07	0.00	-4.62	23.07	-0.00	0.000%
43	4.02	-23.07	2.29	-4.02	23.07	-2.29	0.000%
44	2.31	-23.07	3.97	-2.31	23.07	-3.97	0.000%
45	0.01	-23.07	4.56	-0.01	23.07	-4.56	0.000%
46	-2.26	-23.07	3.93	2.26	23.07	-3.93	0.000%

Load Comb.	Sum of Applied Forces			Sum of Reactions			% Error
	PX K	PY K	PZ K	PX K	PY K	PZ K	
47	-3.97	-23.07	2.27	3.97	23.07	-2.27	0.000%
48	-4.61	-23.07	0.00	4.61	23.07	-0.00	0.000%
49	-3.99	-23.07	-2.29	3.99	23.07	2.29	0.000%
50	-2.30	-23.07	-3.97	2.30	23.07	3.97	0.000%

Non-Linear Convergence Results

Load Combination	Converged?	Number of Cycles	Displacement Tolerance	Force Tolerance
1	Yes	4	0.00000001	0.00000001
2	Yes	4	0.00000001	0.00082465
3	Yes	4	0.00000001	0.00051149
4	Yes	5	0.00000001	0.00014604
5	Yes	5	0.00000001	0.00006423
6	Yes	5	0.00000001	0.00012970
7	Yes	5	0.00000001	0.00005625
8	Yes	4	0.00000001	0.00030004
9	Yes	4	0.00000001	0.00018581
10	Yes	5	0.00000001	0.00014046
11	Yes	5	0.00000001	0.00006075
12	Yes	5	0.00000001	0.00015551
13	Yes	5	0.00000001	0.00006806
14	Yes	4	0.00000001	0.00085917
15	Yes	4	0.00000001	0.00053238
16	Yes	5	0.00000001	0.00012466
17	Yes	5	0.00000001	0.00005439
18	Yes	5	0.00000001	0.00014868
19	Yes	5	0.00000001	0.00006530
20	Yes	4	0.00000001	0.00035484
21	Yes	4	0.00000001	0.00022031
22	Yes	5	0.00000001	0.00014622
23	Yes	5	0.00000001	0.00006374
24	Yes	5	0.00000001	0.00013025
25	Yes	5	0.00000001	0.00005633
26	Yes	4	0.00000001	0.00000001
27	Yes	4	0.00000001	0.00006153
28	Yes	4	0.00000001	0.00036454
29	Yes	4	0.00000001	0.00021943
30	Yes	4	0.00000001	0.00008400
31	Yes	4	0.00000001	0.00024677
32	Yes	4	0.00000001	0.00047994
33	Yes	4	0.00000001	0.00030121
34	Yes	4	0.00000001	0.00021736
35	Yes	4	0.00000001	0.00020920
36	Yes	4	0.00000001	0.00019105
37	Yes	4	0.00000001	0.00038408
38	Yes	4	0.00000001	0.00028240
39	Yes	4	0.00000001	0.00003953
40	Yes	4	0.00000001	0.00006188
41	Yes	4	0.00000001	0.00003967
42	Yes	4	0.00000001	0.00001440
43	Yes	4	0.00000001	0.00004429
44	Yes	4	0.00000001	0.00007045
45	Yes	4	0.00000001	0.00003891
46	Yes	4	0.00000001	0.00003787
47	Yes	4	0.00000001	0.00006287
48	Yes	4	0.00000001	0.00001725
49	Yes	4	0.00000001	0.00005341
50	Yes	4	0.00000001	0.00004355

Maximum Tower Deflections - Service Wind

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
L1	120 - 100	11.94	43	0.80	0.01
L2	100 - 47.0833	8.62	43	0.77	0.00
L3	52 - 0	2.31	43	0.41	0.00

Critical Deflections and Radius of Curvature - Service Wind

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
118.00	DB809MT3-XT	43	11.61	0.80	0.00	72212
107.00	GLF6-450	43	9.77	0.79	0.00	27773
98.00	(2) LPA-80080/6CF w/ Mount Pipe	43	8.30	0.77	0.00	16223
87.00	RADWIN 2000C	43	6.59	0.71	0.00	10457
73.00	AM-X-CD-16-65-00T-RET w/ Mount Pipe	43	4.62	0.60	0.00	7196
50.00	PD1142-1	43	2.14	0.40	0.00	5132
40.00	EPSILON GPS ANTENNA 35 DB	43	1.43	0.31	0.00	6373

Maximum Tower Deflections - Design Wind

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
L1	120 - 100	60.61	10	4.06	0.03
L2	100 - 47.0833	43.80	10	3.93	0.01
L3	52 - 0	11.77	10	2.11	0.00

Critical Deflections and Radius of Curvature - Design Wind

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
118.00	DB809MT3-XT	10	58.91	4.06	0.03	14900
107.00	GLF6-450	10	49.60	4.01	0.02	5730
98.00	(2) LPA-80080/6CF w/ Mount Pipe	10	42.17	3.89	0.01	3324
87.00	RADWIN 2000C	10	33.50	3.60	0.01	2103
73.00	AM-X-CD-16-65-00T-RET w/ Mount Pipe	10	23.50	3.06	0.01	1431
50.00	PD1142-1	10	10.91	2.02	0.00	1011
40.00	EPSILON GPS ANTENNA 35 DB	10	7.29	1.58	0.00	1254

Compression Checks

Pole Design Data

Section No.	Elevation ft	Size	L ft	L _u ft	Kl/r	A in ²	P _u K	φP _n K	Ratio P _u / φP _n
L1	120 - 100 (1)	TP20.263x15.0403x0.187 5	20.00	0.00	0.0	12.120 6	-1.37	829.59	0.002
L2	100 - 47.0833 (2)	TP33.13x20.263x0.2813	52.92	0.00	0.0	28.666 0	-15.18	1920.74	0.008
L3	47.0833 - 0 (3)	TP44x31.372x0.375	52.00	0.00	0.0	52.677 2	-27.67	3477.10	0.008

Pole Bending Design Data

Section No.	Elevation ft	Size	M _{ux} kip-ft	φM _{nx} kip-ft	Ratio M _{ux} / φM _{nx}	M _{uy} kip-ft	φM _{ny} kip-ft	Ratio M _{uy} / φM _{ny}
L1	120 - 100 (1)	TP20.263x15.0403x0.187 5	32.37	338.82	0.096	0.00	338.82	0.000
L2	100 - 47.0833 (2)	TP33.13x20.263x0.2813	690.26	1237.43	0.558	0.00	1237.43	0.000
L3	47.0833 - 0 (3)	TP44x31.372x0.375	1783.92	3088.23	0.578	0.00	3088.23	0.000

Pole Shear Design Data

Section No.	Elevation ft	Size	Actual V _u K	φV _n K	Ratio V _u / φV _n	Actual T _u kip-ft	φT _n kip-ft	Ratio T _u / φT _n
L1	120 - 100 (1)	TP20.263x15.0403x0.187 5	2.97	414.80	0.007	0.67	687.02	0.001
L2	100 - 47.0833 (2)	TP33.13x20.263x0.2813	18.39	960.37	0.019	0.19	2509.12	0.000
L3	47.0833 - 0 (3)	TP44x31.372x0.375	23.46	1738.55	0.013	0.50	6261.97	0.000

Pole Interaction Design Data

Section No.	Elevation ft	Ratio P _u / φP _n	Ratio M _{ux} / φM _{nx}	Ratio M _{uy} / φM _{ny}	Ratio V _u / φV _n	Ratio T _u / φT _n	Comb. Stress Ratio	Allow. Stress Ratio	Criteria
L1	120 - 100 (1)	0.002	0.096	0.000	0.007	0.001	0.097	1.000	4.8.2 ✓
L2	100 - 47.0833 (2)	0.008	0.558	0.000	0.019	0.000	0.566	1.000	4.8.2 ✓
L3	47.0833 - 0 (3)	0.008	0.578	0.000	0.013	0.000	0.586	1.000	4.8.2 ✓

Section Capacity Table

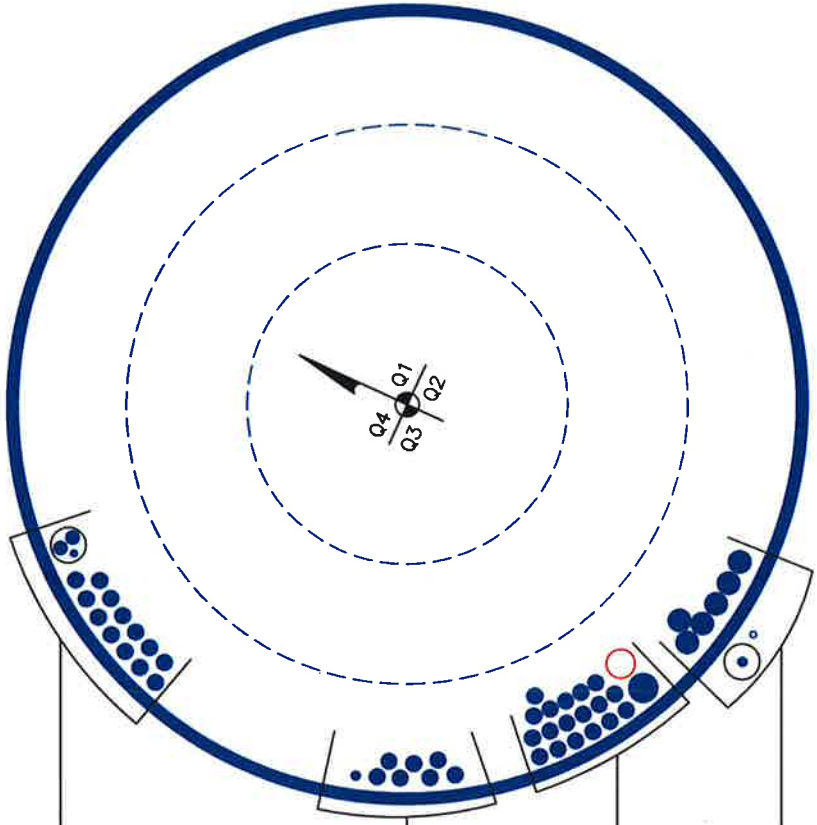
Section No.	Elevation ft	Component Type	Size	Critical Element	P K	φP _{allow} K	% Capacity	Pass Fail
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Section No.	Elevation ft	Component Type	Size	Critical Element	P K	ϕP_{allow} K	% Capacity	Pass Fail	
L1	120 - 100	Pole	TP20.263x15.0403x0.1875	1	-1.37	829.59	9.7	Pass	
L2	100 - 47.0833	Pole	TP33.13x20.263x0.2813	2	-15.18	1920.74	56.6	Pass	
L3	47.0833 - 0	Pole	TP44x31.372x0.375	3	-27.67	3477.10	58.6	Pass	
							Summary		
							Pole (L3)	58.6	Pass
							RATING =	58.6	Pass

APPENDIX B
BASE LEVEL DRAWING



- (INSTALLED)
(1) 7/8" TO 73 FT LEVEL
- (INSTALLED-IN CONDUIT)
(1) 3/8" TO 73 FT LEVEL
(2) 3/4" TO 73 FT LEVEL
(INSTALLED)
(12) 7/8" TO 73 FT LEVEL



- (INSTALLED)
(1) 1/2" TO 50 FT LEVEL
(3) 7/8" TO 50 FT LEVEL
(1) 7/8" TO 107 FT LEVEL
(3) 7/8" TO 118 FT LEVEL

- (PROPOSED)
(1) 1-5/8" TO 98 FT LEVEL
(INSTALLED--TO BE REMOVED)
(6) 7/8" TO 98 FT LEVEL
(INSTALLED)
(12) 7/8" TO 98 FT LEVEL
(1) 1-5/8" TO 98 FT LEVEL

- (RESERVED)
(1) 1/4" TO 87 FT LEVEL
(INSTALLED)
(6) 1-1/4" TO 87 FT LEVEL
(INSTALLED-IN CONDUIT)
(1) 1/2" TO 40 FT LEVEL

APPENDIX C
ADDITIONAL CALCULATIONS

Stiffened or Unstiffened, Exterior Flange Plate - Any Bolt Material TIA Rev G

Site Data

BU#: 806364
 Site Name: HRT 106(B) 943202
 App #: 361327 Rev. 2

Reactions		
Mu	32.37	ft-kips
Axial, Pu:	1.37	kips
Shear, Vu:	2.97	kips
Elevation:	100	feet

Bolt Threads:
X-Excluded
$\phi V_n = \phi(0.55 A_b F_u)$
$\phi = 0.75, \phi V_n$ (kips):
38.88

Pole Manufacturer:	Other
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If No stiffeners, Criteria: **TIA G** <-Only Applicable to Unstiffened Cases

Bolt Data		
Qty:	8	
Diameter (in.):	1	Bolt Fu: 120
Bolt Material:	A325	Bolt Fy: 92
N/A:	100	<-- Disregard
N/A:	75	<-- Disregard
Circle (in.):	24.41	

Flange Bolt Results	
Bolt Tension Capacity, $\phi^*T_n, B1$:	54.54 kips
Adjusted ϕ^*T_n (due to $V_u = V_u/Qty$), B:	54.54 kips
Max Bolt directly applied Tu:	7.79 Kips
Min. PL "tc" for B cap. w/o Prying:	0.799 in
Min PL "treq" for actual T w/ Prying:	0.221 in
Min PL "t1" for actual T w/o Prying:	0.302 in
T allowable w/o Prying:	54.54 kips
Prying Force, q:	0.00 kips
Total Bolt Tension = Tu + q:	7.79 kips
Non-Prying Bolt Stress Ratio, Tu/B:	14.3% Pass

Rigid
ϕ^*T_n
$\phi T_n [(1 - (V_u/\phi V_n)^2)^{0.5}]$

Plate Data		
Diam:	26.91	in
Thick, t:	1.5	in
Grade (Fy):	60	ksi
Strength, Fu:	75	ksi
Single-Rod B-eff:	8.14	in

Exterior Flange Plate Results	
Flexural Check	
Compression Side Plate Stress:	2.1 ksi
Allowable Plate Stress:	54.0 ksi
Compression Plate Stress Ratio:	3.9% Pass
No Prying	
Tension Side Stress Ratio, $(treq/t)^2$:	2.2% Pass

$\alpha < 0$ case

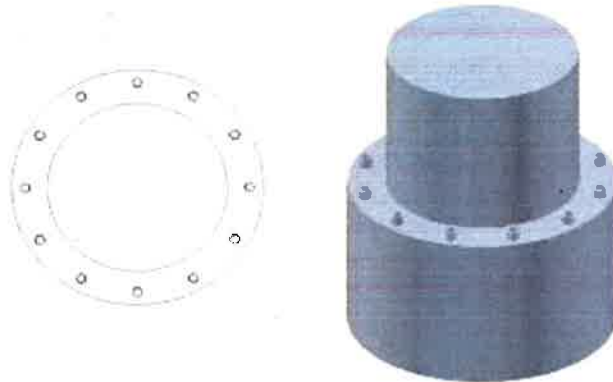
Rigid
TIA G
ϕ^*F_y
Comp. Y.L. Length:
13.61

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

n/a

Stiffener Results	
Horizontal Weld :	n/a
Vertical Weld:	n/a
Plate Flex+Shear, $f_b/F_b + (f_v/F_v)^2$:	n/a
Plate Tension+Shear, $f_t/F_t + (f_v/F_v)^2$:	n/a
Plate Comp. (AISC Bracket):	n/a
Pole Results	
Pole Punching Shear Check:	n/a

Pole Data		
Diam:	20.263	in
Thick:	0.1875	in
Grade:	65	ksi
# of Sides:	12	"0" IF Round
Fu	80	ksi
Reinf. Fillet Weld	0	"0" if None



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

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

Stiffened or Unstiffened, Exterior Flange Plate - Any Bolt Material TIA Rev G

Site Data

BU#: 806364
 Site Name: HRT 106(B) 943202
 App #: 361327 Rev. 2

Reactions		
Mu	32.37	ft-kips
Axial, Pu:	1.37	kips
Shear, Vu:	2.97	kips
Elevation:	100	feet

Bolt Threads:
X-Excluded
$\phi V_n = \phi(0.55 A_b F_u)$
$\phi = 0.75, \phi^* V_n$ (kips):
38.88

Pole Manufacturer:	Other
--------------------	-------

If No stiffeners, Criteria: TIA G <-Only Applicable to Unstiffened Cases

Bolt Data		
Qty:	8	
Diameter (in.):	1	Bolt Fu: 120
Bolt Material:	A325	Bolt Fy: 92
N/A:	100	<-- Disregard
N/A:	75	<-- Disregard
Circle (in.):	24.41	

Flange Bolt Results

Bolt Tension Capacity, $\phi^* T_n, B1$: 54.54 kips
 Adjusted $\phi^* T_n$ (due to $V_u = V_u / Q_t$), B: 54.54 kips
 Max Bolt directly applied T_u : 7.79 Kips
 Min. PL "tc" for B cap. w/o Pry: 0.799 in
 Min PL "treq" for actual T w/ Pry: 0.221 in
 Min PL "t1" for actual T w/o Pry: 0.302 in
 T allowable w/o Prying: 54.54 kips
 Prying Force, q: 0.00 kips
 Total Bolt Tension = $T_u + q$: 7.79 kips
 Non-Prying Bolt Stress Ratio, T_u / B : 14.3% Pass

Rigid
$\phi^* T_n$
$\phi T_n [(1 - (V_u / \phi V_n)^2)^{0.5}]$

Plate Data		
Diam:	26.91	in
Thick, t:	1.5	in
Grade (Fy):	60	ksi
Strength, Fu:	75	ksi
Single-Rod B-eff:	8.14	in

Exterior Flange Plate Results

Flexural Check
 Compression Side Plate Stress: 2.1 ksi
 Allowable Plate Stress: 54.0 ksi
 Compression Plate Stress Ratio: 3.9% Pass
No Prying
 Tension Side Stress Ratio, $(t_{req}/t)^2$: 2.2% Pass

Rigid
TIA G
$\phi^* F_y$
Comp. Y.L. Length: 13.61

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

n/a

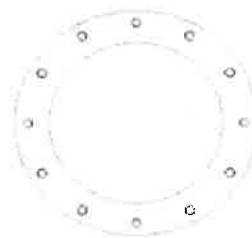
Stiffener Results

Horizontal Weld: n/a
 Vertical Weld: n/a
 Plate Flex+Shear, $f_b / F_b + (f_v / F_v)^2$: n/a
 Plate Tension+Shear, $f_t / F_t + (f_v / F_v)^2$: n/a
 Plate Comp. (AISC Bracket): n/a

Pole Results

Pole Punching Shear Check: n/a

Pole Data		
Diam:	20.263	in
Thick:	0.28125	in
Grade:	65	ksi
# of Sides:	12	"0" IF Round
Fu	80	ksi
Reinf. Fillet Weld	0	"0" if None



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

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

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

TIA Rev G Assumption: Clear space between bottom of leveling nut and top of concrete **not** exceeding $(1) \times (\text{Rod Diameter})$

Site Data

BU#: 806364
Site Name: HRT 106(B) 943202
App #: 361327 Rev. 2
Pole Manufacturer: Other

Anchor Rod Data

Qty:	12	
Diam:	2.25	in
Rod Material:	A615-J	
Strength (Fu):	100	ksi
Yield (Fy):	75	ksi
Bolt Circle:	52.05	in

Plate Data

Diam:	58.05	in
Thick:	2.75	in
Grade:	60	ksi
Single-Rod B-eff:	11.79	in

Stiffener Data (Welding at both sides)

Config:	0	*
Weld Type:		
Groove Depth:		<-- Disregard
Groove Angle:		<-- Disregard
Fillet H. Weld:		in
Fillet V. Weld:		in
Width:		in
Height:		in
Thick:		in
Notch:		in
Grade:		ksi
Weld str.:		ksi

Pole Data

Diam:	44	in
Thick:	0.375	in
Grade:	65	ksi
# of Sides:	12	"0" IF Round
Fu	80	ksi
Reinf. Fillet Weld	0	"0" if None

Reactions

Mu:	1784	ft-kips
Axial, Pu:	28	kips
Shear, Vu:	23	kips
Eta Factor, η	0.5	TIA G (Fig. 4-4)

If No stiffeners, Criteria: **AISC LRFD** <-Only Applicable to Unstiffened Cases

Anchor Rod Results

Max Rod $(C_u + V_u/\eta)$:	143.3 Kips
Allowable Axial, $\phi^*F_u^*A_{net}$:	260.0 Kips
Anchor Rod Stress Ratio:	55.1% Pass

Rigid
AISC LRFD
ϕ^*T_n

Base Plate Results

Base Plate Stress:	16.1 ksi
Allowable Plate Stress:	54.0 ksi
Base Plate Stress Ratio:	29.8% Pass

Flexural Check

Rigid
AISC LRFD
ϕ^*F_y
Y.L. Length:
27.81

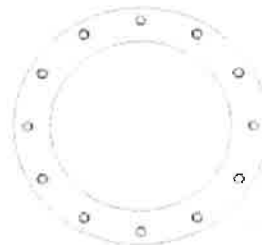
n/a

Stiffener Results

Horizontal Weld :	n/a
Vertical Weld:	n/a
Plate Flex+Shear, $f_b/F_b + (f_v/F_v)^2$:	n/a
Plate Tension+Shear, $f_t/F_t + (f_v/F_v)^2$:	n/a
Plate Comp. (AISC Bracket):	n/a

Pole Results

Pole Punching Shear Check: n/a



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

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

Monopole Block Foundation

Checks capacity of monolithic block foundation for a monopole tower per TIA-222-G

BU #: 806364
 Site Name: HRT 106(B) 943202
 App No.: 361327 Rev. 2



Reinforced Masonry Properties	Value	Units
Shear, S:	23.00	kips
Moment, M:	1784.00	ft-kips
Height, H:	120.00	ft
Weight, W:	28.00	kips
Base Diameter, BD:	44.0	in

Foundation Capacities	Value	Units
Depth, D:	6.0	ft
Block Width, W:	27.0	ft
Neglected Depth, N:	3.3	ft
Ext. Above Grade, E:	0.0	ft
Anchor Steel Length, Lst:	97.0	in
Clear Cover, cc:	4.0	in

Soil Properties	Value	Units
Soil Unit Weight, γ :	0.125	kcf
Ultimate Bearing, Bc:	8.000	ksf
Int. Angle of Friction, Φ :	34.00	deg
Cohesion, Co:	0.000	ksf
Passive Pressure, Pp:	0.000	kcf
Base Friction, μ :	0.2	
Seismic Zone, z:	1	

Material Properties	Value	Units
Rebar Yield Strength, Fy:	60000	psi
Concrete Strength, Fc:	3000	psi
Concrete Density, γ_c :	0.150	kcf

Rebar Properties	Value	Units
Pad Rebar Size, sp:	11	
Rebar Quantity, mp:	26	1.4

Design Checks	Capacity/Availability	Demands/Limits	Check
Shear (ksf):	102.62	23.00	OK
Overturning (ft-kips):	9275.01	1922.00	OK
Bearing (ksf):	6.00	1.52	OK
Shear - 1-Way (kips):	102.62	23.00	OK
Pad Rebar Area (in ²):	40.60	18 > Bs > 2	OK
Bar Spacing (in):	11.17	60.24	OK
Development Length (in):	158.00		OK



Modification Checks	% Capacity	Capacity/Availability	Demands/Limits	Check
Minimum Extra Thickness (in):	22.41	0.00	0.00	Not Used
Pad Rebar Area-short (in ²):	20.72	8.84	0.00	Not Used
Pad Rebar Area-long (in ²):	25.40	2.21	0.00	Not Used
Pad Rebar Spacing-short (in ²):	22.41	15.84	18 > Bs > 2	Not Used
Pad Rebar Spacing-long (in ²):		78.06	18 > Bs > 2	Not Used
End Cap Width (in):		0.00	0.00	Not Used
End Cap Rebar Area (in ²):		4.81	0.00	Not Used
EC Rebar Spacing (in):		-2.02	18 > Bs > 2	Not Used
Tie Spacing (in):		16.13	316 > s > 4.5	Not Used
Dowel Area (in ²):		8.84	0.00	Not Used
Dowel Embedment (in):		6.00	6.00	Not Used
Shear Strength of Cone (kips):		9.87	23.86	Not Used
Dowel Edge Distance (in):		12.00	5.19	Not Used
Dowel Spacing (in):		33.33	12.00	Not Used
Dowel Edge Distance (vert) (in):		36.00	5.19	Not Used
Dowel Devel. Length (in):		-4.00	15.38	Not Used

Modifications	End Cap Width, Wec:	Revised Width, Wx:	EC Rebar Size, Sec:	EC Rebar Quantity, mec:	EC Tie Size, Sect:	Tie Quantity, mecd:	EC Dowel Size, Secc:	Dowel Quantity, mecd:	Rows of Dowels, Nid:	Dowel Depth, decd:	Edge Distance, eecd:
Pad Thickness, Te:	0	in		0							
Revised Pad Thickness, Tx:	6	ft		27							
Pad Rebar Size, Se:	6			7							
Rebar Quantity (long), me:	20			8							
Rebar Quantity (short), mex:	5			4							
Dowel Size, Sed:	7			20							
Dowel Quantity, med:	20			6							
				20							
				2							
				6							
				12							

USGS Design Maps Summary Report

User-Specified Input

Report Title 806364

Tue October 4, 2016 18:04:22 UTC

Building Code Reference Document 2012/2015 International Building Code
(which utilizes USGS hazard data available in 2008)

Site Coordinates 41.45935°N, 72.66273°W

Site Soil Classification Site Class D - "Stiff Soil"

Risk Category I/II/III

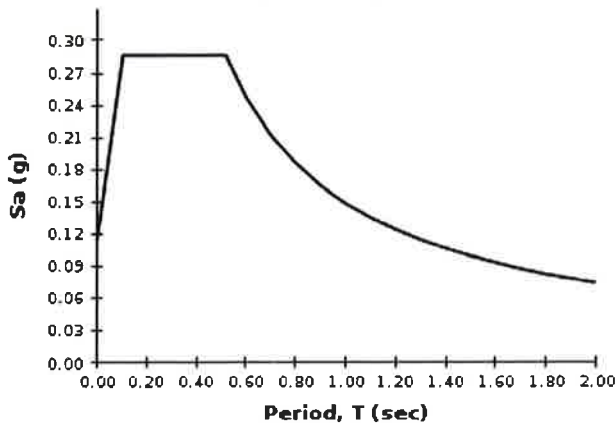


USGS-Provided Output

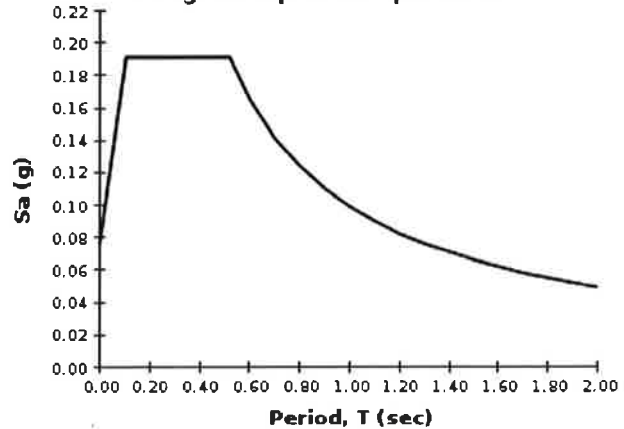
$S_S = 0.179 \text{ g}$	$S_{MS} = 0.286 \text{ g}$	$S_{DS} = 0.191 \text{ g}$
$S_1 = 0.062 \text{ g}$	$S_{M1} = 0.148 \text{ g}$	$S_{D1} = 0.099 \text{ g}$

For information on how the S_S and S_1 values above have been calculated from probabilistic (risk-targeted) and deterministic ground motions in the direction of maximum horizontal response, please return to the application and select the "2009 NEHRP" building code reference document.

MCE_R Response Spectrum



Design Response Spectrum



CCISeismic - Design Category

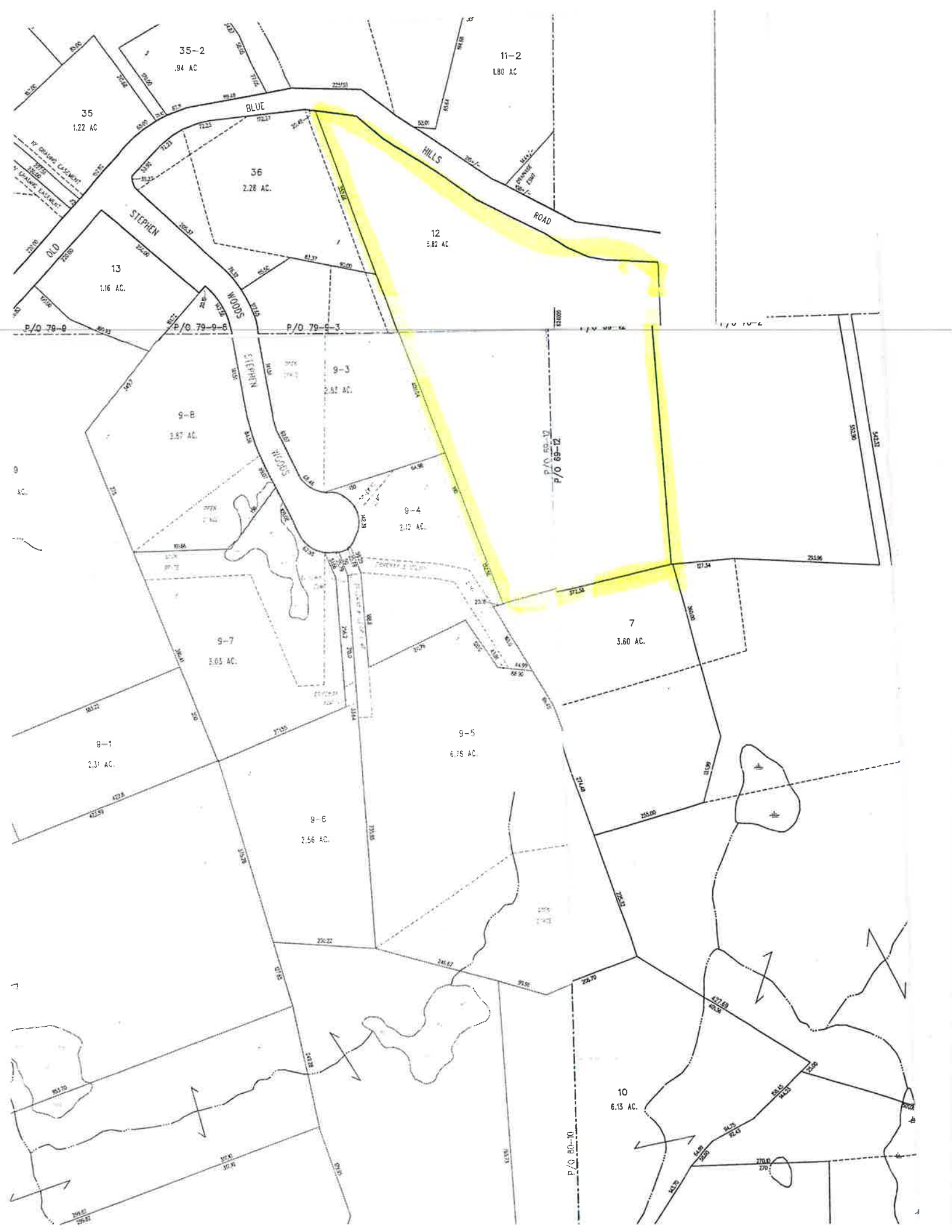
Per 2012/2015 IBC

Site BU: 806364
 Work Order: 1308390
 Application: 361327 Rev. 2



	Degrees	Minutes	Seconds	
Site Latitude =	41	27	33.67	41.4594 degrees
Site Longitude =	-72	39	45.83	-72.6627 degrees
Ground Supported Structure =	Yes			
Structure Class =	II			(Table 2-1)
Site Class =	D - Stiff Soil			(Table 2-11)
Spectral response acceleration short periods, S_s =	0.179			USGS Seismic Tool
Spectral response acceleration 1 s period, S_1 =	0.062			
Importance Factor, I =	1.0			(Table 2-3)
Acceleration-based site coefficient, F_a =	1.6			(Table 2-12)
Velocity-based site coefficient, F_v =	2.4			(Table 2-13)
Design spectral response acceleration short period, S_{DS} =	0.191			(2.7.6)
Design spectral response acceleration 1 s period, S_{D1} =	0.099			(2.7.6)
Seismic Design Category - Short Period Response =	B			ASCE 7-05 Table 11.6-1
Seismic Design Category - 1s Period Response =	B			ASCE 7-05 Table 11.6-2
Worst Case Seismic Design Category =	B			ASCE 7-05 Tables 11.6-1 and 6-2

ATTACHMENT 4



35-2
.94 AC

11-2
1.80 AC

35
1.22 AC

36
2.28 AC

12
5.82 AC

13
1.16 AC

9-3
2.82 AC

9-B
2.57 AC

9-4
2.12 AC

9-7
3.03 AC

7
3.80 AC

9-1
2.31 AC

9-5
6.78 AC

9-B
2.56 AC

10
6.13 AC

BLUE HILLS ROAD

STEPHEN WOODS ROAD

NO. GREENWOOD LAKESIDE
Y. LAKE LAKESIDE

P/O 79-9

P/O 79-9-B

P/O 79-9-3

P/O 59-12
P/O 69-12

P/O 60-10

9
AC.

7

1

Durham, CT : Residential Property Record Card

[[Back to Search Results](#)]

[[Start a New Search](#)] [[Help with Printing](#)]

Search For Properties

Parcel ID	Name behrens	Street Name <input type="text"/>	<input type="button" value="Search"/> <input type="button" value="Reset"/>
------------------	------------------------	--	--

Parcel ID	Card	Routing No	Location	Zoning	State Class	Acres
B0016900	1	69 12	143R OLD BLUE HILLS RD	FR	130 - Developable Land	6.310
Living Units						
0						

Owner Information

Behrens Francis E Jr Castano Marie C

Property Picture



Deed Information

Book/Page: 100/255
Deed Date: 1984/08/24

Dwelling Information

Style:
Story Height: 0
Attic:
Basement:
Year Built: 0
Ground Flr Area: 0
Tot Living Area: 0
Rooms: 0
Bedrooms: 0
Full Baths: 0
Half Baths: 0

Valuation

Land: \$126,400
Building: \$0
Total: \$2,900
Net Assessment: \$2,030

Sales History

Book/Page	Date	Price	Type	Validity
-----------	------	-------	------	----------

Out Building Information

Type	Qty	Year	Size1	Size2	Grade	Cond
------	-----	------	-------	-------	-------	------

Building Sketch

	<u>Descriptor/Area</u>

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Currently All Values Have Not Been Finalized and Are Subject To Change.

Comments regarding this service should be directed to: jphilip@townofdurhamct.org



Commercial Property Record Card - Durham, Connecticut

Property Location:
143r Old Blue Hills Rd

Account: M0162401

Map Block No: 69 12A

Class: U

State Class: 504 Card 1 of 1

Current Owner		Previous Owner History		Miscellaneous		Assessment Information	
Name	Date	Name	Date	Deed Info:	Deed Info:	Cost Estimate:	Cost Estimate:
Bell Atlantic Nynex Behrens Pmb353 McMurray Pa 15317				/-08/24/1984- FR		13,500	*
				Routing No: 069/012.01		144,000	
				Neighborhood: 80		156,600	Prior
				Living Units: 0		300,600	268,800
				Census Trct: 5851		400	210,420
				District: 2093			
Notes		Entrance Information		Effective DOV: 10/1/2015		Value Flag: COST	
2.75 Ac Leased W/ Tower & Transmission Bldg		Date	Time	ID	Actv	Entrance Code	Source
		07/17/2000		ZB		No Response	Other
		05/21/2010		DR		Unoccupied	Other

Book/Page	Date	Price	Type	Validity

Date	Permit #	Price	Purpose	% Comp.
06/12/2014	14-492	50,000	6 Antenna+ Equi	0
05/23/2012	12-541	25,000	3 New Antenna	0

Type	Size	Grade	Influence Factor 1, 2 and %	Value
Primary	A	2	0	138,800
Excess	A	0.75	0	5,180

Total Acres for this Parcel	2.75	Total Land Value	144,000
-----------------------------	------	------------------	---------

Owner/Values: Includes all Land/Buildings/OBYs for this Parcel			
	Current	Market	Income
Land:	144,000	144,000	0
Building:	156,600	156,600	-130,500
Total:	300,600	300,600	13,500



Inspection witness by:

