Robinson+Cole

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Also admitted in Massachusetts

December 12, 2017

Melanie A. Bachman, Esq.
Executive Director/Staff Attorney
Connecticut Siting Council
10 Franklin Square
New Britain, CT 06051

Re: **Notice of Exempt Modification – Facility Modification**
230 Guinea Road, Monroe, Connecticut

Dear Ms. Bachman:

Cellco Partnership d/b/a Verizon Wireless ("Cellco") currently maintains twelve (12) antennas at the 215-foot level of an existing 240-foot lattice tower at 230 Guinea Road in Monroe, Connecticut (the "Property"). The tower is owned by Crown Castle ("Crown"). Cellco's use of the tower was approved by the Council in 2000. Cellco now intends to replace six (6) of its existing antennas with three (3) model JAHH-65B-R3B, 700 MHz antennas and three (3) model JAHH-65B-R3B, 2100 MHz antennas, at the same level on the tower. Cellco also intends to replace six (6) remote radio heads ("RRHs") and install 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 letter is being sent to Kenneth Kellogg, First Selectman for the Town of Monroe; Scott Schatzlein, Monroe's Land Use Director/Town Engineer; and Crown, the tower owner. The Town of Monroe is the owner of the Property.

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

1. The proposed modifications will not result in an increase in the height of the existing tower. Cellco's replacement antennas and RRHs will be installed at the same 215-foot level of the 240-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 (212-foot rad-center) is included behind 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 included in Attachment 3).

A copy of the parcel map and owner information for the Property is included in Attachment 4. A Certificate of Mailing verifying that this filing was sent to municipal officials is included in Attachment 5.

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:
Kenneth Kellogg, Monroe First Selectman
Scott Schatzlein, Monroe Land Use Director/Town Engineer
Crown Castle
Tim Parks

ATTACHMENT 1

Product Specifications

COMMSCOPE®

JAHH-65B-R3B

8-port sector antenna, 2x 698–787, 2x 824-894 and 4x 1695–2360 MHz, 65° HPBW, 3x RET and low bands have diplexers. Internal SBT's on first LB(Port 1) and first HB (Port 5).

- Internal SBT on low and high band allow remote RET control from the radio over the RF jumper cable
- One RET for 700MHz, one RET for 850MHz, and one RET for both high bands to ensure same tilt level for 4x Rx or 4x MIMO
- Internal filter on low band and interleaved dipole technology providing for attractive, low wind load mechanical package
- Separate RS-485 RET input/output for low and high band

Electrical Specifications

Frequency Band, MHz	**698–787**	**824–894**	**1695–1880**	**1850–1990**	**1920–2200**	**2300–2360**
Gain, dBi	14.5	15.8	18.0	18.4	18.5	18.8
Beamwidth, Horizontal, degrees	67	65	63	63	65	68
Beamwidth, Vertical, degrees	12.4	10.5	5.7	5.2	4.9	4.4
Beam Tilt, degrees	2–14	2–14	0–10	0–10	0–10	0–10
USLS (First Lobe), dB	18	18	20	20	21	23
Front-to-Back Ratio at 180°, dB	32	34	31	35	36	38
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	**698–787**	**824–894**	**1695–1880**	**1850–1990**	**1920–2200**	**2300–2360**
Gain by all Beam Tilts, average, dBi	14.3	14.9	17.6	18.1	18.2	18.5
Gain by all Beam Tilts Tolerance, dB	±0.3	±0.5	±0.6	±0.4	±0.5	±0.6
	2 ° | 14.3	2 ° | 15.0	0 ° | 17.2	0 ° | 17.6	0 ° | 17.7	0 ° | 17.9
Gain by Beam Tilt, average, dBi	8 ° | 14.3	8 ° | 14.9	5 ° | 17.6	5 ° | 18.2	5 ° | 18.3	5 ° | 18.7
	14 ° | 14.3	14 ° | 15.4	10 ° | 17.6	10 ° | 18.2	10 ° | 18.3	10 ° | 18.7
Beamwidth, Horizontal Tolerance, degrees	±1.2	±1.4	±4	±2.4	±2.9	±2.7
Beamwidth, Vertical Tolerance, degrees	±0.9	±0.5	±0.3	±0.2	±0.3	±0.1
USLS, beampeak to 20° above beampeak, dB	18	17	17	18	19	18
Front-to-Back Total Power at 180° ± 30°, dB	25	24	26	29	27	29
CPR at Boresight, dB	22	23	20	21	21	24
CPR at Sector, dB	11	12	11	11	11	8

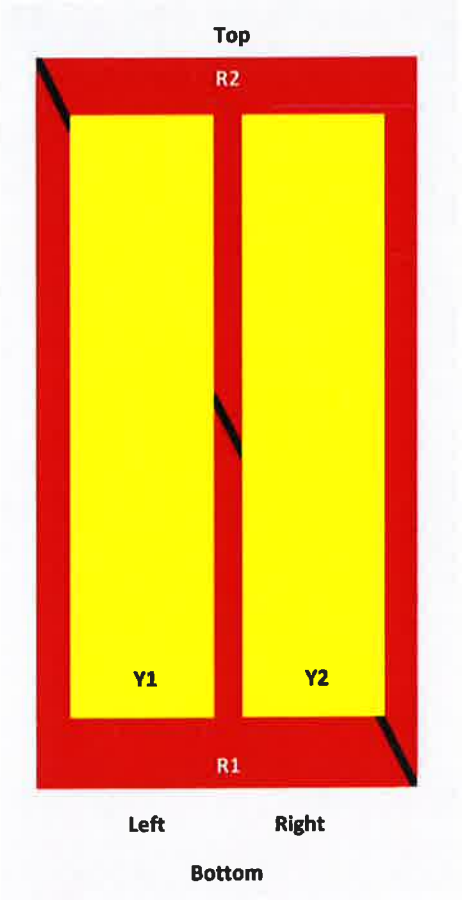
* CommScope® supports NGMN recommendations on Base Station Antenna Standards (BASTA). To learn more about the benefits of BASTA, download the whitepaper Time to Raise the Bar on BSAs.

Array Layout

Product Specifications

JAHH-65B-R3B

JAHH-65A-R3B JAHH-65B-R3B JAHH-65C-R3B



Array	Freq (MHz)	Conns	RET (SRET)	AISG RET UID
R1	698-798	1-2	1	ANxxxxxxxxxxxxxxx1
R2	824-894	3-4	2	ANxxxxxxxxxxxxxxx2
Y1	1695-2360	5-6	3	ANxxxxxxxxxxxxxxx3
Y2	1695-2360	7-8		

View from the front of the antenna

(Sizes of colored boxes are not true depictions of array sizes)

General Specifications

Operating Frequency Band	1695 – 2360 MHz | 698 – 787 MHz | 824 – 894 MHz
Antenna Type	Sector
Band	Multiband
Performance Note	Outdoor usage

Mechanical Specifications

RF Connector Quantity, total	8
RF Connector Quantity, low band	4
RF Connector Quantity, high band	4
RF Connector Interface	4.3-10 Female
Color	Light gray

Product Specifications

JAHH-65B-R3B

Grounding Type	RF connector body grounded to reflector and mounting bracket
Radiator Material	Aluminum | Low loss circuit board
Radome Material	Fiberglass, UV resistant
Reflector Material	Aluminum
RF Connector Location	Bottom
Wind Loading, frontal	746.0 N @ 150 km/h 167.7 lbf @ 150 km/h
Wind Loading, lateral	243.0 N @ 150 km/h 54.6 lbf @ 150 km/h
Wind Loading, rear	776.0 N @ 150 km/h 174.5 lbf @ 150 km/h
Wind Speed, maximum	241 km/h | 150 mph

Dimensions

Length	1828.0 mm | 72.0 in
Width	350.0 mm | 13.8 in
Depth	208.0 mm | 8.2 in
Net Weight, without mounting kit	28.7 kg | 63.3 lb

Remote Electrical Tilt (RET) Information

Input Voltage	10–30 Vdc
Internal Bias Tee	Port 1 | Port 5
Internal RET	High band (1) | Low band (2)
Power Consumption, idle state, maximum	2.0 W
Power Consumption, normal conditions, maximum	13.0 W
Protocol	3GPP/AISG 2.0 (Single RET)
RET Interface	8-pin DIN Female | 8-pin DIN Male
RET Interface, quantity	2 female | 2 male

Packed Dimensions

Length	1975.0 mm | 77.8 in
Width	456.0 mm | 18.0 in
Depth	357.0 mm | 14.1 in
Shipping Weight	42.0 kg | 92.6 lb

Regulatory Compliance/Certifications

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

Product Specifications

JAHH-65B-R3B

Included Products

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

* Footnotes

Performance Note	Severe environmental conditions may degrade optimum performance

ALCATEL-LUCENT B13 RRH4X30-4R

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

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

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

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

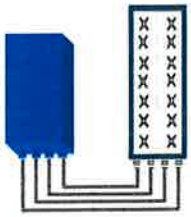
Its compactness and slim design makes the Alcatel-Lucent B13 RRH4x30-4R easy to install close to the antenna: operators can therefore locate this Remote Radio Head where RF design conditions are deemed ideal, minimizing trade-offs between available sites and RF optimum sites, together with reducing the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

FEATURES

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

BENEFITS

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



4x30W with 4T4R
or
2x60W with 2T4R

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

Alcatel·Lucent

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.) Volume in L Weight in kg (lb) (w/o mounting HW)	550 x 305 x 230 (21.6" x 12.0" x 9") (with solar shield) 38 (with solar shield) 26 (57.2) (with solar shield)
DC voltage range DC power consumption	-40.5 to -57V at full performance, -38 to -57V with relaxation on power consumption 550W typical @100% RF load (in 2Tx or 4TX mode)
Environmental conditions Wind load (@150km/h or 93mph)	-40°C (-40°F) /+55°C (+131°F) IP65 Frontal:<200N / Lateral :<150N
Antenna ports	4 ports 7/16 DIN female (50 ohms) VSWR < 1.5
CPRI ports	2 CPRI ports (HW ready for Rate7, 9.8 Gbps) SFP single mode dual fiber
AISG interfaces	1 AISG2.0 output (RS485) Integrated Smart Bias Tees (x2)
Misc. Interfaces	4 external alarms (1 connector) – 4 RF Tx & 4 RF Rx monitor ports - 1 DC connector (2 pins)
Installation conditions	Pole and wall mounting
Regulatory compliance	3GPP 36.141 / 3GPP 36.113 / GR-1089-CORE / GR-3108-CORE / UL 60950-1 / FCC Part 27

ALCATEL-LUCENT 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.

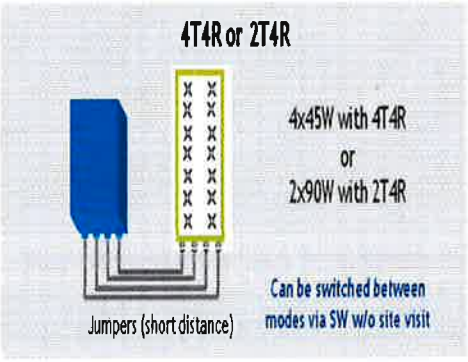
The Alcatel-Lucent B66a RRH4x45 product has four transmit RF paths, offering the possibility to **select, via software only, 2Tx or 4Tx MIMO configurations** with either 2x90W or 4x45W RF output power. It also supports 4-way Rx diversity at the 70 MHz instantaneous bandwidth.

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

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 Receiver Sensivity (FRC A1-3)	2 dB typical (<2.5 dB max) – 2 or 4 way Rx diversity -104.5 dBm maximum
Sizes (HxWxD) in mm (in.) Volume in Liters Weight in kg (lb) (w/o mounting HW)	655x299x182 (25.8x11.8x7.2) (with solar shield) 640x290x160 (25.2x11.4x6.3) (without solar shield) 35.5 (with solar shield) 29.7 (without solar shield) 25.8kg (56.8lb) (with solar shield)
DC voltage range DC power consumption	Nominal: -48V, -40.5 to -57V at full performance, -38 to -57V with relaxation on power consumption 750W typical @100% RF load (in 2Tx or 4Tx mode); Add 58W for 2A*29V for AISG
Environmental conditions Wind load (@150km/h or 93mph)	-40°C (-40°F) /+55°C (+131°F) UL50E Type 4 Enclosure 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

Alcatel·Lucent

Product Data Sheet HB158-1-08U8-S8J18

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

Product Description

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

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

Figure 1: HYBRIFLEX Series

Features/Benefits

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

Technical Specifications

Outer Conductor Armor	Corrugated Aluminum	[mm (in)]	46.5 (1.83)
Jacket:	Polyethylene, PE	[mm (in)]	50.3 (1.98)
UV-Protection	Individual and External Jacket		Yes
Weight, Approximate		[kg/m (lb/ft)]	1.9 (1.30)
Minimum Bending Radius, Single Bending		[mm (in)]	200 (8)
Minimum Bending Radius, Repeated Bending		[mm (in)]	500 (20)
Recommended/Maximum Clamp Spacing		[m (ft)]	1.0 / 1.2 (3.25 / 4.0)
DC-Resistance Outer Conductor Armor		[Ω/km (Ω/1000ft)]	068 (0.205)
DC-Resistance Power Cable, 8.4mm²(8AWG)		[Ω/km (Ω/1000ft)]	2.1 (0.307)
Version			Single-mode OM3
Quantity, Fiber Count			16 (8 pairs)
Core/Clad		[µm]	50/125
Primary Coating (Acrylate)		[µm]	245
Buffer Diameter, Nominal		[µm]	900
Secondary Protection, Jacket, Nominal		[mm (in)]	2.0 (0.08)
Minimum Bending Radius		[mm (in)]	104 (4.1)
Insertion Loss @ wavelength 850nm		dB/km	3.0
Insertion Loss @ wavelength 1310nm		dB/km	1.0
Standards (Meets or exceeds)			UL94-V0, UL1666 RoHS Compliant
Size (Power)		[mm² (AWG)]	8.4 (8)
Quantity, Wire Count (Power)			16 (8 pairs)
Size (Alarm)		[mm² (AWG)]	0.8 (18)
Quantity, Wire Count (Alarm)			4 (2 pairs)
Type			UV protected
Strands			19
Primary Jacket Diameter, Nominal		[mm (in)]	6.8 (0.27)
Standards (Meets or exceeds)			NFPA 130, ICEA S-95-658 UL Type XHHW-2, UL 44 UL-LS Limited Smoke, UL VW-1 IEEE-383 (1974), IEEE1202/FT4 RoHS Compliant
Installation Temperature		[°C (°F)]	-40 to +65 (-40 to149)
Operation Temperature		[°C (°F)]	-40 to +65 (-40 to149)

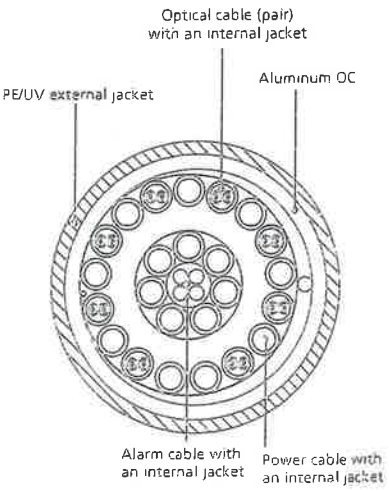


Figure 2: Construction Detail

* This data is provisional and subject to change

ATTACHMENT 2

	General	Power	Density					
Site Name: Monroe								
Tower Height: 242Ft.								
CARRIER	**# OF CHAN.**	**WATTS ERP**	**HEIGHT**	**CALC. POWER DENS**	**FREQ.**	**MAX. PERMISS. EXP.**	**FRACTION MPE**	**Total**
*AT&T UMTS	2	414	236	850	0.0056	0.5667	0.10%	
*AT&T UMTS	2	656	236	1900	0.0089	1.0000	0.09%	
*AT&T GSM	2	414	236	850	0.0056	0.5667	0.10%	
*AT&T GSM	2	940	236	700	0.0128	0.4667	0.27%	
*AT&T LTE	2	1791	236	1900	0.0244	1.0000	0.24%	
*PageNet				931.5	0.0127	0.6210	0.20%	
*RAW Mobile Data				936	0.0008	0.6240	0.01%	
*Nextel			222	858	0.0142	0.5720	0.25%	
*CL&P	2	240	181	935.2375	0.0056	0.6235	0.09%	
Verizon PCS	**0**	**0**	**212**	**0.0000**	**1970**	**1.0000**	**0.00%**	
Verizon Cellular	**3**	**413**	**212**	**0.0099**	**869**	**0.5793**	**1.71%**	
Verizon AWS	**1**	**8325**	**212**	**0.0666**	**2145**	**1.0000**	**6.66%**	
Verizon 700	**1**	**2062**	**212**	**0.0165**	**746**	**0.4973**	**3.32%**	
								13.05%
* Source: Siting Council								

ATTACHMENT 3

Date: **August 21, 2017**

Marianne Dunst
Crown Castle
3530 Toringdon Way Suite 300
Charlotte, NC 28277
(704) 405-6580

GPD Engineering and Architecture
Professional Corporation
520 South Main Street Suite 2531
Akron, Ohio 44311
(216) 927-8663
dpalkovic@gpdgroup.com

Subject:	**Structural Analysis Report**	
Carrier Designation:	***Verizon Wireless* Co-Locate**	
	Carrier Site Number:	118165
	Carrier Site Name:	Monroe Relo CT
Crown Castle Designation:	**Crown Castle BU Number:**	841294
	Crown Castle Site Name:	MONROE-GUINEA ROAD
	Crown Castle JDE Job Number:	453457
	Crown Castle Work Order Number:	1443207
	Crown Castle Application Number:	401422 Rev. 0
Engineering Firm Designation:	**GPD Project Number:**	2017777.841294.11 Rev 1
Site Data:	**230 Guinea Road, Monroe, Fairfield County, CT 06468**	
	Latitude *41° 20' 30.7"*, Longitude *-73° 16' 28.3"*	
	242.917 Foot – Modified Rohn Self Support Tower	

Dear Marianne Dunst,

We are 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 1069193, in accordance with application 401422, revision 0.

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

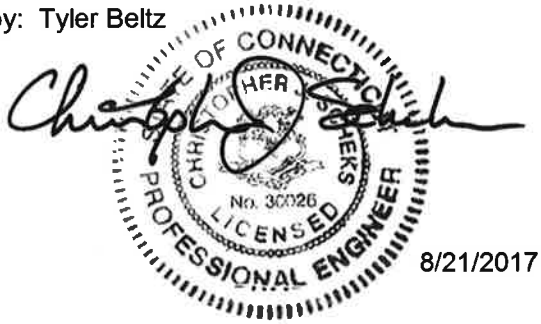
LC5: Existing + Proposed Equipment **Sufficient Capacity**
Note: See Table I and Table II for the proposed and existing/reserved loading, respectively.

This analysis has been performed in accordance with the 2016 Connecticut State Building Code based upon an ultimate 3-second gust wind speed of 120 mph converted to a nominal 3-second gust wind speed of 93 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.

We 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: Tyler Beltz

Respectfully submitted by:



Christopher J. Scheks, P.E. 8/21/2017
Connecticut #: 0030026

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1) INTRODUCTION

The existing 242.9 ft self support tower is supported on three legs and has twelve major sections. It has a triangular cross section made of bolted connections with a "K down" bracing configuration from 0' to 40.7' and an "X" bracing configuration from 40.7' to 242.9'. The tower is fabricated with round pipe legs and pipe bracing members 0' to 40' and angle bracing members from 40.7' to 242.9'. The tower is galvanized and has tower lighting.

This tower is a 242.9 ft self-support tower designed by Rohn in June of 1990. The tower was originally designed for a wind pressure of 40 psf per EIA-222-C.

The modifications designed by GPD (Project #: 2009268.80 Rev. A, dated 10/20/2009), have been considered in this analysis. The modifications consist of replacing the diagonal members from 20.3' to 40.7' and replacing the diagonal member bolts from 142.0' to 162.2'.

The modifications designed by GPD (Project #: 2014777.841294.04, dated 9/22/2014) were considered in the analysis. They consist of replacing the bent top girts at 242.9', replacing the diagonals from 121.8'-162.2', and replacing the diagonal bolts from 101.6'-121.8' and 162'-182.4'.

2) ANALYSIS CRITERIA

This analysis has been performed in accordance with the 2016 Connecticut State Building Code based upon an ultimate 3-second gust wind speed of 120 mph converted to a nominal 3-second gust wind speed of 93 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.

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
215.0	218.0	6	Commscope	JAHH-65B-R3B	1	1-5/8	1,2
		3	Alcatel Lucent	B66A RRH4X45			
		3	Alcatel Lucent	RRH2x60-700			
	212.0	2	RFS/Celwave	DB-T1-6Z-8AB-0Z			

Notes:
1) See Appendix B for the proposed coax layout.
2) Equipment elevations are measured from the bottom of tower steel which is 2ft above ground level.

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
240.0	240.0	2		Side Arm Mount [SO 303-1]	1	1/2	1
	237.0	1	Decibel	DB806-XC			
		1	Kathrein	FMO			
236.0	236.0	3	CCI Antennas	HPA-65R-BUU-H6	12 2 2 3	1-5/8 3/4 5/8 3/8	1
		6	Powerwave Technology	7770.00			
		3	Ericsson	RRUS 11 B12			
		3	Ericsson	RRUS 32 B2			
		6	Powerwave Technology	LGP21401			
		6	Powerwave Technology	TT19-08BP111-001			
		1	Raycap	DC6-48-60-18-8F			
		1		Pipe Mount [PM 601-3]			
		1		Sector Mount [SM 201-3]			
215.0	218.0	3	Andrew	HBXX-6517DS-A2M			1,2
		1	Antel	BXA-70063-4CF-EDIN-6			
		2	Antel	BXA-70063-6CF-2			
		3	Alcatel Lucent	RRH2X60-AWS			
		3	Alcatel Lucent	RRH2X60-PCS			
		3	Andrew	HBXX-6517DS-A2M	19	1-5/8	1
		3	Andrew	LNX-8514DS-A1M			
	215.0	1		Sector Mount [SM 503-3]			
	212.0	1	RFS/Celwave	DB-T1-6Z-8AB-0Z			1,2
201.0	207.0	2	Kathrein	OG-4	2	1-1/4	1
	201.0	2		Side Arm Mount [SO 306-1]			
186.0	189.0	1	Andrew	DB589-A	1 1	7/8 1/2	1
	186.0	1		Side Arm Mount [SO 308-1]			
	184.0	1	Andrew	DB589-A			
12.0	12.0	1	Kathrein	TY-840	1	1/2	1

Notes:
1) Equipment elevations are measured from the bottom of tower steel which is 2ft above ground level.
2) Existing equipment to be removed; not considered in this analysis.

Table 3 - Design Antenna and Cable Information

Mounting Level (ft)	Center Line Elevation (ft)	Number of Antennas	Antenna Manufacturer	Antenna Model	Number of Feed Lines	Feed Line Size (in)
240	240	3		6' Side Arms		
		3		ASPD951		
220	220	4		6' Side Arms		
		4		ASP951		
200	200	3		5' Grid Dishes		
		2		6' Side Arms		
		2		UHF/VHF Antennas		
180	180	3		6' Side Arms		
		3		UHF/VHF Antennas		
170	170	2		6' Side Arms		
		2		UHF/VHF Antennas		
150	150	3		6' Side Arms		
		3		UHF/VHF Antennas		

3) ANALYSIS PROCEDURE

Table 4 - Documents Provided

Document	Remarks	Reference	Source
Tower Drawings	Rohn File #: 25692, dated: 07/05/1990	4841385	CCISITES
Foundation Investigation	WEI Project #: 2009-901, dated 09/16/2009	4468667	CCISITES
Foundation Investigation	GPD Project #: 2015777.841294.06, dated 06/11/2015	D.Palkovic	GPD
Geotechnical Report	WEI Project #: 2009-901, dated 09/16/2009	4468666	CCISITES
Boring Log Review	GPD Project #: 2015777.841294.07, dated 06/17/2015	5751301	CCISITES
Modification Design	GPD Project #: 2009268.80 Rev. A, dated 10/12/2009	4601540	CCISITES
Post-Mod Inspection	GPD Project #: 2009591.00, dated 01/13/2010	4601541	CCISITES
Modification Design	GPD Project #: 2014777.841294.04, dated 09/22/2014	5306639	CCISITES
Post-Mod Inspection	GPD Project #: 2015777.841294.05, dated 06/17/2015	5750961	CCISITES

3.1) Analysis Method

tnxTower (version 7.0.7.0), a commercially available analysis software package, was used to create a three-dimensional model of the tower and calculate member stresses for various loading cases. Selected output from the analysis is included in Appendix A.

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.

This analysis may be affected if any assumptions are not valid or have been made in error. GPD 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
T1	244.917 - 224.792	Leg	ROHN 2.5 STD	1	-11.99	63.41	18.9	Pass
T2	224.792 - 204.625	Leg	ROHN 3 EH	37	-37.80	110.22	34.3	Pass
T3	204.625 - 184.438	Leg	ROHN 3.5 EH	67	-64.27	125.07	51.4	Pass
T4	184.438 - 164.229	Leg	ROHN 4 EH	88	-91.59	159.18	57.5	Pass
T5	164.229 - 144.021	Leg	ROHN 5 EH	109	-118.86	238.65	49.8	Pass
T6	144.021 - 123.813	Leg	ROHN 5 EH	130	-143.51	199.88	71.8	Pass
T7	123.813 - 103.604	Leg	ROHN 6 EH	145	-170.71	302.33	56.5	Pass
T8	103.604 - 83.3333	Leg	ROHN 6 EH	160	-198.44	301.91	65.7	Pass
T9	83.3333 - 63	Leg	ROHN 6 EH	175	-226.51	301.49	75.1	Pass
T10	63 - 42.6667	Leg	ROHN 8 EHS	190	-254.85	384.77	66.2	Pass
T11	42.6667 - 22.3334	Leg	ROHN 8 EHS	205	-260.75	384.77	67.8	Pass
T12	22.3334 - 2	Leg	ROHN 8 EH	238	-288.28	503.91	57.2	Pass
T1	244.917 - 224.792	Diagonal	L1 3/4x1 3/4x3/16	11	-2.35	8.73	26.9 40.1 (b)	Pass
T2	224.792 - 204.625	Diagonal	L1 3/4x1 3/4x3/16	44	-3.83	4.99	76.7	Pass
T3	204.625 - 184.438	Diagonal	L2 1/2x2 1/2x3/16	71	-4.96	9.18	54.1 79.4 (b)	Pass
T4	184.438 - 164.229	Diagonal	L2 1/2x2 1/2x1/4	92	-5.57	9.05	61.5 66.8 (b)	Pass
T5	164.229 - 144.021	Diagonal	L2 1/2x2 1/2x5/16	113	-6.15	8.63	71.3	Pass
T6	144.021 - 123.813	Diagonal	L3x3x5/16	134	-7.37	10.27	71.8	Pass
T7	123.813 - 103.604	Diagonal	L3 1/2x3 1/2x1/4	149	-8.08	11.38	71.0	Pass
T8	103.604 - 83.3333	Diagonal	L4x4x5/16	164	-8.89	17.71	50.2	Pass
T9	83.3333 - 63	Diagonal	L4x4x5/16	179	-9.69	15.04	64.4	Pass
T10	63 - 42.6667	Diagonal	L4x4x5/16	194	-10.44	13.09	79.7	Pass
T11	42.6667 - 22.3334	Diagonal	ROHN 3 STD	212	-18.25	31.03	58.8	Pass
T12	22.3334 - 2	Diagonal	ROHN 3 STD	245	-18.00	29.68	60.7	Pass
T11	42.6667 - 22.3334	Horizontal	ROHN 2.5 STD	208	-9.61	15.16	63.4	Pass
T12	22.3334 - 2	Horizontal	ROHN 3 STD	241	-10.03	25.38	39.5	Pass
T1	244.917 - 224.792	Top Girt	L2x2x1/8	4	-0.02	3.21	0.8	Pass
T2	224.792 - 204.625	Top Girt	L1 3/4x1 3/4x3/16	41	-0.19	3.07	6.1	Pass
T11	42.6667 - 22.3334	Redund Horz 1 Bracing	ROHN 1.5 STD	229	-4.53	13.02	34.8	Pass
T12	22.3334 - 2	Redund Horz 1 Bracing	ROHN 1.5 STD	243	-5.00	11.00	45.5	Pass
T11	42.6667 - 22.3334	Redund Diag 1 Bracing	ROHN 2 STD	211	-4.12	8.53	48.3	Pass
T12	22.3334 - 2	Redund Diag 1 Bracing	ROHN 2 STD	263	-4.29	8.10	53.0	Pass
T11	42.6667 - 22.3334	Redund Hip 1 Bracing	ROHN 1.5 STD	233	-0.03	11.61	0.2	Pass
T12	22.3334 - 2	Redund Hip 1 Bracing	ROHN 1.5 STD	266	-0.02	9.90	0.2	Pass
T11	42.6667 - 22.3334	Redund Hip Diagonal 1 Bracing	Rohn 2.5 STD	232	-0.09	10.15	0.9	Pass
T12	22.3334 - 2	Redund Hip Diagonal 1 Bracing	Rohn 2.5 STD	265	-0.08	9.31	0.9	Pass
T11	42.6667 - 22.3334	Inner Bracing	ROHN 2 STD	236	-0.01	6.24	0.3	Pass
T12	22.3334 - 2	Inner Bracing	ROHN 3 STD	268	-0.02	24.10	0.2	Pass
							Summary	

Section No.	Elevation (ft)	Component Type	Size	Critical Element	P (K)	SF*P_allow (K)	% Capacity	Pass / Fail
				Leg (T9)			75.1	Pass
				Diagonal (T10)			79.7	Pass
				Horizontal (T11)			63.4	Pass
				Top Girt (T2)			6.1	Pass
				Redund Horz 1 Bracing (T12)			45.5	Pass
				Redund Diag 1 Bracing (T12)			53.0	Pass
				Redund Hip 1 Bracing (T11)			0.2	Pass
				Redund Hip Diagonal 1 Bracing (T12)			0.9	Pass
				Inner Bracing (T11)			0.3	Pass
				Bolt Checks			79.4	Pass
				Rating =			79.7	Pass

Table 6 - Tower Component Stresses vs. Capacity – LC5

Notes	Component	Elevation (ft)	% Capacity	Pass / Fail
1	Anchor Rods	0	51.7	Pass
1	Base Foundation	0	41.8	Pass
1	Base Foundation Soil Interaction	0	55.2	Pass

Structure Rating (max from all components) =	**79.7%**

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

4.1) Recommendations

The tower has sufficient capacity to carry the proposed load configuration. Modifications will not be required to bring the tower into compliance with the TIA-222-G standard for the proposed load configuration.

5) DISCLAIMER OF WARRANTIES

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

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

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

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

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

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

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

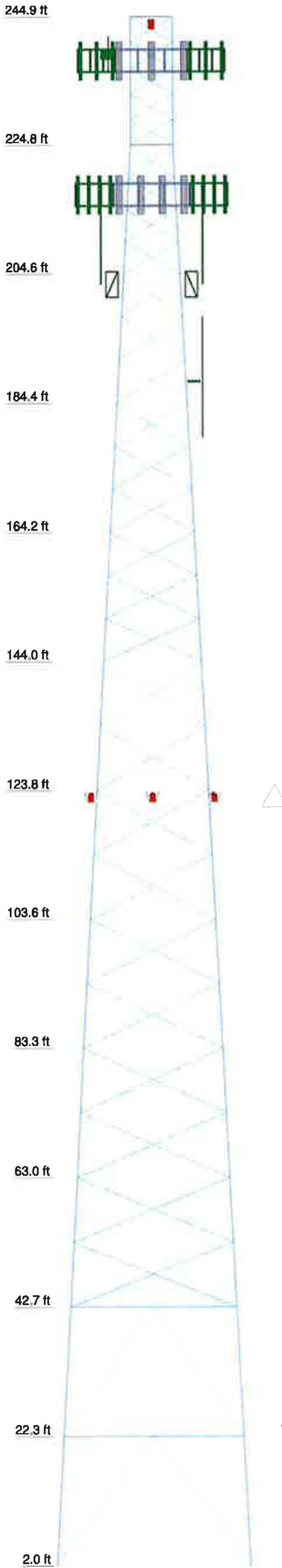
Towers are designed to carry gravity, wind, and ice loads. All members, legs, diagonals, struts, and redundant members provide structural stability to the tower with little redundancy. Absence or removal of a member can trigger catastrophic failure unless a substitute is provided before any removal.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

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

APPENDIX A

TNXTOWER OUTPUT

Section (elevation)	Legs	Leg Grade	Diagonals	Diagonal Grade	Top Girts	Horizontals	Red. Horizontals	Red. Diagonals	Red. Hips	Inner Bracing	Face Width (ft)	# Panels @ (ft)	Weight (K)
224.8 ft – 244.9 ft	ROHN 2.5 STD		L1 3/4x1 3/4x3/16		L2x2x1/8						6.5625	5 @ 4.025	0.9
204.6 ft – 224.8 ft	ROHN 3 EH				L1 3/4x1 3/4x3/16						8.70928	4 @ 5.04167	1.1
184.4 ft – 204.6 ft	ROHN 3.5 EH		L2 1/2x2 1/2x3/16	A36							10.8561	3 @ 6.72917	1.4
164.2 ft – 184.4 ft	ROHN 4 EH		L2 1/2x2 1/2x1/4								13.0028		1.9
144.0 ft – 164.2 ft	ROHN 5 EH		L2 1/2x2 1/2x5/16								15.1496	6 @ 6.73611	2.7
123.8 ft – 144.0 ft			L3x3x5/16			N.A.	N.A.	N.A.	N.A.	N.A.	17.2964		2.7
103.6 ft – 123.8 ft	ROHN 6 EH		L3 1/2x3 1/2x1/4								19.4432	4 @ 10.1042	3.2
83.3 ft – 103.6 ft					N.A.						21.59	2 @ 10.1354	4.0
63.0 ft – 83.3 ft											23.7367		4.2
42.7 ft – 63.0 ft	ROHN 8 EHS	A572-50	L4x4x5/16	A572-50							25.8835	4 @ 10.1667	4.7
22.3 ft – 42.7 ft				A500-42		ROHN 2.5 STD				ROHN 2 STD	28.0303	1 @ 20.3333	4.4
2.0 ft – 22.3 ft	ROHN 8 EH		ROHN 3 STD	A572-50		ROHN 3 STD	ROHN 1.5 STD	ROHN 2 STD	ROHN 1.5 STD	ROHN 3 STD	30.1771	1 @ 20.25	5.5
Total													36.5



DESIGNED APPURTENANCE LOADING

TYPE	ELEVATION	TYPE	ELEVATION
Flash Beacon Lighting	243	HBXX-6517DS-A2M w/ Mount Pipe	217
Side Arm Mount [SO 303-1]	242	HBXX-6517DS-A2M w/ Mount Pipe	217
Side Arm Mount [SO 303-1]	242	LNX-6514DS-A1M w/ Mount Pipe	217
DB806-XC	242	LNX-6514DS-A1M w/ Mount Pipe	217
FMO	242	LNX-6514DS-A1M w/ Mount Pipe	217
Sector Mount [SM 201-3]	238	(2) JAHH-65B-R3B w/ Mount Pipe	217
Pipe Mount [PM 601-3]	238	(2) JAHH-65B-R3B w/ Mount Pipe	217
(2) 7770.00	238	(2) JAHH-65B-R3B w/ Mount Pipe	217
(2) 7770.00	238	B66A RRH4X45	217
(2) 7770.00	238	B66A RRH4X45	217
HPA-65R-BUU-H6	238	B66A RRH4X45	217
HPA-65R-BUU-H6	238	RRH2x60-700	217
HPA-65R-BUU-H6	238	RRH2x60-700	217
(2) LGP21401	238	RRH2x60-700	217
(2) LGP21401	238	(2) DB-T1-6Z-8AB-0Z	217
(2) LGP21401	238	Side Arm Mount [SO 306-1]	203
(2) TT19-08BP111-001	238	Side Arm Mount [SO 306-1]	203
(2) TT19-08BP111-001	238	OG-4	203
(2) TT19-08BP111-001	238	OG-4	203
RRUS 11 B12	238	Side Arm Mount [SO 308-1]	188
RRUS 11 B12	238	DB589-A	188
RRUS 11 B12	238	DB589-A	188
RRUS 32 B2	238	17" Side Light Mount	122
RRUS 32 B2	238	17" Side Light Mount	122
RRUS 32 B2	238	Side Light	122
DC6-48-60-18-8F Surge Suppression Unit	238	Side Light	122
		Side Light	122
Sector Mount [SM 503-3]	217	TY-840	14
HBXX-6517DS-A2M w/ Mount Pipe	217		

MATERIAL STRENGTH

GRADE	Fy	Fu	GRADE	Fy	Fu
A572-50	50 ksi	65 ksi	A500-42	42 ksi	58 ksi
A36	36 ksi	58 ksi			

TOWER DESIGN NOTES

1. Tower is located in Fairfield County, Connecticut.
2. Tower designed for Exposure B to the TIA-222-G Standard.
3. Tower designed for a 93 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: 79.7%

ALL REACTIONS ARE FACTORED

MAX. CORNER REACTIONS AT BASE:
DOWN: 314 K
SHEAR: 34 K

UPLIFT: -259 K
SHEAR: 30 K

AXIAL 193 K
SHEAR 18 K
MOMENT 2625 kip-ft
TORQUE 4 kip-ft
50 mph WIND - 0.7500 in ICE

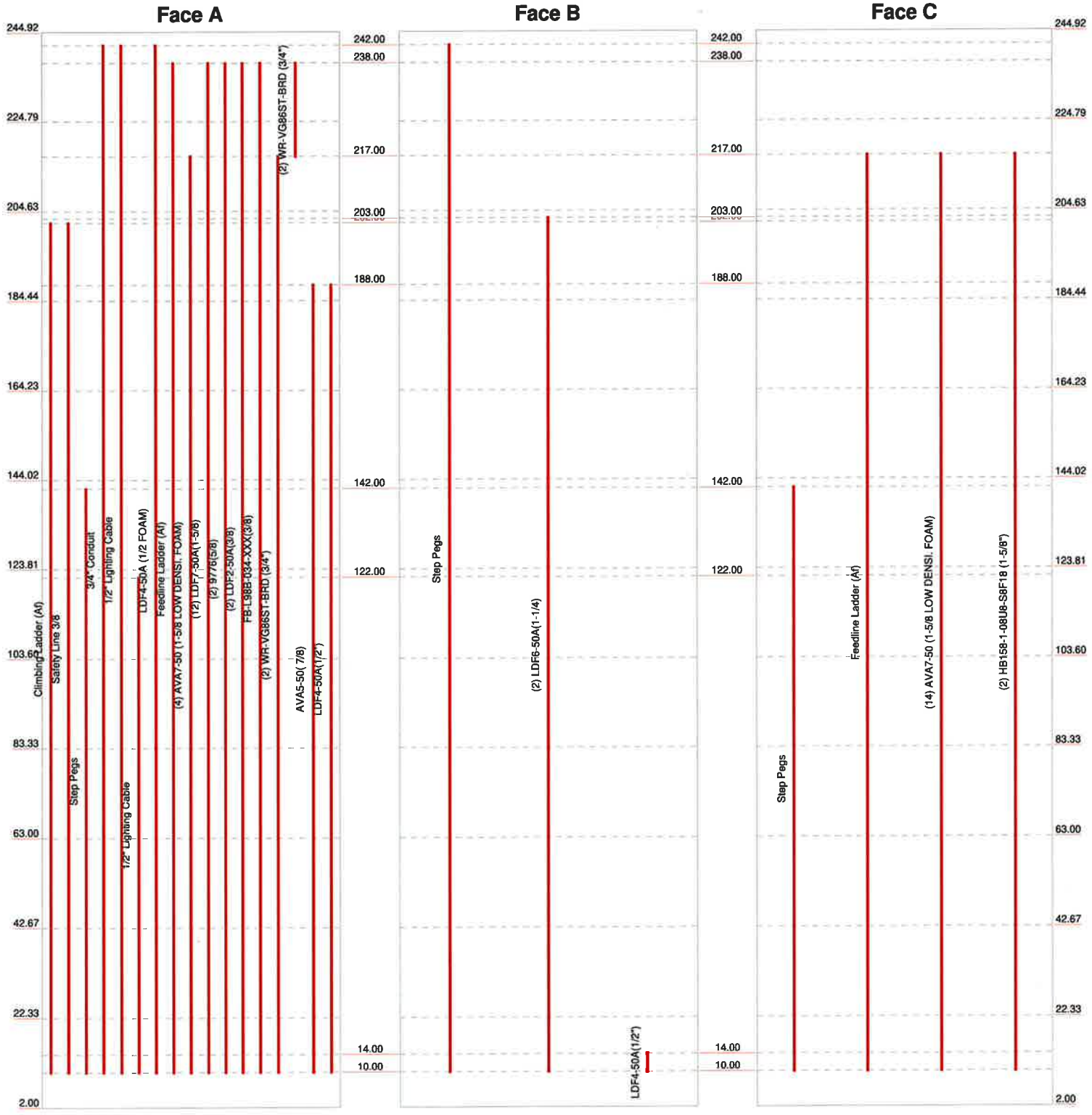
AXIAL 66 K
SHEAR 56 K
MOMENT 7628 kip-ft
TORQUE 22 kip-ft
REACTIONS - 93 mph WIND

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

Job: **BU #: 841294 MONROE-GUINEA ROAD**			
Project: **2016777.841294.11**			
Client: Crown Castle, Inc	Drawn by: tbeltz	App'd:	
Code: TIA-222-G	Date: 08/21/17	Scale: N	
Path: \\AKRN05.gpdco.com\TELECOM\Crown\841294\11\Rev 1\841294.eri		Dwg No.	

2' - 244'11-1/32"

Round | Flat | App In Face | App Out Face | Truss Leg



GPD
520 South Main Street Suite 2531
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GPD

Job:	BU #: 841294 MONROE-GUINEA ROAD		
Project:	2016777.841294.11		
Client:	Crown Castle, Inc	Drawn by: tbeltz	App'd:
Code:	TIA-222-G	Date: 08/21/17	Scale: N
Path:	\\AKRN05.gpdco.com\TELECOM\Crown\841294\11\Rev 1\841294.eri		Dwg No.

Tower Input Data

The main tower is a 3x free standing tower with an overall height of 244.92 ft above the ground line.
The base of the tower is set at an elevation of 2.00 ft above the ground line.
The face width of the tower is 6.56 ft at the top and 30.18 ft at the base.
This tower is designed using the TIA-222-G standard.
The following design criteria apply:

Tower is located in Fairfield County, Connecticut.
ASCE 7-10 Wind Data is used (wind speeds converted to nominal values).
Basic wind speed of 93 mph.
Structure Class II.
Exposure Category B.
Topographic Category 1.
Crest Height 0.00 ft.
Nominal ice thickness of 0.7500 in.
Ice thickness is considered to increase with height.
Ice density of 56 pcf.
A wind speed of 50 mph is used in combination with ice.
Temperature drop of 50 °F.
Deflections calculated using a wind speed of 60 mph.
Pressures are calculated at each section.
Stress ratio used in tower member design is 1.
Local bending stresses due to climbing loads, feed line supports, and appurtenance mounts are not considered.

Options

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

Tower Section Geometry

Tower Section	Tower Elevation ft	Assembly Database	Description	Section Width ft	Number of Sections	Section Length ft
T1	244.92-224.79			6.56	1	20.13
T2	224.79-204.63			6.56	1	20.17
T3	204.63-184.44			8.71	1	20.19
T4	184.44-164.23			10.86	1	20.21
T5	164.23-144.02			13.00	1	20.21
T6	144.02-123.81			15.15	1	20.21
T7	123.81-103.60			17.30	1	20.21
T8	103.60-83.33			19.44	1	20.27
T9	83.33-63.00			21.59	1	20.33
T10	63.00-42.67			23.74	1	20.33
T11	42.67-22.33			25.88	1	20.33
T12	22.33-2.00			28.03	1	20.33

Tower Section Geometry *(cont'd)*

Tower Section	Tower Elevation ft	Diagonal Spacing ft	Bracing Type	Has K Brace End Panels	Has Horizontals	Top Girt Offset in	Bottom Girt Offset in
T1	244.92-224.79	4.03	X Brace	No	No	0.0000	0.0000
T2	224.79-204.63	5.04	X Brace	No	No	0.0000	0.0000
T3	204.63-184.44	6.73	X Brace	No	No	0.0000	0.0000
T4	184.44-164.23	6.74	X Brace	No	No	0.0000	0.0000
T5	164.23-144.02	6.74	X Brace	No	No	0.0000	0.0000
T6	144.02-123.81	10.10	X Brace	No	No	0.0000	0.0000
T7	123.81-103.60	10.10	X Brace	No	No	0.0000	0.0000
T8	103.60-83.33	10.14	X Brace	No	No	0.0000	0.0000
T9	83.33-63.00	10.17	X Brace	No	No	0.0000	0.0000
T10	63.00-42.67	10.17	X Brace	No	No	0.0000	0.0000
T11	42.67-22.33	20.33	K1 Down	No	Yes	0.0000	0.0000
T12	22.33-2.00	20.25	K1 Down	No	Yes	0.0000	1.0000

Tower Section Geometry *(cont'd)*

Tower Elevation ft	Leg Type	Leg Size	Leg Grade	Diagonal Type	Diagonal Size	Diagonal Grade
T1 244.92-224.79	Pipe	ROHN 2.5 STD	A572-50 (50 ksi)	Equal Angle	L1 3/4x1 3/4x3/16	A36 (36 ksi)
T2 224.79-204.63	Pipe	ROHN 3 EH	A572-50 (50 ksi)	Equal Angle	L1 3/4x1 3/4x3/16	A36 (36 ksi)
T3 204.63-184.44	Pipe	ROHN 3.5 EH	A572-50 (50 ksi)	Equal Angle	L2 1/2x2 1/2x3/16	A36 (36 ksi)
T4 184.44-164.23	Pipe	ROHN 4 EH	A572-50 (50 ksi)	Equal Angle	L2 1/2x2 1/2x1/4	A36 (36 ksi)
T5 164.23-144.02	Pipe	ROHN 5 EH	A572-50 (50 ksi)	Equal Angle	L2 1/2x2 1/2x5/16	A36 (36 ksi)
T6 144.02-123.81	Pipe	ROHN 5 EH	A572-50 (50 ksi)	Equal Angle	L3x3x5/16	A36 (36 ksi)

Tower Elevation ft	Leg Type	Leg Size	Leg Grade	Diagonal Type	Diagonal Size	Diagonal Grade
T7 123.81-103.60	Pipe	ROHN 6 EH	A572-50 (50 ksi)	Equal Angle	L3 1/2x3 1/2x1/4	A572-50 (50 ksi)
T8 103.60-83.33	Pipe	ROHN 6 EH	A572-50 (50 ksi)	Equal Angle	L4x4x5/16	A572-50 (50 ksi)
T9 83.33-63.00	Pipe	ROHN 6 EH	A572-50 (50 ksi)	Equal Angle	L4x4x5/16	A572-50 (50 ksi)
T10 63.00-42.67	Pipe	ROHN 8 EHS	A572-50 (50 ksi)	Equal Angle	L4x4x5/16	A572-50 (50 ksi)
T11 42.67-22.33	Pipe	ROHN 8 EHS	A572-50 (50 ksi)	Pipe	ROHN 3 STD	A500-42 (42 ksi)
T12 22.33-2.00	Pipe	ROHN 8 EH	A572-50 (50 ksi)	Pipe	ROHN 3 STD	A572-50 (50 ksi)

Tower Section Geometry *(cont'd)*

Tower Elevation ft	Top Girt Type	Top Girt Size	Top Girt Grade	Bottom Girt Type	Bottom Girt Size	Bottom Girt Grade
T1 244.92-224.79	Equal Angle	L2x2x1/8	A36 (36 ksi)	Flat Bar		A36 (36 ksi)
T2 224.79-204.63	Equal Angle	L1 3/4x1 3/4x3/16	A36 (36 ksi)	Equal Angle		A36 (36 ksi)

Tower Section Geometry *(cont'd)*

Tower Elevation ft	No. of Mid Girts	Mid Girt Type	Mid Girt Size	Mid Girt Grade	Horizontal Type	Horizontal Size	Horizontal Grade
T11 42.67-22.33	None	Solid Round		A36 (36 ksi)	Pipe	ROHN 2.5 STD	A572-50 (50 ksi)
T12 22.33-2.00	None	Solid Round		A36 (36 ksi)	Pipe	ROHN 3 STD	A572-50 (50 ksi)

Tower Section Geometry *(cont'd)*

Tower Elevation ft	Secondary Horizontal Type	Secondary Horizontal Size	Secondary Horizontal Grade	Inner Bracing Type	Inner Bracing Size	Inner Bracing Grade
T11 42.67-22.33	Solid Round		A36 (36 ksi)	Pipe	ROHN 2 STD	A572-50 (50 ksi)
T12 22.33-2.00	Solid Round		A36 (36 ksi)	Pipe	ROHN 3 STD	A572-50 (50 ksi)

Tower Section Geometry *(cont'd)*

Tower Elevation ft	Redundant Bracing Grade		Redundant Type	Redundant Size	K Factor
T11	A572-50	Horizontal (1)	Pipe	ROHN 1.5 STD	1
42.67-22.33	(50 ksi)	Diagonal (1)	Pipe	ROHN 2 STD	1
		Hip (1)	Pipe	ROHN 1.5 STD	1
		Hip Diagonal (1)	Pipe	Rohn 2.5 STD	1
T12	A572-50	Horizontal (1)	Pipe	ROHN 1.5 STD	1
22.33-2.00	(50 ksi)	Diagonal (1)	Pipe	ROHN 2 STD	1
		Hip (1)	Pipe	ROHN 1.5 STD	1
		Hip Diagonal (1)	Pipe	Rohn 2.5 STD	1

Tower Section Geometry *(cont'd)*

Tower Elevation ft	Gusset Area (per face) ft^2	Gusset Thickness in	Gusset Grade	Adjust. Factor A_f	Adjust. Factor A_r	Weight Mult.	Double Angle Stitch Bolt Spacing Diagonals in	Double Angle Stitch Bolt Spacing Horizontals in	Double Angle Stitch Bolt Spacing Redundants in
T1	0.00	0.0000	A36	1	1	1	36.0000	36.0000	36.0000
244.92-224.79			(36 ksi)						
T2	0.00	0.0000	A36	1	1	1	36.0000	36.0000	36.0000
224.79-204.63			(36 ksi)						
T3	0.00	0.0000	A36	1	1	1	36.0000	36.0000	36.0000
204.63-184.44			(36 ksi)						
T4	0.00	0.0000	A36	1	1	1	36.0000	36.0000	36.0000
184.44-164.23			(36 ksi)						
T5	0.00	0.0000	A36	1	1	1	36.0000	36.0000	36.0000
164.23-144.02			(36 ksi)						
T6	0.00	0.0000	A36	1	1	1	36.0000	36.0000	36.0000
144.02-123.81			(36 ksi)						
T7	0.00	0.0000	A36	1	1	1	36.0000	36.0000	36.0000
123.81-103.60			(36 ksi)						
T8	0.00	0.0000	A36	1	1	1	36.0000	36.0000	36.0000
103.60-83.33			(36 ksi)						
T9 83.33-63.00	0.00	0.0000	A36	1	1	1	36.0000	36.0000	36.0000
			(36 ksi)						
T10	0.00	0.0000	A36	1	1	1	36.0000	36.0000	36.0000
63.00-42.67			(36 ksi)						
T11	0.00	0.0000	A36	1	1	1	36.0000	36.0000	36.0000
42.67-22.33			(36 ksi)						
T12 22.33-2.00	0.00	0.0000	A36	1	1	1	36.0000	36.0000	36.0000
			(36 ksi)						

Tower Section Geometry *(cont'd)*

Tower Elevation ft	Calc K Single Angles	Calc K Solid Rounds	K Factors[1] Legs	X Brace Diags X Y	K Brace Diags X Y	Single Diags X Y	Girts X Y	Horiz. X Y	Sec. Horiz. X Y	Inner Brace X Y

Tower Elevation ft	Calc K Single Angles	Calc K Solid Rounds	K Factors[1] Legs	X Brace Diags X	X Brace Diags Y	K Single Diags X	K Single Diags Y	Girts X	Girts Y	Horiz. X	Horiz. Y	Sec. Horiz. X	Sec. Horiz. Y	Inner Brace X	Inner Brace Y
T1	Yes	Yes	1	1	1	1	1	1	1	1	1	1	1	1	1
244.92-224.79				1	1	1	1	1	1	1	1	1	1	1	1
T2	Yes	Yes	1	1	1	1	1	1	1	1	1	1	1	1	1
224.79-204.63				1	1	1	1	1	1	1	1	1	1	1	1
T3	Yes	Yes	1	1	1	1	1	1	1	1	1	1	1	1	1
204.63-184.44				1	1	1	1	1	1	1	1	1	1	1	1
T4	Yes	Yes	1	1	1	1	1	1	1	1	1	1	1	1	1
184.44-164.23				1	1	1	1	1	1	1	1	1	1	1	1
T5	Yes	Yes	1	1	1	1	1	1	1	1	1	1	1	1	1
164.23-144.02				1	1	1	1	1	1	1	1	1	1	1	1
T6	Yes	Yes	1	1	1	1	1	1	1	1	1	1	1	1	1
144.02-123.81				1	1	1	1	1	1	1	1	1	1	1	1
T7	Yes	Yes	1	1	1	1	1	1	1	1	1	1	1	1	1
123.81-103.60				1	1	1	1	1	1	1	1	1	1	1	1
T8	Yes	Yes	1	1	1	1	1	1	1	1	1	1	1	1	1
103.60-83.33				1	1	1	1	1	1	1	1	1	1	1	1
T9	Yes	Yes	1	1	1	1	1	1	1	1	1	1	1	1	1
83.33-63.00				1	1	1	1	1	1	1	1	1	1	1	1
T10	Yes	Yes	1	1	1	1	1	1	1	1	1	1	1	1	1
63.00-42.67				1	1	1	1	1	1	1	1	1	1	1	1
T11	Yes	Yes	1	1	1	1	1	1	1	1	1	1	1	1	1
42.67-22.33				1	1	1	1	1	1	1	1	1	1	1	1
T12	Yes	Yes	1	1	1	1	1	1	1	1	1	1	1	1	1
22.33-2.00				1	1	1	1	1	1	1	1	1	1	1	1

[1]*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.*

Tower Section Geometry *(cont'd)*

Tower Elevation ft	Leg Net Width Deduct in	Leg U	Diagonal Net Width Deduct in	Diagonal U	Top Girt Net Width Deduct in	Top Girt U	Bottom Girt Net Width Deduct in	Bottom Girt U	Mid Girt Net Width Deduct in	Mid Girt U	Long Horizontal Net Width Deduct in	Long Horizontal U	Short Horizontal Net Width Deduct in	Short Horizontal U
T1	0.0000	1	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75
244.92-224.79														
T2	0.0000	1	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75
224.79-204.63														
T3	0.0000	1	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75
204.63-184.44														
T4	0.0000	1	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75
184.44-164.23														
T5	0.0000	1	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75
164.23-144.02														
T6	0.0000	1	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75
144.02-123.81														
T7	0.0000	1	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75
123.81-103.60														
T8	0.0000	1	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75
103.60-83.33														
T9 83.33-63.00	0.0000	1	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75

Tower Elevation ft	Leg		Diagonal		Top Girt		Bottom Girt		Mid Girt		Long Horizontal		Short Horizontal	
	Net Width Deduct in	U	Net Width Deduct in	U	Net Width Deduct in	U	Net Width Deduct in	U	Net Width Deduct in	U	Net Width Deduct in	U	Net Width Deduct in	U
T10 63.00-42.67	0.0000	1	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75
T11 42.67-22.33	0.0000	1	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75
T12 22.33-2.00	0.0000	1	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75

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 244.92-224.79	Flange	0.7500 A325N	4	0.5000 A325N	1	0.5000 A325N	1	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0
T2 224.79-204.63	Flange	0.8750 A325N	4	0.5000 A325N	1	0.5000 A325N	1	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0
T3 204.63-184.44	Flange	0.8750 A325N	4	0.5000 A325N	1	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0
T4 184.44-164.23	Flange	1.0000 A325N	4	0.5000 A325X	1	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0
T5 164.23-144.02	Flange	1.0000 A325N	4	0.5000 A325X	1	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0
T6 144.02-123.81	Flange	1.0000 A325N	6	0.6250 A325N	1	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0
T7 123.81-103.60	Flange	1.0000 A325N	6	0.6250 A325X	1	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0
T8 103.60-83.33	Flange	1.0000 A325N	6	0.7500 A325N	1	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0
T9 83.33-63.00	Flange	1.0000 A325N	6	0.7500 A325N	1	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0
T10 63.00-42.67	Flange	1.0000 A325N	8	0.7500 A325N	1	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0
T11 42.67-22.33	Flange	1.0000 A325N	8	0.7500 A325N	3	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.7500 A325N	2	0.6250 A325N	0
T12 22.33-2.00	Flange	1.0000 A354-BC	0	0.7500 A325N	3	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.7500 A325N	2	0.6250 A325N	0

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
Climbing Ladder (Af)	A	No	Af (CaAa)	202.00 - 10.00	0.0000	0.5	1	1	3.8400	3.8400		4.81
Safety Line 3/8	A	No	Ar (CaAa)	202.00 - 10.00	0.0000	0.5	1	1	0.3750	0.3750		0.22
Step Pegs	C	No	Ar (CaAa)	142.00 - 10.00	0.0000	0.5	1	1	0.8000	0.8000		2.72
Step Pegs	A	No	Ar (CaAa)	142.00 - 10.00	0.0000	0.5	1	1	0.8000	0.8000		2.72
Step Pegs	B	No	Ar (CaAa)	242.00 - 10.00	0.0000	0.5	1	1	0.8000	0.8000		2.72
3/4" Conduit	A	No	Ar (CaAa)	242.00 - 10.00	0.0000	0.4825	1	1	0.7500	0.7500		0.50
1/2" Lighting Cable	A	No	Ar (CaAa)	242.00 - 10.00	0.0000	0.4825	1	1	0.6250	0.6250		0.50
1/2" Lighting Cable	A	No	Ar (CaAa)	122.00 - 10.00	0.0000	0.4825	1	1	0.6250	0.6250		0.50
LDF4-50A (1/2 FOAM)	A	No	Ar (CaAa)	242.00 - 10.00	0.0000	0.48	1	1	0.6300	0.6300		0.15
Feedline Ladder (Af)	A	No	Af (CaAa)	238.00 - 10.00	0.0000	-0.4	1	1	3.0000	3.0000		8.40
AVA7-50 (1-5/8 LOW DENSI. FOAM)	A	No	Ar (CaAa)	217.00 - 10.00	0.0000	-0.425	4	4	1.0000	1.9800		0.72
LDF7-50A(1-5/8)	A	No	Ar (CaAa)	238.00 - 10.00	0.0000	-0.4	12	4	1.0000	1.9800		0.82
9776(5/8)	A	No	Ar (CaAa)	238.00 - 10.00	0.0000	-0.385	2	1	0.7350	0.7350		0.28
LDF2-50A(3/8)	A	No	Ar (CaAa)	238.00 - 10.00	1.0000	-0.375	2	1	0.4400	0.4400		0.08
FB-L98B-034-XXX(3/8)	A	No	Ar (CaAa)	238.00 - 10.00	2.0000	-0.375	1	1	0.3937	0.3937		0.06
WR-VG86ST-BRD (3/4")	A	No	Ar (CaAa)	217.00 - 10.00	2.0000	-0.375	2	2	0.7950	0.7950		0.60
WR-VG86ST-BRD (3/4")	A	No	Ar (CaAa)	238.00 - 217.00	2.0000	-0.375	2	2	0.7950	0.7950		0.60
AVA5-50(7/8)	A	No	Ar (CaAa)	188.00 - 10.00	0.0000	-0.45	1	1	1.0000	1.1020		0.30
LDF4-50A(1/2")	A	No	Ar (CaAa)	188.00 - 10.00	0.0000	-0.45	1	1	0.6300	0.6300		0.15
LDF6-50A(1-1/4)	B	No	Ar (CaAa)	203.00 - 10.00	0.0000	-0.25	2	2	1.0000	1.5500		0.60
Feedline Ladder (Af)	C	No	Af (CaAa)	217.00 - 10.00	0.0000	-0.375	1	1	3.0000	3.0000		8.40
AVA7-50 (1-5/8 LOW DENSI. FOAM)	C	No	Ar (CaAa)	217.00 - 10.00	0.0000	-0.4	14	9	1.0000	1.9800		0.72
HB158-1-08U8-S8F18 (1-5/8")	C	No	Ar (CaAa)	217.00 - 10.00	2.0000	-0.4	2	2	1.0000	1.9800		1.70
LDF4-50A(1/2")	B	No	Ar (CaAa)	14.00 - 10.00	0.0000	-0.375	1	1	0.6300	0.6300		0.15

Discrete Tower Loads

Description	Face or Leg	Offset Type	Offsets: Horz Lateral ft / Vert ft / ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
Flash Beacon Lighting	A	None		0.0000	243.00	No Ice	2.70	2.70	0.05
						1/2" Ice	3.10	3.10	0.07
						1" Ice	3.50	3.50	0.09
Side Arm Mount [SO 303-1]	B	None		0.0000	242.00	No Ice	2.24	5.32	0.12
						1/2" Ice	3.19	7.69	0.16
						1" Ice	4.14	10.06	0.20
Side Arm Mount [SO 303-1]	C	None		0.0000	242.00	No Ice	2.24	5.32	0.12
						1/2" Ice	3.19	7.69	0.16
						1" Ice	4.14	10.06	0.20
DB806-XC	C	From Leg	4.00 0.00 -3.00	0.0000	242.00	No Ice	1.14	1.14	0.02
						1/2" Ice	1.68	1.68	0.03
						1" Ice	2.03	2.03	0.04
FMO	C	From Leg	4.00 0.00 -3.00	0.0000	242.00	No Ice	8.40	8.40	0.01
						1/2" Ice	8.81	8.81	0.18
						1" Ice	9.24	9.24	0.36
Sector Mount [SM 201-3]	B	None		0.0000	238.00	No Ice	26.69	26.69	1.08
						1/2" Ice	37.60	37.60	1.49

Description	Face or Leg	Offset Type	Offsets: Horz Lateral ft / Vert ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
						1" Ice	48.51	48.51	1.90
Pipe Mount [PM 601-3]	B	None		0.0000	238.00	No Ice	4.39	4.39	0.20
						1/2" Ice	5.48	5.48	0.24
						1" Ice	6.57	6.57	0.28
(2) 7770.00	A	From Leg	1.00	0.0000	238.00	No Ice	5.51	2.93	0.04
			0.00			1/2" Ice	5.87	3.27	0.07
			0.00			1" Ice	6.23	3.63	0.11
(2) 7770.00	B	From Leg	1.00	0.0000	238.00	No Ice	5.51	2.93	0.04
			0.00			1/2" Ice	5.87	3.27	0.07
			0.00			1" Ice	6.23	3.63	0.11
(2) 7770.00	C	From Leg	1.00	0.0000	238.00	No Ice	5.51	2.93	0.04
			0.00			1/2" Ice	5.87	3.27	0.07
			0.00			1" Ice	6.23	3.63	0.11
HPA-65R-BUU-H6	A	From Leg	1.00	0.0000	238.00	No Ice	9.66	6.45	0.05
			0.00			1/2" Ice	10.13	6.91	0.11
			0.00			1" Ice	10.61	7.38	0.18
HPA-65R-BUU-H6	B	From Leg	1.00	0.0000	238.00	No Ice	9.66	6.45	0.05
			0.00			1/2" Ice	10.13	6.91	0.11
			0.00			1" Ice	10.61	7.38	0.18
HPA-65R-BUU-H6	C	From Leg	1.00	0.0000	238.00	No Ice	9.66	6.45	0.05
			0.00			1/2" Ice	10.13	6.91	0.11
			0.00			1" Ice	10.61	7.38	0.18
(2) LGP21401	A	From Leg	1.00	0.0000	238.00	No Ice	1.10	0.35	0.01
			0.00			1/2" Ice	1.24	0.44	0.02
			0.00			1" Ice	1.38	0.54	0.03
(2) LGP21401	B	From Leg	1.00	0.0000	238.00	No Ice	1.10	0.35	0.01
			0.00			1/2" Ice	1.24	0.44	0.02
			0.00			1" Ice	1.38	0.54	0.03
(2) LGP21401	C	From Leg	1.00	0.0000	238.00	No Ice	1.10	0.35	0.01
			0.00			1/2" Ice	1.24	0.44	0.02
			0.00			1" Ice	1.38	0.54	0.03
(2) TT19-08BP111-001	A	From Leg	1.00	0.0000	238.00	No Ice	0.55	0.44	0.02
			0.00			1/2" Ice	0.64	0.53	0.02
			0.00			1" Ice	0.74	0.63	0.03
(2) TT19-08BP111-001	B	From Leg	1.00	0.0000	238.00	No Ice	0.55	0.44	0.02
			0.00			1/2" Ice	0.64	0.53	0.02
			0.00			1" Ice	0.74	0.63	0.03
(2) TT19-08BP111-001	C	From Leg	1.00	0.0000	238.00	No Ice	0.55	0.44	0.02
			0.00			1/2" Ice	0.64	0.53	0.02
			0.00			1" Ice	0.74	0.63	0.03
RRUS 11 B12	A	From Leg	1.00	0.0000	238.00	No Ice	2.83	1.18	0.05
			0.00			1/2" Ice	3.04	1.33	0.07
			0.00			1" Ice	3.26	1.48	0.10
RRUS 11 B12	B	From Leg	1.00	0.0000	238.00	No Ice	2.83	1.18	0.05
			0.00			1/2" Ice	3.04	1.33	0.07
			0.00			1" Ice	3.26	1.48	0.10
RRUS 11 B12	C	From Leg	1.00	0.0000	238.00	No Ice	2.83	1.18	0.05
			0.00			1/2" Ice	3.04	1.33	0.07
			0.00			1" Ice	3.26	1.48	0.10
RRUS 32 B2	A	From Leg	1.00	0.0000	238.00	No Ice	2.73	1.67	0.05
			0.00			1/2" Ice	2.95	1.86	0.07
			0.00			1" Ice	3.18	2.05	0.10
RRUS 32 B2	B	From Leg	1.00	0.0000	238.00	No Ice	2.73	1.67	0.05
			0.00			1/2" Ice	2.95	1.86	0.07
			0.00			1" Ice	3.18	2.05	0.10
RRUS 32 B2	C	From Leg	1.00	0.0000	238.00	No Ice	2.73	1.67	0.05
			0.00			1/2" Ice	2.95	1.86	0.07

Description	Face or Leg	Offset Type	Offsets: Horz Lateral ft / Vert ft / ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
			0.00			1" Ice	3.18	2.05	0.10
DC6-48-60-18-8F Surge Suppression Unit	A	From Leg	1.00	0.0000	238.00	No Ice	0.92	0.92	0.02
			0.00			1/2" Ice	1.46	1.46	0.04
			0.00			1" Ice	1.64	1.64	0.06
Sector Mount [SM 503-3]	B	None		0.0000	217.00	No Ice	33.64	33.64	1.69
						1/2" Ice	48.17	48.17	2.26
						1" Ice	62.70	62.70	2.82
HBXX-6517DS-A2M w/ Mount Pipe	A	From Leg	4.00	0.0000	217.00	No Ice	8.95	7.14	0.07
			0.00			1/2" Ice	9.60	8.44	0.14
			3.00			1" Ice	10.23	9.58	0.22
HBXX-6517DS-A2M w/ Mount Pipe	B	From Leg	4.00	0.0000	217.00	No Ice	8.95	7.14	0.07
			0.00			1/2" Ice	9.60	8.44	0.14
			3.00			1" Ice	10.23	9.58	0.22
HBXX-6517DS-A2M w/ Mount Pipe	C	From Leg	4.00	0.0000	217.00	No Ice	8.95	7.14	0.07
			0.00			1/2" Ice	9.60	8.44	0.14
			3.00			1" Ice	10.23	9.58	0.22
LNX-8514DS-A1M w/ Mount Pipe	A	From Leg	4.00	0.0000	217.00	No Ice	11.45	9.60	0.08
			0.00			1/2" Ice	12.06	11.02	0.17
			3.00			1" Ice	12.69	12.29	0.26
LNX-8514DS-A1M w/ Mount Pipe	B	From Leg	4.00	0.0000	217.00	No Ice	11.45	9.60	0.08
			0.00			1/2" Ice	12.06	11.02	0.17
			3.00			1" Ice	12.69	12.29	0.26
LNX-8514DS-A1M w/ Mount Pipe	C	From Leg	4.00	0.0000	217.00	No Ice	11.45	9.60	0.08
			0.00			1/2" Ice	12.06	11.02	0.17
			3.00			1" Ice	12.69	12.29	0.26
(2) JAHH-65B-R3B w/ Mount Pipe	A	From Leg	4.00	0.0000	217.00	No Ice	9.35	7.65	0.09
			0.00			1/2" Ice	9.92	8.83	0.16
			3.00			1" Ice	10.46	9.73	0.25
(2) JAHH-65B-R3B w/ Mount Pipe	B	From Leg	4.00	0.0000	217.00	No Ice	9.35	7.65	0.09
			0.00			1/2" Ice	9.92	8.83	0.16
			3.00			1" Ice	10.46	9.73	0.25
(2) JAHH-65B-R3B w/ Mount Pipe	C	From Leg	4.00	0.0000	217.00	No Ice	9.35	7.65	0.09
			0.00			1/2" Ice	9.92	8.83	0.16
			3.00			1" Ice	10.46	9.73	0.25
B66A RRH4X45	A	From Leg	4.00	0.0000	217.00	No Ice	2.54	1.61	0.06
			0.00			1/2" Ice	2.75	1.79	0.08
			3.00			1" Ice	2.97	1.98	0.10
B66A RRH4X45	B	From Leg	4.00	0.0000	217.00	No Ice	2.54	1.61	0.06
			0.00			1/2" Ice	2.75	1.79	0.08
			3.00			1" Ice	2.97	1.98	0.10
B66A RRH4X45	C	From Leg	4.00	0.0000	217.00	No Ice	2.54	1.61	0.06
			0.00			1/2" Ice	2.75	1.79	0.08
			3.00			1" Ice	2.97	1.98	0.10
RRH2x60-700	A	From Leg	4.00	0.0000	217.00	No Ice	3.50	1.82	0.06
			0.00			1/2" Ice	3.76	2.05	0.08
			3.00			1" Ice	4.03	2.29	0.11
RRH2x60-700	B	From Leg	4.00	0.0000	217.00	No Ice	3.50	1.82	0.06
			0.00			1/2" Ice	3.76	2.05	0.08
			3.00			1" Ice	4.03	2.29	0.11
RRH2x60-700	C	From Leg	4.00	0.0000	217.00	No Ice	3.50	1.82	0.06
			0.00			1/2" Ice	3.76	2.05	0.08
			3.00			1" Ice	4.03	2.29	0.11
(2) DB-T1-6Z-8AB-0Z	C	From Leg	1.00	0.0000	217.00	No Ice	4.80	2.00	0.04
			0.00			1/2" Ice	5.07	2.19	0.08
			-3.00			1" Ice	5.35	2.39	0.12
Side Arm Mount [SO 306-1]	B	From Leg	2.00	0.0000	203.00	No Ice	0.98	2.18	0.04
			0.00			1/2" Ice	1.70	3.80	0.06

Description	Face or Leg	Offset Type	Offsets: Horz Lateral ft / Vert ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
			0.00			1" Ice	2.42	5.42	0.08
Side Arm Mount [SO 306-1]	C	From Leg	2.00	0.0000	203.00	No Ice	0.98	2.18	0.04
			0.00			1/2" Ice	1.70	3.80	0.06
			0.00			1" Ice	2.42	5.42	0.08
OG-4	B	From Leg	4.00	0.0000	203.00	No Ice	4.51	4.51	0.02
			0.00			1/2" Ice	7.14	7.14	0.06
			6.00			1" Ice	7.86	7.86	0.11
OG-4	C	From Leg	4.00	0.0000	203.00	No Ice	4.51	4.51	0.02
			0.00			1/2" Ice	7.14	7.14	0.06
			6.00			1" Ice	7.86	7.86	0.11
Side Arm Mount [SO 308-1]	B	From Leg	1.50	0.0000	188.00	No Ice	0.98	3.03	0.05
			0.00			1/2" Ice	1.70	5.22	0.08
			0.00			1" Ice	2.42	7.41	0.10
DB589-A	B	From Leg	3.00	0.0000	188.00	No Ice	2.76	2.76	0.01
			0.00			1/2" Ice	4.17	4.17	0.03
			3.00			1" Ice	5.59	5.59	0.06
DB589-A	B	From Leg	3.00	0.0000	188.00	No Ice	2.76	2.76	0.01
			0.00			1/2" Ice	4.17	4.17	0.03
			-2.00			1" Ice	5.59	5.59	0.06
TY-840	B	From Face	1.00	0.0000	14.00	No Ice	0.25	0.25	0.00
			0.00			1/2" Ice	0.45	0.45	0.00
			0.00			1" Ice	0.65	0.65	0.00
17" Side Light Mount	A	From Face	0.50	0.0000	122.00	No Ice	2.27	2.27	0.06
			0.00			1/2" Ice	3.42	3.42	1.15
			0.00			1" Ice	4.58	4.58	2.26
17" Side Light Mount	C	From Face	0.50	0.0000	122.00	No Ice	2.27	2.27	0.06
			0.00			1/2" Ice	3.42	3.42	1.15
			0.00			1" Ice	4.58	4.58	2.26
Side Light	A	From Leg	1.00	0.0000	122.00	No Ice	0.33	0.33	0.01
			0.00			1/2" Ice	0.47	0.47	0.01
			0.00			1" Ice	0.60	0.60	0.01
Side Light	B	From Leg	1.00	0.0000	122.00	No Ice	0.33	0.33	0.01
			0.00			1/2" Ice	0.47	0.47	0.01
			0.00			1" Ice	0.60	0.60	0.01
Side Light	C	From Leg	1.00	0.0000	122.00	No Ice	0.33	0.33	0.01
			0.00			1/2" Ice	0.47	0.47	0.01
			0.00			1" Ice	0.60	0.60	0.01

Maximum Tower Deflections - Service Wind

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
T1	244.917 - 224.792	5.785	47	0.2219	0.0239
T2	224.792 - 204.625	4.847	47	0.2146	0.0198
T3	204.625 - 184.438	3.949	47	0.1972	0.0148
T4	184.438 - 164.229	3.142	47	0.1724	0.0110
T5	164.229 - 144.021	2.445	47	0.1464	0.0087
T6	144.021 - 123.813	1.848	47	0.1253	0.0069
T7	123.813 - 103.604	1.347	47	0.1022	0.0057
T8	103.604 - 83.3333	0.929	47	0.0847	0.0046
T9	83.3333 - 63	0.590	47	0.0661	0.0038
T10	63 - 42.6667	0.328	47	0.0468	0.0030
T11	42.6667 - 22.3334	0.141	47	0.0298	0.0022
T12	22.3334 - 2	0.043	39	0.0130	0.0011

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °

Critical Deflections and Radius of Curvature - Service Wind

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
243.00	Flash Beacon Lighting	47	5.695	0.2214	0.0235	502230
242.00	Side Arm Mount [SO 303-1]	47	5.648	0.2211	0.0233	502230
238.00	Sector Mount [SM 201-3]	47	5.461	0.2200	0.0226	363057
217.00	Sector Mount [SM 503-3]	47	4.492	0.2091	0.0179	78619
203.00	Side Arm Mount [SO 306-1]	47	3.880	0.1954	0.0144	49005
188.00	Side Arm Mount [SO 308-1]	47	3.276	0.1771	0.0116	42670
122.00	17" Side Light Mount	47	1.307	0.1004	0.0056	63384
14.00	TY-840	39	0.021	0.0073	0.0006	138005

Maximum Tower Deflections - Design Wind

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
T1	244.917 - 224.792	22.008	18	0.8402	0.0921
T2	224.792 - 204.625	18.452	18	0.8136	0.0763
T3	204.625 - 184.438	15.042	18	0.7489	0.0572
T4	184.438 - 164.229	11.974	18	0.6554	0.0427
T5	164.229 - 144.021	9.322	18	0.5571	0.0335
T6	144.021 - 123.813	7.047	18	0.4770	0.0268
T7	123.813 - 103.604	5.141	18	0.3892	0.0223
T8	103.604 - 83.3333	3.547	18	0.3225	0.0178
T9	83.3333 - 63	2.255	18	0.2518	0.0147
T10	63 - 42.6667	1.256	18	0.1784	0.0117
T11	42.6667 - 22.3334	0.541	19	0.1133	0.0087
T12	22.3334 - 2	0.162	2	0.0494	0.0041

Critical Deflections and Radius of Curvature - Design Wind

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
243.00	Flash Beacon Lighting	18	21.667	0.8384	0.0907	141195
242.00	Side Arm Mount [SO 303-1]	18	21.489	0.8375	0.0900	141195
238.00	Sector Mount [SM 201-3]	18	20.779	0.8336	0.0870	102069
217.00	Sector Mount [SM 503-3]	18	17.105	0.7934	0.0690	21387
203.00	Side Arm Mount [SO 306-1]	18	14.781	0.7421	0.0557	13055
188.00	Side Arm Mount [SO 308-1]	18	12.485	0.6731	0.0448	11290
122.00	17" Side Light Mount	18	4.986	0.3823	0.0219	16696
14.00	TY-840	2	0.081	0.0276	0.0023	36144

Bolt Design Data

Section No.	Elevation ft	Component Type	Bolt Grade	Bolt Size in	Number Of Bolts	Maximum Load per Bolt K	Allowable Load K	Ratio Load / Allowable	Allowable Ratio	Criteria
T1	244.917	Leg	A325N	0.7500	4	2.28	29.82	0.076	1	Bolt Tension
		Diagonal	A325N	0.5000	1	2.29	5.71	0.401	1	Member Block Shear
		Top Girt	A325N	0.5000	1	0.02	6.96	0.003	1	Member Bearing
T2	224.792	Leg	A325N	0.8750	4	7.62	40.59	0.188	1	Bolt Tension
		Diagonal	A325N	0.5000	1	4.06	5.71	0.711	1	Member Block Shear
		Top Girt	A325N	0.5000	1	0.18	5.71	0.032	1	Member Block Shear
T3	204.625	Leg	A325N	0.8750	4	13.59	40.59	0.335	1	Bolt Tension
		Diagonal	A325N	0.5000	1	4.92	6.20	0.794	1	Member Bearing
T4	184.438	Leg	A325N	1.0000	4	19.62	53.01	0.370	1	Bolt Tension
		Diagonal	A325X	0.5000	1	5.52	8.27	0.668	1	Member Bearing
T5	164.229	Leg	A325N	1.0000	4	25.47	53.01	0.480	1	Bolt Tension
		Diagonal	A325X	0.5000	1	6.15	9.72	0.633	1	Bolt Shear
T6	144.021	Leg	A325N	1.0000	6	20.47	53.01	0.386	1	Bolt Tension
		Diagonal	A325N	0.6250	1	7.37	12.43	0.593	1	Bolt Shear
T7	123.813	Leg	A325N	1.0000	6	24.24	53.01	0.457	1	Bolt Tension
		Diagonal	A325X	0.6250	1	7.99	11.70	0.683	1	Member Bearing
T8	103.604	Leg	A325N	1.0000	6	28.01	53.01	0.528	1	Bolt Tension
		Diagonal	A325N	0.7500	1	8.82	17.67	0.499	1	Member Bearing
T9	83.3333	Leg	A325N	1.0000	6	31.78	53.01	0.599	1	Bolt Tension
		Diagonal	A325N	0.7500	1	9.69	17.89	0.542	1	Bolt Shear
T10	63	Leg	A325N	1.0000	8	26.64	53.01	0.502	1	Bolt Tension
		Diagonal	A325N	0.7500	1	10.33	17.67	0.585	1	Member Bearing
T11	42.6667	Leg	A325N	1.0000	8	27.03	53.01	0.510	1	Bolt Tension
		Diagonal	A325N	0.7500	3	6.08	17.89	0.340	1	Bolt Shear
		Horizontal	A325N	0.7500	2	4.92	17.89	0.275	1	Bolt Shear
T12	22.3334	Diagonal	A325N	0.7500	3	6.00	17.89	0.335	1	Bolt Shear
		Horizontal	A325N	0.7500	2	5.02	17.89	0.280	1	Bolt Shear

Compression Checks

Leg Design Data (Compression)

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	A in^2	P_u K	ϕP_n K	Ratio $\frac{P_u}{\phi P_n}$
T1	244.917 - 224.792	ROHN 2.5 STD	20.13	4.02	51.0 K=1.00	1.7040	-11.99	63.41	0.189 [1]
T2	224.792 - 204.625	ROHN 3 EH	20.20	5.05	53.3 K=1.00	3.0159	-37.80	110.22	0.343 [1]
T3	204.625 - 184.438	ROHN 3.5 EH	20.23	6.74	61.9 K=1.00	3.6784	-64.27	125.07	0.514 [1]
T4	184.438 - 164.229	ROHN 4 EH	20.25	6.75	54.8 K=1.00	4.4074	-91.59	159.18	0.575 [1]
T5	164.229 - 144.021	ROHN 5 EH	20.25	6.75	44.0 K=1.00	6.1114	-118.86	238.65	0.498 [1]
T6	144.021 - 123.813	ROHN 5 EH	20.25	10.12	66.1 K=1.00	6.1114	-143.51	199.88	0.718 [1]
T7	123.813 - 103.604	ROHN 6 EH	20.25	10.12	55.3 K=1.00	8.4049	-170.71	302.33	0.565 [1]
T8	103.604 - 83.3333	ROHN 6 EH	20.31	10.15	55.5 K=1.00	8.4049	-198.44	301.91	0.657 [1]
T9	83.3333 - 63	ROHN 6 EH	20.37	10.19	55.7	8.4049	-226.51	301.49	0.751 [1]

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	A in^2	P_u K	ϕP_n K	Ratio $\frac{P_u}{\phi P_n}$
T10	63 - 42.6667	ROHN 8 EHS	20.37	10.19	41.9 K=1.00	9.7193	-254.85	384.77	0.662 [1]
T11	42.6667 - 22.3334	ROHN 8 EHS	20.37	10.19	41.9 K=1.00	9.7193	-260.75	384.77	0.678 [1]
T12	22.3334 - 2	ROHN 8 EH	20.37	10.14	42.3 K=1.00	12.7627	-288.28	503.91	0.572 [1]

[1] P_u / ϕP_n controls

Diagonal Design Data (Compression)

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	A in^2	P_u K	ϕP_n K	Ratio $\frac{P_u}{\phi P_n}$
T1	244.917 - 224.792	L1 3/4x1 3/4x3/16	7.70	3.60	125.9 K=1.00	0.6211	-2.35	8.73	0.269 [1]
T2	224.792 - 204.625	L1 3/4x1 3/4x3/16	9.83	4.80	167.7 K=1.00	0.6211	-3.83	4.99	0.767 [1]
T3	204.625 - 184.438	L2 1/2x2 1/2x3/16	12.47	6.15	149.0 K=1.00	0.9020	-4.96	9.18	0.541 [1]
T4	184.438 - 164.229	L2 1/2x2 1/2x1/4	14.33	7.05	172.3 K=1.00	1.1900	-5.57	9.05	0.615 [1]
T5	164.229 - 144.021	L2 1/2x2 1/2x5/16	16.25	7.97	195.5 K=1.00	1.4600	-6.15	8.63	0.713 [1]
T6	144.021 - 123.813	L3x3x5/16	19.57	9.71	197.8 K=1.00	1.7773	-7.37	10.27	0.718 [1]
T7	123.813 - 103.604	L3 1/2x3 1/2x1/4	21.44	10.59	183.1 K=1.00	1.6900	-8.08	11.38	0.710 [1]
T8	103.604 - 83.3333	L4x4x5/16	23.37	11.54	175.1 K=1.00	2.4023	-8.89	17.71	0.502 [1]
T9	83.3333 - 63	L4x4x5/16	25.33	12.52	190.0 K=1.00	2.4023	-9.69	15.04	0.644 [1]
T10	63 - 42.6667	L4x4x5/16	27.31	13.42	203.6 K=1.00	2.4023	-10.44	13.09	0.797 [1]
T11	42.6667 - 22.3334	KL/R > 200 (C) - 194 ROHN 3 STD	24.70	12.35	127.4 K=1.00	2.2285	-18.25	31.03	0.588 [1]
T12	22.3334 - 2	ROHN 3 STD	25.26	12.63	130.2 K=1.00	2.2285	-18.00	29.68	0.607 [1]

[1] P_u / ϕP_n controls

Horizontal Design Data (Compression)

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	A in^2	P_u K	ϕP_n K	Ratio $\frac{P_u}{\phi P_n}$
T11	42.6667 - 22.3334	ROHN 2.5 STD	25.88	12.58	159.4 K=1.00	1.7040	-9.61	15.16	0.634 [1]
T12	22.3334 - 2	ROHN 3 STD	28.03	13.66	140.8 K=1.00	2.2285	-10.03	25.38	0.395 [1]

[1] P_u / ϕP_n controls

Top Girt Design Data (Compression)

Section No.	Elevation	Size	L	L_u	Kl/r	A	P_u	ϕP_n	Ratio $\frac{P_u}{\phi P_n}$
	ft		ft	ft		in^2	K	K	
T1	244.917 - 224.792	L2x2x1/8	6.56	6.11	184.6 K=1.00	0.4844	-0.02	3.21	0.006 [1]
T2	224.792 - 204.625	L1 3/4x1 3/4x3/16 KL/R > 200 (C) - 41	6.56	6.11	213.6 K=1.00	0.6211	-0.19	3.07	0.061 [1]

[1] P_u / ϕP_n controls

Redundant Horizontal (1) Design Data (Compression)

Section No.	Elevation	Size	L	L_u	Kl/r	A	P_u	ϕP_n	Ratio $\frac{P_u}{\phi P_n}$
	ft		ft	ft		in^2	K	K	
T11	42.6667 - 22.3334	ROHN 1.5 STD	6.47	6.11	117.8 K=1.00	0.7995	-4.53	13.02	0.348 [1]
T12	22.3334 - 2	ROHN 1.5 STD	7.01	6.65	128.1 K=1.00	0.7995	-5.00	11.00	0.455 [1]

[1] P_u / ϕP_n controls

Redundant Diagonal (1) Design Data (Compression)

Section No.	Elevation	Size	L	L_u	Kl/r	A	P_u	ϕP_n	Ratio $\frac{P_u}{\phi P_n}$
	ft		ft	ft		in^2	K	K	
T11	42.6667 - 22.3334	ROHN 2 STD	11.78	11.06	168.7 K=1.00	1.0745	-4.12	8.53	0.483 [1]
T12	22.3334 - 2	ROHN 2 STD	12.02	11.35	173.1 K=1.00	1.0745	-4.29	8.10	0.530 [1]

[1] P_u / ϕP_n controls

Redundant Hip (1) Design Data (Compression)

Section No.	Elevation	Size	L	L_u	Kl/r	A	P_u	ϕP_n	Ratio $\frac{P_u}{\phi P_n}$
	ft		ft	ft		in^2	K	K	
T11	42.6667 - 22.3334	ROHN 1.5 STD	6.47	6.47	124.7 K=1.00	0.7995	-0.03	11.61	0.002 [1]
T12	22.3334 - 2	ROHN 1.5 STD	7.01	7.01	135.1 K=1.00	0.7995	-0.02	9.90	0.002 [1]

[1] P_u / ϕP_n controls

Redundant Hip Diagonal (1) Design Data (Compression)

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	A in^2	P_u K	ϕP_n K	Ratio $\frac{P_u}{\phi P_n}$
T11	42.6667 - 22.3334	Rohn 2.5 STD	15.37	15.37	194.7 K=1.00	1.7040	-0.09	10.15	0.009 [1]
T12	22.3334 - 2	Rohn 2.5 STD	16.05	16.05	203.3 K=1.00	1.7040	-0.08	9.31	0.009 [1]

[1] $P_u / \phi P_n$ controls

Inner Bracing Design Data (Compression)

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	A in^2	P_u K	ϕP_n K	Ratio $\frac{P_u}{\phi P_n}$
T11	42.6667 - 22.3334	ROHN 2 STD	12.94	12.94	197.3 K=1.00	1.0745	-0.01	6.24	0.002 [1]
T12	22.3334 - 2	ROHN 3 STD	14.02	14.02	144.5 K=1.00	2.2285	-0.02	24.10	0.001 [1]

[1] $P_u / \phi P_n$ controls

Tension Checks

Leg Design Data (Tension)

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	A in^2	P_u K	ϕP_n K	Ratio $\frac{P_u}{\phi P_n}$
T1	244.917 - 224.792	ROHN 2.5 STD	20.13	4.02	51.0	1.7040	9.12	76.68	0.119 [1]
T2	224.792 - 204.625	ROHN 3 EH	20.20	5.05	53.3	3.0159	30.48	135.72	0.225 [1]
T3	204.625 - 184.438	ROHN 3.5 EH	20.23	6.74	61.9	3.6784	54.36	165.53	0.328 [1]
T4	184.438 - 164.229	ROHN 4 EH	20.25	6.75	54.8	4.4074	78.49	198.34	0.396 [1]
T5	164.229 - 144.021	ROHN 5 EH	20.25	6.75	44.0	6.1114	101.89	275.01	0.370 [1]
T6	144.021 - 123.813	ROHN 5 EH	20.25	10.12	66.1	6.1114	122.81	275.01	0.447 [1]
T7	123.813 - 103.604	ROHN 6 EH	20.25	10.12	55.3	8.4049	145.45	378.22	0.385 [1]
T8	103.604 - 83.3333	ROHN 6 EH	20.31	10.15	55.5	8.4049	168.05	378.22	0.444 [1]
T9	83.3333 - 63	ROHN 6 EH	20.37	10.19	55.7	8.4049	190.66	378.22	0.504 [1]
T10	63 - 42.6667	ROHN 8 EHS	20.37	10.19	41.9	9.7193	213.08	437.37	0.487 [1]
T11	42.6667 - 22.3334	ROHN 8 EHS	20.37	10.19	41.9	9.7193	216.58	437.37	0.495 [1]
T12	22.3334 - 2	ROHN 8 EH	20.37	0.08	0.3	12.7627	260.71	574.32	0.454 [1]

[1] $P_u / \phi P_n$ controls

Diagonal Design Data (Tension)

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	A in^2	P_u K	ϕP_n K	Ratio $\frac{P_u}{\phi P_n}$
T1	244.917 - 224.792	L1 3/4x1 3/4x3/16	7.70	3.60	82.9	0.3779	2.29	16.44	0.139 [1]
T2	224.792 - 204.625	L1 3/4x1 3/4x3/16	9.38	4.57	104.5	0.3779	4.06	16.44	0.247 [1]
T3	204.625 - 184.438	L2 1/2x2 1/2x3/16	12.47	6.15	96.4	0.5886	4.92	25.60	0.192 [1]
T4	184.438 - 164.229	L2 1/2x2 1/2x1/4	14.33	7.05	111.6	0.7753	5.52	33.73	0.164 [1]
T5	164.229 - 144.021	L2 1/2x2 1/2x5/16	16.25	7.97	127.2	0.9485	6.15	41.26	0.149 [1]
T6	144.021 - 123.813	L3x3x5/16	19.57	9.71	128.0	1.1572	7.31	50.34	0.145 [1]
T7	123.813 - 103.604	L3 1/2x3 1/2x1/4	21.44	10.59	117.9	1.1269	7.99	54.94	0.145 [1]
T8	103.604 - 83.3333	L4x4x5/16	23.37	11.54	112.7	1.5967	8.82	77.84	0.113 [1]
T9	83.3333 - 63	L4x4x5/16	25.33	12.52	122.2	1.5967	9.56	77.84	0.123 [1]
T10	63 - 42.6667	L4x4x5/16	27.31	13.42	130.8	1.5967	10.33	77.84	0.133 [1]
T11	42.6667 - 22.3334	ROHN 3 STD	24.70	12.35	127.4	2.2285	17.45	84.24	0.207 [1]
T12	22.3334 - 2	ROHN 3 STD	25.26	12.63	130.2	2.2285	17.12	100.28	0.171 [1]

[1] $P_u / \phi P_n$ controls

Horizontal Design Data (Tension)

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	A in^2	P_u K	ϕP_n K	Ratio $\frac{P_u}{\phi P_n}$
T11	42.6667 - 22.3334	ROHN 2.5 STD	25.88	12.58	159.4	1.7040	9.83	76.68	0.128 [1]
T12	22.3334 - 2	ROHN 3 STD	28.03	13.66	140.8	2.2285	9.99	100.28	0.100 [1]

[1] $P_u / \phi P_n$ controls

Top Girt Design Data (Tension)

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	A in^2	P_u K	ϕP_n K	Ratio $\frac{P_u}{\phi P_n}$
T1	244.917 - 224.792	L2x2x1/8	6.56	6.11	121.2	0.3047	0.00	13.25	0.000 [1]
T2	224.792 - 204.625	L1 3/4x1 3/4x3/16	6.56	6.11	141.3	0.3779	0.18	16.44	0.011 [1]

[1] $P_u / \phi P_n$ controls

Redundant Horizontal (1) Design Data (Tension)

Section No.	Elevation	Size	L	L_u	Kl/r	A	P_u	ϕP_n	Ratio $\frac{P_u}{\phi P_n}$
	ft		ft	ft		in^2	K	K	
T11	42.6667 - 22.3334	ROHN 1.5 STD	6.47	6.11	117.8	0.7995	4.53	35.98	0.126 [1]
T12	22.3334 - 2	ROHN 1.5 STD	7.01	6.65	128.1	0.7995	5.00	35.98	0.139 [1]

[1] P_u / ϕP_n controls

Redundant Diagonal (1) Design Data (Tension)

Section No.	Elevation	Size	L	L_u	Kl/r	A	P_u	ϕP_n	Ratio $\frac{P_u}{\phi P_n}$
	ft		ft	ft		in^2	K	K	
T11	42.6667 - 22.3334	ROHN 2 STD	11.78	11.06	168.7	1.0745	4.12	48.35	0.085 [1]
T12	22.3334 - 2	ROHN 2 STD	12.02	11.35	173.1	1.0745	4.29	48.35	0.089 [1]

[1] P_u / ϕP_n controls

Redundant Hip (1) Design Data (Tension)

Section No.	Elevation	Size	L	L_u	Kl/r	A	P_u	ϕP_n	Ratio $\frac{P_u}{\phi P_n}$
	ft		ft	ft		in^2	K	K	
T11	42.6667 - 22.3334	ROHN 1.5 STD	6.47	6.47	124.7	0.7995	0.02	35.98	0.000 [1]
T12	22.3334 - 2	ROHN 1.5 STD	7.01	7.01	135.1	0.7995	0.01	35.98	0.000 [1]

[1] P_u / ϕP_n controls

Redundant Hip Diagonal (1) Design Data (Tension)

Section No.	Elevation	Size	L	L_u	Kl/r	A	P_u	ϕP_n	Ratio $\frac{P_u}{\phi P_n}$
	ft		ft	ft		in^2	K	K	
T11	42.6667 - 22.3334	Rohn 2.5 STD	15.37	15.37	194.7	1.7040	0.08	76.68	0.001 [1]
T12	22.3334 - 2	Rohn 2.5 STD	16.05	16.05	203.3	1.7040	0.07	76.68	0.001 [1]

[1] P_u / ϕP_n controls

Inner Bracing Design Data (Tension)

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	A in^2	P_u K	ϕP_n K	Ratio $\frac{P_u}{\phi P_n}$
T11	42.6667 - 22.3334	ROHN 2 STD	12.94	12.94	197.3	1.0745	0.00	48.35	0.000 [1]

[1] $P_u / \phi P_n$ controls

Section Capacity Table

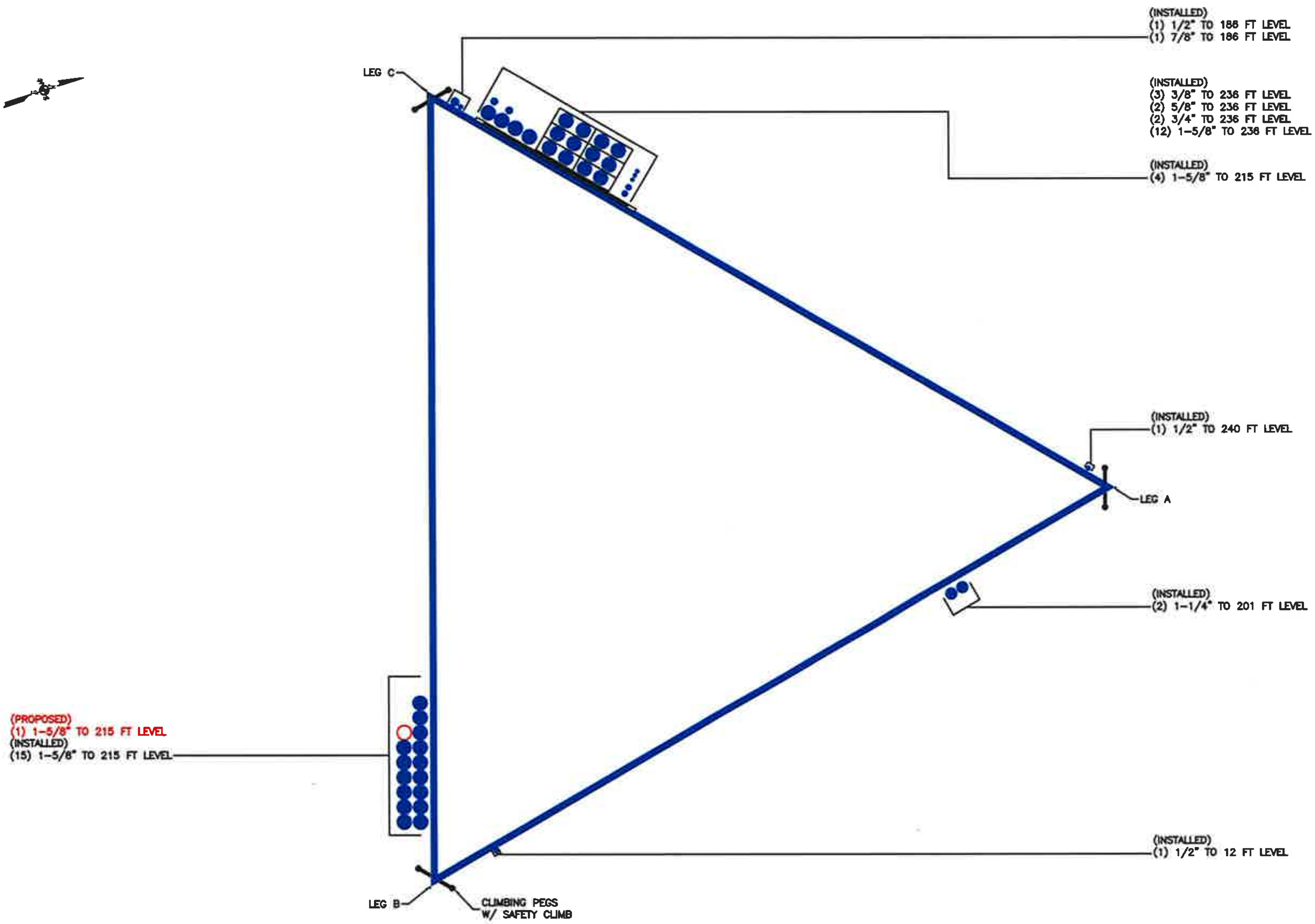
Section No.	Elevation ft	Component Type	Size	Critical Element	P K	ϕP_{allow} K	% Capacity	Pass Fail
T1	244.917 - 224.792	Leg	ROHN 2.5 STD	1	-11.99	63.41	18.9	Pass
T2	224.792 - 204.625	Leg	ROHN 3 EH	37	-37.80	110.22	34.3	Pass
T3	204.625 - 184.438	Leg	ROHN 3.5 EH	67	-64.27	125.07	51.4	Pass
T4	184.438 - 164.229	Leg	ROHN 4 EH	88	-91.59	159.18	57.5	Pass
T5	164.229 - 144.021	Leg	ROHN 5 EH	109	-118.86	238.65	49.8	Pass
T6	144.021 - 123.813	Leg	ROHN 5 EH	130	-143.51	199.88	71.8	Pass
T7	123.813 - 103.604	Leg	ROHN 6 EH	145	-170.71	302.33	56.5	Pass
T8	103.604 - 83.3333	Leg	ROHN 6 EH	160	-198.44	301.91	65.7	Pass
T9	83.3333 - 63	Leg	ROHN 6 EH	175	-226.51	301.49	75.1	Pass
T10	63 - 42.6667	Leg	ROHN 8 EHS	190	-254.85	384.77	66.2	Pass
T11	42.6667 - 22.3334	Leg	ROHN 8 EHS	205	-260.75	384.77	67.8	Pass
T12	22.3334 - 2	Leg	ROHN 8 EH	238	-288.28	503.91	57.2	Pass
T1	244.917 - 224.792	Diagonal	L1 3/4x1 3/4x3/16	11	-2.35	8.73	26.9 40.1 (b)	Pass
T2	224.792 - 204.625	Diagonal	L1 3/4x1 3/4x3/16	44	-3.83	4.99	76.7	Pass
T3	204.625 - 184.438	Diagonal	L2 1/2x2 1/2x3/16	71	-4.96	9.18	54.1 79.4 (b)	Pass
T4	184.438 - 164.229	Diagonal	L2 1/2x2 1/2x1/4	92	-5.57	9.05	61.5 66.8 (b)	Pass
T5	164.229 - 144.021	Diagonal	L2 1/2x2 1/2x5/16	113	-6.15	8.63	71.3	Pass
T6	144.021 - 123.813	Diagonal	L3x3x5/16	134	-7.37	10.27	71.8	Pass
T7	123.813 - 103.604	Diagonal	L3 1/2x3 1/2x1/4	149	-8.08	11.38	71.0	Pass
T8	103.604 - 83.3333	Diagonal	L4x4x5/16	164	-8.89	17.71	50.2	Pass
T9	83.3333 - 63	Diagonal	L4x4x5/16	179	-9.69	15.04	64.4	Pass
T10	63 - 42.6667	Diagonal	L4x4x5/16	194	-10.44	13.09	79.7	Pass
T11	42.6667 - 22.3334	Diagonal	ROHN 3 STD	212	-18.25	31.03	58.8	Pass
T12	22.3334 - 2	Diagonal	ROHN 3 STD	245	-18.00	29.68	60.7	Pass
T11	42.6667 - 22.3334	Horizontal	ROHN 2.5 STD	208	-9.61	15.16	63.4	Pass
T12	22.3334 - 2	Horizontal	ROHN 3 STD	241	-10.03	25.38	39.5	Pass
T1	244.917 - 224.792	Top Girt	L2x2x1/8	4	-0.02	3.21	0.8	Pass
T2	224.792 - 204.625	Top Girt	L1 3/4x1 3/4x3/16	41	-0.19	3.07	6.1	Pass
T11	42.6667 - 22.3334	Redund Horz 1 Bracing	ROHN 1.5 STD	229	-4.53	13.02	34.8	Pass
T12	22.3334 - 2	Redund Horz 1 Bracing	ROHN 1.5 STD	243	-5.00	11.00	45.5	Pass
T11	42.6667 - 22.3334	Redund Diag 1 Bracing	ROHN 2 STD	211	-4.12	8.53	48.3	Pass
T12	22.3334 - 2	Redund Diag 1 Bracing	ROHN 2 STD	263	-4.29	8.10	53.0	Pass
T11	42.6667 - 22.3334	Redund Hip 1 Bracing	ROHN 1.5 STD	233	-0.03	11.61	0.2	Pass
T12	22.3334 - 2	Redund Hip 1 Bracing	ROHN 1.5 STD	266	-0.02	9.90	0.2	Pass
T11	42.6667 - 22.3334	Redund Hip Diagonal 1 Bracing	Rohn 2.5 STD	232	-0.09	10.15	0.9	Pass
T12	22.3334 - 2	Redund Hip Diagonal 1 Bracing	Rohn 2.5 STD	265	-0.08	9.31	0.9	Pass
T11	42.6667 - 22.3334	Inner Bracing	ROHN 2 STD	236	-0.01	6.24	0.3	Pass
T12	22.3334 - 2	Inner Bracing	ROHN 3 STD	268	-0.02	24.10	0.2	Pass

Summary	ELC:	Load Case 5
Leg (T9)	75.1	Pass
Diagonal (T10)	79.7	Pass

Section No.	Elevation ft	Component Type	Size	Critical Element	P K	ϕP_{allow} K	% Capacity	Pass Fail
						Horizontal (T11)	63.4	Pass
						Top Girt (T2)	6.1	Pass
						Redund Horz 1 Bracing (T12)	45.5	Pass
						Redund Diag 1 Bracing (T12)	53.0	Pass
						Redund Hip 1 Bracing (T11)	0.2	Pass
						Redund Hip Diagonal 1 Bracing (T12)	0.9	Pass
						Inner Bracing (T11)	0.3	Pass
						Bolt Checks	79.4	Pass
						Rating =	79.7	Pass

APPENDIX B

BASE LEVEL DRAWING



BUSINESS UNIT: 841294 TOWER ID: C_BASELEVEL

CROWN REGION ADDRESS

USA

1	02/04/14	UPDATED PER WORK ORDER #736798	AGT
2	25/07/14	UPDATED PER WORK ORDER #736563 800219	MB
3	13/08/14	UPDATED PER WORK ORDER # 808418	CJH
4	24/08/16	AS-BUILT INFORMATION ADDED PER WORK ORDER # 1281481	AGF
5	01/11/18	UPDATED PER WORK ORDER 1321101	JRP
6	10/08/17	UPDATED PER WORK ORDER 1443188	KT

DRAWN BY: VJL
CHECKED BY: AGT
DRAWING DATE: 18/03/14

SITE NUMBER:
SITE NAME:

SITE NAME

MONROE-GUINEA ROAD

BUSINESS UNIT NUMBER

841294

SITE ADDRESS

230 GUINEA ROAD
MONROE, CT 06468
FAIRFIELD COUNTY
USA

SHEET TITLE

BASE LEVEL

SHEET NUMBER

A1-0

BASE LEVEL DRAWING | SCALE: N.T.S. | 1

PLOT DATE: 11/1/2018 FILE NAME: 841294_BASELEVEL.dwg

APPENDIX C

ADDITIONAL CALCULATIONS

Anchor Rod Check for Self Supporting Towers

TIA-222-G, Section 4.9.9 Rev. 6.1

CROWN CASTLE

Site Data	
BU#:	841294
Site Name:	MONROE-GUINEA ROAD
App #:	401422 Rev 0

Anchor Rod Data		
Qty:	10	
Diam:	1	in
Rod Material:	A354 Gr. BC (1/4 to 2-1/2 incl.)	
Strength (Fu):	125	ksi
Yield (Fy):	109	ksi

* Rod Circle:		in
* e:		in
* # of Rods		1 or 2

Mu= Pu x e:		ft-kips

** Only enter rod circle, offset (e) and number of anchor rods at the extreme fiber to consider if eccentric load due to leg reinforcement exist.*

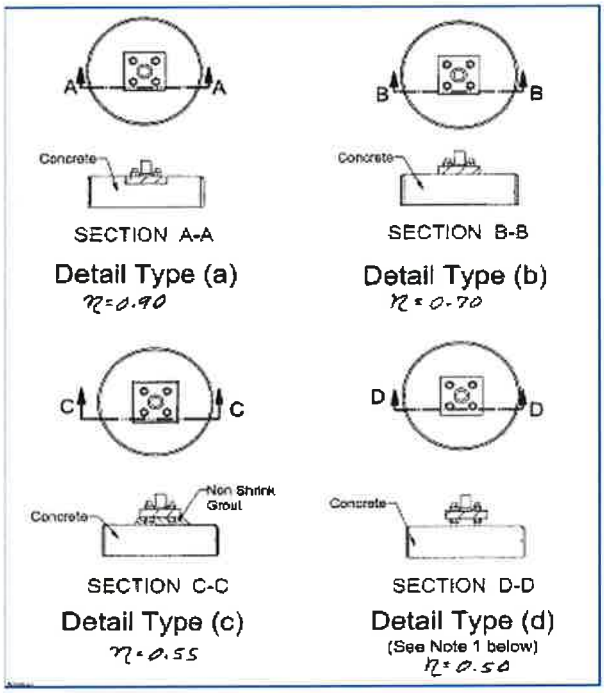


Figure 4-4 of TIA-222-G

Reactions		
Eta Factor, η	0.55	Detail Type
Uplift, Pu:	259	kips
Shear, Vu:	30	kips

l_{ar}:		in
$Mu = 0.65*l_{ar}*V_u$		ft-kips

Anchor Rod Results:

Max Rod (Cu+ Vu/ή):	31.4	Kips
Design Axial, Φ*Fu*Anet:	60.6	Kips
Anchor Rod Stress Ratio:	51.7%	

If Applicable;

Anchor Rod Results with Bending Considered:

When the clear distance from the top of concrete to the bottom of level nut excceeds 1.0 times the diameter of the anchor rod, the following interaction equation shall also be satisfied (see Figure 4-4 of Rev. G):

$$(V_u/\phi R_{nv})^2 + [(P_u/\phi R_{nt}) + (M_u/\phi R_{nm})]^2 <= 1$$

$\phi R_{nv}=\phi*0.45*F_{ub}*A_b=$		kips
$\phi R_{nt}=\phi*F_u*A_{net}=$		kips
$\phi R_{nm}=\phi*F_y*Z=$		ft-kips

Maximum Acceptable Ratio:	105	%
Governing Stress Ratio:	51.7%	**Pass**

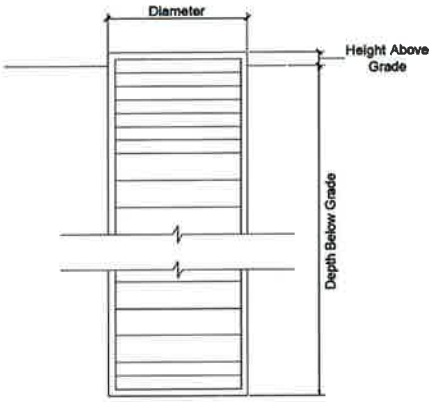
Self Support Tower Drilled Shaft Analysis - Rev G
841294 MONROE-GUINEA ROAD
2017777.841294.11

Tower Reactions		
Uplift		
Axial, P	259.0	kips
Shear, V	30.0	kips
Compression		
Axial, P	314.0	kips
Shear, V	34.0	kips

Overall Capacities		
Compression Capacity	29.3%	OK
Uplift Capacity	55.2%	OK
Reinforcement Capacity[1]	41.8%	OK
As Min OK?	Yes	OK
Controlling Capacity	**55.2%**	**OK**

1) See lateral analysis calculations for moment capacity of drilled shaft

Drilled Shaft Details		
Diameter	3.5	ft
Height Above Grade	2	ft
Depth Below Grade	20	ft
Crossectional Area	9.6	ft²
Perimeter	11.0	ft



Reinforcement Properties	
Reinforcing Known	Yes
Vertical Bar Size	9
# of Existing Vertical Bars	12
Horizontal Bar Type	Tie
Horizontal Bar Size	4
Anchor Rod Embedment	72 in
Anchor Rod Circle	14 in
Min. Concrete Cover	8.5 in
f_c'	3000 psi
F_y	60 ksi

Soil Properties		
Water Table Depth	99	ft
Bearing Type	Net	
Ultimate End Bearing	60	ksf
φ (bearing)	0.75	(TIA-222-G-1 Section 9.4.1)
φ (skin friction - uplift)	0.75	(TIA-222-G-1 Section 9.4.1)
φ (skin friction - comp.)	0.75	(TIA-222-G-1 Section 9.4.1)

Soil Layer	Soil Layer Thickness (ft)	Ultimate Uplift Skin Friction (ksf)	Ultimate Compression Skin Friction (ksf)	Soil Unit Weight (kcf)	Concrete Dry Unit Weight (kcf)
1 (neglected)	3.5	0.000	0.000	0.120	0.150
2	3.5	0.400	0.600	0.120	0.150
3	13	4.000	6.000	0.150	0.150
Totals	20				

Soil Check							
Soil Layer	Soil Layer Thickness (ft)	Effective Soil Unit Weight (kcf)	Effective Concrete Unit Weight (kcf)	Uplift Skin Friction Resistance (kips)	Compression Skin Friction Resistance (kips)	Effective Soil Weight Removed (kips)	Effective Concrete Weight Added (kips)
1 (neglected)	3.5	0.120	0.150	0	0	4.04	7.94
2	3.5	0.120	0.150	15	23	4.04	5.05
3	13.0	0.150	0.150	572	858	18.76	18.76
Totals	20			587.2	880.7	26.8	31.7

End Bearing Resistance:	433.0	kips	Drilled Shaft Weight Resistance:	28.6	kips
Compression Skin Friction Resistance:	660.6	kips	Uplift Skin Friction Resistance:	440.4	kips
Total Compression Resistance:	1093.5	kips	Total Uplift Resistance:	468.9	kips

Reinforcement Check			
Compression			
A_{st}	12.0	in²	
A_g	1385.4	in²	
ϕ (compression)	0.65		(ACI 318-05 Section 9.3.2.2)
ϕP_n	2195.3	k	(ACI 318-05 Section 10.3.6)
Compression Capacity	16.0%	OK	
Reinforcement Minimum			
A_g (effective)	692.7211801	in²	(ACI 318-05 Section 10.8.4)
Compression A_s min. (in²)	6.9	OK	(ACI 318-05 Section 10.9.1)
Tension			
Rebar Cage Diameter	22.9	in	
Rqr'd Development Lenth	61.8	in	(ACI 318-05 Section 12.2.2)
Development Length (in)	59.1	NG	<— Include Tensile Strength Reduction (ld/ld (required))
T_u	259.0	k	
Tensile Strength, ϕP_n (kip)	619.1		
Tensile Capacity	41.8%	OK	

Caisson Foundation LPile Summary

841294 MONROE-GUINEA ROAD

2017777.841294.11

Reinforcement Check			
Allowable Stress Ratio =	1.05		
Case 1 - Uplift			
Nominal Moment Capacity (Mn) =	7931.1	k-in	
=	660.9	k-ft	
ϕ =	0.9		
Factored Moment Capacity (ϕMn) =	594.83	k-ft	
Maximum Bending Moment (Mu) =	2665971	in-lbs	
=	222.2	k-ft	
Mu/ϕMn =	**37.3%**		**OK**
Case 2 - Compression			
Nominal Moment Capacity (Mn) =	15549.8	k-in	
=	1295.8	k-ft	
ϕ =	0.9		
Factored Moment Capacity (ϕMn) =	1166.24	k-ft	
Maximum Bending Moment (Mu) =	3716766	in-lbs	
=	309.7	k-ft	
Mu/ϕMn =	**26.6%**		**OK**

Deflection Check		
Load Type	Design	
Allowable Deflection	1.5	in
Max Deflection from LPILE	0.3512	in
Deflections are Acceptable		

LPile for Windows, Version 2016-09.007

Analysis of Individual Piles and Drilled Shafts
Subjected to Lateral Loading Using the p-y Method

This copy of LPile is being used by:

GPD
INDY

Serial Number of Security Device: 154178656

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Files Used for Analysis

Path to file locations:
\\AKRN05.gpdco.com\TELECOM\Crown\841294\11\Rev 1\Calculations\Lpile\

Name of input data file:
841294 Lpile.lp9d

Name of output report file:
841294 Lpile.lp9o

Name of plot output file:
841294 Lpile.lp9p

Name of runtime message file:
841294 Lpile.lp9r

Date and Time of Analysis

Date: August 21, 2017 Time: 8:23:47

Problem Title

Project Name:

Job Number:

Client:

Engineer:

Description:

Program Options and Settings

Computational Options:
- Use unfactored loads in computations (conventional analysis)

Engineering Units Used for Data Input and Computations:
- US Customary System Units (pounds, feet, inches)

Analysis Control Options:

- Maximum number of iterations allowed	=	1000
- Deflection tolerance for convergence	=	1.0000E-03 in
- Maximum allowable deflection	=	100.0000 in
- Number of pile increments	=	100

Loading Type and Number of Cycles of Loading:
- Static loading specified

- Use of p-y modification factors for p-y curves not selected
- No distributed lateral loads are entered
- Loading by lateral soil movements acting on pile not selected
- Input of shear resistance at the pile tip not selected
- Computation of pile-head foundation stiffness matrix not selected
- Push-over analysis of pile not selected
- Buckling analysis of pile not selected

Output Options:
- Output files use decimal points to denote decimal symbols.
- Values of pile-head deflection, bending moment, shear force, and soil reaction are printed for full length of pile.
- Printing Increment (nodal spacing of output points) = 1
- No p-y curves to be computed and reported for user-specified depths
- Print using wide report formats

Pile Structural Properties and Geometry

Number of pile sections defined	=	1
Total length of pile	=	22.000 ft
Depth of ground surface below top of pile	=	2.0000 ft

Pile diameters used for p-y curve computations are defined using 2 points.

p-y curves are computed using pile diameter values interpolated with depth over the length of the pile. A summary of values of pile diameter vs. depth follows.

Point No.	Depth Below Pile Head feet	Pile Diameter inches
1	0.000	42.0000
2	22.000	42.0000

Input Structural Properties for Pile Sections:

Pile Section No. 1:

Section 1 is a round drilled shaft, bored pile, or CIDH pile

Length of section	=	22.000000 ft
Shaft Diameter	=	42.000000 in
Shear capacity of section	=	0.0000 lbs

Ground Slope and Pile Batter Angles

Ground Slope Angle	=	0.000 degrees
	=	0.000 radians
Pile Batter Angle	=	0.000 degrees
	=	0.000 radians

Soil and Rock Layering Information

The soil profile is modelled using 3 layers

Layer 1 is sand, p-y criteria by Reese et al., 1974

Distance from top of pile to top of layer	=	2.000000 ft
Distance from top of pile to bottom of layer	=	5.500000 ft
Effective unit weight at top of layer	=	120.000000 pcf
Effective unit weight at bottom of layer	=	120.000000 pcf
Friction angle at top of layer	=	1.000000 deg.
Friction angle at bottom of layer	=	1.000000 deg.
Subgrade k at top of layer	=	0.0000 pci
Subgrade k at bottom of layer	=	0.0000 pci

NOTE: Default values for subgrade k will be computed for this layer.

Layer 2 is sand, p-y criteria by Reese et al., 1974

Distance from top of pile to top of layer	=	5.500000 ft
Distance from top of pile to bottom of layer	=	9.000000 ft
Effective unit weight at top of layer	=	120.000000 pcf
Effective unit weight at bottom of layer	=	120.000000 pcf
Friction angle at top of layer	=	34.000000 deg.
Friction angle at bottom of layer	=	34.000000 deg.
Subgrade k at top of layer	=	0.0000 pci
Subgrade k at bottom of layer	=	0.0000 pci

NOTE: Default values for subgrade k will be computed for this layer.

Layer 3 is soft clay, p-y criteria by Matlock, 1970

Distance from top of pile to top of layer	=	9.000000 ft
Distance from top of pile to bottom of layer	=	22.000000 ft
Effective unit weight at top of layer	=	150.000000 pcf
Effective unit weight at bottom of layer	=	150.000000 pcf
Undrained cohesion at top of layer	=	10000. psf
Undrained cohesion at bottom of layer	=	10000. psf
Epsilon-50 at top of layer	=	0.0000
Epsilon-50 at bottom of layer	=	0.0000

NOTE: Default values for Epsilon-50 will be computed for this layer.

(Depth of the lowest soil layer extends 0.000 ft below the pile tip)

**** Warning - Possible Input Data Error ****

Values entered for effective unit weights of soil were outside the limits of 20 pcf to 140 pcf.

The maximum input value for effective unit weight = 150.00 pcf

This data may be erroneous. Please check your data.

Summary of Input Soil Properties

Layer Num.	Soil Type Name (p-y Curve Type)	Layer Depth ft	Effective Unit Wt. pcf	Undrained Cohesion psf	Angle of Friction deg.	E50 or kpy or krm pci
1	Sand	2.0000	120.0000	--	1.0000	--
	default (Reese, et al.)	5.5000	120.0000	--	1.0000	--
2	Sand	5.5000	120.0000	--	34.0000	default

--	default (Reese, et al.)	9.0000	120.0000	--	34.0000
--	default				
3 default	Soft --	9.0000	150.0000	10000.	--
default	Clay --	22.0000	150.0000	10000.	--

Static Loading Type

Static loading criteria were used when computing p-y curves for all analyses.

Pile-head Loading and Pile-head Fixity Conditions

Number of loads specified = 2

Load No.	Load Compute Top y vs. Pile Length Type	Condition 1	Condition 2	Axial Thrust Force, lbs
1 No	1	V = 30000. lbs	M = 0.0000 in-lbs	-259000.
2 No	1	V = 34000. lbs	M = 0.0000 in-lbs	314000.

V = shear force applied normal to pile axis
M = bending moment applied to pile head
y = lateral deflection normal to pile axis
S = pile slope relative to original pile batter angle
R = rotational stiffness applied to pile head
Values of top y vs. pile lengths can be computed only for load types with specified shear loading (Load Types 1, 2, and 3).
Thrust force is assumed to be acting axially for all pile batter angles.

Computations of Nominal Moment Capacity and Nonlinear Bending Stiffness

---

Axial thrust force values were determined from pile-head loading conditions

Number of Pile Sections Analyzed = 1

Pile Section No. 1:

Dimensions and Properties of Drilled Shaft (Bored Pile):

Length of Section	=	22.000000	ft
Shaft Diameter	=	42.000000	in
Concrete Cover Thickness	=	3.000000	in
Number of Reinforcing Bars	=	12	bars
Yield Stress of Reinforcing Bars	=	60000.	psi
Modulus of Elasticity of Reinforcing Bars	=	29000000.	psi
Gross Area of Shaft	=	1385.	sq. in.
Total Area of Reinforcing Steel	=	12.000000	sq. in.
Area Ratio of Steel Reinforcement	=	0.87	percent
Edge-to-Edge Bar Spacing	=	7.897538	in
Maximum Concrete Aggregate Size	=	0.750000	in
Ratio of Bar Spacing to Aggregate Size	=	10.53	
Offset of Center of Rebar Cage from Center of Pile	=	0.0000	in

Axial Structural Capacities:

Nom. Axial Structural Capacity = 0.85 Fc Ac + Fy As	=	4222.278	kips
Tensile Load for Cracking of Concrete	=	-537.570	kips
Nominal Axial Tensile Capacity	=	-720.000	kips

Reinforcing Bar Dimensions and Positions Used in Computations:

Bar Number	Bar Diam. inches	Bar Area sq. in.	X inches	Y inches
1	1.128000	1.000000	17.436000	0.00000
2	1.128000	1.000000	15.100019	8.718000
3	1.128000	1.000000	8.718000	15.100019
4	1.128000	1.000000	0.00000	17.436000
5	1.128000	1.000000	-8.718000	15.100019
6	1.128000	1.000000	-15.100019	8.718000
7	1.128000	1.000000	-17.436000	0.00000
8	1.128000	1.000000	-15.100019	-8.718000
9	1.128000	1.000000	-8.718000	-15.100019
10	1.128000	1.000000	0.00000	-17.436000

11	1.128000	1.000000	8.718000	-15.100019
12	1.128000	1.000000	15.100019	-8.718000

NOTE: The positions of the above rebars were computed by LPile

Minimum spacing between any two bars not equal to zero = 7.898 inches
between bars 7 and 8.

Ratio of bar spacing to maximum aggregate size = 10.53

Concrete Properties:

Compressive Strength of Concrete	=	3000. psi
Modulus of Elasticity of Concrete	=	3122019. psi
Modulus of Rupture of Concrete	=	-410.791918 psi
Compression Strain at Peak Stress	=	0.001634
Tensile Strain at Fracture of Concrete	=	-0.0001160
Maximum Coarse Aggregate Size	=	0.750000 in

Number of Axial Thrust Force Values Determined from Pile-head Loadings = 2

Number	Axial Thrust Force kips
1	-259.000
2	314.000

Definitions of Run Messages and Notes:

C = concrete in section has cracked in tension.
Y = stress in reinforcing steel has reached yield stress.
T = ACI 318 criteria for tension-controlled section met, tensile strain in reinforcement exceeds 0.005 while simultaneously compressive strain in concrete more than 0.003. See ACI 318, Section 10.3.4.
Z = depth of tensile zone in concrete section is less than 10 percent of section depth.

Bending Stiffness (EI) = Computed Bending Moment / Curvature.
Position of neutral axis is measured from edge of compression side of pile.
Compressive stresses and strains are positive in sign.
Tensile stresses and strains are negative in sign.

Axial Thrust Force = -259.000 kips

Bending Max Conc Curvature Stress rad/in. ksi	Bending Max Steel Moment Stress in-kip ksi	Run Msg	Bending Stiffness kip-in2	Depth to N Axis in	Max Comp Strain in/in	Max Tens Strain in/in
6.25000E-07	369.2301539		590768246.	-56.9531147	-0.00003560	-0.00006185
-0.1297888	-1.7897190					
0.00000125	738.4412816		590753025.	-18.0068989	-0.00002251	-0.00007501
-0.0830546	-2.1676376					
0.00000188	1108.		590730789.	-5.0383156	-0.00000945	-0.00008820
-0.0360353	-2.5462897					
0.00000250	1108.		443048091.	-276.7009513	-0.0006918	-0.0007968
0.00000	-23.0905940	C				
0.00000313	1846.		590572303.	5.3131605	0.00001660	-0.0001146
0.0582882	-3.3057136					
0.00000375	1846.		492143586.	-177.4672348	-0.0006655	-0.0008230
0.00000	-23.8442243	C				
0.00000438	1846.		421837359.	-149.1147444	-0.0006524	-0.0008361
0.00000	-24.2210394	C				
0.00000500	1846.		369107689.	-127.8503766	-0.0006393	-0.0008493
0.00000	-24.5978546	C				
0.00000563	1846.		328095724.	-111.3114238	-0.0006261	-0.0008624
0.00000	-24.9746697	C				
0.00000625	1846.		295286151.	-98.0802616	-0.0006130	-0.0008755
0.00000	-25.3514847	C				
0.00000688	1846.		268441956.	-87.2547653	-0.0005999	-0.0008886
0.00000	-25.7283001	C				
0.00000750	1846.		246071793.	-78.2335184	-0.0005868	-0.0009018
0.00000	-26.1051151	C				
0.00000813	1846.		227143193.	-70.6001555	-0.0005736	-0.0009149
0.00000	-26.4819302	C				
0.00000875	1846.		210918680.	-64.0572731	-0.0005605	-0.0009280
0.00000	-26.8587455	C				
0.00000938	1846.		196857434.	-58.3867751	-0.0005474	-0.0009411
0.00000	-27.2355604	C				
0.00001000	1846.		184553845.	-53.4250892	-0.0005343	-0.0009543
0.00000	-27.6123761	C				
0.00001063	1846.		173697736.	-49.0471312	-0.0005211	-0.0009674
0.00000	-27.9891908	C				
0.00001125	1846.		164047862.	-45.1556129	-0.0005080	-0.0009805
0.00000	-28.3660060	C				
0.00001188	1846.		155413764.	-41.6737281	-0.0004949	-0.0009936

0.00000	-28.7428212 C				
0.00001250	1846.	147643076.	-38.5400318	-0.0004818	-0.0010068
0.00000	-29.1196364 C				
0.00001313	1846.	140612453.	-35.7047827	-0.0004686	-0.0010199
0.00000	-29.4964516 C				
0.00001375	1846.	134220978.	-33.1272836	-0.0004555	-0.0010330
0.00000	-29.8732668 C				
0.00001438	1846.	128385283.	-30.7739148	-0.0004424	-0.0010461
0.00000	-30.2500819 C				
0.00001500	1846.	123035896.	-28.6166601	-0.0004292	-0.0010592
0.00000	-30.6268971 C				
0.00001563	1846.	118114461.	-26.6319858	-0.0004161	-0.0010724
0.00000	-31.0037123 C				
0.00001625	1846.	113571597.	-24.7999787	-0.0004030	-0.0010855
0.00000	-31.3805274 C				
0.00001688	1846.	109365241.	-23.1036759	-0.0003899	-0.0010986
0.00000	-31.7573426 C				
0.00001750	1846.	105459340.	-21.5285375	-0.0003767	-0.0011117
0.00000	-32.1341577 C				
0.00001813	1846.	101822811.	-20.0620294	-0.0003636	-0.0011249
0.00000	-32.5109729 C				
0.00001875	1846.	98428717.	-18.6932885	-0.0003505	-0.0011380
0.00000	-32.8877881 C				
0.00001938	1846.	95253597.	-17.4128534	-0.0003374	-0.0011511
0.00000	-33.2646032 C				
0.00002000	1846.	92276922.	-16.2124456	-0.0003242	-0.0011642
0.00000	-33.6414184 C				
0.00002063	1846.	89480652.	-15.0847897	-0.0003111	-0.0011774
0.00000	-34.0182335 C				
0.00002125	1846.	86848868.	-14.0234665	-0.0002980	-0.0011905
0.00000	-34.3950487 C				
0.00002188	1846.	84367472.	-13.0227904	-0.0002849	-0.0012036
0.00000	-34.7718638 C				
0.00002250	1846.	82023931.	-12.0777074	-0.0002717	-0.0012167
0.00000	-35.1486790 C				
0.00002313	1846.	79807068.	-11.1837099	-0.0002586	-0.0012299
0.00000	-35.5254941 C				
0.00002375	1846.	77706882.	-10.3367650	-0.0002455	-0.0012430
0.00000	-35.9023093 C				
0.00002438	1846.	75714398.	-9.5332531	-0.0002324	-0.0012561
0.00000	-36.2791245 C				
0.00002563	1846.	72021013.	-8.0438165	-0.0002061	-0.0012824
0.00000	-37.0327547 C				
0.00002688	1846.	68671198.	-6.6929321	-0.0001799	-0.0013086
0.00000	-37.7863851 C				
0.00002813	1846.	65619145.	-5.4621263	-0.0001536	-0.0013349
0.00000	-38.5400154 C				
0.00002938	1846.	62826841.	-4.3360699	-0.0001274	-0.0013611

0.00000	-39.2936457 C				
0.00003063	1846.	60262480.	-3.3019365	-0.0001011	-0.0013874
0.00000	-40.0472760 C				
0.00003188	1846.	57899245.	-2.3489116	-0.00007487	-0.0014136
0.00000	-40.8009064 C				
0.00003313	1846.	55714368.	-1.4678132	-0.00004862	-0.0014399
0.00000	-41.5545367 C				
0.00003438	1846.	53688391.	-0.6507946	-0.00002237	-0.0014661
0.00000	-42.3081670 C				
0.00003563	1885.	52906543.	0.1088894	0.00000388	-0.0014924
0.00000	-43.0617973 C				
0.00003688	1957.	53063262.	0.7952511	0.00002932	-0.0015194
0.0787431	-43.8387598 C				
0.00003813	2040.	53496849.	1.3957099	0.00005321	-0.0015480
0.1637396	-44.6609374 C				
0.00003938	2133.	54177630.	1.9176489	0.00007551	-0.0015782
0.2418825	-45.5292408 C				
0.00004063	2236.	55046694.	2.3724738	0.00009638	-0.0016099
0.3139952	-46.4387730 C				
0.00004188	2346.	56023078.	2.7751157	0.0001162	-0.0016425
0.3815574	-47.3787000 C				
0.00004313	2461.	57068041.	3.1341477	0.0001352	-0.0016761
0.4452973	-48.3439751 C				
0.00004438	2581.	58166940.	3.4540171	0.0001533	-0.0017105
0.5054383	-49.3336178 C				
0.00004563	2704.	59269267.	3.7452117	0.0001709	-0.0017454
0.5631795	-50.3380113 C				
0.00004688	2829.	60352949.	4.0137099	0.0001881	-0.0017806
0.6191457	-51.3521443 C				
0.00004813	2957.	61453351.	4.2549106	0.0002048	-0.0018165
0.6723837	-52.3849090 C				
0.00004938	3087.	62516332.	4.4802116	0.0002212	-0.0018525
0.7244374	-53.4229533 C				
0.00005063	3218.	63569790.	4.6860717	0.0002372	-0.0018890
0.7745710	-54.4732046 C				
0.00005188	3350.	64583014.	4.8796568	0.0002531	-0.0019256
0.8237641	-55.5269975 C				
0.00005313	3484.	65585838.	5.0565060	0.0002686	-0.0019626
0.8711542	-56.5925390 C				
0.00005438	3618.	66537216.	5.2260410	0.0002842	-0.0019996
0.9181585	-57.6567926 C				
0.00005563	3754.	67480487.	5.3804303	0.0002993	-0.0020370
0.9633712	-58.7331879 C				
0.00005688	3889.	68384097.	5.5273905	0.0003144	-0.0020744
1.0079783	-59.8106414 CY				
0.00005813	4025.	69244108.	5.6687536	0.0003295	-0.0021118
1.0522159	-60.0000000 CY				
0.00005938	4162.	70097164.	5.7973659	0.0003442	-0.0021495

1.0947753	-60.0000000 CY				
0.00006063	4299.	70911081.	5.9212593	0.0003590	-0.0021873
1.1369674	-60.0000000 CY				
0.00006188	4436.	71687880.	6.0407919	0.0003738	-0.0022250
1.1788012	-60.0000000 CY				
0.00006313	4573.	72445105.	6.1525938	0.0003884	-0.0022629
1.2196247	-60.0000000 CY				
0.00006438	4704.	73066715.	6.2526264	0.0004025	-0.0023012
1.2586477	-60.0000000 CY				
0.00006563	4819.	73437397.	6.3384935	0.0004160	-0.0023403
1.2953575	-60.0000000 CY				
0.00006688	4930.	73714918.	6.4178273	0.0004292	-0.0023796
1.3310673	-60.0000000 CY				
0.00006813	5040.	73979730.	6.4946977	0.0004425	-0.0024188
1.3664819	-60.0000000 CY				
0.00006938	5148.	74209820.	6.5640925	0.0004554	-0.0024584
1.4006413	-60.0000000 CY				
0.00007063	5237.	74158373.	6.6169066	0.0004673	-0.0024989
1.4317920	-60.0000000 CY				
0.00007188	5301.	73749409.	6.6500536	0.0004780	-0.0025408
1.4592648	-60.0000000 CY				
0.00007313	5360.	73294579.	6.6792467	0.0004884	-0.0025828
1.4859567	-60.0000000 CY				
0.00007438	5419.	72854191.	6.7076672	0.0004989	-0.0026249
1.5124555	-60.0000000 CY				
0.00007938	5653.	71223292.	6.8143820	0.0005409	-0.0027929
1.6165043	-60.0000000 CY				
0.00008438	5887.	69773326.	6.9115034	0.0005832	-0.0029606
1.7173999	-60.0000000 CY				
0.00008938	6120.	68473931.	6.9958368	0.0006253	-0.0031285
1.8140793	-60.0000000 CY				
0.00009438	6262.	66351645.	7.0119461	0.0006618	-0.0033020
1.8945308	-60.0000000 CY				
0.00009938	6352.	63914763.	6.9939200	0.0006950	-0.0034787
1.9651983	-60.0000000 CY				
0.0001044	6441.	61707831.	6.9787945	0.0007284	-0.0036553
2.0337872	-60.0000000 CY				
0.0001094	6530.	59699255.	6.9661934	0.0007619	-0.0038318
2.1002756	-60.0000000 CY				
0.0001144	6618.	57862966.	6.9558068	0.0007956	-0.0040082
2.1646407	-60.0000000 CY				
0.0001194	6706.	56177261.	6.9473776	0.0008293	-0.0041844
2.2268594	-60.0000000 CY				
0.0001244	6794.	54623924.	6.9406909	0.0008632	-0.0043605
2.2869076	-60.0000000 CY				
0.0001294	6881.	53187547.	6.9355657	0.0008973	-0.0045365
2.3447606	-60.0000000 CY				
0.0001344	6968.	51855038.	6.9318487	0.0009315	-0.0047123

2.4003932	-60.0000000 CY				
0.0001394	7054.	50615154.	6.9293610	0.0009658	-0.0048880
2.4537686	-60.0000000 CY				
0.0001444	7137.	49434348.	6.9252018	0.0009998	-0.0050639
2.5042586	-60.0000000 CY				
0.0001494	7192.	48144649.	6.8999222	0.0010307	-0.0052431
2.5477540	-60.0000000 CY				
0.0001544	7217.	46748937.	6.8535427	0.0010580	-0.0054257
2.5844683	-60.0000000 CY				
0.0001594	7238.	45416828.	6.8076099	0.0010850	-0.0056088
2.6191149	-60.0000000 CY				
0.0001644	7260.	44164894.	6.7649515	0.0011120	-0.0057918
2.6523522	-60.0000000 CY				
0.0001694	7281.	42986025.	6.7252838	0.0011391	-0.0059747
2.6841677	-60.0000000 CY				
0.0001744	7302.	41873922.	6.6883558	0.0011663	-0.0061575
2.7145485	-60.0000000 CY				
0.0001794	7323.	40822993.	6.6539444	0.0011936	-0.0063402
2.7434815	-60.0000000 CY				
0.0001844	7343.	39828248.	6.6218513	0.0012209	-0.0065228
2.7709534	-60.0000000 CY				
0.0001894	7364.	38885226.	6.5918989	0.0012483	-0.0067054
2.7969505	-60.0000000 CY				
0.0001944	7384.	37989924.	6.5639284	0.0012759	-0.0068879
2.8214589	-60.0000000 CY				
0.0001994	7405.	37138741.	6.5377968	0.0013035	-0.0070703
2.8444642	-60.0000000 CY				
0.0002044	7425.	36328427.	6.5133757	0.0013312	-0.0072526
2.8659520	-60.0000000 CY				
0.0002094	7444.	35555104.	6.4885327	0.0013585	-0.0074352
2.8856047	-60.0000000 CY				
0.0002144	7464.	34816992.	6.4649524	0.0013859	-0.0076178
2.9037151	-60.0000000 CY				
0.0002194	7483.	34111822.	6.4428794	0.0014134	-0.0078003
2.9203226	-60.0000000 CY				
0.0002244	7503.	33437382.	6.4222203	0.0014410	-0.0079828
2.9354112	-60.0000000 CY				
0.0002294	7522.	32791651.	6.4028901	0.0014687	-0.0081651
2.9489644	-60.0000000 CY				
0.0002344	7540.	32172781.	6.3848113	0.0014964	-0.0083473
2.9609653	-60.0000000 CY				
0.0002394	7559.	31579079.	6.3679132	0.0015243	-0.0085294
2.9713967	-60.0000000 CY				
0.0002444	7578.	31008987.	6.3521311	0.0015523	-0.0087114
2.9802405	-60.0000000 CY				
0.0002494	7596.	30461075.	6.3374059	0.0015804	-0.0088934
2.9874784	-60.0000000 CY				
0.0002544	7614.	29934023.	6.3236831	0.0016086	-0.0090752

2.9930916	-60.0000000 CY				
0.0002594	7633.	29426612.	6.3109131	0.0016369	-0.0092569
2.9970605	-60.0000000 CY				
0.0002644	7650.	28937718.	6.2990501	0.0016653	-0.0094384
2.9993650	-60.0000000 CY				
0.0002694	7668.	28466260.	6.2880681	0.0016938	-0.0096199
2.9992271	-60.0000000 CY				
0.0002744	7686.	28011124.	6.2779929	0.0017225	-0.0098012
2.9934888	-60.0000000 CY				
0.0003044	7786.	25581754.	6.2326661	0.0018971	-0.0108867
2.9964638	-60.0000000 CY				
0.0003344	7872.	23541581.	6.1974784	0.0020723	-0.0119715
2.9968649	-60.0000000 CY				
0.0003644	7904.	21691417.	6.1204655	0.0022301	-0.0130736
2.9904675	60.0000000 CY				
0.0003944	7912.	20061370.	6.0265584	0.0023767	-0.0141870
2.9999945	60.0000000 CY				
0.0004244	7917.	18656619.	5.9457977	0.0025232	-0.0153005
2.9907685	60.0000000 CY				
0.0004544	7922.	17435986.	5.8785042	0.0026710	-0.0164127
2.9998349	60.0000000 CY				
0.0004844	7927.	16364796.	5.8229100	0.0028205	-0.0175233
2.9858739	60.0000000 CY				
0.0005144	7930.	15417676.	5.7758182	0.0029709	-0.0186328
2.9949736	60.0000000 CY				
0.0005444	7934.	14574157.	5.7357896	0.0031224	-0.0197413
2.9994354	60.0000000 CYT				
0.0005744	7937.	13817691.	5.7023047	0.0032753	-0.0208485
2.9847000	60.0000000 CYT				
0.0006044	7939.	13135932.	5.6732875	0.0034288	-0.0219550
2.9867540	60.0000000 CYT				
0.0006344	7941.	12517688.	5.6432314	0.0035799	-0.0230638
2.9969701	60.0000000 CYT				
0.0006644	7943.	11954854.	5.6164421	0.0037314	-0.0241723
2.9989440	60.0000000 CYT				
0.0006944	7944.	11440167.	5.5935967	0.0038841	-0.0252797
2.9868696	60.0000000 CYT				

Axial Thrust Force = 314.000 kips

Bending Max Conc Curvature Stress rad/in. ksi	Bending Max Steel Moment Stress in-kip ksi	Run Msg	Bending Stiffness kip-in2	Depth to N Axis in	Max Comp Strain in/in	Max Tens Strain in/in

6.25000E-07	366.9912694	587186031.	115.7923495	0.00007237	0.00004612
0.2594643	2.0949301				
0.00000125	733.9699164	587175933.	68.4267172	0.00008553	0.00003303
0.3050225	2.4728560				
0.00000188	1101.	587155291.	52.6517459	0.00009872	0.00001997
0.3502866	2.8515199				
0.00000250	1468.	587125534.	44.7744411	0.0001119	0.00000694
0.3952545	3.2309220				
0.00000313	1835.	587084075.	40.0561768	0.0001252	-0.00000607
0.4399237	3.6110598				
0.00000375	2201.	586947614.	36.9165769	0.0001384	-0.00001906
0.4842810	3.9918402				
0.00000438	2566.	586619633.	34.6775789	0.0001517	-0.00003204
0.5283028	4.3730741				
0.00000500	2930.	586098519.	33.0005251	0.0001650	-0.00004500
0.5719723	4.7546262				
0.00000563	3293.	585412526.	31.6975707	0.0001783	-0.00005795
0.6152788	5.1364100				
0.00000625	3654.	584592779.	30.6561808	0.0001916	-0.00007090
0.6582153	5.5183703				
0.00000688	4013.	583665940.	29.8048372	0.0002049	-0.00008384
0.7007773	5.9004707				
0.00000750	4370.	582653348.	29.0959175	0.0002182	-0.00009678
0.7429617	6.2826871				
0.00000813	4725.	581571600.	28.4964836	0.0002315	-0.0001097
0.7847663	6.6650027				
0.00000875	4725.	540030772.	25.6251499	0.0002242	-0.0001433
0.7612057	6.4490943 C				
0.00000938	4725.	504028720.	24.9372007	0.0002338	-0.0001600
0.7910422	6.7227076 C				
0.00001000	4725.	472526925.	24.3167666	0.0002432	-0.0001768
0.8201000	6.9909623 C				
0.00001063	4725.	444731224.	23.7558265	0.0002524	-0.0001938
0.8485194	7.2550578 C				
0.00001125	4725.	420023933.	23.2436157	0.0002615	-0.0002110
0.8762796	7.5147170 C				
0.00001188	4725.	397917411.	22.7745081	0.0002704	-0.0002283
0.9034653	7.7706525 C				
0.00001250	4725.	378021540.	22.3431850	0.0002793	-0.0002457
0.9301279	8.0232796 C				
0.00001313	4725.	360020514.	21.9449760	0.0002880	-0.0002632
0.9563029	8.2728753 C				
0.00001375	4725.	343655946.	21.5761475	0.0002967	-0.0002808
0.9820289	8.5197514 C				
0.00001438	4725.	328714383.	21.2331726	0.0003052	-0.0002985
1.0073244	8.7640351 C				
0.00001500	4725.	315017950.	20.9125574	0.0003137	-0.0003163

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1.0321827    -9.0816876 C
0.00001563         4743.    303542185.    20.6134859     0.0003221     -0.0003342
1.0566953    -9.5956079 C
0.00001625         4831.    297304173.    20.3343043     0.0003304     -0.0003521
1.0809056   -10.1109966 C
0.00001688         4918.    291418596.    20.0705198     0.0003387     -0.0003701
1.1047039   -10.6289706 C
0.00001750         5003.    285892310.    19.8227238     0.0003469     -0.0003881
1.1282089   -11.1483926 C
0.00001813         5088.    280691702.    19.5894532     0.0003551     -0.0004062
1.1514332   -11.6691624 C
0.00001875         5171.    275764905.    19.3678422     0.0003631     -0.0004244
1.1743034   -12.1920483 C
0.00001938         5253.    271127290.    19.1593713     0.0003712     -0.0004425
1.1969674   -12.7155844 C
0.00002000         5334.    266714961.    18.9602262     0.0003792     -0.0004608
1.2192803   -13.2412688 C
0.00002063         5415.    262546613.    18.7721776     0.0003872     -0.0004791
1.2413978   -13.7675349 C
0.00002125         5495.    258582112.    18.5928043     0.0003951     -0.0004974
1.2632354   -14.2952718 C
0.00002188         5574.    254809754.    18.4217650     0.0004030     -0.0005158
1.2848202   -14.8242240 C
0.00002250         5653.    251239529.    18.2602252     0.0004109     -0.0005341
1.3062698   -15.3531780 C
0.00002313         5730.    247804996.    18.1034923     0.0004186     -0.0005526
1.3273356   -15.8847641 C
0.00002375         5808.    244547667.    17.9552617     0.0004264     -0.0005711
1.3482859   -16.4161760 C
0.00002438         5885.    241441457.    17.8138239     0.0004342     -0.0005895
1.3690507   -16.9481594 C
0.00002563         6037.    235604903.    17.5464777     0.0004496     -0.0006266
1.4098323   -18.0159674 C
0.00002688         6188.    230257240.    17.3009964     0.0004650     -0.0006638
1.4498843   -19.0861172 C
0.00002813         6338.    225338140.    17.0748732     0.0004802     -0.0007010
1.4892450   -20.1582752 C
0.00002938         6485.    220782521.    16.8642624     0.0004954     -0.0007384
1.5278174   -21.2336128 C
0.00003063         6632.    216570015.    16.6696823     0.0005105     -0.0007757
1.5658006   -22.3099821 C
0.00003188         6778.    212649211.    16.4878099     0.0005255     -0.0008132
1.6030835   -23.3887120 C
0.00003313         6923.    208993685.    16.3179125     0.0005405     -0.0008507
1.6397319   -24.4691239 C
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1.7806802	-28.8003558 C				
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1.8804601	-32.0600709 C				
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2.9989651	-60.0000000 CY				
0.0001744	14949.	85727359.	11.7145905	0.0020427	-0.0052810
2.9986775	-60.0000000 CY				
0.0001794	15009.	83675535.	11.6587746	0.0020913	-0.0054425
2.9988517	-60.0000000 CY				
0.0001844	15069.	81729929.	11.6072914	0.0021401	-0.0056037
2.9993370	60.0000000 CY				
0.0001894	15127.	79880554.	11.5601005	0.0021892	-0.0057646
2.9981198	60.0000000 CY				
0.0001944	15184.	78118816.	11.5136158	0.0022380	-0.0059258
2.9999302	60.0000000 CY				
0.0001994	15240.	76439376.	11.4700768	0.0022868	-0.0060869
2.9961552	60.0000000 CY				
0.0002044	15294.	74834660.	11.4292438	0.0023359	-0.0062479
2.9991606	60.0000000 CY				
0.0002094	15346.	73292848.	11.3900246	0.0023848	-0.0064090
2.9992192	60.0000000 CY				
0.0002144	15383.	71759198.	11.3458637	0.0024323	-0.0065715
2.9963927	60.0000000 CY				
0.0002194	15413.	70260092.	11.2998011	0.0024789	-0.0067349
2.9989902	60.0000000 CY				
0.0002244	15430.	68768896.	11.2483395	0.0025238	-0.0068999
2.9999722	60.0000000 CY				
0.0002294	15445.	67333378.	11.1988830	0.0025687	-0.0070650
2.9958501	60.0000000 CY				
0.0002344	15458.	65953433.	11.1513887	0.0026136	-0.0072301
2.9967767	60.0000000 CY				
0.0002394	15470.	64627179.	11.1037806	0.0026580	-0.0073958
2.9989032	60.0000000 CY				
0.0002444	15482.	63351787.	11.0563493	0.0027019	-0.0075619
2.9999016	60.0000000 CY				
0.0002494	15493.	62126432.	11.0114495	0.0027460	-0.0077278
2.9973666	60.0000000 CY				
0.0002544	15504.	60948426.	10.9688199	0.0027902	-0.0078936
2.9941727	60.0000000 CY				
0.0002594	15515.	59815395.	10.9281708	0.0028345	-0.0080593
2.9969782	60.0000000 CY				
0.0002644	15525.	58724780.	10.8893937	0.0028789	-0.0082249
2.9988770	60.0000000 CY				
0.0002694	15536.	57673196.	10.8527308	0.0029235	-0.0083903
2.9998593	60.0000000 CY				
0.0002744	15545.	56655250.	10.8192147	0.0029685	-0.0085552
2.9979785	60.0000000 CY				
0.0003044	15588.	51214201.	10.6484034	0.0032411	-0.0095426

```
   2.9980100    60.0000000 CYT
    0.0003344        15615.     46698088.     10.5204754     0.0035178    -0.0105260
   2.9998466    60.0000000 CYT
    0.0003644        15636.     42911497.     10.4244405     0.0037984    -0.0115053
   2.9966978    60.0000000 CYT
    0.0003944        15636.     39647231.     10.4659932     0.0041275    -0.0124362
   2.9939409    60.0000000 CYT
```

Summary of Results for Nominal (Unfactored) Moment Capacity for Section 1

Moment values interpolated at maximum compressive strain = 0.003
or maximum developed moment if pile fails at smaller strains.

Load No.	Axial Thrust kips	Nominal Mom. Cap. in-kip	Max. Comp. Strain
1	-259.000	7931.108	0.00300000
2	314.000	15549.812	0.00300000

Note that the values of moment capacity in the table above are not
factored by a strength reduction factor (phi-factor).

In ACI 318, the value of the strength reduction factor depends on whether
the transverse reinforcing steel bars are tied hoops (0.65) or spirals (0.70).

The above values should be multiplied by the appropriate strength reduction
factor to compute ultimate moment capacity according to ACI 318, Section
9.3.2.2 or the value required by the design standard being followed.

The following table presents factored moment capacities and corresponding
bending stiffnesses computed for common resistance factor values used for
reinforced concrete sections.

Axial Load No.	Resist. Factor for Moment	Nominal Moment Cap in-kips	Ult. (Fac) Ax. Thrust kips	Ult. (Fac) Moment Cap in-kips	Bend. Stiff. at Ult Mom kip-in^2
1	0.65	7931.	-168.350000	5155.	74205829.
2	0.65	15550.	204.100000	10107.	162962335.
1	0.70	7931.	-181.300000	5552.	71928756.
2	0.70	15550.	219.800000	10885.	156868359.
1	0.75	7931.	-194.250000	5948.	69431599.
2	0.75	15550.	235.500000	11662.	151765831.

Layering Correction Equivalent Depths of Soil & Rock Layers

Layer No.	Top of Layer Below Pile Head ft	Equivalent Top Depth Below Grnd Surf ft	Same Layer Type As Layer Above	Layer is Rock or is Below Rock Layer	F0 Integral for Layer lbs	F1 Integral for Layer lbs
1	2.0000	0.00	N.A.	No	0.00	543.2796
2	5.5000	3.5000	Yes	No	543.2796	98013.
3	9.0000	0.9169	No	No	98556.	N.A.

Notes: The F0 integral of Layer n+1 equals the sum of the F0 and F1 integrals for Layer n. Layering correction equivalent depths are computed only for soil types with both shallow-depth and deep-depth expressions for peak lateral load transfer. These soil types are soft and stiff clays, non-liquefied sands, and cemented c-phi soil.

Computed Values of Pile Loading and Deflection
for Lateral Loading for Load Case Number 1

Pile-head conditions are Shear and Moment (Loading Type 1)

Shear force at pile head = 30000.0 lbs
Applied moment at pile head = 0.0 in-lbs
Axial thrust load on pile head = -259000.0 lbs

Depth X feet	Deflect. y inches	Bending Moment in-lbs	Shear Force lbs	Slope S radians	Total Stress psi*	Bending Stiffness in-lb^2	Soil Res. Es*h lb/inch	Soil Spr. Lat. Load lb/inch	Distrib. p lb/inch
0.00	0.3512	-2.16E-04	30000.	-0.00333	0.00	5.91E+11	0.00	0.00	0.00
0.2200	0.3424	76921.	30000.	-0.00333	0.00	5.91E+11			

```
0.00        0.00        0.00
    0.4400      0.3336     153843.     30000.    -0.00333        0.00    5.91E+11
0.00        0.00        0.00
    0.6600      0.3248     230765.     30000.    -0.00333        0.00    5.91E+11
0.00        0.00        0.00
    0.8800      0.3160     307688.     30000.    -0.00333        0.00    5.91E+11
0.00        0.00        0.00
    1.1000      0.3073     384612.     30000.    -0.00333        0.00    5.91E+11
0.00        0.00        0.00
    1.3200      0.2985     461537.     30000.    -0.00333        0.00    5.91E+11
0.00        0.00        0.00
    1.5400      0.2897     538463.     30000.    -0.00332        0.00    5.91E+11
0.00        0.00        0.00
    1.7600      0.2809     615391.     30000.    -0.00332        0.00    5.91E+11
0.00        0.00        0.00
    1.9800      0.2722     692321.     30000.    -0.00332        0.00    5.91E+11
0.00        0.00        0.00
    2.2000      0.2634     769253.     30000.    -0.00332        0.00    5.91E+11
-0.2334      2.3395        0.00
    2.4200      0.2546     846186.     29999.    -0.00331        0.00    5.91E+11
-0.4739      4.9130        0.00
    2.6400      0.2459     923118.     29997.    -0.00331        0.00    5.91E+11
-0.6974      7.4865        0.00
    2.8600      0.2372    1000047.     29995.    -0.00330        0.00    5.91E+11
-0.9038     10.0600        0.00
    3.0800      0.2285    1076974.     29992.    -0.00330        0.00    5.91E+11
-1.0933     12.6335        0.00
    3.3000      0.2198    1153897.     29989.    -0.00329        0.00    4.67E+11
-1.2659     15.2070        0.00
    3.5200      0.2111    1230815.     29986.    -0.00329        0.00    4.44E+11
-1.4216     17.7805        0.00
    3.7400      0.2024    1307728.     29982.    -0.00328        0.00    5.45E+11
-1.5606     20.3540        0.00
    3.9600      0.1938    1384634.     29978.    -0.00327        0.00    5.78E+11
-1.6828     22.9275        0.00
    4.1800      0.1851    1461533.     29973.    -0.00327        0.00    5.61E+11
-1.7883     25.5009        0.00
    4.4000      0.1765    1538425.     29968.    -0.00326        0.00    5.82E+11
-1.8772     28.0744        0.00
    4.6200      0.1679    1615308.     29963.    -0.00325        0.00    5.85E+11
-1.9494     30.6479        0.00
    4.8400      0.1593    1692182.     29958.    -0.00324        0.00    5.88E+11
-2.0052     33.2214        0.00
    5.0600      0.1508    1769048.     29953.    -0.00324        0.00    5.85E+11
-2.0445     35.7949        0.00
    5.2800      0.1423    1845905.     29947.    -0.00323        0.00    5.19E+11
-2.0675     38.3684        0.00
    5.5000      0.1337    1922754.     29896.    -0.00321        0.00    2.70E+11
```

```
-36.2977   716.4830       0.00
    5.7200     0.1253   1999363.     28949.   -0.00319       0.00   1.44E+11
-681.7084     14365.       0.00
    5.9400     0.1169   2071245.     27159.   -0.00313       0.00   8.13E+10
-673.8185     15215.       0.00
    6.1600     0.1087   2138478.     25397.   -0.00305       0.00   5.37E+10
-661.6255     16064.       0.00
    6.3800     0.1008   2201170.     23671.   -0.00294       0.00   5.50E+10
-645.9416     16914.       0.00
    6.6000    0.09319   2259434.     21990.   -0.00284       0.00   5.54E+10
-627.0438     17763.       0.00
    6.8200    0.08585   2313400.     20364.   -0.00273       0.00   5.56E+10
-605.2389     18613.       0.00
    7.0400    0.07879   2363224.     18798.   -0.00262       0.00   5.63E+10
-580.8423     19462.       0.00
    7.2600    0.07203   2409074.     17300.   -0.00251       0.00   5.65E+10
-554.1556     20312.       0.00
    7.4800    0.06556   2451140.     15875.   -0.00239       0.00   5.70E+10
-525.4976     21161.       0.00
    7.7000    0.05939   2489621.     14527.   -0.00228       0.00   5.74E+10
-495.1775     22011.       0.00
    7.9200    0.05353   2524729.     13262.   -0.00216       0.00   5.77E+10
-463.5045     22861.       0.00
    8.1400    0.04797   2556685.     12081.   -0.00205       0.00   5.78E+10
-430.7981     23710.       0.00
    8.3600    0.04272   2585719.     10988.   -0.00193       0.00   5.81E+10
-397.3795     24560.       0.00
    8.5800    0.03777   2612063.      9984.   -0.00181       0.00   5.84E+10
-363.5651     25409.       0.00
    8.8000    0.03314   2635954.      9069.   -0.00169       0.00   5.87E+10
-329.6689     26259.       0.00
    9.0200    0.02883   2657629.      6093.   -0.00158       0.00   5.89E+10
-1925.    176264.       0.00
    9.2400    0.02482   2665971.      1109.   -0.00146       0.00   5.90E+10
-1851.    196872.       0.00
    9.4600    0.02114   2661492.     -3676.   -0.00134       0.00   5.89E+10
-1774.    221534.       0.00
    9.6800    0.01776   2644733.     -8250.   -0.00122       0.00   5.88E+10
-1692.    251437.       0.00
    9.9000    0.01470   2616264.    -12603.   -0.00110       0.00   5.86E+10
-1605.    288249.       0.00
   10.1200    0.01196   2576686.    -16721.  -9.83E-04       0.00   5.82E+10
-1514.    334372.       0.00
   10.3400    0.00952   2526634.    -20591.  -8.66E-04       0.00   5.76E+10
-1418.    393377.       0.00
   10.5600    0.00738   2466779.    -24201.  -7.51E-04       0.00   5.70E+10
-1316.    470771.       0.00
   10.7800    0.00555   2397827.    -27535.  -6.38E-04       0.00   5.66E+10
```

-1209.	575340.	0.00				
11.0000	0.00401	2320521.	-30579.	-5.27E-04	0.00	5.59E+10
-1097.	721519.	0.00				
11.2200	0.00277	2235647.	-33318.	-4.19E-04	0.00	5.51E+10
-978.3825	933978.	0.00				
11.4400	0.00180	2144027.	-35740.	-3.13E-04	0.00	5.43E+10
-855.8675	1254544.	0.00				
11.6600	0.00111	2046513.	-37838.	-2.11E-04	0.00	5.36E+10
-734.0201	1742980.	0.00				
11.8800	6.89E-04	1943953.	-39635.	-1.29E-04	0.00	8.08E+10
-627.1322	2404062.	0.00				
12.1000	4.33E-04	1837065.	-41177.	-8.36E-05	0.00	1.84E+11
-540.7528	3295041.	0.00				
12.3200	2.47E-04	1726426.	-42484.	-6.50E-05	0.00	4.25E+11
-449.7175	4799046.	0.00				
12.5400	8.98E-05	1612660.	-43488.	-5.57E-05	0.00	5.35E+11
-310.8445	9135544.	0.00				
12.7600	-4.67E-05	1496734.	-43493.	-4.76E-05	0.00	4.84E+11
307.1548	1.74E+07	0.00				
12.9800	-1.62E-04	1382953.	-42534.	-4.03E-05	0.00	5.55E+11
419.0778	6842259.	0.00				
13.2000	-2.59E-04	1272098.	-41333.	-3.34E-05	0.00	4.63E+11
490.9509	4998120.	0.00				
13.4200	-3.38E-04	1164669.	-39976.	-2.64E-05	0.00	4.59E+11
536.8149	4195184.	0.00				
13.6400	-3.99E-04	1060987.	-38516.	-2.04E-05	0.00	5.34E+11
569.8463	3774043.	0.00				
13.8600	-4.46E-04	961280.	-36977.	-1.56E-05	0.00	5.91E+11
595.3496	3527481.	0.00				
14.0800	-4.81E-04	865724.	-35380.	-1.16E-05	0.00	5.91E+11
615.2204	3375462.	0.00				
14.3000	-5.07E-04	774460.	-33735.	-7.89E-06	0.00	5.91E+11
630.5695	3286244.	0.00				
14.5200	-5.23E-04	687593.	-32055.	-4.62E-06	0.00	5.91E+11
642.1487	3242529.	0.00				
14.7400	-5.31E-04	605203.	-30349.	-1.73E-06	0.00	5.91E+11
650.4946	3234285.	0.00				
14.9600	-5.32E-04	527349.	-28624.	7.98E-07	0.00	5.91E+11
656.0066	3255530.	0.00				
15.1800	-5.27E-04	454068.	-26888.	2.99E-06	0.00	5.91E+11
658.9917	3302731.	0.00				
15.4000	-5.16E-04	385382.	-25148.	4.87E-06	0.00	5.91E+11
659.6928	3373970.	0.00				
15.6200	-5.01E-04	321295.	-23408.	6.45E-06	0.00	5.91E+11
658.3062	3468477.	0.00				
15.8400	-4.82E-04	261796.	-21674.	7.75E-06	0.00	5.91E+11
654.9937	3586377.	0.00				
16.0600	-4.60E-04	206864.	-19952.	8.80E-06	0.00	5.91E+11

649.8906 3728558. 0.00
16.2800 -4.36E-04 156462. -18245. 9.61E-06 0.00 5.91E+11
643.1117 3896623. 0.00
16.5000 -4.09E-04 110542. -16558. 1.02E-05 0.00 5.91E+11
634.7552 4092904. 0.00
16.7200 -3.82E-04 69047. -14896. 1.06E-05 0.00 5.91E+11
624.9052 4320533. 0.00
16.9400 -3.53E-04 31908. -13261. 1.08E-05 0.00 5.91E+11
613.6340 4583567. 0.00
17.1600 -3.25E-04 -954.9884 -11657. 1.09E-05 0.00 5.91E+11
601.0025 4887184. 0.00
17.3800 -2.96E-04 -29629. -10089. 1.08E-05 0.00 5.91E+11
587.0605 5237975. 0.00
17.6000 -2.67E-04 -54211. -8559. 1.06E-05 0.00 5.91E+11
571.8458 5644367. 0.00
17.8200 -2.40E-04 -74809. -7072. 1.04E-05 0.00 5.91E+11
555.3829 6117236. 0.00
18.0400 -2.13E-04 -91535. -5629. 9.98E-06 0.00 5.91E+11
537.6787 6670842. 0.00
18.2600 -1.87E-04 -104515. -4234. 9.55E-06 0.00 5.91E+11
518.7179 7324263. 0.00
18.4800 -1.62E-04 -113879. -2892. 9.06E-06 0.00 5.91E+11
498.4540 8103700. 0.00
18.7000 -1.39E-04 -119770. -1604. 8.54E-06 0.00 5.91E+11
476.7955 9046339. 0.00
18.9200 -1.17E-04 -122338. -376.1751 7.99E-06 0.00 5.91E+11
453.5836 1.02E+07 0.00
19.1400 -9.69E-05 -121745. 788.2454 7.45E-06 0.00 5.91E+11
428.5532 1.17E+07 0.00
19.3600 -7.80E-05 -118166. 1884. 6.91E-06 0.00 5.91E+11
401.2635 1.36E+07 0.00
19.5800 -6.04E-05 -111790. 2903. 6.40E-06 0.00 5.91E+11
370.9594 1.62E+07 0.00
19.8000 -4.42E-05 -102830. 3836. 5.92E-06 0.00 5.91E+11
336.2605 2.01E+07 0.00
20.0200 -2.92E-05 -91526. 4669. 5.49E-06 0.00 5.91E+11
294.3122 2.66E+07 0.00
20.2400 -1.52E-05 -78171. 5371. 5.11E-06 0.00 5.91E+11
237.5149 4.12E+07 0.00
20.4600 -2.20E-06 -63161. 5721. 4.79E-06 0.00 5.91E+11
27.6198 3.31E+07 0.00
20.6800 1.01E-05 -47958. 5473. 4.54E-06 0.00 5.91E+11
-215.0504 5.64E+07 0.00
20.9000 2.18E-05 -34255. 4823. 4.36E-06 0.00 5.91E+11
-277.7493 3.37E+07 0.00
21.1200 3.31E-05 -22487. 4033. 4.23E-06 0.00 5.91E+11
-320.6967 2.56E+07 0.00
21.3400 4.41E-05 -12955. 3141. 4.15E-06 0.00 5.91E+11

```
-354.9839   2.12E+07       0.00
   21.5600   5.50E-05     -5897.       2165.    4.11E-06       0.00    5.91E+11
-384.3672   1.84E+07       0.00
   21.7800   6.58E-05     -1517.       1116.    4.09E-06       0.00    5.91E+11
-410.6077   1.65E+07       0.00
   22.0000   7.66E-05      0.00         0.00    4.09E-06       0.00    5.91E+11
-434.6588   7487056.       0.00
```

* This analysis computed pile response using nonlinear moment-curvature relationships. Values of total stress due to combined axial and bending stresses are computed only for elastic sections only and do not equal the actual stresses in concrete and steel. Stresses in concrete and steel may be interpolated from the output for nonlinear bending properties relative to the magnitude of bending moment developed in the pile.

Output Summary for Load Case No. 1:

```
Pile-head deflection              =     0.35122342 inches
Computed slope at pile head       =    -0.00333245 radians
Maximum bending moment            =       2665971. inch-lbs
Maximum shear force               =        -43493. lbs
Depth of maximum bending moment   =     9.24000000 feet below pile head
Depth of maximum shear force      =    12.76000000 feet below pile head
Number of iterations              =             17
Number of zero deflection points  =              2
```

Computed Values of Pile Loading and Deflection
for Lateral Loading for Load Case Number 2

Pile-head conditions are Shear and Moment (Loading Type 1)

```
Shear force at pile head                              =       34000.0 lbs
Applied moment at pile head                           =           0.0 in-lbs
Axial thrust load on pile head                        =      314000.0 lbs
```

```
   Depth     Deflect.    Bending     Shear      Slope      Total      Bending   Soil
Res.  Soil Spr.  Distrib.
     X          y        Moment      Force        S        Stress    Stiffness       p
      Es*h      Lat. Load
   feet       inches      in-lbs       lbs      radians     psi*      in-lb^2
lb/inch    lb/inch    lb/inch
---------- ---------- ---------- ---------- ---------- ---------- ----------
---------- ---------- ----------
```

```
      0.00    0.08799   1.40E-05     34000.  -7.79E-04       0.00   5.87E+11
0.00       0.00       0.00
    0.2200    0.08593     90406.     34000.  -7.79E-04       0.00   5.87E+11
0.00       0.00       0.00
    0.4400    0.08388    180811.     34000.  -7.78E-04       0.00   5.87E+11
0.00       0.00       0.00
    0.6600    0.08182    271215.     34000.  -7.77E-04       0.00   5.87E+11
0.00       0.00       0.00
    0.8800    0.07977    361619.     34000.  -7.75E-04       0.00   5.87E+11
0.00       0.00       0.00
    1.1000    0.07773    452021.     34000.  -7.74E-04       0.00   5.87E+11
0.00       0.00       0.00
    1.3200    0.07569    542421.     34000.  -7.71E-04       0.00   5.87E+11
0.00       0.00       0.00
    1.5400    0.07366    632820.     34000.  -7.69E-04       0.00   5.87E+11
0.00       0.00       0.00
    1.7600    0.07163    723216.     34000.  -7.66E-04       0.00   5.87E+11
0.00       0.00       0.00
    1.9800    0.06961    813609.     34000.  -7.62E-04       0.00   5.87E+11
0.00       0.00       0.00
    2.2000    0.06760    904000.     34000.  -7.58E-04       0.00   5.87E+11
-0.05991     2.3395       0.00
    2.4200    0.06561    994386.     34000.  -7.54E-04       0.00   5.87E+11
-0.1221     4.9130       0.00
    2.6400    0.06362   1084768.     33999.  -7.49E-04       0.00   5.87E+11
-0.1804     7.4865       0.00
    2.8600    0.06165   1175145.     33999.  -7.44E-04       0.00   5.87E+11
-0.2349    10.0600       0.00
    3.0800    0.05969   1265516.     33998.  -7.39E-04       0.00   5.87E+11
-0.2857    12.6335       0.00
    3.3000    0.05775   1355880.     33997.  -7.33E-04       0.00   5.87E+11
-0.3326    15.2070       0.00
    3.5200    0.05582   1446237.     33996.  -7.27E-04       0.00   5.87E+11
-0.3760    17.7805       0.00
    3.7400    0.05391   1536585.     33995.  -7.20E-04       0.00   5.87E+11
-0.4157    20.3540       0.00
    3.9600    0.05202   1626925.     33994.  -7.13E-04       0.00   5.87E+11
-0.4518    22.9275       0.00
    4.1800    0.05015   1717256.     33993.  -7.05E-04       0.00   5.87E+11
-0.4844    25.5009       0.00
    4.4000    0.04830   1807577.     33992.  -6.97E-04       0.00   5.87E+11
-0.5136    28.0744       0.00
    4.6200    0.04647   1897888.     33990.  -6.89E-04       0.00   5.87E+11
-0.5394    30.6479       0.00
    4.8400    0.04466   1988188.     33989.  -6.80E-04       0.00   5.87E+11
-0.5620    33.2214       0.00
    5.0600    0.04287   2078476.     33987.  -6.71E-04       0.00   5.87E+11
-0.5813    35.7949       0.00
```

```
    5.2800    0.04111   2168753.     33986.  -6.62E-04       0.00   5.87E+11
-0.5975    38.3684       0.00
    5.5000    0.03938   2259017.     33971.  -6.52E-04       0.00   5.87E+11
-10.6874   716.4830       0.00
    5.7200    0.03767   2349199.     33686.  -6.41E-04       0.00   5.87E+11
-204.9880     14365.       0.00
    5.9400    0.03599   2437943.     33142.  -6.31E-04       0.00   5.87E+11
-207.4332     15215.       0.00
    6.1600    0.03434   2525232.     32592.  -6.19E-04       0.00   5.87E+11
-208.9740     16064.       0.00
    6.3800    0.03272   2611056.     32039.  -6.08E-04       0.00   5.87E+11
-209.6448     16914.       0.00
    6.6000    0.03113   2695408.     31486.  -5.96E-04       0.00   5.86E+11
-209.4815     17763.       0.00
    6.8200    0.02958   2778291.     30934.  -5.84E-04       0.00   5.86E+11
-208.5213     18613.       0.00
    7.0400    0.02805   2859710.     30386.  -5.71E-04       0.00   5.86E+11
-206.8023     19462.       0.00
    7.2600    0.02656   2939676.     29843.  -5.58E-04       0.00   5.86E+11
-204.3640     20312.       0.00
    7.4800    0.02511   3018208.     29308.  -5.44E-04       0.00   5.86E+11
-201.2468     21161.       0.00
    7.7000    0.02369   3095325.     28782.  -5.31E-04       0.00   5.86E+11
-197.4923     22011.       0.00
    7.9200    0.02230   3171055.     28266.  -5.17E-04       0.00   5.86E+11
-193.1433     22861.       0.00
    8.1400    0.02096   3245427.     27763.  -5.02E-04       0.00   5.85E+11
-188.2435     23710.       0.00
    8.3600    0.01965   3318474.     27273.  -4.87E-04       0.00   5.85E+11
-182.8375     24560.       0.00
    8.5800    0.01839   3390235.     26798.  -4.72E-04       0.00   5.85E+11
-176.9712     25409.       0.00
    8.8000    0.01716   3460750.     26339.  -4.57E-04       0.00   5.85E+11
-170.6914     26259.       0.00
    9.0200    0.01598   3530062.     24000.  -4.41E-04       0.00   5.85E+11
-1601.    264604.       0.00
    9.2400    0.01483   3588200.     19801.  -4.25E-04       0.00   5.85E+11
-1580.    281224.       0.00
    9.4600    0.01373   3635313.     15659.  -4.09E-04       0.00   5.85E+11
-1558.    299439.       0.00
    9.6800    0.01268   3671557.     11578.  -3.92E-04       0.00   5.85E+11
-1534.    319463.       0.00
    9.9000    0.01166   3697095.      7562.  -3.75E-04       0.00   5.84E+11
-1509.    341548.       0.00
   10.1200    0.01069   3712104.      3613.  -3.59E-04       0.00   5.84E+11
-1483.    365996.       0.00
   10.3400    0.00977   3716766.  -264.5778  -3.42E-04       0.00   5.84E+11
-1455.    393165.       0.00
```

```
   10.5600    0.00889   3711274.     -4067.  -3.25E-04       0.00   5.84E+11
-1426.    423489.        0.00
   10.7800    0.00805   3695830.     -7791.  -3.08E-04       0.00   5.84E+11
-1396.    457498.        0.00
   11.0000    0.00726   3670646.    -11434.  -2.92E-04       0.00   5.85E+11
-1364.    495845.        0.00
   11.2200    0.00651   3635944.    -14990.  -2.75E-04       0.00   5.85E+11
-1330.    539344.        0.00
   11.4400    0.00581   3591956.    -18457.  -2.59E-04       0.00   5.85E+11
-1296.    589024.        0.00
   11.6600    0.00515   3538923.    -21829.  -2.43E-04       0.00   5.85E+11
-1259.    646210.        0.00
   11.8800    0.00453   3477099.    -25104.  -2.27E-04       0.00   5.85E+11
-1222.    712633.        0.00
   12.1000    0.00395   3406748.    -28277.  -2.11E-04       0.00   5.85E+11
-1182.    790609.        0.00
   12.3200    0.00341   3328146.    -31343.  -1.96E-04       0.00   5.85E+11
-1141.    883315.        0.00
   12.5400    0.00291   3241583.    -34297.  -1.81E-04       0.00   5.85E+11
-1097.    995243.        0.00
   12.7600    0.00245   3147359.    -37134.  -1.67E-04       0.00   5.86E+11
-1052.   1132991.        0.00
   12.9800    0.00203   3045793.    -39848.  -1.53E-04       0.00   5.86E+11
-1004.   1306715.        0.00
   13.2000    0.00164   2937217.    -42432.  -1.40E-04       0.00   5.86E+11
-953.8714   1533028.       0.00
   13.4200    0.00129   2821982.    -44881.  -1.27E-04       0.00   5.86E+11
-900.8528   1841409.       0.00
   13.6400   9.74E-04   2700457.    -47185.  -1.14E-04       0.00   5.86E+11
-845.0495   2290525.       0.00
   13.8600   6.89E-04   2573033.    -49340.  -1.02E-04       0.00   5.87E+11
-787.5025   3019526.       0.00
   14.0800   4.34E-04   2440111.    -51351.  -9.11E-05       0.00   5.87E+11
-735.5711   4478260.       0.00
   14.3000   2.08E-04   2302053.    -53346.  -8.04E-05       0.00   5.87E+11
-776.3608   9866860.       0.00
   14.5200   9.16E-06   2158576.    -54418.  -7.04E-05       0.00   5.87E+11
-35.8110   1.03E+07        0.00
   14.7400  -1.64E-04   2014841.    -54034.  -6.10E-05       0.00   5.87E+11
326.7482   5267097.       0.00
   14.9600  -3.13E-04   1873376.    -52982.  -5.22E-05       0.00   5.87E+11
470.4971   3971120.       0.00
   15.1800  -4.40E-04   1735183.    -51621.  -4.41E-05       0.00   5.87E+11
560.3935   3365740.       0.00
   15.4000  -5.46E-04   1600889.    -50057.  -3.66E-05       0.00   5.87E+11
624.8264   3022627.       0.00
   15.6200  -6.33E-04   1470944.    -48342.  -2.97E-05       0.00   5.87E+11
673.9380   2811181.       0.00
```

15.8400	-7.03E-04	1345691.	-46512.	-2.34E-05	0.00	5.87E+11
712.5474	2677348.	0.00				
16.0600	-7.56E-04	1225398.	-44590.	-1.76E-05	0.00	5.87E+11
743.3405	2594621.	0.00				
16.2800	-7.96E-04	1110282.	-42595.	-1.23E-05	0.00	5.87E+11
767.9755	2548562.	0.00				
16.5000	-8.22E-04	1000515.	-40542.	-7.60E-06	0.00	5.87E+11
787.5519	2530787.	0.00				
16.7200	-8.36E-04	896232.	-38443.	-3.34E-06	0.00	5.87E+11
802.8370	2536276.	0.00				
16.9400	-8.39E-04	797542.	-36308.	4.69E-07	0.00	5.87E+11
814.3869	2562050.	0.00				
17.1600	-8.33E-04	704525.	-34147.	3.85E-06	0.00	5.87E+11
822.6157	2606488.	0.00				
17.3800	-8.19E-04	617238.	-31969.	6.82E-06	0.00	5.87E+11
827.8373	2668951.	0.00				
17.6000	-7.97E-04	535718.	-29780.	9.41E-06	0.00	5.87E+11
830.2913	2749598.	0.00				
17.8200	-7.69E-04	459984.	-27588.	1.16E-05	0.00	5.87E+11
830.1604	2849312.	0.00				
18.0400	-7.36E-04	390034.	-25400.	1.36E-05	0.00	5.87E+11
827.5808	2969720.	0.00				
18.2600	-6.98E-04	325850.	-23222.	1.52E-05	0.00	5.87E+11
822.6490	3113292.	0.00				
18.4800	-6.56E-04	267398.	-21059.	1.65E-05	0.00	5.87E+11
815.4255	3283540.	0.00				
18.7000	-6.10E-04	214629.	-18919.	1.76E-05	0.00	5.87E+11
805.9361	3485358.	0.00				
18.9200	-5.63E-04	167476.	-16807.	1.84E-05	0.00	5.87E+11
794.1710	3725577.	0.00				
19.1400	-5.13E-04	125857.	-14729.	1.91E-05	0.00	5.87E+11
780.0824	4013869.	0.00				
19.3600	-4.62E-04	89675.	-12691.	1.96E-05	0.00	5.87E+11
763.5794	4364299.	0.00				
19.5800	-4.10E-04	58814.	-10701.	1.99E-05	0.00	5.87E+11
744.5225	4798083.	0.00				
19.8000	-3.57E-04	33142.	-8764.	2.01E-05	0.00	5.87E+11
722.7182	5348838.	0.00				
20.0200	-3.03E-04	12507.	-6889.	2.02E-05	0.00	5.87E+11
697.9246	6073457.	0.00				
20.2400	-2.50E-04	-3264.	-5083.	2.03E-05	0.00	5.87E+11
669.9001	7077306.	0.00				
20.4600	-1.96E-04	-14366.	-3356.	2.02E-05	0.00	5.87E+11
638.6441	8582757.	0.00				
20.6800	-1.43E-04	-21016.	-1713.	2.01E-05	0.00	5.87E+11
605.6149	1.12E+07	0.00				
20.9000	-9.01E-05	-23446.	-144.9645	2.00E-05	0.00	5.87E+11
582.6478	1.71E+07	0.00				

```
   21.1200  -3.74E-05    -21815.      1832.   1.99E-05       0.00   5.87E+11
914.8614   6.46E+07       0.00
   21.3400   1.51E-05    -13808.      2877.   1.99E-05       0.00   5.87E+11
-123.0238   2.15E+07       0.00
   21.5600   6.74E-05     -6658.      2281.   1.98E-05       0.00   5.87E+11
-328.4184   1.29E+07       0.00
   21.7800   1.20E-04     -1796.      1267.   1.98E-05       0.00   5.87E+11
-439.7215   9701072.       0.00
   22.0000   1.72E-04       0.00       0.00   1.98E-05       0.00   5.87E+11
-520.2216   3995007.       0.00
```

* This analysis computed pile response using nonlinear moment-curvature relationships. Values of total stress due to combined axial and bending stresses are computed only for elastic sections only and do not equal the actual stresses in concrete and steel. Stresses in concrete and steel may be interpolated from the output for nonlinear bending properties relative to the magnitude of bending moment developed in the pile.

Output Summary for Load Case No. 2:

```
Pile-head deflection             =     0.08798668 inches
Computed slope at pile head      =    -0.00077874 radians
Maximum bending moment           =       3716766. inch-lbs
Maximum shear force              =        -54418. lbs
Depth of maximum bending moment  =    10.34000000 feet below pile head
Depth of maximum shear force     =    14.52000000 feet below pile head
Number of iterations             =              8
Number of zero deflection points =              2
```

Summary of Pile-head Responses for Conventional Analyses

Definitions of Pile-head Loading Conditions:

```
Load Type 1: Load 1 = Shear, V, lbs, and Load 2 = Moment, M, in-lbs
Load Type 2: Load 1 = Shear, V, lbs, and Load 2 = Slope, S, radians
Load Type 3: Load 1 = Shear, V, lbs, and Load 2 = Rot. Stiffness, R, in-lbs/rad.
Load Type 4: Load 1 = Top Deflection, y, inches, and Load 2 = Moment, M, in-lbs
Load Type 5: Load 1 = Top Deflection, y, inches, and Load 2 = Slope, S, radians
```

Load Case	Load Type	Pile-head	Load Type	Pile-head Loading	Axial Deflection	Pile-head Rotation	Max Shear in Pile	Max Moment in Pile

No.	Load 1	2	Load 2	lbs	inches	radians	lbs in-lbs
1	V, lb 30000.	M, in-lb	0.00	-259000.	0.3512	-0.00333	-43493. 2665971.
2	V, lb 34000.	M, in-lb	0.00	314000.	0.08799	-7.79E-04	-54418. 3716766.

Maximum pile-head deflection = 0.3512234193 inches
Maximum pile-head rotation = -0.0033324460 radians = -0.190935 deg.

Summary of Warning Messages

The following warning was reported 128 times

**** Warning ****

An unreasonable value was input for friction angle has been specified
for a soil layer defined uisng the sand criteria. The input value is
either smaller than 20 degrees or higher than 48 degrees. The input
data should be checked for correctness.

The following warning was reported 480 times

**** Warning ****

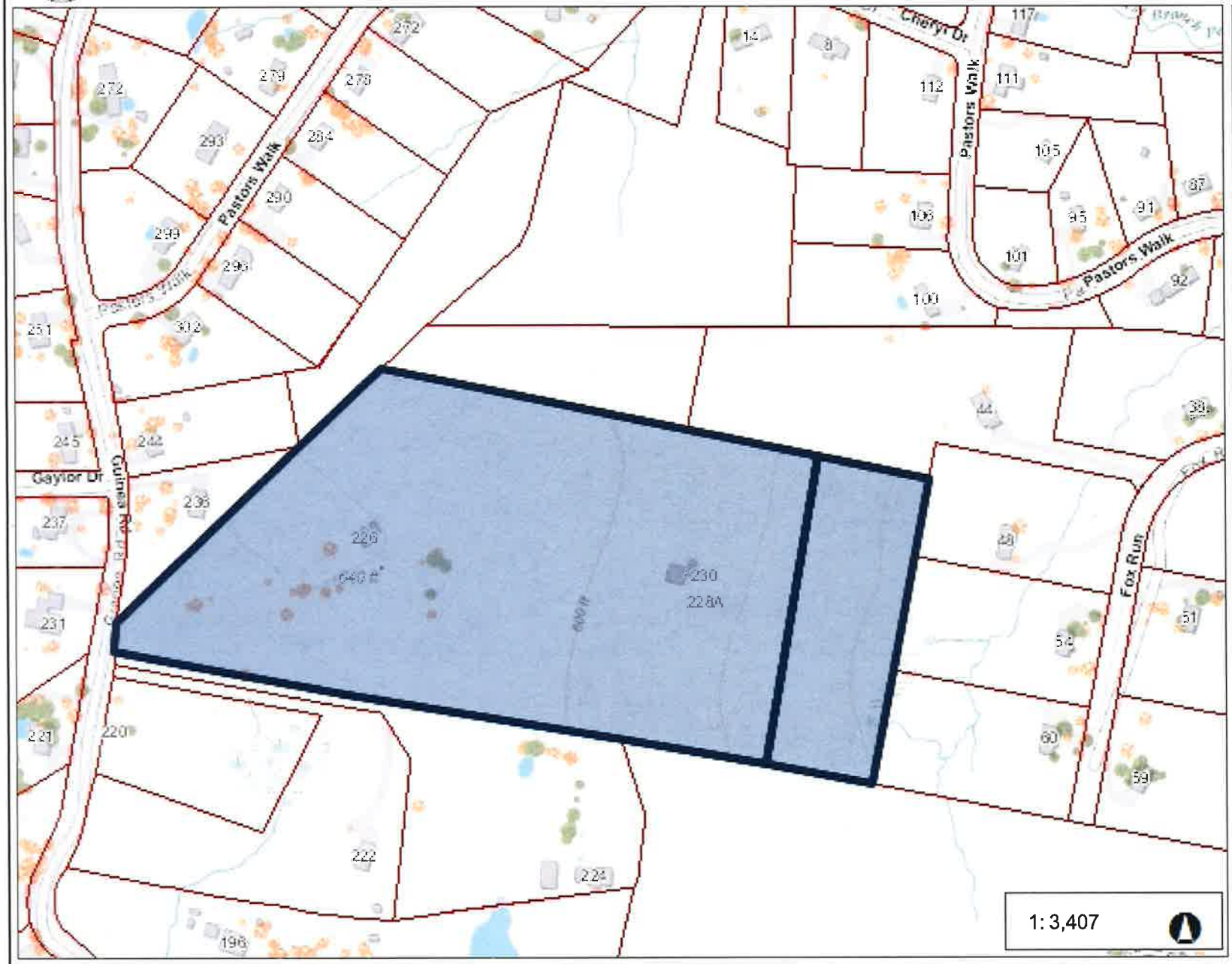
An unreasonable input value for shear strength has been specified for a soil
defined using the soft clay criteria. The input value is greater than 1250 psf.
Please check your input data for correctness.

The analysis ended normally.

ATTACHMENT 4

Town of Monroe

Map Title



Legend

- Parcels
- Streetname
- Roadways
  - Local
  - Collector
  - Minor Collector
  - Minor Arterial
  - Major Collector
  - PA Other
  - PA Other Expwy
  - PA Interstate

567.8 0 283.90 567.8 Feet

WGS_1984_Web_Mercator_Auxiliary_Sphere
Created by Greater Bridgeport Regional Council

This map is a user generated static output from an Internet mapping site and is for reference only. Data layers that appear on this map may or may not be accurate, current, or otherwise reliable.
THIS MAP IS NOT TO BE USED FOR NAVIGATION

METROCOG
Connecticut Metropolitan Council of Governments

230 GUINEA RD

Location	230 GUINEA RD	**Map/Lot**	081/ 008/ 00/ /
Acct#	08100800	**Owner**	MONROE TOWN OF (OPEN SPACE)
Assessment	$16,900	**Appraisal**	$24,200
PID	11950	**Building Count**	1
Survey	1814 C		

Current Value

Appraisal			
Valuation Year	**Improvements**	**Land**	**Total**
2014	$0	$24,200	$24,200
Assessment			
Valuation Year	**Improvements**	**Land**	**Total**
2014	$0	$16,900	$16,900

Owner of Record

Owner	MONROE TOWN OF (OPEN SPACE)	**Sale Price**	$0
Co-Owner		**Certificate**	1
Address	7 FAN HILL RD MONROE, CT 06468-1800	**Book & Page**	297/ 119
		Sale Date	10/30/1985

Ownership History

Ownership History				
Owner	**Sale Price**	**Certificate**	**Book & Page**	**Sale Date**
MONROE TOWN OF (OPEN SPACE)	$0	1	297/ 119	10/30/1985

Building Information

Building 1 : Section 1

Year Built:
Living Area: 0

Building Attributes	
Field	**Description**
Style	Vacant Land
Model	
Stories:	
Occupancy	

Exterior Wall 1	
Heat Fuel	
Heat Type:	
AC Type:	
Total Bedrooms:	
Total Bthrms:	
Total Half Baths:	
Total Rooms:	
Fireplaces	
Basement Gar.	
Basement	
In Law Apt	

Building Photo

(http://images.vgsi.com/photos/MonroeCTPhotos//default.jpg)

Building Layout

Building Sub-Areas (sq ft)	Legend
No Data for Building Sub-Areas	

Extra Features

Extra Features	Legend
No Data for Extra Features	

Land

Land Use

Use Code	903
Description	Municipal
Zone	RF2
Neighborhood	
Alt Land Approved	No
Category	

Land Line Valuation

Size (Acres)	3.02
Appraised Value	$24,200

Outbuildings

Outbuildings	Legend
No Data for Outbuildings	

Valuation History

Appraisal			
Valuation Year	**Improvements**	**Land**	**Total**
2015	$0	$24,200	$24,200
2009		$24,200	$24,200

Assessment

Valuation Year	Improvements	Land	Total
2015	$0	$16,900	$16,900
2009		$16,940	$16,940

ATTACHMENT 5

UNITED STATES POSTAL SERVICE®

Certificate of Mailing — Firm

Name and Address of Sender	TOTAL NO. of Pieces Listed by Sender	TOTAL NO. of Pieces Received at Post Office™	Affix Stamp Here *Postmark with Date of Receipt.*
Kenneth C. Baldwin, Esq. Robinson & Cole LLP 280 Trumbull Street Hartford, CT 06103	2	2	neopost 12/12/2017 US POSTAGE $002.38 ZIP 06103 041L12203360
	Postmaster, per *(name of receiving employee)*		

USPS® Tracking Number / Firm-specific Identifier	Address (Name, Street, City, State, and ZIP Code™)	Postage	Fee	Special Handling	Parcel Airlift
1.	Kenneth Kellogg, First Selectman Town of Monroe 7 Fan Hill Road Monroe, CT 06468				
2.	Scott Schatzlein, P.E Land Use Director/Town Engineer Town of Monroe 7 Fan Hill Road Monroe, CT 06468	[redacted] USPS DEC 12 2017 OLD STATE HOUSE STA 06108			
3.					
4.					
5.					
6.		2			

See Reverse for Instructions