Robinson+Cole

KENNETH C. BALDWIN

280 Trumbull Street
Hartford, CT 06103-3597
Main (860) 275-8200
Fax (860) 275-8299
kbaldwin@rc.com
Direct (860) 275-8345

Also admitted in Massachusetts

August 3, 2016

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

Re: **Notice of Exempt Modification – Facility Modification**
811 Blue Hills Avenue, Bloomfield, Connecticut

Dear Ms. Bachman:

Cellco Partnership d/b/a Verizon Wireless ("Cellco") currently maintains twelve (12) wireless telecommunications antennas at the top of the existing 110-foot tower at 811 Blue Hills Avenue in Bloomfield, Connecticut (the "Property"). The tower is owned by Cellco and was approved by the Council in 2007 (Docket No. 336). Cellco now intends to modify its facility by replacing all of its existing antennas with two (2) model LNX-6514DS-VTM, 700 MHz antennas; one (1) model X7C-FRO-660, 700 MHz antenna; three (3) model LNX-6514DS-VTM, 850 MHz antennas; three (3) model SBNHH-1D65B, 1900 MHz antennas; and three (3) model SBNHH-1D65B, 2100 MHz antennas. Cellco also intends to replace three (3) remote radio heads ("RRHs") and install six (6) additional RRHs behind its 1900 and 2100 MHz antennas. Cellco also intends to install one (1) HYBRIFLEX™ fiber optic antenna cable inside the monopole tower. Included in Attachment 1 are specifications for Cellco's replacement antennas, RRHs and HYBRIFLEX™ cable.

Please accept this letter as notification pursuant to R.C.S.A. § 16-50j-73, for construction that constitutes an exempt modification pursuant to R.C.S.A. § 16-50j-72(b)(2). In accordance with R.C.S.A. § 16-50j-73, a copy of this notice is being sent to Philip K. Schenck, Jr., Town Manager for the Town of Bloomfield. A copy of this letter is also being sent to Samo Realty LLC, 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).

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1. The proposed modifications will not result in an increase in the height of the existing tower. Cellco's new and replacement antennas and RRHs will be installed on its existing antenna platform at the top of the existing 110-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 General Power Density table for Cellco's modified facility is included in Attachment 2.

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

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

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

For the foregoing reasons, Cellco respectfully submits that the proposed modifications to the above-referenced telecommunications facility constitutes an exempt modification under R.C.S.A. § 16-50j-72(b)(2).

Sincerely,

Kenneth C. Baldwin

Enclosures
Copy to:
Philip K. Schenck, Jr., Bloomfield Town Manager
Samo Realty LLC
Tim Parks

ATTACHMENT 1

Product Specifications

COMMSCOPE®

POWERED BY ANDREW.

LNX-6514DS-VTM

Andrew® Antenna, 698–896 MHz, 65° horizontal beamwidth, RET compatible

- Great solution to maximize network coverage and capacity
- Excellent gain, VSWR, front-to-back ratio, and PIM specifications for robust network performance
- Ideal choice for site collocations and tough zoning restrictions
- Excellent solution for site sharing and maximizing capacity
- Fully compatible with Andrew remote electrical tilt system for greater OpEx savings
- The RF connectors are designed for IP67 rating and the radome for IP56 rating

Electrical Specifications

Frequency Band, MHz	**698–806**	**806–896**
Gain, dBi	15.8	15.9
Beamwidth, Horizontal, degrees	65	64
Beamwidth, Vertical, degrees	12.4	11.2
Beam Tilt, degrees	0–10	0–10
USLS (First Lobe), dB	17	18
Front-to-Back Ratio at 180°, dB	32	30
CPR at Boresight, dB	23	23
CPR at Sector, dB	12	10
Isolation, dB	30	30
VSWR | Return Loss, dB	1.4 | 15.6	1.4 | 15.6
PIM, 3rd Order, 2 x 20 W, dBc	-153	-153
Input Power per Port, maximum, watts	400	400
Polarization	±45°	±45°
Impedance	50 ohm	50 ohm

Electrical Specifications, BASTA*

Frequency Band, MHz	**698–806**	**806–896**
Gain by all Beam Tilts, average, dBi	15.6	15.7
Gain by all Beam Tilts Tolerance, dB	±0.4	±0.5
Gain by Beam Tilt, average, dBi	0 ° | 15.7	0 ° | 15.9
	5 ° | 15.7	5 ° | 15.8
	10 ° | 15.3	10 ° | 15.3
Beamwidth, Horizontal Tolerance, degrees	±0.9	±1.4
Beamwidth, Vertical Tolerance, degrees	±0.8	±0.6
USLS, beampeak to 20° above beampeak, dB	18	20
Front-to-Back Total Power at 180° ± 30°, dB	25	23
CPR at Boresight, dB	25	24
CPR at Sector, dB	15	12

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

General Specifications

Antenna Brand	Andrew®
Antenna Type	DualPol®
Band	Single band
Brand	DualPol® | Teletilt®

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Product Specifications

COMMSCOPE®

LNX-6514DS-VTM

POWERED BY ANDREW.

Operating Frequency Band	698 – 896 MHz
Performance Note	Outdoor usage

Mechanical Specifications

Color	Light gray
Lightning Protection	dc Ground
Radiator Material	Aluminum
Radome Material	Fiberglass, UV resistant
RF Connector Interface	7-16 DIN Female
RF Connector Location	Bottom
RF Connector Quantity, total	2
Wind Loading, maximum	617.7 N @ 150 km/h 138.9 lbf @ 150 km/h
Wind Speed, maximum	241 km/h | 150 mph

Dimensions

Depth	180.5 mm | 7.1 in
Length	1851.0 mm | 72.9 in
Width	301.0 mm | 11.9 in
Net Weight	14.2 kg | 31.3 lb

Remote Electrical Tilt (RET) Information

Model with Factory Installed AISG 2.0 Actuator	LNX-6514DS-A1M
RET System	Teletilt®

Packed Dimensions

Depth	284.0 mm | 11.2 in
Length	2163.0 mm | 85.2 in
Width	411.0 mm | 16.2 in
Shipping Weight	32.3 kg | 71.2 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

Included Products

DB380 — Pipe Mounting Kit for 2.4"-4.5" (60-115mm) OD round members on wide panel antennas. Includes 2 clamp sets and double nuts.

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Product Specifications

COMMSCOPE®

LNX-6514DS-VTM

POWERED BY ANDREW.

DB5083 — Downtilt Mounting Kit for 2.4"-4.5" (60 - 115 mm) OD round members. Includes a heavy-duty, galvanized steel downtilt mounting bracket assembly and associated hardware. This kit is compatible with the DB380 pipe mount kit for panel antennas that are equipped with two mounting brackets.

* Footnotes

Performance Note	Severe environmental conditions may degrade optimum performance

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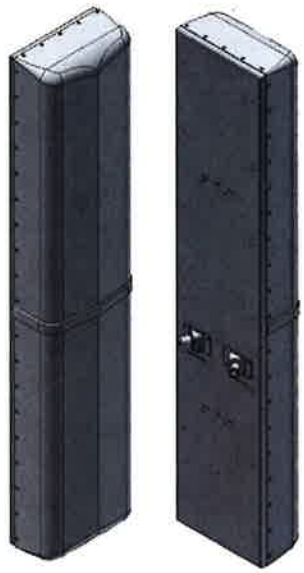
X7C-FRO-660

X-Pol Antenna, 698-896 MHz, (72.0", 60° H-Beam)



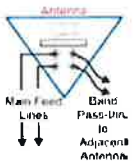
- Fast Roll Off (FRO)
- Designed to improve SNR
- Greatly increases LTE data rates
- Macro Cell High Gain Antenna
- Highly Reliable Fixed Tilt Design
- Suitable for LTE/CDMA/UMTS/GSM
- Mechanical Tilt Bracket Included

Available with Integrated Diplexers

Reduces mainline cables

Eliminates External Tower Devices

Supports high band TMAs



ELECTRICAL SPECIFICATIONS

Frequency Band, MHz	698-824	824-896
Horizontal Beam Width, 3dB points	58°	
Gain, dBi	16.5	17.2
Vertical Beam Width, 3dB points	11.0°	
Front-to-Back at 180°, dB	>30	
Upper Side Lobe Suppression, Typical, dB	<-18	
Polarization	+/-45°	
Electrical Down Tilt, Fixed	0, 2, 4, 6, 8, 10°	
VSWR/Return Loss, dB, Maximum (Non-IP)	1.4:1/-15.6	
VSWR/Return Loss, dB, Maximum (With-IP)	1.5:1/-14.0	
Return Loss, dB Maximum, Pass Thru	-17.7	
Isolation Between Ports, dB, Minimum	27	
Intermodulation (2x20w), IM3, dBc, Maximum	-150	
Impedance, ohms	50	
Maximum Power Per Connector, CW	500 @ 800 MHz	

JMA WIRELESS

MECHANICAL SPECIFICATIONS

Dimensions, Length/Width/Depth	72.0/14.6/8.0 in. (1829/372/203mm)
Connector (Quantity)	(2 or 4) 7-16 DIN Female
Connector Torque	220-265 lbf-in (23-30 N-m)
Connector Location	Back
Antenna Weight	32.2 lbs (14.6 kg) *Note: Weight varies slightly based on ordering options*
Bracket Weight	13.2 lb. (6.0 kg)
Standard Bracket Kit	CSS P/N 919011 (Included)
Mechanical Down Tilt Range	0-12°
Radome Material	High Strength Luran, UV Stabilized, ASTM D1925
Wind Survival	150 mph (241 km/h)
Front Wind Load	211.6 lbf (941.4 N) @100mph
Equivalent Flat Plate	4.22 sq-ft (c=2) @ 100mph

ORDER INFORMATION

MODEL	DESCRIPTION
X7C-FRO-660-*x*	X-Pol antenna with two back DIN connectors
X7C-FRO-660-*x*-IP	X-Pol antenna with four back DIN connectors with integrated pass thru diplexers
919036	Optional Bracket Kit, 2-Point, 12deg D-tilt, For 4.5" OD Pole

***x* defines the electrical tilt**

Product Specifications

COMMSCOPE®

SBNHH-1D65B

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

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

Electrical Specifications

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

Electrical Specifications, BASTA*

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

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

General Specifications

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

Mechanical Specifications

Color	Light gray
Lightning Protection	dc Ground

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Product Specifications

COMMSCOPE®

SBNHH-1D65B

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

Dimensions

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

Remote Electrical Tilt (RET) Information

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

Packed Dimensions

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

Regulatory Compliance/Certifications

Agency	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

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Product Specifications

COMMSCOPE®

SBNHH-1D65B

Included Products

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

* Footnotes

Performance Note	Severe environmental conditions may degrade optimum performance

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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.

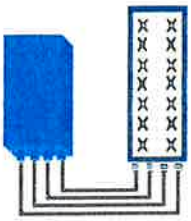
Its compactness and slim design makes the Alcatel-Lucent B13 RRH4x30-4R easy to install close to the antenna: operators can therefore locate this Remote Radio Head where RF design conditions are deemed ideal, minimizing trade-offs between available sites and RF optimum sites, together with reducing the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

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

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ALCATEL-LUCENT
WIRELESS PRODUCT DATASHEET
RRH2X60-1900A-4R FOR BAND 2/25 APPLICATIONS

The Alcatel-Lucent RRH2x60-1900A-4R is a high power, small form factor Remote Radio Head operating in the PCS 1900MHz frequency band for WCDMA and LTE technologies. It is designed with an eco-efficient approach, providing operators with the means to achieve high quality and high capacity coverage with minimum site requirements and efficient operation.

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

The Alcatel-Lucent RRH2x60-1900A-4R is linked to the BBU by an optical-fiber connection carrying downlink and uplink digital radio signals along with operations, administration and maintenance (OA&M) information.

SUPERIOR RF PERFORMANCE

The Alcatel-Lucent RRH2x60-1900A-4R integrates all the latest technologies. This allows operators to offer best-in-class characteristics.

It delivers an outstanding 120 watts of total RF power thanks to its two transmit RF paths of 60 W each.

It is ideally suited to support multiple-input multiple-output (MIMO) 2x2 operation.

It includes four RF receivers to natively support 4-way uplink reception diversity. This improves the radio uplink coverage and this can be used to extend the cell radius commensurate with 2x2MIMO 2x60 W for the downlink.

The latest generation power amplifiers (PA) used in this product achieve high efficiency (>40%), resulting in improved power consumption figures.

OPTIMIZED TCO

The Alcatel-Lucent RRH2x60-1900A-4R is designed to make available all the benefits of a distributed Node B, with excellent RF characteristics, with low capital expenditures (CAPEX) and low operating expenditures (OPEX).

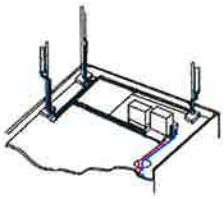
The Alcatel-Lucent RRH2x60-1900A-4R is a very cost-effective solution to deploy LTE MIMO.

EASY INSTALLATION

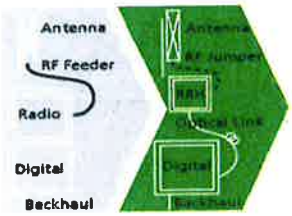
The limited space available in some sites may prevent the installation of traditional single-cabinet BTS equipment. However, many of these sites can host an Alcatel-Lucent RRH2x60-1900A-4R installation, providing more flexible site selection and improved network quality along with greatly reduced installation time and costs.

The Alcatel-Lucent RRH2x60-1900A-4R is a zero-footprint solution and is convection cooled without fans for silent operation, simplifying negotiations with site property owners and minimizing environmental impacts.

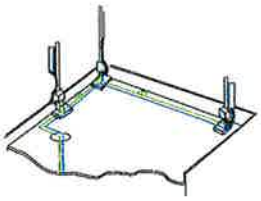
Installation can easily be done by a single person as the Alcatel–Lucent RRH2x60-190A-4R is compact and weighs about 21 kg, eliminating the need for a crane to hoist the BTS cabinet to the rooftop. A site can be in operation in less than one day.



Macro



RRH for space-constrained cell sites



Distributed

FEATURES

- RRH2x60-1900A-4R integrates two power amplifiers of 60W rating (at each antenna connector)
- RRH2x60-1900A-4R can operate WCDMA only, LTE only or a mix of WCDMA and LTE
- RRH2x60-1900A-4R offers the possibility for WCDMA (non MIMO) to operate the two radio chains independently (2 blocks of 20 MHz anywhere in the band)
- RRH2x60-1900A-4R is a very compact and lightweight product
- Advanced power management techniques are embedded to provide power savings, such as PA bias control

BENEFITS

- MIMO deployment and/or WCDMA and LTE simultaneous operation with only one single unit per sector
- Improved uplink coverage with built-in 4-way receive diversity capability
- RRH can be mounted close to the antenna, eliminating nearly all losses in RF cables and thus reducing power consumption by 50% compared to conventional solutions
- Distributed configurations provide easily deployable and cost-effective solutions, near zero footprint and silent solutions, with minimum impact on the neighborhood, which ease the deployment
- RETA and TMA support without additional hardware thanks to the AISG v2.0 port and the integrated Bias-Tees. Bias-Tees support AISG DC supply and signaling.

TECHNICAL SPECIFICATIONS

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

Dimensions and weights

- HxWxD : 500x285x208 mm (30l with solar shield)
- Weight : 21 kg (46 lbs) (with solar shield)

Electrical Data

- Power Supply : -48V DC (-40.5 to -57V)
- Power Consumption: 460W typ. @2x60W (100%RF)

RF Characteristics

- Supported spectrum: DL 1930-1990 / UL 1850-1910
- Frequency band: 3GPP band 2/25
- Output power: 2x60W at antenna connectors
- Technology supported: W-CDMA and LTE
- Instantaneous bandwidth: 20 MHz (MIMO) or 2x20 MHz (non MIMO)
- Rx diversity: 2-way and 4-way uplink reception
- Typical sensitivity without Rx diversity: -124.8dBm for WCDMA and -105 dBm for LTE

Connectivity

- Two CPRI optical ports for daisychaining and up to six RRHs per fiber
- Type of optical fiber: Single-Mode (SM) and Multi-Mode (MM) SFPs
- Optical fiber length: up to 500m using MM fiber, up to 15km using SM fiber
- TMA/RETA: AISG 2.0 (RS485 connector and internal Bias-Tee)
- Six external alarms
- Surge protection for all external ports (DC and RF)

Environmental specifications

- Operating temperature: -40°C to 55°C including solar load
- Operating relative humidity: 8% to 100%
- Environmental Conditions: ETS300-019-1-4 class4.1E
- Ingress Protection: IEC 60529 IP65
- Acoustic Noise : Noiseless (natural convection cooling)

Safety and Regulatory Data

- EMC : 3GPP 25113, EN 301 489-1, EN 301 489-23, GR 1089
- Safety : IEC60950-1, EN 60825-1
- Regulatory: CE Mark-European Directive 2002/95/EC (RoHS), 2002/96/EC (WEEE), 1999/5/EC (R&TTE)
- Health : EN 50385

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Alcatel·Lucent

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.

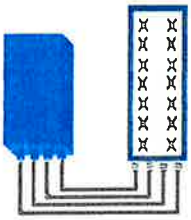
Its compactness and slim design makes the Alcatel-Lucent B13 RRH4x30-4R easy to install close to the antenna: operators can therefore locate this Remote Radio Head where RF design conditions are deemed ideal, minimizing trade-offs between available sites and RF optimum sites, together with reducing the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

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

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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)		[mm (AWG)]	8.4 (8)
Quantity, Wire Count (Power)			16 (8 pairs)
Size (Alarm)		[mm (AWG)]	0.8 (18)
Quantity, Wire Count (Alarm)			4 (2 pairs)
Type			UV protected
Strands			19
Primary Jacket Diameter, Nominal		[mm (in)]	6.8 (0.27)
Standards (Meets or exceeds)			NFPA 130, ICEA S-95-658 UL Type XHHW-2, UL 44 UL-LS Limited Smoke, UL VW-1 IEEE-383 (1974), IEEE1202/FT4 RoHS Compliant
Installation Temperature		[°C (°F)]	-40 to +65 (-40 to149)
Operation Temperature		[°C (°F)]	-40 to +65 (-40 to149)

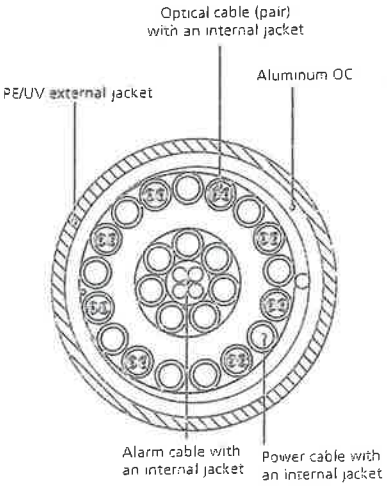

Figure 2: Construction Detail

* This data is provisional and subject to change

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

ATTACHMENT 2

General Power Density

Site Name: Bloomfield Blue Hills, CT
Cumulative Power Density

Operator	Operating Frequency	Number of Trans.	ERP Per Trans.	Total ERP	Distance to Target	Calculated Power Density	Maximum Permissable Exposure*	Fraction of MPE
	(MHz)		(watts)	(watts)	(feet)	(mW/cm^2)	(mW/cm^2)	(%)
VZW PCS	1970	11	441	4854.815	107	0.1525	1.0	15.25%
VZW Cellular	869	9	405	3646.712	107	0.1145	0.579333333	19.77%
VZW AWS	2145	1	1750	1750	107	0.0550	1.0	5.50%
VZW 700	746	1	1050	1050	107	0.0330	0.497333333	6.63%

Total Percentage of Maximum Permissible Exposure 47.15%

*Guidelines adopted by the FCC on August 1, 1996, 47 CFR Part 1 based on NCRP Report 86, 1986 and generally on ANSI/IEEE C95.1-1992

MHz = Megahertz
mW/cm^2 = milliwatts per square centimeter
ERP = Effective Radiated Power

Absolute worst case maximum values used.

ATTACHMENT 3

CENTEK engineering

Centered on Solutions℠

Structural Analysis Report

110-ft Existing EEI Monopole

Proposed Verizon Wireless
Antenna Upgrade

Verizon Site Ref: Bloomfield Blue Hills

811 Blue Hills Ave
Bloomfield, CT

Centek Project No. 15001.070

Date: June 19, 2015

STATE OF CONNECTICUT
TIMOTHY J. LYNN
No. 29336
LICENSED
PROFESSIONAL ENGINEER

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

63-2 North Branford Road, Branford, CT 06405 203.488.0580 Fax 203.488.8587 www.CentekEng.com

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Introduction

The purpose of this report is to summarize the results of the non-linear, P-Δ structural analysis of the antenna upgrade proposed by Verizon Wireless on the existing monopole (tower) located in Bloomfield, Connecticut.

The host tower is a 110-ft tall extendable to 118-ft, three-section, eighteen sided, tapered monopole, originally designed and manufactured by Engineered Endeavors Incorporated; project no. 15165 dated December 5, 2007. The tower geometry, structure member sizes and foundation system information were obtained from the original manufacturers design documents.

The tower consists of three (3) tapered vertical steel sections conforming to ASTM A572-65. The vertical tower sections are slip joint connected. The diameter of the pole (flat-flat) is 17.00-in at the top and 51.00-in at the base.

Antenna and appurtenance information were obtained from a previous structural report prepared by Centek job no; 14067.015 dated June 3, 2014 and a Verizon RF data sheet.

Verizon Wireless proposes the replacement of (12) of the existing (15) panel antennas and six (6) existing radio heads and the installation of three (3) remote radio heads and one (1) distribution box mounted on the existing T-Frames. Refer to the Antenna and Appurtenance Summary below for a detailed description of the proposed antenna and appurtenance configuration.

Antenna and Appurtenance Summary

The existing, proposed and future loads considered in this analysis consist of the following:

- VERIZON (Existing to Remain):
  Antennas: Two (2) Andrew LNX-6514DS panel antennas, one (1) CSS X7C-FRO-660 panel antenna and one (1) RFS DB-T1-6Z-8AB-0Z main distribution box mounted on three (3) existing T-Arms with a RAD center elevation of 107-ft above grade level.
  Coax Cables: Fourteen (14) 1-5/8" ∅ coax cables and one (1) 1-1/4" ∅ fiber cable running on the inside of the existing tower.
- VERIZON (Existing to Remove):
  Antennas: Six (6) Antel BXA-171063-12BF panel antennas, six (6) Antel LPA-80063/6CF panel antennas, three (3) Alcatel-Lucent RRH2x40-AWS remote radio heads and three (3) Alcatel-Lucent RRH2x40-AWS remote radio heads mounted on three (3) existing T-Arms with a RAD center elevation of 107-ft above grade level.
- **VERIZON (Proposed):**
  Antennas: Five (5) Andrew LNX-6514DS panel antennas, one (1) CSS X7C-FRO-660 panel antenna, six (6) Andrew SBNHH-1D65B panel antennas, three (3) Alcatel-Lucent RRH2x60-700 remote radio heads, three (3) Alcatel-Lucent RRH2x60-PCS remote radio heads, three (3) Alcatel-Lucent RRH2x60-AWS remote radio heads and one (1) RFS DB-T1-6Z-8AB-0Z main distribution box mounted on three (3) existing T-Arms with a RAD center elevation of 107-ft above grade level.
  Cables: One (1) 1-1/4" ∅ fiber cable running on the inside of the existing tower.

Primary Assumptions Used in the Analysis

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

Analysis

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

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

The controlling wind speed is determined by evaluating the local available wind speed data as provided in Appendix K of the CSBC[1] and the wind speed data available in the TIA/EIA-222-F-96 Standard. The higher of the two wind speeds is utilized in preparation on the tower analysis.

Tower Loading

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

Basic Wind Speed:	Hartford; v = 80 mph (fastest mile)	*[Section 16 of TIA/EIA-222-F-96]*
	Bloomfield; v = 95 mph (3 second gust) equivalent to v = 77.5 mph (fastest mile)	*[Appendix K of the 2005 CT Building Code Supplement]*
	TIA/EIA wind speed controls.	
Load Cases:	Load Case 1; 80 mph wind speed w/ no ice plus gravity load – used in calculation of tower stresses and rotation.	*[Section 2.3.16 of TIA/EIA-222-F-96]*
	Load Case 2; 69 mph wind speed w/ ½" radial ice plus gravity load – used in calculation of tower stresses. The 69 mph wind speed velocity represents 75% of the wind pressure generated by the 80 mph wind speed.	*[Section 2.3.16 of TIA/EIA-222-F-96]*
	Load Case 3; Seismic – not checked	*[Section 1614.5 of State Bldg. Code 2005] does not control in the design of this structure type*

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

Tower Capacity

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

- Calculated stresses were found to be within allowable limits. In Load Case 1, per tnxTower "Section Capacity Table", this tower was found to be at **43.4%** of its total capacity.

Tower Section	Elevation	Stress Ratio (percentage of capacity)	Result
Pole Shaft (L1)	73.96'-110.00'	43.4%	**PASS**
Pole Shaft (L2)	48.71'-73.96'	32.6%	**PASS**
Pole Shaft (L3)	1.00'-48.71'	37.3%	**PASS**

Foundation and Anchors

The existing foundation consists of a 7.0-ft ∅ x 27.0-ft long reinforced concrete caisson. The sub-grade conditions used in the analysis of the existing foundation were obtained from the aforementioned EEI design report; project no. 15165 dated December 5, 2007. The base of the tower is connected to the foundation by means of (16) 2.25"∅, ASTM A615-75 anchor bolts embedded approximately 7-ft into the concrete foundation structure.

- The tower base reactions developed from the governing Load Case 1 were used in the verification of the foundation and its anchors:

Location	Vector	Proposed Reactions
Base	Shear	12 kips
	Compression	16 kips
	Moment	965 kip-ft

- The foundation was found to be within allowable limits.

Foundation	Design Limit	Proposed Loading	Result
Reinforced Concrete Caisson	Moment Capacity	26.0%	**PASS**
	Lateral Deflection	0.61in.	**PASS**

Note 1: Lateral deflection typically limited to 1.0 in. for monopole tower structures.

- The anchor bolts and base plate were found to be within allowable limits.

Tower Component	Design Limit	Stress Ratio (percentage of capacity)	Result
Anchor Bolts	Combined Compression and Bending	25.7%	**PASS**
Base Plate	Bending	21.7%	**PASS**

Conclusion

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

- **All coax cables routed as specified in Section 3 of this report.**

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

Please feel free to call with any questions or comments.

Respectfully Submitted by:

Timothy J. Lynn, PE
Structural Engineer

STATE OF CONNECTICUT
TIMOTHY J. LYNN
No. 29336
LICENSED
PROFESSIONAL ENGINEER

Standard Conditions for Furnishing of Professional Engineering Services on Existing Structures

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

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

GENERAL DESCRIPTION OF STRUCTURAL ANALYSIS PROGRAM

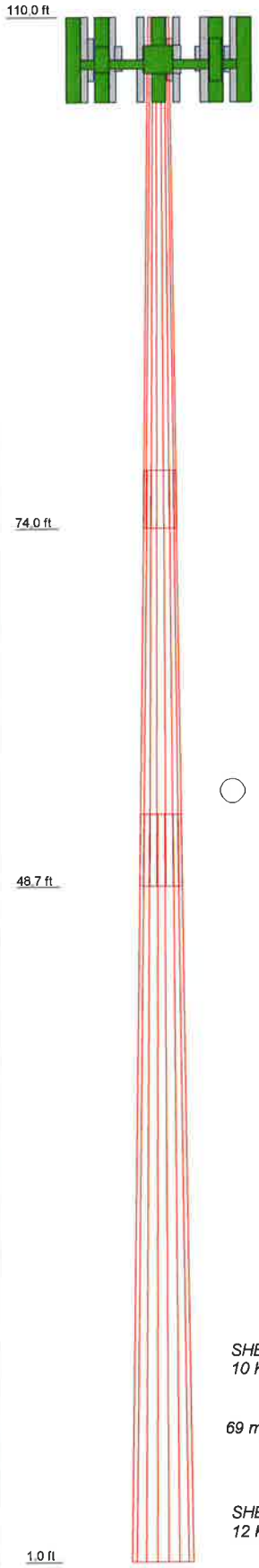
tnxTower, is an integrated structural analysis and design software package for Designed specifically for the telecommunications industry, tnxTower, formerly ERITower and RISATower, automates much of the tower analysis and design required by the TIA/EIA 222 Standard.

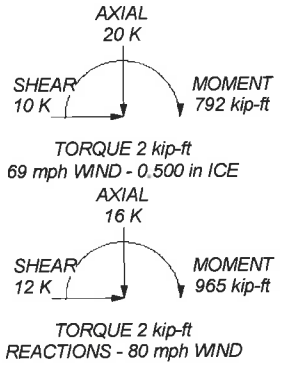
tnxTower Features:

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

Section	1	2	3
Length (ft)	36.040	29.330	52.796
Number of Sides	18	18	18
Thickness (in)	0.188	0.313	0.313
Socket Length (ft)	4.083	5.083	
Top Dia (in)	17.000	26.964	34.074
Bot Dia (in)	28.660	36.320	51.000
Grade	A572-65		
Weight (K)	1.7	3.1	7.5

Total Weight (K): 12.3





DESIGNED APPURTENANCE LOADING

TYPE	ELEVATION	TYPE	ELEVATION
LNX-6514DS-VTM (Verizon - Proposed)	107	SBNHH-1D65B (Verizon - Proposed)	107
SBNHH-1D65B (Verizon - Proposed)	107	LNX-6514DS-VTM (Verizon - Proposed)	107
LNX-6514DS-VTM (Verizon - Existing)	107	RRH2x60-07-U (Verizon - Proposed)	107
SBNHH-1D65B (Verizon - Proposed)	107	RRH2x60-07-U (Verizon - Proposed)	107
LNX-6514DS-VTM (Verizon - Proposed)	107	RRH2x60-07-U (Verizon - Proposed)	107
X7C-FRO-660 (Verizon - Proposed)	107	RRH2x60-AWS (Verizon - Proposed)	107
SBNHH-1D65B (Verizon - Proposed)	107	RRH2x60-AWS (Verizon - Proposed)	107
X7C-FRO-660 (Verizon - Existing)	107	RRH2x60-AWS (Verizon - Proposed)	107
SBNHH-1D65B (Verizon - Proposed)	107	RRH2x60-PCS (Verizon - Proposed)	107
LNX-6514DS-VTM (Verizon - Proposed)	107	RRH2x60-PCS (Verizon - Proposed)	107
LNX-6514DS-VTM (Verizon - Proposed)	107	RRH2x60-PCS (Verizon - Proposed)	107
SBNHH-1D65B (Verizon - Proposed)	107	DB-T1-6Z-8AB-0Z (Verizon - Existing)	107
LNX-6514DS-VTM (Verizon - Existing)	107	DB-T1-6Z-8AB-0Z (Verizon - Proposed)	107
		Valmont T-Arm (3) (Verizon - Existing)	107

MATERIAL STRENGTH

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

TOWER DESIGN NOTES

1. Tower designed for a 80 mph basic wind in accordance with the TIA/EIA-222-F Standard.
2. Tower is also designed for a 69 mph basic wind with 0.50 in ice.
3. Deflections are based upon a 50 mph wind.
4. Weld together tower sections have flange connections.
5. Connections use galvanized A325 bolts, nuts and locking devices. Installation per TIA/EIA-222 and AISC Specifications.
6. Tower members are "hot dipped" galvanized in accordance with ASTM A123 and ASTM A153 Standards.
7. Welds are fabricated with ER-70S-6 electrodes.
8. TOWER RATING: 43.4%

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

Job: 15001.070 - Bloomfield Blue Hills			
Project: 110 EEI Monopole - 811 Blue Hills Ave Bloomfield,			
Client: Verizon Wireless	Drawn by: TJL	App'd:	
Code: TIA/EIA-222-F	Date: 06/18/15	Scale: NTS	
Path:		Dwg No. E-1	

Tower Input Data

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

Basic wind speed of 80 mph.
Nominal ice thickness of 0.500 in.
Ice density of 56 pcf.
A wind speed of 69 mph is used in combination with ice.
Temperature drop of 50 °F.
Deflections calculated using a wind speed of 50 mph.
Weld together tower sections have flange connections..
Connections use galvanized A325 bolts, nuts and locking devices. Installation per TIA/EIA-222 and AISC Specifications..
Tower members are "hot dipped" galvanized in accordance with ASTM A123 and ASTM A153 Standards..
Welds are fabricated with ER-70S-6 electrodes..
A non-linear (P-delta) analysis was used.
Pressures are calculated at each section.
Stress ratio used in pole design is 1.333.
Local bending stresses due to climbing loads, feedline supports, and appurtenance mounts are not considered.

Options

Consider Moments - Legs
Consider Moments - Horizontals
Consider Moments - Diagonals
Use Moment Magnification
√ Use Code Stress Ratios
√ Use Code Safety Factors - Guys
Escalate Ice
Always Use Max Kz
Use Special Wind Profile
Include Bolts In Member Capacity
Leg Bolts Are At Top Of Section
Secondary Horizontal Braces Leg
Use Diamond Inner Bracing (4 Sided)
Add IBC .6D+W Combination

Distribute Leg Loads As Uniform
Assume Legs Pinned
√ Assume Rigid Index Plate
Use Clear Spans For Wind Area
Use Clear Spans For KL/r
Retension Guys To Initial Tension
√ Bypass Mast Stability Checks
Use Azimuth Dish Coefficients
√ Project Wind Area of Appurt.
Autocalc Torque Arm Areas
SR Members Have Cut Ends
√ Sort Capacity Reports By Component
Triangulate Diamond Inner Bracing

Treat Feedline Bundles As Cylinder
Use ASCE 10 X-Brace Ly Rules
Calculate Redundant Bracing Forces
Ignore Redundant Members in FEA
SR Leg Bolts Resist Compression
All Leg Panels Have Same Allowable
Offset Girt At Foundation
Consider Feedline Torque
Include Angle Block Shear Check

Poles

√ Include Shear-Torsion Interaction
Always Use Sub-Critical Flow
Use Top Mounted Sockets

Tapered Pole Section Geometry

Section	Elevation ft	Section Length ft	Splice Length ft	Number of Sides	Top Diameter in	Bottom Diameter in	Wall Thickness in	Bend Radius in	Pole Grade
L1	110.000-73.960	36.040	4.083	18	17.000	28.660	0.188	0.750	A572-65 (65 ksi)
L2	73.960-48.713	29.330	5.083	18	26.964	36.320	0.313	1.250	A572-65 (65 ksi)
L3	48.713-1.000	52.796		18	34.074	51.000	0.313	1.250	A572-65 (65 ksi)

Tapered Pole Properties

Section	Tip Dia. in	Area in^2	I in^4	r in	C in	I/C in^3	J in^4	It/Q in^2	w in	w/t
L1	17.262	10.006	357.308	5.968	8.636	41.374	715.086	5.004	2.662	14.197
	29.102	16.945	1735.491	10.108	14.559	119.202	3473.266	8.474	4.714	25.142
L2	28.703	26.435	2372.252	9.461	13.698	173.186	4747.625	13.220	4.196	13.426
	36.880	35.715	5850.235	12.783	18.451	317.076	11708.168	17.861	5.842	18.695
L3	36.254	33.487	4822.178	11.985	17.309	278.588	9650.700	16.747	5.447	17.43
	51.787	50.276	16319.130	17.994	25.908	629.888	32659.734	25.143	8.426	26.963

Tower Elevation ft	Gusset Area (per face) ft^2	Gusset Thickness in	Gusset Grade	Adjust. Factor A_f	Adjust. Factor A_r	Weight Mult.	Double Angle Stitch Bolt Spacing Diagonals in	Double Angle Stitch Bolt Spacing Horizontals in
L1 110.000-73.960				1	1	1		
L2 73.960-48.713				1	1	1		
L3 48.713-1.000				1	1	1		

Feed Line/Linear Appurtenances - Entered As Area

Description	Face or Leg	Allow Shield	Component Type	Placement ft	Total Number		C_AA_A ft^2/ft	Weight klf
1 5/8 (Verizon - Existing)	C	No	Inside Pole	107.000 - 4.000	14	No Ice	0.000	0.001
						1/2" Ice	0.000	0.001
HYBRIFLEX 1-1/4" (Verizon - Existing)	C	No	Inside Pole	107.000 - 4.000	1	No Ice	0.000	0.001
						1/2" Ice	0.000	0.001
HYBRIFLEX 1-1/4" (Verizon - Proposed)	C	No	Inside Pole	107.000 - 4.000	1	No Ice	0.000	0.001
						1/2" Ice	0.000	0.001

Feed Line/Linear Appurtenances Section Areas

Tower Section	Tower Elevation ft	Face	A_R ft^2	A_F ft^2	C_AA_A In Face ft^2	C_AA_A Out Face ft^2	Weight K
L1	110.000-73.960	A	0.000	0.000	0.000	0.000	0.000
		B	0.000	0.000	0.000	0.000	0.000
		C	0.000	0.000	0.000	0.000	0.567
L2	73.960-48.713	A	0.000	0.000	0.000	0.000	0.000
		B	0.000	0.000	0.000	0.000	0.000
		C	0.000	0.000	0.000	0.000	0.433
L3	48.713-1.000	A	0.000	0.000	0.000	0.000	0.000
		B	0.000	0.000	0.000	0.000	0.000
		C	0.000	0.000	0.000	0.000	0.767

Feed Line/Linear Appurtenances Section Areas - With Ice

Tower Section	Tower Elevation ft	Face or Leg	Ice Thickness in	A_R ft^2	A_F ft^2	C_AA_A In Face ft^2	C_AA_A Out Face ft^2	Weight K
L1	110.000-73.960	A	0.500	0.000	0.000	0.000	0.000	0.000
		B		0.000	0.000	0.000	0.000	0.000
		C		0.000	0.000	0.000	0.000	0.567
L2	73.960-48.713	A	0.500	0.000	0.000	0.000	0.000	0.000
		B		0.000	0.000	0.000	0.000	0.000
		C		0.000	0.000	0.000	0.000	0.433
L3	48.713-1.000	A	0.500	0.000	0.000	0.000	0.000	0.000
		B		0.000	0.000	0.000	0.000	0.000
		C		0.000	0.000	0.000	0.000	0.767

Discrete Tower Loads

Description	Face or Leg	Offset Type	Offsets: Horz Lateral Vert ft ft ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
LNX-6514DS-VTM	A	From Face	3.000	0.000	107.000	No Ice	8.411	5.405	0.039
(Verizon - Proposed)			-6.000			1/2" Ice	8.964	5.863	0.090
			0.000						
SBNHH-1D65B	A	From Face	3.000	0.000	107.000	No Ice	8.330	5.342	0.042
(Verizon - Proposed)			-4.000			1/2" Ice	8.878	5.795	0.092
			0.000						
LNX-6514DS-VTM	A	From Face	3.000	0.000	107.000	No Ice	8.411	5.405	0.039
(Verizon - Existing)			0.000			1/2" Ice	8.964	5.863	0.090
			0.000						
SBNHH-1D65B	A	From Face	3.000	0.000	107.000	No Ice	8.330	5.342	0.042
(Verizon - Proposed)			4.000			1/2" Ice	8.878	5.795	0.092
			0.000						
LNX-6514DS-VTM	A	From Face	3.000	0.000	107.000	No Ice	8.411	5.405	0.039
(Verizon - Proposed)			6.000			1/2" Ice	8.964	5.863	0.090
			0.000						
X7C-FRO-660	B	From Face	3.000	0.000	107.000	No Ice	10.220	5.867	0.040
(Verizon - Proposed)			0.000			1/2" Ice	10.786	6.325	0.100
			0.000						
SBNHH-1D65B	B	From Face	3.000	0.000	107.000	No Ice	8.330	5.342	0.042
(Verizon - Proposed)			-4.000			1/2" Ice	8.878	5.795	0.092
			0.000						
X7C-FRO-660	B	From Face	3.000	0.000	107.000	No Ice	10.220	5.867	0.040
(Verizon - Existing)			0.000			1/2" Ice	10.786	6.325	0.100
			0.000						
SBNHH-1D65B	B	From Face	3.000	0.000	107.000	No Ice	8.330	5.342	0.042
(Verizon - Proposed)			4.000			1/2" Ice	8.878	5.795	0.092
			0.000						
LNX-6514DS-VTM	B	From Face	3.000	0.000	107.000	No Ice	8.411	5.405	0.039
(Verizon - Proposed)			6.000			1/2" Ice	8.964	5.863	0.090
			0.000						
LNX-6514DS-VTM	C	From Face	3.000	0.000	107.000	No Ice	8.411	5.405	0.039
(Verizon - Proposed)			-6.000			1/2" Ice	8.964	5.863	0.090
			0.000						

Description	Face or Leg	Offset Type	Offsets: Horz Lateral Vert ft ft ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
SBNHH-1D65B	C	From Face	3.000	0.000	107.000	No Ice	8.330	5.342	0.042
(Verizon - Proposed)			-4.000			1/2" Ice	8.878	5.795	0.092
			0.000						
LNX-6514DS-VTM	C	From Face	3.000	0.000	107.000	No Ice	8.411	5.405	0.039
(Verizon - Existing)			0.000			1/2" Ice	8.964	5.863	0.090
			0.000						
SBNHH-1D65B	C	From Face	3.000	0.000	107.000	No Ice	8.330	5.342	0.042
(Verizon - Proposed)			4.000			1/2" Ice	8.878	5.795	0.092
			0.000						
LNX-6514DS-VTM	C	From Face	3.000	0.000	107.000	No Ice	8.411	5.405	0.039
(Verizon - Proposed)			6.000			1/2" Ice	8.964	5.863	0.090
			0.000						
RRH2x60-07-U	A	From Face	2.500	0.000	107.000	No Ice	2.450	1.633	0.050
(Verizon - Proposed)			0.000			1/2" Ice	2.668	1.826	0.068
			0.000						
RRH2x60-07-U	B	From Face	2.500	0.000	107.000	No Ice	2.450	1.633	0.050
(Verizon - Proposed)			0.000			1/2" Ice	2.668	1.826	0.068
			0.000						
RRH2x60-07-U	C	From Face	2.500	0.000	107.000	No Ice	2.450	1.633	0.050
(Verizon - Proposed)			0.000			1/2" Ice	2.668	1.826	0.068
			0.000						
RRH2x60-AWS	A	From Face	2.500	0.000	107.000	No Ice	3.782	2.069	0.055
(Verizon - Proposed)			-4.000			1/2" Ice	4.093	2.349	0.078
			0.000						
RRH2x60-AWS	B	From Face	2.500	0.000	107.000	No Ice	3.782	2.069	0.055
(Verizon - Proposed)			-4.000			1/2" Ice	4.093	2.349	0.078
			0.000						
RRH2x60-AWS	C	From Face	2.500	0.000	107.000	No Ice	3.782	2.069	0.055
(Verizon - Proposed)			-4.000			1/2" Ice	4.093	2.349	0.078
			0.000						
RRH2x60-PCS	A	From Face	2.500	0.000	107.000	No Ice	2.508	1.547	0.055
(Verizon - Proposed)			4.000			1/2" Ice	2.730	1.738	0.073
			0.000						
RRH2x60-PCS	B	From Face	2.500	0.000	107.000	No Ice	2.508	1.547	0.055
(Verizon - Proposed)			4.000			1/2" Ice	2.730	1.738	0.073
			0.000						
RRH2x60-PCS	C	From Face	2.500	0.000	107.000	No Ice	2.508	1.547	0.055
(Verizon - Proposed)			4.000			1/2" Ice	2.730	1.738	0.073
			0.000						
DB-T1-6Z-8AB-0Z	C	From Face	0.500	0.000	107.000	No Ice	5.600	2.333	0.044
(Verizon - Existing)			0.000			1/2" Ice	5.915	2.558	0.080
			0.000						
DB-T1-6Z-8AB-0Z	B	From Face	0.500	0.000	107.000	No Ice	5.600	2.333	0.044
(Verizon - Proposed)			0.000			1/2" Ice	5.915	2.558	0.080
			0.000						
Valmont T-Arm (3)	C	None		0.000	107.000	No Ice	21.000	21.000	1.008
(Verizon - Existing)						1/2" Ice	29.000	29.000	1.236

Tower Pressures - No Ice

$G_H = 1.690$

Section Elevation ft	z ft	K_Z	q_z ksf	A_G ft^2	Face	A_F ft^2	A_R ft^2	A_{leg} ft^2	Leg %	C_AA_A In Face ft^2	C_AA_A Out Face ft^2
L1	90.694	1.335	0.022	68.566	A	0.000	68.566	68.566	100.00	0.000	0.000
110.000-73.960					B	0.000	68.566		100.00	0.000	0.000
					C	0.000	68.566		100.00	0.000	0.000
L2	60.812	1.191	0.020	67.942	A	0.000	67.942	67.942	100.00	0.000	0.000
73.960-48.713					B	0.000	67.942		100.00	0.000	0.000
					C	0.000	67.942		100.00	0.000	0.000
L3	23.619	1	0.017	172.370	A	0.000	172.370	172.370	100.00	0.000	0.000
48.713-1.000					B	0.000	172.370		100.00	0.000	0.000
					C	0.000	172.370		100.00	0.000	0.000

Tower Pressure - With Ice

$G_H = 1.690$

Section Elevation ft	z ft	K_Z	q_z ksf	t_Z in	A_G ft^2	Face	A_F ft^2	A_R ft^2	A_{leg} ft^2	Leg %	C_AA_A In Face ft^2	C_AA_A Out Face ft^2
L1	90.694	1.335	0.016	0.500	71.569	A	0.000	71.569	71.569	100.00	0.000	0.000
110.000-73.960						B	0.000	71.569		100.00	0.000	0.000
						C	0.000	71.569		100.00	0.000	0.000
L2	60.812	1.191	0.015	0.500	70.046	A	0.000	70.046	70.046	100.00	0.000	0.000
73.960-48.713						B	0.000	70.046		100.00	0.000	0.000
						C	0.000	70.046		100.00	0.000	0.000
L3 48.713-1.000	23.619	1	0.012	0.500	176.346	A	0.000	176.346	176.346	100.00	0.000	0.000
						B	0.000	176.346		100.00	0.000	0.000
						C	0.000	176.346		100.00	0.000	0.000

Tower Pressure - Service

$G_H = 1.690$

Section Elevation ft	z ft	K_Z	q_z ksf	A_G ft^2	Face	A_F ft^2	A_R ft^2	A_{leg} ft^2	Leg %	C_AA_A In Face ft^2	C_AA_A Out Face ft^2
L1	90.694	1.335	0.009	68.566	A	0.000	68.566	68.566	100.00	0.000	0.000
110.000-73.960					B	0.000	68.566		100.00	0.000	0.000
					C	0.000	68.566		100.00	0.000	0.000
L2	60.812	1.191	0.008	67.942	A	0.000	67.942	67.942	100.00	0.000	0.000
73.960-48.713					B	0.000	67.942		100.00	0.000	0.000
					C	0.000	67.942		100.00	0.000	0.000
L3	23.619	1	0.006	172.370	A	0.000	172.370	172.370	100.00	0.000	0.000
48.713-1.000					B	0.000	172.370		100.00	0.000	0.000
					C	0.000	172.370		100.00	0.000	0.000

Tower Forces - No Ice - Wind Normal To Face

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	R_R	D_F	D_R	A_E ft^2	F K	w klf	Ctrl. Face
L1	0.567	1.653	A	1	0.65	1	1	1	68.566	1.644	0.046	C
110.000-73.960			B	1	0.65	1	1	1	68.566			
			C	1	0.65	1	1	1	68.566			
L2	0.433	3.101	A	1	0.65	1	1	1	67.942	1.456	0.058	C
73.960-48.713			B	1	0.65	1	1	1	67.942			
			C	1	0.65	1	1	1	67.942			
L3	0.767	7.524	A	1	0.65	1	1	1	172.370	3.142	0.066	C
48.713-1.000			B	1	0.65	1	1	1	172.370			
			C	1	0.65	1	1	1	172.370			
Sum Weight:	1.767	12.278						OTM	305.670 kip-ft	6.243		

Tower Forces - No Ice - Wind 45 To Face

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	R_R	D_F	D_R	A_E ft^2	F K	w klf	Ctrl. Face
L1	0.567	1.653	A	1	0.65	1	1	1	68.566	1.644	0.046	C
110.000-73.960			B	1	0.65	1	1	1	68.566			
			C	1	0.65	1	1	1	68.566			
L2	0.433	3.101	A	1	0.65	1	1	1	67.942	1.456	0.058	C
73.960-48.713			B	1	0.65	1	1	1	67.942			
			C	1	0.65	1	1	1	67.942			
L3	0.767	7.524	A	1	0.65	1	1	1	172.370	3.142	0.066	C
48.713-1.000			B	1	0.65	1	1	1	172.370			
			C	1	0.65	1	1	1	172.370			
Sum Weight:	1.767	12.278						OTM	305.670 kip-ft	6.243		

Tower Forces - No Ice - Wind 60 To Face

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	R_R	D_F	D_R	A_E ft^2	F K	w klf	Ctrl. Face
L1	0.567	1.653	A	1	0.65	1	1	1	68.566	1.644	0.046	C
110.000-73.960			B	1	0.65	1	1	1	68.566			
			C	1	0.65	1	1	1	68.566			
L2	0.433	3.101	A	1	0.65	1	1	1	67.942	1.456	0.058	C
73.960-48.713			B	1	0.65	1	1	1	67.942			
			C	1	0.65	1	1	1	67.942			
L3	0.767	7.524	A	1	0.65	1	1	1	172.370	3.142	0.066	C
48.713-1.000			B	1	0.65	1	1	1	172.370			
			C	1	0.65	1	1	1	172.370			
Sum Weight:	1.767	12.278						OTM	305.670 kip-ft	6.243		

Tower Forces - No Ice - Wind 90 To Face

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	R_R	D_F	D_R	A_E ft²	F K	w klf	Ctrl. Face
L1	0.567	1.653	A	1	0.65	1	1	1	68.566	1.644	0.046	C
110.000-73.960			B	1	0.65	1	1	1	68.566			
			C	1	0.65	1	1	1	68.566			
L2	0.433	3.101	A	1	0.65	1	1	1	67.942	1.456	0.058	C
73.960-48.713			B	1	0.65	1	1	1	67.942			
			C	1	0.65	1	1	1	67.942			
L3	0.767	7.524	A	1	0.65	1	1	1	172.370	3.142	0.066	C
48.713-1.000			B	1	0.65	1	1	1	172.370			
			C	1	0.65	1	1	1	172.370			
Sum Weight:	1.767	12.278						OTM	305.670 kip-ft	6.243		

Tower Forces - With Ice - Wind Normal To Face

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	R_R	D_F	D_R	A_E ft²	F K	w klf	Ctrl. Face
L1	0.567	2.171	A	1	0.65	1	1	1	71.569	1.287	0.036	C
110.000-73.960			B	1	0.65	1	1	1	71.569			
			C	1	0.65	1	1	1	71.569			
L2	0.433	3.612	A	1	0.65	1	1	1	70.046	1.126	0.045	C
73.960-48.713			B	1	0.65	1	1	1	70.046			
			C	1	0.65	1	1	1	70.046			
L3	0.767	8.815	A	1	0.65	1	1	1	176.346	2.411	0.051	C
48.713-1.000			B	1	0.65	1	1	1	176.346			
			C	1	0.65	1	1	1	176.346			
Sum Weight:	1.767	14.599						OTM	237.350 kip-ft	4.824		

Tower Forces - With Ice - Wind 45 To Face

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	R_R	D_F	D_R	A_E ft²	F K	w klf	Ctrl. Face
L1	0.567	2.171	A	1	0.65	1	1	1	71.569	1.287	0.036	C
110.000-73.960			B	1	0.65	1	1	1	71.569			
			C	1	0.65	1	1	1	71.569			
L2	0.433	3.612	A	1	0.65	1	1	1	70.046	1.126	0.045	C
73.960-48.713			B	1	0.65	1	1	1	70.046			
			C	1	0.65	1	1	1	70.046			
L3	0.767	8.815	A	1	0.65	1	1	1	176.346	2.411	0.051	C
48.713-1.000			B	1	0.65	1	1	1	176.346			
			C	1	0.65	1	1	1	176.346			
Sum Weight:	1.767	14.599						OTM	237.350 kip-ft	4.824		

Tower Forces - With Ice - Wind 60 To Face

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	R_R	D_F	D_R	A_E ft²	F K	w klf	Ctrl. Face
L1	0.567	2.171	A	1	0.65	1	1	1	71.569	1.287	0.036	C
110.000-73.960			B	1	0.65	1	1	1	71.569			
			C	1	0.65	1	1	1	71.569			
L2	0.433	3.612	A	1	0.65	1	1	1	70.046	1.126	0.045	C
73.960-48.713			B	1	0.65	1	1	1	70.046			
			C	1	0.65	1	1	1	70.046			
L3	0.767	8.815	A	1	0.65	1	1	1	176.346	2.411	0.051	C
48.713-1.000			B	1	0.65	1	1	1	176.346			
			C	1	0.65	1	1	1	176.346			
Sum Weight:	1.767	14.599						OTM	237.350 kip-ft	4.824		

Tower Forces - With Ice - Wind 90 To Face

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	R_R	D_F	D_R	A_E ft²	F K	w klf	Ctrl. Face
L1	0.567	2.171	A	1	0.65	1	1	1	71.569	1.287	0.036	C
110.000-73.960			B	1	0.65	1	1	1	71.569			
			C	1	0.65	1	1	1	71.569			
L2	0.433	3.612	A	1	0.65	1	1	1	70.046	1.126	0.045	C
73.960-48.713			B	1	0.65	1	1	1	70.046			
			C	1	0.65	1	1	1	70.046			
L3	0.767	8.815	A	1	0.65	1	1	1	176.346	2.411	0.051	C
48.713-1.000			B	1	0.65	1	1	1	176.346			
			C	1	0.65	1	1	1	176.346			
Sum Weight:	1.767	14.599						OTM	237.350 kip-ft	4.824		

Tower Forces - Service - Wind Normal To Face

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	R_R	D_F	D_R	A_E ft²	F K	w klf	Ctrl. Face
L1	0.567	1.653	A	1	0.65	1	1	1	68.566	0.642	0.018	C
110.000-73.960			B	1	0.65	1	1	1	68.566			
			C	1	0.65	1	1	1	68.566			
L2	0.433	3.101	A	1	0.65	1	1	1	67.942	0.569	0.023	C
73.960-48.713			B	1	0.65	1	1	1	67.942			
			C	1	0.65	1	1	1	67.942			
L3	0.767	7.524	A	1	0.65	1	1	1	172.370	1.228	0.026	C
48.713-1.000			B	1	0.65	1	1	1	172.370			
			C	1	0.65	1	1	1	172.370			
Sum Weight:	1.767	12.278						OTM	119.402	2.439		

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	R_R	D_F	D_R	A_E ft²	F K	w klf	Ctrl. Face
									kip-ft			

Tower Forces - Service - Wind 45 To Face

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	R_R	D_F	D_R	A_E ft²	F K	w klf	Ctrl. Face
L1	0.567	1.653	A	1	0.65	1	1	1	68.566	0.642	0.018	C
110.000-73.960			B	1	0.65	1	1	1	68.566			
			C	1	0.65	1	1	1	68.566			
L2	0.433	3.101	A	1	0.65	1	1	1	67.942	0.569	0.023	C
73.960-48.713			B	1	0.65	1	1	1	67.942			
			C	1	0.65	1	1	1	67.942			
L3	0.767	7.524	A	1	0.65	1	1	1	172.370	1.228	0.026	C
48.713-1.000			B	1	0.65	1	1	1	172.370			
			C	1	0.65	1	1	1	172.370			
Sum Weight:	1.767	12.278						OTM	119.402 kip-ft	2.439		

Tower Forces - Service - Wind 60 To Face

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	R_R	D_F	D_R	A_E ft²	F K	w klf	Ctrl. Face
L1	0.567	1.653	A	1	0.65	1	1	1	68.566	0.642	0.018	C
110.000-73.960			B	1	0.65	1	1	1	68.566			
			C	1	0.65	1	1	1	68.566			
L2	0.433	3.101	A	1	0.65	1	1	1	67.942	0.569	0.023	C
73.960-48.713			B	1	0.65	1	1	1	67.942			
			C	1	0.65	1	1	1	67.942			
L3	0.767	7.524	A	1	0.65	1	1	1	172.370	1.228	0.026	C
48.713-1.000			B	1	0.65	1	1	1	172.370			
			C	1	0.65	1	1	1	172.370			
Sum Weight:	1.767	12.278						OTM	119.402 kip-ft	2.439		

Tower Forces - Service - Wind 90 To Face

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	R_R	D_F	D_R	A_E ft²	F K	w klf	Ctrl. Face
L1	0.567	1.653	A	1	0.65	1	1	1	68.566	0.642	0.018	C
110.000-73.960			B	1	0.65	1	1	1	68.566			
			C	1	0.65	1	1	1	68.566			

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	R_R	D_F	D_R	A_E ft^2	F K	w klf	Ctrl. Face
L2	0.433	3.101	A	1	0.65	1	1	1	67.942	0.569	0.023	C
73.960-48.713			B	1	0.65	1	1	1	67.942			
			C	1	0.65	1	1	1	67.942			
L3	0.767	7.524	A	1	0.65	1	1	1	172.370	1.228	0.026	C
48.713-1.000			B	1	0.65	1	1	1	172.370			
			C	1	0.65	1	1	1	172.370			
Sum Weight:	1.767	12.278						OTM	119.402 kip-ft	2.439		

Force Totals

Load Case	Vertical Forces K	Sum of Forces X K	Sum of Forces Z K	Sum of Overturning Moments, M_x kip-ft	Sum of Overturning Moments, M_z kip-ft	Sum of Torques kip-ft
Leg Weight	12.278					
Bracing Weight	0.000					
Total Member Self-Weight	12.278			0.226	-0.171	
Total Weight	16.227			0.226	-0.171	
Wind 0 deg - No Ice		0.100	-12.269	-944.240	-10.775	1.192
Wind 30 deg - No Ice		6.216	-10.676	-823.007	-481.001	1.873
Wind 45 deg - No Ice		8.739	-8.747	-675.110	-674.678	2.033
Wind 60 deg - No Ice		10.666	-6.221	-481.190	-822.389	2.053
Wind 90 deg - No Ice		12.258	-0.100	-10.378	-943.464	1.683
Wind 120 deg - No Ice		10.566	6.048	463.276	-811.785	0.862
Wind 135 deg - No Ice		8.597	8.605	660.567	-659.682	0.347
Wind 150 deg - No Ice		6.043	10.576	812.856	-462.634	-0.190
Wind 180 deg - No Ice		-0.100	12.269	944.693	10.433	-1.192
Wind 210 deg - No Ice		-6.216	10.676	823.460	480.659	-1.873
Wind 225 deg - No Ice		-8.739	8.747	675.563	674.336	-2.033
Wind 240 deg - No Ice		-10.666	6.221	481.643	822.047	-2.053
Wind 270 deg - No Ice		-12.258	0.100	10.831	943.122	-1.683
Wind 300 deg - No Ice		-10.566	-6.048	-462.823	811.443	-0.862
Wind 315 deg - No Ice		-8.597	-8.605	-660.114	659.340	-0.347
Wind 330 deg - No Ice		-6.043	-10.576	-812.403	462.292	0.190
Member Ice	2.321					
Total Weight Ice	19.798			0.477	-0.421	
Wind 0 deg - Ice		0.076	-9.874	-772.160	-8.527	0.949
Wind 30 deg - Ice		4.999	-8.590	-672.699	-393.269	1.497
Wind 45 deg - Ice		7.030	-7.036	-551.592	-551.795	1.626
Wind 60 deg - Ice		8.582	-5.003	-392.862	-672.747	1.643
Wind 90 deg - Ice		9.865	-0.076	-7.629	-772.076	1.350
Wind 120 deg - Ice		8.505	4.871	379.775	-664.640	0.694
Wind 135 deg - Ice		6.922	6.928	541.082	-540.331	0.283
Wind 150 deg - Ice		4.866	8.513	665.547	-379.228	-0.147
Wind 180 deg - Ice		-0.076	9.874	773.114	7.686	-0.949
Wind 210 deg - Ice		-4.999	8.590	673.654	392.427	-1.497
Wind 225 deg - Ice		-7.030	7.036	552.546	550.954	-1.626
Wind 240 deg - Ice		-8.582	5.003	393.816	671.905	-1.643
Wind 270 deg - Ice		-9.865	0.076	8.584	771.234	-1.350
Wind 300 deg - Ice		-8.505	-4.871	-378.821	663.799	-0.694
Wind 315 deg - Ice		-6.922	-6.928	-540.128	539.489	-0.283
Wind 330 deg - Ice		-4.866	-8.513	-664.593	378.386	0.147
Total Weight	16.227			0.226	-0.171	
Wind 0 deg - Service		0.039	-4.793	-368.706	-4.313	0.465
Wind 30 deg - Service		2.428	-4.170	-321.349	-187.995	0.732

Load Case	Vertical Forces K	Sum of Forces X K	Sum of Forces Z K	Sum of Overturning Moments, M_x kip-ft	Sum of Overturning Moments, M_z kip-ft	Sum of Torques kip-ft
Wind 45 deg - Service		3.414	-3.417	-263.577	-263.650	0.794
Wind 60 deg - Service		4.166	-2.430	-187.827	-321.350	0.802
Wind 90 deg - Service		4.788	-0.039	-3.916	-368.645	0.657
Wind 120 deg - Service		4.127	2.363	181.105	-317.208	0.337
Wind 135 deg - Service		3.358	3.361	258.172	-257.792	0.136
Wind 150 deg - Service		2.360	4.131	317.660	-180.821	-0.074
Wind 180 deg - Service		-0.039	4.793	369.158	3.971	-0.465
Wind 210 deg - Service		-2.428	4.170	321.802	187.653	-0.732
Wind 225 deg - Service		-3.414	3.417	264.030	263.308	-0.794
Wind 240 deg - Service		-4.166	2.430	188.280	321.008	-0.802
Wind 270 deg - Service		-4.788	0.039	4.369	368.303	-0.657
Wind 300 deg - Service		-4.127	-2.363	-180.652	316.866	-0.337
Wind 315 deg - Service		-3.358	-3.361	-257.719	257.450	-0.136
Wind 330 deg - Service		-2.360	-4.131	-317.207	180.479	0.074

Load Combinations

Comb. No.	Description
1	Dead Only
2	Dead+Wind 0 deg - No Ice
3	Dead+Wind 30 deg - No Ice
4	Dead+Wind 45 deg - No Ice
5	Dead+Wind 60 deg - No Ice
6	Dead+Wind 90 deg - No Ice
7	Dead+Wind 120 deg - No Ice
8	Dead+Wind 135 deg - No Ice
9	Dead+Wind 150 deg - No Ice
10	Dead+Wind 180 deg - No Ice
11	Dead+Wind 210 deg - No Ice
12	Dead+Wind 225 deg - No Ice
13	Dead+Wind 240 deg - No Ice
14	Dead+Wind 270 deg - No Ice
15	Dead+Wind 300 deg - No Ice
16	Dead+Wind 315 deg - No Ice
17	Dead+Wind 330 deg - No Ice
18	Dead+Ice+Temp
19	Dead+Wind 0 deg+Ice+Temp
20	Dead+Wind 30 deg+Ice+Temp
21	Dead+Wind 45 deg+Ice+Temp
22	Dead+Wind 60 deg+Ice+Temp
23	Dead+Wind 90 deg+Ice+Temp
24	Dead+Wind 120 deg+Ice+Temp
25	Dead+Wind 135 deg+Ice+Temp
26	Dead+Wind 150 deg+Ice+Temp
27	Dead+Wind 180 deg+Ice+Temp
28	Dead+Wind 210 deg+Ice+Temp
29	Dead+Wind 225 deg+Ice+Temp
30	Dead+Wind 240 deg+Ice+Temp
31	Dead+Wind 270 deg+Ice+Temp
32	Dead+Wind 300 deg+Ice+Temp
33	Dead+Wind 315 deg+Ice+Temp
34	Dead+Wind 330 deg+Ice+Temp
35	Dead+Wind 0 deg - Service
36	Dead+Wind 30 deg - Service
37	Dead+Wind 45 deg - Service

Comb. No.	Description
38	Dead+Wind 60 deg - Service
39	Dead+Wind 90 deg - Service
40	Dead+Wind 120 deg - Service
41	Dead+Wind 135 deg - Service
42	Dead+Wind 150 deg - Service
43	Dead+Wind 180 deg - Service
44	Dead+Wind 210 deg - Service
45	Dead+Wind 225 deg - Service
46	Dead+Wind 240 deg - Service
47	Dead+Wind 270 deg - Service
48	Dead+Wind 300 deg - Service
49	Dead+Wind 315 deg - Service
50	Dead+Wind 330 deg - Service

Maximum Member Forces

Section No.	Elevation ft	Component Type	Condition	Gov. Load Comb.	Force K	Major Axis Moment kip-ft	Minor Axis Moment kip-ft
L1	110 - 73.96	Pole	Max Tension	18	0.000	0.000	0.000
			Max. Compression	18	-5.804	-0.424	-0.481
			Max. Mx	6	-3.904	-198.642	2.728
			Max. My	10	-3.903	2.779	-199.023
			Max. Vy	6	7.546	-198.642	2.728
			Max. Vx	10	7.557	2.779	-199.023
			Max. Torque	13			2.051
L2	73.96 - 48.713	Pole	Max Tension	1	0.000	0.000	0.000
			Max. Compression	18	-9.412	-0.424	-0.481
			Max. Mx	6	-7.090	-397.904	5.177
			Max. My	10	-7.089	5.231	-398.557
			Max. Vy	6	8.919	-397.904	5.177
			Max. Vx	10	8.930	5.231	-398.557
			Max. Torque	13			2.050
L3	48.713 - 1	Pole	Max Tension	1	0.000	0.000	0.000
			Max. Compression	18	-19.798	-0.424	-0.481
			Max. Mx	6	-16.222	-954.061	10.508
			Max. My	10	-16.222	10.564	-955.305
			Max. Vy	6	12.264	-954.061	10.508
			Max. Vx	10	12.275	10.564	-955.305
			Max. Torque	13			2.049

Maximum Reactions

Location	Condition	Gov. Load Comb.	Vertical K	Horizontal, X K	Horizontal, Z K
Pole	Max. Vert	28	19.798	4.999	-8.590
	Max. H_x	14	16.227	12.258	-0.100
	Max. H_z	2	16.227	-0.100	12.269
	Max. M_x	2	954.842	-0.100	12.269
	Max. M_z	6	954.061	-12.258	0.100
	Max. Torsion	13	2.049	10.666	-6.221
	Min. Vert	1	16.227	0.000	0.000
	Min. H_x	6	16.227	-12.258	0.100
	Min. H_z	10	16.227	0.100	-12.269

Location	Condition	Gov. Load Comb.	Vertical K	Horizontal, X K	Horizontal, Z K
	Min. M_x	10	-955.305	0.100	-12.269
	Min. M_z	14	-953.711	12.258	-0.100
	Min. Torsion	5	-2.049	-10.666	6.221

Tower Mast Reaction Summary

Load Combination	Vertical K	$Shear_x$ K	$Shear_z$ K	Overturning Moment, M_x kip-ft	Overturning Moment, M_z kip-ft	Torque kip-ft
Dead Only	16.227	0.000	0.000	0.226	-0.171	0.000
Dead+Wind 0 deg - No Ice	16.227	0.100	-12.269	-954.842	-10.911	1.189
Dead+Wind 30 deg - No Ice	16.227	6.216	-10.676	-832.252	-486.413	1.869
Dead+Wind 45 deg - No Ice	16.227	8.739	-8.747	-682.698	-682.262	2.028
Dead+Wind 60 deg - No Ice	16.227	10.666	-6.221	-486.604	-831.628	2.049
Dead+Wind 90 deg - No Ice	16.227	12.258	-0.100	-10.508	-954.061	1.679
Dead+Wind 120 deg - No Ice	16.227	10.566	6.048	468.471	-820.900	0.860
Dead+Wind 135 deg - No Ice	16.227	8.597	8.605	667.981	-667.085	0.347
Dead+Wind 150 deg - No Ice	16.227	6.043	10.576	821.984	-467.821	-0.190
Dead+Wind 180 deg - No Ice	16.227	-0.100	12.269	955.305	10.564	-1.189
Dead+Wind 210 deg - No Ice	16.227	-6.216	10.676	832.713	486.066	-1.869
Dead+Wind 225 deg - No Ice	16.227	-8.739	8.747	683.158	681.915	-2.028
Dead+Wind 240 deg - No Ice	16.227	-10.666	6.221	487.063	831.281	-2.049
Dead+Wind 270 deg - No Ice	16.227	-12.258	0.100	10.967	953.711	-1.679
Dead+Wind 300 deg - No Ice	16.227	-10.566	-6.048	-468.009	820.549	-0.860
Dead+Wind 315 deg - No Ice	16.227	-8.597	-8.605	-667.519	666.735	-0.347
Dead+Wind 330 deg - No Ice	16.227	-6.043	-10.576	-821.522	467.471	0.190
Dead+Ice+Temp	19.798	0.000	0.000	0.481	-0.424	0.000
Dead+Wind 0 deg+Ice+Temp	19.798	0.076	-9.874	-784.019	-8.679	0.948
Dead+Wind 30 deg+Ice+Temp	19.798	4.999	-8.590	-683.036	-399.329	1.494
Dead+Wind 45 deg+Ice+Temp	19.798	7.030	-7.036	-560.071	-560.288	1.623
Dead+Wind 60 deg+Ice+Temp	19.798	8.582	-5.003	-398.904	-683.096	1.640
Dead+Wind 90 deg+Ice+Temp	19.798	9.865	-0.076	-7.755	-783.946	1.347
Dead+Wind 120 deg+Ice+Temp	19.798	8.505	4.871	385.608	-674.855	0.693
Dead+Wind 135 deg+Ice+Temp	19.798	6.922	6.928	549.397	-548.632	0.283
Dead+Wind 150 deg+Ice+Temp	19.798	4.866	8.513	675.778	-385.050	-0.147
Dead+Wind 180 deg+Ice+Temp	19.798	-0.076	9.874	785.003	7.812	-0.947
Dead+Wind 210 deg+Ice+Temp	19.798	-4.999	8.590	684.019	398.463	-1.494
Dead+Wind 225 deg+Ice+Temp	19.798	-7.030	7.036	561.053	559.422	-1.623
Dead+Wind 240 deg+Ice+Temp	19.798	-8.582	5.003	399.887	682.229	-1.641
Dead+Wind 270 deg+Ice+Temp	19.798	-9.865	0.076	8.737	783.078	-1.347
Dead+Wind 300 deg+Ice+Temp	19.798	-8.505	-4.871	-384.624	673.986	-0.693
Dead+Wind 315 deg+Ice+Temp	19.798	-6.922	-6.928	-548.412	547.763	-0.283
Dead+Wind 330 deg+Ice+Temp	19.798	-4.866	-8.513	-674.793	384.182	0.147
Dead+Wind 0 deg - Service	16.227	0.039	-4.793	-372.909	-4.370	0.465
Dead+Wind 30 deg - Service	16.227	2.428	-4.170	-325.015	-190.146	0.732
Dead+Wind 45 deg - Service	16.227	3.414	-3.417	-266.585	-266.663	0.794
Dead+Wind 60 deg - Service	16.227	4.166	-2.430	-189.972	-325.020	0.802
Dead+Wind 90 deg - Service	16.227	4.788	-0.039	-3.964	-372.852	0.657
Dead+Wind 120 deg - Service	16.227	4.127	2.363	183.169	-320.825	0.336
Dead+Wind 135 deg - Service	16.227	3.358	3.361	261.116	-260.731	0.136
Dead+Wind 150 deg - Service	16.227	2.360	4.131	321.284	-182.880	-0.074
Dead+Wind 180 deg - Service	16.227	-0.039	4.793	373.372	4.020	-0.465
Dead+Wind 210 deg - Service	16.227	-2.428	4.170	325.478	189.796	-0.731
Dead+Wind 225 deg - Service	16.227	-3.414	3.417	267.048	266.313	-0.794
Dead+Wind 240 deg - Service	16.227	-4.166	2.430	190.435	324.670	-0.802
Dead+Wind 270 deg - Service	16.227	-4.788	0.039	4.427	372.501	-0.657
Dead+Wind 300 deg - Service	16.227	-4.127	-2.363	-182.706	320.475	-0.336

Load Combination	Vertical K	$Shear_x$ K	$Shear_z$ K	Overturning Moment, M_x kip-ft	Overturning Moment, M_z kip-ft	Torque kip-ft
Dead+Wind 315 deg - Service	16.227	-3.358	-3.361	-260.652	260.381	-0.136
Dead+Wind 330 deg - Service	16.227	-2.360	-4.131	-320.820	182.530	0.074

Solution Summary

	Sum of Applied Forces			Sum of Reactions			
Load Comb.	PX K	PY K	PZ K	PX K	PY K	PZ K	% Error
1	0.000	-16.227	0.000	0.000	16.227	0.000	0.000%
2	0.100	-16.227	-12.269	-0.100	16.227	12.269	0.000%
3	6.216	-16.227	-10.676	-6.216	16.227	10.676	0.000%
4	8.739	-16.227	-8.747	-8.739	16.227	8.747	0.000%
5	10.666	-16.227	-6.221	-10.666	16.227	6.221	0.000%
6	12.258	-16.227	-0.100	-12.258	16.227	0.100	0.000%
7	10.566	-16.227	6.048	-10.566	16.227	-6.048	0.000%
8	8.597	-16.227	8.605	-8.597	16.227	-8.605	0.000%
9	6.043	-16.227	10.576	-6.043	16.227	-10.576	0.000%
10	-0.100	-16.227	12.269	0.100	16.227	-12.269	0.000%
11	-6.216	-16.227	10.676	6.216	16.227	-10.676	0.000%
12	-8.739	-16.227	8.747	8.739	16.227	-8.747	0.000%
13	-10.666	-16.227	6.221	10.666	16.227	-6.221	0.000%
14	-12.258	-16.227	0.100	12.258	16.227	-0.100	0.000%
15	-10.566	-16.227	-6.048	10.566	16.227	6.048	0.000%
16	-8.597	-16.227	-8.605	8.597	16.227	8.605	0.000%
17	-6.043	-16.227	-10.576	6.043	16.227	10.576	0.000%
18	0.000	-19.798	0.000	0.000	19.798	0.000	0.000%
19	0.076	-19.798	-9.874	-0.076	19.798	9.874	0.000%
20	4.999	-19.798	-8.590	-4.999	19.798	8.590	0.000%
21	7.030	-19.798	-7.036	-7.030	19.798	7.036	0.000%
22	8.582	-19.798	-5.003	-8.582	19.798	5.003	0.000%
23	9.865	-19.798	-0.076	-9.865	19.798	0.076	0.000%
24	8.505	-19.798	4.871	-8.505	19.798	-4.871	0.000%
25	6.922	-19.798	6.928	-6.922	19.798	-6.928	0.000%
26	4.866	-19.798	8.513	-4.866	19.798	-8.513	0.000%
27	-0.076	-19.798	9.874	0.076	19.798	-9.874	0.000%
28	-4.999	-19.798	8.590	4.999	19.798	-8.590	0.000%
29	-7.030	-19.798	7.036	7.030	19.798	-7.036	0.000%
30	-8.582	-19.798	5.003	8.582	19.798	-5.003	0.000%
31	-9.865	-19.798	0.076	9.865	19.798	-0.076	0.000%
32	-8.505	-19.798	-4.871	8.505	19.798	4.871	0.000%
33	-6.922	-19.798	-6.928	6.922	19.798	6.928	0.000%
34	-4.866	-19.798	-8.513	4.866	19.798	8.513	0.000%
35	0.039	-16.227	-4.793	-0.039	16.227	4.793	0.000%
36	2.428	-16.227	-4.170	-2.428	16.227	4.170	0.000%
37	3.414	-16.227	-3.417	-3.414	16.227	3.417	0.000%
38	4.166	-16.227	-2.430	-4.166	16.227	2.430	0.000%
39	4.788	-16.227	-0.039	-4.788	16.227	0.039	0.000%
40	4.127	-16.227	2.363	-4.127	16.227	-2.363	0.000%
41	3.358	-16.227	3.361	-3.358	16.227	-3.361	0.000%
42	2.360	-16.227	4.131	-2.360	16.227	-4.131	0.000%
43	-0.039	-16.227	4.793	0.039	16.227	-4.793	0.000%
44	-2.428	-16.227	4.170	2.428	16.227	-4.170	0.000%
45	-3.414	-16.227	3.417	3.414	16.227	-3.417	0.000%
46	-4.166	-16.227	2.430	4.166	16.227	-2.430	0.000%
47	-4.788	-16.227	0.039	4.788	16.227	-0.039	0.000%
48	-4.127	-16.227	-2.363	4.127	16.227	2.363	0.000%
49	-3.358	-16.227	-3.361	3.358	16.227	3.361	0.000%
50	-2.360	-16.227	-4.131	2.360	16.227	4.131	0.000%

Non-Linear Convergence Results

Load Combination	Converged?	Number of Cycles	Displacement Tolerance	Force Tolerance
1	Yes	4	0.00000001	0.00000001
2	Yes	4	0.00000001	0.00010557
3	Yes	4	0.00000001	0.00040929
4	Yes	4	0.00000001	0.00039543
5	Yes	4	0.00000001	0.00027626
6	Yes	4	0.00000001	0.00012844
7	Yes	4	0.00000001	0.00033230
8	Yes	4	0.00000001	0.00033588
9	Yes	4	0.00000001	0.00029926
10	Yes	4	0.00000001	0.00008873
11	Yes	4	0.00000001	0.00027482
12	Yes	4	0.00000001	0.00039516
13	Yes	4	0.00000001	0.00042051
14	Yes	4	0.00000001	0.00014526
15	Yes	4	0.00000001	0.00026245
16	Yes	4	0.00000001	0.00033476
17	Yes	4	0.00000001	0.00028255
18	Yes	4	0.00000001	0.00000001
19	Yes	4	0.00000001	0.00071419
20	Yes	5	0.00000001	0.00001957
21	Yes	5	0.00000001	0.00002046
22	Yes	4	0.00000001	0.00096912
23	Yes	4	0.00000001	0.00072206
24	Yes	4	0.00000001	0.00096631
25	Yes	5	0.00000001	0.00001956
26	Yes	4	0.00000001	0.00095311
27	Yes	4	0.00000001	0.00071375
28	Yes	4	0.00000001	0.00096848
29	Yes	5	0.00000001	0.00002046
30	Yes	5	0.00000001	0.00001968
31	Yes	4	0.00000001	0.00072371
32	Yes	4	0.00000001	0.00093578
33	Yes	5	0.00000001	0.00001945
34	Yes	4	0.00000001	0.00094208
35	Yes	4	0.00000001	0.00002209
36	Yes	4	0.00000001	0.00005340
37	Yes	4	0.00000001	0.00004996
38	Yes	4	0.00000001	0.00003611
39	Yes	4	0.00000001	0.00002920
40	Yes	4	0.00000001	0.00003721
41	Yes	4	0.00000001	0.00003291
42	Yes	4	0.00000001	0.00002970
43	Yes	4	0.00000001	0.00002076
44	Yes	4	0.00000001	0.00003408
45	Yes	4	0.00000001	0.00004994
46	Yes	4	0.00000001	0.00005615
47	Yes	4	0.00000001	0.00003054
48	Yes	4	0.00000001	0.00002511
49	Yes	4	0.00000001	0.00003262
50	Yes	4	0.00000001	0.00002651

Maximum Tower Deflections - Service Wind

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
L1	110 - 73.96	10.057	45	0.918	0.014
L2	78.043 - 48.713	4.688	45	0.600	0.004
L3	53.796 - 1	2.147	45	0.391	0.002

Critical Deflections and Radius of Curvature - Service Wind

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
107.000	LNX-6514DS-VTM	45	9.506	0.887	0.013	26129

Maximum Tower Deflections - Design Wind

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
L1	110 - 73.96	25.726	12	2.347	0.037
L2	78.043 - 48.713	11.994	12	1.536	0.009
L3	53.796 - 1	5.494	12	1.000	0.004

Critical Deflections and Radius of Curvature - Design Wind

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
107.000	LNX-6514DS-VTM	12	24.318	2.269	0.034	10247

Compression Checks

Pole Design Data

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	F_a ksi	A in^2	Actual P K	Allow. P_a K	Ratio $\frac{P}{P_a}$
L1	110 - 73.96 (1)	TP28.66x17x0.188	36.040	0.000	0.0	39.000	16.159	-3.898	630.184	0.006
L2	73.96 - 48.713 (2)	TP36.32x26.964x0.313	29.330	0.000	0.0	39.000	34.107	-7.086	1330.160	0.005
L3	48.713 - 1 (3)	TP51x34.074x0.313	52.796	0.000	0.0	37.642	50.276	-16.222	1892.490	0.009

Pole Bending Design Data

Section No.	Elevation ft	Size	Actual M_x kip-ft	Actual f_{bx} ksi	Allow. F_{bx} ksi	Ratio $\frac{f_{bx}}{F_{bx}}$	Actual M_y kip-ft	Actual f_{by} ksi	Allow. F_{by} ksi	Ratio $\frac{f_{by}}{F_{by}}$
L1	110 - 73.96 (1)	TP28.66x17x0.188	201.606	22.326	39.000	0.572	0.000	0.000	39.000	0.000
L2	73.96 - 48.713 (2)	TP36.32x26.964x0.313	403.465	16.750	39.000	0.429	0.000	0.000	39.000	0.000
L3	48.713 - 1 (3)	TP51x34.074x0.313	965.250	18.389	37.642	0.489	0.000	0.000	37.642	0.000

Pole Shear Design Data

Section No.	Elevation ft	Size	Actual V K	Actual f_v ksi	Allow. F_v ksi	Ratio $\frac{f_v}{F_v}$	Actual T kip-ft	Actual f_{vt} ksi	Allow. F_{vt} ksi	Ratio $\frac{f_{vt}}{F_{vt}}$
L1	110 - 73.96 (1)	TP28.66x17x0.188	7.653	0.474	26.000	0.036	2.030	0.110	26.000	0.004
L2	73.96 - 48.713 (2)	TP36.32x26.964x0.313	9.026	0.265	26.000	0.020	2.029	0.041	26.000	0.002
L3	48.713 - 1 (3)	TP51x34.074x0.313	12.370	0.246	26.000	0.019	2.028	0.019	26.000	0.001

Pole Interaction Design Data

Section No.	Elevation ft	Ratio $\frac{P}{P_a}$	Ratio $\frac{f_{bx}}{F_{bx}}$	Ratio $\frac{f_{by}}{F_{by}}$	Ratio $\frac{f_v}{F_v}$	Ratio $\frac{f_{vt}}{F_{vt}}$	Comb. Stress Ratio	Allow. Stress Ratio	Criteria
L1	110 - 73.96 (1)	0.006	0.572	0.000	0.036	0.004	0.579 ✔	1.333	H1-3+VT ✔
L2	73.96 - 48.713 (2)	0.005	0.429	0.000	0.020	0.002	0.435 ✔	1.333	H1-3+VT ✔
L3	48.713 - 1 (3)	0.009	0.489	0.000	0.019	0.001	0.497 ✔	1.333	H1-3+VT ✔

Section Capacity Table

Section No.	Elevation ft	Component Type	Size	Critical Element	P K	$SF*P_{allow}$ K	% Capacity	Pass Fail
L1	110 - 73.96	Pole	TP28.66x17x0.188	1	-3.898	840.035	43.4	Pass
L2	73.96 - 48.713	Pole	TP36.32x26.964x0.313	2	-7.086	1773.103	32.6	Pass
L3	48.713 - 1	Pole	TP51x34.074x0.313	3	-16.222	2522.689	37.3	Pass
							Summary	
						Pole (L1)	43.4	Pass
						RATING =	**43.4**	**Pass**

Anchor Bolt and Base Plate Analysis:

Input Data:

Tower Reactions:

Overturning Moment =	$OM := 965 \cdot ft \cdot kips$	(Input From tnxTower)
Shear Force =	$Shear := 12 \cdot kips$	(Input From tnxTower)
Axial Force =	$Axial := 16 \cdot kips$	(Input From tnxTower)

Anchor Bolt Data:

Use ASTM A615 Grade 75

Number of Anchor Bolts =	$N := 16$	(User Input)
Diameter of Bolt Circle =	$D_{bc} := 59.00 \cdot in$	(User Input)
Bolt "Column" Distance =	$l := 3.0 \cdot in$	(User Input)
Bolt Ultimate Strength =	$F_u := 100 \cdot ksi$	(User Input)
Bolt Yield Strength =	$F_y := 75 \cdot ksi$	(User Input)
Bolt Modulus =	$E := 29000 \cdot ksi$	(User Input)
Diameter of Anchor Bolts =	$D := 2.25 \cdot in$	(User Input)
Threads per Inch =	$n := 4.5$	(User Input)

Base Plate Data:

Use ASTM A572 50

Plate Yield Strength =	$Fy_{bp} := 50 \cdot ksi$	(User Input)
Base Plate Thickness =	$t_{bp} := 2.5 \cdot in$	(User Input)
Base Plate Diameter =	$D_{bp} := 65.00 \cdot in$	(User Input)
Outer Pole Diameter =	$D_{pole} := 51.00 \cdot in$	(User Input)

Geometric Layout Data:

Distance from Bolts to Centroid of Pole:

Radius of Bolt Circle =: $R_{bc} := \frac{D_{bc}}{2} = 29.5 \cdot in$

Distance to Bolts = $i := 1 .. N$

$$d_i := \left| \begin{array}{l} \theta \leftarrow 2 \cdot \pi \cdot \left(\frac{i}{N}\right) \\ d \leftarrow R_{bc} \cdot \sin(\theta) \end{array} \right.$$

$d_1 = 11.29 \cdot in$ $d_7 = 11.29 \cdot in$

$d_2 = 20.86 \cdot in$ $d_8 = 0.00 \cdot in$

$d_3 = 27.25 \cdot in$ $d_9 = -11.29 \cdot in$

$d_4 = 29.50 \cdot in$ $d_{10} = -20.86 \cdot in$

$d_5 = 27.25 \cdot in$ $d_{11} = -27.25 \cdot in$

$d_6 = 20.86 \cdot in$ etc.

Critical Distances For Bending in Plate:

Outer Pole Radius = $R_{pole} := \frac{D_{pole}}{2} = 25.5 \cdot in$

Moment Arms of Bolts about Neutral Axis = $MA_i := if(d_i \geq R_{pole}, d_i - R_{pole}, 0in)$

$MA_1 = 0.00 \cdot in$ $MA_7 = 0.00 \cdot in$

$MA_2 = 0.00 \cdot in$ $MA_8 = 0.00 \cdot in$

$MA_3 = 1.75 \cdot in$ $MA_9 = 0.00 \cdot in$

$MA_4 = 4.00 \cdot in$ $MA_{10} = 0.00 \cdot in$

$MA_5 = 1.75 \cdot in$ $MA_{11} = 0.00 \cdot in$

$MA_6 = 0.00 \cdot in$ etc

Effective Width of Baseplate for Bending = $B_{eff} := .8 \cdot 2 \cdot \sqrt{\left(\frac{D_{bp}}{2}\right)^2 - \left(\frac{D_{pole}}{2}\right)^2} = 32.2 \cdot in$

Anchor Bolt Analysis:

Calculated Anchor Bolt Properties:

Polar Moment of Inertia = $I_p := \sum_i (d_i)^2 = 6.962 \times 10^3 \cdot in^2$

Gross Area of Bolt = $A_g := \frac{\pi}{4} \cdot D^2 = 3.976 \cdot in^2$

Net Area of Bolt = $A_n := \frac{\pi}{4} \cdot \left(D - \frac{0.9743 \cdot in}{n}\right)^2 = 3.248 \cdot in^2$

Net Diameter = $D_n := \frac{2 \cdot \sqrt{A_n}}{\sqrt{\pi}} = 2.033 \cdot in$

Radius of Gyration of Bolt = $r := \frac{D_n}{4} = 0.508 \cdot in$

Section Modulus of Bolt = $S_x := \frac{\pi \cdot D_n^3}{32} = 0.826 \cdot in^3$

Check Anchor Bolt Tension Force:

Maximum Tensile Force = $T_{Max} := OM \cdot \frac{R_{bc}}{I_p} - \frac{Axial}{N} = 48.1 \cdot kips$

Allowable Tensile Force = $T_{ALL.Gross} := 1.333 \cdot (0.33 \cdot A_g \cdot F_u) = 174.9 \cdot kips$ (1.333 increase allowed per TIA/EIA)

$T_{ALL.Net} := 1.333 \cdot (0.60 \cdot A_n \cdot F_y) = 194.812 \cdot kips$ (1.333 increase allowed per TIA/EIA)

Bolt Tension % of Capacity = $\frac{T_{Max}}{T_{ALL.Net}} \cdot 100 = 25$ Bolts are "upset bolts". Use net area per AISC

Condition1 = $Condition1 := if\left(\frac{T_{Max}}{T_{ALL.Net}} \le 1.00, "OK", "Overstressed"\right)$

Condition1 = "OK"

Check Anchor Bolt Bending Stress:

Maximum Bending Moment = $M_x := \left(\frac{Shear}{N}\right) \cdot l = 0.187 \cdot ft \cdot kips$

Maximum Bending Stress = $f_{bx} := \frac{M_x}{S_x} = 2.7 \cdot ksi$

Allowable Bending Stress = $F_{bx} := 1.333 \cdot 0.6 \cdot F_y = 60 \cdot ksi$ (1.333 increase allowed per TIA/EIA)

Check Combined Stress Requirement:

Per ASCE Manual 72: "If the clearance between the base plate and concrete does not exceed two times the bolt diameter a bending stress analysis of the bolts is NOT normally required.

$$l := \begin{cases} l & \text{if } l > 2 \cdot D_n \\ 0 & \text{otherwise} \end{cases} = 0 \cdot in$$

$$f_{bx} := \begin{cases} f_{bx} & \text{if } l > 2 \cdot D_n \\ 0 & \text{otherwise} \end{cases} = 0 \cdot ksi$$

Check Anchor Bolt Compression/Combined Stress:

Maximum Compressive Force =

$$C_{Max} := OM \cdot \frac{R_{bc}}{l_p} + \frac{Axial}{N} = 50.1 \cdot kips$$

Maximum Compressive Stress =

$$f_a := \frac{C_{Max}}{A_n} = 15.4 \cdot ksi$$

$$K := 0.65$$

$$C_c := \sqrt{\frac{2 \cdot \pi^2 \cdot E}{F_y}} = 87.364$$

$$F_a := \begin{cases} \dfrac{\left[1 - \dfrac{\left(\frac{K \cdot l}{r}\right)^2}{2 \cdot C_c^2}\right] \cdot F_y}{\dfrac{5}{3} + \dfrac{3 \cdot \left(\frac{K \cdot l}{r}\right)}{8 \cdot C_c} - \dfrac{\left(\frac{K \cdot l}{r}\right)^3}{8 \cdot C_c^3}} & \text{if } \dfrac{K \cdot l}{r} \le C_c \\ \dfrac{12 \cdot \pi^2 \cdot E}{23 \cdot \left(\frac{K \cdot l}{r}\right)^2} & \text{if } \dfrac{K \cdot l}{r} > C_c \end{cases} = 45 \cdot ksi$$

Allowable Compressive Stress =

$$F_a := 1.333 \cdot F_a = 60 \cdot ksi$$

(1.333 increase allowed per TIA/EIA)

Combined Stress % of Capacity =

$$\left(\frac{f_a}{F_a} + \frac{f_{bx}}{F_{bx}}\right) \cdot 100 = 25.7$$

Condition 2 =

$$Condition2 := \text{if}\left(\frac{f_a}{F_a} + \frac{f_{bx}}{F_{bx}} \le 1.00, \text{"OK"}, \text{"Overstressed"}\right)$$

Condition2 = "OK"

Base Plate Analysis:

Force from Bolts = $C_i := \frac{OM \cdot d_i}{I_p} + \frac{Axial}{N}$

$C_1 = 19.8 \cdot kips$ $C_7 = 19.8 \cdot kips$

$C_2 = 35.7 \cdot kips$ $C_8 = 1.0 \cdot kips$

$C_3 = 46.3 \cdot kips$ $C_9 = -17.8 \cdot kips$

$C_4 = 50.1 \cdot kips$ $C_{10} = -33.7 \cdot kips$

$C_5 = 46.3 \cdot kips$ $C_{11} = -44.3 \cdot kips$

$C_6 = 35.7 \cdot kips$ etc.

Maximum Bending Stress in Plate = $f_{bp} := \sum_i \frac{6 \cdot C_i \cdot MA_i}{\left(B_{eff} \cdot t_{bp}^2\right)} = 10.8 \cdot ksi$

Allowable Bending Stress in Plate = $F_{bp} := 1.33 \cdot 0.75 \cdot Fy_{bp} = 49.9 \cdot ksi$

Plate Bending Stress % of Capacity = $\frac{f_{bp}}{F_{bp}} \cdot 100 = 21.7$

Condition3 = $Condition3 := if\left(\frac{f_{bp}}{F_{bp}} < 1.00, "Ok", "Overstressed"\right)$

Condition3 = "Ok"

Caisson Foundation:

Input Data:

Shear Force =	$S := 12k$	USER INPUT-FROM tnxTower
Overturning Moment =	$M := 965ft \cdot k$	USER INPUT-FROM tnxTower
Applied Axial Load =	$A1 := 16k$	USER INPUT-FROM tnxTower
Bending Moment =	$Mu := 1059ft \cdot k$	USER INPUT–FROM LPILE
Moment Capacity =	$Mn := 5321ft \cdot k$	USER INPUT–FROM LPILE
Foundation Diameter =	$d := 7.0ft$	USER INPUT
Overall Length of Caisson =	$L_c := 27.0ft$	USER INPUT
Depth From Top of Caisson to Grade =	$L_{pag} := 1.0ft$	USER INPUT
Number of Rebar =	$n := 36$	USER INPUT
Area of Rebar =	$Ar := 0.79in^2$	USER INPUT
Rebar Yield Strength =	$fy := 60ksi$	USER INPUT
Concrete Comp Strength =	$f'c := 4ksi$	USER INPUT

Check Foundation Depth:

Depth of Caisson Below Ground Level = $LD := L_c - L_{pag} = 26ft$ (TIA/EIA-222-F 7.2.5)

Depth Required = $LD1 := 2.0ft + \left(\frac{S \cdot ft^2}{3k \cdot d}\right) + 2ft \cdot .5\left(\frac{M \cdot ft}{3 \cdot kd} + \frac{S \cdot ft}{2k} + \frac{S^2 ft^3}{18k^2 d^2}\right)^{.5} = 17.01ft$

$DepthCheck := if(LD1 \le LD, "OK", "NO GOOD")$

$DepthCheck = "OK"$

Check Moment Capacity:

Factor of Safety = $FS := \frac{Mn}{Mu} = 5$

Factor of Safety Required = $FS_{reqd} := 1.3$

$FOSCheck := if(FS \ge FS_{reqd}, "OK", "NO GOOD")$

$FOSCheck = "OK"$

Check Axial Capacity:

Concrete Weight = $A2 := .150\frac{k}{ft^3} \cdot LD \cdot \pi \frac{d^2}{4} = 150.1 \cdot kips$

Total Axial Load = $AT := A1 + A2 = 166.1 \cdot kips$

Area of Concrete = $Ag := \pi \cdot \frac{d^2}{4} = 38.48ft^2$

Axial Capacity = $Po := n \cdot Ar \cdot fy + (Ag - n \cdot Ar) \cdot 0.85 \cdot f'c = 20451.7 \cdot kips$

$AxialCheck := if(AT \le Po, "OK", "NO GOOD")$

$AxialCheck = "OK"$

```
================================================================================

                 LPILE Plus for Windows, Version 5.0 (5.0.47)

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

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                               All Rights Reserved

================================================================================

This program is licensed to:

TJL
Centek Engineering

--------------------------------------------------------------------------------
                             Files Used for Analysis
--------------------------------------------------------------------------------

Path to file locations:      J:\Jobs\1500100.WI\070 - Bloomfield Blue Hills\Backup Documentation\Calcs\LPile\
Name of input data file:     Bloomfield Blue Hills Caisson Analysis.lpd
Name of output file:         Bloomfield Blue Hills Caisson Analysis.lpo
Name of plot output file:    Bloomfield Blue Hills Caisson Analysis.lpp
Name of runtime file:        Bloomfield Blue Hills Caisson Analysis.lpr


--------------------------------------------------------------------------------
                           Time and Date of Analysis
--------------------------------------------------------------------------------

               Date:  June 18, 2015     Time:  17:37:47


--------------------------------------------------------------------------------
                                 Problem Title
--------------------------------------------------------------------------------

15001.070 - Bloomfield Blue Hills


--------------------------------------------------------------------------------
                                 Program Options
--------------------------------------------------------------------------------

Units Used in Computations - US Customary Units: Inches, Pounds

Basic Program Options:

Analysis Type 3:
- Computation of Nonlinear Bending Stiffness and Ultimate Bending Moment
  Capacity with Pile Response Computed Using Nonlinear EI

Computation Options:
- User-specified p-y curves used in analysis
- Analysis does not use p-y multipliers (individual pile or shaft action only)
- Analysis assumes no shear resistance at pile tip
- Analysis for fixed-length pile or shaft only
- Analysis includes computation of foundation stiffness matrix elements
- Output pile response for full length of pile
- Analysis assumes no soil movements acting on pile
- No additional p-y curves to be computed at user-specified depths

Solution Control Parameters:
- Number of pile increments            =          100
- Maximum number of iterations allowed =          100
- Deflection tolerance for convergence =   1.0000E-04 in
- Maximum allowable deflection         =   1.0000E+02 in

Printing Options:
- Values of pile-head deflection, bending moment, shear force, and
  soil reaction are printed for full length of pile.
- Printing Increment (spacing of output points) =  8


--------------------------------------------------------------------------------
                     Pile Structural Properties and Geometry
--------------------------------------------------------------------------------

Pile Length                                 =     324.00 in

Depth of ground surface below top of pile =      12.00 in

Slope angle of ground surface               =       0.00 deg.

Structural properties of pile defined using  2 points
```

Point No.	Point Depth in	Pile Diameter in	Moment of Inertia in**4	Pile Area Sq.in	Modulus of Elasticity lbs/Sq.in
1	0.0000	84.00000000	2443920.	5541.8000	3000000.
2	324.0000	84.00000000	2443920.	5541.8000	3000000.

Please note that because this analysis makes computations of ultimate moment capacity and pile response using nonlinear bending stiffness that the above values of moment of inertia and modulus of are not used for any computations other than total stress due to combined axial loading and bending.

Soil and Rock Layering Information

The soil profile is modelled using 3 layers

Layer 1 is modelled using user-specified p-y curves
Distance from top of pile to top of layer = 12.000 in
Distance from top of pile to bottom of layer = 60.000 in

Layer 2 is sand, p-y criteria by Reese et al., 1974
Distance from top of pile to top of layer = 60.000 in
Distance from top of pile to bottom of layer = 228.000 in
p-y subgrade modulus k for top of soil layer = 35.000 lbs/in**3
p-y subgrade modulus k for bottom of layer = 35.000 lbs/in**3

Layer 3 is sand, p-y criteria by Reese et al., 1974
Distance from top of pile to top of layer = 228.000 in
Distance from top of pile to bottom of layer = 336.000 in
p-y subgrade modulus k for top of soil layer = 100.000 lbs/in**3
p-y subgrade modulus k for bottom of layer = 100.000 lbs/in**3

(Depth of lowest layer extends 12.00 in below pile tip)

Effective Unit Weight of Soil vs. Depth

Effective unit weight of soil with depth defined using 6 points

Point No.	Depth X in	Eff. Unit Weight lbs/in**3
1	12.00	0.00000
2	60.00	0.00000
3	60.00	0.07200
4	228.00	0.07200
5	228.00	0.03800
6	336.00	0.03800

**** WARNING - POSSIBLE INPUT DATA ERROR ****

Values entered for effective unit weights of soil were outside the limits of 0.011574 pci (20 pcf) or 0.0810019 pci (140 pcf) This data may be erroneous. Please check your data.

Shear Strength of Soils

Shear strength parameters with depth defined using 4 points

Point No.	Depth X in	Cohesion c lbs/in**2	Angle of Friction Deg.	E50 or k_rm	RQD %
1	60.000	0.00000	32.00	------	------
2	228.000	0.00000	32.00	------	------
3	228.000	0.00000	32.00	------	------
4	336.000	0.00000	32.00	------	------

Notes:

(1) Cohesion = uniaxial compressive strength for rock materials.
(2) Values of E50 are reported for clay strata.
(3) Default values will be generated for E50 when input values are 0.
(4) RQD and k_rm are reported only for weak rock strata.

User-specified p-y Curves

User-specified p-y curves defined using 2 curves.

User-specified curve number 1 at depth = 12.000in

Point No.	y in	p, lbs/in
1	0.0000	0.000

User-specified curve number 2 at depth = 60.000in

Point No.	y in	p, lbs/in
1	0.0000	0.000

Loading Type

Static loading criteria was used for computation of p-y curves.

Pile-head Loading and Pile-head Fixity Conditions

Number of loads specified = 1

Load Case Number 1

Pile-head boundary conditions are Shear and Moment (BC Type 1)
Shear force at pile head = 12000.000 lbs
Bending moment at pile head = 11580000.000 in-lbs
Axial load at pile head = 16000.000 lbs

Non-zero moment at pile head for this load case indicates the pile-head may rotate under the applied pile-head loading, but is not a free-head (zero moment) condition.

Computations of Nominal Moment Capacity and Nonlinear Bending Stiffness

Number of sections = 1

Pile Section No. 1

The sectional shape is a circular drilled shaft (bored pile).

Outside Diameter = 84.0000 in

Material Properties:

Compressive Strength of Concrete = 4.000 kip/in**2
Yield Stress of Reinforcement = 60. kip/in**2
Modulus of Elasticity of Reinforcement = 29000. kip/in**2
Number of Reinforcing Bars = 36
Area of Single Bar = 0.79000 in**2
Number of Rows of Reinforcing Bars = 19
Area of Steel = 28.440 in**2
Area of Shaft = 5541.769 in**2
Percentage of Steel Reinforcement = 0.513 percent
Cover Thickness (edge to bar center) = 4.000 in

Unfactored Axial Squash Load Capacity = 20451.72 kip

Distribution and Area of Steel Reinforcement

Row Number	Area of Reinforcement in**2	Distance to Centroidal Axis in
1	0.790	38.000
2	1.580	37.423
3	1.580	35.708

4	1.580	32.909
5	1.580	29.110
6	1.580	24.426
7	1.580	19.000
8	1.580	12.997
9	1.580	6.599
10	1.580	0.000
11	1.580	-6.599
12	1.580	-12.997
13	1.580	-19.000
14	1.580	-24.426
15	1.580	-29.110
16	1.580	-32.909
17	1.580	-35.708
18	1.580	-37.423
19	0.790	-38.000

Axial Thrust Force = 16000.00 lbs

Bending Moment in-lbs	Bending Stiffness lb-in2	Bending Curvature rad/in	Maximum Strain in/in	Neutral Axis Position inches	Max. Concrete Stress psi	Max. Steel Stress psi
5914929.	9.463887E+12	6.250000E-07	0.00002712	43.39882833	96.35706860	714.10376
11776526.	9.421221E+12	0.00000125	0.00005347	42.77379566	188.56829	1405.55009
17584967.	9.378649E+12	0.00000188	0.00007981	42.56530792	279.47341	2096.98862
23340251.	9.336100E+12	0.00000250	0.00010615	42.46095139	369.07240	2788.41898
29042378.	9.293561E+12	0.00000313	0.00013249	42.39824635	457.36530	3479.84108
29042378.	7.744634E+12	0.00000375	0.00006962	18.56484121	239.26427	6681.07352
29042378.	6.638258E+12	0.00000438	0.00008059	18.41968185	276.07965	7813.00287
29042378.	5.808476E+12	0.00000500	0.00009156	18.31296962	312.71675	8944.61940
29042378.	5.163089E+12	0.00000563	0.00010255	18.23189467	349.17502	10075.92218
29042378.	4.646780E+12	0.00000625	0.00011375	18.19999892	386.12218	11201.25020
29042378.	4.224346E+12	0.00000688	0.00012498	18.17936593	422.97208	12325.48892
29042378.	3.872317E+12	0.00000750	0.00013601	18.13529617	458.91359	13455.57308
29042378.	3.574446E+12	0.00000813	0.00014706	18.09950513	494.67776	14585.30410
29042378.	3.319129E+12	0.00000875	0.00015811	18.07023293	530.26424	15714.67839
29042378.	3.097854E+12	0.00000938	0.00016918	18.04617780	565.67234	16843.69541
29042378.	2.904238E+12	0.00001000	0.00018026	18.02637094	600.90161	17972.35243
29042378.	2.733400E+12	0.00001063	0.00019136	18.01007134	635.95156	19100.64677
29042378.	2.581545E+12	0.00001125	0.00020246	17.99670070	670.82167	20228.57640
29042378.	2.445674E+12	0.00001188	0.00021358	17.98580092	705.51130	21356.13981
29042378.	2.323390E+12	0.00001250	0.00022471	17.97700900	740.01998	22483.33424
29042378.	2.212753E+12	0.00001313	0.00023586	17.97003204	774.34727	23610.15656
29042378.	2.112173E+12	0.00001375	0.00024701	17.96462470	808.49245	24736.60590
29042378.	2.020339E+12	0.00001438	0.00025818	17.96058923	842.45503	25862.67936
29042378.	1.936159E+12	0.00001500	0.00026937	17.95775789	876.23439	26988.37532
29042378.	1.858712E+12	0.00001563	0.00028056	17.95599550	909.83015	28113.68954
29042378.	1.787223E+12	0.00001625	0.00029177	17.95517939	943.24153	29238.62171
29042378.	1.721030E+12	0.00001688	0.00030299	17.95521444	976.46822	30363.16693
29042378.	1.659564E+12	0.00001750	0.00031423	17.95600802	1009.50929	31487.32593
29042378.	1.602338E+12	0.00001813	0.00032548	17.95749253	1042.36451	32611.09299
29042378.	1.548927E+12	0.00001875	0.00033674	17.95959789	1075.03298	33734.46865
29042378.	1.498961E+12	0.00001938	0.00034802	17.96227401	1107.51440	34857.44729
29042378.	1.452119E+12	0.00002000	0.00035931	17.96546835	1139.80798	35980.02836
29042378.	1.408115E+12	0.00002063	0.00037061	17.96913832	1171.91313	37102.20914
29042378.	1.366700E+12	0.00002125	0.00038193	17.97324640	1203.82924	38223.98691
29396641.	1.343846E+12	0.00002188	0.00039326	17.97776002	1235.55575	39345.35849
30212598.	1.342782E+12	0.00002250	0.00040461	17.98264915	1267.09200	40466.32143
31027831.	1.341744E+12	0.00002313	0.00041597	17.98788875	1298.43748	41586.87210
31842329.	1.340730E+12	0.00002375	0.00042734	17.99345130	1329.59126	42707.01042
32656094.	1.339737E+12	0.00002438	0.00043873	17.99931926	1360.55296	43826.73120
34281410.	1.337811E+12	0.00002563	0.00046155	18.01189631	1421.89742	46064.90955
35903740.	1.335953E+12	0.00002688	0.00048443	18.02548724	1482.46545	48301.38588
37523056.	1.334153E+12	0.00002813	0.00050737	18.03998691	1542.25176	50536.13568
39139318.	1.332402E+12	0.00002938	0.00053037	18.05530518	1601.25072	52769.13690
40752498.	1.330694E+12	0.00003063	0.00055344	18.07137197	1659.45694	55000.36277
42362555.	1.329021E+12	0.00003188	0.00057656	18.08812469	1716.86457	57229.78974
43969463.	1.327380E+12	0.00003313	0.00059975	18.10551578	1773.46808	59457.38891
45378921.	1.320114E+12	0.00003438	0.00062202	18.09501904	1826.84043	60000.00000
46491509.	1.305025E+12	0.00003563	0.00064283	18.04426521	1875.76856	60000.00000
47463706.	1.287151E+12	0.00003688	0.00066294	17.97793776	1922.24319	60000.00000
48315523.	1.267292E+12	0.00003813	0.00068243	17.89986187	1966.54947	60000.00000
49089913.	1.246728E+12	0.00003938	0.00070152	17.81628603	2009.22388	60000.00000
49757531.	1.224801E+12	0.00004063	0.00072001	17.72331744	2049.90053	60000.00000
50423819.	1.204151E+12	0.00004188	0.00073853	17.63663739	2090.04326	60000.00000
50995021.	1.182493E+12	0.00004313	0.00075648	17.54155594	2128.29272	60000.00000
51502084.	1.160610E+12	0.00004438	0.00077404	17.44320506	2165.13667	60000.00000
52008050.	1.139902E+12	0.00004563	0.00079163	17.35082477	2201.49630	60000.00000
52512913.	1.120275E+12	0.00004688	0.00080925	17.26394194	2237.36949	60000.00000
52928672.	1.099817E+12	0.00004813	0.00082624	17.16871029	2271.40106	60000.00000
53301816.	1.079530E+12	0.00004938	0.00084296	17.07258493	2304.34463	60000.00000
53674052.	1.060228E+12	0.00005063	0.00085970	16.98166662	2336.84761	60000.00000
54045368.	1.041838E+12	0.00005188	0.00087646	16.89557987	2368.90794	60000.00000
54415758.	1.024297E+12	0.00005313	0.00089324	16.81398672	2400.52379	60000.00000
55060805.	1.012613E+12	0.00005438	0.00091350	16.80000025	2438.37425	60000.00000
55074651.	9.901061E+11	0.00005563	0.00093002	16.71953112	2468.40144	60000.00000

55334185.	9.729088E+11	0.00005688	0.00094545	16.62323052	2495.88774	60000.00000
55593019.	9.564390E+11	0.00005813	0.00096089	16.53141600	2522.99940	60000.00000
55851174.	9.406514E+11	0.00005938	0.00097635	16.44381219	2549.73559	60000.00000
56108638.	9.255033E+11	0.00006063	0.00099183	16.36015874	2576.09457	60000.00000
56365394.	9.109559E+11	0.00006188	0.00100734	16.28021532	2602.07450	60000.00000
56621464.	8.969737E+11	0.00006313	0.00102286	16.20376915	2627.67447	60000.00000
56840432.	8.829582E+11	0.00006438	0.00103799	16.12412864	2652.18054	60000.00000
57017489.	8.688379E+11	0.00006563	0.00105266	16.04058784	2675.52782	60000.00000
57193969.	8.552369E+11	0.00006688	0.00106735	15.96043915	2698.53458	60000.00000
57369868.	8.421265E+11	0.00006813	0.00108206	15.88349730	2721.19950	60000.00000
57545194.	8.294803E+11	0.00006938	0.00109679	15.80959207	2743.52149	60000.00000
57719927.	8.172733E+11	0.00007063	0.00111154	15.73856074	2765.49890	60000.00000
57894084.	8.054829E+11	0.00007188	0.00112630	15.67025810	2787.13077	60000.00000
58067639.	7.940874E+11	0.00007313	0.00114108	15.60454148	2808.41531	60000.00000
58240597.	7.830668E+11	0.00007438	0.00115588	15.54128319	2829.35132	60000.00000
58584744.	7.620780E+11	0.00007688	0.00118554	15.42167348	2870.17300	60000.00000
58925681.	7.423708E+11	0.00007938	0.00122223	15.39817411	2919.14333	60000.00000
59144552.	7.223762E+11	0.00008188	0.00124910	15.25617403	2952.88331	60000.00000
59361676.	7.035458E+11	0.00008438	0.00127603	15.12333387	2985.47597	60000.00000
59577061.	6.857791E+11	0.00008688	0.00130303	14.99887508	3016.91337	60000.00000
59790678.	6.689866E+11	0.00008938	0.00133009	14.88209921	3047.18662	60000.00000
60002518.	6.530886E+11	0.00009188	0.00135721	14.77238792	3076.28711	60000.00000
60212541.	6.380137E+11	0.00009438	0.00138440	14.66918296	3104.20551	60000.00000
60420762.	6.236982E+11	0.00009688	0.00141166	14.57199365	3130.93340	60000.00000
60615364.	6.099659E+11	0.00009938	0.00143873	14.47780341	3156.21292	60000.00000
60748489.	5.963042E+11	0.00010188	0.00146457	14.37613803	3179.10466	60000.00000
60880088.	5.832823E+11	0.00010438	0.00149047	14.27991754	3200.92078	60000.00000
61010141.	5.708551E+11	0.00010688	0.00151642	14.18876392	3221.65319	60000.00000
61138630.	5.589818E+11	0.00010938	0.00154244	14.10233420	3241.29375	60000.00000
61265550.	5.476250E+11	0.00011188	0.00156852	14.02031797	3259.83435	60000.00000
61762700.	5.400018E+11	0.00011438	0.00160125	14.00000042	3281.77398	60000.00000
61762700.	5.284509E+11	0.00011688	0.00163480	13.98762864	3302.35776	60000.00000
61762700.	5.173839E+11	0.00011938	0.00165968	13.90311152	3316.09196	60000.00000
61816170.	5.072096E+11	0.00012188	0.00168462	13.82255727	3328.81746	60000.00000
61926645.	4.979027E+11	0.00012438	0.00170963	13.74573308	3340.52647	60000.00000
62035704.	4.889514E+11	0.00012688	0.00173469	13.67242366	3351.21097	60000.00000
62143333.	4.803349E+11	0.00012938	0.00175981	13.60243124	3360.86285	60000.00000
62249521.	4.720343E+11	0.00013188	0.00178500	13.53557307	3369.47385	60000.00000
62337910.	4.639100E+11	0.00013438	0.00180965	13.46718031	3376.85447	60000.00000
62398691.	4.558808E+11	0.00013688	0.00183339	13.39459437	3382.98047	60000.00000
62458258.	4.481310E+11	0.00013938	0.00185717	13.32501251	3388.17859	60000.00000
62516615.	4.406457E+11	0.00014188	0.00188102	13.25828201	3392.44182	60000.00000
62573761.	4.334113E+11	0.00014438	0.00190492	13.19426018	3395.76295	60000.00000
62629646.	4.264146E+11	0.00014688	0.00192888	13.13280684	3398.13455	60000.00000
62684292.	4.196438E+11	0.00014938	0.00195290	13.07380182	3399.54925	60000.00000
62737480.	4.130863E+11	0.00015188	0.00197698	13.01712495	3399.79019	60000.00000
62784815.	4.067033E+11	0.00015438	0.00200111	12.96266860	3393.87510	60000.00000
62831728.	4.005210E+11	0.00015688	0.00202531	12.91033262	3387.94405	60000.00000
62878182.	3.945298E+11	0.00015938	0.00204957	12.86001688	3381.99707	60000.00000
62924185.	3.887208E+11	0.00016188	0.00207388	12.81163377	3382.03449	60000.00000
62969740.	3.830859E+11	0.00016438	0.00209826	12.76510066	3386.73569	60000.00000
63014833.	3.776170E+11	0.00016688	0.00212271	12.72033745	3390.73704	60000.00000
63059452.	3.723067E+11	0.00016938	0.00214721	12.67726904	3394.03161	60000.00000
63103604.	3.671482E+11	0.00017188	0.00217178	12.63582784	3396.61242	60000.00000
63103604.	3.618845E+11	0.00017438	0.00219712	12.59999925	3398.52625	60000.00000
63103604.	3.517971E+11	0.00017938	0.00226012	12.59999925	3396.41491	60000.00000
63282556.	3.432274E+11	0.00018438	0.00232312	12.59999925	3382.54280	60000.00000
63451240.	3.350561E+11	0.00018938	0.00237394	12.53566450	3375.49664	60000.00000
63523441.	3.268087E+11	0.00019438	0.00242188	12.45984918	3383.99362	60000.00000
63565236.	3.188225E+11	0.00019938	0.00246764	12.37686914	3390.26751	60000.00000
63593590.	3.111613E+11	0.00020438	0.00251253	12.29372388	3394.86743	60000.00000
63621282.	3.038628E+11	0.00020938	0.00255759	12.21535510	3398.02295	60000.00000
63648297.	2.969017E+11	0.00021438	0.00260282	12.14144486	3399.70707	60000.00000
63673886.	2.902513E+11	0.00021938	0.00264838	12.07237619	3397.17387	60000.00000
63697808.	2.838900E+11	0.00022438	0.00269430	12.00802642	3389.66353	60000.00000
63721417.	2.778045E+11	0.00022938	0.00274033	11.94693357	3382.12583	60000.00000
63744699.	2.719774E+11	0.00023438	0.00278646	11.88889486	3374.56042	60000.00000
63767664.	2.663923E+11	0.00023938	0.00283270	11.83372754	3366.96675	60000.00000
63790299.	2.610345E+11	0.00024438	0.00287905	11.78126138	3365.53540	60000.00000
63812585.	2.558901E+11	0.00024938	0.00292550	11.73133868	3373.10584	60000.00000
63834551.	2.509466E+11	0.00025438	0.00297207	11.68382174	3379.77029	60000.00000
63856153.	2.461924E+11	0.00025938	0.00301875	11.63857287	3385.51434	60000.00000
63877391.	2.416166E+11	0.00026438	0.00306555	11.59547192	3390.32377	60000.00000
63898274.	2.372094E+11	0.00026938	0.00311247	11.55440873	3394.18397	60000.00000
63918786.	2.329614E+11	0.00027438	0.00315950	11.51527816	3397.07969	60000.00000
63936188.	2.288544E+11	0.00027938	0.00320725	11.48010296	3399.03200	60000.00000
63952210.	2.248869E+11	0.00028438	0.00325534	11.44736356	3399.93845	60000.00000
63966663.	2.210511E+11	0.00028938	0.00330386	11.41723019	3395.75800	60000.00000
63980354.	2.173430E+11	0.00029438	0.00335261	11.38889426	3389.35179	60000.00000
63993861.	2.137582E+11	0.00029938	0.00340142	11.36173993	3382.92698	60000.00000
64007200.	2.102906E+11	0.00030438	0.00345031	11.33571464	3376.48312	60000.00000
64016523.	2.069221E+11	0.00030938	0.00350020	11.31377989	3369.77364	60000.00000
64022402.	2.036498E+11	0.00031438	0.00355097	11.29532236	3362.83327	60000.00000
64028029.	2.004792E+11	0.00031938	0.00360183	11.27775604	3355.86647	60000.00000
64033399.	1.974055E+11	0.00032438	0.00365280	11.26104587	3348.87270	60000.00000

Unfactored (Nominal) Moment Capacity at Concrete Strain of 0.003 = 63847.47428 in-kip

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

Pile-head boundary conditions are Shear and Moment (Pile-head Condition Type 1)
Specified shear force at pile head = 12000.000 lbs
Specified moment at pile head = 11580000.000 in-lbs
Specified axial load at pile head = 16000.000 lbs

Depth X in	Deflect. y in	Moment M lbs-in	Shear V lbs	Slope S Rad.	Total Stress lbs/in**2	Flx. Rig. EI lbs-in**2	Soil Res. p lbs/in	Es*h F/L
0.000	0.611373	1.16E+07	12000.	-0.002516	201.895	9.42E+12	0.000	0.000
25.920	0.546583	1.19E+07	12000.	-0.002483	207.258	9.42E+12	0.000	0.000
51.840	0.482641	1.22E+07	12000.	-0.002450	212.621	9.42E+12	0.000	0.000
77.760	0.419571	1.25E+07	11076.	-0.002416	217.914	9.41E+12	-144.715	1117.516
103.680	0.357392	1.27E+07	1688.544	-0.002381	221.202	9.41E+12	-546.381	4953.312
129.600	0.296119	1.25E+07	-14974.	-0.002347	218.434	9.41E+12	-721.345	7892.640
155.520	0.235737	1.19E+07	-34764.	-0.002313	207.439	9.42E+12	-788.116	10832.
181.440	0.176202	1.07E+07	-54907.	-0.002282	187.444	9.43E+12	-748.927	13771.
207.360	0.117429	9.08E+06	-72682.	-0.002254	158.901	9.43E+12	-605.649	16711.
233.280	0.059300	7.01E+06	-88540.	-0.002232	123.342	9.45E+12	-963.932	52667.
259.200	0.001666	4.49E+06	-1.02E+05	-0.002216	79.982	9.46E+12	-31.399	61065.
285.120	-0.055649	1.96E+06	-87626.	-0.002207	36.535	9.46E+12	1193.081	69463.
311.040	-0.112821	2.48E+05	-37653.	-0.002205	7.142	9.46E+12	2711.230	77861.

Please note that because this analysis makes computations of ultimate moment capacity and pile response using nonlinear bending stiffness that the above values of total stress due to combined axial stress and bending may not be representative of actual conditions.

Output Verification:

Computed forces and moments are within specified convergence limits.

Output Summary for Load Case No. 1:

Pile-head deflection = 0.61137263 in
Computed slope at pile head = -0.00251567
Maximum bending moment = 12706166. lbs-in
Maximum shear force = -102059.46047 lbs
Depth of maximum bending moment = 106.92000 in
Depth of maximum shear force = 259.20000 in
Number of iterations = 6
Number of zero deflection points = 1

Summary of Pile Response(s)

Definition of Symbols for Pile-Head Loading Conditions:

Type 1 = Shear and Moment, y = pile-head displacment in
Type 2 = Shear and Slope, M = Pile-head Moment lbs-in
Type 3 = Shear and Rot. Stiffness, V = Pile-head Shear Force lbs
Type 4 = Deflection and Moment, S = Pile-head Slope, radians
Type 5 = Deflection and Slope, R = Rot. Stiffness of Pile-head in-lbs/rad

Load Type	Pile-Head Condition 1	Pile-Head Condition 2	Axial Load lbs	Pile-Head Deflection in	Maximum Moment in-lbs	Maximum Shear lbs
1	V= 12000.	M= 1.16E+07	16000.0000	0.6113726	1.2706E+07	-102059.

Computed Pile-head Stiffness Matrix Members
K22, K23, K32, K33 for Superstructure

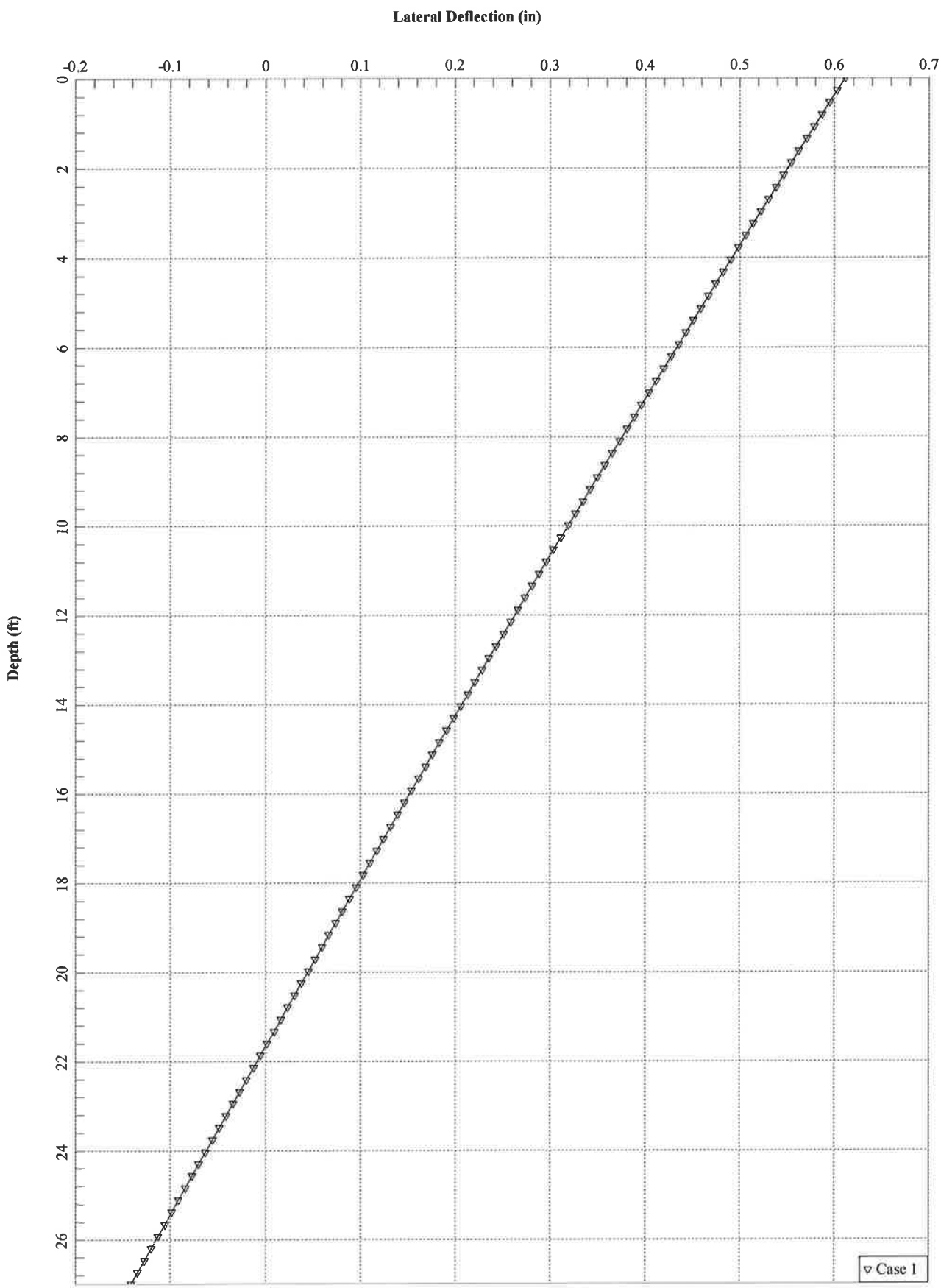
Top y in	Shear React. lbs	Mom. React. in-lbs	K22 lbs/in	K32 in-lbs/in
0.00114303	1200.00002	285390.59464	1049837.	2.496781E+08
0.00344088	3612.35995	859111.28188	1049837.	2.496781E+08
0.00545366	5725.45506	1361659.	1049837.	2.496781E+08
0.00688175	7224.71990	1718223.	1049837.	2.496781E+08

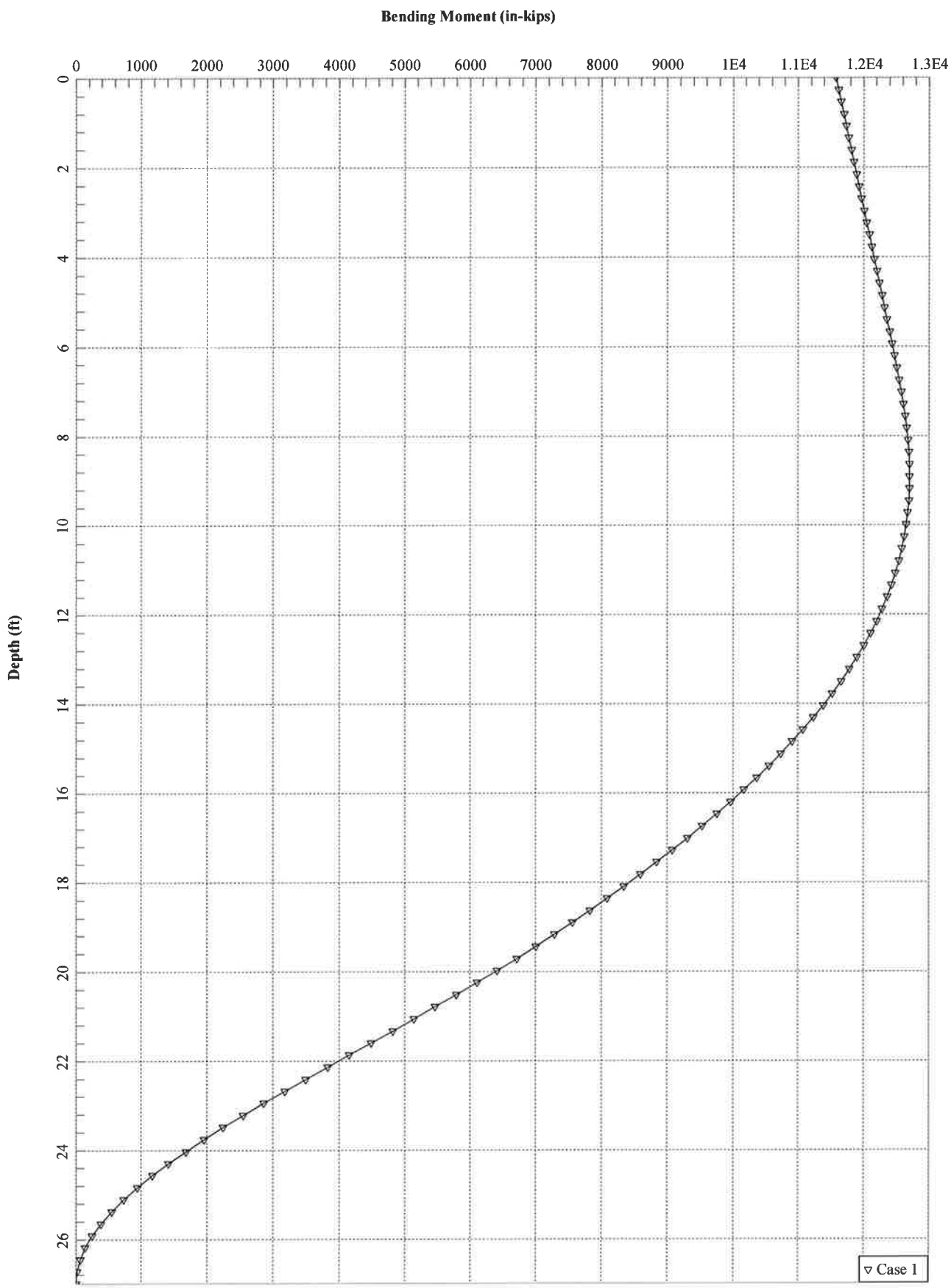
0.00798947	8387.64005	1994795.	1049837.	2.496781E+08
0.00889453	9337.81500	2220770.	1049837.	2.496781E+08
0.00965976	10141.17648	2411830.	1049837.	2.496781E+08
0.01032267	10837.07984	2577342.	1049833.	2.496779E+08
0.01090743	11450.91011	2723339.	1049827.	2.496776E+08
0.01143051	12000.00000	2853939.	1049822.	2.496773E+08

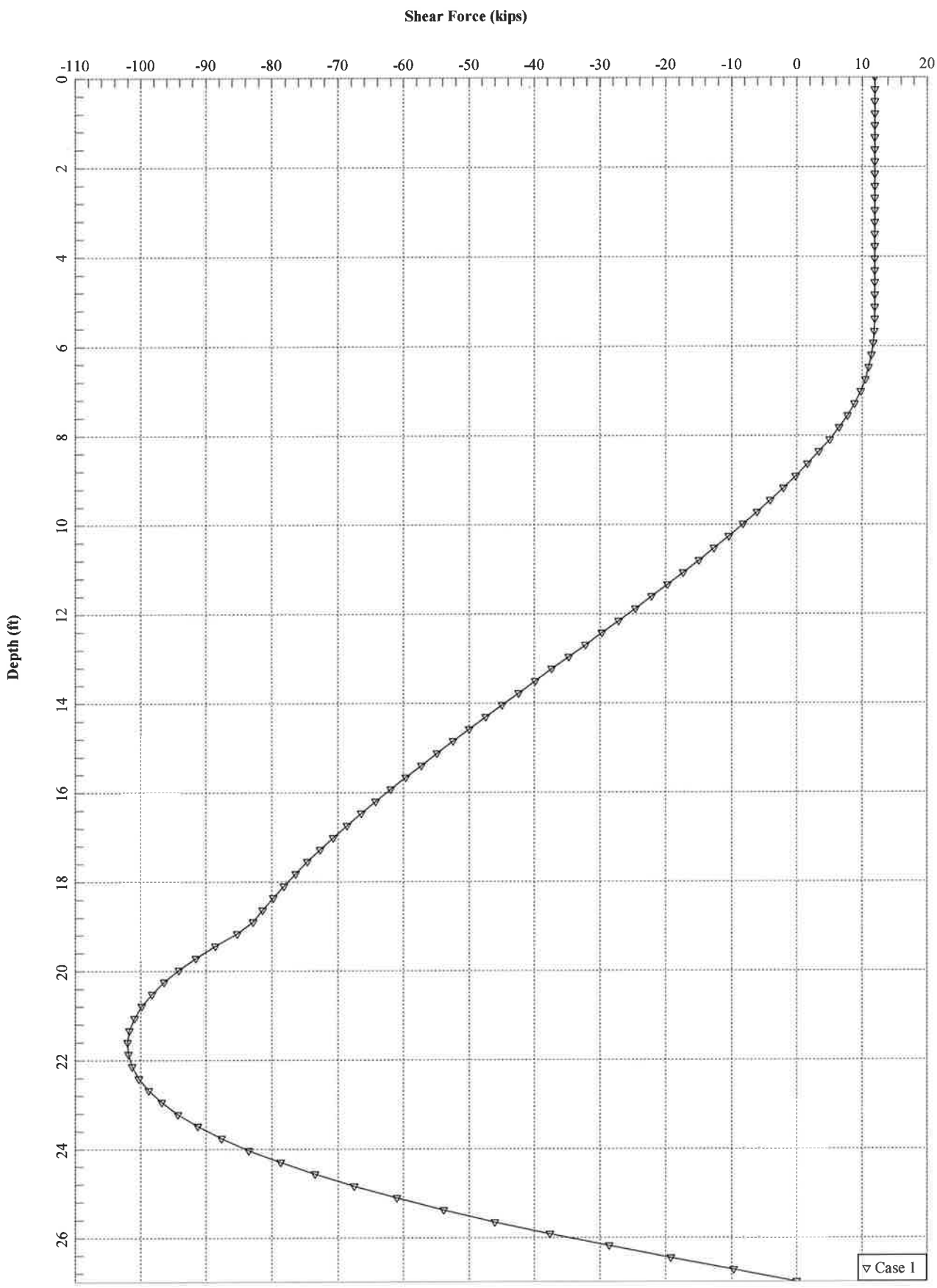
Top Rota. rad	Shear React. lbs	Mom. React. in-lbs	K23 lbs/rad	K33 in-lbs/rad
0.00001772	4423.15402	1158000.	2.496781E+08	6.536676E+10
0.00005333	13315.02015	3485927.	2.496781E+08	6.536676E+10
0.00008452	21103.80763	5525064.	2.496781E+08	6.536676E+10
0.00010668	26630.06604	6971855.	2.496332E+08	6.535494E+10
0.00012389	30916.68627	8094073.	2.495437E+08	6.533122E+10
0.00013797	34419.21383	9010991.	2.494661E+08	6.531052E+10
0.00014988	37380.62631	9786235.	2.494034E+08	6.529371E+10
0.00016020	39945.96365	10457782.	2.493523E+08	6.528000E+10
0.00016930	42208.78191	11050128.	2.493102E+08	6.526865E+10
0.00017745	44232.96318	11580000.	2.492748E+08	6.525909E+10

K22 = abs(Shear Reaction/Top y)
K23 = abs(Shear Reaction/Top Rotation)
K32 = abs(Moment Reaction/Top y)
K33 = abs(Moment Reaction/Top Rotation)

The analysis ended normally.


Lateral Deflection (in)
-0.2
-0.1
0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
Depth (ft)
0
2
4
6
8
10
12
14
16
18
20
22
24
26
Case 1


Bending Moment (in-kips)
0
1000
2000
3000
4000
5000
6000
7000
8000
9000
1E4
1.1E4
1.2E4
1.3E4
Depth (ft)
0
2
4
6
8
10
12
14
16
18
20
22
24
26
Case 1


Shear Force (kips)
-110
-100
-90
-80
-70
-60
-50
-40
-30
-20
-10
0
10
20
Depth (ft)
0
2
4
6
8
10
12
14
16
18
20
22
24
26
Case 1

SITE NAME	BLOOMFIELD BLUE HILLS, CT	ECP - CELL #	8-0280
LATITUDE	41-48-34.86 N	LONGITUDE	72-41-47.75 W
Additional Comments: 700 LTE antenna tilt change, RRH 60W upgrades, the other 2 ports on the 60W 700 RRH goe to the 2nd 700 LNX. Additional fiber line		SAVE BUTTON	
		STRUCTURE TYPE	MONOPOLE

700 LTE - Current Config	ALPHA		BETA		GAMMA	
EQUIPMENT TYPE	700 eNodeB		700 eNodeB		700 eNodeB	
ANTENNA TYPE	LNX-6514DS-A1M		X7C-FRO-660-V		LNX-6514DS-A1M	
QTY OF ANTENNAS PER FACE	1		1		1	
ORIENTATION (DEG)	10		150		270	
DOWN TILT (ELEC° + MECH°)	10° Elec + 0° Mech		10° Elec + 4° Mech		4° Elec + 0° Mech	
RAD CTR (FT AGL)	107		107		107	
TMA - QTY / MODEL						
DIPLEXER - QTY / MODEL						
RRH - QTY/MODEL	1	ALU RH_2X40-700	1	ALU RH_2X40-700	1	ALU RH_2X40-700
SECTOR DISTRIBUTION BOX						
MAIN DISTRIBUTION BOX						

700 LTE - Future Config	ALPHA		BETA		GAMMA	
EQUIPMENT TYPE	700 eNodeB		700 eNodeB		700 eNodeB	
ANTENNA TYPE	LNX-6514DS-A1M		X7C-FRO-660-V		LNX-6514DS-A1M	
QTY OF ANTENNAS PER FACE	2		2		2	
ORIENTATION (DEG)	10		150		270	
DOWN TILT (ELEC° + MECH°)	10° Elec + 0° Mech		10° Elec + 4° Mech		6° Elec + 0° Mech	
RAD CTR (FT AGL)	107		107		107	
TMA - QTY / MODEL						
DIPLEXER - QTY / MODEL						
RRH - QTY/MODEL	1	ALU RH_2X60-700U	1	ALU RH_2X60-700U	1	ALU RH_2X60-700U
SECTOR DISTRIBUTION BOX						
MAIN DISTRIBUTION BOX						

850 Cellular - Current Config	ALPHA		BETA		GAMMA	
EQUIPMENT TYPE	N/A		N/A		N/A	
ANTENNA TYPE	LPA-80063-6CF_5		LPA-80063-6CF_5		LPA-80063-6CF_5	
QTY OF ANTENNAS PER FACE	2		2		2	
ORIENTATION (DEG)	10		150		270	
DOWN TILT (ELEC° + MECH°)	5° Elec + 3° Mech		5° Elec + 4° Mech		5° Elec + 2° Mech	
RAD CTR (FT AGL)	107		107		107	
TMA - QTY / MODEL						
DIPLEXER - QTY / MODEL						

850 Cellular - Future Config	ALPHA		BETA		GAMMA	
EQUIPMENT TYPE	PCS Mod 4.0B		PCS Mod 4.0B		PCS Mod 4.0B	
ANTENNA TYPE	LNX-6514DS-A1M		LNX-6514DS-A1M		LNX-6514DS-A1M	
QTY OF ANTENNAS PER FACE	1		1		1	
ORIENTATION (DEG)	10		150		270	
DOWN TILT (ELEC° + MECH°)	8° Elec + 0° Mech		9° Elec + 0° Mech		7° Elec + 0° Mech	
RAD CTR (FT AGL)	107		107		107	
TMA - QTY / MODEL						
DIPLEXER - QTY / MODEL						

1900 PCS CDMA - Current Config	ALPHA		BETA		GAMMA	
EQUIPMENT TYPE	N/A		N/A		N/A	
ANTENNA TYPE	BXA-171063-12BF_2		BXA-171063-12CF_2		BXA-171063-12CF_2	
QTY OF ANTENNAS PER FACE	1		1		1	
ORIENTATION (DEG)	10		150		270	
DOWN TILT (ELEC° + MECH°)	2° Elec + 2° Mech		2° Elec + 2° Mech		2° Elec + 2° Mech	
RAD CTR (FT AGL)	107		107		107	
TMA - QTY / MODEL						
DIPLEXER - QTY / MODEL						

1900 PCS LTE - Future Config	ALPHA		BETA		GAMMA	
EQUIPMENT TYPE	PCS Mod 4.0B		PCS Mod 4.0B		PCS Mod 4.0B	
ANTENNA TYPE	SBNHH-1D65B		SBNHH-1D65B		SBNHH-1D65B	
QTY OF ANTENNAS PER FACE	1		1		1	
ORIENTATION (DEG)	10		150		270	
DOWN TILT (ELEC° + MECH°)	4° Elec + 0° Mech		4° Elec + 0° Mech		4° Elec + 0° Mech	
RAD CTR (FT AGL)	107		107		107	
TMA - QTY / MODEL						
DIPLEXER - QTY / MODEL						
RRH - QTY/MODEL	1	ALU RH_2X60-PCS	1	ALU RH_2X60-PCS	1	ALU RH_2X60-PCS
SECTOR DISTRIBUTION BOX						
MAIN DISTRIBUTION BOX						

2100 AWS LTE - Current Config	ALPHA		BETA		GAMMA	
EQUIPMENT TYPE	N/A		N/A		N/A	
ANTENNA TYPE	BXA-171063-12BF-EDIN-5		BXA-171063-12BF_2		BXA-171063-12BF_2	
QTY OF ANTENNAS PER FACE	1		1		1	
ORIENTATION (DEG)	30		150		270	
DOWN TILT (ELEC° + MECH°)	5° Elec + 0° Mech		2° Elec + 3° Mech		2° Elec + 2° Mech	
RAD CTR (FT AGL)	107		107		107	
TMA - QTY / MODEL						
DIPLEXER - QTY / MODEL						
RRH - QTY/MODEL	1	ALU RH_2X40-AWS	1	ALU RH_2X40-AWS	1	ALU RH_2X40-AWS
SECTOR DISTRIBUTION BOX	1	DB-E1-3B-8AB-0Z	1	DB-E1-3B-8AB-0Z	1	DB-E1-3B-8AB-0Z
MAIN DISTRIBUTION BOX	1				DB-T1-6Z-8AB-0Z	
2100 AWS LTE - Future Config	**ALPHA**		**BETA**		**GAMMA**	
EQUIPMENT TYPE	N/A		N/A		N/A	
ANTENNA TYPE	SBNHH-1D65B		SBNHH-1D65B		SBNHH-1D65B	
QTY OF ANTENNAS PER FACE	1		1		1	
ORIENTATION (DEG)	30		150		270	
DOWN TILT (ELEC° + MECH°)	5° Elec + 0° Mech		5° Elec + 0° Mech		4° Elec + 0° Mech	
RAD CTR (FT AGL)	107		107		107	
TMA - QTY / MODEL						
DIPLEXER - QTY / MODEL						
RRH - QTY/MODEL	1	ALU RH_2X60-AWS	1	ALU RH_2X60-AWS	1	ALU RH_2X60-AWS
SECTOR DISTRIBUTION BOX	1	DB-E1-3B-8AB-0Z	1	DB-E1-3B-8AB-0Z	1	DB-E1-3B-8AB-0Z
MAIN DISTRIBUTION BOX	1				DB-T1-6Z-8AB-0Z	

NUMBER OF CABLE'S NEEDED					Fiber Lines Model number			
TOTAL # FIBER LINES	2	TOTAL # OF MAINLINES		14	FIBER LINE MODEL #			
TOTAL # TOP JUMPERS	6	TOTAL # OF TOP JUMPERS		36	FIBER TOP JUMPER MODEL #			
Equipment Cable Ordering		**MAIN CABLE #**	14	+ 0	**TOP JUMPER #**	24	+	12

TX / RX FREQUENCIES			TX POWER OUTPUT	
Cellular A-Band	**PCS F / AWS-Band**	**700 Mhz C - Blc**	Cellular (Watts)	20
TX - 869-880,890-891.5 MHz	TX - 1970-1975 / 2145-2155	TX - 746-757	PCS (Watts)	16
RX - 824-835,845-846.5 MHz	RX - 1890-1895 / 1745-1755	RX - 776-787	LTE/ AWS (Watts)	40

ALPHA				BETA				GAMMA			
Ant.	Freq.	Func.	Color Code	Ant.	Freq.	Func.	Color Code	Ant.	Freq.	Func.	Color Code
A1	800	Tx1/Rx0	RED	A7	800	Tx2/Rx0	BLUE	A13	800	Tx3/Rx0	GREEN
A2	1900	Tx1/Rx0	RED/ WHITE	A8	1900	Tx2/Rx0	BLUE/ WHITE	A14	1900	Tx3/Rx0	GREEN/WHITE
A3	700	Tx1/Rx0	RED/ ORANGE	A9	700	Tx2/Rx0	BLUE/ ORANGE	A15	700	Tx3/Rx0	GREEN/ORANGE
A4	700	Tx4/Rx1	RED/RED/ ORANGE	A10	700	Tx5/Rx1	BLUE/BLUE/ ORANGE	A16	700	Tx6/Rx1	GREEN/GREEN/ ORANGE
A5	1900	Tx4/Rx1	RED/RED/ WHITE	A11	1900	Tx5/Rx1	BLUE/BLUE/ WHITE	A17	1900	Tx6/Rx1	GREEN/GREEN/ WHITE
A6	800	Tx4/Rx1	RED/RED	A12	800	Tx5/Rx1	BLUE/BLUE	A18	800	Tx6/Rx1	GREEN/GREEN
F1-A	1700	Tx/Rx	RED/ BROWN	F1-B	1700	Tx/Rx	BLUE/BROWN	F1-C	1700	Tx/Rx	GREEN/BROWN
F1-D	1700	Tx/Rx	RED/RED/ BROWN	F1-E	1700	Tx/Rx	BLUE/BLUE/BRO WN	F1-F	1700	Tx/Rx	GREEN/GREEN/BROWN

RF ENGINEER	RF MANAGER	INITIALS	DATE
Prepared By: Mark Brauer	Robert Hesselbach	MB	3/26/2015

X7C-FRO-660

Xpol, 58° H-Beam

698-896 MHz

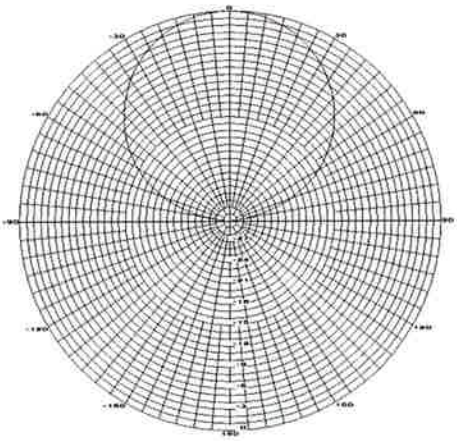
Link to Mechanical Drawing

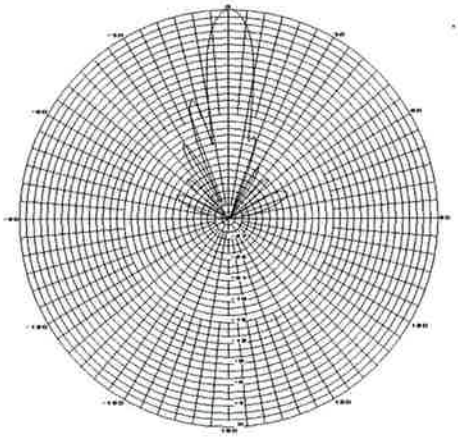
Electrical Specifications

Frequency	698-896 MHz
Polarization	Slant +/- 45
Gain @ 698 MHz	16.1 dBi
Gain @ 782 MHz	16.6 dBi
Gain @ 896 MHz	17.2 dBi
Horizontal Beam (3dB Points)	58°
Vertical Beam (3dB Points)	11°
Elect. Downtilt Range, 2° Increments	0-10°
VSWR / Return Loss	≤1.35:1 / 16.5 dB
VSWR w/ip	<1.50:1 / 14.0 dB
Front-to-Back at Horizon	>30 dB
Upper Side Lobe Suppression	<-18 dB
Impedance	50 Ohms
Power Input Per Connector	500 CW at 800 MHz
Isolation	< -27 dB
Intermodulation (2x20W)	<-150 dBc

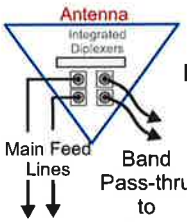
Mechanical Specifications

Input Connector (female)	Back 7/16 DIN or w/bot. opt.
Antenna Dimensions (LxWxD)	72.0 x 14.6 x 8.0 in. (1829 x 372 x 203mm)
*Antenna Weight	32.2 lbs
Bracket Weight	13.2 lbs
RF Distribution	Printed Microstrip Substrate
Radome	Ultra High-Strength Luran
Weatherability	UV Stabilized, ASTM D1925
Radome Water Absorption	ASTM D570, 0.45%
Environmental	MIL-STD-810E
Wind Survival	150 mph
Front Wind Load @100mph	208 lbf
Equivalent Flat Plate @100mph	4.23 sq-ft. (c=2)
Mounting Brackets	Fits 3.5 Inch Max. O.D. Pipe
Mechanical Downtilt Range	0-12°
Clamps/Bolts	Galvanized Steel/Stainless Steel





Available with Integrated Pass-Thru Diplexers to reduce mainline cables and eliminate separate external devices



Band Pass-thru to Adjacent Antennas 1710-2170MHz

Integrated Pass-Thru Diplexers will work with TMA's

Recommended Connector Coupling Torque
7/16 DIN: 220-265 lbf-in (25-30 N-m)

Return Loss at pass-thru port into 50Ω load ≥17.7 dB

Ordering Information & Options

X7C-FRO-660-x	"-x" is a placeholder for the built-in fixed electrical downtilt in degrees, set to 0, 2, 4, 6, 8 or 10
X7C-FRO-660-xip	"ip" option includes pass-thu integrated diplexer(s) which pass DC to the diplexer port(s)
X7C-FRO-660-xip-bot	for bottom mounted connectors, add "-bot" (otherwise antenna comes standard with back mounted connectors)

*Antenna Weight may vary slightly with options.

Published 120412
Subject to alteration.

Made in USA

Product Specifications

COMMSCOPE®

POWERED BY ANDREW.

LNX-6514DS-VTM

Andrew® Antenna, 698–896 MHz, 65° horizontal beamwidth, RET compatible

- Great solution to maximize network coverage and capacity
- Excellent gain, VSWR, front-to-back ratio, and PIM specifications for robust network performance
- Ideal choice for site collocations and tough zoning restrictions
- Excellent solution for site sharing and maximizing capacity
- Fully compatible with Andrew remote electrical tilt system for greater OpEx savings
- The RF connectors are designed for IP67 rating and the radome for IP56 rating

Electrical Specifications

Frequency Band, MHz	**698–806**	**806–896**
Gain, dBi	15.7	16.3
Beamwidth, Horizontal, degrees	65	65
Beamwidth, Horizontal Tolerance, degrees	±3	±3
Beamwidth, Vertical, degrees	12.5	11.2
Beam Tilt, degrees	0–10	0–10
USLS, typical, dB	17	18
Front-to-Back Ratio at 180°, dB	32	30
CPR at Boresight, dB	20	20
CPR at Sector, dB	10	10
Isolation, dB	30	30
VSWR | Return Loss, dB	1.4 | 15.6	1.4 | 15.6
PIM, 3rd Order, 2 x 20 W, dBc	-153	-153
Input Power per Port, maximum, watts	400	400
Polarization	±45°	±45°
Impedance	50 ohm	50 ohm

General Specifications

Antenna Brand	Andrew®
Antenna Type	DualPol®
Band	Single band
Brand	DualPol® | Teletilt®
Operating Frequency Band	698 – 896 MHz

Mechanical Specifications

Color	Light gray
Connector Interface	7-16 DIN Female
Connector Location	Bottom
Connector Quantity, total	2
Lightning Protection	dc Ground
Radiator Material	Aluminum
Radome Material	Fiberglass, UV resistant
Wind Loading, maximum	617.7 N @ 150 km/h 138.9 lbf @ 150 km/h
Wind Speed, maximum	241.0 km/h | 149.8 mph

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All specifications are subject to change without notice. See www.commscope.com for the most current information. Revised: December 17, 2013

Product Specifications

LNX-6514DS-VTM

Dimensions

Depth	181.0 mm | 7.1 in
Length	1847.0 mm | 72.7 in
Width	301.0 mm | 11.9 in
Net Weight	17.6 kg | 38.8 lb

Remote Electrical Tilt (RET) Information

Model with Factory Installed AISG 1.1 Actuator	LNX-6514DS-R2M
Model with Factory Installed AISG 2.0 Actuator	LNX-6514DS-A1M
RET System	Teletilt®

Regulatory Compliance/Certifications

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

Included Products

DB380 — Pipe Mounting Kit for 2.4"-4.5" (60-115mm) OD round members on wide panel antennas. Includes 2 clamp sets and double nuts.

DB5083 — Downtilt Mounting Kit for 2.4"-4.5" (60 - 115 mm) OD round members. Includes a heavy-duty, galvanized steel downtilt mounting bracket assembly and associated hardware. This kit is compatible with the DB380 pipe mount kit for panel antennas that are equipped with two mounting brackets.

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Product Specifications

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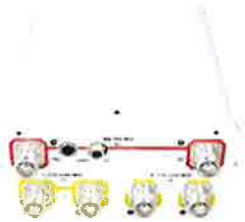

SBNHH-1D65B

Andrew® Tri-band Antenna, 698–896 and 2 x 1710–2360 MHz, 65° horizontal beamwidth, internal RET. Both high bands share the same electrical tilt.

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

Electrical Specifications

Frequency Band, MHz	698–806	806–896	1710–1880	1850–1990	1920–2180	2300–2360
Gain, dBi	14.9	14.7	17.7	18.2	18.6	18.6
Beamwidth, Horizontal, degrees	68	66	69	66	63	58
Beamwidth, Vertical, degrees	12.1	10.7	5.6	5.2	5.0	4.5
Beam Tilt, degrees	0–14	0–14	0–7	0–7	0–7	0–7
USLS, dB	14	13	15	15	15	13
Front-to-Back Ratio at 180°, dB	27	29	28	28	28	27
CPR at Boresight, dB	20	23	20	20	17	21
CPR at Sector, dB	14	10	12	10	9	1
Isolation, dB	25	25	25	25	25	25
Isolation, Intersystem, dB	30	30	30	30	30	30
VSWR | Return Loss, dB	1.5 | 14.0	1.5 | 14.0	1.5 | 14.0	1.5 | 14.0	1.5 | 14.0	1.5 | 14.0
PIM, 3rd Order, 2 x 20 W, dBc	-153	-153	-153	-153	-153	-153
Input Power per Port, maximum, watts	350	350	350	350	350	300
Polarization	±45°	±45°	±45°	±45°	±45°	±45°
Impedance	50 ohm	50 ohm	50 ohm	50 ohm	50 ohm	50 ohm

Electrical Specifications, BASTA*

Frequency Band, MHz	698–806	806–896	1710–1880	1850–1990	1920–2180	2300–2360
Gain by all Beam Tilts, average, dBi	14.5	14.3	17.4	17.9	18.2	18.3
Gain by all Beam Tilts Tolerance, dB	±0.5	±0.8	±0.4	±0.3	±0.5	±0.3
Gain by Beam Tilt, average, dBi	0 ° | 14.6	0 ° | 14.5	0 ° | 17.4	0 ° | 17.8	0 ° | 18.1	0 ° | 18.2
	7 ° | 14.6	7 ° | 14.4	3 ° | 17.5	3 ° | 17.9	3 ° | 18.3	3 ° | 18.4
	14 ° | 14.2	14 ° | 13.6	7 ° | 17.4	7 ° | 17.9	7 ° | 18.2	7 ° | 18.4
Beamwidth, Horizontal Tolerance, degrees	±2.2	±3.4	±2	±4.6	±5.7	±4.3
Beamwidth, Vertical Tolerance, degrees	±0.8	±1	±0.3	±0.2	±0.3	±0.2
USLS, dB	16	14	16	16	16	15
Front-to-Back Total Power at 180° ± 30°, dB	25	26	27	26	26	26
CPR at Boresight, dB	22	23	21	20	20	22
CPR at Sector, dB	13	11	16	12	11	4

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

General Specifications

Antenna Brand	Andrew®
Antenna Type	DualPol® multiband with internal RET
Band	Multiband
Brand	DualPol® | Teletilt®
Operating Frequency Band	1710 – 2360 MHz | 698 – 896 MHz

Mechanical Specifications

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Product Specifications

SBNHH-1D65B

Color	Light gray
Lightning Protection	dc Ground
Radiator Material	Aluminum | Low loss circuit board
Radome Material	Fiberglass, UV resistant
Reflector Material	Aluminum
RF Connector Interface	7-16 DIN Female
RF Connector Location	Bottom
RF Connector Quantity, total	6
Wind Loading, maximum	617.7 N @ 150 km/h 138.9 lbf @ 150 km/h
Wind Speed, maximum	241.4 km/h | 150.0 mph

Dimensions

Depth	181.0 mm | 7.1 in
Length	1828.0 mm | 72.0 in
Width	301.0 mm | 11.9 in
Net Weight	18.4 kg | 40.6 lb

Remote Electrical Tilt (RET) Information

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

Regulatory Compliance/Certifications

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

Included Products

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

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ALCATEL-LUCENT B13 RRH4X30-4R

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

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

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

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

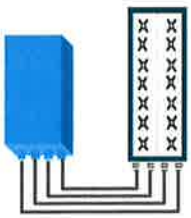
Its compactness and slim design makes the Alcatel-Lucent B13 RRH4x30-4R easy to install close to the antenna: operators can therefore locate this Remote Radio Head where RF design conditions are deemed ideal, minimizing trade-offs between available sites and RF optimum sites, together with reducing the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

FEATURES

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

BENEFITS

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



4x30W with 4T4R
or
2x60W with 2T4R

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

TECHNICAL SPECIFICATIONS

Features & performance	
Number of TX/RX paths	4 duplexed (either 4T4R or 2T4R by SW)
Frequency band	U700 (C) (3GPP bands 13): DL: 746 - 756 MHz / UL: 777 - 787 MHz
Instantaneous bandwidth - #carriers	10MHz – 1 LTE carrier (in 10MHz occupied bandwidth)
LTE carrier bandwidth	10 MHz
RF output power	2x60W or 4x30W (by SW)
Noise figure – RX Diversity scheme	2 dB typ. (<2.5 dB max) – 2 or 4 way Rx diversity
Sizes (HxWxD) in mm (in.) **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

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NEW PCS RF MODULES FOR VZW

RRH2X60 - HW CHARACTERISTICS

LR14.3

	RRH2x60
RF Output Power	2x60W (4x30W HW Ready)
Instantaneous Bandwidth	60MHz
Target Reliability (Annual Return Rate)	<2%
Receiver	4 Branch Rx
Features	AISG 2.0 for RET/TMA
Power	-48VDC
	Internal Smart Bias-T
CPRI Ports	2 CPRI Rate 5 Ports
External Alarms	4 External User Alarms
Monitor Ports	TX, RX
Environmental	GR487 Compliance
RF Connectors	7/16 DIN (downward facing)
Dimensions	22"(h) x 12"(w)x 9.4" (d)**
Weight	55lb**

**- Includes solar shield but not mounting brackets (8 lbs.)

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ALCATEL-LUCENT WIRELESS PRODUCT DATASHEET

RRH2X60-AWS FOR BAND 4 APPLICATIONS

The Alcatel-Lucent RRH2x60-AWS is a high power, small form factor Remote Radio Head operating in the AWS frequency band (3GPP Band 4) for LTE technology. It is designed with an eco-efficient approach, providing operators with the means to achieve high quality and high capacity coverage with minimum site requirements and efficient operation.

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

The Alcatel-Lucent RRH2x60-AWS is linked to the BBU by an optical-fiber connection carrying downlink and uplink digital radio signals along with operations, administration and maintenance (OA&M) information.

SUPERIOR RF PERFORMANCE

The Alcatel-Lucent RRH2x60-AWS integrates all the latest technologies. This allows to offer best-in-class characteristics.

It delivers an outstanding 120 watts of total RF power thanks to its two transmit RF paths of 60 W each.

It is ideally suited to support multiple-input multiple-output (MIMO) 2x2 operation.

It includes four RF receivers to natively support 4-way uplink reception diversity. This improves the radio uplink coverage and this can be used to extend the cell radius commensurate with 2x2MIMO 2x60 W for the downlink.

It supports multiple discontinuous LTE carriers within an instantaneous bandwidth of 45 MHz corresponding to the entire AWS B4 spectrum.

The latest generation power amplifiers (PA) used in this product achieve high efficiency (>40%), resulting in improved power consumption figures.

OPTIMIZED TCO

The Alcatel-Lucent RRH2x60-AWS is designed to make available all the benefits of a distributed Node B, with excellent RF characteristics, with low capital expenditures (CAPEX) and low operating expenditures (OPEX).

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

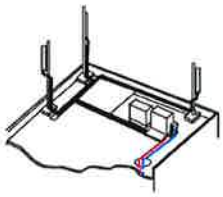
EASY INSTALLATION

The RRH2x60-AWS includes a reversible mounting bracket which allows for ease of installation behind an antenna, or on a rooftop knee wall while providing easy access to the mid body RF connectors.

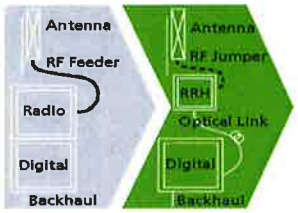
The limited space available in some sites may prevent the installation of traditional single-cabinet BTS equipment. However, many of these sites can host an Alcatel-Lucent RRH2x60-AWS installation, providing more flexible site selection and improved network quality along with greatly reduced installation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

The Alcatel-Lucent RRH2x60-AWS is a zero-footprint solution and is convection cooled without fans for silent operation, simplifying negotiations with site property owners and minimizing environmental impacts.

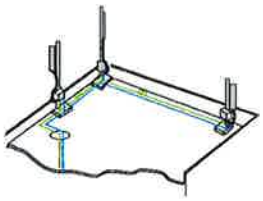
Installation can easily be done by a single person as the Alcatel–Lucent RRH2x60-AWS is compact and weighs about 20 kg, eliminating the need for a crane to hoist the BTS cabinet to the rooftop. A site can be in operation in less than one day.



Macro



RRH for space-constrained cell sites



Distributed

FEATURES

- RRH2x60-AWS integrates two power amplifiers of 60W rating (at each antenna connector)
- Support multiple carriers over the entire 3GPP band 4
- RRH2x60-AWS is optimized for LTE operation
- RRH2x60-AWS is a very compact and lightweight product
- Advanced power management techniques are embedded to provide power savings, such as PA bias control

BENEFITS

- MIMO LTE operation with only one single unit per sector
- Improved uplink coverage with built-in 4-way receive diversity capability
- RRH can be mounted close to the antenna, eliminating nearly all losses in RF cables and thus reducing power consumption by 50% compared to conventional solutions
- Distributed configurations provide easily deployable and cost-effective solutions, near zero footprint and silent solutions, with minimum impact on the neighborhood, which ease the deployment
- RETA and TMA support without additional hardware thanks to the AISG v2.0 port and the integrated Bias-Tees. Bias-Tees support AISG DC supply and signaling.

TECHNICAL SPECIFICATIONS

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

Dimensions and weights

- HxWxD : ~~510x285x186mm~~ 36.7"x10.6"x5.8" (27 l with solar shield)
- Weight : 20 kg (44 lbs)

Electrical Data

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

RF Characteristics

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

Connectivity

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

Environmental specifications

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

Safety and Regulatory Data

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

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Alcatel·Lucent

AT THE SPEED OF IDEAS™

Product Data Sheet DB-B1 and DB-T1 Series

DC and Fiber Management Distribution Boxes for HYBRIFLEX™ Cable

Product Description

The RFS Distribution Box design comes with the option for pluggable over voltage protection (OVP) for up to 6 remote radios and the connection for 6 pairs of optical fiber with LC optical fiber cable management. There is a hybrid cable input with a jumper configuration for power and optical fiber to the remote radio heads (RRHs). A custom wall, a 2-inch pole, and an H-Frame mounting bracket are included. Both the compact and standard design are available with lightening protection.

Features/Benefits

- Designed to accommodate varying diameters of HYBRIFLEX™ (combined power and fiber optic) cables – up to 2 inches
- Supports Single- and Multi-Mode Optical fiber
- NEMA 4x rated enclosure – allows **flexibility for indoor or outdoor installation** on a roof or tower top
- Weatherproof enclosure and ports – **improves system reliability**
- Modular design – makes replacement or addition of OVP easy without removal of other components within the box
- Strikesorb OVP technology – protects equipment from damaging surges up to 60 kA on an 8/20 waveform and up to 5 kA on a 10/350 waveform (certain models only)
- Low residual voltage and high impedance – **ideally suited for RRH technology** – won't shut down the RRH the way spark gap technology does (certain models only)

Technical Specifications

Mechanical Specifications

Model Number	DB-B1-6C-8AB-0Z	DB-T1-6Z-8AB-0Z
Enclosure Design	Standard, 6 OVP's	Standard without OVP
Dimensions - H x W x D, mm (in)	610 x 610 x 254 (24 x 24 x 10)	610 x 610 x 254 (24 x 24 x 10)
Weight, kg (lb)	20 (44)	20 (44)
Suppression Connection Method	Compression lug, #2-#14 AWG Copper, #2-#12 Aluminum	
Fiber Connection Method	LC-LC Single- or Multi-mode duplex	
Environmental Rating	NEMA 4x	
Operating Temperature, °C (°F)	-40 to +80 (-40 to +176)	
UV Protection	ISO 4892-2 Method A Xenon-Arc 2160 hrs	

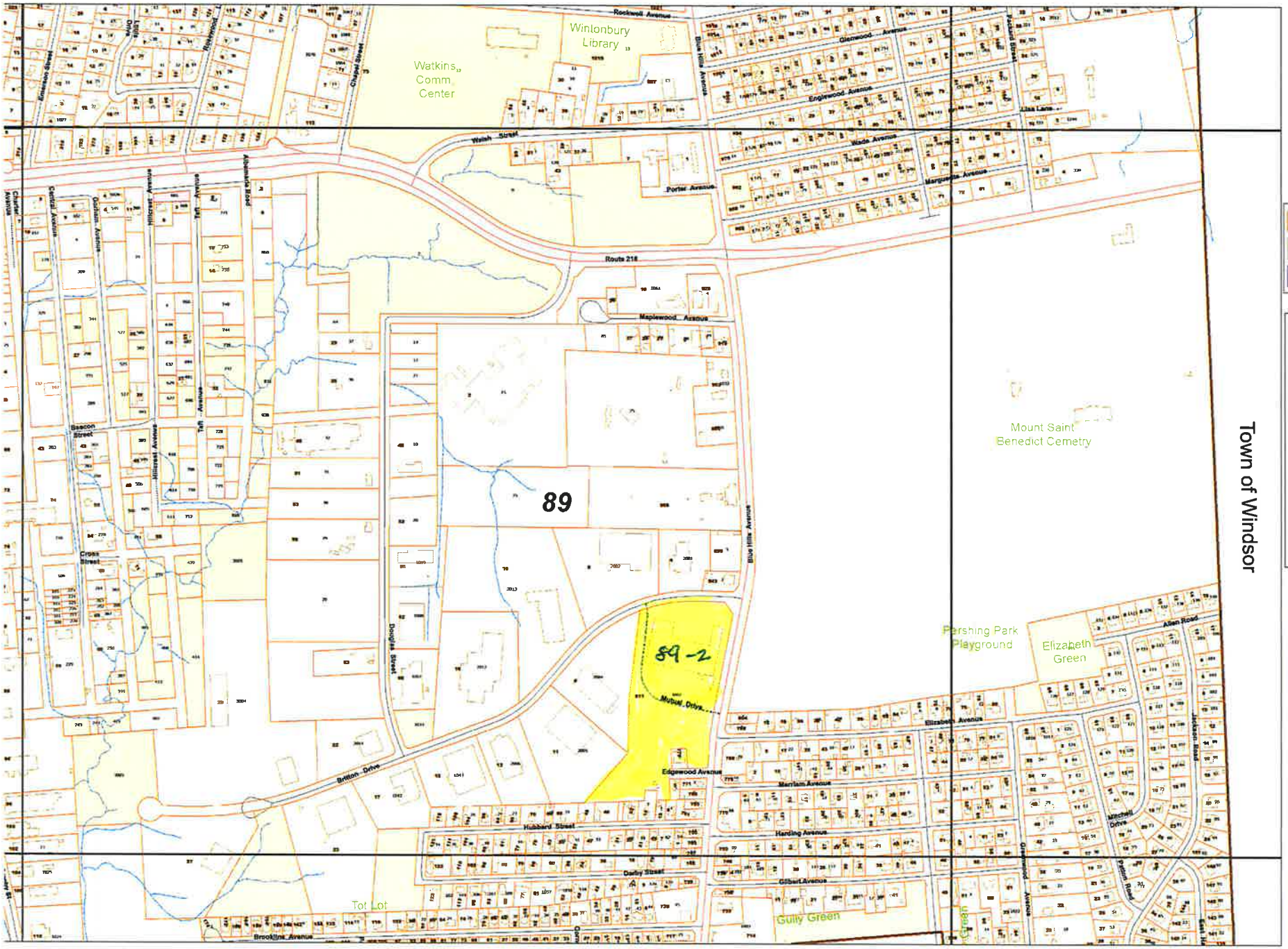
Electrical Specifications

Nominal Operating Voltage	48 VDC	
Nominal Discharge Current (I_n) per UL 1449 3rd Ed	20 kA 8/20 µs	N/A
Maximum Discharge Current (I_{max}) per NEMA LS-1	60 kA 8/20 µs	N/A
Maximum Impulse (Lightning) Current (I_{imp}) per IEC 61643-1	5 kA 10/350 µs	N/A
Maximum Continuous Operating Voltage (U_c)	75 VDC	N/A
Voltage Protection Rating per UL1449 3rd Ed	400 V	N/A
Protection Class as per IEC 61643-1	Class 1	N/A
Strikesorb OVP Compliance	ANSI/UL 1449-3rd Ed	N/A
	IEEE C62.41	N/A
	NEMA LS-1	N/A
	IEC 61643-1	N/A
	IEC 61643-12	N/A
	EN 61643-11	N/A

* This data is provisional and subject to change.

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

ATTACHMENT 4


Rockwell Avenue
Winlonbury Library
Watkins Comm. Center
Glenwood Avenue
Englewood Avenue
Lilac Lane
Blue Hills Avenue
Packard Street
Walsh Street
Wade Avenue
Porter Avenue
Marguerite Avenue
Route 218
Maplewood Avenue
Mount Saint Benedict Cemetry
Town of Windsor
89
89-2
Mutual Drive
Pershing Park Playground
Elizabeth Green
Elizabeth Avenue
Allen Road
Edgewood Avenue
Merriam Avenue
Harding Avenue
Hubbard Street
Derby Street
Gilbert Avenue
Gully Green
Tot Lot
Brookline Avenue
Britton Drive
Douglas Street
Bacon Street
Cross Street
Hillcrest Avenue
Taft Avenue
Alexander Road
Central Avenue
Dodson Avenue
Charter Avenue
Chapel Street
Rockwood
Erickson Street
Little Drive
Greenwood Avenue
Mitchell Drive
Jackson Road
Pleasant Road
CL&P
Town of Bloomfield
State of Connecticu
House Nos. in Brown
Lot Nos. in Black
State Route
Town Road (Paved)
Town Road (Unpaved)
Private Road
This map is for planning purposes only.
The Town of Bloomfield makes no claims, representations or warranties, expressed or imp concerning its validity, reliability or accuracy.
Data Sources: MDC, CRCOG
Imagery - CRCOG 2009
Scale 1:2400
(1 Inch = 200 Feet)
TOWN OF BLOOMFIELD CONNECTICUT

The town of Bloomfield Assessor

Recent Sales in Neighborhood | Previous Parcel | Next Parcel | Field Definitions | Return to Main Search | Bloomfield Home

Owner and Parcel Information

Owner Name	SAMO REALTY LLC	Today's Date	August 2, 2016
Mailing Address	811 BLUE HILLS AVE	Parcel ID	545 (Account #: R00574)
	BLOOMFIELD, CT 06002	Fire District	B
Location Address	811 BLUE HILLS AVE	Census Tract	4712
Map / Lot	89-2 / 3002	Acreage	6.98
Use Class / Description	300 Industrial	Parcel Map	Show Parcel Map / Owner List By Radius
Assessing Neighborhood	0001A	Utilities	

Current Appraised Value Information

Building Value	XF Value	OB Value	Land Value	Special Land Value	Total Appraised Value	Net Appraised Value	Current Assessment
$ 917,800	$ 9,400	$ 0	$ 422,600		$ 1,349,800	$ 1,349,800	$ 944,860

Assessment History

Year	Building	OB/Misc	Land	Total Assessment
Current	$ 642,460	0	$ 295,820	$ 944,860
2013	$ 663,390	0	$ 365,120	$ 1,034,390
2009	$ 663,390	0	$ 396,690	$ 1,065,960

Land Information

Use	Class	Zoning	Area	Value
Industrial	I	GWB	4.17 AC	$ 208,500
Industrial	I	GWB	2.81 AC	$ 14,100
Com Cell Site	C	GWB	1 BL	$ 200,000

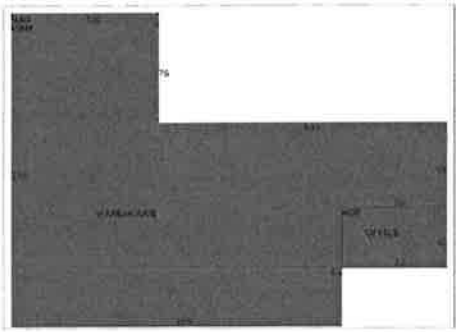
Commercial Building Information

Style	Year Built	Eff Year Built	Gross Area	Stories	Grade	Exterior Wall	Interior Wall	Wall Height	# Units
Warehouse - Storage	1985	1989	89,296	1	C	Concrete	Average	27	1
Roof Cover	**Roof Structure**	**Floor Type**	**Heat Type**	**Heat Fuel**	**AC Type**	**Sprinkler**	**Construction**	**Plumbing**	**Comm Walls**
Rolled Compos	Flat	Concrete	Gas	Hot Air-No Duc	None 27%	0%	Masonry	Average	0%

Building Sub Areas

Code	Description	Living Area	Gross Area	Effective Area
AOF	Office Area	3,024	3,024	
BAS	First Floor	43,136	43,136	
UBM	Basement	0	43,136	
	Totals	**46,160**	**89,296**	**56,753**

Building Sketch Enlarge



Building Photo Enlarge

Out Buildings / Extra Features

Description	Sub Description	Area	Year Built	Value
Ovhd 8'		10 UNITS	1989	$ 5,500
Ovhd 10'		2 UNITS	1989	$ 1,700
Ovhd 12'		2 UNITS	1989	$ 2,200

Sale Information

Sale Date	Sale Price	Deed Book/Page	Sale Qualification	Reason	Vacant or Improved	Owner
03/24/2005	$ 1,800,000	1226/ 94	Qualified	00	Improved	SAMO REALTY LLC
12/19/1995		277/ 219	Unqualified	Old sale- Validity unknown	Improved	BERNIE'S ASSOCIATES C/O MILTON P ROSENBERG

Permit Information

Permit ID	Issue Date	Type	Description	Amount	Inspection Date	% Complete	Date Complete	Comments
B-13-4521	09/25/2013	CM	Commercial	$ 1,000		0	10/01/2013	SIGN
B-13-4291	07/23/2013	CM	Commercial	$ 153,749		0	10/01/2013	SOLAR PANELS
B-13-4234	07/11/2013	CM	Commercial	$ 10,000		0	10/01/2013	REPL 3 ANTENNAS
B-12-3495	10/30/2012	CM	Commercial	$ 2,000		0	10/01/2013	SPRAY BOOTH

B-12-3170	07/24/2012	CM	Commercial	$ 100,000		0	10/01/2012	WIRELESS ANTENNA FORMERLY #23036
B-12-3081	06/22/2012	CM	Commercial	$ 15,000		0	10/01/2012	REPLACE 6 ANTENNAS
E-12-2706	03/09/2012	CM	Commercial	$ 1,500		0	10/01/2012	TENANT FITUP
PL-12-2677	02/28/2012	CM	Commercial	$ 1,500		0	10/01/2012	TENANT FITUP
B-12-2676	02/28/2012	CM	Commercial	$ 4,000		0	10/01/2012	TENANT FITUP
B23971	02/24/2005			$ 40,000		100		

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