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Also admitted in Massachusetts

February 28, 2018

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

Re: **Notice of Exempt Modification – Facility Modification**
117 Washington Avenue, North Haven, Connecticut

Dear Ms. Bachman:

Cellco Partnership d/b/a Verizon Wireless ("Cellco") currently maintains fifteen (15) antennas at the 117-foot level of the existing 120-foot tower at 117 Washington Avenue in North Haven, Connecticut (the "Property"). The tower is owned by Crown Castle ("Crown"). The Council approved Cellco's use of this tower in 1990 (Docket No. 117). Cellco now intends to replace six (6) of its existing antennas with three (3) model JAHH-65B-R3B, 700/2100 MHz antennas and three (3) model JAHH-65B-R3B, 850/1900 MHz antennas, all at the same level on the tower. Cellco also intends to remove six (6) existing remote radio heads ("RRHs") and install twelve (12) new RRHs on its existing antenna platform and install two (2) HYBRIFLEX™ fiber optic antenna cables. Included in Attachment 1 are specifications for Cellco's replacement antennas, RRHs and HYBRIFLEX™ cables.

Please accept this letter as notification pursuant to R.C.S.A. § 16-50j-73, for construction that constitutes an exempt modification pursuant to R.C.S.A. § 16-50j-72(b)(2). In accordance with R.C.S.A. § 16-50j-73, a copy of this letter is being sent to North Haven First Selectman, Michael J. Freda; Alan Fredricksen, North Haven's Land Use Administrator; Commercial Investment Group LLC, the owner of the Property; and Crown, the tower owner.

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

1. The proposed modifications will not result in an increase in the height of the existing tower. Cellco's replacement antennas and RRHs will be installed at the 117-foot level of the tower.

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

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

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

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

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

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

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

Sincerely,

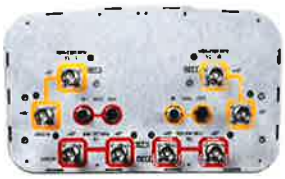
Kenneth C. Baldwin

Enclosures
Copy to:
Michael J. Freda, First Selectman
Alan Fredricksen, Land Use Administrator
Commercial Investment Group LLC
Crown Castle
Tim Parks

ATTACHMENT 1

Product Specifications

COMMSCOPE®



JAHH-65B-R3B

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

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

Electrical Specifications

Frequency Band, MHz	698–787	824–894	1695–1880	1850–1990	1920–2200	2300–2360
Gain, dBi	14.5	15.8	18.0	18.4	18.5	18.8
Beamwidth, Horizontal, degrees	67	65	63	63	65	68
Beamwidth, Vertical, degrees	12.4	10.5	5.7	5.2	4.9	4.4
Beam Tilt, degrees	2–14	2–14	0–10	0–10	0–10	0–10
USLS (First Lobe), dB	18	18	20	20	21	23
Front-to-Back Ratio at 180°, dB	32	34	31	35	36	38
Isolation, dB	25	25	25	25	25	25
Isolation, Intersystem, dB	30	30	30	30	30	30
VSWR | Return Loss, dB	1.5 | 14.0	1.5 | 14.0	1.5 | 14.0	1.5 | 14.0	1.5 | 14.0	1.5 | 14.0
PIM, 3rd Order, 2 x 20 W, dBc	-153	-153	-153	-153	-153	-153
Input Power per Port, maximum, watts	350	350	350	350	350	300
Polarization	±45°	±45°	±45°	±45°	±45°	±45°
Impedance	50 ohm	50 ohm	50 ohm	50 ohm	50 ohm	50 ohm

Electrical Specifications, BASTA*

Frequency Band, MHz	698–787	824–894	1695–1880	1850–1990	1920–2200	2300–2360
Gain by all Beam Tilts, average, dBi	14.3	14.9	17.6	18.1	18.2	18.5
Gain by all Beam Tilts Tolerance, dB	±0.3	±0.5	±0.6	±0.4	±0.5	±0.6
Gain by Beam Tilt, average, dBi	2 ° | 14.3	2 ° | 15.0	0 ° | 17.2	0 ° | 17.6	0 ° | 17.7	0 ° | 17.9
	8 ° | 14.3	8 ° | 14.9	5 ° | 17.6	5 ° | 18.2	5 ° | 18.3	5 ° | 18.7
	14 ° | 14.3	14 ° | 15.4	10 ° | 17.6	10 ° | 18.2	10 ° | 18.3	10 ° | 18.7
Beamwidth, Horizontal Tolerance, degrees	±1.2	±1.4	±4	±2.4	±2.9	±2.7
Beamwidth, Vertical Tolerance, degrees	±0.9	±0.5	±0.3	±0.2	±0.3	±0.1
USLS, beampeak to 20° above beampeak, dB	18	17	17	18	19	18
Front-to-Back Total Power at 180° ± 30°, dB	25	24	26	29	27	29
CPR at Boresight, dB	22	23	20	21	21	24
CPR at Sector, dB	11	12	11	11	11	8

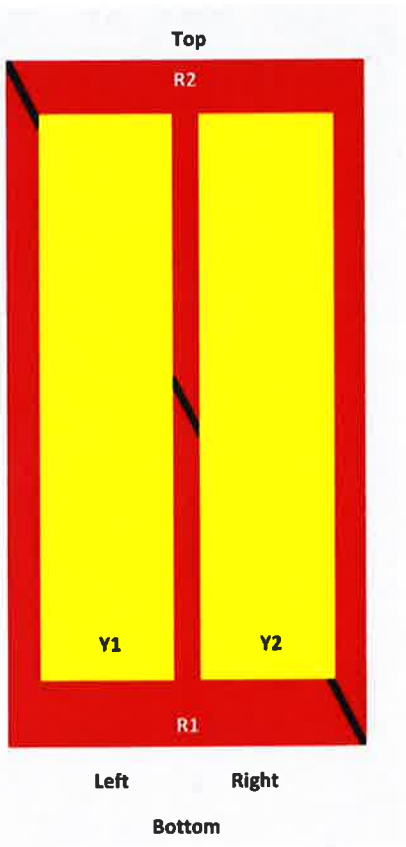
* CommScope® supports NGMN recommendations on Base Station Antenna Standards (BASTA). To learn more about the benefits of BASTA, download the whitepaper Time to Raise the Bar on BSAs.

Product Specifications

JAHH-65B-R3B

Array Layout

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



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

View from the front of the antenna

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

General Specifications

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

Mechanical Specifications

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

Product Specifications

JAHH-65B-R3B

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

Dimensions

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

Remote Electrical Tilt (RET) Information

Input Voltage	10–30 Vdc
Internal Bias Tee	Port 1 | Port 5
Internal RET	High band (1) | Low band (2)
Power Consumption, idle state, maximum	2 W
Power Consumption, normal conditions, maximum	13 W
Protocol	3GPP/AISG 2.0 (Single RET)
RET Interface	8-pin DIN Female | 8-pin DIN Male
RET Interface, quantity	2 female | 2 male

Packed Dimensions

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

Regulatory Compliance/Certifications

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

Product Specifications

JAHH-65B-R3B

Included Products

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

* Footnotes

Performance Note	Severe environmental conditions may degrade optimum performance

ALCATEL-LUCENT B13 RRH4X30-4R

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

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

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

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

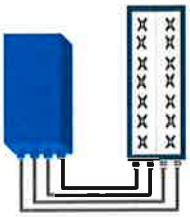
Its compactness and slim design makes the Alcatel-Lucent B13 RRH4x30-4R easy to install close to the antenna: operators can therefore locate this Remote Radio Head where RF design conditions are deemed ideal, minimizing trade-offs between available sites and RF optimum sites, together with reducing the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

FEATURES

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

BENEFITS

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



4x30W with 4T4R
or
2x60W with 2T4R

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

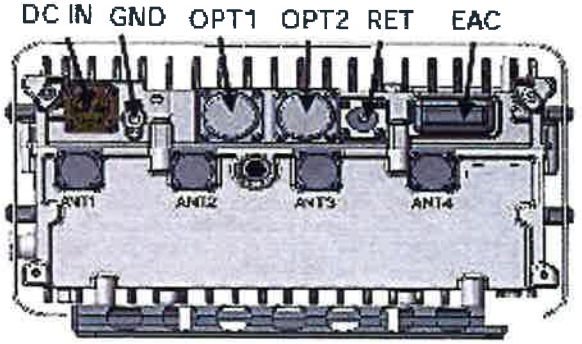
Alcatel·Lucent

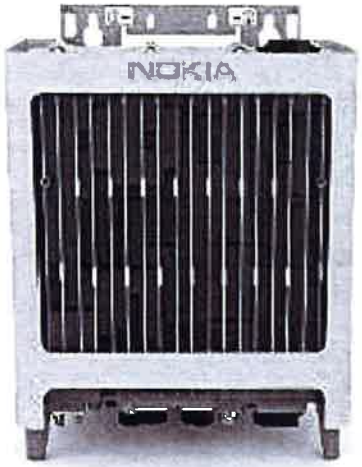
TECHNICAL SPECIFICATIONS

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

AHCA AirScale RRH 4T4R B5 160W

Supported Frequency bands	3GPP band 5
Frequencies	DL 869-894MHz, UL 824-849MHz
Number of TX/RX paths/pipes	4TX/4RX
Instantaneous Bandwidth IBW	25MHz (Full Band)
Occupied Bandwidth OBW	25MHz (Full Band)
Output Power	4T4R @ 40W / 2T4R @ 60W
RF Sharing	LTE, WCDMA, LTE + NB-IoT supported
256 QAM Back Off	No backoff at 40W and 0.8dB at 60W.
Supply Voltage / Voltage Range	DC-48V / -36V to -60V
Typical Power Consumption	365W [50% ETSI Busy Hour Load at 4TX @ 40W]
	529W [100% RF Load at 4 TX @ 40W]
	574W [100% RF Load at 4 TX @ 40W with SBT and AISG ON]
Antenna Ports	4 Ports, 4.3-10+
Optical Ports	2x CPRI 9.8 Gbps
ALD Control Interfaces	AISG3.0 from ANT 1, 2, 3, 4 and RET (Power supply ANT1 and ANT3)
Other Interfaces	External Alarm MDR-26 Serial connector (4 inputs, 1 Output) DC Circular Power Connector





Operational Temperature Range	-40°C to 55°C (with solar cover)
Dimensions (mm) Height x width x depth	337 x 295 x 165 (radio only) 13.3" x 11.7" x 6.5" 428 x 324 x 208 (with bracket and enclosure) 16.9" x 12.8" x 8.2"
Volume (liters)	16.5
Weight (kg)	16/ 35.3 lb – w/o bracket
Ingress protection class	IP65
Installation options	Pole or Wall, Vertical or Horizontal Book Mount
Surge protection	Class II 5kA

ALCATEL-LUCENT B25 RRH4X30

Alcatel-Lucent Band 25 Remote Radio Head 4x30W is the new 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 B25 RRH4x30 allows operators to have a compact radio solution to deploy LTE in the PCS band (1.9 GHz, 3GPP band 25), providing them with the means to achieve high capacity, high quality and high coverage with minimum site requirements.

The Alcatel-Lucent B25 RRH4x30 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, LTE carriers from 3 MHz up to 20 MHz and up to 65 MHz instantaneous bandwidth.

The Alcatel-Lucent B25 RRH4x30 is a near zero-footprint solution and operates noise free, simplifying negotiations with site property owners and minimizing environmental impacts.

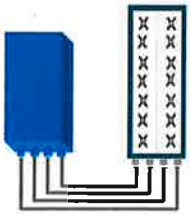
Its compactness and slim design makes the Alcatel-Lucent B25 RRH4x30 easy to install close to the antenna: operators can therefore locate this Remote Radio Head where RF design conditions are deemed ideal, minimizing trade-offs between available sites and RF optimum sites, together with reducing the RF feeder needs and installation costs.

FEATURES

- Supporting LTE in 1.9 GHz band (PCS, 3GPP band 2 & 25)
- LTE 2Tx or 4Tx MIMO (SW switchable)
- Output power: Up to 2x60W or 4x30W
- Ready for 3, 5, 10, 15 or 20MHz LTE carrier operation with 4Rx Diversity
- Ready to support up to 4 carriers anywhere in 65MHz instantaneous bandwidth
- Convection-cooled (fan-less)
- Supports AISG 2.0 devices (RET, TMA) through RS485 or RF ports

BENEFITS

- Compact to reduce additional footprint when adding LTE in PCS band
- MIMO scheme operation selection (2Tx or 4Tx) by software only
- Full flexibility for multiple carriers operation over entire PCS spectrum
- Improves downlink spectral efficiency and cell edge throughput through MIMO4
- Increases LTE coverage thanks to 4-way Rx diversity capability and best in class Rx sensitivity
- Flexible mounting options (Pole or Wall)



4x30W with 4T4R
or
2x60W with 2T4R

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

Alcatel·Lucent

Features & performance	
Number of TX/RX paths	4 duplexed (either 4T4R or 2T4R by SW)
Frequency band	3GPP bands 2 & 25 (PCS-G) DL: 1930 - 1995 MHz UL: 1850 - 1915 MHz
Instantaneous bandwidth - #carriers	65MHz – Up to 4 LTE carriers (in 40MHz occupied bandwidth)
LTE carrier bandwidth	3, 5, 10, 15 or 20 MHz
RF output power	2x60W or 4x30W (by SW)
Noise figure (3GPP band 2) RX Diversity scheme	2.0 dB typ. (<2.5 dB max) 2 or 4 way Rx diversity
Sizes (HxWxD)(w/ solar shield) in mm (in.) Volume (w/ solar shield) in L Weight (w/ solar shield) in kg (lb)	538 x 304 x 182 (21.2" x 12.0" x 7.2") 30 24 (53)
DC voltage range DC power consumption	-40.5 to -57V at full performance, -38 to -57V with relaxation on power consumption 580W typical @100% RF load
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 (> 14dB)
CPRI ports	2 CPRI ports (HW ready for Rate7 / 9.8 Gbps)
AISG interfaces	1 AISG2.0 output (RS485), +24V/2A DC power Integrated Smart Bias Tees (x2)
Misc. Interfaces	1 external alarms connector (4 alarms) 4 RF Tx & 4 RF Rx monitor ports 1 DC connector (2 pins)
Installation conditions	Pole and wall mounting
Regulatory compliance	3GPP 36.141 / 3GPP 36.113 / GR-1089-CORE / GR-3108-CORE / UL 60950-1 / FCC Part 27

ALCATEL-LUCENT B66A RRH4X45

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

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

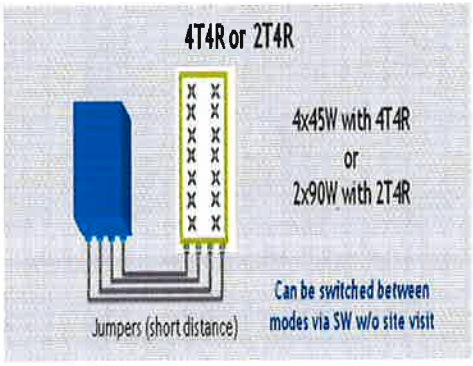
The Alcatel-Lucent B66a RRH4x45 product has four transmit RF paths, offering the possibility to **select, via software only, 2Tx or 4Tx MIMO configurations** with either 2x90W or 4x45W RF output power. It also supports 4-way Rx diversity at the 70 MHz instantaneous bandwidth.

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

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

FEATURES

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



BENEFITS

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

TECHNICAL SPECIFICATIONS

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

Alcatel·Lucent

Product Data Sheet HB158-1-08U8-S8J18

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

Product Description

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

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

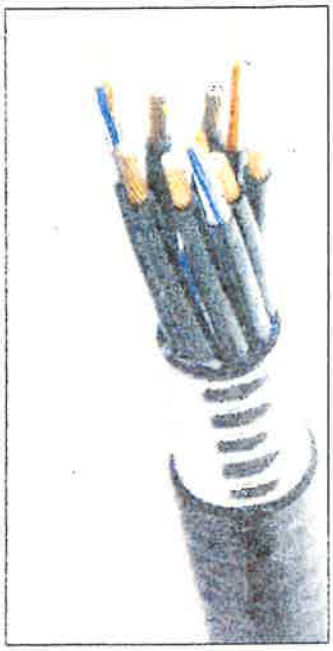


Figure 1: HYBRIFLEX Series

Features/Benefits

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

Technical Specifications

Outer Conductor Armor	Corrugated Aluminum	[mm (in)]	46.5 (1.83)
Jacket	Polyethylene, PE	[mm (in)]	50.3 (1.98)
UV-Protection	Individual and External Jacket		Yes
Mechanical Properties			
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)
Electrical Properties			
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)
Fiber Optic Properties			
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
DC for Applicable Types			
Size (Power)		[mm² (AWG)]	8.4 (8)
Quantity, Wire Count (Power)			16 (8 pairs)
Size (Alarm)		[mm² (AWG)]	0.8 (18)
Quantity, Wire Count (Alarm)			4 (2 pairs)
Type			UV protected
Strands			19
Primary Jacket Diameter, Nominal		[mm (in)]	6.8 (0.27)
Standards (Meets or exceeds)			NFPA 130, ICEA S-95-658 UL Type XHHW-2, UL 44 UL-LS Limited Smoke, UL VW-1 IEEE-383 (1974), IEEE1202/FT4 RoHS Compliant
Environment			
Installation Temperature		[°C (°F)]	-40 to +65 (-40 to149)
Operation Temperature		[°C (°F)]	-40 to +65 (-40 to149)

* This data is provisional and subject to change

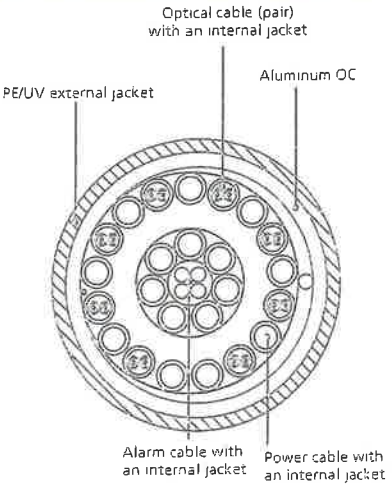


Figure 2: Construction Detail

ATTACHMENT 2

	General	Power	Density					
Site Name: North Haven								
Tower Height: 120'								
CARRIER	# OF CHAN.	WATTS ERP	HEIGHT	CALC. POWER DENS	FREQ.	MAX. PERMISS. EXP.	FRACTION MPE	Total
*Sprint	3	562	107	2657	0.0594	1.0000	0.59%	
*Sprint	2	4	107	22500	0.0003	1.0000	0.00%	
*Sprint	2	4	107	22500	0.0003	1.0000	0.00%	
*Sprint	1	438	106	850	0.0158	0.5667	0.28%	
*Sprint	2	438	106	850	0.0315	0.5667	0.56%	
*Sprint	5	623	106	1900	0.1120	1.0000	1.12%	
*Sprint	2	1556	106	1900	0.1119	1.0000	1.12%	
*Sprint	8	778	106	2500	0.2238	1.0000	2.24%	
*Clearwire	2	153	105	2496	0.0112	1.0000	0.11%	
*Clearwire	1	211	105	11 GHz	0.0077	1.0000	0.08%	
Verizon PCS	**1**	**2254**	**117**	**0.0592**	**1970**	**1.0000**	**5.92%**	
Verizon Cellular	**3**	**326**	**117**	**0.0257**	**876**	**0.5840**	**4.40%**	
Verizon Cellular	**1**	**1088**	**117**	**0.0286**	**869**	**0.5793**	**4.93%**	
Verizon AWS	**1**	**3375**	**117**	**0.0887**	**2145**	**1.0000**	**8.87%**	
Verizon 700	**1**	**945**	**117**	**0.0248**	**746**	**0.4973**	**4.99%**	
								35.2%
* Source: Siting Council								

ATTACHMENT 3

Date: **January 11, 2018**

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

Velocitel, Inc., d.b.a. FDH Velocitel
6521 Meridien Drive, Suite 107
Raleigh, North Carolina 27616
9197551012

Subject: **Structural Analysis Report**

Carrier Designation:	***Verizon Wireless* Co-Locate**	
	Carrier Site Number:	N/A
	Carrier Site Name:	N/A
Crown Castle Designation:	**Crown Castle BU Number:**	806454
	Crown Castle Site Name:	NHV 112 948129
	Crown Castle JDE Job Number:	451544
	Crown Castle Work Order Number:	1510019
	Crown Castle Application Number:	400176 Rev. 2
Engineering Firm Designation:	**FDH Velocitel Project Number:**	18PADX1400
Site Data:	**117 WASHINGTON STREET, NORTH HAVEN, New Haven County, CT**	
	Latitude *41° 23' 46.93"*, Longitude *-72° 51' 27.67"*	
	120 Foot - Monopole Tower	

Dear Charles McGuirt,

FDH Velocitel is pleased to submit this **"Structural Analysis Report"** to determine the structural integrity of the above mentioned tower. This analysis has been performed in accordance with the Crown Castle Structural 'Statement of Work' and the terms of Crown Castle Purchase Order Number 1126686, in accordance with application 400176, revision 2.

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

LC7: Existing + Reserved + Proposed Equipment **Sufficient Capacity**
Note: See Table I and Table II for the proposed and existing loading, respectively.

This analysis has been performed in accordance with the 2016 Connecticut State Building Code based upon an ultimate 3-second gust wind speed of 125 mph converted to a nominal 3-second gust wind speed of 97 mph per Section 1609.3 and Appendix N as required for use in the TIA-222-G Standard per Exception #5 of Section 1609.1.1. Exposure Category B with a maximum topographic factor, K_{zt}, of 1.000 and Risk Category II were used in this analysis.

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

Respectfully submitted by:

Michael Brennan, PE
Project Engineer III

Reviewed by:

Dennis D. Abel, PE
Director, New Product Development
CT PE License No. 23247

STATE OF CONNECTICUT
DENNIS D. ABEL
No. 23247
LICENSED PROFESSIONAL ENGINEER
01-11-2018

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1) INTRODUCTION

This tower is a 120 ft Monopole tower designed by VALMONT in March of 1990. The tower was originally designed for a wind speed of 90 mph per EIA-222-D.

2) ANALYSIS CRITERIA

The structural analysis was performed for this tower in accordance with the requirements of TIA-222-G Structural Standard for Antenna Supporting Structures and Antennas using a 3-second gust wind speed of 97 mph with no ice, 50 mph with 0.75 inch ice thickness and 60 mph under service loads, exposure category B and topographic category 1.

Table 1 - Proposed Antenna and Cable Information

Mounting Level (ft)	Center Line Elevation (ft)	Number of Antennas	Antenna Manufacturer	Antenna Model	Number of Feed Lines	Feed Line Size (in)	Note
115.0	117.0	6	commscope	JAHH-65B-R3B	2	1-5/8	-
		3	alcatel lucent	RRH2X60-700			
		1	rfs celwave	DB-T1-6Z-8AB-0Z			
		3	alcatel lucent	B25 RRH2X60 PCS			
		3	alcatel lucent	B66A RRH4X45			
		3	nokia	AIRSCALE RRH 4T4R B5 160W			

Table 2 - Existing Antenna and Cable Information

Mounting Level (ft)	Center Line Elevation (ft)	Number of Antennas	Antenna Manufacturer	Antenna Model	Number of Feed Lines	Feed Line Size (in)	Note
115.0	117.0	3	commscope	HBXX-6516DS-A2M	2	1-5/8	3
		3	commscope	LNX-6514DS-A1M			
		3	alcatel lucent	RRH2X60-AWS			
		3	alcatel lucent	RRH2X60-PCS			
		3	commscope	HBXX-6517DS-A2M	11	1-5/8	1
		6	decibel	DB844G65ZAXY			
		1	rfs celwave	DB-T1-6Z-8AB-0Z			
	115.0	1	-	Platform Mount [LP 602-1]			
107.0	108.0	3	alcatel lucent	800MHZ RRH	-	-	1
	107.0	1	-	Side Arm Mount [SO 102-3]			
	106.0	3	alcatel lucent	800 EXTERNAL NOTCH FILTER			
		3	alcatel lucent	1900MHz RRH (65MHz)			

Mounting Level (ft)	Center Line Elevation (ft)	Number of Antennas	Antenna Manufacturer	Antenna Model	Number of Feed Lines	Feed Line Size (in)	Note
105.0	109.0	1	dragonwave	A-ANT-23G-2-C	-	-	1
		1	andrew	VHLP2-18			
		1	andrew	VHLP800-11			
	106.0	3	rfs celwave	APXVSPP18-C-A20			
		9	rfs celwave	ACU-A20-N			
		3	rfs celwave	APXVTM14-C-120	1	1-1/4	2
		3	alcatel lucent	TD-RRH8x20-25			
	105.0	3	argus tech	LLPX310R	2 3 6 4	Conduit 1-1/4 5/16 7983A	1
		3	samsung telecom	FDD_R6_RRH			
		1	-	Platform Mount [LP 602-1]			
90.0	90.0	3	rfs celwave	APXV18-206517S-C	6	1-5/8	1
		1	-	Pipe Mount [PM 601-3]			

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

Table 3 - Design Antenna and Cable Information

Mounting Level (ft)	Center Line Elevation (ft)	Number of Antennas	Antenna Manufacturer	Antenna Model	Number of Feed Lines	Feed Line Size (in)
-						

3) ANALYSIS PROCEDURE

Table 4 - Documents Provided

Document	Remarks	Reference	Source
4-GEOTECHNICAL REPORTS	FDH Engineering	2294635	CCISITES
4-TOWER FOUNDATION DRAWINGS/DESIGN/SPECS	SAC Engineering	253930	CCISITES
4-TOWER MANUFACTURER DRAWINGS	Valmont	253972	CCISITES

3.1) Analysis Method

tnxTower (version 7.0.1.5), a commercially available analysis software package, was used to create a three-dimensional model of the tower and calculate member stresses for various loading cases. Selected output from the analysis is included in Appendix A.

3.2) Assumptions

1) Tower and structures were built in accordance with the manufacturer's specifications.
2) The tower and structures have been maintained in accordance with the manufacturer's specification.
3) The configuration of antennas, transmission cables, mounts and other appurtenances are as specified in Tables 1 and 2 and the referenced drawings.

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

4) ANALYSIS RESULTS

Table 5 - Section Capacity (Summary)

Section No.	Elevation (ft)	Component Type	Size	Critical Element	P (K)	SF*P_allow (K)	% Capacity	Pass / Fail
L1	120 - 77.33	Pole	TP30.45x21.91x0.22	1	-10.58	1268.88	52.1	Pass
L2	77.33 - 34.33	Pole	TP38.61x29.08x0.31	2	-18.84	2448.70	60.0	Pass
L3	34.33 - 0	Pole	TP44.85x36.85x0.38	3	-29.65	3512.82	61.3	Pass
							Summary	
						Pole (L3)	61.3	Pass
						RATING =	**61.3**	**Pass**

Table 6 - Tower Component Stresses vs. Capacity – LC7

Notes	Component	Elevation (ft)	% Capacity	Pass / Fail
1	Anchor Rods	0	58.2	Pass
1	Base Plate	0	52.3	Pass
1	Base Foundation Structural	0	30.6	Pass
1,2	Base Foundation Soil Interaction	0	OK	Pass

Structure Rating (max from all components) =	**61.3%**

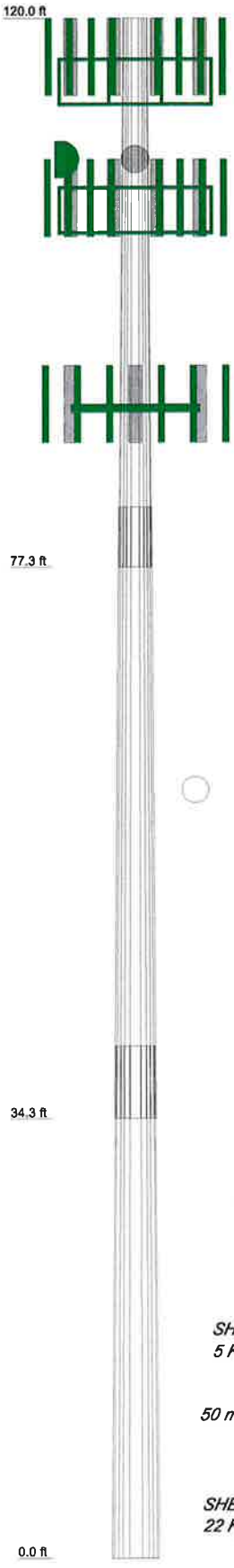
Notes:
1) See additional documentation in "Appendix C – Additional Calculations" for calculations supporting the % capacity consumed.
2) Foundation determined to be adequate per independent L-PILE analysis.

4.1) Recommendations

The tower and its foundation have sufficient capacity to carry the proposed loading configuration. No modifications are required at this time.

APPENDIX A

TNXTOWER OUTPUT



Section	1	2	3
Length (ft)	42.67	47.67	40.00
Number of Sides	12	12	12
Thickness (in)	0.22	0.31	0.38
Socket Length (ft)	4.67	5.67	
Top Dia (in)	21.91	29.08	36.85
Bot Dia (in)	30.45	38.61	44.85
Grade		A572-65	
Weight (K)	2.7	5.5	6.7

14.8

DESIGNED APPURTENANCE LOADING

TYPE	ELEVATION	TYPE	ELEVATION
(2) DB844G65ZAXY w/ Mount Pipe	115	1900MHz RRH (65MHz)	107
(2) DB844G65ZAXY w/ Mount Pipe	115	1900MHz RRH (65MHz)	107
(2) DB844G65ZAXY w/ Mount Pipe	115	Side Arm Mount [SO 102-3]	107
HBXX-6516DS-A2M w/ Mount Pipe	115	APXVSPP18-C-A20 w/ Mount Pipe	105
HBXX-6516DS-A2M w/ Mount Pipe	115	APXVSPP18-C-A20 w/ Mount Pipe	105
HBXX-6516DS-A2M w/ Mount Pipe	115	APXVSPP18-C-A20 w/ Mount Pipe	105
DB-T1-6Z-8AB-0Z	115	(3) ACU-A20-N	105
(2) JAHH-65B-R3B w/ Mount Pipe	115	(3) ACU-A20-N	105
(2) JAHH-65B-R3B w/ Mount Pipe	115	(3) ACU-A20-N	105
(2) JAHH-65B-R3B w/ Mount Pipe	115	APXVTM14-C-120 w/ Mount Pipe	105
RRH2x60-700	115	APXVTM14-C-120 w/ Mount Pipe	105
RRH2x60-700	115	APXVTM14-C-120 w/ Mount Pipe	105
RRH2x60-700	115	TD-RRH8x20-25	105
DB-T1-6Z-8AB-0Z	115	TD-RRH8x20-25	105
B25 RRH2x60 PCS	115	TD-RRH8x20-25	105
B25 RRH2x60 PCS	115	(2) Pipe Mount	105
B25 RRH2x60 PCS	115	Pipe Mount	105
B66A RRH4X45	115	LLPX310R w/ Mount Pipe	105
B66A RRH4X45	115	LLPX310R w/ Mount Pipe	105
B66A RRH4X45	115	LLPX310R w/ Mount Pipe	105
AIRSCALE RRH 4T4R B5 160W	115	FDD_R6_RRH	105
AIRSCALE RRH 4T4R B5 160W	115	FDD_R6_RRH	105
AIRSCALE RRH 4T4R B5 160W	115	FDD_R6_RRH	105
Platform Mount [LP 602-1]	115	Platform Mount [LP 602-1]	105
800MHZ RRH	107	A-ANT-23G-2-C	105
800MHZ RRH	107	VHLP2-18	105
800MHZ RRH	107	VHLP800-11	105
800 EXTERNAL NOTCH FILTER	107	Pipe Mount [PM 601-3]	90
800 EXTERNAL NOTCH FILTER	107	APXV18-206517S-C w/ Mount Pipe	90
800 EXTERNAL NOTCH FILTER	107	APXV18-206517S-C w/ Mount Pipe	90
1900MHz RRH (65MHz)	107	APXV18-206517S-C w/ Mount Pipe	90

MATERIAL STRENGTH

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

TOWER DESIGN NOTES

1. Tower is located in New Haven County, Connecticut.
2. Tower designed for Exposure B to the TIA-222-G Standard.
3. Tower designed for a 97 mph basic wind in accordance with the TIA-222-G Standard.
4. Tower is also designed for a 50 mph basic wind with 0.75 in ice. Ice is considered to increase in thickness with height.
5. Deflections are based upon a 60 mph wind.
6. Tower Structure Class II.
7. Topographic Category 1 with Crest Height of 0.00 ft
8. TOWER RATING: 61.3%

ALL REACTIONS ARE FACTORED

AXIAL 57 K

SHEAR 5 K *MOMENT 484 kip-ft*

TORQUE 0 kip-ft
50 mph WIND - 0.75 in ICE

AXIAL 30 K

SHEAR 22 K *MOMENT 1923 kip-ft*

TORQUE 2 kip-ft
REACTIONS - 97 mph WIND

FDH Velocitel
6521 Meridien Drive, Suite 107
Raleigh, North Carolina 27616
Phone: 9197551012
FAX: 9197551031

Tower Analysis

Job: 806454, NHV 112 948129			
Project: 18PADX1400			
Client: Crown Castle	Drawn by: mbrennan	App'd:	
Code: TIA-222-G	Date: 01/11/18	Scale: N	
Path: C:\Users\mbrennan\Desktop\NHV 112_CT\TWR\806454, NHV 112 948129.eri		Dwg No.	

Tower Input Data

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

Tower is located in New Haven County, Connecticut.
ASCE 7-10 Wind Data is used (wind speeds converted to nominal values).
Basic wind speed of 97 mph.
Structure Class II.
Exposure Category B.
Topographic Category 1.
Crest Height 0.00 ft.
Nominal ice thickness of 0.75 in.
Ice thickness is considered to increase with height.
Ice density of 56 pcf.
A wind speed of 50 mph is used in combination with ice.
Temperature drop of 50 °F.
Deflections calculated using a wind speed of 60 mph.
A non-linear (P-delta) analysis was used.
Pressures are calculated at each section.
Stress ratio used in pole design is 1.
Local bending stresses due to climbing loads, feed line supports, and appurtenance mounts are not considered.

Options

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

Tapered Pole Section Geometry

Section	Elevation ft	Section Length ft	Splice Length ft	Number of Sides	Top Diameter in	Bottom Diameter in	Wall Thickness in	Bend Radius in	Pole Grade
L1	120.00-77.33	42.67	4.67	12	21.91	30.45	0.22	0.88	A572-65 (65 ksi)
L2	77.33-34.33	47.67	5.67	12	29.08	38.61	0.31	1.25	A572-65

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
L3	34.33-0.00	40.00		12	36.85	44.85	0.38	1.50	(65 ksi) A572-65 (65 ksi)

Tapered Pole Properties

Section	Tip Dia. in	Area in^2	I in^4	r in	C in	I/C in^3	J in^4	It/Q in^2	w in	w/t
L1	22.68	15.30	918.60	7.77	11.35	80.94	1861.33	7.53	5.28	24.132
	31.52	21.32	2486.81	10.82	15.77	157.66	5038.96	10.49	7.57	34.583
L2	31.07	28.99	3061.61	10.30	15.06	203.27	6203.65	14.27	6.95	22.217
	39.97	38.60	7225.71	13.71	20.00	361.29	14641.24	19.00	9.51	30.379
L3	39.32	44.04	7479.36	13.06	19.09	391.83	15155.22	21.68	8.87	23.656
	46.43	53.70	13558.79	15.92	23.23	583.62	27473.79	26.43	11.01	29.373

Tower Elevation ft	Gusset Area (per face) ft^2	Gusset Thickness in	Gusset Grade	Adjust. Factor A_f	Adjust. Factor A_r	Weight Mult.	Double Angle Stitch Bolt Spacing Diagonals in	Double Angle Stitch Bolt Spacing Horizontals in	Double Angle Stitch Bolt Spacing Redundants in
L1 120.00-77.33				1	1	1			
L2 77.33-34.33				1	1	1			
L3 34.33-0.00				1	1	1			

Feed Line/Linear Appurtenances - Entered As Round Or Flat

Description	Sector	Component Type	Placement ft	Total Number	Number Per Row	Start/End Position	Width or Diameter in	Perimeter in	Weight plf
Safety Line 3/8	C	Surface Ar (CaAa)	120.00 - 0.00	1	1	0.000 0.000	0.38		0.22
***									
HB114-1-0813U4-M5J(1 1/4")	A	Surface Ar (CaAa)	105.00 - 8.00	3	3	-0.050 0.050	1.54		1.20
HB114-1-0813U4-M5J(1 1/4")	C	Surface Ar (CaAa)	105.00 - 8.00	1	1	-0.200 -0.200	1.54		1.20
***									
7983A(1/2")	C	Surface Ar (CaAa)	105.00 - 8.00	4	2	0.480 0.500	0.58		0.08
9207(5/16")	C	Surface Af (CaAa)	105.00 - 8.00	2	2	0.460 0.470	0.33	1.04	0.60
2" Rigid Conduit	C	Surface Ar (CaAa)	105.00 - 8.00	2	2	0.400 0.450	2.00		2.80
***									
LCF158-50J(1-5/8")	C	Surface Ar (CaAa)	90.00 - 8.00	6	6	-0.500 -0.250	2.01		0.92
***									

Feed Line/Linear Appurtenances - Entered As Area

Description	Face or Leg	Allow Shield	Component Type	Placement ft	Total Number		C_AA_A ft^2/ft	Weight plf
***								
561(1-5/8")	B	No	Inside Pole	115.00 - 8.00	11	No Ice	0.00	1.35
						1/2" Ice	0.00	1.35
						1" Ice	0.00	1.35
HB158-1-08U8-S8J18(1-5/8")	B	No	Inside Pole	115.00 - 8.00	2	No Ice	0.00	1.30
						1/2" Ice	0.00	1.30
						1" Ice	0.00	1.30
9207(5/16")	C	No	Inside Pole	105.00 - 8.00	4	No Ice	0.00	0.60
						1/2" Ice	0.00	0.60
						1" Ice	0.00	0.60
***								

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	120.00-77.33	A	0.000	0.000	12.784	0.000	0.10
		B	0.000	0.000	0.000	0.000	0.66
		C	0.000	0.000	38.463	0.000	0.38
L2	77.33-34.33	A	0.000	0.000	19.866	0.000	0.15
		B	0.000	0.000	0.000	0.000	0.75
		C	0.000	0.000	87.010	0.000	0.71
L3	34.33-0.00	A	0.000	0.000	12.164	0.000	0.09
		B	0.000	0.000	0.000	0.000	0.46
		C	0.000	0.000	53.579	0.000	0.44

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	120.00-77.33	A	1.672	0.000	0.000	27.547	0.000	0.40
		B		0.000	0.000	0.000	0.000	0.66
		C		0.000	0.000	94.765	0.000	1.65
L2	77.33-34.33	A	1.580	0.000	0.000	42.809	0.000	0.63
		B		0.000	0.000	0.000	0.000	0.75
		C		0.000	0.000	183.482	0.000	3.11
L3	34.33-0.00	A	1.401	0.000	0.000	25.607	0.000	0.36
		B		0.000	0.000	0.000	0.000	0.46
		C		0.000	0.000	112.391	0.000	1.83

Feed Line Center of Pressure

Section	Elevation ft	CP_X in	CP_Z in	CP_X Ice in	CP_Z Ice in
L1	120.00-77.33	-0.33	0.46	-0.40	0.67

Section	Elevation	CP_X	CP_Z	CP_X Ice	CP_Z Ice
	ft	in	in	in	in
L2	77.33-34.33	-0.03	0.91	-0.19	1.00
L3	34.33-0.00	-0.02	0.82	-0.18	1.05

Shielding Factor Ka

Tower Section	Feed Line Record No.	Description	Feed Line Segment Elev.	K_a No Ice	K_a Ice
L1	1	Safety Line 3/8	77.33 - 120.00	1.0000	1.0000
L1	6	HB114-1-0813U4-M5J(1 1/4")	77.33 - 105.00	1.0000	1.0000
L1	7	HB114-1-0813U4-M5J(1 1/4")	77.33 - 105.00	1.0000	1.0000
L1	9	7983A(1/2")	77.33 - 105.00	1.0000	1.0000
L1	10	9207(5/16")	77.33 - 105.00	1.0000	1.0000
L1	12	2" Rigid Conduit	77.33 - 105.00	1.0000	1.0000
L1	14	LCF158-50J(1-5/8")	77.33 - 90.00	1.0000	1.0000
L2	1	Safety Line 3/8	34.33 - 77.33	1.0000	1.0000
L2	6	HB114-1-0813U4-M5J(1 1/4")	34.33 - 77.33	1.0000	1.0000
L2	7	HB114-1-0813U4-M5J(1 1/4")	34.33 - 77.33	1.0000	1.0000
L2	9	7983A(1/2")	34.33 - 77.33	1.0000	1.0000
L2	10	9207(5/16")	34.33 - 77.33	1.0000	1.0000
L2	12	2" Rigid Conduit	34.33 - 77.33	1.0000	1.0000
L2	14	LCF158-50J(1-5/8")	34.33 - 77.33	1.0000	1.0000

Discrete Tower Loads

Description	Face or Leg	Offset Type	Offsets: Horz Lateral ft / Vert ft / ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
level 115									
(2) DB844G65ZAXY w/ Mount Pipe	A	From Leg	4.00 0.00 2.00	0.000	115.00	No Ice 1/2" Ice 1" Ice	4.58 4.96 5.34	4.80 5.42 6.04	0.03 0.08 0.13
(2) DB844G65ZAXY w/ Mount Pipe	B	From Leg	4.00 0.00 2.00	0.000	115.00	No Ice 1/2" Ice 1" Ice	4.58 4.96 5.34	4.80 5.42 6.04	0.03 0.08 0.13
(2) DB844G65ZAXY w/ Mount Pipe	C	From Leg	4.00 0.00 2.00	0.000	115.00	No Ice 1/2" Ice 1" Ice	4.58 4.96 5.34	4.80 5.42 6.04	0.03 0.08 0.13
HBXX-6516DS-A2M w/ Mount Pipe	A	From Leg	4.00 0.00 2.00	0.000	115.00	No Ice 1/2" Ice 1" Ice	5.66 6.06 6.47	4.53 5.20 5.86	0.05 0.10 0.15

Description	Face or Leg	Offset Type	Offsets: Horz Lateral ft / Vert ft / ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
HBXX-6516DS-A2M w/ Mount Pipe	B	From Leg	4.00 0.00 2.00	0.000	115.00	No Ice 1/2" Ice 1" Ice	5.66 6.06 6.47	4.53 5.20 5.86	0.05 0.10 0.15
HBXX-6516DS-A2M w/ Mount Pipe	C	From Leg	4.00 0.00 2.00	0.000	115.00	No Ice 1/2" Ice 1" Ice	5.66 6.06 6.47	4.53 5.20 5.86	0.05 0.10 0.15
DB-T1-6Z-8AB-0Z	A	From Leg	4.00 0.00 2.00	0.000	115.00	No Ice 1/2" Ice 1" Ice	4.80 5.07 5.35	2.00 2.19 2.39	0.04 0.08 0.12
(2) JAHH-65B-R3B w/ Mount Pipe	A	From Leg	4.00 0.00 2.00	0.000	115.00	No Ice 1/2" Ice 1" Ice	9.35 9.92 10.46	7.65 8.83 9.73	0.09 0.16 0.25
(2) JAHH-65B-R3B w/ Mount Pipe	B	From Leg	4.00 0.00 2.00	0.000	115.00	No Ice 1/2" Ice 1" Ice	9.35 9.92 10.46	7.65 8.83 9.73	0.09 0.16 0.25
(2) JAHH-65B-R3B w/ Mount Pipe	C	From Leg	4.00 0.00 2.00	0.000	115.00	No Ice 1/2" Ice 1" Ice	9.35 9.92 10.46	7.65 8.83 9.73	0.09 0.16 0.25
RRH2x60-700	A	From Leg	4.00 0.00 2.00	0.000	115.00	No Ice 1/2" Ice 1" Ice	3.50 3.76 4.03	1.82 2.05 2.29	0.06 0.08 0.11
RRH2x60-700	B	From Leg	4.00 0.00 2.00	0.000	115.00	No Ice 1/2" Ice 1" Ice	3.50 3.76 4.03	1.82 2.05 2.29	0.06 0.08 0.11
RRH2x60-700	C	From Leg	4.00 0.00 2.00	0.000	115.00	No Ice 1/2" Ice 1" Ice	3.50 3.76 4.03	1.82 2.05 2.29	0.06 0.08 0.11
DB-T1-6Z-8AB-0Z	A	From Leg	4.00 0.00 2.00	0.000	115.00	No Ice 1/2" Ice 1" Ice	4.80 5.07 5.35	2.00 2.19 2.39	0.04 0.08 0.12
B25 RRH2x60 PCS	A	From Leg	4.00 0.00 2.00	0.000	115.00	No Ice 1/2" Ice 1" Ice	2.14 2.33 2.53	1.31 1.46 1.63	0.05 0.07 0.09
B25 RRH2x60 PCS	B	From Leg	4.00 0.00 2.00	0.000	115.00	No Ice 1/2" Ice 1" Ice	2.14 2.33 2.53	1.31 1.46 1.63	0.05 0.07 0.09
B25 RRH2x60 PCS	C	From Leg	4.00 0.00 2.00	0.000	115.00	No Ice 1/2" Ice 1" Ice	2.14 2.33 2.53	1.31 1.46 1.63	0.05 0.07 0.09
B66A RRH4X45	A	From Leg	4.00 0.00 2.00	0.000	115.00	No Ice 1/2" Ice 1" Ice	2.58 2.79 3.01	1.63 1.81 2.00	0.06 0.08 0.10
B66A RRH4X45	B	From Leg	4.00 0.00 2.00	0.000	115.00	No Ice 1/2" Ice 1" Ice	2.58 2.79 3.01	1.63 1.81 2.00	0.06 0.08 0.10
B66A RRH4X45	C	From Leg	4.00 0.00 2.00	0.000	115.00	No Ice 1/2" Ice 1" Ice	2.58 2.79 3.01	1.63 1.81 2.00	0.06 0.08 0.10
AIRSCALE RRH 4T4R B5 160W	A	From Leg	4.00 0.00 2.00	0.000	115.00	No Ice 1/2" Ice 1" Ice	1.29 1.43 1.58	0.72 0.83 0.96	0.04 0.05 0.06
AIRSCALE RRH 4T4R B5 160W	B	From Leg	4.00 0.00 2.00	0.000	115.00	No Ice 1/2" Ice 1" Ice	1.29 1.43 1.58	0.72 0.83 0.96	0.04 0.05 0.06
AIRSCALE RRH 4T4R B5 160W	C	From Leg	4.00 0.00 2.00	0.000	115.00	No Ice 1/2" Ice 1" Ice	1.29 1.43 1.58	0.72 0.83 0.96	0.04 0.05 0.06

Description	Face or Leg	Offset Type	Offsets: Horz Lateral ft / Vert ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
Platform Mount [LP 602-1]	C	None		0.000	115.00	No Ice	32.03	32.03	1.34
						1/2" Ice	38.71	38.71	1.80
						1" Ice	45.39	45.39	2.26
level 107									
800MHZ RRH	A	From Leg	4.00 0.00 1.00	0.000	107.00	No Ice 1/2" Ice 1" Ice	2.13 2.32 2.51	1.77 1.95 2.13	0.05 0.07 0.10
800MHZ RRH	B	From Leg	4.00 0.00 1.00	0.000	107.00	No Ice 1/2" Ice 1" Ice	2.13 2.32 2.51	1.77 1.95 2.13	0.05 0.07 0.10
800MHZ RRH	C	From Leg	4.00 0.00 1.00	0.000	107.00	No Ice 1/2" Ice 1" Ice	2.13 2.32 2.51	1.77 1.95 2.13	0.05 0.07 0.10
800 EXTERNAL NOTCH FILTER	A	From Leg	4.00 0.00 -1.00	0.000	107.00	No Ice 1/2" Ice 1" Ice	0.66 0.76 0.87	0.32 0.40 0.48	0.01 0.02 0.02
800 EXTERNAL NOTCH FILTER	B	From Leg	4.00 0.00 -1.00	0.000	107.00	No Ice 1/2" Ice 1" Ice	0.66 0.76 0.87	0.32 0.40 0.48	0.01 0.02 0.02
800 EXTERNAL NOTCH FILTER	C	From Leg	4.00 0.00 -1.00	0.000	107.00	No Ice 1/2" Ice 1" Ice	0.66 0.76 0.87	0.32 0.40 0.48	0.01 0.02 0.02
1900MHz RRH (65MHz)	A	From Leg	4.00 0.00 -1.00	0.000	107.00	No Ice 1/2" Ice 1" Ice	2.31 2.52 2.73	2.38 2.58 2.79	0.06 0.08 0.11
1900MHz RRH (65MHz)	B	From Leg	4.00 0.00 -1.00	0.000	107.00	No Ice 1/2" Ice 1" Ice	2.31 2.52 2.73	2.38 2.58 2.79	0.06 0.08 0.11
1900MHz RRH (65MHz)	C	From Leg	4.00 0.00 -1.00	0.000	107.00	No Ice 1/2" Ice 1" Ice	2.31 2.52 2.73	2.38 2.58 2.79	0.06 0.08 0.11
Side Arm Mount [SO 102-3]	C	None		0.000	107.00	No Ice 1/2" Ice 1" Ice	3.00 3.48 3.96	3.00 3.48 3.96	0.08 0.11 0.14
level 105									
APXVSPP18-C-A20 w/ Mount Pipe	A	From Leg	4.00 0.00 1.00	0.000	105.00	No Ice 1/2" Ice 1" Ice	8.26 8.82 9.35	7.47 8.66 9.56	0.09 0.16 0.24
APXVSPP18-C-A20 w/ Mount Pipe	B	From Leg	4.00 0.00 1.00	0.000	105.00	No Ice 1/2" Ice 1" Ice	8.26 8.82 9.35	7.47 8.66 9.56	0.09 0.16 0.24
APXVSPP18-C-A20 w/ Mount Pipe	C	From Leg	4.00 0.00 1.00	0.000	105.00	No Ice 1/2" Ice 1" Ice	8.26 8.82 9.35	7.47 8.66 9.56	0.09 0.16 0.24
(3) ACU-A20-N	A	From Leg	4.00 0.00 1.00	0.000	105.00	No Ice 1/2" Ice 1" Ice	0.07 0.10 0.15	0.12 0.16 0.21	0.00 0.00 0.00
(3) ACU-A20-N	B	From Leg	4.00 0.00 1.00	0.000	105.00	No Ice 1/2" Ice 1" Ice	0.07 0.10 0.15	0.12 0.16 0.21	0.00 0.00 0.00
(3) ACU-A20-N	C	From Leg	4.00 0.00 1.00	0.000	105.00	No Ice 1/2" Ice 1" Ice	0.07 0.10 0.15	0.12 0.16 0.21	0.00 0.00 0.00
APXVTM14-C-120 w/ Mount Pipe	A	From Leg	4.00 0.00 1.00	0.000	105.00	No Ice 1/2" Ice 1" Ice	6.58 7.03 7.47	4.96 5.75 6.47	0.08 0.13 0.19
APXVTM14-C-120 w/	B	From Leg	4.00	0.000	105.00	No Ice	6.58	4.96	0.08

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
Mount Pipe			0.00			1/2" Ice	7.03	5.75	0.13
			1.00			1" Ice	7.47	6.47	0.19
APXVTM14-C-120 w/ Mount Pipe	C	From Leg	4.00	0.000	105.00	No Ice	6.58	4.96	0.08
			0.00			1/2" Ice	7.03	5.75	0.13
			1.00			1" Ice	7.47	6.47	0.19
TD-RRH8x20-25	A	From Leg	4.00	0.000	105.00	No Ice	3.70	1.29	0.07
			0.00			1/2" Ice	3.95	1.46	0.09
			1.00			1" Ice	4.20	1.64	0.12
TD-RRH8x20-25	B	From Leg	4.00	0.000	105.00	No Ice	3.70	1.29	0.07
			0.00			1/2" Ice	3.95	1.46	0.09
			1.00			1" Ice	4.20	1.64	0.12
TD-RRH8x20-25	C	From Leg	4.00	0.000	105.00	No Ice	3.70	1.29	0.07
			0.00			1/2" Ice	3.95	1.46	0.09
			1.00			1" Ice	4.20	1.64	0.12
(2) Pipe Mount	A	From Leg	4.00	0.000	105.00	No Ice	1.20	1.20	0.02
			0.00			1/2" Ice	1.50	1.50	0.03
			0.00			1" Ice	1.81	1.81	0.04
Pipe Mount	C	From Leg	4.00	0.000	105.00	No Ice	1.20	1.20	0.02
			0.00			1/2" Ice	1.50	1.50	0.03
			0.00			1" Ice	1.81	1.81	0.04
LLPX310R w/ Mount Pipe	A	From Leg	4.00	0.000	105.00	No Ice	4.54	2.98	0.05
			0.00			1/2" Ice	4.89	3.53	0.08
			0.00			1" Ice	5.25	4.09	0.13
LLPX310R w/ Mount Pipe	B	From Leg	4.00	0.000	105.00	No Ice	4.54	2.98	0.05
			0.00			1/2" Ice	4.89	3.53	0.08
			0.00			1" Ice	5.25	4.09	0.13
LLPX310R w/ Mount Pipe	C	From Leg	4.00	0.000	105.00	No Ice	4.54	2.98	0.05
			0.00			1/2" Ice	4.89	3.53	0.08
			0.00			1" Ice	5.25	4.09	0.13
FDD_R6_RRH	A	From Leg	4.00	0.000	105.00	No Ice	1.53	0.68	0.03
			0.00			1/2" Ice	1.69	0.80	0.04
			0.00			1" Ice	1.85	0.92	0.06
FDD_R6_RRH	B	From Leg	4.00	0.000	105.00	No Ice	1.53	0.68	0.03
			0.00			1/2" Ice	1.69	0.80	0.04
			0.00			1" Ice	1.85	0.92	0.06
FDD_R6_RRH	C	From Leg	4.00	0.000	105.00	No Ice	1.53	0.68	0.03
			0.00			1/2" Ice	1.69	0.80	0.04
			0.00			1" Ice	1.85	0.92	0.06
Platform Mount [LP 602-1]	C	None		0.000	105.00	No Ice	32.03	32.03	1.34
						1/2" Ice	38.71	38.71	1.80
						1" Ice	45.39	45.39	2.26
level 90									
APXV18-206517S-C w/ Mount Pipe	A	From Leg	4.00	0.000	90.00	No Ice	5.40	4.70	0.05
			0.00			1/2" Ice	5.96	5.86	0.10
			0.00			1" Ice	6.48	6.73	0.15
APXV18-206517S-C w/ Mount Pipe	B	From Leg	4.00	0.000	90.00	No Ice	5.40	4.70	0.05
			0.00			1/2" Ice	5.96	5.86	0.10
			0.00			1" Ice	6.48	6.73	0.15
APXV18-206517S-C w/ Mount Pipe	C	From Leg	4.00	0.000	90.00	No Ice	5.40	4.70	0.05
			0.00			1/2" Ice	5.96	5.86	0.10
			0.00			1" Ice	6.48	6.73	0.15
Pipe Mount [PM 601-3]	C	None		0.000	90.00	No Ice	4.39	4.39	0.20
						1/2" Ice	5.48	5.48	0.24
						1" Ice	6.57	6.57	0.28

Dishes

Description	Face or Leg	Dish Type	Offset Type	Offsets: Horz Lateral Vert ft	Azimuth Adjustment °	3 dB Beam Width °	Elevation ft	Outside Diameter ft		Aperture Area ft²	Weight K
level 105											
A-ANT-23G-2-C	A	Paraboloid w/Shroud (HP)	From Leg	4.00 0.00 4.00	0.000		105.00	2.17	No Ice 1/2" Ice 1" Ice	3.72 4.01 4.30	0.03 0.05 0.07
VHLP2-18	A	Paraboloid w/Shroud (HP)	From Leg	4.00 0.00 4.00	40.000		105.00	2.17	No Ice 1/2" Ice 1" Ice	3.72 4.01 4.30	0.03 0.05 0.07
VHLP800-11	C	Paraboloid w/Shroud (HP)	From Leg	4.00 0.00 4.00	0.000		105.00	2.80	No Ice 1/2" Ice 1" Ice	6.16 6.53 6.90	0.05 0.08 0.12

Compression Checks

Pole Design Data

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	A in²	P_u K	ϕP_n K	Ratio $\frac{P_u}{\phi P_n}$
L1	120 - 77.33 (1)	TP30.45x21.91x0.22	42.67	0.00	0.0	20.66	-10.58	1268.88	0.008
L2	77.33 - 34.33 (2)	TP38.61x29.08x0.31	47.67	0.00	0.0	37.46	-18.84	2448.70	0.008
L3	34.33 - 0 (3)	TP44.85x36.85x0.38	40.00	0.00	0.0	53.70	-29.65	3512.82	0.008

Pole Bending Design Data

Section No.	Elevation ft	Size	M_{ux} kip-ft	ϕM_{nx} kip-ft	Ratio $\frac{M_{ux}}{\phi M_{nx}}$	M_{uy} kip-ft	ϕM_{ny} kip-ft	Ratio $\frac{M_{uy}}{\phi M_{ny}}$
L1	120 - 77.33 (1)	TP30.45x21.91x0.22	387.77	757.66	0.512	0.00	757.66	0.000
L2	77.33 - 34.33 (2)	TP38.61x29.08x0.31	1097.10	1853.02	0.592	0.00	1853.02	0.000
L3	34.33 - 0 (3)	TP44.85x36.85x0.38	1923.20	3181.27	0.605	0.00	3181.27	0.000

Pole Shear Design Data

Section No.	Elevation ft	Size	Actual V_u K	ϕV_n K	Ratio $\frac{V_u}{\phi V_n}$	Actual T_u kip-ft	ϕT_n kip-ft	Ratio $\frac{T_u}{\phi T_n}$
L1	120 - 77.33 (1)	TP30.45x21.91x0.22	14.83	634.44	0.023	1.42	1536.30	0.001

Section No.	Elevation ft	Size	Actual V_u K	ϕV_n K	Ratio $\frac{V_u}{\phi V_n}$	Actual T_u kip-ft	ϕT_n kip-ft	Ratio $\frac{T_u}{\phi T_n}$
L2	77.33 - 34.33 (2)	TP38.61x29.08x0.31	18.86	1224.35	0.015	1.58	3757.35	0.000
L3	34.33 - 0 (3)	TP44.85x36.85x0.38	22.39	1756.41	0.013	1.58	6450.62	0.000

Pole Interaction Design Data

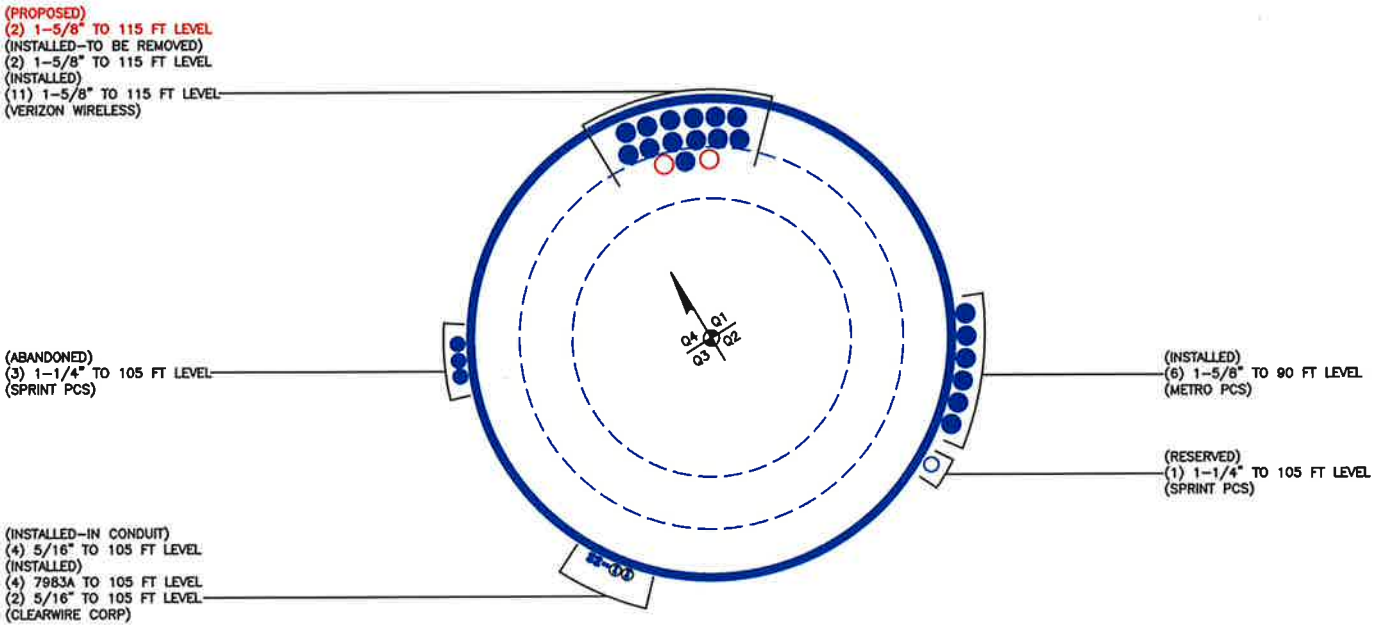
Section No.	Elevation ft	Ratio $\frac{P_u}{\phi P_n}$	Ratio $\frac{M_{ux}}{\phi M_{nx}}$	Ratio $\frac{M_{uy}}{\phi M_{ny}}$	Ratio $\frac{V_u}{\phi V_n}$	Ratio $\frac{T_u}{\phi T_n}$	Comb. Stress Ratio	Allow. Stress Ratio	Criteria
L1	120 - 77.33 (1)	0.008	0.512	0.000	0.023	0.001	0.521 ✔	1.000	4.8.2 ✔
L2	77.33 - 34.33 (2)	0.008	0.592	0.000	0.015	0.000	0.600 ✔	1.000	4.8.2 ✔
L3	34.33 - 0 (3)	0.008	0.605	0.000	0.013	0.000	0.613 ✔	1.000	4.8.2 ✔

Section Capacity Table

Section No.	Elevation ft	Component Type	Size	Critical Element	P K	ϕP_{allow} K	% Capacity	Pass Fail
L1	120 - 77.33	Pole	TP30.45x21.91x0.22	1	-10.58	1268.88	52.1	Pass
L2	77.33 - 34.33	Pole	TP38.61x29.08x0.31	2	-18.84	2448.70	60.0	Pass
L3	34.33 - 0	Pole	TP44.85x36.85x0.38	3	-29.65	3512.82	61.3	Pass
							Summary	
						Pole (L3)	61.3	Pass
						RATING =	**61.3**	**Pass**

APPENDIX B

BASE LEVEL DRAWING


(PROPOSED)
(2) 1-5/8" TO 115 FT LEVEL
(INSTALLED-TO BE REMOVED)
(2) 1-5/8" TO 115 FT LEVEL
(INSTALLED)
(11) 1-5/8" TO 115 FT LEVEL
(VERIZON WIRELESS)
(ABANDONED)
(3) 1-1/4" TO 105 FT LEVEL
(SPRINT PCS)
(INSTALLED-IN CONDUIT)
(4) 5/16" TO 105 FT LEVEL
(INSTALLED)
(4) 7983A TO 105 FT LEVEL
(2) 5/16" TO 105 FT LEVEL
(CLEARWIRE CORP)
Q1
Q2
Q3
Q4
(INSTALLED)
(6) 1-5/8" TO 90 FT LEVEL
(METRO PCS)
(RESERVED)
(1) 1-1/4" TO 105 FT LEVEL
(SPRINT PCS)

APPENDIX C

ADDITIONAL CALCULATIONS

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

TIA Rev G Assumption: Clear space between bottom of leveling nut and top of concrete **not** exceeding (1)*(Rod Diameter)

Site Data

BU#: *806454*
Site Name: *NHV 112 948129*
App #: *400176 Rev. 2*

Pole Manufacturer:	*Other*

Anchor Rod Data		
Qty:	12	
Diam:	2.25	in
Rod Material:	A615-J	
Strength (Fu):	100	ksi
Yield (Fy):	75	ksi
Bolt Circle:	53	in

Plate Data		
Diam:	57.16	in
Thick:	2.75	in
Grade:	36	ksi
Single-Rod B-eff:	12.02	in

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

Pole Data		
Diam:	44.85	in
Thick:	0.375	in
Grade:	65	ksi
# of Sides:	12	"0" IF Round
Fu	80	ksi
Reinf. Fillet Weld	0	"0" if None

Reactions		
Mu:	1923	ft-kips
Axial, Pu:	30	kips
Shear, Vu:	22	kips
Eta Factor, η	0.5	TIA G (Fig. 4-4)

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

Anchor Rod Results

		Rigid
Max Rod (Cu+ Vu/ή):	151.3 Kips	AISC LRFD
Allowable Axial, Φ*Fu*Anet:	260.0 Kips	φ*Tn
Anchor Rod Stress Ratio:	58.2% **Pass**	

Base Plate Results Flexural Check

		Rigid
Base Plate Stress:	17.0 ksi	AISC LRFD
Allowable Plate Stress:	32.4 ksi	φ*Fy
Base Plate Stress Ratio:	52.3% **Pass**	Y.L. Length: 28.24

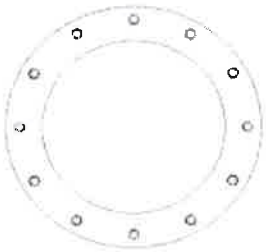
n/a

Stiffener Results

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

Pole Results

Pole Punching Shear Check: n/a



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

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

FDH VELOCITEL
ENGINEERING INNOVATION

FDH Velocitel -- 6521 Meridien Drive, Raleigh, NC 27616 -- Ph. 919.755.1012 -- Fax 919.755.1031

LPILE 2016 Foundation Inputs

Project & Site Details	
Project Number:	18PADX1400
Site Name:	NHV 112 948129
Site ID:	806454
Code	ANSI/TIA-222-G
Water Table Depth (ft)	13
Caisson Diameter (ft)	6
Caisson Length (ft)	59.75
Ext. Above Grade (ft)	0.5
Frost Depth (ft)	3.33
Neglected Depth (ft)	3.33
Total # of Soil Layers	5
Boring Log	B-1
Foundation Type	Monopole Caisson

TNX Reactions	Full Wind	
Moment	1,923	k-ft
Compression	30	k
Shear (comp.)	22	k

LPILE Input Reactions	Full Wind	
Moment	23,076,000	lb-in
Vertical Load Down	30,000	lbs
Horizontal Load (comp.)	22,000	lbs

*File was last imported on 01-11-2018 at 10:10:46

LPILE Output				
Reaction	Maximum Reaction*	Unit	Allowable Deflection (in)	Pass/Fail
Moment	25,200,000	lb-in		
Axial	30	k		
Tensile		k		
Full Wind Deflection	0.65	in	1.5	PASS

DSMC Inputs		
$Moment_{comp.}$	2,100.00	k-ft
Compression	30	k

Soil Parameters per Geotechnical Investigation					Soil Parameters for LPILE INPUT					
Layer	Thickness (ft)	Unit Weight, g (pcf)	Phi Angle (°)	Cohesion (psf)	Soil Type	Top of Layer (ft)	Bottom of Layer (ft)	Phi Angle (°)	Cohesion (psf)	Effective Unit Weight, g_{eff} (pcf)
1	3.33	105	0	0	Sand (Reese)	0.5	3.83	-	-	105
2	8.67	105	25	0	Sand (Reese)	3.83	12.5	25	0	105
3	1	110	0	1250	Stiff Clay without Free Water (Reese)	12.5	13.5	0	1250	110
4	29	110	0	1250	Stiff Clay without Free Water (Reese)	13.5	42.5	0	1250	47.6
5	59.25	115	0	1500	Stiff Clay without Free Water (Reese)	42.5	59.75	0	1500	52.6

LPile for Windows, Version 2016-09.010

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

This copy of LPile is being used by:

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St. Louis

Serial Number of Security Device: 140974183

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is a violation of the software license agreement.

Files Used for Analysis

Path to file locations:
\Users\mbrennan\Desktop\NHV 112, CT\FND\

Name of input data file:
806454, NHV 112 948129.lp9d

Name of output report file:
806454, NHV 112 948129.lp9o

Name of plot output file:
806454, NHV 112 948129.lp9p

Name of runtime message file:
806454, NHV 112 948129.lp9r

Date and Time of Analysis

Date: January 11, 2018 Time: 10:09:20

Problem Title

Project Name: NHV 112 948129

Job Number: 17QJIU1400

Client:

Engineer:

Description:

Program Options and Settings

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

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

Analysis Control Options:

- Maximum number of iterations allowed	=	500
- Deflection tolerance for convergence	=	1.0000E-04 in
- Maximum allowable deflection	=	100.0000 in
- Number of pile increments	=	100

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

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

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

Pile Structural Properties and Geometry

Number of pile sections defined	=	1
Total length of pile	=	59.750 ft
Depth of ground surface below top of pile	=	0.5000 ft

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

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

Point No.	Depth Below Pile Head feet	Pile Diameter inches
1	0.000	72.0000
2	59.750	72.0000

Input Structural Properties for Pile Sections:

Pile Section No. 1:

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

Length of section	=	59.750000 ft
Shaft Diameter	=	72.000000 in
Shear capacity of section	=	0.0000 lbs

Ground Slope and Pile Batter Angles

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

Soil and Rock Layering Information

The soil profile is modelled using 5 layers

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

Distance from top of pile to top of layer	=	0.500000 ft
Distance from top of pile to bottom of layer	=	3.830000 ft
Effective unit weight at top of layer	=	105.000000 pcf
Effective unit weight at bottom of layer	=	105.000000 pcf
Friction angle at top of layer	=	0.0010000 deg.
Friction angle at bottom of layer	=	0.0010000 deg.
Subgrade k at top of layer	=	0.0000 pci
Subgrade k at bottom of layer	=	0.0000 pci

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

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

Distance from top of pile to top of layer	=	3.830000 ft
Distance from top of pile to bottom of layer	=	12.500000 ft
Effective unit weight at top of layer	=	105.000000 pcf
Effective unit weight at bottom of layer	=	105.000000 pcf
Friction angle at top of layer	=	25.000000 deg.

Friction angle at bottom of layer	=	25.000000 deg.
Subgrade k at top of layer	=	0.0000 pci
Subgrade k at bottom of layer	=	0.0000 pci

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

Layer 3 is stiff clay without free water

Distance from top of pile to top of layer	=	12.500000 ft
Distance from top of pile to bottom of layer	=	13.500000 ft
Effective unit weight at top of layer	=	110.000000 pcf
Effective unit weight at bottom of layer	=	110.000000 pcf
Undrained cohesion at top of layer	=	1250. psf
Undrained cohesion at bottom of layer	=	1250. psf
Epsilon-50 at top of layer	=	0.0000
Epsilon-50 at bottom of layer	=	0.0000

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

Layer 4 is stiff clay without free water

Distance from top of pile to top of layer	=	13.500000 ft
Distance from top of pile to bottom of layer	=	42.500000 ft
Effective unit weight at top of layer	=	47.600000 pcf
Effective unit weight at bottom of layer	=	47.600000 pcf
Undrained cohesion at top of layer	=	1250. psf
Undrained cohesion at bottom of layer	=	1250. psf
Epsilon-50 at top of layer	=	0.0000
Epsilon-50 at bottom of layer	=	0.0000

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

Layer 5 is stiff clay without free water

Distance from top of pile to top of layer	=	42.500000 ft
Distance from top of pile to bottom of layer	=	59.750000 ft
Effective unit weight at top of layer	=	52.600000 pcf
Effective unit weight at bottom of layer	=	52.600000 pcf
Undrained cohesion at top of layer	=	1500. psf
Undrained cohesion at bottom of layer	=	1500. psf
Epsilon-50 at top of layer	=	0.0000
Epsilon-50 at bottom of layer	=	0.0000

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

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

Summary of Input Soil Properties

Layer Num.	Soil Type Name (p-y Curve Type)	Layer Depth ft	Effective Unit Wt. pcf	Undrained Cohesion psf	Angle of Friction deg.	E50 or kpy krm pci
1	Sand default	0.5000	105.0000	--	0.00100	--

	(Reese, et al.)	3.8300	105.0000	--	0.00100
--	default				
2	Sand	3.8300	105.0000	--	25.0000
--	default				
	(Reese, et al.)	12.5000	105.0000	--	25.0000
--	default				
3	Stiff Clay	12.5000	110.0000	1250.	--
default	--				
	w/o Free Water	13.5000	110.0000	1250.	--
default	--				
4	Stiff Clay	13.5000	47.6000	1250.	--
default	--				
	w/o Free Water	42.5000	47.6000	1250.	--
default	--				
5	Stiff Clay	42.5000	52.6000	1500.	--
default	--				
	w/o Free Water	59.7500	52.6000	1500.	--
default	--				

Static Loading Type

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

Pile-head Loading and Pile-head Fixity Conditions

Number of loads specified = 1

Load No.	Load Type	Condition 1	Condition 2	Axial Thrust Force, lbs	Compute Top y vs. Pile Length
1	1	V = 22000. lbs	M = 23076000. in-lbs	30000.	No

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

Computations of Nominal Moment Capacity and Nonlinear Bending Stiffness

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

Number of Pile Sections Analyzed = 1

Pile Section No. 1:

Dimensions and Properties of Drilled Shaft (Bored Pile):

Length of Section	=	59.750000 ft
Shaft Diameter	=	72.000000 in
Concrete Cover Thickness	=	3.000000 in
Number of Reinforcing Bars	=	36 bars
Yield Stress of Reinforcing Bars	=	60000. psi
Modulus of Elasticity of Reinforcing Bars	=	29000000. psi
Gross Area of Shaft	=	4072. sq. in.
Total Area of Reinforcing Steel	=	56.160000 sq. in.
Area Ratio of Steel Reinforcement	=	1.38 percent
Edge-to-Edge Bar Spacing	=	4.219389 in
Maximum Concrete Aggregate Size	=	0.750000 in
Ratio of Bar Spacing to Aggregate Size	=	5.63
Offset of Center of Rebar Cage from Center of Pile	=	0.0000 in

Axial Structural Capacities:

Nom. Axial Structural Capacity = 0.85 Fc Ac + Fy As	=	13608.727 kips
Tensile Load for Cracking of Concrete	=	-1642.497 kips
Nominal Axial Tensile Capacity	=	-3369.600 kips

Reinforcing Bar Dimensions and Positions Used in Computations:

Bar Number	Bar Diam. inches	Bar Area sq. in.	X inches	Y inches
1	1.410000	1.560000	32.295000	0.00000
2	1.410000	1.560000	31.804366	5.607968
3	1.410000	1.560000	30.347373	11.045541
4	1.410000	1.560000	27.968290	16.147500
5	1.410000	1.560000	24.739405	20.758826
6	1.410000	1.560000	20.758826	24.739405
7	1.410000	1.560000	16.147500	27.968290
8	1.410000	1.560000	11.045541	30.347373
9	1.410000	1.560000	5.607968	31.804366
10	1.410000	1.560000	0.00000	32.295000
11	1.410000	1.560000	-5.607968	31.804366
12	1.410000	1.560000	-11.045541	30.347373
13	1.410000	1.560000	-16.147500	27.968290
14	1.410000	1.560000	-20.758826	24.739405
15	1.410000	1.560000	-24.739405	20.758826
16	1.410000	1.560000	-27.968290	16.147500
17	1.410000	1.560000	-30.347373	11.045541
18	1.410000	1.560000	-31.804366	5.607968
19	1.410000	1.560000	-32.295000	0.00000
20	1.410000	1.560000	-31.804366	-5.607968
21	1.410000	1.560000	-30.347373	-11.045541
22	1.410000	1.560000	-27.968290	-16.147500
23	1.410000	1.560000	-24.739405	-20.758826
24	1.410000	1.560000	-20.758826	-24.739405
25	1.410000	1.560000	-16.147500	-27.968290
26	1.410000	1.560000	-11.045541	-30.347373
27	1.410000	1.560000	-5.607968	-31.804366
28	1.410000	1.560000	0.00000	-32.295000
29	1.410000	1.560000	5.607968	-31.804366
30	1.410000	1.560000	11.045541	-30.347373
31	1.410000	1.560000	16.147500	-27.968290

32	1.410000	1.560000	20.758826	-24.739405
33	1.410000	1.560000	24.739405	-20.758826
34	1.410000	1.560000	27.968290	-16.147500
35	1.410000	1.560000	30.347373	-11.045541
36	1.410000	1.560000	31.804366	-5.607968

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

Minimum spacing between any two bars not equal to zero = 4.219 inches
between bars 22 and 23.

Ratio of bar spacing to maximum aggregate size = 5.63

Concrete Properties:

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

Number of Axial Thrust Force Values Determined from Pile-head Loadings = 1

Number	Axial Thrust Force kips
1	30.000

Definitions of Run Messages and Notes:

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

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

Axial Thrust Force = 30.000 kips

Bending Max Conc Curvature Stress rad/in. ksi	Bending Max Steel Moment Stress in-kip ksi	Run Msg	Bending Stiffness kip-in2	Depth to N Axis in	Max Comp Strain in/in	Max Tens Strain in/in
4.16667E-07 0.0609825	2322. 0.4839610		5572404821.	40.4119480	0.00001684	-0.00001316

8.33333E-07	4632.	5557945183.	38.2136898	0.00003184	-0.00002816
0.1147440	0.9147975				
0.00000125	6929.	5543303603.	37.4809864	0.00004685	-0.00004315
0.1680095	1.3456358				
0.00000167	9214.	5528616261.	37.1146647	0.00006186	-0.00005814
0.2207789	1.7764755				
0.00000208	11487.	5513910594.	36.8948950	0.00007686	-0.00007314
0.2730522	2.2073165				
0.00000250	13748.	5499195752.	36.7484008	0.00009187	-0.00008813
0.3248294	2.6381590				
0.00000292	15996.	5484475667.	36.6437785	0.0001069	-0.0001031
0.3761105	3.0690029				
0.00000333	15996.	4798916209.	21.6177194	0.00007206	-0.0001679
0.2546180	-4.8354871 C				
0.00000375	15996.	4265703297.	21.4373237	0.00008039	-0.0001896
0.2832875	-5.4595410 C				
0.00000417	15996.	3839132967.	21.2945343	0.00008873	-0.0002113
0.3118286	-6.0834104 C				
0.00000458	15996.	3490120879.	21.1770128	0.00009706	-0.0002329
0.3402081	-6.7073720 C				
0.00000500	15996.	3199277473.	21.0788387	0.0001054	-0.0002546
0.3684328	-7.3313684 C				
0.00000542	15996.	2953179206.	20.9969883	0.0001137	-0.0002763
0.3965295	-7.9551731 C				
0.00000583	15996.	2742237834.	20.9279683	0.0001221	-0.0002979
0.4244981	-8.5787853 C				
0.00000625	15996.	2559421978.	20.8692170	0.0001304	-0.0003196
0.4523381	-9.2022044 C				
0.00000667	15996.	2399458104.	20.8188131	0.0001388	-0.0003412
0.4800494	-9.8254295 C				
0.00000708	15996.	2258313510.	20.7752875	0.0001472	-0.0003628
0.5076317	-10.4484597 C				
0.00000750	15996.	2132851648.	20.7374975	0.0001555	-0.0003845
0.5350846	-11.0712943 C				
0.00000792	15996.	2020596299.	20.7045411	0.0001639	-0.0004061
0.5624079	-11.6939324 C				
0.00000833	15996.	1919566484.	20.6756967	0.0001723	-0.0004277
0.5896013	-12.3163733 C				
0.00000875	15996.	1828158556.	20.6503801	0.0001807	-0.0004493
0.6166646	-12.9386160 C				
0.00000917	15996.	1745060440.	20.6281134	0.0001891	-0.0004709
0.6435974	-13.5606601 C				
0.00000958	15996.	1669188247.	20.6085018	0.0001975	-0.0004925
0.6703994	-14.1825041 C				
0.00001000	16151.	1615057435.	20.5912164	0.0002059	-0.0005141
0.6970705	-14.8041474 C				
0.00001042	16798.	1612566630.	20.5759809	0.0002143	-0.0005357
0.7236102	-15.4255892 C				
0.00001083	17444.	1610223918.	20.5625615	0.0002228	-0.0005572
0.7500183	-16.0468287 C				
0.00001125	18090.	1608012688.	20.5507590	0.0002312	-0.0005788
0.7762944	-16.6678649 C				
0.00001167	18736.	1605918703.	20.5404029	0.0002396	-0.0006004
0.8024384	-17.2886971 C				
0.00001208	19381.	1603929686.	20.5313460	0.0002481	-0.0006219
0.8284499	-17.9093242 C				
0.00001250	20025.	1602034998.	20.5234609	0.0002565	-0.0006435
0.8543285	-18.5297454 C				
0.00001292	20670.	1600225264.	20.5165169	0.0002650	-0.0006650
0.8800693	-19.1500047 C				
0.00001333	21313.	1598492401.	20.5104472	0.0002735	-0.0006865
0.9056727	-19.7700938 C				
0.00001375	21956.	1596829432.	20.5052865	0.0002819	-0.0007081

0.9311433	-20.3899670 C				
0.00001417	22599.	1595230046.	20.5009571	0.0002904	-0.0007296
0.9564808	-21.0096235 C				
0.00001458	23241.	1593688662.	20.4973900	0.0002989	-0.0007511
0.9816847	-21.6290621 C				
0.00001500	23883.	1592200318.	20.4945241	0.0003074	-0.0007726
1.0067548	-22.2482820 C				
0.00001542	24524.	1590760587.	20.4923047	0.0003159	-0.0007941
1.0316908	-22.8672821 C				
0.00001583	25165.	1589365508.	20.4906831	0.0003244	-0.0008156
1.0564924	-23.4860613 C				
0.00001625	25805.	1588011523.	20.4896154	0.0003330	-0.0008370
1.0811592	-24.1046187 C				
0.00001708	27084.	1585414346.	20.4889881	0.0003500	-0.0008800
1.1300871	-25.3410638 C				
0.00001792	28361.	1582946962.	20.4901512	0.0003671	-0.0009229
1.1784719	-26.5766089 C				
0.00001875	29636.	1580591193.	20.4928818	0.0003842	-0.0009658
1.2263111	-27.8112455 C				
0.00001958	30909.	1578331939.	20.4969951	0.0004014	-0.0010086
1.2736017	-29.0449649 C				
0.00002042	32180.	1576156557.	20.5023367	0.0004186	-0.0010514
1.3203411	-30.2777582 C				
0.00002125	33449.	1574054370.	20.5087767	0.0004358	-0.0010942
1.3665265	-31.5096164 C				
0.00002208	34715.	1572016303.	20.5162050	0.0004531	-0.0011369
1.4121551	-32.7405305 C				
0.00002292	35980.	1570034792.	20.5243665	0.0004704	-0.0011796
1.4572142	-33.9705980 C				
0.00002375	37242.	1568103166.	20.5331763	0.0004877	-0.0012223
1.5016999	-35.1998250 C				
0.00002458	38503.	1566215589.	20.5427022	0.0005050	-0.0012650
1.5456175	-36.4281155 C				
0.00002542	39761.	1564367001.	20.5528863	0.0005224	-0.0013076
1.5889640	-37.6554605 C				
0.00002625	41017.	1562552997.	20.5636779	0.0005398	-0.0013502
1.6317363	-38.8818507 C				
0.00002708	42271.	1560769701.	20.5750330	0.0005572	-0.0013928
1.6739316	-40.1072767 C				
0.00002792	43522.	1559013689.	20.5869131	0.0005747	-0.0014353
1.7155467	-41.3317289 C				
0.00002875	44772.	1557281994.	20.5992843	0.0005922	-0.0014778
1.7565786	-42.5551967 C				
0.00002958	46019.	1555571776.	20.6121166	0.0006098	-0.0015202
1.7970241	-43.7776715 C				
0.00003042	47264.	1553880678.	20.6253838	0.0006274	-0.0015626
1.8368801	-44.9991426 C				
0.00003125	48506.	1552206526.	20.6390624	0.0006450	-0.0016050
1.8761432	-46.2195996 C				
0.00003208	49747.	1550547363.	20.6531317	0.0006626	-0.0016474
1.9148103	-47.4390319 C				
0.00003292	50985.	1548901416.	20.6675734	0.0006803	-0.0016897
1.9528780	-48.6574288 C				
0.00003375	52220.	1547267081.	20.6823709	0.0006980	-0.0017320
1.9903429	-49.8747794 C				
0.00003458	53453.	1545642892.	20.6975097	0.0007158	-0.0017742
2.0272016	-51.0910725 C				
0.00003542	54684.	1544027515.	20.7129767	0.0007336	-0.0018164
2.0634505	-52.3062967 C				
0.00003625	55913.	1542419726.	20.7287604	0.0007514	-0.0018586
2.0990862	-53.5204405 C				
0.00003708	57139.	1540818399.	20.7448504	0.0007693	-0.0019007
2.1341051	-54.7334920 C				

0.00003792	58362.	1539222497.	20.7612374	0.0007872	-0.0019428
2.1685034	-55.9454392 C				
0.00003875	59583.	1537631061.	20.7779133	0.0008051	-0.0019849
2.2022775	-57.1562698 C				
0.00003958	60802.	1536043201.	20.7948706	0.0008231	-0.0020269
2.2354236	-58.3659713 C				
0.00004042	62018.	1534458091.	20.8121030	0.0008412	-0.0020688
2.2679378	-59.5745309 C				
0.00004125	63231.	1532874958.	20.8296045	0.0008592	-0.0021108
2.2998162	-60.0000000 CY				
0.00004208	64442.	1531293081.	20.8473703	0.0008773	-0.0021527
2.3310549	-60.0000000 CY				
0.00004292	65650.	1529711781.	20.8653957	0.0008955	-0.0021945
2.3616497	-60.0000000 CY				
0.00004375	66830.	1527535543.	20.8807585	0.0009135	-0.0022365
2.3913855	-60.0000000 CY				
0.00004458	67869.	1522304547.	20.8810744	0.0009309	-0.0022791
2.4193699	-60.0000000 CY				
0.00004542	68799.	1514839701.	20.8700558	0.0009478	-0.0023222
2.4458843	-60.0000000 CY				
0.00004625	69630.	1505511975.	20.8492428	0.0009643	-0.0023657
2.4710523	-60.0000000 CY				
0.00004708	70417.	1495588343.	20.8251033	0.0009805	-0.0024095
2.4953472	-60.0000000 CY				
0.00004792	71167.	1485224999.	20.7983013	0.0009966	-0.0024534
2.5188242	-60.0000000 CY				
0.00004875	71832.	1473479442.	20.7635017	0.0010122	-0.0024978
2.5411180	-60.0000000 CY				
0.00004958	72464.	1461458259.	20.7267942	0.0010277	-0.0025423
2.5626690	-60.0000000 CY				
0.00005292	74760.	1412784696.	20.5714650	0.0010886	-0.0027214
2.6423451	-60.0000000 CY				
0.00005625	76698.	1363523979.	20.3993922	0.0011475	-0.0029025
2.7117688	-60.0000000 CY				
0.00005958	78239.	1313100964.	20.2051325	0.0012039	-0.0030861
2.7712112	-60.0000000 CY				
0.00006292	79680.	1266433612.	20.0269899	0.0012600	-0.0032700
2.8235464	-60.0000000 CY				
0.00006625	80882.	1220854787.	19.8437809	0.0013147	-0.0034553
2.8679230	-60.0000000 CY				
0.00006958	81909.	1177135288.	19.6565986	0.0013678	-0.0036422
2.9049065	-60.0000000 CY				
0.00007292	82924.	1137239987.	19.4887970	0.0014211	-0.0038289
2.9359174	-60.0000000 CY				
0.00007625	83804.	1099063001.	19.3229389	0.0014734	-0.0040166
2.9604199	-60.0000000 CY				
0.00007958	84503.	1061818019.	19.1519263	0.0015242	-0.0042058
2.9785797	-60.0000000 CY				
0.00008292	85188.	1027398539.	18.9931766	0.0015749	-0.0043951
2.9911833	-60.0000000 CY				
0.00008625	85862.	995499552.	18.8462679	0.0016255	-0.0045845
2.9982797	-60.0000000 CY				
0.00008958	86502.	965600299.	18.7100223	0.0016761	-0.0047739
2.9978610	-60.0000000 CY				
0.00009292	87005.	936373835.	18.5675794	0.0017252	-0.0049648
2.9999155	-60.0000000 CY				
0.00009625	87440.	908466813.	18.4292023	0.0017738	-0.0051562
2.9987759	-60.0000000 CY				
0.00009958	87863.	882309298.	18.2986403	0.0018222	-0.0053478
2.9980410	-60.0000000 CY				
0.0001029	88276.	857742666.	18.1748869	0.0018705	-0.0055395
2.9994354	-60.0000000 CY				
0.0001063	88683.	834665653.	18.0614144	0.0019190	-0.0057310

2.9963200	-60.0000000 CY				
0.0001096	89085.	812944669.	17.9572175	0.0019678	-0.0059222
2.9995138	-60.0000000 CY				
0.0001129	89462.	792287345.	17.8578953	0.0020165	-0.0061135
2.9964594	-60.0000000 CY				
0.0001163	89774.	772246692.	17.7555350	0.0020641	-0.0063059
2.9989998	-60.0000000 CY				
0.0001196	90022.	752798464.	17.6499503	0.0021106	-0.0064994
2.9992665	-60.0000000 CY				
0.0001229	90260.	734320166.	17.5446912	0.0021565	-0.0066935
2.9969280	60.0000000 CY				
0.0001263	90496.	716796928.	17.4454099	0.0022025	-0.0068875
2.9994596	60.0000000 CY				
0.0001296	90729.	700157715.	17.3525688	0.0022486	-0.0070814
2.9982147	60.0000000 CY				
0.0001329	90959.	684333435.	17.2658282	0.0022949	-0.0072751
2.9964249	60.0000000 CY				
0.0001363	91188.	669272344.	17.1843008	0.0023414	-0.0074686
2.9991219	60.0000000 CY				
0.0001396	91416.	654919334.	17.1076405	0.0023879	-0.0076621
2.9998685	60.0000000 CY				
0.0001429	91641.	641217315.	17.0359590	0.0024347	-0.0078553
2.9939290	60.0000000 CY				
0.0001462	91862.	628115751.	16.9678523	0.0024815	-0.0080485
2.9975102	60.0000000 CY				
0.0001496	92079.	615567293.	16.9015690	0.0025282	-0.0082418
2.9995129	60.0000000 CY				
0.0001529	92256.	603306354.	16.8281734	0.0025733	-0.0084367
2.9991900	60.0000000 CY				
0.0001562	92407.	591406507.	16.7570196	0.0026183	-0.0086317
2.9940852	60.0000000 CY				
0.0001596	92539.	579875734.	16.6847810	0.0026626	-0.0088274
2.9956091	60.0000000 CY				
0.0001629	92659.	568751192.	16.6136904	0.0027066	-0.0090234
2.9980860	60.0000000 CY				
0.0001662	92761.	557962545.	16.5531156	0.0027520	-0.0092180
2.9996046	60.0000000 CY				
0.0001696	92857.	547559288.	16.4978429	0.0027978	-0.0094122
2.9991171	60.0000000 CY				
0.0001729	92951.	537549001.	16.4456499	0.0028437	-0.0096063
2.9943048	60.0000000 CY				
0.0001762	93045.	527914455.	16.3958808	0.0028898	-0.0098002
2.9934664	60.0000000 CY				
0.0001796	93128.	518580766.	16.3523340	0.0029366	-0.0099934
2.9966483	60.0000000 CY				
0.0001829	93210.	509575804.	16.3114571	0.0029836	-0.0101864
2.9987926	60.0000000 CY				
0.0002029	93629.	461418441.	16.1145098	0.0032699	-0.0113401
2.9978427	60.0000000 CYT				
0.0002229	93929.	421362153.	15.9838777	0.0035631	-0.0124869
2.9933802	60.0000000 CYT				
0.0002429	94092.	387341635.	15.8554724	0.0038516	-0.0136384
2.9934051	60.0000000 CYT				

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

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

Load	Axial Thrust	Nominal Mom. Cap.	Max. Comp.

No.	kips	in-kip	Strain
1	30.000	93233.890	0.00300000

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

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

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

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

Axial Load No.	Resist. Factor for Moment	Nominal Moment Cap in-kips	Ult. (Fac) Ax. Thrust kips	Ult. (Fac) Moment Cap in-kips	Bend. Stiff. at Ult Mom kip-in^2
1	0.65	93234.	19.500000	60602.	1.5363E+09
1	0.70	93234.	21.000000	65264.	1.5302E+09
1	0.75	93234.	22.500000	69925.	1.5018E+09

Layering Correction Equivalent Depths of Soil & Rock Layers

Layer No.	Top of Layer Below Pile Head ft	Equivalent Top Depth Below Grnd Surf ft	Same Layer Type As Layer Above	Layer is Rock or is Below Rock Layer	F0 Integral for Layer lbs	F1 Integral for Layer lbs
1	0.5000	0.00	N.A.	No	0.00	61.8010
2	3.8300	3.3300	Yes	No	61.8010	281296.
3	12.5000	9.8170	No	No	281358.	36838.
4	13.5000	10.8170	Yes	No	318196.	1470304.
5	42.5000	39.8170	Yes	No	1788500.	N.A.

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

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

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

Shear force at pile head = 22000.0 lbs

Applied moment at pile head = 23076000.0 in-lbs
Axial thrust load on pile head = 30000.0 lbs

Depth X feet	Deflect. y inches	Bending Moment in-lbs	Shear Force lbs	Slope S radians	Total Stress psi*	Bending Stiffness in-lb^2	Soil Res. Es*h lb/inch	Soil Spr. Lat. Load lb/inch	Distrib. p lb/inch
0.00	0.6619	2.31E+07	22000.	-0.00447	0.00	1.59E+12	0.00	0.00	0.00
0.5975	0.6302	2.32E+07	22000.	-0.00436	0.00	1.59E+12	-2.72E-04	0.00310	0.00
1.1950	0.5993	2.34E+07	22000.	-0.00426	0.00	1.59E+12	-0.00185	0.02208	0.00
1.7925	0.5692	2.36E+07	22000.	-0.00415	0.00	1.59E+12	-0.00326	0.04106	0.00
2.3900	0.5398	2.37E+07	22000.	-0.00405	0.00	1.59E+12	-0.00452	0.06004	0.00
2.9875	0.5111	2.39E+07	22000.	-0.00394	0.00	1.59E+12	-0.00563	0.07903	0.00
3.5850	0.4833	2.40E+07	22000.	-0.00383	0.00	1.59E+12	-0.00661	0.09801	0.00
4.1825	0.4562	2.42E+07	21333.	-0.00372	0.00	1.59E+12	-186.1045	2925.	0.00
4.7800	0.4299	2.43E+07	19935.	-0.00361	0.00	1.59E+12	-203.8346	3399.	0.00
5.3775	0.4044	2.45E+07	18421.	-0.00350	0.00	1.59E+12	-218.5088	3874.	0.00
5.9750	0.3797	2.46E+07	16812.	-0.00339	0.00	1.59E+12	-230.2862	4348.	0.00
6.5725	0.3558	2.47E+07	15128.	-0.00328	0.00	1.59E+12	-239.3266	4823.	0.00
7.1700	0.3327	2.48E+07	13389.	-0.00317	0.00	1.59E+12	-245.7908	5298.	0.00
7.7675	0.3103	2.49E+07	11612.	-0.00306	0.00	1.59E+12	-249.8401	5772.	0.00
8.3650	0.2888	2.50E+07	9814.	-0.00294	0.00	1.59E+12	-251.6365	6247.	0.00
8.9625	0.2681	2.51E+07	8011.	-0.00283	0.00	1.59E+12	-251.3424	6721.	0.00
9.5600	0.2482	2.51E+07	6217.	-0.00272	0.00	1.59E+12	-249.1204	7196.	0.00
10.1575	0.2291	2.51E+07	4445.	-0.00261	0.00	1.59E+12	-245.1332	7670.	0.00
10.7550	0.2109	2.52E+07	2708.	-0.00249	0.00	1.59E+12	-239.5435	8145.	0.00
11.3525	0.1934	2.52E+07	1015.	-0.00238	0.00	1.59E+12	-232.5138	8620.	0.00
11.9500	0.1768	2.52E+07	-622.1151	-0.00226	0.00	1.59E+12	-224.2064	9094.	0.00
12.5475	0.1609	2.52E+07	-4664.	-0.00215	0.00	1.59E+12	-903.3289	40244.	0.00
13.1450	0.1459	2.51E+07	-11130.	-0.00204	0.00	1.59E+12	-900.1586	44228.	0.00
13.7425	0.1317	2.50E+07	-17560.	-0.00192	0.00	1.59E+12	-893.4649	48632.	0.00
14.3400	0.1183	2.49E+07	-23926.	-0.00181	0.00	1.59E+12	-882.3994	53466.	0.00
14.9375	0.1057	2.47E+07	-30209.	-0.00170	0.00	1.59E+12	-870.1509	59000.	0.00

15.5350	0.09395	2.44E+07	-36400.	-0.00159	0.00	1.59E+12
-856.6729	65376.	0.00				
16.1325	0.08295	2.42E+07	-42489.	-0.00148	0.00	1.59E+12
-841.9143	72770.	0.00				
16.7300	0.07273	2.38E+07	-48468.	-0.00137	0.00	1.59E+12
-825.8191	81410.	0.00				
17.3275	0.06328	2.35E+07	-54327.	-0.00127	0.00	1.59E+12
-808.3256	91589.	0.00				
17.9250	0.05458	2.30E+07	-60054.	-0.00116	0.00	1.59E+12
-789.3661	103688.	0.00				
18.5225	0.04663	2.26E+07	-65641.	-0.00106	0.00	1.60E+12
-768.8665	118217.	0.00				
19.1200	0.03941	2.21E+07	-71074.	-9.58E-04	0.00	1.60E+12
-746.7464	135861.	0.00				
19.7175	0.03290	2.16E+07	-76343.	-8.60E-04	0.00	1.60E+12
-722.9206	157561.	0.00				
20.3150	0.02708	2.10E+07	-81434.	-7.64E-04	0.00	1.60E+12
-697.3015	184627.	0.00				
20.9125	0.02194	2.04E+07	-86335.	-6.71E-04	0.00	1.60E+12
-669.8073	218916.	0.00				
21.5100	0.01745	1.98E+07	-91032.	-5.82E-04	0.00	1.60E+12
-640.3762	263108.	0.00				
22.1075	0.01360	1.91E+07	-95511.	-4.95E-04	0.00	1.60E+12
-608.9995	321102.	0.00				
22.7050	0.01036	1.84E+07	-99759.	-4.11E-04	0.00	1.61E+12
-575.7873	398564.	0.00				
23.3025	0.00771	1.77E+07	-103763.	-3.30E-04	0.00	1.61E+12
-541.1071	503433.	0.00				
23.9000	0.00562	1.69E+07	-107516.	-2.53E-04	0.00	1.61E+12
-505.8669	645439.	0.00				
24.4975	0.00407	1.61E+07	-111022.	-2.01E-04	0.00	3.85E+12
-472.0616	831218.	0.00				
25.0950	0.00274	1.53E+07	-114265.	-1.76E-04	0.00	5.49E+12
-432.4920	1131923.	0.00				
25.6925	0.00155	1.45E+07	-117176.	-1.56E-04	0.00	5.49E+12
-379.5111	1754745.	0.00				
26.2900	4.97E-04	1.36E+07	-119003.	-1.38E-04	0.00	5.50E+12
-130.0262	1873983.	0.00				
26.8875	-4.28E-04	1.28E+07	-119063.	-1.21E-04	0.00	5.50E+12
113.1511	1894737.	0.00				
27.4850	-0.00123	1.19E+07	-117475.	-1.05E-04	0.00	5.51E+12
329.7820	1915491.	0.00				
28.0825	-0.00193	1.11E+07	-114794.	-8.97E-05	0.00	5.52E+12
418.2291	1554289.	0.00				
28.6800	-0.00252	1.03E+07	-111674.	-7.58E-05	0.00	5.52E+12
452.0016	1285694.	0.00				
29.2775	-0.00302	9502190.	-108341.	-6.30E-05	0.00	5.53E+12
477.8000	1135783.	0.00				
29.8750	-0.00342	8737681.	-104841.	-5.11E-05	0.00	5.53E+12
498.3713	1043782.	0.00				
30.4725	-0.00375	7998791.	-101208.	-4.03E-05	0.00	5.54E+12
515.1491	985124.	0.00				
31.0700	-0.00400	7286381.	-97464.	-3.04E-05	0.00	5.54E+12
528.9833	947950.	0.00				
31.6675	-0.00419	6601164.	-93631.	-2.14E-05	0.00	5.54E+12
540.4222	925857.	0.00				
32.2650	-0.00431	5943727.	-89722.	-1.33E-05	0.00	5.55E+12
549.8405	915128.	0.00				
32.8625	-0.00438	5314556.	-85752.	-6.02E-06	0.00	5.55E+12
557.5062	913513.	0.00				
33.4600	-0.00439	4714044.	-81733.	4.50E-07	0.00	5.56E+12
563.6174	919623.	0.00				
34.0575	-0.00437	4142505.	-77675.	6.16E-06	0.00	5.56E+12

568.3249	932617.	0.00				
34.6550	-0.00431	3600183.	-73588.	1.12E-05	0.00	5.56E+12
571.7456	952031.	0.00				
35.2525	-0.00421	3087252.	-69480.	1.55E-05	0.00	5.57E+12
573.9714	977673.	0.00				
35.8500	-0.00408	2603827.	-65361.	1.91E-05	0.00	5.57E+12
575.0765	1009567.	0.00				
36.4475	-0.00394	2149966.	-61238.	2.22E-05	0.00	5.57E+12
575.1212	1047919.	0.00				
37.0450	-0.00377	1725671.	-57117.	2.47E-05	0.00	5.57E+12
574.1545	1093104.	0.00				
37.6425	-0.00358	1330891.	-53008.	2.66E-05	0.00	5.57E+12
572.2169	1145670.	0.00				
38.2400	-0.00338	965529.	-48915.	2.81E-05	0.00	5.57E+12
569.3419	1206343.	0.00				
38.8375	-0.00318	629435.	-44847.	2.92E-05	0.00	5.57E+12
565.5574	1276046.	0.00				
39.4350	-0.00297	322416.	-40808.	2.98E-05	0.00	5.57E+12
560.8867	1355930.	0.00				
40.0325	-0.00275	44231.	-36807.	3.00E-05	0.00	5.57E+12
555.3495	1447414.	0.00				
40.6300	-0.00254	-205403.	-32848.	2.99E-05	0.00	5.57E+12
548.9615	1552245.	0.00				
41.2275	-0.00232	-426816.	-28937.	2.95E-05	0.00	5.57E+12
541.7357	1672576.	0.00				
41.8250	-0.00211	-620379.	-25082.	2.88E-05	0.00	5.57E+12
533.6819	1811063.	0.00				
42.4225	-0.00191	-786506.	-21287.	2.79E-05	0.00	5.57E+12
524.8066	1971009.	0.00				
43.0200	-0.00171	-925653.	-17285.	2.68E-05	0.00	5.57E+12
591.6073	2476806.	0.00				
43.6175	-0.00152	-1034386.	-13086.	2.55E-05	0.00	5.57E+12
579.6235	2725768.	0.00				
44.2150	-0.00135	-1113321.	-9078.	2.42E-05	0.00	5.57E+12
538.5565	2868263.	0.00				
44.8125	-0.00118	-1164568.	-5443.	2.27E-05	0.00	5.57E+12
475.2880	2892550.	0.00				
45.4100	-0.00102	-1191382.	-2250.	2.12E-05	0.00	5.57E+12
415.2512	2916837.	0.00				
46.0075	-8.74E-04	-1196847.	524.1297	1.96E-05	0.00	5.57E+12
358.6567	2941124.	0.00				
46.6050	-7.39E-04	-1183874.	2906.	1.81E-05	0.00	5.57E+12
305.6371	2965411.	0.00				
47.2025	-6.15E-04	-1155188.	4920.	1.66E-05	0.00	5.57E+12
256.2547	2989698.	0.00				
47.8000	-5.01E-04	-1113328.	6593.	1.52E-05	0.00	5.57E+12
210.5092	3013985.	0.00				
48.3975	-3.97E-04	-1060646.	7952.	1.38E-05	0.00	5.57E+12
168.3452	3038272.	0.00				
48.9950	-3.04E-04	-999309.	9020.	1.24E-05	0.00	5.57E+12
129.6597	3062560.	0.00				
49.5925	-2.19E-04	-931306.	9823.	1.12E-05	0.00	5.57E+12
94.3083	3086847.	0.00				
50.1900	-1.43E-04	-858455.	10382.	1.00E-05	0.00	5.57E+12
61.6863	3089786.	0.00				
50.7875	-7.52E-05	-782432.	10719.	8.98E-06	0.00	5.57E+12
32.3875	3089786.	0.00				
51.3850	-1.44E-05	-704744.	10858.	8.02E-06	0.00	5.57E+12
6.1993	3089786.	0.00				
51.9825	3.99E-05	-626737.	10818.	7.17E-06	0.00	5.57E+12
-17.1872	3089786.	0.00				
52.5800	8.84E-05	-549613.	10620.	6.41E-06	0.00	5.57E+12
-38.0819	3089786.	0.00				

53.1775	1.32E-04	-474447.	10280.	5.75E-06	0.00	5.57E+12
-56.7916	3089786.	0.00				
53.7750	1.71E-04	-402200.	9812.	5.19E-06	0.00	5.57E+12
-73.6151	3089786.	0.00				
54.3725	2.06E-04	-333738.	9230.	4.71E-06	0.00	5.57E+12
-88.8396	3089786.	0.00				
54.9700	2.38E-04	-269843.	8543.	4.32E-06	0.00	5.57E+12
-102.7372	3089786.	0.00				
55.5675	2.68E-04	-211229.	7761.	4.01E-06	0.00	5.57E+12
-115.5621	3089786.	0.00				
56.1650	2.96E-04	-158556.	6889.	3.78E-06	0.00	5.57E+12
-127.5472	3089786.	0.00				
56.7625	3.22E-04	-112441.	5934.	3.60E-06	0.00	5.57E+12
-138.9020	3089786.	0.00				
57.3600	3.48E-04	-73466.	4899.	3.48E-06	0.00	5.57E+12
-149.8097	3089786.	0.00				
57.9575	3.72E-04	-42192.	3787.	3.41E-06	0.00	5.57E+12
-160.4254	3089786.	0.00				
58.5550	3.97E-04	-19166.	2599.	3.37E-06	0.00	5.57E+12
-170.8733	3089786.	0.00				
59.1525	4.21E-04	-4924.	1337.	3.35E-06	0.00	5.57E+12
-181.2450	3089786.	0.00				
59.7500	4.45E-04	0.00	0.00	3.35E-06	0.00	5.57E+12
-191.5972	1544893.	0.00				

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

Output Summary for Load Case No. 1:

Pile-head deflection	=	0.66185856 inches
Computed slope at pile head	=	-0.00446628 radians
Maximum bending moment	=	25183690. inch-lbs
Maximum shear force	=	-119063. lbs
Depth of maximum bending moment	=	11.95000000 feet below pile head
Depth of maximum shear force	=	26.88750000 feet below pile head
Number of iterations	=	24
Number of zero deflection points	=	2

Summary of Pile-head Responses for Conventional Analyses

Definitions of Pile-head Loading Conditions:

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

Load Case No.	Load Type	Load 1	Load Type	Load 2	Axial Loading	Pile-head Deflection	Pile-head Rotation	Max Shear in Pile	Max Moment in Pile
		Pile-head		Pile-head	lbs	inches	radians	lbs	

	in-lbs								
1	V, lb	22000.	M, in-lb	2.31E+07	30000.	0.6619	-0.00447	-119063.	2.52E+07

Maximum pile-head deflection = 0.6618585602 inches
Maximum pile-head rotation = -0.0044662843 radians = -0.255899 deg.

Summary of Warning Messages

The following warning was reported 144 times

**** Warning ****

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

The analysis ended normally.

Moment Capacity of Drilled Concrete Shaft (Caisson) for TIA Rev F or G

Note: Shaft assumed to have ties, not spiral, transverse reinforcing

Site Data

BU#: *806454*
Site Name: *NHV 112 948129*
App #: *400176 Rev. 2*

Loads Already Factored		
For M (WL)	1.3	<----Disregard
For P (DL)	1.3	<----Disregard

Pier Properties

Concrete:

Pier Diameter =	6	ft
Concrete Area =	4071.5	in^2

Reinforcement:

Clear Cover to **Tie**=	3	in
Horiz. **Tie** Bar Size=	4	
Vert. Cage Diameter =	5.30	ft
Vert. Cage Diameter =	63.59	in
Vertical Bar Size =	11	
Bar Diameter =	1.41	in
Bar Area =	1.56	in^2
Number of Bars =	36	
As Total=	56.16	in^2
A s/ Aconc, Rho:	0.0138	1.38%

ACI 10.5 , ACI 21.10.4, and IBC 1810.
Min As for Flexural, Tension Controlled, Shafts:

(3)*(Sqrt(f'c)/Fy:	0.0027
200 / Fy:	0.0033

Minimum Rho Check:

Actual Req'd Min. Rho:	0.33%	Flexural
Provided Rho:	1.38%	OK

Ref. Shaft Max Axial Capacities, ϕ Max(Pn or Tn):		
Max Pu = (φ=0.65) Pn.		
Pn per ACI 318 (10-2)	7076.54	kips
at Mu=(ϕ=0.65)Mn=	3617.72	ft-kips
Max Tu, (φ=0.9) Tn =	3032.64	kips
at Mu=ϕ=(0.90)Mn=	0.00	ft-kips

Maximum Shaft Superimposed Forces

TIA Revision:	G	
Max. Factored Shaft Mu:	2100	ft-kips **(* Note)**
Max. Factored Shaft Pu:	30	kips
Max Axial Force Type:	Comp.	

(*) Note: Max Shaft Superimposed Moment does not necessarily equal to the shaft top reaction moment

Load Factor	Shaft Factored Loads		
1.00	Mu:	2100	ft-kips
1.00	Pu:	30	kips

Material Properties

Concrete Comp. strength, f'c =	3000	psi
Reinforcement yield strength, Fy =	60	ksi
Reinforcing Modulus of Elasticity, E =	29000	ksi
Reinforcement yield strain =	0.00207	
Limiting compressive strain =	0.003	

ACI 318 Code

Select Analysis ACI Code=	2008

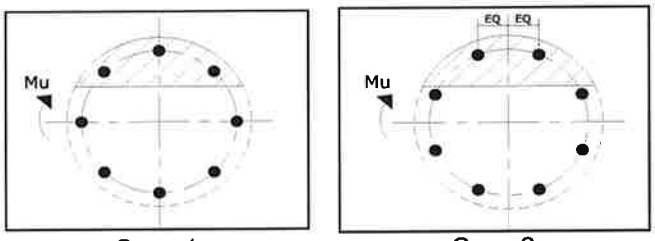
Seismic Properties

Seismic Design Category =	B
Seismic Risk =	**Low**

Solve (Run) <-- Press Upon Completing All Input

Results:

Governing Orientation Case: **1**



Case 1 Case 2

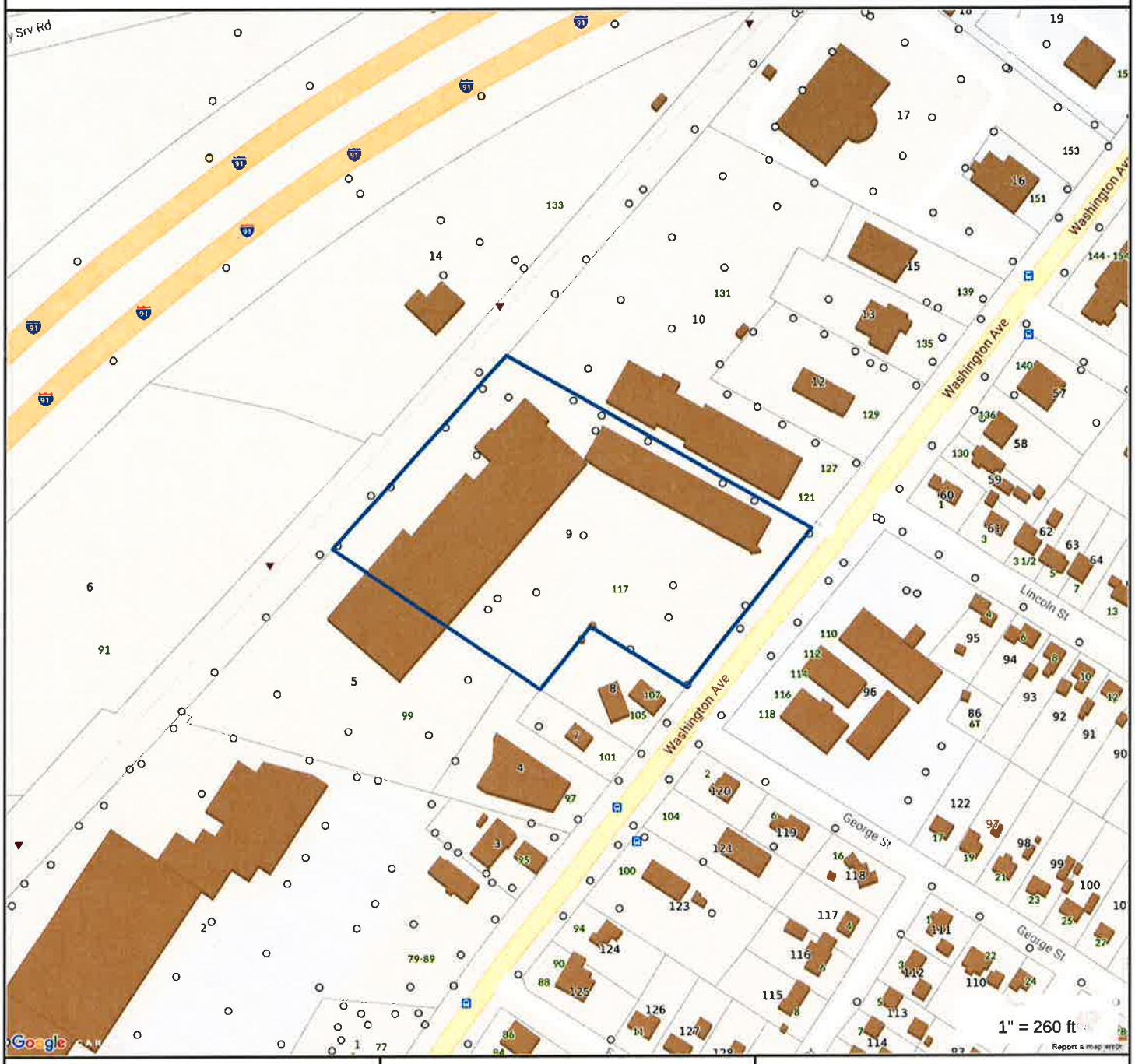
Dist. From Edge to Neutral Axis:	**17.14**	in
Extreme Steel Strain, εt:	**0.0089**	
	εt > 0.0050, Tension Controlled	
Reduction Factor,φ:	**0.900**	

Output Note: Negative Pu=Tension

For Axial Compression, φ Pn = Pu:	30.00	kips
Drilled Shaft Moment Capacity, φMn:	**6858.79**	ft-kips
Drilled Shaft Superimposed Mu:	**2100.00**	ft-kips

(Mu/φMn, Drilled Shaft Flexure CSR:	**30.6%**

ATTACHMENT 4



Property Information

Property ID	73/9
Location	117 WASHINGTON AVE
Owner	COMMERCIAL INVESTMENT GROUP LLC

MAP FOR REFERENCE ONLY
NOT A LEGAL DOCUMENT

Town of North Haven, CT makes no claims and no warranties, expressed or implied, concerning the validity or accuracy of the GIS data presented on this map.

Parcels updated 10/1/2016
Properties updated 02/15/2018

117 WASHINGTON AVE

Location	117 WASHINGTON AVE	**Mblu**	073/ / 009/ /
Acct#	201742	**Owner**	COMMERCIAL INVESTMENT GROUP LLC
Assessment	$3,416,280	**Appraisal**	$4,880,400
PID	8732	**Building Count**	3

Current Value

Appraisal			
Valuation Year	**Improvements**	**Land**	**Total**
2014	$1,740,100	$3,140,300	$4,880,400
Assessment			
Valuation Year	**Improvements**	**Land**	**Total**
2014	$1,218,070	$2,198,210	$3,416,280

Owner of Record

Owner	COMMERCIAL INVESTMENT GROUP LLC	**Sale Price**	$6,139,443
Co-Owner		**Certificate**	
Address	785 SHERMAN AVE HAMDEN, CT 06514	**Book & Page**	952/ 916
		Sale Date	03/30/2017

Ownership History

Ownership History				
Owner	**Sale Price**	**Certificate**	**Book & Page**	**Sale Date**
COMMERCIAL INVESTMENT GROUP LLC	$6,139,443		952/ 916	03/30/2017
NORTH HAVEN SHOPPING CENTER LLC	$0		952/ 912	03/30/2017
NORTH HAVEN SHOPPING CENTER LLC	$0		918/ 751	03/18/2015
LUCIANI REALTY LIMITED PARTNERSHIP	$0		900/ 87	12/30/2013
LUCIANI REALTY LIMITED PARTNERSHIP	$0	1	431/ 862	05/28/1992

Building Information

Building 1 : Section 1

Year Built:	1952
Living Area:	13,800
Replacement Cost:	$872,105

Building Percent Good: 35

Replacement Cost Less Depreciation: $305,200

Building Attributes	
Field	**Description**
STYLE	Shopping Cntr
MODEL	Comm/Ind
Grade	C -
Stories:	1
Occupancy	12
Exterior Wall 1	Concr/Cinder
Exterior Wall 2	
Roof Structure	Gable/Hip
Roof Cover	Asphalt
Interior Wall 1	Drywall
Interior Wall 2	
Interior Floor 1	Carpet
Interior Floor 2	Ceram Clay Til
Heating Fuel	Oil
Heating Type	Forced Air-Duc
AC Type	Central
Bldg Use	SHOPPING CENTER M94
Total Rooms	
Total Bedrms	
Total Baths	
1st Floor Use:	
Heat/AC	HEAT/AC PKGS
Frame Type	FIREPRF STEEL
Baths/Plumbing	AVERAGE
Ceiling/Wall	CEIL & WALLS
Rooms/Prtns	AVERAGE
Wall Height	12
% Comn Wall	

Building 2 : Section 1

Year Built: 1962

Living Area: 41,446

Replacement Cost: $2,429,016

Building Percent Good: 40

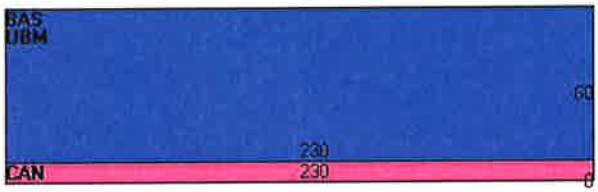
Replacement Cost Less Depreciation: $971,600

Building Attributes : Bldg 2 of 3

Building Photo

(http://images.vgsi.com/photos/NorthHavenCTPhotos//\00\01\S

Building Layout



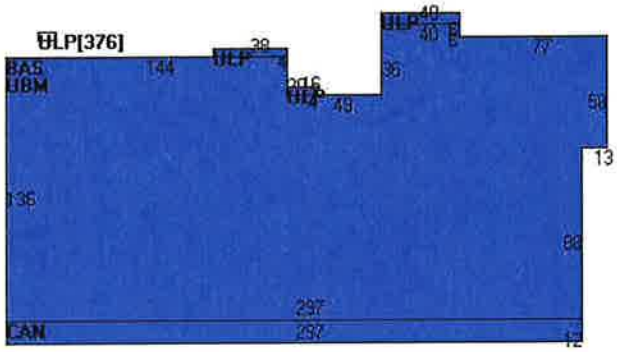
Building Sub-Areas (sq ft)			Legend
Code	**Description**	**Gross Area**	**Living Area**
BAS	First Floor	13,800	13,800
CAN	Canopy	1,840	0
UBM	Basement, Unfinished	13,800	0
		29,440	13,800

Field	Description
STYLE	Shopping Cntr
MODEL	Comm/Ind
Grade	C -
Stories:	1
Occupancy	6
Exterior Wall 1	Concr/Cinder
Exterior Wall 2	
Roof Structure	Flat
Roof Cover	T&G/Rubber
Interior Wall 1	Drywall
Interior Wall 2	
Interior Floor 1	Linoleum
Interior Floor 2	Carpet
Heating Fuel	Oil
Heating Type	Forced Air-Duc
AC Type	Central
Bldg Use	SHOPPING CENTER M94
Total Rooms	
Total Bedrms	
Total Baths	
1st Floor Use:	
Heat/AC	HEAT/AC PKGS
Frame Type	WOOD FRAME
Baths/Plumbing	AVERAGE
Ceiling/Wall	CEIL & WALLS
Rooms/Prtns	AVERAGE
Wall Height	16
% Comn Wall	

Building Photo

(http://images.vgsi.com/photos/NorthHavenCTPhotos//\00\01\S

Building Layout



Building Sub-Areas (sq ft)			Legend
Code	Description	Gross Area	Living Area
BAS	First Floor	41,446	41,446
CAN	Canopy	3,564	0
UBM	Basement, Unfinished	41,446	0
ULP	Loading Platform, Unfinished	832	0
		87,288	41,446

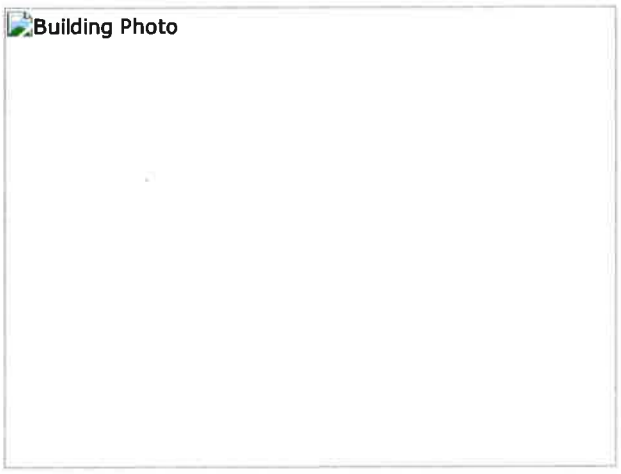
Building 3 : Section 1

Year Built: 2014
Living Area: 5,100
Replacement Cost: $735,779
Building Percent Good: 75
Replacement Cost Less Depreciation: $551,800

Building Attributes : Bldg 3 of 3	
Field	Description
STYLE	Branch Bank

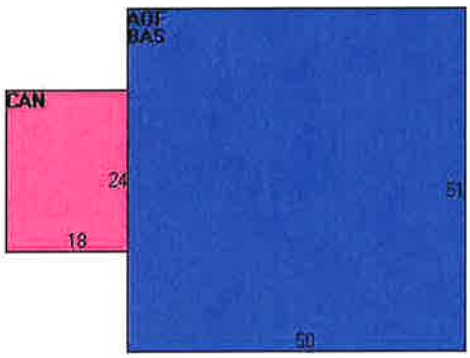
MODEL	Comm/Ind
Grade	C +
Stories:	2
Occupancy	1
Exterior Wall 1	Clapboard
Exterior Wall 2	
Roof Structure	Gable/Hip
Roof Cover	Asphalt
Interior Wall 1	Drywall
Interior Wall 2	
Interior Floor 1	Carpet
Interior Floor 2	
Heating Fuel	Gas
Heating Type	Forced Air-Duc
AC Type	Central
Bldg Use	BANK BLDG
Total Rooms	
Total Bedrms	
Total Baths	
1st Floor Use:	
Heat/AC	HEAT/AC PKGS
Frame Type	WOOD FRAME
Baths/Plumbing	AVERAGE
Ceiling/Wall	SUS-CEIL & WL
Rooms/Prtns	AVERAGE
Wall Height	8
% Comn Wall	

Building Photo



(http://images.vgsi.com/photos/NorthHavenCTPhotos//\00\02\1

Building Layout



Building Sub-Areas (sq ft)			Legend
Code	Description	Gross Area	Living Area
AOF	Office	2,550	2,550
BAS	First Floor	2,550	2,550
CAN	Canopy	432	0
		5,532	5,100

Extra Features

Extra Features				Legend
Code	Description	Size	Value	Bldg #
CLR1	COOLER	98 S.F.	$700	1
OVHD	OVER HEADDOOR	400 S.F.	$0	2
SPR1	SPRINKLERS-WET	29440 S.F.	$9,300	1
ATM1	ATM	1 UNITS	$6,200	2
SPR1	SPRINKLERS-WET	82892 S.F.	$29,800	2

Land

Land Use

Use Code	3230
Description	SHOPPING CENTER M94
Zone	IL30
Neighborhood	301
Alt Land Appr	No
Category	

Land Line Valuation

Size (Acres)	6.09
Frontage	
Depth	
Assessed Value	$2,198,210
Appraised Value	$3,140,300

Outbuildings

Outbuildings						Legend
Code	**Description**	**Sub Code**	**Sub Description**	**Size**	**Value**	**Bldg #**
PAV1	PAVING-ASPHALT			128300 S.F.	$86,600	1
PAV1	PAVING-ASPHALT			128300 S.F.	$86,600	2
TWR1	COMMU-TOWER			1 UNITS	$125,000	2

Valuation History

Appraisal			
Valuation Year	**Improvements**	**Land**	**Total**
2013	$2,080,000	$3,045,000	$5,125,000
2008	$2,096,400	$1,982,400	$4,078,800
2007		$1,364,160	$2,750,160

Assessment			
Valuation Year	**Improvements**	**Land**	**Total**
2013	$1,456,000	$2,131,500	$3,587,500
2008	$1,467,480	$1,387,680	$2,855,160
2007		$1,364,160	$2,750,160

ATTACHMENT 5

UNITED STATES POSTAL SERVICE®

Certificate of Mailing — Firm

Name and Address of Sender

Kenneth C. Baldwin, Esq.
Robinson & Cole LLP
280 Trumbull Street
Hartford, CT 06103

TOTAL NO. of Pieces Listed by Sender	TOTAL NO. of Pieces Received at Post Office™
3	3

Postmaster, per *(name of receiving employee)*

Affix Stamp Here
Postmark with Date of Receipt.

neopost
02/28/2018
US POSTAGE $002.38

ZIP 06103
041L1220336

USPS® Tracking Number / Firm-specific Identifier	Address (Name, Street, City, State, and ZIP Code™)	Postage	Fee	Special Handling	Parcel Airlift
1.	Michael J. Freda, First Selectman Town of North Haven 18 Church Street North Haven, CT 06473				
2.	Alan Fredricksen, Land Use Administrator Town of North Haven 18 Church Street North Haven, CT 06473				
3.	Commercial Investment Group LLC 785 Sherman Avenue Hamden, CT 06514				
4.					
5.					
6.					

OLD STATE HOUSE STA 06103
FEB 28 2018
USPS

See Reverse for Instructions