Robinson+Cole

KENNETH C. BALDWIN

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

Also admitted in Massachusetts

November 1, 2017

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

Re: **Notice of Exempt Modification – Facility Modification**
**442 North Street, Goshen, Connecticut**

Dear Ms. Bachman:

Cellco Partnership d/b/a Verizon Wireless ("Cellco") currently maintains twelve (12) antennas at the top of the existing 149-foot tower at 442 North Street in Goshen, Connecticut (the "Property"). The Property is owned by ARCA LLC. The tower is owned by American Tower Corporation ("ATC"). Cellco's use of this tower was approved by the Council in 2007 (Docket No. 337). Cellco now intends to modify its facility by replacing six (6) existing antennas with three (3) model JAHH-65B-R3B, 700 MHz antennas and three (3) model JAHH-65B-R3B, 2100 MHz antennas. Cellco also intends to install six (6) remote radio heads ("RRHs") behind its 700 and 2100 MHz antennas and 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 Robert Valentine, First Selectman for the Town of Goshen; Goshen's Land Use Official, Martin Connor; ARCA LLC, the owner of the Property; and ATC, 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 on Cellco's platform at the top 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 General Power Density table for Cellco's modified facility is included in Attachment 2.

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

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

A copy of the 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:
Robert Valentine, Goshen First Selectman
Martin Connor, Goshen Land Use Official
ARCA LLC
ATC
Tim Parks

# ATTACHMENT 1

# Product Specifications

COMMSCOPE®

## JAHH-65B-R3B

**Multiband Antenna, 698–787, 824-894 and 2x 1695–2360 MHz, 65° horizontal beamwidth, internal RETs 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.

## General Specifications

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

## Mechanical Specifications

| | |
|---|---|
| RF Connector Quantity, total | 8 |
| RF Connector Quantity, low band | 4 |
| RF Connector Quantity, high band | 4 |
| RF Connector Interface | 4.3-10 Female |
| Color | Light gray |
| 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<br>167.7 lbf @ 150 km/h |
| Wind Loading, lateral | 243.0 N @ 150 km/h<br>54.6 lbf @ 150 km/h |
| Wind Loading, rear | 776.0 N @ 150 km/h<br>174.5 lbf @ 150 km/h |
| Wind Speed, maximum | 241 km/h \| 150 mph |

## Dimensions

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

## Remote Electrical Tilt (RET) Information

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

## Packed Dimensions

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

## Regulatory Compliance/Certifications

| Agency | Classification |
|---|---|
| RoHS 2011/65/EU | Compliant by Exemption |
| China RoHS SJ/T 11364-2006 | Above Maximum Concentration Value (MCV) |

# Product Specifications

JAHH-65B-R3B

| | |
|---|---|
| ISO 9001:2008 | Designed, manufactured and/or distributed under this quality management system |

## Included Products

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

## * Footnotes

| | |
|---|---|
| Performance Note | Severe environmental conditions may degrade optimum performance |

# Product Specifications

COMMSCOPE®

## 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.**

## General Specifications

| | |
|---|---|
| Mount Type | Downtilt mounts |
| Application | Outdoor |
| Includes | Brackets \| Hardware |
| Package Quantity | 1 |

## Mechanical Specifications

| | |
|---|---|
| Color | Silver |
| Material Type | Galvanized steel |

## Dimensions

| | |
|---|---|
| Compatible Diameter, maximum | 115.0 mm \| 4.5 in |
| Compatible Diameter, minimum | 60.0 mm \| 2.4 in |
| Net Weight | 3.4 kg \| 7.5 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 |

# 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.

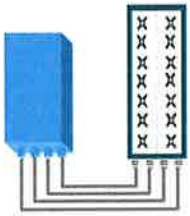
Its compactness and slim design makes the Alcatel-Lucent B13 RRH4x30-4R easy to install close to the antenna: operators can therefore locate this Remote Radio Head where RF design conditions are deemed ideal, minimizing trade-offs between available sites and RF optimum sites, together with reducing the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

| Features & performance | |
|---|---|
| **Number of TX/RX paths** | 4 duplexed (either 4T4R or 2T4R by SW) |
| **Frequency band** | U700 (C) (3GPP bands 13):<br>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.)**<br>**Volume in L**<br>**Weight in kg (lb) (w/o mounting HW)** | 550 x 305 x 230 (21.6" x 12.0" x 9") (with solar shield)<br>38 (with solar shield)<br>26 (57.2) (with solar shield) |
| **DC voltage range**<br>**DC power consumption** | -40.5 to -57V at full performance, -38 to -57V with relaxation on power consumption<br>550W typical @100% RF load ( in 2Tx or 4TX mode) |
| **Environmental conditions**<br><br>**Wind load (@150km/h or 93mph)** | -40°C (-40°F) /+55°C (+131°F)<br>IP65<br>Frontal:<200N / Lateral :<150N |
| **Antenna ports** | 4 ports 7/16 DIN female (50 ohms)<br>VSWR < 1.5 |
| **CPRI ports** | 2 CPRI ports (HW ready for Rate7, 9.8 Gbps)<br>SFP single mode dual fiber |
| **AISG interfaces** | 1 AISG2.0 output (RS485)<br>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 |

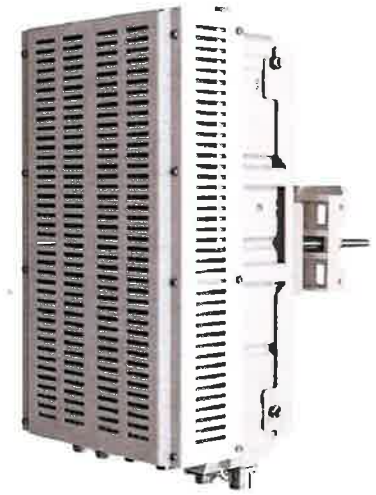
# B66a RRH4x45W

**Datasheet**

| | |
|---|---|
| Radio Technology | FDD-LTE |

**Feature description:**

- Remote Radio Head 4x45W or 2x90W Switchable via SW



| | |
|---|---|
| Power Output | 4 x 45 W or 2x90W (SW Switchable)<br>w/o fans |
| IBW | 70MHz |
| OBW | 60 MHz |
| RF Sharing | LTE |
| Mass/Volume | 25.8kg/56.9 lb Weight<br>655H x 299W x 182D mm<br>25.8"x11.8"x7.2"<br>29.7L / 35.5L |
| Antenna Conf. | 4Tx/4Rx |
| Temperature | -40 to 55 °C |
| IP class | IP65 |
| Input Power | DC 48 V |
| Cooling | Natural Convection |
| Mounting | Wall, Pole mount |
| BBU connection | 2x 9.8Gbps SFP(Rate 7 HW ready) |

# B66a RRH 4x45 – Interfaces

Power:

- Max power: 816W (add  58W for AISG)
- Breaker size: 25A
- Max distance with 6ga power feed and 5.5V drop: 284 feet

RF Interfaces:

- 4.3/10 Connectors
- No monitoring ports(Spectrum analyzer SW takes place of monitoring ports)

AISG:

- Two Smart Bias-T
- One AISG port

# B66 Details

- Max power for a single carrier is:
  - 2x60W for 10,15,20 MHz carrier
  - 2x40W for 5 MHz carrier
- Multi- Carrier Support with AWS-1 carriers: 15.1
- Multi- Carrier Support with AWS-3 carriers: 16.2

Carrier power: Multi-carrier

- Assuming 2 Tx power can be assigned per carrier subject to 40W max for 5Mhz, 60W for larger in 2T, cut that power in half for 4T
- Example:B4 (20Mhz) and AWS3 (10MHz)
  - Power can be varied between those two carriers, can go 60W for 20 MHz carrier, 30W for 10 MHz carrier to use the 90W in 2T.
  - It could be 45/45 for 20Mhz/10Mhz if desired.

# Product Data Sheet HB158-1-08U8-S8J18

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

### Product Description

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

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

Figure 1: HYBRIFLEX Series

### Features/Benefits

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

### Technical Specifications

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

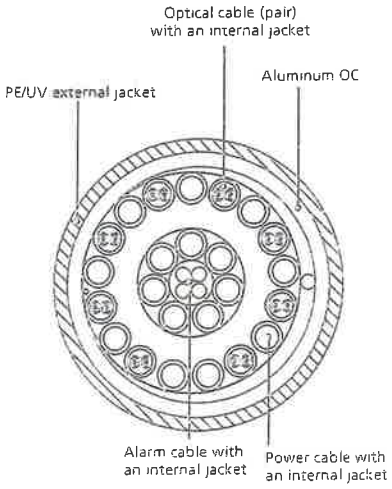



Figure 2: Construction Detail

* This data is provisional and subject to change

# ATTACHMENT 2

**Site Name:** Goshen CT

**Cumulative Power Density**

| Operator | Operating Frequency | Number of Trans. | ERP Per Trans. | Total ERP | Distance to Target | Calculated Power Density | Maximum Permissible Exposure* | Fraction of MPE |
|---|---|---|---|---|---|---|---|---|
| | (MHz) | | (watts) | (watts) | (feet) | (mW/cm^2) | (mW/cm^2) | (%) |
| VZW PCS | 1970 | 0 | 1637 | 0 | 150 | 0.0000 | 1.0 | 0.00% |
| VZW Cellular | 869 | 9 | 492 | 4428 | 150 | 0.0708 | 0.579333333 | 12.22% |
| VZW AWS | 2145 | 1 | 8325 | 8325 | 150 | 0.1331 | 1.0 | 13.31% |
| VZW 700 | 746 | 1 | 2062 | 2062 | 150 | 0.0330 | 0.497333333 | 6.63% |

**Total Percentage of Maximum Permissible Exposure** 32.15%

*Guidelines adopted by the FCC on August 1, 1996, 47 CFR Section 1.13101 based on NCRP Report 86, 1986 and generally on ANSI/IEEE C95.1-1992

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

Absolute worst case maximum values used, including the following assumptions:
1. closest accessible point is distance from antenna to base of pole;
2. continuous transmission from all available channels at full power for indefinite time period; and,
3. all RF energy is assumed to be directed solely to the base of the pole.

# ATTACHMENT 3

AMERICAN TOWER®
CORPORATION

# Structural Analysis Report

| | | |
|---|---|---|
| **Structure** | : | **149 ft Monopole** |
| **ATC Site Name** | : | **Goshen (Brass Mountain) CT, CT** |
| **ATC Site Number** | : | **413850** |
| **Engineering Number** | : | **OAA706894_C3_01** |
| **Proposed Carrier** | : | **Verizon** |
| **Carrier Site Name** | : | **Goshen, CT** |
| **Carrier Site Number** | : | **469179** |
| **Site Location** | : | **438 North Street**<br>**Goshen, CT 06756-1206**<br>**41.856300,-73.241600** |
| **County** | : | **Litchfield** |
| **Date** | : | **July 26, 2017** |
| **Max Usage** | : | **44%** |
| **Result** | : | **Pass** |

Prepared By:
Hamid Kazem, PhD, E.I.
Structural Engineer I

Hamid Kazem

Reviewed By:

STATE OF CONNECTICUT
SCOTT A. WIRGAU
30575
LICENSED
PROFESSIONAL ENGINEER

Jul 28 2017 3:50 PM cosign

**COA: PEC.0001553**

AMERICAN TOWER®
CORPORATION

## Table of Contents

AMERICAN TOWER®
CORPORATION

## Introduction

The purpose of this report is to summarize results of a structural analysis performed on the 149 ft monopole to reflect the change in loading by Verizon.

## Supporting Documents

| | |
|---|---|
| **Tower Drawings** | EEI Project #15244, dated February 6, 2008 |
| **Foundation Drawing** | EEI Project #15244, dated January 23, 2008 |
| **Geotechnical Report** | JGI Project #J2075429, dated January 17, 2008 |

## Analysis

The tower was analyzed using American Tower Corporation's tower analysis software. This program considers an elastic three-dimensional model and second-order effects per ANSI/TIA-222.

| | |
|---|---|
| **Basic Wind Speed:** | 90 mph (3-Second Gust, $V_{asd}$) / 115 mph (3-second Gust, $V_{ult}$) |
| **Basic Wind Speed w/ Ice:** | 40 mph (3-Second Gust) w/ 3/4" radial ice concurrent |
| **Code:** | ANSI/TIA-222-G / 2012 IBC / 2016 Connecticut State Building Code |
| **Structure Class:** | II |
| **Exposure Category:** | B |
| **Topographic Category:** | 1 |
| **Crest Height:** | 0 ft |
| **Spectral Response:** | Ss = 0.18, $S_1$ = 0.06 |
| **Site Class:** | D - Stiff Soil |

## Conclusion

Based on the analysis results, the structure meets the requirements per the applicable codes listed above. The tower and foundation can support the equipment as described in this report.

If you have any questions or require additional information, please contact American Tower via email at Engineering@americantower.com. Please include the American Tower site name, site number, and engineering number in the subject line for any questions.

## Existing and Reserved Equipment

| Elevation[1] (ft) | | Qty | Antenna | Mount Type | Lines | Carrier |
|---|---|---|---|---|---|---|
| Mount | RAD | | | | | |
| 149.0 | 154.0 | 1 | 15' Dipole | T-Arm w/ Working Platforms | (2) 7/8" Coax | Other |
| | 149.0 | 6 | Antel LPA-80080-6CF-EDIN-2 | | (6) 1 5/8" Coax | Verizon |
| | | 1 | VZW Unused Reserve: 16,237 sq in | | | |

## Equipment to be Removed

| Elevation[1] (ft) | | Qty | Antenna | Mount Type | Lines | Carrier |
|---|---|---|---|---|---|---|
| Mount | RAD | | | | | |
| 149.0 | 149.0 | 3 | Antel BXA-171063-12BF | - | (12) 1 5/8" Coax | Verizon |
| | | 3 | Antel BXA-70063-6CF-EDIN-4 | | | |

## Proposed Equipment

| Elevation[1] (ft) | | Qty | Antenna | Mount Type | Lines | Carrier |
|---|---|---|---|---|---|---|
| Mount | RAD | | | | | |
| 149.0 | 149.0 | 3 | Alcatel-Lucent B13 RRH4x30-4R | T-Arm w/ Working Platforms | (2) 1 5/8" Hybriflex | Verizon |
| | | 3 | Alcatel-Lucent B66A RRH 4x45 | | | |
| | | 1 | RFS DB-C1-12C-24AB-0Z | | | |
| | | 6 | Commscope JAHH-65B-R3B | | | |

**[1]Mount elevation is defined as height above bottom of steel structure to the bottom of mount, RAD elevation is defined as center of antenna above ground level (AGL).**

Install proposed coax inside the pole shaft.

## Structure Usages

| Structural Component | Controlling Usage | Pass/Fail |
|---|---|---|
| Anchor Bolts | 24% | Pass |
| Shaft | 40% | Pass |
| Base Plate | 29% | Pass |

## Foundations

| Reaction Component | Analysis Reactions | % of Usage |
|---|---|---|
| Moment (Kips-Ft) | 1,931.0 | 44% |
| Axial (Kips) | 48.6 | 6% |
| Shear (Kips) | 17.7 | 8% |

The structure base reactions resulting from this analysis were found to be acceptable through analysis based on geotechnical and foundation information, therefore no modification or reinforcement of the foundation will be required.

## Deflection and Sway*

| Antenna Elevation (ft) | Antenna | Carrier | Deflection (ft) | Sway (Rotation) (°) |
|---|---|---|---|---|
| 149.0 | Alcatel-Lucent B13 RRH4x30-4R | Verizon | 1.218 | 0.914 |
| | Alcatel-Lucent B66A RRH 4x45 | | | |
| | RFS DB-C1-12C-24AB-0Z | | | |
| | Commscope JAHH-65B-R3B | | | |

***Deflection and Sway was evaluated considering a design wind speed of 60 mph (3-Second Gust) per ANSI/TIA-222-G**

AMERICAN TOWER®
CORPORATION

## Standard Conditions

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

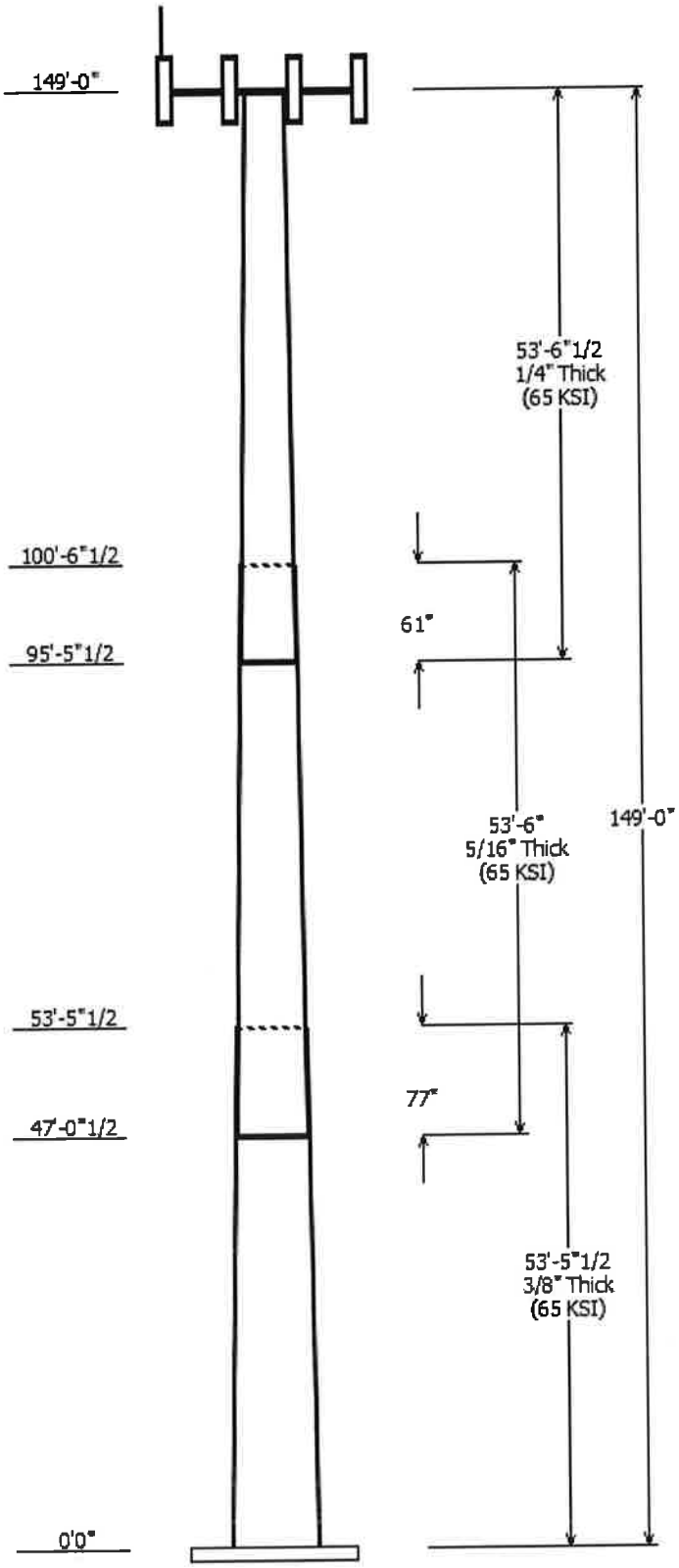
-- Information supplied by the client regarding the structure itself, antenna, mounts and feed line loading on the structure and its components, or other relevant information.

-- Information from drawings in the possession of American Tower Corporation, or generated by field inspections or measurements of the structure.

It is the responsibility of the client to ensure that the information provided to A.T. Engineering Service, PLLC and used in the performance of our engineering services is correct and complete. In the absence of information to the contrary, we assume that all structures were constructed in accordance with the drawings and specifications and that their capacity has not significantly changed from the "as new" condition.

Unless explicitly agreed by both the client and American Tower Corporation, all services will be performed in accordance with the current revision of ANSI/TIA -222. The design basic wind speed will be determined based on the minimum basic wind speed as prescribed in ANSI/TIA-222. Although every effort is taken to ensure that the loading considered is adequate to meet the requirements of all applicable regulatory entities, we can provide no assurance to meet any other local and state codes or requirements. If wind and ice loads or other relevant parameters are to be different from the minimum values recommended by the codes, the client shall specify the exact requirement.

All services are performed, results obtained, and recommendations made in accordance with generally accepted engineering principles and practices. A.T. Engineering Service, PLLC is not responsible for the conclusions, opinions and recommendations made by others based on the information we supply.




## Job Information

| | | | |
|---|---|---|---|
| Pole : | 413850 | Code: | ANSI/TIA-222-G |
| Description : | 149 ft EEI Monopole | | |
| Client : | VERIZON WIRELESS | Struct Class : | II |
| Location : | Goshen (Brass Mountain) CT, CT | | |
| Shape : | 18 Sides | Exposure : | B |
| Height : | 149.00 (ft) | Topo : | 1 |
| Base Elev (ft): | 0.00 | | |
| Taper: | 0.229027 (in/ft) | | |

## Sections Properties

| Shaft Section | Length (ft) | Diameter (in) Across Flats Top | Bottom | Thick (in) | Joint Type | Overlap Length (in) | Taper (in/ft) | Steel Grade (ksi) |
|---|---|---|---|---|---|---|---|---|
| 1 | 53.460 | 44.75 | 57.00 | 0.375 | | 0.000 | 0.229000 | 65 |
| 2 | 53.500 | 34.59 | 46.85 | 0.313 | Slip Joint | 77.000 | 0.229000 | 65 |
| 3 | 53.540 | 24.00 | 36.26 | 0.250 | Slip Joint | 61.000 | 0.229000 | 65 |

## Discrete Appurtenance

| Attach Elev (ft) | Force Elev (ft) | Qty | Description |
|---|---|---|---|
| 149.000 | 149.000 | 1 | VZW Unused Reserve: 16,237 |
| 149.000 | 149.000 | 6 | Commscope JAHH-65B-R3B |
| 149.000 | 149.000 | 1 | RFS DB-C1-12C-24AB-0Z |
| 149.000 | 149.000 | 3 | Alcatel-Lucent B66A RRH 4x45 |
| 149.000 | 149.000 | 3 | Alcatel-Lucent B13 RRH4x30-4R |
| 149.000 | 149.000 | 3 | Flat T-Arm w/ Working |
| 149.000 | 149.000 | 6 | Amphenol Antel LPA-80080- |
| 149.000 | 154.000 | 1 | 15' Dipole |

## Linear Appurtenance

| Elev (ft) From | To | Description | Exposed To Wind |
|---|---|---|---|
| 0.000 | 149.0 | 1 5/8" Coax | No |
| 0.000 | 149.0 | 1 5/8" Hybriflex | No |
| 0.000 | 149.0 | 7/8" Coax | No |

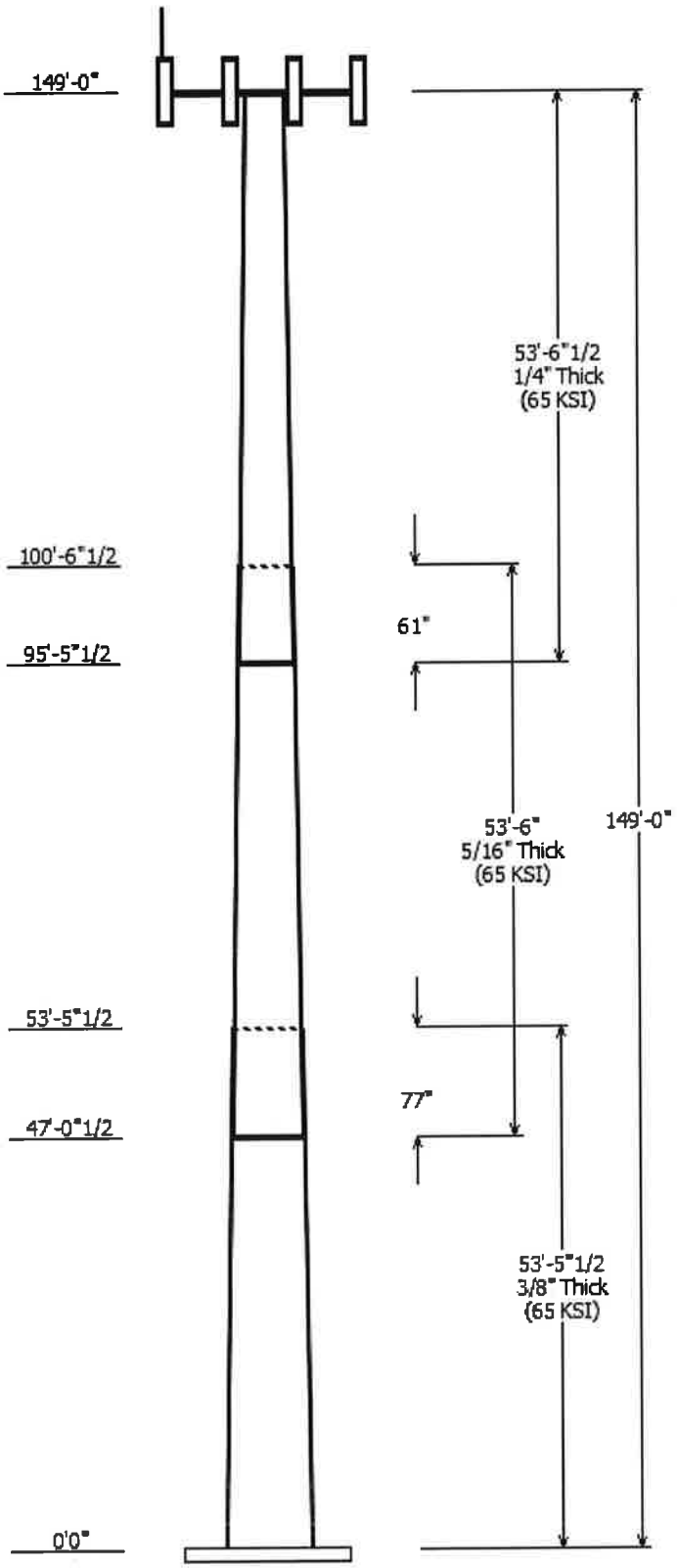
## Load Cases

| | |
|---|---|
| 1.2D + 1.6W | 90 mph with No Ice |
| 0.9D + 1.6W | 90 mph with No Ice (Reduced DL) |
| 1.2D + 1.0Di + 1.0Wi | 40 mph with 0.75 in Radial Ice |
| (1.2 + 0.2Sds) * DL + E | Seismic Equivalent Lateral Forces Method |
| (1.2 + 0.2Sds) * DL + E | Seismic Equivalent Modal Analysis Method |
| (0.9 - 0.2Sds) * DL + E | Seismic (Reduced DL) Equivalent Lateral |
| (0.9 - 0.2Sds) * DL + E | Seismic (Reduced DL) Equivalent Modal |
| 1.0D + 1.0W | Serviceability 60 mph |

## Reactions

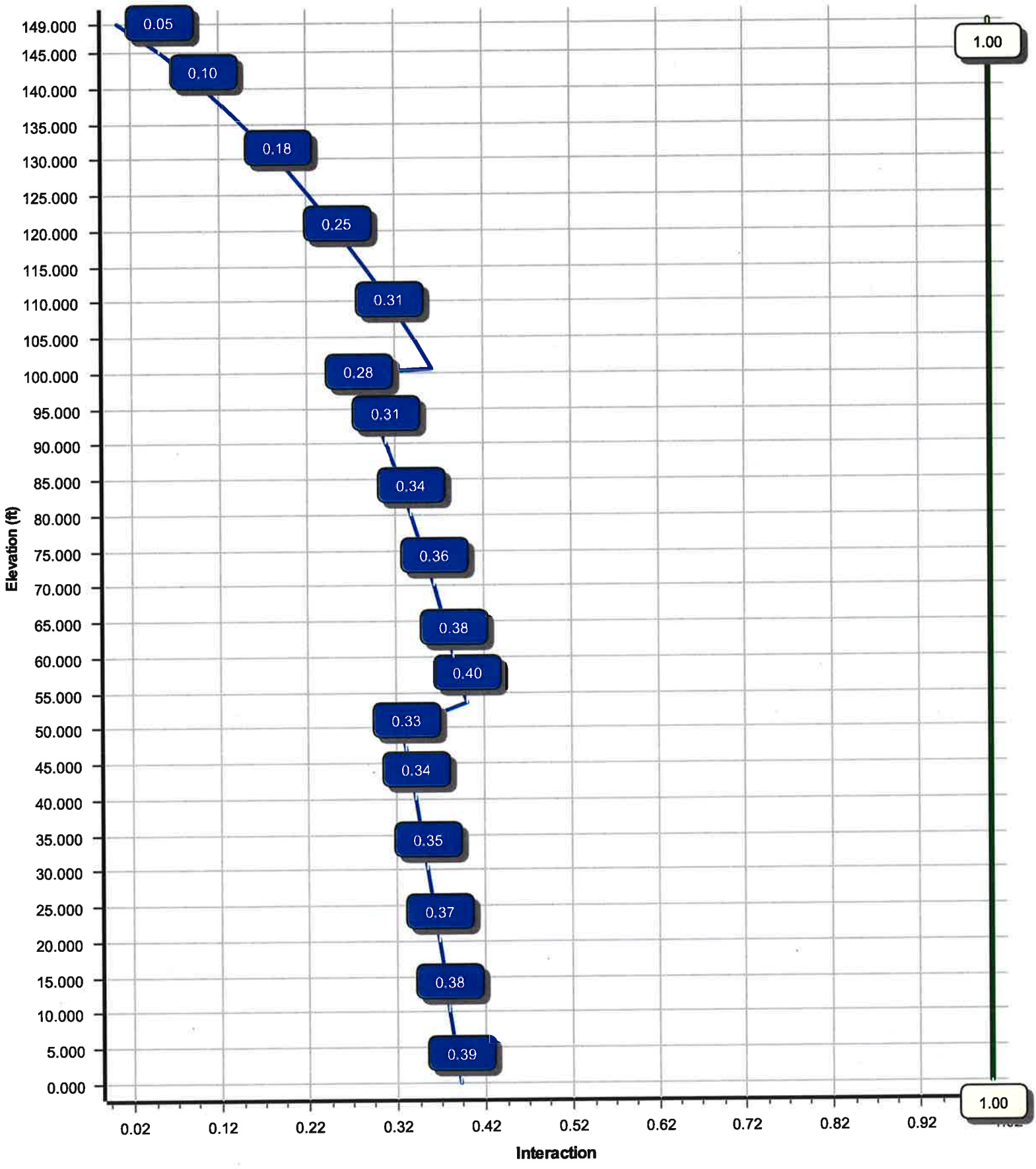
| Load Case | Moment (kip-ft) | Shear (kip) | Axial (kip) |
|---|---|---|---|
| 1.2D + 1.6W | 1931.04 | 17.66 | 32.64 |
| 0.9D + 1.6W | 1918.82 | 17.66 | 24.48 |
| 1.2D + 1.0Di + 1.0Wi | 282.94 | 3.05 | 48.57 |
| (1.2 + 0.2Sds) * DL + E ELFM | 163.56 | 1.42 | 32.25 |
| (1.2 + 0.2Sds) * DL + E EMAM | 239.79 | 1.97 | 32.25 |
| (0.9 - 0.2Sds) * DL + E ELFM | 162.37 | 1.42 | 22.44 |
| (0.9 - 0.2Sds) * DL + E EMAM | 237.90 | 1.97 | 22.43 |
| 1.0D + 1.0W | 534.33 | 4.90 | 27.21 |

| Dish Deflections | | | |
|---|---|---|---|
| Load Case | Attach Elev (ft) | Deflection (in) | Rotation (deg) |
| | 0.00 | 0.000 | 0.000 |



**Load Case : 1.2D + 1.6W**

**Max Ratio 39.83% at 53.5 ft**



Site Number: 413850 Code: ANSI/TIA-222-G 

Site Name: Goshen (Brass Mountain) CT, CT Engineering Number:OAA706894_C3_01 7/26/2017 4:26:05 PM

Customer: VERIZON WIRELESS

## Analysis Parameters

| | | | |
|---|---|---|---|
| Location: | LITCHFIELD County, CT | Height (ft): | 149 |
| Code: | ANSI/TIA-222-G | Base Diameter (in): | 57.00 |
| Shape: | 18 Sides | Top Diameter (in): | 24.00 |
| Pole Type: | Taper | Taper (in/ft) : | 0.229 |
| Pole Manfacturer: | EEI | Rotation (deg) : | 0.00 |

## Ice & Wind Parameters

| | | | |
|---|---|---|---|
| Structure Class: | II | Design Wind Speed Without Ice: | 90 mph |
| Exposure Category: | B | Design Wind Speed With Ice: | 40 mph |
| Topographic Category: | 1 | Operational Wind Speed: | 60 mph |
| Crest Height: | 0.0 ft | Design Ice Thickness: | 0.75 in |

## Seismic Parameters

| | | | | | |
|---|---|---|---|---|---|
| Analysis Method: | Equivalent Modal Analysis & Equivalent Lateral Force Methods | | | | |
| Site Class: | D - Stiff Soil | | | | |
| Period Based on Rayleigh Method (sec): | 1.73 | | | | |
| $T_L$ (sec): | 6 | p: | 1.3 | $C_s$: | 0.040 |
| $S_s$: | 0.180 | $S_1$: | 0.065 | $C_s$ Max: | 0.040 |
| $F_a$: | 1.600 | $F_v$: | 2.400 | $C_s$ Min: | 0.030 |
| $S_{ds}$: | 0.192 | $S_{d1}$: | 0.104 | | |

## Load Cases

| | |
|---|---|
| 1.2D + 1.6W | 90 mph with No Ice |
| 0.9D + 1.6W | 90 mph with No Ice (Reduced DL) |
| 1.2D + 1.0Di + 1.0Wi | 40 mph with 0.75 in Radial Ice |
| (1.2 + 0.2Sds) * DL + E ELFM | Seismic Equivalent Lateral Forces Method |
| (1.2 + 0.2Sds) * DL + E EMAM | Seismic Equivalent Modal Analysis Method |
| (0.9 - 0.2Sds) * DL + E ELFM | Seismic (Reduced DL) Equivalent Lateral Forces Method |
| (0.9 - 0.2Sds) * DL + E EMAM | Seismic (Reduced DL) Equivalent Modal Analysis Method |
| 1.0D + 1.0W | Serviceability 60 mph |

## Shaft Section Properties

| Sect Info | Length (ft) | Thick (in) | Fy (ksi) | Slip Joint Type | Slip Joint Len (in) | Weight (lb) | Bottom Dia (in) | Bottom Elev (ft) | Bottom Area (in²) | Bottom Ix (in⁴) | Bottom W/t Ratio | Bottom D/t Ratio | Top Dia (in) | Top Elev (ft) | Top Area (in²) | Top Ix (in⁴) | Top W/t Ratio | Top D/t Ratio | Taper (in/ft) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1-18 | 53.460 | 0.3750 | 65 | | 0.00 | 10,935 | 57.00 | 0.00 | 67.40 | 27302.4 | 25.39 | 152.00 | 44.75 | 53.46 | 52.82 | 13145.4 | 19.63 | 119.35 | 0.229027 |
| 2-18 | 53.500 | 0.3125 | 65 | Slip | 77.00 | 7,297 | 46.85 | 47.04 | 46.16 | 12630.7 | 25.02 | 149.92 | 34.59 | 100.54 | 34.01 | 5050.3 | 18.11 | 110.71 | 0.229027 |
| 3-18 | 53.540 | 0.2500 | 65 | Slip | 61.00 | 4,320 | 36.26 | 95.46 | 28.57 | 4682.0 | 24.17 | 145.05 | 24.00 | 149.00 | 18.84 | 1343.0 | 15.52 | 96.00 | 0.229027 |
| | | | | Shaft Weight | | 22,551 | | | | | | | | | | | | | |

## Discrete Appurtenance Properties

| Attach Elev (ft) | Description | Qty | No Ice Weight (lb) | No Ice EPAa (sf) | No Ice Orientation Factor | Ice Weight (lb) | Ice EPAa (sf) | Ice Orientation Factor | Distance From Face (ft) | Vert Ecc (ft) |
|---|---|---|---|---|---|---|---|---|---|---|
| 149.00 | 15' Dipole | 1 | 45.00 | 5.640 | 1.00 | 211.31 | 14.563 | 1.00 | 0.000 | 5.000 |
| 149.00 | Alcatel-Lucent B13 RRH4x30- | 3 | 57.80 | 2.140 | 0.67 | 138.24 | 2.760 | 0.67 | 0.000 | 0.000 |
| 149.00 | Alcatel-Lucent B66A RRH | 3 | 67.00 | 2.580 | 0.67 | 152.20 | 3.279 | 0.67 | 0.000 | 0.000 |
| 149.00 | Amphenol Antel LPA-80080- | 6 | 21.00 | 8.630 | 0.65 | 189.09 | 11.366 | 0.65 | 0.000 | 0.000 |
| 149.00 | Commscope JAHH-65B-R3B | 6 | 60.60 | 9.110 | 0.69 | 290.52 | 10.454 | 0.69 | 0.000 | 0.000 |
| 149.00 | Flat T-Arm w/ Working | 3 | 300.00 | 14.400 | 0.67 | 550.80 | 23.529 | 0.67 | 0.000 | 0.000 |
| 149.00 | RFS DB-C1-12C-24AB-0Z | 1 | 32.00 | 4.060 | 0.67 | 176.86 | 4.897 | 0.67 | 0.000 | 0.000 |
| 149.00 | VZW Unused Reserve: | 1 | 1604.00 | 112.85 | 1.00 | 1,852.11 | 6.254 | 1.00 | 0.000 | 0.000 |
| | Totals | 24 | 3445.00 | | | 7,641.69 | | | Number of Loadings : | 8 |

## Linear Appurtenance Properties

| Elev From (ft) | Elev To (ft) | Qty | Description | Coax Diameter (in) | Coax Weight (lb/ft) | Flat | Projected Width (in) | Exposed To Wind | Carrier |
|---|---|---|---|---|---|---|---|---|---|
| 0.00 | 149.00 | 6 | 1 5/8" Coax | 1.98 | 0.82 | N | 0.00 | N | AT&T Mobility |
| 0.00 | 149.00 | 2 | 1 5/8" Hybriflex Cable | 1.98 | 1.30 | N | 0.00 | N | AT&T Mobility |
| 0.00 | 149.00 | 2 | 7/8" Coax | 1.09 | 0.33 | N | 0.00 | N | AT&T Mobility |

## Segment Properties (Max Len : 5. ft)

| Seg Top Elev (ft) | Description | Thick (in) | Flat Dia (in) | Area ($in^2$) | Ix ($in^4$) | W/t Ratio | D/t Ratio | F'y (ksi) | S ($in^3$) | Z ($in^3$) | Weight (lb) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 0.00 | | 0.3750 | 57.000 | 67.395 | 27,302.4 | 25.39 | 152.00 | 71.5 | 943.4 | 0.0 | 0.0 |
| 5.00 | | 0.3750 | 55.855 | 66.033 | 25,679.2 | 24.85 | 148.95 | 72.2 | 905.5 | 0.0 | 1,135.1 |
| 10.00 | | 0.3750 | 54.710 | 64.670 | 24,121.7 | 24.31 | 145.89 | 72.8 | 868.4 | 0.0 | 1,111.9 |
| 15.00 | | 0.3750 | 53.565 | 63.307 | 22,628.5 | 23.78 | 142.84 | 73.4 | 832.1 | 0.0 | 1,088.7 |
| 20.00 | | 0.3750 | 52.419 | 61.944 | 21,198.2 | 23.24 | 139.79 | 74.1 | 796.5 | 0.0 | 1,065.5 |
| 25.00 | | 0.3750 | 51.274 | 60.581 | 19,829.5 | 22.70 | 136.73 | 74.7 | 761.7 | 0.0 | 1,042.3 |
| 30.00 | | 0.3750 | 50.129 | 59.218 | 18,521.0 | 22.16 | 133.68 | 75.3 | 727.7 | 0.0 | 1,019.1 |
| 35.00 | | 0.3750 | 48.984 | 57.855 | 17,271.4 | 21.62 | 130.62 | 76.0 | 694.5 | 0.0 | 995.9 |
| 40.00 | | 0.3750 | 47.839 | 56.492 | 16,079.3 | 21.08 | 127.57 | 76.6 | 662.0 | 0.0 | 972.7 |
| 45.00 | | 0.3750 | 46.694 | 55.129 | 14,943.3 | 20.55 | 124.52 | 77.2 | 630.3 | 0.0 | 949.6 |
| 47.04 | Bot - Section 2 | 0.3750 | 46.226 | 54.572 | 14,495.0 | 20.33 | 123.27 | 77.5 | 617.6 | 0.0 | 381.4 |
| 50.00 | | 0.3750 | 45.549 | 53.766 | 13,862.2 | 20.01 | 121.46 | 77.9 | 599.4 | 0.0 | 1,006.0 |
| 53.46 | Top - Section 1 | 0.3125 | 45.381 | 44.701 | 11,471.5 | 24.20 | 145.22 | 72.9 | 497.9 | 0.0 | 1,158.4 |
| 55.00 | | 0.3125 | 45.029 | 44.351 | 11,204.3 | 24.00 | 144.09 | 73.2 | 490.1 | 0.0 | 233.3 |
| 60.00 | | 0.3125 | 43.883 | 43.215 | 10,365.3 | 23.35 | 140.43 | 73.9 | 465.2 | 0.0 | 744.9 |
| 65.00 | | 0.3125 | 42.738 | 42.080 | 9,569.4 | 22.70 | 136.76 | 74.7 | 441.0 | 0.0 | 725.6 |
| 70.00 | | 0.3125 | 41.593 | 40.944 | 8,815.2 | 22.06 | 133.10 | 75.5 | 417.4 | 0.0 | 706.3 |
| 75.00 | | 0.3125 | 40.448 | 39.808 | 8,101.8 | 21.41 | 129.43 | 76.2 | 394.5 | 0.0 | 687.0 |
| 80.00 | | 0.3125 | 39.303 | 38.672 | 7,427.9 | 20.77 | 125.77 | 77.0 | 372.2 | 0.0 | 667.6 |
| 85.00 | | 0.3125 | 38.158 | 37.536 | 6,792.5 | 20.12 | 122.10 | 77.7 | 350.6 | 0.0 | 648.3 |
| 90.00 | | 0.3125 | 37.013 | 36.401 | 6,194.3 | 19.47 | 118.44 | 78.5 | 329.6 | 0.0 | 629.0 |
| 95.00 | | 0.3125 | 35.867 | 35.265 | 5,632.4 | 18.83 | 114.78 | 79.3 | 309.3 | 0.0 | 609.7 |
| 95.46 | Bot - Section 3 | 0.3125 | 35.762 | 35.160 | 5,582.5 | 18.77 | 114.44 | 79.3 | 307.5 | 0.0 | 55.1 |
| 100.0 | | 0.3125 | 34.722 | 34.129 | 5,105.5 | 18.18 | 111.11 | 80.0 | 289.6 | 0.0 | 970.3 |
| 100.5 | Top - Section 2 | 0.2500 | 35.098 | 27.651 | 4,242.4 | 23.34 | 140.39 | 73.9 | 238.1 | 0.0 | 114.2 |
| 105.0 | | 0.2500 | 34.077 | 26.841 | 3,880.4 | 22.62 | 136.31 | 74.8 | 224.3 | 0.0 | 413.2 |
| 110.0 | | 0.2500 | 32.932 | 25.932 | 3,499.6 | 21.82 | 131.73 | 75.7 | 209.3 | 0.0 | 448.9 |
| 115.0 | | 0.2500 | 31.787 | 25.024 | 3,144.4 | 21.01 | 127.15 | 76.7 | 194.8 | 0.0 | 433.5 |
| 120.0 | | 0.2500 | 30.642 | 24.115 | 2,814.2 | 20.20 | 122.57 | 77.6 | 180.9 | 0.0 | 418.0 |
| 125.0 | | 0.2500 | 29.497 | 23.206 | 2,507.9 | 19.39 | 117.99 | 78.6 | 167.5 | 0.0 | 402.6 |
| 130.0 | | 0.2500 | 28.352 | 22.298 | 2,224.7 | 18.59 | 113.41 | 79.5 | 154.6 | 0.0 | 387.1 |
| 135.0 | | 0.2500 | 27.206 | 21.389 | 1,963.7 | 17.78 | 108.83 | 80.5 | 142.2 | 0.0 | 371.6 |
| 140.0 | | 0.2500 | 26.061 | 20.480 | 1,723.9 | 16.97 | 104.24 | 81.4 | 130.3 | 0.0 | 356.2 |
| 145.0 | | 0.2500 | 24.916 | 19.572 | 1,504.5 | 16.16 | 99.66 | 82.4 | 118.9 | 0.0 | 340.7 |
| 149.0 | | 0.2500 | 24.000 | 18.845 | 1,343.0 | 15.52 | 96.00 | 82.6 | 110.2 | 0.0 | 261.4 |
| | | | | | | | | | | | 22,551.0 |

Site Number: 413850 Code: ANSI/TIA-222-G 

Site Name: Goshen (Brass Mountain) CT, CT Engineering Number:OAA706894_C3_01 7/26/2017 4:26:05 PM

Customer: VERIZON WIRELESS

**Load Case:** 1.2D + 1.6W 90 mph with No Ice 22 Iterations

Gust Response Factor :1.10 Wind Importance Factor :1.00

Dead Load Factor :1.20

Wind Load Factor :1.60

## Applied Segment Forces Summary

| Seg Elev (ft) | Description | Shaft Forces Wind FX (lb) | Shaft Forces Dead Load (lb) | Discrete Forces Wind FX (lb) | Discrete Forces Torsion MY (lb-ft) | Discrete Forces Moment MZ (lb-ft) | Discrete Forces Dead Load (lb) | Linear Forces Wind FX (lb) | Linear Forces Dead Load (lb) | Sum of Forces Wind FX (lb) | Sum of Forces Dead Load (lb) | Sum of Forces Torsion MY (lb-ft) | Sum of Forces Moment MZ (lb) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 0.00 | | 188.3 | 0.0 | | | | | 0.0 | 0.0 | 188.3 | 0.0 | 0.0 | 0.0 |
| 5.00 | | 372.8 | 1,362.1 | | | | | 0.0 | 49.1 | 372.8 | 1,411.2 | 0.0 | 0.0 |
| 10.00 | | 365.2 | 1,334.3 | | | | | 0.0 | 49.1 | 365.2 | 1,383.3 | 0.0 | 0.0 |
| 15.00 | | 357.5 | 1,306.4 | | | | | 0.0 | 49.1 | 357.5 | 1,355.5 | 0.0 | 0.0 |
| 20.00 | | 349.9 | 1,278.6 | | | | | 0.0 | 49.1 | 349.9 | 1,327.7 | 0.0 | 0.0 |
| 25.00 | | 342.2 | 1,250.8 | | | | | 0.0 | 49.1 | 342.2 | 1,299.9 | 0.0 | 0.0 |
| 30.00 | | 338.5 | 1,222.9 | | | | | 0.0 | 49.1 | 338.5 | 1,272.0 | 0.0 | 0.0 |
| 35.00 | | 341.7 | 1,195.1 | | | | | 0.0 | 49.1 | 341.7 | 1,244.2 | 0.0 | 0.0 |
| 40.00 | | 346.7 | 1,167.3 | | | | | 0.0 | 49.1 | 346.7 | 1,216.4 | 0.0 | 0.0 |
| 45.00 | | 246.1 | 1,139.5 | | | | | 0.0 | 49.1 | 246.1 | 1,188.5 | 0.0 | 0.0 |
| 47.04 | Bot - Section 2 | 177.1 | 457.7 | | | | | 0.0 | 20.1 | 177.1 | 477.7 | 0.0 | 0.0 |
| 50.00 | | 229.0 | 1,207.2 | | | | | 0.0 | 29.0 | 229.0 | 1,236.2 | 0.0 | 0.0 |
| 53.46 | Top - Section 1 | 178.7 | 1,390.1 | | | | | 0.0 | 34.0 | 178.7 | 1,424.0 | 0.0 | 0.0 |
| 55.00 | | 233.9 | 280.0 | | | | | 0.0 | 15.1 | 233.9 | 295.1 | 0.0 | 0.0 |
| 60.00 | | 357.2 | 893.9 | | | | | 0.0 | 49.1 | 357.2 | 943.0 | 0.0 | 0.0 |
| 65.00 | | 356.0 | 870.7 | | | | | 0.0 | 49.1 | 356.0 | 919.8 | 0.0 | 0.0 |
| 70.00 | | 353.8 | 847.5 | | | | | 0.0 | 49.1 | 353.8 | 896.6 | 0.0 | 0.0 |
| 75.00 | | 351.0 | 824.3 | | | | | 0.0 | 49.1 | 351.0 | 873.4 | 0.0 | 0.0 |
| 80.00 | | 347.4 | 801.2 | | | | | 0.0 | 49.1 | 347.4 | 850.2 | 0.0 | 0.0 |
| 85.00 | | 343.2 | 778.0 | | | | | 0.0 | 49.1 | 343.2 | 827.0 | 0.0 | 0.0 |
| 90.00 | | 338.3 | 754.8 | | | | | 0.0 | 49.1 | 338.3 | 803.9 | 0.0 | 0.0 |
| 95.00 | | 183.2 | 731.6 | | | | | 0.0 | 49.1 | 183.2 | 780.7 | 0.0 | 0.0 |
| 95.46 | Bot - Section 3 | 167.2 | 66.1 | | | | | 0.0 | 4.5 | 167.2 | 70.7 | 0.0 | 0.0 |
| 100.00 | | 169.9 | 1,164.3 | | | | | 0.0 | 44.6 | 169.9 | 1,208.9 | 0.0 | 0.0 |
| 100.54 | Top - Section 2 | 164.4 | 137.0 | | | | | 0.0 | 5.3 | 164.4 | 142.4 | 0.0 | 0.0 |
| 105.00 | | 307.5 | 495.8 | | | | | 0.0 | 43.7 | 307.5 | 539.6 | 0.0 | 0.0 |
| 110.00 | | 318.8 | 538.7 | | | | | 0.0 | 49.1 | 318.8 | 587.8 | 0.0 | 0.0 |
| 115.00 | | 311.7 | 520.2 | | | | | 0.0 | 49.1 | 311.7 | 569.3 | 0.0 | 0.0 |
| 120.00 | | 304.1 | 501.6 | | | | | 0.0 | 49.1 | 304.1 | 550.7 | 0.0 | 0.0 |
| 125.00 | | 296.2 | 483.1 | | | | | 0.0 | 49.1 | 296.2 | 532.2 | 0.0 | 0.0 |
| 130.00 | | 287.9 | 464.5 | | | | | 0.0 | 49.1 | 287.9 | 513.6 | 0.0 | 0.0 |
| 135.00 | | 279.3 | 446.0 | | | | | 0.0 | 49.1 | 279.3 | 495.1 | 0.0 | 0.0 |
| 140.00 | | 270.3 | 427.4 | | | | | 0.0 | 49.1 | 270.3 | 476.5 | 0.0 | 0.0 |
| 145.00 | | 235.8 | 408.9 | | | | | 0.0 | 49.1 | 235.8 | 457.9 | 0.0 | 0.0 |
| 149.00 | Appertunance(s) | 102.9 | 313.7 | 7,909.0 | 0.0 | 874.5 | 4,134.0 | 0.0 | 39.3 | 8,011.9 | 4,487.0 | 0.0 | 0.0 |
| | | | | | | | | | Totals: | 17,822.5 | 32,657.8 | 0.00 | 0.00 |

Site Number: 413850 Code: ANSI/TIA-222-G 

Site Name: Goshen (Brass Mountain) CT, CT Engineering Number:OAA706894_C3_01 7/26/2017 4:26:06 PM

Customer: VERIZON WIRELESS

**Load Case:** 1.2D + 1.6W 90 mph with No Ice 22 Iterations

Gust Response Factor :1.10 Wind Importance Factor :1.00

Dead Load Factor :1.20

Wind Load Factor :1.60

## Calculated Forces

| Seg Elev (ft) | Pu FY (-) (kips) | Vu FX (-) (kips) | Tu MY (ft-kips) | Mu MZ (ft-kips) | Mu MX (ft-kips) | Resultant Moment (ft-kips) | phi Pn (kips) | phi Vn (kips) | phi Tn (ft-kips) | phi Mn (ft-kips) | Total Deflect (in) | Rotation (deg) | Ratio |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 0.00 | -32.64 | -17.66 | 0.00 | -1,931.04 | 0.00 | 1,931.04 | 4,339.10 | 2,169.55 | 10,108.3 | 5,061.68 | 0.00 | 0.00 | 0.389 |
| 5.00 | -31.20 | -17.34 | 0.00 | -1,842.72 | 0.00 | 1,842.72 | 4,288.99 | 2,144.49 | 9,788.20 | 4,901.38 | 0.05 | -0.10 | 0.383 |
| 10.00 | -29.79 | -17.03 | 0.00 | -1,756.01 | 0.00 | 1,756.01 | 4,237.32 | 2,118.66 | 9,469.35 | 4,741.71 | 0.21 | -0.20 | 0.377 |
| 15.00 | -28.41 | -16.71 | 0.00 | -1,670.88 | 0.00 | 1,670.88 | 4,184.10 | 2,092.05 | 9,152.00 | 4,582.80 | 0.47 | -0.30 | 0.371 |
| 20.00 | -27.05 | -16.40 | 0.00 | -1,587.32 | 0.00 | 1,587.32 | 4,129.33 | 2,064.66 | 8,836.37 | 4,424.75 | 0.84 | -0.40 | 0.365 |
| 25.00 | -25.72 | -16.10 | 0.00 | -1,505.30 | 0.00 | 1,505.30 | 4,073.00 | 2,036.50 | 8,522.69 | 4,267.68 | 1.32 | -0.51 | 0.359 |
| 30.00 | -24.43 | -15.79 | 0.00 | -1,424.81 | 0.00 | 1,424.81 | 4,015.11 | 2,007.56 | 8,211.17 | 4,111.69 | 1.90 | -0.61 | 0.353 |
| 35.00 | -23.16 | -15.48 | 0.00 | -1,345.85 | 0.00 | 1,345.85 | 3,955.68 | 1,977.84 | 7,902.03 | 3,956.89 | 2.60 | -0.72 | 0.346 |
| 40.00 | -21.92 | -15.16 | 0.00 | -1,268.45 | 0.00 | 1,268.45 | 3,894.69 | 1,947.34 | 7,595.51 | 3,803.40 | 3.41 | -0.82 | 0.339 |
| 45.00 | -20.71 | -14.92 | 0.00 | -1,192.66 | 0.00 | 1,192.66 | 3,832.15 | 1,916.07 | 7,291.81 | 3,651.33 | 4.33 | -0.93 | 0.332 |
| 47.04 | -20.22 | -14.76 | 0.00 | -1,162.17 | 0.00 | 1,162.17 | 3,806.14 | 1,903.07 | 7,168.57 | 3,589.61 | 4.74 | -0.98 | 0.329 |
| 50.00 | -18.97 | -14.53 | 0.00 | -1,118.55 | 0.00 | 1,118.55 | 3,768.05 | 1,884.02 | 6,991.17 | 3,500.78 | 5.37 | -1.05 | 0.325 |
| 53.46 | -17.54 | -14.34 | 0.00 | -1,068.27 | 0.00 | 1,068.27 | 2,934.54 | 1,467.27 | 5,439.41 | 2,723.75 | 6.15 | -1.12 | 0.398 |
| 55.00 | -17.23 | -14.13 | 0.00 | -1,046.19 | 0.00 | 1,046.19 | 2,920.91 | 1,460.46 | 5,371.50 | 2,689.74 | 6.52 | -1.16 | 0.395 |
| 60.00 | -16.26 | -13.79 | 0.00 | -975.56 | 0.00 | 975.56 | 2,875.67 | 1,437.83 | 5,151.93 | 2,579.79 | 7.80 | -1.29 | 0.384 |
| 65.00 | -15.32 | -13.44 | 0.00 | -906.63 | 0.00 | 906.63 | 2,828.87 | 1,414.44 | 4,933.94 | 2,470.64 | 9.22 | -1.42 | 0.372 |
| 70.00 | -14.40 | -13.10 | 0.00 | -839.42 | 0.00 | 839.42 | 2,780.52 | 1,390.26 | 4,717.75 | 2,362.38 | 10.77 | -1.55 | 0.361 |
| 75.00 | -13.51 | -12.75 | 0.00 | -773.93 | 0.00 | 773.93 | 2,730.61 | 1,365.31 | 4,503.59 | 2,255.14 | 12.46 | -1.68 | 0.348 |
| 80.00 | -12.64 | -12.41 | 0.00 | -710.17 | 0.00 | 710.17 | 2,679.16 | 1,339.58 | 4,291.67 | 2,149.02 | 14.28 | -1.81 | 0.335 |
| 85.00 | -11.80 | -12.07 | 0.00 | -648.12 | 0.00 | 648.12 | 2,626.14 | 1,313.07 | 4,082.22 | 2,044.14 | 16.25 | -1.94 | 0.322 |
| 90.00 | -10.98 | -11.72 | 0.00 | -587.79 | 0.00 | 587.79 | 2,571.58 | 1,285.79 | 3,875.45 | 1,940.61 | 18.34 | -2.07 | 0.307 |
| 95.00 | -10.20 | -11.52 | 0.00 | -529.17 | 0.00 | 529.17 | 2,515.46 | 1,257.73 | 3,671.59 | 1,838.53 | 20.57 | -2.19 | 0.292 |
| 95.46 | -10.12 | -11.37 | 0.00 | -523.87 | 0.00 | 523.87 | 2,510.22 | 1,255.11 | 3,652.99 | 1,829.21 | 20.79 | -2.21 | 0.291 |
| 100.00 | -8.91 | -11.16 | 0.00 | -472.26 | 0.00 | 472.26 | 2,457.78 | 1,228.89 | 3,470.86 | 1,738.01 | 22.94 | -2.32 | 0.275 |
| 100.54 | -8.76 | -11.00 | 0.00 | -466.20 | 0.00 | 466.20 | 1,840.14 | 920.07 | 2,636.71 | 1,320.31 | 23.21 | -2.34 | 0.358 |
| 105.00 | -8.21 | -10.69 | 0.00 | -417.18 | 0.00 | 417.18 | 1,806.70 | 903.35 | 2,512.42 | 1,258.08 | 25.44 | -2.45 | 0.336 |
| 110.00 | -7.61 | -10.36 | 0.00 | -363.75 | 0.00 | 363.75 | 1,767.71 | 883.85 | 2,374.37 | 1,188.95 | 28.08 | -2.59 | 0.310 |
| 115.00 | -7.03 | -10.04 | 0.00 | -311.94 | 0.00 | 311.94 | 1,727.17 | 863.58 | 2,238.01 | 1,120.67 | 30.86 | -2.73 | 0.283 |
| 120.00 | -6.48 | -9.72 | 0.00 | -261.74 | 0.00 | 261.74 | 1,685.07 | 842.53 | 2,103.55 | 1,053.34 | 33.79 | -2.86 | 0.252 |
| 125.00 | -5.94 | -9.41 | 0.00 | -213.13 | 0.00 | 213.13 | 1,641.42 | 820.71 | 1,971.23 | 987.08 | 36.85 | -2.98 | 0.220 |
| 130.00 | -5.43 | -9.11 | 0.00 | -166.06 | 0.00 | 166.06 | 1,596.21 | 798.11 | 1,841.24 | 921.99 | 40.02 | -3.08 | 0.184 |
| 135.00 | -4.94 | -8.81 | 0.00 | -120.53 | 0.00 | 120.53 | 1,549.45 | 774.73 | 1,713.83 | 858.19 | 43.30 | -3.18 | 0.144 |
| 140.00 | -4.47 | -8.52 | 0.00 | -76.48 | 0.00 | 76.48 | 1,501.14 | 750.57 | 1,589.21 | 795.79 | 46.67 | -3.25 | 0.099 |
| 145.00 | -4.02 | -8.26 | 0.00 | -33.90 | 0.00 | 33.90 | 1,451.27 | 725.64 | 1,467.60 | 734.89 | 50.09 | -3.29 | 0.049 |
| 149.00 | 0.00 | -8.01 | 0.00 | -0.87 | 0.00 | 0.87 | 1,400.09 | 700.04 | 1,362.73 | 682.38 | 52.86 | -3.31 | 0.001 |

Site Number: 413850 Code: ANSI/TIA-222-G 

Site Name: Goshen (Brass Mountain) CT, CT Engineering Number: OAA706894_C3_01 7/26/2017 4:26:06 PM

Customer: VERIZON WIRELESS

**Load Case:** 0.9D + 1.6W — 90 mph with No Ice (Reduced DL) — 22 Iterations

Gust Response Factor : 1.10
Dead Load Factor : 0.90
Wind Load Factor : 1.60

Wind Importance Factor : 1.00

## Applied Segment Forces Summary

| Seg Elev (ft) | Description | Shaft Forces Wind FX (lb) | Shaft Forces Dead Load (lb) | Discrete Forces Wind FX (lb) | Discrete Forces Torsion MY (lb-ft) | Discrete Forces Moment MZ (lb-ft) | Discrete Forces Dead Load (lb) | Linear Forces Wind FX (lb) | Linear Forces Dead Load (lb) | Sum of Forces Wind FX (lb) | Sum of Forces Dead Load (lb) | Sum of Forces Torsion MY (lb-ft) | Sum of Forces Moment MZ (lb) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 0.00 | | 188.3 | 0.0 | | | | | 0.0 | 0.0 | 188.3 | 0.0 | 0.0 | 0.0 |
| 5.00 | | 372.8 | 1,021.6 | | | | | 0.0 | 36.8 | 372.8 | 1,058.4 | 0.0 | 0.0 |
| 10.00 | | 365.2 | 1,000.7 | | | | | 0.0 | 36.8 | 365.2 | 1,037.5 | 0.0 | 0.0 |
| 15.00 | | 357.5 | 979.8 | | | | | 0.0 | 36.8 | 357.5 | 1,016.6 | 0.0 | 0.0 |
| 20.00 | | 349.9 | 958.9 | | | | | 0.0 | 36.8 | 349.9 | 995.8 | 0.0 | 0.0 |
| 25.00 | | 342.2 | 938.1 | | | | | 0.0 | 36.8 | 342.2 | 974.9 | 0.0 | 0.0 |
| 30.00 | | 338.5 | 917.2 | | | | | 0.0 | 36.8 | 338.5 | 954.0 | 0.0 | 0.0 |
| 35.00 | | 341.7 | 896.3 | | | | | 0.0 | 36.8 | 341.7 | 933.1 | 0.0 | 0.0 |
| 40.00 | | 346.7 | 875.5 | | | | | 0.0 | 36.8 | 346.7 | 912.3 | 0.0 | 0.0 |
| 45.00 | | 246.1 | 854.6 | | | | | 0.0 | 36.8 | 246.1 | 891.4 | 0.0 | 0.0 |
| 47.04 | Bot - Section 2 | 177.1 | 343.2 | | | | | 0.0 | 15.0 | 177.1 | 358.3 | 0.0 | 0.0 |
| 50.00 | | 229.0 | 905.4 | | | | | 0.0 | 21.8 | 229.0 | 927.2 | 0.0 | 0.0 |
| 53.46 | Top - Section 1 | 178.7 | 1,042.5 | | | | | 0.0 | 25.5 | 178.7 | 1,068.0 | 0.0 | 0.0 |
| 55.00 | | 233.9 | 210.0 | | | | | 0.0 | 11.3 | 233.9 | 221.3 | 0.0 | 0.0 |
| 60.00 | | 357.2 | 670.4 | | | | | 0.0 | 36.8 | 357.2 | 707.2 | 0.0 | 0.0 |
| 65.00 | | 356.0 | 653.0 | | | | | 0.0 | 36.8 | 356.0 | 689.8 | 0.0 | 0.0 |
| 70.00 | | 353.8 | 635.6 | | | | | 0.0 | 36.8 | 353.8 | 672.5 | 0.0 | 0.0 |
| 75.00 | | 351.0 | 618.3 | | | | | 0.0 | 36.8 | 351.0 | 655.1 | 0.0 | 0.0 |
| 80.00 | | 347.4 | 600.9 | | | | | 0.0 | 36.8 | 347.4 | 637.7 | 0.0 | 0.0 |
| 85.00 | | 343.2 | 583.5 | | | | | 0.0 | 36.8 | 343.2 | 620.3 | 0.0 | 0.0 |
| 90.00 | | 338.3 | 566.1 | | | | | 0.0 | 36.8 | 338.3 | 602.9 | 0.0 | 0.0 |
| 95.00 | | 183.2 | 548.7 | | | | | 0.0 | 36.8 | 183.2 | 585.5 | 0.0 | 0.0 |
| 95.46 | Bot - Section 3 | 167.2 | 49.6 | | | | | 0.0 | 3.4 | 167.2 | 53.0 | 0.0 | 0.0 |
| 100.00 | | 169.9 | 873.2 | | | | | 0.0 | 33.4 | 169.9 | 906.7 | 0.0 | 0.0 |
| 100.54 | Top - Section 2 | 164.4 | 102.8 | | | | | 0.0 | 4.0 | 164.4 | 106.8 | 0.0 | 0.0 |
| 105.00 | | 307.5 | 371.9 | | | | | 0.0 | 32.8 | 307.5 | 404.7 | 0.0 | 0.0 |
| 110.00 | | 318.8 | 404.0 | | | | | 0.0 | 36.8 | 318.8 | 440.9 | 0.0 | 0.0 |
| 115.00 | | 311.7 | 390.1 | | | | | 0.0 | 36.8 | 311.7 | 426.9 | 0.0 | 0.0 |
| 120.00 | | 304.1 | 376.2 | | | | | 0.0 | 36.8 | 304.1 | 413.0 | 0.0 | 0.0 |
| 125.00 | | 296.2 | 362.3 | | | | | 0.0 | 36.8 | 296.2 | 399.1 | 0.0 | 0.0 |
| 130.00 | | 287.9 | 348.4 | | | | | 0.0 | 36.8 | 287.9 | 385.2 | 0.0 | 0.0 |
| 135.00 | | 279.3 | 334.5 | | | | | 0.0 | 36.8 | 279.3 | 371.3 | 0.0 | 0.0 |
| 140.00 | | 270.3 | 320.6 | | | | | 0.0 | 36.8 | 270.3 | 357.4 | 0.0 | 0.0 |
| 145.00 | | 235.8 | 306.7 | | | | | 0.0 | 36.8 | 235.8 | 343.5 | 0.0 | 0.0 |
| 149.00 | Appertunance(s) | 102.9 | 235.3 | 7,909.0 | 0.0 | 874.5 | 3,100.5 | 0.0 | 29.4 | 8,011.9 | 3,365.3 | 0.0 | 0.0 |
| | | | | | | | | | Totals: | 17,822.5 | 24,493.3 | 0.00 | 0.00 |

Site Number: 413850 Code: ANSI/TIA-222-G 

Site Name: Goshen (Brass Mountain) CT, CT Engineering Number: OAA706894_C3_01 7/26/2017 4:26:07 PM

Customer: VERIZON WIRELESS

**Load Case:** 0.9D + 1.6W — 90 mph with No Ice (Reduced DL) — 22 Iterations

Gust Response Factor : 1.10
Dead Load Factor : 0.90
Wind Load Factor : 1.60

Wind Importance Factor : 1.00

## Calculated Forces

| Seg Elev (ft) | Pu FY (-) (kips) | Vu FX (-) (kips) | Tu MY (ft-kips) | Mu MZ (ft-kips) | Mu MX (ft-kips) | Resultant Moment (ft-kips) | phi Pn (kips) | phi Vn (kips) | phi Tn (ft-kips) | phi Mn (ft-kips) | Total Deflect (in) | Rotation (deg) | Ratio |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 0.00 | -24.48 | -17.66 | 0.00 | -1,918.82 | 0.00 | 1,918.82 | 4,339.10 | 2,169.55 | 10,108.3 | 5,061.68 | 0.00 | 0.00 | 0.385 |
| 5.00 | -23.39 | -17.32 | 0.00 | -1,830.54 | 0.00 | 1,830.54 | 4,288.99 | 2,144.49 | 9,788.20 | 4,901.38 | 0.05 | -0.10 | 0.379 |
| 10.00 | -22.32 | -16.99 | 0.00 | -1,743.93 | 0.00 | 1,743.93 | 4,237.32 | 2,118.66 | 9,469.35 | 4,741.71 | 0.21 | -0.20 | 0.373 |
| 15.00 | -21.28 | -16.67 | 0.00 | -1,658.97 | 0.00 | 1,658.97 | 4,184.10 | 2,092.05 | 9,152.00 | 4,582.80 | 0.47 | -0.30 | 0.367 |
| 20.00 | -20.26 | -16.35 | 0.00 | -1,575.63 | 0.00 | 1,575.63 | 4,129.33 | 2,064.66 | 8,836.37 | 4,424.75 | 0.83 | -0.40 | 0.361 |
| 25.00 | -19.26 | -16.03 | 0.00 | -1,493.88 | 0.00 | 1,493.88 | 4,073.00 | 2,036.50 | 8,522.69 | 4,267.68 | 1.31 | -0.50 | 0.355 |
| 30.00 | -18.28 | -15.72 | 0.00 | -1,413.72 | 0.00 | 1,413.72 | 4,015.11 | 2,007.56 | 8,211.17 | 4,111.69 | 1.89 | -0.61 | 0.348 |
| 35.00 | -17.32 | -15.40 | 0.00 | -1,335.12 | 0.00 | 1,335.12 | 3,955.68 | 1,977.84 | 7,902.03 | 3,956.89 | 2.58 | -0.71 | 0.342 |
| 40.00 | -16.38 | -15.07 | 0.00 | -1,258.12 | 0.00 | 1,258.12 | 3,894.69 | 1,947.34 | 7,595.51 | 3,803.40 | 3.38 | -0.82 | 0.335 |
| 45.00 | -15.48 | -14.83 | 0.00 | -1,182.77 | 0.00 | 1,182.77 | 3,832.15 | 1,916.07 | 7,291.81 | 3,651.33 | 4.30 | -0.93 | 0.328 |
| 47.04 | -15.11 | -14.66 | 0.00 | -1,152.46 | 0.00 | 1,152.46 | 3,806.14 | 1,903.07 | 7,168.57 | 3,589.61 | 4.70 | -0.97 | 0.325 |
| 50.00 | -14.17 | -14.44 | 0.00 | -1,109.11 | 0.00 | 1,109.11 | 3,768.05 | 1,884.02 | 6,991.17 | 3,500.78 | 5.33 | -1.04 | 0.321 |
| 53.46 | -13.09 | -14.25 | 0.00 | -1,059.16 | 0.00 | 1,059.16 | 2,934.54 | 1,467.27 | 5,439.41 | 2,723.75 | 6.11 | -1.11 | 0.393 |
| 55.00 | -12.85 | -14.03 | 0.00 | -1,037.21 | 0.00 | 1,037.21 | 2,920.91 | 1,460.46 | 5,371.50 | 2,689.74 | 6.47 | -1.15 | 0.390 |
| 60.00 | -12.12 | -13.69 | 0.00 | -967.06 | 0.00 | 967.06 | 2,875.67 | 1,437.83 | 5,151.93 | 2,579.79 | 7.75 | -1.28 | 0.379 |
| 65.00 | -11.41 | -13.34 | 0.00 | -898.64 | 0.00 | 898.64 | 2,828.87 | 1,414.44 | 4,933.94 | 2,470.64 | 9.15 | -1.40 | 0.368 |
| 70.00 | -10.72 | -12.99 | 0.00 | -831.94 | 0.00 | 831.94 | 2,780.52 | 1,390.26 | 4,717.75 | 2,362.38 | 10.69 | -1.53 | 0.356 |
| 75.00 | -10.04 | -12.65 | 0.00 | -766.98 | 0.00 | 766.98 | 2,730.61 | 1,365.31 | 4,503.59 | 2,255.14 | 12.37 | -1.66 | 0.344 |
| 80.00 | -9.39 | -12.30 | 0.00 | -703.76 | 0.00 | 703.76 | 2,679.16 | 1,339.58 | 4,291.67 | 2,149.02 | 14.18 | -1.79 | 0.331 |
| 85.00 | -8.75 | -11.96 | 0.00 | -642.26 | 0.00 | 642.26 | 2,626.14 | 1,313.07 | 4,082.22 | 2,044.14 | 16.12 | -1.92 | 0.318 |
| 90.00 | -8.14 | -11.62 | 0.00 | -582.47 | 0.00 | 582.47 | 2,571.58 | 1,285.79 | 3,875.45 | 1,940.61 | 18.20 | -2.05 | 0.303 |
| 95.00 | -7.54 | -11.42 | 0.00 | -524.39 | 0.00 | 524.39 | 2,515.46 | 1,257.73 | 3,671.59 | 1,838.53 | 20.42 | -2.18 | 0.288 |
| 95.46 | -7.48 | -11.26 | 0.00 | -519.14 | 0.00 | 519.14 | 2,510.22 | 1,255.11 | 3,652.99 | 1,829.21 | 20.63 | -2.19 | 0.287 |
| 100.00 | -6.57 | -11.06 | 0.00 | -468.02 | 0.00 | 468.02 | 2,457.78 | 1,228.89 | 3,470.86 | 1,738.01 | 22.76 | -2.30 | 0.272 |
| 100.54 | -6.46 | -10.90 | 0.00 | -462.01 | 0.00 | 462.01 | 1,840.14 | 920.07 | 2,636.71 | 1,320.31 | 23.02 | -2.32 | 0.354 |
| 105.00 | -6.05 | -10.59 | 0.00 | -413.43 | 0.00 | 413.43 | 1,806.70 | 903.35 | 2,512.42 | 1,258.08 | 25.24 | -2.43 | 0.332 |
| 110.00 | -5.59 | -10.27 | 0.00 | -360.49 | 0.00 | 360.49 | 1,767.71 | 883.85 | 2,374.37 | 1,188.95 | 27.86 | -2.57 | 0.306 |
| 115.00 | -5.16 | -9.95 | 0.00 | -309.16 | 0.00 | 309.16 | 1,727.17 | 863.58 | 2,238.01 | 1,120.67 | 30.62 | -2.70 | 0.279 |
| 120.00 | -4.74 | -9.63 | 0.00 | -259.43 | 0.00 | 259.43 | 1,685.07 | 842.53 | 2,103.55 | 1,053.34 | 33.52 | -2.83 | 0.249 |
| 125.00 | -4.34 | -9.33 | 0.00 | -211.26 | 0.00 | 211.26 | 1,641.42 | 820.71 | 1,971.23 | 987.08 | 36.55 | -2.95 | 0.217 |
| 130.00 | -3.95 | -9.02 | 0.00 | -164.64 | 0.00 | 164.64 | 1,596.21 | 798.11 | 1,841.24 | 921.99 | 39.70 | -3.06 | 0.181 |
| 135.00 | -3.59 | -8.73 | 0.00 | -119.51 | 0.00 | 119.51 | 1,549.45 | 774.73 | 1,713.83 | 858.19 | 42.95 | -3.15 | 0.142 |
| 140.00 | -3.24 | -8.44 | 0.00 | -75.86 | 0.00 | 75.86 | 1,501.14 | 750.57 | 1,589.21 | 795.79 | 46.29 | -3.22 | 0.098 |
| 145.00 | -2.90 | -8.19 | 0.00 | -33.64 | 0.00 | 33.64 | 1,451.27 | 725.64 | 1,467.60 | 734.89 | 49.69 | -3.26 | 0.048 |
| 149.00 | 0.00 | -8.01 | 0.00 | -0.87 | 0.00 | 0.87 | 1,400.09 | 700.04 | 1,362.73 | 682.38 | 52.43 | -3.28 | 0.001 |

Site Number: 413850 Code: ANSI/TIA-222-G 

Site Name: Goshen (Brass Mountain) CT, CT Engineering Number: OAA706894_C3_01 7/26/2017 4:26:07 PM

Customer: VERIZON WIRELESS

**Load Case:** 1.2D + 1.0Di + 1.0Wi 40 mph with 0.75 in Radial Ice 20 Iterations

Gust Response Factor : 1.10 Ice Dead Load Factor : 1.00 Wind Importance Factor : 1.00

Dead Load Factor : 1.20 Ice Importance Factor : 1.00

Wind Load Factor : 1.00

## Applied Segment Forces Summary

| | | Shaft Forces | | Discrete Forces | | | | Linear Forces | | Sum of Forces | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Seg Elev (ft) | Description | Wind FX (lb) | Dead Load (lb) | Wind FX (lb) | Torsion MY (lb-ft) | Moment MZ (lb-ft) | Dead Load (lb) | Wind FX (lb) | Dead Load (lb) | Wind FX (lb) | Dead Load (lb) | Torsion MY (lb-ft) | Moment MZ (lb) |
| 0.00 | | 44.7 | 0.0 | | | | | 0.0 | 0.0 | 44.7 | 0.0 | 0.0 | 0.0 |
| 5.00 | | 88.6 | 1,776.0 | | | | | 0.0 | 49.1 | 88.6 | 1,825.1 | 0.0 | 0.0 |
| 10.00 | | 87.2 | 1,788.0 | | | | | 0.0 | 49.1 | 87.2 | 1,837.1 | 0.0 | 0.0 |
| 15.00 | | 85.6 | 1,774.8 | | | | | 0.0 | 49.1 | 85.6 | 1,823.9 | 0.0 | 0.0 |
| 20.00 | | 84.0 | 1,753.3 | | | | | 0.0 | 49.1 | 84.0 | 1,802.4 | 0.0 | 0.0 |
| 25.00 | | 82.4 | 1,727.5 | | | | | 0.0 | 49.1 | 82.4 | 1,776.6 | 0.0 | 0.0 |
| 30.00 | | 81.7 | 1,699.0 | | | | | 0.0 | 49.1 | 81.7 | 1,748.1 | 0.0 | 0.0 |
| 35.00 | | 82.6 | 1,668.7 | | | | | 0.0 | 49.1 | 82.6 | 1,717.8 | 0.0 | 0.0 |
| 40.00 | | 84.0 | 1,637.0 | | | | | 0.0 | 49.1 | 84.0 | 1,686.1 | 0.0 | 0.0 |
| 45.00 | | 59.7 | 1,604.2 | | | | | 0.0 | 49.1 | 59.7 | 1,653.3 | 0.0 | 0.0 |
| 47.04 | Bot - Section 2 | 43.0 | 647.3 | | | | | 0.0 | 20.1 | 43.0 | 667.4 | 0.0 | 0.0 |
| 50.00 | | 55.7 | 1,482.8 | | | | | 0.0 | 29.0 | 55.7 | 1,511.8 | 0.0 | 0.0 |
| 53.46 | Top - Section 1 | 43.5 | 1,709.3 | | | | | 0.0 | 34.0 | 43.5 | 1,743.3 | 0.0 | 0.0 |
| 55.00 | | 57.0 | 421.7 | | | | | 0.0 | 15.1 | 57.0 | 436.8 | 0.0 | 0.0 |
| 60.00 | | 87.2 | 1,345.5 | | | | | 0.0 | 49.1 | 87.2 | 1,394.6 | 0.0 | 0.0 |
| 65.00 | | 87.1 | 1,314.7 | | | | | 0.0 | 49.1 | 87.1 | 1,363.8 | 0.0 | 0.0 |
| 70.00 | | 86.8 | 1,283.5 | | | | | 0.0 | 49.1 | 86.8 | 1,332.6 | 0.0 | 0.0 |
| 75.00 | | 86.3 | 1,251.9 | | | | | 0.0 | 49.1 | 86.3 | 1,301.0 | 0.0 | 0.0 |
| 80.00 | | 85.7 | 1,220.0 | | | | | 0.0 | 49.1 | 85.7 | 1,269.1 | 0.0 | 0.0 |
| 85.00 | | 84.9 | 1,187.7 | | | | | 0.0 | 49.1 | 84.9 | 1,236.8 | 0.0 | 0.0 |
| 90.00 | | 83.9 | 1,155.2 | | | | | 0.0 | 49.1 | 83.9 | 1,204.3 | 0.0 | 0.0 |
| 95.00 | | 45.5 | 1,122.4 | | | | | 0.0 | 49.1 | 45.5 | 1,171.5 | 0.0 | 0.0 |
| 95.46 | Bot - Section 3 | 41.6 | 102.1 | | | | | 0.0 | 4.5 | 41.6 | 106.6 | 0.0 | 0.0 |
| 100.00 | | 42.3 | 1,515.1 | | | | | 0.0 | 44.6 | 42.3 | 1,559.7 | 0.0 | 0.0 |
| 100.54 | Top - Section 2 | 41.0 | 179.0 | | | | | 0.0 | 5.3 | 41.0 | 184.3 | 0.0 | 0.0 |
| 105.00 | | 76.9 | 831.2 | | | | | 0.0 | 43.7 | 76.9 | 875.0 | 0.0 | 0.0 |
| 110.00 | | 80.0 | 904.7 | | | | | 0.0 | 49.1 | 80.0 | 953.8 | 0.0 | 0.0 |
| 115.00 | | 78.5 | 875.7 | | | | | 0.0 | 49.1 | 78.5 | 924.8 | 0.0 | 0.0 |
| 120.00 | | 76.9 | 846.6 | | | | | 0.0 | 49.1 | 76.9 | 895.6 | 0.0 | 0.0 |
| 125.00 | | 75.2 | 817.3 | | | | | 0.0 | 49.1 | 75.2 | 866.3 | 0.0 | 0.0 |
| 130.00 | | 73.5 | 787.8 | | | | | 0.0 | 49.1 | 73.5 | 836.9 | 0.0 | 0.0 |
| 135.00 | | 71.6 | 758.2 | | | | | 0.0 | 49.1 | 71.6 | 807.3 | 0.0 | 0.0 |
| 140.00 | | 69.7 | 728.4 | | | | | 0.0 | 49.1 | 69.7 | 777.5 | 0.0 | 0.0 |
| 145.00 | | 61.1 | 698.6 | | | | | 0.0 | 49.1 | 61.1 | 747.7 | 0.0 | 0.0 |
| 149.00 | Appertunance(s) | 26.7 | 538.3 | 644.3 | 0.0 | 278.8 | 7,951.1 | 0.0 | 39.3 | 671.0 | 8,528.6 | 0.0 | 0.0 |
| | | | | | | | | Totals: | | 3,086.66 | 48,567.3 | 0.00 | 0.00 |

Site Number: 413850 Code: ANSI/TIA-222-G 

Site Name: Goshen (Brass Mountain) CT, CT Engineering Number: OAA706894_C3_01 7/26/2017 4:26:08 PM

Customer: VERIZON WIRELESS

**Load Case:** 1.2D + 1.0Di + 1.0Wi 40 mph with 0.75 in Radial Ice 20 Iterations

Gust Response Factor : 1.10 Ice Dead Load Factor : 1.00 Wind Importance Factor : 1.00

Dead Load Factor : 1.20 Ice Importance Factor : 1.00

Wind Load Factor : 1.00

## Calculated Forces

| Seg Elev (ft) | Pu FY (-) (kips) | Vu FX (-) (kips) | Tu MY (ft-kips) | Mu MZ (ft-kips) | Mu MX (ft-kips) | Resultant Moment (ft-kips) | phi Pn (kips) | phi Vn (kips) | phi Tn (ft-kips) | phi Mn (ft-kips) | Total Deflect (in) | Rotation (deg) | Ratio |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 0.00 | -48.57 | -3.05 | 0.00 | -282.94 | 0.00 | 282.94 | 4,339.10 | 2,169.55 | 10,108.3 | 5,061.68 | 0.00 | 0.00 | 0.067 |
| 5.00 | -46.74 | -2.97 | 0.00 | -267.70 | 0.00 | 267.70 | 4,288.99 | 2,144.49 | 9,788.20 | 4,901.38 | 0.01 | -0.01 | 0.066 |
| 10.00 | -44.90 | -2.89 | 0.00 | -252.85 | 0.00 | 252.85 | 4,237.32 | 2,118.66 | 9,469.35 | 4,741.71 | 0.03 | -0.03 | 0.064 |
| 15.00 | -43.08 | -2.82 | 0.00 | -238.38 | 0.00 | 238.38 | 4,184.10 | 2,092.05 | 9,152.00 | 4,582.80 | 0.07 | -0.04 | 0.062 |
| 20.00 | -41.28 | -2.74 | 0.00 | -224.29 | 0.00 | 224.29 | 4,129.33 | 2,064.66 | 8,836.37 | 4,424.75 | 0.12 | -0.06 | 0.061 |
| 25.00 | -39.50 | -2.67 | 0.00 | -210.58 | 0.00 | 210.58 | 4,073.00 | 2,036.50 | 8,522.69 | 4,267.68 | 0.19 | -0.07 | 0.059 |
| 30.00 | -37.75 | -2.59 | 0.00 | -197.24 | 0.00 | 197.24 | 4,015.11 | 2,007.56 | 8,211.17 | 4,111.69 | 0.27 | -0.09 | 0.057 |
| 35.00 | -36.03 | -2.52 | 0.00 | -184.27 | 0.00 | 184.27 | 3,955.68 | 1,977.84 | 7,902.03 | 3,956.89 | 0.37 | -0.10 | 0.056 |
| 40.00 | -34.35 | -2.44 | 0.00 | -171.68 | 0.00 | 171.68 | 3,894.69 | 1,947.34 | 7,595.51 | 3,803.40 | 0.49 | -0.12 | 0.054 |
| 45.00 | -32.69 | -2.38 | 0.00 | -159.48 | 0.00 | 159.48 | 3,832.15 | 1,916.07 | 7,291.81 | 3,651.33 | 0.62 | -0.13 | 0.052 |
| 47.04 | -32.02 | -2.34 | 0.00 | -154.61 | 0.00 | 154.61 | 3,806.14 | 1,903.07 | 7,168.57 | 3,589.61 | 0.67 | -0.14 | 0.051 |
| 50.00 | -30.51 | -2.29 | 0.00 | -147.69 | 0.00 | 147.69 | 3,768.05 | 1,884.02 | 6,991.17 | 3,500.78 | 0.76 | -0.15 | 0.050 |
| 53.46 | -28.77 | -2.24 | 0.00 | -139.78 | 0.00 | 139.78 | 2,934.54 | 1,467.27 | 5,439.41 | 2,723.75 | 0.87 | -0.16 | 0.061 |
| 55.00 | -28.33 | -2.19 | 0.00 | -136.32 | 0.00 | 136.32 | 2,920.91 | 1,460.46 | 5,371.50 | 2,689.74 | 0.92 | -0.16 | 0.060 |
| 60.00 | -26.94 | -2.11 | 0.00 | -125.37 | 0.00 | 125.37 | 2,875.67 | 1,437.83 | 5,151.93 | 2,579.79 | 1.10 | -0.18 | 0.058 |
| 65.00 | -25.57 | -2.02 | 0.00 | -114.84 | 0.00 | 114.84 | 2,828.87 | 1,414.44 | 4,933.94 | 2,470.64 | 1.29 | -0.19 | 0.056 |
| 70.00 | -24.24 | -1.94 | 0.00 | -104.73 | 0.00 | 104.73 | 2,780.52 | 1,390.26 | 4,717.75 | 2,362.38 | 1.51 | -0.21 | 0.053 |
| 75.00 | -22.94 | -1.85 | 0.00 | -95.05 | 0.00 | 95.05 | 2,730.61 | 1,365.31 | 4,503.59 | 2,255.14 | 1.74 | -0.23 | 0.051 |
| 80.00 | -21.67 | -1.77 | 0.00 | -85.78 | 0.00 | 85.78 | 2,679.16 | 1,339.58 | 4,291.67 | 2,149.02 | 1.98 | -0.24 | 0.048 |
| 85.00 | -20.43 | -1.68 | 0.00 | -76.94 | 0.00 | 76.94 | 2,626.14 | 1,313.07 | 4,082.22 | 2,044.14 | 2.24 | -0.26 | 0.045 |
| 90.00 | -19.23 | -1.60 | 0.00 | -68.53 | 0.00 | 68.53 | 2,571.58 | 1,285.79 | 3,875.45 | 1,940.61 | 2.52 | -0.27 | 0.043 |
| 95.00 | -18.06 | -1.55 | 0.00 | -60.54 | 0.00 | 60.54 | 2,515.46 | 1,257.73 | 3,671.59 | 1,838.53 | 2.81 | -0.29 | 0.040 |
| 95.46 | -17.95 | -1.51 | 0.00 | -59.82 | 0.00 | 59.82 | 2,510.22 | 1,255.11 | 3,652.99 | 1,829.21 | 2.84 | -0.29 | 0.040 |
| 100.00 | -16.39 | -1.46 | 0.00 | -52.97 | 0.00 | 52.97 | 2,457.78 | 1,228.89 | 3,470.86 | 1,738.01 | 3.12 | -0.30 | 0.037 |
| 100.54 | -16.21 | -1.42 | 0.00 | -52.18 | 0.00 | 52.18 | 1,840.14 | 920.07 | 2,636.71 | 1,320.31 | 3.16 | -0.30 | 0.048 |
| 105.00 | -15.33 | -1.34 | 0.00 | -45.84 | 0.00 | 45.84 | 1,806.70 | 903.35 | 2,512.42 | 1,258.08 | 3.45 | -0.32 | 0.045 |
| 110.00 | -14.38 | -1.26 | 0.00 | -39.12 | 0.00 | 39.12 | 1,767.71 | 883.85 | 2,374.37 | 1,188.95 | 3.79 | -0.33 | 0.041 |
| 115.00 | -13.45 | -1.18 | 0.00 | -32.81 | 0.00 | 32.81 | 1,727.17 | 863.58 | 2,238.01 | 1,120.67 | 4.14 | -0.35 | 0.037 |
| 120.00 | -12.56 | -1.10 | 0.00 | -26.90 | 0.00 | 26.90 | 1,685.07 | 842.53 | 2,103.55 | 1,053.34 | 4.51 | -0.36 | 0.033 |
| 125.00 | -11.69 | -1.02 | 0.00 | -21.39 | 0.00 | 21.39 | 1,641.42 | 820.71 | 1,971.23 | 987.08 | 4.90 | -0.37 | 0.029 |
| 130.00 | -10.85 | -0.95 | 0.00 | -16.27 | 0.00 | 16.27 | 1,596.21 | 798.11 | 1,841.24 | 921.99 | 5.29 | -0.38 | 0.024 |
| 135.00 | -10.05 | -0.87 | 0.00 | -11.54 | 0.00 | 11.54 | 1,549.45 | 774.73 | 1,713.83 | 858.19 | 5.70 | -0.39 | 0.020 |
| 140.00 | -9.27 | -0.80 | 0.00 | -7.19 | 0.00 | 7.19 | 1,501.14 | 750.57 | 1,589.21 | 795.79 | 6.11 | -0.40 | 0.015 |
| 145.00 | -8.52 | -0.73 | 0.00 | -3.20 | 0.00 | 3.20 | 1,451.27 | 725.64 | 1,467.60 | 734.89 | 6.53 | -0.40 | 0.010 |
| 149.00 | 0.00 | -0.67 | 0.00 | -0.28 | 0.00 | 0.28 | 1,400.09 | 700.04 | 1,362.73 | 682.38 | 6.87 | -0.40 | 0.000 |

Site Number: 413850 Code: ANSI/TIA-222-G 

Site Name: Goshen (Brass Mountain) CT, CT Engineering Number: OAA706894_C3_01 7/26/2017 4:26:08 PM

Customer: VERIZON WIRELESS

**Load Case:** 1.0D + 1.0W Serviceability 60 mph 21 Iterations

Gust Response Factor : 1.10 Wind Importance Factor : 1.00

Dead Load Factor : 1.00

Wind Load Factor : 1.00

## Applied Segment Forces Summary

| Seg Elev (ft) | Description | Shaft Forces Wind FX (lb) | Shaft Forces Dead Load (lb) | Discrete Forces Wind FX (lb) | Discrete Forces Torsion MY (lb-ft) | Discrete Forces Moment MZ (lb-ft) | Discrete Forces Dead Load (lb) | Linear Forces Wind FX (lb) | Linear Forces Dead Load (lb) | Sum of Forces Wind FX (lb) | Sum of Forces Dead Load (lb) | Sum of Forces Torsion MY (lb-ft) | Sum of Forces Moment MZ (lb) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 0.00 | | 52.3 | 0.0 | | | | | 0.0 | 0.0 | 52.3 | 0.0 | 0.0 | 0.0 |
| 5.00 | | 103.6 | 1,135.1 | | | | | 0.0 | 40.9 | 103.6 | 1,176.0 | 0.0 | 0.0 |
| 10.00 | | 101.4 | 1,111.9 | | | | | 0.0 | 40.9 | 101.4 | 1,152.8 | 0.0 | 0.0 |
| 15.00 | | 99.3 | 1,088.7 | | | | | 0.0 | 40.9 | 99.3 | 1,129.6 | 0.0 | 0.0 |
| 20.00 | | 97.2 | 1,065.5 | | | | | 0.0 | 40.9 | 97.2 | 1,106.4 | 0.0 | 0.0 |
| 25.00 | | 95.1 | 1,042.3 | | | | | 0.0 | 40.9 | 95.1 | 1,083.2 | 0.0 | 0.0 |
| 30.00 | | 94.0 | 1,019.1 | | | | | 0.0 | 40.9 | 94.0 | 1,060.0 | 0.0 | 0.0 |
| 35.00 | | 94.9 | 995.9 | | | | | 0.0 | 40.9 | 94.9 | 1,036.8 | 0.0 | 0.0 |
| 40.00 | | 96.3 | 972.7 | | | | | 0.0 | 40.9 | 96.3 | 1,013.6 | 0.0 | 0.0 |
| 45.00 | | 68.3 | 949.6 | | | | | 0.0 | 40.9 | 68.3 | 990.5 | 0.0 | 0.0 |
| 47.04 | Bot - Section 2 | 49.2 | 381.4 | | | | | 0.0 | 16.7 | 49.2 | 398.1 | 0.0 | 0.0 |
| 50.00 | | 63.6 | 1,006.0 | | | | | 0.0 | 24.2 | 63.6 | 1,030.2 | 0.0 | 0.0 |
| 53.46 | Top - Section 1 | 49.6 | 1,158.4 | | | | | 0.0 | 28.3 | 49.6 | 1,186.7 | 0.0 | 0.0 |
| 55.00 | | 65.0 | 233.3 | | | | | 0.0 | 12.6 | 65.0 | 245.9 | 0.0 | 0.0 |
| 60.00 | | 99.2 | 744.9 | | | | | 0.0 | 40.9 | 99.2 | 785.8 | 0.0 | 0.0 |
| 65.00 | | 98.9 | 725.6 | | | | | 0.0 | 40.9 | 98.9 | 766.5 | 0.0 | 0.0 |
| 70.00 | | 98.3 | 706.3 | | | | | 0.0 | 40.9 | 98.3 | 747.2 | 0.0 | 0.0 |
| 75.00 | | 97.5 | 687.0 | | | | | 0.0 | 40.9 | 97.5 | 727.9 | 0.0 | 0.0 |
| 80.00 | | 96.5 | 667.6 | | | | | 0.0 | 40.9 | 96.5 | 708.5 | 0.0 | 0.0 |
| 85.00 | | 95.3 | 648.3 | | | | | 0.0 | 40.9 | 95.3 | 689.2 | 0.0 | 0.0 |
| 90.00 | | 94.0 | 629.0 | | | | | 0.0 | 40.9 | 94.0 | 669.9 | 0.0 | 0.0 |
| 95.00 | | 50.9 | 609.7 | | | | | 0.0 | 40.9 | 50.9 | 650.6 | 0.0 | 0.0 |
| 95.46 | Bot - Section 3 | 46.4 | 55.1 | | | | | 0.0 | 3.8 | 46.4 | 58.9 | 0.0 | 0.0 |
| 100.00 | | 47.2 | 970.3 | | | | | 0.0 | 37.1 | 47.2 | 1,007.4 | 0.0 | 0.0 |
| 100.54 | Top - Section 2 | 45.7 | 114.2 | | | | | 0.0 | 4.4 | 45.7 | 118.6 | 0.0 | 0.0 |
| 105.00 | | 85.4 | 413.2 | | | | | 0.0 | 36.5 | 85.4 | 449.6 | 0.0 | 0.0 |
| 110.00 | | 88.6 | 448.9 | | | | | 0.0 | 40.9 | 88.6 | 489.8 | 0.0 | 0.0 |
| 115.00 | | 86.6 | 433.5 | | | | | 0.0 | 40.9 | 86.6 | 474.4 | 0.0 | 0.0 |
| 120.00 | | 84.5 | 418.0 | | | | | 0.0 | 40.9 | 84.5 | 458.9 | 0.0 | 0.0 |
| 125.00 | | 82.3 | 402.6 | | | | | 0.0 | 40.9 | 82.3 | 443.5 | 0.0 | 0.0 |
| 130.00 | | 80.0 | 387.1 | | | | | 0.0 | 40.9 | 80.0 | 428.0 | 0.0 | 0.0 |
| 135.00 | | 77.6 | 371.6 | | | | | 0.0 | 40.9 | 77.6 | 412.5 | 0.0 | 0.0 |
| 140.00 | | 75.1 | 356.2 | | | | | 0.0 | 40.9 | 75.1 | 397.1 | 0.0 | 0.0 |
| 145.00 | | 65.5 | 340.7 | | | | | 0.0 | 40.9 | 65.5 | 381.6 | 0.0 | 0.0 |
| 149.00 | Appertunance(s) | 28.6 | 261.4 | 2,196.9 | 0.0 | 242.9 | 3,445.0 | 0.0 | 32.7 | 2,225.5 | 3,739.2 | 0.0 | 0.0 |
| | | | | | | | | Totals: | | 4,950.72 | 27,214.8 | 0.00 | 0.00 |

Site Number: 413850 Code: ANSI/TIA-222-G 

Site Name: Goshen (Brass Mountain) CT, CT Engineering Number: OAA706894_C3_01 7/26/2017 4:26:09 PM

Customer: VERIZON WIRELESS

**Load Case:** 1.0D + 1.0W Serviceability 60 mph 21 Iterations

Gust Response Factor : 1.10
Dead Load Factor : 1.00
Wind Load Factor : 1.00

Wind Importance Factor : 1.00

## Calculated Forces

| Seg Elev (ft) | Pu FY (-) (kips) | Vu FX (-) (kips) | Tu MY (ft-kips) | Mu MZ (ft-kips) | Mu MX (ft-kips) | Resultant Moment (ft-kips) | phi Pn (kips) | phi Vn (kips) | phi Tn (ft-kips) | phi Mn (ft-kips) | Total Deflect (in) | Rotation (deg) | Ratio |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 0.00 | -27.21 | -4.90 | 0.00 | -534.33 | 0.00 | 534.33 | 4,339.10 | 2,169.55 | 10,108.3 | 5,061.68 | 0.00 | 0.00 | 0.112 |
| 5.00 | -26.04 | -4.81 | 0.00 | -509.81 | 0.00 | 509.81 | 4,288.99 | 2,144.49 | 9,788.20 | 4,901.38 | 0.01 | -0.03 | 0.110 |
| 10.00 | -24.88 | -4.72 | 0.00 | -485.74 | 0.00 | 485.74 | 4,237.32 | 2,118.66 | 9,469.35 | 4,741.71 | 0.06 | -0.05 | 0.108 |
| 15.00 | -23.75 | -4.63 | 0.00 | -462.13 | 0.00 | 462.13 | 4,184.10 | 2,092.05 | 9,152.00 | 4,582.80 | 0.13 | -0.08 | 0.107 |
| 20.00 | -22.64 | -4.55 | 0.00 | -438.96 | 0.00 | 438.96 | 4,129.33 | 2,064.66 | 8,836.37 | 4,424.75 | 0.23 | -0.11 | 0.105 |
| 25.00 | -21.55 | -4.46 | 0.00 | -416.23 | 0.00 | 416.23 | 4,073.00 | 2,036.50 | 8,522.69 | 4,267.68 | 0.36 | -0.14 | 0.103 |
| 30.00 | -20.49 | -4.37 | 0.00 | -393.93 | 0.00 | 393.93 | 4,015.11 | 2,007.56 | 8,211.17 | 4,111.69 | 0.53 | -0.17 | 0.101 |
| 35.00 | -19.45 | -4.29 | 0.00 | -372.06 | 0.00 | 372.06 | 3,955.68 | 1,977.84 | 7,902.03 | 3,956.89 | 0.72 | -0.20 | 0.099 |
| 40.00 | -18.44 | -4.19 | 0.00 | -350.64 | 0.00 | 350.64 | 3,894.69 | 1,947.34 | 7,595.51 | 3,803.40 | 0.94 | -0.23 | 0.097 |
| 45.00 | -17.45 | -4.13 | 0.00 | -329.67 | 0.00 | 329.67 | 3,832.15 | 1,916.07 | 7,291.81 | 3,651.33 | 1.20 | -0.26 | 0.095 |
| 47.04 | -17.05 | -4.08 | 0.00 | -321.23 | 0.00 | 321.23 | 3,806.14 | 1,903.07 | 7,168.57 | 3,589.61 | 1.31 | -0.27 | 0.094 |
| 50.00 | -16.02 | -4.02 | 0.00 | -309.16 | 0.00 | 309.16 | 3,768.05 | 1,884.02 | 6,991.17 | 3,500.78 | 1.48 | -0.29 | 0.093 |
| 53.46 | -14.83 | -3.97 | 0.00 | -295.25 | 0.00 | 295.25 | 2,934.54 | 1,467.27 | 5,439.41 | 2,723.75 | 1.70 | -0.31 | 0.113 |
| 55.00 | -14.58 | -3.91 | 0.00 | -289.15 | 0.00 | 289.15 | 2,920.91 | 1,460.46 | 5,371.50 | 2,689.74 | 1.80 | -0.32 | 0.112 |
| 60.00 | -13.79 | -3.81 | 0.00 | -269.61 | 0.00 | 269.61 | 2,875.67 | 1,437.83 | 5,151.93 | 2,579.79 | 2.16 | -0.36 | 0.109 |
| 65.00 | -13.03 | -3.72 | 0.00 | -250.56 | 0.00 | 250.56 | 2,828.87 | 1,414.44 | 4,933.94 | 2,470.64 | 2.55 | -0.39 | 0.106 |
| 70.00 | -12.28 | -3.62 | 0.00 | -231.98 | 0.00 | 231.98 | 2,780.52 | 1,390.26 | 4,717.75 | 2,362.38 | 2.98 | -0.43 | 0.103 |
| 75.00 | -11.55 | -3.52 | 0.00 | -213.88 | 0.00 | 213.88 | 2,730.61 | 1,365.31 | 4,503.59 | 2,255.14 | 3.45 | -0.46 | 0.099 |
| 80.00 | -10.84 | -3.43 | 0.00 | -196.26 | 0.00 | 196.26 | 2,679.16 | 1,339.58 | 4,291.67 | 2,149.02 | 3.95 | -0.50 | 0.095 |
| 85.00 | -10.15 | -3.33 | 0.00 | -179.12 | 0.00 | 179.12 | 2,626.14 | 1,313.07 | 4,082.22 | 2,044.14 | 4.49 | -0.54 | 0.091 |
| 90.00 | -9.48 | -3.24 | 0.00 | -162.45 | 0.00 | 162.45 | 2,571.58 | 1,285.79 | 3,875.45 | 1,940.61 | 5.07 | -0.57 | 0.087 |
| 95.00 | -8.83 | -3.18 | 0.00 | -146.26 | 0.00 | 146.26 | 2,515.46 | 1,257.73 | 3,671.59 | 1,838.53 | 5.69 | -0.61 | 0.083 |
| 95.46 | -8.77 | -3.14 | 0.00 | -144.80 | 0.00 | 144.80 | 2,510.22 | 1,255.11 | 3,652.99 | 1,829.21 | 5.75 | -0.61 | 0.083 |
| 100.00 | -7.76 | -3.08 | 0.00 | -130.54 | 0.00 | 130.54 | 2,457.78 | 1,228.89 | 3,470.86 | 1,738.01 | 6.34 | -0.64 | 0.078 |
| 100.54 | -7.64 | -3.04 | 0.00 | -128.87 | 0.00 | 128.87 | 1,840.14 | 920.07 | 2,636.71 | 1,320.31 | 6.42 | -0.65 | 0.102 |
| 105.00 | -7.19 | -2.95 | 0.00 | -115.32 | 0.00 | 115.32 | 1,806.70 | 903.35 | 2,512.42 | 1,258.08 | 7.03 | -0.68 | 0.096 |
| 110.00 | -6.70 | -2.86 | 0.00 | -100.56 | 0.00 | 100.56 | 1,767.71 | 883.85 | 2,374.37 | 1,188.95 | 7.76 | -0.72 | 0.088 |
| 115.00 | -6.22 | -2.77 | 0.00 | -86.24 | 0.00 | 86.24 | 1,727.17 | 863.58 | 2,238.01 | 1,120.67 | 8.53 | -0.75 | 0.081 |
| 120.00 | -5.76 | -2.69 | 0.00 | -72.37 | 0.00 | 72.37 | 1,685.07 | 842.53 | 2,103.55 | 1,053.34 | 9.34 | -0.79 | 0.072 |
| 125.00 | -5.32 | -2.60 | 0.00 | -58.94 | 0.00 | 58.94 | 1,641.42 | 820.71 | 1,971.23 | 987.08 | 10.19 | -0.82 | 0.063 |
| 130.00 | -4.89 | -2.52 | 0.00 | -45.93 | 0.00 | 45.93 | 1,596.21 | 798.11 | 1,841.24 | 921.99 | 11.07 | -0.85 | 0.053 |
| 135.00 | -4.48 | -2.44 | 0.00 | -33.34 | 0.00 | 33.34 | 1,549.45 | 774.73 | 1,713.83 | 858.19 | 11.97 | -0.88 | 0.042 |
| 140.00 | -4.08 | -2.36 | 0.00 | -21.16 | 0.00 | 21.16 | 1,501.14 | 750.57 | 1,589.21 | 795.79 | 12.91 | -0.90 | 0.029 |
| 145.00 | -3.70 | -2.28 | 0.00 | -9.38 | 0.00 | 9.38 | 1,451.27 | 725.64 | 1,467.60 | 734.89 | 13.85 | -0.91 | 0.015 |
| 149.00 | 0.00 | -2.23 | 0.00 | -0.24 | 0.00 | 0.24 | 1,400.09 | 700.04 | 1,362.73 | 682.38 | 14.62 | -0.91 | 0.000 |

## Equivalent Lateral Forces Method Analysis

(Based on ASCE7-10 Chapters 11, 12, 15)

| | | |
|---|---|---|
| Spectral Response Acceleration for Short Period ($S_s$): | 0.18 | |
| Spectral Response Acceleration at 1.0 Second Period ($S_1$): | 0.06 | |
| Long-Period Transition Period ($T_L$): | 6 | |
| Importance Factor ($I_E$): | 1.00 | |
| Site Coefficient $F_a$: | 1.60 | |
| Site Coeffiecient $F_v$: | 2.40 | |
| Response Modification Coefficient (R): | 1.50 | |
| Design Spectral Response Acceleration at Short Period ($S_{ds}$): | 0.19 | |
| Design Spectral Response Acceleration at 1.0 Second Period ($S_{d1}$): | 0.10 | |
| Seismic Response Coefficient ($C_s$): | 0.04 | |
| Upper Limit $C_s$ | 0.04 | |
| Lower Limit $C_s$ | 0.03 | |
| Period based on Rayleigh Method (sec): | 1.73 | |
| Redundancy Factor (p): | 1.30 | |
| Seismic Force Distribution Exponent (k): | 1.62 | |
| Total Unfactored Dead Load: | 27.21 | k |
| Seismic Base Shear (E): | 1.41 | k |

Load Case (1.2 + 0.2Sds) * DL + E ELFM Seismic Equivalent Lateral Forces Method

| Segment | Height Above Base (ft) | Weight (lb) | $W_z$ (lb-ft) | $C_{vx}$ | Horizontal Force (lb) | Vertical Force (lb) |
|---|---|---|---|---|---|---|
| 34 | 147.00 | 294 | 941 | 0.029 | 40 | 364 |
| 33 | 142.50 | 382 | 1,161 | 0.035 | 50 | 473 |
| 32 | 137.50 | 397 | 1,140 | 0.035 | 49 | 492 |
| 31 | 132.50 | 413 | 1,116 | 0.034 | 48 | 511 |
| 30 | 127.50 | 428 | 1,088 | 0.033 | 47 | 530 |
| 29 | 122.50 | 443 | 1,057 | 0.032 | 45 | 549 |
| 28 | 117.50 | 459 | 1,022 | 0.031 | 44 | 568 |
| 27 | 112.50 | 474 | 985 | 0.030 | 42 | 587 |
| 26 | 107.50 | 490 | 945 | 0.029 | 41 | 607 |
| 25 | 102.77 | 450 | 806 | 0.024 | 35 | 557 |
| 24 | 100.27 | 119 | 204 | 0.006 | 9 | 147 |
| 23 | 97.73 | 1,007 | 1,666 | 0.051 | 72 | 1,248 |
| 22 | 95.23 | 59 | 93 | 0.003 | 4 | 73 |
| 21 | 92.50 | 651 | 984 | 0.030 | 42 | 806 |
| 20 | 87.50 | 670 | 926 | 0.028 | 40 | 830 |
| 19 | 82.50 | 689 | 866 | 0.026 | 37 | 854 |
| 18 | 77.50 | 709 | 805 | 0.024 | 35 | 877 |
| 17 | 72.50 | 728 | 743 | 0.023 | 32 | 901 |
| 16 | 67.50 | 747 | 679 | 0.021 | 29 | 925 |
| 15 | 62.50 | 766 | 615 | 0.019 | 26 | 949 |
| 14 | 57.50 | 786 | 551 | 0.017 | 24 | 973 |
| 13 | 54.23 | 246 | 157 | 0.005 | 7 | 305 |
| 12 | 51.73 | 1,187 | 701 | 0.021 | 30 | 1,470 |

| | | | | | | |
|---|---|---|---|---|---|---|
| 11 | 48.52 | 1,030 | 549 | 0.017 | 24 | 1,276 |
| 10 | 46.02 | 398 | 195 | 0.006 | 8 | 493 |
| 9 | 42.50 | 990 | 426 | 0.013 | 18 | 1,227 |
| 8 | 37.50 | 1,014 | 356 | 0.011 | 15 | 1,255 |
| 7 | 32.50 | 1,037 | 289 | 0.009 | 12 | 1,284 |
| 6 | 27.50 | 1,060 | 225 | 0.007 | 10 | 1,313 |
| 5 | 22.50 | 1,083 | 167 | 0.005 | 7 | 1,341 |
| 4 | 17.50 | 1,106 | 113 | 0.003 | 5 | 1,370 |
| 3 | 12.50 | 1,130 | 67 | 0.002 | 3 | 1,399 |
| 2 | 7.50 | 1,153 | 30 | 0.001 | 1 | 1,428 |
| 1 | 2.50 | 1,176 | 5 | 0.000 | 0 | 1,456 |
| Alcatel-Lucent B13 R | 149.00 | 173 | 567 | 0.017 | 24 | 215 |
| Alcatel-Lucent B66A | 149.00 | 201 | 657 | 0.020 | 28 | 249 |
| RFS DB-C1-12C-24AB-0 | 149.00 | 32 | 105 | 0.003 | 4 | 40 |
| 15' Dipole | 149.00 | 45 | 147 | 0.004 | 6 | 56 |
| Amphenol Antel LPA-8 | 149.00 | 126 | 412 | 0.013 | 18 | 156 |
| Commscope JAHH-65B-R | 149.00 | 364 | 1,189 | 0.036 | 51 | 450 |
| Flat T-Arm w/ Workin | 149.00 | 900 | 2,943 | 0.089 | 126 | 1,115 |
| VZW Unused Reserve: | 149.00 | 1,604 | 5,246 | 0.159 | 225 | 1,986 |
| | | 27,215 | 32,942 | 1.000 | 1,414 | 33,703 |

Load Case (0.9 - 0.2Sds) * DL + E ELFM Seismic (Reduced DL) Equivalent Lateral Forces Method

| Segment | Height Above Base (ft) | Weight (lb) | $W_z$ (lb-ft) | $C_{vx}$ | Horizontal Force (lb) | Vertical Force (lb) |
|---|---|---|---|---|---|---|
| 34 | 147.00 | 294 | 941 | 0.029 | 40 | 253 |
| 33 | 142.50 | 382 | 1,161 | 0.035 | 50 | 329 |
| 32 | 137.50 | 397 | 1,140 | 0.035 | 49 | 342 |
| 31 | 132.50 | 413 | 1,116 | 0.034 | 48 | 355 |
| 30 | 127.50 | 428 | 1,088 | 0.033 | 47 | 369 |
| 29 | 122.50 | 443 | 1,057 | 0.032 | 45 | 382 |
| 28 | 117.50 | 459 | 1,022 | 0.031 | 44 | 395 |
| 27 | 112.50 | 474 | 985 | 0.030 | 42 | 409 |
| 26 | 107.50 | 490 | 945 | 0.029 | 41 | 422 |
| 25 | 102.77 | 450 | 806 | 0.024 | 35 | 387 |
| 24 | 100.27 | 119 | 204 | 0.006 | 9 | 102 |
| 23 | 97.73 | 1,007 | 1,666 | 0.051 | 72 | 868 |
| 22 | 95.23 | 59 | 93 | 0.003 | 4 | 51 |
| 21 | 92.50 | 651 | 984 | 0.030 | 42 | 561 |
| 20 | 87.50 | 670 | 926 | 0.028 | 40 | 577 |
| 19 | 82.50 | 689 | 866 | 0.026 | 37 | 594 |
| 18 | 77.50 | 709 | 805 | 0.024 | 35 | 610 |
| 17 | 72.50 | 728 | 743 | 0.023 | 32 | 627 |
| 16 | 67.50 | 747 | 679 | 0.021 | 29 | 644 |
| 15 | 62.50 | 766 | 615 | 0.019 | 26 | 660 |
| 14 | 57.50 | 786 | 551 | 0.017 | 24 | 677 |
| 13 | 54.23 | 246 | 157 | 0.005 | 7 | 212 |
| 12 | 51.73 | 1,187 | 701 | 0.021 | 30 | 1,022 |
| 11 | 48.52 | 1,030 | 549 | 0.017 | 24 | 888 |
| 10 | 46.02 | 398 | 195 | 0.006 | 8 | 343 |
| 9 | 42.50 | 990 | 426 | 0.013 | 18 | 853 |
| 8 | 37.50 | 1,014 | 356 | 0.011 | 15 | 873 |
| 7 | 32.50 | 1,037 | 289 | 0.009 | 12 | 893 |
| 6 | 27.50 | 1,060 | 225 | 0.007 | 10 | 913 |
| 5 | 22.50 | 1,083 | 167 | 0.005 | 7 | 933 |
| 4 | 17.50 | 1,106 | 113 | 0.003 | 5 | 953 |
| 3 | 12.50 | 1,130 | 67 | 0.002 | 3 | 973 |
| 2 | 7.50 | 1,153 | 30 | 0.001 | 1 | 993 |
| 1 | 2.50 | 1,176 | 5 | 0.000 | 0 | 1,013 |
| Alcatel-Lucent B13 R | 149.00 | 173 | 567 | 0.017 | 24 | 149 |

| | | | | | | |
|---|---|---|---|---|---|---|
| Alcatel-Lucent B66A | 149.00 | 201 | 657 | 0.020 | 28 | 173 |
| RFS DB-C1-12C-24AB-0 | 149.00 | 32 | 105 | 0.003 | 4 | 28 |
| 15' Dipole | 149.00 | 45 | 147 | 0.004 | 6 | 39 |
| Amphenol Antel LPA-8 | 149.00 | 126 | 412 | 0.013 | 18 | 109 |
| Commscope JAHH-65B-R | 149.00 | 364 | 1,189 | 0.036 | 51 | 313 |
| Flat T-Arm w/ Workin | 149.00 | 900 | 2,943 | 0.089 | 126 | 775 |
| VZW Unused Reserve: | 149.00 | 1,604 | 5,246 | 0.159 | 225 | 1,382 |
| | | 27,215 | 32,942 | 1.000 | 1,414 | 23,448 |

Site Number: 413850 Code: ANSI/TIA-222-G 

Site Name: Goshen (Brass Mountain) CT, CT Engineering Number: OAA706894_C3_01 7/26/2017 4:26:09 PM

Customer: VERIZON WIRELESS

Load Case (1.2 + 0.2Sds) * DL + E ELFM Seismic Equivalent Lateral Forces Method

Calculated Forces

| Seg Elev (ft) | Pu FY (-) (kips) | Vu FX (-) (kips) | Tu MY (ft-kips) | Mu MZ (ft-kips) | Mu MX (ft-kips) | Resultant Moment (ft-kips) | phi Pn (kips) | phi Vn (kips) | phi Tn (ft-kips) | phi Mn (ft-kips) | Total Deflect (in) | Rotation (deg) | Ratio |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 0.00 | -32.25 | -1.42 | 0.00 | -163.56 | 0.00 | 163.56 | 4,339.10 | 2,169.55 | 10,108.3 | 5,061.68 | 0.00 | 0.00 | 0.040 |
| 5.00 | -30.82 | -1.42 | 0.00 | -156.48 | 0.00 | 156.48 | 4,288.99 | 2,144.49 | 9,788.20 | 4,901.38 | 0.00 | -0.01 | 0.039 |
| 10.00 | -29.42 | -1.42 | 0.00 | -149.38 | 0.00 | 149.38 | 4,237.32 | 2,118.66 | 9,469.35 | 4,741.71 | 0.02 | -0.02 | 0.038 |
| 15.00 | -28.05 | -1.42 | 0.00 | -142.28 | 0.00 | 142.28 | 4,184.10 | 2,092.05 | 9,152.00 | 4,582.80 | 0.04 | -0.03 | 0.038 |
| 20.00 | -26.71 | -1.42 | 0.00 | -135.19 | 0.00 | 135.19 | 4,129.33 | 2,064.66 | 8,836.37 | 4,424.75 | 0.07 | -0.03 | 0.037 |
| 25.00 | -25.39 | -1.41 | 0.00 | -128.11 | 0.00 | 128.11 | 4,073.00 | 2,036.50 | 8,522.69 | 4,267.68 | 0.11 | -0.04 | 0.036 |
| 30.00 | -24.11 | -1.40 | 0.00 | -121.07 | 0.00 | 121.07 | 4,015.11 | 2,007.56 | 8,211.17 | 4,111.69 | 0.16 | -0.05 | 0.035 |
| 35.00 | -22.85 | -1.39 | 0.00 | -114.07 | 0.00 | 114.07 | 3,955.68 | 1,977.84 | 7,902.03 | 3,956.89 | 0.22 | -0.06 | 0.035 |
| 40.00 | -21.63 | -1.37 | 0.00 | -107.14 | 0.00 | 107.14 | 3,894.69 | 1,947.34 | 7,595.51 | 3,803.40 | 0.29 | -0.07 | 0.034 |
| 45.00 | -21.13 | -1.36 | 0.00 | -100.29 | 0.00 | 100.29 | 3,832.15 | 1,916.07 | 7,291.81 | 3,651.33 | 0.37 | -0.08 | 0.033 |
| 47.04 | -19.86 | -1.34 | 0.00 | -97.50 | 0.00 | 97.50 | 3,806.14 | 1,903.07 | 7,168.57 | 3,589.61 | 0.40 | -0.08 | 0.032 |
| 50.00 | -18.39 | -1.31 | 0.00 | -93.54 | 0.00 | 93.54 | 3,768.05 | 1,884.02 | 6,991.17 | 3,500.78 | 0.46 | -0.09 | 0.032 |
| 53.46 | -18.08 | -1.30 | 0.00 | -89.01 | 0.00 | 89.01 | 2,934.54 | 1,467.27 | 5,439.41 | 2,723.75 | 0.52 | -0.10 | 0.039 |
| 55.00 | -17.11 | -1.28 | 0.00 | -87.01 | 0.00 | 87.01 | 2,920.91 | 1,460.46 | 5,371.50 | 2,689.74 | 0.55 | -0.10 | 0.038 |
| 60.00 | -16.16 | -1.26 | 0.00 | -80.61 | 0.00 | 80.61 | 2,875.67 | 1,437.83 | 5,151.93 | 2,579.79 | 0.66 | -0.11 | 0.037 |
| 65.00 | -15.24 | -1.23 | 0.00 | -74.33 | 0.00 | 74.33 | 2,828.87 | 1,414.44 | 4,933.94 | 2,470.64 | 0.78 | -0.12 | 0.035 |
| 70.00 | -14.34 | -1.20 | 0.00 | -68.20 | 0.00 | 68.20 | 2,780.52 | 1,390.26 | 4,717.75 | 2,362.38 | 0.91 | -0.13 | 0.034 |
| 75.00 | -13.46 | -1.16 | 0.00 | -62.22 | 0.00 | 62.22 | 2,730.61 | 1,365.31 | 4,503.59 | 2,255.14 | 1.05 | -0.14 | 0.033 |
| 80.00 | -12.60 | -1.12 | 0.00 | -56.41 | 0.00 | 56.41 | 2,679.16 | 1,339.58 | 4,291.67 | 2,149.02 | 1.21 | -0.15 | 0.031 |
| 85.00 | -11.77 | -1.08 | 0.00 | -50.79 | 0.00 | 50.79 | 2,626.14 | 1,313.07 | 4,082.22 | 2,044.14 | 1.37 | -0.16 | 0.029 |
| 90.00 | -10.97 | -1.04 | 0.00 | -45.36 | 0.00 | 45.36 | 2,571.58 | 1,285.79 | 3,875.45 | 1,940.61 | 1.54 | -0.17 | 0.028 |
| 95.00 | -10.90 | -1.04 | 0.00 | -40.15 | 0.00 | 40.15 | 2,515.46 | 1,257.73 | 3,671.59 | 1,838.53 | 1.73 | -0.18 | 0.026 |
| 95.46 | -9.65 | -0.96 | 0.00 | -39.68 | 0.00 | 39.68 | 2,510.22 | 1,255.11 | 3,652.99 | 1,829.21 | 1.75 | -0.18 | 0.026 |
| 100.00 | -9.50 | -0.96 | 0.00 | -35.30 | 0.00 | 35.30 | 2,457.78 | 1,228.89 | 3,470.86 | 1,738.01 | 1.92 | -0.19 | 0.024 |
| 100.54 | -8.94 | -0.92 | 0.00 | -34.78 | 0.00 | 34.78 | 1,840.14 | 920.07 | 2,636.71 | 1,320.31 | 1.95 | -0.19 | 0.031 |
| 105.00 | -8.34 | -0.88 | 0.00 | -30.68 | 0.00 | 30.68 | 1,806.70 | 903.35 | 2,512.42 | 1,258.08 | 2.13 | -0.20 | 0.029 |
| 110.00 | -7.75 | -0.84 | 0.00 | -26.29 | 0.00 | 26.29 | 1,767.71 | 883.85 | 2,374.37 | 1,188.95 | 2.34 | -0.21 | 0.026 |
| 115.00 | -7.18 | -0.79 | 0.00 | -22.11 | 0.00 | 22.11 | 1,727.17 | 863.58 | 2,238.01 | 1,120.67 | 2.57 | -0.22 | 0.024 |
| 120.00 | -6.63 | -0.74 | 0.00 | -18.16 | 0.00 | 18.16 | 1,685.07 | 842.53 | 2,103.55 | 1,053.34 | 2.80 | -0.23 | 0.021 |
| 125.00 | -6.10 | -0.70 | 0.00 | -14.43 | 0.00 | 14.43 | 1,641.42 | 820.71 | 1,971.23 | 987.08 | 3.05 | -0.24 | 0.018 |
| 130.00 | -5.59 | -0.65 | 0.00 | -10.95 | 0.00 | 10.95 | 1,596.21 | 798.11 | 1,841.24 | 921.99 | 3.30 | -0.24 | 0.015 |
| 135.00 | -5.10 | -0.60 | 0.00 | -7.72 | 0.00 | 7.72 | 1,549.45 | 774.73 | 1,713.83 | 858.19 | 3.56 | -0.25 | 0.012 |
| 140.00 | -4.63 | -0.54 | 0.00 | -4.74 | 0.00 | 4.74 | 1,501.14 | 750.57 | 1,589.21 | 795.79 | 3.83 | -0.26 | 0.009 |
| 145.00 | -4.26 | -0.50 | 0.00 | -2.01 | 0.00 | 2.01 | 1,451.27 | 725.64 | 1,467.60 | 734.89 | 4.10 | -0.26 | 0.006 |
| 149.00 | 0.00 | -0.48 | 0.00 | 0.00 | 0.00 | 0.00 | 1,400.09 | 700.04 | 1,362.73 | 682.38 | 4.31 | -0.26 | 0.000 |

Load Case (0.9 - 0.2Sds) * DL + E ELFM Seismic (Reduced DL) Equivalent Lateral Forces Method

Calculated Forces

| Seg Elev (ft) | Pu FY (-) (kips) | Vu FX (-) (kips) | Tu MY (ft-kips) | Mu MZ (ft-kips) | Mu MX (ft-kips) | Resultant Moment (ft-kips) | phi Pn (kips) | phi Vn (kips) | phi Tn (ft-kips) | phi Mn (ft-kips) | Total Deflect (in) | Rotation (deg) | Ratio |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 0.00 | -22.44 | -1.42 | 0.00 | -162.37 | 0.00 | 162.37 | 4,339.10 | 2,169.55 | 10,108.3 | 5,061.68 | 0.00 | 0.00 | 0.037 |
| 5.00 | -21.44 | -1.42 | 0.00 | -155.30 | 0.00 | 155.30 | 4,288.99 | 2,144.49 | 9,788.20 | 4,901.38 | 0.00 | -0.01 | 0.037 |
| 10.00 | -20.47 | -1.42 | 0.00 | -148.21 | 0.00 | 148.21 | 4,237.32 | 2,118.66 | 9,469.35 | 4,741.71 | 0.02 | -0.02 | 0.036 |
| 15.00 | -19.51 | -1.41 | 0.00 | -141.13 | 0.00 | 141.13 | 4,184.10 | 2,092.05 | 9,152.00 | 4,582.80 | 0.04 | -0.03 | 0.035 |
| 20.00 | -18.58 | -1.41 | 0.00 | -134.06 | 0.00 | 134.06 | 4,129.33 | 2,064.66 | 8,836.37 | 4,424.75 | 0.07 | -0.03 | 0.035 |
| 25.00 | -17.67 | -1.40 | 0.00 | -127.01 | 0.00 | 127.01 | 4,073.00 | 2,036.50 | 8,522.69 | 4,267.68 | 0.11 | -0.04 | 0.034 |
| 30.00 | -16.77 | -1.39 | 0.00 | -120.00 | 0.00 | 120.00 | 4,015.11 | 2,007.56 | 8,211.17 | 4,111.69 | 0.16 | -0.05 | 0.033 |
| 35.00 | -15.90 | -1.38 | 0.00 | -113.04 | 0.00 | 113.04 | 3,955.68 | 1,977.84 | 7,902.03 | 3,956.89 | 0.22 | -0.06 | 0.033 |
| 40.00 | -15.05 | -1.36 | 0.00 | -106.15 | 0.00 | 106.15 | 3,894.69 | 1,947.34 | 7,595.51 | 3,803.40 | 0.29 | -0.07 | 0.032 |
| 45.00 | -14.70 | -1.35 | 0.00 | -99.34 | 0.00 | 99.34 | 3,832.15 | 1,916.07 | 7,291.81 | 3,651.33 | 0.36 | -0.08 | 0.031 |
| 47.04 | -13.82 | -1.33 | 0.00 | -96.57 | 0.00 | 96.57 | 3,806.14 | 1,903.07 | 7,168.57 | 3,589.61 | 0.40 | -0.08 | 0.031 |
| 50.00 | -12.79 | -1.30 | 0.00 | -92.64 | 0.00 | 92.64 | 3,768.05 | 1,884.02 | 6,991.17 | 3,500.78 | 0.45 | -0.09 | 0.030 |
| 53.46 | -12.58 | -1.29 | 0.00 | -88.14 | 0.00 | 88.14 | 2,934.54 | 1,467.27 | 5,439.41 | 2,723.75 | 0.52 | -0.09 | 0.037 |
| 55.00 | -11.90 | -1.27 | 0.00 | -86.15 | 0.00 | 86.15 | 2,920.91 | 1,460.46 | 5,371.50 | 2,689.74 | 0.55 | -0.10 | 0.036 |
| 60.00 | -11.24 | -1.25 | 0.00 | -79.80 | 0.00 | 79.80 | 2,875.67 | 1,437.83 | 5,151.93 | 2,579.79 | 0.66 | -0.11 | 0.035 |
| 65.00 | -10.60 | -1.22 | 0.00 | -73.57 | 0.00 | 73.57 | 2,828.87 | 1,414.44 | 4,933.94 | 2,470.64 | 0.78 | -0.12 | 0.034 |
| 70.00 | -9.97 | -1.19 | 0.00 | -67.49 | 0.00 | 67.49 | 2,780.52 | 1,390.26 | 4,717.75 | 2,362.38 | 0.90 | -0.13 | 0.032 |
| 75.00 | -9.36 | -1.15 | 0.00 | -61.56 | 0.00 | 61.56 | 2,730.61 | 1,365.31 | 4,503.59 | 2,255.14 | 1.05 | -0.14 | 0.031 |
| 80.00 | -8.77 | -1.11 | 0.00 | -55.81 | 0.00 | 55.81 | 2,679.16 | 1,339.58 | 4,291.67 | 2,149.02 | 1.20 | -0.15 | 0.029 |
| 85.00 | -8.19 | -1.07 | 0.00 | -50.24 | 0.00 | 50.24 | 2,626.14 | 1,313.07 | 4,082.22 | 2,044.14 | 1.36 | -0.16 | 0.028 |
| 90.00 | -7.63 | -1.03 | 0.00 | -44.87 | 0.00 | 44.87 | 2,571.58 | 1,285.79 | 3,875.45 | 1,940.61 | 1.53 | -0.17 | 0.026 |
| 95.00 | -7.58 | -1.03 | 0.00 | -39.71 | 0.00 | 39.71 | 2,515.46 | 1,257.73 | 3,671.59 | 1,838.53 | 1.71 | -0.18 | 0.025 |
| 95.46 | -6.71 | -0.95 | 0.00 | -39.24 | 0.00 | 39.24 | 2,510.22 | 1,255.11 | 3,652.99 | 1,829.21 | 1.73 | -0.18 | 0.024 |
| 100.00 | -6.61 | -0.95 | 0.00 | -34.91 | 0.00 | 34.91 | 2,457.78 | 1,228.89 | 3,470.86 | 1,738.01 | 1.91 | -0.19 | 0.023 |
| 100.54 | -6.22 | -0.91 | 0.00 | -34.39 | 0.00 | 34.39 | 1,840.14 | 920.07 | 2,636.71 | 1,320.31 | 1.93 | -0.19 | 0.029 |
| 105.00 | -5.80 | -0.87 | 0.00 | -30.33 | 0.00 | 30.33 | 1,806.70 | 903.35 | 2,512.42 | 1,258.08 | 2.11 | -0.20 | 0.027 |
| 110.00 | -5.39 | -0.83 | 0.00 | -25.99 | 0.00 | 25.99 | 1,767.71 | 883.85 | 2,374.37 | 1,188.95 | 2.32 | -0.21 | 0.025 |
| 115.00 | -5.00 | -0.78 | 0.00 | -21.86 | 0.00 | 21.86 | 1,727.17 | 863.58 | 2,238.01 | 1,120.67 | 2.55 | -0.22 | 0.022 |
| 120.00 | -4.61 | -0.74 | 0.00 | -17.94 | 0.00 | 17.94 | 1,685.07 | 842.53 | 2,103.55 | 1,053.34 | 2.78 | -0.23 | 0.020 |
| 125.00 | -4.25 | -0.69 | 0.00 | -14.26 | 0.00 | 14.26 | 1,641.42 | 820.71 | 1,971.23 | 987.08 | 3.02 | -0.24 | 0.017 |
| 130.00 | -3.89 | -0.64 | 0.00 | -10.82 | 0.00 | 10.82 | 1,596.21 | 798.11 | 1,841.24 | 921.99 | 3.27 | -0.24 | 0.014 |
| 135.00 | -3.55 | -0.59 | 0.00 | -7.63 | 0.00 | 7.63 | 1,549.45 | 774.73 | 1,713.83 | 858.19 | 3.53 | -0.25 | 0.011 |
| 140.00 | -3.22 | -0.54 | 0.00 | -4.68 | 0.00 | 4.68 | 1,501.14 | 750.57 | 1,589.21 | 795.79 | 3.79 | -0.25 | 0.008 |
| 145.00 | -2.97 | -0.50 | 0.00 | -1.99 | 0.00 | 1.99 | 1,451.27 | 725.64 | 1,467.60 | 734.89 | 4.06 | -0.26 | 0.005 |
| 149.00 | 0.00 | -0.48 | 0.00 | 0.00 | 0.00 | 0.00 | 1,400.09 | 700.04 | 1,362.73 | 682.38 | 4.27 | -0.26 | 0.000 |

## Equivalent Modal Forces Analysis

(Based on ASCE7-10 Chapters 11, 12 & 15 and ANSI/TIA-G, section 2.7)

| | |
|---|---|
| Spectral Response Acceleration for Short Period ($S_s$): | 0.18 |
| Spectral Response Acceleration at 1.0 Second Period ($S_1$): | 0.06 |
| Importance Factor ($I_E$): | 1.00 |
| Site Coefficient $F_a$: | 1.60 |
| Site Coefficient $F_v$ | 2.40 |
| Response Modification Coefficient (R): | 1.50 |
| Design Spectral Response Acceleration at Short Period ($S_{ds}$): | 0.19 |
| Desing Spectral Response Acceleration at 1.0 Second Period ($S_{d1}$): | 0.10 |
| Period Based on Rayleigh Method (sec): | 1.73 |
| Redundancy Factor (p): | 1.30 |

Load Case (1.2 + 0.2Sds) * DL + E EMAM Seismic Equivalent Modal Analysis Method

| Segment | Height Above Base (ft) | Weight (lb) | a | b | c | Saz | Horizontal Force (lb) | Vertical Force (lb) |
|---|---|---|---|---|---|---|---|---|
| 34 | 147.00 | 294 | 1.840 | 1.725 | 1.047 | 0.342 | 87 | 364 |
| 33 | 142.50 | 382 | 1.729 | 1.234 | 0.859 | 0.275 | 91 | 473 |
| 32 | 137.50 | 397 | 1.610 | 0.808 | 0.683 | 0.210 | 72 | 492 |
| 31 | 132.50 | 413 | 1.495 | 0.488 | 0.536 | 0.153 | 55 | 511 |
| 30 | 127.50 | 428 | 1.384 | 0.254 | 0.415 | 0.104 | 39 | 530 |
| 29 | 122.50 | 443 | 1.278 | 0.091 | 0.317 | 0.064 | 25 | 549 |
| 28 | 117.50 | 459 | 1.175 | -0.017 | 0.237 | 0.032 | 13 | 568 |
| 27 | 112.50 | 474 | 1.077 | -0.082 | 0.173 | 0.009 | 4 | 587 |
| 26 | 107.50 | 490 | 0.984 | -0.114 | 0.123 | -0.007 | -3 | 607 |
| 25 | 102.77 | 450 | 0.899 | -0.122 | 0.087 | -0.015 | -6 | 557 |
| 24 | 100.27 | 119 | 0.856 | -0.120 | 0.071 | -0.017 | -2 | 147 |
| 23 | 97.73 | 1,007 | 0.813 | -0.114 | 0.058 | -0.017 | -15 | 1,248 |
| 22 | 95.23 | 59 | 0.772 | -0.106 | 0.046 | -0.016 | -1 | 73 |
| 21 | 92.50 | 651 | 0.728 | -0.095 | 0.036 | -0.013 | -7 | 806 |
| 20 | 87.50 | 670 | 0.652 | -0.071 | 0.021 | -0.004 | -2 | 830 |
| 19 | 82.50 | 689 | 0.579 | -0.045 | 0.012 | 0.006 | 4 | 854 |
| 18 | 77.50 | 709 | 0.511 | -0.020 | 0.008 | 0.018 | 11 | 877 |
| 17 | 72.50 | 728 | 0.447 | 0.002 | 0.006 | 0.028 | 17 | 901 |
| 16 | 67.50 | 747 | 0.388 | 0.022 | 0.007 | 0.035 | 23 | 925 |
| 15 | 62.50 | 766 | 0.333 | 0.037 | 0.010 | 0.041 | 27 | 949 |
| 14 | 57.50 | 786 | 0.281 | 0.049 | 0.014 | 0.044 | 30 | 973 |
| 13 | 54.23 | 246 | 0.250 | 0.055 | 0.017 | 0.045 | 10 | 305 |
| 12 | 51.73 | 1,187 | 0.228 | 0.059 | 0.020 | 0.046 | 47 | 1,470 |
| 11 | 48.52 | 1,030 | 0.200 | 0.063 | 0.023 | 0.045 | 41 | 1,276 |
| 10 | 46.02 | 398 | 0.180 | 0.065 | 0.026 | 0.045 | 16 | 493 |
| 9 | 42.50 | 990 | 0.154 | 0.068 | 0.030 | 0.044 | 38 | 1,227 |
| 8 | 37.50 | 1,014 | 0.120 | 0.070 | 0.034 | 0.043 | 38 | 1,255 |
| 7 | 32.50 | 1,037 | 0.090 | 0.071 | 0.038 | 0.042 | 37 | 1,284 |
| 6 | 27.50 | 1,060 | 0.064 | 0.072 | 0.041 | 0.040 | 37 | 1,313 |
| 5 | 22.50 | 1,083 | 0.043 | 0.071 | 0.042 | 0.038 | 36 | 1,341 |
| 4 | 17.50 | 1,106 | 0.026 | 0.067 | 0.040 | 0.036 | 34 | 1,370 |
| 3 | 12.50 | 1,130 | 0.013 | 0.059 | 0.034 | 0.032 | 31 | 1,399 |
| 2 | 7.50 | 1,153 | 0.005 | 0.044 | 0.025 | 0.024 | 24 | 1,428 |
| 1 | 2.50 | 1,176 | 0.001 | 0.018 | 0.010 | 0.011 | 11 | 1,456 |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Alcatel-Lucent B13 R | 149.00 | 173 | 1.890 | 1.980 | 1.140 | 0.374 | 56 | 215 |
| Alcatel-Lucent B66A | 149.00 | 201 | 1.890 | 1.980 | 1.140 | 0.374 | 65 | 249 |
| RFS DB-C1-12C-24AB-0 | 149.00 | 32 | 1.890 | 1.980 | 1.140 | 0.374 | 10 | 40 |
| 15' Dipole | 149.00 | 45 | 1.890 | 1.980 | 1.140 | 0.374 | 15 | 56 |
| Amphenol Antel LPA-8 | 149.00 | 126 | 1.890 | 1.980 | 1.140 | 0.374 | 41 | 156 |
| Commscope JAHH-65B- | 149.00 | 364 | 1.890 | 1.980 | 1.140 | 0.374 | 118 | 450 |
| Flat T-Arm w/ Workin | 149.00 | 900 | 1.890 | 1.980 | 1.140 | 0.374 | 291 | 1,115 |
| VZW Unused Reserve: | 149.00 | 1,604 | 1.890 | 1.980 | 1.140 | 0.374 | 519 | 1,986 |
| | | 27,215 | 36.325 | 20.425 | 14.267 | 4.753 | 1,976 | 33,703 |

Load Case (0.9 - 0.2Sds) * DL + E EMAM Seismic (Reduced DL) Equivalent Modal Analysis Method

| Segment | Height Above Base (ft) | Weight (lb) | a | b | c | Saz | Horizontal Force (lb) | Vertical Force (lb) |
|---|---|---|---|---|---|---|---|---|
| 34 | 147.00 | 294 | 1.840 | 1.725 | 1.047 | 0.342 | 87 | 253 |
| 33 | 142.50 | 382 | 1.729 | 1.234 | 0.859 | 0.275 | 91 | 329 |
| 32 | 137.50 | 397 | 1.610 | 0.808 | 0.683 | 0.210 | 72 | 342 |
| 31 | 132.50 | 413 | 1.495 | 0.488 | 0.536 | 0.153 | 55 | 355 |
| 30 | 127.50 | 428 | 1.384 | 0.254 | 0.415 | 0.104 | 39 | 369 |
| 29 | 122.50 | 443 | 1.278 | 0.091 | 0.317 | 0.064 | 25 | 382 |
| 28 | 117.50 | 459 | 1.175 | -0.017 | 0.237 | 0.032 | 13 | 395 |
| 27 | 112.50 | 474 | 1.077 | -0.082 | 0.173 | 0.009 | 4 | 409 |
| 26 | 107.50 | 490 | 0.984 | -0.114 | 0.123 | -0.007 | -3 | 422 |
| 25 | 102.77 | 450 | 0.899 | -0.122 | 0.087 | -0.015 | -6 | 387 |
| 24 | 100.27 | 119 | 0.856 | -0.120 | 0.071 | -0.017 | -2 | 102 |
| 23 | 97.73 | 1,007 | 0.813 | -0.114 | 0.058 | -0.017 | -15 | 868 |
| 22 | 95.23 | 59 | 0.772 | -0.106 | 0.046 | -0.016 | -1 | 51 |
| 21 | 92.50 | 651 | 0.728 | -0.095 | 0.036 | -0.013 | -7 | 561 |
| 20 | 87.50 | 670 | 0.652 | -0.071 | 0.021 | -0.004 | -2 | 577 |
| 19 | 82.50 | 689 | 0.579 | -0.045 | 0.012 | 0.006 | 4 | 594 |
| 18 | 77.50 | 709 | 0.511 | -0.020 | 0.008 | 0.018 | 11 | 610 |
| 17 | 72.50 | 728 | 0.447 | 0.002 | 0.006 | 0.028 | 17 | 627 |
| 16 | 67.50 | 747 | 0.388 | 0.022 | 0.007 | 0.035 | 23 | 644 |
| 15 | 62.50 | 766 | 0.333 | 0.037 | 0.010 | 0.041 | 27 | 660 |
| 14 | 57.50 | 786 | 0.281 | 0.049 | 0.014 | 0.044 | 30 | 677 |
| 13 | 54.23 | 246 | 0.250 | 0.055 | 0.017 | 0.045 | 10 | 212 |
| 12 | 51.73 | 1,187 | 0.228 | 0.059 | 0.020 | 0.046 | 47 | 1,022 |
| 11 | 48.52 | 1,030 | 0.200 | 0.063 | 0.023 | 0.045 | 41 | 888 |
| 10 | 46.02 | 398 | 0.180 | 0.065 | 0.026 | 0.045 | 16 | 343 |
| 9 | 42.50 | 990 | 0.154 | 0.068 | 0.030 | 0.044 | 38 | 853 |
| 8 | 37.50 | 1,014 | 0.120 | 0.070 | 0.034 | 0.043 | 38 | 873 |
| 7 | 32.50 | 1,037 | 0.090 | 0.071 | 0.038 | 0.042 | 37 | 893 |
| 6 | 27.50 | 1,060 | 0.064 | 0.072 | 0.041 | 0.040 | 37 | 913 |
| 5 | 22.50 | 1,083 | 0.043 | 0.071 | 0.042 | 0.038 | 36 | 933 |
| 4 | 17.50 | 1,106 | 0.026 | 0.067 | 0.040 | 0.036 | 34 | 953 |
| 3 | 12.50 | 1,130 | 0.013 | 0.059 | 0.034 | 0.032 | 31 | 973 |
| 2 | 7.50 | 1,153 | 0.005 | 0.044 | 0.025 | 0.024 | 24 | 993 |
| 1 | 2.50 | 1,176 | 0.001 | 0.018 | 0.010 | 0.011 | 11 | 1,013 |
| Alcatel-Lucent B13 R | 149.00 | 173 | 1.890 | 1.980 | 1.140 | 0.374 | 56 | 149 |
| Alcatel-Lucent B66A | 149.00 | 201 | 1.890 | 1.980 | 1.140 | 0.374 | 65 | 173 |
| RFS DB-C1-12C-24AB-0 | 149.00 | 32 | 1.890 | 1.980 | 1.140 | 0.374 | 10 | 28 |
| 15' Dipole | 149.00 | 45 | 1.890 | 1.980 | 1.140 | 0.374 | 15 | 39 |
| Amphenol Antel LPA-8 | 149.00 | 126 | 1.890 | 1.980 | 1.140 | 0.374 | 41 | 109 |
| Commscope JAHH-65B- | 149.00 | 364 | 1.890 | 1.980 | 1.140 | 0.374 | 118 | 313 |
| Flat T-Arm w/ Workin | 149.00 | 900 | 1.890 | 1.980 | 1.140 | 0.374 | 291 | 775 |
| VZW Unused Reserve: | 149.00 | 1,604 | 1.890 | 1.980 | 1.140 | 0.374 | 519 | 1,382 |
| | | 27,215 | 36.325 | 20.425 | 14.267 | 4.753 | 1,976 | 23,448 |

Site Number: 413850 Code: ANSI/TIA-222-G 

Site Name: Goshen (Brass Mountain) CT, CT Engineering Number: OAA706894_C3_01 7/26/2017 4:26:09 PM

Customer: VERIZON WIRELESS

Load Case (1.2 + 0.2Sds) * DL + E EMAM Seismic Equivalent Modal Analysis Method

Calculated Forces

| Seg Elev (ft) | Pu FY (-) (kips) | Vu FX (-) (kips) | Tu MY (ft-kips) | Mu MZ (ft-kips) | Mu MX (ft-kips) | Resultant Moment (ft-kips) | phi Pn (kips) | phi Vn (kips) | phi Tn (ft-kips) | phi Mn (ft-kips) | Total Deflect (in) | Rotation (deg) | Ratio |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 0.00 | -32.25 | -1.97 | 0.00 | -239.79 | 0.00 | 239.79 | 4,339.10 | 2,169.55 | 10,108.3 | 5,061.68 | 0.00 | 0.00 | 0.055 |
| 5.00 | -30.82 | -1.95 | 0.00 | -229.94 | 0.00 | 229.94 | 4,288.99 | 2,144.49 | 9,788.20 | 4,901.38 | 0.01 | -0.01 | 0.054 |
| 10.00 | -29.42 | -1.93 | 0.00 | -220.19 | 0.00 | 220.19 | 4,237.32 | 2,118.66 | 9,469.35 | 4,741.71 | 0.03 | -0.02 | 0.053 |
| 15.00 | -28.05 | -1.90 | 0.00 | -210.57 | 0.00 | 210.57 | 4,184.10 | 2,092.05 | 9,152.00 | 4,582.80 | 0.06 | -0.04 | 0.053 |
| 20.00 | -26.71 | -1.87 | 0.00 | -201.09 | 0.00 | 201.09 | 4,129.33 | 2,064.66 | 8,836.37 | 4,424.75 | 0.10 | -0.05 | 0.052 |
| 25.00 | -25.39 | -1.83 | 0.00 | -191.76 | 0.00 | 191.76 | 4,073.00 | 2,036.50 | 8,522.69 | 4,267.68 | 0.16 | -0.06 | 0.051 |
| 30.00 | -24.11 | -1.80 | 0.00 | -182.60 | 0.00 | 182.60 | 4,015.11 | 2,007.56 | 8,211.17 | 4,111.69 | 0.24 | -0.08 | 0.050 |
| 35.00 | -22.85 | -1.77 | 0.00 | -173.60 | 0.00 | 173.60 | 3,955.68 | 1,977.84 | 7,902.03 | 3,956.89 | 0.33 | -0.09 | 0.050 |
| 40.00 | -21.63 | -1.73 | 0.00 | -164.77 | 0.00 | 164.77 | 3,894.69 | 1,947.34 | 7,595.51 | 3,803.40 | 0.43 | -0.10 | 0.049 |
| 45.00 | -21.13 | -1.72 | 0.00 | -156.12 | 0.00 | 156.12 | 3,832.15 | 1,916.07 | 7,291.81 | 3,651.33 | 0.55 | -0.12 | 0.048 |
| 47.04 | -19.86 | -1.68 | 0.00 | -152.61 | 0.00 | 152.61 | 3,806.14 | 1,903.07 | 7,168.57 | 3,589.61 | 0.60 | -0.12 | 0.048 |
| 50.00 | -18.39 | -1.63 | 0.00 | -147.65 | 0.00 | 147.65 | 3,768.05 | 1,884.02 | 6,991.17 | 3,500.78 | 0.68 | -0.13 | 0.047 |
| 53.46 | -18.08 | -1.62 | 0.00 | -142.02 | 0.00 | 142.02 | 2,934.54 | 1,467.27 | 5,439.41 | 2,723.75 | 0.78 | -0.14 | 0.058 |
| 55.00 | -17.11 | -1.59 | 0.00 | -139.52 | 0.00 | 139.52 | 2,920.91 | 1,460.46 | 5,371.50 | 2,689.74 | 0.83 | -0.15 | 0.058 |
| 60.00 | -16.16 | -1.57 | 0.00 | -131.56 | 0.00 | 131.56 | 2,875.67 | 1,437.83 | 5,151.93 | 2,579.79 | 0.99 | -0.17 | 0.057 |
| 65.00 | -15.23 | -1.55 | 0.00 | -123.72 | 0.00 | 123.72 | 2,828.87 | 1,414.44 | 4,933.94 | 2,470.64 | 1.17 | -0.18 | 0.055 |
| 70.00 | -14.33 | -1.53 | 0.00 | -115.99 | 0.00 | 115.99 | 2,780.52 | 1,390.26 | 4,717.75 | 2,362.38 | 1.37 | -0.20 | 0.054 |
| 75.00 | -13.45 | -1.52 | 0.00 | -108.33 | 0.00 | 108.33 | 2,730.61 | 1,365.31 | 4,503.59 | 2,255.14 | 1.60 | -0.22 | 0.053 |
| 80.00 | -12.60 | -1.52 | 0.00 | -100.73 | 0.00 | 100.73 | 2,679.16 | 1,339.58 | 4,291.67 | 2,149.02 | 1.83 | -0.24 | 0.052 |
| 85.00 | -11.77 | -1.52 | 0.00 | -93.14 | 0.00 | 93.14 | 2,626.14 | 1,313.07 | 4,082.22 | 2,044.14 | 2.09 | -0.26 | 0.050 |
| 90.00 | -10.96 | -1.53 | 0.00 | -85.54 | 0.00 | 85.54 | 2,571.58 | 1,285.79 | 3,875.45 | 1,940.61 | 2.37 | -0.27 | 0.048 |
| 95.00 | -10.89 | -1.53 | 0.00 | -77.90 | 0.00 | 77.90 | 2,515.46 | 1,257.73 | 3,671.59 | 1,838.53 | 2.67 | -0.29 | 0.047 |
| 95.46 | -9.64 | -1.54 | 0.00 | -77.20 | 0.00 | 77.20 | 2,510.22 | 1,255.11 | 3,652.99 | 1,829.21 | 2.70 | -0.30 | 0.046 |
| 100.00 | -9.50 | -1.54 | 0.00 | -70.21 | 0.00 | 70.21 | 2,457.78 | 1,228.89 | 3,470.86 | 1,738.01 | 2.99 | -0.31 | 0.044 |
| 100.54 | -8.94 | -1.55 | 0.00 | -69.37 | 0.00 | 69.37 | 1,840.14 | 920.07 | 2,636.71 | 1,320.31 | 3.02 | -0.31 | 0.057 |
| 105.00 | -8.33 | -1.55 | 0.00 | -62.47 | 0.00 | 62.47 | 1,806.70 | 903.35 | 2,512.42 | 1,258.08 | 3.32 | -0.33 | 0.054 |
| 110.00 | -7.74 | -1.55 | 0.00 | -54.73 | 0.00 | 54.73 | 1,767.71 | 883.85 | 2,374.37 | 1,188.95 | 3.68 | -0.35 | 0.050 |
| 115.00 | -7.17 | -1.53 | 0.00 | -47.00 | 0.00 | 47.00 | 1,727.17 | 863.58 | 2,238.01 | 1,120.67 | 4.06 | -0.37 | 0.046 |
| 120.00 | -6.63 | -1.51 | 0.00 | -39.34 | 0.00 | 39.34 | 1,685.07 | 842.53 | 2,103.55 | 1,053.34 | 4.46 | -0.39 | 0.041 |
| 125.00 | -6.10 | -1.46 | 0.00 | -31.82 | 0.00 | 31.82 | 1,641.42 | 820.71 | 1,971.23 | 987.08 | 4.89 | -0.41 | 0.036 |
| 130.00 | -5.58 | -1.41 | 0.00 | -24.50 | 0.00 | 24.50 | 1,596.21 | 798.11 | 1,841.24 | 921.99 | 5.32 | -0.43 | 0.030 |
| 135.00 | -5.09 | -1.33 | 0.00 | -17.46 | 0.00 | 17.46 | 1,549.45 | 774.73 | 1,713.83 | 858.19 | 5.78 | -0.44 | 0.024 |
| 140.00 | -4.62 | -1.24 | 0.00 | -10.79 | 0.00 | 10.79 | 1,501.14 | 750.57 | 1,589.21 | 795.79 | 6.25 | -0.45 | 0.017 |
| 145.00 | -4.26 | -1.15 | 0.00 | -4.60 | 0.00 | 4.60 | 1,451.27 | 725.64 | 1,467.60 | 734.89 | 6.72 | -0.46 | 0.009 |
| 149.00 | 0.00 | -1.12 | 0.00 | 0.00 | 0.00 | 0.00 | 1,400.09 | 700.04 | 1,362.73 | 682.38 | 7.11 | -0.46 | 0.000 |

Load Case (0.9 - 0.2Sds) * DL + E EMAM Seismic (Reduced DL) Equivalent Modal Analysis Method

Calculated Forces

| Seg Elev (ft) | Pu FY (-) (kips) | Vu FX (-) (kips) | Tu MY (ft-kips) | Mu MZ (ft-kips) | Mu MX (ft-kips) | Resultant Moment (ft-kips) | phi Pn (kips) | phi Vn (kips) | phi Tn (ft-kips) | phi Mn (ft-kips) | Total Deflect (in) | Rotation (deg) | Ratio |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 0.00 | -22.43 | -1.97 | 0.00 | -237.90 | 0.00 | 237.90 | 4,339.10 | 2,169.55 | 10,108.3 | 5,061.68 | 0.00 | 0.00 | 0.052 |
| 5.00 | -21.44 | -1.95 | 0.00 | -228.06 | 0.00 | 228.06 | 4,288.99 | 2,144.49 | 9,788.20 | 4,901.38 | 0.01 | -0.01 | 0.052 |
| 10.00 | -20.47 | -1.92 | 0.00 | -218.32 | 0.00 | 218.32 | 4,237.32 | 2,118.66 | 9,469.35 | 4,741.71 | 0.03 | -0.02 | 0.051 |
| 15.00 | -19.51 | -1.89 | 0.00 | -208.72 | 0.00 | 208.72 | 4,184.10 | 2,092.05 | 9,152.00 | 4,582.80 | 0.06 | -0.04 | 0.050 |
| 20.00 | -18.58 | -1.86 | 0.00 | -199.27 | 0.00 | 199.27 | 4,129.33 | 2,064.66 | 8,836.37 | 4,424.75 | 0.10 | -0.05 | 0.050 |
| 25.00 | -17.67 | -1.82 | 0.00 | -189.99 | 0.00 | 189.99 | 4,073.00 | 2,036.50 | 8,522.69 | 4,267.68 | 0.16 | -0.06 | 0.049 |
| 30.00 | -16.77 | -1.79 | 0.00 | -180.87 | 0.00 | 180.87 | 4,015.11 | 2,007.56 | 8,211.17 | 4,111.69 | 0.24 | -0.08 | 0.048 |
| 35.00 | -15.90 | -1.75 | 0.00 | -171.93 | 0.00 | 171.93 | 3,955.68 | 1,977.84 | 7,902.03 | 3,956.89 | 0.32 | -0.09 | 0.047 |
| 40.00 | -15.05 | -1.72 | 0.00 | -163.17 | 0.00 | 163.17 | 3,894.69 | 1,947.34 | 7,595.51 | 3,803.40 | 0.43 | -0.10 | 0.047 |
| 45.00 | -14.70 | -1.70 | 0.00 | -154.58 | 0.00 | 154.58 | 3,832.15 | 1,916.07 | 7,291.81 | 3,651.33 | 0.54 | -0.12 | 0.046 |
| 47.04 | -13.81 | -1.66 | 0.00 | -151.10 | 0.00 | 151.10 | 3,806.14 | 1,903.07 | 7,168.57 | 3,589.61 | 0.59 | -0.12 | 0.046 |
| 50.00 | -12.79 | -1.62 | 0.00 | -146.18 | 0.00 | 146.18 | 3,768.05 | 1,884.02 | 6,991.17 | 3,500.78 | 0.67 | -0.13 | 0.045 |
| 53.46 | -12.58 | -1.61 | 0.00 | -140.59 | 0.00 | 140.59 | 2,934.54 | 1,467.27 | 5,439.41 | 2,723.75 | 0.77 | -0.14 | 0.056 |
| 55.00 | -11.90 | -1.58 | 0.00 | -138.12 | 0.00 | 138.12 | 2,920.91 | 1,460.46 | 5,371.50 | 2,689.74 | 0.82 | -0.15 | 0.055 |
| 60.00 | -11.24 | -1.55 | 0.00 | -130.23 | 0.00 | 130.23 | 2,875.67 | 1,437.83 | 5,151.93 | 2,579.79 | 0.98 | -0.16 | 0.054 |
| 65.00 | -10.60 | -1.53 | 0.00 | -122.47 | 0.00 | 122.47 | 2,828.87 | 1,414.44 | 4,933.94 | 2,470.64 | 1.16 | -0.18 | 0.053 |
| 70.00 | -9.97 | -1.51 | 0.00 | -114.81 | 0.00 | 114.81 | 2,780.52 | 1,390.26 | 4,717.75 | 2,362.38 | 1.36 | -0.20 | 0.052 |
| 75.00 | -9.36 | -1.50 | 0.00 | -107.24 | 0.00 | 107.24 | 2,730.61 | 1,365.31 | 4,503.59 | 2,255.14 | 1.58 | -0.22 | 0.051 |
| 80.00 | -8.76 | -1.50 | 0.00 | -99.72 | 0.00 | 99.72 | 2,679.16 | 1,339.58 | 4,291.67 | 2,149.02 | 1.82 | -0.24 | 0.050 |
| 85.00 | -8.19 | -1.50 | 0.00 | -92.22 | 0.00 | 92.22 | 2,626.14 | 1,313.07 | 4,082.22 | 2,044.14 | 2.07 | -0.25 | 0.048 |
| 90.00 | -7.63 | -1.51 | 0.00 | -84.70 | 0.00 | 84.70 | 2,571.58 | 1,285.79 | 3,875.45 | 1,940.61 | 2.35 | -0.27 | 0.047 |
| 95.00 | -7.58 | -1.51 | 0.00 | -77.15 | 0.00 | 77.15 | 2,515.46 | 1,257.73 | 3,671.59 | 1,838.53 | 2.64 | -0.29 | 0.045 |
| 95.46 | -6.71 | -1.52 | 0.00 | -76.45 | 0.00 | 76.45 | 2,510.22 | 1,255.11 | 3,652.99 | 1,829.21 | 2.67 | -0.29 | 0.044 |
| 100.00 | -6.60 | -1.53 | 0.00 | -69.53 | 0.00 | 69.53 | 2,457.78 | 1,228.89 | 3,470.86 | 1,738.01 | 2.96 | -0.31 | 0.043 |
| 100.54 | -6.22 | -1.53 | 0.00 | -68.70 | 0.00 | 68.70 | 1,840.14 | 920.07 | 2,636.71 | 1,320.31 | 2.99 | -0.31 | 0.055 |
| 105.00 | -5.79 | -1.53 | 0.00 | -61.88 | 0.00 | 61.88 | 1,806.70 | 903.35 | 2,512.42 | 1,258.08 | 3.29 | -0.33 | 0.052 |
| 110.00 | -5.38 | -1.53 | 0.00 | -54.21 | 0.00 | 54.21 | 1,767.71 | 883.85 | 2,374.37 | 1,188.95 | 3.65 | -0.35 | 0.049 |
| 115.00 | -4.99 | -1.52 | 0.00 | -46.56 | 0.00 | 46.56 | 1,727.17 | 863.58 | 2,238.01 | 1,120.67 | 4.02 | -0.37 | 0.044 |
| 120.00 | -4.61 | -1.49 | 0.00 | -38.98 | 0.00 | 38.98 | 1,685.07 | 842.53 | 2,103.55 | 1,053.34 | 4.42 | -0.39 | 0.040 |
| 125.00 | -4.24 | -1.45 | 0.00 | -31.52 | 0.00 | 31.52 | 1,641.42 | 820.71 | 1,971.23 | 987.08 | 4.84 | -0.41 | 0.035 |
| 130.00 | -3.88 | -1.39 | 0.00 | -24.27 | 0.00 | 24.27 | 1,596.21 | 798.11 | 1,841.24 | 921.99 | 5.27 | -0.42 | 0.029 |
| 135.00 | -3.54 | -1.32 | 0.00 | -17.30 | 0.00 | 17.30 | 1,549.45 | 774.73 | 1,713.83 | 858.19 | 5.72 | -0.44 | 0.022 |
| 140.00 | -3.21 | -1.23 | 0.00 | -10.69 | 0.00 | 10.69 | 1,501.14 | 750.57 | 1,589.21 | 795.79 | 6.19 | -0.45 | 0.016 |
| 145.00 | -2.96 | -1.14 | 0.00 | -4.55 | 0.00 | 4.55 | 1,451.27 | 725.64 | 1,467.60 | 734.89 | 6.66 | -0.45 | 0.008 |
| 149.00 | 0.00 | -1.12 | 0.00 | 0.00 | 0.00 | 0.00 | 1,400.09 | 700.04 | 1,362.73 | 682.38 | 7.04 | -0.45 | 0.000 |

## Analysis Summary

| | Reactions | | | | | | Max Usage | |
|---|---|---|---|---|---|---|---|---|
| Load Case | Shear FX (kips) | Shear FZ (kips) | Axial FY (kips) | Moment MX (ft-kips) | Moment MY (ft-kips) | Moment MZ (ft-kips) | Elev (ft) | Interaction Ratio |
| 1.2D + 1.6W | 17.66 | 0.00 | 32.64 | 0.00 | 0.00 | 1931.04 | 53.46 | 0.40 |
| 0.9D + 1.6W | 17.66 | 0.00 | 24.48 | 0.00 | 0.00 | 1918.82 | 53.46 | 0.39 |
| 1.2D + 1.0Di + 1.0Wi | 3.05 | 0.00 | 48.57 | 0.00 | 0.00 | 282.94 | 0.00 | 0.07 |
| (1.2 + 0.2Sds) * DL + E ELFM | 1.42 | 0.00 | 32.25 | 0.00 | 0.00 | 163.56 | 0.00 | 0.04 |
| (1.2 + 0.2Sds) * DL + E EMAM | 1.97 | 0.00 | 32.25 | 0.00 | 0.00 | 239.79 | 53.46 | 0.06 |
| (0.9 - 0.2Sds) * DL + E ELFM | 1.42 | 0.00 | 22.44 | 0.00 | 0.00 | 162.37 | 0.00 | 0.04 |
| (0.9 - 0.2Sds) * DL + E EMAM | 1.97 | 0.00 | 22.43 | 0.00 | 0.00 | 237.90 | 53.46 | 0.06 |
| 1.0D + 1.0W | 4.90 | 0.00 | 27.21 | 0.00 | 0.00 | 534.33 | 53.46 | 0.11 |

| | | | |
|---|---|---|---|
| Site Number: | **413850** | *Last Updated:* | *10/6/2016* |
| Site Name: | **Goshen (Brass Mountain) CT, CT** | | |
| Job Number: | **OAA706894_C3_01** | | |
| Engineer: | **Hamid.Kazem** | | |
| Date: | **7/26/2017** | | |

## Base Plate and Bolt Analysis

| | | |
|---|---|---|
| Moment: | 1931.0 | k-ft |
| Shear/Leg: | 17.7 | k |
| Compression/Leg: | 32.6 | k |

| | | |
|---|---|---|
| TIA-222 Code Revision (F/G): | G | |
| Anchor Bolt Arrangement: | Round | |
| Monopole Shaft Diameter (Across Flats): | 57.0 | in |
| Lower Monopole Thickness: | 0.375 | in |
| # of Sides of Pole: | 18 | |
| Monopole Shaft Yield Strength: | 65 | ksi |
| Baseplate Diameter / Length: | 71.00 | |
| Base Plate Thickness: | 3.00 | in |
| Base Plate Yield Strength: | 50 | ksi |
| Baseplate Detail Type: | D | |
| Include Plate Thickness Beyond Bolt Circle: | Y | |
| Stress Increase: | 1.00 | |
| Fillet Weld Size: | 0.313 | in |
| Weld Type (CJP or F/F): | CJP | |
| Weld Strength: | 70 | ksi |

**Anchor Bolts**

| | | |
|---|---|---|
| Anchor Bolt Yield Strength: | 75 | ksi |
| Anchor Bolt Ultimate Strength: | 100 | ksi |
| Anchor Bolt Diameter: | 2.25 | in |
| Anchor Bolt Circle: | 65.00 | in |
| # of Anchor Bolts: | 24 | |
| Minimum Anchor Bolt Separation: | 6.00 | in |
| Additional Anchor Bolts Installed: | N | |

| | Baseplate Flexural Capacity | | | | | Baseplate Shear Capacity | | | |
|---|---|---|---|---|---|---|---|---|---|
| Failure Mode: | Effective Width (in) | Moment (k-in) | S/Z ($in^3$) | Capacity (k-in) | Usage | Shear (k) | Area ($in^4$) | Capacity (k) | Usage |
| AA | 37.24 | 582.7 | 83.8 | 3770.7 | 0.15 | 178.2 | 111.7 | 3016.5 | 0.06 |
| AB | 38.64 | 698.3 | 86.9 | 3912.5 | 0.18 | 178.2 | 115.9 | 3130.0 | 0.06 |
| BA | 35.58 | 504.4 | 80.1 | 3602.5 | 0.14 | 178.2 | 106.7 | 2882.0 | 0.06 |
| BB | 36.83 | 671.5 | 82.9 | 3728.9 | 0.18 | 178.2 | 110.5 | 2983.1 | 0.06 |

### Anchor Bolt Capacity

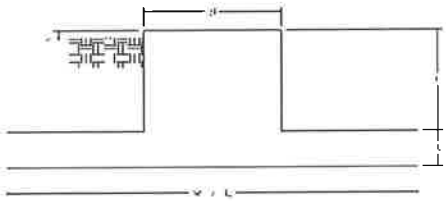
| | | |
|---|---|---|
| Area of Bolt: | 3.25 | $in^2$ |
| Inertia of Bolt: | 0.84 | $in^4$ |
| Total Bolt Inertia: | 41184.5 | $in^4$ |
| Maximum Bolt Tension: | 58.0 | k |
| Maximum Bolt Compression: | 60.7 | k |
| Bolt Shear: | 0.7 | k |
| Tensile Bolt Capacity: | 259.8 | k |
| Compressive Bolt Capacity: | 259.8 | k |
| Shear Bolt Capacity: | 140.3 | k |
| Interaction Equation: | 0.24 | Result: |
| | | OK |

### Base Weld Capacity

| | | |
|---|---|---|
| Force / Weld: | 7.2 | k/in |
| Weld Capacity: | 24.5 | k/in |
| Interaction Equation: | 0.29 | Result: |
| | | OK |

| | |
|---|---|
| Site Name: | Goshen (Brass Mountain) CT, CT |
| Site Number: | 413850 |
| Engineering Number: | OAA706894_C3_01 |
| Engineer: | Hamid.Kazem |
| Date: | 07/26/17 |
| Tower Type: | MP |

*Program Last Updated:* *5/13/2014*



## Design Loads (Factored) - Analysis per TIA-222-G Standards

| | | | | | |
|---|---|---|---|---|---|
| Design / Analysis / Mapping: | Analysis | | | | |
| Compression/Leg: | 32.6 | k | Concrete Strength ($f'_c$): | 4000 | psi |
| Uplift/Leg: | 0.0 | k | Pad Tension Steel Depth: | 32.00 | in |
| Total Shear: | 17.7 | k | $\phi_{Shear}$: | 0.75 | |
| Moment: | 1931.0 | k-ft | $\phi_{Flexure\ /\ Tension}$: | 0.90 | |
| Tower + Appurtenance Weight: | 32.6 | k | $\phi_{Compression:}$ | 0.65 | |
| Depth to Base of Foundation (l + t - h): | 5.00 | ft | $\beta$: | 0.85 | |
| Diameter of Pier (d): | 7.00 | ft | Bottom Pad Rebar Size #: | 8 | |
| Height of Pier above Ground (h): | 1.00 | | # of Bottom Pad Rebar: | 48 | |
| Width of Pad (W): | 28.00 | ft | Pad Bottom Steel Area: | 37.92 | $in^2$ |
| Length of Pad (L): | 28.00 | ft | Pad Steel $F_y$: | 60000 | psi |
| Thickness of Pad (t): | 3.00 | ft | Top Pad Rebar Size #: | 8 | |
| Tower Leg Center to Center: | 0.00 | ft | # of Top Pad Rebar: | 26 | |
| Number of Tower Legs: | 1.0 | (1 if MP or GT) | Pad Top Steel Area: | 20.54 | $in^2$ |
| Tower Center from Mat Center: | 0.00 | ft | Pier Rebar Size #: | 8 | |
| Depth Below Ground Surface to Water Table: | 99.00 | ft | Pier Steel Area (Single Bar): | 0.79 | $in^2$ |
| Unit Weight of Concrete: | 150.0 | pcf | # of Pier Rebar: | 34 | |
| Unit Weight of Soil Above Water Table: | 165.0 | pcf | Pier Steel $F_y$: | 60000 | psi |
| Unit Weight of Water: | 62.4 | pcf | Pier Cage Diameter: | 76.0 | in |
| Unit Weight of Soil Below Water Table: | 102.6 | pcf | Rebar Strain Limit: | 0.008 | |
| Friction Angle of Uplift: | 15.0 | Degrees | Steel Elastic Modulus: | 29000 | ksi |
| Ultimate Coefficient of Shear Friction: | 0.50 | | Tie Rebar Size #: | 4 | |
| Ultimate Compressive Bearing Pressure: | 16000.0 | psf | Tie Steel Area (Single Bar): | 0.20 | $in^2$ |
| Ultimate Passive Pressure on Pad Face: | 3465.0 | psf | Tie Spacing: | 6 | in |
| $\phi_{Soil\ and\ Concrete\ Weight}$: | 0.9 | | Tie Steel $F_y$: | 60000 | psi |
| $\phi_{Soil}$: | 0.75 | | | | |

## Overturning Moment Usage

| | | |
|---|---|---|
| Design OTM: | 2037.0 | k-ft |
| OTM Resistance: | 8855.4 | k-ft |
| Design OTM / OTM Resistance: | 0.23 | Result: OK |

## Soil Bearing Pressure Usage

| | | |
|---|---|---|
| Net Bearing Pressure: | 702 | psf |
| Factored Nominal Bearing Pressure: | 12000 | psf |
| Net Bearing Pressure/Factored Nominal Bearing Pressure: | 0.06 | Result: OK |
| Load Direction Controling Design Bearing Pressure: | Diagonal to Pad Edge | |

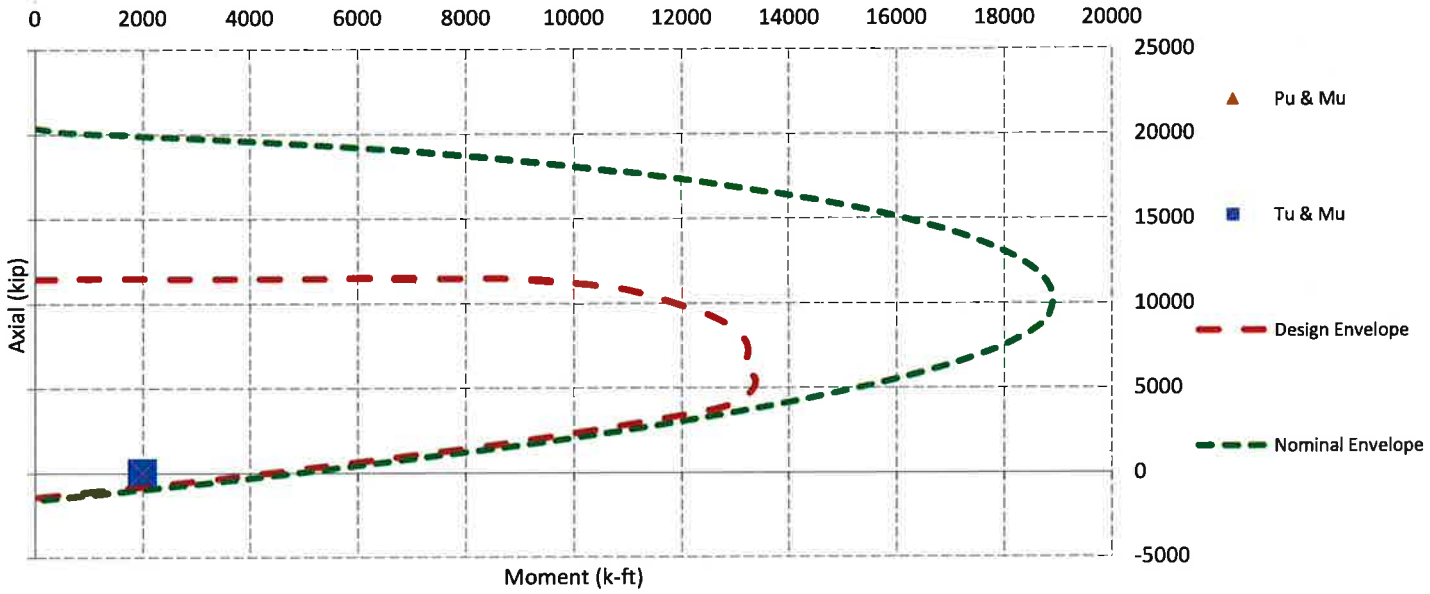
## Sliding Factor of Safety

| | | |
|---|---|---|
| Total Factored Sliding Resistance: | 437.7 | k |
| Sliding Design / Sliding Resistance: | 0.04 | Result: OK |

## One Way Shear, Flexual Capacity, and Punching Shear

| | | |
|---|---|---|
| Factored One Way Shear ($V_u$): | 85.5 | k |
| One Way Shear Capacity ($\phi V_c$): | 1020.0 | k - ACI11.3.1.1 |
| $V_u / \phi V_c$: | 0.08 | Result: OK |
| Load Direction Controling Shear Capacity: | Parallel to Pad Edge | |
| Lower Steel Pad Factored Moment ($M_u$): | 627.3 | k-ft |
| Lower Steel Pad Moment Capacity ($\phi M_n$): | 5316.0 | k-ft - ACI10.3 |
| $M_u / \phi M_n$: | 0.12 | Result: OK |
| Load Direction Controling Flexural Capacity: | Parallel to Pad Edge | |
| Upper Steel Pad Factored Moment ($M_u$): | 538.2 | k-ft |
| Upper Steel Pad Moment Capacity ($\phi M_n$): | 2915.4 | k-ft |
| $M_u / \phi M_n$: | 0.18 | Result: OK |
| Lower Pad Flexural Reinforcement Ratio: | 0.0035 | OK - Minimum Reinforcement Ratio Met - ACI10.5.1 |
| Upper Pad Flexural Reinforcement Ratio: | 0.0019 | OK - Minimum Reinforcement Ratio Met - ACI10.5.1 |
| Lower Pad Reinforcement Spacing: | 7 | in - Pad Reinforcing Spacing OK - ACI7.12.2.2 & 10.5.4 |
| Upper Pad Reinforcement Spacing: | 13 | in - Pad Reinforcing Spacing OK - ACI7.12.2.2 & 10.5.4 |
| Factored Punching Shear ($V_u$): | 15.3 | k |
| Nominal Punching Shear Capacity ($\phi_c V_n$): | 2212.6 | k - ACI11.12.2.1 |
| $V_u / \phi V_c$: | 0.01 | Result: OK |
| Factored Moment in Pier ($M_u$): | 1984.0 | k-ft |
| Pier Moment Capacity ($\phi M_n$): | 4492.1 | k-ft |
| $M_u / \phi M_n$: | 0.44 | Result: OK |
| Factored Shear in Pier ($V_u$): | 17.7 | k |
| Pier Shear Capacity ($\phi V_n$): | 527.3 | k |
| $V_u / \phi V_c$: | 0.03 | Result: OK |
| Pier Shear Reinforcement Ratio: | 0.0004 | No Ties Necessary for Shear - ACI11.5.6.1 |
| Factored Tension in Pier ($T_u$): | 0.0 | k |
| Pier Tension Capacity ($\phi T_n$): | 1450.4 | k |
| $T_u / \phi T_n$: | 0.00 | Result: OK |
| Factored Compression in Pier ($P_u$): | 32.6 | k |
| Pier Compression Capacity ($\phi P_n$): | 9750.4 | k - ACI10.3.6.2 |
| $P_u / \phi P_n$: | 0.00 | Result: OK |
| $M_u/\phi_B M_n + T_u/\phi_T T_n$: | 0.44 | Result: OK |

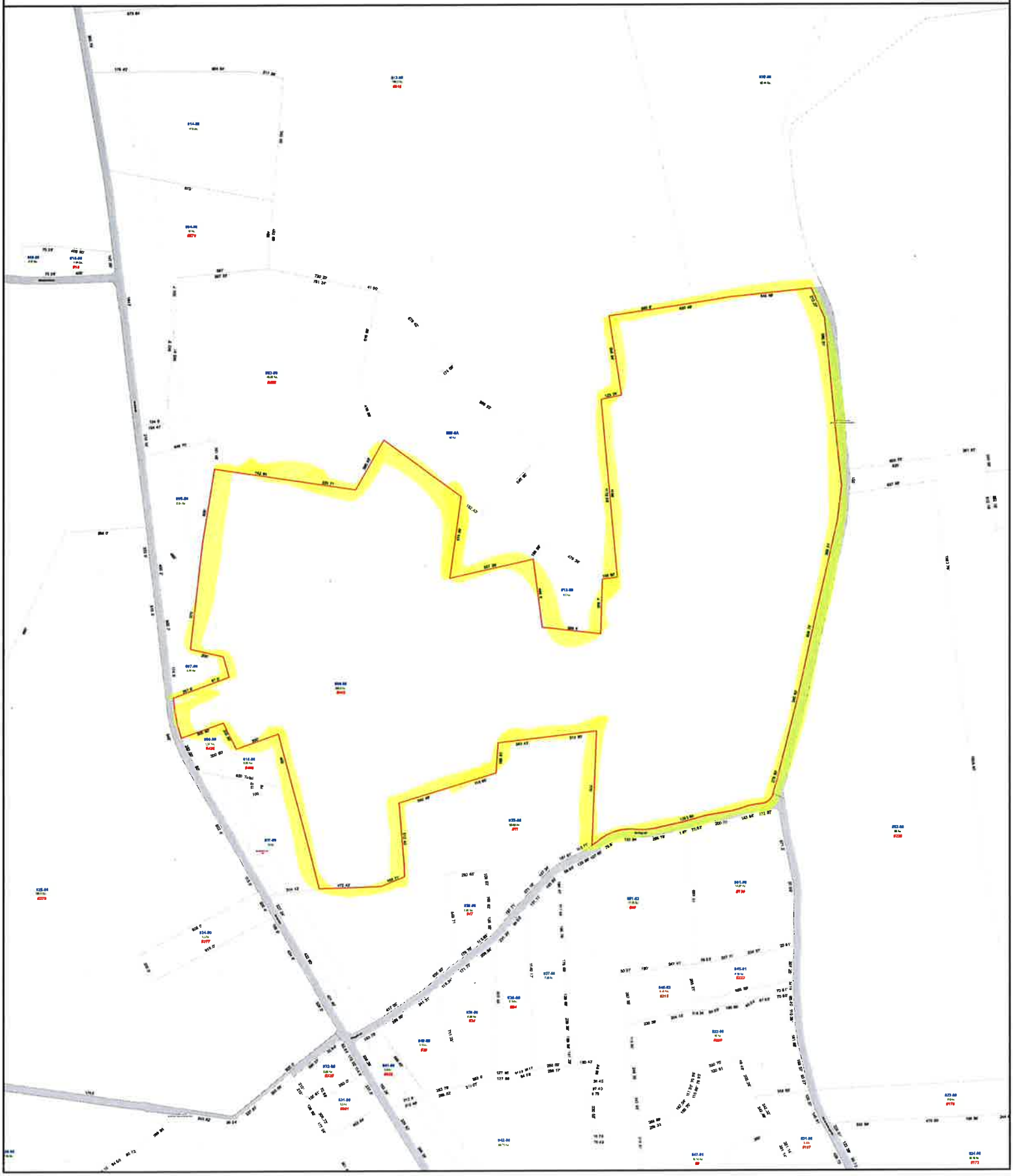
Nominal and Design Moment Capacity and Factored Design Loads



# ATTACHMENT 4

# Town of Goshen, Connecticut - Assessment Parcel Map

**Parcel:** 06-012-008-00 **Location:** 442 NORTH STREET



**Approximate Scale:** 1 inch = 850 feet

0 440 880 1,320 1,760 Feet

**Map Produced:** September 2017

# Town of Goshen, CT

## Property Listing Report

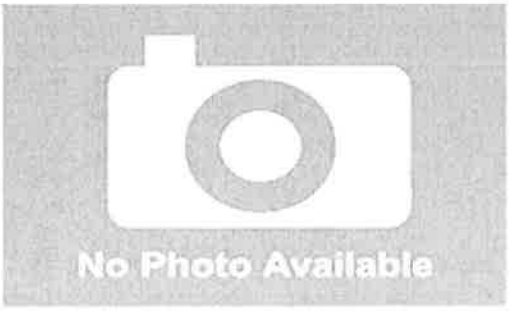
Map Block Lot: 06-012-008-00 | Account: 00084400

## Property Information

| | |
|---|---|
| Property Location | 442 NORTH STREET |
| Owner | ARCA LLC |
| Co-Owner | |
| Mailing Address | 25 LARCHMONT CIRCLE<br>STRATFORD CT 06614-1336 |
| Land Use | 435 Cell Site Vac Lnd |
| Land Class | I |
| Zoning Code | RA5 |
| Town Clerk Map # | TC#258 |
| Subdiv. Lot # | |

| | |
|---|---|
| Neighborhood | |
| Acreage | 233.2 |
| Utilities | |
| Lot Setting/Desc | |
| Survey Map | |
| Additional Info | |

### Photo




### Sketch

## Primary Construction Details

| | |
|---|---|
| Year Built | |
| Stories | |
| Building Style | |
| Building Use | |
| Building Condition | |
| Floors | |
| Total Rooms | |

| | |
|---|---|
| Bedrooms | |
| Full Bathrooms | |
| Half Bathrooms | |
| Bath Style | |
| Kitchen Style | |
| Roof Style | |
| Roof Cover | |

| | |
|---|---|
| Exterior Walls | |
| Interior Walls | |
| Heating Type | |
| Heating Fuel | |
| AC Type | |
| Gross Bldg Area | |
| Total Living Area | |

Report Created On 10/30/2017

# Town of Goshen, CT

Property Listing Report | Map Block Lot 06-012-008-00 | Account 00084400

## Valuation Summary (Assessed value = 70% of Appraised Value)

| Item | Appraised | Assessed |
|---|---|---|
| Buildings | | |
| Extras | 0 | |
| Outbuildings | 125000 | 87500 |
| Land | 1007010 | 172940 |
| Total | 1132010 | 260440 |

## Outbuilding and Extra Items

| Type | Description |
|---|---|
| Cell Tower | 1.00 Units |
| | |
| | |
| | |
| | |
| | |
| | |
| | |
| | |
| | |

## Sub Areas

| Subarea Type | Gross Area (sq ft) | Living Area (sq ft) |
|---|---|---|
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| Total Area | | 0 |

## Sales History

| Owner of Record | Book/ Page | Sale Date | Sale Price |
|---|---|---|---|
| ARCA LLC | 114/ 441 | 3/3/1997 | 310000 |
| KULESZA MARY | 110/ 88 | | 0 |

Report Created On 10/30/2017

# ATTACHMENT 5

UNITED STATES POSTAL SERVICE®

# Certificate of Mailing — Firm

| Name and Address of Sender | TOTAL NO. of Pieces Listed by Sender | TOTAL NO. of Pieces Received at Post Office™ | Affix Stamp Here<br>*Postmark with Date of Receipt.* |
|---|---|---|---|
| Kenneth C. Baldwin, Esq.<br>Robinson & Cole LLP<br>280 Trumbull Street<br>Hartford, CT 06103 | 3 | 3 | ANN STREET STATION 06103 NOV 01 2017 U.S.P.S.<br>neopost 11/01/2017 US POSTAGE $002.38<br>ZIP 06103 041L12203380 |
| | Postmaster, per *(name of receiving employee)* | | |

| USPS® Tracking Number / Firm-specific Identifier | Address (Name, Street, City, State, and ZIP Code™) | Postage | Fee | Special Handling | Parcel Airlift |
|---|---|---|---|---|---|
| 1. | Robert Valentine, First Selectman<br>Town of Goshen<br>42A North Street<br>Goshen, CT 06756 | | | | |
| 2. | Martin Connor, Land Use Official<br>Town of Goshen<br>42A North Street<br>Goshen, CT 06756 | | | | |
| 3. | Arca LLC<br>25 Larchmont Circle<br>Stratford, CT 06614-1336 | | | | |
| 4. | | | | | |
| 5. | | | | | |
| 6. | | | | | |