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August 17th, 2018

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

**RE: Notice of Exempt Modification – Antenna Swap for wireless facility located at 668 JONES HILL ROAD, WEST HAVEN, CONNECTICUT – CT52XC076 (lat. 41° 15' 23.044" N, long. - 72° 58' 20.491" W)**

Dear Ms. Bachman:

Sprint Spectrum, LP ("Sprint") currently maintains wireless telecommunications antennas at the (151-foot level) on an existing (150-foot Monopole Tower) at the above-referenced address. The property and the tower are owned by AMERICAN TOWER CORPORATION.

Sprint's proposed work involves antenna replacement and tower work. Sprint intends to replace three (3) antennas, add an additional three (3) antennas, and add nine (9) new RRHs onto the tower. All the proposed work is contained within the existing fenced area. Please refer to the attached drawings for site plans prepared by Infinigy Engineering.

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). In accordance with R.C.S.A. § 16-50j-73, a copy of this letter is being sent to NANCY ROSSI, MAYOR and FRED MESSORE, COMMISSIONER of the City of West Haven. A copy of this letter is also being sent to JUSTINE PAUL the manager for AMERICAN TOWER CORPORATION who manages the tower and owns the land.

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

1. The proposed modifications will not result in an increase in the height of the existing tower.
2. The antennas work is a one-for-one replacement of facility components.
3. The proposed modifications will include the addition of ground base equipment as depicted on the attached drawings; however, the proposed equipment will not require

32 Clinton Street, Saratoga Springs, NY 12866
Office 518-306-1733 – Fax 518-306-1711
www.airosmithdevelopment.com

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an extension of the site boundaries.

4. The proposed modifications will not increase noise levels at the facility by six decibels or more.

5. The additional ground based equipment will not increase radio frequency (RF) emissions at the facility to a level at or above the Federal Communications Commission (FCC) adopted safety standard.

For the foregoing reasons, Sprint 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).

If you have any questions or require any additional information regarding this request, please do not hesitate to give me a call at (518) 350-4222 or email me to aperkowski@airosmithdevelopment.com

Kind Regards,

Arthur Perkowski
Airosmith Development Inc.
32 Clinton Street
Saratoga Springs, NY 12866
518-306-1711 desk & fax
518-871-3707 cell
aperkowski@airosmithdevelopment.com

Attachment

CC: NANCY ROSSI (MAYOR, West Haven, CT)
Justine Paul (American Tower Corporation)
Fred Messore (COMMISSIONER, West Haven, CT)

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7018 0680 0002 1201 6057

City of West Haven, CT
Property Listing Report

| Parcel ID | 019-0001-0-000A-C | Account | 00019113 |
|---|---|---|---|

## Property Information

| | |
|---|---|
| Owner | AMERICAN TOWERS INC. |
| Co-Owner | ATTN TAX DEPT |
| Address | 668 JONES HILL RD |
| Mailing Address | PO BOX 723597<br>ATLANTA GA 31139 |
| Land Use | 431V TEL REL TW MDL-00 |
| Land Class | I |

| | |
|---|---|
| Vision ID | 102767 |
| Census Tract | |
| Neighborhood | |
| Zoning Code | |
| Acreage | 0 |
| Utilities | |

## Photo

## Sketch


## Primary Construction Details

| | | | | | |
|---|---|---|---|---|---|
| Actual Year Built | | Bedrooms | | Exterior Walls | |
| Effective Year Built | | Full Bathrooms | | Interior Walls | |
| Stories | | Half Bathrooms | | Heating Type | |
| Building Style | | Bath Style | | Heating Fuel | |
| Building Use | | Kitchen Style | | AC Type | |
| Building Condition | | Roof Style | | Gross Bldg Area | |
| Total Rooms | | Roof Cover | | Total Living Area | 0 |

Report Created On 8/17/2018

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

| Item | Appraised | Assessed |
|---|---|---|
| Buildings | 0 | 0 |
| Outbuildings | 431800 | 302260 |
| Improvements | 431800 | 302260 |
| Extras | 0 | 0 |
| Land | 0 | 0 |
| Total | 431800 | 302260 |

## Outbuilding and Extra Items

| Description | Units |
|---|---|
| FENCE-6' CHAIN | 200 L.F. |
| TOWER | 2 SITES |
| CELL SHED | 288 S.F. |
| | |
| | |
| | |
| | |
| | |
| | |
| | |

## Sub Areas

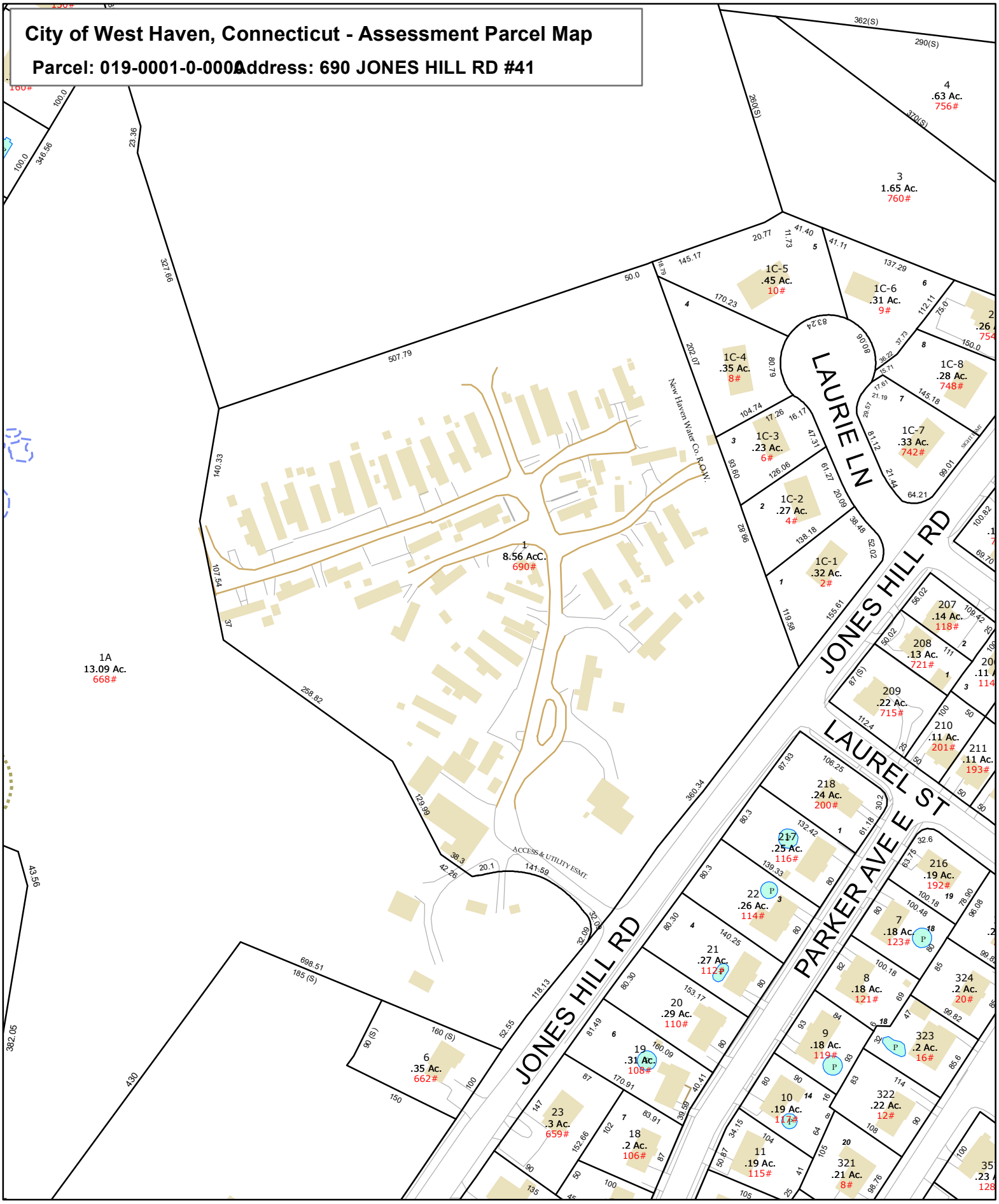
| Subarea Type | Gross Area (sq ft) | Living Area (sq ft) |
|---|---|---|
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| Total Area | | |

## Sales History

| Owner of Record | Book/ Page | Sale Date | Sale Price |
|---|---|---|---|
| AMERICAN TOWERS INC. | 000/ 000 | 10/1/2010 | 0 |

# City of West Haven, Connecticut - Assessment Parcel Map

**Parcel: 019-0001-0-000A Address: 690 JONES HILL RD #41**




N

**Approximate Scale: 1 inch = 150 feet**

0 45 90 180 270 360 Feet

**Map Produced: January 2015**

EBI Consulting
environmental | engineering | due diligence

# RADIO FREQUENCY EMISSIONS ANALYSIS REPORT
# EVALUATION OF HUMAN EXPOSURE POTENTIAL TO NON-IONIZING EMISSIONS

SPRINT Existing Facility

Site ID: CT52XC076

West Haven & RT 162 CT
668 Jones Hill Road
West Haven, CT 06516

**July 27, 2018**

**EBI Project Number: 6218005218**

| Site Compliance Summary | |
|---|---|
| Compliance Status: | COMPLIANT |
| Site total MPE% of FCC general population allowable limit: | 11.99 % |

21 B Street · Burlington, MA 01803 · Tel: (781) 273.2500 · Fax: (781) 273.3311

EBI Consulting
environmental | engineering | due diligence

July 27, 2018

SPRINT
Attn: RF Engineering Manager
1 International Boulevard, Suite 800
Mahwah, NJ 07495

Emissions Analysis for Site: **CT52XC076 – West Haven & RT 162 CT**

EBI Consulting was directed to analyze the proposed SPRINT facility located at **668 Jones Hill Road, West Haven, CT**, for the purpose of determining whether the emissions from the Proposed SPRINT Antenna Installation located on this property are within specified federal limits.

All information used in this report was analyzed as a percentage of current Maximum Permissible Exposure (% MPE) as listed in the FCC OET Bulletin 65 Edition 97-01and ANSI/IEEE Std C95.1. The FCC regulates Maximum Permissible Exposure in units of microwatts per square centimeter (μW/cm2). The number of $\mu W/cm^2$ calculated at each sample point is called the power density. The exposure limit for power density varies depending upon the frequencies being utilized. Wireless Carriers and Paging Services use different frequency bands each with different exposure limits, therefore it is necessary to report results and limits in terms of percent MPE rather than power density.

All results were compared to the FCC (Federal Communications Commission) radio frequency exposure rules, 47 CFR 1.1307(b)(1) – (b)(3), to determine compliance with the Maximum Permissible Exposure (MPE) limits for General Population/Uncontrolled environments as defined below.

General population/uncontrolled exposure limits apply to situations in which the general population may be exposed or in which persons who are exposed as a consequence of their employment may not be made fully aware of the potential for exposure or cannot exercise control over their exposure. Therefore, members of the general population would always be considered under this category when exposure is not employment related, for example, in the case of a telecommunications tower that exposes persons in a nearby residential area.

General population exposure to radio frequencies is regulated and enforced in units of microwatts per square centimeter ($\mu W/cm^2$). The general population exposure limits for the 850 MHz Band is approximately 567 $\mu W/cm^2$. The general population exposure limit for the 1900 MHz (PCS), 2500 MHz (BRS), 11 GHz microwave and 23 GHz microwave bands is 1000 $\mu W/cm^2$. Because each carrier will be using different frequency bands, and each frequency band has different exposure limits, it is necessary to report percent of MPE rather than power density.

Occupational/controlled exposure limits apply to situations in which persons are exposed as a consequence of their employment and in which those persons who are exposed have been made fully aware of the potential for exposure and can exercise control over their exposure. Occupational/controlled exposure limits also apply where exposure is of a transient nature as a result of incidental passage through a location where exposure levels may be above general population/uncontrolled limits (see below), as long as the exposed person has been made fully aware of the potential for exposure and can exercise control over his or her exposure by leaving the area or by some other appropriate means.

Additional details can be found in FCC OET 65.

## CALCULATIONS

Calculations were done for the proposed SPRINT Wireless antenna facility located at **668 Jones Hill Road, West Haven, CT**, using the equipment information listed below. All calculations were performed per the specifications under FCC OET 65. Since SPRINT is proposing highly focused directional panel antennas, which project most of the emitted energy out toward the horizon, all calculations were performed assuming a lobe representing the maximum gain of the antenna per the antenna manufactures supplied specifications, minus 10 dB for directional panel antennas and 20 dB for highly focused parabolic microwave dishes, was focused at the base of the tower. For this report the sample point is the top of a 6-foot person standing at the base of the tower.

For all calculations, all equipment was calculated using the following assumptions:

1) 1 CDMA channels (850 MHz) were considered for each sector of the proposed installation. These Channels have a transmit power of 20 Watts per Channel.

2) 2 LTE channels (850 MHz) were considered for each sector of the proposed installation. These Channels have a transmit power of 50 Watts per Channel.

3) 5 CDMA channels (1900 MHz (PCS)) were considered for each sector of the proposed installation. These Channels have a transmit power of 16 Watts per Channel.

4) 2 LTE channels (1900 MHz (PCS)) were considered for each sector of the proposed installation. These Channels have a transmit power of 40 Watts per Channel.

5) 8 LTE channels (2500 MHz (BRS)) were considered for each sector of the proposed installation. These Channels have a transmit power of 20 Watts per Channel.

6) 1 microwave (23 GHz) backhaul channel was considered for sector A. This channel has a transmit power of 1 Watt.

7) 2 microwave (11 GHz) backhaul channels were considered for sectors B & C. These channels have a transmit power of 1 Watt per channel.

8) All radios at the proposed installation were considered to be running at full power and were uncombined in their RF transmissions paths per carrier prescribed configuration. Per FCC OET Bulletin No. 65 - Edition 97-01 recommendations to achieve the maximum anticipated value at each sample point, all power levels emitting from the proposed antenna installation are increased by a factor of 2.56 to account for possible in-phase reflections from the surrounding environment. This is rarely the case, and if so, is never continuous.

9) For the following calculations, the sample point was the top of a 6-foot person standing at the base of the tower. The maximum gain of the antenna per the antenna manufactures supplied specifications, minus 10 dB for directional panel antennas and 20 dB for highly focused parabolic microwave dishes, was used in this direction. This value is a very conservative estimate as gain reductions for these particular antennas are typically much higher in this direction.

10) The antennas used in this modeling are the **Commscope NNVV-65B-R4 and the Nokia AAHC** for transmission in the 850 MHz, 1900 MHz (PCS) and 2500 MHz (BRS) frequency bands and the **Dragonwave A-ANT-23G-1-C** and **Dragonwave A-ANT-11G-2-C** for the 23 GHz and 11 GHz microwave links respectively. This is based on feedback from the carrier with regards to anticipated antenna selection. Maximum gain values for all antennas are listed in the Inventory and Power Data table below. The maximum gain of the antenna per the antenna manufactures supplied specifications, minus 10 dB for directional panel antennas and 20 dB for highly focused parabolic microwave dishes, was used for all calculations. This value is a very conservative estimate as gain reductions for these particular antennas are typically much higher in this direction.

11) The antenna mounting height centerlines of the proposed panel antennas are **154 feet** above ground level (AGL) for **Sectors A, B & C.** The antenna mounting height centerlines of the proposed microwave dishes are **151 feet** above ground level (AGL) for **Sectors A, B & C**

12) Emissions values for additional carriers were taken from the Connecticut Siting Council active database. Values in this database are provided by the individual carriers themselves.

All calculations were done with respect to uncontrolled / general population threshold limits.

## SPRINT Site Inventory and Power Data by Antenna

| Sector: | A | Sector: | B | Sector: | C |
|---|---|---|---|---|---|
| Antenna #: | **1** | Antenna #: | **1** | Antenna #: | **1** |
| Make / Model: | Commscope NNVV-65B-R4 | Make / Model: | Commscope NNVV-65B-R4 | Make / Model: | Commscope NNVV-65B-R4 |
| Gain: | 12.75 / 15.05 dBd | Gain: | 12.75 / 15.05 dBd | Gain: | 12.75 / 15.05 dBd |
| Height (AGL): | **154 feet** | Height (AGL): | **154 feet** | Height (AGL): | **154 feet** |
| Frequency Bands | 850 MHz / 1900 MHz (PCS) | Frequency Bands | 850 MHz / 1900 MHz (PCS) | Frequency Bands | 850 MHz / 1900 MHz (PCS) |
| Channel Count | 10 | Channel Count | 10 | Channel Count | 10 |
| Total TX Power(W): | 280 Watts | Total TX Power(W): | 280 Watts | Total TX Power(W): | 280 Watts |
| ERP (W): | 7,378.61 | ERP (W): | 7,378.61 | ERP (W): | 7,378.61 |
| Antenna A1 MPE% | **1.50 %** | Antenna B1 MPE% | **1.50 %** | Antenna C1 MPE% | **1.50 %** |
| Antenna #: | **2** | Antenna #: | **2** | Antenna #: | **2** |
| Make / Model: | Nokia AAHC | Make / Model: | Nokia AAHC | Make / Model: | Nokia AAHC |
| Gain: | 15.05 dBd | Gain: | 15.05 dBd | Gain: | 15.05 dBd |
| Height (AGL): | **154 feet** | Height (AGL): | **154 feet** | Height (AGL): | **154 feet** |
| Frequency Bands | 2500 MHz (BRS) | Frequency Bands | 2500 MHz (BRS) | Frequency Bands | 2500 MHz (BRS) |
| Channel Count | 8 | Channel Count | 8 | Channel Count | 8 |
| Total TX Power(W): | 160 Watts | Total TX Power(W): | 160 Watts | Total TX Power(W): | 160 Watts |
| ERP (W): | 5,118.23 | ERP (W): | 5,118.23 | ERP (W): | 5,118.23 |
| Antenna A2 MPE% | **0.84 %** | Antenna B2 MPE% | **0.84 %** | Antenna C2 MPE% | **0.84 %** |

## Microwave Backhaul Data

| Antenna Type: | Gain (dBd) | Height (feet AGL): | Frequency Bands | Channel Count | Total TX Power(W) | ERP (W) | MPE % | Sector |
|---|---|---|---|---|---|---|---|---|
| Dragonwave A-ANT-23G-1-C | 33.15 dBd | 151 | 23 GHz | 1 | 1 | 2,065.38 | **0.03** | A |
| Dragonwave A-ANT-11G-2-C | 32.35 dBd | 151 | 11 GHz | 1 | 1 | 1,717.91 | **0.02** | B |
| Dragonwave A-ANT-11G-2-C | 32.35 dBd | 151 | 11 GHz | 1 | 1 | 1,717.91 | **0.02** | C |

| Site Composite MPE% | |
|---|---|
| **Carrier** | **MPE%** |
| SPRINT –Sector A | **2.37 %** |
| T-Mobile | 1.53 % |
| Clearwire | 0.12 % |
| MetroPCS | 1.02 % |
| Computer Hospital | 0.23 % |
| Verizon Wireless | 2.42 % |
| AT&T | 4.30 % |
| **Site Total MPE %:** | **11.99 %** |

| | |
|---|---|
| SPRINT Sector A Total: | 2.37 % |
| SPRINT Sector B Total: | 2.36 % |
| SPRINT Sector C Total: | 2.36 % |
| | |
| Site Total: | 11.99 % |

# Sprint Maximum Power Values (Sector A)

| SPRINT _ Frequency Band / Technology (All Sectors) | # Channels | Watts ERP (Per Channel) | Height (feet) | Total Power Density ($\mu W/cm^2$) | Frequency (MHz) | Allowable MPE ($\mu W/cm^2$) | Calculated % MPE |
|---|---|---|---|---|---|---|---|
| Sprint 850 MHz CDMA | 1 | 376.73 | 154 | 0.62 | 850 MHz | 567 | 0.11% |
| Sprint 850 MHz LTE | 2 | 941.82 | 154 | 3.09 | 850 MHz | 567 | 0.55% |
| Sprint 1900 MHz (PCS) CDMA | 5 | 511.82 | 154 | 4.20 | 1900 MHz (PCS) | 1000 | 0.42% |
| Sprint 1900 MHz (PCS) LTE | 2 | 1,279.56 | 154 | 4.20 | 1900 MHz (PCS) | 1000 | 0.42% |
| Sprint 2500 MHz (BRS) LTE | 8 | 639.78 | 154 | 8.40 | 2500 MHz (BRS) | 1000 | 0.84% |
| Sprint 23 GHz Microwave | 1 | 2,065.38 | 154 | 0.34 | 23 GHz | 1000 | 0.03% |
| | | | | | | **Total:** | **2.37%** |

## Summary

All calculations performed for this analysis yielded results that were **within** the allowable limits for general population exposure to RF Emissions.

The anticipated maximum composite contributions from the SPRINT facility as well as the site composite emissions value with regards to compliance with FCC's allowable limits for general population exposure to RF Emissions are shown here:

| SPRINT Sector | Power Density Value (%) |
|---|---|
| Sector A: | 2.37 % |
| Sector B: | 2.36 % |
| Sector C: | 2.36 % |
| SPRINT Maximum MPE % (Sector A): | 2.37 % |
| | |
| Site Total: | 11.99 % |
| | |
| Site Compliance Status: | **COMPLIANT** |

The anticipated composite MPE value for this site assuming all carriers present is **11.99 %** of the allowable FCC established general population limit sampled at the ground level. This is based upon values listed in the Connecticut Siting Council database for existing carrier emissions.

FCC guidelines state that if a site is found to be out of compliance (over allowable thresholds), that carriers over a 5% contribution to the composite value will require measures to bring the site into compliance. For this facility, the composite values calculated were well within the allowable 100% threshold standard per the federal government.

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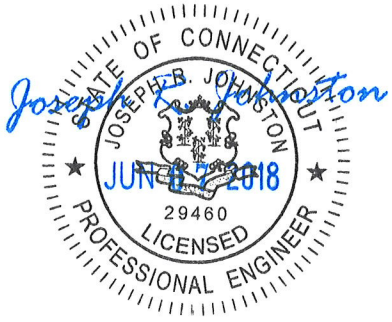
1033 WATERVLIET SHAKER RD, ALBANY, NY 12205

# Mount Analysis Report

**June 7, 2018**

| | |
|---|---|
| Site Name | CT52XC076 |
| Infinigy Job Number | 526-104 |
| Client | Airosmith |
| Proposed Carrier | Sprint |
| Site Location | 668 Jones Hill Road<br>West Haven, CT 06516<br>41.25640° N NAD83<br>72.97236° W NAD83 |
| Mount Centerline El. | 151 ft. |
| Mount Classification | T-Arm |
| Failing Structural Usage | **> 200%** |
| Passing Structural Usage | **68.4%** |
| Overall Result | **Contingent Pass- See Required Modification Below.** |
| Note | **Replace existing mounts with new SitePro1 RMV5-296 with addition 96" long 2.375" OD Sch 40 mount pipes 18" from left side of frame. See appended documents for details.** |

Upon reviewing the results of this analysis, it is our opinion that the structure meets the specified TIA code requirements. The mounts for the proposed carrier are therefore deemed adequate to support the final loading configuration as listed in this report.




Nathaniel R. Ober, E.I.T.
Northeast Structural Region Lead

## Contents

## Introduction

Infinigy Engineering has been requested to perform a mount analysis on the existing Sprint mounts. All supporting documents have been obtained from the client and are assumed to be accurate and applicable to this site. The mount was analyzed using RISA-3D Version 16.0.3 analysis software.

## Supporting Documentation

| | |
|---|---|
| **Colo App** | ATC Eng #OAA714853, dated April 18, 2018 |

## Analysis Code Requirements

| | |
|---|---|
| Wind Speed | 97 mph (3-Second Gust,Vasd) / 125 mph (3-Second Gust,Vult) |
| Wind Speed w/ ice | 50 mph (3-Second Gust,Vasd) w/ 3/4" Ice |
| TIA Revision | ANSI/TIA-222-G |
| Adopted IBC | 2012 IBC |
| Jurisdictional Code | 2016 Connecticut State Building Code |
| Structure Class | II |
| Exposure Category | C |
| Topographic Category | 1 |
| Calculated Crest Height | 0 ft. |

## Conclusion

Upon reviewing the results of this analysis, it is our opinion that the structure meets the specified TIA code requirements. The mounts for the proposed carrier are therefore deemed adequate to support the final loading configuration as listed in this report.

If you have any questions, require additional information, or actual conditions differ from those as detailed in this report please contact me via the information below:

Nathaniel R Ober E.I.T.
Northeast Structural Region Lead | Infinigy
1033 Watervliet Shaker Road, Albany, NY 12205
(O) (518) 690-0790 | (M) (303) 704-0322
nober@infinigy.com | www.infinigy.com

## Final Configuration Loading

| Mount CL (ft) | Rad. HT (ft) | Vert. O/S (ft) | Horiz. O/S (ft)* | Qty | Appurtenance | Carrier |
|---|---|---|---|---|---|---|
| 151.0 | 151.0 | 0.0 | 5.0 | 3 | Commscope NNVV-65B-R4 | Sprint |
| | | | 1.5,5.0 | 6 | Alcatel-Lucent RRH2x50-08 | |
| | | | 5.0 | 3 | Alcatel-Lucent 1900MHz 4x45 RRH | |
| | | | 1.5 | 3 | Nokia AAHC | |
| | | | 0.0 | 3 | DragonWave Horizon Compact | |
| | | | 0.0 | 1 | DragonWave A-ANT-23G-1-C | |
| | | | 0.0 | 2 | Dragon Wave A-ANT-11G-2-C | |

***Horizontal Offset is defined as the distance from the left most edge of the mount face horizontal when viewed facing the tower**

## Structure Usages

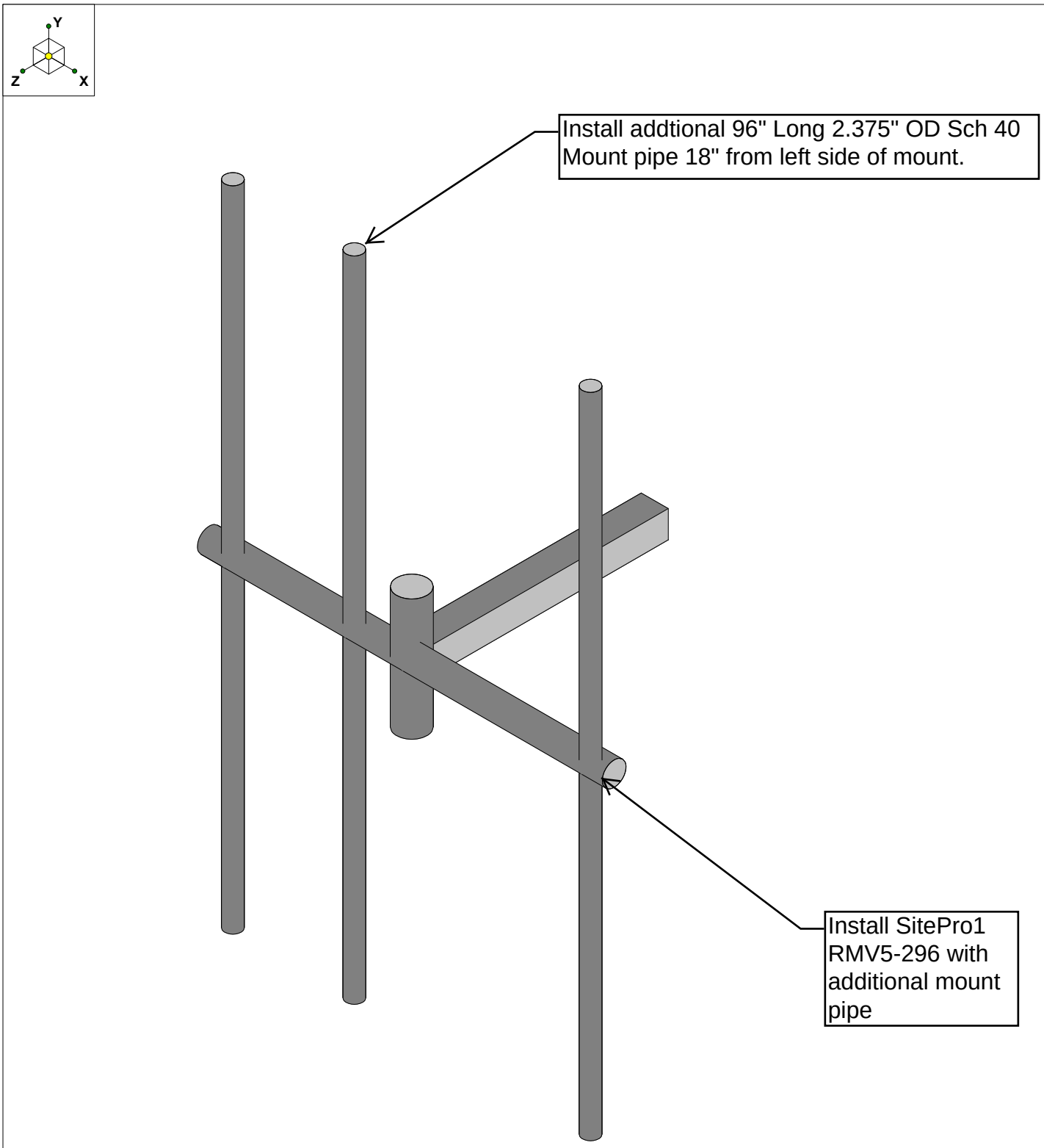
| | | |
|---|---|---|
| Stand off | 36.7 | Pass |
| Horizontal | 38.5 | Pass |
| Mount Pipe | 64.8 | Pass |
| **RATING =** | **64.8** | **Pass** |

## Assumptions and Limitations

Our structural calculations are completed assuming all information provided to Infinigy Engineering is accurate and applicable to this site. For the purposes of calculations, we assume an overall structure condition of "like new" and all members and connections to be free of corrosion and/or structural defects. The structure owner and/or contractor shall verify the structure's condition prior to installation of any proposed equipment. If actual conditions differ from those described in this report Infinigy Engineering should be notified immediately to complete a revised evaluation.

Our evaluation is completed using standard TIA, AISC, ACI, and ASCE methods and procedures. Our structural results are proprietary and should not be used by others as their own. Infinigy Engineering is not responsible for decisions made by others that are or are not based on our supplied assumptions and conclusions.

This report is an evaluation of the proposed carriers mount structure only and does not reflect adequacy of the existing tower, other mounts, or coax mounting attachments. These elements are assumed to be adequate for the purposes of this analysis and are assumed to have been installed per their manufacturer requirements.




Envelope Only Solution

| | | |
|---|---|---|
| Infinigy Engineering PLLC | RMV5-296 | |
| NRO | | June 7, 2018 at 11:19 AM |
| 526-104 | | RMV5-296.r3d |

| | |
|---|---|
| Site Name: | CT52XC076 |
| Client: | Airosmith |
| Carrier: | Sprint |
| Engineer: | NRO |
| Date: | 6/7/2018 |

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INFINIGY WIND LOAD CALCULATOR 3.0.2

Site Information Inputs:

| | |
|---|---|
| Adopted Building Code: | 2012 IBC |
| Structure Load Standard: | TIA-222-G |
| Antenna Load Standard: | TIA-222-G |
| Structure Risk Category: | II |
| Structure Type: | Mount - T-Arm |
| Number of Sectors: | 3 |
| Structure Shape 1: | Round |

Rooftop Inputs:

| | |
|---|---|
| Rooftop Wind Speed-Up?: | No |

Wind Loading Inputs:

| | | |
|---|---|---|
| Design Wind Velocity: | 97 | mph (nominal 3-second gust) |
| Wind Centerline 1 ($z_1$): | 151.0 | ft |
| Side Face Angle (θ): | 60 | degrees |
| Exposure Category: | C | |
| Topographic Category: | 1 | |

| Wind with No Ice | | |
|---|---|---|
| $q_z$ (psf) | Gh | $F_{ST}$ (psf) |
| 31.59 | 1.00 | **37.90** |

| Wind with Ice | | |
|---|---|---|
| $q_z$ (psf) | Gh | $F_{ST}$ (psf) |
| 8.39 | 1.00 | **21.11** |

Ice Loading Inputs:

| | | |
|---|---|---|
| Is Ice Loading Needed?: | Yes | |
| Ice Wind Velocity: | 50 | mph (nominal 3-second gust) |
| Base Ice Thickness: | 0.75 | in |

Input Appurtenance Information and Load Placements:

| Appurtenance Name | Elevation (ft) | Total Quantity | Ka | Front Shape | Side Shape | $q_z$ (psf) | EPA ($ft^2$) | Fz (lbs) | Fx (lbs) | Fz(60) (lbs) | Fx(30) (lbs) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Commscope NNVV-65B-R4 | 151.0 | 3 | 1.00 | Flat | Flat | 31.59 | 12.27 | 387.59 | 181.62 | 233.11 | 336.10 |
| Alcatel-Lucent RRH2x50-08 | 151.0 | 3 | 1.00 | Flat | Flat | 31.59 | 1.73 | 54.75 | 42.11 | 45.27 | 51.59 |
| Alcatel-Lucent RRH2x50-08 | 151.0 | 3 | 1.00 | Flat | Flat | 31.59 | 1.73 | 54.75 | 42.11 | 45.27 | 51.59 |
| Alcatel-Lucent 1900MHz 4x45 RRH | 151.0 | 3 | 1.00 | Flat | Flat | 31.59 | 2.50 | 78.96 | 78.96 | 78.96 | 78.96 |
| Nokia AAHC | 151.0 | 3 | 1.00 | Flat | Flat | 31.59 | 4.20 | 132.74 | 65.09 | 82.00 | 115.83 |
| DragonWave Horizon Compact | 151.0 | 3 | 1.00 | Flat | Flat | 31.59 | 0.72 | 22.77 | 11.63 | 14.41 | 19.98 |
| DragonWave A-ANT-23G-1-C | 151.0 | 1 | 1.00 | Flat | Round | 31.59 | 5.68 | 179.30 | 37.78 | 73.16 | 143.92 |
| Dragon Wave A-ANT-11G-2-C | 151.0 | 2 | 1.00 | Flat | Round | 31.59 | 5.68 | 179.30 | 37.78 | 73.16 | 143.92 |

## Member Primary Data

| | Label | I Joint | J Joint | K Joint | Rotate(deg) | Section/Shape | Type | Design List | Material | Design Rules |
|---|---|---|---|---|---|---|---|---|---|---|
| 1 | M1 | N2 | N1 | | | HSS 4"x4"x1/2" | Beam | None | A53 Gr.B | Typical |
| 2 | M2 | N4 | N3 | | | 3" STD Pipe | Beam | None | A53 Gr.B | Typical |
| 3 | M3 | N6 | N5 | | | 4" STD Pipe | Beam | None | A53 Gr.B | Typical |
| 4 | MP1 | N20 | N21 | | | 2" STD Pipe | Beam | None | A53 Gr.B | Typical |
| 5 | MP3 | N22 | N23 | | | 2" STD Pipe | Beam | None | A53 Gr.B | Typical |
| 6 | MP2 | N20A | N19 | | | 2" STD Pipe | Beam | None | A53 Gr.B | Typical |

## Material Takeoff

| | Material | Size | Pieces | Length[in] | Weight[K] |
|---|---|---|---|---|---|
| 1 | Hot Rolled Steel | | | | |
| 2 | A53 Gr.B | HSS4x4x8 | 1 | 36 | 0 |
| 3 | A53 Gr.B | PIPE_2.0 | 3 | 288 | 0 |
| 4 | A53 Gr.B | PIPE_3.0 | 1 | 60 | 0 |
| 5 | A53 Gr.B | PIPE_4.0 | 1 | 18 | 0 |
| 6 | Total HR Steel | | 6 | 402 | .2 |

## Basic Load Cases

| | BLC Description | Category | X Gravity | Y Gravity | Z Gravity | Joint | Point | Distribut.. | Area(M... | Surface... |
|---|---|---|---|---|---|---|---|---|---|---|
| 1 | Self Weight | DL | | -1 | | | 9 | | | |
| 2 | Wind Load AZI 000 | WLZ | | | | | 9 | | 1 | |
| 3 | Wind Load AZI 090 | WLX | | | | | 9 | | 1 | |
| 4 | Ice Weight | OL1 | | | | | 9 | 6 | | |
| 5 | Wind + Ice Load AZI 000 | OL2 | | | | | 9 | | 1 | |
| 6 | Wind + Ice Load AZI 090 | OL3 | | | | | 9 | | 1 | |
| 7 | Service Live 1 | LL | | | | 2 | | | | |
| 8 | BLC 2 Transient Area Loads | None | | | | | | 5 | | |
| 9 | BLC 3 Transient Area Loads | None | | | | | | 5 | | |
| 10 | BLC 5 Transient Area Loads | None | | | | | | 5 | | |
| 11 | BLC 6 Transient Area Loads | None | | | | | | 5 | | |

## Load Combinations

| | Description | So.. | P... | S... | BLC | Fac.. | BLC | Fac.. | BLC | Fac.. | BLC | Fac.. | BLC | Fac.. | BLC | Fac.. | BLC | Fac.. | BLC | Fac.. | BLC | Fac.. | BLC | Fac.. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 1.4D | Yes | Y | | DL | 1.4 | | | | | | | | | | | | | | | | | | |
| 2 | 1.2D + 1.6W AZI 000 | Yes | Y | | DL | 1.2 | W... | 1.6 | | | | | | | | | | | | | | | | |
| 3 | 1.2D + 1.6W AZI 030 | Yes | Y | | DL | 1.2 | W... | 1.3... | W... | .8 | | | | | | | | | | | | | | |
| 4 | 1.2D + 1.6W AZI 060 | Yes | Y | | DL | 1.2 | W... | .8 | W... | 1.3... | | | | | | | | | | | | | | |
| 5 | 1.2D + 1.6W AZI 090 | Yes | Y | | DL | 1.2 | | | W... | 1.6 | | | | | | | | | | | | | | |
| 6 | 1.2D + 1.6W AZI 120 | Yes | Y | | DL | 1.2 | W... | -.8 | W... | 1.3... | | | | | | | | | | | | | | |
| 7 | 1.2D + 1.6W AZI 150 | Yes | Y | | DL | 1.2 | W... | -1.3... | W... | .8 | | | | | | | | | | | | | | |
| 8 | 1.2D + 1.6W AZI 180 | Yes | Y | | DL | 1.2 | W... | -1.6 | | | | | | | | | | | | | | | | |
| 9 | 1.2D + 1.6W AZI 210 | Yes | Y | | DL | 1.2 | W... | -1.3... | W... | -.8 | | | | | | | | | | | | | | |
| 10 | 1.2D + 1.6W AZI 240 | Yes | Y | | DL | 1.2 | W... | -.8 | W... | -1.3... | | | | | | | | | | | | | | |
| 11 | 1.2D + 1.6W AZI 270 | Yes | Y | | DL | 1.2 | | | W... | -1.6 | | | | | | | | | | | | | | |
| 12 | 1.2D + 1.6W AZI 300 | Yes | Y | | DL | 1.2 | W... | .8 | W... | -1.3... | | | | | | | | | | | | | | |
| 13 | 1.2D + 1.6W AZI 330 | Yes | Y | | DL | 1.2 | W... | 1.3... | W... | -.8 | | | | | | | | | | | | | | |
| 14 | 0.9D + 1.6W AZI 000 | Yes | Y | | DL | .9 | W... | 1.6 | | | | | | | | | | | | | | | | |
| 15 | 0.9D + 1.6W AZI 030 | Yes | Y | | DL | .9 | W... | 1.3... | W... | .8 | | | | | | | | | | | | | | |
| 16 | 0.9D + 1.6W AZI 060 | Yes | Y | | DL | .9 | W... | .8 | W... | 1.3... | | | | | | | | | | | | | | |
| 17 | 0.9D + 1.6W AZI 090 | Yes | Y | | DL | .9 | | | W... | 1.6 | | | | | | | | | | | | | | |
| 18 | 0.9D + 1.6W AZI 120 | Yes | Y | | DL | .9 | W... | -.8 | W... | 1.3... | | | | | | | | | | | | | | |
| 19 | 0.9D + 1.6W AZI 150 | Yes | Y | | DL | .9 | W... | -1.3... | W... | .8 | | | | | | | | | | | | | | |

## Load Combinations (Continued)

| | Description | So.. | P... | S... | BLC | Fac.. | BLC | Fac.. | BLC | Fac.. | BLC | Fac.. | BLC | Fac.. | BLC | Fac.. | BLC | Fac.. | BLC | Fac.. | BLC | Fac.. | BLC | Fac.. | BLC | Fac... |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 20 | 0.9D + 1.6W AZI 180 | Yes | Y | | DL | .9 | W... | -1.6 | | | | | | | | | | | | | | | | | | |
| 21 | 0.9D + 1.6W AZI 210 | Yes | Y | | DL | .9 | W... | -1.3... | W... | -.8 | | | | | | | | | | | | | | | | |
| 22 | 0.9D + 1.6W AZI 240 | Yes | Y | | DL | .9 | W... | -.8 | W... | -1.3... | | | | | | | | | | | | | | | | |
| 23 | 0.9D + 1.6W AZI 270 | Yes | Y | | DL | .9 | | | W... | -1.6 | | | | | | | | | | | | | | | | |
| 24 | 0.9D + 1.6W AZI 300 | Yes | Y | | DL | .9 | W... | .8 | W... | -1.3... | | | | | | | | | | | | | | | | |
| 25 | 0.9D + 1.6W AZI 330 | Yes | Y | | DL | .9 | W... | 1.3... | W... | -.8 | | | | | | | | | | | | | | | | |
| 26 | 1.2D + 1.0Di | Yes | Y | | DL | 1.2 | OL1 | 1 | | | | | | | | | | | | | | | | | | |
| 27 | 1.2D + 1.0Di + 1.0Wi A... | Yes | Y | | DL | 1.2 | OL1 | 1 | OL2 | 1 | | | | | | | | | | | | | | | | |
| 28 | 1.2D + 1.0Di + 1.0Wi A... | Yes | Y | | DL | 1.2 | OL1 | 1 | OL2 | .866 | OL3 | .5 | | | | | | | | | | | | | | |
| 29 | 1.2D + 1.0Di + 1.0Wi A... | Yes | Y | | DL | 1.2 | OL1 | 1 | OL2 | .5 | OL3 | .866 | | | | | | | | | | | | | | |
| 30 | 1.2D + 1.0Di + 1.0Wi A... | Yes | Y | | DL | 1.2 | OL1 | 1 | | | OL3 | 1 | | | | | | | | | | | | | | |
| 31 | 1.2D + 1.0Di + 1.0Wi A... | Yes | Y | | DL | 1.2 | OL1 | 1 | OL2 | -.5 | OL3 | .866 | | | | | | | | | | | | | | |
| 32 | 1.2D + 1.0Di + 1.0Wi A... | Yes | Y | | DL | 1.2 | OL1 | 1 | OL2 | -.866 | OL3 | .5 | | | | | | | | | | | | | | |
| 33 | 1.2D + 1.0Di + 1.0Wi A... | Yes | Y | | DL | 1.2 | OL1 | 1 | OL2 | -1 | | | | | | | | | | | | | | | | |
| 34 | 1.2D + 1.0Di + 1.0Wi A... | Yes | Y | | DL | 1.2 | OL1 | 1 | OL2 | -.866 | OL3 | -.5 | | | | | | | | | | | | | | |
| 35 | 1.2D + 1.0Di + 1.0Wi A... | Yes | Y | | DL | 1.2 | OL1 | 1 | OL2 | -.5 | OL3 | -.866 | | | | | | | | | | | | | | |
| 36 | 1.2D + 1.0Di + 1.0Wi A... | Yes | Y | | DL | 1.2 | OL1 | 1 | | | OL3 | -1 | | | | | | | | | | | | | | |
| 37 | 1.2D + 1.0Di + 1.0Wi A... | Yes | Y | | DL | 1.2 | OL1 | 1 | OL2 | .5 | OL3 | -.866 | | | | | | | | | | | | | | |
| 38 | 1.2D + 1.0Di + 1.0Wi A... | Yes | Y | | DL | 1.2 | OL1 | 1 | OL2 | .866 | OL3 | -.5 | | | | | | | | | | | | | | |
| 39 | 1.2D + 1.5L + 1.0WL (... | Yes | Y | | DL | 1.2 | LL | 1.5 | W... | .111 | | | | | | | | | | | | | | | | |
| 40 | 1.2D + 1.5L + 1.0WL (... | Yes | Y | | DL | 1.2 | LL | 1.5 | W... | .096 | W... | .056 | | | | | | | | | | | | | | |
| 41 | 1.2D + 1.5L + 1.0WL (... | Yes | Y | | DL | 1.2 | LL | 1.5 | W... | .056 | W... | .096 | | | | | | | | | | | | | | |
| 42 | 1.2D + 1.5L + 1.0WL (... | Yes | Y | | DL | 1.2 | LL | 1.5 | | | W... | .111 | | | | | | | | | | | | | | |
| 43 | 1.2D + 1.5L + 1.0WL (... | Yes | Y | | DL | 1.2 | LL | 1.5 | W... | -.056 | W... | .096 | | | | | | | | | | | | | | |
| 44 | 1.2D + 1.5L + 1.0WL (... | Yes | Y | | DL | 1.2 | LL | 1.5 | W... | -.096 | W... | .056 | | | | | | | | | | | | | | |
| 45 | 1.2D + 1.5L + 1.0WL (... | Yes | Y | | DL | 1.2 | LL | 1.5 | W... | -.111 | | | | | | | | | | | | | | | | |
| 46 | 1.2D + 1.5L + 1.0WL (... | Yes | Y | | DL | 1.2 | LL | 1.5 | W... | -.096 | W... | -.056 | | | | | | | | | | | | | | |
| 47 | 1.2D + 1.5L + 1.0WL (... | Yes | Y | | DL | 1.2 | LL | 1.5 | W... | -.056 | W... | -.096 | | | | | | | | | | | | | | |
| 48 | 1.2D + 1.5L + 1.0WL (... | Yes | Y | | DL | 1.2 | LL | 1.5 | | | W... | -.111 | | | | | | | | | | | | | | |
| 49 | 1.2D + 1.5L + 1.0WL (... | Yes | Y | | DL | 1.2 | LL | 1.5 | W... | .056 | W... | -.096 | | | | | | | | | | | | | | |
| 50 | 1.2D + 1.5L + 1.0WL (... | Yes | Y | | DL | 1.2 | LL | 1.5 | W... | .096 | W... | -.056 | | | | | | | | | | | | | | |

## Envelope Joint Reactions

| | Joint | | X [lb] | LC | Y [lb] | LC | Z [lb] | LC | MX [lb-ft] | LC | MY [lb-ft] | LC | MZ [lb-ft] | LC |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | N1 | max | 1178.724 | 5 | 2170.263 | 37 | 2153.988 | 2 | -1568.487 | 14 | 3446.751 | 5 | 305.952 | 5 |
| 2 | | min | -1178.724 | 11 | 584.533 | 17 | -2153.988 | 8 | -6342.161 | 33 | -3443.696 | 11 | 92.775 | 23 |
| 3 | Totals: | max | 1178.724 | 5 | 2170.263 | 37 | 2153.988 | 2 | | | | | | |
| 4 | | min | -1178.724 | 11 | 584.533 | 17 | -2153.988 | 8 | | | | | | |

## Envelope AISC 14th(360-10): LRFD Steel Code Checks

| | Member | Shape | Code Check | Lo... | ... | Shear C... | Loc[in] | ... | LC | phi*Pnc... | phi*Pnt ... | phi*... | phi*... | ... | Eqn |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | MP1 | PIPE_2.0 | .684 | 48 | 8 | .050 | 48 | | 20 | 14916.... | 32130 | 1871... | 1871... | .... | H1-... |
| 2 | MP3 | PIPE_2.0 | .398 | 48 | 8 | .039 | 48 | | 20 | 14916.... | 32130 | 1871... | 1871... | .... | H1-... |
| 3 | M2 | PIPE_3.0 | .385 | 30 | 2 | .097 | 30 | | 8 | 57037.... | 65205 | 5748... | 5748... | .... | H1-... |
| 4 | M1 | HSS4x... | .367 | 36 | ... | .058 | 36 | y | 30 | 183372... | 189630 | 2021... | 2021... | .... | H1-... |
| 5 | MP2 | PIPE_2.0 | .284 | 48 | 8 | .027 | 48 | | 8 | 14916.... | 32130 | 1871... | 1871... | .... | H1-... |
| 6 | M3 | PIPE_4.0 | .001 | 9 | 9 | .001 | 9 | | 9 | 92571.... | 93240 | 1063... | 1063... | .... | H1-... |

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# Structural Analysis Report

| | | |
|---|---|---|
| **Structure** | : | **149 ft Monopole** |
| **ATC Site Name** | : | **West Haven & Rt 162 CT, CT** |
| **ATC Site Number** | : | **243036** |
| **Engineering Number** | : | **OAA714853_C3_06** |
| **Proposed Carrier** | : | **Clearwire** |
| **Carrier Site Name** | : | **West Haven & Rt 162 CT** |
| **Carrier Site Number** | : | **CT52XC076** |
| **Site Location** | : | **668 Jones Hill Road**<br>**West Haven, CT 06516-6311**<br>**41.256400,-72.972400** |
| **County** | : | **New Haven** |
| **Date** | : | **August 2, 2018** |
| **Max Usage** | : | **78%** |
| **Result** | : | **Pass** |

Prepared By:
Christiana Lancaster
Structural Engineer I

Reviewed By:

**COA: PEC.0001553**

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## Table of Contents

## 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 Clearwire.

## Supporting Documents

| | |
|---|---|
| **Tower Drawings** | Sabre Job #06-08204, dated August 19, 2005 |
| **Foundation Drawing** | Sabre Job #06-10095, dated October 12, 2005 |
| **Geotechnical Report** | EBI Project #61051509, dated July 12, 2005 |

## 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:** | 97 mph (3-Second Gust, $V_{asd}$)/ 125 mph (3-second Gust, $V_{ult}$) |
| **Basic Wind Speed w/ Ice:** | 50 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 = 0.19, $S_1$ = 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 | 151.0 | 3 | DragonWave Horizon Compact | - | (3) 1/2" Coax | Clearwire |
| | | 1 | DragonWave A-ANT-23G-1-C | | | |
| | | 2 | DragonWave A-ANT-11G-2-C | | | |
| 144.0 | 144.0 | 3 | Kathrein Smart Bias Tee | Low Profile Platform | (15) 1 5/8" Coax<br>(2) 1 1/4" Hybriflex | T-Mobile |
| | | 3 | Ericsson KRY 112 14 | | | |
| | | 3 | Ericsson KRY 112 489/1 | | | |
| | | 3 | Ericsson RRUS 11 B12 | | | |
| | | 3 | Commscope SBNHH-1D65A | | | |
| | | 3 | Ericsson AIR-32 B2A/B66Aa | | | |
| 136.0 | 137.0 | 3 | Alcatel-Lucent RRH2x40-AWS | Low Profile Platform | (12) 1 5/8" Coax<br>(1) 1 5/8" Fiber | Verizon |
| | | 3 | Antel BXA-171063-12BF-EDIN-X | | | |
| | | 3 | Antel BXA-185085/12CF ___ | | | |
| | | 3 | Andrew DB854DG65ESX | | | |
| | | 3 | Commscope LNX-6514DS-A1M | | | |
| | 136.0 | 6 | RFS FD9R6004/2C-3L | | | |
| | | 1 | RFS DB-T1-6Z-8AB-0Z | | | |
| 126.0 | 126.0 | 1 | Raycap DC6-48-60-0-8F | Platform w/ Handrails | (2) 0.78" 8 AWG 6<br>(1) 0.39" Fiber Trunk<br>(1) 3" Conduit | AT&T Mobility |
| | | 3 | Ericsson RRUS-11 800MHz | | | |
| | | 3 | Ericsson RRUS 32 | | | |
| | | 3 | CCI CCI-HPA-65R-BUU-H8 | | | |
| 115.0 | 115.0 | 3 | RFS APXV18-206517S-C | Flush | (6) 1 5/8" Coax | Metro PCS |
| 106.0 | 106.0 | 1 | Proxim 5054-R-LR | Side Arm | (1) 0.28" RG-6 | Other |
| | | 1 | 3' Dish w/ Radome | | | |

## Equipment to be Removed

| Elevation[1] (ft) | | Qty | Antenna | Mount Type | Lines | Carrier |
|---|---|---|---|---|---|---|
| Mount | RAD | | | | | |
| 149.0 | 151.0 | 3 | Argus LLPX310R | Side Arms | (6) 5/16" Coax | Clearwire |
| | | 3 | NextNet BTS-2500 | | | |

## Proposed Equipment

| Elevation[1] (ft) | | Qty | Antenna | Mount Type | Lines | Carrier |
|---|---|---|---|---|---|---|
| Mount | RAD | | | | | |
| 149.0 | 154.0 | 6 | Alcatel-Lucent RRH2x50-08 | T-Arms | (3) 1 1/4" Hybriflex<br>(1) 1.7" Hybrid | Clearwire |
| | | 3 | Alcatel-Lucent 1900MHz 4x45 RRH | | | |
| | | 3 | Nokia 2.5G MAA - AAHC(64T64R) | | | |
| | | 3 | Commscope NNVV-65B-R4 | | | |

**[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 | 47% | Pass |
| Shaft | 78% | Pass |
| Base Plate | 37% | Pass |

## Foundations

| Reaction Component | Original Design Reactions | Factored Design Reactions* | Analysis Reactions | % of Design |
|---|---|---|---|---|
| Moment (Kips-Ft) | 2,840.0 | 3,834.0 | 2,351.3 | 61% |
| Shear (Kips) | 26.3 | 35.5 | 21.0 | 59% |

*** The design reactions are factored by 1.35 per ANSI/TIA-222-G, Sec. 15.5.1**

The structure base reactions resulting from this analysis are acceptable when compared to those shown on the original structure drawings, 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 | DragonWave A-ANT-23G-1-C | Clearwire | 1.878 | 1.492 |
| | Alcatel-Lucent RRH2x50-08 | | | |
| | Alcatel-Lucent 1900 MHz 4x45 RRH | | | |
| | Nokia 2.5G MAA - AAHC(64T64R) | | | |
| | DragonWave A-ANT-11G-2-C | | | |
| | Commscope NNVV-65B-R4 | | | |
| 106.0 | 3' Dish w/ Radome | Other | 0.880 | 1.045 |

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

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## Standard Conditions

All engineering services performed by A.T. Engineering Service, PLLC are prepared on the basis that the information used is current and correct. This information may consist of, but is not limited to the following:

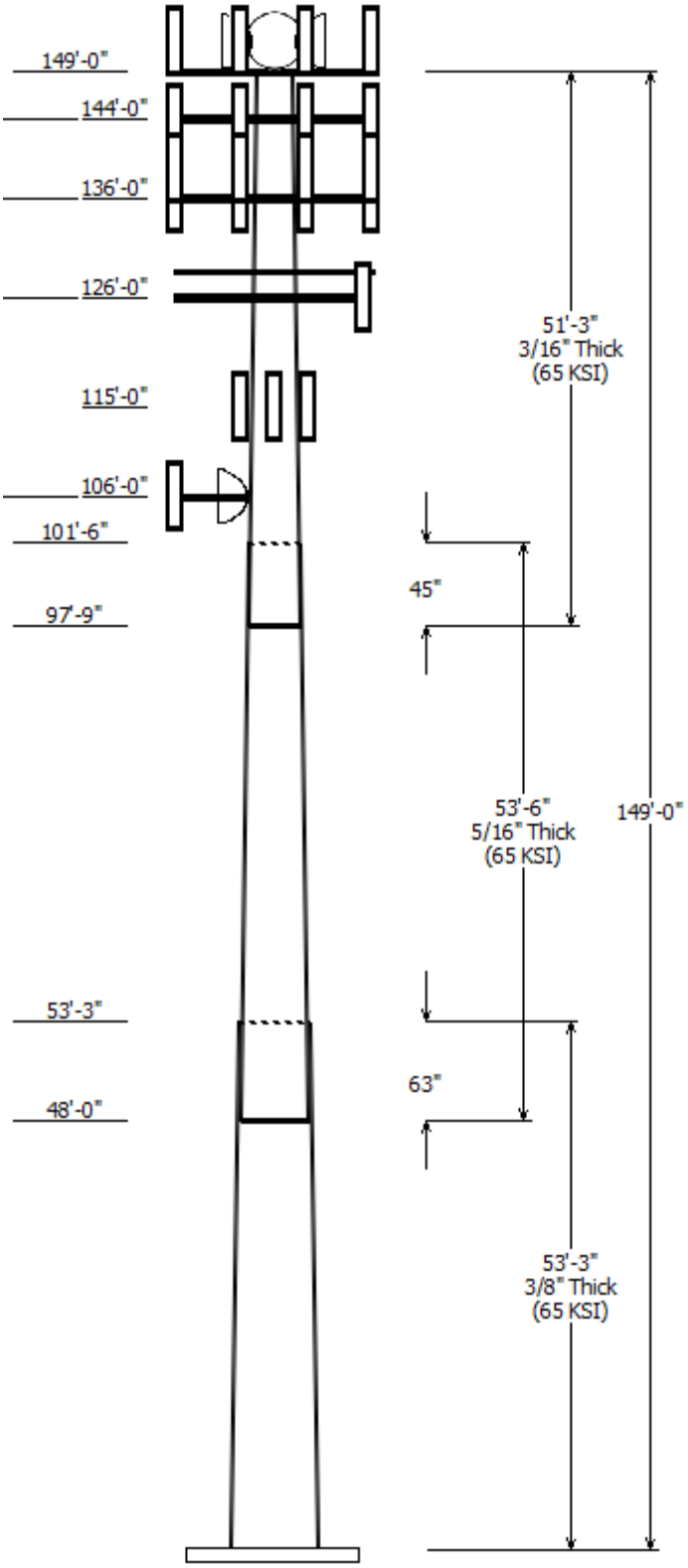
- Information supplied by the client regarding antenna, mounts and feed line loading
- Information from drawings, design and analysis documents, and field notes in the possession of A.T. Engineering Service, PLLC

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.

All assets of American Tower Corporation, its affiliates and subsidiaries (collectively "American Tower") are inspected at regular intervals. Based upon these inspections and in the absence of information to the contrary, American Tower assumes that all structures were constructed in accordance with the drawings and specifications.

Unless explicitly agreed by both the client and A.T. Engineering Service, PLLC, all services will be performed in accordance with the current revision of ANSI/TIA-222.

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 supplied herein.




## Job Information

| | | | |
|---|---|---|---|
| Pole : | 243036 | Code: | ANSI/TIA-222-G |
| Location : | WEST HAVEN & RT 162 CT, CT | | |
| Description : | Tower Model Verified: 12/13/2012 | | |
| Client : | CLEARWIRE CORPORATION | Struct Class : | II |
| Shape : | 18 Sides | Exposure : | B |
| Height : | 149.00 (ft) | Topo : | 1 |
| Base Elev (ft): | 0.00 | | |
| Taper: | 0.234964 (in/ft) | | |

## Sections Properties

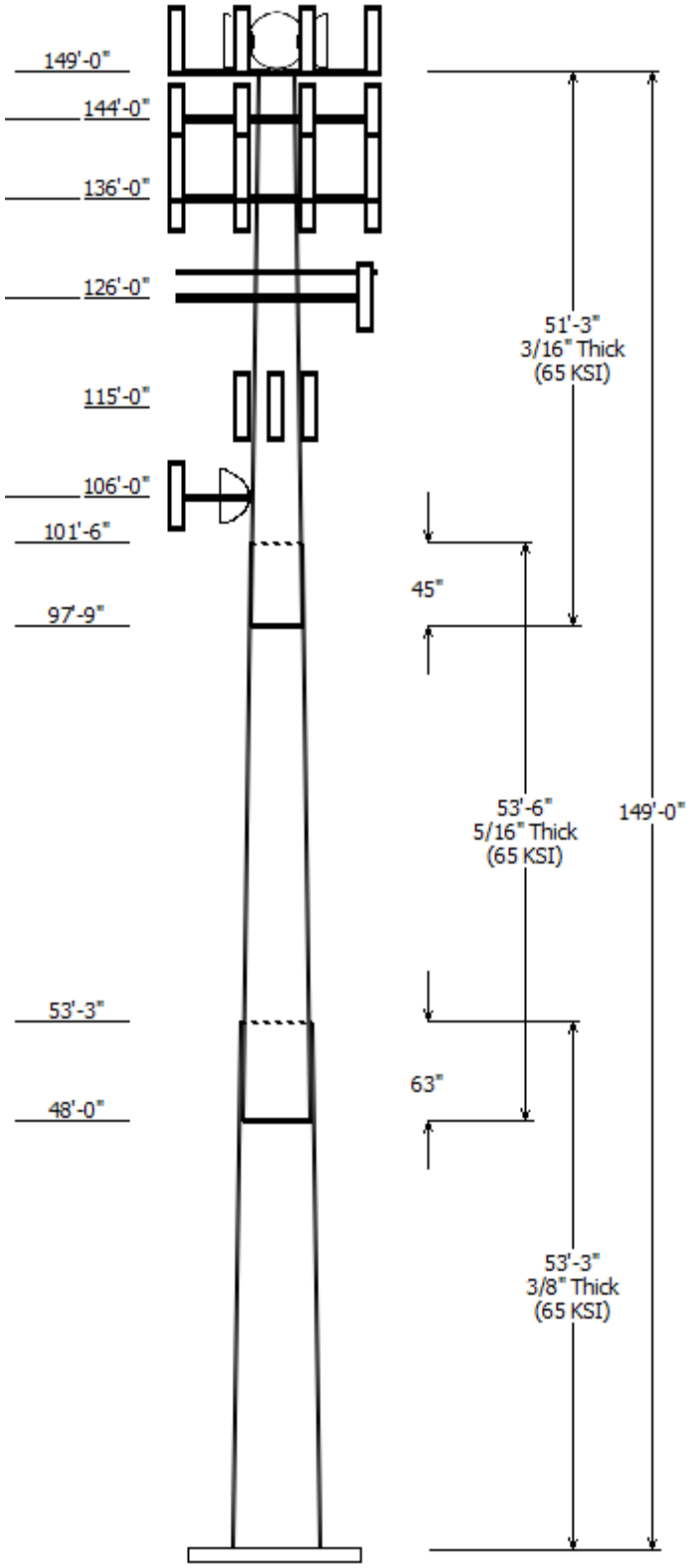
| Shaft Section | Length (ft) | Diameter (in) Accross Flats Top | Bottom | Thick (in) | Joint Type | Overlap Length (in) | Shape | Steel Grade (ksi) |
|---|---|---|---|---|---|---|---|---|
| 1 | 53.250 | 39.49 | 52.01 | 0.375 | | 0.000 | 18 Sides | 65 |
| 2 | 53.500 | 28.78 | 41.35 | 0.313 | Slip Joint | 63.000 | 18 Sides | 65 |
| 3 | 51.250 | 18.00 | 30.04 | 0.188 | Slip Joint | 45.000 | 18 Sides | 65 |

## Discrete Appurtenance

| Attach Elev (ft) | Force Elev (ft) | Qty | Description |
|---|---|---|---|
| 149.000 | 149.000 | 3 | Flat T-Arm |
| 149.000 | 154.000 | 3 | Nokia 2.5G MAA - |
| 149.000 | 154.000 | 3 | Alcatel-Lucent 1900 MHz 4x45 |
| 149.000 | 154.000 | 6 | Alcatel-Lucent RRH2x50-08 |
| 149.000 | 154.000 | 3 | Commscope NNVV-65B-R4 |
| 149.000 | 151.000 | 1 | DragonWave A-ANT-23G-1-C |
| 149.000 | 151.000 | 3 | DragonWave Horizon Compact |
| 149.000 | 151.000 | 2 | DragonWave A-ANT-11G-2-C |
| 144.000 | 144.000 | 1 | Flat Low Profile Platform |
| 144.000 | 144.000 | 3 | Ericsson AIR-32 B2A/B66Aa |
| 144.000 | 144.000 | 3 | Commscope SBNHH-1D65A |
| 144.000 | 144.000 | 3 | Ericsson RRUS 11 B12 |
| 144.000 | 144.000 | 3 | Ericsson KRY 112 489/1 |
| 144.000 | 144.000 | 3 | Ericsson KRY 112 14 |
| 144.000 | 144.000 | 3 | Kathrein Smart Bias Tee |
| 136.000 | 136.000 | 1 | Round Low Profile Platform |
| 136.000 | 137.000 | 3 | Commscope LNX-6514DS-A1M |
| 136.000 | 137.000 | 3 | Andrew DB854DG65ESX |
| 136.000 | 136.000 | 1 | RFS DB-T1-6Z-8AB-0Z |
| 136.000 | 137.000 | 3 | Antel BXA-185085/12CF ___ |
| 136.000 | 137.000 | 3 | Amphenol Antel BXA-171063- |
| 136.000 | 137.000 | 3 | Alcatel-Lucent RRH2x40-AWS |
| 136.000 | 136.000 | 6 | RFS FD9R6004/2C-3L |
| 126.000 | 126.000 | 1 | Round Platform w/ Handrails |
| 126.000 | 126.000 | 3 | CCI CCI-HPA-65R-BUU-H8 |
| 126.000 | 126.000 | 3 | Ericsson RRUS 32 |
| 126.000 | 126.000 | 3 | Ericsson RRUS-11 800 MHz |
| 126.000 | 126.000 | 1 | Raycap DC6-48-60-0-8F |
| 115.000 | 115.000 | 3 | RFS APXV18-206517S-C |
| 106.000 | 106.000 | 1 | Flat Side Arm |
| 106.000 | 106.000 | 1 | Proxim 5054-R-LR |
| 106.000 | 106.000 | 1 | 3' Dish w/ Radome |

## Linear Appurtenance

| Elev (ft) From | To | Description | Exposed To Wind |
|---|---|---|---|
| 4.000 | 106.0 | 0.28" RG-6 | No |
| 4.000 | 115.0 | 1 5/8" Coax | No |
| 4.000 | 126.0 | 0.39" Fiber Trunk | No |
| 4.000 | 126.0 | 0.78" 8 AWG 6 | No |
| 4.000 | 126.0 | 3" Conduit | No |
| 4.000 | 136.0 | 1 5/8" (1.63"- | No |




| | | | |
|---|---|---|---|
| 4.000 | 136.0 | 1 5/8" Coax | No |
| 4.000 | 144.0 | 1 1/4" Hybriflex | Yes |
| 4.000 | 144.0 | 1 5/8" Coax | No |
| 4.000 | 149.0 | 1 1/4" Hybriflex | No |
| 4.000 | 149.0 | 1.7" (43.2mm) | No |
| 4.000 | 149.0 | 1/2" Coax | No |

## Load Cases

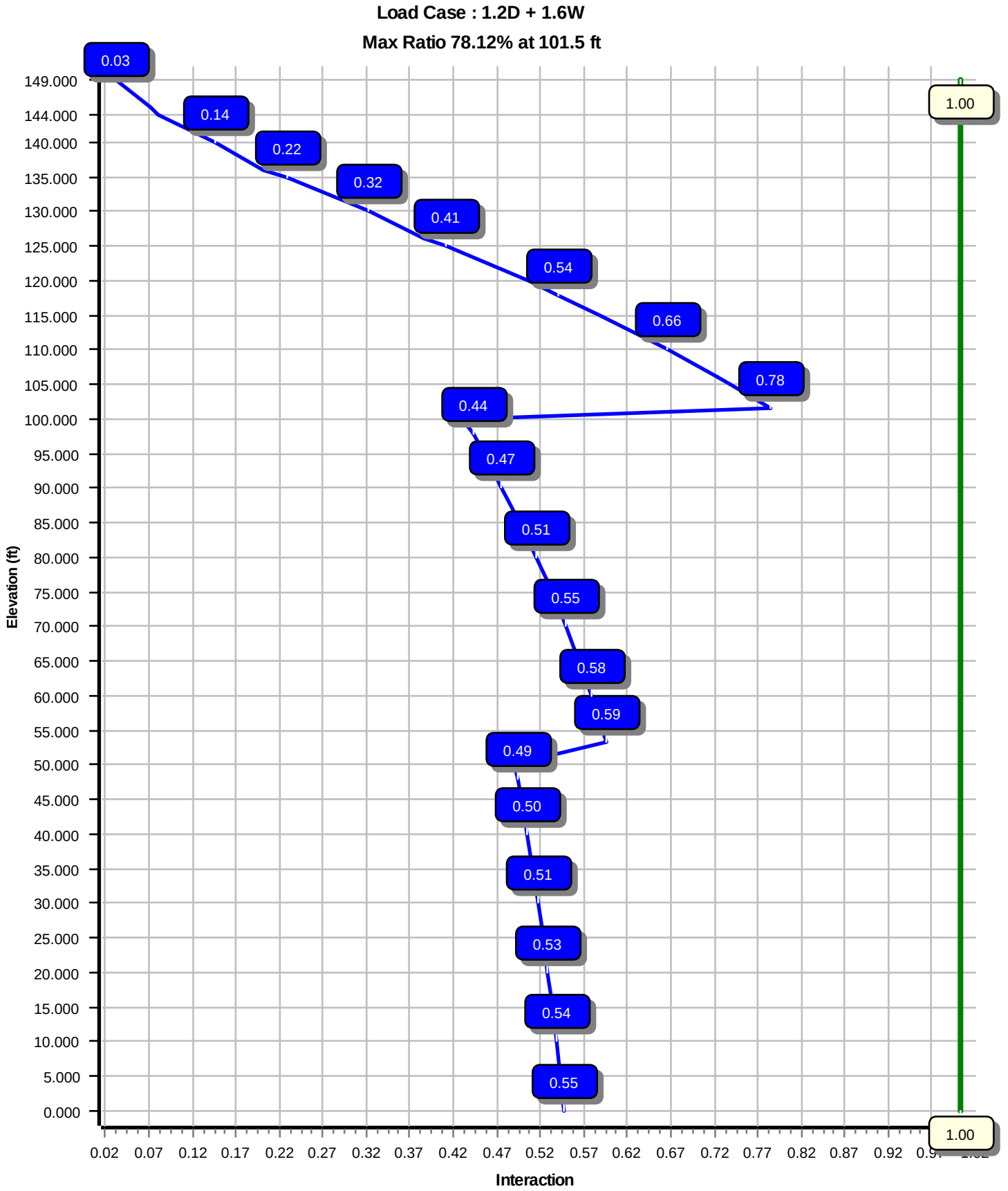
| | |
|---|---|
| 1.2D + 1.6W | 97 mph with No Ice |
| 0.9D + 1.6W | 97 mph with No Ice (Reduced DL) |
| 1.2D + 1.0Di + 1.0Wi | 50 mph with 0.75 in Radial Ice |
| (1.2 + 0.2Sds) * DL + E | Seismic Equivalent Lateral Forces Method |
| (1.2 + 0.2Sds) * DL + E | Seismic Equivalent Modal Analysis Method |
| (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 | 2351.27 | 21.03 | 40.05 |
| 0.9D + 1.6W | 2319.59 | 21.01 | 30.03 |
| 1.2D + 1.0Di + 1.0Wi | 665.25 | 5.99 | 61.16 |
| (1.2 + 0.2Sds) * DL + E ELFM | 166.21 | 1.31 | 40.08 |
| (1.2 + 0.2Sds) * DL + E EMAM | 299.57 | 2.43 | 40.08 |
| (0.9 - 0.2Sds) * DL + E ELFM | 163.44 | 1.30 | 27.79 |
| (0.9 - 0.2Sds) * DL + E EMAM | 294.20 | 2.43 | 27.79 |
| 1.0D + 1.0W | 557.87 | 5.02 | 33.40 |

## Dish Deflections

| Load Case | Attach Elev (ft) | Deflection (in) | Rotation (deg) |
|---|---|---|---|
| 1.0D + 1.0W | 106.00 | 10.556 | 1.045 |
| 1.0D + 1.0W | 149.00 | 22.540 | 1.492 |
| 1.0D + 1.0W | 149.00 | 22.540 | 1.492 |


Load Case : 1.2D + 1.6W
Max Ratio 78.12% at 101.5 ft
0.03
0.14
0.22
0.32
0.41
0.54
0.66
0.78
0.44
0.47
0.51
0.55
0.58
0.59
0.49
0.50
0.51
0.53
0.54
0.55
1.00
1.00
149.000
144.000
140.000
135.000
130.000
125.000
120.000
115.000
110.000
105.000
100.000
95.000
90.000
85.000
80.000
75.000
70.000
65.000
60.000
55.000
50.000
45.000
40.000
35.000
30.000
25.000
20.000
15.000
10.000
5.000
0.000
Elevation (ft)
0.02 0.07 0.12 0.17 0.22 0.27 0.32 0.37 0.42 0.47 0.52 0.57 0.62 0.67 0.72 0.77 0.82 0.87 0.92
Interaction

Site Number: 243036 Code: ANSI/TIA-222-G 

Site Name: WEST HAVEN & RT 162 CT, CT Engineering Number:OAA714853_C3_06 8/2/2018 9:22:01 AM

Customer: CLEARWIRE

## Analysis Parameters

| | | | |
|---|---|---|---|
| Location : | NEW HAVEN County, CT | Height (ft) : | 149 |
| Code : | ANSI/TIA-222-G | Base Diameter (in) : | 52.01 |
| Shape : | 18 Sides | Top Diameter (in) : | 18.00 |
| Pole Type : | Taper | Taper (in/ft) : | 0.235 |
| Pole Manfacturer : | Sabre | Rotation (deg) : | 0.00 |

## Ice & Wind Parameters

| | | | |
|---|---|---|---|
| Structure Class: | II | Design Wind Speed Without Ice: | 97 mph |
| Exposure Category: | B | Design Wind Speed With Ice: | 50 mph |
| Topographic Category: | 1 | Operational Wind Speed: | 60 mph |
| Crest Height: | 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): | 2.54 | | | | |
| $T_L$ (sec): | 6 | p: | 1.3 | $C_s$: | 0.030 |
| $S_s$: | 0.188 | $S_1$: | 0.062 | $C_s$ Max: | 0.030 |
| $F_a$: | 1.600 | $F_v$: | 2.400 | $C_s$ Min: | 0.030 |
| $S_{ds}$: | 0.201 | $S_{d1}$: | 0.099 | | |

## Load Cases

| | |
|---|---|
| 1.2D + 1.6W | 97 mph with No Ice |
| 0.9D + 1.6W | 97 mph with No Ice (Reduced DL) |
| 1.2D + 1.0Di + 1.0Wi | 50 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) | 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 | 53.250 | 0.3750 | 65 | | 0.00 | 9,787 | 52.01 | 0.00 | 61.46 | 20701.4 | 22.69 | 138.69 | 39.49 | 53.25 | 46.56 | 9004.7 | 16.81 | 105.33 | 0.234964 |
| 2-18 | 53.500 | 0.3125 | 65 | Slip | 63.00 | 6,276 | 41.35 | 48.00 | 40.71 | 8664.4 | 21.57 | 132.34 | 28.78 | 101.50 | 28.24 | 2892.7 | 14.48 | 92.11 | 0.234964 |
| 3-18 | 51.250 | 0.1875 | 65 | Slip | 45.00 | 2,473 | 30.04 | 97.75 | 17.77 | 2000.7 | 26.49 | 160.22 | 18.00 | 149.00 | 10.60 | 424.9 | 15.16 | 96.00 | 0.234964 |
| | | | | Shaft Weight | | 18,536 | | | | | | | | | | | | | |

## Discrete Appurtenance Properties

| Attach Elev (ft) | Description | Qty | Distance From Face (ft) | Vert Ecc (ft) | Weight (lb) | No Ice EPAa (sf) | Orientation Factor |
|---|---|---|---|---|---|---|---|
| 149.00 | Alcatel-Lucent 1900 MHz 4x45 R | 3 | 0.000 | 5.000 | 60.00 | 2.320 | 0.50 |
| 149.00 | Alcatel-Lucent RRH2x50-08 | 6 | 0.000 | 5.000 | 52.90 | 1.700 | 0.50 |
| 149.00 | Commscope NNVV-65B-R4 | 3 | 0.000 | 5.000 | 77.40 | 12.270 | 0.64 |
| 149.00 | DragonWave A-ANT-11G-2-C | 2 | 0.000 | 2.000 | 27.00 | 4.690 | 1.00 |
| 149.00 | DragonWave A-ANT-23G-1-C | 1 | 0.000 | 2.000 | 15.00 | 1.610 | 1.00 |
| 149.00 | DragonWave Horizon Compact | 3 | 0.000 | 2.000 | 10.60 | 0.430 | 0.50 |
| 149.00 | Flat T-Arm | 3 | 0.000 | 0.000 | 250.00 | 12.900 | 0.67 |
| 149.00 | Nokia 2.5G MAA - AAHC(64T64R) | 3 | 0.000 | 5.000 | 103.60 | 4.200 | 0.64 |
| 144.00 | Commscope SBNHH-1D65A | 3 | 0.000 | 0.000 | 33.50 | 5.880 | 0.69 |
| 144.00 | Ericsson AIR-32 B2A/B66Aa | 3 | 0.000 | 0.000 | 132.20 | 6.510 | 0.71 |
| 144.00 | Ericsson KRY 112 14 | 3 | 0.000 | 0.000 | 12.10 | 0.580 | 0.50 |
| 144.00 | Ericsson KRY 112 489/1 | 3 | 0.000 | 0.000 | 15.40 | 0.650 | 0.50 |
| 144.00 | Ericsson RRUS 11 B12 | 3 | 0.000 | 0.000 | 50.70 | 2.790 | 0.67 |
| 144.00 | Flat Low Profile Platform | 1 | 0.000 | 0.000 | 1500.00 | 26.100 | 1.00 |
| 144.00 | Kathrein Smart Bias Tee | 3 | 0.000 | 0.000 | 3.31 | 0.090 | 0.50 |
| 136.00 | Alcatel-Lucent RRH2x40-AWS | 3 | 0.000 | 1.000 | 44.00 | 2.160 | 0.50 |
| 136.00 | Amphenol Antel BXA-171063- | 3 | 0.000 | 1.000 | 15.00 | 4.730 | 0.72 |
| 136.00 | Andrew DB854DG65ESX | 3 | 0.000 | 1.000 | 18.50 | 5.250 | 0.65 |
| 136.00 | Antel BXA-185085/12CF ___ | 3 | 0.000 | 1.000 | 13.00 | 4.790 | 0.72 |
| 136.00 | Commscope LNX-6514DS-A1M | 3 | 0.000 | 1.000 | 38.80 | 8.170 | 0.69 |
| 136.00 | RFS DB-T1-6Z-8AB-0Z | 1 | 0.000 | 0.000 | 44.00 | 4.800 | 0.50 |
| 136.00 | RFS FD9R6004/2C-3L | 6 | 0.000 | 0.000 | 2.60 | 0.370 | 0.50 |
| 136.00 | Round Low Profile Platform | 1 | 0.000 | 0.000 | 1500.00 | 21.700 | 1.00 |
| 126.00 | CCI CCI-HPA-65R-BUU-H8 | 3 | 0.000 | 0.000 | 68.00 | 12.980 | 0.67 |
| 126.00 | Ericsson RRUS 32 | 3 | 0.000 | 0.000 | 50.80 | 2.690 | 0.50 |
| 126.00 | Ericsson RRUS-11 800 MHz | 3 | 0.000 | 0.000 | 54.00 | 2.520 | 0.50 |
| 126.00 | Raycap DC6-48-60-0-8F | 1 | 0.000 | 0.000 | 32.80 | 1.280 | 1.00 |
| 126.00 | Round Platform w/ Handrails | 1 | 0.000 | 0.000 | 2000.00 | 27.200 | 1.00 |
| 115.00 | RFS APXV18-206517S-C | 3 | 0.000 | 0.000 | 26.40 | 5.160 | 0.68 |
| 106.00 | 3' Dish w/ Radome | 1 | 0.000 | 0.000 | 100.00 | 6.100 | 1.00 |
| 106.00 | Flat Side Arm | 1 | 0.000 | 0.000 | 150.00 | 6.300 | 1.00 |
| 106.00 | Proxim 5054-R-LR | 1 | 0.000 | 0.000 | 6.00 | 1.320 | 1.00 |
| Totals | Num Loadings:32 | 83 | | | 8966.73 | | |

## 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 |
|---|---|---|---|---|---|---|---|---|---|
| 4.00 | 149.00 | 3 | 1 1/4" Hybriflex Cable | 1.54 | 1.00 | N | 0.00 | N | Clearwire |
| 4.00 | 149.00 | 1 | 1.7" (43.2mm) Hybrid | 1.70 | 1.78 | N | 0.00 | N | Clearwire |
| 4.00 | 149.00 | 3 | 1/2" Coax | 0.63 | 0.15 | N | 0.00 | N | Clearwire |
| 4.00 | 144.00 | 2 | 1 1/4" Hybriflex Cable | 1.54 | 1.00 | N | 1.54 | Y | T-Mobile |
| 4.00 | 144.00 | 15 | 1 5/8" Coax | 1.98 | 0.82 | N | 0.00 | N | T-Mobile |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| 4.00 | 136.00 | 1 | 1 5/8" (1.63"-41.3mm) | 1.63 | 1.61 | N | 0.00 | N | Verizon |
| 4.00 | 136.00 | 12 | 1 5/8" Coax | 1.98 | 0.82 | N | 0.00 | N | Verizon |
| 4.00 | 126.00 | 1 | 0.39" Fiber Trunk | 0.39 | 0.06 | N | 0.00 | N | AT&T Mobility |
| 4.00 | 126.00 | 2 | 0.78" 8 AWG 6 | 0.78 | 0.59 | N | 0.00 | N | AT&T Mobility |
| 4.00 | 126.00 | 1 | 3" Conduit | 3.50 | 7.58 | N | 0.00 | N | AT&T Mobility |
| 4.00 | 115.00 | 6 | 1 5/8" Coax | 1.98 | 0.82 | N | 0.00 | N | Metro PCS |
| 4.00 | 106.00 | 1 | 0.28" RG-6 | 0.28 | 0.03 | N | 0.00 | N | - |

## 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 | 52.010 | 61.456 | 20,701.4 | 22.69 | 138.69 | 74.7 | 784.0 | 0.0 | 0.0 |
| 5.00 | | 0.3750 | 50.835 | 60.058 | 19,320.3 | 22.14 | 135.56 | 75.4 | 748.6 | 0.0 | 1,033.7 |
| 10.00 | | 0.3750 | 49.660 | 58.659 | 18,002.0 | 21.59 | 132.43 | 76.0 | 714.0 | 0.0 | 1,009.9 |
| 15.00 | | 0.3750 | 48.485 | 57.261 | 16,745.1 | 21.03 | 129.29 | 76.7 | 680.2 | 0.0 | 986.1 |
| 20.00 | | 0.3750 | 47.310 | 55.863 | 15,548.1 | 20.48 | 126.16 | 77.3 | 647.3 | 0.0 | 962.3 |
| 25.00 | | 0.3750 | 46.136 | 54.465 | 14,409.6 | 19.93 | 123.03 | 78.0 | 615.2 | 0.0 | 938.5 |
| 30.00 | | 0.3750 | 44.961 | 53.066 | 13,328.0 | 19.38 | 119.90 | 78.6 | 583.9 | 0.0 | 914.8 |
| 35.00 | | 0.3750 | 43.786 | 51.668 | 12,301.9 | 18.83 | 116.76 | 79.3 | 553.4 | 0.0 | 891.0 |
| 40.00 | | 0.3750 | 42.611 | 50.270 | 11,329.9 | 18.27 | 113.63 | 79.9 | 523.7 | 0.0 | 867.2 |
| 45.00 | | 0.3750 | 41.436 | 48.871 | 10,410.6 | 17.72 | 110.50 | 80.6 | 494.9 | 0.0 | 843.4 |
| 48.00 | Bot - Section 2 | 0.3750 | 40.731 | 48.032 | 9,883.6 | 17.39 | 108.62 | 80.9 | 477.9 | 0.0 | 494.6 |
| 50.00 | | 0.3750 | 40.261 | 47.473 | 9,542.3 | 17.17 | 107.36 | 81.2 | 466.8 | 0.0 | 600.4 |
| 53.25 | Top - Section 1 | 0.3125 | 40.123 | 39.485 | 7,906.5 | 20.88 | 128.39 | 76.8 | 388.1 | 0.0 | 960.8 |
| 55.00 | | 0.3125 | 39.712 | 39.078 | 7,664.0 | 20.64 | 127.08 | 77.1 | 380.1 | 0.0 | 233.9 |
| 60.00 | | 0.3125 | 38.537 | 37.912 | 6,998.6 | 19.98 | 123.32 | 77.9 | 357.7 | 0.0 | 654.9 |
| 65.00 | | 0.3125 | 37.362 | 36.747 | 6,373.0 | 19.32 | 119.56 | 78.7 | 336.0 | 0.0 | 635.1 |
| 70.00 | | 0.3125 | 36.187 | 35.582 | 5,785.7 | 18.66 | 115.80 | 79.5 | 314.9 | 0.0 | 615.3 |
| 75.00 | | 0.3125 | 35.012 | 34.417 | 5,235.7 | 17.99 | 112.04 | 80.2 | 294.5 | 0.0 | 595.5 |
| 80.00 | | 0.3125 | 33.838 | 33.251 | 4,721.7 | 17.33 | 108.28 | 81.0 | 274.8 | 0.0 | 575.6 |
| 85.00 | | 0.3125 | 32.663 | 32.086 | 4,242.5 | 16.67 | 104.52 | 81.8 | 255.8 | 0.0 | 555.8 |
| 90.00 | | 0.3125 | 31.488 | 30.921 | 3,796.9 | 16.00 | 100.76 | 82.6 | 237.5 | 0.0 | 536.0 |
| 95.00 | | 0.3125 | 30.313 | 29.756 | 3,383.6 | 15.34 | 97.00 | 82.6 | 219.9 | 0.0 | 516.2 |
| 97.75 | Bot - Section 3 | 0.3125 | 29.667 | 29.115 | 3,169.7 | 14.98 | 94.93 | 82.6 | 210.4 | 0.0 | 275.4 |
| 100.0 | | 0.3125 | 29.138 | 28.591 | 3,001.5 | 14.68 | 93.24 | 82.6 | 202.9 | 0.0 | 355.7 |
| 101.5 | Top - Section 2 | 0.1875 | 29.161 | 17.242 | 1,828.7 | 25.66 | 155.52 | 71.2 | 123.5 | 0.0 | 233.6 |
| 105.0 | | 0.1875 | 28.338 | 16.753 | 1,677.4 | 24.89 | 151.14 | 72.1 | 116.6 | 0.0 | 202.4 |
| 106.0 | | 0.1875 | 28.103 | 16.613 | 1,635.7 | 24.67 | 149.89 | 72.4 | 114.6 | 0.0 | 56.8 |
| 110.0 | | 0.1875 | 27.164 | 16.054 | 1,476.0 | 23.78 | 144.87 | 73.4 | 107.0 | 0.0 | 222.3 |
| 115.0 | | 0.1875 | 25.989 | 15.354 | 1,291.4 | 22.68 | 138.61 | 74.7 | 97.9 | 0.0 | 267.2 |
| 117.9 | | 0.1875 | 25.299 | 14.944 | 1,190.5 | 22.03 | 134.93 | 75.5 | 92.7 | 0.0 | 151.4 |
| 120.0 | | 0.1875 | 24.814 | 14.655 | 1,122.9 | 21.57 | 132.34 | 76.0 | 89.1 | 0.0 | 103.9 |
| 125.0 | | 0.1875 | 23.639 | 13.956 | 969.8 | 20.47 | 126.08 | 77.3 | 80.8 | 0.0 | 243.4 |
| 126.0 | | 0.1875 | 23.404 | 13.816 | 940.9 | 20.25 | 124.82 | 77.6 | 79.2 | 0.0 | 47.3 |
| 130.0 | | 0.1875 | 22.464 | 13.257 | 831.2 | 19.36 | 119.81 | 78.6 | 72.9 | 0.0 | 184.2 |
| 135.0 | | 0.1875 | 21.290 | 12.558 | 706.5 | 18.26 | 113.54 | 79.9 | 65.4 | 0.0 | 219.6 |
| 136.0 | | 0.1875 | 21.055 | 12.418 | 683.2 | 18.04 | 112.29 | 80.2 | 63.9 | 0.0 | 42.5 |
| 140.0 | | 0.1875 | 20.115 | 11.859 | 595.0 | 17.15 | 107.28 | 81.2 | 58.3 | 0.0 | 165.2 |
| 144.0 | | 0.1875 | 19.175 | 11.299 | 514.7 | 16.27 | 102.27 | 82.3 | 52.9 | 0.0 | 157.6 |
| 145.0 | | 0.1875 | 18.940 | 11.160 | 495.8 | 16.05 | 101.01 | 82.5 | 51.6 | 0.0 | 38.2 |
| 149.0 | | 0.1875 | 18.000 | 10.600 | 424.9 | 15.16 | 96.00 | 82.6 | 46.5 | 0.0 | 148.1 |
| | | | | | | | | | | | 18,536.1 |

Site Number: 243036 Code: ANSI/TIA-222-G 

Site Name: WEST HAVEN & RT 162 CT, CT Engineering Number:OAA714853_C3_06 8/2/2018 9:22:02 AM

Customer: CLEARWIRE

**Load Case:** 1.2D + 1.6W — 97 mph with No Ice — 26 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

| | | 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 | | 199.3 | 0.0 | | | | | 0.0 | 0.0 | 199.3 | 0.0 | 0.0 | 0.0 |
| 5.00 | | 394.1 | 1,240.5 | | | | | 0.0 | 53.7 | 394.1 | 1,294.2 | 0.0 | 0.0 |
| 10.00 | | 385.0 | 1,211.9 | | | | | 0.0 | 268.5 | 385.0 | 1,480.4 | 0.0 | 0.0 |
| 15.00 | | 375.9 | 1,183.4 | | | | | 0.0 | 268.5 | 375.9 | 1,451.9 | 0.0 | 0.0 |
| 20.00 | | 366.8 | 1,154.8 | | | | | 0.0 | 268.5 | 366.8 | 1,423.3 | 0.0 | 0.0 |
| 25.00 | | 357.7 | 1,126.3 | | | | | 0.0 | 268.5 | 357.7 | 1,394.8 | 0.0 | 0.0 |
| 30.00 | | 352.7 | 1,097.7 | | | | | 0.0 | 268.5 | 352.7 | 1,366.2 | 0.0 | 0.0 |
| 35.00 | | 354.8 | 1,069.2 | | | | | 0.0 | 268.5 | 354.8 | 1,337.7 | 0.0 | 0.0 |
| 40.00 | | 358.7 | 1,040.6 | | | | | 0.0 | 268.5 | 358.7 | 1,309.1 | 0.0 | 0.0 |
| 45.00 | | 288.5 | 1,012.1 | | | | | 0.0 | 268.5 | 288.5 | 1,280.6 | 0.0 | 0.0 |
| 48.00 | Bot - Section 2 | 181.8 | 593.5 | | | | | 0.0 | 161.1 | 181.8 | 754.6 | 0.0 | 0.0 |
| 50.00 | | 192.7 | 720.5 | | | | | 0.0 | 107.4 | 192.7 | 827.9 | 0.0 | 0.0 |
| 53.25 | Top - Section 1 | 183.4 | 1,153.0 | | | | | 0.0 | 174.5 | 183.4 | 1,327.5 | 0.0 | 0.0 |
| 55.00 | | 247.0 | 280.7 | | | | | 0.0 | 94.0 | 247.0 | 374.7 | 0.0 | 0.0 |
| 60.00 | | 364.4 | 785.9 | | | | | 0.0 | 268.5 | 364.4 | 1,054.4 | 0.0 | 0.0 |
| 65.00 | | 361.5 | 762.1 | | | | | 0.0 | 268.5 | 361.5 | 1,030.6 | 0.0 | 0.0 |
| 70.00 | | 357.6 | 738.4 | | | | | 0.0 | 268.5 | 357.6 | 1,006.9 | 0.0 | 0.0 |
| 75.00 | | 352.9 | 714.6 | | | | | 0.0 | 268.5 | 352.9 | 983.1 | 0.0 | 0.0 |
| 80.00 | | 347.4 | 690.8 | | | | | 0.0 | 268.5 | 347.4 | 959.3 | 0.0 | 0.0 |
| 85.00 | | 341.2 | 667.0 | | | | | 0.0 | 268.5 | 341.2 | 935.5 | 0.0 | 0.0 |
| 90.00 | | 334.3 | 643.2 | | | | | 0.0 | 268.5 | 334.3 | 911.7 | 0.0 | 0.0 |
| 95.00 | | 254.7 | 619.4 | | | | | 0.0 | 268.5 | 254.7 | 887.9 | 0.0 | 0.0 |
| 97.75 | Bot - Section 3 | 162.4 | 330.5 | | | | | 0.0 | 147.7 | 162.4 | 478.2 | 0.0 | 0.0 |
| 100.00 | | 121.4 | 426.9 | | | | | 0.0 | 120.8 | 121.4 | 547.7 | 0.0 | 0.0 |
| 101.50 | Top - Section 2 | 159.4 | 280.3 | | | | | 0.0 | 80.6 | 159.4 | 360.8 | 0.0 | 0.0 |
| 105.00 | | 142.5 | 242.9 | | | | | 0.0 | 188.0 | 142.5 | 430.9 | 0.0 | 0.0 |
| 106.00 | Appurtenance(s) | 155.0 | 68.1 | 555.2 | 0.0 | 0.0 | 307.2 | 0.0 | 53.7 | 710.3 | 429.0 | 0.0 | 0.0 |
| 110.00 | | 274.1 | 266.8 | | | | | 0.0 | 214.7 | 274.1 | 481.4 | 0.0 | 0.0 |
| 115.00 | Appurtenance(s) | 236.5 | 320.6 | 436.0 | 0.0 | 0.0 | 95.0 | 0.0 | 268.3 | 672.6 | 684.0 | 0.0 | 0.0 |
| 117.94 | | 145.6 | 181.7 | | | | | 0.0 | 140.3 | 145.6 | 322.0 | 0.0 | 0.0 |
| 120.00 | | 199.9 | 124.6 | | | | | 0.0 | 98.5 | 199.9 | 223.1 | 0.0 | 0.0 |
| 125.00 | | 168.0 | 292.1 | | | | | 0.0 | 238.8 | 168.0 | 530.9 | 0.0 | 0.0 |
| 126.00 | Appurtenance(s) | 135.2 | 56.7 | 2,281.1 | 0.0 | 0.0 | 3,061.4 | 0.0 | 47.8 | 2,416.3 | 3,165.9 | 0.0 | 0.0 |
| 130.00 | | 237.5 | 221.1 | | | | | 0.0 | 148.7 | 237.5 | 369.8 | 0.0 | 0.0 |
| 135.00 | | 155.0 | 263.5 | | | | | 0.0 | 185.9 | 155.0 | 449.4 | 0.0 | 0.0 |
| 136.00 | Appurtenance(s) | 124.1 | 51.0 | 2,840.0 | 0.0 | 1,775.0 | 2,337.0 | 0.0 | 37.2 | 2,964.1 | 2,425.2 | 0.0 | 0.0 |
| 140.00 | | 193.9 | 198.3 | | | | | 0.0 | 93.7 | 193.9 | 292.0 | 0.0 | 0.0 |
| 144.00 | Appurtenance(s) | 118.2 | 189.1 | 2,341.0 | 0.0 | 0.0 | 2,690.0 | 0.0 | 93.7 | 2,459.3 | 2,972.8 | 0.0 | 0.0 |
| 145.00 | | 113.4 | 45.9 | | | | | 0.0 | 6.3 | 113.4 | 52.1 | 0.0 | 0.0 |
| 149.00 | Appurtenance(s) | 90.3 | 177.7 | 2,830.6 | 0.0 | 8,270.8 | 2,269.4 | 0.0 | 25.1 | 2,920.9 | 2,472.2 | 0.0 | 0.0 |
| | | | | | | | | Totals: | | 21,168.9 | 40,079.7 | 0.00 | 0.00 |

Site Number: 243036 Code: ANSI/TIA-222-G 

Site Name: WEST HAVEN & RT 162 CT, CT Engineering Number:OAA714853_C3_06 8/2/2018 9:22:06 AM

Customer: CLEARWIRE

Load Case: 1.2D + 1.6W 97 mph with No Ice 26 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 | -40.05 | -21.03 | 0.00 | -2,351.27 | 0.00 | 2,351.27 | 4,132.29 | 2,066.14 | 8,772.59 | 4,392.82 | 0.00 | 0.00 | 0.545 |
| 5.00 | -38.70 | -20.74 | 0.00 | -2,246.15 | 0.00 | 2,246.15 | 4,073.39 | 2,036.69 | 8,449.37 | 4,230.97 | 0.08 | -0.16 | 0.540 |
| 10.00 | -37.16 | -20.45 | 0.00 | -2,142.46 | 0.00 | 2,142.46 | 4,012.85 | 2,006.43 | 8,128.58 | 4,070.33 | 0.34 | -0.32 | 0.536 |
| 15.00 | -35.65 | -20.17 | 0.00 | -2,040.20 | 0.00 | 2,040.20 | 3,950.68 | 1,975.34 | 7,810.43 | 3,911.02 | 0.76 | -0.48 | 0.531 |
| 20.00 | -34.18 | -19.89 | 0.00 | -1,939.35 | 0.00 | 1,939.35 | 3,886.87 | 1,943.43 | 7,495.19 | 3,753.17 | 1.36 | -0.65 | 0.526 |
| 25.00 | -32.73 | -19.62 | 0.00 | -1,839.89 | 0.00 | 1,839.89 | 3,821.43 | 1,910.71 | 7,183.08 | 3,596.88 | 2.14 | -0.83 | 0.520 |
| 30.00 | -31.30 | -19.34 | 0.00 | -1,741.81 | 0.00 | 1,741.81 | 3,754.35 | 1,877.17 | 6,874.35 | 3,442.28 | 3.10 | -1.00 | 0.514 |
| 35.00 | -29.91 | -19.05 | 0.00 | -1,645.12 | 0.00 | 1,645.12 | 3,685.64 | 1,842.82 | 6,569.23 | 3,289.50 | 4.24 | -1.18 | 0.508 |
| 40.00 | -28.55 | -18.76 | 0.00 | -1,549.84 | 0.00 | 1,549.84 | 3,615.29 | 1,807.64 | 6,267.96 | 3,138.64 | 5.58 | -1.37 | 0.502 |
| 45.00 | -27.23 | -18.51 | 0.00 | -1,456.05 | 0.00 | 1,456.05 | 3,543.30 | 1,771.65 | 5,970.78 | 2,989.83 | 7.12 | -1.56 | 0.495 |
| 48.00 | -26.45 | -18.35 | 0.00 | -1,400.51 | 0.00 | 1,400.51 | 3,499.33 | 1,749.66 | 5,794.53 | 2,901.57 | 8.13 | -1.67 | 0.490 |
| 50.00 | -25.59 | -18.18 | 0.00 | -1,363.81 | 0.00 | 1,363.81 | 3,469.68 | 1,734.84 | 5,677.92 | 2,843.18 | 8.85 | -1.75 | 0.487 |
| 53.25 | -24.24 | -18.00 | 0.00 | -1,304.71 | 0.00 | 1,304.71 | 2,730.90 | 1,365.45 | 4,467.29 | 2,236.97 | 10.09 | -1.88 | 0.592 |
| 55.00 | -23.83 | -17.80 | 0.00 | -1,273.21 | 0.00 | 1,273.21 | 2,712.29 | 1,356.15 | 4,390.67 | 2,198.60 | 10.80 | -1.95 | 0.588 |
| 60.00 | -22.72 | -17.49 | 0.00 | -1,184.20 | 0.00 | 1,184.20 | 2,658.02 | 1,329.01 | 4,173.50 | 2,089.85 | 12.97 | -2.18 | 0.575 |
| 65.00 | -21.63 | -17.18 | 0.00 | -1,096.74 | 0.00 | 1,096.74 | 2,602.11 | 1,301.05 | 3,959.12 | 1,982.50 | 15.38 | -2.41 | 0.562 |
| 70.00 | -20.57 | -16.86 | 0.00 | -1,010.85 | 0.00 | 1,010.85 | 2,544.56 | 1,272.28 | 3,747.77 | 1,876.67 | 18.03 | -2.65 | 0.547 |
| 75.00 | -19.54 | -16.54 | 0.00 | -926.54 | 0.00 | 926.54 | 2,485.39 | 1,242.69 | 3,539.70 | 1,772.48 | 20.93 | -2.89 | 0.531 |
| 80.00 | -18.53 | -16.22 | 0.00 | -843.83 | 0.00 | 843.83 | 2,424.57 | 1,212.29 | 3,335.13 | 1,670.04 | 24.09 | -3.13 | 0.513 |
| 85.00 | -17.55 | -15.90 | 0.00 | -762.71 | 0.00 | 762.71 | 2,362.12 | 1,181.06 | 3,134.31 | 1,569.49 | 27.49 | -3.37 | 0.494 |
| 90.00 | -16.59 | -15.59 | 0.00 | -683.18 | 0.00 | 683.18 | 2,297.27 | 1,148.64 | 2,936.51 | 1,470.44 | 31.15 | -3.61 | 0.472 |
| 95.00 | -15.68 | -15.33 | 0.00 | -605.26 | 0.00 | 605.26 | 2,210.70 | 1,105.35 | 2,718.30 | 1,361.17 | 35.06 | -3.85 | 0.452 |
| 97.75 | -15.18 | -15.16 | 0.00 | -563.11 | 0.00 | 563.11 | 2,163.09 | 1,081.54 | 2,601.88 | 1,302.87 | 37.32 | -3.99 | 0.439 |
| 100.00 | -14.62 | -15.03 | 0.00 | -529.00 | 0.00 | 529.00 | 2,124.13 | 1,062.07 | 2,508.52 | 1,256.12 | 39.23 | -4.10 | 0.428 |
| 101.50 | -14.24 | -14.87 | 0.00 | -506.46 | 0.00 | 506.46 | 1,105.19 | 552.59 | 1,317.56 | 659.76 | 40.52 | -4.17 | 0.781 |
| 105.00 | -13.79 | -14.73 | 0.00 | -454.41 | 0.00 | 454.41 | 1,087.53 | 543.77 | 1,259.48 | 630.68 | 43.64 | -4.34 | 0.734 |
| 106.00 | -13.37 | -14.03 | 0.00 | -439.68 | 0.00 | 439.68 | 1,082.34 | 541.17 | 1,242.93 | 622.39 | 44.56 | -4.41 | 0.719 |
| 110.00 | -12.83 | -13.79 | 0.00 | -383.57 | 0.00 | 383.57 | 1,060.92 | 530.46 | 1,177.04 | 589.40 | 48.38 | -4.70 | 0.664 |
| 115.00 | -12.15 | -13.11 | 0.00 | -314.64 | 0.00 | 314.64 | 1,032.68 | 516.34 | 1,095.47 | 548.55 | 53.48 | -5.04 | 0.586 |
| 117.94 | -11.81 | -12.97 | 0.00 | -276.11 | 0.00 | 276.11 | 1,015.32 | 507.66 | 1,048.03 | 524.80 | 56.64 | -5.23 | 0.538 |
| 120.00 | -11.56 | -12.80 | 0.00 | -249.36 | 0.00 | 249.36 | 1,002.79 | 501.40 | 1,014.98 | 508.24 | 58.92 | -5.36 | 0.503 |
| 125.00 | -11.01 | -12.61 | 0.00 | -185.38 | 0.00 | 185.38 | 971.28 | 485.64 | 935.83 | 468.61 | 64.68 | -5.63 | 0.408 |
| 126.00 | -8.08 | -9.91 | 0.00 | -172.77 | 0.00 | 172.77 | 964.78 | 482.39 | 920.18 | 460.77 | 65.87 | -5.69 | 0.384 |
| 130.00 | -7.70 | -9.66 | 0.00 | -133.14 | 0.00 | 133.14 | 938.12 | 469.06 | 858.24 | 429.76 | 70.70 | -5.87 | 0.318 |
| 135.00 | -7.25 | -9.47 | 0.00 | -84.84 | 0.00 | 84.84 | 903.33 | 451.67 | 782.47 | 391.82 | 76.95 | -6.06 | 0.225 |
| 136.00 | -5.15 | -6.27 | 0.00 | -73.59 | 0.00 | 73.59 | 896.18 | 448.09 | 767.56 | 384.35 | 78.22 | -6.09 | 0.197 |
| 140.00 | -4.87 | -6.06 | 0.00 | -48.49 | 0.00 | 48.49 | 866.91 | 433.46 | 708.75 | 354.90 | 83.36 | -6.19 | 0.142 |
| 144.00 | -2.18 | -3.29 | 0.00 | -24.26 | 0.00 | 24.26 | 836.60 | 418.30 | 651.40 | 326.19 | 88.57 | -6.26 | 0.077 |
| 145.00 | -2.14 | -3.17 | 0.00 | -20.97 | 0.00 | 20.97 | 828.85 | 414.43 | 637.31 | 319.13 | 89.88 | -6.27 | 0.068 |
| 149.00 | 0.00 | -2.92 | 0.00 | -8.27 | 0.00 | 8.27 | 787.55 | 393.77 | 574.90 | 287.88 | 95.14 | -6.31 | 0.029 |

Load Case: 0.9D + 1.6W — 97 mph with No Ice (Reduced DL) — 25 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 | | 199.3 | 0.0 | | | | | 0.0 | 0.0 | 199.3 | 0.0 | 0.0 | 0.0 |
| 5.00 | | 394.1 | 930.3 | | | | | 0.0 | 40.3 | 394.1 | 970.6 | 0.0 | 0.0 |
| 10.00 | | 385.0 | 908.9 | | | | | 0.0 | 201.4 | 385.0 | 1,110.3 | 0.0 | 0.0 |
| 15.00 | | 375.9 | 887.5 | | | | | 0.0 | 201.4 | 375.9 | 1,088.9 | 0.0 | 0.0 |
| 20.00 | | 366.8 | 866.1 | | | | | 0.0 | 201.4 | 366.8 | 1,067.5 | 0.0 | 0.0 |
| 25.00 | | 357.7 | 844.7 | | | | | 0.0 | 201.4 | 357.7 | 1,046.1 | 0.0 | 0.0 |
| 30.00 | | 352.7 | 823.3 | | | | | 0.0 | 201.4 | 352.7 | 1,024.7 | 0.0 | 0.0 |
| 35.00 | | 354.8 | 801.9 | | | | | 0.0 | 201.4 | 354.8 | 1,003.2 | 0.0 | 0.0 |
| 40.00 | | 358.7 | 780.5 | | | | | 0.0 | 201.4 | 358.7 | 981.8 | 0.0 | 0.0 |
| 45.00 | | 288.5 | 759.0 | | | | | 0.0 | 201.4 | 288.5 | 960.4 | 0.0 | 0.0 |
| 48.00 | Bot - Section 2 | 181.8 | 445.2 | | | | | 0.0 | 120.8 | 181.8 | 566.0 | 0.0 | 0.0 |
| 50.00 | | 192.7 | 540.4 | | | | | 0.0 | 80.5 | 192.7 | 621.0 | 0.0 | 0.0 |
| 53.25 | Top - Section 1 | 183.4 | 864.8 | | | | | 0.0 | 130.9 | 183.4 | 995.7 | 0.0 | 0.0 |
| 55.00 | | 247.0 | 210.5 | | | | | 0.0 | 70.5 | 247.0 | 281.0 | 0.0 | 0.0 |
| 60.00 | | 364.4 | 589.5 | | | | | 0.0 | 201.4 | 364.4 | 790.8 | 0.0 | 0.0 |
| 65.00 | | 361.5 | 571.6 | | | | | 0.0 | 201.4 | 361.5 | 773.0 | 0.0 | 0.0 |
| 70.00 | | 357.6 | 553.8 | | | | | 0.0 | 201.4 | 357.6 | 755.1 | 0.0 | 0.0 |
| 75.00 | | 352.9 | 535.9 | | | | | 0.0 | 201.4 | 352.9 | 737.3 | 0.0 | 0.0 |
| 80.00 | | 347.4 | 518.1 | | | | | 0.0 | 201.4 | 347.4 | 719.5 | 0.0 | 0.0 |
| 85.00 | | 341.2 | 500.2 | | | | | 0.0 | 201.4 | 341.2 | 701.6 | 0.0 | 0.0 |
| 90.00 | | 334.3 | 482.4 | | | | | 0.0 | 201.4 | 334.3 | 683.8 | 0.0 | 0.0 |
| 95.00 | | 254.7 | 464.6 | | | | | 0.0 | 201.4 | 254.7 | 665.9 | 0.0 | 0.0 |
| 97.75 | Bot - Section 3 | 162.4 | 247.9 | | | | | 0.0 | 110.8 | 162.4 | 358.7 | 0.0 | 0.0 |
| 100.00 | | 121.4 | 320.2 | | | | | 0.0 | 90.6 | 121.4 | 410.8 | 0.0 | 0.0 |
| 101.50 | Top - Section 2 | 159.4 | 210.2 | | | | | 0.0 | 60.4 | 159.4 | 270.6 | 0.0 | 0.0 |
| 105.00 | | 142.5 | 182.2 | | | | | 0.0 | 141.0 | 142.5 | 323.2 | 0.0 | 0.0 |
| 106.00 | Appurtenance(s) | 155.0 | 51.1 | 555.2 | 0.0 | 0.0 | 230.4 | 0.0 | 40.3 | 710.3 | 321.8 | 0.0 | 0.0 |
| 110.00 | | 274.1 | 200.1 | | | | | 0.0 | 161.0 | 274.1 | 361.1 | 0.0 | 0.0 |
| 115.00 | Appurtenance(s) | 236.5 | 240.5 | 436.0 | 0.0 | 0.0 | 71.3 | 0.0 | 201.2 | 672.6 | 513.0 | 0.0 | 0.0 |
| 117.94 | | 145.6 | 136.3 | | | | | 0.0 | 105.2 | 145.6 | 241.5 | 0.0 | 0.0 |
| 120.00 | | 199.9 | 93.5 | | | | | 0.0 | 73.9 | 199.9 | 167.4 | 0.0 | 0.0 |
| 125.00 | | 168.0 | 219.1 | | | | | 0.0 | 179.1 | 168.0 | 398.2 | 0.0 | 0.0 |
| 126.00 | Appurtenance(s) | 135.2 | 42.5 | 2,281.1 | 0.0 | 0.0 | 2,296.1 | 0.0 | 35.8 | 2,416.3 | 2,374.4 | 0.0 | 0.0 |
| 130.00 | | 237.5 | 165.8 | | | | | 0.0 | 111.5 | 237.5 | 277.4 | 0.0 | 0.0 |
| 135.00 | | 155.0 | 197.6 | | | | | 0.0 | 139.4 | 155.0 | 337.1 | 0.0 | 0.0 |
| 136.00 | Appurtenance(s) | 124.1 | 38.2 | 2,840.0 | 0.0 | 1,775.0 | 1,752.7 | 0.0 | 27.9 | 2,964.1 | 1,818.9 | 0.0 | 0.0 |
| 140.00 | | 193.9 | 148.7 | | | | | 0.0 | 70.3 | 193.9 | 219.0 | 0.0 | 0.0 |
| 144.00 | Appurtenance(s) | 118.2 | 141.8 | 2,341.0 | 0.0 | 0.0 | 2,017.5 | 0.0 | 70.3 | 2,459.3 | 2,229.6 | 0.0 | 0.0 |
| 145.00 | | 113.4 | 34.4 | | | | | 0.0 | 4.7 | 113.4 | 39.1 | 0.0 | 0.0 |
| 149.00 | Appurtenance(s) | 90.3 | 133.3 | 2,830.6 | 0.0 | 8,270.8 | 1,702.1 | 0.0 | 18.8 | 2,920.9 | 1,854.2 | 0.0 | 0.0 |
| | | | | | | | | Totals: | | 21,168.9 | 30,059.8 | 0.00 | 0.00 |

Load Case: 0.9D + 1.6W — 97 mph with No Ice (Reduced DL) — 25 Iterations

Gust Response Factor :1.10 Wind Importance Factor 1.00
Dead Load Factor :0.90
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 | -30.03 | -21.01 | 0.00 | -2,319.59 | 0.00 | 2,319.59 | 4,132.29 | 2,066.14 | 8,772.59 | 4,392.82 | 0.00 | 0.00 | 0.535 |
| 5.00 | -29.00 | -20.69 | 0.00 | -2,214.54 | 0.00 | 2,214.54 | 4,073.39 | 2,036.69 | 8,449.37 | 4,230.97 | 0.08 | -0.16 | 0.531 |
| 10.00 | -27.84 | -20.38 | 0.00 | -2,111.07 | 0.00 | 2,111.07 | 4,012.85 | 2,006.43 | 8,128.58 | 4,070.33 | 0.33 | -0.32 | 0.526 |
| 15.00 | -26.69 | -20.08 | 0.00 | -2,009.15 | 0.00 | 2,009.15 | 3,950.68 | 1,975.34 | 7,810.43 | 3,911.02 | 0.75 | -0.48 | 0.521 |
| 20.00 | -25.57 | -19.77 | 0.00 | -1,908.77 | 0.00 | 1,908.77 | 3,886.87 | 1,943.43 | 7,495.19 | 3,753.17 | 1.34 | -0.64 | 0.515 |
| 25.00 | -24.47 | -19.48 | 0.00 | -1,809.90 | 0.00 | 1,809.90 | 3,821.43 | 1,910.71 | 7,183.08 | 3,596.88 | 2.11 | -0.81 | 0.510 |
| 30.00 | -23.39 | -19.18 | 0.00 | -1,712.52 | 0.00 | 1,712.52 | 3,754.35 | 1,877.17 | 6,874.35 | 3,442.28 | 3.05 | -0.99 | 0.504 |
| 35.00 | -22.34 | -18.88 | 0.00 | -1,616.62 | 0.00 | 1,616.62 | 3,685.64 | 1,842.82 | 6,569.23 | 3,289.50 | 4.18 | -1.17 | 0.498 |
| 40.00 | -21.31 | -18.56 | 0.00 | -1,522.23 | 0.00 | 1,522.23 | 3,615.29 | 1,807.64 | 6,267.96 | 3,138.64 | 5.50 | -1.35 | 0.491 |
| 45.00 | -20.31 | -18.31 | 0.00 | -1,429.41 | 0.00 | 1,429.41 | 3,543.30 | 1,771.65 | 5,970.78 | 2,989.83 | 7.01 | -1.53 | 0.484 |
| 48.00 | -19.71 | -18.14 | 0.00 | -1,374.49 | 0.00 | 1,374.49 | 3,499.33 | 1,749.66 | 5,794.53 | 2,901.57 | 8.01 | -1.65 | 0.479 |
| 50.00 | -19.07 | -17.96 | 0.00 | -1,338.21 | 0.00 | 1,338.21 | 3,469.68 | 1,734.84 | 5,677.92 | 2,843.18 | 8.72 | -1.73 | 0.476 |
| 53.25 | -18.05 | -17.78 | 0.00 | -1,279.83 | 0.00 | 1,279.83 | 2,730.90 | 1,365.45 | 4,467.29 | 2,236.97 | 9.94 | -1.85 | 0.579 |
| 55.00 | -17.73 | -17.57 | 0.00 | -1,248.71 | 0.00 | 1,248.71 | 2,712.29 | 1,356.15 | 4,390.67 | 2,198.60 | 10.63 | -1.92 | 0.575 |
| 60.00 | -16.88 | -17.25 | 0.00 | -1,160.86 | 0.00 | 1,160.86 | 2,658.02 | 1,329.01 | 4,173.50 | 2,089.85 | 12.76 | -2.15 | 0.562 |
| 65.00 | -16.06 | -16.92 | 0.00 | -1,074.63 | 0.00 | 1,074.63 | 2,602.11 | 1,301.05 | 3,959.12 | 1,982.50 | 15.13 | -2.37 | 0.548 |
| 70.00 | -15.25 | -16.59 | 0.00 | -990.05 | 0.00 | 990.05 | 2,544.56 | 1,272.28 | 3,747.77 | 1,876.67 | 17.74 | -2.60 | 0.534 |
| 75.00 | -14.47 | -16.26 | 0.00 | -907.10 | 0.00 | 907.10 | 2,485.39 | 1,242.69 | 3,539.70 | 1,772.48 | 20.59 | -2.84 | 0.518 |
| 80.00 | -13.70 | -15.93 | 0.00 | -825.80 | 0.00 | 825.80 | 2,424.57 | 1,212.29 | 3,335.13 | 1,670.04 | 23.69 | -3.07 | 0.500 |
| 85.00 | -12.95 | -15.61 | 0.00 | -746.13 | 0.00 | 746.13 | 2,362.12 | 1,181.06 | 3,134.31 | 1,569.49 | 27.03 | -3.31 | 0.481 |
| 90.00 | -12.23 | -15.28 | 0.00 | -668.09 | 0.00 | 668.09 | 2,297.27 | 1,148.64 | 2,936.51 | 1,470.44 | 30.62 | -3.55 | 0.460 |
| 95.00 | -11.53 | -15.02 | 0.00 | -591.67 | 0.00 | 591.67 | 2,210.70 | 1,105.35 | 2,718.30 | 1,361.17 | 34.46 | -3.78 | 0.440 |
| 97.75 | -11.15 | -14.86 | 0.00 | -550.35 | 0.00 | 550.35 | 2,163.09 | 1,081.54 | 2,601.88 | 1,302.87 | 36.68 | -3.91 | 0.428 |
| 100.00 | -10.73 | -14.73 | 0.00 | -516.92 | 0.00 | 516.92 | 2,124.13 | 1,062.07 | 2,508.52 | 1,256.12 | 38.55 | -4.02 | 0.417 |
| 101.50 | -10.44 | -14.57 | 0.00 | -494.82 | 0.00 | 494.82 | 1,105.19 | 552.59 | 1,317.56 | 659.76 | 39.82 | -4.09 | 0.760 |
| 105.00 | -10.10 | -14.43 | 0.00 | -443.82 | 0.00 | 443.82 | 1,087.53 | 543.77 | 1,259.48 | 630.68 | 42.88 | -4.26 | 0.714 |
| 106.00 | -9.79 | -13.73 | 0.00 | -429.40 | 0.00 | 429.40 | 1,082.34 | 541.17 | 1,242.93 | 622.39 | 43.78 | -4.33 | 0.700 |
| 110.00 | -9.38 | -13.47 | 0.00 | -374.49 | 0.00 | 374.49 | 1,060.92 | 530.46 | 1,177.04 | 589.40 | 47.53 | -4.61 | 0.645 |
| 115.00 | -8.87 | -12.80 | 0.00 | -307.12 | 0.00 | 307.12 | 1,032.68 | 516.34 | 1,095.47 | 548.55 | 52.53 | -4.94 | 0.569 |
| 117.94 | -8.61 | -12.66 | 0.00 | -269.52 | 0.00 | 269.52 | 1,015.32 | 507.66 | 1,048.03 | 524.80 | 55.62 | -5.12 | 0.523 |
| 120.00 | -8.41 | -12.47 | 0.00 | -243.41 | 0.00 | 243.41 | 1,002.79 | 501.40 | 1,014.98 | 508.24 | 57.86 | -5.25 | 0.488 |
| 125.00 | -8.00 | -12.29 | 0.00 | -181.05 | 0.00 | 181.05 | 971.28 | 485.64 | 935.83 | 468.61 | 63.50 | -5.52 | 0.395 |
| 126.00 | -5.85 | -9.67 | 0.00 | -168.75 | 0.00 | 168.75 | 964.78 | 482.39 | 920.18 | 460.77 | 64.66 | -5.57 | 0.373 |
| 130.00 | -5.57 | -9.42 | 0.00 | -130.08 | 0.00 | 130.08 | 938.12 | 469.06 | 858.24 | 429.76 | 69.40 | -5.75 | 0.309 |
| 135.00 | -5.23 | -9.24 | 0.00 | -82.97 | 0.00 | 82.97 | 903.33 | 451.67 | 782.47 | 391.82 | 75.52 | -5.93 | 0.218 |
| 136.00 | -3.72 | -6.11 | 0.00 | -71.95 | 0.00 | 71.95 | 896.18 | 448.09 | 767.56 | 384.35 | 76.77 | -5.97 | 0.192 |
| 140.00 | -3.52 | -5.90 | 0.00 | -47.50 | 0.00 | 47.50 | 866.91 | 433.46 | 708.75 | 354.90 | 81.80 | -6.06 | 0.138 |
| 144.00 | -1.56 | -3.22 | 0.00 | -23.90 | 0.00 | 23.90 | 836.60 | 418.30 | 651.40 | 326.19 | 86.90 | -6.13 | 0.075 |
| 145.00 | -1.53 | -3.10 | 0.00 | -20.68 | 0.00 | 20.68 | 828.85 | 414.43 | 637.31 | 319.13 | 88.19 | -6.15 | 0.067 |
| 149.00 | 0.00 | -2.92 | 0.00 | -8.27 | 0.00 | 8.27 | 787.55 | 393.77 | 574.90 | 287.88 | 93.34 | -6.18 | 0.029 |

Load Case: 1.2D + 1.0Di + 1.0Wi 50 mph with 0.75 in Radial Ice 25 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 | | 63.8 | 0.0 | | | | | 0.0 | 0.0 | 63.8 | 0.0 | 0.0 | 0.0 |
| 5.00 | | 126.6 | 1,617.9 | | | | | 0.0 | 58.5 | 126.6 | 1,676.4 | 0.0 | 0.0 |
| 10.00 | | 124.3 | 1,624.7 | | | | | 0.0 | 296.2 | 124.3 | 1,920.9 | 0.0 | 0.0 |
| 15.00 | | 121.7 | 1,608.4 | | | | | 0.0 | 298.1 | 121.7 | 1,906.5 | 0.0 | 0.0 |
| 20.00 | | 119.1 | 1,584.4 | | | | | 0.0 | 299.4 | 119.1 | 1,883.9 | 0.0 | 0.0 |
| 25.00 | | 116.5 | 1,556.5 | | | | | 0.0 | 300.5 | 116.5 | 1,857.0 | 0.0 | 0.0 |
| 30.00 | | 115.2 | 1,526.1 | | | | | 0.0 | 301.4 | 115.2 | 1,827.5 | 0.0 | 0.0 |
| 35.00 | | 116.2 | 1,494.0 | | | | | 0.0 | 302.1 | 116.2 | 1,796.1 | 0.0 | 0.0 |
| 40.00 | | 117.8 | 1,460.6 | | | | | 0.0 | 302.8 | 117.8 | 1,763.3 | 0.0 | 0.0 |
| 45.00 | | 94.9 | 1,426.2 | | | | | 0.0 | 303.4 | 94.9 | 1,729.5 | 0.0 | 0.0 |
| 48.00 | Bot - Section 2 | 59.9 | 840.2 | | | | | 0.0 | 182.3 | 59.9 | 1,022.5 | 0.0 | 0.0 |
| 50.00 | | 63.6 | 886.5 | | | | | 0.0 | 121.6 | 63.6 | 1,008.1 | 0.0 | 0.0 |
| 53.25 | Top - Section 1 | 60.6 | 1,419.2 | | | | | 0.0 | 197.8 | 60.6 | 1,617.0 | 0.0 | 0.0 |
| 55.00 | | 81.7 | 423.3 | | | | | 0.0 | 106.6 | 81.7 | 529.9 | 0.0 | 0.0 |
| 60.00 | | 120.8 | 1,184.4 | | | | | 0.0 | 304.8 | 120.8 | 1,489.2 | 0.0 | 0.0 |
| 65.00 | | 120.2 | 1,152.3 | | | | | 0.0 | 305.2 | 120.2 | 1,457.5 | 0.0 | 0.0 |
| 70.00 | | 119.3 | 1,119.8 | | | | | 0.0 | 305.6 | 119.3 | 1,425.4 | 0.0 | 0.0 |
| 75.00 | | 118.1 | 1,086.9 | | | | | 0.0 | 306.0 | 118.1 | 1,392.9 | 0.0 | 0.0 |
| 80.00 | | 116.7 | 1,053.7 | | | | | 0.0 | 306.4 | 116.7 | 1,360.0 | 0.0 | 0.0 |
| 85.00 | | 115.0 | 1,020.2 | | | | | 0.0 | 306.7 | 115.0 | 1,326.8 | 0.0 | 0.0 |
| 90.00 | | 113.1 | 986.4 | | | | | 0.0 | 307.0 | 113.1 | 1,293.4 | 0.0 | 0.0 |
| 95.00 | | 86.5 | 952.4 | | | | | 0.0 | 307.3 | 86.5 | 1,259.6 | 0.0 | 0.0 |
| 97.75 | Bot - Section 3 | 55.3 | 510.7 | | | | | 0.0 | 169.1 | 55.3 | 679.9 | 0.0 | 0.0 |
| 100.00 | | 41.4 | 574.0 | | | | | 0.0 | 138.4 | 41.4 | 712.4 | 0.0 | 0.0 |
| 101.50 | Top - Section 2 | 54.5 | 377.4 | | | | | 0.0 | 92.3 | 54.5 | 469.8 | 0.0 | 0.0 |
| 105.00 | | 48.7 | 464.1 | | | | | 0.0 | 215.5 | 48.7 | 679.6 | 0.0 | 0.0 |
| 106.00 | Appurtenance(s) | 53.2 | 131.0 | 119.1 | 0.0 | 0.0 | 460.5 | 0.0 | 61.6 | 172.4 | 653.1 | 0.0 | 0.0 |
| 110.00 | | 94.4 | 510.8 | | | | | 0.0 | 246.4 | 94.4 | 757.2 | 0.0 | 0.0 |
| 115.00 | Appurtenance(s) | 81.8 | 614.5 | 89.4 | 0.0 | 0.0 | 435.1 | 0.0 | 308.2 | 171.2 | 1,357.8 | 0.0 | 0.0 |
| 117.94 | | 50.5 | 350.7 | | | | | 0.0 | 163.8 | 50.5 | 514.5 | 0.0 | 0.0 |
| 120.00 | | 69.7 | 241.4 | | | | | 0.0 | 115.1 | 69.7 | 356.5 | 0.0 | 0.0 |
| 125.00 | | 58.7 | 563.5 | | | | | 0.0 | 279.1 | 58.7 | 842.6 | 0.0 | 0.0 |
| 126.00 | Appurtenance(s) | 47.5 | 110.6 | 587.7 | 0.0 | 0.0 | 5,172.5 | 0.0 | 55.9 | 635.2 | 5,338.9 | 0.0 | 0.0 |
| 130.00 | | 83.9 | 429.1 | | | | | 0.0 | 181.2 | 83.9 | 610.3 | 0.0 | 0.0 |
| 135.00 | | 54.9 | 511.8 | | | | | 0.0 | 226.7 | 54.9 | 738.5 | 0.0 | 0.0 |
| 136.00 | Appurtenance(s) | 44.3 | 100.3 | 695.3 | 0.0 | 375.0 | 4,693.1 | 0.0 | 45.4 | 739.6 | 4,838.7 | 0.0 | 0.0 |
| 140.00 | | 69.5 | 387.6 | | | | | 0.0 | 126.5 | 69.5 | 514.1 | 0.0 | 0.0 |
| 144.00 | Appurtenance(s) | 42.6 | 370.8 | 569.3 | 0.0 | 0.0 | 4,579.6 | 0.0 | 126.7 | 611.9 | 5,077.1 | 0.0 | 0.0 |
| 145.00 | | 41.2 | 90.9 | | | | | 0.0 | 6.3 | 41.2 | 97.1 | 0.0 | 0.0 |
| 149.00 | Appurtenance(s) | 32.8 | 349.9 | 652.5 | 0.0 | 1,747.5 | 5,009.5 | 0.0 | 25.1 | 685.3 | 5,384.4 | 0.0 | 0.0 |
| | | | | | | | | Totals: | | 6,029.71 | 61,166.2 | 0.00 | 0.00 |

Load Case: 1.2D + 1.0Di + 1.0Wi 50 mph with 0.75 in Radial Ice 25 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 | -61.16 | -5.99 | 0.00 | -665.25 | 0.00 | 665.25 | 4,132.29 | 2,066.14 | 8,772.59 | 4,392.82 | 0.00 | 0.00 | 0.166 |
| 5.00 | -59.48 | -5.91 | 0.00 | -635.30 | 0.00 | 635.30 | 4,073.39 | 2,036.69 | 8,449.37 | 4,230.97 | 0.02 | -0.04 | 0.165 |
| 10.00 | -57.56 | -5.83 | 0.00 | -605.75 | 0.00 | 605.75 | 4,012.85 | 2,006.43 | 8,128.58 | 4,070.33 | 0.10 | -0.09 | 0.163 |
| 15.00 | -55.65 | -5.75 | 0.00 | -576.61 | 0.00 | 576.61 | 3,950.68 | 1,975.34 | 7,810.43 | 3,911.02 | 0.21 | -0.14 | 0.162 |
| 20.00 | -53.76 | -5.67 | 0.00 | -547.86 | 0.00 | 547.86 | 3,886.87 | 1,943.43 | 7,495.19 | 3,753.17 | 0.38 | -0.18 | 0.160 |
| 25.00 | -51.90 | -5.59 | 0.00 | -519.51 | 0.00 | 519.51 | 3,821.43 | 1,910.71 | 7,183.08 | 3,596.88 | 0.60 | -0.23 | 0.158 |
| 30.00 | -50.06 | -5.51 | 0.00 | -491.55 | 0.00 | 491.55 | 3,754.35 | 1,877.17 | 6,874.35 | 3,442.28 | 0.88 | -0.28 | 0.156 |
| 35.00 | -48.26 | -5.43 | 0.00 | -463.98 | 0.00 | 463.98 | 3,685.64 | 1,842.82 | 6,569.23 | 3,289.50 | 1.20 | -0.33 | 0.154 |
| 40.00 | -46.50 | -5.34 | 0.00 | -436.83 | 0.00 | 436.83 | 3,615.29 | 1,807.64 | 6,267.96 | 3,138.64 | 1.58 | -0.39 | 0.152 |
| 45.00 | -44.76 | -5.27 | 0.00 | -410.11 | 0.00 | 410.11 | 3,543.30 | 1,771.65 | 5,970.78 | 2,989.83 | 2.01 | -0.44 | 0.150 |
| 48.00 | -43.74 | -5.22 | 0.00 | -394.30 | 0.00 | 394.30 | 3,499.33 | 1,749.66 | 5,794.53 | 2,901.57 | 2.30 | -0.47 | 0.148 |
| 50.00 | -42.73 | -5.17 | 0.00 | -383.85 | 0.00 | 383.85 | 3,469.68 | 1,734.84 | 5,677.92 | 2,843.18 | 2.50 | -0.50 | 0.147 |
| 53.25 | -41.11 | -5.12 | 0.00 | -367.04 | 0.00 | 367.04 | 2,730.90 | 1,365.45 | 4,467.29 | 2,236.97 | 2.85 | -0.53 | 0.179 |
| 55.00 | -40.58 | -5.06 | 0.00 | -358.08 | 0.00 | 358.08 | 2,712.29 | 1,356.15 | 4,390.67 | 2,198.60 | 3.05 | -0.55 | 0.178 |
| 60.00 | -39.08 | -4.97 | 0.00 | -332.78 | 0.00 | 332.78 | 2,658.02 | 1,329.01 | 4,173.50 | 2,089.85 | 3.66 | -0.62 | 0.174 |
| 65.00 | -37.62 | -4.88 | 0.00 | -307.93 | 0.00 | 307.93 | 2,602.11 | 1,301.05 | 3,959.12 | 1,982.50 | 4.34 | -0.68 | 0.170 |
| 70.00 | -36.19 | -4.78 | 0.00 | -283.55 | 0.00 | 283.55 | 2,544.56 | 1,272.28 | 3,747.77 | 1,876.67 | 5.09 | -0.75 | 0.165 |
| 75.00 | -34.80 | -4.68 | 0.00 | -259.64 | 0.00 | 259.64 | 2,485.39 | 1,242.69 | 3,539.70 | 1,772.48 | 5.91 | -0.81 | 0.160 |
| 80.00 | -33.43 | -4.59 | 0.00 | -236.22 | 0.00 | 236.22 | 2,424.57 | 1,212.29 | 3,335.13 | 1,670.04 | 6.80 | -0.88 | 0.155 |
| 85.00 | -32.10 | -4.49 | 0.00 | -213.28 | 0.00 | 213.28 | 2,362.12 | 1,181.06 | 3,134.31 | 1,569.49 | 7.76 | -0.95 | 0.149 |
| 90.00 | -30.81 | -4.39 | 0.00 | -190.83 | 0.00 | 190.83 | 2,297.27 | 1,148.64 | 2,936.51 | 1,470.44 | 8.79 | -1.02 | 0.143 |
| 95.00 | -29.55 | -4.31 | 0.00 | -168.88 | 0.00 | 168.88 | 2,210.70 | 1,105.35 | 2,718.30 | 1,361.17 | 9.89 | -1.08 | 0.137 |
| 97.75 | -28.86 | -4.26 | 0.00 | -157.04 | 0.00 | 157.04 | 2,163.09 | 1,081.54 | 2,601.88 | 1,302.87 | 10.52 | -1.12 | 0.134 |
| 100.00 | -28.15 | -4.21 | 0.00 | -147.46 | 0.00 | 147.46 | 2,124.13 | 1,062.07 | 2,508.52 | 1,256.12 | 11.06 | -1.15 | 0.131 |
| 101.50 | -27.68 | -4.17 | 0.00 | -141.14 | 0.00 | 141.14 | 1,105.19 | 552.59 | 1,317.56 | 659.76 | 11.42 | -1.17 | 0.239 |
| 105.00 | -27.00 | -4.12 | 0.00 | -126.56 | 0.00 | 126.56 | 1,087.53 | 543.77 | 1,259.48 | 630.68 | 12.30 | -1.22 | 0.226 |
| 106.00 | -26.35 | -3.96 | 0.00 | -122.44 | 0.00 | 122.44 | 1,082.34 | 541.17 | 1,242.93 | 622.39 | 12.56 | -1.24 | 0.221 |
| 110.00 | -25.59 | -3.88 | 0.00 | -106.62 | 0.00 | 106.62 | 1,060.92 | 530.46 | 1,177.04 | 589.40 | 13.63 | -1.32 | 0.205 |
| 115.00 | -24.23 | -3.71 | 0.00 | -87.20 | 0.00 | 87.20 | 1,032.68 | 516.34 | 1,095.47 | 548.55 | 15.07 | -1.41 | 0.182 |
| 117.94 | -23.71 | -3.67 | 0.00 | -76.30 | 0.00 | 76.30 | 1,015.32 | 507.66 | 1,048.03 | 524.80 | 15.95 | -1.47 | 0.169 |
| 120.00 | -23.35 | -3.61 | 0.00 | -68.74 | 0.00 | 68.74 | 1,002.79 | 501.40 | 1,014.98 | 508.24 | 16.59 | -1.50 | 0.159 |
| 125.00 | -22.51 | -3.55 | 0.00 | -50.69 | 0.00 | 50.69 | 971.28 | 485.64 | 935.83 | 468.61 | 18.21 | -1.58 | 0.131 |
| 126.00 | -17.19 | -2.77 | 0.00 | -47.14 | 0.00 | 47.14 | 964.78 | 482.39 | 920.18 | 460.77 | 18.54 | -1.59 | 0.120 |
| 130.00 | -16.58 | -2.69 | 0.00 | -36.05 | 0.00 | 36.05 | 938.12 | 469.06 | 858.24 | 429.76 | 19.90 | -1.64 | 0.102 |
| 135.00 | -15.84 | -2.62 | 0.00 | -22.62 | 0.00 | 22.62 | 903.33 | 451.67 | 782.47 | 391.82 | 21.64 | -1.69 | 0.075 |
| 136.00 | -11.03 | -1.74 | 0.00 | -19.63 | 0.00 | 19.63 | 896.18 | 448.09 | 767.56 | 384.35 | 22.00 | -1.70 | 0.063 |
| 140.00 | -10.51 | -1.66 | 0.00 | -12.67 | 0.00 | 12.67 | 866.91 | 433.46 | 708.75 | 354.90 | 23.44 | -1.73 | 0.048 |
| 144.00 | -5.46 | -0.89 | 0.00 | -6.04 | 0.00 | 6.04 | 836.60 | 418.30 | 651.40 | 326.19 | 24.89 | -1.75 | 0.025 |
| 145.00 | -5.36 | -0.85 | 0.00 | -5.15 | 0.00 | 5.15 | 828.85 | 414.43 | 637.31 | 319.13 | 25.26 | -1.75 | 0.023 |
| 149.00 | 0.00 | -0.69 | 0.00 | -1.75 | 0.00 | 1.75 | 787.55 | 393.77 | 574.90 | 287.88 | 26.73 | -1.76 | 0.006 |

Load Case: 1.0D + 1.0W Serviceability 60 mph 24 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 | | 47.7 | 0.0 | | | | | 0.0 | 0.0 | 47.7 | 0.0 | 0.0 | 0.0 |
| 5.00 | | 94.2 | 1,033.7 | | | | | 0.0 | 44.8 | 94.2 | 1,078.5 | 0.0 | 0.0 |
| 10.00 | | 92.1 | 1,009.9 | | | | | 0.0 | 223.8 | 92.1 | 1,233.7 | 0.0 | 0.0 |
| 15.00 | | 89.9 | 986.1 | | | | | 0.0 | 223.8 | 89.9 | 1,209.9 | 0.0 | 0.0 |
| 20.00 | | 87.7 | 962.3 | | | | | 0.0 | 223.8 | 87.7 | 1,186.1 | 0.0 | 0.0 |
| 25.00 | | 85.5 | 938.5 | | | | | 0.0 | 223.8 | 85.5 | 1,162.3 | 0.0 | 0.0 |
| 30.00 | | 84.3 | 914.8 | | | | | 0.0 | 223.8 | 84.3 | 1,138.5 | 0.0 | 0.0 |
| 35.00 | | 84.8 | 891.0 | | | | | 0.0 | 223.8 | 84.8 | 1,114.7 | 0.0 | 0.0 |
| 40.00 | | 85.8 | 867.2 | | | | | 0.0 | 223.8 | 85.8 | 1,090.9 | 0.0 | 0.0 |
| 45.00 | | 69.0 | 843.4 | | | | | 0.0 | 223.8 | 69.0 | 1,067.1 | 0.0 | 0.0 |
| 48.00 | Bot - Section 2 | 43.5 | 494.6 | | | | | 0.0 | 134.3 | 43.5 | 628.9 | 0.0 | 0.0 |
| 50.00 | | 46.1 | 600.4 | | | | | 0.0 | 89.5 | 46.1 | 689.9 | 0.0 | 0.0 |
| 53.25 | Top - Section 1 | 43.9 | 960.8 | | | | | 0.0 | 145.4 | 43.9 | 1,106.3 | 0.0 | 0.0 |
| 55.00 | | 59.1 | 233.9 | | | | | 0.0 | 78.3 | 59.1 | 312.2 | 0.0 | 0.0 |
| 60.00 | | 87.1 | 654.9 | | | | | 0.0 | 223.8 | 87.1 | 878.7 | 0.0 | 0.0 |
| 65.00 | | 86.4 | 635.1 | | | | | 0.0 | 223.8 | 86.4 | 858.9 | 0.0 | 0.0 |
| 70.00 | | 85.5 | 615.3 | | | | | 0.0 | 223.8 | 85.5 | 839.0 | 0.0 | 0.0 |
| 75.00 | | 84.4 | 595.5 | | | | | 0.0 | 223.8 | 84.4 | 819.2 | 0.0 | 0.0 |
| 80.00 | | 83.1 | 575.6 | | | | | 0.0 | 223.8 | 83.1 | 799.4 | 0.0 | 0.0 |
| 85.00 | | 81.6 | 555.8 | | | | | 0.0 | 223.8 | 81.6 | 779.6 | 0.0 | 0.0 |
| 90.00 | | 80.0 | 536.0 | | | | | 0.0 | 223.8 | 80.0 | 759.7 | 0.0 | 0.0 |
| 95.00 | | 60.9 | 516.2 | | | | | 0.0 | 223.8 | 60.9 | 739.9 | 0.0 | 0.0 |
| 97.75 | Bot - Section 3 | 38.8 | 275.4 | | | | | 0.0 | 123.1 | 38.8 | 398.5 | 0.0 | 0.0 |
| 100.00 | | 29.0 | 355.7 | | | | | 0.0 | 100.7 | 29.0 | 456.4 | 0.0 | 0.0 |
| 101.50 | Top - Section 2 | 38.1 | 233.6 | | | | | 0.0 | 67.1 | 38.1 | 300.7 | 0.0 | 0.0 |
| 105.00 | | 34.1 | 202.4 | | | | | 0.0 | 156.6 | 34.1 | 359.1 | 0.0 | 0.0 |
| 106.00 | Appurtenance(s) | 37.1 | 56.8 | 132.8 | 0.0 | 0.0 | 256.0 | 0.0 | 44.8 | 169.8 | 357.5 | 0.0 | 0.0 |
| 110.00 | | 65.5 | 222.3 | | | | | 0.0 | 178.9 | 65.5 | 401.2 | 0.0 | 0.0 |
| 115.00 | Appurtenance(s) | 56.6 | 267.2 | 104.3 | 0.0 | 0.0 | 79.2 | 0.0 | 223.6 | 160.8 | 570.0 | 0.0 | 0.0 |
| 117.94 | | 34.8 | 151.4 | | | | | 0.0 | 116.9 | 34.8 | 268.3 | 0.0 | 0.0 |
| 120.00 | | 47.8 | 103.9 | | | | | 0.0 | 82.1 | 47.8 | 186.0 | 0.0 | 0.0 |
| 125.00 | | 40.2 | 243.4 | | | | | 0.0 | 199.0 | 40.2 | 442.4 | 0.0 | 0.0 |
| 126.00 | Appurtenance(s) | 32.3 | 47.3 | 545.5 | 0.0 | 0.0 | 2,551.2 | 0.0 | 39.8 | 577.8 | 2,638.3 | 0.0 | 0.0 |
| 130.00 | | 56.8 | 184.2 | | | | | 0.0 | 123.9 | 56.8 | 308.2 | 0.0 | 0.0 |
| 135.00 | | 37.1 | 219.6 | | | | | 0.0 | 154.9 | 37.1 | 374.5 | 0.0 | 0.0 |
| 136.00 | Appurtenance(s) | 29.7 | 42.5 | 679.1 | 0.0 | 424.5 | 1,947.5 | 0.0 | 31.0 | 708.8 | 2,021.0 | 0.0 | 0.0 |
| 140.00 | | 46.4 | 165.2 | | | | | 0.0 | 78.1 | 46.4 | 243.3 | 0.0 | 0.0 |
| 144.00 | Appurtenance(s) | 28.3 | 157.6 | 559.8 | 0.0 | 0.0 | 2,241.6 | 0.0 | 78.1 | 588.1 | 2,477.4 | 0.0 | 0.0 |
| 145.00 | | 27.1 | 38.2 | | | | | 0.0 | 5.2 | 27.1 | 43.4 | 0.0 | 0.0 |
| 149.00 | Appurtenance(s) | 21.6 | 148.1 | 676.9 | 0.0 | 1,977.8 | 1,891.2 | 0.0 | 20.9 | 698.5 | 2,060.2 | 0.0 | 0.0 |
| | | | | | | | | Totals: | | 5,062.19 | 33,399.8 | 0.00 | 0.00 |

Load Case: 1.0D + 1.0W Serviceability 60 mph 24 Iterations

Gust Response Factor :1.10 Wind Importance Factor 1.00
Dead Load 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 | -33.40 | -5.02 | 0.00 | -557.87 | 0.00 | 557.87 | 4,132.29 | 2,066.14 | 8,772.59 | 4,392.82 | 0.00 | 0.00 | 0.135 |
| 5.00 | -32.32 | -4.95 | 0.00 | -532.75 | 0.00 | 532.75 | 4,073.39 | 2,036.69 | 8,449.37 | 4,230.97 | 0.02 | -0.04 | 0.134 |
| 10.00 | -31.08 | -4.88 | 0.00 | -507.99 | 0.00 | 507.99 | 4,012.85 | 2,006.43 | 8,128.58 | 4,070.33 | 0.08 | -0.08 | 0.133 |
| 15.00 | -29.87 | -4.81 | 0.00 | -483.59 | 0.00 | 483.59 | 3,950.68 | 1,975.34 | 7,810.43 | 3,911.02 | 0.18 | -0.11 | 0.131 |
| 20.00 | -28.68 | -4.74 | 0.00 | -459.55 | 0.00 | 459.55 | 3,886.87 | 1,943.43 | 7,495.19 | 3,753.17 | 0.32 | -0.16 | 0.130 |
| 25.00 | -27.51 | -4.67 | 0.00 | -435.86 | 0.00 | 435.86 | 3,821.43 | 1,910.71 | 7,183.08 | 3,596.88 | 0.51 | -0.20 | 0.128 |
| 30.00 | -26.37 | -4.60 | 0.00 | -412.52 | 0.00 | 412.52 | 3,754.35 | 1,877.17 | 6,874.35 | 3,442.28 | 0.73 | -0.24 | 0.127 |
| 35.00 | -25.25 | -4.53 | 0.00 | -389.53 | 0.00 | 389.53 | 3,685.64 | 1,842.82 | 6,569.23 | 3,289.50 | 1.01 | -0.28 | 0.125 |
| 40.00 | -24.16 | -4.46 | 0.00 | -366.88 | 0.00 | 366.88 | 3,615.29 | 1,807.64 | 6,267.96 | 3,138.64 | 1.32 | -0.32 | 0.124 |
| 45.00 | -23.09 | -4.39 | 0.00 | -344.60 | 0.00 | 344.60 | 3,543.30 | 1,771.65 | 5,970.78 | 2,989.83 | 1.69 | -0.37 | 0.122 |
| 48.00 | -22.46 | -4.36 | 0.00 | -331.42 | 0.00 | 331.42 | 3,499.33 | 1,749.66 | 5,794.53 | 2,901.57 | 1.93 | -0.40 | 0.121 |
| 50.00 | -21.77 | -4.31 | 0.00 | -322.71 | 0.00 | 322.71 | 3,469.68 | 1,734.84 | 5,677.92 | 2,843.18 | 2.10 | -0.42 | 0.120 |
| 53.25 | -20.66 | -4.27 | 0.00 | -308.68 | 0.00 | 308.68 | 2,730.90 | 1,365.45 | 4,467.29 | 2,236.97 | 2.39 | -0.45 | 0.146 |
| 55.00 | -20.35 | -4.22 | 0.00 | -301.21 | 0.00 | 301.21 | 2,712.29 | 1,356.15 | 4,390.67 | 2,198.60 | 2.56 | -0.46 | 0.145 |
| 60.00 | -19.46 | -4.15 | 0.00 | -280.10 | 0.00 | 280.10 | 2,658.02 | 1,329.01 | 4,173.50 | 2,089.85 | 3.07 | -0.52 | 0.141 |
| 65.00 | -18.60 | -4.07 | 0.00 | -259.37 | 0.00 | 259.37 | 2,602.11 | 1,301.05 | 3,959.12 | 1,982.50 | 3.64 | -0.57 | 0.138 |
| 70.00 | -17.76 | -3.99 | 0.00 | -239.02 | 0.00 | 239.02 | 2,544.56 | 1,272.28 | 3,747.77 | 1,876.67 | 4.27 | -0.63 | 0.134 |
| 75.00 | -16.94 | -3.92 | 0.00 | -219.06 | 0.00 | 219.06 | 2,485.39 | 1,242.69 | 3,539.70 | 1,772.48 | 4.96 | -0.68 | 0.130 |
| 80.00 | -16.14 | -3.84 | 0.00 | -199.48 | 0.00 | 199.48 | 2,424.57 | 1,212.29 | 3,335.13 | 1,670.04 | 5.71 | -0.74 | 0.126 |
| 85.00 | -15.35 | -3.76 | 0.00 | -180.29 | 0.00 | 180.29 | 2,362.12 | 1,181.06 | 3,134.31 | 1,569.49 | 6.51 | -0.80 | 0.121 |
| 90.00 | -14.59 | -3.69 | 0.00 | -161.48 | 0.00 | 161.48 | 2,297.27 | 1,148.64 | 2,936.51 | 1,470.44 | 7.38 | -0.86 | 0.116 |
| 95.00 | -13.85 | -3.62 | 0.00 | -143.06 | 0.00 | 143.06 | 2,210.70 | 1,105.35 | 2,718.30 | 1,361.17 | 8.31 | -0.91 | 0.111 |
| 97.75 | -13.45 | -3.59 | 0.00 | -133.09 | 0.00 | 133.09 | 2,163.09 | 1,081.54 | 2,601.88 | 1,302.87 | 8.84 | -0.94 | 0.108 |
| 100.00 | -12.99 | -3.55 | 0.00 | -125.02 | 0.00 | 125.02 | 2,124.13 | 1,062.07 | 2,508.52 | 1,256.12 | 9.29 | -0.97 | 0.106 |
| 101.50 | -12.69 | -3.52 | 0.00 | -119.69 | 0.00 | 119.69 | 1,105.19 | 552.59 | 1,317.56 | 659.76 | 9.60 | -0.99 | 0.193 |
| 105.00 | -12.33 | -3.48 | 0.00 | -107.39 | 0.00 | 107.39 | 1,087.53 | 543.77 | 1,259.48 | 630.68 | 10.34 | -1.03 | 0.182 |
| 106.00 | -11.97 | -3.32 | 0.00 | -103.90 | 0.00 | 103.90 | 1,082.34 | 541.17 | 1,242.93 | 622.39 | 10.56 | -1.04 | 0.178 |
| 110.00 | -11.57 | -3.26 | 0.00 | -90.64 | 0.00 | 90.64 | 1,060.92 | 530.46 | 1,177.04 | 589.40 | 11.46 | -1.11 | 0.165 |
| 115.00 | -11.00 | -3.10 | 0.00 | -74.36 | 0.00 | 74.36 | 1,032.68 | 516.34 | 1,095.47 | 548.55 | 12.67 | -1.19 | 0.146 |
| 117.94 | -10.73 | -3.06 | 0.00 | -65.26 | 0.00 | 65.26 | 1,015.32 | 507.66 | 1,048.03 | 524.80 | 13.42 | -1.24 | 0.135 |
| 120.00 | -10.54 | -3.02 | 0.00 | -58.94 | 0.00 | 58.94 | 1,002.79 | 501.40 | 1,014.98 | 508.24 | 13.96 | -1.27 | 0.127 |
| 125.00 | -10.10 | -2.98 | 0.00 | -43.84 | 0.00 | 43.84 | 971.28 | 485.64 | 935.83 | 468.61 | 15.32 | -1.33 | 0.104 |
| 126.00 | -7.47 | -2.34 | 0.00 | -40.86 | 0.00 | 40.86 | 964.78 | 482.39 | 920.18 | 460.77 | 15.60 | -1.35 | 0.096 |
| 130.00 | -7.17 | -2.28 | 0.00 | -31.49 | 0.00 | 31.49 | 938.12 | 469.06 | 858.24 | 429.76 | 16.75 | -1.39 | 0.081 |
| 135.00 | -6.79 | -2.24 | 0.00 | -20.08 | 0.00 | 20.08 | 903.33 | 451.67 | 782.47 | 391.82 | 18.23 | -1.43 | 0.059 |
| 136.00 | -4.79 | -1.48 | 0.00 | -17.42 | 0.00 | 17.42 | 896.18 | 448.09 | 767.56 | 384.35 | 18.53 | -1.44 | 0.051 |
| 140.00 | -4.55 | -1.43 | 0.00 | -11.49 | 0.00 | 11.49 | 866.91 | 433.46 | 708.75 | 354.90 | 19.75 | -1.46 | 0.038 |
| 144.00 | -2.08 | -0.78 | 0.00 | -5.76 | 0.00 | 5.76 | 836.60 | 418.30 | 651.40 | 326.19 | 20.98 | -1.48 | 0.020 |
| 145.00 | -2.04 | -0.75 | 0.00 | -4.98 | 0.00 | 4.98 | 828.85 | 414.43 | 637.31 | 319.13 | 21.29 | -1.48 | 0.018 |
| 149.00 | 0.00 | -0.70 | 0.00 | -1.98 | 0.00 | 1.98 | 787.55 | 393.77 | 574.90 | 287.88 | 22.54 | -1.49 | 0.007 |

## Equivalent Lateral Forces Method Analysis

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

| | | |
|---|---|---|
| Spectral Response Acceleration for Short Period ($S_s$): | 0.19 | |
| 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 ($S_{ds}$): | 0.20 | |
| Design Spectral Response Acceleration at 1.0 Second Period ($S_{d1}$): | 0.10 | |
| Seismic Response Coefficient ($C_s$): | 0.03 | |
| Upper Limit $C_s$ | 0.03 | |
| Lower Limit $C_s$ | 0.03 | |
| Period based on Rayleigh Method (sec): | 2.54 | |
| Redundancy Factor (p): | 1.30 | |
| Seismic Force Distribution Exponent (k): | 2.00 | |
| Total Unfactored Dead Load: | 33.40 | k |
| Seismic Base Shear (E): | 1.30 | 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) |
|---|---|---|---|---|---|---|
| 39 | 147.00 | 169 | 3,652 | 0.013 | 17 | 210 |
| 38 | 144.50 | 43 | 907 | 0.003 | 4 | 54 |
| 37 | 142.00 | 236 | 4,753 | 0.017 | 22 | 292 |
| 36 | 138.00 | 243 | 4,634 | 0.016 | 21 | 302 |
| 35 | 135.50 | 73 | 1,349 | 0.005 | 6 | 91 |
| 34 | 132.50 | 375 | 6,575 | 0.023 | 30 | 464 |
| 33 | 128.00 | 308 | 5,049 | 0.018 | 23 | 382 |
| 32 | 125.50 | 87 | 1,371 | 0.005 | 6 | 108 |
| 31 | 122.50 | 442 | 6,639 | 0.023 | 30 | 549 |
| 30 | 118.97 | 186 | 2,632 | 0.009 | 12 | 231 |
| 29 | 116.47 | 268 | 3,640 | 0.013 | 16 | 333 |
| 28 | 112.50 | 491 | 6,212 | 0.022 | 28 | 609 |
| 27 | 108.00 | 401 | 4,680 | 0.016 | 21 | 498 |
| 26 | 105.50 | 102 | 1,130 | 0.004 | 5 | 126 |
| 25 | 103.25 | 359 | 3,828 | 0.013 | 17 | 445 |
| 24 | 100.75 | 301 | 3,052 | 0.011 | 14 | 373 |
| 23 | 98.88 | 456 | 4,462 | 0.016 | 20 | 566 |
| 22 | 96.38 | 399 | 3,701 | 0.013 | 17 | 494 |
| 21 | 92.50 | 740 | 6,331 | 0.022 | 29 | 918 |
| 20 | 87.50 | 760 | 5,817 | 0.020 | 26 | 942 |
| 19 | 82.50 | 780 | 5,306 | 0.018 | 24 | 967 |
| 18 | 77.50 | 799 | 4,801 | 0.017 | 22 | 991 |
| 17 | 72.50 | 819 | 4,306 | 0.015 | 20 | 1,016 |

| | | | | | | |
|---|---|---|---|---|---|---|
| 16 | 67.50 | 839 | 3,823 | 0.013 | 17 | 1,041 |
| 15 | 62.50 | 859 | 3,355 | 0.012 | 15 | 1,065 |
| 14 | 57.50 | 879 | 2,905 | 0.010 | 13 | 1,090 |
| 13 | 54.13 | 312 | 915 | 0.003 | 4 | 387 |
| 12 | 51.63 | 1,106 | 2,948 | 0.010 | 13 | 1,372 |
| 11 | 49.00 | 690 | 1,657 | 0.006 | 8 | 856 |
| 10 | 46.50 | 629 | 1,360 | 0.005 | 6 | 780 |
| 9 | 42.50 | 1,067 | 1,928 | 0.007 | 9 | 1,323 |
| 8 | 37.50 | 1,091 | 1,534 | 0.005 | 7 | 1,353 |
| 7 | 32.50 | 1,115 | 1,177 | 0.004 | 5 | 1,382 |
| 6 | 27.50 | 1,139 | 861 | 0.003 | 4 | 1,412 |
| 5 | 22.50 | 1,162 | 588 | 0.002 | 3 | 1,441 |
| 4 | 17.50 | 1,186 | 363 | 0.001 | 2 | 1,471 |
| 3 | 12.50 | 1,210 | 189 | 0.001 | 1 | 1,500 |
| 2 | 7.50 | 1,234 | 69 | 0.000 | 0 | 1,530 |
| 1 | 2.50 | 1,078 | 7 | 0.000 | 0 | 1,337 |
| DragonWave Horizon C | 149.00 | 32 | 706 | 0.002 | 3 | 39 |
| DragonWave A-ANT-23G | 149.00 | 15 | 333 | 0.001 | 2 | 19 |
| Alcatel-Lucent RRH2x | 149.00 | 317 | 7,047 | 0.025 | 32 | 394 |
| Alcatel-Lucent 1900 | 149.00 | 180 | 3,996 | 0.014 | 18 | 223 |
| Nokia 2.5G MAA - AAH | 149.00 | 311 | 6,900 | 0.024 | 31 | 385 |
| DragonWave A-ANT-11G | 149.00 | 54 | 1,199 | 0.004 | 5 | 67 |
| Commscope NNVV-65B-R | 149.00 | 232 | 5,155 | 0.018 | 23 | 288 |
| Flat T-Arm | 149.00 | 750 | 16,651 | 0.058 | 75 | 930 |
| Kathrein Smart Bias | 144.00 | 10 | 206 | 0.001 | 1 | 12 |
| Ericsson KRY 112 14 | 144.00 | 36 | 753 | 0.003 | 3 | 45 |
| Ericsson KRY 112 489 | 144.00 | 46 | 958 | 0.003 | 4 | 57 |
| Ericsson RRUS 11 B12 | 144.00 | 152 | 3,154 | 0.011 | 14 | 189 |
| Commscope SBNHH-1D65 | 144.00 | 101 | 2,084 | 0.007 | 9 | 125 |
| Ericsson AIR-32 B2A/ | 144.00 | 397 | 8,224 | 0.029 | 37 | 492 |
| Flat Low Profile Pla | 144.00 | 1,500 | 31,104 | 0.108 | 141 | 1,860 |
| RFS FD9R6004/2C-3L | 136.00 | 16 | 289 | 0.001 | 1 | 19 |
| Alcatel-Lucent RRH2x | 136.00 | 132 | 2,441 | 0.008 | 11 | 164 |
| Amphenol Antel BXA- | 136.00 | 45 | 832 | 0.003 | 4 | 56 |
| Antel BXA-185085/12C | 136.00 | 39 | 721 | 0.003 | 3 | 48 |
| RFS DB-T1-6Z-8AB-0Z | 136.00 | 44 | 814 | 0.003 | 4 | 55 |
| Andrew DB854DG65ESX | 136.00 | 56 | 1,027 | 0.004 | 5 | 69 |
| Commscope LNX-6514DS | 136.00 | 116 | 2,153 | 0.007 | 10 | 144 |
| Round Low Profile Pl | 136.00 | 1,500 | 27,744 | 0.097 | 126 | 1,860 |
| Raycap DC6-48-60-0-8 | 126.00 | 33 | 521 | 0.002 | 2 | 41 |
| Ericsson RRUS-11 800 | 126.00 | 162 | 2,572 | 0.009 | 12 | 201 |
| Ericsson RRUS 32 | 126.00 | 152 | 2,420 | 0.008 | 11 | 189 |
| CCI CCI-HPA-65R-BUU- | 126.00 | 204 | 3,239 | 0.011 | 15 | 253 |
| Round Platform w/ Ha | 126.00 | 2,000 | 31,752 | 0.110 | 144 | 2,480 |
| RFS APXV18-206517S-C | 115.00 | 79 | 1,047 | 0.004 | 5 | 98 |
| Proxim 5054-R-LR | 106.00 | 6 | 67 | 0.000 | 0 | 7 |
| 3' Dish w/ Radome | 106.00 | 100 | 1,124 | 0.004 | 5 | 124 |
| Flat Side Arm | 106.00 | 150 | 1,685 | 0.006 | 8 | 186 |
| | | 33,400 | 287,423 | 1.000 | 1,303 | 41,419 |

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) |
|---|---|---|---|---|---|---|
| 39 | 147.00 | 169 | 3,652 | 0.013 | 17 | 145 |
| 38 | 144.50 | 43 | 907 | 0.003 | 4 | 37 |
| 37 | 142.00 | 236 | 4,753 | 0.017 | 22 | 203 |
| 36 | 138.00 | 243 | 4,634 | 0.016 | 21 | 209 |
| 35 | 135.50 | 73 | 1,349 | 0.005 | 6 | 63 |
| 34 | 132.50 | 375 | 6,575 | 0.023 | 30 | 322 |

| | | | | | | |
|---|---|---|---|---|---|---|
| 33 | 128.00 | 308 | 5,049 | 0.018 | 23 | 265 |
| 32 | 125.50 | 87 | 1,371 | 0.005 | 6 | 75 |
| 31 | 122.50 | 442 | 6,639 | 0.023 | 30 | 380 |
| 30 | 118.97 | 186 | 2,632 | 0.009 | 12 | 160 |
| 29 | 116.47 | 268 | 3,640 | 0.013 | 16 | 231 |
| 28 | 112.50 | 491 | 6,212 | 0.022 | 28 | 422 |
| 27 | 108.00 | 401 | 4,680 | 0.016 | 21 | 345 |
| 26 | 105.50 | 102 | 1,130 | 0.004 | 5 | 87 |
| 25 | 103.25 | 359 | 3,828 | 0.013 | 17 | 309 |
| 24 | 100.75 | 301 | 3,052 | 0.011 | 14 | 259 |
| 23 | 98.88 | 456 | 4,462 | 0.016 | 20 | 392 |
| 22 | 96.38 | 399 | 3,701 | 0.013 | 17 | 343 |
| 21 | 92.50 | 740 | 6,331 | 0.022 | 29 | 636 |
| 20 | 87.50 | 760 | 5,817 | 0.020 | 26 | 653 |
| 19 | 82.50 | 780 | 5,306 | 0.018 | 24 | 670 |
| 18 | 77.50 | 799 | 4,801 | 0.017 | 22 | 687 |
| 17 | 72.50 | 819 | 4,306 | 0.015 | 20 | 704 |
| 16 | 67.50 | 839 | 3,823 | 0.013 | 17 | 721 |
| 15 | 62.50 | 859 | 3,355 | 0.012 | 15 | 739 |
| 14 | 57.50 | 879 | 2,905 | 0.010 | 13 | 756 |
| 13 | 54.13 | 312 | 915 | 0.003 | 4 | 268 |
| 12 | 51.63 | 1,106 | 2,948 | 0.010 | 13 | 951 |
| 11 | 49.00 | 690 | 1,657 | 0.006 | 8 | 593 |
| 10 | 46.50 | 629 | 1,360 | 0.005 | 6 | 541 |
| 9 | 42.50 | 1,067 | 1,928 | 0.007 | 9 | 918 |
| 8 | 37.50 | 1,091 | 1,534 | 0.005 | 7 | 938 |
| 7 | 32.50 | 1,115 | 1,177 | 0.004 | 5 | 959 |
| 6 | 27.50 | 1,139 | 861 | 0.003 | 4 | 979 |
| 5 | 22.50 | 1,162 | 588 | 0.002 | 3 | 999 |
| 4 | 17.50 | 1,186 | 363 | 0.001 | 2 | 1,020 |
| 3 | 12.50 | 1,210 | 189 | 0.001 | 1 | 1,040 |
| 2 | 7.50 | 1,234 | 69 | 0.000 | 0 | 1,061 |
| 1 | 2.50 | 1,078 | 7 | 0.000 | 0 | 927 |
| DragonWave Horizon C | 149.00 | 32 | 706 | 0.002 | 3 | 27 |
| DragonWave A-ANT-23G | 149.00 | 15 | 333 | 0.001 | 2 | 13 |
| Alcatel-Lucent RRH2x | 149.00 | 317 | 7,047 | 0.025 | 32 | 273 |
| Alcatel-Lucent 1900 | 149.00 | 180 | 3,996 | 0.014 | 18 | 155 |
| Nokia 2.5G MAA - AAH | 149.00 | 311 | 6,900 | 0.024 | 31 | 267 |
| DragonWave A-ANT-11G | 149.00 | 54 | 1,199 | 0.004 | 5 | 46 |
| Commscope NNVV-65B-R | 149.00 | 232 | 5,155 | 0.018 | 23 | 200 |
| Flat T-Arm | 149.00 | 750 | 16,651 | 0.058 | 75 | 645 |
| Kathrein Smart Bias | 144.00 | 10 | 206 | 0.001 | 1 | 9 |
| Ericsson KRY 112 14 | 144.00 | 36 | 753 | 0.003 | 3 | 31 |
| Ericsson KRY 112 489 | 144.00 | 46 | 958 | 0.003 | 4 | 40 |
| Ericsson RRUS 11 B12 | 144.00 | 152 | 3,154 | 0.011 | 14 | 131 |
| Commscope SBNHH-1D65 | 144.00 | 101 | 2,084 | 0.007 | 9 | 86 |
| Ericsson AIR-32 B2A/ | 144.00 | 397 | 8,224 | 0.029 | 37 | 341 |
| Flat Low Profile Pla | 144.00 | 1,500 | 31,104 | 0.108 | 141 | 1,290 |
| RFS FD9R6004/2C-3L | 136.00 | 16 | 289 | 0.001 | 1 | 13 |
| Alcatel-Lucent RRH2x | 136.00 | 132 | 2,441 | 0.008 | 11 | 114 |
| Amphenol Antel BXA- | 136.00 | 45 | 832 | 0.003 | 4 | 39 |
| Antel BXA-185085/12C | 136.00 | 39 | 721 | 0.003 | 3 | 34 |
| RFS DB-T1-6Z-8AB-0Z | 136.00 | 44 | 814 | 0.003 | 4 | 38 |
| Andrew DB854DG65ESX | 136.00 | 56 | 1,027 | 0.004 | 5 | 48 |
| Commscope LNX-6514DS | 136.00 | 116 | 2,153 | 0.007 | 10 | 100 |
| Round Low Profile Pl | 136.00 | 1,500 | 27,744 | 0.097 | 126 | 1,290 |
| Raycap DC6-48-60-0-8 | 126.00 | 33 | 521 | 0.002 | 2 | 28 |
| Ericsson RRUS-11 800 | 126.00 | 162 | 2,572 | 0.009 | 12 | 139 |
| Ericsson RRUS 32 | 126.00 | 152 | 2,420 | 0.008 | 11 | 131 |
| CCI CCI-HPA-65R-BUU- | 126.00 | 204 | 3,239 | 0.011 | 15 | 175 |
| Round Platform w/ Ha | 126.00 | 2,000 | 31,752 | 0.110 | 144 | 1,720 |
| RFS APXV18-206517S-C | 115.00 | 79 | 1,047 | 0.004 | 5 | 68 |
| Proxim 5054-R-LR | 106.00 | 6 | 67 | 0.000 | 0 | 5 |
| 3' Dish w/ Radome | 106.00 | 100 | 1,124 | 0.004 | 5 | 86 |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Flat Side Arm | 106.00 | 150 | 1,685 | 0.006 | 8 | 129 | |
| | | 33,400 | 287,423 | 1.000 | 1,303 | 28,720 | |


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 | -40.08 | -1.31 | 0.00 | -166.21 | 0.00 | 166.21 | 4,132.29 | 2,066.14 | 8,772.59 | 4,392.82 | 0.00 | 0.00 | 0.048 |
| 5.00 | -38.55 | -1.31 | 0.00 | -159.69 | 0.00 | 159.69 | 4,073.39 | 2,036.69 | 8,449.37 | 4,230.97 | 0.01 | -0.01 | 0.047 |
| 10.00 | -37.05 | -1.32 | 0.00 | -153.12 | 0.00 | 153.12 | 4,012.85 | 2,006.43 | 8,128.58 | 4,070.33 | 0.02 | -0.02 | 0.047 |
| 15.00 | -35.58 | -1.32 | 0.00 | -146.53 | 0.00 | 146.53 | 3,950.68 | 1,975.34 | 7,810.43 | 3,911.02 | 0.05 | -0.03 | 0.046 |
| 20.00 | -34.14 | -1.33 | 0.00 | -139.90 | 0.00 | 139.90 | 3,886.87 | 1,943.43 | 7,495.19 | 3,753.17 | 0.10 | -0.05 | 0.046 |
| 25.00 | -32.73 | -1.33 | 0.00 | -133.27 | 0.00 | 133.27 | 3,821.43 | 1,910.71 | 7,183.08 | 3,596.88 | 0.15 | -0.06 | 0.046 |
| 30.00 | -31.34 | -1.33 | 0.00 | -126.62 | 0.00 | 126.62 | 3,754.35 | 1,877.17 | 6,874.35 | 3,442.28 | 0.22 | -0.07 | 0.045 |
| 35.00 | -29.99 | -1.33 | 0.00 | -119.97 | 0.00 | 119.97 | 3,685.64 | 1,842.82 | 6,569.23 | 3,289.50 | 0.30 | -0.09 | 0.045 |
| 40.00 | -28.67 | -1.32 | 0.00 | -113.32 | 0.00 | 113.32 | 3,615.29 | 1,807.64 | 6,267.96 | 3,138.64 | 0.40 | -0.10 | 0.044 |
| 45.00 | -27.89 | -1.32 | 0.00 | -106.70 | 0.00 | 106.70 | 3,543.30 | 1,771.65 | 5,970.78 | 2,989.83 | 0.51 | -0.11 | 0.044 |
| 48.00 | -27.03 | -1.32 | 0.00 | -102.74 | 0.00 | 102.74 | 3,499.33 | 1,749.66 | 5,794.53 | 2,901.57 | 0.58 | -0.12 | 0.043 |
| 50.00 | -25.66 | -1.30 | 0.00 | -100.11 | 0.00 | 100.11 | 3,469.68 | 1,734.84 | 5,677.92 | 2,843.18 | 0.64 | -0.13 | 0.043 |
| 53.25 | -25.27 | -1.30 | 0.00 | -95.87 | 0.00 | 95.87 | 2,730.90 | 1,365.45 | 4,467.29 | 2,236.97 | 0.73 | -0.14 | 0.052 |
| 55.00 | -24.18 | -1.29 | 0.00 | -93.59 | 0.00 | 93.59 | 2,712.29 | 1,356.15 | 4,390.67 | 2,198.60 | 0.78 | -0.14 | 0.051 |
| 60.00 | -23.12 | -1.28 | 0.00 | -87.14 | 0.00 | 87.14 | 2,658.02 | 1,329.01 | 4,173.50 | 2,089.85 | 0.93 | -0.16 | 0.050 |
| 65.00 | -22.08 | -1.27 | 0.00 | -80.74 | 0.00 | 80.74 | 2,602.11 | 1,301.05 | 3,959.12 | 1,982.50 | 1.11 | -0.18 | 0.049 |
| 70.00 | -21.06 | -1.25 | 0.00 | -74.42 | 0.00 | 74.42 | 2,544.56 | 1,272.28 | 3,747.77 | 1,876.67 | 1.30 | -0.19 | 0.048 |
| 75.00 | -20.07 | -1.23 | 0.00 | -68.17 | 0.00 | 68.17 | 2,485.39 | 1,242.69 | 3,539.70 | 1,772.48 | 1.51 | -0.21 | 0.047 |
| 80.00 | -19.10 | -1.21 | 0.00 | -62.02 | 0.00 | 62.02 | 2,424.57 | 1,212.29 | 3,335.13 | 1,670.04 | 1.74 | -0.23 | 0.045 |
| 85.00 | -18.16 | -1.18 | 0.00 | -55.98 | 0.00 | 55.98 | 2,362.12 | 1,181.06 | 3,134.31 | 1,569.49 | 1.99 | -0.25 | 0.043 |
| 90.00 | -17.24 | -1.16 | 0.00 | -50.06 | 0.00 | 50.06 | 2,297.27 | 1,148.64 | 2,936.51 | 1,470.44 | 2.26 | -0.26 | 0.042 |
| 95.00 | -16.75 | -1.14 | 0.00 | -44.28 | 0.00 | 44.28 | 2,210.70 | 1,105.35 | 2,718.30 | 1,361.17 | 2.54 | -0.28 | 0.040 |
| 97.75 | -16.18 | -1.12 | 0.00 | -41.14 | 0.00 | 41.14 | 2,163.09 | 1,081.54 | 2,601.88 | 1,302.87 | 2.71 | -0.29 | 0.039 |
| 100.00 | -15.81 | -1.11 | 0.00 | -38.62 | 0.00 | 38.62 | 2,124.13 | 1,062.07 | 2,508.52 | 1,256.12 | 2.85 | -0.30 | 0.038 |
| 101.50 | -15.36 | -1.09 | 0.00 | -36.96 | 0.00 | 36.96 | 1,105.19 | 552.59 | 1,317.56 | 659.76 | 2.94 | -0.30 | 0.070 |
| 105.00 | -15.24 | -1.09 | 0.00 | -33.15 | 0.00 | 33.15 | 1,087.53 | 543.77 | 1,259.48 | 630.68 | 3.17 | -0.32 | 0.067 |
| 106.00 | -14.42 | -1.05 | 0.00 | -32.06 | 0.00 | 32.06 | 1,082.34 | 541.17 | 1,242.93 | 622.39 | 3.24 | -0.32 | 0.065 |
| 110.00 | -13.81 | -1.02 | 0.00 | -27.86 | 0.00 | 27.86 | 1,060.92 | 530.46 | 1,177.04 | 589.40 | 3.52 | -0.34 | 0.060 |
| 115.00 | -13.38 | -1.01 | 0.00 | -22.74 | 0.00 | 22.74 | 1,032.68 | 516.34 | 1,095.47 | 548.55 | 3.89 | -0.37 | 0.054 |
| 117.94 | -13.15 | -0.99 | 0.00 | -19.78 | 0.00 | 19.78 | 1,015.32 | 507.66 | 1,048.03 | 524.80 | 4.12 | -0.38 | 0.051 |
| 120.00 | -12.60 | -0.96 | 0.00 | -17.73 | 0.00 | 17.73 | 1,002.79 | 501.40 | 1,014.98 | 508.24 | 4.29 | -0.39 | 0.047 |
| 125.00 | -12.49 | -0.96 | 0.00 | -12.92 | 0.00 | 12.92 | 971.28 | 485.64 | 935.83 | 468.61 | 4.71 | -0.41 | 0.040 |
| 126.00 | -8.95 | -0.73 | 0.00 | -11.96 | 0.00 | 11.96 | 964.78 | 482.39 | 920.18 | 460.77 | 4.79 | -0.41 | 0.035 |
| 130.00 | -8.48 | -0.70 | 0.00 | -9.04 | 0.00 | 9.04 | 938.12 | 469.06 | 858.24 | 429.76 | 5.15 | -0.43 | 0.030 |
| 135.00 | -8.39 | -0.69 | 0.00 | -5.56 | 0.00 | 5.56 | 903.33 | 451.67 | 782.47 | 391.82 | 5.60 | -0.44 | 0.023 |
| 136.00 | -5.68 | -0.49 | 0.00 | -4.86 | 0.00 | 4.86 | 896.18 | 448.09 | 767.56 | 384.35 | 5.69 | -0.44 | 0.019 |
| 140.00 | -5.39 | -0.46 | 0.00 | -2.92 | 0.00 | 2.92 | 866.91 | 433.46 | 708.75 | 354.90 | 6.06 | -0.45 | 0.014 |
| 144.00 | -2.55 | -0.23 | 0.00 | -1.06 | 0.00 | 1.06 | 836.60 | 418.30 | 651.40 | 326.19 | 6.44 | -0.45 | 0.006 |
| 145.00 | -2.34 | -0.21 | 0.00 | -0.83 | 0.00 | 0.83 | 828.85 | 414.43 | 637.31 | 319.13 | 6.53 | -0.45 | 0.005 |
| 149.00 | 0.00 | -0.19 | 0.00 | 0.00 | 0.00 | 0.00 | 787.55 | 393.77 | 574.90 | 287.88 | 6.91 | -0.45 | 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 | -27.79 | -1.30 | 0.00 | -163.44 | 0.00 | 163.44 | 4,132.29 | 2,066.14 | 8,772.59 | 4,392.82 | 0.00 | 0.00 | 0.044 |
| 5.00 | -26.73 | -1.31 | 0.00 | -156.91 | 0.00 | 156.91 | 4,073.39 | 2,036.69 | 8,449.37 | 4,230.97 | 0.01 | -0.01 | 0.044 |
| 10.00 | -25.69 | -1.31 | 0.00 | -150.37 | 0.00 | 150.37 | 4,012.85 | 2,006.43 | 8,128.58 | 4,070.33 | 0.02 | -0.02 | 0.043 |
| 15.00 | -24.67 | -1.32 | 0.00 | -143.80 | 0.00 | 143.80 | 3,950.68 | 1,975.34 | 7,810.43 | 3,911.02 | 0.05 | -0.03 | 0.043 |
| 20.00 | -23.67 | -1.32 | 0.00 | -137.22 | 0.00 | 137.22 | 3,886.87 | 1,943.43 | 7,495.19 | 3,753.17 | 0.10 | -0.05 | 0.043 |
| 25.00 | -22.69 | -1.32 | 0.00 | -130.63 | 0.00 | 130.63 | 3,821.43 | 1,910.71 | 7,183.08 | 3,596.88 | 0.15 | -0.06 | 0.042 |
| 30.00 | -21.73 | -1.32 | 0.00 | -124.04 | 0.00 | 124.04 | 3,754.35 | 1,877.17 | 6,874.35 | 3,442.28 | 0.22 | -0.07 | 0.042 |
| 35.00 | -20.79 | -1.31 | 0.00 | -117.46 | 0.00 | 117.46 | 3,685.64 | 1,842.82 | 6,569.23 | 3,289.50 | 0.30 | -0.08 | 0.041 |
| 40.00 | -19.88 | -1.31 | 0.00 | -110.89 | 0.00 | 110.89 | 3,615.29 | 1,807.64 | 6,267.96 | 3,138.64 | 0.39 | -0.10 | 0.041 |
| 45.00 | -19.34 | -1.30 | 0.00 | -104.36 | 0.00 | 104.36 | 3,543.30 | 1,771.65 | 5,970.78 | 2,989.83 | 0.50 | -0.11 | 0.040 |
| 48.00 | -18.74 | -1.30 | 0.00 | -100.45 | 0.00 | 100.45 | 3,499.33 | 1,749.66 | 5,794.53 | 2,901.57 | 0.57 | -0.12 | 0.040 |
| 50.00 | -17.79 | -1.28 | 0.00 | -97.85 | 0.00 | 97.85 | 3,469.68 | 1,734.84 | 5,677.92 | 2,843.18 | 0.62 | -0.12 | 0.040 |
| 53.25 | -17.52 | -1.28 | 0.00 | -93.68 | 0.00 | 93.68 | 2,730.90 | 1,365.45 | 4,467.29 | 2,236.97 | 0.71 | -0.13 | 0.048 |
| 55.00 | -16.77 | -1.27 | 0.00 | -91.43 | 0.00 | 91.43 | 2,712.29 | 1,356.15 | 4,390.67 | 2,198.60 | 0.76 | -0.14 | 0.048 |
| 60.00 | -16.03 | -1.26 | 0.00 | -85.08 | 0.00 | 85.08 | 2,658.02 | 1,329.01 | 4,173.50 | 2,089.85 | 0.92 | -0.16 | 0.047 |
| 65.00 | -15.31 | -1.24 | 0.00 | -78.79 | 0.00 | 78.79 | 2,602.11 | 1,301.05 | 3,959.12 | 1,982.50 | 1.09 | -0.17 | 0.046 |
| 70.00 | -14.60 | -1.23 | 0.00 | -72.58 | 0.00 | 72.58 | 2,544.56 | 1,272.28 | 3,747.77 | 1,876.67 | 1.28 | -0.19 | 0.044 |
| 75.00 | -13.91 | -1.21 | 0.00 | -66.45 | 0.00 | 66.45 | 2,485.39 | 1,242.69 | 3,539.70 | 1,772.48 | 1.48 | -0.21 | 0.043 |
| 80.00 | -13.24 | -1.18 | 0.00 | -60.43 | 0.00 | 60.43 | 2,424.57 | 1,212.29 | 3,335.13 | 1,670.04 | 1.71 | -0.22 | 0.042 |
| 85.00 | -12.59 | -1.16 | 0.00 | -54.51 | 0.00 | 54.51 | 2,362.12 | 1,181.06 | 3,134.31 | 1,569.49 | 1.95 | -0.24 | 0.040 |
| 90.00 | -11.95 | -1.13 | 0.00 | -48.72 | 0.00 | 48.72 | 2,297.27 | 1,148.64 | 2,936.51 | 1,470.44 | 2.21 | -0.26 | 0.038 |
| 95.00 | -11.61 | -1.11 | 0.00 | -43.07 | 0.00 | 43.07 | 2,210.70 | 1,105.35 | 2,718.30 | 1,361.17 | 2.49 | -0.27 | 0.037 |
| 97.75 | -11.22 | -1.09 | 0.00 | -40.01 | 0.00 | 40.01 | 2,163.09 | 1,081.54 | 2,601.88 | 1,302.87 | 2.65 | -0.28 | 0.036 |
| 100.00 | -10.96 | -1.08 | 0.00 | -37.55 | 0.00 | 37.55 | 2,124.13 | 1,062.07 | 2,508.52 | 1,256.12 | 2.79 | -0.29 | 0.035 |
| 101.50 | -10.65 | -1.06 | 0.00 | -35.93 | 0.00 | 35.93 | 1,105.19 | 552.59 | 1,317.56 | 659.76 | 2.88 | -0.30 | 0.064 |
| 105.00 | -10.56 | -1.06 | 0.00 | -32.21 | 0.00 | 32.21 | 1,087.53 | 543.77 | 1,259.48 | 630.68 | 3.10 | -0.31 | 0.061 |
| 106.00 | -10.00 | -1.02 | 0.00 | -31.15 | 0.00 | 31.15 | 1,082.34 | 541.17 | 1,242.93 | 622.39 | 3.17 | -0.31 | 0.059 |
| 110.00 | -9.58 | -1.00 | 0.00 | -27.06 | 0.00 | 27.06 | 1,060.92 | 530.46 | 1,177.04 | 589.40 | 3.44 | -0.33 | 0.055 |
| 115.00 | -9.28 | -0.98 | 0.00 | -22.07 | 0.00 | 22.07 | 1,032.68 | 516.34 | 1,095.47 | 548.55 | 3.81 | -0.36 | 0.049 |
| 117.94 | -9.12 | -0.97 | 0.00 | -19.20 | 0.00 | 19.20 | 1,015.32 | 507.66 | 1,048.03 | 524.80 | 4.03 | -0.37 | 0.046 |
| 120.00 | -8.74 | -0.94 | 0.00 | -17.21 | 0.00 | 17.21 | 1,002.79 | 501.40 | 1,014.98 | 508.24 | 4.19 | -0.38 | 0.043 |
| 125.00 | -8.66 | -0.93 | 0.00 | -12.54 | 0.00 | 12.54 | 971.28 | 485.64 | 935.83 | 468.61 | 4.60 | -0.40 | 0.036 |
| 126.00 | -6.20 | -0.71 | 0.00 | -11.61 | 0.00 | 11.61 | 964.78 | 482.39 | 920.18 | 460.77 | 4.69 | -0.40 | 0.032 |
| 130.00 | -5.88 | -0.68 | 0.00 | -8.78 | 0.00 | 8.78 | 938.12 | 469.06 | 858.24 | 429.76 | 5.03 | -0.42 | 0.027 |
| 135.00 | -5.82 | -0.67 | 0.00 | -5.39 | 0.00 | 5.39 | 903.33 | 451.67 | 782.47 | 391.82 | 5.47 | -0.43 | 0.020 |
| 136.00 | -3.94 | -0.47 | 0.00 | -4.72 | 0.00 | 4.72 | 896.18 | 448.09 | 767.56 | 384.35 | 5.56 | -0.43 | 0.017 |
| 140.00 | -3.73 | -0.45 | 0.00 | -2.83 | 0.00 | 2.83 | 866.91 | 433.46 | 708.75 | 354.90 | 5.93 | -0.44 | 0.012 |
| 144.00 | -1.77 | -0.22 | 0.00 | -1.03 | 0.00 | 1.03 | 836.60 | 418.30 | 651.40 | 326.19 | 6.29 | -0.44 | 0.005 |
| 145.00 | -1.62 | -0.20 | 0.00 | -0.81 | 0.00 | 0.81 | 828.85 | 414.43 | 637.31 | 319.13 | 6.39 | -0.44 | 0.005 |
| 149.00 | 0.00 | -0.19 | 0.00 | 0.00 | 0.00 | 0.00 | 787.55 | 393.77 | 574.90 | 287.88 | 6.75 | -0.44 | 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 ($S_s$): | 0.19 |
| 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 ($S_{ds}$): | 0.20 |
| Desing Spectral Response Acceleration at 1.0 Second Period ($S_{d1}$): | 0.10 |
| Period Based on Rayleigh Method (sec): | 2.54 |
| 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) |
|---|---|---|---|---|---|---|---|---|
| 39 | 147.00 | 169 | 1.840 | 1.725 | 1.047 | 0.345 | 51 | 210 |
| 38 | 144.50 | 43 | 1.778 | 1.438 | 0.939 | 0.305 | 12 | 54 |
| 37 | 142.00 | 236 | 1.717 | 1.186 | 0.840 | 0.268 | 55 | 292 |
| 36 | 138.00 | 243 | 1.621 | 0.846 | 0.699 | 0.212 | 45 | 302 |
| 35 | 135.50 | 73 | 1.563 | 0.669 | 0.621 | 0.180 | 11 | 91 |
| 34 | 132.50 | 375 | 1.495 | 0.488 | 0.536 | 0.144 | 47 | 464 |
| 33 | 128.00 | 308 | 1.395 | 0.274 | 0.426 | 0.096 | 26 | 382 |
| 32 | 125.50 | 87 | 1.341 | 0.181 | 0.373 | 0.072 | 5 | 108 |
| 31 | 122.50 | 442 | 1.278 | 0.091 | 0.317 | 0.047 | 18 | 549 |
| 30 | 118.97 | 186 | 1.205 | 0.009 | 0.258 | 0.020 | 3 | 231 |
| 29 | 116.47 | 268 | 1.155 | -0.034 | 0.222 | 0.004 | 1 | 333 |
| 28 | 112.50 | 491 | 1.077 | -0.082 | 0.173 | -0.018 | -8 | 609 |
| 27 | 108.00 | 401 | 0.993 | -0.112 | 0.128 | -0.036 | -13 | 498 |
| 26 | 105.50 | 102 | 0.948 | -0.119 | 0.107 | -0.044 | -4 | 126 |
| 25 | 103.25 | 359 | 0.908 | -0.122 | 0.090 | -0.049 | -15 | 445 |
| 24 | 100.75 | 301 | 0.864 | -0.120 | 0.074 | -0.053 | -14 | 373 |
| 23 | 98.88 | 456 | 0.832 | -0.117 | 0.064 | -0.054 | -21 | 566 |
| 22 | 96.38 | 399 | 0.791 | -0.110 | 0.051 | -0.054 | -19 | 494 |
| 21 | 92.50 | 740 | 0.728 | -0.095 | 0.036 | -0.050 | -32 | 918 |
| 20 | 87.50 | 760 | 0.652 | -0.071 | 0.021 | -0.038 | -25 | 942 |
| 19 | 82.50 | 780 | 0.579 | -0.045 | 0.012 | -0.021 | -14 | 967 |
| 18 | 77.50 | 799 | 0.511 | -0.020 | 0.008 | -0.001 | -1 | 991 |
| 17 | 72.50 | 819 | 0.447 | 0.002 | 0.006 | 0.019 | 13 | 1,016 |
| 16 | 67.50 | 839 | 0.388 | 0.022 | 0.007 | 0.035 | 25 | 1,041 |
| 15 | 62.50 | 859 | 0.333 | 0.037 | 0.010 | 0.046 | 34 | 1,065 |
| 14 | 57.50 | 879 | 0.281 | 0.049 | 0.014 | 0.053 | 40 | 1,090 |
| 13 | 54.13 | 312 | 0.249 | 0.055 | 0.017 | 0.055 | 15 | 387 |
| 12 | 51.63 | 1,106 | 0.227 | 0.059 | 0.020 | 0.057 | 54 | 1,372 |
| 11 | 49.00 | 690 | 0.204 | 0.062 | 0.023 | 0.057 | 34 | 856 |
| 10 | 46.50 | 629 | 0.184 | 0.065 | 0.025 | 0.057 | 31 | 780 |
| 9 | 42.50 | 1,067 | 0.154 | 0.068 | 0.030 | 0.057 | 52 | 1,323 |
| 8 | 37.50 | 1,091 | 0.120 | 0.070 | 0.034 | 0.056 | 53 | 1,353 |
| 7 | 32.50 | 1,115 | 0.090 | 0.071 | 0.038 | 0.054 | 52 | 1,382 |
| 6 | 27.50 | 1,139 | 0.064 | 0.072 | 0.041 | 0.053 | 52 | 1,412 |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 5 | 22.50 | 1,162 | 0.043 | 0.071 | 0.042 | 0.051 | 52 | 1,441 |
| 4 | 17.50 | 1,186 | 0.026 | 0.067 | 0.040 | 0.049 | 50 | 1,471 |
| 3 | 12.50 | 1,210 | 0.013 | 0.059 | 0.034 | 0.044 | 46 | 1,500 |
| 2 | 7.50 | 1,234 | 0.005 | 0.044 | 0.025 | 0.035 | 38 | 1,530 |
| 1 | 2.50 | 1,078 | 0.001 | 0.018 | 0.010 | 0.017 | 16 | 1,337 |
| DragonWave Horizon C | 149.00 | 32 | 1.890 | 1.980 | 1.140 | 0.379 | 10 | 39 |
| DragonWave A-ANT-23G | 149.00 | 15 | 1.890 | 1.980 | 1.140 | 0.379 | 5 | 19 |
| Alcatel-Lucent RRH2x | 149.00 | 317 | 1.890 | 1.980 | 1.140 | 0.379 | 104 | 394 |
| Alcatel-Lucent 1900 | 149.00 | 180 | 1.890 | 1.980 | 1.140 | 0.379 | 59 | 223 |
| Nokia 2.5G MAA - AAH | 149.00 | 311 | 1.890 | 1.980 | 1.140 | 0.379 | 102 | 385 |
| DragonWave A-ANT-11G | 149.00 | 54 | 1.890 | 1.980 | 1.140 | 0.379 | 18 | 67 |
| Commscope NNVV- | 149.00 | 232 | 1.890 | 1.980 | 1.140 | 0.379 | 76 | 288 |
| Flat T-Arm | 149.00 | 750 | 1.890 | 1.980 | 1.140 | 0.379 | 246 | 930 |
| Kathrein Smart Bias | 144.00 | 10 | 1.765 | 1.385 | 0.919 | 0.298 | 3 | 12 |
| Ericsson KRY 112 14 | 144.00 | 36 | 1.765 | 1.385 | 0.919 | 0.298 | 9 | 45 |
| Ericsson KRY 112 489 | 144.00 | 46 | 1.765 | 1.385 | 0.919 | 0.298 | 12 | 57 |
| Ericsson RRUS 11 B12 | 144.00 | 152 | 1.765 | 1.385 | 0.919 | 0.298 | 39 | 189 |
| Commscope SBNHH- | 144.00 | 101 | 1.765 | 1.385 | 0.919 | 0.298 | 26 | 125 |
| Ericsson AIR-32 B2A/ | 144.00 | 397 | 1.765 | 1.385 | 0.919 | 0.298 | 102 | 492 |
| Flat Low Profile Pla | 144.00 | 1,500 | 1.765 | 1.385 | 0.919 | 0.298 | 387 | 1,860 |
| RFS FD9R6004/2C-3L | 136.00 | 16 | 1.575 | 0.702 | 0.636 | 0.186 | 3 | 19 |
| Alcatel-Lucent RRH2x | 136.00 | 132 | 1.575 | 0.702 | 0.636 | 0.186 | 21 | 164 |
| Amphenol Antel BXA- | 136.00 | 45 | 1.575 | 0.702 | 0.636 | 0.186 | 7 | 56 |
| Antel BXA-185085/12C | 136.00 | 39 | 1.575 | 0.702 | 0.636 | 0.186 | 6 | 48 |
| RFS DB-T1-6Z-8AB-0Z | 136.00 | 44 | 1.575 | 0.702 | 0.636 | 0.186 | 7 | 55 |
| Andrew DB854DG65ESX | 136.00 | 56 | 1.575 | 0.702 | 0.636 | 0.186 | 9 | 69 |
| Commscope LNX- | 136.00 | 116 | 1.575 | 0.702 | 0.636 | 0.186 | 19 | 144 |
| Round Low Profile Pl | 136.00 | 1,500 | 1.575 | 0.702 | 0.636 | 0.186 | 242 | 1,860 |
| Raycap DC6-48-60-0-8 | 126.00 | 33 | 1.352 | 0.198 | 0.384 | 0.077 | 2 | 41 |
| Ericsson RRUS-11 800 | 126.00 | 162 | 1.352 | 0.198 | 0.384 | 0.077 | 11 | 201 |
| Ericsson RRUS 32 | 126.00 | 152 | 1.352 | 0.198 | 0.384 | 0.077 | 10 | 189 |
| CCI CCI-HPA-65R-BUU- | 126.00 | 204 | 1.352 | 0.198 | 0.384 | 0.077 | 14 | 253 |
| Round Platform w/ Ha | 126.00 | 2,000 | 1.352 | 0.198 | 0.384 | 0.077 | 134 | 2,480 |
| RFS APXV18-206517S-C | 115.00 | 79 | 1.126 | -0.054 | 0.203 | -0.005 | 0 | 98 |
| Proxim 5054-R-LR | 106.00 | 6 | 0.957 | -0.118 | 0.111 | -0.043 | 0 | 7 |
| 3' Dish w/ Radome | 106.00 | 100 | 0.957 | -0.118 | 0.111 | -0.043 | -4 | 124 |
| Flat Side Arm | 106.00 | 150 | 0.957 | -0.118 | 0.111 | -0.043 | -6 | 186 |
| | | 33,400 | 78.926 | 38.487 | 30.553 | 8.928 | 2,441 | 41,419 |

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) |
|---|---|---|---|---|---|---|---|---|
| 39 | 147.00 | 169 | 1.840 | 1.725 | 1.047 | 0.345 | 51 | 145 |
| 38 | 144.50 | 43 | 1.778 | 1.438 | 0.939 | 0.305 | 12 | 37 |
| 37 | 142.00 | 236 | 1.717 | 1.186 | 0.840 | 0.268 | 55 | 203 |
| 36 | 138.00 | 243 | 1.621 | 0.846 | 0.699 | 0.212 | 45 | 209 |
| 35 | 135.50 | 73 | 1.563 | 0.669 | 0.621 | 0.180 | 11 | 63 |
| 34 | 132.50 | 375 | 1.495 | 0.488 | 0.536 | 0.144 | 47 | 322 |
| 33 | 128.00 | 308 | 1.395 | 0.274 | 0.426 | 0.096 | 26 | 265 |
| 32 | 125.50 | 87 | 1.341 | 0.181 | 0.373 | 0.072 | 5 | 75 |
| 31 | 122.50 | 442 | 1.278 | 0.091 | 0.317 | 0.047 | 18 | 380 |
| 30 | 118.97 | 186 | 1.205 | 0.009 | 0.258 | 0.020 | 3 | 160 |
| 29 | 116.47 | 268 | 1.155 | -0.034 | 0.222 | 0.004 | 1 | 231 |
| 28 | 112.50 | 491 | 1.077 | -0.082 | 0.173 | -0.018 | -8 | 422 |
| 27 | 108.00 | 401 | 0.993 | -0.112 | 0.128 | -0.036 | -13 | 345 |
| 26 | 105.50 | 102 | 0.948 | -0.119 | 0.107 | -0.044 | -4 | 87 |
| 25 | 103.25 | 359 | 0.908 | -0.122 | 0.090 | -0.049 | -15 | 309 |
| 24 | 100.75 | 301 | 0.864 | -0.120 | 0.074 | -0.053 | -14 | 259 |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 23 | 98.88 | 456 | 0.832 | -0.117 | 0.064 | -0.054 | -21 | 392 |
| 22 | 96.38 | 399 | 0.791 | -0.110 | 0.051 | -0.054 | -19 | 343 |
| 21 | 92.50 | 740 | 0.728 | -0.095 | 0.036 | -0.050 | -32 | 636 |
| 20 | 87.50 | 760 | 0.652 | -0.071 | 0.021 | -0.038 | -25 | 653 |
| 19 | 82.50 | 780 | 0.579 | -0.045 | 0.012 | -0.021 | -14 | 670 |
| 18 | 77.50 | 799 | 0.511 | -0.020 | 0.008 | -0.001 | -1 | 687 |
| 17 | 72.50 | 819 | 0.447 | 0.002 | 0.006 | 0.019 | 13 | 704 |
| 16 | 67.50 | 839 | 0.388 | 0.022 | 0.007 | 0.035 | 25 | 721 |
| 15 | 62.50 | 859 | 0.333 | 0.037 | 0.010 | 0.046 | 34 | 739 |
| 14 | 57.50 | 879 | 0.281 | 0.049 | 0.014 | 0.053 | 40 | 756 |
| 13 | 54.13 | 312 | 0.249 | 0.055 | 0.017 | 0.055 | 15 | 268 |
| 12 | 51.63 | 1,106 | 0.227 | 0.059 | 0.020 | 0.057 | 54 | 951 |
| 11 | 49.00 | 690 | 0.204 | 0.062 | 0.023 | 0.057 | 34 | 593 |
| 10 | 46.50 | 629 | 0.184 | 0.065 | 0.025 | 0.057 | 31 | 541 |
| 9 | 42.50 | 1,067 | 0.154 | 0.068 | 0.030 | 0.057 | 52 | 918 |
| 8 | 37.50 | 1,091 | 0.120 | 0.070 | 0.034 | 0.056 | 53 | 938 |
| 7 | 32.50 | 1,115 | 0.090 | 0.071 | 0.038 | 0.054 | 52 | 959 |
| 6 | 27.50 | 1,139 | 0.064 | 0.072 | 0.041 | 0.053 | 52 | 979 |
| 5 | 22.50 | 1,162 | 0.043 | 0.071 | 0.042 | 0.051 | 52 | 999 |
| 4 | 17.50 | 1,186 | 0.026 | 0.067 | 0.040 | 0.049 | 50 | 1,020 |
| 3 | 12.50 | 1,210 | 0.013 | 0.059 | 0.034 | 0.044 | 46 | 1,040 |
| 2 | 7.50 | 1,234 | 0.005 | 0.044 | 0.025 | 0.035 | 38 | 1,061 |
| 1 | 2.50 | 1,078 | 0.001 | 0.018 | 0.010 | 0.017 | 16 | 927 |
| DragonWave Horizon C | 149.00 | 32 | 1.890 | 1.980 | 1.140 | 0.379 | 10 | 27 |
| DragonWave A-ANT-23G | 149.00 | 15 | 1.890 | 1.980 | 1.140 | 0.379 | 5 | 13 |
| Alcatel-Lucent RRH2x | 149.00 | 317 | 1.890 | 1.980 | 1.140 | 0.379 | 104 | 273 |
| Alcatel-Lucent 1900 | 149.00 | 180 | 1.890 | 1.980 | 1.140 | 0.379 | 59 | 155 |
| Nokia 2.5G MAA - AAH | 149.00 | 311 | 1.890 | 1.980 | 1.140 | 0.379 | 102 | 267 |
| DragonWave A-ANT-11G | 149.00 | 54 | 1.890 | 1.980 | 1.140 | 0.379 | 18 | 46 |
| Commscope NNVV- | 149.00 | 232 | 1.890 | 1.980 | 1.140 | 0.379 | 76 | 200 |
| Flat T-Arm | 149.00 | 750 | 1.890 | 1.980 | 1.140 | 0.379 | 246 | 645 |
| Kathrein Smart Bias | 144.00 | 10 | 1.765 | 1.385 | 0.919 | 0.298 | 3 | 9 |
| Ericsson KRY 112 14 | 144.00 | 36 | 1.765 | 1.385 | 0.919 | 0.298 | 9 | 31 |
| Ericsson KRY 112 489 | 144.00 | 46 | 1.765 | 1.385 | 0.919 | 0.298 | 12 | 40 |
| Ericsson RRUS 11 B12 | 144.00 | 152 | 1.765 | 1.385 | 0.919 | 0.298 | 39 | 131 |
| Commscope SBNHH- | 144.00 | 101 | 1.765 | 1.385 | 0.919 | 0.298 | 26 | 86 |
| Ericsson AIR-32 B2A/ | 144.00 | 397 | 1.765 | 1.385 | 0.919 | 0.298 | 102 | 341 |
| Flat Low Profile Pla | 144.00 | 1,500 | 1.765 | 1.385 | 0.919 | 0.298 | 387 | 1,290 |
| RFS FD9R6004/2C-3L | 136.00 | 16 | 1.575 | 0.702 | 0.636 | 0.186 | 3 | 13 |
| Alcatel-Lucent RRH2x | 136.00 | 132 | 1.575 | 0.702 | 0.636 | 0.186 | 21 | 114 |
| Amphenol Antel BXA- | 136.00 | 45 | 1.575 | 0.702 | 0.636 | 0.186 | 7 | 39 |
| Antel BXA-185085/12C | 136.00 | 39 | 1.575 | 0.702 | 0.636 | 0.186 | 6 | 34 |
| RFS DB-T1-6Z-8AB-0Z | 136.00 | 44 | 1.575 | 0.702 | 0.636 | 0.186 | 7 | 38 |
| Andrew DB854DG65ESX | 136.00 | 56 | 1.575 | 0.702 | 0.636 | 0.186 | 9 | 48 |
| Commscope LNX- | 136.00 | 116 | 1.575 | 0.702 | 0.636 | 0.186 | 19 | 100 |
| Round Low Profile Pl | 136.00 | 1,500 | 1.575 | 0.702 | 0.636 | 0.186 | 242 | 1,290 |
| Raycap DC6-48-60-0-8 | 126.00 | 33 | 1.352 | 0.198 | 0.384 | 0.077 | 2 | 28 |
| Ericsson RRUS-11 800 | 126.00 | 162 | 1.352 | 0.198 | 0.384 | 0.077 | 11 | 139 |
| Ericsson RRUS 32 | 126.00 | 152 | 1.352 | 0.198 | 0.384 | 0.077 | 10 | 131 |
| CCI CCI-HPA-65R-BUU- | 126.00 | 204 | 1.352 | 0.198 | 0.384 | 0.077 | 14 | 175 |
| Round Platform w/ Ha | 126.00 | 2,000 | 1.352 | 0.198 | 0.384 | 0.077 | 134 | 1,720 |
| RFS APXV18-206517S-C | 115.00 | 79 | 1.126 | -0.054 | 0.203 | -0.005 | 0 | 68 |
| Proxim 5054-R-LR | 106.00 | 6 | 0.957 | -0.118 | 0.111 | -0.043 | 0 | 5 |
| 3' Dish w/ Radome | 106.00 | 100 | 0.957 | -0.118 | 0.111 | -0.043 | -4 | 86 |
| Flat Side Arm | 106.00 | 150 | 0.957 | -0.118 | 0.111 | -0.043 | -6 | 129 |
| | | 33,400 | 78.926 | 38.487 | 30.553 | 8.928 | 2,441 | 28,720 |

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 | -40.08 | -2.43 | 0.00 | -299.57 | 0.00 | 299.57 | 4,132.29 | 2,066.14 | 8,772.59 | 4,392.82 | 0.00 | 0.00 | 0.078 |
| 5.00 | -38.55 | -2.41 | 0.00 | -287.41 | 0.00 | 287.41 | 4,073.39 | 2,036.69 | 8,449.37 | 4,230.97 | 0.01 | -0.02 | 0.077 |
| 10.00 | -37.05 | -2.37 | 0.00 | -275.38 | 0.00 | 275.38 | 4,012.85 | 2,006.43 | 8,128.58 | 4,070.33 | 0.04 | -0.04 | 0.077 |
| 15.00 | -35.58 | -2.34 | 0.00 | -263.51 | 0.00 | 263.51 | 3,950.68 | 1,975.34 | 7,810.43 | 3,911.02 | 0.10 | -0.06 | 0.076 |
| 20.00 | -34.14 | -2.30 | 0.00 | -251.83 | 0.00 | 251.83 | 3,886.87 | 1,943.43 | 7,495.19 | 3,753.17 | 0.17 | -0.08 | 0.076 |
| 25.00 | -32.72 | -2.25 | 0.00 | -240.35 | 0.00 | 240.35 | 3,821.43 | 1,910.71 | 7,183.08 | 3,596.88 | 0.27 | -0.11 | 0.075 |
| 30.00 | -31.34 | -2.21 | 0.00 | -229.08 | 0.00 | 229.08 | 3,754.35 | 1,877.17 | 6,874.35 | 3,442.28 | 0.40 | -0.13 | 0.075 |
| 35.00 | -29.99 | -2.17 | 0.00 | -218.03 | 0.00 | 218.03 | 3,685.64 | 1,842.82 | 6,569.23 | 3,289.50 | 0.55 | -0.15 | 0.074 |
| 40.00 | -28.66 | -2.12 | 0.00 | -207.19 | 0.00 | 207.19 | 3,615.29 | 1,807.64 | 6,267.96 | 3,138.64 | 0.72 | -0.18 | 0.074 |
| 45.00 | -27.88 | -2.10 | 0.00 | -196.56 | 0.00 | 196.56 | 3,543.30 | 1,771.65 | 5,970.78 | 2,989.83 | 0.92 | -0.20 | 0.074 |
| 48.00 | -27.03 | -2.07 | 0.00 | -190.26 | 0.00 | 190.26 | 3,499.33 | 1,749.66 | 5,794.53 | 2,901.57 | 1.05 | -0.22 | 0.073 |
| 50.00 | -25.65 | -2.02 | 0.00 | -186.12 | 0.00 | 186.12 | 3,469.68 | 1,734.84 | 5,677.92 | 2,843.18 | 1.15 | -0.23 | 0.073 |
| 53.25 | -25.27 | -2.01 | 0.00 | -179.57 | 0.00 | 179.57 | 2,730.90 | 1,365.45 | 4,467.29 | 2,236.97 | 1.31 | -0.25 | 0.090 |
| 55.00 | -24.18 | -1.97 | 0.00 | -176.06 | 0.00 | 176.06 | 2,712.29 | 1,356.15 | 4,390.67 | 2,198.60 | 1.40 | -0.26 | 0.089 |
| 60.00 | -23.11 | -1.94 | 0.00 | -166.21 | 0.00 | 166.21 | 2,658.02 | 1,329.01 | 4,173.50 | 2,089.85 | 1.69 | -0.29 | 0.088 |
| 65.00 | -22.07 | -1.93 | 0.00 | -156.49 | 0.00 | 156.49 | 2,602.11 | 1,301.05 | 3,959.12 | 1,982.50 | 2.01 | -0.32 | 0.087 |
| 70.00 | -21.05 | -1.92 | 0.00 | -146.87 | 0.00 | 146.87 | 2,544.56 | 1,272.28 | 3,747.77 | 1,876.67 | 2.37 | -0.36 | 0.087 |
| 75.00 | -20.06 | -1.93 | 0.00 | -137.27 | 0.00 | 137.27 | 2,485.39 | 1,242.69 | 3,539.70 | 1,772.48 | 2.76 | -0.39 | 0.086 |
| 80.00 | -19.09 | -1.95 | 0.00 | -127.64 | 0.00 | 127.64 | 2,424.57 | 1,212.29 | 3,335.13 | 1,670.04 | 3.19 | -0.43 | 0.084 |
| 85.00 | -18.15 | -1.97 | 0.00 | -117.92 | 0.00 | 117.92 | 2,362.12 | 1,181.06 | 3,134.31 | 1,569.49 | 3.65 | -0.46 | 0.083 |
| 90.00 | -17.23 | -2.01 | 0.00 | -108.05 | 0.00 | 108.05 | 2,297.27 | 1,148.64 | 2,936.51 | 1,470.44 | 4.16 | -0.50 | 0.081 |
| 95.00 | -16.73 | -2.03 | 0.00 | -97.99 | 0.00 | 97.99 | 2,210.70 | 1,105.35 | 2,718.30 | 1,361.17 | 4.71 | -0.54 | 0.080 |
| 97.75 | -16.17 | -2.06 | 0.00 | -92.40 | 0.00 | 92.40 | 2,163.09 | 1,081.54 | 2,601.88 | 1,302.87 | 5.03 | -0.56 | 0.078 |
| 100.00 | -15.79 | -2.07 | 0.00 | -87.78 | 0.00 | 87.78 | 2,124.13 | 1,062.07 | 2,508.52 | 1,256.12 | 5.30 | -0.58 | 0.077 |
| 101.50 | -15.35 | -2.09 | 0.00 | -84.67 | 0.00 | 84.67 | 1,105.19 | 552.59 | 1,317.56 | 659.76 | 5.48 | -0.59 | 0.142 |
| 105.00 | -15.22 | -2.09 | 0.00 | -77.37 | 0.00 | 77.37 | 1,087.53 | 543.77 | 1,259.48 | 630.68 | 5.93 | -0.62 | 0.137 |
| 106.00 | -14.40 | -2.11 | 0.00 | -75.28 | 0.00 | 75.28 | 1,082.34 | 541.17 | 1,242.93 | 622.39 | 6.06 | -0.63 | 0.134 |
| 110.00 | -13.79 | -2.13 | 0.00 | -66.82 | 0.00 | 66.82 | 1,060.92 | 530.46 | 1,177.04 | 589.40 | 6.61 | -0.68 | 0.126 |
| 115.00 | -13.36 | -2.13 | 0.00 | -56.18 | 0.00 | 56.18 | 1,032.68 | 516.34 | 1,095.47 | 548.55 | 7.36 | -0.74 | 0.115 |
| 117.94 | -13.13 | -2.13 | 0.00 | -49.91 | 0.00 | 49.91 | 1,015.32 | 507.66 | 1,048.03 | 524.80 | 7.83 | -0.78 | 0.108 |
| 120.00 | -12.58 | -2.12 | 0.00 | -45.51 | 0.00 | 45.51 | 1,002.79 | 501.40 | 1,014.98 | 508.24 | 8.17 | -0.80 | 0.102 |
| 125.00 | -12.47 | -2.12 | 0.00 | -34.93 | 0.00 | 34.93 | 971.28 | 485.64 | 935.83 | 468.61 | 9.03 | -0.85 | 0.087 |
| 126.00 | -8.93 | -1.87 | 0.00 | -32.81 | 0.00 | 32.81 | 964.78 | 482.39 | 920.18 | 460.77 | 9.21 | -0.86 | 0.080 |
| 130.00 | -8.46 | -1.82 | 0.00 | -25.33 | 0.00 | 25.33 | 938.12 | 469.06 | 858.24 | 429.76 | 9.95 | -0.90 | 0.068 |
| 135.00 | -8.37 | -1.81 | 0.00 | -16.22 | 0.00 | 16.22 | 903.33 | 451.67 | 782.47 | 391.82 | 10.91 | -0.93 | 0.051 |
| 136.00 | -5.66 | -1.41 | 0.00 | -14.41 | 0.00 | 14.41 | 896.18 | 448.09 | 767.56 | 384.35 | 11.10 | -0.94 | 0.044 |
| 140.00 | -5.37 | -1.35 | 0.00 | -8.77 | 0.00 | 8.77 | 866.91 | 433.46 | 708.75 | 354.90 | 11.90 | -0.96 | 0.031 |
| 144.00 | -2.54 | -0.71 | 0.00 | -3.36 | 0.00 | 3.36 | 836.60 | 418.30 | 651.40 | 326.19 | 12.71 | -0.97 | 0.013 |
| 145.00 | -2.33 | -0.66 | 0.00 | -2.64 | 0.00 | 2.64 | 828.85 | 414.43 | 637.31 | 319.13 | 12.91 | -0.97 | 0.011 |
| 149.00 | 0.00 | -0.62 | 0.00 | 0.00 | 0.00 | 0.00 | 787.55 | 393.77 | 574.90 | 287.88 | 13.73 | -0.97 | 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 | -27.79 | -2.43 | 0.00 | -294.20 | 0.00 | 294.20 | 4,132.29 | 2,066.14 | 8,772.59 | 4,392.82 | 0.00 | 0.00 | 0.074 |
| 5.00 | -26.73 | -2.40 | 0.00 | -282.06 | 0.00 | 282.06 | 4,073.39 | 2,036.69 | 8,449.37 | 4,230.97 | 0.01 | -0.02 | 0.073 |
| 10.00 | -25.69 | -2.36 | 0.00 | -270.05 | 0.00 | 270.05 | 4,012.85 | 2,006.43 | 8,128.58 | 4,070.33 | 0.04 | -0.04 | 0.073 |
| 15.00 | -24.67 | -2.32 | 0.00 | -258.24 | 0.00 | 258.24 | 3,950.68 | 1,975.34 | 7,810.43 | 3,911.02 | 0.10 | -0.06 | 0.072 |
| 20.00 | -23.67 | -2.28 | 0.00 | -246.63 | 0.00 | 246.63 | 3,886.87 | 1,943.43 | 7,495.19 | 3,753.17 | 0.17 | -0.08 | 0.072 |
| 25.00 | -22.69 | -2.23 | 0.00 | -235.25 | 0.00 | 235.25 | 3,821.43 | 1,910.71 | 7,183.08 | 3,596.88 | 0.27 | -0.10 | 0.071 |
| 30.00 | -21.73 | -2.19 | 0.00 | -224.08 | 0.00 | 224.08 | 3,754.35 | 1,877.17 | 6,874.35 | 3,442.28 | 0.39 | -0.13 | 0.071 |
| 35.00 | -20.79 | -2.14 | 0.00 | -213.15 | 0.00 | 213.15 | 3,685.64 | 1,842.82 | 6,569.23 | 3,289.50 | 0.54 | -0.15 | 0.070 |
| 40.00 | -19.87 | -2.09 | 0.00 | -202.45 | 0.00 | 202.45 | 3,615.29 | 1,807.64 | 6,267.96 | 3,138.64 | 0.71 | -0.17 | 0.070 |
| 45.00 | -19.33 | -2.07 | 0.00 | -191.98 | 0.00 | 191.98 | 3,543.30 | 1,771.65 | 5,970.78 | 2,989.83 | 0.90 | -0.20 | 0.070 |
| 48.00 | -18.74 | -2.04 | 0.00 | -185.78 | 0.00 | 185.78 | 3,499.33 | 1,749.66 | 5,794.53 | 2,901.57 | 1.03 | -0.21 | 0.069 |
| 50.00 | -17.79 | -1.98 | 0.00 | -181.71 | 0.00 | 181.71 | 3,469.68 | 1,734.84 | 5,677.92 | 2,843.18 | 1.13 | -0.23 | 0.069 |
| 53.25 | -17.52 | -1.97 | 0.00 | -175.27 | 0.00 | 175.27 | 2,730.90 | 1,365.45 | 4,467.29 | 2,236.97 | 1.28 | -0.24 | 0.085 |
| 55.00 | -16.76 | -1.93 | 0.00 | -171.82 | 0.00 | 171.82 | 2,712.29 | 1,356.15 | 4,390.67 | 2,198.60 | 1.38 | -0.25 | 0.084 |
| 60.00 | -16.02 | -1.90 | 0.00 | -162.16 | 0.00 | 162.16 | 2,658.02 | 1,329.01 | 4,173.50 | 2,089.85 | 1.66 | -0.28 | 0.084 |
| 65.00 | -15.30 | -1.88 | 0.00 | -152.64 | 0.00 | 152.64 | 2,602.11 | 1,301.05 | 3,959.12 | 1,982.50 | 1.97 | -0.32 | 0.083 |
| 70.00 | -14.59 | -1.87 | 0.00 | -143.22 | 0.00 | 143.22 | 2,544.56 | 1,272.28 | 3,747.77 | 1,876.67 | 2.32 | -0.35 | 0.082 |
| 75.00 | -13.91 | -1.88 | 0.00 | -133.85 | 0.00 | 133.85 | 2,485.39 | 1,242.69 | 3,539.70 | 1,772.48 | 2.70 | -0.38 | 0.081 |
| 80.00 | -13.23 | -1.90 | 0.00 | -124.45 | 0.00 | 124.45 | 2,424.57 | 1,212.29 | 3,335.13 | 1,670.04 | 3.12 | -0.42 | 0.080 |
| 85.00 | -12.58 | -1.93 | 0.00 | -114.96 | 0.00 | 114.96 | 2,362.12 | 1,181.06 | 3,134.31 | 1,569.49 | 3.58 | -0.45 | 0.079 |
| 90.00 | -11.94 | -1.96 | 0.00 | -105.34 | 0.00 | 105.34 | 2,297.27 | 1,148.64 | 2,936.51 | 1,470.44 | 4.07 | -0.49 | 0.077 |
| 95.00 | -11.60 | -1.98 | 0.00 | -95.54 | 0.00 | 95.54 | 2,210.70 | 1,105.35 | 2,718.30 | 1,361.17 | 4.60 | -0.53 | 0.075 |
| 97.75 | -11.20 | -2.00 | 0.00 | -90.09 | 0.00 | 90.09 | 2,163.09 | 1,081.54 | 2,601.88 | 1,302.87 | 4.91 | -0.55 | 0.074 |
| 100.00 | -10.94 | -2.02 | 0.00 | -85.58 | 0.00 | 85.58 | 2,124.13 | 1,062.07 | 2,508.52 | 1,256.12 | 5.18 | -0.57 | 0.073 |
| 101.50 | -10.64 | -2.03 | 0.00 | -82.55 | 0.00 | 82.55 | 1,105.19 | 552.59 | 1,317.56 | 659.76 | 5.36 | -0.58 | 0.135 |
| 105.00 | -10.55 | -2.04 | 0.00 | -75.44 | 0.00 | 75.44 | 1,087.53 | 543.77 | 1,259.48 | 630.68 | 5.79 | -0.61 | 0.129 |
| 106.00 | -9.98 | -2.06 | 0.00 | -73.40 | 0.00 | 73.40 | 1,082.34 | 541.17 | 1,242.93 | 622.39 | 5.92 | -0.62 | 0.127 |
| 110.00 | -9.56 | -2.07 | 0.00 | -65.15 | 0.00 | 65.15 | 1,060.92 | 530.46 | 1,177.04 | 589.40 | 6.46 | -0.67 | 0.120 |
| 115.00 | -9.26 | -2.08 | 0.00 | -54.79 | 0.00 | 54.79 | 1,032.68 | 516.34 | 1,095.47 | 548.55 | 7.19 | -0.72 | 0.109 |
| 117.94 | -9.10 | -2.08 | 0.00 | -48.69 | 0.00 | 48.69 | 1,015.32 | 507.66 | 1,048.03 | 524.80 | 7.65 | -0.76 | 0.102 |
| 120.00 | -8.71 | -2.06 | 0.00 | -44.41 | 0.00 | 44.41 | 1,002.79 | 501.40 | 1,014.98 | 508.24 | 7.98 | -0.78 | 0.096 |
| 125.00 | -8.64 | -2.06 | 0.00 | -34.12 | 0.00 | 34.12 | 971.28 | 485.64 | 935.83 | 468.61 | 8.83 | -0.83 | 0.082 |
| 126.00 | -6.18 | -1.83 | 0.00 | -32.07 | 0.00 | 32.07 | 964.78 | 482.39 | 920.18 | 460.77 | 9.00 | -0.84 | 0.076 |
| 130.00 | -5.86 | -1.78 | 0.00 | -24.76 | 0.00 | 24.76 | 938.12 | 469.06 | 858.24 | 429.76 | 9.72 | -0.88 | 0.064 |
| 135.00 | -5.80 | -1.77 | 0.00 | -15.87 | 0.00 | 15.87 | 903.33 | 451.67 | 782.47 | 391.82 | 10.66 | -0.91 | 0.047 |
| 136.00 | -3.92 | -1.38 | 0.00 | -14.11 | 0.00 | 14.11 | 896.18 | 448.09 | 767.56 | 384.35 | 10.85 | -0.92 | 0.041 |
| 140.00 | -3.72 | -1.32 | 0.00 | -8.59 | 0.00 | 8.59 | 866.91 | 433.46 | 708.75 | 354.90 | 11.63 | -0.93 | 0.028 |
| 144.00 | -1.76 | -0.70 | 0.00 | -3.29 | 0.00 | 3.29 | 836.60 | 418.30 | 651.40 | 326.19 | 12.42 | -0.95 | 0.012 |
| 145.00 | -1.62 | -0.65 | 0.00 | -2.59 | 0.00 | 2.59 | 828.85 | 414.43 | 637.31 | 319.13 | 12.61 | -0.95 | 0.010 |
| 149.00 | 0.00 | -0.62 | 0.00 | 0.00 | 0.00 | 0.00 | 787.55 | 393.77 | 574.90 | 287.88 | 13.41 | -0.95 | 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 | 21.03 | 0.00 | 40.05 | 0.00 | 0.00 | 2351.27 | 101.50 | 0.78 |
| 0.9D + 1.6W | 21.01 | 0.00 | 30.03 | 0.00 | 0.00 | 2319.59 | 101.50 | 0.76 |
| 1.2D + 1.0Di + 1.0Wi | 5.99 | 0.00 | 61.16 | 0.00 | 0.00 | 665.25 | 101.50 | 0.24 |
| (1.2 + 0.2Sds) * DL + E ELFM | 1.31 | 0.00 | 40.08 | 0.00 | 0.00 | 166.21 | 101.50 | 0.07 |
| (1.2 + 0.2Sds) * DL + E EMAM | 2.43 | 0.00 | 40.08 | 0.00 | 0.00 | 299.57 | 101.50 | 0.14 |
| (0.9 - 0.2Sds) * DL + E ELFM | 1.30 | 0.00 | 27.79 | 0.00 | 0.00 | 163.44 | 101.50 | 0.06 |
| (0.9 - 0.2Sds) * DL + E EMAM | 2.43 | 0.00 | 27.79 | 0.00 | 0.00 | 294.20 | 101.50 | 0.13 |
| 1.0D + 1.0W | 5.02 | 0.00 | 33.40 | 0.00 | 0.00 | 557.87 | 101.50 | 0.19 |

# Base Plate & Anchor Rod Analysis

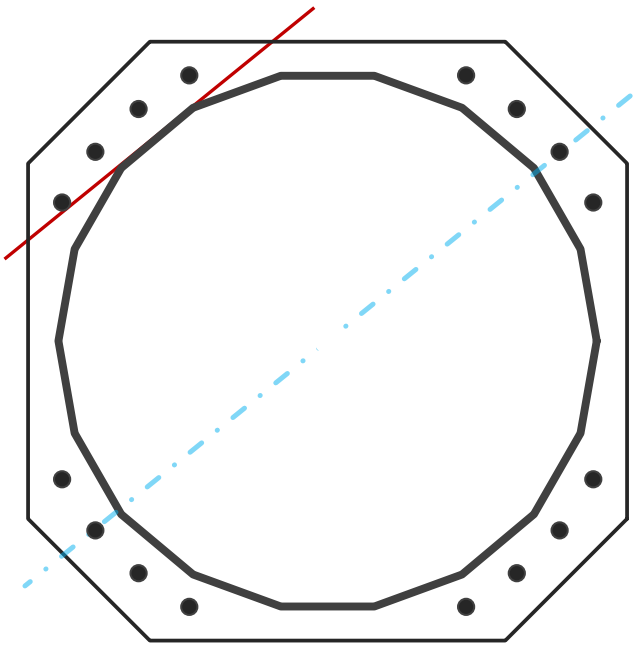
| Pole Dimensions | | |
|---|---|---|
| Number of Sides | 18 | - |
| Diameter | 52.01 | in |
| Thickness | 0.375 | in |
| Orientation Offset | 0 | ° |

| Base Reactions | | |
|---|---|---|
| Moment, Mu | 2351.3 | k-ft |
| Axial, Pu | 40.1 | k |
| Shear, Vu | 21.0 | k |
| Neutral Axis | 39 | ° |

| Report Capacities | | |
|---|---|---|
| Component | Capacity | Result |
| Base Plate | 37% | Pass |
| Anchor Rods | 47% | Pass |
| Dwyidag | - | - |

| Base Plate | | |
|---|---|---|
| Shape | Square | - |
| Width | 59 | in |
| Thickness | 2 3/4 | in |
| Grade | Other | - |
| Yield Strength, Fy | 60 | ksi |
| Tensile Strength, Fu | 80 | ksi |
| Clip | 12 | in |
| Orientation Offset | 0 | ° |
| Anchor Rod Detail | d | η=0.5 |
| Clear Distance | 3 | in |
| Applied Moment, Mu | 1175.2 | k |
| Bending Stress, ϕMn | 3183.1 | k |

| Original Anchor Rods | | |
|---|---|---|
| Arrangement | Cluster | - |
| Quantity | 16 | - |
| Diameter, ø | 2 1/4 | in |
| Bolt Circle | 59 | in |
| Grade | A615-75 | |
| Yield Strength, Fy | 75 | ksi |
| Tensile Strength, Fu | 100 | ksi |
| Spacing | 6.0 | in |
| Orientation Offset | 0 | ° |
| Applied Force, Pu | 122.0 | k |
| Anchor Rods, ϕPn | 259.8 | k |



# Calculations for Monopole Base Plate & Anchor Rod Analysis

**Reaction Distribution**

| Reaction | Shear Vu | Moment Mu | Factor |
|---|---|---|---|
| - | k | k-ft | - |
| Base Forces | 21.0 | 2351.3 | 1.00 |
| Anchor Rod Forces | 21.0 | 2351.3 | 1.00 |
| Additional Bolt (Grp1) Forces | 0.0 | 0.0 | 0.00 |
| Additional Bolt (Grp2) Forces | 0.0 | 0.0 | 0.00 |
| Dywidag Forces | 0.0 | 0.0 | 0.00 |
| Stiffener Forces | 0.0 | 0.0 | 0.00 |

**Geometric Properties**

| Section | Gross Area | Net Area | Individual Inertia | Threads per Inch | Moment of Inertia |
|---|---|---|---|---|---|
| - | $in^2$ | $in^2$ | $in^4$ | # | $in^4$ |
| Pole | 60.5227 | 3.3624 | 0.1582 | | 20173.34 |
| Bolt | 3.9761 | 3.2477 | 0.8393 | 4.5 | 22623.84 |
| Bolt1 | 0.0000 | 0.0000 | 0.0000 | 0 | 0.00 |
| Bolt2 | 0.0000 | 0.0000 | 0.0000 | 0 | 0.00 |
| Dywidag | 0.0000 | 0.0000 | 0.0000 | | 0.00 |
| Stiffener | 0.0000 | 0.0000 | 0.0000 | | 0.00 |

| Base Plate | | |
|---|---|---|
| Shape | Square | - |
| Width, W | 59 | in |
| Thickness, t | 2.75 | in |
| Yield Strength, Fy | 60 | ksi |
| Tensile Strength, Fu | 80 | ksi |
| Base Plate Chord | 27.856 | in |
| Detail Type | d | - |
| Detail Factor | 0.50 | - |
| Clear Distance | 3 | - |

| External Base Plate | | |
|---|---|---|
| Chord Length AA | 31.179 | in |
| Additional AA | 0.000 | in |
| Section Modulus, Z | 58.947 | $in^3$ |
| Applied Moment, Mu | 1175.2 | k-ft |
| Bending Capacity, ϕMn | 3183.1 | k-ft |
| Capacity, Mu/ϕMn | 0.369 | OK |
| | | |
| Chord Length AB | 30.372 | in |
| Additional AB | 0.000 | in |
| Section Modulus, Z | 57.423 | $in^3$ |
| Applied Moment, Mu | 984.5 | k-ft |
| Bending Capacity, ϕMn | 3100.8 | k-ft |
| Capacity, Mu/ϕMn | 0.318 | OK |
| | | |
| Bend Line Length | 0.000 | in |
| Additional Bend Line | 0.000 | in |
| Section Modulus, Z | 0.000 | $in^3$ |
| Applied Moment, Mu | 0.0 | k-ft |
| Bending Capacity, ϕMn | 0.0 | k-ft |
| Capacity, Mu/ϕMn | | |

| Internal Base Plate | | |
|---|---|---|
| Arc Length | 0.000 | in |
| Section Modulus, Z | 0.000 | $in^3$ |
| Moment Arm | 0.000 | in |
| Applied Moment, Mu | 0.0 | k-ft |
| Bending Capacity, ϕMn | 0.0 | k-ft |
| Capacity, Mu/ϕMn | | |

| Anchor Rods | | |
|---|---|---|
| Anchor Rod Quantity, N | 16 | - |
| Rod Diameter, d | 2.25 | in |
| Bolt Circle, BC | 59 | in |
| Yield Strength, Fy | 75 | ksi |
| Tensile Strength, Fu | 100 | ksi |
| Applied Axial, Pu | 122.0 | k |
| Applied Shear, Vu | 0.0 | k |
| Compressive Capacity, ϕPn | 259.8 | k |
| Tensile Capacity, ϕRnt | 0.470 | OK |
| Interaction Capacity | 0.470 | OK |

| Additional Bolt Group 1 | | |
|---|---|---|
| Bolt Quantity, N | 0 | - |
| Bolt Diameter, d | 0 | in |
| Bolt Circle, BC | 0 | in |
| Yield Strength, Fy | 0 | ksi |
| Tensile Strength, Fu | 0 | ksi |
| Applied Axial, Pu | 0.0 | k |
| Applied Shear, Vu | 0.0 | k |
| Compressive Capacity, ϕPn | 0.0 | k |
| Compressive Capacity, ϕPn | | |
| Interaction Capacity | | |

| Additional Bolt Group 2 | | |
|---|---|---|
| Bolt Quantity, N | 0 | - |
| Bolt Diameter, d | 0 | in |
| Bolt Circle, BC | 0 | in |
| Yield Strength, Fy | 0 | ksi |
| Tensile Strength, Fu | 0 | ksi |
| Applied Axial, Pu | 0.0 | k |
| Applied Shear, Vu | 0.0 | k |
| Compressive Capacity, ϕPn | 0.0 | k |
| Compressive Capacity, ϕPn | | |
| Interaction Capacity | | |

| Dywidag Reinforcement | | |
|---|---|---|
| Dywidag Quantity, N | 0 | - |
| Dywidag Diameter, d | 2.5 | in |
| Bolt Circle, BC | 58.89 | in |
| Yield Strength, Fy | 80 | ksi |
| Tensile Strength, Fu | 100 | ksi |
| Applied Axial, Pu | 0.0 | k |
| Compressive Capacity, ϕPn | 0.0 | k |
| Capacity, Pu/ϕPn | | |

| Base Plate Stiffeners | | |
|---|---|---|
| Applied Axial Force, Pu | 0.0 | k |
| Applied Horizontal Force, Vu | 0.00 | k |

| Vertical Weld | | |
|---|---|---|
| Vert.-to-Stiffener a=$e_x$/l | #DIV/0! | - |
| Spacing Ratio, k | #DIV/0! | - |
| Weld Coefficient, C | #DIV/0! | - |
| Compressive Capacity, ϕPn | #DIV/0! | k |
| Vert.-to-Plate a=$e_x$/l | #DIV/0! | - |
| Spacing Ratio, k | #DIV/0! | - |
| Weld Coefficient, C | #DIV/0! | - |
| Shear Capacity, ϕVn | #DIV/0! | k |
| $P_u/\phi_P P_n + V_u/\phi_V V_n$ | - | |

| Horizontal Weld | | |
|---|---|---|
| Horz.-to-Stiffener a=$e_x$/l | #DIV/0! | - |
| Spacing Ratio, k | #DIV/0! | - |
| Weld Coefficient, C | #DIV/0! | - |
| Effective Fillet | 0.000 | in |
| Compressive Capacity, ϕPn | #DIV/0! | k |
| Horz.-to-Pole a=$e_x$/l | #DIV/0! | - |
| Spacing Ratio, k | #DIV/0! | - |
| Weld Coefficient, C | #DIV/0! | - |
| Shear Capacity, ϕVn | #DIV/0! | k |
| $P_u/\phi_P P_n + V_u/\phi_V V_n$ | - | |

| Plate Tension | | |
|---|---|---|
| Gross Cross Section | 0.000 | $in^2$ |
| Net Cross Section | 0.000 | $in^2$ |
| Tensile Capacity, ϕTn | 0.0 | k |
| Capacity, Tu/ϕTn | - | |

| Plate Compression | | |
|---|---|---|
| Radius of Gyration | #DIV/0! | $in^3$ |
| kl/r | #DIV/0! | - |
| 4.71 √(E/Fy) | 0.00 | - |
| Buckling Stress(Fe) | 0.0 | - |
| Crit. Buckling Stress(Fcr) | 0.0 | ksi |
| Compressive Capacity, ϕPn | 0.0 | k |
| Capacity, Pu/ϕPn | - | |

Sprint

| | |
|---|---|
| PROJECT: | DO MACRO UPGRADE |
| SITE NAME: | WEST HAVEN & RT 162 CT |
| SITE CASCADE: | CT52XC076 |
| SITE ADDRESS: | 668 JONES HILL ROAD<br>WEST HAVEN, CT 06516 |
| SITE TYPE: | MONOPOLE TOWER |
| MARKET: | NORTHERN CONNECTICUT |

## SITE INFORMATION

**TOWER OWNER:**
AMERICAN TOWER CORPORATION
10 PRESIDENTIAL WAY
WOBURN, MA 01801

**LATITUDE (NAD83):**
41° 15' 23.044" N
41.25640106

**LONGITUDE (NAD83):**
72° 58' 20.491" W
-72.97235870

**COUNTY:**
NEW HAVEN

**ZONING JURISDICTION:**
CONNECTICUT SITING COUNCIL

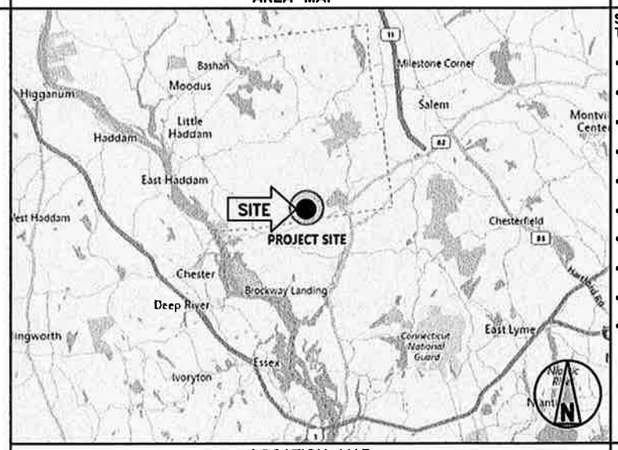
**ZONING DISTRICT:**
TBD

**POWER COMPANY:**
CL&P
PHONE: (800) 286-2000

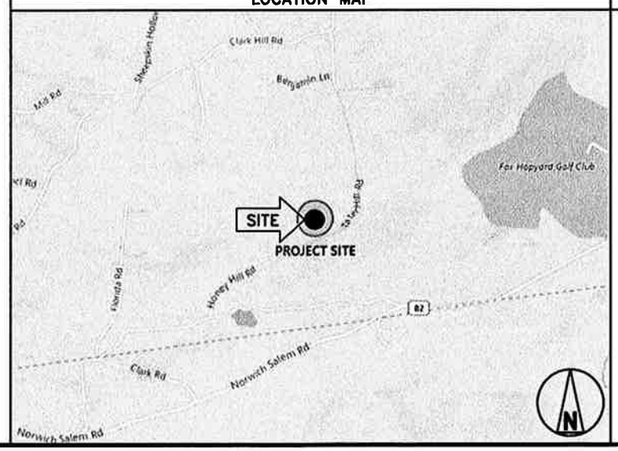
**AAV PROVIDER:**
AT&T
PHONE: (800) 288-2020

**PROJECT MANAGER:**
AIROSMITH DEVELOPMENT
TERRI BURKHOLDER
(315) 719-2928
TBURKHOLDER@AIROSMITHDEVELOPMENT.COM

## AREA MAP




## LOCATION MAP




## PROJECT DESCRIPTION

SPRINT PROPOSES TO MODIFY AN EXISTING UNMANNED TELECOMMUNICATIONS FACILITY.

- REMOVE (3) PANEL ANTENNAS AND RRH'S
- INSTALL (6) PANEL ANTENNAS
- INSTALL (6) 800 MHz RRH'S NEAR ANTENNAS
- INSTALL (3) 1900 MHz RRH'S NEAR ANTENNAS
- INSTALL (24) JUMPER CABLES
- INSTALL (4) HYBRID CABLES
- REMOVE EXISTING CLEARWIRE GROUND EQUIPMENT
- INSTALL (2) EQUIPMENT CABINETS WITHIN EXISTING LEASE AREA
- INSTALL 7'x7' CONCRETE EQUIPMENT PAD
- INSTALL 2.5 EQUIPMENT INSIDE EXISTING N.V. MMBS CABINET

THESE PLANS HAVE BEEN DEVELOPED FOR THE MODIFICATION OF AN EXISTING UNMANNED TELECOMMUNICATIONS FACILITY OWNED OR LEASED BY SPRINT IN ACCORDANCE WITH THE SCOPE OF WORK PROVIDED BY SPRINT. INFINIGY HAS INCORPORATED THIS SCOPE OF WORK IN THE PLANS. THESE PLANS ARE NOT FOR CONSTRUCTION UNLESS ACCOMPANIED BY A PASSING STRUCTURAL STABILITY ANALYSIS PREPARED BY A LICENSED STRUCTURAL ENGINEER. STRUCTURAL ANALYSIS MUST INCLUDE BOTH TOWER AND MOUNT.

## APPLICABLE CODES

ALL WORK SHALL BE PERFORMED AND MATERIALS INSTALL IN ACCORDANCE WITH THE CURRENT EDITIONS OF THE FOLLOWING CODES AS ADOPTED BY THE LOCAL GOVERNING AUTHORITIES. NOTHING IN THESE PLANS IS TO BE CONSTRUED TO PERMIT WORK NOT CONFORMING TO THESE CODES.

1. INTERNATIONAL BUILDING CODE (2015 IBC)
2. TIA-222-G OR LATEST EDITION
3. NFPA 780 – LIGHTNING PROTECTION CODE
4. 2011 NATIONAL ELECTRIC CODE OR LATEST EDITION
5. ANY OTHER NATIONAL OR LOCAL APPLICABLE CODES, MOST RECENT EDITIONS
6. CT BUILDING CODE
7. LOCAL BUILDING CODE
8. CITY/COUNTY ORDINANCES

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## DRAWING INDEX

| SHEET NO. | SHEET TITLE | REV. |
|---|---|---|
| T-1 | TITLE SHEET & PROJECT DATA | 0 |
| | | |
| SP-1 | SPRINT SPECIFICATIONS | 0 |
| SP-2 | SPRINT SPECIFICATIONS | 0 |
| SP-3 | SPRINT SPECIFICATIONS | 0 |
| | | |
| A-1 | SITE PLAN | 0 |
| A-2 | TOWER ELEVATION | 0 |
| A-3 | ANTENNA LAYOUT & MOUNTING DETAILS | 0 |
| A-4 | EQUIPMENT & MOUNTING DETAILS | 0 |
| A-5 | EQUIPMENT DETAILS | 0 |
| A-6 | CIVIL DETAILS | 0 |
| A-7 | PLUMBING DIAGRAM | 0 |
| | | |
| E-1 | ONE LINE & NOTES | 0 |
| E-2 | ELECTRICAL & GROUNDING DETAILS | 0 |
| E-3 | ELECTRICAL & GROUNDING DETAILS | 0 |

PLANS PREPARED FOR:
Sprint

PLANS PREPARED BY:
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Phone: 518-690-0790 | Fax: 518-690-0793
www.infinigy.com
JOB NUMBER 526-104

PROJECT MANAGER:
AIROSMITH DEVELOPMENT
32 CLINTON ST.
SARATOGA SPRINGS, NY 12866
OFFICE#, (518) 306-3740

ENGINEERING LICENSE:
STATE OF CONNECTICUT
JOHN S. STEVENS
LICENSED PROFESSIONAL ENGINEER
LIC. NO. 24018
7/3/2018

DRAWING NOTICE:


REVISIONS:

| DESCRIPTION | DATE | BY | REV. |
|---|---|---|---|
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| ISSUED FOR PERMIT | 06/27/18 | MAP | 0 |
| | | | |

SITE NAME:
WEST HAVEN & RT 162 CT

SITE NUMBER:
CT52XC076

SITE ADDRESS:
668 JONES HILL ROAD
WEST HAVEN, CT 06516

SHEET DESCRIPTION:
TITLE SHEET & PROJECT DATA

SHEET NUMBER:
T-1

**THESE OUTLINE SPECIFICATIONS IN CONJUNCTION WITH THE SPRINT STANDARD CONSTRUCTION SPECIFICATIONS, INCLUDING CONTRACT DOCUMENTS AND THE CONSTRUCTION DRAWINGS DESCRIBE THE WORK TO BE PERFORMED BY THE CONTRACTOR.**

## SECTION 01 100 – SCOPE OF WORK

### PART 1 – GENERAL

1.1 THE WORK: THESE STANDARD CONSTRUCTION SPECIFICATIONS IN CONJUNCTION WITH THE SPRINT CONSTRUCTION STANDARDS FOR WIRELESS SITES, CONTRACT DOCUMENTS AND THE CONSTRUCTION DRAWINGS DESCRIBE THE WORK TO BE PERFORMED BY THE CONTRACTOR.

1.2 RELATED DOCUMENTS:

A. THE REQUIREMENTS OF THIS SECTION APPLY TO ALL SECTIONS IN THIS SPECIFICATION.

B. SPRINT "STANDARD CONSTRUCTION DETAILS FOR WIRELESS SITES" ARE INCLUDED IN AND MADE A PART OF THESE SPECIFICATIONS HEREWITH.

1.3 PRECEDENCE: SHOULD CONFLICTS OCCUR BETWEEN THE STANDARD CONSTRUCTION SPECIFICATIONS FOR WIRELESS SITES INCLUDING THE STANDARD CONSTRUCTION DETAILS FOR WIRELESS SITES AND THE CONSTRUCTION DRAWINGS, INFORMATION ON THE CONSTRUCTION DRAWINGS SHALL TAKE PRECEDENCE. NOTIFY SPRINT CONSTRUCTION MANAGER IF THIS OCCURS.

1.4 NATIONALLY RECOGNIZED CODES AND STANDARDS:

A. THE WORK SHALL COMPLY WITH APPLICABLE NATIONAL AND LOCAL CODES AND STANDARDS, LATEST EDITION, AND PORTIONS THEREOF, INCLUDED BUT NOT LIMITED TO THE FOLLOWING:

1. GR-63-CORE NEBS REQUIREMENTS: PHYSICAL PROTECTION
5. GR-78-CORE GENERIC REQUIREMENTS FOR THE PHYSICAL DESIGN AND MANUFACTURE OF TELECOMMUNICATIONS EQUIPMENT.
3. GR-1089 CORE, ELECTROMAGNETIC COMPATIBILITY AND ELECTRICAL SAFETY –GENERIC CRITERIA FOR NETWORK TELECOMMUNICATIONS EQUIPMENT.
4. NATIONAL FIRE PROTECTION ASSOCIATION CODES AND STANDARDS (NFPA) INCLUDING NFPA 70 (NATIONAL ELECTRICAL CODE – "NEC") AND NFPA 101 (LIFE SAFETY CODE).
5. AMERICAN SOCIETY FOR TESTING OF MATERIALS (ASTM)
6. INSTITUTE OF ELECTRONIC AND ELECTRICAL ENGINEERS (IEEE)
7. AMERICAN CONCRETE INSTITUTE (ACI)
8. AMERICAN WIRE PRODUCERS ASSOCIATION (AWPA)
9. CONCRETE REINFORCING STEEL INSTITUTE (CRSI)
10. AMERICAN ASSOCIATION OF STATE HIGHWAY AND TRANSPORTATION OFFICIALS (AASHTO)
11. PORTLAND CEMENT ASSOCIATION (PCA)
12. NATIONAL CONCRETE MASONRY ASSOCIATION (NCMA)
13. BRICK INDUSTRY ASSOCIATION (BIA)
14. AMERICAN WELDING SOCIETY (AWS)
15. NATIONAL ROOFING CONTRACTORS ASSOCIATION (NRCA)
16. SHEET METAL AND AIR CONDITIONING CONTRACTORS' NATIONAL ASSOCIATION (SMACNA)
17. DOOR AND HARDWARE INSTITUTE (DHI)
18. OCCUPATIONAL SAFETY AND HEALTH ACT (OSHA)
19. APPLICABLE BUILDING CODES INCLUDING UNIFORM BUILDING CODE, SOUTHERN BUILDING CODE, BOCA, AND THE INTERNATIONAL BUILDING CODE.

1.5 DEFINITIONS:

A. WORK: THE SUM OF TASKS AND RESPONSIBILITIES IDENTIFIED IN THE CONTRACT DOCUMENTS.

B. COMPANY: SPRINT CORPORATION

C. ENGINEER: SYNONYMOUS WITH ARCHITECT & ENGINEER AND "A&E". THE DESIGN PROFESSIONAL HAVING PROFESSIONAL RESPONSIBILITY FOR DESIGN OF THE PROJECT.

D. CONTRACTOR: CONSTRUCTION CONTRACTOR; CONSTRUCTION VENDOR; INDIVIDUAL OR ENTITY WHO AFTER EXECUTION OF A CONTRACT IS BOUND TO ACCOMPLISH THE WORK.

E. THIRD PARTY VENDOR OR AGENCY: A VENDOR OR AGENCY ENGAGED SEPARATELY BY THE COMPANY, A&E, OR CONTRACTOR TO PROVIDE MATERIALS OR TO ACCOMPLISH SPECIFIC TASKS RELATED TO BUT NOT INCLUDED IN THE WORK.

F. OFCI: OWNER FURNISHED, CONTRACTOR INSTALLED EQUIPMENT.

G. CONSTRUCTION MANAGER – ALL PROJECTS RELATED COMMUNICATION TO FLOW THROUGH SPRINT REPRESENTATIVE IN CHARGE OF PROJECT...

1.6 SITE FAMILIARITY: CONTRACTOR SHALL BE RESPONSIBLE FOR FAMILIARIZING HIMSELF WITH ALL CONTRACT DOCUMENTS, FIELD CONDITIONS AND DIMENSIONS PRIOR TO PROCEEDING WITH CONSTRUCTION. ANY DISCREPANCIES SHALL BE BROUGHT TO THE ATTENTION OF THE SPRINT CONSTRUCTION MANAGER PRIOR TO THE COMMENCEMENT OF WORK. NO COMPENSATION WILL BE AWARDED BASED ON CLAIM OF LACK OF KNOWLEDGE OR FIELD CONDITIONS.

1.7 POINT OF CONTACT: COMMUNICATION BETWEEN SPRINT AND THE CONTRACTOR SHALL FLOW THROUGH THE SINGLE SPRINT CONSTRUCTION MANAGER APPOINTED TO MANAGE THE PROJECT FOR SPRINT.

1.8 ON-SITE SUPERVISION: THE CONTRACTOR SHALL SUPERVISE AND DIRECT THE WORK AND SHALL BE RESPONSIBLE FOR CONSTRUCTION MEANS, METHODS, TECHNIQUES, SEQUENCES, AND PROCEDURES IN ACCORDANCE WITH THE CONTRACT DOCUMENTS. THE CONTRACTOR SHALL EMPLOY A COMPETENT SUPERINTENDENT WHO SHALL BE IN ATTENDANCE AT THE SITE AT ALL TIMES DURING PERFORMANCE OF THE WORK.

1.9 DRAWINGS, SPECIFICATIONS AND DETAILS REQUIRED AT JOBSITE: THE CONSTRUCTION CONTRACTOR SHALL MAINTAIN A FULL SET OF THE CONSTRUCTION DRAWINGS, STANDARD CONSTRUCTION DETAILS FOR WIRELESS SITES AND THE STANDARD CONSTRUCTION SPECIFICATIONS FOR WIRELESS SITES AT THE JOBSITE FROM MOBILIZATION THROUGH CONSTRUCTION COMPLETION.

A. THE JOBSITE DRAWINGS, SPECIFICATIONS AND DETAILS SHALL BE CLEARLY MARKED DAILY IN RED PENCIL WITH ANY CHANGES IN CONSTRUCTION OVER WHAT IS DEPICTED IN THE DOCUMENTS. AT CONSTRUCTION COMPLETION, THIS JOBSITE MARKUP SET SHALL BE DELIVERED TO THE COMPANY OR COMPANY'S DESIGNATED REPRESENTATIVE TO BE FORWARDED TO THE COMPANY'S A&E VENDOR FOR PRODUCTION OF "AS-BUILT" DRAWINGS.

B. DETAILS ARE INTENDED TO SHOW DESIGN INTENT. MODIFICATIONS MAY BE REQUIRED TO SUIT JOB DIMENSIONS OR CONDITIONS, AND SUCH MODIFICATIONS SHALL BE INCLUDED AS PART OF THE WORK. CONTRACTOR SHALL NOTIFY SPRINT CONSTRUCTION MANAGER OF ANY VARIATIONS PRIOR TO PROCEEDING WITH THE WORK.

C. DIMENSIONS SHOWN ARE TO FINISH SURFACES UNLESS NOTED OTHERWISE. SPACING BETWEEN EQUIPMENT IS THE REQUIRED CLEARANCE. SHOULD THERE BE ANY QUESTIONS REGARDING THE CONTRACT DOCUMENTS, EXISTING CONDITIONS AND/OR DESIGN INTENT, THE CONTRACTOR SHALL BE RESPONSIBLE FOR OBTAINING A CLARIFICATION FROM THE SPRINT CONSTRUCTION MANAGER PRIOR TO PROCEEDING WITH THE WORK.

1.10 USE OF JOB SITE: THE CONTRACTOR SHALL CONFINE ALL CONSTRUCTION AND RELATED OPERATIONS INCLUDING STAGING AND STORAGE OF MATERIALS AND EQUIPMENT, PARKING, TEMPORARY FACILITIES, AND WASTE STORAGE TO THE LEASE PARCEL UNLESS OTHERWISE PERMITTED BY THE CONTRACT DOCUMENTS.

1.11 UTILITIES SERVICES: WHERE NECESSARY TO CUT EXISTING PIPES, ELECTRICAL WIRES, CONDUITS, CABLES, ETC., OF UTILITY SERVICES, OR OF FIRE PROTECTION OR COMMUNICATIONS SYSTEMS, THEY SHALL BE CUT AND CAPPED AT SUITABLE PLACES OR WHERE SHOWN. ALL SUCH ACTIONS SHALL BE COORDINATED WITH THE UTILITY COMPANY INVOLVED:

1.12 PERMITS / FEES: WHEN REQUIRED THAT A PERMIT OR CONNECTION FEE BE PAID TO A PUBLIC UTILITY PROVIDER FOR NEW SERVICE TO THE CONSTRUCTION PROJECT, PAYMENT OF SUCH FEE SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR.

1.13 CONTRACTOR SHALL TAKE ALL MEASURES AND PROVIDE ALL MATERIAL NECESSARY FOR PROTECTING EXISTING EQUIPMENT AND PROPERTY.

1.14 METHODS OF PROCEDURE (MOPS) FOR CONSTRUCTION: CONTRACTOR SHALL PERFORM WORK AS DESCRIBED IN THE FOLLOWING INSTALLATION AND COMMISSIONING MOPS.

NOTE: IN SHORT-FORM SPECIFICATIONS ON THE DRAWINGS, A/E TO INSERT LIST OF APPLICABLE MOPS INCLUDING EN-2012-001, EN-2013-002, EL-0568, AND TS-0193

1.15 USE OF ELECTRONIC PROJECT MANAGEMENT SYSTEMS:

### PART 2 – PRODUCTS (NOT USED)

### PART 3 – EXECUTION

3.1 TEMPORARY UTILITIES AND FACILITIES: THE CONTRACTOR SHALL BE RESPONSIBLE FOR ALL TEMPORARY UTILITIES AND FACILITIES NECESSARY EXCEPT AS OTHERWISE INDICATED IN THE CONSTRUCTION DOCUMENTS. TEMPORARY UTILITIES AND FACILITIES INCLUDE POTABLE WATER, HEAT, HVAC, ELECTRICITY, SANITARY FACILITIES, WASTE DISPOSAL FACILITIES, AND TELEPHONE/COMMUNICATION SERVICES. PROVIDE TEMPORARY UTILITIES AND FACILITIES IN ACCORDANCE WITH OSHA AND THE AUTHORITY HAVING JURISDICTION. CONTRACTOR MAY UTILIZE THE COMPANY ELECTRICAL SERVICE IN THE COMPLETION OF THE WORK WHEN IT BECOMES AVAILABLE. USE OF THE LESSORS OR SITE OWNER'S UTILITIES OR FACILITIES IS EXPRESSLY FORBIDDEN EXCEPT AS OTHERWISE ALLOWED IN THE CONTRACT DOCUMENTS.

3.2 ACCESS TO WORK: THE CONTRACTOR SHALL PROVIDE ACCESS TO THE JOB SITE FOR AUTHORIZED COMPANY PERSONNEL AND AUTHORIZED REPRESENTATIVES OF THE ARCHITECT/ENGINEER DURING ALL PHASES OF THE WORK.

3.3 TESTING: REQUIREMENTS FOR TESTING BY THIS CONTRACTOR SHALL BE AS INDICATED HEREWITH, ON THE CONSTRUCTION DRAWINGS, AND IN THE INDIVIDUAL SECTIONS OF THESE SPECIFICATIONS. SHOULD COMPANY CHOOSE TO ENGAGE ANY THIRD-PARTY TO CONDUCT ADDITIONAL TESTING, THE CONTRACTOR SHALL COOPERATE WITH AND PROVIDE A WORK AREA FOR COMPANY'S TEST AGENCY.

3.4 DIMENSIONS: VERIFY DIMENSIONS INDICATED ON DRAWINGS WITH FIELD DIMENSIONS BEFORE FABRICATION OR ORDERING OF MATERIALS. DO NOT SCALE DRAWINGS.

3.5 EXISTING CONDITIONS: NOTIFY THE SPRINT CONSTRUCTION MANAGER OF EXISTING CONDITIONS DIFFERING FROM THOSE INDICATED ON THE DRAWINGS. DO NOT REMOVE OR ALTER STRUCTURAL COMPONENTS WITHOUT PRIOR WRITTEN APPROVAL FROM THE ARCHITECT AND ENGINEER.

## SECTION 01 200 – COMPANY FURNISHED MATERIAL AND EQUIPMENT

### PART 1 – GENERAL

1.1 THE WORK: THESE STANDARD CONSTRUCTION SPECIFICATIONS IN CONJUNCTION WITH THE OTHER CONTRACT DOCUMENTS AND THE CONSTRUCTION DRAWINGS DESCRIBE THE WORK TO BE PERFORMED BY THE CONTRACTOR.

1.2 RELATED DOCUMENTS:

A. THE REQUIREMENTS OF THIS SECTION APPLY TO ALL SECTIONS IN THIS SPECIFICATION.

B. SPRINT "STANDARD CONSTRUCTION DETAILS FOR WIRELESS SITES" ARE INCLUDED IN AND MADE A PART OF THESE SPECIFICATIONS HEREWITH.

### PART 2 – PRODUCTS (NOT USED)

### PART 3 – EXECUTION

3.1 RECEIPT OF MATERIAL AND EQUIPMENT:

A. A COMPANY FURNISHED MATERIAL AND EQUIPMENT IS IDENTIFIED ON THE RF DATA SHEET IN THE CONSTRUCTION DOCUMENTS.

B. THE CONTRACTOR IS RESPONSIBLE FOR SPRINT PROVIDED MATERIAL AND EQUIPMENT AND UPON RECEIPT SHALL:

1 ACCEPT DELIVERIES AS SHIPPED AND TAKE RECEIPT.

2. VERIFY COMPLETENESS AND CONDITION OF ALL DELIVERIES.

3. TAKE RESPONSIBILITY FOR EQUIPMENT AND PROVIDE INSURANCE PROTECTION AS REQUIRED IN AGREEMENT.

4. RECORD ANY DEFECTS OR DAMAGES AND WITHIN TWENTY-FOUR HOURS AFTER RECEIPT, REPORT TO SPRINT OR ITS DESIGNATED PROJECT REPRESENTATIVE OF SUCH.

5. PROVIDE SECURE AND NECESSARY WEATHER PROTECTED WAREHOUSING.

6. COORDINATE SAFE AND SECURE TRANSPORTATION OF MATERIAL AND EQUIPMENT, DELIVERING AND OFF-LOADING FROM CONTRACTOR'S WAREHOUSE TO SITE.

3.2 DELIVERABLES:

A. COMPLETE SHIPPING AND RECEIPT DOCUMENTATION IN ACCORDANCE WITH COMPANY PRACTICE.

B. IF APPLICABLE, COMPLETE LOST/STOLEN/DAMAGED DOCUMENTATION REPORT AS NECESSARY IN ACCORDANCE WITH COMPANY PRACTICE, AND AS DIRECTED BY COMPANY.

C. UPLOAD DOCUMENTATION INTO SPRINT SITE MANAGEMENT SYSTEM (SMS) AND/OR PROVIDE HARD COPY DOCUMENTATION AS REQUESTED.

## SECTION 01 300 – CELL SITE CONSTRUCTION CO.

### PART 1 – GENERAL

1.1 THE WORK: THESE STANDARD CONSTRUCTION SPECIFICATIONS IN CONJUNCTION WITH THE OTHER CONTRACT DOCUMENTS AND THE CONSTRUCTION DRAWINGS DESCRIBE THE WORK TO BE PERFORMED BY THE CONTRACTOR.

1.2 RELATED DOCUMENTS:

A. THE REQUIREMENTS OF THIS SECTION APPLY TO ALL SECTIONS IN THIS SPECIFICATION.

B. SPRINT "STANDARD CONSTRUCTION DETAILS FOR WIRELESS SITES" ARE INCLUDED IN AND MADE A PART OF THESE SPECIFICATIONS HEREWITH.

1.3 NOTICE TO PROCEED

A. NO WORK SHALL COMMENCE PRIOR TO COMPANY'S WRITTEN NOTICE TO PROCEED AND THE ISSUANCE OF THE WORK ORDER.

B. UPON RECEIVING NOTICE TO PROCEED, CONTRACTOR SHALL FULLY PERFORM ALL WORK NECESSARY TO PROVIDE SPRINT WITH AN OPERATIONAL WIRELESS FACILITY.

### PART 2 – PRODUCTS (NOT USED)

### PART 3 – EXECUTION

3.1 FUNCTIONAL REQUIREMENTS:

A. THE ACTIVITIES DESCRIBED IN THIS PARAGRAPH REPRESENT MINIMUM ACTIONS AND PROCESSES REQUIRED TO SUCCESSFULLY COMPLETE THE WORK. THE ACTIVITIES DESCRIBED ARE NOT EXHAUSTIVE, AND CONTRACTOR SHALL TAKE ANY AND ALL ACTIONS AS NECESSARY TO SUCCESSFULLY COMPLETE THE CONSTRUCTION OF A FULLY FUNCTIONING WIRELESS FACILITY AT THE SITE IN ACCORDANCE WITH COMPANY PROCESSES.

B. SUBMIT SPECIFIC DOCUMENTATION AS INDICATED HEREIN, AND OBTAIN REQUIRED APPROVALS WHILE THE WORK IS BEING PERFORMED.

C. MANAGE AND CONDUCT ALL FIELD CONSTRUCTION SERVICE RELATED ACTIVITIES

D. PROVIDE CONSTRUCTION ACTIVITIES TO THE EXTENT REQUIRED BY THE CONTRACT DOCUMENTS, INCLUDING BUT NOT LIMITED TO THE FOLLOWING:

PLANS PREPARED FOR:

Sprint

PLANS PREPARED BY:

INFINIGY
FROM ZERO TO INFINIGY
the solutions are endless
1033 Watervliet Shaker Rd | Albany, NY 12205
Phone: 518-690-0790 | Fax: 518-690-0793
www.infinigy.com
JOB NUMBER 526-104

PROJECT MANAGER:

AIROSMITH DEVELOPMENT
32 CLINTON ST.
SARATOGA SPRINGS, NY 12866
OFFICE#. (518) 306-3740

ENGINEERING LICENSE:

STATE OF CONNECTICUT
JOHN S. STEVENS
No. 24705
PROFESSIONAL ENGINEER
JUL 18 2018

DRAWING NOTICE:



REVISIONS:

| DESCRIPTION | DATE | BY | REV. |
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SITE NAME:

WEST HAVEN &
RT 162 CT

SITE NUMBER:

CT52XC076

SITE ADDRESS:

668 JONES HILL ROAD
WEST HAVEN, CT 06516

SHEET DESCRIPTION:

SPRINT SPECIFICATIONS

SHEET NUMBER:

SP-1

CONTINUE FROM SP-1

1. PERFORM ANY REQUIRED SITE ENVIRONMENTAL MITIGATION.
2. PREPARE GROUND SITES; PROVIDE DE-GRUBBING; AND ROUGH AND FINAL GRADING, AND COMPOUND SURFACE TREATMENTS.
3. MANAGE AND CONDUCT ALL ACTIVITIES FOR INSTALLATION OF UTILITIES INCLUDING ELECTRICAL AND TELCO BACKHAUL.
4. INSTALL UNDERGROUND FACILITIES INCLUDING UNDERGROUND POWER AND COMMUNICATIONS CONDUITS, AND UNDERGROUND GROUNDING SYSTEM.
5. INSTALL ABOVE GROUND GROUNDING SYSTEMS.
6. PROVIDE NEW HVAC INSTALLATIONS AND MODIFICATIONS.
7. INSTALL "H-FRAMES", CABINETS AND SHELTERS AS INDICATED.
8. INSTALL ROADS, ACCESS WAYS, CURBS AND DRAINS AS INDICATED.
9. ACCOMPLISH REQUIRED MODIFICATION OF EXISTING FACILITIES.
10. PROVIDE ANTENNA SUPPORT STRUCTURE FOUNDATIONS.
11. PROVIDE SLABS AND EQUIPMENT PLATFORMS.
12. INSTALL COMPOUND FENCING, SIGHT SHIELDING, LANDSCAPING AND ACCESS BARRIERS.
13. PERFORM INSPECTION AND MATERIAL TESTING AS REQUIRED HEREINAFTER.
14. CONDUCT SITE RESISTANCE TO EARTH TESTING AS REQUIRED HEREINAFTER
15. INSTALL FIXED GENERATOR SETS AND OTHER STANDBY POWER SOLUTIONS.
16. INSTALL TOWERS, ANTENNA SUPPORT STRUCTURES AND PLATFORMS ON EXISTING TOWERS AS REQUIRED.
17. INSTALL CELL SITE RADIOS, MICROWAVE, GPS, COAXIAL MAINLINE, ANTENNAS, CROSS BAND COUPLERS, TOWER TOP AMPLIFIERS, LOW NOISE AMPLIFIERS AND RELATED EQUIPMENT.
18. PERFORM, DOCUMENT, AND CLOSE OUT ANY CONSTRUCTION CONTROL DOCUMENTS THAT MAY BE REQUIRED BY GOVERNMENT AGENCIES AND LANDLORDS.
19. PERFORM ANTENNAL AND COAX SWEEP TESTING AND MAKE ANY AND ALL NECESSARY CORRECTIONS.
20. REMAIN ON SITE MOBILIZED THROUGHOUT HAND-OFF AND INTEGRATION TO ASSIST AS NEEDED UNTIL SITE IS DEEMED SUBSTANTIALLY COMPLETE AND PLACED "ON AIR."

3.2 GENERAL REQUIREMENTS FOR CIVIL CONSTRUCTION:

A. CONTRACTOR SHALL KEEP THE SITE FREE FROM ACCUMULATING WASTE MATERIAL, DEBRIS, AND TRASH. AT THE COMPLETION OF THE WORK, CONTRACTOR SHALL REMOVE FROM THE SITE ALL REMAINING RUBBISH, IMPLEMENTS, TEMPORARY FACILITIES, AND SURPLUS MATERIALS.

B. EQUIPMENT ROOMS SHALL AT ALL TIMES BE MAINTAINED "BROOM CLEAN" AND CLEAR OF DEBRIS.

C. CONTRACTOR SHALL TAKE ALL REASONABLE PRECAUTIONS TO DISCOVER AND LOCATE ANY HAZARDOUS CONDITION.

1. IN THE EVENT CONTRACTOR ENCOUNTERS ANY HAZARDOUS CONDITION WHICH HAS NOT BEEN ABATED OR OTHERWISE MITIGATED, CONTRACTOR AND ALL OTHER PERSONS SHALL IMMEDIATELY STOP WORK IN THE AFFECTED AREA AND NOTIFY COMPANY IN WRITING. THE WORK IN THE AFFECTED AREA SHALL NOT BE RESUMED EXCEPT BY WRITTEN NOTIFICATION BY COMPANY.
2. CONTRACTOR AGREES TO USE CARE WHILE ON THE SITE AND SHALL NOT TAKE ANY ACTION THAT WILL OR MAY RESULT IN OR CAUSE THE HAZARDOUS CONDITION TO BE FURTHER RELEASED IN THE ENVIRONMENT, OR TO FURTHER EXPOSE INDIVIDUALS TO THE HAZARD.

D. CONTRACTOR'S ACTIVITIES SHALL BE RESTRICTED TO THE PROJECT LIMITS. SHOULD AREAS OUTSIDE THE PROJECT LIMITS BE AFFECTED BY CONTRACTOR'S ACTIVITIES, CONTRACTOR SHALL IMMEDIATELY RETURN THEM TO ORIGINAL CONDITION

E. CONDUCT TESTING AS REQUIRED HEREIN.

3.3 DELIVERABLES:

A. CONTRACTOR SHALL REVIEW, APPROVE, AND SUBMIT TO SPRINT SHOP DRAWINGS, PRODUCT DATA, SAMPLES, AND SIMILAR SUBMITTALS AS REQUIRED HEREINAFTER

B. PROVIDE DOCUMENTATION INCLUDING, BUT NOT LIMITED TO, THE FOLLOWING. DOCUMENTATION SHALL BE FORWARDED IN ORIGINAL FORMAT AND/OR UPLOADED INTO SMS.

1. ALL CORRESPONDENCE AND PRELIMINARY CONSTRUCTION REPORTS.
2. PROJECT PROGRESS REPORTS.
3. CIVIL CONSTRUCTION START DATE (POPULATE FIELD IN SMS AND/OR FORWARD NOTIFICATION).
4. ELECTRICAL SERVICE COMPLETION DATE (POPULATE FIELD IN SMS AND/OR FORWARD NOTIFICATION).
5. LINES AND ANTENNA INSTALL DATE (POPULATE FIELD IN SMS AND/OR FORWARD NOTIFICATION).
6. POWER INSTALL DATE (POPULATE FIELD IN SMS AND/OR FORWARD NOTIFICATION).
7. TELCO READY DATE (POPULATE FIELD IN SMS AND/OR FORWARD NOTIFICATION).
8. PPC (OR SHELTER) INSTALL DATE (POPULATE FIELD IN SMS AND/OR FORWARD NOTIFICATION).
9. TOWER CONSTRUCTION START DATE (POPULATE FIELD IN SMS AND/OR FORWARD NOTIFICATION).
10. TOWER CONSTRUCTION COMPLETE DATE (POPULATE FIELD IN SMS AND/OR FORWARD NOTIFICATION).
11. BTS AND RADIO EQUIPMENT DELIVERED AT SITE DATE (POPULATE FIELD IN SMS AND/OR FORWARD NOTIFICATION).
12. NETWORK OPERATIONS HANDOFF CHECKLIST (HOC WALK) COMPLETE (UPLOAD FORM IN SMS)
13. CIVIL CONSTRUCTION COMPLETE DATE (POPULATE FIELD IN SMS AND/OR FORWARD NOTIFICATION).
14. SITE CONSTRUCTION PROGRESS PHOTOS UNLOADED INTO SMS.

## SECTION 01 400 – SUBMITTALS & TESTS

### PART 1 – GENERAL

1.1 THE WORK: THESE STANDARD CONSTRUCTION SPECIFICATIONS IN CONJUNCTION WITH THE OTHER CONTRACT DOCUMENTS AND THE CONSTRUCTION DRAWINGS DESCRIBE THE WORK TO BE PERFORMED BY THE CONTRACTOR.

1.2 RELATED DOCUMENTS:

A. THE REQUIREMENTS OF THIS SECTION APPLY TO ALL SECTIONS IN THIS SPECIFICATION.

B. SPRINT "STANDARD CONSTRUCTION DETAILS FOR WIRELESS SITES" ARE INCLUDED IN AND MADE A PART OF THESE SPECIFICATIONS HEREWITH.

1.3 SUBMITTALS:

A. THE WORK IN ALL ASPECTS SHALL COMPLY WITH THE CONSTRUCTION DRAWINGS AND THESE SPECIFICATIONS.

B. SUBMIT THE FOLLOWING TO COMPANY REPRESENTATIVE FOR APPROVAL.

1. CONCRETE MIX-DESIGNS FOR TOWER FOUNDATIONS, ANCHORS PIERS, AND CONCRETE PAVING.
2. CONCRETE BREAK TESTS AS SPECIFIED HEREIN.
3. SPECIAL FINISHES FOR INTERIOR SPACES, IF ANY.
4. ALL EQUIPMENT AND MATERIALS SO IDENTIFIED ON THE CONSTRUCTION DRAWINGS.
5. CHEMICAL GROUNDING DESIGN

D. ALTERNATES: AT THE COMPANY'S REQUEST, ANY ALTERNATIVES TO THE MATERIALS OR METHODS SPECIFIED SHALL BE SUBMITTED TO SPRINT'S CONSTRUCTION MANAGER FOR APPROVAL PRIOR TO BEING SHIPPED TO SITE. SPRINT WILL REVIEW AND APPROVE ONLY THOSE REQUESTS MADE IN WRITING. NO VERBAL APPROVALS WILL BE CONSIDERED. SUBMITTAL FOR APPROVAL SHALL INCLUDE A STATEMENT OF COST REDUCTION PROPOSED FOR USE OF ALTERNATE PRODUCT.

1.4 TESTS AND INSPECTIONS:

A. THE CONTRACTOR SHALL BE RESPONSIBLE FOR ALL CONSTRUCTION TESTS, INSPECTIONS AND PROJECT DOCUMENTATION.

B. CONTRACTOR SHALL ACCOMPLISH TESTING INCLUDING BUT NOT LIMITED TO THE FOLLOWING:

1. COAX SWEEPS AND FIBER TESTS PER TS-0200 REV 4 ANTENNA LINE ACCEPTANCE STANDARDS.
2. AGL, AZIMUTH AND DOWNTILT USING ELECTRONIC COMMERCIAL MADE-FOR-THE-PURPOSE ANTENNA ALIGNMENT TOOL.
3. CONTRACTOR SHALL BE RESPONSIBLE FOR ANY AND ALL CORRECTIONS TO ANY WORK IDENTIFIED AS UNACCEPTABLE IN SITE INSPECTION ACTIVITIES AND/OR AS A RESULT OF TESTING.

C. REQUIRED CLOSEOUT DOCUMENTATION INCLUDES, BUT IS NOT LIMITED TO THE FOLLOWING;

1. AZIMUTH, DOWNTILT, AGL – UPLOAD REPORT FROM ANTENNA ALIGNMENT TOOL TO SITERRA TASK 465. INSTALLED AZIMUTH, DOWNTILT, AND AGL MUST CONFORM TO THE RF DATA SHEETS. SWEEP AND FIBER TESTS
2. SCANABLE BARCODE PHOTOGRAPHS OF TOWER TOP AND INACCESSIBLE SERIALIZED EQUIPMENT
3. ALL AVAILABLE JURISDICTIONAL INFORMATION
4. PDF SCAN OF REDLINES PRODUCED IN FIELD
5. ELECTRONIC AS-BUILT DRAWINGS IN AUTOCAD AND PDF FORMATS. ANY FIELD CHANGE MUST BE REFLECTED BY MODIFYING THE PLANS, ELEVATIONS, AND DETAILS IN THE DRAWING SETS. GENERAL NOTES INDICATING MODIFICATIONS WILL NOT BE ACCEPTED. CHANGES SHALL BE HIGHLIGHTED AS "CLOUDS" IDENTIFIED AS THE "AS-BUILT" CONDITION.
6. LIEN WAIVERS
7. FINAL PAYMENT APPLICATION
8. REQUIRED FINAL CONSTRUCTION PHOTOS
9. CONSTRUCTION AND COMMISSIONING CHECKLIST COMPLETE WITH NO DEFICIENT ITEMS
10. ALL POST NTP TASKS INCLUDING DOCUMENT UPLOADS COMPLETED IN SITERRA (SPRINTS DOCUMENT REPOSITORY OF RECORD).

1.5 COMMISSIONING: PERFORM ALL COMMISSIONING AS REQUIRED BY APPLICABLE MOPs

1.6 INTEGRATION: PERFORM ALL INTEGRATION ACTIVITIES AS REQUIRED BY APPLICABLE MOPs

### PART 2 – PRODUCTS (NOT USED)

### PART 3 – EXECUTION

3.1 REQUIREMENTS FOR TESTING:

A. THIRD PARTY TESTING AGENCY:

1. WHEN THE USE OF A THIRD PARTY INDEPENDENT TESTING AGENCY IS REQUIRED, THE AGENCY THAT IS SELECTED MUST PERFORM SUCH WORK ON A REGULAR BASIS IN THE STATE WHERE THE PROJECT IS LOCATED AND HAVE A THOROUGH UNDERSTANDING OF LOCAL AVAILABLE MATERIALS, INCLUDING THE SOIL, ROCK, AND GROUNDWATER CONDITIONS.
2. THE THIRD PARTY TESTING AGENCY IS TO BE FAMILIAR WITH THE APPLICABLE REQUIREMENTS FOR THE TESTS TO BE DONE, EQUIPMENT TO BE USED, AND ASSOCIATED HEALTH AND SAFETY ISSUES.
3. EXPERIENCE IN SOILS, CONCRETE, MASONRY, AGGREGATE, AND ASPHALT TESTING USING ASTM, AASJTO, AND OTHER METHODS IS NEEDED.
4. EXPERIENCE IN SOILS, CONCRETE, MASONRY, AGGREGATE, AND ASPHALT TESTING USING ASTM, AASJTO, AND OTHER METHODS IS NEEDED.

3.2 REQUIRED TESTS:

A. CONTRACTOR SHALL ACCOMPLISH TESTING INCLUDING BUT NOT LIMITED TO THE FOLLOWING:

1. CONCRETE CYLINDER BREAK TESTS FOR THE TOWER AND ANCHOR FOUNDATIONS AS SPECIFIED IN SECTION: PORTLAND CEMENT CONCRETE PAVING.
2. ASPHALT ROADWAY COMPACTED THICKNESS, SURFACE SMOOTHNESS, AND COMPACTED DENSITY TESTING AS SPECIFIED IN SECTION: HOT MIX ASPHALT PAVING.
3. FIELD QUALITY CONTROL TESTING AS SPECIFIED IN SECTION: PORTLAND CEMENT CONCRETE PAVING.
4. TESTING REQUIRED UNDER SECTION: AGGREGATE BASE FOR ACCESS ROADS, PADS AND ANCHOR LOCATIONS
5. STRUCTURAL BACKFILL COMPACTION TESTS FOR THE TOWER FOUNDATION.
6. SITE RESISTANCE TO EARTH TESTING PER EXHIBIT: CELL SITE GROUNDING SYSTEM DESIGN.
7. ANTENNA AND COAX SWEEP TESTS PER EXHIBIT: ANTENNA TRANSMISSION LINE ACCEPTANCE STANDARDS.
8. GROUNDING AT ANTENNA MASTS FOR GPS AND ANTENNAS
9. ALL OTHER TESTS REQUIRED BY COMPANY OR JURISDICTION.

3.3 REQUIRED INSPECTIONS

A. SCHEDULE INSPECTIONS WITH COMPANY REPRESENTATIVE.

B. CONDUCT INSPECTIONS INCLUDING BUT NOT LIMITED TO THE FOLLOWING:

1. GROUNDING SYSTEM INSTALLATION PRIOR TO EARTH CONCEALMENT DOCUMENTED WITH DIGITAL PHOTOGRAPHS BY CONTRACTOR, APPROVED BY A&E OR SPRINT REPRESENTATIVE.
2. FORMING FOR CONCRETE AND REBAR PLACEMENT PRIOR TO POUR DOCUMENTED WITH DIGITAL PHOTOGRAPHS BY CONTRACTOR, APPROVED BY A&E OR SPRINT REPRESENTATIVE.
3. COMPACTION OF BACKFILL MATERIALS; AGGREGATE BASE FOR ROADS, PADS, AND ANCHORS; ASPHALT PAVING; AND SHAFT BACKFILL FOR CONCRETE AND WOOD POLES, BY INDEPENDENT THIRD PARTY AGENCY.
4. PRE- AND POST-CONSTRUCTION ROOFTOP AND STRUCTURAL INSPECTIONS ON EXISTING FACILITIES.
5. TOWER ERECTION SECTION STACKING AND PLATFORM ATTACHMENT DOCUMENTED BY DIGITAL PHOTOGRAPHS BY THIRD PARTY AGENCY.
6. ANTENNA AZIMUTH , DOWN TILT AND PER SUNLIGHT TOOL SUNSIGHT INSTRUMENTS – ANTENNALIGN ALIGNMENT TOOL (AAT)

PLANS PREPARED FOR:

Sprint

PLANS PREPARED BY:

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JOB NUMBER 526-104

PROJECT MANAGER:

AIROSMITH DEVELOPMENT
32 CLINTON ST.
SARATOGA SPRINGS, NY 12866
OFFICE#. (518) 306-3740

ENGINEERING LICENSE:

STATE OF CONNECTICUT
JOHN S. STEVENS
No. 24705
LICENSED
PROFESSIONAL ENGINEER
JULY 18 2018

DRAWING NOTICE:



REVISIONS:

| DESCRIPTION | DATE | BY | REV. |
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| ISSUED FOR PERMIT | 06/27/18 | MAP | 0 |
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SITE NAME:

WEST HAVEN & RT 162 CT

SITE NUMBER:

CT52XC076

SITE ADDRESS:

668 JONES HILL ROAD
WEST HAVEN, CT 06516

SHEET DESCRIPTION:

SPRINT SPECIFICATIONS

SHEET NUMBER:

SP-2

CONTINUE FROM SP-2

7. VERIFICATION DOCUMENTED WITH THE ANTENNA CHECKLIST REPORT, BY A&E, SITE DEVELOPMENT REP, OR RF REP.

8. FINAL INSPECTION CHECKLIST AND HANDOFF WALK (HOC.). SIGNED FORM SHOWING ACCEPTANCE BY FIELD OPS IS TO BE UPLOADED INTO SMS.

9. COAX SWEEP AND FIBER TESTING DOCUMENTS SUBMITTED VIA SMS FOR RF APPROVAL.

10. SCAN-ABLE BARCODE PHOTOGRAPHS OF TOWER TOP AND INACCESSIBLE SERIALIZED EQUIPMENT

11. ALL AVAILABLE JURISDICTIONAL INFORMATION

12. PDF SCAN OF REDLINES PRODUCED IN FIELD

C. THE CONTRACTOR SHALL BE RESPONSIBLE FOR ANY AND ALL CORRECTIONS TO ANY WORK IDENTIFIED AS UNACCEPTABLE IN SITE INSPECTION ACTIVITIES AND/OR AS A RESULT OF TESTING.

D. CONSTRUCTION INSPECTIONS AND CORRECTIVE MEASURES SHALL BE DOCUMENTED BY THE CONTRACTOR WITH WRITTEN REPORTS AND PHOTOGRAPHS. PHOTOGRAPHS MUST BE DIGITAL AND OF SUFFICIENT QUALITY TO CLEARLY SHOW THE SITE CONSTRUCTION. PHOTOGRAPHS MUST CLEARLY IDENTIFY THE PHOTOGRAPHED ITEM AND BE LABELED WITH THE SITE CASCADE NUMBER, SITE NAME, DESCRIPTION, AND DATE.

3.4 DELIVERABLES: TEST AND INSPECTION REPORTS AND CLOSEOUT DOCUMENTATION SHALL BE UPLOADED TO THE SMS AND/OR FORWARDED TO SPRINT FOR INCLUSION INTO THE PERMANENT SITE FILES.

A. THE FOLLOWING TEST AND INSPECTION REPORTS SHALL BE PROVIDED AS APPLICABLE.

1. CONCRETE MIX AND CYLINDER BREAK REPORTS.

2. STRUCTURAL BACKFILL COMPACTION REPORTS.

3. SITE RESISTANCE TO EARTH TEST.

4. ANTENNA AZIMUTH AND DOWN TILT VERIFICATION

5. TOWER ERECTION INSPECTIONS AND MEASUREMENTS DOCUMENTING TOWER INSTALLED PER SUPPLIER'S REQUIREMENTS AND THE APPLICABLE SECTIONS HEREIN.

6. COAX CABLE SWEEP TESTS PER COMPANY'S "ANTENNA LINE ACCEPTANCE STANDARDS".

B. REQUIRED CLOSEOUT DOCUMENTATION INCLUDES THE FOLLOWING;

1. TEST WELLS AND TRENCHES: PHOTOGRAPHS OF ALL TEST WELLS; PHOTOGRAPHS SHOWING ALL OPEN EXCAVATIONS AND TRENCHING PRIOR TO BACKFILLING SHOWING A TAPE MEASURE VISIBLE IN THE EXCAVATIONS INDICATING DEPTH.

2. CONDUITS, CONDUCTORS AND GROUNDING: PHOTOGRAPHS SHOWING TYPICAL INSTALLATION OF CONDUCTORS AND CONNECTORS; PHOTOGRAPHS SHOWING TYPICAL BEND RADIUS OF INSTALLED GROUND WIRES AND GROUND ROD SPACING;

3. CONCRETE FORMS AND REINFORCING: CONCRETE FORMING AT TOWER AND EQUIPMENT/SHELTER PAD/FOUNDATIONS – PHOTOGRAPHS SHOWING ALL REINFORCING STEEL, UTILITY AND CONDUIT STUB OUTS; PHOTOGRAPHS SHOWING CONCRETE POUR OF SHELTER SLAB/FOUNDATION, TOWER FOUNDATION AND GUY ANCHORS WITH VIBRATOR IN USE; PHOTOGRAPHS SHOWING EACH ANCHOR ON GUYED TOWERS, BEFORE CONCRETE POUR.

4. TOWER, ANTENNAS AND MAINLINE: INSPECTION AND PHOTOGRAPHS OF SECTION STACKING; INSPECTION AND PHOTOGRAPHS OF PLATFORM COMPONENT ATTACHMENT POINTS; PHOTOGRAPHS OF TOWER TOP GROUNDING; PHOTOS OF TOWER COAX LINE COLOR CODING AT THE TOP AND AT GROUND LEVEL; INSPECTION AND PHOTOGRAPHS OF OPERATIONAL OF TOWER LIGHTING, AND PLACEMENT OF FAA REGISTRATION SIGN; PHOTOGRAPHS SHOWING ADDITIONAL GROUNDING POINTS FOR TOWERS GREATER THAN 200 FEET.; PHOTOS OF ANTENNA GROUND BAR, EQUIPMENT GROUND BAR, AND MASTER GROUND BAR; PHOTOS OF GPS ANTENNA(S); PHOTOS OF EACH SECTOR OF ANTENNAS; ONE PHOTOGRAPH LOOKING AT THE SECTOR AND ONE FROM BEHIND SHOWING THE PROJECTED COVERAGE AREA; PHOTOS OF COAX WEATHERPROOFING – TOP AND BOTTOM; PHOTOS OF COAX GROUNDING--TOP AND BOTTOM; PHOTOS OF ANTENNA AND MAST GROUNDING; PHOTOS OF COAX CABLE ENTRY INTO SHELTER; PHOTOS OF PLATFORM MECHANICAL CONNECTIONS TO TOWER/MONOPOLE.

5. ROOF TOPS: PRE-CONSTRUCTION AND POST-CONSTRUCTION VISUAL INSPECTION AND PHOTOGRAPHS OF THE ROOF AND INTERIOR TO DETERMINE AND DOCUMENT CONDITIONS; ROOF TOP CONSTRUCTION INSPECTIONS AS REQUIRED BY THE JURISDICTION; PHOTOGRAPHS OF CABLE TRAY AND/OR ICE BRIDGE; PHOTOGRAPHS OF DOGHOUSE/CABLE EXIT FROM ROOF;

6. SITE LAYOUT – PHOTOGRAPHS OF THE OVERALL COMPOUND, INCLUDING EQUIPMENT PLATFORM FROM ALL FOUR CORNERS.

7. FINISHED UTILITIES: CLOSE-UP PHOTOGRAPHS OF THE PPC BREAKER PANEL; CLOSE-UP PHOTOGRAPH OF THE INSIDE OF THE TELCO PANEL AND NIU; CLOSE-UP PHOTOGRAPH OF THE POWER METER AND DISCONNECT; PHOTOS OF POWER AND TELCO ENTRANCE TO COMPANY ENCLOSURE; PHOTOGRAPHS AT METER BOX AND/OR FACILITY DISTRIBUTION PANEL.

8. REQUIRED MATERIALS CERTIFICATIONS: CONCRETE MIX DESIGNS; MILL CERTIFICATION FOR ALL REINFORCING AND STRUCTURAL STEEL; AND ASPHALT PAVING MIX DESIGN.

9. ANY AND ALL SUBMITTALS BY THE JURISDICTION OR COMPANY.

## SECTION 01 400 – SUBMITTALS & TESTS

### PART 1 – GENERAL

1.1 THE WORK: THESE STANDARD CONSTRUCTION SPECIFICATIONS IN CONJUNCTION WITH THE OTHER CONTRACT DOCUMENTS AND THE CONSTRUCTION DRAWINGS DESCRIBE THE WORK TO BE PERFORMED BY THE CONTRACTOR.

1.2 RELATED DOCUMENTS:

A. THE REQUIREMENTS OF THIS SECTION APPLY TO ALL SECTIONS IN THIS SPECIFICATION.

B. SPRINT "STANDARD CONSTRUCTION DETAILS FOR WIRELESS SITES" ARE INCLUDED IN AND MADE A PART OF THESE SPECIFICATIONS HEREWITH.

### PART 2 – PRODUCTS (NOT USED)

### PART 3 – EXECUTION

3.1 WEEKLY REPORTS:

A. CONTRACTOR SHALL PROVIDE SPRINT WITH WEEKLY REPORTS SHOWING PROJECT STATUS. THIS STATUS REPORT FORMAT WILL BE PROVIDED TO THE CONTRACTOR BY SPRINT. THE REPORT WILL CONTAIN SITE ID NUMBER, THE MILESTONES FOR EACH SITE, INCLUDING THE BASELINE DATE, ESTIMATED COMPLETION DATE AND ACTUAL COMPLETION DATE.

B. REPORT INFORMATION WILL BE TRANSMITTED TO SPRINT VIA ELECTRONIC MEANS AS REQUIRED. THIS INFORMATION WILL PROVIDE A BASIS FOR PROGRESS MONITORING AND PAYMENT.

3.2 PROJECT CONFERENCE CALLS:

A. SPRINT MAY HOLD WEEKLY PROJECT CONFERENCE CALLS. CONTRACTOR WILL BE REQUIRED TO COMMUNICATE SITE STATUS, MILESTONE COMPLETIONS AND UPCOMING MILESTONE PROJECTIONS, AND ANSWER ANY OTHER SITE STATUS QUESTIONS AS NECESSARY.

3.3 PROJECT TRACKING IN SMS:

A. CONTRACTOR SHALL PROVIDE SCHEDULE UPDATES AND PROJECTIONS IN THE SMS SYSTEM ON A WEEKLY BASIS.

3.4 ADDITIONAL REPORTING:

A. ADDITIONAL OR ALTERNATE REPORTING REQUIREMENTS MAY BE ADDED TO THE REPORT AS DETERMINED TO BE REASONABLY NECESSARY BY COMPANY.

3.5 PROJECT PHOTOGRAPHS:

A. FILE DIGITAL PHOTOGRAPHS OF COMPLETED SITE IN JPEG FORMAT IN THE SMS PHOTO LIBRARY FOR THE RESPECTIVE SITE. PHOTOGRAPHS SHALL BE CLEARLY LABELED WITH SITE NUMBER, NAME AND DESCRIPTION, AND SHALL INCLUDE AT A MINIMUM THE FOLLOWING AS APPLICABLE:

1. 1SHELTER AND TOWER OVERVIEW.

2. TOWER FOUNDATION(S) – FORMS AND STEEL BEFORE POUR (EACH ANCHOR ON GUYED TOWERS).

3. TOWER FOUNDATION(S) POUR WITH VIBRATOR IN USE (EACH ANCHOR ON GUYED TOWERS).

4. TOWER STEEL AS BEING INSTALLED INTO HOLE (SHOW ANCHOR STEEL ON GUYED TOWERS).

5. PHOTOS OF TOWER SECTION STACKING.

6. CONCRETE TESTING / SAMPLES.

7. PLACING OF ANCHOR BOLTS IN TOWER FOUNDATION.

8. BUILDING/WATER TANK FROM ROAD FOR TENANT IMPROVEMENTS OR COMMENTS.

9. SHELTER FOUNDATION--FORMS AND STEEL BEFORE POURING.

10. SHELTER FOUNDATION POUR WITH VIBRATOR IN USE.

11. COAX CABLE ENTRY INTO SHELTER.

12. PLATFORM MECHANICAL CONNECTIONS TO TOWER/MONOPOLE.

13. ROOFTOP PRE AND POST CONSTRUCTION PHOTOS TO INCLUDE PENETRATIONS AND INTERIOR CEILING.

14. PHOTOS OF TOWER TOP COAX LINE COLOR CODING AND COLOR CODING AT GROUND LEVEL.

15. PHOTOS OF ALL APPROPRIATE COMPANY OR REGULATORY SIGNAGE.

16. PHOTOS OF EQUIPMENT BOLT DOWN INSIDE SHELTER.

17. POWER AND TELCO ENTRANCE TO COMPANY ENCLOSURE AND POWER AND TELCO SUPPLY LOCATIONS INCLUDING METER/DISCONNECT.

18. ELECTRICAL TRENCH(S) WITH ELECTRICAL / CONDUIT BEFORE BACKFILL.

19. ELECTRICAL TRENCH(S) WITH FOIL-BACKED TAPE BEFORE FURTHER BACKFILL.

20. TELCO TRENCH WITH TELEPHONE / CONDUIT BEFORE BACKFILL.

21. TELCO TRENCH WITH FOIL-BACKED TAPE BEFORE FURTHER BACKFILL.

22. SHELTER GROUND-RING TRENCH WITH GROUND-WIRE BEFORE BACKFILL (SHOW ALL CAD WELDS AND BEND RADII).

23. TOWER GROUND-RING TRENCH WITH GROUND-WIRE BEFORE BACKFILL (SHOW ALL CAD WELDS AND BEND RADII).

24. FENCE GROUND-RING TRENCH WITH GROUND-WIRE BEFORE BACKFILL (SHOW ALL CAD WELDS AND BEND RADII).

25. ALL BTS GROUND CONNECTIONS.

26. ALL GROUND TEST WELLS.

27. ANTENNA GROUND BAR AND EQUIPMENT GROUND BAR.

28. ADDITIONAL GROUNDING POINTS ON TOWERS ABOVE 200'.

29. HVAC UNITS INCLUDING CONDENSERS ON SPLIT SYSTEMS.

30. GPS ANTENNAS.

31. CABLE TRAY AND/OR WAVEGUIDE BRIDGE.

32. DOGHOUSE/CABLE EXIT FROM ROOF.

33. EACH SECTOR OF ANTENNAS; ONE PHOTOGRAPH LOOKING AT THE SECTOR AND ONE FROM BEHIND SHOWING THE PROJECTED COVERAGE AREA.

34. MASTER BUS BAR.

35. TELCO BOARD AND NIU.

36. ELECTRICAL DISTRIBUTION WALL.

37. CABLE ENTRY WITH SURGE SUPPRESSION.

38. ENTRANCE TO EQUIPMENT ROOM.

39. COAX WEATHERPROOFING-TOP AND BOTTOM OF TOWER.

40. COAX GROUNDING -TOP AND BOTTOM OF TOWER.

41. ANTENNA AND MAST GROUNDING.

42. LANDSCAPING – WHERE APPLICABLE.

3.6 FINAL PROJECT ACCEPTANCE: COMPLETE ALL REQUIRED REPORTING TASKS PER CONTRACT, CONTRACT DOCUMENTS OR THE SPRINT INTEGRATED CONSTRUCTION STANDARDS FOR WIRELESS SITES AND UPLOAD INTO SITERRA.

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SITE NUMBER:

CT52XC076

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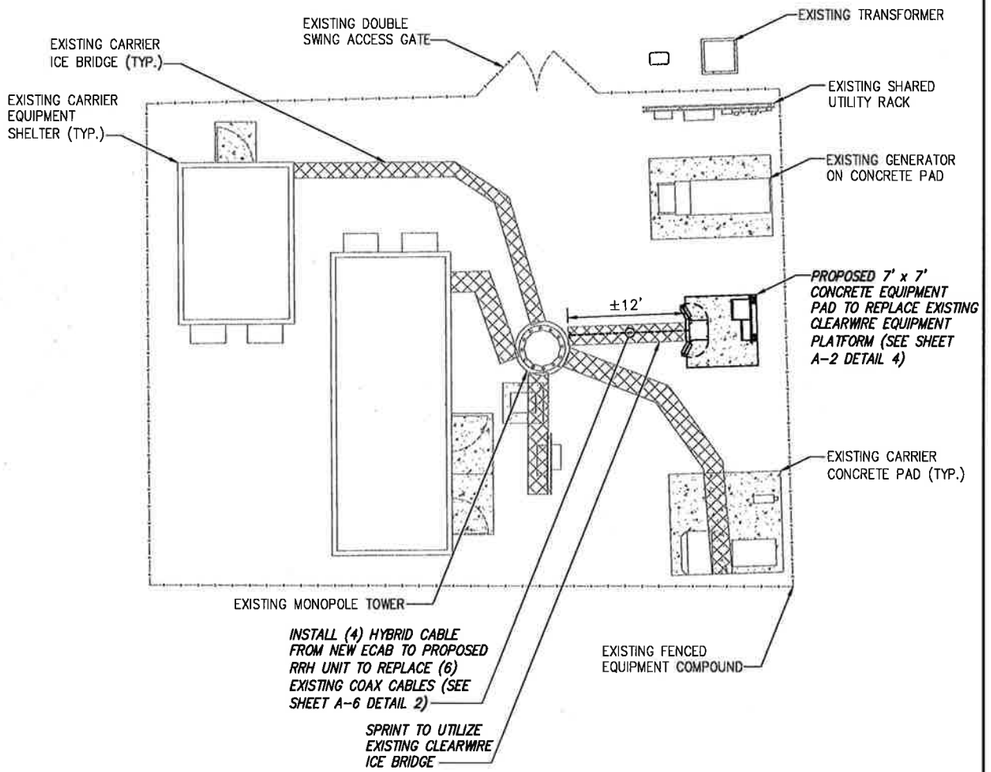
WEST HAVEN, CT 06516

SHEET DESCRIPTION:

SPRINT SPECIFICATIONS

SHEET NUMBER:

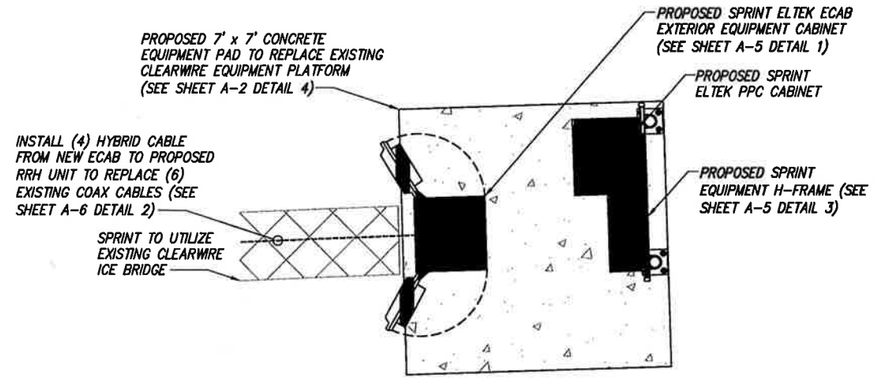
SP-3




INFORMATION CONTAINED WITHIN DRAWINGS ARE BASED ON PROVIDED INFORMATION AND ARE NOT THE RESULT OF A FIELD SURVEY.

GRAPHIC SCALE:
15' 7.5' 0 7.5' 15'
SCALE (11x17): 1" = 15'-0"
SCALE (22x34): 1" = 7'-6"

**OVERALL SITE PLAN** | SCALE: AS NOTED | 1




GRAPHIC SCALE:
4' 2' 0 2' 4'
SCALE (11x17): 1" = 4'-0"
SCALE (22x34): 1" = 2'-0"

**SPRINT EQUIPMENT PLAN** | SCALE: AS NOTED | 2

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No. 24705
PROFESSIONAL ENGINEER
1.8.2018

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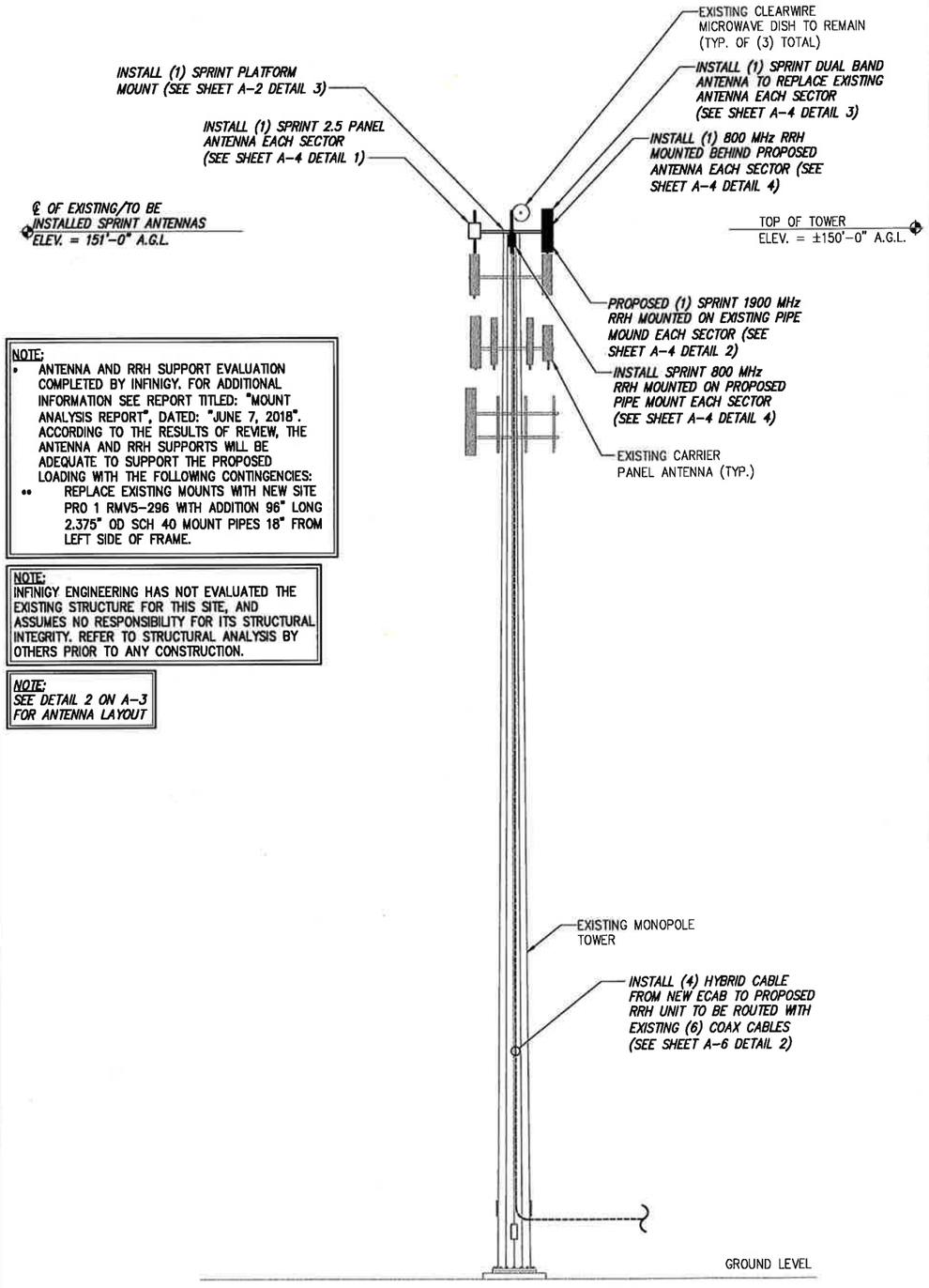
WEST HAVEN, CT 06516

SHEET DESCRIPTION:
SITE PLAN

SHEET NUMBER:
A-1




NOTE:
- ANTENNA AND RRH SUPPORT EVALUATION COMPLETED BY INFINIGY. FOR ADDITIONAL INFORMATION SEE REPORT TITLED: "MOUNT ANALYSIS REPORT", DATED: "JUNE 7, 2018". ACCORDING TO THE RESULTS OF REVIEW, THE ANTENNA AND RRH SUPPORTS WILL BE ADEQUATE TO SUPPORT THE PROPOSED LOADING WITH THE FOLLOWING CONTINGENCIES:
  - REPLACE EXISTING MOUNTS WITH NEW SITE PRO 1 RMV5-296 WITH ADDITION 96" LONG 2.375" OD SCH 40 MOUNT PIPES 18" FROM LEFT SIDE OF FRAME.

NOTE:
INFINIGY ENGINEERING HAS NOT EVALUATED THE EXISTING STRUCTURE FOR THIS SITE, AND ASSUMES NO RESPONSIBILITY FOR ITS STRUCTURAL INTEGRITY. REFER TO STRUCTURAL ANALYSIS BY OTHERS PRIOR TO ANY CONSTRUCTION.

NOTE:
SEE DETAIL 2 ON A-3 FOR ANTENNA LAYOUT

**TOWER ELEVATION** | NO SCALE | 1

## SITE LOADING CHART

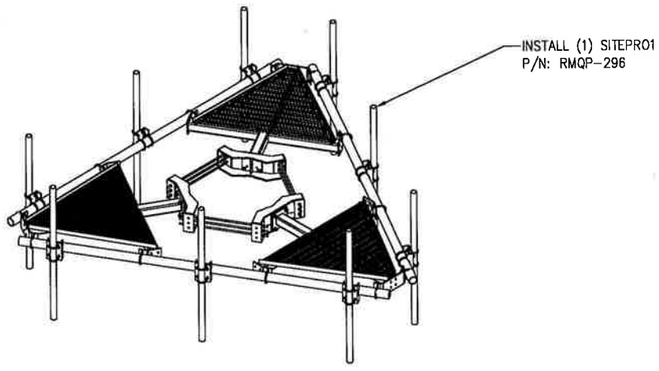
| SECTOR | EXISTING/ PROPOSED | ANTENNA MODEL # | VENDOR | AZIMUTH | QTY. | REMAIN/ REMOVED | RRH (QTY/MODEL) | CABLE | CABLE LENGTH | RAD CENTER |
|---|---|---|---|---|---|---|---|---|---|---|
| ALPHA | PROPOSED | 2.5G MAA - AAHC (64T64R) | NOKIA | 35° | 1 | - | (2) 800 MHZ 2X50W RRH W/ FILTER | SEE SHEET A-5 DETAIL 1 | ±182'* | ±151' AGL |
| | PROPOSED | NNVV-65B-R4 | COMMSCOPE | 35° | 1 | - | | SEE SHEET A-5 DETAIL 1 | | |
| | EXISTING | LLPX310R | ARGUS | 35° | 1 | REMOVE | (1) 1900 MHz 4X45 RRH | EXISTING COAX | | |
| BETA | PROPOSED | 2.5G MAA - AAHC (64T64R) | NOKIA | 155° | 1 | - | (2) 800 MHZ 2X50W RRH W/ FILTER | SEE SHEET A-5 DETAIL 1 | | ±151' AGL |
| | PROPOSED | NNVV-65B-R4 | COMMSCOPE | 155° | 1 | - | | SEE SHEET A-5 DETAIL 1 | | |
| | EXISTING | LLPX310R | ARGUS | 155° | 1 | REMOVE | (1) 1900 MHz 4X45 RRH | EXISTING COAX | | |
| GAMMA | PROPOSED | 2.5G MAA - AAHC (64T64R) | NOKIA | 275° | 1 | - | (2) 800 MHZ 2X50W RRH W/ FILTER | SEE SHEET A-5 DETAIL 1 | | ±151' AGL |
| | PROPOSED | NNVV-65B-R4 | COMMSCOPE | 275° | 1 | - | | SEE SHEET A-5 DETAIL 1 | | |
| | EXISTING | LLPX310R | ARGUS | 275° | 1 | REMOVE | (1) 1900 MHz 4X45 RRH | EXISTING COAX | | |

PROJECT SCOPE:

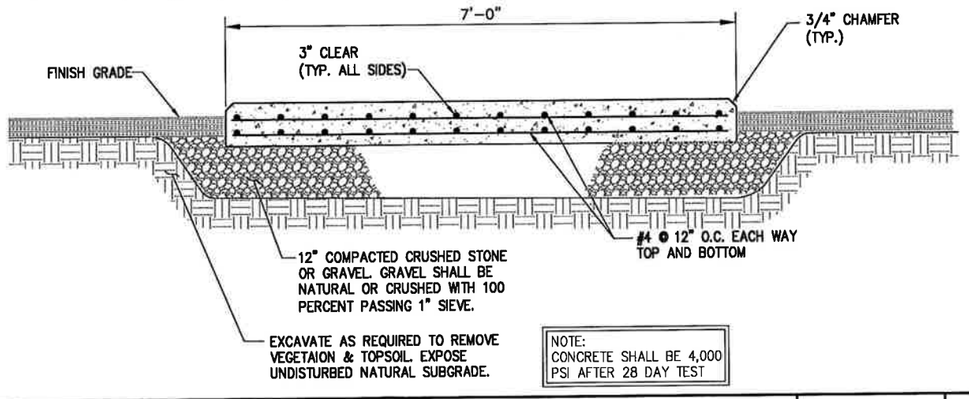
REMOVE: (3) PANEL ANTENNAS INSTALL: (6) PANEL ANTENNAS AND (9) RRH'S

* PROPOSED CABLE LENGTH WAS DETERMINED USING THE SUM OF THE RAD CENTER OF ANTENNAS, AND DISTANCE FROM EXISTING EQUIPMENT AREA TO TOWER BASE WITH AN ADDITIONAL 20' BUFFER. LENGTH TO BE VERIFIED IN FIELD PRIOR TO ORDERING MATERIALS.

**SITE LOADING CHART** | NO SCALE | 2




**MOUNT DETAIL** | NO SCALE | 3




**EQUIPMENT CABINET FOUNDATION** | NO SCALE | 4

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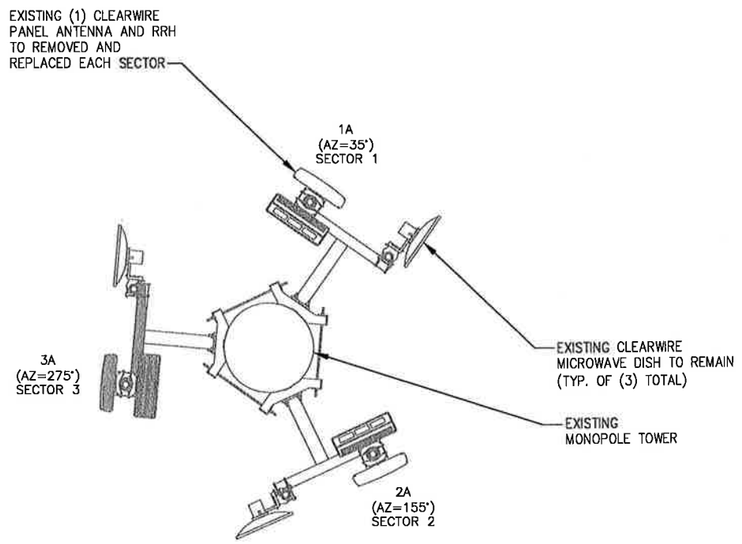
TOWER ELEVATION

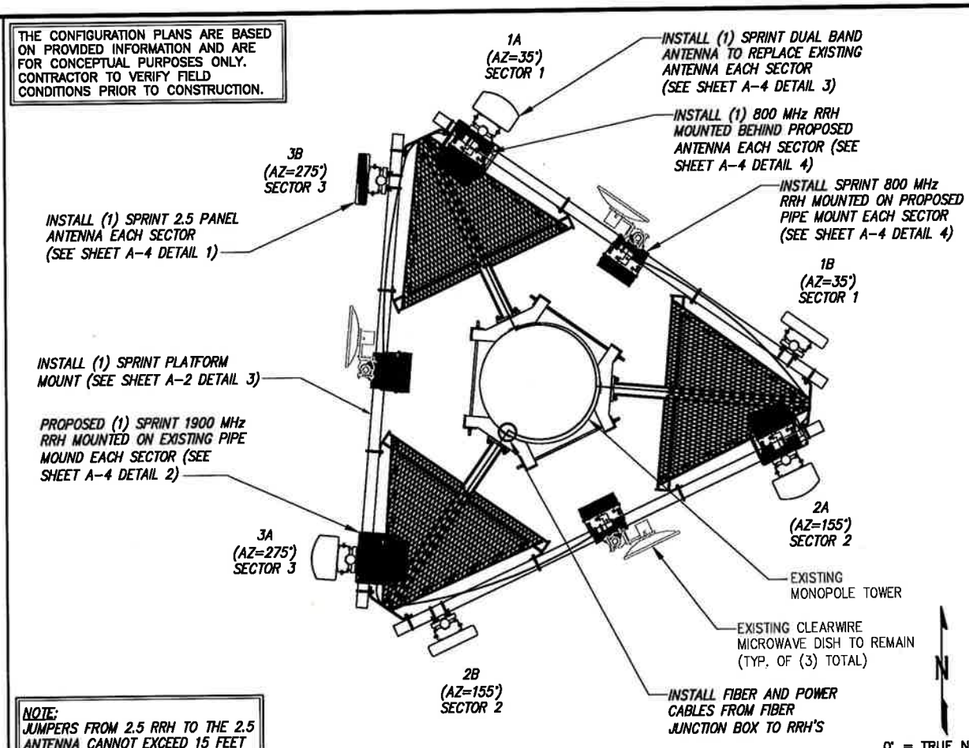
SHEET NUMBER:
A-2




## EXISTING ANTENNA LAYOUT

NO SCALE | 1

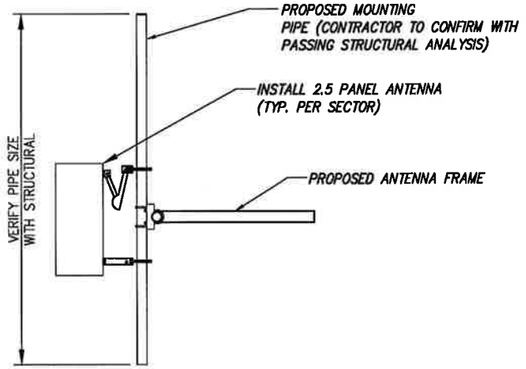
THE CONFIGURATION PLANS ARE BASED ON PROVIDED INFORMATION AND ARE FOR CONCEPTUAL PURPOSES ONLY. CONTRACTOR TO VERIFY FIELD CONDITIONS PRIOR TO CONSTRUCTION.




NOTE:
JUMPERS FROM 2.5 RRH TO THE 2.5 ANTENNA CANNOT EXCEED 15 FEET

## FINAL ANTENNA & RRH LAYOUT

NO SCALE | 2



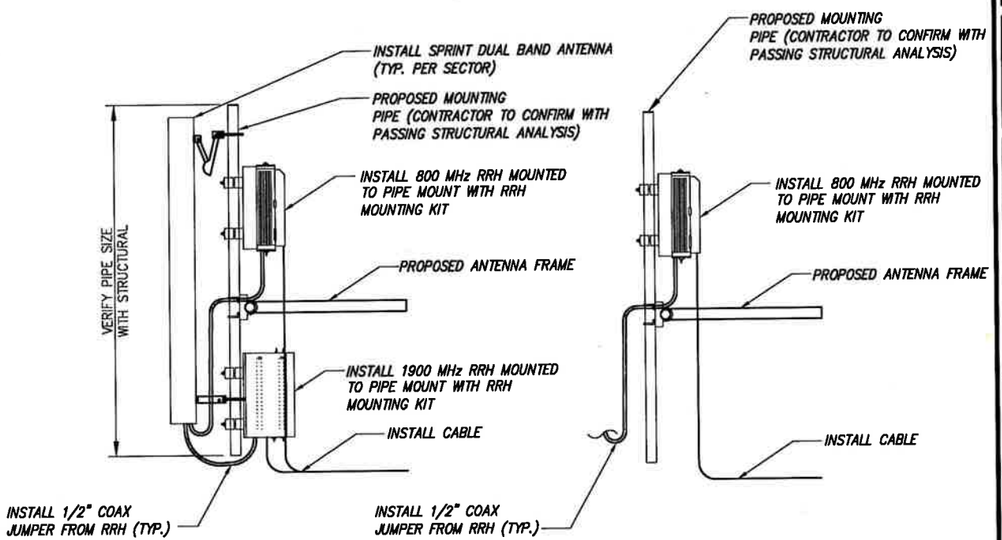

NOTE:
CONTRACTOR TO POSITION RRH ON MOUNT BEHIND ANTENNA SUCH THAT THE RRH DOES NOT INTERFERE WITH THE EXISTING PLATFORM/T-ARM MOUNTING HARDWARE.

NOTE:
THE DIAGRAM IS FOR CONCEPTUAL PURPOSES ONLY. CONTRACTOR IS TO REFER TO PASSING STRUCTURAL ANALYSIS FOR ANTENNA AND RRH MOUNTING DETAILS

NOTES:
1. CUT DC CONDUCTORS TO LENGTH.
2. COIL FIBER CABLE AND SECURE AT SIDE OF RRH.
3. DO NO EXCEED BEND RADIUS.

## TYPICAL 2.5 ANTENNA MOUNTING DETAILS

NO SCALE | 3




NOTE:
CONTRACTOR TO POSITION RRH ON MOUNT BEHIND ANTENNA SUCH THAT THE RRH DOES NOT INTERFERE WITH THE EXISTING PLATFORM/T-ARM MOUNTING HARDWARE.

NOTE:
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NOTES:
1. CUT DC CONDUCTORS TO LENGTH.
2. COIL FIBER CABLE AND SECURE AT SIDE OF RRH.
3. DO NO EXCEED BEND RADIUS.

## TYPICAL DUAL BAND ANTENNA & RRH MOUNTING DETAILS

NO SCALE | 4

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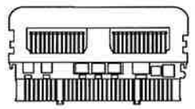
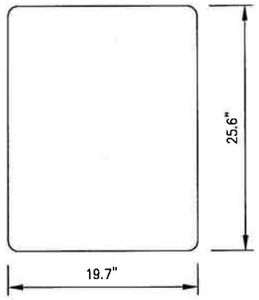
SHEET DESCRIPTION:
ANTENNA LAYOUT & MOUNTING DETAILS

SHEET NUMBER:
A-3

## ANTENNA NOKIA AAHC

| | |
|---|---|
| RADOME MATERIAL: | FIBERGLASS |
| RADOME COLOR: | LIGHT GREY |
| DIMENSIONS, HxWxD.in(mim): | 25.6"x19.7"x9.9" (651x501x245mm) |
| WEIGHT: | 99.2 lbs |
| CONNECTORS: | (2) 7/16" DIN FEMALE |
| | (8) 4.1/9.5 DIN FEMALE |

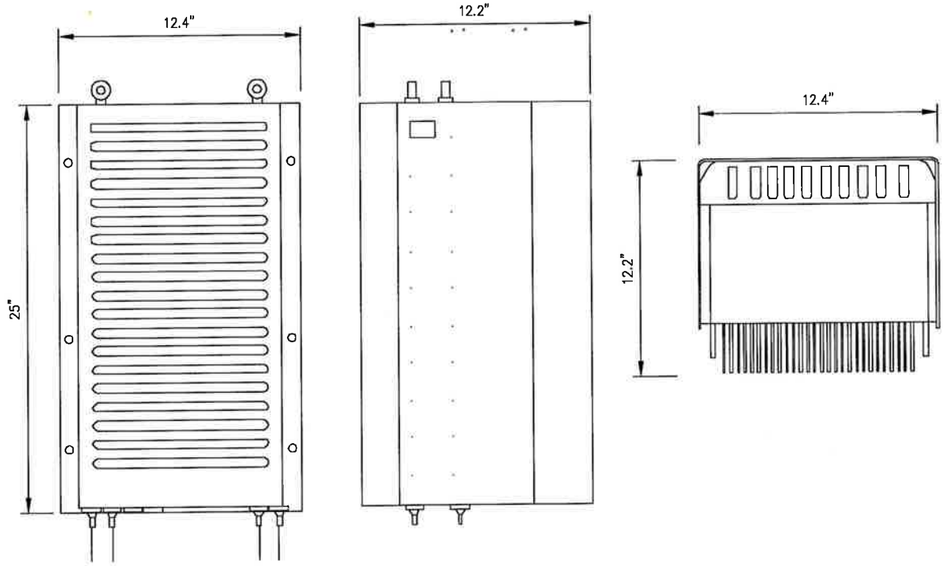





2.5 ANTENNA DETAIL | NO SCALE | 1

## RRH: ALCATEL LUCENT 1900 MHz

COLOR: LIGHT GREY
WEIGHT: 70 LBS.
(INCLUDING OPTIONAL SOLAR SHIELD)

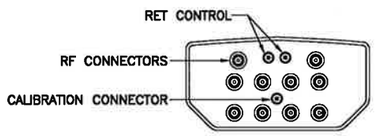



FRONT VIEW | SIDE VIEW | TOP VIEW

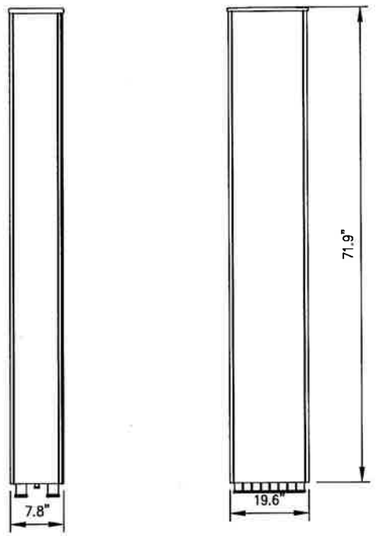
1900 MHz RRH | NO SCALE | 2

## ANTENNA COMMSCOPE NNVV-65B-R4

| | |
|---|---|
| RADOME MATERIAL: | FIBERGLASS |
| RADOME COLOR: | LIGHT GREY |
| DIMENSIONS, HxWxD.in(mim): | 71.9"x19.6"x7.8" (1826x498x198mm) |
| WEIGHT: | 77.4 lbs |
| CONNECTORS: | (2) 7/16" DIN FEMALE |
| | (8) 4.1/9.5 DIN FEMALE |




PLAN VIEW

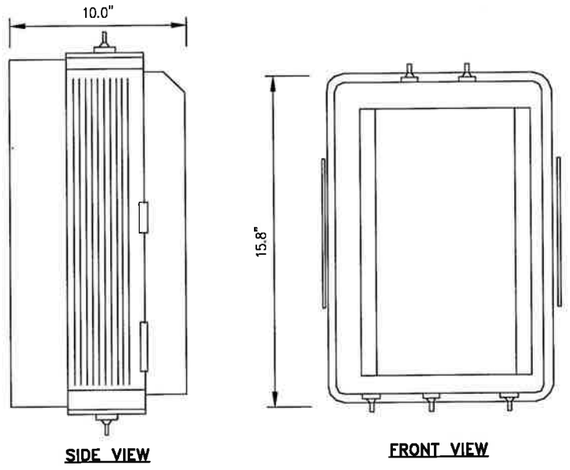



SIDE VIEW | FRONT VIEW

DUAL BAND ANTENNA | NO SCALE | 3

## RRH: ALCATEL LUCENT RRH 800 MHz 2x50W

COLOR: LIGHT GREY
WEIGHT: 53 LBS.




SIDE VIEW | FRONT VIEW | PLAN VIEW

### NOTES

COMPLY WITH MANUFACTURERS INSTRUCTIONS TO ENSURE THAT ALL RRH'S RECEIVE ELECTRICAL POWER WITHIN 24 HOURS OF BEING REMOVED FROM THE MANUFACTURER'S PACKAGING. DO NOT OPEN RRH PACKAGES IN THE RAIN.

800 MHz RRH | NO SCALE | 4

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JOB NUMBER 526-104

PROJECT MANAGER:
AIROSMITH DEVELOPMENT
32 CLINTON ST.
SARATOGA SPRINGS, NY 12866
OFFICE#. (518) 306-3740

ENGINEERING LICENSE:
STATE OF CONNECTICUT
JOHN S. STEVENS
No. 24705
PROFESSIONAL ENGINEER
JUL 18 2018



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| DESCRIPTION | DATE | BY | REV. |
|---|---|---|---|
| ISSUED FOR PERMIT | 06/27/18 | MAP | 0 |

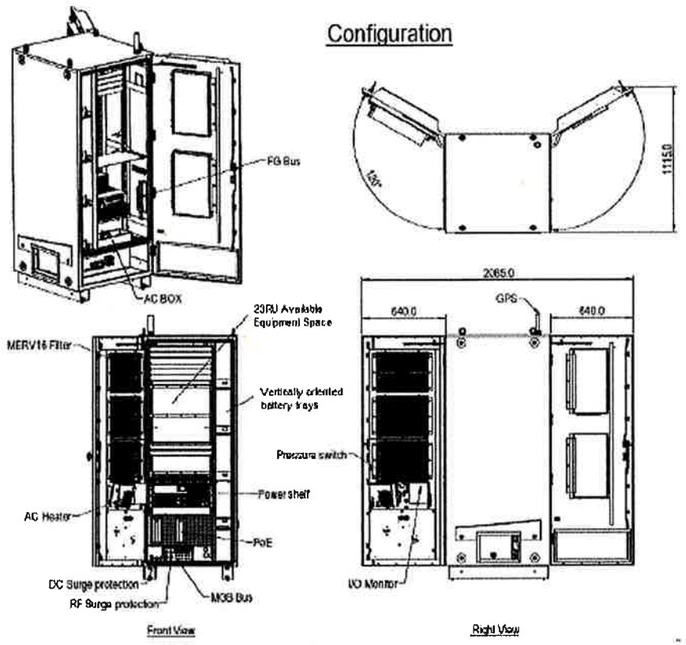
SITE NAME:
WEST HAVEN & RT 162 CT

SITE NUMBER:
CT52XC076

SITE ADDRESS:
668 JONES HILL ROAD
WEST HAVEN, CT 06516

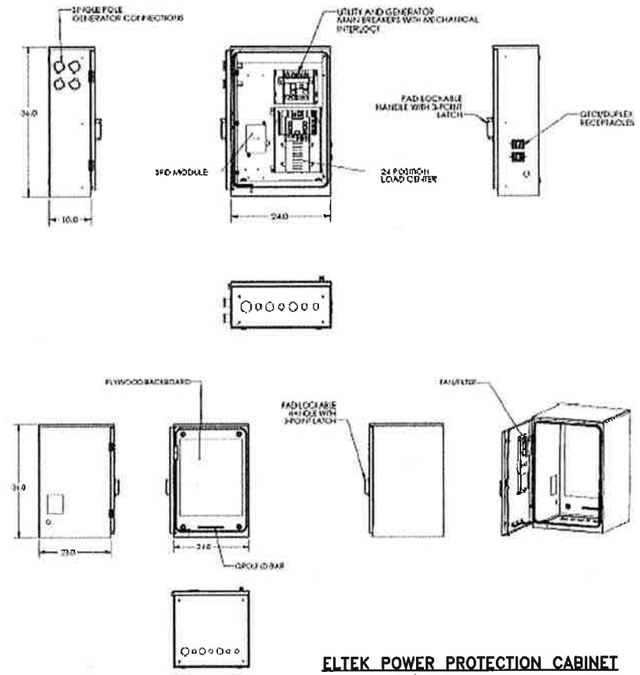
SHEET DESCRIPTION:
EQUIPMENT & MOUNTING DETAILS

SHEET NUMBER:
A-4



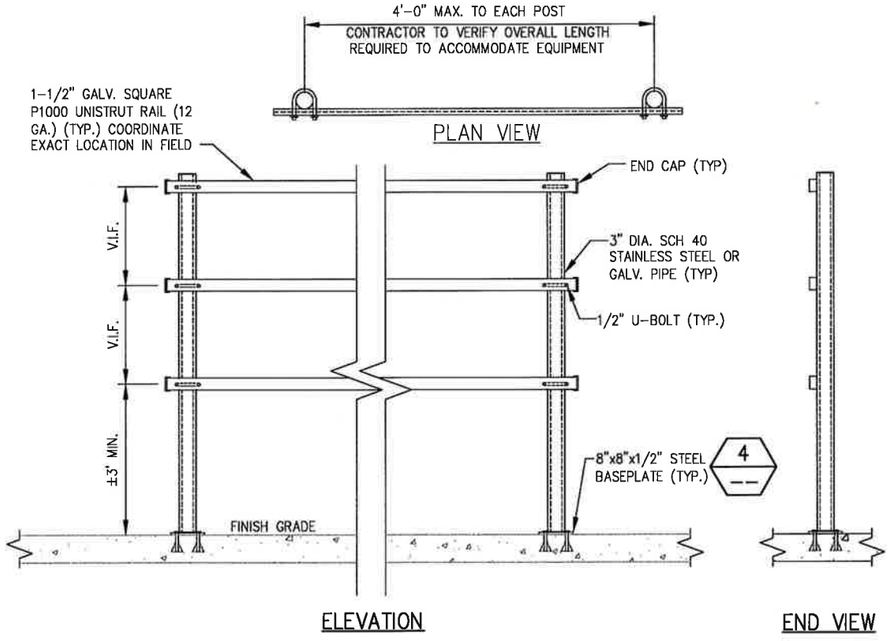

**ELTEK ECAB EXTERIOR CABINET**
**P/N: ES0A220-SCA02**

| EQUIPMENT CABINET DETAIL | NO SCALE | 1 |
|---|---|---|

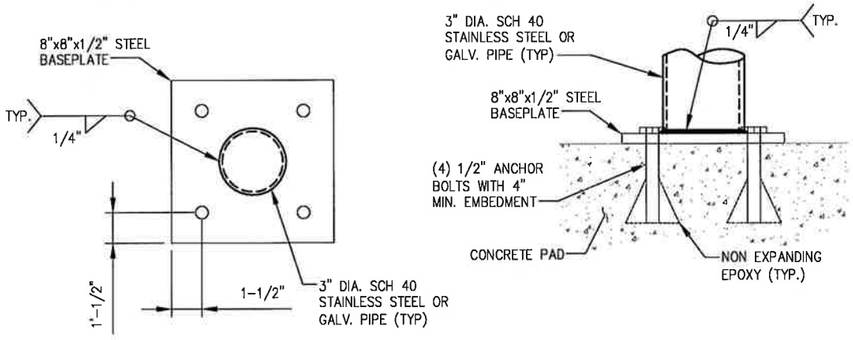



**ELTEK POWER PROTECTION CABINET**
**P/N: 5811122212**

| EQUIPMENT CABINET DETAIL | NO SCALE | 2 |
|---|---|---|




| H-FRAME DETAIL | NO SCALE | 3 |
|---|---|---|




| SUPPORT POST MOUNTING DETAIL | NO SCALE | 4 |
|---|---|---|

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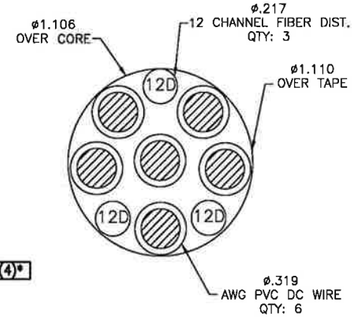
SHEET DESCRIPTION:
EQUIPMENT & MOUNTING DETAILS

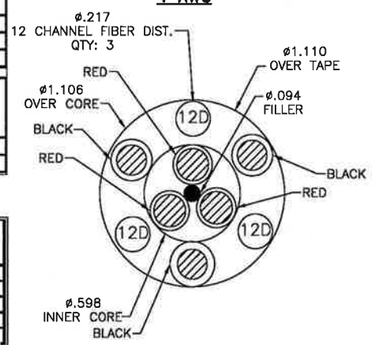
SHEET NUMBER:
A-5

## RFS HYBRIFLEX RISER CABLE SCHEDULE

| | | |
|---|---|---|
| Fiber Only (Existing DC Power) | Hybrid cable<br>MN: HB058-M12-050F<br>12x multi-mode fiber pairs, Top: Outdoor protected connectors, Bottom: LC Connectors, 5/8 cable, 50 ft | 50 ft |
| | MN: HB058-M12-075F | 75 ft |
| | MN: HB058-M12-100F | 100 ft |
| | MN: HB058-M12-125F | 125 ft |
| | MN: HB058-M12-150F | 150 ft |
| | MN: HB058-M12-175F | 175 ft |
| | MN: HB058-M12-200F | 200 ft |
| 8 AWG Power | Hybrid cable<br>MN: HB114-08U3M12-050F<br>3x 8 AWG power pairs, 12x multi-mode fiber pairs, Outdoor rated connectors & LC Connectors, 1 1/4 cable, 50 ft | 50 ft |
| | MN: HB114-08U3M12-075F | 75 ft |
| | MN: HB114-08U3M12-100F | 100 ft |
| | MN: HB114-08U3M12-125F | 125 ft |
| | MN: HB114-08U3M12-150F | 150 ft |
| | MN: HB114-08U3M12-175F | 175 ft |
| | MN: HB114-08U3M12-200F | 200 ft (4)* |
| 6 AWG Power | Hybrid cable<br>MN: HB114-13U3M12-225F<br>3x 6 AWG power pair, 12x multi-mode fiber pairs, Outdoor rated connectors & LC Connectors, 1 1/4 cable, 225 ft | 225 ft |
| | MN: HB114-13U3M12-250F | 250 ft |
| | MN: HB114-13U3M12-275F | 275 ft |
| | MN: HB114-13U3M12-300F | 300 ft |
| 4 AWG Power | Hybrid cable<br>MN: HB114-21U3M12-325F<br>3x 4 AWG power pair, 12x multi-mode fiber pairs, Outdoor rated connectors & LC Connectors, 1 1/4 cable, 325 ft | 325 ft |
| | MN: HB114-21U3M12-350F | 350 ft |
| | MN: HB114-21U3M12-375F | 375 ft |




4 AWG

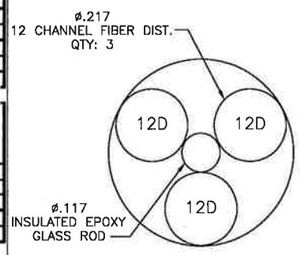



8 & 6 AWG

## RFS HYBRIFLEX JUMPER CABLE SCHEDULE

| | | |
|---|---|---|
| Fiber Only | Hybrid Jumper cable<br>MN: HBF012-M3-5F1<br>5 ft, 3x multi-mode fiber pairs, Outdoor & LC connectors, 1/2 cable | 5 ft |
| | MN: HBF012-M3-10F1 | 10 ft |
| | MN: HBF012-M3-15F1 | 15 ft |
| | MN: HBF012-M3-20F1 | 20 ft |
| | MN: HBF012-M3-25F1 | 25 ft |
| | MN: HBF012-M3-30F1 | 30 ft |
| 8 AWG Power | Hybrid Jumper cable<br>MN: HBF058-08U1M3-5F1<br>5 ft, 1x 8 AWG power pair, 3x multi-mode fiber pairs, Outdoor & LC Connectors, 5/8 cable | 5 ft |
| | MN: HBF058-08U1M3-10F1 | 10 ft |
| | MN: HBF058-08U1M3-15F1 | 15 ft |
| | MN: HBF058-08U1M3-20F1 | 20 ft |
| | MN: HBF058-08U1M3-25F1 | 25 ft |
| | MN: HBF058-08U1M3-30F1 | 30 ft |
| 6 AWG Power | Hybrid Jumper cable<br>MN: HBF058-13U1M3-5F1<br>5 ft, 1x 6 AWG power pair, 3x multi-mode fiber pairs, Outdoor & LC Connectors, 5/8 cable | 5 ft |
| | MN: HBF058-13U1M3-10F1 | 10 ft |
| | MN: HBF058-13U1M3-15F1 | 15 ft |
| | MN: HBF058-13U1M3-20F1 | 20 ft |
| | MN: HBF058-13U1M3-25F1 | 25 ft |
| | MN: HBF058-13U1M3-30F1 | 30 ft |
| 4 AWG Power | Hybrid Jumper cable<br>MN: HBF078-21U1M3-5F1<br>5 ft, 1x 4 AWG power pair, 3x multi-mode fiber pairs, Outdoor & LC Connectors, 7/8 cable | 5 ft |
| | MN: HBF078-21U1M3-10F1 | 10 ft |
| | MN: HBF078-21U1M3-15F1 | 15 ft |
| | MN: HBF078-21U1M3-20F1 | 20 ft |
| | MN: HBF078-21U1M3-25F1 | 25 ft |
| | MN: HBF078-21U1M3-30F1 | 30 ft |

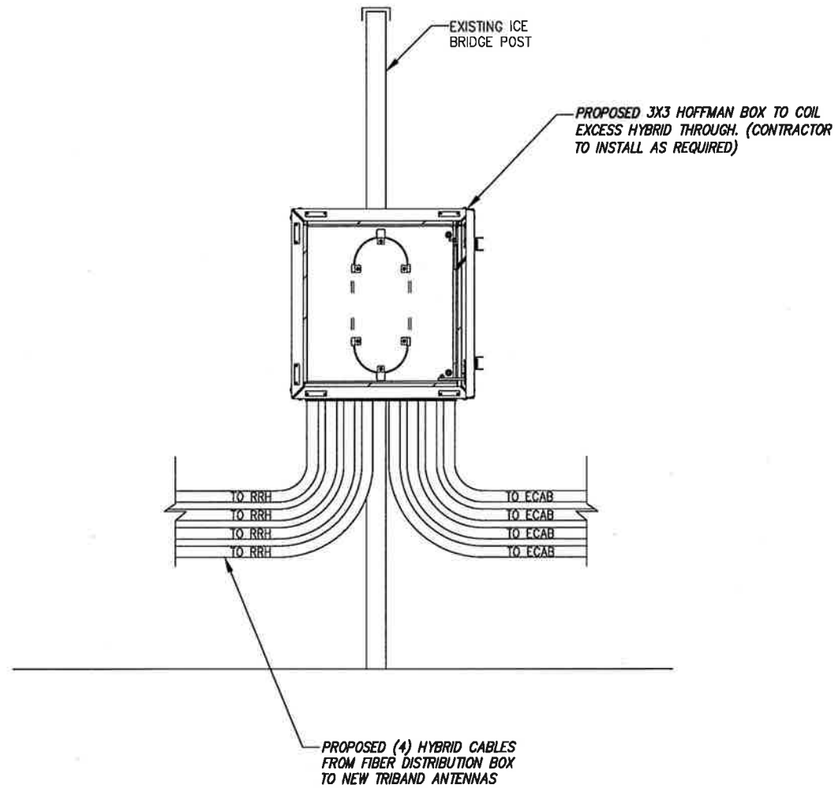
NOTE:
SPRINT CM TO CONFIRM HYBRID OR FIBER RISER CABLE AND HYBRID OR FIBER JUMPER CABLE MODEL NUMBERS IF HYBRID CABLES ARE REQUIRED BEFORE PREPARING BOM.




FIBER ONLY

* PROPOSED CABLE LENGTH WAS DETERMINED USING THE SUM OF THE RAD CENTER OF ANTENNAS, AND DISTANCE FROM EXISTING EQUIPMENT AREA TO TOWER BASE WITH AN ADDITIONAL 20' BUFFER. LENGTH TO BE VERIFIED IN FIELD PRIOR TO ORDERING MATERIALS.

800/1900/2500 CABLE CROSS SECTION DATA | NO SCALE | 1




OPTIONAL HYBRID SLACK BOX | NO SCALE | 2

DETAIL NOT USED | NO SCALE | 3

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SITE NUMBER:
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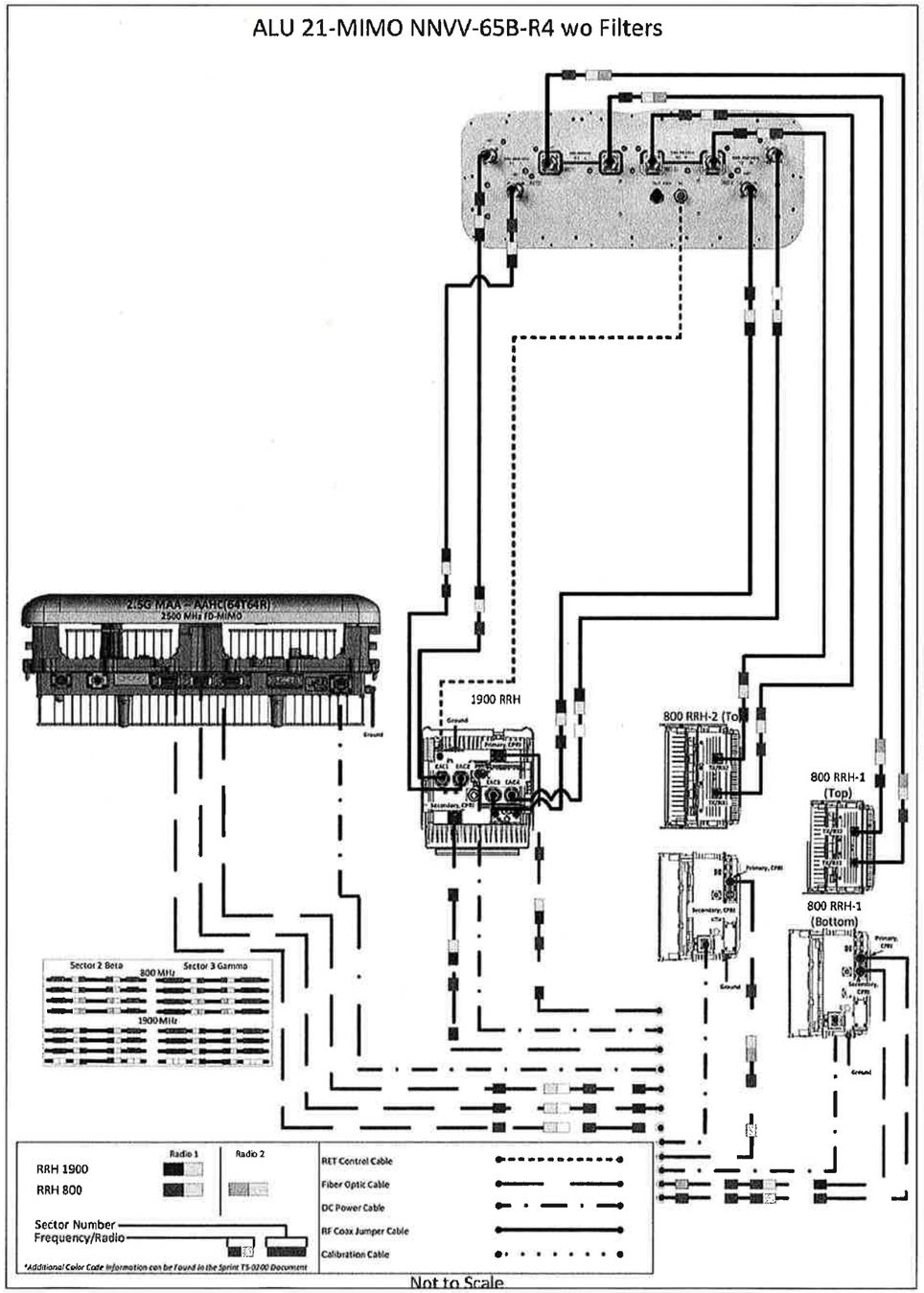
SHEET DESCRIPTION:
CIVIL DETAILS

SHEET NUMBER:
A-6

ALU 21-MIMO NNVV-65B-R4 wo Filters




Not to Scale

PLUMBING DIAGRAM | NO SCALE | 1

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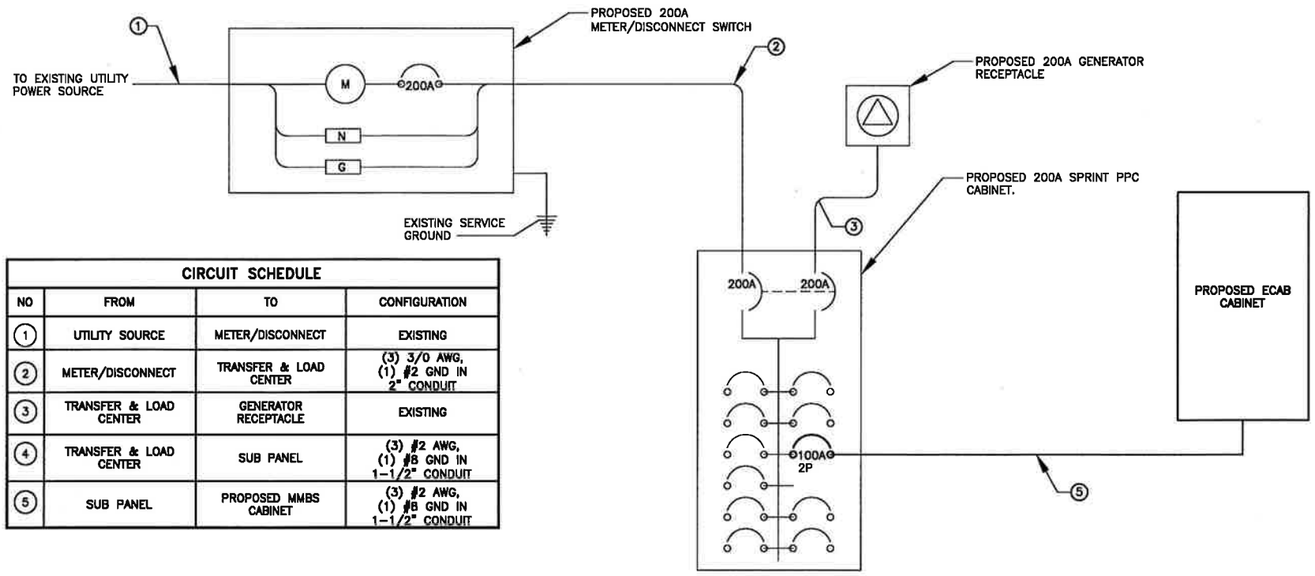
SHEET DESCRIPTION:

PLUMBING DIAGRAM

SHEET NUMBER:

A-7




| CIRCUIT SCHEDULE | | | |
|---|---|---|---|
| NO | FROM | TO | CONFIGURATION |
| 1 | UTILITY SOURCE | METER/DISCONNECT | EXISTING |
| 2 | METER/DISCONNECT | TRANSFER & LOAD CENTER | (3) 3/0 AWG, (1) #2 GND IN 2" CONDUIT |
| 3 | TRANSFER & LOAD CENTER | GENERATOR RECEPTACLE | EXISTING |
| 4 | TRANSFER & LOAD CENTER | SUB PANEL | (3) #2 AWG, (1) #8 GND IN 1-1/2" CONDUIT |
| 5 | SUB PANEL | PROPOSED MMBS CABINET | (3) #2 AWG, (1) #8 GND IN 1-1/2" CONDUIT |

ONE LINE DIAGRAM | NO SCALE | 1

## GENERAL ELECTRICAL NOTES:

1. ALL ELECTRICAL WORK SHALL BE IN ACCORDANCE WITH THE LATEST VERSION OF THE NATIONAL ELECTRICAL CODE AND ALL LOCAL AND STATE CODES, LAWS, AND ORDINANCES.
2. ALL UNDERGROUND CONDUIT SHALL BE PVC SCHEDULE 40 UNLESS OTHERWISE INDICATED. CONDUITS EXPOSED ABOVE GROUND SHALL BE RIGID GALVANIZED STEEL. ALL UNDERGROUND CONDUIT SHALL TRANSITION FROM PVC TO RIGID ABOVE GRADE. PROVIDE 36" SEPARATION BETWEEN UNDERGROUND POWER AND TELEPHONE CONDUITS. SUPPLY UTILITY MARKING TAPE BURIED 12" BELOW GRADE ALONG ENTIRE LENGTH OF UNDERGROUND CONDUITS.
3. ALL CONDUCTORS SHALL BE COPPER WITH THHN/THWN INSULATION. CONTROL CONDUCTORS SHALL BE STRANDED, POWER & LIGHTING CONDUCTORS SHALL BE SOLID FOR #10 & #12 CONDUCTORS AND STRANDED FOR ALL OTHER SIZES.
4. ELECTRICAL DRAWINGS ARE IN PART DIAGRAMMATIC. COORDINATE ELECTRICAL WORK WITH SITE CONDITIONS.
5. LOCATE ALL UNDERGROUND UTILITIES BEFORE TRENCHING. IF CONFLICTS ARISE, CONTACT UTILITY COMPANY AND ENGINEER IMMEDIATELY.
6. ALL EXPOSED CONDUITS SHALL HAVE WEATHERPROOF CAPS NOT DUCT TAPE.
7. PROVIDE 200 LB TEST PULL WIRES IN EACH TELEPHONE AND POWER CONDUIT.
8. PULL BOXES SHALL BE INSTALLED AS NEEDED PER NEC UTILITY REQUIREMENTS.

ELECTRICAL NOTES | NO SCALE | 2

## GENERAL GROUNDING NOTES:

1. TO ENSURE PROPER BONDING, ALL CONNECTIONS SHALL BE AS FOLLOWS:
   – #2/0 BARE TINNED SOLID COPPER CONDUCTOR: CADWELD TO RODS OR GROUND RING
   – LUGS AND BUS BAR (UNLESS NOTED OTHERWISE): SANDED CLEAN, COATED WITH OXIDE INHIBITOR AND BOLTED FOR MAXIMUM SURFACE CONTACT. ALL LUGS SHALL BE COPPER (NO ALUMINUM SHALL BE PERMITTED). PROVIDE LOCK WASHERS FOR ALL MECHANICAL CONNECTIONS FOR GROUND CONDUCTORS. USE STAINLESS STEEL HARDWARE THROUGHOUT.
2. ALL GROUNDING CABLE IN CONCRETE OR THROUGH WALLS SHALL BE IN 3/4" PVC CONDUIT. SEAL AROUND CONDUIT THROUGH WALLS. NO METALLIC CONDUIT SHALL BE USED FOR GROUNDING CONDUCTORS.
3. OWNER'S REPRESENTATIVE WILL INSPECT CADWELDS AND CONDUCT MEGGER TEST PRIOR TO BURIAL. MAXIMUM 5 OHMS RESISTANCE IS REQUIRED.
4. DO NOT INSTALL GROUND RING OUTSIDE OF LEASED AREA.
5. MAKE ALL GROUND CONNECTIONS AS SHORT AND DIRECT AS POSSIBLE. AVOID SHARP BENDS. ALL BENDS SHALL BE A MINIMUM 8" RADIUS AND NO GREATER THAN 90 DEGREES.
6. ALL CADWELDS TO BURIED GROUND RING SHALL BE THE PARALLEL TYPE, EXCEPT FOR THE GROUND RODS WHICH SHALL BE THE TEE TYPE.
7. BOND SERVICE CONDUITS TO GROUND RING AS THEY CROSS. DO NOT EXOTHERMICALLY WELD TO CONDUITS.
8. THE CONTRACTOR SHALL NOTIFY THE CONSTRUCTION MANAGER WHEN THE GROUNDING SYSTEM IS COMPLETE. THE CONSTRUCTION MANAGER SHALL INSPECT THE GROUNDING SYSTEM PRIOR TO BACKFILLING.
9. THE MINIMUM SPACING BETWEEN GROUND RODS SHALL BE 10'–0" (MAX. 15'–0").
10. BOND CIGBE TO EXTERNAL GROUND RING WITH 2 RUNS OF #2 BARE, TINNED, SOLID COPPER CONDUCTOR IN PVC. CONNECT BAR END WITH 2 HOLE LUG, AND "CADWELD" THE OTHER END TO THE EXTERNAL GROUND ROD.
11. THE PREFERRED LOCATION FOR COAX GROUNDING IS AT THE BASE OF THE TOWER PRIOR TO THE COAX BEND. BONDING IS SHOWN ON THE ICE BRIDGE DUE TO DIFFICULTY WITH WELDING OR ATTACHING TO TOWER LEGS. CONTRACTOR SHALL ADVISE CONSTRUCTION MANAGER PRIOR TO PLACING CIGBE ON ICE BRIDGE IF MOUNTING TO TOWER LEG IS POSSIBLE.
12. BONDING OF THE GROUNDED CONDUCTOR (NEUTRAL) AND THE GROUNDING CONDUCTOR SHALL BE AT THE SERVICE DISCONNECTING MEANS. BONDING JUMPER SHALL BE INSTALLED PER N.E.C. ARTICLE 250–30.

GROUNDING NOTES | NO SCALE | 3

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SITE NUMBER:
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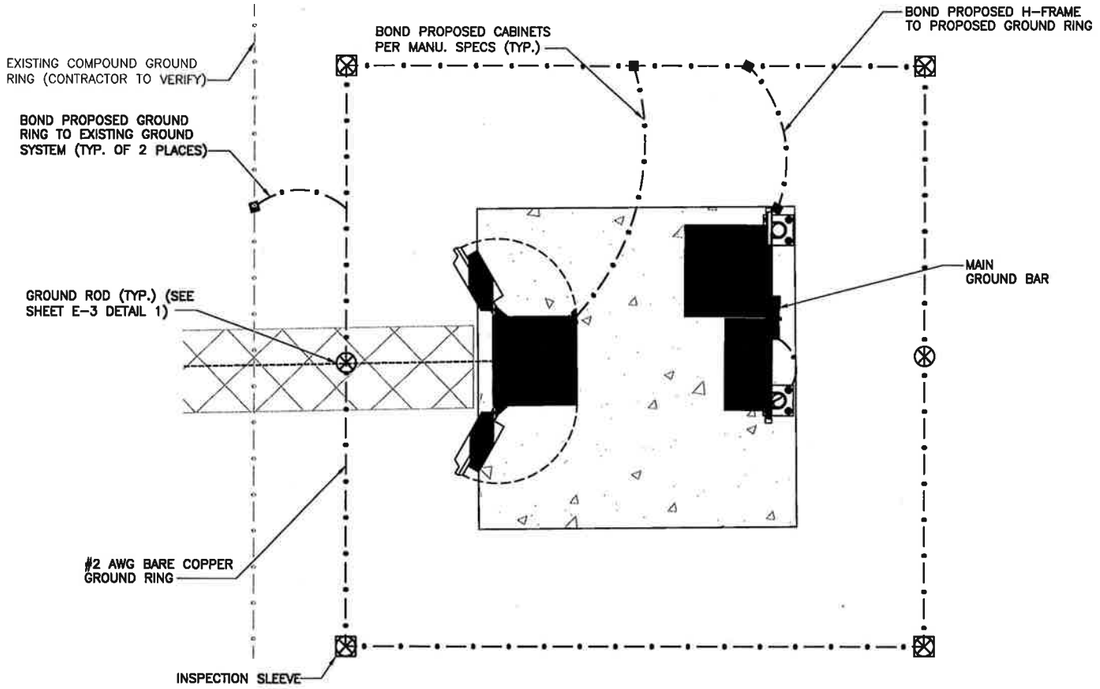
SHEET DESCRIPTION:
ELECTRICAL & GROUNDING PLAN

SHEET NUMBER:
E-1



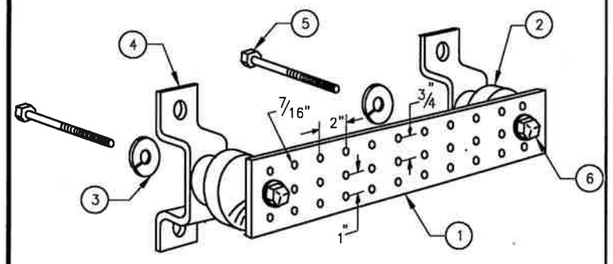

**LEGEND:**

- EXISTING GROUND RING
- CADWELD CONNECTION (EXOTHERMIC WELD)
- MECHANICAL CONNECTION
- GROUND ROD

## GROUNDING PLAN

NO SCALE | 1

NOTE:
1. COPPER GROUND BAR 1/4"x4"x24" 2-HOLE CONTERS TO MATCH NEMA DOUBLE LUG CONFIGURATION.
2. SIMILAR INSTALLATION FOR TOP AND BOTTOM TOWER GROUND BARS AND FOR COAX ENTRY PORT GROUND BARS.

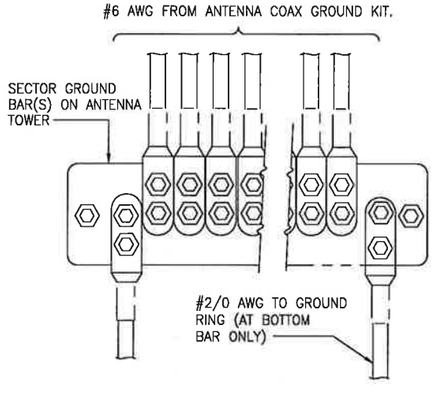



LEGEND

1 – TINNED COPPER GROUND BAR, 1/4"x 4"x 24"
2 – INSULATORS (NO INSULATORS ON TOWER)
3 – 5/8" LOCK WASHERS
4 – MOUNTING BRACKET (MOUNT HORIZONTAL ON VERTICAL CABLE LADDER)
5 – 5/8-11 X 1" H.H.C.S.BOLTS
6 – "LOCTITE" THREAD LOCK (RED) ON ALL REMOVABLE BOLTS

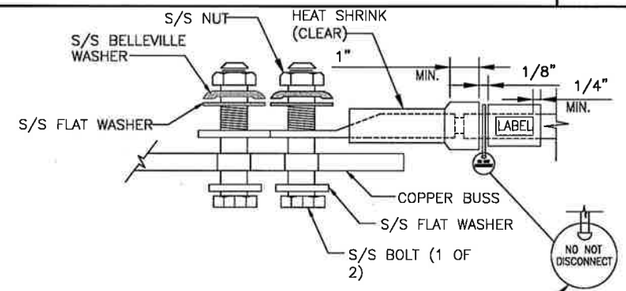
## TINNED GROUND BAR DETAIL

NO SCALE | 2




## ANTENNA GROUND WIRE INSTALLATION

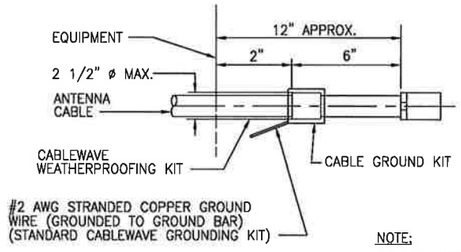
NO SCALE | 3




NOTE:
ALL MECHANICAL EXTERNAL TERMINATION SURFACES SHALL BE TREATED WITH T&B KOPR-SHIELD CP8 ANTI-OXIDATION COMPOUND.

## EQUIPMENT GROUND CONNECTION

NO SCALE | 4




NOTE;
DO NOT INSTALL CABLE GROUND KIT AT A BEND AND ALWAYS DIRECT GROUND WIRE DOWN TO GROUND BAR.

## CABLE GROUND KIT CONNECTION

NO SCALE | 5

PLANS PREPARED FOR:
Sprint

PLANS PREPARED BY:
INFINIGY
FROM ZERO TO INFINIGY
the solutions are endless
1033 Watervliet Shaker Rd | Albany, NY 12205
Phone: 518-690-0790 | Fax: 518-690-0793
www.infinigy.com
JOB NUMBER 526-104

PROJECT MANAGER:
AIROSMITH DEVELOPMENT
32 CLINTON ST.
SARATOGA SPRINGS, NY 12866
OFFICE#. (518) 306-3740

ENGINEERING LICENSE:
STATE OF CONNECTICUT JOHN S. STEVENS No. 24705 PROFESSIONAL ENGINEER
JUL 18 2018

DRAWING NOTICE:


REVISIONS:

| DESCRIPTION | DATE | BY | REV. |
|---|---|---|---|
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| ISSUED FOR PERMIT | 06/27/18 | MAP | 0 |

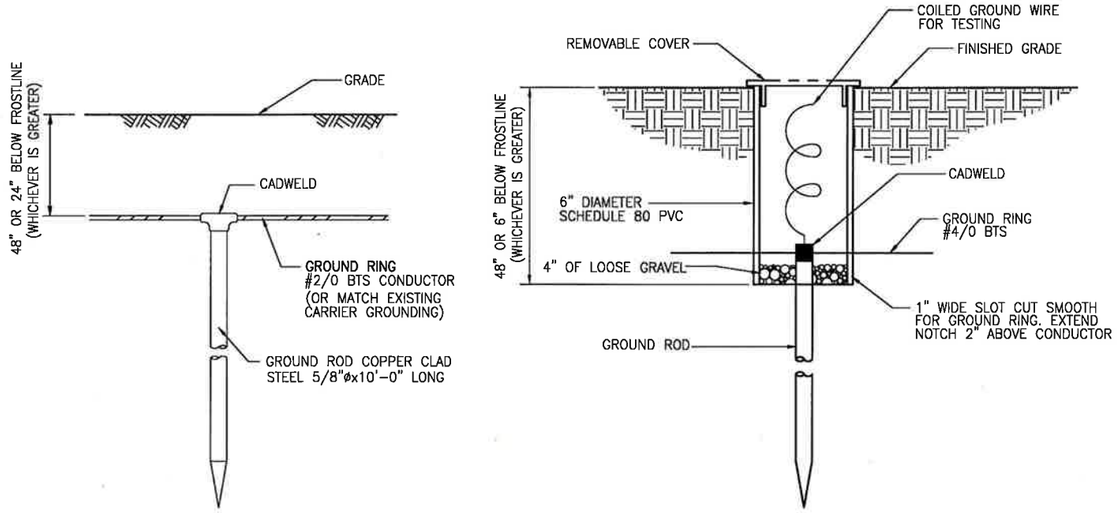
SITE NAME:
WEST HAVEN & RT 162 CT

SITE NUMBER:
CT52XC076

SITE ADDRESS:
668 JONES HILL ROAD
WEST HAVEN, CT 06516

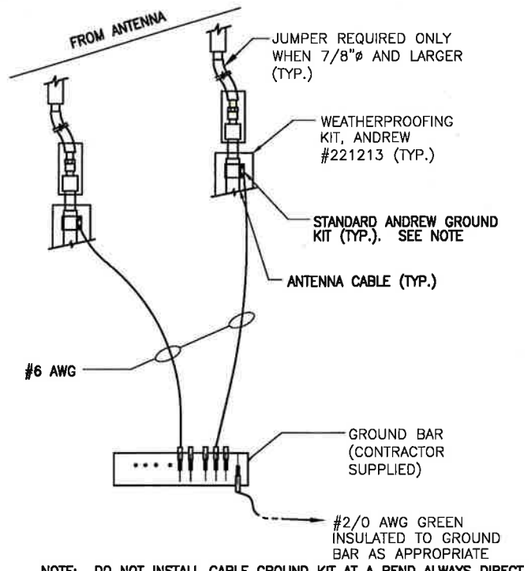
SHEET DESCRIPTION:
ELECTRICAL & GROUNDING PLAN

SHEET NUMBER:
E-2




## GROUND ROD & INSPECTION SLEEVE DETAIL

NO SCALE | 1



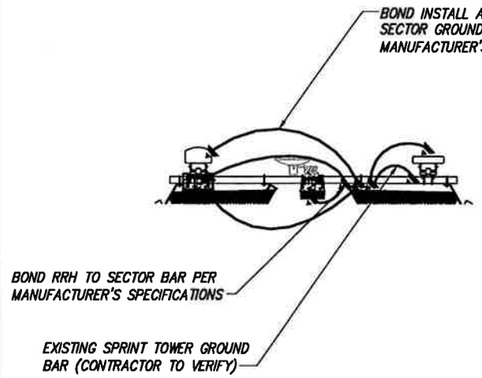

NOTE: DO NOT INSTALL CABLE GROUND KIT AT A BEND ALWAYS DIRECT GROUND WIRE DOWN TO CIGBE

## CONNECTION OF GROUND WIRES TO GROUND BARS @ ANTENNAS

NO SCALE | 2

LEGEND:

- EXISTING GROUND RING
- CADWELD CONNECTION (EXOTHERMIC WELD)
- MECHANICAL CONNECTION
- GROUND ROD
- CABLE GROUND KIT

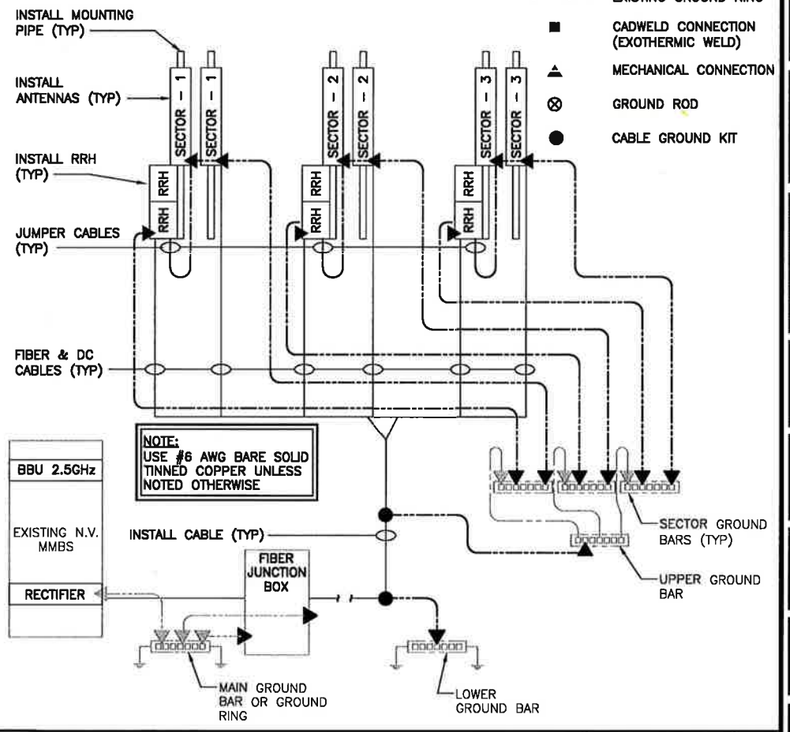



## TYPICAL ANTENNA GROUNDING PLAN

NO SCALE | 3

LEGEND:

- EXISTING GROUND RING
- CADWELD CONNECTION (EXOTHERMIC WELD)
- MECHANICAL CONNECTION
- GROUND ROD
- CABLE GROUND KIT




## GROUNDING RISER DIAGRAM

NO SCALE | 4

PLANS PREPARED FOR:

Sprint

PLANS PREPARED BY:

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SHEET DESCRIPTION:

ELECTRICAL & GROUNDING DETAILS

SHEET NUMBER:

E-3