*Filed by: Kri Pelletier, Property Specialist - SBA Communications*
*134 Flanders Rd., Suite 125, Westborough, MA 01581*
*508.251.0720 x 3804 - kpelletier@sbasite.com*

December 12, 2018

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

**Notice of Exempt Modification**
**58A Montano Road, Glastonbury, CT 06033**
**41 41 58 Latitude / -72 33 50.4 Longitude**
**Sprint #: CT52XC103_DO Macro Upgrade**

Dear Ms. Bachman:

Sprint currently maintains (3) panel antennas and (1) dish antenna at the 110-foot level of the existing 119' Monopole Tower at 58A Montano Road in Glastonbury, CT. The tower is owned by SBA 2012 TC Assets, LLC. The property is owned by Rose Marie Shaw. Sprint now intends to replace (3) existing panel antennas with (3) newer technology panel antennas at the 110-foot level of the tower. Sprint's proposed full scope of work is as follows:

Remove:

- (3) ALU 1900 MHz RRUs
- (6) ALU 800 MHz RRUs
- (3) ALU TD-RRH8x20-25 RRUs
- (1) Junction box on sector frame

Remove and Replace:

- Remove: (3) KMW ETCR 654L12H6 Panel Antennas
  - Replace with: (3) Nokia AAHC Panel Antennas
- Remove: (4) 1-1/4" fiber
  - Replace with: (3) 1.619" hybrid

*At ground level – no change to existing lease area or compound (all equipment on existing pad):*

- Remove: (1) Clearwire equipment cabinet
  - Replace with: (1) Sprint equipment cabinet
- Remove: (1) Clearwire GPS
  - Replace with: (1) Sprint GPS

Install:

- (1) PPC Cabinet on H-Frame
- (1) Battery Plinth Cabinet

Existing Equipment to Remain (Including entitlements):

- (3) standoff /dual sector mounts
- (2) ½" lines
- (2) Andrew VHLP2 18 Dish Antennas / (1) is actual – (1) is entitlement only

This facility was approved by Decision and Order of the Council on September 11, 2008. The tower was to be constructed as a monopole not to exceed a height of 120 feet above ground level and designed and constructed to include a yield point at the height of 82 feet above ground level. A D&M Plan was to be provided. A recalculated report of electromagnetic radio frequency report was to be submitted to the Council for changes in power density and space was to be provided on the tower for public/private entities and to the Town for public safety services. No further restrictions were set forth. This modification complies with all aforementioned condition(s).

Please accept this letter as notification pursuant to Regulations of Connecticut State Agencies §16-50j-73, for construction that constitutes an exempt modification pursuant to R.C.S.A. §16.50j-72(b)(2). In accordance with R.C.S.A. § 16.50j-73, a copy of this letter is being sent to the Town of Glastonbury's Town Manager, Richard J. Johnson, and Director of Land Use & Planning Services, Khara Dodds, as well as to the property owner, Rose Marie Shaw. (Separate notice is not being sent to tower owner, as it belongs to SBA.)

The planned modifications to the facility fall squarely within those activities explicitly provided for in R.C.S.A. §16.50j-72(b)(2).

1. The proposed modifications will not result in an increase in the height of the existing structure.
2. The proposed modification will not require the extension of the site boundary.
3. The proposed modifications will not increase noise levels at the facility by six decibels or more, or to levels that exceed state and local criteria.
4. The operation of the replacement antennas will not increase radio frequency emissions at the facility to a level at or above the Federal Communications Commission safety standard.
5. The proposed modification will not cause a change or alteration in the physical or environmental characteristics of the site.
6. The existing structure and its foundation can support the proposed loading.

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

Sincerely,

Kri Pelletier
Property Specialist / SBA COMMUNICATIONS CORPORATION
134 Flanders Rd., Suite 125
Westborough, MA 01581
508.251.0720 x3804 + T / 508.366.2610 + F / kpelletier@sbasite.com
Attachments
cc: Richard J. Johnson, Town Manager / with attachments
*Glastonbury Town Hall, 2155 Main Street, Glastonbury, CT 06033*
Khara Dodds, Director of Land Use & Planning Services / with attachments
*Glastonbury Town Hall, 2155 Main Street, Glastonbury, CT 06033*
Rose Marie Shaw / with attachments
*58 Montano Road, Glastonbury, CT 06033*

## POWER DENSITY

### SPRINT Site Inventory and Power Data by Antenna

| Sector: | A | Sector: | B | Sector: | C |
|---|---|---|---|---|---|
| Antenna #: | 1 | Antenna #: | 1 | Antenna #: | 1 |
| Make / Model: | Nokia MAA AAHC | Make / Model: | Nokia MAA AAHC | Make / Model: | Nokia MAA AAHC |
| Gain: | 15.05 dBd | Gain: | 15.05 dBd | Gain: | 15.05 dBd |
| Height (AGL): | **110 feet** | Height (AGL): | **110 feet** | Height (AGL): | **110 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% | **1.70 %** | Antenna B2 MPE% | **1.70 %** | Antenna C2 MPE% | **1.70 %** |

| Microwave Backhaul Data | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Antenna Type:** | **Gain (dBd)** | **Height (feet AGL):** | **Frequency Bands** | **Channel Count** | **Total TX Power(W)** | **ERP (W)** | **MPE %** | **Sector** |
| Andrew VHLP2-18 | 36.85 dBd | 110 | 18 GHz | 1 | 1 | 4,841.72 | **0.16** | C |

| Site Composite MPE% | |
|---|---|
| **Carrier** | **MPE%** |
| SPRINT – Sector C | **1.86 %** |
| T-Mobile | 3.27 % |
| Clearwire | 0.17 % |
| AT&T | 3.62 % |
| Verizon Wireless | 3.94 % |
| **Site Total MPE %:** | **12.86 %** |

| | |
|---|---|
| SPRINT Sector A Total: | 1.70 % |
| SPRINT Sector B Total: | 1.70 % |
| SPRINT Sector C Total: | 1.86 % |
| | |
| Site Total: | 12.86 % |

| SPRINT _ Frequency Band / Technology (Sector C) | # 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 2500 MHz (BRS) LTE | 8 | 639.78 | 110 | 17.01 | 2500 MHz (BRS) | 1000 | 1.70% |
| Sprint 18 GHz Microwave | 1 | 4,841.72 | 110 | 1.61 | 18 GHz | 1000 | 0.16% |
| | | | | | | **Total:** | **1.86%** |

| SPRINT Sector | Power Density Value (%) |
|---|---|
| Sector A: | 1.70 % |
| Sector B: | 1.70 % |
| Sector C: | 1.86 % |
| SPRINT Maximum MPE % (Sector C): | 1.86 % |
| | |
| Site Total: | 12.86 % |
| | |
| Site Compliance Status: | **COMPLIANT** |


**After printing this label**:
1. Use the 'Print' button on this page to print your label to your laser or inkjet printer.
2. Fold the printed page along the horizontal line.
3. Place label in shipping pouch and affix it to your shipment so that the barcode portion of the label can be read and scanned.

**Warning**: Use only the printed original label for shipping. Using a photocopy of this label for shipping purposes is fraudulent and could result in additional billing charges, along with the cancellation of your FedEx account number.
Use of this system constitutes your agreement to the service conditions in the current FedEx Service Guide, available on fedex.com.FedEx will not be responsible for any claim in excess of $100 per package, whether the result of loss, damage, delay, non-delivery,misdelivery,or misinformation, unless you declare a higher value, pay an additional charge, document your actual loss and file a timely claim.Limitations found in the current FedEx Service Guide apply. Your right to recover from FedEx for any loss, including intrinsic value of the package, loss of sales, income interest, profit, attorney's fees, costs, and other forms of damage whether direct, incidental,consequential, or special is limited to the greater of $100 or the authorized declared value. Recovery cannot exceed actual documented loss.Maximum for items of extraordinary value is $1,000, e.g. jewelry, precious metals, negotiable instruments and other items listed in our ServiceGuide. Written claims must be filed within strict time limits, see current FedEx Service Guide.


**After printing this label**:
1. Use the 'Print' button on this page to print your label to your laser or inkjet printer.
2. Fold the printed page along the horizontal line.
3. Place label in shipping pouch and affix it to your shipment so that the barcode portion of the label can be read and scanned.

**Warning**: Use only the printed original label for shipping. Using a photocopy of this label for shipping purposes is fraudulent and could result in additional billing charges, along with the cancellation of your FedEx account number.
Use of this system constitutes your agreement to the service conditions in the current FedEx Service Guide, available on fedex.com.FedEx will not be responsible for any claim in excess of $100 per package, whether the result of loss, damage, delay, non-delivery,misdelivery,or misinformation, unless you declare a higher value, pay an additional charge, document your actual loss and file a timely claim.Limitations found in the current FedEx Service Guide apply. Your right to recover from FedEx for any loss, including intrinsic value of the package, loss of sales, income interest, profit, attorney's fees, costs, and other forms of damage whether direct, incidental,consequential, or special is limited to the greater of $100 or the authorized declared value. Recovery cannot exceed actual documented loss.Maximum for items of extraordinary value is $1,000, e.g. jewelry, precious metals, negotiable instruments and other items listed in our ServiceGuide. Written claims must be filed within strict time limits, see current FedEx Service Guide.


**After printing this label**:
1. Use the 'Print' button on this page to print your label to your laser or inkjet printer.
2. Fold the printed page along the horizontal line.
3. Place label in shipping pouch and affix it to your shipment so that the barcode portion of the label can be read and scanned.

**Warning**: Use only the printed original label for shipping. Using a photocopy of this label for shipping purposes is fraudulent and could result in additional billing charges, along with the cancellation of your FedEx account number.
Use of this system constitutes your agreement to the service conditions in the current FedEx Service Guide, available on fedex.com.FedEx will not be responsible for any claim in excess of $100 per package, whether the result of loss, damage, delay, non-delivery,misdelivery,or misinformation, unless you declare a higher value, pay an additional charge, document your actual loss and file a timely claim.Limitations found in the current FedEx Service Guide apply. Your right to recover from FedEx for any loss, including intrinsic value of the package, loss of sales, income interest, profit, attorney's fees, costs, and other forms of damage whether direct, incidental,consequential, or special is limited to the greater of $100 or the authorized declared value. Recovery cannot exceed actual documented loss.Maximum for items of extraordinary value is $1,000, e.g. jewelry, precious metals, negotiable instruments and other items listed in our ServiceGuide. Written claims must be filed within strict time limits, see current FedEx Service Guide.

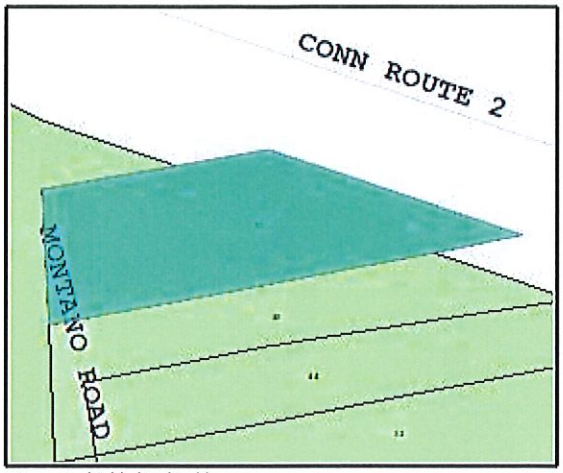
# Town of Glastonbury GIS Parcel Report

Report Generated 12/10/2018 11:34:48 AM

## Owner of Record

**GIS ID:** 44800058
**Owner:** SHAW ROSE MARIE
**Co-Owner:**
**Address:** 58 MONTANO RD
**City, State ZIP:** GLASTONBURY, CT 06033-3324

**Account Number: 44800058**
**Property Address: 58 MONTANO RD**



Property highlighted in blue

## Parcel Information

**Map/Street/Lot** G7 / 4480 / S0021 **Property ID:** 8132
**Developer Lot ID:** **Water:** Well
**Parcel Acreage:** 1.30 **Sewer:** Sewer Nbrhd
**Zoning Code:** AA **Census:** 5204

## Valuation Summary

| Item | Appraised Value | Assessed Value |
|---|---|---|
| **Buildings** | 60300 | 42200 |
| **Land** | 402500 | 281800 |
| **Appurtenances** | 5800 | 4100 |
| **Total** | **468600** | **328100** |

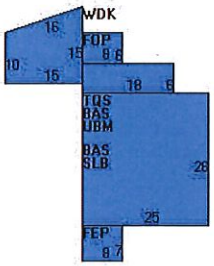
| Owner of Record | Deed / Page | Sale Date | Sale Price |
|---|---|---|---|
| SHAW ROSE MARIE | 1946/0211 | 10/07/2003 | 0 |
| SHAW WILLIAM R+ROSE MARIE | 0147/0396 | 07/01/1966 | 4500 |

## Building Information

**Building ID** 8132

**Year Constructed :** 1931
**Building Type :** Residential
**Style :** Cape
**Occupancy :** Single Family
**Stories :** 1.5
**Building Zone :** AA
**Roof Type :** Gable
**Roof Material :** Asphalt Shingl
**Est. Gross S.F. :** 2458
**Est. Living S.F. :** 1278

**Number of Rooms :** 7
**Number of Bedrooms :** 03
**Number of Bathrooms :** 1
**Number of Half-Baths :** 0
**Exterior Wall :** Wood Shingles
**Interior Wall :** Plaster
**Interior Floor :** Hardwood
**Interior Floor #2 :** No entry
**Air Conditioning Type :** None
**Heat Type :** Forced Air
**Fuel Type :** Oil




| Subarea Type | Est. Gross S.F. | Est. Living S.F. |
|---|---|---|
| First Floor | 758 | 758 |
| Porch, Enclosed | 56 | 0 |
| Porch, Open | 48 | 0 |
| Slab | 108 | 0 |
| Three Quarter Story | 650 | 520 |
| Basement | 650 | 0 |
| Wood Deck | 188 | 0 |

| Outbuilding Type | Est. Gross S.F. | Comments |
|---|---|---|
| Garage | 576.00 | |
| Shed-Wood/Comp | 120.00 | |
| Shed-Wood/Comp | 192.00 | |

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: CT52XC103

Cutter Lane
58A Montano Road
Glastonbury, CT 06033

**November 28, 2018**

**EBI Project Number: 6218007225**

| Site Compliance Summary | |
|---|---|
| Compliance Status: | COMPLIANT |
| Site total MPE% of FCC general population allowable limit: | 12.86 % |

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

EBI Consulting
environmental | engineering | due diligence

November 28, 2018

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

Emissions Analysis for Site: **CT52XC103 – Cutter Lane**

EBI Consulting was directed to analyze the proposed SPRINT facility located at **58A Montano Road, Glastonbury, 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 2500 MHz (BRS) and 18 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 **58A Montano Road, Glastonbury, 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) 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.

2) 1 microwave channel (18 GHz) was considered for Sector C of the proposed installation. This channel has a transmit power of 1 Watt.

3) 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.

4) 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.

5) The antennas used in this modeling are the **Nokia MAA AAHC** for transmission in the 2500 MHz (BRS) frequency bands as well as the **Andrew VHLP2-18** parabolic microwave dish for transmission in the 18 GHz microwave band. 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.

6) The antenna mounting height centerlines of the proposed panel antennas and microwave dish are **110 feet** above ground level (AGL) for **Sector A**, **110 feet** above ground level (AGL) for **Sector B** and **110 feet** above ground level (AGL) for Sector C.

7) 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.

EBI Consulting

environmental | engineering | due diligence

## SPRINT Site Inventory and Power Data by Antenna

| Sector: | A | Sector: | B | Sector: | C |
|---|---|---|---|---|---|
| Antenna #: | **1** | Antenna #: | **1** | Antenna #: | **1** |
| Make / Model: | Nokia MAA AAHC | Make / Model: | Nokia MAA AAHC | Make / Model: | Nokia MAA AAHC |
| Gain: | 15.05 dBd | Gain: | 15.05 dBd | Gain: | 15.05 dBd |
| Height (AGL): | **110 feet** | Height (AGL): | **110 feet** | Height (AGL): | **110 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% | **1.70 %** | Antenna B2 MPE% | **1.70 %** | Antenna C2 MPE% | **1.70 %** |

## Microwave Backhaul Data

| Antenna Type: | Gain (dBd) | Height (feet AGL): | Frequency Bands | Channel Count | Total TX Power(W) | ERP (W) | MPE % | Sector |
|---|---|---|---|---|---|---|---|---|
| Andrew VHLP2-18 | 36.85 dBd | 110 | 18 GHz | 1 | 1 | 4,841.72 | **0.16** | C |

| Site Composite MPE% | |
|---|---|
| **Carrier** | **MPE%** |
| SPRINT – Sector C | **1.86 %** |
| T-Mobile | 3.27 % |
| Clearwire | 0.17 % |
| AT&T | 3.62 % |
| Verizon Wireless | 3.94 % |
| **Site Total MPE %:** | **12.86 %** |

| | |
|---|---|
| SPRINT Sector A Total: | 1.70 % |
| SPRINT Sector B Total: | 1.70 % |
| SPRINT Sector C Total: | 1.86 % |
| | |
| Site Total: | 12.86 % |

| SPRINT _ Frequency Band / Technology (Sector C) | # 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 2500 MHz (BRS) LTE | 8 | 639.78 | 110 | 17.01 | 2500 MHz (BRS) | 1000 | 1.70% |
| Sprint 18 GHz Microwave | 1 | 4,841.72 | 110 | 1.61 | 18 GHz | 1000 | 0.16% |
| | | | | | | **Total:** | **1.86%** |

## 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: | 1.70 % |
| Sector B: | 1.70 % |
| Sector C: | 1.86 % |
| SPRINT Maximum MPE % (Sector C): | 1.86 % |
| | |
| Site Total: | 12.86 % |
| | |
| Site Compliance Status: | **COMPLIANT** |

The anticipated composite MPE value for this site assuming all carriers present is **12.86 %** 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.

Tower Engineering Solutions
Phone (972) 483-0607, Fax (972) 975-9615
1320 Greenway Drive, Suite 600, Irving, Texas 75038

# Structural Analysis Report

**Existing 119 ft SABRE Monopole**

**Customer Name: SBA Communications Corp**

**Customer Site Number: CT13555-S**

**Customer Site Name: Montano**

**Carrier Name: Sprint Nextel**

**Carrier Site ID / Name: CT52XC103 / Cutter Lane**

**Site Location: 58A Montano Road**

**Glastonbury, Connecticut**

**Hartford County**

**Latitude: 41.699444**

**Longitude: -72.564000**


**Analysis Result:**

**Max Structural Usage: 35.2% [Pass]**

**Max Foundation Usage: 44.0% [Pass]**

**Additional Usage Caused by New Mount/Mount Modification: N/A**

**Report Prepared By: Tawfeeq Alajaj**

## Introduction

The purpose of this report is to summarize the analysis results on the 119 ft SABRE Monopole to support the proposed antennas and transmission lines in addition to those currently installed. Any modification listed under Sources of Information was assumed completed and was included in this analysis.

## Sources of Information

| | |
|---|---|
| **Tower Drawings** | Tower Drawing prepared by Sabre, Job #09-11137 dated 11/19/08 |
| **Foundation Drawing** | Foundation Drawing prepared by Sabre, Job #09-11137 dated 11/19/08 |
| **Geotechnical Report** | Geotechnical Report prepared by TES, Project #082695.01 dated 10/27/08 |
| **Modification Drawings** | N/A |

## Analysis Criteria

The rigorous analysis was performed in accordance with the requirements and stipulations of the ANSI/TIA/EIA 222-G**.** In accordance with this standard, the structure was analyzed using **TESPoles,** a proprietary analysis software. The program considers the structure as an elastic 3-D model with second-order effects and temperature effects incorporated in the analysis. The analysis was performed using multiple wind directions.

| | |
|---|---|
| **Wind Speed Used in the Analysis:** | Ultimate Design Wind Speed $V_{ult}$ = 125.0 mph (3-Sec. Gust)/ Nominal Design Wind Speed $V_{asd}$ = 97.0 mph (3-Sec. Gust) |
| **Wind Speed with Ice:** | 50 mph (3-Sec. Gust) with 1" radial ice concurrent |
| **Operational Wind Speed:** | 60 mph + 0" Radial ice |
| **Standard/Codes:** | ANSI/TIA/EIA 222-G / 2012 IBC / 2016 Connecticut State Building Code |
| **Exposure Category:** | B |
| **Structure Class:** | II |
| **Topographic Category:** | 1 |
| **Crest Height:** | 0 ft |
| **Seismic Parameters:** | $S_S$ = 0.18, $S_1$ = 0.063 |

This structural analysis is based upon the tower being classified as a Structure Class II; however, if a different classification is required subsequent to the date hereof, the tower classification will be changed to meet such requirement and a new structural analysis will be run.

## Existing Antennas, Mounts and Transmission Lines

The table below summarizes the antennas, mounts and transmission lines that were considered in the analysis as existing on the tower.

| Items | Elevation (ft) | Qty. | Antenna Descriptions | Mount Type & Qty. | Transmission Lines | Owner |
|---|---|---|---|---|---|---|
| 1 | 117.0 | 3 | Ericsson - S11B12 - RRU | Platform w/ Hand Rail | (12) 1 5/8" (1) 1 5/8" Fiber | T-Mobile |
| 2 | | 3 | Commscope - LNX-6515DS-A1M - Panel | | | |
| 3 | | 3 | Ericsson - AIR 21 B2A/B4P - Panel | | | |
| 4 | | 3 | Ericsson - AIR 21 B4A/B2P - Panel | | | |
| 5 | | 3 | Ericsson - KRY 112 144/1 - TMA | | | |
| 6 | 110.0 | 3 | KMW ETCR-654L12H6 - Panel | (3) Standoff Mounts Ring Mount @ (+/-) 3 ft | (4) 1-1/4" Fiber (2) 1/2" | Sprint Nextel |
| 7 | | 2 | Andrew - VHLP2-18 - Dish | | | |
| 8 | | 3 | ALU 1900 MHz RRU | | | |
| 9 | | 6 | ALU 800 MHz RRU | | | |
| 10 | | 3 | ALU TD-RRH8x20-25 RRU | | | |
| 11 | 100.0 | 3 | ALU IBC700-1 – Filter | Platform w/ Hand Rail and kickers | (2) 1/2" Fiber (8) 3/4" DC (3) 3/8" RET | AT&T |
| 12 | | 12 | CCI - HPA-65R-BUU-H8 - Panel | | | |
| 13 | | 12 | Ericsson - RRU-11 | | | |
| 14 | | 6 | Ericsson - RRU-12 | | | |
| 15 | | 6 | Ericsson - RRUS-A2 Module | | | |
| 16 | | 3 | Ericsson - RRU-32 | | | |
| 17 | | 4 | Raycap DC6-48-60-18-8F | | | |
| 18 | 90.0 | 6 | Andrew - LNX-6514DS-A1M - Panel | Low Profile Platform | (2) 1 5/8" Hybrid Cable | Verizon |
| 19 | | 6 | Andrew - HBXX-6517DS-A2M - Panel | | | |
| 20 | | 3 | ALU RRH2X60-AWS - RRH | | | |
| 21 | | 3 | ALU RRH2x60-PCS - RRH | | | |
| 22 | | 3 | ALU B13 RRH4x30 - RRH | | | |
| 23 | | 2 | RFS DB-T1-6Z-8AB-0Z | | | |

## Proposed Carrier's Final Configuration of Antennas, Mounts and Transmission Lines

Information pertaining to the proposed carrier's final configuration of antennas and transmission lines was provided by SBA Communications Corp. The proposed antennas and lines are listed below.

| Items | Elevation (ft) | Qty. | Antenna Descriptions | Mount Type & Qty. | Transmission Lines | Owner |
|---|---|---|---|---|---|---|
| 6 | 110.0 | 2 | Andrew - VHLP2-18 - Dish | (3) dual sector mounts | (2) 1/2" (3) 1.619" Hybrid | Sprint Nextel |
| 7 | | 3 | Nokia - AAHC - Panel | | | |

All transmission lines are considered running inside of the pole shafts.

## Analysis Results

The results of the structural analysis, performed for the wind and ice loading and antenna equipment as defined above, are summarized as the following:

| | Pole shafts | Anchor Bolts | Base Plate | Flange Bolts | Flange Plate |
|---|---|---|---|---|---|
| Max. Usage: | **35.2%** | **34.5%** | **26.8%** | **20.1%** | **10.2%** |
| Pass/Fail | **Pass** | **Pass** | **Pass** | **Pass** | **Pass** |

## Foundations

| | Moment (Kip-Ft) | Shear (Kips) | Axial (Kips) |
|---|---|---|---|
| Analysis Reactions | 2265.8 | 25.8 | 79.9 |

The foundation has been investigated using the supplied documents and soils report and was found adequate. Therefore, no modification to the foundation will be required.

## Operational Condition (Rigidity):

The maximum twist and sway of the microwave dishes under the operational wind speed as specified in the Analysis Criteria are listed in the table below:

| Elevation (ft) | Antenna / Dish | Carrier | Twist (deg) | Sway (deg) |
|---|---|---|---|---|
| 110.0 | Andrew - VHLP2-18 - Dish | Sprint Nextel | 0.001 | 0.403 |

It is recommended that the carriers review the twist and sway values of the microwave dishes.

## Conclusions

Based on the analysis results, the existing structure and its foundation were found to be adequate to safely support the existing and proposed equipment and meet the minimum requirements per the ANSI/TIA/EIA 222-G Standard under the design basic wind speed as specified in the Analysis Criteria.

# Standard Conditions

1. This analysis was performed based on the information supplied to **(TES) Tower Engineering Solutions, LLC.** Verification of the information provided was not included in the Scope of Work for **TES**. The accuracy of the analysis is dependent on the accuracy of the information provided.

2. The analysis is based on the presumption that the tower members and components along with any existing reinforcement items have been correctly and properly designed, manufactured, installed and maintained.

3. All the existing structural members were assumed to be in good condition with no physical damage or deterioration associated with corrosion.

4. An initial tension of 10% of the break strength on all the existing guy wires was assumed in all the structural analyses of guyed towers unless different values were provided by the client. **TES** cannot take responsibility for the deviations in the analysis results because of differences in the initial tension forces of the existing guy wires.

5. Secondary component or connection secondary components, welds and bolts are assumed to be able to carry their intended original design loads. **TES** cannot take responsibility for verification of the adequacy on the connections, bolts and welds present in the structure.

6. The analyses will be performed based on the codes as specified by the client or based on the best knowledge of the engineering staff of **TES**. In the absence of information to the contrary, all work will be performed in accordance with the latest relevant revision of ANSI/TIA-222. If wind speed and/or ice loads are different from the minimum values recommended by the EIA/TIA-222 standard or other codes, **TES** should be notified in writing and the applicable minimum values provided by the client.

7. The configuration of the existing mounts, antennas, coax and other appurtenances were supplied by the customer for the current structural analysis. **TES** has not visited the tower site to verify the adequacy of the information provided. If there is any discrepancy found in the report regarding the existing conditions, **TES** should be notified immediately to evaluate the effect of the discrepancy on the analysis results.

8. The client will assume responsibility for rework associated with the differences in initially provided information, including tower and foundation information, existing and/or proposed equipment and transmission lines.

9. If a feasibility analysis was performed, final acceptance of changed conditions shall be based upon a rigorous structural analysis.

# Usage Diagram - Max Ratio 35.20% at 0.0ft

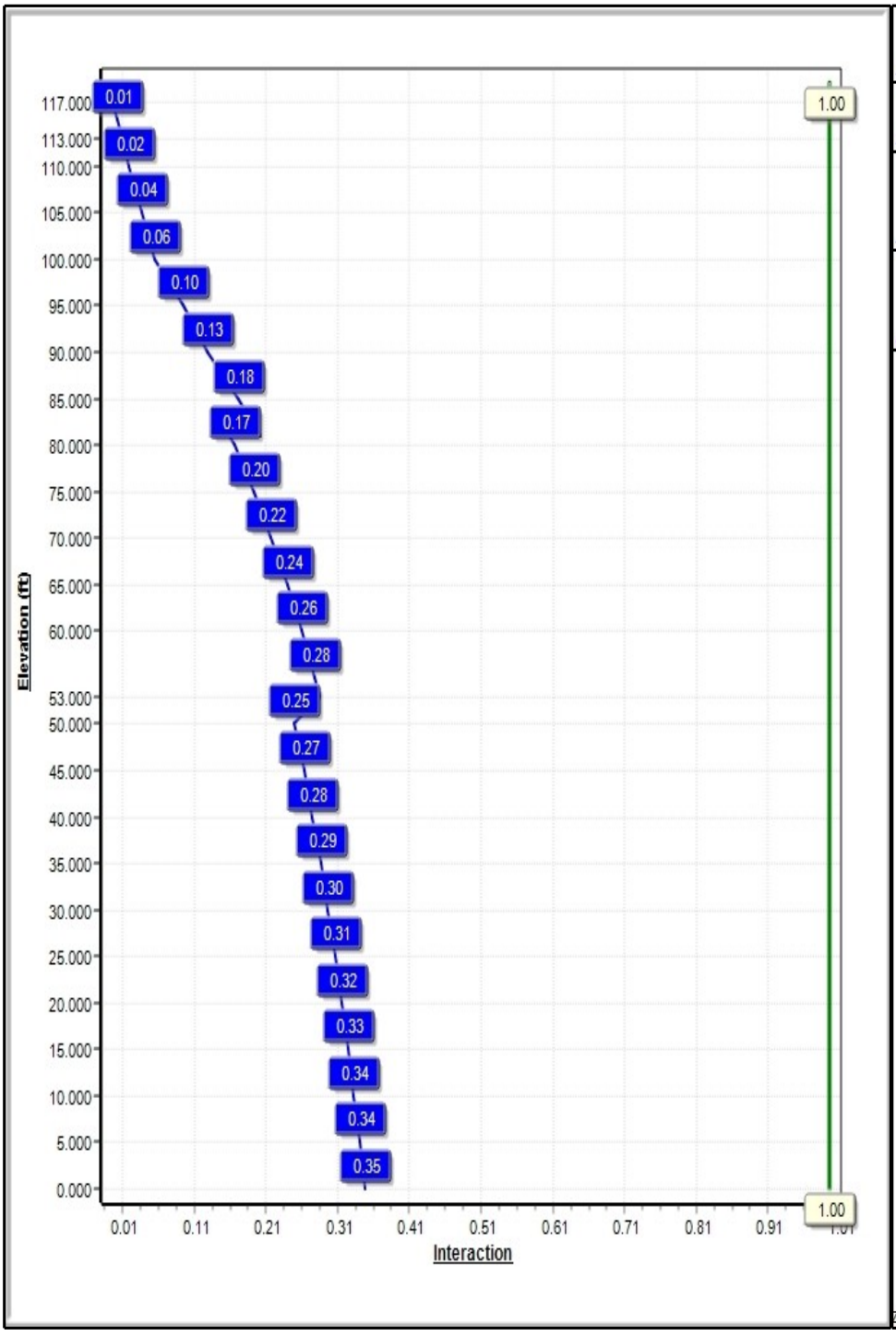
| | | | | | |
|---|---|---|---|---|---|
| **Structure:** | CT13555-S-SBA | **Code:** | EIA/TIA-222-G | 8/17/2018 | |
| **Site Name:** | Montano | **Exposure:** | B | | |
| **Height:** | 119.00 (ft) | **Gh:** | 1.1 | | |
| **Base Elev:** | 0.000 (ft) | | | Page: 1 | |

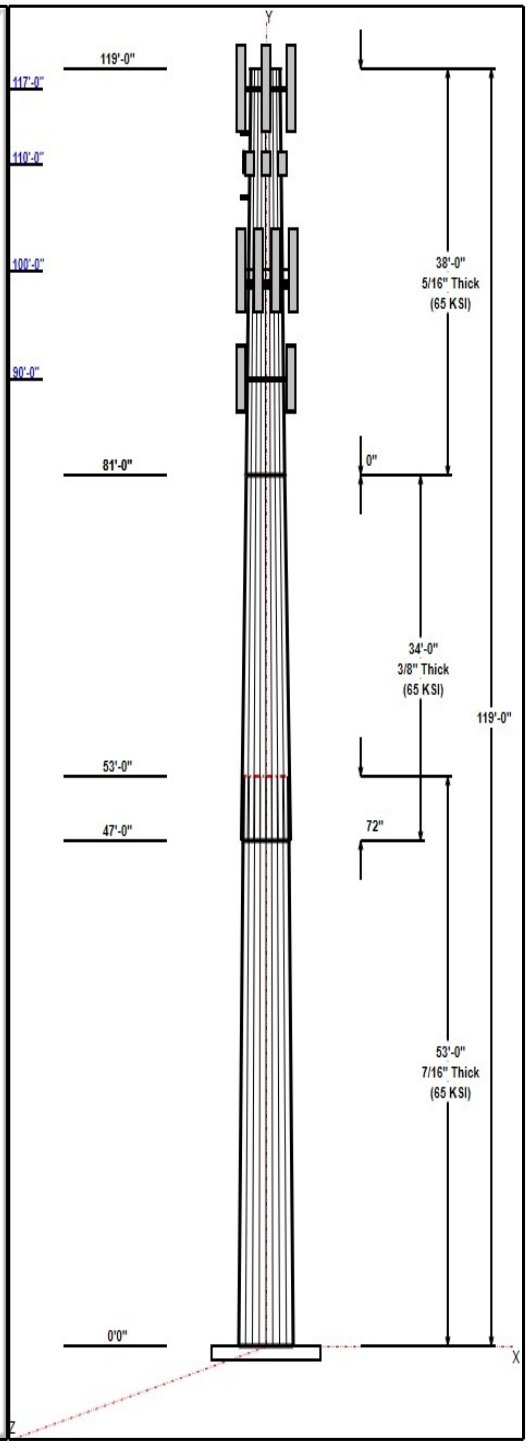
Tower Engineering Solutions

| | | | |
|---|---|---|---|
| Dead Load Factor: | 1.20 | **Iterations:** | 18 |
| Wind Load Factor: | 1.60 | | |

**Load Case : 1.2D + 1.6W 97 mph Wind**





# Structure: CT13555-S-SBA

**Type:** Tapered
**Site Name:** Montano
**Height:** 119.00 (ft)
**Base Elev:** 0.00 (ft)

**Base Shape:** 18 Sided
**Taper:** 0.26403

8/17/2018



Tower Engineering Solutions

## Shaft Properties

| Seq | Length (ft) | Top (in) | Bottom (in) | Thick (in) | Joint Type | Taper | Grade (ksi) |
|---|---|---|---|---|---|---|---|
| 1 | 53.00 | 44.82 | 58.81 | 0.438 | | 0.26403 | 65 |
| 2 | 34.00 | 38.17 | 47.15 | 0.375 | Slip | 0.26403 | 65 |
| 3 | 38.00 | 28.14 | 38.17 | 0.313 | Butt | 0.26403 | 65 |

## Discrete Appurtenances

| Attach Elev (ft) | Force Elev (ft) | Qty | Description | Carrier |
|---|---|---|---|---|
| 119.00 | 119.00 | 1 | 6' Lightning rod | |
| 117.00 | 117.00 | 3 | AIR 21 B2A B4P | T-Mobile |
| 117.00 | 117.00 | 3 | AIR 21 B4A B2P | T-Mobile |
| 117.00 | 117.00 | 3 | KRY 112 144/1 | T-Mobile |
| 117.00 | 117.00 | 1 | Platform w/ Hand Rail | T-Mobile |
| 117.00 | 117.00 | 3 | S11B12 | T-Mobile |
| 117.00 | 117.00 | 3 | LNX-6515DS-A1M | T-Mobile |
| 113.00 | 113.00 | 1 | 3 ft Standoff | Sprint Nextel |
| 110.00 | 110.00 | 3 | AAHC | Sprint Nextel |
| 110.00 | 110.00 | 3 | dual sector mounts | Sprint Nextel |
| 110.00 | 110.00 | 2 | VHLP2-18 | Sprint Nextel |
| 107.00 | 107.00 | 1 | Ring Mount | Sprint Nextel |
| 100.00 | 100.00 | 12 | HPA-65R-BUU-H8 | AT&T |
| 100.00 | 100.00 | 12 | RRU-11 | AT&T |
| 100.00 | 100.00 | 6 | RRU-12 | AT&T |
| 100.00 | 100.00 | 6 | RRUS-A2 | AT&T |
| 100.00 | 100.00 | 3 | RRU-32 | AT&T |
| 100.00 | 100.00 | 4 | DC6-48-60-18-8F | AT&T |
| 100.00 | 100.00 | 1 | Platform w/ Hand Rail | AT&T |
| 100.00 | 100.00 | 3 | IBC700-1 | AT&T |
| 90.00 | 90.00 | 3 | RRH2X60-AWS | Verizon |
| 90.00 | 90.00 | 3 | RRH2x60-PCS | Verizon |
| 90.00 | 90.00 | 3 | B13 RRH4x30 | Verizon |
| 90.00 | 90.00 | 2 | DB-T1-6Z-8AB-0Z | Verizon |
| 90.00 | 90.00 | 1 | Low Profile Platform | Verizon |
| 90.00 | 90.00 | 6 | LNX-6514DS-A1M | Verizon |
| 90.00 | 90.00 | 6 | HBXX-6517DS-A2M | Verizon |

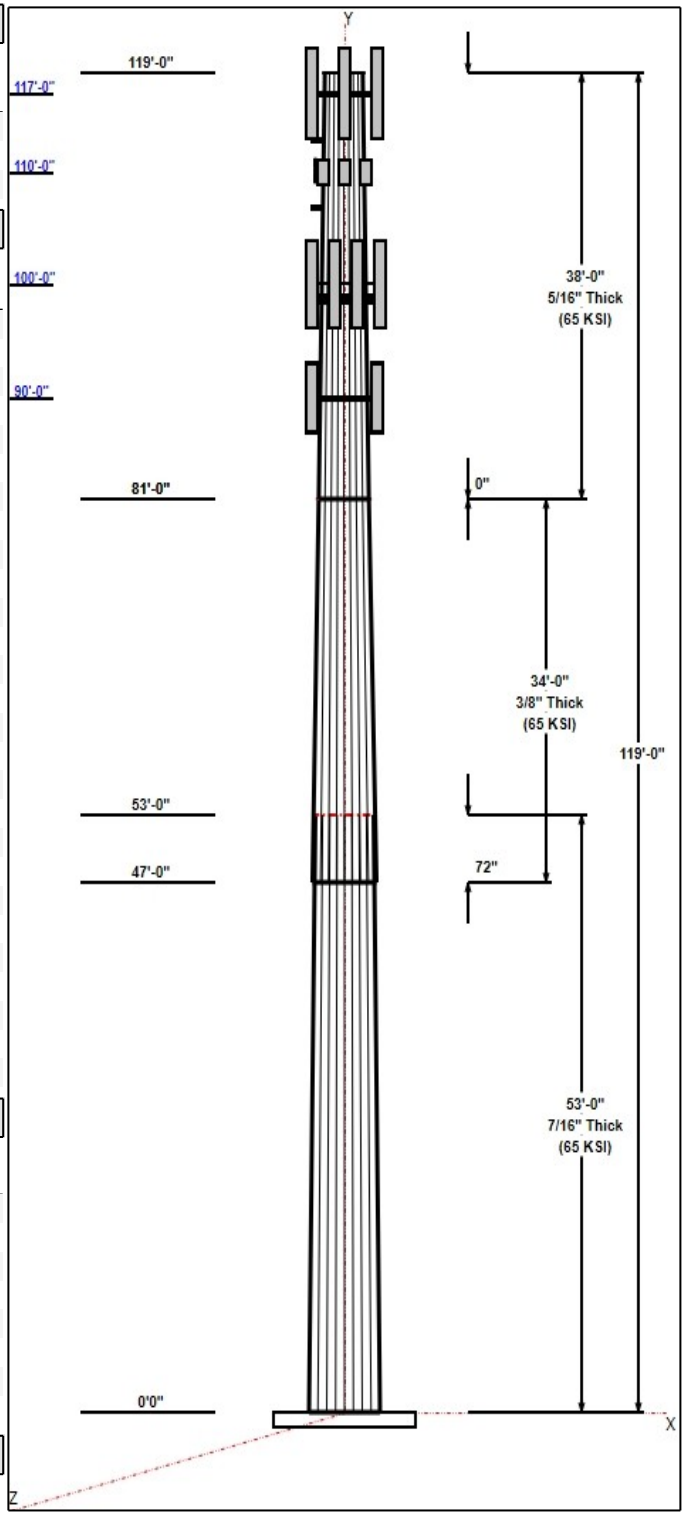
## Linear Appurtenances

| Elev From (ft) | Elev To (ft) | Placement | Description | Carrier |
|---|---|---|---|---|
| 0.00 | 117.00 | Inside | 1 5/8" Coax | T-Mobile |
| 0.00 | 117.00 | Inside | 1 5/8" Fiber | T-Mobile |
| 0.00 | 110.00 | Inside | 1.619" Hybrid | Sprint Nextel |
| 0.00 | 110.00 | Inside | 1/2" Coax | Sprint Nextel |
| 0.00 | 100.00 | Inside | 1/2" Fiber | AT&T |
| 0.00 | 100.00 | Inside | 3/4" DC | AT&T |
| 0.00 | 100.00 | Inside | 3/8" RET | AT&T |
| 0.00 | 90.00 | Inside | 1 5/8" Hybrid Cable | Verizon |

## Anchor Bolts

| Qty | Specifications | Grade (ksi) | Arrangement |
|---|---|---|---|
| 20 | 2.25" 18J | 75.0 | Cluster |

## Base Plate



| Thickness (in) | Specifications (in) | Grade (ksi) | Geometry |
|---|---|---|---|
| 3.2500 | 66.0 | 50.0 | Clipped |

### Reactions

| Load Case | Moment (FT-Kips) | Shear (Kips) | Axial (Kips) |
|---|---|---|---|
| 1.2D + 1.6W 97 mph Wind | 2265.8 | 25.8 | 44.0 |
| 0.9D + 1.6W 97 mph Wind | 2255.6 | 25.8 | 33.0 |
| 1.2D + 1.0Di + 1.0Wi 50 mph Wind | 644.3 | 7.4 | 79.9 |
| 1.2D + 1.0E | 172.1 | 1.8 | 44.0 |
| 0.9D + 1.0E | 171.3 | 1.8 | 33.0 |
| 1.0D + 1.0W 60 mph Wind | 540.2 | 6.2 | 36.7 |

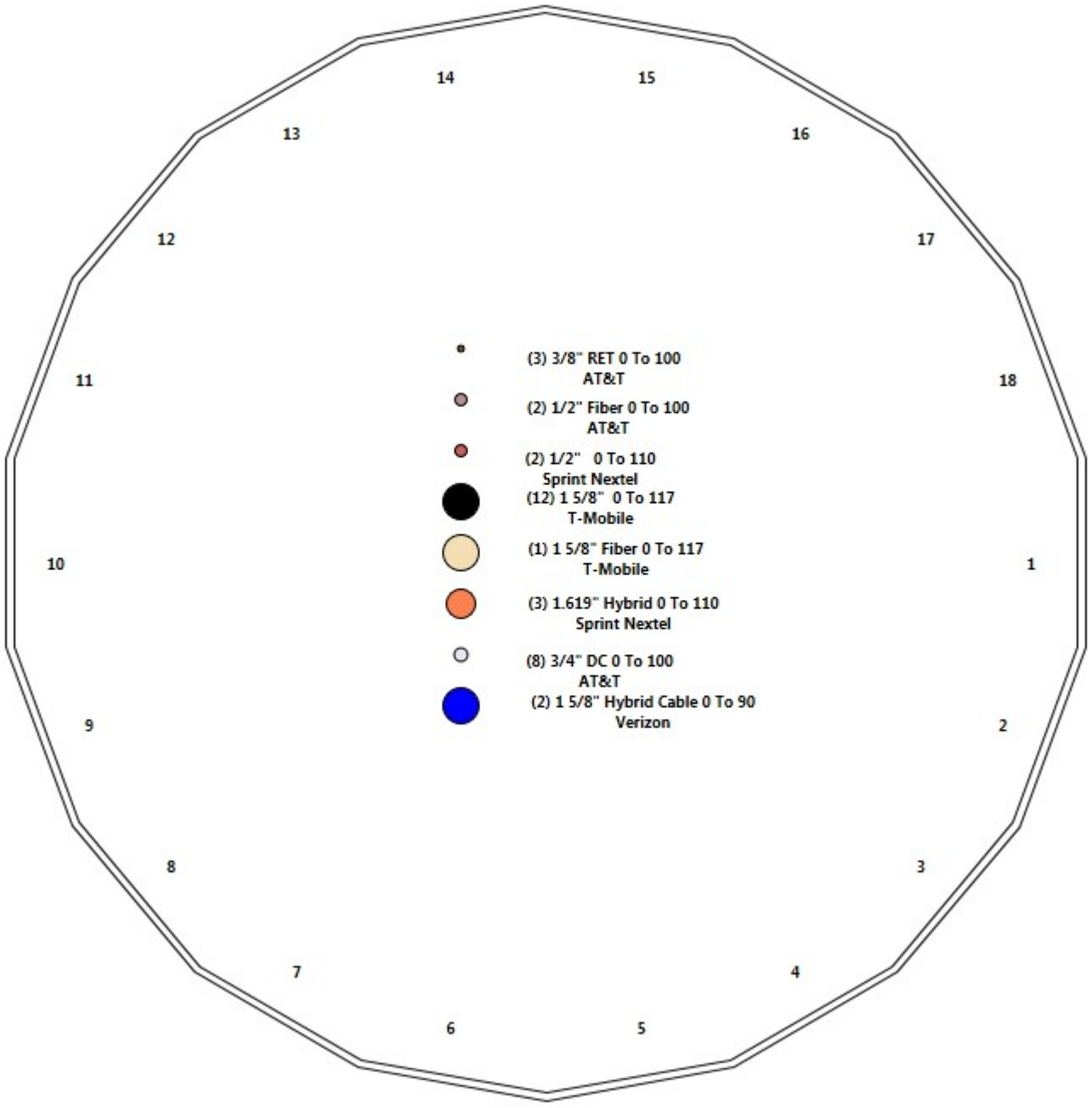
# Structure: CT13555-S-SBA - Coax Line Placement

**Type:** Monopole
**Site Name:** Montano
**Height:** 119.00 (ft)

8/17/2018



Tower Engineering Solutions



# Shaft Properties

| | | | | | |
|---|---|---|---|---|---|
| **Structure:** | CT13555-S-SBA | | **Code:** | EIA/TIA-222-G | 8/17/2018 |
| **Site Name:** | Montano | | **Exposure:** | B | |
| **Height:** | 119.00 (ft) | | **Crest Height:** | 0.00 | |
| **Base Elev:** | 0.000 (ft) | | **Site Class:** | D - Stiff Soil | |
| **Gh:** | 1.1 | **Topography:** 1 | **Struct Class:** | II | Page: 5 |

Tower Engineering Solutions

| Sec. No. | Shape | Length (ft) | Thick (in) | Fy (ksi) | Joint Type | Overlap (in) | Weight (lb) |
|---|---|---|---|---|---|---|---|
| 1 | 18 | 53.000 | 0.4375 | 65 | | 0.00 | 12,866 |
| 2 | 18 | 34.000 | 0.3750 | 65 | Slip | 72.00 | 5,823 |
| 3 | 18 | 38.000 | 0.3125 | 65 | Flange | 0.00 | 4,212 |
| | | | | | **Total Shaft Weight:** | | **22,901** |

| | Bottom | | | | | | Top | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Sec. No. | Dia (in) | Elev (ft) | Area (sqin) | Ix (in^4) | W/t Ratio | D/t Ratio | Dia (in) | Elev (ft) | Area (sqin) | Ix (in^4) | W/t Ratio | D/t Ratio | Taper |
| 1 | 58.81 | 0.00 | 81.05 | 34893.72 | 22.29 | 134.42 | 44.82 | 53.00 | 61.62 | 15333.6 | 16.65 | 102.4 | 0.264034 |
| 2 | 47.15 | 47.00 | 55.67 | 15389.65 | 20.76 | 125.73 | 38.17 | 81.00 | 44.99 | 8120.67 | 16.54 | 101.8 | 0.264034 |
| 3 | 38.17 | 81.00 | 37.55 | 6800.85 | 20.13 | 122.15 | 28.14 | 119.00 | 27.60 | 2700.33 | 14.47 | 90.05 | 0.264034 |

# Load Summary

| | | | | | |
|---|---|---|---|---|---|
| **Structure:** | CT13555-S-SBA | **Code:** | EIA/TIA-222-G | 8/17/2018 | |
| **Site Name:** | Montano | **Exposure:** | B | | |
| **Height:** | 119.00 (ft) | **Crest Height:** | 0.00 | | |
| **Base Elev:** | 0.000 (ft) | **Site Class:** | D - Stiff Soil | | |
| **Gh:** | 1.1 **Topography:** 1 | **Struct Class:** | II | Page: 6 | |

Tower Engineering Solutions

## Discrete Appurtenances

| | | | | No Ice | | | Ice | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| No. | Elev (ft) | Description | Qty | Weight (lb) | CaAa (sf) | CaAa Factor | Weight (lb) | CaAa (sf) | CaAa Factor | Hor. Ecc. (ft) | Vert Ecc (ft) |
| 1 | 119.00 | 6' Lightning rod | 1 | 6.50 | 0.38 | 1.00 | 53.79 | 1.797 | 1.00 | 0.00 | 0.00 |
| 2 | 117.00 | AIR 21 B2A B4P | 3 | 91.50 | 6.09 | 0.83 | 324.13 | 7.546 | 0.83 | 0.00 | 0.00 |
| 3 | 117.00 | AIR 21 B4A B2P | 3 | 90.30 | 6.09 | 0.83 | 322.93 | 7.546 | 0.83 | 0.00 | 0.00 |
| 4 | 117.00 | KRY 112 144/1 | 3 | 11.00 | 0.41 | 0.72 | 25.02 | 1.028 | 0.75 | 0.00 | 0.00 |
| 5 | 117.00 | Platform w/ Hand Rail | 1 | 1600.00 | 32.00 | 1.00 | 4331.08 | 68.318 | 1.00 | 0.00 | 0.00 |
| 6 | 117.00 | S11B12 | 3 | 51.00 | 2.83 | 0.71 | 141.53 | 3.704 | 0.72 | 0.00 | 0.00 |
| 7 | 117.00 | LNX-6515DS-A1M | 3 | 50.30 | 11.47 | 0.84 | 351.85 | 15.719 | 0.84 | 0.00 | 0.00 |
| 8 | 113.00 | 3 ft Standoff | 1 | 120.00 | 4.50 | 1.00 | 228.57 | 8.572 | 1.00 | 0.00 | 0.00 |
| 9 | 110.00 | AAHC | 3 | 104.00 | 4.20 | 0.75 | 280.52 | 5.295 | 0.75 | 0.00 | 0.00 |
| 10 | 110.00 | dual sector mounts | 3 | 350.00 | 4.00 | 1.00 | 728.99 | 7.609 | 1.00 | 0.00 | 0.00 |
| 11 | 110.00 | VHLP2-18 | 2 | 27.00 | 4.68 | 1.00 | 153.50 | 6.327 | 1.00 | 1.00 | 0.00 |
| 12 | 107.00 | Ring Mount | 1 | 350.00 | 5.00 | 1.00 | 664.95 | 9.499 | 1.00 | 0.00 | 0.00 |
| 13 | 100.00 | HPA-65R-BUU-H8 | 12 | 60.80 | 12.98 | 0.78 | 450.81 | 15.083 | 0.78 | 0.00 | 0.00 |
| 14 | 100.00 | RRU-11 | 12 | 54.00 | 2.52 | 0.70 | 175.56 | 3.375 | 0.71 | 0.00 | 0.00 |
| 15 | 100.00 | RRU-12 | 6 | 58.00 | 2.81 | 0.70 | 176.94 | 3.700 | 0.71 | 0.00 | 0.00 |
| 16 | 100.00 | RRUS-A2 | 6 | 22.00 | 1.86 | 0.61 | 69.98 | 3.107 | 0.63 | 0.00 | 0.00 |
| 17 | 100.00 | RRU-32 | 3 | 77.00 | 3.87 | 0.85 | 231.03 | 4.349 | 0.85 | 0.00 | 0.00 |
| 18 | 100.00 | DC6-48-60-18-8F | 4 | 32.80 | 1.47 | 1.00 | 114.45 | 2.366 | 1.00 | 0.00 | 0.00 |
| 19 | 100.00 | Platform w/ Hand Rail | 1 | 1875.00 | 43.80 | 1.00 | 5025.63 | 92.735 | 1.00 | 0.00 | 0.00 |
| 20 | 100.00 | IBC700-1 | 3 | 63.30 | 1.31 | 0.91 | 127.63 | 2.459 | 0.91 | 0.00 | 0.00 |
| 21 | 90.00 | RRH2X60-AWS | 3 | 55.00 | 3.50 | 0.77 | 156.37 | 4.500 | 0.78 | 0.00 | 0.00 |
| 22 | 90.00 | RRH2x60-PCS | 3 | 55.00 | 1.51 | 0.78 | 136.76 | 2.228 | 0.79 | 0.00 | 0.00 |
| 23 | 90.00 | B13 RRH4x30 | 3 | 57.20 | 2.71 | 0.88 | 155.50 | 4.311 | 0.88 | 0.00 | 0.00 |
| 24 | 90.00 | DB-T1-6Z-8AB-0Z | 2 | 44.00 | 4.10 | 0.91 | 352.98 | 5.115 | 1.00 | 0.00 | 0.00 |
| 25 | 90.00 | Low Profile Platform | 1 | 1500.00 | 22.00 | 1.00 | 3158.30 | 44.376 | 1.00 | 0.00 | 0.00 |
| 26 | 90.00 | LNX-6514DS-A1M | 6 | 38.80 | 8.17 | 0.82 | 264.46 | 11.747 | 0.82 | 0.00 | 0.00 |
| 27 | 90.00 | HBXX-6517DS-A2M | 6 | 47.00 | 8.55 | 0.80 | 304.22 | 12.248 | 0.80 | 0.00 | 0.00 |
| | | **Totals:** | **98** | **11,263.90** | | | **36,289.94** | | | | |

## Linear Appurtenances

| Bottom Elev. (ft) | Top Elev. (ft) | Description | Exposed Width | Exposed |
|---|---|---|---|---|
| 0.00 | 117.00 | (12) 1 5/8" Coax | 0.00 | Inside |
| 0.00 | 117.00 | (1) 1 5/8" Fiber | 0.00 | Inside |
| 0.00 | 110.00 | (3) 1.619" Hybrid | 0.00 | Inside |
| 0.00 | 110.00 | (2) 1/2" Coax | 0.00 | Inside |
| 0.00 | 100.00 | (2) 1/2" Fiber | 0.00 | Inside |
| 0.00 | 100.00 | (8) 3/4" DC | 0.00 | Inside |
| 0.00 | 100.00 | (3) 3/8" RET | 0.00 | Inside |
| 0.00 | 90.00 | (2) 1 5/8" Hybrid Cable | 0.00 | Inside |

# Shaft Section Properties

| | | | | | |
|---|---|---|---|---|---|
| **Structure:** | CT13555-S-SBA | **Code:** | EIA/TIA-222-G | 8/17/2018 | |
| **Site Name:** | Montano | **Exposure:** | B | | |
| **Height:** | 119.00 (ft) | **Crest Height:** | 0.00 | | |
| **Base Elev:** | 0.000 (ft) | **Site Class:** | D - Stiff Soil | | |
| **Gh:** | 1.1 **Topography:** 1 | **Struct Class:** | II | Page: 7 | |

Tower Engineering Solutions

**Increment Length:** **5 (ft)**

| Elev (ft) | Description | Thick (in) | Dia (in) | Area (in^2) | Ix (in^4) | W/t Ratio | D/t Ratio | Fpy (ksi) | S (in^3) | Weight (lb) |
|---|---|---|---|---|---|---|---|---|---|---|
| 0.00 | | 0.4375 | 58.810 | 81.055 | 34893.7 | 22.29 | 134.42 | 75.2 | 1168. | 0.0 |
| 5.00 | | 0.4375 | 57.490 | 79.221 | 32579.4 | 21.76 | 131.41 | 75.8 | 1116. | 1363.5 |
| 10.00 | | 0.4375 | 56.170 | 77.388 | 30369.7 | 21.23 | 128.39 | 76.4 | 1064. | 1332.3 |
| 15.00 | | 0.4375 | 54.849 | 75.555 | 28262.2 | 20.70 | 125.37 | 77.1 | 1014. | 1301.1 |
| 20.00 | | 0.4375 | 53.529 | 73.722 | 26254.6 | 20.16 | 122.35 | 77.7 | 966.0 | 1269.9 |
| 25.00 | | 0.4375 | 52.209 | 71.889 | 24344.4 | 19.63 | 119.34 | 78.3 | 918.4 | 1238.7 |
| 30.00 | | 0.4375 | 50.889 | 70.056 | 22529.1 | 19.10 | 116.32 | 78.9 | 872.0 | 1207.5 |
| 35.00 | | 0.4375 | 49.569 | 68.223 | 20806.4 | 18.57 | 113.30 | 79.6 | 826.7 | 1176.3 |
| 40.00 | | 0.4375 | 48.249 | 66.389 | 19173.9 | 18.04 | 110.28 | 80.2 | 782.7 | 1145.1 |
| 45.00 | | 0.4375 | 46.928 | 64.556 | 17629.0 | 17.50 | 107.27 | 80.8 | 739.9 | 1113.9 |
| 47.00 | Bot - Section 2 | 0.4375 | 46.400 | 63.823 | 17035.1 | 17.29 | 106.06 | 81.1 | 723.1 | 436.8 |
| 50.00 | | 0.4375 | 45.608 | 62.723 | 16169.5 | 16.97 | 104.25 | 81.4 | 698.3 | 1209.4 |
| 53.00 | Top - Section 1 | 0.3750 | 45.566 | 53.787 | 13878.3 | 20.01 | 121.51 | 0.0 | 0.0 | 1188.6 |
| 55.00 | | 0.3750 | 45.038 | 53.158 | 13397.5 | 19.77 | 120.10 | 78.2 | 585.9 | 363.9 |
| 60.00 | | 0.3750 | 43.718 | 51.587 | 12244.2 | 19.15 | 116.58 | 78.9 | 551.6 | 891.1 |
| 65.00 | | 0.3750 | 42.398 | 50.016 | 11159.1 | 18.53 | 113.06 | 79.6 | 518.4 | 864.3 |
| 70.00 | | 0.3750 | 41.078 | 48.445 | 10140.1 | 17.90 | 109.54 | 80.3 | 486.2 | 837.6 |
| 75.00 | | 0.3750 | 39.757 | 46.873 | 9185.1 | 17.28 | 106.02 | 81.1 | 455.0 | 810.9 |
| 80.00 | | 0.3750 | 38.437 | 45.302 | 8292.0 | 16.66 | 102.50 | 81.8 | 424.9 | 784.1 |
| 81.00 | Top - Section 2 | 0.3750 | 38.173 | 44.988 | 8120.7 | 16.54 | 101.80 | 81.9 | 419.0 | 153.6 |
| 81.00 | Bot - Section 3 | 0.3125 | 38.173 | 37.552 | 6800.8 | 19.85 | 122.15 | 77.7 | 350.9 | |
| 85.00 | | 0.3125 | 37.117 | 36.504 | 6247.4 | 19.53 | 118.77 | 78.4 | 331.5 | 504.0 |
| 90.00 | | 0.3125 | 35.797 | 35.195 | 5599.0 | 18.79 | 114.55 | 79.3 | 308.1 | 609.9 |
| 95.00 | | 0.3125 | 34.477 | 33.886 | 4997.0 | 18.04 | 110.33 | 80.2 | 285.5 | 587.7 |
| 100.00 | | 0.3125 | 33.157 | 32.576 | 4439.8 | 17.30 | 106.10 | 81.1 | 263.7 | 565.4 |
| 105.00 | | 0.3125 | 31.836 | 31.267 | 3925.7 | 16.55 | 101.88 | 81.9 | 242.9 | 543.1 |
| 107.00 | | 0.3125 | 31.308 | 30.743 | 3731.7 | 16.26 | 100.19 | 82.3 | 234.8 | 211.0 |
| 110.00 | | 0.3125 | 30.516 | 29.957 | 3452.9 | 15.81 | 97.65 | 82.5 | 222.9 | 309.8 |
| 113.00 | | 0.3125 | 29.724 | 29.172 | 3188.3 | 15.36 | 95.12 | 82.5 | 211.3 | 301.8 |
| 115.00 | | 0.3125 | 29.196 | 28.648 | 3019.6 | 15.06 | 93.43 | 82.5 | 203.7 | 196.7 |
| 117.00 | | 0.3125 | 28.668 | 28.124 | 2857.0 | 14.77 | 91.74 | 82.5 | 196.3 | 193.2 |
| 119.00 | | 0.3125 | 28.140 | 27.600 | 2700.3 | 14.47 | 90.05 | 82.5 | 189.0 | 189.6 |
| | | | | | | | | | | **22901.0** |

# Wind Loading - Shaft

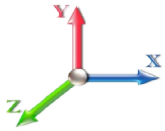
| | | | | | |
|---|---|---|---|---|---|
| **Structure:** | CT13555-S-SBA | **Code:** | EIA/TIA-222-G | 8/17/2018 | |
| **Site Name:** | Montano | **Exposure:** | B | | |
| **Height:** | 119.00 (ft) | **Crest Height:** | 0.00 | | |
| **Base Elev:** | 0.000 (ft) | **Site Class:** | D - Stiff Soil | | |
| **Gh:** | 1.1 **Topography:** 1 | **Struct Class:** | II | Page: 8 | |

Tower Engineering Solutions

**Load Case:** 1.2D + 1.6W 97 mph Wind

**Dead Load Factor** 1.20

**Wind Load Factor** 1.60




**Iterations** 18

| Elev (ft) | Description | Kzt | Kz | qz (psf) | qzGh (psf) | C (mph-ft) | Cf | Ice Thick (in) | Tributary (ft) | Aa (sf) | CfAa (sf) | Wind Force X (lb) | Dead Load Ice (lb) | Tot Dead Load (lb) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 0.00 | | 1.00 | 0.70 | 16.018 | 17.62 | 403.87 | 0.650 | 0.000 | 0.00 | 0.000 | 0.00 | 0.0 | 0.0 | 0.0 |
| 5.00 | | 1.00 | 0.70 | 16.018 | 17.62 | 394.80 | 0.650 | 0.000 | 5.00 | 24.603 | 15.99 | 450.8 | 0.0 | 1636.2 |
| 10.00 | | 1.00 | 0.70 | 16.018 | 17.62 | 385.74 | 0.650 | 0.000 | 5.00 | 24.044 | 15.63 | 440.6 | 0.0 | 1598.7 |
| 15.00 | | 1.00 | 0.70 | 16.018 | 17.62 | 376.67 | 0.650 | 0.000 | 5.00 | 23.486 | 15.27 | 430.4 | 0.0 | 1561.3 |
| 20.00 | | 1.00 | 0.70 | 16.018 | 17.62 | 367.60 | 0.650 | 0.000 | 5.00 | 22.927 | 14.90 | 420.1 | 0.0 | 1523.9 |
| 25.00 | | 1.00 | 0.70 | 16.018 | 17.62 | 358.54 | 0.650 | 0.000 | 5.00 | 22.369 | 14.54 | 409.9 | 0.0 | 1486.4 |
| 30.00 | | 1.00 | 0.70 | 16.031 | 17.63 | 349.62 | 0.650 | 0.000 | 5.00 | 21.810 | 14.18 | 400.0 | 0.0 | 1449.0 |
| 35.00 | | 1.00 | 0.73 | 16.753 | 18.43 | 348.13 | 0.650 | 0.000 | 5.00 | 21.252 | 13.81 | 407.3 | 0.0 | 1411.6 |
| 40.00 | | 1.00 | 0.76 | 17.405 | 19.15 | 345.39 | 0.650 | 0.000 | 5.00 | 20.693 | 13.45 | 412.0 | 0.0 | 1374.2 |
| 45.00 | | 1.00 | 0.79 | 18.000 | 19.80 | 341.64 | 0.650 | 0.000 | 5.00 | 20.134 | 13.09 | 414.6 | 0.0 | 1336.7 |
| 47.00 | Bot - Section 2 | 1.00 | 0.80 | 18.225 | 20.05 | 339.90 | 0.650 | 0.000 | 2.00 | 7.897 | 5.13 | 164.7 | 0.0 | 524.2 |
| 50.00 | | 1.00 | 0.81 | 18.551 | 20.41 | 337.06 | 0.650 | 0.000 | 3.00 | 11.869 | 7.71 | 251.9 | 0.0 | 1451.3 |
| 53.00 | Top - Section 1 | 1.00 | 0.82 | 18.862 | 20.75 | 333.98 | 0.650 | 0.000 | 3.00 | 11.668 | 7.58 | 251.8 | 0.0 | 1426.3 |
| 55.00 | | 1.00 | 0.83 | 19.063 | 20.97 | 337.41 | 0.650 | 0.000 | 2.00 | 7.667 | 4.98 | 167.2 | 0.0 | 436.7 |
| 60.00 | | 1.00 | 0.85 | 19.543 | 21.50 | 331.62 | 0.650 | 0.000 | 5.00 | 18.776 | 12.20 | 419.8 | 0.0 | 1069.3 |
| 65.00 | | 1.00 | 0.87 | 19.995 | 21.99 | 325.30 | 0.650 | 0.000 | 5.00 | 18.218 | 11.84 | 416.7 | 0.0 | 1037.2 |
| 70.00 | | 1.00 | 0.89 | 20.422 | 22.46 | 318.53 | 0.650 | 0.000 | 5.00 | 17.659 | 11.48 | 412.6 | 0.0 | 1005.1 |
| 75.00 | | 1.00 | 0.91 | 20.829 | 22.91 | 311.34 | 0.650 | 0.000 | 5.00 | 17.100 | 11.12 | 407.5 | 0.0 | 973.0 |
| 80.00 | | 1.00 | 0.93 | 21.217 | 23.34 | 303.79 | 0.650 | 0.000 | 5.00 | 16.542 | 10.75 | 401.5 | 0.0 | 941.0 |
| 81.00 | Top - Section 2 | 1.00 | 0.93 | 21.292 | 23.42 | 302.24 | 0.650 | 0.000 | 1.00 | 3.241 | 2.11 | 79.0 | 0.0 | 184.3 |
| 85.00 | | 1.00 | 0.94 | 21.587 | 23.75 | 295.91 | 0.650 | 0.000 | 4.00 | 12.742 | 8.28 | 314.7 | 0.0 | 604.8 |
| 90.00 | Appurtenance(s) | 1.00 | 0.96 | 21.943 | 24.14 | 287.73 | 0.650 | 0.000 | 5.00 | 15.425 | 10.03 | 387.2 | 0.0 | 731.9 |
| 95.00 | | 1.00 | 0.97 | 22.284 | 24.51 | 279.26 | 0.650 | 0.000 | 5.00 | 14.866 | 9.66 | 379.0 | 0.0 | 705.2 |
| 100.00 | Appurtenance(s) | 1.00 | 0.99 | 22.613 | 24.87 | 270.54 | 0.650 | 0.000 | 5.00 | 14.308 | 9.30 | 370.1 | 0.0 | 678.5 |
| 105.00 | | 1.00 | 1.00 | 22.931 | 25.22 | 261.59 | 0.650 | 0.000 | 5.00 | 13.749 | 8.94 | 360.7 | 0.0 | 651.7 |
| 107.00 | Appurtenance(s) | 1.00 | 1.01 | 23.055 | 25.36 | 257.94 | 0.650 | 0.000 | 2.00 | 5.343 | 3.47 | 140.9 | 0.0 | 253.2 |
| 110.00 | Appurtenance(s) | 1.00 | 1.02 | 23.238 | 25.56 | 252.41 | 0.650 | 0.000 | 3.00 | 7.847 | 5.10 | 208.6 | 0.0 | 371.8 |
| 113.00 | Appurtenance(s) | 1.00 | 1.02 | 23.417 | 25.76 | 246.81 | 0.650 | 0.000 | 3.00 | 7.646 | 4.97 | 204.8 | 0.0 | 362.2 |
| 115.00 | | 1.00 | 1.03 | 23.535 | 25.89 | 243.03 | 0.650 | 0.000 | 2.00 | 4.986 | 3.24 | 134.2 | 0.0 | 236.1 |
| 117.00 | Appurtenance(s) | 1.00 | 1.03 | 23.651 | 26.02 | 239.23 | 0.650 | 0.000 | 2.00 | 4.896 | 3.18 | 132.5 | 0.0 | 231.8 |
| 119.00 | Appurtenance(s) | 1.00 | 1.04 | 23.766 | 26.14 | 235.39 | 0.650 | 0.000 | 2.00 | 4.807 | 3.12 | 130.7 | 0.0 | 227.5 |
| | | | | | | | | **Totals:** | **119.00** | | | **9,521.7** | | **27,481.1** |

# Discrete Appurtenance Forces

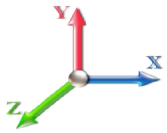
| | | | | | |
|---|---|---|---|---|---|
| **Structure:** | CT13555-S-SBA | **Code:** | EIA/TIA-222-G | 8/17/2018 | |
| **Site Name:** | Montano | **Exposure:** | B | | |
| **Height:** | 119.00 (ft) | **Crest Height:** | 0.00 | | |
| **Base Elev:** | 0.000 (ft) | **Site Class:** | D - Stiff Soil | | |
| **Gh:** | 1.1 **Topography:** 1 | **Struct Class:** | II | Page: 9 | |

Tower Engineering Solutions

**Load Case:** 1.2D + 1.6W 97 mph Wind

**Dead Load Factor** 1.20

**Wind Load Factor** 1.60




**Iterations** 18

| No. | Elev (ft) | Description | Qty | qz (psf) | qzGh (psf) | CaAa x Ka | Ka | Total CaAa (sf) | Dead Load (lb) | Horiz Ecc (ft) | Vert Ecc (ft) | Wind FX (lb) | Mom Y (lb-ft) | Mom Z (lb-ft) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 119.00 | 6' Lightning rod | 1 | 23.766 | 26.142 | 1.00 | 1.00 | 0.38 | 7.80 | 0.000 | 0.000 | 15.89 | 0.00 | 0.00 |
| 2 | 117.00 | AIR 21 B2A B4P | 3 | 23.651 | 26.016 | 0.62 | 0.75 | 11.32 | 329.40 | 0.000 | 0.000 | 471.13 | 0.00 | 0.00 |
| 3 | 117.00 | LNX-6515DS-A1M | 3 | 23.651 | 26.016 | 0.63 | 0.75 | 21.58 | 181.08 | 0.000 | 0.000 | 898.07 | 0.00 | 0.00 |
| 4 | 117.00 | S11B12 | 3 | 23.651 | 26.016 | 0.53 | 0.75 | 4.50 | 183.60 | 0.000 | 0.000 | 187.13 | 0.00 | 0.00 |
| 5 | 117.00 | AIR 21 B4A B2P | 3 | 23.651 | 26.016 | 0.62 | 0.75 | 11.32 | 325.08 | 0.000 | 0.000 | 471.13 | 0.00 | 0.00 |
| 6 | 117.00 | KRY 112 144/1 | 3 | 23.651 | 26.016 | 0.54 | 0.75 | 0.67 | 39.60 | 0.000 | 0.000 | 27.69 | 0.00 | 0.00 |
| 7 | 117.00 | Platform w/ Hand Rail | 1 | 23.651 | 26.016 | 1.00 | 1.00 | 32.00 | 1920.00 | 0.000 | 0.000 | 1332.02 | 0.00 | 0.00 |
| 8 | 113.00 | 3 ft Standoff | 1 | 23.417 | 25.759 | 1.00 | 1.00 | 4.50 | 144.00 | 0.000 | 0.000 | 185.46 | 0.00 | 0.00 |
| 9 | 110.00 | dual sector mounts | 3 | 23.238 | 25.561 | 1.00 | 1.00 | 12.00 | 1260.00 | 0.000 | 0.000 | 490.78 | 0.00 | 0.00 |
| 10 | 110.00 | VHLP2-18 | 2 | 23.238 | 25.561 | 1.00 | 1.00 | 9.36 | 64.80 | 2.291 | 0.000 | 382.81 | 548.16 | 0.00 |
| 11 | 110.00 | AAHC | 3 | 23.238 | 25.561 | 0.60 | 0.80 | 7.56 | 374.40 | 0.000 | 0.000 | 309.19 | 0.00 | 0.00 |
| 12 | 107.00 | Ring Mount | 1 | 23.055 | 25.360 | 1.00 | 1.00 | 5.00 | 420.00 | 0.000 | 0.000 | 202.88 | 0.00 | 0.00 |
| 13 | 100.00 | Platform w/ Hand Rail | 1 | 22.613 | 24.875 | 1.00 | 1.00 | 43.80 | 2250.00 | 0.000 | 0.000 | 1743.22 | 0.00 | 0.00 |
| 14 | 100.00 | DC6-48-60-18-8F | 4 | 22.613 | 24.875 | 0.75 | 0.75 | 4.41 | 157.44 | 0.000 | 0.000 | 175.52 | 0.00 | 0.00 |
| 15 | 100.00 | RRUS-A2 | 6 | 22.613 | 24.875 | 0.46 | 0.75 | 5.12 | 158.40 | 0.000 | 0.000 | 203.87 | 0.00 | 0.00 |
| 16 | 100.00 | RRU-12 | 6 | 22.613 | 24.875 | 0.53 | 0.75 | 8.89 | 417.60 | 0.000 | 0.000 | 353.80 | 0.00 | 0.00 |
| 17 | 100.00 | RRU-11 | 12 | 22.613 | 24.875 | 0.53 | 0.75 | 15.99 | 777.60 | 0.000 | 0.000 | 636.37 | 0.00 | 0.00 |
| 18 | 100.00 | HPA-65R-BUU-H8 | 12 | 22.613 | 24.875 | 0.58 | 0.75 | 91.00 | 875.52 | 0.000 | 0.000 | 3621.87 | 0.00 | 0.00 |
| 19 | 100.00 | IBC700-1 | 3 | 22.613 | 24.875 | 0.68 | 0.75 | 2.68 | 227.88 | 0.000 | 0.000 | 106.63 | 0.00 | 0.00 |
| 20 | 100.00 | RRU-32 | 3 | 22.613 | 24.875 | 0.64 | 0.75 | 7.38 | 277.20 | 0.000 | 0.000 | 293.88 | 0.00 | 0.00 |
| 21 | 90.00 | RRH2X60-AWS | 3 | 21.943 | 24.137 | 0.62 | 0.80 | 6.48 | 198.00 | 0.000 | 0.000 | 250.11 | 0.00 | 0.00 |
| 22 | 90.00 | LNX-6514DS-A1M | 6 | 21.943 | 24.137 | 0.66 | 0.80 | 32.20 | 279.36 | 0.000 | 0.000 | 1243.40 | 0.00 | 0.00 |
| 23 | 90.00 | HBXX-6517DS-A2M | 6 | 21.943 | 24.137 | 0.64 | 0.80 | 32.83 | 338.40 | 0.000 | 0.000 | 1267.95 | 0.00 | 0.00 |
| 24 | 90.00 | Low Profile Platform | 1 | 21.943 | 24.137 | 1.00 | 1.00 | 22.00 | 1800.00 | 0.000 | 0.000 | 849.63 | 0.00 | 0.00 |
| 25 | 90.00 | RRH2x60-PCS | 3 | 21.943 | 24.137 | 0.63 | 0.80 | 2.84 | 198.00 | 0.000 | 0.000 | 109.59 | 0.00 | 0.00 |
| 26 | 90.00 | B13 RRH4x30 | 3 | 21.943 | 24.137 | 0.70 | 0.80 | 5.69 | 205.92 | 0.000 | 0.000 | 219.78 | 0.00 | 0.00 |
| 27 | 90.00 | DB-T1-6Z-8AB-0Z | 2 | 21.943 | 24.137 | 0.73 | 0.80 | 5.97 | 105.60 | 0.000 | 0.000 | 230.54 | 0.00 | 0.00 |
| | | | | | | | **Totals:** | | **13,516.68** | | | **16,280.34** | | |

# Total Applied Force Summary

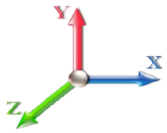
| | | | | | |
|---|---|---|---|---|---|
| **Structure:** | CT13555-S-SBA | | **Code:** | EIA/TIA-222-G | 8/17/2018 |
| **Site Name:** | Montano | | **Exposure:** | B | |
| **Height:** | 119.00 (ft) | | **Crest Height:** | 0.00 | |
| **Base Elev:** | 0.000 (ft) | | **Site Class:** | D - Stiff Soil | |
| **Gh:** | 1.1 | **Topography:** 1 | **Struct Class:** | II | Page: 10 |

Tower Engineering Solutions

**Load Case:** 1.2D + 1.6W 97 mph Wind

**Dead Load Factor** 1.20

**Wind Load Factor** 1.60




**Iterations** 18

| Elev (ft) | Description | Lateral FX (-) (lb) | Axial FY (-) (lb) | Torsion MY (lb-ft) | Moment MZ (lb-ft) |
|---|---|---|---|---|---|
| 0.00 | | 0.00 | 0.00 | 0.00 | 0.00 |
| 5.00 | | 450.83 | 1772.95 | 0.00 | 0.00 |
| 10.00 | | 440.60 | 1735.52 | 0.00 | 0.00 |
| 15.00 | | 430.36 | 1698.10 | 0.00 | 0.00 |
| 20.00 | | 420.13 | 1660.67 | 0.00 | 0.00 |
| 25.00 | | 409.89 | 1623.24 | 0.00 | 0.00 |
| 30.00 | | 400.00 | 1585.82 | 0.00 | 0.00 |
| 35.00 | | 407.30 | 1548.39 | 0.00 | 0.00 |
| 40.00 | | 412.02 | 1510.96 | 0.00 | 0.00 |
| 45.00 | | 414.62 | 1473.54 | 0.00 | 0.00 |
| 47.00 | | 164.66 | 578.93 | 0.00 | 0.00 |
| 50.00 | | 251.88 | 1533.39 | 0.00 | 0.00 |
| 53.00 | | 251.77 | 1508.36 | 0.00 | 0.00 |
| 55.00 | | 167.20 | 491.41 | 0.00 | 0.00 |
| 60.00 | | 419.77 | 1206.08 | 0.00 | 0.00 |
| 65.00 | | 416.70 | 1174.00 | 0.00 | 0.00 |
| 70.00 | | 412.57 | 1141.92 | 0.00 | 0.00 |
| 75.00 | | 407.48 | 1109.84 | 0.00 | 0.00 |
| 80.00 | | 401.50 | 1077.76 | 0.00 | 0.00 |
| 81.00 | | 78.95 | 211.70 | 0.00 | 0.00 |
| 85.00 | | 314.68 | 714.23 | 0.00 | 0.00 |
| 90.00 | (24) attachments | 4558.20 | 3994.01 | 0.00 | 0.00 |
| 95.00 | | 378.99 | 828.80 | 0.00 | 0.00 |
| 100.00 | (47) attachments | 7505.29 | 5943.70 | 0.00 | 0.00 |
| 105.00 | | 360.68 | 753.13 | 0.00 | 0.00 |
| 107.00 | (1) attachments | 343.81 | 713.77 | 0.00 | 0.00 |
| 110.00 | (8) attachments | 1391.39 | 2131.83 | 548.16 | 0.00 |
| 113.00 | (1) attachments | 390.30 | 555.05 | 0.00 | 0.00 |
| 115.00 | | 134.24 | 268.69 | 0.00 | 0.00 |
| 117.00 | (16) attachments | 3519.64 | 3243.17 | 0.00 | 0.00 |
| 119.00 | (1) attachments | 146.59 | 235.34 | 0.00 | 0.00 |
| | **Totals:** | **25,802.04** | **44,024.30** | **548.16** | **0.00** |

# Calculated Forces

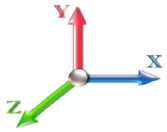
| | | | | | |
|---|---|---|---|---|---|
| **Structure:** | CT13555-S-SBA | **Code:** | EIA/TIA-222-G | 8/17/2018 | |
| **Site Name:** | Montano | **Exposure:** | B | | |
| **Height:** | 119.00 (ft) | **Crest Height:** | 0.00 | | |
| **Base Elev:** | 0.000 (ft) | **Site Class:** | D - Stiff Soil | | |
| **Gh:** | 1.1 **Topography:** 1 | **Struct Class:** | II | Page: 11 | |

Tower Engineering Solutions

**Load Case:** 1.2D + 1.6W 97 mph Wind

**Dead Load Factor** 1.20

**Wind Load Factor** 1.60




**Iterations** 18

| 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 Sway (deg) | Rotation Twist (deg) | Stress Ratio |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 0.00 | -44.00 | -25.84 | -0.55 | -2265.7 | 0.00 | 2265.77 | 5484.43 | 2742.22 | 13159.3 | 6589.47 | 0.00 | 0.000 | 0.000 | 0.352 |
| 5.00 | -42.19 | -25.45 | -0.55 | -2136.5 | 0.00 | 2136.59 | 5405.01 | 2702.51 | 12673.3 | 6346.09 | 0.05 | -0.090 | 0.000 | 0.345 |
| 10.00 | -40.42 | -25.07 | -0.55 | -2009.3 | 0.00 | 2009.34 | 5323.53 | 2661.77 | 12191.2 | 6104.68 | 0.19 | -0.180 | 0.000 | 0.337 |
| 15.00 | -38.68 | -24.70 | -0.55 | -1883.9 | 0.00 | 1883.98 | 5239.98 | 2619.99 | 11713.4 | 5865.43 | 0.43 | -0.271 | 0.000 | 0.329 |
| 20.00 | -36.98 | -24.33 | -0.55 | -1760.5 | 0.00 | 1760.51 | 5154.37 | 2577.18 | 11240.2 | 5628.50 | 0.76 | -0.363 | 0.000 | 0.320 |
| 25.00 | -35.32 | -23.96 | -0.55 | -1638.8 | 0.00 | 1638.88 | 5066.69 | 2533.35 | 10772.0 | 5394.05 | 1.19 | -0.455 | 0.000 | 0.311 |
| 30.00 | -33.70 | -23.60 | -0.55 | -1519.0 | 0.00 | 1519.08 | 4976.95 | 2488.47 | 10309.2 | 5162.27 | 1.72 | -0.548 | 0.000 | 0.301 |
| 35.00 | -32.12 | -23.23 | -0.55 | -1401.0 | 0.00 | 1401.08 | 4885.14 | 2442.57 | 9851.98 | 4933.31 | 2.35 | -0.640 | 0.000 | 0.291 |
| 40.00 | -30.58 | -22.85 | -0.55 | -1284.9 | 0.00 | 1284.93 | 4791.27 | 2395.63 | 9400.73 | 4707.35 | 3.07 | -0.732 | 0.000 | 0.279 |
| 45.00 | -29.09 | -22.45 | -0.55 | -1170.6 | 0.00 | 1170.69 | 4695.33 | 2347.66 | 8955.81 | 4484.56 | 3.88 | -0.823 | 0.000 | 0.267 |
| 47.00 | -28.49 | -22.30 | -0.55 | -1125.8 | 0.00 | 1125.80 | 4656.37 | 2328.19 | 8779.69 | 4396.37 | 4.23 | -0.860 | 0.000 | 0.262 |
| 50.00 | -26.94 | -22.05 | -0.55 | -1058.9 | 0.00 | 1058.92 | 4597.32 | 2298.66 | 8517.56 | 4265.11 | 4.79 | -0.914 | 0.000 | 0.254 |
| 53.00 | -25.42 | -21.79 | -0.55 | -992.78 | 0.00 | 992.78 | 3769.04 | 1884.52 | 6995.75 | 3503.08 | 5.39 | -0.969 | 0.000 | 0.290 |
| 55.00 | -24.91 | -21.64 | -0.55 | -949.20 | 0.00 | 949.20 | 3738.97 | 1869.49 | 6858.18 | 3434.19 | 5.80 | -1.005 | 0.000 | 0.283 |
| 60.00 | -23.68 | -21.24 | -0.55 | -840.99 | -0.01 | 840.99 | 3662.35 | 1831.18 | 6517.42 | 3263.55 | 6.90 | -1.100 | 0.000 | 0.264 |
| 65.00 | -22.48 | -20.83 | -0.55 | -734.80 | -0.01 | 734.80 | 3583.67 | 1791.83 | 6181.48 | 3095.34 | 8.11 | -1.191 | 0.000 | 0.244 |
| 70.00 | -21.32 | -20.43 | -0.55 | -630.63 | -0.01 | 630.63 | 3502.92 | 1751.46 | 5850.70 | 2929.70 | 9.40 | -1.278 | -0.001 | 0.221 |
| 75.00 | -20.19 | -20.02 | -0.55 | -528.49 | -0.01 | 528.49 | 3420.10 | 1710.05 | 5525.41 | 2766.81 | 10.79 | -1.359 | -0.001 | 0.197 |
| 80.00 | -19.11 | -19.61 | -0.55 | -428.38 | -0.01 | 428.38 | 3335.22 | 1667.61 | 5205.95 | 2606.84 | 12.25 | -1.434 | -0.001 | 0.170 |
| 81.00 | -18.88 | -19.54 | -0.55 | -408.77 | -0.01 | 408.77 | 3318.00 | 1659.00 | 5142.79 | 2575.22 | 12.55 | -1.448 | -0.001 | 0.165 |
| 81.00 | -18.88 | -19.54 | -0.55 | -408.77 | -0.01 | 408.77 | 2626.87 | 1313.44 | 4085.05 | 2045.56 | 12.55 | -1.448 | -0.001 | 0.207 |
| 85.00 | -18.16 | -19.22 | -0.55 | -330.62 | -0.01 | 330.62 | 2576.62 | 1288.31 | 3894.21 | 1950.00 | 13.79 | -1.500 | -0.001 | 0.177 |
| 90.00 | -14.27 | -14.57 | -0.55 | -234.51 | -0.01 | 234.51 | 2511.95 | 1255.98 | 3659.15 | 1832.29 | 15.40 | -1.564 | -0.001 | 0.134 |
| 95.00 | -13.45 | -14.18 | -0.55 | -161.65 | -0.01 | 161.65 | 2445.22 | 1222.61 | 3428.26 | 1716.68 | 17.07 | -1.614 | -0.001 | 0.100 |
| 100.00 | -7.72 | -6.51 | -0.55 | -90.75 | -0.01 | 90.75 | 2376.41 | 1188.21 | 3201.88 | 1603.32 | 18.78 | -1.650 | -0.001 | 0.060 |
| 105.00 | -6.97 | -6.13 | -0.55 | -58.18 | -0.01 | 58.18 | 2305.55 | 1152.77 | 2980.36 | 1492.40 | 20.52 | -1.674 | -0.001 | 0.042 |
| 107.00 | -6.27 | -5.77 | -0.55 | -45.92 | -0.01 | 45.92 | 2276.62 | 1138.31 | 2893.19 | 1448.75 | 21.22 | -1.682 | -0.001 | 0.034 |
| 110.00 | -4.18 | -4.32 | 0.00 | -28.61 | 0.00 | 28.61 | 2225.68 | 1112.84 | 2755.45 | 1379.77 | 22.28 | -1.690 | -0.002 | 0.023 |
| 113.00 | -3.63 | -3.91 | 0.00 | -15.66 | 0.00 | 15.66 | 2167.31 | 1083.66 | 2612.10 | 1307.99 | 23.35 | -1.696 | -0.002 | 0.014 |
| 115.00 | -3.37 | -3.77 | 0.00 | -7.84 | 0.00 | 7.84 | 2128.40 | 1064.20 | 2518.66 | 1261.20 | 24.06 | -1.698 | -0.002 | 0.008 |
| 117.00 | -0.23 | -0.15 | 0.00 | -0.31 | 0.00 | 0.31 | 2089.48 | 1044.74 | 2426.92 | 1215.26 | 24.77 | -1.699 | -0.002 | 0.000 |
| 119.00 | 0.00 | -0.15 | 0.00 | 0.00 | 0.00 | 0.00 | 2050.57 | 1025.29 | 2336.89 | 1170.18 | 25.48 | -1.699 | -0.002 | 0.000 |

# Wind Loading - Shaft

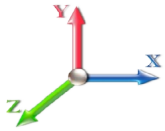
| | | | | | |
|---|---|---|---|---|---|
| **Structure:** | CT13555-S-SBA | **Code:** | EIA/TIA-222-G | 8/17/2018 | |
| **Site Name:** | Montano | **Exposure:** | B | | |
| **Height:** | 119.00 (ft) | **Crest Height:** | 0.00 | | |
| **Base Elev:** | 0.000 (ft) | **Site Class:** | D - Stiff Soil | | |
| **Gh:** | 1.1 **Topography:** 1 | **Struct Class:** | II | Page: 12 | |

Tower Engineering Solutions

**Load Case:** 0.9D + 1.6W 97 mph Wind

**Dead Load Factor** 0.90

**Wind Load Factor** 1.60




**Iterations** 18

| Elev (ft) | Description | Kzt | Kz | qz (psf) | qzGh (psf) | C (mph-ft) | Cf | Ice Thick (in) | Tributary (ft) | Aa (sf) | CfAa (sf) | Wind Force X (lb) | Dead Load Ice (lb) | Tot Dead Load (lb) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 0.00 | | 1.00 | 0.70 | 16.018 | 17.62 | 403.87 | 0.650 | 0.000 | 0.00 | 0.000 | 0.00 | 0.0 | 0.0 | 0.0 |
| 5.00 | | 1.00 | 0.70 | 16.018 | 17.62 | 394.80 | 0.650 | 0.000 | 5.00 | 24.603 | 15.99 | 450.8 | 0.0 | 1227.1 |
| 10.00 | | 1.00 | 0.70 | 16.018 | 17.62 | 385.74 | 0.650 | 0.000 | 5.00 | 24.044 | 15.63 | 440.6 | 0.0 | 1199.0 |
| 15.00 | | 1.00 | 0.70 | 16.018 | 17.62 | 376.67 | 0.650 | 0.000 | 5.00 | 23.486 | 15.27 | 430.4 | 0.0 | 1171.0 |
| 20.00 | | 1.00 | 0.70 | 16.018 | 17.62 | 367.60 | 0.650 | 0.000 | 5.00 | 22.927 | 14.90 | 420.1 | 0.0 | 1142.9 |
| 25.00 | | 1.00 | 0.70 | 16.018 | 17.62 | 358.54 | 0.650 | 0.000 | 5.00 | 22.369 | 14.54 | 409.9 | 0.0 | 1114.8 |
| 30.00 | | 1.00 | 0.70 | 16.031 | 17.63 | 349.62 | 0.650 | 0.000 | 5.00 | 21.810 | 14.18 | 400.0 | 0.0 | 1086.8 |
| 35.00 | | 1.00 | 0.73 | 16.753 | 18.43 | 348.13 | 0.650 | 0.000 | 5.00 | 21.252 | 13.81 | 407.3 | 0.0 | 1058.7 |
| 40.00 | | 1.00 | 0.76 | 17.405 | 19.15 | 345.39 | 0.650 | 0.000 | 5.00 | 20.693 | 13.45 | 412.0 | 0.0 | 1030.6 |
| 45.00 | | 1.00 | 0.79 | 18.000 | 19.80 | 341.64 | 0.650 | 0.000 | 5.00 | 20.134 | 13.09 | 414.6 | 0.0 | 1002.6 |
| 47.00 | Bot - Section 2 | 1.00 | 0.80 | 18.225 | 20.05 | 339.90 | 0.650 | 0.000 | 2.00 | 7.897 | 5.13 | 164.7 | 0.0 | 393.2 |
| 50.00 | | 1.00 | 0.81 | 18.551 | 20.41 | 337.06 | 0.650 | 0.000 | 3.00 | 11.869 | 7.71 | 251.9 | 0.0 | 1088.5 |
| 53.00 | Top - Section 1 | 1.00 | 0.82 | 18.862 | 20.75 | 333.98 | 0.650 | 0.000 | 3.00 | 11.668 | 7.58 | 251.8 | 0.0 | 1069.7 |
| 55.00 | | 1.00 | 0.83 | 19.063 | 20.97 | 337.41 | 0.650 | 0.000 | 2.00 | 7.667 | 4.98 | 167.2 | 0.0 | 327.5 |
| 60.00 | | 1.00 | 0.85 | 19.543 | 21.50 | 331.62 | 0.650 | 0.000 | 5.00 | 18.776 | 12.20 | 419.8 | 0.0 | 802.0 |
| 65.00 | | 1.00 | 0.87 | 19.995 | 21.99 | 325.30 | 0.650 | 0.000 | 5.00 | 18.218 | 11.84 | 416.7 | 0.0 | 777.9 |
| 70.00 | | 1.00 | 0.89 | 20.422 | 22.46 | 318.53 | 0.650 | 0.000 | 5.00 | 17.659 | 11.48 | 412.6 | 0.0 | 753.8 |
| 75.00 | | 1.00 | 0.91 | 20.829 | 22.91 | 311.34 | 0.650 | 0.000 | 5.00 | 17.100 | 11.12 | 407.5 | 0.0 | 729.8 |
| 80.00 | | 1.00 | 0.93 | 21.217 | 23.34 | 303.79 | 0.650 | 0.000 | 5.00 | 16.542 | 10.75 | 401.5 | 0.0 | 705.7 |
| 81.00 | Top - Section 2 | 1.00 | 0.93 | 21.292 | 23.42 | 302.24 | 0.650 | 0.000 | 1.00 | 3.241 | 2.11 | 79.0 | 0.0 | 138.3 |
| 85.00 | | 1.00 | 0.94 | 21.587 | 23.75 | 295.91 | 0.650 | 0.000 | 4.00 | 12.742 | 8.28 | 314.7 | 0.0 | 453.6 |
| 90.00 | Appurtenance(s) | 1.00 | 0.96 | 21.943 | 24.14 | 287.73 | 0.650 | 0.000 | 5.00 | 15.425 | 10.03 | 387.2 | 0.0 | 548.9 |
| 95.00 | | 1.00 | 0.97 | 22.284 | 24.51 | 279.26 | 0.650 | 0.000 | 5.00 | 14.866 | 9.66 | 379.0 | 0.0 | 528.9 |
| 100.00 | Appurtenance(s) | 1.00 | 0.99 | 22.613 | 24.87 | 270.54 | 0.650 | 0.000 | 5.00 | 14.308 | 9.30 | 370.1 | 0.0 | 508.8 |
| 105.00 | | 1.00 | 1.00 | 22.931 | 25.22 | 261.59 | 0.650 | 0.000 | 5.00 | 13.749 | 8.94 | 360.7 | 0.0 | 488.8 |
| 107.00 | Appurtenance(s) | 1.00 | 1.01 | 23.055 | 25.36 | 257.94 | 0.650 | 0.000 | 2.00 | 5.343 | 3.47 | 140.9 | 0.0 | 189.9 |
| 110.00 | Appurtenance(s) | 1.00 | 1.02 | 23.238 | 25.56 | 252.41 | 0.650 | 0.000 | 3.00 | 7.847 | 5.10 | 208.6 | 0.0 | 278.8 |
| 113.00 | Appurtenance(s) | 1.00 | 1.02 | 23.417 | 25.76 | 246.81 | 0.650 | 0.000 | 3.00 | 7.646 | 4.97 | 204.8 | 0.0 | 271.6 |
| 115.00 | | 1.00 | 1.03 | 23.535 | 25.89 | 243.03 | 0.650 | 0.000 | 2.00 | 4.986 | 3.24 | 134.2 | 0.0 | 177.1 |
| 117.00 | Appurtenance(s) | 1.00 | 1.03 | 23.651 | 26.02 | 239.23 | 0.650 | 0.000 | 2.00 | 4.896 | 3.18 | 132.5 | 0.0 | 173.9 |
| 119.00 | Appurtenance(s) | 1.00 | 1.04 | 23.766 | 26.14 | 235.39 | 0.650 | 0.000 | 2.00 | 4.807 | 3.12 | 130.7 | 0.0 | 170.7 |
| | | | | | | | | **Totals:** | **119.00** | | | **9,521.7** | | **20,610.9** |

# Discrete Appurtenance Forces

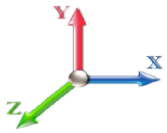
| | | | | | |
|---|---|---|---|---|---|
| **Structure:** | CT13555-S-SBA | **Code:** | EIA/TIA-222-G | 8/17/2018 | |
| **Site Name:** | Montano | **Exposure:** | B | | |
| **Height:** | 119.00 (ft) | **Crest Height:** | 0.00 | | |
| **Base Elev:** | 0.000 (ft) | **Site Class:** | D - Stiff Soil | | |
| **Gh:** | 1.1 **Topography:** 1 | **Struct Class:** | II | Page: 13 | |

Tower Engineering Solutions

**Load Case:** 0.9D + 1.6W 97 mph Wind

**Dead Load Factor** 0.90

**Wind Load Factor** 1.60




**Iterations** 18

| No. | Elev (ft) | Description | Qty | qz (psf) | qzGh (psf) | CaAa x Ka | Ka | Total CaAa (sf) | Dead Load (lb) | Horiz Ecc (ft) | Vert Ecc (ft) | Wind FX (lb) | Mom Y (lb-ft) | Mom Z (lb-ft) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 119.00 | 6' Lightning rod | 1 | 23.766 | 26.142 | 1.00 | 1.00 | 0.38 | 5.85 | 0.000 | 0.000 | 15.89 | 0.00 | 0.00 |
| 2 | 117.00 | AIR 21 B2A B4P | 3 | 23.651 | 26.016 | 0.62 | 0.75 | 11.32 | 247.05 | 0.000 | 0.000 | 471.13 | 0.00 | 0.00 |
| 3 | 117.00 | LNX-6515DS-A1M | 3 | 23.651 | 26.016 | 0.63 | 0.75 | 21.58 | 135.81 | 0.000 | 0.000 | 898.07 | 0.00 | 0.00 |
| 4 | 117.00 | S11B12 | 3 | 23.651 | 26.016 | 0.53 | 0.75 | 4.50 | 137.70 | 0.000 | 0.000 | 187.13 | 0.00 | 0.00 |
| 5 | 117.00 | AIR 21 B4A B2P | 3 | 23.651 | 26.016 | 0.62 | 0.75 | 11.32 | 243.81 | 0.000 | 0.000 | 471.13 | 0.00 | 0.00 |
| 6 | 117.00 | KRY 112 144/1 | 3 | 23.651 | 26.016 | 0.54 | 0.75 | 0.67 | 29.70 | 0.000 | 0.000 | 27.69 | 0.00 | 0.00 |
| 7 | 117.00 | Platform w/ Hand Rail | 1 | 23.651 | 26.016 | 1.00 | 1.00 | 32.00 | 1440.00 | 0.000 | 0.000 | 1332.02 | 0.00 | 0.00 |
| 8 | 113.00 | 3 ft Standoff | 1 | 23.417 | 25.759 | 1.00 | 1.00 | 4.50 | 108.00 | 0.000 | 0.000 | 185.46 | 0.00 | 0.00 |
| 9 | 110.00 | dual sector mounts | 3 | 23.238 | 25.561 | 1.00 | 1.00 | 12.00 | 945.00 | 0.000 | 0.000 | 490.78 | 0.00 | 0.00 |
| 10 | 110.00 | VHLP2-18 | 2 | 23.238 | 25.561 | 1.00 | 1.00 | 9.36 | 48.60 | 2.291 | 0.000 | 382.81 | 548.16 | 0.00 |
| 11 | 110.00 | AAHC | 3 | 23.238 | 25.561 | 0.60 | 0.80 | 7.56 | 280.80 | 0.000 | 0.000 | 309.19 | 0.00 | 0.00 |
| 12 | 107.00 | Ring Mount | 1 | 23.055 | 25.360 | 1.00 | 1.00 | 5.00 | 315.00 | 0.000 | 0.000 | 202.88 | 0.00 | 0.00 |
| 13 | 100.00 | Platform w/ Hand Rail | 1 | 22.613 | 24.875 | 1.00 | 1.00 | 43.80 | 1687.50 | 0.000 | 0.000 | 1743.22 | 0.00 | 0.00 |
| 14 | 100.00 | DC6-48-60-18-8F | 4 | 22.613 | 24.875 | 0.75 | 0.75 | 4.41 | 118.08 | 0.000 | 0.000 | 175.52 | 0.00 | 0.00 |
| 15 | 100.00 | RRUS-A2 | 6 | 22.613 | 24.875 | 0.46 | 0.75 | 5.12 | 118.80 | 0.000 | 0.000 | 203.87 | 0.00 | 0.00 |
| 16 | 100.00 | RRU-12 | 6 | 22.613 | 24.875 | 0.53 | 0.75 | 8.89 | 313.20 | 0.000 | 0.000 | 353.80 | 0.00 | 0.00 |
| 17 | 100.00 | RRU-11 | 12 | 22.613 | 24.875 | 0.53 | 0.75 | 15.99 | 583.20 | 0.000 | 0.000 | 636.37 | 0.00 | 0.00 |
| 18 | 100.00 | HPA-65R-BUU-H8 | 12 | 22.613 | 24.875 | 0.58 | 0.75 | 91.00 | 656.64 | 0.000 | 0.000 | 3621.87 | 0.00 | 0.00 |
| 19 | 100.00 | IBC700-1 | 3 | 22.613 | 24.875 | 0.68 | 0.75 | 2.68 | 170.91 | 0.000 | 0.000 | 106.63 | 0.00 | 0.00 |
| 20 | 100.00 | RRU-32 | 3 | 22.613 | 24.875 | 0.64 | 0.75 | 7.38 | 207.90 | 0.000 | 0.000 | 293.88 | 0.00 | 0.00 |
| 21 | 90.00 | RRH2X60-AWS | 3 | 21.943 | 24.137 | 0.62 | 0.80 | 6.48 | 148.50 | 0.000 | 0.000 | 250.11 | 0.00 | 0.00 |
| 22 | 90.00 | LNX-6514DS-A1M | 6 | 21.943 | 24.137 | 0.66 | 0.80 | 32.20 | 209.52 | 0.000 | 0.000 | 1243.40 | 0.00 | 0.00 |
| 23 | 90.00 | HBXX-6517DS-A2M | 6 | 21.943 | 24.137 | 0.64 | 0.80 | 32.83 | 253.80 | 0.000 | 0.000 | 1267.95 | 0.00 | 0.00 |
| 24 | 90.00 | Low Profile Platform | 1 | 21.943 | 24.137 | 1.00 | 1.00 | 22.00 | 1350.00 | 0.000 | 0.000 | 849.63 | 0.00 | 0.00 |
| 25 | 90.00 | RRH2x60-PCS | 3 | 21.943 | 24.137 | 0.63 | 0.80 | 2.84 | 148.50 | 0.000 | 0.000 | 109.59 | 0.00 | 0.00 |
| 26 | 90.00 | B13 RRH4x30 | 3 | 21.943 | 24.137 | 0.70 | 0.80 | 5.69 | 154.44 | 0.000 | 0.000 | 219.78 | 0.00 | 0.00 |
| 27 | 90.00 | DB-T1-6Z-8AB-0Z | 2 | 21.943 | 24.137 | 0.73 | 0.80 | 5.97 | 79.20 | 0.000 | 0.000 | 230.54 | 0.00 | 0.00 |
| | | | | | | | **Totals:** | | **10,137.51** | | | **16,280.34** | | |

# Total Applied Force Summary

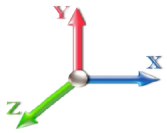
| | | | | | |
|---|---|---|---|---|---|
| **Structure:** | CT13555-S-SBA | | **Code:** | EIA/TIA-222-G | 8/17/2018 |
| **Site Name:** | Montano | | **Exposure:** | B | |
| **Height:** | 119.00 (ft) | | **Crest Height:** | 0.00 | |
| **Base Elev:** | 0.000 (ft) | | **Site Class:** | D - Stiff Soil | |
| **Gh:** | 1.1 | **Topography:** 1 | **Struct Class:** | II | Page: 14 |

Tower Engineering Solutions

**Load Case:** 0.9D + 1.6W 97 mph Wind

**Dead Load Factor** 0.90

**Wind Load Factor** 1.60




**Iterations** 18

| Elev (ft) | Description | Lateral FX (-) (lb) | Axial FY (-) (lb) | Torsion MY (lb-ft) | Moment MZ (lb-ft) |
|---|---|---|---|---|---|
| 0.00 | | 0.00 | 0.00 | 0.00 | 0.00 |
| 5.00 | | 450.83 | 1329.71 | 0.00 | 0.00 |
| 10.00 | | 440.60 | 1301.64 | 0.00 | 0.00 |
| 15.00 | | 430.36 | 1273.57 | 0.00 | 0.00 |
| 20.00 | | 420.13 | 1245.50 | 0.00 | 0.00 |
| 25.00 | | 409.89 | 1217.43 | 0.00 | 0.00 |
| 30.00 | | 400.00 | 1189.36 | 0.00 | 0.00 |
| 35.00 | | 407.30 | 1161.29 | 0.00 | 0.00 |
| 40.00 | | 412.02 | 1133.22 | 0.00 | 0.00 |
| 45.00 | | 414.62 | 1105.15 | 0.00 | 0.00 |
| 47.00 | | 164.66 | 434.20 | 0.00 | 0.00 |
| 50.00 | | 251.88 | 1150.04 | 0.00 | 0.00 |
| 53.00 | | 251.77 | 1131.27 | 0.00 | 0.00 |
| 55.00 | | 167.20 | 368.56 | 0.00 | 0.00 |
| 60.00 | | 419.77 | 904.56 | 0.00 | 0.00 |
| 65.00 | | 416.70 | 880.50 | 0.00 | 0.00 |
| 70.00 | | 412.57 | 856.44 | 0.00 | 0.00 |
| 75.00 | | 407.48 | 832.38 | 0.00 | 0.00 |
| 80.00 | | 401.50 | 808.32 | 0.00 | 0.00 |
| 81.00 | | 78.95 | 158.78 | 0.00 | 0.00 |
| 85.00 | | 314.68 | 535.67 | 0.00 | 0.00 |
| 90.00 | (24) attachments | 4558.20 | 2995.51 | 0.00 | 0.00 |
| 95.00 | | 378.99 | 621.60 | 0.00 | 0.00 |
| 100.00 | (47) attachments | 7505.29 | 4457.78 | 0.00 | 0.00 |
| 105.00 | | 360.68 | 564.85 | 0.00 | 0.00 |
| 107.00 | (1) attachments | 343.81 | 535.32 | 0.00 | 0.00 |
| 110.00 | (8) attachments | 1391.39 | 1598.87 | 548.16 | 0.00 |
| 113.00 | (1) attachments | 390.30 | 416.29 | 0.00 | 0.00 |
| 115.00 | | 134.24 | 201.52 | 0.00 | 0.00 |
| 117.00 | (16) attachments | 3519.64 | 2432.38 | 0.00 | 0.00 |
| 119.00 | (1) attachments | 146.59 | 176.51 | 0.00 | 0.00 |
| | **Totals:** | **25,802.04** | **33,018.22** | **548.16** | **0.00** |

# Calculated Forces

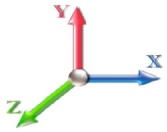
| | | | | | |
|---|---|---|---|---|---|
| **Structure:** | CT13555-S-SBA | **Code:** | EIA/TIA-222-G | 8/17/2018 | |
| **Site Name:** | Montano | **Exposure:** | B | | |
| **Height:** | 119.00 (ft) | **Crest Height:** | 0.00 | | |
| **Base Elev:** | 0.000 (ft) | **Site Class:** | D - Stiff Soil | | |
| **Gh:** | 1.1 **Topography:** 1 | **Struct Class:** | II | Page: 15 | |

Tower Engineering Solutions

**Load Case:** 0.9D + 1.6W 97 mph Wind

**Dead Load Factor** 0.90

**Wind Load Factor** 1.60




**Iterations** 18

| 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 Sway (deg) | Rotation Twist (deg) | Stress Ratio |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 0.00 | -33.00 | -25.83 | -0.55 | -2255.6 | 0.00 | 2255.63 | 5484.43 | 2742.22 | 13159.3 | 6589.47 | 0.00 | 0.000 | 0.000 | 0.348 |
| 5.00 | -31.63 | -25.43 | -0.55 | -2126.5 | 0.00 | 2126.50 | 5405.01 | 2702.51 | 12673.3 | 6346.09 | 0.05 | -0.089 | 0.000 | 0.341 |
| 10.00 | -30.29 | -25.03 | -0.55 | -1999.3 | 0.00 | 1999.37 | 5323.53 | 2661.77 | 12191.2 | 6104.68 | 0.19 | -0.179 | 0.000 | 0.333 |
| 15.00 | -28.98 | -24.64 | -0.55 | -1874.2 | 0.00 | 1874.22 | 5239.98 | 2619.99 | 11713.4 | 5865.43 | 0.43 | -0.270 | 0.000 | 0.325 |
| 20.00 | -27.70 | -24.26 | -0.55 | -1751.0 | 0.00 | 1751.02 | 5154.37 | 2577.18 | 11240.2 | 5628.50 | 0.76 | -0.361 | 0.000 | 0.317 |
| 25.00 | -26.44 | -23.88 | -0.55 | -1629.7 | 0.00 | 1629.73 | 5066.69 | 2533.35 | 10772.0 | 5394.05 | 1.19 | -0.453 | 0.000 | 0.307 |
| 30.00 | -25.22 | -23.51 | -0.55 | -1510.3 | 0.00 | 1510.33 | 4976.95 | 2488.47 | 10309.2 | 5162.27 | 1.71 | -0.545 | 0.000 | 0.298 |
| 35.00 | -24.03 | -23.13 | -0.55 | -1392.7 | 0.00 | 1392.77 | 4885.14 | 2442.57 | 9851.98 | 4933.31 | 2.33 | -0.636 | 0.000 | 0.287 |
| 40.00 | -22.86 | -22.74 | -0.55 | -1277.1 | 0.00 | 1277.12 | 4791.27 | 2395.63 | 9400.73 | 4707.35 | 3.05 | -0.728 | 0.000 | 0.276 |
| 45.00 | -21.74 | -22.34 | -0.55 | -1163.4 | 0.00 | 1163.41 | 4695.33 | 2347.66 | 8955.81 | 4484.56 | 3.86 | -0.818 | 0.000 | 0.264 |
| 47.00 | -21.29 | -22.18 | -0.55 | -1118.7 | 0.00 | 1118.74 | 4656.37 | 2328.19 | 8779.69 | 4396.37 | 4.21 | -0.855 | 0.000 | 0.259 |
| 50.00 | -20.12 | -21.93 | -0.55 | -1052.1 | 0.00 | 1052.19 | 4597.32 | 2298.66 | 8517.56 | 4265.11 | 4.77 | -0.909 | 0.000 | 0.251 |
| 53.00 | -18.98 | -21.68 | -0.55 | -986.40 | 0.00 | 986.40 | 3769.04 | 1884.52 | 6995.75 | 3503.08 | 5.36 | -0.963 | 0.000 | 0.287 |
| 55.00 | -18.59 | -21.52 | -0.55 | -943.05 | 0.00 | 943.05 | 3738.97 | 1869.49 | 6858.18 | 3434.19 | 5.77 | -0.999 | 0.000 | 0.280 |
| 60.00 | -17.66 | -21.12 | -0.55 | -835.43 | -0.01 | 835.43 | 3662.35 | 1831.18 | 6517.42 | 3263.55 | 6.87 | -1.093 | 0.000 | 0.261 |
| 65.00 | -16.75 | -20.71 | -0.55 | -729.85 | -0.01 | 729.85 | 3583.67 | 1791.83 | 6181.48 | 3095.34 | 8.06 | -1.184 | 0.000 | 0.241 |
| 70.00 | -15.87 | -20.30 | -0.55 | -626.31 | -0.01 | 626.31 | 3502.92 | 1751.46 | 5850.70 | 2929.70 | 9.35 | -1.271 | -0.001 | 0.218 |
| 75.00 | -15.02 | -19.89 | -0.55 | -524.81 | -0.01 | 524.81 | 3420.10 | 1710.05 | 5525.41 | 2766.81 | 10.73 | -1.351 | -0.001 | 0.194 |
| 80.00 | -14.21 | -19.48 | -0.55 | -425.34 | -0.01 | 425.34 | 3335.22 | 1667.61 | 5205.95 | 2606.84 | 12.18 | -1.425 | -0.001 | 0.168 |
| 81.00 | -14.04 | -19.41 | -0.55 | -405.85 | -0.01 | 405.85 | 3318.00 | 1659.00 | 5142.79 | 2575.22 | 12.48 | -1.439 | -0.001 | 0.162 |
| 81.00 | -14.04 | -19.41 | -0.55 | -405.85 | -0.01 | 405.85 | 2626.87 | 1313.44 | 4085.05 | 2045.56 | 12.48 | -1.439 | -0.001 | 0.204 |
| 85.00 | -13.50 | -19.10 | -0.55 | -328.21 | -0.01 | 328.21 | 2576.62 | 1288.31 | 3894.21 | 1950.00 | 13.71 | -1.491 | -0.001 | 0.174 |
| 90.00 | -10.61 | -14.47 | -0.55 | -232.74 | -0.01 | 232.74 | 2511.95 | 1255.98 | 3659.15 | 1832.29 | 15.31 | -1.555 | -0.001 | 0.131 |
| 95.00 | -9.99 | -14.08 | -0.55 | -160.40 | -0.01 | 160.40 | 2445.22 | 1222.61 | 3428.26 | 1716.68 | 16.97 | -1.605 | -0.001 | 0.098 |
| 100.00 | -5.74 | -6.45 | -0.55 | -89.99 | -0.01 | 89.99 | 2376.41 | 1188.21 | 3201.88 | 1603.32 | 18.67 | -1.640 | -0.001 | 0.059 |
| 105.00 | -5.19 | -6.08 | -0.55 | -57.72 | -0.01 | 57.72 | 2305.55 | 1152.77 | 2980.36 | 1492.40 | 20.40 | -1.664 | -0.001 | 0.041 |
| 107.00 | -4.66 | -5.72 | -0.55 | -45.56 | -0.01 | 45.56 | 2276.62 | 1138.31 | 2893.19 | 1448.75 | 21.10 | -1.671 | -0.001 | 0.034 |
| 110.00 | -3.10 | -4.28 | 0.00 | -28.40 | 0.00 | 28.40 | 2225.68 | 1112.84 | 2755.45 | 1379.77 | 22.15 | -1.680 | -0.002 | 0.022 |
| 113.00 | -2.70 | -3.88 | 0.00 | -15.55 | 0.00 | 15.55 | 2167.31 | 1083.66 | 2612.10 | 1307.99 | 23.21 | -1.685 | -0.002 | 0.013 |
| 115.00 | -2.50 | -3.74 | 0.00 | -7.79 | 0.00 | 7.79 | 2128.40 | 1064.20 | 2518.66 | 1261.20 | 23.92 | -1.687 | -0.002 | 0.007 |
| 117.00 | -0.17 | -0.15 | 0.00 | -0.30 | 0.00 | 0.30 | 2089.48 | 1044.74 | 2426.92 | 1215.26 | 24.62 | -1.688 | -0.002 | 0.000 |
| 119.00 | 0.00 | -0.15 | 0.00 | 0.00 | 0.00 | 0.00 | 2050.57 | 1025.29 | 2336.89 | 1170.18 | 25.33 | -1.688 | -0.002 | 0.000 |

# Wind Loading - Shaft

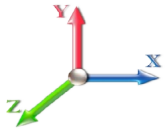
| | | | | | |
|---|---|---|---|---|---|
| **Structure:** | CT13555-S-SBA | **Code:** | EIA/TIA-222-G | 8/17/2018 | |
| **Site Name:** | Montano | **Exposure:** | B | | |
| **Height:** | 119.00 (ft) | **Crest Height:** | 0.00 | | |
| **Base Elev:** | 0.000 (ft) | **Site Class:** | D - Stiff Soil | | |
| **Gh:** | 1.1 **Topography:** 1 | **Struct Class:** | II | Page: 16 | |

Tower Engineering Solutions

**Load Case:** 1.2D + 1.0Di + 1.0Wi 50 mph Wind

**Dead Load Factor** 1.20

**Wind Load Factor** 1.00




**Iterations** 17

| Elev (ft) | Description | Kzt | Kz | qz (psf) | qzGh (psf) | C (mph-ft) | Cf | Ice Thick (in) | Tributary (ft) | Aa (sf) | CfAa (sf) | Wind Force X (lb) | Dead Load Ice (lb) | Tot Dead Load (lb) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 0.00 | | 1.00 | 0.70 | 4.256 | 4.68 | 0.00 | 1.200 | 0.000 | 0.00 | 0.000 | 0.00 | 0.0 | 0.0 | 0.0 |
| 5.00 | | 1.00 | 0.70 | 4.256 | 4.68 | 0.00 | 1.200 | 1.656 | 5.00 | 25.983 | 31.18 | 146.0 | 613.6 | 2249.7 |
| 10.00 | | 1.00 | 0.70 | 4.256 | 4.68 | 0.00 | 1.200 | 1.775 | 5.00 | 25.523 | 30.63 | 143.4 | 644.2 | 2242.9 |
| 15.00 | | 1.00 | 0.70 | 4.256 | 4.68 | 0.00 | 1.200 | 1.848 | 5.00 | 25.026 | 30.03 | 140.6 | 656.4 | 2217.7 |
| 20.00 | | 1.00 | 0.70 | 4.256 | 4.68 | 0.00 | 1.200 | 1.902 | 5.00 | 24.512 | 29.41 | 137.7 | 660.5 | 2184.3 |
| 25.00 | | 1.00 | 0.70 | 4.256 | 4.68 | 0.00 | 1.200 | 1.945 | 5.00 | 23.990 | 28.79 | 134.8 | 659.8 | 2146.2 |
| 30.00 | | 1.00 | 0.70 | 4.260 | 4.69 | 0.00 | 1.200 | 1.981 | 5.00 | 23.461 | 28.15 | 131.9 | 656.0 | 2105.0 |
| 35.00 | | 1.00 | 0.73 | 4.451 | 4.90 | 0.00 | 1.200 | 2.012 | 5.00 | 22.928 | 27.51 | 134.7 | 649.9 | 2061.5 |
| 40.00 | | 1.00 | 0.76 | 4.625 | 5.09 | 0.00 | 1.200 | 2.039 | 5.00 | 22.392 | 26.87 | 136.7 | 642.1 | 2016.3 |
| 45.00 | | 1.00 | 0.79 | 4.783 | 5.26 | 0.00 | 1.200 | 2.063 | 5.00 | 21.854 | 26.22 | 138.0 | 633.0 | 1969.7 |
| 47.00 | Bot - Section 2 | 1.00 | 0.80 | 4.843 | 5.33 | 0.00 | 1.200 | 2.072 | 2.00 | 8.588 | 10.31 | 54.9 | 251.6 | 775.8 |
| 50.00 | | 1.00 | 0.81 | 4.929 | 5.42 | 0.00 | 1.200 | 2.085 | 3.00 | 12.911 | 15.49 | 84.0 | 379.5 | 1830.8 |
| 53.00 | Top - Section 1 | 1.00 | 0.82 | 5.012 | 5.51 | 0.00 | 1.200 | 2.097 | 3.00 | 12.716 | 15.26 | 84.1 | 375.6 | 1801.9 |
| 55.00 | | 1.00 | 0.83 | 5.065 | 5.57 | 0.00 | 1.200 | 2.105 | 2.00 | 8.368 | 10.04 | 55.9 | 248.6 | 685.3 |
| 60.00 | | 1.00 | 0.85 | 5.193 | 5.71 | 0.00 | 1.200 | 2.123 | 5.00 | 20.545 | 24.65 | 140.8 | 609.5 | 1678.8 |
| 65.00 | | 1.00 | 0.87 | 5.313 | 5.84 | 0.00 | 1.200 | 2.140 | 5.00 | 20.001 | 24.00 | 140.3 | 596.9 | 1634.1 |
| 70.00 | | 1.00 | 0.89 | 5.426 | 5.97 | 0.00 | 1.200 | 2.156 | 5.00 | 19.456 | 23.35 | 139.4 | 583.7 | 1588.9 |
| 75.00 | | 1.00 | 0.91 | 5.534 | 6.09 | 0.00 | 1.200 | 2.171 | 5.00 | 18.910 | 22.69 | 138.1 | 570.0 | 1543.1 |
| 80.00 | | 1.00 | 0.93 | 5.637 | 6.20 | 0.00 | 1.200 | 2.185 | 5.00 | 18.363 | 22.04 | 136.6 | 555.8 | 1496.8 |
| 81.00 | Top - Section 2 | 1.00 | 0.93 | 5.657 | 6.22 | 0.00 | 1.200 | 2.188 | 1.00 | 3.606 | 4.33 | 26.9 | 110.6 | 294.9 |
| 85.00 | | 1.00 | 0.94 | 5.736 | 6.31 | 0.00 | 1.200 | 2.198 | 4.00 | 14.208 | 17.05 | 107.6 | 433.0 | 1037.7 |
| 90.00 | Appurtenance(s) | 1.00 | 0.96 | 5.830 | 6.41 | 0.00 | 1.200 | 2.211 | 5.00 | 17.267 | 20.72 | 132.9 | 526.2 | 1258.1 |
| 95.00 | | 1.00 | 0.97 | 5.921 | 6.51 | 0.00 | 1.200 | 2.223 | 5.00 | 16.719 | 20.06 | 130.7 | 510.8 | 1216.0 |
| 100.00 | Appurtenance(s) | 1.00 | 0.99 | 6.008 | 6.61 | 0.00 | 1.200 | 2.234 | 5.00 | 16.170 | 19.40 | 128.2 | 495.1 | 1173.6 |
| 105.00 | | 1.00 | 1.00 | 6.093 | 6.70 | 0.00 | 1.200 | 2.245 | 5.00 | 15.620 | 18.74 | 125.6 | 479.1 | 1130.8 |
| 107.00 | Appurtenance(s) | 1.00 | 1.01 | 6.126 | 6.74 | 0.00 | 1.200 | 2.250 | 2.00 | 6.093 | 7.31 | 49.3 | 189.0 | 442.3 |
| 110.00 | Appurtenance(s) | 1.00 | 1.02 | 6.174 | 6.79 | 0.00 | 1.200 | 2.256 | 3.00 | 8.975 | 10.77 | 73.1 | 277.7 | 649.5 |
| 113.00 | Appurtenance(s) | 1.00 | 1.02 | 6.222 | 6.84 | 0.00 | 1.200 | 2.262 | 3.00 | 8.777 | 10.53 | 72.1 | 271.7 | 633.9 |
| 115.00 | | 1.00 | 1.03 | 6.253 | 6.88 | 0.00 | 1.200 | 2.266 | 2.00 | 5.741 | 6.89 | 47.4 | 178.5 | 414.6 |
| 117.00 | Appurtenance(s) | 1.00 | 1.03 | 6.284 | 6.91 | 0.00 | 1.200 | 2.270 | 2.00 | 5.653 | 6.78 | 46.9 | 175.8 | 407.7 |
| 119.00 | Appurtenance(s) | 1.00 | 1.04 | 6.315 | 6.95 | 0.00 | 1.200 | 2.274 | 2.00 | 5.565 | 6.68 | 46.4 | 173.1 | 400.7 |
| | | | | | | | | **Totals:** | **119.00** | | | **3,205.0** | | **41,288.4** |

# Discrete Appurtenance Forces

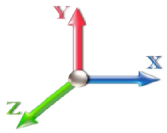
| | | | | | |
|---|---|---|---|---|---|
| **Structure:** | CT13555-S-SBA | **Code:** | EIA/TIA-222-G | 8/17/2018 | |
| **Site Name:** | Montano | **Exposure:** | B | | |
| **Height:** | 119.00 (ft) | **Crest Height:** | 0.00 | | |
| **Base Elev:** | 0.000 (ft) | **Site Class:** | D - Stiff Soil | | |
| **Gh:** | 1.1 **Topography:** 1 | **Struct Class:** | II | Page: 17 | |

Tower Engineering Solutions

**Load Case:** 1.2D + 1.0Di + 1.0Wi 50 mph Wind

**Dead Load Factor** 1.20

**Wind Load Factor** 1.00




**Iterations** 17

| No. | Elev (ft) | Description | Qty | qz (psf) | qzGh (psf) | CaAa x Ka | Ka | Total CaAa (sf) | Dead Load (lb) | Horiz Ecc (ft) | Vert Ecc (ft) | Wind FX (lb) | Mom Y (lb-ft) | Mom Z (lb-ft) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 119.00 | 6' Lightning rod | 1 | 6.315 | 6.946 | 1.00 | 1.00 | 1.80 | 49.79 | 0.000 | 0.000 | 12.48 | 0.00 | 0.00 |
| 2 | 117.00 | AIR 21 B2A B4P | 3 | 6.284 | 6.913 | 0.62 | 0.75 | 14.14 | 1027.29 | 0.000 | 0.000 | 97.76 | 0.00 | 0.00 |
| 3 | 117.00 | LNX-6515DS-A1M | 3 | 6.284 | 6.913 | 0.63 | 0.75 | 29.71 | 889.84 | 0.000 | 0.000 | 205.36 | 0.00 | 0.00 |
| 4 | 117.00 | S11B12 | 3 | 6.284 | 6.913 | 0.54 | 0.75 | 5.97 | 406.88 | 0.000 | 0.000 | 41.24 | 0.00 | 0.00 |
| 5 | 117.00 | AIR 21 B4A B2P | 3 | 6.284 | 6.913 | 0.62 | 0.75 | 14.14 | 1022.97 | 0.000 | 0.000 | 97.76 | 0.00 | 0.00 |
| 6 | 117.00 | KRY 112 144/1 | 3 | 6.284 | 6.913 | 0.56 | 0.75 | 1.73 | 72.37 | 0.000 | 0.000 | 11.93 | 0.00 | 0.00 |
| 7 | 117.00 | Platform w/ Hand Rail | 1 | 6.284 | 6.913 | 1.00 | 1.00 | 68.32 | 4051.08 | 0.000 | 0.000 | 472.25 | 0.00 | 0.00 |
| 8 | 113.00 | 3 ft Standoff | 1 | 6.222 | 6.844 | 1.00 | 1.00 | 8.57 | 372.57 | 0.000 | 0.000 | 58.66 | 0.00 | 0.00 |
| 9 | 110.00 | dual sector mounts | 3 | 6.174 | 6.792 | 1.00 | 1.00 | 22.83 | 2096.97 | 0.000 | 0.000 | 155.04 | 0.00 | 0.00 |
| 10 | 110.00 | VHLP2-18 | 2 | 6.174 | 6.792 | 1.00 | 1.00 | 12.65 | 261.79 | 2.291 | 0.000 | 85.94 | 196.91 | 0.00 |
| 11 | 110.00 | AAHC | 3 | 6.174 | 6.792 | 0.60 | 0.80 | 9.53 | 903.96 | 0.000 | 0.000 | 64.73 | 0.00 | 0.00 |
| 12 | 107.00 | Ring Mount | 1 | 6.126 | 6.738 | 1.00 | 1.00 | 9.50 | 420.00 | 0.000 | 0.000 | 64.01 | 0.00 | 0.00 |
| 13 | 100.00 | Platform w/ Hand Rail | 1 | 6.008 | 6.609 | 1.00 | 1.00 | 92.74 | 5075.63 | 0.000 | 0.000 | 612.91 | 0.00 | 0.00 |
| 14 | 100.00 | DC6-48-60-18-8F | 4 | 6.008 | 6.609 | 0.75 | 0.75 | 7.10 | 391.71 | 0.000 | 0.000 | 46.91 | 0.00 | 0.00 |
| 15 | 100.00 | RRUS-A2 | 6 | 6.008 | 6.609 | 0.47 | 0.75 | 8.75 | 384.41 | 0.000 | 0.000 | 57.84 | 0.00 | 0.00 |
| 16 | 100.00 | RRU-12 | 6 | 6.008 | 6.609 | 0.53 | 0.75 | 11.86 | 1131.21 | 0.000 | 0.000 | 78.36 | 0.00 | 0.00 |
| 17 | 100.00 | RRU-11 | 12 | 6.008 | 6.609 | 0.54 | 0.75 | 21.72 | 2236.37 | 0.000 | 0.000 | 143.53 | 0.00 | 0.00 |
| 18 | 100.00 | HPA-65R-BUU-H8 | 12 | 6.008 | 6.609 | 0.59 | 0.75 | 106.16 | 5555.64 | 0.000 | 0.000 | 701.61 | 0.00 | 0.00 |
| 19 | 100.00 | IBC700-1 | 3 | 6.008 | 6.609 | 0.68 | 0.75 | 5.05 | 364.11 | 0.000 | 0.000 | 33.38 | 0.00 | 0.00 |
| 20 | 100.00 | RRU-32 | 3 | 6.008 | 6.609 | 0.64 | 0.75 | 8.36 | 739.30 | 0.000 | 0.000 | 55.24 | 0.00 | 0.00 |
| 21 | 90.00 | RRH2X60-AWS | 3 | 5.830 | 6.413 | 0.63 | 0.80 | 8.46 | 441.07 | 0.000 | 0.000 | 54.23 | 0.00 | 0.00 |
| 22 | 90.00 | LNX-6514DS-A1M | 6 | 5.830 | 6.413 | 0.66 | 0.80 | 46.40 | 1353.67 | 0.000 | 0.000 | 297.61 | 0.00 | 0.00 |
| 23 | 90.00 | HBXX-6517DS-A2M | 6 | 5.830 | 6.413 | 0.64 | 0.80 | 47.21 | 1600.88 | 0.000 | 0.000 | 302.76 | 0.00 | 0.00 |
| 24 | 90.00 | Low Profile Platform | 1 | 5.830 | 6.413 | 1.00 | 1.00 | 44.38 | 3158.30 | 0.000 | 0.000 | 284.60 | 0.00 | 0.00 |
| 25 | 90.00 | RRH2x60-PCS | 3 | 5.830 | 6.413 | 0.63 | 0.80 | 4.24 | 443.28 | 0.000 | 0.000 | 27.20 | 0.00 | 0.00 |
| 26 | 90.00 | B13 RRH4x30 | 3 | 5.830 | 6.413 | 0.70 | 0.80 | 9.12 | 455.06 | 0.000 | 0.000 | 58.46 | 0.00 | 0.00 |
| 27 | 90.00 | DB-T1-6Z-8AB-0Z | 2 | 5.830 | 6.413 | 0.80 | 0.80 | 8.18 | 669.45 | 0.000 | 0.000 | 52.49 | 0.00 | 0.00 |
| | | | | | | | **Totals:** | | **35,575.58** | | | **4,174.30** | | |

# Total Applied Force Summary

| | | | | | |
|---|---|---|---|---|---|
| **Structure:** | CT13555-S-SBA | | **Code:** | EIA/TIA-222-G | 8/17/2018 |
| **Site Name:** | Montano | | **Exposure:** | B | |
| **Height:** | 119.00 (ft) | | **Crest Height:** | 0.00 | |
| **Base Elev:** | 0.000 (ft) | | **Site Class:** | D - Stiff Soil | |
| **Gh:** | 1.1 | **Topography:** 1 | **Struct Class:** | II | Page: 18 |

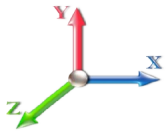
Tower Engineering Solutions

**Load Case:** 1.2D + 1.0Di + 1.0Wi 50 mph Wind

**Iterations** 17

**Dead Load Factor** 1.20

**Wind Load Factor** 1.00




| Elev (ft) | Description | Lateral FX (-) (lb) | Axial FY (-) (lb) | Torsion MY (lb-ft) | Moment MZ (lb-ft) |
|---|---|---|---|---|---|
| 0.00 | | 0.00 | 0.00 | 0.00 | 0.00 |
| 5.00 | | 145.97 | 2386.50 | 0.00 | 0.00 |
| 10.00 | | 143.39 | 2379.73 | 0.00 | 0.00 |
| 15.00 | | 140.59 | 2354.51 | 0.00 | 0.00 |
| 20.00 | | 137.71 | 2321.13 | 0.00 | 0.00 |
| 25.00 | | 134.77 | 2283.03 | 0.00 | 0.00 |
| 30.00 | | 131.91 | 2241.79 | 0.00 | 0.00 |
| 35.00 | | 134.72 | 2198.30 | 0.00 | 0.00 |
| 40.00 | | 136.69 | 2153.08 | 0.00 | 0.00 |
| 45.00 | | 137.97 | 2106.50 | 0.00 | 0.00 |
| 47.00 | | 54.90 | 830.53 | 0.00 | 0.00 |
| 50.00 | | 84.00 | 1912.89 | 0.00 | 0.00 |
| 53.00 | | 84.12 | 1883.93 | 0.00 | 0.00 |
| 55.00 | | 55.95 | 739.97 | 0.00 | 0.00 |
| 60.00 | | 140.82 | 1815.59 | 0.00 | 0.00 |
| 65.00 | | 140.26 | 1770.92 | 0.00 | 0.00 |
| 70.00 | | 139.36 | 1725.66 | 0.00 | 0.00 |
| 75.00 | | 138.14 | 1679.85 | 0.00 | 0.00 |
| 80.00 | | 136.64 | 1633.58 | 0.00 | 0.00 |
| 81.00 | | 26.93 | 322.29 | 0.00 | 0.00 |
| 85.00 | | 107.57 | 1147.19 | 0.00 | 0.00 |
| 90.00 | (24) attachments | 1210.22 | 9516.60 | 0.00 | 0.00 |
| 95.00 | | 130.67 | 1339.60 | 0.00 | 0.00 |
| 100.00 | (47) attachments | 1858.04 | 17175.54 | 0.00 | 0.00 |
| 105.00 | | 125.63 | 1232.22 | 0.00 | 0.00 |
| 107.00 | (1) attachments | 113.28 | 902.81 | 0.00 | 0.00 |
| 110.00 | (8) attachments | 378.87 | 3973.03 | 196.91 | 0.00 |
| 113.00 | (1) attachments | 130.75 | 1055.38 | 0.00 | 0.00 |
| 115.00 | | 47.39 | 447.20 | 0.00 | 0.00 |
| 117.00 | (16) attachments | 973.19 | 7910.67 | 0.00 | 0.00 |
| 119.00 | (1) attachments | 58.87 | 450.48 | 0.00 | 0.00 |
| | **Totals:** | **7,379.33** | **79,890.48** | **196.91** | **0.00** |

# Calculated Forces

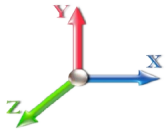
| | | | | | |
|---|---|---|---|---|---|
| **Structure:** | CT13555-S-SBA | **Code:** | EIA/TIA-222-G | 8/17/2018 | |
| **Site Name:** | Montano | **Exposure:** | B | | |
| **Height:** | 119.00 (ft) | **Crest Height:** | 0.00 | | |
| **Base Elev:** | 0.000 (ft) | **Site Class:** | D - Stiff Soil | | |
| **Gh:** | 1.1 **Topography:** 1 | **Struct Class:** | II | Page: 19 | |

Tower Engineering Solutions

**Load Case:** 1.2D + 1.0Di + 1.0Wi 50 mph Wind

**Dead Load Factor** 1.20

**Wind Load Factor** 1.00




**Iterations** 17

| 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 Sway (deg) | Rotation Twist (deg) | Stress Ratio |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 0.00 | -79.89 | -7.40 | -0.20 | -644.34 | 0.00 | 644.34 | 5484.43 | 2742.22 | 13159.3 | 6589.47 | 0.00 | 0.000 | 0.000 | 0.112 |
| 5.00 | -77.50 | -7.28 | -0.20 | -607.36 | 0.00 | 607.36 | 5405.01 | 2702.51 | 12673.3 | 6346.09 | 0.01 | -0.026 | 0.000 | 0.110 |
| 10.00 | -75.12 | -7.17 | -0.20 | -570.94 | 0.00 | 570.94 | 5323.53 | 2661.77 | 12191.2 | 6104.68 | 0.05 | -0.051 | 0.000 | 0.108 |
| 15.00 | -72.76 | -7.06 | -0.20 | -535.07 | 0.00 | 535.07 | 5239.98 | 2619.99 | 11713.4 | 5865.43 | 0.12 | -0.077 | 0.000 | 0.105 |
| 20.00 | -70.43 | -6.95 | -0.20 | -499.75 | 0.00 | 499.75 | 5154.37 | 2577.18 | 11240.2 | 5628.50 | 0.22 | -0.103 | 0.000 | 0.102 |
| 25.00 | -68.15 | -6.85 | -0.20 | -464.98 | 0.00 | 464.98 | 5066.69 | 2533.35 | 10772.0 | 5394.05 | 0.34 | -0.129 | 0.000 | 0.100 |
| 30.00 | -65.90 | -6.74 | -0.20 | -430.75 | 0.00 | 430.75 | 4976.95 | 2488.47 | 10309.2 | 5162.27 | 0.49 | -0.155 | 0.000 | 0.097 |
| 35.00 | -63.70 | -6.63 | -0.20 | -397.06 | 0.00 | 397.06 | 4885.14 | 2442.57 | 9851.98 | 4933.31 | 0.67 | -0.182 | 0.000 | 0.094 |
| 40.00 | -61.55 | -6.51 | -0.20 | -363.93 | 0.00 | 363.93 | 4791.27 | 2395.63 | 9400.73 | 4707.35 | 0.87 | -0.208 | 0.000 | 0.090 |
| 45.00 | -59.44 | -6.38 | -0.20 | -331.38 | 0.00 | 331.38 | 4695.33 | 2347.66 | 8955.81 | 4484.56 | 1.10 | -0.233 | 0.000 | 0.087 |
| 47.00 | -58.61 | -6.34 | -0.20 | -318.62 | 0.00 | 318.62 | 4656.37 | 2328.19 | 8779.69 | 4396.37 | 1.20 | -0.244 | 0.000 | 0.085 |
| 50.00 | -56.69 | -6.26 | -0.20 | -299.61 | 0.00 | 299.61 | 4597.32 | 2298.66 | 8517.56 | 4265.11 | 1.36 | -0.259 | 0.000 | 0.083 |
| 53.00 | -54.81 | -6.18 | -0.20 | -280.82 | 0.00 | 280.82 | 3769.04 | 1884.52 | 6995.75 | 3503.08 | 1.53 | -0.275 | 0.000 | 0.095 |
| 55.00 | -54.07 | -6.14 | -0.20 | -268.47 | 0.00 | 268.47 | 3738.97 | 1869.49 | 6858.18 | 3434.19 | 1.65 | -0.285 | 0.000 | 0.093 |
| 60.00 | -52.25 | -6.01 | -0.20 | -237.78 | 0.00 | 237.78 | 3662.35 | 1831.18 | 6517.42 | 3263.55 | 1.96 | -0.312 | 0.000 | 0.087 |
| 65.00 | -50.48 | -5.88 | -0.20 | -207.72 | 0.00 | 207.72 | 3583.67 | 1791.83 | 6181.48 | 3095.34 | 2.30 | -0.338 | 0.000 | 0.081 |
| 70.00 | -48.75 | -5.75 | -0.20 | -178.30 | 0.00 | 178.30 | 3502.92 | 1751.46 | 5850.70 | 2929.70 | 2.67 | -0.362 | 0.000 | 0.075 |
| 75.00 | -47.07 | -5.62 | -0.20 | -149.53 | 0.00 | 149.53 | 3420.10 | 1710.05 | 5525.41 | 2766.81 | 3.06 | -0.385 | 0.000 | 0.068 |
| 80.00 | -45.44 | -5.49 | -0.20 | -121.42 | 0.00 | 121.42 | 3335.22 | 1667.61 | 5205.95 | 2606.84 | 3.48 | -0.406 | 0.000 | 0.060 |
| 81.00 | -45.11 | -5.46 | -0.20 | -115.93 | 0.00 | 115.93 | 3318.00 | 1659.00 | 5142.79 | 2575.22 | 3.56 | -0.410 | 0.000 | 0.059 |
| 81.00 | -45.11 | -5.46 | -0.20 | -115.93 | 0.00 | 115.93 | 2626.87 | 1313.44 | 4085.05 | 2045.56 | 3.56 | -0.410 | 0.000 | 0.074 |
| 85.00 | -43.96 | -5.36 | -0.20 | -94.08 | 0.00 | 94.08 | 2576.62 | 1288.31 | 3894.21 | 1950.00 | 3.91 | -0.425 | 0.000 | 0.065 |
| 90.00 | -34.46 | -4.09 | -0.20 | -67.28 | 0.00 | 67.28 | 2511.95 | 1255.98 | 3659.15 | 1832.29 | 4.37 | -0.443 | 0.000 | 0.050 |
| 95.00 | -33.12 | -3.95 | -0.20 | -46.84 | 0.00 | 46.84 | 2445.22 | 1222.61 | 3428.26 | 1716.68 | 4.84 | -0.458 | 0.000 | 0.041 |
| 100.00 | -15.96 | -1.96 | -0.20 | -27.07 | 0.00 | 27.07 | 2376.41 | 1188.21 | 3201.88 | 1603.32 | 5.33 | -0.468 | 0.000 | 0.024 |
| 105.00 | -14.72 | -1.82 | -0.20 | -17.28 | 0.00 | 17.28 | 2305.55 | 1152.77 | 2980.36 | 1492.40 | 5.82 | -0.476 | -0.001 | 0.018 |
| 107.00 | -13.82 | -1.70 | -0.20 | -13.63 | 0.00 | 13.63 | 2276.62 | 1138.31 | 2893.19 | 1448.75 | 6.02 | -0.478 | -0.001 | 0.015 |
| 110.00 | -9.85 | -1.29 | 0.00 | -8.51 | 0.00 | 8.51 | 2225.68 | 1112.84 | 2755.45 | 1379.77 | 6.32 | -0.480 | -0.001 | 0.011 |
| 113.00 | -8.80 | -1.15 | 0.00 | -4.64 | 0.00 | 4.64 | 2167.31 | 1083.66 | 2612.10 | 1307.99 | 6.62 | -0.482 | -0.001 | 0.008 |
| 115.00 | -8.35 | -1.10 | 0.00 | -2.33 | 0.00 | 2.33 | 2128.40 | 1064.20 | 2518.66 | 1261.20 | 6.83 | -0.483 | -0.001 | 0.006 |
| 117.00 | -0.45 | -0.06 | 0.00 | -0.13 | 0.00 | 0.13 | 2089.48 | 1044.74 | 2426.92 | 1215.26 | 7.03 | -0.483 | -0.001 | 0.000 |
| 119.00 | 0.00 | -0.06 | 0.00 | 0.00 | 0.00 | 0.00 | 2050.57 | 1025.29 | 2336.89 | 1170.18 | 7.23 | -0.483 | -0.001 | 0.000 |

# Seismic Segment Forces (Factored)

| | | | | | |
|---|---|---|---|---|---|
| **Structure:** | CT13555-S-SBA | **Code:** | EIA/TIA-222-G | 8/17/2018 | |
| **Site Name:** | Montano | **Exposure:** | B | | |
| **Height:** | 119.00 (ft) | **Crest Height:** | 0.00 | | |
| **Base Elev:** | 0.000 (ft) | **Site Class:** | D - Stiff Soil | | |
| **Gh:** | 1.1 **Topography:** 1 | **Struct Class:** | II | Page: 20 | |

Tower Engineering Solutions

**Load Case:** 1.2D + 1.0E

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Gust Response Factor** | 1.10 | | | **Sds** | 0.19 | **Iterations** | 16 |
| **Dead Load Factor** | 1.20 | **Seismic Load Factor** | 1.00 | **Sd1** | 0.10 | **Ss** | 0.18 |
| **Wind Load Factor** | 0.00 | **Structure Frequency** | 0.57 | **SA** | 0.06 | **S1** | 0.06 |
| | | | | | | **Seismic Importance Factor** | 1.00 |

| Top Elev (ft) | Description | Wz (lb) | a | b | c | Lateral Fs (lb) | R: 1.50 |
|---|---|---|---|---|---|---|---|
| 0.00 | | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | |
| 5.00 | | 1363.4 | 0.00 | 0.04 | 0.02 | 20.37 | |
| 10.00 | | 1332.2 | 0.01 | 0.06 | 0.03 | 29.04 | |
| 15.00 | | 1301.0 | 0.03 | 0.07 | 0.04 | 32.61 | |
| 20.00 | | 1269.8 | 0.05 | 0.07 | 0.04 | 34.07 | |
| 25.00 | | 1238.7 | 0.08 | 0.07 | 0.04 | 34.82 | |
| 30.00 | | 1207.5 | 0.12 | 0.07 | 0.03 | 35.37 | |
| 35.00 | | 1176.3 | 0.16 | 0.07 | 0.03 | 35.64 | |
| 40.00 | | 1145.1 | 0.21 | 0.06 | 0.02 | 35.20 | |
| 45.00 | | 1113.9 | 0.27 | 0.05 | 0.01 | 33.37 | |
| 47.00 | Bot - Section 2 | 436.85 | 0.29 | 0.05 | 0.01 | 12.73 | |
| 50.00 | | 1209.4 | 0.33 | 0.04 | 0.01 | 32.93 | |
| 53.00 | Top - Section 1 | 1188.5 | 0.37 | 0.03 | 0.01 | 29.00 | |
| 55.00 | | 363.91 | 0.40 | 0.02 | 0.01 | 7.99 | |
| 60.00 | | 891.06 | 0.48 | -0.01 | 0.01 | 12.58 | |
| 65.00 | | 864.33 | 0.56 | -0.04 | 0.01 | 3.91 | |
| 70.00 | | 837.60 | 0.65 | -0.07 | 0.02 | -4.14 | |
| 75.00 | | 810.86 | 0.75 | -0.10 | 0.04 | -9.53 | |
| 80.00 | | 784.13 | 0.85 | -0.12 | 0.07 | -10.60 | |
| 81.00 | Top - Section 2 | 153.62 | 0.88 | -0.12 | 0.08 | -2.01 | |
| 85.00 | | 503.99 | 0.96 | -0.12 | 0.11 | -4.27 | |
| 90.00 | Appurtenance(s) | 3214.3 | 1.08 | -0.08 | 0.18 | 14.12 | |
| 95.00 | | 587.66 | 1.20 | 0.01 | 0.26 | 15.01 | |
| 100.00 | Appurtenance(s) | 4850.0 | 1.33 | 0.17 | 0.37 | 267.85 | |
| 105.00 | | 543.11 | 1.47 | 0.43 | 0.51 | 50.82 | |
| 107.00 | Appurtenance(s) | 561.01 | 1.53 | 0.57 | 0.58 | 62.47 | |
| 110.00 | Appurtenance(s) | 1725.8 | 1.61 | 0.83 | 0.69 | 242.82 | |
| 113.00 | Appurtenance(s) | 421.80 | 1.70 | 1.14 | 0.82 | 73.08 | |
| 115.00 | | 196.75 | 1.77 | 1.38 | 0.92 | 38.72 | |
| 117.00 | Appurtenance(s) | 2675.4 | 1.83 | 1.66 | 1.02 | 593.28 | |
| 119.00 | Appurtenance(s) | 196.12 | 1.89 | 1.98 | 1.14 | 48.67 | |
| | **Totals:** | **34,164.9** | | | | **1,765.9** | **Total Wind:** **25,802.0** |

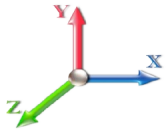
Seismic Base Shear is Less Than 50% of Wind Force - An Analysis is NOT Required

# Calculated Forces

| | | | | | |
|---|---|---|---|---|---|
| **Structure:** | CT13555-S-SBA | **Code:** | EIA/TIA-222-G | 8/17/2018 | |
| **Site Name:** | Montano | **Exposure:** | B | | |
| **Height:** | 119.00 (ft) | **Crest Height:** | 0.00 | | |
| **Base Elev:** | 0.000 (ft) | **Site Class:** | D - Stiff Soil | | |
| **Gh:** | 1.1 **Topography:** 1 | **Struct Class:** | II | Page: 21 | |

Tower Engineering Solutions

**Load Case:** 1.2D + 1.0E




| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| **Gust Response Factor** | 1.10 | | | **Sds** | 0.19 | **Iterations** | 16 | | |
| **Dead Load Factor** | 1.20 | **Seismic Load Factor** | 1.00 | **Sd1** | 0.10 | **Ss** | 0.18 | | |
| **Wind Load Factor** | 0.00 | **Structure Frequency** | 0.57 | **SA** | 0.06 | **S1** | 0.06 | **Seismic Importance Factor** | 1.00 |

| 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 Sway (deg) | Rotation Twist (deg) | Stress Ratio |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 0.00 | -44.02 | -1.80 | 0.00 | -172.15 | 0.00 | 172.15 | 5484.43 | 2742.22 | 13159.3 | 6589.47 | | 0.00 | 0.00 | 0.034 |
| 5.00 | -42.25 | -1.78 | 0.00 | -163.16 | 0.00 | 163.16 | 5405.01 | 2702.51 | 12673.3 | 6346.09 | | 0.00 | -0.01 | 0.034 |
| 10.00 | -40.52 | -1.76 | 0.00 | -154.24 | 0.00 | 154.24 | 5323.53 | 2661.77 | 12191.2 | 6104.68 | | 0.01 | -0.01 | 0.033 |
| 15.00 | -38.82 | -1.73 | 0.00 | -145.45 | 0.00 | 145.45 | 5239.98 | 2619.99 | 11713.4 | 5865.43 | | 0.03 | -0.02 | 0.032 |
| 20.00 | -37.16 | -1.70 | 0.00 | -136.80 | 0.00 | 136.80 | 5154.37 | 2577.18 | 11240.2 | 5628.50 | | 0.06 | -0.03 | 0.032 |
| 25.00 | -35.53 | -1.67 | 0.00 | -128.31 | 0.00 | 128.31 | 5066.69 | 2533.35 | 10772.0 | 5394.05 | | 0.09 | -0.04 | 0.031 |
| 30.00 | -33.95 | -1.64 | 0.00 | -119.96 | 0.00 | 119.96 | 4976.95 | 2488.47 | 10309.2 | 5162.27 | | 0.13 | -0.04 | 0.030 |
| 35.00 | -32.40 | -1.60 | 0.00 | -111.78 | 0.00 | 111.78 | 4885.14 | 2442.57 | 9851.98 | 4933.31 | | 0.18 | -0.05 | 0.029 |
| 40.00 | -30.89 | -1.57 | 0.00 | -103.76 | 0.00 | 103.76 | 4791.27 | 2395.63 | 9400.73 | 4707.35 | | 0.24 | -0.06 | 0.028 |
| 45.00 | -29.41 | -1.54 | 0.00 | -95.91 | 0.00 | 95.91 | 4695.33 | 2347.66 | 8955.81 | 4484.56 | | 0.30 | -0.06 | 0.028 |
| 47.00 | -28.83 | -1.53 | 0.00 | -92.83 | 0.00 | 92.83 | 4656.37 | 2328.19 | 8779.69 | 4396.37 | | 0.33 | -0.07 | 0.027 |
| 50.00 | -27.30 | -1.49 | 0.00 | -88.25 | 0.00 | 88.25 | 4597.32 | 2298.66 | 8517.56 | 4265.11 | | 0.37 | -0.07 | 0.027 |
| 53.00 | -25.79 | -1.47 | 0.00 | -83.77 | 0.00 | 83.77 | 3769.04 | 1884.52 | 6995.75 | 3503.08 | | 0.42 | -0.08 | 0.031 |
| 55.00 | -25.30 | -1.46 | 0.00 | -80.84 | 0.00 | 80.84 | 3738.97 | 1869.49 | 6858.18 | 3434.19 | | 0.45 | -0.08 | 0.030 |
| 60.00 | -24.09 | -1.45 | 0.00 | -73.54 | 0.00 | 73.54 | 3662.35 | 1831.18 | 6517.42 | 3263.55 | | 0.54 | -0.09 | 0.029 |
| 65.00 | -22.92 | -1.45 | 0.00 | -66.30 | 0.00 | 66.30 | 3583.67 | 1791.83 | 6181.48 | 3095.34 | | 0.64 | -0.10 | 0.028 |
| 70.00 | -21.78 | -1.45 | 0.00 | -59.07 | 0.00 | 59.07 | 3502.92 | 1751.46 | 5850.70 | 2929.70 | | 0.74 | -0.10 | 0.026 |
| 75.00 | -20.67 | -1.45 | 0.00 | -51.83 | 0.00 | 51.83 | 3420.10 | 1710.05 | 5525.41 | 2766.81 | | 0.85 | -0.11 | 0.025 |
| 80.00 | -19.59 | -1.45 | 0.00 | -44.60 | 0.00 | 44.60 | 3335.22 | 1667.61 | 5205.95 | 2606.84 | | 0.97 | -0.12 | 0.023 |
| 81.00 | -19.38 | -1.45 | 0.00 | -43.15 | 0.00 | 43.15 | 3318.00 | 1659.00 | 5142.79 | 2575.22 | | 1.00 | -0.12 | 0.023 |
| 81.00 | -19.38 | -1.45 | 0.00 | -43.15 | 0.00 | 43.15 | 2626.87 | 1313.44 | 4085.05 | 2045.56 | | 1.00 | -0.12 | 0.028 |
| 85.00 | -18.66 | -1.45 | 0.00 | -37.36 | 0.00 | 37.36 | 2576.62 | 1288.31 | 3894.21 | 1950.00 | | 1.10 | -0.13 | 0.026 |
| 90.00 | -14.67 | -1.43 | 0.00 | -30.11 | 0.00 | 30.11 | 2511.95 | 1255.98 | 3659.15 | 1832.29 | | 1.24 | -0.13 | 0.022 |
| 95.00 | -13.84 | -1.41 | 0.00 | -22.98 | 0.00 | 22.98 | 2445.22 | 1222.61 | 3428.26 | 1716.68 | | 1.38 | -0.14 | 0.019 |
| 100.00 | -7.90 | -1.13 | 0.00 | -15.92 | 0.00 | 15.92 | 2376.41 | 1188.21 | 3201.88 | 1603.32 | | 1.53 | -0.15 | 0.013 |
| 105.00 | -7.15 | -1.08 | 0.00 | -10.27 | 0.00 | 10.27 | 2305.55 | 1152.77 | 2980.36 | 1492.40 | | 1.69 | -0.15 | 0.010 |
| 107.00 | -6.43 | -1.01 | 0.00 | -8.12 | 0.00 | 8.12 | 2276.62 | 1138.31 | 2893.19 | 1448.75 | | 1.75 | -0.15 | 0.008 |
| 110.00 | -4.30 | -0.76 | 0.00 | -5.08 | 0.00 | 5.08 | 2225.68 | 1112.84 | 2755.45 | 1379.77 | | 1.85 | -0.15 | 0.006 |
| 113.00 | -3.75 | -0.69 | 0.00 | -2.78 | 0.00 | 2.78 | 2167.31 | 1083.66 | 2612.10 | 1307.99 | | 1.95 | -0.15 | 0.004 |
| 115.00 | -3.48 | -0.65 | 0.00 | -1.40 | 0.00 | 1.40 | 2128.40 | 1064.20 | 2518.66 | 1261.20 | | 2.01 | -0.15 | 0.003 |
| 117.00 | -0.24 | -0.05 | 0.00 | -0.10 | 0.00 | 0.10 | 2089.48 | 1044.74 | 2426.92 | 1215.26 | | 2.08 | -0.15 | 0.000 |
| 119.00 | 0.00 | -0.05 | 0.00 | 0.00 | 0.00 | 0.00 | 2050.57 | 1025.29 | 2336.89 | 1170.18 | | 2.14 | -0.15 | 0.000 |

# Seismic Segment Forces (Factored)

| | | | | | |
|---|---|---|---|---|---|
| **Structure:** | CT13555-S-SBA | **Code:** | EIA/TIA-222-G | 8/17/2018 | |
| **Site Name:** | Montano | **Exposure:** | B | | |
| **Height:** | 119.00 (ft) | **Crest Height:** | 0.00 | | |
| **Base Elev:** | 0.000 (ft) | **Site Class:** | D - Stiff Soil | | |
| **Gh:** | 1.1 **Topography:** 1 | **Struct Class:** | II | Page: 22 | |

Tower Engineering Solutions

**Load Case:** 0.9D + 1.0E

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Gust Response Factor** | 1.10 | | | **Sds** | 0.19 | **Iterations** | 16 |
| **Dead Load Factor** | 0.90 | **Seismic Load Factor** | 1.00 | **Sd1** | 0.10 | **Ss** | 0.18 |
| **Wind Load Factor** | 0.00 | **Structure Frequency** | 0.57 | **SA** | 0.06 | **S1** | 0.06 |
| | | | | | | **Seismic Importance Factor** | 1.00 |

| Top Elev (ft) | Description | Wz (lb) | a | b | c | Lateral Fs (lb) | R: 1.50 |
|---|---|---|---|---|---|---|---|
| 0.00 | | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | |
| 5.00 | | 1363.4 | 0.00 | 0.04 | 0.02 | 20.37 | |
| 10.00 | | 1332.2 | 0.01 | 0.06 | 0.03 | 29.04 | |
| 15.00 | | 1301.0 | 0.03 | 0.07 | 0.04 | 32.61 | |
| 20.00 | | 1269.8 | 0.05 | 0.07 | 0.04 | 34.07 | |
| 25.00 | | 1238.7 | 0.08 | 0.07 | 0.04 | 34.82 | |
| 30.00 | | 1207.5 | 0.12 | 0.07 | 0.03 | 35.37 | |
| 35.00 | | 1176.3 | 0.16 | 0.07 | 0.03 | 35.64 | |
| 40.00 | | 1145.1 | 0.21 | 0.06 | 0.02 | 35.20 | |
| 45.00 | | 1113.9 | 0.27 | 0.05 | 0.01 | 33.37 | |
| 47.00 | Bot - Section 2 | 436.85 | 0.29 | 0.05 | 0.01 | 12.73 | |
| 50.00 | | 1209.4 | 0.33 | 0.04 | 0.01 | 32.93 | |
| 53.00 | Top - Section 1 | 1188.5 | 0.37 | 0.03 | 0.01 | 29.00 | |
| 55.00 | | 363.91 | 0.40 | 0.02 | 0.01 | 7.99 | |
| 60.00 | | 891.06 | 0.48 | -0.01 | 0.01 | 12.58 | |
| 65.00 | | 864.33 | 0.56 | -0.04 | 0.01 | 3.91 | |
| 70.00 | | 837.60 | 0.65 | -0.07 | 0.02 | -4.14 | |
| 75.00 | | 810.86 | 0.75 | -0.10 | 0.04 | -9.53 | |
| 80.00 | | 784.13 | 0.85 | -0.12 | 0.07 | -10.60 | |
| 81.00 | Top - Section 2 | 153.62 | 0.88 | -0.12 | 0.08 | -2.01 | |
| 85.00 | | 503.99 | 0.96 | -0.12 | 0.11 | -4.27 | |
| 90.00 | Appurtenance(s) | 3214.3 | 1.08 | -0.08 | 0.18 | 14.12 | |
| 95.00 | | 587.66 | 1.20 | 0.01 | 0.26 | 15.01 | |
| 100.00 | Appurtenance(s) | 4850.0 | 1.33 | 0.17 | 0.37 | 267.85 | |
| 105.00 | | 543.11 | 1.47 | 0.43 | 0.51 | 50.82 | |
| 107.00 | Appurtenance(s) | 561.01 | 1.53 | 0.57 | 0.58 | 62.47 | |
| 110.00 | Appurtenance(s) | 1725.8 | 1.61 | 0.83 | 0.69 | 242.82 | |
| 113.00 | Appurtenance(s) | 421.80 | 1.70 | 1.14 | 0.82 | 73.08 | |
| 115.00 | | 196.75 | 1.77 | 1.38 | 0.92 | 38.72 | |
| 117.00 | Appurtenance(s) | 2675.4 | 1.83 | 1.66 | 1.02 | 593.28 | |
| 119.00 | Appurtenance(s) | 196.12 | 1.89 | 1.98 | 1.14 | 48.67 | |
| | **Totals:** | **34,164.9** | | | | **1,765.9** | **Total Wind:** **25,802.0** |

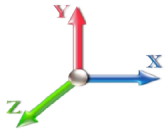
Seismic Base Shear is Less Than 50% of Wind Force - An Analysis is NOT Required

# Calculated Forces

| | | | | | |
|---|---|---|---|---|---|
| **Structure:** | CT13555-S-SBA | **Code:** | EIA/TIA-222-G | 8/17/2018 | |
| **Site Name:** | Montano | **Exposure:** | B | | |
| **Height:** | 119.00 (ft) | **Crest Height:** | 0.00 | | |
| **Base Elev:** | 0.000 (ft) | **Site Class:** | D - Stiff Soil | | |
| **Gh:** | 1.1 | **Topography:** 1 | **Struct Class:** | II | Page: 23 |

Tower Engineering Solutions

**Load Case:** 0.9D + 1.0E




| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| **Gust Response Factor** | 1.10 | | | **Sds** | 0.19 | **Iterations** | 16 | | |
| **Dead Load Factor** | 0.90 | **Seismic Load Factor** | 1.00 | **Sd1** | 0.10 | **Ss** | 0.18 | | |
| **Wind Load Factor** | 0.00 | **Structure Frequency** | 0.57 | **SA** | 0.06 | **S1** | 0.06 | **Seismic Importance Factor** | 1.00 |

| 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 Sway (deg) | Rotation Twist (deg) | Stress Ratio |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 0.00 | -33.02 | -1.80 | 0.00 | -171.32 | 0.00 | 171.32 | 5484.43 | 2742.22 | 13159.3 | 6589.47 | | 0.00 | 0.00 | 0.032 |
| 5.00 | -31.69 | -1.78 | 0.00 | -162.34 | 0.00 | 162.34 | 5405.01 | 2702.51 | 12673.3 | 6346.09 | | 0.00 | -0.01 | 0.031 |
| 10.00 | -30.39 | -1.76 | 0.00 | -153.43 | 0.00 | 153.43 | 5323.53 | 2661.77 | 12191.2 | 6104.68 | | 0.01 | -0.01 | 0.031 |
| 15.00 | -29.11 | -1.73 | 0.00 | -144.66 | 0.00 | 144.66 | 5239.98 | 2619.99 | 11713.4 | 5865.43 | | 0.03 | -0.02 | 0.030 |
| 20.00 | -27.87 | -1.69 | 0.00 | -136.03 | 0.00 | 136.03 | 5154.37 | 2577.18 | 11240.2 | 5628.50 | | 0.06 | -0.03 | 0.030 |
| 25.00 | -26.65 | -1.66 | 0.00 | -127.56 | 0.00 | 127.56 | 5066.69 | 2533.35 | 10772.0 | 5394.05 | | 0.09 | -0.03 | 0.029 |
| 30.00 | -25.46 | -1.63 | 0.00 | -119.25 | 0.00 | 119.25 | 4976.95 | 2488.47 | 10309.2 | 5162.27 | | 0.13 | -0.04 | 0.028 |
| 35.00 | -24.30 | -1.60 | 0.00 | -111.10 | 0.00 | 111.10 | 4885.14 | 2442.57 | 9851.98 | 4933.31 | | 0.18 | -0.05 | 0.027 |
| 40.00 | -23.16 | -1.56 | 0.00 | -103.12 | 0.00 | 103.12 | 4791.27 | 2395.63 | 9400.73 | 4707.35 | | 0.24 | -0.06 | 0.027 |
| 45.00 | -22.06 | -1.53 | 0.00 | -95.31 | 0.00 | 95.31 | 4695.33 | 2347.66 | 8955.81 | 4484.56 | | 0.30 | -0.06 | 0.026 |
| 47.00 | -21.63 | -1.52 | 0.00 | -92.25 | 0.00 | 92.25 | 4656.37 | 2328.19 | 8779.69 | 4396.37 | | 0.33 | -0.07 | 0.026 |
| 50.00 | -20.48 | -1.49 | 0.00 | -87.69 | 0.00 | 87.69 | 4597.32 | 2298.66 | 8517.56 | 4265.11 | | 0.37 | -0.07 | 0.025 |
| 53.00 | -19.34 | -1.46 | 0.00 | -83.23 | 0.00 | 83.23 | 3769.04 | 1884.52 | 6995.75 | 3503.08 | | 0.42 | -0.08 | 0.029 |
| 55.00 | -18.98 | -1.45 | 0.00 | -80.32 | 0.00 | 80.32 | 3738.97 | 1869.49 | 6858.18 | 3434.19 | | 0.45 | -0.08 | 0.028 |
| 60.00 | -18.07 | -1.44 | 0.00 | -73.07 | 0.00 | 73.07 | 3662.35 | 1831.18 | 6517.42 | 3263.55 | | 0.54 | -0.09 | 0.027 |
| 65.00 | -17.19 | -1.44 | 0.00 | -65.88 | 0.00 | 65.88 | 3583.67 | 1791.83 | 6181.48 | 3095.34 | | 0.63 | -0.10 | 0.026 |
| 70.00 | -16.33 | -1.44 | 0.00 | -58.70 | 0.00 | 58.70 | 3502.92 | 1751.46 | 5850.70 | 2929.70 | | 0.74 | -0.10 | 0.025 |
| 75.00 | -15.50 | -1.44 | 0.00 | -51.52 | 0.00 | 51.52 | 3420.10 | 1710.05 | 5525.41 | 2766.81 | | 0.85 | -0.11 | 0.023 |
| 80.00 | -14.69 | -1.44 | 0.00 | -44.33 | 0.00 | 44.33 | 3335.22 | 1667.61 | 5205.95 | 2606.84 | | 0.97 | -0.12 | 0.021 |
| 81.00 | -14.53 | -1.44 | 0.00 | -42.90 | 0.00 | 42.90 | 3318.00 | 1659.00 | 5142.79 | 2575.22 | | 0.99 | -0.12 | 0.021 |
| 81.00 | -14.53 | -1.44 | 0.00 | -42.90 | 0.00 | 42.90 | 2626.87 | 1313.44 | 4085.05 | 2045.56 | | 0.99 | -0.12 | 0.027 |
| 85.00 | -14.00 | -1.44 | 0.00 | -37.15 | 0.00 | 37.15 | 2576.62 | 1288.31 | 3894.21 | 1950.00 | | 1.10 | -0.13 | 0.024 |
| 90.00 | -11.00 | -1.42 | 0.00 | -29.96 | 0.00 | 29.96 | 2511.95 | 1255.98 | 3659.15 | 1832.29 | | 1.23 | -0.13 | 0.021 |
| 95.00 | -10.38 | -1.40 | 0.00 | -22.87 | 0.00 | 22.87 | 2445.22 | 1222.61 | 3428.26 | 1716.68 | | 1.38 | -0.14 | 0.018 |
| 100.00 | -5.92 | -1.12 | 0.00 | -15.85 | 0.00 | 15.85 | 2376.41 | 1188.21 | 3201.88 | 1603.32 | | 1.53 | -0.15 | 0.012 |
| 105.00 | -5.36 | -1.07 | 0.00 | -10.23 | 0.00 | 10.23 | 2305.55 | 1152.77 | 2980.36 | 1492.40 | | 1.68 | -0.15 | 0.009 |
| 107.00 | -4.82 | -1.01 | 0.00 | -8.08 | 0.00 | 8.08 | 2276.62 | 1138.31 | 2893.19 | 1448.75 | | 1.74 | -0.15 | 0.008 |
| 110.00 | -3.22 | -0.76 | 0.00 | -5.06 | 0.00 | 5.06 | 2225.68 | 1112.84 | 2755.45 | 1379.77 | | 1.84 | -0.15 | 0.005 |
| 113.00 | -2.81 | -0.69 | 0.00 | -2.77 | 0.00 | 2.77 | 2167.31 | 1083.66 | 2612.10 | 1307.99 | | 1.93 | -0.15 | 0.003 |
| 115.00 | -2.61 | -0.65 | 0.00 | -1.40 | 0.00 | 1.40 | 2128.40 | 1064.20 | 2518.66 | 1261.20 | | 2.00 | -0.15 | 0.002 |
| 117.00 | -0.18 | -0.05 | 0.00 | -0.10 | 0.00 | 0.10 | 2089.48 | 1044.74 | 2426.92 | 1215.26 | | 2.06 | -0.15 | 0.000 |
| 119.00 | 0.00 | -0.05 | 0.00 | 0.00 | 0.00 | 0.00 | 2050.57 | 1025.29 | 2336.89 | 1170.18 | | 2.13 | -0.15 | 0.000 |

# Wind Loading - Shaft

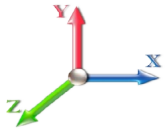
| | | | | | |
|---|---|---|---|---|---|
| **Structure:** | CT13555-S-SBA | **Code:** | EIA/TIA-222-G | 8/17/2018 | |
| **Site Name:** | Montano | **Exposure:** | B | | |
| **Height:** | 119.00 (ft) | **Crest Height:** | 0.00 | | |
| **Base Elev:** | 0.000 (ft) | **Site Class:** | D - Stiff Soil | | |
| **Gh:** | 1.1 **Topography:** 1 | **Struct Class:** | II | Page: 24 | |

Tower Engineering Solutions

**Load Case:** 1.0D + 1.0W 60 mph Wind

**Dead Load Factor** 1.00

**Wind Load Factor** 1.00




**Iterations** 17

| Elev (ft) | Description | Kzt | Kz | qz (psf) | qzGh (psf) | C (mph-ft) | Cf | Ice Thick (in) | Tributary (ft) | Aa (sf) | CfAa (sf) | Wind Force X (lb) | Dead Load Ice (lb) | Tot Dead Load (lb) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 0.00 | | 1.00 | 0.70 | 6.129 | 6.74 | 249.82 | 0.650 | 0.000 | 0.00 | 0.000 | 0.00 | 0.0 | 0.0 | 0.0 |
| 5.00 | | 1.00 | 0.70 | 6.129 | 6.74 | 244.21 | 0.650 | 0.000 | 5.00 | 24.603 | 15.99 | 107.8 | 0.0 | 1363.5 |
| 10.00 | | 1.00 | 0.70 | 6.129 | 6.74 | 238.60 | 0.650 | 0.000 | 5.00 | 24.044 | 15.63 | 105.4 | 0.0 | 1332.3 |
| 15.00 | | 1.00 | 0.70 | 6.129 | 6.74 | 232.99 | 0.650 | 0.000 | 5.00 | 23.486 | 15.27 | 102.9 | 0.0 | 1301.1 |
| 20.00 | | 1.00 | 0.70 | 6.129 | 6.74 | 227.38 | 0.650 | 0.000 | 5.00 | 22.927 | 14.90 | 100.5 | 0.0 | 1269.9 |
| 25.00 | | 1.00 | 0.70 | 6.129 | 6.74 | 221.78 | 0.650 | 0.000 | 5.00 | 22.369 | 14.54 | 98.0 | 0.0 | 1238.7 |
| 30.00 | | 1.00 | 0.70 | 6.134 | 6.75 | 216.26 | 0.650 | 0.000 | 5.00 | 21.810 | 14.18 | 95.7 | 0.0 | 1207.5 |
| 35.00 | | 1.00 | 0.73 | 6.410 | 7.05 | 215.34 | 0.650 | 0.000 | 5.00 | 21.252 | 13.81 | 97.4 | 0.0 | 1176.3 |
| 40.00 | | 1.00 | 0.76 | 6.659 | 7.33 | 213.64 | 0.650 | 0.000 | 5.00 | 20.693 | 13.45 | 98.5 | 0.0 | 1145.1 |
| 45.00 | | 1.00 | 0.79 | 6.887 | 7.58 | 211.32 | 0.650 | 0.000 | 5.00 | 20.134 | 13.09 | 99.1 | 0.0 | 1113.9 |
| 47.00 | Bot - Section 2 | 1.00 | 0.80 | 6.973 | 7.67 | 210.25 | 0.650 | 0.000 | 2.00 | 7.897 | 5.13 | 39.4 | 0.0 | 436.8 |
| 50.00 | | 1.00 | 0.81 | 7.098 | 7.81 | 208.49 | 0.650 | 0.000 | 3.00 | 11.869 | 7.71 | 60.2 | 0.0 | 1209.4 |
| 53.00 | Top - Section 1 | 1.00 | 0.82 | 7.217 | 7.94 | 206.58 | 0.650 | 0.000 | 3.00 | 11.668 | 7.58 | 60.2 | 0.0 | 1188.6 |
| 55.00 | | 1.00 | 0.83 | 7.294 | 8.02 | 208.71 | 0.650 | 0.000 | 2.00 | 7.667 | 4.98 | 40.0 | 0.0 | 363.9 |
| 60.00 | | 1.00 | 0.85 | 7.477 | 8.22 | 205.12 | 0.650 | 0.000 | 5.00 | 18.776 | 12.20 | 100.4 | 0.0 | 891.1 |
| 65.00 | | 1.00 | 0.87 | 7.650 | 8.42 | 201.22 | 0.650 | 0.000 | 5.00 | 18.218 | 11.84 | 99.6 | 0.0 | 864.3 |
| 70.00 | | 1.00 | 0.89 | 7.814 | 8.60 | 197.03 | 0.650 | 0.000 | 5.00 | 17.659 | 11.48 | 98.7 | 0.0 | 837.6 |
| 75.00 | | 1.00 | 0.91 | 7.969 | 8.77 | 192.58 | 0.650 | 0.000 | 5.00 | 17.100 | 11.12 | 97.4 | 0.0 | 810.9 |
| 80.00 | | 1.00 | 0.93 | 8.118 | 8.93 | 187.91 | 0.650 | 0.000 | 5.00 | 16.542 | 10.75 | 96.0 | 0.0 | 784.1 |
| 81.00 | Top - Section 2 | 1.00 | 0.93 | 8.147 | 8.96 | 186.95 | 0.650 | 0.000 | 1.00 | 3.241 | 2.11 | 18.9 | 0.0 | 153.6 |
| 85.00 | | 1.00 | 0.94 | 8.260 | 9.09 | 183.04 | 0.650 | 0.000 | 4.00 | 12.742 | 8.28 | 75.2 | 0.0 | 504.0 |
| 90.00 | Appurtenance(s) | 1.00 | 0.96 | 8.396 | 9.24 | 177.97 | 0.650 | 0.000 | 5.00 | 15.425 | 10.03 | 92.6 | 0.0 | 609.9 |
| 95.00 | | 1.00 | 0.97 | 8.526 | 9.38 | 172.74 | 0.650 | 0.000 | 5.00 | 14.866 | 9.66 | 90.6 | 0.0 | 587.7 |
| 100.00 | Appurtenance(s) | 1.00 | 0.99 | 8.652 | 9.52 | 167.35 | 0.650 | 0.000 | 5.00 | 14.308 | 9.30 | 88.5 | 0.0 | 565.4 |
| 105.00 | | 1.00 | 1.00 | 8.774 | 9.65 | 161.81 | 0.650 | 0.000 | 5.00 | 13.749 | 8.94 | 86.3 | 0.0 | 543.1 |
| 107.00 | Appurtenance(s) | 1.00 | 1.01 | 8.821 | 9.70 | 159.55 | 0.650 | 0.000 | 2.00 | 5.343 | 3.47 | 33.7 | 0.0 | 211.0 |
| 110.00 | Appurtenance(s) | 1.00 | 1.02 | 8.891 | 9.78 | 156.13 | 0.650 | 0.000 | 3.00 | 7.847 | 5.10 | 49.9 | 0.0 | 309.8 |
| 113.00 | Appurtenance(s) | 1.00 | 1.02 | 8.960 | 9.86 | 152.67 | 0.650 | 0.000 | 3.00 | 7.646 | 4.97 | 49.0 | 0.0 | 301.8 |
| 115.00 | | 1.00 | 1.03 | 9.005 | 9.91 | 150.33 | 0.650 | 0.000 | 2.00 | 4.986 | 3.24 | 32.1 | 0.0 | 196.7 |
| 117.00 | Appurtenance(s) | 1.00 | 1.03 | 9.049 | 9.95 | 147.97 | 0.650 | 0.000 | 2.00 | 4.896 | 3.18 | 31.7 | 0.0 | 193.2 |
| 119.00 | Appurtenance(s) | 1.00 | 1.04 | 9.093 | 10.00 | 145.60 | 0.650 | 0.000 | 2.00 | 4.807 | 3.12 | 31.3 | 0.0 | 189.6 |
| | | | | | | | | **Totals:** | **119.00** | | | **2,277.0** | | **22,901.0** |

# Discrete Appurtenance Forces

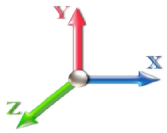
| | | | | | |
|---|---|---|---|---|---|
| **Structure:** | CT13555-S-SBA | **Code:** | EIA/TIA-222-G | 8/17/2018 | |
| **Site Name:** | Montano | **Exposure:** | B | | |
| **Height:** | 119.00 (ft) | **Crest Height:** | 0.00 | | |
| **Base Elev:** | 0.000 (ft) | **Site Class:** | D - Stiff Soil | | |
| **Gh:** | 1.1 **Topography:** 1 | **Struct Class:** | II | Page: 25 | |

Tower Engineering Solutions

**Load Case:** 1.0D + 1.0W 60 mph Wind

**Dead Load Factor** 1.00

**Wind Load Factor** 1.00




**Iterations** 17

| No. | Elev (ft) | Description | Qty | qz (psf) | qzGh (psf) | CaAa x Ka | Ka | Total CaAa (sf) | Dead Load (lb) | Horiz Ecc (ft) | Vert Ecc (ft) | Wind FX (lb) | Mom Y (lb-ft) | Mom Z (lb-ft) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 119.00 | 6' Lightning rod | 1 | 9.093 | 10.002 | 1.00 | 1.00 | 0.38 | 6.50 | 0.000 | 0.000 | 3.80 | 0.00 | 0.00 |
| 2 | 117.00 | AIR 21 B2A B4P | 3 | 9.049 | 9.954 | 0.62 | 0.75 | 11.32 | 274.50 | 0.000 | 0.000 | 112.66 | 0.00 | 0.00 |
| 3 | 117.00 | LNX-6515DS-A1M | 3 | 9.049 | 9.954 | 0.63 | 0.75 | 21.58 | 150.90 | 0.000 | 0.000 | 214.76 | 0.00 | 0.00 |
| 4 | 117.00 | S11B12 | 3 | 9.049 | 9.954 | 0.53 | 0.75 | 4.50 | 153.00 | 0.000 | 0.000 | 44.75 | 0.00 | 0.00 |
| 5 | 117.00 | AIR 21 B4A B2P | 3 | 9.049 | 9.954 | 0.62 | 0.75 | 11.32 | 270.90 | 0.000 | 0.000 | 112.66 | 0.00 | 0.00 |
| 6 | 117.00 | KRY 112 144/1 | 3 | 9.049 | 9.954 | 0.54 | 0.75 | 0.67 | 33.00 | 0.000 | 0.000 | 6.62 | 0.00 | 0.00 |
| 7 | 117.00 | Platform w/ Hand Rail | 1 | 9.049 | 9.954 | 1.00 | 1.00 | 32.00 | 1600.00 | 0.000 | 0.000 | 318.53 | 0.00 | 0.00 |
| 8 | 113.00 | 3 ft Standoff | 1 | 8.960 | 9.856 | 1.00 | 1.00 | 4.50 | 120.00 | 0.000 | 0.000 | 44.35 | 0.00 | 0.00 |
| 9 | 110.00 | dual sector mounts | 3 | 8.891 | 9.780 | 1.00 | 1.00 | 12.00 | 1050.00 | 0.000 | 0.000 | 117.36 | 0.00 | 0.00 |
| 10 | 110.00 | VHLP2-18 | 2 | 8.891 | 9.780 | 1.00 | 1.00 | 9.36 | 54.00 | 2.291 | 0.000 | 91.54 | 209.73 | 0.00 |
| 11 | 110.00 | AAHC | 3 | 8.891 | 9.780 | 0.60 | 0.80 | 7.56 | 312.00 | 0.000 | 0.000 | 73.94 | 0.00 | 0.00 |
| 12 | 107.00 | Ring Mount | 1 | 8.821 | 9.703 | 1.00 | 1.00 | 5.00 | 350.00 | 0.000 | 0.000 | 48.52 | 0.00 | 0.00 |
| 13 | 100.00 | Platform w/ Hand Rail | 1 | 8.652 | 9.517 | 1.00 | 1.00 | 43.80 | 1875.00 | 0.000 | 0.000 | 416.86 | 0.00 | 0.00 |
| 14 | 100.00 | DC6-48-60-18-8F | 4 | 8.652 | 9.517 | 0.75 | 0.75 | 4.41 | 131.20 | 0.000 | 0.000 | 41.97 | 0.00 | 0.00 |
| 15 | 100.00 | RRUS-A2 | 6 | 8.652 | 9.517 | 0.46 | 0.75 | 5.12 | 132.00 | 0.000 | 0.000 | 48.75 | 0.00 | 0.00 |
| 16 | 100.00 | RRU-12 | 6 | 8.652 | 9.517 | 0.53 | 0.75 | 8.89 | 348.00 | 0.000 | 0.000 | 84.60 | 0.00 | 0.00 |
| 17 | 100.00 | RRU-11 | 12 | 8.652 | 9.517 | 0.53 | 0.75 | 15.99 | 648.00 | 0.000 | 0.000 | 152.18 | 0.00 | 0.00 |
| 18 | 100.00 | HPA-65R-BUU-H8 | 12 | 8.652 | 9.517 | 0.58 | 0.75 | 91.00 | 729.60 | 0.000 | 0.000 | 866.11 | 0.00 | 0.00 |
| 19 | 100.00 | IBC700-1 | 3 | 8.652 | 9.517 | 0.68 | 0.75 | 2.68 | 189.90 | 0.000 | 0.000 | 25.50 | 0.00 | 0.00 |
| 20 | 100.00 | RRU-32 | 3 | 8.652 | 9.517 | 0.64 | 0.75 | 7.38 | 231.00 | 0.000 | 0.000 | 70.28 | 0.00 | 0.00 |
| 21 | 90.00 | RRH2X60-AWS | 3 | 8.396 | 9.235 | 0.62 | 0.80 | 6.48 | 165.00 | 0.000 | 0.000 | 59.81 | 0.00 | 0.00 |
| 22 | 90.00 | LNX-6514DS-A1M | 6 | 8.396 | 9.235 | 0.66 | 0.80 | 32.20 | 232.80 | 0.000 | 0.000 | 297.34 | 0.00 | 0.00 |
| 23 | 90.00 | HBXX-6517DS-A2M | 6 | 8.396 | 9.235 | 0.64 | 0.80 | 32.83 | 282.00 | 0.000 | 0.000 | 303.21 | 0.00 | 0.00 |
| 24 | 90.00 | Low Profile Platform | 1 | 8.396 | 9.235 | 1.00 | 1.00 | 22.00 | 1500.00 | 0.000 | 0.000 | 203.17 | 0.00 | 0.00 |
| 25 | 90.00 | RRH2x60-PCS | 3 | 8.396 | 9.235 | 0.63 | 0.80 | 2.84 | 165.00 | 0.000 | 0.000 | 26.21 | 0.00 | 0.00 |
| 26 | 90.00 | B13 RRH4x30 | 3 | 8.396 | 9.235 | 0.70 | 0.80 | 5.69 | 171.60 | 0.000 | 0.000 | 52.56 | 0.00 | 0.00 |
| 27 | 90.00 | DB-T1-6Z-8AB-0Z | 2 | 8.396 | 9.235 | 0.73 | 0.80 | 5.97 | 88.00 | 0.000 | 0.000 | 55.13 | 0.00 | 0.00 |
| | | | | | | | **Totals:** | | **11,263.90** | | | **3,893.16** | | |

# Total Applied Force Summary

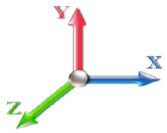
| | | | | | |
|---|---|---|---|---|---|
| **Structure:** | CT13555-S-SBA | | **Code:** | EIA/TIA-222-G | 8/17/2018 |
| **Site Name:** | Montano | | **Exposure:** | B | |
| **Height:** | 119.00 (ft) | | **Crest Height:** | 0.00 | |
| **Base Elev:** | 0.000 (ft) | | **Site Class:** | D - Stiff Soil | |
| **Gh:** | 1.1 | **Topography:** 1 | **Struct Class:** | II | Page: 26 |

Tower Engineering Solutions

**Load Case:** 1.0D + 1.0W 60 mph Wind

**Dead Load Factor** 1.00

**Wind Load Factor** 1.00




**Iterations** 17

| Elev (ft) | Description | Lateral FX (-) (lb) | Axial FY (-) (lb) | Torsion MY (lb-ft) | Moment MZ (lb-ft) |
|---|---|---|---|---|---|
| 0.00 | | 0.00 | 0.00 | 0.00 | 0.00 |
| 5.00 | | 107.81 | 1477.46 | 0.00 | 0.00 |
| 10.00 | | 105.36 | 1446.27 | 0.00 | 0.00 |
| 15.00 | | 102.91 | 1415.08 | 0.00 | 0.00 |
| 20.00 | | 100.47 | 1383.89 | 0.00 | 0.00 |
| 25.00 | | 98.02 | 1352.70 | 0.00 | 0.00 |
| 30.00 | | 95.65 | 1321.51 | 0.00 | 0.00 |
| 35.00 | | 97.40 | 1290.33 | 0.00 | 0.00 |
| 40.00 | | 98.53 | 1259.14 | 0.00 | 0.00 |
| 45.00 | | 99.15 | 1227.95 | 0.00 | 0.00 |
| 47.00 | | 39.38 | 482.45 | 0.00 | 0.00 |
| 50.00 | | 60.23 | 1277.82 | 0.00 | 0.00 |
| 53.00 | | 60.21 | 1256.97 | 0.00 | 0.00 |
| 55.00 | | 39.98 | 409.51 | 0.00 | 0.00 |
| 60.00 | | 100.38 | 1005.06 | 0.00 | 0.00 |
| 65.00 | | 99.65 | 978.33 | 0.00 | 0.00 |
| 70.00 | | 98.66 | 951.60 | 0.00 | 0.00 |
| 75.00 | | 97.44 | 924.86 | 0.00 | 0.00 |
| 80.00 | | 96.01 | 898.13 | 0.00 | 0.00 |
| 81.00 | | 18.88 | 176.42 | 0.00 | 0.00 |
| 85.00 | | 75.25 | 595.19 | 0.00 | 0.00 |
| 90.00 | (24) attachments | 1090.02 | 3328.34 | 0.00 | 0.00 |
| 95.00 | | 90.63 | 690.66 | 0.00 | 0.00 |
| 100.00 | (47) attachments | 1794.76 | 4953.09 | 0.00 | 0.00 |
| 105.00 | | 86.25 | 627.61 | 0.00 | 0.00 |
| 107.00 | (1) attachments | 82.22 | 594.81 | 0.00 | 0.00 |
| 110.00 | (8) attachments | 332.73 | 1776.52 | 209.73 | 0.00 |
| 113.00 | (1) attachments | 93.33 | 462.54 | 0.00 | 0.00 |
| 115.00 | | 32.10 | 223.91 | 0.00 | 0.00 |
| 117.00 | (16) attachments | 841.66 | 2702.64 | 0.00 | 0.00 |
| 119.00 | (1) attachments | 35.05 | 196.12 | 0.00 | 0.00 |
| | **Totals:** | **6,170.11** | **36,686.92** | **209.73** | **0.00** |

# Calculated Forces

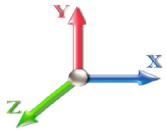
| | | | | | |
|---|---|---|---|---|---|
| **Structure:** | CT13555-S-SBA | **Code:** | EIA/TIA-222-G | 8/17/2018 | |
| **Site Name:** | Montano | **Exposure:** | B | | |
| **Height:** | 119.00 (ft) | **Crest Height:** | 0.00 | | |
| **Base Elev:** | 0.000 (ft) | **Site Class:** | D - Stiff Soil | | |
| **Gh:** | 1.1 **Topography:** 1 | **Struct Class:** | II | Page: 27 | |

Tower Engineering Solutions

**Load Case:** 1.0D + 1.0W 60 mph Wind

**Dead Load Factor** 1.00

**Wind Load Factor** 1.00




**Iterations** 17

| 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 Sway (deg) | Rotation Twist (deg) | Stress Ratio |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 0.00 | -36.69 | -6.18 | -0.21 | -540.22 | 0.00 | 540.22 | 5484.43 | 2742.22 | 13159.3 | 6589.47 | 0.00 | 0.000 | 0.000 | 0.089 |
| 5.00 | -35.21 | -6.08 | -0.21 | -509.34 | 0.00 | 509.34 | 5405.01 | 2702.51 | 12673.3 | 6346.09 | 0.01 | -0.021 | 0.000 | 0.087 |
| 10.00 | -33.76 | -5.99 | -0.21 | -478.93 | 0.00 | 478.93 | 5323.53 | 2661.77 | 12191.2 | 6104.68 | 0.05 | -0.043 | 0.000 | 0.085 |
| 15.00 | -32.34 | -5.90 | -0.21 | -448.99 | 0.00 | 448.99 | 5239.98 | 2619.99 | 11713.4 | 5865.43 | 0.10 | -0.065 | 0.000 | 0.083 |
| 20.00 | -30.95 | -5.81 | -0.21 | -419.51 | 0.00 | 419.51 | 5154.37 | 2577.18 | 11240.2 | 5628.50 | 0.18 | -0.087 | 0.000 | 0.081 |
| 25.00 | -29.60 | -5.72 | -0.21 | -390.48 | 0.00 | 390.48 | 5066.69 | 2533.35 | 10772.0 | 5394.05 | 0.28 | -0.109 | 0.000 | 0.078 |
| 30.00 | -28.28 | -5.63 | -0.21 | -361.90 | 0.00 | 361.90 | 4976.95 | 2488.47 | 10309.2 | 5162.27 | 0.41 | -0.130 | 0.000 | 0.076 |
| 35.00 | -26.98 | -5.54 | -0.21 | -333.75 | 0.00 | 333.75 | 4885.14 | 2442.57 | 9851.98 | 4933.31 | 0.56 | -0.152 | 0.000 | 0.073 |
| 40.00 | -25.72 | -5.45 | -0.21 | -306.06 | 0.00 | 306.06 | 4791.27 | 2395.63 | 9400.73 | 4707.35 | 0.73 | -0.174 | 0.000 | 0.070 |
| 45.00 | -24.49 | -5.35 | -0.21 | -278.83 | 0.00 | 278.83 | 4695.33 | 2347.66 | 8955.81 | 4484.56 | 0.93 | -0.196 | 0.000 | 0.067 |
| 47.00 | -24.01 | -5.31 | -0.21 | -268.13 | 0.00 | 268.13 | 4656.37 | 2328.19 | 8779.69 | 4396.37 | 1.01 | -0.205 | 0.000 | 0.066 |
| 50.00 | -22.73 | -5.25 | -0.21 | -252.19 | 0.00 | 252.19 | 4597.32 | 2298.66 | 8517.56 | 4265.11 | 1.14 | -0.218 | 0.000 | 0.064 |
| 53.00 | -21.47 | -5.19 | -0.21 | -236.43 | 0.00 | 236.43 | 3769.04 | 1884.52 | 6995.75 | 3503.08 | 1.28 | -0.231 | 0.000 | 0.073 |
| 55.00 | -21.06 | -5.16 | -0.21 | -226.04 | 0.00 | 226.04 | 3738.97 | 1869.49 | 6858.18 | 3434.19 | 1.38 | -0.239 | 0.000 | 0.071 |
| 60.00 | -20.06 | -5.06 | -0.21 | -200.26 | 0.00 | 200.26 | 3662.35 | 1831.18 | 6517.42 | 3263.55 | 1.65 | -0.262 | 0.000 | 0.067 |
| 65.00 | -19.08 | -4.96 | -0.21 | -174.96 | 0.00 | 174.96 | 3583.67 | 1791.83 | 6181.48 | 3095.34 | 1.93 | -0.284 | 0.000 | 0.062 |
| 70.00 | -18.12 | -4.87 | -0.21 | -150.15 | 0.00 | 150.15 | 3502.92 | 1751.46 | 5850.70 | 2929.70 | 2.24 | -0.305 | 0.000 | 0.056 |
| 75.00 | -17.20 | -4.77 | -0.21 | -125.82 | 0.00 | 125.82 | 3420.10 | 1710.05 | 5525.41 | 2766.81 | 2.57 | -0.324 | 0.000 | 0.051 |
| 80.00 | -16.30 | -4.67 | -0.21 | -101.98 | 0.00 | 101.98 | 3335.22 | 1667.61 | 5205.95 | 2606.84 | 2.92 | -0.341 | 0.000 | 0.044 |
| 81.00 | -16.12 | -4.65 | -0.21 | -97.31 | 0.00 | 97.31 | 3318.00 | 1659.00 | 5142.79 | 2575.22 | 2.99 | -0.345 | 0.000 | 0.043 |
| 81.00 | -16.12 | -4.65 | -0.21 | -97.31 | 0.00 | 97.31 | 2626.87 | 1313.44 | 4085.05 | 2045.56 | 2.99 | -0.345 | 0.000 | 0.054 |
| 85.00 | -15.53 | -4.58 | -0.21 | -78.70 | 0.00 | 78.70 | 2576.62 | 1288.31 | 3894.21 | 1950.00 | 3.29 | -0.357 | 0.000 | 0.046 |
| 90.00 | -12.21 | -3.47 | -0.21 | -55.81 | 0.00 | 55.81 | 2511.95 | 1255.98 | 3659.15 | 1832.29 | 3.67 | -0.373 | 0.000 | 0.035 |
| 95.00 | -11.51 | -3.38 | -0.21 | -38.46 | 0.00 | 38.46 | 2445.22 | 1222.61 | 3428.26 | 1716.68 | 4.07 | -0.385 | 0.000 | 0.027 |
| 100.00 | -6.57 | -1.55 | -0.21 | -21.58 | 0.00 | 21.58 | 2376.41 | 1188.21 | 3201.88 | 1603.32 | 4.47 | -0.393 | 0.000 | 0.016 |
| 105.00 | -5.95 | -1.46 | -0.21 | -13.84 | 0.00 | 13.84 | 2305.55 | 1152.77 | 2980.36 | 1492.40 | 4.89 | -0.399 | -0.001 | 0.012 |
| 107.00 | -5.35 | -1.37 | -0.21 | -10.93 | 0.00 | 10.93 | 2276.62 | 1138.31 | 2893.19 | 1448.75 | 5.06 | -0.401 | -0.001 | 0.010 |
| 110.00 | -3.58 | -1.03 | 0.00 | -6.81 | 0.00 | 6.81 | 2225.68 | 1112.84 | 2755.45 | 1379.77 | 5.31 | -0.403 | -0.001 | 0.007 |
| 113.00 | -3.12 | -0.93 | 0.00 | -3.73 | 0.00 | 3.73 | 2167.31 | 1083.66 | 2612.10 | 1307.99 | 5.56 | -0.404 | -0.001 | 0.004 |
| 115.00 | -2.89 | -0.90 | 0.00 | -1.87 | 0.00 | 1.87 | 2128.40 | 1064.20 | 2518.66 | 1261.20 | 5.73 | -0.404 | -0.001 | 0.003 |
| 117.00 | -0.20 | -0.04 | 0.00 | -0.07 | 0.00 | 0.07 | 2089.48 | 1044.74 | 2426.92 | 1215.26 | 5.90 | -0.405 | -0.001 | 0.000 |
| 119.00 | 0.00 | -0.03 | 0.00 | 0.00 | 0.00 | 0.00 | 2050.57 | 1025.29 | 2336.89 | 1170.18 | 6.07 | -0.405 | -0.001 | 0.000 |

# Final Analysis Summary

| | | | | | |
|---|---|---|---|---|---|
| **Structure:** | CT13555-S-SBA | **Code:** | EIA/TIA-222-G | 8/17/2018 | |
| **Site Name:** | Montano | **Exposure:** | B | | |
| **Height:** | 119.00 (ft) | **Crest Height:** | 0.00 | | |
| **Base Elev:** | 0.000 (ft) | **Site Class:** | D - Stiff Soil | | |
| **Gh:** | 1.1 **Topography:** 1 | **Struct Class:** | II | Page: 28 | |

Tower Engineering Solutions

## Reactions

| Load Case | Shear FX (kips) | Shear FZ (kips) | Axial FY (kips) | Moment MX (ft-kips) | Moment MY (ft-kips) | Moment MZ (ft-kips) |
|---|---|---|---|---|---|---|
| 1.2D + 1.6W 97 mph Wind | 25.8 | 0.00 | 44.00 | 0.00 | 0.55 | 2265.77 |
| 0.9D + 1.6W 97 mph Wind | 25.8 | 0.00 | 33.00 | 0.00 | 0.55 | 2255.63 |
| 1.2D + 1.0Di + 1.0Wi 50 mph Wind | 7.4 | 0.00 | 79.89 | 0.00 | 0.20 | 644.34 |
| 1.2D + 1.0E | 1.8 | 0.00 | 44.02 | 0.00 | 0.00 | 172.15 |
| 0.9D + 1.0E | 1.8 | 0.00 | 33.02 | 0.00 | 0.00 | 171.32 |
| 1.0D + 1.0W 60 mph Wind | 6.2 | 0.00 | 36.69 | 0.00 | 0.21 | 540.22 |

## Max Stresses

| Load Case | 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) | Elev (ft) | Stress Ratio |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1.2D + 1.6W 97 mph Wind | -44.00 | -25.84 | -0.55 | -2265.7 | 0.00 | -2265.7 | 5484.43 | 2742.2 | 13159.3 | 6589.47 | 0.00 | 0.352 |
| 0.9D + 1.6W 97 mph Wind | -33.00 | -25.83 | -0.55 | -2255.6 | 0.00 | -2255.6 | 5484.43 | 2742.2 | 13159.3 | 6589.47 | 0.00 | 0.348 |
| 1.2D + 1.0Di + 1.0Wi 50 mph Wind | -79.89 | -7.40 | -0.20 | -644.34 | 0.00 | -644.34 | 5484.43 | 2742.2 | 13159.3 | 6589.47 | 0.00 | 0.112 |
| 1.2D + 1.0E | -44.02 | -1.80 | 0.00 | -172.15 | 0.00 | -172.15 | 5484.43 | 2742.2 | 13159.3 | 6589.47 | 0.00 | 0.034 |
| 0.9D + 1.0E | -33.02 | -1.80 | 0.00 | -171.32 | 0.00 | -171.32 | 5484.43 | 2742.2 | 13159.3 | 6589.47 | 0.00 | 0.032 |
| 1.0D + 1.0W 60 mph Wind | -36.69 | -6.18 | -0.21 | -540.22 | 0.00 | -540.22 | 5484.43 | 2742.2 | 13159.3 | 6589.47 | 0.00 | 0.089 |

# Monopole Mat Foundation Design

| | | | | Date |
|---|---|---|---|---|
| | | | | 8/17/2018 |
| **Customer Name:** | Sprint Nextel | **EIA/TIA Standard:** | EIA-222-G |
| **Site Name:** | | **Structure Height (Ft.):** | 119 |
| **Site Number:** | CT13555-S-SBA | **Engineer Name:** | T. Alajaj |
| **Engr. Number:** | 59056 | **Engineer Login ID:** | |

**Foundation Info Obtained from:** Drawings/Calculations

**Structure Type:** Monopole

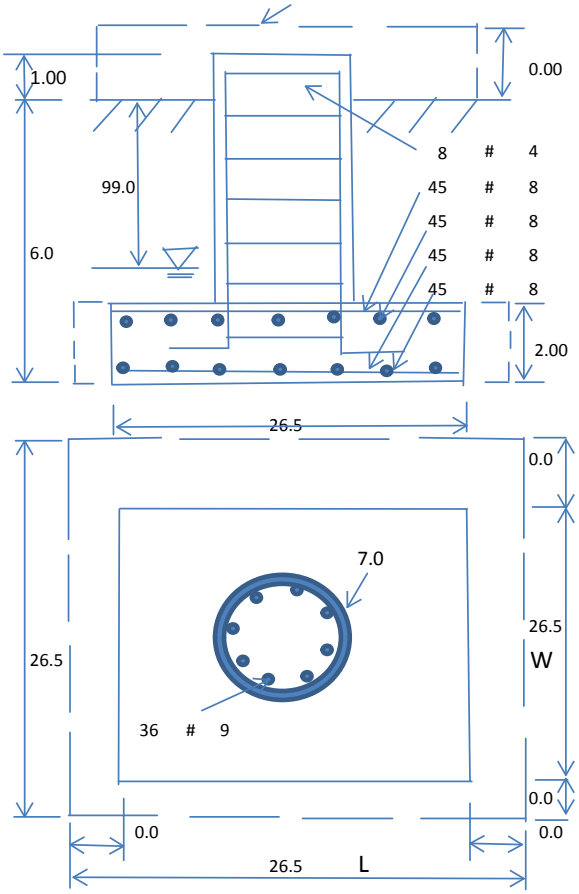
**Analysis or Design?** Analysis

**Base Reactions (Factored):**

| | | | |
|---|---|---|---|
| Axial Load (Kips): | 79.9 | Shear Force (Kips): | 25.8 |
| Uplift Force (Kips): | 0.0 | Moment (Kips-ft): | 2265.8 |
| Allowable overstress %: | 5.0% | | |

**Foundation Geometries:**

| | | | |
|---|---|---|---|
| | | Mods required -Yes/No ?: | No |
| Diameter of Pier (ft.): | 7.0 | Depth of Base BG (ft.): | 6.0 |
| Pier Height A. G. (ft.): | 1.00 | Thickness of Pad (ft): | 2.00 |
| Length of Pad (ft.): | 26.5 | Width of Pad (ft.): | 26.5 |
| Final Length of pad (ft) | 26.5 | Final width of pad (ft): | 26.5 |
| Control Value for Cell D18: | 0 | Control Value for Cell F18: | 0 |




**Material Properties and Reabr Info:**

| | | | | |
|---|---|---|---|---|
| Concrete Strength (psi): | 4000 | Steel Elastic Modulus: | 29000 | ksi |
| Vertical bar yield (ksi) | 60 | Tie steel yield (ksi): | 60 | |
| Vertical Rebar Size #: | 9 | Tie / Stirrup Size #: | 4 | |
| Qty. of Vertical Rebars: | 36 | Tie Spacing (in): | 12.0 | |
| Pad Rebar Yield (Ksi): | 60 | Pad Steel Rebar Size (#): | 8 | |
| Concrete Cover (in.): | 3 | Unit Weight of Concrete: | 150.0 | pcf |
| Rebar at the bottom of the concrete pad: | | | | |
| Qty. of Rebar in Pad (L): | 45 | Qty. of Rebar in Pad (W): | 45 | |
| Rebar at the top of the concrete pad: | | | | |
| Qty. of Rebar in Pad (L): | 45 | Qty. of Rebar in Pad (W): | 45 | |
| Apply 1.35 factor for e/w Per G: | 1.35 | | | |

**Soil Design Parameters:**

| | | | | | | |
|---|---|---|---|---|---|---|
| Soil Unit Weight (pcf): | 110.0 | Soil Buoyant Weight: | 37.6 | Pcf | | |
| Water Table B.G.S. (ft): | 99.0 | Unit Weight of Water: | 62.4 | pcf | Angle from Top of Pad: | 30 |
| Ultimate Bearing Pressure (psf): | 9000 | Ultimate Skin Friction: | 0 | Psf | Angle from Bottm of Pad: | 25 |
| Consider Friction for O.T.M. (Y/N): | No | Consider Friction for bearing (Y/N): | No | | Angle from Bottm of Pad: | 25 |
| Consider soil hor. resist. for OTM.: | Yes | Reduction factor on the maximum soil bearing pressure: | 1.00 | | | |

**Foundation Analysis and Design:** Uplift Strength Reduction Factor: 0.75 — Compression Strength Reduction Factor: 0.75

| | | | |
|---|---|---|---|
| Total Dry Soil Volume (cu. Ft.): | 2655.06 | Total Dry Soil Weight (Kips): | 292.06 |
| Total Buoyant Soil Volume (cu. Ft.): | 0.00 | Total Buoyant Soil Weight (Kips): | 0.00 |
| Total Effective Soil Weight (Kips): | 292.06 | Weight from the Concrete Block at Top (K): | 0.00 |
| Total Dry Concrete Volume (cu. Ft.): | 1596.92 | Total Dry Concrete Weight (Kips): | 239.54 |
| Total Buoyant Concrete Volume (cu. Ft.): | 0.00 | Total Buoyant Concrete Weight (Kips): | 0.00 |
| Total Effective Concrete Weight (Kips): | 239.54 | Total Vertical Load on Base (Kips): | 611.50 |

**Check Soil Capacities:**

| | | | | | Load/ Capacity Ratio | |
|---|---|---|---|---|---|---|
| Calculated Maxium Net Soil Pressure under the base (psf): | 1574 | < | Allowable Factored Soil Bearing (psf): | 6750 | 0.23 | OK! |
| Allowable Foundation Overturning Resistance (kips-ft.): | 7397.9 | > | Design Factored Momont (kips-ft): | 2341 | 0.32 | OK! |
| Factor of Safety Against Overturning (O. R. Moment/Design Moment): | 3.16 | OK! | | | | |

Check the capacities of Reinforceing Concrete:

| | | | | | |
|---|---|---|---|---|---|
| Strength reduction factor (Flexure and axial tension): | 0.90 | Strength reduction factor (Shear): | 0.75 | | |
| Strength reduction factor (Axial compression): | 0.65 | Wind Load Factor on Concrete Design: | 1.00 | | |

(1) Concrete Pier:

| | | | | Load/ Capacity Ratio | |
|---|---|---|---|---|---|
| Vertical Steel Rebar Area (sq. in./each): | 1.00 | Tie / Stirrup Area (sq. in./each): | 0.20 | | |
| Calculated Moment Capacity (Mn, Kips-Ft): | 6026.1 | > Design Factored Moment (Mu, Kips-F | 2394.8 | 0.40 | OK! |
| Calculated Shear Capacity (Kips): | 660.1 | > Design Factored Shear (Kips): | 25.8 | 0.04 | OK! |
| Calculated Tension Capacity (Tn, Kips): | 1944.0 | > Design Factored Tension (Tu Kips): | 0.0 | 0.00 | OK! |
| Calculated Compression Capacity (Pn, Kips): | 9734.2 | > Design Factored Axial Load (Pu Kips): | 79.9 | 0.01 | OK! |
| Moment & Axial Strength Combination: | 0.40 | OK! Check Tie Spacing (Design/Required): | | 1 | OK! |
| Pier Reinforcement Ratio: | 0.006 | Reinforcement Ratio is satisfied per ACI | | | |

(2). Concrete Pad:

| | | | | | |
|---|---|---|---|---|---|
| One-Way Design Shear Capacity (L-Direction, Kips): | 618.4 | > One-Way Factored Shear (L-D. Kips) | 199.5 | 0.32 | OK! |
| One-Way Design Shear Capacity (W-Direction, Kips): | 618.4 | > One-Way Factored Shear (W-D., Kips) | 199.5 | 0.32 | OK! |
| One-Way Design Shear Capacity (Corner-Corner. Kips): | 631.5 | > One-Way Factored Shear (C-C, Kips): | 189.6 | 0.30 | OK! |
| Lower Steel Pad Reinforcement Ratio (L-Direct. ): | 0.0055 | OK! Lower Steel Pad Reinf. Ratio (W-Direc | 0.0055 | | |
| Lower Steel Pad Moment Capacity (L-Direction. Kips-ft): | 3121.7 | > Moment at Bottom ( L-Dir. K-Ft): | 1093.7 | 0.35 | OK! |
| Lower Steel Pad Moment Capacity (W-Direction Kips-ft): | 3121.7 | > Moment at Bottom ( W-Dir. K-Ft): | 1093.7 | 0.35 | OK! |
| Lower Steel Pad Moment Capacity (Corner-Corner, K-ft): | 4363.5 | > Moment at Bottom ( C-C Dir K-Ft): | 1546.7 | 0.35 | OK! |
| Upper Steel Pad Reinforcement Ratio (L-Direct. ): | 0.0055 | OK! Upper Steel Refn Ratio (W-Dir. ): | 0.0055 | | |
| Upper Steel Pad Moment Capacity (L-Direc. Kips-ft): | 3121.7 | > Moment at the top (L-Dir K-Ft): | 353.9 | 0.11 | OK! |
| Upper Steel Pad Moment Capacity (W-Direc. Kips-ft): | 3121.7 | > Moment at the top (W-Dir K-Ft): | 353.9 | 0.11 | OK! |
| Upper Steel Pad Moment Capacity (Corner-Corner. K-ft): | 4363.5 | > Moment at the top (C-C Dir K-Ft): | 331.4 | 0.08 | OK! |

(3). Check Punching Shear Capacty due to Moment in the Pier:

| | | | | | |
|---|---|---|---|---|---|
| Moment transferred by punching shear: | 906.3 | k-ft. | Max. factored shear stress $v_{u\_CD}$: | 3.7 | Psi |
| Max. factored shear stress $v_{u\_AB}$: | 16.1 | Psi | Factored shear Strength $\phi v_n$: | 189.7 | Psi |
| Max. factored shear stress $v_u$: | 16.1 | Psi | Check Usage of Punching Shear Capacity: | 0.08 | O |

# Pier Foundation Design For Monopole

| | | | | Date |
|---|---|---|---|---|
| | | | | 8/17/2018 |
| **Customer Name:** | **Sprint Nextel** | **EIA/TIA Standard:** | EIA-222-G |
| **Site Name:** | | **Structure Height (Ft.):** | 119 |
| **Site Number:** | CT13555-S-SBA | **Engineer Name:** | T. Alajaj |
| **Engr. Number:** | 59056 | **Engineer Login ID:** | |

**Foundation Info Obtained from:** Drawings/Calculations

**Structure Type:** Monopole

**Analysis or Design?** Analysis

Acceptable overstress ( 5.0%

**Base Reactions (Factored):**

| | | | |
|---|---|---|---|
| Axial Load (Kips): | 79.9 | Shear Force (Kips): | 25.8 |
| Uplift Force (Kips): | 0.0 | Moment (Kips-ft): | 2265.8 |

**Foundation Geometries:**

| | | | | |
|---|---|---|---|---|
| Mods required -Yes/No ?: | No | | | ft. |
| Diameter of Pier (ft.): | 7.0 | Depth of Base B. G. S. : | 29.0 | ft. |
| Pier Height A. G. (ft.): | 1.00 | | | |

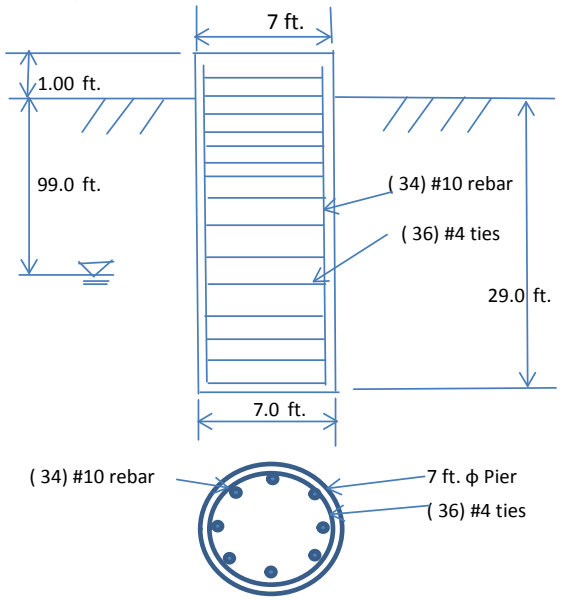
**Material Properties and Reabr Info:**

| | | | | |
|---|---|---|---|---|
| Concrete Strength (psi): | 4000 | Steel Elastic Modulus: | 29000 | ksi |
| Vertical bar yield (ksi) | 60 | Tie steel yield strength: | 60 | ksi |
| Vertical Rebar Size #: | 10 | Tie / Stirrup Size #: | 4 | |
| Qty. of Vertical Rebars: | 34 | Tie Spacing: | 12.0 | in. |
| Concrete Cover (in.): | 3 | Concrete unit weight: | 150.0 | pcf |

**Soil Design Parameters:**

| | | | | |
|---|---|---|---|---|
| Water Table B.G.S. (ft): | 99.0 | Unit weight of water: | 62.4 | psf |
| Ratio of Uplift/Axial Skin Friction: | 1.0 | Pullout failure Angle: | 30 | (°) |

Skin Frictions are to be obtained from: Soil Report




**Monopole Pier Foundation**

| Depth of Layers (ft) Top | Depth of Layers (ft) Bottom | $\gamma_{soil}$ (pcf) | ϕ (°) | Cohesion (psf) | Ultimate Skin Friction (psf) | Ultimate Bearing (psf) | Soil Types |
|---|---|---|---|---|---|---|---|
| 0.0 | 3.0 | 100 | 0 | 0 | 0 | 0 | Sand |
| 3.0 | 25.0 | 110 | 33 | 0 | 1000 | 0 | Sand |
| 25.0 | 30.0 | 105 | 30 | 0 | 1600 | 12000 | Silt |
| 30.0 | 35.0 | | | | | | |
| | | | | | | | |
| | | | | | | | |
| | | | | | | | |
| | | | | | | | |
| | | | | | | | |
| | | | | | | | |

Soil weight Increase Factor for bouyant soils (1.0 to 1.15): 1.1

**Foundation Analysis and Design:**

| | | | | |
|---|---|---|---|---|
| Uplift Strength Reduction Factor: | 0.75 | Soil Bearing Strength Reduction Factor: | 0.75 | |
| Total Dry Soil Volume from Conical Failure (cu. Ft.): | 13814 | Dry Soil Weight from Conical Failure: | 1281 | Kips |
| Total Buoyant Soil Volume from Conical Failure (cu. Ft.): | 0 | Buoyant Soil Weight from Conical Failure (Ki | 0 | Kips |
| Total Dry Concrete Volume (cu. Ft.): | 1155 | Total Dry Concrete Weight: | 173.2 | Kips |
| Total Buoyant Concrete Volume (cu. Ft.): | 0.0 | Total Buoyant Concrete Weight: | 0.00 | Kips |
| Total Effective Concrete Weight (Kips): | 173.2 | Total Effective Soil Weight: | 1280.7 | Kips |
| Total Effective Vertical Load on Base (Kips): | 149.6 | | | |

**Check Soil Capacities:**

| | | | | | Usage | |
|---|---|---|---|---|---|---|
| Allowable Foundation Overturning Resistance (kips-ft.): | 10741.2 | > | Design Factored Momont (kips-ft): | 2794 | 0.26 | OK! |
| Factor of Safety of Passive Soil Resistance against Moment: | 3.84 | OK! | | | | |

**Check the capacities of Reinforceing Concrete:**

| | | | | |
|---|---|---|---|---|
| Strength reduction factor (Flexure and axial tension): | 0.90 | Strength reduction factor (Shear): | 0.75 | |
| Strength reduction factor (Axial compresion): | 0.65 | Wind Load Factor on Concrete Design: | 1.00 | |

Reinforcing Concrete Pier:

| | | | | | Usage | |
|---|---|---|---|---|---|---|
| Vertical Steel Rebar Area (sq. in./each): | 1.27 | | Tie / Stirrup Area (sq. in./each): | 0.20 | | |
| Calculated Moment Capacity (Mn,Kips-Ft): | 7102.8 | > | Design Factored Moment (Mu, K-Ft): | 2377.4 | 0.33 | OK! |
| Calculated Shear Capacity (Kips): | 1120.9 | > | Design Factored Shear (Kips): | 217.0 | 0.19 | OK! |
| Calculated Tension Capacity (Tn, Kips): | 2331.7 | > | Design Factored Tension (Tu Kips): | 0.0 | 0.00 | OK! |
| Calculated Compression Capacity (Pn, Kips): | 9722 | > | Design Factored Axial Load (Pu Kips): | 79.9 | 0.01 | OK! |
| Moment & Axial Strength Combination: | 0.33 | OK! | Max. Allowable Tie/Stirrup Spacing: | 12.00 | in. | |
| Pier Reinforcement Ratio: | 0.008 | Reinforcement Ratio is satisfied per ACI | | | | |

GeoStructural, LLC
PO Box 2621 | Boise, ID 83701
p:530.539.4787 | e:Contact@GeoStructural.com
www.GeoStructural.com

# Mount Structural Analysis Report

| | |
|---|---|
| Site Name: | **CT13555-S Montano** |
| Site Number: | **CT52XC103** |
| Project: | **MIMO** |
| Prepared For: | Sprint |
| Mount Description: | (3) Dual Sector Mounts |
| Site Location: | 58A Montano Rd<br>Glastonbury, CT<br>Hartford County<br>41.699444°, -72.5640° |
| Design Codes: | ANSI/TIA-222-G<br>IBC 2012 w/ 2016 CT Building Code |
| Analysis Load Case: | Sprint Final Configuration |
| **Analysis Result:** | **Adequate @ 94%** - See Conclusion |


Revision 0
July 27, 2018

## *1.0 Introduction*

GeoStructural, LLC has completed a structural analysis for Sprint's existing antenna mount assembly located at the CT13555-S Montano communications site in Hartford County, CT. The objective of the analysis was to determine the adequacy of the main mount assembly structural members to support Sprint's final loading configuration. This analysis was completed at the request of ProTerra.

## *2.0 Analysis Procedure & Design Criteria*

The mount structure has been analyzed to determine its compliance based on the minimum loading requirements of the following applicable building codes, design standards and design criteria:

- IBC 2012 – International Building Code w/ State Amendments and Adoptions.
- ANSI/TIA-222-G – Structural Standard for Antenna Supporting Structures and Antennas.
- AISC – Steel Construction Manual.
- ANSI/AWS D1.1 – Structural Welding Code.

| | |
|---|---|
| Design Wind w/o ice = 125 mph (3-sec gust Ultimate Wind Speed per ASCE)<br>Design Wind w/o ice = 97 mph (3-sec gust Equivalent per TIA-222-G Tower Code) | |
| Design Wind with ice = 50 mph (3-sec gust, 1" Ice)<br>Exposure Category C | Topographic Category 1<br>Structure Class II |
| Design Wind Force, $F_A = (q_z)(G_h)(EPA)_A$ *[ANSI/TIA-222-G §2.6.9.2]* | |

The load effects due to factored loads and the strength level limit state load combinations of ANSI/TIA-222-G §2.3.2 have been evaluated and compared to the design strengths of the main mount structural members. The results of the analysis are illustrated in Sections 4.0 and 7.0. Refer to the Standard Conditions section of this report for information regarding the design criteria listed above.

All data required to complete our structural analysis was furnished by ProTerra. GeoStructural has <u>not</u> conducted a site visit or independent study to verify existing conditions and the results of this analysis are based solely on the information provided. The following documents were provided:

- <u>Tower Structural Analysis</u>
  TES, 09/29/15.
- <u>Sprint – CT52XC103</u>
  RFDS ID: 264749, Massive MIMO.

If any of the existing or proposed conditions (appurtenance loading, member sizes, etc.) reported in this analysis are not properly represented, please contact our office immediately to request an amended report.

## 3.0 Appurtenance & Mount Information

### Table 3.1 – Sprint Final Antenna Configuration[1,2,3,4]

| COR[4] | (Quantity) Appurtenance Make/Model | Mount Description |
|---|---|---|
| 110'± | (3) NOKIA AAHC | *(3) Dual Sector Mounts* |
| | (1) 1'Ø Microwave w/ Radio | |
| | (2) 2.2'Ø Microwave w/ Radio | |

1. *Proposed appurtenance and mount configurations are based on information obtained from the client. Refer to the Calculations & Software Output portion of this report for additional information regarding analysis loading.*
2. *Refer to antenna installation Construction Drawings (when applicable) for additional information regarding final antenna and equipment orientations. Refer to the Calculations & Software Output portion of this report for mount component member sizes and structural information.*
3. *Panel antennas to be installed in Position 1 and centered vertically on the face boom.*
4. *Microwave antennas to remain in their currently installed positions in Position 2.*

## 4.0 Analysis Results

### Table 4.1 – Existing Mount Component Capacities

| Load Case | Mount Component[1] | % Capacity[2] | Result[3] |
|---|---|---|---|
| Final Sprint Configuration | Face Boom | 94% | **Adequate** |

1. *Refer to the Calculations & Software Output portion of this report for mount component member sizes and structural information.*
2. *Listed results are expressed as a percentage of available mount member capacity ($\Sigma\alpha_i Q_i$ / $\Phi R_n$) based upon the material strengths listed in Table 4.2. 105% is an acceptable engineering allowable stress percentage for mount components.*
3. *Refer to the Calculations & Software Output portion of this report for main mount member factored load effects ($\Sigma\alpha_i Q_i$) and design strengths ($\Phi R_n$).*

***Table 4.2 – Structural Component Material Strengths***

| Structural Component | Nominal Strength/Material[1] |
|---|---|
| Pipe | $F_y$ = 35 ksi (A53, Gr. B) |
| Tube | $F_y$ = 46 ksi (A500, Gr. B) |
| Structural Shapes (L, C, W, etc.), Plate / Bar | $F_y$ = 36 ksi (A36) |
| Uni-Strut | $F_y$ = 33 ksi (A570, Gr. 33) |
| Connection Bolts | A325 |
| Stainless Steel Bolts | 18-8 Stainless, Grade 316/304<br>$F_y$ = 74 ksi (Yield) & $F_u$ = 29 ksi (Tension) |
| U-Bolts / Threaded Rod | SAE J429 Grade 2 (Substitution: ASTM A449)<br>$F_y$ = 57 ksi (Yield) & $F_u$ = 74 ksi (Tension) |
| Welds | E70XX Electrodes |

1. *Strengths listed were assumed for this analysis and are based upon ASTM, AISC, RCSC, AWS and ACI preferred specification values. Values and materials are consistent with industry standards. Material strengths were taken from original design documents when available.*

## *5.0 Conclusion & Recommendations*

Based on Sprint's final equipment loading configuration, the existing mount assembly has sufficient capacity to support the loading considered in this analysis pursuant to the listed standards.

**Installation Requirements:**

- Antennas and equipment shall be installed centered vertically on the mount front face rails (limit vertical installation eccentricity).
- Panel antennas to be installed in Position 1.
- Microwave antennas to remain in their currently installed positions in Position 2.

**Hoisting/Rigging and Maintenance Loading Note:**

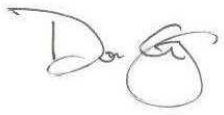
- This mount assembly is **not** rated for rigging, hoisting or worker maintenance loading of any kind. The results of this analysis assume no additional loading beyond the proposed final appurtenances is being applied to the mount structures. Hoisting/rigging or worker loading will create an overstress condition under design loading and is not allowed.

This analysis only encompasses the antenna mount assembly. The tower, overall mount support structure, foundation, etc. are beyond the scope of this analysis. If any of the existing or proposed conditions (appurtenance loading, member sizes, etc.) reported in this analysis are not properly represented, please contact our office immediately to request an amended report.

Prepared by:

**Jesse Drennen, PE, MLE**
208.761.7986
jesse.drennen@geostructural.com

Reviewed and Approved by:



**Don George, PE, SE, MLSE**
208.602.6569
don.george@geostructural.com

## 6.0 Standard Conditions

- All data required to complete our structural analysis was furnished by our client and provided record data. GeoStructural has not conducted a site visit or independent study to verify existing conditions and the results of this analysis are based solely on the information provided. It has been assumed that the tower, antenna support structure and foundation have been constructed according to the provided existing drawings, previous structural analysis reports, mapping documents, etc.

- The default Structure Classification is Class II in accordance with ANSI/TIA-222-G §A.2.2 & §A.15.3 and has been assumed for this analysis. The owner shall verify this classification conforms with original or desired reliability criteria.

- This analysis assumes that the structure has been properly installed and maintained in accordance with ANSI/TIA-222-G §15.5 and that no physical deterioration has occurred in any of the components of the structure. Damaged, missing, or rusted members were not considered.

- This analysis verifies the adequacy of the main components of the structure. Not all connections, welds, bolts, plates, etc. were individually detailed and analyzed. Where not specifically analyzed, the existing connection plates, welds, bolts, etc. were assumed adequate to develop the full capacity of the main structural members.

- No consideration has been made for unusual or extreme wind events, rime/in-cloud ice loadings, harmonic or nodal vibration, vortex shedding or other similar conditions.

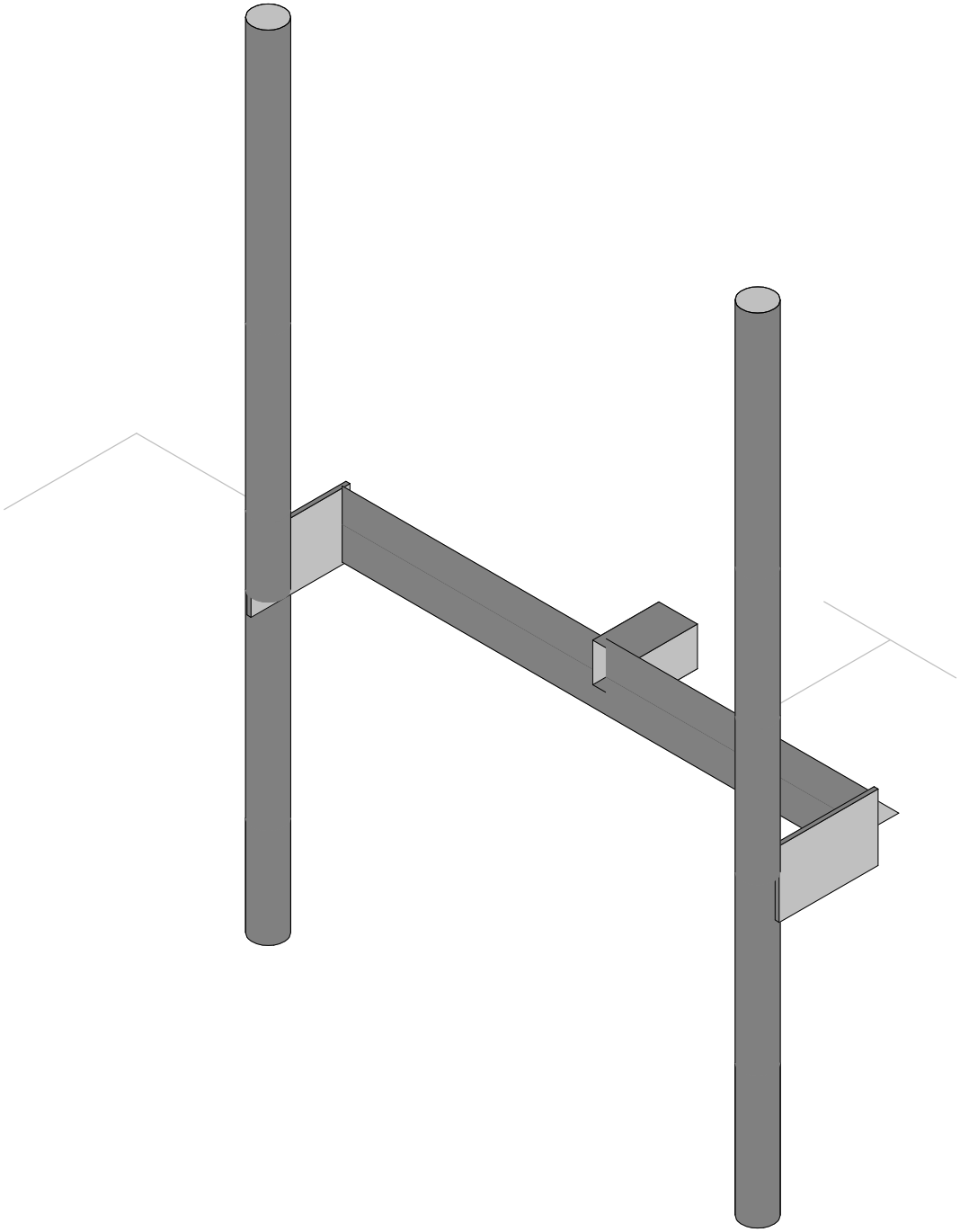
- It is the owner's responsibility to determine the appropriate design wind speed and amount of ice accumulation beyond code minimum values that should be considered in the analysis.

- This analysis report does not constitute a maintenance and condition assessment. No certifications regarding maintenance and condition are expressed or implied. If desired, GeoStructural can provide these services under a subsequent contract.

- This analysis only encompasses the antenna mount assembly. The tower, overall mount support structure, foundation, etc. are beyond the scope of this analysis. If desired, GeoStructural can provide these services under a subsequent contract.

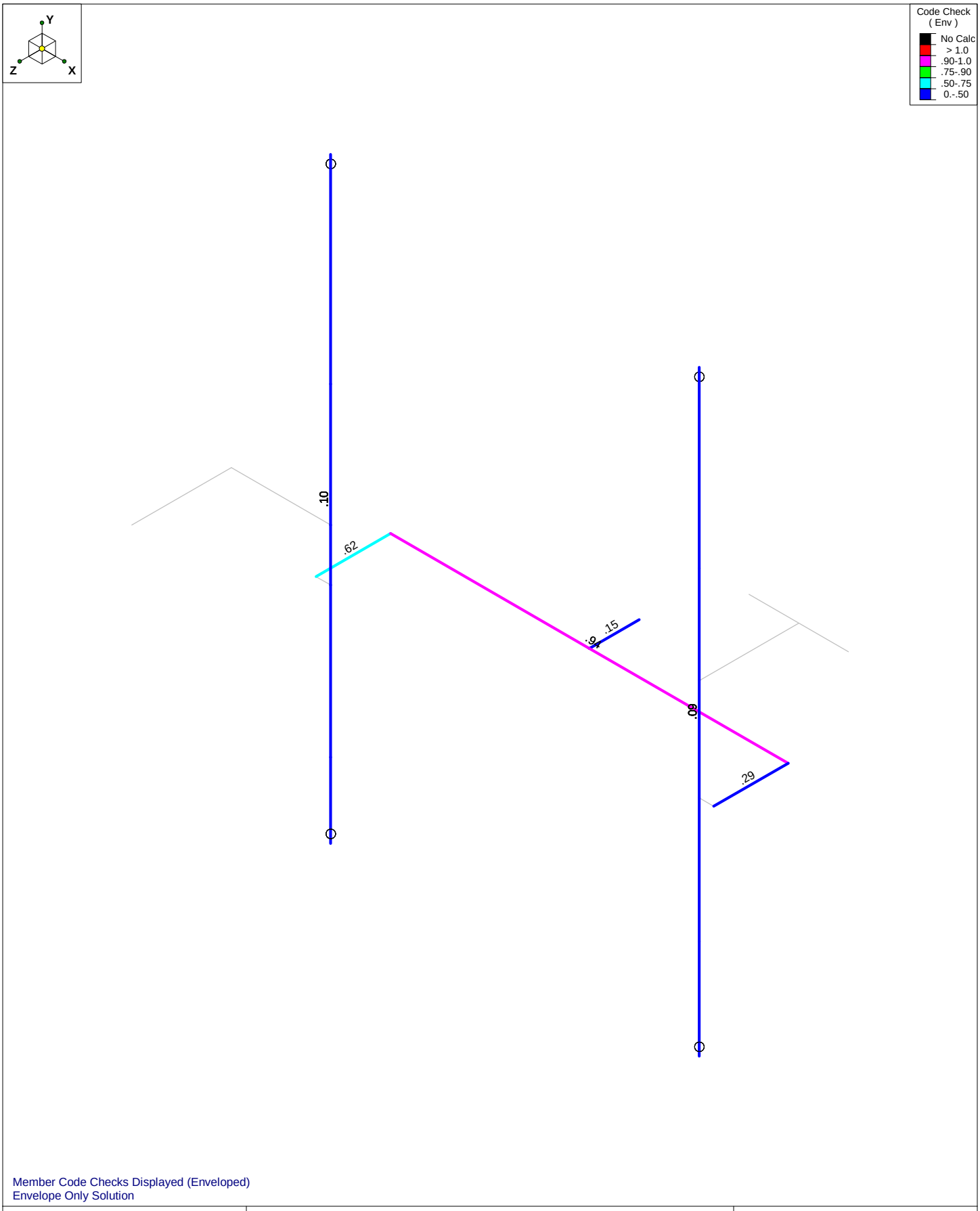
## ***7.0 Attachments & Software Output***

This Page Intentionally Left Blank



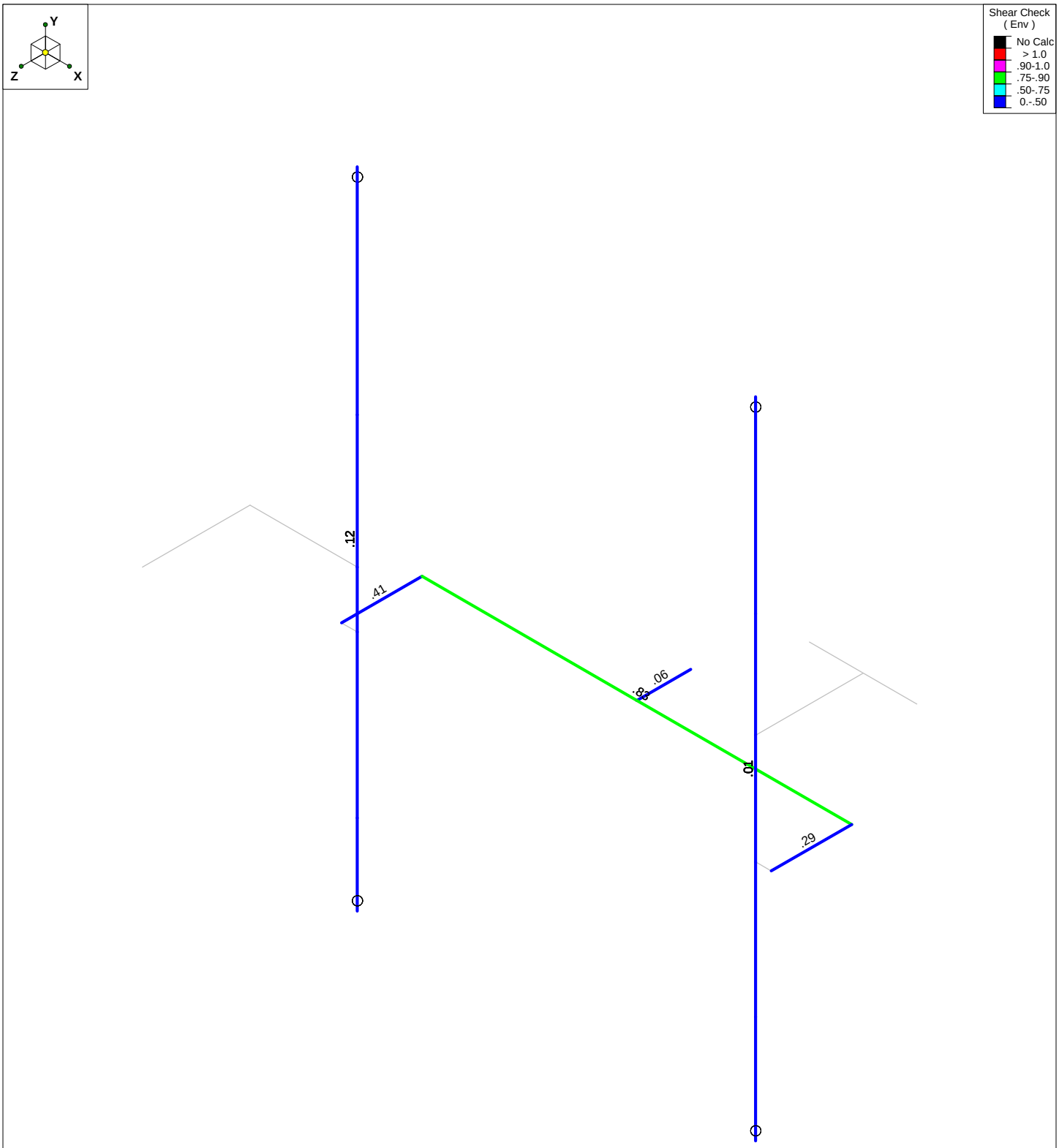

Envelope Only Solution

| | | |
|---|---|---|
| GeoStructural, LLC | CT52XC103 | SK - 1 |
| Jesse Drennen, PE | | July 27, 2018 at 3:58 PM |
| | | CT52XC103_Mount Analysis_R0 1... |



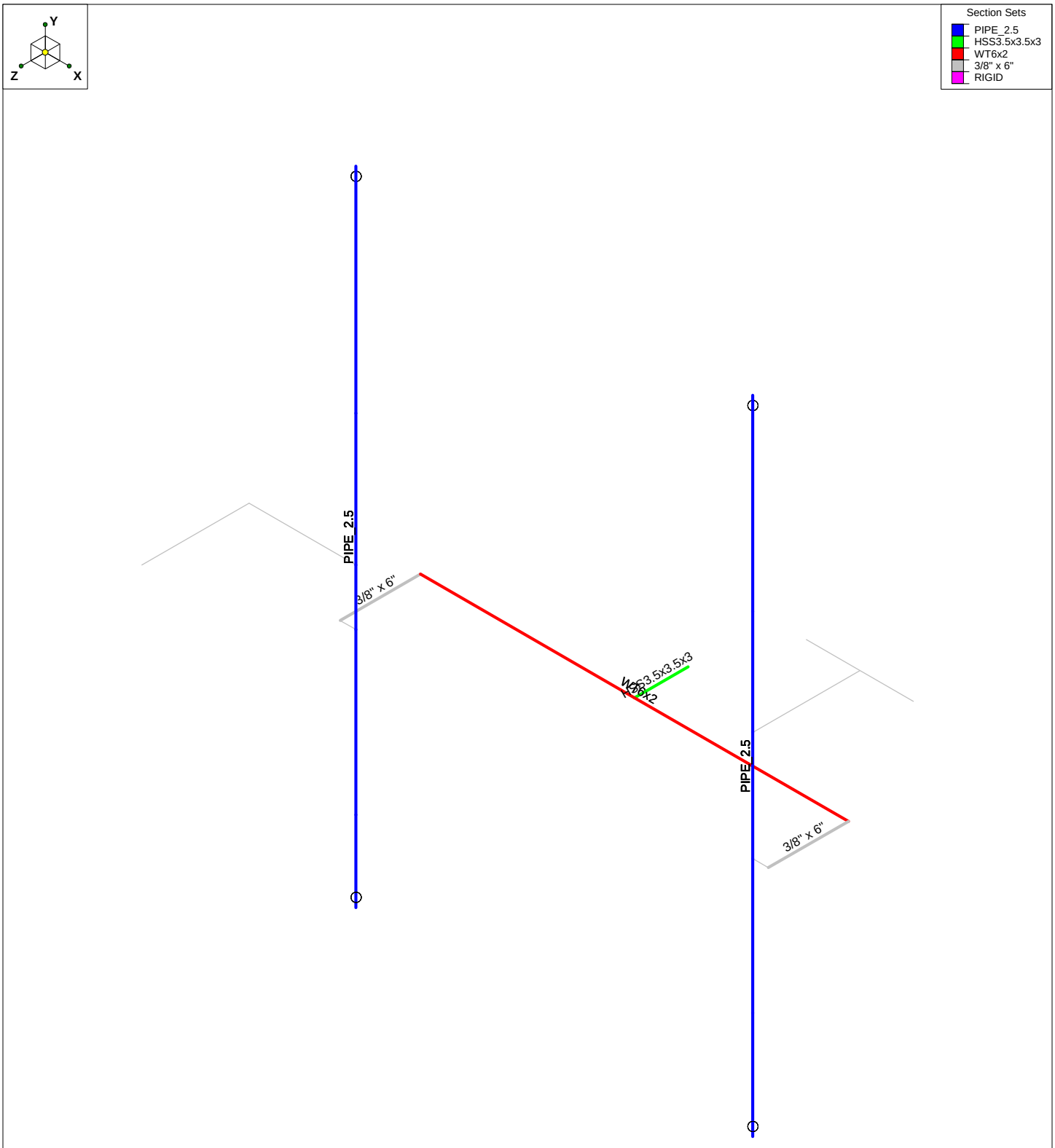

Member Code Checks Displayed (Enveloped)
Envelope Only Solution

| | | |
|---|---|---|
| GeoStructural, LLC | CT52XC103 | SK - 2 |
| Jesse Drennen, PE | | July 27, 2018 at 3:58 PM |
| | | CT52XC103_Mount Analysis_R0 1... |



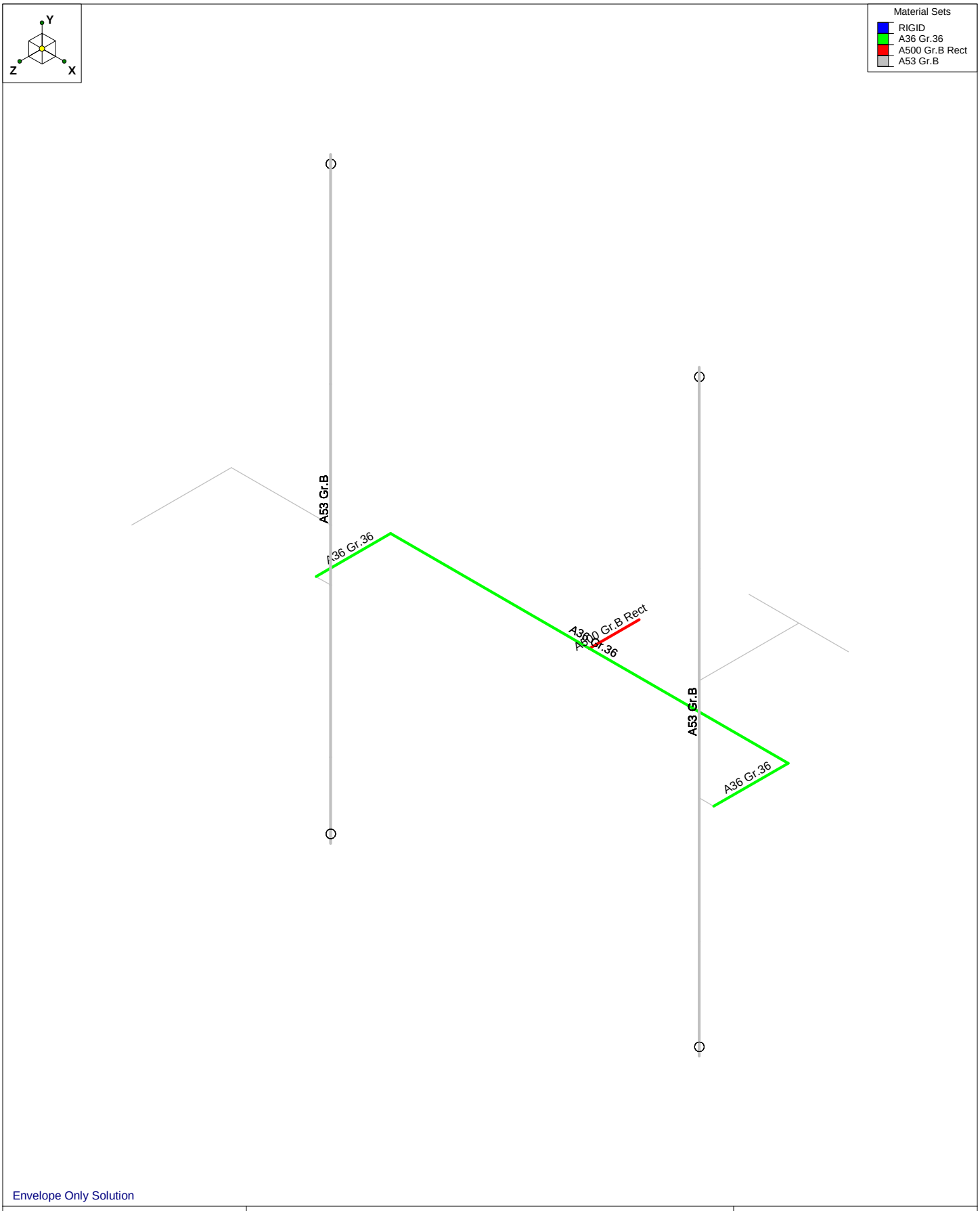

Member Shear Checks Displayed (Enveloped)
Envelope Only Solution

| | | |
|---|---|---|
| GeoStructural, LLC | CT52XC103 | SK - 3 |
| Jesse Drennen, PE | | July 27, 2018 at 3:59 PM |
| | | CT52XC103_Mount Analysis_R0 1... |



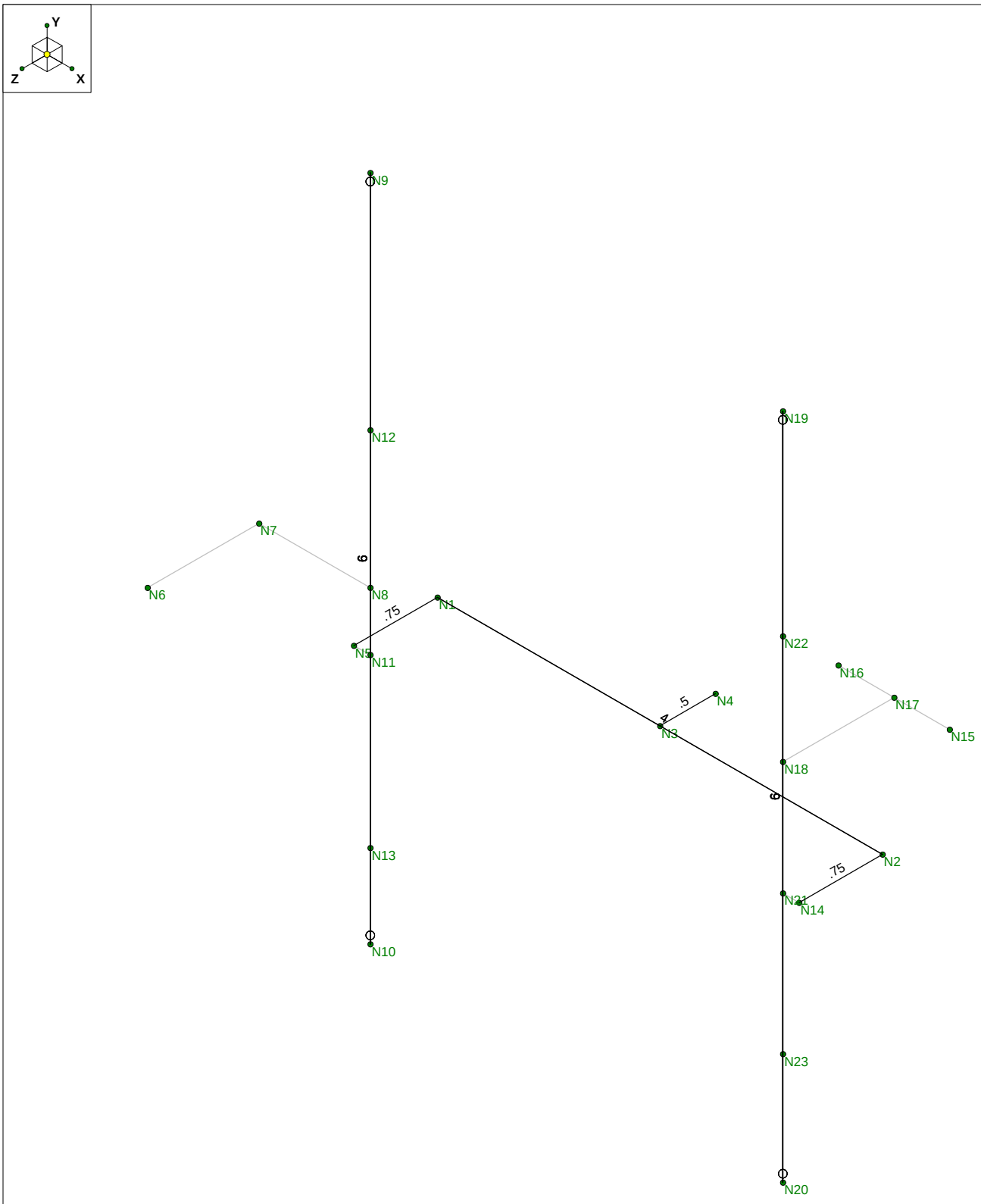

Envelope Only Solution

| | | |
|---|---|---|
| GeoStructural, LLC | CT52XC103 | SK - 4 |
| Jesse Drennen, PE | | July 27, 2018 at 3:59 PM |
| | | CT52XC103_Mount Analysis_R0 1... |



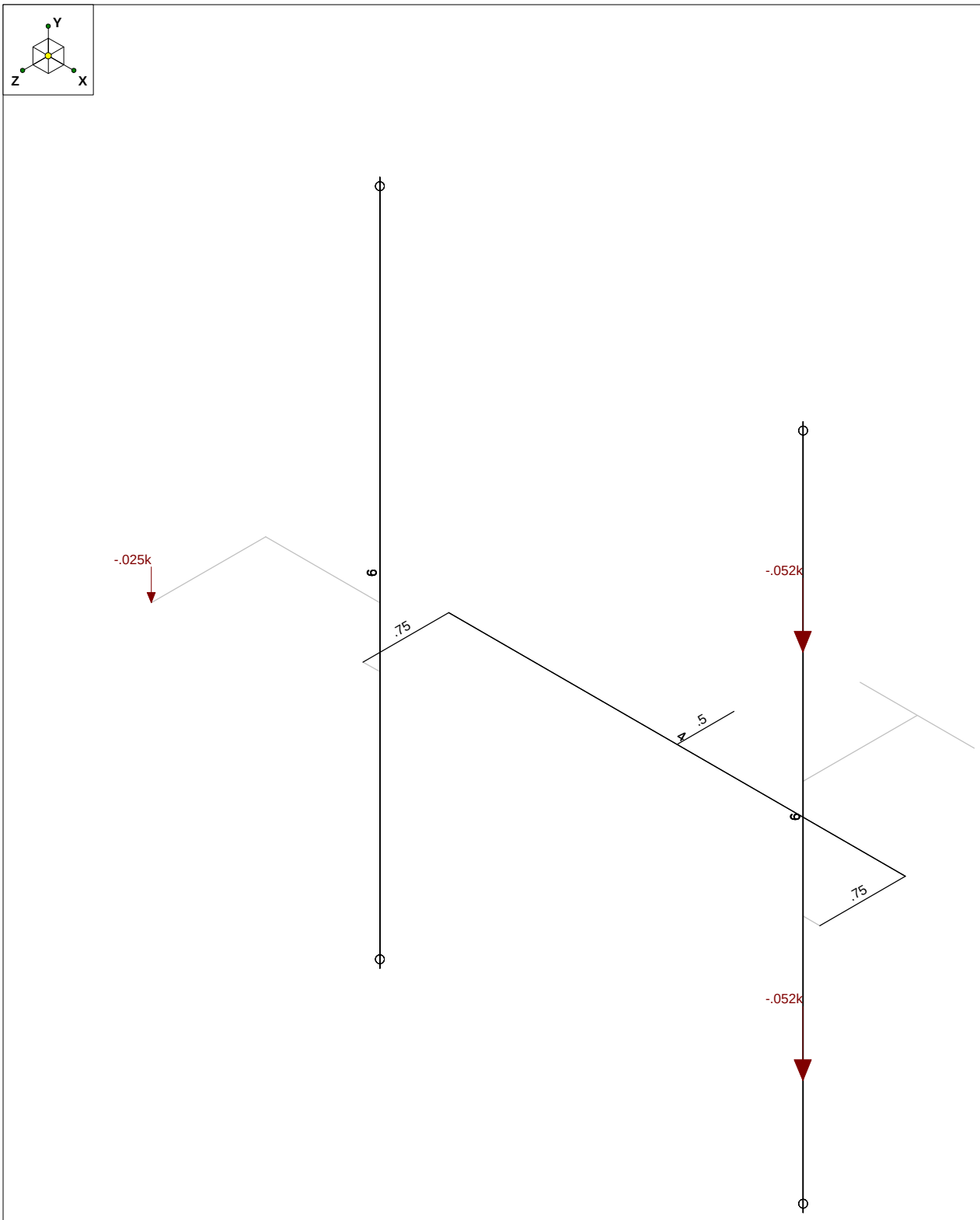

Envelope Only Solution

| | | |
|---|---|---|
| GeoStructural, LLC | CT52XC103 | SK - 5 |
| Jesse Drennen, PE | | July 27, 2018 at 3:59 PM |
| | | CT52XC103_Mount Analysis_R0 1... |



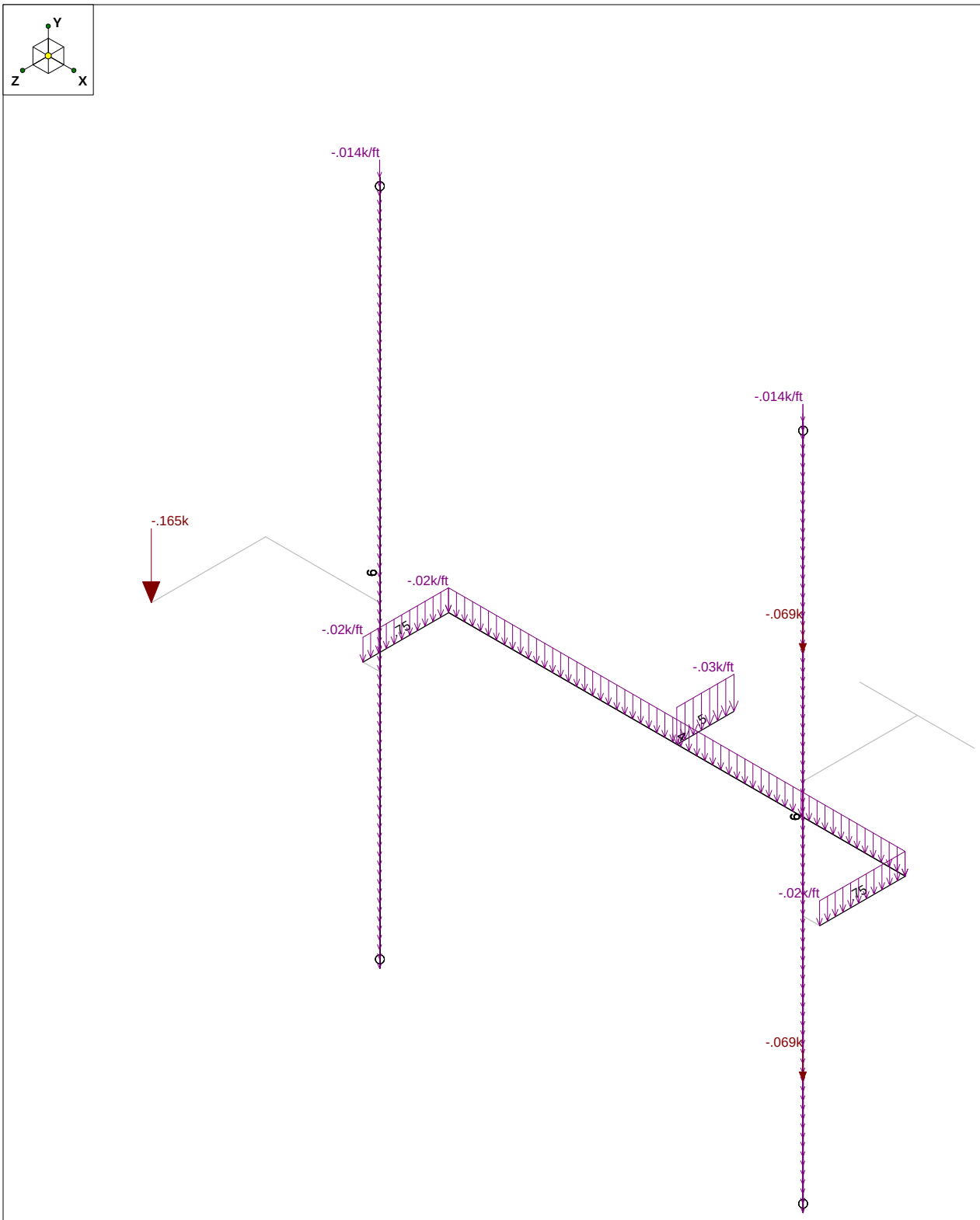

Member Length (ft) Displayed
Envelope Only Solution

| | | |
|---|---|---|
| GeoStructural, LLC | CT52XC103 | SK - 6 |
| Jesse Drennen, PE | | July 27, 2018 at 3:59 PM |
| | | CT52XC103_Mount Analysis_R0 1... |



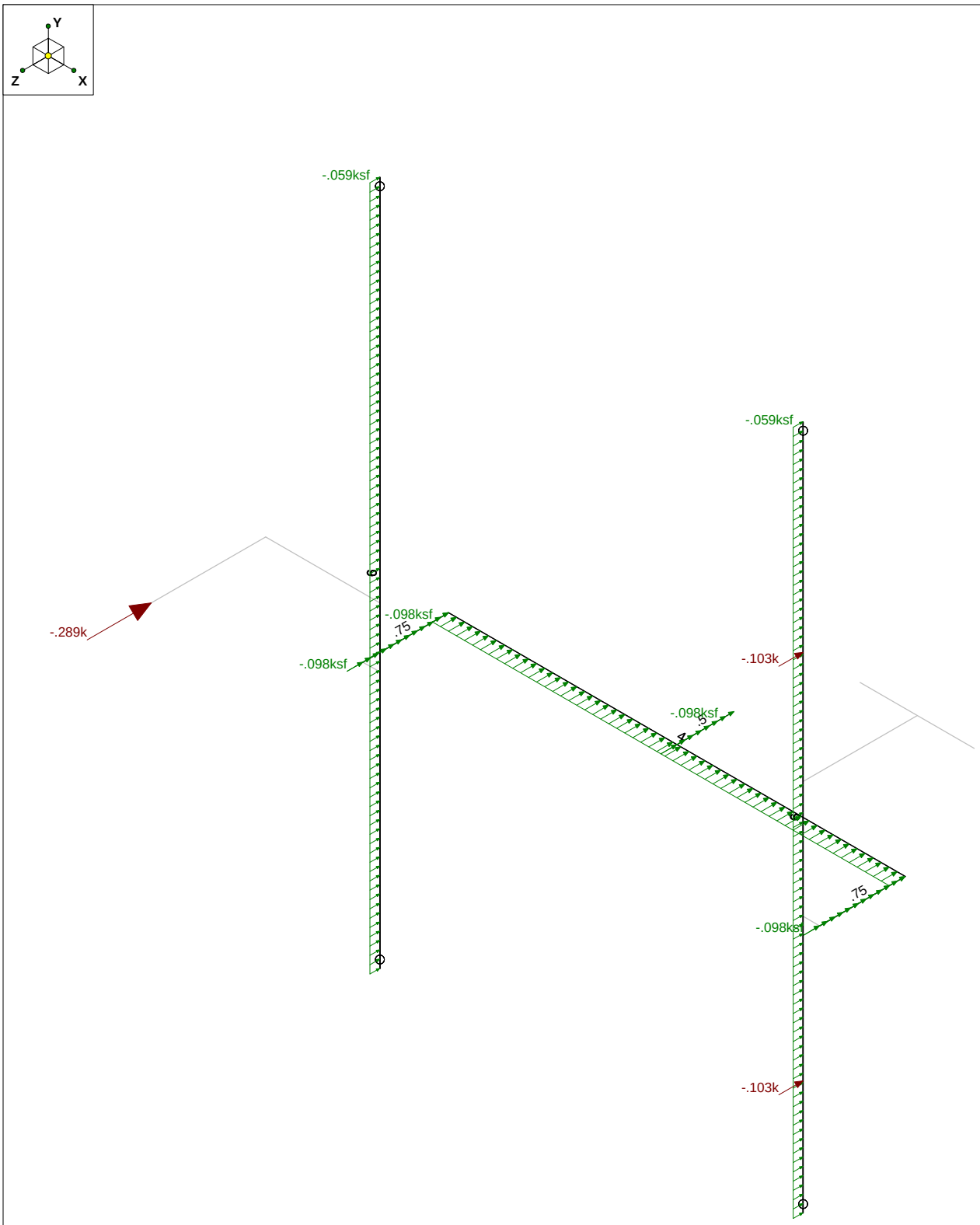

Member Length (ft) Displayed
Loads: BLC 1, D
Envelope Only Solution

| | | |
|---|---|---|
| GeoStructural, LLC | CT52XC103 | SK - 7 |
| Jesse Drennen, PE | | July 27, 2018 at 3:59 PM |
| | | CT52XC103_Mount Analysis_R0 1... |



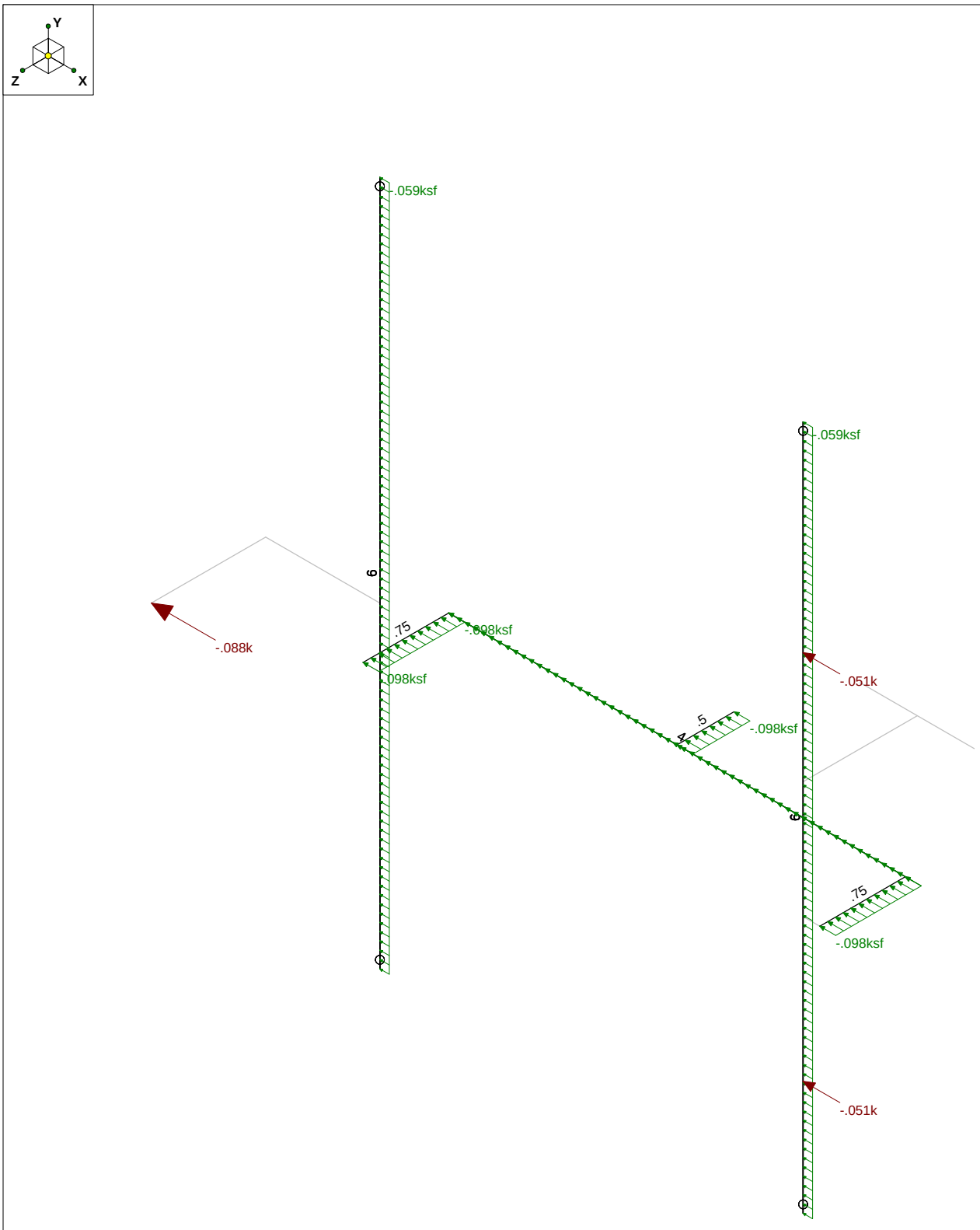

Member Length (ft) Displayed
Loads: BLC 2, Di
Envelope Only Solution

| | | |
|---|---|---|
| GeoStructural, LLC | CT52XC103 | SK - 8 |
| Jesse Drennen, PE | | July 27, 2018 at 3:59 PM |
| | | CT52XC103_Mount Analysis_R0 1... |




Member Length (ft) Displayed
Loads: BLC 5, Woz
Envelope Only Solution

| | | |
|---|---|---|
| GeoStructural, LLC | CT52XC103 | SK - 9 |
| Jesse Drennen, PE | | July 27, 2018 at 3:59 PM |
| | | CT52XC103_Mount Analysis_R0 1... |




Member Length (ft) Displayed
Loads: BLC 6, Wox
Envelope Only Solution

| | | |
|---|---|---|
| GeoStructural, LLC | CT52XC103 | SK - 10 |
| Jesse Drennen, PE | | July 27, 2018 at 3:59 PM |
| | | CT52XC103_Mount Analysis_R0 1... |

## Basic Load Cases

| | BLC Description | Category | X Gravity | Y Gravity | Z Gravity | Joint | Point | Distributed | Area(Me... | Surface(P... |
|---|---|---|---|---|---|---|---|---|---|---|
| 1 | D | DL | | -1 | | 4 | | | | |
| 2 | Di | SL | | | | 4 | | 6 | | |
| 3 | Lm [500] | LL | | | | 1 | | | | |
| 4 | Lv [250] | LL | | | | 2 | | | | |
| 5 | Woz | WL | | | | 4 | | 6 | | |
| 6 | Wox | WL | | | | 4 | | 6 | | |
| 7 | Wiz | WL | | | | 4 | | 6 | | |
| 8 | Wix | WL | | | | 4 | | 6 | | |
| 9 | Ez | EL | | | | 4 | | | | |
| 10 | Ex | EL | | | | 4 | | | | |

## Load Combination Design

| | Description | ASIF | CD | Service | Hot Rol... | Cold Form... | Wood | Concrete | Masonry | Aluminum | Stainless | Connection |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 1) 1.4D | | | | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| 2 | 2) 1.2D+1.0... | | | | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| 3 | 2) 1.2D+1.0... | | | | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| 4 | 2) 1.2D+1.0... | | | | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| 5 | 2) 1.2D+1.0... | | | | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| 6 | 2) 1.2D+1.0... | | | | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| 7 | 2) 1.2D+1.0... | | | | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| 8 | 2) 1.2D+1.0... | | | | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| 9 | 2) 1.2D+1.0... | | | | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| 10 | 2) 1.2D+1.0... | | | | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| 11 | 2) 1.2D+1.0... | | | | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| 12 | 2) 1.2D+1.0... | | | | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| 13 | 2) 1.2D+1.0... | | | | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| 14 | 3) 0.9D+1.0... | | | | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| 15 | 3) 0.9D+1.0... | | | | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| 16 | 3) 0.9D+1.0... | | | | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| 17 | 3) 0.9D+1.0... | | | | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| 18 | 3) 0.9D+1.0... | | | | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| 19 | 3) 0.9D+1.0... | | | | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| 20 | 3) 0.9D+1.0... | | | | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| 21 | 3) 0.9D+1.0... | | | | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| 22 | 3) 0.9D+1.0... | | | | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| 23 | 3) 0.9D+1.0... | | | | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| 24 | 3) 0.9D+1.0... | | | | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| 25 | 3) 0.9D+1.0... | | | | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| 26 | 4) 1.2D+1.0... | | | | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| 27 | 4) 1.2D+1.0... | | | | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| 28 | 4) 1.2D+1.0... | | | | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| 29 | 4) 1.2D+1.0... | | | | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| 30 | 4) 1.2D+1.0... | | | | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| 31 | 4) 1.2D+1.0... | | | | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| 32 | 4) 1.2D+1.0... | | | | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| 33 | 4) 1.2D+1.0... | | | | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| 34 | 4) 1.2D+1.0... | | | | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| 35 | 4) 1.2D+1.0... | | | | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| 36 | 4) 1.2D+1.0... | | | | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| 37 | 4) 1.2D+1.0... | | | | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| 38 | 5) 1.2D+1.5L... | | | | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| 39 | 5) 1.2D+1.5L... | | | | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| 40 | 5) 1.2D+1.5L... | | | | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| 41 | 5) 1.2D+1.5L... | | | | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |

## Load Combination Design (Continued)

| | Description | ASIF | CD | Service | Hot Rol... | Cold Form... | Wood | Concrete | Masonry | Aluminum | Stainless | Connection |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 42 | 5) 1.2D+1.5L... | | | | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| 43 | 5) 1.2D+1.5L... | | | | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| 44 | 5) 1.2D+1.5L... | | | | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| 45 | 5) 1.2D+1.5L... | | | | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| 46 | 5) 1.2D+1.5L... | | | | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| 47 | 5) 1.2D+1.5L... | | | | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| 48 | 5) 1.2D+1.5L... | | | | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| 49 | 5) 1.2D+1.5L... | | | | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| 50 | 6) 1.2D+1.5Lv | | | | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| 51 | 7) (1.2+0.2Sd... | | | | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| 52 | 7) (1.2+0.2Sd... | | | | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| 53 | 7) (1.2+0.2Sd... | | | | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| 54 | 7) (1.2+0.2Sd... | | | | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| 55 | 7) (1.2+0.2Sd... | | | | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| 56 | 7) (1.2+0.2Sd... | | | | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| 57 | 7) (1.2+0.2Sd... | | | | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| 58 | 7) (1.2+0.2Sd... | | | | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| 59 | 7) (1.2+0.2Sd... | | | | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| 60 | 7) (1.2+0.2Sd... | | | | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| 61 | 7) (1.2+0.2Sd... | | | | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| 62 | 7) (1.2+0.2Sd... | | | | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| 63 | 8) (0.9-0.2Sd... | | | | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| 64 | 8) (0.9-0.2Sd... | | | | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| 65 | 8) (0.9-0.2Sd... | | | | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| 66 | 8) (0.9-0.2Sd... | | | | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| 67 | 8) (0.9-0.2Sd... | | | | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| 68 | 8) (0.9-0.2Sd... | | | | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| 69 | 8) (0.9-0.2Sd... | | | | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| 70 | 8) (0.9-0.2Sd... | | | | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| 71 | 8) (0.9-0.2Sd... | | | | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| 72 | 8) (0.9-0.2Sd... | | | | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| 73 | 8) (0.9-0.2Sd... | | | | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| 74 | 8) (0.9-0.2Sd... | | | | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |

## Hot Rolled Steel Properties

| | Label | E [ksi] | G [ksi] | Nu | Therm (\1E... | Density[k/ft... | Yield[ksi] | Ry | Fu[ksi] | Rt |
|---|---|---|---|---|---|---|---|---|---|---|
| 1 | A36 Gr.36 | 29000 | 11154 | .3 | .65 | .49 | 36 | 1.5 | 58 | 1.2 |
| 2 | A572 Gr.50 | 29000 | 11154 | .3 | .65 | .49 | 50 | 1.1 | 65 | 1.1 |
| 3 | A992 | 29000 | 11154 | .3 | .65 | .49 | 50 | 1.1 | 65 | 1.1 |
| 4 | A500 Gr.B RND | 29000 | 11154 | .3 | .65 | .49 | 42 | 1.4 | 58 | 1.3 |
| 5 | A500 Gr.B Rect | 29000 | 11154 | .3 | .65 | .49 | 46 | 1.4 | 58 | 1.3 |
| 6 | A53 Gr.B | 29000 | 11154 | .3 | .65 | .49 | 35 | 1.6 | 60 | 1.2 |
| 7 | A500 Gr.B RND_1 | 29000 | 11154 | .3 | .65 | .527 | 42 | 1.4 | 58 | 1.3 |
| 8 | A500 Gr.B Rect_1 | 29000 | 11154 | .3 | .65 | .527 | 46 | 1.4 | 58 | 1.3 |
| 9 | A1085 | 29000 | 11154 | .3 | .65 | .49 | 50 | 1.4 | 65 | 1.3 |

## Hot Rolled Steel Section Sets

| | Label | Shape | Type | Design List | Material | Design R... | A [in2] | Iyy [in4] | Izz [in4] | J [in4] |
|---|---|---|---|---|---|---|---|---|---|---|
| 1 | PIPE_1.5 | PIPE_1.5 | Beam | Pipe | A53 Gr.B | Typical | .749 | .293 | .293 | .586 |
| 2 | PIPE_2.0 | PIPE_2.0 | Beam | Pipe | A53 Gr.B | Typical | 1.02 | .627 | .627 | 1.25 |
| 3 | PIPE_2.5 | PIPE_2.5 | Beam | Pipe | A53 Gr.B | Typical | 1.61 | 1.45 | 1.45 | 2.89 |
| 4 | PIPE_3.0 | PIPE_3.0 | Beam | Pipe | A53 Gr.B | Typical | 2.07 | 2.85 | 2.85 | 5.69 |
| 5 | PIPE_3.5 | PIPE_3.5 | Beam | Pipe | A53 Gr.B | Typical | 2.5 | 4.52 | 4.52 | 9.04 |
| 6 | PIPE_4.0 | PIPE_4.0 | Beam | Pipe | A53 Gr.B | Typical | 2.96 | 6.82 | 6.82 | 13.6 |

## Hot Rolled Steel Section Sets (Continued)

| | Label | Shape | Type | Design List | Material | Design R... | A [in2] | Iyy [in4] | Izz [in4] | J [in4] |
|---|---|---|---|---|---|---|---|---|---|---|
| 7 | PIPE_5.0 | PIPE_5.0 | Beam | Pipe | A53 Gr.B | Typical | 4.01 | 14.3 | 14.3 | 28.6 |
| 8 | HSS2x2x3 | HSS2x2x3 | Beam | Tube | A500 Gr.B R... | Typical | 1.19 | .641 | .641 | 1.09 |
| 9 | HSS3.5x3.5x3 | HSS3.5x3.5x3 | Beam | Tube | A500 Gr.B R... | Typical | 2.24 | 4.05 | 4.05 | 6.56 |
| 10 | HSS4x4x3 | HSS4x4x3 | Beam | Tube | A500 Gr.B R... | Typical | 2.58 | 6.21 | 6.21 | 10 |
| 11 | HSS4x4x4 | HSS4x4x4 | Beam | Tube | A500 Gr.B R... | Typical | 3.37 | 7.8 | 7.8 | 12.8 |
| 12 | HSS5x5x4 | HSS5x5x4 | Beam | Tube | A500 Gr.B R... | Typical | 4.3 | 16 | 16 | 25.8 |
| 13 | C3x3.5 | C3x3.5 | Beam | Channel | A36 Gr.36 | Typical | 1.09 | .169 | 1.57 | .023 |
| 14 | C4x4.5 | C4x4.5 | Beam | Channel | A36 Gr.36 | Typical | 1.38 | .289 | 3.65 | .032 |
| 15 | C5x6.7 | C5x6.7 | Beam | Channel | A36 Gr.36 | Typical | 1.97 | .47 | 7.48 | .055 |
| 16 | L2.5x2.5x3 | L2.5x2.5x3 | Beam | Single Angle | A36 Gr.36 | Typical | .901 | .535 | .535 | .011 |
| 17 | L2.5x2.5x4 | L2.5x2.5x4 | Beam | Single Angle | A36 Gr.36 | Typical | 1.19 | .692 | .692 | .026 |
| 18 | L3x3x3 | L3x3x3 | Beam | Single Angle | A36 Gr.36 | Typical | 1.09 | .948 | .948 | .014 |
| 19 | L3x3x4 | L3x3x4 | Beam | Single Angle | A36 Gr.36 | Typical | 1.44 | 1.23 | 1.23 | .031 |
| 20 | L3x3x6 | L3x3x6 | Beam | Single Angle | A36 Gr.36 | Typical | 2.11 | 1.75 | 1.75 | .101 |
| 21 | L3.5x3.5x4 | L3.5x3.5x4 | Beam | Single Angle | A36 Gr.36 | Typical | 1.7 | 2 | 2 | .039 |
| 22 | L4x4x4 | L4x4x4 | Beam | Single Angle | A36 Gr.36 | Typical | 1.93 | 3 | 3 | .044 |
| 23 | L5x3x6 | L5x3x6 | Beam | Single Angle | A36 Gr.36 | Typical | 2.86 | 2.01 | 7.35 | .141 |
| 24 | 3/8"x2.5" | 3/8"x2.5" | Beam | Single Angle | A36 Gr.36 | Typical | .938 | .011 | .488 | .04 |
| 25 | 1/2 x 6 | 1/2 x 6 | Beam | BAR | A36 Gr.36 | Typical | 3 | 9 | .063 | .237 |
| 26 | 5/8SR | 5/8SR | Beam | BAR | A36 Gr.36 | Typical | .307 | .007 | .007 | .015 |
| 27 | LL2.5x2.5x3x3 | LL2.5x2.5x3x3 | Beam | Double Angle (3/8... | A36 Gr.36 | Typical | 1.8 | 2.46 | 1.07 | .023 |
| 28 | WT6x2 | WT6x2 | Beam | W_Tee | A36 Gr.36 | Typical | 2.797 | 6.753 | .967 | .115 |
| 29 | 3/8" x 6" | 3/8" x 6" | Beam | BAR | A36 Gr.36 | Typical | 2.25 | .026 | 6.75 | .101 |

## Member Primary Data

| | Label | I Joint | J Joint | K Joint | Rotate(deg) | Section/Shape | Type | Design List | Material | Design Rules |
|---|---|---|---|---|---|---|---|---|---|---|
| 1 | M1 | N1 | N2 | | 90 | WT6x2 | Beam | W_Tee | A36 Gr.36 | Typical |
| 2 | M2 | N4 | N3 | | | HSS3.5x3.5x3 | Beam | Tube | A500 Gr.B... | Typical |
| 3 | M3 | N5 | N1 | | | 3/8" x 6" | Beam | BAR | A36 Gr.36 | Typical |
| 4 | M4 | N6 | N7 | | | RIGID | None | None | RIGID | Typical |
| 5 | M5 | N7 | N8 | | | RIGID | None | None | RIGID | Typical |
| 6 | M6 | N9 | N10 | | | PIPE_2.5 | Beam | Pipe | A53 Gr.B | Typical |
| 7 | M7 | N5 | N11 | | | RIGID | None | None | RIGID | Typical |
| 8 | M8 | N14 | N2 | | | 3/8" x 6" | Beam | BAR | A36 Gr.36 | Typical |
| 9 | M9 | N15 | N16 | | | RIGID | None | None | RIGID | Typical |
| 10 | M10 | N17 | N18 | | | RIGID | None | None | RIGID | Typical |
| 11 | M11 | N19 | N20 | | | PIPE_2.5 | Beam | Pipe | A53 Gr.B | Typical |
| 12 | M12 | N14 | N21 | | | RIGID | None | None | RIGID | Typical |

## Envelope Joint Reactions

| | Joint | | X [k] | LC | Y [k] | LC | Z [k] | LC | MX [k-ft] | LC | MY [k-ft] | LC | MZ [k-ft] | LC |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | N4 | max | .447 | 17 | .893 | 32 | .861 | 2 | .115 | 14 | .754 | 16 | .358 | 11 |
| 2 | | min | -.447 | 11 | .223 | 14 | -.861 | 20 | -1.27 | 32 | -.737 | 10 | -.118 | 29 |
| 3 | Totals: | max | .447 | 17 | .893 | 32 | .861 | 2 | | | | | | |
| 4 | | min | -.447 | 11 | .223 | 14 | -.861 | 20 | | | | | | |

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

| | Member | Shape | Code Check | Loc[ft] | LC | Shear... | Loc[ft] | Dir | LC | phi*Pnc... | phi*Pnt ... | phi*Mn ... | phi*Mn ... | Cb | Eqn |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | M1 | WT6x2 | .936 | 2 | 2 | .835 | 2 | z | 32 | 63.798 | 90.619 | 9.205 | 1.229 | 1... | H1-1b |
| 2 | M3 | 3/8" x 6" | .618 | .75 | 15 | .411 | .75 | y | 29 | 50.616 | 72.9 | .57 | 9.113 | 1... | H1-1b |
| 3 | M8 | 3/8" x 6" | .292 | .75 | 10 | .295 | .75 | y | 5 | 50.616 | 72.9 | .57 | 9.113 | 1... | H1-1b |
| 4 | M2 | HSS3.5x3.... | .149 | 0 | 33 | .062 | 0 | z | 11 | 92.612 | 92.736 | 9.522 | 9.522 | 1... | H1-1b |

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

| | Member | Shape | Code Check | Loc[ft] | LC | Shear... | Loc[ft] | Dir | LC | phi*Pnc... | phi*Pnt ... | phi*Mn ... | phi*Mn ... | Cb | Eqn |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 5 | M6 | PIPE_2.5 | .097 | 3.75 | 31 | .118 | 3.75 | | 2 | 37.774 | 50.715 | 3.596 | 3.596 | 4... | H1-1b |
| 6 | M11 | PIPE_2.5 | .089 | 3.75 | 8 | .011 | 3.75 | | 8 | 37.774 | 50.715 | 3.596 | 3.596 | 2... | H1-1b |

Sprint®

| | |
|---|---|
| **SITE NAME:** | CUTTER LANE |
| **SITE NUMBER:** | CT52XC103 |
| **AUGMENT ID:** | CT-HFD0097Q17.1 |
| **SITE ADDRESS:** | 58A MONTANO ROAD<br>GLASTONBURY, CT 06033 |
| **JURISDICTION:** | TOWN OF GLASTONBURY / CT SITING COUNCIL |
| **SITE TYPE:** | EXISTING 119' MONOPOLE |
| **PROGRAM:** | DO MACRO UPGRADE EQUIPMENT DEPLOYMENT |

## PROJECT INFORMATION

**SITE INFORMATION**

| | |
|---|---|
| LATTITUDE:<br>(PER SBA RECORD) | 41° 41' 58.00" N<br>(41.6994°) |
| LONGITUDE:<br>(PER SBA RECORD) | 72° 33' 50.40" W<br>(-72.5640°) |
| GROUND ELEVATION: | 265'± AMSL (PER GOOGLE EARTH) |
| STRUCTURE HEIGHT: | 119'± AGL (FROM RECORD STRUCTURAL) |
| STRUCTURE TYPE: | MONOPOLE |
| ZONING JURISDICTION | TOWN OF GLASTONBURY / CT SITING COUNCIL |
| ZONING DISTRICT/<br>OCCUPANCY: | AA (RESIDENCE AA) |
| COUNTY: | HARTFORD |

**APPLICANT**

SPRINT
1 INTERNATIONAL BLVD. SUITE 800
MAHWAH, NJ 07495

**PROPERTY OWNER:**

N/F ROSE MARIE SHAW
58 MONTANO ROAD
GLASTONBURY, CT 06033

**TOWER OWNER:**

SBA TOWERS II LLC
8051 CONGRESS AVENUE
BOCA RATON, FL 33487
(561) 995-7670

SBA SITE ID: CT13555-S

SBA SITE NAME: MONTANO

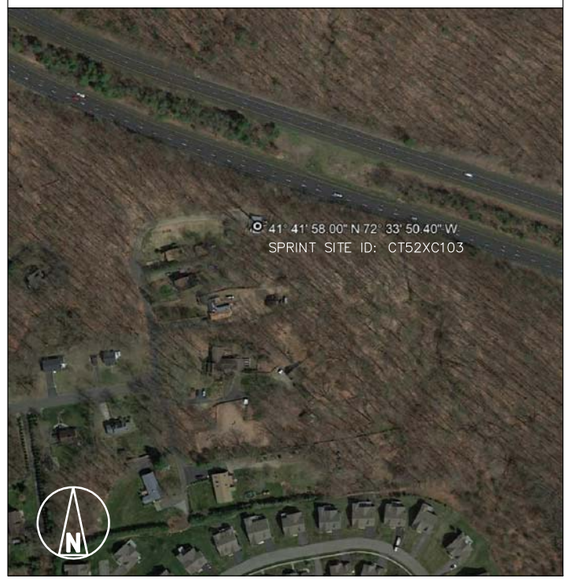
**SBA CONTACT:**

STEPHEN ROTH
(860) 539-4920
SRoth@sbasite.com

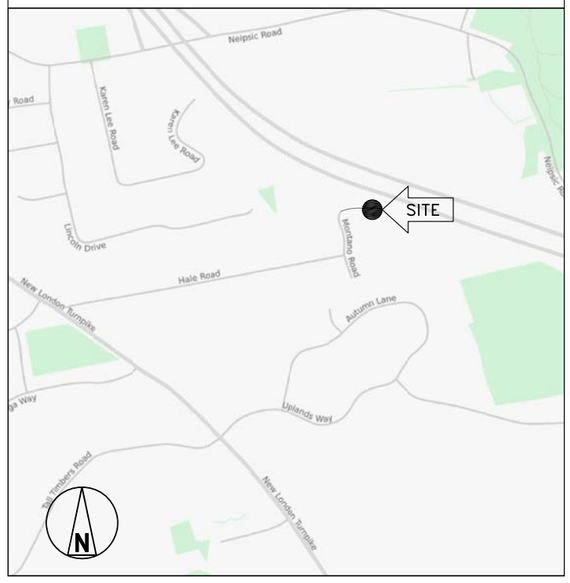
CALL CONNECTICUT ONE CALL
(800) 922-4455
CALL 3 WORKING DAYS
BEFORE YOU DIG!

811 Know what's below. Call before you dig.
www.call811.com

## LOCATION MAP N.T.S.




## AREA MAP N.T.S.




## SCOPE OF WORK

1. REMOVE (1) EXISTING SPRINT (CLEARWIRE) TOWER TOP JUNCTION BOX.
2. REMOVE EXISTING CABLING AND REPLACE WITH (1) HYBRID CABLE.
3. REMOVE (3) EXISTING SPRINT (CLEARWIRE) PANEL ANTENNAS AND REPLACE WITH (3) NEW SPRINT PANEL ANTENNAS.
4. REMOVE (3) EXISTING SPRINT (CLEARWIRE) RRHS.
5. REMOVE EXISTING SPRINT (CLEARWIRE) EQUIPMENT CABINET AND REPLACE WITH NEW SPRINT EQUIPMENT CABINET.
6. INSTALL NEW BATTERY PLINTH CABINET.
7. REMOVE EXISTING SPRINT (CLEARWIRE) GPS ANTENNA AND REPLACE WITH NEW SPRINT GPS ANTENNA.
8. INSTALL NEW SPRINT PPC MOUNTED TO A NEW H-FRAME.

## GENERAL NOTES

1. THIS IS AN UNMANNED TELECOMMUNICATION FACILITY AND NOT FOR HUMAN HABITATION:
   - ADA COMPLIANCE NOT REQUIRED.
   - POTABLE WATER OR SANITARY SERVICE IS NOT REQUIRED.
   - NO OUTDOOR STORAGE OR ANY SOLID WASTE RECEPTACLES REQUIRED.
2. CONTRACTOR SHALL VERIFY ALL PLANS, EXISTING DIMENSIONS, AND CONDITIONS ON JOB SITE. CONTRACTOR SHALL IMMEDIATELY NOTIFY THE ARCHITECT/ENGINEER IN WRITING OF ANY DISCREPANCIES BEFORE PROCEEDING WITH THE WORK. FAILURE TO NOTIFY THE ARCHITECT/ENGINEER PLACE THE RESPONSIBILITY ON THE CONTRACTOR TO CORRECT THE DISCREPANCIES AT THE CONTRACTOR'S EXPENSE.
3. REFER TO THE ANTENNA MOUNT ANALYSIS PREPARED BY GEOSTRUCTURAL DATED JULY 27, 2018.

## DRAWING INDEX

| SHEET NO. | SHEET DESCRIPTION | REV. NO. |
|---|---|---|
| T-1 | TITLE SHEET | 1 |
| SP-1 | OUTLINE SPECIFICATIONS | 1 |
| SP-2 | OUTLINE SPECIFICATIONS | 1 |
| SP-3 | OUTLINE SPECIFICATIONS | 1 |
| A-1 | COMPOUND PLAN | 1 |
| A-2 | ELEVATION AND ANTENNA PLANS | 1 |
| A-3 | TOWER EQUIPMENT DETAILS | 1 |
| S-1 | ANTENNA AND RRH MOUNTING DETAILS | 1 |
| S-2 | EQUIPMENT DETAILS | 1 |
| E-1 | ELECTRICAL AND GROUNDING DETAILS | 1 |
| E-2 | ELECTRICAL AND GROUNDING DETAILS | 1 |
| RF-1 | RF DATA SHEET | 1 |
| RF-2 | PLUMBING DIAGRAM AND RAN WIRING | 1 |

## CODE COMPLIANCE

1. 2016 CONNECTICUT STATE BUILDING CODE WITH AMENDMENTS.
2. 2017 NATIONAL ELECTRICAL CODE WITH AMENDMENTS
3. TIA-EIA-222-G

BASED ON INFORMATION PROVIDED BY SPRINT, THIS TELECOMMUNICATIONS EQUIPMENT DEPLOYMENT IS CONSIDERED AN ELIGIBLE FACILITY UNDER THE TAX RELIEF ACT OF 2012, 47 USC 1455(A), AND IS SUBJECT TO AN EXPEDITED ELIGIBLE FACILITIES REQUEST/REVIEW AND ZONING PRE-EMPTION FOR LOCAL DISCRETIONARY PERMITS (VARIANCE, SPECIAL PERMIT, SITE PLAN REVIEW).

## APPROVALS

| TITLE | SIGNATURE | DATE |
|---|---|---|
| PROJECT MANAGER: | | |
| CONSTRUCTION: | | |
| RF ENGINEER: | | |
| ZONING/SITE ACQ: | | |
| OPERATIONS: | | |
| TOWER OWNER: | | |

THE FOLLOWING PARTIES HEREBY APPROVE AND ACCEPT THESE DOCUMENTS AND AUTHORIZE THE CONTRACTOR TO PROCEED WITH THE CONSTRUCTION DESCRIBED HEREIN. ALL DOCUMENTS ARE SUBJECT TO REVIEW BY THE LOCAL BUILDING DEPARTMENT AND MAY IMPOSE CHANGES OR MODIFICATIONS.


Sprint®
1 INTERNATIONAL BLVD, SUITE 800
MAHWAH, NJ 07495
TEL: (800) 357-7641

SBA
SBA COMMUNICATIONS CORP.
134 FLANDERS ROAD, SUITE 125
WESTBOROUGH, MA 01581 TEL: (508) 251-0720

ProTerra DESIGN GROUP, LLC
4 Bay Road, Building A
Suite 200
Hadley, MA 01035 TEL: (413) 320-4918


STATE OF CONNECTICUT
THOMAS E. JOHNSON
No. 28192
LICENSED PROFESSIONAL ENGINEER
11/9/18

CHECKED BY: JMM/TEJ

APPROVED BY: JMM/TEJ

### SUBMITTALS

| REV. | DATE | DESCRIPTION | BY |
|---|---|---|---|
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| 1 | 11/09/18 | CONSTRUCTION REVISED | PN |
| 0 | 07/27/18 | ISSUED FOR CONSTRUCTION | PN |

SITE NUMBER:
CT52XC103
SITE NAME:
CUTTER LANE
SITE ADDRESS:
58A MONTANO ROAD
GLASTONBURY, CT 06033

SHEET TITLE
TITLE SHEET

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

A. TOP HAT
B. HOW TO INSTALL A NEW CABINET
C. BASE BAND UNIT IN EXISTING UNIT
D. INSTALLATION OF BATTERIES
E. INSTALLATION OF HYBRID CABLE
F. INSTALLATION OF RRH'S
G. CABLING
H. TS–0200 REV 4 – ANTENNA LINE ACCEPTANCE STANDARDS
I. SPRINT CELL SITE ENGINEERING NOTICE – EN 2012–001, REV 1.
J. COMMISSIONING MOPS
K. SPRINT CELL SITE ENGINEERING NOTICE – EN–2013–002
L. SPRINT ENGINEERING LETTER – EL–0504
M. SPRINT ENGINEERING LETTER – EL–0568
N. SPRINT TECHNICAL SPECIFICATION – TS–0193

1.15 USE OF ELECTRONIC PROJECT MANAGEMENT SYSTEMS:

A. CONTRACTOR WILL UTILIZE ITS BEST EFFORTS TO WORK WITH SPRINT ELECTRONIC PROJECT MANAGEMENT SYSTEMS. CONTRACTOR UNDERSTANDS THAT SUFFICIENT INTERNET ACCESS, EQUIVALENT TO "BROADBAND" OR BETTER, IS REQUIRED TO TIMELY AND EFFECTIVELY UTILIZE SPRINT DATA AND DOCUMENT MANAGEMENT SYSTEMS AND AGREES TO MAINTAIN APPROPRIATE CONNECTIONS FOR CONTRACTOR'S STAFF AND OFFICES THAT ARE COMPATIBLE WITH SPRINT DATA AND DOCUMENT 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. 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

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:

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.

**CONTINUE SHEET SP-2**

Sprint
1 INTERNATIONAL BLVD, SUITE 800
MAHWAH, NJ 07495
TEL: (800) 357-7641

SBA
SBA COMMUNICATIONS CORP.
134 FLANDERS ROAD, SUITE 125
WESTBOROUGH, MA 01581 TEL: (508) 251-0720

ProTerra DESIGN GROUP, LLC
4 Bay Road, Building A
Suite 200
Hadley, MA 01035 TEL: (413) 320–4918

STATE OF CONNECTICUT
THOMAS E. JOHNSON
No. 28192
LICENSED
PROFESSIONAL ENGINEER
11/9/18

CHECKED BY: JMM/TEJ

APPROVED BY: JMM/TEJ

SUBMITTALS

| REV. | DATE | DESCRIPTION | BY |
|---|---|---|---|
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| 1 | 11/09/18 | CONSTRUCTION REVISED | PN |
| 0 | 07/27/18 | ISSUED FOR CONSTRUCTION | PN |

SITE NUMBER:
CT52XC103
SITE NAME:
CUTTER LANE
SITE ADDRESS:
58A MONTANO ROAD
GLASTONBURY, CT 06033

SHEET TITLE
OUTLINE SPECIFICATIONS

SHEET NUMBER
SP–1

CONTINUED FROM SP-1:

## SECTION 01 400 - SUBMITTALS, TESTS, AND INSPECTIONS

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.

C. 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 SPRINT TS–0200 CURRENT VERSION 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: 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.
1. 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.
2. EXPERIENCE IN SOILS, CONCRETE, MASONRY, AGGREGATE, AND ASPHALT TESTING USING ASTM, AASJTO, AND OTHER METHODS IS NEEDED.
3. 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)
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

E. 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.

F. 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 01 500 - PROJECT REPORTING

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. SHELTER 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.

## SECTION 07 500 - ROOF CUTTING, PATCHING AND REPAIR

SUMMARY:
THIS SECTION SPECIFIES CUTTING AND PATCHING EXISTING ROOFING SYSTEMS WHERE CONDUIT OR CABLES EXIT THE BUILDING ONTO THE ROOF OR BUILDING–MOUNTED ANTENNAS, AND AS REQUIRED FOR WATERTIGHT PERFORMANCE. ROOFTOP ENTRY OPENINGS IN MEMBRANE ROOFTOPS SHALL BE CONSTRUCTED TO COMPLY WITH LANDLORD, ANY EXISTING WARRANTY, AND LOCAL JURISDICTIONAL STANDARDS.

### 1.4 SUBMITTALS:

A. PRE–CONSTRUCTION ROOF PHOTOS: COMPLETE A ROOF INSPECTION PRIOR TO THE INSTALLATION OF SPRINT EQUIPMENT ON ANY ROOFTOP BUILD. AT A MINIMUM INSPECT AND PHOTOGRAPH (MINIMUM 3 EA.) ALL AREAS IMPACTED BY THE ADDITION OF THE SPRINT EQUIPMENT.

B. PROVIDE SIMILAR PHOTOGRAPHS SHOWING ROOF CONDITIONS AFTER CONSTRUCTION (MINIMUM 3 EA.)

C. ROOF INSPECTION PHOTOGRAPHS SHOULD BE UPLOADED WITH CLOSEOUT PHOTOGRAPHS.

## SECTION 09 900 - PAINTING

### QUALITY ASSURANCE:

A. COMPLY WITH GOVERNING CODES AND REGULATIONS. PROVIDE PRODUCTS OF ACCEPTABLE MANUFACTURERS WHICH HAVE BEEN IN SATISFACTORY USE IN SIMILAR SERVICE FOR THREE YEARS. USE EXPERIENCED INSTALLERS. DELIVER, HANDLE, AND STORE MATERIALS IN ACCORDANCE WITH MANUFACTURER'S INSTRUCTIONS.

B. COMPLY WITH ALL ENVIRONMENTAL REGULATIONS FOR VOLATILE ORGANIC COMPOUNDS.

**CONTINUE SHEET SP-3**

Sprint
1 INTERNATIONAL BLVD, SUITE 800
MAHWAH, NJ 07495
TEL: (800) 357-7641

SBA
SBA COMMUNICATIONS CORP.
134 FLANDERS ROAD, SUITE 125
WESTBOROUGH, MA 01581 TEL: (508) 251-0720

ProTerra
DESIGN GROUP, LLC
4 Bay Road, Building A
Suite 200
Hadley, MA 01035 PH: (413) 320–4918

STATE OF CONNECTICUT
THOMAS E. JOHNSON
No. 28192
LICENSED
PROFESSIONAL ENGINEER
11/9/18

CHECKED BY: JMM/TEJ

APPROVED BY: JMM/TEJ

SUBMITTALS

| REV. | DATE | DESCRIPTION | BY |
|---|---|---|---|
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| 1 | 11/09/18 | CONSTRUCTION REVISED | PN |
| 0 | 07/27/18 | ISSUED FOR CONSTRUCTION | PN |

SITE NUMBER:
CT52XC103
SITE NAME:
CUTTER LANE
SITE ADDRESS:
58A MONTANO ROAD
GLASTONBURY, CT 06033

SHEET TITLE
OUTLINE SPECIFICATIONS

SHEET NUMBER
SP–2

**CONTINUED FROM SP-2:**

## MATERIALS:

A. MANUFACTURERS: BENJAMIN MOORE, ICI DEVOE COATINGS, PPG, SHERWIN WILLIAMS OR APPROVED EQUAL. PROVIDE PREMIUM GRADE, PROFESSIONAL-QUALITY PRODUCTS FOR COATING SYSTEMS.

## PAINT SCHEDULE:

A. EXTERIOR ANTENNAE AND ANTENNA MOUNTING HARDWARE: ONE COAT OF PRIMER AND TWO FINISH COATS. PAINT FOR ANTENNAE SHALL BE NON-METALLIC BASED AND CONTAIN NO METALLIC PARTICLES. PROVIDE COLORS AND PATTERNS AS REQUIRED TO MASK APPEARANCE OF ANTENNAE ON ADJACENT BUILDING SURFACES AND AS ACCEPTABLE TO THE OWNER. REFER TO ANTENNA MANUFACTURER'S INSTRUCTIONS WHENEVER POSSIBLE.

B. ROOF TOP CONSTRUCTION: TOUCH UP – PREPARE SURFACES TO BE REPAIRED. FOLLOW INDUSTRY STANDARDS AND REQUIREMENTS OF OWNER TO MATCH EXISTING COATING AND FINISH.

## PAINTING APPLICATION:

1. INSPECT SURFACES, REPORT UNSATISFACTORY CONDITIONS IN WRITING; BEGINNING WORK MEANS ACCEPTANCE OF SUBSTRATE.
2. COMPLY WITH MANUFACTURER'S INSTRUCTIONS AND RECOMMENDATIONS FOR PREPARATION, PRIMING AND COATING WORK. COORDINATE WITH WORK OF OTHER SECTIONS.
3. MATCH APPROVED MOCK-UPS FOR COLOR, TEXTURE, AND PATTERN. RE-COAT OR REMOVE AND REPLACE WORK WHICH DOES NOT MATCH OR SHOWS LOSS OF ADHESION.
4. CLEAN UP, TOUCH UP AND PROTECT WORK.

## TOUCHUP PAINTING:

1. GALVANIZING DAMAGE AND ALL BOLTS AND NUTS SHALL BE TOUCHED UP AFTER TOWER ERECTION WITH "GALVANOX," "DRY GALV," OR "ZINC-IT."
2. FIELD TOUCHUP PAINT SHALL BE DONE IN ACCORDANCE WITH THE MANUFACTURER'S WRITTEN INSTRUCTIONS.
3. ALL METAL COMPONENTS SHALL BE HANDLED WITH CARE TO PREVENT DAMAGE TO THE COMPONENTS, THEIR PRESERVATIVE TREATMENT, OR THEIR PROTECTIVE COATINGS.

## SECTION 11 700 - ANTENNA ASSEMBLY, REMOTE RADIO HEADS AND CABLE INSTALLATION

SUMMARY:
THIS SECTION SPECIFIES INSTALLATION OF ANTENNAS, RRH'S, AND CABLE EQUIPMENT, INSTALLATION, AND TESTING OF COAXIAL FIBER CABLE.

ANTENNAS AND RRH'S:
THE NUMBER AND TYPE OF ANTENNAS AND RRH'S TO BE INSTALLED IS DETAILED ON THE CONSTRUCTION DRAWINGS.

HYBRID CABLE:
HYBRID CABLE WILL BE DC/FIBER AND FURNISHED FOR INSTALLATION AT EACH SITE. CABLE SHALL BE INSTALLED PER THE CONSTRUCTION DRAWINGS AND THE APPLICABLE MANUFACTURER'S REQUIREMENTS.

JUMPERS AND CONNECTORS:
FURNISH AND INSTALL 1/2" COAX JUMPER CABLES BETWEEN THE RRH'S AND ANTENNAS. JUMPERS SHALL BE TYPE LDF 4, FLC 12-50, CR 540, OR FXL 540. SUPER-FLEX CABLES ARE NOT ACCEPTABLE. JUMPERS BETWEEN THE RRH'S AND ANTENNAS OR TOWER TOP AMPLIFIERS SHALL CONSIST OF 1/2 INCH FOAM DIELECTRIC, OUTDOOR RATED COAXIAL CABLE. DO NOT USE SUPERFLEX OUTDOORS. JUMPERS SHALL BE FACTORY FABRICATED IN APPROPRIATE LENGTHS WITH A MAXIMUM OF 4 FEET EXCESS PER JUMPER AND HAVE CONNECTORS AT EACH END, MANUFACTURED BY SUPPLIER. IF JUMPERS ARE FIELD FABRICATED, FOLLOW MANUFACTURER'S REQUIREMENTS FOR INSTALLATION OF CONNECTORS

## REMOTE ELECTRICAL TILT (RET) CABLES:

MISCELLANEOUS:
INSTALL SPLITTERS, COMBINERS, FILTERS PER RF DATA SHEET, FURNISHED BY SPRINT.

ANTENNA INSTALLATION:
THE CONTRACTOR SHALL ASSEMBLE ALL ANTENNAS ONSITE IN ACCORDANCE WITH THE INSTRUCTIONS SUPPLIED BY THE MANUFACTURER. ANTENNA HEIGHT, AZIMUTH, AND FEED ORIENTATION INFORMATION SHALL BE A DESIGNATED ON THE CONSTRUCTION DRAWINGS.

A. THE CONTRACTOR SHALL POSITION THE ANTENNA ON TOWER PIPE MOUNTS SO THAT THE BOTTOM STRUT IS LEVEL. THE PIPE MOUNTS SHALL BE PLUMB TO WITHIN 1 DEGREE.

B. ANTENNA MOUNTING REQUIREMENTS: PROVIDE ANTENNA MOUNTING HARDWARE AS INDICATED ON THE DRAWINGS.

## HYBRID CABLES INSTALLATION:

A. THE CONTRACTOR SHALL ROUTE, TEST, AND INSTALL ALL CABLES AS INDICATED ON THE CONSTRUCTION DRAWINGS AND IN ACCORDANCE WITH THE MANUFACTURER'S RECOMMENDATIONS.

B. THE INSTALLED RADIUS OF THE CABLES SHALL NOT BE LESS THAN THE MANUFACTURER'S SPECIFICATIONS FOR BENDING RADII.

C. EXTREME CARE SHALL BE TAKEN TO AVOID DAMAGE TO THE CABLES DURING HANDLING AND INSTALLATION.

1. FASTENING MAIN HYBRID CABLES: ALL CABLES SHALL BE PERMANENTLY FASTENED TO THE COAX LADDER AT 4'-0" OC USING NON-MAGNETIC STAINLESS STEEL CLIPS.
2. FASTENING INDIVIDUAL FIBER AND DC CABLES ABOVE BREAKOUT ENCLOSURE (MEDUSA), WITHIN THE MMBTS CABINET AND ANY INTERMEDIATE DISTRIBUTION BOXES:
   a. FIBER: SUPPORT FIBER BUNDLES USING ½" VELCRO STRAPS OF THE REQUIRED LENGTH @ 18" OC. STRAPS SHALL BE UV, OIL AND WATER RESISTANT AND SUITABLE FOR INDUSTRIAL INSTALLATIONS AS MANUFACTURED BY TEXTOL OR APPROVED EQUAL.
   b. DC: SUPPORT DC BUNDLES WITH ZIP TIES OF THE ADEQUATE LENGTH. ZIP TIES TO BE UV STABILIZED, BLACK NYLON, WITH TENSILE STRENGTH AT 12,000 PSI AS MANUFACTURED BY NELCO PRODUCTS OR EQUAL.
3. FASTENING JUMPERS: SECURE JUMPERS TO THE SIDE ARMS OR HEAD FRAMES USING STAINLESS STEEL TIE WRAPS OR STAINLESS STEEL BUTTERFLY CLIPS.
4. CABLE INSTALLATION:
   a. INSPECT CABLE PRIOR TO USE FOR SHIPPING DAMAGE, NOTIFY THE CONSTRUCTION MANAGER.
   b. CABLE ROUTING: CABLE INSTALLATION SHALL BE PLANNED TO ENSURE THAT THE LINES WILL BE PROPERLY ROUTED IN THE CABLE ENVELOP AS INDICATED ON THE DRAWINGS. AVOID TWISTING AND CROSSOVERS.
   c. HOIST CABLE USING PROPER HOISTING GRIPS. DO NOT EXCEED MANUFACTURES RECOMMENDED MAXIMUM BEND RADIUS.
5. GROUNDING OF TRANSMISSION LINES: ALL TRANSMISSION LINES SHALL BE GROUNDED AS INDICATED ON DRAWINGS.
6. HYBRID CABLE COLOR CODING: ALL COLOR CODING SHALL BE AS REQUIRED PER SPRINT TS 0200 CURRENT VERSION.
7. HYBRID CABLE LABELING: INDIVIDUAL HYBRID AND DC BUNDLES SHALL BE LABELED ALPHA-NUMERICALLY ACCORDING TO SPRINT CELL SITE ENGINEERING NOTICE-EN 2012-001, REV 1

## WEATHERPROOFING EXTERIOR CONNECTORS AND HYBRID CABLE GROUND KITS:

A. ALL FIBER & COAX CONNECTORS AND GROUND KITS SHALL BE WEATHERPROOFED.

B. WEATHERPROOFED USING ONE OF THE FOLLOWING METHODS. ALL INSTALLATIONS MUST BE DONE IN ACCORDANCE WITH THE MANUFACTURER'S RECOMMENDATIONS AND INDUSTRY BEST PRACTICES.

1. COLD SHRINK: ENCOMPASS CONNECTOR IN COLD SHRINK TUBING AND PROVIDE A DOUBLE WRAP OF 2" ELECTRICAL TAPE EXTENDING 2" BEYOND TUBING. PROVIDE 3M COLD SHRINK CXS SERIES OR EQUAL.
2. SELF-AMALGAMATING TAPE: CLEAN SURFACES. APPLY A DOUBLE WRAP OF SELF-AMALGAMATING TAPE 2" BEYOND CONNECTOR. APPLY A SECOND WRAP OF SELF-AMALGAMATING TAPE IN OPPOSITE DIRECTION. APPLY DOUBLE WRAP OF 2" WIDE ELECTRICAL TAPE EXTENDING 2" BEYOND THE SELF-AMALGAMATING TAPE.
3. 3M SLIM LOCK CLOSURE 716: SUBSTITUTIONS WILL NOT BE ALLOWED.
4. OPEN FLAME ON JOB SITE IS NOT ACCEPTABLE

## SECTION 11 800 – INSTALLATION OF MULTIMODAL BASE STATIONS (MMBTS) AND RELATED EQUIPMENT

### SUMMARY:

A. THIS SECTION SPECIFIES MMBTS CABINETS, POWER CABINETS, AND INTERNAL EQUIPMENT INCLUDING BY NOT LIMITED TO RECTIFIERS, POWER DISTRIBUTION UNITS, BASE BAND UNITS, SURGE ARRESTORS, BATTERIES, AND SIMILAR EQUIPMENT FURNISHED BY THE COMPANY FOR INSTALLATION BY THE CONTRACTOR (OFCI).

B. CONTRACTOR SHALL PROVIDE AND INSTALL ALL MISCELLANEOUS MATERIALS AND PROVIDE ALL LABOR REQUIRED FOR INSTALLATION EQUIPMENT IN EXISTING CABINET OR NEW CABINET AS SHOWN ON DRAWINGS AND AS REQUIRE BY THE APPLICABLE INSTALLATION MOPS.

C. COMPLY WITH MANUFACTURERS INSTALLATION AND START-UP REQUIREMENTS

## DC CIRCUIT BREAKER LABELING

A. LABEL CIRCUIT BREAKERS ACCORDING TO SPRINT CELL SITE ENGINEERING NOTICE – EN 2012-001, REV 1.

## SECTION 11 800 - INSTALLATION OF MULTIMODAL BASE TRANSCIEVER STATIONS (MMBTS) AND RELATED EQUIPMENT

### SUMMARY:

A. THIS SECTION SPECIFIES MMBTS CABINETS, POWER CABINETS, AND INTERNAL EQUIPMENT INCLUDING BY NOT LIMITED TO RECTIFIERS, POWER DISTRIBUTION UNITS, BASE BAND UNITS, SURGE ARRESTORS, BATTERIES, AND SIMILAR EQUIPMENT FURNISHED BY THE COMPANY FOR INSTALLATION BY THE CONTRACTOR (OFCI).

B. CONTRACTOR SHALL PROVIDE AND INSTALL ALL MISCELLANEOUS MATERIALS AND PROVIDE ALL LABOR REQUIRED FOR INSTALLATION EQUIPMENT IN EXISTING CABINET OR NEW CABINET AS SHOWN ON DRAWINGS AND AS REQUIRE BY THE APPLICABLE INSTALLATION MOPS.

C. COMPLY WITH MANUFACTURERS INSTALLATION AND START-UP REQUIREMENTS

## SUPPORTING DEVICES:

A. MANUFACTURED STRUCTURAL SUPPORT MATERIALS: SUBJECT TO COMPLIANCE WITH REQUIREMENTS, PROVIDE PRODUCTS BY THE FOLLOWING:
1. ALLIED TUBE AND CONDUIT
2. B-LINE SYSTEM
3. UNISTRUT DIVERSIFIED PRODUCTS
4. THOMAS & BETTS

B. FASTENERS: TYPES, MATERIALS, AND CONSTRUCTION FEATURES AS FOLLOWS:
1. EXPANSION ANCHORS: CARBON STEEL WEDGE OR SLEEVE TYPE.
2. POWER-DRIVEN THREADED STUDS: HEAT-TREATED STEEL, DESIGNED SPECIFICALLY FOR THE INTENDED SERVICE.
3. FASTEN BY MEANS OF WOOD SCREWS ON WOOD.
4. TOGGLE BOLTS ON HOLLOW MASONRY UNITS.
5. CONCRETE INSERTS OR EXPANSION BOLTS ON CONCRETE OR SOLID MASONRY.
6. MACHINE SCREWS, WELDED THREADED STUDS, OR SPRING-TENSION CLAMPS ON STEEL.
7. EXPLOSIVE DEVICES FOR ATTACHING HANGERS TO STRUCTURE SHALL NOT BE PERMITTED.
8. DO NOT WELD CONDUIT, PIPE STRAPS, OR ITEMS OTHER THAN THREADED STUDS TO STEEL STRUCTURES.
9. IN PARTITIONS OF LIGHT STEEL CONSTRUCTION, USE SHEET METAL SCREWS.

## SUPPORTING DEVICES:

A. INSTALL SUPPORTING DEVICES TO FASTEN ELECTRICAL COMPONENTS SECURELY AND PERMANENTLY IN ACCORDANCE WITH NEC.

B. COORDINATE WITH THE BUILDING STRUCTURAL SYSTEM AND WITH OTHER TRADES.

C. UNLESS OTHERWISE INDICATED ON THE DRAWINGS, FASTEN ELECTRICAL ITEMS AND THEIR SUPPORTING HARDWARE SECURELY TO THE STRUCTURE IN ACCORDANCE WITH THE FOLLOWING:

D. ENSURE THAT THE LOAD APPLIED BY ANY FASTENER DOES NOT EXCEED 25 PERCENT OF THE PROOF TEST LOAD.

E. USE VIBRATION AND SHOCK-RESISTANT FASTENERS FOR ATTACHMENTS TO CONCRETE SLABS.

## ELECTRICAL IDENTIFICATION:

A. UPDATE AND PROVIDE TYPED CIRCUIT BREAKER SCHEDULES IN THE MOUNTING BRACKET, INSIDE DOORS OF AC PANEL BOARDS WITH ANY CHANGES MADE TO THE AC SYSTEM.

B. BRANCH CIRCUITS FEEDING AVIATION OBSTRUCTION LIGHTING EQUIPMENT SHALL BE CLEARLY IDENTIFIED AS SUCH AT THE BRANCH CIRCUIT PANELBOARD.

## SECTION 26 200 - ELECTRICAL MATERIALS AND EQUIPMENT

## CONDUIT:

A. RIGID GALVANIZED STEEL (RGS) CONDUIT SHALL BE USED FOR EXTERIOR LOCATIONS ABOVE GROUND AND IN UNFINISHED INTERIOR LOCATIONS AND FOR ENCASED RUNS IN CONCRETE. RIGID CONDUIT AND FITTINGS SHALL BE STEEL, COATED WITH ZINC EXTERIOR AND INTERIOR BY THE HOT DIP GALVANIZING PROCESS. CONDUIT SHALL BE PRODUCED TO ANSI SPECIFICATIONS C80.1, FEDERAL SPECIFICATION WW-C-581 AND SHALL BE LISTED WITH THE UNDERWRITERS' LABORATORIES. FITTINGS SHALL BE THREADED – SET SCREW OR COMPRESSION FITTINGS WILL NOT BE ACCEPTABLE. RGS CONDUITS SHALL BE MANUFACTURED BY ALLIED, REPUBLIC OR WHEATLAND.

B. UNDERGROUND CONDUIT IN CONCRETE SHALL BE POLYVINYLCHLORIDE (PVC) SUITABLE FOR DIRECT BURIAL AS APPLICABLE. JOINTS SHALL BE BELLED, AND FLUSH SOLVENT WELDED IN ACCORDANCE WITH MANUFACTURER'S INSTRUCTIONS. CONDUIT SHALL BE CARLON ELECTRICAL PRODUCTS OR APPROVED EQUAL.

C. TRANSITIONS BETWEEN PVC AND RIGID (RGS) SHALL BE MADE WITH PVC COATED METALLIC LONG SWEEP RADIUS ELBOWS.

D. EMT OR RIGID GALVANIZED STEEL CONDUIT MAY BE USED IN FINISHED SPACES CONCEALED IN WALLS AND CEILINGS. EMT SHALL BE MILD STEEL, ELECTRICALLY WELDED, ELECTRO-GALVANIZED OR HOT-DIPPED GALVANIZED AND PRODUCED TO ANSI SPECIFICATION C80.3, FEDERAL SPECIFICATION WW-C-563, AND SHALL BE UL LISTED. EMT SHALL BE MANUFACTURED BY ALLIED, REPUBLIC OR WHEATLAND, OR APPROVED EQUAL. FITTINGS SHALL BE METALLIC COMPRESSION. SET SCREW CONNECTIONS SHALL NOT BE ACCEPTABLE.

E. LIQUID TIGHT FLEXIBLE METALLIC CONDUIT SHALL BE USED FOR FINAL CONNECTION TO EQUIPMENT. FITTINGS SHALL BE METALLIC GLAND TYPE COMPRESSION FITTINGS, MAINTAINING THE INTEGRITY OF CONDUIT SYSTEM. SET SCREW CONNECTIONS SHALL NOT BE ACCEPTABLE. MAXIMUM LENGTH OF FLEXIBLE CONDUIT SHALL NOT EXCEED 6-FEET. LFMC SHALL BE PROTECTED AND SUPPORTED AS REQUIRE BY NEC. MANUFACTURERS OF FLEXIBLE CONDUITS SHALL BE CAROL, ANACONDA METAL HOSE OR UNIVERSAL METAL HOSE, OR APPROVED EQUAL.

F. MINIMUM SIZE CONDUIT SHALL BE 3/4 INCH (21MM).

## HUBS AND BOXES:

A. AT ENTRANCES TO CABINETS OR OTHER EQUIPMENT NOT HAVING INTEGRAL THREADED HUBS PROVIDE METALLIC THREADED HUBS OF THE SIZE AND CONFIGURATION REQUIRED. HUB SHALL INCLUDE LOCKNUT AND NEOPRENE O-RING SEAL. PROVIDE IMPACT RESISTANT 105 DEGREE C PLASTIC BUSHINGS TO PROTECT CABLE INSULATION.

B. CABLE TERMINATION FITTINGS FOR CONDUIT
1. CABLE TERMINATORS FOR RGS CONDUITS SHALL BE TYPE CRC BY O-Z/GEDNEY OR EQUAL.
2. CABLE TERMINATORS FOR LFMC SHALL BE ETCO – CL2075; OR MADE FOR THE PURPOSE PRODUCTS BY ROXTEC.

C. EXTERIOR PULL BOXES AND PULL BOXES IN INTERIOR INDUSTRIAL AREAS SHALL BE PLATED CAST ALLOY, HEAVY DUTY, WEATHERPROOF, DUST PROOF, WITH GASKET, PLATED IRON ALLOY COVER AND STAINLESS STEEL COVER SCREWS, CROUSE-HINDS WAB SERIES OR EQUAL.

D. CONDUIT OUTLET BODIES SHALL BE PLATED CAST ALLOY WITH SIMILAR GASKETED COVERS. OUTLET BODIES SHALL BE OF THE CONFIGURATION AND SIZE SUITABLE FOR THE APPLICATION. PROVIDE CROUSE-HINDS FORM 8 OR EQUAL.

E. MANUFACTURER FOR BOXES AND COVERS SHALL BE HOFFMAN, SQUARE "D", CROUSE-HINDS, COOPER, ADALET, APPLETON, O-Z GEDNEY, RACO, OR APPROVED EQUAL.

## SUPPLEMENTAL GROUNDING SYSTEM

A. FURNISH AND INSTALL A SUPPLEMENTAL GROUNDING SYSTEM AS INDICATED ON THE DRAWINGS. SUPPORT SYSTEM WITH NON-MAGNETIC STAINLESS STEEL CLIPS WITH RUBBER GROMMETS. GROUNDING CONNECTORS SHALL BE TINNED COPPER WIRE, SIZES AS INDICATED ON THE DRAWINGS. PROVIDE STRANDED OR SOLID BARE OR INSULATED CONDUCTORS AS INDICATED.

B. SUPPLEMENTAL GROUNDING SYSTEM: ALL CONNECTIONS TO BE MADE WITH CAD WELDS, EXCEPT AT EQUIPMENT USE LUGS OR OTHER AVAILABLE GROUNDING MEANS AS REQUIRED BY MANUFACTURER; AT GROUND BARS USE TWO HOLE SPADES WITH NO OX.

C. STOLEN GROUND-BARS: IN THE EVENT OF STOLEN GROUND BARS, CONTACT SPRINT CM FOR REPLACEMENT INSTRUCTION USING THREADED ROD KITS.

## EXISTING STRUCTURE:

A. EXISTING EXPOSED WIRING AND ALL EXPOSED OUTLETS, RECEPTACLES, SWITCHES, DEVICES, BOXES, AND OTHER EQUIPMENT THAT ARE NOT TO BE UTILIZED IN THE COMPLETED PROJECT SHALL BE REMOVED OR DE-ENERGIZED AND CAPPED IN THE WALL, CEILING, OR FLOOR SO THAT THEY ARE CONCEALED AND SAFE. WALL, CEILING, OR FLOOR SHALL BE PATCHED TO MATCH THE ADJACENT CONSTRUCTION.

## CONDUIT AND CONDUCTOR INSTALLATION:

A. CONDUITS SHALL BE FASTENED SECURELY IN PLACE WITH APPROVED NON-PERFORATED STRAPS AND HANGERS. EXPLOSIVE DEVICES FOR ATTACHING HANGERS TO STRUCTURE WILL NOT BE PERMITTED. CLOSELY FOLLOW THE LINES OF THE STRUCTURE, MAINTAIN CLOSE PROXIMITY TO THE STRUCTURE AND KEEP CONDUITS IN TIGHT ENVELOPES. CHANGES IN DIRECTION TO ROUTE AROUND OBSTACLES SHALL BE MADE WITH CONDUIT OUTLET BODIES. CONDUIT SHALL BE INSTALLED IN A NEAT AND WORKMANLIKE MANNER, PARALLEL AND PERPENDICULAR TO STRUCTURE WALL AND CEILING LINES. ALL CONDUIT SHALL BE FISHED TO CLEAR OBSTRUCTIONS. ENDS OF CONDUITS SHALL BE TEMPORARILY CAPPED TO PREVENT CONCRETE, PLASTER OR DIRT FROM ENTERING. CONDUITS SHALL BE RIGIDLY CLAMPED TO BOXES BY GALVANIZED MALLEABLE IRON BUSHING ON INSIDE AND GALVANIZED MALLEABLE IRON LOCKNUT ON OUTSIDE AND INSIDE.

B. CONDUCTORS SHALL BE PULLED IN ACCORDANCE WITH ACCEPTED GOOD PRACTICE.


Sprint
1 INTERNATIONAL BLVD, SUITE 800
MAHWAH, NJ 07495
TEL: (800) 357-7641

SBA
SBA COMMUNICATIONS CORP.
134 FLANDERS ROAD, SUITE 125
WESTBOROUGH, MA 01581 TEL: (508) 251-0720

ProTerra DESIGN GROUP, LLC
4 Bay Road, Building A
Suite 200
Hadley, MA 01035 PH: (413) 320-4918


STATE OF CONNECTICUT
THOMAS E. JOHNSON
No. 28192
LICENSED PROFESSIONAL ENGINEER
11/9/18

CHECKED BY: JMM/TEJ

APPROVED BY: JMM/TEJ

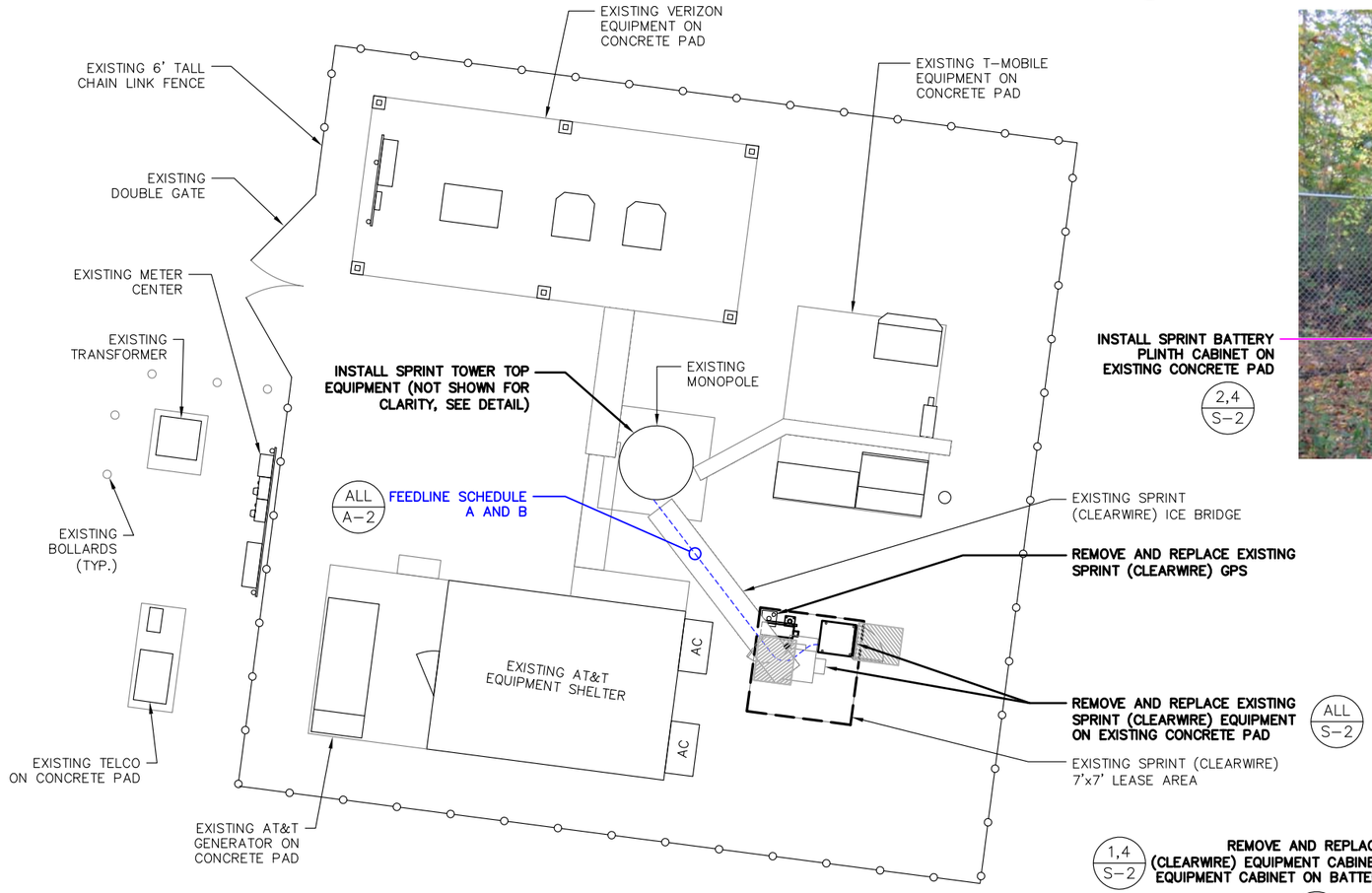
SUBMITTALS

| REV. | DATE | DESCRIPTION | BY |
|---|---|---|---|
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| 1 | 11/09/18 | CONSTRUCTION REVISED | PN |
| 0 | 07/27/18 | ISSUED FOR CONSTRUCTION | PN |

SITE NUMBER:
CT52XC103
SITE NAME:
CUTTER LANE
SITE ADDRESS:
58A MONTANO ROAD
GLASTONBURY, CT 06033

SHEET TITLE
OUTLINE SPECIFICATIONS

SHEET NUMBER
SP-3




## COMPOUND PLAN

SCALE: 1"=10' (11"x17")
1"=5' (22"x34")

1 / A-1

10 5 0 10

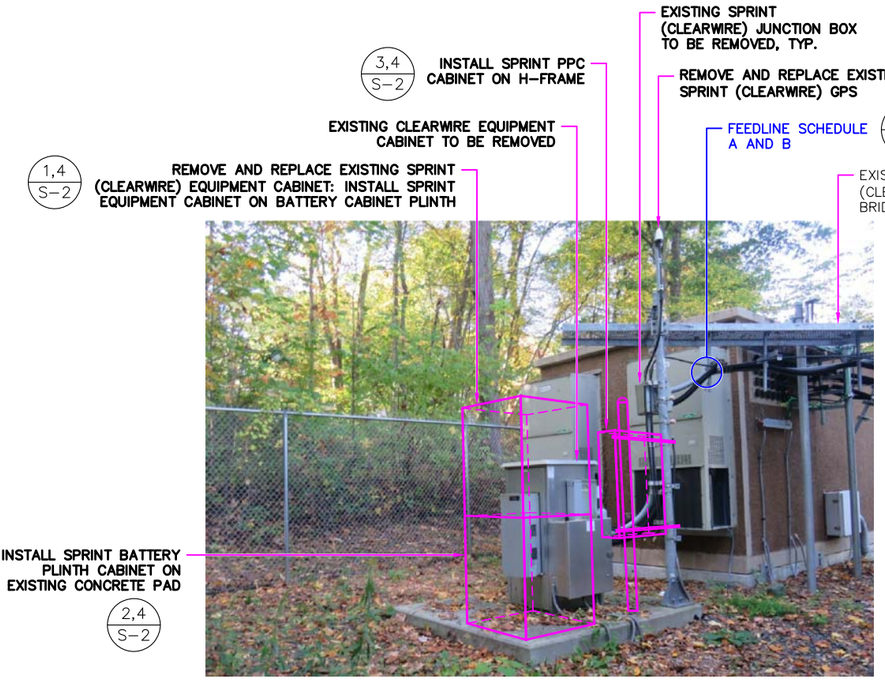



IMAGE SOURCE: PROTERRA 10/20/2017
(VIEW FROM NORTHEAST)

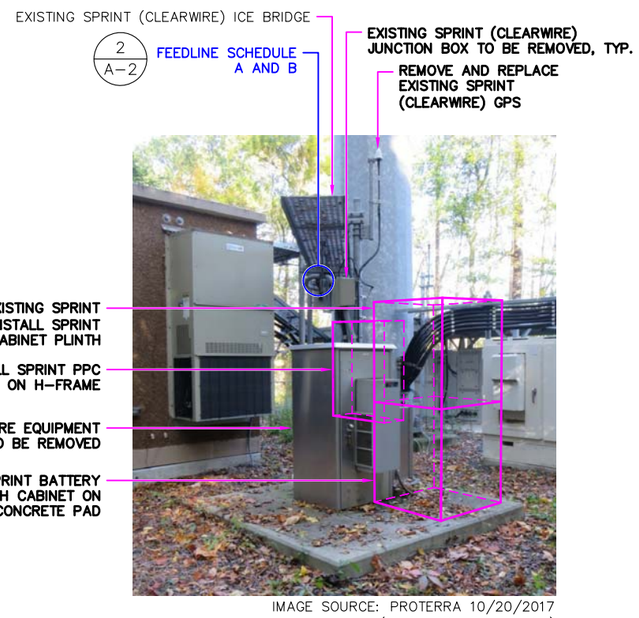



IMAGE SOURCE: PROTERRA 10/20/2017
(VIEW FROM SOUTHEAST)

## EQUIPMENT PLAN PHOTO DETAIL

SCALE: N.T.S.

2 / A-1

Sprint
1 INTERNATIONAL BLVD, SUITE 800
MAHWAH, NJ 07495
TEL: (800) 357-7641

SBA
SBA COMMUNICATIONS CORP.
134 FLANDERS ROAD, SUITE 125
WESTBOROUGH, MA 01581 TEL: (508) 251-0720

ProTerra DESIGN GROUP, LLC
4 Bay Road, Building A
Suite 200
Hadley, MA 01035 PH: (413) 320-4918

STATE OF CONNECTICUT
THOMAS E. JOHNSON
No. 28192
LICENSED PROFESSIONAL ENGINEER
11/9/18

CHECKED BY: JMM/TEJ

APPROVED BY: JMM/TEJ

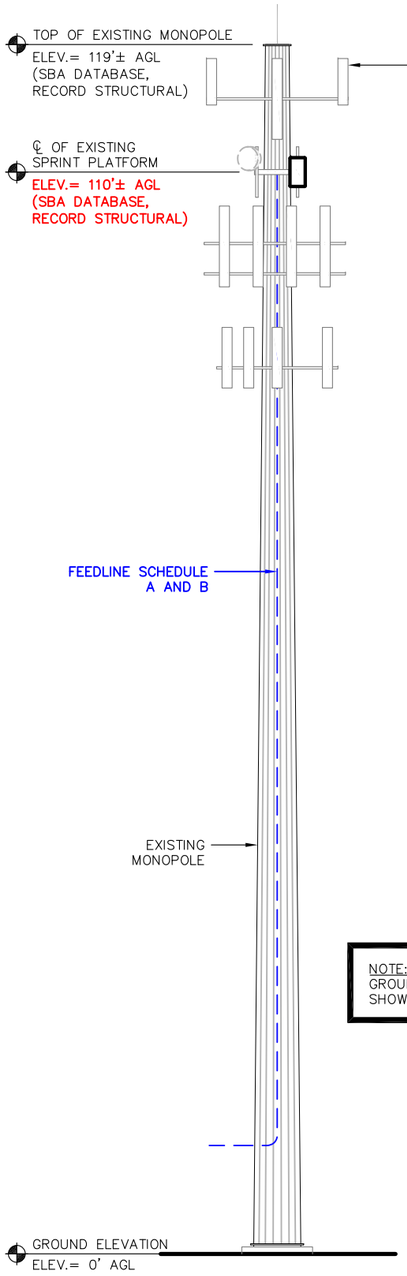
SUBMITTALS

| REV. | DATE | DESCRIPTION | BY |
|---|---|---|---|
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| 1 | 11/09/18 | CONSTRUCTION REVISED | PN |
| 0 | 07/27/18 | ISSUED FOR CONSTRUCTION | PN |

SITE NUMBER:
CT52XC103
SITE NAME:
CUTTER LANE
SITE ADDRESS:
58A MONTANO ROAD
GLASTONBURY, CT 06033

SHEET TITLE
COMPOUND PLAN

SHEET NUMBER
A-1




NOTE:
GROUND EQUIPMENT NOT SHOWN FOR CLARITY

## ELEVATION

SCALE: 1"=15' (11"x17")
1"=7.5' (22"x34")

1 / A-2

15 7.5 0 15

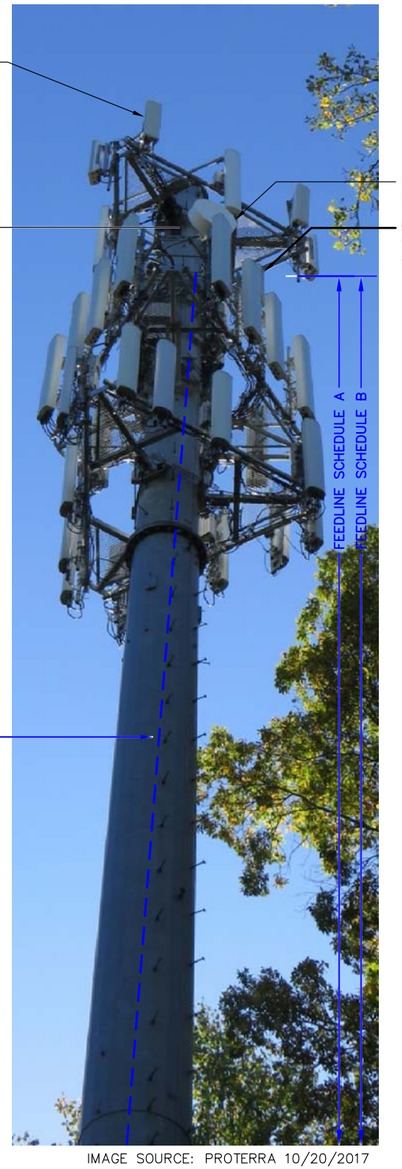



IMAGE SOURCE: PROTERRA 10/20/2017

| FEEDLINE SCHEDULE | FEEDLINE DESCRIPTION | LOCATION |
|---|---|---|
| A | EXISTING TO BE REMOVED: (3) 7/8" COAX, (3) 3/8" DC, AND (3) 1" HYBRID (PER COLO-APP) IN (2) FLEX CONDUIT TO 110' RAD<br>EXISTING TO REMAIN: (1) 1" MICROWAVE DISH CABLE TO 110' RAD | UP INSIDE MONOPOLE TO RAD |
| B | PROPOSED: (1) HYBRID TRUNK MIMO TO 110' RAD; | UP INSIDE MONOPOLE TO RAD |

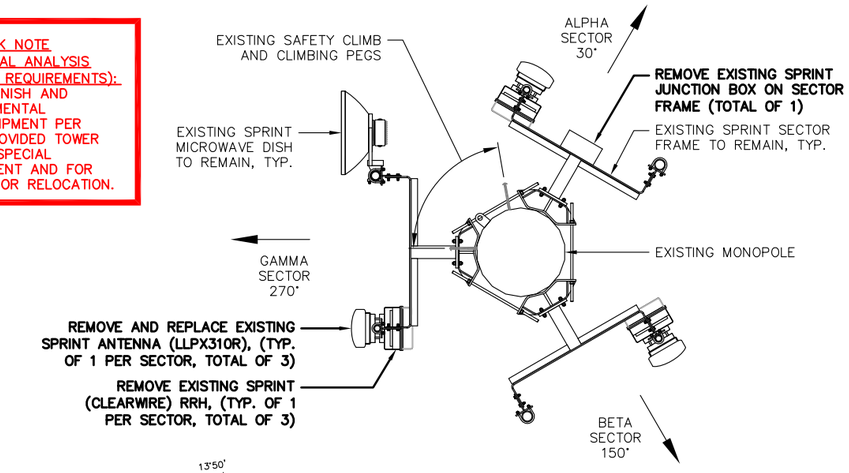
NOTE:
EXISTING SPRINT EQUIPMENT FEEDLINE INVENTORY BASED ON COLOCATION APPLICATION AND SBA RECORD, NOT FIELD OBSERVATIONS. RFDS AND FEEDLINE LEASING ENTITLEMENTS MAY DIFFER

## TOWER ELEVATION PHOTO DETAIL

SCALE: N.T.S.

2 / A-2

SPECIAL PRE-CONSTRUCTION WORK NOTE (SBA-PROVIDED TOWER STRUCTURAL ANALYSIS SPECIAL EQUIPMENT INSTALLATION REQUIREMENTS):
GENERAL CONTRACTOR SHALL FURNISH AND INSTALL ALL SPECIAL OR SUPPLEMENTAL ADDITIONAL TOWER-MOUNTED EQUIPMENT PER RECOMMENDATIONS FROM SBA-PROVIDED TOWER STRUCTURAL ANALYSIS FOR ANY SPECIAL SHIELDING OF TOWER TOP EQUIPMENT AND FOR ANY SPECIAL FEEDLINE BUNDLING OR RELOCATION.



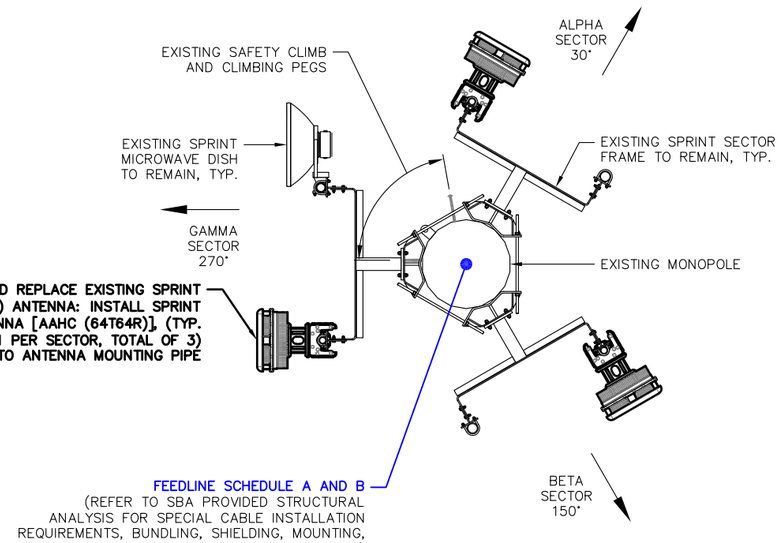


NOTE:
REFER TO THE ANTENNA MOUNT ANALYSIS PREPARED BY GEOSTRUCTURAL DATED JULY 27, 2018.

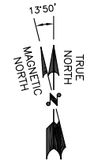
## EXISTING ANTENNA PLAN

SCALE: N.T.S.

3 / A-2




ALL / S-1 — 1 / A-3




## PROPOSED ANTENNA PLAN

SCALE: N.T.S.

4 / A-2

SPECIAL INSTALLATION NOTE:
JUMPERS FROM RRHs TO ANTENNA SHALL NOT EXCEED 15'. NOTIFY SPRINT CONSTRUCTION MANAGER OF ANY DISCREPANCY

NOTE:
VERIFY PROPOSED AZIMUTHS WITH RF ENGINEER PRIOR TO INSTALLATION

Sprint
1 INTERNATIONAL BLVD, SUITE 800
MAHWAH, NJ 07495
TEL: (800) 357-7641

SBA
SBA COMMUNICATIONS CORP.
134 FLANDERS ROAD, SUITE 125
WESTBOROUGH, MA 01581 TEL: (508) 251-0720

ProTerra DESIGN GROUP, LLC
4 Bay Road, Building A
Suite 200
Hadley, MA 01035 TEL: (413) 320-4918

STATE OF CONNECTICUT
THOMAS E. JOHNSON
No. 28192
LICENSED PROFESSIONAL ENGINEER
11/9/18

CHECKED BY: JMM/TEJ

APPROVED BY: JMM/TEJ

SUBMITTALS

| REV. | DATE | DESCRIPTION | BY |
|---|---|---|---|
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| 1 | 11/09/18 | CONSTRUCTION REVISED | PN |
| 0 | 07/27/18 | ISSUED FOR CONSTRUCTION | PN |

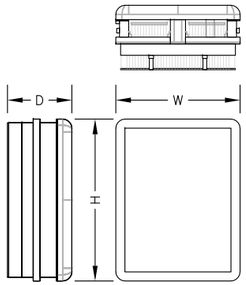
SITE NUMBER:
CT52XC103
SITE NAME:
CUTTER LANE
SITE ADDRESS:
58A MONTANO ROAD
GLASTONBURY, CT 06033

SHEET TITLE
ELEVATION AND ANTENNA PLANS

SHEET NUMBER
A-2

## MIMO ANTENNA SPECIFICATIONS

| | |
|---|---|
| MANUF. | NOKIA |
| MODEL # | 2.5G MAA–AAHC(64T64R) |
| HEIGHT | 25.6" |
| WIDTH | 19.7" |
| DEPTH | 9.6" |
| WEIGHT | 103.7± LBS. (MOUNT BRACKETS NOT INCLUDED) |




## MIMO ANTENNA DETAIL

SCALE: N.T.S.

1 / A–3

## MAJOR RF EQUIPMENT LIST

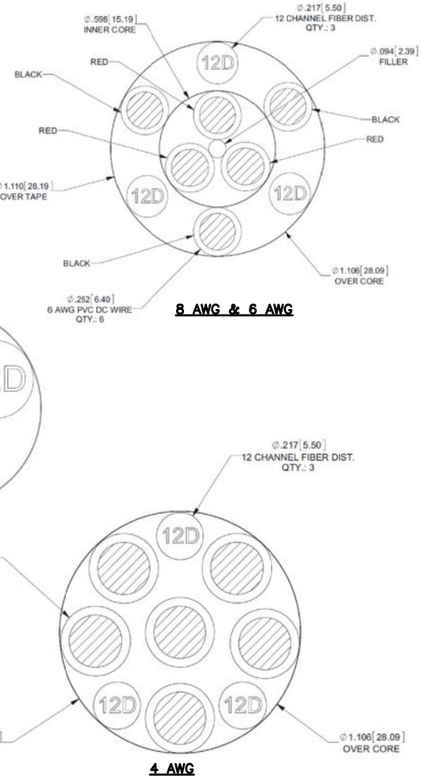
(GC SHALL FURNISH AND INSTALL ALL OTHER MATERIALS AND EQUIPMENT NOT SUPPLIED BY SPRINT)

| DESCRIPTION | QUANTITY | UNITS | MAKE/MODEL/MATERIAL | PROVIDED BY |
|---|---|---|---|---|
| ANTENNA | 3 | EA | 2.5G MAA–AAHC(64T64R) | SPRINT |
| HYBRID TRUNK MIMO | 1 @ 170'± FROM FIBER CABINET | LINEAR FEET LISTED [INCLUDES (2) 10' COILS] | NOKIA HYBRID | SPRINT |
| EQUIPMENT CABINET | 1 | EA | NOKIA 9712 LRO–21U | SPRINT |
| BATTERY CABINET | 1 | EA | NOKIA 3JR50450ABAA | SPRINT |
| PPC/TELCO CABINET | 1 | EA | PURCELL SYSTEMS, INC. (VERIFY MODEL WITH SPRINT) | SPRINT |

## SPRINT-PROVIDED EQUIPMENT SCHEDULE

SCALE: N.T.S.

2 / A–3




HYBRID CABLE DC CONDUCTOR SIZE GUIDELINE

MANUF: RFS

| | CABLE | LENGTH | DC CONDUCTOR | CABLE DIAMETER |
|---|---|---|---|---|
| | FIBER ONLY | VARIES | USE NV HYBRIFLEX 7/8" | |
| (*) | HYBRIFLEX | <200' | 8 AWG | 1–1/4" |
| | HYBRIFLEX | 225–300' | 6 AWG | 1–1/4" |
| | HYBRIFLEX | 325–375' | 4 AWG | 1–1/4" |

### RFS HYBRIFLEX RISER CABLE SCHEDULE

| | | |
|---|---|---|
| Fiber Only (Existing DC Power) | **Hybrid cable** MN: HB058-M12-050F 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** MN: HB114-08U3M12-050F 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 |
| 6 AWG Power | **Hybrid cable** MN: HB114-13U3M12-225F 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** MN: HB114-21U3M12-325F 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 |

### RFS HYBRIFLEX JUMPER CABLE SCHEDULE

| | | |
|---|---|---|
| Fiber Only | **Hybrid Jumper cable** MN: HBF012-M3-5F1 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 |
| | SPECIAL INSTALLATION NOTE: JUMPERS FROM 2.5 RRH TO 2.5 ANTENNA SHALL NOT EXCEED 15'. NOTIFY SPRINT CM OF ANY DISCREPANCY | |
| 8 AWG Power | **Hybrid Jumper cable** MN: HBF058-08U1M3-5F1 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 |
| | SPECIAL INSTALLATION NOTE: JUMPERS FROM 2.5 RRH TO 2.5 ANTENNA SHALL NOT EXCEED 15'. NOTIFY SPRINT CM OF ANY DISCREPANCY | |
| 6 AWG Power | **Hybrid Jumper cable** MN: HBF058-13U1M3-5F1 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 |
| | SPECIAL INSTALLATION NOTE: JUMPERS FROM 2.5 RRH TO 2.5 ANTENNA SHALL NOT EXCEED 15'. NOTIFY SPRINT CM OF ANY DISCREPANCY | |
| 4 AWG Power | **Hybrid Jumper cable** MN: HBF078-21U1M3-5F1 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 |
| | SPECIAL INSTALLATION NOTE: JUMPERS FROM 2.5 RRH TO 2.5 ANTENNA SHALL NOT EXCEED 15'. NOTIFY SPRINT CM OF ANY DISCREPANCY | |

## 2.5 HYBRID CABLE X-SECTION AND DATA

SCALE: N.T.S.

3 / A–3

* NOTE: SPRINT CM TO CONFIRM HYBRID RISER CABLE AND HYBRID JUMPER CABLE MODEL NUMBERS BEFORE PREPARING BOM.


Sprint
1 INTERNATIONAL BLVD, SUITE 800
MAHWAH, NJ 07495
TEL: (800) 357-7641

SBA
SBA COMMUNICATIONS CORP.
134 FLANDERS ROAD, SUITE 125
WESTBOROUGH, MA 01581 TEL: (508) 251-0720

ProTerra DESIGN GROUP, LLC
4 Bay Road, Building A
Suite 200
Hadley, MA 01035 TEL: (413) 320–4918


STATE OF CONNECTICUT
THOMAS E. JOHNSON
No. 28192
LICENSED PROFESSIONAL ENGINEER
11/9/18

CHECKED BY: JMM/TEJ

APPROVED BY: JMM/TEJ

### SUBMITTALS

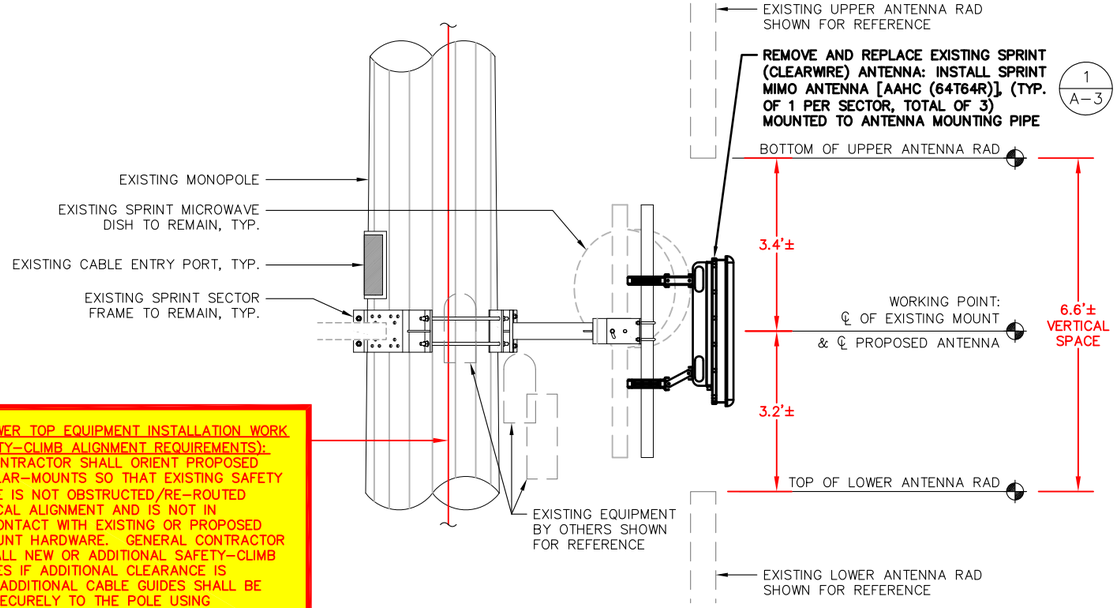
| REV. | DATE | DESCRIPTION | BY |
|---|---|---|---|
| 1 | 11/09/18 | CONSTRUCTION REVISED | PN |
| 0 | 07/27/18 | ISSUED FOR CONSTRUCTION | PN |

SITE NUMBER:
CT52XC103
SITE NAME:
CUTTER LANE

SITE ADDRESS:
58A MONTANO ROAD
GLASTONBURY, CT 06033

SHEET TITLE
TOWER EQUIPMENT DETAILS

SHEET NUMBER
A–3




## 800MHZ/1900MHZ ANTENNA AND RRH MOUNTING DETAIL

1 / S-1

SCALE: N.T.S.

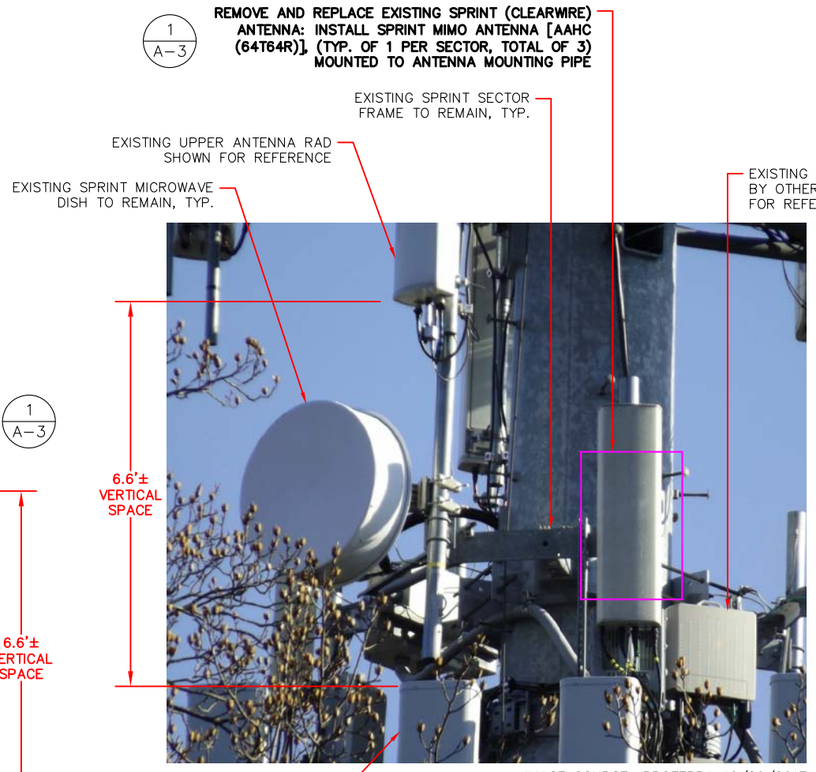



IMAGE SOURCE: PROTERRA 10/20/2017

## ANTENNA AND RRH MOUNT PHOTO DETAIL

2 / S-1

SCALE: N.T.S.

NOTE:
REFER TO THE ANTENNA MOUNT ANALYSIS PREPARED BY GEOSTRUCTURAL DATED JULY 27, 2018.

SPECIAL PRE-CONSTRUCTION WORK NOTE (SBA-PROVIDED TOWER STRUCTURAL ANALYSIS SPECIAL EQUIPMENT INSTALLATION REQUIREMENTS): GENERAL CONTRACTOR SHALL FURNISH AND INSTALL ALL SPECIAL OR SUPPLEMENTAL ADDITIONAL TOWER-MOUNTED EQUIPMENT PER RECOMMENDATIONS FROM SBA-PROVIDED TOWER STRUCTURAL ANALYSIS FOR ANY SPECIAL SHIELDING OF TOWER TOP EQUIPMENT AND FOR ANY SPECIAL FEEDLINE BUNDLING OR RELOCATION.

Sprint
1 INTERNATIONAL BLVD, SUITE 800
MAHWAH, NJ 07495
TEL: (800) 357-7641

SBA
SBA COMMUNICATIONS CORP.
134 FLANDERS ROAD, SUITE 125
WESTBOROUGH, MA 01581 TEL: (508) 251-0720

ProTerra DESIGN GROUP, LLC
4 Bay Road, Building A
Suite 200
Hadley, MA 01035 TEL: (413) 320-4918

STATE OF CONNECTICUT
THOMAS E. JOHNSON
No. 28192
LICENSED PROFESSIONAL ENGINEER
11/9/18

CHECKED BY: JMM/TEJ

APPROVED BY: JMM/TEJ

SUBMITTALS

| REV. | DATE | DESCRIPTION | BY |
|---|---|---|---|
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| 1 | 11/09/18 | CONSTRUCTION REVISED | PN |
| 0 | 07/27/18 | ISSUED FOR CONSTRUCTION | PN |

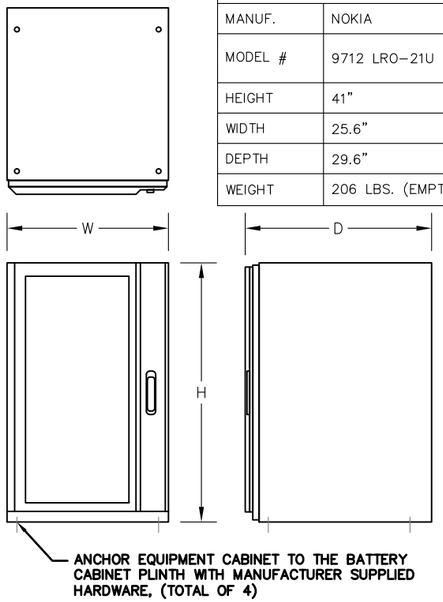
SITE NUMBER:
CT52XC103
SITE NAME:
CUTTER LANE

SITE ADDRESS:
58A MONTANO ROAD
GLASTONBURY, CT 06033

SHEET TITLE
ANTENNA AND RRH MOUNTING DETAILS

SHEET NUMBER
S-1

| EQUIPMENT CABINET | |
|---|---|
| MANUF. | NOKIA |
| MODEL # | 9712 LRO-21U |
| HEIGHT | 41" |
| WIDTH | 25.6" |
| DEPTH | 29.6" |
| WEIGHT | 206 LBS. (EMPTY) |



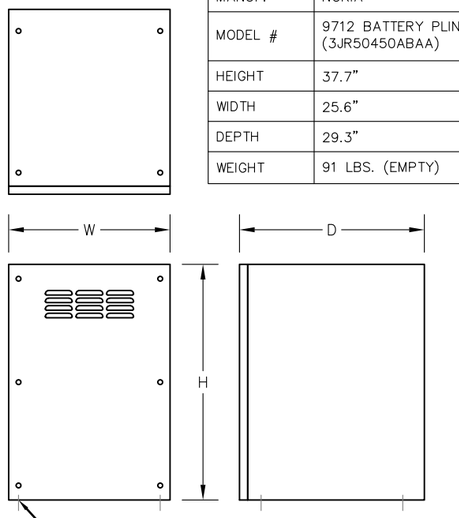

ANCHOR EQUIPMENT CABINET TO THE BATTERY CABINET PLINTH WITH MANUFACTURER SUPPLIED HARDWARE, (TOTAL OF 4)

## EQUIPMENT CABINET DETAIL

SCALE: N.T.S.

1 / S-2

| BATTERY CABINET | |
|---|---|
| MANUF. | NOKIA |
| MODEL # | 9712 BATTERY PLINTH (3JR50450ABAA) |
| HEIGHT | 37.7" |
| WIDTH | 25.6" |
| DEPTH | 29.3" |
| WEIGHT | 91 LBS. (EMPTY) |

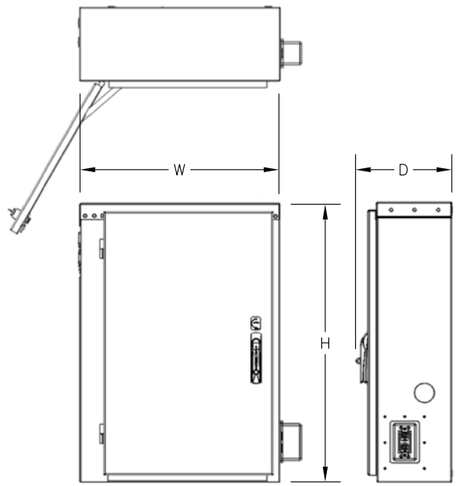



ANCHOR BATTERY CABINET TO CONCRETE PER MANUFACTURER SPECIFICATIONS OR MINIMUM OF ½"ø HDG HILTI KWIK BOLT SS 304 2¾" LONG WITH 2¼" NOMINAL EMBEDMENT PER CABINET, (TOTAL OF 4)

## BATTERY CABINET DETAIL

SCALE: N.T.S.

2 / S-2

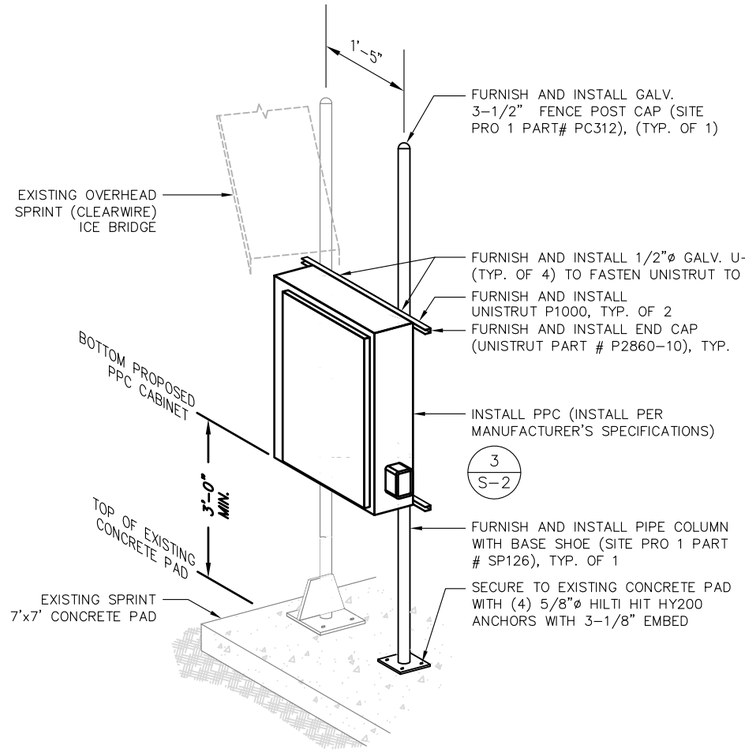



| PPC CABINET | |
|---|---|
| MANUF. | PURCELL SYSTEMS, INC. |
| MODEL # | PPC (VERIFY WITH SPRINT MODEL) |
| HEIGHT | 36" |
| WIDTH | 26" |
| DEPTH | 12.2" |
| WEIGHT | 67± LBS |

## PPC DETAIL

SCALE: N.T.S.

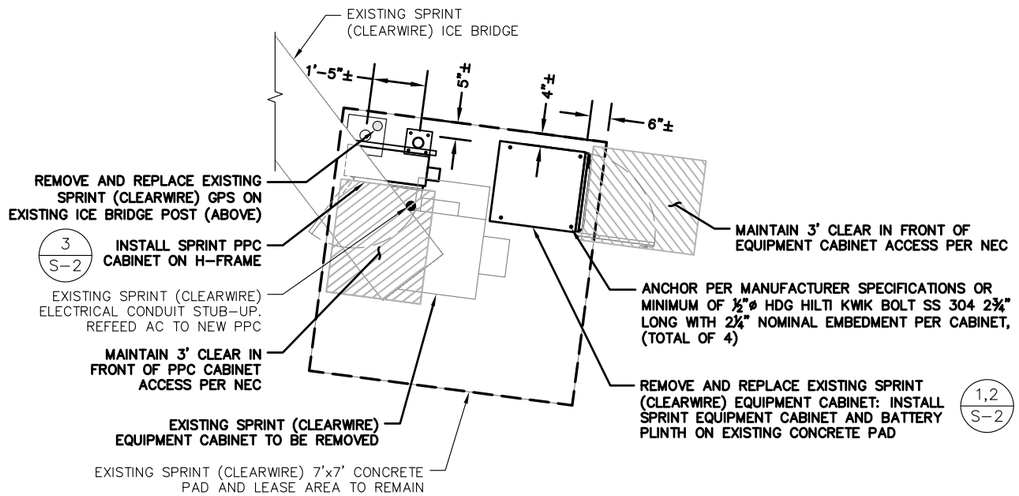
3 / S-2

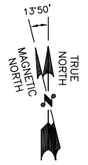



## PPC H-FRAME MOUNTING DETAIL

SCALE: N.T.S.

5 / S-2




## GROUND LEVEL EQUIPMENT PLAN

SCALE: N.T.S.

4 / S-2


Sprint
1 INTERNATIONAL BLVD, SUITE 800
MAHWAH, NJ 07495
TEL: (800) 357-7641

SBA
SBA COMMUNICATIONS CORP.
134 FLANDERS ROAD, SUITE 125
WESTBOROUGH, MA 01581 TEL: (508) 251-0720

ProTerra DESIGN GROUP, LLC
4 Bay Road, Building A
Suite 200
Hadley, MA 01035 TEL: (413) 320-4918


STATE OF CONNECTICUT
THOMAS E. JOHNSON
No. 28192
LICENSED PROFESSIONAL ENGINEER
11/9/18

| | |
|---|---|
| CHECKED BY: | JMM/TEJ |
| APPROVED BY: | JMM/TEJ |

SUBMITTALS

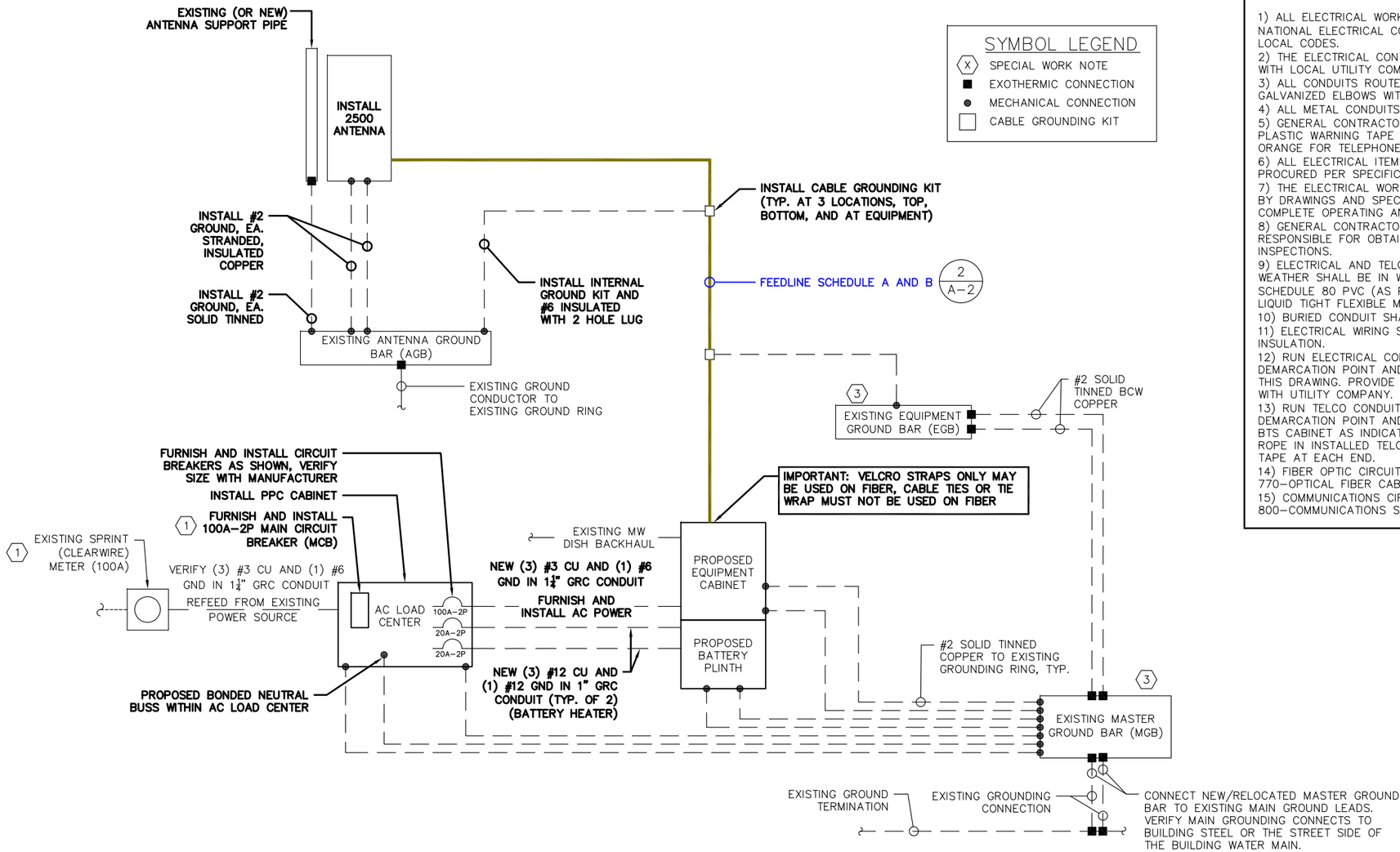
| REV. | DATE | DESCRIPTION | BY |
|---|---|---|---|
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| 1 | 11/09/18 | CONSTRUCTION REVISED | PN |
| 0 | 07/27/18 | ISSUED FOR CONSTRUCTION | PN |

SITE NUMBER:
CT52XC103
SITE NAME:
CUTTER LANE

SITE ADDRESS:
58A MONTANO ROAD
GLASTONBURY, CT 06033

SHEET TITLE
EQUIPMENT DETAILS

SHEET NUMBER
S-2




SYMBOL LEGEND

- X — SPECIAL WORK NOTE
- ■ — EXOTHERMIC CONNECTION
- ● — MECHANICAL CONNECTION
- □ — CABLE GROUNDING KIT

## TYPICAL POWER AND GROUNDING ONE LINE DIAGRAMS

1 / E-1

SCALE: N.T.S.

SPECIAL WORK NOTE:

1. G.C. TO FURNISH AND INSTALL ALL COMPONENTS TO UPGRADE EXISTING ELECTRICAL SERVICE, CONDUIT, CONDUCTOR, PPC AND MCB IN ACCORDANCE WITH SPRINT CONSTRUCTION STANDARDS NV 2.5 ADDENDUM "ENGINEERING NOTICE 2013-002 (POWER UPGRADES) REV.0"_ (OR CURRENT VERSION)
2. G.C. TO FURNISH AND INSTALL UPGRADE THE EXISTING MMBTS BREAKER, CONDUCTOR, AND CONDUIT TO A MINIMUM NEC RATING.
3. FOR NEW OR REPAIRED GROUNDING EQUIPMENT, REFER TO SPRINT GROUNDING STANDARDS AND FOLLOWING (SUPPLEMENTS):
   -ANTI-THEFT UPDATE TO SPRINT GROUNDING DATED 08-24-12 (OR CURRENT VERSION)
   -SPRINT ENGINEERING LETTER EL-0504 DATED 04-20-12 (OR CURRENT VERSION).

## ELECTRICAL NOTES

1) ALL ELECTRICAL WORK SHALL CONFORM TO THE REQUIREMENTS OF THE NATIONAL ELECTRICAL CODE (NEC) AS WELL AS APPLICABLE STATE AND LOCAL CODES.
2) THE ELECTRICAL CONTRACTOR SHALL COORDINATE ALL CONDUIT ROUTING WITH LOCAL UTILITY COMPANIES AND SPRINT CONSTRUCTION MANAGER.
3) ALL CONDUITS ROUTED BELOW GRADE SHALL TRANSITION TO RIGID GALVANIZED ELBOWS WITH RIGID GALVANIZED STEEL CONDUIT ABOVE GRADE.
4) ALL METAL CONDUITS SHALL BE PROVIDED WITH GROUNDING BUSHINGS.
5) GENERAL CONTRACTOR SHALL PROVIDE ALL DIRECT BURIED CONDUITS WITH PLASTIC WARNING TAPE IDENTIFYING CONTENTS. TAPE COLORS SHALL BE ORANGE FOR TELEPHONE AND RED FOR ELECTRIC.
6) ALL ELECTRICAL ITEMS SHALL BE U.L. APPROVED OR LISTED AND PROCURED PER SPECIFICATION REQUIREMENTS.
7) THE ELECTRICAL WORK INCLUDES ALL LABOR AND MATERIALS DESCRIBED BY DRAWINGS AND SPECIFICATIONS INCLUDING INCIDENTAL WORK TO PROVIDE COMPLETE OPERATING AND APPROVED ELECTRICAL SYSTEM.
8) GENERAL CONTRACTOR SHALL PAY FEES FOR PERMITS, AND IS RESPONSIBLE FOR OBTAINING SAID PERMITS AND COORDINATION OF INSPECTIONS.
9) ELECTRICAL AND TELCO WIRING OUTSIDE A BUILDING AND EXPOSED TO WEATHER SHALL BE IN WATER TIGHT GALVANIZED RIGID STEEL CONDUITS OR SCHEDULE 80 PVC (AS PERMITTED BY CODE) AND WHERE REQUIRED IN LIQUID TIGHT FLEXIBLE METAL OR NONMETALLIC CONDUITS.
10) BURIED CONDUIT SHALL BE SCHEDULE 40 PVC.
11) ELECTRICAL WIRING SHALL BE COPPER WITH TYPE XHHW, THWN, OR THIN INSULATION.
12) RUN ELECTRICAL CONDUIT OR CABLE BETWEEN ELECTRICAL UTILITY DEMARCATION POINT AND PROJECT OWNER CELL SITE PPC AS INDICATED ON THIS DRAWING. PROVIDE FULL LENGTH PULL ROPE. COORDINATE INSTALLATION WITH UTILITY COMPANY.
13) RUN TELCO CONDUIT OR CABLE BETWEEN TELEPHONE UTILITY DEMARCATION POINT AND PROJECT OWNER CELL SITE TELCO CABINET AND BTS CABINET AS INDICATED ON THIS DRAWING PROVIDE FULL LENGTH PULL ROPE IN INSTALLED TELCO CONDUIT. PROVIDE GREENLEE CONDUIT MEASURING TAPE AT EACH END.
14) FIBER OPTIC CIRCUITS SHALL BE IN ACCORDANCE WITH NEC ARTICLE 770-OPTICAL FIBER CABLES AND RACEWAYS.
15) COMMUNICATIONS CIRCUITS SHALL BE IN ACCORDANCE WITH NEC ARTICLE 800-COMMUNICATIONS SYSTEMS.

Sprint
1 INTERNATIONAL BLVD, SUITE 800
MAHWAH, NJ 07495
TEL: (800) 357-7641

SBA
SBA COMMUNICATIONS CORP.
134 FLANDERS ROAD, SUITE 125
WESTBOROUGH, MA 01581 TEL: (508) 251-0720

ProTerra DESIGN GROUP, LLC
4 Bay Road, Building A
Suite 200
Hadley, MA 01035 TEL: (413) 320-4918

STATE OF CONNECTICUT
THOMAS E. JOHNSON
No. 28192
LICENSED PROFESSIONAL ENGINEER
FOR SCHEMATIC ONLY 11/9/18

CHECKED BY: JMM/TEJ

APPROVED BY: JMM/TEJ

SUBMITTALS

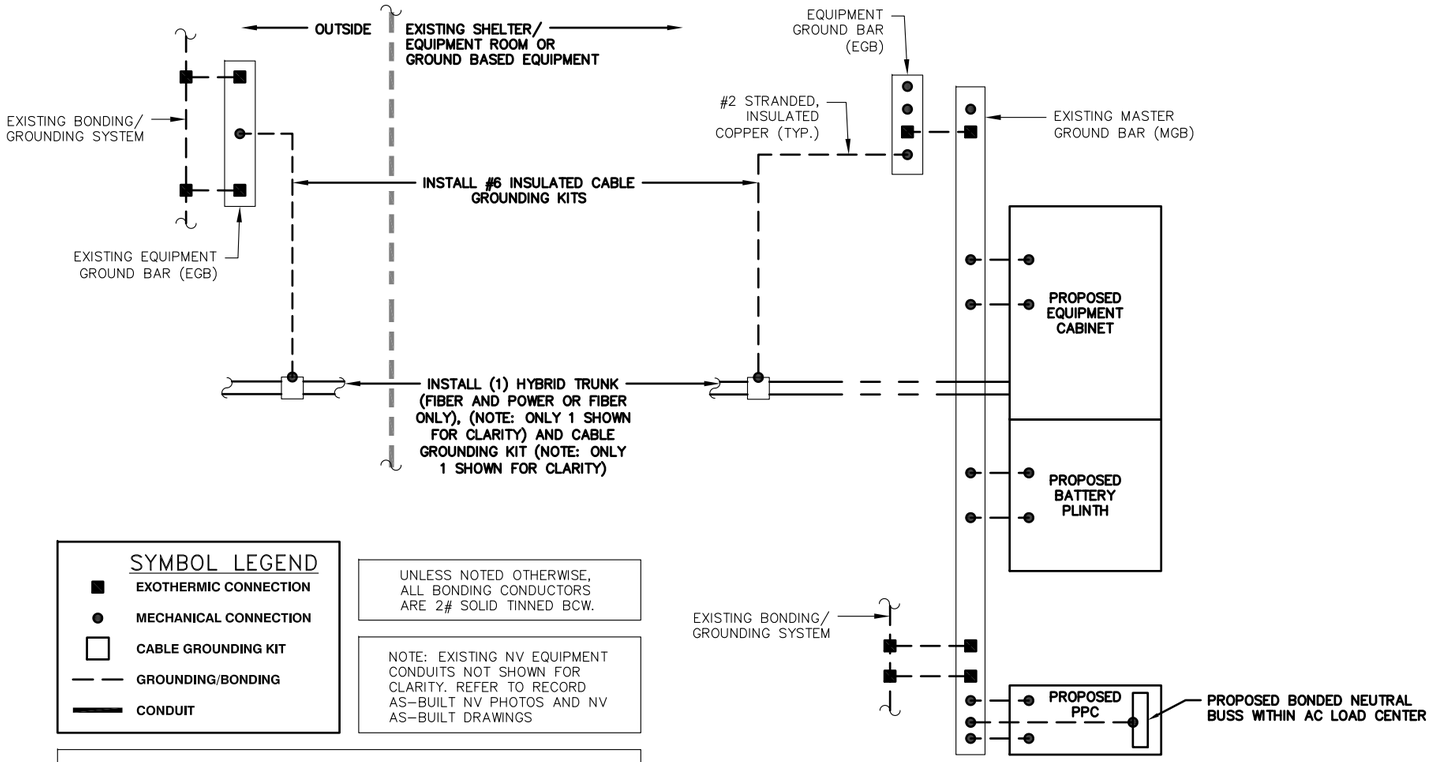
| REV. | DATE | DESCRIPTION | BY |
|---|---|---|---|
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| 1 | 11/09/18 | CONSTRUCTION REVISED | PN |
| 0 | 07/27/18 | ISSUED FOR CONSTRUCTION | PN |

SITE NUMBER:
CT52XC103
SITE NAME:
CUTTER LANE

SITE ADDRESS:
58A MONTANO ROAD
GLASTONBURY, CT 06033

SHEET TITLE
ELECTRICAL AND GROUNDING DETAILS

SHEET NUMBER
E-1




SYMBOL LEGEND

- EXOTHERMIC CONNECTION
- MECHANICAL CONNECTION
- CABLE GROUNDING KIT
- GROUNDING/BONDING
- CONDUIT

UNLESS NOTED OTHERWISE, ALL BONDING CONDUCTORS ARE 2# SOLID TINNED BCW.

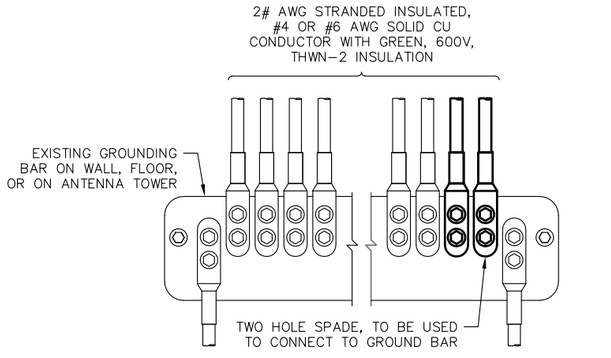
NOTE: EXISTING NV EQUIPMENT CONDUITS NOT SHOWN FOR CLARITY. REFER TO RECORD AS-BUILT NV PHOTOS AND NV AS-BUILT DRAWINGS

NOTE: HYBRIFLEX (FIBER & POWER) AND HYBRIFLEX (FIBER-ONLY) SHOWN. REFER TO RAN EQUIPMENT RFDS FOR SITE-SPECIFIC SCENARIO.

## RAN EQUIPMENT GROUNDING SCHEMATIC

SCALE: N.T.S.

1 / E-2

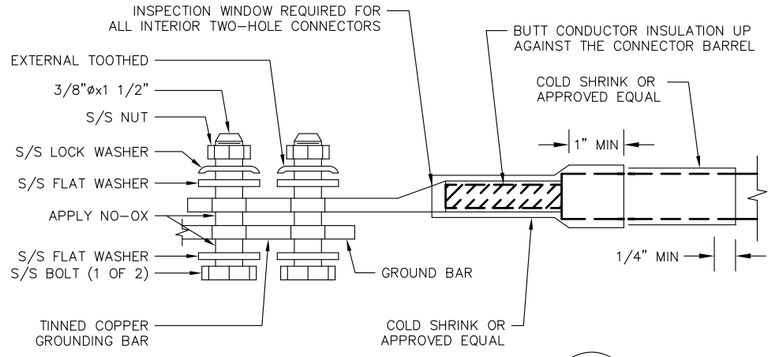



1. APPLY NO-OX TO LUG AND BAR CONTACT SURFACE. DO NOT COAT INLINE LUG.
2. IF STOLEN GROUND BARS ARE ENCOUNTERED, CONTACT SPRINT CM FOR REPLACEMENT THREADED ROD KIT.

## INSTALLATION OF GROUNDING CONDUCTOR TO GROUNDING BAR

SCALE: N.T.S.

2 / E-2




## TWO HOLE LUG

SCALE: N.T.S.

3 / E-2

## PROTECTIVE GROUNDING SYSTEMS GENERAL NOTES:

1. GROUNDING SHALL BE IN ACCORDANCE WITH NEC ARTICLE 250-GROUNDING AND BONDING.
2. GROUNDING SHALL BE IN ACCORDANCE WITH SPRINT SSEO DOCUMENTS 3.018.02.004 "BONDING, GROUNDING AND TRANSIENT PROTECTION FOR CELL SITES" AND 3.018.10.002 "SITE RESISTANCE TO EARTH TESTING".
3. PROVIDE GROUND CONNECTIONS FOR ALL METALLIC STRUCTURES, ENCLOSURES, RACEWAYS AND OTHER CONDUCTIVE ITEMS ASSOCIATED WITH THE INSTALLATION OF CARRIER'S EQUIPMENT.
4. GROUND CONNECTIONS: CLEAN SURFACES THOROUGHLY BEFORE APPLYING GROUND LUGS OR CLAMPS. IF SURFACE IS COATED, REMOVE THE COATING, APPLY A NON-CORROSIVE APPROVED COMPOUND TO CLEAN SURFACE AND INSTALL LUGS OR CLAMPS. WHERE GALVANIZING IS REMOVED FROM METAL, IT SHALL BE PAINTED OR TOUCHED UP WITH "GALVAMOX" OR EQUAL.
5. ALL GROUNDING WIRES SHALL PROVIDE A STRAIGHT, DOWNWARD PATH TO GROUND WITH GRADUAL BENDS AS REQUIRED. GROUND WIRES SHALL NOT BE LOOPED OR SHARPLY BENT.
6. ALL CLAMPS AND SUPPORTS USED TO SUPPORT THE GROUNDING SYSTEM CONDUCTORS AND PVC CONDUITS SHALL BE PVC TYPE (NON CONDUCTIVE). DO NOT USE METAL BRACKETS OR SUPPORTS WHICH WOULD FORM A COMPLETE RING AROUND ANY GROUNDING CONDUCTOR.
7. ALL GROUND WIRES SHALL BE #2 SOLID TINNED BCW UNLESS NOTED OTHERWISE.
8. PROVIDE DEDICATED #2 AWG COPPER GROUND WIRE FROM EACH ANTENNA MOUNTING PIPE TO ASSOCIATED CIGBE.
9. GROUND ANTENNA BASES, FRAMES, CABLE RACKS, AND OTHER METALLIC COMPONENTS WITH #2 INSULATED TINNED STRANDED COPPER GROUNDING CONDUCTORS AND CONNECT TO INSULATED SURFACE MOUNTED GROUND BARS. CONNECTION DETAILS SHALL FOLLOW MANUFACTURER'S SPECIFICATIONS FOR GROUNDING.
10. EACH EQUIPMENT CABINET SHALL BE CONNECTED TO THE MASTER ISOLATION GROUND BAR (MGB) WITH #2 SOLID TINNED BCW EQUIPMENT CABINETS WALL HAVE (2) CONNECTIONS.
11. GROUND HYBRIFLEX SHIELD AT TOP, BOTTOM AND AT TRANSITION TO HYBRIFLEX JUMPER CABLES AT EQUIPMENT CABINET ENTRANCE USING MANUFACTURER'S GUIDELINES. WHEN HYBRIFLEX CABLE EXCEEDS 200', GROUND AT INTERVALS NOT EXCEEDING 100'.
12. THE CONTRACTOR SHALL VERIFY THAT THE EXISTING GROUND BARS HAVE ENOUGH SPACE/HOLES FOR ADDITIONAL TWO HOLE LUGS.
13. EXOTHERMIC WELDING IS RECOMMENDED FOR GROUNDING CONNECTION WHERE PRACTICAL OTHERWISE. THE CONNECTION SHALL BE MADE USING COMPRESSION TYPE-2 HOLES, LONG BARREL LUGS OR DOUBLE CRIMP "C" CLAMP. THE COPPER CABLES SHALL BE COATED WITH AN ANTI-OXIDANT (THOMAS BETTS KOPR-SHILD) BEFORE MAKING THE CRIMP CONNECTIONS THE CONTRACTOR SHALL FOLLOW MANUFACTURER'S RECOMMENDED TORQUES ON THE BOLT ASSEMBLY TO SECURE CONNECTIONS.
14. AT ALL TERMINATIONS AT EQUIPMENT ENCLOSURES, PANEL, AND FRAMES OF EQUIPMENT AND WHERE EXPOSED FOR GROUNDING. CONDUCTOR TERMINATION SHALL BE PERFORMED UTILIZING TWO HOLE BOLTED TONGUE COMPRESSION TYPE LUGS WITH STAINLESS STEEL SELF-TAPPING SCREWS.
15. THE MASTER GROUND BAR (MGB) SHALL BE MADE OF BARE 1/4"x2" COPPER (FOR OUTDOOR APPLICATIONS IT SHALL BE TINNED COPPER) AND LARGE ENOUGH TO ACCOMMODATE THE REQUIRED NUMBER OF GROUND CONNECTIONS. THE HARDWARE SECURING THE MGB SHALL ELECTRICAL INSULATE THE MGB FROM ANY STRUCTURE TO WHICH IT IS FASTENED.
16. ALL BOLTS, WASHERS, AND NUTS USED ON GROUNDING CONNECTIONS SHALL BE STAINLESS STEEL.
17. ALL GROUNDING CONNECTIONS SHALL BE COATED WITH A COPPER SHIELD ANTI-CORROSIVE AGENT SUCH AS T&B KOPR SHIELD. VERIFY PRODUCT WITH SPRINT CONSTRUCTION MANAGER.
18. FOR NEW OR REPAIRED GROUNDING EQUIPMENT. REFER TO SPRINT GROUNDING STANDARDS AND FOLLOWING (SUPPLEMENTS):
    -ANTI-THEFT UPDATE TO SPRINT GROUNDING DATED 08-24-12 (OR CURRENT VERSION)
    -SPRINT ENGINEERING LETTER EL-0504 DATED 04-20-12 (OR CURRENT VERSION)

Sprint
1 INTERNATIONAL BLVD, SUITE 800
MAHWAH, NJ 07495
TEL: (800) 357-7641

SBA
SBA COMMUNICATIONS CORP.
134 FLANDERS ROAD, SUITE 125
WESTBOROUGH, MA 01581 TEL: (508) 251-0720

ProTerra DESIGN GROUP, LLC
4 Bay Road, Building A
Suite 200
Hadley, MA 01035 TEL: (413) 320-4918

STATE OF CONNECTICUT
THOMAS E. JOHNSON
No. 28192
LICENSED PROFESSIONAL ENGINEER
FOR SCHEMATIC ONLY
11/9/18

CHECKED BY: JMM/TEJ

APPROVED BY: JMM/TEJ

SUBMITTALS

| REV. | DATE | DESCRIPTION | BY |
|---|---|---|---|
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| 1 | 11/09/18 | CONSTRUCTION REVISED | PN |
| 0 | 07/27/18 | ISSUED FOR CONSTRUCTION | PN |

SITE NUMBER:
CT52XC103
SITE NAME:
CUTTER LANE
SITE ADDRESS:
58A MONTANO ROAD
GLASTONBURY, CT 06033

SHEET TITLE
ELECTRICAL AND GROUNDING DETAILS

SHEET NUMBER
E-2

CT-HFD0097S18.1

Augment 26749

RFDS ID:

SprintVision

# RF Design Sheet

| Site Identification | |
|---|---|
| Cascade | CT-HFD0097 |
| SMS Schedule ID | |
| SMS Schedule Name | Massive MIMO |
| PID | |
| RRU OEM | Alcatel Lucent |
| Switch OEM | |
| RFDS Issue Date | 2018-06-04 13:19:15.0 |
| RFDS Revision Date | 2018-06-08 19:38:48.0 |
| RFDS Revision | 1 |

| | |
|---|---|
| Filter Analysis Complete | YES |
| RFDS - Issue Date | 06/04/2018 |
| Design Status | Complete |
| | |
| Project Description | Massive MIMO - Separated from KSU Augment |

| Battery Backup Cabinet Model | |
|---|---|
| Model Number | |
| Weight (Lbs.) | |
| Dimensions (In.) | |
| Manufacturer | |

| Contact Information | |
|---|---|
| Engineer Email | Bill.M.Hastings@sprint.com |
| Sprint Badged RF Engineer | Bill Hastings |
| RF Engineer Email | Bill.M.Hastings@sprint.com |
| RF Engineer Phone | 978-590-9700 |
| RF Manager | Jonathan Hull |
| RF Manager Email | Jonathan.B.Hull@Sprint.com |
| RF Manager Phone | 617-233-2920 |

| Carrier Count | |
|---|---|
| 2500 LTE | 3 |
| 1900 LTE | |
| 1900 EVDO | |
| 1900 Voice | |
| 800 LTE | |
| 800 Voice | |

| UE Relay Model | |
|---|---|
| Model Number | |
| Weight (Lbs.) | |
| Dimensions (In.) | |
| UE Relay Azimuth | |
| Manufacturer | |
| UE Relay CL Height (meters) | |

| Location Details | |
|---|---|
| Latitude | 41.699453 |
| Longitude | -72.564172 |
| Market | Northern Connecticut |
| Region | Northeast |
| City | GLASTONBURY |
| State | CT |
| Zip Code | CT/06033 |
| County | HARTFORD |

| | |
|---|---|
| 2500MHz | 3 |
| 1900MHz | |
| 800MHz | |

| GPS Antenna Model | |
|---|---|
| Model Number | |
| Weight (Lbs.) | |
| Dimensions (In.) | |
| Manufacturer | |
| GPS Antenna needed at site | |

| A&E Drawing Requirements |
|---|
| Massive MIMO - Separated from KSU Augment |

| Band: 2500 | Alpha | Beta | Gamma | Delta | Epsilon | Zeta |
|---|---|---|---|---|---|---|
| **Radio Model** | | | | | | |
| Model Number | Nokia MIMO Integrated Radio/Antenna | Nokia MIMO Integrated Radio/Antenna | Nokia MIMO Integrated Radio/Antenna | N/A | N/A | N/A |
| Weight (lbs) | N/A | N/A | N/A | N/A | N/A | N/A |
| Dimensions | Refer to Antenna model for details | Refer to Antenna model for details | Refer to Antenna model for details | N/A | N/A | N/A |
| Manufacturer | Nokia | Nokia | Nokia | N/A | N/A | N/A |
| Number of RRUs needed | 1 | 1 | 1 | 0 | 0 | 0 |

| Band: 2500 | Alpha | Beta | Gamma | Delta | Epsilon | Zeta |
|---|---|---|---|---|---|---|
| **Antenna1** | | | | | | |
| Model Number | AAHC | AAHC | AAHC | | | |
| Weight (lbs) | 103.7 | 103.7 | 103.7 | N/A | N/A | N/A |
| Dimensions | 25.6 x 19.7 x 9.64 | 25.6 x 19.7 x 9.64 | 25.6 x 19.7 x 9.64 | N/A | N/A | N/A |
| Manufacturer | Nokia | Nokia | Nokia | N/A | N/A | N/A |
| Ant1 Top Jumper Make/Mode/Qty | N/A 0 | N/A 0 | N/A 0 | N/A 0 | N/A 0 | N/A 0 |
| Ant 1 RF requested Diameter | N/A | N/A | N/A | N/A | N/A | N/A |
| Ant 1 RF requested Top Jumper Length(ft) | N/A | N/A | N/A | N/A | N/A | N/A |
| Antenna 1 Azimuth | 0 | 120 | 240 | N/A | N/A | N/A |
| Antenna 1 Mechanical DT | N/A | N/A | N/A | N/A | N/A | N/A |
| Antenna 1 Center Line (ft) | 110.0065652 | 110.0065652 | 110.0065652 | N/A | N/A | N/A |
| Antenna 1 Electrical DT | 2 | 2 | 2 | N/A | N/A | N/A |
| Antenna 1 Electrical DT 2 | N/A | N/A | N/A | N/A | N/A | N/A |
| Antenna 1 Electrical DT 3 | N/A | N/A | N/A | N/A | N/A | N/A |
| Antenna 1 Twist | N/A | N/A | N/A | N/A | N/A | N/A |

NOTE: RFDS PROVIDED BY SPRINT DATED 06/04/2018. EXCERPTS TAKEN DEPICT RELEVANT RF DESIGN INFORMATION.
A&E VENDOR SCOPE OF WORK LIMITED TO DESIGN OF MECHANICAL/STRUCUTRAL EQUIPMENT ATTACHMENTS.

## RF DATA SHEET

SCALE: N.T.S.

1
RF-1

SPRINT CONSTRUCTION STANDARDS:

GENERAL CONTRACTOR SHALL ADHERE TO THE FOLLOWING SPRINT CONSTRUCTION STANDARDS.

- CONSTRUCTION STANDARDS: INTEGRATED CONSTRUCTION STANDARDS FOR WIRELESS SITES – CURRENT VERSION, INCLUDING EXHIBITS A–M.
- CONSTRUCTION SPECIFICATIONS: CONSTRUCTION STANDARDS EXHIBIT A – STANDARD CONSTRUCTION SPECIFICATIONS FOR WIRELESS SITES (CURRENT VERSION).
- GROUNDING STANDARDS: EXTERIOR GROUNDING SYSTEM DESIGN. GROUNDING STANDARDS (SUPPLEMENT): ANTI–THEFT UPDATE TO SPRINT GROUNDING 082412 AND SPRINT ENGINEERING LETTER EL–0504 DATED 04.20.12.
- WEATHER PROOFING STANDARDS: EXCERPT FROM CONSTRUCTION STANDARDS EXHIBIT A, SECTION 3.6 WEATHERPROOFING CONNECTORS AND GROUND KITS.
- COLOR CODING: SPRINT NEXTEL ANT AND LINE COLOR CODING PER SPRINT TS–0200 CURRENT VERSION.
- GENERAL CONTRACTOR TO FIELD VERIFY AZIMUTH AND CL HEIGHT AND MECHANICAL DOWNTILT. IF DIFFERENT THAN CALLED OUT IN RFDS, HALT ANTENNA WORK FOR ONE HOUR, CALL SPRINT RF ENGINEER (OR MANAGER IF RF ENGINEER DOES NOT ANSWER, BUT STILL LEAVE A MESSAGE TO RF ENGINEER) USING SPRINT–PROVIDED CONTACT INFORMATION FOR FURTHER INSTRUCTIONS. IF SPRINT DOES NOT RESPOND WITHIN ONE HOUR, PLACE ANTENNA AT SAME CL HEIGHT AS PLAN AND EMAIL CORRECT CL HEIGHT AND AZIMUTH TO SPRINT RF ENGINEER. UPDATE AS–BUILT DRAWING WITH CORRECT CL HEIGHT. ALSO EMAIL CORRECT ANTENNA CL HEIGHT, AZIMUTH AND MECHANICAL DOWNTILT TO RF ENGINEER.
- AISG TESTS TO VERIFY OPERATION IS TO BE PERFORMED AFTER FINAL INSTALLATION OF ANTENNAS AND AISG CABLES HAVE BEEN CONNECTED. VERIFY OPERATION OF ALL EXISTING SPRINT AISG EQUIPMENT INCLUDING 800MHZ, 1.9GHZ AND 2.5G. TEST INCLUDE COMPLETE DOWNTILT, AZIMUTH (IF APPLICABLE) AND BEAMWIDTH SWINGS (IF APPLICABLE). DOCUMENT AISG TEST RESULTS IN COAX SWEEP TEST SPREADSHEET.
- GENERAL CONTRACTOR MUST INSURE THAT NO OBJECT IS LOCATED IN FRONT OF ANTENNA. THIS MEANS NO OBJECT IS TO BE LOCATED 45 DEGREES LEFT AND RIGHT OF FRONT OF ANTENNA OR 7 DEGREES UP AND DOWN FROM CENTER OF ANTENNA. IF THIS IS NOT POSSIBLE, CONTACT RF ENGINEER FOR FURTHER INSTRUCTION.
- GENERAL CONTRACT IS REQUIRED TO USE A DIGITAL ALIGNMENT TOOL TO SET AZIMUTH, ROLL AND DOWNTILT. AZIMUTH ACCURACY IS TO BE WITHIN 1 DEGREES. DOWNTILT AND ROLL (LEFT TO RIGHT TILT) IS TO BE WITHIN 0.1 DEGREES. IF FOR SOME REASON THIS ACCURACY CANNOT BE ACHIEVED, UPDATE AS–BUILT DRAWINGS AND EMAIL SPRINT RF ENGINEER WITH AS–BUILT SETTINGS. USE 3Z RF ALIGNMENT TOOL OR EQUIVALENT TOOL.
  HTTP://WWW.3ZTELECOM.COM/ANTENNA–ALIGNMENT–TOOL/.

NOTE:
VERIFY PROPOSED AZIMUTHS WITH RF ENGINEER PRIOR TO INSTALLATION


Sprint
1 INTERNATIONAL BLVD, SUITE 800
MAHWAH, NJ 07495
TEL: (800) 357-7641

SBA
SBA COMMUNICATIONS CORP.
134 FLANDERS ROAD, SUITE 125
WESTBOROUGH, MA 01581 TEL: (508) 251-0720

ProTerra DESIGN GROUP, LLC
4 Bay Road, Building A
Suite 200
Hadley, MA 01035 TEL: (413) 320–4918


STATE OF CONNECTICUT
THOMAS E. JOHNSON
No. 28192
LICENSED PROFESSIONAL ENGINEER
11/9/18

CHECKED BY: JMM/TEJ

APPROVED BY: JMM/TEJ

SUBMITTALS

| REV. | DATE | DESCRIPTION | BY |
|---|---|---|---|
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| 1 | 11/09/18 | CONSTRUCTION REVISED | PN |
| 0 | 07/27/18 | ISSUED FOR CONSTRUCTION | PN |

SITE NUMBER:
CT52XC103
SITE NAME:
CUTTER LANE

SITE ADDRESS:
58A MONTANO ROAD
GLASTONBURY, CT 06033

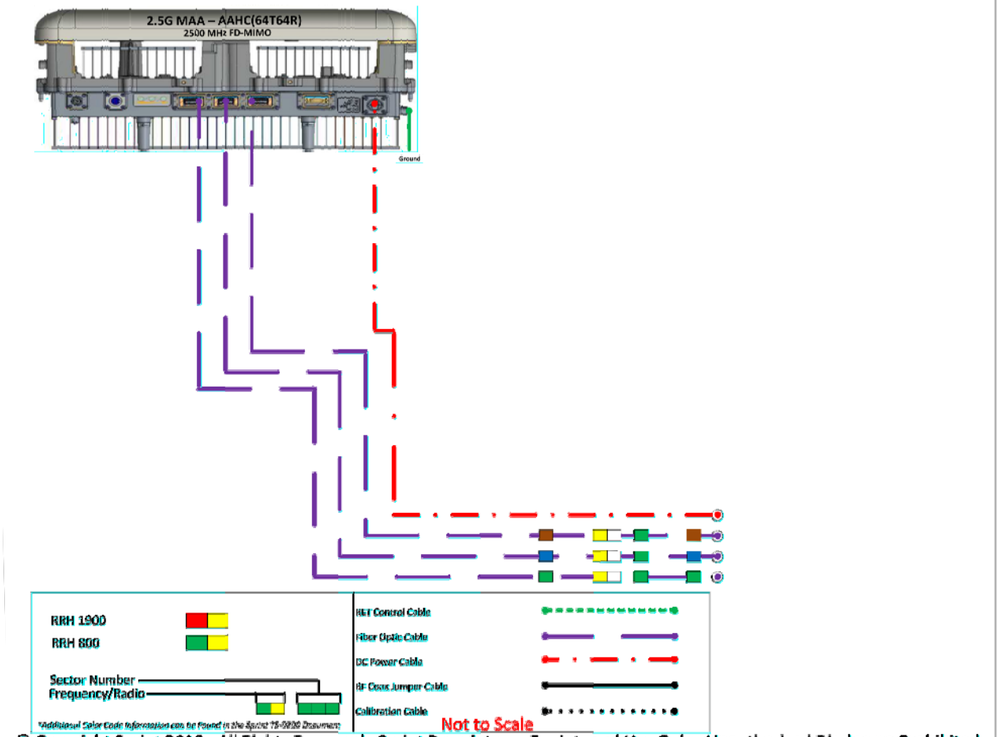
SHEET TITLE
RF DATA SHEET

SHEET NUMBER
RF–1

| Prepared By | Revision Date | Revision Number | |
|---|---|---|---|
| Mark Elliott | April 4, 2018 | | R1 |
| **Approved By** | **Approval Date** | | |
| RAN Hardware & Antenna Teams | Final-Macro Generated | | |

Sprint

# ALU mMIMO




Not to Scale



| Prepared By | Creation Date | Revision Number | |
|---|---|---|---|
| Mark Elliott | February 13, 2016 | R-1 | Nokia-A Tri-Band Fiber Connections |
| **Approved By** | **Approval Date** | | (Nokia-A Two-800, One-1900, & One-2500 RRH) |
| RAN Hardware & Antenna Teams | February 23, 2017 | | |

Sprint

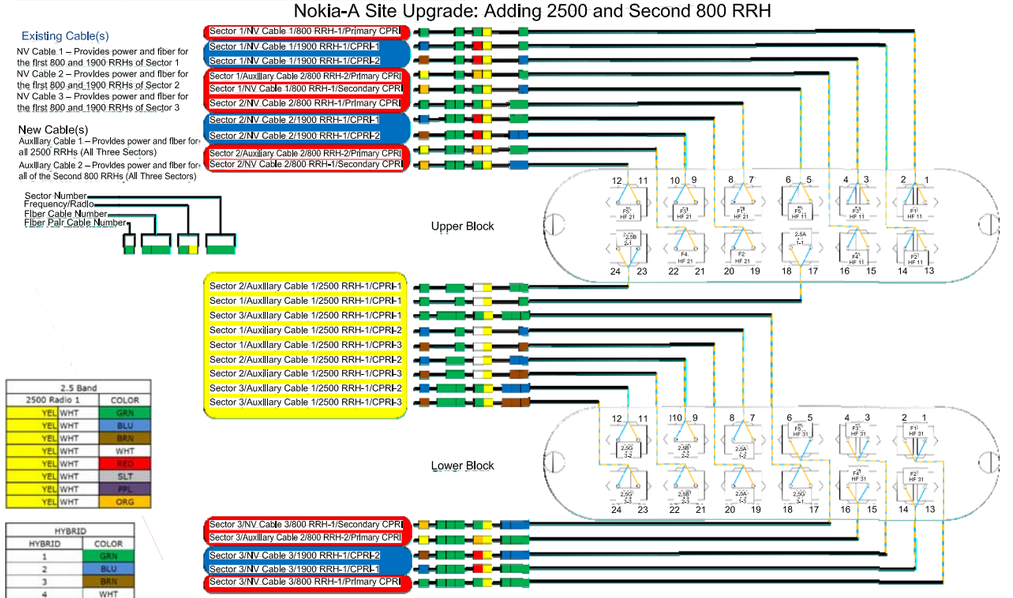
## Nokia-A Site Upgrade: Adding 2500 and Second 800 RRH

**Existing Cable(s)**

NV Cable 1 – Provides power and fiber for the first 800 and 1900 RRHs of Sector 1
NV Cable 2 – Provides power and fiber for the first 800 and 1900 RRHs of Sector 2
NV Cable 3 – Provides power and fiber for the first 800 and 1900 RRHs of Sector 3

**New Cable(s)**

Auxiliary Cable 1 – Provides power and fiber for all 2500 RRHs (All Three Sectors)
Auxiliary Cable 2 – Provides power and fiber for all of the Second 800 RRHs (All Three Sectors)




| 2.5 Band | |
|---|---|
| 2500 Radio 1 | COLOR |
| YEL WHT | GRN |
| YEL WHT | BLU |
| YEL WHT | BRN |
| YEL WHT | WHT |
| YEL WHT | RED |
| YEL WHT | SLT |
| YEL WHT | PPL |
| YEL WHT | ORG |

| HYBRID | |
|---|---|
| HYBRID | COLOR |
| 1 | GRN |
| 2 | BLU |
| 3 | BRN |
| 4 | WHT |
| 5 | RED |
| 6 | SLT |
| 7 | PPL |
| 8 | ORG |

**SPECIAL WORK NOTE:**
CPRI BLOCK DIAGRAM SHOWN IS FOR SCHEMATIC ONLY. CONFIRM CPRI BLOCK WIRING DIAGRAM WITH THE CONSTRUCTION MANAGER PRIOR TO INSTALLATION.

NOTES:

1. ALL CABLES SHALL BE MARKED AT THE TOP AND BOTTOM WITH 2" COLORED TAPE, STENCIL TAG COLORED TAPE, OR COLORED HEAT SHRINK TUBING
2. COLORED TAPE MAY BE OBTAINED FROM GRAYBAR ELECTRONIC. UV STABILIZED TAPE OR HEAT SHRINK ARE PREFERRED.
3. THE FIRST RING SHALL BE CLOSEST TO THE END OF THE CABLE, AND THERE SHALL BE A 1" SPACE BETWEEN EACH RING.
4. THE CABLE COLOR CODE SHALL BE APPLIED IN ACCORDANCE TO TABLE 19–1.
   a. TABLE 19–1 ONLY SHOWS 3 SECTORS, BUT ADDITIONAL SECTORS ARE EASILY SUPPORTED BY ADDING THE APPROPRIATE NUMBER OF COLORED RINGS TO THE CABLE COLOR CODE.
5. AFTER THE CABLE COLOR CODE IS APPLIED, THE FREQUENCY COLOR CODE, TABLE 19–2, MUST BE APPLIED FOR THE SPECIFIC FREQUENCY BAND IN USE ON A GIVEN LINE.
   a. 2" GAP SHALL SEPARATE THE CABLE COLOR CODE FROM THE FREQUENCY COLOR CODE.
   b. THE 2" COLOR RINGS FOR THE FREQUENCY CODE SHALL BE PLACED NEXT TO EACH OTHER WITH NO SPACES.
6. WRAP 2" COLORED TAPE A MINIMUM OF 3 TIMES AROUND THE COAX, AND KEEP THE TAPE IN THE SAME AREA AS MUCH AS POSSIBLE. THIS WILL ALLOW REMOVAL OF TAPE THAT FADES OR DISCOLORS DUE TO WEATHER.
7. EXAMPLES OF THE CABLE AND FREQUENCY COLOR CODES ARE SHOWN IN FIGURE 19-1 AND FIGURE 19–2.

| NV CABLES | | | |
|---|---|---|---|
| BAND | INDICATOR | PORT | COLOR |
| 800-1 | YEL GRN | NV-1 | GRN |
| 1900-1 | YEL RED | NV-2 | BLU |
| 1900-2 | YEL BRN | NV-3 | BRN |
| 1900-3 | YEL BLU | NV-4 | WHT |
| 1900-4 | YEL SLT | NV-5 | RED |
| 800-2 | YEL ORG | NV-6 | SLT |
| SPARE | YEL WHT | NV-7 | PPL |
| 2500 | YEL PPL | NV-8 | ORG |

**Figure 1: Anterna Orientation**

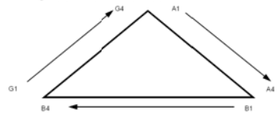


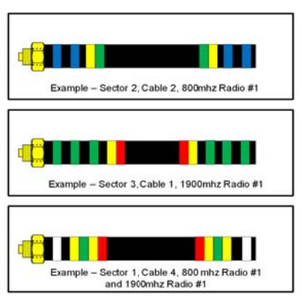

FIGURE 19–1

| Sector | Cable | First Ring | Second Ring | Third Ring |
|---|---|---|---|---|
| 1 Alpha | 1 | Green | No Tape | No Tape |
| 1 | 2 | Blue | No Tape | No Tape |
| 1 | 3 | Brown | No Tape | No Tape |
| 1 | 4 | White | No Tape | No Tape |
| 1 | 5 | Red | No Tape | No Tape |
| 1 | 6 | Grey | No Tape | No Tape |
| 1 | 7 | Purple | No Tape | No Tape |
| 1 | 8 | Orange | No Tape | No Tape |
| 2 Beta | 1 | Green | Green | No Tape |
| 2 | 2 | Blue | Blue | No Tape |
| 2 | 3 | Brown | Brown | No Tape |
| 2 | 4 | White | White | No Tape |
| 2 | 5 | Red | Red | No Tape |
| 2 | 6 | Grey | Grey | No Tape |
| 2 | 7 | Purple | Purple | No Tape |
| 2 | 8 | Orange | Orange | No Tape |
| 3 Gamma | 1 | Green | Green | Green |
| 3 | 2 | Blue | Blue | Blue |
| 3 | 3 | Brown | Brown | Brown |
| 3 | 4 | White | White | White |
| 3 | 5 | Red | Red | Red |
| 3 | 6 | Grey | Grey | Grey |
| 3 | 7 | Purple | Purple | Purple |
| 3 | 8 | Orange | Orange | Orange |

FIGURE 19–2

| NV FREQUENCY | INDICATOR | ID |
|---|---|---|
| 800-1 | YEL | GRN |
| 1900-1 | YEL | RED |
| 1900-2 | YEL | BRN |
| 1900-3 | YEL | BLU |
| 1900-4 | YEL | SLT |
| 800-1 | YEL | ORG |
| RESERVED | YEL | WHT |
| RESERVED | YEL | PPL |

| 2.5 FREQUENCY | INDICATOR | | ID |
|---|---|---|---|
| 2500 -1 | YEL | WHT | GRN |
| 2500 -2 | YEL | WHT | RED |
| 2500 -3 | YEL | WHT | BRN |
| 2500 -4 | YEL | WHT | BLU |
| 2500 -5 | YEL | WHT | SLT |
| 2500 -6 | YEL | WHT | ORG |
| 2500 -7 | YEL | WHT | WHT |
| 2500 -8 | YEL | WHT | PPL |




Sprint
1 INTERNATIONAL BLVD, SUITE 800
MAHWAH, NJ 07495
TEL: (800) 357-7641

SBA
SBA COMMUNICATIONS CORP.
134 FLANDERS ROAD, SUITE 125
WESTBOROUGH, MA 01581 TEL: (508) 251-0720

ProTerra
DESIGN GROUP, LLC
4 Bay Road, Building A
Suite 200
Hadley, MA 01035 (413) 320–4918

STATE OF CONNECTICUT
THOMAS E. JOHNSON
No. 28182
LICENSED PROFESSIONAL ENGINEER
11/9/18

CHECKED BY: JMM/TEJ

APPROVED BY: JMM/TEJ

SUBMITTALS

| REV. | DATE | DESCRIPTION | BY |
|---|---|---|---|
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| 1 | 11/09/18 | CONSTRUCTION REVISED | PN |
| 0 | 07/27/18 | ISSUED FOR CONSTRUCTION | PN |

SITE NUMBER:
CT52XC103
SITE NAME:
CUTTER LANE
SITE ADDRESS:
58A MONTANO ROAD
GLASTONBURY, CT 06033

SHEET TITLE
PLUMBING DIAGRAM AND RAN WIRING

SHEET NUMBER
RF–2