



1280 Route 46 West, Suite 9, Parsippany NJ, 07054

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

Re: Notice of Exempt Modification Application  
2111 Berlin Turnpike (a.k.a 99 Cedarwood Lane) Newington, CT 06111

May 20, 2018

Dear Ms. Bachman:

Sprint Spectrum Realty Company, L.P. ("Sprint"), received CT Siting Council approval for an exempt modification on March 5, 2018; EM-SPRINT-094-180206. Sprint subsequently found the need to change some equipment from that specified in the approved EM. Sprint, therefore, will not proceed with the EM approval received on March 5, 2018 and will instead resubmit for a new exempt modification with the new equipment. Please advise if anything else is required to rescind the original approval, and clear the way for the subsequent resubmittal. Thank you.

If you have any questions, please feel free to contact me.

Thank you,

By: *Paul F. Sagristano*

Paul F. Sagristano  
Cherundolo Consulting  
917.841.0247  
[psagristano@lrivassoc.com](mailto:psagristano@lrivassoc.com)



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Re: Notice of Exempt Modification Application  
2111 Berlin Turnpike (a.k.a 99 Cedarwood Lane) Newington, CT 06111

May 20, 2018

Dear Ms. Bachman:

Sprint Spectrum Realty Company, L.P. ("Sprint"), is submitting to the Connecticut Siting Council for a Notice of Exempt Modification for Proposed Modifications to an Existing Telecommunications Facility located at the above-referenced site. Sprint currently maintains 12 panel antennas and 3 microwave dish antennas at the 140' level of the Tower. Sprint proposes to remove and replace 6 existing panel antennas with 6 new panel antennas (1 per sector) and add 9 remote radio units (3 per sector) at 140' tower level as well as 4 new hybrid cables and 48 Antenna-RRH jumper cables, and a new 2.5 MHz equipment cabinet. Sprint further proposes tower modifications to produce a passing structural analysis

The earliest CT Siting Council submission I could find was issued to Sprint/Nextel on April 7, 2004. The original Building permit for the actual tower construction was issued by the Town was unavailable. The attached construction and structural documents enclosed reflect the current reality of all the installations on the Tower.

If you have any questions, please feel free to contact me.

Thank you,

By: *Paul F. Sagristano*

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Cherundolo Consulting  
917.841.0247  
[psagristano@lrvassoc.com](mailto:psagristano@lrvassoc.com)



4 Davis Road West, Suite 5 – Old Lyme, CT 06371

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

Re: Notice of Exempt Modification Application  
2111 Berlin Turnpike, Newington, CT 06111

Lat: N 41.69490  
Long: W72.70892

May 20, 2018

Dear Ms. Bachman:

Sprint currently maintains 12 panel antennas and 3 microwave parabolic antennas at the 140' level of the above noted wireless tower. Sprint proposes to remove 6 existing panel antennas (2) per sector and replace with 6 new panel antennas (2 per sector) and add 12 remote radio units (4 per sector) at the 140' tower level as well as 4 new hybrid cables and 48 Antenna-RRH jumper cables, and 2.5 MHz radio equipment in a new radio cabinet on the existing slab. Sprint is performing a new high-performance upgrade for cellular mobile communications. It is designed to increase the capacity and speed of mobile communications networks.

The earliest CT Siting Council application available was submitted on April 2004, 2004. The original Building permit for the Tower construction was not available.

Attached is a summary of the planned modifications, including power density calculations reflecting the change in Sprint's operations at the site. Also included is documentation of the structural sufficiency of the tower with proposed modifications to accommodate the revised antenna configuration.

### **Existing Facility**

The Newington facility is located at 2111 Berlin Turnpike, the Site coordinates are: N41.69490, W72.70892. The existing facility consists of a 170' Guyed Tower. Sprint currently operates wireless communications equipment on a platform on a concrete slab at the facility and has 12 antennas and 3 parabolic microwave antennas at a centerline of 140' feet on the tower.

Please accept this letter as notification to the Council, pursuant to R.C.S.A. Section 16-50j-73, for construction which constitutes an exempt modification pursuant to R.C.S.A. Section 16-50j-72(b)(2). In compliance with R.C.S.A. Section 16-50j-73, a copy of this letter is being sent to Hon. Roy Zartarian the Mayor for Newington, as well as Mr. Craig Minor, Town Planner for the Town and Frederick Callahan III, the tower owner.

## **Statutory Considerations**

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

1. The height of the overall structure will be unaffected.
2. The proposed changes will not require an extension of the property boundaries.
3. The proposed additions will not increase the noise level at the existing facility by six decibels or more, or to levels that exceed state and/or local criteria
4. The changes will not increase the calculated “worst case” power density for the combined operations at the site to a level at or above the Federal Communications Commission safety standard.
5. The proposed modifications 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 changes at the referenced site constitute exempt modifications under R.C.S.A Section §16-50j-72(b)(2).

Respectfully submitted,

*Paul F. Sagristano*

Paul F. Sagristano  
Charles Cherundolo Consulting  
917-841-0247  
[psagristano@lrivassoc.com](mailto:psagristano@lrivassoc.com)

PFS/mtf

Additional Recipients:

Hon. Roy Zartarian the Mayor for Newington – Via Fed Ex

Mr. Craig Minor, Town Planner – Via Fed Ex

Frederick Callahan III, the tower owner – Via Fed Ex



May 24, 2018

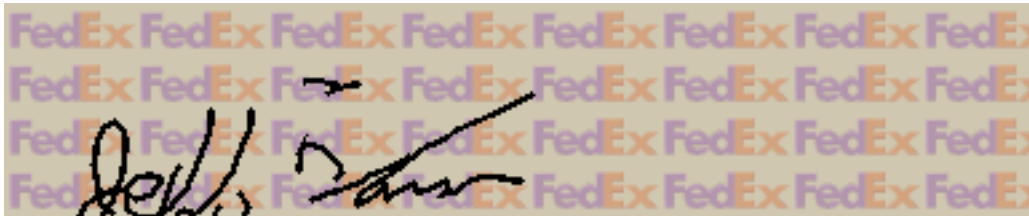
Dear Customer:

The following is the proof-of-delivery for tracking number **772280873730**.

---

**Delivery Information:**

<b>Status:</b>	Delivered	<b>Delivered to:</b>	Receptionist/Front Desk
<b>Signed for by:</b>	J.BARON	<b>Delivery location:</b>	131 CEDAR ST. NEWINGTON, CT 06111
<b>Service type:</b>	FedEx Express Saver	<b>Delivery date:</b>	May 24, 2018 13:55
<b>Special Handling:</b>	Deliver Weekday  Direct Signature Required		



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**Shipping Information:**

<b>Tracking number:</b>	772280873730	<b>Ship date:</b>	May 21, 2018
		<b>Weight:</b>	0.5 lbs/0.2 kg

**Recipient:**  
Hon. Roy Zatarian, Mayor  
Town of Newington  
131 Cedar St.  
NEWINGTON, CT 06111 US

**Shipper:**  
Paul Sagristano  
CCC  
4 Davis Road West  
Suite 5  
OLD LYME, CT 06371 US  
CT52XC043 - CSC Resubmit

**Reference**

Thank you for choosing FedEx.



May 30, 2018

Dear Customer:

The following is the proof-of-delivery for tracking number **772280950560**.

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**Delivery Information:**

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<b>Status:</b>	Delivered	<b>Delivered to:</b>	Receptionist/Front Desk
<b>Signed for by:</b>	J.GILLISEE	<b>Delivery location:</b>	2143 BERLIN TURNPIKE NEWINGTON, CT 06111
<b>Service type:</b>	FedEx Express Saver	<b>Delivery date:</b>	May 24, 2018 16:19
<b>Special Handling:</b>	Deliver Weekday  Direct Signature Required		



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**Shipping Information:**

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<b>Tracking number:</b>	772280950560	<b>Ship date:</b>	May 21, 2018
		<b>Weight:</b>	0.5 lbs/0.2 kg

**Recipient:**  
Mr Frederick Callahan III  
2143 Berlin Turnpike  
NEWINGTON, CT 06111 US

**Shipper:**  
Paul Sagristano  
CCC  
4 Davis Road West  
Suite 5  
OLD LYME, CT 06371 US  
CT52XC043 CSC Resubmit

**Reference**

Thank you for choosing FedEx.



May 24, 2018

Dear Customer:

The following is the proof-of-delivery for tracking number **772280898002**.

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**Delivery Information:**

<b>Status:</b>	Delivered	<b>Delivered to:</b>	Receptionist/Front Desk
<b>Signed for by:</b>	A.CERIGLIA	<b>Delivery location:</b>	131 CEDAR STREET NEWINGTON, CT 06111
<b>Service type:</b>	FedEx Express Saver	<b>Delivery date:</b>	May 24, 2018 14:00
<b>Special Handling:</b>	Deliver Weekday  Direct Signature Required		



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**Shipping Information:**

<b>Tracking number:</b>	772280898002	<b>Ship date:</b>	May 21, 2018
		<b>Weight:</b>	0.5 lbs/0.2 kg

**Recipient:**  
Craig Minor, Town Planner  
Town of Newington  
131 Cedar Street  
NEWINGTON, CT 06111 US

**Shipper:**  
Paul Sagristano  
CCC  
4 Davis Road West  
Suite 5  
OLD LYME, CT 06371 US  
CT52XC043 CSC resubmit

**Reference**

Thank you for choosing FedEx.

# Google Maps 2111 Berlin Turnpike



Map data ©2018 Google 200 ft



The Assessor's office is responsible for the maintenance of records on the ownership of properties. Assessments are computed at 70% of the estimated market value of real property at the time of the last revaluation which was 2015.

## Town of Newington

# ASSESSOR'S OFFICE



Information on the Property Records for the Municipality of Newington was last updated on 2/1/2018.

### Parcel Information

Location:	2111 BERLIN TPK	Property Use:	Apartments	Primary Use:	Apartments General
Unique ID:	C0465900	Map Block Lot:	18/038/000	Acres:	3.09
490 Acres:	0.00	Zone:	B-BT	Volume / Page:	1971/0568
Developers Map / Lot:	N/E 2140/LOT 2	Census:			

### Value Information

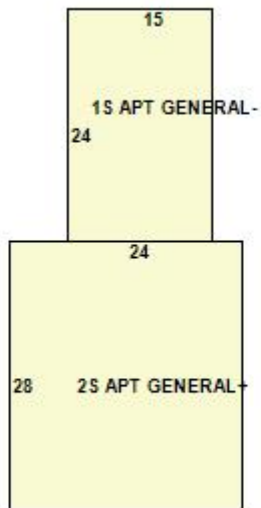
	Appraised Value	70% Assessed Value
Land	454,050	317,830
Buildings	77,398	54,180
Detached Outbuildings	250,000	175,000
Total	781,448	547,010

# Owner's Information

## Owner's Data

CALLAHAN FRANCIS C  
105 CEDARWOOD LANE  
NEWINGTON CT 06111

## Building 1



Category:	Apartments	Use:	Apartments General	GLA:	1,704
Stories:	2.00	Construction:	Wood Frame	Year Built:	1874
Heating:	Hot Water	Fuel:	Oil	Cooling Percent:	0

Siding:	Brick	Roof Material:	Asphalt	Beds/Units:	0
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## Special Features

## Attached Components

## Detached Outbuildings

Type:	Year Built:	Length:	Width:	Area:
Cell Tower	2000	0.00	0.00	1

## Owner History - Sales

Owner Name	Volume	Page	Sale Date	Deed Type	Valid Sale	Sale Price
CALLAHAN FRANCIS C	1971	568	05/15/2008	Probate	No	\$0
CALLAHAN FREDERICK H JR	245	222	01/10/1974		No	\$0
CALLAHAN FREDERICK H JR & LORETTA M	117	125	12/17/1958		No	\$0
CALLAHAN FREDERICK H JR & LORETTA M	102	513	11/21/1957		No	\$0
MULLER ROBERT J	102	512	11/21/1957		No	\$0
CALLAHAN FREDERICK H JR	51	120-1	08/11/1943		No	\$0

## Building Permits

Permit Number	Permit Type	Date Opened	Date Closed	Permit Status	Reason
77822		09/22/2009		Closed	MODIFICATION OF EXISTING TELECOMMUNICATIONS FACILITY CONSISTING OF ADDING 3 / (1) ONE PER SECTOR AN



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

SPRINT Existing Facility

Site ID: CT52XC043

Newington  
99 Cedarwood Lane  
Newington, CT 06111

**May 8, 2018**

**EBI Project Number: 6218003636**

Site Compliance Summary	
Compliance Status:	<b>COMPLIANT</b>
Site total MPE% of FCC general population allowable limit:	<b>15.73 %</b>



May 8, 2018

SPRINT

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

## Emissions Analysis for Site: **CT52XC043 – Newington**

EBI Consulting was directed to analyze the proposed SPRINT facility located at **99 Cedarwood Lane, Newington, 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 97-01 and ANSI/IEEE Std C95.1. The FCC regulates Maximum Permissible Exposure in units of microwatts per square centimeter ( $\mu\text{W}/\text{cm}^2$ ). The number of  $\mu\text{W}/\text{cm}^2$  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 ( $\mu\text{W}/\text{cm}^2$ ). The general population exposure limits for the 850 MHz Band is approximately  $567 \mu\text{W}/\text{cm}^2$ . The general population exposure limit for the 1900 MHz (PCS), 2500 MHz (BRS) and 11 GHz microwave bands is  $1000 \mu\text{W}/\text{cm}^2$ . 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 **99 Cedarwood Lane, Newington, CT**, using the equipment information listed below. All calculations were performed per the specifications under FCC OET 65. Since SPRINT is proposing highly focused directional panel antennas, which project most of the emitted energy out toward the horizon, all calculations were performed assuming a lobe representing the maximum gain of the antenna per the antenna manufactures supplied specifications, minus 10 dB for directional panel antennas and 20 dB for highly focused parabolic microwave dishes, was focused at the base of the tower. For this report the sample point is the top of a 6-foot person standing at the base of the tower.

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

- 1) 1 CDMA channels (850 MHz) were considered for each sector of the proposed installation. This channel has a transmit power of 20 Watts per Channel.
- 2) 2 LTE channels (850 MHz) were considered for each sector of the proposed installation. These Channels have a transmit power of 20 Watts per Channel.
- 3) 5 CDMA channels (1900 MHz (PCS)) were considered for each sector of the proposed installation. These Channels have a transmit power of 16 Watts per Channel.
- 4) 2 LTE channels (1900 MHz (PCS)) were considered for each sector of the proposed installation. These Channels have a transmit power of 40 Watts per Channel.
- 5) 8 LTE channels (2500 MHz (BRS)) were considered for each sector of the proposed installation. These Channels have a transmit power of 20 Watts per Channel.
- 6) 1 microwave backhaul channel (11 GHz) was considered for each sector. This channel has a transmit power of 1 Watt.



- 7) 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.
- 8) 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.
- 9) The antennas used in this modeling are the **Commscope NNVV-65B-R4 and the Nokia AAHC** for transmission in the 850 MHz, 1900 MHz (PCS) and 2500 MHz (BRS) frequency bands and one **2.5 foot parabolic microwave dish** was modeled for the 11 GHz backhaul channels. 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.
- 10) The antenna mounting height centerlines of the proposed antennas are **140 feet** above ground level (AGL) for **Sector A**, **140 feet** above ground level (AGL) for **Sector B** and **140 feet** above ground level (AGL) for Sector C.  
  
The antenna mounting height centerlines of the proposed microwave dishes are **145 feet** above ground level (AGL) for **Sector A**, **145 feet** above ground level (AGL) for **Sector B** and **145 feet** above ground level (AGL) for Sector C
- 11) Emissions values for additional carriers were taken from the Connecticut Siting Council active database. Values in this database are provided by the individual carriers themselves.

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



## SPRINT Site Inventory and Power Data by Antenna

Sector:	A	Sector:	B	Sector:	C
Antenna #:	<b>1</b>	Antenna #:	<b>1</b>	Antenna #:	<b>1</b>
Make / Model:	Commscope NNVV-65B-R4	Make / Model:	Commscope NNVV-65B-R4	Make / Model:	Commscope NNVV-65B-R4
Gain:	12.75 / 15.05 dBd	Gain:	12.75 / 15.05 dBd	Gain:	12.75 / 15.05 dBd
Height (AGL):	<b>140 feet</b>	Height (AGL):	<b>140 feet</b>	Height (AGL):	<b>140 feet</b>
Frequency Bands	850 MHz / 1900 MHz (PCS)	Frequency Bands	850 MHz / 1900 MHz (PCS)	Frequency Bands	850 MHz / 1900 MHz (PCS)
Channel Count	10	Channel Count	10	Channel Count	10
Total TX Power(W):	220 Watts	Total TX Power(W):	220 Watts	Total TX Power(W):	220 Watts
ERP (W):	6,248.42	ERP (W):	6,248.42	ERP (W):	6,248.42
Antenna A1 MPE%	<b>1.42 %</b>	Antenna B1 MPE%	<b>1.42 %</b>	Antenna C1 MPE%	<b>1.42 %</b>
Antenna #:	<b>2</b>	Antenna #:	<b>2</b>	Antenna #:	<b>2</b>
Make / Model:	Nokia AAHC	Make / Model:	Nokia AAHC	Make / Model:	Nokia AAHC
Gain:	15.05 dBd	Gain:	15.05 dBd	Gain:	15.05 dBd
Height (AGL):	<b>140 feet</b>	Height (AGL):	<b>140 feet</b>	Height (AGL):	<b>140 feet</b>
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%	<b>1.02 %</b>	Antenna B2 MPE%	<b>1.02 %</b>	Antenna C2 MPE%	<b>1.02 %</b>

## Microwave Backhaul Data

Antenna Type:	Gain (dBd)	Height (feet AGL):	Frequency Bands	Channel Count	Total TX Power(W)	ERP (W)	MPE %	Sector
2.5 foot parabolic dish	28 dBd	145	11 GHz	1	1	630.96	<b>0.13</b>	<b>A</b>
2.5 foot parabolic dish	28 dBd	145	11 GHz	1	1	630.96	<b>0.13</b>	<b>B</b>
2.5 foot parabolic dish	28 dBd	145	11 GHz	1	1	630.96	<b>0.13</b>	<b>C</b>

Site Composite MPE%	
Carrier	MPE%
SPRINT – Max per sector	<b>2.57 %</b>
AT&T	4.48 %
Clearwire	0.10 %
Carbone's Auto Body	6.45 %
Town of Wethersfield	0.08 %
T-Mobile	2.05 %
<b>Site Total MPE %:</b>	<b>15.73 %</b>

SPRINT Sector A Total:	2.57 %
SPRINT Sector B Total:	2.57 %
SPRINT Sector C Total:	2.57 %
<b>Site Total:</b>	<b>15.73 %</b>





# EBI Consulting

environmental | engineering | due diligence

SPRINT _ Frequency Band / Technology (All Sectors)	# Channels	Watts ERP (Per Channel)	Height (feet)	Total Power Density ( $\mu\text{W}/\text{cm}^2$ )	Frequency (MHz)	Allowable MPE ( $\mu\text{W}/\text{cm}^2$ )	Calculated % MPE
Sprint 850 MHz CDMA	1	376.73	140	0.75	850 MHz	567	0.13%
Sprint 850 MHz LTE	2	376.73	140	1.51	850 MHz	567	0.27%
Sprint 1900 MHz (PCS) CDMA	5	511.82	140	5.12	1900 MHz (PCS)	1000	0.51%
Sprint 1900 MHz (PCS) LTE	2	1,279.56	140	5.12	1900 MHz (PCS)	1000	0.51%
Sprint 2500 MHz (BRS) LTE	8	639.78	140	10.25	2500 MHz (BRS)	1000	1.02%
Sprint 11 GHz microwave	1	630.96	145	1.26	11 GHz	1000	0.13%
						<b>Total:</b>	<b>2.57%</b>

## Summary

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

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

SPRINT Sector	Power Density Value (%)
Sector A:	2.57 %
Sector B:	2.57 %
Sector C:	2.57 %
SPRINT Maximum Total (per sector):	2.57 %
Site Total:	15.73 %
Site Compliance Status:	<b>COMPLIANT</b>

The anticipated composite MPE value for this site assuming all carriers present is **15.73 %** 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.



MASER CONSULTING  
— CONNECTICUT —

# Guy Tower & Antenna Mount Structural Analysis

FOR

Newington

Site ID: CT52XC043  
99 Cedarwood Lane  
Newington, CT 06111  
Hartford County

**Mount Utilization: 31.5%**  
**Guy Tower Utilization: 99.7%**

April 19, 2018

*Prepared For*

Sprint

201 State Route 17 North  
Rutherford, NJ 07070

*Prepared By*

Maser Consulting Connecticut

331 Newman Springs Road, Suite 203

Red Bank, NJ 07701

T: 908.333.1950



Petros Tsoukalas P.E.

Geographic Discipline Leader

Connecticut License No. PEN.32577



### **Objective:**

The objective of this report is to determine the capacity of the existing 170' lattice guyed tower structure and the existing antenna support mounts at the subject facility for the final wireless telecommunications configuration, per the applicable codes and standards.

### **Introduction:**

Maser Consulting Connecticut has performed limited field observations on August 30, 2017 to visually verify the existing condition of the structure from grade and to locate and quantify the existing wireless appurtenances where possible. Maser Consulting Connecticut has reviewed the following documents in completing this report:

- Previous Antenna Mount Analysis (17924017A) performed by Maser Consulting Connecticut, dated December 21, 2017
- Previous Tower Structural Modification analysis prepared by Maser Consulting Connecticut, dated December 21, 2017
- Previous Tower Structural Analysis prepared by Maser Connecticut, dated November 3, 2017
- Previous Structural Analysis and Reinforcement analysis report prepared by URS Corporation., project# 33931279.000000 dated, August 22, 2014.
- Previous Structural Analysis report prepared by Hudson Design Group LLC., dated June 11, 2012.
- Previous Structural Analysis report prepared by CENTEK Engineering, project# 16002.12 dated April 26, 2016.
- Previous Structural Analysis report prepared by Destek Engineering dated, January 14, 2016.
- Previous Structural Analysis report prepared by Hudson Design Group LLC., dated May 17, 2016.
- RFDS 63868 provided by Sprint, dated March 29, 2018
- Construction Drawings(17924017A) Prepared by Maser Consulting P.A. dated April 16, 2018

The existing **SPRINT** equipment is supported on an existing 170' lattice guyed tower structure. The primary tower structure is constructed of pipe legs, with the diagonal and horizontal members with pipes and angle members. The existing **SPRINT** equipment is supported on an existing antenna support mounts constructed of structural steel antenna support pipes supported by Steel Angles and pipes at a centerline of approximately 140'-0" above ground level. This report is based only upon this information, as well as the information obtained in the field.

### **Codes, Standards and Loading:**

Maser Consulting Connecticut utilized the following codes and standards:

- 2016 Connecticut State Building Code, Incorporating the 2012 IBC
- Structural Standards for Antenna Supporting Structures and Antennas ANSI/TIA-222-G
  - Basic Wind Speed – 95 mph (3 Second Gust)
  - Exposure Category – B
  - Structural Class – II
  - Topographic Category – 2
  - Crest Height- 200'
  - Ice Wind – 40 mph
  - Ice Thickness – 1"
- Specification for Structural Steel Buildings ANSI/AISC 360-10, American Institute of Steel Construction (AISC)

Loading used in this analysis is found in Appendix A of this report.

### **Analysis Approach & Assumptions:**

The analysis approach used in this structural analysis is based on the premise that if the existing modified guy tower is structurally adequate to support the existing and proposed equipment per the aforementioned codes and standards, or if the increase in the forces in the structure are deemed to be negligible or acceptable, then the proposed equipment can be installed as intended. Tower Numerics, tnx Tower, a tower analysis and design program, designed specifically for the telecommunications industry and for all applicable codes and standards was used for this structural analysis.

The analysis approach used in this structural analysis is based on the premise that if the existing antenna support mount is structurally adequate to support the proposed equipment per the aforementioned codes and standards, or if the increase in the forces in the structure is deemed to be negligible or acceptable, then the proposed equipment can be installed as intended.

The existing antenna mount in all sectors have been modeled in RISA-3D, a comprehensive structural analysis program. The program performs design checks of structures under user specified loads. The user specified loads have been calculated separately based on the requirements of the above referenced codes. The program performs an analysis based on the steel code to determine the adequacy of the members, and produces the reactions at the connection points of the mounts to the existing structure. Additional calculations were then prepared to analyze the mount connection points with the proposed loading conditions.

### **General Site Design Assumption:**

- Structural Steel Main Legs and Diagonals are constructed of A572-50 Grade Steel.
- Structural Steel Diagonals and Horizontals are constructed of A36 Grade.
- Structural Bolts are assumed to be A325N
- It is assumed that the modifications proposed per the reference documents **Have Been** installed per the construction drawings.
- Tower is installed to plumb and is maintained properly without any structural deficiencies or deteriorations to the original design.
- The existing tower foundations are assumed to have been constructed per the original design drawings. As such the calculated foundation capacities are used for comparison to the base reactions of this analysis.
- All engineering services are performed on the basis that the information used is current and correct.
- It is assumed that the telecommunication equipment supports, antenna supports, and existing structure have been designed by a registered licensed professional engineer for the existing loads acting on the structure, as required by all applicable codes, prior to the proposed modifications listed within this report, if any.
- It is assumed that information provided by the client regarding the structure itself, the antenna models, feed lines, and other relevant information is current and correct.
- It is the responsibility of the client to ensure that the information provided to Maser Consulting Connecticut and used in the performance of our engineering services is correct and complete. In the absence of information to the contrary, we assume that the original design, material production, fabrication, and erection of the existing structure was performed in accordance with accepted industry design standards and in accordance with all applicable codes. Further, it is assumed that the existing structure and appurtenances have been properly maintained in

accordance with all applicable codes and manufacturer's specifications and no structural defects and/or deterioration to the structural members has occurred.

- It is assumed all other existing appurtenances, antennas, cables, etc. belonging to others have been installed and supported per code and per specifications so as not to damage any existing structural support members, and that any contributing loads from adjacent equipment has been taken into consideration for their design.
- All services are performed, results obtained, and recommendations made in accordance with generally accepted engineering principles and practices. Maser Consulting Connecticut is not responsible for the conclusion, opinions, and recommendations made by others based on the information we supply.

### Site Specific Design Parameters:

The following design parameters have been utilized in this report as per previous structural modification dated December 21, 2017 prepared by Maser Consulting Connecticut:

- Replacing existing 1/2" guy wires with 3/8" guy wires at elevation 152'-4".
- Replacing existing 7/8" guy wires with 1/2" guy wires at elevation 132'-5".
- Replacing existing 7/16" guy wires with 1/2" guy wires at elevation 90'-0".
- Replacing existing 7/16" guy wires with 1/2" guy wires at elevation 50'-0".
- Retention all guy wires as indicated in the attached tower elevation drawings.
- Adding L2x2x3/16 secondary horizontal members at elevation between 100'-0" to 110'-0", twelve (12) members in total.
- Replacing bottom girt members with L2x2x3/16 at elevation 5'-0", three (3) members in total.
- Reinforcing 2.5 STD tower leg members by attaching one quarter portion of 3.0 STD pipe at elevation between 40'-0" to 0'-0".

The following design parameters have been utilized in this report as per Construction Drawings(17924017A) Prepared by Maser Consulting P.A. dated April 16, 2018

- Gamma sector STD 2.0 pipe stabilizer arm was reconnected prior to the installation

### Calculations:

The calculations are found in Appendix A for the antenna mounts of this report. The structural analysis for the tower can be found in Appendix B

### Conclusion:

Maser Consulting Connecticut has determined that the existing **SPRINT** equipment on modified guy tower is stressed to **99.7%** of its structural capacity, with the maximum usage occurring within the leg members between 110'-0" and 112'-6".

#### Foundation Reaction Comparison

Tower Base	Foundation Reaction from Previous Analysis using 222F*1.35	Current Forces	Comparison
Shear	5.4 kips	3.3 kips	(61.1%) Adequate
Axial	500.5 kips	219.2 kips	(43.8%) Adequate

#### Anchor Block Reactions

	Anchor @ 106 radius (Allowable)	Anchor @ 106ft radius (Current Reactions)	Comparison

	Reactions)		
Uplift	93.9 kips	54.4 kips	(57.9%) Adequate
Sliding	77.79 kips	50.6 kips	(65.05%) Adequate

\*Based on calculations provided in the above referenced structural analysis and multiplied by a factor of 1.35 per 15.5.1 section of the 222G-code

The foundation and anchor blocks in comparison with the capacities from the previous structural analysis referenced above is observed to have **ADEQUATE** capacity. Therefore, the proposed **SPRINT** installation **CAN** be placed as intended.

Maser Consulting Connecticut has determined the existing antenna support mount has **ADEQUATE** structural capacity to support the proposed loading. The existing antenna support mount has been determined to be stressed to a maximum of **31.5%** of its structural capacity with the maximum usage occurring at the pipe masts. Therefore, the proposed **Sprint** installation **CAN** be installed as intended.

It should be noted that due to a lack of information Maser Consulting Connecticut did not perform an analysis on the foundation, but a comparison of the capacities summarized in previous analysis with the current forces has been determined. The conclusions reached by Maser Consulting Connecticut in this evaluation are only applicable for the existing structural members supporting the proposed Sprint telecommunications installation described herein. Further, no structural qualifications are made or implied by this document for the existing structure.

Maser Consulting Connecticut reserves the right to amend this report if additional information about the existing members is provided. The conclusions reached by Maser Consulting Connecticut in this report are only valid for the appurtenances listed in this report. Any change to the installation will require a revision to this structural analysis.

We appreciate the opportunity to be of service on this project. If you should have any questions or require any additional information, please do not hesitate to call our office.

Sincerely,

Maser Consulting Connecticut



Petros E. Tsoukalas P.E.  
Connecticut Licensed Professional Engineer  
License No. PEN.32577



Anthony Bassett  
Structural Engineer



# APPENDIX A







Client:	Sprint	Computed By:	AB
Site Name:	NEWINGTON	Date:	4/19/2018
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## ANALYSIS AND DESIGN



Client:	Sprint	Computed By:	AB
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## I. DESIGN INPUTS

Calculations for gravity and lateral loading on equipment and support mounts are determined as per the ANSI/TIA-222-G Code, Addendum 2

### Wind Load Inputs Parameters

		Reference	Equation
Antenna Centerline	z 140 ft		
Basic Wind Speed (3 sec. Gust):	V 95 mph	Ref. 1, Eqn. 16-33	
Basic Wind Speed with Ice (3 sec. gust):	V <sub>i</sub> 40.0 mph	(Figure a5-2a, p. 233)	
Service Wind Speed:	V <sub>s</sub> 60.0 mph	(Figure a5-2a, p. 233)	
Design Ice Thickness:	t <sub>i</sub> 1.00 in	(Figure A1-2a, p. 233)	
Exposure Category:	B	Ref. 3, Section 2.6.5.1	
Structure Class:	II	Ref. 3, Table 2-1	
Gust Effect Factor:	G <sub>h</sub> 0.85	Ref. 3, Section 2.6.7	
Wind Directionality Factor:	K <sub>d</sub> 0.85	Ref. 3, Table 2-2	
Topographic Category:	2	Ref. 3, Section 2.6.6.2	
Height of Crest Above Surrounding Terrain	H 200		

### Wind Load Coefficients

#### Importance Factors:

Non-Iced:	I 1	Ref. 3, Table 2-3
Iced:	I <sub>ice</sub> 1	(Table 2-3, P. 39)

#### Exposure Category Coefficients:

3-s Gust-Speed Power Law Exponent:	α 7.0	Ref. 3, Table 2-4
Nominal Height of the Atmospheric Boundary Layer:	Z <sub>g</sub> 1200 ft	Ref. 3, Table 2-4
Min. Value for k <sub>z</sub> :	K <sub>z,min</sub> 0.70	Ref. 3, Table 2-4
Terrain Constant:	K <sub>e</sub> 0.90	Ref. 3, Table 2-4
Velocity Pressure Exposure Coefficient:	K <sub>z</sub> 1.088	Ref. 3, Section 2.6.5.2 = 2.01 · (z/z <sub>g</sub> ) <sup>2α</sup>

#### Topographic Category Coefficients:

Topographic Constant:	K <sub>t</sub> 0.43	Ref. 3, Table 2-5
Height Attenuation Factor:	f 1.25	Ref. 3, Table 2-5
Height Reduction Factor:	K <sub>h</sub> 2.3989	Ref. 3, Section 2.6.6.4 = e <sup>(f·z/H)</sup>
Topographic Factor:	K <sub>zt</sub> 1.35	Ref. 3, Section 2.6.6.4 = [1 + (K <sub>e</sub> · K <sub>t</sub> /K <sub>h</sub> )] <sup>2</sup>

#### Ice Accumulation:

Ice Velocity Pressure Exposure Coefficient:	K <sub>iz</sub> 1.16	= (z/33) <sup>0.10</sup>
Factored Ice Thickness:	t <sub>iz</sub> 2.57 in	(Section 2.6.8, p. 16) = 2.0 · t <sub>i</sub> · I · K <sub>iz</sub> · K <sub>zt</sub>
Ice Density:	ρ <sub>i</sub> 56.00 pcf	

#### Design Wind Pressures:

Velocity Pressure:	q <sub>z</sub> 28.82 psf	Ref. 3, Section 2.6.9.6 = 0.00256 · K <sub>z</sub> · K <sub>zt</sub> · K <sub>d</sub> · V <sup>2</sup> · I
Velocity Pressure (With Ice):	q <sub>zi</sub> 5.11 psf	(Section 2.6.9.6, P. 25) = .00256 · K <sub>z</sub> · K <sub>zt</sub> · K <sub>d</sub> · V <sub>i</sub> <sup>2</sup> · I
Velocity Pressure (Service):	q <sub>zs</sub> 11.49 psf	(Section 2.6.9.6, P. 25) = .00256 · K <sub>z</sub> · K <sub>zt</sub> · K <sub>d</sub> · V <sub>s</sub> <sup>2</sup> · I



**II. CALCULATIONS**

**• Wind Load on Appurtenances**

Dimensions and Force C 3

Antenna/ Appurtenance	Non-Iced Condition								Iced Condition							
	Mounting Pipe			Equipment					Mounting Pipe			Equipment				
	Length (in)	Diameter (in)	Force Coefficient C <sub>a</sub>	Height (in)	Width (in)	Depth (in)	Force Coefficient		Length (in)	Diameter (in)	Force Coefficient C <sub>a</sub>	Height (in)	Width (in)	Depth (in)	Force Coefficient	
							C <sub>a Front</sub>	C <sub>a Side</sub>							C <sub>a Front</sub>	C <sub>a Side</sub>
MAA-AAHC	0.0	0.000	0.000	25.60	19.70	9.65	1.20	1.21	0.0	0.0	0.000	30.73	24.83	14.78	1.20	1.20
NNVV-65B-R4	96.0	2.875	1.200	72.00	19.60	7.80	1.25	1.47	101.1	8.0	0.925	77.13	24.73	12.93	1.23	1.35
RRH4x45-1900	0.0	0.000	0.000	25.00	12.00	12.00	1.20	1.20	0.0	0.0	0.000	30.13	17.13	17.13	1.20	1.20
RRH 2x50-800	0.0	0.000	0.000	16.00	13.00	10.00	1.20	1.20	0.0	0.0	0.000	21.13	18.13	15.13	1.20	1.20
2.5' Dish	0.0	0.000	0.000	30.00	30.00	10.00	0.70	0.71	0.0	0.0	0.000	35.13	35.13	15.13	0.70	0.70
844G65VTZASX	60.0	2.875	1.108	48.50	12.50	8.50	1.26	1.34	65.1	8.0	0.825	53.63	17.63	13.63	1.22	1.26

Antenna/ Appurtenance	# of Brackets	Non-Iced Condition				Iced Condition			
		Wind Force (lbs.)		Controlling Wind Force (lbs.)	Gravity (lbs.)	Wind Force (lbs.)		Controlling Wind Force (lbs.)	Gravity (lbs.)
		F <sub>N</sub>	F <sub>T</sub>			F <sub>N</sub>	F <sub>T</sub>		
MAA-AAHC	2	51.5	25.4	51.5	51.9	13.8	8.2	13.8	98.4
NNVV-65B-R4	2	157.3	98.6	157.3	46.2	38.8	31.7	38.8	238.4
RRH4x45-1900	2	30.6	30.6	30.6	34.8	9.3	9.3	9.3	76.9
RRH 2x50-800	2	21.2	16.3	21.2	34.6	6.9	5.8	6.9	52.4
2.5' Dish	1	107.2	36.3	107.2	65.0	26.1	11.2	26.1	298.9
844G65VTZASX	2	68.1	63.3	68.1	15.5	19.0	20.4	20.4	123.9

\* ALL CALCULATED LOADS ARE PER MOUNTING BRACKET. TO GET THE TOTAL EQUIPMENT LOAD, MULTIPLY THE INDIVIDUAL LOADS BY THE NUMBER OF BRACKETS

**• Wind Load on Framing Members**

Member Category	Member Shape	Length (in)	Member Surface	Non-Iced Condition				Iced Condition				
				Exposed Wind Height (in)	Force Coefficient C <sub>a</sub>	Wind Load (plf)	Exposed Wind Height (in)	Depth (in)	Length (in)	Force Coefficient C <sub>a</sub>	Wind Load (plf)	Ice Weight (plf)
Pipe	Pipe 3.0	144	Round	3.50	1.20	8.57	8.63	8.63	149.13	1.03	3.21	19.02
Pipe	Pipe 2.5	96	Round	2.88	1.20	7.04	8.01	8.01	101.13	0.92	2.68	17.06
Square HSS	HSS 3X3	10	Square	3.00	1.24	7.57	8.13	8.13	15.13	1.20	3.53	21.34
Pipe	Pipe 2.5	90	Round	2.88	1.20	7.04	8.01	8.01	95.13	0.91	2.63	17.06
Pipe	Pipe 2.5	60	Round	2.88	1.11	6.50	8.01	8.01	65.13	0.83	2.39	17.06



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## BASIC EQUATIONS

### ANSI/TIA-222-G Reference

Importance Factor:  $I := \begin{cases} 1.0 & \text{if Class} = \text{"II"} \\ 1.15 & \text{if Class} = \text{"III"} \end{cases}$  Table 2-3, Pg. 39

Force Coefficient:  
(Square)  $C_{f\_square}(h, w) := \begin{cases} 1.2 & \text{if } \frac{h}{w} \leq 2.5 \\ \left[ 1.2 + \frac{0.2}{4.5} \cdot \left( \frac{h}{w} - 2.5 \right) \right] & \text{if } \frac{h}{w} > 2.5 \wedge \frac{h}{w} \leq 7 \\ \left[ 1.4 + \frac{0.6}{18} \cdot \left( \frac{h}{w} - 7 \right) \right] & \text{if } \frac{h}{w} > 7 \wedge \frac{h}{w} \leq 25 \\ 2.0 & \text{otherwise} \end{cases}$  Table 2-8, P. 42

Force Coefficient:  
(Round)  $C_{f\_round}(h, w) := \begin{cases} 0.7 & \text{if } \frac{h}{w} \leq 2.5 \\ \left[ 0.7 + \frac{0.1}{4.5} \cdot \left( \frac{h}{w} - 2.5 \right) \right] & \text{if } \frac{h}{w} > 2.5 \wedge \frac{h}{w} \leq 7 \\ \left[ 0.8 + \frac{0.4}{18} \cdot \left( \frac{h}{w} - 7 \right) \right] & \text{if } \frac{h}{w} > 7 \wedge \frac{h}{w} \leq 25 \\ 1.2 & \text{otherwise} \end{cases}$  Table 2-8, P. 42

Terrain Exposure Constants: Table 2-4, P. 40

$$\alpha := \begin{cases} 7.0 & \text{if Exp} = \text{"B"} \\ 9.5 & \text{if Exp} = \text{"C"} \\ 11.5 & \text{if Exp} = \text{"D"} \end{cases} \quad Z_g := \begin{cases} 1200\text{ft} & \text{if Exp} = \text{"B"} \\ 900\text{ft} & \text{if Exp} = \text{"C"} \\ 700\text{ft} & \text{if Exp} = \text{"D"} \end{cases} \quad K_{zmin} := \begin{cases} 0.70 & \text{if Exp} = \text{"B"} \\ 0.85 & \text{if Exp} = \text{"C"} \\ 1.03 & \text{if Exp} = \text{"D"} \end{cases}$$



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## BASIC EQUATIONS

### ANSI/TIA-222-G Reference

Velocity Pressure Coefficient:

$$K_z(z) := \begin{cases} K_z \leftarrow \max \left[ 2.01 \cdot \left( \frac{z}{Z_g} \right)^{\frac{2}{\alpha}}, K_{zmin} \right] \\ K_z \leftarrow \min(K_z, 2.01) \end{cases}$$

$$K_z := K_z(z)$$

Section 2.6.5, P. 13

$$K_{zt}(z) := K_{zt} \leftarrow \begin{cases} 1.0 & \text{if Topo} = "1" \\ \text{otherwise} \\ \begin{cases} K_e \leftarrow \begin{cases} 0.90 & \text{if Exp} = "B" \\ 1.00 & \text{if Exp} = "C" \\ 1.10 & \text{if Exp} = "D" \end{cases} \\ K_t \leftarrow \begin{cases} 0.43 & \text{if Topo} = "2" \\ 0.53 & \text{if Topo} = "3" \\ 0.72 & \text{if Topo} = "4" \end{cases} \\ f \leftarrow \begin{cases} 1.25 & \text{if Topo} = "2" \\ 2.00 & \text{if Topo} = "3" \\ 1.50 & \text{if Topo} = "4" \end{cases} \\ K_h \leftarrow e^{\left( \frac{f \cdot z}{CH} \right)} \\ \left( 1 + \frac{K_e \cdot K_t}{K_h} \right)^2 \end{cases} \end{cases}$$

Section 2.6.6.4, p. 14

Table 2-4 p. 40

Table 2-5 p. 40

Table 2-5 p. 40

Section 2.6.6.4, P. 14

Section 2.6.6.4, P. 14

$$K_{zt} := K_{zt}(z)$$

Velocity Pressure:

Section 2.6.9.6, P. 25

$$q_z := 0.00256 \cdot K_z \cdot K_{zt} \cdot K_d \cdot V^2 \cdot I \text{ psf}$$



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## LOAD EQUATIONS

### WIND LOAD

Area (Normal):	$AN_{area} = H_{ant} \cdot W_{ant}$
Area (Side):	$AT_{area} = H_{ant} \cdot D_{ant}$
Force Coefficient (Normal):	$C_{fn} = C_{fsquare}(H_{ant}, W_{ant})$
Force Coefficient (Side):	$C_{fs} = C_{fsquare}(H_{ant}, D_{ant})$
Pipe Area (Normal):	$AN_p = \max[(L_p - H_{ant}) * D_p, 0]$
Pipe Area (Side):	$AT_p = L_p \cdot D_p$
Force Coefficient (Normal):	$C_{fp} = C_{fround}(L_p, D_p)$
Normal Effective Projected Area:	$E_{pan} = (C_{fn} \cdot AN_{area}) + (C_{fp} \cdot AN_p)$
Side Effective Projected Area:	$E_{pat} = (C_{fs} \cdot AT_{area}) + (C_{fp} \cdot AT_p)$
Effective Projected Area:	$EPA = \max(E_{pan}, E_{pat})$
Wind Force:	$F_{ant} = q_z \cdot Gh \cdot EPA$

### ICE DEAD LOAD

Largest Out-to-Out Dimension:	$D_{ant} = \sqrt{D_{ant}^2 + W_{ant}^2}$
Cross Sectional Area of Ice:	$A_{ice\_ant} = \pi \cdot t_{iz} \cdot (D_{ant} + t_{iz})$
Total Ice Dead Load:	$DL_{ice\_ant} = \rho_i \cdot (A_{ice\_ant} \cdot H_{ant})$

### ICE WIND LOAD

Dimensions:	$H_{i\_ant} = H_{ant} + 2t_{iz}$
	$W_{i\_ant} = W_{ant} + 2t_{iz}$
	$D_{i\_ant} = D_{ant} + 2t_{iz}$
Area (Normal):	$AIN_{area} = H_{i\_ant} \cdot W_{i\_ant}$
Area (Side):	$AIT_{area} = H_{i\_ant} \cdot D_{i\_ant}$
Force Coefficient (Normal):	$Ci_{fn} = C_{fsquare}(H_{i\_ant}, W_{i\_ant})$
Force Coefficient (Side):	$Ci_{fs} = C_{fsquare}(H_{i\_ant}, D_{i\_ant})$
Pipe Area (Normal):	$AN_p = \max[(L_{ip} - H_{i\_ant}) * D_{ip}, 0]$
Pipe Area (Side):	$AT_p = L_{ip} \cdot D_{ip}$
Force Coefficient (Normal):	$C_{fp} = C_{fround}(L_{ip}, D_{ip})$
Normal Effective Projected Area:	$E_{pain} = (Ci_{fn} \cdot AIN_{area}) + (C_{fp} \cdot AN_p)$
Side Effective Projected Area:	$E_{pait} = (Ci_{fs} \cdot AIT_{area}) + (C_{fp} \cdot AT_p)$
Effective Projected Area:	$EPA_i = \max(E_{pain}, E_{pait})$
Wind Force:	$F_{i\_ant} = q_z \cdot Gh \cdot EPA_i$



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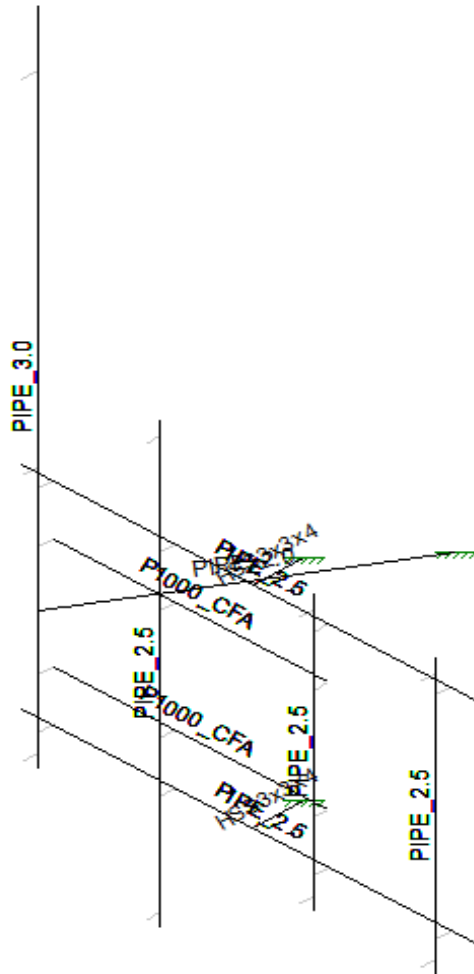
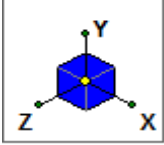
### III. ATTACHMENTS





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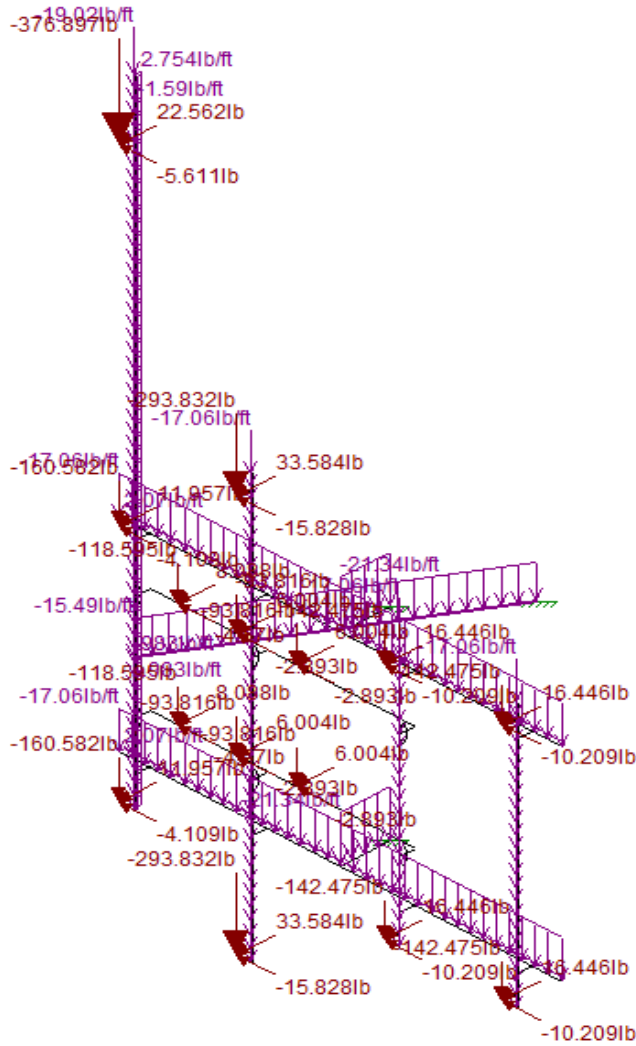
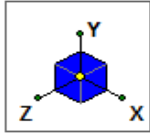
### RISA MODEL





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### RISA WORST CASE LOADING



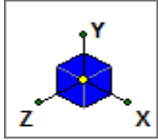
Loads: LC 20, 1.2D+1.0ICE+1.0W6ICE  
Envelope Only Solution



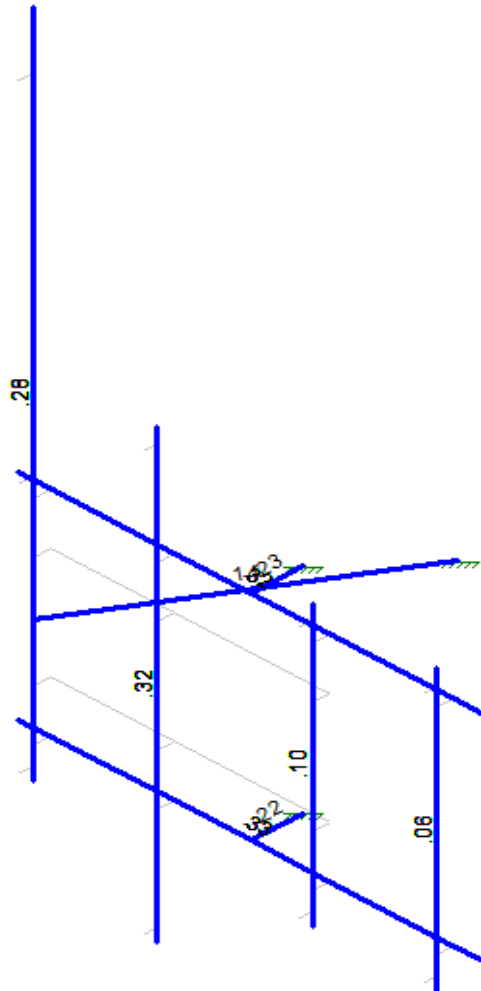
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### RISA CODE CHECK



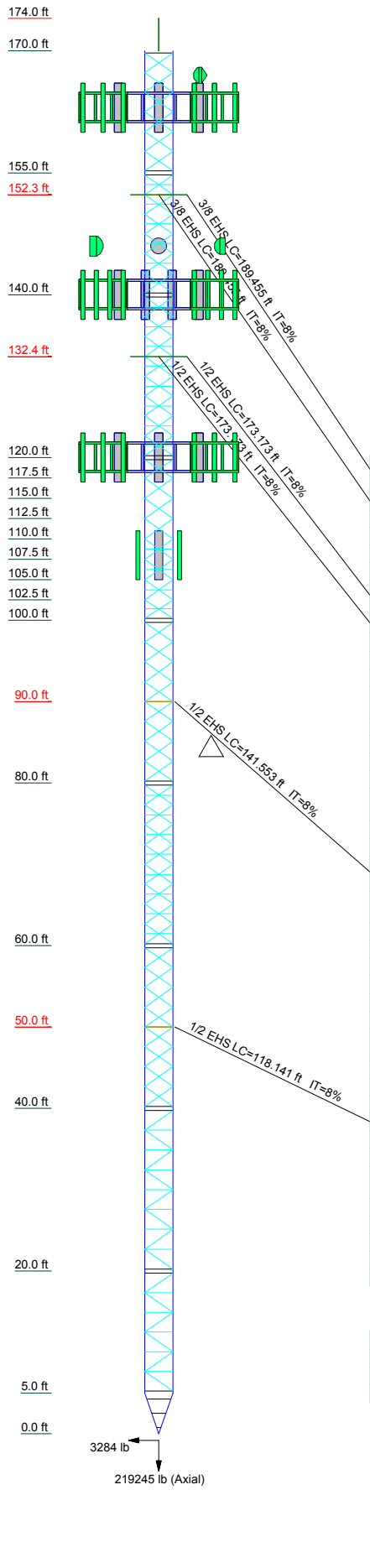
Code Check	
Black	No Calc
Red	> 1.0
Magenta	.90-1.0
Green	.75-.90
Cyan	.50-.75
Blue	0-.50





## **APPENDIX B**

Section	T17	T16	T15	T14	T13	T12	T11	T10	T9	T8	T7	T6	T5	T4	T3	T2	T1
Legs	2.5 STD w/ 90 deg 3.0 STD	ROHN 2.5 STD	ROHN 2.5 STD	ROHN 2.5 STD	ROHN 2.5 STD	ROHN 2.5 STD	ROHN 2.5 STD	ROHN 2.5 STD	ROHN 2.5 STD	ROHN 2.5 STD	ROHN 2.5 STD	ROHN 2.5 STD	ROHN 2.5 STD	ROHN 2.5 STD	ROHN 2.5 STD	ROHN 2.5 STD	ROHN 2.5 STD
Leg Grade	N.A.	P1.5X0625	P1.5X0625	P1.5X0625	P1.5X0625	P1.5X0625	P1.5X0625	P1.5X0625	P1.5X0625	P1.5X0625	P1.5X0625	P1.5X0625	P1.5X0625	P1.5X0625	P1.5X0625	P1.5X0625	P1.5X0625
Diagonals	N.A.	P1.5X0625	P1.5X0625	P1.5X0625	P1.5X0625	P1.5X0625	P1.5X0625	P1.5X0625	P1.5X0625	P1.5X0625	P1.5X0625	P1.5X0625	P1.5X0625	P1.5X0625	P1.5X0625	P1.5X0625	P1.5X0625
Diagonal Grade	N.A.	P1.5X0625	P1.5X0625	P1.5X0625	P1.5X0625	P1.5X0625	P1.5X0625	P1.5X0625	P1.5X0625	P1.5X0625	P1.5X0625	P1.5X0625	P1.5X0625	P1.5X0625	P1.5X0625	P1.5X0625	P1.5X0625
Top Girts	D	ROHN 1.5 STD	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.
Mid Girts	D	L2x2x3/16	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.
Bottom Girts	D	L2x2x3/16	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.
Horizontals	N.A.	SR 1	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.
Sec. Horizontals	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.
Top Guy Pull-Offs	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.
Face Width (ft)	F	6 @ 2.41667	32 @ 2.4375	32 @ 2.4375	32 @ 2.4375	32 @ 2.4375	32 @ 2.4375	32 @ 2.4375	32 @ 2.4375	32 @ 2.4375	32 @ 2.4375	32 @ 2.4375	32 @ 2.4375	32 @ 2.4375	32 @ 2.4375	32 @ 2.4375	32 @ 2.4375
# Panels @ (ft)	2998.6	348.7	468.0	400.3	342.4	400.3	400.3	400.3	400.3	400.3	400.3	400.3	400.3	400.3	400.3	400.3	400.3
Weight (lb)	2998.6	348.7	468.0	400.3	342.4	400.3	400.3	400.3	400.3	400.3	400.3	400.3	400.3	400.3	400.3	400.3	400.3



**DESIGNED APPURTENANCE LOADING**

TYPE	ELEVATION	TYPE	ELEVATION
DB636 Omni	176	(2) RRH-2X50-800 (Sprint)	140
DB806-XT	174	Junction Box (Sprint)	140
DB874H120-SX	171.5	Pirod 12' PCS T-Frame (1) 104569 (Sprint)	140
BOX 24"x6"x6"	171.5		
1' Side Mount Standoff	168	NNVV-65B-R4 (Sprint)	140
Pirod 5' Side Mount Standoff (1)	168	AAHC (Sprint)	140
Pirod 5' Side Mount Standoff (1)	168	844G65VTZASX (Sprint)	140
SC2	167	(2) LGP21401 (ATI)	120
APX16DWV-16DWVS (T-Mobile)	163	DC6-48-06-18-8F (ATI)	120
LNX-6515DS-VTM (T-Mobile)	163	RRUS-11 (ATI)	120
(2) TMA (T-Mobile)	163	RRUS 32 (ATI)	120
AIR 32 with 6' pipe (T-Mobile)	163	TPX-070821 (ATI)	120
Pirod 12' T-Frame Sector Mount (1) (T-Mobile)	163	14-ft T-Frame Sector Mount (ATI)	120
APX16DWV-16DWVS (T-Mobile)	163	Powerwave 7770 w/5ft mount pipe (ATI)	120
LNX-6515DS-VTM (T-Mobile)	163	CCI OPA-65R-LCUU-H6 Panel Antenna with 8ft Pipe (ATI)	120
(2) TMA (T-Mobile)	163	Quintel QS66512-2 w/m pipe (ATI)	120
AIR 32 with 6' pipe (T-Mobile)	163	(2) LGP21401 (ATI)	120
Pirod 12' T-Frame Sector Mount (1) (T-Mobile)	163	DC6-48-06-18-8F (ATI)	120
APX16DWV-16DWVS (T-Mobile)	163	RRUS-11 (ATI)	120
LNX-6515DS-VTM (T-Mobile)	163	RRUS 32 (ATI)	120
(2) TMA (T-Mobile)	163	TPX-070821 (ATI)	120
AIR 32 with 6' pipe (T-Mobile)	163	14-ft T-Frame Sector Mount (ATI)	120
Pirod 12' T-Frame Sector Mount (1) (T-Mobile)	163	Powerwave 7770 w/5ft mount pipe (ATI)	120
VHLP2-18	146	CCI OPA-65R-LCUU-H6 Panel Antenna with 8ft Pipe (ATI)	120
VHLP2-18	146	Quintel QS66512-2 w/m pipe (ATI)	120
VHLP800-11	146	(2) LGP21401 (ATI)	120
844G65VTZASX (Sprint)	140	RRUS-11 (ATI)	120
ALU RRH-4X45-1900 (Sprint)	140	RRUS 32 (ATI)	120
(2) RRH-2X50-800 (Sprint)	140	TPX-070821 (ATI)	120
Pirod 12' PCS T-Frame (1) 104569 (Sprint)	140	14-ft T-Frame Sector Mount (ATI)	120
NNVV-65B-R4 (Sprint)	140	Powerwave 7770 w/5ft mount pipe (ATI)	120
AAHC (Sprint)	140	CCI OPA-65R-LCUU-H6 Panel Antenna with 8ft Pipe (ATI)	120
DB844H90E-XY (Sprint)	140	Quintel QS66512-2 w/m pipe (ATI)	120
DB844H90E-XY (Sprint)	140	1' Side Mount Standoff (Other)	108.4
ALU RRH-4X45-1900 (Sprint)	140	1' Side Mount Standoff (Other)	108.4
(2) RRH-2X50-800 (Sprint)	140	1' Side Mount Standoff (Other)	108.4
Pirod 12' PCS T-Frame (1) 104569 (Sprint)	140	Panel Antenna 6'x6"x3" (Other)	108
NNVV-65B-R4 (Sprint)	140	Panel Antenna 6'x6"x3" (Other)	108
AAHC (Sprint)	140	Panel Antenna 6'x6"x3" (Other)	108
844G65VTZASX (Sprint)	140	Panel Antenna 6'x6"x3" (Other)	108
844G65VTZASX (Sprint)	140	GPS (Other)	50
ALU RRH-4X45-1900 (Sprint)	140		

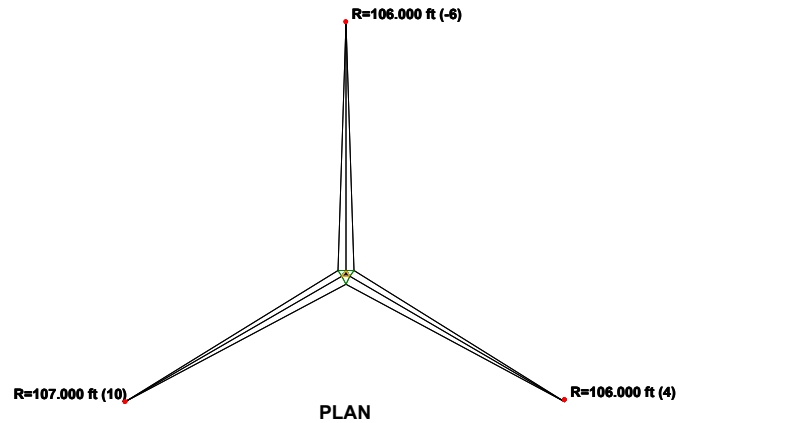
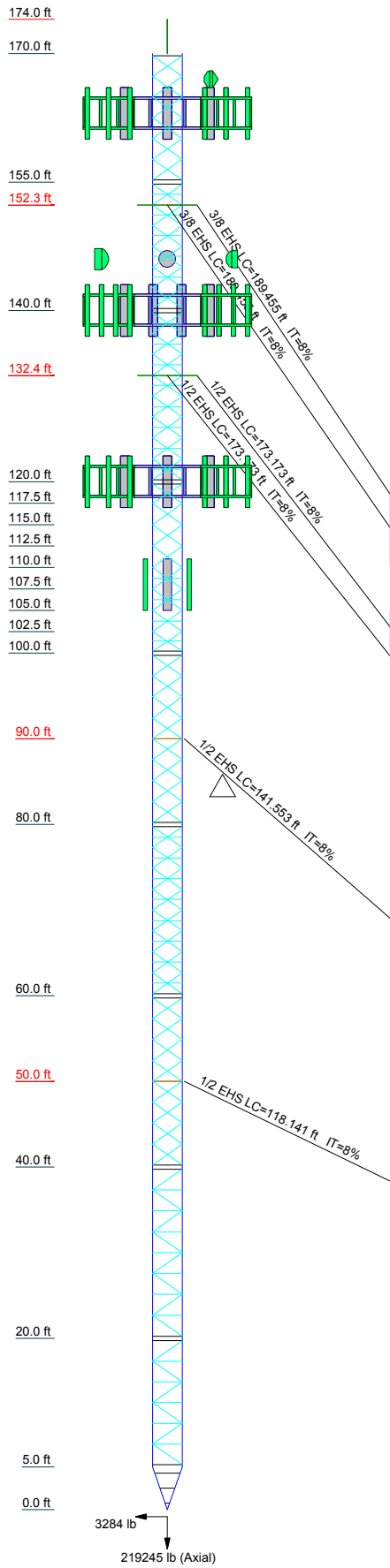
**SYMBOL LIST**

MARK	SIZE	MARK	SIZE
A	Pipe 2.0 STD W 1" Rod Reinforcement	D	14x3/16
B	Pipe 2.0 STD with 1/3rd Split 2.5 STD Pipe	E	1 @ 2.25
C	P1.5X0625	F	6 @ 0.875

ALL REACTIONS ARE FACTORED

<b>Maser Consulting PA</b> 400 Valley Road Mt. Arlington, NJ Phone: 973398.3110 FAX: 973.398.3199	<b>Job: Guyed Tower Modification</b>		
	Project: <b>17924017A</b>		
	Client: Sprint	Drawn by: abassett	App'd:
	Code: TIA-222-G	Date: 04/18/18	Scale: NTS
	Path:	Dwg No. E-1	

Section	T16	T15	T14	T13	T12	T11	T10	T9	T8	T7	T6	T5	T4	T3	T2	T1
Legs	2.5 STD w/ 90 deg 3.0 STD		ROHN 2.5 STD	B	ROHN 2.5 STD	A572-50	ROHN 2 STD		A	ROHN 2 STD		ROHN 2 STD		ROHN 2 STD		
Leg Grade	N.A.		P1.5X0625		P1.5X0625	A36	P1.5X0625		L1 3/4x1 3/4x1/4	P1.5X0625		P1.5X0625		P1.5X0625		
Diagonals	N.A.						N.A.			N.A.		N.A.				
Diagonal Grade	N.A.						N.A.			N.A.		N.A.				
Top Girts	D		ROHN 1.5 STD	N.A.	P1.5X0625		N.A.		C	L1 1/2x1 1/2x1/8		P1.5X0625		P1.5X0625		
Mid Girts	D		N.A.	N.A.			N.A.			L1 3/4x1 3/4x1/8		P1.5X0625		P1.5X0625		
Bottom Girts	D		L2x2x3/16	SR 1	P1.5X0625		N.A.			L1 3/4x1 3/4x1/8		P1.5X0625		P1.5X0625		
Horizontals	N.A.						N.A.			N.A.		N.A.				
Sec. Horizontals	N.A.						L2x2x3/16		N.A.	L1 3/4x1 3/4x1/4		SR 1		L2x2x3/16		
Top Guy Pull-Offs	N.A.						4x3/8		N.A.	4x3/8		N.A.				
Face Width (ft)	F		6 @ 2.41667		32 @ 2.4375		6 @ 2.5		E	8 @ 2.4375		12 @ 2.41667				
# Panels @ (ft)	2998.6		348.7	3424	400.3	400.3	400.3	400.3	400.3	400.3	400.3	400.3	400.3	400.3	400.3	400.3
Weight (lb)	2998.6		348.7	3424	400.3	400.3	400.3	400.3	400.3	400.3	400.3	400.3	400.3	400.3	400.3	400.3



**SYMBOL LIST**

MARK	SIZE	MARK	SIZE
A	Pipe 2.0 STD W 1" Rod Reinforcement	D	14x3/16
B	Pipe 2.0 STD with 1/3rd Split 2.5 STD Pipe	E	1 @ 2.25
C	P1.5X0625	F	6 @ 0.875

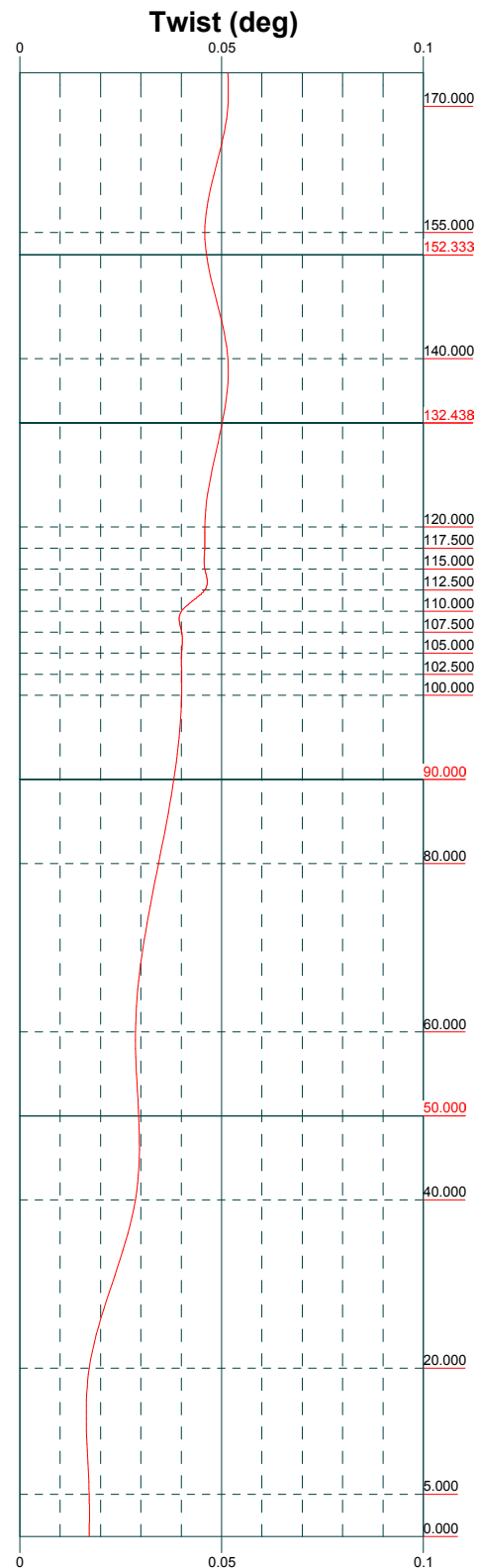
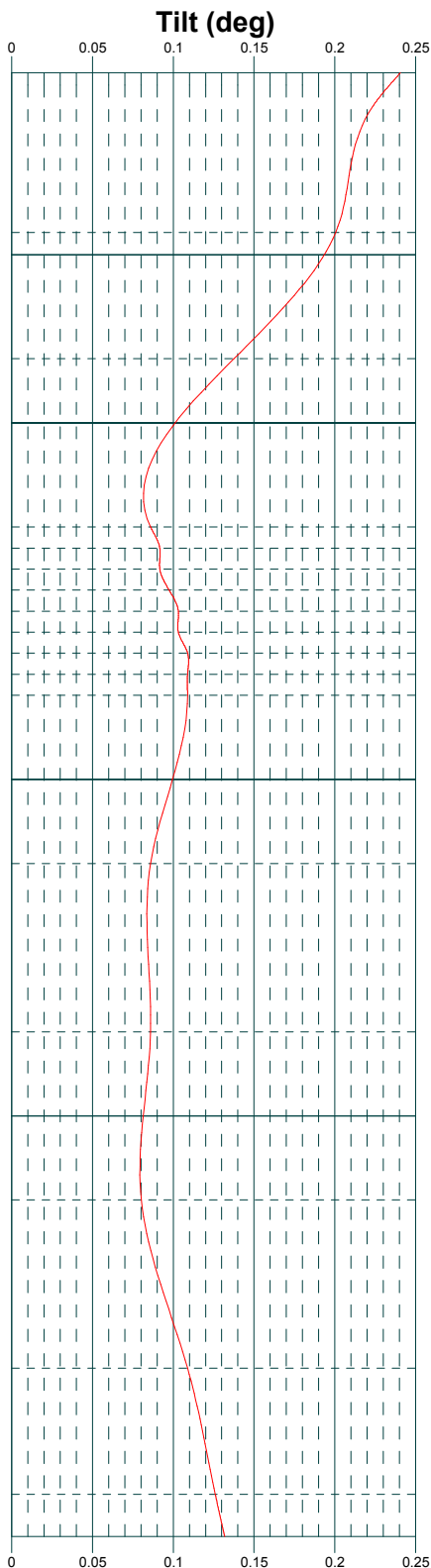
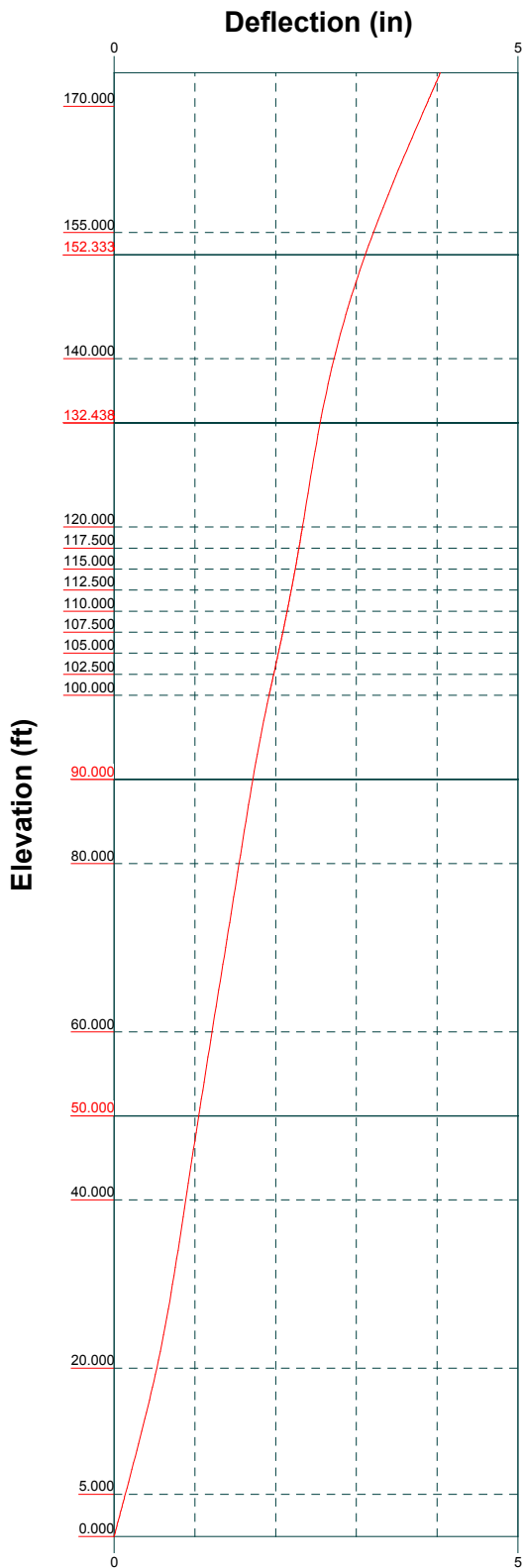
**MATERIAL STRENGTH**

GRADE	Fy	Fu	GRADE	Fy	Fu
A572-50	50 ksi	65 ksi	A36	36 ksi	58 ksi

- TOWER DESIGN NOTES**
1. Tower is located in Hartford County, Connecticut.
  2. Tower designed for Exposure B to the TIA-222-G Standard.
  3. Tower designed for a 95 mph basic wind in accordance with the TIA-222-G Standard.
  4. Tower is also designed for a 40 mph basic wind with 1.00 in ice. Ice is considered to increase in thickness with height.
  5. Deflections are based upon a 60 mph wind.
  6. Tower Structure Class II.
  7. Topographic Category 2 with Crest Height of 200.000 ft
  8. 4,000 ft Lightning Rod is included for load transfer only.
  9. TOWER RATING: 99.7%

ALL REACTIONS ARE FACTORED

<b>Maser Consulting PA</b> 400 Valley Road Mt. Arlington, NJ Phone: 973398.3110 FAX: 973.398.3199	<b>Job: Guyed Tower Modification</b>		
	Project: <b>17924017A</b>		
	Client: Sprint	Drawn by: abassett	App'd:
	Code: TIA-222-G	Date: 04/18/18	Scale: NTS
	Path:		Dwg No. E-1

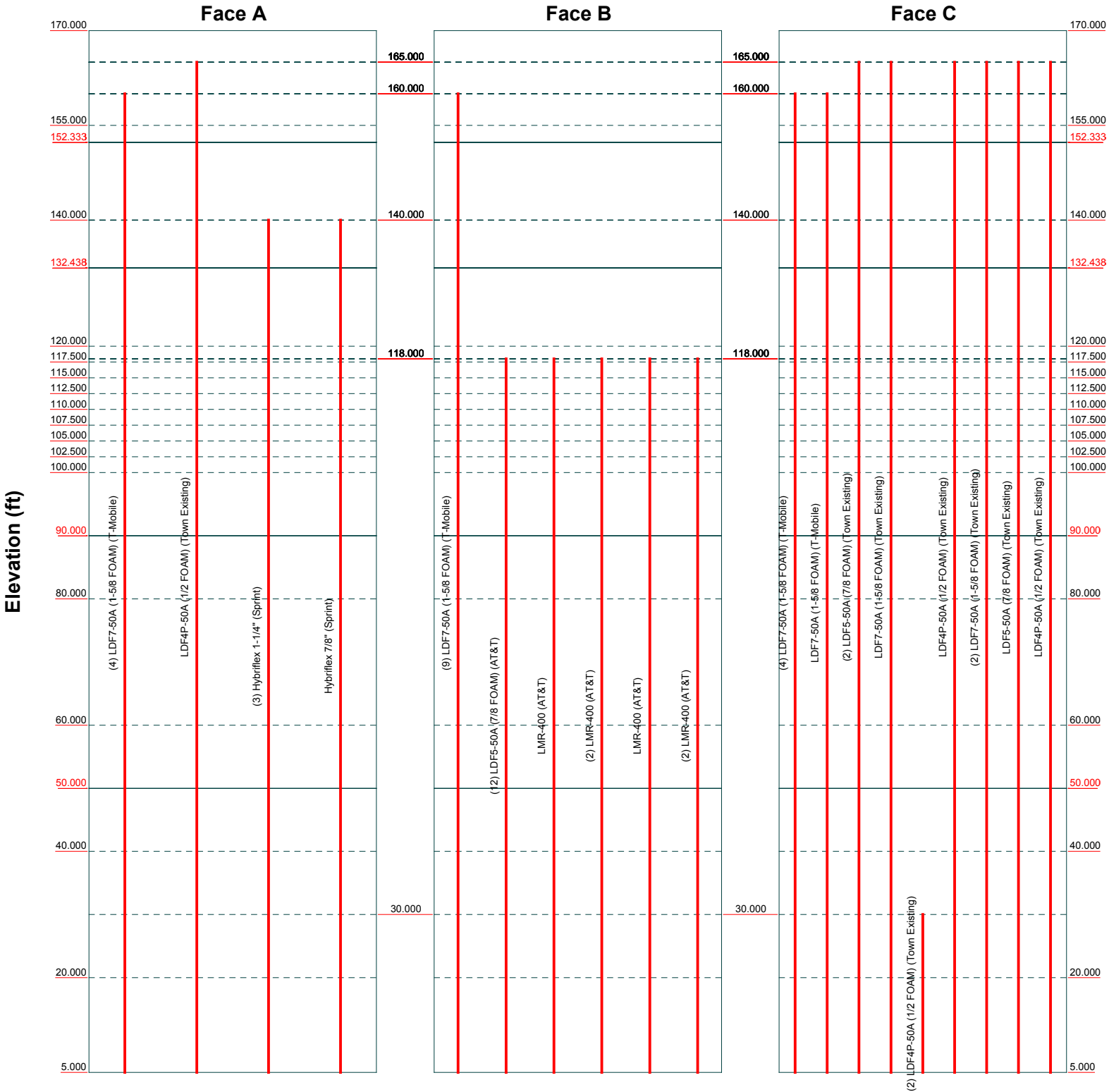


<b>Maser Consulting PA</b>		<b>Job: Guyed Tower Modification</b>	
400 Valley Road		Project: 17924017A	
Mt. Arlington, NJ		Client: Sprint	Drawn by: abassett
Phone: 973398.3110		Date: 04/18/18	App'd:
FAX: 973.398.3199		Code: TIA-222-G	Scale: NTS
		Path:	Dwg No. E-5

# Feed Line Distribution Chart

## 5' - 170'

— Round   
 — Flat   
 — App In Face   
 — App Out Face   
 — Truss Leg



<b>Maser Consulting PA</b>			<b>Job: Guyed Tower Modification</b>		
400 Valley Road Mt. Arlington, NJ Phone: 973398.3110 FAX: 973.398.3199			Project: <b>17924017A</b>		
Client: Sprint		Drawn by: abassett		App'd:	
Code: TIA-222-G		Date: 04/18/18		Scale: NTS	
Path:			Dwg No. E-7		

C:\Users\abassett\Desktop\New folder\CT52XC043 Newington Tower Modification Rev 2.dwg



<b>tnxTower</b>  <b>Maser Consulting PA</b> 400 Valley Road Mt. Arlington, NJ Phone: 973398.3110 FAX: 973.398.3199	<b>Job</b> Guyed Tower Modification	<b>Page</b> 1 of 60
	<b>Project</b> 17924017A	<b>Date</b> 17:49:30 04/18/18
	<b>Client</b> Sprint	<b>Designed by</b> abassett

## Tower Input Data

The main tower is a 3x guyed tower with an overall height of 170.000 ft above the ground line.

The base of the tower is set at an elevation of 0.000 ft above the ground line.

The face width of the tower is 3.420 ft at the top and tapered at the base.

This tower is designed using the TIA-222-G standard.

The following design criteria apply:

Tower is located in Hartford County, Connecticut.

ASCE 7-10 Wind Data is used (wind speeds converted to nominal values).

Basic wind speed of 95 mph.

Structure Class II.

Exposure Category B.

Topographic Category 2.

Crest Height 200.000 ft.

Nominal ice thickness of 1.000 in.

Ice thickness is considered to increase with height.

Ice density of 56 pcf.

A wind speed of 40 mph is used in combination with ice.

Temperature drop of 50 °F.

Deflections calculated using a wind speed of 60 mph.

Pressures are calculated at each section.

Safety factor used in guy design is 1.

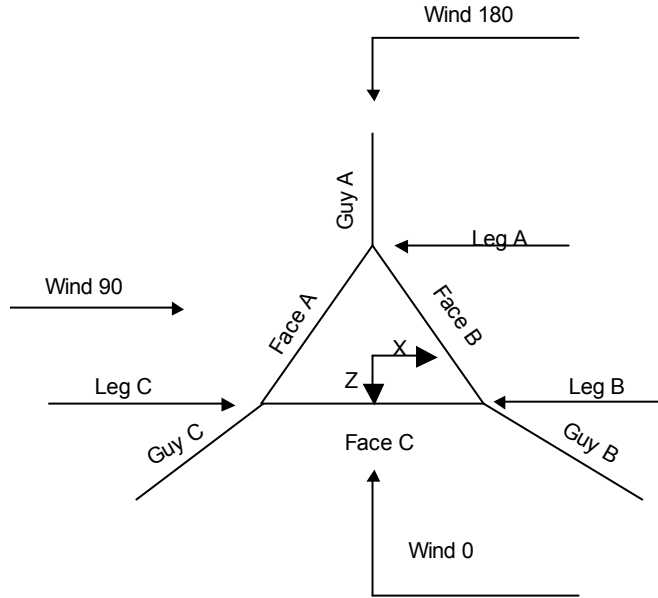
Stress ratio used in tower member design is 1.

Local bending stresses due to climbing loads, feed line supports, and appurtenance mounts are not considered.

## Options

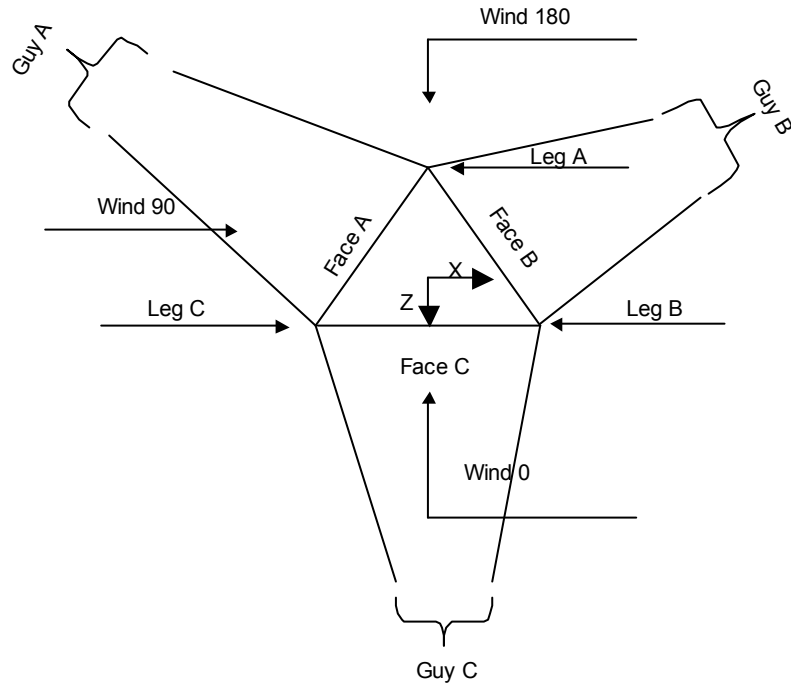
<ul style="list-style-type: none"> <li>Consider Moments - Legs</li> <li>Consider Moments - Horizontals</li> <li>Consider Moments - Diagonals</li> <li>Use Moment Magnification</li> <li>√ Use Code Stress Ratios</li> <li>√ Use Code Safety Factors - Guys</li> <li>Escalate Ice</li> <li>Always Use Max Kz</li> <li>Use Special Wind Profile</li> <li>√ Include Bolts In Member Capacity</li> <li>√ Leg Bolts Are At Top Of Section</li> <li>√ Secondary Horizontal Braces Leg</li> <li>Use Diamond Inner Bracing (4 Sided)</li> <li>SR Members Have Cut Ends</li> <li>SR Members Are Concentric</li> </ul>	<ul style="list-style-type: none"> <li>Distribute Leg Loads As Uniform</li> <li>Assume Legs Pinned</li> <li>√ Assume Rigid Index Plate</li> <li>√ Use Clear Spans For Wind Area</li> <li>√ Use Clear Spans For KL/r</li> <li>√ Retension Guys To Initial Tension</li> <li>√ Bypass Mast Stability Checks</li> <li>√ Use Azimuth Dish Coefficients</li> <li>√ Project Wind Area of Appurt.</li> <li>√ Autocalc Torque Arm Areas</li> <li>Add IBC .6D+W Combination</li> <li>√ Sort Capacity Reports By Component</li> <li>Triangulate Diamond Inner Bracing</li> <li>Treat Feed Line Bundles As Cylinder</li> </ul>	<ul style="list-style-type: none"> <li>Use ASCE 10 X-Brace Ly Rules</li> <li>√ Calculate Redundant Bracing Forces</li> <li>Ignore Redundant Members in FEA</li> <li>√ SR Leg Bolts Resist Compression</li> <li>All Leg Panels Have Same Allowable</li> <li>Offset Girt At Foundation</li> <li>√ Consider Feed Line Torque</li> <li>√ Include Angle Block Shear Check</li> <li>Use TIA-222-G Bracing Resist. Exemption</li> <li>Use TIA-222-G Tension Splice Exemption</li> <li style="text-align: center;">Poles</li> <li>Include Shear-Torsion Interaction</li> <li>Always Use Sub-Critical Flow</li> <li>Use Top Mounted Sockets</li> </ul>
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<b>Job</b>	Guyed Tower Modification	<b>Page</b>	2 of 60
<b>Project</b>	17924017A	<b>Date</b>	17:49:30 04/18/18
<b>Client</b>	Sprint	<b>Designed by</b>	abassett



**Corner & Starmount Guyed Tower**

<b>tnxTower</b>  <b>Maser Consulting PA</b> 400 Valley Road Mt. Arlington, NJ Phone: 973.398.3110 FAX: 973.398.3199	<b>Job</b> Guyed Tower Modification	<b>Page</b> 3 of 60
	<b>Project</b> 17924017A	<b>Date</b> 17:49:30 04/18/18
	<b>Client</b> Sprint	<b>Designed by</b> abassett



**Face Guyed**

## Tower Section Geometry

Tower Section	Tower Elevation	Assembly Database	Description	Section Width	Number of Sections	Section Length
	<i>ft</i>			<i>ft</i>		<i>ft</i>
T1	170.000-155.000			3.420	1	15.000
T2	155.000-140.000			3.420	1	15.000
T3	140.000-120.000			3.420	1	20.000
T4	120.000-117.500			3.420	1	2.500
T5	117.500-115.000			3.420	1	2.500
T6	115.000-112.500			3.420	1	2.500
T7	112.500-110.000			3.420	1	2.500
T8	110.000-107.500			3.420	1	2.500
T9	107.500-105.000			3.420	1	2.500
T10	105.000-102.500			3.420	1	2.500
T11	102.500-100.000			3.420	1	2.500
T12	100.000-80.000			3.420	1	20.000
T13	80.000-60.000			3.420	1	20.000
T14	60.000-40.000			3.420	1	20.000
T15	40.000-20.000			3.420	1	20.000
T16	20.000-5.000			3.420	1	15.000

<b>tnxTower</b>  <b>Maser Consulting PA</b> 400 Valley Road Mt. Arlington, NJ Phone: 973.398.3110 FAX: 973.398.3199	<b>Job</b>	Guyed Tower Modification	<b>Page</b>	4 of 60
	<b>Project</b>	17924017A	<b>Date</b>	17:49:30 04/18/18
	<b>Client</b>	Sprint	<b>Designed by</b>	abassett

Tower Section	Tower Elevation	Assembly Database	Description	Section Width	Number of Sections	Section Length
	ft			ft		ft
T17	5.000-0.000			3.420	1	5.000

### Tower Section Geometry (cont'd)

Tower Section	Tower Elevation	Diagonal Spacing	Bracing Type	Has K Brace End Panels	Has Horizontals	Top Girt Offset	Bottom Girt Offset
	ft	ft				in	in
T1	170.000-155.000	2.417	X Brace	No	No	3.000	3.000
T2	155.000-140.000	2.417	X Brace	No	Yes	3.000	3.000
T3	140.000-120.000	2.438	X Brace	No	Yes	3.000	3.000
T4	120.000-117.500	2.250	X Brace	No	Yes	3.000	0.000
T5	117.500-115.000	2.500	X Brace	No	Yes	0.000	0.000
T6	115.000-112.500	2.500	X Brace	No	Yes	0.000	0.000
T7	112.500-110.000	2.500	X Brace	No	Yes	0.000	0.000
T8	110.000-107.500	2.500	X Brace	No	Yes	0.000	0.000
T9	107.500-105.000	2.500	X Brace	No	Yes	0.000	0.000
T10	105.000-102.500	2.500	X Brace	No	Yes	0.000	0.000
T11	102.500-100.000	2.250	X Brace	No	Yes	0.000	3.000
T12	100.000-80.000	2.438	X Brace	No	No	3.000	3.000
T13	80.000-60.000	2.438	X Brace	No	Yes	3.000	3.000
T14	60.000-40.000	2.438	X Brace	No	No	3.000	3.000
T15	40.000-20.000	2.438	K Brace Right	No	Yes	3.000	3.000
T16	20.000-5.000	2.417	K Brace Right	No	Yes	3.000	3.000
T17	5.000-0.000	0.875	X Brace	No	Yes	9.000	9.000

### Tower Section Geometry (cont'd)

Tower Elevation	Leg Type	Leg Size	Leg Grade	Diagonal Type	Diagonal Size	Diagonal Grade
ft						
170.000-155.000	Pipe	ROHN 2 STD	A572-50 (50 ksi)	Pipe	P1.5X0625	A36 (36 ksi)
155.000-140.000	Pipe	ROHN 2 STD	A572-50 (50 ksi)	Pipe	P1.5X0625	A36 (36 ksi)
140.000-120.000	Arbitrary Shape	Pipe 2.0 STD W 1" Rod Reinforcement	A572-50 (50 ksi)	Single Angle	L1 3/4x1 3/4x1/4	A36 (36 ksi)
120.000-117.500	Pipe	ROHN 2 STD	A572-50 (50 ksi)	Pipe	P1.5X0625	A36 (36 ksi)
117.500-115.000	Pipe	ROHN 2 STD	A572-50 (50 ksi)	Pipe	P1.5X0625	A36 (36 ksi)
115.000-112.500	Pipe	ROHN 2 STD	A572-50 (50 ksi)	Pipe	P1.5X0625	A36 (36 ksi)
112.500-110.000	Pipe	ROHN 2 STD	A572-50 (50 ksi)	Pipe	P1.5X0625	A36 (36 ksi)
110.000-107.500	Pipe	ROHN 2 STD	A572-50 (50 ksi)	Pipe	P1.5X0625	A36 (36 ksi)
107.500-105.000	Pipe	ROHN 2 STD	A572-50 (50 ksi)	Pipe	P1.5X0625	A36 (36 ksi)
105.000-102.500	Pipe	ROHN 2 STD	A572-50 (50 ksi)	Pipe	P1.5X0625	A36 (36 ksi)
T11	Pipe	ROHN 2 STD	A572-50	Pipe	P1.5X0625	A36

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Tower Elevation ft	Leg Type	Leg Size	Leg Grade	Diagonal Type	Diagonal Size	Diagonal Grade			
102.500-100.000	T12	Pipe	ROHN 2.5 STD	(50 ksi)	A572-50	Pipe	P1.5X0625	(36 ksi)	A36
100.000-80.000	T13	Arbitrary Shape	Pipe 2.0 STD with 1/3rd Split	(50 ksi)	A572-50	Pipe	P1.5X0625	(36 ksi)	A36
80.000-60.000	T14	Pipe	ROHN 2.5 STD	(50 ksi)	A572-50	Pipe	P1.5X0625	(36 ksi)	A36
60.000-40.000	T15	Arbitrary Shape	2.5 STD w/ 90 deg 3.0 STD	(50 ksi)	A572-50	Pipe	P1.5X0625	(36 ksi)	A36
40.000-20.000	T16	Arbitrary Shape	2.5 STD w/ 90 deg 3.0 STD	(50 ksi)	A572-50	Pipe	P1.5X0625	(36 ksi)	A36
T17 5.000-0.000	Arbitrary Shape	2.5 STD w/ 90 deg 3.0 STD	(50 ksi)	A572-50	Pipe			(36 ksi)	A36

### Tower Section Geometry (cont'd)

Tower Elevation ft	Top Girt Type	Top Girt Size	Top Girt Grade	Bottom Girt Type	Bottom Girt Size	Bottom Girt Grade	
170.000-155.000	T1	Pipe	P1.5X0625	A36	Pipe	P1.5X0625	A36
155.000-140.000	T2	Pipe	P1.5X0625	(36 ksi)	Pipe	P1.5X0625	(36 ksi)
140.000-120.000	T3	Equal Angle	L1 1/2x1 1/2x1/8	A36	Equal Angle	L1 3/4x1 3/4x1/8	A36
120.000-117.500	T4	Pipe	P1.5X0625	(36 ksi)	Pipe		(36 ksi)
102.500-100.000	T11	Pipe	P1.5X0625	A36	Pipe	P1.5X0625	A36
100.000-80.000	T12	Pipe	P1.5X0625	(36 ksi)	Pipe	P1.5X0625	(36 ksi)
80.000-60.000	T13	Pipe	P1.5X0625	A36	Pipe	P1.5X0625	A36
60.000-40.000	T14	Pipe	P1.5X0625	(36 ksi)	Pipe	P1.5X0625	(36 ksi)
40.000-20.000	T15	Pipe	P1.5X0625	A36	Pipe	P1.5X0625	A36
T16 20.000-5.000	Pipe	ROHN 1.5 STD	A36	Equal Angle	L2x2x3/16	A36	(36 ksi)
T17 5.000-0.000	Flat Bar	14x3/16	(36 ksi)	A36	Flat Bar	14x3/16	A36

### Tower Section Geometry (cont'd)

Tower Elevation ft	No. of Mid Girts	Mid Girt Type	Mid Girt Size	Mid Girt Grade	Horizontal Type	Horizontal Size	Horizontal Grade
100.000-80.000	1	Pipe	P1.5X0625	A36	Solid Round		A36
				(36 ksi)			(36 ksi)
	1	Pipe	P1.5X0625	A36	Equal Angle		A36

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Tower Elevation ft	No. of Mid Girts	Mid Girt Type	Mid Girt Size	Mid Girt Grade	Horizontal Type	Horizontal Size	Horizontal Grade
60.000-40.000 T15	None	Flat Bar		(36 ksi) A36	Solid Round	1	(36 ksi) A36
40.000-20.000 T16	None	Flat Bar		(36 ksi) A36	Solid Round	1	(36 ksi) A36
20.000-5.000 T17	1	Flat Bar	14x3/16	(36 ksi) A36	Solid Round		(36 ksi) A36

### Tower Section Geometry (cont'd)

Tower Elevation ft	Secondary Horizontal Type	Secondary Horizontal Size	Secondary Horizontal Grade	Inner Bracing Type	Inner Bracing Size	Inner Bracing Grade
155.000-140.000 T2	Solid Round	1	(36 ksi) A36	Solid Round		(36 ksi) A36
140.000-120.000 T3	Equal Angle	L1 3/4x1 3/4x1/4	(36 ksi) A36	Solid Round		(36 ksi) A36
110.000-107.500 T8	Equal Angle	L2x2x3/16	(36 ksi) A36	Solid Round		(36 ksi) A36
107.500-105.000 T9	Equal Angle	L2x2x3/16	(36 ksi) A36	Solid Round		(36 ksi) A36
105.000-102.500 T10	Equal Angle	L2x2x3/16	(36 ksi) A36	Solid Round		(36 ksi) A36
102.500-100.000 T11	Equal Angle	L2x2x3/16	(36 ksi) A36	Solid Round		(36 ksi) A36
100.000-80.000 T13	Equal Angle	L2x2x3/16	(36 ksi) A36	Solid Round		(36 ksi) A36

### Tower Section Geometry (cont'd)

Tower Elevation ft	Gusset Area (per face) ft <sup>2</sup>	Gusset Thickness in	Gusset Grade	Adjust. Factor A <sub>f</sub>	Adjust. Factor A <sub>r</sub>	Weight Mult.	Double Angle Stitch Bolt Spacing Diagonals in	Double Angle Stitch Bolt Spacing Horizontals in	Double Angle Stitch Bolt Spacing Redundants in
170.000-155.000 T1	0.000	0.000	A36 (36 ksi)	1	1	1	36.000	36.000	36.000
155.000-140.000 T2	0.000	0.000	A36 (36 ksi)	1	1	1	36.000	36.000	36.000
140.000-120.000 T3	0.000	0.000	A36 (36 ksi)	1	1	1	36.000	36.000	36.000
120.000-117.500 T4	0.000	0.000	A36 (36 ksi)	1	1	1	36.000	36.000	36.000
117.500-115.000 T5	0.000	0.000	A36 (36 ksi)	1	1	1	36.000	36.000	36.000







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Tower Elevation ft	Leg		Diagonal		Top Girt		Bottom Girt		Mid Girt		Long Horizontal		Short Horizontal	
	Net Width Deduct in	U	Net Width Deduct in	U	Net Width Deduct in	U	Net Width Deduct in	U	Net Width Deduct in	U	Net Width Deduct in	U	Net Width Deduct in	U
T4 120.000-117.500	0.000	1	0.000	0.75	0.000	0.75	0.000	0.75	0.000	0.75	0.000	0.75	0.000	0.75
T5 117.500-115.000	0.000	1	0.000	0.75	0.000	0.75	0.000	0.75	0.000	0.75	0.000	0.75	0.000	0.75
T6 115.000-112.500	0.000	1	0.000	0.75	0.000	0.75	0.000	0.75	0.000	0.75	0.000	0.75	0.000	0.75
T7 112.500-110.000	0.000	1	0.000	0.75	0.000	0.75	0.000	0.75	0.000	0.75	0.000	0.75	0.000	0.75
T8 110.000-107.500	0.000	1	0.000	0.75	0.000	0.75	0.000	0.75	0.000	0.75	0.000	0.75	0.000	0.75
T9 107.500-105.000	0.000	1	0.000	0.75	0.000	0.75	0.000	0.75	0.000	0.75	0.000	0.75	0.000	0.75
T10 105.000-102.500	0.000	1	0.000	0.75	0.000	0.75	0.000	0.75	0.000	0.75	0.000	0.75	0.000	0.75
T11 102.500-100.000	0.000	1	0.000	0.75	0.000	0.75	0.000	0.75	0.000	0.75	0.000	0.75	0.000	0.75
T12 100.000-80.000	0.000	1	0.000	0.75	0.000	0.75	0.000	0.75	0.000	0.75	0.000	0.75	0.000	0.75
T13 80.000-60.000	0.000	1	0.000	0.75	0.000	0.75	0.000	0.75	0.000	0.75	0.000	0.75	0.000	0.75
T14 60.000-40.000	0.000	1	0.000	0.75	0.000	0.75	0.000	0.75	0.000	0.75	0.000	0.75	0.000	0.75
T15 40.000-20.000	0.000	1	0.000	0.75	0.000	0.75	0.000	0.75	0.000	0.75	0.000	0.75	0.000	0.75
T16 20.000-5.000	0.000	1	0.000	0.75	0.000	0.75	0.000	0.75	0.000	0.75	0.000	0.75	0.000	0.75
T17 5.000-0.000	0.000	1	0.000	0.75	0.000	0.75	0.000	0.75	0.000	0.75	0.000	0.75	0.000	0.75

### Tower Section Geometry (cont'd)

Tower Elevation ft	Leg Connection Type	Leg		Diagonal		Top Girt		Bottom Girt		Mid Girt		Long Horizontal		Short Horizontal	
		Bolt Size in	No.	Bolt Size in	No.	Bolt Size in	No.	Bolt Size in	No.	Bolt Size in	No.	Bolt Size in	No.	Bolt Size in	No.
T1 170.000-155.000	Flange	0.750 A325N	4	0.500 A325N	1	0.500 A325N	1	0.500 A325N	0	0.625 A325N	0	0.500 A325N	0	0.500 A325N	0
T2 155.000-140.000	Flange	0.750 A325N	4	0.500 A325N	1	0.500 A325N	1	0.500 A325N	0	0.625 A325N	0	0.500 A325N	0	0.625 A325N	0

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Tower Elevation ft	Leg Connection Type	Leg		Diagonal		Top Girt		Bottom Girt		Mid Girt		Long Horizontal		Short Horizontal	
		Bolt Size in	No.	Bolt Size in	No.	Bolt Size in	No.	Bolt Size in	No.	Bolt Size in	No.	Bolt Size in	No.	Bolt Size in	No.
140.000-120.000	T3 Flange	0.750 A325N	4	0.625 A325N	1	0.625 A325N	1	0.625 A325N	0	0.625 A325N	0	0.500 A325N	0	0.500 A325N	0
120.000-117.500	T4 Flange	0.750 A325N	4	0.500 A325N	1	0.500 A325N	1	0.000 A325N	0	0.625 A325N	0	0.500 A325N	0	0.500 A325N	0
117.500-115.000	T5 Flange	0.750 A325N	0	0.500 A325N	1	0.500 A325N	0	0.000 A325N	0	0.625 A325N	0	0.500 A325N	0	0.500 A325N	0
115.000-112.500	T6 Flange	0.750 A325N	0	0.500 A325N	1	0.500 A325N	0	0.000 A325N	0	0.625 A325N	0	0.500 A325N	0	0.500 A325N	0
112.500-110.000	T7 Flange	0.750 A325N	0	0.500 A325N	1	0.500 A325N	0	0.000 A325N	0	0.625 A325N	0	0.500 A325N	0	0.500 A325N	0
110.000-107.500	T8 Flange	0.750 A325N	0	0.500 A325N	1	0.500 A325N	0	0.000 A325N	0	0.625 A325N	0	0.500 A325N	0	0.500 A325N	0
107.500-105.000	T9 Flange	0.750 A325N	0	0.500 A325N	1	0.500 A325N	0	0.000 A325N	0	0.625 A325N	0	0.500 A325N	0	0.500 A325N	0
105.000-102.500	T10 Flange	0.750 A325N	0	0.500 A325N	1	0.500 A325N	0	0.000 A325N	0	0.625 A325N	0	0.500 A325N	0	0.500 A325N	0
102.500-100.000	T11 Flange	0.750 A325N	0	0.500 A325N	1	0.500 A325N	0	0.500 A325N	0	0.625 A325N	0	0.500 A325N	0	0.500 A325N	0
100.000-80.000	T12 Flange	0.750 A325N	4	0.500 A325N	1	0.500 A325N	1	0.500 A325N	0	0.625 A325N	0	0.500 A325N	0	0.500 A325N	0
80.000-60.000	T13 Flange	0.750 A325N	4	0.500 A325N	1	0.500 A325N	1	0.750 A325N	0	0.750 A325N	0	0.500 A325N	0	0.500 A325N	0
60.000-40.000	T14 Flange	0.750 A325N	4	0.500 A325N	1	0.500 A325N	1	0.500 A325N	0	0.625 A325N	0	0.500 A325N	0	0.500 A325N	0
40.000-20.000	T15 Flange	0.750 A325N	4	0.500 A325N	1	0.500 A325N	1	0.500 A325N	0	0.625 A325N	0	0.500 A325N	0	0.500 A325N	0
20.000-5.000	T16 Flange	0.750 A325N	4	0.500 A325N	1	0.500 A325N	1	0.500 A490N	0	0.625 A325N	0	0.500 A325N	0	0.500 A325N	0
5.000-0.000	T17 Flange	0.750 A325N	4	0.500 A325N	0	0.500 A325N	0	0.500 A490N	0	0.625 A325N	0	0.500 A325N	0	0.500 A325N	0

### Guy Data

Guy Elevation ft	Guy Grade	Guy Size	Initial Tension lb	%	Guy Modulus ksi	Guy Weight plf	L <sub>u</sub> ft	Anchor Radius ft	Anchor Azimuth Adj. °	Anchor Elevation ft	End Fitting Efficiency %
152.333	EHS	A 3/8	1232.000	8%	21000.000	0.273	189.317	106.000	0.0000	-6.000	100%
		B 3/8	1232.000	8%	21000.000	0.273	181.049	106.000	0.0000	4.000	100%
		C 3/8	1232.000	8%	21000.000	0.273	176.765	107.000	0.0000	10.000	100%
132.438	EHS	A 1/2	2152.000	8%	21000.000	0.517	173.057	106.000	0.0000	-6.000	100%
		B 1/2	2152.000	8%	21000.000	0.517	165.177	106.000	0.0000	4.000	100%
		C 1/2	2152.000	8%	21000.000	0.517	161.211	107.000	0.0000	10.000	100%

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90	EHS	A	1/2	2152.000	8%	21000.000	0.517	141.459	106.000	0.0000	-6.000	100%
		B	1/2	2152.000	8%	21000.000	0.517	134.882	106.000	0.0000	4.000	100%
		C	1/2	2152.000	8%	21000.000	0.517	131.936	107.000	0.0000	10.000	100%
50	EHS	A	1/2	2152.000	8%	21000.000	0.517	118.063	106.000	0.0000	-6.000	100%
		B	1/2	2152.000	8%	21000.000	0.517	113.667	106.000	0.0000	4.000	100%
		C	1/2	2152.000	8%	21000.000	0.517	112.310	107.000	0.0000	10.000	100%

### Guy Data(cont'd)

Guy Elevation ft	Mount Type	Torque-Arm Spread ft	Torque-Arm Leg Angle °	Torque-Arm Style	Torque-Arm Grade	Torque-Arm Type	Torque-Arm Size
152.333	Torque Arm	7.000	0.0000	Channel	A36 (36 ksi)	Channel	C12x20.7
132.438	Torque Arm	7.000	0.0000	Channel	A36 (36 ksi)	Arbitrary Shape	C12x20.7 with 8"x3/8" plates
90	Corner						
50	Corner						

### Guy Data (cont'd)

Guy Elevation ft	Diagonal Grade	Diagonal Type	Upper Diagonal Size	Lower Diagonal Size	Is Strap.	Pull-Off Grade	Pull-Off Type	Pull-Off Size
152.333	A36 (36 ksi)	Solid Round			Yes	A36 (36 ksi)	Equal Angle	L2x2x3/16
132.438	A36 (36 ksi)	Solid Round				A572-50 (50 ksi)	Solid Round	
90.000	A36 (36 ksi)	Solid Round			Yes	A572-50 (50 ksi)	Flat Bar	4x3/8
50.000	A36 (36 ksi)	Solid Round			Yes	A572-50 (50 ksi)	Flat Bar	4x3/8

### Guy Data (cont'd)

Guy Elevation ft	Cable Weight A lb	Cable Weight B lb	Cable Weight C lb	Cable Weight D lb	Tower Intercept A ft	Tower Intercept B ft	Tower Intercept C ft	Tower Intercept D ft
152.333	51.683	49.426	48.257		3.906	3.576	3.411	
					3.4 sec/pulse	3.3 sec/pulse	3.2 sec/pulse	
132.438	89.470	85.397	83.346		3.541	3.230	3.079	
					3.2 sec/pulse	3.1 sec/pulse	3.0 sec/pulse	
90	73.134	69.734	68.211		2.378	2.165	2.073	
					2.7 sec/pulse	2.5 sec/pulse	2.5 sec/pulse	
50	61.038	58.766	58.065		1.664	1.545	1.509	
					2.2 sec/pulse	2.1 sec/pulse	2.1 sec/pulse	

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### Guy Data (cont'd)

Guy Elevation ft	Calc K Single Angles	Calc K Solid Rounds	Torque Arm		Pull Off		Diagonal	
			K <sub>x</sub>	K <sub>y</sub>	K <sub>x</sub>	K <sub>y</sub>	K <sub>x</sub>	K <sub>y</sub>
152.333	No	No	1	1	1	1	1	1
132.438	No	No	1	1	1	1	1	1
90	No	No			1	1	1	1
50	No	No			1	1	1	1

### Guy Data (cont'd)

Guy Elevation ft	Torque-Arm				Pull Off				Diagonal			
	Bolt Size in	Number	Net Width Deduct in	U	Bolt Size in	Number	Net Width Deduct in	U	Bolt Size in	Number	Net Width Deduct in	U
152.333	0.750 A325N	8	0.000	1	0.750 A325N	1	0.000	0.75	0.625 A325N	0	0.000	0.75
132.438	0.750 A325N	8	0.000	1	0.750 A325N	1	0.000	0.75	0.625 A325N	0	0.000	0.75
90	0.875 A325N	4	0.000	1	0.625 A325N	0	0.000	0.75	0.625 A325N	0	0.000	0.75
50	0.875 A325N	4	0.000	1	0.625 A325N	0	0.000	0.75	0.625 A325N	0	0.000	0.75

### Guy Pressures

Guy Elevation ft	Guy Location	z ft	q <sub>z</sub> ksf	q <sub>z</sub> Ice ksf	Ice Thickness in
152.333	A	73.167	0.028	0.005	2.525
	B	78.167	0.028	0.005	2.531
	C	81.167	0.028	0.005	2.534
132.438	A	63.219	0.027	0.005	2.510
	B	68.219	0.027	0.005	2.518
	C	71.219	0.027	0.005	2.522
90	A	42.000	0.026	0.005	2.459
	B	47.000	0.026	0.005	2.474
	C	50.000	0.026	0.005	2.482
50	A	22.000	0.025	0.004	2.354
	B	27.000	0.024	0.004	2.389
	C	30.000	0.024	0.004	2.407

### Guy-Tensioning Information

Temperature At Time Of Tensioning						
0 F	20 F	40 F	60 F	80 F	100 F	120 F

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Guy Elevation ft	H ft	V ft	Initial Tension lb	Intercept ft	Initial Tension lb	Intercept ft	Initial Tension lb	Intercept ft	Initial Tension lb	Intercept ft	Initial Tension lb	Intercept ft	Initial Tension lb	Intercept ft	Initial Tension lb	Intercept ft
152.333	A 104.04	158.33	1419	3.40	1356	3.55	1294	3.72	1232	3.91	1170	4.11	1110	4.33	1049	4.57
	B 104.04	148.33	1437	3.07	1368	3.22	1300	3.39	1232	3.58	1165	3.78	1098	4.00	1033	4.25
	C 105.04	142.33	1451	2.90	1377	3.05	1304	3.22	1232	3.41	1160	3.62	1089	3.85	1020	4.11
132.438	A 104.04	138.44	2572	2.97	2430	3.14	2290	3.33	2152	3.54	2015	3.78	1881	4.04	1749	4.34
	B 104.04	128.44	2613	2.67	2458	2.83	2304	3.02	2152	3.23	2002	3.47	1855	3.74	1711	4.05
	C 105.04	122.44	2645	2.51	2479	2.68	2315	2.87	2152	3.08	1992	3.32	1835	3.60	1683	3.92
90	A 104.03	96.00	2783	1.84	2570	1.99	2360	2.17	2152	2.38	1948	2.62	1751	2.92	1560	3.27
	B 104.03	86.00	2847	1.64	2612	1.79	2380	1.96	2152	2.16	1928	2.41	1712	2.71	1505	3.08
	C 105.03	80.00	2893	1.55	2642	1.69	2395	1.86	2152	2.07	1914	2.33	1685	2.64	1468	3.03
50	A 104.03	56.00	3063	1.17	2755	1.30	2451	1.46	2152	1.66	1861	1.92	1584	2.26	1328	2.69
	B 104.03	46.00	3137	1.06	2804	1.19	2475	1.34	2152	1.54	1839	1.81	1542	2.15	1272	2.61
	C 105.03	40.00	3181	1.02	2833	1.15	2489	1.31	2152	1.51	1826	1.78	1518	2.14	1241	2.61

### Feed Line/Linear Appurtenances - Entered As Round Or Flat

Description	Face or Leg	Allow Shield	Component Type	Placement ft	Face Offset in	Lateral Offset (Frac FW)	#	# Per Row	Clear Spacing in	Width or Diameter in	Perimeter in	Weight plf
LDF7-50A (1-5/8 FOAM) (T-Mobile)	A	No	Ar (CaAa)	160.000 - 0.000	0.000	-0.3	4	4	1.000	1.980		0.820
LDF7-50A (1-5/8 FOAM) (T-Mobile)	B	No	Ar (CaAa)	160.000 - 0.000	-2.000	0	9	9	1.000	1.980		0.820
LDF7-50A (1-5/8 FOAM) (T-Mobile)	C	No	Ar (CaAa)	160.000 - 0.000	0.000	-0.12	4	4	1.000	1.980		0.820
LDF7-50A (1-5/8 FOAM) (T-Mobile)	C	No	Ar (CaAa)	160.000 - 0.000	0.000	0.3	1	1	1.000	1.980		0.820
LDF5-50A (7/8 FOAM) (AT&T)	B	No	Ar (CaAa)	118.000 - 0.000	0.000	0	12	8	0.750	1.090		0.330
LDF5-50A (7/8 FOAM) (Town Existing)	C	No	Ar (CaAa)	165.000 - 0.000	0.000	0.15	2	1	0.750	1.090		0.330
LDF7-50A (1-5/8 FOAM) (Town Existing)	C	No	Ar (CaAa)	165.000 - 0.000	0.000	0.1	1	1	1.980	1.980		0.820
LDF4P-50A (1/2 FOAM) (Town Existing)	C	No	Ar (CaAa)	30.000 - 0.000	3.000	0.15	2	1	0.630	0.630		0.150
LDF4P-50A (1/2 FOAM) (Town Existing)	C	No	Ar (CaAa)	165.000 - 0.000	2.000	0.1	1	1	0.630	0.630		0.150
LDF4P-50A (1/2 FOAM) (Town Existing)	A	No	Ar (CaAa)	165.000 - 0.000	0.000	-0.45	1	1	0.630	0.630		0.150
LDF7-50A (1-5/8 FOAM) (Town Existing)	C	No	Ar (CaAa)	165.000 - 0.000	-5.000	0.35	2	1	1.000	1.980		0.820
LDF5-50A (7/8 FOAM) (Town Existing)	C	No	Ar (CaAa)	165.000 - 0.000	-3.000	0.4	1	1	1.090	1.090		0.330

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Description	Face or Leg	Allow Shield	Component Type	Placement ft	Face Offset in	Lateral Offset (Frac FW)	#	# Per Row	Clear Spacing in	Width or Diameter in	Perimeter in	Weight plf
Existing) LDF4P-50A (1/2 FOAM) (Town Existing)	C	No	Ar (CaAa)	165.000 - 0.000	-3.000	0.4	1	1	0.630	0.630		0.150
LMR-400 (AT&T)	B	No	Ar (CaAa)	118.000 - 0.000	0.000	0.5	1	1	0.400	0.405		0.540
LMR-400 (AT&T)	B	No	Ar (CaAa)	118.000 - 0.000	0.000	0.49	2	1	0.400	0.405		0.540
LMR-400 (AT&T)	B	No	Ar (CaAa)	118.000 - 0.000	0.000	0.46	1	1	0.400	0.405		0.540
LMR-400 (AT&T)	B	No	Ar (CaAa)	118.000 - 0.000	0.000	0.48	2	2	0.400	0.405		0.540
Hybriflex 1-1/4" (Sprint)	A	No	Ar (CaAa)	140.000 - 0.000	0.000	0	3	3	1.580	1.580		1.080
Hybriflex 7/8" (Sprint)	A	No	Ar (CaAa)	140.000 - 0.000	0.000	0.16	1	1	1.100	1.100		0.683

### Feed Line/Linear Appurtenances Section Areas

Tower Section	Tower Elevation ft	Face	A <sub>R</sub> ft <sup>2</sup>	A <sub>F</sub> ft <sup>2</sup>	C <sub>AA</sub> In Face ft <sup>2</sup>	C <sub>AA</sub> Out Face ft <sup>2</sup>	Weight lb
T1	170.000-155.000	A	0.000	0.000	4.590	0.000	17.900
		B	0.000	0.000	8.910	0.000	36.900
		C	0.000	0.000	15.420	0.000	58.000
T2	155.000-140.000	A	0.000	0.000	12.825	0.000	51.450
		B	0.000	0.000	26.730	0.000	110.700
		C	0.000	0.000	30.555	0.000	117.750
T3	140.000-120.000	A	0.000	0.000	28.780	0.000	147.060
		B	0.000	0.000	35.640	0.000	147.600
		C	0.000	0.000	40.740	0.000	157.000
T4	120.000-117.500	A	0.000	0.000	3.598	0.000	18.383
		B	0.000	0.000	5.231	0.000	22.050
		C	0.000	0.000	5.093	0.000	19.625
T5	117.500-115.000	A	0.000	0.000	3.598	0.000	18.383
		B	0.000	0.000	8.332	0.000	36.450
		C	0.000	0.000	5.093	0.000	19.625
T6	115.000-112.500	A	0.000	0.000	3.598	0.000	18.383
		B	0.000	0.000	8.332	0.000	36.450
		C	0.000	0.000	5.093	0.000	19.625
T7	112.500-110.000	A	0.000	0.000	3.598	0.000	18.383
		B	0.000	0.000	8.332	0.000	36.450
		C	0.000	0.000	5.093	0.000	19.625
T8	110.000-107.500	A	0.000	0.000	3.598	0.000	18.383
		B	0.000	0.000	8.332	0.000	36.450
		C	0.000	0.000	5.093	0.000	19.625
T9	107.500-105.000	A	0.000	0.000	3.598	0.000	18.383
		B	0.000	0.000	8.332	0.000	36.450
		C	0.000	0.000	5.093	0.000	19.625
T10	105.000-102.500	A	0.000	0.000	3.598	0.000	18.383
		B	0.000	0.000	8.332	0.000	36.450
		C	0.000	0.000	5.093	0.000	19.625
T11	102.500-100.000	A	0.000	0.000	3.598	0.000	18.383
		B	0.000	0.000	8.332	0.000	36.450
		C	0.000	0.000	5.093	0.000	19.625

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Tower Section	Tower Elevation ft	Face	$A_R$ ft <sup>2</sup>	$A_F$ ft <sup>2</sup>	$C_{AA}$ In Face ft <sup>2</sup>	$C_{AA}$ Out Face ft <sup>2</sup>	Weight lb
T12	100.000-80.000	A	0.000	0.000	28.780	0.000	147.060
		B	0.000	0.000	66.660	0.000	291.600
		C	0.000	0.000	40.740	0.000	157.000
T13	80.000-60.000	A	0.000	0.000	28.780	0.000	147.060
		B	0.000	0.000	66.660	0.000	291.600
		C	0.000	0.000	40.740	0.000	157.000
T14	60.000-40.000	A	0.000	0.000	28.780	0.000	147.060
		B	0.000	0.000	66.660	0.000	291.600
		C	0.000	0.000	40.740	0.000	157.000
T15	40.000-20.000	A	0.000	0.000	28.780	0.000	147.060
		B	0.000	0.000	66.660	0.000	291.600
		C	0.000	0.000	42.000	0.000	160.000
T16	20.000-5.000	A	0.000	0.000	21.585	0.000	110.295
		B	0.000	0.000	49.995	0.000	218.700
		C	0.000	0.000	32.445	0.000	122.250
T17	5.000-0.000	A	0.000	0.000	7.195	0.000	36.765
		B	0.000	0.000	16.665	0.000	72.900
		C	0.000	0.000	10.815	0.000	40.750

**Feed Line/Linear Appurtenances Section Areas - With Ice**

Tower Section	Tower Elevation ft	Face or Leg	Ice Thickness in	$A_R$ ft <sup>2</sup>	$A_F$ ft <sup>2</sup>	$C_{AA}$ In Face ft <sup>2</sup>	$C_{AA}$ Out Face ft <sup>2</sup>	Weight lb
T1	170.000-155.000	A	2.571	0.000	0.000	16.754	0.000	295.797
		B		0.000	0.000	19.857	0.000	390.654
		C		0.000	0.000	67.642	0.000	1281.889
T2	155.000-140.000	A	2.568	0.000	0.000	41.578	0.000	733.181
		B		0.000	0.000	59.556	0.000	1170.619
		C		0.000	0.000	123.177	0.000	2322.511
T3	140.000-120.000	A	2.563	0.000	0.000	104.464	0.000	1841.807
		B		0.000	0.000	79.379	0.000	1558.145
		C		0.000	0.000	164.037	0.000	3088.090
T4	120.000-117.500	A	2.559	0.000	0.000	13.047	0.000	229.777
		B		0.000	0.000	12.816	0.000	245.161
		C		0.000	0.000	20.484	0.000	385.109
T5	117.500-115.000	A	2.558	0.000	0.000	13.044	0.000	229.662
		B		0.000	0.000	24.399	0.000	447.645
		C		0.000	0.000	20.478	0.000	384.877
T6	115.000-112.500	A	2.557	0.000	0.000	13.041	0.000	229.540
		B		0.000	0.000	24.394	0.000	447.421
		C		0.000	0.000	20.472	0.000	384.633
T7	112.500-110.000	A	2.556	0.000	0.000	13.038	0.000	229.412
		B		0.000	0.000	24.389	0.000	447.183
		C		0.000	0.000	20.466	0.000	384.375
T8	110.000-107.500	A	2.554	0.000	0.000	13.035	0.000	229.276
		B		0.000	0.000	24.383	0.000	446.932
		C		0.000	0.000	20.460	0.000	384.102
T9	107.500-105.000	A	2.553	0.000	0.000	13.031	0.000	229.132
		B		0.000	0.000	24.378	0.000	446.666
		C		0.000	0.000	20.453	0.000	383.813
T10	105.000-102.500	A	2.552	0.000	0.000	13.027	0.000	228.980
		B		0.000	0.000	24.371	0.000	446.384
		C		0.000	0.000	20.446	0.000	383.507
T11	102.500-100.000	A	2.550	0.000	0.000	13.023	0.000	228.818
		B		0.000	0.000	24.365	0.000	446.084
		C		0.000	0.000	20.439	0.000	383.182
T12	100.000-80.000	A	2.542	0.000	0.000	104.017	0.000	1823.638

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Tower Section	Tower Elevation ft	Face or Leg	Ice Thickness in	A <sub>R</sub> ft <sup>2</sup>	A <sub>F</sub> ft <sup>2</sup>	C <sub>AA</sub> In Face ft <sup>2</sup>	C <sub>AA</sub> Out Face ft <sup>2</sup>	Weight lb
		B		0.000	0.000	194.643	0.000	3555.896
		C		0.000	0.000	163.185	0.000	3051.586
T13	80.000-60.000	A	2.521	0.000	0.000	103.558	0.000	1805.121
		B		0.000	0.000	193.898	0.000	3521.628
		C		0.000	0.000	162.313	0.000	3014.428
T14	60.000-40.000	A	2.482	0.000	0.000	102.745	0.000	1772.465
		B		0.000	0.000	192.576	0.000	3461.170
		C		0.000	0.000	160.765	0.000	2949.006
T15	40.000-20.000	A	2.407	0.000	0.000	101.141	0.000	1708.854
		B		0.000	0.000	189.969	0.000	3343.313
		C		0.000	0.000	168.506	0.000	3003.610
T16	20.000-5.000	A	2.248	0.000	0.000	73.326	0.000	1183.898
		B		0.000	0.000	138.365	0.000	2326.094
		C		0.000	0.000	128.819	0.000	2164.394
T17	5.000-0.000	A	1.937	0.000	0.000	22.792	0.000	334.218
		B		0.000	0.000	43.436	0.000	662.841
		C		0.000	0.000	39.242	0.000	585.196

### Feed Line Center of Pressure

Section	Elevation ft	CP <sub>x</sub> in	CP <sub>z</sub> in	CP <sub>x</sub> Ice in	CP <sub>z</sub> Ice in
T1	170.000-155.000	-0.639	0.860	-0.544	0.569
T2	155.000-140.000	-0.454	0.825	-0.029	0.034
T3	140.000-120.000	-0.612	0.556	0.000	0.000
T4	120.000-117.500	-0.471	0.518	-0.334	0.328
T5	117.500-115.000	0.107	0.294	-0.115	0.579
T6	115.000-112.500	0.107	0.294	-0.115	0.579
T7	112.500-110.000	0.107	0.294	-0.115	0.579
T8	110.000-107.500	0.103	0.284	-0.055	0.276
T9	107.500-105.000	0.103	0.284	-0.055	0.277
T10	105.000-102.500	0.103	0.284	-0.055	0.278
T11	102.500-100.000	0.101	0.278	0.000	0.000
T12	100.000-80.000	0.104	0.288	-0.096	0.484
T13	80.000-60.000	0.101	0.279	-0.027	0.138
T14	60.000-40.000	0.104	0.288	-0.096	0.494
T15	40.000-20.000	0.093	0.321	-0.144	0.688
T16	20.000-5.000	0.080	0.348	-0.158	0.727
T17	5.000-0.000	0.349	0.145	0.113	0.534

### Shielding Factor Ka

Tower Section	Feed Line Record No.	Description	Feed Line Segment Elev.	K <sub>a</sub> No Ice	K <sub>a</sub> Ice
T1	1	LDF7-50A (1-5/8 FOAM)	155.00 - 160.00	0.6000	0.1998
T1	2	LDF7-50A (1-5/8 FOAM)	155.00 - 160.00	0.6000	0.1998
T1	3	LDF7-50A (1-5/8 FOAM)	155.00 - 160.00	0.6000	0.1998



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Tower Section	Feed Line Record No.	Description	Feed Line Segment Elev.	$K_a$ No Ice	$K_a$ Ice
T1	4	LDF7-50A (1-5/8 FOAM)	155.00 - 160.00	0.6000	0.1998
T1	6	LDF5-50A (7/8 FOAM)	155.00 - 165.00	0.6000	0.1998
T1	7	LDF7-50A (1-5/8 FOAM)	155.00 - 165.00	0.6000	0.1998
T1	9	LDF4P-50A (1/2 FOAM)	155.00 - 165.00	0.6000	0.1998
T1	10	LDF4P-50A (1/2 FOAM)	155.00 - 165.00	0.6000	0.1998
T1	11	LDF7-50A (1-5/8 FOAM)	155.00 - 165.00	0.6000	0.1998
T1	12	LDF5-50A (7/8 FOAM)	155.00 - 165.00	0.6000	0.1998
T1	13	LDF4P-50A (1/2 FOAM)	155.00 - 165.00	0.6000	0.1998
T2	1	LDF7-50A (1-5/8 FOAM)	140.00 - 155.00	0.6000	0.0060
T2	2	LDF7-50A (1-5/8 FOAM)	140.00 - 155.00	0.6000	0.0060
T2	3	LDF7-50A (1-5/8 FOAM)	140.00 - 155.00	0.6000	0.0060
T2	4	LDF7-50A (1-5/8 FOAM)	140.00 - 155.00	0.6000	0.0060
T2	6	LDF5-50A (7/8 FOAM)	140.00 - 155.00	0.6000	0.0060
T2	7	LDF7-50A (1-5/8 FOAM)	140.00 - 155.00	0.6000	0.0060
T2	9	LDF4P-50A (1/2 FOAM)	140.00 - 155.00	0.6000	0.0060
T2	10	LDF4P-50A (1/2 FOAM)	140.00 - 155.00	0.6000	0.0060
T2	11	LDF7-50A (1-5/8 FOAM)	140.00 - 155.00	0.6000	0.0060
T2	12	LDF5-50A (7/8 FOAM)	140.00 - 155.00	0.6000	0.0060
T2	13	LDF4P-50A (1/2 FOAM)	140.00 - 155.00	0.6000	0.0060
T3	1	LDF7-50A (1-5/8 FOAM)	120.00 - 140.00	0.6000	0.0000
T3	2	LDF7-50A (1-5/8 FOAM)	120.00 - 140.00	0.6000	0.0000
T3	3	LDF7-50A (1-5/8 FOAM)	120.00 - 140.00	0.6000	0.0000
T3	4	LDF7-50A (1-5/8 FOAM)	120.00 - 140.00	0.6000	0.0000
T3	6	LDF5-50A (7/8 FOAM)	120.00 - 140.00	0.6000	0.0000
T3	7	LDF7-50A (1-5/8 FOAM)	120.00 - 140.00	0.6000	0.0000
T3	9	LDF4P-50A (1/2 FOAM)	120.00 - 140.00	0.6000	0.0000
T3	10	LDF4P-50A (1/2 FOAM)	120.00 - 140.00	0.6000	0.0000
T3	11	LDF7-50A (1-5/8 FOAM)	120.00 - 140.00	0.6000	0.0000
T3	12	LDF5-50A (7/8 FOAM)	120.00 - 140.00	0.6000	0.0000
T3	13	LDF4P-50A (1/2 FOAM)	120.00 - 140.00	0.6000	0.0000
T3	18	Hybriflex 1-1/4"	120.00 - 140.00	0.6000	0.0000

<i>Tower Section</i>	<i>Feed Line Record No.</i>	<i>Description</i>	<i>Feed Line Segment Elev.</i>	<i>K<sub>a</sub> No Ice</i>	<i>K<sub>a</sub> Ice</i>
T3	19	Hybriflex 7/8"	120.00 - 140.00	0.6000	0.0000
T4	1	LDF7-50A (1-5/8 FOAM)	117.50 - 120.00	0.6000	0.0948
T4	2	LDF7-50A (1-5/8 FOAM)	117.50 - 120.00	0.6000	0.0948
T4	3	LDF7-50A (1-5/8 FOAM)	117.50 - 120.00	0.6000	0.0948
T4	4	LDF7-50A (1-5/8 FOAM)	117.50 - 120.00	0.6000	0.0948
T4	5	LDF5-50A (7/8 FOAM)	117.50 - 118.00	0.6000	0.0948
T4	6	LDF5-50A (7/8 FOAM)	117.50 - 120.00	0.6000	0.0948
T4	7	LDF7-50A (1-5/8 FOAM)	117.50 - 120.00	0.6000	0.0948
T4	9	LDF4P-50A (1/2 FOAM)	117.50 - 120.00	0.6000	0.0948
T4	10	LDF4P-50A (1/2 FOAM)	117.50 - 120.00	0.6000	0.0948
T4	11	LDF7-50A (1-5/8 FOAM)	117.50 - 120.00	0.6000	0.0948
T4	12	LDF5-50A (7/8 FOAM)	117.50 - 120.00	0.6000	0.0948
T4	13	LDF4P-50A (1/2 FOAM)	117.50 - 120.00	0.6000	0.0948
T4	14	LMR-400	117.50 - 118.00	0.6000	0.0948
T4	15	LMR-400	117.50 - 118.00	0.6000	0.0948
T4	16	LMR-400	117.50 - 118.00	0.6000	0.0948
T4	17	LMR-400	117.50 - 118.00	0.6000	0.0948
T4	18	Hybriflex 1-1/4"	117.50 - 120.00	0.6000	0.0948
T4	19	Hybriflex 7/8"	117.50 - 120.00	0.6000	0.0948
T5	1	LDF7-50A (1-5/8 FOAM)	115.00 - 117.50	0.6000	0.2560
T5	2	LDF7-50A (1-5/8 FOAM)	115.00 - 117.50	0.6000	0.2560
T5	3	LDF7-50A (1-5/8 FOAM)	115.00 - 117.50	0.6000	0.2560
T5	4	LDF7-50A (1-5/8 FOAM)	115.00 - 117.50	0.6000	0.2560
T5	5	LDF5-50A (7/8 FOAM)	115.00 - 117.50	0.6000	0.2560
T5	6	LDF5-50A (7/8 FOAM)	115.00 - 117.50	0.6000	0.2560
T5	7	LDF7-50A (1-5/8 FOAM)	115.00 - 117.50	0.6000	0.2560
T5	9	LDF4P-50A (1/2 FOAM)	115.00 - 117.50	0.6000	0.2560
T5	10	LDF4P-50A (1/2 FOAM)	115.00 - 117.50	0.6000	0.2560
T5	11	LDF7-50A (1-5/8 FOAM)	115.00 - 117.50	0.6000	0.2560
T5	12	LDF5-50A (7/8 FOAM)	115.00 - 117.50	0.6000	0.2560
T5	13	LDF4P-50A (1/2 FOAM)	115.00 - 117.50	0.6000	0.2560

Tower Section	Feed Line Record No.	Description	Feed Line Segment Elev.	$K_a$ No Ice	$K_a$ Ice
T5	14	LMR-400	115.00 - 117.50	0.6000	0.2560
T5	15	LMR-400	115.00 - 117.50	0.6000	0.2560
T5	16	LMR-400	115.00 - 117.50	0.6000	0.2560
T5	17	LMR-400	115.00 - 117.50	0.6000	0.2560
T5	18	Hybriflex 1-1/4"	115.00 - 117.50	0.6000	0.2560
T5	19	Hybriflex 7/8"	115.00 - 117.50	0.6000	0.2560
T6	1	LDF7-50A (1-5/8 FOAM)	112.50 - 115.00	0.6000	0.2563
T6	2	LDF7-50A (1-5/8 FOAM)	112.50 - 115.00	0.6000	0.2563
T6	3	LDF7-50A (1-5/8 FOAM)	112.50 - 115.00	0.6000	0.2563
T6	4	LDF7-50A (1-5/8 FOAM)	112.50 - 115.00	0.6000	0.2563
T6	5	LDF5-50A (7/8 FOAM)	112.50 - 115.00	0.6000	0.2563
T6	6	LDF5-50A (7/8 FOAM)	112.50 - 115.00	0.6000	0.2563
T6	7	LDF7-50A (1-5/8 FOAM)	112.50 - 115.00	0.6000	0.2563
T6	9	LDF4P-50A (1/2 FOAM)	112.50 - 115.00	0.6000	0.2563
T6	10	LDF4P-50A (1/2 FOAM)	112.50 - 115.00	0.6000	0.2563
T6	11	LDF7-50A (1-5/8 FOAM)	112.50 - 115.00	0.6000	0.2563
T6	12	LDF5-50A (7/8 FOAM)	112.50 - 115.00	0.6000	0.2563
T6	13	LDF4P-50A (1/2 FOAM)	112.50 - 115.00	0.6000	0.2563
T6	14	LMR-400	112.50 - 115.00	0.6000	0.2563
T6	15	LMR-400	112.50 - 115.00	0.6000	0.2563
T6	16	LMR-400	112.50 - 115.00	0.6000	0.2563
T6	17	LMR-400	112.50 - 115.00	0.6000	0.2563
T6	18	Hybriflex 1-1/4"	112.50 - 115.00	0.6000	0.2563
T6	19	Hybriflex 7/8"	112.50 - 115.00	0.6000	0.2563
T7	1	LDF7-50A (1-5/8 FOAM)	110.00 - 112.50	0.6000	0.2565
T7	2	LDF7-50A (1-5/8 FOAM)	110.00 - 112.50	0.6000	0.2565
T7	3	LDF7-50A (1-5/8 FOAM)	110.00 - 112.50	0.6000	0.2565
T7	4	LDF7-50A (1-5/8 FOAM)	110.00 - 112.50	0.6000	0.2565
T7	5	LDF5-50A (7/8 FOAM)	110.00 - 112.50	0.6000	0.2565
T7	6	LDF5-50A (7/8 FOAM)	110.00 - 112.50	0.6000	0.2565
T7	7	LDF7-50A (1-5/8 FOAM)	110.00 - 112.50	0.6000	0.2565

<i>Tower Section</i>	<i>Feed Line Record No.</i>	<i>Description</i>	<i>Feed Line Segment Elev.</i>	<i>K<sub>a</sub> No Ice</i>	<i>K<sub>a</sub> Ice</i>
T7	9	LDF4P-50A (1/2 FOAM)	110.00 - 112.50	0.6000	0.2565
T7	10	LDF4P-50A (1/2 FOAM)	110.00 - 112.50	0.6000	0.2565
T7	11	LDF7-50A (1-5/8 FOAM)	110.00 - 112.50	0.6000	0.2565
T7	12	LDF5-50A (7/8 FOAM)	110.00 - 112.50	0.6000	0.2565
T7	13	LDF4P-50A (1/2 FOAM)	110.00 - 112.50	0.6000	0.2565
T7	14	LMR-400	110.00 - 112.50	0.6000	0.2565
T7	15	LMR-400	110.00 - 112.50	0.6000	0.2565
T7	16	LMR-400	110.00 - 112.50	0.6000	0.2565
T7	17	LMR-400	110.00 - 112.50	0.6000	0.2565
T7	18	Hybriflex 1-1/4"	110.00 - 112.50	0.6000	0.2565
T7	19	Hybriflex 7/8"	110.00 - 112.50	0.6000	0.2565
T8	1	LDF7-50A (1-5/8 FOAM)	107.50 - 110.00	0.6000	0.0679
T8	2	LDF7-50A (1-5/8 FOAM)	107.50 - 110.00	0.6000	0.0679
T8	3	LDF7-50A (1-5/8 FOAM)	107.50 - 110.00	0.6000	0.0679
T8	4	LDF7-50A (1-5/8 FOAM)	107.50 - 110.00	0.6000	0.0679
T8	5	LDF5-50A (7/8 FOAM)	107.50 - 110.00	0.6000	0.0679
T8	6	LDF5-50A (7/8 FOAM)	107.50 - 110.00	0.6000	0.0679
T8	7	LDF7-50A (1-5/8 FOAM)	107.50 - 110.00	0.6000	0.0679
T8	9	LDF4P-50A (1/2 FOAM)	107.50 - 110.00	0.6000	0.0679
T8	10	LDF4P-50A (1/2 FOAM)	107.50 - 110.00	0.6000	0.0679
T8	11	LDF7-50A (1-5/8 FOAM)	107.50 - 110.00	0.6000	0.0679
T8	12	LDF5-50A (7/8 FOAM)	107.50 - 110.00	0.6000	0.0679
T8	13	LDF4P-50A (1/2 FOAM)	107.50 - 110.00	0.6000	0.0679
T8	14	LMR-400	107.50 - 110.00	0.6000	0.0679
T8	15	LMR-400	107.50 - 110.00	0.6000	0.0679
T8	16	LMR-400	107.50 - 110.00	0.6000	0.0679
T8	17	LMR-400	107.50 - 110.00	0.6000	0.0679
T8	18	Hybriflex 1-1/4"	107.50 - 110.00	0.6000	0.0679
T8	19	Hybriflex 7/8"	107.50 - 110.00	0.6000	0.0679
T9	1	LDF7-50A (1-5/8 FOAM)	105.00 - 107.50	0.6000	0.0682
T9	2	LDF7-50A (1-5/8 FOAM)	105.00 - 107.50	0.6000	0.0682

<b>tnxTower</b>  <b>Maser Consulting PA</b> 400 Valley Road Mt. Arlington, NJ Phone: 973.398.3110 FAX: 973.398.3199	<b>Job</b>	Guyed Tower Modification	<b>Page</b>	21 of 60
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Tower Section	Feed Line Record No.	Description	Feed Line Segment Elev.	$K_a$ No Ice	$K_a$ Ice
T9	3	LDF7-50A (1-5/8 FOAM)	105.00 - 107.50	0.6000	0.0682
T9	4	LDF7-50A (1-5/8 FOAM)	105.00 - 107.50	0.6000	0.0682
T9	5	LDF5-50A (7/8 FOAM)	105.00 - 107.50	0.6000	0.0682
T9	6	LDF5-50A (7/8 FOAM)	105.00 - 107.50	0.6000	0.0682
T9	7	LDF7-50A (1-5/8 FOAM)	105.00 - 107.50	0.6000	0.0682
T9	9	LDF4P-50A (1/2 FOAM)	105.00 - 107.50	0.6000	0.0682
T9	10	LDF4P-50A (1/2 FOAM)	105.00 - 107.50	0.6000	0.0682
T9	11	LDF7-50A (1-5/8 FOAM)	105.00 - 107.50	0.6000	0.0682
T9	12	LDF5-50A (7/8 FOAM)	105.00 - 107.50	0.6000	0.0682
T9	13	LDF4P-50A (1/2 FOAM)	105.00 - 107.50	0.6000	0.0682
T9	14	LMR-400	105.00 - 107.50	0.6000	0.0682
T9	15	LMR-400	105.00 - 107.50	0.6000	0.0682
T9	16	LMR-400	105.00 - 107.50	0.6000	0.0682
T9	17	LMR-400	105.00 - 107.50	0.6000	0.0682
T9	18	Hybriflex 1-1/4"	105.00 - 107.50	0.6000	0.0682
T9	19	Hybriflex 7/8"	105.00 - 107.50	0.6000	0.0682
T10	1	LDF7-50A (1-5/8 FOAM)	102.50 - 105.00	0.6000	0.0685
T10	2	LDF7-50A (1-5/8 FOAM)	102.50 - 105.00	0.6000	0.0685
T10	3	LDF7-50A (1-5/8 FOAM)	102.50 - 105.00	0.6000	0.0685
T10	4	LDF7-50A (1-5/8 FOAM)	102.50 - 105.00	0.6000	0.0685
T10	5	LDF5-50A (7/8 FOAM)	102.50 - 105.00	0.6000	0.0685
T10	6	LDF5-50A (7/8 FOAM)	102.50 - 105.00	0.6000	0.0685
T10	7	LDF7-50A (1-5/8 FOAM)	102.50 - 105.00	0.6000	0.0685
T10	9	LDF4P-50A (1/2 FOAM)	102.50 - 105.00	0.6000	0.0685
T10	10	LDF4P-50A (1/2 FOAM)	102.50 - 105.00	0.6000	0.0685
T10	11	LDF7-50A (1-5/8 FOAM)	102.50 - 105.00	0.6000	0.0685
T10	12	LDF5-50A (7/8 FOAM)	102.50 - 105.00	0.6000	0.0685
T10	13	LDF4P-50A (1/2 FOAM)	102.50 - 105.00	0.6000	0.0685
T10	14	LMR-400	102.50 - 105.00	0.6000	0.0685
T10	15	LMR-400	102.50 - 105.00	0.6000	0.0685
T10	16	LMR-400	102.50 - 105.00	0.6000	0.0685

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Tower Section	Feed Line Record No.	Description	Feed Line Segment Elev.	$K_a$ No Ice	$K_a$ Ice
T10	17	LMR-400	102.50 - 105.00	0.6000	0.0685
T10	18	Hybriflex 1-1/4"	102.50 - 105.00	0.6000	0.0685
T10	19	Hybriflex 7/8"	102.50 - 105.00	0.6000	0.0685
T11	1	LDF7-50A (1-5/8 FOAM)	100.00 - 102.50	0.6000	0.0000
T11	2	LDF7-50A (1-5/8 FOAM)	100.00 - 102.50	0.6000	0.0000
T11	3	LDF7-50A (1-5/8 FOAM)	100.00 - 102.50	0.6000	0.0000
T11	4	LDF7-50A (1-5/8 FOAM)	100.00 - 102.50	0.6000	0.0000
T11	5	LDF5-50A (7/8 FOAM)	100.00 - 102.50	0.6000	0.0000
T11	6	LDF5-50A (7/8 FOAM)	100.00 - 102.50	0.6000	0.0000
T11	7	LDF7-50A (1-5/8 FOAM)	100.00 - 102.50	0.6000	0.0000
T11	9	LDF4P-50A (1/2 FOAM)	100.00 - 102.50	0.6000	0.0000
T11	10	LDF4P-50A (1/2 FOAM)	100.00 - 102.50	0.6000	0.0000
T11	11	LDF7-50A (1-5/8 FOAM)	100.00 - 102.50	0.6000	0.0000
T11	12	LDF5-50A (7/8 FOAM)	100.00 - 102.50	0.6000	0.0000
T11	13	LDF4P-50A (1/2 FOAM)	100.00 - 102.50	0.6000	0.0000
T11	14	LMR-400	100.00 - 102.50	0.6000	0.0000
T11	15	LMR-400	100.00 - 102.50	0.6000	0.0000
T11	16	LMR-400	100.00 - 102.50	0.6000	0.0000
T11	17	LMR-400	100.00 - 102.50	0.6000	0.0000
T11	18	Hybriflex 1-1/4"	100.00 - 102.50	0.6000	0.0000
T11	19	Hybriflex 7/8"	100.00 - 102.50	0.6000	0.0000
T12	1	LDF7-50A (1-5/8 FOAM)	80.00 - 100.00	0.6000	0.1735
T12	2	LDF7-50A (1-5/8 FOAM)	80.00 - 100.00	0.6000	0.1735
T12	3	LDF7-50A (1-5/8 FOAM)	80.00 - 100.00	0.6000	0.1735
T12	4	LDF7-50A (1-5/8 FOAM)	80.00 - 100.00	0.6000	0.1735
T12	5	LDF5-50A (7/8 FOAM)	80.00 - 100.00	0.6000	0.1735
T12	6	LDF5-50A (7/8 FOAM)	80.00 - 100.00	0.6000	0.1735
T12	7	LDF7-50A (1-5/8 FOAM)	80.00 - 100.00	0.6000	0.1735
T12	9	LDF4P-50A (1/2 FOAM)	80.00 - 100.00	0.6000	0.1735
T12	10	LDF4P-50A (1/2 FOAM)	80.00 - 100.00	0.6000	0.1735
T12	11	LDF7-50A (1-5/8 FOAM)	80.00 - 100.00	0.6000	0.1735
T12	12	LDF5-50A (7/8 FOAM)	80.00 - 100.00	0.6000	0.1735
T12	13	LDF4P-50A (1/2 FOAM)	80.00 - 100.00	0.6000	0.1735
T12	14	LMR-400	80.00 - 100.00	0.6000	0.1735
T12	15	LMR-400	80.00 - 100.00	0.6000	0.1735
T12	16	LMR-400	80.00 - 100.00	0.6000	0.1735
T12	17	LMR-400	80.00 - 100.00	0.6000	0.1735
T12	18	Hybriflex 1-1/4"	80.00 - 100.00	0.6000	0.1735
T12	19	Hybriflex 7/8"	80.00 - 100.00	0.6000	0.1735
T13	1	LDF7-50A (1-5/8 FOAM)	60.00 - 80.00	0.6000	0.0288
T13	2	LDF7-50A (1-5/8 FOAM)	60.00 - 80.00	0.6000	0.0288

<b>tnxTower</b>  <b>Maser Consulting PA</b> 400 Valley Road Mt. Arlington, NJ Phone: 973.398.3110 FAX: 973.398.3199	<b>Job</b>	Guyed Tower Modification	<b>Page</b>	23 of 60
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Tower Section	Feed Line Record No.	Description	Feed Line Segment Elev.	$K_a$ No Ice	$K_a$ Ice
T13	3	LDF7-50A (1-5/8 FOAM)	60.00 - 80.00	0.6000	0.0288
T13	4	LDF7-50A (1-5/8 FOAM)	60.00 - 80.00	0.6000	0.0288
T13	5	LDF5-50A (7/8 FOAM)	60.00 - 80.00	0.6000	0.0288
T13	6	LDF5-50A (7/8 FOAM)	60.00 - 80.00	0.6000	0.0288
T13	7	LDF7-50A (1-5/8 FOAM)	60.00 - 80.00	0.6000	0.0288
T13	9	LDF4P-50A (1/2 FOAM)	60.00 - 80.00	0.6000	0.0288
T13	10	LDF4P-50A (1/2 FOAM)	60.00 - 80.00	0.6000	0.0288
T13	11	LDF7-50A (1-5/8 FOAM)	60.00 - 80.00	0.6000	0.0288
T13	12	LDF5-50A (7/8 FOAM)	60.00 - 80.00	0.6000	0.0288
T13	13	LDF4P-50A (1/2 FOAM)	60.00 - 80.00	0.6000	0.0288
T13	14	LMR-400	60.00 - 80.00	0.6000	0.0288
T13	15	LMR-400	60.00 - 80.00	0.6000	0.0288
T13	16	LMR-400	60.00 - 80.00	0.6000	0.0288
T13	17	LMR-400	60.00 - 80.00	0.6000	0.0288
T13	18	Hybriflex 1-1/4"	60.00 - 80.00	0.6000	0.0288
T13	19	Hybriflex 7/8"	60.00 - 80.00	0.6000	0.0288
T14	1	LDF7-50A (1-5/8 FOAM)	40.00 - 60.00	0.6000	0.1855
T14	2	LDF7-50A (1-5/8 FOAM)	40.00 - 60.00	0.6000	0.1855
T14	3	LDF7-50A (1-5/8 FOAM)	40.00 - 60.00	0.6000	0.1855
T14	4	LDF7-50A (1-5/8 FOAM)	40.00 - 60.00	0.6000	0.1855
T14	5	LDF5-50A (7/8 FOAM)	40.00 - 60.00	0.6000	0.1855
T14	6	LDF5-50A (7/8 FOAM)	40.00 - 60.00	0.6000	0.1855
T14	7	LDF7-50A (1-5/8 FOAM)	40.00 - 60.00	0.6000	0.1855
T14	9	LDF4P-50A (1/2 FOAM)	40.00 - 60.00	0.6000	0.1855
T14	10	LDF4P-50A (1/2 FOAM)	40.00 - 60.00	0.6000	0.1855
T14	11	LDF7-50A (1-5/8 FOAM)	40.00 - 60.00	0.6000	0.1855
T14	12	LDF5-50A (7/8 FOAM)	40.00 - 60.00	0.6000	0.1855
T14	13	LDF4P-50A (1/2 FOAM)	40.00 - 60.00	0.6000	0.1855
T14	14	LMR-400	40.00 - 60.00	0.6000	0.1855
T14	15	LMR-400	40.00 - 60.00	0.6000	0.1855
T14	16	LMR-400	40.00 - 60.00	0.6000	0.1855
T14	17	LMR-400	40.00 - 60.00	0.6000	0.1855
T14	18	Hybriflex 1-1/4"	40.00 - 60.00	0.6000	0.1855
T14	19	Hybriflex 7/8"	40.00 - 60.00	0.6000	0.1855
T15	1	LDF7-50A (1-5/8 FOAM)	20.00 - 40.00	0.6000	0.3617
T15	2	LDF7-50A (1-5/8 FOAM)	20.00 - 40.00	0.6000	0.3617
T15	3	LDF7-50A (1-5/8 FOAM)	20.00 - 40.00	0.6000	0.3617
T15	4	LDF7-50A (1-5/8 FOAM)	20.00 - 40.00	0.6000	0.3617
T15	5	LDF5-50A (7/8 FOAM)	20.00 - 40.00	0.6000	0.3617
T15	6	LDF5-50A (7/8 FOAM)	20.00 - 40.00	0.6000	0.3617
T15	7	LDF7-50A (1-5/8 FOAM)	20.00 - 40.00	0.6000	0.3617
T15	8	LDF4P-50A (1/2 FOAM)	20.00 - 30.00	0.6000	0.3617
T15	9	LDF4P-50A (1/2 FOAM)	20.00 - 40.00	0.6000	0.3617
T15	10	LDF4P-50A (1/2 FOAM)	20.00 - 40.00	0.6000	0.3617
T15	11	LDF7-50A (1-5/8 FOAM)	20.00 - 40.00	0.6000	0.3617
T15	12	LDF5-50A (7/8 FOAM)	20.00 - 40.00	0.6000	0.3617
T15	13	LDF4P-50A (1/2 FOAM)	20.00 - 40.00	0.6000	0.3617
T15	14	LMR-400	20.00 - 40.00	0.6000	0.3617
T15	15	LMR-400	20.00 - 40.00	0.6000	0.3617
T15	16	LMR-400	20.00 - 40.00	0.6000	0.3617
T15	17	LMR-400	20.00 - 40.00	0.6000	0.3617
T15	18	Hybriflex 1-1/4"	20.00 - 40.00	0.6000	0.3617
T15	19	Hybriflex 7/8"	20.00 - 40.00	0.6000	0.3617
T16	1	LDF7-50A (1-5/8 FOAM)	5.00 - 20.00	0.6000	0.3754
T16	2	LDF7-50A (1-5/8 FOAM)	5.00 - 20.00	0.6000	0.3754
T16	3	LDF7-50A (1-5/8 FOAM)	5.00 - 20.00	0.6000	0.3754
T16	4	LDF7-50A (1-5/8 FOAM)	5.00 - 20.00	0.6000	0.3754
T16	5	LDF5-50A (7/8 FOAM)	5.00 - 20.00	0.6000	0.3754
T16	6	LDF5-50A (7/8 FOAM)	5.00 - 20.00	0.6000	0.3754
T16	7	LDF7-50A (1-5/8 FOAM)	5.00 - 20.00	0.6000	0.3754
T16	8	LDF4P-50A (1/2 FOAM)	5.00 - 20.00	0.6000	0.3754
T16	9	LDF4P-50A (1/2 FOAM)	5.00 - 20.00	0.6000	0.3754

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Tower Section	Feed Line Record No.	Description	Feed Line Segment Elev.	$K_a$ No Ice	$K_a$ Ice
T16	10	LDF4P-50A (1/2 FOAM)	5.00 - 20.00	0.6000	0.3754
T16	11	LDF7-50A (1-5/8 FOAM)	5.00 - 20.00	0.6000	0.3754
T16	12	LDF5-50A (7/8 FOAM)	5.00 - 20.00	0.6000	0.3754
T16	13	LDF4P-50A (1/2 FOAM)	5.00 - 20.00	0.6000	0.3754
T16	14	LMR-400	5.00 - 20.00	0.6000	0.3754
T16	15	LMR-400	5.00 - 20.00	0.6000	0.3754
T16	16	LMR-400	5.00 - 20.00	0.6000	0.3754
T16	17	LMR-400	5.00 - 20.00	0.6000	0.3754
T16	18	Hybriflex 1-1/4"	5.00 - 20.00	0.6000	0.3754
T16	19	Hybriflex 7/8"	5.00 - 20.00	0.6000	0.3754
T17	1	LDF7-50A (1-5/8 FOAM)	0.00 - 5.00	0.6000	0.4237
T17	2	LDF7-50A (1-5/8 FOAM)	0.00 - 5.00	0.6000	0.4237
T17	3	LDF7-50A (1-5/8 FOAM)	0.00 - 5.00	0.6000	0.4237
T17	4	LDF7-50A (1-5/8 FOAM)	0.00 - 5.00	0.6000	0.4237
T17	5	LDF5-50A (7/8 FOAM)	0.00 - 5.00	0.6000	0.4237
T17	6	LDF5-50A (7/8 FOAM)	0.00 - 5.00	0.6000	0.4237
T17	7	LDF7-50A (1-5/8 FOAM)	0.00 - 5.00	0.6000	0.4237
T17	8	LDF4P-50A (1/2 FOAM)	0.00 - 5.00	0.6000	0.4237
T17	9	LDF4P-50A (1/2 FOAM)	0.00 - 5.00	0.6000	0.4237
T17	10	LDF4P-50A (1/2 FOAM)	0.00 - 5.00	0.6000	0.4237
T17	11	LDF7-50A (1-5/8 FOAM)	0.00 - 5.00	0.6000	0.4237
T17	12	LDF5-50A (7/8 FOAM)	0.00 - 5.00	0.6000	0.4237
T17	13	LDF4P-50A (1/2 FOAM)	0.00 - 5.00	0.6000	0.4237
T17	14	LMR-400	0.00 - 5.00	0.6000	0.4237
T17	15	LMR-400	0.00 - 5.00	0.6000	0.4237
T17	16	LMR-400	0.00 - 5.00	0.6000	0.4237
T17	17	LMR-400	0.00 - 5.00	0.6000	0.4237
T17	18	Hybriflex 1-1/4"	0.00 - 5.00	0.6000	0.4237
T17	19	Hybriflex 7/8"	0.00 - 5.00	0.6000	0.4237

### Antenna Pole Forces *Lightening Rod*

Length of Pole	$I_x$	$I_y$	Modulus E	Antenna Pole	Antenna Pole	Length of Beacon	Beacon $C_{AA}$	Beacon Weight
ft	$in^4$	$in^4$	ksi	$C_{AA}$	Weight	ft	$ft^2$	lb
4.000	10.000	10.000	29000.000	No Ice	2.500	0.000	0.000	0.000
				With Ice	3.000	4.000	0.000	0.000

### Discrete Tower Loads

Description	Face or Leg	Offset Type	Offsets: Horz Lateral	Vertical	Azimuth Adjustment	Placement	$C_{AA}$ Front	$C_{AA}$ Side	Weight
			ft	ft	°	ft	$ft^2$	$ft^2$	lb
Pirod 5' Side Mount Standoff (1)	A	From Leg	2.500	0.000	0.0000	168.000	No Ice	2.720	50.000
			0.000				1/2" Ice	3.264	65.000
			0.000				1" Ice	3.808	80.000



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Description	Face or Leg	Offset Type	Offsets: Horz Lateral Vert ft ft ft	Azimuth Adjustment °	Placement ft	CAA Front ft <sup>2</sup>	CAA Side ft <sup>2</sup>	Weight lb
Pirod 5' Side Mount Standoff (1)	B	From Leg	2.500 0.000 0.000	0.0000	168.000	No Ice 2.720 1/2" Ice 3.264 1" Ice 3.808	2.720 3.264 3.808	50.000 65.000 80.000
DB636 Omni	A	From Leg	5.000 0.000 0.000	0.0000	176.000	No Ice 2.375 1/2" Ice 3.354 1" Ice 4.350	2.375 3.354 4.350	66.000 83.722 107.653
DB806-XT	B	From Leg	5.000 0.000 0.000	0.0000	174.000	No Ice 1.140 1/2" Ice 1.680 1" Ice 2.220	1.140 1.680 2.220	21.000 29.930 98.394
1' Side Mount Standoff	C	From Leg	0.500 0.000 0.000	0.0000	168.000	No Ice 1.000 1/2" Ice 1.500 1" Ice 2.000	1.000 1.500 2.000	30.000 50.000 70.000
DB874H120-SX	C	From Leg	1.000 0.000 0.000	0.0000	171.500	No Ice 5.600 1/2" Ice 5.990 1" Ice 6.380	2.480 2.780 3.080	14.000 44.500 75.000
BOX 24"X6"X6"	C	From Leg	0.000 0.000 0.000	0.0000	171.500	No Ice 1.400 1/2" Ice 1.600 1" Ice 1.800	1.400 1.600 1.800	15.000 26.700 38.400
*****								
Pirod 12' T-Frame Sector Mount (1) (T-Mobile)	A	From Leg	0.000 0.000 0.000	0.0000	163.000	No Ice 13.600 1/2" Ice 18.400 1" Ice 23.200	9.520 12.880 16.240	465.000 600.000 735.000
APX16DWV-16DWVS (T-Mobile)	A	From Leg	4.000 3.000 0.000	0.0000	163.000	No Ice 6.586 1/2" Ice 6.962 1" Ice 7.344	2.150 2.490 2.837	41.000 74.235 112.654
LNX-6515DS-VTM (T-Mobile)	A	From Leg	4.000 -3.000 0.000	0.0000	163.000	No Ice 11.445 1/2" Ice 12.064 1" Ice 12.689	9.596 11.017 12.290	80.000 166.467 263.188
(2) TMA (T-Mobile)	A	From Leg	4.000 0.000 0.000	0.0000	163.000	No Ice 1.000 1/2" Ice 1.131 1" Ice 1.270	0.267 0.337 0.415	15.000 22.778 32.500
AIR 32 with 6' pipe (T-Mobile)	A	From Leg	4.000 0.000 0.000	0.0000	163.000	No Ice 6.815 1/2" Ice 7.299 1" Ice 7.762	6.137 6.993 7.725	154.000 215.811 284.463
Pirod 12' T-Frame Sector Mount (1) (T-Mobile)	B	From Leg	0.000 0.000 0.000	0.0000	163.000	No Ice 13.600 1/2" Ice 18.400 1" Ice 23.200	9.520 12.880 16.240	465.000 600.000 735.000
APX16DWV-16DWVS (T-Mobile)	B	From Leg	4.000 3.000 0.000	0.0000	163.000	No Ice 6.586 1/2" Ice 6.962 1" Ice 7.344	2.150 2.490 2.837	41.000 74.235 112.654
LNX-6515DS-VTM (T-Mobile)	B	From Leg	4.000 -3.000 0.000	0.0000	163.000	No Ice 11.445 1/2" Ice 12.064 1" Ice 12.689	9.596 11.017 12.290	80.000 166.467 263.188
(2) TMA (T-Mobile)	B	From Leg	4.000 0.000 0.000	0.0000	163.000	No Ice 1.000 1/2" Ice 1.131 1" Ice 1.270	0.267 0.337 0.415	15.000 22.778 32.500
AIR 32 with 6' pipe (T-Mobile)	B	From Leg	4.000 0.000 0.000	0.0000	163.000	No Ice 6.815 1/2" Ice 7.299 1" Ice 7.762	6.137 6.993 7.725	154.000 215.811 284.463
Pirod 12' T-Frame Sector Mount (1) (T-Mobile)	C	From Leg	0.000 0.000 0.000	0.0000	163.000	No Ice 13.600 1/2" Ice 18.400 1" Ice 23.200	9.520 12.880 16.240	465.000 600.000 735.000
APX16DWV-16DWVS (T-Mobile)	C	From Leg	4.000 3.000 0.000	0.0000	163.000	No Ice 6.586 1/2" Ice 6.962 1" Ice 7.344	2.150 2.490 2.837	41.000 74.235 112.654
LNX-6515DS-VTM (T-Mobile)	C	From Leg	4.000 -3.000	0.0000	163.000	No Ice 11.445 1/2" Ice 12.064	9.596 11.017	80.000 166.467

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Description	Face or Leg	Offset Type	Offsets:		Azimuth Adjustment	Placement	C <sub>AA</sub> Front	C <sub>AA</sub> Side	Weight	
			Horz	Vert						
			ft	ft	°	ft	ft <sup>2</sup>	ft <sup>2</sup>	lb	
(2) TMA (T-Mobile)	C	From Leg	0.000		0.0000	163.000	1" Ice	12.689	12.290	263.188
			4.000				No Ice	1.000	0.267	15.000
			0.000				1/2" Ice	1.131	0.337	22.778
			0.000				1" Ice	1.270	0.415	32.500
AIR 32 with 6' pipe (T-Mobile)	C	From Leg	4.000		0.0000	163.000	No Ice	6.815	6.137	154.000
			0.000				1/2" Ice	7.299	6.993	215.811
			0.000				1" Ice	7.762	7.725	284.463
			0.000							
*****										
Pirod 12' PCS T-Frame (1) 104569 (Sprint)	A	From Leg	0.000		0.0000	140.000	No Ice	9.800	6.860	260.000
			0.000				1/2" Ice	14.800	10.360	360.000
			0.000				1" Ice	19.800	13.860	460.000
			0.000							
NNVV-65B-R4 (Sprint)	A	From Leg	3.000		0.0000	140.000	No Ice	12.746	7.650	121.600
			-5.000				1/2" Ice	13.448	8.935	214.840
			0.000				1" Ice	14.118	10.072	316.799
			0.000							
AAHC (Sprint)	A	From Leg	3.000		0.0000	140.000	No Ice	4.203	2.070	103.700
			-2.000				1/2" Ice	4.458	2.262	136.024
			0.000				1" Ice	4.721	2.465	172.103
			0.000							
844G65VTZASX (Sprint)	A	From Leg	3.000		0.0000	140.000	No Ice	5.248	3.796	16.000
			2.000				1/2" Ice	5.576	4.104	54.378
			0.000				1" Ice	5.912	4.419	97.424
			0.000							
844G65VTZASX (Sprint)	A	From Leg	3.000		0.0000	140.000	No Ice	5.248	3.796	16.000
			5.000				1/2" Ice	5.576	4.104	54.378
			0.000				1" Ice	5.912	4.419	97.424
			0.000							
ALU RRH-4X45-1900 (Sprint)	A	From Leg	3.000		0.0000	140.000	No Ice	1.250	2.500	70.000
			0.000				1/2" Ice	1.355	2.709	95.231
			0.000				1" Ice	1.459	2.926	124.333
			0.000							
(2) RRH-2X50-800 (Sprint)	A	From Leg	3.000		0.0000	140.000	No Ice	0.866	1.333	69.000
			0.000				1/2" Ice	0.949	1.481	86.535
			0.000				1" Ice	1.032	1.637	106.693
			0.000							
Pirod 12' PCS T-Frame (1) 104569 (Sprint)	A	From Leg	0.000		0.0000	140.000	No Ice	9.800	6.860	260.000
			0.000				1/2" Ice	14.800	10.360	360.000
			0.000				1" Ice	19.800	13.860	460.000
			0.000							
NNVV-65B-R4 (Sprint)	B	From Leg	3.000		0.0000	140.000	No Ice	12.746	7.650	121.600
			-5.000				1/2" Ice	13.448	8.935	214.840
			0.000				1" Ice	14.118	10.072	316.799
			0.000							
AAHC (Sprint)	B	From Leg	3.000		0.0000	140.000	No Ice	4.203	2.070	103.700
			-2.000				1/2" Ice	4.458	2.262	136.024
			0.000				1" Ice	4.721	2.465	172.103
			0.000							
DB844H90E-XY (Sprint)	B	From Leg	3.000		0.0000	140.000	No Ice	2.867	3.615	10.000
			2.000				1/2" Ice	3.177	3.920	35.375
			0.000				1" Ice	3.487	4.233	64.963
			0.000							
DB844H90E-XY (Sprint)	B	From Leg	3.000		0.0000	140.000	No Ice	2.867	3.615	10.000
			5.000				1/2" Ice	3.177	3.920	35.375
			0.000				1" Ice	3.487	4.233	64.963
			0.000							
ALU RRH-4X45-1900 (Sprint)	B	From Leg	3.000		0.0000	140.000	No Ice	1.250	2.500	70.000
			0.000				1/2" Ice	1.355	2.709	95.231
			0.000				1" Ice	1.459	2.926	124.333
			0.000							
(2) RRH-2X50-800 (Sprint)	B	From Leg	3.000		0.0000	140.000	No Ice	0.866	1.333	69.000
			0.000				1/2" Ice	0.949	1.481	86.535
			0.000				1" Ice	1.032	1.637	106.693
			0.000							
Pirod 12' PCS T-Frame (1) 104569 (Sprint)	A	From Leg	0.000		0.0000	140.000	No Ice	9.800	6.860	260.000
			0.000				1/2" Ice	14.800	10.360	360.000
			0.000				1" Ice	19.800	13.860	460.000
			0.000							
NNVV-65B-R4 (Sprint)	C	From Leg	3.000		0.0000	140.000	No Ice	12.746	7.650	121.600
			-5.000				1/2" Ice	13.448	8.935	214.840
			0.000				1" Ice	14.118	10.072	316.799
			0.000							
AAHC	C	From Leg	3.000		0.0000	140.000	No Ice	4.203	2.070	103.700
			0.000							

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Description	Face or Leg	Offset Type	Offsets: Horz Lateral Vert	Azimuth Adjustment	Placement	C <sub>AA</sub> Front	C <sub>AA</sub> Side	Weight
			ft ft ft	°	ft	ft <sup>2</sup>	ft <sup>2</sup>	lb
(Sprint)			-2.000		1/2" Ice	4.458	2.262	136.024
			0.000		1" Ice	4.721	2.465	172.103
844G65VTZASX (Sprint)	C	From Leg	3.000	0.0000	140.000	No Ice	5.248	3.796
			2.000		1/2" Ice	5.576	4.104	54.378
			0.000		1" Ice	5.912	4.419	97.424
844G65VTZASX (Sprint)	C	From Leg	3.000	0.0000	140.000	No Ice	5.248	3.796
			5.000		1/2" Ice	5.576	4.104	54.378
			0.000		1" Ice	5.912	4.419	97.424
ALU RRH-4X45-1900 (Sprint)	C	From Leg	3.000	0.0000	140.000	No Ice	1.250	2.500
			0.000		1/2" Ice	1.355	2.709	95.231
			0.000		1" Ice	1.459	2.926	124.333
(2) RRH-2X50-800 (Sprint)	C	From Leg	3.000	0.0000	140.000	No Ice	0.866	1.333
			0.000		1/2" Ice	0.949	1.481	86.535
			0.000		1" Ice	1.032	1.637	106.693
Junction Box (Sprint)	A	From Leg	3.000	0.0000	140.000	No Ice	1.200	0.600
			0.000		1/2" Ice	1.337	0.704	25.338
			0.000		1" Ice	1.481	0.815	37.815
*****								
14-ft T-Frame Sector Mount (AT&T)	A	From Leg	0.000	0.0000	120.000	No Ice	16.300	11.410
			0.000		1/2" Ice	20.600	14.420	720.000
			0.000		1" Ice	24.900	17.430	930.000
Powerwave 7770 w/5ft mount pipe (AT&T)	A	From Leg	4.000	0.0000	120.000	No Ice	5.607	4.116
			-6.000		1/2" Ice	5.992	4.769	91.165
			0.000		1" Ice	6.384	5.432	143.354
CCI OPA-65R-LCUU-H6 Panel Antenna with 8ft Pipe (AT&T)	A	From Leg	4.000	0.0000	120.000	No Ice	9.718	7.149
			6.000		1/2" Ice	10.289	8.333	176.873
			0.000		1" Ice	10.827	9.231	260.862
Quintel QS66512-2 w/m pipe (AT&T)	A	From Leg	4.000	0.0000	120.000	No Ice	8.846	8.938
			0.000		1/2" Ice	9.612	10.332	224.754
			0.000		1" Ice	10.390	11.733	314.202
(2) LGP21401 (AT&T)	A	From Leg	4.000	0.0000	120.000	No Ice	1.656	0.445
			0.000		1/2" Ice	1.816	0.542	45.888
			0.000		1" Ice	1.984	0.647	59.037
DC6-48-06-18-8F (AT&T)	A	From Leg	4.000	0.0000	120.000	No Ice	1.201	1.201
			0.000		1/2" Ice	1.877	1.877	53.813
			0.000		1" Ice	2.088	2.088	78.477
RRUS-11 (AT&T)	A	From Leg	4.000	0.0000	120.000	No Ice	2.522	1.020
			0.000		1/2" Ice	2.719	1.158	74.320
			0.000		1" Ice	2.923	1.304	96.557
RRUS 32 (AT&T)	A	From Leg	4.000	0.0000	120.000	No Ice	3.314	2.424
			0.000		1/2" Ice	3.558	2.638	119.928
			0.000		1" Ice	3.809	2.860	151.466
TPX-070821 (AT&T)	A	From Leg	4.000	0.0000	120.000	No Ice	0.120	0.120
			0.000		1/2" Ice	0.170	0.170	10.000
			0.000		1" Ice	0.220	0.220	10.000
14-ft T-Frame Sector Mount (AT&T)	B	From Leg	0.000	0.0000	120.000	No Ice	16.300	11.410
			0.000		1/2" Ice	20.600	14.420	720.000
			0.000		1" Ice	24.900	17.430	930.000
Powerwave 7770 w/5ft mount pipe (AT&T)	B	From Leg	4.000	0.0000	120.000	No Ice	5.607	4.116
			-6.000		1/2" Ice	5.992	4.769	91.165
			0.000		1" Ice	6.384	5.432	143.354
CCI OPA-65R-LCUU-H6 Panel Antenna with 8ft Pipe (AT&T)	B	From Leg	4.000	0.0000	120.000	No Ice	9.718	7.149
			6.000		1/2" Ice	10.289	8.333	176.873
			0.000		1" Ice	10.827	9.231	260.862
Quintel QS66512-2 w/m pipe (AT&T)	B	From Leg	4.000	0.0000	120.000	No Ice	8.846	8.938
			0.000		1/2" Ice	9.612	10.332	224.754
			0.000		1" Ice	10.390	11.733	314.202

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Description	Face or Leg	Offset Type	Offsets:		Azimuth Adjustment	Placement	C <sub>AA</sub> Front	C <sub>AA</sub> Side	Weight
			Horz	Vert					
			ft	ft	°	ft	ft <sup>2</sup>	ft <sup>2</sup>	lb
(2) LGP21401 (AT&T)	B	From Leg	4.000	0.000	0.0000	120.000	No Ice 1.656	0.445	35.000
			0.000				1/2" Ice 1.816	0.542	45.888
			0.000				1" Ice 1.984	0.647	59.037
DC6-48-06-18-8F (AT&T)	B	From Leg	4.000	0.000	0.0000	120.000	No Ice 1.201	1.201	32.000
			0.000				1/2" Ice 1.877	1.877	53.813
			0.000				1" Ice 2.088	2.088	78.477
RRUS-11 (AT&T)	B	From Leg	4.000	0.000	0.0000	120.000	No Ice 2.522	1.020	55.000
			0.000				1/2" Ice 2.719	1.158	74.320
			0.000				1" Ice 2.923	1.304	96.557
RRUS 32 (AT&T)	B	From Leg	4.000	0.000	0.0000	120.000	No Ice 3.314	2.424	92.000
			0.000				1/2" Ice 3.558	2.638	119.928
			0.000				1" Ice 3.809	2.860	151.466
TPX-070821 (AT&T)	B	From Leg	4.000	0.000	0.0000	120.000	No Ice 0.120	0.120	10.000
			0.000				1/2" Ice 0.170	0.170	10.000
			0.000				1" Ice 0.220	0.220	10.000
14-ft T-Frame Sector Mount (AT&T)	C	From Leg	0.000	0.000	0.0000	120.000	No Ice 16.300	11.410	510.000
			0.000				1/2" Ice 20.600	14.420	720.000
			0.000				1" Ice 24.900	17.430	930.000
Powerwave 7770 w/5ft mount pipe (AT&T)	C	From Leg	4.000	0.000	0.0000	120.000	No Ice 5.607	4.116	45.000
			-6.000				1/2" Ice 5.992	4.769	91.165
			0.000				1" Ice 6.384	5.432	143.354
CCI OPA-65R-LCUU-H6 Panel Antenna with 8ft Pipe (AT&T)	C	From Leg	4.000	0.000	0.0000	120.000	No Ice 9.718	7.149	101.000
			6.000				1/2" Ice 10.289	8.333	176.873
			0.000				1" Ice 10.827	9.231	260.862
Quintel QS66512-2 w/m pipe (AT&T)	C	From Leg	4.000	0.000	0.0000	120.000	No Ice 8.846	8.938	144.000
			0.000				1/2" Ice 9.612	10.332	224.754
			0.000				1" Ice 10.390	11.733	314.202
(2) LGP21401 (AT&T)	C	From Leg	4.000	0.000	0.0000	120.000	No Ice 1.656	0.445	35.000
			0.000				1/2" Ice 1.816	0.542	45.888
			0.000				1" Ice 1.984	0.647	59.037
RRUS-11 (AT&T)	C	From Leg	4.000	0.000	0.0000	120.000	No Ice 2.522	1.020	55.000
			0.000				1/2" Ice 2.719	1.158	74.320
			0.000				1" Ice 2.923	1.304	96.557
RRUS 32 (AT&T)	C	From Leg	4.000	0.000	0.0000	120.000	No Ice 3.314	2.424	92.000
			0.000				1/2" Ice 3.558	2.638	119.928
			0.000				1" Ice 3.809	2.860	151.466
TPX-070821 (AT&T)	C	From Leg	4.000	0.000	0.0000	120.000	No Ice 0.120	0.120	10.000
			0.000				1/2" Ice 0.170	0.170	10.000
			0.000				1" Ice 0.220	0.220	10.000
*****									
1' Side Mount Standoff (Other)	A	From Leg	0.000	0.000	0.0000	108.400	No Ice 1.000	1.000	30.000
			0.000				1/2" Ice 1.500	1.500	50.000
			0.000				1" Ice 2.000	2.000	70.000
1' Side Mount Standoff (Other)	B	From Leg	0.000	0.000	0.0000	108.400	No Ice 1.000	1.000	30.000
			0.000				1/2" Ice 1.500	1.500	50.000
			0.000				1" Ice 2.000	2.000	70.000
1' Side Mount Standoff (Other)	C	From Leg	0.000	0.000	0.0000	108.400	No Ice 1.000	1.000	30.000
			0.000				1/2" Ice 1.500	1.500	50.000
			0.000				1" Ice 2.000	2.000	70.000
Panel Antenna 6'x6"x3" (Other)	A	From Leg	1.000	0.000	0.0000	108.000	No Ice 4.700	2.950	40.000
			0.000				1/2" Ice 5.150	3.380	64.300
			0.000				1" Ice 5.600	3.810	88.600
Panel Antenna 6'x6"x3" (Other)	B	From Leg	1.000	0.000	0.0000	108.000	No Ice 4.700	2.950	40.000
			0.000				1/2" Ice 5.150	3.380	64.300
			0.000				1" Ice 5.600	3.810	88.600
Panel Antenna 6'x6"x3" (Other)	C	From Leg	1.000	0.000	0.0000	108.000	No Ice 4.700	2.950	40.000
			0.000				1/2" Ice 5.150	3.380	64.300

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Description	Face or Leg	Offset Type	Offsets:		Azimuth Adjustment	Placement	C <sub>AA</sub> Front	C <sub>AA</sub> Side	Weight	
			Horz Lateral	Vert						
			ft	ft	°	ft	ft <sup>2</sup>	ft <sup>2</sup>	lb	
GPS (Other)	C	From Leg	0.000				1" Ice	5.600	3.810	88.600
			0.500		0.0000	50.000	No Ice	0.210	0.210	5.000
			0.000				1/2" Ice	0.320	0.320	7.500
			0.000				1" Ice	0.430	0.430	10.000

### Dishes

Description	Face or Leg	Dish Type	Offset Type	Offsets:		Azimuth Adjustment	3 dB Beam Width	Elevation	Outside Diameter	Aperture Area	Weight	
				Horz Lateral	Vert							
				ft	ft	°	°	ft	ft	ft <sup>2</sup>	lb	
SC2	B	Paraboloid w/Radome	From Leg	3.000		0.0000		167.000	2.000	No Ice	3.140	30.000
				0.000						1/2" Ice	3.410	40.000
				0.000						1" Ice	3.680	50.000
VHLP2-18	A	Paraboloid w/Shroud (HP)	From Leg	6.000		-45.0000		146.000	2.000	No Ice	3.140	20.000
				0.000						1/2" Ice	3.410	40.000
				0.000						1" Ice	3.680	60.000
VHLP2-18	B	Paraboloid w/Shroud (HP)	From Leg	6.000		45.0000		146.000	2.000	No Ice	3.140	20.000
				0.000						1/2" Ice	3.410	40.000
				0.000						1" Ice	3.680	60.000
VHLP800-11	C	Paraboloid w/Shroud (HP)	From Leg	6.000		45.0000		146.000	2.500	No Ice	6.000	20.000
				0.000						1/2" Ice	6.400	56.000
				0.000						1" Ice	7.470	93.000

### Load Combinations

Comb. No.	Description
1	Dead Only
2	1.2 Dead+1.6 Wind 0 deg - No Ice+1.0 Guy
3	1.2 Dead+1.6 Wind 30 deg - No Ice+1.0 Guy
4	1.2 Dead+1.6 Wind 60 deg - No Ice+1.0 Guy
5	1.2 Dead+1.6 Wind 90 deg - No Ice+1.0 Guy
6	1.2 Dead+1.6 Wind 120 deg - No Ice+1.0 Guy
7	1.2 Dead+1.6 Wind 150 deg - No Ice+1.0 Guy
8	1.2 Dead+1.6 Wind 180 deg - No Ice+1.0 Guy
9	1.2 Dead+1.6 Wind 210 deg - No Ice+1.0 Guy
10	1.2 Dead+1.6 Wind 240 deg - No Ice+1.0 Guy
11	1.2 Dead+1.6 Wind 270 deg - No Ice+1.0 Guy
12	1.2 Dead+1.6 Wind 300 deg - No Ice+1.0 Guy
13	1.2 Dead+1.6 Wind 330 deg - No Ice+1.0 Guy
14	1.2 Dead+1.0 Ice+1.0 Temp+Guy
15	1.2 Dead+1.0 Wind 0 deg+1.0 Ice+1.0 Temp+1.0 Guy
16	1.2 Dead+1.0 Wind 30 deg+1.0 Ice+1.0 Temp+1.0 Guy
17	1.2 Dead+1.0 Wind 60 deg+1.0 Ice+1.0 Temp+1.0 Guy
18	1.2 Dead+1.0 Wind 90 deg+1.0 Ice+1.0 Temp+1.0 Guy
19	1.2 Dead+1.0 Wind 120 deg+1.0 Ice+1.0 Temp+1.0 Guy

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Comb. No.	Description
20	1.2 Dead+1.0 Wind 150 deg+1.0 Ice+1.0 Temp+1.0 Guy
21	1.2 Dead+1.0 Wind 180 deg+1.0 Ice+1.0 Temp+1.0 Guy
22	1.2 Dead+1.0 Wind 210 deg+1.0 Ice+1.0 Temp+1.0 Guy
23	1.2 Dead+1.0 Wind 240 deg+1.0 Ice+1.0 Temp+1.0 Guy
24	1.2 Dead+1.0 Wind 270 deg+1.0 Ice+1.0 Temp+1.0 Guy
25	1.2 Dead+1.0 Wind 300 deg+1.0 Ice+1.0 Temp+1.0 Guy
26	1.2 Dead+1.0 Wind 330 deg+1.0 Ice+1.0 Temp+1.0 Guy
27	Dead+Wind 0 deg - Service+Guy
28	Dead+Wind 30 deg - Service+Guy
29	Dead+Wind 60 deg - Service+Guy
30	Dead+Wind 90 deg - Service+Guy
31	Dead+Wind 120 deg - Service+Guy
32	Dead+Wind 150 deg - Service+Guy
33	Dead+Wind 180 deg - Service+Guy
34	Dead+Wind 210 deg - Service+Guy
35	Dead+Wind 240 deg - Service+Guy
36	Dead+Wind 270 deg - Service+Guy
37	Dead+Wind 300 deg - Service+Guy
38	Dead+Wind 330 deg - Service+Guy

### Maximum Member Forces

Section No.	Elevation ft	Component Type	Condition	Gov. Load Comb.	Axial lb	Major Axis Moment kip-ft	Minor Axis Moment kip-ft	
T1	170 - 155	Leg	Max Tension	4	18472.733	0.422	-0.244	
			Max. Compression	10	-20555.528	0.114	-0.065	
			Max. Mx	23	-69.076	-0.817	0.475	
			Max. My	15	-67.397	0.000	-0.942	
			Max. Vy	23	-3491.399	0.055	-0.031	
			Max. Vx	15	-4027.239	0.001	0.065	
		Diagonal	Max Tension	13	2733.228	-0.007	0.001	
			Max. Compression	13	-2768.072	0.000	0.000	
			Max. Mx	18	316.005	-0.013	-0.000	
			Max. My	13	-2395.521	0.003	0.004	
			Max. Vy	18	17.015	-0.013	-0.000	
			Max. Vx	13	1.936	0.003	0.004	
		Top Girt	Max Tension	23	2086.920	0.000	0.000	
			Max. Compression	4	-23.258	0.000	0.000	
			Max. Mx	23	2086.914	0.019	0.000	
			Max. My	24	2080.972	0.000	-0.000	
			Max. Vy	23	21.869	0.000	0.000	
			Max. Vx	24	0.000	0.000	0.000	
		Bottom Girt	Max Tension	4	803.175	0.000	0.000	
			Max. Compression	10	-744.285	0.000	0.000	
			Max. Mx	23	-19.355	0.019	0.000	
			Max. My	24	165.290	0.000	-0.000	
			Max. Vy	23	21.869	0.000	0.000	
			Max. Vx	24	0.000	0.000	0.000	
Pole Antenna	Max Tension	10	5.322	1.087	-0.626			
	Max. Compression	14	-17.970	-0.000	0.000			
	Max. Mx	5	2.335	-1.255	0.004			
	Max. My	8	0.032	-0.003	-1.255			
	Max. Vy	5	627.393	-1.255	0.004			
	Max. Vx	8	627.393	-0.003	-1.255			
	Max. Torque	12			0.000			
	Max Tension	4	21351.702	-0.659	0.381			
	Max. Compression	10	-31450.838	0.128	-0.009			
	Max. Mx	11	15637.620	0.688	0.139			
	T2	155 - 140	Leg	Max Tension	4	21351.702	-0.659	0.381
				Max. Compression	10	-31450.838	0.128	-0.009
Max. Mx				11	15637.620	0.688	0.139	

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Section No.	Elevation ft	Component Type	Condition	Gov. Load Comb.	Axial lb	Major Axis Moment kip-ft	Minor Axis Moment kip-ft
			Max. My	8	20534.434	-0.018	-0.751
			Max. Vy	11	-2251.205	0.688	0.139
			Max. Vx	8	2468.592	-0.018	-0.751
		Diagonal	Max Tension	13	3196.041	0.000	0.000
			Max. Compression	13	-3370.706	0.011	0.004
			Max. Mx	23	-296.416	-0.019	0.001
			Max. My	2	-3191.121	0.010	0.005
			Max. Vy	23	20.086	-0.019	0.001
			Max. Vx	2	-2.220	0.010	0.005
		Secondary Horizontal	Max Tension	6	1360.226	0.000	0.000
			Max. Compression	8	-1091.279	0.000	0.000
			Max. Mx	22	-291.922	-0.008	0.001
			Max. My	10	6.492	-0.003	-0.005
			Max. Vy	22	14.178	-0.008	0.001
			Max. Vx	10	-2.718	-0.003	-0.005
		Top Girt	Max Tension	10	340.295	0.000	0.000
			Max. Compression	8	-321.644	0.000	0.000
			Max. Mx	23	219.467	0.019	0.000
			Max. My	24	141.466	0.000	-0.000
			Max. Vy	23	-21.824	0.000	0.000
			Max. Vx	24	-0.000	0.000	0.000
		Bottom Girt	Max Tension	19	387.067	0.000	0.000
			Max. Compression	1	0.000	0.000	0.000
			Max. Mx	23	378.964	0.019	0.000
			Max. My	24	353.450	0.000	-0.000
			Max. Vy	23	-21.824	0.000	0.000
			Max. Vx	24	-0.000	0.000	0.000
		Guy A	Bottom Tension	9	8601.909		
			Top Tension	9	8642.755		
			Top Cable Vert	9	7245.380		
			Top Cable Norm	9	4711.854		
			Top Cable Tan	9	10.987		
			Bot Cable Vert	9	-7102.177		
			Bot Cable Norm	9	4851.146		
			Bot Cable Tan	9	135.257		
		Guy B	Bottom Tension	13	8315.744		
			Top Tension	13	8354.166		
			Top Cable Vert	13	6863.879		
			Top Cable Norm	13	4762.266		
			Top Cable Tan	13	7.914		
			Bot Cable Vert	13	-6725.369		
			Bot Cable Norm	13	4889.288		
			Bot Cable Tan	13	126.000		
		Guy C	Bottom Tension	3	8172.134		
			Top Tension	3	8209.048		
			Top Cable Vert	3	6630.710		
			Top Cable Norm	3	4839.635		
			Top Cable Tan	3	9.636		
			Bot Cable Vert	3	-6494.690		
			Bot Cable Norm	3	4958.568		
			Bot Cable Tan	3	124.024		
		Top Guy Pull-Off	Max Tension	4	4263.238	0.000	0.000
			Max. Compression	2	-3863.982	0.000	0.000
			Max. Mx	23	-446.504	-0.025	0.000
			Max. My	24	483.751	0.000	0.000
			Max. Vy	23	-28.951	0.000	0.000
			Max. Vx	24	0.000	0.000	0.000
		Torque Arm Top	Max Tension	3	5222.407	0.000	0.000
			Max. Compression	13	-2484.054	0.000	0.000
			Max. Mx	7	-32.513	-25.242	0.000

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Section No.	Elevation ft	Component Type	Condition	Gov. Load Comb.	Axial lb	Major Axis Moment kip-ft	Minor Axis Moment kip-ft	
T3	140 - 120	Leg	Max. My	24	794.683	-16.459	0.000	
			Max. Vy	7	7211.390	-25.242	0.000	
			Max. Vx	24	0.001	-16.459	0.000	
			Max Tension	4	28594.490	-1.136	-0.001	
			Max. Compression	2	-45935.533	-1.789	-0.065	
			Max. Mx	2	-45928.645	1.870	0.005	
			Max. My	9	-8091.722	-0.800	3.993	
			Max. Vy	2	3009.645	1.870	0.005	
			Max. Vx	9	-3776.025	-0.800	3.993	
			Max Tension	12	3596.179	0.008	0.006	
			Max. Compression	12	-4953.349	-0.007	-0.030	
			Diagonal	Max. Mx	3	426.673	-0.076	-0.019
		Max. My		7	-4403.210	0.027	-0.033	
		Max. Vy		3	-36.082	0.000	0.000	
		Max. Vx		7	15.906	0.027	-0.033	
		Max Tension		8	4720.642	0.000	0.000	
		Secondary Horizontal		Max. Compression	10	-3215.898	0.000	0.000
				Max. Mx	6	413.431	-0.058	-0.007
				Max. My	7	-684.722	-0.050	-0.010
				Max. Vy	6	-33.674	0.000	0.000
				Max. Vx	7	5.770	0.000	0.000
				Max Tension	2	527.896	0.000	0.000
				Max. Compression	8	-181.422	0.000	0.000
			Max. Mx	23	514.937	-0.021	0.000	
			Max. My	24	429.476	0.000	0.000	
			Max. Vy	23	25.083	0.000	0.000	
			Max. Vx	24	0.000	0.000	0.000	
			Top Girt	Max Tension	10	989.204	0.000	0.000
		Max. Compression		8	-157.747	0.000	0.000	
		Max. Mx		23	832.773	-0.023	0.000	
		Max. My		24	698.880	0.000	0.000	
		Max. Vy		23	26.976	0.000	0.000	
		Max. Vx		24	0.000	0.000	0.000	
		Bottom Girt		Bottom Tension	9	15532.499		
				Top Tension	9	15601.527		
				Top Cable Vert	9	12490.555		
				Top Cable Norm	9	9348.340		
				Top Cable Tan	9	47.025		
				Bot Cable Vert	9	-12289.467		
			Bot Cable Norm	9	9496.880			
			Bot Cable Tan	9	191.858			
			Guy A	Bottom Tension	13	14846.660		
Top Tension	13			14910.880				
Top Cable Vert	13			11609.886				
Top Cable Norm	13			9356.462				
Top Cable Tan	13	38.834						
Bot Cable Vert	13	-11416.910						
Bot Cable Norm	13	9489.287						
Bot Cable Tan	13	175.906						
Guy B	Bottom Tension	3		14481.375				
	Top Tension	3		14542.645				
	Top Cable Vert	3		11063.765				
	Top Cable Norm	3		9438.219				
	Top Cable Tan	3	40.275					
	Bot Cable Vert	3	-10875.313					
	Bot Cable Norm	3	9560.750					
	Bot Cable Tan	3	172.723					
	Guy C	Max Tension	13	10656.955	0.000	0.000		
		Max. Compression	7	-5394.910	0.000	0.000		
		Max. Mx	7	-241.214	-42.335	0.000		



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Section No.	Elevation ft	Component Type	Condition	Gov. Load Comb.	Axial lb	Major Axis Moment kip-ft	Minor Axis Moment kip-ft
T4	120 - 117.5	Leg	Max. My	24	809.218	-19.214	0.000
			Max. Vy	7	12094.763	-42.335	0.000
			Max. Vx	24	0.000	-19.214	0.000
			Max Tension	1	0.000	0.000	0.000
			Max. Compression	24	-41791.949	-0.023	-0.009
			Max. Mx	11	-24780.006	-0.177	-0.061
		Diagonal	Max. My	21	-40568.538	-0.001	0.185
			Max. Vy	4	-1073.647	-0.114	0.051
			Max. Vx	8	-1089.390	0.007	-0.093
			Max Tension	12	413.868	0.013	0.001
			Max. Compression	5	-723.374	-0.002	-0.001
			Max. Mx	19	-354.651	0.027	-0.000
		Top Girt	Max. My	6	-88.357	0.018	-0.001
			Max. Vy	19	23.965	0.000	0.000
			Max. Vx	6	-0.474	0.018	-0.001
			Max Tension	19	775.484	0.000	0.000
Max. Compression	1		0.000	0.000	0.000		
Max. Mx	23		756.922	0.019	0.000		
T5	117.5 - 115	Leg	Max. My	24	671.903	0.000	-0.000
			Max. Vy	23	-21.698	0.000	0.000
			Max. Vx	24	-0.000	0.000	0.000
			Max Tension	1	0.000	0.000	0.000
		Diagonal	Max. Compression	24	-42611.011	0.007	-0.147
			Max. Mx	25	-38679.230	0.134	0.080
			Max. My	21	-41482.577	0.004	-0.153
			Max. Vy	24	88.945	0.133	0.081
			Max. Vx	21	-102.767	0.004	-0.153
			Max Tension	5	382.723	0.000	0.000
			Max. Compression	5	-223.516	0.000	0.000
			Max. Mx	19	229.097	-0.032	-0.000
T6	115 - 112.5	Leg	Max. My	12	-209.435	-0.010	0.001
			Max. Vy	19	26.055	-0.032	-0.000
			Max. Vx	12	-0.368	0.000	0.000
		Diagonal	Max Tension	1	0.000	0.000	0.000
			Max. Compression	24	-42811.826	0.002	0.092
			Max. Mx	20	-41830.671	0.078	-0.044
T7	112.5 - 110	Leg	Max. My	24	-42811.826	0.002	0.092
			Max. Vy	24	-44.636	0.023	0.016
			Max. Vx	21	50.742	0.002	-0.023
			Max Tension	6	167.822	0.016	-0.000
			Max. Compression	6	-322.073	-0.011	-0.001
		Diagonal	Max. Mx	19	-129.343	-0.022	-0.000
			Max. My	12	-126.005	-0.006	0.001
			Max. Vy	24	21.186	-0.022	0.000
			Max. Vx	12	-0.382	0.000	0.000
			Max Tension	1	0.000	0.000	0.000
T8	110 - 107.5	Leg	Max. Compression	24	-43368.601	0.003	-0.017
			Max. Mx	21	-40451.979	0.127	0.071
			Max. My	23	-43196.213	0.001	-0.148
			Max. Vy	24	49.773	-0.015	0.015
		Diagonal	Max. Vx	15	56.270	0.002	-0.019
			Max Tension	6	434.426	0.000	0.000
			Max. Compression	6	-402.627	0.000	0.000
			Max. Mx	24	148.351	-0.031	0.000
			Max. My	12	-242.716	-0.012	0.001
			Max. Vy	24	25.304	-0.031	0.000
T8	110 - 107.5	Leg	Max. Vx	12	-0.426	0.000	0.000
			Max Tension	1	0.000	0.000	0.000
			Max. Compression	24	-43473.280	0.002	-0.582
			Max. Mx	15	-42388.644	-0.497	0.288
			Max. My	23	-43252.291	-0.001	-0.583

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Section No.	Elevation ft	Component Type	Condition	Gov. Load Comb.	Axial lb	Major Axis Moment kip-ft	Minor Axis Moment kip-ft		
T9	107.5 - 105	Diagonal	Max. Vy	19	748.428	-0.494	0.300		
			Max. Vx	23	872.201	-0.001	-0.583		
			Max Tension	7	435.861	0.014	0.003		
			Max. Compression	6	-995.264	0.000	0.000		
			Max. Mx	18	-322.379	-0.025	0.005		
			Max. My	19	-472.644	-0.024	-0.005		
			Max. Vy	24	22.655	-0.025	-0.005		
			Max. Vx	19	2.414	0.000	0.000		
			Max Tension	20	787.100	0.000	0.000		
			Secondary Horizontal	Max. Compression	24	-752.979	0.001	-0.007	
				Max. Mx	25	-741.419	-0.006	-0.007	
				Max. My	24	752.979	0.001	-0.007	
		Max. Vy		15	-15.252	0.002	-0.007		
		Max. Vx		24	-4.290	0.000	0.000		
		Max Tension		1	0.000	0.000	0.000		
		Leg		Max. Compression	24	-43617.104	0.002	-0.582	
				Max. Mx	15	-42331.626	-0.497	0.288	
				Max. My	23	-43208.878	-0.001	-0.583	
				Max. Vy	20	-781.606	-0.497	0.297	
				Max. Vx	24	-912.580	0.002	-0.582	
				Diagonal	Max Tension	7	578.479	0.011	0.002
			Max. Compression		7	-1465.894	0.000	0.000	
			Max. Mx		24	-595.801	-0.028	-0.004	
			Max. My		19	-773.043	-0.027	-0.005	
Max. Vy	24		24.102		-0.028	-0.004			
Max. Vx	19		2.176		0.000	0.000			
Secondary Horizontal	Max Tension		19	1000.747	0.016	-0.006			
	Max. Compression	24	-755.470	0.016	-0.006				
	Max. Mx	18	-721.915	0.017	-0.006				
	Max. My	24	986.231	0.016	-0.007				
	Max. Vy	18	-24.212	0.017	-0.006				
	Max. Vx	24	-3.828	0.000	0.000				
T10	105 - 102.5	Leg	Max Tension	1	0.000	0.000	0.000		
			Max. Compression	24	-44448.169	-0.000	0.625		
			Max. Mx	21	-44095.440	-0.612	0.352		
			Max. My	24	-44418.072	0.007	-0.708		
			Max. Vy	21	919.680	-0.612	0.352		
			Max. Vx	24	1066.461	-0.000	0.625		
			Diagonal	Max Tension	7	1003.315	0.015	0.002	
				Max. Compression	7	-1504.216	0.000	0.000	
				Max. Mx	25	-189.527	-0.022	-0.004	
				Max. My	19	-470.352	-0.021	-0.005	
				Max. Vy	25	21.313	-0.022	-0.004	
				Max. Vx	19	2.399	0.000	0.000	
		Secondary Horizontal	Max Tension	25	1111.355	-0.015	-0.007		
			Max. Compression	24	-769.865	-0.016	-0.007		
			Max. Mx	23	-752.042	-0.017	-0.007		
			Max. My	25	1111.355	-0.015	-0.007		
			Max. Vy	23	23.712	0.000	0.000		
			Max. Vx	25	4.358	0.000	0.000		
		T11	102.5 - 100	Leg	Max Tension	1	0.000	0.000	0.000
					Max. Compression	21	-45921.693	0.034	-0.026
					Max. Mx	21	-44261.491	-0.612	0.352
					Max. My	24	-44353.087	0.007	-0.708
					Max. Vy	10	-1672.346	0.063	-0.040
					Max. Vx	2	-1921.866	0.001	0.072
Diagonal	Max Tension			7	1165.425	0.004	0.001		
	Max. Compression			7	-2337.879	0.000	0.000		

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Section No.	Elevation ft	Component Type	Condition	Gov. Load Comb.	Axial lb	Major Axis Moment kip-ft	Minor Axis Moment kip-ft	
T12	100 - 80	Secondary Horizontal	Max. Mx	18	-763.363	-0.037	0.003	
			Max. My	19	-1131.412	-0.000	-0.004	
			Max. Vy	21	28.763	-0.037	-0.003	
			Max. Vx	19	-1.825	0.000	0.000	
			Max Tension	22	921.441	0.000	0.000	
			Bottom Girt	Max. Compression	24	-768.218	0.061	-0.005
				Max. Mx	19	-749.913	0.062	-0.005
				Max. My	21	840.620	0.061	-0.005
				Max. Vy	19	-50.851	0.062	-0.005
				Max. Vx	21	-3.003	0.000	0.000
				Max Tension	7	351.485	0.000	0.000
				Max. Compression	10	-96.606	0.000	0.000
		Max. Mx		17	312.481	0.018	0.000	
		Max. My		24	256.381	0.000	-0.000	
		Max. Vy		17	-21.576	0.000	0.000	
		Max. Vx		24	0.000	0.000	0.000	
		Max Tension		1	0.000	0.000	0.000	
		Diagonal	Max. Compression	21	-54348.960	0.055	-0.033	
			Max. Mx	10	-32654.551	0.481	-0.307	
			Max. My	2	-32333.606	0.009	0.553	
			Max. Vy	10	-1674.038	0.481	-0.307	
			Max. Vx	2	-1923.677	0.009	0.553	
			Max Tension	7	2074.900	0.006	-0.001	
			Max. Compression	7	-2347.027	0.000	0.000	
			Max. Mx	22	-579.087	-0.031	-0.000	
			Max. My	11	-2103.385	-0.006	0.002	
			Max. Vy	22	25.529	-0.031	-0.000	
			Max. Vx	11	-1.038	-0.006	0.002	
			Max Tension	19	811.345	0.000	0.000	
		Top Girt	Max. Compression	1	0.000	0.000	0.000	
			Max. Mx	17	720.122	0.018	0.000	
			Max. My	24	738.479	0.000	-0.000	
			Max. Vy	17	21.466	0.000	0.000	
			Max. Vx	24	0.000	0.000	0.000	
			Max Tension	19	904.954	0.000	0.000	
			Max. Compression	1	0.000	0.000	0.000	
			Max. Mx	21	876.043	0.018	0.000	
			Max. My	24	870.888	0.000	-0.000	
			Max. Vy	21	-21.466	0.000	0.000	
			Max. Vx	24	0.000	0.000	0.000	
			Max Tension	10	923.024	0.000	0.000	
		Mid Girt	Max. Compression	1	0.000	0.000	0.000	
Max. Mx	21		512.772	0.018	0.000			
Max. My	24		578.215	0.000	-0.000			
Max. Vy	21		-21.466	0.000	0.000			
Max. Vx	24		0.000	0.000	0.000			
Guy A	Bottom Tension		7	15102.243				
	Top Tension		7	15150.643				
	Top Cable Vert		7	10290.492				
	Top Cable Norm		7	11119.643				
	Top Cable Tan		7	36.346				
	Bot Cable Vert		7	-10135.691				
	Bot Cable Norm		7	11195.015				
	Bot Cable Tan	7	130.958					
	Guy B	Bottom Tension	13	14362.985				
		Top Tension	13	14406.412				
		Top Cable Vert	13	9199.201				
		Top Cable Norm	13	11086.856				
Top Cable Tan		13	32.297					
Bot Cable Vert		13	-9054.051					

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Section No.	Elevation ft	Component Type	Condition	Gov. Load Comb.	Axial lb	Major Axis Moment kip-ft	Minor Axis Moment kip-ft		
T13	80 - 60	Guy C	Bot Cable Norm	13	11149.209				
			Bot Cable Tan	13	120.969				
			Bottom Tension	3	13883.180				
			Top Tension	3	13923.599				
			Top Cable Vert	3	8459.599				
			Top Cable Norm	3	11058.966				
			Top Cable Tan	3	32.480				
			Bot Cable Vert	3	-8320.243				
			Bot Cable Norm	3	11113.163				
			Bot Cable Tan	3	117.700				
			Top Guy Pull-Off	Max Tension	10	4905.316		0.000	0.000
				Max. Compression	1	0.000		0.000	0.000
		Max. Mx		21	2725.055		0.039	0.000	
		Max. My		6	2912.485		0.000	0.000	
		Max. Vy		21	-45.310		0.000	0.000	
		Max. Vx		6	-0.000		0.000	0.000	
		Leg		Max Tension	1	0.000		0.000	0.000
				Max. Compression	23	-58939.391		0.071	-0.000
				Max. Mx	23	-56867.041		-0.959	-0.000
				Max. My	11	-26950.978		-0.046	0.117
			Max. Vy	23	1460.006		0.817	-0.000	
			Max. Vx	11	470.046		0.031	-0.001	
			Diagonal	Max Tension	12	459.052		0.000	0.000
				Max. Compression	7	-1769.213		0.000	0.000
				Max. Mx	23	-1147.575		-0.030	-0.002
				Max. My	19	-643.698		-0.017	-0.003
		Max. Vy		23	24.671		-0.030	-0.002	
		Max. Vx		19	1.647		0.000	0.000	
		Secondary Horizontal	Max Tension	22	1488.318		-0.018	-0.005	
			Max. Compression	21	-988.142		0.000	0.000	
			Max. Mx	23	-976.012		0.046	-0.003	
			Max. My	21	-983.630		-0.018	-0.005	
			Max. Vy	23	-40.809		0.046	-0.003	
			Max. Vx	21	2.936		0.000	0.000	
			Top Girt	Max Tension	21	335.611		0.000	0.000
				Max. Compression	1	0.000		0.000	0.000
				Max. Mx	21	335.611		0.018	0.000
				Max. My	24	305.474		0.000	-0.000
		Max. Vy		21	21.171		0.000	0.000	
		Max. Vx		24	-0.000		0.000	0.000	
		Bottom Girt	Max Tension	17	377.799		0.000	0.000	
			Max. Compression	1	0.000		0.000	0.000	
Max. Mx	21		377.464		0.018	0.000			
Max. My	24		359.547		0.000	-0.000			
Max. Vy	21		21.171		0.000	0.000			
Max. Vx	24		-0.000		0.000	0.000			
T14	60 - 40	Leg	Max Tension	1	0.000		0.000		
			Max. Compression	23	-65906.577		-0.059	-0.341	
			Max. Mx	10	-34847.664		0.564	-0.218	
			Max. My	2	-31400.000		-0.086	0.584	
			Max. Vy	5	-1860.267		-0.475	-0.218	
			Max. Vx	2	1849.688		-0.086	0.584	
		Diagonal	Max Tension	5	2077.360		0.000	0.000	
			Max. Compression	5	-2357.979		-0.006	0.001	
			Max. Mx	23	-137.424		-0.037	0.001	
			Max. My	11	-1612.375		-0.010	0.002	
			Max. Vy	23	27.995		-0.037	0.001	
			Max. Vx	11	-0.751		-0.010	0.002	
		Top Girt	Max Tension	19	965.381		0.000	0.000	
			Max. Compression	1	0.000		0.000	0.000	

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Section No.	Elevation ft	Component Type	Condition	Gov. Load Comb.	Axial lb	Major Axis Moment kip-ft	Minor Axis Moment kip-ft
			Max. Mx	21	953.888	0.018	0.000
			Max. My	24	946.101	0.000	-0.000
			Max. Vy	21	-20.653	0.000	0.000
			Max. Vx	24	0.000	0.000	0.000
		Bottom Girt	Max Tension	21	928.164	0.000	0.000
			Max. Compression	2	-16.381	0.000	0.000
			Max. Mx	18	852.487	0.018	0.000
			Max. My	24	737.568	0.000	-0.000
			Max. Vy	18	-20.653	0.000	0.000
			Max. Vx	24	0.000	0.000	0.000
		Mid Girt	Max Tension	10	938.574	0.000	0.000
			Max. Compression	1	0.000	0.000	0.000
			Max. Mx	14	702.422	0.018	0.000
			Max. My	24	712.833	0.000	-0.000
			Max. Vy	14	-20.653	0.000	0.000
			Max. Vx	24	0.000	0.000	0.000
		Guy A	Bottom Tension	7	12408.749		
			Top Tension	7	12437.253		
			Top Cable Vert	7	5921.580		
			Top Cable Norm	7	10937.094		
			Top Cable Tan	7	12.311		
			Bot Cable Vert	7	-5814.395		
			Bot Cable Norm	7	10961.937		
			Bot Cable Tan	7	76.150		
		Guy B	Bottom Tension	11	11768.300		
			Top Tension	11	11791.710		
			Top Cable Vert	11	4795.569		
			Top Cable Norm	11	10772.497		
			Top Cable Tan	11	15.758		
			Bot Cable Vert	11	-4700.224		
			Bot Cable Norm	11	10788.674		
			Bot Cable Tan	11	72.859		
		Guy C	Bottom Tension	5	11397.929		
			Top Tension	5	11418.286		
			Top Cable Vert	5	4091.315		
			Top Cable Norm	5	10660.121		
			Top Cable Tan	5	14.892		
			Bot Cable Vert	5	-4002.237		
			Bot Cable Norm	5	10671.933		
			Bot Cable Tan	5	68.727		
		Top Guy Pull-Off	Max Tension	10	4987.955	0.000	0.000
			Max. Compression	1	0.000	0.000	0.000
			Max. Mx	14	3732.933	0.038	0.000
			Max. My	3	3180.597	0.000	-0.000
			Max. Vy	14	44.183	0.000	0.000
			Max. Vx	3	0.000	0.000	0.000
			Max Tension	1	0.000	0.000	0.000
			Max. Compression	21	-71605.849	-0.036	0.544
			Max. Mx	11	-37290.485	0.487	-0.064
			Max. My	23	-68809.362	-0.006	0.667
			Max. Vy	6	1883.176	0.121	0.171
			Max. Vx	10	908.613	0.148	0.168
		Diagonal	Max Tension	11	2716.092	0.000	0.000
			Max. Compression	9	-3452.792	0.000	0.000
			Max. Mx	22	-1384.160	0.021	0.000
			Max. My	18	-1156.923	0.000	0.000
			Max. Vy	22	-19.693	0.000	0.000
			Max. Vx	18	-0.034	0.000	0.000
		Horizontal	Max Tension	21	1225.308	0.000	0.000
			Max. Compression	21	-1225.308	0.000	0.000
			Max. Mx	18	1218.888	0.015	0.000
T15	40 - 20	Leg					

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Section No.	Elevation ft	Component Type	Condition	Gov. Load Comb.	Axial lb	Major Axis Moment kip-ft	Minor Axis Moment kip-ft
T16	20 - 5	Top Girt	Max. My	22	1223.814	0.000	-0.000
			Max. Vy	18	-17.133	0.000	0.000
			Max. Vx	22	0.000	0.000	0.000
			Max Tension	5	879.513	0.000	0.000
			Max. Compression	11	-681.024	0.000	0.000
			Max. Mx	18	118.539	0.017	0.000
		Bottom Girt	Max. My	24	-2.396	0.000	-0.000
			Max. Vy	18	-19.647	0.000	0.000
			Max. Vx	24	-0.000	0.000	0.000
			Max Tension	24	351.548	0.000	0.000
			Max. Compression	1	0.000	0.000	0.000
			Max. Mx	14	307.338	0.017	0.000
		Leg	Max. My	18	292.195	0.000	-0.000
			Max. Vy	14	19.647	0.000	0.000
			Max. Vx	18	-0.000	0.000	0.000
			Max Tension	1	0.000	0.000	0.000
			Max. Compression	22	-72929.833	0.345	0.057
			Max. Mx	22	-72926.467	-4.671	0.074
			Max. My	23	-71193.510	0.001	-0.683
			Max. Vy	24	20135.935	-4.650	0.108
			Max. Vx	23	-562.722	-0.004	0.665
			Max Tension	7	2161.812	0.000	0.000
			Max. Compression	13	-2649.027	0.000	0.000
			Diagonal	Max. Mx	22	-739.141	0.018
		Max. My		23	-585.889	0.000	0.000
		Max. Vy		22	17.653	0.000	0.000
		Max. Vx		23	-0.034	0.000	0.000
		Max Tension		24	1257.650	0.000	0.000
		Max. Compression		24	-1257.650	0.000	0.000
		Horizontal	Max. Mx	14	1222.342	0.013	0.000
			Max. My	22	1256.976	0.000	-0.000
			Max. Vy	14	15.259	0.000	0.000
			Max. Vx	22	-0.000	0.000	0.000
			Max Tension	18	604.100	0.000	0.000
			Max. Compression	1	0.000	0.000	0.000
		Top Girt	Max. Mx	14	548.522	0.017	0.000
			Max. My	22	538.911	0.000	-0.000
			Max. Vy	14	-19.487	0.000	0.000
			Max. Vx	22	0.000	0.000	0.000
			Max Tension	24	11897.002	0.000	0.000
			Max. Compression	1	0.000	0.000	0.000
		Bottom Girt	Max. Mx	15	11714.017	-0.020	0.000
Max. My	22		11801.717	0.000	0.000		
Max. Vy	15		23.848	0.000	0.000		
Max. Vx	22		-0.000	0.000	0.000		
Max Tension	1		0.000	0.000	0.000		
Max. Compression	24		-79286.041	-0.378	0.044		
Leg	Max. Mx	22	-75426.001	-4.671	0.069		
	Max. My	6	-42169.754	0.619	0.257		
	Max. Vy	23	-8440.443	-4.655	0.082		
	Max. Vx	6	-248.702	0.957	0.237		
	Max Tension	23	5785.519	-0.029	-2.230		
	Max. Compression	1	0.000	0.000	0.000		
	Max. Mx	18	5713.786	-0.029	-2.265		
	Max. My	15	5683.074	-0.029	-2.339		
	Max. Vy	18	54.706	-0.029	-2.265		
	Max. Vx	12	-197.465	-0.001	-0.938		
	Max Tension	8	1709.021	-0.000	-1.128		
	Max. Compression	9	-1916.981	-0.004	-1.037		
Bottom Girt	Max. Mx	10	-655.712	-0.005	-0.981		
	Max. My	15	-958.523	-0.004	-2.538		

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Section No.	Elevation ft	Component Type	Condition	Gov. Load Comb.	Axial lb	Major Axis Moment kip-ft	Minor Axis Moment kip-ft
		Mid Girt	Max. Vy	10	17.373	-0.005	-0.981
			Max. Vx	8	-1901.135	-0.002	-1.164
			Max Tension	1	0.000	0.000	0.000
			Max. Compression	20	-756.285	0.000	0.000
			Max. Mx	15	-740.004	0.014	0.000
			Max. My	24	-754.847	0.000	0.003
			Max. Vy	15	-31.636	0.000	0.000
			Max. Vx	24	6.247	0.000	0.000

### Maximum Reactions

Location	Condition	Gov. Load Comb.	Vertical lb	Horizontal, X lb	Horizontal, Z lb	
Mast	Max. Vert	23	219245.353	105.826	161.897	
	Max. H <sub>x</sub>	12	74940.607	2801.177	1558.520	
	Max. H <sub>z</sub>	2	105157.146	-48.920	2465.449	
	Max. M <sub>x</sub>	1	0.000	2.481	7.056	
	Max. M <sub>z</sub>	1	0.000	2.481	7.056	
	Max. Torsion	8	0.214	26.998	-3051.829	
	Min. Vert	1	39407.719	2.481	7.056	
	Min. H <sub>x</sub>	4	72963.370	-2852.707	1627.102	
	Min. H <sub>z</sub>	8	77890.122	26.998	-3051.829	
	Min. M <sub>x</sub>	1	0.000	2.481	7.056	
	Min. M <sub>z</sub>	1	0.000	2.481	7.056	
	Min. Torsion	3	-0.252	-1731.765	2212.532	
	Guy C @ 107 ft Elev 10 ft Azimuth 240 deg	Max. Vert	35	-858.706	-1065.109	614.679
		Max. H <sub>x</sub>	10	-1034.844	-483.005	278.062
Max. H <sub>z</sub>		3	-46673.022	-43374.709	25894.673	
Min. Vert		3	-46673.022	-43374.709	25894.673	
Min. H <sub>x</sub>		5	-46310.483	-43850.610	24438.660	
Min. H <sub>z</sub>		9	-1502.906	-1062.799	266.281	
Guy B @ 106 ft Elev 4 ft Azimuth 120 deg		Max. Vert	31	-1017.815	1115.317	643.187
		Max. H <sub>x</sub>	11	-49371.914	43829.552	24391.619
		Max. H <sub>z</sub>	13	-49887.748	43429.114	25954.147
		Min. Vert	13	-49887.748	43429.114	25954.147
	Min. H <sub>x</sub>	6	-1209.537	524.237	301.176	
	Min. H <sub>z</sub>	7	-1697.419	1118.424	284.498	
Guy A @ 106 ft Elev -6 ft Azimuth 0 deg	Max. Vert	27	-1351.717	0.494	-1469.243	
	Max. H <sub>x</sub>	10	-46872.906	1222.059	-43464.299	
	Max. H <sub>z</sub>	2	-1497.170	0.581	-682.593	
	Min. Vert	7	-54392.800	-812.687	-50624.795	
	Min. H <sub>x</sub>	6	-46983.150	-1197.383	-43546.309	
	Min. H <sub>z</sub>	7	-54392.800	-812.687	-50624.795	

### Tower Mast Reaction Summary

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Load Combination	Vertical lb	Shear <sub>x</sub> lb	Shear <sub>z</sub> lb	Overturning Moment, M <sub>x</sub> kip-ft	Overturning Moment, M <sub>z</sub> kip-ft	Torque kip-ft
Dead Only	39407.719	-2.481	-7.056	0.000	0.000	-0.008
1.2 Dead+1.6 Wind 0 deg - No Ice+1.0 Guy	105157.146	48.920	-2465.449	0.000	0.000	0.135
1.2 Dead+1.6 Wind 30 deg - No Ice+1.0 Guy	94820.687	1731.765	-2212.532	0.000	0.000	0.252
1.2 Dead+1.6 Wind 60 deg - No Ice+1.0 Guy	72963.370	2852.707	-1627.102	0.000	0.000	0.151
1.2 Dead+1.6 Wind 90 deg - No Ice+1.0 Guy	96171.260	2741.080	-473.816	0.000	0.000	-0.090
1.2 Dead+1.6 Wind 120 deg - No Ice+1.0 Guy	108289.758	2067.802	1028.672	0.000	0.000	-0.153
1.2 Dead+1.6 Wind 150 deg - No Ice+1.0 Guy	100119.551	929.583	2312.638	0.000	0.000	-0.138
1.2 Dead+1.6 Wind 180 deg - No Ice+1.0 Guy	77890.122	-26.998	3051.829	0.000	0.000	-0.214
1.2 Dead+1.6 Wind 210 deg - No Ice+1.0 Guy	101375.296	-879.946	2309.655	0.000	0.000	-0.201
1.2 Dead+1.6 Wind 240 deg - No Ice+1.0 Guy	110783.489	-1954.050	1023.153	0.000	0.000	-0.121
1.2 Dead+1.6 Wind 270 deg - No Ice+1.0 Guy	98817.645	-2622.937	-469.385	0.000	0.000	0.049
1.2 Dead+1.6 Wind 300 deg - No Ice+1.0 Guy	74940.607	-2801.177	-1558.520	0.000	0.000	0.194
1.2 Dead+1.6 Wind 330 deg - No Ice+1.0 Guy	96256.489	-1650.033	-2152.154	0.000	0.000	0.064
1.2 Dead+1.0 Ice+1.0 Temp+Guy	215552.214	32.174	-231.180	0.000	0.000	-0.035
1.2 Dead+1.0 Wind 0 deg+1.0 Ice+1.0 Temp+1.0 Guy	217178.290	35.090	-418.400	0.000	0.000	-0.019
1.2 Dead+1.0 Wind 30 deg+1.0 Ice+1.0 Temp+1.0 Guy	216671.521	146.034	-408.854	0.000	0.000	0.055
1.2 Dead+1.0 Wind 60 deg+1.0 Ice+1.0 Temp+1.0 Guy	216505.489	226.940	-341.270	0.000	0.000	-0.047
1.2 Dead+1.0 Wind 90 deg+1.0 Ice+1.0 Temp+1.0 Guy	217333.552	240.240	-244.911	0.000	0.000	-0.160
1.2 Dead+1.0 Wind 120 deg+1.0 Ice+1.0 Temp+1.0 Guy	218295.775	185.358	-156.977	0.000	0.000	-0.079
1.2 Dead+1.0 Wind 150 deg+1.0 Ice+1.0 Temp+1.0 Guy	218173.842	121.643	-72.693	0.000	0.000	0.021
1.2 Dead+1.0 Wind 180 deg+1.0 Ice+1.0 Temp+1.0 Guy	218062.992	32.770	-38.429	0.000	0.000	-0.050
1.2 Dead+1.0 Wind 210 deg+1.0 Ice+1.0 Temp+1.0 Guy	218740.210	-50.028	-76.106	0.000	0.000	-0.121
1.2 Dead+1.0 Wind 240 deg+1.0 Ice+1.0 Temp+1.0 Guy	219245.353	-105.826	-161.897	0.000	0.000	-0.018
1.2 Dead+1.0 Wind 270 deg+1.0 Ice+1.0 Temp+1.0 Guy	218272.860	-163.474	-245.816	0.000	0.000	0.093
1.2 Dead+1.0 Wind 300 deg+1.0 Ice+1.0 Temp+1.0 Guy	217211.172	-155.595	-337.145	0.000	0.000	0.015
1.2 Dead+1.0 Wind 330 deg+1.0 Ice+1.0 Temp+1.0 Guy	217050.959	-76.119	-404.942	0.000	0.000	-0.084
Dead+Wind 0 deg - Service+Guy	40660.310	0.835	-954.541	0.000	0.000	0.028
Dead+Wind 30 deg - Service+Guy	41219.992	456.956	-788.984	0.000	0.000	0.072
Dead+Wind 60 deg - Service+Guy	41177.236	772.017	-450.667	0.000	0.000	0.035
Dead+Wind 90 deg - Service+Guy	41175.939	909.428	-12.173	0.000	0.000	-0.032
Dead+Wind 120 deg - Service+Guy	40938.268	819.352	458.802	0.000	0.000	-0.034



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Load Combination	Vertical lb	Shear <sub>x</sub> lb	Shear <sub>z</sub> lb	Overturning Moment, M <sub>x</sub> kip-ft	Overturning Moment, M <sub>z</sub> kip-ft	Torque kip-ft
Dead+Wind 150 deg - Service+Guy	41334.165	444.752	764.759	0.000	0.000	-0.011
Dead+Wind 180 deg - Service+Guy	41138.998	-5.992	867.303	0.000	0.000	-0.048
Dead+Wind 210 deg - Service+Guy	41457.192	-452.735	766.884	0.000	0.000	-0.086
Dead+Wind 240 deg - Service+Guy	41369.952	-818.406	459.936	0.000	0.000	-0.041
Dead+Wind 270 deg - Service+Guy	41349.752	-910.490	-6.164	0.000	0.000	0.025
Dead+Wind 300 deg - Service+Guy	41227.414	-772.551	-443.341	0.000	0.000	0.019
Dead+Wind 330 deg - Service+Guy	41283.542	-455.228	-784.017	0.000	0.000	-0.002

## Solution Summary

Load Comb.	Sum of Applied Forces			Sum of Reactions			% Error
	PX lb	PY lb	PZ lb	PX lb	PY lb	PZ lb	
1	0.000	-16810.433	-0.000	-0.633	16810.459	2.259	0.014%
2	-56.197	-20037.171	-47337.814	56.101	20037.035	47335.113	0.005%
3	23390.217	-19884.611	-40764.874	-23390.311	19884.509	40762.716	0.004%
4	40208.522	-19741.673	-23281.553	-40207.378	19741.677	23283.657	0.005%
5	46826.658	-19913.898	47.570	-46824.611	19913.784	-46.108	0.005%
6	40773.453	-20089.570	23682.733	-40770.858	20089.412	-23680.912	0.006%
7	23471.004	-19961.040	40728.281	-23468.788	19960.913	-40726.749	0.005%
8	58.435	-19826.325	46616.570	-60.471	19826.237	-46614.072	0.006%
9	-23412.518	-19978.892	40730.828	23410.564	19978.783	-40729.575	0.005%
10	-40780.097	-20121.824	23630.057	40777.787	20121.686	-23628.554	0.005%
11	-46773.639	-19949.604	-21.663	46771.789	19949.502	22.890	0.004%
12	-40134.448	-19773.927	-23341.644	40133.695	19773.931	23343.164	0.003%
13	-23426.545	-19902.463	-40746.405	23426.483	19902.358	40744.193	0.004%
14	0.000	-164761.876	-0.000	-1.228	164761.872	2.116	0.001%
15	-27.331	-164903.035	-12985.906	27.309	164903.025	12985.064	0.001%
16	6397.056	-164706.090	-11209.671	-6397.170	164706.085	11209.122	0.000%
17	11085.245	-164520.238	-6457.492	-11084.571	164520.231	6457.823	0.000%
18	12799.951	-164740.541	19.551	-12799.556	164740.537	-19.134	0.000%
19	11121.773	-164964.848	6511.776	-11121.104	164964.839	-6511.310	0.000%
20	6440.304	-164796.328	11232.454	-6439.557	164796.321	-11232.093	0.001%
21	27.687	-164620.719	12953.421	-28.093	164620.713	-12953.080	0.000%
22	-6400.621	-164817.664	11204.251	6400.079	164817.658	-11204.043	0.000%
23	-11104.868	-165003.516	6471.801	11104.193	165003.505	-6471.357	0.000%
24	-12791.457	-164783.213	-15.410	12791.054	164783.207	15.820	0.000%
25	-11091.314	-164558.906	-6498.642	11090.848	164558.902	6499.085	0.000%
26	-6433.176	-164727.426	-11235.338	6433.244	164727.418	11234.574	0.000%
27	-14.010	-16836.715	-11801.671	13.925	16836.685	11799.988	0.008%
28	5831.356	-16798.682	-10162.988	-5831.565	16798.656	10161.600	0.007%
29	10024.285	-16763.049	-5804.265	-10023.504	16763.038	5804.133	0.004%
30	11674.236	-16805.983	11.860	-11673.539	16805.967	-11.204	0.005%
31	10165.127	-16849.778	5904.282	-10164.287	16849.752	-5903.661	0.005%
32	5851.497	-16817.735	10153.865	-5849.971	16817.697	-10152.903	0.009%
33	14.568	-16784.153	11621.859	-14.699	16784.133	-11620.376	0.007%
34	-5836.916	-16822.186	10154.500	5835.849	16822.160	-10153.897	0.006%
35	-10166.783	-16857.819	5891.150	10165.741	16857.786	-5890.453	0.006%
36	-11661.018	-16814.885	-5.401	11659.823	16814.855	6.403	0.008%
37	-10005.818	-16771.090	-5819.246	10005.230	16771.082	5819.142	0.003%
38	-5840.413	-16803.132	-10158.384	5840.443	16803.117	10157.610	0.004%

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## Non-Linear Convergence Results

<i>Load Combination</i>	<i>Converged?</i>	<i>Number of Cycles</i>	<i>Displacement Tolerance</i>	<i>Force Tolerance</i>
1	Yes	10	0.0000001	0.00009133
2	Yes	24	0.00005036	0.00008227
3	Yes	24	0.00004639	0.00006883
4	Yes	19	0.00008219	0.00000955
5	Yes	25	0.00005338	0.00007547
6	Yes	25	0.00005624	0.00009239
7	Yes	25	0.00005121	0.00008307
8	Yes	15	0.00006111	0.00006855
9	Yes	26	0.00004416	0.00007044
10	Yes	26	0.00004802	0.00007885
11	Yes	26	0.00004531	0.00006520
12	Yes	18	0.00005315	0.00008375
13	Yes	24	0.00004564	0.00006997
14	Yes	17	0.00010000	0.00004489
15	Yes	23	0.00000001	0.00002388
16	Yes	23	0.00000001	0.00001604
17	Yes	20	0.00000001	0.00001788
18	Yes	24	0.00000001	0.00001541
19	Yes	24	0.00000001	0.00002239
20	Yes	23	0.00000001	0.00002148
21	Yes	22	0.00000001	0.00001681
22	Yes	25	0.00000001	0.00001684
23	Yes	25	0.00000001	0.00002339
24	Yes	25	0.00000001	0.00001641
25	Yes	22	0.00000001	0.00001604
26	Yes	22	0.00000001	0.00002099
27	Yes	14	0.00000001	0.00007909
28	Yes	15	0.00000001	0.00009089
29	Yes	12	0.00000001	0.00006828
30	Yes	16	0.00000001	0.00005506
31	Yes	17	0.00000001	0.00004818
32	Yes	16	0.00000001	0.00009766
33	Yes	13	0.00000001	0.00009769
34	Yes	17	0.00000001	0.00006645
35	Yes	18	0.00000001	0.00006272
36	Yes	16	0.00000001	0.00008152
37	Yes	13	0.00000001	0.00004891
38	Yes	16	0.00000001	0.00005242

## Maximum Tower Deflections - Service Wind

<i>Section No.</i>	<i>Elevation ft</i>	<i>Horz. Deflection in</i>	<i>Gov. Load Comb.</i>	<i>Tilt °</i>	<i>Twist °</i>
Pole	174 - 170	4.039	32	0.2379	0.0511
Antenna					
T1	170 - 155	3.858	32	0.2261	0.0511
T2	155 - 140	3.210	32	0.2001	0.0485
T3	140 - 120	2.723	32	0.1364	0.0504
T4	120 - 117.5	2.332	32	0.0872	0.0465

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Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
T5	117.5 - 115	2.289	32	0.0906	0.0455
T6	115 - 112.5	2.243	32	0.0943	0.0445
T7	112.5 - 110	2.194	32	0.0979	0.0435
T8	110 - 107.5	2.143	32	0.1014	0.0425
T9	107.5 - 105	2.090	32	0.1043	0.0416
T10	105 - 102.5	2.034	32	0.1064	0.0407
T11	102.5 - 100	1.977	32	0.1072	0.0398
T12	100 - 80	1.919	34	0.1066	0.0387
T13	80 - 60	1.548	35	0.0852	0.0319
T14	60 - 40	1.213	35	0.0869	0.0306
T15	40 - 20	0.887	35	0.0774	0.0272
T16	20 - 5	0.528	35	0.1067	0.0186
T17	5 - 0	0.138	35	0.1272	0.0169

### Critical Deflections and Radius of Curvature - Service Wind

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
176.000	DB636 Omni	32	4.039	0.2379	0.0511	131178
174.000	DB806-XT	32	4.039	0.2379	0.0511	131178
171.500	DB874H120-SX	32	3.926	0.2302	0.0512	131178
168.000	Pirod 5' Side Mount Standoff (1)	32	3.768	0.2216	0.0509	87936
167.000	SC2	32	3.723	0.2197	0.0508	63632
163.000	Pirod 12' T-Frame Sector Mount (1)	32	3.545	0.2140	0.0499	28059
152.333	Guy	32	3.109	0.1917	0.0485	12775
146.000	VHLP2-18	32	2.893	0.1647	0.0495	11912
140.000	Pirod 12' PCS T-Frame (1) 104569	32	2.723	0.1364	0.0504	11676
132.438	Guy	32	2.553	0.1070	0.0502	17160
120.000	14-ft T-Frame Sector Mount	32	2.332	0.0872	0.0465	58340
108.400	1' Side Mount Standoff	32	2.109	0.1033	0.0419	28570
108.000	Panel Antenna 6'x6"x3"	32	2.101	0.1038	0.0418	29048
90.000	Guy	34	1.710	0.0959	0.0349	43849
50.000	Guy	35	1.048	0.0796	0.0294	102928

### Maximum Tower Deflections - Design Wind

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
Pole	174 - 170	36.362	10	1.5955	0.2527
Antenna					
T1	170 - 155	35.036	10	1.5479	0.2570
T2	155 - 140	30.187	10	1.4454	0.2354
T3	140 - 120	26.014	10	1.1803	0.2343
T4	120 - 117.5	21.617	10	0.9908	0.2171
T5	117.5 - 115	21.101	10	0.9962	0.2122
T6	115 - 112.5	20.579	10	1.0025	0.2076
T7	112.5 - 110	20.052	10	1.0087	0.2031
T8	110 - 107.5	19.520	10	1.0138	0.1986
T9	107.5 - 105	18.985	10	1.0169	0.1942
T10	105 - 102.5	18.445	10	1.0162	0.1898

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Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
T11	102.5 - 100	17.906	10	1.0106	0.1855
T12	100 - 80	17.366	10	0.9990	0.1802
T13	80 - 60	13.468	10	0.8586	0.1477
T14	60 - 40	9.971	10	0.8124	0.1206
T15	40 - 20	6.822	10	0.7239	0.0945
T16	20 - 5	3.728	10	0.8187	0.0632
T17	5 - 0	0.956	10	0.8956	0.0580

### Critical Deflections and Radius of Curvature - Design Wind

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
176.000	DB636 Omni	10	36.362	1.5955	0.2527	36420
174.000	DB806-XT	10	36.362	1.5955	0.2527	36420
171.500	DB874H120-SX	10	35.534	1.5643	0.2559	36420
168.000	Pirod 5' Side Mount Standoff (1)	10	34.373	1.5305	0.2569	24154
167.000	SC2	10	34.042	1.5235	0.2561	17369
163.000	Pirod 12' T-Frame Sector Mount (1)	10	32.727	1.5016	0.2503	7307
152.333	Guy	10	29.383	1.4100	0.2329	3246
146.000	VHLP2-18	10	27.578	1.2967	0.2325	2969
140.000	Pirod 12' PCS T-Frame (1) 104569	10	26.014	1.1803	0.2343	2900
132.438	Guy	10	24.244	1.0640	0.2326	4299
120.000	14-ft T-Frame Sector Mount	10	21.617	0.9908	0.2171	28470
108.400	1' Side Mount Standoff	10	19.178	1.0161	0.1958	13199
108.000	Panel Antenna 6'x6"x3"	10	19.093	1.0165	0.1951	13713
90.000	Guy	10	15.336	0.9266	0.1620	7220
50.000	Guy	10	8.355	0.7595	0.1086	14520

### Bolt Design Data

Section No.	Elevation ft	Component Type	Bolt Grade	Bolt Size in	Number Of Bolts	Maximum Load per Bolt lb	Allowable Load lb	Ratio Load Allowable	Allowable Ratio	Criteria	
T1	170	Leg	A325N	0.750	4	231.939	29820.600	0.008	✓	1	Bolt Tension
		Diagonal	A325N	0.500	1	2733.230	4132.500	0.661	✓	1	Member Bearing
		Top Girt	A325N	0.500	1	2086.920	4132.500	0.505	✓	1	Member Bearing
T2	155	Leg	A325N	0.750	4	4617.670	29820.600	0.155	✓	1	Bolt Tension
		Diagonal	A325N	0.500	1	3196.040	4132.500	0.773	✓	1	Member Bearing
		Top Girt	A325N	0.500	1	340.295	4132.500	0.082	✓	1	Member Bearing
		Top Guy	A325N	0.750	1	4263.240	6932.810	0.615	✓	1	Member Block Shear
		Torque Arm Top@152.333	A325N	0.750	8	652.801	17892.400	0.036	✓	1	Bolt Shear
T3	140	Leg	A325N	0.750	4	3923.840	29820.600	0.132	✓	1	Bolt Tension
		Diagonal	A325N	0.625	1	3596.180	7748.440	0.464	✓	1	Member Block Shear

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Section No.	Elevation ft	Component Type	Bolt Grade	Bolt Size in	Number Of Bolts	Maximum Load per Bolt lb	Allowable Load lb	Ratio Load Allowable	Allowable Ratio	Criteria	
T4	120	Top Girt	A325N	0.625	1	527.896	3194.530	0.165	✓	1	Member Block Shear
		Torque Arm Top@132.438	A325N	0.750	8	1332.120	17892.400	0.074	✓	1	Bolt Shear
		Leg	A325N	0.750	4	3482.590	29820.600	0.117	✓	1	Bolt Tension
		Diagonal	A325N	0.500	1	723.374	6960.000	0.104	✓	1	Member Bearing
T5	117.5	Top Girt	A325N	0.500	1	775.484	4132.500	0.188	✓	1	Member Bearing
		Diagonal	A325N	0.500	1	382.723	4132.500	0.093	✓	1	Member Bearing
T6	115	Diagonal	A325N	0.500	1	322.073	6960.000	0.046	✓	1	Member Bearing
T7	112.5	Diagonal	A325N	0.500	1	434.426	4132.500	0.105	✓	1	Member Bearing
T8	110	Diagonal	A325N	0.500	1	995.264	6960.000	0.143	✓	1	Member Bearing
T9	107.5	Diagonal	A325N	0.500	1	1465.890	6960.000	0.211	✓	1	Member Bearing
T10	105	Diagonal	A325N	0.500	1	1003.310	4132.500	0.243	✓	1	Member Bearing
T11	102.5	Diagonal	A325N	0.500	1	2337.880	6960.000	0.336	✓	1	Member Bearing
T12	100	Leg	A325N	0.750	4	3827.810	29820.600	0.128	✓	1	Bolt Tension
		Diagonal	A325N	0.500	1	2074.900	4132.500	0.502	✓	1	Member Bearing
T13	80	Top Girt	A325N	0.500	1	811.345	4132.500	0.196	✓	1	Member Bearing
		Leg	A325N	0.750	4	4530.020	29820.600	0.152	✓	1	Bolt Tension
		Diagonal	A325N	0.500	1	1769.210	6960.000	0.254	✓	1	Member Bearing
T14	60	Top Girt	A325N	0.500	1	335.611	4132.500	0.081	✓	1	Member Bearing
		Leg	A325N	0.750	4	4912.580	29820.600	0.165	✓	1	Bolt Tension
T15	40	Diagonal	A325N	0.500	1	2077.360	4132.500	0.503	✓	1	Member Bearing
		Top Girt	A325N	0.500	1	965.380	4132.500	0.234	✓	1	Member Bearing
		Leg	A325N	0.750	4	5493.230	29820.600	0.184	✓	1	Bolt Tension
T16	20	Diagonal	A325N	0.500	1	2716.090	4132.500	0.657	✓	1	Member Bearing
		Top Girt	A325N	0.500	1	879.513	4132.500	0.213	✓	1	Member Bearing
		Leg	A325N	0.750	4	5966.880	29820.600	0.200	✓	1	Bolt Tension
T17	5	Diagonal	A325N	0.500	1	2161.810	4132.500	0.523	✓	1	Member Bearing
		Top Girt	A325N	0.500	1	604.100	7952.160	0.076	✓	1	Bolt Shear
		Leg	A325N	0.750	4	6287.320	29820.600	0.211	✓	1	Bolt Tension

### Guy Design Data

Section No.	Elevation ft	Size	Initial Tension lb	Breaking Load lb	Actual $T_u$ lb	Allowable $\phi T_n$ lb	Required S.F.	Actual S.F.
T2	152.333 (A) (601)	3/8 EHS	1232.000	15399.965	8642.750	9240.000	1.000	1.069 ✓
	152.333 (A) (602)	3/8 EHS	1232.000	15399.965	8604.670	9240.000	1.000	1.074 ✓
	152.333 (B)	3/8 EHS	1232.000	15399.965	8354.170	9240.000	1.000	1.106 ✓

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Section No.	Elevation ft	Size	Initial Tension lb	Breaking Load lb	Actual $T_u$ lb	Allowable $\phi T_n$ lb	Required S.F.	Actual S.F.
	(597)							
	152.333 (B)	3/8 EHS	1232.000	15399.965	8346.690	9240.000	1.000	1.107 ✓
	(598)							
	152.333 (C)	3/8 EHS	1232.000	15399.965	8147.990	9240.000	1.000	1.134 ✓
	(590)							
	152.333 (C)	3/8 EHS	1232.000	15399.965	8209.050	9240.000	1.000	1.126 ✓
	(591)							
T3	132.438 (A)	1/2 EHS	2152.000	26900.043	15601.500	16140.000	1.000	1.035 ✓
	(613)							
	132.438 (A)	1/2 EHS	2152.000	26900.043	15554.800	16140.000	1.000	1.038 ✓
	(614)							
	132.438 (B)	1/2 EHS	2152.000	26900.043	14910.900	16140.000	1.000	1.082 ✓
	(609)							
	132.438 (B)	1/2 EHS	2152.000	26900.043	14897.000	16140.000	1.000	1.083 ✓
	(610)							
	132.438 (C)	1/2 EHS	2152.000	26900.043	14436.200	16140.000	1.000	1.118 ✓
	(605)							
	132.438 (C)	1/2 EHS	2152.000	26900.043	14542.600	16140.000	1.000	1.110 ✓
	(606)							
T12	90.000 (A)	1/2 EHS	2152.000	26900.043	15150.600	16140.000	1.000	1.065 ✓
	(622)							
	90.000 (B)	1/2 EHS	2152.000	26900.043	14406.400	16140.000	1.000	1.120 ✓
	(621)							
	90.000 (C)	1/2 EHS	2152.000	26900.043	13923.600	16140.000	1.000	1.159 ✓
	(617)							
T14	50.000 (A)	1/2 EHS	2152.000	26900.043	12437.300	16140.000	1.000	1.298 ✓
	(628)							
	50.000 (B)	1/2 EHS	2152.000	26900.043	11791.700	16140.000	1.000	1.369 ✓
	(627)							
	50.000 (C)	1/2 EHS	2152.000	26900.043	11418.300	16140.000	1.000	1.414 ✓
	(623)							

### Compression Checks

### Leg Design Data (Compression)

Section No.	Elevation ft	Size	L ft	$L_u$ ft	$Kl/r$	A $in^2$	$P_u$ lb	$\phi P_n$ lb	Ratio $\frac{P_u}{\phi P_n}$
T1	170 - 155	ROHN 2 STD	15.000	0.250	3.8 K=1.00	1.075	-20555.500	48302.602	0.426 <sup>1</sup> ✓
T2	155 - 140	ROHN 2 STD	15.000	0.250	3.8 K=1.00	1.075	-31450.801	48302.602	0.651 <sup>1</sup> ✓
T3	140 - 120	Pipe 2.0 STD W 1" Rod Reinforcement	20.000	1.219	12.4 K=1.00	1.805	-45935.500	80322.203	0.572 <sup>1</sup> ✓
T4	120 - 117.5	ROHN 2 STD	2.500	2.250	34.3 K=1.00	1.075	-41698.000	44367.898	0.940 <sup>1</sup> ✓
T5	117.5 - 115	ROHN 2 STD	2.500	2.500	38.1 K=1.00	1.075	-42611.000	43481.500	0.980 <sup>1</sup> ✓
T6	115 - 112.5	ROHN 2 STD	2.500	2.500	38.1 K=1.00	1.075	-42811.801	43481.500	0.985 <sup>1</sup> ✓

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Section No.	Elevation ft	Size	L ft	L <sub>u</sub> ft	Kl/r	A in <sup>2</sup>	P <sub>u</sub> lb	φP <sub>n</sub> lb	Ratio $\frac{P_u}{\phi P_n}$
T7	112.5 - 110	ROHN 2 STD	2.500	2.500	38.1 K=1.00	1.075	-43368.602	43481.500	0.997 <sup>1</sup> ✓
T8	110 - 107.5	ROHN 2 STD	2.500	1.250	19.1 K=1.00	1.075	-43473.301	47086.898	0.923 <sup>1</sup> ✓
T9	107.5 - 105	ROHN 2 STD	2.500	1.250	19.1 K=1.00	1.075	-43617.102	47086.898	0.926 <sup>1</sup> ✓
T10	105 - 102.5	ROHN 2 STD	2.500	1.250	19.1 K=1.00	1.075	-44448.199	47086.898	0.944 <sup>1</sup> ✓
T11	102.5 - 100	ROHN 2 STD	2.500	0.250	3.8 K=1.00	1.075	-45921.699	48302.602	0.951 <sup>1</sup> ✓
T12	100 - 80	ROHN 2.5 STD	20.000	2.438	30.9 K=1.00	1.704	-54252.602	71520.000	0.759 <sup>1</sup> ✓
T13	80 - 60	Pipe 2.0 STD with 1/3rd Split 2.5 STD Pipe	20.000	0.250	3.9 K=1.00	1.677	-58939.398	75376.500	0.782 <sup>1</sup> ✓
T14	60 - 40	ROHN 2.5 STD	20.000	2.438	30.9 K=1.00	1.704	-65080.602	71520.000	0.910 <sup>1</sup> ✓
T15	40 - 20	2.5 STD w/ 90 deg 3.0 STD	20.000	2.438	32.7 K=1.00	2.277	-70743.203	94783.203	0.746 <sup>1</sup> ✓
T16	20 - 5	2.5 STD w/ 90 deg 3.0 STD	15.000	2.417	32.4 K=1.00	2.277	-72610.500	94909.398	0.765 <sup>1</sup> ✓
T17	5 - 0	2.5 STD w/ 90 deg 3.0 STD	5.376	1.882	25.2 K=1.00	2.277	-79286.000	97824.703	0.810 <sup>1</sup> ✓

<sup>1</sup> P<sub>u</sub> / φP<sub>n</sub> controls

### Diagonal Design Data (Compression)

Section No.	Elevation ft	Size	L ft	L <sub>u</sub> ft	Kl/r	A in <sup>2</sup>	P <sub>u</sub> lb	φP <sub>n</sub> lb	Ratio $\frac{P_u}{\phi P_n}$
T1	170 - 155	P1.5X0625	4.188	1.973	46.5 K=1.00	0.282	-2768.070	8159.740	0.339 <sup>1</sup> ✓
T2	155 - 140	P1.5X0625	4.188	1.973	46.5 K=1.00	0.282	-3370.710	8159.740	0.413 <sup>1</sup> ✓
T3	140 - 120	L1 3/4x1 3/4x1/4	4.200	1.859	79.0 K=1.21	0.813	-4953.350	18952.801	0.261 <sup>1</sup> ✓
T4	120 - 117.5	P1.5X0625	4.094	1.928	45.5 K=1.00	0.282	-723.374	8201.100	0.088 <sup>1</sup> ✓
T5	117.5 - 115	P1.5X0625	4.236	1.996	47.1 K=1.00	0.282	-223.516	8138.040	0.027 <sup>1</sup> ✓
T6	115 - 112.5	P1.5X0625	4.236	1.996	47.1 K=1.00	0.282	-322.073	8138.040	0.040 <sup>1</sup> ✓
T7	112.5 - 110	P1.5X0625	4.236	1.996	47.1 K=1.00	0.282	-402.627	8138.040	0.049 <sup>1</sup> ✓
T8	110 - 107.5	P1.5X0625	4.236	1.996	47.1 K=1.00	0.282	-995.264	8138.040	0.122 <sup>1</sup> ✓
T9	107.5 - 105	P1.5X0625	4.236	1.996	47.1 K=1.00	0.282	-1465.890	8138.040	0.180 <sup>1</sup> ✓
T10	105 - 102.5	P1.5X0625	4.236	1.996	47.1 K=1.00	0.282	-1504.220	8138.040	0.185 <sup>1</sup> ✓

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Section No.	Elevation ft	Size	L ft	L <sub>u</sub> ft	Kl/r	A in <sup>2</sup>	P <sub>u</sub> lb	φP <sub>n</sub> lb	Ratio $\frac{P_u}{\phi P_n}$
T11	102.5 - 100	P1.5X0625	4.094	1.928	45.5 K=1.00	0.282	-2337.880	8201.100	0.285 <sup>1</sup> ✓
T12	100 - 80	P1.5X0625	4.200	1.953	46.1 K=1.00	0.282	-2347.030	8178.440	0.287 <sup>1</sup> ✓
T13	80 - 60	P1.5X0625	4.200	1.968	46.4 K=1.00	0.282	-1769.210	8164.510	0.217 <sup>1</sup> ✓
T14	60 - 40	P1.5X0625	4.200	1.953	46.1 K=1.00	0.282	-2357.980	8178.440	0.288 <sup>1</sup> ✓
T15	40 - 20	P1.5X0625	4.200	3.905	92.1 K=1.00	0.282	-3452.790	5850.370	0.590 <sup>1</sup> ✓
T16	20 - 5	P1.5X0625	4.188	3.894	91.9 K=1.00	0.282	-2649.030	5865.380	0.452 <sup>1</sup> ✓

<sup>1</sup> P<sub>u</sub> / φP<sub>n</sub> controls

### Horizontal Design Data (Compression)

Section No.	Elevation ft	Size	L ft	L <sub>u</sub> ft	Kl/r	A in <sup>2</sup>	P <sub>u</sub> lb	φP <sub>n</sub> lb	Ratio $\frac{P_u}{\phi P_n}$
T15	40 - 20	1	3.420	3.180	106.8 K=0.70	0.785	-1225.310	13951.400	0.088 <sup>1</sup> ✓
T16	20 - 5	1	3.420	3.180	106.8 K=0.70	0.785	-1257.650	13951.400	0.090 <sup>1</sup> ✓

<sup>1</sup> P<sub>u</sub> / φP<sub>n</sub> controls

### Secondary Horizontal Design Data (Compression)

Section No.	Elevation ft	Size	L ft	L <sub>u</sub> ft	Kl/r	A in <sup>2</sup>	P <sub>u</sub> lb	φP <sub>n</sub> lb	Ratio $\frac{P_u}{\phi P_n}$
T2	155 - 140	1	3.420	3.222	108.3 K=0.70	0.785	-1091.280	13729.800	0.079 <sup>1</sup> ✓
T3	140 - 120	L1 3/4x1 3/4x1/4	3.420	3.222	96.6 K=1.32	0.813	-3215.900	16113.700	0.200 <sup>1</sup> ✓
T8	110 - 107.5	L2x2x3/16	3.420	3.222	91.3 K=1.46	0.715	-752.979	14932.500	0.050 <sup>1</sup> ✓
T9	107.5 - 105	L2x2x3/16	3.420	3.222	91.3 K=1.46	0.715	-755.470	14932.500	0.051 <sup>1</sup> ✓
T10	105 - 102.5	L2x2x3/16	3.420	3.222	91.3 K=1.46	0.715	-769.865	14932.500	0.052 <sup>1</sup> ✓
T11	102.5 - 100	L2x2x3/16	3.420	3.222	91.3 K=1.46	0.715	-768.218	14932.500	0.051 <sup>1</sup> ✓
T13	80 - 60	L2x2x3/16	3.420	3.205	91.2 K=1.46	0.715	-988.142	14956.900	0.066 <sup>1</sup> ✓



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Section No.	Elevation ft	Size	L ft	L <sub>u</sub> ft	Kl/r	A in <sup>2</sup>	P <sub>u</sub> lb	φP <sub>n</sub> lb	Ratio $\frac{P_u}{\phi P_n}$
									✓

<sup>1</sup> P<sub>u</sub> / φP<sub>n</sub> controls

### Top Girt Design Data (Compression)

Section No.	Elevation ft	Size	L ft	L <sub>u</sub> ft	Kl/r	A in <sup>2</sup>	P <sub>u</sub> lb	φP <sub>n</sub> lb	Ratio $\frac{P_u}{\phi P_n}$
T1	170 - 155	P1.5X0625	3.420	3.222	76.0 K=1.00	0.282	-23.258	6746.920	0.003 <sup>1</sup> ✓
T2	155 - 140	P1.5X0625	3.420	3.222	76.0 K=1.00	0.282	-321.644	6746.920	0.048 <sup>1</sup> ✓
T3	140 - 120	L1 1/2x1 1/2x1/8	3.420	2.983	120.8 K=1.00	0.359	-181.422	5398.350	0.034 <sup>1</sup> ✓
T15	40 - 20	P1.5X0625	3.420	3.180	75.0 K=1.00	0.282	-681.024	6800.380	0.100 <sup>1</sup> ✓

<sup>1</sup> P<sub>u</sub> / φP<sub>n</sub> controls

### Bottom Girt Design Data (Compression)

Section No.	Elevation ft	Size	L ft	L <sub>u</sub> ft	Kl/r	A in <sup>2</sup>	P <sub>u</sub> lb	φP <sub>n</sub> lb	Ratio $\frac{P_u}{\phi P_n}$
T1	170 - 155	P1.5X0625	3.420	3.222	76.0 K=1.00	0.282	-744.285	6746.920	0.110 <sup>1</sup> ✓
T3	140 - 120	L1 3/4x1 3/4x1/8	3.420	3.222	115.7 K=1.04	0.422	-157.747	6752.150	0.023 <sup>1</sup> ✓
T11	102.5 - 100	P1.5X0625	3.420	3.222	76.0 K=1.00	0.282	-96.606	6746.920	0.014 <sup>1</sup> ✓
T14	60 - 40	P1.5X0625	3.420	3.180	75.0 K=1.00	0.282	-16.381	6799.860	0.002 <sup>1</sup> ✓
T17	5 - 0	14x3/16	0.513	0.273	60.5 K=1.00	2.625	-1916.980	70132.703	0.027 <sup>1</sup> ✓

<sup>1</sup> P<sub>u</sub> / φP<sub>n</sub> controls

### Mid Girt Design Data (Compression)

Section No.	Elevation ft	Size	L ft	L <sub>u</sub> ft	Kl/r	A in <sup>2</sup>	P <sub>u</sub> lb	φP <sub>n</sub> lb	Ratio $\frac{P_u}{\phi P_n}$
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Section No.	Elevation	Size	L	L <sub>u</sub>	Kl/r	A	P <sub>u</sub>	φP <sub>n</sub>	Ratio $\frac{P_u}{\phi P_n}$
	ft		ft	ft		in <sup>2</sup>	lb	lb	
T17	5 - 0	14x3/16	1.710	1.470	325.9 K=1.00	2.625	-756.285	5583.330	0.135 <sup>1</sup>

KL/R > 200 (C) - 589

<sup>1</sup> P<sub>u</sub> / φP<sub>n</sub> controls

### Top Guy Pull-Off Design Data (Compression)

Section No.	Elevation	Size	L	L <sub>u</sub>	Kl/r	A	P <sub>u</sub>	φP <sub>n</sub>	Ratio $\frac{P_u}{\phi P_n}$
	ft		ft	ft		in <sup>2</sup>	lb	lb	
T2	155 - 140	L2x2x3/16	3.420	3.222	98.1 K=1.00	0.715	-3863.980	13953.100	0.277 <sup>1</sup>

<sup>1</sup> P<sub>u</sub> / φP<sub>n</sub> controls

### Top Guy Pull-Off Bending Design Data

Section No.	Elevation	Size	M <sub>ux</sub>	φM <sub>ux</sub>	Ratio $\frac{M_{ux}}{\phi M_{ux}}$	M <sub>uy</sub>	φM <sub>uy</sub>	Ratio $\frac{M_{uy}}{\phi M_{uy}}$
	ft		kip-ft	kip-ft		kip-ft	kip-ft	
T2	155 - 140	L2x2x3/16	0.000	1.301	0.000	0.000	0.664	0.000

### Top Guy Pull-Off Interaction Design Data

Section No.	Elevation	Size	Ratio $\frac{P_u}{\phi P_n}$	Ratio $\frac{M_{ux}}{\phi M_{ux}}$	Ratio $\frac{M_{uy}}{\phi M_{uy}}$	Comb. Stress Ratio	Allow. Stress Ratio	Criteria
T2	155 - 140	L2x2x3/16	0.277	0.000	0.000	0.277 <sup>1</sup>	1.000	4.8.1 ✓

<sup>1</sup> P<sub>u</sub> / φP<sub>n</sub> controls

### Torque-Arm Top Design Data

Section No.	Elevation	Size	L	L <sub>u</sub>	Kl/r	A	P <sub>u</sub>	φP <sub>n</sub>	Ratio $\frac{P_u}{\phi P_n}$
	ft		ft	ft		in <sup>2</sup>	lb	lb	
T2	155 - 140 (592)	C12x20.7	3.500	3.401	51.1 K=1.00	6.090	-2472.680	171988.000	0.014
T2	155 - 140 (593)	C12x20.7	3.500	3.401	51.1 K=1.00	6.090	-32.513	171988.000	0.000

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Section No.	Elevation ft	Size	L ft	L <sub>u</sub> ft	Kl/r	A in <sup>2</sup>	P <sub>u</sub> lb	φP <sub>n</sub> lb	Ratio $\frac{P_u}{\phi P_n}$
T2	155 - 140 (599)	C12x20.7	3.500	3.401	51.1 K=1.00	6.090	-26.250	171988.000	0.000
T2	155 - 140 (600)	C12x20.7	3.500	3.401	51.1 K=1.00	6.090	-131.182	171988.000	0.001
T2	155 - 140 (603)	C12x20.7	3.500	3.401	51.1 K=1.00	6.090	-2484.050	171988.000	0.014
T2	155 - 140 (604)	C12x20.7	3.500	3.401	51.1 K=1.00	6.090	-2469.570	171988.000	0.014
T3	140 - 120 (607)	C12x20.7 with 8"x3/8" plates	3.500	3.401	61.3 K=1.00	9.080	-350.692	241335.000	0.001
T3	140 - 120 (608)	C12x20.7 with 8"x3/8" plates	3.500	3.401	61.3 K=1.00	9.080	-241.214	241335.000	0.001
T3	140 - 120 (611)	C12x20.7 with 8"x3/8" plates	3.500	3.401	61.3 K=1.00	9.080	-145.712	241335.000	0.001
T3	140 - 120 (612)	C12x20.7 with 8"x3/8" plates	3.500	3.401	61.3 K=1.00	9.080	-265.663	241335.000	0.001
T3	140 - 120 (615)	C12x20.7 with 8"x3/8" plates	3.500	3.401	61.3 K=1.00	9.080	-5387.290	241335.000	0.022
T3	140 - 120 (616)	C12x20.7 with 8"x3/8" plates	3.500	3.401	61.3 K=1.00	9.080	-366.043	241335.000	0.002

### Torque-Arm Top Bending Design Data

Section No.	Elevation ft	Size	M <sub>ux</sub> kip-ft	φM <sub>ux</sub> kip-ft	Ratio $\frac{M_{ux}}{\phi M_{ux}}$	M <sub>uy</sub> kip-ft	φM <sub>uy</sub> kip-ft	Ratio $\frac{M_{uy}}{\phi M_{uy}}$
T2	155 - 140 (592)	C12x20.7	-22.619	58.050	0.390	0.000	9.423	0.000
T2	155 - 140 (593)	C12x20.7	-25.242	58.050	0.435	0.000	9.423	0.000
T2	155 - 140 (599)	C12x20.7	-24.109	58.050	0.415	0.000	9.423	0.000
T2	155 - 140 (600)	C12x20.7	-23.014	58.050	0.396	0.000	9.423	0.000
T2	155 - 140 (603)	C12x20.7	-23.668	58.050	0.408	0.000	9.423	0.000
T2	155 - 140 (604)	C12x20.7	-24.792	58.050	0.427	0.000	9.423	0.000
T3	140 - 120 (607)	C12x20.7 with 8"x3/8" plates	-37.124	97.877	0.379	0.000	11.078	0.000
T3	140 - 120 (608)	C12x20.7 with 8"x3/8" plates	-42.335	97.877	0.433	0.000	11.078	0.000
T3	140 - 120 (611)	C12x20.7 with 8"x3/8" plates	-39.694	97.877	0.406	0.000	11.078	0.000
T3	140 - 120 (612)	C12x20.7 with 8"x3/8" plates	-37.449	97.877	0.383	0.000	11.078	0.000
T3	140 - 120 (615)	C12x20.7 with 8"x3/8" plates	-38.258	97.877	0.391	0.000	11.078	0.000
T3	140 - 120 (616)	C12x20.7 with 8"x3/8" plates	-42.133	97.877	0.430	0.000	11.078	0.000

### Torque-Arm Top Interaction Design Data

Section No.	Elevation ft	Size	Ratio $\frac{P_u}{\phi P_n}$	Ratio $\frac{M_{ux}}{\phi M_{ux}}$	Ratio $\frac{M_{uy}}{\phi M_{uy}}$	Comb. Stress Ratio	Allow. Stress Ratio	Criteria
T2	155 - 140 (592)	C12x20.7	0.014	0.390	0.000	0.397	1.000	4.8.1 ✓

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Section No.	Elevation ft	Size	Ratio	Ratio	Ratio	Comb. Stress Ratio	Allow. Stress Ratio	Criteria
			$\phi P_n$	$\phi M_{ux}$	$\phi M_{uy}$			
T2	155 - 140 (593)	C12x20.7	0.000	0.435	0.000	0.435	1.000	4.8.1 ✓
T2	155 - 140 (599)	C12x20.7	0.000	0.415	0.000	0.415	1.000	4.8.1 ✓
T2	155 - 140 (600)	C12x20.7	0.001	0.396	0.000	0.397	1.000	4.8.1 ✓
T2	155 - 140 (603)	C12x20.7	0.014	0.408	0.000	0.415	1.000	4.8.1 ✓
T2	155 - 140 (604)	C12x20.7	0.014	0.427	0.000	0.434	1.000	4.8.1 ✓
T3	140 - 120 (607)	C12x20.7 with 8"x3/8" plates	0.001	0.379	0.000	0.380	1.000	4.8.1 ✓
T3	140 - 120 (608)	C12x20.7 with 8"x3/8" plates	0.001	0.433	0.000	0.433	1.000	4.8.1 ✓
T3	140 - 120 (611)	C12x20.7 with 8"x3/8" plates	0.001	0.406	0.000	0.406	1.000	4.8.1 ✓
T3	140 - 120 (612)	C12x20.7 with 8"x3/8" plates	0.001	0.383	0.000	0.383	1.000	4.8.1 ✓
T3	140 - 120 (615)	C12x20.7 with 8"x3/8" plates	0.022	0.391	0.000	0.402	1.000	4.8.1 ✓
T3	140 - 120 (616)	C12x20.7 with 8"x3/8" plates	0.002	0.430	0.000	0.431	1.000	4.8.1 ✓

### Tension Checks

### Leg Design Data (Tension)

Section No.	Elevation ft	Size	L	L <sub>u</sub>	Kl/r	A	P <sub>u</sub>	φP <sub>n</sub>	Ratio P <sub>u</sub> φP <sub>n</sub>
			ft	ft		in <sup>2</sup>	lb	lb	
T1	170 - 155	ROHN 2 STD	15.000	0.250	3.8	1.075	18472.699	48353.898	0.382 <sup>1</sup> ✓
T2	155 - 140	ROHN 2 STD	15.000	1.208	18.4	1.075	21351.699	48353.898	0.442 <sup>1</sup> ✓
T3	140 - 120	Pipe 2.0 STD W 1" Rod Reinforcement	20.000	1.219	12.4	1.805	28594.500	81225.000	0.352 <sup>1</sup> ✓

<sup>1</sup> P<sub>u</sub> / φP<sub>n</sub> controls

### Diagonal Design Data (Tension)

Section No.	Elevation ft	Size	L	L <sub>u</sub>	Kl/r	A	P <sub>u</sub>	φP <sub>n</sub>	Ratio P <sub>u</sub> φP <sub>n</sub>
			ft	ft		in <sup>2</sup>	lb	lb	
T1	170 - 155	P1.5X0625	4.188	1.973	46.5	0.282	2733.230	9144.980	0.299 <sup>1</sup>

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Section No.	Elevation ft	Size	L ft	L <sub>u</sub> ft	Kl/r	A in <sup>2</sup>	P <sub>u</sub> lb	φP <sub>n</sub> lb	Ratio $\frac{P_u}{\phi P_n}$
T2	155 - 140	P1.5X0625	4.188	1.973	46.5	0.282	3196.040	9144.980	0.349 <sup>1</sup> ✓
T3	140 - 120	L1 3/4x1 3/4x1/4	4.200	1.859	44.9	0.469	3596.180	20390.600	0.176 <sup>1</sup> ✓
T4	120 - 117.5	P1.5X0625	4.094	1.928	45.5	0.282	413.868	9144.980	0.045 <sup>1</sup> ✓
T5	117.5 - 115	P1.5X0625	4.236	1.996	47.1	0.282	382.723	9144.980	0.042 <sup>1</sup> ✓
T6	115 - 112.5	P1.5X0625	4.236	1.996	47.1	0.282	167.822	9144.980	0.018 <sup>1</sup> ✓
T7	112.5 - 110	P1.5X0625	4.236	1.996	47.1	0.282	434.426	9144.980	0.048 <sup>1</sup> ✓
T8	110 - 107.5	P1.5X0625	4.236	1.996	47.1	0.282	435.861	9144.980	0.048 <sup>1</sup> ✓
T9	107.5 - 105	P1.5X0625	4.236	1.996	47.1	0.282	578.479	9144.980	0.063 <sup>1</sup> ✓
T10	105 - 102.5	P1.5X0625	4.236	1.996	47.1	0.282	1003.310	9144.980	0.110 <sup>1</sup> ✓
T11	102.5 - 100	P1.5X0625	4.094	1.928	45.5	0.282	1165.430	9144.980	0.127 <sup>1</sup> ✓
T12	100 - 80	P1.5X0625	4.200	1.953	46.1	0.282	2074.900	9144.980	0.227 <sup>1</sup> ✓
T13	80 - 60	P1.5X0625	4.200	1.968	46.4	0.282	459.052	9144.980	0.050 <sup>1</sup> ✓
T14	60 - 40	P1.5X0625	4.200	1.953	46.1	0.282	2077.360	9144.980	0.227 <sup>1</sup> ✓
T15	40 - 20	P1.5X0625	4.200	3.905	92.1	0.282	2716.090	9144.980	0.297 <sup>1</sup> ✓
T16	20 - 5	P1.5X0625	4.188	3.894	91.9	0.282	2161.810	9144.980	0.236 <sup>1</sup> ✓

<sup>1</sup> P<sub>u</sub> / φP<sub>n</sub> controls

### Horizontal Design Data (Tension)

Section No.	Elevation ft	Size	L ft	L <sub>u</sub> ft	Kl/r	A in <sup>2</sup>	P <sub>u</sub> lb	φP <sub>n</sub> lb	Ratio $\frac{P_u}{\phi P_n}$
T15	40 - 20	1	3.420	3.180	152.6	0.785	1225.310	25446.900	0.048 <sup>1</sup> ✓
T16	20 - 5	1	3.420	3.180	152.6	0.785	1257.650	25446.900	0.049 <sup>1</sup> ✓

<sup>1</sup> P<sub>u</sub> / φP<sub>n</sub> controls

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### Secondary Horizontal Design Data (Tension)

Section No.	Elevation ft	Size	L ft	L <sub>u</sub> ft	Kl/r	A in <sup>2</sup>	P <sub>u</sub> lb	φP <sub>n</sub> lb	Ratio $\frac{P_u}{\phi P_n}$
T2	155 - 140	1	3.420	3.222	154.7	0.785	1360.230	25446.900	0.053 <sup>1</sup>
T3	140 - 120	L1 3/4x1 3/4x1/4	3.420	3.222	73.1	0.813	4720.640	26325.000	0.179 <sup>1</sup>
T8	110 - 107.5	L2x2x3/16	3.420	3.222	62.7	0.715	787.100	23166.000	0.034 <sup>1</sup>
T9	107.5 - 105	L2x2x3/16	3.420	3.222	62.7	0.715	1000.750	23166.000	0.043 <sup>1</sup>
T10	105 - 102.5	L2x2x3/16	3.420	3.222	62.7	0.715	1111.350	23166.000	0.048 <sup>1</sup>
T11	102.5 - 100	L2x2x3/16	3.420	3.222	62.7	0.715	921.441	23166.000	0.040 <sup>1</sup>
T13	80 - 60	L2x2x3/16	3.420	3.205	62.3	0.715	1488.320	23166.000	0.064 <sup>1</sup>

<sup>1</sup> P<sub>u</sub> / φP<sub>n</sub> controls

### Top Girt Design Data (Tension)

Section No.	Elevation ft	Size	L ft	L <sub>u</sub> ft	Kl/r	A in <sup>2</sup>	P <sub>u</sub> lb	φP <sub>n</sub> lb	Ratio $\frac{P_u}{\phi P_n}$
T1	170 - 155	P1.5X0625	3.420	3.222	76.0	0.282	2086.920	9144.980	0.228 <sup>1</sup>
T2	155 - 140	P1.5X0625	3.420	3.222	76.0	0.282	340.295	9144.980	0.037 <sup>1</sup>
T3	140 - 120	L1 1/2x1 1/2x1/8	3.420	2.983	83.1	0.199	527.896	8666.020	0.061 <sup>1</sup>
T4	120 - 117.5	P1.5X0625	3.420	3.222	76.0	0.282	775.484	9144.980	0.085 <sup>1</sup>
T12	100 - 80	P1.5X0625	3.420	3.180	75.0	0.282	811.345	9144.980	0.089 <sup>1</sup>
T13	80 - 60	P1.5X0625	3.420	3.205	75.6	0.282	335.611	9144.980	0.037 <sup>1</sup>
T14	60 - 40	P1.5X0625	3.420	3.180	75.0	0.282	965.380	9144.980	0.106 <sup>1</sup>
T15	40 - 20	P1.5X0625	3.420	3.180	75.0	0.282	879.513	9144.980	0.096 <sup>1</sup>
T16	20 - 5	ROHN 1.5 STD	3.420	3.180	61.3	0.799	604.100	25902.400	0.023 <sup>1</sup>
T17	5 - 0	14x3/16	2.907	2.667	591.3	2.625	5785.520	85050.000	0.068 <sup>1</sup>

L/R > 500 (T) - 583

<sup>1</sup> P<sub>u</sub> / φP<sub>n</sub> controls

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### Bottom Girt Design Data (Tension)

Section No.	Elevation <i>ft</i>	Size	<i>L</i> <i>ft</i>	<i>L<sub>u</sub></i> <i>ft</i>	<i>Kl/r</i>	<i>A</i> <i>in<sup>2</sup></i>	<i>P<sub>u</sub></i> <i>lb</i>	$\phi P_n$ <i>lb</i>	Ratio $\frac{P_u}{\phi P_n}$
T1	170 - 155	P1.5X0625	3.420	3.222	76.0	0.282	803.175	9144.980	0.088 <sup>1</sup>
T2	155 - 140	P1.5X0625	3.420	3.222	76.0	0.282	387.067	9144.980	0.042 <sup>1</sup>
T3	140 - 120	L1 3/4x1 3/4x1/8	3.420	3.222	70.9	0.422	989.204	13668.800	0.072 <sup>1</sup>
T11	102.5 - 100	P1.5X0625	3.420	3.222	76.0	0.282	351.486	9144.980	0.038 <sup>1</sup>
T12	100 - 80	P1.5X0625	3.420	3.180	75.0	0.282	904.954	9144.980	0.099 <sup>1</sup>
T13	80 - 60	P1.5X0625	3.420	3.205	75.6	0.282	377.799	9144.980	0.041 <sup>1</sup>
T14	60 - 40	P1.5X0625	3.420	3.180	75.0	0.282	928.164	9144.980	0.101 <sup>1</sup>
T15	40 - 20	P1.5X0625	3.420	3.180	75.0	0.282	351.548	9144.980	0.038 <sup>1</sup>
T16	20 - 5	L2x2x3/16	3.420	3.180	61.8	0.715	11897.000	23166.000	0.514 <sup>1</sup>
T17	5 - 0	14x3/16	0.513	0.273	60.5	2.625	1709.020	85050.000	0.020 <sup>1</sup>

<sup>1</sup>  $P_u / \phi P_n$  controls

### Mid Girt Design Data (Tension)

Section No.	Elevation <i>ft</i>	Size	<i>L</i> <i>ft</i>	<i>L<sub>u</sub></i> <i>ft</i>	<i>Kl/r</i>	<i>A</i> <i>in<sup>2</sup></i>	<i>P<sub>u</sub></i> <i>lb</i>	$\phi P_n$ <i>lb</i>	Ratio $\frac{P_u}{\phi P_n}$
T12	100 - 80	P1.5X0625	3.420	3.180	75.0	0.282	923.024	9144.980	0.101 <sup>1</sup>
T14	60 - 40	P1.5X0625	3.420	3.180	75.0	0.282	938.574	9144.980	0.103 <sup>1</sup>

<sup>1</sup>  $P_u / \phi P_n$  controls

### Top Guy Pull-Off Design Data (Tension)

Section No.	Elevation <i>ft</i>	Size	<i>L</i> <i>ft</i>	<i>L<sub>u</sub></i> <i>ft</i>	<i>Kl/r</i>	<i>A</i> <i>in<sup>2</sup></i>	<i>P<sub>u</sub></i> <i>lb</i>	$\phi P_n$ <i>lb</i>	Ratio $\frac{P_u}{\phi P_n}$
T2	155 - 140	L2x2x3/16	3.420	3.222	62.7	0.413	4263.240	17974.301	0.237 <sup>1</sup>
T12	100 - 80	4x3/8	3.420	3.180	352.6	1.125	3519.420	54843.801	0.064
T14	60 - 40	4x3/8	3.420	3.180	352.6	1.125	4177.330	54843.801	0.076

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Section No.	Elevation ft	Size	L ft	L <sub>u</sub> ft	Kl/r	A in <sup>2</sup>	P <sub>u</sub> lb	φP <sub>n</sub> lb	Ratio $\frac{P_u}{\phi P_n}$
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<sup>1</sup> P<sub>u</sub> / φP<sub>n</sub> controls

### Top Guy Pull-Off Bending Design Data

Section No.	Elevation ft	Size	M <sub>ux</sub> kip-ft	φM <sub>ux</sub> kip-ft	Ratio $\frac{M_{ux}}{\phi M_{ux}}$	M <sub>uy</sub> kip-ft	φM <sub>uy</sub> kip-ft	Ratio $\frac{M_{uy}}{\phi M_{uy}}$
T2	155 - 140	L2x2x3/16	0.000	1.301	0.000	0.000	0.664	0.000
T12	100 - 80	4x3/8	0.039	0.527	0.073	-0.000	5.625	0.000
T14	60 - 40	4x3/8	0.038	0.527	0.072	0.000	5.625	0.000

### Top Guy Pull-Off Interaction Design Data

Section No.	Elevation ft	Size	Ratio $\frac{P_u}{\phi P_n}$	Ratio $\frac{M_{ux}}{\phi M_{ux}}$	Ratio $\frac{M_{uy}}{\phi M_{uy}}$	Comb. Stress Ratio	Allow. Stress Ratio	Criteria
T2	155 - 140	L2x2x3/16	0.237	0.000	0.000	0.237 <sup>1</sup>	1.000	4.8.1 ✓
T12	100 - 80	4x3/8	0.064	0.073	0.000	0.106 ✓	1.000	4.8.1 ✓
T14	60 - 40	4x3/8	0.076	0.072	0.000	0.110 ✓	1.000	4.8.1 ✓

<sup>1</sup> P<sub>u</sub> / φP<sub>n</sub> controls

### Torque-Arm Top Design Data

Section No.	Elevation ft	Size	L ft	L <sub>u</sub> ft	Kl/r	A in <sup>2</sup>	P <sub>u</sub> lb	φP <sub>n</sub> lb	Ratio $\frac{P_u}{\phi P_n}$
T2	155 - 140 (592)	C12x20.7	3.500	3.401	51.1	6.090	1989.730	197316.000	0.010
T2	155 - 140 (593)	C12x20.7	3.500	3.401	51.1	6.090	2179.100	197316.000	0.011
T2	155 - 140 (599)	C12x20.7	3.500	3.401	51.1	6.090	2165.790	197316.000	0.011
T2	155 - 140 (600)	C12x20.7	3.500	3.401	51.1	6.090	2076.460	197316.000	0.011
T2	155 - 140 (603)	C12x20.7	3.500	3.401	51.1	6.090	2035.470	197316.000	0.010
T2	155 - 140 (604)	C12x20.7	3.500	3.401	51.1	6.090	2108.640	197316.000	0.011
T3	140 - 120 (607)	C12x20.7 with 8"x3/8" plates	3.500	3.401	61.3	9.080	4173.970	294192.000	0.014
T3	140 - 120 (608)	C12x20.7 with 8"x3/8" plates	3.500	3.401	61.3	9.080	4301.740	294192.000	0.015
T3	140 - 120 (611)	C12x20.7 with 8"x3/8" plates	3.500	3.401	61.3	9.080	4323.470	294192.000	0.015
T3	140 - 120 (612)	C12x20.7 with 8"x3/8" plates	3.500	3.401	61.3	9.080	4253.260	294192.000	0.014
T3	140 - 120 (615)	C12x20.7 with 8"x3/8" plates	3.500	3.401	61.3	9.080	4219.120	294192.000	0.014



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	<b>Client</b>	Sprint	<b>Designed by</b>	abassett

Section No.	Elevation ft	Size	L ft	L <sub>u</sub> ft	Kl/r	A in <sup>2</sup>	P <sub>u</sub> lb	φP <sub>n</sub> lb	Ratio $\frac{P_u}{\phi P_n}$
T3	140 - 120 (616)	C12x20.7 with 8"x3/8" plates	3.500	3.401	61.3	9.080	4225.210	294192.000	0.014

### Torque-Arm Top Bending Design Data

Section No.	Elevation ft	Size	M <sub>ux</sub> kip-ft	φM <sub>ux</sub> kip-ft	Ratio $\frac{M_{ux}}{\phi M_{ux}}$	M <sub>uy</sub> kip-ft	φM <sub>uy</sub> kip-ft	Ratio $\frac{M_{uy}}{\phi M_{uy}}$
T2	155 - 140 (592)	C12x20.7	-19.968	58.050	0.344	0.000	9.423	0.000
T2	155 - 140 (593)	C12x20.7	-22.123	58.050	0.381	0.000	9.423	0.000
T2	155 - 140 (599)	C12x20.7	-21.178	58.050	0.365	0.000	9.423	0.000
T2	155 - 140 (600)	C12x20.7	-20.169	58.050	0.347	0.000	9.423	0.000
T2	155 - 140 (603)	C12x20.7	-20.948	58.050	0.361	0.000	9.423	0.000
T2	155 - 140 (604)	C12x20.7	-22.046	58.050	0.380	0.000	9.423	0.000
T3	140 - 120 (607)	C12x20.7 with 8"x3/8" plates	-33.419	97.877	0.341	0.000	11.078	0.000
T3	140 - 120 (608)	C12x20.7 with 8"x3/8" plates	-37.970	97.877	0.388	0.000	11.078	0.000
T3	140 - 120 (611)	C12x20.7 with 8"x3/8" plates	-35.709	97.877	0.365	0.000	11.078	0.000
T3	140 - 120 (612)	C12x20.7 with 8"x3/8" plates	-33.743	97.877	0.345	0.000	11.078	0.000
T3	140 - 120 (615)	C12x20.7 with 8"x3/8" plates	-35.365	97.877	0.361	0.000	11.078	0.000
T3	140 - 120 (616)	C12x20.7 with 8"x3/8" plates	-37.837	97.877	0.387	0.000	11.078	0.000

### Torque-Arm Top Interaction Design Data

Section No.	Elevation ft	Size	Ratio $\frac{P_u}{\phi P_n}$	Ratio $\frac{M_{ux}}{\phi M_{ux}}$	Ratio $\frac{M_{uy}}{\phi M_{uy}}$	Comb. Stress Ratio	Allow. Stress Ratio	Criteria
T2	155 - 140 (592)	C12x20.7	0.010	0.344	0.000	0.349	1.000	4.8.1 ✓
T2	155 - 140 (593)	C12x20.7	0.011	0.381	0.000	0.387	1.000	4.8.1 ✓
T2	155 - 140 (599)	C12x20.7	0.011	0.365	0.000	0.370	1.000	4.8.1 ✓
T2	155 - 140 (600)	C12x20.7	0.011	0.347	0.000	0.353	1.000	4.8.1 ✓
T2	155 - 140 (603)	C12x20.7	0.010	0.361	0.000	0.366	1.000	4.8.1 ✓
T2	155 - 140 (604)	C12x20.7	0.011	0.380	0.000	0.385	1.000	4.8.1 ✓
T3	140 - 120 (607)	C12x20.7 with 8"x3/8" plates	0.014	0.341	0.000	0.349	1.000	4.8.1 ✓
T3	140 - 120 (608)	C12x20.7 with 8"x3/8" plates	0.015	0.388	0.000	0.395	1.000	4.8.1 ✓

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	<b>Client</b>	Sprint	<b>Designed by</b>	abassett

Section No.	Elevation ft	Size	Ratio	Ratio	Ratio	Comb. Stress Ratio	Allow. Stress Ratio	Criteria
			$P_u$	$M_{ux}$	$M_{uy}$			
T3	140 - 120 (611)	C12x20.7 with 8"x3/8" plates	0.015	0.365	0.000	0.372	1.000	4.8.1 ✓
T3	140 - 120 (612)	C12x20.7 with 8"x3/8" plates	0.014	0.345	0.000	0.352	1.000	4.8.1 ✓
T3	140 - 120 (615)	C12x20.7 with 8"x3/8" plates	0.014	0.361	0.000	0.368	1.000	4.8.1 ✓
T3	140 - 120 (616)	C12x20.7 with 8"x3/8" plates	0.014	0.387	0.000	0.394	1.000	4.8.1 ✓

### Section Capacity Table

Section No.	Elevation ft	Component Type	Size	Critical Element	P lb	$\phi P_{allow}$ lb	% Capacity	Pass Fail
T1	170 - 155	Leg	ROHN 2 STD	2	-20555.500	48302.602	42.6	Pass
T2	155 - 140	Leg	ROHN 2 STD	47	-31450.801	48302.602	65.1	Pass
T3	140 - 120	Leg	Pipe 2.0 STD W 1" Rod Reinforcement	112	-45935.500	80322.203	57.2	Pass
T4	120 - 117.5	Leg	ROHN 2 STD	193	-41698.000	44367.898	94.0	Pass
T5	117.5 - 115	Leg	ROHN 2 STD	205	-42611.000	43481.500	98.0	Pass
T6	115 - 112.5	Leg	ROHN 2 STD	214	-42811.801	43481.500	98.5	Pass
T7	112.5 - 110	Leg	ROHN 2 STD	223	-43368.602	43481.500	99.7	Pass
T8	110 - 107.5	Leg	ROHN 2 STD	232	-43473.301	47086.898	92.3	Pass
T9	107.5 - 105	Leg	ROHN 2 STD	244	-43617.102	47086.898	92.6	Pass
T10	105 - 102.5	Leg	ROHN 2 STD	256	-44448.199	47086.898	94.4	Pass
T11	102.5 - 100	Leg	ROHN 2 STD	266	-45921.699	48302.602	95.1	Pass
T12	100 - 80	Leg	ROHN 2.5 STD	281	-54252.602	71520.000	75.9	Pass
T13	80 - 60	Leg	Pipe 2.0 STD with 1/3rd Split 2.5 STD Pipe	341	-58939.398	75376.500	78.2	Pass
T14	60 - 40	Leg	ROHN 2.5 STD	423	-65080.602	71520.000	91.0	Pass
T15	40 - 20	Leg	2.5 STD w/ 90 deg 3.0 STD	484	-70743.203	94783.203	74.6	Pass
T16	20 - 5	Leg	2.5 STD w/ 90 deg 3.0 STD	537	-72610.500	94909.398	76.5	Pass
T17	5 - 0	Leg	2.5 STD w/ 90 deg 3.0 STD	579	-79286.000	97824.703	81.0	Pass
T1	170 - 155	Diagonal	P1.5X0625	14	-2768.070	8159.740	33.9	Pass
T2	155 - 140	Diagonal	P1.5X0625	104	-3370.710	8159.740	41.3	Pass
T3	140 - 120	Diagonal	L1 3/4x1 3/4x1/4	156	-4953.350	18952.801	26.1	Pass
T4	120 - 117.5	Diagonal	P1.5X0625	197	-723.374	8201.100	8.8	Pass
T5	117.5 - 115	Diagonal	P1.5X0625	207	382.723	9144.980	4.2	Pass
T6	115 - 112.5	Diagonal	P1.5X0625	217	-322.073	8138.040	4.0	Pass
T7	112.5 - 110	Diagonal	P1.5X0625	226	-402.627	8138.040	4.9	Pass
T8	110 - 107.5	Diagonal	P1.5X0625	235	-995.264	8138.040	12.2	Pass
T9	107.5 - 105	Diagonal	P1.5X0625	247	-1465.890	8138.040	18.0	Pass
T10	105 - 102.5	Diagonal	P1.5X0625	259	-1504.220	8138.040	18.5	Pass
T11	102.5 - 100	Diagonal	P1.5X0625	274	-2337.880	8201.100	28.5	Pass
T12	100 - 80	Diagonal	P1.5X0625	319	-2347.030	8178.440	28.7	Pass

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	<b>Client</b>	Sprint	<b>Designed by</b>	abassett

Section No.	Elevation ft	Component Type	Size	Critical Element	P lb	$\phi P_{allow}$ lb	% Capacity	Pass Fail
T13	80 - 60	Diagonal	P1.5X0625	352	-1769.210	8164.510	50.2 (b) 21.7	Pass
T14	60 - 40	Diagonal	P1.5X0625	452	-2357.980	8178.440	25.4 (b) 28.8	Pass
T15	40 - 20	Diagonal	P1.5X0625	535	-3452.790	5850.370	50.3 (b) 59.0	Pass
T16	20 - 5	Diagonal	P1.5X0625	546	-2649.030	5865.380	65.7 (b) 45.2	Pass
T15	40 - 20	Horizontal	1	501	-1225.310	13951.400	52.3 (b) 8.8	Pass
T16	20 - 5	Horizontal	1	548	-1257.650	13951.400	9.0	Pass
T2	155 - 140	Secondary Horizontal	1	108	-1091.280	13729.800	7.9	Pass
T3	140 - 120	Secondary Horizontal	L1 3/4x1 3/4x1/4	171	-3215.900	16113.700	20.0	Pass
T8	110 - 107.5	Secondary Horizontal	L2x2x3/16	240	-752.979	14932.500	5.0	Pass
T9	107.5 - 105	Secondary Horizontal	L2x2x3/16	252	-755.470	14932.500	5.1	Pass
T10	105 - 102.5	Secondary Horizontal	L2x2x3/16	264	-769.865	14932.500	5.2	Pass
T11	102.5 - 100	Secondary Horizontal	L2x2x3/16	279	-768.218	14932.500	5.1	Pass
T13	80 - 60	Secondary Horizontal	L2x2x3/16	358	-988.142	14956.900	6.6	Pass
T1	170 - 155	Top Girt	P1.5X0625	6	2086.920	9144.980	22.8	Pass
T2	155 - 140	Top Girt	P1.5X0625	50	-321.644	6746.920	50.5 (b) 4.8	Pass
T3	140 - 120	Top Girt	L1 1/2x1 1/2x1/8	113	527.896	8666.020	8.2 (b) 6.1	Pass
T4	120 - 117.5	Top Girt	P1.5X0625	196	775.484	9144.980	16.5 (b) 8.5	Pass
T12	100 - 80	Top Girt	P1.5X0625	286	811.345	9144.980	18.8 (b) 8.9	Pass
T13	80 - 60	Top Girt	P1.5X0625	344	335.611	9144.980	19.6 (b) 3.7	Pass
T14	60 - 40	Top Girt	P1.5X0625	427	965.380	9144.980	8.1 (b) 10.6	Pass
T15	40 - 20	Top Girt	P1.5X0625	485	-681.024	6800.380	23.4 (b) 10.0	Pass
T16	20 - 5	Top Girt	ROHN 1.5 STD	541	604.100	25902.400	21.3 (b) 2.3	Pass
T17	5 - 0	Top Girt	14x3/16	583	5785.520	85050.000	7.6 (b) 6.8	Pass
T1	170 - 155	Bottom Girt	P1.5X0625	9	-744.285	6746.920	11.0	Pass
T2	155 - 140	Bottom Girt	P1.5X0625	55	387.067	9144.980	4.2	Pass
T3	140 - 120	Bottom Girt	L1 3/4x1 3/4x1/8	117	989.204	13668.800	7.2	Pass
T11	102.5 - 100	Bottom Girt	P1.5X0625	269	351.486	9144.980	3.8	Pass
T12	100 - 80	Bottom Girt	P1.5X0625	289	904.954	9144.980	9.9	Pass
T13	80 - 60	Bottom Girt	P1.5X0625	348	377.799	9144.980	4.1	Pass
T14	60 - 40	Bottom Girt	P1.5X0625	430	928.164	9144.980	10.1	Pass
T15	40 - 20	Bottom Girt	P1.5X0625	489	351.548	9144.980	3.8	Pass
T16	20 - 5	Bottom Girt	L2x2x3/16	543	11897.000	23166.000	51.4	Pass
T17	5 - 0	Bottom Girt	14x3/16	586	-1916.980	70132.703	3.7	Pass
T12	100 - 80	Mid Girt	P1.5X0625	291	923.024	9144.980	10.1	Pass
T14	60 - 40	Mid Girt	P1.5X0625	432	938.574	9144.980	10.3	Pass
T17	5 - 0	Mid Girt	14x3/16	589	-756.285	5583.330	13.5	Pass
T2	155 - 140	Guy A@152.333	3/8	601	8642.750	9240.000	93.5	Pass
T3	140 - 120	Guy A@132.438	1/2	613	15601.500	16140.000	96.7	Pass
T12	100 - 80	Guy A@90	1/2	622	15150.600	16140.000	93.9	Pass
T14	60 - 40	Guy A@50	1/2	628	12437.300	16140.000	77.1	Pass
T2	155 - 140	Guy B@152.333	3/8	597	8354.170	9240.000	90.4	Pass
T3	140 - 120	Guy B@132.438	1/2	609	14910.900	16140.000	92.4	Pass
T12	100 - 80	Guy B@90	1/2	621	14406.400	16140.000	89.3	Pass
T14	60 - 40	Guy B@50	1/2	627	11791.700	16140.000	73.1	Pass
T2	155 - 140	Guy C@152.333	3/8	591	8209.050	9240.000	88.8	Pass
T3	140 - 120	Guy C@132.438	1/2	606	14542.600	16140.000	90.1	Pass
T12	100 - 80	Guy C@90	1/2	617	13923.600	16140.000	86.3	Pass

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	<b>Client</b>	Sprint	<b>Designed by</b>	abassett

Section No.	Elevation ft	Component Type	Size	Critical Element	P lb	$\phi P_{allow}$ lb	% Capacity	Pass Fail	
T14	60 - 40	Guy C@50	1/2	623	11418.300	16140.000	70.7	Pass	
T2	155 - 140	Top Guy	L2x2x3/16	594	-3863.980	13953.100	27.7	Pass	
		Pull-Off@152.333					61.5 (b)		
T12	100 - 80	Top Guy	4x3/8	620	3519.420	54843.801	10.6	Pass	
		Pull-Off@90							
T14	60 - 40	Top Guy	4x3/8	626	4177.330	54843.801	11.0	Pass	
		Pull-Off@50							
T2	155 - 140	Torque Arm	C12x20.7	593	2179.100	197316.000	43.5	Pass	
		Top@152.333							
T3	140 - 120	Torque Arm	C12x20.7 with 8"x3/8" plates	608	4301.740	294192.000	43.3	Pass	
		Top@132.438							
							Summary		
							Leg (T7)	99.7	Pass
							Diagonal (T2)	77.3	Pass
							Horizontal (T16)	9.0	Pass
							Secondary Horizontal (T3)	20.0	Pass
							Top Girt (T1)	50.5	Pass
							Bottom Girt (T16)	51.4	Pass
							Mid Girt (T17)	13.5	Pass
							Guy A (T3)	96.7	Pass
							Guy B (T3)	92.4	Pass
							Guy C (T3)	90.1	Pass
							Top Guy Pull-Off (T2)	61.5	Pass
							Torque Arm Top (T2)	43.5	Pass
							Bolt Checks	77.3	Pass
							<b>RATING =</b>	<b>99.7</b>	<b>Pass</b>



201 STATE ROUTE 17 NORTH  
RUTHERFORD, NJ 07070  
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713 Clover Lane  
Moscow, PA 18444  
Phone: 973-207-4248  
Fax: 570-842-5592



SCALE: AS SHOWN JOB NUMBER: 17924017A

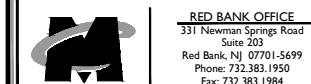
REV	DATE	DESCRIPTION	BY	CHECKED BY
3	04/16/18	REVISED PER COMMENTS	JCM	PET
2	04/06/18	REVISED PER RFDS	JCM	JKM
1	12/21/17	TOWER MODIFICATION	JRF	JKM
0	10/30/17	ISSUED FOR PERMIT	JRF	JKM
A	09/28/17	ISSUED FOR REVIEW	JRF	FEP



IT IS A VIOLATION OF LAW FOR ANY PERSON, UNLESS THEY ARE ACTING UNDER THE DIRECTION OF THE RESPONSIBLE LICENSED PROFESSIONAL ENGINEER, TO ALTER THIS DOCUMENT.

SITE NAME: NEWINGTON  
SITE ID: CT52XC043

99 CEDARWOOD LANE  
NEWINGTON, CT 06111



RED BANK OFFICE  
331 Newnam Springs Road  
Suite 203  
Red Bank, NJ 07701-5699  
Phone: 732.383.1950  
Fax: 732.383.1984

SHEET TITLE:

TITLE SHEET

SHEET NUMBER:

T-001.00

# SITE ID: CT52XC043 SITE NAME: NEWINGTON

## 99 CEDARWOOD LANE NEWINGTON, CT 06111

### DO MACRO PROJECT

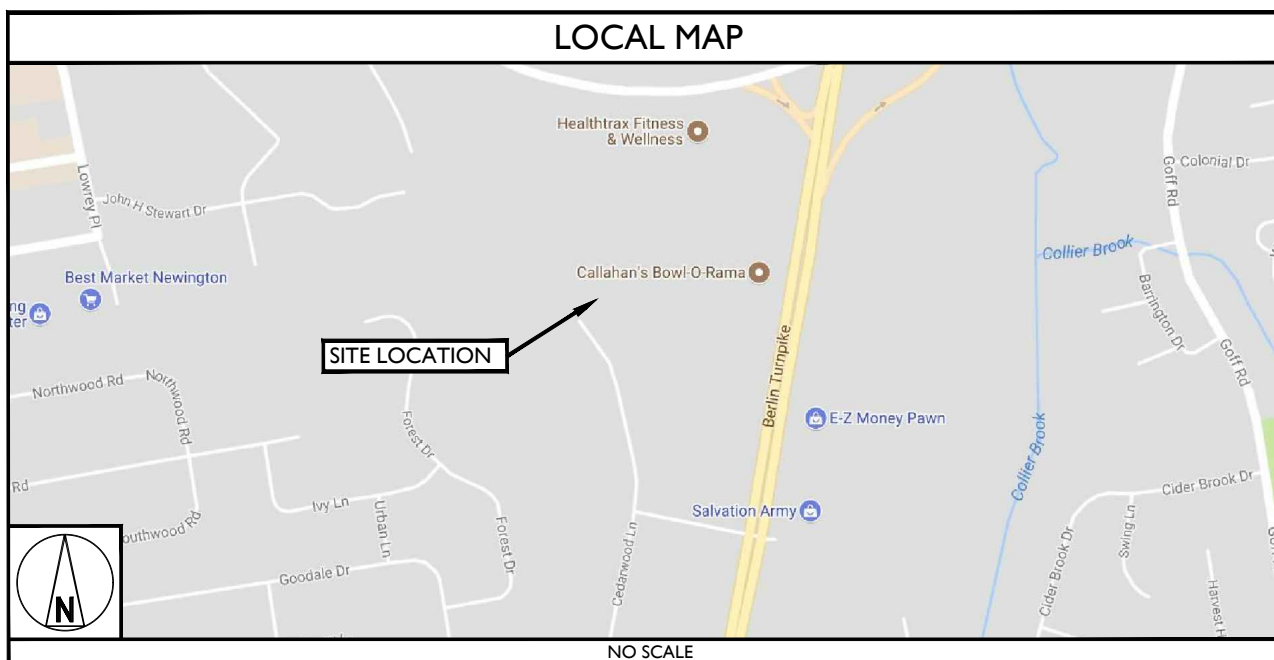
SITE INFORMATION	
ADDRESS:	99 CEDARWOOD LANE NEWINGTON, CT 06111
JURISDICTION:	TOWN OF NEWINGTON
COUNTY:	HARTFORD
PROPERTY OWNER:	FRANCIS CALLAHAN 105 CEDARWOOD LANE NEWINGTON, CT 06111
TOWER OWNER:	FRANCIS CALLAHAN 105 CEDARWOOD LANE NEWINGTON, CT 06111
APPLICANT:	SPRINT 201 STATE ROUTE 17 NORTH RUTHERFORD, NJ 07070
LATITUDE (NAD 83):	N 41.69490°
LONGITUDE (NAD 83):	W 72.70892°
CURRENT USE:	UNMANNED TELECOMMUNICATIONS FACILITY
PROPOSED USE:	NO CHANGE
UTILITY COMPANY:	CONNECTICUT LIGHT AND POWER PHONE: 800-922-4455

RF CONFIGURATION	
THE CONTRACTOR SHALL OBTAIN THE LATEST RF DATA SHEET AND CONFIRM SAME WITH THE SPRINT CONSTRUCTION MANAGER PRIOR TO START OF CONSTRUCTION.	

PROJECT CONTACTS			
NAME:	COMPANY:	PHONE #:	
ENGINEER: JEREMY MCKEON	MASER CONSULTING P.A.	973.398.3110	
CONSTRUCTION: TOM JUPIN	CHERUNDOLO CONSULTING	973.819.9033	

STRUCTURAL STATEMENT	
THE PROPOSED ANTENNA AND EQUIPMENT INSTALLATION SHALL BE EVALUATED INCLUDING THE NEW LOAD CONDITIONS ON THE SUPPORTING ELEMENTS OF THE EXISTING STRUCTURE. THESE PLANS HAVE BEEN DEVELOPED FOR THE PROPOSED TELECOMMUNICATION FACILITY TO BE OWNED OR LEASED BY SPRINT IN ACCORDANCE WITH THE SCOPE OF WORK PROVIDED BY CHERUNDOLO CONSULTING. MASER HAS INCORPORATED THE SCOPE OF WORK WITHIN THESE PLANS. ELEMENTS OF THE STRUCTURE AFFECTED BY THE SCOPE OF WORK SHALL BE ANALYZED UNDER SEPARATE COVER. MASER ASSUMES NO RESPONSIBILITY FOR ANY ELEMENTS OF THE SITE NOT AFFECTED BY THE SCOPE OR FOR CHANGES TO THE SCOPE OF WORK NOT SPECIFICALLY SHOWN ON THESE DRAWINGS.	

APPROVALS	
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.	
CONSTRUCTION: _____ DATE: _____	
LEASING/SITE ACQUISITION: _____ DATE: _____	
RF ENGINEERING: _____ DATE: _____	
LANDLORD/PROPERTY OWNER: _____ DATE: _____	



DRIVING DIRECTIONS	
FROM SPRINT OFFICES, RUTHERFORD, NJ: HEAD SOUTH. SLIGHT LEFT TOWARD VETERANS BOULEVARD. TURN LEFT TOWARD VETERANS BOULEVARD. TURN RIGHT TOWARD VETERANS BOULEVARD. TURN LEFT TOWARD VETERANS BOULEVARD. TURN LEFT ONTO BOROUGH ST. TURN RIGHT ONTO NJ-17 N. TAKE THE POLIFLY ROAD/I-80 EAST/HACKENSACK EXIT. MERGE ONTO TERRACE AVENUE. CONTINUE ONTO POLIFLY ROAD. TURN RIGHT ONTO THE RAMP TO NEW JERSEY TURNPIKE. MERGE ONTO I-80 EAST. MERGE ONTO I-95 NORTH. KEEP RIGHT TO CONTINUE ON I-95. FOLLOW SIGNS FOR GW BRIDGE (LOWER LEVEL)/PALISADES PARKWAY/IUS-9W. KEEP RIGHT TO STAY ON I-95. FOLLOW SIGNS FOR US-1 NIJUS-9 NIGEOURGE WASHINGTON BRIDGE. CONTINUE ONTO US-1 NIJUS-9 N. CONTINUE ONTO I-95 LOWER LEVEL NIJUS-1 LOWER LEVEL N. CONTINUE ONTO I-95 N. TAKE EXIT 1C-D FOR ALBANY N TOWARD ALBANY. MERGE ONTO I-87 N. TAKE EXIT 4 TOWARD CROSS COUNTY PKWY E. MERGE ONTO CENTRAL PARK AVE. TAKE THE CROSS COUNTY PARKWAY E RAMP. KEEP LEFT AT THE FORK. FOLLOW SIGNS FOR HUTCHINSON PKWY AND MERGE ONTO CROSS COUNTY PARKWAY/NEW YORK STATE REFERENCE RTE 907K. MERGE ONTO HUTCHINSON RIVER PKWY N. KEEP RIGHT AT THE FORK TO STAY ON HUTCHINSON RIVER PKWY N. CONTINUE ONTO CT-15 NORTH. KEEP LEFT TO STAY ON CT-15 NORTH. TURN LEFT TOWARD CEDARWOOD LN. TURN RIGHT ONTO CEDARWOOD LANE. THE TOWER WILL BE ON THE RIGHT.	COPYRIGHT © 2017, MASER CONSULTING P.A. ALL RIGHTS RESERVED  THIS DRAWING AND ALL THE INFORMATION CONTAINED HEREIN IS AUTHORIZED FOR USE ONLY BY THE PARTY FOR WHOM THE WORK WAS CONTRACTED OR TO WHOM IT IS CERTIFIED. THIS DRAWING MAY NOT BE COPIED, REUSED, DISCLOSED, DISTRIBUTED OR RELIED UPON FOR ANY OTHER PURPOSE WITHOUT THE EXPRESS WRITTEN CONSENT OF MASER CONSULTING, P.A.

DRAWING INDEX		
NYC DOB NUMBER	SHEET TITLE	REV.
T-001.00	TITLE SHEET	2
ANT-001.00	GENERAL NOTES - 1	2
ANT-002.00	GENERAL NOTES - 2	2
ANT-003.00	GENERAL NOTES - 3	2
ANT-004.00	COMPOUND PLAN	2
ANT-005.00	EQUIPMENT PLAN AND ELEVATION	2
ANT-006.00	ANTENNA ORIENTATION PLAN	2
ANT-007.00	DETAILS	2
ANT-008.00	ANTENNA SCHEDULE, WIRING DIAGRAM, BILL OF MATERIALS AND NOTES	2
ANT-009.00	FIBER PLUMBING DIAGRAMS - 1	2
ANT-010.00	FIBER PLUMBING DIAGRAMS - 2	2
ANT-011.00	CABLE COLOR CODING, DC POWER DETAILS & PANEL SCHEDULES	2
ANT-012.00	ELECTRICAL AND GROUNDING NOTES	2
ANT-013.00	GROUNDING SCHEMATIC AND DETAILS	2
ANT-014.00	TOWER MODIFICATION DETAILS	2

APPLICABLE BUILDING CODES & STANDARDS	
ALL WORK AND MATERIALS SHALL BE PERFORMED AND INSTALLED IN ACCORDANCE WITH THE CURRENT EDITIONS OF THE FOLLOWING CODES AS ADOPTED BY THE LOCAL GOVERNING AUTHORITIES. NOTHING IN THESE PLANS IS TO BE CONSTRUED TO PERMIT WORK NOT CONFORMING TO THE LATEST EDITIONS OF THE FOLLOWING CODES.	
1.	2016 CONNECTICUT STATE BUILDING CODE, INCORPORATING THE 2012 INTERNATIONAL BUILDING CODE
2.	TIA/EIA-222-G OR LATEST EDITION
3.	NFPA 780-LIGHTNING PROTECTION CODE 2011
4.	2014 NATIONAL ELECTRIC CODE OR LATEST EDITION
5.	ANY OTHER NATIONAL OR LOCAL APPLICABLE CODES MOST RECENT EDITIONS
6.	CT BUILDING CODE
7.	LOCAL BUILDING CODE
8.	CITY/COUNTY ORDINANCES

SCOPE OF WORK	
SPRINT PROPOSED TO MODIFY AN EXISTING UNMANNED TELECOMMUNICATIONS FACILITY.	
<ul style="list-style-type: none"> <li>INSTALL (6) NEW PANEL ANTENNAS</li> <li>INSTALL (9) NEW RRH'S BEHIND NEW ANTENNAS</li> <li>INSTALL (24) JUMPER CABLES</li> <li>INSTALL (4) HYBRID CABLES</li> <li>INSTALL (1) ELTEK GROWTH CABINET</li> <li>INSTALL (1) ELTEK PPC</li> <li>TOWER MODIFICATIONS</li> </ul>	

**GENERAL NOTES**

1. CONTRACTOR SHALL NOT COMMENCE ANY WORK UNTIL HE OBTAINS, AT HIS OWN EXPENSE, ALL INSURANCE REQUIRED BY SPRINT, THE PROPERTY OWNER AND/OR PROPERTY MANAGEMENT COMPANY.
2. THIS SET OF PLANS HAS BEEN PREPARED FOR THE PURPOSES OF MUNICIPAL AND AGENCY REVIEW AND APPROVAL. THIS SET OF PLANS SHALL NOT BE UTILIZED AS CONSTRUCTION DOCUMENTS UNTIL ALL CONDITIONS OF APPROVAL HAVE BEEN SATISFIED AND EACH OF THE DRAWINGS HAVE BEEN REVISED TO INDICATE "ISSUED FOR CONSTRUCTION".
3. THE CONTRACTOR SHALL COMPLY WITH ALL APPLICABLE CODES, ORDINANCES, LAWS AND REGULATIONS OF ALL MUNICIPALITIES, UTILITIES OR OTHER PUBLIC AUTHORITIES.
4. THE CONTRACTOR SHALL BE RESPONSIBLE FOR OBTAINING ALL PERMITS AND INSPECTIONS THAT MAY BE REQUIRED BY ANY FEDERAL, STATE, COUNTY OR MUNICIPAL AUTHORITIES.
5. THE CONTRACTOR SHALL NOTIFY THE CONSTRUCTION MANAGER, IN WRITING, OF ANY CONFLICTS, ERRORS OR OMISSIONS PRIOR TO THE SUBMISSION OF BIDS FOR PERFORMANCE OF WORK. MINOR OMISSIONS OR ERRORS IN THE BID DOCUMENTS SHALL NOT EXCUSE SAID CONTRACTOR FROM COMPLETING THIS PROJECT IN ACCORDANCE WITH THE OVERALL INTENT OF THESE DRAWINGS.
6. THE CONTRACTOR SHALL BE RESPONSIBLE FOR PROTECTING ALL EXISTING SITE IMPROVEMENTS PRIOR TO COMMENCING DEMOLITION. THE CONTRACTOR SHALL REPAIR ANY DAMAGE CAUSED AS A RESULT OF REMOVAL OF THIS FACILITY.
7. THE SCOPE OF WORK FOR THIS PROJECT SHALL INCLUDE PROVIDING ALL MATERIALS, EQUIPMENT AND LABOR AS REQUIRED TO COMPLETE THIS PROJECT. ALL EQUIPMENT SHALL BE INSTALLED IN ACCORDANCE WITH THE MANUFACTURER'S RECOMMENDATIONS.
8. THE CONTRACTOR SHALL VISIT THE PROJECT SITE PRIOR TO SUBMITTING A BID TO VERIFY THAT THE PROJECT CAN BE REMOVED IN ACCORDANCE WITH THE CONTRACT DOCUMENTS.
9. THE DEMOLITION CONTRACTOR IS SOLELY RESPONSIBLE FOR DETERMINING ALL REMOVAL MEANS AND METHODS. THE DEMOLITION CONTRACTOR IS ALSO RESPONSIBLE FOR ALL JOB SITE SAFETY.
10. THE CONTRACTOR IS TO REVIEW ALL DRAWINGS AND SPECIFICATIONS IN THE CONTRACT DOCUMENT SET. THE CONTRACTOR SHALL COORDINATE ALL WORK SHOWN IN THE SET OF DRAWINGS. THE CONTRACTOR SHALL PROVIDE A COMPLETE SET OF DRAWINGS TO ALL SUBCONTRACTORS AND RELATED PARTIES. THE SUBCONTRACTOR SHALL EXAMINE ALL THE DRAWINGS AND SPECIFICATIONS FOR THE INFORMATION THAT EFFECTS THEIR WORK.
11. THE CONTRACTOR SHALL MAINTAIN A CURRENT SET OF DRAWINGS AND SPECIFICATIONS ON THE SITE AT ALL TIMES AND INSURE THE DISTRIBUTION OF NEW DRAWINGS TO SUBCONTRACTORS AND OTHER RELEVANT PARTIES AS SOON AS THEY ARE MADE AVAILABLE. OLD DRAWINGS SHALL BE MARKED VOID AND REMOVED FROM THE CONTRACT AREA. CONTRACTOR FURNISH 3 SETS OF REDLINE "AS-REMOVED" DRAWINGS TO SPRINT UPON COMPLETION OF THE WORK.
12. REPAIR MATERIALS INSTALLED SHALL MEET REQUIREMENTS OF CONTRACTORS DOCUMENTS. NO SUBSTITUTIONS ARE ALLOWED.
13. THE CONTRACTOR SHALL RECEIVE CLARIFICATION IN WRITING AND SHALL RECEIVE IN WRITING AUTHORIZATION TO PROCEED BEFORE STARTING WORK ON ANY ITEMS NOT CLEARLY DEFINED OR IDENTIFIED BY THE CONTRACT DOCUMENTS.
14. THE CONTRACTOR SHALL NOTIFY THE CONSTRUCTION MANAGER OF ALL PRODUCTS OR ITEMS NOTED AS EXISTING WHICH ARE NOT FOUND TO BE IN THE FIELD.
15. DEMOLITION SHALL BE DONE IN A WORKMANLIKE MANNER BY COMPETENT EXPERIENCED WORKMEN IN ACCORDANCE WITH APPLICABLE CODES AND THE BEST-ACCEPTED PRACTICE. ALL SURFACES SHALL BE REPAIRED TO MATCH THEIR SURROUNDINGS AND PROVIDE WEATHER TIGHT SEAL ON SAME DAY AS REMOVAL.
16. THE CONTRACTOR SHALL COORDINATE HIS WORK AND SCHEDULE HIS ACTIVITIES AND WORKING HOURS IN ACCORDANCE WITH THE REQUIREMENTS OF THE PROPERTY OWNER AND/OR PROPERTY MANAGEMENT COMPANY.
17. THE CONTRACTOR SHALL BE RESPONSIBLE FOR COORDINATING HIS WORK WITH THE WORK OF OTHERS AS IT MAY RELATE TO RADIO EQUIPMENT, ANTENNAS AND ANY OTHER PORTIONS OF THE WORK.
18. THE CONTRACTOR SHALL REPAIR ALL EXISTING SURFACES DAMAGED DURING REMOVAL SUCH THAT THEY MATCH AND BLEND WITH ADJACENT SURFACES.
19. THE CONTRACTOR SHALL KEEP CONTRACT AREA CLEAN, HAZARD FREE AND DISPOSE OF ALL DEBRIS AND RUBBISH. LEAVE PREMISES IN CLEAN CONDITION AND FREE FROM PAINT SPOTS. THE CONTRACTOR SHALL BE RESPONSIBLE FOR MAINTAINING ALL ITEMS UNTIL COMPLETION OF CONSTRUCTION.
20. BEFORE FINAL ACCEPTANCE OF THE WORK, THE CONTRACTOR SHALL REMOVE ALL EQUIPMENT, TEMPORARY WORKS, UNUSED AND USELESS MATERIALS, RUBBISH AND TEMPORARY STRUCTURES.



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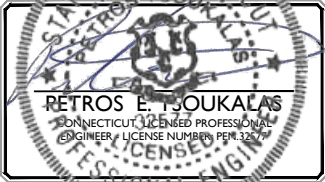


Charles Cherundolo Consulting, Inc.  
 713 Clover Lane  
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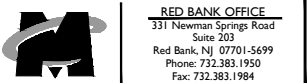
SCALE:	JOB NUMBER:
AS SHOWN	17924017A

REV	DATE	DESCRIPTION	BY	CHECKED BY
3	04/16/18	REVISED PER COMMENTS	JCM	PET
2	04/06/18	REVISED PER RFDS	JCM	JKM
1	12/21/17	TOWER MODIFICATION	JRF	JKM
0	10/30/17	ISSUED FOR PERMITS	JRF/DTS	JKM
A	09/28/17	ISSUED FOR PERMITS	JRF	FEP



IT IS A VIOLATION OF LAW FOR ANY PERSON, UNLESS THEY ARE ACTING UNDER THE DIRECTION OF THE RESPONSIBLE LICENSED PROFESSIONAL ENGINEER, TO ALTER THIS DOCUMENT.

SITE NAME: NEWINGTON  
 SITE ID: CT52XC043  
  
 99 CEDARWOOD LANE  
 NEWINGTON, CT 06111



RED BANK OFFICE  
 331 Newnam Springs Road  
 Suite 203  
 Red Bank, NJ 07701-5699  
 Phone: 732.383.1950  
 Fax: 732.383.1984

SHEET TITLE:  
 GENERAL NOTES - I

SHEET NUMBER:  
 ANT-001.00



## SECTION 01 100 - SCOPE OF WORK

### THE WORK:

THESE STANDARD CONSTRUCTION SPECIFICATIONS IN CONJUNCTION WITH THE CONSTRUCTION DRAWINGS AND ASSOCIATED OUTLINE SPECIFICATIONS AND THE SITE SPECIFIC WORK ORDER, DESCRIBE THE WORK TO BE PERFORMED BY THIS CONSTRUCTION CONTRACTOR (SUPPLIER).

### RELATED DOCUMENTS:

- A. THE REQUIREMENTS OF EACH SECTION OF THIS SPECIFICATION APPLY TO ALL SECTIONS, INDIVIDUALLY AND COLLECTIVELY.
- B. RELATED DOCUMENTS: THE CONTRACTOR SHALL COMPLY WITH THE MOST CURRENT VERSION OF THE FOLLOWING SUPPLEMENTAL REQUIREMENTS FOR INSTALLATION AND TESTING.
  - 1.EN-2012-001: (FIBER OPTIC, DC CABLE, AND DC CIRCUIT BREAKER TAGGING STANDARDS)
  - 2.TS-0200 - (TRANSMISSION ANTENNA LINE ACCEPTANCE STANDARDS)
  - 3.EL-0568: (FIBER TESTING POLICY)
  - 4.NP-312-201: (EXTERIOR GROUNDING SYSTEM TESTING)
  - 5.NP-760-500: ETHERNET, MICROWAVE, TESTING AND ACCEPTANCE

### PRECEDENCE:

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

### NATIONALLY RECOGNIZED CODES AND STANDARDS:

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

- A. GR-63-CORE NEBS REQUIREMENTS: PHYSICAL PROTECTION
- B. GR-78-CORE GENERIC REQUIREMENTS FOR THE PHYSICAL DESIGN AND MANUFACTURE OF TELECOMMUNICATIONS EQUIPMENT.
- C. GR-1089 CORE ELECTROMAGNETIC COMPATIBILITY AND ELECTRICAL SAFETY -GENERIC CRITERIA FOR NETWORK TELECOMMUNICATIONS EQUIPMENT.
- D. NATIONAL FIRE PROTECTION ASSOCIATION CODES AND STANDARDS (NFPA) INCLUDING NFPA 70 (NATIONAL ELECTRICAL CODE - "NEC") AND NFPA 101 (LIFE SAFETY CODE).
- E. AMERICAN SOCIETY FOR TESTING OF MATERIALS (ASTM)
- F. INSTITUTE OF ELECTRONIC AND ELECTRICAL ENGINEERS (IEEE)
- G. AMERICAN CONCRETE INSTITUTE (ACI)
- H. AMERICAN WIRE PRODUCERS ASSOCIATION (AWPA)
- I. CONCRETE REINFORCING STEEL INSTITUTE (CRSI)
- J. AMERICAN ASSOCIATION OF STATE HIGHWAY AND TRANSPORTATION OFFICIALS (AASHTO)
- K. PORTLAND CEMENT ASSOCIATION (PCA)
- L. NATIONAL CONCRETE MASONRY ASSOCIATION (NCMA)
- M. BRICK INDUSTRY ASSOCIATION (BIA)
- N. AMERICAN WELDING SOCIETY (AWS)
- O. NATIONAL ROOFING CONTRACTORS ASSOCIATION (NRCA)
- P. SHEET METAL AND AIR CONDITIONING CONTRACTORS' NATIONAL ASSOCIATION (SMACNA)
- Q. DOOR AND HARDWARE INSTITUTE (DHI)
- R. OCCUPATIONAL SAFETY AND HEALTH ACT (OSHA)
- S. APPLICABLE BUILDING CODES INCLUDING UNIFORM BUILDING CODE, SOUTHERN BUILDING CODE, BOCA, AND THE INTERNATIONAL BUILDING CODE.

### DEFINITIONS:

- A. WORK: THE SUM OF TASKS AND RESPONSIBILITIES IDENTIFIED IN THE CONTRACT DOCUMENTS.
- B. COMPANY: "SPRINT"; SPRINT NEXTEL CORPORATION AND ITS OPERATING ENTITIES.
- C. ENGINEER: SYNONYMOUS WITH ARCHITECT & ENGINEER AND "A&E". THE DESIGN PROFESSIONAL HAVING PROFESSIONAL RESPONSIBILITY FOR DESIGN OF THE PROJECT.
- D. CONTRACTOR: CONSTRUCTION CONTRACTOR, SUPPLIER, 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. CONSTRUCTION MANAGER - ALL PROJECTS RELATED COMMUNICATION TO FLOW THROUGH SPRINT REPRESENTATIVE IN CHARGE OF PROJECT.

### 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.

### POINT OF CONTACT:

COMMUNICATION BETWEEN SPRINT AND THE CONTRACTOR SHALL FLOW THROUGH THE SINGLE SPRINT CONSTRUCTION MANAGER APPOINTED TO MANAGE THE PROJECT FOR SPRINT.

### 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.

### DRAWINGS REQUIRED AT JOBSITE:

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

- A. THE JOBSITE DRAWINGS 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. 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.

### 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.

### UTILITY 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.

### 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.

### CONTRACTOR:

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

### USE OF ELECTRONIC PROJECT MANAGEMENT SYSTEMS:

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

### 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 LESSOR'S OR SITE OWNER'S UTILITIES OR FACILITIES IS EXPRESSLY FORBIDDEN EXCEPT AS OTHERWISE ALLOWED IN THE CONTRACT DOCUMENTS.

### 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.

### DIMENSIONS:

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

### 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

### FURNISHED MATERIALS:

COMPANY FURNISHED MATERIALS AND EQUIPMENT TO BE INSTALLED BY THE CONTRACTOR (OPIIC) IS IDENTIFIED ON THE RF DATA SHEET IN THE CONSTRUCTION DOCUMENTS.

### RECEIPT OF MATERIAL AND EQUIPMENT:

- A. 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.
- B. RECORD ANY DEFECTS OR DAMAGES AND WITHIN TWENTY-FOUR HOURS AFTER RECEIPT, REPORT TO SPRINT OR ITS DESIGNATED PROJECT REPRESENTATIVE OF SUCH.
- C. PROVIDE SECURE AND NECESSARY WEATHER PROTECTED WAREHOUSING.
- D. COORDINATE SAFE AND SECURE TRANSPORTATION OF MATERIAL AND EQUIPMENT, DELIVERING AND OFF-LOADING FROM CONTRACTOR'S WAREHOUSE TO SITE.

### 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.

## SECTION 01 300 - CELL SITE CONSTRUCTION

### NOTICE TO PROCEED:

- A. NO WORK SHALL COMMENCE PRIOR TO COMPANY'S 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.

### GENERAL REQUIREMENTS FOR 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

### FUNCTIONAL REQUIREMENTS:

- A. THE ACTIVITIES DESCRIBED IN THIS PARAGRAPH REPRESENT MINIMUM ACTIONS AND PROCESSES REQUIRED TO SUCCESSFULLY COMPLETE THE WORK. CONTRACTOR SHALL TAKE 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 BACKHAUL (FIBER, COPPER, OR MICROWAVE).
  4. INSTALL UNDERGROUND FACILITIES INCLUDING UNDERGROUND POWER AND COMMUNICATIONS CONDUITS, AND UNDERGROUND GROUNDING SYSTEM.
  5. INSTALL ABOVE GROUND GROUNDING SYSTEMS, CONDUIT AND BOXES.
  6. PROVIDE NEW HVAC INSTALLATIONS AND MODIFICATIONS.
  7. INSTALL "H-FRAMES", CABINETS AND PADS AND PLATFORMS 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. CONDUCT ALL REQUIRED TESTS AND INSPECTIONS
  19. PERFORM, DOCUMENT, AND CLOSE OUT ALL JURISDICTIONAL PERMITTING REQUIREMENTS AND ANY CONSTRUCTION CONTROL DOCUMENTS THAT MAY BE REQUIRED BY GOVERNMENT AGENCIES AND LANDLORDS.
  20. PERFORM ALL ADDITIONAL WORK AS IDENTIFIED IN SCOPE OF SERVICES ATTACHED TO THE SUPPLIER AGREEMENT FOR THIS PROJECT. THIS WORK MAY INCLUDE COMMISSIONING, INTEGRATION, SPECIAL WAREHOUSING, REVERSE LOGISTICS ACTIVITIES, ETC. PERFORM COMMISSIONING AND INTEGRATION ACTIVITIES PER APPLICABLE MOPS.

### DELIVERABLES:

- A. THE CONTRACTOR SHALL PROVIDE ALL REQUIRED TEST REPORTS AND DOCUMENTATION INCLUDED BUT NOT LIMITED TO THE FOLLOWING:
  1. PRODUCT SPECIFICATIONS FOR MATERIALS OR SPECIAL CONSTRUCTION IF REQUESTED BY SPRINT
  2. ACTUALIZE ALL CONSTRUCTION RELATED MILESTONES IN SITERA AND COMPLETE ALL ON-LINE FORMS AND COMPLETE DOCUMENT UP-LOADS. UPLOAD ALL REQUIRED CLOSEOUT DOCUMENTS AND FINAL SITE PHOTOS.
  3. SCANABLE BARCODE PHOTOGRAPHS OF TOWER TOP AND INACCESSIBLE SERIALIZED EQUIPMENT LEFT ON SITE INSIDE BASE OF MAIN RF CABINET IN A PROTECTIVE POUCH.
  4. ALL REQUIRED TEST REPORTS.
  5. REQUIRED CLOSEOUT DOCUMENTATION INCLUDING BUT NOT LIMITED TO:
    - a. ALL JURISDICTIONAL PERMITTING AND OCCUPANCY INFORMATION
    - b. PDF SCAN OF REDLINES PRODUCED IN THE FIELD
    - c. ELECTRONIC AS-BUILT DRAWINGS IN AUTOCAD AND PDF FORMATS
    - d. LIEN WAIVERS
    - e. FINAL PAYMENT APPLICATION
    - f. REQUIRED FINAL CONSTRUCTION PHOTOS
    - g. CONSTRUCTION AND COMMISSIONING CHECKLIST COMPLETE WITH NO DEFICIENT ITEMS
    - h. LISTS OF SUBCONTRACTORS
- B. PROVIDE ADDITIONAL 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. PRE-CONSTRUCTION MEETING NOTES.

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

### TESTS AND INSPECTIONS:

- A. THE CONTRACTOR SHALL BE RESPONSIBLE FOR ALL CONSTRUCTION TESTS, INSPECTIONS AND PROJECT DOCUMENTATION.
- B. CONTRACTOR SHALL ACCOMPLISH TESTING INCLUDING BUT NOT LIMITED TO THE FOLLOWING:
  1. COAX SWEEPS AND FIBER TESTS PER TS-0200 (CURRENT VERSION) ANTENNA LINE ACCEPTANCE STANDARDS
  2. POST CONSTRUCTION HEIGHT VERIFICATION, AZIMUTH AND DOWNTILT USING ELECTRONIC COMMERCIAL MADE-FOR-THE-PURPOSE ANTENNA ALIGNMENT TOOL.
  3. CONCRETE BREAK TESTS
  4. SITE RESISTANCE TO EARTH TEST
  5. STRUCTURAL BACKFILL COMPACTION TESTS
  6. 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.
  7. ADDITIONAL TESTING AS REQUIRED ELSEWHERE IN THIS SPECIFICATION.

### SUBMITTALS:

- A. THE WORK IN ALL ASPECTS SHALL COMPLY WITH THE CONSTRUCTION DRAWINGS AND THESE SPECIFICATIONS.
- B. UPLOAD THE FOLLOWING TO SITERA AS APPLICABLE INCLUDING BUT NOT LIMITED TO THE FOLLOWING:
  1. CONCRETE MIX-DESIGNS FOR TOWER FOUNDATIONS, ANCHORS PIERS, AND CONCRETE PAVING.
  2. CONCRETE BREAK TESTS AS SPECIFIED HEREIN.
  3. CHEMICAL GROUNDING SYSTEM .
  4. REINFORCEMENT CERTIFICATIONS
  5. STRUCTURAL BACKFILL TEST RESULTS
  6. SWEEP AND FIBER TESTS
  7. ANTENNA AZIMUTH AND DOWN-TILT VERIFICATION
  8. POST CONSTRUCTION HEIGHT VERIFICATION
  9. ADDITIONAL SUBMITTALS MAY BE REQUIRED FOR SPECIAL CONSTRUCTION OR MINOR MATERIALS
- 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.

### TESTING BY THIRD PARTY AGENCY:

- A. EMPLOY AN AGENCY OF ENGINEERS AND SCIENTISTS WHO IS REGULARLY ENGAGED IN FIELD AND LABORATORY TESTING AND ANALYSIS. AGENCY SHALL HAVE BEEN IN BUSINESS A MINIMUM OF FIVE YEARS, AND BE LICENSED AS PROFESSIONAL ENGINEERS IN THE STATE WHERE THE PROJECT IS LOCATED. AGENCY IS SUBJECT TO APPROVAL BY COMPANY.
  1. AGENCY MUST HAVE A THOROUGH UNDERSTANDING OF LOCAL AVAILABLE MATERIALS, INCLUDING THE SOIL, ROCK, AND GROUNDWATER CONDITIONS.
  2. AGENCY IS TO BE FAMILIAR WITH THE APPLICABLE REQUIREMENTS FOR THE TESTS TO BE DONE, EQUIPMENT TO BE USED, AND ASSOCIATED HEALTH AND SAFETY ISSUES.
  3. EXPERIENCE IN SOILS, CONCRETE, MASONRY, AGGREGATE, AND ASPHALT TESTING USING ASTM, AASHTO, AND OTHER METHODS IS NEEDED.

### B. REQUIRED THIRD PARTY TESTS:

1. SITE RESISTANCE TO EARTH TEST PER NP-312-201
2. CONCRETE CYLINDER BREAK TESTS FOR TOWER PIER AND ANCHORS PER NATIONALLY RECOGNIZED STANDARDS
3. STRUCTURAL SOILS COMPACTION TESTS PER NATIONALLY RECOGNIZED STANDARDS
4. REBAR PLACEMENT VERIFICATION WITH REPORT
5. TESTING TENSION STUDY FOR ROCK ANCHORS
6. ALL THIRD PARTY TESTS AS REQUIRED BY LOCAL JURISDICTION

### C. REQUIRED TESTS BY CONTRACTOR

1. COAX SWEEP TESTS PER SPRINT STANDARD TS-0200
  2. FIBER TESTS PER SPRINT STANDARD EL-0568
  3. MICROWAVE LINK TESTS PER NP-760-500
  4. ANTENNA AZIMUTHS AND DOWN TILT USING ELECTRONIC ALIGNMENT TOOL PER ANTENNA INSTALLATION SPECIFICATION HEREIN.
  5. POST CONSTRUCTION HEIGHT VERIFICATION AS REQUIRED HERewith IN THE TOWER INSTALLATION SPECIFICATIONS.
  6. ASPHALT ROADWAY COMPACTED THICKNESS, SURFACE SMOOTHNESS, AND COMPACTED DENSITY TESTING AS SPECIFIED HERewith IN THE ASPHALT PAVING SPECIFICATIONS.
  7. FIELD QUALITY CONTROL TESTING AS SPECIFIED HERewith IN THE CONCRETE PAVING SPECIFICATIONS.
  8. TESTING REQUIRED HERewith UNDER SPECIFICATIONS FOR AGGREGATE BASE FOR ROADWAYS
  9. ALL OTHER TESTS REQUIRED BY LOCAL JURISDICTION
- D. INSPECTIONS BY COMPANY: THE CONTRACTOR SHALL BE RESPONSIBLE FOR ANY AND ALL CORRECTIONS TO ANY WORK IDENTIFIED AS UNACCEPTABLE IN INSPECTION ACTIVITIES, FINAL ACCEPTANCE / PUNCH WALK REVIEW, AND/OR AS A RESULT OF TESTING
  - E. SPRINT RESERVES THE RIGHT TO INSPECT THE CONSTRUCTION SITE AT ANY TIME VIA SITE WALKS AND/OR PHOTO REVIEWS. CONTRACTOR SHALL GIVE SPRINT 24 HOURS NOTICE PRIOR TO THE COMMENCEMENT OF THE FOLLOWING CONSTRUCTION ACTIVITIES AND PHOTOGRAPHS OF THE IN-PROGRESS WORK.
    1. GROUNDING SYSTEM AND BURIED UTILITIES 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. PRIOR TO CONSTRUCTION ACTIVITIES AND AFTER CONSTRUCTION IS COMPLETE, PROVIDE PHOTOGRAPHIC DOCUMENTATION OF ROOF, FLASHINGS, AND PARAPETS, BOTH BEFORE AND AFTER CONSTRUCTION IS COMPLETE.
    5. TOWER ERECTION SECTION STACKING AND PLATFORM ATTACHMENT DOCUMENTED BY DIGITAL PHOTOGRAPHS BY THIRD PARTY AGENCY.
    6. TOWER TOP AND INACCESSIBLE EQUIPMENT (RRUS, ANTENNAS, AND CABLING): PROVIDE PHOTOS OF THE BACKS OF ALL ANTENNAS, RRUS, COMBINERS, FILTERS, FIBER AND DC CABLING, CABLE COLOR CODING, EQUIPMENT GROUNDING AND CONNECTOR WATER PROOFING INCLUDING NAME PLATE AND SERIAL NUMBER FOR ALL SERIALIZED EQUIPMENT.



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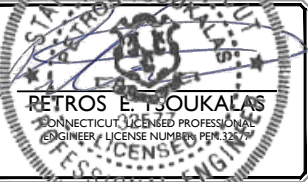


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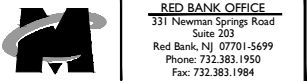
NO.	DATE	DESCRIPTION	BY	CHECKED BY
3	04/16/18	REVISED PER COMMENTS	JCM	PET
2	04/06/18	REVISED PER RFDS	JCM	JCM
1	12/21/17	TOWER MODIFICATION	JRF	JCM
0	10/30/17	ISSUED FOR PERMIT	JRF	JCM
A	09/28/17	ISSUED FOR PERMIT	JRF	FEP
REV	DATE	DESCRIPTION	BY	CHECKED BY



IT IS A VIOLATION OF LAW FOR ANY PERSON, UNLESS THEY ARE ACTING WITH THE PERMISSION OF THE RESPONSIBLE LICENSED PROFESSIONAL ENGINEER, TO ALTER THIS DOCUMENT.

SITE NAME: NEWINGTON  
SITE ID: CT52XC043

99 CEDARWOOD LANE  
NEWINGTON, CT 06111



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SHEET TITLE:

GENERAL NOTES - 2

SHEET NUMBER: ANT-002.00

**PROJECT CLOSEOUT:**

- A. FINAL ACCEPTANCE PUNCH WALK AND INSPECTION: AS IDENTIFIED IN THE SCOPE OF SERVICES, SPRINT WILL CONDUCT A FINAL PUNCH WALK OR FINAL DESK TOP PHOTO REVIEW (SITE MODIFICATIONS). PUNCH WALKS MUST BE SCHEDULED IN ADVANCE AS REQUIRED. AT THE PUNCH WALK / REVIEW, SPRINT MAY IDENTIFY CRITICAL DEFICIENCIES WHICH MUST BE CORRECTED PRIOR TO PUTTING SITE ON AIR. MINOR DEFICIENCIES MUST BE CORRECTED WITHIN 30 DAYS EXCEPT AS OTHERWISE REQUIRED. VERIFICATIONS OF CORRECTIONS MAY BE MADE BY COMPANY DURING A REPEAT SITE WALK OR DESK TOP PHOTO REVIEW AT COMPANY'S SOLE DISCRETION.
- B. CLOSEOUT DOCUMENTATION: ALL CLOSEOUT DOCUMENTATION AND PHOTOGRAPHS SHALL BE UPLOADED PRIOR TO FINAL ACCEPTANCE. SPRINT WILL REVIEW CLOSEOUT DOCUMENTATION FOR PRESENCE AND CONTENT. CLOSEOUT DOCUMENTATION SHALL INCLUDE BUT IS NOT LIMITED TO THE FOLLOWING AS APPLICABLE:
  - 1. COAX SWEEP TESTS;
  - 2. FIBER TESTS;
  - 3. JURISDICTION FINAL INSPECTION DOCUMENTATION
  - 4. REINFORCEMENT CERTIFICATION (MILL CERTIFICATION)
  - 5. CONCRETE MIX DESIGN AND PRODUCT DATA (TOWER FOUNDATION)
  - 6. LIEN WAIVERS AND RELEASES.
  - 7. POST -CONSTRUCTION HEIGHT VERIFICATION
  - 8. JURISDICTION CERTIFICATE OF OCCUPANCY
  - 9. ELECTRONIC ANTENNA AZIMUTH AND DOWN TILT VERIFICATION
  - 10. STRUCTURAL BACKFILL TEST RESULTS (IF APPLICABLE)
  - 11. CELL SITE UTILITY SETUP
  - 12. AS-BUILT REDLINE CONSTRUCTION DRAWINGS (PDF SCAN OF FIELD MARKS)
  - 13. AS-BUILT CONSTRUCTION DRAWINGS IN DWG AND PDF FORMATS
  - 14. LIST OF SUB CONTRACTORS
  - 15. APPROVED PERMITTING DOCUMENTS
  - 16. FINAL SITE PHOTOS UP-LOADED TO SITERRA. INCLUDE THE FOLLOWING AS APPLICABLE:
    - a. TOWER, ANTENNAS, RRUS, 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/CABLE 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.
    - b. 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;
    - c. SITE LAYOUT - PHOTOGRAPHS OF THE OVERALL COMPOUND, INCLUDING EQUIPMENT PLATFORM FROM ALL FOUR CORNERS.
    - d. 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.

**PROJECT PHOTOGRAPHS:**

- A. PROVIDE PROJECT CLOSEOUT GENERAL ARRANGEMENT PHOTOS OF ALL NEW WORK. THE FOLLOWING LIST REPRESENTS MINIMUM REQUIREMENTS AND MINIMUM QUANTITY. ADDITIONAL PHOTOS MAY BE REQUIRED TO ADEQUATELY DOCUMENT THE WORK.
  - 1. ASR AND RF MPE SIGNAGE (IF NOT IN PLACE, SUPPLIER NOTIFIES EMS FIELD REPRESENTATIVE)
  - 2. BACK OF ANTENNAS AND RRUS (1 EACH SECTOR)
  - 3. BACK OF ANTENNAS AND RRUS (1 EACH SECTOR) CLOSE UP SHOWING WEATHERPROOFING AND GROUNDING (AS REQUIRED). CLOSE-UP OF BACK SIDE OF EACH PERMANENT RRU SHOWING SERIAL NUMBER/BAR CODE.
  - 4. VIEW (1 EACH SECTOR) ALONG THE AZIMUTH AND TILT OF THE ANTENNAS
  - 5. TOP OF TOWER FROM GROUND, 1 EACH SECTOR
  - 6. MAINLINE HYBRID CABLE ROUTE DOWN TOWER SHOWING FASTENERS AND SUPPORT
  - 7. MAINLINE/HYBRID CABLE ROUTE ALONG ICE BRIDGE OR IN CABLE TRAY SHOWING FASTENERS AND SUPPORT
  - 8. GROUND MOUNTED RRU RACKS (FRONT AND BACK)
  - 9. FRONT, SIDE AND BACK ELEVATIONS OF ALL GROUND CABINETS
  - 10. VIEW OF COMPOUND FROM A DISTANCE
    - 11. VIEW OF EACH GROUND CABINET (POWER, RF, FIBER SPOOL, PPC POWER, PPC TELCO WITH DOOR OPEN)
    - 12. BACK-HAUL FIBER MEET-ME-POINT AND CONDUIT ROUTE (MICROWAVE INSTALLATION IF NOT FIBER)
    - 13. AAV NETWORK INTERFACE DEVICE OR MICROWAVE RADIO INSTALLATION

**DEFICIENCY CORRECTIONS:**  
 CONTRACTOR IS RESPONSIBLE FOR ALL CORRECTIONS TO DEFICIENCIES IDENTIFIED THROUGH TESTING, REVIEW OF SUBMITTALS, INSPECTIONS AND CLOSEOUT REVIEWS.

**SECTION 01 500 - PROJECT REPORTING**

**WEEKLY REPORTS:**

- A. CONTRACTOR SHALL REPORT TO SPRINT AT MINIMUM ON A WEEKLY BASIS VIA SITERRA BY UPDATING ALL APPLICABLE POST END KEEPING MILESTONES WITH ACTUAL AND FORECASTED COMPLETION DATES.
  - B. ADDITIONAL REQUIREMENTS FOR REPORTING MAY BE IDENTIFIED ELSEWHERE OR REQUIRED BY THE SCOPE OF SERVICES OR SPRINTS LOCAL MARKET CONSTRUCTION MANAGER. THIS INFORMATION WILL PROVIDE A BASIS FOR PROGRESS MONITORING AND PAYMENT.
- PROJECT CONFERENCE CALLS:**  
 SPRINT MAY HOLD PERIODIC 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.  
 FINAL PROJECT ACCEPTANCE: PRIOR TO SPRINTS FINAL PROJECT ACCEPTANCE, ALL REQUIRED MILESTONE ACTUALS MUST BE UPDATED IN SITERRA AND ALL REQUIRED REPORTING TASKS MUST BE COMPLETE.

**SECTION 11 700 - ANTENNA ASSEMBLY, REMOTE RADIO UNITS AND CABLE INSTALLATION**

**SUMMARY:**  
 THIS SECTION SPECIFIES INSTALLATION OF ANTENNAS, RRUS, AND CABLE EQUIPMENT, INSTALLATION, AND TESTING OF COAXIAL FIBER CABLE.

**ANTENNAS AND RRUS:**  
 THE NUMBER AND TYPE OF ANTENNAS AND RRUS 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 RRUS 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 RRUS AND ANTENNAS OR TOWER TOP AMPLIFIERS SHALL CONSIST OF 1/2 INCH FOAM DIELECTRIC, OUTDOOR RATED COAXIAL CABLE. MIN. LENGTH FOR JUMPER SHALL BE 10'-0".

**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 CABLE 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 INSTALLED INSIDE MONOPOLE WITH CABLE SUPPORT GRIPS AS REQUIRED BY THE MANUFACTURER.
  - 2. FASTENING INDIVIDUAL FIBER AND DC CABLES ABOVE BREAKOUT ENCLOSURE (MEDUSA), WITHIN THE MMBS CABINET AND ANY INTERMEDIATE DISTRIBUTION BOXES:
    - a. FIBER: SUPPORT FIBER BUNDLES USING 1/2 " VELCRO STRAPS OF THE REQUIRED LENGTH AT 18" O.C. 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 MANUFACTURER'S 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 IN 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 (MMBS) AND RELATED EQUIPMENT**

**SUMMARY:**

- A. THIS SECTION SPECIFIES MMBS CABINETS, POWER CABINETS, AND INTERNAL EQUIPMENT INCLUDING BUT 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 (SPEC).
- 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 REQUIRED BY THE APPLICABLE INSTALLATION MOPS.
- C. COMPLY WITH MANUFACTURER'S INSTALLATION AND START-UP REQUIREMENTS.

**DC CIRCUIT BREAKER LABELING**

A. NEW DC CIRCUIT IS REQUIRED IN MMBS CABINET SHALL BE CLEARLY IDENTIFIED AS TO RRU BEING SERVICED.

**SECTION 26 100 - BASIC ELECTRICAL REQUIREMENTS**

**SUMMARY:**

THIS SECTION SPECIFIES BASIC ELECTRICAL REQUIREMENTS FOR SYSTEMS AND COMPONENTS

**QUALITY ASSURANCE:**

- A. ALL EQUIPMENT FURNISHED UNDER DIVISION 26 SHALL CARRY UL LABELS AND LISTINGS WHERE SUCH LABELS AND LISTINGS ARE AVAILABLE IN THE INDUSTRY.
- B. MANUFACTURERS OF EQUIPMENT SHALL HAVE A MINIMUM OF THREE YEARS EXPERIENCE WITH THEIR EQUIPMENT INSTALLED AND OPERATING IN THE FIELD IN A USE SIMILAR TO THE PROPOSED USE FOR THIS PROJECT.
- C. MATERIALS AND EQUIPMENT: ALL MATERIALS AND EQUIPMENT SPECIFIED IN DIVISION 26 OF THE SAME TYPE SHALL BE OF THE SAME MANUFACTURER AND SHALL BE NEW, OF THE BEST QUALITY AND DESIGN, AND FREE FROM DEFECTS.

**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:
  - 1. ENSURE THAT THE LOAD APPLIED BY ANY FASTENER DOES NOT EXCEED 25 PERCENT OF THE PROOF TEST LOAD.
  - 2. 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**

- A. RIGID GALVANIZED STEEL (RGS) CONDUIT SHALL BE USED FOR EXTERIOR LOCATIONS ABOVE GROUND AND IN UNFINISHED INTERIOR LOCATIONS AND FOR UNDERGROUND RUNS. 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 REQUIRED 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 BY ROXTEC.
  - 2. CABLE TERMINATORS FOR LFMC SHALL BE ETCD - 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 GASKET 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 TO THE EXTENT 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 EXCEPT AS OTHERWISE NOTED.
- 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.



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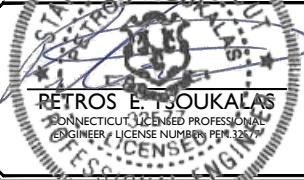


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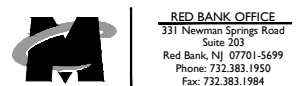
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2	04/06/18	REVISED PER RFDS	JCM	JCM
1	12/21/17	TOWER MODIFICATION	JRF	JCM
0	10/30/17	ISSUED FOR PERMITS	JRF	JCM
A	09/28/17	ISSUED FOR PERMITS	JRF	FEP
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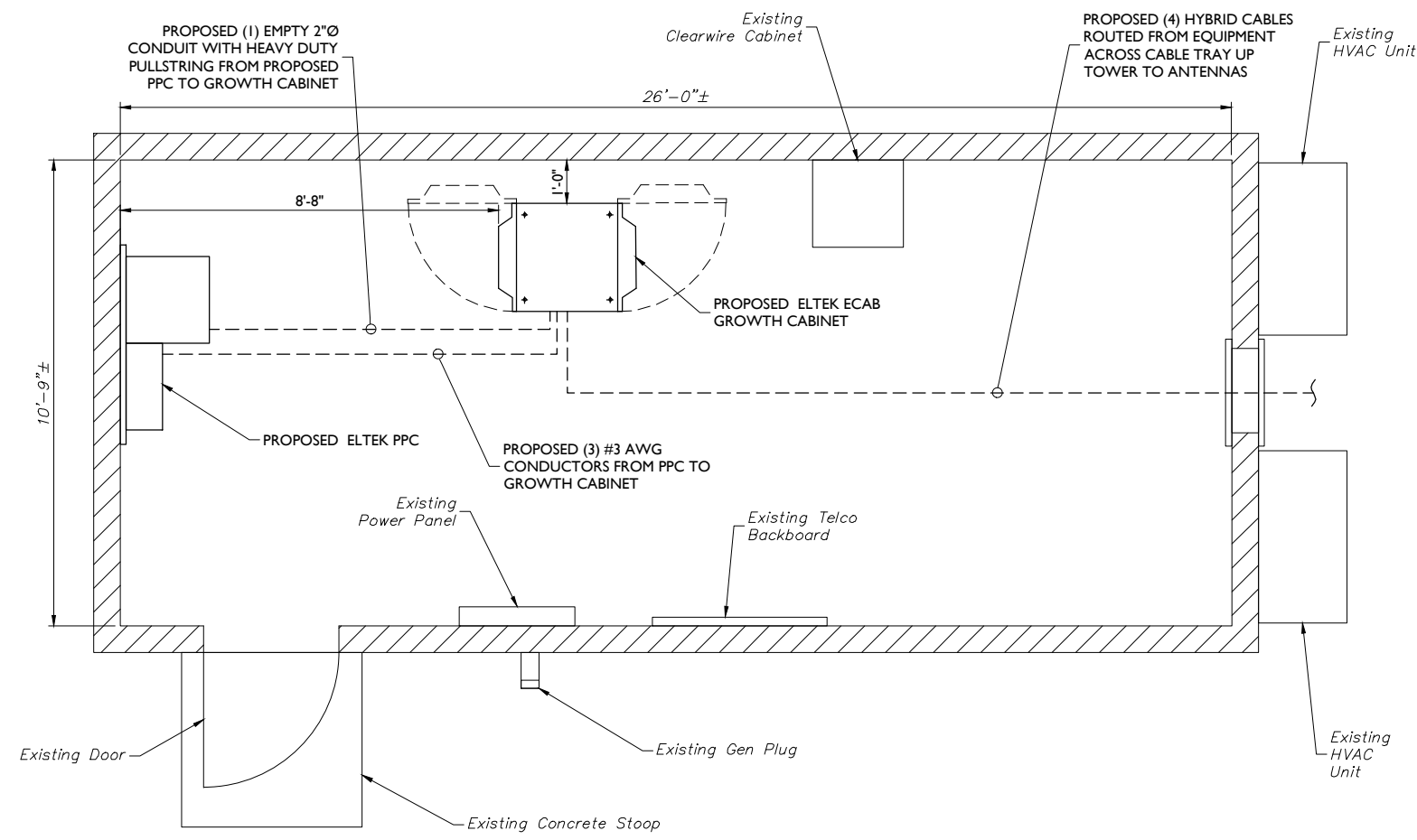
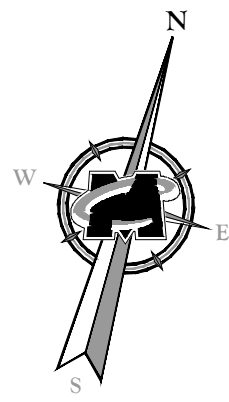
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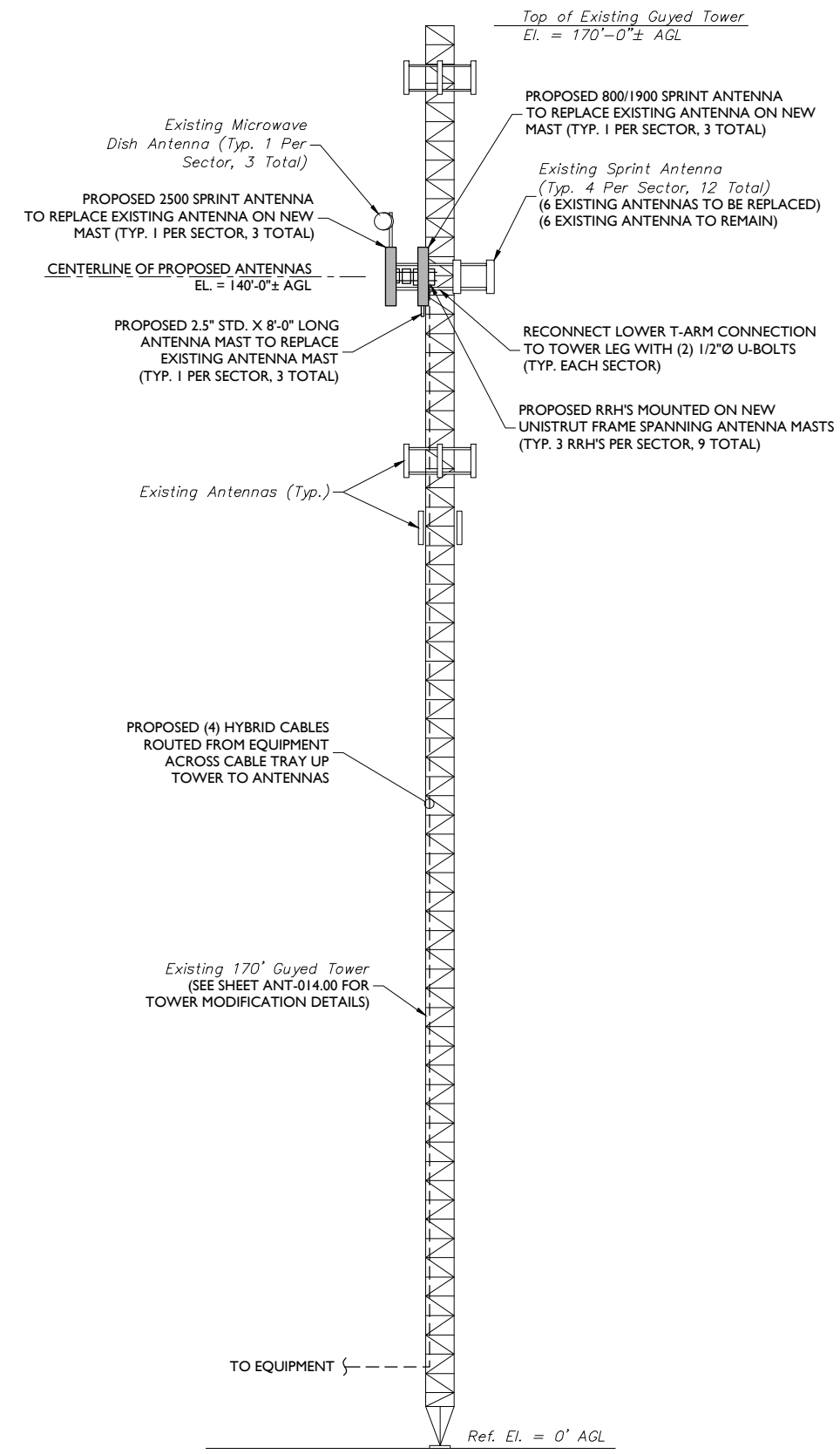






**EQUIPMENT PLAN**  
 SCALE: 1" = 2'  
 (DO NOT SCALE 11"X17" DRAWINGS)

**LEGEND**  
 LIGHT LINE WORK INDICATES EXISTING OBJECTS  
 HEAVY LINE WORK INDICATED PROPOSED OBJECTS



**ELEVATION**  
 SCALE: 1" = 10'  
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A	09/28/17	ISSUED FOR PERMITS	JRF	FEP
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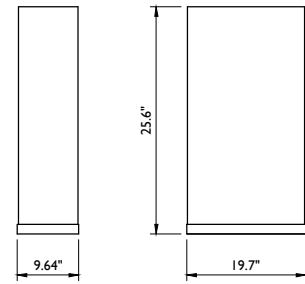
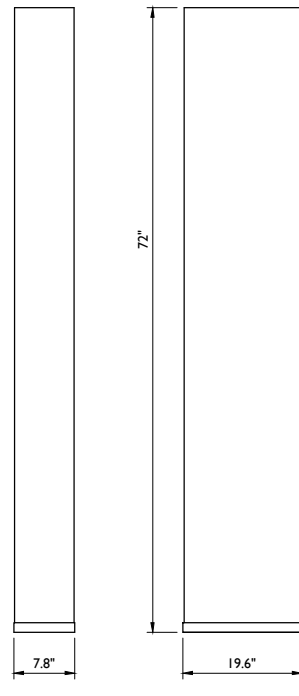
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SHEET TITLE:  
**EQUIPMENT PLAN AND ELEVATION**  
 SHEET NUMBER:  
**ANT-005.00**

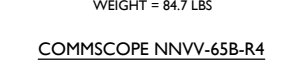




WEIGHT = 103.7 LBS

NOKIA AAHC

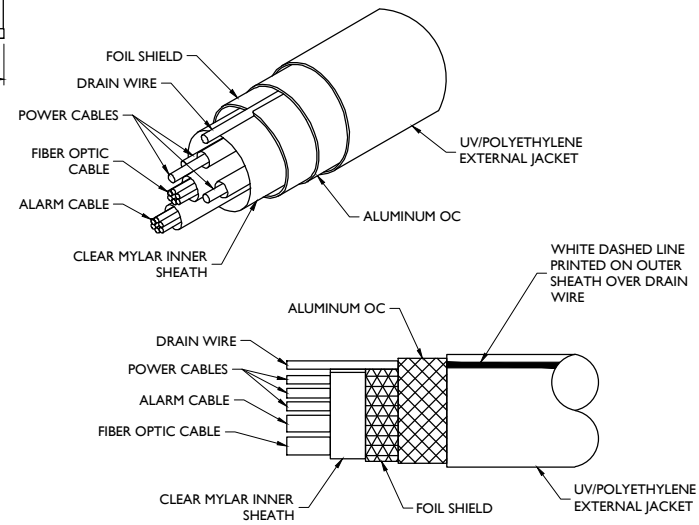
**ANTENNA DETAIL**  
NOT TO SCALE



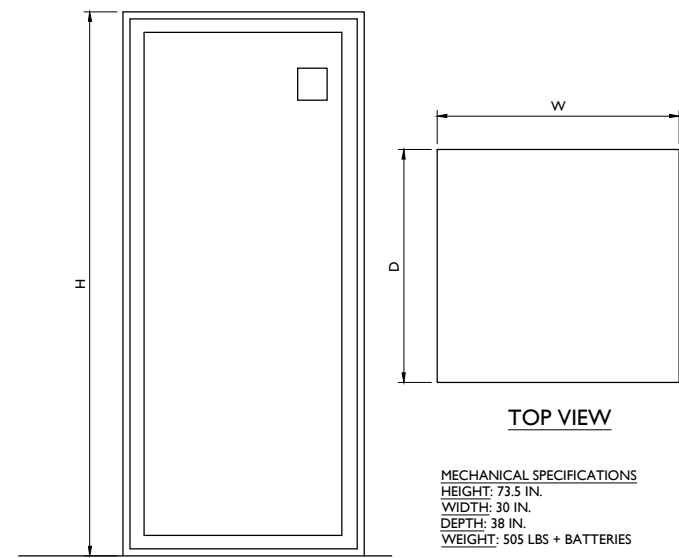
WEIGHT = 84.7 LBS

COMMSCOPE NNVV-65B-R4

**ANTENNA DETAIL**  
NOT TO SCALE



**HYBRID CABLE**  
NOT TO SCALE



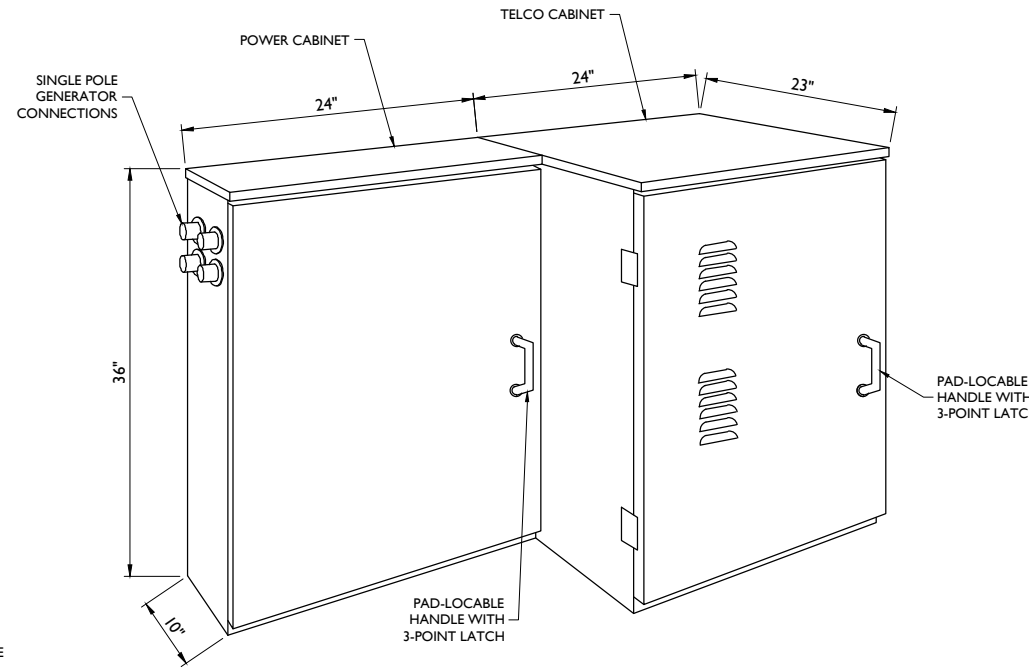
**FRONT VIEW**

**TOP VIEW**

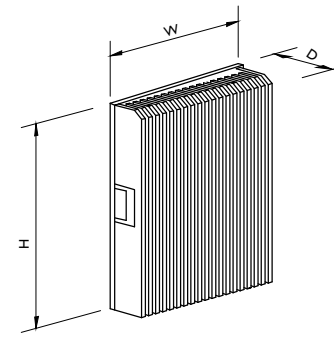
MECHANICAL SPECIFICATIONS  
HEIGHT: 73.5 IN.  
WIDTH: 30 IN.  
DEPTH: 38 IN.  
WEIGHT: 505 LBS + BATTERIES

ECAB ELTEK

**GROWTH CABINET DETAIL**  
NOT TO SCALE

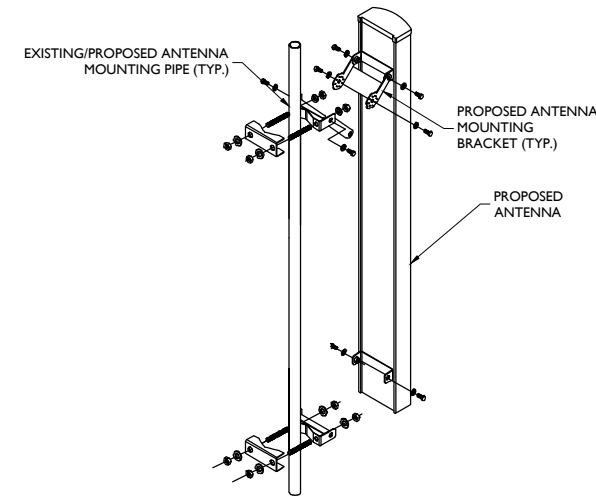


**ELTEK POWER PROTECTION CABINET DETAIL**  
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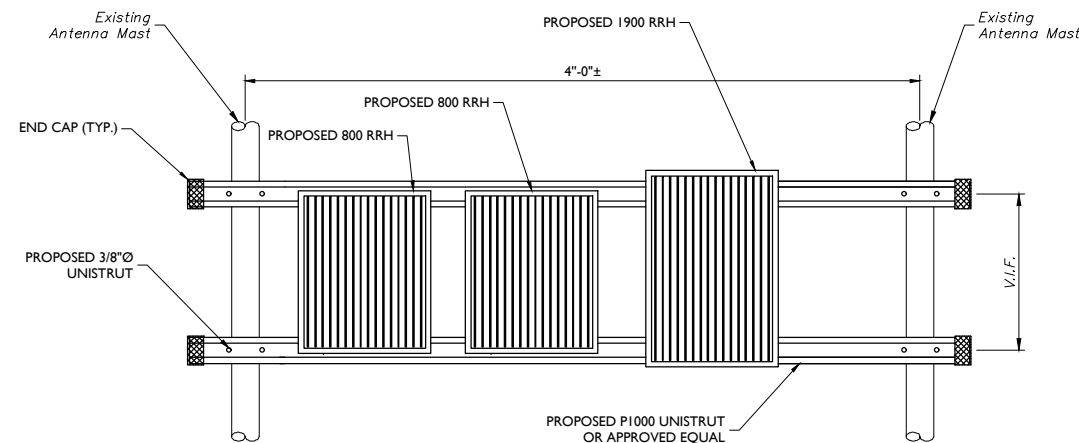


MODEL:	HEIGHT (H)	WIDTH (W)	DEPTH (D)	WEIGHT
ALU RRH-4x45-1900	25"	12"	12"	69.5 LBS
ALU RRH-2x50-800	16"	13"	10"	69.1 LBS

**RRH SPECIFICATIONS**  
NOT TO SCALE



**ANTENNA MOUNTING DETAIL**  
NOT TO SCALE



**NOTES:**

- ALL FASTENERS ARE 1/2"Ø. ALL DRILLED HOLES SHALL BE 9/16"Ø.
- MOUNT RRH TO UNISTRUT WITH 3/8"Ø UNISTRUT BOLTING HARDWARE AND SPRING NUTS. TYPICAL FOUR (4) PER DEVICE SUBCONTRACTOR SHALL SUPPLY.
- NO PAINTING OF THE RRH OR SOLAR SHIELD IS ALLOWED.

**RRH MOUNTING DETAIL (ALPHA SECTOR; SIMILAR FOR BETA AND GAMMA SECTORS)**  
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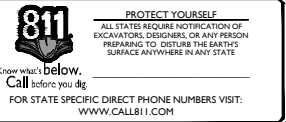
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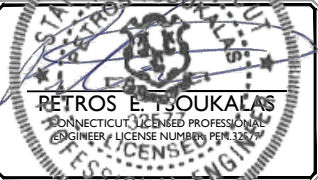


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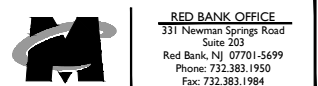
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2	04/06/18	REVISED PER RFDS	JCM	JKM
1	12/21/17	TOWER MODIFICATION	JRF	JKM
0	10/30/17	ISSUED FOR PERMITS	JRF/DTS	JKM
A	09/28/17	ISSUED FOR PERMITS	JRF	FEP



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DETAILS - I

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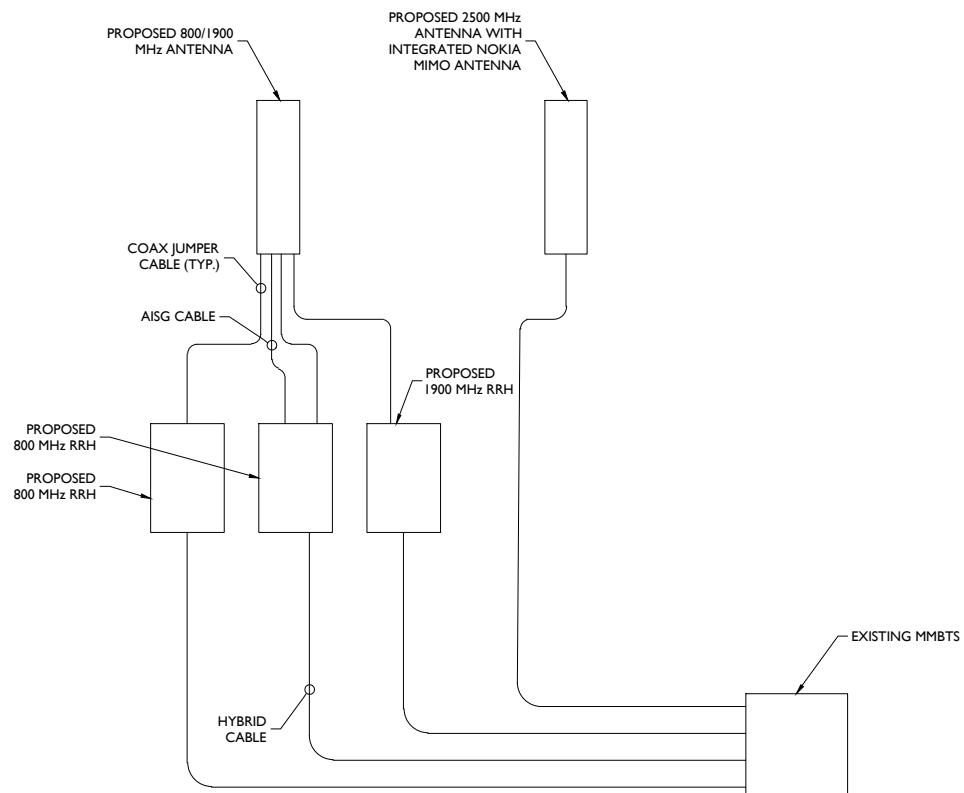


**RF NOTES**

- ACTUAL CABLE LENGTHS SHALL BE DETERMINED PER SITE CONDITION BY SUBCONTRACTOR.
- THE DESIGN IS BASED ON RF DATA SHEETS, SIGNED AND APPROVED.
- RADIO SIGNAL CABLE AND RACEWAY SHALL COMPLY WITH THE REQUIREMENTS OF THE NATIONAL ELECTRICAL CODE (NEC, NFPA 70), CHAPTER 8.
- ALL SPECIFIED MATERIAL FOR EACH LOCATION (E.G., OUTDOORS, INDOORS-OCCUPIED, INDOORS-UNOCCUPIED, PLENUMS, RISER SHAFTS, ETC.) SHALL BE APPROVED, LISTED, OR LABELED AS REQUIRED BY THE NEC.
- HARDLINE AND JUMPER CABLES SHALL BE SUPPORTED WITH HANGERS AND AT INTERVALS AS REQUIRED BY THE MANUFACTURER FOR 125 mph WIND SPEED AND EXPECTED ICE CONDITIONS. FOR SITES WITH TOWER HEIGHT OVER 300' OR ARE LOCATED IN THE EXTREME WEATHER/OPERATION AREAS, THE WORST CASE SCENARIO FOR 150 mph WIND SPEED AND 1" ICE CONDITION SHOULD BE APPLIED. ALL CABLES SHOULD BE SUPPORTED AT HALF THE DISTANCE OF THE MAXIMUM HANGER SPACING FROM THE CABLE CONNECTOR LOCATION TO THE 1ST HANGER. MANUFACTURER RECOMMENDED CABLE SUPPORT ACCESSORIES SHALL BE USED. PLASTIC CABLE TIES ARE NOT ACCEPTABLE. HANGER STACKING LIMIT SHOULD ALSO REFER TO VENDOR'S RECOMMENDATION.
- THE OUTDOOR CABLE SUPPORT SYSTEM SHALL BE PROVIDED WITH AN ICE SHIELD TO SUPPORT AND PROTECT ANTENNA CABLE RUNS.
- DRIP LOOPS SHALL BE REQUIRED ON ALL OUTSIDE CABLES. CABLES SHALL BE SLOPED AWAY FROM THE BUILDING OR OUTDOOR BTS CABINETS TO PREVENT WATER FROM ENTERING THROUGH THE COAXIAL CABLE PORT.
- ALL FEEDER LINE AND JUMPER CONNECTORS SHALL BE 7/16 DIN CABLE CONNECTORS THAT MEET IP68 STANDARDS.
- CONNECTORS IN INDOOR APPLICATIONS REQUIRE NO WEATHERPROOFING. OUTDOOR APPLICATIONS REQUIRE WEATHERPROOFING AND THE FOLLOWING PROCEDURES SHOULD BE FOLLOWED:  
  
RE-ENTERABLE AND RE-SEALABLE PLASTIC ENCLOSURE APPROVED BY CABLE MANUFACTURER AND CONTRACTOR IS RECOMMENDED METHOD TO WEATHERPROOF CONNECTORS.  
  
ALSO ACCEPTABLE IS THE USE OF BUTYL RUBBER WEATHERPROOFING KIT APPROVED BY CABLE MANUFACTURER AND CONTRACTOR. START BUTYL RUBBER TAPE APPROXIMATELY 5 INCHES FROM THE CONNECTOR AND WRAP 2 INCHES TOWARD THE CONNECTOR. THEN REVERSE THE TAPE SO THAT THE STICKY SIDE IS UP. TAPE OVER THE CONNECTOR OR SURGE ARRESTOR UNTIL THREE (3) TO FOUR (4) INCHES BEYOND THE CONNECTOR AND REVERSE AGAIN WITH THE STICKY SIDE DOWN FOR ANOTHER TWO INCHES. FINISH WITH TWO LAYERS OF VINYL TAPE. COLD SHRINK IS STRICTLY PROHIBITED. SELF-BONDING, AMALGAMATING TAPE MAYBE USED AS AN ALTERNATIVE TO BUTYL RUBBER TAPE.
- ANTENNAS SHALL BE PAINTED, WHEN REQUIRED, BY THE LANDLORD OR AUTHORITY HAVING JURISDICTION IN ACCORDANCE WITH ANTENNA MANUFACTURERS' SURFACE PREPARATION AND PAINTING REQUIREMENTS.
- CABLE SHIELDS, AND TOWER CONDUITS SHALL BE GROUNDED AT THE TOP OF THE TOWER, WITHIN 10 FEET OF THEIR CONNECTORS, AND AT THE BOTTOM OF THE TOWER ABOUT 6 INCHES BEFORE THEY TURN TOWARD THE FACILITY. THEY SHALL BE GROUNDED AT THE MIDPOINT OF TOWERS THAT ARE BETWEEN 100 FEET AND 200 FEET HIGH, AND AT INTERVALS OF 100 FEET OR LESS ON TOWERS THAT ARE HIGHER THAN 200 FEET.
- APPROVED GROUNDING KITS, WHICH INCLUDE GROUNDING STRAPS, SHALL BE USED TO GROUND THE COAXIAL CABLE SHIELDS, AND CONDUITS. THE GROUND CONDUCTORS FOR THE KITS AT THE TOP OF THE TOWER, AND IN THE MIDDLE SECTION OF THE TOWER, ARE BONDED DIRECTLY TO TOWER STEEL USING BOLTED, OR APPROVED CLAMP CONNECTIONS. EXOTHERMIC WELDS SHALL BE PERMITTED ON TOWERS ONLY WITH THE EXPRESS APPROVAL OF THE TOWER MANUFACTURER OR THE CONTRACTORS STRUCTURAL ENGINEER.
- ALL RADIO SIGNAL CABLE SHALL BE LABELED AND COLOR CODED PER MARKET REQUIREMENTS.
- ANTENNA FEED LINE SYSTEM SWEEP TESTING SHALL BE PERFORMED AND REPORTED IN ACCORDANCE WITH THE REQUIREMENTS OF PROJECT SPECIFICATIONS. CONTRACTOR WILL NOT ACCEPT A RADIO SIGNAL CABLE INSTALLATION WITH UNSATISFACTORY SWEEP TEST RESULTS.
- PIM TESTS SHALL BE PERFORMED ON NEW AND MOVED OR MODIFIED COAXIAL CABLE INSTALLATIONS. TEST SHALL BE PERFORMED AND REPORTED IN ACCORDANCE WITH PROJECT SPECIFICATIONS.
- DC CONNECTORS AT OUTDOOR BIAS-Ts OR DIPLEXER/TRIPLEXER PORTS SHALL BE WEATHERPROOFED PER MANUFACTURER RECOMMENDATIONS.
- AISG CONNECTIONS DO NOT REQUIRE ADDITIONAL WEATHERPROOFING UNLESS RECOMMENDED BY MANUFACTURER OR BY MARKET REQUIREMENTS.
- INSTALL ONLY STANDARD RF JUMPER CABLES (e.g. LDF4 OR LCF12) AT TOWER-TOP APPLICATIONS. FLEXIBLE RF CABLES (e.g. FSJ4 OR SCF12) SHALL NOT BE USED.
- CABLES AND CONNECTORS MUST BE PREPARED AND INSTALLED USING THE TOOLS RECOMMENDED BY THE COAXIAL CABLE MANUFACTURER. IT IS THE CONTRACTOR'S RESPONSIBILITY TO ENSURE THAT THE CORRECT TOOLS ARE USED FOR THE SIZE AND TYPE OF COAX AND CONNECTOR. ALL ASPECTS OF INSTALLATION OF ALL COAXIAL CABLE SHALL FOLLOW THE CABLE MANUFACTURER'S RECOMMENDATIONS, INCLUDING THOSE FOR PULLING, MOUNTING AND GROUNDING.

PROPOSED ANTENNA CONFIGURATION												
SECTOR	PROPOSED ANTENNA	TECH.	ANTENNA	HEIGHT	WIDTH	DEPTH	WEIGHT	ANTENNA	ANT. CL.	ELECTRICAL	MECHANICAL	
			STATUS	(in)	(in)	(in)	(lbs)	AZIMUTH	ELEV (ft.)	DOWNTILT	DOWNTILT	
ALPHA	A1	NOKIA AAHC	2500	REPLACED	25.6	19.7	9.64	103.7	30°	140'	2°	0°
	A2	COMMSCOPE NNVV-65B-R4	800/1900	REPLACED	72	19.6	7.8	84.7	30°	140'	3°	0°
BETA	B1	NOKIA AAHC	2500	REPLACED	25.6	19.7	9.64	103.7	120°	140'	2°	0°
	B2	COMMSCOPE NNVV-65B-R4	800/1900	REPLACED	72	19.6	7.8	84.7	120°	140'	3°	0°
GAMMA	C1	NOKIA AAHC	2500	REPLACED	25.6	19.7	9.64	103.7	240°	140'	2°	0°
	C2	COMMSCOPE NNVV-65B-R4	800/1900	REPLACED	72	19.6	7.8	84.7	240°	140'	3°	0°

BILL OF MATERIALS				
NUMBER	QUANTITY	DESCRIPTION	MANUFACTURER	MODEL NUMBER
1	3	PANEL ANTENNA	NOKIA	AAHC
2	3	PANEL ANTENNA	COMMSCOPE	NNVV-65B-R4
3	3	1900MHZ RRH	ALU	RRH-4X45-1900
4	6	800MHZ RRH	ALU	RRH-2X50-800
5	840 LF	1-1/4"Ø HYBRID FIBER RISER (4 HYBRID CABLES TOTAL)	ALU	TBD
6	24	1/2"Ø JUMPER CABLE (8' LONG)	TBD	
7	3	0.315"Ø AISG CABLE (8' LONG)	COMMSCOPE	ATCB-801-006
8	3	2.5" O.D. x 8'-0" LONG STEEL MOUNTING PIPE	-	-
9	1	GROWTH CABINET	ELTEK	ECAB
10	1	POWER PROTECTION CABINET	ELTEK	5811122212



**ANTENNA WIRING DIAGRAM**  
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1	12/21/17	TOWER MODIFICATION	JRF	JCM
0	10/30/17	ISSUED FOR CONSTRUCTION	JRF	JCM
A	09/28/17	ISSUED FOR PERMITS	JRF	FEP
REV	DATE	DESCRIPTION	BY	CHECKED BY

**RETROS E. TSOUKALAS**  
 CONNECTICUT LICENSED PROFESSIONAL ENGINEER LICENSE NUMBER PER 32579

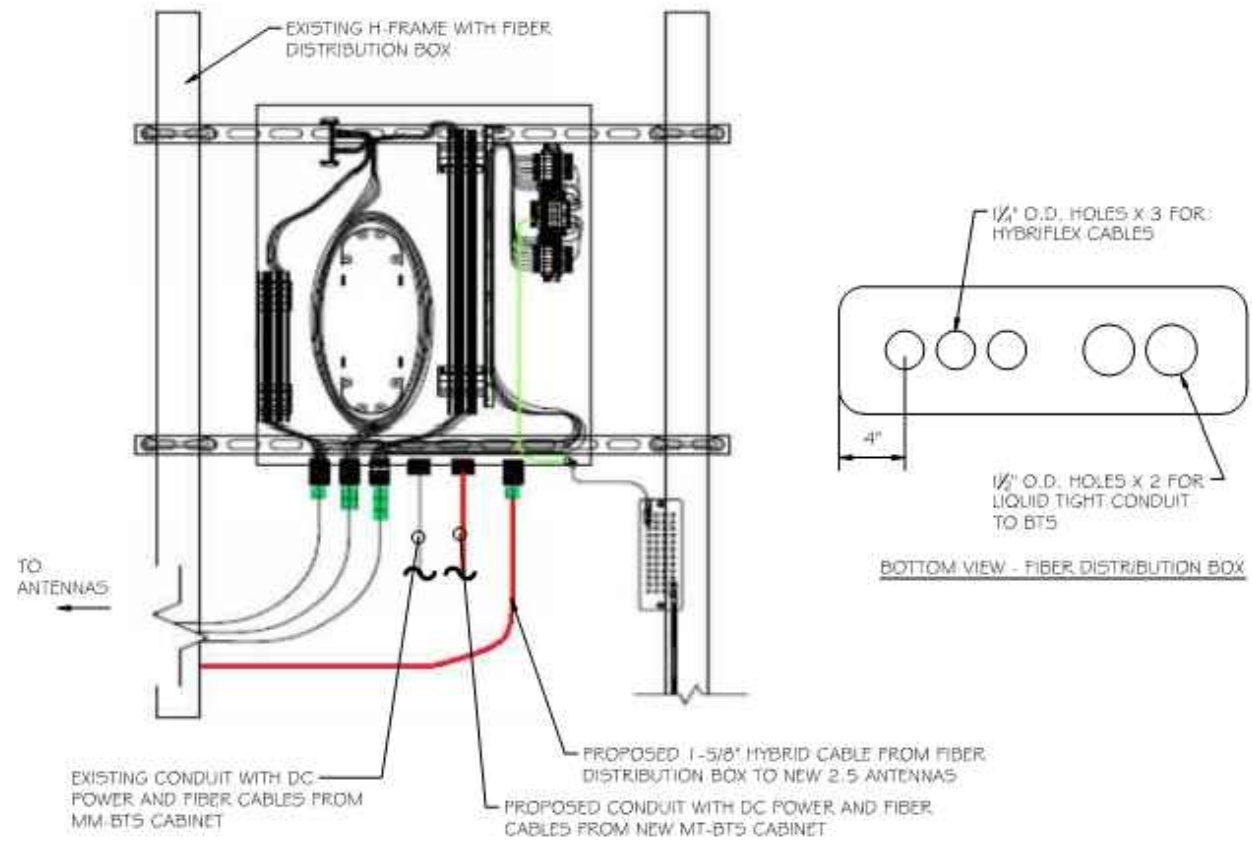
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**SITE ID: CT52XC043**  
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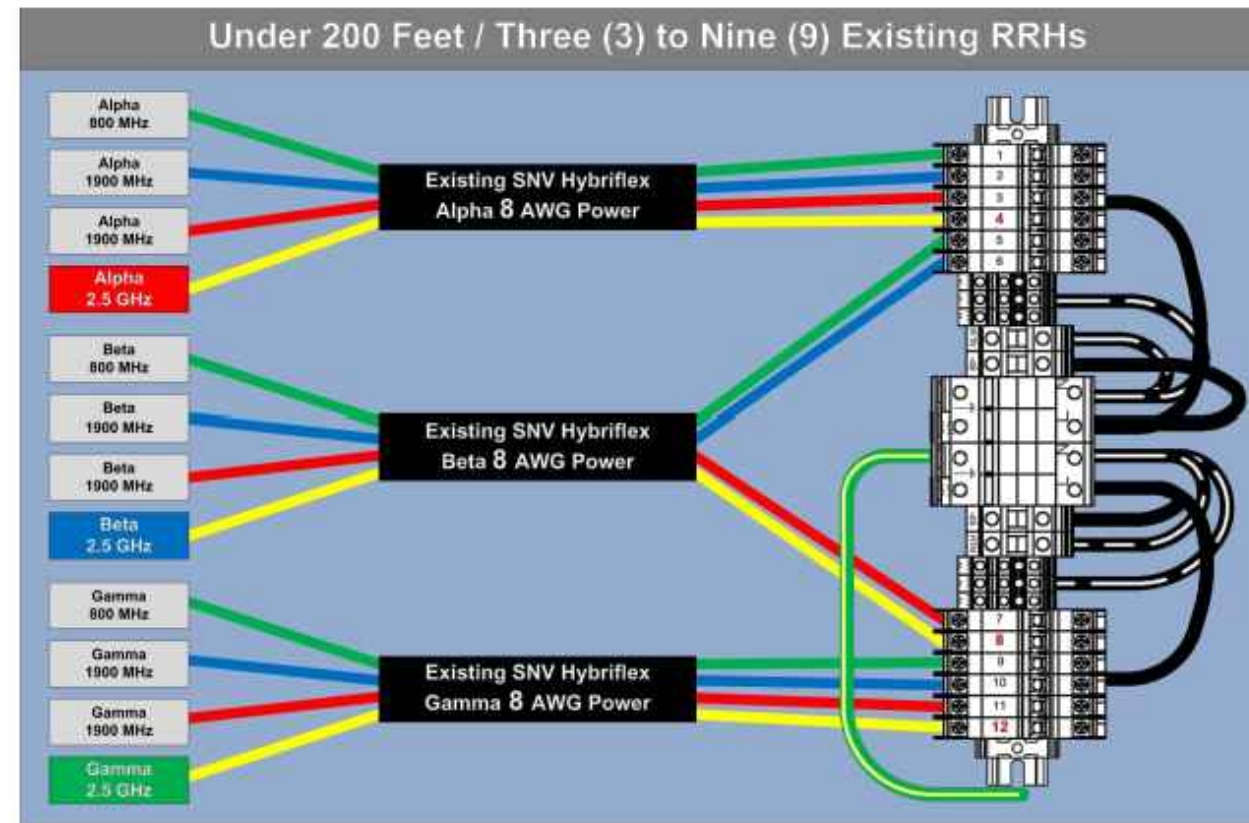
**RED BANK OFFICE**  
 331 Newman Springs Road  
 Suite 203  
 Red Bank, NJ 07701-5699  
 Phone: 732.383.1950  
 Fax: 732.383.1984

SHEET TITLE:  
**ANTENNA SCHEDULE, WIRING DIAGRAM, BILL OF MATERIALS AND NOTES**

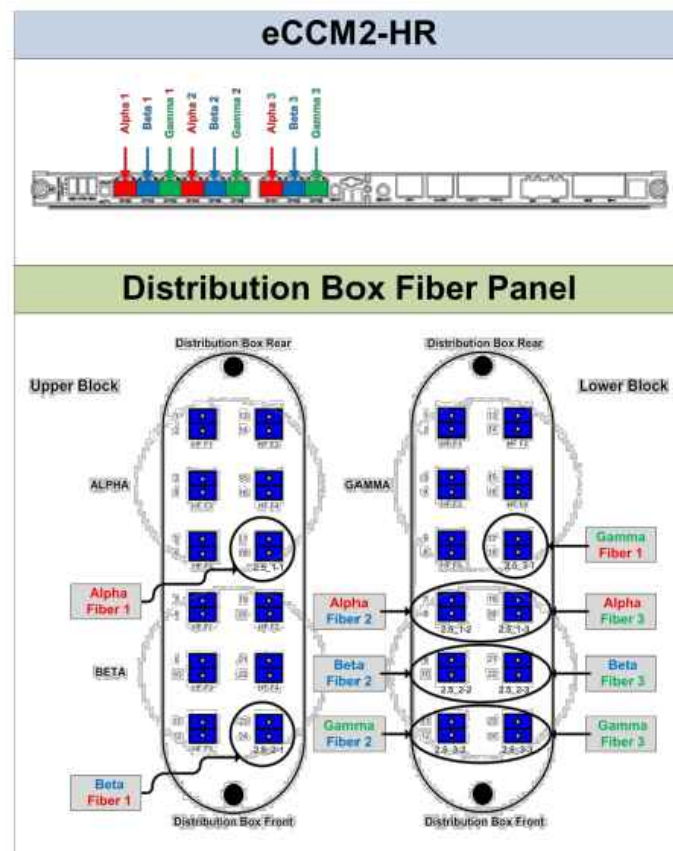
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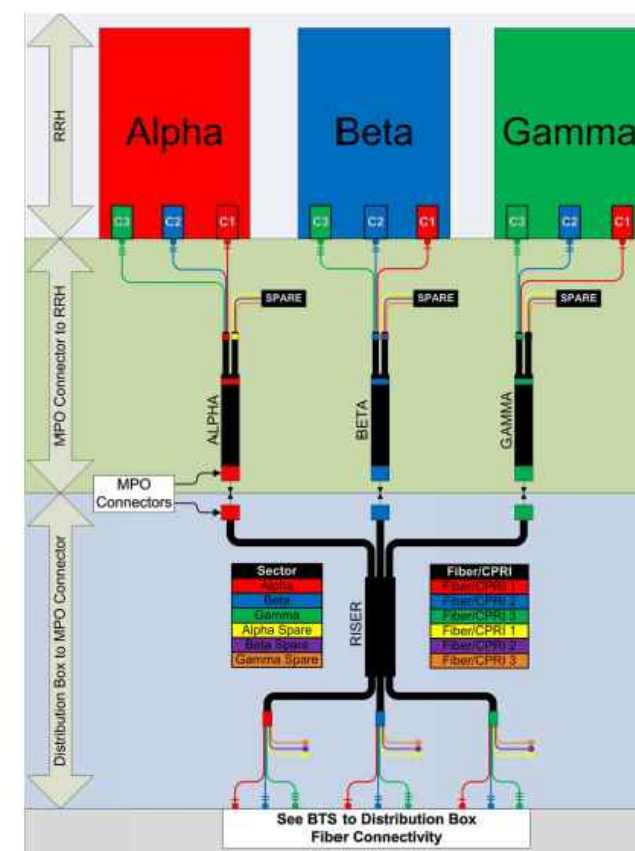
TYPICAL FIBER DISTRIBUTION BOX DETAIL  
NOT TO SCALE



RRH TO DISTRIBUTION BOX POWER CONNECTIVITY DETAIL  
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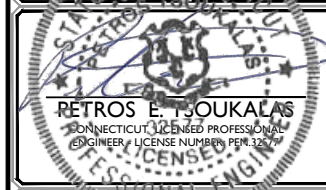


BTS TO DISTRIBUTION BOX FIBER CONNECTIVITY DETAIL  
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RRH TO DISTRIBUTION BOX FIBER CONNECTIVITY DETAIL  
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Prepared By  
Mark Elliott  
Approved By  
RAN Hardware & Antenna Teams

Revision Date  
March 13, 2018  
Revision Number  
R1  
Approval Date  
Final-Macro Generated



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



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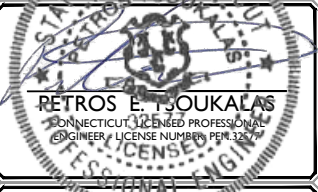


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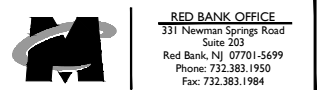
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SHEET TITLE:

FIBER PLUMBING DIAGRAMS - 2

SHEET NUMBER:

ANT-010.00

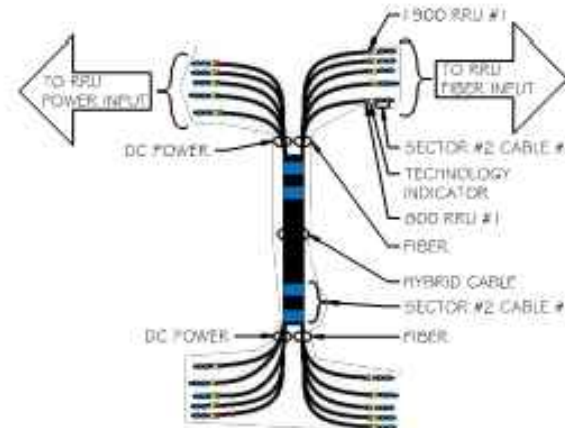
# CABLE MARKING NOTES

- ALL CABLES SHALL BE MARKED WITH 2" WIDE, UV STABILIZED, UL APPROVED TAPE.
- THE FIRST RING SHALL BE CLOSEST TO THE END OF THE CABLE AND SPACED APPROXIMATELY 2" FROM THE END CONNECTOR, WEATHERPROOFING, OR BREAKOUT UNIT. THERE SHALL BE 1" SPACE BETWEEN EACH RING.
- A 2" GAP SHALL SEPARATE THE CABLE COLOR CODE FROM THE FREQUENCY COLOR CODE. THE 2" COLOR RINGS FOR THE FREQUENCY CODE SHALL BE PLACED NEXT TO EACH OTHER WITH NO SPACES.
- THE 2" COLORED TAPE(S) SHALL BE WRAPPED A MINIMUM OF 3 TIMES AROUND THE INDIVIDUAL CABLES, AND THE TAPE SHALL BE KEPT IN THE SAME LOCATION AS MUCH AS POSSIBLE.
- SITES WITH MORE THAN FOUR (4) SECTORS WILL REQUIRE ADDITIONAL RINGS FOR EACH SECTOR, FOLLOWING THE PATTERN. HIGH CAPACITY SITES WILL USE THE SECOND CABLE IDENTIFIED BY BLUE BANDS OF TAPE.
- HYBRID FIBER CABLE SHALL BE SECTOR IDENTIFIED INSIDE THE CABINET ON FREQUENCY BUNDLES, ON THE SEALTITE, ON THE MAIN LINE UPON EXIT OF SEALTITE, AND BEFORE AND AFTER THE BREAKOUT UNIT (MEDUSA), AS WELL AS BEFORE AND AFTER ANY ENTRANCE OR EXIT.
- HFC "MAIN TRUNK" WILL NOT BE MARKED WITH THE FREQUENCY CODES, AS IT CONTAINS ALL FREQUENCIES.
- INDIVIDUAL POWER PAIRS AND FIBER BUNDLES SHALL BE LABEL.

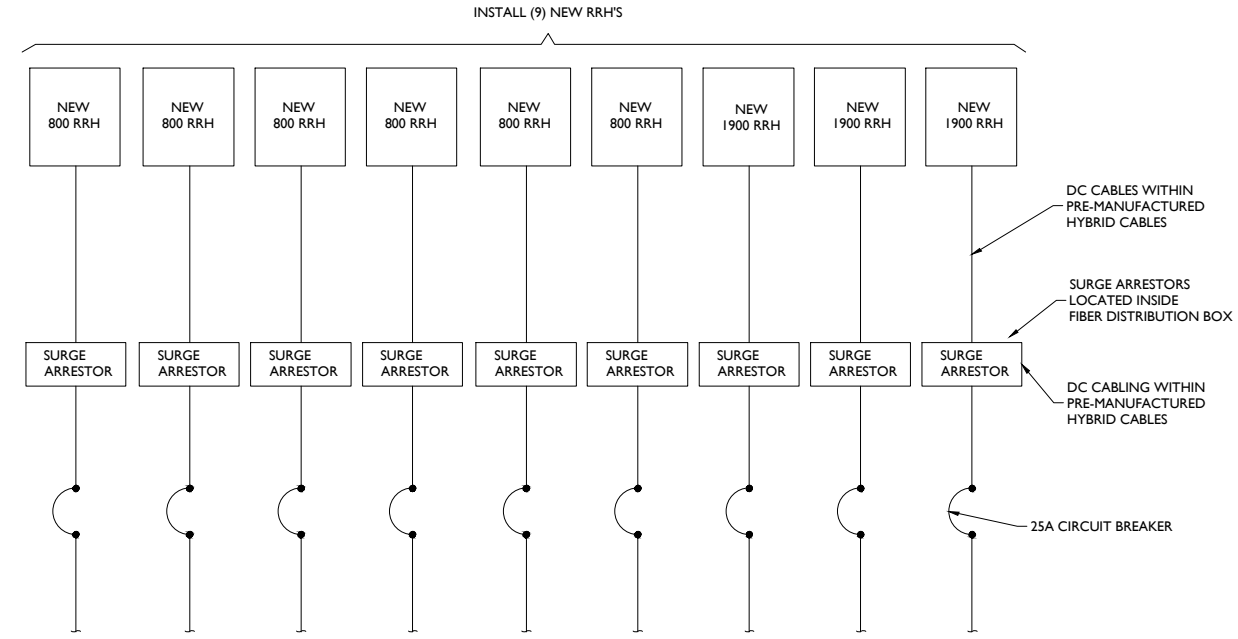
2.5 FREQUENCY	INDICATOR		ID
2500 -1	YEL	WHT	GRN
2500 -2	YEL	WHT	RED
2500 -3	YEL	WHT	BRN
2500 -4	YEL	WHT	BLU
2500 -5	YEL	WHT	SLT
2500 -6	YEL	WHT	ORG
2500 -7	YEL	WHT	WHT
2500 -8	YEL	WHT	PPL

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

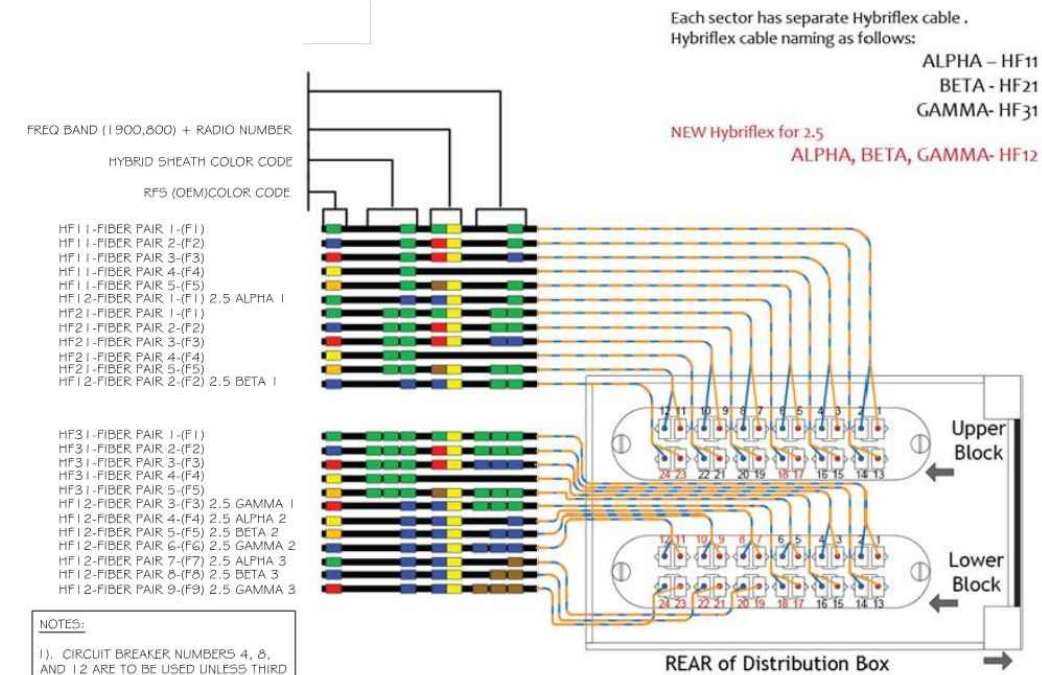
Sector	Cable	First Ring	Second Ring	Third Ring
1 Alpha	1	Green	No Tape	No Tape
1	2	Blue	No Tape	No Tape
1	3	Brown	No Tape	No Tape
1	4	White	No Tape	No Tape
1	5	Red	No Tape	No Tape
1	6	Grey	No Tape	No Tape
1	7	Purple	No Tape	No Tape
1	8	Orange	No Tape	No Tape
2 Beta	1	Green	Green	No Tape
2	2	Blue	Blue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



COLOR CODING CHARTS  
NOT TO SCALE



DC ONE-LINE DIAGRAM  
NOT TO SCALE



TYPICAL FIBER DISTRIBUTION  
NOT TO SCALE

- NOTES:
- CIRCUIT BREAKER NUMBERS 4, 8, AND 12 ARE TO BE USED UNLESS THIRD DC RAIL IS REQUIRED FOR MICROWAVE.
  - USE DC POWER LOOP.
  - ALL UNUSED DC FEEDERS TO BE TERMINATED WITH WIRE NUTS AND TAPED.
  - REMOVE ALL DEBRIS FROM INTERIOR OF FIBER DISTRIBUTION BOX WHEN COMPLETE.



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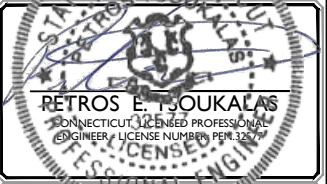


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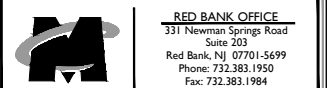
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3	04/16/18	REVISED PER COMMENTS	JCM	PET
2	04/06/18	REVISED PER RFS	JCM	JKM
1	12/21/17	TOWER MODIFICATION	JRF	JKM
0	10/30/17	ISSUED FOR CONSTRUCTION	JRF/DTS	JKM
A	09/28/17	ISSUED FOR PERMITS	JRF	FEP



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SHEET TITLE:  
CABLE COLOR CODING,  
DC POWER DETAILS &  
PANEL SCHEDULES

SHEET NUMBER:  
ANT-011.00



**GENERAL REQUIREMENTS:**

1. THE WORK TO BE DONE UNDER THIS PROJECT INCLUDES PROVIDING ALL EQUIPMENT, MATERIALS, LABOR AND SERVICES, AND PERFORMING ALL OPERATIONS FOR COMPLETE AND OPERATING SYSTEMS. ANY WORK NOT SPECIFICALLY COVERED BY NECESSARY TO COMPLETE THIS INSTALLATION, SHALL BE PROVIDED. ALL EQUIPMENT AND WIRING TO BE NEW AND PROVIDED UNDER THIS CONTRACT UNLESS OTHERWISE NOTED.
2. ENTIRE INSTALLATION, INCLUDING MATERIALS, EQUIPMENT AND WORKMANSHIP, SHALL CONFORM TO THE 2011 EDITION OF THE NATIONAL ELECTRIC CODE (NEC) AS WELL AS ALL APPLICABLE LAWS AND REGULATIONS AND REGULATORY BODIES HAVING JURISDICTION OVER THIS WORK.
3. THE TERM "FURNISH" SHALL MEAN TO OBTAIN AND SUPPLY THE JOB SITE. THE TERM "INSTALL" SHALL MEAN TO FIX IN POSITION AND CONNECT FOR USE. THE TERM "PROVIDE" SHALL MEAN TO FURNISH AND INSTALL. THE TERM "CONTRACTOR" SHALL MEAN ELECTRICAL CONTRACTOR.
4. ONLY WRITTEN CHANGES AND/OR MODIFICATIONS APPROVED BY THE ENGINEER, CONSULTING ENGINEER OR OWNER'S REPRESENTATIVE WILL BE RECOGNIZED.
5. THE ELECTRICAL CONTRACTOR SHALL SUBMIT, FOR THE ENGINEER'S APPROVAL, DETAILED SHOP DRAWINGS OF ALL EQUIPMENT SPECIFIED.
6. CONTRACTOR SHALL COORDINATE WITH SPECIFICATIONS BY OTHER TRADES.
7. PROVIDE OPERATING AND MAINTENANCE MANUALS, PER SPECIFICATIONS, AND GIVE INSTRUCTIONS TO USER FOR ALL EQUIPMENT AND SYSTEMS PROVIDED UNDER THIS CONTRACT AFTER ALL ARE CLEANED AND OPERATING.
8. KEEP PREMISES FREE FROM RUBBISH. REMOVE ALL ELECTRICAL RUBBISH FROM SITE.
9. ALL WORK SHALL BE INSTALLED CONCEALED UNLESS OTHERWISE NOTED.
10. THE WORK SHALL INCLUDE ALL PANELS, DEVICES, FEEDERS AND BRANCH CIRCUIT WIRING AS REQUIRED FOR THE DISTRIBUTION SYSTEM INDICATED AND CALLED FOR ON THE DRAWINGS. REQUIRED BY SPECIFICATIONS AND AS NECESSARY FOR COMPLETE FUNCTIONAL SYSTEMS PRESENTED AND INTENDED.
11. THE CONTRACTOR SHALL FURNISH ALL MATERIAL, LABOR, TOOLS, EQUIPMENT, CONSUMABLES AND SERVICES REQUIRED FOR OBTAINING, DELIVERY, INSTALLATION, CONNECTION, DISCONNECTION, REMOVAL, RELOCATION, REPAIR, REPLACEMENT, TESTING AND COMMISSIONING OF ALL EQUIPMENT AND DEVICES INCLUDED IN OR NECESSARY FOR THE WORK, AS APPLICABLE. THIS INCLUDES SCAFFOLDING, LADDERS, RIGGING, HOISTING, ETC.
12. ELECTRICAL WORK SHALL INCLUDE ALL REQUIRED CUTTING, PATCHING AND THE FULL RESTORATION OF WALL AND FLOOR STRUCTURE AND SURFACES. ALL EQUIPMENT, WALLS, FLOORS, ETC., DISTURBED OR DAMAGED DURING CONSTRUCTION SHALL BE REPAIRED TO THE SATISFACTION OF THE OWNER, AT THE CONTRACTORS EXPENSE.
13. BEFORE SUBMITTING HIS BID, THE CONTRACTOR SHALL FULLY ACQUAINT HIMSELF/HERSELF WITH THE JOB CONDITIONS AND DIFFICULTIES THAT WILL PERTAIN TO THE EXECUTION OF THIS WORK. SUBMISSION OF A PROPOSAL WILL BE CONSTRUED AS EVIDENCE THAT SUCH AN EXAMINATION HAS BEEN MADE. LATER CLAIMS WILL NOT BE RECOGNIZED FOR EXTRA LABOR, EQUIPMENT OR MATERIALS REQUIRED BECAUSE OF DIFFICULTIES ENCOUNTERED, WHICH COULD NOT HAVE BEEN FORESEEN HAD SUCH AN EXAMINATION BEEN MADE.
14. THE CONTRACTOR SHALL CONFIRM THE LOCATION OF ALL UTILITIES. THE CONTRACTOR IS RESPONSIBLE FOR REPAIRING ANY DAMAGE TO EXISTING UTILITIES.
15. UPON COMPLETION OF THE ELECTRICAL WORK, THE CONTRACTOR SHALL TEST THE COMPLETE ELECTRICAL SYSTEM FOR SHORTS, GROUNDS, AND PROPER OPERATION, IN THE PRESENCE OF THE OWNER'S REPRESENTATIVE.
16. UPON COMPLETION OF WORK, THE CONTRACTOR SHALL CLEAN AND ADJUST ALL EQUIPMENT AND LIGHTING AND TEST SYSTEMS TO THE SATISFACTION OF OWNER AND ENGINEER. RESULTS SHALL BE SUBMITTED TO THE ENGINEER FOR APPROVAL.
17. THE CONTRACTOR SHALL FIELD VERIFY DIMENSIONS OF FINISHED CONSTRUCTION PRIOR TO FABRICATION AND INSTALLATION OF FIXTURES AND EQUIPMENT.
18. EXACT ROUTING OF CONDUITS AND "MC" CABLES SHALL BE DETERMINED IN THE FIELD.
19. IF THE OWNER AND/OR HIS REPRESENTATIVE CONSIDERS ANY WORK TO BE INFERIOR, THE RESPECTIVE CONTRACTOR SHALL REPLACE SAME WITH CONTRACT STANDARD WORK WITHOUT ADDITIONAL CHARGE. ALL WORK SHALL BE DONE IN A NEAT, WORKMANLIKE MANNER. LEFT CLEAN AND FREE FROM DEFECTS, AND COMPLETELY OPERABLE.
20. THE CONTRACTOR SHALL PROVIDE ALL MATERIALS AS SHOWN ON THE DRAWINGS AND/OR AS SPECIFIED. ALL MATERIALS SHALL BE NEW, AND BEAR THE UL LABEL. ALL WORK SHALL BE GUARANTEED BY THE CONTRACTOR FOR A PERIOD OF ONE (1) YEAR FROM THE DATE OF ACCEPTANCE BY THE OWNER.
21. DRAWINGS ARE TO BE CONSIDERED DIAGRAMMATIC, AND SHALL BE FOLLOWED AS CLOSELY AS CONDITIONS ALLOW TO COMPLETE THE INTENT OF THE CONTRACT. THE DRAWINGS AND SPECIFICATIONS COMPLIMENT AND VICE VERSA, IS TO BE INCLUDED IN THE SCOPE OF WORK.
22. ALL EQUIPMENT CONNECTIONS SHALL BE INSTALLED PER APPLICABLE SEISMIC REQUIREMENTS.
23. ENGINEER WILL MAKE A FINAL INSPECTION WITH THE OWNER AND CONTRACTOR AND WILL NOTIFY THE CONTRACTOR IN WRITING OF ALL PARTICULARS IN WHICH THIS INSPECTION REVEALS THAT THE WORK IS INCOMPLETE OR DEFECTIVE. THE CONTRACTOR SHALL IMMEDIATELY TAKE SUCH MEASURES AS ARE NECESSARY TO COMPLETE SUCH WORK OR REMEDY SUCH DEFICIENCIES.
24. THE CONTRACTOR SHALL PERFORM ALL EXCAVATION, TRENCHING, AND BACKFILL AS REQUIRED FOR ELECTRICAL WORK. BACKFILL SHALL BE SUITABLE MATERIAL PROPERLY COMPACTED TO 95% DENSITY IN EACH LAYER OF SIX (6) INCH DEPTH. CONDUIT SHALL BE MINIMUM 36" BELOW FINISHED GRADE.

**PROJECT COORDINATION:**

1. THE CONTRACTOR SHALL VERIFY FIELD CONDITIONS AT THE SITE AND NOTIFY THE OWNER OF ANY DISCREPANCIES, PRIOR TO COMMENCING WITH THE WORK.
2. THE CONTRACTOR SHALL REVIEW AND COORDINATE WITH THE DOCUMENTS OF ALL TRADES.
3. THE CONTRACTOR SHALL FURNISH A SCHEDULE INDICATING HIS PORTION OF TIME, WITHIN THE OVERALL SCHEDULE, REQUIRED TO COMPLETE THE WORK, IN CONJUNCTION WITH ALL TRADES. ALL WORK THAT MAY AFFECT OPERATION OF BUILDING SYSTEMS SHALL BE COORDINATED WITH THE OWNER'S REPRESENTATIVE.
4. SHUT DOWN OF POWER SHALL BE COORDINATED WITH THE OWNER, ARCHITECT AND PROJECT MANAGER AT LEAST 14 WORKING DAYS PRIOR TO SHUT DOWN. SHUT DOWNS LONGER THAN 2 DAYS SHALL BE COORDINATED WITH THE ABOVE PERSONNEL AT LEAST ONCE A MONTH IN ADVANCE. TEMPORARY POWER FOR CONSTRUCTION SHALL BE PROVIDED BY THE ELECTRICAL CONTRACTOR FOR SHUT DOWNS OVER 2 DAYS.
5. ALL CONDUITS AND DEVICE BOXES SHALL BE PROVIDED BY THE ELECTRICAL CONTRACTOR, INCLUDING ALL TECHNOLOGY CONDUITS AND BOXES.
6. INSTALL NEW WORK AND CONNECT TO EXISTING WORK WITH MINIMUM INTERFERENCE TO EXISTING FACILITIES. ALARM AND EMERGENCY SYSTEMS SHALL NOT BE INTERRUPTED. TEMPORARY SHUT DOWNS OF ANY SYSTEMS SHALL BE COORDINATED WITH AND APPROVED BY THE OWNER AND ARCHITECT.

**PROTECTION OF WORK:**

1. EFFECTIVELY PROTECT ALL MATERIALS AND EQUIPMENT FROM ENVIRONMENTAL AND PHYSICAL DAMAGE UNTIL FINAL ACCEPTANCE. CLOSE AND PROTECT ALL OPENINGS DURING CONSTRUCTION. PROVIDE NEW MATERIALS AND EQUIPMENT TO REPLACE ITEMS DAMAGED.

**WARRANTIES AND BONDS:**

1. ALL MATERIALS, EQUIPMENT AND WORKMANSHIP SHALL BE GUARANTEED IN WRITING FOR A MINIMUM OF ONE YEAR AFTER FINAL ACCEPTANCE BY OWNER.
2. OBTAIN AND DELIVER TO THE OWNER'S REPRESENTATIVE ALL GUARANTEES AND CERTIFICATES OF COMPLIANCE.

**PERMITS:**

1. CONTRACTOR SHALL OBTAIN AND PAY FOR ALL REQUIRED PERMITS AND INSPECTION FEES FOR ELECTRICAL WORK.

**RACEWAYS:**

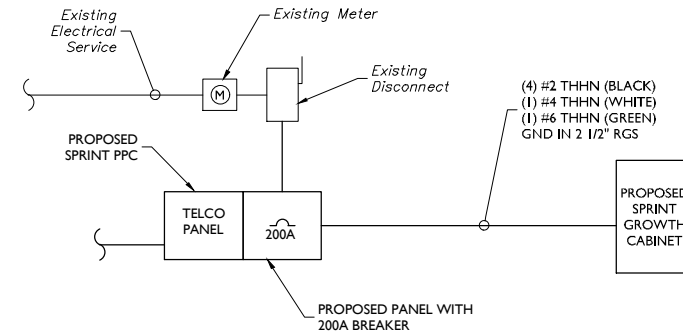
1. ALL CONDUIT SHALL BE MINIMUM SIZE OF 3/4" FOR POWER CIRCUITS AND CONTROL CIRCUITS EXCEPT WHERE FLEXIBLE CONDUIT IS CALLED FOR ON PROJECT DOCUMENTS. ALL EXTERIOR EXPOSED CONDUIT SHALL BE GRC (GALVANIZED RIGID METAL CONDUIT). ALL UNDERGROUND, IN SLAB OR UNDER SLAB SHALL BE RNC (RIGID NONMETALLIC CONDUIT). CHANGE RIGID METALLIC CONDUIT FOR INTERMEDIATE METALLIC CONDUIT BEFORE EXITING OUT OF CONCRETE OR PENETRATING A WALL, FLOOR OR ROOF. EMT IS ALLOWED IN INTERIOR DRY LOCATIONS WHERE NOT SUBJECT TO DAMAGE.
2. ALL FLEXIBLE CONDUIT IN WET OR DRY AREAS SHALL BE LIQUID TIGHT CONDUIT. NONMETALLIC FLEXIBLE CONDUIT IS SPECIFICALLY PROHIBITED.
3. CONDUIT SHALL BE RUN AT RIGHT ANGLES AND PARALLEL TO BUILDING LINES, SHALL BE NEATLY RACKED AND SECURELY FASTENED. JUNCTION BOXES SHALL BE PROVIDED WHERE REQUIRED TO FACILITATE INSTALLATION OF WIRES.
4. ALL CONDUIT AND ELECTRICAL EQUIPMENT SHALL BE SUPPORTED FROM THE BUILDING STRUCTURE IN AN APPROVED MANNER.
5. ALL EMPTY RACEWAYS SHALL BE FURNISHED WITH A 200 LB. TEST NYLON DRAG LINE.
6. ARRANGEMENT OF CONDUIT AND EQUIPMENT SHALL BE AS INDICATED, UNLESS MODIFICATION IS REQUIRED TO AVOID INTERFERENCES.
7. FOR CONDUITS CROSSING EXPANSION JOINTS, PROVIDE EXPANSION FITTINGS FOR SIZE 1 1/4" AND LARGER. PROVIDE SECTIONS OF FLEXIBLE CONDUIT WITH GROUNDING JUMPERS FOR SIZES 1" AND SMALLER.
8. THE CONTRACTOR SHALL INSTALL DETECTABLE UNDERGROUND TAPES FOR THE PROTECTION, LOCATION AND IDENTIFICATION OF UNDERGROUND CONDUIT INSTALLATION.
9. EXACT ROUTING OF CONDUITS AND CABLES SHALL BE DETERMINED IN FIELD.

**WIRING:**

1. ALL WIRE SHALL BE COPPER WITH TYPE THHN/THWN 600 VOLT INSULATION, MINIMUM #12 AWG FOR POWER AND LIGHTING CIRCUITS AND #16 AWG FOR CONTROL CIRCUITS.
2. UNDER NO CIRCUMSTANCES SHALL FEEDERS BE SPLICED.
3. ALL COMPUTER CIRCUITS SHALL HAVE SEPARATE NEUTRAL CONDUCTORS. ALL OTHER CIRCUITS MAY SHARE GROUND AND NEUTRAL CONDUCTORS.
4. WHERE EQUIPMENT, LIGHTING FIXTURES AND WIRING DEVICES ARE SHOWN WITH CIRCUIT NUMBERS ONLY, THE MINIMUM BRANCH CIRCUITING REQUIREMENTS SHALL BE AS FOLLOWS.
5. CONTRACTOR SHALL INCREASE SIZE OF CIRCUIT WIRING/CONDUCTORS TO COMPENSATE FOR VOLTAGE DROP.
6. WIRE SIZES SHALL BE INCREASED TO COMPENSATE FOR VOLTAGE DROP AS FOLLOWS:

**GROUNDING:**

1. PROVIDE A COMPLETE EQUIPMENT GROUND SYSTEM FOR THE ELECTRICAL SYSTEM AS REQUIRED BY ARTICLE 250, OF THE NEC, AND AS SPECIFIED HEREIN.
2. ALL BRANCH CIRCUITS FOR POWER WIRING SHALL CONTAIN A COPPER GROUND WIRE. NO FLEXIBLE METAL CONDUIT OF ANY KIND OR LENGTH SHALL BE USED AS THE EQUIPMENT GROUNDING CONDUCTOR.
3. THE EQUIPMENT BONDING JUMPER SHALL BE PERMITTED TO BE INSTALLED INSIDE OR OUTSIDE OF A RACEWAY OR ENCLOSURE. WHERE INSTALLED ON OUTSIDE, THE LENGTH OF THE EQUIPMENT BONDING JUMPER SHALL NOT EXCEED 6 FEET AND SHALL BE ROUTED WITH THE RACEWAY OR ENCLOSURE. REFER TO NEC 2011 - 250.102 (E)
4. ALL GROUNDING DEVICES SHALL BE U.L. APPROVED OR LISTED FOR THEIR INTENDED USE.
5. ALL WIRES SHALL BE AWG THHN/THWN COPPER UNLESS NOTED OTHERWISE.
6. GROUNDING CONNECTIONS TO GROUND RODS, GROUND RING WIRE, TOWER BASE AND FENCE POSTS SHALL BE EXOTHERMIC ("CADWELDS") UNLESS NOTED OTHERWISE. CLEAN SURFACES TO SHINY METAL. WHERE GROUND WIRES ARE CADWELDED TO GALVANIZED SURFACES, SPRAY CADWELD WITH GALVANIZING PAINT.
7. GROUNDING CONNECTIONS TO GROUND BARS ARE TO BE TWO-HOLE BRASS MECHANICAL CONNECTORS WITH STAINLESS STEEL HARDWARE (INCLUDE SCREW SET). CLEAN GROUND BAR TO SHINY METAL. AFTER MECHANICAL CONNECTION, TREAT WITH PROTECTIVE ANTIOXIDANT COATING.
8. GROUND COAXIAL CABLE SHIELDS AT BOTH ENDS WITH MANUFACTURERS' GROUNDING KITS.
9. ROUTE GROUNDING CONDUCTORS THE SHORTEST AND STRAIGHTEST PATH POSSIBLE. BEND GROUNDING LEADS WITH A MINIMUM 12" RADIUS.
10. INSTALL #2 AWG GREEN-INSULATED STRANDED WIRE FOR ABOVE GRADE GROUNDING AND #2 BARE TINNED COPPER WIRE FOR BELOW GRADE GROUNDING UNLESS OTHERWISE NOTED.
11. GROUNDING CONNECTIONS SHALL BE EXOTHERMIC TYPE ("CADWELDS") TO GROUND RING. REMAINING GROUNDING CONNECTIONS SHALL BE COMPRESSION FITTINGS. CONNECTIONS TO GROUND BARS SHALL BE MADE WITH TWO-HOLE LUGS.
12. EXOTHERMIC WELDS SHALL BE MADE IN ACCORDANCE WITH ERICO PRODUCTS BULLETIN A-A1.
13. CONSTRUCTION OF GROUND RING AND CONNECTIONS TO EXISTING GROUND RING SYSTEM SHALL BE DOCUMENTED WITH PHOTOGRAPHS PRIOR TO BACKFILLING SITE. PROVIDE PHOTOS TO CARRIER'S CONSTRUCTION MANAGER.
14. ALL GROUND LEADS EXCEPT THOSE TO THE EQUIPMENT ARE TO BE #2/0 TINNED. ALL EXTERIOR GROUND BARS TINNED COPPER.
15. PRIOR TO INSTALLING LUGS ON GROUND WIRES, APPLY THOMAS & BETTS KOPR-SHIELD (TM OF JET LUBE INC.) PRIOR TO BOLTING GROUND WIRE LUGS TO GROUND BARS, APPLY KOPR-SHIELD OR EQUAL.
16. ENGAGE IN INDEPENDENTLY ELECTRICAL TESTING FIRM TO TEST AND VERIFY THAT IMPEDANCE DOES NOT EXCEED FIVE OHMS TO GROUND BY MEANS OF "FALL OF POTENTIAL TEST". TEST SHALL BE WITNESSED BY CARRIER REPRESENTATIVE, AND RECORDED ON CARRIER'S "GROUND RESISTANCE TEST" FORM.
17. WHERE BARE COPPER GROUND WIRES ARE ROUTED FROM ANY CONNECTION ABOVE GRADE TO GROUND RING, INSTALL WIRE IN 3/4" PVC SLEEVE, FROM 1' BELOW GRADE AND SEAL TOP WITH SILICONE MATERIAL.
18. PREPARE ALL BONDING SURFACES FOR GROUNDING CONNECTIONS BY REMOVING ALL PAINT AND CORROSION DOWN TO SHINY METAL FOLLOWING CONNECTION, APPLY APPROPRIATE ANTI-OXIDIZATION PAINT.
19. ANY SITE WHERE THE EQUIPMENT (BTS, CABLE BRIDGE, PPC, GENERATOR, ETC.) IS LOCATED WITHIN 6 FEET OF METAL FENCING THE BGR SHALL BE BONDED TO THE NEAREST FENCE POST USING (2) RUNS OF #2 BARE TINNED COPPER WIRE.

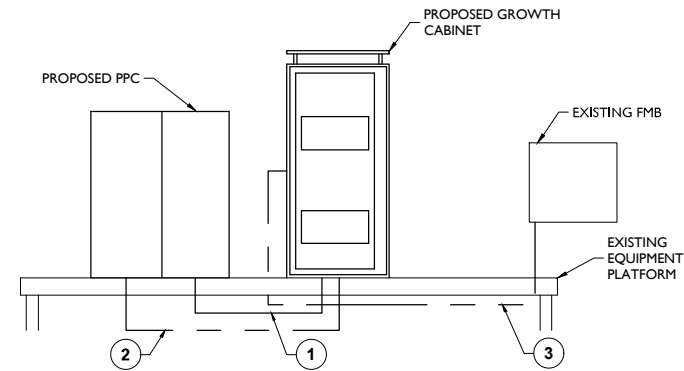


**NOTES:**

1. SERVICE POWER SHALL BE 240VAC, 200A, 1Ø, 3W OR 208VAC, 200A, 1Ø, 3W.
2. POWER & TELEPHONE CONDUIT INSTALLATION SHALL BE COORDINATED WITH THE UTILITY COMPANIES.
3. CONTRACTOR SHALL INSTALL (1) 100 AMP DUAL POLE BREAKER IN EXISTING PANEL FOR PROPOSED GROWTH CABINET. BREAKER INTERRUPTING RATING SHALL MATCH EXISTING PANEL BOARD.

**POWER RISER DIAGRAM**

NOT TO SCALE



**LEGEND:**

1. USE PROPOSED 100A 2 POLE BREAKER IN PROPOSED PPC. INSTALL (3) #3 AWG OR LARGER.
2. CONTRACTOR TO PROVIDE (1) 2" EMPTY CONDUIT W/ HEAVY DUTY PULLSTRING FROM PROPOSED PPC TO BTS
3. CONTRACTOR PROVIDE (2) 1-1/2" L/T FROM FMB TO GROWTH CABINET. (PROVIDED WITH FMB)

**EQUIPMENT RISER DIAGRAM DETAIL**

NOT TO SCALE

**PRELIMINARY ELECTRIC SCHEMATIC SHOWN  
PENDING - LOAD STUDY AND VERIFICATION  
OF EXISTING SERVICE CAPACITY**



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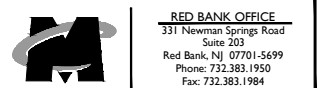
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0	10/30/17	ISSUED FOR PERMIT	JRF	JCM
A	09/28/17	ISSUED FOR PERMIT	JRF	FEP
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**SITE NAME: NEWINGTON  
SITE ID: CT52XC043**

**99 CEDARWOOD LANE  
NEWINGTON, CT 06111**



SHEET TITLE:  
**ELECTRICAL AND  
GROUNDING NOTES**

SHEET NUMBER:  
**ANT-012.00**



**MODIFICATION NOTES:**

- IF THE EXISTING CONDITIONS ARE NOT AS REPRESENTED ON THESE DRAWINGS, MASER CONSULTING SHOULD BE CONTACTED IMMEDIATELY TO RE-EVALUATE THE STRUCTURE BASED ON THE FIELD CONDITIONS AND DIMENSIONS FOUND.
- IT IS ASSUMED THAT ANY STRUCTURAL MODIFICATION WORK SPECIFIED ON THESE DRAWINGS WILL BE ACCOMPLISHED BY KNOWLEDGEABLE WORKMEN WITH TOWER CONSTRUCTION EXPERIENCE.
- THIS DRAWING DOES NOT INDICATE THE METHOD OF CONSTRUCTION. THE CONTRACTORS SHALL SUPERVISE AND DIRECT THE WORK AND THEY SHALL BE SOLELY RESPONSIBLE FOR ALL CONSTRUCTION MEANS, METHODS, TECHNIQUES, SEQUENCES, AND PROCEDURES.
- CONTRACTOR SHALL VERIFY PLACEMENT OF ALL NEW PIECES FOR ADEQUATE FIT, CLEARANCES, AND DESIGN INTENT BEFORE FABRICATION STARTS.
- IT IS THE CONTRACTOR'S SOLE RESPONSIBILITY TO DETERMINE THE ERECTION PROCEDURE AND SEQUENCE TO INSURE THE STABILITY, SAFETY OF THE STRUCTURE AND MOUNTS (AS APPLICABLE), AND THE ADEQUACY OF TEMPORARY OR INCOMPLETE CONNECTIONS DURING CONSTRUCTION.
- THE CONTRACTOR SHALL BE RESPONSIBLE FOR INITIATING, MAINTAINING, AND SUPERVISING ALL SAFETY PRECAUTIONS AND PROGRAMS IN CONNECTION WITH THE WORK. THIS INCLUDES WHATEVER PROVISIONS NEED TO BE TAKEN TO PROTECT THE PROPERTY IN THE VICINITY OF THE TOWER DURING CONSTRUCTION.
- DURING CONSTRUCTION THE CONTRACTOR SHALL COORDINATE WITH THE TOWER/STRUCTURE OWNER AND CORDON OFF AREAS BELOW AND AROUND THE WORK TO PREVENT INJURY TO PERSONS AND/OR PROPERTY. DAMAGES RESULTING FROM THE CONTRACTORS WORK SHALL BE REPAIRED AT THE CONTRACTORS EXPENSE.
- BACK CHARGES FOR CORRECTIVE WORK OR REPLACEMENT MATERIALS WILL NOT BE ACCEPTED UNLESS EXPRESSLY AUTHORIZED BY MASER CONSULTING BEFORE ANY SUCH COSTS ARE INCURRED.
- POST CONSTRUCTION INSPECTION TO BE COMPLETED BY OTHERS.
- ALL FIELD CONNECTIONS, UNLESS NOTED OTHERWISE, SHALL BE BOLTED.
- CUTTING OR BURNING OF STEEL IN THE FIELD IS STRICTLY PROHIBITED. CONTRACTOR SHALL COORDINATE WITH TOWER OWNER AND FOLLOW ALL PROCEDURES FOR DRILLING AND INSTALLING NW FASTENERS IN STRUCTURE TO AVOID DAMAGE TO STRUCTURE, CABLES, AND EXISTING APPURTENANCES.
- WHERE STEEL IS IN CONTACT WITH ALUMINUM PROVIDE ADEQUATE BARRIER TO PREVENT OXIDATION OF THE STEEL AND ALUMINUM.
- ALL BOLT HOLES SHALL BE  $\frac{1}{16}$ " LARGER THAN BOLT DIAMETER. ALL BOLTS SHALL HAVE ONE FLAT WASHER, ONE LOCK WASHER, AND ONE NUT UNLESS NOTED OTHERWISE.
- COMPLY WITH ALL APPLICABLE REQUIREMENTS OF THE CURRENT EDITIONS OF THE FOLLOWING STANDARDS AND CODES:
  - AMERICAN INSTITUTE OF STEEL CONSTRUCTION (AISC) "SPECIFICATIONS FOR THE DESIGN, FABRICATION, AND ERECTION OF STRUCTURAL STEEL FOR BUILDINGS".
  - AMERICAN IRON AND STEEL INSTITUTE (AISI) "DESIGN OF COLD FORMED STEEL STRUCTURAL MEMBERS".
  - ASTM A563-04 "STANDARD SPECIFICATION FOR CARBON AND ALLOY STEEL NUTS".
  - ASTM F436-03 "STANDARD SPECIFICATION FOR HARDENED STEEL WASHERS".
  - ASTM A325-04 "STANDARD SPECIFICATION FOR STRUCTURAL BOLTS, STEEL, HEAT TREATED, 300 KSI MINIMUM TENSILE STRENGTH".
  - ASTM A153/A153M-09 "STANDARD SPECIFICATION FOR ZINC COATING (HOT-DIP) ON IRON AND STEEL HARDWARE".
  - ASTM 123/A1123M-09 "STANDARD SPECIFICATION FOR ZINC (HOT-DIP GALVANIZED) COATINGS ON IRON AND STEEL PRODUCTS".
- ALL STEEL WORK SHALL BE ASTM A53 GRADE B FOR PIPE SECTIONS, A475 GRADE 4 FOR HIGH STRENGTH GUY WIRES, AND A36 FOR PLATE AND ANGLE AND GALVANIZED UNLESS NOTED OTHERWISE, GALVANIZED COATING THICKNESS TO BE G90.
- SHOP WELDING SHALL BE PERFORMED BY WELDERS THAT ARE CERTIFIED (AWS "STANDARD QUALIFICATION PROCEDURE") TO PERFORM THE TYPE OF WORK REQUIRED. WELDS SHALL CONFORM TO AMERICAN WELDING SOCIETY (AWS) D1.1 "STRUCTURAL WELDING CODE - STEEL". PROVIDE THE MINIMUM SIZE PER PART 8 IN THE AISC "MANUAL OF STEEL CONSTRUCTION", LRFD 3RD EDITION, WHEN WELD SIZES ARE NOT SHOWN. USE E70XX ELECTRODES FOR ALL WELDING.
- UNLESS NOTED OTHERWISE ALL BOLTS SHALL BE INSTALLED WITH HEADS UP OR TOWARD THE OUTSIDE FACE, AND NUTS DOWN OR ON THE SIDE MOST PROTECTED FROM WEATHER.
- USE PRECAUTIONS & PROCEDURES PER AWS D1.1 WHEN WELDING GALVANIZED MATERIALS. AT COMPLETION OF WELDING, ALL DAMAGE TO GALVANIZED COATING SHALL BE REPAIRED.
- ALL STRUCTURAL STEEL SHALL BE DETAILED, FABRICATED AND ERECTED IN ACCORDANCE WITH THE CURRENT EDITION OF AISC "SPECIFICATIONS FOR DESIGN, FABRICATION AND ERECTION OF STRUCTURAL STEEL FOR BUILDINGS - LOAD AND RESISTANCE FACTOR DESIGN".
- MEMBERS SHALL BE LAID PLUMB AND TRUE AS SHOWN ON THE DRAWINGS.
- COPE ALL FRAMING AT ENDS AS NECESSARY, UNLESS NOTED OTHERWISE.
- THE GENERAL CONTRACTOR AND THEIR SUBCONSULTANTS SHALL BE RESPONSIBLE FOR OBTAINING ALL PERMITS AND INSPECTIONS WHICH MAY BE REQUIRED FOR THE WORK.
- ONLY ONE ANGLE IS TO BE REMOVED AND REPLACED AT A TIME.



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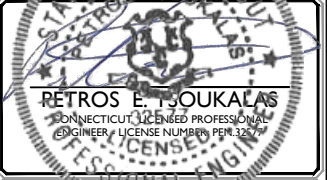


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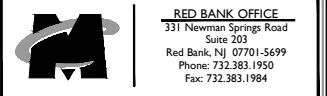
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1	12/21/17	TOWER MODIFICATION	JRF	JKM
0	10/30/17	ISSUED FOR PERMITS	JRF	JKM
A	09/28/17	ISSUED FOR PERMITS	JRF	FEP



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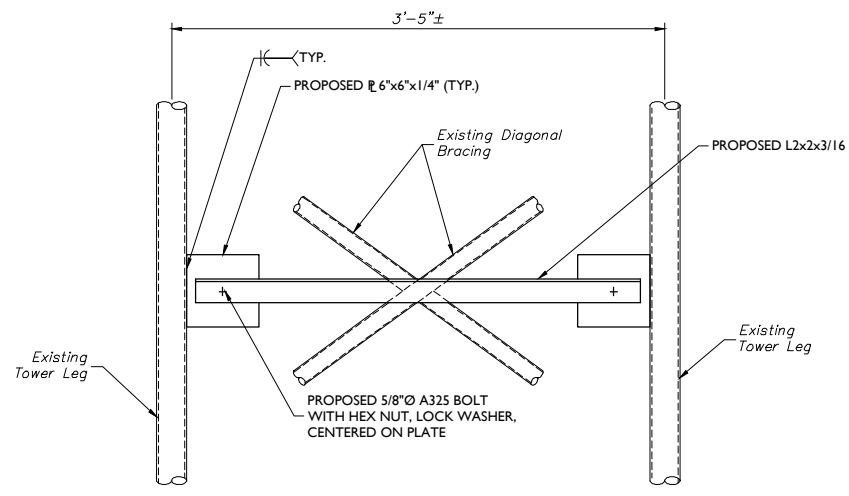
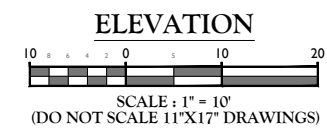
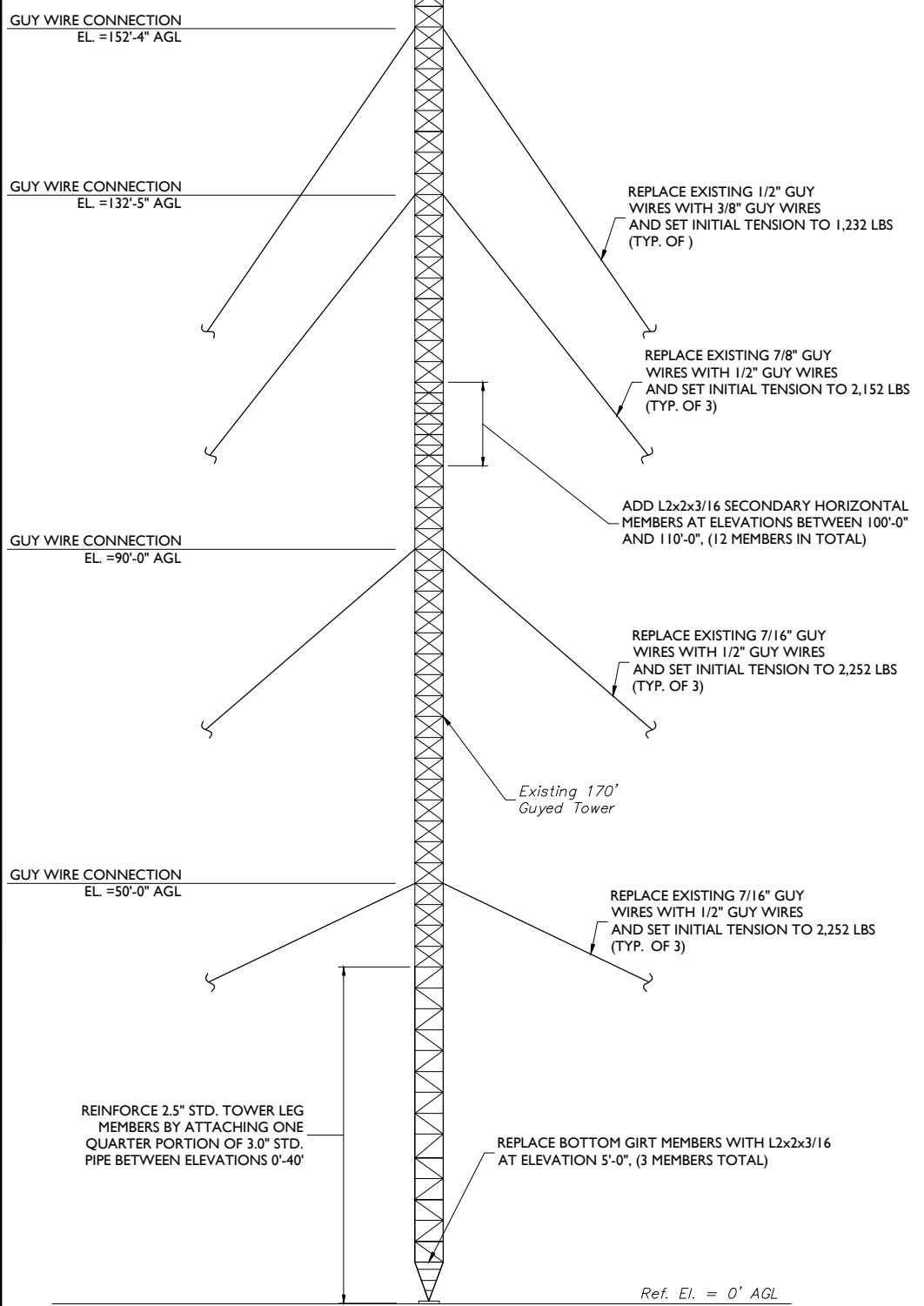
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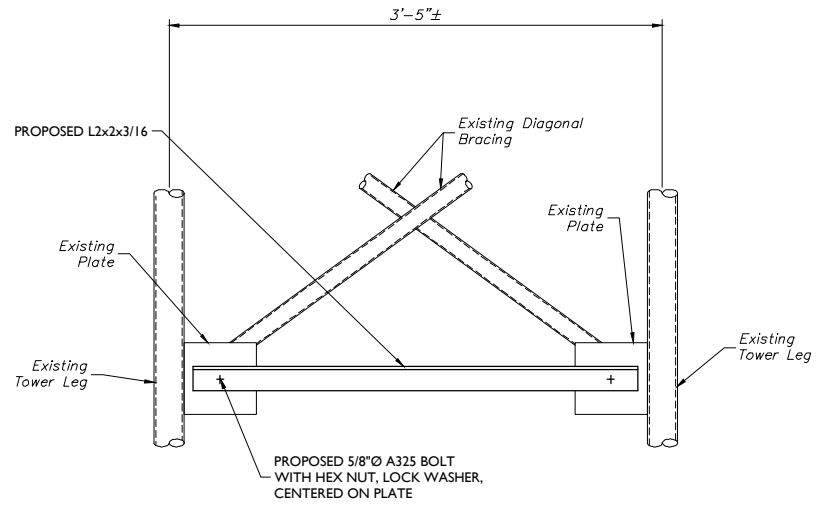
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SHEET TITLE:  
**TOWER MODIFICATION DETAILS**  
SHEET NUMBER:  
**ANT-014.00**

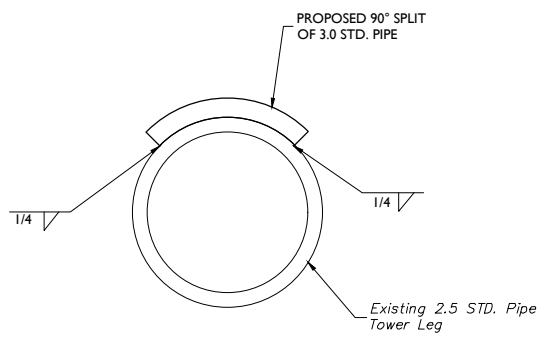
Top of Existing Guyed Tower  
El. = 170'-0"± AGL



**SECONDARY HORIZONTAL MEMBER DETAIL**  
SCALE: 1 1/2" = 1'-0"



**GIRT REPLACEMENT DETAIL**  
SCALE: 1 1/2" = 1'-0"



**TOWER LEG REINFORCEMENT DETAIL**  
NOT TO SCALE

**LEGEND**

- LIGHT LINE WORK INDICATES EXISTING OBJECTS
- HEAVY LINE WORK INDICATED PROPOSED OBJECTS