Cherundolo Consulting

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

January 23, 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 3 new panel antennas (1 per sector) and add 12 remote radio units (4 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*

Paul F. Sagristano
Cherundolo Consulting
917.841.0247
psagristano@lrivassoc.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

January 23, 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 and replace 3 panel antennas (1 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 telephone 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 has12 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

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

February 8,2018

Dear Customer:

The following is the proof-of-delivery for tracking number **771384309903**.

Delivery Information:

Status:	Delivered	**Delivered to:**	Receptionist/Front Desk
Signed for by:	E.CALAHAN	**Delivery location:**	2143 BERLIN TURNPIKE NEWINGTON, CT 06111
Service type:	FedEx Express Saver	**Delivery date:**	Feb 6, 2018 15:45
Special Handling:	Deliver Weekday Direct Signature Required		

Shipping Information:

Tracking number:	771384309903	**Ship date:**	Feb 1, 2018
		Weight:	0.5 lbs/0.2 kg

Recipient:
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

Reference
CT52XC043 - CSC to LL

Thank you for choosing FedEx.

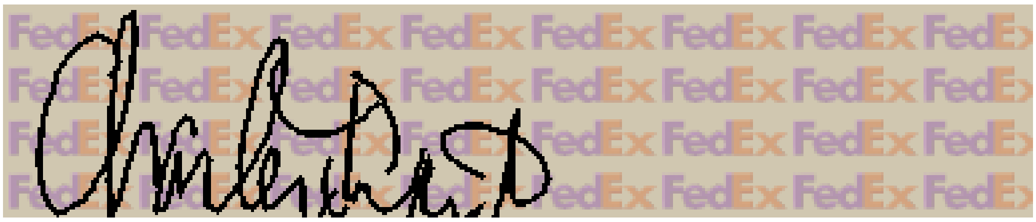
February 8,2018

Dear Customer:

The following is the proof-of-delivery for tracking number **771384224094**.

Delivery Information:

Status:	Delivered	**Delivered to:**	Receptionist/Front Desk
Signed for by:	C.DRZATA	**Delivery location:**	131 CEDAR STREET NEWINGTON, CT 06111
Service type:	FedEx Express Saver	**Delivery date:**	Feb 6, 2018 14:42
Special Handling:	Deliver Weekday Direct Signature Required		



Shipping Information:

Tracking number:	771384224094	**Ship date:**	Feb 1, 2018
		Weight:	0.5 lbs/0.2 kg

Recipient:
Hon. Roy Zartarian, Mayor
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

Reference
CT52XC043 CSC to Mayor

Thank you for choosing FedEx.

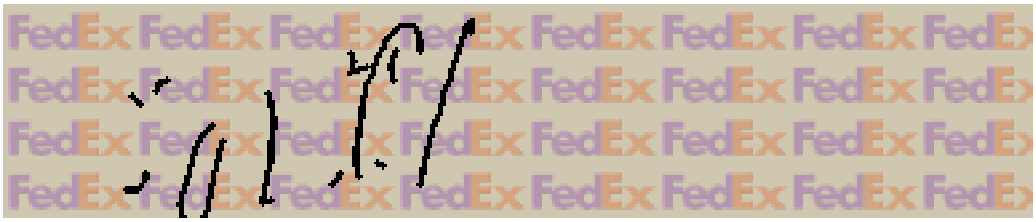
February 8,2018

Dear Customer:

The following is the proof-of-delivery for tracking number **771384254476**.

Delivery Information:

Status:	Delivered	**Delivered to:**	Receptionist/Front Desk
Signed for by:	J.DIAZ	**Delivery location:**	131 CEDAR STREET NEWINGTON, CT 06111
Service type:	FedEx Express Saver	**Delivery date:**	Feb 6, 2018 14:38
Special Handling:	Deliver Weekday Direct Signature Required		



Shipping Information:

Tracking number:	771384254476	**Ship date:**	Feb 1, 2018
		Weight:	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

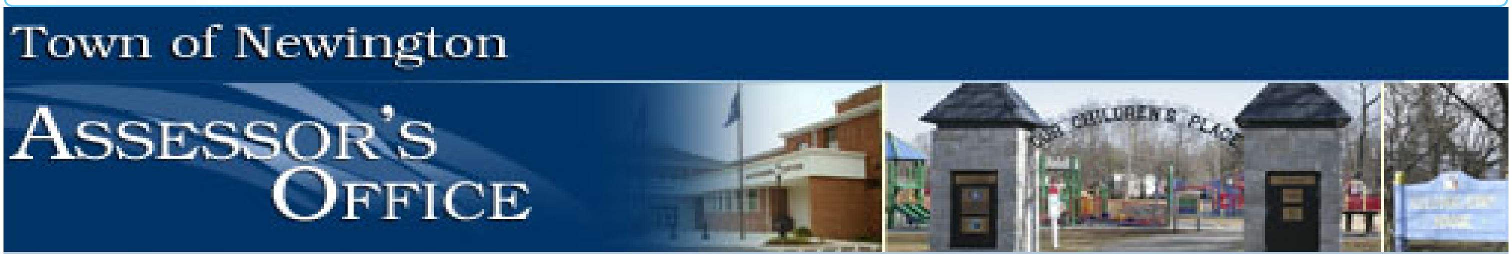
Reference
CT52XC043 CSC to Planner

Thank you for choosing FedEx.

Google Maps 2111 Berlin Turnpike - Callahan's Property

Imagery ©2018 Google, 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.



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:			

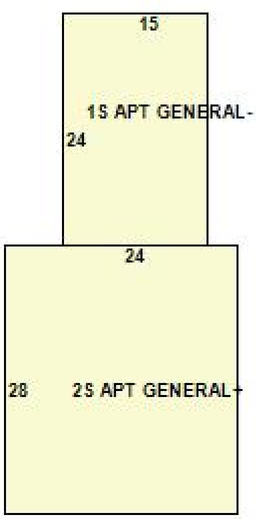
Value Information

	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

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

Sprint
Together with Nextel.

208 Gilead Road, Andover, Ct 06232

April 7, 2004

EM-NEXTEL-094-060407

Pamela B. Katz, P.E.
Chairperson
Connecticut Siting Council
10 Franklin square
New Britain Connecticut 06051

Re: Notice of Exempt Modification
Address: 2111 Berlin Turnpike, Newington, Connecticut

Dear Ms. Katz:

Please be advised that Sprint Nextel Communication, Inc. proposes to modify an existing site at 2111 Berlin Turnpike, Newington. The modifications will add 3 panel antennas to the already existing 9 panel antennas located at the ~~152~~ ft level centerline above ground level; install a diesel generator; and replace the existing equipment shelter. 140'

Discussion:

The existing facility consists of a ~~180~~ 170' ft, guyed lattice tower. The coordinates at the site are latitude: 41'41'40.8'N and 72'42'34.0".

Nextel plans to update the existing antenna cluster by adding 3 panel antennas, one to each of the existing 3 sectors resulting in four antennas per sector, constituting a total of twelve (12) panel-type antennas (DB844H90E-XY). The 60kw, class 1 diesel generator will be installed on a 6' x 12' concrete pad at the location noted in attached Exhibit A. The existing 10' x 20' equipment shelter will be replaced with a ~~12x20~~ equipment shelter. The smaller existing shelter will remain on site while the transfer to the larger equipment shed is taking place.

11'6" x 26'6"

The planned modification to the 2111 Berlin Turnpike site is within the activities explicitly provided for in R.C.S.A. 16-50j-72(b)(2).

1. The proposed modification will not increase the height of the tower and will not extend the boundaries of the existing compound area. The enclosed tower drawings (exhibit A) confirm that the planned changes will not increase the overall height of the tower or change the dimensions of the compound.

2. The installation of Nextel equipment, as reflected on the attached site plan, will not require an extension of the site boundaries. The equipment will be located entirely within the existing compound.

Exhibit B

Newington, CT0746 (Berlin Tpke.) - CT Siting Council Power Density Calculations

Nextel Directional Antennas ESMR - 851 MHz at centerline ~~152'~~ 140' AGL

Note: Power densities are in mW/ cm²

Transmitters:	Frequency in MHz	CT Standard mW/ cm²	Number of Channels	ERP (W) per channel	Centerline of Tx antennas AGL (ft.)	Power density calculated at base of tower	% of CT Standard
T-Mobile (from prior file) cumulative power density	1935	1.0000	8	394.89	170	0.0184	6.1770%
Town of Wethersfield (from T-Mobile file included in cumulative %)					180'		
Town of Wethersfield (from T-Mobile file included in cumulative %)					189'		
Town of Wethersfield (from T-Mobile file included in cumulative %)					100'		
Cingular (from T-Mobile file included in cumulative %)					142		
Nextel Digital ESMR**	**851**	**0.5673**	**12**	**100**	~~146~~ 134	~~0.020232689~~ 0.02404562	~~3.5663%~~ 4.2384%

** lowest Nextel antenna centerline is ~~152'~~ 140' adjusted to ~~146'~~ 134' per OET 65 Bulliten for 6' average head height.

Total % of CT Standard ~~9.7433%~~ 10.4154%

EBI Consulting
environmental | engineering | due diligence

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

SPRINT Existing Facility

Site ID: CT52XC043

Newington
99 Cedarwood Lane
Newington, CT 06111

January 9, 2018

EBI Project Number: 6218000017

Site Compliance Summary	
Compliance Status:	**COMPLIANT**
Site total MPE% of FCC general population allowable limit:	**16.14 %**

January 9, 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 97-01and ANSI/IEEE Std C95.1. The FCC regulates Maximum Permissible Exposure in units of microwatts per square centimeter (μW/cm2). The number of $\mu W/cm^2$ calculated at each sample point is called the power density. The exposure limit for power density varies depending upon the frequencies being utilized. Wireless Carriers and Paging Services use different frequency bands each with different exposure limits, therefore it is necessary to report results and limits in terms of percent MPE rather than power density.

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

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

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

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

Additional details can be found in FCC OET 65.

CALCULATIONS

Calculations were done for the proposed SPRINT Wireless antenna facility located at **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, was focused at the base of the tower. For this report the sample point is the top of a 6-foot person standing at the base of the tower.

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

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

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

7) 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 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.

8) The antennas used in this modeling are the **KMW ETCR-654L12H6** for transmission in the 850 MHz, 1900 MHz (PCS) and 2500 MHz (BRS) frequency bands. 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, 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.

9) 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.

10) 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.

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

SPRINT Site Inventory and Power Data by Antenna

Sector:	A	Sector:	B	Sector:	C
Antenna #:	**1**	Antenna #:	**1**	Antenna #:	**1**
Make / Model:	KMW ETCR-654L12H6	Make / Model:	KMW ETCR-654L12H6	Make / Model:	KMW ETCR-654L12H6
Gain:	13.35 / 15.25 / 15.05 dBd	Gain:	13.35 / 15.25 / 15.05 dBd	Gain:	13.35 / 15.25 / 15.05 dBd
Height (AGL):	**140 feet**	Height (AGL):	**140 feet**	Height (AGL):	**140 feet**
Frequency Bands	850 MHz / 1900 MHz (PCS) / 2500 MHz (BRS)	Frequency Bands	850 MHz / 1900 MHz (PCS) / 2500 MHz (BRS)	Frequency Bands	850 MHz / 1900 MHz (PCS) / 2500 MHz (BRS)
Channel Count	18	Channel Count	18	Channel Count	18
Total TX Power(W):	380 Watts	Total TX Power(W):	380 Watts	Total TX Power(W):	380 Watts
ERP (W):	11,775.31	ERP (W):	11,775.31	ERP (W):	11,775.31
Antenna A1 MPE%	**2.56 %**	Antenna B1 MPE%	**2.56 %**	Antenna C1 MPE%	**2.56 %**

Site Composite MPE%	
Carrier	**MPE%**
SPRINT – Max per sector	**2.56 %**
AT&T	4.48 %
Clearwire	0.10 %
Nextel	0.42 %
Carbone's Auto Body	6.45 %
Town of Wethersfield	0.08 %
T-Mobile	2.05 %
Site Total MPE %:	**16.14 %**

SPRINT Sector A Total:	2.56 %
SPRINT Sector B Total:	2.56 %
SPRINT Sector C Total:	2.56 %
Site Total:	16.14 %

SPRINT _ Frequency Band / Technology (All Sectors)	# Channels	Watts ERP (Per Channel)	Height (feet)	Total Power Density ($\mu W/cm^2$)	Frequency (MHz)	Allowable MPE ($\mu W/cm^2$)	Calculated % MPE
Sprint 850 MHz CDMA	1	432.54	140	0.87	850 MHz	567	0.15%
Sprint 850 MHz LTE	2	432.54	140	1.73	850 MHz	567	0.31%
Sprint 1900 MHz (PCS) CDMA	5	535.94	140	5.37	1900 MHz (PCS)	1000	0.54%
Sprint 1900 MHz (PCS) LTE	2	1,339.86	140	5.37	1900 MHz (PCS)	1000	0.54%
Sprint 2500 MHz (BRS) LTE	8	639.78	140	10.25	2500 MHz (BRS)	1000	1.02%
						Total:	**2.56%**

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:	2.56 %
Sector B:	2.56 %
Sector C:	2.56 %
SPRINT Maximum Total (per sector):	2.56 %
Site Total:	16.14 %
Site Compliance Status:	**COMPLIANT**

The anticipated composite MPE value for this site assuming all carriers present is **16.14 %** 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 —

331 Newman Springs Road, Suite 203
Red Bank, NJ 07701
T: 732.383.1950
www.maserconsulting.com

December 21, 2017

Mr. Thomas Jupin

Cherundolo Consulting, Inc.
713 Cover Lane
Moscow, PA 18444

Re: **Sprint**: Site ID-CT52XC043
Site Name-Newington

99 Cedarwood Lane
Newington, CT 06111
MC Project No: 17924017A

Dear Mr. Jupin,

In accordance with your request, Maser Consulting Connecticut has prepared a modification design of the existing **SPRINT** equipment on guy tower at the above referenced address.

Maser Consulting Connecticut has previously analyzed the existing lattice tower structure, Project Number 17924017A, dated November 01, 2017. This structural modification design is only valid for the appurtenances included in the referenced analysis.

The proposed modifications to the existing antenna mount consist of:

- 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”.

MASER CONSULTING
— CONNECTICUT —

Maser Consulting Connecticut has determined that the existing **SPRINT** equipment on the guy tower, with the proposed modifications, is stressed to **98.6%** of its structural capacity, with the maximum usage occurring within the leg members between 110'-0" and 112'-6". The proposed modifications do not increase the foundation reactions and thus **ADEQUATE** to support the proposed installation. Therefore, once the proposed modifications are installed and the existing **SPRINT** antenna mounts found to be adequate under a separate report, the proposed **SPRINT** installation can be installed as intended.

Maser Consulting Connecticut reserves the right to amend this report if additional information about the existing tower structure and connections is provided. No structural qualifications are made or implied by this document for the capacity of the existing structure and foundation. The conclusions reached by Maser Consulting Connecticut in this report are only valid for the appurtenances listed in the referenced report. Any change to the installation will require a revision to this structural analysis.

If you have any questions or comments, or require additional information, please do not hesitate to contact me.

Very truly yours,
Maser Consulting Connecticut

STATE OF CONNECTICUT
PETROS TSOUKALAS
32577
LICENSED
PROFESSIONAL ENGINEER

Dejian Xu

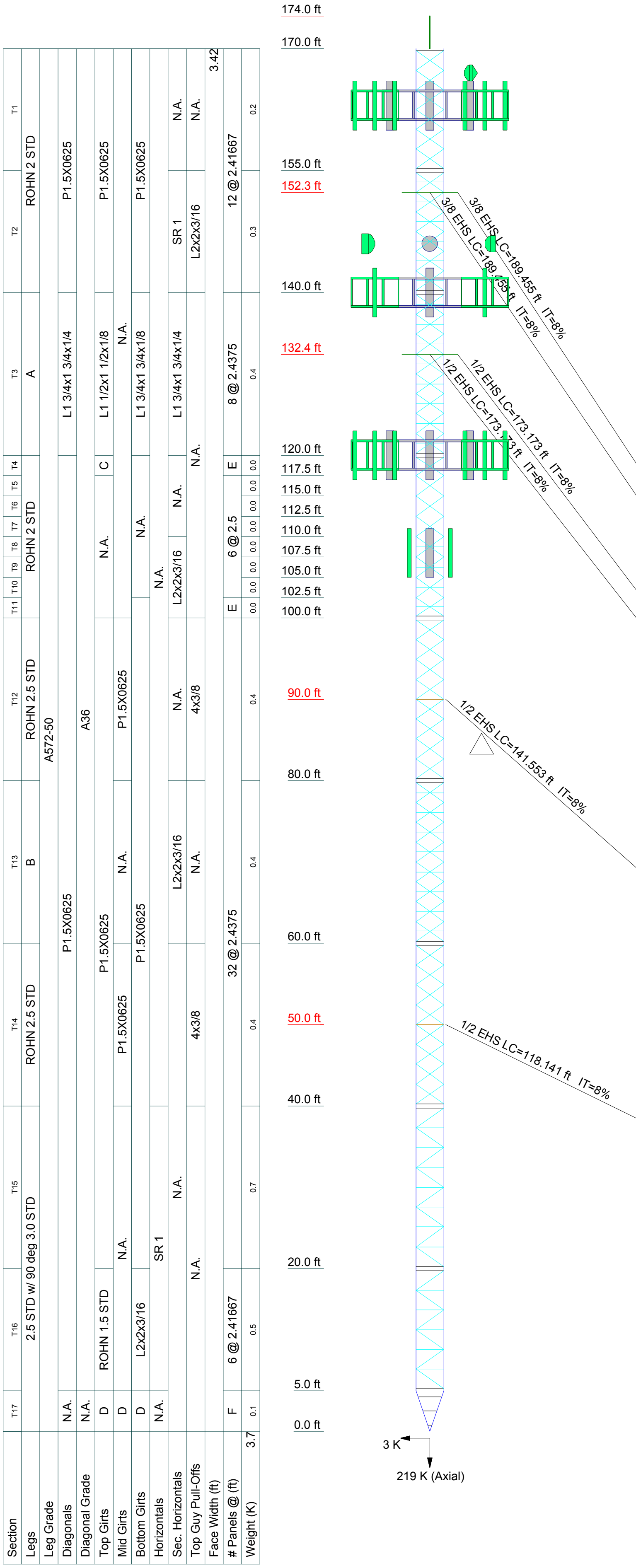
Petros E. Tsoukalas, P.E.
Connecticut Professional Engineer
PE License # 32577

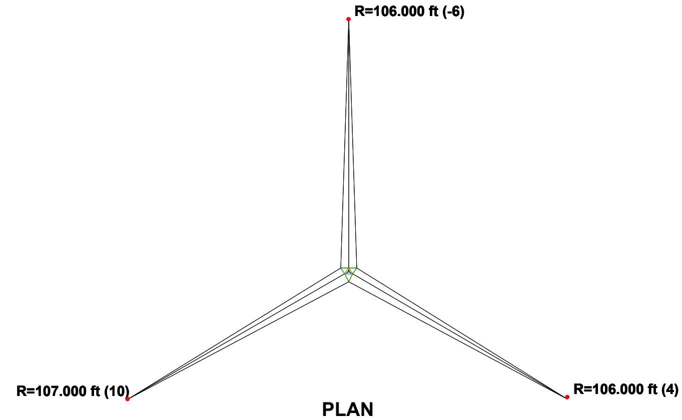
Dejian Xu, P.E.
Telecommunications Project Engineer

R:\AllOffices\MtArlington\Projects\2017\17924000A\17924017A\Structural\Structural Modification\Rev 2 - MOD\Word\CT52XC043.Newington.Modification.Rev 2.Word.docx

MASER CONSULTING
— CONNECTICUT —

APPENDIX A





DESIGNED APPURTENANCE LOADING

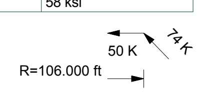
TYPE	ELEVATION	TYPE	ELEVATION
DB636 Omni	176	Pirod 12' T-Frame Sector Mount (1) (Sprint)	140
DB806-XT	174	ETCR-654L12H6 W/Pipe Mount (Sprint)	140
DB874H120-SX	171.5	TD-RRH8x20-25 (Sprint)	140
BOX 24"X6"X6"	171.5	ALU RRH-4X45-1900 (Sprint)	140
1' Side Mount Standoff	168	(2) LGP21401 (ATT)	120
Pirod 5' Side Mount Standoff (1)	168	DC6-48-06-18-8F (ATT)	120
Pirod 5' Side Mount Standoff (1)	168	RRUS-11 (ATT)	120
SC2	167	RRUS 32 (ATT)	120
APX16DWV-16DWVS (T-Mobile)	163	TPX-070821 (ATT)	120
LNX-6515DS-VTM (T-Mobile)	163	14-ft T-Frame Sector Mount (ATT)	120
(2) TMA (T-Mobile)	163	Powerwave 7770 w/5ft mount pipe (ATT)	120
AIR 32 with 6' pipe (T-Mobile)	163	CCI OPA-65R-LCUU-H6 Panel Antenna with 8ft Pipe (ATT)	120
Pirod 12' T-Frame Sector Mount (1) (T-Mobile)	163	Quintel QS66512-2 w/m pipe (ATT)	120
APX16DWV-16DWVS (T-Mobile)	163	(2) LGP21401 (ATT)	120
LNX-6515DS-VTM (T-Mobile)	163	DC6-48-06-18-8F (ATT)	120
(2) TMA (T-Mobile)	163	RRUS-11 (ATT)	120
AIR 32 with 6' pipe (T-Mobile)	163	RRUS 32 (ATT)	120
Pirod 12' T-Frame Sector Mount (1) (T-Mobile)	163	TPX-070821 (ATT)	120
APX16DWV-16DWVS (T-Mobile)	163	14-ft T-Frame Sector Mount (ATT)	120
LNX-6515DS-VTM (T-Mobile)	163	Powerwave 7770 w/5ft mount pipe (ATT)	120
(2) TMA (T-Mobile)	163	CCI OPA-65R-LCUU-H6 Panel Antenna with 8ft Pipe (ATT)	120
AIR 32 with 6' pipe (T-Mobile)	163	Quintel QS66512-2 w/m pipe (ATT)	120
Pirod 12' T-Frame Sector Mount (1) (T-Mobile)	163	(2) LGP21401 (ATT)	120
VHLP2-18	146	RRUS-11 (ATT)	120
VHLP2-18	146	RRUS 32 (ATT)	120
VHLP800-11	146	TPX-070821 (ATT)	120
(2) RRH-2X50-800 (Sprint)	140	14-ft T-Frame Sector Mount (ATT)	120
Pirod 12' T-Frame Sector Mount (1) (Sprint)	140	Powerwave 7770 w/5ft mount pipe (ATT)	120
ETCR-654L12H6 W/Pipe Mount (Sprint)	140	CCI OPA-65R-LCUU-H6 Panel Antenna with 8ft Pipe (ATT)	120
TD-RRH8x20-25 (Sprint)	140	Quintel QS66512-2 w/m pipe (ATT)	120
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' T-Frame Sector Mount (1) (Sprint)	140	1' Side Mount Standoff (Other)	108.4
ETCR-654L12H6 W/Pipe Mount (Sprint)	140	Panel Antenna 6'x6"x3" (Other)	108
TD-RRH8x20-25 (Sprint)	140	Panel Antenna 6'x6"x3" (Other)	108
ALU RRH-4X45-1900 (Sprint)	140	Panel Antenna 6'x6"x3" (Other)	108
(2) RRH-2X50-800 (Sprint)	140	GPS (Other)	50
Junction Box (Sprint)	140		

SYMBOL LIST

MARK	SIZE	MARK	SIZE
A	Pipe 2.0 STD W 1" Rod Reinforcment	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.

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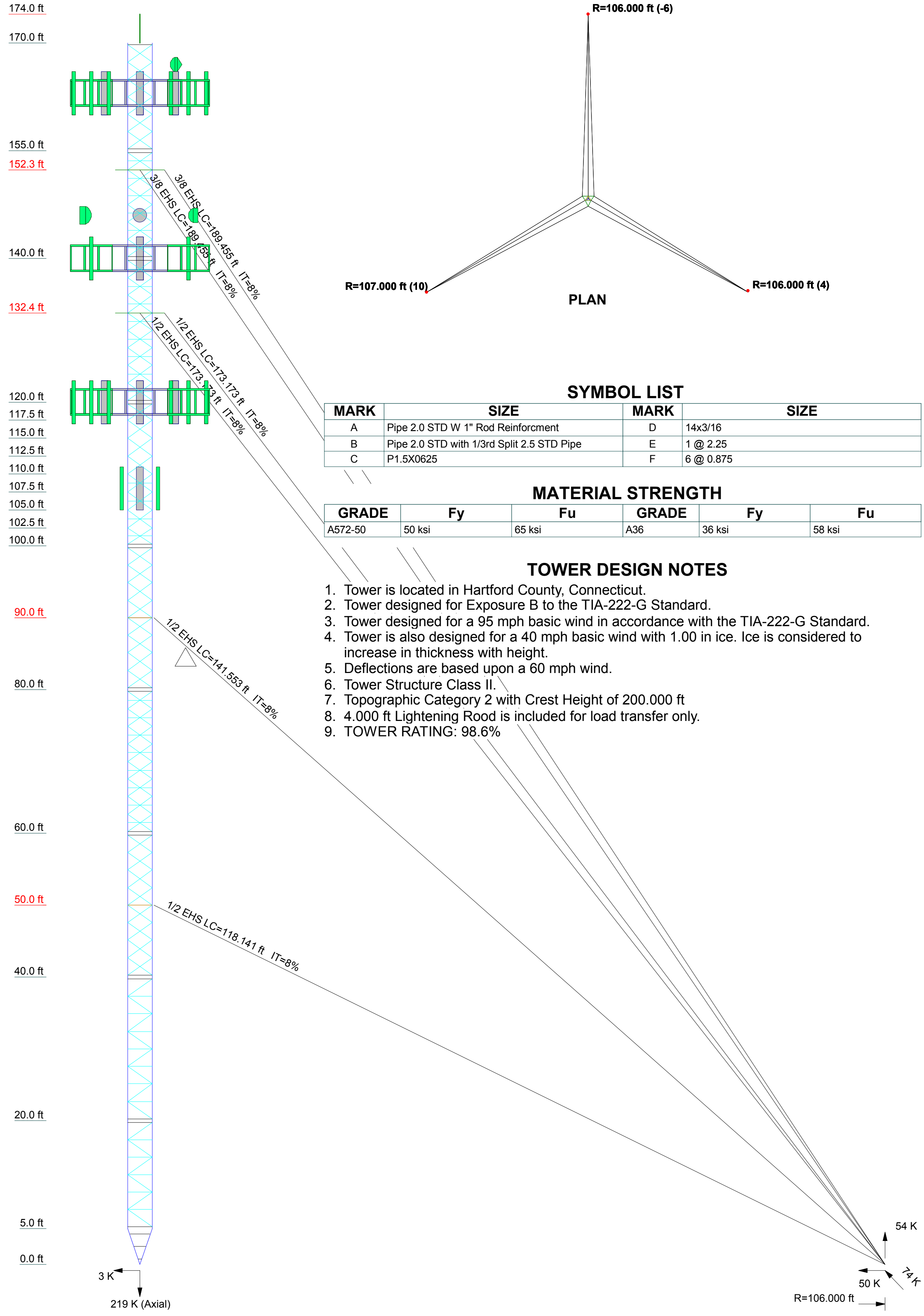
Consulting Engineers

Job: Guyed Tower Modification		
Project: 17924017A		
Client: Sprint	Drawn by: dxu	App'd:
Code: TIA-222-G	Date: 12/12/17	Scale: NTS
Path:		Dwg No. E-1

Section	Legs	Leg Grade	Diagonals	Diagonal Grade	Top Girts	Mid Girts	Bottom Girts	Horizontals	Sec. Horizontals	Top Guy Pull-Offs	Face Width (ft)	# Panels @ (ft)	Weight (K)
T1	ROHN 2 STD	A572-50	P1.5X0625	A36	P1.5X0625		P1.5X0625		N.A.	N.A.	3.42	12 @ 2.41667	0.2
T2									SR 1	L2x2x3/16			0.3
T3	A		L1 3/4x1 3/4x1/4		L1 1/2x1 1/2x1/8	N.A.	L1 3/4x1 3/4x1/8		L1 3/4x1 3/4x1/4	N.A.		8 @ 2.4375	0.4
T4	ROHN 2 STD		P1.5X0625		C		N.A.	N.A.	N.A.			E	0.0
T5					N.A.							6 @ 2.5	0.0
T6													0.0
T7													0.0
T8									L2x2x3/16				0.0
T9													0.0
T10													0.0
T11												E	0.0
T12	ROHN 2.5 STD				P1.5X0625	P1.5X0625			N.A.	4x3/8		32 @ 2.4375	0.4
T13	B					N.A.	P1.5X0625		L2x2x3/16	N.A.			0.4
T14	ROHN 2.5 STD					P1.5X0625				4x3/8			0.4
T15	2.5 STD w/ 90 deg 3.0 STD					N.A.		SR 1	N.A.	N.A.			0.7
T16					ROHN 1.5 STD		L2x2x3/16					6 @ 2.41667	0.5
T17			N.A.	N.A.	D	D	D	N.A.			3.7	F	0.1



SYMBOL LIST

MARK	SIZE	MARK	SIZE
A	Pipe 2.0 STD W 1" Rod Reinforcment	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 Lightening Rood is included for load transfer only.
9. TOWER RATING: 98.6%

ALL REACTIONS ARE FACTORED

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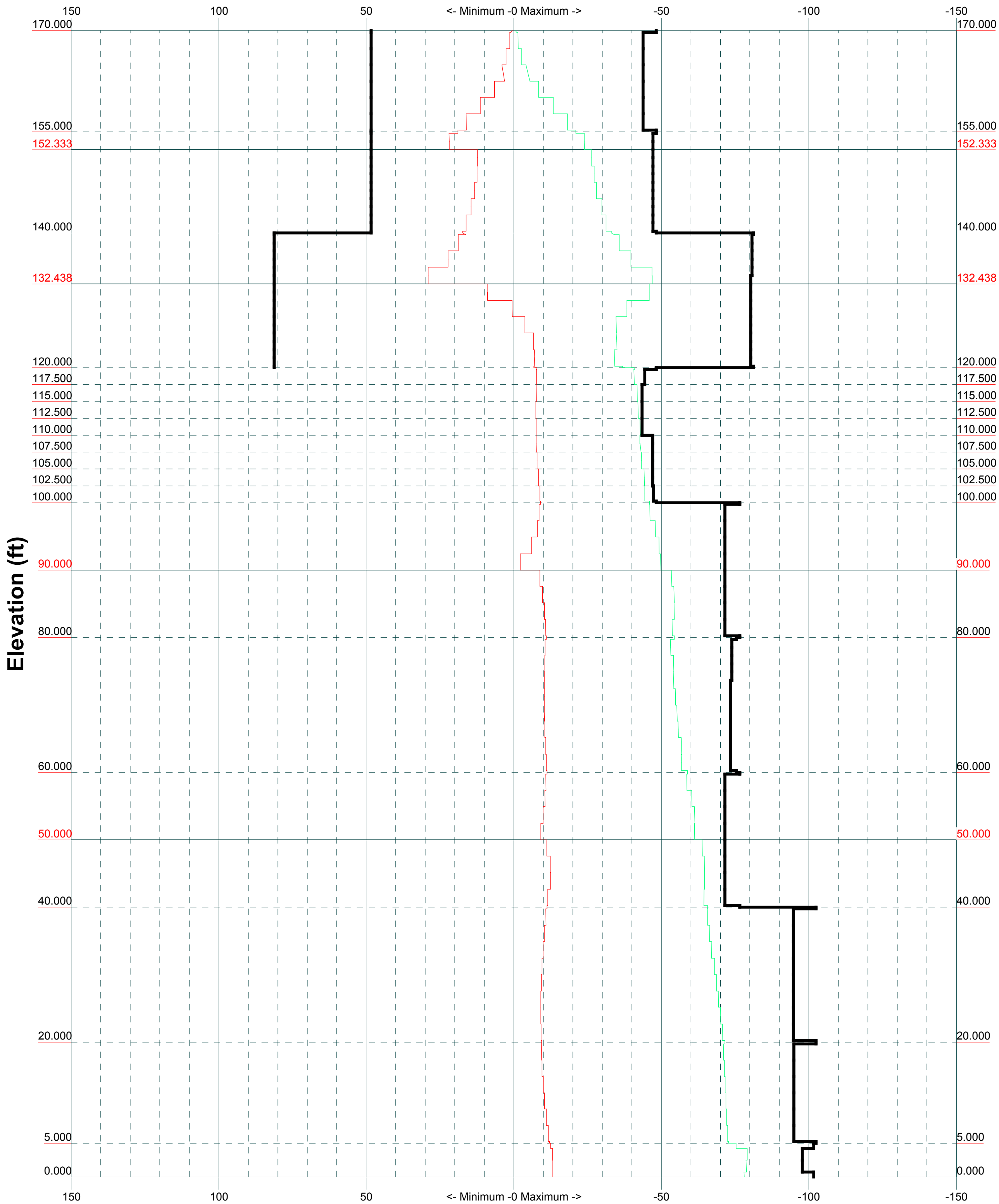
Job: ***Guyed Tower Modification***		
Project: ***17924017A***		
Client: Sprint	Drawn by: dxu	App'd:
Code: TIA-222-G	Date: 12/12/17	Scale: NTS
Path:		Dwg No. E-1

TIA-222-G - 95 mph/40 mph 1.000 in Ice Exposure B

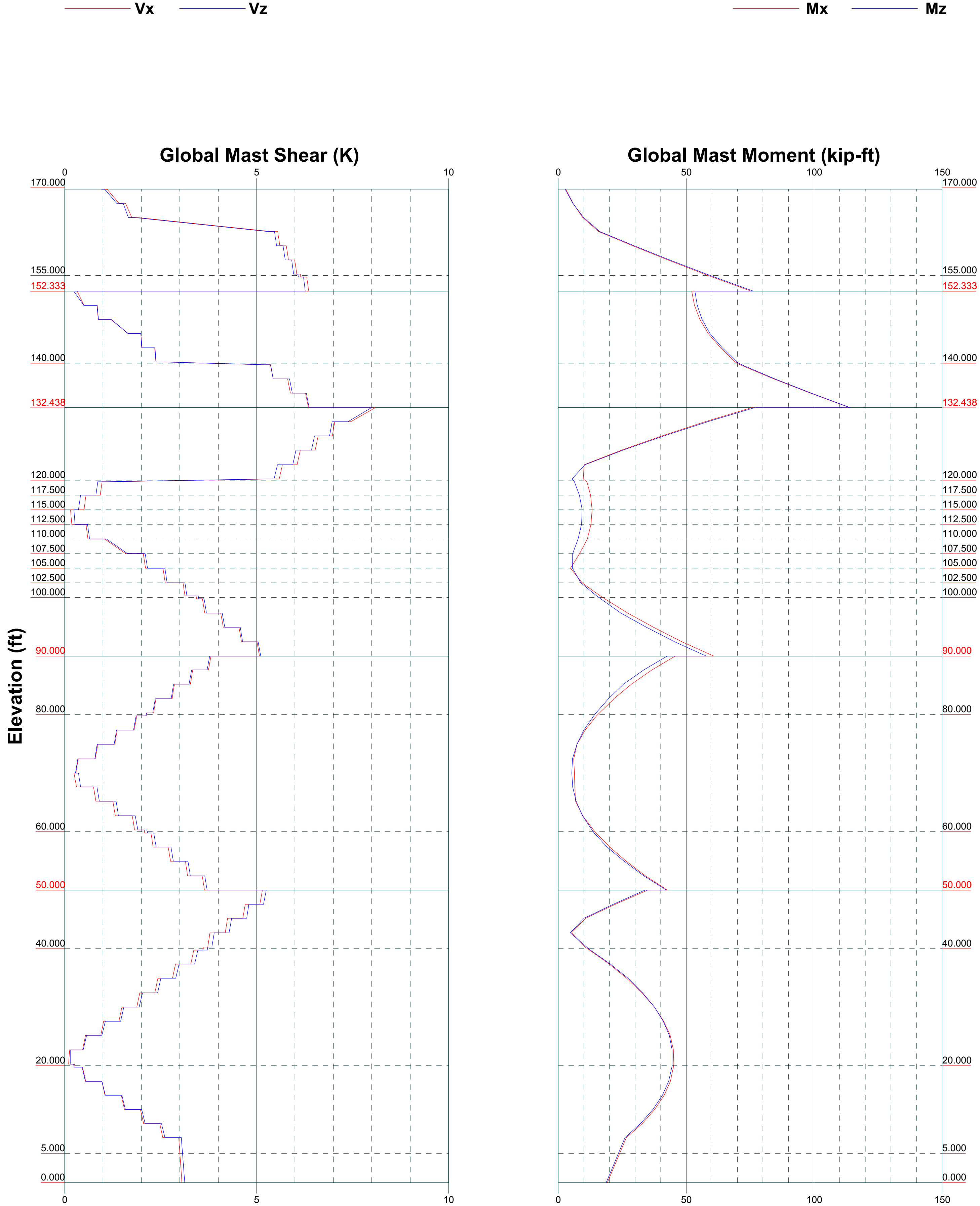
Leg Capacity ——— **Leg Compression (K)**



MASER Consulting P.A. Consulting Engineers	*Maser Consulting P.A.* 2000 Midlantic Drive, Suite 100 Mt. Laurel, NJ 08054 Phone: (856) 797-0412 FAX: (856) 722-1120	Job: ***Guyed Tower Modification*** Project: ***17924017A*** Client: Sprint — Drawn by: dxu — App'd: Code: TIA-222-G — Date: 12/12/17 — Scale: NTS Path: — Dwg No. E-3

TIA-222-G - 95 mph/40 mph 1.000 in Ice Exposure B

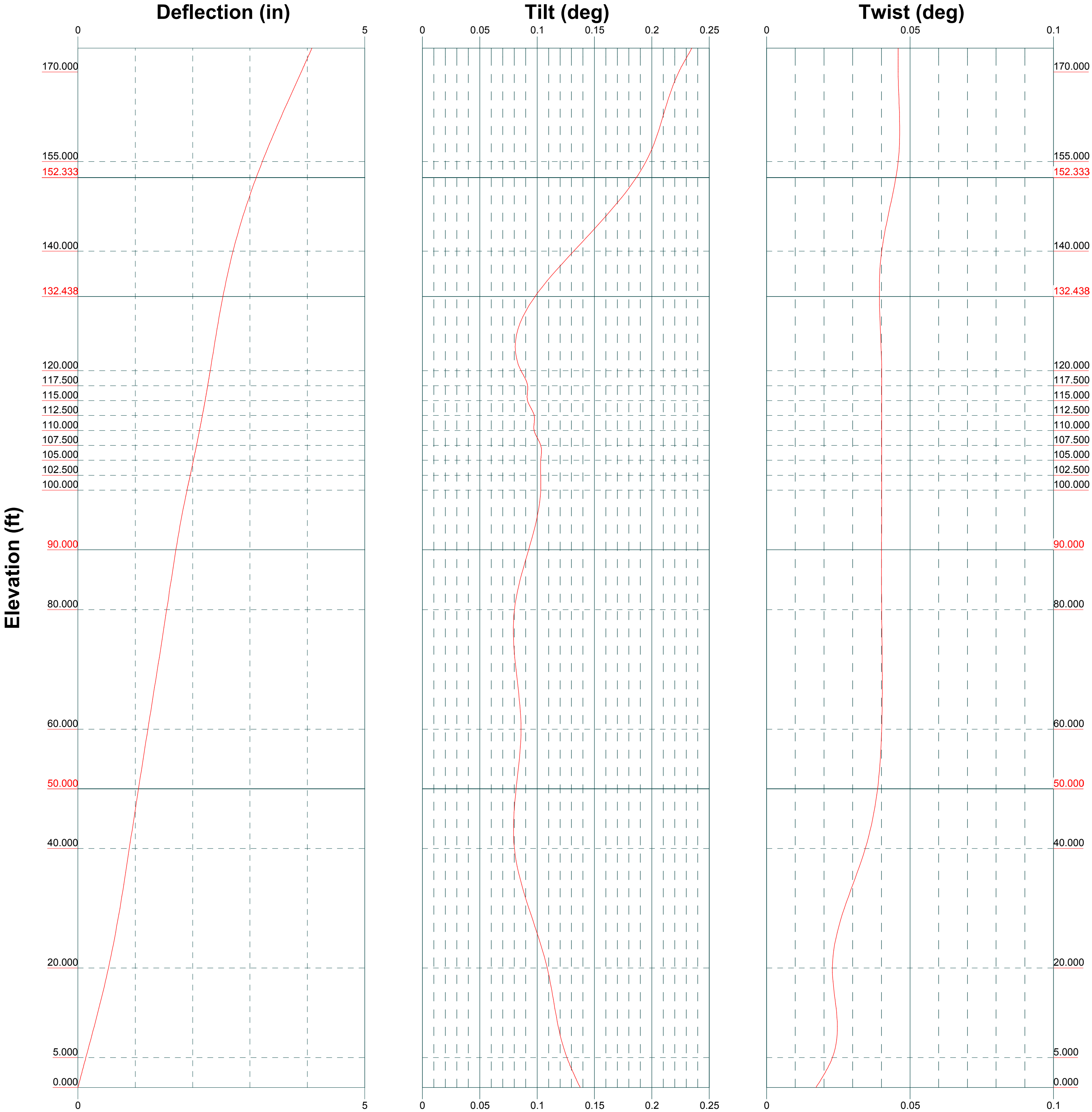
Maximum Values



Maser Consulting P.A. 2000 Midlantic Drive, Suite 100 Mt. Laurel, NJ 08054 Phone: (856) 797-0412 FAX: (856) 722-1120	Job: ***Guyed Tower Modification***		
MASER Consulting Engineers	Project: ***17924017A***		
	Client: Sprint	Drawn by: dxu	App'd:
	Code: TIA-222-G	Date: 12/12/17	Scale: NTS
	Path:		Dwg No. E-4

TIA-222-G - Service - 60 mph

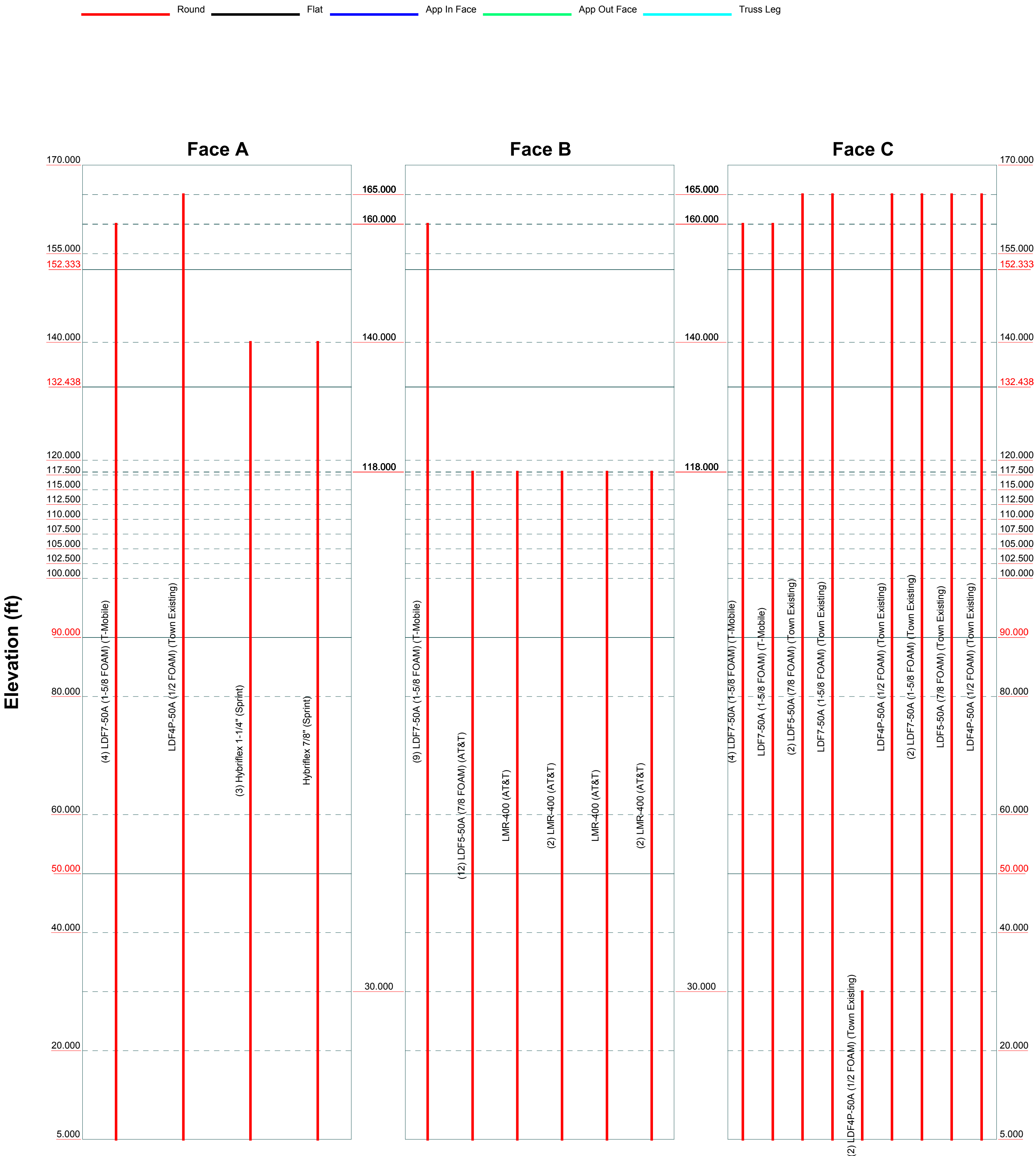
Maximum Values



Maser Consulting P.A. 2000 Midlantic Drive, Suite 100 Mt. Laurel, NJ 08054 Phone: (856) 797-0412 FAX: (856) 722-1120	Job: **Guyed Tower Modification**		
Consulting Engineers	Project: **17924017A**		
	Client: Sprint	Drawn by: dxu	App'd:
	Code: TIA-222-G	Date: 12/12/17	Scale: NTS
	Path:		Dwg No. E-5

Feed Line Distribution Chart

5' - 170'



Maser Consulting P.A. 2000 Midlantic Drive, Suite 100, Mt. Laurel, NJ 08054, Phone: (856) 797-0412, FAX: (856) 722-1120 — Consulting Engineers	Job: ***Guyed Tower Modification***
	Project: ***17924017A***
	Client: Sprint — Drawn by: dxu — App'd:
	Code: TIA-222-G — Date: 12/12/17 — Scale: NTS
	Path: — Dwg No. E-7

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

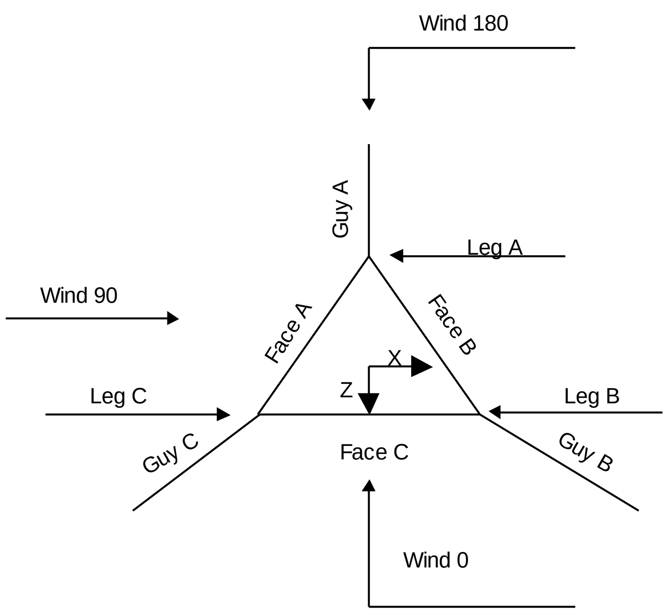
- Consider Moments - Legs
- Consider Moments - Horizontals
- Consider Moments - Diagonals
- Use Moment Magnification
- √ Use Code Stress Ratios
- √ Use Code Safety Factors - Guys
- Escalate Ice
- Always Use Max Kz
- Use Special Wind Profile
- √ Include Bolts In Member Capacity
- √ Leg Bolts Are At Top Of Section
- √ Secondary Horizontal Braces Leg
- Use Diamond Inner Bracing (4 Sided)
- SR Members Have Cut Ends
- SR Members Are Concentric

- Distribute Leg Loads As Uniform
- Assume Legs Pinned
- √ Assume Rigid Index Plate
- √ Use Clear Spans For Wind Area
- √ Use Clear Spans For KL/r
- √ Retension Guys To Initial Tension
- √ Bypass Mast Stability Checks
- √ Use Azimuth Dish Coefficients
- √ Project Wind Area of Appurt.
- √ Autocalc Torque Arm Areas
- Add IBC .6D+W Combination
- √ Sort Capacity Reports By Component
- Triangulate Diamond Inner Bracing
- Treat Feed Line Bundles As Cylinder

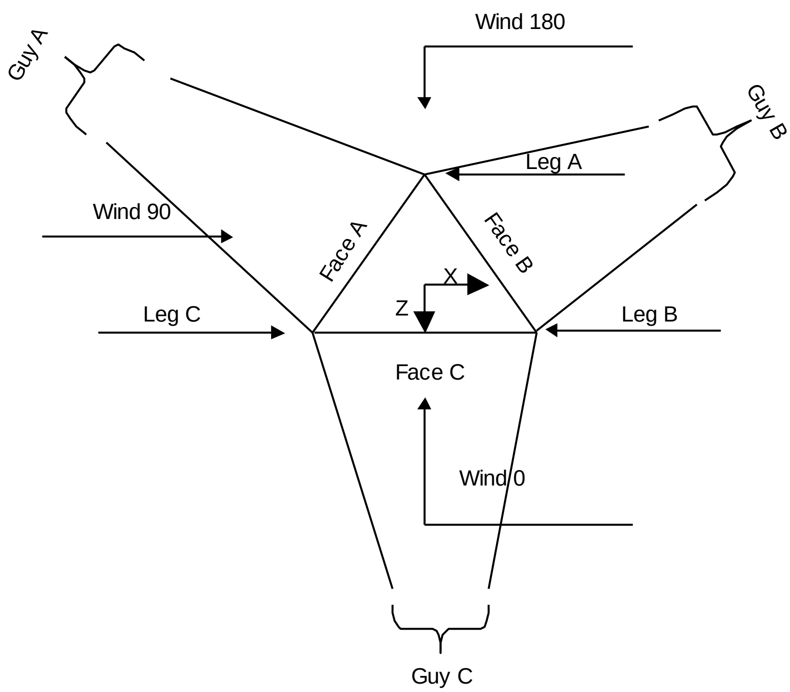
- Use ASCE 10 X-Brace Ly Rules
- √ Calculate Redundant Bracing Forces
- Ignore Redundant Members in FEA
- √ SR Leg Bolts Resist Compression
- All Leg Panels Have Same Allowable
- Offset Girt At Foundation
- √ Consider Feed Line Torque
- √ Include Angle Block Shear Check
- Use TIA-222-G Bracing Resist. Exemption
- Use TIA-222-G Tension Splice Exemption

Poles

- Include Shear-Torsion Interaction
- Always Use Sub-Critical Flow
- Use Top Mounted Sockets



Corner & Starmount Guyed Tower



Face Guyed

Tower Section Geometry

Tower Section	*Tower Elevation* ft	*Assembly Database*	*Description*	*Section Width* ft	*Number of Sections*	*Section Length* ft
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

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

Tower Section Geometry *(cont'd)*

Tower Section	*Tower Elevation* *ft*	*Diagonal Spacing* *ft*	*Bracing Type*	*Has K Brace End Panels*	*Has Horizontals*	*Top Girt Offset* *in*	*Bottom Girt Offset* *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 *ft*	*Leg Type*	*Leg Size*	*Leg Grade*	*Diagonal Type*	*Diagonal Size*	*Diagonal Grade*
T1 170.000-155.000	Pipe	ROHN 2 STD	A572-50 (50 ksi)	Pipe	P1.5X0625	A36 (36 ksi)
T2 155.000-140.000	Pipe	ROHN 2 STD	A572-50 (50 ksi)	Pipe	P1.5X0625	A36 (36 ksi)
T3 140.000-120.000	Arbitrary Shape	Pipe 2.0 STD W 1" Rod Reinforcment	A572-50 (50 ksi)	Single Angle	L1 3/4x1 3/4x1/4	A36 (36 ksi)
T4 120.000-117.500	Pipe	ROHN 2 STD	A572-50 (50 ksi)	Pipe	P1.5X0625	A36 (36 ksi)
T5 117.500-115.000	Pipe	ROHN 2 STD	A572-50 (50 ksi)	Pipe	P1.5X0625	A36 (36 ksi)
T6 115.000-112.500	Pipe	ROHN 2 STD	A572-50 (50 ksi)	Pipe	P1.5X0625	A36 (36 ksi)
T7 112.500-110.000	Pipe	ROHN 2 STD	A572-50 (50 ksi)	Pipe	P1.5X0625	A36 (36 ksi)
T8 110.000-107.500	Pipe	ROHN 2 STD	A572-50 (50 ksi)	Pipe	P1.5X0625	A36 (36 ksi)
T9 107.500-105.000	Pipe	ROHN 2 STD	A572-50 (50 ksi)	Pipe	P1.5X0625	A36 (36 ksi)
T10 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

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

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

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*
T12 100.000-80.000	1	Pipe	P1.5X0625	A572-50 (50 ksi)	Solid Round		A36 (36 ksi)
T14	1	Pipe	P1.5X0625	A572-50	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				(50 ksi)			(36 ksi)
T15 40.000-20.000	None	Flat Bar		A36 (36 ksi)	Solid Round	1	A572-50 (50 ksi)
T16 20.000-5.000	None	Flat Bar		A36 (36 ksi)	Solid Round	1	A570-50 (50 ksi)
T17 5.000-0.000	1	Flat Bar	14x3/16	A36 (36 ksi)	Solid Round		A36 (36 ksi)

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*
T2 155.000-140.000	Solid Round	1	A572-50 (50 ksi)	Solid Round		A36 (36 ksi)
T3 140.000-120.000	Equal Angle	L1 3/4x1 3/4x1/4	A36 (36 ksi)	Solid Round		A36 (36 ksi)
T8 110.000-107.500	Equal Angle	L2x2x3/16	A36 (36 ksi)	Solid Round		A36 (36 ksi)
T9 107.500-105.000	Equal Angle	L2x2x3/16	A36 (36 ksi)	Solid Round		A36 (36 ksi)
T10 105.000-102.500	Equal Angle	L2x2x3/16	A36 (36 ksi)	Solid Round		A36 (36 ksi)
T11 102.500-100.000	Equal Angle	L2x2x3/16	A36 (36 ksi)	Solid Round		A36 (36 ksi)
T13 80.000-60.000	Equal Angle	L2x2x3/16	A36 (36 ksi)	Solid Round		A36 (36 ksi)

Tower Section Geometry *(cont'd)*

Tower Elevation *ft*	*Gusset Area (per face)* ft^2	*Gusset Thickness* *in*	*Gusset Grade*	*Adjust. Factor* A_f	*Adjust. Factor* A_r	*Weight Mult.*	*Double Angle Stitch Bolt Spacing Diagonals* *in*	*Double Angle Stitch Bolt Spacing Horizontals* *in*	*Double Angle Stitch Bolt Spacing Redundants* *in*
T1 170.000-155.000	0.000	0.000	A36 (36 ksi)	1	1	1.05	36.000	36.000	36.000
T2 155.000-140.000	0.000	0.000	A36 (36 ksi)	1	1	1.05	36.000	36.000	36.000
T3 140.000-120.000	0.000	0.000	A36 (36 ksi)	1	1	1.05	36.000	36.000	36.000
T4 120.000-117.500	0.000	0.000	A36 (36 ksi)	1	1	1.05	36.000	36.000	36.000
T5 117.500-115.000	0.000	0.000	A36 (36 ksi)	1	1	1.05	36.000	36.000	36.000

Tower Elevation ft	Gusset Area (per face) ft^2	Gusset Thickness in	Gusset Grade	Adjust. Factor A_f	Adjust. Factor A_r	Weight Mult.	Double Angle Stitch Bolt Spacing Diagonals in	Double Angle Stitch Bolt Spacing Horizontals in	Double Angle Stitch Bolt Spacing Redundants in
T6 115.000-112.500	0.000	0.000	A36 (36 ksi)	1	1	1.05	36.000	36.000	36.000
T7 112.500-110.000	0.000	0.000	A36 (36 ksi)	1	1	1.05	36.000	36.000	36.000
T8 110.000-107.500	0.000	0.000	A36 (36 ksi)	1	1	1.05	36.000	36.000	36.000
T9 107.500-105.000	0.000	0.000	A36 (36 ksi)	1	1	1.05	36.000	36.000	36.000
T10 105.000-102.500	0.000	0.000	A36 (36 ksi)	1	1	1.05	36.000	36.000	36.000
T11 102.500-100.000	0.000	0.000	A36 (36 ksi)	1	1	1.05	36.000	36.000	36.000
T12 100.000-80.000	0.000	0.000	A36 (36 ksi)	1	1	1.05	36.000	36.000	36.000
T13 80.000-60.000	0.000	0.000	A36 (36 ksi)	1	1	1.05	36.000	36.000	36.000
T14 60.000-40.000	0.000	0.000	A36 (36 ksi)	1	1	1.05	36.000	36.000	36.000
T15 40.000-20.000	0.000	0.000	A36 (36 ksi)	1	1	1.05	36.000	36.000	36.000
T16 20.000-5.000	0.000	0.000	A36 (36 ksi)	1	1	1.05	36.000	36.000	36.000
T17 5.000-0.000	0.000	0.000	A36 (36 ksi)	1	1	1.05	36.000	36.000	36.000

Tower Section Geometry *(cont'd)*

			K Factors[1]							
Tower Elevation ft	Calc K Single Angles	Calc K Solid Rounds	Legs	X Brace Diags X Y	K Brace Diags X Y	Single Diags X Y	Girts X Y	Horiz. X Y	Sec. Horiz. X Y	Inner Brace X Y
T1 170.000-155.000	Yes	Yes	1	1 1	1 1	1 1	1 1	1 1	1 1	1 1
T2 155.000-140.000	Yes	Yes	1	1 1	1 1	1 1	1 1	1 1	1 1	1 1
T3 140.000-120.000	Yes	Yes	1	1 1	1 1	1 1	1 1	1 1	1 1	1 1
T4 120.000-117.500	Yes	Yes	1	1 1	1 1	1 1	1 1	1 1	1 1	1 1
T5 117.500-115.000	Yes	Yes	1	1 1	1 1	1 1	1 1	1 1	1 1	1 1

Tower Elevation ft	Calc K Single Angles	Calc K Solid Rounds	K Factors[1] Legs	X Brace Diags X Y	K Brace Diags X Y	Single Diags X Y	Girts X Y	Horiz. X Y	Sec. Horiz. X Y	Inner Brace X Y
T6 115.000-112.500	Yes	Yes	1	1 1	1 1	1 1	1 1	1 1	1 1	1 1
T7 112.500-110.000	Yes	Yes	1	1 1	1 1	1 1	1 1	1 1	1 1	1 1
T8 110.000-107.500	Yes	Yes	1	1 1	1 1	1 1	1 1	1 1	1 1	1 1
T9 107.500-105.000	Yes	Yes	1	1 1	1 1	1 1	1 1	1 1	1 1	1 1
T10 105.000-102.500	Yes	Yes	1	1 1	1 1	1 1	1 1	1 1	1 1	1 1
T11 102.500-100.000	Yes	Yes	1	1 1	1 1	1 1	1 1	1 1	1 1	1 1
T12 100.000-80.000	Yes	Yes	1	1 1	1 1	1 1	1 1	1 1	1 1	1 1
T13 80.000-60.000	Yes	Yes	1	1 1	1 1	1 1	1 1	1 1	1 1	1 1
T14 60.000-40.000	Yes	Yes	1	1 1	1 1	1 1	1 1	1 1	1 1	1 1
T15 40.000-20.000	Yes	Yes	1	1 1	1 1	1 1	1 1	1 1	1 1	1 1
T16 20.000-5.000	Yes	Yes	1	1 1	1 1	1 1	1 1	1 1	1 1	1 1
T17 5.000-0.000	Yes	Yes	1	1 1	1 1	1 1	1 1	1 1	1 1	1 1

[1]*Note: K factors are applied to member segment lengths. K-braces without inner supporting members will have the K factor in the out-of-plane direction applied to the overall length.*

Tower Section Geometry *(cont'd)*

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
T1 170.000-155.000	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
T2 155.000-140.000	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
T3 140.000-120.000	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 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

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.
T3 140.000-120.000	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
T4 120.000-117.500	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
T5 117.500-115.000	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
T6 115.000-112.500	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
T7 112.500-110.000	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
T8 110.000-107.500	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
T9 107.500-105.000	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
T10 105.000-102.500	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
T11 102.500-100.000	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
T12 100.000-80.000	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
T13 80.000-60.000	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
T14 60.000-40.000	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
T15 40.000-20.000	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
T16 20.000-5.000	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
T17 5.000-0.000	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 K	%	Guy Modulus ksi	Guy Weight plf	L_u ft	Anchor Radius ft	Anchor Azimuth Adj. °	Anchor Elevation ft	End Fitting Efficiency %
152.333	EHS	A	3/8	1.232	8%	21000.000	0.273	189.317	106.000	0.0000	-6.000	100%
		B	3/8	1.232	8%	21000.000	0.273	181.049	106.000	0.0000	4.000	100%
		C	3/8	1.232	8%	21000.000	0.273	176.765	107.000	0.0000	10.000	100%
132.438	EHS	A	1/2	2.152	8%	21000.000	0.517	173.057	106.000	0.0000	-6.000	100%
		B	1/2	2.152	8%	21000.000	0.517	165.177	106.000	0.0000	4.000	100%
		C	1/2	2.152	8%	21000.000	0.517	161.211	107.000	0.0000	10.000	100%

90	EHS	A	1/2	2.152	8%	21000.000	0.517	141.459	106.000	0.0000	-6.000	100%
		B	1/2	2.152	8%	21000.000	0.517	134.882	106.000	0.0000	4.000	100%
		C	1/2	2.152	8%	21000.000	0.517	131.936	107.000	0.0000	10.000	100%
50	EHS	A	1/2	2.152	8%	21000.000	0.517	118.063	106.000	0.0000	-6.000	100%
		B	1/2	2.152	8%	21000.000	0.517	113.667	106.000	0.0000	4.000	100%
		C	1/2	2.152	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 K*	*Cable Weight B K*	*Cable Weight C K*	*Cable Weight D K*	*Tower Intercept A ft*	*Tower Intercept B ft*	*Tower Intercept C ft*	*Tower Intercept D ft*
152.333	0.052	0.049	0.048		3.906 3.4 sec/pulse	3.576 3.3 sec/pulse	3.411 3.2 sec/pulse	
132.438	0.089	0.085	0.083		3.541 3.2 sec/pulse	3.230 3.1 sec/pulse	3.079 3.0 sec/pulse	
90	0.073	0.070	0.068		2.378 2.7 sec/pulse	2.165 2.5 sec/pulse	2.073 2.5 sec/pulse	
50	0.061	0.059	0.058		1.664 2.2 sec/pulse	1.545 2.1 sec/pulse	1.509 2.1 sec/pulse	

Guy Data *(cont'd)*

			Torque Arm		*Pull Off*		*Diagonal*	
Guy Elevation ft	*Calc K Single Angles*	*Calc K Solid Rounds*	K_x	K_y	K_x	K_y	K_x	K_y
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)*

	Torque-Arm				*Pull Off*				*Diagonal*			
Guy Elevation ft	*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_z *ksf*	q_z *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*

Guy Elevation ft		H ft	V ft	Initial Tension K	Intercept ft	Initial Tension K	Intercept ft	Initial Tension K	Intercept ft	Initial Tension K	Intercept ft	Initial Tension K	Intercept ft	Initial Tension K	Intercept ft	Initial Tension K	Intercept ft
152.333	A	104.04	158.33	1.419	3.40	1.356	3.55	1.294	3.72	1.232	3.91	1.170	4.11	1.110	4.33	1.049	4.57
	B	104.04	148.33	1.437	3.07	1.368	3.22	1.300	3.39	1.232	3.58	1.165	3.78	1.098	4.00	1.033	4.25
	C	105.04	142.33	1.451	2.90	1.377	3.05	1.304	3.22	1.232	3.41	1.160	3.62	1.089	3.85	1.020	4.11
132.438	A	104.04	138.44	2.572	2.97	2.430	3.14	2.290	3.33	2.152	3.54	2.015	3.78	1.881	4.04	1.749	4.34
	B	104.04	128.44	2.613	2.67	2.458	2.83	2.304	3.02	2.152	3.23	2.002	3.47	1.855	3.74	1.711	4.05
	C	105.04	122.44	2.645	2.51	2.479	2.68	2.315	2.87	2.152	3.08	1.992	3.32	1.835	3.60	1.683	3.92
90	A	104.03	96.00	2.783	1.84	2.570	1.99	2.360	2.17	2.152	2.38	1.948	2.62	1.751	2.92	1.560	3.27
	B	104.03	86.00	2.847	1.64	2.612	1.79	2.380	1.96	2.152	2.16	1.928	2.41	1.712	2.71	1.505	3.08
	C	105.03	80.00	2.893	1.55	2.642	1.69	2.395	1.86	2.152	2.07	1.914	2.33	1.685	2.64	1.468	3.03
50	A	104.03	56.00	3.063	1.17	2.755	1.30	2.451	1.46	2.152	1.66	1.861	1.92	1.584	2.26	1.328	2.69
	B	104.03	46.00	3.137	1.06	2.804	1.19	2.475	1.34	2.152	1.54	1.839	1.81	1.542	2.15	1.272	2.61
	C	105.03	40.00	3.181	1.02	2.833	1.15	2.489	1.31	2.152	1.51	1.826	1.78	1.518	2.14	1.241	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	C	No	Ar (CaAa)	165.000 - 0.000	-3.000	0.4	1	1	1.090	1.090		0.330

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_R ft^2	A_F ft^2	C_AA_A In Face ft^2	C_AA_A Out Face ft^2	Weight K
T1	170.000-155.000	A	0.000	0.000	4.590	0.000	0.018
		B	0.000	0.000	8.910	0.000	0.037
		C	0.000	0.000	15.420	0.000	0.058
T2	155.000-140.000	A	0.000	0.000	12.825	0.000	0.051
		B	0.000	0.000	26.730	0.000	0.111
		C	0.000	0.000	30.555	0.000	0.118
T3	140.000-120.000	A	0.000	0.000	28.780	0.000	0.147
		B	0.000	0.000	35.640	0.000	0.148
		C	0.000	0.000	40.740	0.000	0.157
T4	120.000-117.500	A	0.000	0.000	3.598	0.000	0.018
		B	0.000	0.000	5.231	0.000	0.022
		C	0.000	0.000	5.093	0.000	0.020
T5	117.500-115.000	A	0.000	0.000	3.598	0.000	0.018
		B	0.000	0.000	8.332	0.000	0.036
		C	0.000	0.000	5.093	0.000	0.020
T6	115.000-112.500	A	0.000	0.000	3.598	0.000	0.018
		B	0.000	0.000	8.332	0.000	0.036
		C	0.000	0.000	5.093	0.000	0.020
T7	112.500-110.000	A	0.000	0.000	3.598	0.000	0.018
		B	0.000	0.000	8.332	0.000	0.036
		C	0.000	0.000	5.093	0.000	0.020
T8	110.000-107.500	A	0.000	0.000	3.598	0.000	0.018
		B	0.000	0.000	8.332	0.000	0.036
		C	0.000	0.000	5.093	0.000	0.020
T9	107.500-105.000	A	0.000	0.000	3.598	0.000	0.018
		B	0.000	0.000	8.332	0.000	0.036
		C	0.000	0.000	5.093	0.000	0.020
T10	105.000-102.500	A	0.000	0.000	3.598	0.000	0.018
		B	0.000	0.000	8.332	0.000	0.036
		C	0.000	0.000	5.093	0.000	0.020
T11	102.500-100.000	A	0.000	0.000	3.598	0.000	0.018
		B	0.000	0.000	8.332	0.000	0.036
		C	0.000	0.000	5.093	0.000	0.020

Tower Section	Tower Elevation ft	Face	A_R ft²	A_F ft²	C_AA_A In Face ft²	C_AA_A Out Face ft²	Weight K
T12	100.000-80.000	A	0.000	0.000	28.780	0.000	0.147
		B	0.000	0.000	66.660	0.000	0.292
		C	0.000	0.000	40.740	0.000	0.157
T13	80.000-60.000	A	0.000	0.000	28.780	0.000	0.147
		B	0.000	0.000	66.660	0.000	0.292
		C	0.000	0.000	40.740	0.000	0.157
T14	60.000-40.000	A	0.000	0.000	28.780	0.000	0.147
		B	0.000	0.000	66.660	0.000	0.292
		C	0.000	0.000	40.740	0.000	0.157
T15	40.000-20.000	A	0.000	0.000	28.780	0.000	0.147
		B	0.000	0.000	66.660	0.000	0.292
		C	0.000	0.000	42.000	0.000	0.160
T16	20.000-5.000	A	0.000	0.000	21.585	0.000	0.110
		B	0.000	0.000	49.995	0.000	0.219
		C	0.000	0.000	32.445	0.000	0.122
T17	5.000-0.000	A	0.000	0.000	7.195	0.000	0.037
		B	0.000	0.000	16.665	0.000	0.073
		C	0.000	0.000	10.815	0.000	0.041

Feed Line/Linear Appurtenances Section Areas - With Ice

Tower Section	Tower Elevation ft	Face or Leg	Ice Thickness in	A_R ft²	A_F ft²	C_AA_A In Face ft²	C_AA_A Out Face ft²	Weight K
T1	170.000-155.000	A	2.571	0.000	0.000	16.754	0.000	0.296
		B		0.000	0.000	19.857	0.000	0.391
		C		0.000	0.000	67.642	0.000	1.282
T2	155.000-140.000	A	2.568	0.000	0.000	41.578	0.000	0.733
		B		0.000	0.000	59.556	0.000	1.171
		C		0.000	0.000	123.177	0.000	2.323
T3	140.000-120.000	A	2.563	0.000	0.000	104.464	0.000	1.842
		B		0.000	0.000	79.379	0.000	1.558
		C		0.000	0.000	164.037	0.000	3.088
T4	120.000-117.500	A	2.559	0.000	0.000	13.047	0.000	0.230
		B		0.000	0.000	12.816	0.000	0.245
		C		0.000	0.000	20.484	0.000	0.385
T5	117.500-115.000	A	2.558	0.000	0.000	13.044	0.000	0.230
		B		0.000	0.000	24.399	0.000	0.448
		C		0.000	0.000	20.478	0.000	0.385
T6	115.000-112.500	A	2.557	0.000	0.000	13.041	0.000	0.230
		B		0.000	0.000	24.394	0.000	0.447
		C		0.000	0.000	20.472	0.000	0.385
T7	112.500-110.000	A	2.556	0.000	0.000	13.038	0.000	0.229
		B		0.000	0.000	24.389	0.000	0.447
		C		0.000	0.000	20.466	0.000	0.384
T8	110.000-107.500	A	2.554	0.000	0.000	13.035	0.000	0.229
		B		0.000	0.000	24.383	0.000	0.447
		C		0.000	0.000	20.460	0.000	0.384
T9	107.500-105.000	A	2.553	0.000	0.000	13.031	0.000	0.229
		B		0.000	0.000	24.378	0.000	0.447
		C		0.000	0.000	20.453	0.000	0.384
T10	105.000-102.500	A	2.552	0.000	0.000	13.027	0.000	0.229
		B		0.000	0.000	24.371	0.000	0.446
		C		0.000	0.000	20.446	0.000	0.384
T11	102.500-100.000	A	2.550	0.000	0.000	13.023	0.000	0.229
		B		0.000	0.000	24.365	0.000	0.446
		C		0.000	0.000	20.439	0.000	0.383
T12	100.000-80.000	A	2.542	0.000	0.000	104.017	0.000	1.824

Tower Section	Tower Elevation ft	Face or Leg	Ice Thickness in	A_R ft^2	A_F ft^2	C_AA_A In Face ft^2	C_AA_A Out Face ft^2	Weight K
		B		0.000	0.000	194.643	0.000	3.556
		C		0.000	0.000	163.185	0.000	3.052
T13	80.000-60.000	A	2.521	0.000	0.000	103.558	0.000	1.805
		B		0.000	0.000	193.898	0.000	3.522
		C		0.000	0.000	162.313	0.000	3.014
T14	60.000-40.000	A	2.482	0.000	0.000	102.745	0.000	1.772
		B		0.000	0.000	192.576	0.000	3.461
		C		0.000	0.000	160.765	0.000	2.949
T15	40.000-20.000	A	2.407	0.000	0.000	101.141	0.000	1.709
		B		0.000	0.000	189.969	0.000	3.343
		C		0.000	0.000	168.506	0.000	3.004
T16	20.000-5.000	A	2.248	0.000	0.000	73.326	0.000	1.184
		B		0.000	0.000	138.365	0.000	2.326
		C		0.000	0.000	128.819	0.000	2.164
T17	5.000-0.000	A	1.937	0.000	0.000	22.792	0.000	0.334
		B		0.000	0.000	43.436	0.000	0.663
		C		0.000	0.000	39.242	0.000	0.585

Feed Line Center of Pressure

Section	Elevation ft	CP_X in	CP_Z in	CP_X Ice in	CP_Z 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	0.103	0.285	-0.092	0.467
T13	80.000-60.000	0.101	0.279	-0.027	0.138
T14	60.000-40.000	0.103	0.285	-0.093	0.478
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_a No Ice	K_a 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

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

Tower Section	*Feed Line Record No.*	*Description*	*Feed Line Segment Elev.*	K_a *No Ice*	K_a *Ice*
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

Tower Section	Feed Line Record No.	Description	Feed Line Segment Elev.	K_a No Ice	K_a Ice
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

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

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	0.1617
T12	2	LDF7-50A (1-5/8 FOAM)	80.00 - 100.00	0.6000	0.1617
T12	3	LDF7-50A (1-5/8 FOAM)	80.00 - 100.00	0.6000	0.1617
T12	4	LDF7-50A (1-5/8 FOAM)	80.00 - 100.00	0.6000	0.1617
T12	5	LDF5-50A (7/8 FOAM)	80.00 - 100.00	0.6000	0.1617
T12	6	LDF5-50A (7/8 FOAM)	80.00 - 100.00	0.6000	0.1617
T12	7	LDF7-50A (1-5/8 FOAM)	80.00 - 100.00	0.6000	0.1617
T12	9	LDF4P-50A (1/2 FOAM)	80.00 - 100.00	0.6000	0.1617
T12	10	LDF4P-50A (1/2 FOAM)	80.00 - 100.00	0.6000	0.1617
T12	11	LDF7-50A (1-5/8 FOAM)	80.00 - 100.00	0.6000	0.1617
T12	12	LDF5-50A (7/8 FOAM)	80.00 - 100.00	0.6000	0.1617
T12	13	LDF4P-50A (1/2 FOAM)	80.00 - 100.00	0.6000	0.1617
T12	14	LMR-400	80.00 - 100.00	0.6000	0.1617
T12	15	LMR-400	80.00 - 100.00	0.6000	0.1617
T12	16	LMR-400	80.00 - 100.00	0.6000	0.1617
T12	17	LMR-400	80.00 - 100.00	0.6000	0.1617
T12	18	Hybriflex 1-1/4"	80.00 - 100.00	0.6000	0.1617
T12	19	Hybriflex 7/8"	80.00 - 100.00	0.6000	0.1617
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

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	0.1737
T14	2	LDF7-50A (1-5/8 FOAM)	40.00 - 60.00	0.6000	0.1737
T14	3	LDF7-50A (1-5/8 FOAM)	40.00 - 60.00	0.6000	0.1737
T14	4	LDF7-50A (1-5/8 FOAM)	40.00 - 60.00	0.6000	0.1737
T14	5	LDF5-50A (7/8 FOAM)	40.00 - 60.00	0.6000	0.1737
T14	6	LDF5-50A (7/8 FOAM)	40.00 - 60.00	0.6000	0.1737
T14	7	LDF7-50A (1-5/8 FOAM)	40.00 - 60.00	0.6000	0.1737
T14	9	LDF4P-50A (1/2 FOAM)	40.00 - 60.00	0.6000	0.1737
T14	10	LDF4P-50A (1/2 FOAM)	40.00 - 60.00	0.6000	0.1737
T14	11	LDF7-50A (1-5/8 FOAM)	40.00 - 60.00	0.6000	0.1737
T14	12	LDF5-50A (7/8 FOAM)	40.00 - 60.00	0.6000	0.1737
T14	13	LDF4P-50A (1/2 FOAM)	40.00 - 60.00	0.6000	0.1737
T14	14	LMR-400	40.00 - 60.00	0.6000	0.1737
T14	15	LMR-400	40.00 - 60.00	0.6000	0.1737
T14	16	LMR-400	40.00 - 60.00	0.6000	0.1737
T14	17	LMR-400	40.00 - 60.00	0.6000	0.1737
T14	18	Hybriflex 1-1/4"	40.00 - 60.00	0.6000	0.1737
T14	19	Hybriflex 7/8"	40.00 - 60.00	0.6000	0.1737
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

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 Rood*

Length of Pole	*Ix*	*Iy*	*Modulus E*		*Antenna Pole C_AA_A*	*Antenna Pole Weight*	*Length of Beacon*	*Beacon C_AA_A*	*Beacon Weight*
ft	*in^4*	*in^4*	*ksi*		*ft^2/ft*	*plf*	*ft*	*ft^2*	*K*
4.000	10.000	10.000	29000.000	No Ice	2.500	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 Vert*	*Azimuth Adjustment*	*Placement*		*C_AA_A Front*	*C_AA_A Side*	*Weight*
			ft ft ft	*°*	*ft*		*ft^2*	*ft^2*	*K*
Pirod 5' Side Mount Standoff (1)	A	From Leg	2.500 0.000 0.000	0.0000	168.000	No Ice 1/2" Ice 1" Ice	2.720 3.264 3.808	2.720 3.264 3.808	0.050 0.065 0.080

Description	Face or Leg	Offset Type	Offsets: Horz Lateral Vert (ft, ft, ft)	Azimuth Adjustment (°)	Placement (ft)		C_AA_A Front (ft^2)	C_AA_A Side (ft^2)	Weight (K)
Pirod 5' Side Mount Standoff (1)	B	From Leg	2.500	0.0000	168.000	No Ice	2.720	2.720	0.050
			0.000			1/2" Ice	3.264	3.264	0.065
			0.000			1" Ice	3.808	3.808	0.080
DB636 Omni	A	From Leg	5.000	0.0000	176.000	No Ice	2.375	2.375	0.066
			0.000			1/2" Ice	3.354	3.354	0.084
			0.000			1" Ice	4.350	4.350	0.108
DB806-XT	B	From Leg	5.000	0.0000	174.000	No Ice	1.140	1.140	0.021
			0.000			1/2" Ice	1.680	1.680	0.030
			0.000			1" Ice	2.220	2.220	0.098
1' Side Mount Standoff	C	From Leg	0.500	0.0000	168.000	No Ice	1.000	1.000	0.030
			0.000			1/2" Ice	1.500	1.500	0.050
			0.000			1" Ice	2.000	2.000	0.070
DB874H120-SX	C	From Leg	1.000	0.0000	171.500	No Ice	5.600	2.480	0.014
			0.000			1/2" Ice	5.990	2.780	0.044
			0.000			1" Ice	6.380	3.080	0.075
BOX 24"X6"X6"	C	From Leg	0.000	0.0000	171.500	No Ice	1.400	1.400	0.015
			0.000			1/2" Ice	1.600	1.600	0.027
			0.000			1" Ice	1.800	1.800	0.038
**********									
Pirod 12' T-Frame Sector Mount (1)	A	From Leg	3.000	0.0000	163.000	No Ice	13.600	13.600	0.465
			0.000			1/2" Ice	18.400	18.400	0.600
(T-Mobile)			0.000			1" Ice	23.200	23.200	0.735
APX16DWV-16DWVS	A	From Leg	6.000	0.0000	163.000	No Ice	6.586	2.150	0.041
(T-Mobile)			0.000			1/2" Ice	6.962	2.490	0.074
			0.000			1" Ice	7.344	2.837	0.113
LNX-6515DS-VTM	A	From Leg	6.000	0.0000	163.000	No Ice	11.445	9.596	0.080
(T-Mobile)			0.000			1/2" Ice	12.064	11.017	0.166
			0.000			1" Ice	12.689	12.290	0.263
(2) TMA	A	From Leg	5.000	0.0000	163.000	No Ice	1.000	0.267	0.015
(T-Mobile)			0.000			1/2" Ice	1.131	0.337	0.023
			0.000			1" Ice	1.270	0.415	0.033
AIR 32 with 6' pipe	A	From Leg	6.000	0.0000	163.000	No Ice	6.815	6.137	0.154
(T-Mobile)			0.000			1/2" Ice	7.299	6.993	0.216
			0.000			1" Ice	7.762	7.725	0.284
Pirod 12' T-Frame Sector Mount (1)	B	From Leg	3.000	0.0000	163.000	No Ice	13.600	13.600	0.465
			0.000			1/2" Ice	18.400	18.400	0.600
(T-Mobile)			0.000			1" Ice	23.200	23.200	0.735
APX16DWV-16DWVS	B	From Leg	6.000	0.0000	163.000	No Ice	6.586	2.150	0.041
(T-Mobile)			0.000			1/2" Ice	6.962	2.490	0.074
			0.000			1" Ice	7.344	2.837	0.113
LNX-6515DS-VTM	B	From Leg	6.000	0.0000	163.000	No Ice	11.445	9.596	0.080
(T-Mobile)			0.000			1/2" Ice	12.064	11.017	0.166
			0.000			1" Ice	12.689	12.290	0.263
(2) TMA	B	From Leg	5.000	0.0000	163.000	No Ice	1.000	0.267	0.015
(T-Mobile)			0.000			1/2" Ice	1.131	0.337	0.023
			0.000			1" Ice	1.270	0.415	0.033
AIR 32 with 6' pipe	B	From Leg	6.000	0.0000	163.000	No Ice	6.815	6.137	0.154
(T-Mobile)			0.000			1/2" Ice	7.299	6.993	0.216
			0.000			1" Ice	7.762	7.725	0.284
Pirod 12' T-Frame Sector Mount (1)	C	From Leg	3.000	0.0000	163.000	No Ice	13.600	13.600	0.465
			0.000			1/2" Ice	18.400	18.400	0.600
(T-Mobile)			0.000			1" Ice	23.200	23.200	0.735
APX16DWV-16DWVS	C	From Leg	6.000	0.0000	163.000	No Ice	6.586	2.150	0.041
(T-Mobile)			0.000			1/2" Ice	6.962	2.490	0.074
			0.000			1" Ice	7.344	2.837	0.113
LNX-6515DS-VTM	C	From Leg	6.000	0.0000	163.000	No Ice	11.445	9.596	0.080
(T-Mobile)			0.000			1/2" Ice	12.064	11.017	0.166

Description	*Face or Leg*	*Offset Type*	*Offsets: Horz Lateral Vert* *ft* *ft* *ft*	*Azimuth Adjustment* *°*	*Placement* *ft*		*C_AA_A Front* *ft²*	*C_AA_A Side* *ft²*	*Weight* *K*
			0.000			1" Ice	12.689	12.290	0.263
(2) TMA	C	From Leg	5.000	0.0000	163.000	No Ice	1.000	0.267	0.015
(T-Mobile)			0.000			1/2" Ice	1.131	0.337	0.023
			0.000			1" Ice	1.270	0.415	0.033
AIR 32 with 6' pipe	C	From Leg	6.000	0.0000	163.000	No Ice	6.815	6.137	0.154
(T-Mobile)			0.000			1/2" Ice	7.299	6.993	0.216
			0.000			1" Ice	7.762	7.725	0.284
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Pirod 12' T-Frame Sector	A	From Leg	0.500	0.0000	140.000	No Ice	13.600	13.600	0.465
Mount (1)			0.000			1/2" Ice	18.400	18.400	0.600
(Sprint)			0.000			1" Ice	23.200	23.200	0.735
ETCR-654L12H6 W/Pipe	A	From Leg	4.000	0.0000	140.000	No Ice	6.653	5.032	0.078
Mount			0.000			1/2" Ice	7.136	5.892	0.133
(Sprint)			0.000			1" Ice	7.598	6.627	0.195
TD-RRH8x20-25	A	From Leg	4.000	0.0000	140.000	No Ice	4.030	1.526	0.076
(Sprint)			1.000			1/2" Ice	4.281	1.705	0.103
			0.000			1" Ice	4.540	1.891	0.134
ALU RRH-4X45-1900	A	From Leg	4.000	0.0000	140.000	No Ice	2.500	2.500	0.070
(Sprint)			2.000			1/2" Ice	2.709	2.709	0.095
			0.000			1" Ice	2.926	2.926	0.124
(2) RRH-2X50-800	A	From Leg	4.000	0.0000	140.000	No Ice	1.733	1.333	0.069
(Sprint)			3.000			1/2" Ice	1.898	1.481	0.087
			0.000			1" Ice	2.070	1.637	0.107
Pirod 12' T-Frame Sector	B	From Leg	0.500	0.0000	140.000	No Ice	13.600	13.600	0.465
Mount (1)			0.000			1/2" Ice	18.400	18.400	0.600
(Sprint)			0.000			1" Ice	23.200	23.200	0.735
ETCR-654L12H6 W/Pipe	B	From Leg	4.000	0.0000	140.000	No Ice	6.653	5.032	0.078
Mount			0.000			1/2" Ice	7.136	5.892	0.133
(Sprint)			0.000			1" Ice	7.598	6.627	0.195
TD-RRH8x20-25	B	From Leg	4.000	0.0000	140.000	No Ice	4.030	1.526	0.076
(Sprint)			1.000			1/2" Ice	4.281	1.705	0.103
			0.000			1" Ice	4.540	1.891	0.134
ALU RRH-4X45-1900	B	From Leg	4.000	0.0000	140.000	No Ice	2.500	2.500	0.070
(Sprint)			2.000			1/2" Ice	2.709	2.709	0.095
			0.000			1" Ice	2.926	2.926	0.124
(2) RRH-2X50-800	B	From Leg	4.000	0.0000	140.000	No Ice	1.733	1.333	0.069
(Sprint)			3.000			1/2" Ice	1.898	1.481	0.087
			0.000			1" Ice	2.070	1.637	0.107
Pirod 12' T-Frame Sector	C	From Leg	0.500	0.0000	140.000	No Ice	13.600	13.600	0.465
Mount (1)			0.000			1/2" Ice	18.400	18.400	0.600
(Sprint)			0.000			1" Ice	23.200	23.200	0.735
ETCR-654L12H6 W/Pipe	C	From Leg	4.000	0.0000	140.000	No Ice	6.653	5.032	0.078
Mount			0.000			1/2" Ice	7.136	5.892	0.133
(Sprint)			0.000			1" Ice	7.598	6.627	0.195
TD-RRH8x20-25	C	From Leg	4.000	0.0000	140.000	No Ice	4.030	1.526	0.076
(Sprint)			1.000			1/2" Ice	4.281	1.705	0.103
			0.000			1" Ice	4.540	1.891	0.134
ALU RRH-4X45-1900	C	From Leg	4.000	0.0000	140.000	No Ice	2.500	2.500	0.070
(Sprint)			2.000			1/2" Ice	2.709	2.709	0.095
			0.000			1" Ice	2.926	2.926	0.124
(2) RRH-2X50-800	C	From Leg	4.000	0.0000	140.000	No Ice	1.733	1.333	0.069
(Sprint)			3.000			1/2" Ice	1.898	1.481	0.087
			0.000			1" Ice	2.070	1.637	0.107
Junction Box	A	From Leg	1.000	0.0000	140.000	No Ice	0.970	0.970	0.015
(Sprint)			0.000			1/2" Ice	1.110	1.110	0.025
			0.000			1" Ice	1.250	1.250	0.035
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Description	*Face or Leg*	*Offset Type*	*Offsets: Horz Lateral Vert* (*ft ft ft*)	*Azimuth Adjustment* (*°*)	*Placement* (*ft*)		*C_AA_A Front* (*ft²*)	*C_AA_A Side* (*ft²*)	*Weight* (*K*)
14-ft T-Frame Sector Mount	A	From Leg	2.000	0.0000	120.000	No Ice	16.300	16.300	0.510
(AT&T)			0.000			1/2" Ice	20.600	20.600	0.720
			0.000			1" Ice	24.900	24.900	0.930
Powerwave 7770 w/5ft mount	A	From Leg	3.000	0.0000	120.000	No Ice	5.607	4.116	0.045
pipe			-6.000			1/2" Ice	5.992	4.769	0.091
(AT&T)			0.000			1" Ice	6.384	5.432	0.143
CCI OPA-65R-LCUU-H6	A	From Leg	3.000	0.0000	120.000	No Ice	9.718	7.149	0.101
Panel Antenna with 8ft Pipe			-3.000			1/2" Ice	10.289	8.333	0.177
(AT&T)			0.000			1" Ice	10.827	9.231	0.261
Quintel QS66512-2 w/m pipe	A	From Leg	3.000	0.0000	120.000	No Ice	8.846	8.938	0.144
(AT&T)			6.000			1/2" Ice	9.612	10.332	0.225
			0.000			1" Ice	10.390	11.733	0.314
(2) LGP21401	A	From Leg	3.000	0.0000	120.000	No Ice	1.656	0.445	0.035
(AT&T)			-6.000			1/2" Ice	1.816	0.542	0.046
			0.000			1" Ice	1.984	0.647	0.059
DC6-48-06-18-8F	A	From Leg	3.000	0.0000	120.000	No Ice	1.201	1.201	0.032
(AT&T)			0.000			1/2" Ice	1.877	1.877	0.054
			0.000			1" Ice	2.088	2.088	0.078
RRUS-11	A	From Leg	3.000	0.0000	120.000	No Ice	2.522	1.020	0.055
(AT&T)			0.000			1/2" Ice	2.719	1.158	0.074
			0.000			1" Ice	2.923	1.304	0.097
RRUS 32	A	From Leg	3.000	0.0000	120.000	No Ice	3.314	2.424	0.092
(AT&T)			0.000			1/2" Ice	3.558	2.638	0.120
			0.000			1" Ice	3.809	2.860	0.151
TPX-070821	A	From Leg	3.000	0.0000	120.000	No Ice	0.120	0.120	0.010
(AT&T)			0.000			1/2" Ice	0.170	0.170	0.010
			0.000			1" Ice	0.220	0.220	0.010
14-ft T-Frame Sector Mount	B	From Leg	2.000	0.0000	120.000	No Ice	16.300	16.300	0.510
(AT&T)			0.000			1/2" Ice	20.600	20.600	0.720
			0.000			1" Ice	24.900	24.900	0.930
Powerwave 7770 w/5ft mount	B	From Leg	3.000	0.0000	120.000	No Ice	5.607	4.116	0.045
pipe			-6.000			1/2" Ice	5.992	4.769	0.091
(AT&T)			0.000			1" Ice	6.384	5.432	0.143
CCI OPA-65R-LCUU-H6	B	From Leg	3.000	0.0000	120.000	No Ice	9.718	7.149	0.101
Panel Antenna with 8ft Pipe			-3.000			1/2" Ice	10.289	8.333	0.177
(AT&T)			0.000			1" Ice	10.827	9.231	0.261
Quintel QS66512-2 w/m pipe	B	From Leg	3.000	0.0000	120.000	No Ice	8.846	8.938	0.144
(AT&T)			6.000			1/2" Ice	9.612	10.332	0.225
			0.000			1" Ice	10.390	11.733	0.314
(2) LGP21401	B	From Leg	3.000	0.0000	120.000	No Ice	1.656	0.445	0.035
(AT&T)			-6.000			1/2" Ice	1.816	0.542	0.046
			0.000			1" Ice	1.984	0.647	0.059
DC6-48-06-18-8F	B	From Leg	3.000	0.0000	120.000	No Ice	1.201	1.201	0.032
(AT&T)			0.000			1/2" Ice	1.877	1.877	0.054
			0.000			1" Ice	2.088	2.088	0.078
RRUS-11	B	From Leg	3.000	0.0000	120.000	No Ice	2.522	1.020	0.055
(AT&T)			0.000			1/2" Ice	2.719	1.158	0.074
			0.000			1" Ice	2.923	1.304	0.097
RRUS 32	B	From Leg	3.000	0.0000	120.000	No Ice	3.314	2.424	0.092
(AT&T)			0.000			1/2" Ice	3.558	2.638	0.120
			0.000			1" Ice	3.809	2.860	0.151
TPX-070821	B	From Leg	3.000	0.0000	120.000	No Ice	0.120	0.120	0.010
(AT&T)			0.000			1/2" Ice	0.170	0.170	0.010
			0.000			1" Ice	0.220	0.220	0.010
14-ft T-Frame Sector Mount	C	From Leg	2.000	0.0000	120.000	No Ice	16.300	16.300	0.510
(AT&T)			0.000			1/2" Ice	20.600	20.600	0.720
			0.000			1" Ice	24.900	24.900	0.930

Description	Face or Leg	Offset Type	Offsets: Horz Lateral Vert (ft ft ft)	Azimuth Adjustment (°)	Placement (ft)		C_AA_A Front (ft^2)	C_AA_A Side (ft^2)	Weight (K)
Powerwave 7770 w/5ft mount pipe (AT&T)	C	From Leg	3.000 -6.000 0.000	0.0000	120.000	No Ice 1/2" Ice 1" Ice	5.607 5.992 6.384	4.116 4.769 5.432	0.045 0.091 0.143
CCI OPA-65R-LCUU-H6 Panel Antenna with 8ft Pipe (AT&T)	C	From Leg	3.000 -3.000 0.000	0.0000	120.000	No Ice 1/2" Ice 1" Ice	9.718 10.289 10.827	7.149 8.333 9.231	0.101 0.177 0.261
Quintel QS66512-2 w/m pipe (AT&T)	C	From Leg	3.000 6.000 0.000	0.0000	120.000	No Ice 1/2" Ice 1" Ice	8.846 9.612 10.390	8.938 10.332 11.733	0.144 0.225 0.314
(2) LGP21401 (AT&T)	C	From Leg	3.000 -6.000 0.000	0.0000	120.000	No Ice 1/2" Ice 1" Ice	1.656 1.816 1.984	0.445 0.542 0.647	0.035 0.046 0.059
RRUS-11 (AT&T)	C	From Leg	3.000 0.000 0.000	0.0000	120.000	No Ice 1/2" Ice 1" Ice	2.522 2.719 2.923	1.020 1.158 1.304	0.055 0.074 0.097
RRUS 32 (AT&T)	C	From Leg	3.000 0.000 0.000	0.0000	120.000	No Ice 1/2" Ice 1" Ice	3.314 3.558 3.809	2.424 2.638 2.860	0.092 0.120 0.151
TPX-070821 (AT&T)	C	From Leg	3.000 0.000 0.000	0.0000	120.000	No Ice 1/2" Ice 1" Ice	0.120 0.170 0.220	0.120 0.170 0.220	0.010 0.010 0.010
**********									
1' Side Mount Standoff (Other)	A	From Leg	0.500 0.000 0.000	0.0000	108.400	No Ice 1/2" Ice 1" Ice	1.000 1.500 2.000	1.000 1.500 2.000	0.030 0.050 0.070
1' Side Mount Standoff (Other)	B	From Leg	0.500 0.000 0.000	0.0000	108.400	No Ice 1/2" Ice 1" Ice	1.000 1.500 2.000	1.000 1.500 2.000	0.030 0.050 0.070
1' Side Mount Standoff (Other)	C	From Leg	0.500 0.000 0.000	0.0000	108.400	No Ice 1/2" Ice 1" Ice	1.000 1.500 2.000	1.000 1.500 2.000	0.030 0.050 0.070
Panel Antenna 6'x6"x3" (Other)	A	From Leg	1.000 0.000 0.000	0.0000	108.000	No Ice 1/2" Ice 1" Ice	4.700 5.150 5.600	2.950 3.380 3.810	0.040 0.064 0.089
Panel Antenna 6'x6"x3" (Other)	B	From Leg	1.000 0.000 0.000	0.0000	108.000	No Ice 1/2" Ice 1" Ice	4.700 5.150 5.600	2.950 3.380 3.810	0.040 0.064 0.089
Panel Antenna 6'x6"x3" (Other)	C	From Leg	1.000 0.000 0.000	0.0000	108.000	No Ice 1/2" Ice 1" Ice	4.700 5.150 5.600	2.950 3.380 3.810	0.040 0.064 0.089
GPS (Other)	C	From Leg	0.500 0.000 0.000	0.0000	50.000	No Ice 1/2" Ice 1" Ice	0.210 0.320 0.430	0.210 0.320 0.430	0.005 0.007 0.010

Dishes

Description	Face or Leg	Dish Type	Offset Type	Offsets: Horz Lateral Vert (ft)	Azimuth Adjustment (°)	3 dB Beam Width (°)	Elevation (ft)	Outside Diameter (ft)	Aperture Area (ft^2)	Weight (K)

Description	Face or Leg	Dish Type	Offset Type	Offsets: Horz Lateral Vert ft	Azimuth Adjustment °	3 dB Beam Width °	Elevation ft	Outside Diameter ft		Aperture Area ft^2	Weight K
SC2	B	Paraboloid	From	3.000	0.0000		167.000	2.000	No Ice	3.140	0.030
		w/Radome	Leg	0.000					1/2" Ice	3.410	0.040
				0.000					1" Ice	3.680	0.050
VHLP2-18	A	Paraboloid	From	6.000	-45.0000		146.000	2.000	No Ice	3.140	0.020
		w/Shroud (HP)	Leg	0.000					1/2" Ice	3.410	0.040
				0.000					1" Ice	3.680	0.060
VHLP2-18	B	Paraboloid	From	6.000	45.0000		146.000	2.000	No Ice	3.140	0.020
		w/Shroud (HP)	Leg	0.000					1/2" Ice	3.410	0.040
				0.000					1" Ice	3.680	0.060
VHLP800-11	C	Paraboloid	From	6.000	45.0000		146.000	2.500	No Ice	6.000	0.020
		w/Shroud (HP)	Leg	0.000					1/2" Ice	6.400	0.056
				0.000					1" Ice	7.470	0.093

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
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 K	Major Axis Moment kip-ft	Minor Axis Moment kip-ft
T1	170 - 155	Leg	Max Tension	4	18.959	0.435	-0.251
			Max. Compression	10	-21.042	0.117	-0.067
			Max. Mx	23	-0.069	-0.817	0.475
			Max. My	15	-0.067	0.000	-0.941
			Max. Vy	23	-3.491	0.055	-0.031
			Max. Vx	15	-4.027	0.001	0.065
		Diagonal	Max Tension	13	2.816	-0.007	0.001
			Max. Compression	13	-2.850	0.000	0.000
			Max. Mx	18	0.316	-0.013	-0.000
			Max. My	13	-2.474	0.003	0.004
			Max. Vy	18	0.017	-0.013	-0.000
			Max. Vx	13	0.002	0.003	0.004
		Top Girt	Max Tension	23	2.087	0.000	0.000
			Max. Compression	4	-0.024	0.000	0.000
			Max. Mx	23	2.087	0.019	0.000
			Max. My	22	2.081	0.000	-0.000
			Max. Vy	23	0.022	0.000	0.000
			Max. Vx	22	-0.000	0.000	0.000
		Bottom Girt	Max Tension	4	0.828	0.000	0.000
			Max. Compression	10	-0.770	0.000	0.000
			Max. Mx	26	0.317	0.019	0.000
			Max. My	22	0.156	0.000	-0.000
			Max. Vy	26	0.022	0.000	0.000
			Max. Vx	22	-0.000	0.000	0.000
		Pole Antenna	Max Tension	10	0.005	1.086	-0.628
			Max. Compression	14	-0.018	-0.000	0.000
			Max. Mx	11	0.003	1.255	0.001
			Max. My	8	0.000	-0.002	-1.255
			Max. Vy	5	0.627	-1.255	0.001
			Max. Vx	8	0.627	-0.002	-1.255
			Max. Torque	5			0.000
T2	155 - 140	Leg	Max Tension	4	21.912	-0.678	0.391
			Max. Compression	10	-33.081	0.124	-0.048
			Max. Mx	11	18.616	0.708	0.142
			Max. My	8	21.096	-0.018	-0.772
			Max. Vy	11	-2.317	0.708	0.142
			Max. Vx	2	-2.544	0.020	0.768
		Diagonal	Max Tension	13	3.288	0.000	0.000
			Max. Compression	13	-3.463	0.012	0.004
			Max. Mx	23	-0.305	-0.019	0.001
			Max. My	2	-3.283	0.010	0.005
			Max. Vy	23	0.020	-0.019	0.001
			Max. Vx	2	-0.002	0.010	0.005
		Secondary Horizontal	Max Tension	6	1.372	0.000	0.000
			Max. Compression	8	-1.106	0.000	0.000
			Max. Mx	22	-0.293	-0.009	0.001
			Max. My	10	0.001	-0.004	-0.005
			Max. Vy	22	0.018	-0.009	0.001
			Max. Vx	10	-0.003	-0.004	-0.005
		Top Girt	Max Tension	6	0.342	0.000	0.000
			Max. Compression	12	-0.326	0.000	0.000
			Max. Mx	26	0.058	0.019	0.000
			Max. My	22	0.127	0.000	-0.000
			Max. Vy	26	-0.022	0.000	0.000

Section No.	Elevation ft	Component Type	Condition	Gov. Load Comb.	Axial K	Major Axis Moment kip-ft	Minor Axis Moment kip-ft
			Max. Vx	22	0.000	0.000	0.000
		Bottom Girt	Max Tension	15	0.379	0.000	0.000
			Max. Compression	1	0.000	0.000	0.000
			Max. Mx	26	0.357	0.019	0.000
			Max. My	22	0.355	0.000	-0.000
			Max. Vy	26	-0.022	0.000	0.000
			Max. Vx	22	0.000	0.000	0.000
		Guy A	Bottom Tension	7	8.540		
			Top Tension	7	8.581		
			Top Cable Vert	7	7.194		
			Top Cable Norm	7	4.677		
			Top Cable Tan	7	0.008		
			Bot Cable Vert	7	-7.051		
			Bot Cable Norm	7	4.817		
			Bot Cable Tan	7	0.132		
		Guy B	Bottom Tension	13	8.259		
			Top Tension	13	8.298		
			Top Cable Vert	13	6.818		
			Top Cable Norm	13	4.729		
			Top Cable Tan	13	0.006		
			Bot Cable Vert	13	-6.680		
			Bot Cable Norm	13	4.856		
			Bot Cable Tan	13	0.124		
		Guy C	Bottom Tension	3	8.081		
			Top Tension	3	8.118		
			Top Cable Vert	3	6.558		
			Top Cable Norm	3	4.785		
			Top Cable Tan	3	0.007		
			Bot Cable Vert	3	-6.422		
			Bot Cable Norm	3	4.904		
			Bot Cable Tan	3	0.122		
		Top Guy Pull-Off	Max Tension	4	4.264	0.000	0.000
			Max. Compression	6	-3.849	0.000	0.000
			Max. Mx	26	1.257	-0.025	0.000
			Max. My	22	0.509	0.000	0.000
			Max. Vy	26	-0.029	0.000	0.000
			Max. Vx	22	0.000	0.000	0.000
		Torque Arm Top	Max Tension	5	5.215	0.000	0.000
			Max. Compression	5	-2.502	0.000	0.000
			Max. Mx	7	-0.040	-25.037	0.000
			Max. My	22	0.756	-15.671	-0.000
			Max. Vy	7	7.153	-25.037	0.000
			Max. Vx	22	-0.000	-15.671	-0.000
T3	140 - 120	Leg	Max Tension	4	29.041	-1.146	0.005
			Max. Compression	10	-46.925	-1.796	-0.052
			Max. Mx	10	-46.912	1.899	0.004
			Max. My	9	-8.514	-0.803	3.959
			Max. Vy	10	3.040	1.899	0.004
			Max. Vx	9	-3.742	-0.803	3.959
		Diagonal	Max Tension	4	3.359	0.010	0.006
			Max. Compression	8	-4.985	-0.007	0.029
			Max. Mx	11	0.579	-0.076	-0.019
			Max. My	7	-4.546	0.028	-0.033
			Max. Vy	11	-0.036	0.000	0.000
			Max. Vx	7	0.016	0.028	-0.033
		Secondary Horizontal	Max Tension	8	4.717	-0.053	-0.008
			Max. Compression	6	-3.239	0.045	0.008
			Max. Mx	6	0.408	-0.057	-0.007
			Max. My	7	-0.706	-0.049	-0.010
			Max. Vy	6	-0.033	0.000	0.000

Section No.	Elevation ft	Component Type	Condition	Gov. Load Comb.	Axial K	Major Axis Moment kip-ft	Minor Axis Moment kip-ft
			Max. Vx	7	0.006	0.000	0.000
		Top Girt	Max Tension	15	0.507	0.000	0.000
			Max. Compression	8	-0.083	0.000	0.000
			Max. Mx	26	0.381	-0.021	0.000
			Max. My	22	0.437	0.000	0.000
			Max. Vy	26	0.025	0.000	0.000
			Max. Vx	22	-0.000	0.000	0.000
		Bottom Girt	Max Tension	10	1.012	0.000	0.000
			Max. Compression	8	-0.174	0.000	0.000
			Max. Mx	26	0.635	-0.023	0.000
			Max. My	22	0.721	0.000	0.000
			Max. Vy	26	0.027	0.000	0.000
			Max. Vx	22	-0.000	0.000	0.000
		Guy A	Bottom Tension	7	15.409		
			Top Tension	7	15.478		
			Top Cable Vert	7	12.392		
			Top Cable Norm	7	9.273		
			Top Cable Tan	7	0.042		
			Bot Cable Vert	7	-12.191		
			Bot Cable Norm	7	9.421		
			Bot Cable Tan	7	0.186		
		Guy B	Bottom Tension	13	14.753		
			Top Tension	13	14.817		
			Top Cable Vert	13	11.538		
			Top Cable Norm	13	9.297		
			Top Cable Tan	13	0.036		
			Bot Cable Vert	13	-11.345		
			Bot Cable Norm	13	9.430		
			Bot Cable Tan	13	0.173		
		Guy C	Bottom Tension	3	14.324		
			Top Tension	3	14.386		
			Top Cable Vert	3	10.945		
			Top Cable Norm	3	9.335		
			Top Cable Tan	3	0.037		
			Bot Cable Vert	3	-10.757		
			Bot Cable Norm	3	9.458		
			Bot Cable Tan	3	0.169		
		Torque Arm Top	Max Tension	5	10.556	0.000	0.000
			Max. Compression	5	-5.357	0.000	0.000
			Max. Mx	7	-0.249	-41.822	0.000
			Max. My	22	0.825	-17.857	-0.000
			Max. Vy	7	11.948	-41.822	0.000
			Max. Vx	22	-0.000	-17.857	-0.000
T4	120 - 117.5	Leg	Max Tension	1	0.000	0.000	0.000
			Max. Compression	20	-40.879	-0.127	0.070
			Max. Mx	11	-25.388	-0.180	-0.063
			Max. My	9	-27.117	-0.032	0.190
			Max. Vy	3	-1.071	-0.121	0.013
			Max. Vx	8	-1.144	0.007	-0.102
		Diagonal	Max Tension	4	0.337	0.013	-0.000
			Max. Compression	5	-0.674	-0.001	-0.000
			Max. Mx	20	-0.207	0.026	-0.000
			Max. My	6	-0.120	0.018	-0.001
			Max. Vy	20	0.024	0.000	0.000
			Max. Vx	6	-0.000	0.018	-0.001
		Top Girt	Max Tension	19	0.761	0.000	0.000
			Max. Compression	1	0.000	0.000	0.000
			Max. Mx	26	0.644	0.019	0.000
			Max. My	22	0.691	0.000	-0.000
			Max. Vy	26	-0.022	0.000	0.000
			Max. Vx	22	0.000	0.000	0.000

Section No.	*Elevation ft*	*Component Type*	*Condition*	*Gov. Load Comb.*	*Axial K*	*Major Axis Moment kip-ft*	*Minor Axis Moment kip-ft*
T5	117.5 - 115	Leg	Max Tension	1	0.000	0.000	0.000
			Max. Compression	20	-41.874	0.078	-0.045
			Max. Mx	25	-39.034	0.135	0.074
			Max. My	21	-39.729	0.004	-0.155
			Max. Vy	24	0.089	0.135	0.075
			Max. Vx	21	-0.102	0.004	-0.155
		Diagonal	Max Tension	5	0.327	0.000	0.000
			Max. Compression	5	-0.164	0.000	0.000
			Max. Mx	20	0.110	-0.032	-0.000
			Max. My	6	0.152	-0.015	-0.000
			Max. Vy	20	0.026	-0.032	-0.000
			Max. Vx	6	0.000	0.000	0.000
T6	115 - 112.5	Leg	Max Tension	1	0.000	0.000	0.000
			Max. Compression	20	-42.187	-0.015	0.008
			Max. Mx	26	-41.996	0.078	-0.045
			Max. My	24	-41.047	0.002	0.088
			Max. Vy	24	-0.045	0.023	0.012
			Max. Vx	21	0.050	0.002	-0.026
		Diagonal	Max Tension	3	0.097	0.012	-0.000
			Max. Compression	6	-0.237	-0.011	-0.000
			Max. Mx	20	-0.070	-0.022	-0.000
			Max. My	6	0.011	0.014	-0.000
			Max. Vy	20	0.021	-0.022	-0.000
			Max. Vx	6	-0.000	0.014	-0.000
T7	112.5 - 110	Leg	Max Tension	1	0.000	0.000	0.000
			Max. Compression	20	-42.851	-0.127	0.072
			Max. Mx	21	-40.839	0.128	0.067
			Max. My	23	-41.542	0.002	-0.146
			Max. Vy	24	0.051	-0.014	0.012
			Max. Vx	15	0.054	0.002	-0.023
		Diagonal	Max Tension	7	0.357	0.000	0.000
			Max. Compression	6	-0.318	0.000	0.000
			Max. Mx	20	0.063	-0.030	-0.000
			Max. My	6	-0.318	0.009	-0.001
			Max. Vy	20	0.025	-0.030	-0.000
			Max. Vx	6	-0.000	0.009	-0.001
T8	110 - 107.5	Leg	Max Tension	1	0.000	0.000	0.000
			Max. Compression	20	-43.134	-0.498	0.290
			Max. Mx	15	-42.683	-0.500	0.282
			Max. My	23	-41.687	-0.000	-0.571
			Max. Vy	25	0.752	0.423	-0.242
			Max. Vx	23	0.850	-0.000	-0.571
		Diagonal	Max Tension	7	0.367	0.014	0.003
			Max. Compression	6	-0.911	0.000	0.000
			Max. Mx	26	-0.391	-0.025	0.005
			Max. My	20	-0.421	-0.025	-0.005
			Max. Vy	20	0.023	-0.025	-0.005
			Max. Vx	20	0.002	0.000	0.000
		Secondary Horizontal	Max Tension	20	0.776	0.000	0.000
			Max. Compression	20	-0.747	0.000	0.000
			Max. Mx	25	-0.713	-0.006	-0.007
			Max. My	20	0.747	0.001	-0.007
			Max. Vy	15	-0.015	0.002	-0.007
			Max. Vx	26	0.004	0.000	0.000
T9	107.5 - 105	Leg	Max Tension	1	0.000	0.000	0.000
			Max. Compression	20	-43.344	-0.451	0.259
			Max. Mx	15	-42.599	-0.500	0.282
			Max. My	23	-41.731	-0.000	-0.571
			Max. Vy	26	-0.784	0.480	-0.276
			Max. Vx	23	-0.890	-0.000	-0.571

Section No.	Elevation ft	Component Type	Condition	Gov. Load Comb.	Axial K	Major Axis Moment kip-ft	Minor Axis Moment kip-ft
		Diagonal	Max Tension	7	0.509	0.011	0.002
			Max. Compression	7	-1.399	0.000	0.000
			Max. Mx	20	-0.676	-0.028	-0.004
			Max. My	19	-0.772	-0.027	-0.004
			Max. Vy	20	0.024	-0.028	-0.004
			Max. Vx	19	0.002	0.000	0.000
		Secondary Horizontal	Max Tension	20	0.986	0.000	0.000
			Max. Compression	20	-0.751	0.000	0.000
			Max. Mx	18	-0.723	0.017	-0.006
			Max. My	21	0.974	0.015	-0.007
			Max. Vy	18	-0.024	0.017	-0.006
			Max. Vx	21	-0.004	0.000	0.000
T10	105 - 102.5	Leg	Max Tension	1	0.000	0.000	0.000
			Max. Compression	20	-44.309	-0.610	0.349
			Max. Mx	21	-44.243	-0.614	0.345
			Max. My	24	-42.956	0.009	-0.695
			Max. Vy	21	0.922	-0.614	0.345
			Max. Vx	24	1.043	-0.001	0.608
		Diagonal	Max Tension	7	0.934	0.015	0.003
			Max. Compression	7	-1.437	0.000	0.000
			Max. Mx	21	-0.270	-0.022	-0.005
			Max. My	20	-0.365	0.020	-0.005
			Max. Vy	21	0.021	-0.022	-0.005
			Max. Vx	20	-0.002	0.020	-0.005
		Secondary Horizontal	Max Tension	21	1.100	-0.015	-0.007
			Max. Compression	20	-0.767	0.000	0.000
			Max. Mx	23	1.092	-0.017	-0.007
			Max. My	21	1.100	-0.015	-0.007
			Max. Vy	23	-0.024	0.000	0.000
			Max. Vx	25	0.004	0.000	0.000
T11	102.5 - 100	Leg	Max Tension	1	0.000	0.000	0.000
			Max. Compression	21	-46.000	0.034	-0.026
			Max. Mx	21	-44.368	-0.614	0.345
			Max. My	24	-42.977	0.009	-0.695
			Max. Vy	10	-1.676	0.063	-0.037
			Max. Vx	2	-1.894	0.001	0.070
		Diagonal	Max Tension	7	1.083	0.004	0.001
			Max. Compression	7	-2.260	0.000	0.000
			Max. Mx	21	-0.743	-0.037	-0.003
			Max. My	20	-0.848	-0.037	-0.004
			Max. Vy	21	0.029	-0.037	-0.003
			Max. Vx	20	0.002	0.000	0.000
		Secondary Horizontal	Max Tension	24	0.905	0.060	-0.005
			Max. Compression	21	-0.769	0.000	0.000
			Max. Mx	19	-0.749	0.062	-0.005
			Max. My	21	0.848	0.061	-0.005
			Max. Vy	19	-0.050	0.062	-0.005
			Max. Vx	21	-0.003	0.000	0.000
		Bottom Girt	Max Tension	7	0.346	0.000	0.000
			Max. Compression	10	-0.090	0.000	0.000
			Max. Mx	21	0.311	0.018	0.000
			Max. My	22	0.258	0.000	-0.000
			Max. Vy	21	-0.022	0.000	0.000
			Max. Vx	22	0.000	0.000	0.000
T12	100 - 80	Leg	Max Tension	1	0.000	0.000	0.000
			Max. Compression	23	-54.420	-0.264	0.153
			Max. Mx	10	-32.291	0.482	-0.288
			Max. My	2	-31.073	0.008	0.544

Section No.	*Elevation ft*	*Component Type*	*Condition*	*Gov. Load Comb.*	*Axial K*	*Major Axis Moment kip-ft*	*Minor Axis Moment kip-ft*
			Max. Vy	10	-1.677	0.482	-0.288
			Max. Vx	2	-1.896	0.008	0.544
		Diagonal	Max Tension	7	2.019	0.006	-0.001
			Max. Compression	7	-2.295	0.000	0.000
			Max. Mx	22	-0.566	-0.031	-0.000
			Max. My	11	-2.174	-0.006	0.002
			Max. Vy	22	0.026	-0.031	-0.000
			Max. Vx	11	-0.001	-0.006	0.002
		Top Girt	Max Tension	15	0.801	0.000	0.000
			Max. Compression	1	0.000	0.000	0.000
			Max. Mx	21	0.738	0.018	0.000
			Max. My	22	0.747	0.000	-0.000
			Max. Vy	21	-0.021	0.000	0.000
			Max. Vx	22	-0.000	0.000	0.000
		Bottom Girt	Max Tension	19	0.897	0.000	0.000
			Max. Compression	1	0.000	0.000	0.000
			Max. Mx	21	0.872	0.018	0.000
			Max. My	22	0.879	0.000	-0.000
			Max. Vy	21	-0.021	0.000	0.000
			Max. Vx	22	-0.000	0.000	0.000
		Mid Girt	Max Tension	6	0.927	0.000	0.000
			Max. Compression	1	0.000	0.000	0.000
			Max. Mx	21	0.515	0.020	0.000
			Max. My	22	0.583	0.000	-0.000
			Max. Vy	21	-0.024	0.000	0.000
			Max. Vx	22	-0.000	0.000	0.000
		Guy A	Bottom Tension	7	15.084		
			Top Tension	7	15.132		
			Top Cable Vert	7	10.278		
			Top Cable Norm	7	11.106		
			Top Cable Tan	7	0.036		
			Bot Cable Vert	7	-10.123		
			Bot Cable Norm	7	11.182		
			Bot Cable Tan	7	0.131		
		Guy B	Bottom Tension	13	14.390		
			Top Tension	13	14.434		
			Top Cable Vert	13	9.216		
			Top Cable Norm	13	11.108		
			Top Cable Tan	13	0.032		
			Bot Cable Vert	13	-9.071		
			Bot Cable Norm	13	11.170		
			Bot Cable Tan	13	0.121		
		Guy C	Bottom Tension	3	13.894		
			Top Tension	3	13.935		
			Top Cable Vert	3	8.466		
			Top Cable Norm	3	11.068		
			Top Cable Tan	3	0.032		
			Bot Cable Vert	3	-8.327		
			Bot Cable Norm	3	11.122		
			Bot Cable Tan	3	0.118		
		Top Guy Pull-Off	Max Tension	6	4.929	0.000	0.000
			Max. Compression	1	0.000	0.000	0.000
			Max. Mx	21	2.738	0.039	0.000
			Max. My	3	3.174	0.000	-0.000
			Max. Vy	21	-0.046	0.000	0.000
			Max. Vx	3	0.000	0.000	0.000
T13	80 - 60	Leg	Max Tension	1	0.000	0.000	0.000
			Max. Compression	23	-58.826	0.071	-0.000
			Max. Mx	23	-56.780	-0.956	-0.000
			Max. My	9	-28.541	-0.062	-0.115
			Max. Vy	23	1.456	0.816	-0.000

Section No.	*Elevation ft*	*Component Type*	*Condition*	*Gov. Load Comb.*	*Axial K*	*Major Axis Moment kip-ft*	*Minor Axis Moment kip-ft*
			Max. Vx	9	-0.463	0.032	0.001
		Diagonal	Max Tension	4	0.401	0.000	0.000
			Max. Compression	7	-1.745	0.000	0.000
			Max. Mx	23	-1.149	-0.029	0.002
			Max. My	21	-0.627	0.016	-0.003
			Max. Vy	23	0.025	-0.029	0.002
			Max. Vx	22	-0.002	0.016	-0.003
		Secondary Horizontal	Max Tension	23	1.483	-0.018	-0.005
			Max. Compression	23	-0.986	0.000	0.000
			Max. Mx	23	-0.969	0.046	-0.003
			Max. My	21	-0.979	-0.018	-0.005
			Max. Vy	23	-0.041	0.046	-0.003
			Max. Vx	21	0.003	0.000	0.000
		Top Girt	Max Tension	21	0.338	0.000	0.000
			Max. Compression	1	0.000	0.000	0.000
			Max. Mx	21	0.338	0.018	0.000
			Max. My	22	0.302	0.000	-0.000
			Max. Vy	21	0.021	0.000	0.000
			Max. Vx	22	0.000	0.000	0.000
		Bottom Girt	Max Tension	17	0.378	0.000	0.000
			Max. Compression	1	0.000	0.000	0.000
			Max. Mx	21	0.373	0.018	0.000
			Max. My	20	0.364	0.000	-0.000
			Max. Vy	21	0.021	0.000	0.000
			Max. Vx	20	0.000	0.000	0.000
T14	60 - 40	Leg	Max Tension	1	0.000	0.000	0.000
			Max. Compression	23	-65.654	-0.231	0.228
			Max. Mx	10	-34.485	0.557	-0.223
			Max. My	2	-30.712	-0.085	0.576
			Max. Vy	5	-1.830	-0.467	-0.228
			Max. Vx	2	1.832	-0.085	0.576
		Diagonal	Max Tension	9	2.072	0.000	0.000
			Max. Compression	9	-2.358	-0.006	0.001
			Max. Mx	23	-0.152	-0.037	0.001
			Max. My	9	-1.691	-0.010	-0.001
			Max. Vy	23	0.028	-0.037	0.001
			Max. Vx	9	0.001	-0.010	-0.001
		Top Girt	Max Tension	15	0.963	0.000	0.000
			Max. Compression	1	0.000	0.000	0.000
			Max. Mx	21	0.951	0.018	0.000
			Max. My	20	0.929	0.000	-0.000
			Max. Vy	21	-0.021	0.000	0.000
			Max. Vx	20	0.000	0.000	0.000
		Bottom Girt	Max Tension	21	0.924	0.000	0.000
			Max. Compression	2	-0.014	0.000	0.000
			Max. Mx	14	0.805	0.018	0.000
			Max. My	20	0.742	0.000	-0.000
			Max. Vy	14	-0.021	0.000	0.000
			Max. Vx	20	0.000	0.000	0.000
		Mid Girt	Max Tension	10	0.947	0.000	0.000
			Max. Compression	1	0.000	0.000	0.000
			Max. Mx	21	0.653	0.019	0.000
			Max. My	20	0.711	0.000	-0.000
			Max. Vy	21	-0.023	0.000	0.000
			Max. Vx	20	0.000	0.000	0.000
		Guy A	Bottom Tension	7	12.485		
			Top Tension	7	12.513		
			Top Cable Vert	7	5.957		
			Top Cable Norm	7	11.004		
			Top Cable Tan	7	0.013		

Section No.	*Elevation ft*	*Component Type*	*Condition*	*Gov. Load Comb.*	*Axial K*	*Major Axis Moment kip-ft*	*Minor Axis Moment kip-ft*
			Bot Cable Vert	7	-5.850		
			Bot Cable Norm	7	11.029		
			Bot Cable Tan	7	0.077		
		Guy B	Bottom Tension	13	11.858		
			Top Tension	13	11.882		
			Top Cable Vert	13	4.832		
			Top Cable Norm	13	10.855		
			Top Cable Tan	13	0.012		
			Bot Cable Vert	13	-4.736		
			Bot Cable Norm	13	10.871		
			Bot Cable Tan	13	0.069		
		Guy C	Bottom Tension	3	11.489		
			Top Tension	3	11.509		
			Top Cable Vert	3	4.124		
			Top Cable Norm	3	10.745		
			Top Cable Tan	3	0.012		
			Bot Cable Vert	3	-4.034		
			Bot Cable Norm	3	10.757		
			Bot Cable Tan	3	0.066		
		Top Guy Pull-Off	Max Tension	10	5.035	0.000	0.000
			Max. Compression	1	0.000	0.000	0.000
			Max. Mx	21	3.472	0.038	0.000
			Max. My	3	3.195	0.000	-0.000
			Max. Vy	21	0.045	0.000	0.000
			Max. Vx	3	0.000	0.000	0.000
T15	40 - 20	Leg	Max Tension	1	0.000	0.000	0.000
			Max. Compression	21	-71.524	-0.034	0.542
			Max. Mx	7	-37.397	0.484	-0.057
			Max. My	23	-68.735	-0.005	0.665
			Max. Vy	10	1.877	0.125	0.175
			Max. Vx	2	0.885	0.144	0.158
		Diagonal	Max Tension	3	2.656	0.000	0.000
			Max. Compression	9	-3.462	0.000	0.000
			Max. Mx	22	-1.392	0.021	0.000
			Max. My	22	-1.367	0.000	0.000
			Max. Vy	22	-0.020	0.000	0.000
			Max. Vx	22	-0.000	0.000	0.000
		Horizontal	Max Tension	21	1.224	0.000	0.000
			Max. Compression	21	-1.224	0.000	0.000
			Max. Mx	14	1.162	0.020	0.000
			Max. My	9	0.801	0.000	-0.000
			Max. Vy	14	0.023	0.000	0.000
			Max. Vx	9	0.000	0.000	0.000
		Top Girt	Max Tension	9	0.878	0.000	0.000
			Max. Compression	3	-0.667	0.000	0.000
			Max. Mx	14	0.169	0.017	0.000
			Max. My	22	0.346	0.000	-0.000
			Max. Vy	14	0.020	0.000	0.000
			Max. Vx	22	0.000	0.000	0.000
		Bottom Girt	Max Tension	20	0.345	0.000	0.000
			Max. Compression	1	0.000	0.000	0.000
			Max. Mx	14	0.307	0.017	0.000
			Max. My	22	0.294	0.000	-0.000
			Max. Vy	14	0.020	0.000	0.000
			Max. Vx	22	0.000	0.000	0.000
T16	20 - 5	Leg	Max Tension	1	0.000	0.000	0.000
			Max. Compression	22	-72.828	0.346	0.048
			Max. Mx	22	-72.824	-4.664	0.068
			Max. My	23	-70.938	0.000	-0.681
			Max. Vy	24	20.096	-4.640	0.095
			Max. Vx	23	-0.561	-0.004	0.663

Section No.	Elevation ft	Component Type	Condition	Gov. Load Comb.	Axial K	Major Axis Moment kip-ft	Minor Axis Moment kip-ft
		Diagonal	Max Tension	11	2.241	0.000	0.000
			Max. Compression	5	-2.729	0.000	0.000
			Max. Mx	22	-0.746	0.018	0.000
			Max. My	23	-0.518	0.000	0.000
			Max. Vy	22	0.018	0.000	0.000
			Max. Vx	23	0.000	0.000	0.000
		Horizontal	Max Tension	24	1.256	0.000	0.000
			Max. Compression	24	-1.256	0.000	0.000
			Max. Mx	15	1.244	0.018	0.000
			Max. My	10	0.760	0.000	0.000
			Max. Vy	15	0.021	0.000	0.000
			Max. Vx	10	-0.000	0.000	0.000
		Top Girt	Max Tension	18	0.592	0.000	0.000
			Max. Compression	1	0.000	0.000	0.000
			Max. Mx	15	0.573	0.017	0.000
			Max. My	22	0.541	0.000	-0.000
			Max. Vy	15	-0.019	0.000	0.000
			Max. Vx	22	0.000	0.000	0.000
		Bottom Girt	Max Tension	24	11.849	0.000	0.000
			Max. Compression	1	0.000	0.000	0.000
			Max. Mx	15	11.689	-0.020	0.000
			Max. My	22	11.775	0.000	0.000
			Max. Vy	15	0.024	0.000	0.000
			Max. Vx	22	-0.000	0.000	0.000
T17	5 - 0	Leg	Max Tension	1	0.000	0.000	0.000
			Max. Compression	24	-79.129	-0.377	0.061
			Max. Mx	22	-75.322	-4.664	0.064
			Max. My	10	-43.575	0.633	0.276
			Max. Vy	23	-8.424	-4.649	0.072
			Max. Vx	10	-0.278	0.990	0.246
		Top Girt	Max Tension	23	5.774	-0.029	-2.233
			Max. Compression	1	0.000	0.000	0.000
			Max. Mx	22	5.625	-0.029	-2.215
			Max. My	26	5.675	-0.029	-2.338
			Max. Vy	26	0.055	-0.029	-2.338
			Max. Vx	4	-0.218	-0.001	-0.968
		Bottom Girt	Max Tension	8	1.732	-0.000	-1.137
			Max. Compression	9	-1.944	-0.004	-1.044
			Max. Mx	10	-0.659	-0.006	-0.982
			Max. My	15	-0.957	-0.004	-2.532
			Max. Vy	10	0.018	-0.006	-0.982
			Max. Vx	8	-1.928	-0.002	-1.179
		Mid Girt	Max Tension	1	0.000	0.000	0.000
			Max. Compression	20	-0.755	0.000	0.000
			Max. Mx	15	-0.738	0.014	0.000
			Max. My	16	-0.724	0.000	0.003
			Max. Vy	15	-0.032	0.000	0.000
			Max. Vx	16	-0.006	0.000	0.000

Maximum Reactions

Location	Condition	Gov. Load Comb.	Vertical K	Horizontal, X K	Horizontal, Z K
Mast	Max. Vert	23	218.888	0.104	0.132
	Max. H_x	12	76.103	2.785	1.580
	Max. H_z	2	105.601	-0.049	2.493

Location	*Condition*	*Gov. Load Comb.*	*Vertical K*	*Horizontal, X K*	*Horizontal, Z K*
	Max. M_x	1	0.000	0.002	0.004
	Max. M_z	1	0.000	0.002	0.004
	Max. Torsion	9	0.289	0.893	-2.330
	Min. Vert	1	40.409	0.002	0.004
	Min. H_x	4	74.041	-2.835	1.658
	Min. H_z	8	78.745	0.041	-3.070
	Min. M_x	1	0.000	0.002	0.004
	Min. M_z	1	0.000	0.002	0.004
	Min. Torsion	4	-0.395	-2.835	1.658
Guy C @ 107 ft Elev 10 ft Azimuth 240 deg	Max. Vert	35	-0.865	-1.067	0.616
	Max. H_x	10	-1.037	-0.485	0.279
	Max. H_z	3	-46.272	-43.154	25.752
	Min. Vert	5	-46.346	-43.948	24.482
	Min. H_x	5	-46.346	-43.948	24.482
	Min. H_z	9	-1.510	-1.067	0.269
Guy B @ 106 ft Elev 4 ft Azimuth 120 deg	Max. Vert	31	-1.014	1.109	0.640
	Max. H_x	11	-49.418	43.927	24.438
	Max. H_z	13	-49.618	43.312	25.873
	Min. Vert	13	-49.618	43.312	25.873
	Min. H_x	6	-1.210	0.524	0.301
	Min. H_z	7	-1.700	1.120	0.286
Guy A @ 106 ft Elev -6 ft Azimuth 0 deg	Max. Vert	27	-1.417	0.000	-1.504
	Max. H_x	10	-46.628	1.212	-43.318
	Max. H_z	2	-1.509	0.001	-0.691
	Min. Vert	7	-54.137	-0.806	-50.471
	Min. H_x	6	-46.926	-1.191	-43.543
	Min. H_z	7	-54.137	-0.806	-50.471

Tower Mast Reaction Summary

Load Combination	*Vertical K*	*Shear$_x$ K*	*Shear$_z$ K*	*Overturning Moment, M_x kip-ft*	*Overturning Moment, M_z kip-ft*	*Torque kip-ft*
Dead Only	40.409	-0.002	-0.004	0.000	0.000	-0.008
1.2 Dead+1.6 Wind 0 deg - No Ice+1.0 Guy	105.601	0.049	-2.493	0.000	0.000	0.122
1.2 Dead+1.6 Wind 30 deg - No Ice+1.0 Guy	95.280	1.732	-2.238	0.000	0.000	0.333
1.2 Dead+1.6 Wind 60 deg - No Ice+1.0 Guy	74.041	2.835	-1.658	0.000	0.000	0.395
1.2 Dead+1.6 Wind 90 deg - No Ice+1.0 Guy	97.537	2.731	-0.471	0.000	0.000	0.100
1.2 Dead+1.6 Wind 120 deg - No Ice+1.0 Guy	109.530	2.062	1.035	0.000	0.000	0.009
1.2 Dead+1.6 Wind 150 deg - No Ice+1.0 Guy	101.170	0.931	2.324	0.000	0.000	-0.030
1.2 Dead+1.6 Wind 180 deg - No Ice+1.0 Guy	78.745	-0.041	3.070	0.000	0.000	-0.195
1.2 Dead+1.6 Wind 210 deg - No Ice+1.0 Guy	102.127	-0.893	2.330	0.000	0.000	-0.289
1.2 Dead+1.6 Wind 240 deg -	111.762	-1.958	1.038	0.000	0.000	-0.275

Load Combination	*Vertical* *K*	*Shear$_x$* *K*	*Shear$_z$* *K*	*Overturning Moment, M$_x$* *kip-ft*	*Overturning Moment, M$_z$* *kip-ft*	*Torque* *kip-ft*
No Ice+1.0 Guy						
1.2 Dead+1.6 Wind 270 deg - No Ice+1.0 Guy	100.035	-2.618	-0.461	0.000	0.000	-0.147
1.2 Dead+1.6 Wind 300 deg - No Ice+1.0 Guy	76.103	-2.785	-1.580	0.000	0.000	-0.086
1.2 Dead+1.6 Wind 330 deg - No Ice+1.0 Guy	96.857	-1.650	-2.172	0.000	0.000	-0.040
1.2 Dead+1.0 Ice+1.0 Temp+Guy	215.153	0.033	-0.204	0.000	0.000	-0.036
1.2 Dead+1.0 Wind 0 deg+1.0 Ice+1.0 Temp+1.0 Guy	216.742	0.036	-0.395	0.000	0.000	-0.024
1.2 Dead+1.0 Wind 30 deg+1.0 Ice+1.0 Temp+1.0 Guy	216.249	0.147	-0.385	0.000	0.000	0.099
1.2 Dead+1.0 Wind 60 deg+1.0 Ice+1.0 Temp+1.0 Guy	216.117	0.227	-0.317	0.000	0.000	0.032
1.2 Dead+1.0 Wind 90 deg+1.0 Ice+1.0 Temp+1.0 Guy	216.974	0.240	-0.218	0.000	0.000	-0.066
1.2 Dead+1.0 Wind 120 deg+1.0 Ice+1.0 Temp+1.0 Guy	217.939	0.185	-0.128	0.000	0.000	0.003
1.2 Dead+1.0 Wind 150 deg+1.0 Ice+1.0 Temp+1.0 Guy	217.791	0.121	-0.042	0.000	0.000	0.070
1.2 Dead+1.0 Wind 180 deg+1.0 Ice+1.0 Temp+1.0 Guy	217.663	0.033	-0.007	0.000	0.000	-0.046
1.2 Dead+1.0 Wind 210 deg+1.0 Ice+1.0 Temp+1.0 Guy	218.355	-0.048	-0.045	0.000	0.000	-0.164
1.2 Dead+1.0 Wind 240 deg+1.0 Ice+1.0 Temp+1.0 Guy	218.888	-0.104	-0.132	0.000	0.000	-0.097
1.2 Dead+1.0 Wind 270 deg+1.0 Ice+1.0 Temp+1.0 Guy	217.919	-0.161	-0.218	0.000	0.000	-0.002
1.2 Dead+1.0 Wind 300 deg+1.0 Ice+1.0 Temp+1.0 Guy	216.832	-0.154	-0.311	0.000	0.000	-0.071
1.2 Dead+1.0 Wind 330 deg+1.0 Ice+1.0 Temp+1.0 Guy	216.636	-0.074	-0.381	0.000	0.000	-0.138
Dead+Wind 0 deg - Service+Guy	41.625	0.001	-0.955	0.000	0.000	0.024
Dead+Wind 30 deg - Service+Guy	42.164	0.457	-0.789	0.000	0.000	0.093
Dead+Wind 60 deg - Service+Guy	42.165	0.772	-0.449	0.000	0.000	0.075
Dead+Wind 90 deg - Service+Guy	42.186	0.909	-0.009	0.000	0.000	0.019
Dead+Wind 120 deg - Service+Guy	41.944	0.820	0.463	0.000	0.000	0.015
Dead+Wind 150 deg - Service+Guy	42.323	0.445	0.770	0.000	0.000	0.020
Dead+Wind 180 deg - Service+Guy	42.121	-0.006	0.873	0.000	0.000	-0.044
Dead+Wind 210 deg - Service+Guy	42.417	-0.455	0.773	0.000	0.000	-0.110
Dead+Wind 240 deg - Service+Guy	42.342	-0.820	0.466	0.000	0.000	-0.089
Dead+Wind 270 deg - Service+Guy	42.353	-0.911	-0.002	0.000	0.000	-0.030
Dead+Wind 300 deg - Service+Guy	42.222	-0.772	-0.441	0.000	0.000	-0.026
Dead+Wind 330 deg - Service+Guy	42.233	-0.455	-0.784	0.000	0.000	-0.031

Solution Summary

Load Comb.	Sum of Applied Forces PX K	PY K	PZ K	Sum of Reactions PX K	PY K	PZ K	% Error
1	0.000	-17.814	0.000	-0.000	17.814	0.001	0.007%
2	-0.116	-21.242	-47.102	0.116	21.241	47.099	0.005%
3	23.381	-21.089	-40.509	-23.381	21.089	40.507	0.004%
4	40.246	-20.946	-23.095	-40.245	20.946	23.097	0.004%
5	46.912	-21.118	0.107	-46.910	21.118	-0.106	0.005%
6	40.900	-21.294	23.617	-40.897	21.294	-23.615	0.006%
7	23.566	-21.166	40.532	-23.563	21.165	-40.530	0.005%
8	0.118	-21.031	46.347	-0.115	21.031	-46.347	0.005%
9	-23.404	-21.183	40.475	23.402	21.183	-40.474	0.004%
10	-40.846	-21.326	23.460	40.844	21.326	-23.459	0.005%
11	-46.859	-21.154	-0.081	46.858	21.154	0.083	0.004%
12	-40.231	-20.978	-23.259	40.230	20.978	23.261	0.005%
13	-23.521	-21.107	-40.550	23.521	21.107	40.548	0.004%
14	0.000	-164.304	-0.000	-0.001	164.304	0.001	0.001%
15	-0.034	-164.445	-12.961	0.034	164.445	12.960	0.000%
16	6.436	-164.248	-11.184	-6.436	164.248	11.184	0.000%
17	11.160	-164.062	-6.439	-11.159	164.062	6.439	0.000%
18	12.890	-164.283	0.027	-12.890	164.283	-0.026	0.000%
19	11.203	-164.507	6.505	-11.203	164.507	-6.505	0.000%
20	6.491	-164.338	11.214	-6.491	164.338	-11.214	0.001%
21	0.035	-164.163	12.928	-0.035	164.163	-12.928	0.001%
22	-6.440	-164.360	11.179	6.439	164.360	-11.179	0.000%
23	-11.179	-164.546	6.453	11.179	164.546	-6.453	0.000%
24	-12.882	-164.325	-0.022	12.881	164.325	0.023	0.000%
25	-11.173	-164.101	-6.492	11.172	164.101	6.493	0.000%
26	-6.484	-164.270	-11.217	6.484	164.270	11.217	0.000%
27	-0.029	-17.840	-11.743	0.029	17.840	11.742	0.006%
28	5.829	-17.802	-10.099	-5.829	17.802	10.098	0.006%
29	10.034	-17.767	-5.758	-10.033	17.767	5.758	0.005%
30	11.696	-17.810	0.027	-11.695	17.810	-0.026	0.005%
31	10.197	-17.853	5.888	-10.196	17.853	-5.887	0.005%
32	5.875	-17.821	10.105	-5.874	17.821	-10.104	0.008%
33	0.029	-17.788	11.555	-0.030	17.788	-11.553	0.007%
34	-5.835	-17.826	10.091	5.834	17.826	-10.090	0.005%
35	-10.183	-17.862	5.849	10.182	17.862	-5.848	0.006%
36	-11.682	-17.819	-0.020	11.681	17.819	0.021	0.007%
37	-10.030	-17.775	-5.799	10.029	17.775	5.799	0.003%
38	-5.864	-17.807	-10.109	5.864	17.807	10.108	0.007%

Non-Linear Convergence Results

Load Combination	Converged?	Number of Cycles	Displacement Tolerance	Force Tolerance
1	Yes	11	0.00000001	0.00006740
2	Yes	24	0.00004976	0.00007969
3	Yes	24	0.00004630	0.00006728
4	Yes	27	0.00007814	0.00001972
5	Yes	25	0.00005357	0.00007502
6	Yes	25	0.00005645	0.00009173
7	Yes	25	0.00005121	0.00008197
8	Yes	24	0.00009153	0.00001974
9	Yes	26	0.00004406	0.00006919
10	Yes	26	0.00004801	0.00007790

11	Yes	26	0.00004555	0.00006479
12	Yes	26	0.00009233	0.00002099
13	Yes	24	0.00004567	0.00006858
14	Yes	18	0.00010000	0.00003608
15	Yes	23	0.00000001	0.00002002
16	Yes	22	0.00000001	0.00001889
17	Yes	21	0.00000001	0.00001609
18	Yes	24	0.00000001	0.00001758
19	Yes	25	0.00000001	0.00001620
20	Yes	23	0.00000001	0.00002318
21	Yes	21	0.00000001	0.00002667
22	Yes	25	0.00000001	0.00001741
23	Yes	26	0.00000001	0.00001647
24	Yes	25	0.00000001	0.00001790
25	Yes	22	0.00000001	0.00002063
26	Yes	22	0.00000001	0.00001590
27	Yes	14	0.00000001	0.00005392
28	Yes	15	0.00000001	0.00007423
29	Yes	12	0.00000001	0.00007377
30	Yes	16	0.00000001	0.00005706
31	Yes	17	0.00000001	0.00004768
32	Yes	16	0.00000001	0.00009441
33	Yes	13	0.00000001	0.00009612
34	Yes	17	0.00000001	0.00006024
35	Yes	18	0.00000001	0.00005753
36	Yes	16	0.00000001	0.00008194
37	Yes	13	0.00000001	0.00005055
38	Yes	15	0.00000001	0.00008693

Maximum Tower Deflections - Service Wind

Section No.	*Elevation* *ft*	*Horz. Deflection* *in*	*Gov. Load Comb.*	*Tilt* °	*Twist* °
Pole Antenna	174 - 170	4.080	32	0.2342	0.0468
T1	170 - 155	3.892	32	0.2223	0.0466
T2	155 - 140	3.215	32	0.1949	0.0445
T3	140 - 120	2.704	32	0.1299	0.0406
T4	120 - 117.5	2.306	32	0.0861	0.0399
T5	117.5 - 115	2.263	32	0.0890	0.0401
T6	115 - 112.5	2.218	32	0.0922	0.0404
T7	112.5 - 110	2.170	32	0.0954	0.0406
T8	110 - 107.5	2.120	32	0.0985	0.0407
T9	107.5 - 105	2.068	32	0.1011	0.0409
T10	105 - 102.5	2.014	32	0.1030	0.0411
T11	102.5 - 100	1.959	32	0.1037	0.0412
T12	100 - 80	1.902	32	0.1030	0.0413
T13	80 - 60	1.548	35	0.0829	0.0413
T14	60 - 40	1.220	35	0.0857	0.0399
T15	40 - 20	0.896	35	0.0777	0.0351
T16	20 - 5	0.533	35	0.1077	0.0247
T17	5 - 0	0.139	35	0.1284	0.0206

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	4.080	0.2342	0.0468	143286
174.000	DB806-XT	32	4.080	0.2342	0.0468	143286
171.500	DB874H120-SX	32	3.962	0.2265	0.0467	143286
168.000	Pirod 5' Side Mount Standoff (1)	32	3.797	0.2179	0.0465	92172
167.000	SC2	32	3.751	0.2161	0.0464	65130
163.000	Pirod 12' T-Frame Sector Mount (1)	32	3.565	0.2102	0.0459	27802
152.333	Guy	32	3.109	0.1864	0.0438	12382
146.000	VHLP2-18	32	2.883	0.1587	0.0421	11390
140.000	Pirod 12' T-Frame Sector Mount (1)	32	2.704	0.1299	0.0406	11094
132.438	Guy	32	2.528	0.1011	0.0396	16955
120.000	14-ft T-Frame Sector Mount	32	2.306	0.0861	0.0399	64208
108.400	1' Side Mount Standoff	32	2.087	0.1002	0.0409	29253
108.000	Panel Antenna 6'x6"x3"	32	2.079	0.1006	0.0409	29706
90.000	Guy	35	1.705	0.0929	0.0415	45731
50.000	Guy	35	1.056	0.0793	0.0381	115905

Maximum Tower Deflections - Design Wind

Section No.	*Elevation* *ft*	*Horz. Deflection* *in*	*Gov. Load Comb.*	*Tilt* *°*	*Twist* *°*
Pole Antenna	174 - 170	36.209	10	1.6003	0.1791
T1	170 - 155	34.879	10	1.5527	0.1748
T2	155 - 140	30.012	10	1.4484	0.1783
T3	140 - 120	25.844	10	1.1688	0.1703
T4	120 - 117.5	21.526	10	0.9692	0.1641
T5	117.5 - 115	21.021	10	0.9747	0.1645
T6	115 - 112.5	20.511	10	0.9812	0.1647
T7	112.5 - 110	19.995	10	0.9877	0.1649
T8	110 - 107.5	19.474	10	0.9932	0.1650
T9	107.5 - 105	18.950	10	0.9969	0.1649
T10	105 - 102.5	18.421	10	0.9970	0.1648
T11	102.5 - 100	17.892	10	0.9923	0.1646
T12	100 - 80	17.361	10	0.9817	0.1642
T13	80 - 60	13.522	10	0.8485	0.1601
T14	60 - 40	10.049	10	0.8105	0.1520
T15	40 - 20	6.894	10	0.7286	0.1360
T16	20 - 5	3.770	10	0.8272	0.0968
T17	5 - 0	0.966	10	0.9054	0.0585

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	36.209	1.6003	0.1791	39064
174.000	DB806-XT	10	36.209	1.6003	0.1791	39064
171.500	DB874H120-SX	10	35.378	1.5691	0.1763	39064
168.000	Pirod 5' Side Mount Standoff (1)	10	34.213	1.5354	0.1740	25042
167.000	SC2	10	33.881	1.5284	0.1739	17659
163.000	Pirod 12' T-Frame Sector Mount (1)	10	32.561	1.5067	0.1749	7239

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
152.333	Guy	10	29.206	1.4111	0.1781	3143
146.000	VHLP2-18	10	27.401	1.2916	0.1748	2826
140.000	Pirod 12' T-Frame Sector Mount (1)	10	25.844	1.1688	0.1703	2731
132.438	Guy	10	24.096	1.0464	0.1660	4106
120.000	14-ft T-Frame Sector Mount	10	21.526	0.9692	0.1641	28519
108.400	1' Side Mount Standoff	10	19.139	0.9959	0.1650	12835
108.000	Panel Antenna 6'x6"x3"	10	19.055	0.9964	0.1650	13288
90.000	Guy	10	15.365	0.9130	0.1624	7827
50.000	Guy	10	8.434	0.7612	0.1458	15870

Bolt Design Data

Section No.	Elevation ft	Component Type	Bolt Grade	Bolt Size in	Number Of Bolts	Maximum Load per Bolt K	Allowable Load K	Ratio Load / Allowable	Allowable Ratio	Criteria
T1	170	Leg	A325N	0.750	4	0.232	29.821	0.008 ✔	1	Bolt Tension
		Diagonal	A325N	0.500	1	2.816	4.133	0.681 ✔	1	Member Bearing
		Top Girt	A325N	0.500	1	2.087	4.133	0.505 ✔	1	Member Bearing
T2	155	Leg	A325N	0.750	4	4.739	29.821	0.159 ✔	1	Bolt Tension
		Diagonal	A325N	0.500	1	3.288	4.133	0.796 ✔	1	Member Bearing
		Top Girt	A325N	0.500	1	0.342	4.133	0.083 ✔	1	Member Bearing
		Top Guy Pull-Off@152.333	A325N	0.750	1	4.264	6.933	0.615 ✔	1	Member Block Shear
		Torque Arm Top@152.333	A325N	0.750	8	0.652	17.892	0.036 ✔	1	Bolt Shear
T3	140	Leg	A325N	0.750	4	4.326	29.821	0.145 ✔	1	Bolt Tension
		Diagonal	A325N	0.625	1	3.359	7.748	0.433 ✔	1	Member Block Shear
		Top Girt	A325N	0.625	1	0.507	3.195	0.159 ✔	1	Member Block Shear
		Torque Arm Top@132.438	A325N	0.750	8	1.319	17.892	0.074 ✔	1	Bolt Shear
T4	120	Leg	A325N	0.750	4	3.402	29.821	0.114 ✔	1	Bolt Tension
		Diagonal	A325N	0.500	1	0.674	6.960	0.097 ✔	1	Member Bearing
		Top Girt	A325N	0.500	1	0.761	4.133	0.184 ✔	1	Member Bearing
T5	117.5	Diagonal	A325N	0.500	1	0.327	4.133	0.079 ✔	1	Member Bearing
T6	115	Diagonal	A325N	0.500	1	0.237	6.960	0.034 ✔	1	Member Bearing
T7	112.5	Diagonal	A325N	0.500	1	0.357	4.133	0.086 ✔	1	Member Bearing
T8	110	Diagonal	A325N	0.500	1	0.911	6.960	0.131 ✔	1	Member Bearing
T9	107.5	Diagonal	A325N	0.500	1	1.399	6.960	0.201 ✔	1	Member Bearing
T10	105	Diagonal	A325N	0.500	1	0.934	4.133	0.226 ✔	1	Member Bearing
T11	102.5	Diagonal	A325N	0.500	1	2.260	6.960	0.325 ✔	1	Member Bearing
T12	100	Leg	A325N	0.750	4	3.834	29.821	0.129 ✔	1	Bolt Tension
		Diagonal	A325N	0.500	1	2.019	4.133	0.488 ✔	1	Member Bearing

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Section No.	Elevation ft	Component Type	Bolt Grade	Bolt Size in	Number Of Bolts	Maximum Load per Bolt K	Allowable Load K	Ratio Load / Allowable	Allowable Ratio	Criteria
		Top Girt	A325N	0.500	1	0.801	4.133	0.194 ✔	1	Member Bearing
T13	80	Leg	A325N	0.750	4	4.535	29.821	0.152 ✔	1	Bolt Tension
		Diagonal	A325N	0.500	1	1.745	6.960	0.251 ✔	1	Member Bearing
		Top Girt	A325N	0.500	1	0.338	4.133	0.082 ✔	1	Member Bearing
T14	60	Leg	A325N	0.750	4	4.903	29.821	0.164 ✔	1	Bolt Tension
		Diagonal	A325N	0.500	1	2.072	4.133	0.501 ✔	1	Member Bearing
		Top Girt	A325N	0.500	1	0.963	4.133	0.233 ✔	1	Member Bearing
T15	40	Leg	A325N	0.750	4	5.471	29.821	0.183 ✔	1	Bolt Tension
		Diagonal	A325N	0.500	1	2.656	4.133	0.643 ✔	1	Member Bearing
		Top Girt	A325N	0.500	1	0.878	4.133	0.212 ✔	1	Member Bearing
T16	20	Leg	A325N	0.750	4	5.960	29.821	0.200 ✔	1	Bolt Tension
		Diagonal	A325N	0.500	1	2.241	4.133	0.542 ✔	1	Member Bearing
		Top Girt	A325N	0.500	1	0.592	7.952	0.074 ✔	1	Bolt Shear
T17	5	Leg	A325N	0.750	4	6.277	29.821	0.210 ✔	1	Bolt Tension

Guy Design Data

Section No.	Elevation ft	Size	Initial Tension K	Breaking Load K	Actual T_u K	Allowable ϕT_n K	Required S.F.	Actual S.F.
T2	152.333 (A) (601)	3/8 EHS	1.232	15.400	8.579	9.240	1.000	1.077 ✔
	152.333 (A) (602)	3/8 EHS	1.232	15.400	8.581	9.240	1.000	1.077 ✔
	152.333 (B) (597)	3/8 EHS	1.232	15.400	8.298	9.240	1.000	1.114 ✔
	152.333 (B) (598)	3/8 EHS	1.232	15.400	8.294	9.240	1.000	1.114 ✔
	152.333 (C) (590)	3/8 EHS	1.232	15.400	8.095	9.240	1.000	1.141 ✔
	152.333 (C) (591)	3/8 EHS	1.232	15.400	8.118	9.240	1.000	1.138 ✔
T3	132.438 (A) (613)	1/2 EHS	2.152	26.900	15.452	16.140	1.000	1.045 ✔
	132.438 (A) (614)	1/2 EHS	2.152	26.900	15.478	16.140	1.000	1.043 ✔
	132.438 (B) (609)	1/2 EHS	2.152	26.900	14.817	16.140	1.000	1.089 ✔
	132.438 (B) (610)	1/2 EHS	2.152	26.900	14.760	16.140	1.000	1.093 ✔
	132.438 (C) (605)	1/2 EHS	2.152	26.900	14.312	16.140	1.000	1.128 ✔
	132.438 (C) (606)	1/2 EHS	2.152	26.900	14.386	16.140	1.000	1.122 ✔
T12	90.000 (A) (622)	1/2 EHS	2.152	26.900	15.132	16.140	1.000	1.067 ✔
	90.000 (B)	1/2 EHS	2.152	26.900	14.434	16.140	1.000	1.118 ✔

Section No.	*Elevation* *ft*	*Size*	*Initial Tension* *K*	*Breaking Load* *K*	*Actual* T_u *K*	*Allowable* ϕT_n *K*	*Required S.F.*	*Actual S.F.*
	(621)							
	90.000 (C)	1/2 EHS	2.152	26.900	13.935	16.140	1.000	1.158
	(617)							
T14	50.000 (A)	1/2 EHS	2.152	26.900	12.513	16.140	1.000	1.290
	(628)							
	50.000 (B)	1/2 EHS	2.152	26.900	11.882	16.140	1.000	1.358
	(627)							
	50.000 (C)	1/2 EHS	2.152	26.900	11.509	16.140	1.000	1.402
	(623)							

Compression Checks

Leg Design Data (Compression)

Section No.	*Elevation* *ft*	*Size*	*L* *ft*	L_u *ft*	*Kl/r*	*A* in^2	P_u *K*	ϕP_n *K*	*Ratio* $\frac{P_u}{\phi P_n}$
T1	170 - 155	ROHN 2 STD	15.000	0.250	3.8 K=1.00	1.075	-21.042	48.303	0.436 [1]
T2	155 - 140	ROHN 2 STD	15.000	0.250	3.8 K=1.00	1.075	-33.081	48.303	0.685 [1]
T3	140 - 120	Pipe 2.0 STD W 1" Rod Reinforcment	20.000	1.219	12.4 K=1.00	1.805	-46.925	80.322	0.584 [1]
T4	120 - 117.5	ROHN 2 STD	2.500	2.250	34.3 K=1.00	1.075	-40.879	44.368	0.921 [1]
T5	117.5 - 115	ROHN 2 STD	2.500	2.500	38.1 K=1.00	1.075	-41.874	43.481	0.963 [1]
T6	115 - 112.5	ROHN 2 STD	2.500	2.500	38.1 K=1.00	1.075	-42.187	43.481	0.970 [1]
T7	112.5 - 110	ROHN 2 STD	2.500	2.500	38.1 K=1.00	1.075	-42.851	43.481	0.986 [1]
T8	110 - 107.5	ROHN 2 STD	2.500	1.250	19.1 K=1.00	1.075	-43.134	47.087	0.916 [1]
T9	107.5 - 105	ROHN 2 STD	2.500	1.250	19.1 K=1.00	1.075	-43.344	47.087	0.921 [1]
T10	105 - 102.5	ROHN 2 STD	2.500	1.250	19.1 K=1.00	1.075	-44.309	47.087	0.941 [1]
T11	102.5 - 100	ROHN 2 STD	2.500	0.250	3.8 K=1.00	1.075	-45.999	48.303	0.952 [1]
T12	100 - 80	ROHN 2.5 STD	20.000	2.438	30.9 K=1.00	1.704	-54.420	71.520	0.761 [1]
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	-58.827	75.376	0.780 [1]
T14	60 - 40	ROHN 2.5 STD	20.000	2.438	30.9 K=1.00	1.704	-64.690	71.520	0.904 [1]
T15	40 - 20	2.5 STD w/ 90 deg 3.0 STD	20.000	2.438	32.7 K=1.00	2.277	-70.668	94.783	0.746 [1]
T16	20 - 5	2.5 STD w/ 90 deg 3.0 STD	15.000	2.417	32.4	2.277	-72.495	94.909	0.764 [1]

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Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	A in^2	P_u K	ϕP_n K	Ratio $\frac{P_u}{\phi P_n}$
					K=1.00				✔
T17	5 - 0	2.5 STD w/ 90 deg 3.0 STD	5.376	1.882	25.2 K=1.00	2.277	-79.129	97.825	0.809 [1] ✔

[1] P_u / ϕP_n controls

Diagonal Design Data (Compression)

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	A in^2	P_u K	ϕP_n K	Ratio $\frac{P_u}{\phi P_n}$
T1	170 - 155	P1.5X0625	4.188	1.973	46.5 K=1.00	0.282	-2.850	8.160	0.349 [1] ✔
T2	155 - 140	P1.5X0625	4.188	1.973	46.5 K=1.00	0.282	-3.463	8.160	0.424 [1] ✔
T3	140 - 120	L1 3/4x1 3/4x1/4	4.200	1.859	79.0 K=1.21	0.813	-4.985	18.953	0.263 [1] ✔
T4	120 - 117.5	P1.5X0625	4.094	1.928	45.5 K=1.00	0.282	-0.674	8.201	0.082 [1] ✔
T5	117.5 - 115	P1.5X0625	4.236	1.996	47.1 K=1.00	0.282	-0.164	8.138	0.020 [1] ✔
T6	115 - 112.5	P1.5X0625	4.236	1.996	47.1 K=1.00	0.282	-0.237	8.138	0.029 [1] ✔
T7	112.5 - 110	P1.5X0625	4.236	1.996	47.1 K=1.00	0.282	-0.318	8.138	0.039 [1] ✔
T8	110 - 107.5	P1.5X0625	4.236	1.996	47.1 K=1.00	0.282	-0.911	8.138	0.112 [1] ✔
T9	107.5 - 105	P1.5X0625	4.236	1.996	47.1 K=1.00	0.282	-1.399	8.138	0.172 [1] ✔
T10	105 - 102.5	P1.5X0625	4.236	1.996	47.1 K=1.00	0.282	-1.437	8.138	0.177 [1] ✔
T11	102.5 - 100	P1.5X0625	4.094	1.928	45.5 K=1.00	0.282	-2.260	8.201	0.276 [1] ✔
T12	100 - 80	P1.5X0625	4.200	1.953	46.1 K=1.00	0.282	-2.295	8.178	0.281 [1] ✔
T13	80 - 60	P1.5X0625	4.200	1.968	46.4 K=1.00	0.282	-1.745	8.165	0.214 [1] ✔
T14	60 - 40	P1.5X0625	4.200	1.953	46.1 K=1.00	0.282	-2.358	8.178	0.288 [1] ✔
T15	40 - 20	P1.5X0625	4.200	3.905	92.1 K=1.00	0.282	-3.462	5.850	0.592 [1] ✔
T16	20 - 5	P1.5X0625	4.188	3.894	91.9 K=1.00	0.282	-2.729	5.865	0.465 [1] ✔

[1] P_u / ϕP_n controls

Horizontal Design Data (Compression)

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	A in^2	P_u K	ϕP_n K	Ratio $\frac{P_u}{\phi P_n}$
T15	40 - 20	1	3.420	3.180	106.8 K=0.70	0.785	-1.224	15.338	0.080 [1] ✔
T16	20 - 5	1	3.420	3.180	106.8 K=0.70	0.785	-1.256	15.338	0.082 [1] ✔

[1] P_u / ϕP_n controls

Secondary Horizontal Design Data (Compression)

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	A in^2	P_u K	ϕP_n K	Ratio $\frac{P_u}{\phi P_n}$
T2	155 - 140	1	3.420	3.222	108.3 K=0.70	0.785	-1.106	15.001	0.074 [1] ✔
T3	140 - 120	L1 3/4x1 3/4x1/4	3.420	3.222	96.6 K=1.32	0.813	-3.239	16.114	0.201 [1] ✔
T8	110 - 107.5	L2x2x3/16	3.420	3.222	91.3 K=1.46	0.715	-0.747	14.932	0.050 [1] ✔
T9	107.5 - 105	L2x2x3/16	3.420	3.222	91.3 K=1.46	0.715	-0.751	14.932	0.050 [1] ✔
T10	105 - 102.5	L2x2x3/16	3.420	3.222	91.3 K=1.46	0.715	-0.767	14.932	0.051 [1] ✔
T11	102.5 - 100	L2x2x3/16	3.420	3.222	91.3 K=1.46	0.715	-0.769	14.932	0.052 [1] ✔
T13	80 - 60	L2x2x3/16	3.420	3.205	91.2 K=1.46	0.715	-0.986	14.957	0.066 [1] ✔

[1] P_u / ϕP_n controls

Top Girt Design Data (Compression)

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	A in^2	P_u K	ϕP_n K	Ratio $\frac{P_u}{\phi P_n}$
T1	170 - 155	P1.5X0625	3.420	3.222	76.0 K=1.00	0.282	-0.024	6.747	0.003 [1] ✔
T2	155 - 140	P1.5X0625	3.420	3.222	76.0 K=1.00	0.282	-0.326	6.747	0.048 [1] ✔
T3	140 - 120	L1 1/2x1 1/2x1/8	3.420	2.983	120.8 K=1.00	0.359	-0.083	5.398	0.015 [1] ✔
T15	40 - 20	P1.5X0625	3.420	3.180	75.0 K=1.00	0.282	-0.667	6.800	0.098 [1] ✔

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[1] P_u / ϕP_n controls

Bottom Girt Design Data (Compression)

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	A in^2	P_u K	ϕP_n K	Ratio $P_u / \phi P_n$
T1	170 - 155	P1.5X0625	3.420	3.222	76.0 K=1.00	0.282	-0.770	6.747	0.114 [1] ✔
T3	140 - 120	L1 3/4x1 3/4x1/8	3.420	3.222	115.7 K=1.04	0.422	-0.174	6.752	0.026 [1] ✔
T11	102.5 - 100	P1.5X0625	3.420	3.222	76.0 K=1.00	0.282	-0.090	6.747	0.013 [1] ✔
T14	60 - 40	P1.5X0625	3.420	3.180	75.0 K=1.00	0.282	-0.014	6.800	0.002 [1] ✔
T17	5 - 0	14x3/16	0.513	0.273	60.5 K=1.00	2.625	-1.944	70.133	0.028 [1] ✔

[1] P_u / ϕP_n controls

Mid Girt Design Data (Compression)

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	A in^2	P_u K	ϕP_n K	Ratio $P_u / \phi P_n$
T17	5 - 0	14x3/16	1.710	1.470	325.9 K=1.00	2.625	-0.755	5.583	0.135 [1] ✔
		KL/R > 200 (C) - 589							

[1] P_u / ϕP_n controls

Top Guy Pull-Off Design Data (Compression)

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	A in^2	P_u K	ϕP_n K	Ratio $P_u / \phi P_n$
T2	155 - 140	L2x2x3/16	3.420	3.222	98.1 K=1.00	0.715	-3.849	13.953	0.276 [1]

[1] P_u / ϕP_n controls

Top Guy Pull-Off Bending Design Data

Section No.	Elevation ft	Size	M_{ux} kip-ft	ϕM_{nx} kip-ft	Ratio $M_{ux}/\phi M_{nx}$	M_{uy} kip-ft	ϕM_{ny} kip-ft	Ratio $M_{uy}/\phi M_{ny}$
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 ft	Size	Ratio $P_u/\phi P_n$	Ratio $M_{ux}/\phi M_{nx}$	Ratio $M_{uy}/\phi M_{ny}$	Comb. Stress Ratio	Allow. Stress Ratio	Criteria
T2	155 - 140	L2x2x3/16	0.276	0.000	0.000	0.276 [1] ✔	1.000	4.8.1 ✔

[1] P_u / ϕP_n controls

Torque-Arm Top Design Data

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	A in^2	P_u K	ϕP_n K	Ratio $P_u/\phi P_n$
T2	155 - 140 (592)	C12x20.7	3.500	3.401	51.1 K=1.00	6.090	-0.113	171.988	0.001
T2	155 - 140 (593)	C12x20.7	3.500	3.401	51.1 K=1.00	6.090	-0.040	171.988	0.000
T2	155 - 140 (599)	C12x20.7	3.500	3.401	51.1 K=1.00	6.090	-0.094	171.988	0.001
T2	155 - 140 (600)	C12x20.7	3.500	3.401	51.1 K=1.00	6.090	-2.502	171.988	0.015
T2	155 - 140 (603)	C12x20.7	3.500	3.401	51.1 K=1.00	6.090	-0.135	171.988	0.001
T2	155 - 140 (604)	C12x20.7	3.500	3.401	51.1 K=1.00	6.090	-2.437	171.988	0.014
T3	140 - 120 (607)	C12x20.7 with 8"x3/8" plates	3.500	3.401	61.3 K=1.00	9.080	-0.190	241.335	0.001
T3	140 - 120 (608)	C12x20.7 with 8"x3/8" plates	3.500	3.401	61.3 K=1.00	9.080	-0.249	241.335	0.001
T3	140 - 120 (611)	C12x20.7 with 8"x3/8" plates	3.500	3.401	61.3 K=1.00	9.080	-0.282	241.335	0.001
T3	140 - 120 (612)	C12x20.7 with 8"x3/8" plates	3.500	3.401	61.3 K=1.00	9.080	-5.357	241.335	0.022
T3	140 - 120 (615)	C12x20.7 with 8"x3/8" plates	3.500	3.401	61.3 K=1.00	9.080	-0.291	241.335	0.001
T3	140 - 120 (616)	C12x20.7 with 8"x3/8" plates	3.500	3.401	61.3 K=1.00	9.080	-0.373	241.335	0.002

Torque-Arm Top Bending Design Data

Section No.	Elevation ft	Size	M_{ux} kip-ft	ϕM_{nx} kip-ft	Ratio $M_{ux}/\phi M_{nx}$	M_{uy} kip-ft	ϕM_{ny} kip-ft	Ratio $M_{uy}/\phi M_{ny}$

Section No.	Elevation ft	Size	M_{ux} kip-ft	ϕM_{nx} kip-ft	Ratio $\frac{M_{ux}}{\phi M_{nx}}$	M_{uy} kip-ft	ϕM_{ny} kip-ft	Ratio $\frac{M_{uy}}{\phi M_{ny}}$
T2	155 - 140 (592)	C12x20.7	-22.943	58.050	0.395	0.000	9.423	0.000
T2	155 - 140 (593)	C12x20.7	-25.037	58.050	0.431	0.000	9.423	0.000
T2	155 - 140 (599)	C12x20.7	-23.805	58.050	0.410	0.000	9.423	0.000
T2	155 - 140 (600)	C12x20.7	-22.520	58.050	0.388	0.000	9.423	0.000
T2	155 - 140 (603)	C12x20.7	-23.831	58.050	0.411	0.000	9.423	0.000
T2	155 - 140 (604)	C12x20.7	-24.583	58.050	0.423	0.000	9.423	0.000
T3	140 - 120 (607)	C12x20.7 with 8"x3/8" plates	-37.369	97.877	0.382	0.000	11.078	0.000
T3	140 - 120 (608)	C12x20.7 with 8"x3/8" plates	-41.822	97.877	0.427	0.000	11.078	0.000
T3	140 - 120 (611)	C12x20.7 with 8"x3/8" plates	-39.105	97.877	0.400	0.000	11.078	0.000
T3	140 - 120 (612)	C12x20.7 with 8"x3/8" plates	-35.791	97.877	0.366	0.000	11.078	0.000
T3	140 - 120 (615)	C12x20.7 with 8"x3/8" plates	-39.235	97.877	0.401	0.000	11.078	0.000
T3	140 - 120 (616)	C12x20.7 with 8"x3/8" plates	-41.492	97.877	0.424	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 $\frac{M_{ux}}{\phi M_{nx}}$	Ratio $\frac{M_{uy}}{\phi M_{ny}}$	Comb. Stress Ratio	Allow. Stress Ratio	Criteria
T2	155 - 140 (592)	C12x20.7	0.001	0.395	0.000	0.396 ✔	1.000	4.8.1 ✔
T2	155 - 140 (593)	C12x20.7	0.000	0.431	0.000	0.431 ✔	1.000	4.8.1 ✔
T2	155 - 140 (599)	C12x20.7	0.001	0.410	0.000	0.410 ✔	1.000	4.8.1 ✔
T2	155 - 140 (600)	C12x20.7	0.015	0.388	0.000	0.395 ✔	1.000	4.8.1 ✔
T2	155 - 140 (603)	C12x20.7	0.001	0.411	0.000	0.411 ✔	1.000	4.8.1 ✔
T2	155 - 140 (604)	C12x20.7	0.014	0.423	0.000	0.431 ✔	1.000	4.8.1 ✔
T3	140 - 120 (607)	C12x20.7 with 8"x3/8" plates	0.001	0.382	0.000	0.382 ✔	1.000	4.8.1 ✔
T3	140 - 120 (608)	C12x20.7 with 8"x3/8" plates	0.001	0.427	0.000	0.428 ✔	1.000	4.8.1 ✔
T3	140 - 120 (611)	C12x20.7 with 8"x3/8" plates	0.001	0.400	0.000	0.400 ✔	1.000	4.8.1 ✔
T3	140 - 120 (612)	C12x20.7 with 8"x3/8" plates	0.022	0.366	0.000	0.377 ✔	1.000	4.8.1 ✔
T3	140 - 120 (615)	C12x20.7 with 8"x3/8" plates	0.001	0.401	0.000	0.401 ✔	1.000	4.8.1 ✔
T3	140 - 120 (616)	C12x20.7 with 8"x3/8" plates	0.002	0.424	0.000	0.425 ✔	1.000	4.8.1 ✔

Tension Checks

Leg Design Data (Tension)

Section No.	Elevation (ft)	Size	L (ft)	L_u (ft)	Kl/r	A (in^2)	P_u (K)	ϕP_n (K)	Ratio $P_u / \phi P_n$
T1	170 - 155	ROHN 2 STD	15.000	0.250	3.8	1.075	18.959	48.354	0.392 [1] ✔
T2	155 - 140	ROHN 2 STD	15.000	1.208	18.4	1.075	21.912	48.354	0.453 [1] ✔
T3	140 - 120	Pipe 2.0 STD W 1" Rod Reinforcment	20.000	1.219	12.4	1.805	29.041	81.225	0.358 [1] ✔

[1] $P_u / \phi P_n$ controls

Diagonal Design Data (Tension)

Section No.	Elevation (ft)	Size	L (ft)	L_u (ft)	Kl/r	A (in^2)	P_u (K)	ϕP_n (K)	Ratio $P_u / \phi P_n$
T1	170 - 155	P1.5X0625	4.188	1.973	46.5	0.282	2.816	9.145	0.308 [1] ✔
T2	155 - 140	P1.5X0625	4.188	1.973	46.5	0.282	3.288	9.145	0.360 [1] ✔
T3	140 - 120	L1 3/4x1 3/4x1/4	4.200	1.859	44.9	0.469	3.359	20.391	0.165 [1] ✔
T4	120 - 117.5	P1.5X0625	4.094	1.928	45.5	0.282	0.337	9.145	0.037 [1] ✔
T5	117.5 - 115	P1.5X0625	4.236	1.996	47.1	0.282	0.327	9.145	0.036 [1] ✔
T6	115 - 112.5	P1.5X0625	4.236	1.996	47.1	0.282	0.097	9.145	0.011 [1] ✔
T7	112.5 - 110	P1.5X0625	4.236	1.996	47.1	0.282	0.357	9.145	0.039 [1] ✔
T8	110 - 107.5	P1.5X0625	4.236	1.996	47.1	0.282	0.367	9.145	0.040 [1] ✔
T9	107.5 - 105	P1.5X0625	4.236	1.996	47.1	0.282	0.509	9.145	0.056 [1] ✔
T10	105 - 102.5	P1.5X0625	4.236	1.996	47.1	0.282	0.934	9.145	0.102 [1] ✔
T11	102.5 - 100	P1.5X0625	4.094	1.928	45.5	0.282	1.083	9.145	0.118 [1] ✔
T12	100 - 80	P1.5X0625	4.200	1.953	46.1	0.282	2.019	9.145	0.221 [1] ✔
T13	80 - 60	P1.5X0625	4.200	1.968	46.4	0.282	0.401	9.145	0.044 [1] ✔
T14	60 - 40	P1.5X0625	4.200	1.953	46.1	0.282	2.072	9.145	0.227 [1] ✔
T15	40 - 20	P1.5X0625	4.200	3.905	92.1	0.282	2.656	9.145	0.290 [1]

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	A in^2	P_u K	ϕP_n K	Ratio $\frac{P_u}{\phi P_n}$
T16	20 - 5	P1.5X0625	4.188	3.894	91.9	0.282	2.241	9.145	0.245 [1] ✔

[1] P_u / ϕP_n controls

Horizontal Design Data (Tension)

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	A in^2	P_u K	ϕP_n K	Ratio $\frac{P_u}{\phi P_n}$
T15	40 - 20	1	3.420	3.180	152.6	0.785	1.224	35.343	0.035 [1] ✔
T16	20 - 5	1	3.420	3.180	152.6	0.785	1.256	35.343	0.036 [1] ✔

[1] P_u / ϕP_n controls

Secondary Horizontal Design Data (Tension)

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	A in^2	P_u K	ϕP_n K	Ratio $\frac{P_u}{\phi P_n}$
T2	155 - 140	1	3.420	3.222	154.7	0.785	1.372	35.343	0.039 [1] ✔
T3	140 - 120	L1 3/4x1 3/4x1/4	3.420	3.222	73.1	0.813	4.717	26.325	0.179 [1] ✔
T8	110 - 107.5	L2x2x3/16	3.420	3.222	62.7	0.715	0.776	23.166	0.033 [1] ✔
T9	107.5 - 105	L2x2x3/16	3.420	3.222	62.7	0.715	0.986	23.166	0.043 [1] ✔
T10	105 - 102.5	L2x2x3/16	3.420	3.222	62.7	0.715	1.100	23.166	0.047 [1] ✔
T11	102.5 - 100	L2x2x3/16	3.420	3.222	62.7	0.715	0.905	23.166	0.039 [1] ✔
T13	80 - 60	L2x2x3/16	3.420	3.205	62.3	0.715	1.483	23.166	0.064 [1] ✔

[1] P_u / ϕP_n controls

Top Girt Design Data (Tension)

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	A in^2	P_u K	ϕP_n K	Ratio $\frac{P_u}{\phi P_n}$
T1	170 - 155	P1.5X0625	3.420	3.222	76.0	0.282	2.087	9.145	0.228 [1]
T2	155 - 140	P1.5X0625	3.420	3.222	76.0	0.282	0.342	9.145	0.037 [1]
T3	140 - 120	L1 1/2x1 1/2x1/8	3.420	2.983	83.1	0.199	0.507	8.666	0.059 [1]
T4	120 - 117.5	P1.5X0625	3.420	3.222	76.0	0.282	0.761	9.145	0.083 [1]
T12	100 - 80	P1.5X0625	3.420	3.180	75.0	0.282	0.801	9.145	0.088 [1]
T13	80 - 60	P1.5X0625	3.420	3.205	75.6	0.282	0.338	9.145	0.037 [1]
T14	60 - 40	P1.5X0625	3.420	3.180	75.0	0.282	0.963	9.145	0.105 [1]
T15	40 - 20	P1.5X0625	3.420	3.180	75.0	0.282	0.878	9.145	0.096 [1]
T16	20 - 5	ROHN 1.5 STD	3.420	3.180	61.3	0.799	0.592	25.902	0.023 [1]
T17	5 - 0	14x3/16	2.907	2.667	591.3	2.625	5.774	85.050	0.068 [1]
		L/R > 500 (T) - 583							

[1] P_u / ϕP_n controls

Bottom Girt Design Data (Tension)

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	A in^2	P_u K	ϕP_n K	Ratio $\frac{P_u}{\phi P_n}$
T1	170 - 155	P1.5X0625	3.420	3.222	76.0	0.282	0.828	9.145	0.091 [1]
T2	155 - 140	P1.5X0625	3.420	3.222	76.0	0.282	0.379	9.145	0.041 [1]
T3	140 - 120	L1 3/4x1 3/4x1/8	3.420	3.222	70.9	0.422	1.012	13.669	0.074 [1]
T11	102.5 - 100	P1.5X0625	3.420	3.222	76.0	0.282	0.346	9.145	0.038 [1]
T12	100 - 80	P1.5X0625	3.420	3.180	75.0	0.282	0.897	9.145	0.098 [1]
T13	80 - 60	P1.5X0625	3.420	3.205	75.6	0.282	0.378	9.145	0.041 [1]
T14	60 - 40	P1.5X0625	3.420	3.180	75.0	0.282	0.924	9.145	0.101 [1]
T15	40 - 20	P1.5X0625	3.420	3.180	75.0	0.282	0.345	9.145	0.038 [1]
T16	20 - 5	L2x2x3/16	3.420	3.180	61.8	0.715	11.849	23.166	0.511 [1]
T17	5 - 0	14x3/16	0.513	0.273	60.5	2.625	1.732	85.050	0.020 [1]

[1] P_u / ϕP_n controls

Mid Girt Design Data (Tension)

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	A in^2	P_u K	ϕP_n K	Ratio P_u / ϕP_n
T12	100 - 80	P1.5X0625	3.420	3.180	75.0	0.282	0.927	12.701	0.073 [1] ✔
T14	60 - 40	P1.5X0625	3.420	3.180	75.0	0.282	0.947	12.701	0.075 [1] ✔

[1] P_u / ϕP_n controls

Top Guy Pull-Off Design Data (Tension)

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	A in^2	P_u K	ϕP_n K	Ratio P_u / ϕP_n
T2	155 - 140	L2x2x3/16	3.420	3.222	62.7	0.413	4.264	17.974	0.237 [1]
T12	100 - 80	4x3/8	3.420	3.180	352.6	1.125	4.929	54.844	0.090 [1]
T14	60 - 40	4x3/8	3.420	3.180	352.6	1.125	5.035	54.844	0.092 [1]

[1] P_u / ϕP_n controls

Top Guy Pull-Off Bending Design Data

Section No.	Elevation ft	Size	M_{ux} kip-ft	ϕM_{nx} kip-ft	Ratio M_{ux} / ϕM_{nx}	M_{uy} kip-ft	ϕM_{ny} kip-ft	Ratio M_{uy} / ϕM_{ny}
T2	155 - 140	L2x2x3/16	0.000	1.301	0.000	0.000	0.664	0.000
T12	100 - 80	4x3/8	0.000	5.625	0.000	0.000	0.527	0.000
T14	60 - 40	4x3/8	0.000	5.625	0.000	0.000	0.527	0.000

Top Guy Pull-Off Interaction Design Data

Section No.	Elevation ft	Size	Ratio P_u / ϕP_n	Ratio M_{ux} / ϕM_{nx}	Ratio M_{uy} / ϕM_{ny}	Comb. Stress Ratio	Allow. Stress Ratio	Criteria
T2	155 - 140	L2x2x3/16	0.237	0.000	0.000	0.237 [1] ✔	1.000	4.8.1 ✔
T12	100 - 80	4x3/8	0.090	0.000	0.000	0.090 [1] ✔	1.000	4.8.1 ✔
T14	60 - 40	4x3/8	0.092	0.000	0.000	0.092 [1] ✔	1.000	4.8.1 ✔

Section No.	Elevation ft	Size	Ratio P_u / ϕP_n	Ratio M_{ux} / ϕM_{nx}	Ratio M_{uy} / ϕM_{ny}	Comb. Stress Ratio	Allow. Stress Ratio	Criteria

[1] P_u / ϕP_n controls

Torque-Arm Top Design Data

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	A in^2	P_u K	ϕP_n K	Ratio P_u / ϕP_n
T2	155 - 140 (592)	C12x20.7	3.500	3.401	51.1	6.090	2.030	197.316	0.010
T2	155 - 140 (593)	C12x20.7	3.500	3.401	51.1	6.090	2.133	197.316	0.011
T2	155 - 140 (599)	C12x20.7	3.500	3.401	51.1	6.090	2.116	197.316	0.011
T2	155 - 140 (600)	C12x20.7	3.500	3.401	51.1	6.090	2.057	197.316	0.010
T2	155 - 140 (603)	C12x20.7	3.500	3.401	51.1	6.090	2.052	197.316	0.010
T2	155 - 140 (604)	C12x20.7	3.500	3.401	51.1	6.090	2.070	197.316	0.010
T3	140 - 120 (607)	C12x20.7 with 8"x3/8" plates	3.500	3.401	61.3	9.080	4.245	294.192	0.014
T3	140 - 120 (608)	C12x20.7 with 8"x3/8" plates	3.500	3.401	61.3	9.080	4.209	294.192	0.014
T3	140 - 120 (611)	C12x20.7 with 8"x3/8" plates	3.500	3.401	61.3	9.080	4.230	294.192	0.014
T3	140 - 120 (612)	C12x20.7 with 8"x3/8" plates	3.500	3.401	61.3	9.080	4.220	294.192	0.014
T3	140 - 120 (615)	C12x20.7 with 8"x3/8" plates	3.500	3.401	61.3	9.080	4.245	294.192	0.014
T3	140 - 120 (616)	C12x20.7 with 8"x3/8" plates	3.500	3.401	61.3	9.080	4.147	294.192	0.014

Torque-Arm Top Bending Design Data

Section No.	Elevation ft	Size	M_{ux} kip-ft	ϕM_{nx} kip-ft	Ratio M_{ux} / ϕM_{nx}	M_{uy} kip-ft	ϕM_{ny} kip-ft	Ratio M_{uy} / ϕM_{ny}
T2	155 - 140 (592)	C12x20.7	-20.084	58.050	0.346	0.000	9.423	0.000
T2	155 - 140 (593)	C12x20.7	-21.983	58.050	0.379	0.000	9.423	0.000
T2	155 - 140 (599)	C12x20.7	-20.864	58.050	0.359	0.000	9.423	0.000
T2	155 - 140 (600)	C12x20.7	-19.837	58.050	0.342	0.000	9.423	0.000
T2	155 - 140 (603)	C12x20.7	-21.001	58.050	0.362	0.000	9.423	0.000
T2	155 - 140 (604)	C12x20.7	-21.798	58.050	0.376	0.000	9.423	0.000
T3	140 - 120 (607)	C12x20.7 with 8"x3/8" plates	-33.681	97.877	0.344	0.000	11.078	0.000
T3	140 - 120 (608)	C12x20.7 with 8"x3/8" plates	-37.537	97.877	0.384	0.000	11.078	0.000
T3	140 - 120 (611)	C12x20.7 with 8"x3/8" plates	-35.173	97.877	0.359	0.000	11.078	0.000
T3	140 - 120 (612)	C12x20.7 with 8"x3/8" plates	-33.207	97.877	0.339	0.000	11.078	0.000
T3	140 - 120 (615)	C12x20.7 with 8"x3/8" plates	-35.510	97.877	0.363	0.000	11.078	0.000
T3	140 - 120 (616)	C12x20.7 with 8"x3/8" plates	-37.234	97.877	0.380	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* $\frac{M_{ux}}{\phi M_{nx}}$	*Ratio* $\frac{M_{uy}}{\phi M_{ny}}$	*Comb. Stress Ratio*	*Allow. Stress Ratio*	*Criteria*
T2	155 - 140 (592)	C12x20.7	0.010	0.346	0.000	0.351 ✔	1.000	4.8.1 ✔
T2	155 - 140 (593)	C12x20.7	0.011	0.379	0.000	0.384 ✔	1.000	4.8.1 ✔
T2	155 - 140 (599)	C12x20.7	0.011	0.359	0.000	0.365 ✔	1.000	4.8.1 ✔
T2	155 - 140 (600)	C12x20.7	0.010	0.342	0.000	0.347 ✔	1.000	4.8.1 ✔
T2	155 - 140 (603)	C12x20.7	0.010	0.362	0.000	0.367 ✔	1.000	4.8.1 ✔
T2	155 - 140 (604)	C12x20.7	0.010	0.376	0.000	0.381 ✔	1.000	4.8.1 ✔
T3	140 - 120 (607)	C12x20.7 with 8"x3/8" plates	0.014	0.344	0.000	0.351 ✔	1.000	4.8.1 ✔
T3	140 - 120 (608)	C12x20.7 with 8"x3/8" plates	0.014	0.384	0.000	0.391 ✔	1.000	4.8.1 ✔
T3	140 - 120 (611)	C12x20.7 with 8"x3/8" plates	0.014	0.359	0.000	0.367 ✔	1.000	4.8.1 ✔
T3	140 - 120 (612)	C12x20.7 with 8"x3/8" plates	0.014	0.339	0.000	0.346 ✔	1.000	4.8.1 ✔
T3	140 - 120 (615)	C12x20.7 with 8"x3/8" plates	0.014	0.363	0.000	0.370 ✔	1.000	4.8.1 ✔
T3	140 - 120 (616)	C12x20.7 with 8"x3/8" plates	0.014	0.380	0.000	0.387 ✔	1.000	4.8.1 ✔

Section Capacity Table

Section No.	*Elevation ft*	*Component Type*	*Size*	*Critical Element*	*P K*	*øP_{allow} K*	*% Capacity*	*Pass Fail*
T1	170 - 155	Leg	ROHN 2 STD	2	-21.042	48.303	43.6	Pass
T2	155 - 140	Leg	ROHN 2 STD	47	-33.081	48.303	68.5	Pass
T3	140 - 120	Leg	Pipe 2.0 STD W 1" Rod Reinforcment	110	-46.925	80.322	58.4	Pass
T4	120 - 117.5	Leg	ROHN 2 STD	191	-40.879	44.368	92.1	Pass
T5	117.5 - 115	Leg	ROHN 2 STD	203	-41.874	43.481	96.3	Pass
T6	115 - 112.5	Leg	ROHN 2 STD	212	-42.187	43.481	97.0	Pass
T7	112.5 - 110	Leg	ROHN 2 STD	221	-42.851	43.481	98.6	Pass
T8	110 - 107.5	Leg	ROHN 2 STD	230	-43.134	47.087	91.6	Pass
T9	107.5 - 105	Leg	ROHN 2 STD	242	-43.344	47.087	92.1	Pass
T10	105 - 102.5	Leg	ROHN 2 STD	254	-44.309	47.087	94.1	Pass
T11	102.5 - 100	Leg	ROHN 2 STD	266	-45.999	48.303	95.2	Pass
T12	100 - 80	Leg	ROHN 2.5 STD	281	-54.420	71.520	76.1	Pass
T13	80 - 60	Leg	Pipe 2.0 STD with 1/3rd Split 2.5 STD Pipe	341	-58.827	75.376	78.0	Pass
T14	60 - 40	Leg	ROHN 2.5 STD	424	-64.690	71.520	90.4	Pass
T15	40 - 20	Leg	2.5 STD w/ 90 deg 3.0 STD	484	-70.668	94.783	74.6	Pass
T16	20 - 5	Leg	2.5 STD w/ 90 deg 3.0 STD	537	-72.495	94.909	76.4	Pass

Section No.	Elevation ft	Component Type	Size	Critical Element	P K	$øP_{allow}$ K	% Capacity	Pass Fail
T17	5 - 0	Leg	2.5 STD w/ 90 deg 3.0 STD	579	-79.129	97.825	80.9	Pass
T1	170 - 155	Diagonal	P1.5X0625	14	-2.850	8.160	34.9 68.1 (b)	Pass
T2	155 - 140	Diagonal	P1.5X0625	104	-3.463	8.160	42.4 79.6 (b)	Pass
T3	140 - 120	Diagonal	L1 3/4x1 3/4x1/4	159	-4.985	18.953	26.3 43.3 (b)	Pass
T4	120 - 117.5	Diagonal	P1.5X0625	197	-0.674	8.201	8.2 9.7 (b)	Pass
T5	117.5 - 115	Diagonal	P1.5X0625	207	0.327	9.145	3.6 7.9 (b)	Pass
T6	115 - 112.5	Diagonal	P1.5X0625	217	-0.237	8.138	2.9 3.4 (b)	Pass
T7	112.5 - 110	Diagonal	P1.5X0625	227	0.357	9.145	3.9 8.6 (b)	Pass
T8	110 - 107.5	Diagonal	P1.5X0625	235	-0.911	8.138	11.2 13.1 (b)	Pass
T9	107.5 - 105	Diagonal	P1.5X0625	247	-1.399	8.138	17.2 20.1 (b)	Pass
T10	105 - 102.5	Diagonal	P1.5X0625	259	-1.437	8.138	17.7 22.6 (b)	Pass
T11	102.5 - 100	Diagonal	P1.5X0625	274	-2.260	8.201	27.6 32.5 (b)	Pass
T12	100 - 80	Diagonal	P1.5X0625	319	-2.295	8.178	28.1 48.8 (b)	Pass
T13	80 - 60	Diagonal	P1.5X0625	352	-1.745	8.165	21.4 25.1 (b)	Pass
T14	60 - 40	Diagonal	P1.5X0625	456	-2.358	8.178	28.8 50.1 (b)	Pass
T15	40 - 20	Diagonal	P1.5X0625	535	-3.462	5.850	59.2 64.3 (b)	Pass
T16	20 - 5	Diagonal	P1.5X0625	545	-2.729	5.865	46.5 54.2 (b)	Pass
T15	40 - 20	Horizontal	1	495	-1.224	15.338	8.0	Pass
T16	20 - 5	Horizontal	1	554	-1.256	15.338	8.2	Pass
T2	155 - 140	Secondary Horizontal	1	108	-1.106	15.001	7.4	Pass
T3	140 - 120	Secondary Horizontal	L1 3/4x1 3/4x1/4	172	-3.239	16.114	20.1	Pass
T8	110 - 107.5	Secondary Horizontal	L2x2x3/16	239	-0.747	14.932	5.0	Pass
T9	107.5 - 105	Secondary Horizontal	L2x2x3/16	251	-0.751	14.932	5.0	Pass
T10	105 - 102.5	Secondary Horizontal	L2x2x3/16	263	-0.767	14.932	5.1	Pass
T11	102.5 - 100	Secondary Horizontal	L2x2x3/16	278	-0.769	14.932	5.2	Pass
T13	80 - 60	Secondary Horizontal	L2x2x3/16	358	-0.986	14.957	6.6	Pass
T1	170 - 155	Top Girt	P1.5X0625	6	2.087	9.145	22.8 50.5 (b)	Pass
T2	155 - 140	Top Girt	P1.5X0625	52	-0.326	6.747	4.8 8.3 (b)	Pass
T3	140 - 120	Top Girt	L1 1/2x1 1/2x1/8	113	0.507	8.666	5.9 15.9 (b)	Pass
T4	120 - 117.5	Top Girt	P1.5X0625	196	0.761	9.145	8.3 18.4 (b)	Pass
T12	100 - 80	Top Girt	P1.5X0625	284	0.801	9.145	8.8 19.4 (b)	Pass
T13	80 - 60	Top Girt	P1.5X0625	344	0.338	9.145	3.7 8.2 (b)	Pass
T14	60 - 40	Top Girt	P1.5X0625	425	0.963	9.145	10.5 23.3 (b)	Pass
T15	40 - 20	Top Girt	P1.5X0625	487	-0.667	6.800	9.8 21.2 (b)	Pass
T16	20 - 5	Top Girt	ROHN 1.5 STD	541	0.592	25.902	2.3 7.4 (b)	Pass
T17	5 - 0	Top Girt	14x3/16	583	5.774	85.050	6.8	Pass

Section No.	Elevation ft	Component Type	Size	Critical Element	P K	$øP_{allow}$ K	% Capacity	Pass Fail
T1	170 - 155	Bottom Girt	P1.5X0625	9	-0.770	6.747	11.4	Pass
T2	155 - 140	Bottom Girt	P1.5X0625	53	0.379	9.145	4.1	Pass
T3	140 - 120	Bottom Girt	L1 3/4x1 3/4x1/8	117	1.012	13.669	7.4	Pass
T11	102.5 - 100	Bottom Girt	P1.5X0625	269	0.346	9.145	3.8	Pass
T12	100 - 80	Bottom Girt	P1.5X0625	289	0.897	9.145	9.8	Pass
T13	80 - 60	Bottom Girt	P1.5X0625	348	0.378	9.145	4.1	Pass
T14	60 - 40	Bottom Girt	P1.5X0625	430	0.924	9.145	10.1	Pass
T15	40 - 20	Bottom Girt	P1.5X0625	489	0.345	9.145	3.8	Pass
T16	20 - 5	Bottom Girt	L2x2x3/16	543	11.849	23.166	51.1	Pass
T17	5 - 0	Bottom Girt	14x3/16	586	-1.944	70.133	3.8	Pass
T12	100 - 80	Mid Girt	P1.5X0625	292	0.927	12.701	7.3	Pass
T14	60 - 40	Mid Girt	P1.5X0625	432	0.947	12.701	7.5	Pass
T17	5 - 0	Mid Girt	14x3/16	589	-0.755	5.583	13.5	Pass
T2	155 - 140	Guy A@152.333	3/8	602	8.581	9.240	92.9	Pass
T3	140 - 120	Guy A@132.438	1/2	614	15.478	16.140	95.9	Pass
T12	100 - 80	Guy A@90	1/2	622	15.132	16.140	93.8	Pass
T14	60 - 40	Guy A@50	1/2	628	12.513	16.140	77.5	Pass
T2	155 - 140	Guy B@152.333	3/8	597	8.298	9.240	89.8	Pass
T3	140 - 120	Guy B@132.438	1/2	609	14.817	16.140	91.8	Pass
T12	100 - 80	Guy B@90	1/2	621	14.434	16.140	89.4	Pass
T14	60 - 40	Guy B@50	1/2	627	11.882	16.140	73.6	Pass
T2	155 - 140	Guy C@152.333	3/8	591	8.118	9.240	87.9	Pass
T3	140 - 120	Guy C@132.438	1/2	606	14.386	16.140	89.1	Pass
T12	100 - 80	Guy C@90	1/2	617	13.935	16.140	86.3	Pass
T14	60 - 40	Guy C@50	1/2	623	11.509	16.140	71.3	Pass
T2	155 - 140	Top Guy Pull-Off@152.333	L2x2x3/16	596	-3.849	13.953	27.6 61.5 (b)	Pass
T12	100 - 80	Top Guy Pull-Off@90	4x3/8	620	4.929	54.844	9.0	Pass
T14	60 - 40	Top Guy Pull-Off@50	4x3/8	625	5.035	54.844	9.2	Pass
T2	155 - 140	Torque Arm Top@152.333	C12x20.7	593	2.133	197.316	43.1	Pass
T3	140 - 120	Torque Arm Top@132.438	C12x20.7 with 8"x3/8" plates	608	4.209	294.192	42.8	Pass
							Summary	
						Leg (T7)	98.6	Pass
						Diagonal (T2)	79.6	Pass
						Horizontal (T16)	8.2	Pass
						Secondary Horizontal (T3)	20.1	Pass
						Top Girt (T1)	50.5	Pass
						Bottom Girt (T16)	51.1	Pass
						Mid Girt (T17)	13.5	Pass
						Guy A (T3)	95.9	Pass
						Guy B (T3)	91.8	Pass
						Guy C (T3)	89.1	Pass
						Top Guy Pull-Off (T2)	61.5	Pass
						Torque Arm Top (T2)	43.1	Pass
						Bolt Checks	79.6	Pass
						RATING =	**98.6**	**Pass**

Program Version 7.0.5.1 - 2/1/2016 File:R:/Projects/2017/17924000A/17924017A/Structural/Tower Analysis/Rev 2 - MOD/tnx Tower/CT52XC043.Newington.Tower Modification.Rev 2.eri

Engineers Planners Surveyors Landscape Architects Environmental Scientists

MASER CONSULTING
— CONNECTICUT —

Mount Analysis Report

FOR

Newington

CT52XC043
99 Cedarwood Lane
Newington, CT 06111
Hartford County

Mount Utilization: 60.1%

December 21, 2017

Prepared For

Sprint

Prepared By

Maser Consulting Connecticut
331 Newman Springs Road, Suite 203
Red Bank, NJ 07701
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Petros E. Tsoukalas, P.E.
Connecticut Professional Engineer
License No. 32577

MC Project No. 17924017A

Objective:

The objective of this report is to determine the capacity of the existing antenna support mount at the subject facility for the final wireless telecommunications configuration, per the applicable codes and standards.

Introduction:

Maser Consulting Connecticut has reviewed the following documents in completing this report:

- Mapping Report, prepared by Tower Engineering Professionals, TEP No. 83902.145938, dated December 20, 2017
- Construction Drawings, prepared by Maser Consulting Connecticut, Job No. 17924017A, dated December 21, 2017
- RFDS 63868 provided by Sprint, dated April 22, 2017

The existing **Sprint** equipment is to be supported on the existing antenna support mounts constructed of structural steel antenna support pipes and tubes at a centerline of approximately 140'-0" above ground level. This report is based only upon this information.

Equipment Loading:

Maser Consulting Connecticut understands the existing and proposed **Sprint** loading to be as follows:

- *(3) Argus LLPX301R-V1 Panel Antennas (Existing)*
- *(4) Decibel 844G65VTZASX Panel Antennas (Existing)*
- *(2) Decibel DB844H90E-XY Panel Antennas (Existing)*
- *(1) Andrew VHLP2-11-DW1 Dish (Existing)*
- *(1) CommScope A-ANT-11G-24 Dish (Existing)*
- *(1) Unknown 2.5'ø Dish (Existing)*
- **(3) KMW ETCR-654L12H6 Panel Antennas (Proposed)**
- **(6) ALU RRH-2X50-800 (Proposed)**
- **(3) ALU RRH-4X45-1900 (Proposed)**
- **(3) ALU TD-RRH8X20-25 (Proposed)**

Codes, Standards and Loading:

Maser Consulting Connecticut utilized the following codes and standards:

- 2016 Connecticut State Building Code, Incorporating the 2012 International Building Code
- 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"

Analysis Approach & Assumptions:

The analysis approach used in this structural analysis is based on the premise that if the existing antenna support mounts are 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. Risa-3D, a 3D finite element modeling and analysis program, was used to determine the capacity and usage of the existing antenna support mounts.

General Site Design Assumption:

- 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.
- 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 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:

- *Structural Steel Tubes are constructed of A500 Grade B 46 Steel*
- *Structural Steel Pipes are constructed of A53 Grade B Steel*
- *Replace existing antenna pipes with 8'-0" long 2.5 STD pipes for proposed antennas*
- *All proposed RRHs shall be mounted behind antennas with unistruts as indicated in the Construction Drawings*
- *Existing HSS tube has 1/4 inch thickness*

Calculations:

The calculations are found in Appendix A of this report.

Conclusion:

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 **60.1%** of its structural capacity with the maximum usage occurring at the horizontal support pipes. Therefore, the proposed **Sprint** installation **CAN** be installed as intended.

The conclusions reached by Maser Consulting Connecticut in this evaluation are only applicable for the proposed 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.
Telecommunications Discipline Leader

Dejian Xu, P.E.
Telecommunications Project Engineer

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APPENDIX A

1. LOADING SUMMARY

Quantity	Manufacturer	Antenna/ Appurtenance	Status	Sector
3	Argus	LLP301R-V1	Existing	Alpha, Beta, & Gamma
4	Decibel	844G65VTZASX	Existing	Alpha & Gamma
2	Decibel	DB844H90E-XY	Existing	Beta
1	Andrew	VHLP2-11-DW1	Existing	Alpha
1	Commscope	A-ANT-11G-24	Existing	Beta
1	OTHER	2.5' Dish	Existing	Gamma
3	**KMW**	**ETCR-654L12H6**	**Proposed**	**Alpha, Beta, & Gamma**
6	**Alcatel-Lucent**	**RRH-2X50-800**	**Proposed**	**Alpha, Beta, & Gamma**
3	**Alcatel-Lucent**	**RRH-4X45-1900**	**Proposed**	**Alpha, Beta, & Gamma**
3	**Alcatel-Lucent**	**TD-RRH8X20-25**	**Proposed**	**Alpha, Beta, & Gamma**

The worst case loading occurs in the Gamma Sector

Quantity	Manufacturer	Antenna/ Appurtenance	Status
1	Argus	LLP301R-V1	Existing
2	Decibel	844G65VTZASX	Existing
1	OTHER	2.5' Dish	Existing
1	**KMW**	**ETCR-654L12H6**	**Proposed**
2	**Alcatel-Lucent**	**RRH-2X50-800**	**Proposed**
1	**Alcatel-Lucent**	**RRH-4X45-1900**	**Proposed**
1	**Alcatel-Lucent**	**TD-RRH8X20-25**	**Proposed**

ANALYSIS AND DESIGN

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

	Symbol	Value	Unit	Reference	Equation
Wind Load Inputs Parameters					
Antenna Centerline	z	140	ft		
Normal Wind Speed (3 sec. Gust):	V	95	mph	Ref. 1, Eqn. 16-33	
Normal Wind Speed with Ice (3 sec. gust):	V_i	40.0	mph	(Figure a5-2a, p. 233)	
Service Wind Speed:	V_s	60.0	mph	(Figure a5-2a, p. 233)	
Design Ice Thickness:	t_i	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_h	0.85		Ref. 3, Section 2.6.7	
Wind Directionality Factor:	K_d	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_{ice}	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_g	1200	ft	Ref. 3, Table 2-4	
Min. Value for k_z:	Kz_{min}	0.70		Ref. 3, Table 2-4	
Terrain Constant:	K_e	0.90		Ref. 3, Table 2-4	
Velocity Pressure Exposure Coefficient:	K_z	1.088		Ref. 3, Section 2.6.5.2	$=2.01\cdot(z/z_g)^{2/\alpha}$
Topographic Category Coefficients:					
Topographic Constant:	K_t	0.43		Ref. 3, Table 2-5	
Height Attenuation Factor:	f	1.25		Ref. 3, Table 2-5	
Height Reduction Factor:	K_h	2.3989		Ref. 3, Section 2.6.6.4	$=e^{(f\cdot z/H)}$
Topographic Factor:	K_{zt}	1.35		Ref.3, Section 2.6.6.4	$=[1+(K_e\cdot K_t/K_h)]^2$
Ice Accumulation:					
Ice Velocity Pressure Exposure Coefficient:	K_{iz}	1.16			$=(z/33)^{0.10}$
Factored Ice Thickness:	t_{iz}	2.57	in	(Section 2.6.8, p. 16)	$=2.0\cdot t_i\cdot I\cdot K_{iz}\cdot K_{zt}$
Ice Density:	ρ_i	56.00	pcf		
Design Wind Pressures:					
Velocity Pressure:	q_z	28.82	psf	Ref. 3, Section 2.6.9.6	$=0.00256\cdot K_z\cdot K_{zt}\cdot K_d\cdot V^2\cdot I$
Velocity Pressure (With Ice):	q_{zi}	5.11	psf	(Section 2.6.9.6, P. 25)	$=.00256\cdot K_z\cdot K_{zt}\cdot K_d\cdot V_i^2\cdot I$
Velocity Pressure (Service):	q_{zs}	11.49	psf	(Section 2.6.9.6, P. 25)	$=.00256\cdot K_z\cdot K_{zt}\cdot K_d\cdot V_i^2\cdot I$

II. CALCULATIONS

▪ ***Wind Load on Appurtenances***

Dimensions and Force Coefficients

Antenna/ Appurtenance	*Non-Iced Condition*								*Iced Condition*							
	Mounting Pipe			Equipment					Mounting Pipe			Equipment				
	Length (in)	Diameter (in)	Force Coefficient C_a	Height (in)	Width (in)	Depth (in)	Force Coefficient $C_{a\ Front}$	$C_{a\ Side}$	Length (in)	Diameter (in)	Force Coefficient C_a	Height (in)	Width (in)	Depth (in)	Force Coefficient $C_{a\ Front}$	$C_{a\ Side}$
LLP301R-V1	0.0	0.000	0.000	42.40	11.80	4.50	1.25	1.48	0.0	0.0	0.000	47.53	16.93	9.63	1.21	1.31
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
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
ETCR-654L12H6	96.0	2.875	1.200	84.90	21.00	6.30	1.27	1.62	101.1	8.0	0.925	90.03	26.13	11.43	1.24	1.43
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
RRH-4X45-1900	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
TD-RRH8X20-25	0.0	0.000	0.000	26.00	18.60	6.70	1.20	1.26	0.0	0.0	0.000	31.13	23.73	11.83	1.20	1.21

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_N	F_T			F_N	F_T		
LLP301R-V1	2	53.1	24.0	**53.1**	**21.3**	14.7	9.0	**14.7**	**94.3**
844G65VTZASX	2	68.1	63.3	**68.1**	**15.5**	19.0	20.4	**20.4**	**123.9**
2.5' Dish	1	107.2	36.3	**107.2**	**65.0**	26.1	11.2	**26.1**	**313.8**
ETCR-654L12H6	2	195.6	101.7	**195.6**	**50.0**	45.7	33.5	**45.7**	**288.0**
RRH-2X50-800	2	21.2	16.3	**21.2**	**42.1**	6.9	5.8	**6.9**	**52.4**
RRH-4X45-1900	2	30.6	30.6	**30.6**	**42.3**	9.3	9.3	**9.3**	**76.9**
TD-RRH8X20-25	2	49.4	18.7	**49.4**	**45.6**	13.4	6.7	**13.4**	**90.8**

****** ***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_a	Wind Load (plf)	Exposed Wind Height (in)	Depth (in)	Length (in)	Force Coefficient C_a	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

BASIC EQUATIONS

ANSI/TIA-222-G Reference

Importance Factor:

$$I := \begin{cases} 1.0 & \text{if } Class = \text{"II"} \\ 1.15 & \text{if } Class = \text{"III"} \end{cases} = 1$$

Table 2-3, Pg. 39

Force Coefficient:
(Square)

$$C_{f\_square}(h,w) := \begin{cases} 1.2 & \text{if } \frac{h}{w} \le 2.5 \\ \left[1.2 + \frac{0.2}{4.5}\cdot\left(\frac{h}{w} - 2.5\right)\right] & \text{if } \frac{h}{w} > 2.5 \wedge \frac{h}{w} \le 7 \\ \left[1.4 + \frac{0.6}{18}\cdot\left(\frac{h}{w} - 7\right)\right] & \text{if } \frac{h}{w} > 7 \wedge \frac{h}{w} \le 25 \\ 2.0 & \text{otherwise} \end{cases}$$

Table 2-8, P. 42

Force Coefficient:
(Round)

$$C_{f\_round}(h,w) := \begin{cases} 0.7 & \text{if } \frac{h}{w} \le 2.5 \\ \left[0.7 + \frac{0.1}{4.5}\cdot\left(\frac{h}{w} - 2.5\right)\right] & \text{if } \frac{h}{w} > 2.5 \wedge \frac{h}{w} \le 7 \\ \left[0.8 + \frac{0.4}{18}\cdot\left(\frac{h}{w} - 7\right)\right] & \text{if } \frac{h}{w} > 7 \wedge \frac{h}{w} \le 25 \\ 1.2 & \text{otherwise} \end{cases}$$

Table 2-8, P. 42

Terrain Exposure Constants:

Table 2-4, P. 40

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

BASIC EQUATIONS

ANSI/TIA-222-G Reference

Velocity Pressure Coefficient:

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

$$K_z := Kz(z)$$ Section 2.6.5, P. 13

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

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

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

Velocity Pressure: Section 2.6.9.6, P. 25

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

LOAD EQUATIONS

WIND LOAD

Area (Normal):	$AN_{area} = H_{ant} \cdot Want$
Area (Side):	$AT_{area} = H_{ant} \cdot Dant$
Force Coefficient (Normal):	$C_{fn} = C_{fsquare}(H_{ant}, Want)$
Force Coefficient (Side):	$C_{fs} = C_{fsquare}(H_{ant}, Dant)$
Pipe Area (Normal):	$AN_p = \max[(L_p - H_{ant}) * Dp, 0]$
Pipe Area (Side):	$AT_p = L_p \cdot Dp$
Force Coefficient (Normal):	$C_{fp} = C_{fround}(Lp, Dp)$
Normal Effective Projected Area:	$E_{pan} = (C_{fn} \cdot ANarea) + (Cfp \cdot ANp)$
Side Effective Projected Area:	$E_{pat} = (C_{fs} \cdot ATarea) + (Cfp \cdot ATp)$
Effective Projected Area:	$EPA = max(E_{pan}, Epat)$
Wind Force:	$F_{ant} = q_z \cdot Gh \cdot EPA$

ICE DEAD LOAD

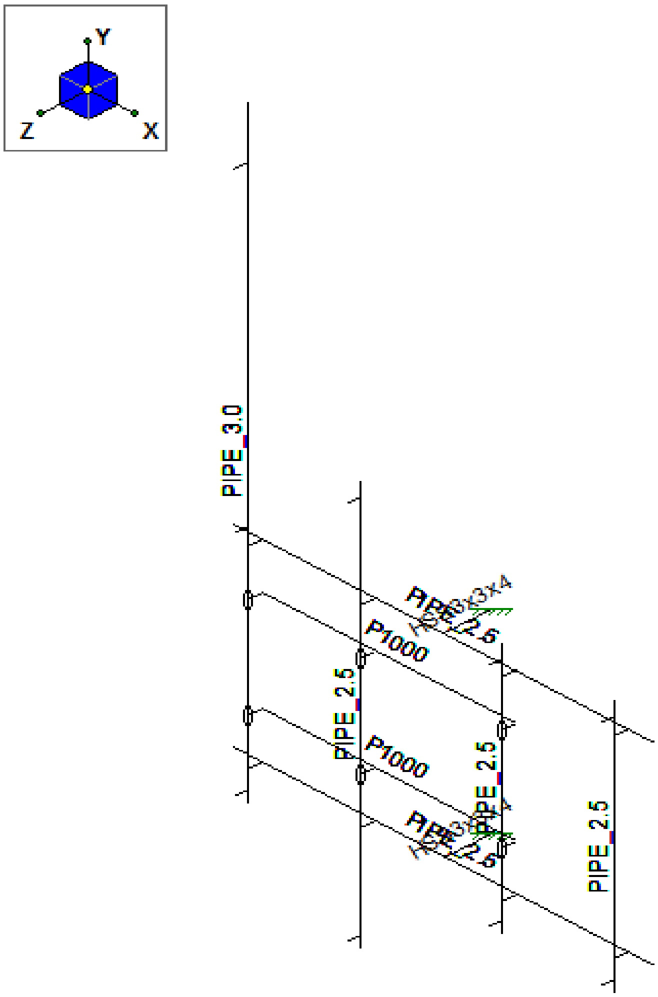
Largest Out-to-Out Dimension:	$D_{ant} = \sqrt{D_{ant}{}^2 + W_{ant}{}^2}$
Cross Sectional Area of Ice:	$A_{ice\_ant} = \pi \cdot tiz \cdot (Dant + tiz)$
Total Ice Dead Load:	$DL_{ice\_ant} = \boldsymbol{\rho_i} \cdot (Aice_{\_ant} \cdot Hant)$

ICE WIND LOAD

Dimensions:	$H_{i_{ant}} = H_{ant} + 2tiz$
	$W_{i_{ant}} = W_{ant} + 2tiz$
	$D_{i_{ant}} = D_{ant} + 2tiz$
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):	$AT_p = L_{ip} \cdot Dip$
Force Coefficient (Normal):	$C_{fp} = C_{fround}(L_{ip}, D_{ip})$
Normal Effective Projected Area:	$E_{pain} = (Ci_{fn} \cdot ANarea) + (Cfp \cdot ANp)$
Side Effective Projected Area:	$E_{pait} = (Ci_{fs} \cdot ATarea) + (Cfp \cdot ATp)$
Effective Projected Area:	$EPA_i = max(E_{pain}, Epait)$
Wind Force:	$F_{i\_ant} = q_z \cdot Gh \cdot EPAi$

III. ATTACHMENTS

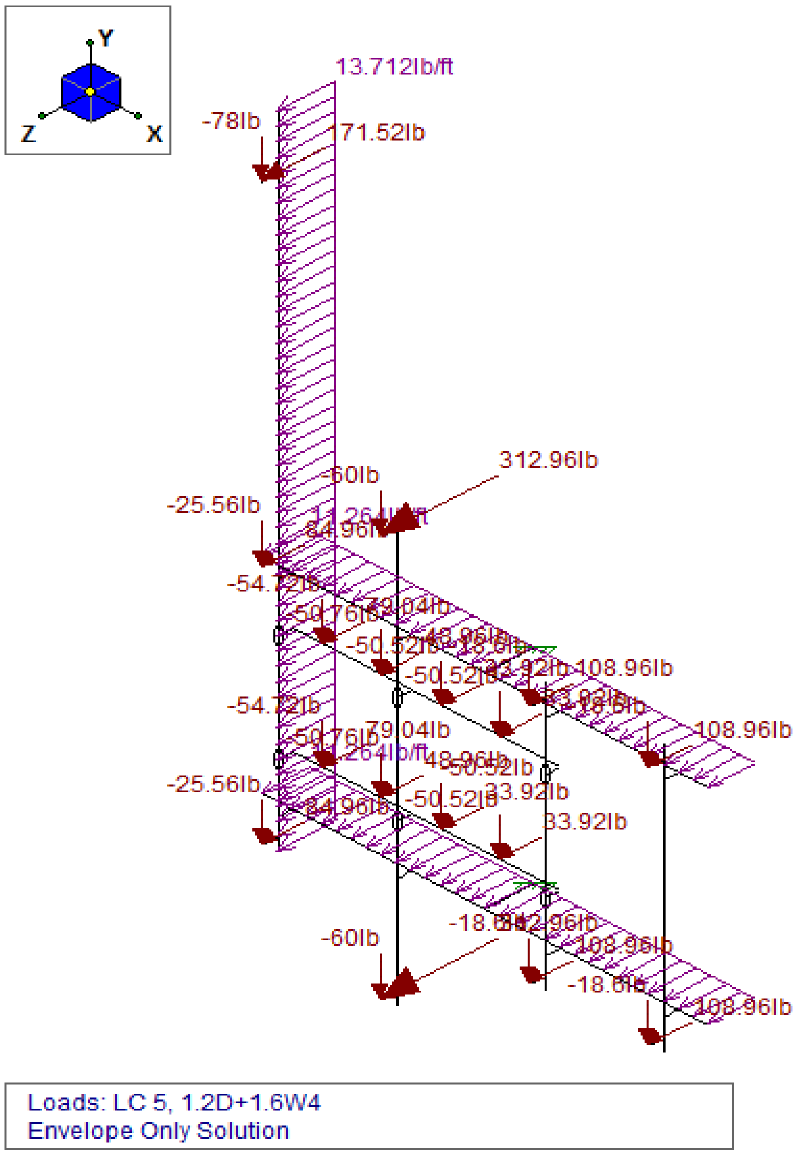
RISA MODEL



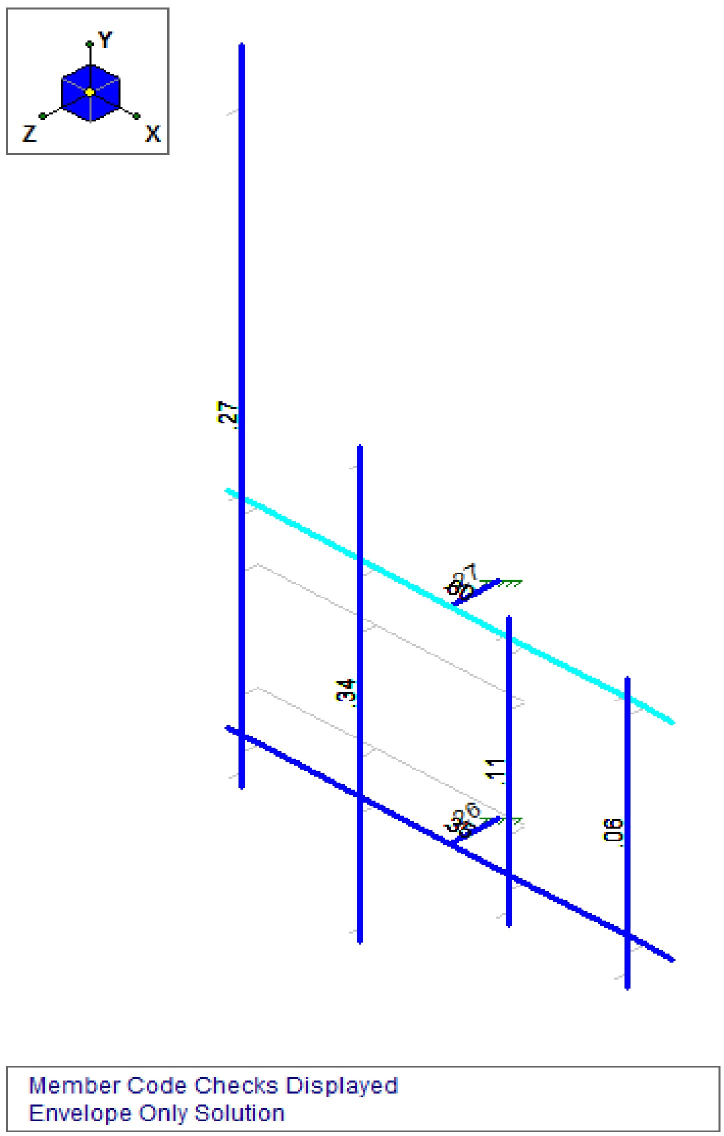
Envelope Only Solution

Client:	Sprint	Computed By:	DX
Site Name:	Newington	Date:	12/21/2017
Project No.	17924017A	Verified By:	PET
Title:	Antenna Mount Design	Page:	10

RISA WORST CASE LOADING



RISA CODE CHECK



Member Primary Data

	Label	I Joint	J Joint	K Joint	Rotat...	Section/Shape	Type	Design ...	Material	Design Rules
1	M1	N1	N2			2.5 STD	Column	Pipe	A53 Gr. B	Typical
2	M2	N3	N4			2.5 STD	Column	Pipe	A53 Gr. B	Typical
3	M3	N5	N6			HSS3x3	Beam	Tube	A500 Gr.46	Typical
4	M4	N7	N8			HSS3x3	Beam	Tube	A500 Gr.46	Typical
5	M5	N9	N10			2.5 STD	Column	Pipe	A53 Gr. B	Typical
6	M6	N11	N12			2.5 STD	Column	Pipe	A53 Gr. B	Typical
7	M7	N13	N14			2.5 STD	Column	Pipe	A53 Gr. B	Typical
8	M8	N15	N16			3.0 STD	Column	Pipe	A53 Gr. B	Typical
9	M9	N17	N18			RIGID	None	None	RIGID	Typical
10	M10	N19	N20			RIGID	None	None	RIGID	Typical
11	M11	N21	N22			RIGID	None	None	RIGID	Typical
12	M12	N23	N24			RIGID	None	None	RIGID	Typical
13	M13	N25	N26			RIGID	None	None	RIGID	Typical
14	M14	N27	N28			RIGID	None	None	RIGID	Typical
15	M15	N29	N30			RIGID	None	None	RIGID	Typical
16	M16	N31	N32			RIGID	None	None	RIGID	Typical
17	M17	N33	N34			RIGID	None	None	RIGID	Typical
18	M18	N35	N36			RIGID	None	None	RIGID	Typical
19	M19	N37	N38			RIGID	None	None	RIGID	Typical
20	M20	N39	N40			RIGID	None	None	RIGID	Typical
21	M21	N41	N42			RIGID	None	None	RIGID	Typical
22	M22	N43	N44			RIGID	None	None	RIGID	Typical
23	M23	N45	N46			RIGID	None	None	RIGID	Typical
24	M24	N47	N48			RIGID	None	None	RIGID	Typical
25	M25	N50	N49			RIGID	None	None	RIGID	Typical
26	M26	N52	N58			RIGID	None	None	RIGID	Typical
27	M27	N51	N57			RIGID	None	None	RIGID	Typical
28	M28	N55	N61			RIGID	None	None	RIGID	Typical
29	M29	N54	N60			RIGID	None	None	RIGID	Typical
30	M30	N53	N59			RIGID	None	None	RIGID	Typical
31	M31	N56	N62			RIGID	None	None	RIGID	Typical
32	M32	N58	N61			Unistrut	Beam	CU	A570 Gr.33	Typical
33	M33	N60	N62			Unistrut	Beam	CU	A570 Gr.33	Typical

Joint Loads and Enforced Displacements (BLC 1 : Dead)

	Joint Label	L,D,M	Direction	Magnitude[(lb,lb-ft), (in,rad), (lb*s^2/in, lb*s^2*in)]
1	N36	L	Y	-21.3
2	N34	L	Y	-21.3
3	N40	L	Y	-15.5
4	N42	L	Y	-15.5
5	N46	L	Y	-15.5
6	N44	L	Y	-15.5
7	N38	L	Y	-50
8	N48	L	Y	-50
9	N50	L	Y	-65
10	N63	L	Y	-45.6
11	N64	L	Y	-45.6
12	N65	L	Y	-42.3
13	N66	L	Y	-42.3

Joint Loads and Enforced Displacements (BLC 1 : Dead) (Continued)

	Joint Label	L,D,M	Direction	Magnitude[(lb,lb-ft), (in,rad), (lb*s^2/in, lb*s^2*in)]
14	N67	L	Y	-42.1
15	N68	L	Y	-42.1
16	N69	L	Y	-42.1
17	N70	L	Y	-42.1

Joint Loads and Enforced Displacements (BLC 2 : Wx)

	Joint Label	L,D,M	Direction	Magnitude[(lb,lb-ft), (in,rad), (lb*s^2/in, lb*s^2*in)]
1	N36	L	X	24
2	N34	L	X	24
3	N40	L	X	63.3
4	N42	L	X	63.3
5	N46	L	X	63.3
6	N44	L	X	63.3
7	N38	L	X	101.7
8	N48	L	X	101.7
9	N50	L	X	36.3
10	N63	L	X	18.7
11	N64	L	X	18.7
12	N65	L	X	30.6
13	N66	L	X	30.6
14	N67	L	X	16.3
15	N68	L	X	16.3
16	N69	L	X	16.3
17	N70	L	X	16.3

Joint Loads and Enforced Displacements (BLC 3 : Wz)

	Joint Label	L,D,M	Direction	Magnitude[(lb,lb-ft), (in,rad), (lb*s^2/in, lb*s^2*in)]
1	N36	L	Z	53.1
2	N34	L	Z	53.1
3	N40	L	Z	68.1
4	N42	L	Z	68.1
5	N46	L	Z	68.1
6	N44	L	Z	68.1
7	N38	L	Z	195.6
8	N48	L	Z	195.6
9	N50	L	Z	107.2
10	N63	L	Z	49.4
11	N64	L	Z	49.4
12	N65	L	Z	30.6
13	N66	L	Z	30.6
14	N67	L	Z	21.2
15	N68	L	Z	21.2
16	N69	L	Z	21.2
17	N70	L	Z	21.2

Joint Loads and Enforced Displacements (BLC 4 : Wx Ice)

	Joint Label	L,D,M	Direction	Magnitude[(lb,lb-ft), (in,rad), (lb*s^2/in, lb*s^2*in)]
1	N36	L	X	9
2	N34	L	X	9
3	N40	L	X	20.4

Joint Loads and Enforced Displacements (BLC 4 : Wx Ice) (Continued)

	Joint Label	L,D,M	Direction	Magnitude[(lb,lb-ft), (in,rad), (lb*s^2/in, lb*s^2*in)]
4	N42	L	X	20.4
5	N46	L	X	20.4
6	N44	L	X	20.4
7	N38	L	X	33.5
8	N48	L	X	33.5
9	N50	L	X	11.2
10	N63	L	X	6.7
11	N64	L	X	6.7
12	N65	L	X	9.3
13	N66	L	X	9.3
14	N67	L	X	5.8
15	N68	L	X	5.8
16	N69	L	X	5.8
17	N70	L	X	5.8

Joint Loads and Enforced Displacements (BLC 5 : Wz Ice)

	Joint Label	L,D,M	Direction	Magnitude[(lb,lb-ft), (in,rad), (lb*s^2/in, lb*s^2*in)]
1	N36	L	Z	14.7
2	N34	L	Z	14.7
3	N40	L	Z	19
4	N42	L	Z	19
5	N46	L	Z	19
6	N44	L	Z	19
7	N38	L	Z	45.7
8	N48	L	Z	45.7
9	N50	L	Z	26.1
10	N63	L	Z	13.4
11	N64	L	Z	13.4
12	N65	L	Z	9.3
13	N66	L	Z	9.3
14	N67	L	Z	6.9
15	N68	L	Z	6.9
16	N69	L	Z	6.9
17	N70	L	Z	6.9

Joint Loads and Enforced Displacements (BLC 6 : Ice Weight)

	Joint Label	L,D,M	Direction	Magnitude[(lb,lb-ft), (in,rad), (lb*s^2/in, lb*s^2*in)]
1	N36	L	Y	-94.3
2	N34	L	Y	-94.3
3	N40	L	Y	-123.9
4	N42	L	Y	-123.9
5	N46	L	Y	-123.9
6	N44	L	Y	-123.9
7	N38	L	Y	-288
8	N48	L	Y	-288
9	N50	L	Y	-313.8
10	N63	L	Y	-90.8
11	N64	L	Y	-90.8
12	N65	L	Y	-76.9
13	N66	L	Y	-76.9
14	N67	L	Y	-52.4

Joint Loads and Enforced Displacements (BLC 6 : Ice Weight) (Continued)

	Joint Label	L,D,M	Direction	Magnitude[(lb,lb-ft), (in,rad), (lb*s^2/in, lb*s^2*in)]
15	N68	L	Y	-52.4
16	N69	L	Y	-52.4
17	N70	L	Y	-52.4

Member Distributed Loads (BLC 2 : Wx)

	Member Label	Direction	Start Magnitude[lb/ft,F]	End Magnitude[lb/ft,F]	Start Location[in,%]	End Location[in,...
1	M8	PX	8.57	8.57	0	0
2	M3	PX	7.57	7.57	0	0
3	M4	PX	7.57	7.57	0	0

Member Distributed Loads (BLC 3 : Wz)

	Member Label	Direction	Start Magnitude[lb/ft,F]	End Magnitude[lb/ft,F]	Start Location[in,%]	End Location[in,...
1	M8	PZ	8.57	8.57	0	0
2	M1	PZ	7.04	7.04	0	0
3	M2	PZ	7.04	7.04	0	0

Member Distributed Loads (BLC 4 : Wx Ice)

	Member Label	Direction	Start Magnitude[lb/ft,F]	End Magnitude[lb/ft,F]	Start Location[in,%]	End Location[in,...
1	M8	PX	3.18	3.18	0	0
2	M3	PX	3.53	3.53	0	0
3	M4	PX	3.53	3.53	0	0

Member Distributed Loads (BLC 5 : Wz Ice)

	Member Label	Direction	Start Magnitude[lb/ft,F]	End Magnitude[lb/ft,F]	Start Location[in,%]	End Location[in,...
1	M8	PZ	3.18	3.18	0	0
2	M1	PZ	2.63	2.63	0	0
3	M2	PZ	2.63	2.63	0	0

Member Distributed Loads (BLC 6 : Ice Weight)

	Member Label	Direction	Start Magnitude[lb/ft,F]	End Magnitude[lb/ft,F]	Start Location[in,%]	End Location[in,...
1	M8	Y	-19.02	-19.02	0	0
2	M1	Y	-17.06	-17.06	0	0
3	M2	Y	-17.06	-17.06	0	0
4	M6	Y	-17.06	-17.06	0	0
5	M5	Y	-17.06	-17.06	0	0
6	M7	Y	-17.06	-17.06	0	0
7	M3	Y	-21.34	-21.34	0	0
8	M4	Y	-21.34	-21.34	0	0

Basic Load Cases

	BLC Description	Category	X Gra...	Y Gra...	Z Gra...	Joint	Point	Distributed	Area(...	Surface(...
1	Dead	DL		-1.05		17				
2	Wx	WL				17		3		
3	Wz	WL				17		3		
4	Wx Ice	WL				17		3		
5	Wz Ice	WL				17		3		
6	Ice Weight	OL1				17		8		

Load Combinations

	Description	Solve	PDelta	S...	BLC	Fact...	BLC	Fac...	BLC	Fact...	B...	F...	B...	F...	B...	F...	B...	F...	B...	F...
1	1.4D	Yes	Y		1	1.4														
2	1.2D+1.6W1	Yes	Y		1	1.2	2	1.6	3											
3	1.2D+1.6W2	Yes	Y		1	1.2	2	1.386	3	.8										
4	1.2D+1.6W3	Yes	Y		1	1.2	2	.8	3	1.386										
5	1.2D+1.6W4	Yes	Y		1	1.2	2		3	1.6										
6	1.2D+1.6W5	Yes	Y		1	1.2	2	-.8	3	1.386										
7	1.2D+1.6W6	Yes	Y		1	1.2	2	-1.3...	3	.8										
8	1.2D+1.6W7	Yes	Y		1	1.2	2	-1.6	3											
9	1.2D+1.6W8	Yes	Y		1	1.2	2	-1.3...	3	-.8										
10	1.2D+1.6W9	Yes	Y		1	1.2	2	-.8	3	-1.3...										
11	1.2D+1.6W10	Yes	Y		1	1.2	2		3	-1.6										
12	1.2D+1.6W11	Yes	Y		1	1.2	2	.8	3	-1.3...										
13	1.2D+1.6W12	Yes	Y		1	1.2	2	1.386	3	-.8										
14	1.2D+1.0 Ice	Yes	Y		1	1.2	6	1												
15	1.2D+1.0ICE+1.0W1ICE	Yes	Y		1	1.2	6	1	4	1	5									
16	1.2D+1.0ICE+1.0W2ICE	Yes	Y		1	1.2	6	1	4	.866	5	.5								
17	1.2D+1.0ICE+1.0W3ICE	Yes	Y		1	1.2	6	1	4	.5	5	.8...								
18	1.2D+1.0ICE+1.0W4ICE	Yes	Y		1	1.2	6	1	4		5	1								
19	1.2D+1.0ICE+1.0W5ICE	Yes	Y		1	1.2	6	1	4	-.5	5	.8...								
20	1.2D+1.0ICE+1.0W6ICE	Yes	Y		1	1.2	6	1	4	-.866	5	.5								
21	1.2D+1.0ICE+1.0W7ICE	Yes	Y		1	1.2	6	1	4	-1	5									
22	1.2D+1.0ICE+1.0W8ICE	Yes	Y		1	1.2	6	1	4	-.866	5	-.5								
23	1.2D+1.0ICE+1.0W9ICE	Yes	Y		1	1.2	6	1	4	-.5	5	-....								
24	1.2D+1.0ICE+1.0W10ICE	Yes	Y		1	1.2	6	1	4		5	-1								
25	1.2D+1.0ICE+1.0W11ICE	Yes	Y		1	1.2	6	1	4	.5	5	-....								
26	1.2D+1.0ICE+1.0W12ICE	Yes	Y		1	1.2	6	1	4	.866	5	-.5								

Envelope Joint Reactions

	Joint		X [lb]	LC	Y [lb]	LC	Z [lb]	LC	MX [lb-ft]	LC	MY [lb-ft]	LC	MZ [lb-ft]	LC
1	N6	...	1139.15	8	2075.573	24	1445.036	11	-303.081	10	1893.077	10	-66.253	5
2		...	-698.226	2	173.162	5	-1600.549	5	-1574.821	17	-1598.6...	4	-585.583	24
3	N8	...	173.104	8	2089.846	18	683.351	11	-234.991	11	689.683	10	-128.517	2
4		...	-776.861	15	175.6	11	-527.84	5	-1581.625	19	-986.587	4	-581.928	21
5	Tot...	...	1312.253	8	4052.75	21	2128.387	11						
6		...	-1312.253	2	1106.961	2	-2128.389	5						

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

	Memb...	Shape	Code Check	Loc[in]	LC	Shear ...	Loc[in]	Dir	LC	phi*...	phi*...	phi*...	phi*...	Eqn
1	M1	PIPE_2.5	.601	45	5	.251	45		11	320...	507...	359...	359...	...H1...
2	M2	PIPE_2.5	.355	45	23	.128	45		18	320...	507...	359...	359...	...H1...
3	M3	HSS3x3x4	.269	10	23	.157	10	y	24	100...	101...	8556	8556	...H1...
4	M4	HSS3x3x4	.255	10	17	.156	10	y	20	100...	101...	8556	8556	...H1...
5	M5	PIPE_2.5	.059	7.5	17	.017	7.5		24	413...	507...	359...	359...	...H1...
6	M6	PIPE_2.5	.111	52.5	17	.062	42.5		18	413...	507...	359...	359...	...H1...
7	M7	PIPE_2.5	.344	25	19	.145	25		11	300...	507...	359...	359...	...H1...
8	M8	PIPE_3.0	.274	90	5	.104	91.5		5	301...	652...	574...	574...	...H1...

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.

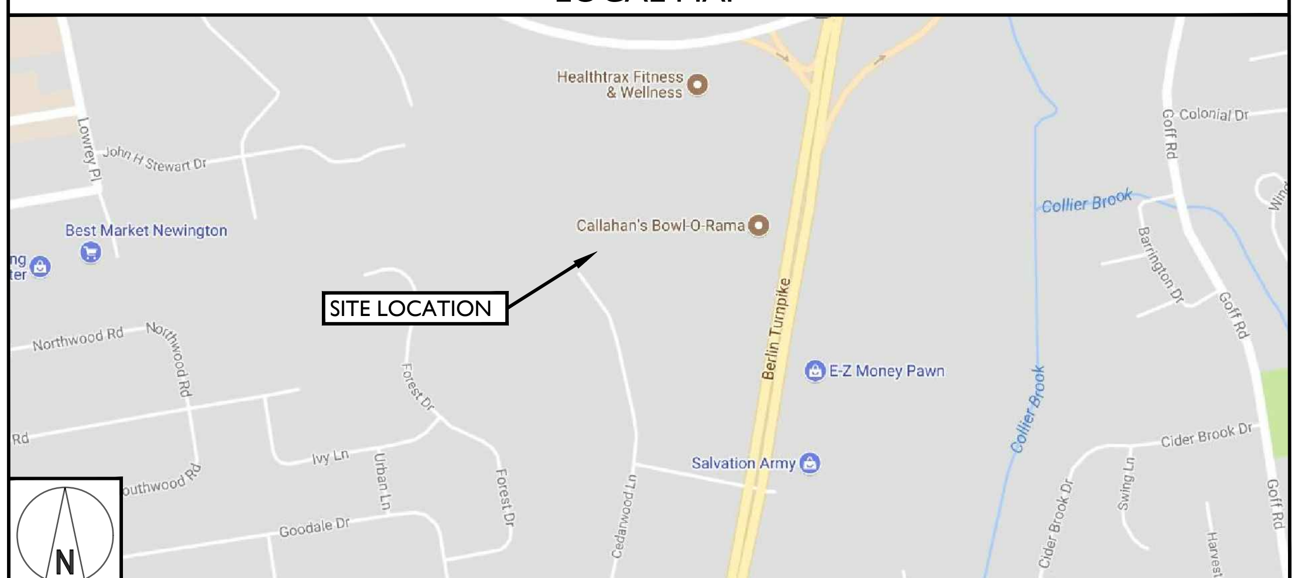
CONSTRUCTION: ______________________ DATE: __________

LEASING/SITE ACQUISITION: ______________________ DATE: __________

RF ENGINEERING: ______________________ DATE: __________

LANDLORD/PROPERTY OWNER: ______________________ DATE: __________

LOCAL MAP



NO SCALE

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 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/US-9W. KEEP RIGHT TO STAY ON I-95, FOLLOW SIGNS FOR US-1 N/US-9 N/GEORGE WASHINGTON BRIDGE. CONTINUE ONTO US-1 N/U.S. 9 N. CONTINUE ONTO I-95 LOWER LEVEL N/U.S. 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.

DRAWING INDEX

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

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 201
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.

- INSTALL (3) NEW PANEL ANTENNAS
- INSTALL (12) NEW RRH'S BEHIND NEW ANTENNAS
- INSTALL (48) JUMPER CABLES
- INSTALL (4) HYBRID CABLES
- INSTALL (1) ELTEK GROWTH CABINET
- INSTALL (1) ELTEK PPC
- TOWER MODIFICATIONS

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PHONE: (201) 684-4000 FAX: (201) 684-4223

Cherundolo Consulting

Charles Cherundulo Consulting, Inc.
713 Clover Lane
Moscow, PA 18444
Phone: 973-207-4248
Fax: 570-842-5592

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FOR STATE SPECIFIC DIRECT PHONE NUMBERS VISIT: WWW.CALL811.COM

SCALE :	JOB NUMBER :
AS SHOWN	17924017A

REV	DATE	DESCRIPTION	DRAWN BY	CHECKED BY
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1	12/21/17	TOWER MODIFICATION	JRF	JKM
0	10/30/17	ISSUED FOR CONSTRUCTION	JRF/DTS	JKM
A	09/28/17	ISSUED FOR REVIEW	JRF	FEP

STATE OF CONNECTICUT · PETROS TSOUKALAS · LICENSED · PROFESSIONAL ENGINEER

PETROS E. TSOUKALAS
CONNECTICUT LICENSED PROFESSIONAL ENGINEER - LICENSE NUMBER: PEN.[illegible]

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

SITE NAME: NEWINGTON
SITE ID: CT52XC043

99 CEDARWOOD LANE
NEWINGTON, CT 06111

RED BANK OFFICE
331 Newman 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

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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SCALE : AS SHOWN
JOB NUMBER : 17924017A

REV	DATE	DESCRIPTION	DRAWN BY	CHECKED BY
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1	12/21/17	TOWER MODIFICATION	JRF	JKM
0	10/30/17	ISSUED FOR CONSTRUCTION	JRF/DTS	JKM
A	09/28/17	ISSUED FOR REVIEW	JRF	FEP

PETROS E. TSOUKALAS
CONNECTICUT LICENSED PROFESSIONAL ENGINEER - LICENSE NUMBER: PEN.32577

STATE OF CONNECTICUT · PETROS TSOUKALAS · 32577 · LICENSED · PROFESSIONAL ENGINEER

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

SITE NAME: NEWINGTON
SITE ID: CT52XC043

99 CEDARWOOD LANE
NEWINGTON, CT 06111

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

SHEET TITLE : GENERAL NOTES - 1

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 IT'S 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 SHALL 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 (OFIC) 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 SITERRA 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 SITERRA 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, AASJTO, 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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811 Know what's below. Call before you dig.
PROTECT YOURSELF
ALL STATES REQUIRE NOTIFICATION OF EXCAVATORS, DESIGNERS, OR ANY PERSON PREPARING TO DISTURB THE EARTH'S SURFACE ANYWHERE IN ANY STATE
FOR STATE SPECIFIC DIRECT PHONE NUMBERS VISIT: WWW.CALL811.COM

SCALE :	JOB NUMBER :
AS SHOWN	17924017A

REV	DATE	DESCRIPTION	DRAWN BY	CHECKED BY
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1	12/21/17	TOWER MODIFICATION	JRF	JKM
0	10/30/17	ISSUED FOR CONSTRUCTION	JRF/DTS	JKM
A	09/28/17	ISSUED FOR REVIEW	JRF	FEP

PETROS E. TSOUKALAS
CONNECTICUT LICENSED PROFESSIONAL ENGINEER - LICENSE NUMBER: PEN.32577

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

SITE NAME: NEWINGTON
SITE ID: CT52XC043

99 CEDARWOOD LANE
NEWINGTON, CT 06111

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

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. BACKHAUL 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, RRU'S, AND CABLE EQUIPMENT, INSTALLATION, AND TESTING OF COAXIAL FIBER CABLE.

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

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

JUMPERS AND CONNECTORS:
FURNISH AND INSTALL 1/2" COAX JUMPER CABLES BETWEEN THE RRU'S AND ANTENNAS. JUMPERS SHALL BE TYPE LDF 4, FLC 12-50, CR 540, OR FXL 540. SUPER-FLEX CABLES ARE NOT ACCEPTABLE. JUMPERS BETWEEN THE RRU'S 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 BY NOT LIMITED TO RECTIFIERS, POWER DISTRIBUTION UNITS, BASE BAND UNITS, SURGE ARRESTORS, BATTERIES, AND SIMILAR EQUIPMENT FURNISHED BY THE COMPANY FOR INSTALLATION BY THE CONTRACTOR (OFCI).
B. CONTRACTOR SHALL PROVIDE AND INSTALL ALL MISCELLANEOUS MATERIALS AND PROVIDE ALL LABOR REQUIRED FOR INSTALLATION EQUIPMENT IN EXISTING CABINET OR NEW CABINET AS SHOWN ON DRAWINGS AND AS 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 ETCO - CL2075; OR MADE FOR THE PURPOSE PRODUCTS BY ROXTEC.
C. EXTERIOR PULL BOXES AND PULL BOXES IN INTERIOR INDUSTRIAL AREAS SHALL BE PLATED CAST ALLOY, HEAVY DUTY, WEATHERPROOF, DUST PROOF, WITH GASKET, PLATED IRON ALLOY COVER AND STAINLESS STEEL COVER SCREWS, CROUSE-HINDS WAB SERIES OR EQUAL.
D. CONDUIT OUTLET BODIES SHALL BE PLATED CAST ALLOY WITH SIMILAR 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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SCALE :	JOB NUMBER :
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0	10/30/17	ISSUED FOR CONSTRUCTION	JRF/DTS	JKM
A	09/28/17	ISSUED FOR REVIEW	JRF	FEP

STATE OF CONNECTICUT
PETROS TSOUKALAS
LICENSED PROFESSIONAL ENGINEER

PETROS E. TSOUKALAS
CONNECTICUT LICENSED PROFESSIONAL ENGINEER - LICENSE NUMBER: PEN.32577

SITE NAME: NEWINGTON
SITE ID: CT52XC043

99 CEDARWOOD LANE
NEWINGTON, CT 06111

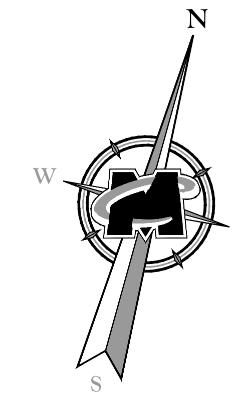
RED BANK OFFICE
331 Newman Springs Road
Suite 203
Red Bank, NJ 07701-5699
Phone: 732.383.1950
Fax: 732.383.1984

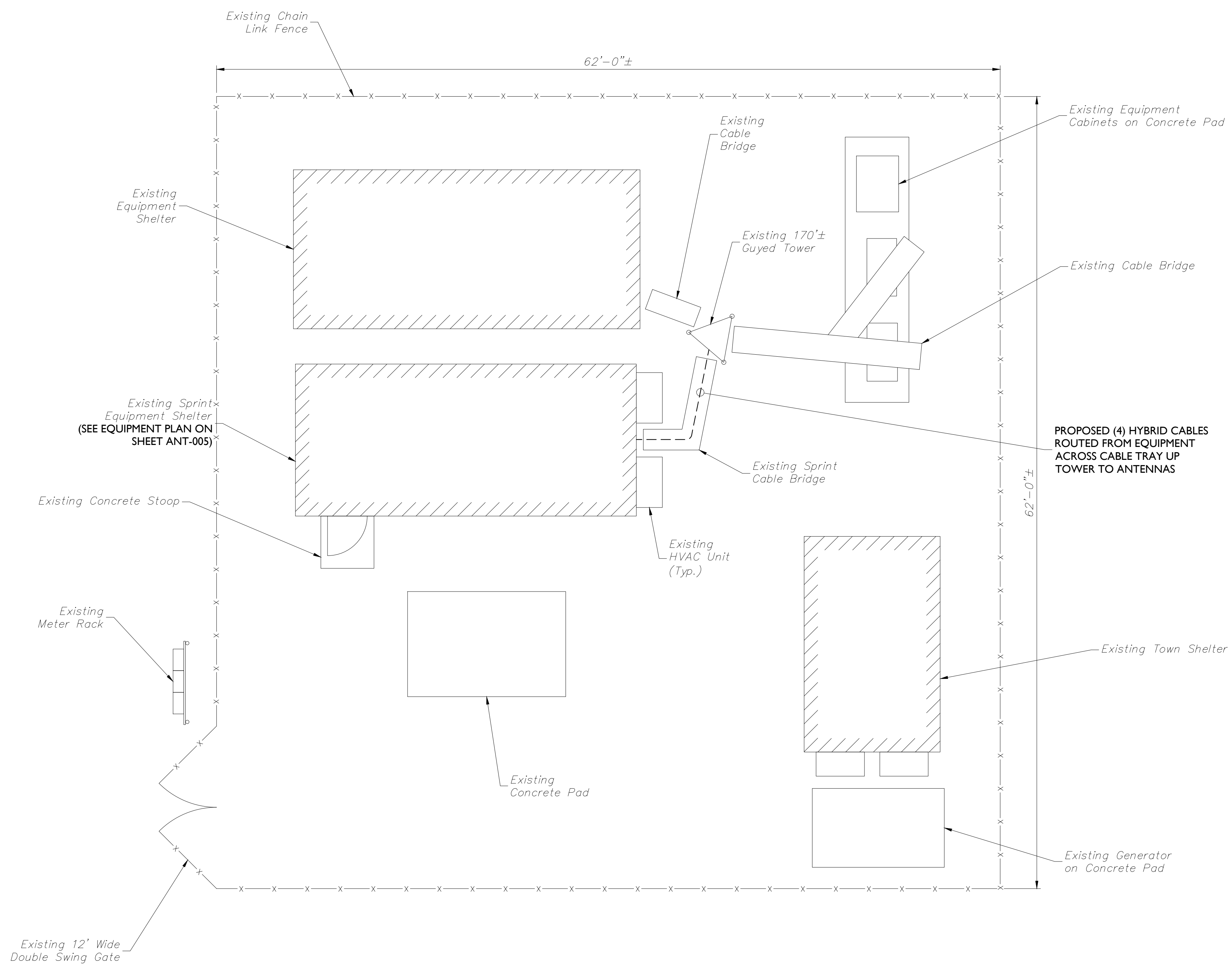
SHEET TITLE :
GENERAL NOTES - 3

SHEET NUMBER :
ANT-003.00

GENERAL NOTES:

1. SITE INFORMATION OBTAINED FROM THE FOLLOWING:
   A. DRAWINGS ENTITLED "NEWINGTON", PREPARED BY BAY STATE DESIGN, INC. OF MARLBOROUGH, MA DATED 05/10/13.
2. CONTRACTOR SHALL VERIFY ALL PLANS AND EXISTING DIMENSIONS AND CONDITIONS ON THE JOB SITE AND SHALL IMMEDIATELY NOTIFY THE ARCHITECT/ENGINEER IN WRITING OF ANY DISCREPANCIES BEFORE PROCEEDING WITH THE WORK OR BE RESPONSIBLE FOR SAME.





COMPOUND PLAN

SCALE : 1" = 5'
(DO NOT SCALE 11"X17" DRAWINGS)

LEGEND

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

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REV	DATE	DESCRIPTION	DRAWN BY	CHECKED BY

PETROS E. TSOUKALAS
CONNECTICUT LICENSED PROFESSIONAL ENGINEER - LICENSE NUMBER: PEN.32577

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SITE ID: CT52XC043

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SHEET TITLE :
COMPOUND PLAN

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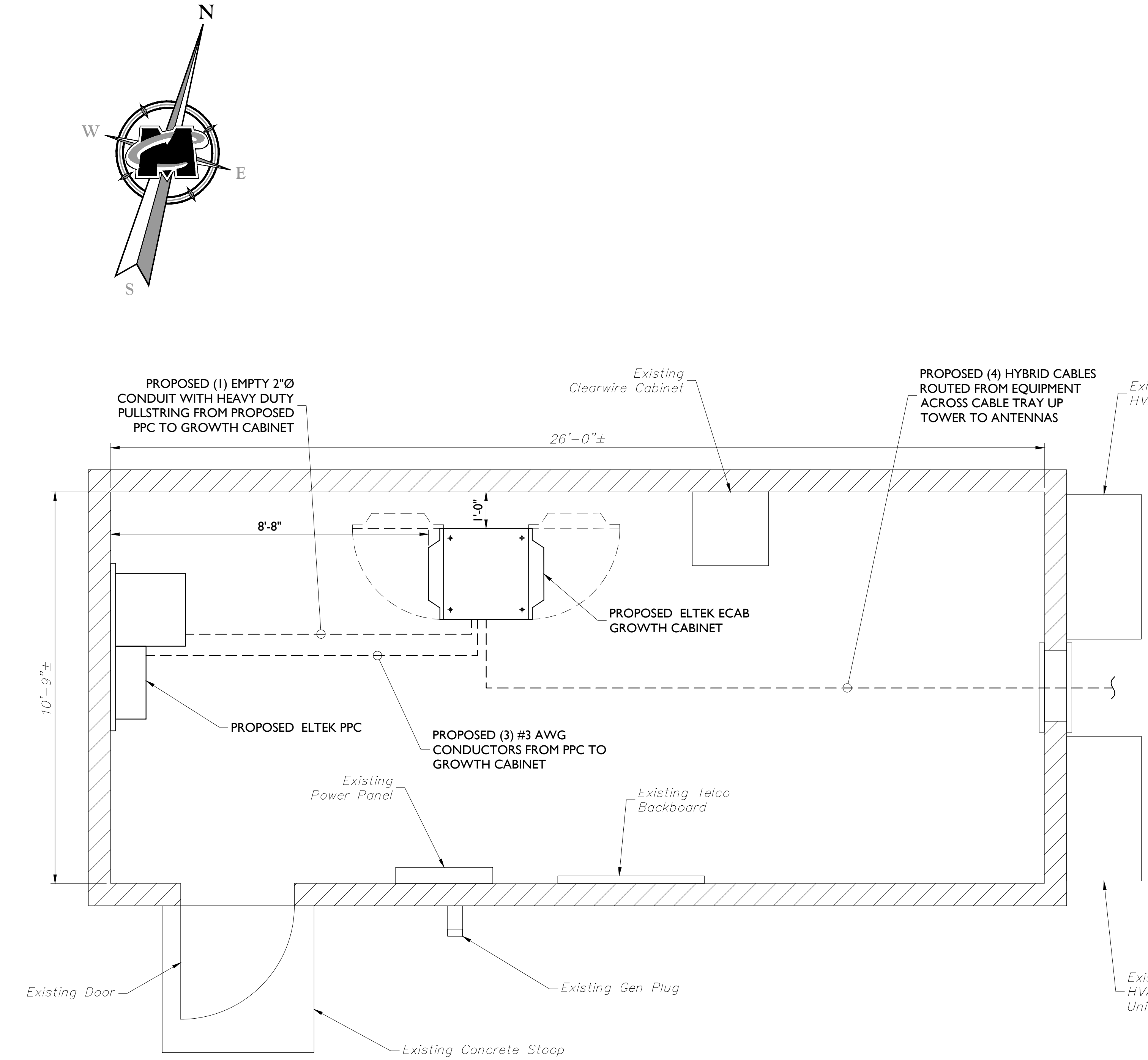

EQUIPMENT PLAN

SCALE : 1" = 2'
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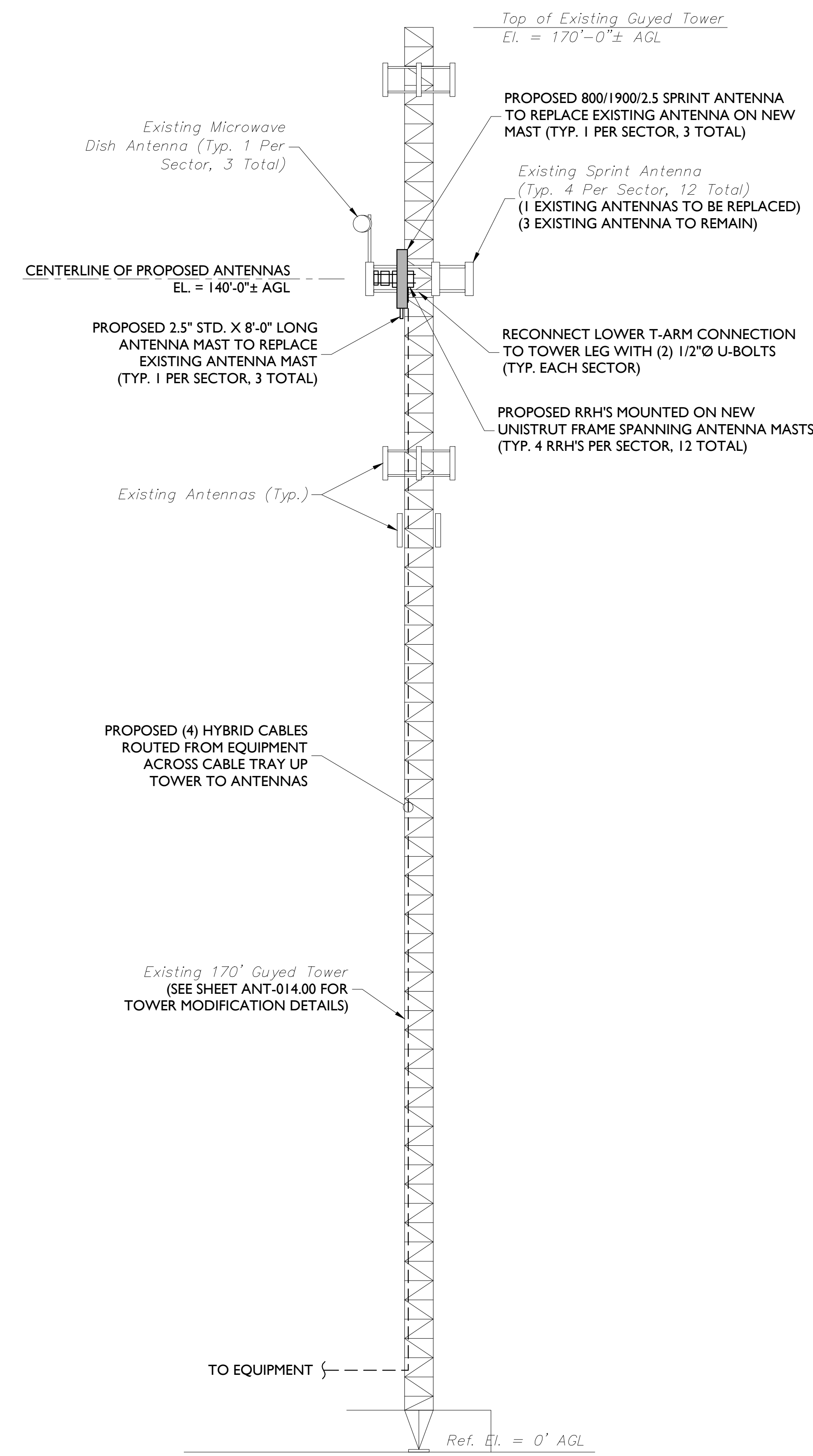

ELEVATION

SCALE : 1" = 10'
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LEGEND

LIGHT LINE WORK INDICATES EXISTING OBJECTS

HEAVY LINE WORK INDICATED PROPOSED OBJECTS

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STATE OF CONNECTICUT PETROS TSOUKALAS 32577 LICENSED PROFESSIONAL ENGINEER

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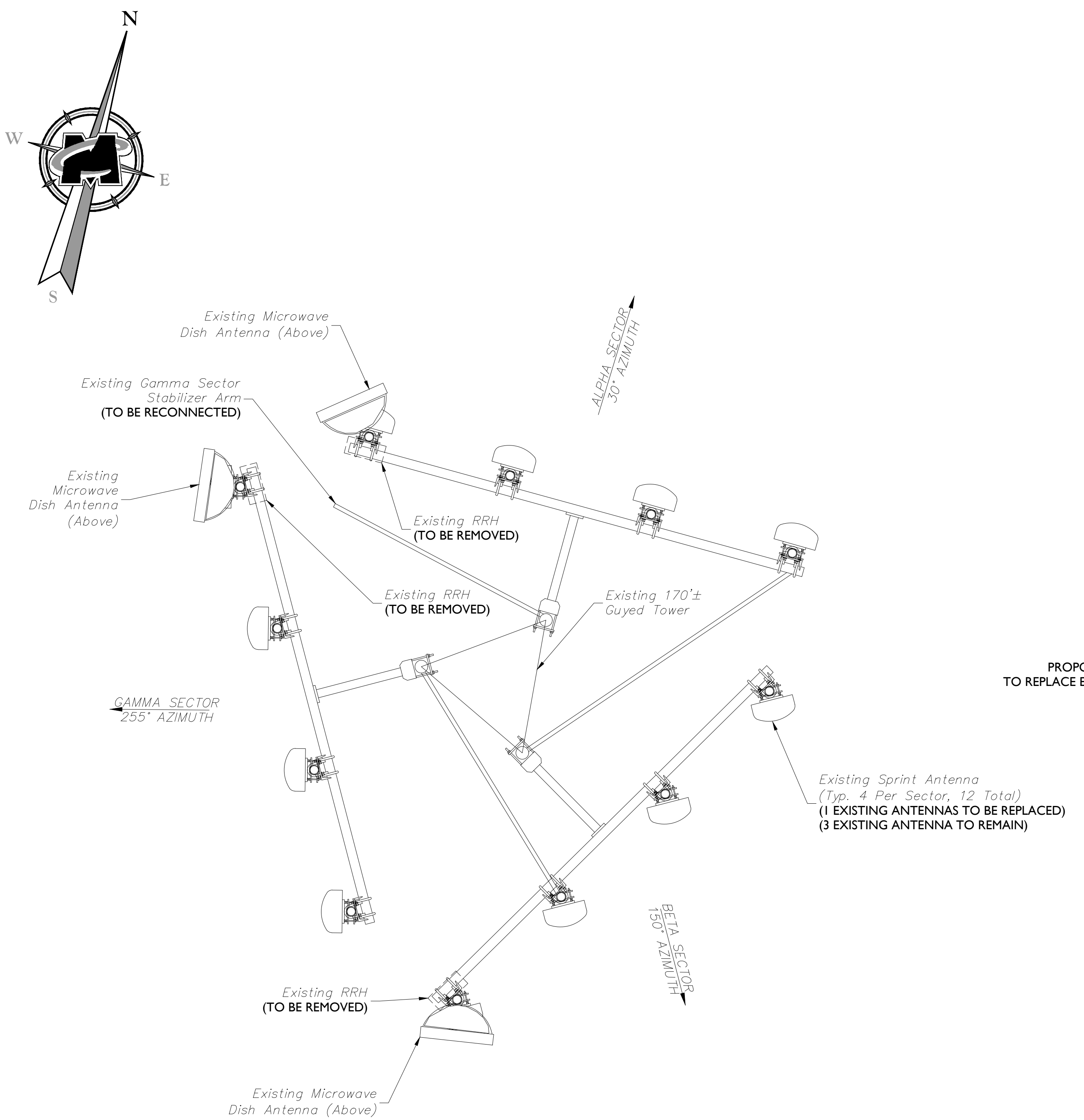
EQUIPMENT PLAN AND ELEVATION

SHEET NUMBER :
ANT-005.00

NOTE:
PROPOSED ANTENNA INSTALLATION MUST MEET SPRINT GUIDELINES FOR SPACING. CONTRACTOR TO VERIFY IN FIELD.



EXISTING ANTENNA LAYOUT

SCALE : 1" = 2'
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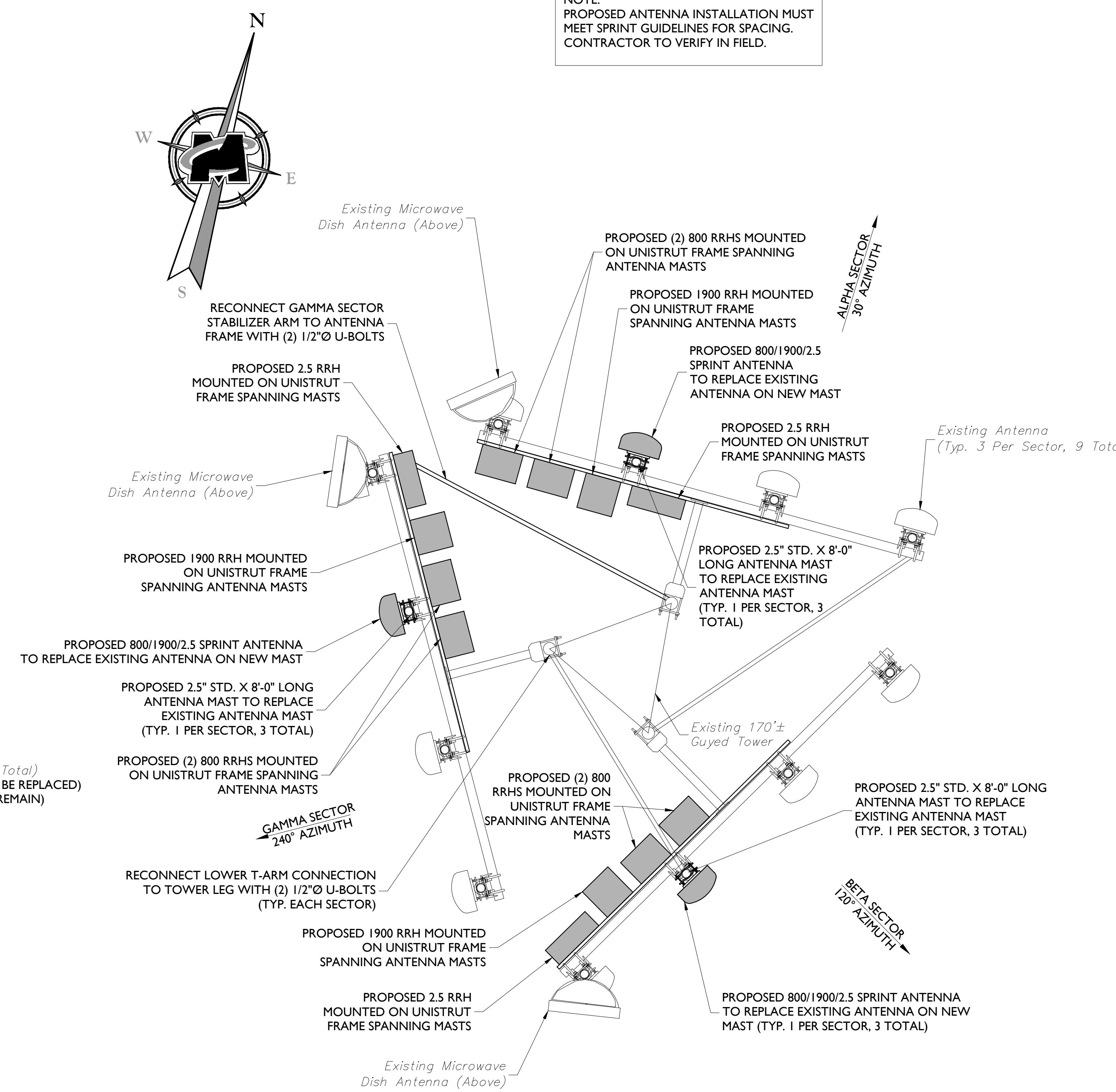

PROPOSED ANTENNA LAYOUT

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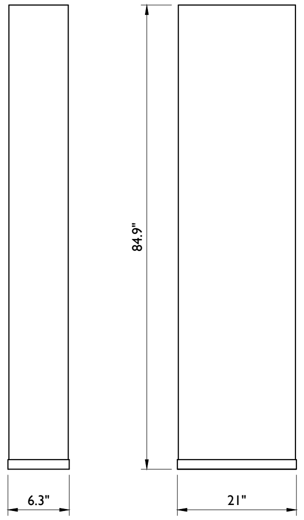
SHEET TITLE :
ANTENNA
ORIENTATION PLANS

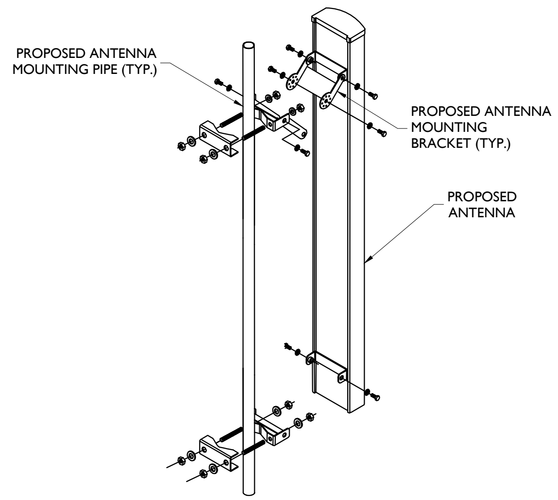
SHEET NUMBER :
ANT-006.00



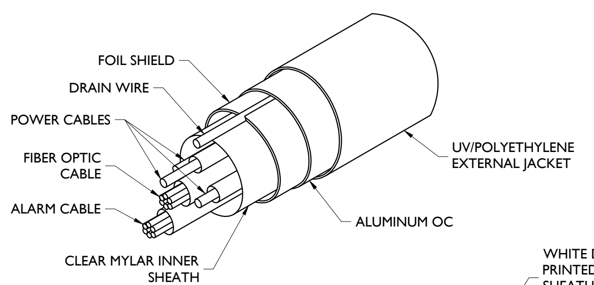
WEIGHT = 58 LBS

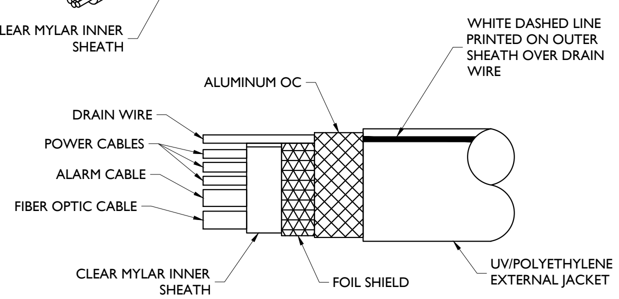
KMW ETCR-654L12H6

ANTENNA DETAIL
NOT TO SCALE



ANTENNA MOUNTING DETAIL
NOT TO SCALE





HYBRID CABLE
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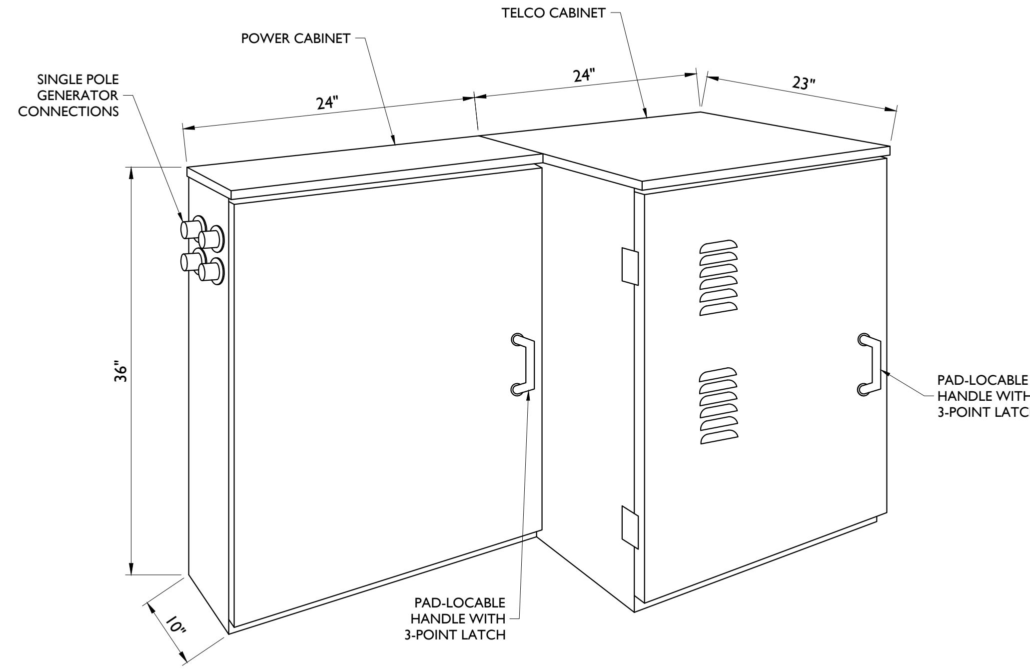
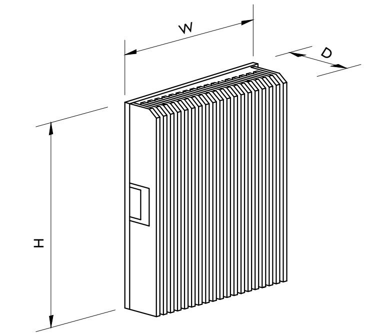
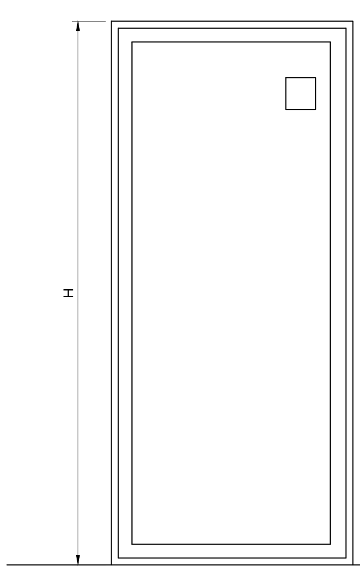


ELTEK POWER PROTECTION CABINET DETAIL
NOT TO SCALE

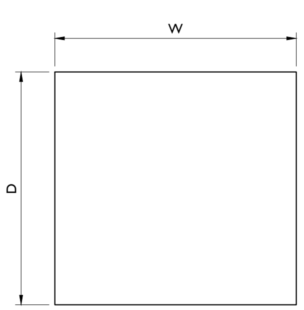


MODEL:	HEIGHT (H)	WIDTH (W)	DEPTH (D)	WEIGHT
ALU TD-RRH8x20-25	26"	18.6"	6.7"	76.2 LBS
ALU RRH-4x45-1900	25"	12"	12"	69.5 LBS
ALU RRH-2x50-800	16"	13"	10"	69.1 LBS

RRH SPECIFICATIONS
NOT TO SCALE



FRONT VIEW

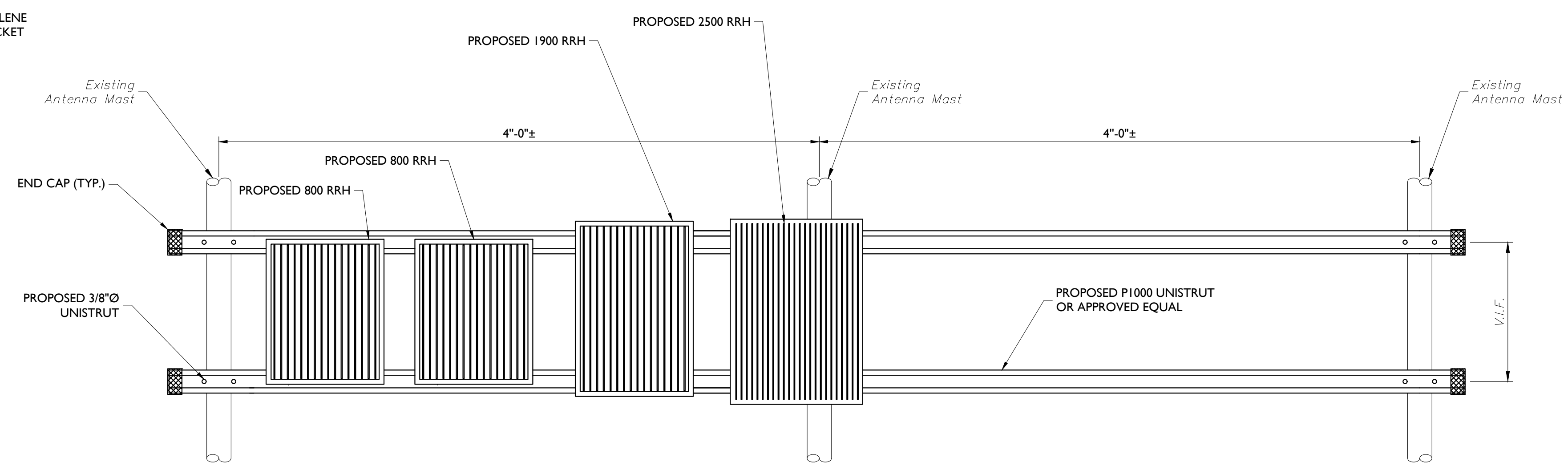


TOP VIEW

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

ECAB ELTEK

GROWTH CABINET DETAIL
NOT TO SCALE



NOTES:

1. ALL FASTENERS ARE 1/2"Ø. ALL DRILLED HOLES SHALL BE 9/16"Ø.
2. MOUNT RRH TO UNISTRUT WITH 3/8"Ø UNISTRUT BOLTING HARDWARE AND SPRING NUTS. TYPICAL FOUR (4) PER DEVICE SUBCONTRACTOR SHALL SUPPLY.
3. 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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1	12/21/17	TOWER MODIFICATION	JRF	JKM
0	10/30/17	ISSUED FOR CONSTRUCTION	JRF/DTS	JKM
A	09/28/17	ISSUED FOR REVIEW	JRF	FEP

PETROS E. TSOUKALAS
CONNECTICUT LICENSED PROFESSIONAL ENGINEER - LICENSE NUMBER: PEN.[illegible]

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SITE ID: CT52XC043

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SHEET TITLE :
DETAILS - 1

SHEET NUMBER :
ANT-007.00

RF NOTES

1. ACTUAL CABLE LENGTHS SHALL BE DETERMINED PER SITE CONDITION BY SUBCONTRACTOR.
2. THE DESIGN IS BASED ON RF DATA SHEETS, SIGNED AND APPROVED.
3. RADIO SIGNAL CABLE AND RACEWAY SHALL COMPLY WITH THE REQUIREMENTS OF THE NATIONAL ELECTRICAL CODE (NEC, NFPA 70), CHAPTER 8.
4. 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.
5. 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.
6. THE OUTDOOR CABLE SUPPORT SYSTEM SHALL BE PROVIDED WITH AN ICE SHIELD TO SUPPORT AND PROTECT ANTENNA CABLE RUNS.
7. 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.
8. ALL FEEDER LINE AND JUMPER CONNECTORS SHALL BE 7/16 DIN CABLE CONNECTORS THAT MEET IP68 STANDARDS.
9. 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.

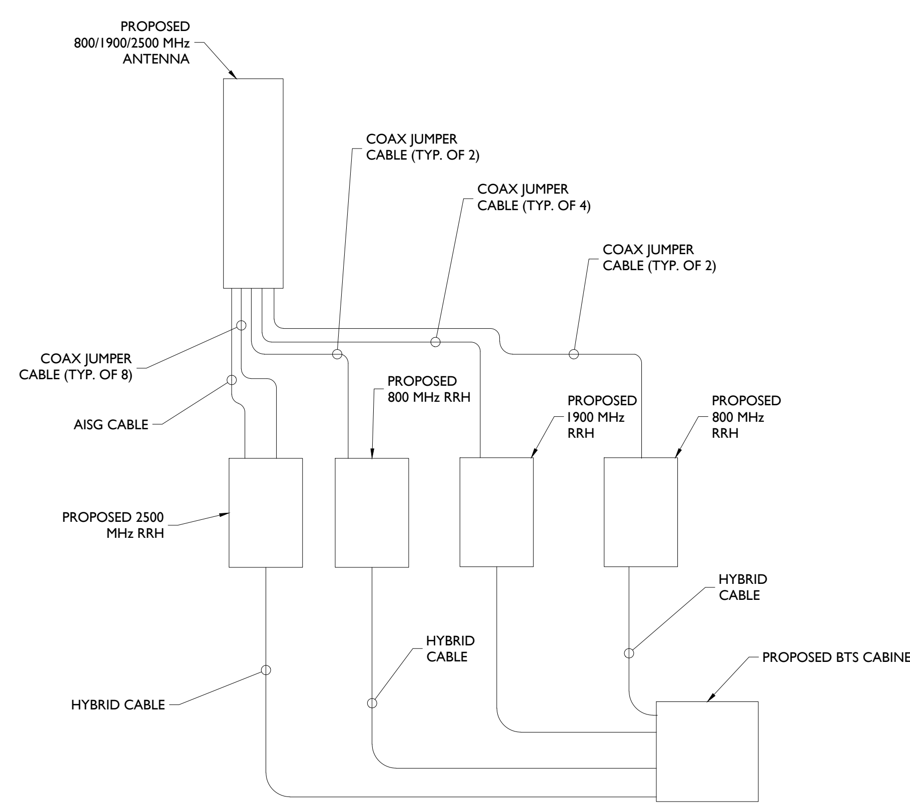
   ALSO ACCEPTABLE IS THE USE OF BUTYL RUBBER WEATHERPROOFING KIT APPROVED BY CABLE MANUFACTURER AND CONTRACTOR. START BUTYL RUBBER TAPE APPROXIMATELY 5 INCHES FROM THE CONNECTOR AND WRAP 2 INCHES TOWARD THE CONNECTOR, THEN REVERSE THE TAPE SO THAT THE STICKY SIDE IS UP. TAPE OVER THE CONNECTOR OR SURGE 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.
10. ANTENNAS SHALL BE PAINTED, WHEN REQUIRED, BY THE LANDLORD OR AUTHORITY HAVING JURISDICTION IN ACCORDANCE WITH ANTENNA MANUFACTURERS' SURFACE PREPARATION AND PAINTING REQUIREMENTS.
11. 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.
12. 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.
13. ALL RADIO SIGNAL CABLE SHALL BE LABELED AND COLOR CODED PER MARKET REQUIREMENTS.
14. 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.
15. 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.
16. DC CONNECTORS AT OUTDOOR BIAS-Ts OR DIPLEXER/TRIPLEXER PORTS SHALL BE WEATHERPROOFED PER MANUFACTURER RECOMMENDATIONS.
17. AISG CONNECTIONS DO NOT REQUIRE ADDITIONAL WEATHERPROOFING UNLESS RECOMMENDED BY MANUFACTURER OR BY MARKET REQUIREMENTS.
18. 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.
19. 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 STATUS	HEIGHT (in)	WIDTH (in)	DEPTH (in)	WEIGHT (lbs)	ANTENNA AZIMUTH	ANT. CL. ELEV (ft.)	ELECTRICAL DOWNTILT	MECHANICAL DOWNTILT
ALPHA	A1	KMW ETCR-654L12H6	800/1900/2500	REPLACE	84.9	21	6.3	85	0°	140'	5°/3°/2°	0°
BETA	B4	KMW ETCR-654L12H6	800/1900/2500	REPLACE	84.9	21	6.3	85	120°	140'	5°/3°/2°	0°
GAMMA	C4	KMW ETCR-654L12H6	800/1900/2500	REPLACE	84.9	21	6.3	85	240°	140'	5°/3°/2°	0°

BILL OF MATERIALS

NUMBER	QUANTITY	DESCRIPTION	MANUFACTURER	MODEL NUMBER
1	3	PANEL ANTENNA	KMW	ETCR-65L12H6
2	3	2500MHZ RRH	ALU	TD-RRH8X20-25
3	3	1900MHZ RRH	ALU	RRH-4X45-1900
4	6	800MHZ RRH	ALU	RRH-2X50-800
5	4 @ 210 LF EACH	1-1/4"Ø HYBRID FIBER RISER	ALU	TBD
6	48	1/2"Ø JUMPER CABLE (8' LONG)	TBD	
7	3	0.315"Ø AISG CABLE (8' LONG)	COMMSCOPE	ATCB-B01-006
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	JKM
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PETROS E. TSOUKALAS
CONNECTICUT LICENSED PROFESSIONAL ENGINEER - LICENSE NUMBER: PEN.32577

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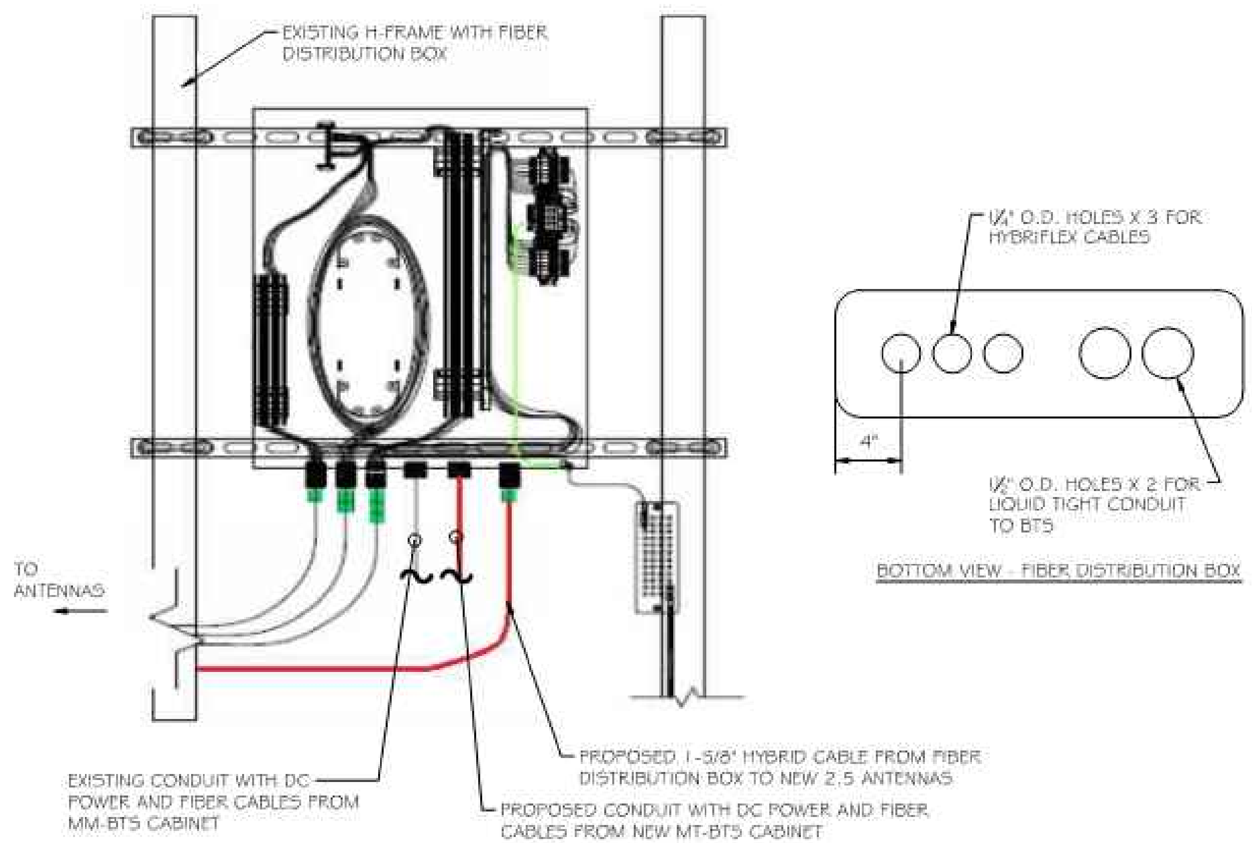
SHEET TITLE:
ANTENNA SCHEDULE, WIRING DIAGRAM, BILL OF MATERIALS AND NOTES

SHEET NUMBER:
ANT-008.00



TYPICAL FIBER DISTRIBUTION BOX DETAIL

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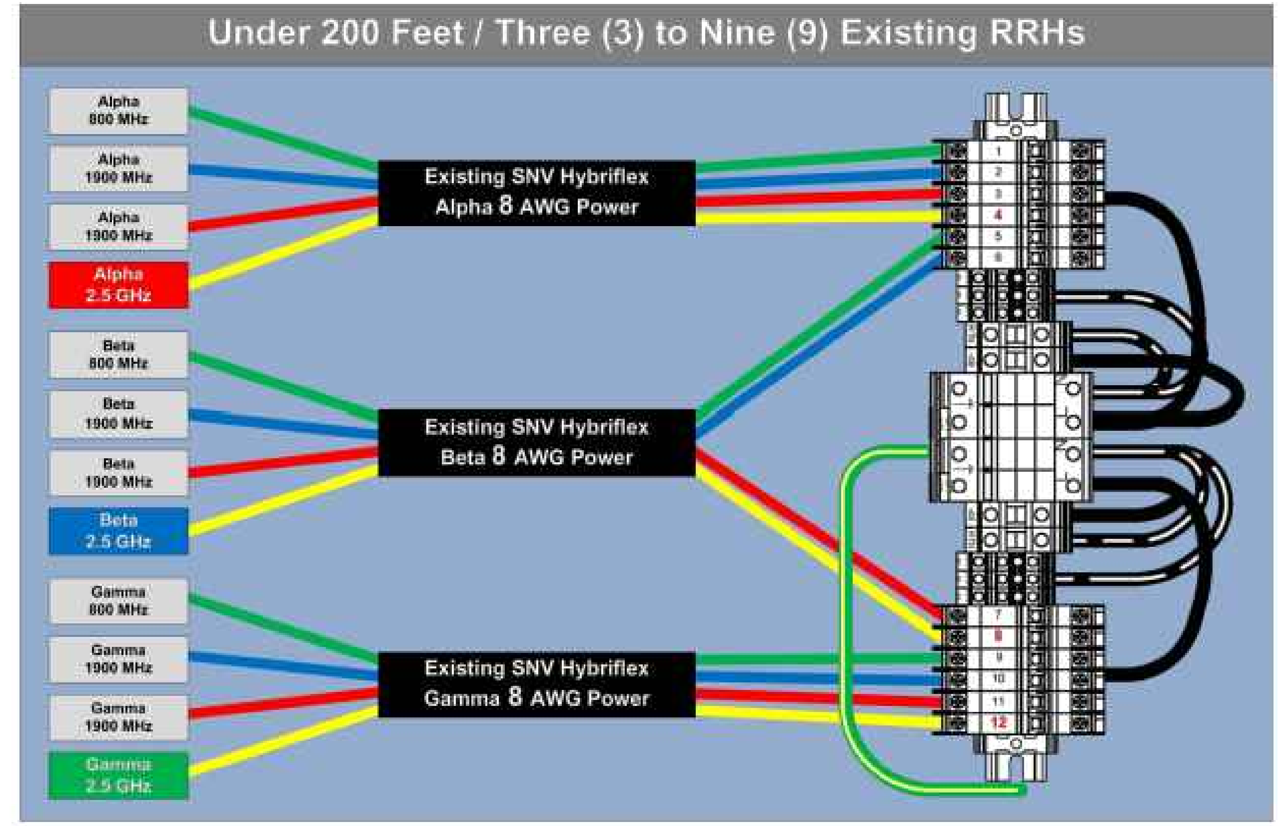

RRH TO DISTRIBUTION BOX POWER CONNECTIVITY DETAIL

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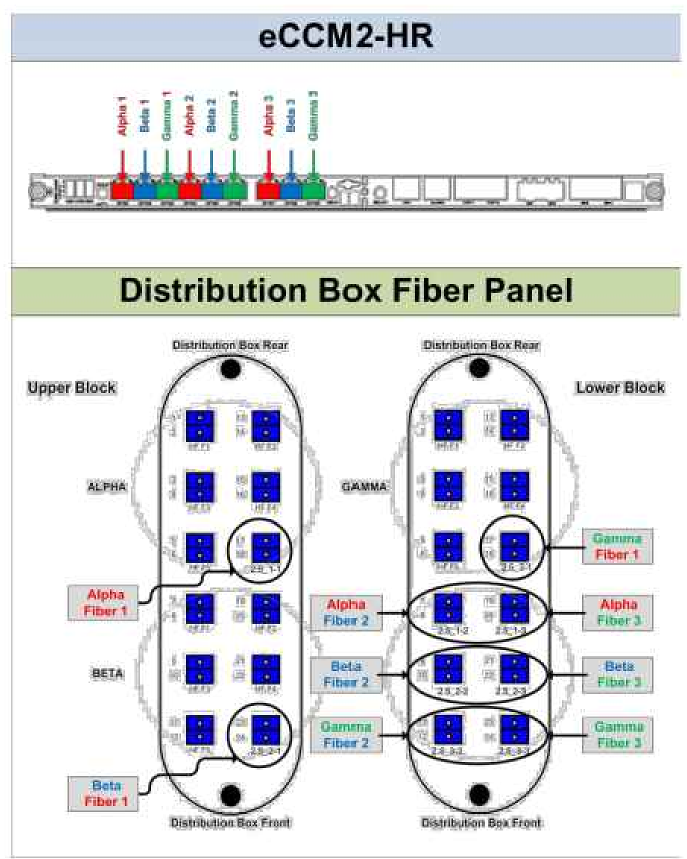

BTS TO DISTRIBUTION BOX FIBER CONNECTIVITY DETAIL

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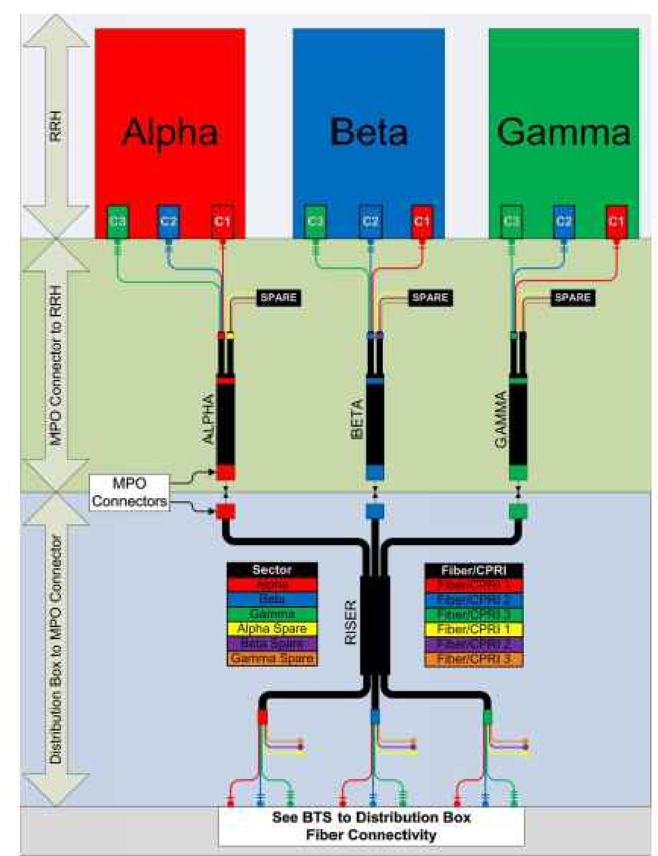

RRH TO DISTRIBUTION BOX FIBER CONNECTIVITY DETAIL

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SHEET TITLE :

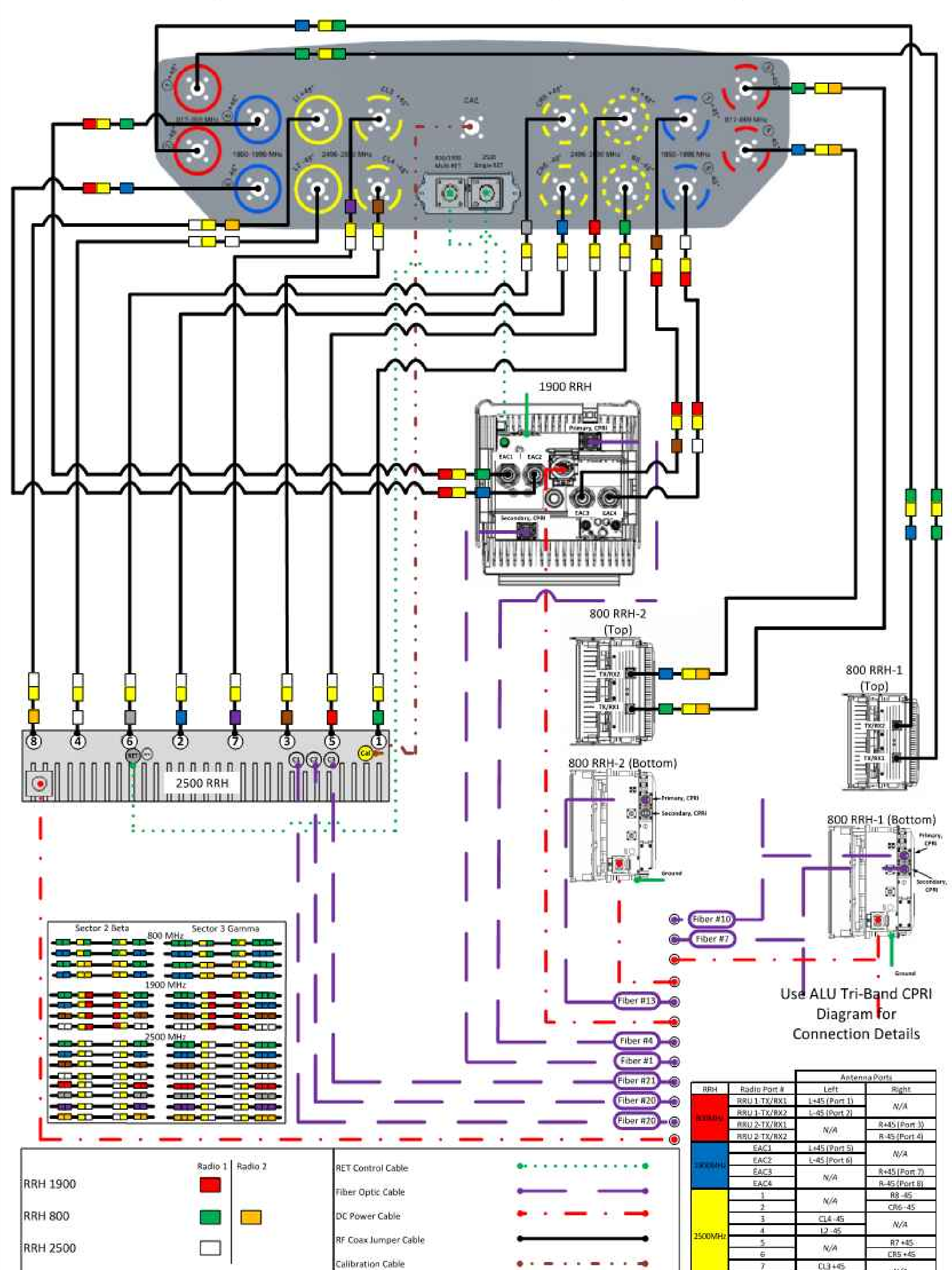
FIBER PLUMBING DIAGRAMS - 1

SHEET NUMBER :

ANT-009.00

Prepared By	Creation Date	Revision Number	
Mark Elliott	January 24, 2017	R-2	Sprint
Approved By	Approval Date		
RAN Hardware & Antenna Teams	January 26, 2017		

KMW 16 Port Nokia-A RRH 800, 1900, and 2500



Use ALU Tri-Band CPRI Diagram for Connection Details

RRH	Radio Port #	Antenna Ports: Left	Antenna Ports: Right
800MHz	RRU 1-TX/RX1	L+45 (Port 1)	N/A
	RRU 1-TX/RX2	L-45 (Port 2)	
	RRU 2-TX/RX1	N/A	R+45 (Port 3)
	RRU 2-TX/RX2		R-45 (Port 4)
1900MHz	EAC1	L+45 (Port 5)	N/A
	EAC2	L-45 (Port 6)	
	EAC3	N/A	R+45 (Port 7)
	EAC4		R-45 (Port 8)
2500MHz	1	N/A	R8 -45
	2		CR6 -45
	3	CL4 -45	N/A
	4	L2 -45	
	5	N/A	R7 +45
	6		CR5 +45
	7	CL3 +45	N/A
	8	L1 +45	

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SHEET TITLE :
FIBER PLUMBING DIAGRAMS - 2

SHEET NUMBER :
ANT-010.00

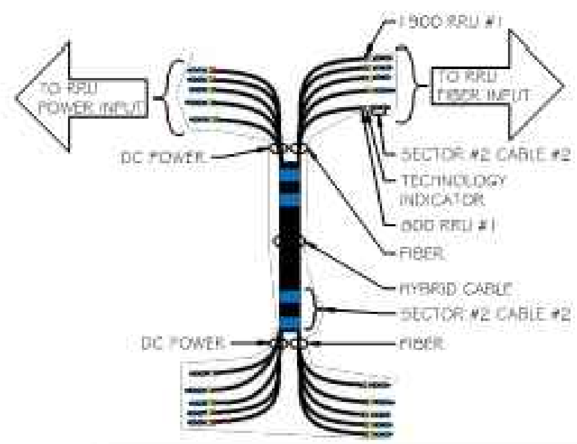
CABLE MARKING NOTES

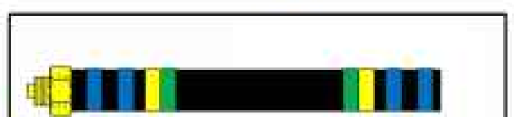
1. ALL CABLES SHALL BE MARKED WITH 2" WIDE, UV STABILIZED, UL APPROVED TAPE.
2. THE FIRST RING SHALL BE CLOSEST TO THE END OF THE CABLE AND SPACED APPROXIMATELY 2" FROM THE END CONNECTOR, WEATHERPROOFING, OR BREAKOUT UNIT. THERE SHALL BE 1" SPACE BETWEEN EACH RING.
3. A 2" GAP SHALL SEPARATE THE CABLE 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.
4. 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.
5. 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
6. 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.
7. HFC "MAIN TRUNK" WILL NOT BE MARKED WITH THE FREQUENCY CODES, AS IT CONTAINS ALL FREQUENCIES.
8. 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

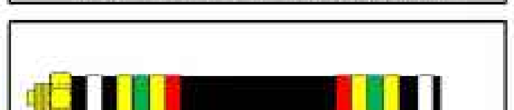
Sector	Cable	First Ring	Second Ring	Third Ring
1 Alpha	1	Green	No Tape	No Tape
1	2	Blue	No Tape	No Tape
1	3	Brown	No Tape	No Tape
1	4	White	No Tape	No Tape
1	5	Red	No Tape	No Tape
1	6	Grey	No Tape	No Tape
1	7	Purple	No Tape	No Tape
1	8	Orange	No Tape	No Tape
2 Beta	1	Green	Green	No Tape
2	2	Blue	Blue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





Example – Sector 2, Cable 2, 800mhz Radio #1

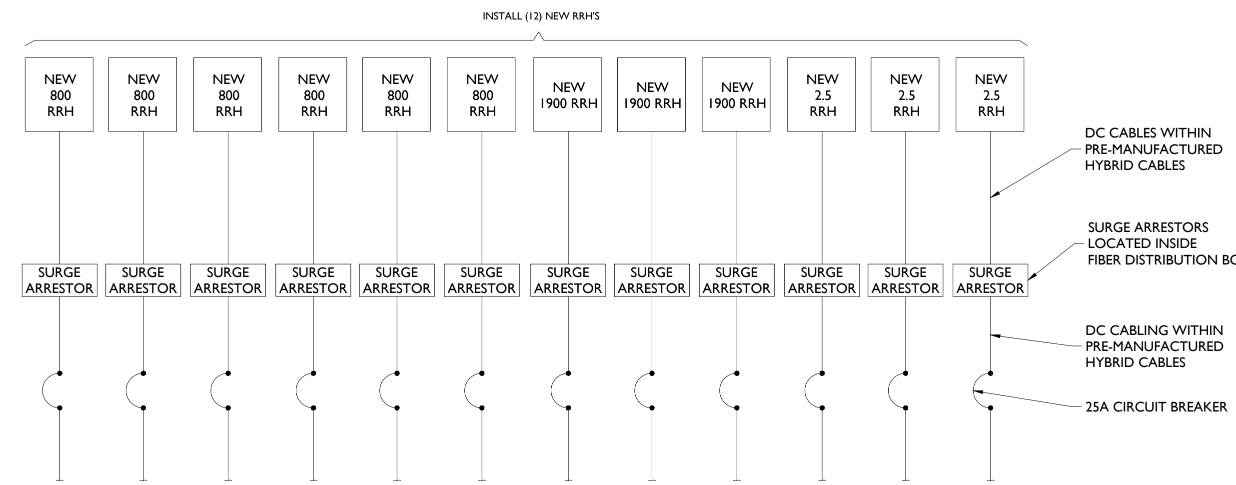
Example – Sector 3, Cable 1, 1900mhz Radio #1



Example – Sector 1, Cable 4, 800 mhz Radio #1 and 1900mhz Radio #1

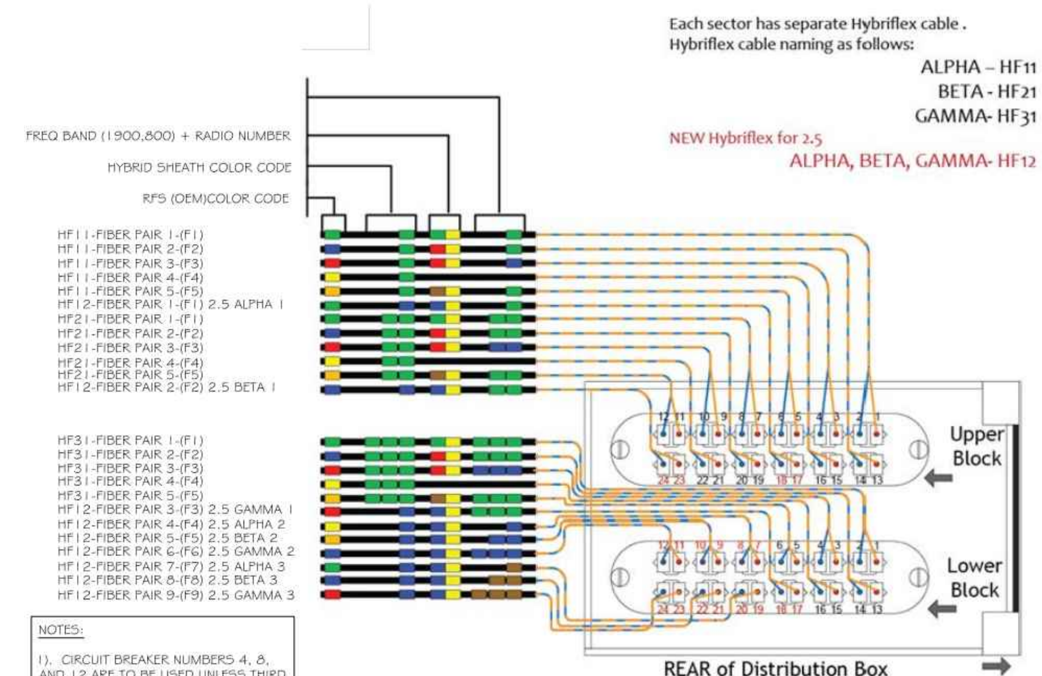
COLOR CODING CHARTS

NOT TO SCALE



DC ONE-LINE DIAGRAM

NOT TO SCALE



NOTES:

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

TYPICAL FIBER DISTRIBUTION

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SCALE :	JOB NUMBER :
AS SHOWN	17924017A

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

PETROS E. TSOUKALAS
CONNECTICUT LICENSED PROFESSIONAL ENGINEER - LICENSE NUMBER: PEN.02577

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SITE ID: CT52XC043

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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 PRI9OR 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:

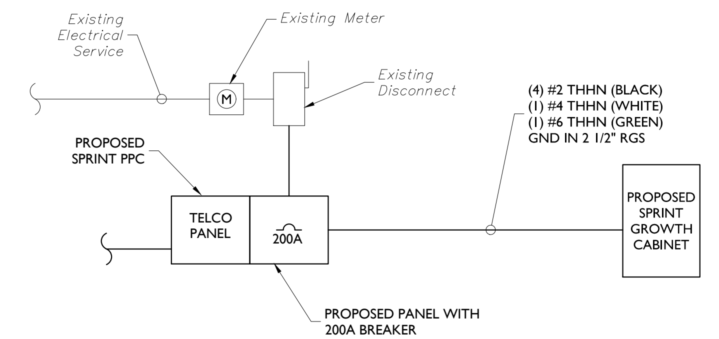
1. ALL CONDUIT SHALL BE MINIMUM SIZE OF 3/4" FOR POWER CIRCUITS AND CONTROL CIRCUITS EXCEPT WHERE FLEXIBLE CONDUIT IS CALLED FOR ON PROJECT DOCUMENTS. ALL EXTERIOR EXPOSED CONDUIT SHALL BE GRC (GALVANIZED RIGID METAL CONDUIT). ALL UNDERGROUND, IN SLAB OR UNDER SLAB SHALL BE RNC (RIGID NONMETALLIC CONDUIT). 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 THNN/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 TO GROUND RING 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-AT.
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.

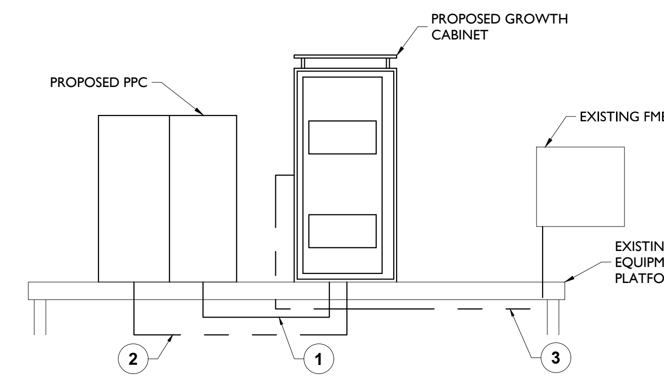


NOTES:

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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SCALE :	JOB NUMBER :
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PETROS E. TSOUKALAS
CONNECTICUT LICENSED PROFESSIONAL ENGINEER - LICENSE NUMBER: PEN.32577

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SITE ID: CT52XC043

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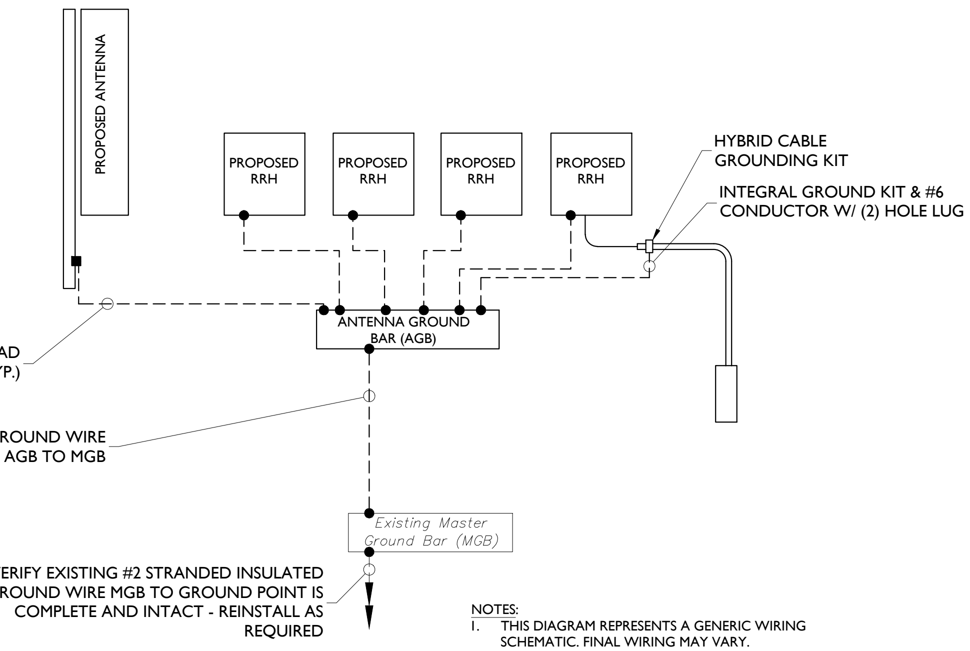
SHEET TITLE :
ELECTRICAL AND GROUNDING NOTES

SHEET NUMBER :
ANT-012.00

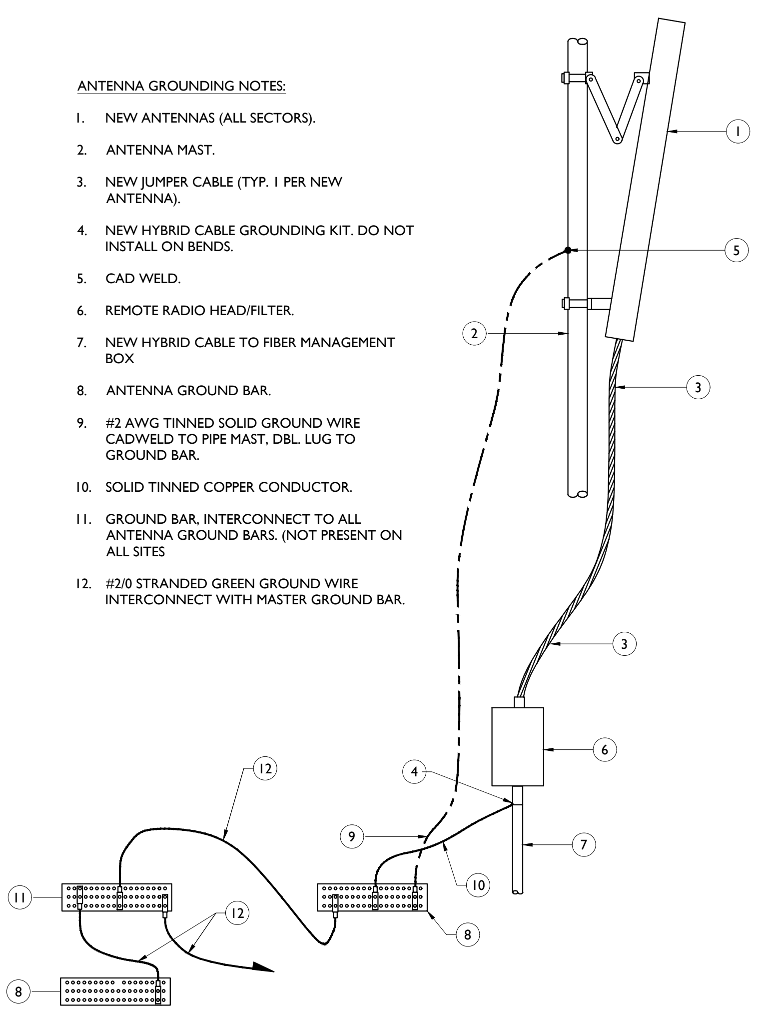


NOTES:
1. THIS DIAGRAM REPRESENTS A GENERIC WIRING SCHEMATIC. FINAL WIRING MAY VARY.
2. GROUNDING INSTALLATION TYPICAL AT EACH SECTOR.

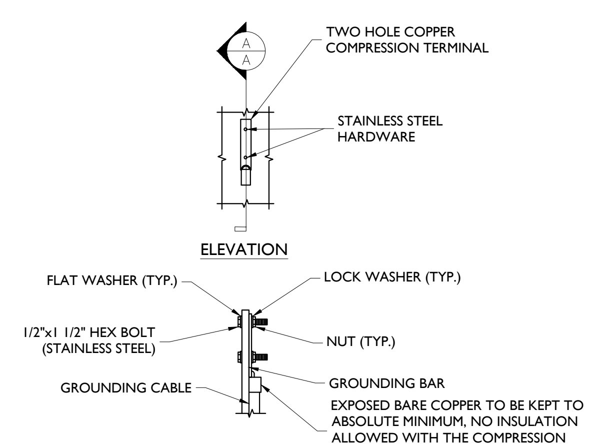
GROUNDING SCHEMATIC
NOT TO SCALE

ANTENNA GROUNDING NOTES:

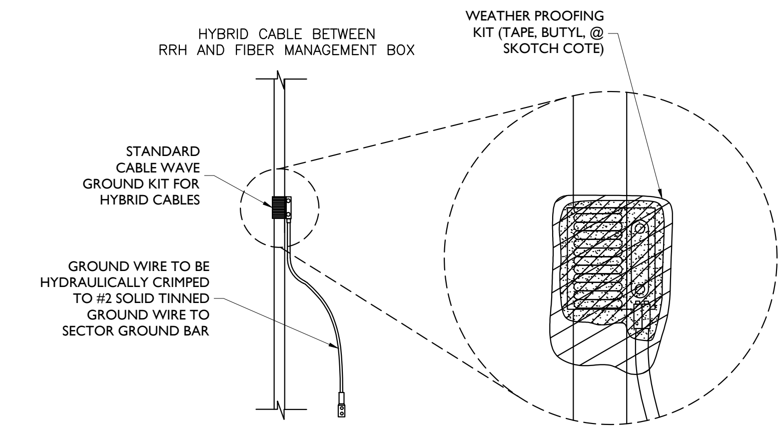
1. NEW ANTENNAS (ALL SECTORS).
2. ANTENNA MAST.
3. NEW JUMPER CABLE (TYP. 1 PER NEW ANTENNA).
4. NEW HYBRID CABLE GROUNDING KIT. DO NOT INSTALL ON BENDS.
5. CAD WELD.
6. REMOTE RADIO HEAD/FILTER.
7. NEW HYBRID CABLE TO FIBER MANAGEMENT BOX
8. ANTENNA GROUND BAR.
9. #2 AWG TINNED SOLID GROUND WIRE CADWELD TO PIPE MAST, DBL. LUG TO GROUND BAR.
10. SOLID TINNED COPPER CONDUCTOR.
11. GROUND BAR, INTERCONNECT TO ALL ANTENNA GROUND BARS. (NOT PRESENT ON ALL SITES
12. #2/0 STRANDED GREEN GROUND WIRE INTERCONNECT WITH MASTER GROUND BAR.

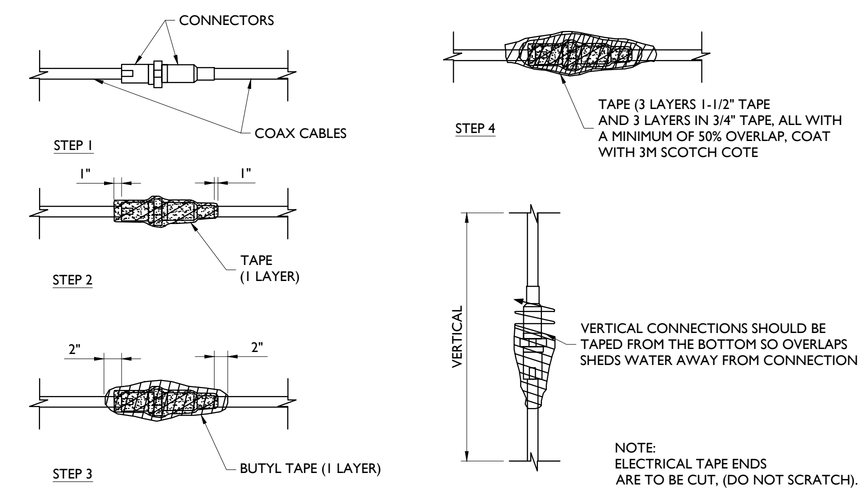


ANTENNA GROUNDING SCHEMATIC
NOT TO SCALE



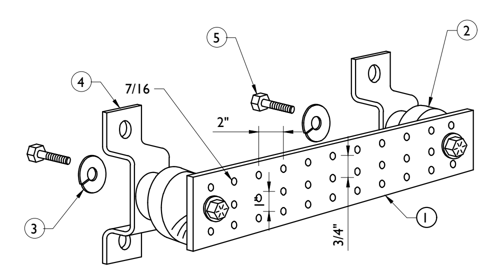
TYPICAL GROUND BAR CONNECTION DETAIL
NOT TO SCALE





NOTE:
ELECTRICAL TAPE ENDS ARE TO BE CUT, (DO NOT SCRATCH).

CABLE WRAPPING DETAIL
NOT TO SCALE



1. COPPER GROUND BAR, 1/4" X 4" X 20", NEWTON INSTRUMENT CO. CAT. NO. B-6142 OR EQUAL. HOLE CENTERS TO MATCH NEMA DOUBLE LUG CONFIGURATION. (ACTUAL GROUND BAR SIZE WILL VARY BASED ON NUMBER OF GROUND CONNECTIONS)
2. INSULATORS, NEWTON INSTRUMENT CAT. NO. 3061-4 OR EQUAL
3. 5/8" LOCKWASHERS, NEWTON INSTRUMENT CO. CAT. NO. 3015-8 OR EQUAL
4. WALL MOUNTING BRACKET, NEWTON INSTRUMENT CO. CAT NO. A-6056 OR EQUAL
5. 5/8-11 X 1" HHCS BOLTS, NEWTON INSTRUMENT CO. CAT NO. 3012-1 OR EQUAL

NOTE: INSULATORS SHALL BE ELIMINATED WHEN BONDING DIRECTLY TO MONOPOLE STRUCTURE. CONNECTION TO MONOPOLE STRUCTURE SHALL BE PER MANUFACTURERS RECOMMENDATIONS.

GROUND BAR DETAIL
NOT TO SCALE

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AS SHOWN	17924017A

REV	DATE	DESCRIPTION	DRAWN BY	CHECKED BY
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1	12/21/17	TOWER MODIFICATION	JRF	JKM
0	10/30/17	ISSUED FOR CONSTRUCTION	JRF/DTS	JKM
A	09/28/17	ISSUED FOR REVIEW	JRF	FEP

PETROS E. TSOUKALAS
CONNECTICUT LICENSED PROFESSIONAL ENGINEER - LICENSE NUMBER: PEN.25?7

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

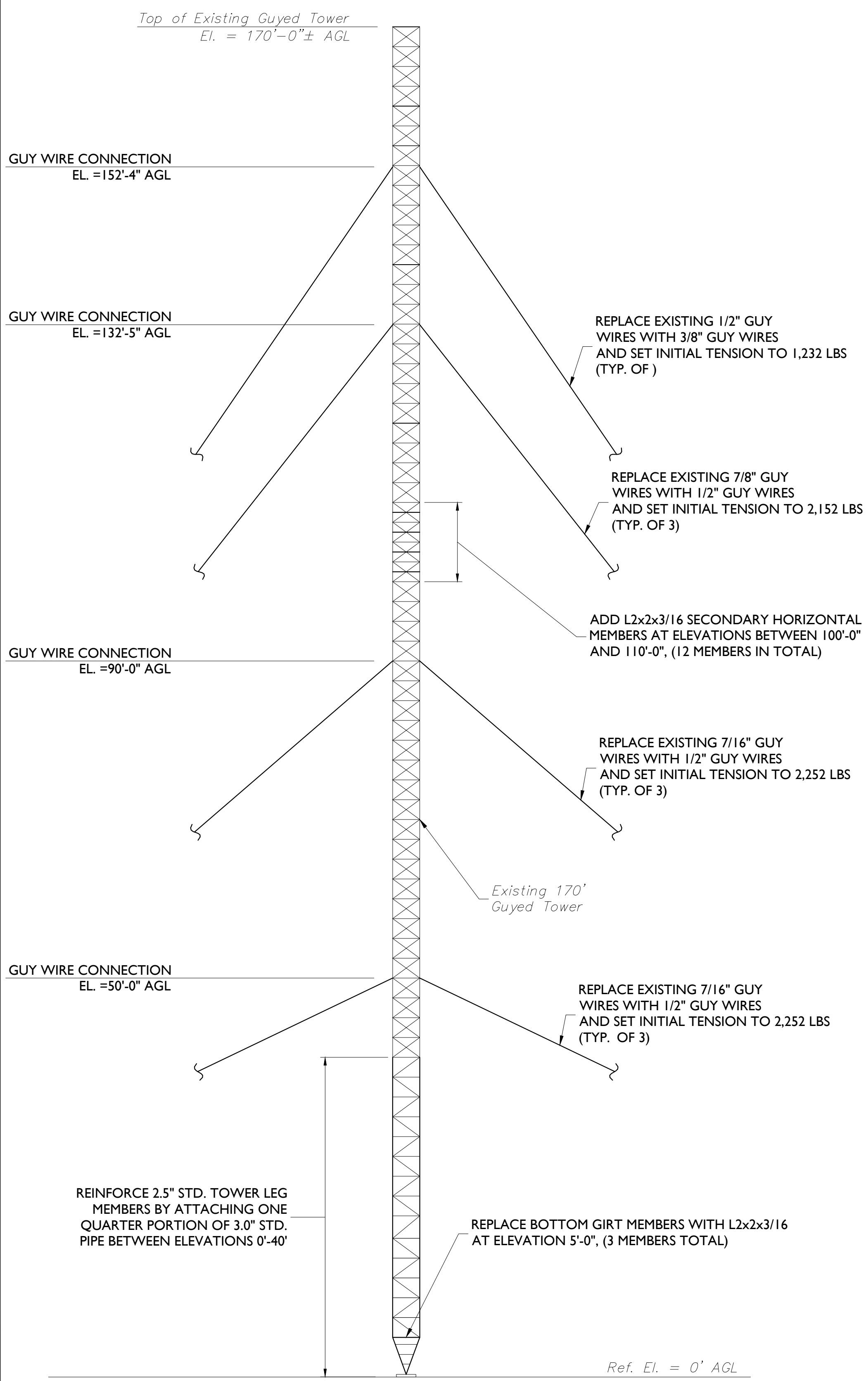
SITE NAME: NEWINGTON
SITE ID: CT52XC043

99 CEDARWOOD LANE
NEWINGTON, CT 06111

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

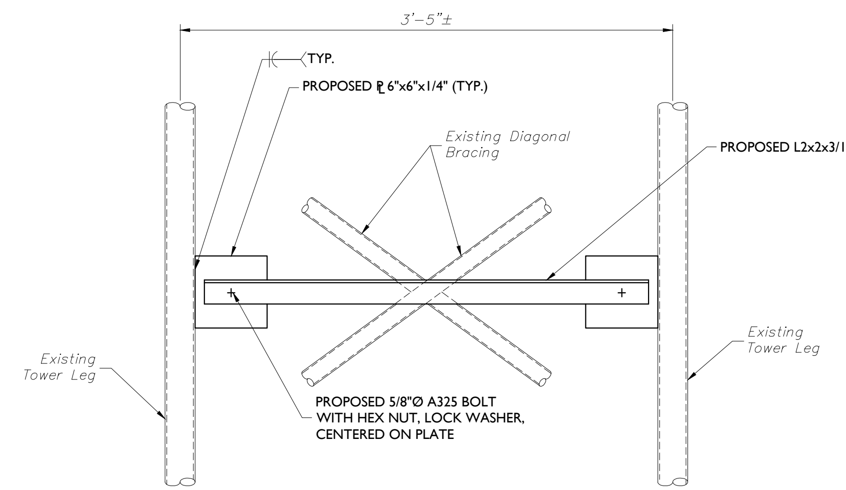
SHEET TITLE :
GROUNDING SCHEMATIC AND DETAILS

SHEET NUMBER :
ANT-013.00



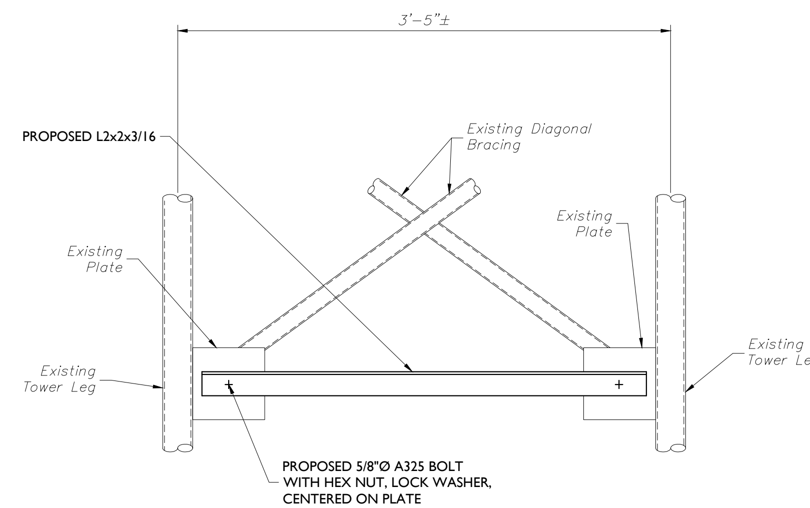
ELEVATION

SCALE : 1" = 10'
(DO NOT SCALE 11"X17" DRAWINGS)



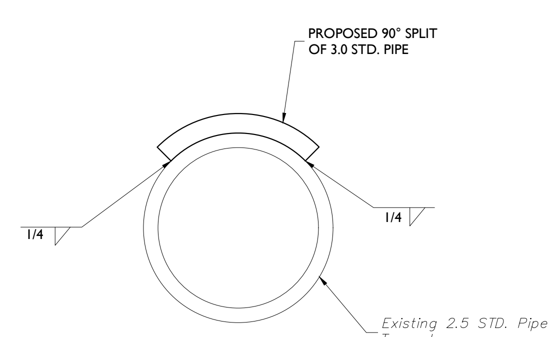
SECONDARY HORIZONTAL MEMBER DETAIL

SCALE: 1 1/2" = 1'-0"



GIRT REPLACEMENT DETAIL

SCALE: 1 1/2" = 1'-0"



TOWER LEG REINFORCEMENT DETAIL

NOT TO SCALE

MODIFICATION NOTES:

1. IF THE EXISTING CONDITIONS ARE NOT AS REPRESENTED ON THESE DRAWINGS, MASER CONSULTING SHOULD BE CONTACTED IMMEDIATELY TO RE-RVALUATE THE STRUCTURE BASED ON THE FIELD CONDITIONS AND DIMENSIONS FOUND.
2. IT IS ASSUMED THAT ANY STRUCTURAL MODIFICATION WORK SPECIFIED ON THESE DRAWINGS WILL BE ACCOMPLISHED BY KNOWLEDGEABLE WORKMEN WITH TOWER CONSTRUCTION EXPERIENCE.
3. 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.
4. CONTRACTOR SHALL VERIFY PLACEMENT OF ALL NEW PIECES FOR ADEQUATE FIT, CLEARANCES, AND DESIGN INTENT BEFORE FABRICATION STARTS.
5. 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.
6. 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.
7. 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.
8. BACK CHARGES FOR CORRECTIVE WORK OR REPLACEMENT MATERIALS WILL NOT BE ACCEPTED UNLESS EXPRESSLY AUTHORIZED BY MASER CONSULTING BEFORE ANY SUCH COSTS ARE INCURRED.
9. POST CONSTRUCTION INSPECTION TO BE COMPLETED BY OTHERS.
10. ALL FIELD CONNECTIONS, UNLESS NOTED OTHERWISE , SHALL BE BOLTED.
11. 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.
12. WHERE STEEL IS IN CONTACT WITH ALUMINUM PROVIDE ADEQUATE BARRIER TO PREVENT OXIDATION OF THE STEEL AND ALUMINUM.
13. 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.
14. COMPLY WITH ALL APPLICABLE REQUIREMENTS OF THE CURRENT EDITIONS OF THE FOLLOWING STANDARDS AND CODES:
    - 14.1. AMERICAN INSTITUTE OF STEEL CONSTRUCTION (AISC) "SPECIFICATIONS FOR THE DESIGN, FABRICATION, AND ERECTION OF STRUCTURAL STEEL FOR BUILDINGS".
    - 14.2. AMERICAN IRON AND STEEL INSTITUTE (AISI) "DESIGN OF COLD FORMED STEEL STRUCTURAL MEMBERS".
    - 14.3. ASTM A563-04 "STANDARD SPECIFICATION FOR CARBON AND ALLOY STEEL NUTS".
    - 14.4. ASTM F436-03 "STANDARD SPECIFICATION FOR HARDENED STEEL WASHERS"
    - 14.5. ASTM A325-04 "STANDARD SPECIFICATION FOR STRUCTURAL BOLTS, STEEL, HEAT TREATED, $\frac{120}{105}$ KSI MENIMUM TENSILE STRENGTH".
    - 14.6. ASTM A153/A153M-09 "STANDARD SPECIFICATION FOR ZINC COATING (HOT-DIP) ON IRON AND STEEL HARDWARE".
    - 14.7. ASTM 123/A1123M-09 "STANDARD SPECIFICATION FOR ZINC (HOT-DIP GALVANIZED) COATINGS ON IRON AND STEEL PRODUCTS".
15. 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.
16. 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.
17. 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.
18. USE PRECAUTIONS & PROCEDURES PER AWS D1.1 WHEN WELDING GALVANIZED MATERIALS. AT COMPLETION OF WELDING, ALL DAMAGE TO GALVANIZED COATING SHALL BE REPAIRED.
19. 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".
20. MEMBERS SHALL BE LAID PLUMB AND TRUE AS SHOWN ON THE DRAWINGS.
21. COPE ALL FRAMING AT ENDS AS NECESSARY, UNLESS NOTED OTHERWISE.
22. THE GENERAL CONTRACTOR AND THEIR SUBCONSULTANTS SHALL BE RESPONSIBLE FOR OBTAINING ALL PERMITS AND INSPECTIONS WHICH MAY BE REQUIRED FOR THE WORK.
23. ONLY ONE ANGLE IS TO BE REMOVED AND REPLACED AT A TIME.

LEGEND

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

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Cherundolo Consulting

Charles Cherundulo Consulting, Inc.
713 Clover Lane
Moscow, PA 18444
Phone: 973-207-4248
Fax: 570-842-5592

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STATE OF CONNECTICUT · PETROS TSOUKALAS · No. 25257 · LICENSED · PROFESSIONAL ENGINEER

PETROS E. TSOUKALAS
CONNECTICUT LICENSED PROFESSIONAL ENGINEER - LICENSE NUMBER: PEN.25257

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