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

October 5, 2017

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

Notice of Exempt Modification
2-4 Volunteer Drive
Windsor Locks, CT 06096
Sprint Site #: NV2.5_CT43XC828
N 41° 55' 41.18"
W 72° 38' 48.42"

Dear Ms. Bachman:

Sprint currently maintains antennas at the 115-foot level of the existing 200-foot Self Support Tower at 2-4 Volunteer Drive in Windsor Locks, CT. The tower is owned by MCM Acquisition 2017, LLC, an SBA entity. (SBA recently acquired the site from MCM). The property is owned by the Town of Windsor Locks. Sprint now intends to add (3) newer technology cell antennas at the 115-foot level of the tower.

Please note: previous approval was given by the Siting Council on 9/26/14 under EM-SPRINT-165-140911. A Notification of Construction Not Complete was sent 11/12/15. Sprint now intends to resume construction. The proposed full scope of work is as follows:

Remove: n/a

Remove and Replace: n/a

Install:
(3) RFS APXVSPP18-C-A20 panel antennas
(3) Alcatel-Lucent TD-RRH8x20-25 RRHs
(1) 1-1/4" fiber
(1) RRU Mount Kit Sitepro1
(1) Sector Frame Stiff Arm Kit Sitepro 1

Existing Equipment to Remain (Including entitlements):
(3) RFS APXVTM14-C-I20 Panel Antennas
(3) Alcatel-Lucent 800 MHz RRHs
(3) Alcatel-Lucent 1900 MHz RRHS
(3) 1-1/4" fiber
(1) PCTEL GPS-TMG-HR-26N (at 60')
(1) ½" line (at 60')

This facility was approved prior to the Council's jurisdiction, on 6/29/1999 by the Town of Windsor Locks Planning Department. Per Building Official Mark Doody, Zoning Sign-off was part of the building permit approval process for the 200' tower. There were no post-constructions conditions placed on the tower. This modification complies with all conditions.

Please accept this letter as notification pursuant to Regulations of Connecticut State Agencies §16-50j-73, for construction that constitutes an exempt modification pursuant to R.C.S.A. §16.50j-72(b)(2). In accordance with R.C.S.A. § 16.50j-73, a copy of this letter is being sent to J. Christopher Kervick, the Town of Windsor Locks' First Selectman and representative for the Town as Property Owner, as well as Town Planner, Jennifer Rodriguez. (Separate notice is not being sent to tower owner, as it belongs to SBA.)

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

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

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

Sincerely,

Kri Pelletier
Property Specialist
SBA COMMUNICATIONS CORPORATION
134 Flanders Rd., Suite 125
Westborough, MA 01581
508.251.0720 x3804 + T
508.366.2610 + F
203.446.7700 + C
kpelletier@sbasite.com

Attachments

cc: J. Christopher Kervick., First Selectman / with attachments
Town of Windsor Locks, 50 Church Street, Windsor Locks, CT 06096
Jennifer Rodriguez, Town Planner / with attachments
Town of Windsor Locks, 50 Church Street, Windsor Locks, CT 06096

POWER DENSITY

SPRINT Site Inventory and Power Data by Antenna

Sector:	A	Sector:	B	Sector:	C
Antenna #:	1	Antenna #:	1	Antenna #:	1
Make / Model:	RFS APXVSPP18-C-A20	Make / Model:	RFS APXVSPP18-C-A20	Make / Model:	RFS APXVSPP18-C-A20
Gain:	13.4 / 15.9 dBd	Gain:	13.4 / 15.9 dBd	Gain:	13.4 / 15.9 dBd
Height (AGL):	**116.8 feet**	Height (AGL):	**116.8 feet**	Height (AGL):	**116.8 feet**
Frequency Bands	850 MHz / 1900 MHz (PCS)	Frequency Bands	850 MHz / 1900 MHz (PCS)	Frequency Bands	850 MHz / 1900 MHz (PCS)
Channel Count	10	Channel Count	10	Channel Count	10
Total TX Power(W):	220 Watts	Total TX Power(W):	220 Watts	Total TX Power(W):	220 Watts
ERP (W):	7,537.38	ERP (W):	7,537.38	ERP (W):	7,537.38
Antenna A1 MPE%	**2.50 %**	Antenna B1 MPE%	**2.50 %**	Antenna C1 MPE%	**2.50 %**
Antenna #:	2	Antenna #:	2	Antenna #:	2
Make / Model:	RFS APXVTM14-C-120	Make / Model:	RFS APXVTM14-C-120	Make / Model:	RFS APXVTM14-C-120
Gain:	15.9 dBd	Gain:	15.9 dBd	Gain:	15.9 dBd
Height (AGL):	**115 feet**	Height (AGL):	**115 feet**	Height (AGL):	**115 feet**
Frequency Bands	2500 MHz (BRS)	Frequency Bands	2500 MHz (BRS)	Frequency Bands	2500 MHz (BRS)
Channel Count	8	Channel Count	8	Channel Count	8
Total TX Power(W):	160 Watts	Total TX Power(W):	160 Watts	Total TX Power(W):	160 Watts
ERP (W):	6,224.72	ERP (W):	6,224.72	ERP (W):	6,224.72
Antenna A2 MPE%	**1.88 %**	Antenna B2 MPE%	**1.88 %**	Antenna C2 MPE%	**1.88 %**

Site Composite MPE%	
Carrier	**MPE%**
SPRINT – Max per sector	**4.38 %**
AT&T	0.99 %
T-Mobile	0.85 %
Verizon Wireless	3.16 %
Clearwire	0.32 %
Windsor Fire Dept	1.44 %
Site Total MPE %:	**11.14 %**

SPRINT Sector A Total:	4.38 %
SPRINT Sector B Total:	4.38 %
SPRINT Sector C Total:	4.38 %
Site Total:	11.14 %

SPRINT _ Max Values per Frequency Band / Technology Per Sector	# 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	437.55	116.8	1.28	850 MHz	567	0.23%
Sprint 850 MHz LTE	2	437.55	116.8	2.56	850 MHz	567	0.45%
Sprint 1900 MHz (PCS) CDMA	5	622.47	116.8	9.11	1900 MHz (PCS)	1000	0.91%
Sprint 1900 MHz (PCS) LTE	2	1,556.18	116.8	9.11	1900 MHz (PCS)	1000	0.91%
Sprint 2500 MHz (BRS) LTE	8	778.09	115	18.84	2500 MHz (BRS)	1000	1.88%
						Total:	**4.38%**

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2 VOLUNTEER DRIVE #4

Location 2 VOLUNTEER DRIVE #4 **Mblu** 34/ 62/ 80/ /

UID 00023300 **Owner** WINDSOR LOCKS TOWN OF

Assessment $1,292,200 **PID** 1943

Building Count 1

Current Value

Assessment			
Valuation Year	**Improvements**	**Land**	**Total**
2013	$929,800	$362,400	$1,292,200

Owner of Record

Owner WINDSOR LOCKS TOWN OF
Co-Owner
Address 50 CHURCH ST
WINDSOR LOCKS, CT 06096

Sale Price $0
Certificate
Book & Page 113/299
Sale Date 11/16/1972

Ownership History

Ownership History				
Owner	**Sale Price**	**Certificate**	**Book & Page**	**Sale Date**
WINDSOR LOCKS TOWN OF	$0		113/299	11/16/1972

Building Information

Building 1 : Section 1

Year Built: 1975
Living Area: 16,268
Replacement Cost: $1,619,556
Building Percent Good: 75
Replacement Cost Less Depreciation: $1,214,700

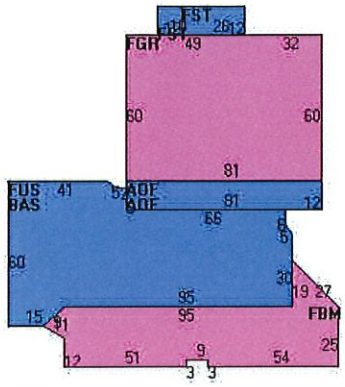
Building Attributes	
Field	**Description**
STYLE	Other Municip
MODEL	Ind/Comm
Stories:	1
Occupancy	
Exterior Wall A	Brick

Building Photo

(http://images.vgsi.com/photos/WindsorlocksCTPhotos//00\00\32/13.jpg)

Exterior Wall B	
Roof Structure	Flat
Roof Cover	Tar & Gravel
Interior Wall A	Drywall/Sheet
Interior Wall B	Minim/Masonry
Interior Floor A	Ceram Clay Til
Interior Floor B	Carpet
Heating Fuel	Oil
Heating Type	Forced Air-Duc
AC Type	Central
Bldg Use	Municipal
Total Rooms	
Total Bedrooms	00
Total Baths	0
Fireplace Types	
Fireplaces	
Heat/AC	Heat/AC Pkg
Frame Type	Masonry
Baths/Plumbing	Average
Ceiling/Wall	Ceil and Walls
Rooms/Prtns	Average
Wall Height	11.00
% Comn Wall	0.00

Building Layout



Building Sub-Areas (sq ft)			Legend
Code	Description	Gross Area	Living Area
BAS	First Floor	5,418	5,418
FUS	Upper Sty	5,418	5,418
FBM	Fin Bsmt	3,056	3,056
AOF	Office	1,944	1,944
FST	Utility	432	432
FGR	Fin Garage	4,860	0
		21,128	16,268

Extra Features

Extra Features				Legend
Code	Description	Size	Value	Bldg #
SPRK	Sprinklers	15836.00 S.F.	$9,500	1

Land

Land Use

Use Code	901I
Description	Municipal
Zone	RESA
Neighborhood	
Alt Land Appr	No
Category	

Land Line Valuation

Size (Acres)	11.20
Frontage	947
Depth	0
Assessed Value	$362,400

Outbuildings

Outbuildings						Legend
Code	Description	Sub Code	Sub Description	Size	Value	Bldg #
GAR1	Garage	G	Good	2592.00 S.F.	$50,500	1
PAV	Paving	A	Asphalt	46600.00 S.F.	$38,400	1

GAR1	Garage	A	Average	800.00 S.F.	$15,000	1

Valuation History

Assessment			
Valuation Year	**Improvements**	**Land**	**Total**
2013	$927,000	$362,400	$1,289,400
2012	$927,000	$236,300	$1,163,300
2007	$1,110,200	$205,900	$1,316,100

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: CT43XC828

Windsor Locks / MCM
2-4 Volunteer Drive
Windsor Locks, CT 06096

September 26, 2017

EBI Project Number: 6217004203

Site Compliance Summary	
Compliance Status:	COMPLIANT
Site total MPE% of FCC general population allowable limit:	11.14 %

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

September 26, 2017

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

Emissions Analysis for Site: **CT43XC828 – Windsor Locks / MCM**

EBI Consulting was directed to analyze the proposed SPRINT facility located at **2-4 Volunteer Drive, Windsor Locks, CT**, for the purpose of determining whether the emissions from the Proposed SPRINT Antenna Installation located on this property are within specified federal limits.

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

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

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

Public 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 **2-4 Volunteer Drive, Windsor Locks, 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 **RFS APXVSPP18-C-A20 and the RFS APXVTM14-C-120** 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 **116.8 feet and 115 feet** above ground level (AGL) for **Sector A**, **116.8 feet and 115 feet** above ground level (AGL) for **Sector B** and **116.8 feet and 115 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.

SPRINT Site Inventory and Power Data by Antenna

Sector:	A	Sector:	B	Sector:	C
Antenna #:	**1**	Antenna #:	**1**	Antenna #:	**1**
Make / Model:	RFS APXVSPP18-C-A20	Make / Model:	RFS APXVSPP18-C-A20	Make / Model:	RFS APXVSPP18-C-A20
Gain:	13.4 / 15.9 dBd	Gain:	13.4 / 15.9 dBd	Gain:	13.4 / 15.9 dBd
Height (AGL):	**116.8 feet**	Height (AGL):	**116.8 feet**	Height (AGL):	**116.8 feet**
Frequency Bands	850 MHz / 1900 MHz (PCS)	Frequency Bands	850 MHz / 1900 MHz (PCS)	Frequency Bands	850 MHz / 1900 MHz (PCS)
Channel Count	10	Channel Count	10	Channel Count	10
Total TX Power(W):	220 Watts	Total TX Power(W):	220 Watts	Total TX Power(W):	220 Watts
ERP (W):	7,537.38	ERP (W):	7,537.38	ERP (W):	7,537.38
Antenna A1 MPE%	**2.50 %**	Antenna B1 MPE%	**2.50 %**	Antenna C1 MPE%	**2.50 %**
Antenna #:	**2**	Antenna #:	**2**	Antenna #:	**2**
Make / Model:	RFS APXVTM14-C-120	Make / Model:	RFS APXVTM14-C-120	Make / Model:	RFS APXVTM14-C-120
Gain:	15.9 dBd	Gain:	15.9 dBd	Gain:	15.9 dBd
Height (AGL):	**115 feet**	Height (AGL):	**115 feet**	Height (AGL):	**115 feet**
Frequency Bands	2500 MHz (BRS)	Frequency Bands	2500 MHz (BRS)	Frequency Bands	2500 MHz (BRS)
Channel Count	8	Channel Count	8	Channel Count	8
Total TX Power(W):	160 Watts	Total TX Power(W):	160 Watts	Total TX Power(W):	160 Watts
ERP (W):	6,224.72	ERP (W):	6,224.72	ERP (W):	6,224.72
Antenna A2 MPE%	**1.88 %**	Antenna B2 MPE%	**1.88 %**	Antenna C2 MPE%	**1.88 %**

Site Composite MPE%	
Carrier	**MPE%**
SPRINT – Max per sector	**4.38 %**
AT&T	0.99 %
T-Mobile	0.85 %
Verizon Wireless	3.16 %
Clearwire	0.32 %
Windsor Fire Dept	1.44 %
Site Total MPE %:	**11.14 %**

SPRINT Sector A Total:	4.38 %
SPRINT Sector B Total:	4.38 %
SPRINT Sector C Total:	4.38 %
Site Total:	11.14 %

SPRINT _ Max Values per Frequency Band / Technology Per Sector	# 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	437.55	116.8	1.28	850 MHz	567	0.23%
Sprint 850 MHz LTE	2	437.55	116.8	2.56	850 MHz	567	0.45%
Sprint 1900 MHz (PCS) CDMA	5	622.47	116.8	9.11	1900 MHz (PCS)	1000	0.91%
Sprint 1900 MHz (PCS) LTE	2	1,556.18	116.8	9.11	1900 MHz (PCS)	1000	0.91%
Sprint 2500 MHz (BRS) LTE	8	778.09	115	18.84	2500 MHz (BRS)	1000	1.88%
						Total:	**4.38%**

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:	4.38 %
Sector B:	4.38 %
Sector C:	4.38 %
SPRINT Maximum Total (per sector):	4.38 %
Site Total:	11.14 %
Site Compliance Status:	**COMPLIANT**

The anticipated composite MPE value for this site assuming all carriers present is **11.14 %** 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.

FDH VELOCITEL
ENGINEERING INNOVATION

Structural Analysis for
SBA Network Services, Inc.

195.0' Self Support (195.0' AGL)

SBA Site Name: Windsor Locks @ Volunteer
SBA Site ID: CT22108-A-03
Sprint Nextel Site Name: Windsor Locks @ Volunteer
Sprint Nextel Site ID: CT43XC828
Site Address: 2-4 Volunteer Drive, Windsor Locks, CT 06096

FDH Velocitel Project Number 17QKYA1400

Analysis Results

Tower Components	63.3%	Sufficient
Foundation	40.6%	Sufficient

Prepared By:

Stephan Rawles, EI
Project Engineer I

Reviewed By:

Dennis D. Abel, PE
Director
CT License No. 23247

Velocitel, Inc., d.b.a. FDH Velocitel
6521 Meridien Drive
Raleigh, NC, 27616
(919) 755-1012
Structural@fdhvelocitel.com

STATE OF CONNECTICUT
DENNIS D. ABEL
No. 23247
LICENSED
PROFESSIONAL ENGINEER
08-23-2017

August 23, 2017

Prepared pursuant to the TIA/EIA-222-G Structural Standards for Steel Antenna Towers and Antenna Supporting Structures and 2016 Connecticut Building Code

TABLE OF CONTENTS

EXECUTIVE SUMMARY

At the request of SBA Network Services, Inc., FDH Velocitel performed a structural analysis of the existing Self Support located in Windsor Locks, CT to determine whether the tower is structurally adequate to support the antenna configuration in place per **Table 1** pursuant to the *TIA/EIA-222-G Structural Standards for Steel Antenna Towers and Antenna Supporting Structures and 2016 Connecticut Building Code*. Information pertaining to the antenna loading, current tower geometry, member sizes, and below grade parameters was obtained from:

Source	Document Type	Reference	Date
Pirod, Inc.	Tower & Foundation Drawings	Eng File No. A-115761-1	January 10, 2001
Tectonic Engineering Consultants P.C.	Geotechnical Report	Project No. 2285.01	May 18, 1999
FDH Velocitel	TIA Inspection	Project No. 17QALE1500	April 10, 2017
SBA Network Services, Inc.	-	-	-

This analysis has been performed in accordance with the 2016 Connecticut State Building Code based upon an *ultimate 3-second gust wind speed* of 125 mph converted to a *nominal 3-second gust wind speed* of 97 mph per Section 1609.3 and Appendix N as required for use in the *TIA-222-G Standard* per Exception #5 of Section 1609.1.1. Exposure Category B and Risk Category II were used in this analysis.

Note: Per *Section 2.7.3* of the *ANSI/TIA-222-G* Standard, the seismic/earthquake loading effects can be ignored if the spectral response acceleration at short periods (S_S) is less than or equal to 1.00. The tower's location mandates a design S_S of less than 1.00, thus seismic loading was not considered as part of the analysis of this structure.

Conclusions

With the antenna configuration in place per **Table 1** we have determined the tower stress level to be sufficient and the foundation(s) to be sufficient pursuant to the requirements stipulated by *TIA/EIA-222-G Structural Standards for Steel Antenna Towers and Antenna Supporting Structures and 2016 Connecticut Building Code* provided the **Recommendations** listed below are satisfied. For a more detailed description of the analysis of the tower, see the **Results** section of this report.

Our structural analysis has been performed assuming all information provided to FDH Velocitel is accurate (i.e., the structure member information, tower layout, existing antenna loading, and proposed antenna loading) and that the tower has been properly erected and maintained per the original design drawings.

Recommendations

To ensure the requirements of the current analysis standards are met with the antenna configuration in place per **Table 1**, we have the following recommendations:

1. Feed lines to be installed as shown in **Figure 1** in the **Appendix**.
2. RRU/RRH Stipulation: The equipment may be installed in any arrangement as determined by the client.

APPURTENANCE LISTING

The antennas and equipment, with their corresponding feed lines, considered for this analysis are shown in **Table 1**. *If the actual layout determined in the field deviates from the layout, FDH Velocitel should be contacted to perform a revised analysis.*

Table 1 - Appurtenance Loading

Existing Loading:

Antenna Elevation (ft.)	Description	Feed Lines	Carrier	Mount Elevation (ft.)	Mount Type
203.4	(1) Andrew DB224-A	(1) 7/8"	WLPD	193.4	Direct
183.7	(5) Andrew 20' Dipoles w/ (4) Element	(8) 7/8"		171.5	(3) 15' T-Frames
182.8	(1) 2.5"Ø x 20.0' Omni				
180.6	(1) 1.3"Ø x 13.0' Omni				
179.1	(1) 1.3"Ø x 10.0' Omni				
168.3	(1) Raycap DC6-48-60-18-8F	(9) 1-5/8" (1) 1-5/16" Conduit	AT&T	167.5	Direct
165	(3) Andrew 8.0'x1.0'x6.5" Panel			161.5	(3) 15' T-Frames
164.8	(3) Kathrein 80010121 (3) 14.5"x9.5"x3.0" TMA				
163.9	(3) Ericsson RRUS 11 B12				
146.8	(1) Raycap RRFDC-3315-PF-48	(12) 1-5/8" (1) 1-1/4"	Verizon	146	Direct
145.7	(1) 6.0' x 1.0' x 6.5" Panel (2) Amphenol BXA-70063/6CF-EDIN (3) Antel BXA-171063-12CF-EDIN-5				(3) 12.5' T-Frames
145.5	(3) Alcatel-Lucent 9442 RRH2x40 AWS				
138.3	(3) EMS RR90-17-02DP (3) RFS 4.7'x1.1'x3.5' Panel (3) 7" x 6" x 3" TMA	(18) 1-5/8"	T-Mobile	135	(3) 15' T-Frames
137.8	(3) Andrew LNX-6515DS-A1M				
116.8	(3) RFS APXVSPP18-C-A20	(4) 1-1/4" Fiber	Sprint	112.3	(3) 15' T-Frames
115	(3) RFS APXVTM14-C-I20 (3) Alcatel-Lucent TD-RRH8x20-25				
110.3	(3) Alcatel-Lucent 800 MHz RRH			109.6	Direct
107.6	(3) Alcatel-Lucent 1900 MHz RRH			106.5	Direct
104.6	(1) Andrew 3.3' Dish	(2) 1/2" (1) 1-5/16" Conduit	Clearwire	101.4	(3) 1.3' Standoffs
104	(1) Andrew VHLP1-23-DW1 (3) Argus LLPX310R-V1				
103.8	(3) Alcatel-Lucent SPI-22132825WB				
102.4	(1) 12" x 12" x 6.38" Junction Box			101.8	Direct
75.9	(1) 3.5" Ø x 8" GPS	(1) 1/2"	Unknown	74	(1) 3.5' Standoff
60	(1) PCTEL GPS-TMG-HR-26N	(1) 1/2"	Sprint	60	Direct

Proposed Carrier Final Loading:

Antenna Elevation (ft.)	Description	Feed Lines	Carrier	Mount Elevation (ft.)	Mount Type
116.8	(3) RFS APXVSPP18-C-A20	(4) 1-1/4" Fiber	Sprint	112.3	(3) 15' T-Frames
115	(3) RFS APXVTM14-C-I20 (3) Alcatel-Lucent TD-RRH8x20-25				
110.3	(3) Alcatel-Lucent 800 MHz RRH			109.6	Direct
107.6	(3) Alcatel-Lucent 1900 MHz RRH			106.5	Direct
60	(1) PCTEL GPS-TMG-HR-26N	(1) 1/2"		60	Direct

RESULTS

The following material grades for individual members were used for analysis:

Table 2 - Material Grade

Member Type	Material Grade
Legs	A572-50
Bracing	A36 & A572-50
Anchor Rods	A687

Table 3 and **Table 4** display the summary of capacities for the analyzed structure and its additional components. Values greater than 100% indicate locations where the maximum force in the member exceeds its capacity. **Table 5** displays the maximum dish rotations at service winds speeds.

If the assumptions outlined in this report differ from actual field conditions, FDH Velocitel should be contacted to perform a revised analysis. Furthermore, as no information pertaining to the allowable twist and sway requirements for the appurtenances was provided, deflection and rotation were not taken into consideration when performing this analysis.

See the **Appendix** for detailed modeling information.

Table 3 - Structure Member Capacities

Section No.	Elevation (ft.)	Component Type	Size	% Capacity	Pass / Fail
T1	195 - 185	Leg	1 3/4	2.7	Pass
T2	185 - 170	Leg	1 3/4	13.2	Pass
T3	170 - 150	Leg	2	30.6	Pass
T4	150 - 140	Leg	Pirod 105244	27.7	Pass
T5	140 - 120	Leg	Pirod 105217	34.7	Pass
T6	120 - 100	Leg	Pirod 105218	36.7	Pass
T7	100 - 80	Leg	Pirod 105218	48.9	Pass
T8	80 - 60	Leg	Pirod 105219	45.4	Pass
T9	60 - 40	Leg	Pirod 105219	53.6	Pass
T10	40 - 20	Leg	Pirod 105220	47.9 48.0 (b)	Pass
T11	20 - 0	Leg	Pirod 105220	53.6	Pass
T1	195 - 185	Diagonal	3/4	8.2	Pass
T2	185 - 170	Diagonal	3/4	24.8	Pass
T3	170 - 150	Diagonal	7/8	32.5	Pass
T4	150 - 140	Diagonal	L2 1/2x2 1/2x3/16	39.9 42.2 (b)	Pass
T5	140 - 120	Diagonal	L2 1/2x2 1/2x3/16	53.0 54.4 (b)	Pass
T6	120 - 100	Diagonal	L3x3x3/16	46.0 57.3 (b)	Pass
T7	100 - 80	Diagonal	L3x3x5/16	37.9	Pass
T8	80 - 60	Diagonal	L3x3x5/16	47.6	Pass
T9	60 - 40	Diagonal	L3x3x5/16	60.2	Pass
T10	40 - 20	Diagonal	L3 1/2x3 1/2x5/16	47.5	Pass
T11	20 - 0	Diagonal	L3 1/2x3 1/2x5/16	63.3	Pass
T1	195 - 185	Horizontal	3/4	1.1	Pass
T2	185 - 170	Horizontal	3/4	8.5	Pass
T3	170 - 150	Horizontal	7/8	8.3	Pass
T1	195 - 185	Top Girt	7/8	0.8	Pass
T2	185 - 170	Top Girt	7/8	2.8	Pass
T3	170 - 150	Top Girt	1	9.9	Pass
T5	140 - 120	Top Girt	L2 1/2x2 1/2x3/16	8.7	Pass

Section No.	Elevation (ft.)	Component Type	Size	% Capacity	Pass / Fail
				18.6 (b)	
T1	195 - 185	Bottom Girt	3/4	3.2	Pass
T2	185 - 170	Bottom Girt	3/4	13.4	Pass
T3	170 - 150	Bottom Girt	7/8	13.4	Pass
T2	185 - 170	Mid Girt	7/8	2.2	Pass
T3	170 - 150	Mid Girt	1	1.8	Pass

Table 4 – Additional Structure Component Capacities

Elevation (ft.)	Component	% Capacity	Pass / Fail	Notes
0	Anchor Rods	49.2	Pass	-
0	Base Foundation (Soil Interaction)	40.6	Pass	-
0	Base Foundation (Structural)	16.2	Pass	-

Table 5 - Maximum Dish Rotations at Service Wind Speeds

Centerline Elevation (ft.)	Dish	Tilt (deg)*	Twist (deg)*
104.6	(1) Andrew 3.3'	0.1088	0.0022
104	(1) Andrew VHLP1-23-DW1	0.1081	0.0022

*Allowable tilt and twist to be reviewed by the carrier.

GENERAL COMMENTS

This engineering analysis is based upon the theoretical capacity of the structure. It is not a condition assessment of the tower and its foundation. It is the responsibility of SBA Network Services, Inc. to verify that the tower modeled and analyzed is the correct structure (with accurate antenna loading information) modeled. If there are substantial modifications to be made or the assumptions made in this analysis are not accurate, FDH Velocitel should be notified immediately to perform a revised analysis.

LIMITATIONS

All opinions and conclusions are considered accurate to a reasonable degree of engineering certainty based upon the evidence available at the time of this report. All opinions and conclusions are subject to revision based upon receipt of new or additional/updated information. All services are provided exercising a level of care and diligence equivalent to the standard and care of our profession. No other warranty or guarantee, expressed or implied, is offered. Our services are confidential in nature and we will not release this report to any other party without the client's consent. The use of this engineering work is limited to the express purpose for which it was commissioned and it may not be reused, copied, or distributed for any other purpose without the written consent of FDH Velocitel.

APPENDIX

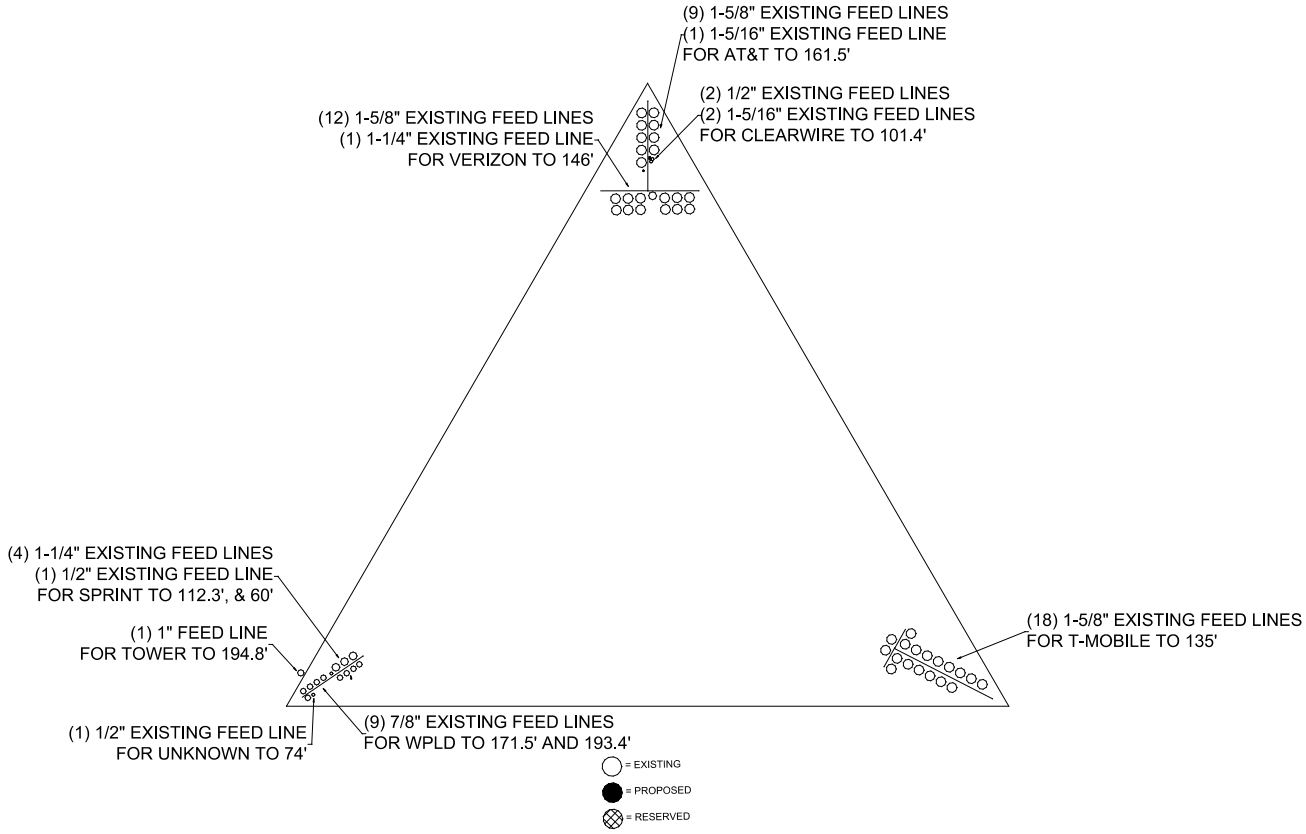
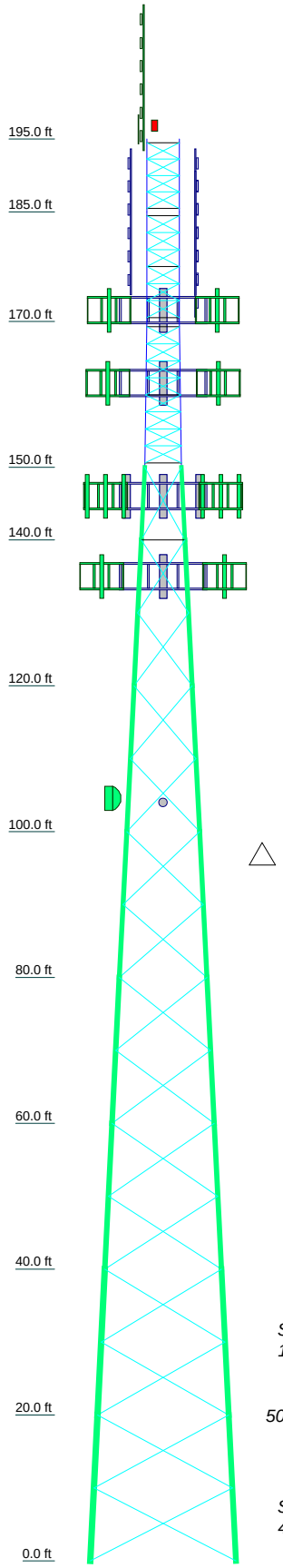


Figure 1 – Feed Line Layout



Section		T1	T2	T3	T4	T5	T6	T7	T8	T9	T10	T11
Legs			SR 1 3/4		A	Pirod 105217		Pirod 105218		Pirod 105219		Pirod 105220
Leg Grade						A572-50						
Diagonals	SR 3/4			SR 7/8		L2 1/2x2 1/2x3/16		L3x3x3/16		L3x3x5/16		L3 1/2x3 1/2x5/16
Diagonal Grade	A572-50								A36			
Top Girts	SR 7/8		SR 7/8	SR 1	N.A.	L2 1/2x2 1/2x3/16		N.A.				
Mid Girts	SR 1	N.A.	SR 7/8	SR 1					N.A.			
Bottom Girts	SR 1		SR 7/8						N.A.			
Horizontals	SR 7/8		SR 3/4						N.A.			
Face Width (ft)	15 @ 2.33333	4.5	4 @ 2.25		5	6	8	10	12	14	16	18
# Panels @ (ft)		0.5	0.8	1.3	1.0	2.2	2.7	3.2	4.3	15 @ 10	4.5	5.3
Weight (K)	31.3											5.5

SYMBOL LIST

MARK	SIZE	MARK	SIZE
A	Pirod 105244		

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 97 mph basic wind in accordance with the TIA-222-G Standard.
4. Tower is also designed for a 50 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 1 with Crest Height of 0.00 ft
8. TOWER RATING: 63.3%

ALL REACTIONS ARE FACTORED

MAX. CORNER REACTIONS AT BASE:
DOWN: 283 K
SHEAR: 30 K

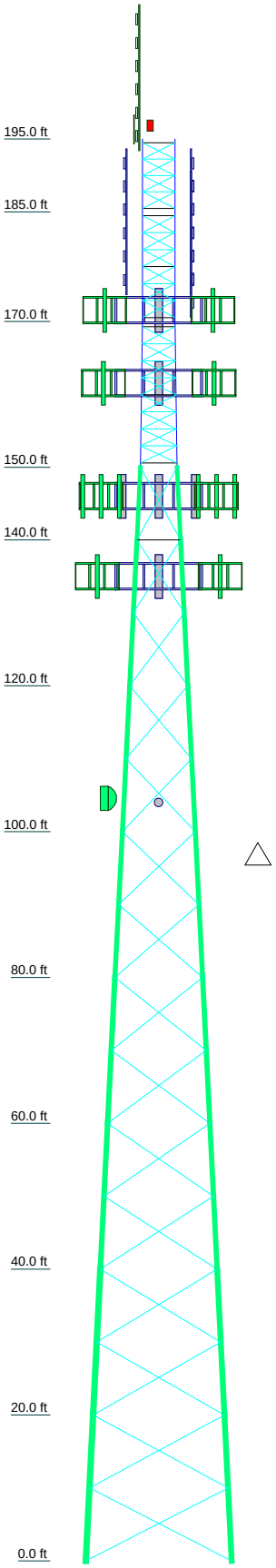
UPLIFT: -239 K
SHEAR: 26 K

AXIAL 225 K
SHEAR 15 K *MOMENT 1703 kip-ft*
TORQUE 1 kip-ft
50 mph WIND - 1.0000 in ICE
AXIAL 65 K
SHEAR 45 K *MOMENT 4522 kip-ft*
TORQUE 6 kip-ft
REACTIONS - 97 mph WIND

FDH VELOCITEL ENGINEERING INNOVATION
Tower Analysis
FDH Velocitel
6521 Meridien Drive
Raleigh, NC 27616
Phone: 919.755.1012
FAX: 919.755.1031

Job:	***CT22108-A_Windsor Locks @ Volunteer Drive***		
Project:	***17QKYA1400***		
Client: SBA Network Communications, Inc.		Drawn by: Stephan Rawles, EI	App'd:
Code: TIA-222-G		Date: 08/23/17	Scale: NTS
Path:			Dwg No. E-1

Section	T1	T2	T3	T4	T5	T6	T7	T8	T9	T10	T11
Legs		SR 1 3/4		A	Pirod 105217		Pirod 105218		Pirod 105219		Pirod 105220
Leg Grade					A572-50						
Diagonals		SR 3/4	SR 7/8		L2 1/2x2 1/2x3/16	L3x3x3/16		L3x3x5/16		L3 1/2x3 1/2x5/16	
Diagonal Grade		A572-50						A36			
Top Girts		SR 7/8	SR 1	N.A.	L2 1/2x2 1/2x3/16			N.A.			
Mid Girts		N.A.	SR 7/8					N.A.			
Bottom Girts		SR 7/8	SR 1					N.A.			
Horizontals		SR 3/4	SR 7/8					N.A.			
Face Width (ft)	4.5	4 @ 2.25	15 @ 2.33333	5	6	8	10	12	14	16	18	20
# Panels @ (ft)	0.5	0.8	1.3	1.0	2.2	2.7	3.2	15 @ 10	4.3	4.5	5.3	5.5
Weight (K)												31.3



DESIGNED APPURTENANCE LOADING

TYPE	ELEVATION	TYPE	ELEVATION
Beacon	194.8	RFS 4.7'x1.1'x3.5' Panel	135
Lightning Rod	194.6	RFS 4.7'x1.1'x3.5' Panel	135
DB224-A Omni	193.4	RFS 4.7'x1.1'x3.5' Panel	135
(2) 20' 4 Element Dipole	171.5	7" x 6" x 3" TMA	135
(2) 20' 4 Element Dipole	171.5	7" x 6" x 3" TMA	135
20' 4 Element Dipole	171.5	7" x 6" x 3" TMA	135
20'x2.5" Omni	171.5	LNX-6515DS-A1M w/ Mount Pipe	135
13'x2" Omni	171.5	LNX-6515DS-A1M w/ Mount Pipe	135
10' x 1.38" omni	171.5	LNX-6515DS-A1M w/ Mount Pipe	135
(3) 15' T-Frames	171.5	(3) 15' T-Frames	135
(5) Pipe Mount	171.5	(4) Pipe Mount	135
(5) Pipe Mount	171.5	(4) Pipe Mount	135
(5) Pipe Mount	171.5	(4) Pipe Mount	135
DC6-48-60-18-8F	167.5	APXVTM14-C-I20 w/ Mount Pipe	112.3
8'x1'x7" Panel w/ Pipe Mount	161.5	APXVTM14-C-I20 w/ Mount Pipe	112.3
8'x1'x7" Panel w/ Pipe Mount	161.5	APXVTM14-C-I20 w/ Mount Pipe	112.3
8'x1'x7" Panel w/ Pipe Mount	161.5	APXVSPP18-C-A20 w/ Mount Pipe	112.3
800 10121 w/ Mount Pipe	161.5	APXVSPP18-C-A20 w/ Mount Pipe	112.3
800 10121 w/ Mount Pipe	161.5	APXVSPP18-C-A20 w/ Mount Pipe	112.3
800 10121 w/ Mount Pipe	161.5	TD-RRH8x20-25	112.3
14.5"x9.25"x3.0" TMA	161.5	TD-RRH8x20-25	112.3
14.5"x9.25"x3.0" TMA	161.5	TD-RRH8x20-25	112.3
14.5"x9.25"x3.0" TMA	161.5	(3) 15' T-Frames	112.3
RRUS 11 B12	161.5	(2) Pipe Mount	112.3
RRUS 11 B12	161.5	(2) Pipe Mount	112.3
RRUS 11 B12	161.5	(2) Pipe Mount	112.3
(3) 15' T-Frames	161.5	800 MHz RRH	109.6
(2) Pipe Mount	161.5	800 MHz RRH	109.6
(2) Pipe Mount	161.5	800 MHz RRH	109.6
(2) Pipe Mount	161.5	1900 MHz RRH	106.5
RRFDC-3315-PF-48	146	1900 MHz RRH	106.5
6' x 1' x 7" Panel	146	1900 MHz RRH	106.5
Pipe Mount [PM 601-1]	146	12" x 12" x 6.38" Junction Box	101.8
BXA-70063-6CF-EDIN w/ Mount Pipe	146	LLPX310R w/ Mount Pipe	101.4
BXA-70063-6CF-EDIN w/ Mount Pipe	146	LLPX310R w/ Mount Pipe	101.4
BXA-171063-12CF-EDIN-5 w/Mount Pipe	146	LLPX310R w/ Mount Pipe	101.4
BXA-171063-12CF-EDIN-5 w/Mount Pipe	146	SPI-22132825WB RRH	101.4
BXA-171063-12CF-EDIN-5 w/Mount Pipe	146	SPI-22132825WB RRH	101.4
9442 RRH2x40 AWS RRH	146	SPI-22132825WB RRH	101.4
9442 RRH2x40 AWS RRH	146	(3) 1.3' Standoffs	101.4
9442 RRH2x40 AWS RRH	146	Pipe Mount	101.4
(3) 12.5' T-Frames	146	Pipe Mount	101.4
(2) Pipe Mount	146	Pipe Mount	101.4
(2) Pipe Mount	146	3.3' Dish	101.4
(2) Pipe Mount	146	VHLP1-23-DW1	101.4
RR90-17-02DP w/ Mount Pipe	135	Sidemarker	94.5
RR90-17-02DP w/ Mount Pipe	135	Sidemarker	94.5
RR90-17-02DP w/ Mount Pipe	135	Sidemarker	94.5
		3.37" Ø x 7.5" GPS	74
		(1) 3.5' Standoff	74
		GPS-TMG-HR-26N	60

SYMBOL LIST

MARK	SIZE	MARK	SIZE
A	Pirod 105244		

MATERIAL STRENGTH

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

FDH VELOCITEL ENGINEERING INNOVATION
Tower Analysis

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Job: ***CT22108-A_Windsor Locks @ Volunteer Drive***
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Code: TIA-222-G | Date: 08/23/17 | Scale: NTS
Path: | Dwg No. E-1

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Tower Input Data

The main tower is a 3x free standing tower with an overall height of 195.00 ft above the ground line.
The base of the tower is set at an elevation of 0.00 ft above the ground line.
The face width of the tower is 4.50 ft at the top and 20.00 ft 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 97 mph.
Structure Class II.
Exposure Category B.
Topographic Category 1.
Crest Height 0.00 ft.
Nominal ice thickness of 1.0000 in.
Ice thickness is considered to increase with height.
Ice density of 56 pcf.
A wind speed of 50 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.
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		Distribute Leg Loads As Uniform		Use ASCE 10 X-Brace Ly Rules
	Consider Moments - Horizontals		Assume Legs Pinned	√	Calculate Redundant Bracing Forces
	Consider Moments - Diagonals	√	Assume Rigid Index Plate		Ignore Redundant Members in FEA
	Use Moment Magnification	√	Use Clear Spans For Wind Area	√	SR Leg Bolts Resist Compression
√	Use Code Stress Ratios	√	Use Clear Spans For KL/r		All Leg Panels Have Same Allowable
√	Use Code Safety Factors - Guys		Retension Guys To Initial Tension		Offset Girt At Foundation
	Escalate Ice	√	Bypass Mast Stability Checks	√	Consider Feed Line Torque
	Always Use Max Kz	√	Use Azimuth Dish Coefficients	√	Include Angle Block Shear Check
	Use Special Wind Profile	√	Project Wind Area of Appurt.		Use TIA-222-G Bracing Resist. Exemption
√	Include Bolts In Member Capacity		Autocalc Torque Arm Areas		Use TIA-222-G Tension Splice Exemption
	Leg Bolts Are At Top Of Section		Add IBC .6D+W Combination		Poles
√	Secondary Horizontal Braces Leg	√	Sort Capacity Reports By Component		Include Shear-Torsion Interaction
	Use Diamond Inner Bracing (4 Sided)		Triangulate Diamond Inner Bracing		Always Use Sub-Critical Flow
√	SR Members Have Cut Ends		Treat Feed Line Bundles As Cylinder		Use Top Mounted Sockets
	SR Members Are Concentric				

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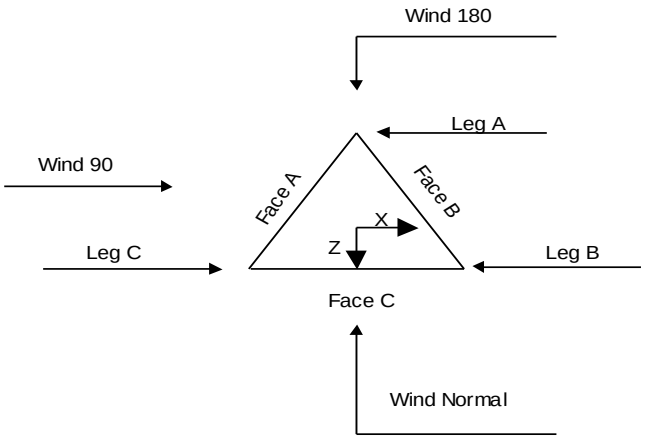

Triangular Tower

Tower Section Geometry

Tower Section	Tower Elevation	Assembly Database	Description	Section Width	Number of Sections	Section Length
	ft			ft		ft
T1	195.00-185.00			4.50	1	10.00
T2	185.00-170.00			4.50	1	15.00
T3	170.00-150.00			4.50	1	20.00
T4	150.00-140.00			5.00	1	10.00
T5	140.00-120.00			6.00	1	20.00
T6	120.00-100.00			8.00	1	20.00
T7	100.00-80.00			10.00	1	20.00
T8	80.00-60.00			12.00	1	20.00
T9	60.00-40.00			14.00	1	20.00
T10	40.00-20.00			16.00	1	20.00
T11	20.00-0.00			18.00	1	20.00

Tower Section Geometry *(cont'd)*

Tower Section	Tower Elevation	Diagonal Spacing	Bracing Type	Has K Brace End Panels	Has Horizontals	Top Girt Offset	Bottom Girt Offset
	ft	ft				in	in
T1	195.00-185.00	2.25	X Brace	No	Steps	6.0000	6.0000
T2	185.00-170.00	2.33	X Brace	No	Steps	6.0000	6.0000
T3	170.00-150.00	2.33	X Brace	No	Steps	9.0000	7.0000
T4	150.00-140.00	10.00	X Brace	No	No	0.0000	0.0000

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
T5	140.00-120.00	10.00	X Brace	No	No	0.0000	0.0000
T6	120.00-100.00	10.00	X Brace	No	No	0.0000	0.0000
T7	100.00-80.00	10.00	X Brace	No	No	0.0000	0.0000
T8	80.00-60.00	10.00	X Brace	No	No	0.0000	0.0000
T9	60.00-40.00	10.00	X Brace	No	No	0.0000	0.0000
T10	40.00-20.00	10.00	X Brace	No	No	0.0000	0.0000
T11	20.00-0.00	10.00	X Brace	No	No	0.0000	0.0000

Tower Section Geometry *(cont'd)*

Tower Elevation ft	Leg Type	Leg Size	Leg Grade	Diagonal Type	Diagonal Size	Diagonal Grade
T1 195.00-185.00	Solid Round	1 3/4	A572-50 (50 ksi)	Solid Round	3/4	A572-50 (50 ksi)
T2 185.00-170.00	Solid Round	1 3/4	A572-50 (50 ksi)	Solid Round	3/4	A572-50 (50 ksi)
T3 170.00-150.00	Solid Round	2	A572-50 (50 ksi)	Solid Round	7/8	A572-50 (50 ksi)
T4 150.00-140.00	Truss Leg	Pirod 105244	A572-50 (50 ksi)	Equal Angle	L2 1/2x2 1/2x3/16	A36 (36 ksi)
T5 140.00-120.00	Truss Leg	Pirod 105217	A572-50 (50 ksi)	Equal Angle	L2 1/2x2 1/2x3/16	A36 (36 ksi)
T6 120.00-100.00	Truss Leg	Pirod 105218	A572-50 (50 ksi)	Equal Angle	L3x3x3/16	A36 (36 ksi)
T7 100.00-80.00	Truss Leg	Pirod 105218	A572-50 (50 ksi)	Equal Angle	L3x3x5/16	A36 (36 ksi)
T8 80.00-60.00	Truss Leg	Pirod 105219	A572-50 (50 ksi)	Equal Angle	L3x3x5/16	A36 (36 ksi)
T9 60.00-40.00	Truss Leg	Pirod 105219	A572-50 (50 ksi)	Equal Angle	L3x3x5/16	A36 (36 ksi)
T10 40.00-20.00	Truss Leg	Pirod 105220	A572-50 (50 ksi)	Equal Angle	L3 1/2x3 1/2x5/16	A36 (36 ksi)
T11 20.00-0.00	Truss Leg	Pirod 105220	A572-50 (50 ksi)	Equal Angle	L3 1/2x3 1/2x5/16	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 195.00-185.00	Solid Round	7/8	A572-50 (50 ksi)	Solid Round	7/8	A572-50 (50 ksi)
T2 185.00-170.00	Solid Round	7/8	A572-50 (50 ksi)	Solid Round	7/8	A572-50 (50 ksi)
T3 170.00-150.00	Solid Round	1	A572-50 (50 ksi)	Solid Round	1	A572-50 (50 ksi)
T5 140.00-120.00	Equal Angle	L2 1/2x2 1/2x3/16	A36 (36 ksi)	Solid Round		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
T1 195.00-185.00	None	Flat Bar		A36 (36 ksi)	Solid Round	3/4	A572-50 (50 ksi)
T2 185.00-170.00	1	Solid Round	7/8	A36 (36 ksi)	Solid Round	3/4	A572-50 (50 ksi)
T3 170.00-150.00	1	Solid Round	1	A36 (36 ksi)	Solid Round	7/8	A572-50 (50 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 195.00-185.00	0.00	0.0000	A36 (36 ksi)	1	1	1	36.0000	36.0000	36.0000
T2 185.00-170.00	0.00	0.0000	A36 (36 ksi)	1	1	1	36.0000	36.0000	36.0000
T3 170.00-150.00	0.00	0.0000	A36 (36 ksi)	1	1	1	36.0000	36.0000	36.0000
T4 150.00-140.00	0.00	0.0000	A36 (36 ksi)	1	1	1	36.0000	36.0000	36.0000
T5 140.00-120.00	0.00	0.0000	A36 (36 ksi)	1	1	1	36.0000	36.0000	36.0000
T6 120.00-100.00	0.00	0.0000	A36 (36 ksi)	1	1	1	36.0000	36.0000	36.0000
T7 100.00-80.00	0.00	0.0000	A36 (36 ksi)	1	1	1	36.0000	36.0000	36.0000
T8 80.00-60.00	0.00	0.0000	A36 (36 ksi)	1	1	1	36.0000	36.0000	36.0000
T9 60.00-40.00	0.00	0.0000	A36 (36 ksi)	1	1	1	36.0000	36.0000	36.0000
T10 40.00-20.00	0.00	0.0000	A36 (36 ksi)	1	1	1	36.0000	36.0000	36.0000
T11 20.00-0.00	0.00	0.0000	A36 (36 ksi)	1	1	1	36.0000	36.0000	36.0000

Tower Section Geometry *(cont'd)*

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
T1 195.00-185.00	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
T2	Yes	Yes	1	1	1	1	1	1	1	1
185.00-170.00				1	1	1	1	1	1	1
T3	Yes	Yes	1	1	1	1	1	1	1	1
170.00-150.00				1	1	1	1	1	1	1
T4	Yes	Yes	1	1	1	1	1	1	1	1
150.00-140.00				1	1	1	1	1	1	1
T5	Yes	Yes	1	1	1	1	1	1	1	1
140.00-120.00				1	1	1	1	1	1	1
T6	Yes	Yes	1	1	1	1	1	1	1	1
120.00-100.00				1	1	1	1	1	1	1
T7	Yes	Yes	1	1	1	1	1	1	1	1
100.00-80.00				1	1	1	1	1	1	1
T8	Yes	Yes	1	1	1	1	1	1	1	1
80.00-60.00				1	1	1	1	1	1	1
T9	Yes	Yes	1	1	1	1	1	1	1	1
60.00-40.00				1	1	1	1	1	1	1
T10	Yes	Yes	1	1	1	1	1	1	1	1
40.00-20.00				1	1	1	1	1	1	1
T11	Yes	Yes	1	1	1	1	1	1	1	1
20.00-0.00				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	Truss-Leg K Factors: Truss-Legs Used As Leg Members — Leg Panels	X Brace Diagonals	Z Brace Diagonals	Truss-Legs Used As Inner Members — Leg Panels	X Brace Diagonals	Z Brace Diagonals
T4	1	0.5	0.85	1	0.5	0.85
150.00-140.00						
T5	1	0.5	0.85	1	0.5	0.85
140.00-120.00						
T6	1	0.5	0.85	1	0.5	0.85
120.00-100.00						
T7	1	0.5	0.85	1	0.5	0.85
100.00-80.00						
T8	1	0.5	0.85	1	0.5	0.85
80.00-60.00						
T9	1	0.5	0.85	1	0.5	0.85
60.00-40.00						
T10	1	0.5	0.85	1	0.5	0.85
40.00-20.00						
T11	1	0.5	0.85	1	0.5	0.85
20.00-0.00						

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 195.00-185.00	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	0.75	0.0000	1	0.0000	1
T2 185.00-170.00	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	0.75	0.0000	1	0.0000	1
T3 170.00-150.00	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	0.75	0.0000	1	0.0000	1
T4 150.00-140.00	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	0.75	0.0000	1	0.0000	1
T5 140.00-120.00	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	0.75	0.0000	1	0.0000	1
T6 120.00-100.00	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	0.75	0.0000	1	0.0000	1
T7 100.00-80.00	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	0.75	0.0000	1	0.0000	1
T8 80.00-60.00	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	0.75	0.0000	1	0.0000	1
T9 60.00-40.00	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	0.75	0.0000	1	0.0000	1
T10 40.00-20.00	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	0.75	0.0000	1	0.0000	1
T11 20.00-0.00	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	0.75	0.0000	1	0.0000	1

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 195.00-185.00	Sleeve DS	0.6250 A325N	4	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0
T2 185.00-170.00	Sleeve DS	0.6250 A325N	5	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0
T3 170.00-150.00	Flange	1.0000 A325SC	6	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0
T4 150.00-140.00	Flange	1.0000 A325N	6	1.0000 A325N	1	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0
T5 140.00-120.00	Flange	1.0000 A325N	6	1.0000 A325N	1	1.0000 A325N	1	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0
T6 120.00-100.00	Flange	1.0000 A325N	6	1.0000 A325N	1	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0
T7 100.00-80.00	Flange	1.0000 A325N	6	1.0000 A325N	1	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0
T8 80.00-60.00	Flange	1.2500 A325N >1"	6	1.2500 A325N>1"	1	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0
T9 60.00-40.00	Flange	1.2500 A325N >1"	6	1.2500 A325N>1"	1	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0
T10 40.00-20.00	Flange	1.2500 A325N >1"	6	1.2500 A325N>1"	1	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0
T11 20.00-0.00	Flange	0.7500 A325N	0	1.2500 A325N>1"	1	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0

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
*** Wave Guide 1 ***												
T-Brackets	A	No	Af (CaAa)	161.50 - 8.00	-10.0000	0.43	1	1	1.0000	1.0000		8.40
1-5/8"	A	No	Ar (CaAa)	161.50 - 8.00	-8.0000	0.45	9	5	0.5000	1.9800		0.82
8 AWG(1-5/16")	A	No	Ar (CaAa)	161.50 - 8.00	-8.0000	0.42	1	1	0.5000	1.3500		1.00
***												
1/2"	A	No	Ar (CaAa)	101.40 - 8.00	-10.0000	0.45	2	2	0.0000	0.5800		0.15
8 AWG(1-5/16")	A	No	Ar (CaAa)	101.40 - 8.00	-10.0000	0.44	2	2	0.5000	1.3500		1.00
***												
1-5/8"	A	No	Ar (CaAa)	146.00 - 9.00	-18.0000	0.4	12	2	0.5000	1.9800		0.82
1-1/4"	A	No	Ar (CaAa)	146.00 - 9.00	-18.0000	0.4	1	1	0.5000	1.5500		0.66
***												
*** Wave Guide 2 ***												
T-Brackets	B	No	Af (CaAa)	135.00 - 9.00	-9.0000	0.43	1	1	1.0000	1.0000		8.40
1-5/8"	B	No	Ar (CaAa)	135.00 - 9.00	-8.0000	0.42	18	9	0.5000	1.9800		0.82
*** Wave Guide 3 ***												
T-Brackets	C	No	Af (CaAa)	171.50 - 9.00	-10.0000	0.42	1	1	1.0000	1.0000		8.40
7/8"	C	No	Ar (CaAa)	171.50 - 9.00	-10.0000	0.42	9	4	0.5000	1.1100		0.54
***												
1/2"	C	No	Ar (CaAa)	74.00 - 12.00	-4.0000	0.44	1	1	0.5800	0.5800		0.15
***												
***												
1"	A	No	Ar (CaAa)	194.80 - 9.00	0.0000	-0.45	1	1	0.5000	1.2500		0.58
***												
***												
1-1/4"	C	No	Ar (CaAa)	112.30 - 10.00	-12.0000	0.43	4	4	0.5000	1.5500		0.66
1/2"	C	No	Ar (CaAa)	60.00 - 10.00	-12.0000	0.43	1	1	0.0000	0.5800		0.15
***												

Feed Line/Linear Appurtenances - Entered As Area

Description	Face or Leg	Allow Shield	Component Type	Placement ft	Total Number	C_AA_A ft^2/ft	Weight plf
***							
***							
***							

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

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	195.00-185.00	A	0.000	0.000	1.225	0.000	0.01
		B	0.000	0.000	0.000	0.000	0.00
		C	0.000	0.000	0.000	0.000	0.00
T2	185.00-170.00	A	0.000	0.000	1.875	0.000	0.01
		B	0.000	0.000	0.000	0.000	0.00
		C	0.000	0.000	1.748	0.000	0.02
T3	170.00-150.00	A	0.000	0.000	26.462	0.000	0.20
		B	0.000	0.000	0.000	0.000	0.00
		C	0.000	0.000	23.313	0.000	0.27
T4	150.00-140.00	A	0.000	0.000	37.273	0.000	0.24
		B	0.000	0.000	0.000	0.000	0.00
		C	0.000	0.000	11.657	0.000	0.13
T5	140.00-120.00	A	0.000	0.000	94.793	0.000	0.56
		B	0.000	0.000	55.960	0.000	0.35
		C	0.000	0.000	23.313	0.000	0.27
T6	120.00-100.00	A	0.000	0.000	95.334	0.000	0.56
		B	0.000	0.000	74.613	0.000	0.46
		C	0.000	0.000	30.939	0.000	0.30
T7	100.00-80.00	A	0.000	0.000	102.513	0.000	0.60
		B	0.000	0.000	74.613	0.000	0.46
		C	0.000	0.000	35.713	0.000	0.32
T8	80.00-60.00	A	0.000	0.000	102.513	0.000	0.60
		B	0.000	0.000	74.613	0.000	0.46
		C	0.000	0.000	36.525	0.000	0.32
T9	60.00-40.00	A	0.000	0.000	102.513	0.000	0.60
		B	0.000	0.000	74.613	0.000	0.46
		C	0.000	0.000	38.033	0.000	0.32
T10	40.00-20.00	A	0.000	0.000	102.513	0.000	0.60
		B	0.000	0.000	74.613	0.000	0.46
		C	0.000	0.000	38.033	0.000	0.32
T11	20.00-0.00	A	0.000	0.000	58.852	0.000	0.35
		B	0.000	0.000	41.037	0.000	0.25
		C	0.000	0.000	20.066	0.000	0.17

Feed Line/Linear Appurtenances Section Areas - With Ice

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
T1	195.00-185.00	A	2.383	0.000	0.000	5.895	0.000	0.11
		B		0.000	0.000	0.000	0.000	0.00
		C		0.000	0.000	0.000	0.000	0.00
T2	185.00-170.00	A	2.366	0.000	0.000	8.974	0.000	0.17
		B		0.000	0.000	0.000	0.000	0.00
		C		0.000	0.000	3.585	0.000	0.08
T3	170.00-150.00	A	2.342	0.000	0.000	53.334	0.000	1.14
		B		0.000	0.000	0.000	0.000	0.00
		C		0.000	0.000	47.533	0.000	1.05
T4	150.00-140.00	A	2.319	0.000	0.000	61.300	0.000	1.33
		B		0.000	0.000	0.000	0.000	0.00
		C		0.000	0.000	23.640	0.000	0.52
T5	140.00-120.00	A	2.294	0.000	0.000	147.892	0.000	3.18
		B		0.000	0.000	61.722	0.000	1.53
		C		0.000	0.000	47.002	0.000	1.03
T6	120.00-100.00	A	2.256	0.000	0.000	149.801	0.000	3.17
		B		0.000	0.000	81.903	0.000	2.02
		C		0.000	0.000	67.543	0.000	1.32
T7	100.00-80.00	A	2.211	0.000	0.000	188.094	0.000	3.56

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	81.439	0.000	1.99
		C		0.000	0.000	79.870	0.000	1.49
T8	80.00-60.00	A	2.156	0.000	0.000	185.707	0.000	3.47
		B		0.000	0.000	80.872	0.000	1.95
		C		0.000	0.000	85.747	0.000	1.56
T9	60.00-40.00	A	2.085	0.000	0.000	182.605	0.000	3.36
		B		0.000	0.000	80.135	0.000	1.91
		C		0.000	0.000	96.631	0.000	1.69
T10	40.00-20.00	A	1.981	0.000	0.000	178.093	0.000	3.20
		B		0.000	0.000	79.064	0.000	1.84
		C		0.000	0.000	93.962	0.000	1.60
T11	20.00-0.00	A	1.775	0.000	0.000	98.042	0.000	1.67
		B		0.000	0.000	42.319	0.000	0.94
		C		0.000	0.000	45.572	0.000	0.74

Feed Line Center of Pressure

Section	Elevation ft	CP_X in	CP_Z in	CP_X Ice in	CP_Z Ice in
T1	195.00-185.00	-0.8866	0.4379	-0.4772	0.2357
T2	185.00-170.00	-1.3908	0.5641	-0.6520	0.2780
T3	170.00-150.00	-1.8048	-1.5320	-1.3198	-0.6268
T4	150.00-140.00	-0.5435	-3.0890	-0.7505	-1.3744
T5	140.00-120.00	1.4379	-1.9665	0.3610	-1.0586
T6	120.00-100.00	1.6882	-1.7762	0.5302	-1.0290
T7	100.00-80.00	1.6296	-2.5058	0.4050	-1.3510
T8	80.00-60.00	1.7468	-2.9209	0.1743	-1.4693
T9	60.00-40.00	1.8021	-3.3076	-0.3254	-1.4021
T10	40.00-20.00	1.9242	-3.6688	-0.3473	-1.5917
T11	20.00-0.00	1.7771	-3.6742	-0.0373	-1.7630

Shielding Factor Ka

Tower Section	Feed Line Record No.	Description	Feed Line Segment Elev.	K_a No Ice	K_a Ice
T1	22	1"	185.00 - 194.80	0.6000	0.3486
T2	16	T-Brackets	170.00 - 171.50	0.6000	0.3492
T2	17	7/8"	170.00 - 171.50	0.6000	0.3492
T2	22	1"	170.00 - 185.00	0.6000	0.3492
T3	2	T-Brackets	150.00 - 161.50	0.6000	0.3719
T3	3	1-5/8"	150.00 - 161.50	0.6000	0.3719
T3	4	8 AWG(1-5/16")	150.00 - 161.50	0.6000	0.3719
T3	16	T-Brackets	150.00 -	0.6000	0.3719

Tower Section	Feed Line Record No.	Description	Feed Line Segment Elev.	K_a No Ice	K_a Ice
T3	17	7/8"	150.00 - 170.00	0.6000	0.3719
T3	22	1"	150.00 - 170.00	0.6000	0.3719
T4	2	T-Brackets	140.00 - 150.00	0.6000	0.2606
T4	3	1-5/8"	140.00 - 150.00	0.6000	0.2606
T4	4	8 AWG(1-5/16")	140.00 - 150.00	0.6000	0.2606
T4	9	1-5/8"	140.00 - 146.00	0.6000	0.2606
T4	10	1-1/4"	140.00 - 146.00	0.6000	0.2606
T4	16	T-Brackets	140.00 - 150.00	0.6000	0.2606
T4	17	7/8"	140.00 - 150.00	0.6000	0.2606
T4	22	1"	140.00 - 150.00	0.6000	0.2606
T5	2	T-Brackets	120.00 - 140.00	0.6000	0.3868
T5	3	1-5/8"	120.00 - 140.00	0.6000	0.3868
T5	4	8 AWG(1-5/16")	120.00 - 140.00	0.6000	0.3868
T5	9	1-5/8"	120.00 - 140.00	0.6000	0.3868
T5	10	1-1/4"	120.00 - 140.00	0.6000	0.3868
T5	13	T-Brackets	120.00 - 135.00	0.6000	0.3868
T5	14	1-5/8"	120.00 - 135.00	0.6000	0.3868
T5	16	T-Brackets	120.00 - 140.00	0.6000	0.3868
T5	17	7/8"	120.00 - 140.00	0.6000	0.3868
T5	22	1"	120.00 - 140.00	0.6000	0.3868
T6	2	T-Brackets	100.00 - 120.00	0.6000	0.4909
T6	3	1-5/8"	100.00 - 120.00	0.6000	0.4909
T6	4	8 AWG(1-5/16")	100.00 - 120.00	0.6000	0.4909
T6	6	1/2"	100.00 - 101.40	0.6000	0.4909
T6	7	8 AWG(1-5/16")	100.00 - 101.40	0.6000	0.4909
T6	9	1-5/8"	100.00 - 120.00	0.6000	0.4909
T6	10	1-1/4"	100.00 - 120.00	0.6000	0.4909
T6	13	T-Brackets	100.00 - 120.00	0.6000	0.4909
T6	14	1-5/8"	100.00 - 120.00	0.6000	0.4909
T6	16	T-Brackets	100.00 - 120.00	0.6000	0.4909
T6	17	7/8"	100.00 -	0.6000	0.4909

Tower Section	Feed Line Record No.	Description	Feed Line Segment Elev.	K_a No Ice	K_a Ice
			120.00		
T6	22	1"	100.00 - 120.00	0.6000	0.4909
T6	27	1-1/4"	100.00 - 112.30	0.6000	0.4909
T7	2	T-Brackets	80.00 - 100.00	0.6000	0.5595
T7	3	1-5/8"	80.00 - 100.00	0.6000	0.5595
T7	4	8 AWG(1-5/16")	80.00 - 100.00	0.6000	0.5595
T7	6	1/2"	80.00 - 100.00	0.6000	0.5595
T7	7	8 AWG(1-5/16")	80.00 - 100.00	0.6000	0.5595
T7	9	1-5/8"	80.00 - 100.00	0.6000	0.5595
T7	10	1-1/4"	80.00 - 100.00	0.6000	0.5595
T7	13	T-Brackets	80.00 - 100.00	0.6000	0.5595
T7	14	1-5/8"	80.00 - 100.00	0.6000	0.5595
T7	16	T-Brackets	80.00 - 100.00	0.6000	0.5595
T7	17	7/8"	80.00 - 100.00	0.6000	0.5595
T7	22	1"	80.00 - 100.00	0.6000	0.5595
T7	27	1-1/4"	80.00 - 100.00	0.6000	0.5595
T8	2	T-Brackets	60.00 - 80.00	0.6000	0.6000
T8	3	1-5/8"	60.00 - 80.00	0.6000	0.6000
T8	4	8 AWG(1-5/16")	60.00 - 80.00	0.6000	0.6000
T8	6	1/2"	60.00 - 80.00	0.6000	0.6000
T8	7	8 AWG(1-5/16")	60.00 - 80.00	0.6000	0.6000
T8	9	1-5/8"	60.00 - 80.00	0.6000	0.6000
T8	10	1-1/4"	60.00 - 80.00	0.6000	0.6000
T8	13	T-Brackets	60.00 - 80.00	0.6000	0.6000
T8	14	1-5/8"	60.00 - 80.00	0.6000	0.6000
T8	16	T-Brackets	60.00 - 80.00	0.6000	0.6000
T8	17	7/8"	60.00 - 80.00	0.6000	0.6000
T8	19	1/2"	60.00 - 74.00	0.6000	0.6000
T8	22	1"	60.00 - 80.00	0.6000	0.6000
T8	27	1-1/4"	60.00 - 80.00	0.6000	0.6000
T9	2	T-Brackets	40.00 - 60.00	0.6000	0.6000
T9	3	1-5/8"	40.00 - 60.00	0.6000	0.6000
T9	4	8 AWG(1-5/16")	40.00 - 60.00	0.6000	0.6000
T9	6	1/2"	40.00 - 60.00	0.6000	0.6000
T9	7	8 AWG(1-5/16")	40.00 - 60.00	0.6000	0.6000
T9	9	1-5/8"	40.00 - 60.00	0.6000	0.6000
T9	10	1-1/4"	40.00 - 60.00	0.6000	0.6000
T9	13	T-Brackets	40.00 - 60.00	0.6000	0.6000
T9	14	1-5/8"	40.00 - 60.00	0.6000	0.6000
T9	16	T-Brackets	40.00 - 60.00	0.6000	0.6000
T9	17	7/8"	40.00 - 60.00	0.6000	0.6000
T9	19	1/2"	40.00 - 60.00	0.6000	0.6000
T9	22	1"	40.00 - 60.00	0.6000	0.6000
T9	27	1-1/4"	40.00 - 60.00	0.6000	0.6000
T9	28	1/2"	40.00 - 60.00	0.6000	0.6000
T10	2	T-Brackets	20.00 - 40.00	0.6000	0.6000
T10	3	1-5/8"	20.00 - 40.00	0.6000	0.6000
T10	4	8 AWG(1-5/16")	20.00 - 40.00	0.6000	0.6000
T10	6	1/2"	20.00 - 40.00	0.6000	0.6000
T10	7	8 AWG(1-5/16")	20.00 - 40.00	0.6000	0.6000
T10	9	1-5/8"	20.00 - 40.00	0.6000	0.6000
T10	10	1-1/4"	20.00 - 40.00	0.6000	0.6000
T10	13	T-Brackets	20.00 - 40.00	0.6000	0.6000
T10	14	1-5/8"	20.00 - 40.00	0.6000	0.6000
T10	16	T-Brackets	20.00 - 40.00	0.6000	0.6000
T10	17	7/8"	20.00 - 40.00	0.6000	0.6000
T10	19	1/2"	20.00 - 40.00	0.6000	0.6000
T10	22	1"	20.00 - 40.00	0.6000	0.6000
T10	27	1-1/4"	20.00 - 40.00	0.6000	0.6000
T10	28	1/2"	20.00 - 40.00	0.6000	0.6000

Tower Section	Feed Line Record No.	Description	Feed Line Segment Elev.	K_a No Ice	K_a Ice
T11	2	T-Brackets	8.00 - 20.00	0.6000	0.6000
T11	3	1-5/8"	8.00 - 20.00	0.6000	0.6000
T11	4	8 AWG(1-5/16")	8.00 - 20.00	0.6000	0.6000
T11	6	1/2"	8.00 - 20.00	0.6000	0.6000
T11	7	8 AWG(1-5/16")	8.00 - 20.00	0.6000	0.6000
T11	9	1-5/8"	9.00 - 20.00	0.6000	0.6000
T11	10	1-1/4"	9.00 - 20.00	0.6000	0.6000
T11	13	T-Brackets	9.00 - 20.00	0.6000	0.6000
T11	14	1-5/8"	9.00 - 20.00	0.6000	0.6000
T11	16	T-Brackets	9.00 - 20.00	0.6000	0.6000
T11	17	7/8"	9.00 - 20.00	0.6000	0.6000
T11	19	1/2"	12.00 - 20.00	0.6000	0.6000
T11	22	1"	9.00 - 20.00	0.6000	0.6000
T11	27	1-1/4"	10.00 - 20.00	0.6000	0.6000
T11	28	1/2"	10.00 - 20.00	0.6000	0.6000

Discrete Tower Loads

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
Beacon	A	From Face	0.00	0.0000	194.80	No Ice	2.00	2.00	0.02
			0.00			1/2" Ice	2.50	2.50	0.03
			1.30			1" Ice	3.00	3.00	0.04
Lightning Rod	C	From Leg	1.30	0.0000	194.60	No Ice	0.25	0.25	0.03
			0.00			1/2" Ice	0.66	0.66	0.03
			1.70			1" Ice	0.97	0.97	0.04
Sidemarker	A	From Leg	1.00	0.0000	94.50	No Ice	0.38	0.38	0.01
			0.00			1/2" Ice	0.63	0.63	0.02
			0.00			1" Ice	0.75	0.75	0.03
Sidemarker	B	From Leg	1.00	0.0000	94.50	No Ice	0.38	0.38	0.01
			0.00			1/2" Ice	0.63	0.63	0.02
			0.00			1" Ice	0.75	0.75	0.03
Sidemarker	C	From Leg	1.00	0.0000	94.50	No Ice	0.38	0.38	0.01
			0.00			1/2" Ice	0.63	0.63	0.02
			0.00			1" Ice	0.75	0.75	0.03
***									
DB224-A Omni	C	From Leg	0.50	0.0000	193.40	No Ice	6.38	6.38	0.04
			0.00			1/2" Ice	8.53	8.53	0.08
			10.00			1" Ice	10.71	10.71	0.14
***									
(2) 20' 4 Element Dipole	A	From Face	3.80	0.0000	171.50	No Ice	4.00	4.00	0.04
			0.00			1/2" Ice	6.03	6.03	0.07
			12.20			1" Ice	8.07	8.07	0.11
(2) 20' 4 Element Dipole	B	From Face	3.80	0.0000	171.50	No Ice	4.00	4.00	0.04
			0.00			1/2" Ice	6.03	6.03	0.07
			12.20			1" Ice	8.07	8.07	0.11
20' 4 Element Dipole	C	From Face	3.80	0.0000	171.50	No Ice	4.00	4.00	0.04
			0.00			1/2" Ice	6.03	6.03	0.07
			12.20			1" Ice	8.07	8.07	0.11
20'x2.5" Omni	C	From Face	3.80	0.0000	171.50	No Ice	5.00	5.00	0.03

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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 ft^2	C_AA_A Side ft^2	Weight K
			0.00			1/2" Ice	7.03	7.03	0.07
			11.30			1" Ice	9.07	9.07	0.12
13'x2" Omni	B	From Face	3.80	0.0000	171.50	No Ice	2.60	2.60	0.03
			0.00			1/2" Ice	3.92	3.92	0.05
			9.10			1" Ice	5.27	5.27	0.07
10' x 1.38" omni	C	From Face	3.80	0.0000	171.50	No Ice	1.38	1.38	0.02
			0.00			1/2" Ice	2.40	2.40	0.03
			7.60			1" Ice	3.44	3.44	0.05
(3) 15' T-Frames	C	None		0.0000	171.50	No Ice	27.35	27.35	1.89
						1/2" Ice	38.29	38.29	2.64
						1" Ice	49.23	49.23	3.40
(5) Pipe Mount	A	From Face	3.80	0.0000	171.50	No Ice	1.20	1.20	0.02
			0.00			1/2" Ice	1.50	1.50	0.03
			0.00			1" Ice	1.81	1.81	0.04
(5) Pipe Mount	B	From Face	3.80	0.0000	171.50	No Ice	1.20	1.20	0.02
			0.00			1/2" Ice	1.50	1.50	0.03
			0.00			1" Ice	1.81	1.81	0.04
(5) Pipe Mount	C	From Face	3.80	0.0000	171.50	No Ice	1.20	1.20	0.02
			0.00			1/2" Ice	1.50	1.50	0.03
			0.00			1" Ice	1.81	1.81	0.04
***									
DC6-48-60-18-8F	A	From Leg	0.50	0.0000	167.50	No Ice	1.21	1.21	0.03
			0.00			1/2" Ice	1.89	1.89	0.05
			0.80			1" Ice	2.11	2.11	0.08
8'x1'x7" Panel w/ Pipe Mount	A	From Face	3.80	0.0000	161.50	No Ice	11.47	9.20	0.06
			0.00			1/2" Ice	12.08	10.48	0.15
			3.50			1" Ice	12.71	11.50	0.24
8'x1'x7" Panel w/ Pipe Mount	B	From Face	3.80	0.0000	161.50	No Ice	11.47	9.20	0.06
			0.00			1/2" Ice	12.08	10.48	0.15
			3.50			1" Ice	12.71	11.50	0.24
8'x1'x7" Panel w/ Pipe Mount	C	From Face	3.80	0.0000	161.50	No Ice	11.47	9.20	0.06
			0.00			1/2" Ice	12.08	10.48	0.15
			3.50			1" Ice	12.71	11.50	0.24
800 10121 w/ Mount Pipe	A	From Face	3.80	0.0000	161.50	No Ice	5.39	4.60	0.07
			0.00			1/2" Ice	5.81	5.35	0.11
			3.30			1" Ice	6.23	6.05	0.17
800 10121 w/ Mount Pipe	B	From Face	3.80	0.0000	161.50	No Ice	5.39	4.60	0.07
			0.00			1/2" Ice	5.81	5.35	0.11
			3.30			1" Ice	6.23	6.05	0.17
800 10121 w/ Mount Pipe	C	From Face	3.80	0.0000	161.50	No Ice	5.39	4.60	0.07
			0.00			1/2" Ice	5.81	5.35	0.11
			3.30			1" Ice	6.23	6.05	0.17
14.5"x9.25"x3.0" TMA	A	From Face	3.80	0.0000	161.50	No Ice	0.00	0.34	0.02
			0.00			1/2" Ice	0.00	0.43	0.02
			3.30			1" Ice	0.00	0.54	0.03
14.5"x9.25"x3.0" TMA	B	From Face	3.80	0.0000	161.50	No Ice	0.00	0.34	0.02
			0.00			1/2" Ice	0.00	0.43	0.02
			3.30			1" Ice	0.00	0.54	0.03
14.5"x9.25"x3.0" TMA	C	From Face	3.80	0.0000	161.50	No Ice	0.00	0.34	0.02
			0.00			1/2" Ice	0.00	0.43	0.02
			3.30			1" Ice	0.00	0.54	0.03
RRUS 11 B12	A	From Face	3.80	0.0000	161.50	No Ice	2.83	1.18	0.05
			0.00			1/2" Ice	3.04	1.33	0.07
			2.40			1" Ice	3.26	1.48	0.10
RRUS 11 B12	B	From Face	3.80	0.0000	161.50	No Ice	2.83	1.18	0.05
			0.00			1/2" Ice	3.04	1.33	0.07
			2.40			1" Ice	3.26	1.48	0.10

Description	Face or Leg	Offset Type	Offsets: Horz Lateral ft / Vert ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
RRUS 11 B12	C	From Face	3.80 0.00 2.40	0.0000	161.50	No Ice 1/2" Ice 1" Ice	2.83 3.04 3.26	1.18 1.33 1.48	0.05 0.07 0.10
(3) 15' T-Frames	C	None		0.0000	161.50	No Ice 1/2" Ice 1" Ice	27.35 38.29 49.23	27.35 38.29 49.23	1.89 2.64 3.40
(2) Pipe Mount	A	From Face	3.80 0.00 0.00	0.0000	161.50	No Ice 1/2" Ice 1" Ice	1.20 1.50 1.81	1.20 1.50 1.81	0.02 0.03 0.04
(2) Pipe Mount	B	From Face	3.80 0.00 0.00	0.0000	161.50	No Ice 1/2" Ice 1" Ice	1.20 1.50 1.81	1.20 1.50 1.81	0.02 0.03 0.04
(2) Pipe Mount	C	From Face	3.80 0.00 0.00	0.0000	161.50	No Ice 1/2" Ice 1" Ice	1.20 1.50 1.81	1.20 1.50 1.81	0.02 0.03 0.04
***									
RRFDC-3315-PF-48	A	From Leg	0.50 0.00 0.80	0.0000	146.00	No Ice 1/2" Ice 1" Ice	3.02 3.24 3.47	1.96 2.15 2.35	0.03 0.06 0.09
6' x 1' x 7" Panel	A	From Leg	4.00 0.00 -0.30	0.0000	146.00	No Ice 1/2" Ice 1" Ice	8.13 8.59 9.05	5.28 5.74 6.20	0.04 0.09 0.15
Pipe Mount [PM 601-1]	A	From Leg	4.00 0.00 -0.30	0.0000	146.00	No Ice 1/2" Ice 1" Ice	3.00 3.74 4.48	0.90 1.12 1.34	0.07 0.08 0.09
BXA-70063-6CF-EDIN w/ Mount Pipe	B	From Leg	4.00 0.00 -0.30	0.0000	146.00	No Ice 1/2" Ice 1" Ice	7.81 8.36 8.87	5.80 6.95 7.82	0.04 0.10 0.17
BXA-70063-6CF-EDIN w/ Mount Pipe	C	From Leg	4.00 0.00 -0.30	0.0000	146.00	No Ice 1/2" Ice 1" Ice	7.81 8.36 8.87	5.80 6.95 7.82	0.04 0.10 0.17
BXA-171063-12CF-EDIN-5 w/Mount Pipe	A	From Leg	4.00 0.00 -0.30	0.0000	146.00	No Ice 1/2" Ice 1" Ice	5.02 5.57 6.09	5.28 6.45 7.33	0.04 0.09 0.14
BXA-171063-12CF-EDIN-5 w/Mount Pipe	B	From Leg	4.00 0.00 -0.30	0.0000	146.00	No Ice 1/2" Ice 1" Ice	5.02 5.57 6.09	5.28 6.45 7.33	0.04 0.09 0.14
BXA-171063-12CF-EDIN-5 w/Mount Pipe	C	From Leg	4.00 0.00 -0.30	0.0000	146.00	No Ice 1/2" Ice 1" Ice	5.02 5.57 6.09	5.28 6.45 7.33	0.04 0.09 0.14
9442 RRH2x40 AWS RRH	A	From Leg	4.00 0.00 -0.50	0.0000	146.00	No Ice 1/2" Ice 1" Ice	2.50 2.71 2.93	1.89 2.08 2.27	0.05 0.07 0.10
9442 RRH2x40 AWS RRH	B	From Leg	4.00 0.00 -0.50	0.0000	146.00	No Ice 1/2" Ice 1" Ice	2.50 2.71 2.93	1.89 2.08 2.27	0.05 0.07 0.10
9442 RRH2x40 AWS RRH	C	From Leg	4.00 0.00 -0.50	0.0000	146.00	No Ice 1/2" Ice 1" Ice	2.50 2.71 2.93	1.89 2.08 2.27	0.05 0.07 0.10
(3) 12.5' T-Frames	A	None		0.0000	146.00	No Ice 1/2" Ice 1" Ice	30.02 40.48 50.94	30.02 40.48 50.94	0.95 1.40 1.86
(2) Pipe Mount	A	From Leg	4.00 0.00 0.00	0.0000	146.00	No Ice 1/2" Ice 1" Ice	1.20 1.50 1.81	1.20 1.50 1.81	0.02 0.03 0.04
(2) Pipe Mount	B	From Leg	4.00 0.00	0.0000	146.00	No Ice 1/2" Ice	1.20 1.50	1.20 1.50	0.02 0.03

Description	Face or Leg	Offset Type	Offsets: Horz Lateral ft	Offsets: Vert ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
			0.00				1" Ice	1.81	1.81	0.04
(2) Pipe Mount	C	From Leg	4.00		0.0000	146.00	No Ice	1.20	1.20	0.02
			0.00				1/2" Ice	1.50	1.50	0.03
			0.00				1" Ice	1.81	1.81	0.04
***										
RR90-17-02DP w/ Mount Pipe	A	From Leg	3.80		0.0000	135.00	No Ice	4.59	3.32	0.03
			0.00				1/2" Ice	5.02	4.09	0.07
			3.30				1" Ice	5.44	4.78	0.12
RR90-17-02DP w/ Mount Pipe	B	From Leg	3.80		0.0000	135.00	No Ice	4.59	3.32	0.03
			0.00				1/2" Ice	5.02	4.09	0.07
			3.30				1" Ice	5.44	4.78	0.12
RR90-17-02DP w/ Mount Pipe	C	From Leg	3.80		0.0000	135.00	No Ice	4.59	3.32	0.03
			0.00				1/2" Ice	5.02	4.09	0.07
			3.30				1" Ice	5.44	4.78	0.12
RFS 4.7'x1.1'x3.5' Panel	A	From Leg	3.80		0.0000	135.00	No Ice	5.80	2.42	0.02
			0.00				1/2" Ice	6.16	2.76	0.05
			3.30				1" Ice	6.52	3.10	0.09
RFS 4.7'x1.1'x3.5' Panel	B	From Leg	3.80		0.0000	135.00	No Ice	5.80	2.42	0.02
			0.00				1/2" Ice	6.16	2.76	0.05
			3.30				1" Ice	6.52	3.10	0.09
RFS 4.7'x1.1'x3.5' Panel	C	From Leg	3.80		0.0000	135.00	No Ice	5.80	2.42	0.02
			0.00				1/2" Ice	6.16	2.76	0.05
			3.30				1" Ice	6.52	3.10	0.09
7" x 6" x 3" TMA	A	From Leg	3.80		0.0000	135.00	No Ice	0.00	0.17	0.01
			0.00				1/2" Ice	0.00	0.23	0.01
			3.30				1" Ice	0.00	0.30	0.02
7" x 6" x 3" TMA	B	From Leg	3.80		0.0000	135.00	No Ice	0.00	0.17	0.01
			0.00				1/2" Ice	0.00	0.23	0.01
			3.30				1" Ice	0.00	0.30	0.02
7" x 6" x 3" TMA	C	From Leg	3.80		0.0000	135.00	No Ice	0.00	0.17	0.01
			0.00				1/2" Ice	0.00	0.23	0.01
			3.30				1" Ice	0.00	0.30	0.02
LNX-6515DS-A1M w/ Mount Pipe	A	From Leg	3.80		0.0000	135.00	No Ice	11.78	10.85	0.12
			0.00				1/2" Ice	12.50	12.32	0.22
			2.80				1" Ice	13.18	13.46	0.33
LNX-6515DS-A1M w/ Mount Pipe	B	From Leg	3.80		0.0000	135.00	No Ice	11.78	10.85	0.12
			0.00				1/2" Ice	12.50	12.32	0.22
			2.80				1" Ice	13.18	13.46	0.33
LNX-6515DS-A1M w/ Mount Pipe	C	From Leg	3.80		0.0000	135.00	No Ice	11.78	10.85	0.12
			0.00				1/2" Ice	12.50	12.32	0.22
			2.80				1" Ice	13.18	13.46	0.33
(3) 15' T-Frames	C	None			0.0000	135.00	No Ice	27.35	27.35	1.89
							1/2" Ice	38.29	38.29	2.64
							1" Ice	49.23	49.23	3.40
(4) Pipe Mount	A	From Leg	3.80		0.0000	135.00	No Ice	1.20	1.20	0.02
			0.00				1/2" Ice	1.50	1.50	0.03
			0.00				1" Ice	1.81	1.81	0.04
(4) Pipe Mount	B	From Leg	3.80		0.0000	135.00	No Ice	1.20	1.20	0.02
			0.00				1/2" Ice	1.50	1.50	0.03
			0.00				1" Ice	1.81	1.81	0.04
(4) Pipe Mount	C	From Leg	3.80		0.0000	135.00	No Ice	1.20	1.20	0.02
			0.00				1/2" Ice	1.50	1.50	0.03
			0.00				1" Ice	1.81	1.81	0.04
***										
***										
APXVTM14-C-I20 w/ Mount Pipe	A	From Leg	4.50		0.0000	112.30	No Ice	6.65	5.03	0.08
			0.00				1/2" Ice	7.14	5.89	0.13

Description	Face or Leg	Offset Type	Offsets: Horz Lateral ft	Offsets: Vert ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
				2.70			1" Ice	7.60	6.63	0.20
APXVTM14-C-I20 w/ Mount Pipe	B	From Leg	4.50	0.00	0.0000	112.30	No Ice 1/2" Ice	6.65 7.14	5.03 5.89	0.08 0.13
				2.70			1" Ice	7.60	6.63	0.20
APXVTM14-C-I20 w/ Mount Pipe	C	From Leg	4.50	0.00	0.0000	112.30	No Ice 1/2" Ice	6.65 7.14	5.03 5.89	0.08 0.13
				2.70			1" Ice	7.60	6.63	0.20
APXVSPP18-C-A20 w/ Mount Pipe	A	From Leg	4.50	0.00	0.0000	112.30	No Ice 1/2" Ice	8.26 8.82	6.95 8.13	0.08 0.15
				4.50			1" Ice	9.35	9.02	0.23
APXVSPP18-C-A20 w/ Mount Pipe	B	From Leg	4.50	0.00	0.0000	112.30	No Ice 1/2" Ice	8.26 8.82	6.95 8.13	0.08 0.15
				4.50			1" Ice	9.35	9.02	0.23
APXVSPP18-C-A20 w/ Mount Pipe	C	From Leg	4.50	0.00	0.0000	112.30	No Ice 1/2" Ice	8.26 8.82	6.95 8.13	0.08 0.15
				4.50			1" Ice	9.35	9.02	0.23
TD-RRH8x20-25	A	From Leg	4.50	0.00	0.0000	112.30	No Ice 1/2" Ice	3.70 3.95	1.29 1.46	0.07 0.09
				2.70			1" Ice	4.20	1.64	0.12
TD-RRH8x20-25	B	From Leg	4.50	0.00	0.0000	112.30	No Ice 1/2" Ice	3.70 3.95	1.29 1.46	0.07 0.09
				2.70			1" Ice	4.20	1.64	0.12
TD-RRH8x20-25	C	From Leg	4.50	0.00	0.0000	112.30	No Ice 1/2" Ice	3.70 3.95	1.29 1.46	0.07 0.09
				2.70			1" Ice	4.20	1.64	0.12
800 MHz RRH	A	From Leg	0.50	0.00	0.0000	109.60	No Ice 1/2" Ice	2.13 2.32	1.77 1.95	0.05 0.07
				0.70			1" Ice	2.51	2.13	0.10
800 MHz RRH	B	From Leg	0.50	0.00	0.0000	109.60	No Ice 1/2" Ice	2.13 2.32	1.77 1.95	0.05 0.07
				0.70			1" Ice	2.51	2.13	0.10
800 MHz RRH	C	From Leg	0.50	0.00	0.0000	109.60	No Ice 1/2" Ice	2.13 2.32	1.77 1.95	0.05 0.07
				0.70			1" Ice	2.51	2.13	0.10
1900 MHz RRH	A	From Leg	0.50	0.00	0.0000	106.50	No Ice 1/2" Ice	2.31 2.52	2.38 2.58	0.06 0.08
				1.10			1" Ice	2.73	2.79	0.11
1900 MHz RRH	B	From Leg	0.50	0.00	0.0000	106.50	No Ice 1/2" Ice	2.31 2.52	2.38 2.58	0.06 0.08
				1.10			1" Ice	2.73	2.79	0.11
1900 MHz RRH	C	From Leg	0.50	0.00	0.0000	106.50	No Ice 1/2" Ice	2.31 2.52	2.38 2.58	0.06 0.08
				1.10			1" Ice	2.73	2.79	0.11
(3) 15' T-Frames	C	None			0.0000	112.30	No Ice 1/2" Ice 1" Ice	34.86 49.79 64.72	34.86 49.79 64.72	1.73 2.32 2.91
(2) Pipe Mount	A	From Leg	4.50	0.00	0.0000	112.30	No Ice 1/2" Ice	1.20 1.50	1.20 1.50	0.02 0.03
				0.00			1" Ice	1.81	1.81	0.04
(2) Pipe Mount	B	From Leg	4.50	0.00	0.0000	112.30	No Ice 1/2" Ice	1.20 1.50	1.20 1.50	0.02 0.03
				0.00			1" Ice	1.81	1.81	0.04
(2) Pipe Mount	C	From Leg	4.50	0.00	0.0000	112.30	No Ice 1/2" Ice	1.20 1.50	1.20 1.50	0.02 0.03
				0.00			1" Ice	1.81	1.81	0.04
***										
LLPX310R w/ Mount Pipe	A	From Leg	1.30		0.0000	101.40	No Ice	4.69	3.16	0.05

Description	*Face or Leg*	*Offset Type*	*Offsets: Horz Lateral ft / Vert ft / ft*	*Azimuth Adjustment* °	*Placement* ft		*C_AA_A Front* ft^2	*C_AA_A Side* ft^2	*Weight* K
			0.00			1/2" Ice	5.07	3.74	0.09
			2.60			1" Ice	5.47	4.33	0.13
LLPX310R w/ Mount Pipe	B	From Leg	1.30	0.0000	101.40	No Ice	4.69	3.16	0.05
			0.00			1/2" Ice	5.07	3.74	0.09
			2.60			1" Ice	5.47	4.33	0.13
LLPX310R w/ Mount Pipe	C	From Leg	1.30	0.0000	101.40	No Ice	4.69	3.16	0.05
			0.00			1/2" Ice	5.07	3.74	0.09
			2.60			1" Ice	5.47	4.33	0.13
SPI-22132825WB RRH	A	From Leg	1.30	0.0000	101.40	No Ice	0.00	0.00	0.00
			0.00			1/2" Ice	0.00	0.00	0.00
			2.40			1" Ice	0.00	0.00	0.00
SPI-22132825WB RRH	B	From Leg	1.30	0.0000	101.40	No Ice	0.00	0.00	0.00
			0.00			1/2" Ice	0.00	0.00	0.00
			2.40			1" Ice	0.00	0.00	0.00
SPI-22132825WB RRH	C	From Leg	0.00	0.0000	101.40	No Ice	0.00	0.00	0.00
			0.00			1/2" Ice	0.00	0.00	0.00
			2.40			1" Ice	0.00	0.00	0.00
(3) 1.3' Standoffs	C	None		0.0000	101.40	No Ice	9.50	9.50	0.22
						1/2" Ice	11.80	11.80	0.32
						1" Ice	14.10	14.10	0.41
Pipe Mount	A	From Leg	1.30	0.0000	101.40	No Ice	1.20	1.20	0.02
			0.00			1/2" Ice	1.50	1.50	0.03
			0.00			1" Ice	1.81	1.81	0.04
Pipe Mount	B	From Leg	1.30	0.0000	101.40	No Ice	1.20	1.20	0.02
			0.00			1/2" Ice	1.50	1.50	0.03
			0.00			1" Ice	1.81	1.81	0.04
Pipe Mount	C	From Leg	1.30	0.0000	101.40	No Ice	1.20	1.20	0.02
			0.00			1/2" Ice	1.50	1.50	0.03
			0.00			1" Ice	1.81	1.81	0.04
12" x 12" x 6.38" Junction Box	A	From Leg	0.50	0.0000	101.80	No Ice	1.20	0.64	0.02
			0.00			1/2" Ice	1.34	0.74	0.03
			0.60			1" Ice	1.48	0.86	0.04
***									
3.37" Ø x 7.5" GPS	C	From Leg	3.50	0.0000	74.00	No Ice	0.12	0.12	0.00
			0.00			1/2" Ice	0.18	0.18	0.00
			1.90			1" Ice	0.25	0.25	0.00
(1) 3.5' Standoff	C	From Leg	1.75	0.0000	74.00	No Ice	0.85	1.67	0.07
			0.00			1/2" Ice	1.14	2.34	0.08
			0.00			1" Ice	1.43	3.01	0.09
***									
GPS-TMG-HR-26N	C	From Leg	0.50	0.0000	60.00	No Ice	0.21	0.13	0.00
			0.00			1/2" Ice	0.27	0.18	0.00
			0.00			1" Ice	0.33	0.24	0.01
***									

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 ft²	Weight K
3.3' Dish	C	Paraboloid w/Shroud (HP)	From Leg	1.00 0.00 3.20	0.0000		101.40	3.30	No Ice 1/2" Ice 1" Ice	8.55 8.99 9.43	0.04 0.09 0.13
VHLP1-23-DW1 ***	A	Paraboloid w/Shroud (HP)	From Leg	1.00 0.00 2.60	0.0000		101.40	1.27	No Ice 1/2" Ice 1" Ice	1.28 1.45 1.62	0.01 0.02 0.03

Truss-Leg Properties

Section Designation	Area in²	Area Ice in²	Self Weight K	Ice Weight K	Equiv. Diameter in	Equiv. Diameter Ice in	Leg Area in²
Pirod 105244	1026.8606	3412.2617	0.54	1.21	7.1310	23.6963	3.6816
Pirod 105217	2312.6169	6612.9668	0.57	2.54	8.0299	22.9617	5.3014
Pirod 105218	2441.6826	6657.9346	0.70	2.56	8.4781	23.1178	7.2158
Pirod 105218	2441.6826	6626.0542	0.70	2.54	8.4781	23.0071	7.2158
Pirod 105219	2620.2715	6659.0197	1.05	2.55	9.0982	23.1216	9.4248
Pirod 105219	2620.2715	6608.2711	1.05	2.51	9.0982	22.9454	9.4248
Pirod 105220	2757.8509	6606.4167	1.22	2.49	9.5759	22.9389	11.9282
Pirod 105220	2757.8509	6459.8043	1.22	2.32	9.5759	22.4299	11.9282

Load Combinations

Comb. No.	Description
1	Dead Only
2	1.2 Dead+1.6 Wind 0 deg - No Ice
3	0.9 Dead+1.6 Wind 0 deg - No Ice
4	1.2 Dead+1.6 Wind 30 deg - No Ice
5	0.9 Dead+1.6 Wind 30 deg - No Ice
6	1.2 Dead+1.6 Wind 60 deg - No Ice
7	0.9 Dead+1.6 Wind 60 deg - No Ice
8	1.2 Dead+1.6 Wind 90 deg - No Ice
9	0.9 Dead+1.6 Wind 90 deg - No Ice
10	1.2 Dead+1.6 Wind 120 deg - No Ice
11	0.9 Dead+1.6 Wind 120 deg - No Ice
12	1.2 Dead+1.6 Wind 150 deg - No Ice
13	0.9 Dead+1.6 Wind 150 deg - No Ice
14	1.2 Dead+1.6 Wind 180 deg - No Ice
15	0.9 Dead+1.6 Wind 180 deg - No Ice
16	1.2 Dead+1.6 Wind 210 deg - No Ice
17	0.9 Dead+1.6 Wind 210 deg - No Ice
18	1.2 Dead+1.6 Wind 240 deg - No Ice
19	0.9 Dead+1.6 Wind 240 deg - No Ice
20	1.2 Dead+1.6 Wind 270 deg - No Ice
21	0.9 Dead+1.6 Wind 270 deg - No Ice
22	1.2 Dead+1.6 Wind 300 deg - No Ice
23	0.9 Dead+1.6 Wind 300 deg - No Ice
24	1.2 Dead+1.6 Wind 330 deg - No Ice
25	0.9 Dead+1.6 Wind 330 deg - No Ice
26	1.2 Dead+1.0 Ice+1.0 Temp

Comb. No.	Description
27	1.2 Dead+1.0 Wind 0 deg+1.0 Ice+1.0 Temp
28	1.2 Dead+1.0 Wind 30 deg+1.0 Ice+1.0 Temp
29	1.2 Dead+1.0 Wind 60 deg+1.0 Ice+1.0 Temp
30	1.2 Dead+1.0 Wind 90 deg+1.0 Ice+1.0 Temp
31	1.2 Dead+1.0 Wind 120 deg+1.0 Ice+1.0 Temp
32	1.2 Dead+1.0 Wind 150 deg+1.0 Ice+1.0 Temp
33	1.2 Dead+1.0 Wind 180 deg+1.0 Ice+1.0 Temp
34	1.2 Dead+1.0 Wind 210 deg+1.0 Ice+1.0 Temp
35	1.2 Dead+1.0 Wind 240 deg+1.0 Ice+1.0 Temp
36	1.2 Dead+1.0 Wind 270 deg+1.0 Ice+1.0 Temp
37	1.2 Dead+1.0 Wind 300 deg+1.0 Ice+1.0 Temp
38	1.2 Dead+1.0 Wind 330 deg+1.0 Ice+1.0 Temp
39	Dead+Wind 0 deg - Service
40	Dead+Wind 30 deg - Service
41	Dead+Wind 60 deg - Service
42	Dead+Wind 90 deg - Service
43	Dead+Wind 120 deg - Service
44	Dead+Wind 150 deg - Service
45	Dead+Wind 180 deg - Service
46	Dead+Wind 210 deg - Service
47	Dead+Wind 240 deg - Service
48	Dead+Wind 270 deg - Service
49	Dead+Wind 300 deg - Service
50	Dead+Wind 330 deg - Service

Maximum Tower Deflections - Service Wind

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
T1	195 - 185	4.303	39	0.1895	0.0131
T2	185 - 170	3.904	39	0.1888	0.0105
T3	170 - 150	3.301	39	0.1849	0.0055
T4	150 - 140	2.531	39	0.1645	0.0044
T5	140 - 120	2.192	39	0.1506	0.0038
T6	120 - 100	1.586	39	0.1256	0.0028
T7	100 - 80	1.083	39	0.1033	0.0021
T8	80 - 60	0.688	39	0.0776	0.0016
T9	60 - 40	0.391	39	0.0566	0.0012
T10	40 - 20	0.181	39	0.0349	0.0008
T11	20 - 0	0.054	39	0.0175	0.0004

Critical Deflections and Radius of Curvature - Service Wind

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
194.80	Beacon	39	4.295	0.1894	0.0131	474672
194.60	Lightning Rod	39	4.287	0.1894	0.0130	474672
193.40	DB224-A Omni	39	4.239	0.1894	0.0127	474672
171.50	(2) 20' 4 Element Dipole	39	3.362	0.1857	0.0060	371878
167.50	DC6-48-60-18-8F	39	3.201	0.1833	0.0049	139027
161.50	8'x1'x7" Panel w/ Pipe Mount	39	2.963	0.1782	0.0042	58831
146.00	RRFDC-3315-PF-48	39	2.392	0.1590	0.0042	35659
135.00	RR90-17-02DP w/ Mount Pipe	39	2.032	0.1438	0.0036	56736

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
112.30	APXVTM14-C-I20 w/ Mount Pipe	39	1.380	0.1172	0.0025	43979
109.60	800 MHz RRH	39	1.311	0.1143	0.0024	43887
106.50	1900 MHz RRH	39	1.235	0.1109	0.0023	43781
104.60	3.3' Dish	39	1.189	0.1088	0.0022	43717
104.00	VHLP1-23-DW1	39	1.175	0.1081	0.0022	43699
101.80	12" x 12" x 6.38" Junction Box	39	1.124	0.1055	0.0021	43689
101.40	LLPX310R w/ Mount Pipe	39	1.115	0.1050	0.0021	43704
94.50	Sidemarker	39	0.964	0.0963	0.0019	45099
74.00	3.37" Ø x 7.5" GPS	39	0.589	0.0709	0.0015	51099
60.00	GPS-TMG-HR-26N	39	0.391	0.0566	0.0012	54604

Maximum Tower Deflections - Design Wind

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
T1	195 - 185	17.873	2	0.7872	0.0549
T2	185 - 170	16.217	2	0.7843	0.0438
T3	170 - 150	13.713	2	0.7673	0.0231
T4	150 - 140	10.515	2	0.6822	0.0184
T5	140 - 120	9.112	2	0.6245	0.0161
T6	120 - 100	6.595	2	0.5214	0.0118
T7	100 - 80	4.506	2	0.4292	0.0086
T8	80 - 60	2.864	2	0.3223	0.0068
T9	60 - 40	1.626	2	0.2353	0.0050
T10	40 - 20	0.753	2	0.1452	0.0032
T11	20 - 0	0.226	2	0.0728	0.0016

Critical Deflections and Radius of Curvature - Design Wind

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
194.80	Beacon	2	17.840	0.7871	0.0547	124468
194.60	Lightning Rod	2	17.807	0.7871	0.0545	124468
193.40	DB224-A Omni	2	17.608	0.7868	0.0533	124468
171.50	(2) 20' 4 Element Dipole	2	13.964	0.7706	0.0249	75828
167.50	DC6-48-60-18-8F	2	13.297	0.7606	0.0204	34354
161.50	8'x1'x7" Panel w/ Pipe Mount	2	12.310	0.7391	0.0177	14315
146.00	RRFDC-3315-PF-48	2	9.938	0.6593	0.0176	8661
135.00	RR90-17-02DP w/ Mount Pipe	2	8.448	0.5966	0.0151	13819
112.30	APXVTM14-C-I20 w/ Mount Pipe	2	5.737	0.4867	0.0104	10609
109.60	800 MHz RRH	2	5.452	0.4746	0.0100	10583
106.50	1900 MHz RRH	2	5.135	0.4605	0.0095	10552
104.60	3.3' Dish	2	4.946	0.4517	0.0092	10534
104.00	VHLP1-23-DW1	2	4.888	0.4488	0.0091	10528
101.80	12" x 12" x 6.38" Junction Box	2	4.675	0.4382	0.0089	10523
101.40	LLPX310R w/ Mount Pipe	2	4.638	0.4362	0.0088	10526
94.50	Sidemarker	2	4.011	0.4001	0.0080	10861
74.00	3.37" Ø x 7.5" GPS	2	2.452	0.2946	0.0062	12311
60.00	GPS-TMG-HR-26N	2	1.626	0.2353	0.0050	13146

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	195	Leg	A325N	0.6250	4	0.63	24.85	0.025 ✔	1	Bolt DS
T2	185	Leg	A325N	0.6250	5	2.28	24.85	0.092 ✔	1	Bolt DS
T3	170	Leg	A325SC	1.0000	6	5.08	53.01	0.096 ✔	1	Bolt Tension
T4	150	Leg	A325N	1.0000	6	5.61	53.01	0.106 ✔	1	Bolt Tension
		Diagonal	A325N	1.0000	1	4.50	10.66	0.422 ✔	1	Member Block Shear
T5	140	Leg	A325N	1.0000	6	10.37	53.01	0.196 ✔	1	Bolt Tension
		Diagonal	A325N	1.0000	1	5.80	10.66	0.544 ✔	1	Member Block Shear
		Top Girt	A325N	1.0000	1	1.98	10.66	0.186 ✔	1	Member Block Shear
T6	120	Leg	A325N	1.0000	6	15.41	53.01	0.291 ✔	1	Bolt Tension
		Diagonal	A325N	1.0000	1	6.70	11.68	0.573 ✔	1	Member Block Shear
T7	100	Leg	A325N	1.0000	6	20.87	53.01	0.394 ✔	1	Bolt Tension
		Diagonal	A325N	1.0000	1	7.38	19.47	0.379 ✔	1	Member Block Shear
T8	80	Leg	A325N >1"	1.2500	6	25.84	72.48	0.357 ✔	1	Bolt Tension
		Diagonal	A325N>1' '	1.2500	1	7.38	20.30	0.364 ✔	1	Member Block Shear
T9	60	Leg	A325N >1"	1.2500	6	30.45	72.48	0.420 ✔	1	Bolt Tension
		Diagonal	A325N>1' '	1.2500	1	7.62	20.30	0.375 ✔	1	Member Block Shear
T10	40	Leg	A325N >1"	1.2500	6	34.78	72.48	0.480 ✔	1	Bolt Tension
		Diagonal	A325N>1' '	1.2500	1	7.97	23.70	0.336 ✔	1	Member Block Shear
T11	20	Diagonal	A325N>1' '	1.2500	1	8.60	23.70	0.363 ✔	1	Member Block Shear

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	195 - 185	1 3/4	10.00	2.25	61.7 K=1.00	2.4053	-2.22	81.93	0.027 [1] ✔
T2	185 - 170	1 3/4	15.00	2.33	64.0	2.4053	-10.61	80.23	0.132 [1]

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	A in^2	P_u K	ϕP_n K	Ratio $\frac{P_u}{\phi P_n}$
T3	170 - 150	2	20.00	2.33	K=1.00 56.0	3.1416	-34.37	112.40	0.306 [1] ✔
T4	150 - 140	Pirod 105244	10.02	10.02	K=1.00 45.4	3.6816	-39.41	142.49	0.277 [1] ✔
T5	140 - 120	Pirod 105217	20.03	10.02	K=1.00 37.8	5.3014	-74.56	214.86	0.347 [1] ✔
T6	120 - 100	Pirod 105218	20.03	10.02	K=1.00 32.4	7.2158	-110.25	300.68	0.367 [1] ✔
T7	100 - 80	Pirod 105218	20.03	10.02	K=1.00 32.4	7.2158	-146.96	300.68	0.489 [1] ✔
T8	80 - 60	Pirod 105219	20.03	10.02	K=1.00 28.4	9.4248	-181.49	399.87	0.454 [1] ✔
T9	60 - 40	Pirod 105219	20.03	10.02	K=1.00 28.4	9.4248	-214.13	399.87	0.536 [1] ✔
T10	40 - 20	Pirod 105220	20.03	10.02	K=1.00 25.2	11.9282	-245.62	512.38	0.479 [1] ✔
T11	20 - 0	Pirod 105220	20.03	10.02	K=1.00 25.2	11.9282	-274.80	512.38	0.536 [1] ✔
					K=1.00				✔

[1] P_u / ϕP_n controls

Truss-Leg Diagonal Data

Section No.	Elevation ft	Diagonal Size	L_d ft	Kl/r	ϕP_n K	A in^2	V_u K	ϕV_n K	Stress Ratio
T4	150 - 140	0.5	1.48	121.0	165.67	0.1963	0.65	3.39	0.190 ✔
T5	140 - 120	0.5	1.47	120.0	238.57	0.1963	0.70	3.34	0.210 ✔
T6	120 - 100	0.5	1.46	119.0	324.71	0.1963	0.73	3.38	0.216 ✔
T7	100 - 80	0.5	1.46	119.0	324.71	0.1963	0.25	3.38	0.074 ✔
T8	80 - 60	0.625	1.45	94.4	424.12	0.3068	0.17	6.96	0.024 ✔
T9	60 - 40	0.625	1.45	94.4	424.12	0.3068	0.17	6.96	0.025 ✔
T10	40 - 20	0.625	1.43	93.6	536.77	0.3068	0.81	7.01	0.115 ✔
T11	20 - 0	0.625	1.43	93.6	536.77	0.3068	1.30	7.01	0.185 ✔

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	195 - 185	3/4	5.03	2.43	140.2 K=0.90	0.4418	-0.42	5.08	0.082 [1] ✔
T2	185 - 170	3/4	5.07	2.45	141.3 K=0.90	0.4418	-1.24	5.00	0.248 [1] ✔
T3	170 - 150	7/8	5.48	2.66	131.5 K=0.90	0.6013	-2.55	7.86	0.325 [1] ✔
T4	150 - 140	L2 1/2x2 1/2x3/16	11.42	4.98	120.8 K=1.00	0.9020	-5.41	13.56	0.399 [1] ✔
T5	140 - 120	L2 1/2x2 1/2x3/16	12.50	5.63	136.4 K=1.00	0.9020	-5.80	10.95	0.530 [1] ✔
T6	120 - 100	L3x3x3/16	13.80	6.33	127.4 K=1.00	1.0900	-6.87	14.95	0.460 [1] ✔
T7	100 - 80	L3x3x5/16	15.24	7.08	144.3 K=1.00	1.7800	-7.33	19.32	0.379 [1] ✔
T8	80 - 60	L3x3x5/16	16.80	7.84	159.7 K=1.00	1.7800	-7.49	15.76	0.476 [1] ✔
T9	60 - 40	L3x3x5/16	18.45	8.68	176.8 K=1.00	1.7800	-7.75	12.87	0.602 [1] ✔
T10	40 - 20	L3 1/2x3 1/2x5/16	20.16	9.54	165.9 K=1.00	2.0900	-8.15	17.15	0.475 [1] ✔
T11	20 - 0	L3 1/2x3 1/2x5/16	21.92	10.43	181.3 K=1.00	2.0900	-9.09	14.36	0.633 [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 $\frac{P_u}{\phi P_n}$
T1	195 - 185	3/4	4.50	4.35	195.1 K=0.70	0.4418	-0.03	2.62	0.011 [1] ✔
T2	185 - 170	3/4	4.50	4.35	195.1 K=0.70	0.4418	-0.22	2.62	0.085 [1] ✔
T3	170 - 150	7/8	4.58	4.41	169.4 K=0.70	0.6013	-0.39	4.74	0.083 [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	195 - 185	7/8	4.50	4.35	167.2 K=0.70	0.6013	-0.04	4.86	0.008 [1] ✔
T2	185 - 170	7/8	4.50	4.35	167.2	0.6013	-0.14	4.86	0.028 [1]

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	A in^2	P_u K	ϕP_n K	Ratio $\frac{P_u}{\phi P_n}$
T3	170 - 150	1	4.52	4.35	146.2 K=0.70	0.7854	-0.82	8.30	0.099 [1] ✔
T5	140 - 120	L2 1/2x2 1/2x3/16	6.00	4.58	115.6 K=1.04	0.9020	-1.25	14.47	0.087 [1] ✔

[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 $\frac{P_u}{\phi P_n}$
T1	195 - 185	7/8	4.50	4.35	167.2 K=0.70	0.6013	-0.16	4.86	0.032 [1] ✔
T2	185 - 170	7/8	4.50	4.35	167.2 K=0.70	0.6013	-0.65	4.86	0.134 [1] ✔
T3	170 - 150	1	4.99	4.82	161.9 K=0.70	0.7854	-0.91	6.77	0.134 [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 $\frac{P_u}{\phi P_n}$
T2	185 - 170	7/8	4.50	4.35	167.2 K=0.70	0.6013	-0.11	4.86	0.022 [1] ✔
T3	170 - 150	1	4.75	4.59	154.1 K=0.70	0.7854	-0.13	7.47	0.018 [1] ✔

[1] P_u / ϕP_n controls

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 $\frac{P_u}{\phi P_n}$
T1	195 - 185	1 3/4	10.00	0.50	13.7	1.2339	1.57	60.15	0.026 [1 #]

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	A in^2	P_u K	ϕP_n K	Ratio $\frac{P_u}{\phi P_n}$
T2	185 - 170	1 3/4	15.00	0.50	13.7	1.7942	7.25	87.47	0.083 [1] [#]
T3	170 - 150	2	20.00	0.58	14.0	3.1416	30.49	141.37	0.216 [1]
T4	150 - 140	Pirod 105244	10.02	10.02	45.4	3.6816	33.68	165.67	0.203 [1]
T5	140 - 120	Pirod 105217	20.03	10.02	37.8	5.3014	62.23	238.57	0.261 [1]
T6	120 - 100	Pirod 105218	20.03	10.02	32.4	7.2158	92.43	324.71	0.285 [1]
T7	100 - 80	Pirod 105218	20.03	10.02	32.4	7.2158	125.21	324.71	0.386 [1]
T8	80 - 60	Pirod 105219	20.03	10.02	28.4	9.4248	155.05	424.12	0.366 [1]
T9	60 - 40	Pirod 105219	20.03	10.02	28.4	9.4248	182.71	424.12	0.431 [1]
T10	40 - 20	Pirod 105220	20.03	10.02	25.2	11.9282	208.67	536.77	0.389 [1]
T11	20 - 0	Pirod 105220	20.03	10.02	25.2	11.9282	232.50	536.77	0.433 [1]

[1] P_u / ϕP_n controls
[#] Based on net area of leg in section below

Truss-Leg Diagonal Data

Section No.	Elevation ft	Diagonal Size	L_d ft	Kl/r	ϕP_n K	A in^2	V_u K	ϕV_n K	Stress Ratio
T4	150 - 140	0.5	1.48	121.0	165.67	0.1963	0.65	3.39	0.190
T5	140 - 120	0.5	1.47	120.0	238.57	0.1963	0.70	3.34	0.210
T6	120 - 100	0.5	1.46	119.0	324.71	0.1963	0.73	3.38	0.216
T7	100 - 80	0.5	1.46	119.0	324.71	0.1963	0.25	3.38	0.074
T8	80 - 60	0.625	1.45	94.4	424.12	0.3068	0.17	6.96	0.024
T9	60 - 40	0.625	1.45	94.4	424.12	0.3068	0.17	6.96	0.025
T10	40 - 20	0.625	1.43	93.6	536.77	0.3068	0.81	7.01	0.115
T11	20 - 0	0.625	1.43	93.6	536.77	0.3068	1.30	7.01	0.185

Diagonal Design Data (Tension)

Section No.	Elevation	Size	L	L_u	Kl/r	A	P_u	ϕP_n	Ratio $\frac{P_u}{\phi P_n}$
	ft		ft	ft		in^2	K	K	
T1	195 - 185	3/4	5.03	2.43	155.8	0.4418	0.42	19.88	0.021 [1] ✔
T2	185 - 170	3/4	5.07	2.45	156.9	0.4418	1.22	19.88	0.061 [1] ✔
T3	170 - 150	7/8	5.48	2.66	146.1	0.6013	2.54	27.06	0.094 [1] ✔
T4	150 - 140	L2 1/2x2 1/2x3/16	11.42	4.98	80.1	0.9020	4.50	29.22	0.154 [1] ✔
T5	140 - 120	L2 1/2x2 1/2x3/16	12.50	5.63	90.0	0.9020	5.80	29.22	0.199 [1] ✔
T6	120 - 100	L3x3x3/16	13.80	6.33	83.5	1.0900	6.70	35.32	0.190 [1] ✔
T7	100 - 80	L3x3x5/16	14.50	6.73	90.3	1.7800	7.38	57.67	0.128 [1] ✔
T8	80 - 60	L3x3x5/16	16.80	7.84	105.3	1.7800	7.38	57.67	0.128 [1] ✔
T9	60 - 40	L3x3x5/16	18.45	8.68	116.2	1.7800	7.62	57.67	0.132 [1] ✔
T10	40 - 20	L3 1/2x3 1/2x5/16	20.16	9.54	108.8	2.0900	7.97	67.72	0.118 [1] ✔
T11	20 - 0	L3 1/2x3 1/2x5/16	21.92	10.43	118.6	2.0900	8.60	67.72	0.127 [1] ✔

[1] P_u / ϕP_n controls

Horizontal Design Data (Tension)

Section No.	Elevation	Size	L	L_u	Kl/r	A	P_u	ϕP_n	Ratio $\frac{P_u}{\phi P_n}$
	ft		ft	ft		in^2	K	K	
T1	195 - 185	3/4	4.50	4.35	278.7	0.4418	0.05	19.88	0.003 [1] ✔
T2	185 - 170	3/4	4.50	4.35	278.7	0.4418	0.27	19.88	0.013 [1] ✔
T3	170 - 150	7/8	4.58	4.41	241.9	0.6013	0.49	27.06	0.018 [1] ✔

[1] P_u / ϕP_n controls

Top Girt Design Data (Tension)

Section No.	Elevation	Size	L	L_u	Kl/r	A	P_u	ϕP_n	Ratio $\frac{P_u}{\phi P_n}$
	ft		ft	ft		in^2	K	K	

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	195 - 185	7/8	4.50	4.35	238.9	0.6013	0.02	27.06	0.001 [1] ✔
T2	185 - 170	7/8	4.50	4.35	238.9	0.6013	0.13	27.06	0.005 [1] ✔
T3	170 - 150	1	4.52	4.35	208.9	0.7854	0.81	35.34	0.023 [1] ✔
T5	140 - 120	L2 1/2x2 1/2x3/16	6.00	4.58	77.1	0.9020	1.98	29.22	0.068 [1] ✔

[1] $P_u / \phi P_n$ 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	195 - 185	7/8	4.50	4.35	238.9	0.6013	0.17	27.06	0.006 [1] ✔
T2	185 - 170	7/8	4.50	4.35	238.9	0.6013	0.66	27.06	0.024 [1] ✔
T3	170 - 150	1	4.99	4.82	231.3	0.7854	1.20	35.34	0.034 [1] ✔

[1] $P_u / \phi P_n$ 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 $\frac{P_u}{\phi P_n}$
T2	185 - 170	7/8	4.50	4.35	238.9	0.6013	0.13	19.48	0.006 [1] ✔
T3	170 - 150	1	4.75	4.59	220.1	0.7854	0.41	25.45	0.016 [1] ✔

[1] $P_u / \phi P_n$ controls

Section Capacity Table

Section No.	Elevation ft	Component Type	Size	Critical Element	P K	ϕP_{allow} K	% Capacity	Pass Fail
T1	195 - 185	Leg	1 3/4	1	-2.22	81.93	2.7	Pass
T2	185 - 170	Leg	1 3/4	37	-10.61	80.23	13.2	Pass
T3	170 - 150	Leg	2	89	-34.37	112.40	30.6	Pass

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Section No.	Elevation ft	Component Type	Size	Critical Element	P K	ϕP_{allow} K	% Capacity	Pass Fail
T4	150 - 140	Leg	Pirod 105244	157	-39.41	142.49	27.7	Pass
T5	140 - 120	Leg	Pirod 105217	166	-74.56	214.86	34.7	Pass
T6	120 - 100	Leg	Pirod 105218	184	-110.25	300.68	36.7	Pass
T7	100 - 80	Leg	Pirod 105218	199	-146.96	300.68	48.9	Pass
T8	80 - 60	Leg	Pirod 105219	214	-181.49	399.87	45.4	Pass
T9	60 - 40	Leg	Pirod 105219	229	-214.13	399.87	53.6	Pass
T10	40 - 20	Leg	Pirod 105220	244	-245.62	512.38	47.9	Pass
							48.0 (b)	
T11	20 - 0	Leg	Pirod 105220	259	-274.80	512.38	53.6	Pass
T1	195 - 185	Diagonal	3/4	14	-0.42	5.08	8.2	Pass
T2	185 - 170	Diagonal	3/4	53	-1.24	5.00	24.8	Pass
T3	170 - 150	Diagonal	7/8	102	-2.55	7.86	32.5	Pass
T4	150 - 140	Diagonal	L2 1/2x2 1/2x3/16	162	-5.41	13.56	39.9	Pass
							42.2 (b)	
T5	140 - 120	Diagonal	L2 1/2x2 1/2x3/16	175	-5.80	10.95	53.0	Pass
							54.4 (b)	
T6	120 - 100	Diagonal	L3x3x3/16	190	-6.87	14.95	46.0	Pass
							57.3 (b)	
T7	100 - 80	Diagonal	L3x3x5/16	205	-7.33	19.32	37.9	Pass
T8	80 - 60	Diagonal	L3x3x5/16	220	-7.49	15.76	47.6	Pass
T9	60 - 40	Diagonal	L3x3x5/16	232	-7.75	12.87	60.2	Pass
T10	40 - 20	Diagonal	L3 1/2x3 1/2x5/16	247	-8.15	17.15	47.5	Pass
T11	20 - 0	Diagonal	L3 1/2x3 1/2x5/16	262	-9.09	14.36	63.3	Pass
T1	195 - 185	Horizontal	3/4	16	-0.03	2.62	1.1	Pass
T2	185 - 170	Horizontal	3/4	55	-0.22	2.62	8.5	Pass
T3	170 - 150	Horizontal	7/8	148	-0.39	4.74	8.3	Pass
T1	195 - 185	Top Girt	7/8	4	-0.04	4.86	0.8	Pass
T2	185 - 170	Top Girt	7/8	41	-0.14	4.86	2.8	Pass
T3	170 - 150	Top Girt	1	93	-0.82	8.30	9.9	Pass
T5	140 - 120	Top Girt	L2 1/2x2 1/2x3/16	168	-1.25	14.47	8.7	Pass
							18.6 (b)	
T1	195 - 185	Bottom Girt	7/8	8	-0.16	4.86	3.2	Pass
T2	185 - 170	Bottom Girt	7/8	44	-0.65	4.86	13.4	Pass
T3	170 - 150	Bottom Girt	1	95	-0.91	6.77	13.4	Pass
T2	185 - 170	Mid Girt	7/8	47	-0.11	4.86	2.2	Pass
T3	170 - 150	Mid Girt	1	98	-0.13	7.47	1.8	Pass
							Summary	
						Leg (T11)	53.6	Pass
						Diagonal (T11)	63.3	Pass
						Horizontal (T2)	8.5	Pass
						Top Girt (T5)	18.6	Pass
						Bottom Girt (T2)	13.4	Pass
						Mid Girt (T2)	2.2	Pass
						Bolt Checks	57.3	Pass
						RATING =	**63.3**	**Pass**

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SST - Anchor Rod Interaction Check per 4.9.9 TIA-222-G

Project No.	17QKYA1400
Site Name	Windsor Locks
Site ID	CT22108-A

RISA Reactions per Leg		
Pu	239	kips
Vu	26	kips

Anchor Rod Properties:			
F_{yb}, Anchor Rod Ult. Yield Stress	105	ksi	
F_{ub}, Anchor Rod Ult. Tensile Stress	125	ksi	
number of anchor rods per leg	6	-	
diameter of anchor rod	1 1/4	in	
A_{net}, anchor rods	0.969	in^2	*(use Table 7-18 AISC, Net Tensile Area)*
η, detail type factor	0.55	-	*(see Fig. 4-4 Anchor Rod Detail Type)*

Capacity:			
$øR_{nt}$, design tensile strength	96.90	kips	
$øR_{nv}$, design shear strength	51.77	kips	
$øR_{nm}$, design flexural strength	20.32	kip-in	
Interaction Equation	**49.2%**	**OK**	*(TIA-222-G section 4.9.9)*
Interaction Equation	**N/A**	**OK**	*(TIA-222-G section 4.9.9)*

Equations:

$$øR_{nt} = 0.8 * F_{ub} * A_{net}$$

$$øR_{nt} = 0.75 * 0.45 * F_{ub} * A_{b}$$

$$øR_{nt} = 0.9 * Fy_{b} * d\text{^}3/6$$

Interaction Equation = [Pu/leg+(Vu/leg)/η]/øRnt

Interaction Equation = [(Vu/øRnv)^2+(Pu/øRnt+Mu/øRnm)^2]

FDH VELOCITEL
ENGINEERING INNOVATION

Version: 3.5
Issue Date: 12/6/2016

Combined Foundation (3 Piers, 1 Pad)

Project Data		
Project Number:	*Project*	17QKYA1400
Site Name:	*SiteName*	Windsor Locks @ Volunteer Driv
Site ID:	*SiteID*	CT22108-A

Tower & Leg Reactions			
Tower Shear:	*TwrV*	45	kip
Tower Moment:	*TwrM*	4522	ft-kip
Tower Weight:	*TwrWt*	65	kip
Leg Compression:	*LegC*	283	kip
Leg Shear (leg in compression):	*LegVcomp*	30	kip
Uplift:	*LegU*	239	kip
Leg Shear (leg in tension):	*LegVup*	26	kip

Code & Design Parameters			
Standard:	*Standard*	TIA-222-G	-
Maximum Soil Stress Ratio:	*SRmaxSoil*	110%	-
Maximum Steel Stress Ratio:	*SRmaxStr*	105%	-
Results Type:	*ResultsType*	Steel Only	-

Site Details			
Frost Depth:	*Frost*	3.333	ft
Water Depth:	*Water*	11	ft
Depth Neglected:	*Neglect*	3.333	ft
Seismic Design Category:	*SDC*	B	-

Soil Parameters			
Bearing Pressure Capacity:	*Bc*	3500	psf
Ultimate or Allowable:	*BcUltAll*	Allowable	-
Bearing Pressure Type:	*BcType*	Net	-
Unit Weight:	*gamma*	100	pcf
Angle of Internal Friction:	*phi*	28	deg
Cohesion:	*cohesion*	0	psf
Sliding Friction Coefficient:	*mu*	0.4	-
Passive Pressure Coefficient:	*Kp*	2.77	-
Passive Pressure Coeff. Override:	*KpOver*		-

Material Specifications			
Concrete Strength:	*fc*	3000	psi
Concrete Weight:	*ConcUnitWt*	150	pcf
Rebar Yield Strength:	*Fy*	60	ksi
Clear Cover:	*cc*	3	in

Design Dimensions			
Tower Width:	*TwrW*	20	ft
Number of Tower Legs:	*Legs*	3	-
Tower/Foundation Offset:	*Offset*	TRUE	TRUE/FALSE
Bearing Depth:	*D*	10	ft
Pad Width:	*W*	29.5	ft
Pad Thickness:	*T*	3.5	ft
Pier Diameter/Width:	*Dp*	5	ft
Pier Shape:	*Shape*	Round	-
Pier Extension:	*Ext*	5	ft

Reinforcement			
Pad Reinforcement Quantity:	*PadQty*	39	-
Pad Reinforcement Size:	*PadSize*	9	-
Pier Reinforcement Quantity:	*PierQty*	27	-
Pier Reinforcement Size:	*PierSize*	8	-
Pier Reinforcement Hook:	*PierHook*	TRUE	TRUE/FALSE
Tie Reinforcement Size:	*TieSize*	4	-
Tie Reinforcement Spacing:	*TieSp*	6	in

Anchor Embedment			
Anchor Bolt Diameter:	*ABDia*	1.25	in
Anchor Bolt Length:	*ABL*	80.0625	in
Anchor Bolt Exposed:	*ABExp*	8.5	in
Embedment Plate Diameter:	*ABPlateD*	-	in
Embedment Plate Thickness:	*ABPlateT*	-	in
Anchor Bolt Embedment Length:	*ABEmbed*	71.5625	in

Steel & Soil Checks		
Lateral:	*=LatRatio*	N/A
Overturning:	*=OTRatio*	N/A
Bearing:	*=QRatio*	N/A
Pad One-Way Shear:	*=V1Ratio*	1.4%
Pad Two-Way Shear:	*=V2Ratio*	16.2%
Pad Flexure:	*=FlexRatio*	3.9%
Pad Minimum Reinforcement:	*=MinPadCheck*	OK
Pad Reinforcement Development:	*=DevPadCheck*	OK
Pier Compression:	*=CompRatio*	6.6%
Pier Tension & Bending:	*=PierStrRatio*	Use DSMC
Pier Minimum Reinforcement:	*=MinPierCheck*	OK
Pier Reinforcement Development:	*=DevPierCCheck1*	OK
Pier Reinforcement Development:	*=DevPierTCheck1*	OK
Pier Reinforcement Development:	*=DevPierTCheck2*	OK
Pier Hook Development:	*=DevHookCheck*	OK
Anchor Embedment:	*=ABCheck*	#VALUE!

Controlling Percentages	
Soil Stress Ratio:	**N/A**
Structure Stress Ratio:	**16.2%**

SOLVE

Notes:
1. This sheet is a supplement to the BSPSQP Pad Pier sheet, which should be used to calculate actual overturning and bearing capacities.
2. If pier appears to be overstressed in bending and tension, use the Drilled Shaft Moment Capacity for a less conservative capacity.
3. Enter 0 for rebar quantity and 0 for anchor bolt length if unknown.
4. Buoyant weights for concrete and soil must be entered directly in the "ConcUnitWt" and "gamma" cells.

(Bearing and Stability Checks) Tool for TIA Rev F or G - Application (MP, SST with unitbase)

Site Data

BU#:
Site Name:
App #:

Loads Already Factored		
For P (DL)	1.2	<----Disregard
For P,V, and M (WL)	1.35	<----Disregard

Pad & Pier Data		
Base PL Dist. Above Pier:	3.5	in
Pier Dist. Above Grade:	60	in
Pad Bearing Depth, D:	10	ft
Pad Thickness, T:	3.5	ft
Pad Width=Length, L:	29.5	ft
Pier Cross Section Shape:	Round	<--Pull Down
Enter Pier Diameter:	8.7	ft
Concrete Density:	150	pcf
Pier Cross Section Area:	58.90	ft^2
Pier Height:	11.50	ft
Soil (above pad) Height:	6.50	ft

Soil Parameters		
Unit Weight, γ:	100	pcf
Ultimate Bearing Capacity, qn:	7.88	ksf
Strength Reduct. factor, ϕ:	0.75	
Angle of Friction, Φ:	28	degrees
Undrained Shear Strength, Cu:	0	ksf
Allowable Bearing: ϕ*qn:	5.91	ksf
Passive Pres. Coeff., Kp	2.77	

Forces/Moments due to Wind and Lateral Soil		
Minimum of (φ*Ultimate Pad Passive Force, Vu):	45.0	kips
Pad Force Location Above D:	1.63	ft
ϕ(Passive Pressure Moment):	73.18	ft-kips
Factored O.T. M(WL), "1.6W":	5397.7	ft-kips
Factored OT (MW-Msoil), M1	5324.50	ft-kips

Resistance due to Foundation Gravity		
Soil Wedge Projection grade, a:	3.46	ft
Sum of Soil Wedges Wt:	57.46	kips
Soil Wedges ecc, K1:	14.11	ft
Ftg+Soil above Pad wt:	1085.9	kips
Unfactored (Total ftg-soil Wt):	1143.33	kips
1.2D. **No Soil Wedges**.	1368.04	kips
0.9D. **With Soil Wedges**	1077.74	kips

Resistance due to Cohesion (Vertical)		
ϕ*(1/2*Cu)(Total Vert. Planes)	0.00	kips
Cohesion Force Eccentricity, K2	0.00	ft

SST Base Reaction Forces		
TIA Revision:	G	<--Pull Down
Factored DL Axial, PDu:	65	kips
Factored WL Shear, Vu:	45	kips
Factored WL Moment, Mu:	4709.552	ft-kips

Load Factor	Shaft Factored Loads		
1.00	1.2D+1.6W, Pu:	65	kips
0.90	0.9D+1.6W, Pu:	48.75	kips
1.00	Vu:	45	kips
	Mu:	4709.552	ft-kips

1.2D+1.6W Load Combination, Bearing Results:

(**No Soil Wedges**) [Reaction+Conc+Soil]	1368.04	P1="1.2D+1.6W" (Kips)
Factored "1.6W" Overturning Moment (MW-Msoil), M1	5324.50	ft-kips

Orthogonal Direction:

ecc1 = M1/P1 =	3.89	ft
Orthogonal qu=	2.40	ksf
qu/ϕ*qn Ratio=	**40.64%**	**Pass**

Diagonal Direction:

ecc2 = (0.707M1)/P1 =	2.75	ft
Diagonal qu=	2.38	ksf
qu/ϕ*qn Ratio=	**40.20%**	**Pass**

Run <-- Press Upon Completing All Input

Overturning Stability Check

0.9D+1.6W Load Combination, Bearing Results:

(**w/ Soil Wedges**) [Reaction+Conc+Soil]	1077.74	P2="0.9D+1.6W" (Kips)
Factored "1.6W" Overturning Moment (MW-Msoil) - 0.9(M of Wedge + M of Cohesion), M2	4594.76	ft-kips

Orthogonal ecc3 = M2/P2 =	4.26	ft
Ortho Non Bearing Length,NBL=	8.53	ft
Orthogonal qu=	1.95	ksf
Diagonal qu=	1.96	ksf

Max Reaction Moment (ft-kips) so that qu=φ*qn = 100% Capacity Rating			
Actual M:	4709.55		
M Orthogonal:	12899.10	**36.51%**	**Pass**
M Diagonal:	12465.85	**37.78%**	**Pass**

Moment Capacity of Drilled Concrete Shaft (Caisson) for TIA Rev F or G

Note: Shaft assumed to have ties, not spiral, transverse reinforcing

Site Data

BU#:
Site Name:
App #:

Loads Already Factored		
For M (WL)	1.3	<----Disregard
For P (DL)	1.3	<----Disregard

Pier Properties

Concrete:

Pier Diameter =	5	ft
Concrete Area =	2827.4	in^2

Reinforcement:

Clear Cover to **Tie**=	3	in
Horiz. **Tie** Bar Size=	4	
Vert. Cage Diameter =	4.33	ft
Vert. Cage Diameter =	52.00	in
Vertical Bar Size =	8	
Bar Diameter =	1.00	in
Bar Area =	0.79	in^2
Number of Bars =	27	
As Total=	21.33	in^2
A s/ Aconc, Rho:	0.0075	0.75%

ACI 10.5 , ACI 21.10.4, and IBC 1810.
Min As for Flexural, Tension Controlled, Shafts:

(3)*(Sqrt(f'c)/Fy:	0.0027
200 / Fy:	0.0033

Minimum Rho Check:

Actual Req'd Min. Rho:	0.33%	Flexural
Provided Rho:	0.75%	**OK**

Ref. Shaft Max Axial Capacities, ϕ Max(Pn or Tn):		
Max Pu = (φ=0.65) Pn.		
Pn per ACI 318 (10-2)	4386.39	kips
at Mu=(ϕ=0.65)Mn=	1884.57	ft-kips
Max Tu, (φ=0.9) Tn =	1151.82	kips
at Mu=ϕ=(0.90)Mn=	0.00	ft-kips

Maximum Shaft Superimposed Forces

TIA Revision:	G	
Max. Factored Shaft Mu:	299	ft-kips **(* Note)**
Max. Factored Shaft Pu:	239	kips
Max Axial Force Type:	Tension	

(*) Note: Max Shaft Superimposed Moment does not necessarily equal to the shaft top reaction moment

Load Factor	**Shaft Factored Loads**		
1.00	Mu:	299	ft-kips
1.00	Pu:	239	kips

Material Properties

Concrete Comp. strength, f'c =	3000	psi
Reinforcement yield strength, Fy =	60	ksi
Reinforcing Modulus of Elasticity, E =	29000	ksi
Reinforcement yield strain =	0.00207	
Limiting compressive strain =	0.003	

ACI 318 Code

Select Analysis ACI Code=	2008

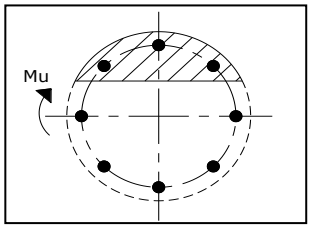
Seismic Properties

Seismic Design Category =	B
Seismic Risk =	**Low**

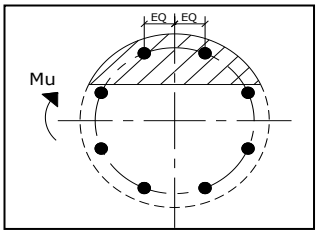
Solve (Run) <-- Press Upon Completing All Input

Results:

Governing Orientation Case: **1**



Case 1



Case 2

Dist. From Edge to Neutral Axis:	**9.16**	in
Extreme Steel Strain, ϵt:	**0.0153**	
	ϵt > 0.0050, Tension Controlled	
Reduction Factor,φ:	**0.900**	

Output Note: Negative Pu=Tension

For Axial Compression, φ Pn = Pu:	-239.00	kips
Drilled Shaft Moment Capacity, φMn:	**1868.18**	ft-kips
Drilled Shaft Superimposed Mu:	**299.00**	ft-kips

(Mu/φMn, Drilled Shaft Flexure CSR:	**16.0%**

Ultimate Net Bearing-to-Ultimate Gross Bearing Capacity Conversion Sheet

Ultimate Net Bearing, q_{net}	ksf	7
Depth to Base of Pad, D	ft	10
Converted Gross Bearing, q_{gross}	ksf	**7.88**

Soil Layer Thickness (ft) *	Soil Weight (pcf)**
8	100
2	38

Note : we are only using this conversion when we know that the values given in the soil report are net. If no indication is given as to whether the given bearing value is net or gross, we will assume that the value is net.

**Last soil thickness layer should stop at base of foundation*

***Soil unit weight should be the original soil density, not the desnsity of the backfill.*

SPECIAL PRE-CONSTRUCTION NOTE:

SPRINT WORK IS CONTINGENT ON THE FOLLOWING:
- COMPLETION OF A GLOBAL STRUCTURAL STABILITY ASSESSMENT
- COMPLETION OF AN ANTENNA/RRH MOUNT STRUCTURAL ASSESSMENT
- GC SHALL FURNISH, INSTALL AND COMPLETE ALL STRUCTURAL MODIFICATIONS AS INDICATED IN BEFORE-MENTIONED ANALYSIS AND ASSESSMENT

Sprint®

TM

SITE NAME: WINDSOR LOCKS @ VOLUNTEER DRIVE

SITE NUMBER: CT43XC828

AUGMENT ID: CT43XC828Q17.1

SITE ADDRESS: 2-4 VOLUNTEER DRIVE
WINDSOR LOCKS, CT 06096

JURISDICTION: TOWN OF WINDSOR LOCKS

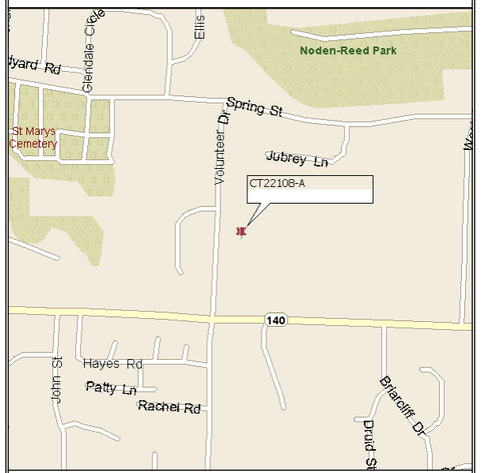
SITE TYPE: EXISTING 200' SELF-SUPPORT TOWER

PROGRAM: DO MACRO

PROJECT INFORMATION

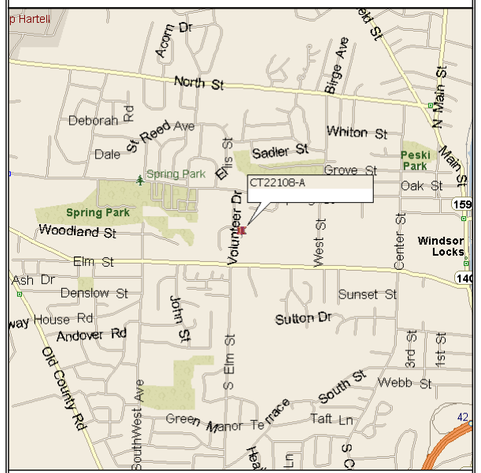
SCOPE OF WORK:	UNMANNED TELECOMMUNICATIONS FACILITY SPRINT EQUIPMENT MODERNIZATION
ZONING JURISDICTION: (TOWN OF WINDSOR LOCKS)	BASED ON INFORMATION PROVIDED BY SPRINT, REGULATORY COMPLIANCE AND LEGAL COUNSEL, THIS TELECOMMUNICATIONS EQUIPMENT DEPLOYMENT IS CONSIDERED AN ELIGIBLE FACILITY UNDER THE MIDDLE CLASS TAX RELIEF AND JOB CREATION ACT OF 2012, 47 USC 1455(A), SECTION 6409 AND IS SUBJECT TO AN ELIGIBLE FACILITY REQUEST, EXPEDITED REVIEW AND LIMITED/PARTIAL ZONING PRE-EMPTION FOR LOCAL DISCRETIONARY PERMITS (VARIANCE, SPECIAL PERMIT, SITE PLAN REVIEW OR ADMINISTRATIVE REVIEW).
SITE ADDRESS:	2-4 VOLUNTEER DRIVE WINDSOR LOCKS, CT 06096
LATITUDE: LONGITUDE:	41.92814166° N -72.6468° W
JURISDICTION:	NATIONAL, STATE & LOCAL CODES & ORDINANCES
CURRENT USE:	TELECOMMUNICATIONS FACILITY
PROPOSED USE:	TELECOMMUNICATIONS FACILITY
TOWER OWNER:	SBA TOWERS LLC
SBA SITE ID:	CT22108-A
SBA SITE NAME:	WINDSOR LOCKS @ VOLUNTEER DRIVE
SBA REGIONAL SITE MANAGER:	T.B.D.

AREA MAP



NO SCALE

LOCATION MAP



NO SCALE

DRAWING INDEX

SHEET #	SHEET DESCRIPTION	REV. #
T-1	TITLE SHEET	0
SP-1	OUTLINE SPECIFICATIONS	0
SP-2	OUTLINE SPECIFICATIONS	0
SP-3	OUTLINE SPECIFICATIONS	0
A-1	COMPOUND AND EQUIPMENT PLAN	0
A-2	ANTENNA PLANS & ELEVATION	0
A-3	RF DATA SHEET	0
A-4	TOWER EQUIPMENT DETAILS	0
S-1	ANTENNA AND RRH MOUNTING DETAILS	0
E-1	ELECTRICAL DETAILS AND NOTES	0
G-1	GROUNDING DETAILS AND NOTES	0

APPROVALS

TITLE	SIGNATURE	DATE
PROJECT MANAGER:		
CONSTRUCTION:		
RF ENGINEERING:		
ZONING/SITE ACQ.:		
OPERATIONS:		
TOWER OWNER:		

ACCEPTANCE DOES NOT CONSTITUTE APPROVAL OF DESIGN, CALCULATIONS, ANALYSIS, TEST METHODS OF MATERIALS DEVELOPED OR SELECTED BY THE SUBCONTRACTOR AND DOES NOT RELIEVE SUBCONTRACTOR FROM FULL COMPLIANCE WITH CONTRACTUAL OBLIGATIONS.

CONTACT INFORMATION

A&E FIRM: ADDRESS:	B+T GROUP 1717 S. BOULDER, STE. 300 TULSA, OK 74119
CONTACT: PHONE:	TODD HIGGINBOTTOM (918) 587-4630
PROJECT MANAGEMENT.: ADDRESS:	SPRINT
CONTACT: PHONE:	
CONSTRUCTION MANAGER: EMAIL: PHONE:	MICHAEL DELIA michael.delia@sprint.com (781) 316-6348

SCOPE OF WORK

- INSTALL (3) NEW SPRINT PANEL ANTENNAS
- INSTALL (3) NEW SPRINT 2500MHz RRHS
- INSTALL (1) NEW SPRINT 1 1/4" FIBER

DIRECTIONS

DEPART BRADLEY INTERNATIONAL AIRPORT ON BRADLEY FIELD CONNECTOR. ROAD NAME CHANGES TO SCHOEPHOESTER RD. TURN LEFT ONTO CT-75 [TURNPIKE RD]. TURN RIGHT ONTO CT-140 [ELM ST]. TURN LEFT ONTO VOLUNTEER DR. TURN RIGHT ONTO ACCESS ROAD AND ARRIVE AT CT22108-A.

GENERAL NOTES

1. THIS IS AN UNMANNED TELECOMMUNICATIONS FACILITY AND NOT FOR HUMAN HABITATION
   - HANDICAPPED ACCESS, POTABLE WATER, SANITARY SERVICE, OUTDOOR STORAGE AND SOLID WASTE RECEPTACLES ARE NOT REQUIRED.
2. CONTRACTORS SHALL VERIFY ALL PLANS, EXISTING DIMENSIONS AND CONDITIONS ON JOB SITE. CONTRCATOR SHALL IMMEDIATELY NOTIFY THE ARCHOTECT/ENGINEER IN WRITING OF ANY DISCREPANCIES BEFORE PROCEEDING WITH THE WORK. FAILURE TO NOTIFY THE ARCHITECT/ENGINNER PLACES THE RESPONSIBILITY ON THE CONTRACTOR TO CORRECT THE DISCREPANCIES AT THE CONTRACTOR'S EXPENSE.

CODE COMPLIANCE

ALL WORK SHALL BE PERFORMED AND MATERIALS 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 THESE CODES:

CODE TYPE	CODE
BUILDING/DWELLING	IBC 2012
STRUCTURAL	IBC 2012
MECHANICAL	IMC 2012
ELECTRICAL	NEC 2014

CALL CONNECTICUT ONE CALL
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CALL 3 WORKING DAYS
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811

B+T GRP
1717 S. BOULDER
SUITE 300
TULSA, OK 74119
PH: (918) 587-4630
www.btgrp.com

Sprint
1 INTERNATIONAL BLVD, SUITE 800
MAHWAH, NJ 07495

SBA
SBA COMMUNICATIONS CORP.
134 FLANDERS ROAD, SUITE 125
WESTBOROUGH, MA 01581

CT43XC828

WINDSOR LOCKS @ VOLUNTEER DRIVE

2-4 VOLUNTEER DRIVE
WINDSOR LOCKS, CT 06096

PROJECT NO:	114957.002
CHECKED BY:	RCM

ISSUED FOR:

REV	DATE	DRWN	DESCRIPTION
0	9/13/17	MDW	CONSTRUCTION

B&T ENGINEERING, INC.
PEC.0001564
Expires 2/10/18

STATE OF CONNECTICUT
31627
LICENSED PROFESSIONAL ENGINEER
9/13/17

SHEET NUMBER:	REVISION:
T-1	0

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

SECTION 01 100 - SCOPE OF WORK

PART 1 – GENERAL

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

1.2 RELATED DOCUMENTS:

A. THE REQUIREMENTS OF THIS SECTION APPLY TO ALL SECTIONS IN THIS SPECIFICATION.
B. SPRINT "STANDARD CONSTRUCTION DETAILS FOR WIRELESS SITES" ARE INCLUDED IN AND MADE A PART OF THESE SPECIFICATIONS HEREWITH.

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

1.4 NATIONALLY RECOGNIZED CODES AND STANDARDS:

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

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

1.5 DEFINITIONS:

A. WORK: THE SUM OF TASKS AND RESPONSIBILITIES IDENTIFIED IN THE CONTRACT DOCUMENTS.
B. COMPANY: SPRINT CORPORATION
C. ENGINEER: SYNONYMOUS WITH ARCHITECT & ENGINEER AND "A&E". THE DESIGN PROFESSIONAL HAVING PROFESSIONAL RESPONSIBILITY FOR DESIGN OF THE PROJECT.
D. CONTRACTOR: CONSTRUCTION CONTRACTOR; CONSTRUCTION VENDOR; INDIVIDUAL OR ENTITY WHO AFTER EXECUTION OF A CONTRACT IS BOUND TO ACCOMPLISH THE WORK.
E. THIRD PARTY VENDOR OR AGENCY: A VENDOR OR AGENCY ENGAGED SEPARATELY BY THE COMPANY, A&E, OR CONTRACTOR TO PROVIDE MATERIALS OR TO ACCOMPLISH SPECIFIC TASKS RELATED TO BUT NOT INCLUDED IN THE WORK.
F. OFCI: OWNER FURNISHED, CONTRACTOR INSTALLED EQUIPMENT.
G. CONSTRUCTION MANAGER – ALL PROJECTS RELATED COMMUNICATION TO FLOW THROUGH SPRINT REPRESENTATIVE IN CHARGE OF PROJECT...

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

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

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

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

A. THE JOBSITE DRAWINGS, SPECIFICATIONS AND DETAILS SHALL BE CLEARLY MARKED DAILY IN RED PENCIL WITH ANY CHANGES IN CONSTRUCTION OVER WHAT IS DEPICTED IN THE DOCUMENTS. AT CONSTRUCTION COMPLETION, THIS JOBSITE MARKUP SET SHALL BE DELIVERED TO THE COMPANY OR COMPANY'S DESIGNATED REPRESENTATIVE TO BE FORWARDED TO THE COMPANY'S A&E VENDOR FOR PRODUCTION OF "AS–BUILT" DRAWINGS.
B. DETAILS ARE INTENDED TO SHOW DESIGN INTENT. MODIFICATIONS MAY BE REQUIRED TO SUIT JOB DIMENSIONS OR CONDITIONS, AND SUCH MODIFICATIONS SHALL BE INCLUDED AS PART OF THE WORK. CONTRACTOR SHALL NOTIFY SPRINT CONSTRUCTION MANAGER OF ANY VARIATIONS PRIOR TO PROCEEDING WITH THE WORK.
C. DIMENSIONS SHOWN ARE TO FINISH SURFACES UNLESS NOTED OTHERWISE. SPACING BETWEEN EQUIPMENT IS THE REQUIRED CLEARANCE. SHOULD THERE BE ANY QUESTIONS REGARDING THE CONTRACT DOCUMENTS, EXISTING CONDITIONS AND/OR DESIGN INTENT, THE CONTRACTOR SHALL BE RESPONSIBLE FOR OBTAINING A CLARIFICATION FROM THE SPRINT CONSTRUCTION MANAGER PRIOR TO PROCEEDING WITH THE WORK.

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

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

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

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

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

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

1.15 USE OF ELECTRONIC PROJECT MANAGEMENT SYSTEMS:

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

PART 2 – PRODUCTS (NOT USED)

PART 3 – EXECUTION

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

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

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

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

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

SECTION 01 200 - COMPANY FURNISHED MATERIAL AND EQUIPMENT

PART 1 – GENERAL

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

1.2 RELATED DOCUMENTS:

A. THE REQUIREMENTS OF THIS SECTION APPLY TO ALL SECTIONS IN THIS SPECIFICATION.
B. SPRINT "STANDARD CONSTRUCTION DETAILS FOR WIRELESS SITES" ARE INCLUDED IN AND MADE A PART OF THESE SPECIFICATIONS HEREWITH.

PART 2 – PRODUCTS (NOT USED)

PART 3 – EXECUTION

3.1 RECEIPT OF MATERIAL AND EQUIPMENT:

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

B. THE CONTRACTOR IS RESPONSIBLE FOR SPRINT PROVIDED MATERIAL AND EQUIPMENT AND UPON RECEIPT SHALL:
1. ACCEPT DELIVERIES AS SHIPPED AND TAKE RECEIPT.
2. VERIFY COMPLETENESS AND CONDITION OF ALL DELIVERIES.
3. TAKE RESPONSIBILITY FOR EQUIPMENT AND PROVIDE INSURANCE PROTECTION AS REQUIRED IN AGREEMENT.
4. RECORD ANY DEFECTS OR DAMAGES AND WITHIN TWENTY–FOUR HOURS AFTER RECEIPT, REPORT TO SPRINT OR ITS DESIGNATED PROJECT REPRESENTATIVE OF SUCH.
5. PROVIDE SECURE AND NECESSARY WEATHER PROTECTED WAREHOUSING.
6. COORDINATE SAFE AND SECURE TRANSPORTATION OF MATERIAL AND EQUIPMENT, DELIVERING AND OFF–LOADING FROM CONTRACTOR'S WAREHOUSE TO SITE.

3.2 DELIVERABLES:

A. COMPLETE SHIPPING AND RECEIPT DOCUMENTATION IN ACCORDANCE WITH COMPANY PRACTICE.
B. IF APPLICABLE, COMPLETE LOST/STOLEN/DAMAGED DOCUMENTATION REPORT AS NECESSARY IN ACCORDANCE WITH COMPANY PRACTICE, AND AS DIRECTED BY COMPANY.
C. UPLOAD DOCUMENTATION INTO SPRINT SITE MANAGEMENT SYSTEM (SMS) AND/OR PROVIDE HARD COPY DOCUMENTATION AS REQUESTED.

SECTION 01 300 - CELL SITE CONSTRUCTION

PART 1 – GENERAL

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

1.2 RELATED DOCUMENTS:

A. THE REQUIREMENTS OF THIS SECTION APPLY TO ALL SECTIONS IN THIS SPECIFICATION.
B. SPRINT "STANDARD CONSTRUCTION DETAILS FOR WIRELESS SITES" ARE INCLUDED IN AND MADE A PART OF THESE SPECIFICATIONS HEREWITH.

1.3 NOTICE TO PROCEED:

A. NO WORK SHALL COMMENCE PRIOR TO COMPANY'S WRITTEN NOTICE TO PROCEED AND THE ISSUANCE OF THE WORK ORDER.
B. UPON RECEIVING NOTICE TO PROCEED, CONTRACTOR SHALL FULLY PERFORM ALL WORK NECESSARY TO PROVIDE SPRINT WITH AN OPERATIONAL WIRELESS FACILITY.

PART 2 – PRODUCTS (NOT USED)

PART 3 – EXECUTION

3.1 FUNCTIONAL REQUIREMENTS:

A. THE ACTIVITIES DESCRIBED IN THIS PARAGRAPH REPRESENT MINIMUM ACTIONS AND PROCESSES REQUIRED TO SUCCESSFULLY COMPLETE THE WORK. THE ACTIVITIES DESCRIBED ARE NOT EXHAUSTIVE, AND CONTRACTOR SHALL TAKE ANY AND ALL ACTIONS AS NECESSARY TO SUCCESSFULLY COMPLETE THE CONSTRUCTION OF A FULLY FUNCTIONING WIRELESS FACILITY AT THE SITE IN ACCORDANCE WITH COMPANY PROCESSES.
B. SUBMIT SPECIFIC DOCUMENTATION AS INDICATED HEREIN, AND OBTAIN REQUIRED APPROVALS WHILE THE WORK IS BEING PERFORMED.
C. MANAGE AND CONDUCT ALL FIELD CONSTRUCTION SERVICE RELATED ACTIVITIES
D. PROVIDE CONSTRUCTION ACTIVITIES TO THE EXTENT REQUIRED BY THE CONTRACT DOCUMENTS, INCLUDING BUT NOT LIMITED TO THE FOLLOWING:

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

3.2 GENERAL REQUIREMENTS FOR CIVIL CONSTRUCTION:

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

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

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

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

E. CONDUCT TESTING AS REQUIRED HEREIN.

3.3 DELIVERABLES:

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

B. PROVIDE DOCUMENTATION INCLUDING, BUT NOT LIMITED TO, THE FOLLOWING. DOCUMENTATION SHALL BE FORWARDED IN ORIGINAL FORMAT AND/OR UPLOADED INTO SMS.
1. ALL CORRESPONDENCE AND PRELIMINARY CONSTRUCTION REPORTS.
2. PROJECT PROGRESS REPORTS.
3. CIVIL CONSTRUCTION START DATE (POPULATE FIELD IN SMS AND/OR FORWARD NOTIFICATION).
4. ELECTRICAL SERVICE COMPLETION DATE (POPULATE FIELD IN SMS AND/OR FORWARD NOTIFICATION).
5. LINES AND ANTENNA INSTALL DATE (POPULATE FIELD IN SMS AND/OR FORWARD NOTIFICATION).
6. POWER INSTALL DATE (POPULATE FIELD IN SMS AND/OR FORWARD NOTIFICATION).
7. TELCO READY DATE (POPULATE FIELD IN SMS AND/OR FORWARD NOTIFICATION).
8. PPC (OR SHELTER) INSTALL DATE (POPULATE FIELD IN SMS AND/OR FORWARD NOTIFICATION).
9. TOWER CONSTRUCTION START DATE (POPULATE FIELD IN SMS AND/OR FORWARD NOTIFICATION).
10. TOWER CONSTRUCTION COMPLETE DATE (POPULATE FIELD IN SMS AND/OR FORWARD NOTIFICATION).
11. BTS AND RADIO EQUIPMENT DELIVERED AT SITE DATE (POPULATE FIELD IN SMS AND/OR FORWARD NOTIFICATION).
12. NETWORK OPERATIONS HANDOFF CHECKLIST (HOC WALK) COMPLETE (UPLOAD FORM IN SMS)
13. CIVIL CONSTRUCTION COMPLETE DATE (POPULATE FIELD IN SMS AND/OR FORWARD NOTIFICATION).
14. SITE CONSTRUCTION PROGRESS PHOTOS UNLOADED INTO SMS.

CONTINUE SHEET SP-2

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SBA
SBA COMMUNICATIONS CORP.
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WESTBOROUGH, MA 01581

CT43XC828

WINDSOR LOCKS @ VOLUNTEER DRIVE

2-4 VOLUNTEER DRIVE
WINDSOR LOCKS, CT 06096

PROJECT NO:	114957.002
CHECKED BY:	RCM

ISSUED FOR:

REV	DATE	DRWN	DESCRIPTION
0	9/13/17	MDW	CONSTRUCTION

B&T ENGINEERING, INC.
PEC.0001564
Expires 2/10/18

STATE OF CONNECTICUT
31627
LICENSED
PROFESSIONAL ENGINEER
9/13/17

SHEET NUMBER:	REVISION:
SP-1	0

CONTINUED FROM SP-1:

SECTION 01 400 - SUBMITTALS, TESTS, AND INSPECTIONS

PART 1 – GENERAL

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

1.2 RELATED DOCUMENTS:

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

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

1.3 SUBMITTALS:

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

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

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

1.4 TESTS AND INSPECTIONS:

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

B. CONTRACTOR SHALL ACCOMPLISH TESTING INCLUDING BUT NOT LIMITED TO THE FOLLOWING:
1. COAX SWEEPS AND FIBER TESTS PER SPRINT TS–0200 (CURRENT VERSION) ANTENNA LINE ACCEPTANCE STANDARDS.
2. AGL, AZIMUTH AND DOWNTILT USING ELECTRONIC COMMERCIAL MADE–FOR–THE–PURPOSE ANTENNA ALIGNMENT TOOL.
3. CONTRACTOR SHALL BE RESPONSIBLE FOR ANY AND ALL CORRECTIONS TO ANY WORK IDENTIFIED AS UNACCEPTABLE IN SITE INSPECTION ACTIVITIES AND/OR AS A RESULT OF TESTING.

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

1.5 COMMISSIONING: PERFORM ALL COMMISSIONING AS REQUIRED BY APPLICABLE MOPS

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

PART 2 – PRODUCTS (NOT USED)
PART 3 – EXECUTION

3.1 REQUIREMENTS FOR TESTING:
A. THIRD PARTY TESTING AGENCY: WHEN THE USE OF A THIRD PARTY INDEPENDENT TESTING AGENCY IS REQUIRED, THE AGENCY THAT IS SELECTED MUST PERFORM SUCH WORK ON A REGULAR BASIS IN THE STATE WHERE THE PROJECT IS LOCATED AND HAVE A THOROUGH UNDERSTANDING OF LOCAL AVAILABLE MATERIALS, INCLUDING THE SOIL, ROCK, AND GROUNDWATER CONDITIONS.

1. THE THIRD PARTY TESTING AGENCY IS TO BE FAMILIAR WITH THE APPLICABLE REQUIREMENTS FOR THE TESTS TO BE DONE, EQUIPMENT TO BE USED, AND ASSOCIATED HEALTH AND SAFETY ISSUES.
2. EXPERIENCE IN SOILS, CONCRETE, MASONRY, AGGREGATE, AND ASPHALT TESTING USING ASTM, AASJTO, AND OTHER METHODS IS NEEDED.
3. EXPERIENCE IN SOILS, CONCRETE, MASONRY, AGGREGATE, AND ASPHALT TESTING USING ASTM, AASJTO, AND OTHER METHODS IS NEEDED.

3.2 REQUIRED TESTS:

A. CONTRACTOR SHALL ACCOMPLISH TESTING INCLUDING BUT NOT LIMITED TO THE FOLLOWING:
1. CONCRETE CYLINDER BREAK TESTS FOR THE TOWER AND ANCHOR FOUNDATIONS AS SPECIFIED IN SECTION: PORTLAND CEMENT CONCRETE PAVING.
2. ASPHALT ROADWAY COMPACTED THICKNESS, SURFACE SMOOTHNESS, AND COMPACTED DENSITY TESTING AS SPECIFIED IN SECTION: HOT MIX ASPHALT PAVING.
3. FIELD QUALITY CONTROL TESTING AS SPECIFIED IN SECTION: PORTLAND CEMENT CONCRETE PAVING.
4. TESTING REQUIRED UNDER SECTION: AGGREGATE BASE FOR ACCESS ROADS, PADS AND ANCHOR LOCATIONS
5. STRUCTURAL BACKFILL COMPACTION TESTS FOR THE TOWER FOUNDATION.
6. SITE RESISTANCE TO EARTH TESTING PER EXHIBIT: CELL SITE GROUNDING SYSTEM DESIGN.
7. ANTENNA AND COAX SWEEP TESTS PER EXHIBIT: ANTENNA TRANSMISSION LINE ACCEPTANCE STANDARDS.
8. GROUNDING AT ANTENNA MASTS FOR GPS AND ANTENNAS
9. ALL OTHER TESTS REQUIRED BY COMPANY OR JURISDICTION.

3.3 REQUIRED INSPECTIONS:

A. SCHEDULE INSPECTIONS WITH COMPANY REPRESENTATIVE.

B. CONDUCT INSPECTIONS INCLUDING BUT NOT LIMITED TO THE FOLLOWING:
1. GROUNDING SYSTEM INSTALLATION PRIOR TO EARTH CONCEALMENT DOCUMENTED WITH DIGITAL PHOTOGRAPHS BY CONTRACTOR, APPROVED BY A&E OR SPRINT REPRESENTATIVE.
2. FORMING FOR CONCRETE AND REBAR PLACEMENT PRIOR TO POUR DOCUMENTED WITH DIGITAL PHOTOGRAPHS BY CONTRACTOR, APPROVED BY A&E OR SPRINT REPRESENTATIVE.
3. COMPACTION OF BACKFILL MATERIALS; AGGREGATE BASE FOR ROADS, PADS, AND ANCHORS; ASPHALT PAVING; AND SHAFT BACKFILL FOR CONCRETE AND WOOD POLES, BY INDEPENDENT THIRD PARTY AGENCY.
4. PRE– AND POST–CONSTRUCTION ROOFTOP AND STRUCTURAL INSPECTIONS ON EXISTING FACILITIES.
5. TOWER ERECTION SECTION STACKING AND PLATFORM ATTACHMENT DOCUMENTED BY DIGITAL PHOTOGRAPHS BY THIRD PARTY AGENCY.
6. ANTENNA AZIMUTH , DOWN TILT AND PER SUNLIGHT TOOL SUNSIGHT INSTRUMENTS – ANTENNALIGN ALIGNMENT TOOL (AAT)
7. VERIFICATION DOCUMENTED WITH THE ANTENNA CHECKLIST REPORT, BY A&E, SITE DEVELOPMENT REP, OR RF REP.
8. FINAL INSPECTION CHECKLIST AND HANDOFF WALK (HOC.). SIGNED FORM SHOWING ACCEPTANCE BY FIELD OPS IS TO BE UPLOADED INTO SMS.
9. COAX SWEEP AND FIBER TESTING DOCUMENTS SUBMITTED VIA SMS FOR RF APPROVAL.
10. SCAN–ABLE BARCODE PHOTOGRAPHS OF TOWER TOP AND INACCESSIBLE SERIALIZED EQUIPMENT
11. ALL AVAILABLE JURISDICTIONAL INFORMATION
12. PDF SCAN OF REDLINES PRODUCED IN FIELD

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

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

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

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

1. CONCRETE MIX AND CYLINDER BREAK REPORTS.
2. STRUCTURAL BACKFILL COMPACTION REPORTS.
3. SITE RESISTANCE TO EARTH TEST.
4. ANTENNA AZIMUTH AND DOWN TILT VERIFICATION
5. TOWER ERECTION INSPECTIONS AND MEASUREMENTS DOCUMENTING TOWER INSTALLED PER SUPPLIER'S REQUIREMENTS AND THE APPLICABLE SECTIONS HEREIN.
6. COAX CABLE SWEEP TESTS PER COMPANY'S "ANTENNA LINE ACCEPTANCE STANDARDS".

B. REQUIRED CLOSEOUT DOCUMENTATION INCLUDES THE FOLLOWING:

1. TEST WELLS AND TRENCHES: PHOTOGRAPHS OF ALL TEST WELLS; PHOTOGRAPHS SHOWING ALL OPEN EXCAVATIONS AND TRENCHING PRIOR TO BACKFILLING SHOWING A TAPE MEASURE VISIBLE IN THE EXCAVATIONS INDICATING DEPTH.
2. CONDUITS, CONDUCTORS AND GROUNDING: PHOTOGRAPHS SHOWING TYPICAL INSTALLATION OF CONDUCTORS AND CONNECTORS; PHOTOGRAPHS SHOWING TYPICAL BEND RADIUS OF INSTALLED GROUND WIRES AND GROUND ROD SPACING;
3. CONCRETE FORMS AND REINFORCING: CONCRETE FORMING AT TOWER AND EQUIPMENT/SHELTER PAD/FOUNDATIONS – PHOTOGRAPHS SHOWING ALL REINFORCING STEEL, UTILITY AND CONDUIT STUB OUTS; PHOTOGRAPHS SHOWING CONCRETE POUR OF SHELTER SLAB/FOUNDATION, TOWER FOUNDATION AND GUY ANCHORS WITH VIBRATOR IN USE; PHOTOGRAPHS SHOWING EACH ANCHOR ON GUYED TOWERS, BEFORE CONCRETE POUR.
4. TOWER, ANTENNAS AND MAINLINE: INSPECTION AND PHOTOGRAPHS OF SECTION STACKING; INSPECTION AND PHOTOGRAPHS OF PLATFORM COMPONENT ATTACHMENT POINTS; PHOTOGRAPHS OF TOWER TOP GROUNDING; PHOTOS OF TOWER COAX LINE COLOR CODING AT THE TOP AND AT GROUND LEVEL; INSPECTION AND PHOTOGRAPHS OF OPERATIONAL OF TOWER LIGHTING, AND PLACEMENT OF FAA REGISTRATION SIGN; PHOTOGRAPHS SHOWING ADDITIONAL GROUNDING POINTS FOR TOWERS GREATER THAN 200 FEET.; PHOTOS OF ANTENNA GROUND BAR, EQUIPMENT GROUND BAR, AND MASTER GROUND BAR; PHOTOS OF GPS ANTENNA(S); PHOTOS OF EACH SECTOR OF ANTENNAS; ONE PHOTOGRAPH LOOKING AT THE SECTOR AND ONE FROM BEHIND SHOWING THE PROJECTED COVERAGE AREA; PHOTOS OF COAX WEATHERPROOFING – TOP AND BOTTOM; PHOTOS OF COAX GROUNDING––TOP AND BOTTOM; PHOTOS OF ANTENNA AND MAST GROUNDING; PHOTOS OF COAX CABLE ENTRY INTO SHELTER; PHOTOS OF PLATFORM MECHANICAL CONNECTIONS TO TOWER/MONOPOLE.
5. ROOF TOPS: PRE–CONSTRUCTION AND POST–CONSTRUCTION VISUAL INSPECTION AND PHOTOGRAPHS OF THE ROOF AND INTERIOR TO DETERMINE AND DOCUMENT CONDITIONS; ROOF TOP CONSTRUCTION INSPECTIONS AS REQUIRED BY THE JURISDICTION; PHOTOGRAPHS OF CABLE TRAY AND/OR ICE BRIDGE; PHOTOGRAPHS OF DOGHOUSE/CABLE EXIT FROM ROOF;
6. SITE LAYOUT – PHOTOGRAPHS OF THE OVERALL COMPOUND, INCLUDING EQUIPMENT PLATFORM FROM ALL FOUR CORNERS.
7. FINISHED UTILITIES: CLOSE–UP PHOTOGRAPHS OF THE PPC BREAKER PANEL; CLOSE–UP PHOTOGRAPH OF THE INSIDE OF THE TELCO PANEL AND NIU; CLOSE–UP PHOTOGRAPH OF THE POWER METER AND DISCONNECT; PHOTOS OF POWER AND TELCO ENTRANCE TO COMPANY ENCLOSURE; PHOTOGRAPHS AT METER BOX AND/OR FACILITY DISTRIBUTION PANEL.
8. REQUIRED MATERIALS CERTIFICATIONS: CONCRETE MIX DESIGNS; MILL CERTIFICATION FOR ALL REINFORCING AND STRUCTURAL STEEL; AND ASPHALT PAVING MIX DESIGN.
9. ANY AND ALL SUBMITTALS BY THE JURISDICTION OR COMPANY.

SECTION 01 500 - PROJECT REPORTING

PART 1 – GENERAL

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

1.2 RELATED DOCUMENTS:
A. THE REQUIREMENTS OF THIS SECTION APPLY TO ALL SECTIONS IN THIS SPECIFICATION.
B. SPRINT "STANDARD CONSTRUCTION DETAILS FOR WIRELESS SITES" ARE INCLUDED IN AND MADE A PART OF THESE SPECIFICATIONS HEREWITH.

PART 2 – PRODUCTS (NOT USED)
PART 3 – EXECUTION

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

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

3.2 PROJECT CONFERENCE CALLS:

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

3.3 PROJECT TRACKING IN SMS:

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

3.4 ADDITIONAL REPORTING:

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

3.5 PROJECT PHOTOGRAPHS:

A. FILE DIGITAL PHOTOGRAPHS OF COMPLETED SITE IN JPEG FORMAT IN THE SMS PHOTO LIBRARY FOR THE RESPECTIVE SITE. PHOTOGRAPHS SHALL BE CLEARLY LABELED WITH SITE NUMBER, NAME AND DESCRIPTION, AND SHALL INCLUDE AT A MINIMUM THE FOLLOWING AS APPLICABLE:
1. SHELTER AND TOWER OVERVIEW.
2. TOWER FOUNDATION(S) – FORMS AND STEEL BEFORE POUR (EACH ANCHOR ON GUYED TOWERS).
3. TOWER FOUNDATION(S) POUR WITH VIBRATOR IN USE (EACH ANCHOR ON GUYED TOWERS).
4. TOWER STEEL AS BEING INSTALLED INTO HOLE (SHOW ANCHOR STEEL ON GUYED TOWERS).
5. PHOTOS OF TOWER SECTION STACKING.
6. CONCRETE TESTING / SAMPLES.
7. PLACING OF ANCHOR BOLTS IN TOWER FOUNDATION.
8. BUILDING/WATER TANK FROM ROAD FOR TENANT IMPROVEMENTS OR COMMENTS.
9. SHELTER FOUNDATION––FORMS AND STEEL BEFORE POURING.
10. SHELTER FOUNDATION POUR WITH VIBRATOR IN USE.
11. COAX CABLE ENTRY INTO SHELTER.
12. PLATFORM MECHANICAL CONNECTIONS TO TOWER/MONOPOLE.
13. ROOFTOP PRE AND POST CONSTRUCTION PHOTOS TO INCLUDE PENETRATIONS AND INTERIOR CEILING.
14. PHOTOS OF TOWER TOP COAX LINE COLOR CODING AND COLOR CODING AT GROUND LEVEL.
15. PHOTOS OF ALL APPROPRIATE COMPANY OR REGULATORY SIGNAGE.
16. PHOTOS OF EQUIPMENT BOLT DOWN INSIDE SHELTER.
17. POWER AND TELCO ENTRANCE TO COMPANY ENCLOSURE AND POWER AND TELCO SUPPLY LOCATIONS INCLUDING METER/DISCONNECT.
18. ELECTRICAL TRENCH(S) WITH ELECTRICAL / CONDUIT BEFORE BACKFILL.
19. ELECTRICAL TRENCH(S) WITH FOIL–BACKED TAPE BEFORE FURTHER BACKFILL.
20. TELCO TRENCH WITH TELEPHONE / CONDUIT BEFORE BACKFILL.
21. TELCO TRENCH WITH FOIL–BACKED TAPE BEFORE FURTHER BACKFILL.
22. SHELTER GROUND–RING TRENCH WITH GROUND–WIRE BEFORE BACKFILL (SHOW ALL CAD WELDS AND BEND RADII).
23. TOWER GROUND–RING TRENCH WITH GROUND–WIRE BEFORE BACKFILL (SHOW ALL CAD WELDS AND BEND RADII).
24. FENCE GROUND–RING TRENCH WITH GROUND–WIRE BEFORE BACKFILL (SHOW ALL CAD WELDS AND BEND RADII).
25. ALL BTS GROUND CONNECTIONS.
26. ALL GROUND TEST WELLS.
27. ANTENNA GROUND BAR AND EQUIPMENT GROUND BAR.
28. ADDITIONAL GROUNDING POINTS ON TOWERS ABOVE 200'.
29. HVAC UNITS INCLUDING CONDENSERS ON SPLIT SYSTEMS.
30. GPS ANTENNAS.
31. CABLE TRAY AND/OR WAVEGUIDE BRIDGE.
32. DOGHOUSE/CABLE EXIT FROM ROOF.
33. EACH SECTOR OF ANTENNAS; ONE PHOTOGRAPH LOOKING AT THE SECTOR AND ONE FROM BEHIND SHOWING THE PROJECTED COVERAGE AREA.
34. MASTER BUS BAR.
35. TELCO BOARD AND NIU.
36. ELECTRICAL DISTRIBUTION WALL.
37. CABLE ENTRY WITH SURGE SUPPRESSION.
38. ENTRANCE TO EQUIPMENT ROOM.
39. COAX WEATHERPROOFING–TOP AND BOTTOM OF TOWER.
40. COAX GROUNDING –TOP AND BOTTOM OF TOWER.
41. ANTENNA AND MAST GROUNDING.
42. LANDSCAPING – WHERE APPLICABLE.

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

SECTION 07 500 - ROOF CUTTING, PATCHING AND REPAIR

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

1.4 SUBMITTALS:

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

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

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

SECTION 09 900 - PAINTING

QUALITY ASSURANCE:

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

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

CONTINUE SHEET SP-3

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CT43XC828

WINDSOR LOCKS @ VOLUNTEER DRIVE

2-4 VOLUNTEER DRIVE
WINDSOR LOCKS, CT 06096

PROJECT NO:	114957.002
CHECKED BY:	RCM

ISSUED FOR:

REV	DATE	DRWN	DESCRIPTION
0	9/13/17	MDW	CONSTRUCTION

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PEC.0001564
Expires 2/10/18

STATE OF CONNECTICUT
31627
LICENSED
PROFESSIONAL ENGINEER
9/13/17

SHEET NUMBER:	REVISION:
SP-2	0

CONTINUED FROM SP-2:

MATERIALS:

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

PAINT SCHEDULE:

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

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

PAINTING APPLICATION:

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

TOUCHUP PAINTING:

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

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

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

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

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

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

REMOTE ELECTRICAL TILT (RET) CABLES:

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

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

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

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

HYBRID CABLES INSTALLATION:

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

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

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

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

WEATHERPROOFING EXTERIOR CONNECTORS AND HYBRID CABLE GROUND KITS:

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

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

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

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

SUMMARY:

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

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

C. COMPLY WITH MANUFACTURERS INSTALLATION AND START–UP REQUIREMENTS

DC CIRCUIT BREAKER LABELING

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

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

SUMMARY:

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

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

C. COMPLY WITH MANUFACTURERS INSTALLATION AND START–UP REQUIREMENTS

SUPPORTING DEVICES:

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

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

SUPPORTING DEVICES:

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

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

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

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

E. USE VIBRATION & SHOCK–RESISTANT FASTENERS FOR ATTACHMENTS TO CONCRETE SLABS.

ELECTRICAL IDENTIFICATION:

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

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

SECTION 26 200 - ELECTRICAL MATERIALS AND EQUIPMENT

CONDUIT:

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

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

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

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

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

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

HUBS AND BOXES:

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

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

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

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

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

SUPPLEMENTAL GROUNDING SYSTEM

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

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

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

EXISTING STRUCTURE:

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

CONDUIT AND CONDUCTOR INSTALLATION:

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

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

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WINDSOR LOCKS @
VOLUNTEER DRIVE

2-4 VOLUNTEER DRIVE
WINDSOR LOCKS, CT 06096

PROJECT NO:	114957.002
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ISSUED FOR:

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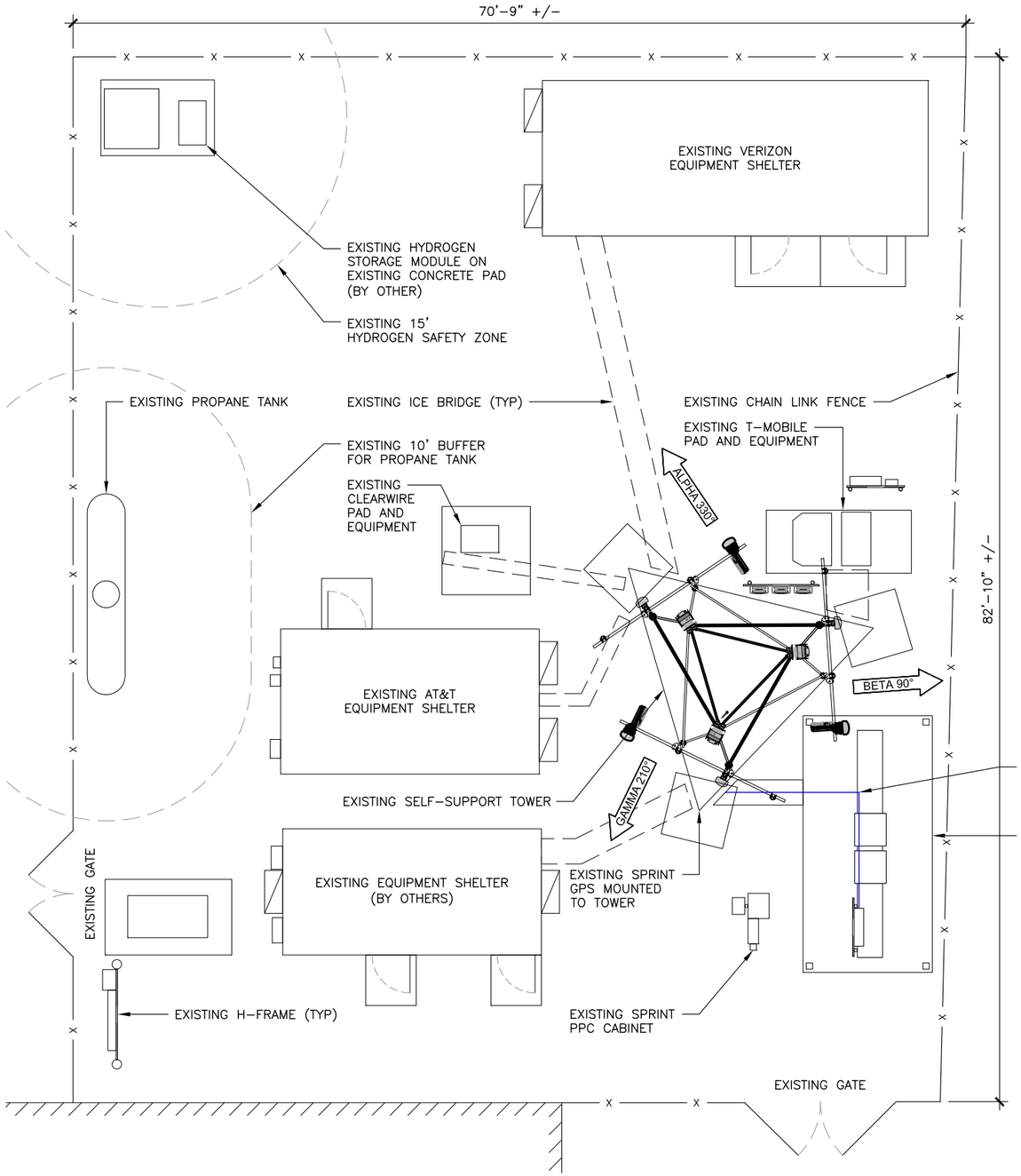
B&T ENGINEERING, INC.
PEC.0001564
Expires 2/10/18

STATE OF CONNECTICUT
31627
LICENSED
PROFESSIONAL ENGINEER
9/13/17

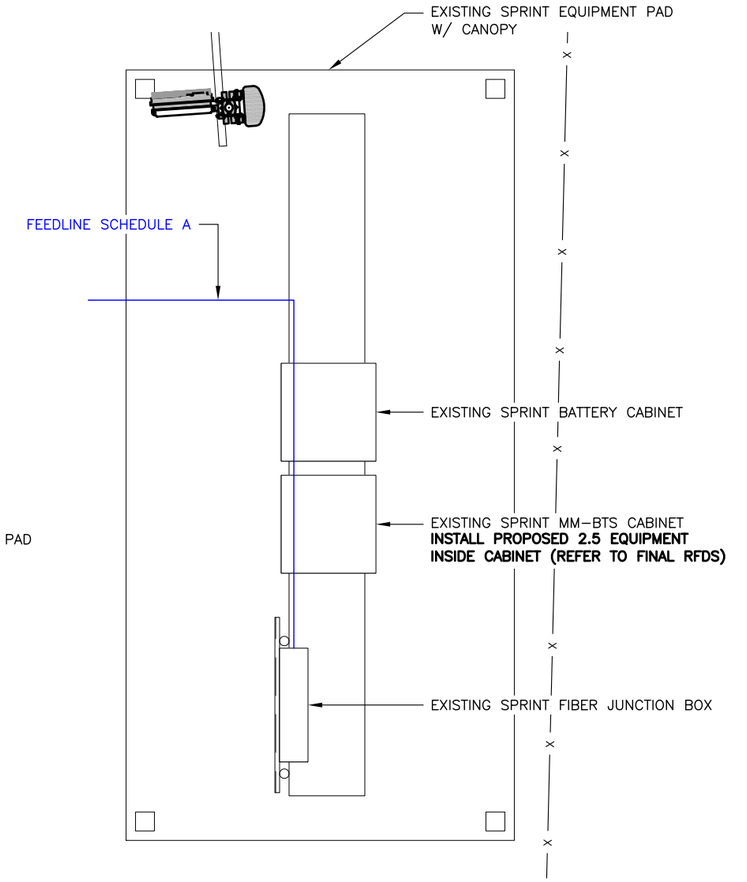
SHEET NUMBER:	REVISION:
SP-3	0



1 OVERALL SITE PLAN

SCALE: 0' 4' 8' 16' 32'

11x17 SCALE: 3/32"=1'-0"
22x34 SCALE: 3/16"=1'-0"



2 EQUIPMENT PLAN

SCALE: 0' 1' 2' 4' 10'

11x17 SCALE: 1/4"=1'-0"
22x34 SCALE: 1/2"=1'-0"

SPECIAL PRE-CONSTRUCTION WORK NOTE:

GENERAL CONTRACTOR SHALL FURNISH AND INSTALL ALL SPECIAL OR SUPPLEMENTAL ADDITIONAL TOWER-MOUNTED EQUIPMENT PER RECOMMENDATIONS FROM SBA-PROVIDED TOWER STRUCTURAL ANALYSIS FOR ANY SPECIAL SHIELDING OF TOWER TOP EQUIPMENT AND FOR ANY SPECIAL FEEDLINE BUNDLING OR RELOCATION.

ANTENNA MOUNT STRUCTURAL DESIGN NOTE:

ENGINEER-OF-RECORD HAS MADE A VISUAL ASSESSMENT ONLY OF EXISTING ANTENNA MOUNT ASSEMBLIES, WITHOUT THE BENEFIT OF A RIGOROUS ANTENNA MOUNT STRUCTURAL ANALYSIS, AND RECOMMENDS THAT EXISTING AND PROPOSED TOWER TOP EQUIPMENT BE INSTALLED AS DEPICTED HEREIN. STRUCTURAL DETAILS AS DEPICTED HEREIN FOR MODIFICATION OF EXISTING ANTENNA MOUNT ASSEMBLIES ARE PRELIMINARY ONLY AND THAT FINAL CONSTRUCTION DETAILS MAY BE SUBJECT TO CHANGE PENDING THE COMPLETION OF A SEPARATE SUPPLEMENTAL ANTENNA MOUNT STRUCTURAL ASSESSMENT, SUPPLEMENTAL STRUCTURAL MAPPING/CONDITIONS ASSESSMENT REPORT AND/OR SUPPLEMENTAL RIGOROUS ANTENNA MOUNT STRUCTURAL ANALYSIS.

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MAHWAH, NJ 07495

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134 FLANDERS ROAD, SUITE 125
WESTBOROUGH, MA 01581

CT43XC828

WINDSOR LOCKS @ VOLUNTEER DRIVE

2-4 VOLUNTEER DRIVE
WINDSOR LOCKS, CT 06096

PROJECT NO:	114957.002
CHECKED BY:	RCM

ISSUED FOR:

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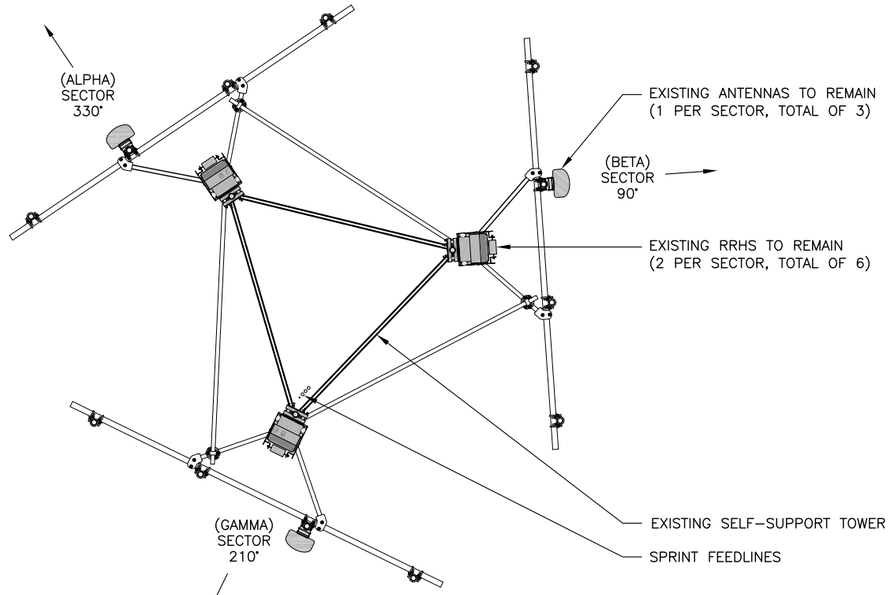
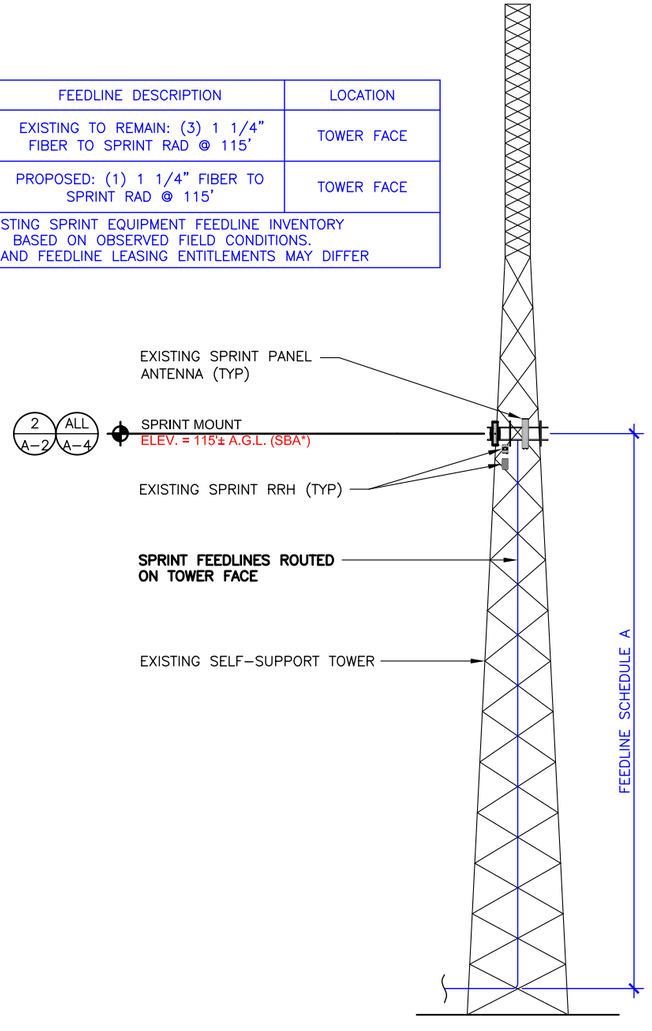


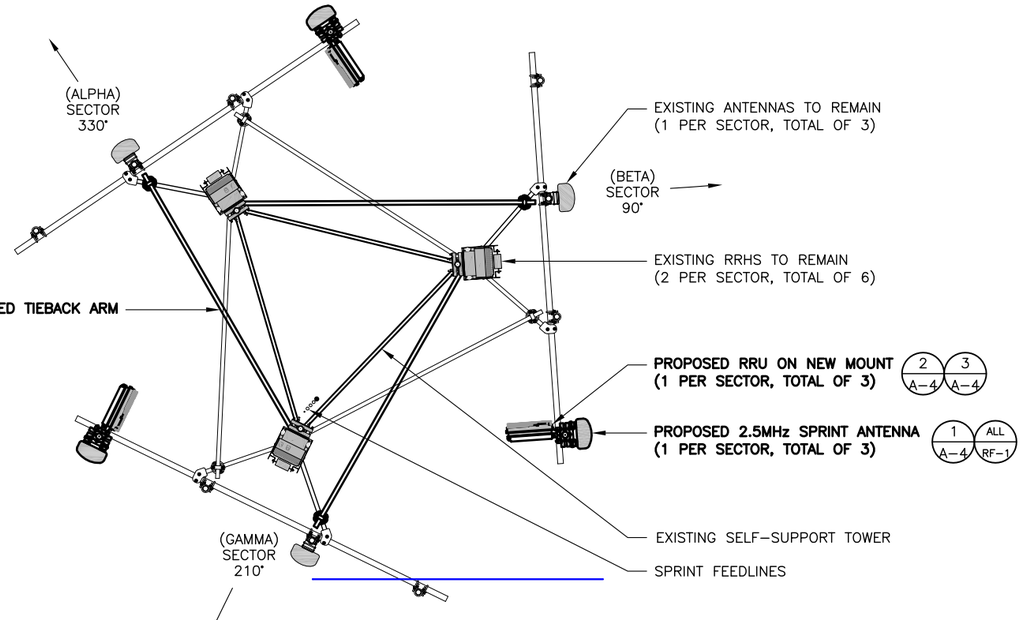
1 EXISTING ANTENNA PLAN

SCALE: 0' 1' 2' 4' 10' — 11x17 SCALE: 1/4"=1'-0" / 22x34 SCALE: 1/2"=1'-0"

N

FEEDLINE SCHEDULE	FEEDLINE DESCRIPTION	LOCATION
A	EXISTING TO REMAIN: (3) 1 1/4" FIBER TO SPRINT RAD @ 115'	TOWER FACE
B	PROPOSED: (1) 1 1/4" FIBER TO SPRINT RAD @ 115'	TOWER FACE
EXISTING SPRINT EQUIPMENT FEEDLINE INVENTORY BASED ON OBSERVED FIELD CONDITIONS. RFDS AND FEEDLINE LEASING ENTITLEMENTS MAY DIFFER		





2 PROPOSED ANTENNA PLAN

SCALE: 0' 1' 2' 4' 10' — 11x17 SCALE: 1/4"=1'-0" / 22x34 SCALE: 1/2"=1'-0"

N

3 TOWER ELEVATION

SCALE: 0' 15' 30' 45' 60' — 11x17 SCALE: 1"=30' / 22x34 SCALE: 1"=15'

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WINDSOR LOCKS @ VOLUNTEER DRIVE

2-4 VOLUNTEER DRIVE
WINDSOR LOCKS, CT 06096

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NOTE:
PLUMBING DIAGRAM COULD NOT BE FOUND IN PLAYBOOK TO MATCH PROPOSED SCOPE OF WORK

SPRINT CONSTRUCTION STANDARDS:

GENERAL CONTRACTOR SHALL ADHERE TO THE FOLLOWING SPRINT CONSTRUCTION STANDARDS.

- CONSTRUCTION STANDARDS: INTEGRATED CONSTRUCTION STANDARDS FOR WIRELESS SITES – (CURRENT VERSION), INCLUDING EXHIBITS A–M.
- CONSTRUCTION SPECIFICATIONS: CONSTRUCTION STANDARDS EXHIBIT A – STANDARD CONSTRUCTION SPECIFICATIONS FOR WIRELESS SITES (CURRENT VERSION).
- GROUNDING STANDARDS: EXTERIOR GROUNDING SYSTEM DESIGN. GROUNDING STANDARDS (SUPPLEMENT): ANTI–THEFT UPDATE TO SPRINT GROUNDING 082412 AND SPRINT ENGINEERING LETTER EL–0504 DATED 04.20.12.
- WEATHER PROOFING STANDARDS: EXCERPT FROM CONSTRUCTION STANDARDS EXHIBIT A, SECTION 3.6 WEATHERPROOFING CONNECTORS AND GROUND KITS.
- COLOR CODING: SPRINT NEXTEL ANT AND LINE COLOR CODING PER SPRINT TS–0200 CURRENT VERSION.
- GENERAL CONTRACTOR TO FIELD VERIFY AZIMUTH AND CL HEIGHT AND MECHANICAL DOWNTILT. IF DIFFERENT THAN CALLED OUT IN RFDS, HALT ANTENNA WORK FOR ONE HOUR, CALL SPRINT RF ENGINEER (OR MANAGER IF RF ENGINEER DOES NOT ANSWER, BUT STILL LEAVE A MESSAGE TO RF ENGINEER) USING SPRINT–PROVIDED CONTACT INFORMATION FOR FURTHER INSTRUCTIONS. IF SPRINT DOES NOT RESPOND WITHIN ONE HOUR, PLACE 2.5G ANTENNA AT SAME CL HEIGHT AS 1.9G ANTENNA AND EMAIL CORRECT CL HEIGHT AND AZIMUTH TO SPRINT RF ENGINEER. UPDATE AS–BUILD DRAWING WITH CORRECT CL HEIGHT. ALSO EMAIL CORRECT 1900 MHZ AND 800 MHZ ANTENNA CL HEIGHT, AZIMUTH AND MECHANICAL DOWNTILT TO RF ENGINEER.
- AISG TESTS TO VERIFY OPERATION IS TO BE PERFORMED AFTER FINAL INSTALLATION OF ANTENNAS AND AISG CABLES HAVE BEEN CONNECTED. VERIFY OPERATION OF ALL EXISTING SPRINT AISG EQUIPMENT INCLUDING 800MHZ, 1.9GHZ AND 2.5G. TEST INCLUDE COMPLETE DOWNTILT, AZIMUTH (IF APPLICABLE) AND BEAMWIDTH SWINGS (IF APPLICABLE). DOCUMENT AISG TEST RESULTS IN COAX SWEEP TEST SPREADSHEET.
- GENERAL CONTRACTOR MUST INSURE THAT NO OBJECT IS LOCATED IN FRONT OF ANTENNA. THIS MEANS NO OBJECT IS TO BE LOCATED 45 DEGREES LEFT AND RIGHT OF FRONT OF ANTENNA OR 7 DEGREES UP AND DOWN FROM CENTER OF ANTENNA. IF THIS IS NOT POSSIBLE, CONTACT RF ENGINEER FOR FURTHER INSTRUCTION. IN ADDITION, 2.5G ANTENNA IS NOT TO BE PLACED IN FRONT OF ANY OTHER ANTENNA USING THE SAME 45 DEGREE RULE. THIS INCLUDES SPRINT AND NON–SPRINT ANTENNAS.
- GENERAL CONTRACT IS REQUIRED TO USE A DIGITAL ALIGNMENT TOOL TO SET AZIMUTH, ROLL AND DOWNTILT. AZIMUTH ACCURACY IS TO BE WITHIN 1 DEGREES. DOWNTILT AND ROLL (LEFT TO RIGHT TILT) IS TO BE WITHIN 0.1 DEGREES. IF FOR SOME REASON THIS ACCURACY CANNOT BE ACHIEVED, UPDATE AS–BUILT DRAWINGS AND EMAIL SPRINT RF ENGINEER WITH AS–BUILT SETTINGS. USE 3Z RF ALIGNMENT TOOL OR EQUIVALENT TOOL. HTTP://WWW.3ZTELECOM.COM/ANTENNA–ALIGNMENT–TOOL/.

NOTE:
REFER TO THE FINAL RF DATA SHEET FOR FINAL ANTENNA SETTINGS

1 RF DATA SHEET
SCALE: N.T.S.

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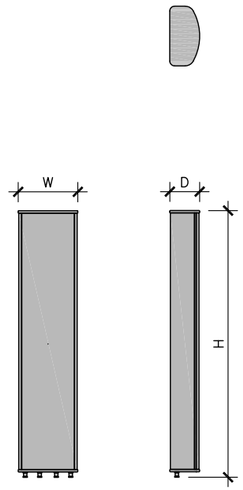
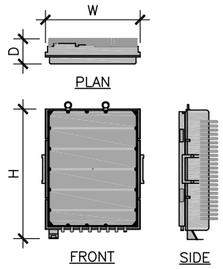


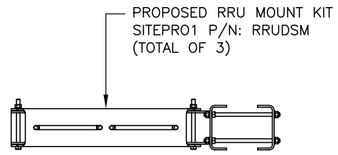
2.5MHz ANTENNA SPECS	
MANUFACTURER	RFS
MODEL #	APXV9TM14-ALU-I20
WIDTH	12.6"
DEPTH	6.3"
HEIGHT	56.3"
WEIGHT	56.2 LBS

1 2.5MHz ANTENNA DETAIL
SCALE: N.T.S.

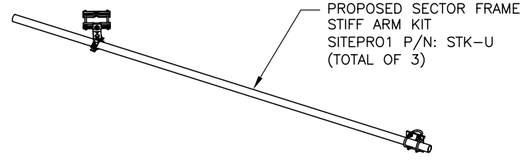


2.5MHz RRH SPECS	
MANUFACTURER	NOKIA/ALU
MODEL #	TD-RRH8X20-25
WIDTH	18.6"
DEPTH	6.7"
HEIGHT	26.1"
WEIGHT	70 LBS

2 2.5MHz RRH DETAIL
SCALE: N.T.S.



3 RRU MOUNT
SCALE: N.T.S.



4 TIEBACK ARM DETAIL
SCALE: N.T.S.

MAJOR RF EQUIPEMENT LIST
(GC SHALL FURNISH AND INSTALL ALL OTHER MATERIAL AND EQUIPMENT NOT SUPPLIED BY SPRINT)

DESCRIPTION	QUANTITY	UNITS	MAKE/MODEL/MATERIAL	PROVIDED BY
ANTENNA	3	EA	RFS APXVTM14-ALU-I20	SPRINT
2500 RRH	3	EA	ALCATEL LUCENT TD-RRH8x20-25	SPRINT
HYBRID TRUNK	1 @ 140'±	LINEAR FEET LISTED (APPROX. 115'+15%)	1 1/4" HYBRID TRUNK	SPRINT

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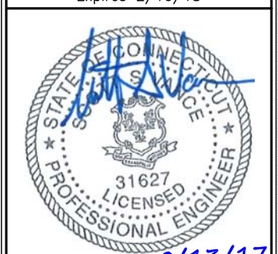
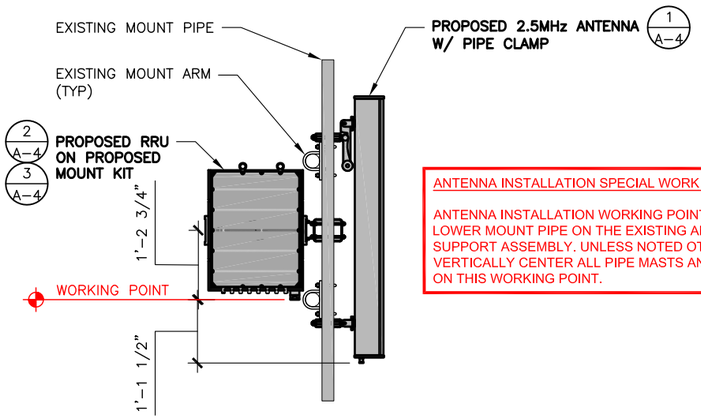


SHEET NUMBER: A-4
REVISION: 0

STRUCTURAL NOTE:
ANALYSIS FOR THE CAPACITY OF THE EXISTING STRUCTURES TO SUPPORT THE PROPOSED EQUIPMENT SHALL BE DETERMINED PRIOR TO CONSTRUCTION

NOTE:
REFER TO THE FINAL RF DATA SHEET FOR FINAL ANTENNA SETTINGS



ANTENNA INSTALLATION SPECIAL WORK NOTE:

ANTENNA INSTALLATION WORKING POINT IS THE LOWER MOUNT PIPE ON THE EXISTING ANTENNA SUPPORT ASSEMBLY. UNLESS NOTED OTHERWISE VERTICALLY CENTER ALL PIPE MASTS AND ANTENNAS ON THIS WORKING POINT.

NOTE:
AT TIME OF CONSTRUCTION, CONTRACTOR TO VERIFY AZIMUTHS OF EXISTING ANTENNAS. IF DIFFERENT FROM RFDS, PLEASE NOTIFY THE RF ENGINEER AND CONSTRUCTION MANAGER WITH ACTUAL AZIMUTH TO ENSURE SPRINT'S DATABASE IS ACCURATE AND UP-TO-DATE.

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PROPOSED 2.5MHz ANTENNA
& RRU MOUNTING DETAIL
1
SCALE: N.T.S.

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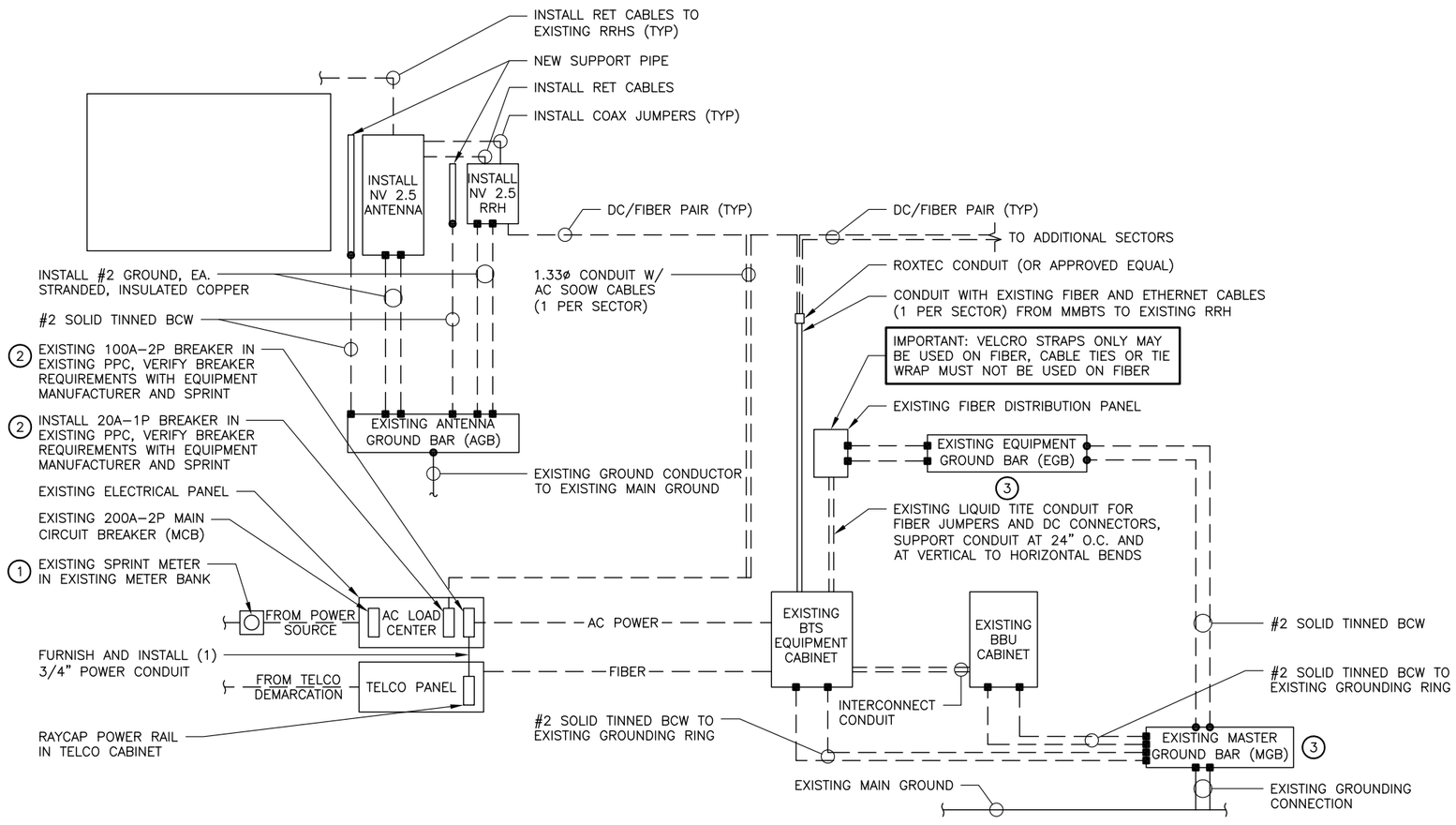

1 TYPICAL POWER AND GROUNDING ONE LINE DIAGRAMS

SCALE: N.T.S.

ELECTRICAL NOTES

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

SPECIAL WORK NOTES

1. G.C TO FURNISH AND INSTALL ALL COMPONENTS TO UPGRADE EXISTING ELECTRICAL SERVICE, CONDUIT, CONDUCTOR, PPC AND MCP IN ACCORDANCE WITH SPRINT CONSTRUCTION STANDARDS NV 2.5 ADDENDUM "ENGINEERING NOTICE 2013–002 (POWER UPGRADES) REV.0"
2. G.C. TO FURNISH AND INSTALL UPGRADE AT THE EXISTING MMBTS BREAKER, CONDUCTOR AND CONDUIT TO A MINIMUM NEC RATING FOR A 100 AMP, 240V CIRCUIT.
3. FOR NEW OR REPAIRED GROUNDING EQUIPMENT, REFER TO SPRINT GROUNDING STANDARDS AND FOLLOWING (SUPPLEMENTS):
   –ANTI–THEFT UPDATE TO SPINT GROUNDING DATED 08–24–12
   –SPRINT ENGINEERING LETTER EL–0504 DATED 04–20–12

ELECTRICAL LEGEND

- EXOTHERMIC CONNECTION (CAD WELD)
- MECHANICAL CONNECTION
- CABLE GROUNDING KIT
- X SPECIAL WORK NOTE

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

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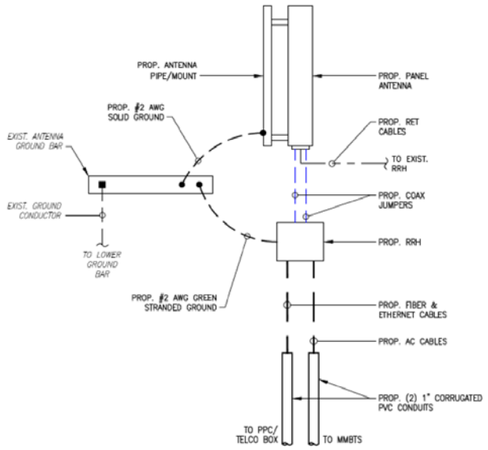


1 EQUIPMENT GROUNDING SCHEMATIC

SCALE: N.T.S.

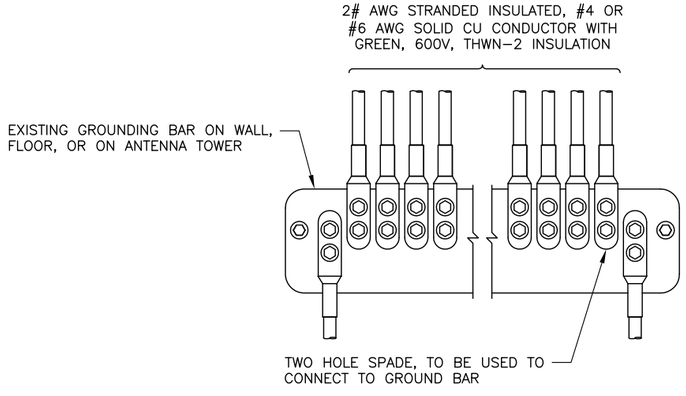
ELECTRICAL LEGEND

- EXOTHERMIC CONNECTION (CAD WELD)
- MECHANICAL CONNECTION
- CABLE GROUNDING KIT
- G — GROUND COPPER WIRE, SIZED AS NOTED
- INSULATED WIRING, SIZE AS NOTED

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

PROTECTIVE GROUNDING SYSTEMS GENERAL NOTES

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

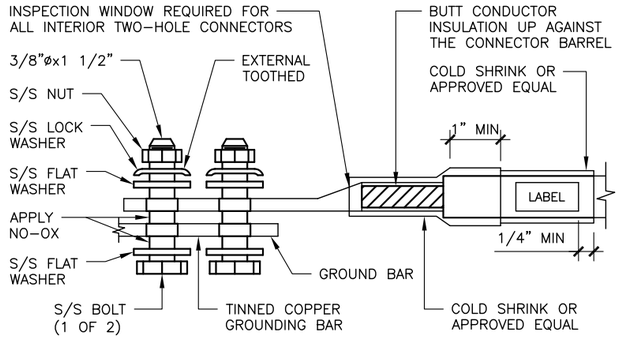


NOTES

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

2 INSTALLATION OF GROUNDING CONDUCTOR TO GROUND BAR

SCALE: N.T.S.



NOTES:

1. PROVIDE 2–HOLE, LONG BARREL, TINNED SOLID COPPER LUGS WHEREVER LUGS ARE SHOWN. ERICO B–122–CE PREFERRED WITH CADWELD TYPE GL CONNECTION. THOMAS AND BETTS 54800BE SERIES WHERE CRIMP CONNECTOR IS REQUIRED.
2. ALL CRIMP CONNECTIONS MUST BE MADE USING HYDRAULIC TOOLS AND THREE POINT NHEXAGONAL COMPRESSION MOLDS ON LONG BARREL LUGS.
3. ALL MECHANICAL CONNECTIONS MUST BE MADE USING THOMAS AND BETTS "KOPR–SHIELD". COAT ALL WIRES BEFORE LUGGING. COAT ALL SURFACES BEFORE CONNECTING.
4. ALL HARDWARE 18/8 STAINLESS STEEL INCLUDING BELLEVILLE, COAT ALL SURFACES WITH "KOPR–SHIELD" BEFORE MATING.
5. FOR GROUNDING BOND TO STEEL ONLY: INSERT A DRAGON TOOTH WASHER BETWEEN LUG AND STEEL, COAT ALL SURFACES WITH "KOPR–SHIELD".
6. NO SLOTTED HOLES ON BUS BAR OR LUGS ARE PERMITTED.
7. ALL LUG SHANKS AND LEAD JOINTS SHALL HAVE HEAT SHRINK MATERIAL.

3 TWO HOLE LUG

SCALE: N.T.S.

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WINDSOR LOCKS @ VOLUNTEER DRIVE

2-4 VOLUNTEER DRIVE
WINDSOR LOCKS, CT 06096

PROJECT NO:	114957.002
CHECKED BY:	RCM

ISSUED FOR:

REV	DATE	DRWN	DESCRIPTION
0	9/13/17	MDW	CONSTRUCTION

B&T ENGINEERING, INC.
PEC.0001564
Expires 2/10/18

SHEET NUMBER:	REVISION:
G-1	0