



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

February 1, 2018

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

**Notice of Exempt Modification**  
**35 Lower County Road, Roxbury, CT 06783**  
**41 33 34.3 N**  
**-73 17 32.3 W**  
**Sprint #: CT72XC031 \_DOMU**

Dear Ms. Bachman:

Sprint currently maintains antennas at the 177-foot level of the existing 180-foot Self Support Tower at Lower County Road in Roxbury, CT. The tower is owned by SBA 2012 TC Assets, LLC. The property is owned by the Town of Roxbury. Sprint now intends to replace (3) existing cell antennas with (3) newer technology cell antennas at the 177-foot level of the tower. Sprint's proposed full scope of work is as follows:

Remove:

- None

Remove and Replace:

- Remove (3) APXVSP18-C-A20 Panel Antennas and Replace with (3) ETCR-654L12H6 Panel Antennas

Install:

- (3) ALU 800 Mhz RRUs
- (3) TD-RRH8x20-25 RRUs
- (1) 1-1/4" fiber

Existing Equipment to Remain (Including entitlements):

- (3) ALU 1900 Mhz RRUs
- (3) ALU 800 Mhz RRUs
- (3) Sector Frames
- (3) 1-1/4" fiber



This facility was approved prior to the Council's jurisdiction. The Town of Roxbury's Zoning Commission granted Special Permit and Site Plan Approval on October 21, 1999 for a 180' tower. Nextel's (Sprint's) original approval was for 12 panel antennas at the top of the Tower to be colored "blue gray" to blend with the sky. A 22'x26'x10.3' equipment shelter was approved to be placed at the base. There were no further conditions placed on the tower. It is SBA's opinion that this modification is in full compliance.

Please accept this letter as notification pursuant to Regulations of Connecticut State Agencies §16-50j-73, for construction that constitutes an exempt modification pursuant to R.C.S.A. §16.50j-72(b)(2). In accordance with R.C.S.A. § 16.50j-73, a copy of this letter is being sent to the Town of Roxbury's First Selectman as representative for the Town and Landowner, The Town of Roxbury, as well as to the Zoning Enforcement Officer, John Cody. (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@sbsite.com

**Attachments**

cc: Barbara Henry, First Selectman / with attachments  
*Town of Roxbury, Roxbury Town Hall, 29 North Street, Roxbury, CT 06783*  
John Cody, Zoning Enforcement Officer / with attachments  
*Town of Roxbury, Roxbury Town Hall, 29 North Street, Roxbury, CT 06783*



## POWER DENSITY

### SPRINT Site Inventory and Power Data by Antenna

Sector:	A	Sector:	B	Sector:	C
Antenna #:	1	Antenna #:	1	Antenna #:	1
Make / Model:	KMW ETCR-654L12H6	Make / Model:	KMW ETCR-654L12H6	Make / Model:	KMW ETCR-654L12H6
Gain:	13.35 / 15.25/15.05 dBd	Gain:	13.35 / 15.25/15.05 dBd	Gain:	13.35 / 15.25/15.05 dBd
Height (AGL):	177.5 feet	Height (AGL):	177.5 feet	Height (AGL):	177.5 feet
Frequency Bands	850 MHz / 1900 MHz (PCS) / 2500 MHz (BRS)	Frequency Bands	850 MHz / 1900 MHz (PCS) / 2500 MHz (BRS)	Frequency Bands	850 MHz / 1900 MHz (PCS) / 2500 MHz (BRS)
Channel Count	18	Channel Count	18	Channel Count	18
Total TX Power(W):	380 Watts	Total TX Power(W):	380 Watts	Total TX Power(W):	380 Watts
ERP (W):	11,775.31	ERP (W):	11,775.31	ERP (W):	11,775.31
Antenna A1 MPE%	1.56 %	Antenna B1 MPE%	1.56 %	Antenna C1 MPE%	1.56 %

Site Composite MPE%	
Carrier	MPE%
SPRINT – Max per sector	1.56 %
Town	0.13 %
Alltel	0.41 %
AT&T	2.24 %
Verizon Wireless	1.48 %
<b>Site Total MPE %:</b>	<b>5.82 %</b>

SPRINT Sector A Total:	1.56 %
SPRINT Sector B Total:	1.56 %
SPRINT Sector C Total:	1.56 %
Site Total:	5.82 %

SPRINT Frequency Band / Technology (All Sectors)	# Channels	Watts ERP (Per Channel)	Height (feet)	Total Power Density ( $\mu\text{W}/\text{cm}^2$ )	Frequency (MHz)	Allowable MPE ( $\mu\text{W}/\text{cm}^2$ )	Calculated % MPE
Sprint 850 MHz CDMA	1	432.54	177.5	0.53	850 MHz	567	0.09%
Sprint 850 MHz LTE	2	432.54	177.5	1.06	850 MHz	567	0.19%
Sprint 1900 MHz (PCS) CDMA	5	535.94	177.5	3.28	1900 MHz (PCS)	1000	0.33%
Sprint 1900 MHz (PCS) LTE	2	1,339.86	177.5	3.28	1900 MHz (PCS)	1000	0.33%
Sprint 2500 MHz (BRS) LTE	8	639.78	177.5	6.26	2500 MHz (BRS)	1000	0.63%
<b>Total*:</b>						<b>1.56%</b>	

\*NOTE: Totals may vary by 0.01% due to summing of remainders

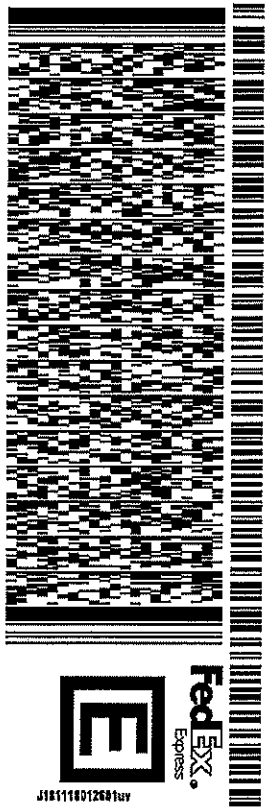
ORIGIN ID:BBFA (508) 251-0720  
 KR PELLETIER  
 SPA COMMUNICATIONS CORPORATION  
 124 FLEANDERS RD  
 SUITE 125  
 WESTBOROUGH, MA 01581  
 UNITED STATES US

SHIP DATE: 01FEB18  
 ACTWGT: 1.00 LB  
 CAD: 105843304INET3980  
 BILL SENDER

TO **BARBARA HENRY, FIRST SELECTMAN**  
**TOWN OF ROXBURY**  
**ROXBURY TOWN HALL, 29 NORTH STREET**

**ROXBURY CT 06783**  
 (508) 251-0720 X 3804 REF: 105692009-6389  
 INV: DEPT:  
 PO:

552J11/22D/DCA5

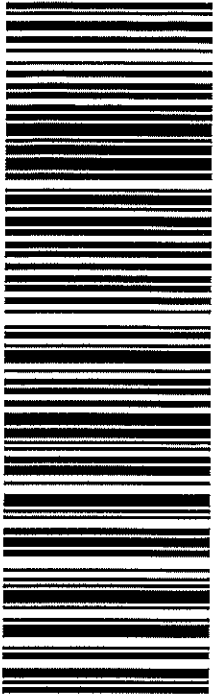


FRI - 02 FEB 10:30A

PRIORITY OVERNIGHT

TRK# 7713 7944 7595  
 0201

**EB HFDA**  
 CT-US **06783**  
**BDL**



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ORIGIN ID:BBFA (508) 251-0720  
KRIPELLETTER  
SBA COMMUNICATIONS CORPORATION  
134 FLANDERS RD  
SUITE 125  
WESTBOROUGH MA 01581  
UNITED STATES US

SHIP DATE: 01FEB18  
ACTWGT: 4.00 LB  
CAD: 105843304/MET3980

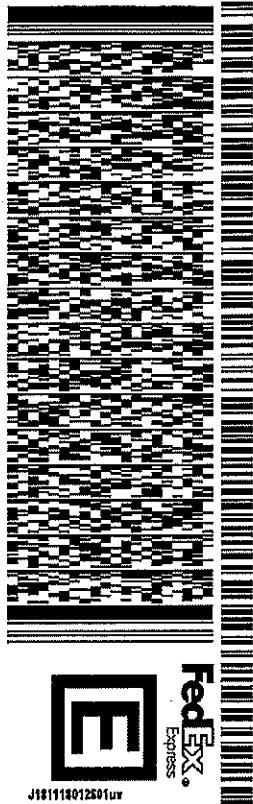
BILL SENDER

TO JOHN CODY, ZONING ENFORCEMENT

ROXBURY TOWN HALL, 29 NORTH STREET

ROXBURY CT 06783

(508) 251-0720 X.3804 REF: 10-56-92009-0089  
INV: DEPT:  
PO:



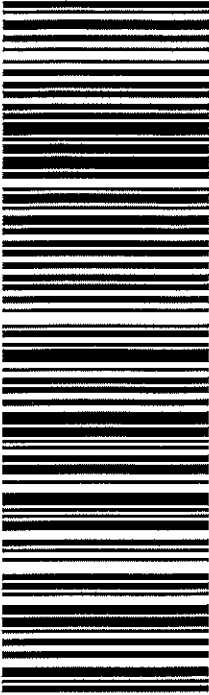
552J11122D/DCA5

TRK# 7713 7946 6649  
0201

FRI - 02 FEB 10:30A  
PRIORITY OVERNIGHT

EB HFDA

06783  
CT-US BDL

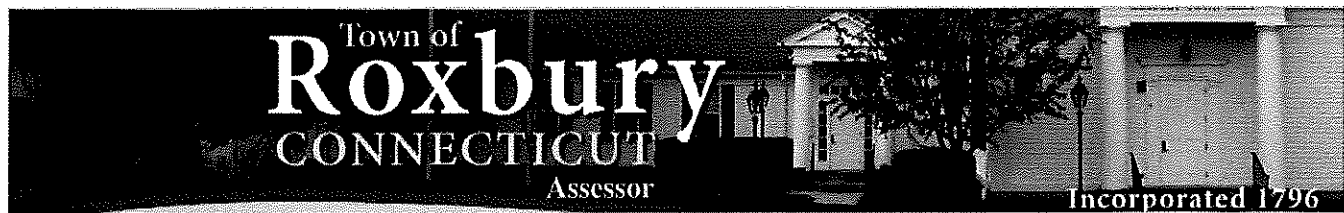


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Use of this system constitutes your agreement to the service conditions in the current FedEx Service Guide, available on fedex.com. FedEx will not be responsible for any claim in excess of \$100 per package, whether the result of loss, damage, delay,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



<a href="#">Recent Sales in Neighborhood</a>		<a href="#">Previous Parcel</a>	<a href="#">Next Parcel</a>	<a href="#">Return to Main Search</a>	<a href="#">Roxbury Home</a>
<b>Owner and Parcel Information</b>					
Owner Name	ROXBURY TOWN OF	Today's Date		November 10, 2017	
Mailing Address	29 NORTH ST ROXBURY, CT 06783	Parcel ID	1158 (Account #: 00059300)		
Location Address	35 LOWER COUNTY RD	Survey	15/30		
Map / Lot	27 / 029	Census Tract / Census Block	5290 / 268100000000		
Use Class / Description	920 Mun Land Com	Acreage	4.78		
Assessing Neighborhood	0001	Parcel Map	<a href="#">Show Parcel Map</a> <a href="#">Owner List By Radius</a>		

Current Appraised Value Information							
Building Value	XF Value	OB Value	Land Value	Special Land Value	Total Appraised Value	Net Appraised Value	Current Assessment
\$ 0	\$ 0	\$ 11,670	\$ 230,250		\$ 241,920	\$ 241,920	\$ 169,350

Assessment History				
Year	Building	OB/Misc	Land	Total Assessment
Current	0	\$ 8,170	\$ 161,180	\$ 169,350
2015	0	\$ 8,170	\$ 161,180	\$ 169,350
2014	0	\$ 8,170	\$ 50,190	\$ 58,360

Land Information				
Use	Class	Zoning	Area	Value
Mun Land Com	E	C	4.55 AC	\$ 68,250
Mun Land Com	E		0.23 AC	
Cell Site Vac Lnd	I		1 BL	\$ 162,000

Building Information	
No Building Information available for this parcel.	

Out Buildings / Extra Features				
Description	Sub Description	Area	Year Built	Value
Barn 1Story	Frame	576 S.F.	2002	\$ 9,940
Shed	Metal	384 S.F.	2002	\$ 1,730

Sale Information				
Sale Date	Sale Price	Deed Book/Page	Vacant or Improved	Owner
04/14/1992		57/ 607		ROXBURY TOWN OF

Permit Information								
Permit ID	Issue Date	Type	Description	Amount	Inspection Date	% Complete	Date Complete	Comments
BP14-60	12/05/2013	MISC	Miscellaneous	\$ 25,000		100		REPLACE ANTENNAS/CELL TOWER
BP13-51	01/03/2013	MISC	Miscellaneous	\$ 25,001		100		CELL TOWER MODIFICATION
EP09-35	10/24/2008	EL	Electric	\$ 890	08/25/2009	100	10/01/2009	UNDER 100SF
BP09-36	10/17/2008	OB	Out Bldg	\$ 10,500	08/25/2009	100	10/01/2009	UNDER 100SF
7922	06/05/2001	NC	New Construct			100	10/01/2002	shed
7280	12/16/1999	NC	New Construct	\$ 140,000		100	10/01/2002	radio rooms/tower

<a href="#">Recent Sales in Neighborhood</a>		<a href="#">Previous Parcel</a>	<a href="#">Next Parcel</a>	<a href="#">Return to Main Search Page</a>	<a href="#">Roxbury Home</a>
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## RADIO FREQUENCY EMISSIONS ANALYSIS REPORT EVALUATION OF HUMAN EXPOSURE POTENTIAL TO NON-IONIZING EMISSIONS

SPRINT Existing Facility

Site ID: CT72XC031

Roxbury-Lower County Road  
Lower County Road  
Roxbury, CT 06783

**November 29, 2017**

**EBI Project Number: 6217005374**

Site Compliance Summary	
Compliance Status:	<b>COMPLIANT</b>
Site total MPE% of FCC general public allowable limit:	<b>5.82 %</b>



November 29, 2017

SPRINT

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

## Emissions Analysis for Site: **CT72XC031 – Roxbury-Lower County Road**

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

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

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

General population/uncontrolled exposure limits apply to situations in which the general public 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 public 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 ( $\mu\text{W}/\text{cm}^2$ ). The general population exposure limits for the 850 MHz Band is approximately  $567 \mu\text{W}/\text{cm}^2$ . The general population exposure limit for the 1900 MHz (PCS) and 2500 MHz (BRS) bands is  $1000 \mu\text{W}/\text{cm}^2$ . Because each carrier will be using different frequency bands, and each frequency band has different exposure limits, it is necessary to report percent of MPE rather than power density.





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

Additional details can be found in FCC OET 65.

## CALCULATIONS

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

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

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



- 6) All radios at the proposed installation were considered to be running at full power and were uncombined in their RF transmissions paths per carrier prescribed configuration. Per FCC OET Bulletin No. 65 - Edition 97-01 recommendations to achieve the maximum anticipated value at each sample point, all power levels emitting from the proposed antenna installation are increased by a factor of 2.56 to account for possible in-phase reflections from the surrounding environment. This is rarely the case, and if so, is never continuous.
- 7) For the following calculations the sample point was the top of a 6-foot person standing at the base of the tower. The maximum gain of the antenna per the antenna manufactures supplied specifications minus 10 dB was used in this direction. This value is a very conservative estimate as gain reductions for these particular antennas are typically much higher in this direction.
- 8) The antennas used in this modeling are the **KMW ETCR-654L12H6** for transmission in the 850 MHz, 1900 MHz (PCS) and 2500 MHz (BRS) frequency bands. This is based on feedback from the carrier with regards to anticipated antenna selection. Maximum gain values for all antennas are listed in the Inventory and Power Data table below. The maximum gain of the antenna per the antenna manufactures supplied specifications, minus 10 dB, was used for all calculations. This value is a very conservative estimate as gain reductions for these particular antennas are typically much higher in this direction.
- 9) The antenna mounting height centerlines of the proposed antennas are **177.5 feet** above ground level (AGL) for **Sector A**, **177.5 feet** above ground level (AGL) for **Sector B** and **177.5 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 public threshold limits.



## SPRINT Site Inventory and Power Data by Antenna

Sector:	A	Sector:	B	Sector:	C
Antenna #:	<b>1</b>	Antenna #:	<b>1</b>	Antenna #:	<b>1</b>
Make / Model:	KMW ETCR-654L12H6	Make / Model:	KMW ETCR-654L12H6	Make / Model:	KMW ETCR-654L12H6
Gain:	13.35 / 15.25/15.05 dBd	Gain:	13.35 / 15.25/15.05 dBd	Gain:	13.35 / 15.25/15.05 dBd
Height (AGL):	<b>177.5 feet</b>	Height (AGL):	<b>177.5 feet</b>	Height (AGL):	<b>177.5 feet</b>
Frequency Bands	850 MHz / 1900 MHz (PCS) / 2500 MHz (BRS)	Frequency Bands	850 MHz / 1900 MHz (PCS) / 2500 MHz (BRS)	Frequency Bands	850 MHz / 1900 MHz (PCS) / 2500 MHz (BRS)
Channel Count	18	Channel Count	18	Channel Count	18
Total TX Power(W):	380 Watts	Total TX Power(W):	380 Watts	Total TX Power(W):	380 Watts
ERP (W):	11,775.31	ERP (W):	11,775.31	ERP (W):	11,775.31
Antenna A1 MPE%	<b>1.56 %</b>	Antenna B1 MPE%	<b>1.56 %</b>	Antenna C1 MPE%	<b>1.56 %</b>

Site Composite MPE%	
Carrier	MPE%
SPRINT – Max per sector	<b>1.56 %</b>
Town	0.13 %
Alltel	0.41 %
AT&T	2.24 %
Verizon Wireless	1.48 %
<b>Site Total MPE %:</b>	<b>5.82 %</b>

SPRINT Sector A Total:	1.56 %
SPRINT Sector B Total:	1.56 %
SPRINT Sector C Total:	1.56 %
<b>Site Total:</b>	<b>5.82 %</b>

SPRINT _ Frequency Band / Technology (All Sectors)	# Channels	Watts ERP (Per Channel)	Height (feet)	Total Power Density ( $\mu\text{W}/\text{cm}^2$ )	Frequency (MHz)	Allowable MPE ( $\mu\text{W}/\text{cm}^2$ )	Calculated % MPE
Sprint 850 MHz CDMA	1	432.54	177.5	0.53	850 MHz	567	0.09%
Sprint 850 MHz LTE	2	432.54	177.5	1.06	850 MHz	567	0.19%
Sprint 1900 MHz (PCS) CDMA	5	535.94	177.5	3.28	1900 MHz (PCS)	1000	0.33%
Sprint 1900 MHz (PCS) LTE	2	1,339.86	177.5	3.28	1900 MHz (PCS)	1000	0.33%
Sprint 2500 MHz (BRS) LTE	8	639.78	177.5	6.26	2500 MHz (BRS)	1000	0.63%
						<b>Total*:</b>	<b>1.56%</b>

\*NOTE: Totals may vary by 0.01% due to summing of remainders

## Summary

All calculations performed for this analysis yielded results that were **within** the allowable limits for general public 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 public exposure to RF Emissions are shown here:

SPRINT Sector	Power Density Value (%)
Sector A:	1.56 %
Sector B:	1.56 %
Sector C:	1.56 %
SPRINT Maximum Total (per sector):	1.56 %
Site Total:	5.82 %
Site Compliance Status:	<b>COMPLIANT</b>

The anticipated composite MPE value for this site assuming all carriers present is **5.82 %** of the allowable FCC established general public 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.



CONSULTING GROUP, INC.

9221 Lyndon B. Johnson Freeway, #204, Dallas, TX 75243 ★ PHONE 972-231-8893 ★ FAX 1-866-364-8375  
www.allprocgi.com ★ e-mail: info@allprocgi.com

**Tower Structural Analysis Report for  
SBA Network Services, Inc.**



**Existing 180' Self Supported Tower**

**SBA Site Name: Roxbury-lower County Rd**

**SBA Site ID: CT46125-A-03**

**Application #: 71183, v1**

**Carrier Name: Sprint Nextel**

**Carrier Site ID: CT72XC031/Roxbury-Lower County Rd.**

**Site Location:**

**Lower County Road  
Roxbury, CT 06783**

**Latitude: 41.559528°**

**Longitude: -73.292306°**

**ACGI Job # 17-6610**

<b>ANALYSIS RESULTS</b>		
<b>Tower Components</b>	77.2%	<b>Pass</b>
<b>Tower Base Foundation</b>	98.5%	<b>Pass</b>
<b>Net change in tower stress</b>	+12.1%	<b>Changed From Previous SA by FDH Engineering, Inc. Project #: 12-09661E S1, dated 10/2/2012</b>

Prepared By:  
Dipika Dhungana, EIT



10/26/2017  
Approved By:  
Joji M. George, P.E.  
CT PE # 24444

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MATHCAD CALCULATION PRINTOUT .....	V



**1. ANALYSIS SUMMARY**

The existing 182' Self Supported Tower located in Roxbury, CT was analyzed by Allpro Consulting Group, Inc (ACGI) for the existing loads and the proposed Sprint Nextel antennas and coaxes as authorized by SBA Communication Corp. Based on the results of the analysis, the existing tower with mentioned proposed and existing loading is found to be in compliance with TIA-222-G Addendum 2, Structural Standards for Steel Antenna Towers and Antenna Supporting Structures and 2012 International Building Code (IBC 2012).

**2. SCOPE & SOURCE OF INFORMATION**

The purpose of this structural analysis is to determine whether the existing structure is capable of supporting additional proposed loads.

SOURCE OF INFORMATION		
<b>Tower Data:</b>	FDH Engineering, Inc.	Structural Analysis for SBA Network Services, Inc., Project #: 12-09661E S1, dated 10/02/2012
	Vertical Solutions, Inc.	Rigorous Structural Analysis, Project #: 111673, Revision 1, dated 02/16/2012
	URS Corporation.	Detailed Structural Analysis, Evaluation, and Foundation reinforcement Design for 180' Existing SST for proposed antenna addition, dated 12/03/2003
<b>Foundation Data:</b>	Fred A. Nudd Corporation.	Original Foundation design by Fred A. Nudd Corporation, Drawing #: 99-7018-2R, dated 10/12/1999
	URS Corporation.	Detailed Structural Analysis, Evaluation, and Foundation reinforcement Design for 180' Existing SST for proposed antenna addition, dated 12/03/2003
<b>Geotechnical Report:</b>	Tectonic Engineering Consultants P.C	Geotechnical Evaluation of Proposed 180' SST and Equipment Building, Reference#: 1170.C056, dated 07/04/1999
<b>Loading Data:</b>	SBA Communication Corp.	Existing Loading as per site summary from sbasite.com, dated 6/14/2017
		Proposed final loading for Sprint Nextel as per sbasite.com, Application ID# 71183, v1
<b>Authorization:</b>	SBA Communication Corp.	

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**3. ANALYSIS METHODS & DATA**


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The analysis was performed in accordance with Telecommunication Industry Association specification TIA-222-G-Addendum 2. The tower was modeled using TNX Tower, a 3-D finite element program. TNX Tower is a general-purpose modeling, analysis, and design program created specifically for communication towers using the EIA-222-C, EIA-222-D, TIA/EIA-222-F or TIA-222-G standards. The 3-D model included the tower, with existing appurtenances and all proposed loads.

<b>SITE DATA</b>	
<b>SBA Site Name:</b>	Roxbury-lower County Rd
<b>SBA Site Number:</b>	CT46125-A-03
<b>Carrier Site ID:</b>	CT72XC031/ Roxbury-Lower County Rd.
<b>City, State:</b>	Roxbury, CT
<b>County:</b>	Litchfield
<b>Code Wind Load Requirement:</b>	TIA-222-G & 2012 International Building Code (IBC 2012) (117 mph Ultimate wind speed equivalent to 91 mph nominal wind speed)
<b>Wind Load Used:</b>	TIA-222-G Code: <ul style="list-style-type: none"> <li>• Nominal wind speed of 91 mph (3 second gust wind speed)</li> <li>• Structure Class II.</li> <li>• Exposure Category C.</li> <li>• Topographic Category 1.</li> <li>• Crest Height 0.00 ft.</li> <li>• A wind speed of 40 mph is used in combination with ice.</li> <li>• Nominal ice thickness of 1 in.</li> </ul>
<b>Seismic Check</b>	$S_s = 0.196g < 1.0g$ , thus seismic loading can be ignored as per 2.7.3 of the TIA-222-G code.

<b>TOWER DATA</b>	
<b>Tower Type:</b>	Self-Supported Tower
<b>Height:</b>	180'
<b>Cross Section:</b>	4 sided
<b>Steel Strength:</b>	Legs – 54 ksi , Braces – 36 ksi
<b>Type of Foundation:</b>	Drilled Shafts with rock anchors

<b>TOWER HISTORY</b>	
<b>Tower Manufacturer / Model:</b>	Fred A. Nudd Corporation
<b>Date of Original Design:</b>	10/12/1999
<b>Previous Modifications:</b>	Detailed Structural Analysis, Evaluation, and Foundation Reinforcement Design for 180' Existing SST by URS Corporation, Revision 2, dated 12/03/2003.
<b>Original Design Code Requirements:</b>	ANSI/EIA/TIA 222-F with ½" radial Ice



**4. CONCLUSIONS**

RESULT SUMMARY		
<i>MEMBER</i>	<i>% Capacity</i>	<i>Result</i>
Legs	<b>71.3%</b>	<b>Pass</b>
Diagonals	<b>77.2%</b>	<b>Pass</b>
Top Girt	<b>0.6%</b>	<b>Pass</b>
Bolt Checks	<b>77.2%</b>	<b>Pass</b>
	Download capacity: <b>11.5%</b>	<b>Pass</b>
	Uplift capacity for pier: <b>66.0%</b>	<b>Pass</b>
	Required Pier Length: <b>98.5%</b>	<b>Pass</b>
	Anchor bolt check: <b>90.1%</b>	<b>Pass</b>
<b>OVERALL TOWER RATING = 98.5%, Pass</b>		

As per the results of the analysis, the existing tower is in code compliance for the proposed and existing antenna loads.

Maximum tower member stress is less than allowable, making it in code compliance under the TIA-222-G code and 2012 International Building Code (IBC 2012) requirements.

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5.

**DISCLAIMER**

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Installation procedures and related loading are not within the scope of this analysis. A contractor experienced in similar work should perform all installation work. The engineering services provided by Allpro Consulting Group, Inc. (ACGI) are limited to the computer analysis and calculations of the structure with the proposed and existing loads. This analysis is considered void if the loading mentioned in this report is changed or is different as installed. It is assumed that the existing structure is properly maintained and is in good condition free of any defects. Scope of this analysis does not include existing connections, except as noted in this report.

ACGI does not make any warranties, expressed or implied in connection with this engineering analysis report and disclaims any liability arising from deficiencies or any existing conditions of the original structure. ACGI will not be responsible for consequential or incidental damages sustained by any parties as a result of any data or conclusions included in this Report. The maximum liability of ACGI pursuant to this report shall be limited to the consulting fee received for the preparation of the report.

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6.

**ASSUMPTIONS**

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This analysis was completed based on the following assumptions:

- Tower has been properly maintained
- Tower erection was in accordance to manufacturer drawings
- Leg flanges have been properly designed by manufacturer to not be a limiting reaction
- Welds have been properly designed and installed by manufacturer to not be a limiting reaction
- Foundation was constructed in accordance to manufacturer drawings
- Foundation does not have structural damage
- Bolts have been properly tightened according to manufacturer specifications
- Appurtenance, mount and transmission line sizes and weights are best estimates using the tnxTower database and manufacturer information

**7. APPURTENANCE LISTING**

<b>EXISTING LOAD DESCRIPTION</b>					
<u>ELEV</u> <u>(ft.)</u>	<u>Qt</u> <u>y.</u>	<u>Antenna Description</u>	<u>Mount Type &amp;</u> <u>Qty.</u>	<u>TX. LINE (in)</u>	<u>TENANT</u>
179.25'±	1	10' Dipole	(1) Pipe Mount	(1) 1/2"	Town Of Roxbury
178.5'±	1	5' Omni	(1) Pipe Mount	(1) 7/8"	
141.5'±	1	18' Dipole	(2) Pipe Mounts	(2) 1/2"	
	1	10' Dipole			
18'±	1	Yagi	Leg Mounted	(1) 1/2"	Sprint Nextel
177'±	3	RFS APXVSP18-C-A20 Antennas	(3) Sector Frames	(3) 1-1/4"	
	3	1900 4x45 65 MHz Radios			
	3	900 2x50W Radios			
163'±	3	BXA-70063-6CF-2 Antennas	(3) Sector Frames	(24) 1-5/8"	Verizon
	6	LPA-80080-6CF Antennas			
	3	BXA-171085-8CF-2 Antennas			
	6	FD9R6004/2C-3L Diplexers			
130'±	2	KMW AM-C-CD-16-65-00T-RET Antennas	(3) Sector Frames	(15) 1-5/8" (2) 3/4" DC Power (1) 7/16"	AT&T
	3	CSS DU04-8670 Antennas			
	1	Powerwave P65-17-XLH-RR Antennas			
	6	Powerwave 7770 Antennas			
	6	Powerwave TT19-08BP111-001 TMAs			
	6	Powerwave LGP21903 Diplexers			
	6	Ericsson RRUS 11 Radios			
	3	Raycap DC6-48-60-8-8F DF Surge			
6	Powerwave 7020.30 DB RET				

<b>FINAL SPRINT NEXTEL LOAD DESCRIPTION</b>					
<u>ELEV</u> <u>(ft.)</u>	<u>Qt</u> <u>y.</u>	<u>Antenna Description</u>	<u>Mount Type &amp;</u> <u>Qty.</u>	<u>TX. LINE (in)</u>	<u>TENANT</u>
177.5'±	3	KMW ETCR-654L12H6 Antennas	(3) Sector Frames	(4) 1-1/4" Fiber	Sprint Nextel
	3	ALU 1900 Mhz Radios			
	6	ALU 800 Mhz Radios			
	3	ALU TD-RRH8x20-25 Radios			

Notes:

1. ACGI should be notified of any discrepancies found in the data listed in this report.
2. Notify ACGI if any potential physical and other interference with existing antennas for a redesign.

**8. SUMMARY OF WORKING PERCENTAGE OF STRUCTURAL COMPONENTS**

**Section Capacity Table**

Section No.	Elevation ft	Component Type	Size	Critical Element	P K	$\phi P_{allow}$ K	% Capacity	Pass Fail	
T1	180 - 160	Leg	P2.5x.203 (2.875 OD)	4	-12.745	60.269	21.1	Pass	
T2	160 - 140	Leg	P3x.216 (3.5 OD)	41	-31.380	74.468	42.1	Pass	
T3	140 - 120	Leg	P3.5x.226 (4 OD)	69	-55.002	98.046	56.1	Pass	
T4	120 - 100	Leg	P5 x 0.258(5.563 OD)	97	-78.903	124.619	63.3	Pass	
T5	100 - 80	Leg	P6 x 0.28 (6.625 OD)	117	-105.311	185.123	56.9	Pass	
T6	80 - 60	Leg	P6 x 0.28 (6.625 OD)	137	-132.031	185.123	71.3	Pass	
T7	60 - 40	Leg	P8x.332 (8.625 OD)	157	-159.326	368.199	43.3	Pass	
T8	40 - 20	Leg	P8x.332 (8.625 OD)	177	-186.836	368.199	50.7	Pass	
T9	20 - 0	Leg	P8x.332 (8.625 OD)	197	-214.107	368.199	58.1	Pass	
T1	180 - 160	Diagonal	L1-3/4x1-3/4x3/16	13	-2.822	6.795	41.5	Pass	
T2	160 - 140	Diagonal	L2 1/2x2 1/2x3/16	52	-4.172	12.293	33.9	Pass	
T3	140 - 120	Diagonal	L3x3x3/16	80	-5.519	16.457	33.5	Pass	
T4	120 - 100	Diagonal	L3 1/2x3 1/2x1/4	108	-6.753	21.598	31.3	Pass	
T5	100 - 80	Diagonal	L3 1/2x3 1/2x1/4	128	-7.155	18.474	38.7	Pass	
T6	80 - 60	Diagonal	L4x4x1/4	147	-7.664	23.870	32.1	Pass	
T7	60 - 40	Diagonal	L4x4x1/4	167	-8.205	20.582	39.9	Pass	
T8	40 - 20	Diagonal	L4x4x3/8	187	-8.778	25.858	33.9	Pass	
T9	20 - 0	Diagonal	L5x5x5/16	201	-9.500	37.986	25.0	Pass	
T1	180 - 160	Top Girt	L1 3/4x1 3/4x3/16	6	-0.022	5.944	0.6	Pass	
							Summary		
							Leg (T6)	71.3	Pass
							Diagonal (T7)	77.2	Pass
							Top Girt (T1)	0.6	Pass
							Bolt Checks	77.2	Pass
							<b>RATING =</b>	<b>77.2</b>	<b>Pass</b>

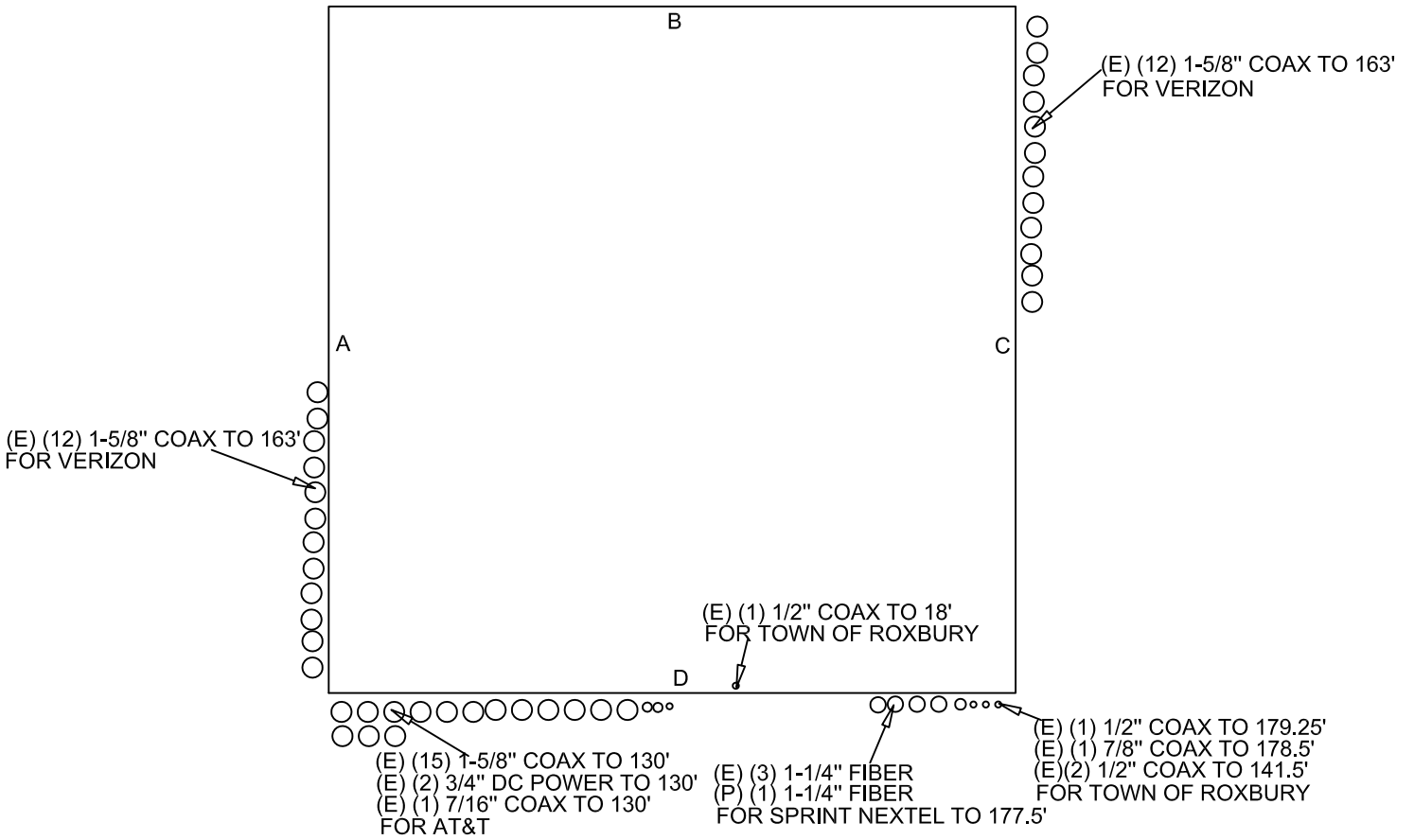
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APPENDIX

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**COAX LAYOUT**

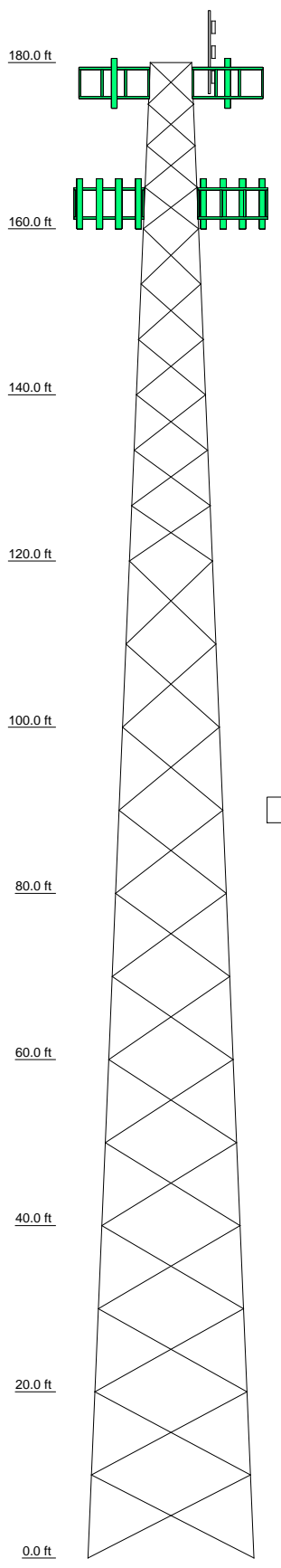


COAX LAYOUT  
N.T.S.

**TOWER ELEVATION DRAWING**



Section	T1	T2	T3	T4	T5	T6	T7	T8	T9
Legs	P2.5x.203 (2.875 OD)	P3x.216 (3.5 OD)	P3.5x.226 (4 OD)	P5 x 0.258(5.563 OD)	P6 x 0.28 (6.625 OD)	P8x.332 (8.625 OD)			
Leg Grade	Nudd 54 ksi								
Diagonals	L1-3/4x1-3/4x3/16	L2 1/2x2 1/2x3/16	L3x3x3/16	L3 1/2x3 1/2x1/4	L4x4x1/4	L4x4x3/8	L5x5x5/16		
Diagonal Grade	A36								
Top Girts	L1 3/4x1-3/4x3/16								
Face Width (ft)	5	6.66667	8.33333	10	11.6667	13.3333	15	16.6667	18.3333
# Panels @ (ft)	4 @ 5	6 @ 6.66667	6 @ 6.66667				12 @ 10		
Weight (K)	1.1	1.4	1.8	2.5	3.0	3.4	4.6	5.8	6.2



**MATERIAL STRENGTH**

GRADE	Fy	Fu	GRADE	Fy	Fu
Nudd 54 ksi	54 ksi	65 ksi	A36	36 ksi	58 ksi

**TOWER DESIGN NOTES**

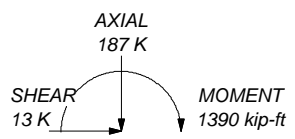
1. Tower is located in Litchfield County, Connecticut.
2. Tower designed for Exposure C to the TIA-222-G Standard.
3. Tower designed for a 91 mph basic wind in accordance with the TIA-222-G Standard.
4. Tower is also designed for a 40 mph basic wind with 1.00 in ice. Ice is considered to increase in thickness with height.
5. Deflections are based upon a 60 mph wind.
6. Tower Structure Class II.
7. Topographic Category 1 with Crest Height of 0.000 ft
8. TOWER RATING: 77.2%

ALL REACTIONS  
ARE FACTORED

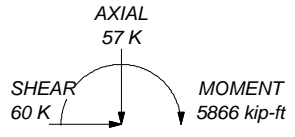
MAX. CORNER REACTIONS AT BASE:

DOWN: 222 K  
SHEAR: 24 K

UPLIFT: -196 K  
SHEAR: 22 K



TORQUE 3 kip-ft  
40 mph WIND - 1.000 in ICE

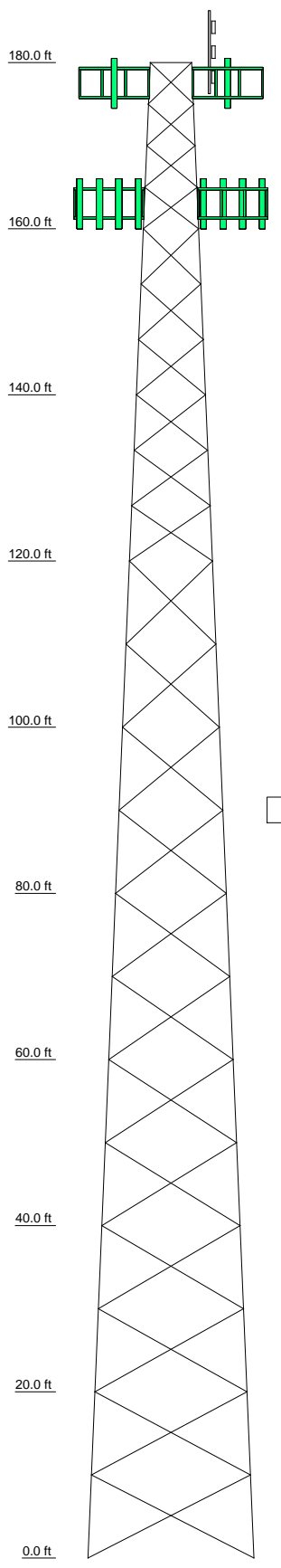


TORQUE 13 kip-ft  
REACTIONS - 91 mph WIND

<b>ALLPRO CONSULTING GROUP</b> 9221LYNDONB.JOHNSON FWY 204 DALLAS, TX Phone: 9722318893 FAX: 866-364-8375	<b>Job: CT46125-A-03/ Roxbury-lower County Rd</b>		
	Project: 17-6610	Client: SBA Communications Corporation	Drawn by: ddhungana
	Code: TIA-222-G	Date: 10/26/17	Scale: NTS
	Path:	Dwg No. E-1	

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Section	T1	T2	T3	T4	T5	T6	T7	T8	T9	T10	T11	T12	T13	T14	T15	T16	T17	T18	T19	T20	
Legs	P2.5x.203 (2.875 OD)	P3x.216 (3.5 OD)	P3.5x.226 (4 OD)	P5 x 0.258(5.563 OD)	P6 x 0.28 (6.625 OD)	P8x.332 (8.625 OD)															
Leg Grade	Nudd 54 ksi																				
Diagonals	A36																				
Diagonal Grade	N.A.																				
Top Girts	N.A.																				
Face Width (ft)	5	6.66667	8.33333	10	11.6667	13.3333	15	16.6667	18.3333	20	21.6667	23.3333	25	26.6667	28.3333	30	31.6667	33.3333	35	36.6667	
# Panels @ (ft)	4 @ 5	6 @ 6.66667	6 @ 6.66667	6 @ 6.66667	6 @ 6.66667	6 @ 6.66667	6 @ 6.66667	6 @ 6.66667	6 @ 6.66667	6 @ 6.66667	6 @ 6.66667	6 @ 6.66667	6 @ 6.66667	6 @ 6.66667	6 @ 6.66667	6 @ 6.66667	6 @ 6.66667	6 @ 6.66667	6 @ 6.66667	6 @ 6.66667	
Weight (K)	1.1	1.4	1.8	2.5	3.0	3.4	4.6	5.8	6.2	6.2	6.2	6.2	6.2	6.2	6.2	6.2	6.2	6.2	6.2	6.2	



### DESIGNED APPURTENANCE LOADING

TYPE	ELEVATION	TYPE	ELEVATION
10'x1.75" dipole (Town of Roxbury)	179.25	BXA-70063-6CF-2 (Verizon)	163
6'8"x4" Pipe Mount (Town of Roxbury)	179.25	BXA-70063-6CF-2 (Verizon)	163
08010 Omni (Town of Roxbury)	178.5	BXA-70063-6CF-2 (Verizon)	163
6'8"x4" Pipe Mount (Town of Roxbury)	178.5	(2) LPA-80080/6CF (Verizon)	163
1900 MHz RRH (Sprint Nextel)	177.5	10'x1.75" dipole (Town of Roxbury)	141.5
1900 MHz RRH (Sprint Nextel)	177.5	6'8"x4" Pipe Mount (Town of Roxbury)	141.5
(2) 800 MHz RRH (Sprint Nextel)	177.5	18' Dipole (Town of Roxbury)	141.5
(2) 800 MHz RRH (Sprint Nextel)	177.5	6'8"x4" Pipe Mount (Town of Roxbury)	141.5
(2) 800 MHz RRH (Sprint Nextel)	177.5	(2) TT19-08BP111-001 TMA (ATT)	130
TD-RRH8x20-25 (Sprint Nextel)	177.5	(2) LGP21903 Diplexer (ATT)	130
TD-RRH8x20-25 (Sprint Nextel)	177.5	(2) LGP21903 Diplexer (ATT)	130
TD-RRH8x20-25 (Sprint Nextel)	177.5	(2) LGP21903 Diplexer (ATT)	130
T-Frame Sector Mount (Sprint Nextel)	177.5	(2) RRUS 11 (ATT)	130
T-Frame Sector Mount (Sprint Nextel)	177.5	(2) RRUS 11 (ATT)	130
T-Frame Sector Mount (Sprint Nextel)	177.5	(2) RRUS 11 (ATT)	130
ETCR-654L12H6 (Sprint Nextel)	177.5	DC6-48-60-18-8F (ATT)	130
ETCR-654L12H6 (Sprint Nextel)	177.5	DC6-48-60-18-8F (ATT)	130
ETCR-654L12H6 (Sprint Nextel)	177.5	DC6-48-60-18-8F (ATT)	130
1900 MHz RRH (Sprint Nextel)	177.5	(2) 7020 RET (ATT)	130
(2) LPA-80080/6CF (Verizon)	163	(2) 7020 RET (ATT)	130
(2) LPA-80080/6CF (Verizon)	163	(2) 7020 RET (ATT)	130
BXA-171085-8CF-2 (Verizon)	163	AM-C-CD-16-65-00T-RET (ATT)	130
BXA-171085-8CF-2 (Verizon)	163	AM-C-CD-16-65-00T-RET (ATT)	130
BXA-171085-8CF-2 (Verizon)	163	DU04-8670 (ATT)	130
(2) FDR9R6004/2C-3L (Verizon)	163	DU04-8670 (ATT)	130
(2) FDR9R6004/2C-3L (Verizon)	163	DU04-8670 (ATT)	130
(2) FDR9R6004/2C-3L (Verizon)	163	P65-17-XLH-RR (ATT)	130
T-Frame Sector Mount (Verizon)	163	(2) 7770 (ATT)	130
T-Frame Sector Mount (Verizon)	163	(2) 7770 (ATT)	130
T-Frame Sector Mount (Verizon)	163	(2) 7770 (ATT)	130
T-Frame Sector Mount (ATT)	163	(2) TT19-08BP111-001 TMA (ATT)	130
T-Frame Sector Mount (ATT)	163	(2) TT19-08BP111-001 TMA (ATT)	130
T-Frame Sector Mount (ATT)	163	6' "Yagi" (Town of Roxbury)	18

### MATERIAL STRENGTH

GRADE	Fy	Fu	GRADE	Fy	Fu
Nudd 54 ksi	54 ksi	65 ksi	A36	36 ksi	58 ksi

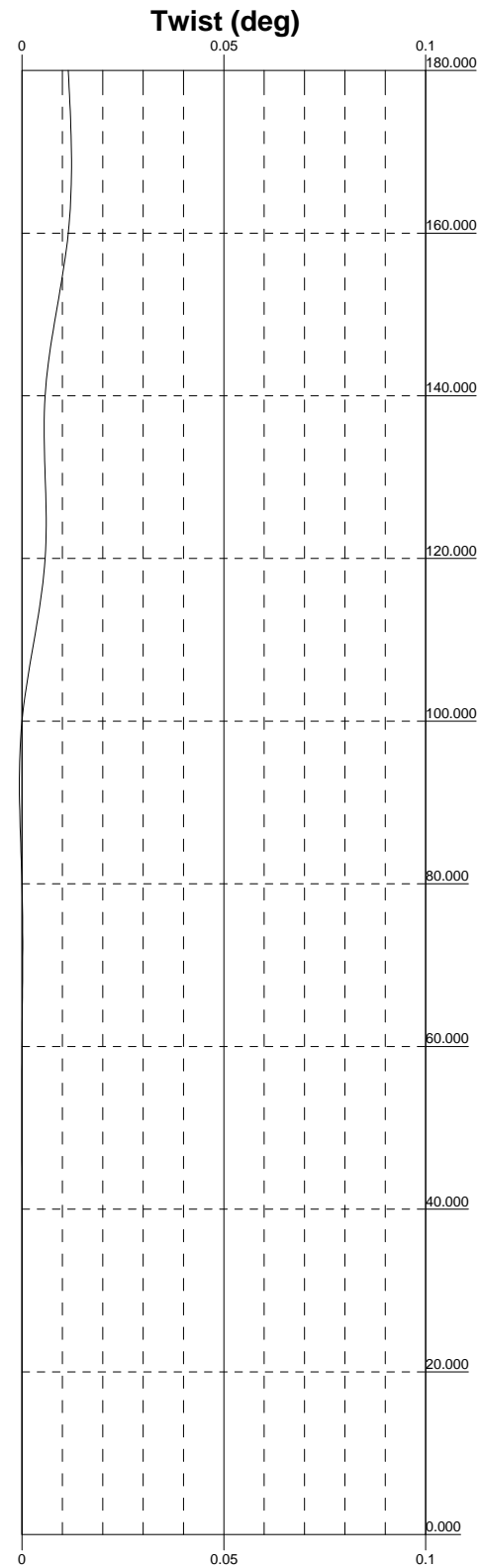
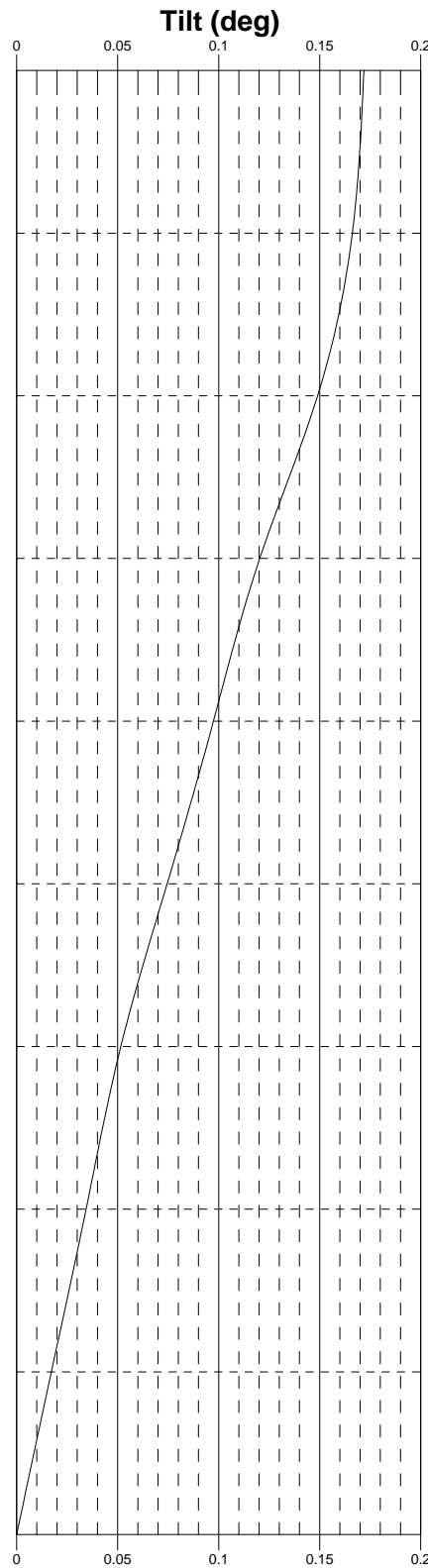
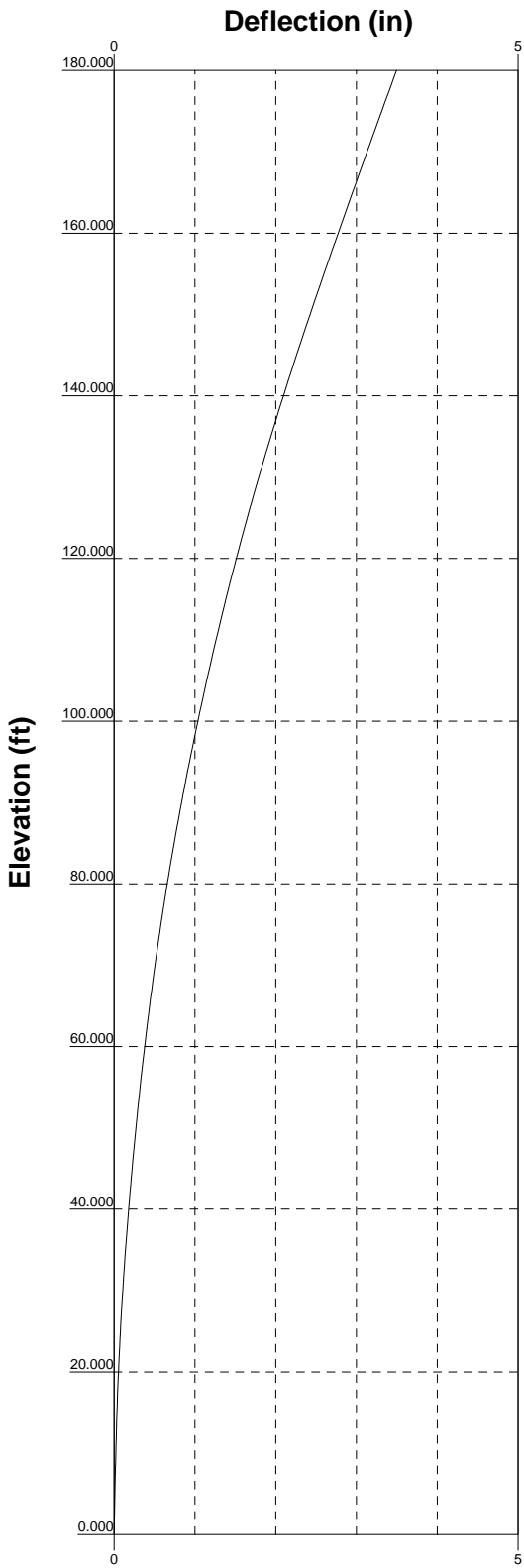
### TOWER DESIGN NOTES

1. Tower is located in Litchfield County, Connecticut.
2. Tower designed for Exposure C to the TIA-222-G Standard.
3. Tower designed for a 91 mph basic wind in accordance with the TIA-222-G Standard.
4. Tower is also designed for a 40 mph basic wind with 1.00 in ice. Ice is considered to increase in thickness with height.
5. Deflections are based upon a 60 mph wind.
6. Tower Structure Class II.
7. Topographic Category 1 with Crest Height of 0.000 ft

<b>ALLPRO CONSULTING GROUP</b> 9221LYNDONB. JOHNSON FWY 204 DALLAS, TX Phone: 9722318893 FAX: 866-364-8375	Job: <b>CT46125-A-03/ Roxbury-lower County Rd</b>
	Project: <b>17-6610</b>
Client: <b>SBA Communications Corporation</b>	Drawn by: <b>ddhungana</b>
Code: <b>TIA-222-G</b>	Date: <b>10/26/17</b>
Path:	Scale: <b>NTS</b>
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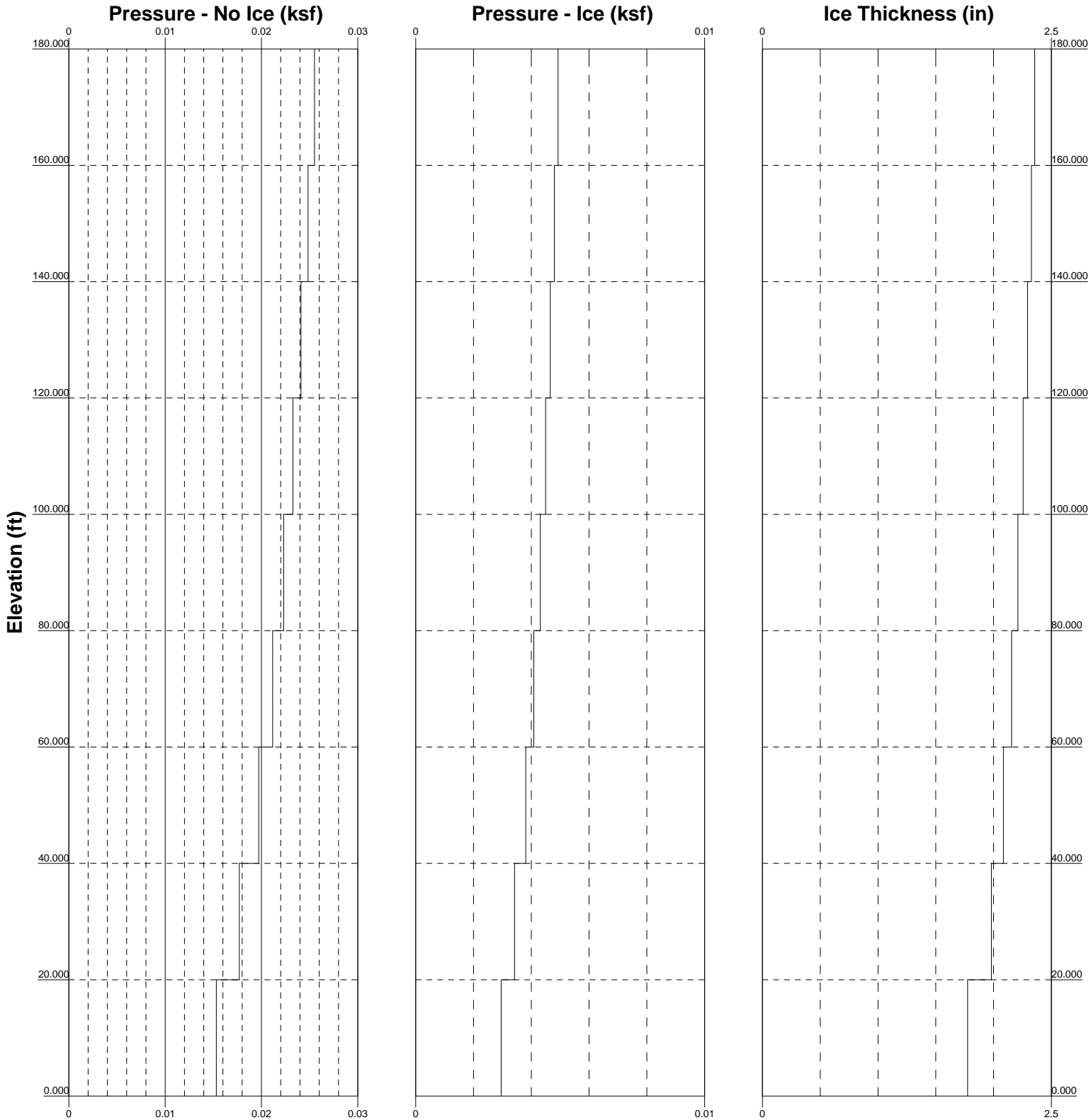
**MISCELLANEOUS PLOTS**



<b>ALLPRO CONSULTING GROUP</b> 9221LYNDONB.JOHNSON FWY 204 DALLAS, TX Phone: 9722318893 FAX: 866-364-8375	Job: <b>CT46125-A-03/ Roxbury-lower County Rd</b>		
	Project: <b>17-6610</b>		
	Client: SBA Communications Corporation	Drawn by: ddhungana	App'd:
	Code: TIA-222-G	Date: 10/26/17	Scale: NTS
	Path:	Dwg No. E-5	

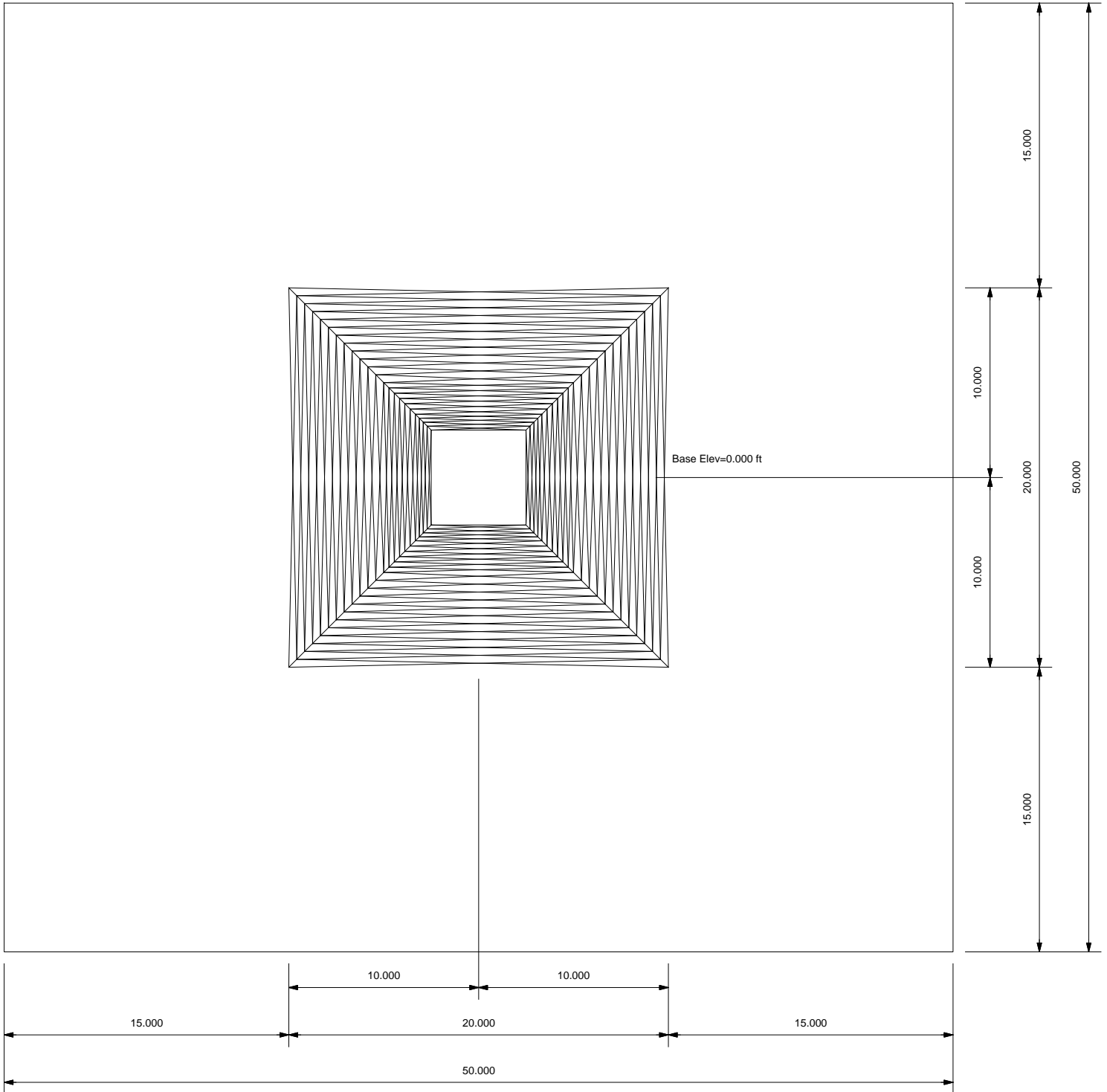
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**Wind Pressures and Ice Thickness**  
**TIA-222-G - 91 mph/40 mph 1.000 in Ice Exposure C**



<b>ALLPRO CONSULTING GROUP</b>		Job: <b>CT46125-A-03/ Roxbury-lower County Rd</b>	
9221LYNDONB.JOHNSON FWY 204		Project: <b>17-6610</b>	
DALLAS, TX		Client: SBA Communications Corporation	Drawn by: ddhungana
Phone: 9722318893		Code: TIA-222-G	Date: 10/26/17
FAX: 866-364-8375		Path:	Scale: NTS
			Dwg No. E-9

**Plot Plan**  
**Total Area - 0.06 Acres**



<b>ALLPRO CONSULTING GROUP</b>		<b>Job: CT46125-A-03/ Roxbury-lower County Rd</b>	
9221LYNDONB.JOHNSON FWY 204		Project: 17-6610	
DALLAS, TX		Client: SBA Communications Corporation	Drawn by: ddhungana
Phone: 9722318893		Code: TIA-222-G	Date: 10/26/17
FAX: 866-364-8375		Path:	Scale: NTS
		Dwg No. E-2	

P:\2017\Shocung\17-6610\_CT46125-A-03\_Roxbury-lower County Rd\_SAITNO\CT46125-A-03\_Roxbury-lower County Rd (17-6610).dgn

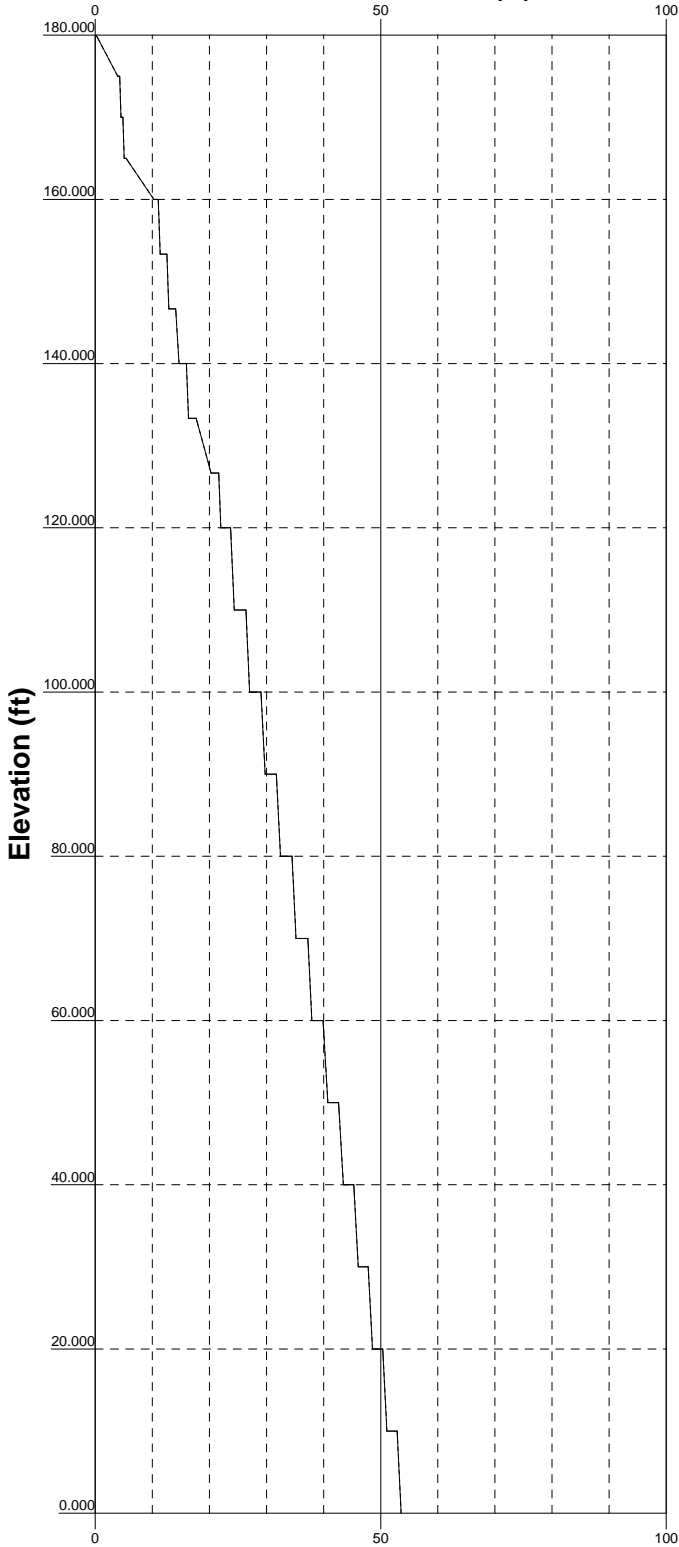
Vx

Vz

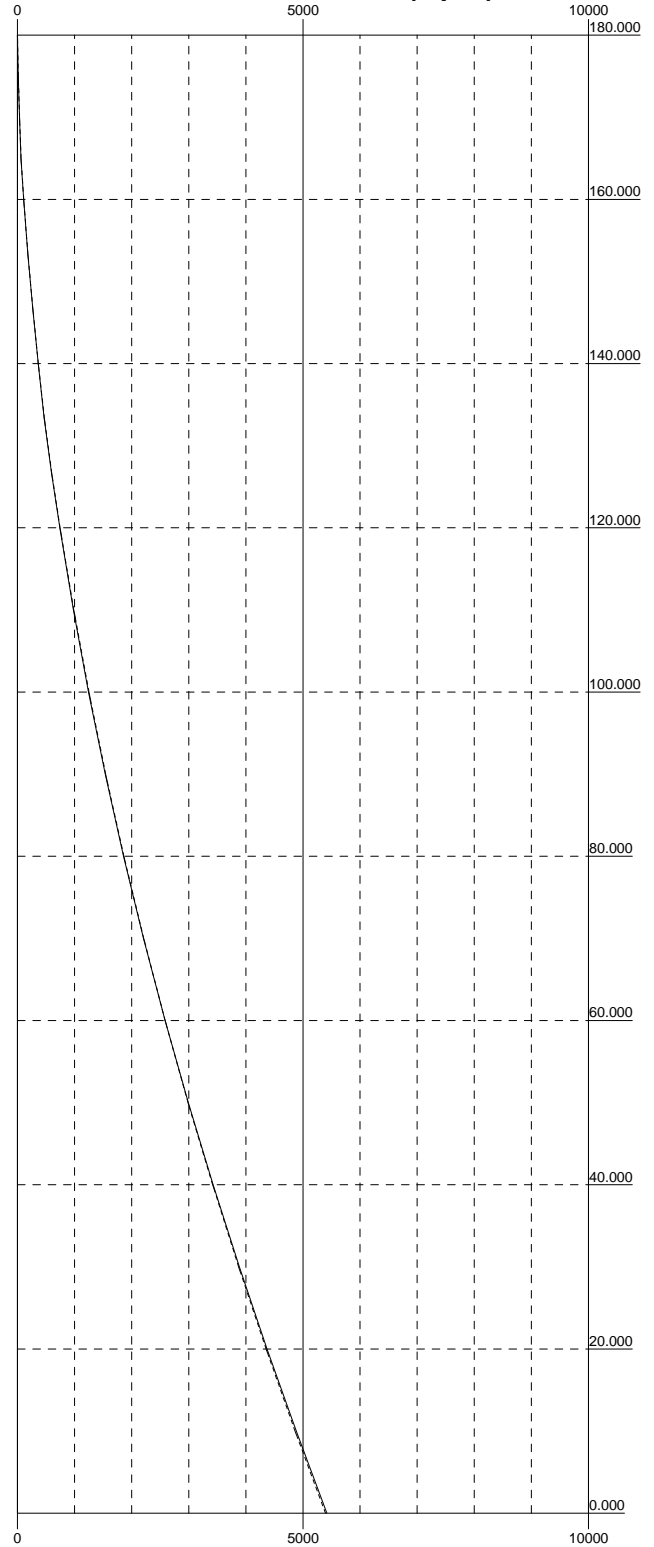
Mx

Mz

Global Mast Shear (K)



Global Mast Moment (kip-ft)



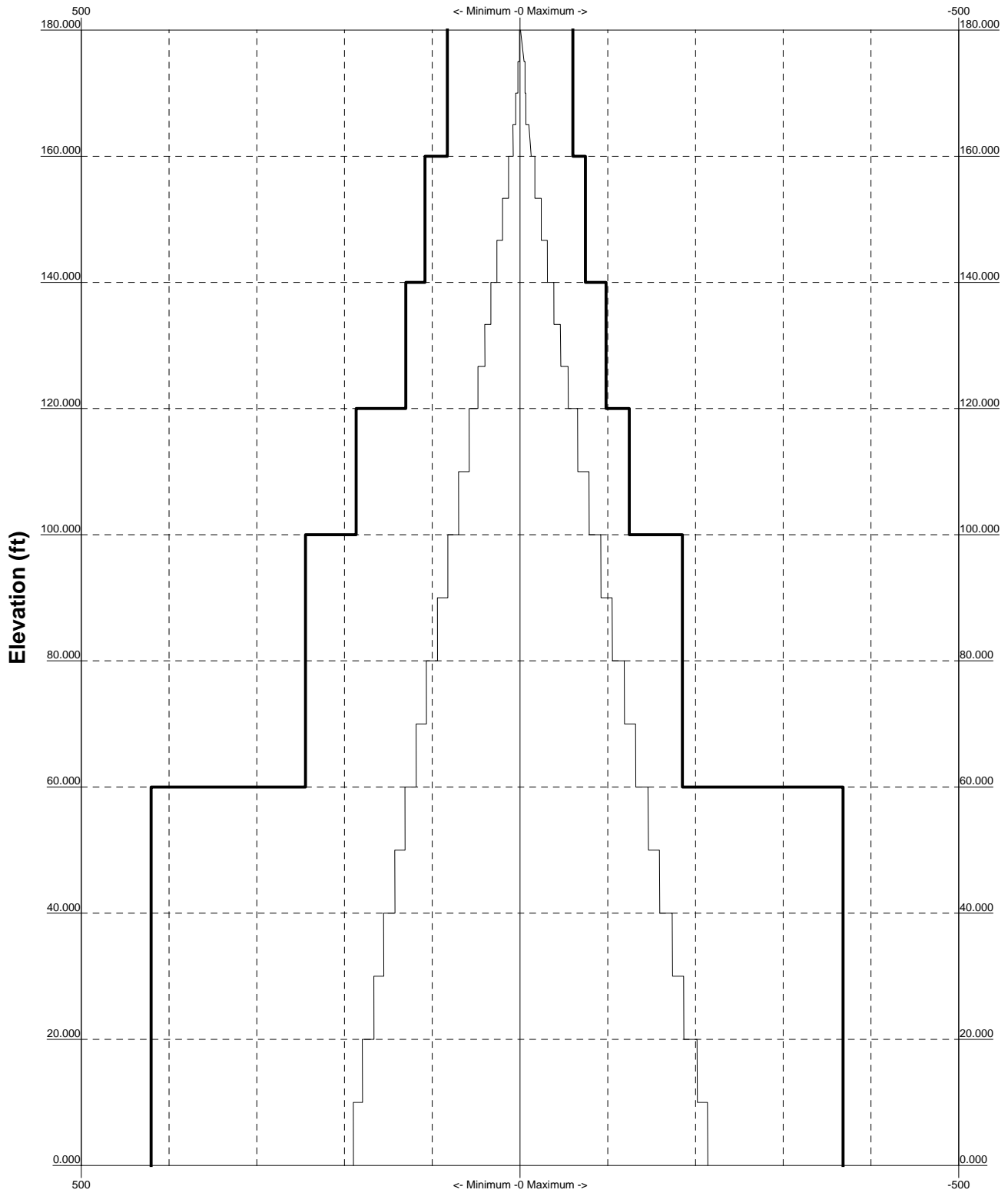
<b>ALLPRO CONSULTING GROUP</b> 9221LYNDONB.JOHNSON FWY 204 DALLAS, TX Phone: 9722318893 FAX: 866-364-8375	Job: <b>CT46125-A-03/ Roxbury-lower County Rd</b>		
	Project: <b>17-6610</b>		
	Client: SBA Communications Corporation	Drawn by: ddhungana	App'd:
	Code: TIA-222-G	Date: 10/26/17	Scale: NTS
	Path:		Dwg No. E-4

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TIA-222-G - 91 mph/40 mph 1.000 in Ice Exposure C

Leg Capacity ———

Leg Compression (K)



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	Project: <b>17-6610</b>		
	Client: SBA Communications Corporation	Drawn by: ddhungana	App'd:
	Code: TIA-222-G	Date: 10/26/17	Scale: NTS
	Path:		Dwg No. E-3

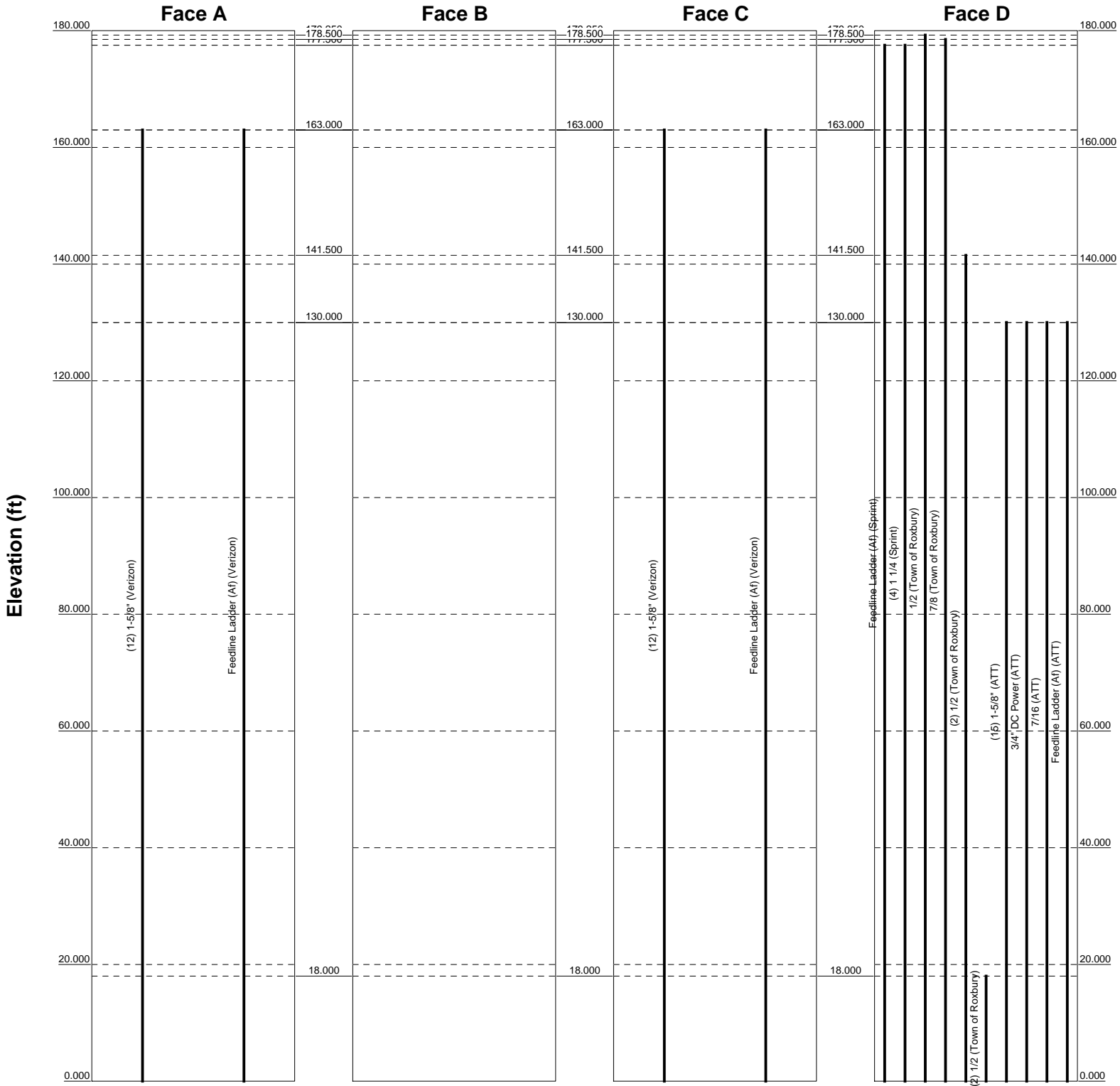
P:\2017\Shocung\17-6610\_CT46125-A-03\_Roxbury-lower County Rd\_SAITNO\CT46125-A-03\_Roxbury-lower County Rd (17-6610).dwg



# Feed Line Distribution Chart

## 0' - 180'

Round   
  Flat   
  App In Face   
  App Out Face   
  Truss Leg



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		Project: <b>17-6610</b>	
Client: SBA Communications Corporation		Drawn by: ddhungana	App'd:
Code: TIA-222-G		Date: 10/26/17	Scale: NTS
Path:		Dwg No. E-7	

**CALCULATION PRINTOUT**

<p style="text-align: center;"><b>tnxTower</b></p> <p style="text-align: center;"><b>ALLPRO CONSULTING GROUP</b></p> <p style="text-align: center;">9221LYNDONB.JOHNSON FWY 204 DALLAS, TX Phone: 9722318893 FAX: 866-364-8375</p>	<b>Job</b> CT46125-A-03/ Roxbury-lower County Rd	<b>Page</b> 1 of 21
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	<b>Client</b> SBA Communications Corporation	<b>Designed by</b> ddhungana

## Tower Input Data

The main tower is a 4x free standing tower with an overall height of 180.000 ft above the ground line.

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

The face width of the tower is 5.000 ft at the top and 20.000 ft at the base.

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

The following design criteria apply:

Tower is located in Litchfield County, Connecticut.

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

Basic wind speed of 91 mph.

Structure Class II.

Exposure Category C.

Topographic Category 1.

Crest Height 0.000 ft.

Nominal ice thickness of 1.000 in.

Ice thickness is considered to increase with height.

Ice density of 56.000 pcf.

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

Temperature drop of 50.000 °F.

Deflections calculated using a wind speed of 60 mph.

Pressures are calculated at each section.

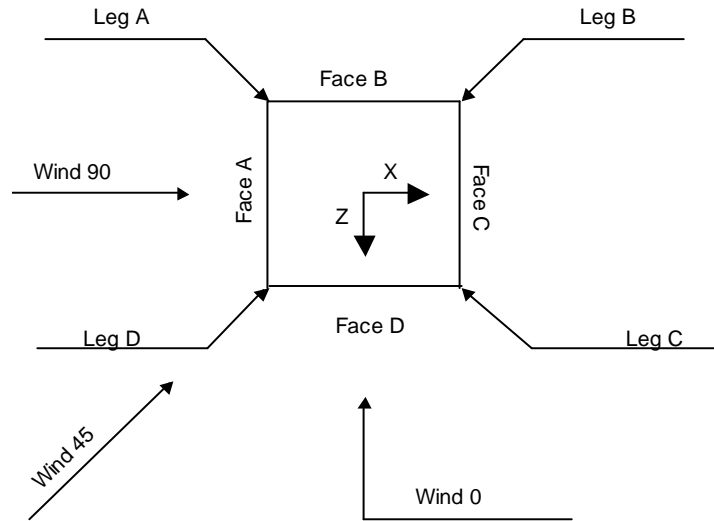
Stress ratio used in tower member design is 1.

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	Retention 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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**Square Tower**

**Tower Section Geometry**

Tower Section	Tower Elevation	Assembly Database	Description	Section Width	Number of Sections	Section Length
	<i>ft</i>			<i>ft</i>		<i>ft</i>
T1	180.000-160.000			5.000	1	20.000
T2	160.000-140.000			6.667	1	20.000
T3	140.000-120.000			8.333	1	20.000
T4	120.000-100.000			10.000	1	20.000
T5	100.000-80.000			11.667	1	20.000
T6	80.000-60.000			13.333	1	20.000
T7	60.000-40.000			15.000	1	20.000
T8	40.000-20.000			16.667	1	20.000
T9	20.000-0.000			18.333	1	20.000

**Tower Section Geometry (cont'd)**

Tower Section	Tower Elevation	Diagonal Spacing	Bracing Type	Has K Brace End Panels	Has Horizontals	Top Girt Offset	Bottom Girt Offset
	<i>ft</i>	<i>ft</i>				<i>in</i>	<i>in</i>
T1	180.000-160.000	5.000	X Brace	No	No	0.000	0.000
T2	160.000-140.000	6.667	X Brace	No	No	0.000	0.000
T3	140.000-120.000	6.667	X Brace	No	No	0.000	0.000
T4	120.000-100.000	10.000	X Brace	No	No	0.000	0.000
T5	100.000-80.000	10.000	X Brace	No	No	0.000	0.000
T6	80.000-60.000	10.000	X Brace	No	No	0.000	0.000
T7	60.000-40.000	10.000	X Brace	No	No	0.000	0.000
T8	40.000-20.000	10.000	X Brace	No	No	0.000	0.000
T9	20.000-0.000	10.000	X Brace	No	No	0.000	0.000

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### Tower Section Geometry (cont'd)

Tower Elevation ft	Leg Type	Leg Size	Leg Grade	Diagonal Type	Diagonal Size	Diagonal Grade
T1 180.000-160.000	Pipe	P2.5x.203 (2.875 OD)	Nudd 54 ksi (54 ksi)	Equal Angle	L1-3/4x1-3/4x3/16	A36 (36 ksi)
T2 160.000-140.000	Pipe	P3x.216 (3.5 OD)	Nudd 54 ksi (54 ksi)	Equal Angle	L2 1/2x2 1/2x3/16	A36 (36 ksi)
T3 140.000-120.000	Pipe	P3.5x.226 (4 OD)	Nudd 54 ksi (54 ksi)	Single Angle	L3x3x3/16	A36 (36 ksi)
T4 120.000-100.000	Pipe	P5 x 0.258(5.563 OD)	Nudd 54 ksi (54 ksi)	Equal Angle	L3 1/2x3 1/2x1/4	A36 (36 ksi)
T5 100.000-80.000	Pipe	P6 x 0.28 (6.625 OD)	Nudd 54 ksi (54 ksi)	Equal Angle	L3 1/2x3 1/2x1/4	A36 (36 ksi)
T6 80.000-60.000	Pipe	P6 x 0.28 (6.625 OD)	Nudd 54 ksi (54 ksi)	Equal Angle	L4x4x1/4	A36 (36 ksi)
T7 60.000-40.000	Pipe	P8x.332 (8.625 OD)	Nudd 54 ksi (54 ksi)	Single Angle	L4x4x1/4	A36 (36 ksi)
T8 40.000-20.000	Pipe	P8x.332 (8.625 OD)	Nudd 54 ksi (54 ksi)	Single Angle	L4x4x3/8	A36 (36 ksi)
T9 20.000-0.000	Pipe	P8x.332 (8.625 OD)	Nudd 54 ksi (54 ksi)	Single Angle	L5x5x5/16	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 180.000-160.000	Equal Angle	L1 3/4x1 3/4x3/16	A36 (36 ksi)	Solid Round		A572-50 (50 ksi)

### Tower Section Geometry (cont'd)

Tower Elevation ft	Gusset Area (per face) ft <sup>2</sup>	Gusset Thickness in	Gusset Grade	Adjust. Factor A <sub>f</sub>	Adjust. Factor A <sub>r</sub>	Weight Mult.	Double Angle Stitch Bolt Spacing Diagonals in	Double Angle Stitch Bolt Spacing Horizontal in	Double Angle Stitch Bolt Spacing Redundants in
T1 180.000-160.000	0.000	0.000	A36 (36 ksi)	1	1	1.05	0.000	0.000	36.000
T2 160.000-140.000	0.000	0.000	A36 (36 ksi)	1	1	1.05	0.000	0.000	36.000
T3 140.000-120.000	0.000	0.000	A36 (36 ksi)	1	1	1.05	0.000	0.000	36.000
T4 120.000-100.000	0.000	0.000	A36 (36 ksi)	1	1	1.05	0.000	0.000	36.000

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Tower Elevation	Gusset Area (per face)	Gusset Thickness	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
ft	ft <sup>2</sup>	in							
T5 100.000-80.000	0.000	0.000	A36 (36 ksi)	1	1	1.05	0.000	0.000	36.000
T6 80.000-60.000	0.000	0.000	A36 (36 ksi)	1	1	1.05	0.000	0.000	36.000
T7 60.000-40.000	0.000	0.000	A36 (36 ksi)	1	1	1.05	0.000	0.000	36.000
T8 40.000-20.000	0.000	0.000	A36 (36 ksi)	1	1	1.05	0.000	0.000	36.000
T9 20.000-0.000	0.000	0.000	A36 (36 ksi)	1	1	1.05	0.000	0.000	36.000

### Tower Section Geometry (cont'd)

Tower Elevation	Calc K Single Angles	Calc K Solid Rounds	Legs	K Factors <sup>1</sup>							
				X Brace Diags	K Brace Diags	Single Diags	Girts	Horiz.	Sec. Horiz.	Inner Brace	
											X
ft				Y	Y	Y	Y	Y	Y	Y	
T1 180.000-160.000	Yes	Yes	1	1	1	1	1	1	1	1	1
T2 160.000-140.000	Yes	Yes	1	1	1	1	1	1	1	1	1
T3 140.000-120.000	Yes	Yes	1	1	1	1	1	1	1	1	1
T4 120.000-100.000	Yes	Yes	1	1	1	1	1	1	1	1	1
T5 100.000-80.000	Yes	Yes	1	1	1	1	1	1	0.5	0.5	1
T6 80.000-60.000	Yes	Yes	1	1	1	1	1	1	1	1	1
T7 60.000-40.000	Yes	Yes	1	1	1	1	1	1	1	1	1
T8 40.000-20.000	Yes	Yes	1	1	1	1	1	1	1	1	1
T9 20.000-0.000	Yes	Yes	1	1	1	1	1	1	0.5	0.5	1

<sup>1</sup>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)

<p style="text-align: center;"><b>tnxTower</b></p> <p style="text-align: center;"><b>ALLPRO CONSULTING GROUP</b></p> <p style="text-align: center;">9221LYNDONB.JOHNSON FWY 204 DALLAS, TX Phone: 9722318893 FAX: 866-364-8375</p>	<b>Job</b> CT46125-A-03/ Roxbury-lower County Rd	<b>Page</b> 5 of 21
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Tower Elevation ft	Leg		Diagonal		Top Girt		Bottom Girt		Mid Girt		Long Horizontal		Short Horizontal	
	Net Width Deduct in	U	Net Width Deduct in	U	Net Width Deduct in	U	Net Width Deduct in	U	Net Width Deduct in	U	Net Width Deduct in	U	Net Width Deduct in	U
T1 180.000-160.000	0.000	1	0.000	0.75	0.000	0.75	0.000	0.75	0.000	1	0.000	0.75	0.000	0.75
T2 160.000-140.000	0.000	1	0.000	0.75	0.000	0.75	0.000	0.75	0.000	0.75	0.000	0.75	0.000	0.75
T3 140.000-120.000	0.000	1	0.000	0.75	0.000	0.75	0.000	0.75	0.000	0.75	0.000	0.75	0.000	0.75
T4 120.000-100.000	0.000	1	0.000	0.75	0.000	0.75	0.000	0.75	0.000	0.75	0.000	0.75	0.000	0.75
T5 100.000-80.000	0.000	1	0.000	0.75	0.000	0.75	0.000	0.75	0.000	0.75	0.000	0.75	0.000	0.75
T6 80.000-60.000	0.000	1	0.000	0.75	0.000	0.75	0.000	0.75	0.000	0.75	0.000	0.75	0.000	0.75
T7 60.000-40.000	0.000	1	0.000	0.75	0.000	0.75	0.000	0.75	0.000	0.75	0.000	0.75	0.000	0.75
T8 40.000-20.000	0.000	1	0.000	0.75	0.000	0.75	0.000	0.75	0.000	0.75	0.000	0.75	0.000	0.75
T9 20.000-0.000	0.000	1	0.000	0.75	0.000	0.75	0.000	0.75	0.000	0.75	0.000	0.75	0.000	0.75

### Tower Section Geometry (cont'd)

Tower Elevation ft	Leg Connection Type	Leg		Diagonal		Top Girt		Bottom Girt		Mid Girt		Long Horizontal		Short Horizontal	
		Bolt Size in	No.	Bolt Size in	No.	Bolt Size in	No.	Bolt Size in	No.	Bolt Size in	No.	Bolt Size in	No.	Bolt Size in	No.
T1 180.000-160.000	Flange	0.750 A325N	4	0.500 A325N	1	0.000 A325N	0	0.000 A325N	0	0.625 A325N	0	0.625 A325N	1	0.000 A325N	0
T2 160.000-140.000	Flange	0.750 A325N	6	0.625 A325N	1	0.000 A325N	0	0.000 A325N	0	1.000 A325N	0	0.625 A325N	1	0.000 A325N	0
T3 140.000-120.000	Flange	1.000 A325N	6	0.625 A325N	1	0.625 A325N	1	0.000 A325N	0	1.000 A325N	0	0.625 A325N	1	0.000 A325N	0
T4 120.000-100.000	Flange	1.000 A325N	8	0.625 A325N	1	0.000 A325N	0	0.000 A325N	0	1.000 A325N	0	0.625 A325N	1	0.000 A325N	0
T5 100.000-80.000	Flange	1.000 A325N	8	0.625 A325N	1	0.625 A325N	1	0.000 A325N	0	1.000 A325N	0	0.625 A325N	1	0.625 A325N	1
T6 80.000-60.000	Flange	1.250 A325N	8	0.625 A325N	1	0.000 A325N	0	0.000 A325N	0	1.000 A325N	0	0.625 A325N	1	0.000 A325N	0
T7 60.000-40.000	Flange	1.250 A325N	8	0.625 A325N	1	0.625 A325N	1	0.000 A325N	0	1.000 A325N	0	0.000 A325N	0	0.000 A325N	0
T8 40.000-20.000	Flange	1.250 A325N	8	0.625 A325N	1	0.000 A325N	0	0.000 A325N	0	1.000 A325N	0	0.000 A325N	0	0.000 A325N	0

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Tower Elevation ft	Leg Connection Type	Leg		Diagonal		Top Girt		Bottom Girt		Mid Girt		Long Horizontal		Short Horizontal	
		Bolt Size in	No.	Bolt Size in	No.	Bolt Size in	No.	Bolt Size in	No.	Bolt Size in	No.	Bolt Size in	No.	Bolt Size in	No.
T9 20.000-0.000	Flange	1.250 A325N	0	0.625 A325N	1	0.625 A325N	1	0.000 A325N	0	1.000 A325N	0	0.000 A325N	0	0.625 A325N	1

**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 klf
Feedline Ladder (Af) (Sprint)	D	No	Af (CaAa)	177.500 - 0.000	0.000	0	1	1	1.500	3.000		0.008
1 1/4 (Sprint)	D	No	Ar (CaAa)	177.500 - 0.000	0.000	0	4	4	0.500	1.550		0.001
*****												
1/2 (Town of Roxbury)	D	No	Ar (CaAa)	179.250 - 0.000	0.000	0.45	1	1	0.500	0.580		0.000
7/8 (Town of Roxbury)	D	No	Ar (CaAa)	178.500 - 0.000	0.000	0.45	1	1	0.500	1.110		0.001
1/2 (Town of Roxbury)	D	No	Ar (CaAa)	141.500 - 0.000	0.000	0.45	2	2	0.500	0.580		0.000
1/2 (Town of Roxbury)	D	No	Ar (CaAa)	18.000 - 0.000	0.000	0	2	2	0.500	0.580		0.000
*****												
1-5/8" (Verizon)	A	No	Ar (CaAa)	163.000 - 0.000	0.000	-0.3	12	12	0.500	1.980		0.001
1-5/8" (Verizon)	C	No	Ar (CaAa)	163.000 - 0.000	0.000	-0.3	12	12	0.500	1.980		0.001
Feedline Ladder (Af) (Verizon)	A	No	Af (CaAa)	163.000 - 0.000	0.000	-0.3	1	1	1.500	3.000		0.008
Feedline Ladder (Af) (Verizon)	C	No	Af (CaAa)	163.000 - 0.000	0.000	-0.3	1	1	1.500	3.000		0.008
*****												
1-5/8" (ATT)	D	No	Ar (CaAa)	130.000 - 0.000	0.000	-0.3	15	12	0.500	1.980		0.001
3/4" DC Power (ATT)	D	No	Ar (CaAa)	130.000 - 0.000	0.000	-0.35	1	1	0.500	0.865		0.000
7/16 (ATT)	D	No	Ar (CaAa)	130.000 - 0.000	0.000	-0.35	1	1	0.500	0.560		0.000
Feedline Ladder (Af) (ATT)	D	No	Af (CaAa)	130.000 - 0.000	0.000	-0.35	1	1	1.500	3.000		0.008



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### Feed Line/Linear Appurtenances Section Areas

Tower Section	Tower Elevation ft	Face	$A_R$ ft <sup>2</sup>	$A_F$ ft <sup>2</sup>	$C_{AA}$ In Face ft <sup>2</sup>	$C_{AA}$ Out Face ft <sup>2</sup>	Weight K
T1	180.000-160.000	A	0.000	0.000	8.628	0.000	0.055
		B	0.000	0.000	0.000	0.000	0.000
		C	0.000	0.000	8.628	0.000	0.055
		D	0.000	0.000	22.770	0.000	0.208
T2	160.000-140.000	A	0.000	0.000	57.520	0.000	0.365
		B	0.000	0.000	0.000	0.000	0.000
		C	0.000	0.000	57.520	0.000	0.365
		D	0.000	0.000	25.954	0.000	0.237
T3	140.000-120.000	A	0.000	0.000	57.520	0.000	0.365
		B	0.000	0.000	0.000	0.000	0.000
		C	0.000	0.000	57.520	0.000	0.365
		D	0.000	0.000	64.225	0.000	0.458
T4	120.000-100.000	A	0.000	0.000	57.520	0.000	0.365
		B	0.000	0.000	0.000	0.000	0.000
		C	0.000	0.000	57.520	0.000	0.365
		D	0.000	0.000	100.350	0.000	0.669
T5	100.000-80.000	A	0.000	0.000	57.520	0.000	0.365
		B	0.000	0.000	0.000	0.000	0.000
		C	0.000	0.000	57.520	0.000	0.365
		D	0.000	0.000	100.350	0.000	0.669
T6	80.000-60.000	A	0.000	0.000	57.520	0.000	0.365
		B	0.000	0.000	0.000	0.000	0.000
		C	0.000	0.000	57.520	0.000	0.365
		D	0.000	0.000	100.350	0.000	0.669
T7	60.000-40.000	A	0.000	0.000	57.520	0.000	0.365
		B	0.000	0.000	0.000	0.000	0.000
		C	0.000	0.000	57.520	0.000	0.365
		D	0.000	0.000	100.350	0.000	0.669
T8	40.000-20.000	A	0.000	0.000	57.520	0.000	0.365
		B	0.000	0.000	0.000	0.000	0.000
		C	0.000	0.000	57.520	0.000	0.365
		D	0.000	0.000	100.350	0.000	0.669
T9	20.000-0.000	A	0.000	0.000	57.520	0.000	0.365
		B	0.000	0.000	0.000	0.000	0.000
		C	0.000	0.000	57.520	0.000	0.365
		D	0.000	0.000	102.438	0.000	0.678

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

Tower Section	Tower Elevation ft	Face or Leg	Ice Thickness in	$A_R$ ft <sup>2</sup>	$A_F$ ft <sup>2</sup>	$C_{AA}$ In Face ft <sup>2</sup>	$C_{AA}$ Out Face ft <sup>2</sup>	Weight K
T1	180.000-160.000	A	2.356	0.000	0.000	15.898	0.000	0.323
		B		0.000	0.000	0.000	0.000	0.000
		C		0.000	0.000	15.898	0.000	0.323
		D		0.000	0.000	68.369	0.000	1.311
T2	160.000-140.000	A	2.327	0.000	0.000	105.699	0.000	2.130
		B		0.000	0.000	0.000	0.000	0.000
		C		0.000	0.000	105.699	0.000	2.130
		D		0.000	0.000	77.402	0.000	1.463
T3	140.000-120.000	A	2.294	0.000	0.000	105.373	0.000	2.103
		B		0.000	0.000	0.000	0.000	0.000
		C		0.000	0.000	105.373	0.000	2.103
		D		0.000	0.000	159.499	0.000	2.950
T4	120.000-100.000	A	2.256	0.000	0.000	104.999	0.000	2.073

<b>tnxTower</b>  <b>ALLPRO CONSULTING GROUP</b> 9221LYNDONB.JOHNSON FWY 204 DALLAS,TX Phone: 9722318893 FAX: 866-364-8375	<b>Job</b> CT46125-A-03/ Roxbury-lower County Rd	<b>Page</b> 8 of 21
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Tower Section	Tower Elevation ft	Face or Leg	Ice Thickness in	A <sub>R</sub> ft <sup>2</sup>	A <sub>F</sub> ft <sup>2</sup>	C <sub>AA</sub> In Face ft <sup>2</sup>	C <sub>AA</sub> Out Face ft <sup>2</sup>	Weight K
		B		0.000	0.000	0.000	0.000	0.000
		C		0.000	0.000	104.999	0.000	2.073
		D		0.000	0.000	221.816	0.000	4.190
T5	100.000-80.000	A	2.211	0.000	0.000	104.557	0.000	2.036
		B		0.000	0.000	0.000	0.000	0.000
		C		0.000	0.000	104.557	0.000	2.036
		D		0.000	0.000	219.851	0.000	4.103
T6	80.000-60.000	A	2.156	0.000	0.000	104.017	0.000	1.993
		B		0.000	0.000	0.000	0.000	0.000
		C		0.000	0.000	104.017	0.000	1.993
		D		0.000	0.000	217.445	0.000	3.997
T7	60.000-40.000	A	2.085	0.000	0.000	103.316	0.000	1.936
		B		0.000	0.000	0.000	0.000	0.000
		C		0.000	0.000	103.316	0.000	1.936
		D		0.000	0.000	214.319	0.000	3.861
T8	40.000-20.000	A	1.981	0.000	0.000	102.297	0.000	1.854
		B		0.000	0.000	0.000	0.000	0.000
		C		0.000	0.000	102.297	0.000	1.854
		D		0.000	0.000	209.774	0.000	3.667
T9	20.000-0.000	A	1.775	0.000	0.000	100.281	0.000	1.696
		B		0.000	0.000	0.000	0.000	0.000
		C		0.000	0.000	100.281	0.000	1.696
		D		0.000	0.000	215.720	0.000	3.428

### Feed Line Center of Pressure

Section	Elevation ft	CP <sub>x</sub> in	CP <sub>z</sub> in	CP <sub>x</sub> Ice in	CP <sub>z</sub> Ice in
T1	180.000-160.000	-0.352	2.912	-0.803	2.907
T2	160.000-140.000	-0.200	1.654	-0.585	2.087
T3	140.000-120.000	1.094	4.068	0.549	4.015
T4	120.000-100.000	2.370	6.182	1.710	5.980
T5	100.000-80.000	2.657	6.908	1.942	6.744
T6	80.000-60.000	2.936	7.610	2.172	7.483
T7	60.000-40.000	3.094	8.003	2.357	8.052
T8	40.000-20.000	3.385	8.742	2.605	8.790
T9	20.000-0.000	3.513	9.247	2.766	9.245

### Shielding Factor Ka

Tower Section	Feed Line Record No.	Description	Feed Line Segment Elev.	K <sub>a</sub> No Ice	K <sub>a</sub> Ice
T1	1	Feedline Ladder (Af)	160.00 - 177.50	0.6000	0.5386
T1	2		160.00 - 177.50	0.6000	0.5386
T1	4		160.00 - 179.25	0.6000	0.5386
T1	5		160.00 - 178.50	0.6000	0.5386

<b><i>tnxTower</i></b>  <b>ALLPRO CONSULTING GROUP</b> 9221LYNDONB.JOHNSON FWY 204 DALLAS,TX Phone: 9722318893 FAX: 866-364-8375	<b>Job</b> CT46125-A-03/ Roxbury-lower County Rd	<b>Page</b> 9 of 21
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Tower Section	Feed Line Record No.	Description	Feed Line Segment Elev.	K <sub>a</sub> No Ice	K <sub>a</sub> Ice
T1	10	1-5/8"	160.00 - 163.00	0.6000	0.5386
T1	11	1-5/8"	160.00 - 163.00	0.6000	0.5386
T1	12	Feedline Ladder (Af)	160.00 - 163.00	0.6000	0.5386
T1	13	Feedline Ladder (Af)	160.00 - 163.00	0.6000	0.5386
T2	1	Feedline Ladder (Af)	140.00 - 160.00	0.6000	0.6000
T2	2	1 1/4	140.00 - 160.00	0.6000	0.6000
T2	4	1/2	140.00 - 160.00	0.6000	0.6000
T2	5	7/8	140.00 - 160.00	0.6000	0.6000
T2	6	1/2	140.00 - 141.50	0.6000	0.6000
T2	10	1-5/8"	140.00 - 160.00	0.6000	0.6000
T2	11	1-5/8"	140.00 - 160.00	0.6000	0.6000
T2	12	Feedline Ladder (Af)	140.00 - 160.00	0.6000	0.6000
T2	13	Feedline Ladder (Af)	140.00 - 160.00	0.6000	0.6000
T3	1	Feedline Ladder (Af)	120.00 - 140.00	0.6000	0.6000
T3	2	1 1/4	120.00 - 140.00	0.6000	0.6000
T3	4	1/2	120.00 - 140.00	0.6000	0.6000
T3	5	7/8	120.00 - 140.00	0.6000	0.6000
T3	6	1/2	120.00 - 140.00	0.6000	0.6000
T3	10	1-5/8"	120.00 - 140.00	0.6000	0.6000
T3	11	1-5/8"	120.00 - 140.00	0.6000	0.6000
T3	12	Feedline Ladder (Af)	120.00 - 140.00	0.6000	0.6000
T3	13	Feedline Ladder (Af)	120.00 - 140.00	0.6000	0.6000
T3	15	1-5/8"	120.00 - 130.00	0.6000	0.6000
T3	16	3/4" DC Power	120.00 - 130.00	0.6000	0.6000
T3	17	7/16	120.00 - 130.00	0.6000	0.6000
T3	18	Feedline Ladder (Af)	120.00 - 130.00	0.6000	0.6000
T4	1	Feedline Ladder (Af)	100.00 - 120.00	0.6000	0.6000
T4	2	1 1/4	100.00 - 120.00	0.6000	0.6000
T4	4	1/2	100.00 - 120.00	0.6000	0.6000
T4	5	7/8	100.00 - 120.00	0.6000	0.6000
T4	6	1/2	100.00 - 120.00	0.6000	0.6000

<p style="text-align: center;"><b>tnxTower</b></p> <p style="text-align: center;"><b>ALLPRO CONSULTING GROUP</b></p> <p style="text-align: center;">9221LYNDONB.JOHNSON FWY 204 DALLAS,TX Phone: 9722318893 FAX: 866-364-8375</p>	<p><b>Job</b></p> <p style="text-align: center;">CT46125-A-03/ Roxbury-lower County Rd</p>	<p><b>Page</b></p> <p style="text-align: center;">10 of 21</p>
	<p><b>Project</b></p> <p style="text-align: center;">17-6610</p>	<p><b>Date</b></p> <p style="text-align: center;">09:33:12 10/26/17</p>
	<p><b>Client</b></p> <p style="text-align: center;">SBA Communications Corporation</p>	<p><b>Designed by</b></p> <p style="text-align: center;">ddhungana</p>

Tower Section	Feed Line Record No.	Description	Feed Line Segment Elev.	K <sub>a</sub> No Ice	K <sub>a</sub> Ice
T4	10	1-5/8"	100.00 - 120.00	0.6000	0.6000
T4	11	1-5/8"	100.00 - 120.00	0.6000	0.6000
T4	12	Feedline Ladder (Af)	100.00 - 120.00	0.6000	0.6000
T4	13	Feedline Ladder (Af)	100.00 - 120.00	0.6000	0.6000
T4	15	1-5/8"	100.00 - 120.00	0.6000	0.6000
T4	16	3/4" DC Power	100.00 - 120.00	0.6000	0.6000
T4	17	7/16	100.00 - 120.00	0.6000	0.6000
T4	18	Feedline Ladder (Af)	100.00 - 120.00	0.6000	0.6000
T5	1	Feedline Ladder (Af)	80.00 - 100.00	0.6000	0.6000
T5	2	1 1/4	80.00 - 100.00	0.6000	0.6000
T5	4	1/2	80.00 - 100.00	0.6000	0.6000
T5	5	7/8	80.00 - 100.00	0.6000	0.6000
T5	6	1/2	80.00 - 100.00	0.6000	0.6000
T5	10	1-5/8"	80.00 - 100.00	0.6000	0.6000
T5	11	1-5/8"	80.00 - 100.00	0.6000	0.6000
T5	12	Feedline Ladder (Af)	80.00 - 100.00	0.6000	0.6000
T5	13	Feedline Ladder (Af)	80.00 - 100.00	0.6000	0.6000
T5	15	1-5/8"	80.00 - 100.00	0.6000	0.6000
T5	16	3/4" DC Power	80.00 - 100.00	0.6000	0.6000
T5	17	7/16	80.00 - 100.00	0.6000	0.6000
T5	18	Feedline Ladder (Af)	80.00 - 100.00	0.6000	0.6000
T6	1	Feedline Ladder (Af)	60.00 - 80.00	0.6000	0.6000
T6	2	1 1/4	60.00 - 80.00	0.6000	0.6000
T6	4	1/2	60.00 - 80.00	0.6000	0.6000
T6	5	7/8	60.00 - 80.00	0.6000	0.6000
T6	6	1/2	60.00 - 80.00	0.6000	0.6000
T6	10	1-5/8"	60.00 - 80.00	0.6000	0.6000
T6	11	1-5/8"	60.00 - 80.00	0.6000	0.6000
T6	12	Feedline Ladder (Af)	60.00 - 80.00	0.6000	0.6000
T6	13	Feedline Ladder (Af)	60.00 - 80.00	0.6000	0.6000
T6	15	1-5/8"	60.00 - 80.00	0.6000	0.6000
T6	16	3/4" DC Power	60.00 - 80.00	0.6000	0.6000
T6	17	7/16	60.00 - 80.00	0.6000	0.6000
T6	18	Feedline Ladder (Af)	60.00 - 80.00	0.6000	0.6000
T7	1	Feedline Ladder (Af)	40.00 - 60.00	0.6000	0.6000
T7	2	1 1/4	40.00 - 60.00	0.6000	0.6000
T7	4	1/2	40.00 - 60.00	0.6000	0.6000
T7	5	7/8	40.00 - 60.00	0.6000	0.6000
T7	6	1/2	40.00 - 60.00	0.6000	0.6000
T7	10	1-5/8"	40.00 - 60.00	0.6000	0.6000
T7	11	1-5/8"	40.00 - 60.00	0.6000	0.6000
T7	12	Feedline Ladder (Af)	40.00 - 60.00	0.6000	0.6000
T7	13	Feedline Ladder (Af)	40.00 - 60.00	0.6000	0.6000
T7	15	1-5/8"	40.00 - 60.00	0.6000	0.6000
T7	16	3/4" DC Power	40.00 - 60.00	0.6000	0.6000
T7	17	7/16	40.00 - 60.00	0.6000	0.6000
T7	18	Feedline Ladder (Af)	40.00 - 60.00	0.6000	0.6000
T8	1	Feedline Ladder (Af)	20.00 - 40.00	0.6000	0.6000
T8	2	1 1/4	20.00 - 40.00	0.6000	0.6000
T8	4	1/2	20.00 - 40.00	0.6000	0.6000
T8	5	7/8	20.00 - 40.00	0.6000	0.6000
T8	6	1/2	20.00 - 40.00	0.6000	0.6000
T8	10	1-5/8"	20.00 - 40.00	0.6000	0.6000
T8	11	1-5/8"	20.00 - 40.00	0.6000	0.6000

<b>tnxTower</b>  <b>ALLPRO CONSULTING GROUP</b> 9221LYNDONB.JOHNSON FWY 204 DALLAS,TX Phone: 9722318893 FAX: 866-364-8375	<b>Job</b> CT46125-A-03/ Roxbury-lower County Rd	<b>Page</b> 11 of 21
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	<b>Client</b> SBA Communications Corporation	<b>Designed by</b> ddhungana

Tower Section	Feed Line Record No.	Description	Feed Line Segment Elev.	K <sub>a</sub> No Ice	K <sub>a</sub> Ice
T8	12	Feedline Ladder (Af)	20.00 - 40.00	0.6000	0.6000
T8	13	Feedline Ladder (Af)	20.00 - 40.00	0.6000	0.6000
T8	15	1-5/8"	20.00 - 40.00	0.6000	0.6000
T8	16	3/4" DC Power	20.00 - 40.00	0.6000	0.6000
T8	17	7/16	20.00 - 40.00	0.6000	0.6000
T8	18	Feedline Ladder (Af)	20.00 - 40.00	0.6000	0.6000
T9	1	Feedline Ladder (Af)	0.00 - 20.00	0.6000	0.6000
T9	2	1 1/4	0.00 - 20.00	0.6000	0.6000
T9	4	1/2	0.00 - 20.00	0.6000	0.6000
T9	5	7/8	0.00 - 20.00	0.6000	0.6000
T9	6	1/2	0.00 - 20.00	0.6000	0.6000
T9	7	1/2	0.00 - 18.00	0.6000	0.6000
T9	10	1-5/8"	0.00 - 20.00	0.6000	0.6000
T9	11	1-5/8"	0.00 - 20.00	0.6000	0.6000
T9	12	Feedline Ladder (Af)	0.00 - 20.00	0.6000	0.6000
T9	13	Feedline Ladder (Af)	0.00 - 20.00	0.6000	0.6000
T9	15	1-5/8"	0.00 - 20.00	0.6000	0.6000
T9	16	3/4" DC Power	0.00 - 20.00	0.6000	0.6000
T9	17	7/16	0.00 - 20.00	0.6000	0.6000
T9	18	Feedline Ladder (Af)	0.00 - 20.00	0.6000	0.6000

### Discrete Tower Loads

Description	Face or Leg	Offset Type	Offsets: Horz Lateral	Azimuth Adjustment	Placement	C <sub>A</sub> A <sub>A</sub> Front	C <sub>A</sub> A <sub>A</sub> Side	Weight
			Vert ft ft ft	°	ft	ft <sup>2</sup>	ft <sup>2</sup>	K
*****								
ETCR-654L12H6 (Sprint Nextel)	A	From Leg	3.000 0.000 0.000	0.000	177.500	No Ice 15.707 1/2" Ice 16.279 1" Ice 16.858	6.002 6.524 7.054	0.085 0.168 0.259
ETCR-654L12H6 (Sprint Nextel)	B	From Leg	3.000 0.000 0.000	0.000	177.500	No Ice 15.707 1/2" Ice 16.279 1" Ice 16.858	6.002 6.524 7.054	0.085 0.168 0.259
ETCR-654L12H6 (Sprint Nextel)	D	From Leg	3.000 0.000 0.000	0.000	177.500	No Ice 15.707 1/2" Ice 16.279 1" Ice 16.858	6.002 6.524 7.054	0.085 0.168 0.259
1900 MHz RRH (Sprint Nextel)	A	From Leg	3.000 0.000 0.000	0.000	177.500	No Ice 2.322 1/2" Ice 2.527 1" Ice 2.739	2.238 2.441 2.651	0.060 0.083 0.110
1900 MHz RRH (Sprint Nextel)	B	From Leg	3.000 0.000 0.000	0.000	177.500	No Ice 2.322 1/2" Ice 2.527 1" Ice 2.739	2.238 2.441 2.651	0.060 0.083 0.110
1900 MHz RRH (Sprint Nextel)	D	From Leg	3.000 0.000 0.000	0.000	177.500	No Ice 2.322 1/2" Ice 2.527 1" Ice 2.739	2.238 2.441 2.651	0.060 0.083 0.110
(2) 800 MHz RRH (Sprint Nextel)	B	From Leg	3.000 0.000 0.000	0.000	177.500	No Ice 2.058 1/2" Ice 2.240 1" Ice 2.429	1.710 1.879 2.056	0.050 0.071 0.094
(2) 800 MHz RRH (Sprint Nextel)	A	From Leg	3.000 0.000 0.000	0.000	177.500	No Ice 2.058 1/2" Ice 2.240 1" Ice 2.429	1.710 1.879 2.056	0.050 0.071 0.094

<b>tnxTower</b>  <b>ALLPRO CONSULTING GROUP</b> 9221LYNDONB.JOHNSON FWY 204 DALLAS,TX Phone: 9722318893 FAX: 866-364-8375	<b>Job</b>	CT46125-A-03/ Roxbury-lower County Rd	<b>Page</b>	12 of 21
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	<b>Client</b>	SBA Communications Corporation	<b>Designed by</b>	dhdhungana

Description	Face or Leg	Offset Type	Offsets: Horz Lateral Vert ft ft ft	Azimuth Adjustment °	Placement ft	C <sub>AA</sub> Front ft <sup>2</sup>	C <sub>AA</sub> Side ft <sup>2</sup>	Weight K
(2) 800 MHz RRH (Sprint Nextel)	D	From Leg	3.000 0.000 0.000	0.000	177.500	No Ice 2.058 1/2" Ice 2.240 1" Ice 2.429	1.710 1.879 2.056	0.050 0.071 0.094
TD-RRH8x20-25 (Sprint Nextel)	A	From Leg	3.000 0.000 0.000	0.000	177.500	No Ice 3.704 1/2" Ice 3.946 1" Ice 4.196	1.294 1.465 1.642	0.066 0.090 0.117
TD-RRH8x20-25 (Sprint Nextel)	B	From Leg	3.000 0.000 0.000	0.000	177.500	No Ice 3.704 1/2" Ice 3.946 1" Ice 4.196	1.294 1.465 1.642	0.066 0.090 0.117
TD-RRH8x20-25 (Sprint Nextel)	D	From Leg	3.000 0.000 0.000	0.000	177.500	No Ice 3.704 1/2" Ice 3.946 1" Ice 4.196	1.294 1.465 1.642	0.066 0.090 0.117
T-Frame Sector Mount (Sprint Nextel)	A	From Leg	1.500 0.000 0.000	0.000	177.500	No Ice 13.600 1/2" Ice 18.400 1" Ice 23.200	10.800 13.050 15.300	0.465 0.600 0.735
T-Frame Sector Mount (Sprint Nextel)	B	From Leg	1.500 0.000 0.000	0.000	177.500	No Ice 13.600 1/2" Ice 18.400 1" Ice 23.200	10.800 13.050 15.300	0.465 0.600 0.735
T-Frame Sector Mount (Sprint Nextel)	D	From Leg	1.500 0.000 0.000	0.000	177.500	No Ice 13.600 1/2" Ice 18.400 1" Ice 23.200	10.800 13.050 15.300	0.465 0.600 0.735
***** ***** *****								
BXA-70063-6CF-2 (Verizon)	A	From Leg	3.000 0.000 0.000	0.000	163.000	No Ice 8.024 1/2" Ice 8.480 1" Ice 8.943	4.642 5.088 5.542	0.017 0.063 0.116
BXA-70063-6CF-2 (Verizon)	B	From Leg	3.000 0.000 0.000	0.000	163.000	No Ice 8.024 1/2" Ice 8.480 1" Ice 8.943	4.642 5.088 5.542	0.017 0.063 0.116
BXA-70063-6CF-2 (Verizon)	D	From Leg	3.000 0.000 0.000	0.000	163.000	No Ice 8.024 1/2" Ice 8.480 1" Ice 8.943	4.642 5.088 5.542	0.017 0.063 0.116
(2) LPA-80080/6CF (Verizon)	B	From Leg	3.000 0.000 0.000	0.000	163.000	No Ice 4.326 1/2" Ice 4.764 1" Ice 5.210	8.619 9.075 9.539	0.021 0.069 0.123
(2) LPA-80080/6CF (Verizon)	A	From Leg	3.000 0.000 0.000	0.000	163.000	No Ice 4.326 1/2" Ice 4.764 1" Ice 5.210	8.619 9.075 9.539	0.021 0.069 0.123
(2) LPA-80080/6CF (Verizon)	D	From Leg	3.000 0.000 0.000	0.000	163.000	No Ice 4.326 1/2" Ice 4.764 1" Ice 5.210	8.619 9.075 9.539	0.021 0.069 0.123
BXA-171085-8CF-2 (Verizon)	A	From Leg	3.000 0.000 0.000	0.000	163.000	No Ice 7.059 1/2" Ice 7.486 1" Ice 7.920	4.273 4.694 5.122	0.050 0.092 0.140
BXA-171085-8CF-2 (Verizon)	B	From Leg	3.000 0.000 0.000	0.000	163.000	No Ice 7.059 1/2" Ice 7.486 1" Ice 7.920	4.273 4.694 5.122	0.050 0.092 0.140
BXA-171085-8CF-2 (Verizon)	D	From Leg	3.000 0.000 0.000	0.000	163.000	No Ice 7.059 1/2" Ice 7.486 1" Ice 7.920	4.273 4.694 5.122	0.050 0.092 0.140
(2) FDR9R6004/2C-3L (Verizon)	A	From Leg	3.000 0.000 0.000	0.000	163.000	No Ice 0.314 1/2" Ice 0.386 1" Ice 0.466	0.076 0.119 0.169	0.006 0.008 0.011
(2) FDR9R6004/2C-3L (Verizon)	B	From Leg	3.000 0.000 0.000	0.000	163.000	No Ice 0.314 1/2" Ice 0.386 1" Ice 0.466	0.076 0.119 0.169	0.006 0.008 0.011

<b>tnxTower</b>  <b>ALLPRO CONSULTING GROUP</b> 9221LYNDONB.JOHNSON FWY 204 DALLAS,TX Phone: 9722318893 FAX: 866-364-8375	<b>Job</b>	CT46125-A-03/ Roxbury-lower County Rd	<b>Page</b>	13 of 21
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Description	Face or Leg	Offset Type	Offsets:		Azimuth Adjustment	Placement	C <sub>AA</sub> Front	C <sub>AA</sub> Side	Weight
			Horz	Vert					
			ft	ft	°	ft	ft <sup>2</sup>	ft <sup>2</sup>	K
(2) FDR9R6004/2C-3L (Verizon)	D	From Leg	3.000	0.000	0.000	163.000	No Ice 0.314	0.076	0.006
			0.000				1/2" Ice 0.386	0.119	0.008
			0.000				1" Ice 0.466	0.169	0.011
T-Frame Sector Mount (Verizon)	A	From Leg	1.500	0.000	0.000	163.000	No Ice 13.600	10.800	0.465
			0.000				1/2" Ice 18.400	13.050	0.600
			0.000				1" Ice 23.200	15.300	0.735
T-Frame Sector Mount (Verizon)	B	From Leg	1.500	0.000	0.000	163.000	No Ice 13.600	10.800	0.465
			0.000				1/2" Ice 18.400	13.050	0.600
			0.000				1" Ice 23.200	15.300	0.735
T-Frame Sector Mount (Verizon)	D	From Leg	1.500	0.000	0.000	163.000	No Ice 13.600	10.800	0.465
			0.000				1/2" Ice 18.400	13.050	0.600
			0.000				1" Ice 23.200	15.300	0.735
*****									
AM-C-CD-16-65-00T-RET (ATT)	A	From Leg	3.000	0.000	0.000	130.000	No Ice 8.024	4.642	0.060
			0.000				1/2" Ice 8.480	5.088	0.106
			0.000				1" Ice 8.943	5.542	0.159
AM-C-CD-16-65-00T-RET (ATT)	B	From Leg	3.000	0.000	0.000	130.000	No Ice 8.024	4.642	0.060
			0.000				1/2" Ice 8.480	5.088	0.106
			0.000				1" Ice 8.943	5.542	0.159
DU04-8670 (ATT)	A	From Leg	3.000	0.000	0.000	130.000	No Ice 6.065	3.009	0.060
			0.000				1/2" Ice 6.412	3.331	0.097
			0.000				1" Ice 6.765	3.660	0.140
DU04-8670 (ATT)	B	From Leg	3.000	0.000	0.000	130.000	No Ice 6.065	3.009	0.060
			0.000				1/2" Ice 6.412	3.331	0.097
			0.000				1" Ice 6.765	3.660	0.140
DU04-8670 (ATT)	D	From Leg	3.000	0.000	0.000	130.000	No Ice 6.065	3.009	0.060
			0.000				1/2" Ice 6.412	3.331	0.097
			0.000				1" Ice 6.765	3.660	0.140
P65-17-XLH-RR (ATT)	D	From Leg	3.000	0.000	0.000	130.000	No Ice 11.467	6.800	0.059
			0.000				1/2" Ice 12.083	7.384	0.121
			0.000				1" Ice 12.707	7.976	0.191
(2) 7770 (ATT)	A	From Leg	3.000	0.000	0.000	130.000	No Ice 5.508	2.928	0.035
			0.000				1/2" Ice 5.867	3.273	0.068
			0.000				1" Ice 6.233	3.625	0.105
(2) 7770 (ATT)	B	From Leg	3.000	0.000	0.000	130.000	No Ice 5.508	2.928	0.035
			0.000				1/2" Ice 5.867	3.273	0.068
			0.000				1" Ice 6.233	3.625	0.105
(2) 7770 (ATT)	D	From Leg	3.000	0.000	0.000	130.000	No Ice 5.508	2.928	0.035
			0.000				1/2" Ice 5.867	3.273	0.068
			0.000				1" Ice 6.233	3.625	0.105
(2) TT19-08BP111-001 TMA (ATT)	B	From Leg	3.000	0.000	0.000	130.000	No Ice 0.553	0.446	0.016
			0.000				1/2" Ice 0.649	0.534	0.022
			0.000				1" Ice 0.752	0.630	0.029
(2) TT19-08BP111-001 TMA (ATT)	A	From Leg	3.000	0.000	0.000	130.000	No Ice 0.553	0.446	0.016
			0.000				1/2" Ice 0.649	0.534	0.022
			0.000				1" Ice 0.752	0.630	0.029
(2) TT19-08BP111-001 TMA (ATT)	D	From Leg	3.000	0.000	0.000	130.000	No Ice 0.553	0.446	0.016
			0.000				1/2" Ice 0.649	0.534	0.022
			0.000				1" Ice 0.752	0.630	0.029
(2) LGP21903 Diplexer (ATT)	A	From Leg	3.000	0.000	0.000	130.000	No Ice 0.231	0.158	0.005
			0.000				1/2" Ice 0.294	0.213	0.007
			0.000				1" Ice 0.365	0.276	0.011
(2) LGP21903 Diplexer (ATT)	B	From Leg	3.000	0.000	0.000	130.000	No Ice 0.231	0.158	0.005
			0.000				1/2" Ice 0.294	0.213	0.007
			0.000				1" Ice 0.365	0.276	0.011
(2) LGP21903 Diplexer (ATT)	D	From Leg	3.000	0.000	0.000	130.000	No Ice 0.231	0.158	0.005
			0.000				1/2" Ice 0.294	0.213	0.007

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Description	Face or Leg	Offset Type	Offsets:		Azimuth Adjustment	Placement	C <sub>AA</sub> Front	C <sub>AA</sub> Side	Weight	
			Horz	Vert						
			ft	ft	°	ft	ft <sup>2</sup>	ft <sup>2</sup>	K	
(2) RRUS 11 (ATT)	A	From Leg	0.000		0.000	130.000	1" Ice	0.365	0.276	0.011
			3.000				No Ice	1.861	1.421	0.051
			0.000				1/2" Ice	2.037	1.582	0.068
(2) RRUS 11 (ATT)	B	From Leg	0.000		0.000	130.000	1" Ice	2.220	1.751	0.088
			3.000				No Ice	1.861	1.421	0.051
			0.000				1/2" Ice	2.037	1.582	0.068
(2) RRUS 11 (ATT)	D	From Leg	0.000		0.000	130.000	1" Ice	2.220	1.751	0.088
			3.000				No Ice	1.861	1.421	0.051
			0.000				1/2" Ice	2.037	1.582	0.068
DC6-48-60-18-8F (ATT)	A	From Leg	0.000		0.000	130.000	1" Ice	2.220	1.751	0.088
			3.000				No Ice	1.861	1.421	0.051
			0.000				1/2" Ice	2.037	1.582	0.068
DC6-48-60-18-8F (ATT)	B	From Leg	0.000		0.000	130.000	1" Ice	2.220	1.751	0.088
			3.000				No Ice	1.861	1.421	0.051
			0.000				1/2" Ice	2.037	1.582	0.068
DC6-48-60-18-8F (ATT)	D	From Leg	0.000		0.000	130.000	1" Ice	2.220	1.751	0.088
			3.000				No Ice	1.861	1.421	0.051
			0.000				1/2" Ice	2.037	1.582	0.068
(2) 7020 RET (ATT)	A	From Leg	0.000		0.000	130.000	1" Ice	2.220	1.751	0.088
			3.000				No Ice	1.861	1.421	0.051
			0.000				1/2" Ice	2.037	1.582	0.068
(2) 7020 RET (ATT)	B	From Leg	0.000		0.000	130.000	1" Ice	2.220	1.751	0.088
			3.000				No Ice	1.861	1.421	0.051
			0.000				1/2" Ice	2.037	1.582	0.068
(2) 7020 RET (ATT)	D	From Leg	0.000		0.000	130.000	1" Ice	2.220	1.751	0.088
			3.000				No Ice	1.861	1.421	0.051
			0.000				1/2" Ice	2.037	1.582	0.068
T-Frame Sector Mount (ATT)	A	From Leg	0.000		0.000	163.000	1" Ice	2.220	1.751	0.088
			1.500				No Ice	13.600	13.600	0.465
			0.000				1/2" Ice	18.400	18.400	0.600
T-Frame Sector Mount (ATT)	B	From Leg	0.000		0.000	163.000	1" Ice	23.200	23.200	0.735
			1.500				No Ice	13.600	10.800	0.465
			0.000				1/2" Ice	18.400	13.050	0.600
T-Frame Sector Mount (ATT)	D	From Leg	0.000		0.000	163.000	1" Ice	23.200	23.200	0.735
			1.500				No Ice	13.600	10.800	0.465
			0.000				1/2" Ice	18.400	13.050	0.600
*****										
*****										
10'x1.75" dipole (Town of Roxbury)	B	From Leg	0.000		0.000	179.250	1" Ice	2.220	1.751	0.088
			3.000				No Ice	0.875	0.875	0.030
			2.000				1/2" Ice	1.325	1.325	0.037
6'8"x4" Pipe Mount (Town of Roxbury)	B	From Leg	0.000		0.000	179.250	1" Ice	1.634	1.634	0.048
			1.500				No Ice	2.140	2.140	0.072
			0.000				1/2" Ice	3.006	3.006	0.093
08010 Omni (Town of Roxbury)	A	From Leg	0.000		0.000	178.500	1" Ice	3.423	3.423	0.119
			3.000				No Ice	1.652	1.652	0.018
			2.000				1/2" Ice	2.238	2.238	0.035
6'8"x4" Pipe Mount (Town of Roxbury)	A	From Leg	0.000		0.000	178.500	1" Ice	2.582	2.582	0.055
			1.500				No Ice	2.141	2.141	0.072
			0.000				1/2" Ice	3.006	3.006	0.093
10'x1.75" dipole (Town of Roxbury)	B	From Leg	0.000		0.000	141.500	1" Ice	3.423	3.423	0.119
			3.000				No Ice	0.875	0.875	0.030
			2.000				1/2" Ice	1.325	1.325	0.037
6'8"x4" Pipe Mount (Town of Roxbury)	B	From Leg	0.000		0.000	141.500	1" Ice	1.634	1.634	0.048
			1.500				No Ice	2.183	2.183	0.072
			0.000				1/2" Ice	3.006	3.006	0.093
			0.000				1" Ice	3.423	3.423	0.119



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Description	Face or Leg	Offset Type	Offsets:		Azimuth Adjustment	Placement	C <sub>AA</sub> Front	C <sub>AA</sub> Side	Weight	
			Horz Lateral	Vert						
			ft	ft	°	ft	ft <sup>2</sup>	ft <sup>2</sup>	K	
6' "Yagi" (Town of Roxbury)	C	From Leg	3.000	0.000	0.000	18.000	No Ice	1.767	1.767	0.041
			0.000				1/2" Ice	2.129	2.129	0.054
			2.000				1" Ice	2.501	2.501	0.071
18' Dipole (Town of Roxbury)	D	From Leg	3.000	0.000	0.000	141.500	No Ice	4.000	4.000	0.055
			0.000				1/2" Ice	6.000	6.000	0.100
			2.000				1" Ice	8.000	8.000	0.145
6'8"x4" Pipe Mount (Town of Roxbury)	D	From Leg	1.500	0.000	0.000	141.500	No Ice	2.183	2.183	0.072
			0.000				1/2" Ice	3.006	3.006	0.093
			0.000				1" Ice	3.423	3.423	0.119

## 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 45 deg - No Ice
5	0.9 Dead+1.6 Wind 45 deg - No Ice
6	1.2 Dead+1.6 Wind 90 deg - No Ice
7	0.9 Dead+1.6 Wind 90 deg - No Ice
8	1.2 Dead+1.6 Wind 135 deg - No Ice
9	0.9 Dead+1.6 Wind 135 deg - No Ice
10	1.2 Dead+1.6 Wind 180 deg - No Ice
11	0.9 Dead+1.6 Wind 180 deg - No Ice
12	1.2 Dead+1.6 Wind 225 deg - No Ice
13	0.9 Dead+1.6 Wind 225 deg - No Ice
14	1.2 Dead+1.6 Wind 270 deg - No Ice
15	0.9 Dead+1.6 Wind 270 deg - No Ice
16	1.2 Dead+1.6 Wind 315 deg - No Ice
17	0.9 Dead+1.6 Wind 315 deg - No Ice
18	1.2 Dead+1.0 Ice+1.0 Temp
19	1.2 Dead+1.0 Wind 0 deg+1.0 Ice+1.0 Temp
20	1.2 Dead+1.0 Wind 45 deg+1.0 Ice+1.0 Temp
21	1.2 Dead+1.0 Wind 90 deg+1.0 Ice+1.0 Temp
22	1.2 Dead+1.0 Wind 135 deg+1.0 Ice+1.0 Temp
23	1.2 Dead+1.0 Wind 180 deg+1.0 Ice+1.0 Temp
24	1.2 Dead+1.0 Wind 225 deg+1.0 Ice+1.0 Temp
25	1.2 Dead+1.0 Wind 270 deg+1.0 Ice+1.0 Temp
26	1.2 Dead+1.0 Wind 315 deg+1.0 Ice+1.0 Temp
27	Dead+Wind 0 deg - Service
28	Dead+Wind 45 deg - Service
29	Dead+Wind 90 deg - Service
30	Dead+Wind 135 deg - Service
31	Dead+Wind 180 deg - Service
32	Dead+Wind 225 deg - Service
33	Dead+Wind 270 deg - Service
34	Dead+Wind 315 deg - Service

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### Maximum Tower Deflections - Service Wind

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
T1	180 - 160	3.495	32	0.171	0.014
T2	160 - 140	2.773	32	0.166	0.010
T3	140 - 120	2.096	32	0.147	0.005
T4	120 - 100	1.512	32	0.121	0.003
T5	100 - 80	1.037	32	0.097	0.002
T6	80 - 60	0.658	32	0.075	0.001
T7	60 - 40	0.378	32	0.050	0.001
T8	40 - 20	0.180	32	0.034	0.000
T9	20 - 0	0.054	32	0.018	0.000

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

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
179.250	10'x1.75" dipole	32	3.467	0.171	0.014	331090
178.500	08010 Omni	32	3.440	0.171	0.014	331090
177.500	ETCR-654L12H6	32	3.404	0.171	0.014	331090
163.000	BXA-70063-6CF-2	32	2.880	0.167	0.011	97455
141.500	10'x1.75" dipole	32	2.144	0.149	0.006	49034
130.000	AM-C-CD-16-65-00T-RET	32	1.790	0.134	0.004	44013
18.000	6"Yagi"	32	0.046	0.016	0.000	59869

### Maximum Tower Deflections - Design Wind

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
T1	180 - 160	12.780	12	0.627	0.052
T2	160 - 140	10.140	12	0.605	0.037
T3	140 - 120	7.664	12	0.537	0.020
T4	120 - 100	5.529	12	0.442	0.011
T5	100 - 80	3.795	12	0.353	0.007
T6	80 - 60	2.409	12	0.273	0.004
T7	60 - 40	1.383	12	0.182	0.002
T8	40 - 20	0.658	12	0.126	0.001
T9	20 - 0	0.199	12	0.064	0.001

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

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
179.250	10'x1.75" dipole	12	12.680	0.626	0.051	120639
178.500	08010 Omni	12	12.580	0.626	0.051	120639
177.500	ETCR-654L12H6	12	12.447	0.625	0.050	120639

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	<b>Client</b> SBA Communications Corporation	<b>Designed by</b> dddhungana

Elevation	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
163.000	BXA-70063-6CF-2	12	10.530	0.611	0.039	35459
141.500	10'x1.75" dipole	12	7.839	0.543	0.021	13748
130.000	AM-C-CD-16-65-00T-RET	12	6.547	0.490	0.014	12039
18.000	6" "Yagi"	12	0.170	0.058	0.001	16389

### 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	180	Leg	A325N	0.750	4	2.055	29.821	0.069 ✓	1	Bolt Tension
		Diagonal	A325N	0.500	1	2.732	5.709	0.479 ✓	1	Member Block Shear
T2	160	Leg	A325N	0.750	6	4.408	29.821	0.148 ✓	1	Bolt Tension
		Diagonal	A325N	0.625	1	4.122	7.830	0.526 ✓	1	Member Bearing
T3	140	Leg	A325N	1.000	6	7.983	53.014	0.151 ✓	1	Bolt Tension
		Diagonal	A325N	0.625	1	5.507	7.830	0.703 ✓	1	Member Bearing
T4	120	Leg	A325N	1.000	8	8.747	53.014	0.165 ✓	1	Bolt Tension
		Diagonal	A325N	0.625	1	6.689	10.440	0.641 ✓	1	Member Bearing
T5	100	Leg	A325N	1.000	8	11.767	53.014	0.222 ✓	1	Bolt Tension
		Diagonal	A325N	0.625	1	7.062	10.440	0.676 ✓	1	Member Bearing
T6	80	Leg	A325N	1.250	8	14.801	82.835	0.179 ✓	1	Bolt Tension
		Diagonal	A325N	0.625	1	7.562	10.440	0.724 ✓	1	Member Bearing
T7	60	Leg	A325N	1.250	8	17.840	82.835	0.215 ✓	1	Bolt Tension
		Diagonal	A325N	0.625	1	8.060	10.440	0.772 ✓	1	Member Bearing
T8	40	Leg	A325N	1.250	8	20.828	82.835	0.251 ✓	1	Bolt Tension
		Diagonal	A325N	0.625	1	8.779	12.425	0.707 ✓	1	Bolt Shear
T9	20	Diagonal	A325N	0.625	1	9.501	12.425	0.765 ✓	1	Bolt Shear

### Compression Checks

### Leg Design Data (Compression)

Section No.	Elevation ft	Size	L ft	L <sub>u</sub> ft	KL/r	A in <sup>2</sup>	P <sub>u</sub> K	φP <sub>n</sub> K	Ratio $\frac{P_u}{\phi P_n}$
T1	180 - 160	P2.5x.203 (2.875 OD)	20.035	5.009	63.4 K=1.00	1.704	-12.736	60.269	0.211 <sup>1</sup> ✓
T2	160 - 140	P3x.216 (3.5 OD)	20.035	6.678	68.9	2.228	-31.328	74.468	0.421 <sup>1</sup>

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	<b>Client</b> SBA Communications Corporation	<b>Designed by</b> ddhungana

Section No.	Elevation ft	Size	L ft	L <sub>u</sub> ft	Kl/r	A in <sup>2</sup>	P <sub>u</sub> K	φP <sub>n</sub> K	Ratio $\frac{P_u}{\phi P_n}$
T3	140 - 120	P3.5x.226 (4 OD)	20.035	6.678	K=1.00 60.0	2.680	-54.957	98.046	0.561 <sup>1</sup> ✓
T4	120 - 100	P5 x 0.258(5.563 OD)	20.035	10.017	K=1.00 71.6	3.844	-78.863	124.619	0.633 <sup>1</sup> ✓
T5	100 - 80	P6 x 0.28 (6.625 OD)	20.035	10.017	K=1.00 59.4	5.032	-105.275	185.123	0.569 <sup>1</sup> ✓
T6	80 - 60	P6 x 0.28 (6.625 OD)	20.035	10.017	K=1.00 59.4	5.032	-131.999	185.123	0.713 <sup>1</sup> ✓
T7	60 - 40	P8x.332 (8.625 OD)	20.035	10.017	K=1.00 41.0	8.650	-159.296	368.199	0.433 <sup>1</sup> ✓
T8	40 - 20	P8x.332 (8.625 OD)	20.035	10.017	K=1.00 41.0	8.650	-186.809	368.199	0.507 <sup>1</sup> ✓
T9	20 - 0	P8x.332 (8.625 OD)	20.035	10.017	K=1.00 41.0	8.650	-214.082	368.199	0.581 <sup>1</sup> ✓

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

### Diagonal Design Data (Compression)

Section No.	Elevation ft	Size	L ft	L <sub>u</sub> ft	Kl/r	A in <sup>2</sup>	P <sub>u</sub> K	φP <sub>n</sub> K	Ratio $\frac{P_u}{\phi P_n}$
T1	180 - 160	L1-3/4x1-3/4x3/16	8.170	4.113	K=1.00 143.7	0.621	-2.824	6.795	0.416 <sup>1</sup> ✓
T2	160 - 140	L2 1/2x2 1/2x3/16	10.460	5.291	K=1.00 128.3	0.902	-4.173	12.293	0.340 <sup>1</sup> ✓
T3	140 - 120	L3x3x3/16	11.792	5.944	K=1.00 119.7	1.090	-5.520	16.457	0.335 <sup>1</sup> ✓
T4	120 - 100	L3 1/2x3 1/2x1/4	15.058	7.688	K=1.00 132.9	1.690	-6.754	21.598	0.313 <sup>1</sup> ✓
T5	100 - 80	L3 1/2x3 1/2x1/4	16.341	8.314	K=1.00 143.8	1.690	-7.156	18.474	0.387 <sup>1</sup> ✓
T6	80 - 60	L4x4x1/4	17.688	8.977	K=1.00 135.5	1.940	-7.665	23.870	0.321 <sup>1</sup> ✓
T7	60 - 40	L4x4x1/4	19.085	9.667	K=1.00 145.9	1.940	-8.206	20.582	0.399 <sup>1</sup> ✓
T8	40 - 20	L4x4x3/8	20.523	10.380	K=1.00 158.1	2.860	-8.779	25.858	0.340 <sup>1</sup> ✓
T9	20 - 0	L5x5x5/16	21.993	11.111	K=1.00 134.1	3.030	-9.501	37.986	0.250 <sup>1</sup> ✓

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

### Top Girt Design Data (Compression)

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	<b>Client</b> SBA Communications Corporation	<b>Designed by</b> ddhungana

Section No.	Elevation ft	Size	L ft	L <sub>u</sub> ft	Kl/r	A in <sup>2</sup>	P <sub>u</sub> K	φP <sub>n</sub> K	Ratio $\frac{P_u}{\phi P_n}$
T1	180 - 160	L1 3/4x1 3/4x3/16	5.000	5.000	153.6 K=0.88	0.621	-0.022	5.944	0.004 <sup>1</sup> ✓

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

### Tension Checks

### Leg Design Data (Tension)

Section No.	Elevation ft	Size	L ft	L <sub>u</sub> ft	Kl/r	A in <sup>2</sup>	P <sub>u</sub> K	φP <sub>n</sub> K	Ratio $\frac{P_u}{\phi P_n}$
T1	180 - 160	P2.5x.203 (2.875 OD)	20.035	5.009	63.4	1.704	8.220	82.817	0.099 <sup>1</sup> ✓
T2	160 - 140	P3x.216 (3.5 OD)	20.035	6.678	68.9	2.228	26.446	108.304	0.244 <sup>1</sup> ✓
T3	140 - 120	P3.5x.226 (4 OD)	20.035	6.678	60.0	2.680	47.896	130.226	0.368 <sup>1</sup> ✓
T4	120 - 100	P5 x 0.258(5.563 OD)	20.035	10.017	71.6	3.844	69.974	186.796	0.375 <sup>1</sup> ✓
T5	100 - 80	P6 x 0.28 (6.625 OD)	20.035	10.017	59.4	5.032	94.139	244.535	0.385 <sup>1</sup> ✓
T6	80 - 60	P6 x 0.28 (6.625 OD)	20.035	10.017	59.4	5.032	118.404	244.535	0.484 <sup>1</sup> ✓
T7	60 - 40	P8x.332 (8.625 OD)	20.035	10.017	41.0	8.650	142.723	420.374	0.340 <sup>1</sup> ✓
T8	40 - 20	P8x.332 (8.625 OD)	20.035	10.017	41.0	8.650	166.627	420.374	0.396 <sup>1</sup> ✓
T9	20 - 0	P8x.332 (8.625 OD)	20.035	10.017	41.0	8.650	190.016	420.374	0.452 <sup>1</sup> ✓

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

### Diagonal Design Data (Tension)

Section No.	Elevation ft	Size	L ft	L <sub>u</sub> ft	Kl/r	A in <sup>2</sup>	P <sub>u</sub> K	φP <sub>n</sub> K	Ratio $\frac{P_u}{\phi P_n}$
T1	180 - 160	L1-3/4x1-3/4x3/16	8.170	4.113	94.2	0.378	2.732	16.440	0.166 <sup>1</sup> ✓
T2	160 - 140	L2 1/2x2 1/2x3/16	10.460	5.291	83.4	0.571	4.122	24.851	0.166 <sup>1</sup> ✓
T3	140 - 120	L3x3x3/16	11.792	5.944	77.5	0.712	5.507	30.968	0.178 <sup>1</sup> ✓
T4	120 - 100	L3 1/2x3 1/2x1/4	15.058	7.688	86.0	1.127	6.689	49.019	0.136 <sup>1</sup> ✓

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Section No.	Elevation ft	Size	L ft	L <sub>u</sub> ft	Kl/r	A in <sup>2</sup>	P <sub>u</sub> K	φP <sub>n</sub> K	Ratio $\frac{P_u}{\phi P_n}$
T5	100 - 80	L3 1/2x3 1/2x1/4	16.341	8.314	92.8	1.127	7.062	49.019	0.144 <sup>1</sup> ✓
T6	80 - 60	L4x4x1/4	17.688	8.977	87.3	1.314	7.562	57.175	0.132 <sup>1</sup> ✓
T7	60 - 40	L4x4x1/4	19.085	9.667	94.0	1.314	8.060	57.175	0.141 <sup>1</sup> ✓
T8	40 - 20	L4x4x3/8	20.523	10.380	102.4	1.934	8.610	84.132	0.102 <sup>1</sup> ✓
T9	20 - 0	L5x5x5/16	21.993	11.111	85.8	2.097	9.175	91.207	0.101 <sup>1</sup> ✓

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

### Top Girt Design Data (Tension)

Section No.	Elevation ft	Size	L ft	L <sub>u</sub> ft	Kl/r	A in <sup>2</sup>	P <sub>u</sub> K	φP <sub>n</sub> K	Ratio $\frac{P_u}{\phi P_n}$
T1	180 - 160	L1 3/4x1 3/4x3/16	5.000	5.000	111.7	0.621	0.048	20.123	0.002 <sup>1</sup> ✓

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

### Section Capacity Table

Section No.	Elevation ft	Component Type	Size	Critical Element	P K	φP <sub>allow</sub> K	% Capacity	Pass Fail
T1	180 - 160	Leg	P2.5x.203 (2.875 OD)	4	-12.736	60.269	21.1	Pass
T2	160 - 140	Leg	P3x.216 (3.5 OD)	41	-31.328	74.468	42.1	Pass
T3	140 - 120	Leg	P3.5x.226 (4 OD)	69	-54.957	98.046	56.1	Pass
T4	120 - 100	Leg	P5 x 0.258(5.563 OD)	97	-78.863	124.619	63.3	Pass
T5	100 - 80	Leg	P6 x 0.28 (6.625 OD)	117	-105.275	185.123	56.9	Pass
T6	80 - 60	Leg	P6 x 0.28 (6.625 OD)	137	-131.999	185.123	71.3	Pass
T7	60 - 40	Leg	P8x.332 (8.625 OD)	157	-159.296	368.199	43.3	Pass
T8	40 - 20	Leg	P8x.332 (8.625 OD)	177	-186.809	368.199	50.7	Pass
T9	20 - 0	Leg	P8x.332 (8.625 OD)	197	-214.082	368.199	58.1	Pass
T1	180 - 160	Diagonal	L1-3/4x1-3/4x3/16	13	-2.824	6.795	41.6	Pass
T2	160 - 140	Diagonal	L2 1/2x2 1/2x3/16	52	-4.173	12.293	34.0	Pass
T3	140 - 120	Diagonal	L3x3x3/16	80	-5.520	16.457	52.6 (b)	Pass
T4	120 - 100	Diagonal	L3 1/2x3 1/2x1/4	108	-6.754	21.598	33.5	Pass
T5	100 - 80	Diagonal	L3 1/2x3 1/2x1/4	128	-7.156	18.474	70.3 (b)	Pass
T6	80 - 60	Diagonal	L4x4x1/4	147	-7.665	23.870	31.3	Pass
							64.1 (b)	
							38.7	Pass
							67.6 (b)	
							32.1	Pass
							72.4 (b)	

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	<b>Client</b> SBA Communications Corporation	<b>Designed by</b> ddhungana

Section No.	Elevation ft	Component Type	Size	Critical Element	P K	$\phi P_{allow}$ K	% Capacity	Pass Fail	
T7	60 - 40	Diagonal	L4x4x1/4	167	-8.206	20.582	39.9	Pass	
T8	40 - 20	Diagonal	L4x4x3/8	187	-8.779	25.858	77.2 (b) 34.0	Pass	
T9	20 - 0	Diagonal	L5x5x5/16	201	-9.501	37.986	70.7 (b) 25.0	Pass	
T1	180 - 160	Top Girt	L1 3/4x1 3/4x3/16	6	-0.022	5.944	76.5 (b) 0.6	Pass	
							Summary		
							Leg (T6)	71.3	Pass
							Diagonal (T7)	77.2	Pass
							Top Girt (T1)	0.6	Pass
							Bolt Checks	77.2	Pass
							<b>RATING =</b>	<b>77.2</b>	<b>Pass</b>

**MATHCAD CALCULATION PRINTOUT**



**Existing Pier Foundation Check for 180' SST**

**Customer Name: SBA Communication Corp.**  
**Customer Site Number: CT46125-A-03**  
**Customer Site Name: CT72XC031/Roxbury-Lower County Rd.**  
**Carrier Name: Sprint Nextel**

**Latitude: 41.559528**  
**Longitude: -73.292306**

**ACGI #17-6610**

**Allpro Consulting Group, Inc.**  
9221 Lyndon B. Johnson Freeway, Suite 204  
Dallas, TX 75243  
Tel: 972-231-8893, Fax: 866-364-8375

**INPUT DATA**

**-Foundation Reactions-(factored)**

(TNX output):

Down Load:  $P_{down} := 222 \cdot \text{kips}$   
 Uplift Load:  $P_{up} := 196 \cdot \text{kips}$   
 Shear Load:  $S := 24 \cdot \text{kips}$   
 Moment:  $M := 0 \cdot \text{ft} \cdot \text{kips}$

**-Pier Dimensions-**

Diameter:  $D_{pier} := 2.5 \text{ft}$   
 Extension above grade:  $E_{pier} := 0.25 \cdot \text{ft}$   
 Concrete density: See below  
 Concrete strength:  $F_c := 3000 \cdot \text{psi}$   
 Rebar Fy:  $F_y := 60 \cdot \text{ksi}$

Foundation design Building code - IBC2012, ACI318-11, TIA-222-G

ACI Strength reduction factors

$\phi_{comp} := 0.65$  (ACI 9.3.2.2)  
 $\phi_{tens} := 0.9$  (ACI 9.3.2.2a)  
 $\phi_{shear} := 0.75$  (ACI 9.3.2.3)

**-Factor of Safety for soil strength-**

$\phi_{s\_bear} := 0.75$  as per TIA-222-G code for bearing, 9.4.1 - for SST/MP  
 $\phi_{s\_friction} := 0.75$  as per TIA-222-G code for skin friction resistance, 9.4.1  
 $\phi_{s\_lateral} := 0.75$  as per TIA-222-G code for lateral resistance, 9.4.1

**-Soil Properties- (Note)**

Number of soil layers  $NSL := 3$   $j := 1.. NSL$   
 Neglected soil height  $L_{ngl} := 2.5 \cdot \text{ft}$   $k := 1.. NSL$   
 $i_{neg} := 2$  (neglected soil layer number)  $i := 1.. NSL$

$\alpha := 0.4$  Estimated cohesion

Ground Water @ 15' depth below ground level

Height	PHI	Cu	Soil Dens	Conc Dens	Ult Skin friction	
$H_j :=$	$\phi_j :=$	$Cu_j :=$	$\gamma_{s_j} :=$	$\gamma_{c_j} :=$	$SKU_{dn_j} :=$ $SKU_{up_j} :=$	
2·ft	0·deg	0·ksf	0·pcf	150·pcf	0·ksf	0·ksf
0.5·ft	35·deg	0·ksf	165·pcf	150·pcf	36·ksf	36·ksf
7.5·ft	35·deg	0·ksf	165·pcf	150·pcf	36·ksf	36·ksf

$$L_{pier} := \sum_{j=1}^{NSL} H_j \quad L_{pier} = 10 \text{ft}$$

Soil Bearing Safety factor:  $SF := 2$  (as per GEO report)

Allowable bearing capacity:  $BC_{all} := 30ksf$  (as per GEO report)

End Ultimate bearing capacity:  $BC_{ult} := BC_{all} \cdot SF = 60 \cdot ksf$

**CALCULATIONS**

-Pier calculation-

Pier area  $A_{pier} := \pi \cdot \frac{D_{pier}^2}{4}$   $A_{pier} = 4.91 ft^2$

Pier perimeter  $PM_{pier} := \pi \cdot D_{pier}$   $PM_{pier} = 7.85 ft$

Pier volume  $V_{pier} := A_{pier} \cdot (L_{pier} + E_{pier})$   $V_{pier} = 1.86 \cdot cy$

Weighted average unit weight of concrete

$$\gamma_{cave} := \frac{\sum_{n=1}^{NSL} (\gamma_{c_n} \cdot H_n)}{\sum_{n=1}^{NSL} H_n} \quad \gamma_{cave} = 150 \cdot pcf$$

Pier concrete weight  $W_{pier} := V_{pier} \cdot \gamma_{cave}$   $W_{pier} = 7.55 \cdot kips$

-Download capacity-

$\alpha = 0.4$  - (average value for soils 0.4)

$\sigma_{v_0} := 0.0 \cdot ksf$

$TL_0 := 0 \cdot ft$

$\sigma_{v_i} := \sigma_{v_{i-1}} + 1.0 \cdot \gamma_{s_i} \cdot H_i$

$SKFN_k := SKU_{dn_k} \cdot PM_{pier} \cdot H_k$   $P_k := \text{if}[k = NSL, [A_{pier} \cdot (BC_{ult})], 0 \cdot kips]$   $SKUFN_k := SKU_{up_k} \cdot PM_{pier} \cdot H_k$

SKFN <sub>k</sub> =	P <sub>k</sub> =
0 · lb	0 · lb
141371.67	0
2.12 · 10 <sup>6</sup>	294524.31

$P_{dcap} := \sum_k P_k \cdot \phi_{s\_bear} + \sum_k SKFN_k \cdot \phi_{s\_friction}$

$P_{dcap} = 1917.35 \cdot kips > P_{dwn} = 222 \cdot kips$  **OK!**  $\frac{P_{dwn}}{P_{dcap}} = 11.58 \cdot \%$

-Required Pier Length Based on Brohm's method for granular soils-

$PP_i := \text{if} \left[ i > i_{neg}, \left( 2 \cdot Cu_i \cdot \sqrt{\tan \left( 45 \cdot \text{deg} + \frac{\phi_i}{2} \right)^2} + \sigma_{v_i} \cdot \tan \left( 45 \cdot \text{deg} + \frac{\phi_i}{2} \right)^2 \right) \cdot \phi_{s\_lateral}, 0 \cdot kips \right]$

PP<sub>j</sub> =

0	·psf
0	
3653.27	

$$PP_j := PP_j + PP_{j-1}$$

PP<sub>j</sub> =

0	·psf
0	
3653.27	

$$PP := \frac{\sum_j \left[ (PP_j + PP_{j-1}) \cdot \frac{H_j}{2} \right]}{\sum_j (H_j) - L_{ng1}}$$

$$PP = 1.83 \cdot \text{kscf}$$

Passive pressure

Depth to point of zero shear

$$PP_{allw} := \frac{2PP}{L_{pier} - L_{ng1}}$$

$$PP_{allw} = 0.49 \cdot \text{kcf}$$

$$f := \left( \frac{S}{D_{pier} \cdot PP_{allw}} \right)^{\frac{1}{2}} \cdot 0.816 \quad f = 3.62 \text{ ft}$$

-Required pier length-

$$L_1 := 5 \cdot \text{ft}$$

$$A := \text{root} \left[ S \cdot (E_{pier} + L_{ng1} + L_1) + M - \left[ D_{pier} \cdot PP_{allw} \cdot L_1^3 \cdot (.5) \right], L_1 \right]$$

$$A = 7.36 \text{ ft}$$

$$L_{req} := A + L_{ng1}$$

$$L_{req} = 9.86 \text{ ft}$$

< Available

$$L_{pier} = 10 \text{ ft}$$

$$\text{Ratio} := \frac{L_{req}}{L_{pier}}$$

$$\text{Ratio} = 98.585 \cdot \%$$

**OK!**

### SUMMARY

-Pier Dimensions-

Depth of pier	$L_{pier} = 10 \text{ ft}$	Concrete strength	$F_c = 3000 \cdot \text{psi}$
Extension above grade	$E_{pier} = 0.25 \text{ ft}$	Rebar F <sub>y</sub>	$F_y = 60 \cdot \text{ksi}$
Total length of pier	$L_{tot} := L_{pier} + E_{pier}$	$L_{tot} = 10.25 \text{ ft}$	
Diameter	$D_{pier} = 2.5 \text{ ft}$		
Volume of pier concrete	$V_{pier} = 1.86 \cdot \text{cy}$		
Weight of pier concrete	$W_{pier} = 7.55 \cdot \text{kips}$		

Calculations summary-Download capacity-

$$P_{dcap} = 1917.35 \cdot \text{kips} > P_{dwn} = 222 \cdot \text{kips} \quad \text{OK!} \quad \frac{P_{dwn}}{P_{dcap}} = 11.58\%$$

-Required Pier Length Based on Brohm's method for cohesive soils-

$$L_{req} = 9.86 \text{ ft} < L_{pier} = 10 \text{ ft} \quad \text{OK!} \quad \frac{L_{req}}{L_{pier}} = 98.58\%$$

**Pier Foundation with rock anchor for 180' Self Supporting Tower**

**Customer Name: SBA Communication Corp**  
**Customer Site Number: CT46125-A-03**  
**Customer Site Name: CT72XC031/Roxbury-Lower County Rd.**

**Carrier Name: Sprint Nextel**  
**Application: 71183, v1**

**ACGI Job # 17-6610**

**By:**

**Allpro Consulting Group, Inc.**  
**9221 Lyndon B. Johnson Freeway, Suite 204**  
**Dallas, TX 75243**  
**Tel: 972-231-8893, Fax: 866-364-8375**

PIER WITH ROCK ANCHOR REINFORCEMENT

INPUT DATA

-Foundation Reactions- G Code, (factored)

(As per TNX Output)

Down Load  $P_{down} := 222 \cdot \text{kips}$   
 Uplift Load  $P_{up} := 196 \cdot \text{kips}$   
 Shear Load  $S := 24 \cdot \text{kips}$   
 Moment  $M := 0 \cdot \text{ft} \cdot \text{kips}$

Depths ,

Depth to bottom of socket ,  
 Depth to suitable rock ,  
 Depth to suitable earth ,

Soil Properties ,

Rock failure angle,  
 Unit weight of earth,  
 Unit weight of rock,

Dimensions

Overall footing length ,  
 Suitable Earth height ,  
 Suitable rock height ,  
 Socket radius ,  
 Gross Cone triangle leg ,  
 Rock Cone triangle leg ,  
 Cone Height Below Ftg ,

Depth below Caisson  $h_{ra} := 8 \text{ft}$   
 Rock Anchor Spacing  $SP := 4 \text{ft}$

Anchors

Hole Diameter  $hole_d := 3.5 \text{in}$

-Pier Dimensions-

-Foundation Data as per

Diameter  $B_{ftg} := 2.5 \cdot \text{ft}$   
 Extension above grade  $D_{proj} := 0.25 \cdot \text{ft}$   
 Concrete unit weight  $\gamma_c := 150 \frac{\text{lb}}{\text{ft}^3}$   
 Rebar Fy  $F_y := 60 \cdot \text{ksi}$

$D_{socket} := 10 \text{ft}$

$D_{rock} := 2 \text{ft}$

$D_{earth} := 0 \text{ft}$

$\phi := 30 \text{deg}$

$\gamma_{earth} := 125 \frac{\text{lb}}{\text{ft}^3}$

$\gamma_{rock} := 165 \frac{\text{lb}}{\text{ft}^3}$

$L_{ftg} := D_{proj} + D_{socket} = 10.25 \text{ft}$

$E := D_{rock} - D_{earth}$

$R := D_{socket} - D_{rock} - D_{earth}$

$R_{ftg} := \frac{B_{ftg}}{2} = 1.25 \text{ft}$

$X_L := (E + R) \cdot \tan(\phi) = 5.77 \text{ft}$

$X_R := R \cdot \tan(\phi) = 4.62 \text{ft}$

$h := \frac{2 \cdot B_{ftg}}{\tan(\phi)} = 8.66 \text{ft}$

Bond Strength  $\sigma_{\text{bond}} := 60 \frac{\text{lb}}{\text{in}^2}$

Design :

Resistance from rock Anchors:

Radius of Rock cone,  $X_{\text{rac}} := h_{\text{ra}} \cdot \tan(\phi) = 4.62 \text{ ft}$

Conical volume  $V_1 := \frac{\pi \cdot X_{\text{rac}}^2 \cdot h_{\text{ra}}}{3} = 178.72 \text{ ft}^3$

Triangular Volume  $V_2 := X_{\text{rac}} \cdot h_{\text{ra}} \cdot \text{SP} = 147.8 \text{ ft}^3$

Resisting Force  $F_{\text{anchor}} := \frac{(V_1 + V_2) \cdot \gamma_{\text{rock}}}{2} = 26938.18 \text{ lb}$

Volumes:

Revised total gross cone volume  $\text{TCV}_1 := \frac{\pi}{3} \cdot \left( X_{\text{rac}} + \frac{\text{SP}}{2} + X_L \right)^2 \cdot (E + R + h) = 3000.89 \text{ ft}^3$

Revised total gross cone volume  $\text{TRCV}_1 := \frac{\pi}{3} \cdot \left( X_{\text{rac}} + \frac{\text{SP}}{2} + X_R \right)^2 \cdot (R + h) = 2203.22 \text{ ft}^3$

Revised cone point volume  $\text{CPV}_1 := \frac{\pi}{3} \cdot \left( X_{\text{rac}} + \frac{\text{SP}}{2} + R_{\text{ftg}} \right)^2 \cdot (h) = 561.53 \text{ ft}^3$

Revised Rock volume( Net)  $R_{\text{net}.1} := \text{TRCV}_1 - \text{CPV}_1 - (\pi \cdot R_{\text{ftg}}^2 \cdot R) = 1602.41 \text{ ft}^3$

Revised Rock volume( Net)  $E_{\text{net}.1} := \text{TCV}_1 - \text{TRCV}_1 - (\pi \cdot R_{\text{ftg}}^2 \cdot E) = 787.86 \text{ ft}^3$

Caisson Volume  $C_{\text{voll}} := \pi \cdot R_{\text{ftg}}^2 \cdot L_{\text{ftg}} = 50.31 \text{ ft}^3$

Resisting Forces:

Revised resisting rock force  $F_{\text{rock}1} := R_{\text{net}.1} \cdot \gamma_{\text{rock}} = 264398.43 \text{ lb}$

Revised resisting rock force  $F_{\text{earth}1} := E_{\text{net}.1} \cdot \gamma_{\text{earth}} = 98481.9 \text{ lb}$

Revised resisting concrete force  $F_{\text{concrete}1} := C_{\text{voll}} \cdot \gamma_c = 7547.19 \text{ lb}$

Revised resisting socket force  $F_{\text{socket}1} := F_{\text{rock}1} + F_{\text{earth}1} + F_{\text{concrete}1} = 370427.51 \text{ lb}$

Anchor Resisting force  $F_{\text{anchor}1} := 26.94 \text{ kips}$

Check TIA-G Code:

$\text{UP2} := 0.75F_{\text{rock}1} + 0.75F_{\text{earth}1} + 0.75F_{\text{concrete}1} + 0.75F_{\text{anchor}1} = 298025.63 \text{ lb}$

Percentage Capacity,  $\frac{P_{\text{up}}}{\text{UP2}} = 0.66 \quad 66.0\%, \text{ OK}$



# EXISTING 180' SST TOWER ANCHOR ROD CHECK

## REACTIONS ON THE FOUNDATION

As per Tnx output (see attached)

Down load;  $P_v := 222 \cdot \text{kips}$       Shear;  $S := 22 \cdot \text{kips}$   
Uplift load;  $P_{up} := 196 \cdot \text{kips}$       Moment;  $M := 0 \cdot \text{kips} \cdot \text{ft}$

Anchor Rod Data is as per Tower drawings by Universal Tower Inc., Job No. S-168, dated 07/1999

Number of Anchor Rods:  $N_{anchors} := 4$   
Diameter of Anchors:  $D_{anchors} := 1.5 \text{in}$        $n := \frac{5}{\text{in}}$   
Net Tensile Area of Anchors:  $A_{anchors} := 1.41 \text{in}^2$       (Table 7-17, AISC 14th )  
Ultimate Tensile Stress:  $F_{anchors} := 58 \text{ksi}$       (Grade A 36)  
Safety Factor for Anchor:  $\phi_{anchor} := 0.80$       (Section 4.9.9, TIA-222-G)  
Allowable Axial Load per Anchor:  $T_{cap} := \phi_{anchor} \cdot F_{anchors} \cdot A_{anchors}$   
 $T_{cap} = 65.42 \cdot \text{kips}$

For detail type (C) as per Figure 4.4       $\eta := 0.55$

Maximum Load on Anchor:  $T_{max} := \frac{P_{up} + \frac{S}{\eta}}{N_{anchors}}$        $T_{max} = 59 \cdot \text{kips}$

Anchor Rod Capacity:  $\frac{T_{max}}{T_{cap}} = 90.18\%$       OK!

### Summary

Down load       $S = 22 \cdot \text{kips}$   
Uplift load       $P_v = 222 \cdot \text{kips}$   
Moment       $P_{up} = 196 \cdot \text{kips}$   
                  $M = 0 \cdot \text{ft} \cdot \text{kip}$

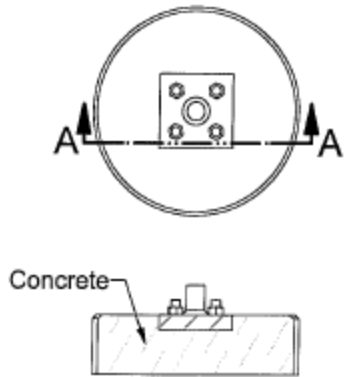
Anchor Rod Check       $T_{max} = 59 \cdot \text{kips} < T_{cap} = 65.42 \cdot \text{kips}$

Anchor\_Rod\_Check := if( $T_{max} < T_{cap}$ , "OK", "Not OK")

Anchor\_Rod\_Check = "OK"

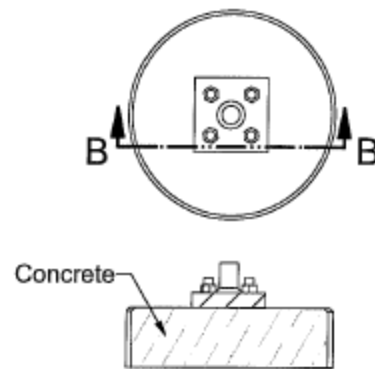


ANSI/TIA-222-G  
Addendum 1



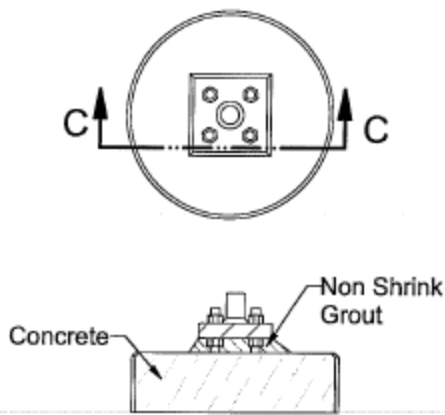
SECTION A-A

Detail Type (a)



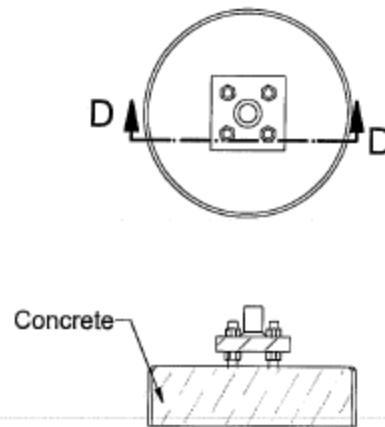
SECTION B-B

Detail Type (b)



SECTION C-C

Detail Type (c)



SECTION D-D

Detail Type (d)

(See Note 1 below)

Note:

1. When clear distance from top of concrete to the bottom face of the leveling nut exceeds 1.0 times the diameter of the anchor rod, bending of the anchor rod shall be considered (refer to 4.9.9).

Figure 4-4: Anchor Rod Detail Types

**4.9.9 Anchor Rods**

For anchor rods, the following interaction equation shall be satisfied:

$$\left( \frac{P_u + \frac{V_u}{\eta}}{\phi R_{nt}} \right) \leq 1$$

where:

$$\phi = 0.80$$

$P_u$  = tension force for detail types (a), (b) & (c) and larger of compression or tension force for type (d) as depicted in Figure 4-4.

$V_u$  = shear force (direct shear and torsion components) corresponding to  $P_u$

$R_{nt}$  = nominal tensile strength of anchor rod as per 4.9.6.1

$$\begin{aligned} \eta &= 0.90 \text{ for detail type (a)} \\ &= 0.70 \text{ for detail type (b)} \\ &= 0.55 \text{ for detail type (c)} \\ &= 0.50 \text{ for detail type (d)} \end{aligned}$$

For detail type (d), when the clear distance from the top of concrete to the bottom leveling nut exceeds 1.0 times the diameter of the anchor rod, the following interaction equation shall also be satisfied:

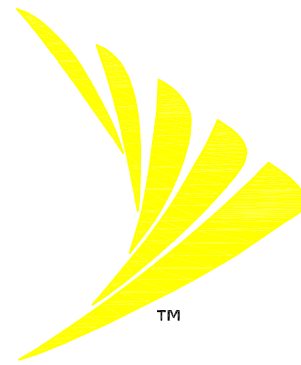
$$\left( \frac{V_u}{\phi R_{nv}} \right)^2 + \left( \left| \frac{P_u}{\phi R_{nt}} \right| + \left| \frac{M_u}{\phi R_{nm}} \right| \right)^2 \leq 1$$

where:

$$\begin{aligned} M_u &= \text{bending moment corresponding to } V_u \\ &= 0.65 l_{ar} V_u \end{aligned}$$

$l_{ar}$  = length from top of concrete to bottom of anchor rod leveling nut

**SPECIAL CONSTRUCTION NOTE:**  
 SPRINT WORK IS CONTINGENT ON THE FOLLOWING:  
 \* COMPLETION OF A GLOBAL STRUCTURAL STABILITY ANALYSIS.  
 \* COMPLETION OF A MOUNT STRUCTURAL ANALYSIS.  
 \* GC SHALL FURNISH, INSTALL AND COMPLETE ALL REQUIRED STRUCTURAL MODIFICATIONS AS INDICATED IN BEFORE-MENTIONED GLOBAL AND MOUNT ANALYSIS.



**SITE NAME:** ROXBURY-LOWER COUNTY ROAD  
**SITE NUMBER:** CT72XC031  
**AUGMENT ID:** CT72XC031Q17.1  
**SITE ADDRESS:** LOWER COUNTY ROAD  
 ROXBURY, CT 06783  
**JURISDICTION:** TOWN OF ROXBURY/ CT SITING COUNCIL  
**SITE TYPE:** EXISTING 180' SELF SUPPORT  
**PROGRAM:** DO MACRO UPGRADE EQUIPMENT DEPLOYMENT



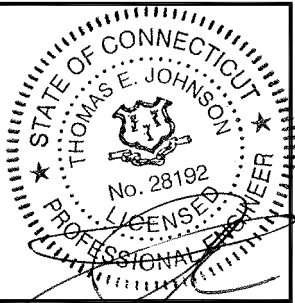
1 INTERNATIONAL BLVD, SUITE 800  
 MAHWAH, NJ 07495  
 TEL: (800) 357-7641



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



4 Bay Road, Building A  
 Suite 200  
 Hadley, MA 01035 Ph: (413) 320-4918



CHECKED BY: *[Signature]*

APPROVED BY: JMM/TEJ

**SUBMITTALS**

REV.	DATE	DESCRIPTION	BY
1	01/30/18	ISSUED FOR CONSTRUCTION	PN
0	11/07/17	ISSUED FOR REVIEW	JEB/EN

SITE NUMBER:  
 CT72XC031

SITE NAME:  
 ROXBURY-LOWER COUNTY ROAD

SITE ADDRESS:  
 LOWER COUNTY ROAD  
 ROXBURY, CT 06783

SHEET TITLE

TITLE SHEET

SHEET NUMBER

T-1

**PROJECT INFORMATION**

**SITE INFORMATION**  
 LATITUDE: 41° 33' 34.30" N (41.559528°)  
 LONGITUDE: 73° 17' 32.30" W (-73.292306°)  
 GROUND ELEVATION: 872'± AMSL (PER GOOGLE EARTH)  
 STRUCTURE HEIGHT: 180'± AGL (FROM RECORD STRUCTURAL)  
 STRUCTURE TYPE: SELF SUPPORT  
 ZONING JURISDICTION: TOWN OF ROXBURY/ CT SITING COUNCIL  
 ZONING DISTRICT/ OCCUPANCY: RESIDENCE ZONE C  
 COUNTY: LITCHFIELD

**APPLICANT**  
 SPRINT  
 1 INTERNATIONAL BLVD. SUITE 800  
 MAHWAH, NJ 07495  
**PROPERTY OWNER:**  
 N/F TOWN OF ROXBURY  
 29 NORTH STREET  
 ROXBURY, CT 06783  
**TOWER OWNER:**  
 SBA 2012 TC ASSETS, LLC  
 8051 CONGRESS AVENUE  
 BOCA RATON, FL 33487  
 (561) 995-7670  
 SBA SITE ID: CT46125-A  
 SBA SITE NAME: ROXBURY-LOWER COUNTY ROAD  
**SBA CONTACT:**  
 STEPHEN ROTH  
 (860) 539-4920  
 SROth@sbasite.com

**LOCATION MAP**

N.T.S.



**AREA MAP**

N.T.S.



**SCOPE OF WORK**

- REMOVE (3) EXISTING SPRINT PANEL ANTENNAS AND REPLACE WITH (3) NEW SPRINT TRI-BAND PANEL ANTENNAS.
- REMOVE (3) EXISTING TIE-BACKS.
- TRIM EXISTING SPRINT SECTOR FRAME.
- INSTALL (3) TIE-BACKS TO EXISTING SPRINT SECTOR FRAME.
- INSTALL (3) NEW DOUBLE PIPE MOUNTS TO TOWER LEGS.
- INSTALL (3) NEW SPRINT 2500 MHz RRHS.
- INSTALL (3) NEW SPRINT 800 MHz RRHS.
- RELOCATE (3) EXISTING SPRINT 800 RRHS.
- RELOCATE (3) EXISTING SPRINT 1900 RRHS.

**GENERAL NOTES**

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

**DRAWING INDEX**

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

**CODE COMPLIANCE**

- 2016 CONNECTICUT STATE BUILDING CODE WITH AMENDMENTS.
- 2014 NATIONAL ELECTRICAL CODE WITH AMENDMENTS
- TIA-EIA-222-G

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

**APPROVALS**

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

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

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

**SECTION 01 100 - SCOPE OF WORK**

**PART 1 – GENERAL**

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

1.2 **RELATED DOCUMENTS:**

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

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

1.4 **NATIONALLY RECOGNIZED CODES AND STANDARDS:**

- A. THE WORK SHALL COMPLY WITH APPLICABLE NATIONAL AND LOCAL CODES AND STANDARDS, LATEST EDITION, AND PORTIONS THEREOF, INCLUDED BUT NOT LIMITED TO THE FOLLOWING:
  1. GR-78-CORE GENERIC REQUIREMENTS FOR THE PHYSICAL DESIGN AND MANUFACTURE OF TELECOMMUNICATIONS EQUIPMENT.
  2. GR-1089 CORE, ELECTROMAGNETIC COMPATIBILITY AND ELECTRICAL SAFETY -GENERIC CRITERIA FOR NETWORK TELECOMMUNICATIONS EQUIPMENT.
  3. NATIONAL FIRE PROTECTION ASSOCIATION CODES AND STANDARDS (NFPA) INCLUDING NFPA 70 (NATIONAL ELECTRICAL CODE - "NEC") AND NFPA 101 (LIFE SAFETY CODE).
  4. AMERICAN SOCIETY FOR TESTING OF MATERIALS (ASTM)
  5. INSTITUTE OF ELECTRONIC AND ELECTRICAL ENGINEERS (IEEE)
  6. AMERICAN CONCRETE INSTITUTE (ACI)
  7. AMERICAN WIRE PRODUCERS ASSOCIATION (AWPA)
  8. CONCRETE REINFORCING STEEL INSTITUTE (CRSI)
  9. AMERICAN ASSOCIATION OF STATE HIGHWAY AND TRANSPORTATION OFFICIALS (AASHTO)
  10. PORTLAND CEMENT ASSOCIATION (PCA)
  11. NATIONAL CONCRETE MASONRY ASSOCIATION (NCMA)
  12. BRICK INDUSTRY ASSOCIATION (BIA)
  13. AMERICAN WELDING SOCIETY (AWS)
  14. NATIONAL ROOFING CONTRACTORS ASSOCIATION (NRCA)
  15. SHEET METAL AND AIR CONDITIONING CONTRACTORS' NATIONAL ASSOCIATION (SMACNA)
  16. DOOR AND HARDWARE INSTITUTE (DHI)
  17. OCCUPATIONAL SAFETY AND HEALTH ACT (OSHA)
  18. APPLICABLE BUILDING CODES INCLUDING UNIFORM BUILDING CODE, SOUTHERN BUILDING CODE, BOCA, AND THE INTERNATIONAL BUILDING CODE.

1.5 **DEFINITIONS:**

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

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

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

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

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

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

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

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

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

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

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

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

1.15 **USE OF ELECTRONIC PROJECT MANAGEMENT SYSTEMS:**

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

**PART 2 – PRODUCTS (NOT USED)**

**PART 3 – EXECUTION**

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

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

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

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

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

**SECTION 01 200 - COMPANY FURNISHED MATERIAL AND EQUIPMENT**

**PART 1 – GENERAL**

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

1.2 **RELATED DOCUMENTS:**

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

**PART 2 – PRODUCTS (NOT USED)**

**PART 3 – EXECUTION**

3.1 **RECEIPT OF MATERIAL AND EQUIPMENT:**

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

3.2 **DELIVERABLES:**

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

**SECTION 01 300 - CELL SITE CONSTRUCTION**

**PART 1 – GENERAL**

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

1.2 **RELATED DOCUMENTS:**

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

1.3 **NOTICE TO PROCEED:**

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

**PART 2 – PRODUCTS (NOT USED)**

**PART 3 – EXECUTION**

3.1 **FUNCTIONAL REQUIREMENTS:**

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

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

3.2 **GENERAL REQUIREMENTS FOR CIVIL CONSTRUCTION:**

- A. CONTRACTOR SHALL KEEP THE SITE FREE FROM ACCUMULATING WASTE MATERIAL, DEBRIS, AND TRASH. AT THE COMPLETION OF THE WORK, CONTRACTOR SHALL REMOVE FROM THE SITE ALL REMAINING RUBBISH, IMPLEMENTS, TEMPORARY FACILITIES, AND SURPLUS MATERIALS.
- B. EQUIPMENT ROOMS SHALL AT ALL TIMES BE MAINTAINED "BROOM CLEAN" AND CLEAR OF DEBRIS.
- C. CONTRACTOR SHALL TAKE ALL REASONABLE PRECAUTIONS TO DISCOVER AND LOCATE ANY HAZARDOUS CONDITION.
  1. IN THE EVENT CONTRACTOR ENCOUNTERS ANY HAZARDOUS CONDITION WHICH HAS NOT BEEN ABATED OR OTHERWISE MITIGATED, CONTRACTOR AND ALL OTHER PERSONS SHALL IMMEDIATELY STOP WORK IN THE AFFECTED AREA AND NOTIFY COMPANY IN WRITING. THE WORK IN THE AFFECTED AREA SHALL NOT BE RESUMED EXCEPT BY WRITTEN NOTIFICATION BY COMPANY.
  2. CONTRACTOR AGREES TO USE CARE WHILE ON THE SITE AND SHALL NOT TAKE ANY ACTION THAT WILL OR MAY RESULT IN OR CAUSE THE HAZARDOUS CONDITION TO BE FURTHER RELEASED IN THE ENVIRONMENT, OR TO FURTHER EXPOSE INDIVIDUALS TO THE HAZARD.
- D. CONTRACTOR'S ACTIVITIES SHALL BE RESTRICTED TO THE PROJECT LIMITS. SHOULD AREAS OUTSIDE THE PROJECT LIMITS BE AFFECTED BY CONTRACTOR'S ACTIVITIES, CONTRACTOR SHALL IMMEDIATELY RETURN THEM TO ORIGINAL CONDITION
- E. CONDUCT TESTING AS REQUIRED HEREIN.

3.3 **DELIVERABLES:**

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



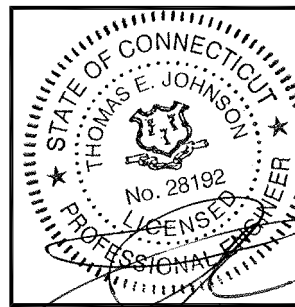
1 INTERNATIONAL BLVD, SUITE 800  
MAHWAH, NJ 07495  
TEL: (800) 357-7641



SBA COMMUNICATIONS CORP.  
134 FLANDERS ROAD, SUITE 125  
WESTBOROUGH, MA 01581  
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4 Bay Road, Building A  
Suite 200  
Hadley, MA 01035 Ph: (413)320-4918



CHECKED BY: *[Signature]* 1/30/18

APPROVED BY: JMM/TEJ

SUBMITTALS			
REV.	DATE	DESCRIPTION	BY
1	01/30/18	ISSUED FOR CONSTRUCTION	PN
0	11/07/17	ISSUED FOR REVIEW	JEB/EN

SITE NUMBER:  
**CT72XC031**  
SITE NAME:  
**ROXBURY-LOWER COUNTY ROAD**  
SITE ADDRESS:  
LOWER COUNTY ROAD  
ROXBURY, CT 06783

SHEET TITLE  
**OUTLINE SPECIFICATIONS**

SHEET NUMBER  
**SP-1**



CONTINUED FROM SP-1:

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

**PART 1 - GENERAL**

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

1.2 RELATED DOCUMENTS:

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

1.3 SUBMITTALS:

- A. THE WORK IN ALL ASPECTS SHALL COMPLY WITH THE CONSTRUCTION DRAWINGS AND THESE SPECIFICATIONS.
- B. SUBMIT THE FOLLOWING TO COMPANY REPRESENTATIVE FOR APPROVAL.
  - 1. CONCRETE MIX-DESIGNS FOR TOWER FOUNDATIONS, ANCHORS PIERS, AND CONCRETE PAVING.
  - 2. CONCRETE BREAK TESTS AS SPECIFIED HEREIN.
  - 3. SPECIAL FINISHES FOR INTERIOR SPACES, IF ANY.
  - 4. ALL EQUIPMENT AND MATERIALS SO IDENTIFIED ON THE CONSTRUCTION DRAWINGS.
  - 5. CHEMICAL GROUNDING DESIGN.
- C. ALTERNATES: AT THE COMPANY'S REQUEST, ANY ALTERNATIVES TO THE MATERIALS OR METHODS SPECIFIED SHALL BE SUBMITTED TO SPRINT'S CONSTRUCTION MANAGER FOR APPROVAL PRIOR TO BEING SHIPPED TO SITE. SPRINT WILL REVIEW AND APPROVE ONLY THOSE REQUESTS MADE IN WRITING. NO VERBAL APPROVALS WILL BE CONSIDERED. SUBMITTAL FOR APPROVAL SHALL INCLUDE A STATEMENT OF COST REDUCTION PROPOSED FOR USE OF ALTERNATE PRODUCT.

1.4 TESTS AND INSPECTIONS:

- A. THE CONTRACTOR SHALL BE RESPONSIBLE FOR ALL CONSTRUCTION TESTS, INSPECTIONS AND PROJECT DOCUMENTATION.
- B. CONTRACTOR SHALL ACCOMPLISH TESTING INCLUDING BUT NOT LIMITED TO THE FOLLOWING:
  - 1. COAX SWEEPS AND FIBER TESTS PER SPRINT TS-0200 CURRENT VERSION ANTENNA LINE ACCEPTANCE STANDARDS.
  - 2. AGL, AZIMUTH AND DOWNTILT USING ELECTRONIC COMMERCIAL MADE-FOR-THE-PURPOSE ANTENNA ALIGNMENT TOOL.
  - 3. CONTRACTOR SHALL BE RESPONSIBLE FOR ANY AND ALL CORRECTIONS TO ANY WORK IDENTIFIED AS UNACCEPTABLE IN SITE INSPECTION ACTIVITIES AND/OR AS A RESULT OF TESTING.
- C. REQUIRED CLOSEOUT DOCUMENTATION INCLUDES, BUT IS NOT LIMITED TO THE FOLLOWING:
  - 1. AZIMUTH, DOWNTILT, AGL - UPLOAD REPORT FROM ANTENNA ALIGNMENT TOOL TO SITERRA TASK 465. INSTALLED AZIMUTH, DOWNTILT, AND AGL MUST CONFORM TO THE RF DATA SHEETS. SWEEP AND FIBER TESTS
  - 2. SCANABLE BARCODE PHOTOGRAPHS OF TOWER TOP AND INACCESSIBLE SERIALIZED EQUIPMENT
  - 3. ALL AVAILABLE JURISDICTIONAL INFORMATION
  - 4. PDF SCAN OF REDLINES PRODUCED IN FIELD
  - 5. ELECTRONIC AS-BUILT DRAWINGS IN AUTOCAD AND PDF FORMATS. ANY FIELD CHANGE MUST BE REFLECTED BY MODIFYING THE PLANS, ELEVATIONS, AND DETAILS IN THE DRAWING SETS. GENERAL NOTES INDICATING MODIFICATIONS WILL NOT BE ACCEPTED. CHANGES SHALL BE HIGHLIGHTED AS "CLOUDS" IDENTIFIED AS THE "AS-BUILT" CONDITION.
  - 6. LIEN WAIVERS
  - 7. FINAL PAYMENT APPLICATION
  - 8. REQUIRED FINAL CONSTRUCTION PHOTOS
  - 9. CONSTRUCTION AND COMMISSIONING CHECKLIST COMPLETE WITH NO DEFICIENT ITEMS
  - 10. ALL POST NTP TASKS INCLUDING DOCUMENT UPLOADS COMPLETED IN SITERRA (SPRINTS DOCUMENT REPOSITORY OF RECORD).

1.5 COMMISSIONING: PERFORM ALL COMMISSIONING AS REQUIRED BY APPLICABLE MOPS

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

**PART 2 - PRODUCTS (NOT USED)**

**PART 3 - EXECUTION**

3.1 REQUIREMENTS FOR TESTING:

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

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

3.2 REQUIRED TESTS:

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

3.3 REQUIRED INSPECTIONS:

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

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

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

**SECTION 01 500 - PROJECT REPORTING**

**PART 1 - GENERAL**

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

1.2 RELATED DOCUMENTS:

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

**PART 2 - PRODUCTS (NOT USED)**

**PART 3 - EXECUTION**

3.1 WEEKLY REPORTS:

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

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

3.2 PROJECT CONFERENCE CALLS:

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

3.3 PROJECT TRACKING IN SMS:

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

3.4 ADDITIONAL REPORTING:

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

3.5 PROJECT PHOTOGRAPHS:

- A. FILE DIGITAL PHOTOGRAPHS OF COMPLETED SITE IN JPEG FORMAT IN THE SMS PHOTO LIBRARY FOR THE RESPECTIVE SITE. PHOTOGRAPHS SHALL BE CLEARLY LABELED WITH SITE NUMBER, NAME AND DESCRIPTION, AND SHALL INCLUDE AT A MINIMUM THE FOLLOWING AS APPLICABLE:
    - 1. SHELTER AND TOWER OVERVIEW.
    - 2. TOWER FOUNDATION(S) - FORMS AND STEEL BEFORE POUR (EACH ANCHOR ON GUYED TOWERS).
    - 3. TOWER FOUNDATION(S) POUR WITH VIBRATOR IN USE (EACH ANCHOR ON GUYED TOWERS).
    - 4. TOWER STEEL AS BEING INSTALLED INTO HOLE (SHOW ANCHOR STEEL ON GUYED TOWERS).
    - 5. PHOTOS OF TOWER SECTION STACKING.
    - 6. CONCRETE TESTING / SAMPLES.
    - 7. PLACING OF ANCHOR BOLTS IN TOWER FOUNDATION.
    - 8. BUILDING/WATER TANK FROM ROAD FOR TENANT IMPROVEMENTS OR COMMENTS.
    - 9. SHELTER FOUNDATION--FORMS AND STEEL BEFORE POURING.
    - 10. SHELTER FOUNDATION POUR WITH VIBRATOR IN USE.
    - 11. COAX CABLE ENTRY INTO SHELTER.
    - 12. PLATFORM MECHANICAL CONNECTIONS TO TOWER/MONOPOLE.
    - 13. ROOFTOP PRE AND POST CONSTRUCTION PHOTOS TO INCLUDE PENETRATIONS AND INTERIOR CEILING.
    - 14. PHOTOS OF TOWER TOP COAX LINE COLOR CODING AND COLOR CODING AT GROUND LEVEL.
    - 15. PHOTOS OF ALL APPROPRIATE COMPANY OR REGULATORY SIGNAGE.
    - 16. PHOTOS OF EQUIPMENT BOLT DOWN INSIDE SHELTER.
    - 17. POWER AND TELCO ENTRANCE TO COMPANY ENCLOSURE AND POWER AND TELCO SUPPLY LOCATIONS INCLUDING METER/DISCONNECT.
    - 18. ELECTRICAL TRENCH(S) WITH ELECTRICAL / CONDUIT BEFORE BACKFILL.
    - 19. ELECTRICAL TRENCH(S) WITH FOIL-BACKED TAPE BEFORE FURTHER BACKFILL.
    - 20. TELCO TRENCH WITH TELEPHONE / CONDUIT BEFORE BACKFILL.
    - 21. TELCO TRENCH WITH FOIL-BACKED TAPE BEFORE FURTHER BACKFILL.
    - 22. SHELTER GROUND-RING TRENCH WITH GROUND-WIRE BEFORE BACKFILL (SHOW ALL CAD WELDS AND BEND RADI).
    - 23. TOWER GROUND-RING TRENCH WITH GROUND-WIRE BEFORE BACKFILL (SHOW ALL CAD WELDS AND BEND RADI).
    - 24. FENCE GROUND-RING TRENCH WITH GROUND-WIRE BEFORE BACKFILL (SHOW ALL CAD WELDS AND BEND RADI).
    - 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:**

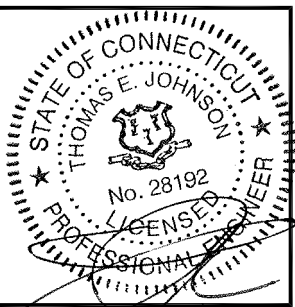
- A. PRE-CONSTRUCTION ROOF PHOTOS: COMPLETE A ROOF INSPECTION PRIOR TO THE INSTALLATION OF SPRINT EQUIPMENT ON ANY ROOFTOP BUILD. AT A MINIMUM INSPECT AND PHOTOGRAPH (MINIMUM 3 EA.) ALL AREAS IMPACTED BY THE ADDITION OF THE SPRINT EQUIPMENT.
- B. PROVIDE SIMILAR PHOTOGRAPHS SHOWING ROOF CONDITIONS AFTER 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**



CHECKED BY: *[Signature]* 1/30/18

APPROVED BY: JMM/TEJ

SUBMITTALS			
REV.	DATE	DESCRIPTION	BY
1	01/30/18	ISSUED FOR CONSTRUCTION	PN
0	11/07/17	ISSUED FOR REVIEW	JEB

SITE NUMBER:  
**CT72XC031**

SITE NAME:  
**ROXBURY-LOWER COUNTY ROAD**

SITE ADDRESS:  
LOWER COUNTY ROAD  
ROXBURY, CT 06783

SHEET TITLE  
**OUTLINE SPECIFICATIONS**

SHEET NUMBER  
**SP-2**



**CONTINUED FROM SP-2:**

**MATERIALS:**

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

**PAINT SCHEDULE:**

- A. EXTERIOR ANTENNAE AND ANTENNA MOUNTING HARDWARE: ONE COAT OF PRIMER AND TWO FINISH COATS. PAINT FOR ANTENNAE SHALL BE NON-METALLIC BASED AND CONTAIN NO METALLIC PARTICLES. PROVIDE COLORS AND PATTERNS AS REQUIRED TO MASK APPEARANCE OF ANTENNAE ON ADJACENT BUILDING SURFACES AND AS ACCEPTABLE TO THE OWNER. REFER TO ANTENNA MANUFACTURER'S INSTRUCTIONS WHENEVER POSSIBLE.
- B. ROOF TOP CONSTRUCTION: TOUCH UP - PREPARE SURFACES TO BE REPAIRED. FOLLOW INDUSTRY STANDARDS AND REQUIREMENTS OF OWNER TO MATCH EXISTING COATING AND FINISH.

**PAINTING APPLICATION:**

- INSPECT SURFACES, REPORT UNSATISFACTORY CONDITIONS IN WRITING; BEGINNING WORK MEANS ACCEPTANCE OF SUBSTRATE.
- COMPLY WITH MANUFACTURER'S INSTRUCTIONS AND RECOMMENDATIONS FOR PREPARATION, PRIMING AND COATING WORK. COORDINATE WITH WORK OF OTHER SECTIONS.
- 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.
- CLEAN UP, TOUCH UP AND PROTECT WORK.

**TOUCHUP PAINTING:**

- GALVANIZING DAMAGE AND ALL BOLTS AND NUTS SHALL BE TOUCHED UP AFTER TOWER ERECTION WITH "GALVANOX," "DRY GALV," OR "ZINC-IT."
- FIELD TOUCHUP PAINT SHALL BE DONE IN ACCORDANCE WITH THE MANUFACTURER'S WRITTEN INSTRUCTIONS.
- 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.
  - FASTENING MAIN HYBRID CABLES: ALL CABLES SHALL BE PERMANENTLY FASTENED TO THE COAX LADDER AT 4'-0" OC USING NON-MAGNETIC STAINLESS STEEL CLIPS.
  - FASTENING INDIVIDUAL FIBER AND DC CABLES ABOVE BREAKOUT ENCLOSURE (MEDUSA), WITHIN THE MMBTS CABINET AND ANY INTERMEDIATE DISTRIBUTION BOXES:
    - FIBER: SUPPORT FIBER BUNDLES USING 1/2" 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.
    - 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.
  - FASTENING JUMPERS: SECURE JUMPERS TO THE SIDE ARMS OR HEAD FRAMES USING STAINLESS STEEL TIE WRAPS OR STAINLESS STEEL BUTTERFLY CLIPS.
  - CABLE INSTALLATION:
    - INSPECT CABLE PRIOR TO USE FOR SHIPPING DAMAGE, NOTIFY THE CONSTRUCTION MANAGER.
    - 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.
    - HOIST CABLE USING PROPER HOISTING GRIPS. DO NOT EXCEED MANUFACTURERS RECOMMENDED MAXIMUM BEND RADIUS.

- GROUNDING OF TRANSMISSION LINES: ALL TRANSMISSION LINES SHALL BE GROUNDED AS INDICATED ON DRAWINGS.
- HYBRID CABLE COLOR CODING: ALL COLOR CODING SHALL BE AS REQUIRED PER SPRINT TS 0200 CURRENT VERSION.
- 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.

- 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.
- 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.
- 3M SLIM LOCK CLOSURE 716: SUBSTITUTIONS WILL NOT BE ALLOWED.
- 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:
  - ALLIED TUBE AND CONDUIT
  - B-LINE SYSTEM
  - UNISTRUT DIVERSIFIED PRODUCTS
  - THOMAS & BETTS
- B. FASTENERS: TYPES, MATERIALS, AND CONSTRUCTION FEATURES AS FOLLOWS:
  - EXPANSION ANCHORS: CARBON STEEL WEDGE OR SLEEVE TYPE.
  - POWER-DRIVEN THREADED STUDS: HEAT-TREATED STEEL, DESIGNED SPECIFICALLY FOR THE INTENDED SERVICE.
  - FASTEN BY MEANS OF WOOD SCREWS ON WOOD.
  - TOGGLE BOLTS ON HOLLOW MASONRY UNITS.
  - CONCRETE INSERTS OR EXPANSION BOLTS ON CONCRETE OR SOLID MASONRY.
  - MACHINE SCREWS, WELDED THREADED STUDS, OR SPRING-TENSION CLAMPS ON STEEL.
  - EXPLOSIVE DEVICES FOR ATTACHING HANGERS TO STRUCTURE SHALL NOT BE PERMITTED.
  - DO NOT WELD CONDUIT, PIPE STRAPS, OR ITEMS OTHER THAN THREADED STUDS TO STEEL STRUCTURES.
  - IN PARTITIONS OF LIGHT STEEL CONSTRUCTION, USE SHEET METAL SCREWS.

**SUPPORTING DEVICES:**

- A. INSTALL SUPPORTING DEVICES TO FASTEN ELECTRICAL COMPONENTS SECURELY AND PERMANENTLY IN ACCORDANCE WITH NEC.
- B. COORDINATE WITH THE BUILDING STRUCTURAL SYSTEM AND WITH OTHER TRADES.
- C. UNLESS OTHERWISE INDICATED ON THE DRAWINGS, FASTEN ELECTRICAL ITEMS AND THEIR SUPPORTING HARDWARE SECURELY TO THE STRUCTURE IN ACCORDANCE WITH THE FOLLOWING:
- D. ENSURE THAT THE LOAD APPLIED BY ANY FASTENER DOES NOT EXCEED 25 PERCENT OF THE PROOF TEST LOAD.
- E. USE VIBRATION AND SHOCK-RESISTANT FASTENERS FOR ATTACHMENTS TO CONCRETE SLABS.

**ELECTRICAL IDENTIFICATION:**

- A. UPDATE AND PROVIDE TYPED CIRCUIT BREAKER SCHEDULES IN THE MOUNTING BRACKET, INSIDE DOORS OF AC PANEL BOARDS WITH ANY CHANGES MADE TO THE AC SYSTEM.
- B. BRANCH CIRCUITS FEEDING AVIATION OBSTRUCTION LIGHTING EQUIPMENT SHALL BE CLEARLY IDENTIFIED AS SUCH AT THE BRANCH CIRCUIT PANELBOARD.

**SECTION 26 200 - ELECTRICAL MATERIALS AND EQUIPMENT**

**CONDUIT:**

- A. RIGID GALVANIZED STEEL (RGS) CONDUIT SHALL BE USED FOR EXTERIOR LOCATIONS ABOVE GROUND AND IN UNFINISHED INTERIOR LOCATIONS AND FOR ENCASED RUNS IN CONCRETE. RIGID CONDUIT AND FITTINGS SHALL BE STEEL, COATED WITH ZINC EXTERIOR AND INTERIOR BY THE HOT DIP GALVANIZING PROCESS. CONDUIT SHALL BE PRODUCED TO ANSI SPECIFICATIONS C80.1, FEDERAL SPECIFICATION WW-C-581 AND SHALL BE LISTED WITH THE UNDERWRITERS' LABORATORIES. FITTINGS SHALL BE THREADED - SET SCREW OR COMPRESSION FITTINGS WILL NOT BE ACCEPTABLE. RGS CONDUITS SHALL BE MANUFACTURED BY ALLIED, REPUBLIC OR WHEATLAND.
- B. UNDERGROUND CONDUIT IN CONCRETE SHALL BE POLYVINYLCHLORIDE (PVC) SUITABLE FOR DIRECT BURIAL AS APPLICABLE. JOINTS SHALL BE BELLED, AND FLUSH SOLVENT WELDED IN ACCORDANCE WITH MANUFACTURER'S INSTRUCTIONS. CONDUIT SHALL BE CARLON ELECTRICAL PRODUCTS OR APPROVED EQUAL.
- C. TRANSITIONS BETWEEN PVC AND RIGID (RGS) SHALL BE MADE WITH PVC COATED METALLIC LONG SWEEP RADIUS ELBOWS.
- D. EMT OR RIGID GALVANIZED STEEL CONDUIT MAY BE USED IN FINISHED SPACES CONCEALED IN WALLS AND CEILINGS. EMT SHALL BE MILD STEEL, ELECTRICALLY WELDED, ELECTRO-GALVANIZED OR HOT-DIPPED GALVANIZED AND PRODUCED TO ANSI SPECIFICATION C80.3, FEDERAL SPECIFICATION WW-C-563, AND SHALL BE UL LISTED. EMT SHALL BE MANUFACTURED BY ALLIED, REPUBLIC OR WHEATLAND, OR APPROVED EQUAL. FITTINGS SHALL BE METALLIC COMPRESSION. SET SCREW CONNECTIONS SHALL NOT BE ACCEPTABLE.
- E. LIQUID TIGHT FLEXIBLE METALLIC CONDUIT SHALL BE USED FOR FINAL CONNECTION TO EQUIPMENT. FITTINGS SHALL BE METALLIC GLAND TYPE COMPRESSION FITTINGS, MAINTAINING THE INTEGRITY OF CONDUIT SYSTEM. SET SCREW CONNECTIONS SHALL NOT BE ACCEPTABLE. MAXIMUM LENGTH OF FLEXIBLE CONDUIT SHALL NOT EXCEED 6- FEET. LFMC SHALL BE PROTECTED AND SUPPORTED AS REQUIRE BY NEC. MANUFACTURERS OF FLEXIBLE CONDUITS SHALL BE CAROL, ANACONDA METAL HOSE OR UNIVERSAL METAL HOSE, OR APPROVED EQUAL.
- F. MINIMUM SIZE CONDUIT SHALL BE 3/4 INCH (21MM).

**HUBS AND BOXES:**

- A. AT ENTRANCES TO CABINETS OR OTHER EQUIPMENT NOT HAVING INTEGRAL THREADED HUBS PROVIDE METALLIC THREADED HUBS OF THE SIZE AND CONFIGURATION REQUIRED. HUB SHALL INCLUDE LOCKNUT AND NEOPRENE O-RING SEAL. PROVIDE IMPACT RESISTANT 105 DEGREE C PLASTIC BUSHINGS TO PROTECT CABLE INSULATION.
- B. CABLE TERMINATION FITTINGS FOR CONDUIT
  - CABLE TERMINATORS FOR RGS CONDUITS SHALL BE TYPE CRC BY O-Z/GEDNEY OR EQUAL.
  - 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.
- B. CONDUCTORS SHALL BE PULLED IN ACCORDANCE WITH ACCEPTED GOOD PRACTICE.

**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.



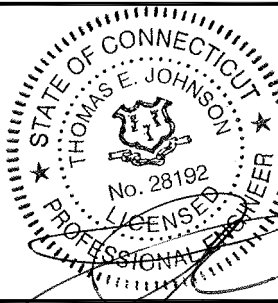
1 INTERNATIONAL BLVD, SUITE 800  
MAHWAH, NJ 07495  
TEL: (800) 357-7641



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



4 Bay Road, Building A  
Suite 200  
Hadley, MA 01035 Ph: (413)320-4918



CHECKED BY: *JMM/TEJ*

APPROVED BY: JMM/TEJ

SUBMITTALS			
REV.	DATE	DESCRIPTION	BY
1	01/30/18	ISSUED FOR CONSTRUCTION	PN
0	11/07/17	ISSUED FOR REVIEW	JEB/EN

SITE NUMBER:  
**CT72XC031**  
SITE NAME:  
**ROXBURY-LOWER COUNTY ROAD**  
SITE ADDRESS:  
LOWER COUNTY ROAD  
ROXBURY, CT 06783

SHEET TITLE  
**OUTLINE SPECIFICATIONS**

SHEET NUMBER  
**SP-3**



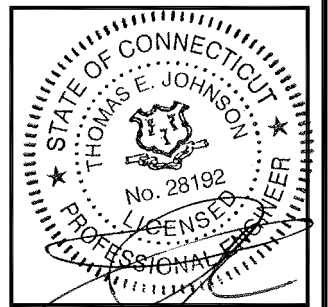
1 INTERNATIONAL BLVD, SUITE 800  
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CHECKED BY: *1/30/18* JEU

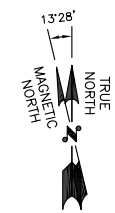
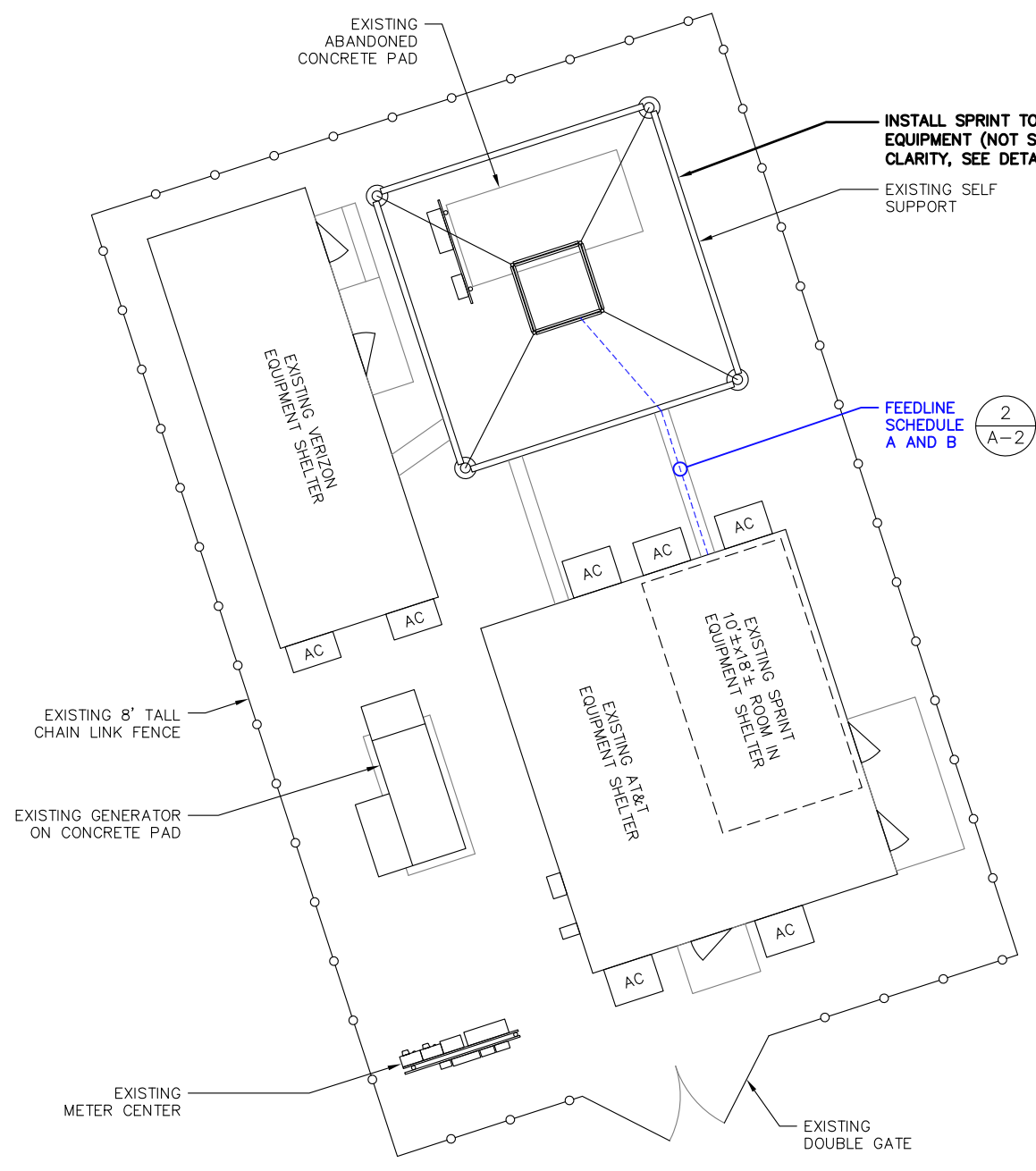
APPROVED BY: JMM/TEJ

SUBMITTALS			
REV.	DATE	DESCRIPTION	BY
1	01/30/18	ISSUED FOR CONSTRUCTION	PN
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SITE NUMBER:  
**CT72XC031**  
SITE NAME:  
**ROXBURY-LOWER COUNTY ROAD**  
SITE ADDRESS:  
LOWER COUNTY ROAD  
ROXBURY, CT 06783

SHEET TITLE  
**COMPOUND PLAN**

SHEET NUMBER  
**A-1**



**COMPOUND PLAN**

SCALE: 1"=12' (11"x17")  
1"=6' (22"x34")

1  
A-1

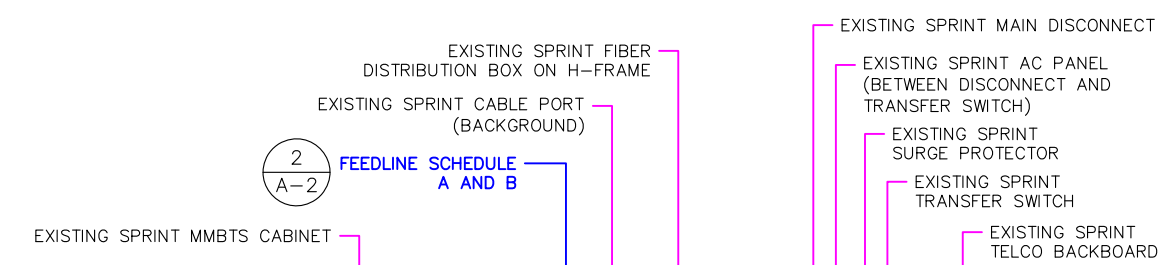
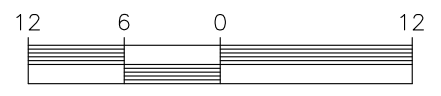


IMAGE SOURCE: PROTERRA 10/14/2017 (VIEW FROM SOUTH)

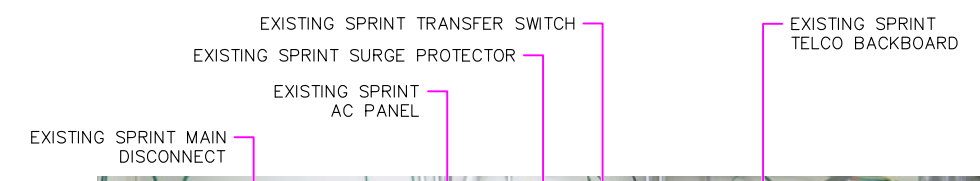


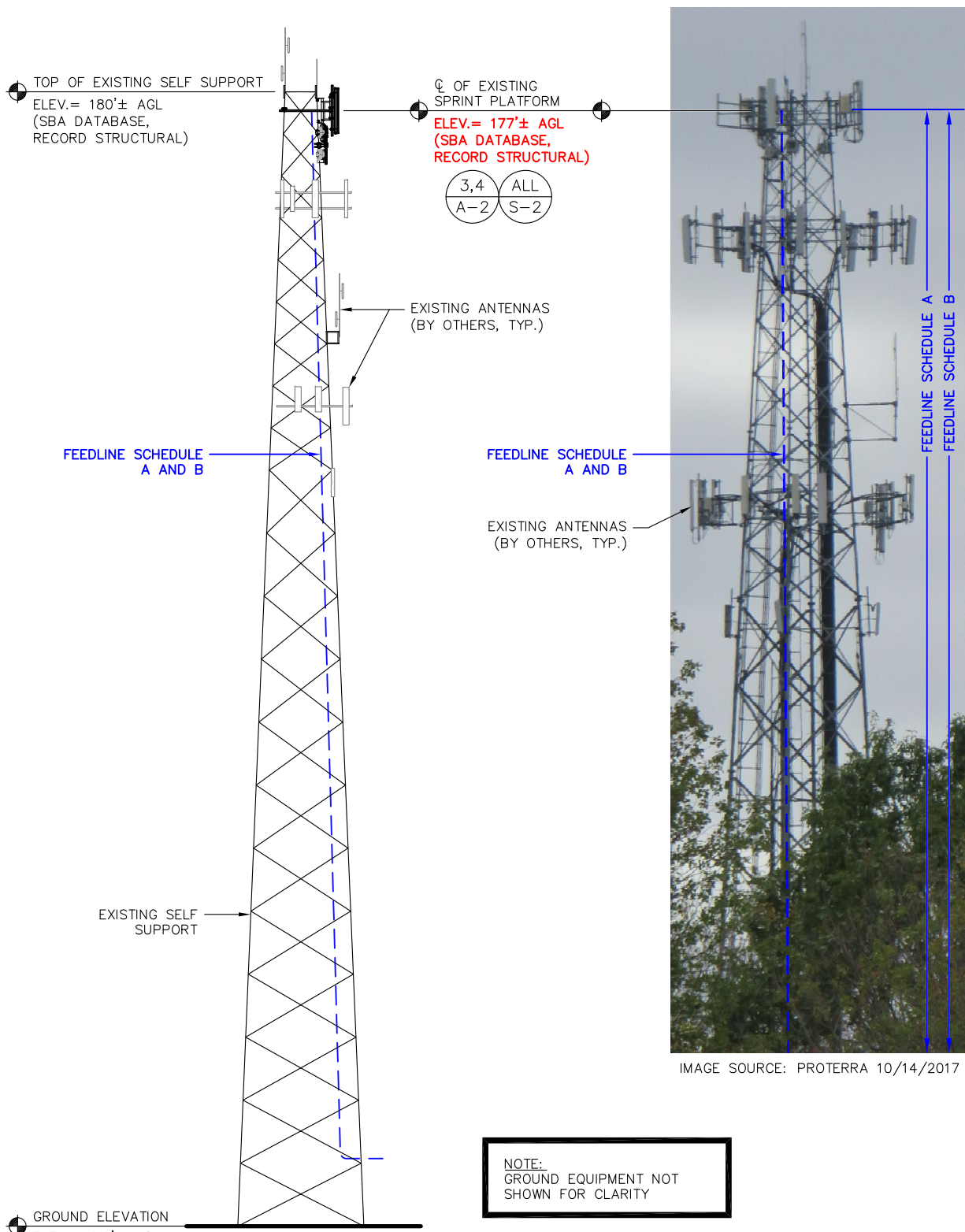
IMAGE SOURCE: PROTERRA 10/14/2017 (VIEW FROM WEST)

**EQUIPMENT PLAN PHOTO DETAIL**

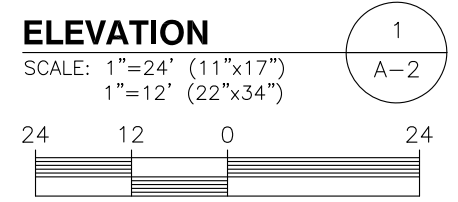
SCALE: N.T.S.

2  
A-1





NOTE:  
GROUND EQUIPMENT NOT  
SHOWN FOR CLARITY



FEEDLINE SCHEDULE	FEEDLINE DESCRIPTION	LOCATION
A	EXISTING TO REMAIN: (3) 1 1/2" HYBRID TO 177' RAD	UP FACE OF SELF SUPPORT TO RAD
B	PROPOSED: (1) HYBRID TO 177' RAD;	UP FACE OF SELF SUPPORT TO RAD

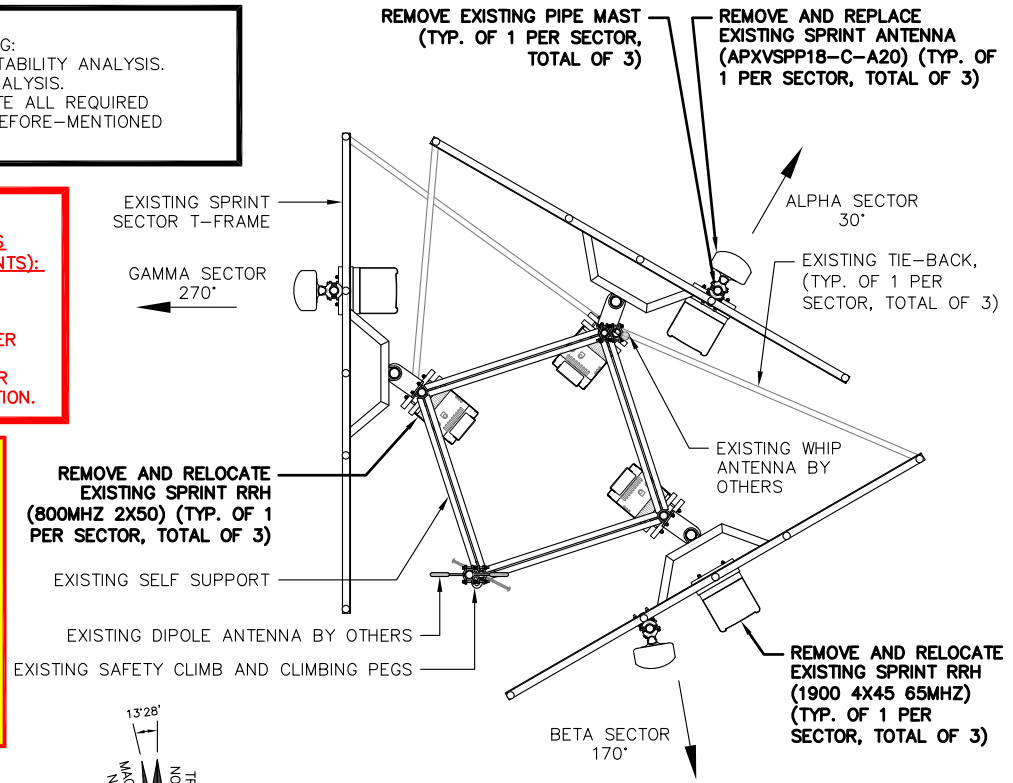
NOTE:  
EXISTING SPRINT EQUIPMENT FEEDLINE INVENTORY BASED ON OBSERVED FIELD CONDITIONS.  
RFDS AND FEEDLINE LEASING ENTITLEMENTS MAY DIFFER

**TOWER ELEVATION PHOTO DETAIL**  
SCALE: N.T.S.

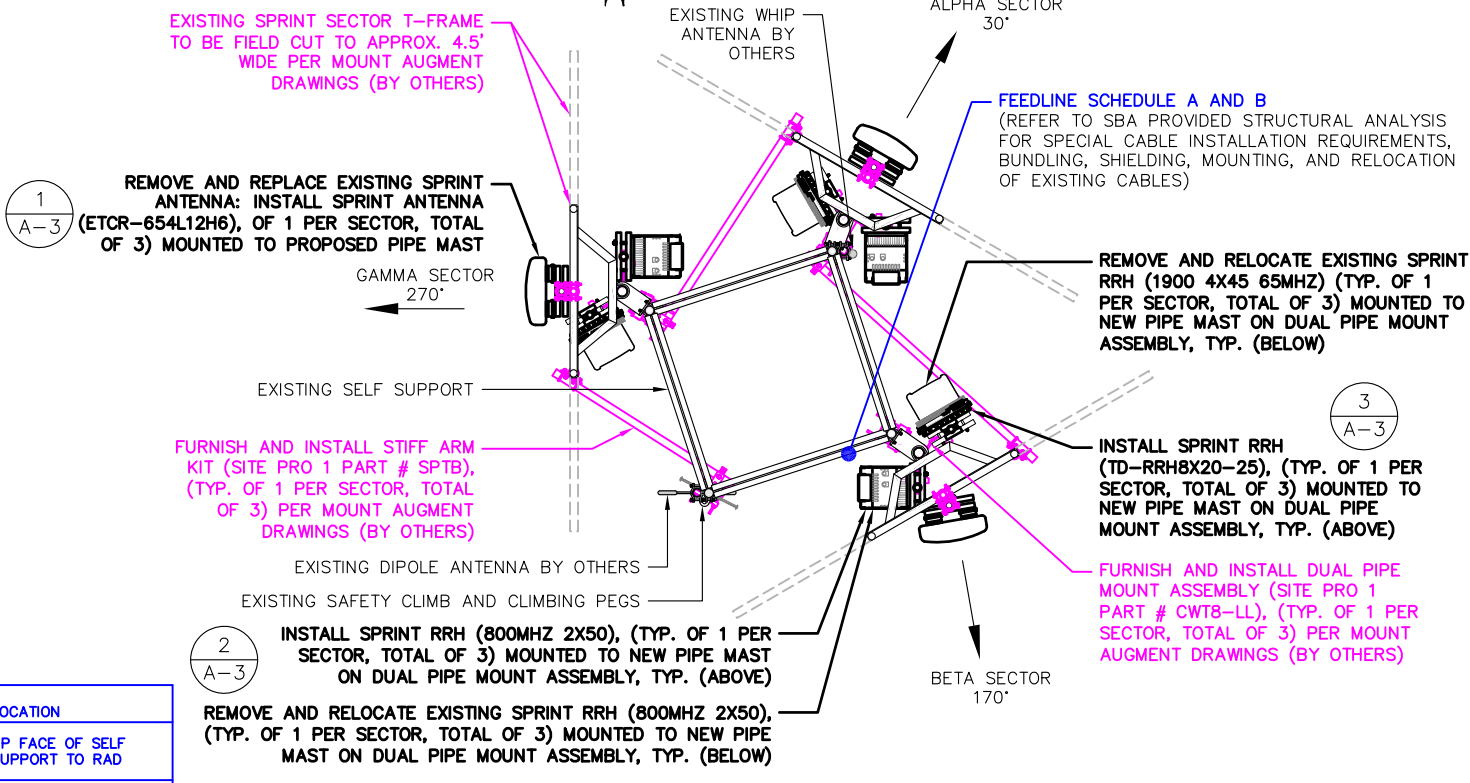
**SPECIAL CONSTRUCTION NOTE:**  
SPRINT WORK IS CONTINGENT ON THE FOLLOWING:  
\* COMPLETION OF A GLOBAL STRUCTURAL STABILITY ANALYSIS.  
\* COMPLETION OF A MOUNT STRUCTURAL ANALYSIS.  
\* GC SHALL FURNISH, INSTALL AND COMPLETE ALL REQUIRED STRUCTURAL MODIFICATIONS AS INDICATED IN BEFORE-MENTIONED GLOBAL AND MOUNT ANALYSIS.

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

**SPECIAL CONSTRUCTION NOTE (ANTENNA MOUNT STRUCTURAL AUGMENT SCHEMATIC DESIGN NOT FOR FINAL CONSTRUCTION):**  
GENERAL CONTRACTOR SHALL FURNISH AND INSTALL ALL ANTENNA MOUNT STRUCTURAL AUGMENTS AND STRUCTURAL MODIFICATIONS AT THE SPRINT RAD/VERTICAL EQUIPMENT SPACE PER RECOMMENDATIONS FROM SBA-PROVIDED ANTENNA MOUNT STRUCTURAL ANALYSIS AND ANY SUPPLEMENTAL CONSTRUCTION DRAWINGS (PROVIDED BY OTHERS). SCHEMATIC DESIGNS DEPICTED IN MAGENTA ARE PRELIMINARY ONLY AND ARE NOT FOR FINAL CONSTRUCTION.



**EXISTING ANTENNA PLAN**  
SCALE: N.T.S.



**PROPOSED ANTENNA PLAN**  
SCALE: N.T.S.

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

NOTE:  
VERIFY PROPOSED AZIMUTHS WITH RF ENGINEER PRIOR TO INSTALLATION

**Sprint**

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

**SBA**

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

**ProTerra**  
DESIGN GROUP, LLC

4 Bay Road, Building A  
Suite 200  
Hadley, MA 01035 Ph: (413) 320-4918

STATE OF CONNECTICUT  
THOMAS E. JOHNSON  
No. 28192  
LICENSED PROFESSIONAL ENGINEER

CHECKED BY: *VJB/18*  
APPROVED BY: JMM/TEJ

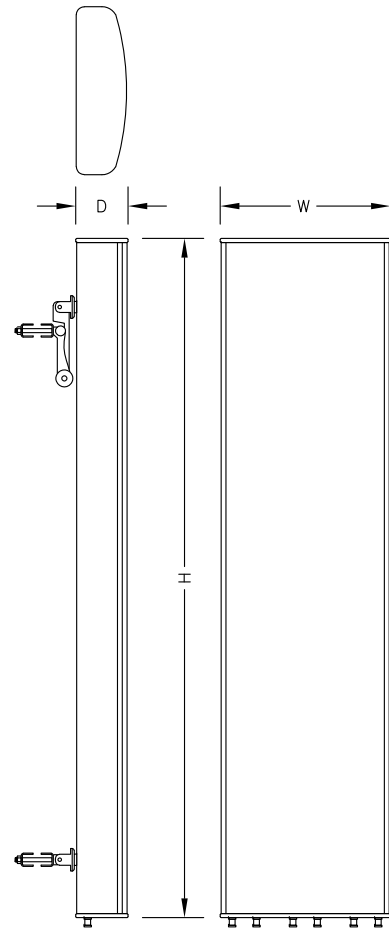
**SUBMITTALS**

REV.	DATE	DESCRIPTION	BY
1	01/30/18	ISSUED FOR CONSTRUCTION	PN
0	11/07/17	ISSUED FOR REVIEW	JEB/EN

SITE NUMBER:  
CT72XC031  
SITE NAME:  
ROXBURY-LOWER COUNTY ROAD  
SITE ADDRESS:  
LOWER COUNTY ROAD  
ROXBURY, CT 06783

SHEET TITLE  
ELEVATION AND ANTENNA PLANS

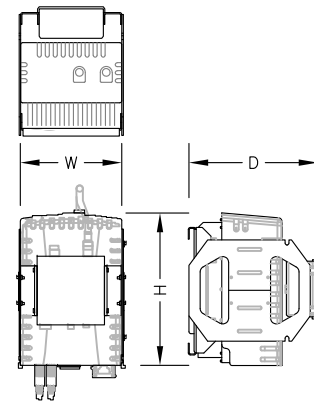
SHEET NUMBER  
A-2



ANTENNA SPECIFICATIONS	
MANUF.	KMW
MODEL #	ETCR-654L12H6
HEIGHT	84.9"
WIDTH	21.0"
DEPTH	6.3"
WEIGHT	84.9± LBS.

**ANTENNA DETAIL**  
SCALE: N.T.S.

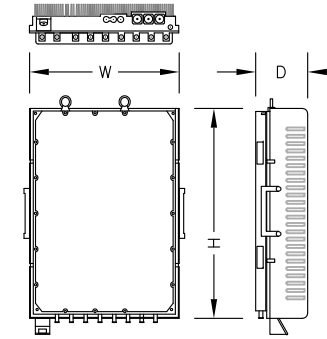
1  
A-3



800 MHZ RRH SPECIFICATIONS	
MANUF.	NOKIA (ALU)
MODEL #	800MHZ 2X50W
HEIGHT	19.7"
WIDTH	13"
DEPTH	10.8"
WEIGHT	53± LBS

**800 MHz RRH DETAIL**  
SCALE: N.T.S.

2  
A-3



2.5 GHZ RRH SPECIFICATIONS	
MANUF.	NOKIA (ALU)
MODEL #	TD-RRH8X20-25
HEIGHT	26.1"
WIDTH	18.6"
DEPTH	6.7"
WEIGHT	70± LBS

**2.5 GHz RRH DETAIL**  
SCALE: N.T.S.

3  
A-3

MAJOR RF EQUIPMENT LIST				
(GC SHALL FURNISH AND INSTALL ALL OTHER MATERIALS AND EQUIPMENT NOT SUPPLIED BY SPRINT)				
DESCRIPTION	QUANTITY	UNITS	MAKE/MODEL/MATERIAL	PROVIDED BY
ANTENNA	3	EA	KMW ETCR-654L12H6	SPRINT
2500 RRH	3	EA	NOKIA (ALU) TD-RRH8x20-25	SPRINT
RELOCATE EXISTING 1900 RRH	3	EA	NOKIA (ALU) 1900 4x45 65MHZ	EXISTING TO BE RELOCATED
RELOCATE EXISTING 800 RRH	3	EA	NOKIA (ALU) 800MHz 2x50W	EXISTING TO BE RELOCATED
800 RRH	3	EA	NOKIA (ALU) 800MHz 2x50W	SPRINT
FIBER	1 @ 270'± FROM FIBER CABINET	LINEAR FEET LISTED [INCLUDES (2) 10' COILS]	1-1/4" HYBRIFLEX	SPRINT

**SPRINT-PROVIDED EQUIPMENT SCHEDULE**  
SCALE: N.T.S.

4  
A-3



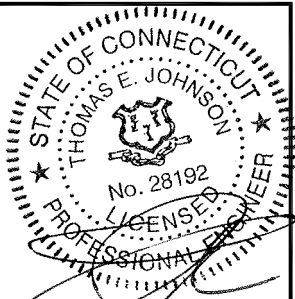
1 INTERNATIONAL BLVD, SUITE 800  
MAHWAH, NJ 07495  
TEL: (800) 357-7641



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



4 Bay Road, Building A  
Suite 200  
Hadley, MA 01035 Ph: (413)320-4918



CHECKED BY: *JMM/TEJ*

APPROVED BY: JMM/TEJ

SUBMITTALS			
REV.	DATE	DESCRIPTION	BY
1	01/30/18	ISSUED FOR CONSTRUCTION	PN
0	11/07/17	ISSUED FOR REVIEW	JEB/EN

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**CT72XC031**  
SITE NAME:  
**ROXBURY-LOWER COUNTY ROAD**  
SITE ADDRESS:  
LOWER COUNTY ROAD  
ROXBURY, CT 06783

SHEET TITLE  
**TOWER EQUIPMENT DETAILS**

SHEET NUMBER  
**A-3**

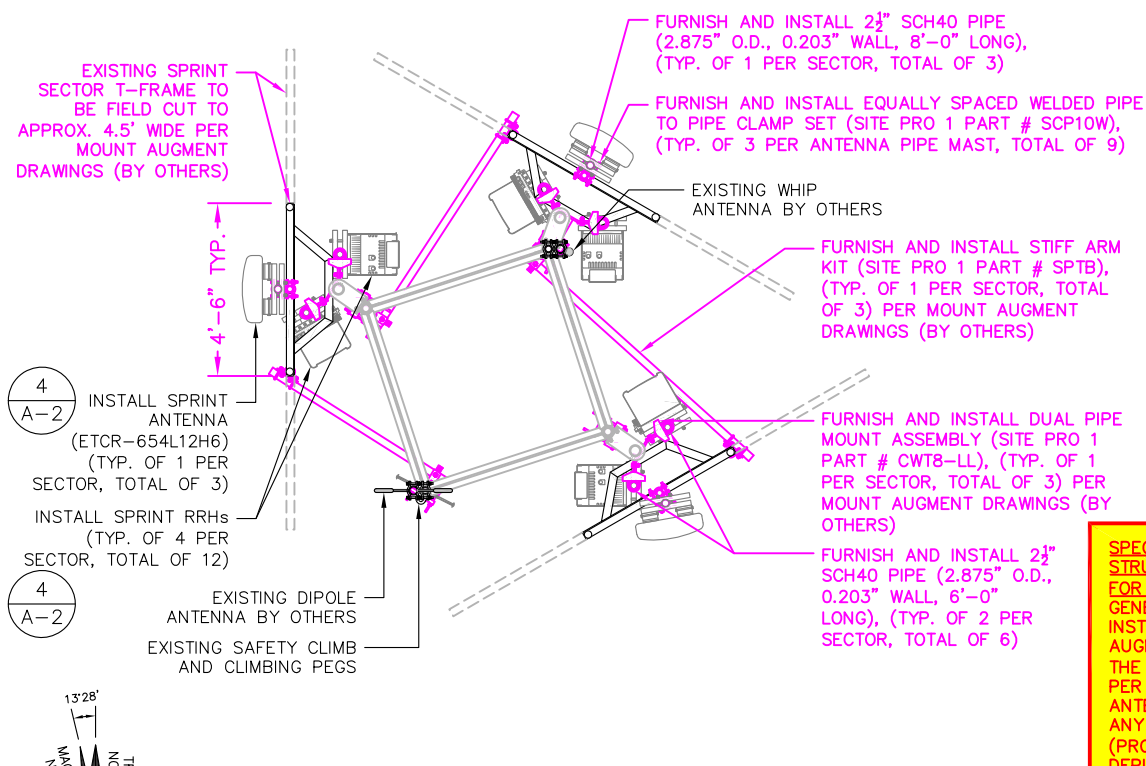


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 \* COMPLETION OF A GLOBAL STRUCTURAL STABILITY ANALYSIS.  
 \* COMPLETION OF A MOUNT STRUCTURAL ANALYSIS.  
 \* GC SHALL FURNISH, INSTALL AND COMPLETE ALL REQUIRED STRUCTURAL MODIFICATIONS AS INDICATED IN BEFORE-MENTIONED GLOBAL AND MOUNT ANALYSIS.

**SPECIAL PRE-CONSTRUCTION WORK NOTE (SBA-PROVIDED TOWER STRUCTURAL ANALYSIS, SPECIAL EQUIPMENT INSTALLATION REQUIREMENTS):**  
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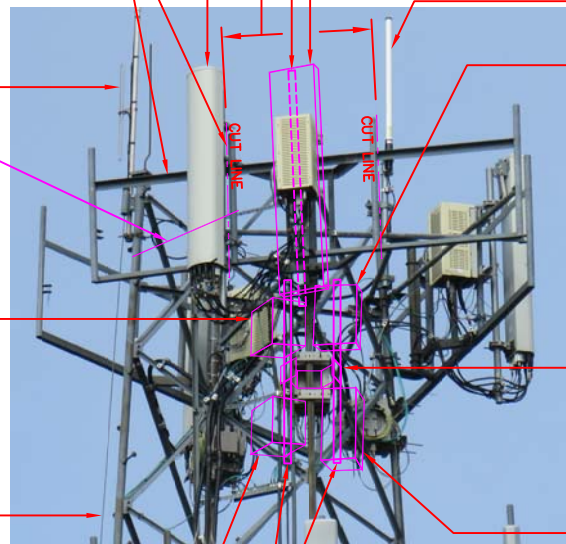
**NOTE:**  
 VERIFY PROPOSED AZIMUTHS WITH RF ENGINEER PRIOR TO INSTALLATION



**SECTOR FRAME PLAN DETAIL**

SCALE: N.T.S.

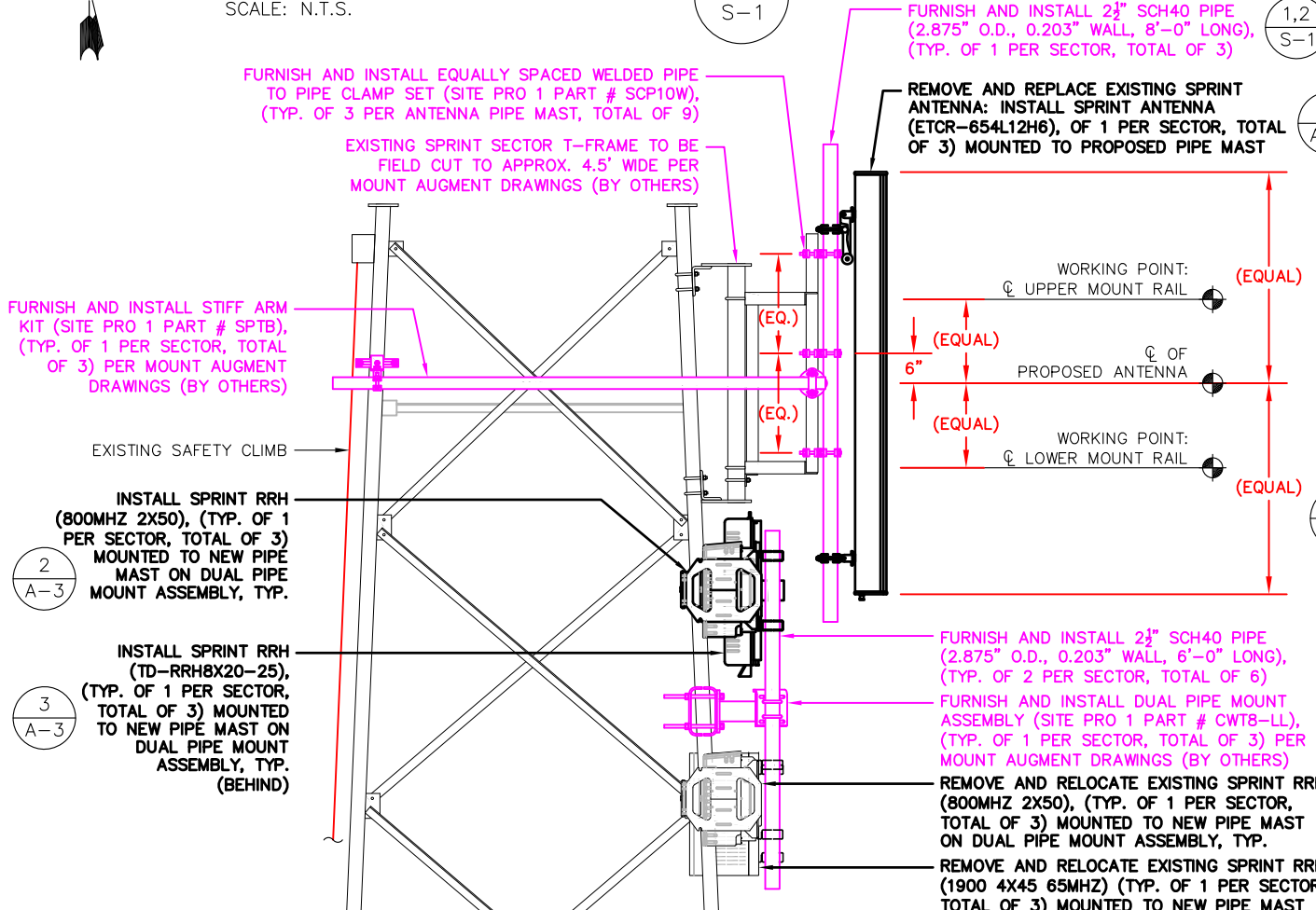
1  
S-1



**ANTENNA AND RRH MOUNT PHOTO DETAIL**

SCALE: N.T.S.

5  
S-1



**ANTENNA AND RRH MOUNTING DETAIL**

SCALE: N.T.S.

2  
S-1

**PROPOSED 800 MHZ RRH MOUNTING ELEVATION**

SCALE: N.T.S.

3  
S-1

**PROPOSED 1900 MHZ AND 2.5GHZ RRH MOUNTING ELEVATION**

SCALE: N.T.S.

4  
S-1

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

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

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

STATE OF CONNECTICUT  
 THOMAS E. JOHNSON  
 No. 28192  
 LICENSED PROFESSIONAL ENGINEER

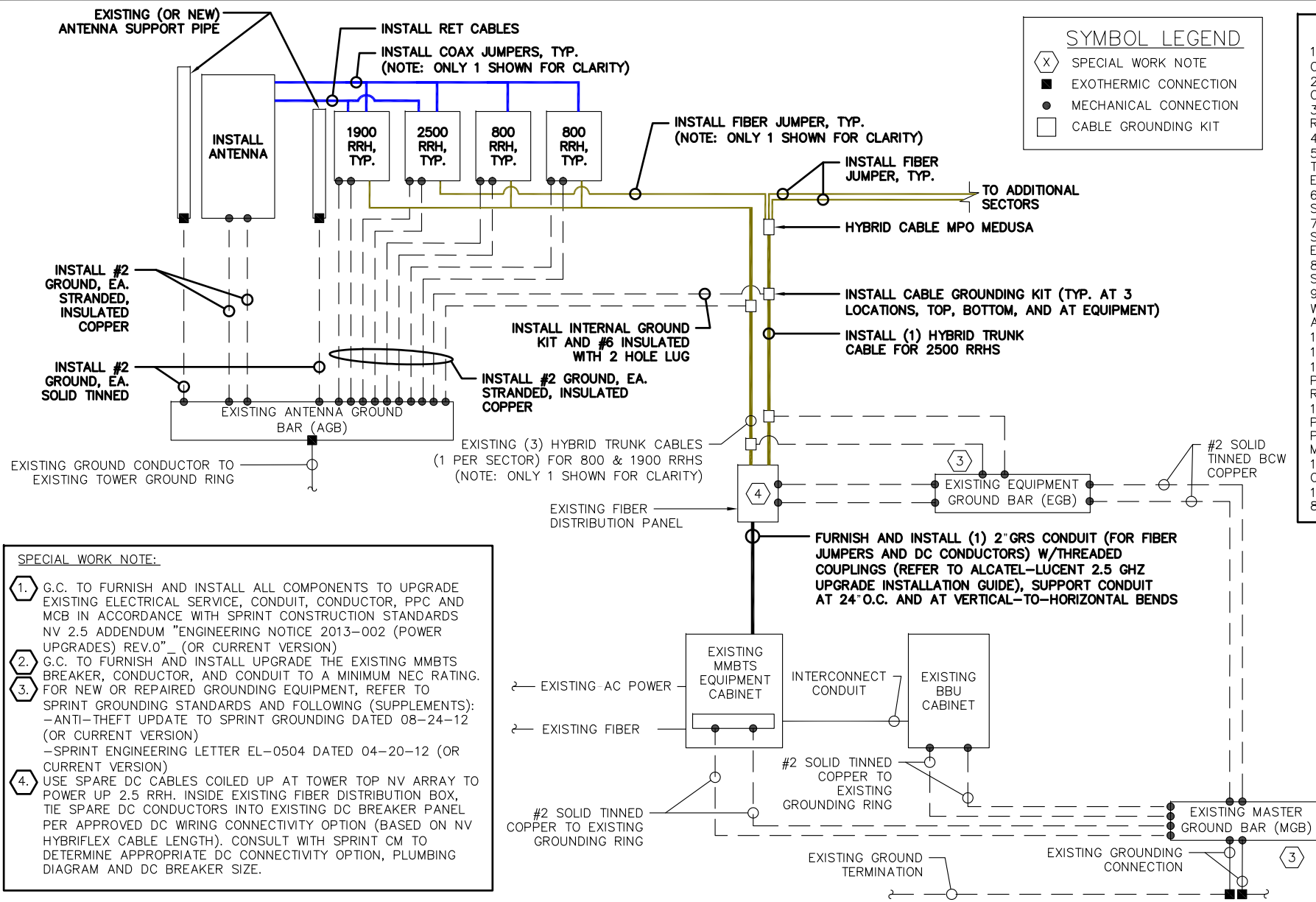
CHECKED BY: *[Signature]*  
 APPROVED BY: JMM/TEJ

REV.	DATE	DESCRIPTION	BY
1	01/30/18	ISSUED FOR CONSTRUCTION	PN
0	11/07/17	ISSUED FOR REVIEW	JEB/EN

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 CT72XC031  
 SITE NAME:  
 ROXBURY-LOWER COUNTY ROAD  
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 LOWER COUNTY ROAD  
 ROXBURY, CT 06783

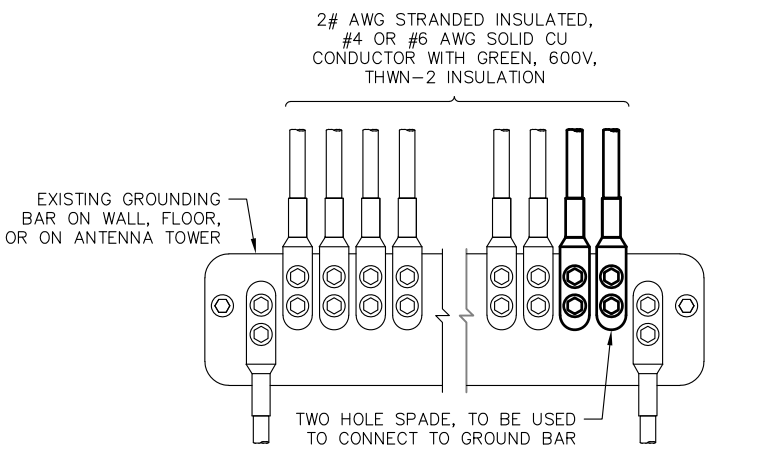
SHEET TITLE  
 ANTENNA AND RRH MOUNTING DETAILS

SHEET NUMBER  
 S-1



**TYPICAL POWER AND GROUNDING ONE LINE DIAGRAMS**

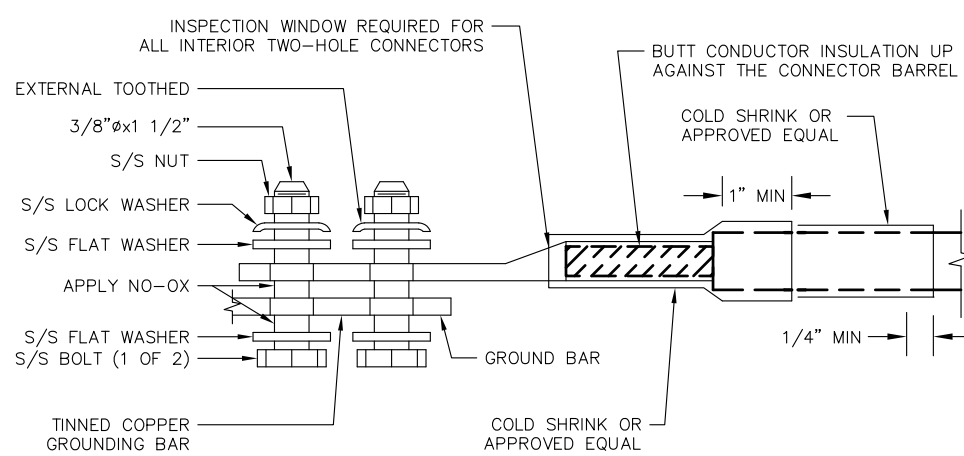
SCALE: N.T.S.



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

**INSTALLATION OF GROUNDING CONDUCTOR TO GROUNDING BAR**

SCALE: N.T.S.



**TWO HOLE LUG**

SCALE: N.T.S.

**PROTECTIVE GROUNDING SYSTEMS GENERAL NOTES:**

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

**Sprint**

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

**SBA**

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

**ProTerra**  
 DESIGN GROUP, LLC

4 Bay Road, Building A  
 Suite 200  
 Hadley, MA 01035 Ph: (413)320-4918

STATE OF CONNECTICUT  
 THOMAS E. JOHNSON  
 No. 28192  
 LICENSED PROFESSIONAL ENGINEER  
 FOR SCHEMATIC ONLY

CHECKED BY: J30/18

APPROVED BY: JMM/TEJ

**SUBMITTALS**

REV.	DATE	DESCRIPTION	BY
1	01/30/18	ISSUED FOR CONSTRUCTION	PN
0	11/07/17	ISSUED FOR REVIEW	JEB/EN

SITE NUMBER:  
**CT72XC031**

SITE NAME:  
**ROXBURY-LOWER COUNTY ROAD**

SITE ADDRESS:  
 LOWER COUNTY ROAD  
 ROXBURY, CT 06783

SHEET TITLE  
**ELECTRICAL AND GROUNDING DETAILS**

SHEET NUMBER  
**E-1**



Site Identification	
Cascade	CT72XC031
SMS Schedule ID	1232539
SMS Schedule Name	DO Macro Upgrade
PID	DOKU_CT72XC031
RRU OEM	Alcatel Lucent
Switch OEM	ALU
RFDS Issue Date	
RFDS Revision Date	2017-04-08 00:00:00
RFDS Revision	1
Filter Analysis Complete	YES
RFDS - Issue Date	
Design Status	Complete
Border Analysis Complete	YES
Project Description	DO Macro Upgrade - Add 2500 MHz

Contact Information	
Engineer Email	Bill.M.Hastings@sprint.com
Sprint Badged RF Engineer	Bill Hastings
RF Engineer Email	Bill.M.Hastings@sprint.com
RF Engineer Phone	978-590-9700
RF Manager	Jonathan Hull
RF Manager Email	Jonathan.B.Hull@sprint.com
RF Manager Phone	617-233-2920
Carrier Count	
2500 LTE	3
1900 LTE	
1900 EVDO	
1900 Voice	
800 LTE	
800 Voice	

Location Details		
Latitude	41.55954166	
Longitude	-73.29230556	
Market	Southern Connecticut	
Region	Northeast	
City	Roxbury	
State	CT	
Zip Code	06783	
County	Litchfield	
2500MHz		3
1900MHz		
800MHz		

Band: 2500	Alpha	Beta	Gamma	Delta	Epsilon	Zeta
<b>Antenna 1</b>						
Model Number	Antenna assigned on a different band	Antenna assigned on a different band	Antenna assigned on a different band			
Weight (lbs)	0	0	0	N/A	N/A	N/A
Dimensions	0 x 0 x 0	0 x 0 x 0	0 x 0 x 0	N/A	N/A	N/A
Manufacturer	KMW	KMW	KMW	N/A	N/A	N/A
Ant1 Top Jumper Make/Mode/Cty	2.5 Jumper	2.5 Jumper	2.5 Jumper	0	0	0
Ant 1 RF requested Diameter	1/2"	1/2"	1/2"	N/A	N/A	N/A
Ant 1 RF requested Top Jumper Length(ft)	8	8	8	N/A	N/A	N/A
Antenna 1 Azimuth	30	170	270	N/A	N/A	N/A
Antenna 1 Mechanical DT	N/A	N/A	N/A	N/A	N/A	N/A
Antenna 1 Center Line (ft)	177.001318	177.001318	177.001318	N/A	N/A	N/A
Antenna 1 Electrical DT	2	2	2	N/A	N/A	N/A
Antenna 1 Electrical DT 2	N/A	N/A	N/A	N/A	N/A	N/A
Antenna 1 Electrical DT 3	N/A	N/A	N/A	N/A	N/A	N/A
Antenna 1 Twist	N/A	N/A	N/A	N/A	N/A	N/A
<b>Band: 1900</b>						
<b>Antenna 1</b>						
Model Number	ETCR-654L12H6	ETCR-654L12H6	ETCR-654L12H6			
Weight (lbs)	85	85	85	N/A	N/A	N/A
Dimensions	84.9 x 21 x 6.3	84.9 x 21 x 6.3	84.9 x 21 x 6.3	N/A	N/A	N/A
Manufacturer	KMW	KMW	KMW	N/A	N/A	N/A
Ant1 Top Jumper Make/Mode/Cty	N/A	0	N/A	0	N/A	0
Ant 1 RF requested Diameter	1/2"	1/2"	1/2"	N/A	N/A	N/A
Ant 1 RF requested Top Jumper Length(ft)	8	8	8	N/A	N/A	N/A
Antenna 1 Azimuth	30	170	270	N/A	N/A	N/A
Antenna 1 Mechanical DT	N/A	N/A	N/A	N/A	N/A	N/A
Antenna 1 Center Line (ft)	177.001318	177.001318	177.001318	N/A	N/A	N/A
Antenna 1 Electrical DT	3	3	3	N/A	N/A	N/A
Antenna 1 Electrical DT 2	N/A	N/A	N/A	N/A	N/A	N/A
Antenna 1 Electrical DT 3	N/A	N/A	N/A	N/A	N/A	N/A
Antenna 1 Twist	N/A	N/A	N/A	N/A	N/A	N/A
<b>Band: 800</b>						
<b>Antenna 1</b>						
Model Number	Antenna assigned on a different band	Antenna assigned on a different band	Antenna assigned on a different band			
Weight (lbs)	0	0	0	N/A	N/A	N/A
Dimensions	0 x 0 x 0	0 x 0 x 0	0 x 0 x 0	N/A	N/A	N/A
Manufacturer	KMW	KMW	KMW	N/A	N/A	N/A
Ant1 Top Jumper Make/Mode/Cty	800/1900 Jumper	800/1900 Jumper	800/1900 Jumper	0	0	0
Ant 1 RF requested Diameter	1/2"	1/2"	1/2"	N/A	N/A	N/A
Ant 1 RF requested Top Jumper Length(ft)	8	8	8	N/A	N/A	N/A
Antenna 1 Azimuth	30	170	270	N/A	N/A	N/A
Antenna 1 Mechanical DT	N/A	N/A	N/A	N/A	N/A	N/A
Antenna 1 Center Line (ft)	177.001318	177.001318	177.001318	N/A	N/A	N/A
Antenna 1 Electrical DT	5	5	5	N/A	N/A	N/A
Antenna 1 Electrical DT 2	N/A	N/A	N/A	N/A	N/A	N/A
Antenna 1 Electrical DT 3	N/A	N/A	N/A	N/A	N/A	N/A
Antenna 1 Twist	N/A	N/A	N/A	N/A	N/A	N/A

SPRINT CONSTRUCTION STANDARDS:

GENERAL CONTRACTOR SHALL ADHERE TO THE FOLLOWING SPRINT CONSTRUCTION STANDARDS.

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

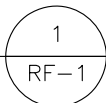
NOTE:  
VERIFY PROPOSED AZIMUTHS WITH RF ENGINEER PRIOR TO INSTALLATION

Band: 2500	Alpha	Beta	Gamma	Delta	Epsilon	Zeta
<b>Radio Model</b>						
Model Number	TD-RRH8x20-25	TD-RRH8x20-25	TD-RRH8x20-25	N/A	N/A	N/A
Weight (lbs)	76.2	76.2	76.2	N/A	N/A	N/A
Dimensions	26 x 18.6 x 6.7	26 x 18.6 x 6.7	26 x 18.6 x 6.7	N/A	N/A	N/A
Manufacturer	ALU	ALU	ALU	N/A	N/A	N/A
Number of RRUs needed	1	1	1	0	0	0
<b>Trunk Cable 1</b>						
Model Number	Hybriflex	N/A	N/A	N/A	N/A	N/A
Weight (lbs.)	1	N/A	N/A	N/A	N/A	N/A
Dimensions (in.)	1.54	N/A	N/A	N/A	N/A	N/A
Manufacturer	ALU	N/A	N/A	N/A	N/A	N/A
<b>Band: 800</b>						
<b>Radio Model</b>						
Model Number	RRH-2x50-800	RRH-2x50-800	RRH-2x50-800	N/A	N/A	N/A
Weight (lbs)	69.1	69.1	69.1	N/A	N/A	N/A
Dimensions	16 x 13 x 10	16 x 13 x 10	16 x 13 x 10	N/A	N/A	N/A
Manufacturer	ALU	ALU	ALU	N/A	N/A	N/A
Number of RRUs needed	2	2	2	0	0	0
<b>Trunk Cable 1</b>						
Model Number	1900 Hybrid_ALU	1900 Hybrid_ALU	N/A	N/A	N/A	N/A
Weight (lbs.)	1.1	1.1	N/A	N/A	N/A	N/A
Dimensions (in.)	1.25	1.25	N/A	N/A	N/A	N/A
Manufacturer	ALU	ALU	N/A	N/A	N/A	N/A

NOTE: RFDS PROVIDED BY SPRINT DATED 04/06/2017. EXCERPTS TAKEN DEPICT RELEVANT RF DESIGN INFORMATION. A&E VENDOR SCOPE OF WORK LIMITED TO DESIGN OF MECHANICAL/STRUCTURAL EQUIPMENT ATTACHMENTS.

RF DATA SHEET

SCALE: N.T.S.



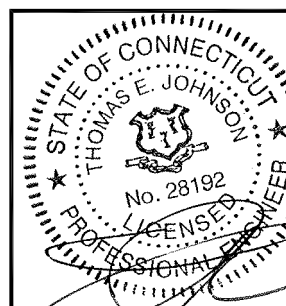
1 INTERNATIONAL BLVD, SUITE 800  
MAHWAH, NJ 07495  
TEL: (800) 357-7641



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



4 Bay Road, Building A  
Suite 200  
Hadley, MA 01035 Ph: (413)320-4918



CHECKED BY: JMM/TEJ

APPROVED BY: JMM/TEJ

SUBMITTALS

REV.	DATE	DESCRIPTION	BY
1	01/30/18	ISSUED FOR CONSTRUCTION	PN
0	11/07/17	ISSUED FOR REVIEW	JEB/EN

SITE NUMBER:  
CT72XC031  
SITE NAME:  
ROXBURY-LOWER COUNTY ROAD  
SITE ADDRESS:  
LOWER COUNTY ROAD  
ROXBURY, CT 06783

SHEET TITLE  
RF DATA SHEET

SHEET NUMBER  
RF-1

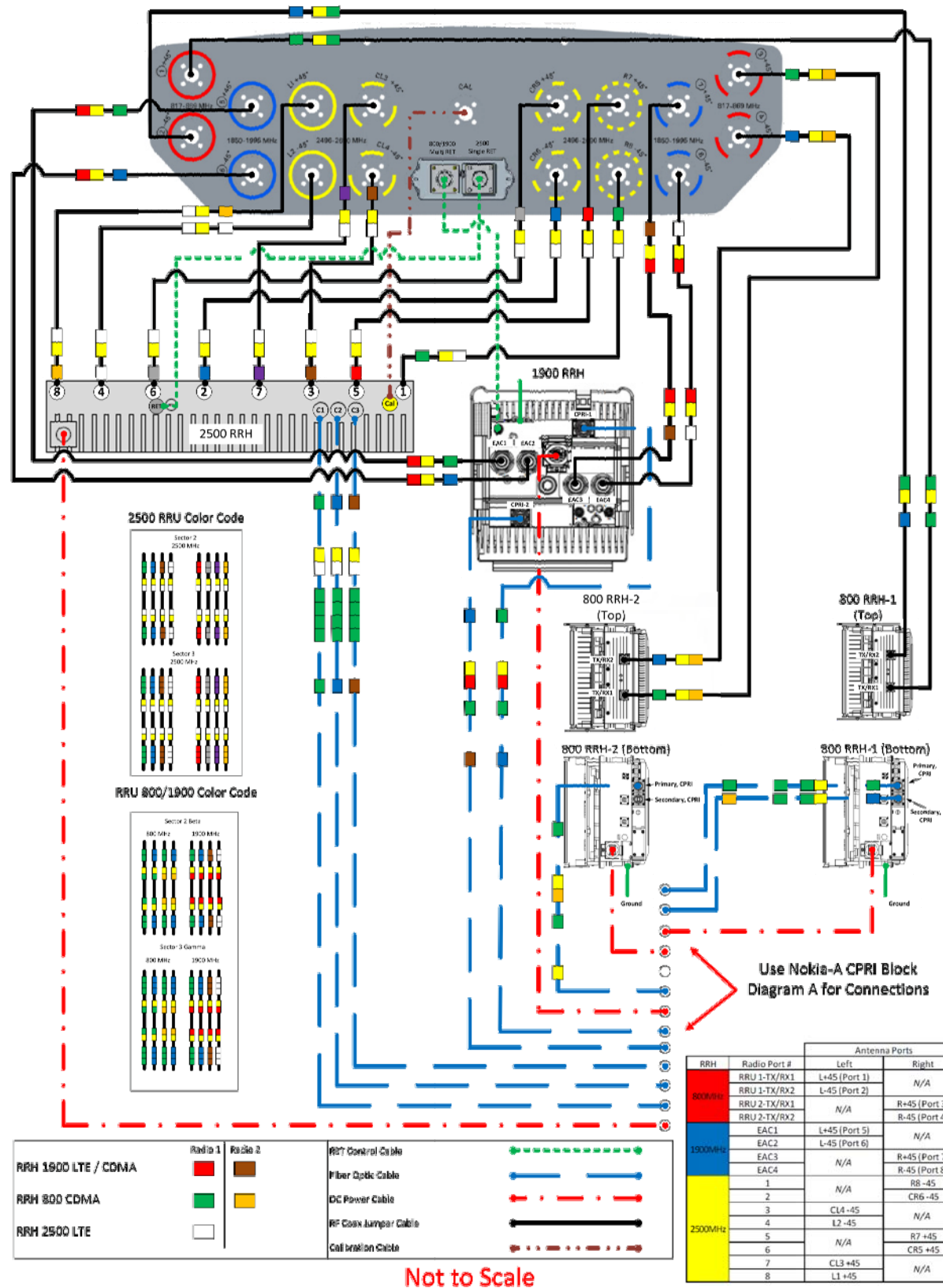


Prepared By  
**Mark Elliott**  
Approved By  
**TBD**

Creation Date  
**September 12, 2016**  
Revision Number  
**R-4**  
Approval Date  
**TBD**



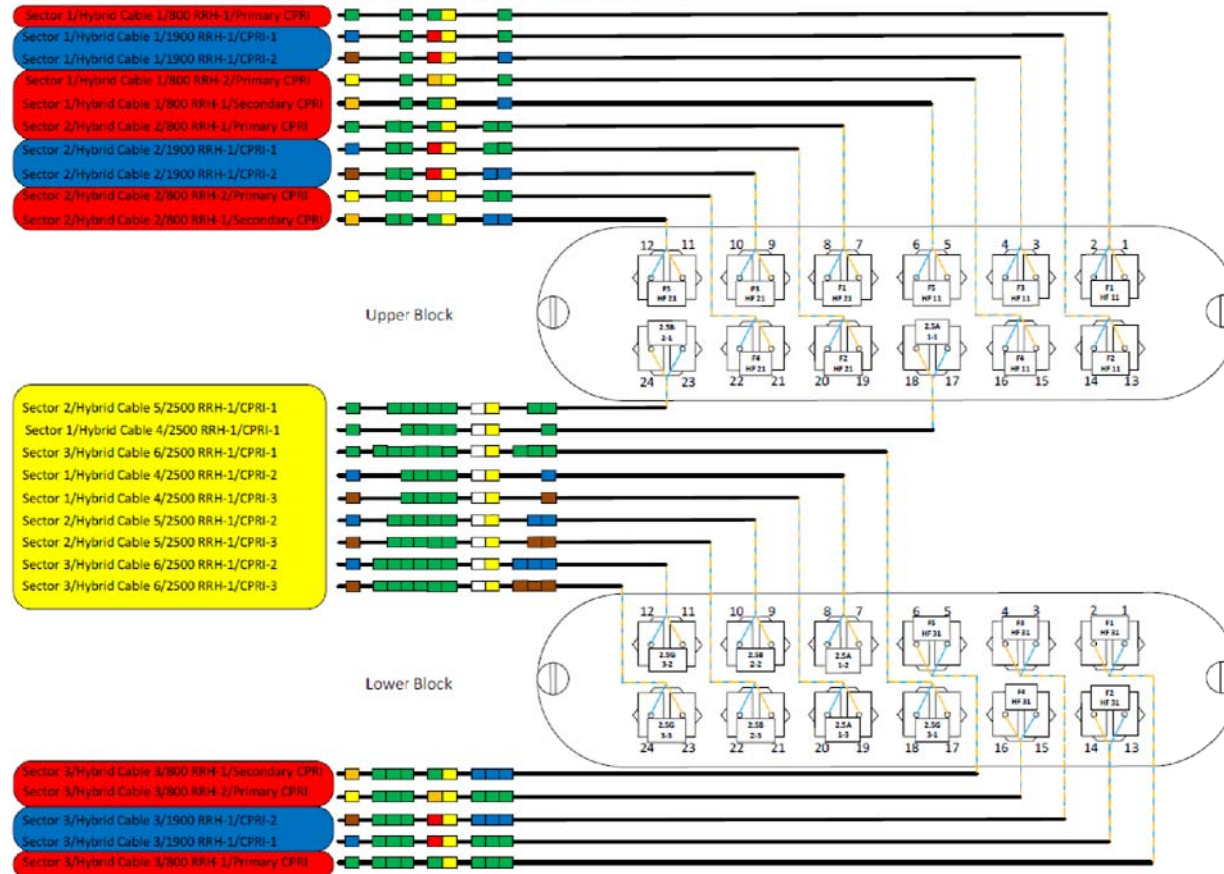
**KMW 16 Port Nokia-A RRH 800, 1900, and 2500 (Sprint Scenario 4)**



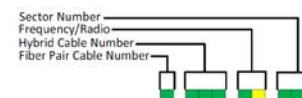
Not to Scale

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

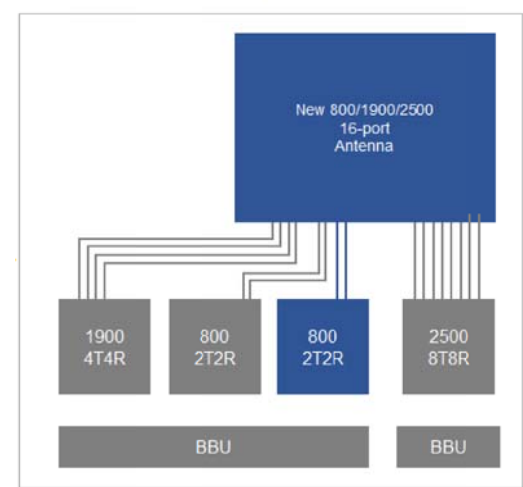
**CPRI Block Connections for Sprint Scenario 4**



Frequency / Radio	Indicator	ID
800 #1	Yellow	Green
800 #2	Yellow	Orange
1900 #1	Yellow	Red
1900 #2	Yellow	Brown
1900 #3	Yellow	Blue
1900 #4	Yellow	Grey
2500 #1	Yellow	White
2500 #2	Yellow	Purple



**Future**



**Sprint**

1 INTERNATIONAL BLVD, SUITE 800  
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**SBA**

SBA COMMUNICATIONS CORP.  
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**ProTerra**  
DESIGN GROUP, LLC

4 Bay Road, Building A  
Suite 200  
Hadley, MA 01035 Ph: (413)320-4918

STATE OF CONNECTICUT  
THOMAS E. JOHNSON  
No. 28192  
LICENSED PROFESSIONAL ENGINEER

CHECKED BY: *VJ/TEJ*  
APPROVED BY: JMM/TEJ

**SUBMITTALS**

REV.	DATE	DESCRIPTION	BY
1	01/30/18	ISSUED FOR CONSTRUCTION	PN
0	11/07/17	ISSUED FOR REVIEW	JEB/EN

SITE NUMBER:  
**CT72XC031**  
SITE NAME:  
**ROXBURY-LOWER COUNTY ROAD**  
SITE ADDRESS:  
LOWER COUNTY ROAD  
ROXBURY, CT 06783

SHEET TITLE  
**PLUMBING DIAGRAM AND RAN WIRING**

SHEET NUMBER  
**RF-2**

# CT72XC031

## DO MACRO EQUIPMENT DEPLOYMENT

### MOUNT AUGMENTATION @ 177'

SELF SUPPORT TOWER

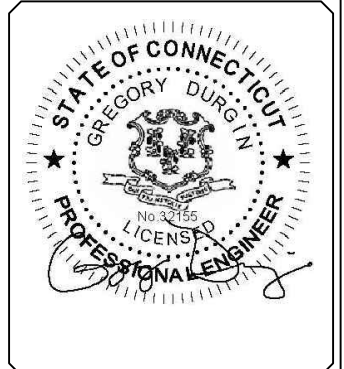
ROXBURY, CT  
LITCHFIELD COUNTY



REVISIONS:			
0	01/11/18	ISSUE FOR CONSTRUCTION	JAD

CHECKED BY: \_\_\_\_\_ DWG

THE INFORMATION CONTAINED IN THIS SET OF DOCUMENTS IS PROPRIETARY BY NATURE. ANY USE OR DISCLOSURE OTHER THAN THAT WHICH RELATES TO THE CLIENT NAMES IS STRICTLY PROHIBITED.



SITE INFORMATION:  
MOUNT AUGMENTATION  
  
CT72XC031  
  
ROXBURY, CT  
  
LATITUDE: 41.55952778  
LONGITUDE: -73.29230556

SHEET TITLE:  
  
TITLE SHEET

SHEET NUMBER:  
  
**S1**

#### SITE INFORMATION

STRUCTURE TYPE: SELF SUPPORT  
MOUNT TYPE: SECTOR FRAMES  
LATITUDE: 41.55952778 (NAD 83)  
LONGITUDE: -73.29230556 (NAD 83)  
CITY, STATE: ROXBURY, CT  
COUNTY: LITCHFIELD  
SBA SITE: CT46125-A ROXBURY-LOWER COUNTY RD  
COORDINATES ARE FOR NAVIGATIONAL PURPOSES ONLY, NOT TO 1A ACCURACY.

#### DO NOT SCALE DRAWINGS

CONTRACTOR SHALL VERIFY ALL PLANS, EXISTING DIMENSIONS, CONDITIONS ON THE JOB SITE & SHALL IMMEDIATELY NOTIFY THE ENGINEER IN WRITING OF ANY DISCREPANCIES BEFORE PROCEEDING WITH THE WORK OR BE RESPONSIBLE FOR THE LABOR & MATERIALS FOR THE DISCREPANCIES.

#### 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.  
  
BUILDING CODE AND DESIGN STANDARD: 2012 IBC / TIA-222-G

#### RIGGING PLAN REQUIRED

THIS SET OF PLANS DOES "NOT" CONSTITUTE A RIGGING PLAN.  
  
A PROPER RIGGING PLAN SHALL BE PERFORMED BY A LICENSED PROFESSIONAL ENGINEER PRIOR TO PROCEEDING ON ANY AUGMENTATIONS SHOWN HEREIN.

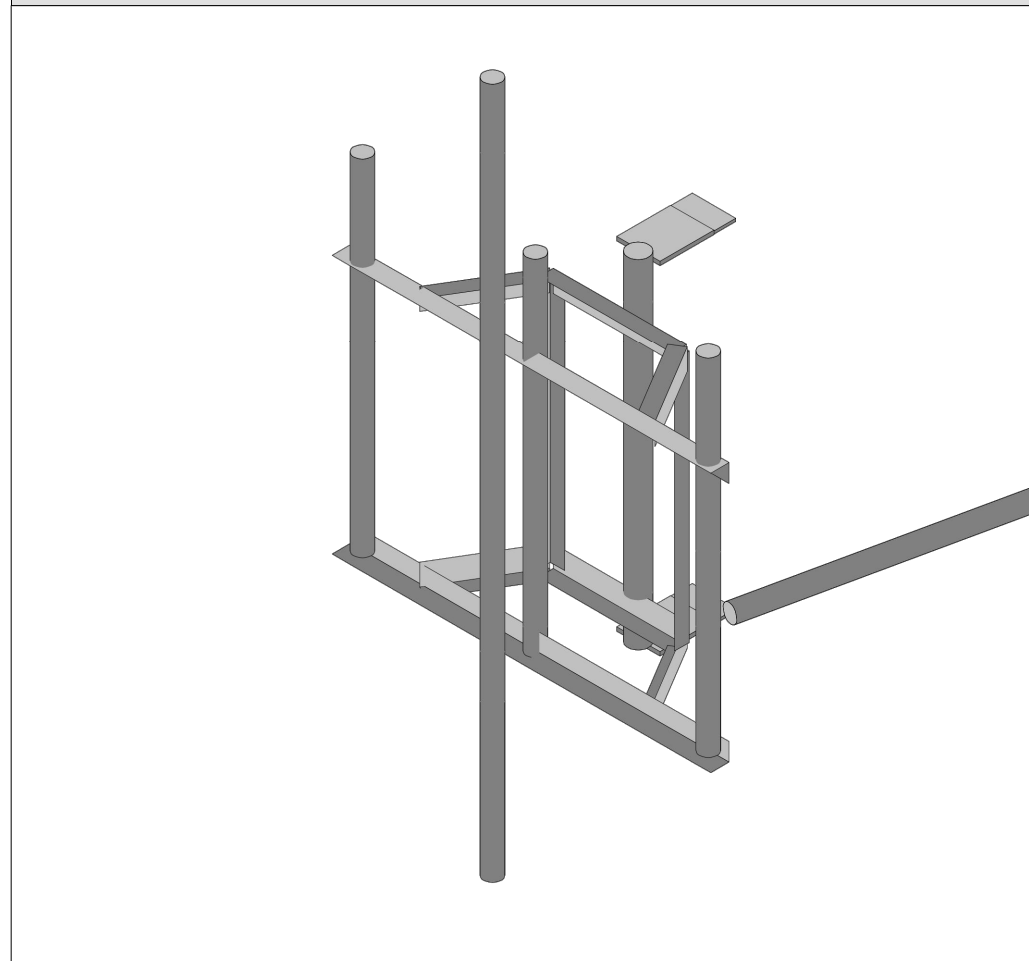
#### GENERAL DESIGN NOTES

- THIS PLAN HAS BEEN DESIGNED UTILIZING THE CORRESPONDING MOUNT STRUCTURAL ANALYSIS.
- THESE PLANS HAVE BEEN DESIGNED IN ACCORDANCE WITH THE GOVERNING PROVISIONS OF TIA/EIA-222, ASCE 7, AWS, ACI, AND AISC. MATERIALS AND SERVICES PROVIDED BY THE CONTRACTOR SHALL CONFORM TO THE ABOVE-MENTIONED CODES AND THE CONTRACT SPECIFICATIONS.
- ALL STRUCTURE INFORMATION OBTAINED IN THE FORM OF FROM INFORMATION PROVIDED BY THE CLIENT. CONTRACTOR SHALL OBTAIN AND BECOME FAMILIAR WITH THE REFERENCED DOCUMENTS. CONTRACTOR SHALL ISSUE A REQUEST FOR INFORMATION (RFI) IN THE EVENT ANY DISCREPANCIES ARE DISCOVERED BETWEEN THESE DOCUMENTS AND THE AS-BUILT CONDITIONS IN THE FIELD IN A SITE VISIT THAT SHALL BE PERFORMED PRIOR TO STARTING FABRICATION OR CONSTRUCTION.
- ALL MATERIALS UTILIZED FOR THIS PROJECT MUST BE NEW AND FREE OF ANY DEFECTS.
- ALL PRODUCT OR MATERIAL SUBSTITUTIONS PROPOSED BY THE CONTRACTOR SHALL BE APPROVED IN WRITING BY THE ENGINEER. CONTRACTOR SHALL PROVIDE DOCUMENTATION TO ENGINEER SUITABLE TO DETERMINE IF SUBSTITUTE IS ACCEPTABLE FOR USE AND MEETS THE ORIGINAL DESIGN CRITERIA. DIFFERENCES FROM THE ORIGINAL DESIGN, INCLUDING MAINTENANCE, REPAIR AND REPLACEMENT, SHALL BE NOTED. ESTIMATES OF COSTS/CREDITS ASSOCIATED WITH THE SUBSTITUTION (INCLUDING RE-DESIGN COSTS AND COSTS TO SUB-CONTRACTORS) SHALL BE PROVIDED TO THE ENGINEER. CONTRACTOR SHALL PROVIDE ADDITIONAL DOCUMENTATION AND/OR SPECIFICATIONS TO THE ENGINEER AS REQUESTED.
- PROVIDE STRUCTURAL STEEL SHOP DRAWING(S) TO THE ENGINEER OF RECORD FOR APPROVAL PRIOR TO FABRICATION (ONLY IF SPECIFICALLY REQUESTED BY ENGINEER).
- UNLESS NOTED OTHERWISE, ALL NEW MEMBERS AND REINFORCING SHALL MAINTAIN THE EXISTING MEMBER WORK LINES AND NOT INTRODUCE ECCENTRICITIES INTO THE STRUCTURE.
- ANY CONTRACTOR-CAUSED DAMAGE TO PROPERTY OF THE LAND OWNER, PROPERTY OF THE STRUCTURE OWNER, PROPERTY OF THE CUSTOMER, SITE FENCING OR GATES, ANY AND ALL UTILITY AND/OR SERVICE LINES, SHOWN OR NOT SHOWN ON THE PLANS, SHALL BE REPAIRED OR REPLACED AT THE SOLE COST OF THE CONTRACTOR AND SHALL BE ACCOMPLISHED BY THE CONTRACTOR OR SUBCONTRACTOR AS APPROVED BY THE ENGINEER OF RECORD AND LAND OWNER. DAMAGE TO EQUIPMENT OR PROPERTY OF ANY KIND BELONGING TO OTHER COMPANIES (BESIDES THE INDICATED CUSTOMER) SHALL BE ADDRESSED BY THE CONTRACTOR WITH THE COMPANIES THAT OWN THE DAMAGED ITEMS.

#### SHEET INDEX

SHEET	DESCRIPTION
S-1	TITLE SHEET
S-2	NOTES AND SPECIFICATIONS
S-3	AUGMENTATIONS, SECTIONS & DETAILS

#### MOUNT AUGMENTATION CONFIGURATION



#### AUGMENTATION SCOPE

AUGMENT ALL SECTORS OF CARRIER'S EXISTING MOUNT INSTALLATION AS REQUIRED (UNLESS NOTED OTHERWISE)



### CONTRACTOR NOTES

- PRIOR TO BEGINNING CONSTRUCTION, ALL CONTRACTORS AND SUBCONTRACTORS MUST ACKNOWLEDGE IN WRITING TO TOWER OWNER THAT THEY HAVE OBTAINED, UNDERSTAND, AND WILL FOLLOW STRUCTURE OWNER STANDARDS OF PRACTICE, CONSTRUCTION GUIDELINES, ALL SITE AND STRUCTURE/TOWER SAFETY PROCEDURES, ALL PRODUCT LIMITATIONS AND INSTALLATION PROCEDURES USED ON SITE, AND PROPOSED AUGMENTATIONS DESCRIBED. RECEIPT OF ACKNOWLEDGEMENT MUST OCCUR PRIOR TO BEGINNING CONSTRUCTION OR CLIMBING. IT IS THE RESPONSIBILITY OF THE GENERAL CONTRACTOR TO PROVIDE THIS DOCUMENTATION FOR STRUCTURE OWNER ON COMPANY LETTERHEAD AND THE RESPONSIBILITY OF THE GENERAL CONTRACTOR TO OBTAIN THIS DOCUMENTATION FROM ANY SUBCONTRACTORS (ON SUBCONTRACTOR LETTERHEAD) AND DELIVER IT TO THE STRUCTURE OWNER.
- IF THE CONTRACTOR DISCOVERS ANY EXISTING CONDITIONS THAT ARE NOT REPRESENTED ON THESE DRAWINGS, OR ANY CONDITIONS THAT WOULD INTERFERE WITH THE INSTALLATION OF THE AUGMENTATIONS, THE ENGINEER OF RECORD SHALL BE CONTACTED IMMEDIATELY TO EVALUATE THE SIGNIFICANCE OF THE DEVIATION.
- THE CONTRACTOR SHALL SOLICIT AND HIRE THE SERVICES OF A QUALIFIED AUGMENTATION INSPECTOR PRIOR TO BEGINNING CONSTRUCTION. THE AUGMENTATION INSPECTOR MAY BE AN EMPLOYEE OF THE CONTRACTOR'S FIRM, HOWEVER THE INSPECTOR'S ONLY DUTIES SHALL BE INSPECTION, TESTING, AND REPORT CREATION AS REQUIRED ON THE "AUGMENTATION INSPECTION NOTES" SHEET.
- THE CONTRACTOR SHALL NOTIFY THE TOWER OWNER OF THE PLANNED CONSTRUCTION & INSPECTION SCHEDULE, AS WELL AS ANY CHANGES TO THE SCHEDULE, WITHIN TWO BUSINESS DAYS OF THE COMPLETION OF THE SCHEDULE OR SCHEDULE REVISION BOTH PRIOR TO BEGINNING CONSTRUCTION AND DURING CONSTRUCTION AS THE SCHEDULE CHANGES. THE STRUCTURE OWNER WHEN THE WORK HAS BEEN COMPLETED WITHIN 2 BUSINESS DAYS OF THE COMPLETION OF THE WORK AND ASSOCIATED AUGMENTATION INSPECTIONS & TESTING (WHEN APPLICABLE).
- IT IS ASSUMED THAT ANY STRUCTURAL AUGMENTATION WORK SPECIFIED ON THESE PLANS WILL BE ACCOMPLISHED BY KNOWLEDGEABLE WORKMEN WITH TOWER CONSTRUCTION EXPERIENCE. THIS INCLUDES PROVIDING THE NECESSARY CERTIFICATIONS TO THE STRUCTURE OWNER AND ENGINEER INCLUDING BUT NOT LIMITED TO TOWER CLIMBER AND RESCUE CLIMBER CERTIFICATIONS, ET CETERA.
- THESE DRAWINGS DO NOT INDICATE THE METHOD OF CONSTRUCTION. THE CONTRACTOR SHALL SUPERVISE AND DIRECT THE WORK AND SHALL BE SOLELY RESPONSIBLE FOR ALL CONSTRUCTION METHODS, MEANS, TECHNIQUES, SEQUENCES AND PROCEDURES.
- CONTRACTOR SHALL WORK WITHIN THE LIMITS OF THE STRUCTURE OWNER'S PROPERTY OR LEASE AREA AND APPROVED EASEMENTS. IT IS THE RESPONSIBILITY OF THE CONTRACTOR TO VERIFY WORK IS WITHIN THESE BOUNDARIES. CONTRACTOR SHALL EMPLOY A SURVEYOR AS REQUIRED. ANY WORK OUTSIDE THESE BOUNDARIES SHALL BE APPROVED IN WRITING BY THE LAND OWNER PRIOR TO MOBILIZATION. CONSTRUCTION STAKING AND BOUNDARY MARKING IS THE RESPONSIBILITY OF THE CONTRACTOR.

### STRUCTURAL ERECTION AND BRACING REQUIREMENTS

- THE STRUCTURAL DRAWINGS ILLUSTRATE THE COMPLETED STRUCTURE WITH ALL ELEMENTS IN THEIR FINAL POSITIONS, PROPERLY SUPPORTED AND BRACED.
- THE CONTRACTOR SHALL PROVIDE SHORING AND BRACING AS REQUIRED DURING CONSTRUCTION TO ENSURE STABILITY. DESIGN AND SEQUENCING OF CONSTRUCTION SHORING AND BRACING IS OUTSIDE THE SCOPE OF THIS WORK.
- THE CONTRACTOR IS RESPONSIBLE FOR THE DESIGN AND EXECUTION OF ALL MISCELLANEOUS SHORING, BRACING, TEMPORARY SUPPORTS, GUYING, ETC. NECESSARY TO PROVIDE A COMPLETE AND STABLE STRUCTURE AS SHOWN ON THESE DRAWINGS.

### BOLTS

- ALL CONNECTIONS OF STRUCTURAL STEEL MEMBERS SHALL BE MADE USING SPECIFIED GALVANIZED HIGH STRENGTH ASTM A325 OR A490 BOLTS WITH THREADS EXCLUDED FROM SHEAR PLANE.
- FASTENERS SHALL BE INSTALLED IN PROPERLY ALIGNED HOLES, WITH BOLT HEADS FACING DOWN WHERE APPLICABLE.
- ALL BOLTS AT EVERY CONNECTION SHALL BE INSTALLED SNUG-TIGHT UNTIL THE SECTION IS FULLY COMPACTED AND ALL PLIES ARE JOINED, AND THEN TIGHTENED FURTHER BY AISC - "TURN OF THE NUT" METHOD. TIGHTENING SHALL PROGRESS SYSTEMATICALLY.
- BOLT LENGTHS UP TO AND INCLUDING 4 DIAMETERS SHALL BE TENSIONED 1/3 TURN BEYOND SNUG-TIGHT. BOLT LENGTHS OVER 4 DIAMETERS SHALL BE 1 1/2 TURNS BEYOND SNUG-TIGHT.
- ALL BOLTED CONNECTIONS SHALL USE LOCK WASHERS.

### STRUCTURAL STEEL

- STRUCTURAL STEEL SHALL BE DETAILED, FABRICATED, AND ERECTED IN ACCORDANCE WITH THE CURRENT EDITION OF THE AISC STEEL CONSTRUCTION MANUAL AND SECTION 4 OF THE TIA CODE.
- PRE-QUALIFIED STRUCTURAL STEEL SHALL CONFORM TO THE FOLLOWING MINIMUM GRADES UNLESS OTHERWISE NOTED:
  - CHANNELS & ANGLES ..... ASTM A36, (Fy = 36 KSI)
  - PLATES ..... ASTM A36, (Fy = 36 KSI)
  - PIPES ..... ASTM A53 GR.B, (Fy = 35 KSI)
  - HSS ROUND ..... ASTM A500 GR.B, (Fy = 42 KSI)
  - HSS RECTANGULAR ..... ASTM A500 GR.B, (Fy = 46 KSI)
  - STRUCTURAL BOLTS ..... ASTM A325
  - U-BOLTS ..... ASTM A307 GR.A
  - NUTS FOR BOLTS ..... ASTM A563 (THREADING TO MATCH BOLT)
  - WASHERS FOR BOLTS ..... ASTM F436
  - SEE TABLE 5-1 OF THE TIA CODE FOR ADDITIONAL SHAPES AND STANDARDS THAT ARE NOT LISTED ABOVE.
- NON PRE-QUALIFIED STRUCTURAL STEEL SHALL CONFORM TO THE FOLLOWING STANDARDS PER THE TIA CODE:
  - THE CARBON EQUIVALENT OF STEEL SHALL NOT EXCEED 0.65 PER SECTION 5.4.2 OF THE TIA CODE
  - ELONGATION OF STEEL SHALL NOT BE LESS THAN 18%
  - TEST REPORTS SHALL BE IN ACCORDANCE WITH ASTM A6 OR A568
  - TOLERANCES SHALL BE IN ACCORDANCE WITH ASTM A6
- FIELD CUT EDGES, EXCEPT DRILLED HOLES, SHALL BE GROUND SMOOTH AND COLD GALVANIZED.
- ALL WELDING WORK SHALL CONFORM TO THE AWS D1.1 STRUCTURAL WELDING CODE. ALL WELDING SHALL BE PERFORMED BY CERTIFIED WELDERS ONLY. WELDING ELECTRODES SHALL BE E70XX.
- ALL DETAILING, FABRICATION AND ERECTION OF STRUCTURAL STEEL SHALL CONFORM TO AISC SPECS AND CODES, LATEST EDITION.
- UPON REQUEST, THE CONTRACTOR SHALL SUBMIT DETAILED, ENGINEERED, COORDINATED AND CHECKED SHOP DRAWINGS FOR ALL STRUCTURAL STEEL TO THE ENGINEER OF RECORD TO REVIEW FOR COMPLIANCE WITH DESIGN INTENT PRIOR TO THE START OF FABRICATION AND/OR ERECTION.
- TORCH-CUTTING OF ANY KIND SHALL NOT BE PERMITTED.
- ALL BOLT HOLES SHALL BE STANDARD SIZE BOLT HOLES PER AISC 360, UNLESS OTHERWISE NOTED. ALL HOLES SHALL BE SHOP DRILLED OR SUB-PUNCHED AND REAMED. BURNING OF HOLES IS NOT PERMITTED. WHERE SLOTTED OR OVERSIZE HOLES ARE SPECIFIED ON THE DRAWINGS, EXTRA-THICK ASTM F436 PLATE WASHERS SHALL BE USED (3/16" MINIMUM THICKNESS) WITH A DIAMETER SUITABLE TO COVER THE EXTENTS OF THE SLOT OR HOLE. BOLTS SHALL BE HEAVY-HEX WHERE AVAILABLE IN THE SIZE AND GRADE SPECIFIED, OTHERWISE BOLTS SHALL BE HEX HEAD CAP SCREWS.
- ALL STEEL HARDWARE, INCLUDING ADHESIVE OR EMBEDDED ANCHOR BOLTS AND THEIR ACCESSORIES, SHALL BE HOT-DIP GALVANIZED IN ACCORDANCE WITH ASTM A153 (EXCEPT BOLTS SMALLER THAN 1/2" SHALL CONFORM TO FE/ZN 3 AT PER ASTM F1941 WHERE HOT-DIP GALVANIZED BOLTS ARE NOT AVAILABLE). ALL STEEL MEMBERS, INCLUDING WELDMENTS, SHALL BE HOT-DIP GALVANIZED IN ACCORDANCE WITH ASTM A123. REPAIR DAMAGE TO GALVANIZED COATINGS USING ASTM A780 PROCEDURES WITH A ZINC RICH PAINT (SUCH AS ZINC GALVILITE) FOR GALVANIZING DAMAGED BY HANDLING, TRANSPORTING, CUTTING, WELDING, OR BOLTING. DO NOT HEAT SURFACES TO WHICH REPAIR PAINT HAS BEEN APPLIED. CALL OUT HOLES REQUIRED FOR HOT-DIP GALVANIZING ON SHOP DRAWINGS.
- MEMBERS SHALL BE SHOP-FABRICATED AND WELDED TO THE EXTENT PRACTICABLE IN ORDER TO REDUCE FIELD INSTALLATION COSTS.

### CONSTRUCTION INSPECTION CHECKLIST

CONSTRUCTION AND/OR INSTALLATION INSPECTIONS REQUIRED FOR REPORT? (CHECK=YES, BLANK=NO)	INSPECTION REPORT ITEM
√	CONSTRUCTION INSPECTIONS
	THIRD-PARTY CERTIFIED WELD INSPECTION (INCLUDING IBC SPECIAL INSPECTIONS)
√	GALVANIZING REPAIR MATERIAL PREPARATION, INSPECTION, & PAINT APPLICATION
√	PRIME CONTRACTOR'S AS-BUILT DOCUMENTS (SIGNED & DATED)
√	FABRICATION INSPECTION
√	MATERIAL TEST REPORT(S) / MILL CERTIFICATE(S)
√	PACKING SLIPS FOR STRUCTURAL MATERIALS

### NOMINAL HOLE DIMENSIONS

BOLT Ø	STANDARD HOLE Ø
1/2"Ø	9/16"Ø
5/8"Ø	11/16"Ø
3/4"Ø	13/16"Ø
7/8"Ø	15/16"Ø
1"Ø	1 1/8"Ø

**Sprint**

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E: CONTACT@GEOSTRUCTURAL.COM  
WWW.GEOSTRUCTURAL.COM

### REVISIONS:

NO.	DATE	DESCRIPTION	BY
0	01/11/18	ISSUE FOR CONSTRUCTION	JAD

### CHECKED BY:

DWG

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### SITE INFORMATION:

MOUNT AUGMENTATION

CT72XC031

ROXBURY, CT

LATITUDE: 41.55952778  
LONGITUDE: -73.29230556

### SHEET TITLE:

NOTES AND SPECIFICATIONS

### SHEET NUMBER:

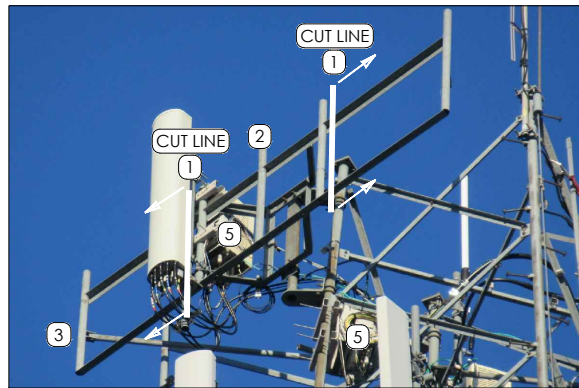
S2



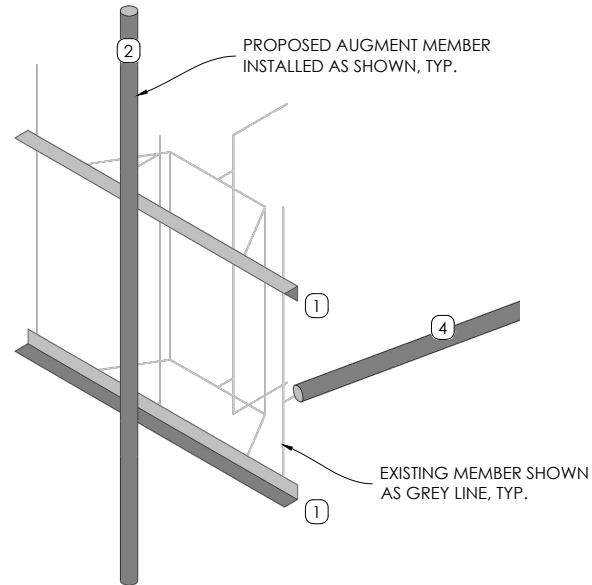
**NEW MOUNT AUGMENTATIONS**

1. CONTRACTOR TO MODIFY FACE WIDTH OF EXISTING MOUNT FRAME FROM 12' WIDE TO 4.5' WIDE. TOP AND BOTTOM ANGLE RAIL MEMBERS TO BE CUT JUST BEYOND THE WELDED INTERIOR MOUNT PIPE LOCATIONS AS DEPICTED IN PHOTO BELOW. APPLY (2) COATS OF COLD-GALV. COMPOUND TO CUT MEMBER ENDS. [TYP. (3) SECTORS]
2. NEW PIPE 2.0 STD. (2.375"O.D.) MOUNT PIPE INSTALLED IN MIDDLE POSITION OF MODIFIED MOUNT FACE. ATTACH NEW MOUNT PIPE TO EXISTING WELDED MOUNT PIPE WITH (2) SITEPRO1 DCP12K PIPE TO PIPE CLAMP SETS AND INSTALL PROPOSED PANEL ANTENNA. [(3) TOTAL]
3. CONTRACTOR TO REMOVE AND DISPOSE OF EXISTING PIPE STIFF-ARM (TIE-BACK) MEMBER FROM TERMINAL END OF MOUNT AND TOWER LEG. [TYP. (3) LOCATIONS]
4. SECTOR FRAME STIFF ARM KIT SITEPRO1 PART# SPTB, 1 KIT PER SECTOR, INSTALLED FROM (E) INTERIOR WELDED PIPE MOUNT MEMBER TO ADJACENT TOWER LEG SIMILAR TO EXISTING PER MANUF. SPECS. [(3) TOTAL]
5. DUAL PIPE MOUNT ASSEMBLY KIT ALL 800, 1900 AND 2500 MHZ RRH UNITS MUST BE INSTALLED DIRECTLY TO TOWER LEGS ON NEW SITEPRO1 PART# CWT8-LL DUAL PIPE MOUNT ASSEMBLIES TO THE TOWER LEG BELOW THE EXISTING MOUNT ATTACHMENT POINT AS SHOWN IN CONSTRUCTION DRAWINGS. [(3) TOTAL]

AUGMENTATIONS SHALL BE COMPLETED PRIOR TO THE INSTALLATION OF ANY NEW EQUIPMENT.



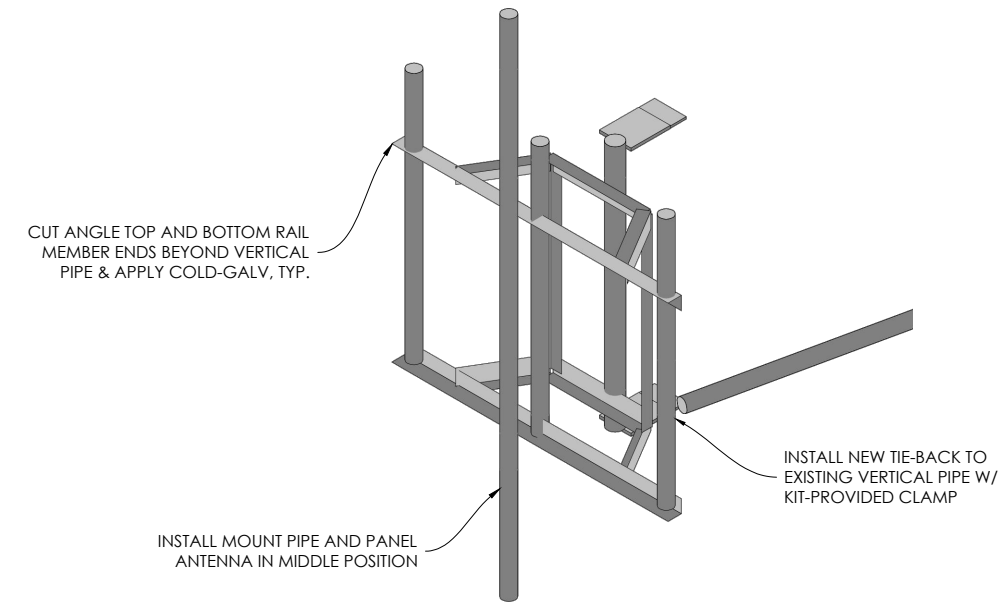
**SECTOR FRAMES @ 177' AUGMENTATION**



**MOUNT AUGMENTATION ISOLATION**  
SCALE: N.T.S.

**CONSTRUCTION NOTES**

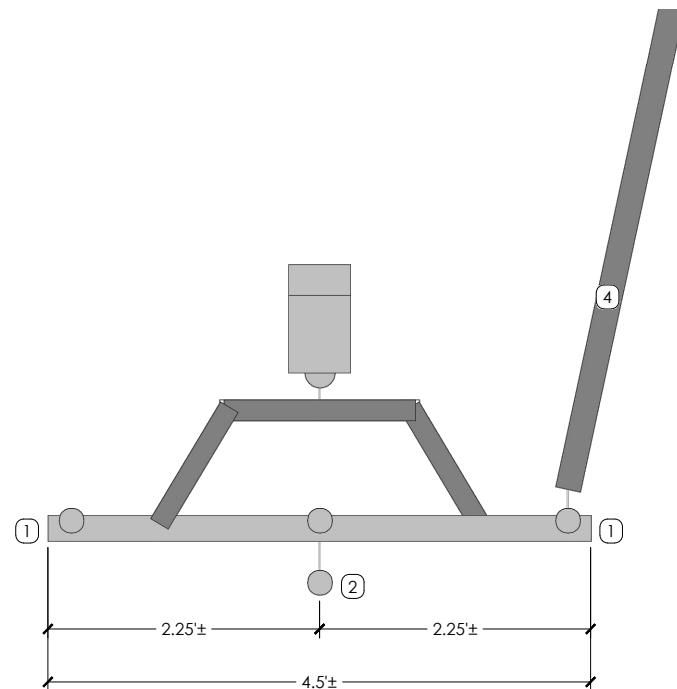
1. SCOPE OF WORK MUST BE COMPLETED AT WIND SPEEDS < 20 MPH.
2. ALL DIMENSIONS ARE APPROXIMATE. CONTRACTOR SHOULD FIELD-VERIFY ALL DIMENSIONS BEFORE FABRICATION OF STEEL AND COMMENCEMENT OF WORK. FIELD CUT MEMBERS AS REQUIRED.
3. CONTRACTOR TO COORDINATE THE TEMPORARY REMOVAL/RELOCATION/REPLACEMENT OF ELEMENTS (E.G. COAX, CLIPS, TMAs, ETC.) CONNECTED TO, OR IN THE DIRECT PATH, OF NEW AUGMENTATION MEMBERS.



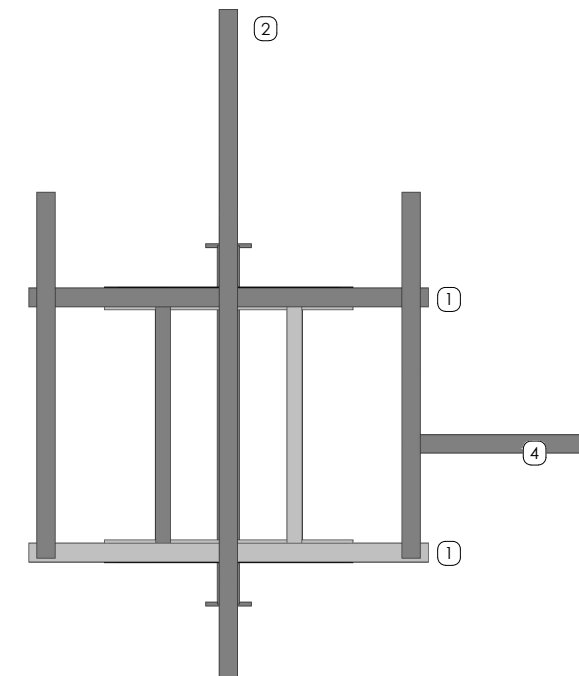
**AUGMENTED MOUNT ISOMETRIC**  
SCALE: N.T.S.

**INSTALLATION NOTES**

1. AUGMENT MEMBER(S) MAY NEED TO BE FIELD-CUT TO LENGTH TO ACCOMMODATE THIS INSTALLATION. CONTRACTOR TO CUT AND DRILL TO SUIT AS REQUIRED AND APPLY (2) COATS OF COLD-GALV. COMPOUND TO CUT MEMBER ENDS.
2. CONTRACTOR TO CHECK ALL EXISTING MEMBER CONNECTION BOLTS, PARTICULARLY STANDOFF TO TOWER BOLTS, FOR PROPER INSTALLATION AND TIGHTNESS.
3. COORDINATE PLACEMENT OF NEW AUGMENT MEMBERS WITH EXISTING TOWER AND CLIMBING FACILITY ELEMENTS (E.G. STEP PEGS, COAX PORTS, ETC.)
4. REFER TO CONSTRUCTION DRAWINGS (BY OTHERS) AND MOUNT STRUCTURAL ANALYSIS FOR APPROVED INSTALLATION LOCATIONS AND QUANTITIES OF APPURTENANCES.



**AUGMENTED MOUNT PLAN**  
SCALE: N.T.S.



**AUGMENTED MOUNT FRONT ELEVATION**  
SCALE: N.T.S.

**Sprint**

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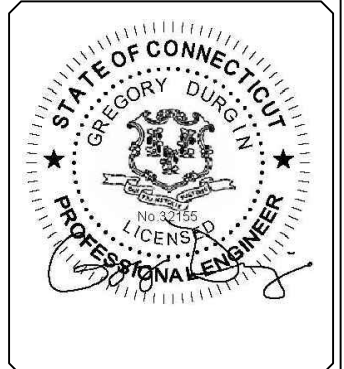
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REVISIONS:

NO.	DATE	DESCRIPTION	BY
0	01/11/18	ISSUE FOR CONSTRUCTION	JAD

CHECKED BY: DWG

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SITE INFORMATION:  
**MOUNT AUGMENTATION**  
  
CT72XC031  
  
ROXBURY, CT  
  
LATITUDE: 41.55952778  
LONGITUDE: -73.29230556

SHEET TITLE:  
**AUGMENTATIONS,  
SECTIONS &  
DETAILS**

SHEET NUMBER:  
**S3**