



Filed by:

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

December 1, 2017

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

**Notice of Exempt Modification**

**640 Hilliard Street, Manchester, CT  
41.784500 N**

**-72.550806 W**

**Sprint #: CT52XC028\_DO Macro Upgrade**

Dear Ms. Bachman:

Sprint (Clearwire) currently maintains antennas at the 117-foot level of the existing 149-foot Monopole Tower at 640 Hilliard Street. The property is owned by Hilliard Mills, LLC. The Tower is owned by SBA Infrastructure, LLC. Sprint now intends to remove (3) existing cell antennas and replace with (3) newer technology cell antennas at the 117-foot level of the tower. The proposed full scope of work is as follows:

Remove:

*At 117':*

(3) Samsung BTSs

(3) ¼" lines

(3) 5/8" lines

(1) 5/16" line

(3) Clearwire RRHs

*On Ground:*

Clearwire Junction Box

Clearwire Equipment Cabinet

Remove and Replace:

*At 117':*

Remove (3) Argus LLPX-310R Panel Antennas / Replace with (3) KMW - ETCR-654L12H6 Panel Antennas

Remove chain mount and pipe mast / Replace with (2) Collar Mount site pro 1 part LWRM and (6) 36" standoff arms Sitepro 1 part MM03

*On Ground:*

*\*No change to ground area / replacing equipment on existing 7'x7' concrete pad*

Remove Clearwire equipment cabinet / Replace with Sprint equipment cabinet on existing concrete pad

Remove Clearwire GPS / Replace with Sprint GPS



Install:

*At 117':*

- (3) ALU 1900 MHz RRUs
- (6) ALU 800 MHz RRUs
- (3) ALU TD-RRH8x20-25 RRUs
- (4) 1-1/4" fiber

Existing Equipment to Remain (Including entitlements):

*At 117':*

- (2) Andrew VHLP2.5-11 dishes ((1) is entitlement only - not installed)
- (2) 1/2" lines

This facility was approved by the Council on November 29, 2007 under Docket 339. Approval was initially for a 150' brown monopole with flush mounted antennas painted to match the pole. On December 17, 2015, the Council reissued the Decision and Order in Docket 339 "eliminating the requirement that all antennas on the facility be flush-mounted and color thereof to match the monopole" and approving the installation of T-arm mount kits. It is SBA's opinion that the proposed modification complies with all tower conditions.

Please accept this letter as notification pursuant to Regulations of Connecticut State Agencies §16-50j-73, for construction that constitutes an exempt modification pursuant to R.C.S.A. §16.50j-72(b)(2). In accordance with R.C.S.A. § 16.50j-73, a copy of this letter is being sent to the Town's General Manager, Scott Shanley, and Zoning Enforcement Officer, James Davis, as well as to the Property Owner. (Separate notice is not being sent to the tower owner, as it belongs to SBA.)

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

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

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

Sincerely,

Kri Pelletier

Property Specialist

SBA COMMUNICATIONS CORPORATION

134 Flanders Rd., Suite 125

Westborough, MA 01581

508.251.0720 x3804 + T - 508.366.2610 + F - kpelletier@sbsite.com



Attachments

cc: Scott Shanley, General Manager / with attachments  
*Town of Manchester, 41 Center Street, Manchester, CT 06045*

James Davis, Zoning Enforcement Officer / with attachments  
*Town of Manchester, Lincoln Center, 2<sup>nd</sup> Floor, 494 Main St., Manchester, CT 06045*

Hilliard Mills, LLC, Property Owner / with attachments  
*40 Hansen Drive, Vernon, CT 06066 (per SBA records)*  
*642 Hilliard Street, Suite 2301, Manchester, CT 06042 (per Assessor DB)*





## POWER DENSITY

### 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>117 feet</b>	Height (AGL):	<b>117 feet</b>	Height (AGL):	<b>117 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>3.72 %</b>	Antenna B1 MPE%	<b>3.72 %</b>	Antenna C1 MPE%	<b>3.72 %</b>

Site Composite MPE%	
Carrier	MPE%
SPRINT – Max per sector	3.72 %
T-Mobile	0.01 %
Clearwire	0.15 %
MetroPCS	0.83 %
<b>Site Total MPE %:</b>	<b>4.71 %</b>

SPRINT Sector A Total:	3.72 %
SPRINT Sector B Total:	3.72 %
SPRINT Sector C Total:	3.72 %
<b>Site Total:</b>	<b>4.71 %</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	117	1.26	850 MHz	567	0.22%
Sprint 850 MHz LTE	2	432.54	117	2.52	850 MHz	567	0.45%
Sprint 1900 MHz (PCS) CDMA	5	535.94	117	7.82	1900 MHz (PCS)	1000	0.78%
Sprint 1900 MHz (PCS) LTE	2	1,339.86	117	7.82	1900 MHz (PCS)	1000	0.78%
Sprint 2500 MHz (BRS) LTE	8	639.78	117	14.93	2500 MHz (BRS)	1000	1.49%
<b>Total:</b>						<b>567</b>	<b>3.72%</b>



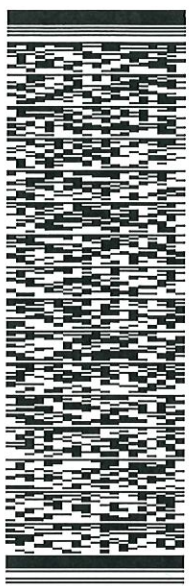
ORIGIN ID:BBFA (508) 614-0389  
RICK WOODS  
SBA NETWORK SERVICES INC  
134 FLANDERS ROAD  
SUITE 125  
WESTBOROUGH, MA 01581  
UNITED STATES US

SHIP DATE: 01DEC17  
ACTWGT: 1.00 LB  
CAD: 105843304/NET/3920  
BILL SENDER

TO **PRESIDENT OR MANAGER**  
**HILLIARD MILLS LLC**  
**40 HANSEN DRIVE**

**VERNON CT 06066**  
(508) 251-0720 X 3804 REF: 10-56-92009-6089  
INV: DEPT:  
PO:

549J1574C104C



J172117091301uv

TRK# 7708 8381 7880  
0201  
MON - 04 DEC 10:30A  
PRIORITY OVERNIGHT

**SE QCWA**  
CT-US **BDL**  
**06066**



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SBA NETWORK SERVICES INC  
134 FLANDERS ROAD  
SUITE 125  
WESTBOROUGH MA 01581  
UNITED STATES US

SHIP DATE: 01DEC17  
ACTWTGT: 1.00 LB  
CAD: 105843304N/ET3920

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TO PRESIDENT OR MANAGER

HILLIARD MILLS LLC

642 HILLIARD STREET

SUITE 2301

MANCHESTER CT 06042

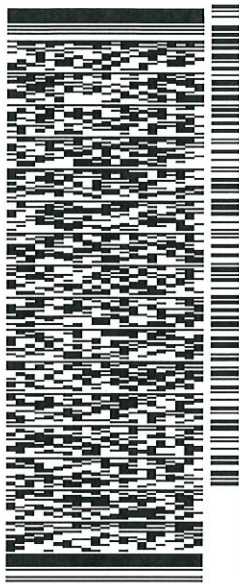
(508) 251-0720 X 3804

REF: 1056-92009-6099

INV:

PO:

DEPT:



J172117091301uv

549J1574C/104C

TRK# 7708 8376 7816  
0201

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SE QCWA

06042  
CT-US BDL



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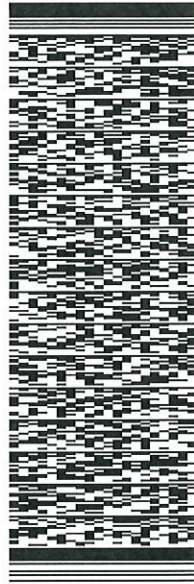
ORIGIN ID: BFEA (508) 614-0389  
RICK WOODS  
SEA NETWORK SERVICES INC  
134 FLANDERS ROAD  
SUITE 125  
WESTBOROUGH, MA 01581  
UNITED STATES US

SHIP DATE: 01DEC17  
ACTWGT: 1.00 LB  
CAD: 105843304/NET3920  
BILL SENDER

TO **SCOTT SHANLEY, GENERAL MANAGER**  
**TOWN OF MANCHESTER**  
**41 CENTER STREET**

**MANCHESTER CT 06045**  
(508) 251-0720 X.3804 REF: 10-56-92009-6089  
INV. DEPT.  
P.O.

549J1574C/104C



TRK# 7708 8334 0006  
0201

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PRIORITY OVERNIGHT

**SE QCWA**

06045  
CT-US BDL



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ORIGIN ID: BFEA (508) 614-0389  
RICK WOODS  
SBA NETWORK SERVICES INC  
134 FLANDERS ROAD  
SUITE 125  
WESTBOROUGH, MA 01581  
UNITED STATES US

SHIP DATE: 01DEC17  
ACTWGT: 1.00 LB  
CAD: 105843304/NET3920  
BILL SENDER

TO JAMES DAVIS, ZONING ENFORC. OFFICER

TOWN OF MANCHESTER

LINCOLN CENTER - 2ND FLOOR

494 MAIN STREET

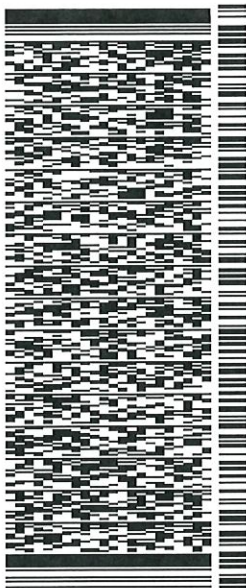
MANCHESTER CT 06045

(508) 251-0720 X 3804

REF: 10-56-92009-6089

PO:

DEPT:



J172117091301uv

549J1574C/M04C

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**640 HILLIARD STREET**

**Location** 640 HILLIARD STREET

**Mblu** 45/ 2920/ 640/ /

**Acct#** 292000640

**Owner** HILLIARD MILLS LLC

**Assessment** \$173,100

**Appraisal** \$247,300

**PID** 7687

**Building Count** 2

**Current Value**

Appraisal			
Valuation Year	Improvements	Land	Total
2016	\$132,100	\$115,200	\$247,300
Assessment			
Valuation Year	Improvements	Land	Total
2016	\$92,500	\$80,600	\$173,100

**Owner of Record**

**Owner** HILLIARD MILLS LLC  
**Address** 642 HILLIARD STREET SUITE 2301  
 MANCHESTER, CT 06042

**Sale Price** \$75,000  
**Certificate**  
**Book & Page** 3649/ 42  
**Sale Date** 04/02/2009  
**Instrument** 03

**Ownership History**

Ownership History					
Owner	Sale Price	Certificate	Book & Page	Instrument	Sale Date
HILLIARD MILLS LLC	\$75,000		3649/ 42	03	04/02/2009
SBA INFRASTRUCTURE HOLDINGS II INC	\$0		3649/ 32	43	04/02/2009
OPTASITE INC	\$196,657		3570/ 277	33	05/16/2008
SIX HUNDRED FORTY HILLIARD ST LLC	\$0		3358/ 001	31	11/01/2006
LYONS PAMELA J	\$0	C	1591/ 131		04/21/1993

**Building Information**

**Building 1 : Section 1**

**Year Built:** 1900  
**Living Area:** 8,160  
**Replacement Cost:** \$240,776  
**Replacement Cost  
 Less Depreciation:** \$127,600

**Building Photo**

**Building Attributes**

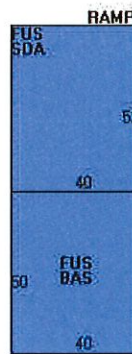


Field	Description
STYLE	Mill Building
MODEL	Ind/Comm
Grade	Average
Stories:	2
Occupancy	3
Exterior Wall 1	Masonite
Exterior Wall 2	Brick/Masonry
Roof Structure	Gable/Hip
Roof Cover	Asphalt Shingl
Interior Wall 1	Minim/Masonry
Interior Wall 2	
Interior Floor 1	Concr-Finished
Interior Floor 2	Hardwood
Heating Fuel	Gas
Heating Type	Hot Air-no Duc
AC Type	None
Bldg Use	Industrial 96
Total Rooms	
Total Bedrms	00
Total Baths	0
1st Floor Use:	300
Heat/AC	None
Frame Type	Wood Frame
Baths/Plumbing	Average
Ceiling/Wall	Ceil & Min WI
Rooms/Prtns	Above Average
Wall Height	10
% Comn Wall	0



(http://images.vgsi.com/photos2/ManchesterCTPhotos//\00\02\21\35.jpg)

**Building Layout**



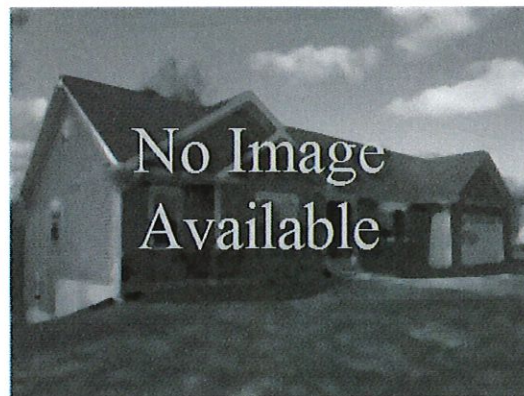
Building Sub-Areas (sq ft)			Legend
Code	Description	Gross Area	Living Area
FUS	Upper Story, Finished	4,080	4,080
SDA	Store Display Area	2,080	2,080
BAS	First Floor	2,000	2,000
		8,160	8,160

**Building 2 : Section 1**

**Year Built:** 1900  
**Living Area:** 4,168  
**Replacement Cost:** \$90,020  
**Replacement Cost Less Depreciation:** \$4,500

Building Attributes : Bldg 2 of 2	
Field	Description
STYLE	Mill Building
MODEL	Ind/Comm
Grade	Minimum
Stories:	3
Occupancy	1
Exterior Wall 1	Brick Veneer

**Building Photo**

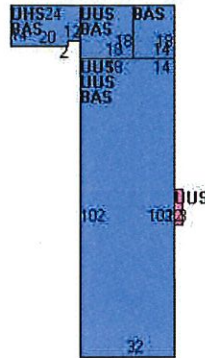


(http://images.vgsi.com/photos2/ManchesterCTPhotos//default)



Exterior Wall 2	Clapboard
Roof Structure	Gable/Hip
Roof Cover	Asphalt Shingl
Interior Wall 1	Minim/Masonry
Interior Wall 2	
Interior Floor 1	Dirt/None
Interior Floor 2	
Heating Fuel	Coal or Wood
Heating Type	None
AC Type	None
Bldg Use	Industrial 96
Total Rooms	
Total Bedrms	
Total Baths	
1st Floor Use:	
Heat/AC	None
Frame Type	Wood Frame
Baths/Plumbing	None
Ceiling/Wall	Ceil & Min WI
Rooms/Prtns	Average
Wall Height	9
% Comn Wall	

**Building Layout**



Building Sub-Areas (sq ft)		Legend	
Code	Description	Gross Area	Living Area
BAS	First Floor	4,168	4,168
UHS	Half Story, Unfinished	328	0
UUS	Upper Story, Unfinished	6,888	0
		11,384	4,168

**Extra Features**

Extra Features	Legend
No Data for Extra Features	

**Land**

**Land Use**

Use Code 300  
 Description Industrial 96  
 Zone IND  
 Neighborhood 3000  
 Alt Land Appr No  
 Category

**Land Line Valuation**

Size (Acres) 1.23  
 Frontage 0  
 Depth 0  
 Assessed Value \$80,600  
 Appraised Value \$115,200

**Outbuildings**

Outbuildings	Legend
No Data for Outbuildings	

**Valuation History**

--

<b>Appraisal</b>			
<b>Valuation Year</b>	<b>Improvements</b>	<b>Land</b>	<b>Total</b>
2015	\$156,600	\$115,200	\$271,800
2010	\$186,700	\$120,800	\$307,500
2005	\$144,800	\$85,900	\$230,700

<b>Assessment</b>			
<b>Valuation Year</b>	<b>Improvements</b>	<b>Land</b>	<b>Total</b>
2015	\$109,600	\$80,600	\$190,200
2010	\$130,700	\$84,500	\$215,200
2005	\$101,400	\$60,100	\$161,500

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

SPRINT Existing Facility

Site ID: CT52XC028

SBA Hillard  
640 Hilliard Street  
Manchester, CT 06040

**November 28, 2017**

**EBI Project Number: 6217005372**

Site Compliance Summary	
Compliance Status:	<b>COMPLIANT</b>
Site total MPE% of FCC general public allowable limit:	<b>4.71 %</b>





November 28, 2017

SPRINT

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

## Emissions Analysis for Site: **CT52XC028 – SBA Hillard**

EBI Consulting was directed to analyze the proposed SPRINT facility located at **640 Hilliard Street, Manchester, 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 **640 Hilliard Street, Manchester, 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 **117 feet** above ground level (AGL) for **Sector A**, **117 feet** above ground level (AGL) for **Sector B** and **117 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>117 feet</b>	Height (AGL):	<b>117 feet</b>	Height (AGL):	<b>117 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>3.72 %</b>	Antenna B1 MPE%	<b>3.72 %</b>	Antenna C1 MPE%	<b>3.72 %</b>

Site Composite MPE%	
Carrier	MPE%
SPRINT – Max per sector	<b>3.72 %</b>
T-Mobile	0.01 %
Clearwire	0.15 %
MetroPCS	0.83 %
<b>Site Total MPE %:</b>	<b>4.71 %</b>

SPRINT Sector A Total:	3.72 %
SPRINT Sector B Total:	3.72 %
SPRINT Sector C Total:	3.72 %
<b>Site Total:</b>	<b>4.71 %</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	117	1.26	850 MHz	567	0.22%
Sprint 850 MHz LTE	2	432.54	117	2.52	850 MHz	567	0.45%
Sprint 1900 MHz (PCS) CDMA	5	535.94	117	7.82	1900 MHz (PCS)	1000	0.78%
Sprint 1900 MHz (PCS) LTE	2	1,339.86	117	7.82	1900 MHz (PCS)	1000	0.78%
Sprint 2500 MHz (BRS) LTE	8	639.78	117	14.93	2500 MHz (BRS)	1000	1.49%
						<b>Total:</b>	<b>3.72%</b>



## 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:	3.72 %
Sector B:	3.72 %
Sector C:	3.72 %
SPRINT Maximum Total (per sector):	3.72 %
Site Total:	4.71 %
Site Compliance Status:	<b>COMPLIANT</b>

The anticipated composite MPE value for this site assuming all carriers present is **4.71 %** 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.



**Tower Engineering Solutions**

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**Structural Analysis Report**

**Existing 149 ft SABRE Monopole**  
**Customer Name: SBA Communications Corp**  
**Customer Site Number: CT13063-A**  
**Customer Site Name: Middle Turnpike**  
**Carrier Name: Sprint Nextel**  
**Carrier Site ID / Name: CT52XC028 / SBA Hillard**  
**Site Location: 640 Hilliard Street**  
**Manchester, Connecticut**  
**Hartford County**  
**Latitude: 41.784500**  
**Longitude: -72.550806**

**Analysis Result:**

**Max Structural Usage: 67.5% [Pass]**  
**Max Foundation Usage: 75.0% [Pass]**  
**Report Prepared By : Tawfeeq Alajaj**



## Introduction

The purpose of this report is to summarize the analysis results on the 149 ft SABRE Monopole to support the proposed antennas and transmission lines in addition to those currently installed. Any modification listed under Sources of Information was assumed completed and was included in this analysis.

## Sources of Information

<b>Tower Drawings</b>	Sabre Towers & Poles, "Revised Stamped Permit Drawings," Job No. 08-01015 Revision A, Drawing No. 08-01015-PE, dated February 15, 2008
<b>Foundation Drawing</b>	Sabre Towers & Poles, "Revised Stamped Permit Drawings," Job No. 08-01015 Revision A, Drawing No. 08-01015-PE, dated February 15, 2008
<b>Geotechnical Report</b>	JGI Eastern, Inc., "Geotechnical Evaluation," Project No. J2085111, dated February 7, 2008
<b>Modification Drawings</b>	N/A

## Analysis Criteria

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

<b>Wind Speed Used in the Analysis:</b>	Ultimate Design Wind Speed $V_{ult} = 125$ mph (3-Sec. Gust)/ Nominal Design Wind Speed $V_{asd} = 97.0$ mph (3-Sec. Gust)
<b>Wind Speed with Ice:</b>	50 mph (3-Sec. Gust) with 1" radial ice concurrent
<b>Operational Wind Speed:</b>	60 mph + 0" Radial ice
<b>Standard/Codes:</b>	ANSI/TIA/EIA 222-G / 2012 IBC / 2016 Connecticut State Building Code
<b>Exposure Category:</b>	B
<b>Structure Class:</b>	II
<b>Topographic Category:</b>	1
<b>Crest Height:</b>	0 ft
<b>Seismic Parameters:</b>	$S_S = 0.179$ , $S_1 = 0.064$



**Existing Antennas, Mounts and Transmission Lines**

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

Items	Elevation (ft)	Qty.	Antenna Descriptions	Mount Type & Qty.	Transmission Lines	Owner
1	148.0	3	Ericsson KRY 112 144 TMA	(3) T-Arms	(13) 1-5/8"	T-Mobile
2	147.0	3	Ericsson - AIR 21 B2A/B4P - Panel			
-	117.0	3	Argus LLPX-310R	Flush Mount	(3) 1/4"	Clearwire
-		3	Samsung BTSs		(2) 1/2"	
-		1	Andrew VHLP2-11 Dish		(3) 5/8"	
-		1	Andrew VHLP2.5-11 Dish		(1) 5/16"	

**Proposed Carrier’s Final Configuration of Antennas, Mounts and Transmission Lines**

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

Items	Elevation (ft)	Qty.	Antenna Descriptions	Mount Type & Qty.	Transmission Lines	Owner
3	117.0	3	KMW - ETCR-654L12H6 - Panel	(2) ring-mounts, 3' Standoff Arms (2/sector), Back-to-Back RRH Mounts (2/sector), 8' Pipe Masts (2/Sector);	(4) 1-1/4" fiber (2) 1/2"	Sprint Nextel
4		2	Andrew - VHLP2.5-11 - Dish			
5		3	ALU 1900 Mhz RRUs			
6		6	ALU 800 Mhz RRUs			
7		3	ALU TD-RRH8x20-25 RRUs			

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

## **Analysis Results**

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

	Pole shafts	Anchor Bolts	Base Plate	Flange Connection
Max. Usage:	<b>49.9%</b>	<b>46.3%</b>	<b>36.7%</b>	<b>67.5%</b>
Pass/Fail	<b>Pass</b>	<b>Pass</b>	<b>Pass</b>	<b>Pass</b>

## **Foundations**

	Moment (Kip-Ft)	Shear (Kips)
Original Design Reactions	1715.8	19.6
Analysis Reactions	1392.7	15.2
Factored Reactions*	2316.4	26.4
% of Design Reactions	60.1%	57.7%

\* Per section 15.5.1 of the TIA-222-G standard, factored reactions were obtained by multiplying a 1.35 factor to the original design reactions.

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

## **Operational Condition (Rigidity):**

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

Elevation (ft)	Antenna / Dish	Carrier	Twist (deg)	Sway (deg)
117.0	Andrew - VHLP2.5-11 - Dish	Sprint Nextel	0.000	0.833

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

## **Conclusions**

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

## **Antenna Mount Note:**

The new proposed mount contributes **1.2 %** of additional stress to the tower structure.

## Standard Conditions

1. This analysis was performed based on the information supplied to **(TES) Tower Engineering Solutions, LLC**. Verification of the information provided was not included in the Scope of Work for **TES**. The accuracy of the analysis is dependent on the accuracy of the information provided.
2. The analysis is based on the presumption that the tower members and components along with any existing reinforcement items have been correctly and properly designed, manufactured, installed and maintained.
3. All the existing structural members were assumed to be in good condition with no physical damage or deterioration associated with corrosion.
4. An initial tension of 10% of the break strength on all the existing guy wires was assumed in all the structural analyses of guyed towers unless different values were provided by the client. **TES** cannot take responsibility for the deviations in the analysis results because of differences in the initial tension forces of the existing guy wires.
5. Secondary component or connection secondary components, welds and bolts are assumed to be able to carry their intended original design loads. **TES** cannot take responsibility for verification of the adequacy on the connections, bolts and welds present in the structure.
6. The analyses will be performed based on the codes as specified by the client or based on the best knowledge of the engineering staff of **TES**. In the absence of information to the contrary, all work will be performed in accordance with the latest relevant revision of ANSI/TIA-222. If wind speed and/or ice loads are different from the minimum values recommended by the EIA/TIA-222 standard or other codes, **TES** should be notified in writing and the applicable minimum values provided by the client.
7. The configuration of the existing mounts, antennas, coax and other appurtenances were supplied by the customer for the current structural analysis. **TES** has not visited the tower site to verify the adequacy of the information provided. If there is any discrepancy found in the report regarding the existing conditions, **TES** should be notified immediately to evaluate the effect of the discrepancy on the analysis results.
8. The client will assume responsibility for rework associated with the differences in initially provided information, including tower and foundation information, existing and/or proposed equipment and transmission lines.
9. If a feasibility analysis was performed, final acceptance of changed conditions shall be based upon a rigorous structural analysis.

# Usage Diagram - Max Ratio 49.92% at 53.3ft

**Structure:** CT13063-A-SBA  
**Site Name:** Middle Turnpike  
**Height:** 149.00 (ft)  
**Base Elev:** 0.000 (ft)

**Code:** EIA/TIA-222-G  
**Exposure:** B  
**Gh:** 1.1

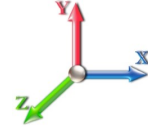
10/12/2017



Page: 1

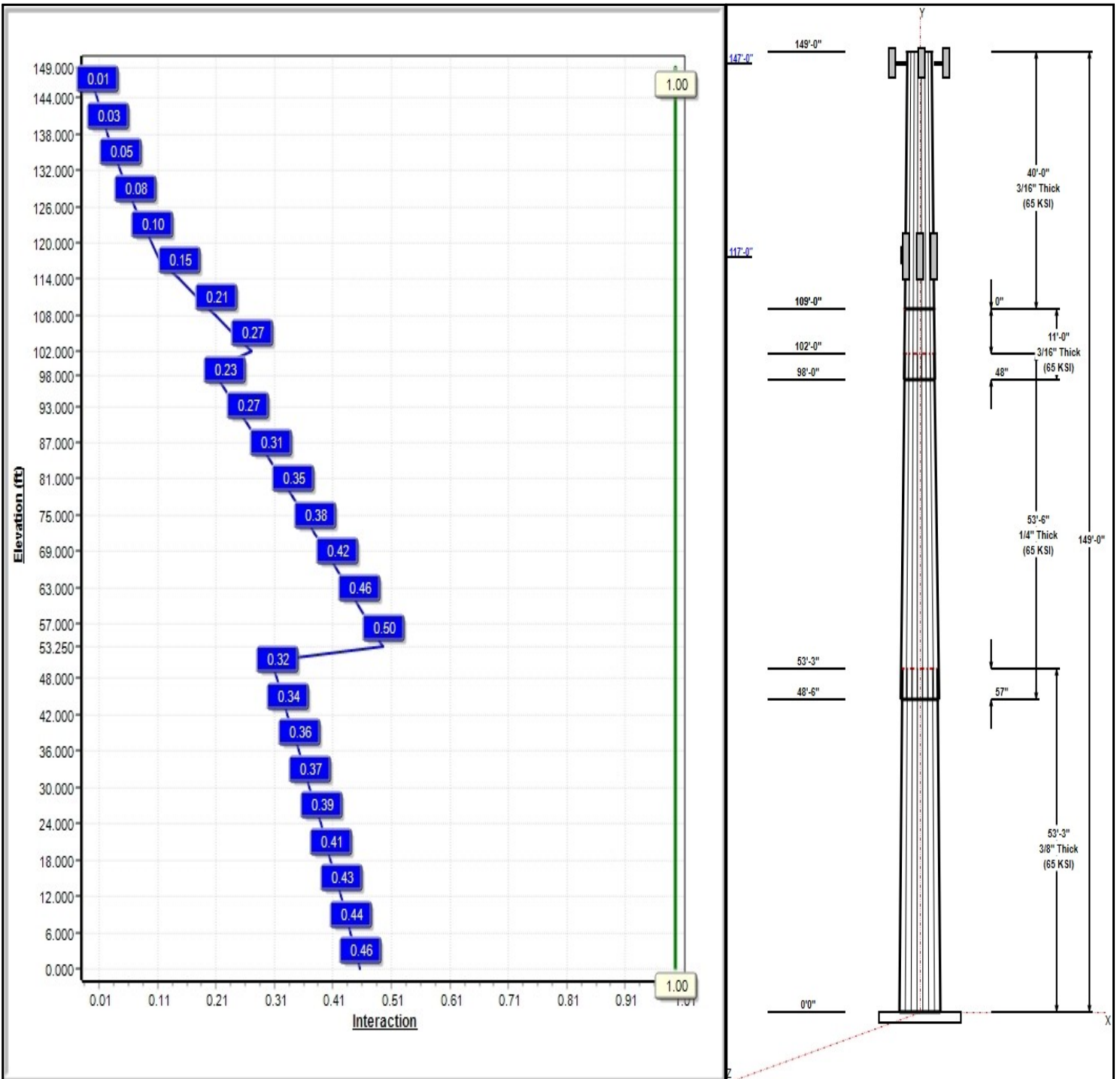
**Dead Load Factor:** 1.20  
**Wind Load Factor:** 1.60

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



**Iterations:** 28

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## Structure: CT13063-A-SBA

**Type:** Tapered  
**Site Name:** Middle Turnpike  
**Height:** 149.00 (ft)  
**Base Elev:** 0.00 (ft)

**Base Shape:** 16 Sided  
**Taper:** 0.12852

10/12/2017

Page: 2



### Shaft Properties

Seq	Length (ft)	Top (in)	Bottom (in)	Thick (in)	Joint Type	Taper	Grade (ksi)
1	53.25	35.51	42.35	0.375		0.12852	65
2	53.50	29.74	36.62	0.250	Slip	0.12852	65
3	11.00	29.22	30.63	0.188	Slip	0.12852	65
4	40.00	24.08	29.22	0.188	Butt	0.12852	65

### Discrete Appurtenances

Attach Elev (ft)	Force Elev (ft)	Qty	Description	Carrier
147.00	147.00	3	AIR 21 B2A/B4P	T-Mobile
147.00	147.00	3	KRY 112 144/1	T-Mobile
147.00	147.00	3	T-Arms (Site Pro P/N	T-Mobile
117.00	117.00	3	Flush Mount	Sprint Nextel
117.00	117.00	3	ETCR-654L12H6	Sprint Nextel
117.00	117.00	3	ALU 1900 Mhz RRUs	Sprint Nextel
117.00	117.00	6	ALU 800 Mhz RRUs	Sprint Nextel
117.00	117.00	3	ALU TD-RRH8x20-25	Sprint Nextel
117.00	117.00	2	VHLP2.5-11	Sprint Nextel

### Linear Appurtenances

Elev From (ft)	Elev To (ft)	Placement	Description	Carrier
0.00	147.00	Inside	1 5/8" Coax	T-Mobile
0.00	117.00	Inside	1-1/4" fiber	Sprint Nextel
0.00	117.00	Inside	1/2" Coax	Sprint Nextel

### Anchor Bolts

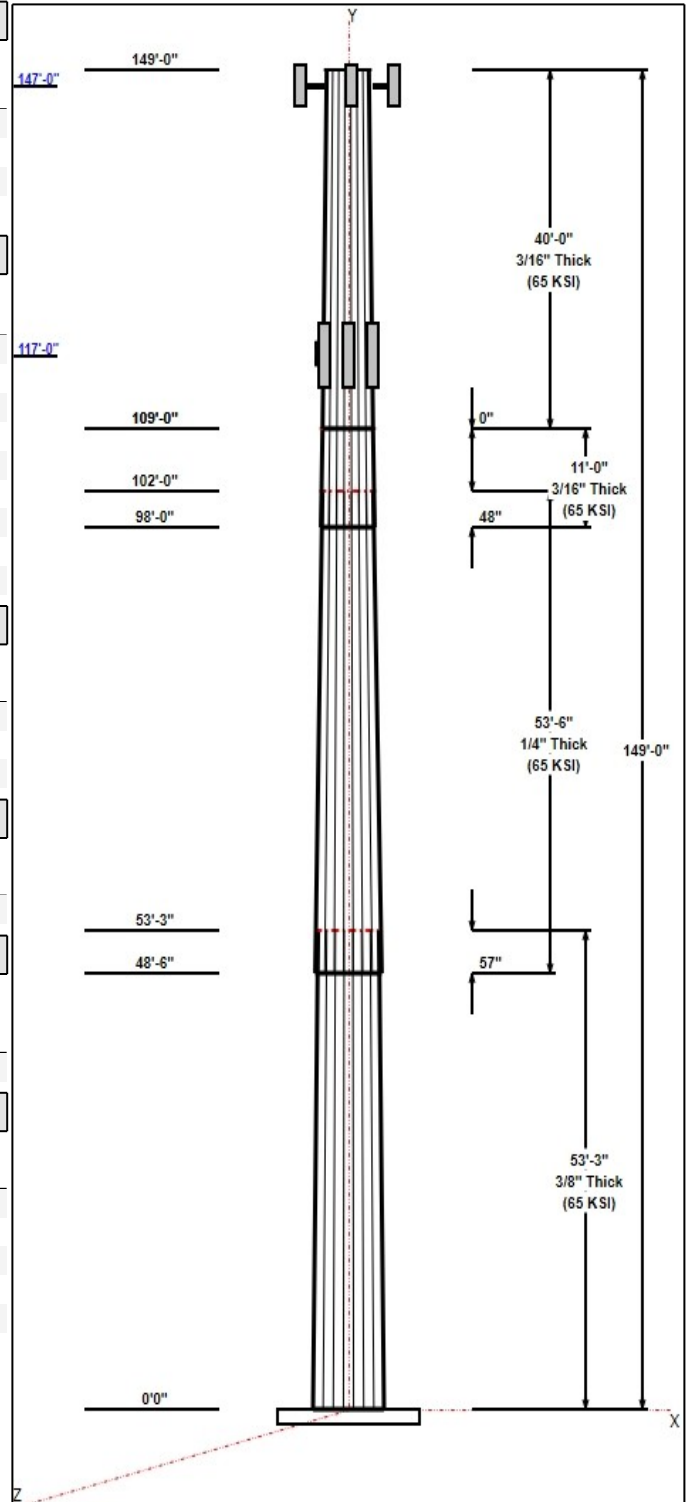
Qty	Specifications	Grade (ksi)	Arrangement
12	2.25" 18J	75.0	Cluster

### Base Plate

Thickness (in)	Specifications (in)	Grade (ksi)	Geometry
2.7500	48.0	60.0	Clipped

### Reactions

Load Case	Moment (FT-Kips)	Shear (Kips)	Axial (Kips)
1.2D + 1.6W 97 mph Wind	1392.7	15.2	23.5
0.9D + 1.6W 97 mph Wind	1381.1	15.2	17.6
1.2D + 1.0Di + 1.0Wi 50 mph Wind	405.5	4.3	42.1
1.2D + 1.0E	78.4	0.8	23.5
0.9D + 1.0E	77.7	0.8	17.6
1.0D + 1.0W 60 mph Wind	331.2	3.6	19.6



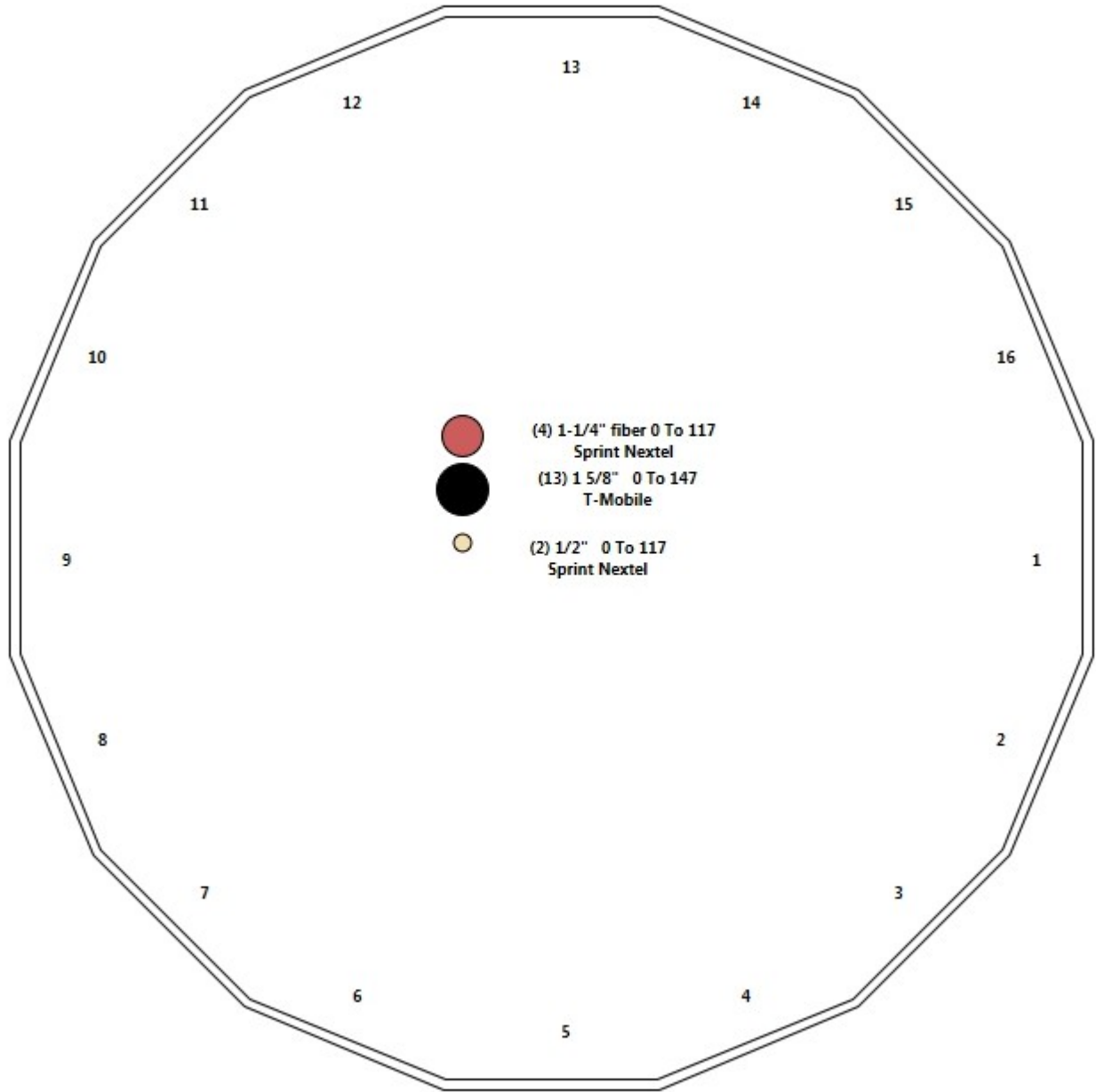
Structure: CT13063-A-SBA - Coax Line Placement

Type: Monopole  
Site Name: Middle Turnpike  
Height: 149.00 (ft)

10/12/2017



Page: 3



## Shaft Properties

<b>Structure:</b> CT13063-A-SBA	<b>Code:</b> EIA/TIA-222-G	10/12/2017
<b>Site Name:</b> Middle Turnpike	<b>Exposure:</b> B	
<b>Height:</b> 149.00 (ft)	<b>Crest Height:</b> 0.00	
<b>Base Elev:</b> 0.000 (ft)	<b>Site Class:</b> D - Stiff Soil	
<b>Gh:</b> 1.1	<b>Topography:</b> 1	<b>Struct Class:</b> II



Page: 4

Sec. No.	Shape	Length (ft)	Thick (in)	Fy (ksi)	Joint Type	Overlap (in)	Weight (lb)
1	16	53.250	0.3750	65		0.00	8,357
2	16	53.500	0.2500	65	Slip	57.00	4,781
3	16	11.000	0.1875	65	Slip	48.00	666
4	16	40.000	0.1875	65	Flange	0.00	2,154
<b>Total Shaft Weight:</b>							<b>15,957</b>

Bottom

Top

Sec. No.	Dia (in)	Elev (ft)	Area (sqin)	Ix (in^4)	W/t Ratio	D/t Ratio	Dia (in)	Elev (ft)	Area (sqin)	Ix (in^4)	W/t Ratio	D/t Ratio	Taper
1	42.35	0.00	50.21	11176.57	20.87	112.93	35.51	53.25	42.03	6552.63	17.24	94.68	0.128522
2	36.62	48.50	29.00	4845.70	27.54	146.47	29.74	102.00	23.52	2584.07	22.07	118.9	0.128522
3	30.63	98.00	18.21	2131.78	30.90	163.36	29.22	109.00	17.36	1848.36	29.40	155.8	0.128522
4	29.22	109.0	17.36	1848.36	29.40	155.82	24.08	149.00	14.29	1029.99	23.95	128.4	0.128522

## Load Summary

<b>Structure:</b> CT13063-A-SBA	<b>Code:</b> EIA/TIA-222-G	10/12/2017
<b>Site Name:</b> Middle Turnpike	<b>Exposure:</b> B	
<b>Height:</b> 149.00 (ft)	<b>Crest Height:</b> 0.00	
<b>Base Elev:</b> 0.000 (ft)	<b>Site Class:</b> D - Stiff Soil	
<b>Gh:</b> 1.1	<b>Topography:</b> 1	<b>Struct Class:</b> II



Page: 5

### Discrete Appurtenances

No.	Elev (ft)	Description	Qty	No Ice			Ice			Hor. Ecc. (ft)	Vert Ecc (ft)
				Weight (lb)	CaAa (sf)	CaAa Factor	Weight (lb)	CaAa (sf)	CaAa Factor		
1	147.00	AIR 21 B2A/B4P	3	117.00	6.30	0.92	356.34	7.582	0.95	0.00	0.00
2	147.00	KRY 112 144/1	3	11.00	0.41	0.50	25.35	1.042	0.75	0.00	0.00
3	147.00	T-Arms (Site Pro P/N RMV5-3096)	3	250.00	2.67	0.83	482.23	5.770	0.88	0.00	0.00
4	117.00	Flush Mount	3	200.00	5.00	1.00	417.91	9.540	1.00	0.00	0.00
5	117.00	ETCR-654L12H6	3	99.00	15.71	0.71	537.42	17.924	0.71	0.00	0.00
6	117.00	ALU 1900 Mhz RRUs	3	60.00	2.77	0.67	168.52	4.420	0.67	0.00	0.00
7	117.00	ALU 800 Mhz RRUs	6	53.00	2.49	0.67	149.19	3.978	0.67	0.00	0.00
8	117.00	ALU TD-RRH8x20-25 RRUs	3	70.00	4.05	0.67	222.84	5.132	0.67	0.00	0.00
9	117.00	VHLP2.5-11	2	48.00	8.42	1.00	272.62	10.637	1.00	0.00	0.00
<b>Totals:</b>			<b>29</b>	<b>2,835.00</b>			<b>8,072.20</b>				

### Linear Appurtenances

Bottom Elev. (ft)	Top Elev. (ft)	Description	Exposed Width	Exposed
0.00	147.00	(13) 1 5/8" Coax	0.00	Inside
0.00	117.00	(4) 1-1/4" fiber	0.00	Inside
0.00	117.00	(2) 1/2" Coax	0.00	Inside



## Shaft Section Properties

<b>Structure:</b> CT13063-A-SBA	<b>Code:</b> EIA/TIA-222-G	10/12/2017
<b>Site Name:</b> Middle Turnpike	<b>Exposure:</b> B	
<b>Height:</b> 149.00 (ft)	<b>Crest Height:</b> 0.00	
<b>Base Elev:</b> 0.000 (ft)	<b>Site Class:</b> D - Stiff Soil	
<b>Gh:</b> 1.1	<b>Topography:</b> 1	<b>Struct Class:</b> II



Page: 6

**Increment Length:** 3 (ft)

Elev (ft)	Description	Thick (in)	Dia (in)	Area (in^2)	Ix (in^4)	W/t Ratio	D/t Ratio	Fpy (ksi)	S (in^3)	Weight (lb)
0.00		0.3750	42.350	50.213	11176.6	20.87	112.93	79.0	517.7	0.0
3.00		0.3750	41.964	49.751	10871.4	20.67	111.91	79.2	508.2	510.2
6.00		0.3750	41.579	49.290	10571.8	20.46	110.88	79.4	498.7	505.5
9.00		0.3750	41.193	48.829	10277.8	20.26	109.85	79.6	489.4	500.8
12.00		0.3750	40.808	48.368	9989.3	20.05	108.82	79.9	480.2	496.1
15.00		0.3750	40.422	47.906	9706.3	19.85	107.79	80.1	471.0	491.4
18.00		0.3750	40.037	47.445	9428.6	19.65	106.76	80.3	461.9	486.7
21.00		0.3750	39.651	46.984	9156.3	19.44	105.74	80.6	453.0	482.0
24.00		0.3750	39.265	46.523	8889.3	19.24	104.71	80.8	444.1	477.3
27.00		0.3750	38.880	46.062	8627.5	19.03	103.68	81.0	435.3	472.6
30.00		0.3750	38.494	45.600	8370.9	18.83	102.65	81.3	426.6	467.9
33.00		0.3750	38.109	45.139	8119.5	18.62	101.62	81.5	417.9	463.1
36.00		0.3750	37.723	44.678	7873.1	18.42	100.60	81.7	409.4	458.4
39.00		0.3750	37.338	44.217	7631.8	18.21	99.57	82.0	400.9	453.7
42.00		0.3750	36.952	43.755	7395.4	18.01	98.54	82.2	392.6	449.0
45.00		0.3750	36.567	43.294	7164.0	17.80	97.51	82.4	384.3	444.3
48.00		0.3750	36.181	42.833	6937.5	17.60	96.48	82.5	376.1	439.6
48.50	Bot - Section 2	0.3750	36.117	42.756	6900.2	17.57	96.31	82.5	374.8	72.8
51.00		0.3750	35.795	42.372	6715.8	17.40	95.45	82.5	368.0	607.7
53.25	Top - Section 1	0.2500	36.006	28.516	4605.7	27.06	144.02	0.0	0.0	542.3
54.00		0.2500	35.910	28.439	4568.6	26.98	143.64	72.0	249.6	72.7
57.00		0.2500	35.524	28.131	4422.0	26.67	142.10	72.4	244.2	288.7
60.00		0.2500	35.139	27.824	4278.6	26.37	140.55	72.7	238.8	285.6
63.00		0.2500	34.753	27.516	4138.3	26.06	139.01	73.1	233.6	282.5
66.00		0.2500	34.368	27.209	4001.1	25.75	137.47	73.4	228.4	279.3
69.00		0.2500	33.982	26.901	3867.0	25.45	135.93	73.8	223.2	276.2
72.00		0.2500	33.596	26.594	3735.9	25.14	134.39	74.1	218.1	273.0
75.00		0.2500	33.211	26.286	3607.8	24.83	132.84	74.5	213.1	269.9
78.00		0.2500	32.825	25.979	3482.7	24.53	131.30	74.8	208.1	266.8
81.00		0.2500	32.440	25.671	3360.5	24.22	129.76	75.2	203.2	263.6
84.00		0.2500	32.054	25.364	3241.1	23.91	128.22	75.5	198.3	260.5
87.00		0.2500	31.669	25.056	3124.7	23.61	126.67	75.9	193.5	257.4
90.00		0.2500	31.283	24.749	3011.1	23.30	125.13	76.2	188.8	254.2
93.00		0.2500	30.897	24.441	2900.2	22.99	123.59	76.6	184.1	251.1
96.00		0.2500	30.512	24.134	2792.1	22.69	122.05	76.9	179.5	247.9
98.00	Bot - Section 3	0.2500	30.255	23.929	2721.6	22.48	121.02	77.1	176.5	163.5
99.00		0.2500	30.126	23.826	2686.8	22.38	120.51	77.2	174.9	143.1
102.00	Top - Section 2	0.1875	30.116	17.901	2025.6	30.36	160.62	0.0	0.0	425.6
105.00		0.1875	29.730	17.670	1948.3	29.95	158.56	68.7	128.5	181.6
108.00		0.1875	29.345	17.440	1873.0	29.54	156.50	69.1	125.2	179.2
109.00	Top - Section 3	0.1875	29.216	17.363	1848.4	29.40	155.82	69.3	124.1	59.2
109.00	Bot - Section 4	0.1875	29.216	17.363	1848.4	29.40	155.82	69.3	124.1	
111.00		0.1875	28.959	17.209	1799.7	29.13	154.45	69.6	121.9	117.6
114.00		0.1875	28.574	16.978	1728.3	28.72	152.39	70.1	118.6	174.5
117.00		0.1875	28.188	16.748	1658.8	28.31	150.34	70.5	115.4	172.1
120.00		0.1875	27.802	16.517	1591.2	27.90	148.28	71.0	112.3	169.8
123.00		0.1875	27.417	16.287	1525.5	27.49	146.22	71.5	109.1	167.4
126.00		0.1875	27.031	16.056	1461.6	27.09	144.17	71.9	106.1	165.1
129.00		0.1875	26.646	15.825	1399.5	26.68	142.11	72.4	103.0	162.7
132.00		0.1875	26.260	15.595	1339.2	26.27	140.05	72.9	100.0	160.4

Increment Length: 3 (ft)

Elev (ft)	Description	Thick (in)	Dia (in)	Area (in <sup>2</sup> )	Ix (in <sup>4</sup> )	W/t Ratio	D/t Ratio	Fpy (ksi)	S (in <sup>3</sup> )	Weight (lb)
135.00		0.1875	25.875	15.364	1280.7	25.86	138.00	73.3	97.1	158.0
138.00		0.1875	25.489	15.133	1223.9	25.45	135.94	73.8	94.2	155.7
141.00		0.1875	25.103	14.903	1168.8	25.04	133.89	74.2	91.3	153.3
144.00		0.1875	24.718	14.672	1115.4	24.63	131.83	74.7	88.5	151.0
147.00		0.1875	24.332	14.442	1063.6	24.22	129.77	75.2	85.7	148.6
149.00		0.1875	24.075	14.288	1030.0	23.95	128.40	75.5	83.9	97.8
										<u>15957.1</u>

## Wind Loading - Shaft

**Structure:** CT13063-A-SBA  
**Site Name:** Middle Turnpike  
**Height:** 149.00 (ft)  
**Base Elev:** 0.000 (ft)  
**Gh:** 1.1

**Topography:** 1

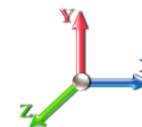
**Code:** EIA/TIA-222-G 10/12/2017  
**Exposure:** B  
**Crest Height:** 0.00  
**Site Class:** D - Stiff Soil  
**Struct Class:** II

Page: 8



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

**Dead Load Factor** 1.20  
**Wind Load Factor** 1.60



**Iterations** 28

Elev (ft)	Description	Kzt	Kz	qz (psf)	qzGh (psf)	C (mph-ft)	Cf	Ice Thick (in)	Tributary (ft)	Aa (sf)	CfAa (sf)	Wind Force X (lb)	Dead Load Ice (lb)	Tot Dead Load (lb)
0.00		1.00	0.70	16.018	17.62	292.02	0.750	0.000	0.00	0.000	0.00	0.0	0.0	0.0
3.00		1.00	0.70	16.018	17.62	289.37	0.750	0.000	3.00	10.746	8.06	227.2	0.0	612.3
6.00		1.00	0.70	16.018	17.62	286.71	0.750	0.000	3.00	10.648	7.99	225.1	0.0	606.6
9.00		1.00	0.70	16.018	17.62	284.05	0.750	0.000	3.00	10.549	7.91	223.0	0.0	601.0
12.00		1.00	0.70	16.018	17.62	281.39	0.750	0.000	3.00	10.451	7.84	221.0	0.0	595.3
15.00		1.00	0.70	16.018	17.62	278.73	0.750	0.000	3.00	10.353	7.76	218.9	0.0	589.7
18.00		1.00	0.70	16.018	17.62	276.07	0.750	0.000	3.00	10.254	7.69	216.8	0.0	584.0
21.00		1.00	0.70	16.018	17.62	273.41	0.750	0.000	3.00	10.156	7.62	214.7	0.0	578.4
24.00		1.00	0.70	16.018	17.62	270.75	0.750	0.000	3.00	10.058	7.54	212.7	0.0	572.7
27.00		1.00	0.70	16.018	17.62	268.10	0.750	0.000	3.00	9.960	7.47	210.6	0.0	567.1
30.00		1.00	0.70	16.031	17.63	265.55	0.750	0.000	3.00	9.861	7.40	208.7	0.0	561.4
33.00		1.00	0.72	16.474	18.12	266.49	0.750	0.000	3.00	9.763	7.32	212.3	0.0	555.8
36.00		1.00	0.74	16.889	18.58	267.10	0.750	0.000	3.00	9.665	7.25	215.5	0.0	550.1
39.00		1.00	0.76	17.279	19.01	267.41	0.750	0.000	3.00	9.566	7.17	218.2	0.0	544.5
42.00		1.00	0.77	17.649	19.41	267.46	0.750	0.000	3.00	9.468	7.10	220.6	0.0	538.8
45.00		1.00	0.79	18.000	19.80	267.29	0.750	0.000	3.00	9.370	7.03	222.6	0.0	533.2
48.00		1.00	0.80	18.335	20.17	266.92	0.750	0.000	3.00	9.272	6.95	224.4	0.0	527.5
48.50	Bot - Section 2	1.00	0.80	18.390	20.23	266.85	0.750	0.000	0.50	1.536	1.15	37.3	0.0	87.4
51.00		1.00	0.82	18.656	20.52	266.38	0.750	0.000	2.50	7.744	5.81	190.7	0.0	729.3
53.25	Top - Section 1	1.00	0.83	18.887	20.78	265.86	0.750	0.000	2.25	6.911	5.18	172.3	0.0	650.7
54.00		1.00	0.83	18.963	20.86	269.42	0.750	0.000	0.75	2.291	1.72	57.4	0.0	87.2
57.00		1.00	0.84	19.258	21.18	268.59	0.750	0.000	3.00	9.104	6.83	231.4	0.0	346.5
60.00		1.00	0.85	19.543	21.50	267.63	0.750	0.000	3.00	9.006	6.75	232.3	0.0	342.7
63.00		1.00	0.87	19.817	21.80	266.55	0.750	0.000	3.00	8.908	6.68	233.0	0.0	339.0
66.00		1.00	0.88	20.082	22.09	265.35	0.750	0.000	3.00	8.809	6.61	233.5	0.0	335.2
69.00		1.00	0.89	20.339	22.37	264.04	0.750	0.000	3.00	8.711	6.53	233.9	0.0	331.4
72.00		1.00	0.90	20.587	22.65	262.64	0.750	0.000	3.00	8.613	6.46	234.1	0.0	327.7
75.00		1.00	0.91	20.829	22.91	261.14	0.750	0.000	3.00	8.515	6.39	234.1	0.0	323.9
78.00		1.00	0.92	21.064	23.17	259.56	0.750	0.000	3.00	8.416	6.31	234.0	0.0	320.1
81.00		1.00	0.93	21.292	23.42	257.90	0.750	0.000	3.00	8.318	6.24	233.8	0.0	316.4
84.00		1.00	0.94	21.514	23.67	256.16	0.750	0.000	3.00	8.220	6.16	233.4	0.0	312.6
87.00		1.00	0.95	21.731	23.90	254.35	0.750	0.000	3.00	8.121	6.09	233.0	0.0	308.8
90.00		1.00	0.96	21.943	24.14	252.47	0.750	0.000	3.00	8.023	6.02	232.4	0.0	305.1
93.00		1.00	0.97	22.149	24.36	250.53	0.750	0.000	3.00	7.925	5.94	231.7	0.0	301.3
96.00		1.00	0.98	22.351	24.59	248.53	0.750	0.000	3.00	7.827	5.87	230.9	0.0	297.5
98.00	Bot - Section 3	1.00	0.98	22.483	24.73	247.17	0.750	0.000	2.00	5.163	3.87	153.2	0.0	196.3
99.00		1.00	0.99	22.549	24.80	246.47	0.750	0.000	1.00	2.597	1.95	77.3	0.0	171.7
102.00	Top - Section 2	1.00	0.99	22.742	25.02	244.36	0.750	0.000	3.00	7.726	5.79	231.9	0.0	510.7
105.00		1.00	1.00	22.931	25.22	245.29	0.750	0.000	3.00	7.627	5.72	230.9	0.0	217.9
108.00		1.00	1.01	23.116	25.43	243.08	0.750	0.000	3.00	7.529	5.65	229.7	0.0	215.0
109.00	Top - Section 3	1.00	1.01	23.177	25.49	242.33	0.750	0.000	1.00	2.488	1.87	76.1	0.0	71.1
111.00		1.00	1.02	23.298	25.63	240.83	0.750	0.000	2.00	4.943	3.71	152.0	0.0	141.2
114.00		1.00	1.03	23.476	25.82	238.53	0.750	0.000	3.00	7.332	5.50	227.2	0.0	209.4
117.00	Appurtenance(s)	1.00	1.03	23.651	26.02	236.18	0.750	0.000	3.00	7.234	5.43	225.8	0.0	206.6
120.00		1.00	1.04	23.823	26.20	233.80	0.750	0.000	3.00	7.136	5.35	224.4	0.0	203.7
123.00		1.00	1.05	23.991	26.39	231.37	0.750	0.000	3.00	7.038	5.28	222.9	0.0	200.9
126.00		1.00	1.06	24.157	26.57	228.90	0.750	0.000	3.00	6.939	5.20	221.3	0.0	198.1

## Wind Loading - Shaft

<b>Structure:</b> CT13063-A-SBA	<b>Code:</b> EIA/TIA-222-G	10/12/2017
<b>Site Name:</b> Middle Turnpike	<b>Exposure:</b> B	
<b>Height:</b> 149.00 (ft)	<b>Crest Height:</b> 0.00	
<b>Base Elev:</b> 0.000 (ft)	<b>Site Class:</b> D - Stiff Soil	
<b>Gh:</b> 1.1	<b>Topography:</b> 1	<b>Struct Class:</b> II



Page: 9

129.00	1.00	1.06	24.320	26.75	226.40	0.750	0.000	3.00	6.841	5.13	219.6	0.0	195.3
132.00	1.00	1.07	24.480	26.93	223.86	0.750	0.000	3.00	6.743	5.06	217.9	0.0	192.4
135.00	1.00	1.08	24.638	27.10	221.28	0.750	0.000	3.00	6.645	4.98	216.1	0.0	189.6
138.00	1.00	1.08	24.793	27.27	218.67	0.750	0.000	3.00	6.546	4.91	214.2	0.0	186.8
141.00	1.00	1.09	24.946	27.44	216.02	0.750	0.000	3.00	6.448	4.84	212.3	0.0	184.0
144.00	1.00	1.10	25.096	27.61	213.34	0.750	0.000	3.00	6.350	4.76	210.3	0.0	181.1
147.00 Appurtenance(s)	1.00	1.10	25.245	27.77	210.64	0.750	0.000	3.00	6.251	4.69	208.3	0.0	178.3
149.00	1.00	1.11	25.342	27.88	208.81	0.750	0.000	2.00	4.113	3.08	137.6	0.0	117.3
<b>Totals:</b>								<b>149.00</b>			<b>11,120.6</b>		<b>19,148.6</b>



## Discrete Appurtenance Forces

<b>Structure:</b> CT13063-A-SBA	<b>Code:</b> EIA/TIA-222-G	10/12/2017
<b>Site Name:</b> Middle Turnpike	<b>Exposure:</b> B	
<b>Height:</b> 149.00 (ft)	<b>Crest Height:</b> 0.00	
<b>Base Elev:</b> 0.000 (ft)	<b>Site Class:</b> D - Stiff Soil	
<b>Gh:</b> 1.1	<b>Topography:</b> 1	<b>Struct Class:</b> II

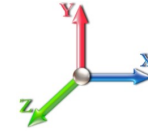


Page: 10

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

**Dead Load Factor** 1.20

**Wind Load Factor** 1.60



**Iterations** 28

No.	Elev (ft)	Description	Qty	qz (psf)	qzGh (psf)	CaAa x Ka	Ka	Total CaAa (sf)	Dead Load (lb)	Horiz Ecc (ft)	Vert Ecc (ft)	Wind FX (lb)	Mom Y (lb-ft)	Mom Z (lb-ft)
1	147.00	AIR 21 B2A/B4P	3	25.245	27.769	0.74	0.80	13.90	421.20	0.000	0.000	617.38	0.00	0.00
2	147.00	KRY 112 144/1	3	25.245	27.769	0.40	0.80	0.49	39.60	0.000	0.000	21.86	0.00	0.00
3	147.00	T-Arms (Site Pro P/N	3	25.245	27.769	0.62	0.75	4.97	900.00	0.000	0.000	221.01	0.00	0.00
4	117.00	Flush Mount	3	23.651	26.016	1.00	1.00	15.00	720.00	0.000	0.000	624.38	0.00	0.00
5	117.00	ETCR-654L12H6	3	23.651	26.016	0.57	0.80	26.77	356.40	0.000	0.000	1114.31	0.00	0.00
6	117.00	ALU 1900 Mhz RRUs	3	23.651	26.016	0.54	0.80	4.45	216.00	0.000	0.000	185.41	0.00	0.00
7	117.00	ALU 800 Mhz RRUs	6	23.651	26.016	0.54	0.80	8.01	381.60	0.000	0.000	333.33	0.00	0.00
8	117.00	ALU TD-RRH8x20-25	3	23.651	26.016	0.54	0.80	6.51	252.00	0.000	0.000	271.08	0.00	0.00
9	117.00	VHLP2.5-11	2	23.651	26.016	1.00	1.00	16.84	115.20	0.000	0.000	700.97	0.00	0.00
<b>Totals:</b>									<b>3,402.00</b>			<b>4,089.73</b>		

## Total Applied Force Summary

<b>Structure:</b> CT13063-A-SBA	<b>Code:</b> EIA/TIA-222-G	10/12/2017
<b>Site Name:</b> Middle Turnpike	<b>Exposure:</b> B	
<b>Height:</b> 149.00 (ft)	<b>Crest Height:</b> 0.00	
<b>Base Elev:</b> 0.000 (ft)	<b>Site Class:</b> D - Stiff Soil	
<b>Gh:</b> 1.1	<b>Topography:</b> 1	<b>Struct Class:</b> II



Page: 11

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

**Dead Load Factor** 1.20  
**Wind Load Factor** 1.60



**Iterations** 28

Elev (ft)	Description	Lateral FX (-) (lb)	Axial FY (-) (lb)	Torsion MY (lb-ft)	Moment MZ (lb-ft)
0.00		0.00	0.00	0.00	0.00
3.00		227.20	634.17	0.00	0.00
6.00		225.13	628.52	0.00	0.00
9.00		223.05	622.87	0.00	0.00
12.00		220.97	617.22	0.00	0.00
15.00		218.89	611.57	0.00	0.00
18.00		216.81	605.92	0.00	0.00
21.00		214.74	600.27	0.00	0.00
24.00		212.66	594.62	0.00	0.00
27.00		210.58	588.97	0.00	0.00
30.00		208.68	583.32	0.00	0.00
33.00		212.30	577.67	0.00	0.00
36.00		215.46	572.02	0.00	0.00
39.00		218.20	566.37	0.00	0.00
42.00		220.58	560.72	0.00	0.00
45.00		222.63	555.07	0.00	0.00
48.00		224.40	549.42	0.00	0.00
48.50		37.28	91.02	0.00	0.00
51.00		190.70	747.50	0.00	0.00
53.25		172.30	667.16	0.00	0.00
54.00		57.36	92.68	0.00	0.00
57.00		231.44	368.38	0.00	0.00
60.00		232.32	364.61	0.00	0.00
63.00		233.01	360.85	0.00	0.00
66.00		233.52	357.08	0.00	0.00
69.00		233.87	353.31	0.00	0.00
72.00		234.06	349.55	0.00	0.00
75.00		234.10	345.78	0.00	0.00
78.00		234.01	342.01	0.00	0.00
81.00		233.78	338.25	0.00	0.00
84.00		233.43	334.48	0.00	0.00
87.00		232.96	330.71	0.00	0.00
90.00		232.39	326.94	0.00	0.00
93.00		231.70	323.18	0.00	0.00
96.00		230.91	319.41	0.00	0.00
98.00		153.23	210.85	0.00	0.00
99.00		77.30	178.99	0.00	0.00
102.00		231.91	532.58	0.00	0.00
105.00		230.87	239.76	0.00	0.00
108.00		229.74	236.94	0.00	0.00
109.00		76.11	78.35	0.00	0.00
111.00		152.01	155.76	0.00	0.00
114.00		227.22	231.29	0.00	0.00
117.00	(20) attachments	3455.33	2269.66	0.00	0.00
120.00		224.39	214.98	0.00	0.00
123.00		222.87	212.15	0.00	0.00
126.00		221.28	209.33	0.00	0.00

## Total Applied Force Summary

<b>Structure:</b> CT13063-A-SBA	<b>Code:</b> EIA/TIA-222-G	10/12/2017
<b>Site Name:</b> Middle Turnpike	<b>Exposure:</b> B	
<b>Height:</b> 149.00 (ft)	<b>Crest Height:</b> 0.00	
<b>Base Elev:</b> 0.000 (ft)	<b>Site Class:</b> D - Stiff Soil	
<b>Gh:</b> 1.1	<b>Topography:</b> 1	<b>Struct Class:</b> II



Page: 12

129.00		219.61	206.50	0.00	0.00
132.00		217.89	203.68	0.00	0.00
135.00		216.09	200.85	0.00	0.00
138.00		214.24	198.03	0.00	0.00
141.00		212.32	195.20	0.00	0.00
144.00		210.35	192.38	0.00	0.00
147.00	(9) attachments	1068.56	1550.35	0.00	0.00
149.00		137.59	117.31	0.00	0.00
	<b>Totals:</b>	<b>15,210.31</b>	<b>23,516.52</b>	<b>0.00</b>	<b>0.00</b>

## Calculated Forces

**Structure:** CT13063-A-SBA  
**Site Name:** Middle Turnpike  
**Height:** 149.00 (ft)  
**Base Elev:** 0.000 (ft)  
**Gh:** 1.1

**Code:** EIA/TIA-222-G  
**Exposure:** B  
**Crest Height:** 0.00  
**Site Class:** D - Stiff Soil  
**Struct Class:** II

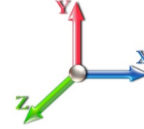
10/12/2017  
 Page: 13



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

**Iterations** 28

**Dead Load Factor** 1.20  
**Wind Load Factor** 1.60



Seg Elev (ft)	Pu FY (-) (kips)	Vu FX (-) (kips)	Tu MY (-) (ft-kips)	Mu MZ (ft-kips)	Mu MX (ft-kips)	Resultant Moment (ft-kips)	phi Pn (kips)	phi Vn (kips)	phi Tn (ft-kips)	phi Mn (ft-kips)	Total Deflect (in)	Rotation Sway (deg)	Rotation Twist (deg)	Stress Ratio
0.00	-23.50	-15.23	0.00	-1392.6	0.00	1392.68	3568.03	1784.01	6174.83	3065.44	0.00	0.000	0.000	0.461
3.00	-22.84	-15.05	0.00	-1346.9	0.00	1346.99	3545.62	1772.81	6079.18	3017.96	0.03	-0.105	0.000	0.453
6.00	-22.19	-14.86	0.00	-1301.8	0.00	1301.86	3523.01	1761.51	5983.92	2970.67	0.13	-0.209	0.000	0.445
9.00	-21.54	-14.67	0.00	-1257.2	0.00	1257.28	3500.21	1750.11	5889.06	2923.58	0.30	-0.312	0.000	0.436
12.00	-20.90	-14.48	0.00	-1213.2	0.00	1213.27	3477.22	1738.61	5794.62	2876.69	0.53	-0.414	0.000	0.428
15.00	-20.26	-14.30	0.00	-1169.8	0.00	1169.82	3454.04	1727.02	5700.59	2830.02	0.82	-0.516	0.000	0.419
18.00	-19.63	-14.11	0.00	-1126.9	0.00	1126.93	3430.67	1715.33	5607.00	2783.55	1.18	-0.617	0.000	0.411
21.00	-19.01	-13.92	0.00	-1084.6	0.00	1084.61	3407.10	1703.55	5513.84	2737.30	1.60	-0.717	0.000	0.402
24.00	-18.40	-13.73	0.00	-1042.8	0.00	1042.85	3383.34	1691.67	5421.14	2691.28	2.08	-0.817	0.000	0.393
27.00	-17.79	-13.54	0.00	-1001.6	0.00	1001.67	3359.39	1679.70	5328.89	2645.48	2.62	-0.915	0.000	0.384
30.00	-17.18	-13.35	0.00	-961.04	0.00	961.04	3335.25	1667.63	5237.10	2599.92	3.23	-1.012	0.000	0.375
33.00	-16.59	-13.16	0.00	-920.99	0.00	920.99	3310.92	1655.46	5145.79	2554.59	3.90	-1.108	0.000	0.366
36.00	-16.00	-12.96	0.00	-881.52	0.00	881.52	3286.39	1643.20	5054.97	2509.50	4.62	-1.202	0.000	0.356
39.00	-15.42	-12.75	0.00	-842.66	0.00	842.66	3261.67	1630.84	4964.64	2464.66	5.41	-1.296	0.000	0.347
42.00	-14.84	-12.54	0.00	-804.41	0.00	804.41	3236.76	1618.38	4874.82	2420.07	6.25	-1.388	0.000	0.337
45.00	-14.27	-12.33	0.00	-766.79	0.00	766.79	3211.66	1605.83	4785.51	2375.73	7.16	-1.479	0.000	0.327
48.00	-13.72	-12.10	0.00	-729.82	0.00	729.82	3182.27	1591.13	4690.68	2328.65	8.11	-1.568	0.000	0.318
48.50	-13.62	-12.07	0.00	-723.77	0.00	723.77	3176.56	1588.28	4673.77	2320.26	8.28	-1.583	0.000	0.316
51.00	-12.86	-11.87	0.00	-693.59	0.00	693.59	3148.00	1574.00	4589.69	2278.51	9.13	-1.656	0.000	0.309
53.25	-12.19	-11.69	0.00	-666.88	0.00	666.88	1846.69	923.35	2727.65	1354.12	9.92	-1.721	0.000	0.499
54.00	-12.09	-11.65	0.00	-658.11	0.00	658.11	1843.93	921.97	2716.18	1348.43	10.20	-1.742	0.000	0.495
57.00	-11.70	-11.43	0.00	-623.17	0.00	623.17	1832.78	916.39	2670.37	1325.68	11.33	-1.862	0.000	0.477
60.00	-11.33	-11.21	0.00	-588.89	0.00	588.89	1821.44	910.72	2624.63	1302.98	12.54	-1.979	0.000	0.458
63.00	-10.95	-10.98	0.00	-555.28	0.00	555.28	1809.91	904.95	2578.98	1280.32	13.82	-2.093	0.000	0.440
66.00	-10.58	-10.75	0.00	-522.33	0.00	522.33	1798.18	899.09	2533.44	1257.70	15.17	-2.204	0.000	0.421
69.00	-10.22	-10.53	0.00	-490.07	0.00	490.07	1786.27	893.13	2488.00	1235.15	16.59	-2.312	0.000	0.403
72.00	-9.86	-10.30	0.00	-458.49	0.00	458.49	1774.16	887.08	2442.68	1212.65	18.07	-2.417	0.000	0.384
75.00	-9.51	-10.06	0.00	-427.60	0.00	427.60	1761.85	880.93	2397.48	1190.21	19.62	-2.518	0.000	0.365
78.00	-9.16	-9.83	0.00	-397.41	0.00	397.41	1749.36	874.68	2352.43	1167.84	21.24	-2.616	0.000	0.346
81.00	-8.82	-9.59	0.00	-367.92	0.00	367.92	1736.67	868.34	2307.51	1145.55	22.91	-2.709	0.000	0.326
84.00	-8.48	-9.36	0.00	-339.14	0.00	339.14	1723.80	861.90	2262.76	1123.33	24.64	-2.799	0.000	0.307
87.00	-8.15	-9.12	0.00	-311.07	0.00	311.07	1710.73	855.36	2218.16	1101.19	26.43	-2.885	0.000	0.287
90.00	-7.82	-8.88	0.00	-283.70	0.00	283.70	1697.46	848.73	2173.74	1079.14	28.27	-2.966	0.000	0.268
93.00	-7.50	-8.64	0.00	-257.05	0.00	257.05	1684.01	842.00	2129.51	1057.18	30.16	-3.043	0.000	0.248
96.00	-7.19	-8.40	0.00	-231.12	0.00	231.12	1670.36	835.18	2085.46	1035.31	32.09	-3.114	0.000	0.228
98.00	-6.98	-8.24	0.00	-214.31	0.00	214.31	1661.16	830.58	2056.21	1020.79	33.40	-3.160	0.000	0.214
99.00	-6.80	-8.16	0.00	-206.07	0.00	206.07	1656.52	828.26	2041.62	1013.55	34.07	-3.182	0.000	0.208
102.00	-6.27	-7.91	0.00	-181.58	0.00	181.58	1099.11	549.56	1359.81	675.07	36.09	-3.243	0.000	0.275
105.00	-6.04	-7.67	0.00	-157.86	0.00	157.86	1092.31	546.16	1333.88	662.20	38.14	-3.299	0.000	0.244
108.00	-5.81	-7.43	0.00	-134.86	0.00	134.86	1085.32	542.66	1307.94	649.32	40.24	-3.364	0.000	0.213
109.00	-5.73	-7.35	0.00	-127.43	0.00	127.43	1082.95	541.47	1299.29	645.02	40.94	-3.383	0.000	0.203
109.00	-5.73	-7.35	0.00	-127.43	0.00	127.43	1082.95	541.47	1299.29	645.02	40.94	-3.383	0.000	0.203
111.00	-5.58	-7.20	0.00	-112.72	0.00	112.72	1078.13	539.07	1281.99	636.43	42.37	-3.420	0.000	0.182
114.00	-5.36	-6.96	0.00	-91.13	0.00	91.13	1070.76	535.38	1256.05	623.55	44.53	-3.469	0.000	0.151
117.00	-3.30	-3.37	0.00	-70.26	0.00	70.26	1063.19	531.60	1230.12	610.68	46.72	-3.509	0.000	0.118
120.00	-3.10	-3.14	0.00	-60.14	0.00	60.14	1055.43	527.72	1204.21	597.82	48.94	-3.542	0.000	0.104
123.00	-2.90	-2.90	0.00	-50.72	0.00	50.72	1047.48	523.74	1178.34	584.98	51.17	-3.572	0.000	0.090
126.00	-2.70	-2.67	0.00	-42.01	0.00	42.01	1039.33	519.67	1152.51	572.15	53.43	-3.598	0.000	0.076



## Calculated Forces

<b>Structure:</b> CT13063-A-SBA	<b>Code:</b> EIA/TIA-222-G	10/12/2017	
<b>Site Name:</b> Middle Turnpike	<b>Exposure:</b> B		
<b>Height:</b> 149.00 (ft)	<b>Crest Height:</b> 0.00		
<b>Base Elev:</b> 0.000 (ft)	<b>Site Class:</b> D - Stiff Soil		
<b>Gh:</b> 1.1	<b>Topography:</b> 1	<b>Struct Class:</b> II	Page: 14



129.00	-2.51	-2.44	0.00	-33.99	0.00	33.99	1031.00	515.50	1126.73	559.36	55.69	-3.620	0.000	0.063
132.00	-2.32	-2.21	0.00	-26.67	0.00	26.67	1022.47	511.23	1101.01	546.59	57.97	-3.639	0.000	0.051
135.00	-2.13	-1.98	0.00	-20.04	0.00	20.04	1013.75	506.87	1075.36	533.85	60.26	-3.653	0.000	0.040
138.00	-1.95	-1.76	0.00	-14.09	0.00	14.09	1004.83	502.42	1049.79	521.16	62.56	-3.665	0.000	0.029
141.00	-1.77	-1.53	0.00	-8.82	0.00	8.82	995.73	497.86	1024.31	508.51	64.86	-3.673	0.000	0.019
144.00	-1.59	-1.31	0.00	-4.22	0.00	4.22	986.43	493.22	998.92	495.91	67.17	-3.678	0.000	0.010
147.00	-0.11	-0.14	0.00	-0.29	0.00	0.29	976.94	488.47	973.65	483.36	69.48	-3.679	0.000	0.001
149.00	0.00	-0.14	0.00	0.00	0.00	0.00	970.51	485.25	956.86	475.02	71.02	-3.679	0.000	0.000

## Wind Loading - Shaft

**Structure:** CT13063-A-SBA  
**Site Name:** Middle Turnpike  
**Height:** 149.00 (ft)  
**Base Elev:** 0.000 (ft)  
**Gh:** 1.1

**Topography:** 1

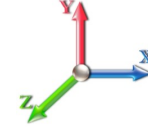
**Code:** EIA/TIA-222-G 10/12/2017  
**Exposure:** B  
**Crest Height:** 0.00  
**Site Class:** D - Stiff Soil  
**Struct Class:** II

Page: 15



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

**Dead Load Factor** 0.90  
**Wind Load Factor** 1.60



**Iterations** 28

Elev (ft)	Description	Kzt	Kz	qz (psf)	qzGh (psf)	C (mph-ft)	Cf	Ice Thick (in)	Tributary (ft)	Aa (sf)	CfAa (sf)	Wind Force X (lb)	Dead Load Ice (lb)	Tot Dead Load (lb)
0.00		1.00	0.70	16.018	17.62	292.02	0.750	0.000	0.00	0.000	0.00	0.0	0.0	0.0
3.00		1.00	0.70	16.018	17.62	289.37	0.750	0.000	3.00	10.746	8.06	227.2	0.0	459.2
6.00		1.00	0.70	16.018	17.62	286.71	0.750	0.000	3.00	10.648	7.99	225.1	0.0	455.0
9.00		1.00	0.70	16.018	17.62	284.05	0.750	0.000	3.00	10.549	7.91	223.0	0.0	450.7
12.00		1.00	0.70	16.018	17.62	281.39	0.750	0.000	3.00	10.451	7.84	221.0	0.0	446.5
15.00		1.00	0.70	16.018	17.62	278.73	0.750	0.000	3.00	10.353	7.76	218.9	0.0	442.3
18.00		1.00	0.70	16.018	17.62	276.07	0.750	0.000	3.00	10.254	7.69	216.8	0.0	438.0
21.00		1.00	0.70	16.018	17.62	273.41	0.750	0.000	3.00	10.156	7.62	214.7	0.0	433.8
24.00		1.00	0.70	16.018	17.62	270.75	0.750	0.000	3.00	10.058	7.54	212.7	0.0	429.5
27.00		1.00	0.70	16.018	17.62	268.10	0.750	0.000	3.00	9.960	7.47	210.6	0.0	425.3
30.00		1.00	0.70	16.031	17.63	265.55	0.750	0.000	3.00	9.861	7.40	208.7	0.0	421.1
33.00		1.00	0.72	16.474	18.12	266.49	0.750	0.000	3.00	9.763	7.32	212.3	0.0	416.8
36.00		1.00	0.74	16.889	18.58	267.10	0.750	0.000	3.00	9.665	7.25	215.5	0.0	412.6
39.00		1.00	0.76	17.279	19.01	267.41	0.750	0.000	3.00	9.566	7.17	218.2	0.0	408.4
42.00		1.00	0.77	17.649	19.41	267.46	0.750	0.000	3.00	9.468	7.10	220.6	0.0	404.1
45.00		1.00	0.79	18.000	19.80	267.29	0.750	0.000	3.00	9.370	7.03	222.6	0.0	399.9
48.00		1.00	0.80	18.335	20.17	266.92	0.750	0.000	3.00	9.272	6.95	224.4	0.0	395.6
48.50	Bot - Section 2	1.00	0.80	18.390	20.23	266.85	0.750	0.000	0.50	1.536	1.15	37.3	0.0	65.5
51.00		1.00	0.82	18.656	20.52	266.38	0.750	0.000	2.50	7.744	5.81	190.7	0.0	546.9
53.25	Top - Section 1	1.00	0.83	18.887	20.78	265.86	0.750	0.000	2.25	6.911	5.18	172.3	0.0	488.1
54.00		1.00	0.83	18.963	20.86	269.42	0.750	0.000	0.75	2.291	1.72	57.4	0.0	65.4
57.00		1.00	0.84	19.258	21.18	268.59	0.750	0.000	3.00	9.104	6.83	231.4	0.0	259.9
60.00		1.00	0.85	19.543	21.50	267.63	0.750	0.000	3.00	9.006	6.75	232.3	0.0	257.0
63.00		1.00	0.87	19.817	21.80	266.55	0.750	0.000	3.00	8.908	6.68	233.0	0.0	254.2
66.00		1.00	0.88	20.082	22.09	265.35	0.750	0.000	3.00	8.809	6.61	233.5	0.0	251.4
69.00		1.00	0.89	20.339	22.37	264.04	0.750	0.000	3.00	8.711	6.53	233.9	0.0	248.6
72.00		1.00	0.90	20.587	22.65	262.64	0.750	0.000	3.00	8.613	6.46	234.1	0.0	245.7
75.00		1.00	0.91	20.829	22.91	261.14	0.750	0.000	3.00	8.515	6.39	234.1	0.0	242.9
78.00		1.00	0.92	21.064	23.17	259.56	0.750	0.000	3.00	8.416	6.31	234.0	0.0	240.1
81.00		1.00	0.93	21.292	23.42	257.90	0.750	0.000	3.00	8.318	6.24	233.8	0.0	237.3
84.00		1.00	0.94	21.514	23.67	256.16	0.750	0.000	3.00	8.220	6.16	233.4	0.0	234.4
87.00		1.00	0.95	21.731	23.90	254.35	0.750	0.000	3.00	8.121	6.09	233.0	0.0	231.6
90.00		1.00	0.96	21.943	24.14	252.47	0.750	0.000	3.00	8.023	6.02	232.4	0.0	228.8
93.00		1.00	0.97	22.149	24.36	250.53	0.750	0.000	3.00	7.925	5.94	231.7	0.0	226.0
96.00		1.00	0.98	22.351	24.59	248.53	0.750	0.000	3.00	7.827	5.87	230.9	0.0	223.1
98.00	Bot - Section 3	1.00	0.98	22.483	24.73	247.17	0.750	0.000	2.00	5.163	3.87	153.2	0.0	147.2
99.00		1.00	0.99	22.549	24.80	246.47	0.750	0.000	1.00	2.597	1.95	77.3	0.0	128.8
102.00	Top - Section 2	1.00	0.99	22.742	25.02	244.36	0.750	0.000	3.00	7.726	5.79	231.9	0.0	383.0
105.00		1.00	1.00	22.931	25.22	245.29	0.750	0.000	3.00	7.627	5.72	230.9	0.0	163.4
108.00		1.00	1.01	23.116	25.43	243.08	0.750	0.000	3.00	7.529	5.65	229.7	0.0	161.3
109.00	Top - Section 3	1.00	1.01	23.177	25.49	242.33	0.750	0.000	1.00	2.488	1.87	76.1	0.0	53.3
111.00		1.00	1.02	23.298	25.63	240.83	0.750	0.000	2.00	4.943	3.71	152.0	0.0	105.9
114.00		1.00	1.03	23.476	25.82	238.53	0.750	0.000	3.00	7.332	5.50	227.2	0.0	157.0
117.00	Appurtenance(s)	1.00	1.03	23.651	26.02	236.18	0.750	0.000	3.00	7.234	5.43	225.8	0.0	154.9
120.00		1.00	1.04	23.823	26.20	233.80	0.750	0.000	3.00	7.136	5.35	224.4	0.0	152.8
123.00		1.00	1.05	23.991	26.39	231.37	0.750	0.000	3.00	7.038	5.28	222.9	0.0	150.7
126.00		1.00	1.06	24.157	26.57	228.90	0.750	0.000	3.00	6.939	5.20	221.3	0.0	148.6

## Wind Loading - Shaft

<b>Structure:</b> CT13063-A-SBA	<b>Code:</b> EIA/TIA-222-G	10/12/2017
<b>Site Name:</b> Middle Turnpike	<b>Exposure:</b> B	
<b>Height:</b> 149.00 (ft)	<b>Crest Height:</b> 0.00	
<b>Base Elev:</b> 0.000 (ft)	<b>Site Class:</b> D - Stiff Soil	
<b>Gh:</b> 1.1	<b>Topography:</b> 1	<b>Page:</b> 16
	<b>Struct Class:</b> II	



129.00	1.00	1.06	24.320	26.75	226.40	0.750	0.000	3.00	6.841	5.13	219.6	0.0	146.5
132.00	1.00	1.07	24.480	26.93	223.86	0.750	0.000	3.00	6.743	5.06	217.9	0.0	144.3
135.00	1.00	1.08	24.638	27.10	221.28	0.750	0.000	3.00	6.645	4.98	216.1	0.0	142.2
138.00	1.00	1.08	24.793	27.27	218.67	0.750	0.000	3.00	6.546	4.91	214.2	0.0	140.1
141.00	1.00	1.09	24.946	27.44	216.02	0.750	0.000	3.00	6.448	4.84	212.3	0.0	138.0
144.00	1.00	1.10	25.096	27.61	213.34	0.750	0.000	3.00	6.350	4.76	210.3	0.0	135.9
147.00 Appurtenance(s)	1.00	1.10	25.245	27.77	210.64	0.750	0.000	3.00	6.251	4.69	208.3	0.0	133.7
149.00	1.00	1.11	25.342	27.88	208.81	0.750	0.000	2.00	4.113	3.08	137.6	0.0	88.0
<b>Totals:</b>								<b>149.00</b>			<b>11,120.6</b>		<b>14,361.4</b>

## Discrete Appurtenance Forces

<b>Structure:</b> CT13063-A-SBA	<b>Code:</b> EIA/TIA-222-G	10/12/2017
<b>Site Name:</b> Middle Turnpike	<b>Exposure:</b> B	
<b>Height:</b> 149.00 (ft)	<b>Crest Height:</b> 0.00	
<b>Base Elev:</b> 0.000 (ft)	<b>Site Class:</b> D - Stiff Soil	
<b>Gh:</b> 1.1	<b>Topography:</b> 1	<b>Struct Class:</b> II

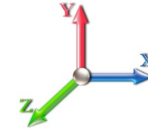


Page: 17

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

**Dead Load Factor** 0.90

**Wind Load Factor** 1.60



**Iterations** 28

No.	Elev (ft)	Description	Qty	qz (psf)	qzGh (psf)	CaAa x Ka	Ka	Total CaAa (sf)	Dead Load (lb)	Horiz Ecc (ft)	Vert Ecc (ft)	Wind FX (lb)	Mom Y (lb-ft)	Mom Z (lb-ft)
1	147.00	AIR 21 B2A/B4P	3	25.245	27.769	0.74	0.80	13.90	315.90	0.000	0.000	617.38	0.00	0.00
2	147.00	KRY 112 144/1	3	25.245	27.769	0.40	0.80	0.49	29.70	0.000	0.000	21.86	0.00	0.00
3	147.00	T-Arms (Site Pro P/N	3	25.245	27.769	0.62	0.75	4.97	675.00	0.000	0.000	221.01	0.00	0.00
4	117.00	Flush Mount	3	23.651	26.016	1.00	1.00	15.00	540.00	0.000	0.000	624.38	0.00	0.00
5	117.00	ETCR-654L12H6	3	23.651	26.016	0.57	0.80	26.77	267.30	0.000	0.000	1114.31	0.00	0.00
6	117.00	ALU 1900 Mhz RRUs	3	23.651	26.016	0.54	0.80	4.45	162.00	0.000	0.000	185.41	0.00	0.00
7	117.00	ALU 800 Mhz RRUs	6	23.651	26.016	0.54	0.80	8.01	286.20	0.000	0.000	333.33	0.00	0.00
8	117.00	ALU TD-RRH8x20-25	3	23.651	26.016	0.54	0.80	6.51	189.00	0.000	0.000	271.08	0.00	0.00
9	117.00	VHLP2.5-11	2	23.651	26.016	1.00	1.00	16.84	86.40	0.000	0.000	700.97	0.00	0.00
<b>Totals:</b>									<b>2,551.50</b>			<b>4,089.73</b>		

## Total Applied Force Summary

<b>Structure:</b> CT13063-A-SBA	<b>Code:</b> EIA/TIA-222-G	10/12/2017
<b>Site Name:</b> Middle Turnpike	<b>Exposure:</b> B	
<b>Height:</b> 149.00 (ft)	<b>Crest Height:</b> 0.00	
<b>Base Elev:</b> 0.000 (ft)	<b>Site Class:</b> D - Stiff Soil	
<b>Gh:</b> 1.1	<b>Topography:</b> 1	<b>Struct Class:</b> II

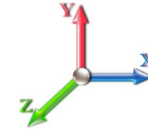


Page: 18

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

**Dead Load Factor** 0.90

**Wind Load Factor** 1.60



**Iterations** 28

Elev (ft)	Description	Lateral FX (-) (lb)	Axial FY (-) (lb)	Torsion MY (lb-ft)	Moment MZ (lb-ft)
0.00		0.00	0.00	0.00	0.00
3.00		227.20	475.63	0.00	0.00
6.00		225.13	471.39	0.00	0.00
9.00		223.05	467.15	0.00	0.00
12.00		220.97	462.91	0.00	0.00
15.00		218.89	458.68	0.00	0.00
18.00		216.81	454.44	0.00	0.00
21.00		214.74	450.20	0.00	0.00
24.00		212.66	445.96	0.00	0.00
27.00		210.58	441.72	0.00	0.00
30.00		208.68	437.49	0.00	0.00
33.00		212.30	433.25	0.00	0.00
36.00		215.46	429.01	0.00	0.00
39.00		218.20	424.77	0.00	0.00
42.00		220.58	420.54	0.00	0.00
45.00		222.63	416.30	0.00	0.00
48.00		224.40	412.06	0.00	0.00
48.50		37.28	68.26	0.00	0.00
51.00		190.70	560.63	0.00	0.00
53.25		172.30	500.37	0.00	0.00
54.00		57.36	69.51	0.00	0.00
57.00		231.44	276.28	0.00	0.00
60.00		232.32	273.46	0.00	0.00
63.00		233.01	270.63	0.00	0.00
66.00		233.52	267.81	0.00	0.00
69.00		233.87	264.98	0.00	0.00
72.00		234.06	262.16	0.00	0.00
75.00		234.10	259.33	0.00	0.00
78.00		234.01	256.51	0.00	0.00
81.00		233.78	253.68	0.00	0.00
84.00		233.43	250.86	0.00	0.00
87.00		232.96	248.03	0.00	0.00
90.00		232.39	245.21	0.00	0.00
93.00		231.70	242.38	0.00	0.00
96.00		230.91	239.56	0.00	0.00
98.00		153.23	158.14	0.00	0.00
99.00		77.30	134.24	0.00	0.00
102.00		231.91	399.43	0.00	0.00
105.00		230.87	179.82	0.00	0.00
108.00		229.74	177.70	0.00	0.00
109.00		76.11	58.76	0.00	0.00
111.00		152.01	116.82	0.00	0.00
114.00		227.22	173.46	0.00	0.00
117.00	(20) attachments	3455.33	1702.25	0.00	0.00
120.00		224.39	161.23	0.00	0.00
123.00		222.87	159.12	0.00	0.00
126.00		221.28	157.00	0.00	0.00

## Total Applied Force Summary

<b>Structure:</b> CT13063-A-SBA	<b>Code:</b> EIA/TIA-222-G	10/12/2017	
<b>Site Name:</b> Middle Turnpike	<b>Exposure:</b> B		
<b>Height:</b> 149.00 (ft)	<b>Crest Height:</b> 0.00		
<b>Base Elev:</b> 0.000 (ft)	<b>Site Class:</b> D - Stiff Soil		
<b>Gh:</b> 1.1	<b>Topography:</b> 1	<b>Struct Class:</b> II	Page: 19



129.00		219.61	154.88	0.00	0.00
132.00		217.89	152.76	0.00	0.00
135.00		216.09	150.64	0.00	0.00
138.00		214.24	148.52	0.00	0.00
141.00		212.32	146.40	0.00	0.00
144.00		210.35	144.28	0.00	0.00
147.00	(9) attachments	1068.56	1162.77	0.00	0.00
149.00		137.59	87.98	0.00	0.00
	<b>Totals:</b>	<b>15,210.31</b>	<b>17,637.39</b>	<b>0.00</b>	<b>0.00</b>



## Calculated Forces

**Structure:** CT13063-A-SBA  
**Site Name:** Middle Turnpike  
**Height:** 149.00 (ft)  
**Base Elev:** 0.000 (ft)  
**Gh:** 1.1

**Topography:** 1

**Code:** EIA/TIA-222-G 10/12/2017  
**Exposure:** B  
**Crest Height:** 0.00  
**Site Class:** D - Stiff Soil  
**Struct Class:** II

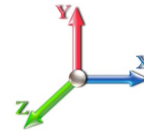


Page: 20

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

**Iterations** 28

**Dead Load Factor** 0.90  
**Wind Load Factor** 1.60



Seg Elev (ft)	Pu FY (-) (kips)	Vu FX (-) (kips)	Tu MY (-) (ft-kips)	Mu MZ (ft-kips)	Mu MX (ft-kips)	Resultant Moment (ft-kips)	phi Pn (kips)	phi Vn (kips)	phi Tn (ft-kips)	phi Mn (ft-kips)	Total Deflect (in)	Rotation Sway (deg)	Rotation Twist (deg)	Stress Ratio
0.00	-17.62	-15.23	0.00	-1381.0	0.00	1381.08	3568.03	1784.01	6174.83	3065.44	0.00	0.000	0.000	0.456
3.00	-17.12	-15.03	0.00	-1335.4	0.00	1335.40	3545.62	1772.81	6079.18	3017.96	0.03	-0.104	0.000	0.447
6.00	-16.62	-14.83	0.00	-1290.3	0.00	1290.31	3523.01	1761.51	5983.92	2970.67	0.13	-0.207	0.000	0.439
9.00	-16.13	-14.64	0.00	-1245.8	0.00	1245.82	3500.21	1750.11	5889.06	2923.58	0.30	-0.309	0.000	0.431
12.00	-15.64	-14.44	0.00	-1201.9	0.00	1201.91	3477.22	1738.61	5794.62	2876.69	0.52	-0.411	0.000	0.422
15.00	-15.16	-14.24	0.00	-1158.5	0.00	1158.59	3454.04	1727.02	5700.59	2830.02	0.81	-0.512	0.000	0.414
18.00	-14.69	-14.05	0.00	-1115.8	0.00	1115.86	3430.67	1715.33	5607.00	2783.55	1.17	-0.612	0.000	0.405
21.00	-14.21	-13.85	0.00	-1073.7	0.00	1073.72	3407.10	1703.55	5513.84	2737.30	1.58	-0.711	0.000	0.396
24.00	-13.75	-13.66	0.00	-1032.1	0.00	1032.16	3383.34	1691.67	5421.14	2691.28	2.06	-0.809	0.000	0.388
27.00	-13.29	-13.46	0.00	-991.19	0.00	991.19	3359.39	1679.70	5328.89	2645.48	2.60	-0.906	0.000	0.379
30.00	-12.83	-13.27	0.00	-950.80	0.00	950.80	3335.25	1667.63	5237.10	2599.92	3.20	-1.002	0.000	0.370
33.00	-12.38	-13.07	0.00	-910.99	0.00	910.99	3310.92	1655.46	5145.79	2554.59	3.86	-1.097	0.000	0.360
36.00	-11.93	-12.86	0.00	-871.79	0.00	871.79	3286.39	1643.20	5054.97	2509.50	4.58	-1.191	0.000	0.351
39.00	-11.49	-12.65	0.00	-833.20	0.00	833.20	3261.67	1630.84	4964.64	2464.66	5.36	-1.283	0.000	0.342
42.00	-11.06	-12.44	0.00	-795.23	0.00	795.23	3236.76	1618.38	4874.82	2420.07	6.20	-1.374	0.000	0.332
45.00	-10.63	-12.23	0.00	-757.91	0.00	757.91	3211.66	1605.83	4785.51	2375.73	7.09	-1.464	0.000	0.322
48.00	-10.21	-12.00	0.00	-721.23	0.00	721.23	3182.27	1591.13	4690.68	2328.65	8.04	-1.552	0.000	0.313
48.50	-10.14	-11.97	0.00	-715.23	0.00	715.23	3176.56	1588.28	4673.77	2320.26	8.20	-1.567	0.000	0.312
51.00	-9.57	-11.77	0.00	-685.31	0.00	685.31	3148.00	1574.00	4589.69	2278.51	9.04	-1.639	0.000	0.304
53.25	-9.06	-11.59	0.00	-658.82	0.00	658.82	1846.69	923.35	2727.65	1354.12	9.83	-1.703	0.000	0.492
54.00	-8.98	-11.54	0.00	-650.13	0.00	650.13	1843.93	921.97	2716.18	1348.43	10.10	-1.724	0.000	0.487
57.00	-8.69	-11.32	0.00	-615.49	0.00	615.49	1832.78	916.39	2670.37	1325.68	11.22	-1.842	0.000	0.469
60.00	-8.40	-11.10	0.00	-581.52	0.00	581.52	1821.44	910.72	2624.63	1302.98	12.41	-1.958	0.000	0.451
63.00	-8.12	-10.87	0.00	-548.23	0.00	548.23	1809.91	904.95	2578.98	1280.32	13.68	-2.071	0.000	0.433
66.00	-7.84	-10.64	0.00	-515.61	0.00	515.61	1798.18	899.09	2533.44	1257.70	15.02	-2.180	0.000	0.414
69.00	-7.56	-10.41	0.00	-483.69	0.00	483.69	1786.27	893.13	2488.00	1235.15	16.42	-2.287	0.000	0.396
72.00	-7.29	-10.18	0.00	-452.45	0.00	452.45	1774.16	887.08	2442.68	1212.65	17.89	-2.390	0.000	0.377
75.00	-7.03	-9.95	0.00	-421.90	0.00	421.90	1761.85	880.93	2397.48	1190.21	19.42	-2.490	0.000	0.359
78.00	-6.77	-9.71	0.00	-392.06	0.00	392.06	1749.36	874.68	2352.43	1167.84	21.02	-2.586	0.000	0.340
81.00	-6.51	-9.48	0.00	-362.91	0.00	362.91	1736.67	868.34	2307.51	1145.55	22.68	-2.679	0.000	0.321
84.00	-6.26	-9.24	0.00	-334.48	0.00	334.48	1723.80	861.90	2262.76	1123.33	24.39	-2.767	0.000	0.301
87.00	-6.01	-9.01	0.00	-306.74	0.00	306.74	1710.73	855.36	2218.16	1101.19	26.15	-2.852	0.000	0.282
90.00	-5.76	-8.77	0.00	-279.72	0.00	279.72	1697.46	848.73	2173.74	1079.14	27.97	-2.932	0.000	0.263
93.00	-5.52	-8.53	0.00	-253.41	0.00	253.41	1684.01	842.00	2129.51	1057.18	29.84	-3.008	0.000	0.243
96.00	-5.28	-8.30	0.00	-227.80	0.00	227.80	1670.36	835.18	2085.46	1035.31	31.75	-3.078	0.000	0.223
98.00	-5.13	-8.14	0.00	-211.21	0.00	211.21	1661.16	830.58	2056.21	1020.79	33.05	-3.123	0.000	0.210
99.00	-4.99	-8.06	0.00	-203.07	0.00	203.07	1656.52	828.26	2041.62	1013.55	33.70	-3.145	0.000	0.203
102.00	-4.60	-7.81	0.00	-178.90	0.00	178.90	1099.11	549.56	1359.81	675.07	35.70	-3.205	0.000	0.269
105.00	-4.43	-7.57	0.00	-155.48	0.00	155.48	1092.31	546.16	1333.88	662.20	37.73	-3.261	0.000	0.239
108.00	-4.26	-7.34	0.00	-132.76	0.00	132.76	1085.32	542.66	1307.94	649.32	39.80	-3.324	0.000	0.209
109.00	-4.20	-7.26	0.00	-125.43	0.00	125.43	1082.95	541.47	1299.29	645.02	40.50	-3.343	0.000	0.199
109.00	-4.20	-7.26	0.00	-125.43	0.00	125.43	1082.95	541.47	1299.29	645.02	40.50	-3.343	0.000	0.199
111.00	-4.09	-7.10	0.00	-110.91	0.00	110.91	1078.13	539.07	1281.99	636.43	41.91	-3.380	0.000	0.178
114.00	-3.92	-6.87	0.00	-89.60	0.00	89.60	1070.76	535.38	1256.05	623.55	44.04	-3.427	0.000	0.148
117.00	-2.43	-3.32	0.00	-69.00	0.00	69.00	1063.19	531.60	1230.12	610.68	46.21	-3.466	0.000	0.115
120.00	-2.28	-3.09	0.00	-59.04	0.00	59.04	1055.43	527.72	1204.21	597.82	48.40	-3.499	0.000	0.101
123.00	-2.13	-2.85	0.00	-49.79	0.00	49.79	1047.48	523.74	1178.34	584.98	50.61	-3.529	0.000	0.087
126.00	-1.99	-2.63	0.00	-41.22	0.00	41.22	1039.33	519.67	1152.51	572.15	52.83	-3.554	0.000	0.074

## Calculated Forces

<b>Structure:</b> CT13063-A-SBA	<b>Code:</b> EIA/TIA-222-G	10/12/2017
<b>Site Name:</b> Middle Turnpike	<b>Exposure:</b> B	
<b>Height:</b> 149.00 (ft)	<b>Crest Height:</b> 0.00	
<b>Base Elev:</b> 0.000 (ft)	<b>Site Class:</b> D - Stiff Soil	
<b>Gh:</b> 1.1	<b>Topography:</b> 1	<b>Page:</b> 21
	<b>Struct Class:</b> II	



129.00	-1.85	-2.40	0.00	-33.35	0.00	33.35	1031.00	515.50	1126.73	559.36	55.07	-3.576	0.000	0.061
132.00	-1.71	-2.17	0.00	-26.16	0.00	26.16	1022.47	511.23	1101.01	546.59	57.32	-3.594	0.000	0.050
135.00	-1.57	-1.95	0.00	-19.65	0.00	19.65	1013.75	506.87	1075.36	533.85	59.58	-3.609	0.000	0.038
138.00	-1.44	-1.72	0.00	-13.81	0.00	13.81	1004.83	502.42	1049.79	521.16	61.85	-3.620	0.000	0.028
141.00	-1.30	-1.50	0.00	-8.64	0.00	8.64	995.73	497.86	1024.31	508.51	64.13	-3.628	0.000	0.018
144.00	-1.17	-1.28	0.00	-4.13	0.00	4.13	986.43	493.22	998.92	495.91	66.41	-3.632	0.000	0.010
147.00	-0.08	-0.14	0.00	-0.29	0.00	0.29	976.94	488.47	973.65	483.36	68.69	-3.634	0.000	0.001
149.00	0.00	-0.14	0.00	0.00	0.00	0.00	970.51	485.25	956.86	475.02	70.21	-3.634	0.000	0.000

## Wind Loading - Shaft

**Structure:** CT13063-A-SBA  
**Site Name:** Middle Turnpike  
**Height:** 149.00 (ft)  
**Base Elev:** 0.000 (ft)  
**Gh:** 1.1

**Topography:** 1

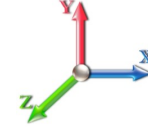
**Code:** EIA/TIA-222-G 10/12/2017  
**Exposure:** B  
**Crest Height:** 0.00  
**Site Class:** D - Stiff Soil  
**Struct Class:** II

Page: 22



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

**Dead Load Factor** 1.20  
**Wind Load Factor** 1.00



**Iterations** 27

Elev (ft)	Description	Kzt	Kz	qz (psf)	qzGh (psf)	C (mph-ft)	Cf	Ice Thick (in)	Tributary (ft)	Aa (sf)	CfAa (sf)	Wind Force X (lb)	Dead Load Ice (lb)	Tot Dead Load (lb)
0.00		1.00	0.70	4.256	4.68	0.00	1.200	0.000	0.00	0.000	0.00	0.0	0.0	0.0
3.00		1.00	0.70	4.256	4.68	0.00	1.200	1.574	3.00	11.533	13.84	64.8	259.8	872.1
6.00		1.00	0.70	4.256	4.68	0.00	1.200	1.687	3.00	11.491	13.79	64.6	276.7	883.3
9.00		1.00	0.70	4.256	4.68	0.00	1.200	1.756	3.00	11.427	13.71	64.2	286.0	887.0
12.00		1.00	0.70	4.256	4.68	0.00	1.200	1.808	3.00	11.355	13.63	63.8	292.1	887.4
15.00		1.00	0.70	4.256	4.68	0.00	1.200	1.848	3.00	11.277	13.53	63.4	296.2	885.9
18.00		1.00	0.70	4.256	4.68	0.00	1.200	1.882	3.00	11.196	13.43	62.9	299.2	883.2
21.00		1.00	0.70	4.256	4.68	0.00	1.200	1.912	3.00	11.112	13.33	62.4	301.2	879.6
24.00		1.00	0.70	4.256	4.68	0.00	1.200	1.937	3.00	11.026	13.23	61.9	302.6	875.3
27.00		1.00	0.70	4.256	4.68	0.00	1.200	1.960	3.00	10.940	13.13	61.5	303.5	870.6
30.00		1.00	0.70	4.260	4.69	0.00	1.200	1.981	3.00	10.852	13.02	61.0	304.0	865.4
33.00		1.00	0.72	4.377	4.81	0.00	1.200	2.000	3.00	10.763	12.92	62.2	304.1	859.9
36.00		1.00	0.74	4.487	4.94	0.00	1.200	2.017	3.00	10.673	12.81	63.2	303.9	854.1
39.00		1.00	0.76	4.591	5.05	0.00	1.200	2.034	3.00	10.583	12.70	64.1	303.5	848.0
42.00		1.00	0.77	4.689	5.16	0.00	1.200	2.049	3.00	10.493	12.59	64.9	302.9	841.7
45.00		1.00	0.79	4.783	5.26	0.00	1.200	2.063	3.00	10.401	12.48	65.7	302.1	835.3
48.00		1.00	0.80	4.872	5.36	0.00	1.200	2.076	3.00	10.310	12.37	66.3	301.1	828.6
48.50 Bot - Section 2		1.00	0.80	4.886	5.37	0.00	1.200	2.079	0.50	1.709	2.05	11.0	50.2	137.5
51.00		1.00	0.82	4.957	5.45	0.00	1.200	2.089	2.50	8.614	10.34	56.4	253.3	982.6
53.25 Top - Section 1		1.00	0.83	5.018	5.52	0.00	1.200	2.098	2.25	7.698	9.24	51.0	227.3	878.0
54.00		1.00	0.83	5.039	5.54	0.00	1.200	2.101	0.75	2.554	3.06	17.0	75.7	162.9
57.00		1.00	0.84	5.117	5.63	0.00	1.200	2.112	3.00	10.160	12.19	68.6	301.4	647.8
60.00		1.00	0.85	5.193	5.71	0.00	1.200	2.123	3.00	10.068	12.08	69.0	299.9	642.6
63.00		1.00	0.87	5.265	5.79	0.00	1.200	2.134	3.00	9.974	11.97	69.3	298.3	637.3
66.00		1.00	0.88	5.336	5.87	0.00	1.200	2.144	3.00	9.881	11.86	69.6	296.6	631.8
69.00		1.00	0.89	5.404	5.94	0.00	1.200	2.153	3.00	9.788	11.75	69.8	294.9	626.3
72.00		1.00	0.90	5.470	6.02	0.00	1.200	2.162	3.00	9.694	11.63	70.0	293.1	620.7
75.00		1.00	0.91	5.534	6.09	0.00	1.200	2.171	3.00	9.600	11.52	70.1	291.2	615.0
78.00		1.00	0.92	5.597	6.16	0.00	1.200	2.180	3.00	9.506	11.41	70.2	289.2	609.3
81.00		1.00	0.93	5.657	6.22	0.00	1.200	2.188	3.00	9.412	11.29	70.3	287.1	603.5
84.00		1.00	0.94	5.716	6.29	0.00	1.200	2.196	3.00	9.318	11.18	70.3	285.0	597.6
87.00		1.00	0.95	5.774	6.35	0.00	1.200	2.204	3.00	9.223	11.07	70.3	282.9	591.7
90.00		1.00	0.96	5.830	6.41	0.00	1.200	2.211	3.00	9.129	10.95	70.3	280.7	585.7
93.00		1.00	0.97	5.885	6.47	0.00	1.200	2.218	3.00	9.034	10.84	70.2	278.4	579.7
96.00		1.00	0.98	5.939	6.53	0.00	1.200	2.225	3.00	8.939	10.73	70.1	276.1	573.6
98.00 Bot - Section 3		1.00	0.98	5.974	6.57	0.00	1.200	2.230	2.00	5.906	7.09	46.6	183.0	379.3
99.00		1.00	0.99	5.991	6.59	0.00	1.200	2.232	1.00	2.969	3.56	23.5	92.3	264.0
102.00 Top - Section 2		1.00	0.99	6.043	6.65	0.00	1.200	2.239	3.00	8.845	10.61	70.5	274.5	785.2
105.00		1.00	1.00	6.093	6.70	0.00	1.200	2.245	3.00	8.750	10.50	70.4	272.1	490.0
108.00		1.00	1.01	6.142	6.76	0.00	1.200	2.252	3.00	8.655	10.39	70.2	269.6	484.7
109.00 Top - Section 3		1.00	1.01	6.158	6.77	0.00	1.200	2.254	1.00	2.863	3.44	23.3	89.6	160.6
111.00		1.00	1.02	6.190	6.81	0.00	1.200	2.258	2.00	5.696	6.83	46.5	178.1	319.2
114.00		1.00	1.03	6.238	6.86	0.00	1.200	2.264	3.00	8.464	10.16	69.7	264.5	473.9
117.00 Appurtenance(s)		1.00	1.03	6.284	6.91	0.00	1.200	2.270	3.00	8.369	10.04	69.4	262.0	468.5
120.00		1.00	1.04	6.330	6.96	0.00	1.200	2.276	3.00	8.274	9.93	69.1	259.3	463.1
123.00		1.00	1.05	6.375	7.01	0.00	1.200	2.281	3.00	8.178	9.81	68.8	256.7	457.6
126.00		1.00	1.06	6.419	7.06	0.00	1.200	2.287	3.00	8.083	9.70	68.5	254.0	452.1

## Wind Loading - Shaft

<b>Structure:</b> CT13063-A-SBA	<b>Code:</b> EIA/TIA-222-G	10/12/2017
<b>Site Name:</b> Middle Turnpike	<b>Exposure:</b> B	
<b>Height:</b> 149.00 (ft)	<b>Crest Height:</b> 0.00	
<b>Base Elev:</b> 0.000 (ft)	<b>Site Class:</b> D - Stiff Soil	
<b>Gh:</b> 1.1	<b>Topography:</b> 1	<b>Page:</b> 23
	<b>Struct Class:</b> II	



129.00	1.00	1.06	6.462	7.11	0.00	1.200	2.292	3.00	7.987	9.58	68.1	251.3	446.6
132.00	1.00	1.07	6.504	7.15	0.00	1.200	2.297	3.00	7.891	9.47	67.8	248.6	441.0
135.00	1.00	1.08	6.546	7.20	0.00	1.200	2.303	3.00	7.796	9.35	67.4	245.8	435.4
138.00	1.00	1.08	6.588	7.25	0.00	1.200	2.308	3.00	7.700	9.24	67.0	243.0	429.8
141.00	1.00	1.09	6.628	7.29	0.00	1.200	2.313	3.00	7.604	9.13	66.5	240.2	424.2
144.00	1.00	1.10	6.668	7.34	0.00	1.200	2.317	3.00	7.508	9.01	66.1	237.4	418.5
147.00 Appurtenance(s)	1.00	1.10	6.708	7.38	0.00	1.200	2.322	3.00	7.413	8.90	65.6	234.5	412.8
149.00	1.00	1.11	6.734	7.41	0.00	1.200	2.325	2.00	4.888	5.87	43.4	155.0	272.4
<b>Totals:</b>							<b>149.00</b>			<b>3,338.8</b>		<b>33,060.0</b>	

## Discrete Appurtenance Forces

<b>Structure:</b> CT13063-A-SBA	<b>Code:</b> EIA/TIA-222-G	10/12/2017
<b>Site Name:</b> Middle Turnpike	<b>Exposure:</b> B	
<b>Height:</b> 149.00 (ft)	<b>Crest Height:</b> 0.00	
<b>Base Elev:</b> 0.000 (ft)	<b>Site Class:</b> D - Stiff Soil	
<b>Gh:</b> 1.1	<b>Topography:</b> 1	<b>Struct Class:</b> II



Page: 24

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

**Dead Load Factor** 1.20  
**Wind Load Factor** 1.00



**Iterations** 27

No.	Elev (ft)	Description	Qty	qz (psf)	qzGh (psf)	CaAa x Ka	Ka	Total CaAa (sf)	Dead Load (lb)	Horiz Ecc (ft)	Vert Ecc (ft)	Wind FX (lb)	Mom Y (lb-ft)	Mom Z (lb-ft)
1	147.00	AIR 21 B2A/B4P	3	6.708	7.378	0.76	0.80	17.25	1139.23	0.000	0.000	127.28	0.00	0.00
2	147.00	KRY 112 144/1	3	6.708	7.378	0.60	0.80	1.88	73.34	0.000	0.000	13.84	0.00	0.00
3	147.00	T-Arms (Site Pro P/N	3	6.708	7.378	0.66	0.75	11.43	1446.68	0.000	0.000	84.30	0.00	0.00
4	117.00	Flush Mount	3	6.284	6.913	1.00	1.00	28.62	1223.72	0.000	0.000	197.83	0.00	0.00
5	117.00	ETCR-654L12H6	3	6.284	6.913	0.57	0.80	30.54	1671.67	0.000	0.000	211.12	0.00	0.00
6	117.00	ALU 1900 Mhz RRUs	3	6.284	6.913	0.54	0.80	7.11	469.85	0.000	0.000	49.13	0.00	0.00
7	117.00	ALU 800 Mhz RRUs	6	6.284	6.913	0.54	0.80	12.79	832.16	0.000	0.000	88.42	0.00	0.00
8	117.00	ALU TD-RRH8x20-25	3	6.284	6.913	0.54	0.80	8.25	710.53	0.000	0.000	57.05	0.00	0.00
9	117.00	VHLP2.5-11	2	6.284	6.913	1.00	1.00	21.27	465.63	0.000	0.000	147.06	0.00	0.00
<b>Totals:</b>									<b>8,032.80</b>			<b>976.03</b>		

## Total Applied Force Summary

<b>Structure:</b> CT13063-A-SBA	<b>Code:</b> EIA/TIA-222-G	10/12/2017
<b>Site Name:</b> Middle Turnpike	<b>Exposure:</b> B	
<b>Height:</b> 149.00 (ft)	<b>Crest Height:</b> 0.00	
<b>Base Elev:</b> 0.000 (ft)	<b>Site Class:</b> D - Stiff Soil	
<b>Gh:</b> 1.1	<b>Topography:</b> 1	<b>Struct Class:</b> II



Page: 25

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

**Dead Load Factor** 1.20  
**Wind Load Factor** 1.00



**Iterations** 27

Elev (ft)	Description	Lateral FX (-) (lb)	Axial FY (-) (lb)	Torsion MY (lb-ft)	Moment MZ (lb-ft)
0.00		0.00	0.00	0.00	0.00
3.00		64.79	893.96	0.00	0.00
6.00		64.55	905.19	0.00	0.00
9.00		64.20	908.88	0.00	0.00
12.00		63.79	909.28	0.00	0.00
15.00		63.35	907.79	0.00	0.00
18.00		62.90	905.08	0.00	0.00
21.00		62.43	901.49	0.00	0.00
24.00		61.95	897.24	0.00	0.00
27.00		61.46	892.47	0.00	0.00
30.00		61.02	887.29	0.00	0.00
33.00		62.19	881.77	0.00	0.00
36.00		63.22	875.95	0.00	0.00
39.00		64.14	869.89	0.00	0.00
42.00		64.95	863.62	0.00	0.00
45.00		65.67	857.16	0.00	0.00
48.00		66.30	850.53	0.00	0.00
48.50		11.02	141.18	0.00	0.00
51.00		56.36	1000.79	0.00	0.00
53.25		50.99	894.44	0.00	0.00
54.00		16.99	168.36	0.00	0.00
57.00		68.63	669.73	0.00	0.00
60.00		69.00	664.49	0.00	0.00
63.00		69.33	659.15	0.00	0.00
66.00		69.60	653.72	0.00	0.00
69.00		69.82	648.20	0.00	0.00
72.00		70.00	642.60	0.00	0.00
75.00		70.13	636.93	0.00	0.00
78.00		70.23	631.19	0.00	0.00
81.00		70.29	625.38	0.00	0.00
84.00		70.31	619.51	0.00	0.00
87.00		70.30	613.59	0.00	0.00
90.00		70.25	607.61	0.00	0.00
93.00		70.18	601.58	0.00	0.00
96.00		70.08	595.50	0.00	0.00
98.00		46.58	393.86	0.00	0.00
99.00		23.48	271.29	0.00	0.00
102.00		70.55	807.09	0.00	0.00
105.00		70.37	511.84	0.00	0.00
108.00		70.17	506.54	0.00	0.00
109.00		23.28	167.94	0.00	0.00
111.00		46.54	333.82	0.00	0.00
114.00		69.69	495.83	0.00	0.00
117.00	(20) attachments	820.03	5863.98	0.00	0.00
120.00		69.13	474.32	0.00	0.00
123.00		68.82	468.85	0.00	0.00
126.00		68.48	463.35	0.00	0.00



## Total Applied Force Summary

<b>Structure:</b> CT13063-A-SBA	<b>Code:</b> EIA/TIA-222-G	10/12/2017	
<b>Site Name:</b> Middle Turnpike	<b>Exposure:</b> B		
<b>Height:</b> 149.00 (ft)	<b>Crest Height:</b> 0.00		
<b>Base Elev:</b> 0.000 (ft)	<b>Site Class:</b> D - Stiff Soil		
<b>Gh:</b> 1.1	<b>Topography:</b> 1	<b>Struct Class:</b> II	Page: 26



129.00	68.13	457.81	0.00	0.00
132.00	67.76	452.25	0.00	0.00
135.00	67.37	446.66	0.00	0.00
138.00	66.96	441.04	0.00	0.00
141.00	66.53	435.40	0.00	0.00
144.00	66.09	429.73	0.00	0.00
147.00	(9) attachments 291.05	3083.29	0.00	0.00
149.00	43.45	272.35	0.00	0.00
<b>Totals:</b>	<b>4,314.82</b>	<b>42,058.77</b>	<b>0.00</b>	<b>0.00</b>

## Calculated Forces

**Structure:** CT13063-A-SBA  
**Site Name:** Middle Turnpike  
**Height:** 149.00 (ft)  
**Base Elev:** 0.000 (ft)  
**Gh:** 1.1

**Topography:** 1

**Code:** EIA/TIA-222-G 10/12/2017  
**Exposure:** B  
**Crest Height:** 0.00  
**Site Class:** D - Stiff Soil  
**Struct Class:** II

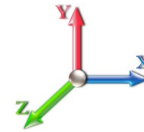


Page: 27

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

**Iterations** 27

**Dead Load Factor** 1.20  
**Wind Load Factor** 1.00



Seg Elev (ft)	Pu FY (-) (kips)	Vu FX (-) (kips)	Tu MY (-) (ft-kips)	Mu MZ (ft-kips)	Mu MX (ft-kips)	Resultant Moment (ft-kips)	phi Pn (kips)	phi Vn (kips)	phi Tn (ft-kips)	phi Mn (ft-kips)	Total Deflect (in)	Rotation Sway (deg)	Rotation Twist (deg)	Stress Ratio
0.00	-42.06	-4.33	0.00	-405.54	0.00	405.54	3568.03	1784.01	6174.83	3065.44	0.00	0.000	0.000	0.144
3.00	-41.16	-4.28	0.00	-392.57	0.00	392.57	3545.62	1772.81	6079.18	3017.96	0.01	-0.030	0.000	0.142
6.00	-40.25	-4.24	0.00	-379.72	0.00	379.72	3523.01	1761.51	5983.92	2970.67	0.04	-0.061	0.000	0.139
9.00	-39.34	-4.19	0.00	-367.01	0.00	367.01	3500.21	1750.11	5889.06	2923.58	0.09	-0.091	0.000	0.137
12.00	-38.43	-4.15	0.00	-354.43	0.00	354.43	3477.22	1738.61	5794.62	2876.69	0.15	-0.121	0.000	0.134
15.00	-37.52	-4.10	0.00	-341.98	0.00	341.98	3454.04	1727.02	5700.59	2830.02	0.24	-0.151	0.000	0.132
18.00	-36.61	-4.06	0.00	-329.68	0.00	329.68	3430.67	1715.33	5607.00	2783.55	0.34	-0.180	0.000	0.129
21.00	-35.71	-4.01	0.00	-317.51	0.00	317.51	3407.10	1703.55	5513.84	2737.30	0.47	-0.209	0.000	0.126
24.00	-34.81	-3.96	0.00	-305.49	0.00	305.49	3383.34	1691.67	5421.14	2691.28	0.61	-0.239	0.000	0.124
27.00	-33.92	-3.91	0.00	-293.61	0.00	293.61	3359.39	1679.70	5328.89	2645.48	0.77	-0.267	0.000	0.121
30.00	-33.03	-3.86	0.00	-281.88	0.00	281.88	3335.25	1667.63	5237.10	2599.92	0.94	-0.296	0.000	0.118
33.00	-32.15	-3.81	0.00	-270.29	0.00	270.29	3310.92	1655.46	5145.79	2554.59	1.14	-0.324	0.000	0.116
36.00	-31.27	-3.76	0.00	-258.86	0.00	258.86	3286.39	1643.20	5054.97	2509.50	1.35	-0.352	0.000	0.113
39.00	-30.40	-3.70	0.00	-247.59	0.00	247.59	3261.67	1630.84	4964.64	2464.66	1.58	-0.379	0.000	0.110
42.00	-29.53	-3.65	0.00	-236.48	0.00	236.48	3236.76	1618.38	4874.82	2420.07	1.83	-0.406	0.000	0.107
45.00	-28.67	-3.59	0.00	-225.54	0.00	225.54	3211.66	1605.83	4785.51	2375.73	2.09	-0.433	0.000	0.104
48.00	-27.82	-3.52	0.00	-214.78	0.00	214.78	3182.27	1591.13	4690.68	2328.65	2.37	-0.459	0.000	0.101
48.50	-27.68	-3.52	0.00	-213.02	0.00	213.02	3176.56	1588.28	4673.77	2320.26	2.42	-0.463	0.000	0.101
51.00	-26.68	-3.46	0.00	-204.24	0.00	204.24	3148.00	1574.00	4589.69	2278.51	2.67	-0.485	0.000	0.098
53.25	-25.79	-3.41	0.00	-196.45	0.00	196.45	1846.69	923.35	2727.65	1354.12	2.90	-0.504	0.000	0.159
54.00	-25.62	-3.40	0.00	-193.90	0.00	193.90	1843.93	921.97	2716.18	1348.43	2.98	-0.510	0.000	0.158
57.00	-24.95	-3.34	0.00	-183.70	0.00	183.70	1832.78	916.39	2670.37	1325.68	3.31	-0.546	0.000	0.152
60.00	-24.28	-3.28	0.00	-173.69	0.00	173.69	1821.44	910.72	2624.63	1302.98	3.67	-0.580	0.000	0.147
63.00	-23.62	-3.21	0.00	-163.85	0.00	163.85	1809.91	904.95	2578.98	1280.32	4.04	-0.614	0.000	0.141
66.00	-22.96	-3.15	0.00	-154.21	0.00	154.21	1798.18	899.09	2533.44	1257.70	4.44	-0.647	0.000	0.135
69.00	-22.32	-3.09	0.00	-144.76	0.00	144.76	1786.27	893.13	2488.00	1235.15	4.86	-0.679	0.000	0.130
72.00	-21.67	-3.02	0.00	-135.50	0.00	135.50	1774.16	887.08	2442.68	1212.65	5.29	-0.709	0.000	0.124
75.00	-21.03	-2.95	0.00	-126.44	0.00	126.44	1761.85	880.93	2397.48	1190.21	5.75	-0.739	0.000	0.118
78.00	-20.40	-2.88	0.00	-117.58	0.00	117.58	1749.36	874.68	2352.43	1167.84	6.22	-0.768	0.000	0.112
81.00	-19.78	-2.81	0.00	-108.93	0.00	108.93	1736.67	868.34	2307.51	1145.55	6.71	-0.796	0.000	0.106
84.00	-19.16	-2.74	0.00	-100.49	0.00	100.49	1723.80	861.90	2262.76	1123.33	7.22	-0.823	0.000	0.101
87.00	-18.54	-2.67	0.00	-92.26	0.00	92.26	1710.73	855.36	2218.16	1101.19	7.75	-0.848	0.000	0.095
90.00	-17.94	-2.60	0.00	-84.24	0.00	84.24	1697.46	848.73	2173.74	1079.14	8.29	-0.872	0.000	0.089
93.00	-17.33	-2.53	0.00	-76.44	0.00	76.44	1684.01	842.00	2129.51	1057.18	8.84	-0.895	0.000	0.083
96.00	-16.74	-2.45	0.00	-68.85	0.00	68.85	1670.36	835.18	2085.46	1035.31	9.41	-0.916	0.000	0.077
98.00	-16.35	-2.40	0.00	-63.94	0.00	63.94	1661.16	830.58	2056.21	1020.79	9.80	-0.930	0.000	0.072
99.00	-16.07	-2.38	0.00	-61.54	0.00	61.54	1656.52	828.26	2041.62	1013.55	10.00	-0.936	0.000	0.070
102.00	-15.27	-2.30	0.00	-54.40	0.00	54.40	1099.11	549.56	1359.81	675.07	10.59	-0.955	0.000	0.094
105.00	-14.76	-2.23	0.00	-47.50	0.00	47.50	1092.31	546.16	1333.88	662.20	11.20	-0.972	0.000	0.085
108.00	-14.25	-2.15	0.00	-40.82	0.00	40.82	1085.32	542.66	1307.94	649.32	11.81	-0.991	0.000	0.076
109.00	-14.08	-2.13	0.00	-38.67	0.00	38.67	1082.95	541.47	1299.29	645.02	12.02	-0.997	0.000	0.073
109.00	-14.08	-2.13	0.00	-38.67	0.00	38.67	1082.95	541.47	1299.29	645.02	12.02	-0.997	0.000	0.073
111.00	-13.75	-2.08	0.00	-34.42	0.00	34.42	1078.13	539.07	1281.99	636.43	12.44	-1.008	0.000	0.067
114.00	-13.26	-2.00	0.00	-28.19	0.00	28.19	1070.76	535.38	1256.05	623.55	13.08	-1.023	0.000	0.058
117.00	-7.41	-1.08	0.00	-22.18	0.00	22.18	1063.19	531.60	1230.12	610.68	13.73	-1.036	0.000	0.043
120.00	-6.93	-1.00	0.00	-18.95	0.00	18.95	1055.43	527.72	1204.21	597.82	14.38	-1.046	0.000	0.038
123.00	-6.47	-0.93	0.00	-15.95	0.00	15.95	1047.48	523.74	1178.34	584.98	15.04	-1.055	0.000	0.033
126.00	-6.00	-0.85	0.00	-13.17	0.00	13.17	1039.33	519.67	1152.51	572.15	15.71	-1.064	0.000	0.029

## Calculated Forces

<b>Structure:</b> CT13063-A-SBA	<b>Code:</b> EIA/TIA-222-G	10/12/2017
<b>Site Name:</b> Middle Turnpike	<b>Exposure:</b> B	
<b>Height:</b> 149.00 (ft)	<b>Crest Height:</b> 0.00	
<b>Base Elev:</b> 0.000 (ft)	<b>Site Class:</b> D - Stiff Soil	
<b>Gh:</b> 1.1	<b>Topography:</b> 1	<b>Page:</b> 28
	<b>Struct Class:</b> II	



129.00	-5.55	-0.77	0.00	-10.62	0.00	10.62	1031.00	515.50	1126.73	559.36	16.38	-1.071	0.000	0.024
132.00	-5.10	-0.70	0.00	-8.31	0.00	8.31	1022.47	511.23	1101.01	546.59	17.05	-1.076	0.000	0.020
135.00	-4.65	-0.62	0.00	-6.21	0.00	6.21	1013.75	506.87	1075.36	533.85	17.73	-1.081	0.000	0.016
138.00	-4.21	-0.55	0.00	-4.35	0.00	4.35	1004.83	502.42	1049.79	521.16	18.41	-1.084	0.000	0.013
141.00	-3.78	-0.47	0.00	-2.71	0.00	2.71	995.73	497.86	1024.31	508.51	19.09	-1.087	0.000	0.009
144.00	-3.35	-0.40	0.00	-1.29	0.00	1.29	986.43	493.22	998.92	495.91	19.78	-1.088	0.000	0.006
147.00	-0.27	-0.05	0.00	-0.10	0.00	0.10	976.94	488.47	973.65	483.36	20.46	-1.089	0.000	0.000
149.00	0.00	-0.04	0.00	0.00	0.00	0.00	970.51	485.25	956.86	475.02	20.92	-1.089	0.000	0.000

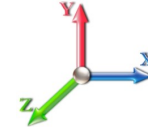
## Seismic Segment Forces (Factored)

<b>Structure:</b> CT13063-A-SBA	<b>Code:</b> EIA/TIA-222-G	10/12/2017
<b>Site Name:</b> Middle Turnpike	<b>Exposure:</b> B	
<b>Height:</b> 149.00 (ft)	<b>Crest Height:</b> 0.00	
<b>Base Elev:</b> 0.000 (ft)	<b>Site Class:</b> D - Stiff Soil	
<b>Gh:</b> 1.1	<b>Topography:</b> 1	<b>Struct Class:</b> II



Page: 29

<b>Load Case:</b> 1.2D + 1.0E					<b>Iterations</b> 25
<b>Gust Response Factor</b>	1.10	<b>Seismic Load Factor</b>	1.00	<b>Sds</b> 0.19	<b>Ss</b> 0.18
<b>Dead Load Factor</b>	1.20	<b>Structure Frequency</b>	0.37	<b>Sd1</b> 0.10	<b>S1</b> 0.06
<b>Wind Load Factor</b>	0.00	<b>Seismic Importance Factor</b>	1.00	<b>SA</b> 0.04	



Top Elev (ft)	Description	Wz (lb)	a	b	c	Lateral Fs (lb)	
0.00		0.00	0.00	0.00	0.00	0.00	<b>R: 1.50</b>
3.00		510.23	0.00	0.02	0.01	6.19	
6.00		505.52	0.00	0.04	0.02	9.88	
9.00		500.82	0.01	0.05	0.03	12.17	
12.00		496.11	0.01	0.06	0.03	13.61	
15.00		491.40	0.02	0.06	0.04	14.51	
18.00		486.69	0.03	0.07	0.04	15.05	
21.00		481.98	0.04	0.07	0.04	15.38	
24.00		477.27	0.05	0.07	0.04	15.57	
27.00		472.57	0.06	0.07	0.04	15.69	
30.00		467.86	0.08	0.07	0.04	15.78	
33.00		463.15	0.09	0.07	0.04	15.86	
36.00		458.44	0.11	0.07	0.04	15.93	
39.00		453.73	0.13	0.07	0.03	15.98	
42.00		449.02	0.15	0.07	0.03	16.00	
45.00		444.31	0.17	0.07	0.03	15.96	
48.00		439.61	0.20	0.06	0.02	15.81	
48.50	Bot - Section 2	72.81	0.20	0.06	0.02	2.62	
51.00		607.72	0.22	0.06	0.02	21.69	
53.25	Top - Section 1	542.29	0.24	0.06	0.02	19.08	
54.00		72.68	0.25	0.06	0.02	2.54	
57.00		288.74	0.28	0.05	0.01	9.70	
60.00		285.60	0.31	0.04	0.01	8.99	
63.00		282.46	0.34	0.04	0.01	8.03	
66.00		279.33	0.37	0.03	0.01	6.81	
69.00		276.19	0.41	0.02	0.01	5.32	
72.00		273.05	0.44	0.00	0.01	3.58	
75.00		269.91	0.48	-0.01	0.01	1.66	
78.00		266.77	0.52	-0.02	0.01	-0.36	
81.00		263.63	0.56	-0.04	0.01	-2.36	
84.00		260.49	0.60	-0.05	0.01	-4.22	
87.00		257.35	0.64	-0.07	0.02	-5.81	
90.00		254.21	0.69	-0.08	0.03	-7.05	
93.00		251.08	0.74	-0.10	0.04	-7.88	
96.00		247.94	0.78	-0.11	0.05	-8.26	
98.00	Bot - Section 3	163.55	0.82	-0.11	0.06	-5.49	
99.00		143.08	0.83	-0.12	0.06	-4.78	
102.00	Top - Section 2	425.57	0.89	-0.12	0.08	-13.48	
105.00		181.56	0.94	-0.12	0.10	-5.09	
108.00		179.21	0.99	-0.11	0.13	-4.04	
109.00	Top - Section 3	59.21	1.01	-0.11	0.14	-1.20	
111.00		117.64	1.05	-0.09	0.16	-1.79	
114.00		174.50	1.11	-0.07	0.19	-1.05	
117.00	Appurtenance(s)	1873.1	1.17	-0.03	0.23	9.38	
120.00		169.79	1.23	0.03	0.27	3.04	
123.00		167.44	1.29	0.10	0.33	5.46	

## Seismic Segment Forces (Factored)

<b>Structure:</b> CT13063-A-SBA	<b>Code:</b> EIA/TIA-222-G	10/12/2017
<b>Site Name:</b> Middle Turnpike	<b>Exposure:</b> B	
<b>Height:</b> 149.00 (ft)	<b>Crest Height:</b> 0.00	
<b>Base Elev:</b> 0.000 (ft)	<b>Site Class:</b> D - Stiff Soil	
<b>Gh:</b> 1.1	<b>Topography:</b> 1	<b>Struct Class:</b> II



Page: 30

126.00		165.08	1.35	0.20	0.38	8.13
129.00		162.73	1.42	0.32	0.45	11.02
132.00		160.37	1.48	0.46	0.52	14.13
135.00		158.02	1.55	0.64	0.61	17.45
138.00		155.66	1.62	0.85	0.70	20.97
141.00		153.31	1.69	1.09	0.80	24.68
144.00		150.96	1.77	1.39	0.92	28.56
147.00	Appurtenance(s)	1282.6	1.84	1.72	1.05	281.50
149.00		97.76	1.89	1.98	1.14	23.54
<b>Totals:</b>		<b>18,792.1</b>				<b>694.4</b>
						<b>Total Wind: 15,210.3</b>

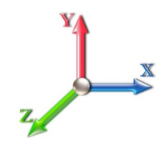
Seismic Base Shear is Less Than 50% of Wind Force - An Analysis is NOT Required

## Calculated Forces

<b>Structure:</b> CT13063-A-SBA	<b>Code:</b> EIA/TIA-222-G	10/12/2017
<b>Site Name:</b> Middle Turnpike	<b>Exposure:</b> B	
<b>Height:</b> 149.00 (ft)	<b>Crest Height:</b> 0.00	
<b>Base Elev:</b> 0.000 (ft)	<b>Site Class:</b> D - Stiff Soil	
<b>Gh:</b> 1.1	<b>Topography:</b> 1	<b>Struct Class:</b> II



<b>Load Case: 1.2D + 1.0E</b>										<b>Iterations</b> 25
<b>Gust Response Factor</b>	1.10						<b>Sds</b>	0.19		<b>Ss</b> 0.18
<b>Dead Load Factor</b>	1.20	<b>Seismic Load Factor</b>	1.00	<b>Sd1</b>	0.10					<b>S1</b> 0.06
<b>Wind Load Factor</b>	0.00	<b>Structure Frequency</b>	0.37	<b>SA</b>	0.04	<b>Seismic Importance Factor</b>	1.00			



Seg Elev (ft)	Pu FY (-) (kips)	Vu FX (-) (kips)	Tu MY (-) (ft-kips)	Mu MZ (ft-kips)	Mu MX (ft-kips)	Resultant Moment (ft-kips)	phi Pn (kips)	phi Vn (kips)	phi Tn (ft-kips)	phi Mn (ft-kips)	Total Deflect (in)	Rotation Sway (deg)	Rotation Twist (deg)	Stress Ratio
0.00	-23.52	-0.77	0.00	-78.38	0.00	78.38	3568.03	1784.01	6174.83	3065.44	0.00	0.00	0.00	0.032
3.00	-22.88	-0.76	0.00	-76.08	0.00	76.08	3545.62	1772.81	6079.18	3017.96	0.00	-0.01	0.00	0.032
6.00	-22.25	-0.76	0.00	-73.79	0.00	73.79	3523.01	1761.51	5983.92	2970.67	0.01	-0.01	0.00	0.031
9.00	-21.63	-0.75	0.00	-71.52	0.00	71.52	3500.21	1750.11	5889.06	2923.58	0.02	-0.02	0.00	0.031
12.00	-21.01	-0.73	0.00	-69.29	0.00	69.29	3477.22	1738.61	5794.62	2876.69	0.03	-0.02	0.00	0.030
15.00	-20.40	-0.72	0.00	-67.09	0.00	67.09	3454.04	1727.02	5700.59	2830.02	0.05	-0.03	0.00	0.030
18.00	-19.80	-0.71	0.00	-64.92	0.00	64.92	3430.67	1715.33	5607.00	2783.55	0.07	-0.04	0.00	0.029
21.00	-19.20	-0.69	0.00	-62.80	0.00	62.80	3407.10	1703.55	5513.84	2737.30	0.09	-0.04	0.00	0.029
24.00	-18.60	-0.68	0.00	-60.72	0.00	60.72	3383.34	1691.67	5421.14	2691.28	0.12	-0.05	0.00	0.028
27.00	-18.01	-0.67	0.00	-58.68	0.00	58.68	3359.39	1679.70	5328.89	2645.48	0.15	-0.05	0.00	0.028
30.00	-17.43	-0.65	0.00	-56.68	0.00	56.68	3335.25	1667.63	5237.10	2599.92	0.18	-0.06	0.00	0.027
33.00	-16.85	-0.64	0.00	-54.73	0.00	54.73	3310.92	1655.46	5145.79	2554.59	0.22	-0.06	0.00	0.027
36.00	-16.28	-0.62	0.00	-52.82	0.00	52.82	3286.39	1643.20	5054.97	2509.50	0.26	-0.07	0.00	0.026
39.00	-15.71	-0.61	0.00	-50.96	0.00	50.96	3261.67	1630.84	4964.64	2464.66	0.31	-0.08	0.00	0.025
42.00	-15.15	-0.59	0.00	-49.14	0.00	49.14	3236.76	1618.38	4874.82	2420.07	0.36	-0.08	0.00	0.025
45.00	-14.60	-0.58	0.00	-47.37	0.00	47.37	3211.66	1605.83	4785.51	2375.73	0.41	-0.09	0.00	0.024
48.00	-14.05	-0.56	0.00	-45.64	0.00	45.64	3182.27	1591.13	4690.68	2328.65	0.47	-0.09	0.00	0.024
48.50	-13.96	-0.56	0.00	-45.36	0.00	45.36	3176.56	1588.28	4673.77	2320.26	0.48	-0.09	0.00	0.024
51.00	-13.21	-0.54	0.00	-43.97	0.00	43.97	3148.00	1574.00	4589.69	2278.51	0.53	-0.10	0.00	0.023
53.25	-12.54	-0.52	0.00	-42.77	0.00	42.77	1846.69	923.35	2727.65	1354.12	0.57	-0.10	0.00	0.038
54.00	-12.45	-0.51	0.00	-42.38	0.00	42.38	1843.93	921.97	2716.18	1348.43	0.59	-0.10	0.00	0.038
57.00	-12.08	-0.51	0.00	-40.84	0.00	40.84	1832.78	916.39	2670.37	1325.68	0.66	-0.11	0.00	0.037
60.00	-11.72	-0.50	0.00	-39.32	0.00	39.32	1821.44	910.72	2624.63	1302.98	0.73	-0.12	0.00	0.037
63.00	-11.35	-0.49	0.00	-37.83	0.00	37.83	1809.91	904.95	2578.98	1280.32	0.81	-0.13	0.00	0.036
66.00	-11.00	-0.48	0.00	-36.36	0.00	36.36	1798.18	899.09	2533.44	1257.70	0.89	-0.13	0.00	0.035
69.00	-10.64	-0.48	0.00	-34.91	0.00	34.91	1786.27	893.13	2488.00	1235.15	0.97	-0.14	0.00	0.034
72.00	-10.29	-0.48	0.00	-33.47	0.00	33.47	1774.16	887.08	2442.68	1212.65	1.06	-0.15	0.00	0.033
75.00	-9.95	-0.47	0.00	-32.05	0.00	32.05	1761.85	880.93	2397.48	1190.21	1.16	-0.16	0.00	0.033
78.00	-9.61	-0.47	0.00	-30.62	0.00	30.62	1749.36	874.68	2352.43	1167.84	1.26	-0.16	0.00	0.032
81.00	-9.27	-0.48	0.00	-29.20	0.00	29.20	1736.67	868.34	2307.51	1145.55	1.37	-0.17	0.00	0.031
84.00	-8.93	-0.48	0.00	-27.77	0.00	27.77	1723.80	861.90	2262.76	1123.33	1.48	-0.18	0.00	0.030
87.00	-8.60	-0.48	0.00	-26.35	0.00	26.35	1710.73	855.36	2218.16	1101.19	1.59	-0.19	0.00	0.029
90.00	-8.28	-0.48	0.00	-24.92	0.00	24.92	1697.46	848.73	2173.74	1079.14	1.71	-0.19	0.00	0.028
93.00	-7.95	-0.48	0.00	-23.49	0.00	23.49	1684.01	842.00	2129.51	1057.18	1.83	-0.20	0.00	0.027
96.00	-7.63	-0.47	0.00	-22.07	0.00	22.07	1670.36	835.18	2085.46	1035.31	1.96	-0.21	0.00	0.026
98.00	-7.42	-0.47	0.00	-21.12	0.00	21.12	1661.16	830.58	2056.21	1020.79	2.05	-0.21	0.00	0.025
99.00	-7.24	-0.47	0.00	-20.65	0.00	20.65	1656.52	828.26	2041.62	1013.55	2.09	-0.21	0.00	0.025
102.00	-6.71	-0.47	0.00	-19.22	0.00	19.22	1099.11	549.56	1359.81	675.07	2.23	-0.22	0.00	0.035
105.00	-6.47	-0.47	0.00	-17.80	0.00	17.80	1092.31	546.16	1333.88	662.20	2.37	-0.23	0.00	0.033
108.00	-6.23	-0.47	0.00	-16.38	0.00	16.38	1085.32	542.66	1307.94	649.32	2.51	-0.23	0.00	0.031
109.00	-6.16	-0.47	0.00	-15.91	0.00	15.91	1082.95	541.47	1299.29	645.02	2.56	-0.23	0.00	0.030
109.00	-6.16	-0.47	0.00	-15.91	0.00	15.91	1082.95	541.47	1299.29	645.02	2.56	-0.23	0.00	0.030
111.00	-6.00	-0.47	0.00	-14.97	0.00	14.97	1078.13	539.07	1281.99	636.43	2.66	-0.24	0.00	0.029
114.00	-5.77	-0.47	0.00	-13.55	0.00	13.55	1070.76	535.38	1256.05	623.55	2.81	-0.25	0.00	0.027
117.00	-3.50	-0.45	0.00	-12.13	0.00	12.13	1063.19	531.60	1230.12	610.68	2.97	-0.25	0.00	0.023
120.00	-3.28	-0.45	0.00	-10.77	0.00	10.77	1055.43	527.72	1204.21	597.82	3.13	-0.26	0.00	0.021
123.00	-3.07	-0.44	0.00	-9.42	0.00	9.42	1047.48	523.74	1178.34	584.98	3.29	-0.26	0.00	0.019



## Calculated Forces

<b>Structure:</b> CT13063-A-SBA	<b>Code:</b> EIA/TIA-222-G	10/12/2017
<b>Site Name:</b> Middle Turnpike	<b>Exposure:</b> B	
<b>Height:</b> 149.00 (ft)	<b>Crest Height:</b> 0.00	
<b>Base Elev:</b> 0.000 (ft)	<b>Site Class:</b> D - Stiff Soil	
<b>Gh:</b> 1.1	<b>Topography:</b> 1	<b>Struct Class:</b> II



Page: 32

126.00	-2.86	-0.43	0.00	-8.09	0.00	8.09	1039.33	519.67	1152.51	572.15	3.46	-0.27	0.017
129.00	-2.66	-0.42	0.00	-6.78	0.00	6.78	1031.00	515.50	1126.73	559.36	3.63	-0.27	0.015
132.00	-2.45	-0.41	0.00	-5.52	0.00	5.52	1022.47	511.23	1101.01	546.59	3.80	-0.28	0.012
135.00	-2.25	-0.39	0.00	-4.29	0.00	4.29	1013.75	506.87	1075.36	533.85	3.98	-0.28	0.010
138.00	-2.05	-0.37	0.00	-3.12	0.00	3.12	1004.83	502.42	1049.79	521.16	4.16	-0.28	0.008
141.00	-1.86	-0.34	0.00	-2.02	0.00	2.02	995.73	497.86	1024.31	508.51	4.34	-0.28	0.006
144.00	-1.67	-0.31	0.00	-0.99	0.00	0.99	986.43	493.22	998.92	495.91	4.51	-0.29	0.004
147.00	-0.12	-0.02	0.00	-0.05	0.00	0.05	976.94	488.47	973.65	483.36	4.69	-0.29	0.000
149.00	0.00	-0.02	0.00	0.00	0.00	0.00	970.51	485.25	956.86	475.02	4.81	-0.29	0.000

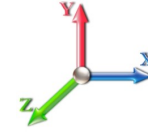
## Seismic Segment Forces (Factored)

<b>Structure:</b> CT13063-A-SBA	<b>Code:</b> EIA/TIA-222-G	10/12/2017
<b>Site Name:</b> Middle Turnpike	<b>Exposure:</b> B	
<b>Height:</b> 149.00 (ft)	<b>Crest Height:</b> 0.00	
<b>Base Elev:</b> 0.000 (ft)	<b>Site Class:</b> D - Stiff Soil	
<b>Gh:</b> 1.1	<b>Topography:</b> 1	<b>Struct Class:</b> II



Page: 33

<b>Load Case:</b> 0.9D + 1.0E					<b>Iterations</b> 25
<b>Gust Response Factor</b>	1.10			<b>Sds</b> 0.19	<b>Ss</b> 0.18
<b>Dead Load Factor</b>	0.90	<b>Seismic Load Factor</b>	1.00	<b>Sd1</b> 0.10	<b>S1</b> 0.06
<b>Wind Load Factor</b>	0.00	<b>Structure Frequency</b>	0.37	<b>SA</b> 0.04	<b>Seismic Importance Factor</b> 1.00



Top Elev (ft)	Description	Wz (lb)	a	b	c	Lateral Fs (lb)	R: 1.50
0.00		0.00	0.00	0.00	0.00	0.00	
3.00		510.23	0.00	0.02	0.01	6.19	
6.00		505.52	0.00	0.04	0.02	9.88	
9.00		500.82	0.01	0.05	0.03	12.17	
12.00		496.11	0.01	0.06	0.03	13.61	
15.00		491.40	0.02	0.06	0.04	14.51	
18.00		486.69	0.03	0.07	0.04	15.05	
21.00		481.98	0.04	0.07	0.04	15.38	
24.00		477.27	0.05	0.07	0.04	15.57	
27.00		472.57	0.06	0.07	0.04	15.69	
30.00		467.86	0.08	0.07	0.04	15.78	
33.00		463.15	0.09	0.07	0.04	15.86	
36.00		458.44	0.11	0.07	0.04	15.93	
39.00		453.73	0.13	0.07	0.03	15.98	
42.00		449.02	0.15	0.07	0.03	16.00	
45.00		444.31	0.17	0.07	0.03	15.96	
48.00		439.61	0.20	0.06	0.02	15.81	
48.50	Bot - Section 2	72.81	0.20	0.06	0.02	2.62	
51.00		607.72	0.22	0.06	0.02	21.69	
53.25	Top - Section 1	542.29	0.24	0.06	0.02	19.08	
54.00		72.68	0.25	0.06	0.02	2.54	
57.00		288.74	0.28	0.05	0.01	9.70	
60.00		285.60	0.31	0.04	0.01	8.99	
63.00		282.46	0.34	0.04	0.01	8.03	
66.00		279.33	0.37	0.03	0.01	6.81	
69.00		276.19	0.41	0.02	0.01	5.32	
72.00		273.05	0.44	0.00	0.01	3.58	
75.00		269.91	0.48	-0.01	0.01	1.66	
78.00		266.77	0.52	-0.02	0.01	-0.36	
81.00		263.63	0.56	-0.04	0.01	-2.36	
84.00		260.49	0.60	-0.05	0.01	-4.22	
87.00		257.35	0.64	-0.07	0.02	-5.81	
90.00		254.21	0.69	-0.08	0.03	-7.05	
93.00		251.08	0.74	-0.10	0.04	-7.88	
96.00		247.94	0.78	-0.11	0.05	-8.26	
98.00	Bot - Section 3	163.55	0.82	-0.11	0.06	-5.49	
99.00		143.08	0.83	-0.12	0.06	-4.78	
102.00	Top - Section 2	425.57	0.89	-0.12	0.08	-13.48	
105.00		181.56	0.94	-0.12	0.10	-5.09	
108.00		179.21	0.99	-0.11	0.13	-4.04	
109.00	Top - Section 3	59.21	1.01	-0.11	0.14	-1.20	
111.00		117.64	1.05	-0.09	0.16	-1.79	
114.00		174.50	1.11	-0.07	0.19	-1.05	
117.00	Appurtenance(s)	1873.1	1.17	-0.03	0.23	9.38	
120.00		169.79	1.23	0.03	0.27	3.04	
123.00		167.44	1.29	0.10	0.33	5.46	

## Seismic Segment Forces (Factored)

<b>Structure:</b> CT13063-A-SBA	<b>Code:</b> EIA/TIA-222-G	10/12/2017
<b>Site Name:</b> Middle Turnpike	<b>Exposure:</b> B	
<b>Height:</b> 149.00 (ft)	<b>Crest Height:</b> 0.00	
<b>Base Elev:</b> 0.000 (ft)	<b>Site Class:</b> D - Stiff Soil	
<b>Gh:</b> 1.1	<b>Topography:</b> 1	<b>Struct Class:</b> II



Page: 34

126.00		165.08	1.35	0.20	0.38	8.13
129.00		162.73	1.42	0.32	0.45	11.02
132.00		160.37	1.48	0.46	0.52	14.13
135.00		158.02	1.55	0.64	0.61	17.45
138.00		155.66	1.62	0.85	0.70	20.97
141.00		153.31	1.69	1.09	0.80	24.68
144.00		150.96	1.77	1.39	0.92	28.56
147.00	Appurtenance(s)	1282.6	1.84	1.72	1.05	281.50
149.00		97.76	1.89	1.98	1.14	23.54
<b>Totals:</b>		<b>18,792.1</b>				<b>694.4</b>
						<b>Total Wind: 15,210.3</b>

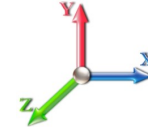
Seismic Base Shear is Less Than 50% of Wind Force - An Analysis is NOT Required

## Calculated Forces

<b>Structure:</b> CT13063-A-SBA	<b>Code:</b> EIA/TIA-222-G	10/12/2017
<b>Site Name:</b> Middle Turnpike	<b>Exposure:</b> B	
<b>Height:</b> 149.00 (ft)	<b>Crest Height:</b> 0.00	
<b>Base Elev:</b> 0.000 (ft)	<b>Site Class:</b> D - Stiff Soil	
<b>Gh:</b> 1.1	<b>Topography:</b> 1	<b>Struct Class:</b> II



<b>Load Case:</b> 0.9D + 1.0E										<b>Iterations</b> 25
<b>Gust Response Factor</b>	1.10						<b>Sds</b>	0.19		<b>Ss</b> 0.18
<b>Dead Load Factor</b>	0.90	<b>Seismic Load Factor</b>	1.00	<b>Sd1</b>	0.10					<b>S1</b> 0.06
<b>Wind Load Factor</b>	0.00	<b>Structure Frequency</b>	0.37	<b>SA</b>	0.04	<b>Seismic Importance Factor</b>	1.00			



Seg Elev (ft)	Pu FY (-) (kips)	Vu FX (-) (kips)	Tu MY (-) (ft-kips)	Mu MZ (ft-kips)	Mu MX (ft-kips)	Resultant Moment (ft-kips)	phi Pn (kips)	phi Vn (kips)	phi Tn (ft-kips)	phi Mn (ft-kips)	Total Deflect (in)	Rotation Sway (deg)	Rotation Twist (deg)	Stress Ratio
0.00	-17.64	-0.77	0.00	-77.65	0.00	77.65	3568.03	1784.01	6174.83	3065.44	0.00	0.00	0.00	0.030
3.00	-17.16	-0.76	0.00	-75.35	0.00	75.35	3545.62	1772.81	6079.18	3017.96	0.00	-0.01	0.00	0.030
6.00	-16.69	-0.75	0.00	-73.06	0.00	73.06	3523.01	1761.51	5983.92	2970.67	0.01	-0.01	0.00	0.029
9.00	-16.22	-0.74	0.00	-70.80	0.00	70.80	3500.21	1750.11	5889.06	2923.58	0.02	-0.02	0.00	0.029
12.00	-15.76	-0.73	0.00	-68.57	0.00	68.57	3477.22	1738.61	5794.62	2876.69	0.03	-0.02	0.00	0.028
15.00	-15.30	-0.72	0.00	-66.37	0.00	66.37	3454.04	1727.02	5700.59	2830.02	0.05	-0.03	0.00	0.028
18.00	-14.85	-0.70	0.00	-64.22	0.00	64.22	3430.67	1715.33	5607.00	2783.55	0.07	-0.03	0.00	0.027
21.00	-14.40	-0.69	0.00	-62.11	0.00	62.11	3407.10	1703.55	5513.84	2737.30	0.09	-0.04	0.00	0.027
24.00	-13.95	-0.68	0.00	-60.04	0.00	60.04	3383.34	1691.67	5421.14	2691.28	0.12	-0.05	0.00	0.026
27.00	-13.51	-0.66	0.00	-58.01	0.00	58.01	3359.39	1679.70	5328.89	2645.48	0.15	-0.05	0.00	0.026
30.00	-13.07	-0.65	0.00	-56.03	0.00	56.03	3335.25	1667.63	5237.10	2599.92	0.18	-0.06	0.00	0.025
33.00	-12.64	-0.63	0.00	-54.09	0.00	54.09	3310.92	1655.46	5145.79	2554.59	0.22	-0.06	0.00	0.025
36.00	-12.21	-0.62	0.00	-52.19	0.00	52.19	3286.39	1643.20	5054.97	2509.50	0.26	-0.07	0.00	0.025
39.00	-11.78	-0.60	0.00	-50.35	0.00	50.35	3261.67	1630.84	4964.64	2464.66	0.31	-0.07	0.00	0.024
42.00	-11.36	-0.58	0.00	-48.55	0.00	48.55	3236.76	1618.38	4874.82	2420.07	0.35	-0.08	0.00	0.024
45.00	-10.95	-0.57	0.00	-46.79	0.00	46.79	3211.66	1605.83	4785.51	2375.73	0.41	-0.09	0.00	0.023
48.00	-10.53	-0.55	0.00	-45.08	0.00	45.08	3182.27	1591.13	4690.68	2328.65	0.46	-0.09	0.00	0.023
48.50	-10.47	-0.55	0.00	-44.81	0.00	44.81	3176.56	1588.28	4673.77	2320.26	0.47	-0.09	0.00	0.023
51.00	-9.91	-0.53	0.00	-43.43	0.00	43.43	3148.00	1574.00	4589.69	2278.51	0.52	-0.10	0.00	0.022
53.25	-9.41	-0.51	0.00	-42.24	0.00	42.24	1846.69	923.35	2727.65	1354.12	0.57	-0.10	0.00	0.036
54.00	-9.34	-0.51	0.00	-41.85	0.00	41.85	1843.93	921.97	2716.18	1348.43	0.58	-0.10	0.00	0.036
57.00	-9.06	-0.50	0.00	-40.33	0.00	40.33	1832.78	916.39	2670.37	1325.68	0.65	-0.11	0.00	0.035
60.00	-8.79	-0.49	0.00	-38.83	0.00	38.83	1821.44	910.72	2624.63	1302.98	0.72	-0.12	0.00	0.035
63.00	-8.52	-0.48	0.00	-37.36	0.00	37.36	1809.91	904.95	2578.98	1280.32	0.80	-0.12	0.00	0.034
66.00	-8.25	-0.48	0.00	-35.91	0.00	35.91	1798.18	899.09	2533.44	1257.70	0.88	-0.13	0.00	0.033
69.00	-7.98	-0.47	0.00	-34.48	0.00	34.48	1786.27	893.13	2488.00	1235.15	0.96	-0.14	0.00	0.032
72.00	-7.72	-0.47	0.00	-33.06	0.00	33.06	1774.16	887.08	2442.68	1212.65	1.05	-0.15	0.00	0.032
75.00	-7.46	-0.47	0.00	-31.66	0.00	31.66	1761.85	880.93	2397.48	1190.21	1.15	-0.15	0.00	0.031
78.00	-7.20	-0.47	0.00	-30.26	0.00	30.26	1749.36	874.68	2352.43	1167.84	1.25	-0.16	0.00	0.030
81.00	-6.95	-0.47	0.00	-28.85	0.00	28.85	1736.67	868.34	2307.51	1145.55	1.35	-0.17	0.00	0.029
84.00	-6.70	-0.47	0.00	-27.45	0.00	27.45	1723.80	861.90	2262.76	1123.33	1.46	-0.18	0.00	0.028
87.00	-6.45	-0.47	0.00	-26.05	0.00	26.05	1710.73	855.36	2218.16	1101.19	1.57	-0.18	0.00	0.027
90.00	-6.21	-0.47	0.00	-24.64	0.00	24.64	1697.46	848.73	2173.74	1079.14	1.69	-0.19	0.00	0.026
93.00	-5.96	-0.47	0.00	-23.24	0.00	23.24	1684.01	842.00	2129.51	1057.18	1.81	-0.20	0.00	0.026
96.00	-5.72	-0.47	0.00	-21.83	0.00	21.83	1670.36	835.18	2085.46	1035.31	1.94	-0.20	0.00	0.025
98.00	-5.57	-0.47	0.00	-20.90	0.00	20.90	1661.16	830.58	2056.21	1020.79	2.02	-0.21	0.00	0.024
99.00	-5.43	-0.47	0.00	-20.43	0.00	20.43	1656.52	828.26	2041.62	1013.55	2.07	-0.21	0.00	0.023
102.00	-5.03	-0.47	0.00	-19.03	0.00	19.03	1099.11	549.56	1359.81	675.07	2.20	-0.22	0.00	0.033
105.00	-4.85	-0.47	0.00	-17.63	0.00	17.63	1092.31	546.16	1333.88	662.20	2.34	-0.22	0.00	0.031
108.00	-4.68	-0.47	0.00	-16.23	0.00	16.23	1085.32	542.66	1307.94	649.32	2.48	-0.23	0.00	0.029
109.00	-4.62	-0.47	0.00	-15.77	0.00	15.77	1082.95	541.47	1299.29	645.02	2.53	-0.23	0.00	0.029
109.00	-4.62	-0.47	0.00	-15.77	0.00	15.77	1082.95	541.47	1299.29	645.02	2.53	-0.23	0.00	0.029
111.00	-4.50	-0.47	0.00	-14.83	0.00	14.83	1078.13	539.07	1281.99	636.43	2.63	-0.24	0.00	0.027
114.00	-4.33	-0.47	0.00	-13.43	0.00	13.43	1070.76	535.38	1256.05	623.55	2.78	-0.24	0.00	0.026
117.00	-2.62	-0.45	0.00	-12.04	0.00	12.04	1063.19	531.60	1230.12	610.68	2.94	-0.25	0.00	0.022
120.00	-2.46	-0.45	0.00	-10.69	0.00	10.69	1055.43	527.72	1204.21	597.82	3.09	-0.26	0.00	0.020
123.00	-2.30	-0.44	0.00	-9.35	0.00	9.35	1047.48	523.74	1178.34	584.98	3.26	-0.26	0.00	0.018

## Calculated Forces

<b>Structure:</b> CT13063-A-SBA	<b>Code:</b> EIA/TIA-222-G	10/12/2017
<b>Site Name:</b> Middle Turnpike	<b>Exposure:</b> B	
<b>Height:</b> 149.00 (ft)	<b>Crest Height:</b> 0.00	
<b>Base Elev:</b> 0.000 (ft)	<b>Site Class:</b> D - Stiff Soil	
<b>Gh:</b> 1.1	<b>Topography:</b> 1	<b>Struct Class:</b> II



Page: 36

126.00	-2.15	-0.43	0.00	-8.03	0.00	8.03	1039.33	519.67	1152.51	572.15	3.42	-0.27	0.016
129.00	-1.99	-0.42	0.00	-6.74	0.00	6.74	1031.00	515.50	1126.73	559.36	3.59	-0.27	0.014
132.00	-1.84	-0.41	0.00	-5.48	0.00	5.48	1022.47	511.23	1101.01	546.59	3.76	-0.27	0.012
135.00	-1.69	-0.39	0.00	-4.26	0.00	4.26	1013.75	506.87	1075.36	533.85	3.94	-0.28	0.010
138.00	-1.54	-0.37	0.00	-3.10	0.00	3.10	1004.83	502.42	1049.79	521.16	4.11	-0.28	0.007
141.00	-1.39	-0.34	0.00	-2.00	0.00	2.00	995.73	497.86	1024.31	508.51	4.29	-0.28	0.005
144.00	-1.25	-0.31	0.00	-0.98	0.00	0.98	986.43	493.22	998.92	495.91	4.46	-0.28	0.003
147.00	-0.09	-0.02	0.00	-0.05	0.00	0.05	976.94	488.47	973.65	483.36	4.64	-0.28	0.000
149.00	0.00	-0.02	0.00	0.00	0.00	0.00	970.51	485.25	956.86	475.02	4.76	-0.28	0.000

## Wind Loading - Shaft

**Structure:** CT13063-A-SBA  
**Site Name:** Middle Turnpike  
**Height:** 149.00 (ft)  
**Base Elev:** 0.000 (ft)  
**Gh:** 1.1

**Topography:** 1

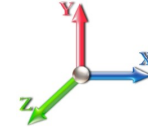
**Code:** EIA/TIA-222-G 10/12/2017  
**Exposure:** B  
**Crest Height:** 0.00  
**Site Class:** D - Stiff Soil  
**Struct Class:** II

Page: 37



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

**Dead Load Factor** 1.00  
**Wind Load Factor** 1.00



**Iterations** 26

Elev (ft)	Description	Kzt	Kz	qz (psf)	qzGh (psf)	C (mph-ft)	Cf	Ice Thick (in)	Tributary (ft)	Aa (sf)	CfAa (sf)	Wind Force X (lb)	Dead Load Ice (lb)	Tot Dead Load (lb)
0.00		1.00	0.70	6.129	6.74	180.63	0.750	0.000	0.00	0.000	0.00	0.0	0.0	0.0
3.00		1.00	0.70	6.129	6.74	178.99	0.750	0.000	3.00	10.746	8.06	54.3	0.0	510.2
6.00		1.00	0.70	6.129	6.74	177.34	0.750	0.000	3.00	10.648	7.99	53.8	0.0	505.5
9.00		1.00	0.70	6.129	6.74	175.70	0.750	0.000	3.00	10.549	7.91	53.3	0.0	500.8
12.00		1.00	0.70	6.129	6.74	174.06	0.750	0.000	3.00	10.451	7.84	52.8	0.0	496.1
15.00		1.00	0.70	6.129	6.74	172.41	0.750	0.000	3.00	10.353	7.76	52.3	0.0	491.4
18.00		1.00	0.70	6.129	6.74	170.77	0.750	0.000	3.00	10.254	7.69	51.8	0.0	486.7
21.00		1.00	0.70	6.129	6.74	169.12	0.750	0.000	3.00	10.156	7.62	51.4	0.0	482.0
24.00		1.00	0.70	6.129	6.74	167.48	0.750	0.000	3.00	10.058	7.54	50.9	0.0	477.3
27.00		1.00	0.70	6.129	6.74	165.83	0.750	0.000	3.00	9.960	7.47	50.4	0.0	472.6
30.00		1.00	0.70	6.134	6.75	164.26	0.750	0.000	3.00	9.861	7.40	49.9	0.0	467.9
33.00		1.00	0.72	6.303	6.93	164.84	0.750	0.000	3.00	9.763	7.32	50.8	0.0	463.1
36.00		1.00	0.74	6.462	7.11	165.21	0.750	0.000	3.00	9.665	7.25	51.5	0.0	458.4
39.00		1.00	0.76	6.611	7.27	165.41	0.750	0.000	3.00	9.566	7.17	52.2	0.0	453.7
42.00		1.00	0.77	6.753	7.43	165.44	0.750	0.000	3.00	9.468	7.10	52.7	0.0	449.0
45.00		1.00	0.79	6.887	7.58	165.34	0.750	0.000	3.00	9.370	7.03	53.2	0.0	444.3
48.00		1.00	0.80	7.015	7.72	165.11	0.750	0.000	3.00	9.272	6.95	53.7	0.0	439.6
48.50	Bot - Section 2	1.00	0.80	7.036	7.74	165.06	0.750	0.000	0.50	1.536	1.15	8.9	0.0	72.8
51.00		1.00	0.82	7.138	7.85	164.77	0.750	0.000	2.50	7.744	5.81	45.6	0.0	607.7
53.25	Top - Section 1	1.00	0.83	7.227	7.95	164.45	0.750	0.000	2.25	6.911	5.18	41.2	0.0	542.3
54.00		1.00	0.83	7.255	7.98	166.65	0.750	0.000	0.75	2.291	1.72	13.7	0.0	72.7
57.00		1.00	0.84	7.368	8.11	166.14	0.750	0.000	3.00	9.104	6.83	55.3	0.0	288.7
60.00		1.00	0.85	7.477	8.22	165.55	0.750	0.000	3.00	9.006	6.75	55.6	0.0	285.6
63.00		1.00	0.87	7.582	8.34	164.87	0.750	0.000	3.00	8.908	6.68	55.7	0.0	282.5
66.00		1.00	0.88	7.684	8.45	164.13	0.750	0.000	3.00	8.809	6.61	55.8	0.0	279.3
69.00		1.00	0.89	7.782	8.56	163.33	0.750	0.000	3.00	8.711	6.53	55.9	0.0	276.2
72.00		1.00	0.90	7.877	8.66	162.46	0.750	0.000	3.00	8.613	6.46	56.0	0.0	273.0
75.00		1.00	0.91	7.969	8.77	161.53	0.750	0.000	3.00	8.515	6.39	56.0	0.0	269.9
78.00		1.00	0.92	8.059	8.87	160.55	0.750	0.000	3.00	8.416	6.31	56.0	0.0	266.8
81.00		1.00	0.93	8.147	8.96	159.53	0.750	0.000	3.00	8.318	6.24	55.9	0.0	263.6
84.00		1.00	0.94	8.232	9.05	158.45	0.750	0.000	3.00	8.220	6.16	55.8	0.0	260.5
87.00		1.00	0.95	8.315	9.15	157.33	0.750	0.000	3.00	8.121	6.09	55.7	0.0	257.4
90.00		1.00	0.96	8.396	9.24	156.17	0.750	0.000	3.00	8.023	6.02	55.6	0.0	254.2
93.00		1.00	0.97	8.475	9.32	154.97	0.750	0.000	3.00	7.925	5.94	55.4	0.0	251.1
96.00		1.00	0.98	8.552	9.41	153.73	0.750	0.000	3.00	7.827	5.87	55.2	0.0	247.9
98.00	Bot - Section 3	1.00	0.98	8.602	9.46	152.89	0.750	0.000	2.00	5.163	3.87	36.6	0.0	163.5
99.00		1.00	0.99	8.627	9.49	152.46	0.750	0.000	1.00	2.597	1.95	18.5	0.0	143.1
102.00	Top - Section 2	1.00	0.99	8.701	9.57	151.15	0.750	0.000	3.00	7.726	5.79	55.5	0.0	425.6
105.00		1.00	1.00	8.774	9.65	151.72	0.750	0.000	3.00	7.627	5.72	55.2	0.0	181.6
108.00		1.00	1.01	8.845	9.73	150.36	0.750	0.000	3.00	7.529	5.65	54.9	0.0	179.2
109.00	Top - Section 3	1.00	1.01	8.868	9.75	149.90	0.750	0.000	1.00	2.488	1.87	18.2	0.0	59.2
111.00		1.00	1.02	8.914	9.81	148.97	0.750	0.000	2.00	4.943	3.71	36.4	0.0	117.6
114.00		1.00	1.03	8.982	9.88	147.54	0.750	0.000	3.00	7.332	5.50	54.3	0.0	174.5
117.00	Appurtenance(s)	1.00	1.03	9.049	9.95	146.09	0.750	0.000	3.00	7.234	5.43	54.0	0.0	172.1
120.00		1.00	1.04	9.115	10.03	144.62	0.750	0.000	3.00	7.136	5.35	53.7	0.0	169.8
123.00		1.00	1.05	9.179	10.10	143.12	0.750	0.000	3.00	7.038	5.28	53.3	0.0	167.4
126.00		1.00	1.06	9.243	10.17	141.59	0.750	0.000	3.00	6.939	5.20	52.9	0.0	165.1



## Wind Loading - Shaft

<b>Structure:</b> CT13063-A-SBA	<b>Code:</b> EIA/TIA-222-G	10/12/2017
<b>Site Name:</b> Middle Turnpike	<b>Exposure:</b> B	
<b>Height:</b> 149.00 (ft)	<b>Crest Height:</b> 0.00	
<b>Base Elev:</b> 0.000 (ft)	<b>Site Class:</b> D - Stiff Soil	
<b>Gh:</b> 1.1	<b>Topography:</b> 1	<b>Struct Class:</b> II



Page: 38

129.00	1.00	1.06	9.305	10.24	140.04	0.750	0.000	3.00	6.841	5.13	52.5	0.0	162.7
132.00	1.00	1.07	9.366	10.30	138.47	0.750	0.000	3.00	6.743	5.06	52.1	0.0	160.4
135.00	1.00	1.08	9.427	10.37	136.87	0.750	0.000	3.00	6.645	4.98	51.7	0.0	158.0
138.00	1.00	1.08	9.486	10.43	135.26	0.750	0.000	3.00	6.546	4.91	51.2	0.0	155.7
141.00	1.00	1.09	9.545	10.50	133.62	0.750	0.000	3.00	6.448	4.84	50.8	0.0	153.3
144.00	1.00	1.10	9.602	10.56	131.97	0.750	0.000	3.00	6.350	4.76	50.3	0.0	151.0
147.00 Appurtenance(s)	1.00	1.10	9.659	10.62	130.29	0.750	0.000	3.00	6.251	4.69	49.8	0.0	148.6
149.00	1.00	1.11	9.696	10.67	129.16	0.750	0.000	2.00	4.113	3.08	32.9	0.0	97.8
<b>Totals:</b>								<b>149.00</b>		<b>2,659.3</b>		<b>15,957.1</b>	

## Discrete Appurtenance Forces

<b>Structure:</b> CT13063-A-SBA	<b>Code:</b> EIA/TIA-222-G	10/12/2017
<b>Site Name:</b> Middle Turnpike	<b>Exposure:</b> B	
<b>Height:</b> 149.00 (ft)	<b>Crest Height:</b> 0.00	
<b>Base Elev:</b> 0.000 (ft)	<b>Site Class:</b> D - Stiff Soil	
<b>Gh:</b> 1.1	<b>Topography:</b> 1	<b>Struct Class:</b> II



Page: 39

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

**Dead Load Factor** 1.00  
**Wind Load Factor** 1.00



**Iterations** 26

No.	Elev (ft)	Description	Qty	qz (psf)	qzGh (psf)	CaAa x Ka	Ka	Total CaAa (sf)	Dead Load (lb)	Horiz Ecc (ft)	Vert Ecc (ft)	Wind FX (lb)	Mom Y (lb-ft)	Mom Z (lb-ft)
1	147.00	AIR 21 B2A/B4P	3	9.659	10.625	0.74	0.80	13.90	351.00	0.000	0.000	147.64	0.00	0.00
2	147.00	KRY 112 144/1	3	9.659	10.625	0.40	0.80	0.49	33.00	0.000	0.000	5.23	0.00	0.00
3	147.00	T-Arms (Site Pro P/N	3	9.659	10.625	0.62	0.75	4.97	750.00	0.000	0.000	52.85	0.00	0.00
4	117.00	Flush Mount	3	9.049	9.954	1.00	1.00	15.00	600.00	0.000	0.000	149.31	0.00	0.00
5	117.00	ETCR-654L12H6	3	9.049	9.954	0.57	0.80	26.77	297.00	0.000	0.000	266.47	0.00	0.00
6	117.00	ALU 1900 Mhz RRUs	3	9.049	9.954	0.54	0.80	4.45	180.00	0.000	0.000	44.34	0.00	0.00
7	117.00	ALU 800 Mhz RRUs	6	9.049	9.954	0.54	0.80	8.01	318.00	0.000	0.000	79.71	0.00	0.00
8	117.00	ALU TD-RRH8x20-25	3	9.049	9.954	0.54	0.80	6.51	210.00	0.000	0.000	64.82	0.00	0.00
9	117.00	VHLP2.5-11	2	9.049	9.954	1.00	1.00	16.84	96.00	0.000	0.000	167.63	0.00	0.00
<b>Totals:</b>									<b>2,835.00</b>			<b>977.99</b>		

## Total Applied Force Summary

<b>Structure:</b> CT13063-A-SBA	<b>Code:</b> EIA/TIA-222-G	10/12/2017
<b>Site Name:</b> Middle Turnpike	<b>Exposure:</b> B	
<b>Height:</b> 149.00 (ft)	<b>Crest Height:</b> 0.00	
<b>Base Elev:</b> 0.000 (ft)	<b>Site Class:</b> D - Stiff Soil	
<b>Gh:</b> 1.1	<b>Topography:</b> 1	<b>Struct Class:</b> II

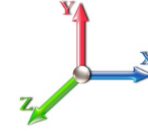


Page: 40

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

**Dead Load Factor** 1.00

**Wind Load Factor** 1.00



**Iterations** 26

Elev (ft)	Description	Lateral FX (-) (lb)	Axial FY (-) (lb)	Torsion MY (lb-ft)	Moment MZ (lb-ft)
0.00		0.00	0.00	0.00	0.00
3.00		54.33	528.47	0.00	0.00
6.00		53.84	523.76	0.00	0.00
9.00		53.34	519.06	0.00	0.00
12.00		52.84	514.35	0.00	0.00
15.00		52.34	509.64	0.00	0.00
18.00		51.85	504.93	0.00	0.00
21.00		51.35	500.22	0.00	0.00
24.00		50.85	495.51	0.00	0.00
27.00		50.36	490.81	0.00	0.00
30.00		49.90	486.10	0.00	0.00
33.00		50.77	481.39	0.00	0.00
36.00		51.52	476.68	0.00	0.00
39.00		52.18	471.97	0.00	0.00
42.00		52.75	467.26	0.00	0.00
45.00		53.24	462.55	0.00	0.00
48.00		53.66	457.85	0.00	0.00
48.50		8.91	75.85	0.00	0.00
51.00		45.60	622.92	0.00	0.00
53.25		41.20	555.97	0.00	0.00
54.00		13.72	77.24	0.00	0.00
57.00		55.34	306.98	0.00	0.00
60.00		55.55	303.84	0.00	0.00
63.00		55.72	300.70	0.00	0.00
66.00		55.84	297.57	0.00	0.00
69.00		55.93	294.43	0.00	0.00
72.00		55.97	291.29	0.00	0.00
75.00		55.98	288.15	0.00	0.00
78.00		55.96	285.01	0.00	0.00
81.00		55.90	281.87	0.00	0.00
84.00		55.82	278.73	0.00	0.00
87.00		55.71	275.59	0.00	0.00
90.00		55.57	272.45	0.00	0.00
93.00		55.41	269.32	0.00	0.00
96.00		55.22	266.18	0.00	0.00
98.00		36.64	175.71	0.00	0.00
99.00		18.48	149.16	0.00	0.00
102.00		55.46	443.81	0.00	0.00
105.00		55.21	199.80	0.00	0.00
108.00		54.94	197.45	0.00	0.00
109.00		18.20	65.29	0.00	0.00
111.00		36.35	129.80	0.00	0.00
114.00		54.34	192.74	0.00	0.00
117.00	(20) attachments	826.28	1891.38	0.00	0.00
120.00		53.66	179.15	0.00	0.00
123.00		53.30	176.80	0.00	0.00
126.00		52.91	174.44	0.00	0.00

## Total Applied Force Summary

<b>Structure:</b> CT13063-A-SBA	<b>Code:</b> EIA/TIA-222-G	10/12/2017	
<b>Site Name:</b> Middle Turnpike	<b>Exposure:</b> B		
<b>Height:</b> 149.00 (ft)	<b>Crest Height:</b> 0.00		
<b>Base Elev:</b> 0.000 (ft)	<b>Site Class:</b> D - Stiff Soil		
<b>Gh:</b> 1.1	<b>Topography:</b> 1	<b>Struct Class:</b> II	Page: 41



129.00	52.52	172.09	0.00	0.00
132.00	52.10	169.73	0.00	0.00
135.00	51.67	167.38	0.00	0.00
138.00	51.23	165.02	0.00	0.00
141.00	50.77	162.67	0.00	0.00
144.00	50.30	160.32	0.00	0.00
147.00	(9) attachments 255.53	1291.96	0.00	0.00
149.00	32.90	97.76	0.00	0.00
<b>Totals:</b>	<b>3,637.28</b>	<b>19,597.10</b>	<b>0.00</b>	<b>0.00</b>

## Calculated Forces

**Structure:** CT13063-A-SBA  
**Site Name:** Middle Turnpike  
**Height:** 149.00 (ft)  
**Base Elev:** 0.000 (ft)  
**Gh:** 1.1

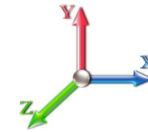
**Code:** EIA/TIA-222-G  
**Exposure:** B  
**Crest Height:** 0.00  
**Site Class:** D - Stiff Soil  
**Struct Class:** II

10/12/2017  
 Page: 42



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

**Dead Load Factor** 1.00  
**Wind Load Factor** 1.00



**Iterations** 26

Seg Elev (ft)	Pu FY (-) (kips)	Vu FX (-) (kips)	Tu MY (-) (ft-kips)	Mu MZ (ft-kips)	Mu MX (ft-kips)	Resultant Moment (ft-kips)	phi Pn (kips)	phi Vn (kips)	phi Tn (ft-kips)	phi Mn (ft-kips)	Total Deflect (in)	Rotation Sway (deg)	Rotation Twist (deg)	Stress Ratio
0.00	-19.60	-3.64	0.00	-331.21	0.00	331.21	3568.03	1784.01	6174.83	3065.44	0.00	0.000	0.000	0.114
3.00	-19.07	-3.59	0.00	-320.29	0.00	320.29	3545.62	1772.81	6079.18	3017.96	0.01	-0.025	0.000	0.112
6.00	-18.54	-3.55	0.00	-309.51	0.00	309.51	3523.01	1761.51	5983.92	2970.67	0.03	-0.050	0.000	0.109
9.00	-18.02	-3.50	0.00	-298.87	0.00	298.87	3500.21	1750.11	5889.06	2923.58	0.07	-0.074	0.000	0.107
12.00	-17.50	-3.46	0.00	-288.36	0.00	288.36	3477.22	1738.61	5794.62	2876.69	0.13	-0.099	0.000	0.105
15.00	-16.99	-3.41	0.00	-278.00	0.00	278.00	3454.04	1727.02	5700.59	2830.02	0.19	-0.123	0.000	0.103
18.00	-16.49	-3.36	0.00	-267.77	0.00	267.77	3430.67	1715.33	5607.00	2783.55	0.28	-0.147	0.000	0.101
21.00	-15.99	-3.32	0.00	-257.68	0.00	257.68	3407.10	1703.55	5513.84	2737.30	0.38	-0.171	0.000	0.099
24.00	-15.49	-3.27	0.00	-247.73	0.00	247.73	3383.34	1691.67	5421.14	2691.28	0.49	-0.194	0.000	0.097
27.00	-15.00	-3.22	0.00	-237.92	0.00	237.92	3359.39	1679.70	5328.89	2645.48	0.62	-0.217	0.000	0.094
30.00	-14.51	-3.18	0.00	-228.25	0.00	228.25	3335.25	1667.63	5237.10	2599.92	0.77	-0.240	0.000	0.092
33.00	-14.03	-3.13	0.00	-218.71	0.00	218.71	3310.92	1655.46	5145.79	2554.59	0.93	-0.263	0.000	0.090
36.00	-13.55	-3.08	0.00	-209.32	0.00	209.32	3286.39	1643.20	5054.97	2509.50	1.10	-0.286	0.000	0.088
39.00	-13.08	-3.03	0.00	-200.07	0.00	200.07	3261.67	1630.84	4964.64	2464.66	1.29	-0.308	0.000	0.085
42.00	-12.61	-2.98	0.00	-190.97	0.00	190.97	3236.76	1618.38	4874.82	2420.07	1.49	-0.330	0.000	0.083
45.00	-12.15	-2.93	0.00	-182.03	0.00	182.03	3211.66	1605.83	4785.51	2375.73	1.70	-0.351	0.000	0.080
48.00	-11.69	-2.88	0.00	-173.23	0.00	173.23	3182.27	1591.13	4690.68	2328.65	1.93	-0.372	0.000	0.078
48.50	-11.61	-2.87	0.00	-171.79	0.00	171.79	3176.56	1588.28	4673.77	2320.26	1.97	-0.376	0.000	0.078
51.00	-10.99	-2.82	0.00	-164.62	0.00	164.62	3148.00	1574.00	4589.69	2278.51	2.17	-0.393	0.000	0.076
53.25	-10.43	-2.78	0.00	-158.27	0.00	158.27	1846.69	923.35	2727.65	1354.12	2.36	-0.409	0.000	0.123
54.00	-10.35	-2.77	0.00	-156.18	0.00	156.18	1843.93	921.97	2716.18	1348.43	2.42	-0.414	0.000	0.121
57.00	-10.05	-2.72	0.00	-147.88	0.00	147.88	1832.78	916.39	2670.37	1325.68	2.69	-0.442	0.000	0.117
60.00	-9.74	-2.66	0.00	-139.73	0.00	139.73	1821.44	910.72	2624.63	1302.98	2.98	-0.470	0.000	0.113
63.00	-9.44	-2.61	0.00	-131.74	0.00	131.74	1809.91	904.95	2578.98	1280.32	3.28	-0.497	0.000	0.108
66.00	-9.14	-2.55	0.00	-123.92	0.00	123.92	1798.18	899.09	2533.44	1257.70	3.60	-0.523	0.000	0.104
69.00	-8.85	-2.50	0.00	-116.25	0.00	116.25	1786.27	893.13	2488.00	1235.15	3.94	-0.549	0.000	0.099
72.00	-8.56	-2.44	0.00	-108.76	0.00	108.76	1774.16	887.08	2442.68	1212.65	4.29	-0.574	0.000	0.095
75.00	-8.27	-2.39	0.00	-101.42	0.00	101.42	1761.85	880.93	2397.48	1190.21	4.66	-0.598	0.000	0.090
78.00	-7.98	-2.33	0.00	-94.26	0.00	94.26	1749.36	874.68	2352.43	1167.84	5.05	-0.621	0.000	0.085
81.00	-7.70	-2.28	0.00	-87.26	0.00	87.26	1736.67	868.34	2307.51	1145.55	5.44	-0.643	0.000	0.081
84.00	-7.42	-2.22	0.00	-80.42	0.00	80.42	1723.80	861.90	2262.76	1123.33	5.85	-0.665	0.000	0.076
87.00	-7.14	-2.16	0.00	-73.76	0.00	73.76	1710.73	855.36	2218.16	1101.19	6.28	-0.685	0.000	0.071
90.00	-6.87	-2.11	0.00	-67.27	0.00	67.27	1697.46	848.73	2173.74	1079.14	6.72	-0.704	0.000	0.066
93.00	-6.60	-2.05	0.00	-60.95	0.00	60.95	1684.01	842.00	2129.51	1057.18	7.16	-0.722	0.000	0.062
96.00	-6.34	-1.99	0.00	-54.79	0.00	54.79	1670.36	835.18	2085.46	1035.31	7.62	-0.739	0.000	0.057
98.00	-6.16	-1.96	0.00	-50.80	0.00	50.80	1661.16	830.58	2056.21	1020.79	7.94	-0.750	0.000	0.053
99.00	-6.01	-1.94	0.00	-48.85	0.00	48.85	1656.52	828.26	2041.62	1013.55	8.09	-0.755	0.000	0.052
102.00	-5.57	-1.88	0.00	-43.04	0.00	43.04	1099.11	549.56	1359.81	675.07	8.57	-0.770	0.000	0.069
105.00	-5.37	-1.82	0.00	-37.41	0.00	37.41	1092.31	546.16	1333.88	662.20	9.06	-0.783	0.000	0.061
108.00	-5.17	-1.76	0.00	-31.95	0.00	31.95	1085.32	542.66	1307.94	649.32	9.56	-0.798	0.000	0.054
109.00	-5.11	-1.75	0.00	-30.18	0.00	30.18	1082.95	541.47	1299.29	645.02	9.73	-0.803	0.000	0.052
109.00	-5.11	-1.75	0.00	-30.18	0.00	30.18	1082.95	541.47	1299.29	645.02	9.73	-0.803	0.000	0.052
111.00	-4.98	-1.71	0.00	-26.69	0.00	26.69	1078.13	539.07	1281.99	636.43	10.06	-0.812	0.000	0.047
114.00	-4.79	-1.65	0.00	-21.57	0.00	21.57	1070.76	535.38	1256.05	623.55	10.58	-0.823	0.000	0.039
117.00	-2.91	-0.80	0.00	-16.62	0.00	16.62	1063.19	531.60	1230.12	610.68	11.10	-0.833	0.000	0.030
120.00	-2.73	-0.74	0.00	-14.22	0.00	14.22	1055.43	527.72	1204.21	597.82	11.63	-0.841	0.000	0.026
123.00	-2.55	-0.69	0.00	-11.99	0.00	11.99	1047.48	523.74	1178.34	584.98	12.16	-0.848	0.000	0.023
126.00	-2.38	-0.63	0.00	-9.93	0.00	9.93	1039.33	519.67	1152.51	572.15	12.69	-0.854	0.000	0.020

## Calculated Forces

<b>Structure:</b> CT13063-A-SBA	<b>Code:</b> EIA/TIA-222-G	10/12/2017
<b>Site Name:</b> Middle Turnpike	<b>Exposure:</b> B	
<b>Height:</b> 149.00 (ft)	<b>Crest Height:</b> 0.00	
<b>Base Elev:</b> 0.000 (ft)	<b>Site Class:</b> D - Stiff Soil	
<b>Gh:</b> 1.1	<b>Topography:</b> 1	<b>Page:</b> 43
	<b>Struct Class:</b> II	



129.00	-2.21	-0.58	0.00	-8.03	0.00	8.03	1031.00	515.50	1126.73	559.36	13.23	-0.859	0.000	0.017
132.00	-2.04	-0.52	0.00	-6.30	0.00	6.30	1022.47	511.23	1101.01	546.59	13.77	-0.863	0.000	0.014
135.00	-1.87	-0.47	0.00	-4.73	0.00	4.73	1013.75	506.87	1075.36	533.85	14.31	-0.867	0.000	0.011
138.00	-1.71	-0.42	0.00	-3.33	0.00	3.33	1004.83	502.42	1049.79	521.16	14.86	-0.870	0.000	0.008
141.00	-1.54	-0.36	0.00	-2.08	0.00	2.08	995.73	497.86	1024.31	508.51	15.41	-0.872	0.000	0.006
144.00	-1.39	-0.31	0.00	-1.00	0.00	1.00	986.43	493.22	998.92	495.91	15.95	-0.873	0.000	0.003
147.00	-0.10	-0.03	0.00	-0.07	0.00	0.07	976.94	488.47	973.65	483.36	16.50	-0.873	0.000	0.000
149.00	0.00	-0.03	0.00	0.00	0.00	0.00	970.51	485.25	956.86	475.02	16.87	-0.873	0.000	0.000

## Final Analysis Summary

<b>Structure:</b> CT13063-A-SBA	<b>Code:</b> EIA/TIA-222-G	10/12/2017
<b>Site Name:</b> Middle Turnpike	<b>Exposure:</b> B	
<b>Height:</b> 149.00 (ft)	<b>Crest Height:</b> 0.00	
<b>Base Elev:</b> 0.000 (ft)	<b>Site Class:</b> D - Stiff Soil	
<b>Gh:</b> 1.1	<b>Topography:</b> 1	<b>Struct Class:</b> II



Page: 44

### Reactions

Load Case	Shear FX (kips)	Shear FZ (kips)	Axial FY (kips)	Moment MX (ft-kips)	Moment MY (ft-kips)	Moment MZ (ft-kips)
1.2D + 1.6W 97 mph Wind	15.2	0.00	23.50	0.00	0.00	1392.68
0.9D + 1.6W 97 mph Wind	15.2	0.00	17.62	0.00	0.00	1381.08
1.2D + 1.0Di + 1.0Wi 50 mph Wind	4.3	0.00	42.06	0.00	0.00	405.54
1.2D + 1.0E	0.8	0.00	23.52	0.00	0.00	78.38
0.9D + 1.0E	0.8	0.00	17.64	0.00	0.00	77.65
1.0D + 1.0W 60 mph Wind	3.6	0.00	19.60	0.00	0.00	331.21

### Max Stresses

Load Case	Pu FY (-) (kips)	Vu FX (-) (kips)	Tu MY (-) (ft-kips)	Mu MZ (ft-kips)	Mu MX (ft-kips)	Resultant Moment (ft-kips)	phi Pn (kips)	phi Vn (kips)	phi Tn (ft-kips)	phi Mn (ft-kips)	Elev (ft)	Stress Ratio
1.2D + 1.6W 97 mph Wind	-12.19	-11.69	0.00	-666.88	0.00	-666.88	1846.69	923.35	2727.65	1354.12	53.25	0.499
0.9D + 1.6W 97 mph Wind	-9.06	-11.59	0.00	-658.82	0.00	-658.82	1846.69	923.35	2727.65	1354.12	53.25	0.492
1.2D + 1.0Di + 1.0Wi 50 mph Wind	-25.79	-3.41	0.00	-196.45	0.00	-196.45	1846.69	923.35	2727.65	1354.12	53.25	0.159
1.2D + 1.0E	-12.54	-0.52	0.00	-42.77	0.00	-42.77	1846.69	923.35	2727.65	1354.12	53.25	0.038
0.9D + 1.0E	-9.41	-0.51	0.00	-42.24	0.00	-42.24	1846.69	923.35	2727.65	1354.12	53.25	0.036
1.0D + 1.0W 60 mph Wind	-10.43	-2.78	0.00	-158.27	0.00	-158.27	1846.69	923.35	2727.65	1354.12	53.25	0.123





# Monopole Mat Foundation Design

Date  
10/12/2017

<b>Customer Name:</b>	Sprint Nextel	<b>EIA/TIA Standard:</b>	EIA-222-G
<b>Site Name:</b>		<b>Structure Height (Ft.):</b>	149
<b>Site Number:</b>	CT13063-A-SBA	<b>Engineer Name:</b>	H. You
<b>Engr. Number:</b>	41658	<b>Engineer Login ID:</b>	

**Foundation Info Obtained from:**

Drawings/Calculations
Monopole
Analysis

**Structure Type:**

**Analysis or Design?**

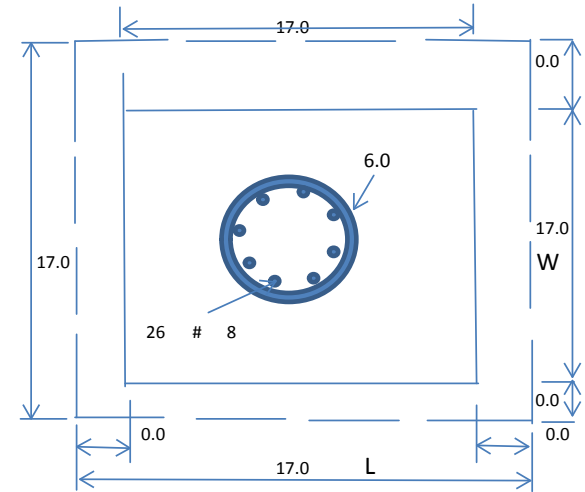
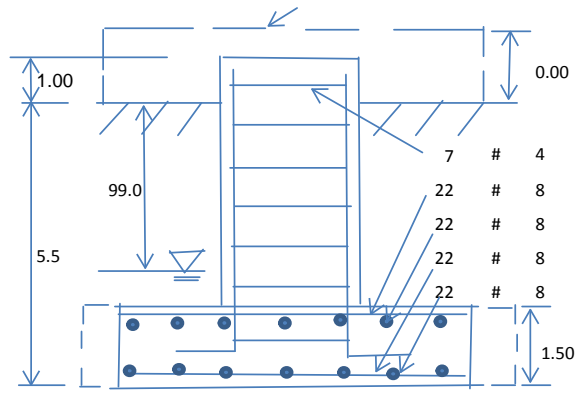
**Base Reactions (Factored):**

Axial Load (Kips):	42.1	Shear Force (Kips):	15.2
Uplift Force (Kips):	0.0	Moment (Kips-ft):	1392.7

Allowable overstress %: 5.0%

**Foundation Geometries:**

	No	Mods required -Yes/No ?:	No
Diameter of Pier (ft.):	6.0	Depth of Base BG (ft.):	5.5
Pier Height A. G. (ft.):	1.00	Thickness of Pad (ft):	1.50
Length of Pad (ft.):	17	Width of Pad (ft.):	17
Final Length of pad (ft)	17.0	Final width of pad (ft):	17.0
Control Value for Cell D18:	0	Control Value for Cell F18:	0



**Material Properties and Rebar Info:**

Concrete Strength (psi):	4000	Steel Elastic Modulus:	29000	ksi
Vertical bar yield (ksi)	60	Tie steel yield (ksi):	60	
Vertical Rebar Size #:	8	Tie / Stirrup Size #:	4	
Qty. of Vertical Rebars:	26	Tie Spacing (in):	12.0	
Pad Rebar Yield (Ksi):	60	Pad Steel Rebar Size (#):	8	
Concrete Cover (in.):	3	Unit Weight of Concrete:	150.0	pcf
Rebar at the bottom of the concrete pad:				
Qty. of Rebar in Pad (L):	22	Qty. of Rebar in Pad (W):	22	
Rebar at the top of the concrete pad:				
Qty. of Rebar in Pad (L):	22	Qty. of Rebar in Pad (W):	22	

Apply 1.35 factor for e/w Per G: 1.35

**Soil Design Parameters:**

Soil Unit Weight (pcf):	120.0	Soil Buoyant Weight:	50.0	Pcf
Water Table B.G.S. (ft):	99.0	Unit Weight of Water:	62.4	pcf
Ultimate Bearing Pressure (psf):	10667	Ultimate Skin Friction:	0	Psf
Consider Friction for O.T.M. (Y/N):	Yes	Consider Friction for bearing (Y/N):	No	
Consider soil hori. force for O.T.M.:	Yes	Reduction factor on the maximum soil bearing pressure:	1.00	
		Angle from Top of Pad:	30	
		Angle from Bottm of Pad:	25	
		Angle from Bottm of Pad:	25	

**Foundation Analysis and Design:**

Uplift Strength Reduction Factor:	0.75	Compression Strength Reduction Factor:	0.75
Total Dry Soil Volume (cu. Ft.):	1042.90	Total Dry Soil Weight (Kips):	125.15
Total Buoyant Soil Volume (cu. Ft.):	0.00	Total Buoyant Soil Weight (Kips):	0.00
Total Effective Soil Weight (Kips):	125.15	Weight from the Concrete Block at Top (K):	0.00
Total Dry Concrete Volume (cu. Ft.):	574.87	Total Dry Concrete Weight (Kips):	86.23
Total Buoyant Concrete Volume (cu. Ft.):	0.00	Total Buoyant Concrete Weight (Kips):	0.00
Total Effective Concrete Weight (Kips):	86.23	Total Vertical Load on Base (Kips):	253.48

**Check Soil Capacities:**

Calculated Maxium Net Soil Pressure under the base (psf):	3472	<	Allowable Factored Soil Bearing (psf):	8000	0.43	OK!
Allowable Foundation Overturning Resistance (kips-ft.):	1974.9	>	Design Factored Momont (kips-ft):	1472	0.75	OK!
Factor of Safety Against Overturning (O. R. Moment/Design Moment):	1.34					OK!

Load/  
Capacity  
Ratio

**Check the capacities of Reinforceing Concrete:**

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

**(1) Concrete Pier:**

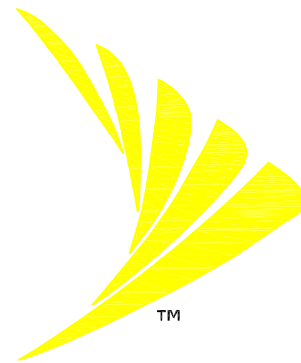
Vertical Steel Rebar Area (sq. in./each):	0.79	Tie / Stirrup Area (sq. in./each):	0.20	
Calculated Moment Capacity (Mn,Kips-Ft):	2994.3	> Design Factored Moment (Mu, Kips-Ft)	1468.7	0.49 OK!
Calculated Shear Capacity (Kips):	501.5	> Design Factored Shear (Kips):	15.2	0.03 OK!
Calculated Tension Capacity (Tn, Kips):	1109.2	> Design Factored Tension (Tu Kips):	0.0	0.00 OK!
Calculated Compression Capacity (Pn, Kips):	7162.1	> Design Factored Axial Load (Pu Kips):	42.1	0.01 OK!
Moment & Axial Strength Combination:	0.49	OK! Check Tie Spacing (Design/Required):	1	OK!
Pier Reinforcement Ratio:	0.005	Reinforcement Ratio is satisfied per ACI		

**(2).Concrete Pad:**

One-Way Design Shear Capacity (L-Direction, Kips):	280.6	> One-Way Factored Shear (L-D. Kips):	129.9	0.46 OK!
One-Way Design Shear Capacity (W-Direction, Kips):	280.6	> One-Way Factored Shear (W-D., Kips)	129.9	0.46 OK!
One-Way Design Shear Capacity (Corner-Corner. Kips):	297.8	> One-Way Factored Shear (C-C, Kips):	197.7	0.66 OK!
Lower Steel Pad Reinforcement Ratio (L-Direct. ):	0.0059	OK! Lower Steel Pad Reinf. Ratio (W-Direc	0.0059	
Lower Steel Pad Moment Capacity (L-Direction. Kips-ft):	1075.3	> Moment at Bottom ( L-Direct. K-Ft):	278.7	0.26 OK!
Lower Steel Pad Moment Capacity (W-Direction. Kips-ft):	1075.3	> Moment at Bottom ( W-Direct. K-Ft):	278.7	0.26 OK!
Lower Steel Pad Moment Capacity (Corner-Corner,K-ft):	1493.0	> Moment at Bottom ( C-C Dir. K-Ft):	394.2	0.26 OK!
Upper Steel Pad Reinforcement Ratio (L-Direct. ):	0.0059	OK! Upper Steel Reinf. Ratio (W-Direct. ):	0.0059	
Upper Steel Pad Moment Capacity (L-Direction. Kips-ft):	1075.3	> Moment at the top (L-Dir Kips-Ft):	78.7	0.07 OK!
Upper Steel Pad Moment Capacity (W-Direction. Kips-ft):	1075.3	> Moment at the top (W-Dir Kips-Ft):	78.7	0.07 OK!
Upper Steel Pad Moment Capacity (Corner-Corner. K-ft):	1493.0	> Moment at the top (C-C Direc. K-Ft):	128.5	0.09 OK!

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

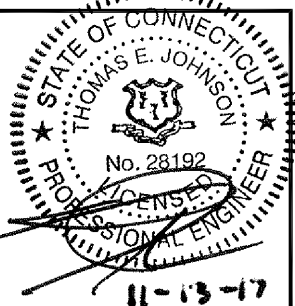
# Sprint®



**SITE NAME:** SBA HILLARD  
**SITE NUMBER:** CT52XC028  
**AUGMENT ID:** CT-HFD0042Q17.1  
**SITE ADDRESS:** 640 HILLIARD STREET  
 MANCHESTER, CT 06040  
**JURISDICTION:** TOWN OF MANCHESTER/ CT SITING  
 COUNCIL  
**SITE TYPE:** EXISTING 149' MONOPOLE  
**PROGRAM:** DO MACRO UPGRADE EQUIPMENT  
 DEPLOYMENT



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



**PROJECT INFORMATION**

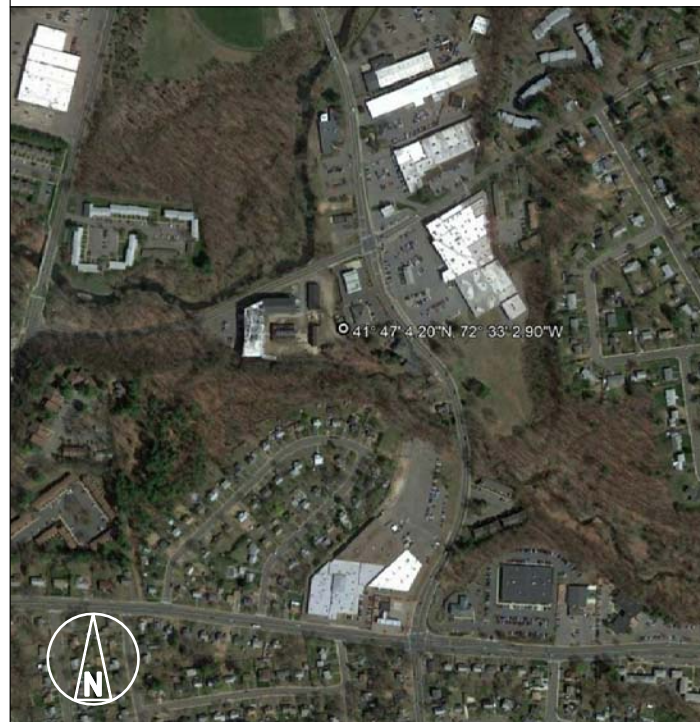
**SITE INFORMATION**  
 LATITUDE: 41° 47' 04.20" N (41.7845°)  
 LONGITUDE: 72° 33' 02.90" W (-72.5508°)  
 GROUND ELEVATION: 100'± AMSL (PER GOOGLE EARTH)  
 STRUCTURE HEIGHT: 149'± AGL (FROM RECORD STRUCTURAL)  
 STRUCTURE TYPE: MONOPOLE  
 ZONING JURISDICTION: TOWN OF MANCHESTER/ CT SITING COUNCIL  
 ZONING DISTRICT/ OCCUPANCY: IND (INDUSTRIAL)  
 COUNTY: HARTFORD

**APPLICANT**  
 SPRINT  
 1 INTERNATIONAL BLVD. SUITE 800  
 MAHWAH, NJ 07495  
**PROPERTY OWNER:**  
 N/F HILLIARD MILLS LLC  
 642 HILLIARD STREET  
 MANCHESTER, CT 06042

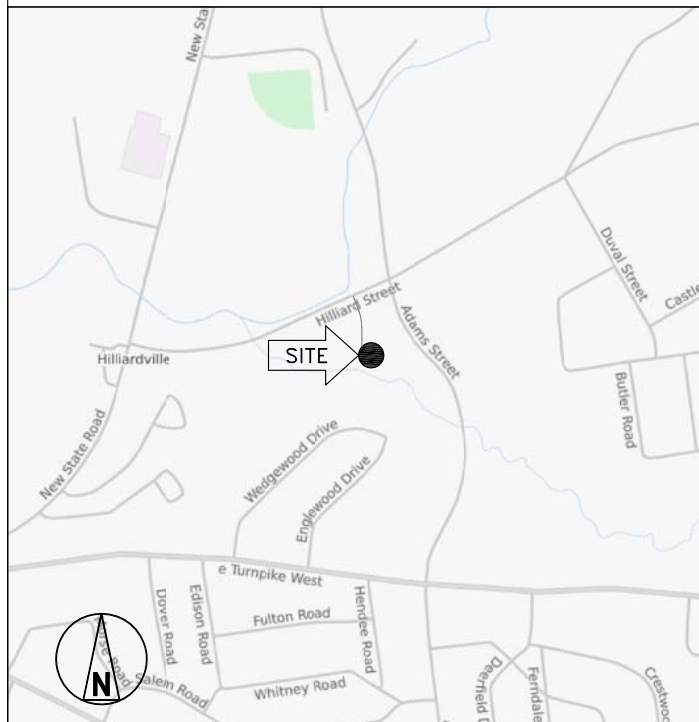
**TOWER OWNER:**  
 SBA INFRASTRUCTURE, LLC  
 8051 CONGRESS AVENUE  
 BOCA RATON, FL 33487  
 (561) 995-7670  
 SBA SITE ID: CT13063-A  
 SBA SITE NAME: MIDDLE TURNPIKE

**SBA CONTACT:**  
 STEPHEN ROTH  
 (860) 539-4920  
 SROth@sbasite.com

**LOCATION MAP N.T.S.**



**AREA MAP N.T.S.**



**DRAWING INDEX**

SHEET NO.	SHEET DESCRIPTION	REV. NO.
T-1	TITLE SHEET	0
SP-1	OUTLINE SPECIFICATIONS	0
SP-2	OUTLINE SPECIFICATIONS	0
SP-3	OUTLINE SPECIFICATIONS	0
A-1	COMPOUND PLAN	0
A-2	ELEVATION AND ANTENNA PLANS	0
A-3	TOWER EQUIPMENT DETAILS	0
S-1	ANTENNA AND RRH MOUNTING DETAILS	0
S-2	GROUND EQUIPMENT DETAILS	0
E-1	ELECTRICAL AND GROUNDING DETAILS	0
RF-1	RF DATA SHEET	0
RF-2	PLUMBING DIAGRAM AND RAN WIRING	0

**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.

**SCOPE OF WORK**

- REMOVE EXISTING SPRINT TOWER TOP JUNCTION BOXES.
- REMOVE EXISTING CABLING AND REPLACE WITH (4) HYBRID CABLES.
- REMOVE (3) EXISTING SPRINT (CLEARWIRE) PANEL ANTENNAS AND REPLACE WITH (3) NEW SPRINT PANEL ANTENNAS.
- INSTALL (6) NEW SPRINT 800 MHz RRHS.
- INSTALL (3) NEW SPRINT 1900 MHz RRHS.
- INSTALL (3) NEW SPRINT 2500 MHz RRHS.
- REMOVE EXISTING SPRINT (CLEARWIRE) EQUIPMENT CABINET AND REPLACE WITH NEW SPRINT EQUIPMENT CABINET WITH CABLING CABINET.
- REMOVE EXISTING SPRINT (CLEARWIRE) GPS ANTENNA AND REPLACE WITH NEW SPRINT GPS ANTENNA.
- INSTALL NEW SPRINT PPC MOUNTED TO A NEW H-FRAME.

**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.

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



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 www.call811.com

CHECKED BY: JMM/TEJ

APPROVED BY: JMM/TEJ

**SUBMITTALS**

REV.	DATE	DESCRIPTION	BY
0	11/13/17	ISSUED FOR CONSTRUCTION	JEB/EN

SITE NUMBER:  
**CT52XC028**  
 SITE NAME:  
**SBA HILLARD**  
 SITE ADDRESS:  
 640 HILLIARD STREET  
 MANCHESTER, CT 06040

SHEET TITLE  
 TITLE SHEET

SHEET NUMBER  
 T-1



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

**SECTION 01 100 - SCOPE OF WORK**

**PART 1 – GENERAL**

- 1.1 **THE WORK:** THESE STANDARD CONSTRUCTION SPECIFICATIONS IN CONJUNCTION WITH THE SPRINT CONSTRUCTION STANDARDS FOR WIRELESS SITES, CONTRACT DOCUMENTS AND THE CONSTRUCTION DRAWINGS DESCRIBE THE WORK TO BE PERFORMED BY THE CONTRACTOR.
- 1.2 **RELATED DOCUMENTS:**
- A. THE REQUIREMENTS OF THIS SECTION APPLY TO ALL SECTIONS IN THIS SPECIFICATION.
  - B. SPRINT "STANDARD CONSTRUCTION DETAILS FOR WIRELESS SITES" ARE INCLUDED IN AND MADE A PART OF THESE SPECIFICATIONS HEREWITH.
- 1.3 **PRECEDENCE:** SHOULD CONFLICTS OCCUR BETWEEN THE STANDARD CONSTRUCTION SPECIFICATIONS FOR WIRELESS SITES INCLUDING THE STANDARD CONSTRUCTION DETAILS FOR WIRELESS SITES AND THE CONSTRUCTION DRAWINGS, INFORMATION ON THE CONSTRUCTION DRAWINGS SHALL TAKE PRECEDENCE. NOTIFY SPRINT CONSTRUCTION MANAGER IF THIS OCCURS.
- 1.4 **NATIONALLY RECOGNIZED CODES AND STANDARDS:**
- A. THE WORK SHALL COMPLY WITH APPLICABLE NATIONAL AND LOCAL CODES AND STANDARDS, LATEST EDITION, AND PORTIONS THEREOF, INCLUDED BUT NOT LIMITED TO THE FOLLOWING:
    1. GR-78-CORE GENERIC REQUIREMENTS FOR THE PHYSICAL DESIGN AND MANUFACTURE OF TELECOMMUNICATIONS EQUIPMENT.
    2. GR-1089 CORE, ELECTROMAGNETIC COMPATIBILITY AND ELECTRICAL SAFETY -GENERIC CRITERIA FOR NETWORK TELECOMMUNICATIONS EQUIPMENT.
    3. NATIONAL FIRE PROTECTION ASSOCIATION CODES AND STANDARDS (NFPA) INCLUDING NFPA 70 (NATIONAL ELECTRICAL CODE - "NEC") AND NFPA 101 (LIFE SAFETY CODE).
    4. AMERICAN SOCIETY FOR TESTING OF MATERIALS (ASTM)
    5. INSTITUTE OF ELECTRONIC AND ELECTRICAL ENGINEERS (IEEE)
    6. AMERICAN CONCRETE INSTITUTE (ACI)
    7. AMERICAN WIRE PRODUCERS ASSOCIATION (AWPA)
    8. CONCRETE REINFORCING STEEL INSTITUTE (CRSI)
    9. AMERICAN ASSOCIATION OF STATE HIGHWAY AND TRANSPORTATION OFFICIALS (AASHTO)
    10. PORTLAND CEMENT ASSOCIATION (PCA)
    11. NATIONAL CONCRETE MASONRY ASSOCIATION (NCMA)
    12. BRICK INDUSTRY ASSOCIATION (BIA)
    13. AMERICAN WELDING SOCIETY (AWS)
    14. NATIONAL ROOFING CONTRACTORS ASSOCIATION (NRCA)
    15. SHEET METAL AND AIR CONDITIONING CONTRACTORS' NATIONAL ASSOCIATION (SMACNA)
    16. DOOR AND HARDWARE INSTITUTE (DHI)
    17. OCCUPATIONAL SAFETY AND HEALTH ACT (OSHA)
    18. APPLICABLE BUILDING CODES INCLUDING UNIFORM BUILDING CODE, SOUTHERN BUILDING CODE, BOCA, AND THE INTERNATIONAL BUILDING CODE.
- 1.5 **DEFINITIONS:**
- A. WORK: THE SUM OF TASKS AND RESPONSIBILITIES IDENTIFIED IN THE CONTRACT DOCUMENTS.
  - B. COMPANY: SPRINT CORPORATION
  - C. ENGINEER: SYNONYMOUS WITH ARCHITECT & ENGINEER AND "A&E". THE DESIGN PROFESSIONAL HAVING PROFESSIONAL RESPONSIBILITY FOR DESIGN OF THE PROJECT.
  - D. CONTRACTOR: CONSTRUCTION CONTRACTOR; CONSTRUCTION VENDOR; INDIVIDUAL OR ENTITY WHO AFTER EXECUTION OF A CONTRACT IS BOUND TO ACCOMPLISH THE WORK.
  - E. THIRD PARTY VENDOR OR AGENCY: A VENDOR OR AGENCY ENGAGED SEPARATELY BY THE COMPANY, A&E, OR CONTRACTOR TO PROVIDE MATERIALS OR TO ACCOMPLISH SPECIFIC TASKS RELATED TO BUT NOT INCLUDED IN THE WORK.
  - F. OFCI: OWNER FURNISHED, CONTRACTOR INSTALLED EQUIPMENT.
  - G. CONSTRUCTION MANAGER - ALL PROJECTS RELATED COMMUNICATION TO FLOW THROUGH SPRINT REPRESENTATIVE IN CHARGE OF PROJECT...
- 1.6 **SITE FAMILIARITY:** CONTRACTOR SHALL BE RESPONSIBLE FOR FAMILIARIZING HIMSELF WITH ALL CONTRACT DOCUMENTS, FIELD CONDITIONS AND DIMENSIONS PRIOR TO PROCEEDING WITH CONSTRUCTION. ANY DISCREPANCIES SHALL BE BROUGHT TO THE ATTENTION OF THE SPRINT CONSTRUCTION MANAGER PRIOR TO THE COMMENCEMENT OF WORK. NO COMPENSATION WILL BE AWARDED BASED ON CLAIM OF LACK OF KNOWLEDGE OR FIELD CONDITIONS.
- 1.7 **POINT OF CONTACT:** COMMUNICATION BETWEEN SPRINT AND THE CONTRACTOR SHALL FLOW THROUGH THE SINGLE SPRINT CONSTRUCTION MANAGER APPOINTED TO MANAGE THE PROJECT FOR SPRINT.
- 1.8 **ON-SITE SUPERVISION:** THE CONTRACTOR SHALL SUPERVISE AND DIRECT THE WORK AND SHALL BE RESPONSIBLE FOR CONSTRUCTION MEANS, METHODS, TECHNIQUES, SEQUENCES, AND PROCEDURES IN ACCORDANCE WITH THE CONTRACT DOCUMENTS. THE CONTRACTOR SHALL EMPLOY A COMPETENT SUPERINTENDENT WHO SHALL BE IN ATTENDANCE AT THE SITE AT ALL TIMES DURING PERFORMANCE OF THE WORK.
- 1.9 **DRAWINGS, SPECIFICATIONS AND DETAILS REQUIRED AT JOBSITE:** THE CONSTRUCTION CONTRACTOR SHALL MAINTAIN A FULL SET OF THE CONSTRUCTION DRAWINGS, STANDARD CONSTRUCTION DETAILS FOR WIRELESS SITES AND THE STANDARD CONSTRUCTION SPECIFICATIONS FOR WIRELESS SITES AT THE JOBSITE FROM MOBILIZATION THROUGH CONSTRUCTION COMPLETION.
- A. THE JOBSITE DRAWINGS, SPECIFICATIONS AND DETAILS SHALL BE CLEARLY MARKED DAILY IN RED PENCIL WITH ANY CHANGES IN CONSTRUCTION OVER WHAT IS DEPICTED IN THE DOCUMENTS. AT CONSTRUCTION COMPLETION, THIS JOBSITE MARKUP SET SHALL BE DELIVERED TO THE COMPANY OR COMPANY'S DESIGNATED REPRESENTATIVE TO BE FORWARDED TO THE COMPANY'S A&E VENDOR FOR PRODUCTION OF "AS-BUILT" DRAWINGS.
  - B. DETAILS ARE INTENDED TO SHOW DESIGN INTENT. MODIFICATIONS MAY BE REQUIRED TO SUIT JOB DIMENSIONS OR CONDITIONS, AND SUCH MODIFICATIONS SHALL BE INCLUDED AS PART OF THE WORK. CONTRACTOR SHALL NOTIFY SPRINT CONSTRUCTION MANAGER OF ANY VARIATIONS PRIOR TO PROCEEDING WITH THE WORK.
  - C. DIMENSIONS SHOWN ARE TO FINISH SURFACES UNLESS NOTED OTHERWISE. SPACING BETWEEN EQUIPMENT IS THE REQUIRED CLEARANCE. SHOULD THERE BE ANY QUESTIONS REGARDING THE CONTRACT DOCUMENTS, EXISTING CONDITIONS AND/OR DESIGN INTENT, THE CONTRACTOR SHALL BE RESPONSIBLE FOR OBTAINING A CLARIFICATION FROM THE SPRINT CONSTRUCTION MANAGER PRIOR TO PROCEEDING WITH THE WORK.
- 1.10 **USE OF JOB SITE:** THE CONTRACTOR SHALL CONFINE ALL CONSTRUCTION AND RELATED OPERATIONS INCLUDING STAGING AND STORAGE OF MATERIALS AND EQUIPMENT, PARKING, TEMPORARY FACILITIES, AND WASTE STORAGE TO THE LEASE PARCEL UNLESS OTHERWISE PERMITTED BY THE CONTRACT DOCUMENTS.

- 1.11 **UTILITIES SERVICES:** WHERE NECESSARY TO CUT EXISTING PIPES, ELECTRICAL WIRES, CONDUITS, CABLES, ETC., OF UTILITY SERVICES, OR OF FIRE PROTECTION OR COMMUNICATIONS SYSTEMS, THEY SHALL BE CUT AND CAPPED AT SUITABLE PLACES OR WHERE SHOWN. ALL SUCH ACTIONS SHALL BE COORDINATED WITH THE UTILITY COMPANY INVOLVED:
- 1.12 **PERMITS / FEES:** WHEN REQUIRED THAT A PERMIT OR CONNECTION FEE BE PAID TO A PUBLIC UTILITY PROVIDER FOR NEW SERVICE TO THE CONSTRUCTION PROJECT, PAYMENT OF SUCH FEE SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR.
- 1.13 CONTRACTOR SHALL TAKE ALL MEASURES AND PROVIDE ALL MATERIAL NECESSARY FOR PROTECTING EXISTING EQUIPMENT AND PROPERTY.
- 1.14 **METHODS OF PROCEDURE (MOPS) FOR CONSTRUCTION:** CONTRACTOR SHALL PERFORM WORK AS DESCRIBED IN THE FOLLOWING INSTALLATION AND COMMISSIONING MOPS.
- A. TOP HAT
  - B. HOW TO INSTALL A NEW CABINET
  - C. BASE BAND UNIT IN EXISTING UNIT
  - D. INSTALLATION OF BATTERIES
  - E. INSTALLATION OF HYBRID CABLE
  - F. INSTALLATION OF RRH'S
  - G. CABLING
  - H. TS-0200 REV 4 - ANTENNA LINE ACCEPTANCE STANDARDS
  - I. SPRINT CELL SITE ENGINEERING NOTICE - EN 2012-001, REV 1.
  - J. COMMISSIONING MOPS
  - K. SPRINT CELL SITE ENGINEERING NOTICE - EN-2013-002
  - L. SPRINT ENGINEERING LETTER - EL-0504
  - M. SPRINT ENGINEERING LETTER - EL-0568
  - N. SPRINT TECHNICAL SPECIFICATION - TS-0193

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

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

**PART 2 – PRODUCTS (NOT USED)**

**PART 3 – EXECUTION**

- 3.1 **TEMPORARY UTILITIES AND FACILITIES:** THE CONTRACTOR SHALL BE RESPONSIBLE FOR ALL TEMPORARY UTILITIES AND FACILITIES NECESSARY EXCEPT AS OTHERWISE INDICATED IN THE CONSTRUCTION DOCUMENTS. TEMPORARY UTILITIES AND FACILITIES INCLUDE POTABLE WATER, HEAT, HVAC, ELECTRICITY, SANITARY FACILITIES, WASTE DISPOSAL FACILITIES, AND TELEPHONE/COMMUNICATION SERVICES. PROVIDE TEMPORARY UTILITIES AND FACILITIES IN ACCORDANCE WITH OSHA AND THE AUTHORITY HAVING JURISDICTION. CONTRACTOR MAY UTILIZE THE COMPANY ELECTRICAL SERVICE IN THE COMPLETION OF THE WORK WHEN IT BECOMES AVAILABLE. USE OF THE LESSORS OR SITE OWNER'S UTILITIES OR FACILITIES IS EXPRESSLY FORBIDDEN EXCEPT AS OTHERWISE ALLOWED IN THE CONTRACT DOCUMENTS.
- 3.2 **ACCESS TO WORK:** THE CONTRACTOR SHALL PROVIDE ACCESS TO THE JOB SITE FOR AUTHORIZED COMPANY PERSONNEL AND AUTHORIZED REPRESENTATIVES OF THE ARCHITECT/ENGINEER DURING ALL PHASES OF THE WORK.
- 3.3 **TESTING: REQUIREMENTS FOR TESTING BY THIS CONTRACTOR SHALL BE AS INDICATED HEREWITH, ON THE CONSTRUCTION DRAWINGS, AND IN THE INDIVIDUAL SECTIONS OF THESE SPECIFICATIONS.** SHOULD COMPANY CHOOSE TO ENGAGE ANY THIRD-PARTY TO CONDUCT ADDITIONAL TESTING, THE CONTRACTOR SHALL COOPERATE WITH AND PROVIDE A WORK AREA FOR COMPANY'S TEST AGENCY.
- 3.4 **DIMENSIONS:** VERIFY DIMENSIONS INDICATED ON DRAWINGS WITH FIELD DIMENSIONS BEFORE FABRICATION OR ORDERING OF MATERIALS. DO NOT SCALE DRAWINGS.
- 3.5 **EXISTING CONDITIONS:** NOTIFY THE SPRINT CONSTRUCTION MANAGER OF EXISTING CONDITIONS DIFFERING FROM THOSE INDICATED ON THE DRAWINGS. DO NOT REMOVE OR ALTER STRUCTURAL COMPONENTS WITHOUT PRIOR WRITTEN APPROVAL FROM THE ARCHITECT AND ENGINEER.

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

**PART 1 – GENERAL**

- 1.1 **THE WORK:** THESE STANDARD CONSTRUCTION SPECIFICATIONS IN CONJUNCTION WITH THE OTHER CONTRACT DOCUMENTS AND THE CONSTRUCTION DRAWINGS DESCRIBE THE WORK TO BE PERFORMED BY THE CONTRACTOR.
- 1.2 **RELATED DOCUMENTS:**
- A. THE REQUIREMENTS OF THIS SECTION APPLY TO ALL SECTIONS IN THIS SPECIFICATION.
  - B. SPRINT "STANDARD CONSTRUCTION DETAILS FOR WIRELESS SITES" ARE INCLUDED IN AND MADE A PART OF THESE SPECIFICATIONS HEREWITH.
- PART 2 – PRODUCTS (NOT USED)
- PART 3 – EXECUTION
- 3.1 **RECEIPT OF MATERIAL AND EQUIPMENT:**

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

**3.2 DELIVERABLES:**

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

**SECTION 01 300 - CELL SITE CONSTRUCTION**

**PART 1 – GENERAL**

- 1.1 **THE WORK:** THESE STANDARD CONSTRUCTION SPECIFICATIONS IN CONJUNCTION WITH THE OTHER CONTRACT DOCUMENTS AND THE CONSTRUCTION DRAWINGS DESCRIBE THE WORK TO BE PERFORMED BY THE CONTRACTOR.
- 1.2 **RELATED DOCUMENTS:**
- A. THE REQUIREMENTS OF THIS SECTION APPLY TO ALL SECTIONS IN THIS SPECIFICATION.
  - B. SPRINT "STANDARD CONSTRUCTION DETAILS FOR WIRELESS SITES" ARE INCLUDED IN AND MADE A PART OF THESE SPECIFICATIONS HEREWITH.
- 1.3 **NOTICE TO PROCEED:**
- A. NO WORK SHALL COMMENCE PRIOR TO COMPANY'S WRITTEN NOTICE TO PROCEED AND THE ISSUANCE OF THE WORK ORDER.
  - B. UPON RECEIVING NOTICE TO PROCEED, CONTRACTOR SHALL FULLY PERFORM ALL WORK NECESSARY TO PROVIDE SPRINT WITH AN OPERATIONAL WIRELESS FACILITY.

**PART 2 – PRODUCTS (NOT USED)**

**PART 3 – EXECUTION**

**3.1 FUNCTIONAL REQUIREMENTS:**

- A. THE ACTIVITIES DESCRIBED IN THIS PARAGRAPH REPRESENT MINIMUM ACTIONS AND PROCESSES REQUIRED TO SUCCESSFULLY COMPLETE THE WORK. THE ACTIVITIES DESCRIBED ARE NOT EXHAUSTIVE, AND CONTRACTOR SHALL TAKE ANY AND ALL ACTIONS AS NECESSARY TO SUCCESSFULLY COMPLETE THE CONSTRUCTION OF A FULLY FUNCTIONING WIRELESS FACILITY AT THE SITE IN ACCORDANCE WITH COMPANY PROCESSES.
- B. SUBMIT SPECIFIC DOCUMENTATION AS INDICATED HEREIN, AND OBTAIN REQUIRED APPROVALS WHILE THE WORK IS BEING PERFORMED.
- C. MANAGE AND CONDUCT ALL FIELD CONSTRUCTION SERVICE RELATED ACTIVITIES
- D. PROVIDE CONSTRUCTION ACTIVITIES TO THE EXTENT REQUIRED BY THE CONTRACT DOCUMENTS, INCLUDING BUT NOT LIMITED TO THE FOLLOWING:
  1. PERFORM ANY REQUIRED SITE ENVIRONMENTAL MITIGATION.
  2. PREPARE GROUND SITES; PROVIDE DE-GRUBBING; AND ROUGH AND FINAL GRADING, AND COMPOUND SURFACE TREATMENTS.
  3. MANAGE AND CONDUCT ALL ACTIVITIES FOR INSTALLATION OF UTILITIES INCLUDING ELECTRICAL AND TELCO BACKHAUL.
  4. INSTALL UNDERGROUND FACILITIES INCLUDING UNDERGROUND POWER AND COMMUNICATIONS CONDUITS, AND UNDERGROUND GROUNDING SYSTEM.
  5. INSTALL ABOVE GROUND GROUNDING SYSTEMS.
  6. PROVIDE NEW HVAC INSTALLATIONS AND MODIFICATIONS.
  7. INSTALL "H-FRAMES", CABINETS AND SHELTERS AS INDICATED.
  8. INSTALL ROADS, ACCESS WAYS, CURBS AND DRAINS AS INDICATED.
  9. ACCOMPLISH REQUIRED MODIFICATION OF EXISTING FACILITIES.
  10. PROVIDE ANTENNA SUPPORT STRUCTURE FOUNDATIONS.
  11. PROVIDE SLABS AND EQUIPMENT PLATFORMS.
  12. INSTALL COMPOUND FENCING, SIGHT SHIELDING, LANDSCAPING AND ACCESS BARRIERS.
  13. PERFORM INSPECTION AND MATERIAL TESTING AS REQUIRED HEREINAFTER.
  14. CONDUCT SITE RESISTANCE TO EARTH TESTING AS REQUIRED HEREINAFTER
  15. INSTALL FIXED GENERATOR SETS AND OTHER STANDBY POWER SOLUTIONS.
  16. INSTALL TOWERS, ANTENNA SUPPORT STRUCTURES AND PLATFORMS ON EXISTING TOWERS AS REQUIRED.
  17. INSTALL CELL SITE RADIOS, MICROWAVE, GPS, COAXIAL MAINLINE, ANTENNAS, CROSS BAND COUPLERS, TOWER TOP AMPLIFIERS, LOW NOISE AMPLIFIERS AND RELATED EQUIPMENT.
  18. PERFORM, DOCUMENT, AND CLOSE OUT ANY CONSTRUCTION CONTROL DOCUMENTS THAT MAY BE REQUIRED BY GOVERNMENT AGENCIES AND LANDLORDS.
  19. PERFORM ANTENNA 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.



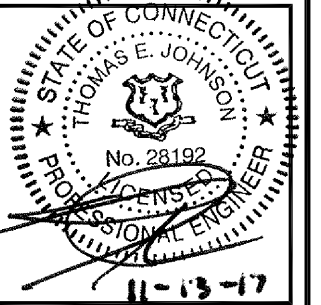
1 INTERNATIONAL BLVD, SUITE 800  
MAHWAH, NJ 07495  
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Suite 200  
Hadley, MA 01035 Ph: (413)320-4918



CHECKED BY: JMM/TEJ

APPROVED BY: JMM/TEJ

SUBMITTALS			
REV.	DATE	DESCRIPTION	BY
0	11/13/17	ISSUED FOR CONSTRUCTION	JEB/EN

SITE NUMBER:  
**CT52XC028**  
SITE NAME:  
**SBA HILLARD**

SITE ADDRESS:  
640 HILLIARD STREET  
MANCHESTER, CT 06040

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**

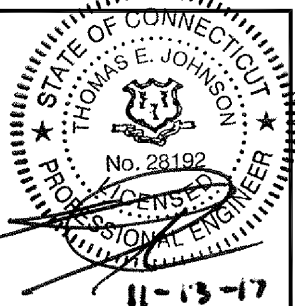
**QUALITY ASSURANCE:**

- 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**



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
0	11/13/17	ISSUED FOR CONSTRUCTION	JEB/EN

SITE NUMBER: CT52XC028  
SITE NAME: SBA HILLARD  
SITE ADDRESS: 640 HILLIARD STREET MANCHESTER, CT 06040

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**

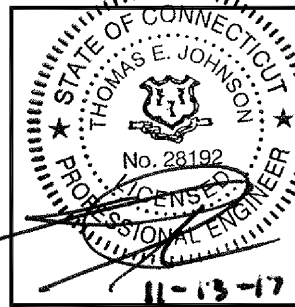
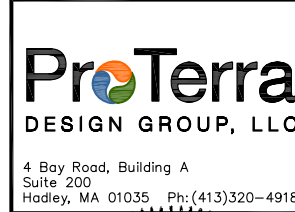
- A. FURNISH AND INSTALL A SUPPLEMENTAL GROUNDING SYSTEM AS INDICATED ON THE DRAWINGS. SUPPORT SYSTEM WITH NON-MAGNETIC STAINLESS STEEL CLIPS WITH RUBBER GROMMETS. GROUNDING CONNECTORS SHALL BE TINNED COPPER WIRE, SIZES AS INDICATED ON THE DRAWINGS. PROVIDE STRANDED OR SOLID BARE OR INSULATED CONDUCTORS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

**CONDUIT AND CONDUCTOR INSTALLATION:**

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



CHECKED BY: JMM/TEJ

APPROVED BY: JMM/TEJ

SUBMITTALS			
REV.	DATE	DESCRIPTION	BY
0	11/13/17	ISSUED FOR CONSTRUCTION	JEB/EN

SITE NUMBER:  
**CT52XC028**  
SITE NAME:  
**SBA HILLARD**

SITE ADDRESS:  
640 HILLIARD STREET  
MANCHESTER, CT 06040

SHEET TITLE  
**OUTLINE SPECIFICATIONS**

SHEET NUMBER  
**SP-3**





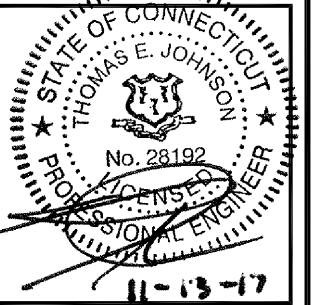
1 INTERNATIONAL BLVD, SUITE 800  
MAHWAH, NJ 07495  
TEL: (800) 357-7641



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
0	11/13/17	ISSUED FOR CONSTRUCTION	JEB/EN

SITE NUMBER:

CT52XC028

SITE NAME:

SBA HILLARD

SITE ADDRESS:

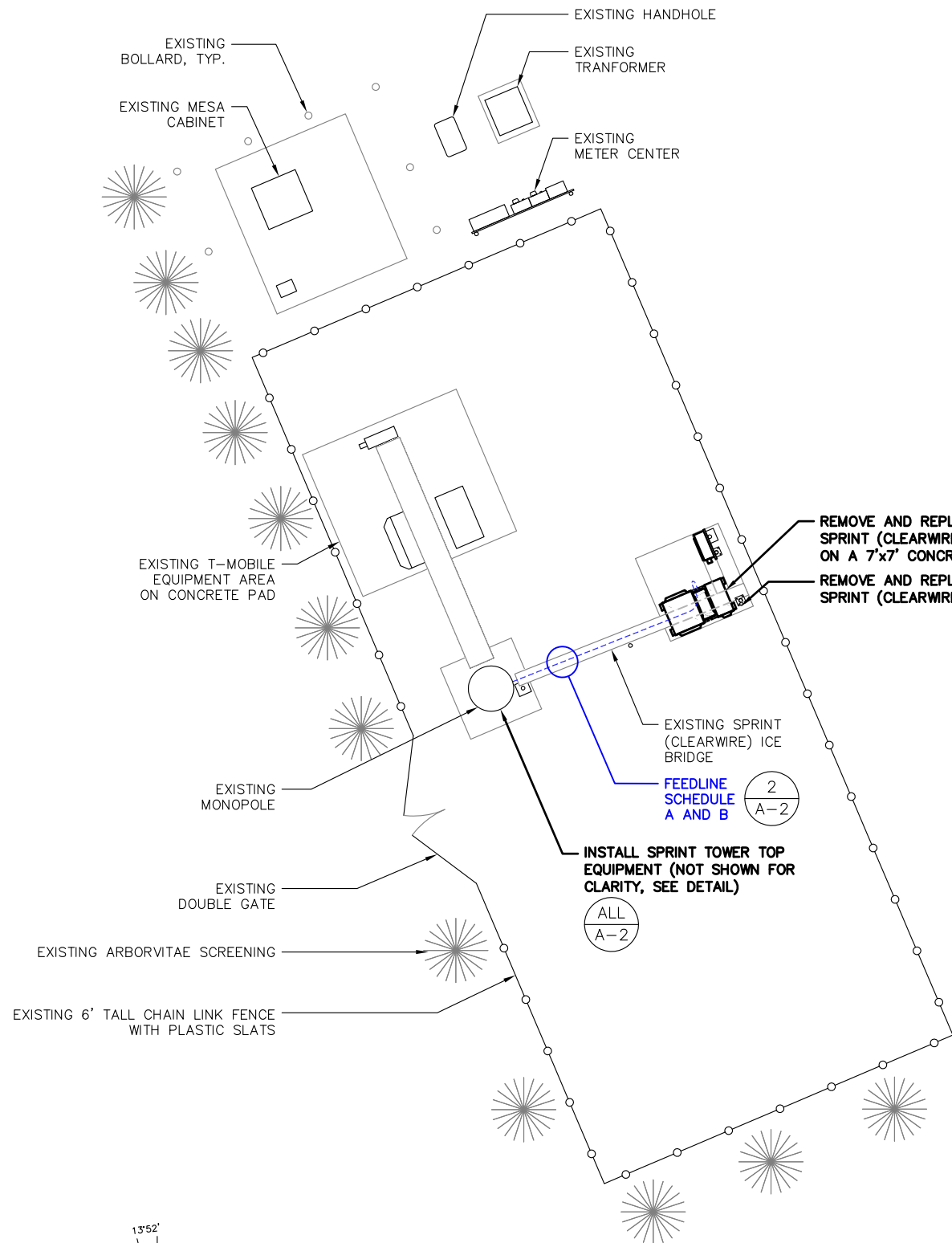
640 HILLIARD STREET  
MANCHESTER, CT 06040

SHEET TITLE

COMPOUND PLAN

SHEET NUMBER

A-1



COMPOUND PLAN

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

1  
A-1



(ALL S-2) REMOVE AND REPLACE EXISTING SPRINT (CLEARWIRE) EQUIPMENT CABINET: INSTALL SPRINT EQUIPMENT CABINET ON EXISTING CONCRETE PAD

EXISTING SPRINT (CLEARWIRE) ICE BRIDGE

(2 A-2) FEEDLINE SCHEDULE A AND B

EXISTING SPRINT (CLEARWIRE) JUNCTION BOX TO BE REMOVED, TYP.

REMOVE AND REPLACE EXISTING SPRINT (CLEARWIRE) GPS

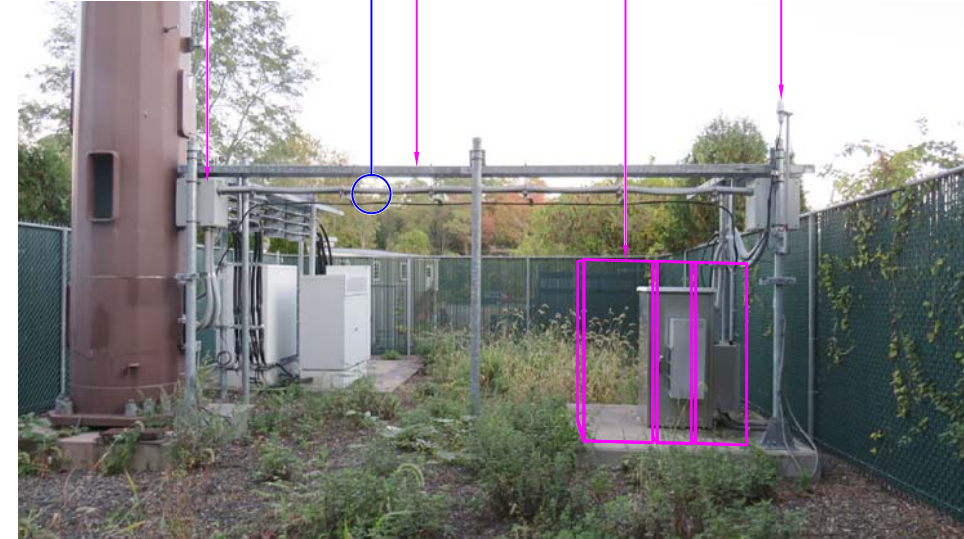


IMAGE SOURCE: PROTERRA 10/20/2017 (VIEW FROM SOUTHEAST)

(1,3 S-2)

REMOVE AND REPLACE EXISTING SPRINT (CLEARWIRE) EQUIPMENT CABINET: INSTALL SPRINT EQUIPMENT CABINET ON EXISTING CONCRETE PAD

EXISTING CLEARWIRE EQUIPMENT CABINET TO BE REMOVED

(2,4 S-2) INSTALL SPRINT PPC CABINET ON H-FRAME

REMOVE AND REPLACE EXISTING SPRINT (CLEARWIRE) GPS

EXISTING SPRINT (CLEARWIRE) ICE BRIDGE

FEEDLINE SCHEDULE A AND B (2 A-2)

EXISTING SPRINT (CLEARWIRE) JUNCTION BOX TO BE REMOVED, TYP.

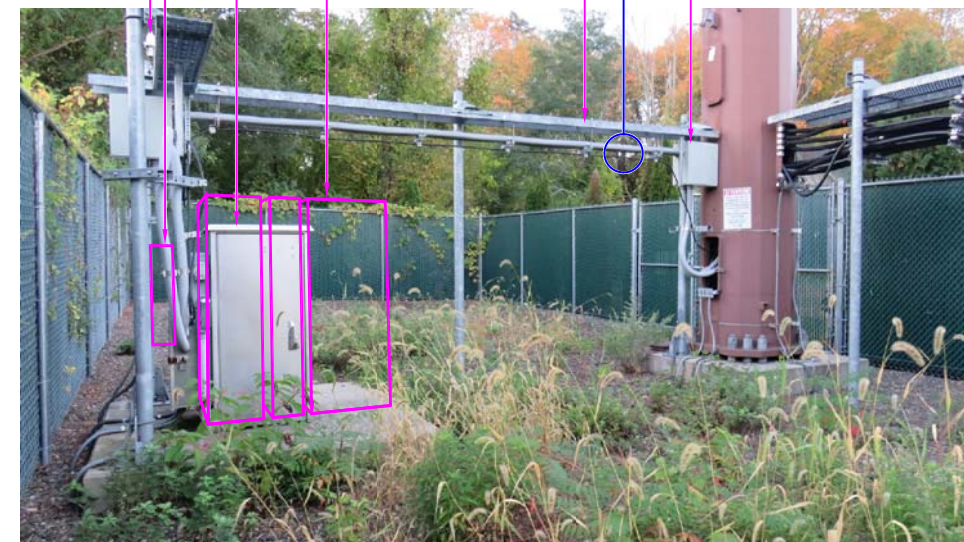


IMAGE SOURCE: PROTERRA 10/20/2017 (VIEW FROM NORTH)

EQUIPMENT PLAN PHOTO DETAIL

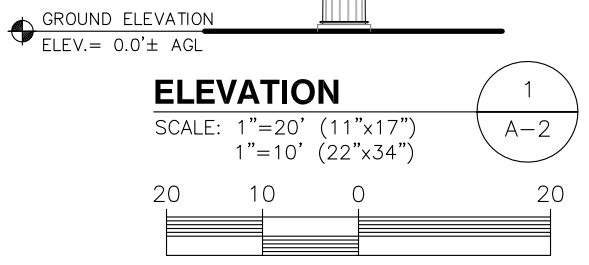
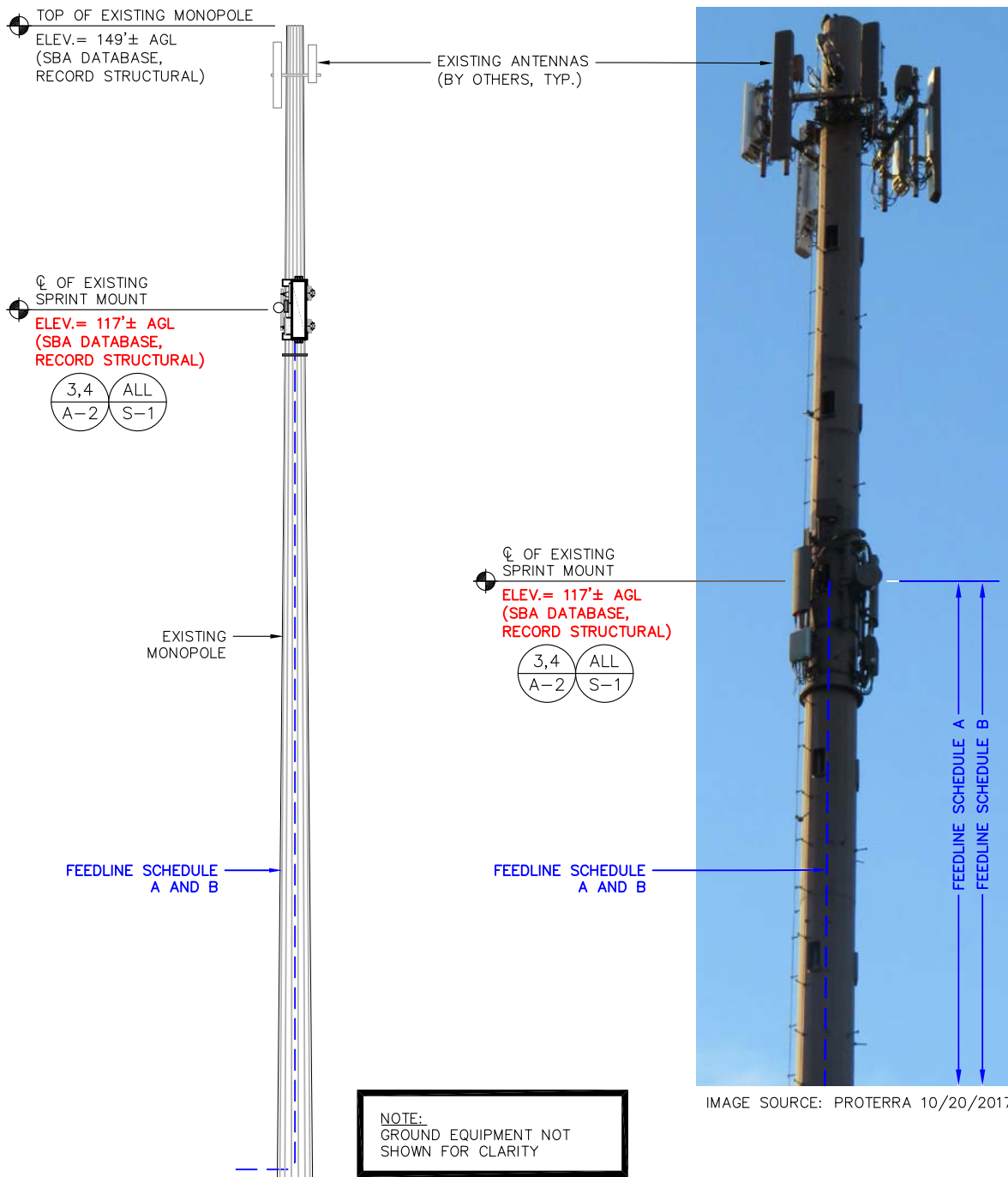
SCALE: N.T.S.

2  
A-1



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

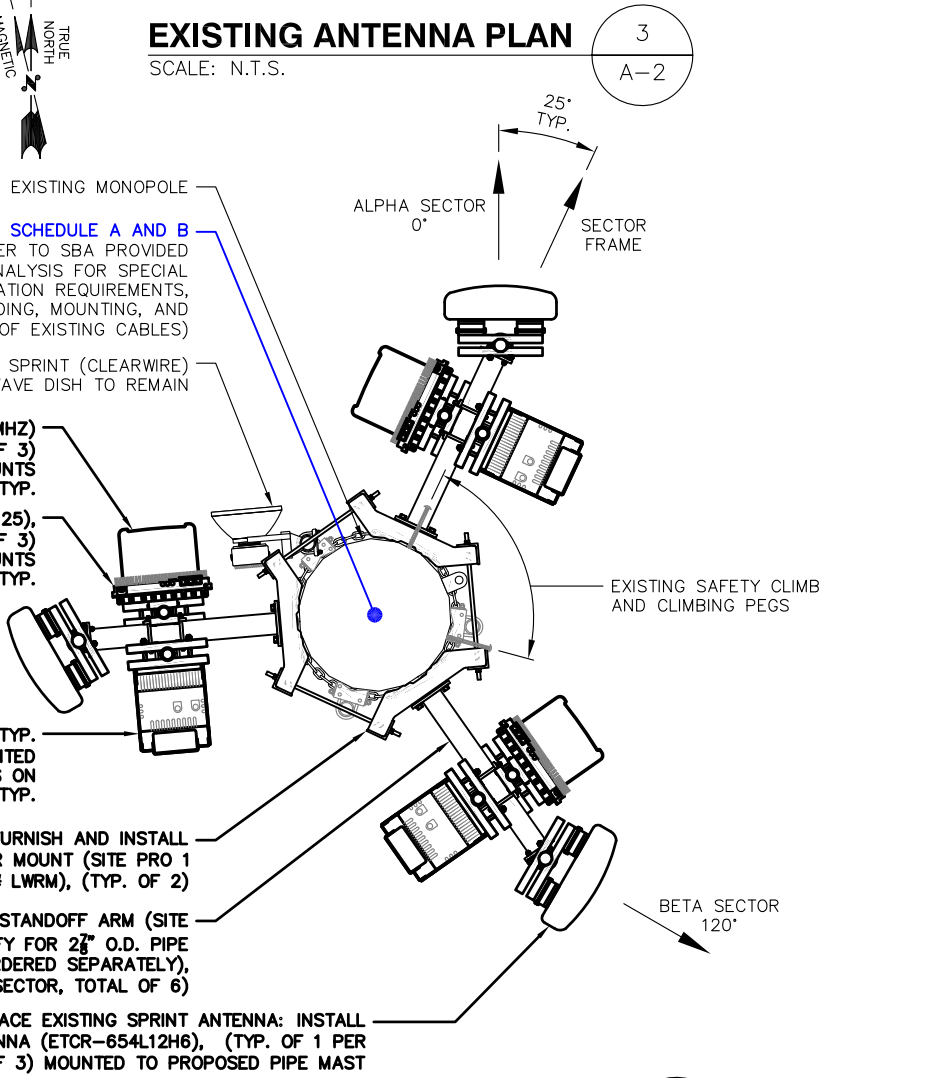
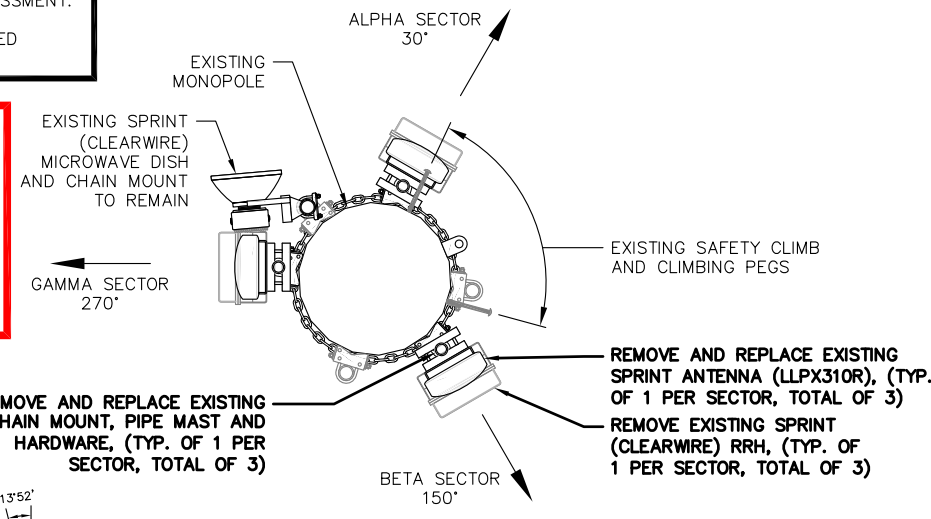
**SPECIAL PRE-CONSTRUCTION WORK NOTE (SBA-PROVIDED TOWER STRUCTURAL ANALYSIS SPECIAL EQUIPMENT INSTALLATION REQUIREMENTS):**  
 GENERAL CONTRACTOR SHALL FURNISH AND INSTALL ALL SPECIAL OR SUPPLEMENTAL ADDITIONAL TOWER-MOUNTED EQUIPMENT PER RECOMMENDATIONS FROM SBA-PROVIDED TOWER STRUCTURAL ANALYSIS FOR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



FEEDLINE SCHEDULE	FEEDLINE DESCRIPTION	LOCATION
A	EXISTING TO BE REMOVED: (1) 1/2" COAX, (3) 3/8" DC, AND (3) 1/2" HYBRID (PER COLO-APP. IN FLEX CONDUIT) TO 117' RAD EXISTING TO REMAIN: (1) 1/2" MICROWAVE DISH CABLE TO 117' RAD	UP INSIDE MONOPOLE TO RAD
B	PROPOSED: (4) HYBRID TO 117' RAD;	UP INSIDE MONOPOLE TO RAD

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

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



**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  
 PROFESSIONAL ENGINEER  
 11-13-17

CHECKED BY: JMM/TEJ  
 APPROVED BY: JMM/TEJ

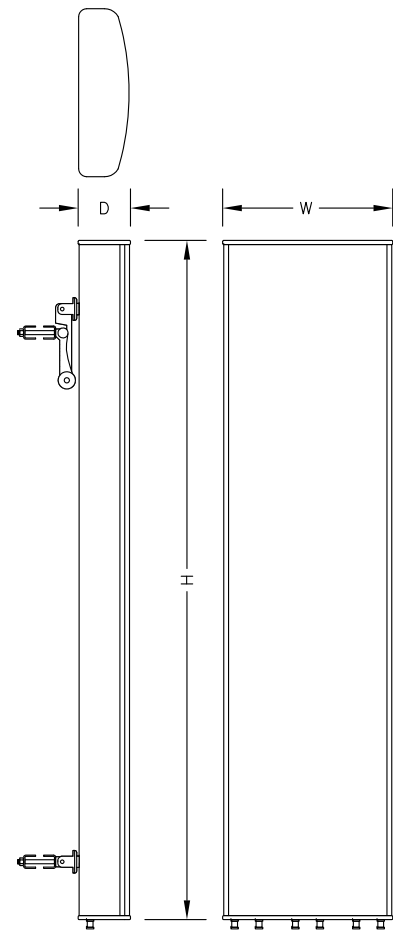
**SUBMITTALS**

REV.	DATE	DESCRIPTION	BY
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SITE NUMBER:  
 CT52XC028  
 SITE NAME:  
 SBA HILLARD  
 SITE ADDRESS:  
 640 HILLIARD STREET  
 MANCHESTER, CT 06040

SHEET TITLE  
 ELEVATION AND ANTENNA PLANS

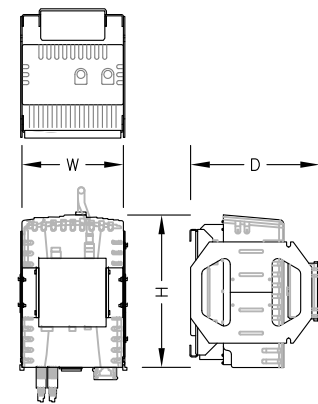
SHEET NUMBER  
 A-2



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.

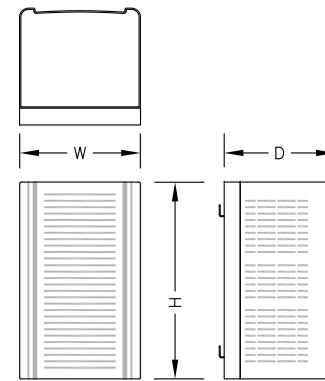
1  
A-3



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.

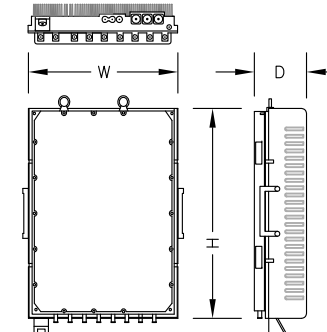
2  
A-3



1900 MHZ RRH SPECIFICATIONS	
MANUF.	NOKIA (ALU)
MODEL #	1900 4X45 65MHZ
HEIGHT	25"
WIDTH	11.1"
DEPTH	11.4"
WEIGHT	60± LBS

**1900 MHz RRH DETAIL**  
SCALE: N.T.S.

3  
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.

4  
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
1900 RRH	3	EA	NOKIA (ALU) 1900 4X45 65MHZ	SPRINT
800 RRH	6	EA	NOKIA (ALU) 800MHz 2x50W	SPRINT
FIBER	4 @ 190'± FROM FIBER CABINET	LINEAR FEET LISTED [INCLUDES (2) 10' COILS]	1-1/4" HYBRIFLEX	SPRINT

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

5  
A-3

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

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

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

STATE OF CONNECTICUT  
THOMAS E. JOHNSON  
No. 28192  
PROFESSIONAL ENGINEER  
11-13-17

CHECKED BY: JMM/TEJ

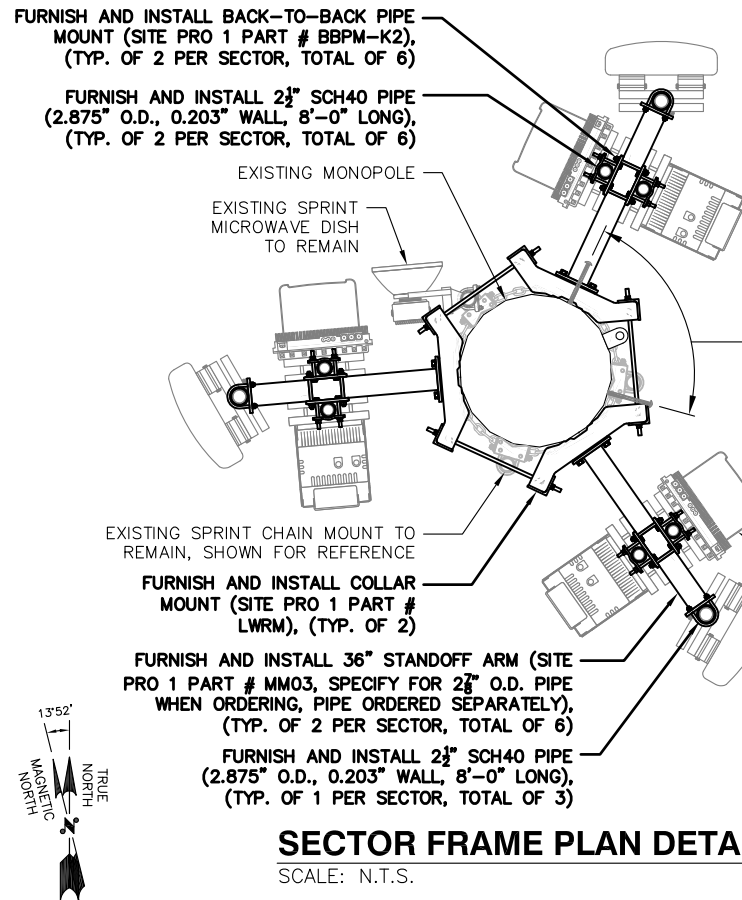
APPROVED BY: JMM/TEJ

SUBMITTALS			
REV.	DATE	DESCRIPTION	BY
0	11/13/17	ISSUED FOR CONSTRUCTION	JEB/EN

SITE NUMBER:  
**CT52XC028**  
SITE NAME:  
**SBA HILLARD**  
SITE ADDRESS:  
640 HILLIARD STREET  
MANCHESTER, CT 06040

SHEET TITLE  
**TOWER EQUIPMENT DETAILS**

SHEET NUMBER  
**A-3**



**SECTOR FRAME PLAN DETAIL**

SCALE: N.T.S.

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

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

**NOTE:**  
 VERIFY PROPOSED AZIMUTHS WITH RF ENGINEER PRIOR TO INSTALLATION

**FURNISH AND INSTALL 36" STANDOFF ARM (SITE PRO 1 PART # MM03, SPECIFY FOR 2 1/2" O.D. PIPE WHEN ORDERING, PIPE ORDERED SEPARATELY), (TYP. OF 2 PER SECTOR, TOTAL OF 6)**

**REMOVE EXISTING SPRINT (CLEARWIRE) JUNCTION BOX, TYP.**

**FURNISH AND INSTALL COLLAR MOUNT (SITE PRO 1 PART # LWRM), (TYP. OF 2)**

EXISTING SPRINT (CLEARWIRE) MICROWAVE DISH TO REMAIN

**REMOVE EXISTING SPRINT ANTENNA (LLPX310R), (TYP. OF 1 PER SECTOR, TOTAL OF 3)**

**REMOVE EXISTING SPRINT (CLEARWIRE) RRH (TYP. OF 1 PER SECTOR, TOTAL OF 3)**

**INSTALL SPRINT RRH (1900 4X45 65MHZ) (TYP. OF 1 PER SECTOR, TOTAL OF 3) MOUNTED ON BACK-TO-BACK PIPE MOUNTS ON SECTOR FRAME STAND-OFF ARM, TYP.**

**FURNISH AND INSTALL 2 1/2" SCH40 PIPE (2.875" O.D., 0.203" WALL, 8'-0" LONG), (TYP. OF 2 PER SECTOR, TOTAL OF 6)**

**INSTALL SPRINT RRH (TD-RRH8X20-25), (TYP. OF 1 PER SECTOR, TOTAL OF 3) MOUNTED ON BACK-TO-BACK PIPE MOUNTS ON SECTOR FRAME STAND-OFF ARM, TYP.**

**INSTALL SPRINT RRH (800MHZ 2X50), (TYP. OF 2 PER SECTOR, TOTAL OF 6) MOUNTED ON BACK-TO-BACK PIPE MOUNTS ON SECTOR FRAME STAND-OFF ARM, TYP.**

**INSTALL SPRINT ANTENNA (ETCR-654L12H6), (TYP. OF 1 PER SECTOR, TOTAL OF 3)**

**FURNISH AND INSTALL 2 1/2" SCH40 PIPE (2.875" O.D., 0.203" WALL, 8'-0" LONG), (TYP. OF 1 PER SECTOR, TOTAL OF 3)**

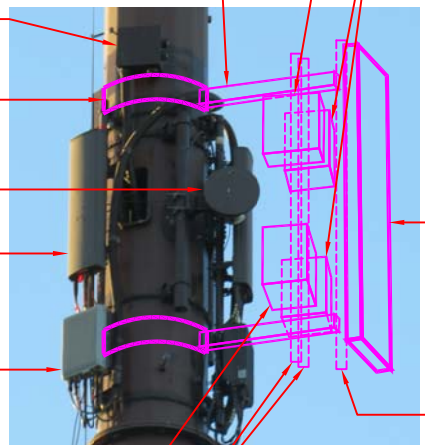


IMAGE SOURCE: PROTERRA 10/20/2017

**ANTENNA AND RRH MOUNT PHOTO DETAIL**

SCALE: N.T.S.

**INSTALL SPRINT RRH (TD-RRH8X20-25), (TYP. OF 1 PER SECTOR, TOTAL OF 3) MOUNTED ON BACK-TO-BACK PIPE MOUNTS ON SECTOR FRAME STAND-OFF ARM, TYP.**

**FURNISH AND INSTALL 36" STANDOFF ARM (SITE PRO 1 PART # MM03, SPECIFY FOR 2 1/2" O.D. PIPE WHEN ORDERING, PIPE ORDERED SEPARATELY), (TYP. OF 2 PER SECTOR, TOTAL OF 6)**

**FURNISH AND INSTALL COLLAR MOUNT (SITE PRO 1 PART # LWRM), (TYP. OF 2)**

EXISTING CABLE ENTRY PORT, TYP.

EXISTING SPRINT (CLEARWIRE) MICROWAVE DISH TO REMAIN

EXISTING SPRINT (CLEARWIRE) CHAIN MOUNT WITH MOUNTING PIPE TO REMAIN

**INSTALL SPRINT RRH (800MHZ 2X50), (TYP. OF 2 PER SECTOR, TOTAL OF 6) MOUNTED ON BACK-TO-BACK PIPE MOUNTS ON SECTOR FRAME STAND-OFF ARM, TYP. (MOUNTED BEHIND RRH'S SHOWN IN THIS VIEW)**

**FURNISH AND INSTALL 2 1/2" SCH40 PIPE (2.875" O.D., 0.203" WALL, 8'-0" LONG), (TYP. OF 1 PER SECTOR, TOTAL OF 3)**

**INSTALL SPRINT ANTENNA (ETCR-654L12H6), (TYP. OF 1 PER SECTOR, TOTAL OF 3)**

NEW UPPER COLLAR MOUNT

WORKING POINT: Q OF PROPOSED ANTENNA

NEW LOWER COLLAR MOUNT

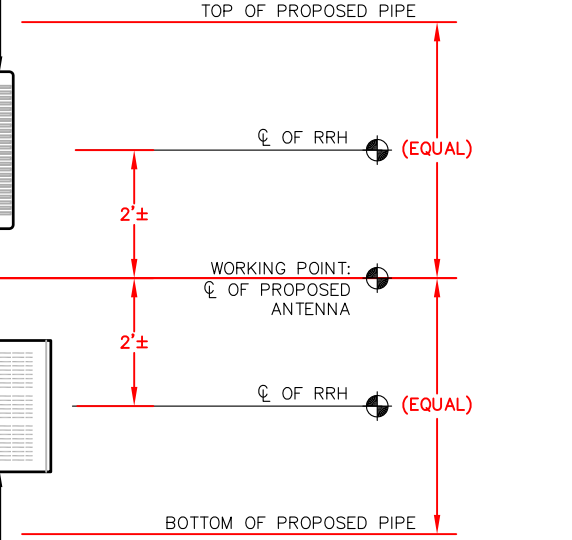
**FURNISH AND INSTALL 2 1/2" SCH40 PIPE (2.875" O.D., 0.203" WALL, 8'-0" LONG), (TYP. OF 2 PER SECTOR, TOTAL OF 6)**

**INSTALL SPRINT RRH (1900 4X45 65MHZ) (TYP. OF 1 PER SECTOR, TOTAL OF 3) MOUNTED ON BACK-TO-BACK PIPE MOUNTS ON SECTOR FRAME STAND-OFF ARM, TYP.**

**FURNISH AND INSTALL 2 1/2" SCH40 PIPE (2.875" O.D., 0.203" WALL, 8'-0" LONG), (TYP. OF 2 PER SECTOR, TOTAL OF 6)**

WORKING POINT: EXISTING TOWER JOINT

**INSTALL SPRINT RRH (TD-RRH8X20-25), (TYP. OF 1 PER SECTOR, TOTAL OF 3) MOUNTED ON BACK-TO-BACK PIPE MOUNTS ON SECTOR FRAME STAND-OFF ARM, TYP.**



**INSTALL SPRINT RRH (1900 4X45 65MHZ) (TYP. OF 1 PER SECTOR, TOTAL OF 3) MOUNTED ON BACK-TO-BACK PIPE MOUNTS ON SECTOR FRAME STAND-OFF ARM, TYP.**

**FURNISH AND INSTALL BACK-TO-BACK PIPE MOUNT (SITE PRO 1 PART # BBPM-K2), (TYP. OF 2 PER SECTOR, TOTAL OF 6)**

**INSTALL SPRINT RRH (800MHZ 2X50), (TYP. OF 2 PER SECTOR, TOTAL OF 6) MOUNTED ON BACK-TO-BACK PIPE MOUNTS ON SECTOR FRAME STAND-OFF ARM, TYP.**

**SPECIAL TOWER TOP EQUIPMENT INSTALLATION WORK NOTE (SAFETY-CLIMB ALIGNMENT REQUIREMENTS):**  
 GENERAL CONTRACTOR SHALL ORIENT PROPOSED SPRINT COLLAR-MOUNTS SO THAT EXISTING SAFETY CLIMB CABLE IS NOT OBSTRUCTED/RE-ROUTED FROM VERTICAL ALIGNMENT AND IS NOT IN PHYSICAL CONTACT WITH EXISTING OR PROPOSED COLLAR-MOUNT HARDWARE. GENERAL CONTRACTOR SHALL INSTALL NEW OR ADDITIONAL SAFETY-CLIMB CABLE GUIDES IF ADDITIONAL CLEARANCE IS REQUIRED. ADDITIONAL CABLE GUIDES SHALL BE ATTACHED SECURELY TO THE POLE USING MECHANICAL FASTENERS OR FIELD WELDED BY A CERTIFIED WELDING TECHNICIAN.

**ANTENNA AND RRH MOUNTING DETAIL**

SCALE: N.T.S.

**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  
 PROFESSIONAL ENGINEER  
 11-13-17

CHECKED BY: JMM/TEJ

APPROVED BY: JMM/TEJ

**SUBMITTALS**

REV.	DATE	DESCRIPTION	BY
0	11/13/17	ISSUED FOR CONSTRUCTION	JEB/EN

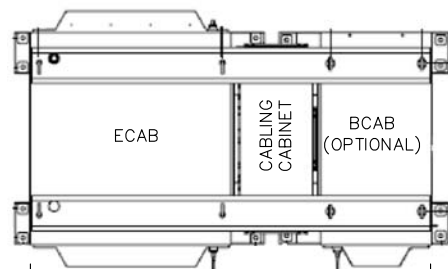
SITE NUMBER:  
 CT52XC028  
 SITE NAME:  
 SBA HILLARD

SITE ADDRESS:  
 640 HILLARD STREET  
 MANCHESTER, CT 06040

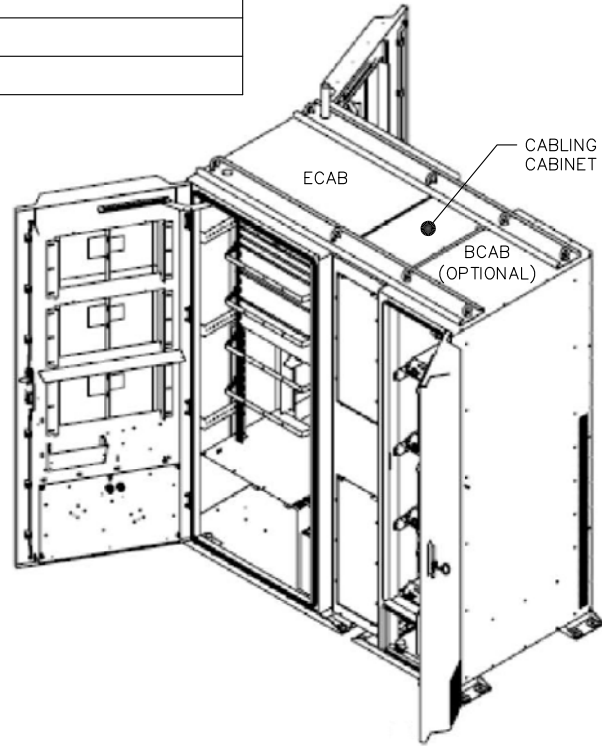
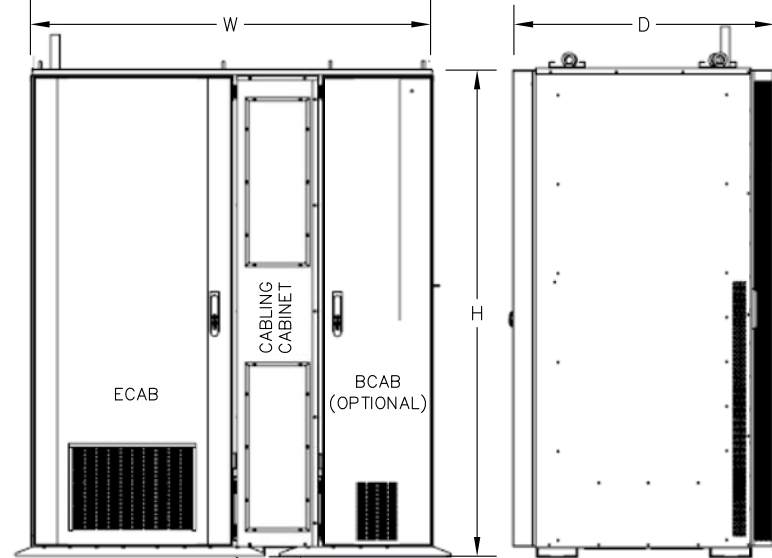
SHEET TITLE  
 ANTENNA AND RRH MOUNTING DETAILS

SHEET NUMBER  
 S-1





ELTEK EQUIPMENT CABINET	
MANUF.	ELTEK
MODEL #	DO EXTERNAL ECAB & BCAB ASSEMBLY
HEIGHT	72.3"
WIDTH	59.5"
DEPTH	38"
WEIGHT	TBD



ANCHOR PER MANUFACTURER SPECIFICATIONS OR MINIMUM OF 1/2" Ø HDG HILTI KWIK BOLT SS 304 2 3/4" LONG WITH 2 1/4" NOMINAL EMBEDMENT PER CABINET, (TYP OF 4 ANCHORS PER SKID, TOTAL OF 16)

**ELTEK EQUIPMENT CABINET DETAIL**

SCALE: N.T.S.

1  
S-2

2  
S-2

4  
S-2

INSTALL SPRINT PPC CABINET ON H-FRAME

MAINTAIN 3' CLEAR IN FRONT OF CABINET ACCESS PER NEC

EXISTING SPRINT (CLEARWIRE) 7'x7' CONCRETE PAD TO REMAIN

ANCHOR PER MANUFACTURER SPECIFICATIONS OR MINIMUM OF 1/2" Ø HDG HILTI KWIK BOLT SS 304 2 3/4" LONG WITH 2 1/4" NOMINAL EMBEDMENT PER CABINET, (TYP OF 4 ANCHORS PER SKID, TOTAL OF 16)

1  
S-2

REMOVE AND REPLACE EXISTING SPRINT (CLEARWIRE) EQUIPMENT CABINET: INSTALL SPRINT EQUIPMENT CABINET ON EXISTING CONCRETE PAD

EXISTING SPRINT (CLEARWIRE) ICE BRIDGE

EXISTING FENCE

IF OPTIONAL BCAB IS INSTALLED, REMOVE AND REPLACE EXISTING ICE BRIDGE POST: FURNISH AND INSTALL PIPE COLUMN WITH BASE SHOE (SITE PRO 1 PART # SP126).

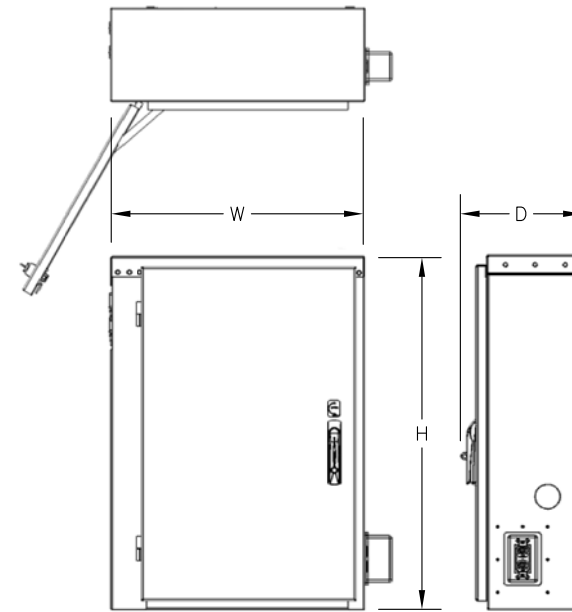
REMOVE AND REPLACE EXISTING SPRINT (CLEARWIRE) GPS

MAINTAIN 3' CLEAR IN FRONT OF EQUIPMENT CABINET ACCESS PER NEC

**GROUND LEVEL EQUIPMENT PLAN**

SCALE: N.T.S.

3  
S-2



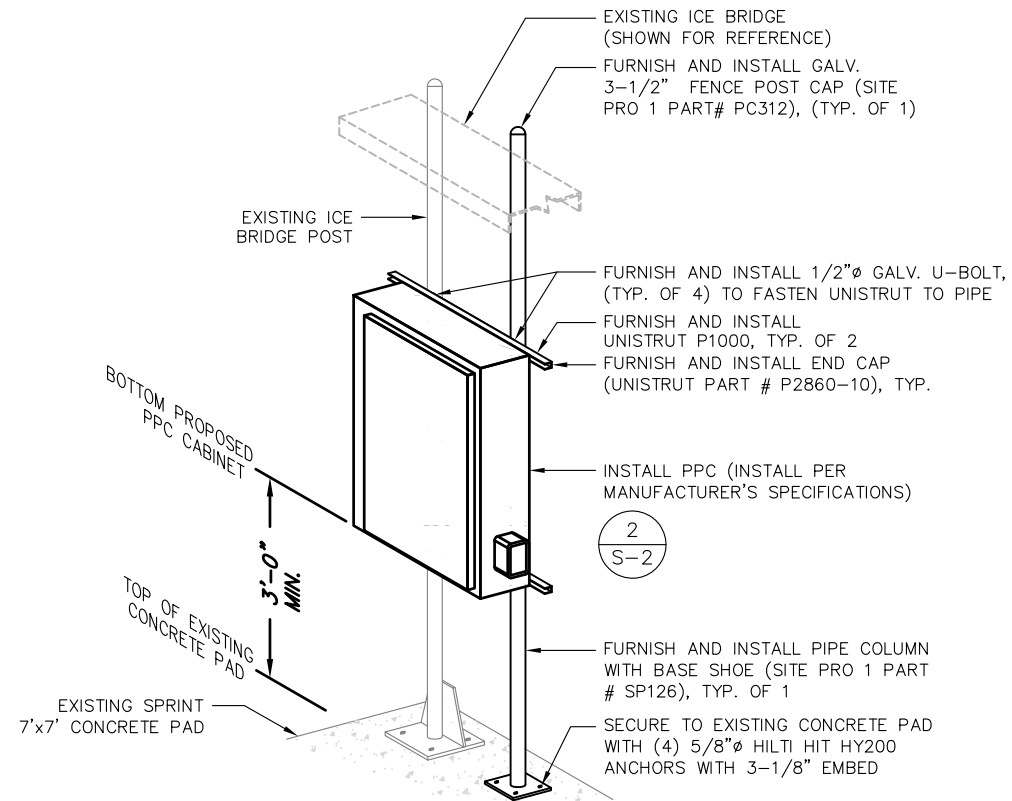
**PPC CABINET**

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

**PPC DETAIL**

SCALE: N.T.S.

2  
S-2



EXISTING ICE BRIDGE (SHOWN FOR REFERENCE)  
FURNISH AND INSTALL GALV. 3-1/2" FENCE POST CAP (SITE PRO 1 PART # PC312), (TYP. OF 1)

EXISTING ICE BRIDGE POST

FURNISH AND INSTALL 1/2" Ø GALV. U-BOLT, (TYP. OF 4) TO FASTEN UNISTRUT TO PIPE  
FURNISH AND INSTALL UNISTRUT P1000, TYP. OF 2  
FURNISH AND INSTALL END CAP (UNISTRUT PART # P2860-10), TYP.

INSTALL PPC (INSTALL PER MANUFACTURER'S SPECIFICATIONS)

2  
S-2

FURNISH AND INSTALL PIPE COLUMN WITH BASE SHOE (SITE PRO 1 PART # SP126), TYP. OF 1

SECURE TO EXISTING CONCRETE PAD WITH (4) 5/8" Ø HILTI HIT HY200 ANCHORS WITH 3-1/8" EMBED

**PPC H-FRAME MOUNTING DETAIL**

SCALE: N.T.S.

4  
S-2

**Sprint**

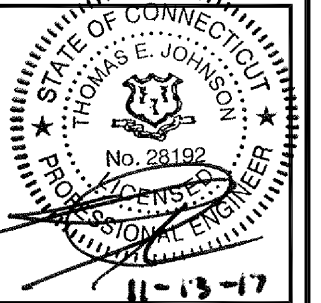
1 INTERNATIONAL BLVD, SUITE 800  
MAHWAH, NJ 07495  
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**SUBMITTALS**

REV.	DATE	DESCRIPTION	BY
0	11/13/17	ISSUED FOR CONSTRUCTION	JEB/EN

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CT52XC028

SITE NAME:

SBA HILLARD

SITE ADDRESS:

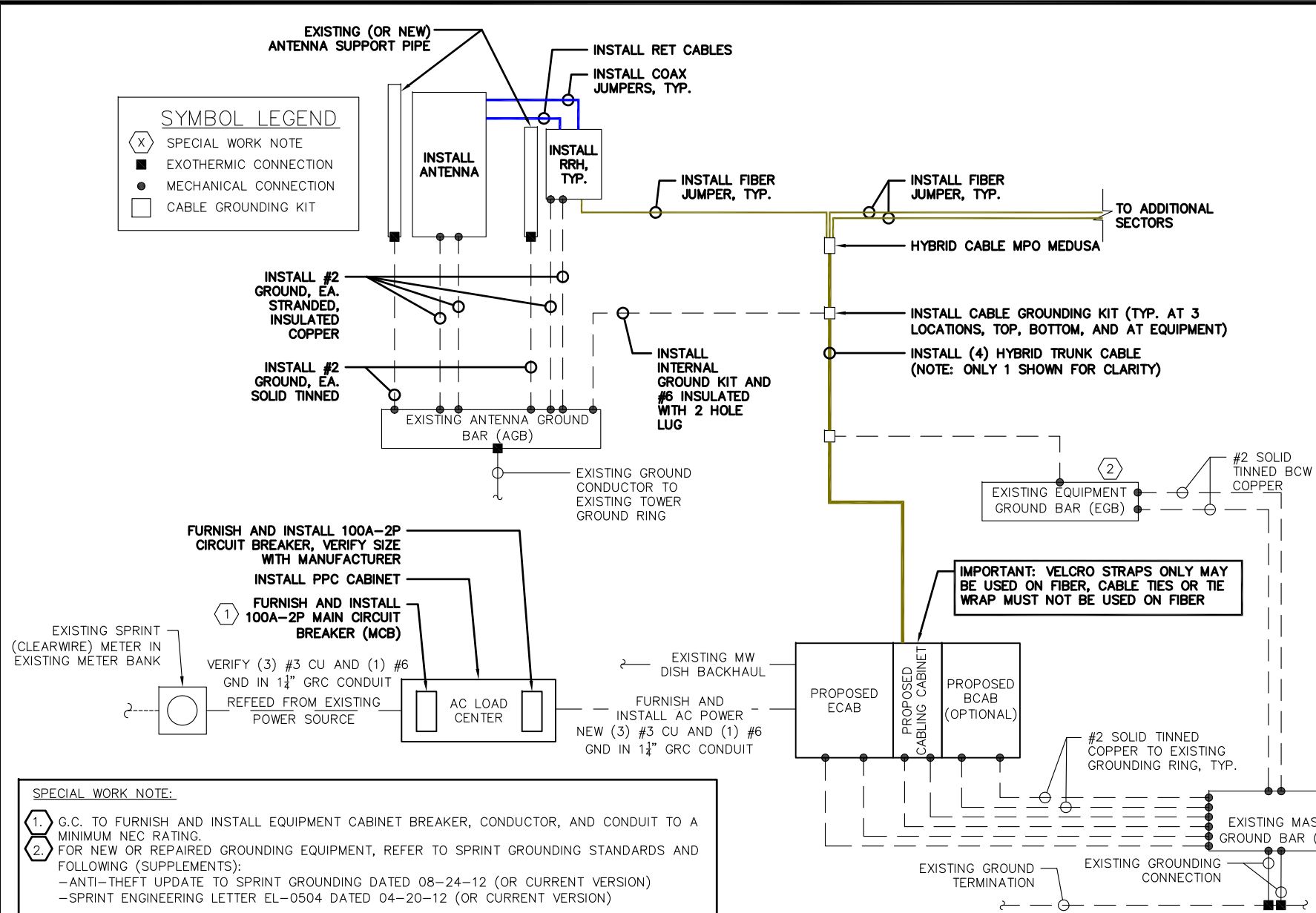
640 HILLARD STREET  
MANCHESTER, CT 06040

SHEET TITLE

GROUND EQUIPMENT  
DETAILS

SHEET NUMBER

S-2

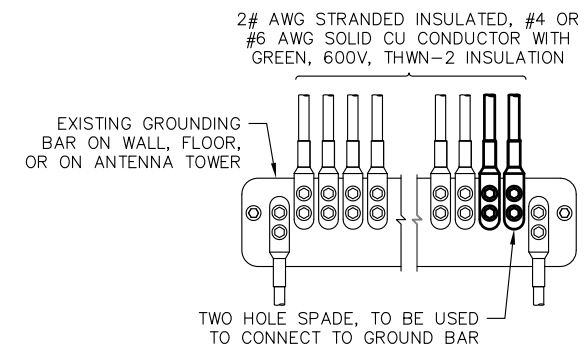
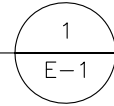


**SPECIAL WORK NOTE:**

- G.C. TO FURNISH AND INSTALL EQUIPMENT CABINET BREAKER, CONDUCTOR, AND CONDUIT TO A MINIMUM NEC RATING.
- 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)

**TYPICAL POWER AND GROUNDING ONE LINE DIAGRAMS**

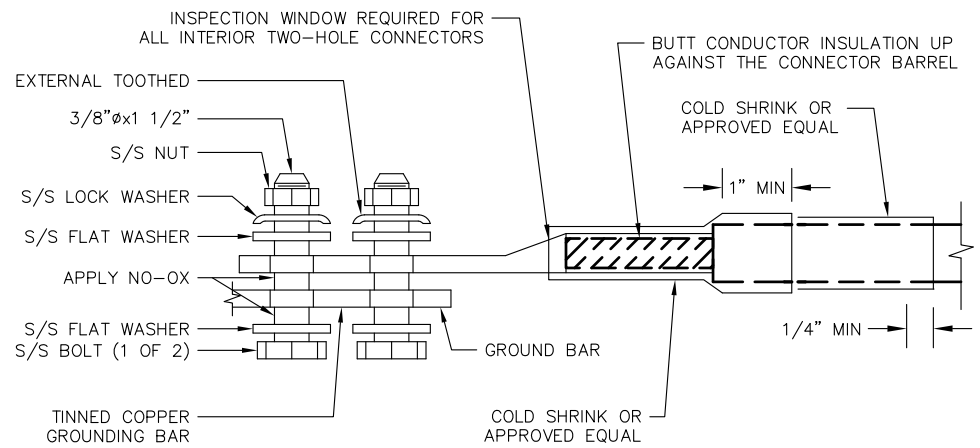
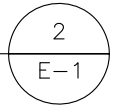
SCALE: N.T.S.



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

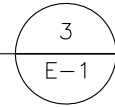
**INSTALLATION OF GROUNDING CONDUCTOR TO GROUNDING BAR**

SCALE: N.T.S.



**TWO HOLE LUG**

SCALE: N.T.S.



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

**PROTECTIVE GROUNDING SYSTEMS GENERAL NOTES:**

- GROUNDING SHALL BE IN ACCORDANCE WITH NEC ARTICLE 250-GROUNDING AND BONDING.
- 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".
- PROVIDE GROUND CONNECTIONS FOR ALL METALLIC STRUCTURES, ENCLOSURES, RACEWAYS AND OTHER CONDUCTIVE ITEMS ASSOCIATED WITH THE INSTALLATION OF CARRIER'S EQUIPMENT.
- 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.
- 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.
- 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.
- ALL GROUND WIRES SHALL BE #2 SOLID TINNED BCW UNLESS NOTED OTHERWISE.
- PROVIDE DEDICATED #2 AWG COPPER GROUND WIRE FROM EACH ANTENNA MOUNTING PIPE TO ASSOCIATED CIGBE.
- 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.
- EACH EQUIPMENT CABINET SHALL BE CONNECTED TO THE MASTER ISOLATION GROUND BAR (MGB) WITH #2 SOLID TINNED BCW EQUIPMENT CABINETS WALL HAVE (2) CONNECTIONS.
- 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'.
- THE CONTRACTOR SHALL VERIFY THAT THE EXISTING GROUND BARS HAVE ENOUGH SPACE/HOLES FOR ADDITIONAL TWO HOLE LUGS.
- 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.
- 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.
- 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.
- ALL BOLTS, WASHERS, AND NUTS USED ON GROUNDING CONNECTIONS SHALL BE STAINLESS STEEL.
- 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.
- 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)

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 THOMAS E. JOHNSON  
 No. 28192  
 PROFESSIONAL ENGINEER  
 FOR SCHEMATIC 11-13-17

CHECKED BY: JMM/TEJ

APPROVED BY: JMM/TEJ

**SUBMITTALS**

REV.	DATE	DESCRIPTION	BY
0	11/13/17	ISSUED FOR CONSTRUCTION	JEB/EN

SITE NUMBER:  
**CT52XC028**  
 SITE NAME:  
**SBA HILLARD**  
 SITE ADDRESS:  
 640 HILLIARD STREET  
 MANCHESTER, CT 06040

SHEET TITLE  
**ELECTRICAL AND GROUNDING DETAILS**

SHEET NUMBER  
**E-1**





# RF Design Sheet

Site Identification	
Cascade	CT-HFD0042
SMS Schedule ID	12323372
SMS Schedule Name	DO Macro Upgrade
PID	DOKU_CT52XC028
RRU OEM	Alcatel Lucent
Switch OEM	ALU
RFDS Issue Date	
RFDS Revision Date	2017-03-13 00:00:00
RFDS Revision	1

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

Location Details	
Latitude	41.7845
Longitude	-72.5509556
Market	Northern Connecticut
Region	Northeast
City	Manchester
State	CT
Zip Code	CT06042
County	Hartford

Carrier Count	
2500 LTE	3
1900 LTE	1
1900 EVDO	
1900 Voice	1
800 LTE	1
800 Voice	1

2500MHz	
1900MHz	3
800MHz	3

Filter Analysis Complete	YES
RFDS - Issue Date	
Design Status	Complete
Border Analysis Complete	YES
Project Description	DO Macro Upgrade - Add 800MHz (3G + 4G) and 1900 MHz

Additional RF Notes

Replace Existing Antenna with 16 port KMW Panel Antenna for 1900 4T4R, 800 2T4R and 2500 8T8R.

Band: 2500	Alpha	Beta	Gamma	Delta	Epsilon	Zeta
<b>Antenna1</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	-	-	-	N/A	N/A	N/A
Ant1 Top Jumper Make/Mode/Qty	2.5 Jumper   8	2.5 Jumper   8	2.5 Jumper   8	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	0	120	240	N/A	N/A	N/A
Antenna 1 Mechanical DT	N/A	N/A	N/A	N/A	N/A	N/A
Antenna 1 Center Line (ft)	116.9947544	116.9947544	116.9947544	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
Band: 1900	Alpha	Beta	Gamma	Delta	Epsilon	Zeta
<b>Antenna1</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/Qty	800/1900 Jumper   4	800/1900 Jumper   4	800/1900 Jumper   4	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	0	120	240	N/A	N/A	N/A
Antenna 1 Mechanical DT	N/A	N/A	N/A	N/A	N/A	N/A
Antenna 1 Center Line (ft)	116.9947544	116.9947544	116.9947544	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
Band: 800	Alpha	Beta	Gamma	Delta	Epsilon	Zeta
<b>Antenna1</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	-	-	-	N/A	N/A	N/A
Ant1 Top Jumper Make/Mode/Qty	800/1900 Jumper   4	800/1900 Jumper   4	800/1900 Jumper   4	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	0	120	240	N/A	N/A	N/A
Antenna 1 Mechanical DT	N/A	N/A	N/A	N/A	N/A	N/A
Antenna 1 Center Line (ft)	116.9947544	116.9947544	116.9947544	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

GPS Antenna Model	
Model Number	
Weight (Lbs.)	
Dimensions (In.)	
Manufacturer	
GPS Antenna needed at site	1

BTS #1 Model	
Model Number	Ecab Elitek
Weight (Lbs.)	505
Dimensions (In.)	73.5 x 30 x 38
Manufacturer	Elitek
Number of BTS #1	1

Power Protection Cabinet Model	
Model Number	PPC w/ATS cabinet
Weight (Lbs.)	175
Dimensions (In.)	64.00 x 30.18 x 12.28
Manufacturer	
Power Protection Cabinet	1

NOTE: VERIFY PROPOSED AZIMUTHS WITH RF ENGINEER PRIOR TO INSTALLATION

### 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/.

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
Band: 1900	Alpha	Beta	Gamma	Delta	Epsilon	Zeta
<b>Radio Model</b>						
Model Number	RRH-4x45-1900	RRH-4x45-1900	RRH-4x45-1900	N/A	N/A	N/A
Weight (lbs.)	69.5	69.5	69.5	N/A	N/A	N/A
Dimensions	25 x 12 x 12	25 x 12 x 12	25 x 12 x 12	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	1900 Hybrid_ALU	1900 Hybrid_ALU	1900 Hybrid_ALU	N/A	N/A	N/A
Weight (Lbs.)	1.1	1.1	1.1	N/A	N/A	N/A
Dimensions (In.)	1.25	1.25	1.25	N/A	N/A	N/A
Manufacturer	ALU	ALU	ALU	N/A	N/A	N/A
Band: 800	Alpha	Beta	Gamma	Delta	Epsilon	Zeta
<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

NOTE: RFDS PROVIDED BY SPRINT DATED 03/13/2017. 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  
RF-1



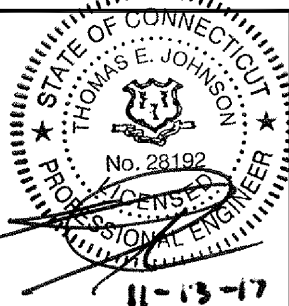
1 INTERNATIONAL BLVD, SUITE 800  
MAHWAH, NJ 07495  
TEL: (800) 357-7641



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
0	11/13/17	ISSUED FOR CONSTRUCTION	JEB/EN

SITE NUMBER:  
CT52XC028  
SITE NAME:  
SBA HILLARD  
SITE ADDRESS:  
640 HILLIARD STREET  
MANCHESTER, CT 06040

SHEET TITLE  
RF DATA SHEET

SHEET NUMBER  
RF-1

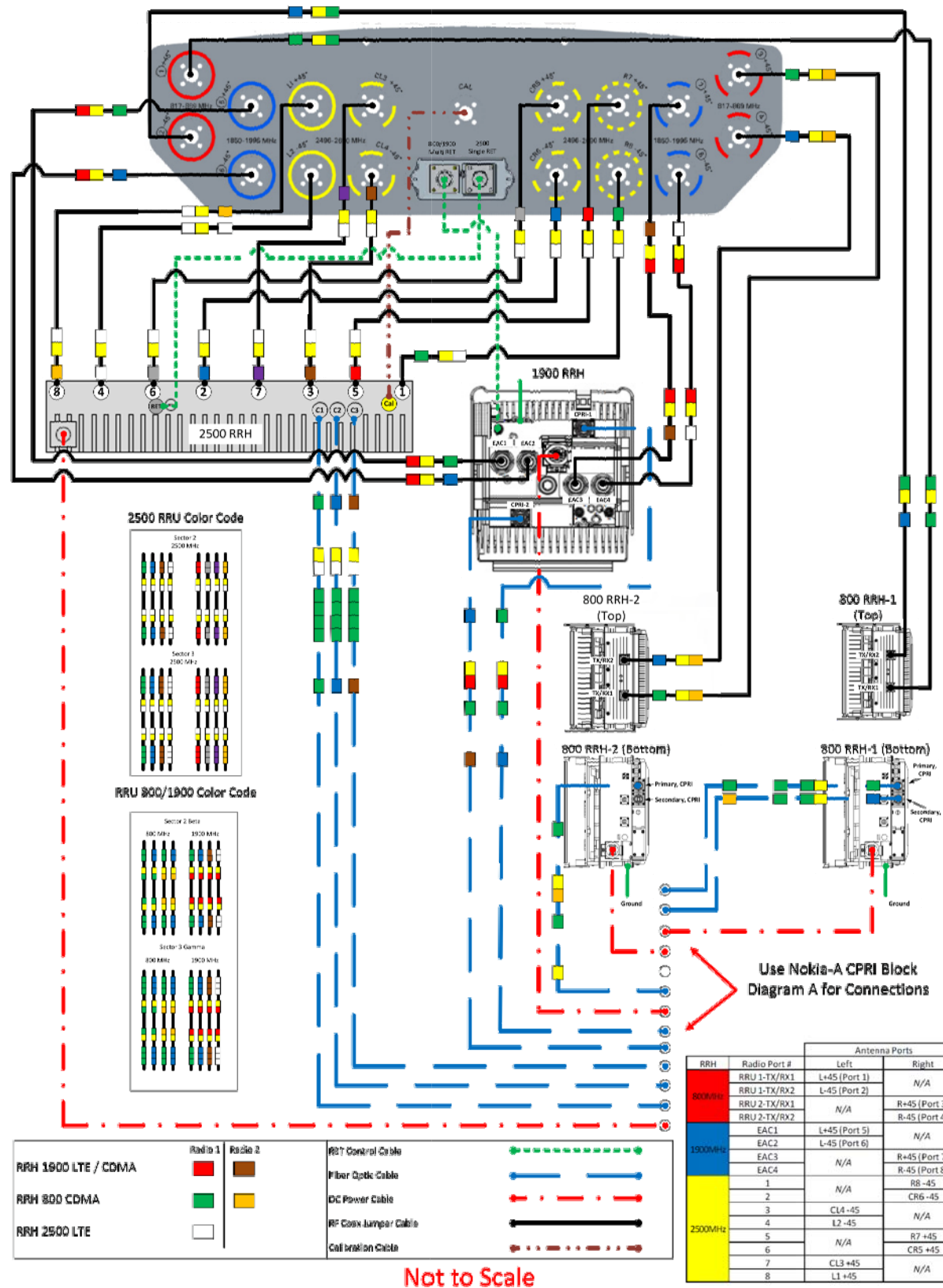


Prepared By  
**Mark Elliott**  
Approved By  
**TBD**

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



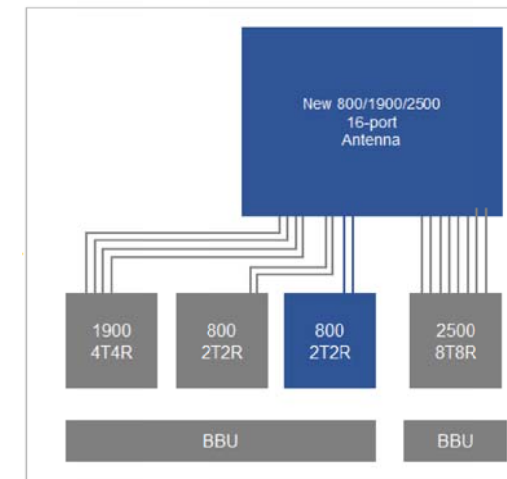
**KMW 16 Port Nokia-A RRH 800, 1900, and 2500 (Sprint Scenario 4)**



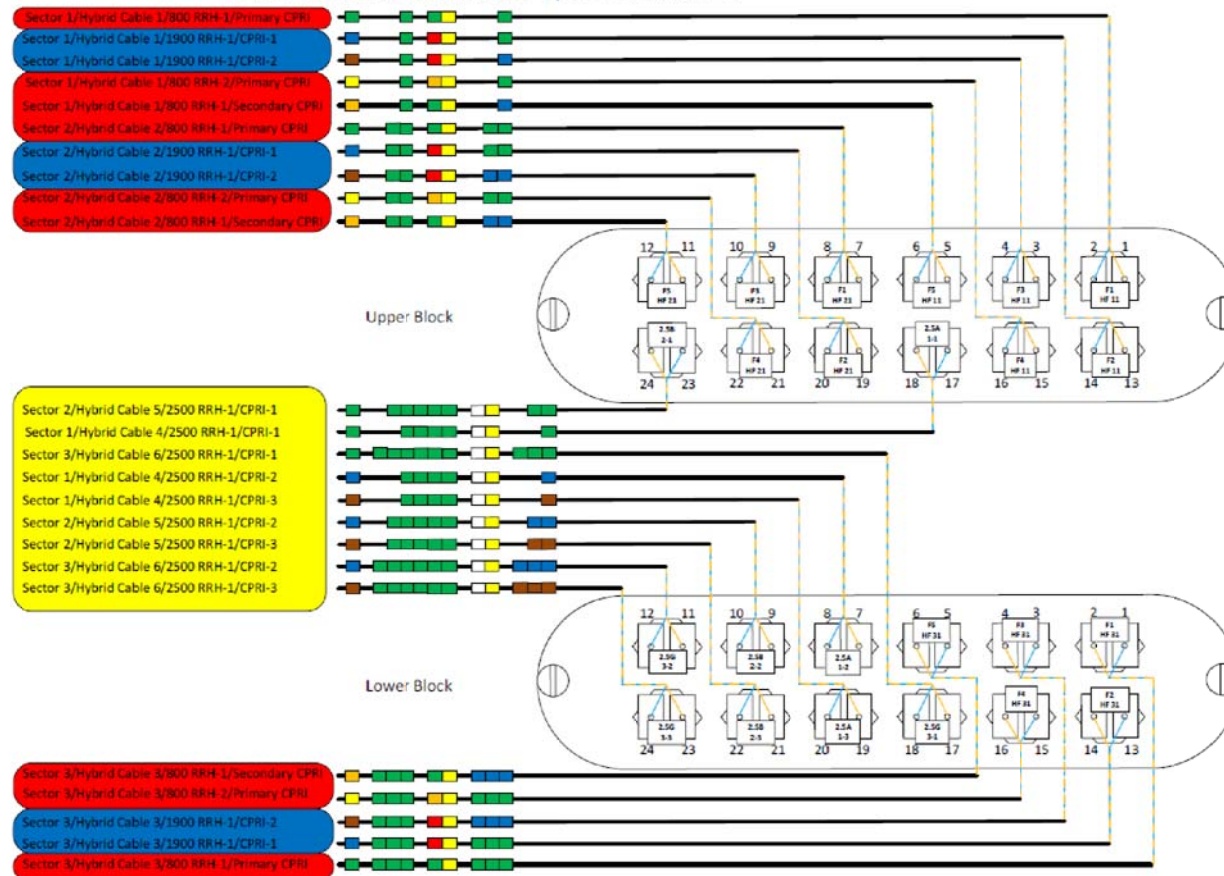
Not to Scale

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

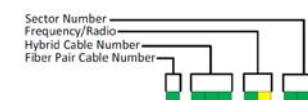
Future



**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



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

**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  
PROFESSIONAL ENGINEER  
11-13-17

CHECKED BY: JMM/TEJ  
APPROVED BY: JMM/TEJ

**SUBMITTALS**

REV.	DATE	DESCRIPTION	BY
0	11/13/17	ISSUED FOR CONSTRUCTION	JEB/EN

SITE NUMBER:  
**CT52XC028**  
SITE NAME:  
**SBA HILLARD**  
SITE ADDRESS:  
640 HILLARD STREET  
MANCHESTER, CT 06040

SHEET TITLE  
**PLUMBING DIAGRAM AND RAN WIRING**

SHEET NUMBER  
**RF-2**