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

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

Re: Notice of Exempt Modification Application
785 Park Ave., Bloomfield, CT 06002

December 5, 2017

Dear Ms. Bachman:

Sprint Spectrum Realty Company, L.P. ("Sprint"), is submitting to the Connecticut Siting Council for a Notice of Exempt Modification for Proposed Modifications to an Existing Telecommunications Facility located at the above-referenced site. Sprint currently maintains 3 existing panel antenna and 1 parabolic dishes at the 115' level of the Tower. Sprint proposes to add 3 new panel antennas (1 per sector) and add 12 remote radio units (3 per sector) at 115' tower level as well as 4 new hybrid cables and 48 Antenna-RRH jumper cables, and a new 2.5 MHz equipment in a new Eltek radio cabinet.

The Sprint installation was initially approved by Siting Council on 5/27/2010. No Building permit for this construction was found by the Town. The construction and structural documents enclosed reflect the reality of all the current installations on the Tower.

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

Thank you,

By: Paul F. Sagristano

Paul F. Sagristano
Cherundolo Consulting
917.841.0247
psagristano@lrivassoc.com

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

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

Re: Notice of Exempt Modification Application
785 Park Ave., Bloomfield, CT 06002

Lat: N 41.8285
Long: W 72.73361

December 5, 2017

Dear Ms. Bachman:

Sprint currently maintains 3 existing panel antenna and 1 parabolic dishes at the 115' level of the Tower. Sprint proposes to add 3 new panel antennas (1 per sector) and add 12 remote radio units (3 per sector) at 115' tower level as well as 4 new hybrid cables and 48 Antenna-RRH jumper cables, and finally new 2.5 MHz radio equipment in a new Eltek radio cabinet on the existing slab. Sprint is performing a new high-performance upgrade for cellular mobile communications. It is designed to increase the capacity and speed of mobile telephone networks.

The Sprint installation was initially approved by Siting Council on 5/27/2010. No Building permit for this construction was found by the Town.

Please accept this letter as notification to the Council, pursuant to R.C.S.A. Section 16-50j-73, for construction which constitutes an exempt modification pursuant to R.C.S.A. Section 16-50j-72(b)(2).
In compliance with R.C.S.A. Section 16-50j-73, a copy of this letter is being sent to and to Phillip K. Schenck Jr. the Town manager for the town of Bloomfield, as well as Jose Giner, P&Z Director for the Town of Bloomfield, and Ray Lemley for Integrated Wireless Services LLC, the tower owner.
.
Attached is a summary of the planned modifications, including power density calculations reflecting the change in Sprint's operations at the site. Also included is documentation of the structural sufficiency of the tower with proposed modifications to accommodate the revised antenna configuration.

**Existing Facility**

The Bloomfield facility is located at 785 Park Ave. and is owned by for Integrated Wireless Services LLC, the Site coordinates are: N41.8285, W72.73361. The existing facility consists of a 136' Monnopole. Sprint currently operates wireless communications equipment on a platform on a concrete slab at the facility and has 3 antennas and 1 Parabolic dish at a centerline of 115' feet on the tower.

**Statutory Considerations**

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

1. The height of the overall structure will be unaffected.

2. The proposed changes will not require an extension of the property boundaries.

3. The proposed additions will not increase the noise level at the existing facility by

six decibels or more, or to levels that exceed state and/or local criteria

4. The changes will not increase the calculated "worst case" power density for the combined operations at the site to a level at or above the Federal Communications Commission safety standard.

5. The proposed modifications will not cause a change or alteration in the physical or environmental characteristics of the site.

6. The existing structure and its foundation can support the proposed loading.

For the foregoing reasons, Sprint respectfully submits that the proposed changes at the referenced site constitute exempt modifications under R.C.S.A Section §16-50j-72(b)(2).

Respectfully submitted,

*Paul F. Sagristano*

Paul F. Sagristano
Charles Cherundolo Consulting
917-841-0247
psagristano@lrivassoc.com

PFS/mtf

Additional Recipients:
Phillip K. Schenck Jr. the Town manager for the town of Bloomfield – Via Fed Ex
Jose Giner, P&Z Director for the Town of Bloomfield – Via Fed Ex
Ray Lemley for Integrated Wireless Services LLC, the tower owner – Via Fed Ex

December 7,2017

Dear Customer:

The following is the proof-of-delivery for tracking number **770907751050**.

## Delivery Information:

| | | | |
|---|---|---|---|
| **Status:** | Delivered | **Delivered to:** | Receptionist/Front Desk |
| **Signed for by:** | J.KITCHENS | **Delivery location:** | 800 BLOOMFIELD AVE<br>BLOOMFIELD, CT 06002 |
| **Service type:** | FedEx Express Saver | **Delivery date:** | Dec 7, 2017 10:40 |
| **Special Handling:** | Deliver Weekday<br>Direct Signature Required | | |

## Shipping Information:

| | | | |
|---|---|---|---|
| **Tracking number:** | 770907751050 | **Ship date:** | Dec 5, 2017 |
| | | **Weight:** | 0.5 lbs/0.2 kg |

**Recipient:**
Phillip K. Schenck Jr. Town Manager
Town of Bloomfield
800 Bloomfield Ave.
BLOOMFIELD, CT 06002 US

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

**Reference**
CT52XC024 - CSC to P&Z

Thank you for choosing FedEx.

December 7,2017

Dear Customer:

The following is the proof-of-delivery for tracking number 770907724126.

## Delivery Information:

| | | | |
|---|---|---|---|
| **Status:** | Delivered | **Delivered to:** | Receptionist/Front Desk |
| **Signed for by:** | J.KITCHENS | **Delivery location:** | 800 BLOOMFIELD AVE<br>BLOOMFIELD, CT 06002 |
| **Service type:** | FedEx Express Saver | **Delivery date:** | Dec 7, 2017 10:40 |
| **Special Handling:** | Deliver Weekday<br>Direct Signature Required | | |

## Shipping Information:

| | | | |
|---|---|---|---|
| **Tracking number:** | 770907724126 | **Ship date:** | Dec 5, 2017 |
| | | **Weight:** | 0.5 lbs/0.2 kg |

**Recipient:**
Jose Giner, P&Z Direcor
Town of Bloomfield
800 Bloomfield Ave.
BLOOMFIELD, CT 06002 US

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

**Reference**
CT52XC024 - CSC to P&Z

Thank you for choosing FedEx.

December 6,2017

Dear Customer:

The following is the proof-of-delivery for tracking number 770907679542.

## Delivery Information:

| | | | |
|---|---|---|---|
| **Status:** | Delivered | **Delivered to:** | Receptionist/Front Desk |
| **Signed for by:** | M.GIBSON | **Delivery location:** | 63-3 N BRANFORD RD<br>BRANFORD, CT 06405 |
| **Service type:** | FedEx Express Saver | **Delivery date:** | Dec 6, 2017 13:13 |
| **Special Handling:** | Deliver Weekday<br><br>Direct Signature Required | | |

NO SIGNATURE IMAGE IS AVAILABLE VIA THIS TRACKING APPLICATION.
The proof of delivery details appear below; however, no signature image is available at this time.

## Shipping Information:

| | | | |
|---|---|---|---|
| **Tracking number:** | 770907679542 | **Ship date:** | Dec 5, 2017 |
| | | **Weight:** | 0.5 lbs/0.2 kg |

**Recipient:**
Ray Lemley
Integrated Wireless Services, LLC
63-3 North Branford Road
BRANFORD, CT 06405 US

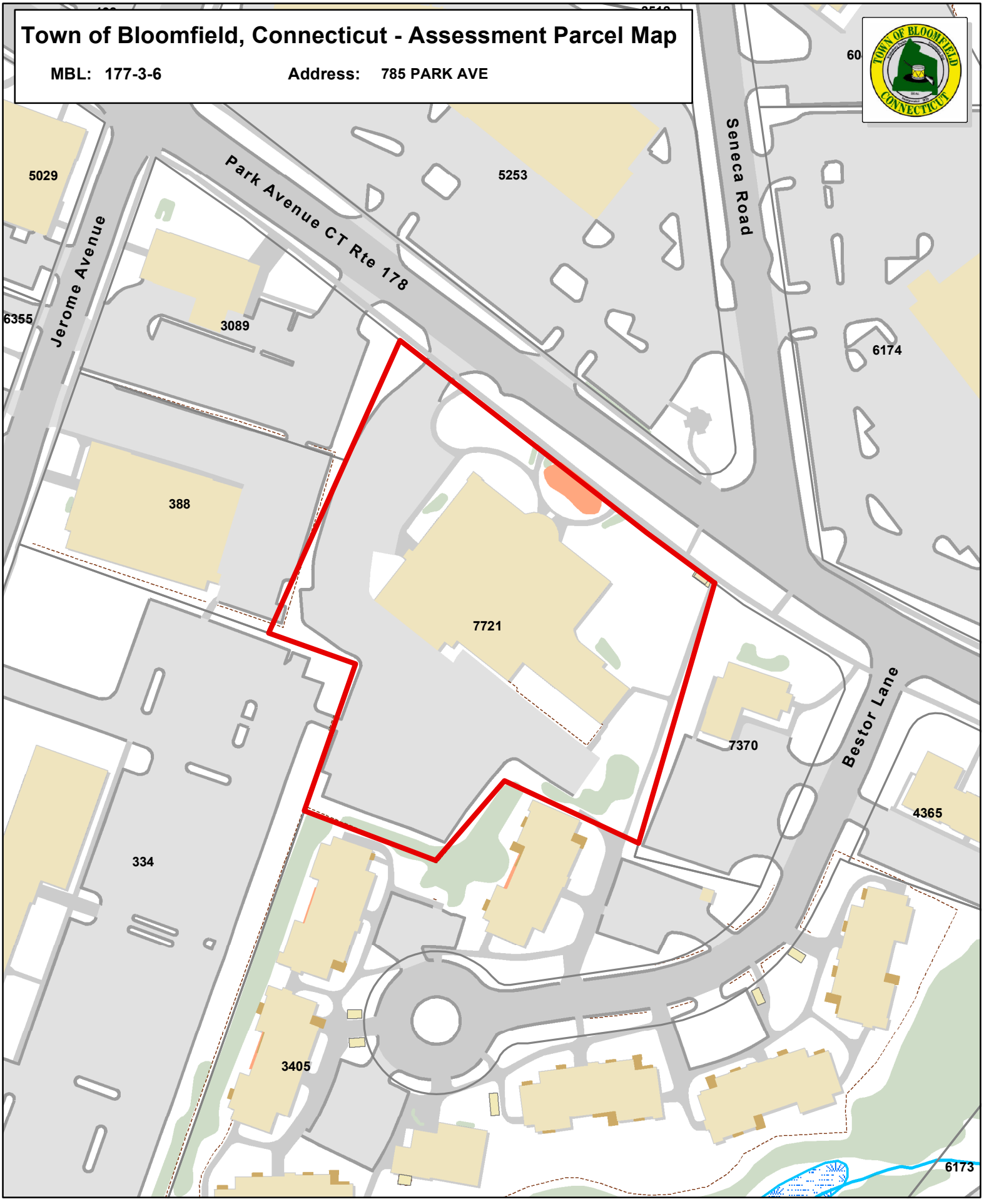
**Shipper:**
Paul Sagristano
CCC
4 Davis Road West
Suite 5
OLD LYME, CT 06371 US

**Reference**
CT52XC024 CSC to LL

Thank you for choosing FedEx.

# Town of Bloomfield, Connecticut - Assessment Parcel Map

**MBL:** 177-3-6 **Address:** 785 PARK AVE




Approximate Scale:

1 inch = 100 feet

Disclaimer:
This map is for informational purposes only.
All information is subject to verification by any user.
The Town of Bloomfield and its mapping contractors
assume no legal responsibility for the information contained herein.

Map Produced July 2017

Parcels labeled by Unique ID

# Town of Bloomfield, CT

## Property Listing Report

Map Block Lot 177-3-6 | Account R90068

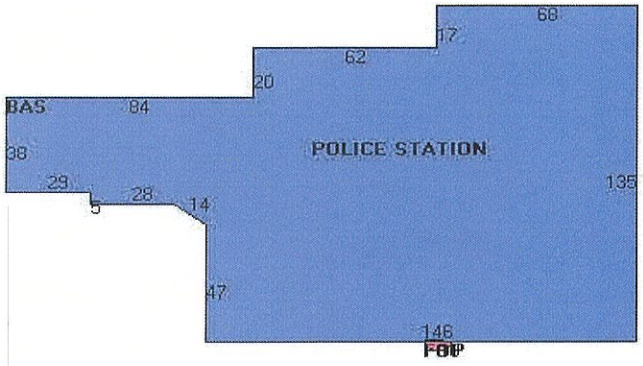
## Property Information

| | |
|---|---|
| Property Location | 785 PARK AVE |
| Owner | BLOOMFIELD TOWN OF |
| Co-Owner | POLICE STATION |
| Mailing Address | 800 BLOOMFIELD AVE.<br>BLOOMFIELD CT 06002 |
| Land Use | 922 Mun Bldg Com |
| Land Class | E |
| Zoning Code | BCD |
| Census Tract | |
| Sub Lot | |

| | |
|---|---|
| Neighborhood | |
| Acreage | 2.25 |
| Utilities | |
| Lot Setting/Desc | |
| Survey Map | |
| Foundation | POURED CONC. |

## Photo

## Sketch




## Primary Construction Details

| | |
|---|---|
| Year Built | 1991 |
| Stories | 1 |
| Building Style | City/Town Hall |
| Building Use | Commercial |
| Building Condition | B |
| Floors | Carpet |
| Total Rooms | |

| | |
|---|---|
| Bedrooms | |
| Full Bathrooms | |
| Half Bathrooms | |
| Bath Style | |
| Kitchen Style | |
| Roof Style | Gable |
| Roof Cover | Asphalt Shingl |

| | |
|---|---|
| Exterior Walls | Concrete |
| Interior Walls | Drywall |
| Heating Type | Forced Air |
| Heating Fuel | Gas |
| AC Type | |
| Gross Bldg Area | 20917 |
| Total Living Area | 20887 |

Report Created On 12/4/2017

# Town of Bloomfield, CT

**Property Listing Report** | Map Block Lot 177-3-6 | Account R90068

## Valuation Summary

(Assessed value = 70% of Appraised Value)

| Item | Appraised | Assessed |
|---|---|---|
| Buildings | 2511900 | 1758330 |
| Extras | 0 | 0 |
| Outbuildings | 0 | 0 |
| Land | 560000 | 392000 |
| Total | 3071900 | 2150330 |

## Outbuilding and Extra Items

| Type | Description |
|---|---|
| | |
| | |
| | |
| | |
| | |
| | |
| | |
| | |
| | |
| | |

## Sub Areas

| Subarea Type | Gross Area (sq ft) | Living Area (sq ft) |
|---|---|---|
| First Floor | 20887 | 20887 |
| Finished Open Porch | 30 | 0 |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| Total Area | 20917 | 20887 |

## Sales History

| Owner of Record | Book/ Page | Sale Date | Sale Price |
|---|---|---|---|
| BLOOMFIELD TOWN OF | 33/ 70 | | 0 |

Report Created On 12/4/2017

# STATE OF CONNECTICUT

***CONNECTICUT SITING COUNCIL***

Ten Franklin Square, New Britain, CT 06051

Phone: (860) 827-2935 Fax: (860) 827-2950

E-Mail: siting.council@ct.gov

Internet: ct.gov/csc

*Daniel F. Caruso*
*Chairman*


May 27, 2010

Thomas F. Flynn III
Site Development Project Manager
Maxton Technology Inc.
1296 Blue Hills Avenue
Bloomfield, CT 06002

RE: **EM-CLEARWIRE-011-100401** – Clearwire Corporation notice of intent to modify an existing telecommunications facility located at 785 Park Avenue, Bloomfield, Connecticut.

Dear Mr. Flynn:

The Connecticut Siting Council (Council) hereby acknowledges your notice to modify this existing telecommunications facility, pursuant to Section 16-50j-73 of the Regulations of Connecticut State Agencies with the following conditions:

- The coax and remote radio heads shall be installed per the structural analysis report dated March 10, 2010 and sealed by Christopher Michael Murphy, P.E.; and

- Not more than 45 days after completion of construction, the Council shall be notified in writing that the coax and remote radio heads were installed as specified.

The proposed modifications are to be implemented as specified here and in your notice dated April 1, 2010, including the placement of all necessary equipment and shelters within the tower compound. The modifications are in compliance with the exception criteria in Section 16-50j-72 (b) of the Regulations of Connecticut State Agencies as changes to an existing facility site that would not increase tower height, extend the boundaries of the tower site, increase noise levels at the tower site boundary by six decibels, and increase the total radio frequencies electromagnetic radiation power density measured at the tower site boundary to or above the standard adopted by the State Department of Environmental Protection pursuant to General Statutes § 22a-162. This facility has also been carefully modeled to ensure that radio frequency emissions are conservatively below State and federal standards applicable to the frequencies now used on this tower.

This decision is under the exclusive jurisdiction of the Council. Please be advised that the validity of this action shall expire one year from the date of this letter. Any additional change to this facility will require explicit notice to this agency pursuant to Regulations of Connecticut State Agencies Section 16-50j-73. Such notice shall include all relevant information regarding the proposed change with cumulative worst-case modeling of radio frequency exposure at the closest point of uncontrolled access to the tower base, consistent with Federal Communications Commission, Office of Engineering and Technology, Bulletin 65. Any deviation from this format may result in the Council implementing enforcement proceedings pursuant to

General Statutes § 16-50u including, without limitation, imposition of expenses resulting from such failure and of civil penalties in an amount not less than one thousand dollars per day for each day of construction or operation in material violation.

Thank you for your attention and cooperation.

Very truly yours,

S. Derek Phelps
Executive Director

SDP/MP/laf

c: The Honorable Sydney Schulman, Mayor, Town of Bloomfield
Louie Chapman, Jr., Town Manager, Town of Bloomfield
Thomas B. Hooper, Director of Planning, Town of Bloomfield

# STATE OF CONNECTICUT

*CONNECTICUT SITING COUNCIL*

Ten Franklin Square, New Britain, CT 06051
Phone: (860) 827-2935 Fax: (860) 827-2950
E-Mail: siting.council@ct.gov
www.ct.gov/csc


April 16, 2010

The Honorable Sydney Schulman
Mayor
Town of Bloomfield
Town Hall
800 Bloomfield Avenue
P. O. Box 337
Bloomfield, CT 06002-0337

RE: **EM-CLEARWIRE-011-100401** – Clearwire Corporation notice of intent to modify an existing telecommunications facility located at 785 Park Avenue, Bloomfield, Connecticut.

Dear Mayor Schulman:

The Connecticut Siting Council (Council) received this request to modify an existing telecommunications facility, pursuant to Regulations of Connecticut State Agencies Section 16-50j-72.

If you have any questions or comments regarding this proposal, please call me or inform the Council by April 30, 2010.

Thank you for your cooperation and consideration.

Very truly yours,

S. Derek Phelps

S. Derek Phelps
Executive Director

SDP/jbw

Enclosure: Notice of Intent

c: Louie Chapman, Jr., Town Manager, Town of Bloomfield
Thomas B. Hooper, Director of Planning, Town of Bloomfield

**EM-CLEARWIRE-011-100401**

April 1, 2010

RECEIVED
APR - 1 2010
CONNECTICUT
SITING COUNCIL

S. Derek Phelps, Executive Director
Connecticut Siting Council ORIGINAL
Ten Franklin Square
New Britain, CT 06051

**Re: Notice of Exempt Modification**
**Clearwire Corporation Notice to make an Exempt Modification to an Existing Facility at 785 Park Avenue, Bloomfield, CT**
**Clearwire Site Number CT-HFD0021**

Dear Mr. Phelps,

Pursuant to Conn. Agency Regulations Sections 16-50j-73 and 16-50j-72(b), Clearwire Corporation (Clearwire) hereby gives notice to the Connecticut Siting Council (Council) and the Town of Wethersfield, CT. of Clearwire's intent to make an exempt modification to an existing monopole tower (tower) located at 785 Park Avenue, Bloomfield, CT. Specifically, Clearwire plans to add three (3) antennas to the tower, one (1) per sector and to add three (3) microwave dishes, one (1) per sector for backhaul at the 95'' AGL. Pursuant to the Council's regulations, (Conn. Agency Regulations Section 16-50j-72(b)), Clearwire's plans do not constitute a modification subject to the Council's review because Clearwire will not change the height of the tower, will not extend the boundaries of the compound, will not increase the noise levels at the site and will not increase the total radio frequency electromagnetic radiation power density at the site to levels above applicable standards. A copy of this notice has been sent to Town Manager Louie Chapman Jr. of the Town of Bloomfield, CT.

Clearwire is currently developing a 4G wireless broadband network to provide high-speed wireless data and VoIP service within the State of Connecticut. Clearwire's 4G service leverages the WiMAX technology to enable enhanced wireless data communications. In order to accomplish the upgrade at this site, Clearwire plans to add three (3) WiMAX antennas, three (3) dishes and to install additional WiMAX related electronic equipment at the base of the tower.

The tower is a 136' lattice tower located at 785 Park Avenue, Bloomfield, Connecticut (Latitude 41 49 42.6 N Longitude 72 44 1W). The monopole is owned by the Town of Bloomfield. Currently, AT&T, Verizon, Nextel and TMO and the Town of Bloomfield are located on the tower, as well as a number of other public service antennas. Presently, Clearwire is not located at the site. Clearwire's base station equipment will be located on the ground next to the tower. A site plan with the tower elevations and site plan specifications is attached.

Clearwire will add three (3) antennas, one (1) to each sector, and mount three (3) microwave dishes, one (1) above each of those antennas. The center line for the microwave dishes will be 55'. Nine coaxial cables will be added to the structure, 2 per antenna and one per microwave dish. These cables will be on the inside of the monopole and bundled so that there

will be no additional wind loading. To confirm that the tower can support these changes, Clearwire commissioned Bay State Design Inc. to perform a structural analysis of the tower and the proposed changes. According to that structural dated September 29, 2009 and attached hereto, the structure is not sufficient to support the proposed loading but will be modified in accordance with the proposed modifications. The tower, with the additions and the modifications will be at less than 48.2% of its capacity.

Within the existing compound, Clearwire will install one (1) WiMAX radio and power cabinet on the existing pad at the site. The new equipment will be adjacent to the existing tower. Excluding brief, construction related noise during the addition of this equipment, the proposed changes to the tower will not increase noise levels at the site.

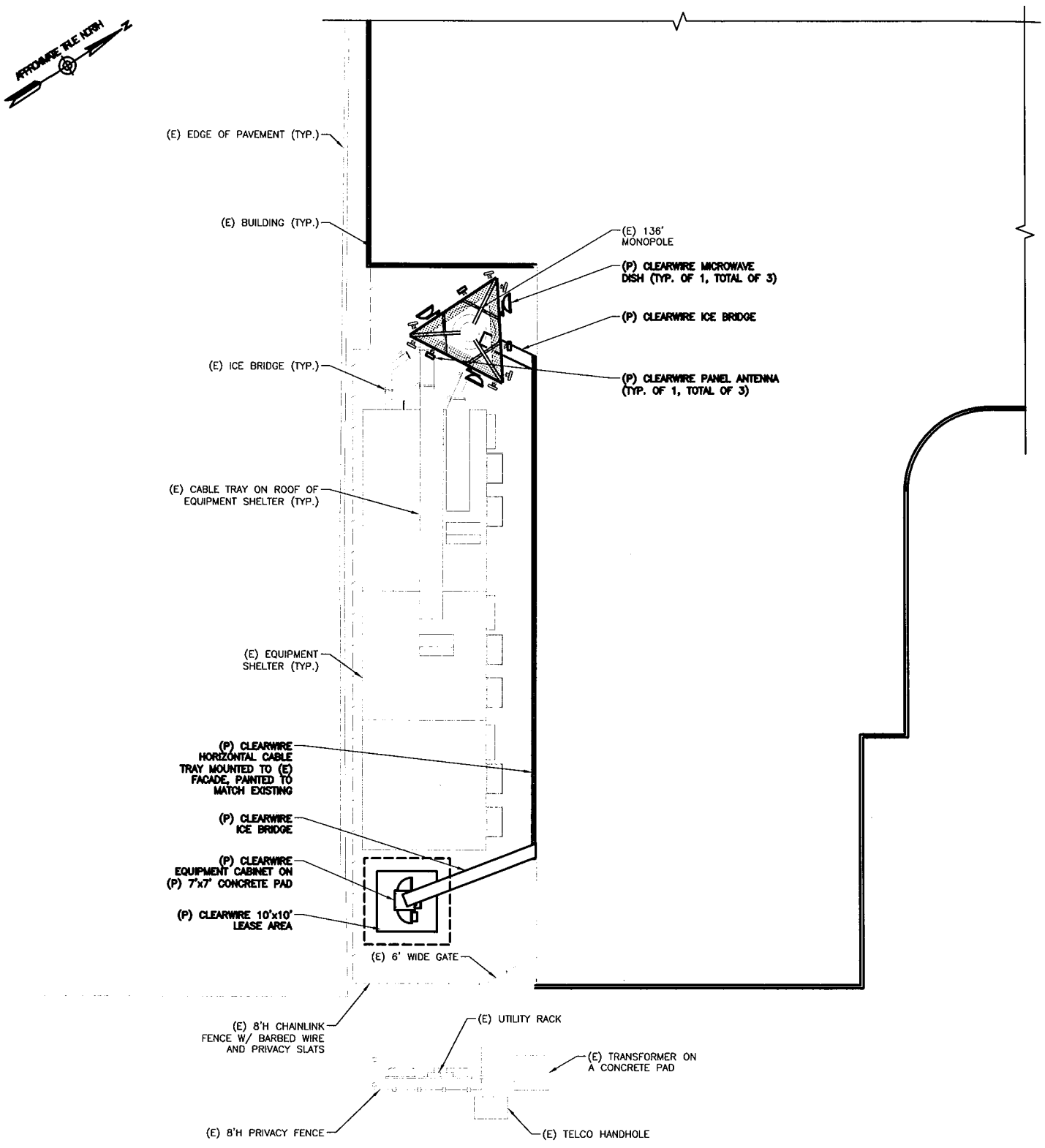
The addition of new WiMAX antennas and microwave dishes will not adversely impact the health and safety of the surrounding community or the people working on the tower. The total radio frequency exposure measured around the base of the tower will be well below the National Council on Radiation Protection and Measurements' (NCRP) standard adopted by the Federal Communications Commission (FCC). The worst case power density analysis for the WiMAX antennas and dishes, measured at the base of the tower, indicates that the WiMAX antennas and dishes will emit .37% of the NCRP's standard for maximum permissible exposure. The cumulative power density analysis indicates that all the antennas on the structure will emit 34.2157% of the NRCP's standard for maximum permissible exposure. Therefore, the power density levels will be well below the FCC mandated radio frequency exposure limits in all locations around the base of the tower. The power density analysis is attached.

In conclusion, Clearwire's proposed plan to add three (3) WiMAX antennas, three (3) microwave dishes and the associated base station equipment does not constitute a modification subject to the Council's jurisdiction because Clearwire will not increase the height of the tower, will not extend the boundaries of the compound at the site, will not increase the noise levels at the site and the radio frequency electromagnetic radiation power density will stay within all applicable standards.

Respectfully Submitted

Thomas F. Flynn III
Site Development Project Manager
Maxton Technology Inc.
1296 Blue Hills Avenue
Bloomfield, CT 06002
508-821-6974
Tom.Flynn@maxtontech.com
Agent for Clearwire Corporation

Cc: Town Manager Louie Chapman Jr.
800 Bloomfield Ave.
Bloomfield CT 06002




## ROOF PLAN

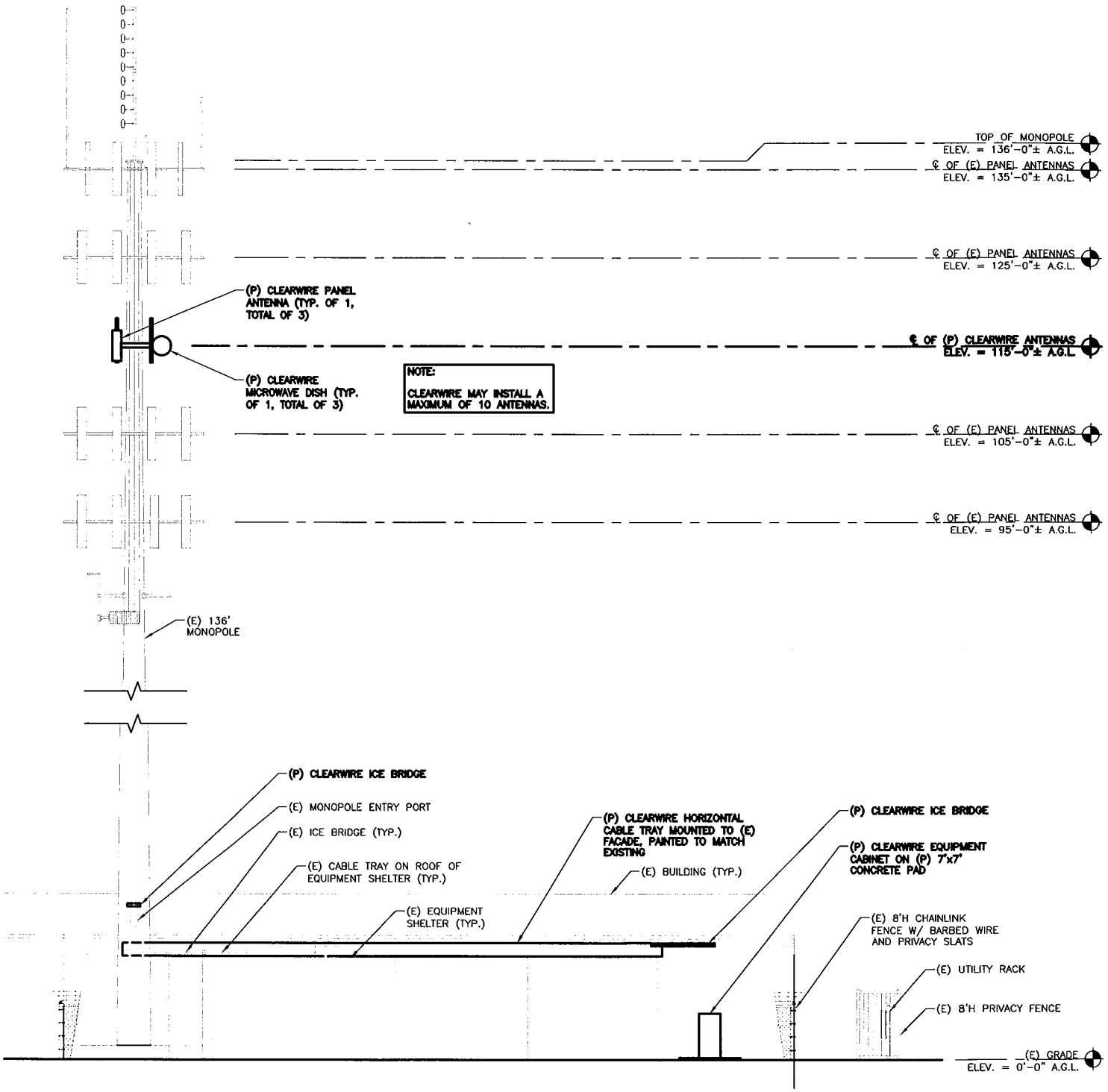
SCALE: N.T.S

1


MAXTON
BAY STATE DESIGN
241 BOSTON POST RD WEST
MARLBOROUGH, MA. 01752
Phone: 508-229-4100
Fax: 508-485-5321
Bay State, Design, Inc.
Architects Engineers
241 BOSTON POST RD WEST
MARLBOROUGH, MA. 01752
Phone: 508-229-4100
Fax: 508-485-5321

clearwire
5808 LAKE WASHINGTON BLVD.
NE SUITE 300
KIRKLAND, WA 98033


| | | | |
|---|---|---|---|
| PROJECT LOCATION: BLOOMFIELD CT-HFD0021C 785 PARK AVE BLOOMFIELD, CT 06002 | SITE TYPE: MONOPOLE | | BSDA PROJ. #: 2908.019 |
| | PROJECT MANAGER: JP | DRAWN BY: PN | SHEET: L1 |
| APPROVED BY: | DATE: 02/26/10 | REVISION: 3 | |




## ELEVATION 1

SCALE: N.T.S


MAXTON
241 BOSTON POST RD WEST
MARLBOROUGH, MA. 01752
Phone: 508-229-4100
Fax: 508-485-5321

BAY STATE DESIGN
Bay State, Design, Inc.
Architects Engineers
241 BOSTON POST RD WEST
MARLBOROUGH, MA. 01752
Phone: 508-229-4100
Fax: 508-485-5321

clearw're
5808 LAKE WASHINGTON BLVD.
NE SUITE 300
KIRKLAND, WA 98033


| | | | |
|---|---|---|---|
| PROJECT LOCATION: BLOOMFIELD CT-HFD0021C 785 PARK AVE BLOOMFIELD, CT 06002 | SITE TYPE: MONOPOLE | | BSDA PROJ. #: 2908.019 |
| | PROJECT MANAGER: JP | DRAWN BY: PN | SHEET: L2 |
| APPROVED BY: | DATE: 02/26/10 | REVISION: 3 | |

BAY STATE
DESIGN

# STRUCTURAL ANALYSIS REPORT

## CT-HFD0021B

785 Park Ave
Bloomfield, CT 06002

clearwire
wireless broadband

September 29, 2009


Gordon Govalet, P.E.

Bay State Design, Inc. 241 Boston Post Road Marlborough, MA 01752 TEL: (508) 229-4100 FAX: (508) 485-5321
Architects • Engineers

**INTRODUCTION:**

The purpose of this analysis is to determine the structural capability of the existing 136'-0" Monopole at 785 Park Avenue in Bloomfield, CT for the proposed loading of the following Clearwire wireless equipment at an elevation of 95'-0":

| | |
|---|---|
| 3 | Argus 2300-2700MHz Remote Tilt Panel Antenna |
| 3 | Samsung WiMAX U-RAS Flexible RRU |
| 3 | Dragonwave 2'-0" Microwave Dish |

In addition, a total of (6) lines of 5/16" coax and (3) lines of ½" coax will be run inside the monopole to the proposed antennas.

**ASSUMPTIONS:**

All engineering services have been performed on the basis that the information used is current and accurate. This information may consist of, but is not necessarily limited to:

- Information supplied by the client regarding the structure itself, the antenna and feed line loading on the structure and its components, or other relevant information.
- Information from drawings in the possession of Bay State Design, Inc., or generated by field inspections or measurements of the structure.

It is the responsibility of the client to ensure that the information provided to Bay State Design, Inc. and used in the performance of our engineering services is correct and complete. In the absence of information to the contrary, BSD assumes that all structures were constructed in accordance with the drawings / specifications and are in good condition and have not significantly changed from the "as new" condition.

All services were performed to codes specified by the client. BSD does not imply to have met any other codes or requirements unless explicitly agreed in writing. If wind and ice loads or other relevant parameters are different from the minimum values recommended by code, the client shall specify the exact requirement.

All services are performed in accordance with generally accepted engineering principles and practices. Bay State Design, Inc., is not responsible for the conclusions, opinions and recommendations made by others based on the information provided.

**REFERENCES:**

This structural analysis was evaluated using RISA Tower, a general-purpose modeling, analysis, and design program created specifically for communications towers in accordance with the following:

- TIA/EIA 222-F Structural Standards for Steel Antenna Tower and Antenna Supporting Structures
- International Building Code 2003 Edition with the CT Supplement
- CT State Building Code 2005

**CONCLUSION:**

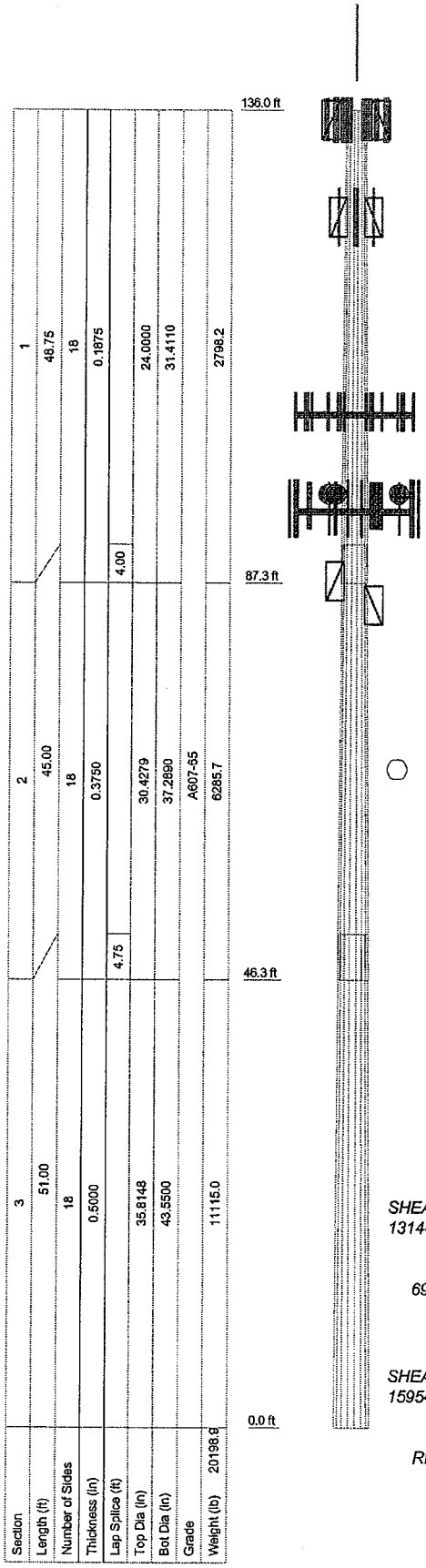
Based on our analysis, Bay State Design, Inc. has concluded the above referenced monopole is sufficient for the proposed loading. No modifications are required. The monopole is rated at 48.2% of its structural capacity. Performed concurrently was an analysis of the tower foundation. The analysis resulted in the following proposed loading:

Axial - 29 kips
Shear - 16 kips
Moment – 1,434 kips

Design loading (Summit Tubular LLC) is:

Axial – 29 kips
Shear – 27 kips
Moment – 2,800 kips

Because the proposed loading does not exceed the design loading, the foundation can be considered structurally sufficient.




| Section | 1 | 2 | 3 |
|---|---|---|---|
| Length (ft) | 48.75 | 45.00 | 51.00 |
| Number of Sides | 18 | 18 | 18 |
| Thickness (in) | 0.1875 | 0.3750 | 0.5000 |
| Lap Splice (ft) | 4.00 | 4.75 | |
| Top Dia (in) | 24.0000 | 30.4279 | 35.8148 |
| Bot Dia (in) | 31.4110 | 37.2890 | 43.5500 |
| Grade | A607-65 | | |
| Weight (lb) | 2798.2 | 6285.7 | 11115.0 |
| 20198.9 | | | |

## DESIGNED APPURTENANCE LOADING

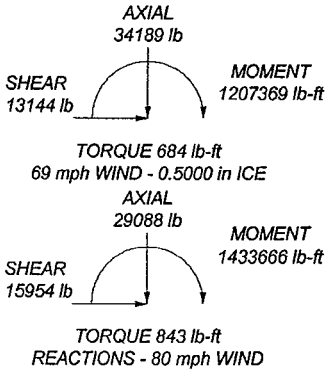
| TYPE | ELEVATION | TYPE | ELEVATION |
|---|---|---|---|
| DB205-A | 135 | (4) DB844H90 | 105 |
| PD1610 | 135 | (4) DB844H90 | 105 |
| ANT450D6-9 | 135 | 14' Low Profile Platform (Monopole) | 95 |
| ANT450F6 | 135 | | |
| 2' Standoff T-Arm (5' face width) | 135 | 6' Panel Antenna | 95 |
| 2' Standoff T-Arm (5' face width) | 135 | 6' Panel Antenna | 95 |
| 2' Standoff T-Arm (5' face width) | 135 | 6' Panel Antenna | 95 |
| APX16DWV-16DWVS-C-A20 | 135 | 6' Panel Antenna | 95 |
| APX16DWV-16DWVS-C-A20 | 135 | 6' Panel Antenna | 95 |
| APX16DWV-16DWVS-C-A20 | 135 | 6' Panel Antenna | 95 |
| APX16PV-16PVL-C | 135 | LLPX310R | 95 |
| APX16PV-16PVL-C | 135 | LLPX310R | 95 |
| APX16PV-16PVL-C | 135 | LLPX310R | 95 |
| (2) ATMAA142112D-1A20 (TMA) | 135 | U-RAS | 95 |
| | | U-RAS | 95 |
| (2) ATMAA142112D-1A20 (TMA) | 135 | U-RAS | 95 |
| | | 3"x 5.5' pipe | 95 |
| (2) ATMAA142112D-1A20 (TMA) | 135 | 3"x 5.5' pipe | 95 |
| | | 3"x 5.5' pipe | 95 |
| 1' Side Mount Standoff | 125 | DragonWave | 95 |
| 1' Side Mount Standoff | 125 | DragonWave | 95 |
| 1' Side Mount Standoff | 125 | DragonWave | 95 |
| APXV18-206517S-C-ACU | 125 | 1' Side Mount Standoff | 87.5 |
| APXV18-206517S-C-ACU | 125 | SRL312 | 87.5 |
| APXV18-206517S-C-ACU | 125 | 1' Side Mount Standoff | 85 |
| 14' Low Profile Platform (Monopole) | 105 | DB205-A | 85 |
| (4) DB844H90 | 105 | 1' Side Mount Standoff | 82.5 |
| | | MF-900B | 82.5 |

## MATERIAL STRENGTH

| GRADE | Fy | Fu | GRADE | Fy | Fu |
|---|---|---|---|---|---|
| A607-65 | 65 ksi | 80 ksi | | | |

## TOWER DESIGN NOTES

1. Tower is located in Hartford County, Connecticut.
2. Tower designed for a 80 mph basic wind in accordance with the TIA/EIA-222-F Standard.
3. Tower is also designed for a 69 mph basic wind with 0.50 in ice.
4. Deflections are based upon a 60 mph wind.
5. TOWER RATING: 48.2%





**Bay State Design**
241 Boston Post Road West
Marlborough, MA 01752
Phone: (508) 229-4100
FAX: (508) 485-5321


| | | | |
|---|---|---|---|
| Job: CT-HFD0021A | | | |
| Project: 136' Monopole | | | |
| Client: Clearwire CT | Drawn by: kw | App'd: | |
| Code: TIA/EIA-222-F | Date: 09/29/09 | Scale: NTS | |
| Path: N:\PROJECTS\Clearwire-CT\CT-HFD0021A\CT-HFD0021A.eri | | Dwg No. E-1 | |

CLEAR

4400 Carillon Point
Kirkland, WA 98033

To: Maxton
From: Frantz Pierre – Radio Frequency Engineer
Cc: Micah Hawthorne
Subject: Power Density Report for CT-HFD0021
Date: March 29, 2010

---

**1. Introduction:**

This report is the result of Electromagnetic Field Intensities (EMF – Power Densities) study for the Clearwire broadband antenna installation on a Steel Monopole at 785 Park Avenue, Bloomfield, CT, 06002. This study incorporates the most conservative consideration for determining the practical combined worst case power density levels that would be theoretically encountered from locations surrounding the transmitting location:

**2: Discussion:**

The following assumptions were used in the calculations:

1) The emissions from Clearwire transmitters are in the (2496 – 2960) Frequency Band
2) The emissions from the Clearwire Microwave dishes are in the 11 GHz Frequency Band
3) The model number for Clearwire Antenna is Argus LLPX310R
4) The model number for the Microwave dish is Andrew VHLP2-23 with 24" Diameter.
5) The Clearwire Panel antenna centerline is 115 feet.
6) The Clearwire Microwave dish centerline is 115 feet.
7) The Maximum Transmit power from any Clearwire panel antenna is 251 Watts Effective Isotropic Radiated Power (EiRP) assuming 2 channels per sector.
8) The Maximum Transmit power from any Clearwire Microwave Dish is 346 Watts Effective Isotropic Radiated Power (EiRP) assuming 1 channel per dish.
9) All antennas are simultaneously transmitting and receiving 24 hours per day.
10) The average ground level of the studied area does not change significantly with respect to the transmitting location.

Equations given in "FCC OET Bulletin 65, Edition 97-01" were used with the above information to perform the calculations.

**3: Conclusion:**

Based on the above worst case assumptions, the power density calculation from the Clearwire antenna installation on a Steel Monopole at 785 Park Avenue, Bloomfield, CT, 06002 is 0.003667 $mW/cm^2$. This value represents 0.37% of the Maximum Permissible Exposure (MPE) standard of 1 milliwatt per square centimeter ($mW/cm^2$) set forth in the FCC/ANSI/IEEE C95-1-1991. Furthermore, the proposed antenna location for Clearwire will not interfere with existing public safety communications, AM or FM radio broadcasts, TV, Police Communications, HAM Radio communications or any other signals in the area.

The combined Power Density from all other carriers is 33.8457%. The combined Power Density for this site is 34.2157% of the M.P.E. standard.

EBI Consulting
environmental | engineering | due diligence

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

SPRINT Existing Facility

Site ID: CT52XC024

Bloomfield Police Department
785 Park Avenue
Bloomfield, CT 06002

**November 3, 2017**

**EBI Project Number: 6217004879**

| Site Compliance Summary | |
|---|---|
| Compliance Status: | COMPLIANT |
| Site total MPE% of FCC general population allowable limit: | 12.21 % |

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

EBI Consulting
environmental | engineering | due diligence

November 3, 2017

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

Emissions Analysis for Site: **CT52XC024 – Bloomfield Police Department**

EBI Consulting was directed to analyze the proposed SPRINT facility located at **785 Park Avenue, Bloomfield, CT**, for the purpose of determining whether the emissions from the Proposed SPRINT Antenna Installation located on this property are within specified federal limits.

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

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

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

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

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

Additional details can be found in FCC OET 65.

## CALCULATIONS

Calculations were done for the proposed SPRINT Wireless antenna facility located at **785 Park Avenue, Bloomfield, 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 **115 feet** above ground level (AGL) for **Sector A**, **115 feet** above ground level (AGL) for **Sector B** and **115 feet** above ground level (AGL) for Sector C.

10) Emissions values for additional carriers were taken from the Connecticut Siting Council active database. Values in this database are provided by the individual carriers themselves.

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

## SPRINT Site Inventory and Power Data by Antenna

| Sector: | A | Sector: | B | Sector: | C |
|---|---|---|---|---|---|
| Antenna #: | **1** | Antenna #: | **1** | Antenna #: | **1** |
| Make / Model: | 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): | **115 feet** | Height (AGL): | **115 feet** | Height (AGL): | **115 feet** |
| Frequency Bands | 850 MHz / 1900 MHz (PCS) / 2500 MHz | Frequency Bands | 850 MHz / 1900 MHz (PCS) / 2500 MHz | Frequency Bands | 850 MHz / 1900 MHz (PCS) / 2500 MHz |
| Channel Count | 18 | Channel Count | 18 | Channel Count | 18 |
| Total TX Power(W): | 380 Watts | Total TX Power(W): | 380 Watt | Total TX Power(W): | 380 Watt |
| ERP (W): | 11,775.31 | ERP (W): | 11,775.31 | ERP (W): | 11,775.31 |
| Antenna A1 MPE% | **3.86 %** | Antenna B1 MPE% | **3.86 %** | Antenna C1 MPE% | **3.86 %** |

| Site Composite MPE% | |
|---|---|
| **Carrier** | **MPE%** |
| SPRINT – Max per sector | **3.86 %** |
| Police UHF | 0.07 % |
| Police Back up repeater | 0.10 % |
| Hartford Co. Fire | 0.08 % |
| State Police | 0.36 % |
| NPSAC | 0.01 % |
| RAFS | 0.12 % |
| Verizon Wireless | 5.42 % |
| Nextel | 1.10 % |
| Clearwire | 0.11 % |
| T-Mobile | 0.98 % |
| **Site Total MPE %:** | **12.21 %** |

| | |
|---|---|
| SPRINT Sector A Total: | 3.86 % |
| SPRINT Sector B Total: | 3.86 % |
| SPRINT Sector C Total: | 3.86 % |
| | |
| Site Total: | 12.21 % |

| SPRINT _ Max Values per Frequency Band / Technology Per Sector | # Channels | Watts ERP (Per Channel) | Height (feet) | Total Power Density ($\mu W/cm^2$) | Frequency (MHz) | Allowable MPE ($\mu W/cm^2$) | Calculated % MPE |
|---|---|---|---|---|---|---|---|
| Sprint 850 MHz CDMA | 1 | 432.54 | 115 | 1.31 | 850 MHz | 567 | 0.23% |
| Sprint 850 MHz LTE | 2 | 432.54 | 115 | 2.62 | 850 MHz | 567 | 0.46% |
| Sprint 1900 MHz (PCS) CDMA | 5 | 535.94 | 115 | 8.11 | 1900 MHz (PCS) | 1000 | 0.81% |
| Sprint 1900 MHz (PCS) LTE | 2 | 1,339.86 | 115 | 8.11 | 1900 MHz (PCS) | 1000 | 0.81% |
| Sprint 2500 MHz (BRS) LTE | 8 | 639.78 | 115 | 15.49 | 2500 MHz (BRS) | 1000 | 1.55% |
| | | | | | | **Total:** | **3.86%** |

## Summary

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

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

| SPRINT Sector | Power Density Value (%) |
|---|---|
| Sector A: | 3.86 % |
| Sector B: | 3.86 % |
| Sector C: | 3.86 % |
| SPRINT Maximum Total (per sector): | 3.86 % |
| | |
| Site Total: | 12.21 % |
| | |
| Site Compliance Status: | **COMPLIANT** |

The anticipated composite MPE value for this site assuming all carriers present is **12.21 %** of the allowable FCC established general population limit sampled at the ground level. This is based upon values listed in the Connecticut Siting Council database for existing carrier emissions.

FCC guidelines state that if a site is found to be out of compliance (over allowable thresholds), that carriers over a 5% contribution to the composite value will require measures to bring the site into compliance. For this facility, the composite values calculated were well within the allowable 100% threshold standard per the federal government.

MASER CONSULTING
— CONNECTICUT —

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Sprint®

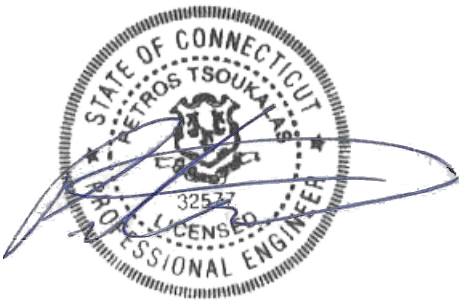
***Rev 0***

# ***Monopole Structural Analysis***

***Site Name:*** *Bloomfield Police Department*
***Site ID:*** *CT52XC024*

***Site Address:*** *785 Park Avenue*
*Bloomfield, CT 06002*
*Hartford County*
***Maser Project Number:*** *17924009A*
*October 23, 2017*

| ***Analysis Type*** | *Monopole Tower* | *Foundation* |
|---|---|---|
| ***Pass/Fail*** | *Pass* | *Adequate* |
| ***Mount Utilization*** | *86.5%* | *N/A* |




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

## Objective:

The objective of this report is to determine the capacity of the existing 136' Monopole tower structure at the subject facility for the final **SPRINT** wireless telecommunications configuration, per the applicable codes and standards.

## Introduction:

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

- RFDS 63853 provided by Sprint, dated April 6, 2017.
- Construction Drawings prepared by Maser Consulting Connecticut, Project# 17924009A, dated October 20, 2017.
- Previous Structural Analysis report prepared by Hudson Design Group, dated May 31, 2017.
- Previous Structural Analysis report prepared by CENTEK Engineering, Inc, date July 14, 2015.

The existing structure is an existing 136'-0'', three-section, eighteen-sided, tapered Monopole tower originally designed and manufactured by PennSummit Tubular, LLC. The manufacturer's drawings and calculations were unavailable for use in this report. The tower geometry and structure member sizes were all obtained from the referenced report prepared by Hudson Design Group, dated May 31, 2017. The foundation information was obtained from the referenced report prepared by CENTEK Engineering, Inc, date July 14, 2015. The existing **SPRINT** equipment is supported on existing dual stand-off mounts at a centerline of approximately 115'-0" above ground level. The **SPRINT** stand-off mounts will be analyzed under a separate report. This report is based upon this information, as well as the information obtained in the field.

## Discrete and Linear Appurtenances:

Maser Consulting Connecticut understands the existing & proposed **SPRINT** loading to be as follows:

- **(3) KMW ETCR-654L12H6 Panel Antenna (Proposed per RFDS)**
- **(3) ALU RRH-4x45 1900 RRH (Proposed per RFDS)**
- **(6) ALU RRH-2x50-800 RRH (Proposed per RFDS)**
- **(3) ALU TD-RRH-8x20-25 RRH (Proposed per RFDS)**
- (3) Andrew VHLP1 Dish (Existing)
- (2) 3''Ø flex conduits (Existing)
- **(4) Hybrid Cable (Proposed)**

The overall antenna loading is found in the Appendix A of this report.

## Tower Member Information:

See the material Take-Off sheet in appendix A for Monopole Tower information.

## Codes, Standards and Loading:

Maser Consulting Connecticut utilized the following codes and standards:

- 2016 Connecticut State Building Code, Incorporating The 2012 IBC
- Structural Standards for Antenna Supporting Structures and Antennas ANSI/TIA-222-G
    - Basic Wind Speed – 98 mph
    - Service Wind Speed – 60 mph
    - Ice Wind Speed – 40 mph (1.0'' Ice)
    - Exposure Category – B
    - Structure Class – II
    - Topographic Category - 1

## Analysis Approach & Assumptions:

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

The following assumptions were utilized in this report:

- Structural Steel for the monopole sections are assumed to be A607-65 Grade.
- Structural Anchor Bolts are assumed to be A615-75 grade.
- No physical deterioration has occurred in any of the structural components of the monopole and all the tower members have the same capacity as the day they were erected.
- The existing tower foundations are assumed to have been constructed per the original design drawings. As such the calculated foundation capacities are used for comparison to the base reactions of this analysis.
- It is assumed that the telecommunication equipment supports, antenna supports, and existing structure have been designed by a registered licensed professional engineer for the existing loads acting on the structure, as required by all applicable codes, prior to the proposed modifications listed within this report.
- It is assumed that information provided by the client regarding the structure itself, the antenna models, feed lines, and other relevant information is current and correct.
- It is assumed all other existing appurtenances, antennas, cables, etc. belonging to others have been installed and supported per code and per specifications so as not to damage any existing structural support members, and that any contributing loads from adjacent equipment has been taken into consideration for their design.

## Calculations:

The calculations are found in Appendix A of this report.

## Conclusion:

The existing Monopole tower was analyzed for the loading in the applicable codes and standards. The tower has been determined to be structurally **ADEQUATE** to support the proposed and existing antennas, based upon the aforementioned assumptions. The Monopole tower has been determined to be stressed to a maximum of **86.5%** of its structural capacity with the maximum usage occurring at the base plate.

Additionally, the base reactions have been compared to the previous structural analyses. It is assumed that the foundations and capacities noted in the previous structural analysis by CENTEK Engineering are accurate. Based on the comparison of the capacities to the base reactions of this analysis, the existing concrete foundations have been determined to have **ADEQUATE** structural capacity. Therefore, the proposed **SPRINT** installation **CAN** be placed as intended.

**Foundation Reaction Comparison:**

| | **Capacity*** | **Current Reactions** | **Pass/Fail** |
|---|---|---|---|
| Moment Capacity | 4619 ft-k | 3281 ksf | **Pass** |
| Axial Capacity | 12174.8 kips | 232.7 kips | **Pass** |

* *Capacities were calculated in the structural analysis by* CENTEK Engineering

It should be noted that due to a lack of information Maser Consulting Connecticut did not perform an analysis on the foundation, but a comparison of the capacities summarized in previous analysis with the current forces has been determined. If information is provided then this report can be amended. The conclusions reached by Maser Consulting Connecticut in this evaluation are only applicable for the existing structural members supporting the proposed **SPRINT** telecommunications installation described herein.

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

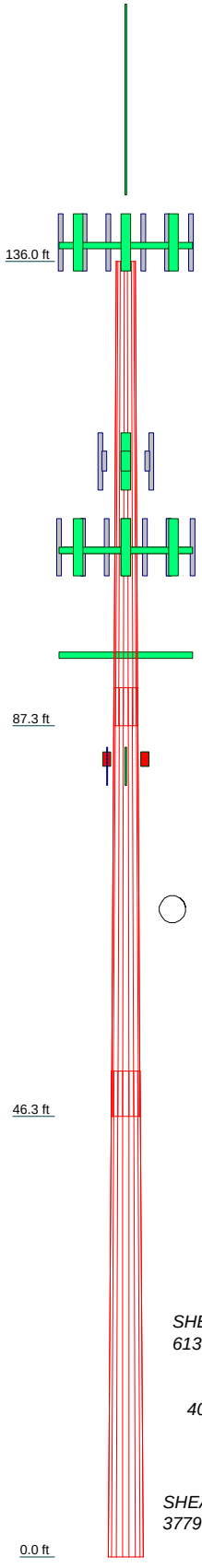
Sincerely,
Maser Consulting Connecticut

Petros E. Tsoukalas, P.E.
Telecommunications Discipline Leader

Bintao Qin, E.I.T.
Structural Engineer

# APPENDIX A

| Section | Length (ft) | Number of Sides | Thickness (in) | Socket Length (ft) | Top Dia (in) | Bot Dia (in) | Grade | Weight (lb) |
|---|---|---|---|---|---|---|---|---|
| 1 | 48.75 | 18 | 0.1875 | 4.00 | 23.0000 | 30.7000 | | 2763.8 |
| 2 | 45.00 | 18 | 0.3750 | 4.75 | 29.6932 | 36.8100 | A607-65 | 6291.6 |
| 3 | 51.00 | 18 | 0.5000 | | 35.3088 | 43.3600 | | 11230.2 |
| | | | | | | | | 20285.7 |




*ALL REACTIONS ARE FACTORED*

*AXIAL 86440 lb*

*SHEAR 6135 lb*

*MOMENT 586 kip-ft*

*TORQUE 1 kip-ft*
*40 mph WIND - 1.0000 in ICE*

*AXIAL 41800 lb*

*SHEAR 37796 lb*

*MOMENT 3281 kip-ft*

*TORQUE 10 kip-ft*
*REACTIONS - 98 mph WIND*

## DESIGNED APPURTENANCE LOADING

| TYPE | ELEVATION | TYPE | ELEVATION |
|---|---|---|---|
| 20' Dipole | 143 | ALU RRH-4X45-1900 (Sprint) | 115 |
| PTP 400 | 142 | ALU RRH-4X45-1900 (Sprint) | 115 |
| 3"x4.5' Pipe | 140 | TD-RRH8x20-25 (Sprint) | 115 |
| (2) Ericsson AIR21 with 6' pipe (T-Mobile) | 138 | TD-RRH8x20-25 (Sprint) | 115 |
| | | TD-RRH8x20-25 (Sprint) | 115 |
| (2) Ericsson AIR21 with 6' pipe (T-Mobile) | 138 | BXA-70063-6CF-EDIN-X (Verizon) | 106 |
| (2) Ericsson AIR21 with 6' pipe (T-Mobile) | 138 | BXA-80063-4BF W/ Mount Pipe (Verizon) | 106 |
| LNX-6515DS-VTM (T-Mobile) | 138 | BXA-80063-4BF W/ Mount Pipe (Verizon) | 106 |
| LNX-6515DS-VTM (T-Mobile) | 138 | SLCP 2x6014 (Verizon) | 106 |
| LNX-6515DS-VTM (T-Mobile) | 138 | SLCP 2x6014 (Verizon) | 106 |
| KRY 112 71 (T-Mobile) | 138 | SLCP 2x6014 (Verizon) | 106 |
| KRY 112 71 (T-Mobile) | 138 | B13 RRH4x30 (Verizon) | 106 |
| KRY 112 71 (T-Mobile) | 138 | B13 RRH4x30 (Verizon) | 106 |
| RRUS-11 (T-Mobile) | 138 | B13 RRH4x30 (Verizon) | 106 |
| RRUS-11 (T-Mobile) | 138 | B4 RRH 2x60-4R (Verizon) | 106 |
| RRUS-11 (T-Mobile) | 138 | B4 RRH 2x60-4R (Verizon) | 106 |
| Pirod 13' Platform w/ Handrail | 138 | B4 RRH 2x60-4R (Verizon) | 106 |
| Valmont Light Duty Tri-Bracket (Sprint) | 115 | DB-T1-6Z-8ZB-0Z (Verizon) | 106 |
| Dual Standoff Mount (Sprint) | 115 | DB-T1-6Z-8ZB-0Z (Verizon) | 106 |
| Dual Standoff Mount (Sprint) | 115 | Pirod 13' Platform w/ Handrail (Verizon) | 106 |
| Dual Standoff Mount (Sprint) | 115 | SBNHH-1D65A (Verizon) | 106 |
| ETCR-654L12H6 W/Pipe Mount (Sprint) | 115 | SBNHH-1D65A (Verizon) | 106 |
| ETCR-654L12H6 W/Pipe Mount (Sprint) | 115 | SBNHH-1D65A (Verizon) | 106 |
| ETCR-654L12H6 W/Pipe Mount (Sprint) | 115 | Pirod 13' Platform w/ Handrail | 95 |
| (2) RRH-2X50-800 (Sprint) | 115 | PTP 400 | 83 |
| (2) RRH-2X50-800 (Sprint) | 115 | 3"x4.5' Pipe | 83 |
| (2) RRH-2X50-800 (Sprint) | 115 | 3"x4.5' Pipe | 83 |
| ALU RRH-4X45-1900 (Sprint) | 115 | PTP 400 | 83 |
| | | 3"x4.5' Pipe | 83 |
| | | PTP 400 | 83 |

## MATERIAL STRENGTH

| GRADE | Fy | Fu | GRADE | Fy | Fu |
|---|---|---|---|---|---|
| A607-65 | 65 ksi | 80 ksi | | | |

## TOWER DESIGN NOTES

1. Tower is located in Hartford County, Connecticut.
2. Tower designed for Exposure B to the TIA-222-G Standard.
3. Tower designed for a 98 mph basic wind in accordance with the TIA-222-G Standard.
4. Tower is also designed for a 40 mph basic wind with 1.00 in ice. Ice is considered to increase in thickness with height.
5. Deflections are based upon a 60 mph wind.
6. Tower Structure Class II.
7. Topographic Category 1 with Crest Height of 0.00 ft
8. TOWER RATING: 86.5%


MASER CONSULTING P.A.
Consulting Engineers

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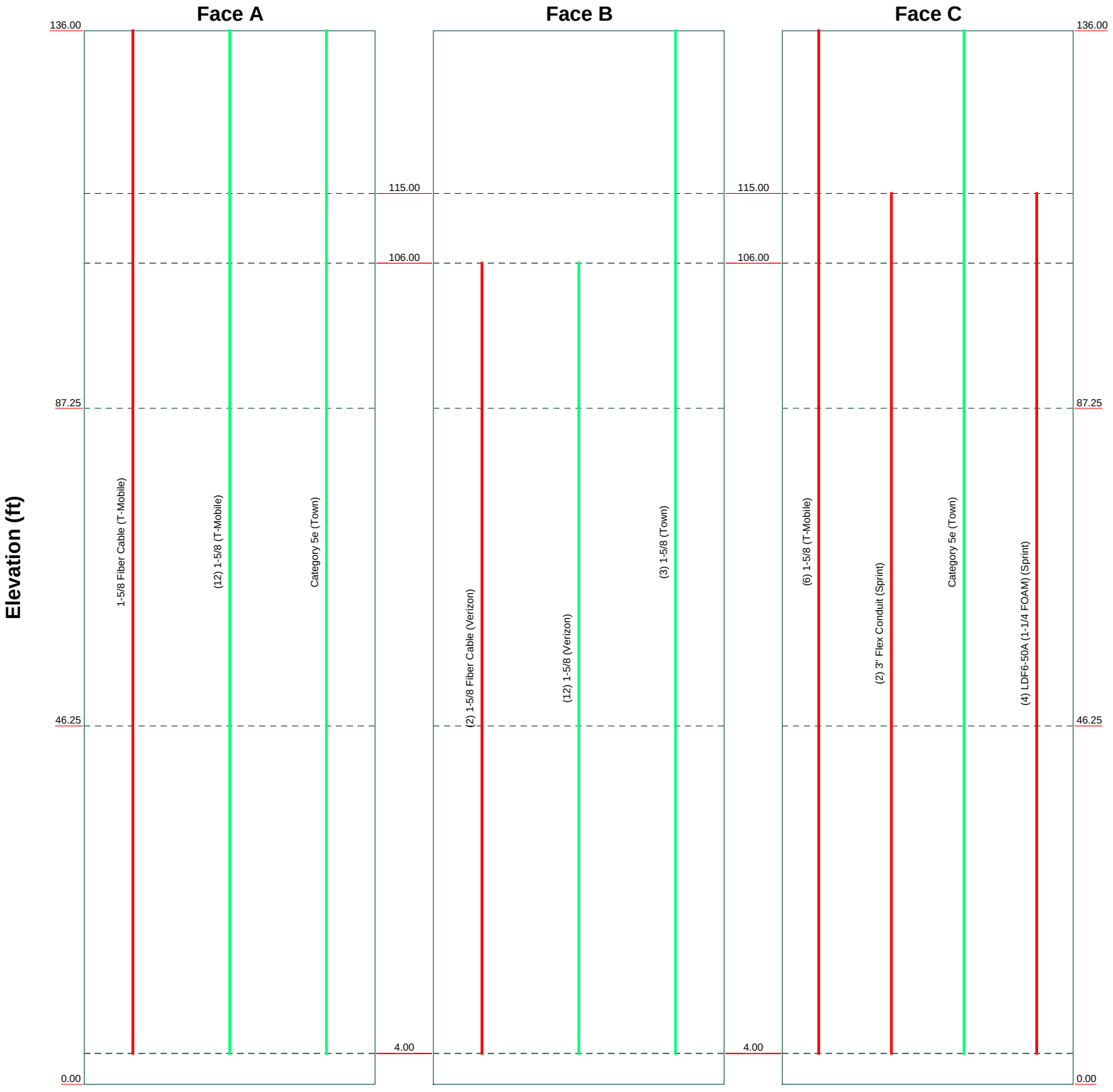
6240 Old Dobbin Lane, Suite 150
Columbia, MD 21045
Phone: 877.627.3772
FAX: 732.383.1984


| | | | |
|---|---|---|---|
| Job: ***17924009A*** | | | |
| Project: ***Bloomfield Police Department*** | | | |
| Client: Sprint | Drawn by: BQin | App'd: | |
| Code: TIA-222-G | Date: 10/23/17 | Scale: NTS | |
| Path: \\MTCAD01\Projects\2017\17924000A\17924009A\Structural\Rev 0\TNX\CT52XC024.eri | | Dwg No. E-1 | |

# Feed Line Distribution Chart
## 0' - 136'

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





Consulting Engineers

***Maser Consulting P.A.***
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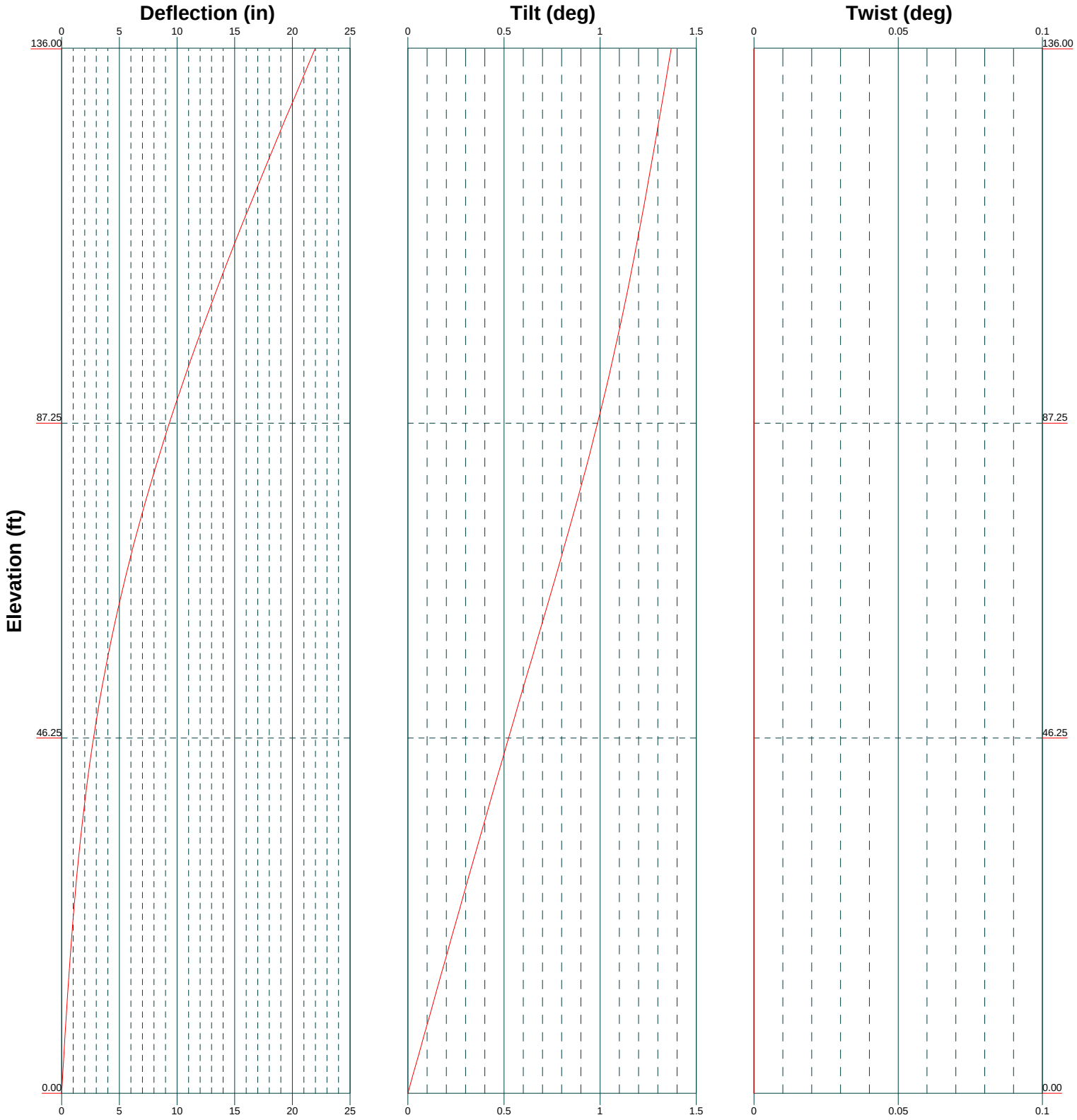
Columbia, MD 21045
Phone: 877.627.3772
FAX: 732.383.1984


| | | | |
|---|---|---|---|
| Job: ***17924009A*** | | | |
| Project: ***Bloomfield Police Department*** | | | |
| Client: Sprint | Drawn by: BQin | App'd: | |
| Code: TIA-222-G | Date: 10/23/17 | Scale: NTS | |
| Path: \\MTCAD01\Projects\2017\17924000A\17924009A\Structural\Rev 0\TNX\CT52XC024.eri | | Dwg No. E-7 | |

## TIA-222-G - Service - 60 mph

**Maximum Values**





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| | | | |
|---|---|---|---|
| Job: ***17924009A*** | | | |
| Project: ***Bloomfield Police Department*** | | | |
| Client: Sprint | Drawn by: BQin | App'd: | |
| Code: TIA-222-G | Date: 10/23/17 | Scale: NTS | |
| Path: \\MTCAD01\Projects\2017\17924000A\17924009A\Structural\Rev 0\TNX\CT52XC024.eri | | Dwg No. E-5 | |

# Tower Input Data

There is a pole section.
This tower is designed using the TIA-222-G standard.
The following design criteria apply:

Tower is located in Hartford County, Connecticut.
Basic wind speed of 98 mph.
Structure Class II.
Exposure Category B.
Topographic Category 1.
Crest Height 0.00 ft.
Nominal ice thickness of 1.0000 in.
Ice thickness is considered to increase with height.
Ice density of 56 pcf.
A wind speed of 40 mph is used in combination with ice.
Temperature drop of 50 °F.
Deflections calculated using a wind speed of 60 mph.
A non-linear (P-delta) analysis was used.
Pressures are calculated at each section.
Stress ratio used in pole design is 1.
Local bending stresses due to climbing loads, feed line supports, and appurtenance mounts are not considered.

# Options

| | | | | | |
|---|---|---|---|---|---|
| | Consider Moments - Legs | | Distribute Leg Loads As Uniform | | Use ASCE 10 X-Brace Ly Rules |
| | Consider Moments - Horizontals | | Assume Legs Pinned | | Calculate Redundant Bracing Forces |
| | Consider Moments - Diagonals | | Assume Rigid Index Plate | | Ignore Redundant Members in FEA |
| | Use Moment Magnification | | Use Clear Spans For Wind Area | | SR Leg Bolts Resist Compression |
| √ | Use Code Stress Ratios | | Use Clear Spans For KL/r | | All Leg Panels Have Same Allowable |
| √ | Use Code Safety Factors - Guys | | Retension Guys To Initial Tension | | Offset Girt At Foundation |
| | Escalate Ice | √ | Bypass Mast Stability Checks | √ | Consider Feed Line Torque |
| | Always Use Max Kz | √ | Use Azimuth Dish Coefficients | | Include Angle Block Shear Check |
| | Use Special Wind Profile | | Project Wind Area of Appurt. | | Use TIA-222-G Bracing Resist. Exemption |
| | Include Bolts In Member Capacity | | Autocalc Torque Arm Areas | | Use TIA-222-G Tension Splice Exemption |
| | Leg Bolts Are At Top Of Section | | Add IBC .6D+W Combination | | Poles |
| | Secondary Horizontal Braces Leg | | Sort Capacity Reports By Component | | Include Shear-Torsion Interaction |
| | Use Diamond Inner Bracing (4 Sided) | | Triangulate Diamond Inner Bracing | | Always Use Sub-Critical Flow |
| | SR Members Have Cut Ends | | Treat Feed Line Bundles As Cylinder | | Use Top Mounted Sockets |
| | SR Members Are Concentric | | | | |

# Tapered Pole Section Geometry

| *Section* | *Elevation* | *Section Length* | *Splice Length* | *Number of Sides* | *Top Diameter* | *Bottom Diameter* | *Wall Thickness* | *Bend Radius* | *Pole Grade* |
|---|---|---|---|---|---|---|---|---|---|
| | *ft* | *ft* | *ft* | | *in* | *in* | *in* | *in* | |
| L1 | 136.00-87.25 | 48.75 | 4.00 | 18 | 23.0000 | 30.7000 | 0.1875 | 0.7500 | A607-65 (65 ksi) |
| L2 | 87.25-46.25 | 45.00 | 4.75 | 18 | 29.6932 | 36.8100 | 0.3750 | 1.5000 | A607-65 (65 ksi) |

| Section | Elevation<br>ft | Section Length<br>ft | Splice Length<br>ft | Number of Sides | Top Diameter<br>in | Bottom Diameter<br>in | Wall Thickness<br>in | Bend Radius<br>in | Pole Grade |
|---|---|---|---|---|---|---|---|---|---|
| L3 | 46.25-0.00 | 51.00 | | 18 | 35.3088 | 43.3600 | 0.5000 | 2.0000 | A607-65 (65 ksi) |

## Tapered Pole Properties

| Section | Tip Dia.<br>in | Area<br>$in^2$ | I<br>$in^4$ | r<br>in | C<br>in | I/C<br>$in^3$ | J<br>$in^4$ | It/Q<br>$in^2$ | w<br>in | w/t |
|---|---|---|---|---|---|---|---|---|---|---|
| L1 | 23.3548 | 13.5763 | 892.6152 | 8.0984 | 11.6840 | 76.3964 | 1786.4050 | 6.7894 | 3.7180 | 19.829 |
| | 31.1736 | 18.1588 | 2135.8907 | 10.8319 | 15.5956 | 136.9547 | 4274.5918 | 9.0811 | 5.0732 | 27.057 |
| L2 | 30.7936 | 34.8960 | 3789.5512 | 10.4080 | 15.0841 | 251.2274 | 7584.0888 | 17.4513 | 4.5660 | 12.176 |
| | 37.3779 | 43.3668 | 7273.3077 | 12.9344 | 18.6995 | 388.9578 | 14556.1858 | 21.6875 | 5.8186 | 15.516 |
| L3 | 36.6149 | 55.2415 | 8456.3098 | 12.3571 | 17.9369 | 471.4487 | 16923.7467 | 27.6260 | 5.3343 | 10.669 |
| | 44.0289 | 68.0188 | 15785.9556 | 15.2153 | 22.0269 | 716.6678 | 31592.6828 | 34.0159 | 6.7514 | 13.503 |

| Tower Elevation<br>ft | Gusset Area (per face)<br>$ft^2$ | Gusset Thickness<br>in | Gusset Grade | Adjust. Factor $A_f$ | Adjust. Factor $A_r$ | Weight Mult. | Double Angle Stitch Bolt Spacing Diagonals<br>in | Double Angle Stitch Bolt Spacing Horizontals<br>in | Double Angle Stitch Bolt Spacing Redundants<br>in |
|---|---|---|---|---|---|---|---|---|---|
| L1 136.00-87.25 | | | | 1 | 1 | 1.05 | | | |
| L2 87.25-46.25 | | | | 1 | 1 | 1.05 | | | |
| L3 46.25-0.00 | | | | 1 | 1 | 1.05 | | | |

## Monopole Base Plate Data

| Base Plate Data | |
|---|---|
| Base plate is square | √ |
| Base plate is grouted | |
| Anchor bolt grade | A615-75 |
| Anchor bolt size | 2.2500 in |
| Number of bolts | 16 |
| Embedment length | 84.0000 in |
| $f'_c$ | 4 ksi |
| Grout space | 3.0000 in |
| Base plate grade | A572-55 |
| Base plate thickness | 3.0000 in |
| Bolt circle diameter | 49.7500 in |
| Outer diameter | 54.7500 in |
| Inner diameter | 43.3600 in |
| Base plate type | Plain Plate |

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

| Description | Sector | Component Type | Placement<br>ft | Total Number | Number Per Row | Start/End Position | Width or Diameter<br>in | Perimeter<br>in | Weight<br>plf |
|---|---|---|---|---|---|---|---|---|---|
| 1-5/8 (T-Mobile) | C | Surface Ar (CaAa) | 136.00 - 4.00 | 6 | 6 | 0.000<br>0.000 | 1.9800 | | 1.04 |

| Description | Sector | Component Type | Placement ft | Total Number | Number Per Row | Start/End Position | Width or Diameter in | Perimeter in | Weight plf |
|---|---|---|---|---|---|---|---|---|---|
| 3" Flex Conduit (Sprint) | C | Surface Ar (CaAa) | 115.00 - 4.00 | 2 | 2 | 0.000<br>0.000 | 3.0100 | | 2.50 |
| 1-5/8 Fiber Cable (T-Mobile) | A | Surface Ar (CaAa) | 136.00 - 4.00 | 1 | 1 | 0.000<br>0.000 | 1.9800 | | 1.04 |
| 1-5/8 Fiber Cable (Verizon) | B | Surface Ar (CaAa) | 106.00 - 4.00 | 2 | 2 | 0.000<br>0.000 | 1.9800 | | 1.04 |
| LDF6-50A (1-1/4 FOAM) (Sprint) | C | Surface Ar (CaAa) | 115.00 - 4.00 | 4 | 4 | 0.000<br>0.000 | 1.5500 | | 0.66 |

## Feed Line/Linear Appurtenances - Entered As Area

| Description | Face or Leg | Allow Shield | Component Type | Placement ft | Total Number | | $C_AA_A$ $ft^2/ft$ | Weight plf |
|---|---|---|---|---|---|---|---|---|
| 1-5/8 (T-Mobile) | A | No | Inside Pole | 136.00 - 4.00 | 12 | No Ice<br>1/2" Ice<br>1" Ice | 0.00<br>0.00<br>0.00 | 1.04<br>1.04<br>1.04 |
| 1-5/8 (Verizon) | B | No | Inside Pole | 106.00 - 4.00 | 12 | No Ice<br>1/2" Ice<br>1" Ice | 0.00<br>0.00<br>0.00 | 1.04<br>1.04<br>1.04 |
| Category 5e (Town) | C | No | Inside Pole | 136.00 - 4.00 | 1 | No Ice<br>1/2" Ice<br>1" Ice | 0.00<br>0.00<br>0.00 | 0.21<br>0.21<br>0.21 |
| Category 5e (Town) | A | No | Inside Pole | 136.00 - 4.00 | 1 | No Ice<br>1/2" Ice<br>1" Ice | 0.00<br>0.00<br>0.00 | 0.21<br>0.21<br>0.21 |
| 1-5/8 (Town) | B | No | Inside Pole | 136.00 - 4.00 | 3 | No Ice<br>1/2" Ice<br>1" Ice | 0.00<br>0.00<br>0.00 | 1.04<br>1.04<br>1.04 |

## Feed Line/Linear Appurtenances Section Areas

| Tower Section | Tower Elevation ft | Face | $A_R$ $ft^2$ | $A_F$ $ft^2$ | $C_AA_A$ In Face $ft^2$ | $C_AA_A$ Out Face $ft^2$ | Weight lb |
|---|---|---|---|---|---|---|---|
| L1 | 136.00-87.25 | A | 0.000 | 0.000 | 9.652 | 0.000 | 669.34 |
| | | B | 0.000 | 0.000 | 7.425 | 0.000 | 425.10 |
| | | C | 0.000 | 0.000 | 91.826 | 0.000 | 526.45 |
| L2 | 87.25-46.25 | A | 0.000 | 0.000 | 8.118 | 0.000 | 562.93 |
| | | B | 0.000 | 0.000 | 16.236 | 0.000 | 724.88 |
| | | C | 0.000 | 0.000 | 98.810 | 0.000 | 577.69 |
| L3 | 46.25-0.00 | A | 0.000 | 0.000 | 8.366 | 0.000 | 580.09 |
| | | B | 0.000 | 0.000 | 16.731 | 0.000 | 746.98 |
| | | C | 0.000 | 0.000 | 101.823 | 0.000 | 595.30 |

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

| Tower Section | Tower Elevation ft | Face or Leg | Ice Thickness in | $A_R$ $ft^2$ | $A_F$ $ft^2$ | $C_AA_A$ In Face $ft^2$ | $C_AA_A$ Out Face $ft^2$ | Weight lb |
|---|---|---|---|---|---|---|---|---|
| L1 | 136.00-87.25 | A | 2.258 | 0.000 | 0.000 | 31.664 | 0.000 | 1239.13 |
| | | B | | 0.000 | 0.000 | 19.864 | 0.000 | 715.58 |

| Tower Section | Tower Elevation ft | Face or Leg | Ice Thickness in | $A_R$ $ft^2$ | $A_F$ $ft^2$ | $C_AA_A$ In Face $ft^2$ | $C_AA_A$ Out Face $ft^2$ | Weight lb |
|---|---|---|---|---|---|---|---|---|
| | | C | | 0.000 | 0.000 | 173.621 | 0.000 | 3128.98 |
| L2 | 87.25-46.25 | A | 2.145 | 0.000 | 0.000 | 26.630 | 0.000 | 1042.14 |
| | | B | | 0.000 | 0.000 | 43.435 | 0.000 | 1360.05 |
| | | C | | 0.000 | 0.000 | 192.934 | 0.000 | 3470.10 |
| L3 | 46.25-0.00 | A | 1.926 | 0.000 | 0.000 | 26.493 | 0.000 | 1036.91 |
| | | B | | 0.000 | 0.000 | 43.574 | 0.000 | 1357.21 |
| | | C | | 0.000 | 0.000 | 195.257 | 0.000 | 3396.62 |

## Feed Line Center of Pressure

| Section | Elevation ft | $CP_X$ in | $CP_Z$ in | $CP_X$ Ice in | $CP_Z$ Ice in |
|---|---|---|---|---|---|
| L1 | 136.00-87.25 | -0.0230 | 1.3990 | -0.0696 | 1.2010 |
| L2 | 87.25-46.25 | 0.1304 | 1.6140 | 0.1218 | 1.3286 |
| L3 | 46.25-0.00 | 0.1327 | 1.6420 | 0.1335 | 1.4534 |

## Shielding Factor Ka

| Tower Section | Feed Line Record No. | Description | Feed Line Segment Elev. | $K_a$ No Ice | $K_a$ Ice |
|---|---|---|---|---|---|
| L1 | 1 | 1-5/8 | 87.25 - 136.00 | 1.0000 | 1.0000 |
| L1 | 2 | 3" Flex Conduit | 87.25 - 115.00 | 1.0000 | 1.0000 |
| L1 | 3 | 1-5/8 Fiber Cable | 87.25 - 136.00 | 1.0000 | 1.0000 |
| L1 | 4 | 1-5/8 Fiber Cable | 87.25 - 106.00 | 1.0000 | 1.0000 |
| L1 | 10 | LDF6-50A (1-1/4 FOAM) | 87.25 - 115.00 | 1.0000 | 1.0000 |
| L2 | 1 | 1-5/8 | 46.25 - 87.25 | 1.0000 | 1.0000 |
| L2 | 2 | 3" Flex Conduit | 46.25 - 87.25 | 1.0000 | 1.0000 |
| L2 | 3 | 1-5/8 Fiber Cable | 46.25 - 87.25 | 1.0000 | 1.0000 |
| L2 | 4 | 1-5/8 Fiber Cable | 46.25 - 87.25 | 1.0000 | 1.0000 |
| L2 | 10 | LDF6-50A (1-1/4 FOAM) | 46.25 - 87.25 | 1.0000 | 1.0000 |

## Discrete Tower Loads

| Description | Face or Leg | Offset Type | Offsets: Horz Lateral ft<br>Vert ft | Azimuth Adjustment ° | Placement ft | | $C_AA_A$ Front $ft^2$ | $C_AA_A$ Side $ft^2$ | Weight lb |
|---|---|---|---|---|---|---|---|---|---|
| 20' Dipole | C | From Face | 1.00<br>0.00<br>10.00 | 0.0000 | 143.00 | No Ice<br>1/2" Ice<br>1" Ice | 7.00<br>10.04<br>13.08 | 7.00<br>10.04<br>13.08 | 60.00<br>115.61<br>171.22 |

| Description | Face or Leg | Offset Type | Offsets: Horz Lateral Vert<br>ft<br>ft<br>ft | Azimuth Adjustment<br>° | Placement<br>ft | | $C_AA_A$ Front<br>$ft^2$ | $C_AA_A$ Side<br>$ft^2$ | Weight<br>lb |
|---|---|---|---|---|---|---|---|---|---|
| PTP 400 | C | From Face | 1.00 | 0.0000 | 142.00 | No Ice | 1.75 | 0.48 | 12.10 |
| | | | 0.00 | | | 1/2" Ice | 1.92 | 0.58 | 23.53 |
| | | | 0.00 | | | 1" Ice | 2.09 | 0.68 | 34.96 |
| 3"x4.5' Pipe | C | From Face | 1.00 | 0.0000 | 140.00 | No Ice | 1.30 | 1.30 | 34.00 |
| | | | 0.00 | | | 1/2" Ice | 1.57 | 1.57 | 45.51 |
| | | | 0.00 | | | 1" Ice | 1.84 | 1.84 | 57.02 |
| Pirod 13' Platform w/ Handrail (Verizon) | C | None | | 0.0000 | 106.00 | No Ice | 31.30 | 31.30 | 1822.00 |
| | | | | | | 1/2" Ice | 40.20 | 40.20 | 2452.00 |
| | | | | | | 1" Ice | 49.10 | 49.10 | 3082.00 |
| SBNHH-1D65A (Verizon) | A | From Face | 4.00 | 0.0000 | 106.00 | No Ice | 5.86 | 3.86 | 33.50 |
| | | | 0.00 | | | 1/2" Ice | 6.23 | 4.22 | 72.43 |
| | | | 0.00 | | | 1" Ice | 6.60 | 4.57 | 116.35 |
| SBNHH-1D65A (Verizon) | B | From Face | 4.00 | 0.0000 | 106.00 | No Ice | 5.86 | 3.86 | 33.50 |
| | | | 0.00 | | | 1/2" Ice | 6.23 | 4.22 | 72.43 |
| | | | 0.00 | | | 1" Ice | 6.60 | 4.57 | 116.35 |
| SBNHH-1D65A (Verizon) | C | From Face | 4.00 | 0.0000 | 106.00 | No Ice | 5.86 | 3.86 | 33.50 |
| | | | 0.00 | | | 1/2" Ice | 6.23 | 4.22 | 72.43 |
| | | | 0.00 | | | 1" Ice | 6.60 | 4.57 | 116.35 |
| BXA-70063-6CF-EDIN-X (Verizon) | A | From Face | 4.00 | 0.0000 | 106.00 | No Ice | 14.41 | 5.72 | 38.00 |
| | | | 0.00 | | | 1/2" Ice | 14.92 | 6.17 | 120.76 |
| | | | 0.00 | | | 1" Ice | 15.44 | 6.63 | 210.38 |
| BXA-80063-4BF W/ Mount Pipe (Verizon) | B | From Face | 4.00 | 0.0000 | 106.00 | No Ice | 4.96 | 3.44 | 28.25 |
| | | | 0.00 | | | 1/2" Ice | 5.34 | 4.04 | 69.36 |
| | | | 0.00 | | | 1" Ice | 5.72 | 4.64 | 110.47 |
| BXA-80063-4BF W/ Mount Pipe (Verizon) | C | From Face | 4.00 | 0.0000 | 106.00 | No Ice | 4.96 | 3.44 | 28.25 |
| | | | 0.00 | | | 1/2" Ice | 5.34 | 4.04 | 69.36 |
| | | | 0.00 | | | 1" Ice | 5.72 | 4.64 | 110.47 |
| SLCP 2x6014 (Verizon) | A | From Face | 4.00 | 0.0000 | 106.00 | No Ice | 6.48 | 5.28 | 20.00 |
| | | | 0.00 | | | 1/2" Ice | 6.84 | 5.62 | 70.49 |
| | | | 0.00 | | | 1" Ice | 7.21 | 5.98 | 126.23 |
| SLCP 2x6014 (Verizon) | B | From Face | 4.00 | 0.0000 | 106.00 | No Ice | 6.48 | 5.28 | 20.00 |
| | | | 0.00 | | | 1/2" Ice | 6.84 | 5.62 | 70.49 |
| | | | 0.00 | | | 1" Ice | 7.21 | 5.98 | 126.23 |
| SLCP 2x6014 (Verizon) | C | From Face | 4.00 | 0.0000 | 106.00 | No Ice | 6.48 | 5.28 | 20.00 |
| | | | 0.00 | | | 1/2" Ice | 6.84 | 5.62 | 70.49 |
| | | | 0.00 | | | 1" Ice | 7.21 | 5.98 | 126.23 |
| B13 RRH4x30 (Verizon) | A | From Face | 3.00 | 0.0000 | 106.00 | No Ice | 2.06 | 1.32 | 55.60 |
| | | | 0.00 | | | 1/2" Ice | 2.24 | 1.48 | 72.88 |
| | | | 0.00 | | | 1" Ice | 2.43 | 1.64 | 92.95 |
| B13 RRH4x30 (Verizon) | B | From Face | 3.00 | 0.0000 | 106.00 | No Ice | 2.06 | 1.32 | 55.60 |
| | | | 0.00 | | | 1/2" Ice | 2.24 | 1.48 | 72.88 |
| | | | 0.00 | | | 1" Ice | 2.43 | 1.64 | 92.95 |
| B13 RRH4x30 (Verizon) | C | From Face | 3.00 | 0.0000 | 106.00 | No Ice | 2.06 | 1.32 | 55.60 |
| | | | 0.00 | | | 1/2" Ice | 2.24 | 1.48 | 72.88 |
| | | | 0.00 | | | 1" Ice | 2.43 | 1.64 | 92.95 |
| B4 RRH 2x60-4R (Verizon) | A | From Face | 3.00 | 0.0000 | 106.00 | No Ice | 3.50 | 2.10 | 60.00 |
| | | | 0.00 | | | 1/2" Ice | 3.76 | 2.34 | 84.31 |
| | | | 0.00 | | | 1" Ice | 4.02 | 2.58 | 108.62 |
| B4 RRH 2x60-4R (Verizon) | B | From Face | 3.00 | 0.0000 | 106.00 | No Ice | 3.50 | 2.10 | 60.00 |
| | | | 0.00 | | | 1/2" Ice | 3.76 | 2.34 | 84.31 |
| | | | 0.00 | | | 1" Ice | 4.02 | 2.58 | 108.62 |
| B4 RRH 2x60-4R (Verizon) | C | From Face | 3.00 | 0.0000 | 106.00 | No Ice | 3.50 | 2.10 | 60.00 |
| | | | 0.00 | | | 1/2" Ice | 3.76 | 2.34 | 84.31 |
| | | | 0.00 | | | 1" Ice | 4.02 | 2.58 | 108.62 |
| DB-T1-6Z-8ZB-0Z (Verizon) | A | From Face | 2.00 | 0.0000 | 106.00 | No Ice | 4.80 | 2.00 | 44.00 |
| | | | 0.00 | | | 1/2" Ice | 5.07 | 2.19 | 80.13 |
| | | | 0.00 | | | 1" Ice | 5.34 | 2.38 | 116.26 |

| Description | Face or Leg | Offset Type | Offsets: Horz Lateral ft / Vert ft | Azimuth Adjustment ° | Placement ft | | $C_AA_A$ Front $ft^2$ | $C_AA_A$ Side $ft^2$ | Weight lb |
|---|---|---|---|---|---|---|---|---|---|
| DB-T1-6Z-8ZB-0Z | B | From Face | 2.00 | 0.0000 | 106.00 | No Ice | 4.80 | 2.00 | 44.00 |
| (Verizon) | | | 0.00 | | | 1/2" Ice | 5.07 | 2.19 | 80.13 |
| | | | 0.00 | | | 1" Ice | 5.34 | 2.38 | 116.26 |
| Pirod 13' Platform w/ Handrail | A | None | | 0.0000 | 95.00 | No Ice | 31.30 | 31.30 | 1822.00 |
| | | | | | | 1/2" Ice | 40.20 | 40.20 | 2452.00 |
| | | | | | | 1" Ice | 49.10 | 49.10 | 3082.00 |
| PTP 400 | A | From Face | 1.00 | 0.0000 | 83.00 | No Ice | 1.75 | 0.48 | 12.10 |
| | | | 0.00 | | | 1/2" Ice | 1.92 | 0.58 | 23.53 |
| | | | 0.00 | | | 1" Ice | 2.09 | 0.68 | 34.96 |
| 3"x4.5' Pipe | A | From Face | 1.00 | 0.0000 | 83.00 | No Ice | 1.30 | 1.30 | 34.00 |
| | | | 0.00 | | | 1/2" Ice | 1.57 | 1.57 | 45.51 |
| | | | 0.00 | | | 1" Ice | 1.84 | 1.84 | 57.02 |
| PTP 400 | B | From Face | 1.00 | 0.0000 | 83.00 | No Ice | 1.75 | 0.48 | 12.10 |
| | | | 0.00 | | | 1/2" Ice | 1.92 | 0.58 | 23.53 |
| | | | 0.00 | | | 1" Ice | 2.09 | 0.68 | 34.96 |
| 3"x4.5' Pipe | B | From Face | 1.00 | 0.0000 | 83.00 | No Ice | 1.30 | 1.30 | 34.00 |
| | | | 0.00 | | | 1/2" Ice | 1.57 | 1.57 | 45.51 |
| | | | 0.00 | | | 1" Ice | 1.84 | 1.84 | 57.02 |
| PTP 400 | C | From Face | 1.00 | 0.0000 | 83.00 | No Ice | 1.75 | 0.48 | 12.10 |
| | | | 0.00 | | | 1/2" Ice | 1.92 | 0.58 | 23.53 |
| | | | 0.00 | | | 1" Ice | 2.09 | 0.68 | 34.96 |
| 3"x4.5' Pipe | C | From Face | 1.00 | 0.0000 | 83.00 | No Ice | 1.30 | 1.30 | 34.00 |
| | | | 0.00 | | | 1/2" Ice | 1.57 | 1.57 | 45.51 |
| | | | 0.00 | | | 1" Ice | 1.84 | 1.84 | 57.02 |
| (2) Ericsson AIR21 with 6' pipe | A | From Face | 4.00 | 0.0000 | 138.00 | No Ice | 6.75 | 6.08 | 127.70 |
| | | | 0.00 | | | 1/2" Ice | 7.23 | 6.93 | 188.97 |
| (T-Mobile) | | | 0.00 | | | 1" Ice | 7.70 | 7.66 | 257.14 |
| (2) Ericsson AIR21 with 6' pipe | B | From Face | 4.00 | 0.0000 | 138.00 | No Ice | 6.75 | 6.08 | 127.70 |
| | | | 0.00 | | | 1/2" Ice | 7.23 | 6.93 | 188.97 |
| (T-Mobile) | | | 0.00 | | | 1" Ice | 7.70 | 7.66 | 257.14 |
| (2) Ericsson AIR21 with 6' pipe | C | From Face | 4.00 | 0.0000 | 138.00 | No Ice | 6.75 | 6.08 | 127.70 |
| | | | 0.00 | | | 1/2" Ice | 7.23 | 6.93 | 188.97 |
| (T-Mobile) | | | 0.00 | | | 1" Ice | 7.70 | 7.66 | 257.14 |
| LNX-6515DS-VTM | A | From Face | 4.00 | 0.0000 | 138.00 | No Ice | 11.45 | 9.60 | 79.50 |
| (T-Mobile) | | | 0.00 | | | 1/2" Ice | 12.06 | 11.02 | 166.47 |
| | | | 0.00 | | | 1" Ice | 12.69 | 12.29 | 263.19 |
| LNX-6515DS-VTM | B | From Face | 4.00 | 0.0000 | 138.00 | No Ice | 11.45 | 9.60 | 79.50 |
| (T-Mobile) | | | 0.00 | | | 1/2" Ice | 12.06 | 11.02 | 166.47 |
| | | | 0.00 | | | 1" Ice | 12.69 | 12.29 | 263.19 |
| LNX-6515DS-VTM | C | From Face | 4.00 | 0.0000 | 138.00 | No Ice | 11.45 | 9.60 | 79.50 |
| (T-Mobile) | | | 0.00 | | | 1/2" Ice | 12.06 | 11.02 | 166.47 |
| | | | 0.00 | | | 1" Ice | 12.69 | 12.29 | 263.19 |
| KRY 112 71 | A | From Face | 4.00 | 0.0000 | 138.00 | No Ice | 0.58 | 0.40 | 13.20 |
| (T-Mobile) | | | 0.00 | | | 1/2" Ice | 0.69 | 0.49 | 18.38 |
| | | | 0.00 | | | 1" Ice | 0.80 | 0.59 | 25.16 |
| KRY 112 71 | B | From Face | 4.00 | 0.0000 | 138.00 | No Ice | 0.58 | 0.40 | 13.20 |
| (T-Mobile) | | | 0.00 | | | 1/2" Ice | 0.69 | 0.49 | 18.38 |
| | | | 0.00 | | | 1" Ice | 0.80 | 0.59 | 25.16 |
| KRY 112 71 | C | From Face | 4.00 | 0.0000 | 138.00 | No Ice | 0.58 | 0.40 | 13.20 |
| (T-Mobile) | | | 0.00 | | | 1/2" Ice | 0.69 | 0.49 | 18.38 |
| | | | 0.00 | | | 1" Ice | 0.80 | 0.59 | 25.16 |
| RRUS-11 | A | From Face | 4.00 | 0.0000 | 138.00 | No Ice | 2.52 | 1.02 | 55.00 |
| (T-Mobile) | | | 0.00 | | | 1/2" Ice | 2.72 | 1.16 | 74.32 |
| | | | 0.00 | | | 1" Ice | 2.92 | 1.30 | 96.56 |
| RRUS-11 | B | From Face | 4.00 | 0.0000 | 138.00 | No Ice | 2.52 | 1.02 | 55.00 |
| (T-Mobile) | | | 0.00 | | | 1/2" Ice | 2.72 | 1.16 | 74.32 |
| | | | 0.00 | | | 1" Ice | 2.92 | 1.30 | 96.56 |

| Description | Face or Leg | Offset Type | Offsets: Horz Lateral Vert<br>ft<br>ft<br>ft | Azimuth Adjustment<br>° | Placement<br>ft | | $C_AA_A$ Front<br>$ft^2$ | $C_AA_A$ Side<br>$ft^2$ | Weight<br>lb |
|---|---|---|---|---|---|---|---|---|---|
| RRUS-11 | C | From Face | 4.00 | 0.0000 | 138.00 | No Ice | 2.52 | 1.02 | 55.00 |
| (T-Mobile) | | | 0.00 | | | 1/2" Ice | 2.72 | 1.16 | 74.32 |
| | | | 0.00 | | | 1" Ice | 2.92 | 1.30 | 96.56 |
| Pirod 13' Platform w/ Handrail | A | None | | 0.0000 | 138.00 | No Ice | 31.30 | 31.30 | 1822.00 |
| | | | | | | 1/2" Ice | 40.20 | 40.20 | 2452.00 |
| | | | | | | 1" Ice | 49.10 | 49.10 | 3082.00 |
| Valmont Light Duty Tri-Bracket | C | None | | 0.0000 | 115.00 | No Ice | 1.76 | 1.76 | 54.00 |
| (Sprint) | | | | | | 1/2" Ice | 2.08 | 2.08 | 70.00 |
| | | | | | | 1" Ice | 2.40 | 2.40 | 86.00 |
| Dual Standoff Mount | A | From Face | 1.50 | 0.0000 | 115.00 | No Ice | 1.40 | 0.95 | 130.00 |
| (Sprint) | | | 0.00 | | | 1/2" Ice | 1.69 | 1.15 | 192.44 |
| | | | 0.00 | | | 1" Ice | 1.98 | 1.35 | 254.88 |
| Dual Standoff Mount | B | From Face | 1.50 | 0.0000 | 115.00 | No Ice | 1.40 | 0.95 | 130.00 |
| (Sprint) | | | 0.00 | | | 1/2" Ice | 1.69 | 1.15 | 192.44 |
| | | | 0.00 | | | 1" Ice | 1.98 | 1.35 | 254.88 |
| Dual Standoff Mount | C | From Face | 1.50 | 0.0000 | 115.00 | No Ice | 1.40 | 0.95 | 130.00 |
| (Sprint) | | | 0.00 | | | 1/2" Ice | 1.69 | 1.15 | 192.44 |
| | | | 0.00 | | | 1" Ice | 1.98 | 1.35 | 254.88 |
| ETCR-654L12H6 W/Pipe Mount | A | From Face | 2.00 | 0.0000 | 115.00 | No Ice | 6.65 | 5.03 | 77.90 |
| (Sprint) | | | 0.00 | | | 1/2" Ice | 7.14 | 5.89 | 133.31 |
| | | | 0.00 | | | 1" Ice | 7.60 | 6.63 | 195.47 |
| ETCR-654L12H6 W/Pipe Mount | B | From Face | 2.00 | 0.0000 | 115.00 | No Ice | 6.65 | 5.03 | 77.90 |
| (Sprint) | | | 0.00 | | | 1/2" Ice | 7.14 | 5.89 | 133.31 |
| | | | 0.00 | | | 1" Ice | 7.60 | 6.63 | 195.47 |
| ETCR-654L12H6 W/Pipe Mount | C | From Face | 2.00 | 0.0000 | 115.00 | No Ice | 6.65 | 5.03 | 77.90 |
| (Sprint) | | | 0.00 | | | 1/2" Ice | 7.14 | 5.89 | 133.31 |
| | | | 0.00 | | | 1" Ice | 7.60 | 6.63 | 195.47 |
| (2) RRH-2X50-800 | A | From Face | 2.00 | 0.0000 | 115.00 | No Ice | 1.73 | 1.33 | 69.10 |
| (Sprint) | | | 0.00 | | | 1/2" Ice | 1.90 | 1.48 | 86.54 |
| | | | 0.00 | | | 1" Ice | 2.07 | 1.64 | 106.69 |
| (2) RRH-2X50-800 | B | From Face | 2.00 | 0.0000 | 115.00 | No Ice | 1.73 | 1.33 | 69.10 |
| (Sprint) | | | 0.00 | | | 1/2" Ice | 1.90 | 1.48 | 86.54 |
| | | | 0.00 | | | 1" Ice | 2.07 | 1.64 | 106.69 |
| (2) RRH-2X50-800 | C | From Face | 2.00 | 0.0000 | 115.00 | No Ice | 1.73 | 1.33 | 69.10 |
| (Sprint) | | | 0.00 | | | 1/2" Ice | 1.90 | 1.48 | 86.54 |
| | | | 0.00 | | | 1" Ice | 2.07 | 1.64 | 106.69 |
| ALU RRH-4X45-1900 | A | From Face | 1.50 | 0.0000 | 115.00 | No Ice | 2.50 | 2.50 | 69.50 |
| (Sprint) | | | 0.00 | | | 1/2" Ice | 2.71 | 2.71 | 95.23 |
| | | | 0.00 | | | 1" Ice | 2.93 | 2.93 | 124.33 |
| ALU RRH-4X45-1900 | B | From Face | 1.50 | 0.0000 | 115.00 | No Ice | 2.50 | 2.50 | 69.50 |
| (Sprint) | | | 0.00 | | | 1/2" Ice | 2.71 | 2.71 | 95.23 |
| | | | 0.00 | | | 1" Ice | 2.93 | 2.93 | 124.33 |
| ALU RRH-4X45-1900 | C | From Face | 1.50 | 0.0000 | 115.00 | No Ice | 2.50 | 2.50 | 69.50 |
| (Sprint) | | | 0.00 | | | 1/2" Ice | 2.71 | 2.71 | 95.23 |
| | | | 0.00 | | | 1" Ice | 2.93 | 2.93 | 124.33 |
| TD-RRH8x20-25 | A | From Face | 1.50 | 0.0000 | 115.00 | No Ice | 4.03 | 1.53 | 76.20 |
| (Sprint) | | | 0.00 | | | 1/2" Ice | 4.28 | 1.70 | 103.25 |
| | | | 0.00 | | | 1" Ice | 4.54 | 1.89 | 133.82 |
| TD-RRH8x20-25 | B | From Face | 1.50 | 0.0000 | 115.00 | No Ice | 4.03 | 1.53 | 76.20 |
| (Sprint) | | | 0.00 | | | 1/2" Ice | 4.28 | 1.70 | 103.25 |
| | | | 0.00 | | | 1" Ice | 4.54 | 1.89 | 133.82 |
| TD-RRH8x20-25 | C | From Face | 1.50 | 0.0000 | 115.00 | No Ice | 4.03 | 1.53 | 76.20 |
| (Sprint) | | | 0.00 | | | 1/2" Ice | 4.28 | 1.70 | 103.25 |
| | | | 0.00 | | | 1" Ice | 4.54 | 1.89 | 133.82 |

## Tower Pressures - No Ice

$G_H$ = 1.100

| Section Elevation ft | z ft | $K_Z$ | $q_z$ psf | $A_G$ ft² | Face | $A_F$ ft² | $A_R$ ft² | $A_{leg}$ ft² | Leg % | $C_AA_A$ In Face ft² | $C_AA_A$ Out Face ft² |
|---|---|---|---|---|---|---|---|---|---|---|---|
| L1 | 110.84 | 1.018 | 24 | 110.761 | A | 0.000 | 110.761 | 110.761 | 100.00 | 9.652 | 0.000 |
| 136.00-87.25 | | | | | B | 0.000 | 110.761 | | 100.00 | 7.425 | 0.000 |
| | | | | | C | 0.000 | 110.761 | | 100.00 | 91.826 | 0.000 |
| L2 87.25-46.25 | 66.54 | 0.88 | 20 | 116.460 | A | 0.000 | 116.460 | 116.460 | 100.00 | 8.118 | 0.000 |
| | | | | | B | 0.000 | 116.460 | | 100.00 | 16.236 | 0.000 |
| | | | | | C | 0.000 | 116.460 | | 100.00 | 98.810 | 0.000 |
| L3 46.25-0.00 | 22.65 | 0.7 | 17 | 155.407 | A | 0.000 | 155.407 | 155.407 | 100.00 | 8.366 | 0.000 |
| | | | | | B | 0.000 | 155.407 | | 100.00 | 16.731 | 0.000 |
| | | | | | C | 0.000 | 155.407 | | 100.00 | 101.823 | 0.000 |

## Tower Pressure - With Ice

$G_H$ = 1.100

| Section Elevation ft | z ft | $K_Z$ | $q_z$ psf | $t_Z$ in | $A_G$ ft² | Face | $A_F$ ft² | $A_R$ ft² | $A_{leg}$ ft² | Leg % | $C_AA_A$ In Face ft² | $C_AA_A$ Out Face ft² |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| L1 136.00-87.25 | 110.84 | 1.018 | 4 | 2.2576 | 129.104 | A | 0.000 | 129.104 | 129.104 | 100.00 | 31.664 | 0.000 |
| | | | | | | B | 0.000 | 129.104 | | 100.00 | 19.864 | 0.000 |
| | | | | | | C | 0.000 | 129.104 | | 100.00 | 173.621 | 0.000 |
| L2 87.25-46.25 | 66.54 | 0.88 | 3 | 2.1453 | 131.887 | A | 0.000 | 131.887 | 131.887 | 100.00 | 26.630 | 0.000 |
| | | | | | | B | 0.000 | 131.887 | | 100.00 | 43.435 | 0.000 |
| | | | | | | C | 0.000 | 131.887 | | 100.00 | 192.934 | 0.000 |
| L3 46.25-0.00 | 22.65 | 0.7 | 3 | 1.9261 | 171.944 | A | 0.000 | 171.944 | 171.944 | 100.00 | 26.493 | 0.000 |
| | | | | | | B | 0.000 | 171.944 | | 100.00 | 43.574 | 0.000 |
| | | | | | | C | 0.000 | 171.944 | | 100.00 | 195.257 | 0.000 |

## Tower Pressure - Service

$G_H$ = 1.100

| Section Elevation ft | z ft | $K_Z$ | $q_z$ psf | $A_G$ ft² | Face | $A_F$ ft² | $A_R$ ft² | $A_{leg}$ ft² | Leg % | $C_AA_A$ In Face ft² | $C_AA_A$ Out Face ft² |
|---|---|---|---|---|---|---|---|---|---|---|---|
| L1 | 110.84 | 1.018 | 8 | 110.761 | A | 0.000 | 110.761 | 110.761 | 100.00 | 9.652 | 0.000 |
| 136.00-87.25 | | | | | B | 0.000 | 110.761 | | 100.00 | 7.425 | 0.000 |
| | | | | | C | 0.000 | 110.761 | | 100.00 | 91.826 | 0.000 |
| L2 87.25-46.25 | 66.54 | 0.88 | 7 | 116.460 | A | 0.000 | 116.460 | 116.460 | 100.00 | 8.118 | 0.000 |
| | | | | | B | 0.000 | 116.460 | | 100.00 | 16.236 | 0.000 |
| | | | | | C | 0.000 | 116.460 | | 100.00 | 98.810 | 0.000 |
| L3 46.25-0.00 | 22.65 | 0.7 | 6 | 155.407 | A | 0.000 | 155.407 | 155.407 | 100.00 | 8.366 | 0.000 |
| | | | | | B | 0.000 | 155.407 | | 100.00 | 16.731 | 0.000 |

| Section Elevation ft | z ft | $K_Z$ | $q_z$ psf | $A_G$ ft² | Face | $A_F$ ft² | $A_R$ ft² | $A_{leg}$ ft² | Leg % | $C_AA_A$ In Face ft² | $C_AA_A$ Out Face ft² |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | C | 0.000 | 155.407 | | 100.00 | 101.823 | 0.000 |

## Tower Forces - No Ice - Wind Normal To Face

| Section Elevation ft | Add Weight lb | Self Weight lb | Face | e | $C_F$ | $q_z$ psf | $D_F$ | $D_R$ | $A_E$ ft² | F lb | w plf | Ctrl. Face |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| L1 | 1620.89 | 2763.81 | A | 1 | 0.65 | 24 | 1 | 1 | 110.761 | 1878.36 | 38.53 | C |
| 136.00-87.25 | | | B | 1 | 0.65 | | 1 | 1 | 110.761 | | | |
| | | | C | 1 | 0.65 | | 1 | 1 | 110.761 | | | |
| L2 | 1865.50 | 6291.62 | A | 1 | 0.65 | 20 | 1 | 1 | 116.460 | 1703.34 | 41.54 | C |
| 87.25-46.25 | | | B | 1 | 0.65 | | 1 | 1 | 116.460 | | | |
| | | | C | 1 | 0.65 | | 1 | 1 | 116.460 | | | |
| L3 46.25-0.00 | 1922.38 | 11230.22 | A | 1 | 0.65 | 17 | 1 | 1 | 155.407 | 1852.81 | 40.06 | C |
| | | | B | 1 | 0.65 | | 1 | 1 | 155.407 | | | |
| | | | C | 1 | 0.65 | | 1 | 1 | 155.407 | | | |
| Sum Weight: | 5408.76 | 20285.65 | | | | | | OTM | 363.51 kip-ft | 5434.51 | | |

## Tower Forces - No Ice - Wind 60 To Face

| Section Elevation ft | Add Weight lb | Self Weight lb | Face | e | $C_F$ | $q_z$ psf | $D_F$ | $D_R$ | $A_E$ ft² | F lb | w plf | Ctrl. Face |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| L1 | 1620.89 | 2763.81 | A | 1 | 0.65 | 24 | 1 | 1 | 110.761 | 1878.36 | 38.53 | C |
| 136.00-87.25 | | | B | 1 | 0.65 | | 1 | 1 | 110.761 | | | |
| | | | C | 1 | 0.65 | | 1 | 1 | 110.761 | | | |
| L2 | 1865.50 | 6291.62 | A | 1 | 0.65 | 20 | 1 | 1 | 116.460 | 1703.34 | 41.54 | C |
| 87.25-46.25 | | | B | 1 | 0.65 | | 1 | 1 | 116.460 | | | |
| | | | C | 1 | 0.65 | | 1 | 1 | 116.460 | | | |
| L3 46.25-0.00 | 1922.38 | 11230.22 | A | 1 | 0.65 | 17 | 1 | 1 | 155.407 | 1852.81 | 40.06 | C |
| | | | B | 1 | 0.65 | | 1 | 1 | 155.407 | | | |
| | | | C | 1 | 0.65 | | 1 | 1 | 155.407 | | | |
| Sum Weight: | 5408.76 | 20285.65 | | | | | | OTM | 363.51 kip-ft | 5434.51 | | |

## Tower Forces - No Ice - Wind 90 To Face

| Section Elevation ft | Add Weight lb | Self Weight lb | Face | e | $C_F$ | $q_z$ psf | $D_F$ | $D_R$ | $A_E$ ft² | F lb | w plf | Ctrl. Face |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| L1 | 1620.89 | 2763.81 | A | 1 | 0.65 | 24 | 1 | 1 | 110.761 | 5863.48 | 120.28 | C |
| 136.00-87.25 | | | B | 1 | 0.65 | | 1 | 1 | 110.761 | | | |

| Section Elevation ft | Add Weight lb | Self Weight lb | Face | e | $C_F$ | $q_z$ psf | $D_F$ | $D_R$ | $A_E$ ft² | F lb | w plf | Ctrl. Face |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | C | 1 | 1.2 | | 1 | 1 | 110.761 | | | |
| L2 | 1865.50 | 6291.62 | A | 1 | 0.65 | 20 | 1 | 1 | 116.460 | 5368.02 | 130.93 | C |
| 87.25-46.25 | | | B | 1 | 0.65 | | 1 | 1 | 116.460 | | | |
| | | | C | 1 | 1.2 | | 1 | 1 | 116.460 | | | |
| L3 46.25-0.00 | 1922.38 | 11230.22 | A | 1 | 0.65 | 17 | 1 | 1 | 155.407 | 5288.21 | 114.34 | C |
| | | | B | 1 | 0.65 | | 1 | 1 | 155.407 | | | |
| | | | C | 1 | 1.2 | | 1 | 1 | 155.407 | | | |
| Sum Weight: | 5408.76 | 20285.65 | | | | | | OTM | 1126.90 kip-ft | 16519.71 | | |

## Tower Forces - With Ice - Wind Normal To Face

| Section Elevation ft | Add Weight lb | Self Weight lb | Face | e | $C_F$ | $q_z$ psf | $D_F$ | $D_R$ | $A_E$ ft² | F lb | w plf | Ctrl. Face |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| L1 | 5083.69 | 6718.04 | A | 1 | 1.2 | 4 | 1 | 1 | 129.104 | 1086.46 | 22.29 | B |
| 136.00-87.25 | | | B | 1 | 1.2 | | 1 | 1 | 129.104 | | | |
| | | | C | 1 | 1.2 | | 1 | 1 | 129.104 | | | |
| L2 | 5872.30 | 10168.96 | A | 1 | 1.2 | 3 | 1 | 1 | 131.887 | 989.87 | 24.14 | A |
| 87.25-46.25 | | | B | 1 | 1.2 | | 1 | 1 | 131.887 | | | |
| | | | C | 1 | 1.2 | | 1 | 1 | 131.887 | | | |
| L3 46.25-0.00 | 5790.74 | 15808.44 | A | 1 | 1.2 | 3 | 1 | 1 | 171.944 | 943.33 | 20.40 | A |
| | | | B | 1 | 1.2 | | 1 | 1 | 171.944 | | | |
| | | | C | 1 | 1.2 | | 1 | 1 | 171.944 | | | |
| Sum Weight: | 16746.73 | 32695.44 | | | | | | OTM | 207.66 kip-ft | 3019.65 | | |

## Tower Forces - With Ice - Wind 60 To Face

| Section Elevation ft | Add Weight lb | Self Weight lb | Face | e | $C_F$ | $q_z$ psf | $D_F$ | $D_R$ | $A_E$ ft² | F lb | w plf | Ctrl. Face |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| L1 | 5083.69 | 6718.04 | A | 1 | 1.2 | 4 | 1 | 1 | 129.104 | 1086.46 | 22.29 | C |
| 136.00-87.25 | | | B | 1 | 1.2 | | 1 | 1 | 129.104 | | | |
| | | | C | 1 | 1.2 | | 1 | 1 | 129.104 | | | |
| L2 | 5872.30 | 10168.96 | A | 1 | 1.2 | 3 | 1 | 1 | 131.887 | 989.87 | 24.14 | B |
| 87.25-46.25 | | | B | 1 | 1.2 | | 1 | 1 | 131.887 | | | |
| | | | C | 1 | 1.2 | | 1 | 1 | 131.887 | | | |
| L3 46.25-0.00 | 5790.74 | 15808.44 | A | 1 | 1.2 | 3 | 1 | 1 | 171.944 | 943.33 | 20.40 | B |
| | | | B | 1 | 1.2 | | 1 | 1 | 171.944 | | | |
| | | | C | 1 | 1.2 | | 1 | 1 | 171.944 | | | |
| Sum Weight: | 16746.73 | 32695.44 | | | | | | OTM | 207.66 kip-ft | 3019.65 | | |

## Tower Forces - With Ice - Wind 90 To Face

| Section Elevation ft | Add Weight lb | Self Weight lb | Face | e | $C_F$ | $q_z$ psf | $D_F$ | $D_R$ | $A_E$ ft² | F lb | w plf | Ctrl. Face |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| L1 | 5083.69 | 6718.04 | A | 1 | 1.2 | 4 | 1 | 1 | 129.104 | 1522.92 | 31.24 | C |
| 136.00-87.25 | | | B | 1 | 1.2 | | 1 | 1 | 129.104 | | | |
| | | | C | 1 | 1.2 | | 1 | 1 | 129.104 | | | |
| L2 | 5872.30 | 10168.96 | A | 1 | 1.2 | 3 | 1 | 1 | 131.887 | 1380.08 | 33.66 | C |
| 87.25-46.25 | | | B | 1 | 1.2 | | 1 | 1 | 131.887 | | | |
| | | | C | 1 | 1.2 | | 1 | 1 | 131.887 | | | |
| L3 46.25-0.00 | 5790.74 | 15808.44 | A | 1 | 1.2 | 3 | 1 | 1 | 171.944 | 1274.00 | 27.55 | C |
| | | | B | 1 | 1.2 | | 1 | 1 | 171.944 | | | |
| | | | C | 1 | 1.2 | | 1 | 1 | 171.944 | | | |
| Sum Weight: | 16746.73 | 32695.44 | | | | | | OTM | 289.49 kip-ft | 4177.01 | | |

## Tower Forces - Service - Wind Normal To Face

| Section Elevation ft | Add Weight lb | Self Weight lb | Face | e | $C_F$ | $q_z$ psf | $D_F$ | $D_R$ | $A_E$ ft² | F lb | w plf | Ctrl. Face |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| L1 | 1620.89 | 2763.81 | A | 1 | 0.65 | 8 | 1 | 1 | 110.761 | 629.98 | 12.92 | C |
| 136.00-87.25 | | | B | 1 | 0.65 | | 1 | 1 | 110.761 | | | |
| | | | C | 1 | 0.65 | | 1 | 1 | 110.761 | | | |
| L2 | 1865.50 | 6291.62 | A | 1 | 0.65 | 7 | 1 | 1 | 116.460 | 571.28 | 13.93 | C |
| 87.25-46.25 | | | B | 1 | 0.65 | | 1 | 1 | 116.460 | | | |
| | | | C | 1 | 0.65 | | 1 | 1 | 116.460 | | | |
| L3 46.25-0.00 | 1922.38 | 11230.22 | A | 1 | 0.65 | 6 | 1 | 1 | 155.407 | 621.41 | 13.44 | C |
| | | | B | 1 | 0.65 | | 1 | 1 | 155.407 | | | |
| | | | C | 1 | 0.65 | | 1 | 1 | 155.407 | | | |
| Sum Weight: | 5408.76 | 20285.65 | | | | | | OTM | 121.92 kip-ft | 1822.66 | | |

## Tower Forces - Service - Wind 60 To Face

| Section Elevation ft | Add Weight lb | Self Weight lb | Face | e | $C_F$ | $q_z$ psf | $D_F$ | $D_R$ | $A_E$ ft² | F lb | w plf | Ctrl. Face |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| L1 | 1620.89 | 2763.81 | A | 1 | 0.65 | 8 | 1 | 1 | 110.761 | 629.98 | 12.92 | C |
| 136.00-87.25 | | | B | 1 | 0.65 | | 1 | 1 | 110.761 | | | |
| | | | C | 1 | 0.65 | | 1 | 1 | 110.761 | | | |
| L2 | 1865.50 | 6291.62 | A | 1 | 0.65 | 7 | 1 | 1 | 116.460 | 571.28 | 13.93 | C |
| 87.25-46.25 | | | B | 1 | 0.65 | | 1 | 1 | 116.460 | | | |
| | | | C | 1 | 0.65 | | 1 | 1 | 116.460 | | | |
| L3 46.25-0.00 | 1922.38 | 11230.22 | A | 1 | 0.65 | 6 | 1 | 1 | 155.407 | 621.41 | 13.44 | C |
| | | | B | 1 | 0.65 | | 1 | 1 | 155.407 | | | |
| | | | C | 1 | 0.65 | | 1 | 1 | 155.407 | | | |

| Section Elevation ft | Add Weight lb | Self Weight lb | Face | e | $C_F$ | $q_z$ psf | $D_F$ | $D_R$ | $A_E$ ft² | F lb | w plf | Ctrl. Face |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Sum Weight: | 5408.76 | 20285.65 | | | | | | OTM | 121.92 kip-ft | 1822.66 | | |

## Tower Forces - Service - Wind 90 To Face

| Section Elevation ft | Add Weight lb | Self Weight lb | Face | e | $C_F$ | $q_z$ psf | $D_F$ | $D_R$ | $A_E$ ft² | F lb | w plf | Ctrl. Face |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| L1 | 1620.89 | 2763.81 | A | 1 | 0.65 | 8 | 1 | 1 | 110.761 | 1966.53 | 40.34 | C |
| 136.00-87.25 | | | B | 1 | 0.65 | | 1 | 1 | 110.761 | | | |
| | | | C | 1 | 1.2 | | 1 | 1 | 110.761 | | | |
| L2 | 1865.50 | 6291.62 | A | 1 | 0.65 | 7 | 1 | 1 | 116.460 | 1800.36 | 43.91 | C |
| 87.25-46.25 | | | B | 1 | 0.65 | | 1 | 1 | 116.460 | | | |
| | | | C | 1 | 1.2 | | 1 | 1 | 116.460 | | | |
| L3 46.25-0.00 | 1922.38 | 11230.22 | A | 1 | 0.65 | 6 | 1 | 1 | 155.407 | 1773.60 | 38.35 | C |
| | | | B | 1 | 0.65 | | 1 | 1 | 155.407 | | | |
| | | | C | 1 | 1.2 | | 1 | 1 | 155.407 | | | |
| Sum Weight: | 5408.76 | 20285.65 | | | | | | OTM | 377.95 kip-ft | 5540.49 | | |

## Force Totals

| Load Case | Vertical Forces lb | Sum of Forces X lb | Sum of Forces Z lb | Sum of Overturning Moments, $M_x$ kip-ft | Sum of Overturning Moments, $M_z$ kip-ft | Sum of Torques kip-ft |
|---|---|---|---|---|---|---|
| Leg Weight | 20285.65 | | | | | |
| Bracing Weight | 0.00 | | | | | |
| Total Member Self-Weight | 20285.65 | | | 2.29 | -0.07 | |
| Total Weight | 34833.31 | | | 2.29 | -0.07 | |
| Wind 0 deg - No Ice | | 0.00 | -12537.26 | -1205.03 | -0.07 | -0.87 |
| Wind 30 deg - No Ice | | 6268.63 | -10857.59 | -1043.28 | -603.73 | -0.94 |
| Wind 60 deg - No Ice | | 10857.59 | -6268.63 | -601.37 | -1045.64 | -0.76 |
| Wind 90 deg - No Ice | | 23622.46 | 0.00 | 2.29 | -1970.78 | 6.48 |
| Wind 120 deg - No Ice | | 10857.59 | 6268.63 | 605.95 | -1045.64 | 0.11 |
| Wind 150 deg - No Ice | | 6268.63 | 10857.59 | 1047.86 | -603.73 | 0.57 |
| Wind 180 deg - No Ice | | 0.00 | 12537.26 | 1209.61 | -0.07 | 0.87 |
| Wind 210 deg - No Ice | | -6268.63 | 10857.59 | 1047.86 | 603.59 | 0.94 |
| Wind 240 deg - No Ice | | -10857.59 | 6268.63 | 605.95 | 1045.50 | 0.76 |
| Wind 270 deg - No Ice | | -23622.46 | 0.00 | 2.29 | 1970.64 | -6.48 |
| Wind 300 deg - No Ice | | -10857.59 | -6268.63 | -601.37 | 1045.50 | -0.11 |
| Wind 330 deg - No Ice | | -6268.63 | -10857.59 | -1043.28 | 603.59 | -0.57 |
| Member Ice | 12409.79 | | | | | |
| Total Weight Ice | 78625.24 | | | 11.94 | 0.88 | |
| Wind 0 deg - Ice | | 0.00 | -3855.05 | -349.42 | 0.88 | -0.16 |
| Wind 30 deg - Ice | | 1927.52 | -3338.57 | -301.00 | -179.80 | -0.12 |
| Wind 60 deg - Ice | | 4273.39 | -2467.24 | -207.35 | -378.94 | -0.06 |
| Wind 90 deg - Ice | | 6134.88 | 0.00 | 11.94 | -521.57 | 1.41 |

| Load Case | Vertical Forces lb | Sum of Forces X lb | Sum of Forces Z lb | Sum of Overturning Moments, $M_x$ kip-ft | Sum of Overturning Moments, $M_z$ kip-ft | Sum of Torques kip-ft |
|---|---|---|---|---|---|---|
| Wind 120 deg - Ice | | 4300.41 | 2482.84 | 231.60 | -379.57 | 0.10 |
| Wind 150 deg - Ice | | 1927.52 | 3338.57 | 324.89 | -179.80 | 0.15 |
| Wind 180 deg - Ice | | 0.00 | 3855.05 | 373.30 | 0.88 | 0.16 |
| Wind 210 deg - Ice | | -1927.52 | 3338.57 | 324.89 | 181.56 | 0.12 |
| Wind 240 deg - Ice | | -4273.39 | 2467.24 | 231.23 | 380.70 | 0.06 |
| Wind 270 deg - Ice | | -6134.88 | 0.00 | 11.94 | 523.33 | -1.41 |
| Wind 300 deg - Ice | | -4300.41 | -2482.84 | -207.71 | 381.33 | -0.10 |
| Wind 330 deg - Ice | | -1927.52 | -3338.57 | -301.00 | 181.56 | -0.15 |
| Total Weight | 34833.31 | | | 2.29 | -0.07 | |
| Wind 0 deg - Service | | 0.00 | -4204.83 | -404.88 | 0.04 | -0.29 |
| Wind 30 deg - Service | | 2102.41 | -3641.49 | -350.63 | -202.42 | -0.32 |
| Wind 60 deg - Service | | 3641.49 | -2102.41 | -202.42 | -350.63 | -0.25 |
| Wind 90 deg - Service | | 7922.66 | 0.00 | 0.04 | -660.91 | -0.12 |
| Wind 120 deg - Service | | 3641.49 | 2102.41 | 202.50 | -350.63 | 0.04 |
| Wind 150 deg - Service | | 2102.41 | 3641.49 | 350.71 | -202.42 | 0.19 |
| Wind 180 deg - Service | | 0.00 | 4204.83 | 404.96 | 0.04 | 0.29 |
| Wind 210 deg - Service | | -2102.41 | 3641.49 | 350.71 | 202.50 | 0.32 |
| Wind 240 deg - Service | | -3641.49 | 2102.41 | 202.50 | 350.71 | 0.25 |
| Wind 270 deg - Service | | -7922.66 | 0.00 | 0.04 | 660.99 | 0.12 |
| Wind 300 deg - Service | | -3641.49 | -2102.41 | -202.42 | 350.71 | -0.04 |
| Wind 330 deg - Service | | -2102.41 | -3641.49 | -350.63 | 202.50 | -0.19 |

## Load Combinations

| Comb. No. | Description |
|---|---|
| 1 | Dead Only |
| 2 | 1.2 Dead+1.6 Wind 0 deg - No Ice |
| 3 | 0.9 Dead+1.6 Wind 0 deg - No Ice |
| 4 | 1.2 Dead+1.6 Wind 30 deg - No Ice |
| 5 | 0.9 Dead+1.6 Wind 30 deg - No Ice |
| 6 | 1.2 Dead+1.6 Wind 60 deg - No Ice |
| 7 | 0.9 Dead+1.6 Wind 60 deg - No Ice |
| 8 | 1.2 Dead+1.6 Wind 90 deg - No Ice |
| 9 | 0.9 Dead+1.6 Wind 90 deg - No Ice |
| 10 | 1.2 Dead+1.6 Wind 120 deg - No Ice |
| 11 | 0.9 Dead+1.6 Wind 120 deg - No Ice |
| 12 | 1.2 Dead+1.6 Wind 150 deg - No Ice |
| 13 | 0.9 Dead+1.6 Wind 150 deg - No Ice |
| 14 | 1.2 Dead+1.6 Wind 180 deg - No Ice |
| 15 | 0.9 Dead+1.6 Wind 180 deg - No Ice |
| 16 | 1.2 Dead+1.6 Wind 210 deg - No Ice |
| 17 | 0.9 Dead+1.6 Wind 210 deg - No Ice |
| 18 | 1.2 Dead+1.6 Wind 240 deg - No Ice |
| 19 | 0.9 Dead+1.6 Wind 240 deg - No Ice |
| 20 | 1.2 Dead+1.6 Wind 270 deg - No Ice |
| 21 | 0.9 Dead+1.6 Wind 270 deg - No Ice |
| 22 | 1.2 Dead+1.6 Wind 300 deg - No Ice |
| 23 | 0.9 Dead+1.6 Wind 300 deg - No Ice |
| 24 | 1.2 Dead+1.6 Wind 330 deg - No Ice |
| 25 | 0.9 Dead+1.6 Wind 330 deg - No Ice |
| 26 | 1.2 Dead+1.0 Ice+1.0 Temp |
| 27 | 1.2 Dead+1.0 Wind 0 deg+1.0 Ice+1.0 Temp |
| 28 | 1.2 Dead+1.0 Wind 30 deg+1.0 Ice+1.0 Temp |
| 29 | 1.2 Dead+1.0 Wind 60 deg+1.0 Ice+1.0 Temp |
| 30 | 1.2 Dead+1.0 Wind 90 deg+1.0 Ice+1.0 Temp |

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

## Maximum Member Forces

| Section No. | Elevation ft | Component Type | Condition | Gov. Load Comb. | Axial lb | Major Axis Moment kip-ft | Minor Axis Moment kip-ft |
|---|---|---|---|---|---|---|---|
| L1 | 136 - 87.25 | Pole | Max Tension | 26 | 0.00 | -0.00 | 0.00 |
| | | | Max. Compression | 26 | -42145.31 | 1.56 | -3.32 |
| | | | Max. Mx | 20 | -13823.40 | 535.65 | -0.71 |
| | | | Max. My | 14 | -14756.22 | 0.02 | -400.18 |
| | | | Max. Vy | 20 | -20918.38 | 535.65 | -0.71 |
| | | | Max. Vx | 14 | 14718.25 | 0.02 | -400.18 |
| | | | Max. Torque | 8 | | | -2.73 |
| L2 | 87.25 - 46.25 | Pole | Max Tension | 1 | 0.00 | 0.00 | 0.00 |
| | | | Max. Compression | 26 | -59693.63 | 1.45 | -8.16 |
| | | | Max. Mx | 20 | -23444.99 | 1555.51 | -1.63 |
| | | | Max. My | 14 | -24333.95 | -0.01 | -1055.46 |
| | | | Max. Vy | 8 | 29515.31 | -1555.50 | -1.63 |
| | | | Max. Vx | 14 | 17558.71 | -0.01 | -1055.46 |
| | | | Max. Torque | 8 | | | -6.26 |
| L3 | 46.25 - 0 | Pole | Max Tension | 1 | 0.00 | 0.00 | 0.00 |
| | | | Max. Compression | 26 | -86440.37 | 1.15 | -14.01 |
| | | | Max. Mx | 8 | -41752.28 | -3280.64 | -2.81 |
| | | | Max. My | 14 | -41784.36 | -0.09 | -2020.32 |
| | | | Max. Vy | 8 | 37848.62 | -3280.64 | -2.81 |
| | | | Max. Vx | 14 | 20092.12 | -0.09 | -2020.32 |
| | | | Max. Torque | 8 | | | -10.32 |

## Maximum Reactions

| Location | Condition | Gov. Load Comb. | Vertical lb | Horizontal, X lb | Horizontal, Z lb |
|---|---|---|---|---|---|
| Pole | Max. Vert | 36 | 86440.38 | 6134.90 | -0.00 |
| | Max. $H_x$ | 21 | 31349.98 | 37795.94 | -0.00 |

| Location | Condition | Gov. Load Comb. | Vertical lb | Horizontal, X lb | Horizontal, Z lb |
|---|---|---|---|---|---|
| | Max. $H_z$ | 2 | 41799.97 | 0.00 | 20059.62 |
| | Max. $M_x$ | 2 | 2014.57 | 0.00 | 20059.62 |
| | Max. $M_z$ | 8 | 3280.64 | -37795.94 | -0.00 |
| | Max. Torsion | 20 | 10.32 | 37795.94 | -0.00 |
| | Min. Vert | 5 | 31349.98 | -10029.81 | 17372.14 |
| | Min. $H_x$ | 9 | 31349.98 | -37795.94 | -0.00 |
| | Min. $H_z$ | 14 | 41799.97 | 0.00 | -20059.62 |
| | Min. $M_x$ | 14 | -2020.32 | 0.00 | -20059.62 |
| | Min. $M_z$ | 20 | -3280.48 | 37795.94 | -0.00 |
| | Min. Torsion | 8 | -10.32 | -37795.94 | -0.00 |

## Tower Mast Reaction Summary

| Load Combination | Vertical lb | $Shear_x$ lb | $Shear_z$ lb | Overturning Moment, $M_x$ kip-ft | Overturning Moment, $M_z$ kip-ft | Torque kip-ft |
|---|---|---|---|---|---|---|
| Dead Only | 34833.31 | 0.00 | 0.00 | 2.30 | -0.07 | 0.00 |
| 1.2 Dead+1.6 Wind 0 deg - No Ice | 41799.97 | -0.00 | -20059.62 | -2014.57 | -0.09 | -1.38 |
| 0.9 Dead+1.6 Wind 0 deg - No Ice | 31349.98 | -0.00 | -20059.62 | -1992.59 | -0.07 | -1.38 |
| 1.2 Dead+1.6 Wind 30 deg - No Ice | 41799.97 | 10029.81 | -17372.14 | -1744.28 | -1008.81 | -1.48 |
| 0.9 Dead+1.6 Wind 30 deg - No Ice | 31349.98 | 10029.81 | -17372.14 | -1725.34 | -997.43 | -1.49 |
| 1.2 Dead+1.6 Wind 60 deg - No Ice | 41799.97 | 17372.14 | -10029.81 | -1005.84 | -1747.24 | -1.19 |
| 0.9 Dead+1.6 Wind 60 deg - No Ice | 31349.98 | 17372.14 | -10029.81 | -995.22 | -1727.54 | -1.19 |
| 1.2 Dead+1.6 Wind 90 deg - No Ice | 41799.97 | 37795.94 | 0.00 | 2.81 | -3280.64 | 10.32 |
| 0.9 Dead+1.6 Wind 90 deg - No Ice | 31349.98 | 37795.94 | 0.00 | 2.08 | -3246.18 | 10.31 |
| 1.2 Dead+1.6 Wind 120 deg - No Ice | 41799.97 | 17372.14 | 10029.81 | 1011.60 | -1747.24 | 0.20 |
| 0.9 Dead+1.6 Wind 120 deg - No Ice | 31349.98 | 17372.14 | 10029.81 | 999.49 | -1727.54 | 0.19 |
| 1.2 Dead+1.6 Wind 150 deg - No Ice | 41799.97 | 10029.81 | 17372.14 | 1750.03 | -1008.81 | 0.91 |
| 0.9 Dead+1.6 Wind 150 deg - No Ice | 31349.98 | 10029.81 | 17372.14 | 1729.60 | -997.42 | 0.91 |
| 1.2 Dead+1.6 Wind 180 deg - No Ice | 41799.97 | -0.00 | 20059.62 | 2020.32 | -0.09 | 1.38 |
| 0.9 Dead+1.6 Wind 180 deg - No Ice | 31349.98 | -0.00 | 20059.62 | 1996.85 | -0.07 | 1.38 |
| 1.2 Dead+1.6 Wind 210 deg - No Ice | 41799.97 | -10029.81 | 17372.14 | 1750.04 | 1008.63 | 1.48 |
| 0.9 Dead+1.6 Wind 210 deg - No Ice | 31349.98 | -10029.81 | 17372.14 | 1729.61 | 997.29 | 1.49 |
| 1.2 Dead+1.6 Wind 240 deg - No Ice | 41799.97 | -17372.14 | 10029.81 | 1011.61 | 1747.07 | 1.19 |
| 0.9 Dead+1.6 Wind 240 deg - No Ice | 31349.98 | -17372.14 | 10029.81 | 999.50 | 1727.41 | 1.19 |
| 1.2 Dead+1.6 Wind 270 deg - No Ice | 41799.97 | -37795.94 | 0.00 | 2.81 | 3280.48 | -10.32 |
| 0.9 Dead+1.6 Wind 270 deg - No Ice | 31349.98 | -37795.94 | 0.00 | 2.08 | 3246.06 | -10.31 |

| Load Combination | Vertical | $Shear_x$ | $Shear_z$ | Overturning Moment, $M_x$ | Overturning Moment, $M_z$ | Torque |
|---|---|---|---|---|---|---|
| | lb | lb | lb | kip-ft | kip-ft | kip-ft |
| 1.2 Dead+1.6 Wind 300 deg - No Ice | 41799.97 | -17372.14 | -10029.81 | -1005.84 | 1747.08 | -0.20 |
| 0.9 Dead+1.6 Wind 300 deg - No Ice | 31349.98 | -17372.14 | -10029.81 | -995.23 | 1727.42 | -0.19 |
| 1.2 Dead+1.6 Wind 330 deg - No Ice | 41799.97 | -10029.81 | -17372.14 | -1744.28 | 1008.64 | -0.91 |
| 0.9 Dead+1.6 Wind 330 deg - No Ice | 31349.98 | -10029.81 | -17372.14 | -1725.35 | 997.30 | -0.91 |
| 1.2 Dead+1.0 Ice+1.0 Temp | 86440.37 | -0.01 | 0.03 | 14.01 | 1.15 | -0.00 |
| 1.2 Dead+1.0 Wind 0 deg+1.0 Ice+1.0 Temp | 86440.38 | -0.00 | -3855.06 | -392.47 | 1.16 | -0.15 |
| 1.2 Dead+1.0 Wind 30 deg+1.0 Ice+1.0 Temp | 86440.38 | 1927.53 | -3338.58 | -338.00 | -202.13 | -0.11 |
| 1.2 Dead+1.0 Wind 60 deg+1.0 Ice+1.0 Temp | 86440.38 | 4273.41 | -2467.25 | -231.84 | -424.83 | -0.04 |
| 1.2 Dead+1.0 Wind 90 deg+1.0 Ice+1.0 Temp | 86440.38 | 6134.90 | 0.00 | 14.10 | -583.28 | 1.43 |
| 1.2 Dead+1.0 Wind 120 deg+1.0 Ice+1.0 Temp | 86440.38 | 4300.43 | 2482.85 | 260.40 | -425.43 | 0.11 |
| 1.2 Dead+1.0 Wind 150 deg+1.0 Ice+1.0 Temp | 86440.38 | 1927.53 | 3338.58 | 366.21 | -202.13 | 0.15 |
| 1.2 Dead+1.0 Wind 180 deg+1.0 Ice+1.0 Temp | 86440.38 | -0.00 | 3855.06 | 420.68 | 1.16 | 0.15 |
| 1.2 Dead+1.0 Wind 210 deg+1.0 Ice+1.0 Temp | 86440.38 | -1927.53 | 3338.58 | 366.21 | 204.44 | 0.11 |
| 1.2 Dead+1.0 Wind 240 deg+1.0 Ice+1.0 Temp | 86440.38 | -4273.41 | 2467.25 | 260.05 | 427.14 | 0.04 |
| 1.2 Dead+1.0 Wind 270 deg+1.0 Ice+1.0 Temp | 86440.38 | -6134.90 | 0.00 | 14.10 | 585.59 | -1.43 |
| 1.2 Dead+1.0 Wind 300 deg+1.0 Ice+1.0 Temp | 86440.38 | -4300.43 | -2482.85 | -232.19 | 427.75 | -0.11 |
| 1.2 Dead+1.0 Wind 330 deg+1.0 Ice+1.0 Temp | 86440.38 | -1927.53 | -3338.58 | -338.00 | 204.44 | -0.15 |
| Dead+Wind 0 deg - Service | 34833.31 | -0.00 | -4204.83 | -417.67 | -0.07 | -0.29 |
| Dead+Wind 30 deg - Service | 34833.31 | 2102.42 | -3641.49 | -361.40 | -210.10 | -0.31 |
| Dead+Wind 60 deg - Service | 34833.31 | 3641.49 | -2102.41 | -207.65 | -363.85 | -0.25 |
| Dead+Wind 90 deg - Service | 34833.31 | 7922.66 | -0.00 | 2.38 | -684.05 | -0.12 |
| Dead+Wind 120 deg - Service | 34833.31 | 3641.49 | 2102.42 | 212.41 | -363.85 | 0.04 |
| Dead+Wind 150 deg - Service | 34833.31 | 2102.42 | 3641.49 | 366.16 | -210.10 | 0.19 |
| Dead+Wind 180 deg - Service | 34833.31 | -0.00 | 4204.83 | 422.44 | -0.07 | 0.29 |
| Dead+Wind 210 deg - Service | 34833.31 | -2102.41 | 3641.49 | 366.16 | 209.96 | 0.31 |
| Dead+Wind 240 deg - Service | 34833.31 | -3641.49 | 2102.42 | 212.41 | 363.71 | 0.25 |
| Dead+Wind 270 deg - Service | 34833.31 | -7922.66 | -0.00 | 2.38 | 683.91 | 0.12 |
| Dead+Wind 300 deg - Service | 34833.31 | -3641.49 | -2102.42 | -207.65 | 363.71 | -0.04 |
| Dead+Wind 330 deg - Service | 34833.31 | -2102.42 | -3641.49 | -361.40 | 209.96 | -0.19 |

# Solution Summary

| | Sum of Applied Forces | | | Sum of Reactions | | | |
|---|---|---|---|---|---|---|---|
| Load Comb. | PX lb | PY lb | PZ lb | PX lb | PY lb | PZ lb | % Error |
| 1 | 0.00 | -34833.31 | 0.00 | 0.00 | 34833.31 | -0.00 | 0.000% |
| 2 | 0.00 | -41799.97 | -20059.62 | 0.00 | 41799.97 | 20059.62 | 0.000% |
| 3 | 0.00 | -31349.98 | -20059.62 | 0.00 | 31349.98 | 20059.62 | 0.000% |
| 4 | 10029.81 | -41799.97 | -17372.14 | -10029.81 | 41799.97 | 17372.14 | 0.000% |
| 5 | 10029.81 | -31349.98 | -17372.14 | -10029.81 | 31349.98 | 17372.14 | 0.000% |
| 6 | 17372.14 | -41799.97 | -10029.81 | -17372.14 | 41799.97 | 10029.81 | 0.000% |
| 7 | 17372.14 | -31349.98 | -10029.81 | -17372.14 | 31349.98 | 10029.81 | 0.000% |

| | Sum of Applied Forces | | | Sum of Reactions | | | |
|---|---|---|---|---|---|---|---|
| Load Comb. | PX lb | PY lb | PZ lb | PX lb | PY lb | PZ lb | % Error |
| 8 | 37795.94 | -41799.97 | 0.00 | -37795.94 | 41799.97 | -0.00 | 0.000% |
| 9 | 37795.94 | -31349.98 | 0.00 | -37795.94 | 31349.98 | -0.00 | 0.000% |
| 10 | 17372.14 | -41799.97 | 10029.81 | -17372.14 | 41799.97 | -10029.81 | 0.000% |
| 11 | 17372.14 | -31349.98 | 10029.81 | -17372.14 | 31349.98 | -10029.81 | 0.000% |
| 12 | 10029.81 | -41799.97 | 17372.14 | -10029.81 | 41799.97 | -17372.14 | 0.000% |
| 13 | 10029.81 | -31349.98 | 17372.14 | -10029.81 | 31349.98 | -17372.14 | 0.000% |
| 14 | 0.00 | -41799.97 | 20059.62 | 0.00 | 41799.97 | -20059.62 | 0.000% |
| 15 | 0.00 | -31349.98 | 20059.62 | 0.00 | 31349.98 | -20059.62 | 0.000% |
| 16 | -10029.81 | -41799.97 | 17372.14 | 10029.81 | 41799.97 | -17372.14 | 0.000% |
| 17 | -10029.81 | -31349.98 | 17372.14 | 10029.81 | 31349.98 | -17372.14 | 0.000% |
| 18 | -17372.14 | -41799.97 | 10029.81 | 17372.14 | 41799.97 | -10029.81 | 0.000% |
| 19 | -17372.14 | -31349.98 | 10029.81 | 17372.14 | 31349.98 | -10029.81 | 0.000% |
| 20 | -37795.94 | -41799.97 | 0.00 | 37795.94 | 41799.97 | -0.00 | 0.000% |
| 21 | -37795.94 | -31349.98 | 0.00 | 37795.94 | 31349.98 | -0.00 | 0.000% |
| 22 | -17372.14 | -41799.97 | -10029.81 | 17372.14 | 41799.97 | 10029.81 | 0.000% |
| 23 | -17372.14 | -31349.98 | -10029.81 | 17372.14 | 31349.98 | 10029.81 | 0.000% |
| 24 | -10029.81 | -41799.97 | -17372.14 | 10029.81 | 41799.97 | 17372.14 | 0.000% |
| 25 | -10029.81 | -31349.98 | -17372.14 | 10029.81 | 31349.98 | 17372.14 | 0.000% |
| 26 | 0.00 | -86440.38 | 0.00 | 0.01 | 86440.37 | -0.03 | 0.000% |
| 27 | 0.00 | -86440.38 | -3855.05 | 0.00 | 86440.38 | 3855.06 | 0.000% |
| 28 | 1927.52 | -86440.38 | -3338.57 | -1927.53 | 86440.38 | 3338.58 | 0.000% |
| 29 | 4273.39 | -86440.38 | -2467.24 | -4273.41 | 86440.38 | 2467.25 | 0.000% |
| 30 | 6134.88 | -86440.38 | 0.00 | -6134.90 | 86440.38 | -0.00 | 0.000% |
| 31 | 4300.41 | -86440.38 | 2482.84 | -4300.43 | 86440.38 | -2482.85 | 0.000% |
| 32 | 1927.52 | -86440.38 | 3338.57 | -1927.53 | 86440.38 | -3338.58 | 0.000% |
| 33 | 0.00 | -86440.38 | 3855.05 | 0.00 | 86440.38 | -3855.06 | 0.000% |
| 34 | -1927.52 | -86440.38 | 3338.57 | 1927.53 | 86440.38 | -3338.58 | 0.000% |
| 35 | -4273.39 | -86440.38 | 2467.24 | 4273.41 | 86440.38 | -2467.25 | 0.000% |
| 36 | -6134.88 | -86440.38 | 0.00 | 6134.90 | 86440.38 | -0.00 | 0.000% |
| 37 | -4300.41 | -86440.38 | -2482.84 | 4300.43 | 86440.38 | 2482.85 | 0.000% |
| 38 | -1927.52 | -86440.38 | -3338.57 | 1927.53 | 86440.38 | 3338.58 | 0.000% |
| 39 | 0.00 | -34833.31 | -4204.83 | 0.00 | 34833.31 | 4204.83 | 0.000% |
| 40 | 2102.41 | -34833.31 | -3641.49 | -2102.42 | 34833.31 | 3641.49 | 0.000% |
| 41 | 3641.49 | -34833.31 | -2102.41 | -3641.49 | 34833.31 | 2102.41 | 0.000% |
| 42 | 7922.66 | -34833.31 | 0.00 | -7922.66 | 34833.31 | 0.00 | 0.000% |
| 43 | 3641.49 | -34833.31 | 2102.41 | -3641.49 | 34833.31 | -2102.42 | 0.000% |
| 44 | 2102.41 | -34833.31 | 3641.49 | -2102.42 | 34833.31 | -3641.49 | 0.000% |
| 45 | 0.00 | -34833.31 | 4204.83 | 0.00 | 34833.31 | -4204.83 | 0.000% |
| 46 | -2102.41 | -34833.31 | 3641.49 | 2102.41 | 34833.31 | -3641.49 | 0.000% |
| 47 | -3641.49 | -34833.31 | 2102.41 | 3641.49 | 34833.31 | -2102.42 | 0.000% |
| 48 | -7922.66 | -34833.31 | 0.00 | 7922.66 | 34833.31 | 0.00 | 0.000% |
| 49 | -3641.49 | -34833.31 | -2102.41 | 3641.49 | 34833.31 | 2102.42 | 0.000% |
| 50 | -2102.41 | -34833.31 | -3641.49 | 2102.42 | 34833.31 | 3641.49 | 0.000% |

## Non-Linear Convergence Results

| Load Combination | Converged? | Number of Cycles | Displacement Tolerance | Force Tolerance |
|---|---|---|---|---|
| 1 | Yes | 4 | 0.00000001 | 0.00000001 |
| 2 | Yes | 5 | 0.00000001 | 0.00003371 |
| 3 | Yes | 5 | 0.00000001 | 0.00001678 |
| 4 | Yes | 6 | 0.00000001 | 0.00002119 |
| 5 | Yes | 6 | 0.00000001 | 0.00000735 |
| 6 | Yes | 6 | 0.00000001 | 0.00002286 |
| 7 | Yes | 6 | 0.00000001 | 0.00000799 |
| 8 | Yes | 6 | 0.00000001 | 0.00000801 |

| | | | | |
|---|---|---|---|---|
| 9 | Yes | 5 | 0.00000001 | 0.00007160 |
| 10 | Yes | 6 | 0.00000001 | 0.00002242 |
| 11 | Yes | 6 | 0.00000001 | 0.00000780 |
| 12 | Yes | 6 | 0.00000001 | 0.00002158 |
| 13 | Yes | 6 | 0.00000001 | 0.00000749 |
| 14 | Yes | 5 | 0.00000001 | 0.00003379 |
| 15 | Yes | 5 | 0.00000001 | 0.00001681 |
| 16 | Yes | 6 | 0.00000001 | 0.00002325 |
| 17 | Yes | 6 | 0.00000001 | 0.00000812 |
| 18 | Yes | 6 | 0.00000001 | 0.00002152 |
| 19 | Yes | 6 | 0.00000001 | 0.00000746 |
| 20 | Yes | 6 | 0.00000001 | 0.00000801 |
| 21 | Yes | 5 | 0.00000001 | 0.00007160 |
| 22 | Yes | 6 | 0.00000001 | 0.00002188 |
| 23 | Yes | 6 | 0.00000001 | 0.00000762 |
| 24 | Yes | 6 | 0.00000001 | 0.00002277 |
| 25 | Yes | 6 | 0.00000001 | 0.00000796 |
| 26 | Yes | 4 | 0.00000001 | 0.00007060 |
| 27 | Yes | 6 | 0.00000001 | 0.00003695 |
| 28 | Yes | 6 | 0.00000001 | 0.00004037 |
| 29 | Yes | 6 | 0.00000001 | 0.00004934 |
| 30 | Yes | 6 | 0.00000001 | 0.00005240 |
| 31 | Yes | 6 | 0.00000001 | 0.00005219 |
| 32 | Yes | 6 | 0.00000001 | 0.00004336 |
| 33 | Yes | 6 | 0.00000001 | 0.00003992 |
| 34 | Yes | 6 | 0.00000001 | 0.00004393 |
| 35 | Yes | 6 | 0.00000001 | 0.00005277 |
| 36 | Yes | 6 | 0.00000001 | 0.00005298 |
| 37 | Yes | 6 | 0.00000001 | 0.00004982 |
| 38 | Yes | 6 | 0.00000001 | 0.00004093 |
| 39 | Yes | 4 | 0.00000001 | 0.00003354 |
| 40 | Yes | 4 | 0.00000001 | 0.00008136 |
| 41 | Yes | 5 | 0.00000001 | 0.00000470 |
| 42 | Yes | 4 | 0.00000001 | 0.00003100 |
| 43 | Yes | 4 | 0.00000001 | 0.00009483 |
| 44 | Yes | 4 | 0.00000001 | 0.00008472 |
| 45 | Yes | 4 | 0.00000001 | 0.00003400 |
| 46 | Yes | 5 | 0.00000001 | 0.00000502 |
| 47 | Yes | 4 | 0.00000001 | 0.00008488 |
| 48 | Yes | 4 | 0.00000001 | 0.00003100 |
| 49 | Yes | 4 | 0.00000001 | 0.00008688 |
| 50 | Yes | 4 | 0.00000001 | 0.00009994 |

## Maximum Tower Deflections - Service Wind

| *Section No.* | *Elevation* | *Horz. Deflection* | *Gov. Load Comb.* | *Tilt* | *Twist* |
|---|---|---|---|---|---|
| | *ft* | *in* | | ° | ° |
| L1 | 136 - 87.25 | 21.958 | 48 | 1.3721 | 0.0022 |
| L2 | 91.25 - 46.25 | 10.219 | 42 | 1.0229 | 0.0014 |
| L3 | 51 - 0 | 3.274 | 42 | 0.5800 | 0.0005 |

## Critical Deflections and Radius of Curvature - Service Wind

| Elevation<br>ft | Appurtenance | Gov. Load Comb. | Deflection<br>in | Tilt<br>° | Twist<br>° | Radius of Curvature<br>ft |
|---|---|---|---|---|---|---|
| 143.00 | 20' Dipole | 48 | 21.958 | 1.3721 | 0.0022 | 43800 |
| 142.00 | PTP 400 | 48 | 21.958 | 1.3721 | 0.0022 | 43800 |
| 140.00 | 3"x4.5' Pipe | 48 | 21.958 | 1.3721 | 0.0022 | 43800 |
| 138.00 | (2) Ericsson AIR21 with 6' pipe | 48 | 21.958 | 1.3721 | 0.0022 | 43800 |
| 115.00 | Valmont Light Duty Tri-Bracket | 48 | 16.149 | 1.2224 | 0.0018 | 10428 |
| 106.00 | Pirod 13' Platform w/ Handrail | 42 | 13.786 | 1.1523 | 0.0016 | 7299 |
| 95.00 | Pirod 13' Platform w/ Handrail | 42 | 11.083 | 1.0579 | 0.0014 | 5341 |
| 83.00 | PTP 400 | 42 | 8.442 | 0.9405 | 0.0012 | 4671 |

## Maximum Tower Deflections - Design Wind

| Section No. | Elevation<br>ft | Horz. Deflection<br>in | Gov. Load Comb. | Tilt<br>° | Twist<br>° |
|---|---|---|---|---|---|
| L1 | 136 - 87.25 | 105.332 | 20 | 6.5909 | 0.0464 |
| L2 | 91.25 - 46.25 | 49.042 | 8 | 4.9134 | 0.0247 |
| L3 | 51 - 0 | 15.714 | 8 | 2.7846 | 0.0126 |

## Critical Deflections and Radius of Curvature - Design Wind

| Elevation<br>ft | Appurtenance | Gov. Load Comb. | Deflection<br>in | Tilt<br>° | Twist<br>° | Radius of Curvature<br>ft |
|---|---|---|---|---|---|---|
| 143.00 | 20' Dipole | 20 | 105.332 | 6.5909 | 0.0464 | 9321 |
| 142.00 | PTP 400 | 20 | 105.332 | 6.5909 | 0.0464 | 9321 |
| 140.00 | 3"x4.5' Pipe | 20 | 105.332 | 6.5909 | 0.0464 | 9321 |
| 138.00 | (2) Ericsson AIR21 with 6' pipe | 20 | 105.332 | 6.5909 | 0.0464 | 9321 |
| 115.00 | Valmont Light Duty Tri-Bracket | 20 | 77.482 | 5.8720 | 0.0354 | 2216 |
| 106.00 | Pirod 13' Platform w/ Handrail | 8 | 66.149 | 5.5353 | 0.0310 | 1549 |
| 95.00 | Pirod 13' Platform w/ Handrail | 8 | 53.182 | 5.0815 | 0.0262 | 1131 |
| 83.00 | PTP 400 | 8 | 40.515 | 4.5177 | 0.0217 | 985 |

## Base Plate Design Data

| Plate Thickness<br>in | Number of Anchor Bolts | Anchor Bolt Size<br>in | Actual<br>Allowable<br>Ratio<br>Bolt Tension<br>lb | Actual<br>Allowable<br>Ratio<br>Bolt Compression<br>lb | Actual<br>Allowable<br>Ratio<br>Plate Stress<br>ksi | Actual<br>Allowable<br>Ratio<br>Stiffener Stress<br>ksi | Controlling Condition | Ratio |
|---|---|---|---|---|---|---|---|---|
| 3.0000 | 16 | 2.2500 | 193400.11<br>223654.40<br>0.86 | 198619.15<br>371266.30<br>0.53 | 33.128<br>49.500<br>0.67 | | Bolt T | 0.86 ✔ |

# Compression Checks

## Pole Design Data

| Section No. | Elevation ft | Size | L ft | $L_u$ ft | Kl/r | A $in^2$ | $P_u$ lb | $\phi P_n$ lb | Ratio $\frac{P_u}{\phi P_n}$ |
|---|---|---|---|---|---|---|---|---|---|
| L1 | 136 - 87.25 (1) | TP30.7x23x0.1875 | 48.75 | 0.00 | 0.0 | 17.7828 | -13823.40 | 1124710.00 | 0.012 |
| L2 | 87.25 - 46.25 (2) | TP36.81x29.6932x0.375 | 45.00 | 0.00 | 0.0 | 42.4726 | -23445.00 | 3155500.00 | 0.007 |
| L3 | 46.25 - 0 (3) | TP43.36x35.3088x0.5 | 51.00 | 0.00 | 0.0 | 68.0188 | -41752.30 | 5053460.00 | 0.008 |

## Pole Bending Design Data

| Section No. | Elevation ft | Size | $M_{ux}$ kip-ft | $\phi M_{nx}$ kip-ft | Ratio $\frac{M_{ux}}{\phi M_{nx}}$ | $M_{uy}$ kip-ft | $\phi M_{ny}$ kip-ft | Ratio $\frac{M_{uy}}{\phi M_{ny}}$ |
|---|---|---|---|---|---|---|---|---|
| L1 | 136 - 87.25 (1) | TP30.7x23x0.1875 | 535.65 | 692.16 | 0.774 | 0.00 | 692.16 | 0.000 |
| L2 | 87.25 - 46.25 (2) | TP36.81x29.6932x0.375 | 1555.52 | 2309.36 | 0.674 | 0.00 | 2309.36 | 0.000 |
| L3 | 46.25 - 0 (3) | TP43.36x35.3088x0.5 | 3280.64 | 4437.07 | 0.739 | 0.00 | 4437.07 | 0.000 |

## Pole Shear Design Data

| Section No. | Elevation ft | Size | Actual $V_u$ lb | $\phi V_n$ lb | Ratio $\frac{V_u}{\phi V_n}$ | Actual $T_u$ kip-ft | $\phi T_n$ kip-ft | Ratio $\frac{T_u}{\phi T_n}$ |
|---|---|---|---|---|---|---|---|---|
| L1 | 136 - 87.25 (1) | TP30.7x23x0.1875 | 20918.40 | 562353.00 | 0.037 | 2.70 | 1386.01 | 0.002 |
| L2 | 87.25 - 46.25 (2) | TP36.81x29.6932x0.375 | 29515.30 | 1577750.00 | 0.019 | 6.26 | 4624.38 | 0.001 |
| L3 | 46.25 - 0 (3) | TP43.36x35.3088x0.5 | 37848.60 | 2526730.00 | 0.015 | 10.32 | 8885.00 | 0.001 |

## Pole Interaction Design Data

| Section No. | Elevation ft | Ratio $\frac{P_u}{\phi P_n}$ | Ratio $\frac{M_{ux}}{\phi M_{nx}}$ | Ratio $\frac{M_{uy}}{\phi M_{ny}}$ | Ratio $\frac{V_u}{\phi V_n}$ | Ratio $\frac{T_u}{\phi T_n}$ | Comb. Stress Ratio | Allow. Stress Ratio | Criteria |
|---|---|---|---|---|---|---|---|---|---|
| L1 | 136 - 87.25 (1) | 0.012 | 0.774 | 0.000 | 0.037 | 0.002 | 0.788 ✔ | 1.000 | 4.8.2 ✔ |
| L2 | 87.25 - 46.25 (2) | 0.007 | 0.674 | 0.000 | 0.019 | 0.001 | 0.681 ✔ | 1.000 | 4.8.2 ✔ |
| L3 | 46.25 - 0 (3) | 0.008 | 0.739 | 0.000 | 0.015 | 0.001 | 0.748 ✔ | 1.000 | 4.8.2 ✔ |

# Section Capacity Table

| Section No. | Elevation ft | Component Type | Size | Critical Element | P lb | $\phi P_{allow}$ lb | % Capacity | Pass Fail |
|---|---|---|---|---|---|---|---|---|
| L1 | 136 - 87.25 | Pole | TP30.7x23x0.1875 | 1 | -13823.40 | 1124710.00 | 78.8 | Pass |
| L2 | 87.25 - 46.25 | Pole | TP36.81x29.6932x0.375 | 2 | -23445.00 | 3155500.00 | 68.1 | Pass |
| L3 | 46.25 - 0 | Pole | TP43.36x35.3088x0.5 | 3 | -41752.30 | 5053460.00 | 74.8 | Pass |
| | | | | | | | Summary | |
| | | | | | | Pole (L1) | 78.8 | Pass |
| | | | | | | Base Plate | 86.5 | Pass |
| | | | | | | **RATING =** | **86.5** | **Pass** |

# SITE ID: CT52XC024
# SITE NAME: BLOOMFIELD POLICE DEPARTMENT

# 785 PARK AVENUE
# BLOOMFIELD, CT 06002

# DO MACRO PROJECT

## SITE INFORMATION

| | |
|---|---|
| ADDRESS: | 785 PARK AVENUE<br>BLOOMFIELD, CT 06002 |
| JURISDICTION: | TOWN OF BLOOMFIELD |
| COUNTY : | HARTFORD |
| PROPERTY OWNER: | TOWN OF BLOOMFIELD POLICE STATION<br>800 BLOOMFIELD AVENUE<br>BLOOMFIELD, CT 06002 |
| APPLICANT: | SPRINT<br>201 STATE ROUTE 17 NORTH<br>RUTHERFORD, NJ 07070 |
| LATITUDE (NAD 83): | N 41.8285° |
| LONGITUDE (NAD 83): | W 72.733611° |
| CURRENT USE: | UNMANNED TELECOMMUNICATIONS FACILITY |
| PROPOSED USE: | NO CHANGE |
| UTILITY COMPANY: | CONNECTICUT LIGHT AND POWER<br>PHONE: 800-266-2000 |

## RF CONFIGURATION

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

## PROJECT CONTACTS

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

## STRUCTURAL STATEMENT

THE PROPOSED ANTENNA AND EQUIPMENT INSTALLATION SHALL BE EVALUATED INCLUDING THE NEW LOAD CONDITIONS ON THE SUPPORTING ELEMENTS OF THE EXISTING STRUCTURE. THESE PLANS HAVE BEEN DEVELOPED FOR THE PROPOSED TELECOMMUNICATION FACILITY TO BE OWNED OR LEASED BY SPRINT IN ACCORDANCE WITH THE SCOPE OF WORK PROVIDED BY CHERUNDOLO CONSULTING. MASER HAS INCORPORATED THE SCOPE OF WORK WITHIN THESE PLANS. ELEMENTS OF THE STRUCTURE AFFECTED BY THE SCOPE OF WORK SHALL BE ANALYZED UNDER SEPARATE COVER. MASER ASSUMES N OF RESPONSIBILITY FOR ANY ELEMENTS OF THE SITE NOT AFFECTED BY THE SCOPE OR FOR CHANGES TO THE SCOPE OF WORK NOT SPECIFICALLY SHOWN ON THESE DRAWINGS.

## APPROVALS

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

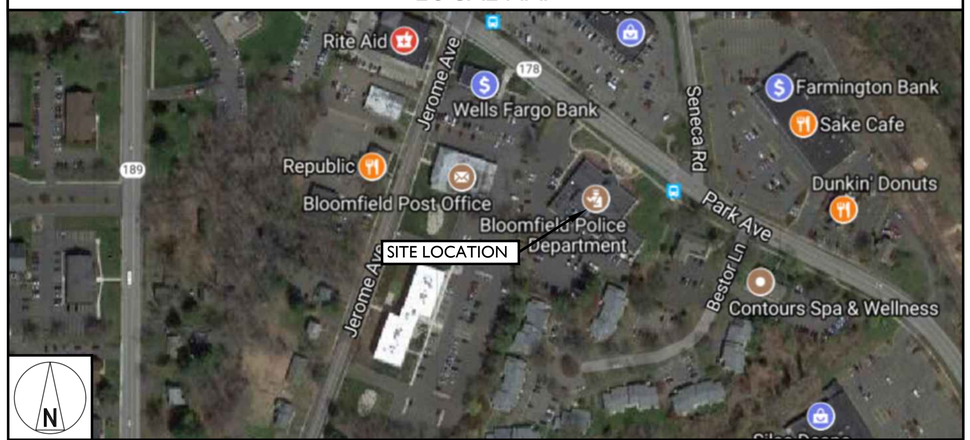
CONSTRUCTION:_____ DATE: _____

LEASING/SITE ACQUISITION: _____ DATE: _____

RF ENGINEERING: _____ DATE: _____

LANDLORD/PROPERTY OWNER: _____ DATE: _____

## LOCAL MAP




NO SCALE

## DRIVING DIRECTIONS

FROM SPRINT OFFICES, RUTHERFORD, NJ: TAKE VETERANS BLVD AND BOROUGH ST TO NJ-17 N. HEAD SOUTH. SLIGHT LEFT TOWARD VETERANS BLVD. TURN LEFT TOWARD VETERANS BLVD. TURN RIGHT TOWARD VETERANS BLVD. TURN LEFT TOWARD VETERANS BLVD. TURN LEFT ONTO BOROUGH ST. FOLLOW NJ-17 N. GARDEN STATE PKWY AND I-87 S TO SAW MILL PKWY N/SAW MILL RIVER PKWY N IN ELMSFORD. TAKE EXIT 8A FROM I-87 S. TURN RIGHT ONTO NJ-17 N. TAKE THE GARDEN STATE PARKWAY N EXIT. MERGE ONTO GARDEN STATE PKWY. ENTERING NEW YORK. USE THE RIGHT 2 LANES TO TAKE EXIT 14-1 TO MERGE ONTO I-287 E/I-87 S. USE THE RIGHT LANE TO KEEP RIGHT AT THE FORK, CONTINUE ON I-87 S AND FOLLOW SIGNS FOR NEW YORK CITY/SAW MILL PKWY S TAKE EXIT 8A FOR NY-119/SAW MILL PKWY N TOWARD ELMSFORD. KEEP LEFT, FOLLOW SIGNS FOR KATONAH/SAW MILL RIVER PKWY N AND MERGE ONTO SAW MILL PKWY N/SAW MILL RIVER PKWY N. GET ON I-684 N IN BEDFORD. MERGE ONTO SAW MILL PKWY N/SAW MILL RIVER PKWY N. KEEP LEFT, FOLLOW SIGNS FOR I-684/BREWSTER AND MERGE ONTO I-684 N. DRIVE FROM I-84 E TO WEST HARTFORD. TAKE EXIT 43 FROM I-84 E. MERGE ONTO I-684 N. TAKE EXIT 9E FOR INTERSTATE 84 E TOWARD DANBURY. MERGE ONTO I-84 E. ENTERING CONNECTICUT. KEEP RIGHT TO STAY ON I-84 E. KEEP RIGHT AT THE FORK TO STAY ON I-84 E. FOLLOW SIGNS FOR HARTFORD/INTERSTATE 84 E. USE THE LEFT LANE TO TAKE EXIT 43 TOWARD PARK RD/W HARTFORD CENTER. TAKE TROUT BROOK DR AND CT-218 E TO CT-178 W IN BLOOMFIELD. USE THE RIGHT 2 LANES TO TURN RIGHT ONTO PARK RD. USE THE LEFT 2 LANES TO TURN LEFT AT THE 1ST CROSS STREET ONTO TROUT BROOK DR. CONTINUE ONTO KING PHILIP DR. TURN LEFT ONTO MOHAWK DR. TURN RIGHT ONTO CT-218 E/N MAIN ST. CONTINUE TO FOLLOW CT-218 E. TURN LEFT ONTO PROSPECT ST. TURN LEFT ONTO CT-178 W.DESTINATION WILL BE ON THE LEFT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## DRAWING INDEX

| NYC DOB NUMBER | SHEET TITLE | REV. |
|---|---|---|
| T-001.00 | TITLE SHEET | 0 |
| ANT-001.00 | GENERAL NOTES - 1 | 0 |
| ANT-002.00 | GENERAL NOTES - 2 | 0 |
| ANT-003.00 | GENERAL NOTES - 3 | 0 |
| ANT-004.00 | SITE PLAN | 0 |
| ANT-005.00 | EQUIPMENT PLAN AND ELEVATION | 0 |
| ANT-006.00 | ANTENNA ORIENTATION PLAN | 0 |
| ANT-007.00 | DETAILS | 0 |
| ANT-008.00 | ANTENNA SCHEDULE, WIRING DIAGRAM, BILL OF MATERIALS AND NOTES | 0 |
| ANT-009.00 | FIBER PLUMBING DIAGRAMS - 1 | 0 |
| ANT-010.00 | FIBER PLUMBING DIAGRAMS - 2 | 0 |
| ANT-011.00 | CABLE COLOR CODING, DC POWER DETAILS & PANEL SCHEDULES | 0 |
| ANT-012.00 | ELECTRICAL AND GROUNDING NOTES | 0 |
| ANT-013.00 | GROUNDING SCHEMATIC AND DETAILS | 0 |

## APPLICABLE BUILDING CODES & STANDARDS

ALL WORK AND MATERIALS SHALL BE PERFORMED AND INSTALLED IN ACCORDANCE WITH THE CURRENT EDITIONS OF THE FOLLOWING CODES AS ADOPTED BY THE LOCAL GOVERNING AUTHORITIES. NOTHING IN THESE PLANS IS TO BE CONSTRUED TO PERMIT WORK NOT CONFORMING TO THE LATEST EDITIONS OF THE FOLLOWING CODES.

1. 2016 CONNECTICUT STATE BUILDING CODE, INCORPORATING THE 2012 INTERNATIONAL BUILDING CODE
2. TIA/EIA-222-G OR LATEST EDITION
3. NFPA 780-LIGHTNING PROTECTION CODE 201
4. 2014 NATIONAL ELECTRIC CODE OR LATEST EDITION
5. ANY OTHER NATIONAL OR LOCAL APPLICABLE CODES MOST RECENT EDITIONS
6. CT BUILDING CODE
7. LOCAL BUILDING CODE
8. CITY/COUNTY ORDINANCES

## SCOPE OF WORK

SPRINT PROPOSED TO MODIFY AN EXISTING UNMANNED TELECOMMUNICATIONS FACILITY.

- INSTALL (3) NEW PANEL ANTENNAS
- INSTALL (12) NEW RRH'S
- INSTALL (48) JUMPER CABLES
- INSTALL (4) HYBRID CABLES (1 PER SECTOR)
- INSTALL (1) ELTEK ECAB GROWTH CABINET
- INSTALL (1) PPC


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Sprint

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Cherundolo Consulting

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


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| REV | DATE | DESCRIPTION | DRAWN BY | CHECKED BY |
|---|---|---|---|---|
| 0 | 10/20/17 | ISSUED FOR CONSTRUCTION | JRF | PET |
| A | 09/13/17 | ISSUED FOR REVIEW | DTS | PET |

STATE OF CONNECTICUT — PETROS E. TSOUKALAS — 32577 — LICENSED PROFESSIONAL ENGINEER

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


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


SITE NAME: BLOOMFIELD POLICE DEPARTMENT
SITE ID: CT52XC024

785 PARK AVENUE
BLOOMFIELD, CT 06002


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


SHEET TITLE :
TITLE SHEET

SHEET NUMBER :
T-001.00

# GENERAL NOTES

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


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| A | 09/13/17 | ISSUED FOR REVIEW | DTS | PET |

STATE OF CONNECTICUT — PETROS E. SOULALAS — 32577 — PROFESSIONAL ENGINEER

PETROS E. SOULALAS
CONNECTICUT LICENSED PROFESSIONAL ENGINEER, LICENSE NUMBER: PEN.32577


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


SITE NAME: BLOOMFIELD POLICE DEPARTMENT
SITE ID: CT52XC024

785 PARK AVENUE
BLOOMFIELD, CT 06002


RED BANK OFFICE
331 Newman Springs Road
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SHEET TITLE :
GENERAL NOTES - 1

SHEET NUMBER :
ANT-001.00

## SECTION 01 100 - SCOPE OF WORK

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

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

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

NATIONALLY RECOGNIZED CODES AND STANDARDS:

THE WORK SHALL COMPLY WITH APPLICABLE NATIONAL AND LOCAL CODES AND STANDARDS, LATEST EDITION, AND PORTIONS THEREOF, INCLUDED BUT NOT LIMITED TO THE FOLLOWING:
A. GR-63-CORE NEBS REQUIREMENTS: PHYSICAL PROTECTION
B. GR-78-CORE GENERIC REQUIREMENTS FOR THE PHYSICAL DESIGN AND MANUFACTURE OF TELECOMMUNICATIONS EQUIPMENT.
C. GR-1089 CORE, ELECTROMAGNETIC COMPATIBILITY AND ELECTRICAL SAFETY -GENERIC CRITERIA FOR NETWORK TELECOMMUNICATIONS EQUIPMENT.
D. NATIONAL FIRE PROTECTION ASSOCIATION CODES AND STANDARDS (NFPA) INCLUDING NFPA 70 (NATIONAL ELECTRICAL CODE - "NEC") AND NFPA 101 (LIFE SAFETY CODE).
E. AMERICAN SOCIETY FOR TESTING OF MATERIALS (ASTM)
F. INSTITUTE OF ELECTRONIC AND ELECTRICAL ENGINEERS (IEEE)
G. AMERICAN CONCRETE INSTITUTE (ACI)
H. AMERICAN WIRE PRODUCERS ASSOCIATION (AWPA)
I. CONCRETE REINFORCING STEEL INSTITUTE (CRSI)
J. AMERICAN ASSOCIATION OF STATE HIGHWAY AND TRANSPORTATION OFFICIALS (AASHTO)
K. PORTLAND CEMENT ASSOCIATION (PCA)
L. NATIONAL CONCRETE MASONRY ASSOCIATION (NCMA)
M. BRICK INDUSTRY ASSOCIATION (BIA)
N. AMERICAN WELDING SOCIETY (AWS)
O. NATIONAL ROOFING CONTRACTORS ASSOCIATION (NRCA)
P. SHEET METAL AND AIR CONDITIONING CONTRACTORS' NATIONAL ASSOCIATION (SMACNA)
Q. DOOR AND HARDWARE INSTITUTE (DHI)
R. OCCUPATIONAL SAFETY AND HEALTH ACT (OSHA)
S. APPLICABLE BUILDING CODES INCLUDING UNIFORM BUILDING CODE, SOUTHERN BUILDING CODE, BOCA, AND THE INTERNATIONAL BUILDING CODE.

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

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

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

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

DRAWINGS REQUIRED AT JOBSITE:
THE CONSTRUCTION CONTRACTOR SHALL MAINTAIN A FULL SET OF THE CONSTRUCTION DRAWINGS FOR WIRELESS SITES AND THE STANDARD CONSTRUCTION SPECIFICATIONS FOR WIRELESS SITES AT THE JOBSITE FROM MOBILIZATION THROUGH CONSTRUCTION COMPLETION.
A. THE JOBSITE DRAWINGS SHALL BE CLEARLY MARKED DAILY IN RED PENCIL WITH ANY CHANGES IN CONSTRUCTION OVER WHAT IS DEPICTED IN THE DOCUMENTS. AT CONSTRUCTION COMPLETION, THIS JOBSITE MARKUP SET SHALL BE DELIVERED TO THE COMPANY OR COMPANY'S DESIGNATED REPRESENTATIVE TO BE FORWARDED TO THE COMPANY'S A&E VENDOR FOR PRODUCTION OF "AS-BUILT" DRAWINGS.
B. DIMENSIONS SHOWN ARE TO FINISH SURFACES UNLESS NOTED OTHERWISE. SPACING BETWEEN EQUIPMENT IS THE REQUIRED CLEARANCE. SHOULD THERE BE ANY QUESTIONS REGARDING THE CONTRACT DOCUMENTS, EXISTING CONDITIONS AND/OR DESIGN INTENT, THE CONTRACTOR SHALL BE RESPONSIBLE FOR OBTAINING A CLARIFICATION FROM THE SPRINT CONSTRUCTION MANAGER PRIOR TO PROCEEDING WITH THE WORK.

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

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

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

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

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

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

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

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

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

## SECTION 01 200 - COMPANY FURNISHED MATERIAL AND EQUIPMENT

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

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

DELIVERABLES:
A. COMPLETE SHIPPING AND RECEIPT DOCUMENTATION IN ACCORDANCE WITH COMPANY PRACTICE.
B. IF APPLICABLE, COMPLETE LOST/STOLEN/DAMAGED DOCUMENTATION REPORT AS NECESSARY IN ACCORDANCE WITH COMPANY PRACTICE, AND AS DIRECTED BY COMPANY.

## SECTION 01 300 - CELL SITE CONSTRUCTION

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

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

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

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

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

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

SUBMITTALS:
A. THE WORK IN ALL ASPECTS SHALL COMPLY WITH THE CONSTRUCTION DRAWINGS AND THESE SPECIFICATIONS.
B. UPLOAD THE FOLLOWING TO SITERRA AS APPLICABLE INCLUDING BUT NOT LIMITED TO THE FOLLOWING:
   1. CONCRETE MIX-DESIGNS FOR TOWER FOUNDATIONS, ANCHORS PIERS, AND CONCRETE PAVING.
   2. CONCRETE BREAK TESTS AS SPECIFIED HEREIN.
   3. CHEMICAL GROUNDING SYSTEM .
   4. REINFORCEMENT CERTIFICATIONS
   5. STRUCTURAL BACKFILL TEST RESULTS
   6. SWEEP AND FIBER TESTS
   7. ANTENNA AZIMUTH AND DOWN-TILT VERIFICATION
   8. POST CONSTRUCTION HEIGHT VERIFICATION
   9. ADDITIONAL SUBMITTALS MAY BE REQUIRED FOR SPECIAL CONSTRUCTION OR MINOR MATERIALS
C. ALTERNATES: AT THE COMPANY'S REQUEST, ANY ALTERNATIVES TO THE MATERIALS OR METHODS SPECIFIED SHALL BE SUBMITTED TO SPRINT'S CONSTRUCTION MANAGER FOR APPROVAL PRIOR TO BEING SHIPPED TO SITE. SPRINT WILL REVIEW AND APPROVE ONLY THOSE REQUESTS MADE IN WRITING. NO VERBAL APPROVALS WILL BE CONSIDERED. SUBMITTAL FOR APPROVAL SHALL INCLUDE A STATEMENT OF COST REDUCTION PROPOSED FOR USE OF ALTERNATE PRODUCT.

TESTING BY THIRD PARTY AGENCY:
A. EMPLOY AN AGENCY OF ENGINEERS AND SCIENTISTS WHO IS REGULARLY ENGAGED IN FIELD AND LABORATORY TESTING AND ANALYSIS. AGENCY SHALL HAVE BEEN IN BUSINESS A MINIMUM OF FIVE YEARS, AND BE LICENSED AS PROFESSIONAL ENGINEERS IN THE STATE WHERE THE PROJECT IS LOCATED. AGENCY IS SUBJECT TO APPROVAL BY COMPANY.
   1. AGENCY MUST HAVE A THOROUGH UNDERSTANDING OF LOCAL AVAILABLE MATERIALS, INCLUDING THE SOIL, ROCK, AND GROUNDWATER CONDITIONS.
   2. AGENCY IS TO BE FAMILIAR WITH THE APPLICABLE REQUIREMENTS FOR THE TESTS TO BE DONE, EQUIPMENT TO BE USED, AND ASSOCIATED HEALTH AND SAFETY ISSUES.
   3. EXPERIENCE IN SOILS, CONCRETE, MASONRY, AGGREGATE, AND ASPHALT TESTING USING ASTM, AASJTO, AND OTHER METHODS IS NEEDED.
B. REQUIRED THIRD PARTY TESTS:
   1. SITE RESISTANCE TO EARTH TEST PER NP-312-201
   2. CONCRETE CYLINDER BREAK TESTS FOR TOWER PIER AND ANCHORS PER NATIONALLY RECOGNIZED STANDARDS
   3. STRUCTURAL SOILS COMPACTION TESTS PER NATIONALLY RECOGNIZED STANDARDS
   4. REBAR PLACEMENT VERIFICATION WITH REPORT
   5. TESTING TENSION STUDY FOR ROCK ANCHORS
   6. ALL THIRD PARTY TESTS AS REQUIRED BY LOCAL JURISDICTION
C. REQUIRED TESTS BY CONTRACTOR
   1. COAX SWEEP TESTS PER SPRINT STANDARD TS-0200
   2. FIBER TESTS PER SPRINT STANDARD EL-0568
   3. MICROWAVE LINK TESTS PER NP-760-500
   4. ANTENNA AZIMUTHS AND DOWN TILT USING ELECTRONIC ALIGNMENT TOOL PER ANTENNA INSTALLATION SPECIFICATION HEREIN.
   5. POST CONSTRUCTION HEIGHT VERIFICATION AS REQUIRED HEREWITH IN THE TOWER INSTALLATION SPECIFICATIONS.
   6. ASPHALT ROADWAY COMPACTED THICKNESS, SURFACE SMOOTHNESS, AND COMPACTED DENSITY TESTING AS SPECIFIED HEREWITH IN THE ASPHALT PAVING SPECIFICATIONS.
   7. FIELD QUALITY CONTROL TESTING AS SPECIFIED HEREWITH IN THE CONCRETE PAVING SPECIFICATIONS.
   8. TESTING REQUIRED HEREWITH UNDER SPECIFICATIONS FOR AGGREGATE BASE FOR ROADWAYS
   9. ALL OTHER TESTS REQUIRED BY LOCAL JURISDICTION
D. INSPECTIONS BY COMPANY: THE CONTRACTOR SHALL BE RESPONSIBLE FOR ANY AND ALL CORRECTIONS TO ANY WORK IDENTIFIED AS UNACCEPTABLE IN INSPECTION ACTIVITIES, FINAL ACCEPTANCE / PUNCH WALK REVIEW, AND/OR AS A RESULT OF TESTING
E. SPRINT RESERVES THE RIGHT TO INSPECT THE CONSTRUCTION SITE AT ANY TIME VIA SITE WALKS AND/OR PHOTO REVIEWS. CONTRACTOR SHALL GIVE SPRINT 24 HOURS NOTICE PRIOR TO THE COMMENCEMENT OF THE FOLLOWING CONSTRUCTION ACTIVITIES AND PHOTOGRAPHS OF THE IN-PROGRESS WORK.
   1. GROUNDING SYSTEM AND BURIED UTILITIES INSTALLATION PRIOR TO EARTH CONCEALMENT DOCUMENTED WITH DIGITAL PHOTOGRAPHS BY CONTRACTOR, APPROVED BY A&E OR SPRINT REPRESENTATIVE.
   2. FORMING FOR CONCRETE AND REBAR PLACEMENT PRIOR TO POUR DOCUMENTED WITH DIGITAL PHOTOGRAPHS BY CONTRACTOR, APPROVED BY A&E OR SPRINT REPRESENTATIVE.
   3. COMPACTION OF BACKFILL MATERIALS, AGGREGATE BASE FOR ROADS, PADS, AND ANCHORS, ASPHALT PAVING, AND SHAFT BACKFILL FOR CONCRETE AND WOOD POLES, BY INDEPENDENT THIRD PARTY AGENCY.
   4. PRE AND POST CONSTRUCTION ROOFTOP AND STRUCTURAL INSPECTIONS ON EXISTING FACILITIES. PRIOR TO CONSTRUCTION ACTIVITIES AND AFTER CONSTRUCTION IS COMPLETE, PROVIDE PHOTOGRAPHIC DOCUMENTATION OF ROOF, FLASHINGS, AND PARAPETS, BOTH BEFORE AND AFTER CONSTRUCTION IS COMPLETE.
   5. TOWER ERECTION SECTION STACKING AND PLATFORM ATTACHMENT DOCUMENTED BY DIGITAL PHOTOGRAPHS BY THIRD PARTY AGENCY.
   6. TOWER TOP AND INACCESSIBLE EQUIPMENT (RRUS, ANTENNAS, AND CABLING): PROVIDE PHOTOS OF THE BACKS OF ALL ANTENNAS, RRUS, COMBINERS, FILTERS, FIBER AND DC CABLING, CABLE COLOR CODING, EQUIPMENT GROUNDING AND CONNECTOR WATER PROOFING INCLUDING NAME PLATE AND SERIAL NUMBER FOR ALL SERIALIZED EQUIPMENT.


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|---|---|---|---|---|
| 0 | 10/20/17 | ISSUED FOR CONSTRUCTION | JRF | PET |
| A | 09/13/17 | ISSUED FOR REVIEW | DTS | PET |

STATE OF CONNECTICUT — PETROS E. TSOUKALAS — LICENSED PROFESSIONAL ENGINEER — LICENSE NUMBER: PEN.32577

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

SITE NAME: BLOOMFIELD POLICE DEPARTMENT
SITE ID: CT52XC024

785 PARK AVENUE
BLOOMFIELD, CT 06002


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SHEET TITLE: GENERAL NOTES - 2

SHEET NUMBER: ANT-002.00

PROJECT CLOSEOUT:
A. FINAL ACCEPTANCE PUNCH WALK AND INSPECTION: AS IDENTIFIED IN THE SCOPE OF SERVICES, SPRINT WILL CONDUCT A FINAL PUNCH WALK OR FINAL DESK TOP PHOTO REVIEW (SITE MODIFICATIONS). PUNCH WALKS MUST BE SCHEDULED IN ADVANCE AS REQUIRED. AT THE PUNCH WALK / REVIEW, SPRINT MAY IDENTIFY CRITICAL DEFICIENCIES WHICH MUST BE CORRECTED PRIOR TO PUTTING SITE ON AIR. MINOR DEFICIENCIES MUST BE CORRECTED WITHIN 30 DAYS EXCEPT AS OTHERWISE REQUIRED. VERIFICATIONS OF CORRECTIONS MAY BE MADE BY COMPANY DURING A REPEAT SITE WALK OR DESK TOP PHOTO REVIEW AT COMPANY'S SOLE DISCRETION.
B. CLOSEOUT DOCUMENTATION: ALL CLOSEOUT DOCUMENTATION AND PHOTOGRAPHS SHALL BE UPLOADED PRIOR TO FINAL ACCEPTANCE. SPRINT WILL REVIEW CLOSEOUT DOCUMENTATION FOR PRESENCE AND CONTENT. CLOSEOUT DOCUMENTATION SHALL INCLUDE BUT IS NOT LIMITED TO THE FOLLOWING AS APPLICABLE:
1. COAX SWEEP TESTS:
2. FIBER TESTS;
3. JURISDICTION FINAL INSPECTION DOCUMENTATION
4. REINFORCEMENT CERTIFICATION (MILL CERTIFICATION)
5. CONCRETE MIX DESIGN AND PRODUCT DATA (TOWER FOUNDATION)
6. LIEN WAIVERS AND RELEASES.
7. POST -CONSTRUCTION HEIGHT VERIFICATION
8. JURISDICTION CERTIFICATE OF OCCUPANCY
9. ELECTRONIC ANTENNA AZIMUTH AND DOWN TILT VERIFICATION
10. STRUCTURAL BACKFILL TEST RESULTS (IF APPLICABLE)
11. CELL SITE UTILITY SETUP
12. AS-BUILT REDLINE CONSTRUCTION DRAWINGS (PDF SCAN OF FIELD MARKS)
13. AS-BUILT CONSTRUCTION DRAWINGS IN DWG AND PDF FORMATS
14. LIST OF SUB CONTRACTORS
15. APPROVED PERMITTING DOCUMENTS
16. FINAL SITE PHOTOS UP-LOADED TO SITERRA. INCLUDE THE FOLLOWING AS APPLICABLE:
    a. TOWER, ANTENNAS, RRUS, AND MAINLINE: INSPECTION AND PHOTOGRAPHS OF SECTION STACKING; INSPECTION AND PHOTOGRAPHS OF PLATFORM COMPONENT ATTACHMENT POINTS; PHOTOGRAPHS OF TOWER TOP GROUNDING; PHOTOS OF TOWER COAX/CABLE LINE COLOR CODING AT THE TOP AND AT GROUND LEVEL; INSPECTION AND PHOTOGRAPHS OF OPERATIONAL OF TOWER LIGHTING, AND PLACEMENT OF FAA REGISTRATION SIGN; PHOTOGRAPHS SHOWING ADDITIONAL GROUNDING POINTS FOR TOWERS GREATER THAN 200 FEET.; PHOTOS OF ANTENNA GROUND BAR, EQUIPMENT GROUND BAR, AND MASTER GROUND BAR; PHOTOS OF GPS ANTENNA(S); PHOTOS OF EACH SECTOR OF ANTENNAS; ONE PHOTOGRAPH LOOKING AT THE SECTOR AND ONE FROM BEHIND SHOWING THE PROJECTED COVERAGE AREA; PHOTOS OF COAX WEATHERPROOFING - TOP AND BOTTOM; PHOTOS OF COAX GROUNDING--TOP AND BOTTOM; PHOTOS OF ANTENNA AND MAST GROUNDING; PHOTOS OF COAX CABLE ENTRY INTO SHELTER; PHOTOS OF PLATFORM MECHANICAL CONNECTIONS TO TOWER/MONOPOLE.
    b. ROOF TOPS: PRE-CONSTRUCTION AND POST-CONSTRUCTION VISUAL INSPECTION AND PHOTOGRAPHS OF THE ROOF AND INTERIOR TO DETERMINE AND DOCUMENT CONDITIONS; ROOF TOP CONSTRUCTION INSPECTIONS AS REQUIRED BY THE JURISDICTION; PHOTOGRAPHS OF CABLE TRAY AND/OR ICE BRIDGE; PHOTOGRAPHS OF DOGHOUSE/CABLE EXIT FROM ROOF;
    c. SITE LAYOUT - PHOTOGRAPHS OF THE OVERALL COMPOUND, INCLUDING EQUIPMENT PLATFORM FROM ALL FOUR CORNERS.
    d. FINISHED UTILITIES: CLOSE-UP PHOTOGRAPHS OF THE PPC BREAKER PANEL; CLOSE-UP PHOTOGRAPH OF THE INSIDE OF THE TELCO PANEL AND NIU; CLOSE-UP PHOTOGRAPH OF THE POWER METER AND DISCONNECT; PHOTOS OF POWER AND TELCO ENTRANCE TO COMPANY ENCLOSURE; PHOTOGRAPHS AT METER BOX AND/OR FACILITY DISTRIBUTION PANEL.

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

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

## SECTION 01 500 - PROJECT REPORTING

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

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

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

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

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

JUMPERS AND CONNECTORS:
FURNISH AND INSTALL 1/2" COAX JUMPER CABLES BETWEEN THE RRU'S AND ANTENNAS. JUMPERS SHALL BE TYPE LDF 4, FLC 12-50, CR 540, OR FXL 540. SUPER-FLEX CABLES ARE NOT ACCEPTABLE. JUMPERS BETWEEN THE RRU'S AND ANTENNAS OR TOWER TOP AMPLIFIERS SHALL CONSIST OF 1/2 INCH FOAM DIELECTRIC, OUTDOOR RATED COAXIAL CABLE, MIN. LENGTH FOR JUMPER SHALL BE 10'-0".

REMOTE ELECTRICAL TILT (RET) CABLES:

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

ANTENNA INSTALLATION:
THE CONTRACTOR SHALL ASSEMBLE ALL ANTENNAS ONSITE IN ACCORDANCE WITH THE INSTRUCTIONS SUPPLIED BY THE MANUFACTURER. ANTENNA HEIGHT, AZIMUTH, AND FEED ORIENTATION INFORMATION SHALL BE A DESIGNATED ON THE CONSTRUCTION DRAWINGS.
A. THE CONTRACTOR SHALL POSITION THE ANTENNA ON TOWER PIPE MOUNTS SO THAT THE BOTTOM STRUT IS LEVEL. THE PIPE MOUNTS SHALL BE PLUMB TO WITHIN 1 DEGREE.
B. ANTENNA MOUNTING REQUIREMENTS: PROVIDE ANTENNA MOUNTING HARDWARE AS INDICATED ON THE DRAWINGS.

HYBRID CABLE INSTALLATION:
A. THE CONTRACTOR SHALL ROUTE, TEST, AND INSTALL ALL CABLES AS INDICATED ON THE CONSTRUCTION DRAWINGS AND IN ACCORDANCE WITH THE MANUFACTURER'S RECOMMENDATIONS.
B. THE INSTALLED RADIUS OF THE CABLES SHALL NOT BE LESS THAN THE MANUFACTURER'S SPECIFICATIONS FOR BENDING RADII.
C. EXTREME CARE SHALL BE TAKEN TO AVOID DAMAGE TO THE CABLES DURING HANDLING AND INSTALLATION.
1. FASTENING MAIN HYBRID CABLES: ALL CABLES SHALL BE INSTALLED INSIDE MONOPOLE WITH CABLE SUPPORT GRIPS AS REQUIRED BY THE MANUFACTURER.
2. FASTENING INDIVIDUAL FIBER AND DC CABLES ABOVE BREAKOUT ENCLOSURE (MEDUSA), WITHIN THE MMBS CABINET AND ANY INTERMEDIATE DISTRIBUTION BOXES:
    a. FIBER: SUPPORT FIBER BUNDLES USING 1/2 " VELCRO STRAPS OF THE REQUIRED LENGTH AT 18" O.C. STRAPS SHALL BE UV, OIL AND WATER RESISTANT AND SUITABLE FOR INDUSTRIAL INSTALLATIONS AS MANUFACTURED BY TEXTOL OR APPROVED EQUAL.
    b. DC: SUPPORT DC BUNDLES WITH ZIP TIES OF THE ADEQUATE LENGTH. ZIP TIES TO BE UV STABILIZED, BLACK NYLON, WITH TENSILE STRENGTH AT 12,000 PSI AS MANUFACTURED BY NELCO PRODUCTS OR EQUAL.
3. FASTENING JUMPERS: SECURE JUMPERS TO THE SIDE ARMS OR HEAD FRAMES USING STAINLESS STEEL TIE WRAPS OR STAINLESS STEEL BUTTERFLY CLIPS.
4. CABLE INSTALLATION:
    a. INSPECT CABLE PRIOR TO USE FOR SHIPPING DAMAGE, NOTIFY THE CONSTRUCTION MANAGER.
    b. CABLE ROUTING: CABLE INSTALLATION SHALL BE PLANNED TO ENSURE THAT THE LINES WILL BE PROPERLY ROUTED IN THE CABLE ENVELOP AS INDICATED ON THE DRAWINGS. AVOID TWISTING AND CROSSOVERS.
    c. HOIST CABLE USING PROPER HOISTING GRIPS. DO NOT EXCEED MANUFACTURER'S RECOMMENDED MAXIMUM BEND RADIUS.
5. GROUNDING OF TRANSMISSION LINES: ALL TRANSMISSION LINES SHALL BE GROUNDED AS INDICATED ON DRAWINGS.
6. HYBRID CABLE COLOR CODING: ALL COLOR CODING SHALL BE AS REQUIRED IN TS 0200 (CURRENT VERSION).
7. HYBRID CABLE LABELING: INDIVIDUAL HYBRID AND DC BUNDLES SHALL BE LABELED ALPHA-NUMERICALLY ACCORDING TO SPRINT CELL SITE ENGINEERING NOTICE - EN 2012-001, REV 1

WEATHERPROOFING EXTERIOR CONNECTORS AND HYBRID CABLE GROUND KITS:
A. ALL FIBER & COAX CONNECTORS AND GROUND KITS SHALL BE WEATHERPROOFED.
B. WEATHERPROOFED USING ONE OF THE FOLLOWING METHODS. ALL INSTALLATIONS MUST BE DONE IN ACCORDANCE WITH THE MANUFACTURER'S RECOMMENDATIONS AND INDUSTRY BEST PRACTICES.
1. COLD SHRINK: ENCOMPASS CONNECTOR IN COLD SHRINK TUBING AND PROVIDE A DOUBLE WRAP OF 2" ELECTRICAL TAPE EXTENDING 2" BEYOND TUBING. PROVIDE 3M COLD SHRINK CXS SERIES OR EQUAL.
2. SELF-AMALGAMATING TAPE: CLEAN SURFACES. APPLY A DOUBLE WRAP OF SELF-AMALGAMATING TAPE 2" BEYOND CONNECTOR. APPLY A SECOND WRAP OF SELF-AMALGAMATING TAPE IN OPPOSITE DIRECTION. APPLY DOUBLE WRAP OF 2 " WIDE ELECTRICAL TAPE EXTENDING 2 " BEYOND THE SELF-AMALGAMATING TAPE.
3. 3M SLIM LOCK CLOSURE 716: SUBSTITUTIONS WILL NOT BE ALLOWED.
4. OPEN FLAME ON JOB SITE IS NOT ACCEPTABLE

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

SUMMARY:
A. THIS SECTION SPECIFIES MMBS CABINETS, POWER CABINETS, AND INTERNAL EQUIPMENT INCLUDING BY NOT LIMITED TO RECTIFIERS, POWER DISTRIBUTION UNITS, BASE BAND UNITS, SURGE ARRESTORS, BATTERIES, AND SIMILAR EQUIPMENT FURNISHED BY THE COMPANY FOR INSTALLATION BY THE CONTRACTOR (OFCI).
B. CONTRACTOR SHALL PROVIDE AND INSTALL ALL MISCELLANEOUS MATERIALS AND PROVIDE ALL LABOR REQUIRED FOR INSTALLATION EQUIPMENT IN EXISTING CABINET OR NEW CABINET AS SHOWN ON DRAWINGS AND AS REQUIRED BY THE APPLICABLE INSTALLATION MOPS.
C. COMPLY WITH MANUFACTURER'S INSTALLATION AND START-UP REQUIREMENTS.

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

## SECTION 26 100 - BASIC ELECTRICAL REQUIREMENTS

SUMMARY:
THIS SECTION SPECIFIES BASIC ELECTRICAL REQUIREMENTS FOR SYSTEMS AND COMPONENTS

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

SUPPORTING DEVICES:
A. MANUFACTURED STRUCTURAL SUPPORT MATERIALS: SUBJECT TO COMPLIANCE WITH REQUIREMENTS, PROVIDE PRODUCTS BY THE FOLLOWING:
1. ALLIED TUBE AND CONDUIT.
2. B-LINE SYSTEM.
3. UNISTRUT DIVERSIFIED PRODUCTS.
4. THOMAS & BETTS.
B. FASTENERS: TYPES, MATERIALS, AND CONSTRUCTION FEATURES AS FOLLOWS:
1. EXPANSION ANCHORS: CARBON STEEL WEDGE OR SLEEVE TYPE.
2. POWER-DRIVEN THREADED STUDS: HEAT-TREATED STEEL, DESIGNED SPECIFICALLY FOR THE INTENDED SERVICE.
3. FASTEN BY MEANS OF WOOD SCREWS ON WOOD.
4. TOGGLE BOLTS ON HOLLOW MASONRY UNITS.
5. CONCRETE INSERTS OR EXPANSION BOLTS ON CONCRETE OR SOLID MASONRY.
6. MACHINE SCREWS, WELDED THREADED STUDS, OR SPRING-TENSION CLAMPS ON STEEL.
7. EXPLOSIVE DEVICES FOR ATTACHING HANGERS TO STRUCTURE SHALL NOT BE PERMITTED.
8. DO NOT WELD CONDUIT, PIPE STRAPS, OR ITEMS OTHER THAN THREADED STUDS TO STEEL STRUCTURES.
9. IN PARTITIONS OF LIGHT STEEL CONSTRUCTION, USE SHEET METAL SCREWS.

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

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

## SECTION 26 200 - ELECTRICAL MATERIALS AND EQUIPMENT

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

HUBS AND BOXES:
A. AT ENTRANCES TO CABINETS OR OTHER EQUIPMENT NOT HAVING INTEGRAL THREADED HUBS PROVIDE METALLIC THREADED HUBS OF THE SIZE AND CONFIGURATION REQUIRED. HUB SHALL INCLUDE LOCKNUT AND NEOPRENE O-RING SEAL. PROVIDE IMPACT RESISTANT 105 DEGREE C PLASTIC BUSHINGS TO PROTECT CABLE INSULATION.
B. CABLE TERMINATION FITTINGS FOR CONDUIT
1. CABLE TERMINATORS FOR RGS CONDUITS SHALL BE TYPE CRC BY O-Z/GEDNEY OR EQUAL BY ROXTEC.
2. CABLE TERMINATORS FOR LFMC SHALL BE ETCO - CL2075; OR MADE FOR THE PURPOSE PRODUCTS BY ROXTEC.
C. EXTERIOR PULL BOXES AND PULL BOXES IN INTERIOR INDUSTRIAL AREAS SHALL BE PLATED CAST ALLOY, HEAVY DUTY, WEATHERPROOF, DUST PROOF, WITH GASKET, PLATED IRON ALLOY COVER AND STAINLESS STEEL COVER SCREWS, CROUSE-HINDS WAB SERIES OR EQUAL.
D. CONDUIT OUTLET BODIES SHALL BE PLATED CAST ALLOY WITH SIMILAR GASKET COVERS. OUTLET BODIES SHALL BE OF THE CONFIGURATION AND SIZE SUITABLE FOR THE APPLICATION. PROVIDE CROUSE-HINDS FORM 8 OR EQUAL.
E. MANUFACTURER FOR BOXES AND COVERS SHALL BE HOFFMAN, SQUARE "D", CROUSE-HINDS, COOPER, ADALET, APPLETON, O-Z GEDNEY, RACO, OR APPROVED EQUAL.

SUPPLEMENTAL GROUNDING SYSTEM:
A. FURNISH AND INSTALL A SUPPLEMENTAL GROUNDING SYSTEM TO THE EXTENT INDICATED ON THE DRAWINGS. SUPPORT SYSTEM WITH NON-MAGNETIC STAINLESS STEEL CLIPS WITH RUBBER GROMMETS. GROUNDING CONNECTORS SHALL BE TINNED COPPER WIRE, SIZES AS INDICATED ON THE DRAWINGS. PROVIDE STRANDED OR SOLID BARE OR INSULATED CONDUCTORS EXCEPT AS OTHERWISE NOTED.
B. SUPPLEMENTAL GROUNDING SYSTEM: ALL CONNECTIONS TO BE MADE WITH CAD WELDS, EXCEPT AT EQUIPMENT USE LUGS OR OTHER AVAILABLE GROUNDING MEANS AS REQUIRED BY MANUFACTURER; AT GROUND BARS USE TWO HOLE SPADES WITH NO-OX.
C. STOLEN GROUND-BARS: IN THE EVENT OF STOLEN GROUND BARS, CONTACT SPRINT CM FOR REPLACEMENT INSTRUCTION USING THREADED ROD KITS.

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

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


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STATE OF CONNECTICUT — PETROS E. TSOUKALAS — LICENSED PROFESSIONAL ENGINEER — 32577


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SITE NAME: BLOOMFIELD POLICE DEPARTMENT
SITE ID: CT52XC024

785 PARK AVENUE
BLOOMFIELD, CT 06002


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


SHEET TITLE :
GENERAL NOTES - 3

SHEET NUMBER :
ANT-003.00

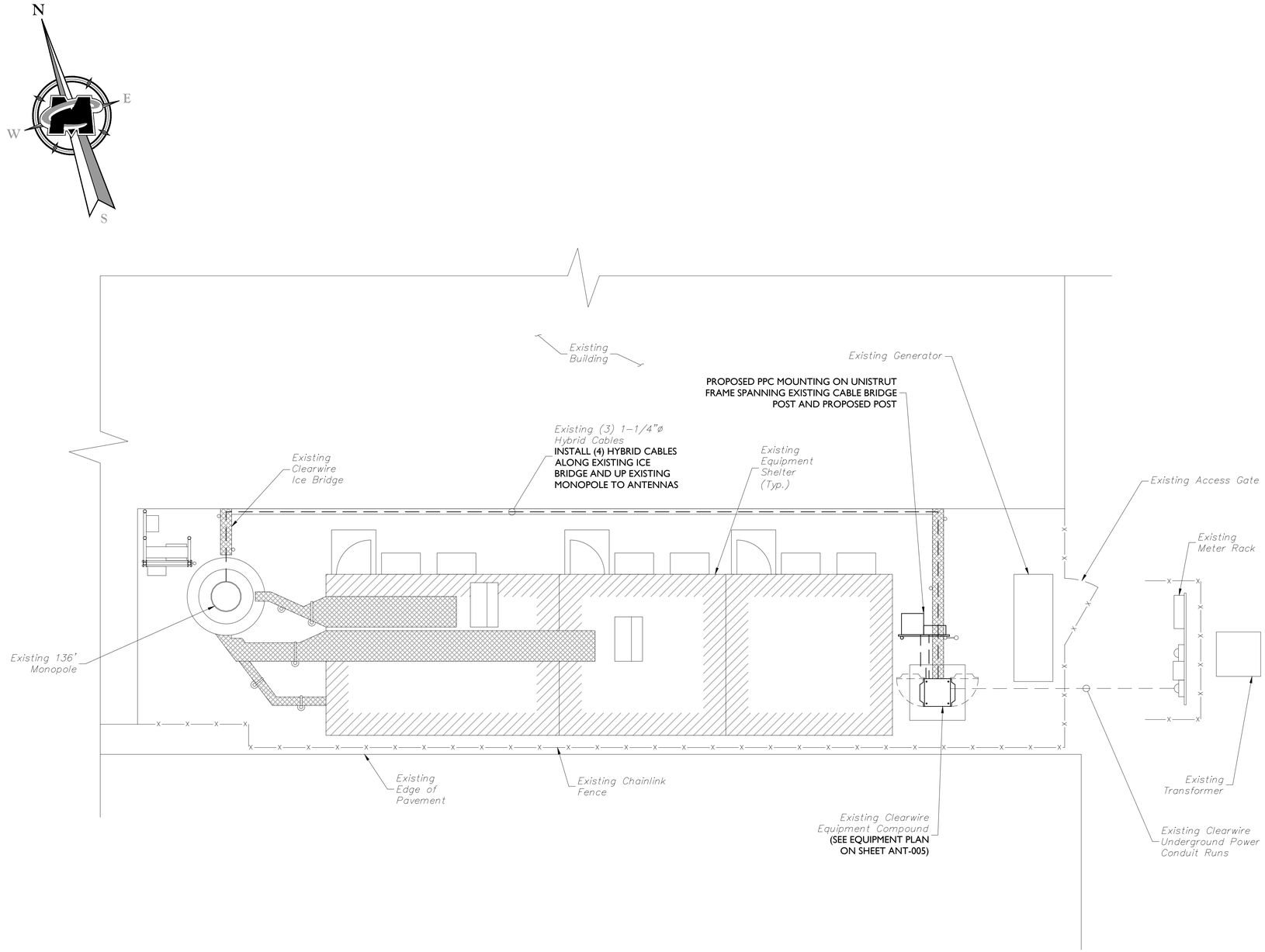
## GENERAL NOTES:

1. SITE INFORMATION OBTAINED FROM THE FOLLOWING:
   A. DRAWINGS ENTITLED, "BLOOMFIELD POLICE DEPARTMENT" PREPARED BY CLEARWIRE TECHNOLOGIES, INC. OF BLOOMFIELD, CONNECTICUT, DATED 06/21/10.
2. CONTRACTOR SHALL VERIFY ALL PLANS AND EXISTING DIMENSIONS AND CONDITIONS ON THE JOB SITE AND SHALL IMMEDIATELY NOTIFY THE ARCHITECT/ENGINEER IN WRITING OF ANY DISCREPANCIES BEFORE PROCEEDING WITH THE WORK OR BE RESPONSIBLE FOR SAME.
3. CONTRACTOR SHALL NOT COMMENCE ANY WORK UNTIL HE OBTAINS, AT HIS OWN EXPENSE, ALL INSURANCE REQUIRED BY SPRINT, THE PROPERTY OWNER AND/OR PROPERTY MANAGEMENT COMPANY.
4. THIS SET OF PLANS HAS BEEN PREPARED FOR THE PURPOSES OF MUNICIPAL AND AGENCY REVIEW AND APPROVAL. THIS SET OF PLANS SHALL NOT BE UTILIZED AS CONSTRUCTION DOCUMENTS UNTIL ALL CONDITIONS OF APPROVAL HAVE BEEN SATISFIED AND EACH OF THE DRAWINGS HAVE BEEN REVISED TO INDICATE "ISSUED FOR CONSTRUCTION.
5. THE CONTRACTOR SHALL COMPLY WITH ALL APPLICABLE CODES, ORDINANCES, LAWS AND REGULATIONS OF ALL MUNICIPALITIES, UTILITIES OR OTHER PUBLIC AUTHORITIES.
6. THE CONTRACTOR SHALL BE RESPONSIBLE FOR OBTAINING ALL PERMITS AND INSPECTIONS THAT MAY BE REQUIRED BY ANY FEDERAL, STATE, COUNTY OR MUNICIPAL AUTHORITIES.
7. THE CONTRACTOR SHALL NOTIFY THE CONSTRUCTION MANAGER, IN WRITING, OF ANY CONFLICTS, ERRORS OR OMISSIONS PRIOR TO THE SUBMISSION OF BIDS FOR PERFORMANCE OF WORK. MINOR OMISSIONS OR ERRORS IN THE BID DOCUMENTS SHALL NOT EXCUSE SAID CONTRACTOR FROM COMPLETING THIS PROJECT IN ACCORDANCE WITH THE OVERALL INTENT OF THESE DRAWINGS.
8. THE CONTRACTOR SHALL BE RESPONSIBLE FOR PROTECTING ALL EXISTING SITE IMPROVEMENTS PRIOR TO COMMENCING DEMOLITION. THE CONTRACTOR SHALL REPAIR ANY DAMAGE CAUSED AS A RESULT OF REMOVAL OF THIS FACILITY.
9. THE SCOPE OF WORK FOR THIS PROJECT SHALL INCLUDE PROVIDING ALL MATERIALS, EQUIPMENT AND LABOR AS REQUIRED TO COMPLETE THIS PROJECT. ALL EQUIPMENT SHALL BE INSTALLED IN ACCORDANCE WITH THE MANUFACTURER'S RECOMMENDATIONS.
10. THE CONTRACTOR SHALL VISIT THE PROJECT SITE PRIOR TO SUBMITTING A BID TO VERIFY THAT THE PROJECT CAN BE REMOVED IN ACCORDANCE WITH THE CONTRACT DOCUMENTS.
11. THE DEMOLITION CONTRACTOR IS SOLELY RESPONSIBLE FOR DETERMINING ALL REMOVAL MEANS AND METHODS. THE DEMOLITION CONTRACTOR IS ALSO RESPONSIBLE FOR ALL JOB SITE SAFETY.
12. THE CONTRACTOR IS TO REVIEW ALL DRAWINGS AND SPECIFICATIONS IN THE CONTRACT DOCUMENT SET. THE CONTRACTOR SHALL COORDINATE ALL WORK SHOWN IN THE SET OF DRAWINGS. THE CONTRACTOR SHALL PROVIDE A COMPLETE SET OF DRAWINGS TO ALL SUBCONTRACTORS AND RELATED PARTIES. THE SUBCONTRACTOR SHALL EXAMINE ALL THE DRAWINGS AND SPECIFICATIONS FOR THE INFORMATION THAT EFFECTS THEIR WORK.
13. THE CONTRACTOR SHALL MAINTAIN A CURRENT SET OF DRAWINGS AND SPECIFICATIONS ON THE SITE AT ALL TIMES AND INSURE THE DISTRIBUTION OF NEW DRAWINGS TO SUBCONTRACTORS AND OTHER RELEVANT PARTIES AS SOON AS THEY ARE MADE AVAILABLE. OLD DRAWINGS SHALL BE MARKED VOID AND REMOVED FROM THE CONTRACT AREA CONTRACTOR FURNISH 3 SETS OF REDLINE "AS-REMOVED" DRAWINGS TO SPRINT UPON COMPLETION OF THE WORK.
14. REPAIR MATERIALS INSTALLED SHALL MEET REQUIREMENTS OF CONTRACTORS DOCUMENTS. NO SUBSTITUTIONS ARE ALLOWED.
15. THE CONTRACTOR SHALL RECEIVE CLARIFICATION IN WRITING AND SHALL RECEIVE IN WRITING AUTHORIZATION TO PROCEED BEFORE STARTING WORK ON ANY ITEMS NOT CLEARLY DEFINED OR IDENTIFIED BY THE CONTRACT DOCUMENTS.
16. THE CONTRACTOR SHALL NOTIFY THE CONSTRUCTION MANAGER OF ALL PRODUCTS OR ITEMS NOTED AS EXISTING WHICH ARE NOT FOUND TO BE IN THE FIELD.
17. DEMOLITION SHALL BE DONE IN A WORKMANLIKE MANNER BY COMPETENT EXPERIENCED WORKMEN IN ACCORDANCE WITH APPLICABLE CODES AND THE BEST-ACCEPTED PRACTICE. ALL SURFACES SHALL BE REPAIRED TO MATCH THEIR SURROUNDINGS AND PROVIDE WEATHER TIGHT SEAL ON SAME DAY AS REMOVAL.
18. THE CONTRACTOR SHALL COORDINATE HIS WORK AND SCHEDULE HIS ACTIVITIES AND WORKING HOURS IN ACCORDANCE WITH THE REQUIREMENTS OF THE PROPERTY OWNER AND/OR PROPERTY MANAGEMENT COMPANY.
19. THE CONTRACTOR SHALL BE RESPONSIBLE FOR COORDINATING HIS WORK WITH THE WORK OF OTHERS AS IT MAY RELATE TO RADIO EQUIPMENT, ANTENNAS AND ANY OTHER PORTIONS OF THE WORK.
20. THE CONTRACTOR SHALL REPAIR ALL EXISTING SURFACES DAMAGED DURING REMOVAL SUCH THAT THEY MATCH AND BLEND WITH ADJACENT SURFACES.
21. THE CONTRACTOR SHALL KEEP CONTRACT AREA CLEAN, HAZARD FREE AND DISPOSE OF ALL DEBRIS AND RUBBISH. LEAVE PREMISES IN CLEAN CONDITION AND FREE FROM PAINT SPOTS. THE CONTRACTOR SHALL BE RESPONSIBLE FOR MAINTAINING ALL ITEMS UNTIL COMPLETION OF CONSTRUCTION.
22. BEFORE FINAL ACCEPTANCE OF THE WORK, THE CONTRACTOR SHALL REMOVE ALL EQUIPMENT, TEMPORARY WORKS, UNUSED AND USELESS MATERIALS, RUBBISH AND TEMPORARY STRUCTURES.

## LEGEND

LIGHT LINE WORK INDICATES EXISTING OBJECTS

HEAVY LINE WORK INDICATED PROPOSED OBJECTS




## SITE PLAN

5 4 3 2 1 0 2.5 5 10

SCALE : 1" = 5'

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STATE OF CONNECTICUT — PETROS E. SOULALAS — 32577 — LICENSED PROFESSIONAL ENGINEER

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


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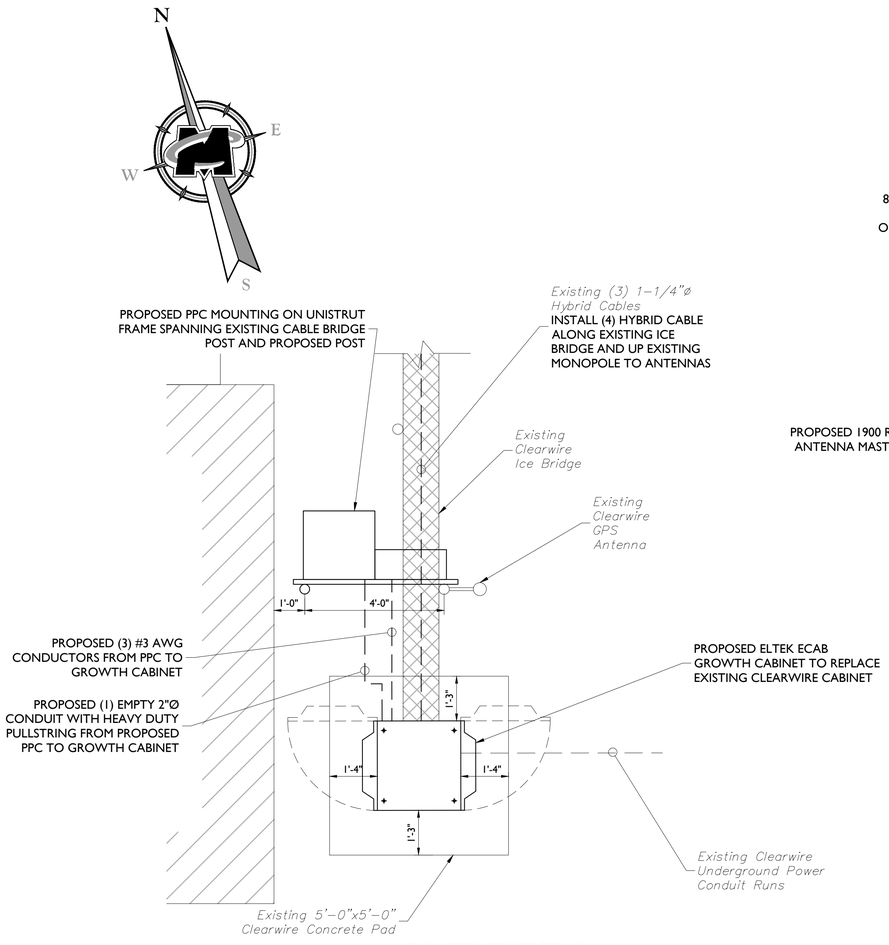
SHEET TITLE : SITE PLAN

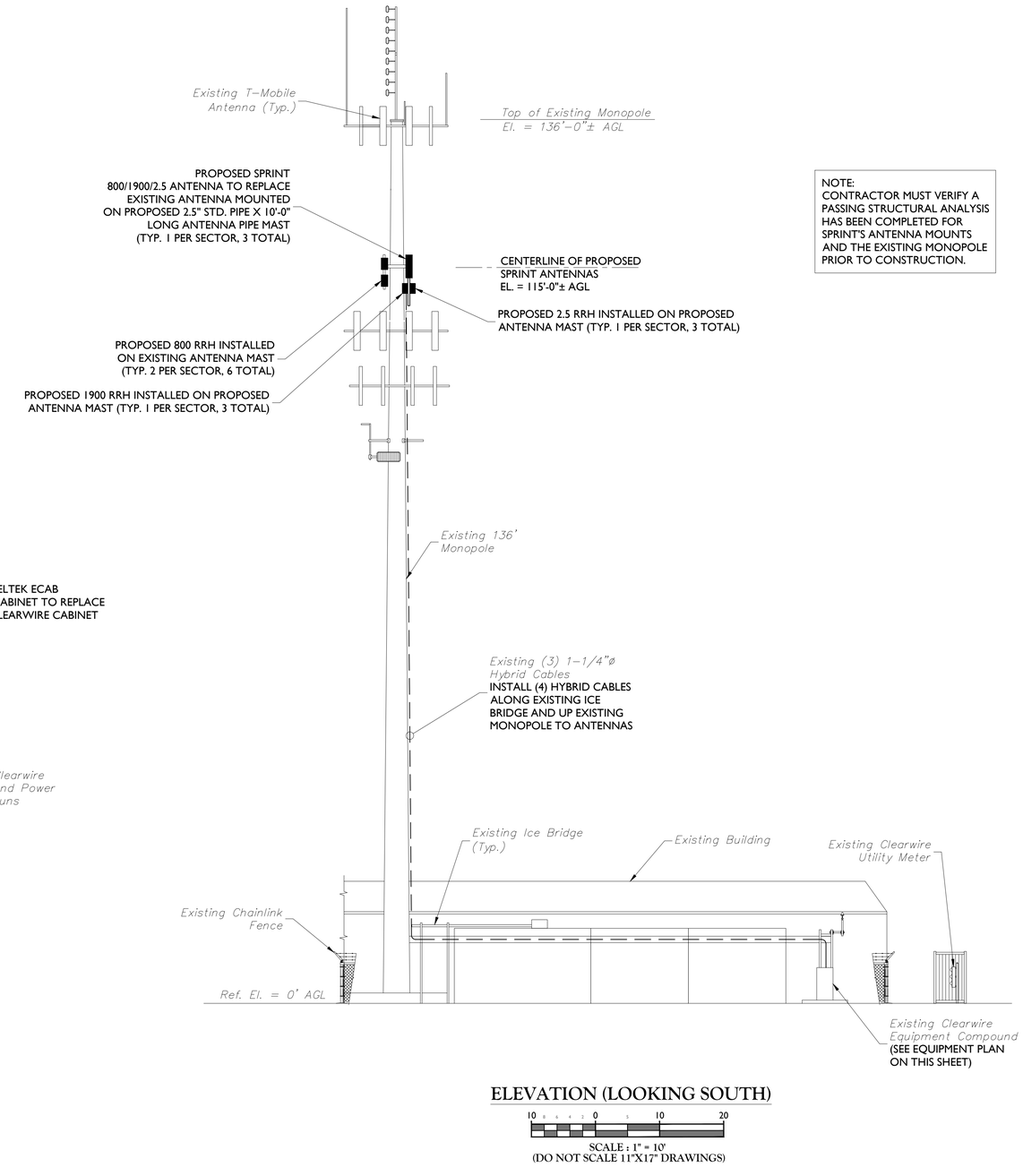
SHEET NUMBER : ANT-004.00




## EQUIPMENT PLAN

2 1.6 1.2 0.8 0.4 0 2 4

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




NOTE:
CONTRACTOR MUST VERIFY A PASSING STRUCTURAL ANALYSIS HAS BEEN COMPLETED FOR SPRINT'S ANTENNA MOUNTS AND THE EXISTING MONOPOLE PRIOR TO CONSTRUCTION.

## ELEVATION (LOOKING SOUTH)

10 8 6 4 2 0 5 10 20

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

LEGEND

LIGHT LINE WORK INDICATES EXISTING OBJECTS
HEAVY LINE WORK INDICATED PROPOSED OBJECTS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CONNECTICUT LICENSED PROFESSIONAL ENGINEER, LICENSE NUMBER: PEN.32577


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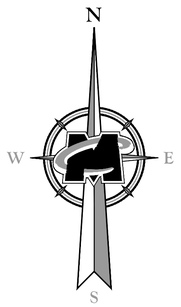
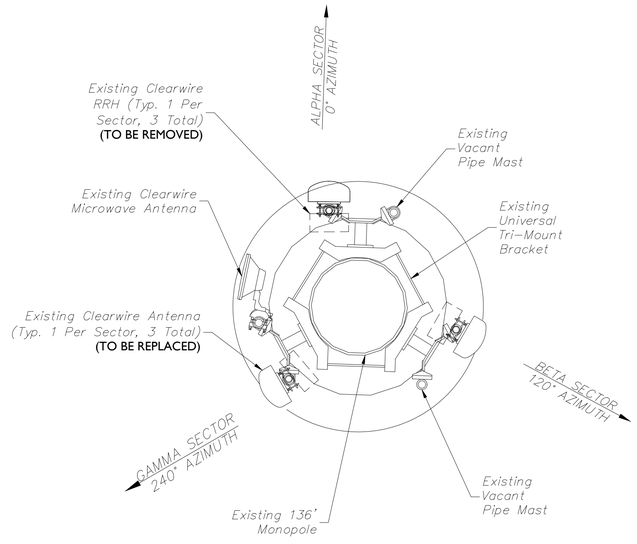
SHEET TITLE :
EQUIPMENT PLAN AND ELEVATION

SHEET NUMBER :
ANT-005.00




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




## EXISTING ANTENNA LAYOUT

2 1.6 1.2 0.8 0.4 0 1 2 4

SCALE : 1" = 2'
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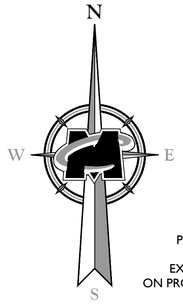


NOTE:
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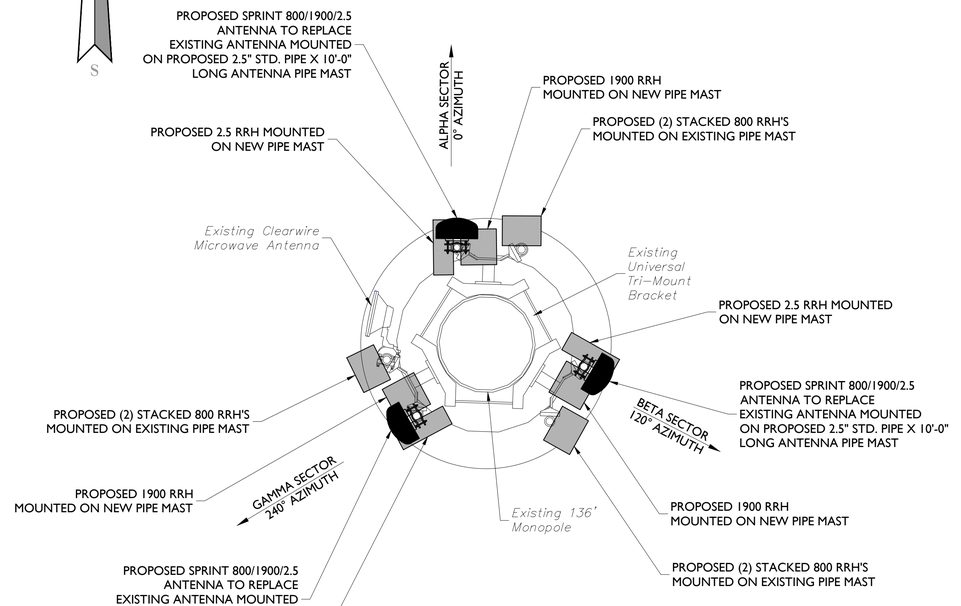


## PROPOSED ANTENNA LAYOUT

2 1.6 1.2 0.8 0.4 0 1 2 4

SCALE : 1" = 2'
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STATE OF CONNECTICUT
PETROS E. SOUKALAS
LICENSED PROFESSIONAL ENGINEER
PETROS E. SOUKALAS
CONNECTICUT LICENSED PROFESSIONAL ENGINEER, LICENSE NUMBER: PEN.32577

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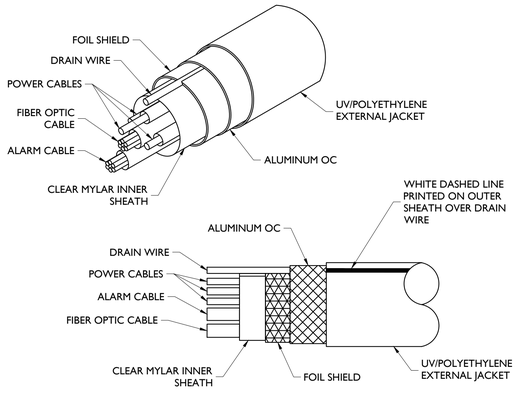
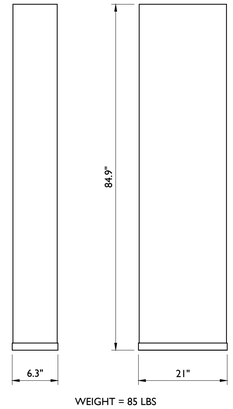
SHEET TITLE :
ANTENNA ORIENTATION PLAN

SHEET NUMBER :
ANT-006.00



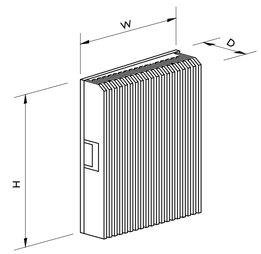

HYBRID CABLE
NOT TO SCALE




WEIGHT = 85 LBS

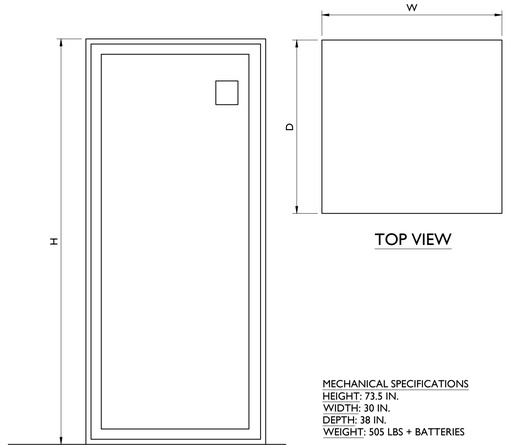
KMW ETCR-654L12H6

ANTENNA DETAIL
NOT TO SCALE




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

RRH SPECIFICATIONS
NOT TO SCALE



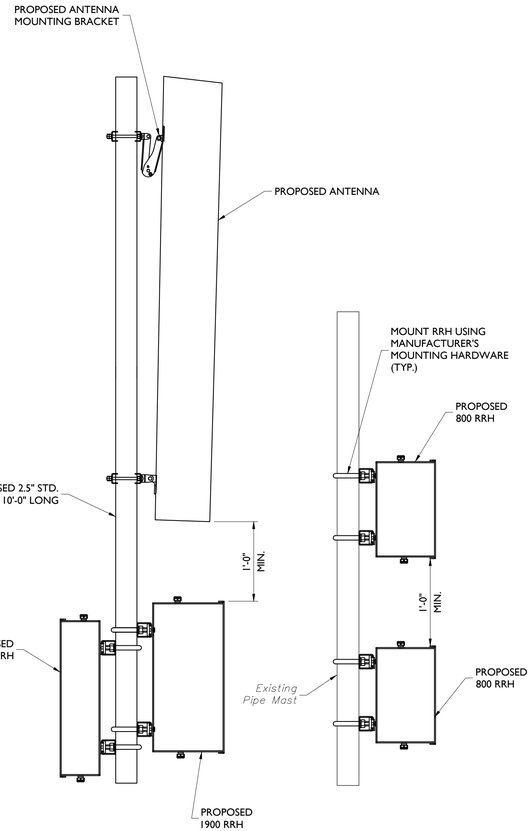

TOP VIEW

FRONT VIEW

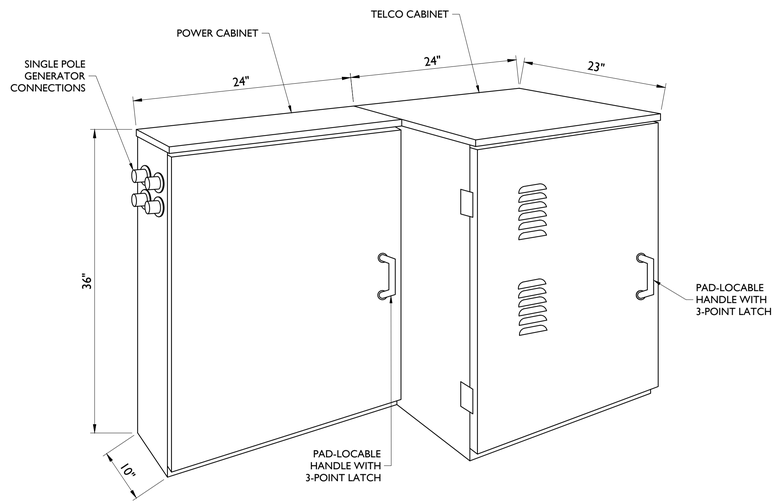
MECHANICAL SPECIFICATIONS
HEIGHT: 73.5 IN.
WIDTH: 30 IN.
DEPTH: 38 IN.
WEIGHT: 505 LBS + BATTERIES

ECAB ELTEK

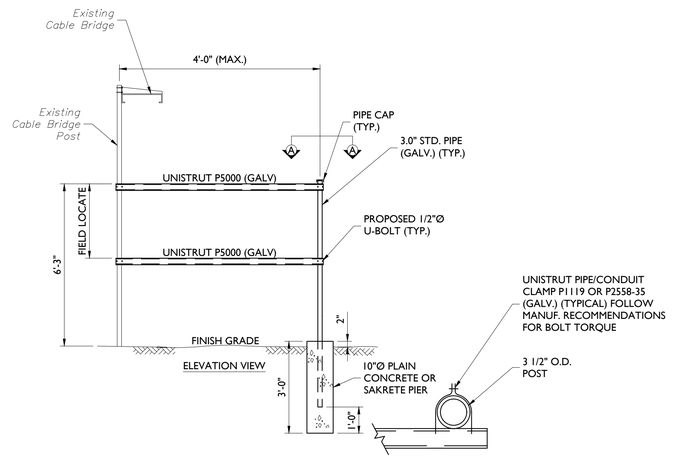
GROWTH CABINET DETAIL
NOT TO SCALE




ANTENNA AND RRH MOUNTING DETAIL
NOT TO SCALE




ELTEK POWER PROTECTION CABINET DETAIL
NOT TO SCALE




H-FRAME FOR PPC MOUNTING DETAIL
NOT TO SCALE

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STATE OF CONNECTICUT — PETROS E. SOULAKIS — LICENSED PROFESSIONAL ENGINEER — 32577 — FINAL

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

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Fax: 732.383.1984

SHEET TITLE :
DETAILS

SHEET NUMBER :
ANT-007.00

# RF NOTES

1. ACTUAL CABLE LENGTHS SHALL BE DETERMINED PER SITE CONDITION BY SUBCONTRACTOR.
2. THE DESIGN IS BASED ON RF DATA SHEETS, SIGNED AND APPROVED.
3. RADIO SIGNAL CABLE AND RACEWAY SHALL COMPLY WITH THE REQUIREMENTS OF THE NATIONAL ELECTRICAL CODE (NEC, NFPA 70), CHAPTER 8.
4. ALL SPECIFIED MATERIAL FOR EACH LOCATION (E.G., OUTDOORS, INDOORS-OCCUPIED, INDOORS-UNOCCUPIED, PLENUMS, RISER SHAFTS, ETC.) SHALL BE APPROVED, LISTED, OR LABELED AS REQUIRED BY THE NEC.
5. HARDLINE AND JUMPER CABLES SHALL BE SUPPORTED WITH HANGERS AND AT INTERVALS AS REQUIRED BY THE MANUFACTURER FOR 125 mph WIND SPEED AND EXPECTED ICE CONDITIONS. FOR SITES WITH TOWER HEIGHT OVER 300' OR ARE LOCATED IN THE EXTREME WEATHER/OPERATION AREAS, THE WORST CASE SCENARIO FOR 150 mph WIND SPEED AND 1" ICE CONDITION SHOULD BE APPLIED. ALL CABLES SHOULD BE SUPPORTED AT HALF THE DISTANCE OF THE MAXIMUM HANGER SPACING FROM THE CABLE CONNECTOR LOCATION TO THE 1ST HANGER. MANUFACTURER RECOMMENDED CABLE SUPPORT ACCESSORIES SHALL BE USED. PLASTIC CABLE TIES ARE NOT ACCEPTABLE. HANGER STACKING LIMIT SHOULD ALSO REFER TO VENDOR'S RECOMMENDATION.
6. THE OUTDOOR CABLE SUPPORT SYSTEM SHALL BE PROVIDED WITH AN ICE SHIELD TO SUPPORT AND PROTECT ANTENNA CABLE RUNS.
7. DRIP LOOPS SHALL BE REQUIRED ON ALL OUTSIDE CABLES. CABLES SHALL BE SLOPED AWAY FROM THE BUILDING OR OUTDOOR BTS CABINETS TO PREVENT WATER FROM ENTERING THROUGH THE COAXIAL CABLE PORT.
8. ALL FEEDER LINE AND JUMPER CONNECTORS SHALL BE 7/16 DIN CABLE CONNECTORS THAT MEET IP68 STANDARDS.
9. CONNECTORS IN INDOOR APPLICATIONS REQUIRE NO WEATHERPROOFING. OUTDOOR APPLICATIONS REQUIRE WEATHERPROOFING AND THE FOLLOWING PROCEDURES SHOULD BE FOLLOWED:

   RE-ENTERABLE AND RE-SEALABLE PLASTIC ENCLOSURE APPROVED BY CABLE MANUFACTURER AND CONTRACTOR IS RECOMMENDED METHOD TO WEATHERPROOF CONNECTORS.

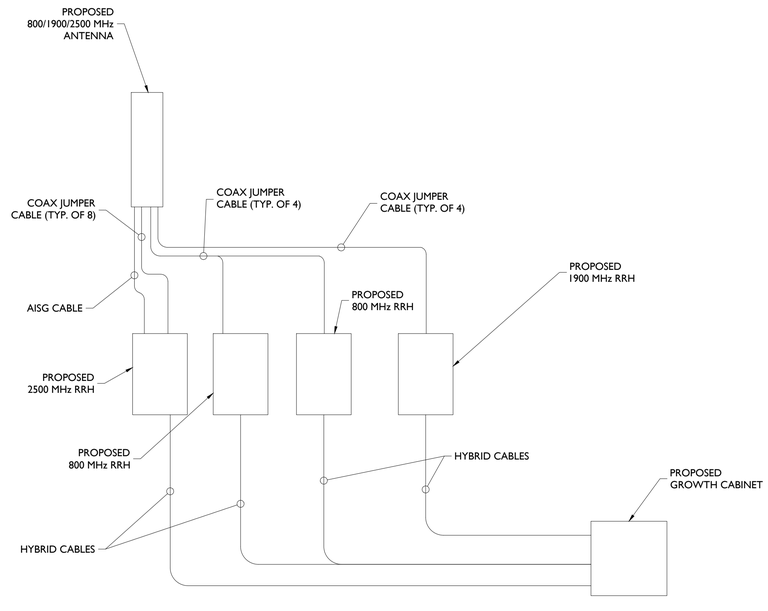
   ALSO ACCEPTABLE IS THE USE OF BUTYL RUBBER WEATHERPROOFING KIT APPROVED BY CABLE MANUFACTURE AND CONTRACTOR. START BUTYL RUBBER TAPE APPROXIMATELY 5 INCHES FROM THE CONNECTOR AND WRAP 2 INCHES TOWARD THE CONNECTOR, THEN REVERSE THE TAPE SO THAT THE STICKY SIDE IS UP. TAPE OVER THE CONNECTOR OR SURGE ARRESTOR UNTIL THREE (3) TO FOUR (4) INCHES BEYOND THE CONNECTOR AND REVERSE AGAIN WITH THE STICKY SIDE DOWN FOR ANOTHER TWO INCHES. FINISH WITH TWO LAYERS OF VINYL TAPE. COLD SHRINK IS STRICTLY PROHIBITED. SELF-BONDING, AMALGAMATING TAPE MAYBE USED AS AN ALTERNATIVE TO BUTYL RUBBER TAPE.
10. ANTENNAS SHALL BE PAINTED, WHEN REQUIRED, BY THE LANDLORD OR AUTHORITY HAVING JURISDICTION IN ACCORDANCE WITH ANTENNA MANUFACTURERS' SURFACE PREPARATION AND PAINTING REQUIREMENTS.
11. CABLE SHIELDS, AND TOWER CONDUITS SHALL BE GROUNDED AT THE TOP OF THE TOWER, WITHIN 10 FEET OF THEIR CONNECTORS, AND AT THE BOTTOM OF THE TOWER ABOUT 6 INCHES BEFORE THEY TURN TOWARD THE FACILITY. THEY SHALL BE GROUNDED AT THE MIDPOINT OF TOWERS THAT ARE BETWEEN 100 FEET AND 200 FEET HIGH, AND AT INTERVALS OF 100 FEET OR LESS ON TOWERS THAT ARE HIGHER THAN 200 FEET.
12. APPROVED GROUNDING KITS, WHICH INCLUDE GROUNDING STRAPS, SHALL BE USED TO GROUND THE COAXIAL CABLE SHIELDS, AND CONDUITS. THE GROUND CONDUCTORS FOR THE KITS AT THE TOP OF THE TOWER, AND IN THE MIDDLE SECTION OF THE TOWER, ARE BONDED DIRECTLY TO TOWER STEEL USING BOLTED, OR APPROVED CLAMP CONNECTIONS. EXOTHERMIC WELDS SHALL BE PERMITTED ON TOWERS ONLY WITH THE EXPRESS APPROVAL OF THE TOWER MANUFACTURER OR THE CONTRACTORS STRUCTURAL ENGINEER.
13. ALL RADIO SIGNAL CABLE SHALL BE LABELED AND COLOR CODED PER MARKET REQUIREMENTS.
14. ANTENNA FEED LINE SYSTEM SWEEP TESTING SHALL BE PERFORMED AND REPORTED IN ACCORDANCE WITH THE REQUIREMENTS OF PROJECT SPECIFICATIONS. CONTRACTOR WILL NOT ACCEPT A RADIO SIGNAL CABLE INSTALLATION WITH UNSATISFACTORY SWEEP TEST RESULTS.
15. PIM TESTS SHALL BE PERFORMED ON NEW AND MOVED OR MODIFIED COAXIAL CABLE INSTALLATIONS. TEST SHALL BE PERFORMED AND REPORTED IN ACCORDANCE WITH PROJECT SPECIFICATIONS.
16. DC CONNECTORS AT OUTDOOR BIAS-Ts OR DIPLEXER/TRIPLEXER PORTS SHALL BE WEATHERPROOFED PER MANUFACTURER RECOMMENDATIONS.
17. AISG CONNECTIONS DO NOT REQUIRE ADDITIONAL WEATHERPROOFING UNLESS RECOMMENDED BY MANUFACTURER OR BY MARKET REQUIREMENTS.
18. INSTALL ONLY STANDARD RF JUMPER CABLES (e.g. LDF4 OR LCF12) AT TOWER-TOP APPLICATIONS. FLEXIBLE RF CABLES (e.g. FSJ4 OR SCF12) SHALL NOT BE USED.
19. CABLES AND CONNECTORS MUST BE PREPARED AND INSTALLED USING THE TOOLS RECOMMENDED BY THE COAXIAL CABLE MANUFACTURER. IT IS THE CONTRACTOR'S RESPONSIBILITY TO ENSURE THAT THE CORRECT TOOLS ARE USED FOR THE SIZE AND TYPE OF COAX AND CONNECTOR. ALL ASPECTS OF INSTALLATION OF ALL COAXIAL CABLE SHALL FOLLOW THE CABLE MANUFACTURER'S RECOMMENDATIONS, INCLUDING THOSE FOR PULLING, MOUNTING AND GROUNDING.

**PROPOSED ANTENNA CONFIGURATION**

| SECTOR | | PROPOSED ANTENNA | TECH. | ANTENNA STATUS | HEIGHT (in) | WIDTH (in) | DEPTH (in) | WEIGHT (lbs) | ANTENNA AZIMUTH | ANT. CL. ELEV (ft.) | ELECTRICAL DOWNTILT | MECHANICAL DOWNTILT |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| ALPHA | A1 | KMW ETCR-654L12H6 | 800/1900/2500 | NEW | 84.9 | 21 | 6.3 | 85 | 0° | 115' | 5°/3°/2° | 0° |
| BETA | B1 | KMW ETCR-654L12H6 | 800/1900/2500 | NEW | 84.9 | 21 | 6.3 | 85 | 120° | 115' | 5°/3°/2° | 0° |
| GAMMA | C1 | KMW ETCR-654L12H6 | 800/1900/2500 | NEW | 84.9 | 21 | 6.3 | 85 | 240° | 115' | 5°/3°/2° | 0° |

BILL OF MATERIALS

| NUMBER | QUANTITY | DESCRIPTION | MANUFACTURER | MODEL NUMBER |
|---|---|---|---|---|
| 1 | 3 | PANEL ANTENNA | KMW | ETCR-654L12H6 |
| 2 | 3 | 2500MHZ RRH | ALU | TD-RRH8X20-25 |
| 3 | 6 | 800MHZ RRH | ALU | RRH-2X50-800 |
| 4 | 3 | 1900MHZ RRH | ALU | RRH-2X50-1900 |
| 5 | 320 LF | 1-1/4"Ø HYBRID FIBER RISER X4 | ALU | TBD |
| 6 | 48 | 1/2"Ø JUMPER CABLE (8' LONG) | TBD | |
| 7 | 3 | 0.315"Ø AISG CABLE (8' LONG) | COMMSCOPE | ATCB-B01-006 |
| 8 | 1 | GROWTH CABINET | ELTEK | ECAB |
| 9 | 1 | POWER PROTECTION CABINET | ELTEK | 5811122212 |




## ANTENNA WIRING DIAGRAM

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STATE OF CONNECTICUT — PETROS E. TSOUKALAS — 21708 — LICENSED PROFESSIONAL ENGINEER

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


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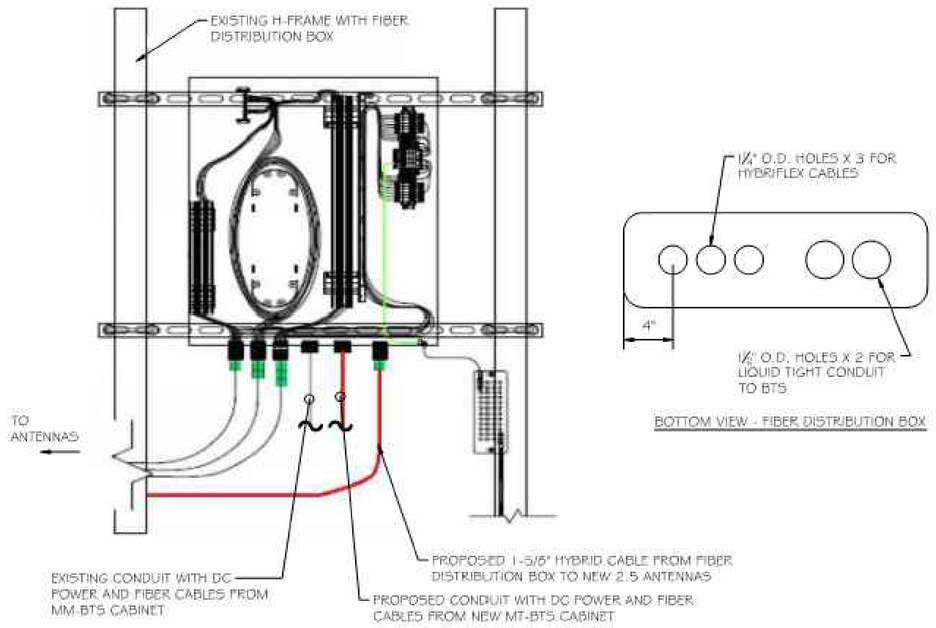
Fax: 732.383.1984


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

SHEET NUMBER: ANT-008.00




TYPICAL FIBER DISTRIBUTION BOX DETAIL

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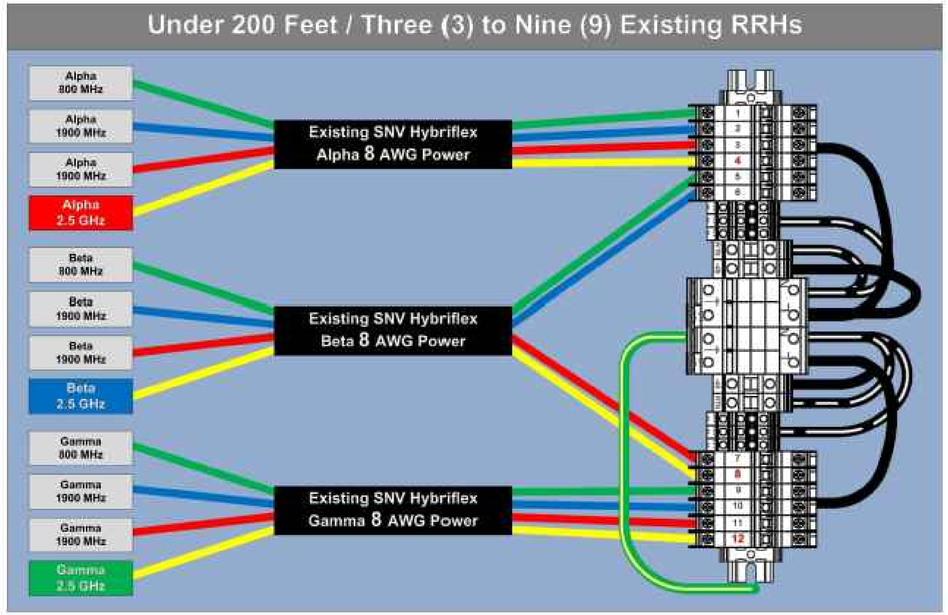


RRH TO DISTRIBUTION BOX POWER CONNECTIVITY DETAIL

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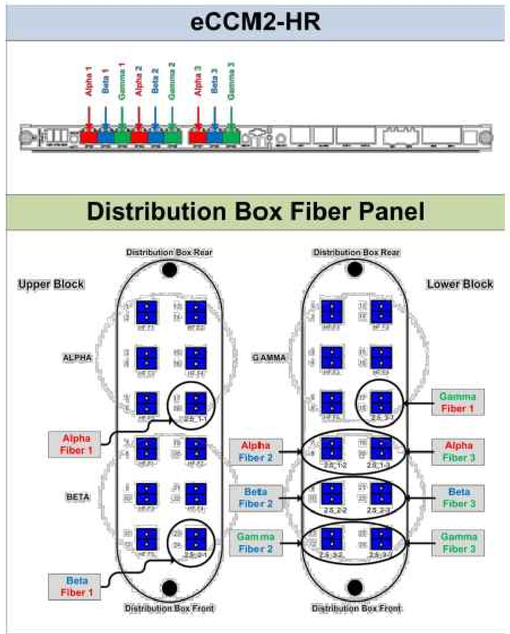


BTS TO DISTRIBUTION BOX FIBER CONNECTIVITY DETAIL

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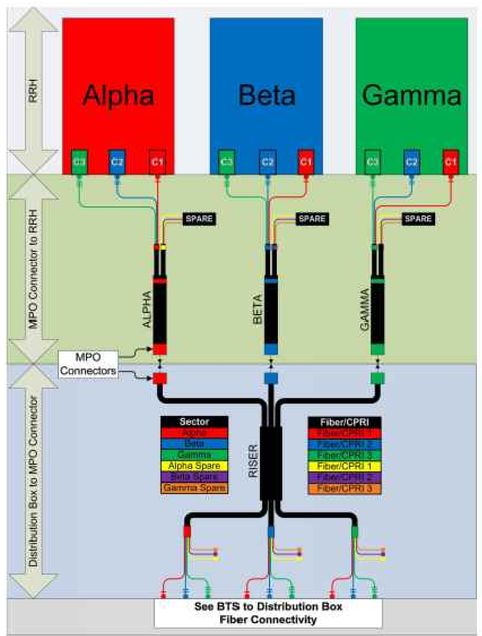


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CONNECTICUT LICENSED PROFESSIONAL ENGINEER
LICENSE NUMBER: PEN.32577

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Fax: 732.383.1984

SHEET TITLE:
FIBER PLUMBING DIAGRAMS - 1

SHEET NUMBER:
ANT-009.00

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

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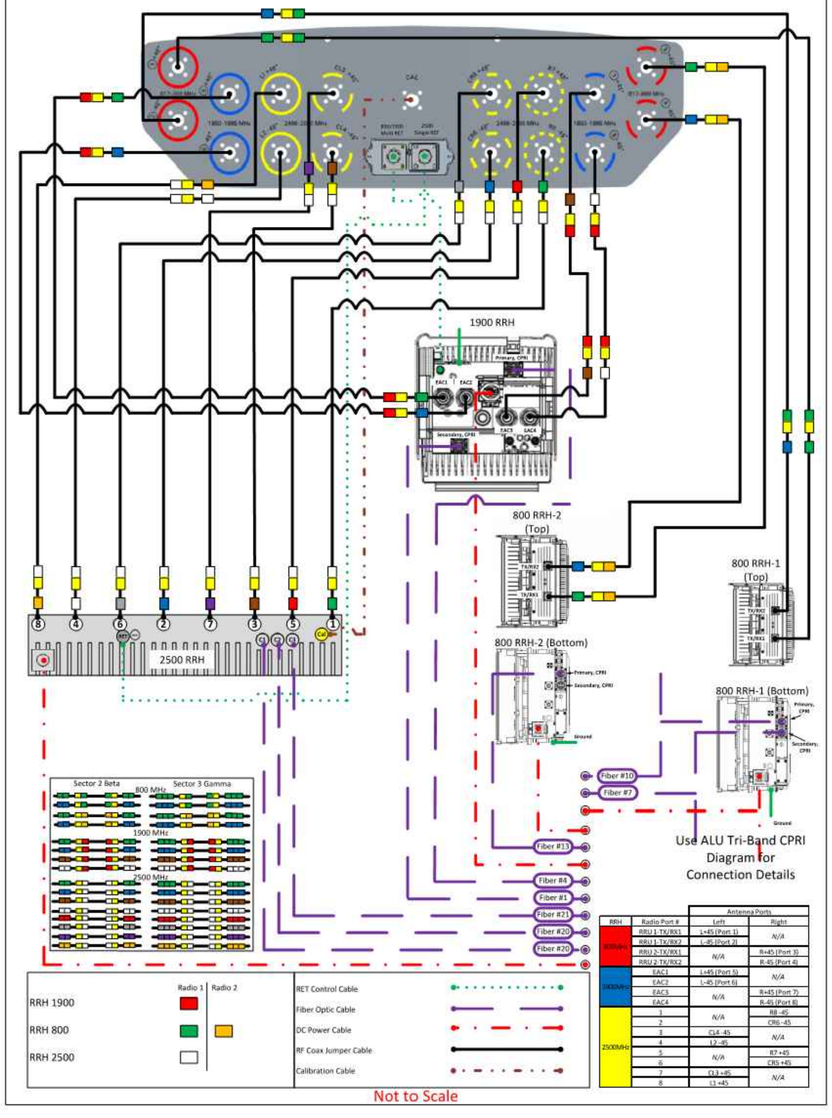
## KMW 16 Port Nokia-A RRH 800, 1900, and 2500




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

# ANTENNA WIRING DIAGRAM

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SHEET TITLE :

FIBER PLUMBING DIAGRAMS - 2

SHEET NUMBER :

ANT-010.00

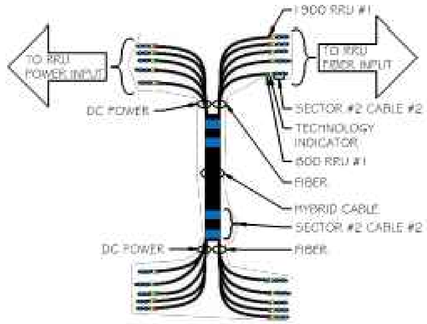
## CABLE MARKING NOTES

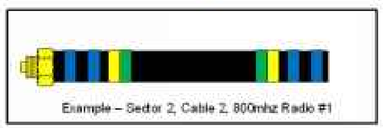
1. ALL CABLES SHALL BE MARKED WITH 2" WIDE, UV STABILIZED, UL APPROVED TAPE.
2. THE FIRST RING SHALL BE CLOSEST TO THE END OF THE CABLE AND SPACED APPROXIMATELY 2" FROM THE END CONNECTOR, WEATHERPROOFING, OR BREAKOUT UNIT. THERE SHALL BE 1" SPACE BETWEEN EACH RING.
3. A 2" GAP SHALL SEPARATE THE CABLE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

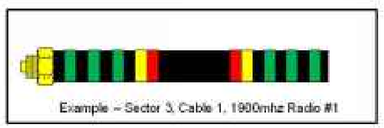
| 2.5 FREQUENCY | INDICATOR | | ID |
|---|---|---|---|
| 2500 -1 | YEL | WHT | GRN |
| 2500 -2 | YEL | WHT | RED |
| 2500 -3 | YEL | WHT | BRN |
| 2500 -4 | YEL | WHT | BLU |
| 2500 -5 | YEL | WHT | SLT |
| 2500 -6 | YEL | WHT | ORG |
| 2500 -7 | YEL | WHT | WHT |
| 2500 -8 | YEL | WHT | PPL |

| NV FREQUENCY | INDICATOR | ID |
|---|---|---|
| 800-1 | YEL | GRN |
| 1900-1 | YEL | RED |
| 1900-2 | YEL | BRN |
| 1900-3 | YEL | BLU |
| 1900-4 | YEL | SLT |
| 800-1 | YEL | ORG |
| RESERVED | YEL | WHT |
| RESERVED | YEL | PPL |

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





## COLOR CODING CHARTS
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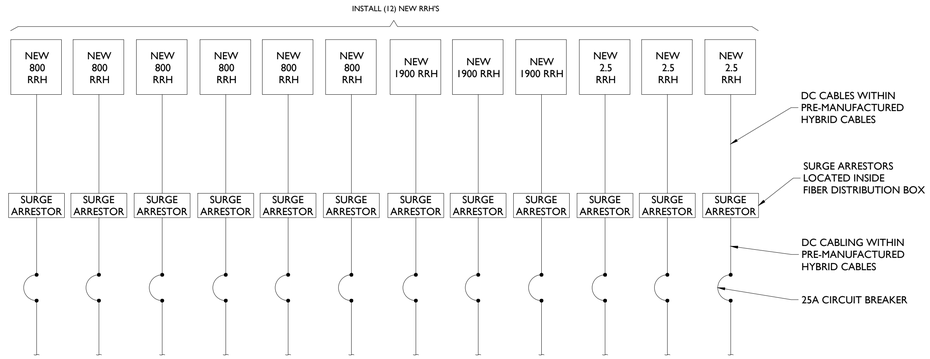


## DC ONE-LINE DIAGRAM
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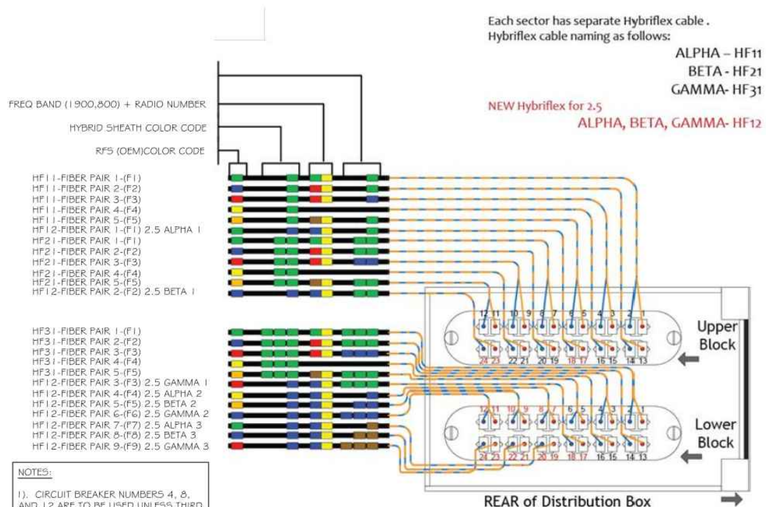


NOTES:
1). CIRCUIT BREAKER NUMBERS 4, 8, AND 12 ARE TO BE USED UNLESS THIRD DC RAIL IS REQUIRED FOR MICROWAVE.
2). USE DC POWER LOOP.
3). ALL UNUSED DC FEEDERS TO BE TERMINATED WITH WIRE NUTS AND TAPED.
4). REMOVE ALL DEBRIS FROM INTERIOR OF FIBER DISTRIBUTION BOX WHEN COMPLETE.

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STATE OF CONNECTICUT — PETROS E. TSOUKALAS — 21711 — LICENSED PROFESSIONAL ENGINEER — FINAL

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


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

SHEET NUMBER:
ANT-011.00

GENERAL REQUIREMENTS:

1. THE WORK TO BE DONE UNDER THIS PROJECT INCLUDES PROVIDING ALL EQUIPMENT, MATERIALS, LABOR AND SERVICES, AND PERFORMING ALL OPERATIONS FOR COMPLETE AND OPERATING SYSTEMS. ANY WORK NOT SPECIFICALLY COVERED BY NECESSARY TO COMPLETE THIS INSTALLATION, SHALL BE PROVIDED. ALL EQUIPMENT AND WIRING TO BE NEW AND PROVIDED UNDER THIS CONTRACT UNLESS OTHERWISE NOTED.
2. ENTIRE INSTALLATION, INCLUDING MATERIALS, EQUIPMENT AND WORKMANSHIP, SHALL CONFORM TO THE 2011 EDITION OF THE NATIONAL ELECTRIC CODE (NEC) AS WELL AS ALL APPLICABLE LAWS AND REGULATIONS AND REGULATORY BODIES HAVING JURISDICTION OVER THIS WORK.
3. THE TERM "FURNISH" SHALL MEAN TO OBTAIN AND SUPPLY THE JOB SITE. THE TERM "INSTALL" SHALL MEAN TO FIX IN POSITION AND CONNECT FOR USE. THE TERM "PROVIDE" SHALL MEAN TO FURNISH AND INSTALL. THE TERM "CONTRACTOR" SHALL MEAN ELECTRICAL CONTRACTOR.
4. ONLY WRITTEN CHANGES AND/OR MODIFICATIONS APPROVED BY THE ENGINEER, CONSULTING ENGINEER OR OWNER'S REPRESENTATIVE WILL BE RECOGNIZED.
5. THE ELECTRICAL CONTRACTOR SHALL SUBMIT, FOR THE ENGINEER'S APPROVAL, DETAILED SHOP DRAWINGS OF ALL EQUIPMENT SPECIFIED.
6. CONTRACTOR SHALL COORDINATE WITH SPECIFICATIONS BY OTHER TRADES.
7. PROVIDE OPERATING AND MAINTENANCE MANUALS, PER SPECIFICATIONS, AND GIVE INSTRUCTIONS TO USER FOR ALL EQUIPMENT AND SYSTEMS PROVIDED UNDER THIS CONTRACT AFTER ALL ARE CLEANED AND OPERATING.
8. KEEP PREMISES FREE FROM RUBBISH. REMOVE ALL ELECTRICAL RUBBISH FROM SITE.
9. ALL WORK SHALL BE INSTALLED CONCEALED UNLESS OTHERWISE NOTED.
10. THE WORK SHALL INCLUDE ALL PANELS, DEVICES, FEEDERS AND BRANCH CIRCUIT WIRING AS REQUIRED FOR THE DISTRIBUTION SYSTEM INDICATED AND CALLED FOR ON THE DRAWINGS. REQUIRED BY SPECIFICATIONS AND AS NECESSARY FOR COMPLETE FUNCTIONAL SYSTEMS PRESENTED AND INTENDED.
11. THE CONTRACTOR SHALL FURNISH ALL MATERIAL, LABOR, TOOLS, EQUIPMENT, CONSUMABLES AND SERVICES REQUIRED FOR OBTAINING, DELIVERY, INSTALLATION, CONNECTION, DISCONNECTION, REMOVAL, RELOCATION, REPAIR, REPLACEMENT, TESTING AND COMMISSIONING OF ALL EQUIPMENT AND DEVICES INCLUDED IN OR NECESSARY FOR THE WORK, AS APPLICABLE. THIS INCLUDES SCAFFOLDING, LADDERS, RIGGING, HOISTING, ETC.
12. ELECTRICAL WORK SHALL INCLUDE ALL REQUIRED CUTTING, PATCHING AND THE FULL RESTORATION OF WALL AND FLOOR STRUCTURE AND SURFACES. ALL EQUIPMENT, WALLS, FLOORS, ETC., DISTURBED OR DAMAGED DURING CONSTRUCTION SHALL BE REPAIRED TO THE SATISFACTION OF THE OWNER, AT THE CONTRACTORS EXPENSE.
13. BEFORE SUBMITTING HIS BID, THE CONTRACTOR SHALL FULLY ACQUAINT HIMSELF/HERSELF WITH THE JOB CONDITIONS AND DIFFICULTIES THAT WILL PERTAIN TO THE EXECUTION OF THIS WORK. SUBMISSION OF A PROPOSAL WILL BE CONSTRUED AS EVIDENCE THAT SUCH AN EXAMINATION HAS BEEN MADE.LATER CLAIMS WILL NOT BE RECOGNIZED FOR EXTRA LABOR, EQUIPMENT OR MATERIALS REQUIRED BECAUSE OF DIFFICULTIES ENCOUNTERED, WHICH COULD NOT HAVE BEEN FORESEEN HAD SUCH AN EXAMINATION BEEN MADE.
14. THE CONTRACTOR SHALL CONFIRM THE LOCATION OF ALL UTILITIES. THE CONTRACTOR IS RESPONSIBLE FOR REPAIRING ANY DAMAGE TO EXISTING UTILITIES.
15. UPON COMPLETION OF THE ELECTRICAL WORK, THE CONTRACTOR SHALL TEST THE COMPLETE ELECTRICAL SYSTEM FOR SHORTS, GROUNDS, AND PROPER OPERATION, IN THE PRESENCE OF THE OWNER'S REPRESENTATIVE.
16. UPON COMPLETION OF WORK, THE CONTRACTOR SHALL CLEAN AND ADJUST ALL EQUIPMENT AND LIGHTING AND TEST SYSTEMS TO THE SATISFACTION OF OWNER AND ENGINEER. RESULTS SHALL BE SUBMITTED TO THE ENGINEER FOR APPROVAL.
17. THE CONTRACTOR SHALL FIELD VERIFY DIMENSIONS OF FINISHED CONSTRUCTION PRI9OR TO FABRICATION AND INSTALLATION OF FIXTURES AND EQUIPMENT.
18. EXACT ROUTING OF CONDUITS AND "MC" CABLES SHALL BE DETERMINED IN THE FIELD.
19. IF THE OWNER AND/OR HIS REPRESENTATIVE CONSIDERS ANY WORK TO BE INFERIOR, THE RESPECTIVE CONTRACTOR SHALL REPLACE SAME WITH CONTRACT STANDARD WORK WITHOUT ADDITIONAL CHARGE. ALL WORK SHALL BE DONE IN A NEAT, WORKMANLIKE MANNER. LEFT CLEAN AND FREE FROM DEFECTS, AND COMPLETELY OPERABLE.
20. THE CONTRACTOR SHALL PROVIDE ALL MATERIALS AS SHOWN ON THE DRAWINGS AND/OR AS SPECIFIED. ALL MATERIALS SHALL BE NEW, AND BEAR THE UL LABEL. ALL WORK SHALL BE GUARANTEED BY THE CONTRACTOR FOR A PERIOD OF ONE (1) YEAR FROM THE DATE OF ACCEPTANCE BY THE OWNER.
21. DRAWINGS ARE TO BE CONSIDERED DIAGRAMMATIC, AND SHALL BE FOLLOWED AS CLOSELY AS CONDITIONS ALLOW TO COMPLETE THE INTENT OF THE CONTRACT. THE DRAWINGS AND SPECIFICATIONS COMPLIMENT AND VICE VERSA, IS TO BE INCLUDED IN THE SCOPE OF WORK.
22. ALL EQUIPMENT CONNECTIONS SHALL BE INSTALLED PER APPLICABLE SEISMIC REQUIREMENTS.
23. ENGINEER WILL MAKE A FINAL INSPECTION WITH THE OWNER AND CONTRACTOR AND WILL NOTIFY THE CONTRACTOR IN WRITING OF ALL PARTICULARS IN WHICH THIS INSPECTION REVEALS THAT THE WORK IS INCOMPLETE OR DEFECTIVE. THE CONTRACTOR SHALL IMMEDIATELY TAKE SUCH MEASURES AS ARE NECESSARY TO COMPLETE SUCH WORK OR REMEDY SUCH DEFICIENCIES.
24. THE CONTRACTOR SHALL PERFORM ALL EXCAVATION, TRENCHING, AND BACKFILL AS REQUIRED FOR ELECTRICAL WORK. BACKFILL SHALL BE SUITABLE MATERIAL PROPERLY COMPACTED TO 95% DENSITY IN EACH LAYER OF SIX (6) INCH DEPTH. CONDUIT SHALL BE MINIMUM 36" BELOW FINISHED GRADE.

PROJECT COORDINATION:

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

PROTECTION OF WORK:

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

WARRANTIES AND BONDS:

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

PERMITS:

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

RACEWAYS:

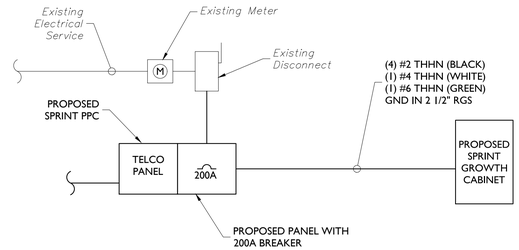
1. ALL CONDUIT SHALL BE MINIMUM SIZE OF 3/4" FOR POWER CIRCUITS AND CONTROL CIRCUITS EXCEPT WHERE FLEXIBLE CONDUIT IS CALLED FOR ON PROJECT DOCUMENTS. ALL EXTERIOR EXPOSED CONDUIT SHALL BE GRC (GALVANIZED RIGID METAL CONDUIT). ALL UNDERGROUND, IN SLAB OR UNDER SLAB SHALL BE RNC (RIGID NONMETALLIC CONDUIT).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

WIRING:

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

GROUNDING:

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




NOTES:

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

## POWER RISER DIAGRAM

NOT TO SCALE




LEGEND:

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

## EQUIPMENT RISER DIAGRAM DETAIL

NOT TO SCALE

PRELIMINARY ELECTRIC SCHEMATIC SHOWN
PENDING - LOAD STUDY AND VERIFICATION
OF EXISTING SERVICE CAPACITY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STATE OF CONNECTICUT — PETROS E. TSOUKALAS — 21751 — REGISTERED PROFESSIONAL ENGINEER

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


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SITE ID: CT52XC024

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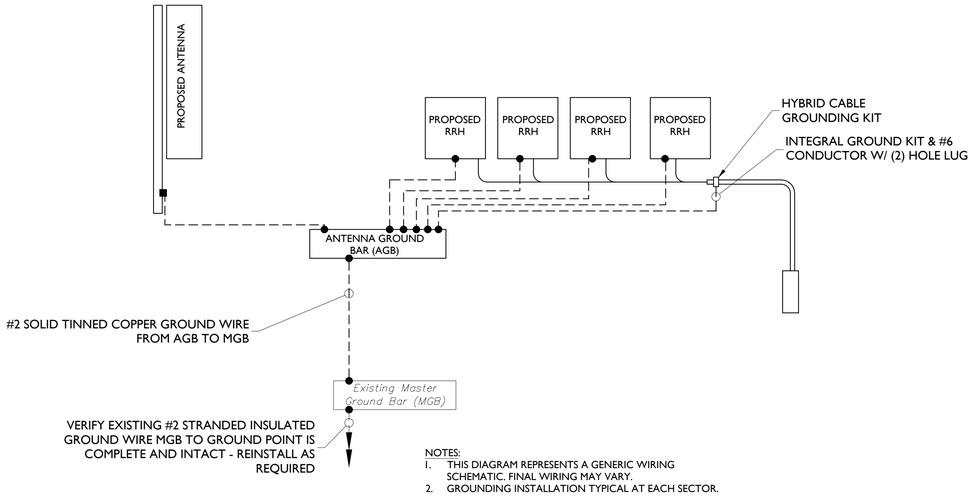
SHEET TITLE :

ELECTRICAL AND GROUNDING NOTES

SHEET NUMBER :

ANT-012.00



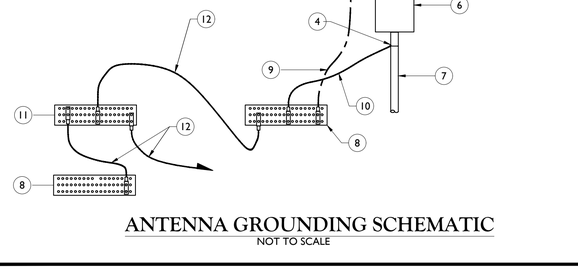

NOTES:
1. THIS DIAGRAM REPRESENTS A GENERIC WIRING SCHEMATIC. FINAL WIRING MAY VARY.
2. GROUNDING INSTALLATION TYPICAL AT EACH SECTOR.

## GROUNDING SCHEMATIC

NOT TO SCALE

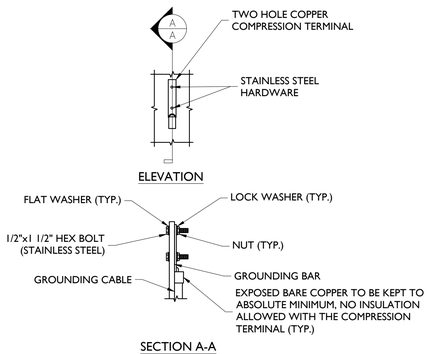
ANTENNA GROUNDING NOTES:

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




## ANTENNA GROUNDING SCHEMATIC

NOT TO SCALE




## TYPICAL GROUND BAR CONNECTION DETAIL

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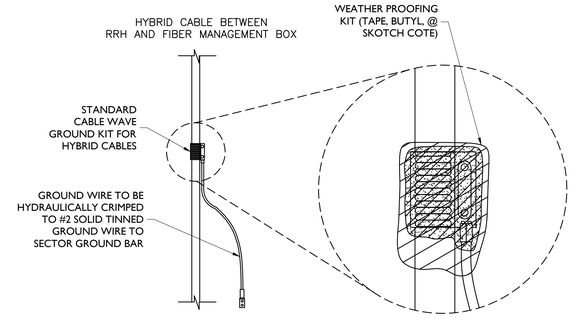


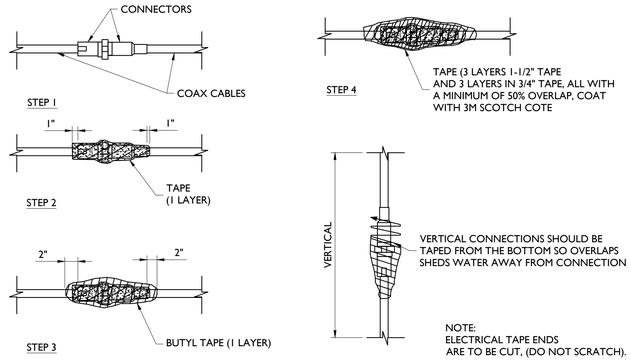


## CABLE WRAPPING DETAIL

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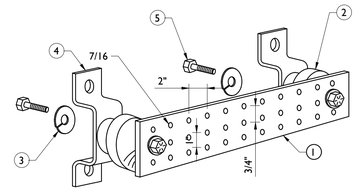


1. COPPER GROUND BAR, 1/4" X 4" X 20", NEWTON INSTRUMENT CO. CAT. NO. B-6142 OR EQUAL. HOLE CENTERS TO MATCH NEMA DOUBLE LUG CONFIGURATION. (ACTUAL GROUND BAR SIZE WILL VARY BASED ON NUMBER OF GROUND CONNECTIONS)
2. INSULATORS, NEWTON INSTRUMENT CAT. NO. 3061-4 OR EQUAL
3. 5/8" LOCKWASHERS, NEWTON INSTRUMENT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

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

## GROUND BAR DETAIL

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STATE OF CONNECTICUT · ELECTRICAL ENGINEER · PROFESSIONAL

PETROS E. SOULALAS
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SHEET TITLE:
GROUNDING SCHEMATIC AND DETAILS

SHEET NUMBER:
ANT-013.00