Transcend Wireless

10 Industrial Ave,
Suite 3
Mahwah NJ 07430

Phone: 201.684.0055
Fax: 201.684.0066

October 10, 2019

Members of the Siting Council
Connecticut Siting Council
Ten Franklin Square
New Britain, CT 06051

RE: Notice of Exempt Modification
761 Federal Road Brookfield, CT 06804
Latitude: 41.478769
Longitude: -73.408306
Sprint Site#: CT54XC713 – DO Macro

Dear Ms. Bachman:

Sprint currently maintains three (3) antennas at the 110-foot level of the existing 113-foot transmission tower at 761 Federal Road Brookfield, CT. The 113-foot transmission tower is owned by The Connecticut Light & Power Company, d/b/a Eversource Energy and the property is owned by the State of Connecticut. Sprint now intends to replace three (3) of its existing antennas with three (3) new 800/1900/2500 MHz antennas. The new antennas will be installed at the same 110-foot level of the tower.

Planned Modifications:
Tower:

Remove
N/A

Remove and Replace:
(2) RFS APXVSPP18-C antennas (Remove) - CommScope DHHTT65B-3XR antennas (Replace) 800/1900/2500 MHz
(1) RFS APXV9EERR18-C antenna (Remove) - CommScope DHHTT65B-3XR antennas (Replace) 800/1900/2500 MHz

Install New:
(3) RFS KIT-FD9R6004 / 1C-DL diplexers
(3) CCI DPO-7126Y-0-T1 diplexers

Existing to Remain:
(18) 1-1/4" coax cables

Ground:

Install New: (3) RFS KIT-FD9R6004 / 1C-DL diplexers, (3) CCI DPO-7126Y-0-T1 diplexers (3) 2500 MHz RRHs

This facility was approved by the CSC for Sprint use in Petition No. 580 dated September 25, 2002. This modification complies with this approval. Please see the enclosed.

Please accept this letter as notification pursuant to Regulations of Connecticut State Agencies§ 16- SOj-73, for construction that constitutes an exempt modification pursuant to R.C.S.A. § 16-50j-72(b)(2). In accordance with R.C.SA. § 16-SOj-73, a copy of this letter is being sent to First Selectman – Stephen C. Dunn, Elected Official, and Francis Lollie, Zoning Enforcement Officer for the Town of Brookfield, as well as the owners.

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

1. The proposed modifications will not result in an increase in the height of the existing structure.

2. The proposed modifications will not require the extension of the site boundary.

3. The proposed modifications will not increase noise levels at the facility by six decibels or more, or to levels that exceed state and local criteria.

4. The operation of the replacement antennas will not increase radio frequency emissions at the facility to a level at or above the Federal Communications Commission safety standard.

5. The proposed 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 modifications to the above referenced telecommunications facility constitute an exempt modification under R.C.S.A. § 16-50j-72(b)(2).

Sincerely,

Jake Shappy
Transcend Wireless
Cell: 845-553-3330
Email: jshappy@transcendwireless.com

Attachments
cc: Stephen C. Dunn – Town of Brookfield First Selectman
Francis Lollie – Town of Brookfield Zoning Enforcement Officer
State of Connecticut – property owner
The Connecticut Light & Power Company, d/b/a Eversource Energy – tower owner

EVERSOURCE ENERGY

56 Prospect Street,
Hartford, CT 06103

P.O. Box 270
Hartford, CT 06141-0270
(860) 665-5000

September 10, 2019

Mr. Jake Shappy
Transcend Mobile
10 Industrial Ave, Suite 3
Mahwah, NJ 07430

RE: Sprint Antenna Site, CT-54XC713, Federal Road, Brookfield, CT, structure 2683

Dear Mr. Shappy:

Based on the structural report and construction drawings provided by Centek Engineering, as well as a review of the structural report by Paul J. Ford & Company, Eversource accepts the proposed modification of the subject site.

Please contact Christopher Gelinas of Eversource Real Estate at 860-665-2008 to complete the site lease amendment if needed. Please contact me at 860-728-4503 for other questions regarding this site.

Sincerely,

Joel Szarkowicz
Transmission Line Engineering

REF: 17159.18 - CT54XC713 - Structural Analysis Rev5 19.03.05
17159.18 CT54XC713 Brookfield - CD REV.0 19.03.25 (S&S)

Petition No. 580
Sprint Spectrum, L.P.
Brookfield, Connecticut
Staff Report
September 25, 2002

On September 18, 2002, Connecticut Siting Council (Council) member Edward S. Wilensky with Robert Mercier of Council staff met Sprint Spectrum (Sprint) representatives Thomas Regan, Esq., and Carlo Centore for inspection of a Connecticut Light & Power Company (CL&P) electric transmission line structure (no. 2683) located at 761 Federal Road in Brookfield. Sprint, with the agreement of CL&P, proposes to modify the structure by installing antennas and associated equipment for telecommunications use and is petitioning the Council for a declaratory ruling that no Certificate of Environmental Compatibility and Public Need (Certificate) is required for the modification.

The existing 90-foot CL&P monopole was previously modified for telecommunications use by Cingular Wireless (Cingular) under approved Petition 494. Cingular installed three antennas on a pole mount, raising the height of the structure to approximately 101 feet above ground level (agl). Cingular installed an equipment compound at the base of the tower containing an equipment shelter with a brick façade.

Under this Petition, Sprint proposes to replace the existing Cingular pole mount with a 23-foot pole mount and install three-panel antennas with a centerline height of approximately 111 feet agl. Cingular's antennas would be located at their original height of 96.8 feet agl. The total height of the structure would be approximately 113 feet agl.

Sprint proposes to install equipment cabinets on a twenty-foot by ten-foot concrete pad within a graveled compound north of the tower. The compound would be enclosed with a six-foot high chain link fence. Site clearing and grading, and the extension of an existing retaining wall would be required to accommodate the compound area. The retaining wall would be constructed of or finished with decorative block to match the existing wall. Existing shrubby vegetation on a steep slope would be removed to accommodate the retaining wall. A GPS antenna extending to a height of 16 feet agl would be mounted to the proposed ice bridge.

The site would provide coverage to the Route 7/202 corridor and Route 25 and would allow for uninterrupted service between Danbury and New Milford.

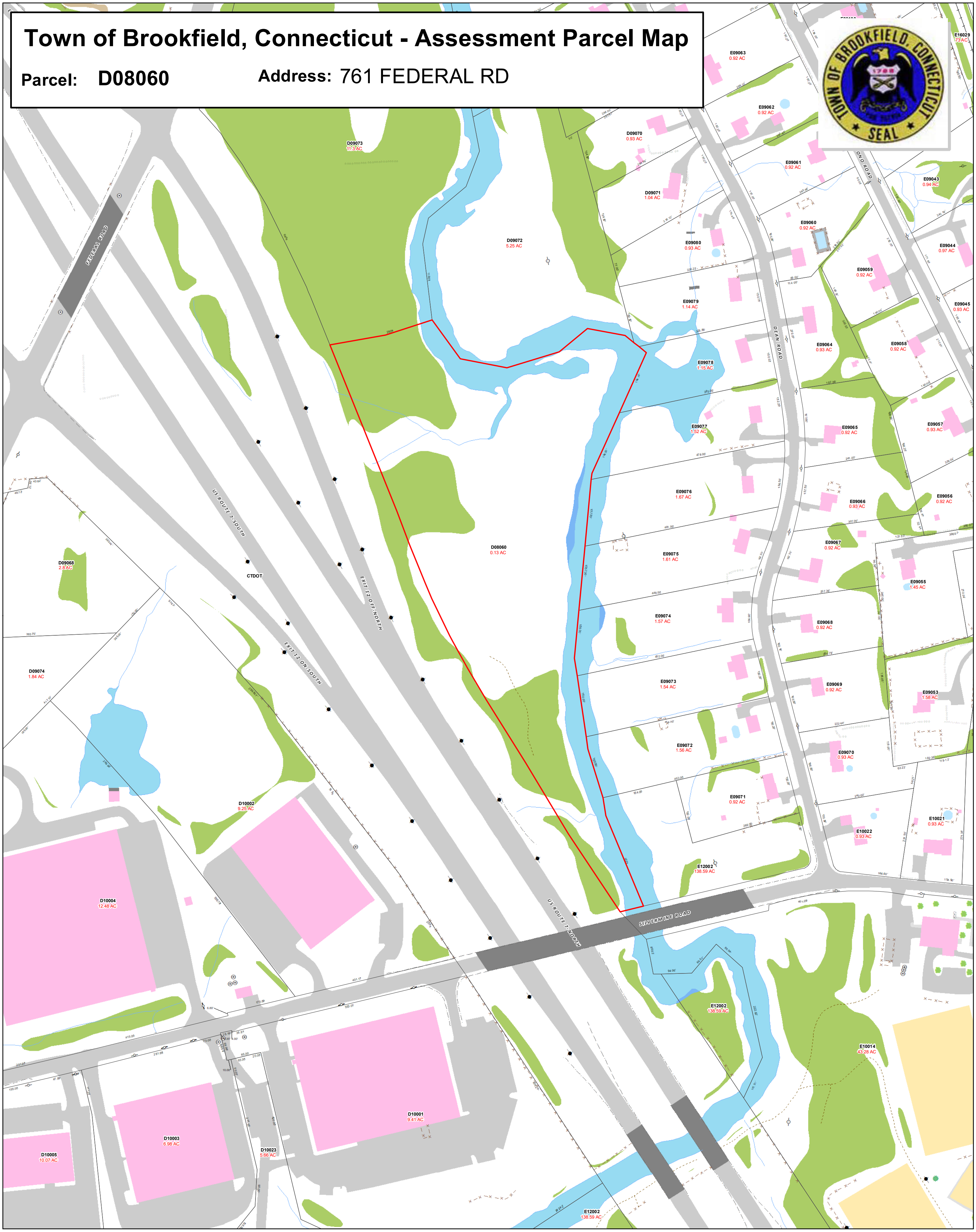
The proposed site is located east of Route 7 (Federal Road) in Brookfield. The site is bordered by commercial properties to the north and west, vacant land to the east and undeveloped land to the south. The zoning designation of this site is "Central Business District". The nearest residence is approximately 500 feet east of the site.

The worst-case power density for the telecommunications operations at the site has been calculated to be 26.3% of the applicable standard for uncontrolled environments.

Sprint contends that the proposed modification of the structure would not require a Certificate because the increase in height of this monopole structure will not result in a substantial environmental effect nor will there be damage to existing scenic, historical or recreational values.and the proposed project will prevent the construction of a new tower in the area.

Town of Brookfield, Connecticut - Assessment Parcel Map

Parcel: **D08060** **Address:** 761 FEDERAL RD



Map Produced Oct 2017

Approximate Scale: 1 inch = 300 feet

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

761 FEDERAL RD

Location	761 FEDERAL RD	**Mblu**	D08/ / 060/ /
Acct#	01179000	**Owner**	CONNECTICUT STATE OF
Assessment	$189,910	**Appraisal**	$271,290
PID	2420	**Building Count**	1

Current Value

Appraisal			
Valuation Year	**Improvements**	**Land**	**Total**
2018	$33,170	$238,120	$271,290
Assessment			
Valuation Year	**Improvements**	**Land**	**Total**
2018	$23,230	$166,680	$189,910

Owner of Record

Owner	CONNECTICUT STATE OF	**Sale Price**	$0
Co-Owner		**Certificate**	
Address	450 CAPITOL AVE HARTFORD, CT 06106	**Book & Page**	103/ 160
		Sale Date	09/19/1973

Ownership History

Ownership History				
Owner	**Sale Price**	**Certificate**	**Book & Page**	**Sale Date**
CONNECTICUT STATE OF	$0		103/ 160	09/19/1973

Building Information

Building 1 : Section 1

Year Built:
Living Area: 0

Building Attributes	
Field	**Description**
Style	Outbuildings
Model	
Stories:	
Occupancy	

Exterior Wall 1	
Exterior Wall 2	
Roof Structure:	
Roof Cover	
Interior Wall 1	
Interior Wall 2	
Interior Flr 1	
Interior Flr 2	
Heat Fuel	
Heat Type:	
AC Type:	
Total Bedrooms:	
Total Bathrooms	
Total Half Baths:	
Total Xtra Fixtrs:	
Total Rooms:	
Kitchens	
Whirlpool Tub	
Hot Tubs	
Fireplaces	
Fin Bsmt Area	
Fin Bsmt Quality	
Bsmt Garages	

Building Photo

(http://images.vgsi.com/photos2/BrookfieldCTPhotos//default.jpg

Building Layout

Building Layout

Building Sub-Areas (sq ft)
No Data for Building Sub-Areas

Extra Features

Extra Features
No Data for Extra Features

Land

Land Use

Use Code 913
Description State Lnd Com
Zone TCD

Land Line Valuation

Size (Acres) 0.13
Depth
Assessed Value $166,680
Appraised Value $238,120

Outbuildings

Outbuildings						
Code	Description	Sub Code	Sub Description	Size	Value	Bldg #

SHD3	Comm Shed	CB		200 S.F.	$13,650	1
FN3	Fence 6'			110 L.F.	$1,040	1
CB1	PreCastConc Shed			80 S.F	$18,480	1

Valuation History

Appraisal			
Valuation Year	**Improvements**	**Land**	**Total**
2018	$33,170	$238,120	$271,290
2017	$33,170	$238,120	$271,290
2015	$33,170	$230,480	$263,650

Assessment			
Valuation Year	**Improvements**	**Land**	**Total**
2018	$23,230	$166,680	$189,910
2017	$23,230	$166,680	$189,910
2015	$23,230	$161,340	$184,570

UPS Internet Shipping: View/Print Label

1. **Ensure there are no other shipping or tracking labels attached to your package.** Select the Print button on the print dialog box that appears. Note: If your browser does not support this function select Print from the File menu to print the label.

2. **Fold the printed label at the solid line below.** Place the label in a UPS Shipping Pouch. If you do not have a pouch, affix the folded label using clear plastic shipping tape over the entire label.

3. **GETTING YOUR SHIPMENT TO UPS**
Customers with a Daily Pickup
Your driver will pickup your shipment(s) as usual.

Customers without a Daily Pickup
Take your package to any location of The UPS Store®, UPS Access Point(TM) location, UPS Drop Box, UPS Customer Center, Staples® or Authorized Shipping Outlet near you. Items sent via UPS Return Services(SM) (including via Ground) are also accepted at Drop Boxes. To find the location nearest you, please visit the 'Find Locations' Quick link at ups.com.
Schedule a same day or future day Pickup to have a UPS driver pickup all of your Internet Shipping packages.
Hand the package to any UPS driver in your area.

UPS Access Point™
MICHAELS STORE # 7773
75 INTERSTATE SHOP CTR
RAMSEY ,NJ 07446

UPS Access Point™
THE UPS STORE
115 FRANKLIN TPKE
MAHWAH ,NJ 07430

UPS Access Point™
THE UPS STORE
120 E MAIN ST
RAMSEY ,NJ 07446

FOLD HERE

JAKE SHAPPY
8455533330
TRANSCEND WIRELESS
10 INDUSTRIAL AVE
MAHWAH NJ 074302284

2 LBS 1 OF 1
DWT: 12,9,2

SHIP TO:
MELANIE A. BACHMAN
CONNECTICUT SITING COUNCIL
10 FRANKLIN SQUARE
NEW BRITAIN CT 06051-2655

CT 067 9-06

UPS GROUND
TRACKING #: 1Z V25 742 03 9126 5500

BILLING: P/P

Reference#1: CT54XC713

UIS 21.5.42. WNTNV50 15.0A 07/2019

UPS Internet Shipping: View/Print Label

1. **Ensure there are no other shipping or tracking labels attached to your package.** Select the Print button on the print dialog box that appears. Note: If your browser does not support this function select Print from the File menu to print the label.

2. **Fold the printed label at the solid line below.** Place the label in a UPS Shipping Pouch. If you do not have a pouch, affix the folded label using clear plastic shipping tape over the entire label.

3. **GETTING YOUR SHIPMENT TO UPS**
   Customers with a Daily Pickup
   Your driver will pickup your shipment(s) as usual.

   Customers without a Daily Pickup
   Take your package to any location of The UPS Store®, UPS Access Point(TM) location, UPS Drop Box, UPS Customer Center, Staples® or Authorized Shipping Outlet near you. Items sent via UPS Return Services(SM) (including via Ground) are also accepted at Drop Boxes. To find the location nearest you, please visit the 'Find Locations' Quick link at ups.com.
   Schedule a same day or future day Pickup to have a UPS driver pickup all of your Internet Shipping packages.
   Hand the package to any UPS driver in your area.

UPS Access Point™
MICHAELS STORE # 7773
75 INTERSTATE SHOP CTR
RAMSEY ,NJ 07446

UPS Access Point™
THE UPS STORE
115 FRANKLIN TPKE
MAHWAH ,NJ 07430

UPS Access Point™
THE UPS STORE
120 E MAIN ST
RAMSEY ,NJ 07446

FOLD HERE

JAKE SHAPPY
8455533330
TRANSCEND WIRELESS
10 INDUSTRIAL AVE
MAHWAH NJ 074302284

1 LBS **1 OF 1**
DWT: 14,9,1

SHIP TO:
CHRIS GELINAS
860-665-2008
EVERSOURCE ENERGY
107 SELDEN ST.
BERLIN CT 06037-1616

CT 061 9-02

UPS GROUND
TRACKING #: 1Z V25 742 03 9086 3491

BILLING: P/P

Reference#1: CT54XC713

UIS 21.5.42. WNTNV50 15.0A 07/2019

UPS Internet Shipping: View/Print Label

1. **Ensure there are no other shipping or tracking labels attached to your package.** Select the Print button on the print dialog box that appears. Note: If your browser does not support this function select Print from the File menu to print the label.

2. **Fold the printed label at the solid line below.** Place the label in a UPS Shipping Pouch. If you do not have a pouch, affix the folded label using clear plastic shipping tape over the entire label.

3. **GETTING YOUR SHIPMENT TO UPS**
   Customers with a Daily Pickup
   Your driver will pickup your shipment(s) as usual.

   Customers without a Daily Pickup
   Take your package to any location of The UPS Store®, UPS Access Point(TM) location, UPS Drop Box, UPS Customer Center, Staples® or Authorized Shipping Outlet near you. Items sent via UPS Return Services(SM) (including via Ground) are also accepted at Drop Boxes. To find the location nearest you, please visit the 'Find Locations' Quick link at ups.com.
   Schedule a same day or future day Pickup to have a UPS driver pickup all of your Internet Shipping packages.
   Hand the package to any UPS driver in your area.

UPS Access Point™
MICHAELS STORE # 7773
75 INTERSTATE SHOP CTR
RAMSEY ,NJ 07446

UPS Access Point™
THE UPS STORE
115 FRANKLIN TPKE
MAHWAH ,NJ 07430

UPS Access Point™
THE UPS STORE
120 E MAIN ST
RAMSEY ,NJ 07446

FOLD HERE

NEIL GUERRIERO
3473040176
TRANSCEND WIRELESS
10 INDUSTRIAL AVE
MAHWAH NJ 07430

1 LBS 1 OF 1
DWT: 14,9,1

SHIP TO:
STATE OF CONNECTICUT
450 CAPITOL AVENUE
HARTFORD CT 06106-1365

CT 061 9-03

UPS GROUND
TRACKING #: 1Z V25 742 03 9348 1460

BILLING: P/P

Reference#1: CT54XC713

UIS 21.5.42. WNTNV50 15.0A 07/2019

UPS Internet Shipping: View/Print Label

1. **Ensure there are no other shipping or tracking labels attached to your package.** Select the Print button on the print dialog box that appears. Note: If your browser does not support this function select Print from the File menu to print the label.

2. **Fold the printed label at the solid line below.** Place the label in a UPS Shipping Pouch. If you do not have a pouch, affix the folded label using clear plastic shipping tape over the entire label.

3. **GETTING YOUR SHIPMENT TO UPS**
   Customers with a Daily Pickup
   Your driver will pickup your shipment(s) as usual.

   Customers without a Daily Pickup
   Take your package to any location of The UPS Store®, UPS Access Point(TM) location, UPS Drop Box, UPS Customer Center, Staples® or Authorized Shipping Outlet near you. Items sent via UPS Return Services(SM) (including via Ground) are also accepted at Drop Boxes. To find the location nearest you, please visit the 'Find Locations' Quick link at ups.com.
   Schedule a same day or future day Pickup to have a UPS driver pickup all of your Internet Shipping packages.
   Hand the package to any UPS driver in your area.

UPS Access Point™
MICHAELS STORE # 7773
75 INTERSTATE SHOP CTR
RAMSEY ,NJ 07446

UPS Access Point™
THE UPS STORE
115 FRANKLIN TPKE
MAHWAH ,NJ 07430

UPS Access Point™
THE UPS STORE
120 E MAIN ST
RAMSEY ,NJ 07446

FOLD HERE

JAKE SHAPPY
8455533330
TRANSCEND WIRELESS
10 INDUSTRIAL AVE
MAHWAH NJ 074302284

1 LBS 1 OF 1
DWT: 14,9,1

SHIP TO:
STEPHEN C. DUNN
TOWN OF BROOKFIELD
100 POCONO ROAD
BROOKFIELD CT 06804-3322

CT 068 0-03

UPS GROUND
TRACKING #: 1Z V25 742 03 9466 5484

BILLING: P/P

Reference#1: CT54XC713

UIS 21.5.42. WNTNV50 15.0A 07/2019

UPS Internet Shipping: View/Print Label

1. **Ensure there are no other shipping or tracking labels attached to your package.** Select the Print button on the print dialog box that appears. Note: If your browser does not support this function select Print from the File menu to print the label.

2. **Fold the printed label at the solid line below.** Place the label in a UPS Shipping Pouch. If you do not have a pouch, affix the folded label using clear plastic shipping tape over the entire label.

3. **GETTING YOUR SHIPMENT TO UPS**
   Customers with a Daily Pickup
   Your driver will pickup your shipment(s) as usual.

   Customers without a Daily Pickup
   Take your package to any location of The UPS Store®, UPS Access Point(TM) location, UPS Drop Box, UPS Customer Center, Staples® or Authorized Shipping Outlet near you. Items sent via UPS Return Services(SM) (including via Ground) are also accepted at Drop Boxes. To find the location nearest you, please visit the 'Find Locations' Quick link at ups.com.
   Schedule a same day or future day Pickup to have a UPS driver pickup all of your Internet Shipping packages.
   Hand the package to any UPS driver in your area.

UPS Access Point™
MICHAELS STORE # 7773
75 INTERSTATE SHOP CTR
RAMSEY ,NJ 07446

UPS Access Point™
THE UPS STORE
115 FRANKLIN TPKE
MAHWAH ,NJ 07430

UPS Access Point™
THE UPS STORE
120 E MAIN ST
RAMSEY ,NJ 07446

FOLD HERE

JAKE SHAPPY
8455533330
TRANSCEND WIRELESS
10 INDUSTRIAL AVE
MAHWAH NJ 074302284

1 LBS 1 OF 1
DWT: 14,9,1

SHIP TO:
FRANCIS LOLLIE
TOWN OF BROOKFIELD
PO BOX 5106
100 POCOONO ROAD
BROOKFIELD CT 06804-3331

CT 068 0-03

UPS GROUND
TRACKING #: 1Z V25 742 03 9107 1479

BILLING: P/P

Reference#1: CT54XC713

UIS 21.5.42. WNTNV50 15.0A 07/2019

EBI Consulting

environmental | engineering | due diligence

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

Sprint Existing Facility

<u>Site ID: CT54XC713</u>

Eversource Struct.: 2683
761 Federal Road
Brookfield, Connecticut 06804

October 10, 2019

EBI Project Number: 6219005249

Site Compliance Summary	
Compliance Status:	**COMPLIANT**
Site total MPE% of FCC general population allowable limit:	**9.38%**

October 10, 2019

Sprint
Attn: RF Engineering Manager
1 International Boulevard, Suite 800
Mahwah, New Jersey 07495

Emissions Analysis for Site: CT54XC713 - Eversource Struct.: 2683

EBI Consulting was directed to analyze the proposed Sprint facility located at **761 Federal Road** in **Brookfield, Connecticut** 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 ($\mu W/cm^2$). 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 600 MHz and 700 MHz frequency bands are approximately 400 $\mu W/cm^2$ and 467 $\mu W/cm^2$, respectively. The general population exposure limit for the 1900 MHz (PCS), 2100 MHz (AWS) and 11 GHz frequency 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 761 Federal Road in Brookfield, Connecticut 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 manufacturer's supplied specifications, minus 10 dB for directional panel antennas and 20 dB for highly focused parabolic microwave dishes, 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) 2 CDMA channels (800 MHz Band) were considered for each sector of the proposed installation. These Channels have a transmit power of 50 Watts per Channel.

2) 4 PCS channels (1900 MHz Band) were considered for each sector of the proposed installation. These Channels have a transmit power of 40 Watts per Channel.

3) 8 BRS channels (2500 MHz Band) were considered for each sector of the proposed installation. These Channels have a transmit power of 20 Watts per Channel.

4) 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.

5) 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 manufacturer's supplied specifications, minus 10 dB for directional panel antennas and 20 dB for highly focused parabolic microwave dishes, 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.

6) The antennas used in this modeling are the Commscope DHHTT65B-3XR for the 800 MHz / 1900 MHz / 2500 MHz channel(s) in Sector A, the Commscope DHHTT65B-3XR for the 800 MHz / 1900 MHz / 2500 MHz channel(s) in Sector B, the Commscope DHHTT65B-3XR for the 800 MHz / 1900 MHz / 2500 MHz channel(s) in Sector C. This is based on feedback from the carrier with regard to anticipated antenna selection. All Antenna gain values and associated transmit power levels are shown in the Site Inventory and Power Data table below. The maximum gain of the antenna per the antenna manufacturer's supplied specifications, minus 10 dB for directional panel antennas and 20 dB for highly focused parabolic microwave dishes, 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.

7) The antenna mounting height centerline of the proposed antennas is 110 feet above ground level (AGL).

8) 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.

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

EBI Consulting
environmental | engineering | due diligence

Sprint Site Inventory and Power Data

Sector:	A	Sector:	B	Sector:	C
Antenna #:	**1**	Antenna #:	**1**	Antenna #:	**1**
Make / Model:	Commscope DHHTT65B-3XR	Make / Model:	Commscope DHHTT65B-3XR	Make / Model:	Commscope DHHTT65B-3XR
Frequency Bands:	800 MHz / 1900 MHz / 2500 MHz	Frequency Bands:	800 MHz / 1900 MHz / 2500 MHz	Frequency Bands:	800 MHz / 1900 MHz / 2500 MHz
Gain:	13.35 dBd / 15.25 dBd / 15.05 dBd	Gain:	13.35 dBd / 15.25 dBd / 15.05 dBd	Gain:	13.35 dBd / 15.25 dBd / 15.05 dBd
Height (AGL):	110 feet	Height (AGL):	110 feet	Height (AGL):	110 feet
Channel Count:	14	Channel Count:	14	Channel Count:	14
Total TX Power (W):	420 Watts	Total TX Power (W):	420 Watts	Total TX Power (W):	420 Watts
ERP (W):	12,640.40	ERP (W):	12,640.40	ERP (W):	12,640.40
Antenna A1 MPE %:	**4.32%**	Antenna B1 MPE %:	**4.32%**	Antenna C1 MPE %:	**4.32%**

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

Site Composite MPE %	
Carrier	**MPE %**
Sprint (Max at Sector A):	4.32%
AT&T	5.06%
Site Total MPE % :	9.38%

Sprint MPE % Per Sector	
Sprint Sector A Total:	4.32%
Sprint Sector B Total:	4.32%
Sprint Sector C Total:	4.32%
Site Total MPE % :	9.38%

Sprint Maximum MPE Power Values (Sector A)

Sprint Frequency Band / Technology (Sector A)	# Channels	Watts ERP (Per Channel)	Height (feet)	Total Power Density (μW/cm²)	Frequency (MHz)	Allowable MPE (μW/cm²)	Calculated % MPE
Sprint 800 MHz CDMA	2	1081.36	110.0	6.43	800 MHz CDMA	533	1.21%
Sprint 1900 MHz PCS	4	1339.86	110.0	15.92	1900 MHz PCS	1000	1.59%
Sprint 2500 MHz BRS	8	639.78	110.0	15.21	2500 MHz BRS	1000	1.52%
						Total:	**4.32%**

• NOTE: Totals may vary by approximately 0.01% due to summation of remainders in calculations.

Summary

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

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

Sprint Sector	Power Density Value (%)
Sector A:	4.32%
Sector B:	4.32%
Sector C:	4.32%
Sprint Maximum MPE % (Sector A):	4.32%
Site Total:	9.38%
Site Compliance Status:	**COMPLIANT**

The anticipated composite MPE value for this site assuming all carriers present is **9.38%** 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.

WIRELESS COMMUNICATIONS FACILITY

EVERSOURCE STRUCT.: 2683
SITE ID: CT54XC713
761 FEDERAL ROAD
BROOKFIELD, CT 06804

GENERAL NOTES

1. ALL WORK SHALL BE IN ACCORDANCE WITH THE 2015 INTERNATIONAL BUILDING CODE AS MODIFIED BY THE 2018 CONNECTICUT SUPPLEMENT, INCLUDING THE TIA/EIA-222 REVISION "G" "STRUCTURAL STANDARDS FOR STEEL ANTENNA TOWERS AND SUPPORTING STRUCTURES." 2016 CONNECTICUT FIRE SAFETY CODE, NATIONAL ELECTRICAL CODE AND LOCAL CODES.
2. CONTRACTOR SHALL REVIEW ALL DRAWINGS AND SPECIFICATIONS IN THE CONTRACT DOCUMENT SET. CONTRACTOR SHALL COORDINATE ALL WORK SHOWN IN THE SET OF DRAWINGS. THE CONTRACTOR SHALL PROVIDE A COMPLETE SET OF DRAWINGS TO ALL SUBCONTRACTORS AND ALL RELATED PARTIES. THE SUBCONTRACTORS SHALL EXAMINE ALL THE DRAWINGS AND SPECIFICATIONS FOR THE INFORMATION THAT AFFECTS THEIR WORK.
3. CONTRACTOR SHALL PROVIDE A COMPLETE BUILD-OUT WITH ALL FINISHES, STRUCTURAL, MECHANICAL, AND ELECTRICAL COMPONENTS AND PROVIDE ALL ITEMS AS SHOWN OR INDICATED ON THE DRAWINGS OR IN THE WRITTEN SPECIFICATIONS.
4. CONTRACTOR SHALL FURNISH ALL MATERIAL, LABOR AND EQUIPMENT TO COMPLETE THE WORK AND FURNISH A COMPLETED JOB ALL IN ACCORDANCE WITH LOCAL AND STATE GOVERNING AUTHORITIES AND OTHER AUTHORITIES HAVING LAWFUL JURISDICTION OVER THE WORK.
5. CONTRACTOR SHALL SECURE AND PAY FOR ALL PERMITS AND ALL INSPECTIONS REQUIRED AND SHALL ALSO PAY FEES REQUIRED FOR THE GENERAL CONSTRUCTION, PLUMBING, ELECTRICAL AND HVAC. PERMITS SHALL BE PAID FOR BY THE RESPECTIVE SUBCONTRACTORS.
6. CONTRACTOR SHALL MAINTAIN A CURRENT SET OF DRAWINGS AND SPECIFICATIONS ON SITE AT ALL TIMES AND INSURE DISTRIBUTION OF NEW DRAWINGS TO SUBCONTRACTORS AND OTHER RELEVANT PARTIES AS SOON AS THEY ARE MADE AVAILABLE. ALL OLD DRAWINGS SHALL BE MARKED VOID AND REMOVED FROM THE CONTRACT AREA. THE CONTRACTOR SHALL FURNISH AN 'AS-BUILT' SET OF DRAWINGS TO OWNER UPON COMPLETION OF PROJECT.
7. LOCATION OF EQUIPMENT, AND WORK SUPPLIED BY OTHERS THAT IS DIAGRAMMATICALLY INDICATED ON THE DRAWINGS SHALL BE DETERMINED BY THE CONTRACTOR. THE CONTRACTOR SHALL DETERMINE LOCATIONS AND DIMENSIONS SUBJECT TO STRUCTURAL CONDITIONS AND WORK OF THE SUBCONTRACTORS.
8. THE CONTRACTOR IS SOLELY RESPONSIBLE TO DETERMINE CONSTRUCTION PROCEDURE AND SEQUENCE, AND TO ENSURE THE SAFETY OF THE EXISTING STRUCTURES AND ITS COMPONENT PARTS DURING CONSTRUCTION. THIS INCLUDES THE ADDITION OF WHATEVER SHORING, BRACING, UNDERPINNING, ETC. THAT MAY BE NECESSARY.
9. DRAWINGS INDICATE THE MINIMUM STANDARDS, BUT IF ANY WORK SHOULD BE INDICATED TO BE SUBSTANDARD TO ANY ORDINANCES, LAWS, CODES, RULES, OR REGULATIONS BEARING ON THE WORK, THE CONTRACTOR SHALL INCLUDE IN HIS WORK AND SHALL EXECUTE THE WORK CORRECTLY IN ACCORDANCE WITH SUCH ORDINANCES, LAWS, CODES, RULES OR REGULATIONS WITH NO INCREASE IN COSTS.
10. ALL UTILITY WORK SHALL BE IN ACCORDANCE WITH LOCAL UTILITY COMPANY REQUIREMENTS AND SPECIFICATIONS.
11. ALL EQUIPMENT AND PRODUCTS PURCHASED ARE TO BE REVIEWED BY CONTRACTOR AND ALL APPLICABLE SUBCONTRACTORS FOR ANY CONDITION PER MFR.'S RECOMMENDATIONS. CONTRACTOR TO SUPPLY THESE ITEMS AT NO COST TO OWNER OR CONSTRUCTION MANAGER.
12. ANY AND ALL ERRORS, DISCREPANCIES, AND 'MISSED" ITEMS ARE TO BE BROUGHT TO THE ATTENTION OF THE SPRINT CONSTRUCTION MANAGER DURING THE BIDDING PROCESS BY THE CONTRACTOR. ALL THESE ITEMS ARE TO BE INCLUDED IN THE BID. NO 'EXTRA' WILL BE ALLOWED FOR MISSED ITEMS.
13. CONTRACTOR SHALL BE RESPONSIBLE FOR ALL ON-SITE SAFETY FROM THE TIME THE JOB IS AWARDED UNTIL ALL WORK IS COMPLETE AND ACCEPTED BY THE OWNER.
14. CONTRACTOR TO REVIEW ALL SHOP DRAWINGS AND SUBMIT COPY TO ENGINEER FOR APPROVAL. DRAWINGS MUST BEAR THE CHECKER'S INITIALS BEFORE SUBMITTING TO THE CONSTRUCTION MANAGER FOR REVIEW.
15. THE CONTRACTOR SHALL FIELD VERIFY ALL DIMENSIONS, ELEVATIONS, ANGLES, AND EXISTING CONDITIONS AT THE SITE, PRIOR TO FABRICATION AND/OR INSTALLATION OF ANY WORK IN THE CONTRACT AREA.
16. COORDINATION, LAYOUT, FURNISHING AND INSTALLATION OF CONDUIT AND ALL APPURTENANCES REQUIRED FOR PROPER INSTALLATION OF ELECTRICAL AND TELECOMMUNICATION SERVICE SHALL BE THE SOLE RESPONSIBILITY OF THE CONTRACTOR.
17. ALL DAMAGE CAUSED TO ANY EXISTING STRUCTURE SHALL BE THE SOLE RESPONSIBILITY OF THE CONTRACTOR. THE CONTRACTOR WILL BE HELD LIABLE FOR ALL REPAIRS REQUIRED FOR EXISTING STRUCTURES IF DAMAGED DURING CONSTRUCTION ACTIVITIES.
18. THE CONTRACTOR SHALL CONTACT "CALL BEFORE YOU DIG" AT LEAST 48 HOURS PRIOR TO ANY EXCAVATIONS AT 1-800-922-4455. ALL UTILITIES SHALL BE IDENTIFIED AND CLEARLY MARKED. CONTRACTOR SHALL MAINTAIN AND PROTECT MARKED UTILITIES THROUGHOUT PROJECT COMPLETION.
19. CONTRACTOR SHALL COMPLY WITH OWNERS ENVIRONMENTAL ENGINEER ON ALL METHODS AND PROVISIONS FOR ALL EXCAVATION ACTIVITIES INCLUDING SOIL DISPOSAL. ALL BACKFILL MATERIALS TO BE PROVIDED BY THE CONTRACTOR.

SITE DIRECTIONS

FROM: 5 WAYSIDE ROAD
BURLINGTON, MA 01803

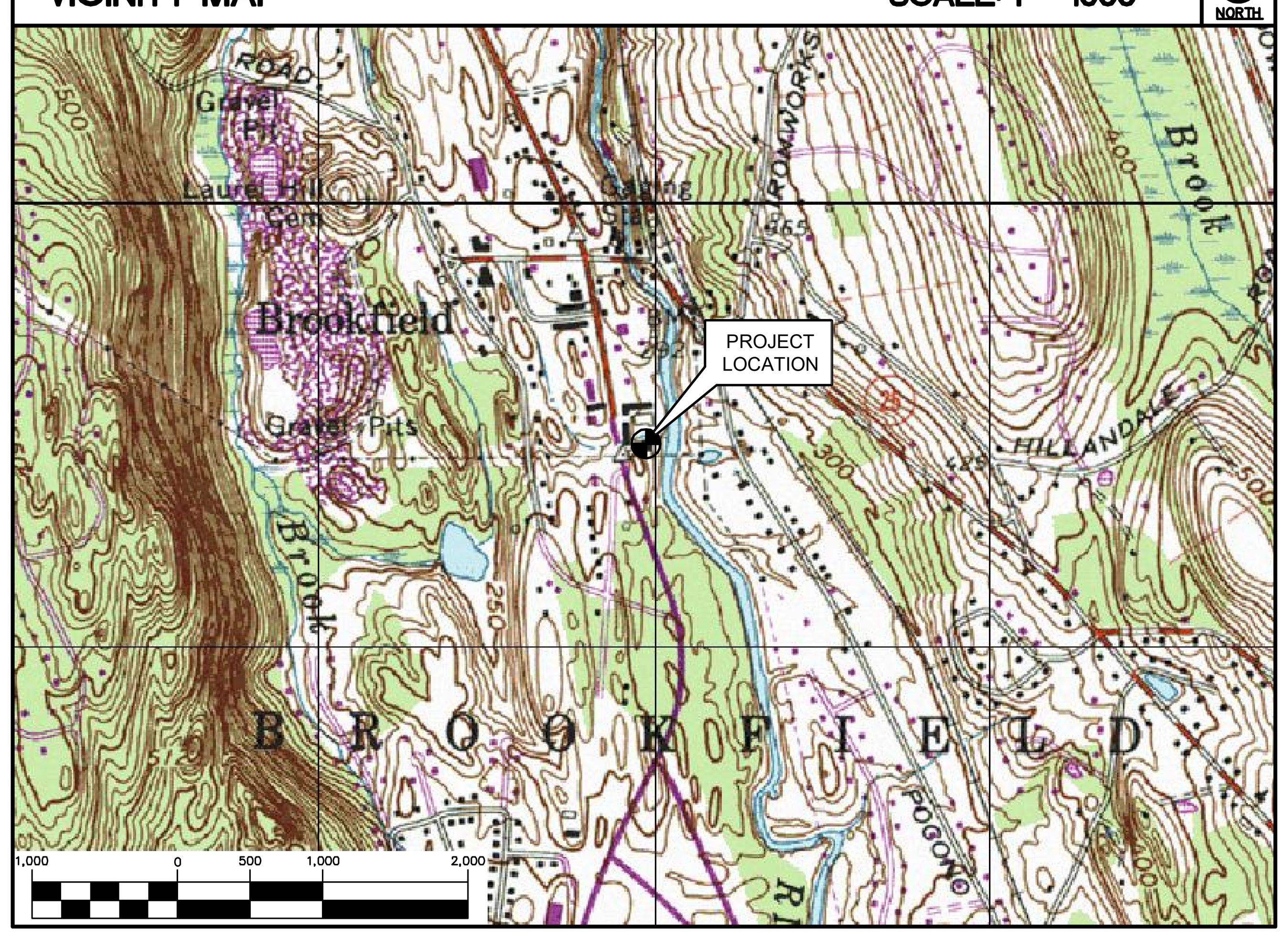
TO: 761 FEDERAL ROAD
BROOKFIELD, CT 06804

1.	START OUT BY GOING TO WAYSIDE ROAD.	0.12 MI.
2.	TURN LEFT ONTO CAMBRIDGE ST/US-3 N/MA	0.12 MI.
3.	MERGE ONTO I-95 S/MA-128 S/YANKEE DIVISION HWY S TOWARD WALTHAM/LOWELL	0.27 MI.
4.	TAKE THE I-90/MASS PIKE EXIT, EXIT 25, TOWARD BOSTON/ALBANY NY.	12.32 MI.
5.	MERGE ONTO I-90 W/MASSACHUSETTS TPKE W TOWARD WORCESTER (PORTIONS TOLL).	44.45 MI.
6.	MERGE ONTO I-84 W/WILBUR CROSS HWY S VIA EXIT 9 TOWARD US-20(PORTIONS TOLL).	97.50 MI.
7.	TAKE EXIT 7 FOR US-7 N/US-202 E TOWARD NEW MILFORD/BROOFIELD.	0.30 MI.
8.	CONTINUE ONTO US-202 E/US-7 N.	3.90 MI.
9.	TAKE EXIT 12 FOR US-202 TOWARD BROOKFIELD.	0.30 MI.
10.	TURN RIGHT ONTO US-202 E.	0.40 MI.
11.	THE DESTINATION WILL BE ON THE RIGHT.	0.64 MI.

VICINITY MAP

SCALE: 1" = 1000'

NORTH



PROJECT SUMMARY

1. THE PROPOSED SCOPE OF WORK CONSISTS OF A MODIFICATION TO THE EXISTING UNMANNED TELECOMMUNICATIONS FACILITY INCLUDING THE FOLLOWING:
   - A. INSTALLATION OF A PROPOSED UNISTURT EQUIPMENT RACK MOUNTED ON EXISTING CONCRETE PAD.
   - B. REMOVE (3) EXISTING PANEL ANTENNAS FROM TOWER.
   - C. INSTALL (3) PROPOSED 10-PORT PANEL ANTENNAS, (1) PER SECTOR.
   - D. INSTALL (6) PROPOSED DIPLEXERS ON TOWER.
   - E. INSTALL (6) PROPOSED DIPLEXERS ON PROPOSED UNISTRUT RACK
   - F. INSTALL (3) PROPOSED RRH'S ON PROPOSED UNISTRUT RACK.

PROJECT INFORMATION

SITE NAME:	EVERSOURCE STRUCT.: 2683
SITE ID:	CT54XC713
SITE ADDRESS:	761 FEDERAL ROAD BROOOKFIELD, CT 06804
APPLICANT:	SPRINT 5 WAYSIDE ROAD BURLINGTON, MA 01803
CONTACT PERSON:	MIKE KITHCART (PROJECT MANAGER) (973)626-5792
ENGINEER:	CENTEK ENGINEERING, INC. 63-2 NORTH BRANFORD RD. BRANFORD, CT 06405
PROJECT COORDINATES:	LATITUDE: 41° 28' 43.57"N LONGITUDE: 73° 24' 29.90"W GROUND ELEVATION: ±284' AMSL SITE COORDINATES AND GROUND ELEVATION REFERENCED FROM GOOGLE EARTH.

SHEET INDEX

SHT. NO.	DESCRIPTION	REV.
T-1	TITLE SHEET	0
N-1	DESIGN BASIS AND SITE NOTES	0
C-1	COMPOUND PLAN AND ELEVATION	0
C-2	TYPICAL DETAILS	0
C-3	COLOR CODE AND CPRI DETAILS	0

REV.	DATE	DRAWN BY	CHK'D BY	DESCRIPTION
0	3/25/19	TJL	CAG	ISSUED FOR CONSTRUCITON

PROFESSIONAL ENGINEER SEAL

Sprint

CENTEK engineering
Centered on Solutions
(203) 488-0580
(203) 488-8587 Fax
63-2 North Branford Road
Branford, CT 06405
www.CentekEng.com

SPRINT
WIRELESS COMMUNICATIONS FACILITY
EVERSOURCE STRUCT.: 2683
SITE ID: CT54XC713
761 FEDERAL ROAD
BROOKFIELD, CT 06804

DATE:	01/11/18
SCALE:	AS NOTED
JOB NO.	17159.18

TITLE SHEET

T-1

DESIGN BASIS:

GOVERNING CODE: 2015 INTERNATIONAL BUILDING CODE AS MODIFIED BY THE 2018 CT STATE BUILDING CODE.

1. DESIGN CRITERIA:
   - WIND LOAD: PER TIA-222-G & EVERSOURCE CRITERIA (ANTENNA MOUNTS): 93 MPH (3 SECOND GUST), NORMAL DESIGNS WIND SPEED VASD
   - WIND LOAD: PER NESC C2-2012 SECTION 25 RULE 250C (TOWER AND FOUNDATION 100 MPH (3 SECOND GUSTS).
   - SEISMIC LOAD (DOES NOT CONTROL): PER ASCE 7-10 MINIMUM DESIGN LOADS FOR BUILDINGS AND OTHER STRUCTURES.

GENERAL NOTES:

1. ALL CONSTRUCTION SHALL BE IN COMPLIANCE WITH THE GOVERNING BUILDING CODE.
2. DRAWINGS INDICATE THE MINIMUM STANDARDS, BUT IF ANY WORK SHOULD BE INDICATED TO BE SUBSTANDARD TO ANY ORDINANCES, LAWS, CODES, RULES, OR REGULATIONS BEARING ON THE WORK, THE CONTRACTOR SHALL INCLUDE IN HIS WORK AND SHALL EXECUTE THE WORK CORRECTLY IN ACCORDANCE WITH SUCH ORDINANCES, LAWS, CODES, RULES OR REGULATIONS WITH NO INCREASE IN COSTS.
3. BEFORE BEGINNING THE WORK, THE CONTRACTOR IS RESPONSIBLE FOR MAKING SUCH INVESTIGATIONS CONCERNING PHYSICAL CONDITIONS (SURFACE AND SUBSURFACE) AT OR CONTIGUOUS TO THE SITE WHICH MAY AFFECT PERFORMANCE AND COST OF THE WORK.
4. DIMENSIONS AND DETAILS SHALL BE CHECKED AGAINST EXISTING FIELD CONDITIONS.
5. THE CONTRACTOR SHALL VERIFY AND COORDINATE THE SIZE AND LOCATION OF ALL OPENINGS, SLEEVES AND ANCHOR BOLTS AS REQUIRED BY ALL TRADES.
6. ALL DIMENSIONS, ELEVATIONS, AND OTHER REFERENCES TO EXISTING STRUCTURES, SURFACE, AND SUBSURFACE CONDITIONS ARE APPROXIMATE. NO GUARANTEE IS MADE FOR THE ACCURACY OR COMPLETENESS OF THE INFORMATION SHOWN. THE CONTRACTOR SHALL VERIFY AND COORDINATE ALL DIMENSIONS, ELEVATIONS, ANGLES WITH EXISTING CONDITIONS AND WITH ARCHITECTURAL AND SITE DRAWINGS BEFORE PROCEEDING WITH ANY WORK.
7. AS THE WORK PROGRESSES, THE CONTRACTOR SHALL NOTIFY THE OWNER OF ANY CONDITIONS WHICH ARE IN CONFLICT OR OTHERWISE NOT CONSISTENT WITH THE CONSTRUCTION DOCUMENTS AND SHALL NOT PROCEED WITH SUCH WORK UNTIL THE CONFLICT IS SATISFACTORILY RESOLVED.
8. THE CONTRACTOR SHALL COMPLY WITH ALL APPLICABLE SAFETY CODES AND REGULATIONS DURING ALL PHASES OF CONSTRUCTION. THE CONTRACTOR IS SOLELY RESPONSIBLE FOR PROVIDING AND MAINTAINING ADEQUATE SHORING, BRACING, AND BARRICADES AS MAY BE REQUIRED FOR THE PROTECTION OF EXISTING PROPERTY, CONSTRUCTION WORKERS, AND FOR PUBLIC SAFETY.
9. THE CONTRACTOR IS SOLELY RESPONSIBLE TO DETERMINE CONSTRUCTION PROCEDURE AND SEQUENCE, AND TO ENSURE THE SAFETY OF THE EXISTING STRUCTURES AND ITS COMPONENT PARTS DURING CONSTRUCTION. THIS INCLUDES THE ADDITION OF WHATEVER SHORING, BRACING, UNDERPINNING, ETC. THAT MAY BE NECESSARY. MAINTAIN EXISTING SITE OPERATIONS, COORDINATE WORK WITH NORTHEAST UTILITIES
10. THE STRUCTURE IS DESIGNED TO BE SELF-SUPPORTING AND STABLE AFTER FOUNDATION REMEDIATION WORK IS COMPLETE. IT IS THE CONTRACTOR'S SOLE RESPONSIBILITY TO DETERMINE ERECTION PROCEDURE AND SEQUENCE AND TO ENSURE THE SAFETY OF THE STRUCTURE AND ITS COMPONENT PARTS DURING ERECTION. THIS INCLUDES THE ADDITION OF WHATEVER SHORING, TEMPORARY BRACING, GUYS OR TIEDOWNS, WHICH MIGHT BE NECESSARY.
11. ALL DAMAGE CAUSED TO ANY EXISTING STRUCTURE SHALL BE THE SOLE RESPONSIBILITY OF THE CONTRACTOR. THE CONTRACTOR WILL BE HELD LIABLE FOR ALL REPAIRS REQUIRED FOR EXISTING STRUCTURES IF DAMAGED DURING CONSTRUCTION ACTIVITIES.
12. SHOP DRAWINGS, CONCRETE MIX DESIGNS, TEST REPORTS, AND OTHER SUBMITTALS PERTAINING TO STRUCTURAL WORK SHALL BE FORWARDED TO THE OWNER FOR REVIEW BEFORE FABRICATION AND/OR INSTALLATION IS MADE. SHOP DRAWINGS SHALL INCLUDE ERECTION DRAWINGS AND COMPLETE DETAILS OF CONNECTIONS AS WELL AS MANUFACTURER'S SPECIFICATION DATA WHERE APPROPRIATE. SHOP DRAWINGS SHALL BE CHECKED BY THE CONTRACTOR AND BEAR THE CHECKER'S INITIALS BEFORE BEING SUBMITTED FOR REVIEW.
13. NO DRILLING WELDING OR TAPING ON EVERSOURCE OWNED EQUIPMENT.
14. REFER TO DRAWING T1 FOR ADDITIONAL NOTES AND REQUIREMENTS.

STRUCTURAL STEEL

1. ALL STRUCTURAL STEEL IS DESIGNED BY ALLOWABLE STRESS DESIGN (ASD)

   A. STRUCTURAL STEEL (W SHAPES)---ASTM A992 (FY = 50 KSI)
   B. STRUCTURAL STEEL (OTHER SHAPES)---ASTM A36 (FY = 36 KSI)
   C. STRUCTURAL HSS (RECTANGULAR SHAPES)---ASTM A500 GRADE B, (FY = 46 KSI)
   D. STRUCTURAL HSS (ROUND SHAPES)---ASTM A500 GRADE B, (FY = 42 KSI)
   E. PIPE---ASTM A53 (FY = 35 KSI)
   F. CONNECTION BOLTS---ASTM A325-N
   G. U-BOLTS---ASTM A36
   H. ANCHOR RODS---ASTM F 1554
   I. WELDING ELECTRODE---ASTM E 70XX
2. CONTRACTOR TO REVIEW ALL SHOP DRAWINGS AND SUBMIT COPY TO ENGINEER FOR APPROVAL. DRAWINGS MUST BEAR THE CHECKER'S INITIALS BEFORE SUBMITTING TO THE ENGINEER FOR REVIEW. SHOP DRAWINGS SHALL INCLUDE THE FOLLOWING: SECTION PROFILES, SIZES, CONNECTION ATTACHMENTS, REINFORCING, ANCHORAGE, SIZE AND TYPE OF FASTENERS AND ACCESSORIES. INCLUDE ERECTION DRAWINGS, ELEVATIONS AND DETAILS.
3. STRUCTURAL STEEL SHALL BE DETAILED, FABRICATED AND ERECTED IN ACCORDANCE WITH THE LATEST PROVISIONS OF AISC MANUAL OF STEEL CONSTRUCTION.
4. PROVIDE ALL PLATES, CLIP ANGLES, CLOSURE PIECES, STRAP ANCHORS, MISCELLANEOUS PIECES AND HOLES REQUIRED TO COMPLETE THE STRUCTURE.
5. FIT AND SHOP ASSEMBLE FABRICATIONS IN THE LARGEST PRACTICAL SECTIONS FOR DELIVERY TO SITE.
6. INSTALL FABRICATIONS PLUMB AND LEVEL, ACCURATELY FITTED, AND FREE FROM DISTORTIONS OR DEFECTS.
7. AFTER ERECTION OF STRUCTURES, TOUCHUP ALL WELDS, ABRASIONS AND NON-GALVANIZED SURFACES WITH A 95% ORGANIC ZINC RICH PAINT IN ACCORDANCE WITH ASTM 780.
8. ALL STEEL MATERIAL (EXPOSED TO WEATHER) SHALL BE GALVANIZED AFTER FABRICATION IN ACCORDANCE WITH ASTM A123 "ZINC (HOT DIPPED GALVANIZED) COATINGS" ON IRONS AND STEEL PRODUCTS.
9. ALL BOLTS, ANCHORS AND MISCELLANEOUS HARDWARE SHALL BE GALVANIZED IN ACCORDANCE WITH ASTM A153 "ZINC COATING (HOT-DIP) ON IRON AND STEEL HARDWARE".
10. THE ENGINEER SHALL BE NOTIFIED OF ANY INCORRECTLY FABRICATED, DAMAGED OR OTHERWISE MISFITTING OR NON CONFORMING MATERIALS OR CONDITIONS TO REMEDIAL OR CORRECTIVE ACTION. ANY SUCH ACTION SHALL REQUIRE ENGINEER REVIEW.
11. CONNECTION ANGLES SHALL HAVE A MINIMUM THICKNESS OF 1/4 INCHES.
12. STRUCTURAL CONNECTION BOLTS SHALL CONFORM TO ASTM A325. ALL BOLTS SHALL BE 3/4" DIAMETER MINIMUM AND SHALL HAVE A MINIMUM OF TWO BOLTS, UNLESS OTHERWISE ON THE DRAWINGS.
13. LOCK WASHER ARE NOT PERMITTED FOR A325 STEEL ASSEMBLIES.
14. SHOP CONNECTIONS SHALL BE WELDED OR HIGH STRENGTH BOLTED.
15. MILL BEARING ENDS OF COLUMNS, STIFFENERS, AND OTHER BEARING SURFACES TO TRANSFER LOAD OVER ENTIRE CROSS SECTION.
16. FABRICATE BEAMS WITH MILL CAMBER UP.
17. LEVEL AND PLUMB INDIVIDUAL MEMBERS OF THE STRUCTURE TO AN ACCURACY OF 1:500, BUT NOT TO EXCEED 1/4" IN THE FULL HEIGHT OF THE COLUMN.
18. COMMENCEMENT OF STRUCTURAL STEEL WORK WITHOUT NOTIFYING THE ENGINEER OF ANY DISCREPANCIES WILL BE CONSIDERED ACCEPTANCE OF PRECEDING WORK.
19. INSPECTION AND TESTING OF ALL WELDING AND HIGH STRENGTH BOLTING SHALL BE PERFORMED BY AN INDEPENDENT TESTING LABORATORY.
20. FOUR COPIES OF ALL INSPECTION TEST REPORTS SHALL BE SUBMITTED TO THE ENGINEER WITHIN TEN (10) WORKING DAYS OF THE DATE OF INSPECTION.

REV.	DATE	DRAWN BY	CHK'D BY	DESCRIPTION
0	3/25/19	TJL	CAG	ISSUED FOR CONSTRUCITON

PROFESSIONAL ENGINEER SEAL

Sprint

CENTEK engineering
Centered on Solutions
(203) 488-0580
(203) 488-8587 Fax
63-2 North Branford Road
Branford, CT 06405
www.CentekEng.com

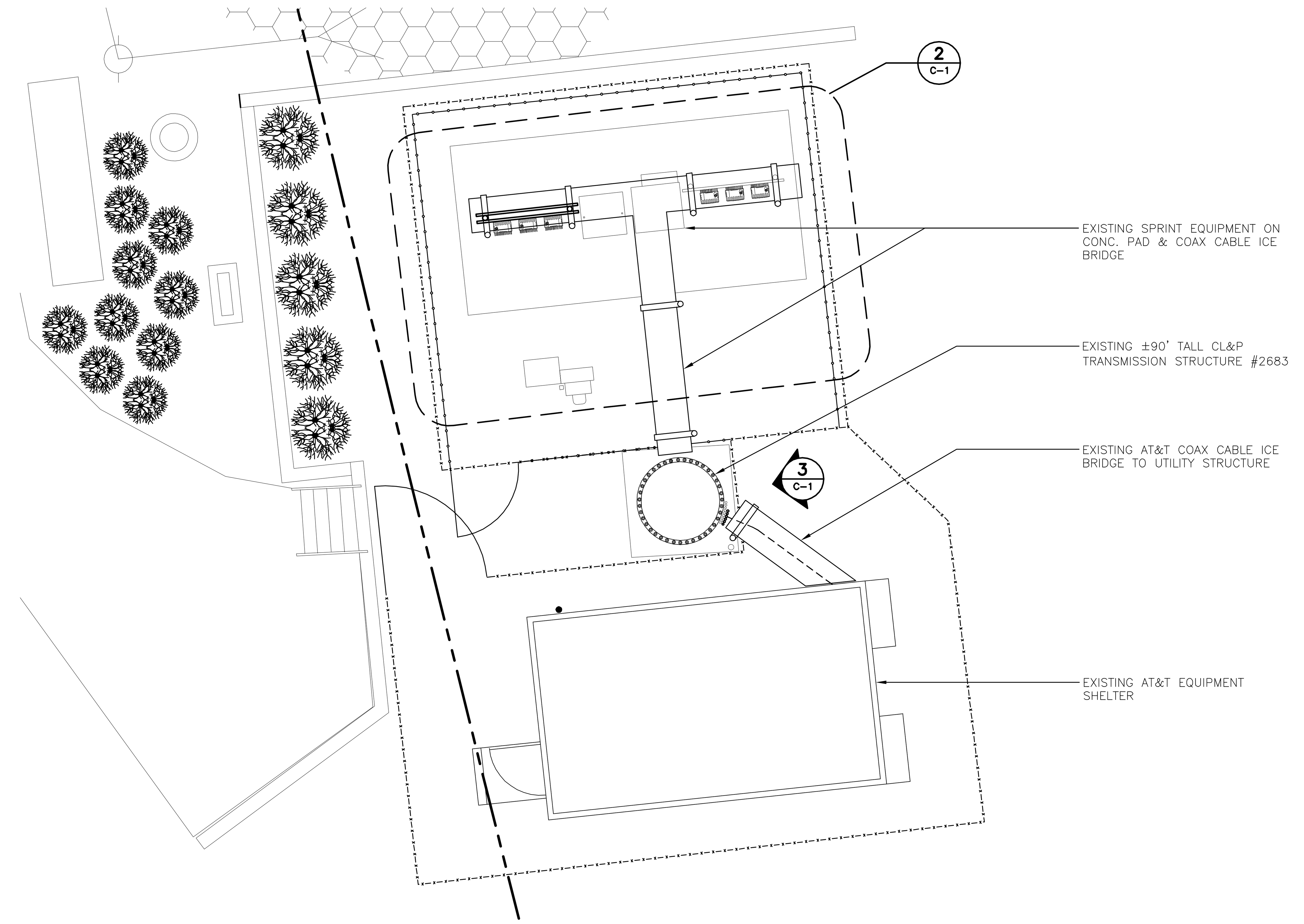
SPRINT
WIRELESS COMMUNICATIONS FACILITY
EVERSOURCE STRUCT.: 2683
SITE ID: CT54CX713
761 FEDERAL ROAD
BROOKFIELD, CT 06804

DATE: 01/11/18
SCALE: AS NOTED
JOB NO. 17159.18

DESIGN BASIS AND SITE NOTES

N-1

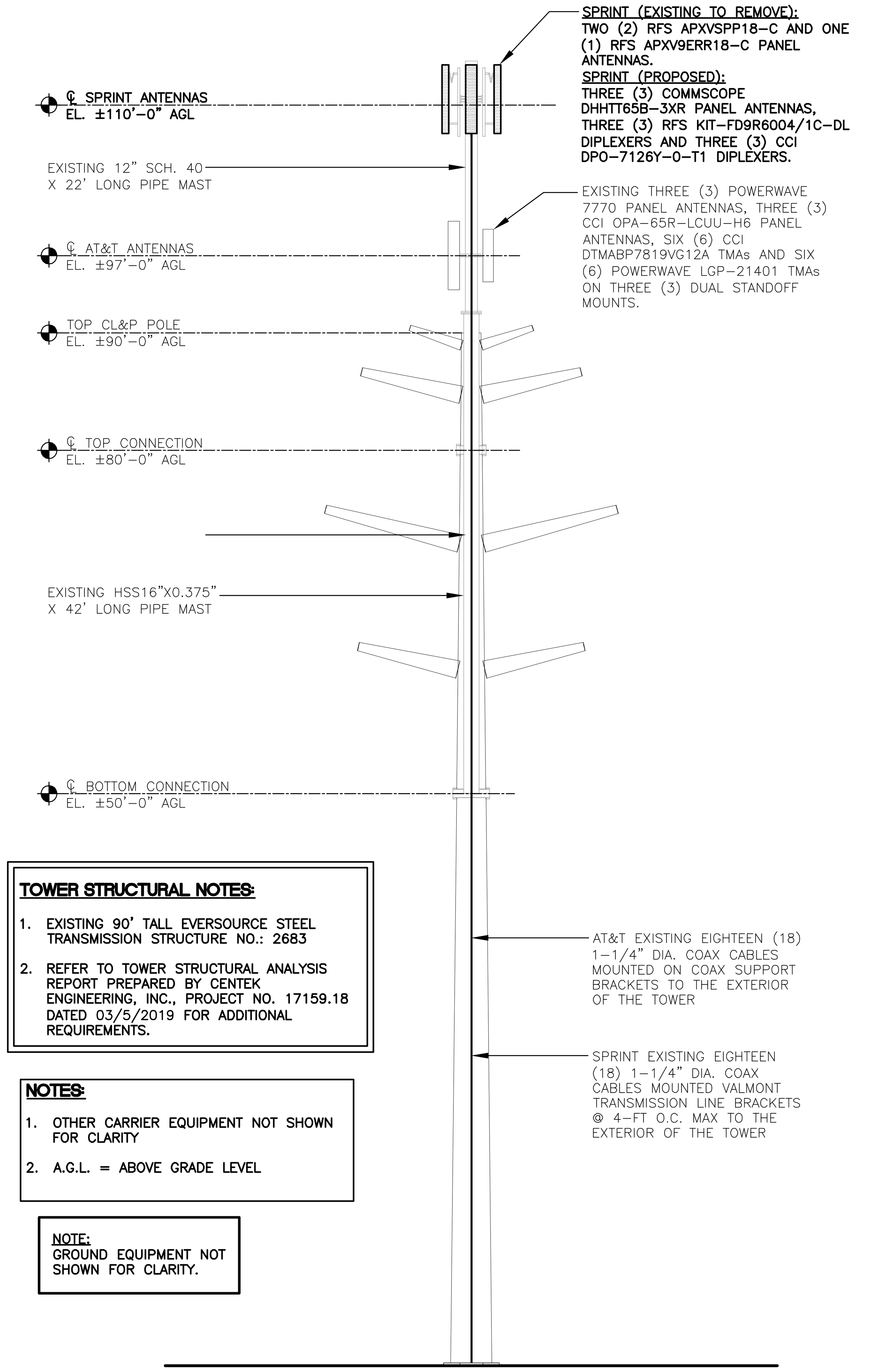
Sheet No. 2 of 5



1 C-1 COMPOUND PLAN

SCALE: 1" = 5'

TRUE NORTH



TOWER STRUCTURAL NOTES:

1. EXISTING 90' TALL EVERSOURCE STEEL TRANSMISSION STRUCTURE NO.: 2683
2. REFER TO TOWER STRUCTURAL ANALYSIS REPORT PREPARED BY CENTEK ENGINEERING, INC., PROJECT NO. 17159.18 DATED 03/5/2019 FOR ADDITIONAL REQUIREMENTS.

NOTES:

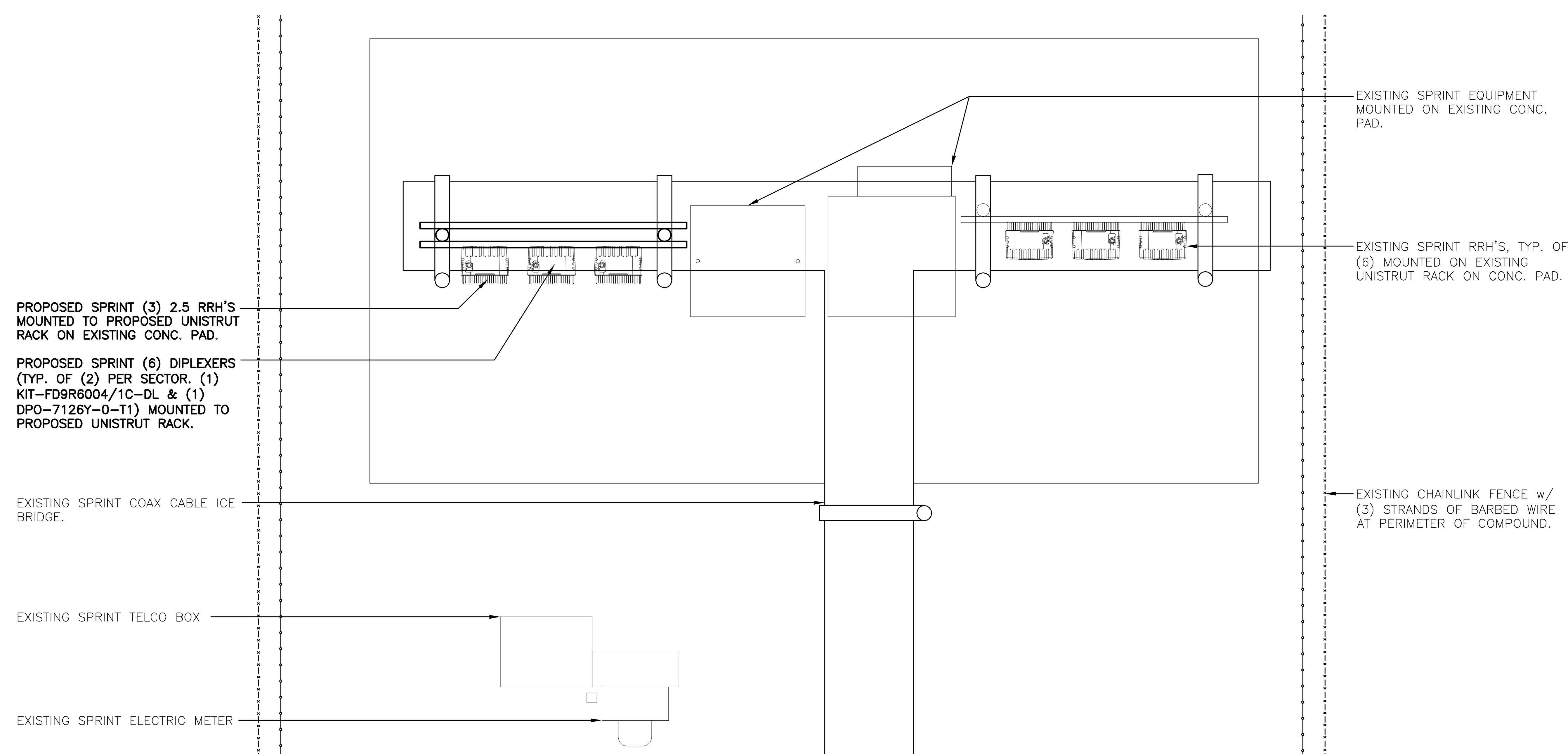
1. OTHER CARRIER EQUIPMENT NOT SHOWN FOR CLARITY
2. A.G.L. = ABOVE GRADE LEVEL

NOTE:
GROUND EQUIPMENT NOT SHOWN FOR CLARITY.

3 C-1 TOWER ELEVATION

SCALE: 1/8" = 1'

GRAPHIC SCALE
(IN FEET)
1 inch = 8 ft.



2 C-1 EQUIPMENT PLAN

SCALE: 1/2" = 1'

TRUE NORTH

REV.	DATE	DRAWN BY	CHK'D BY	DESCRIPTION
0	3/25/19	TJL	CAG	ISSUED FOR CONSTRUCTION

PROFESSIONAL ENGINEER SEAL

Sprint

CENTEK engineering
Centered on Solutions
(203) 488-0580
(203) 488-8587 Fax
63-2 North Branford Road
Branford, CT 06405
www.CentekEng.com

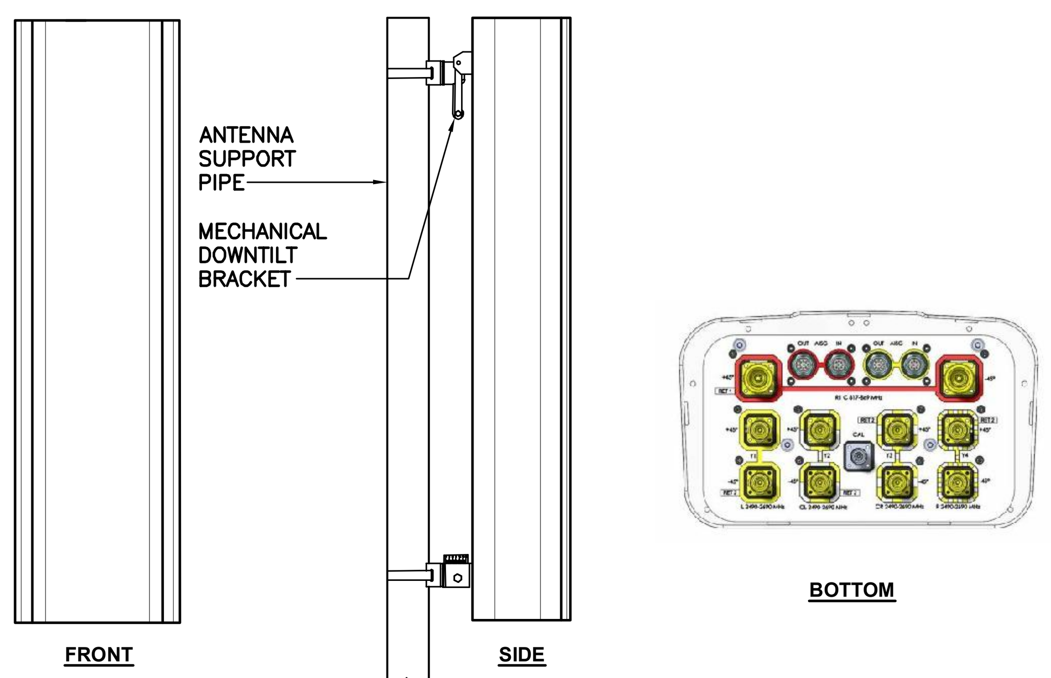
SPRINT
WIRELESS COMMUNICATIONS FACILITY
EVERSOURCE STRUCT.: 2683
SITE ID: CT54CX713
761 FEDERAL ROAD
BROOKFIELD, CT 06804

DATE: 01/11/18
SCALE: AS NOTED
JOB NO. 17159.18

COMPOUND PLANS
ELEVATION
AND ANTENNA
CONFIGURATION

C-1

Sheet No. 3 of 5



ALPHA/BETA/GAMMA ANTENNA		
EQUIPMENT	DIMENSIONS	WEIGHT
MAKE: COMMSCOPE MODEL: DHHT65B–3XR	71.9"L x 13.8"W x 8.2"D	58 LBS.

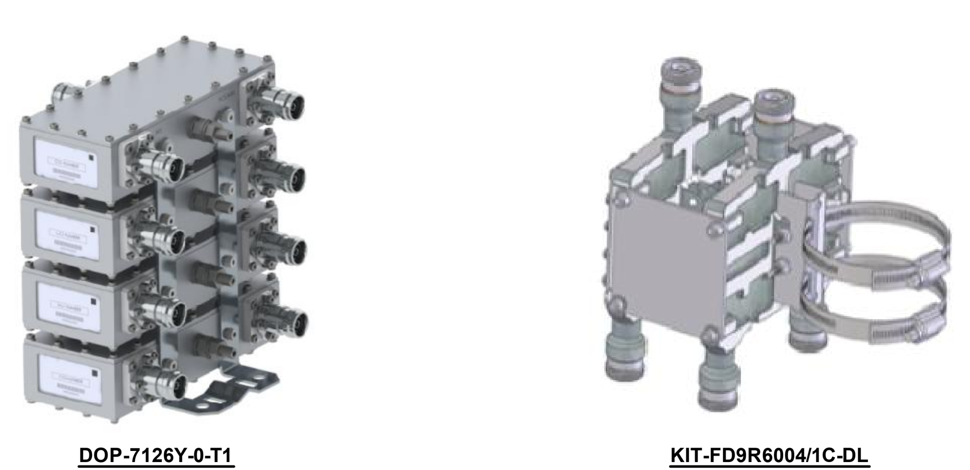
1 C–2 **PROPOSED ANTENNA DETAIL**
SCALE: 1/2" = 1'–0"

TD-RRH8x20-25

RRU (REMOTE RADIO UNIT)			
EQUIPMENT	DIMENSIONS	WEIGHT	CLEARANCES
MAKE: ALCATEL–LUCENT MODEL: TD–RRH8x20–25	25.3"L x 17.5"W x 5.7"D	66 LBS.	ABOVE: 16" MIN. BELOW: 12" MIN. FRONT: 36" MIN.

NOTES:
1. CONTRACTOR TO COORDINATE FINAL EQUIPMENT MODEL SELECTION WITH SPRINT CONSTRUCTION MANAGER PRIOR TO ORDERING.

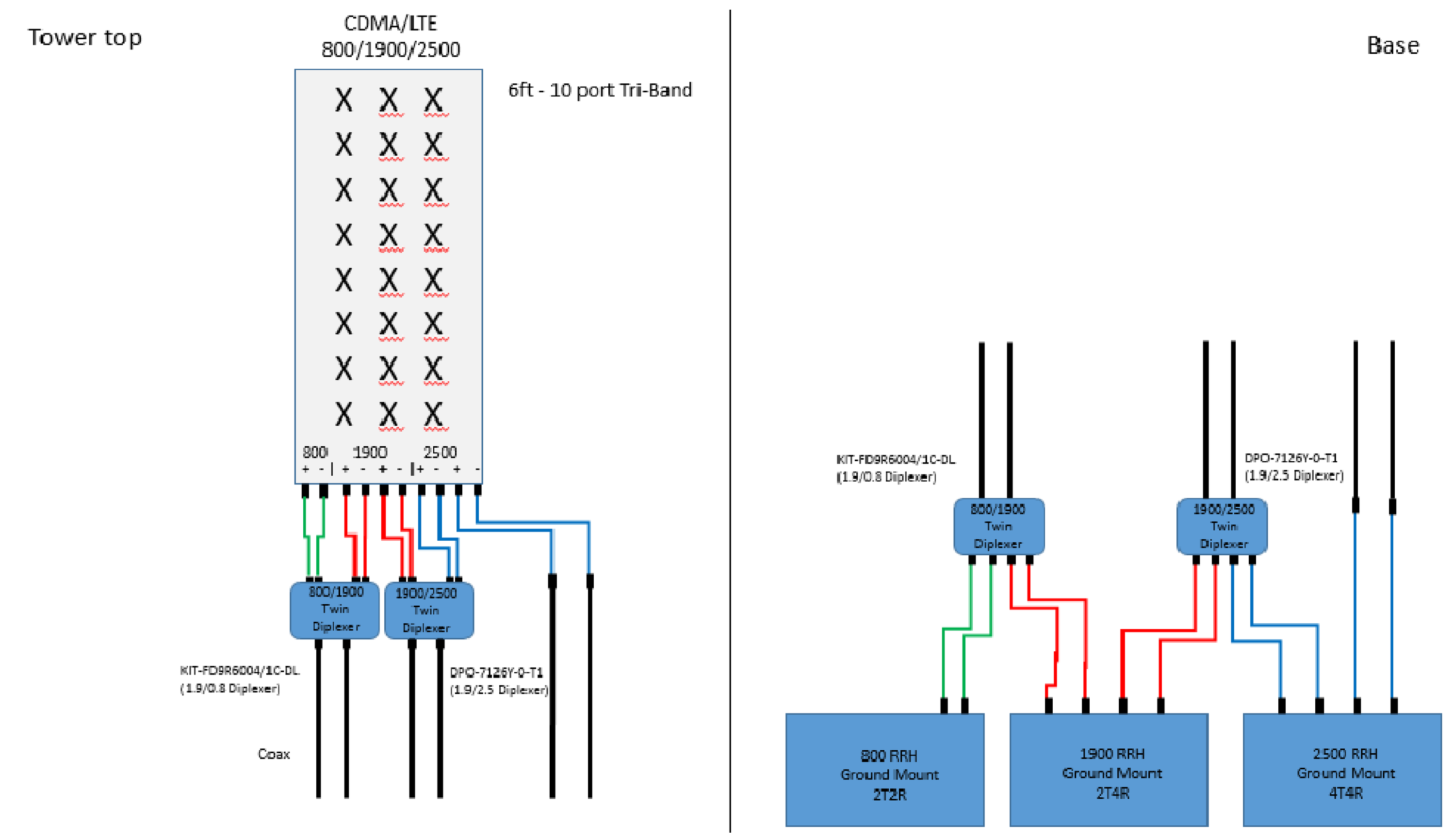
2 C–2 **REMOTE RADIO HEAD DETAIL**
SCALE: NOT TO SCALE



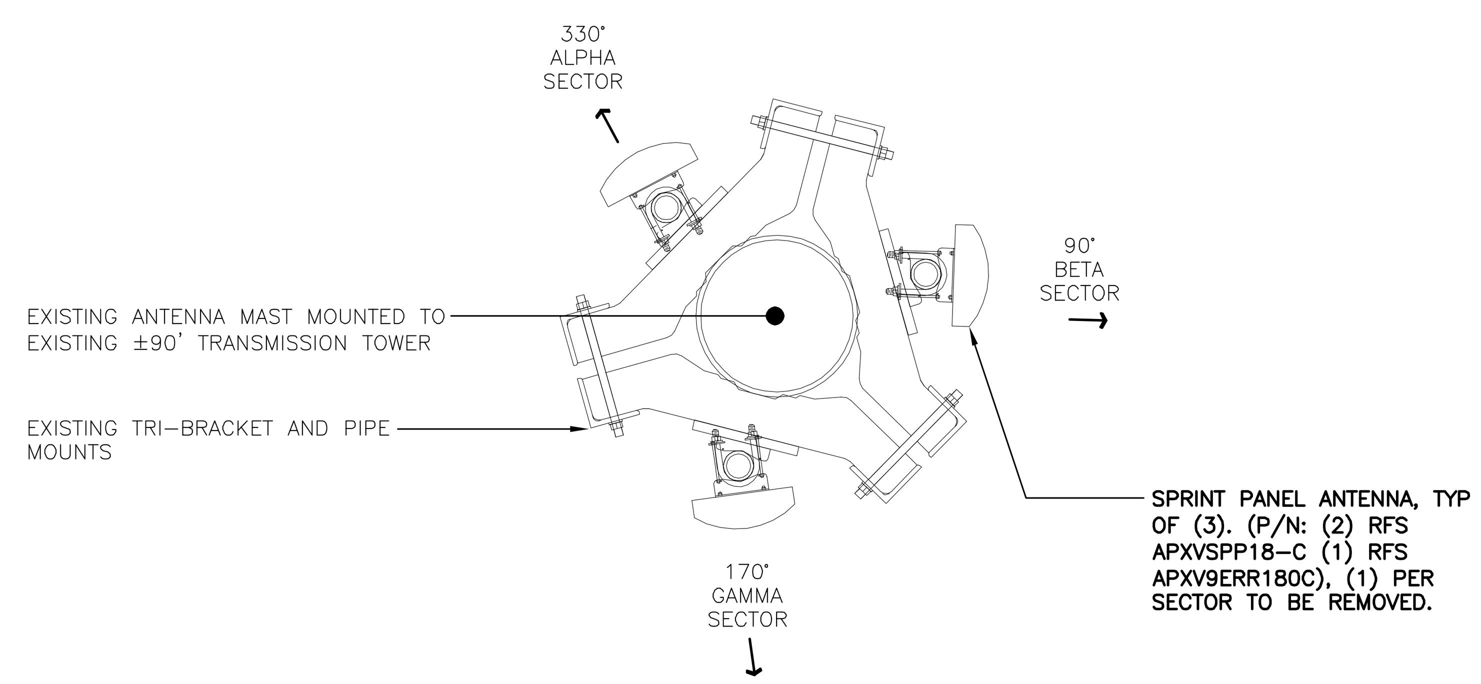
DIPLEXERS		
EQUIPMENT	DIMENSIONS	WEIGHT
MAKE: RFS MODEL: KIT–FD9R6004/1C–DL	5.8"L x 6.5"W x 4.6"D	6.4 LBS.
MAKE: CCI MODEL: DPO–7126Y–0–T1	6.26"L x 7.42"W x 4.07"D	7.3 LBS.

NOTES:
1. CONTRACTOR TO COORDINATE FINAL EQUIPMENT MODEL SELECTION WITH SPRINT CONSTRUCTION MANAGER PRIOR TO ORDERING.

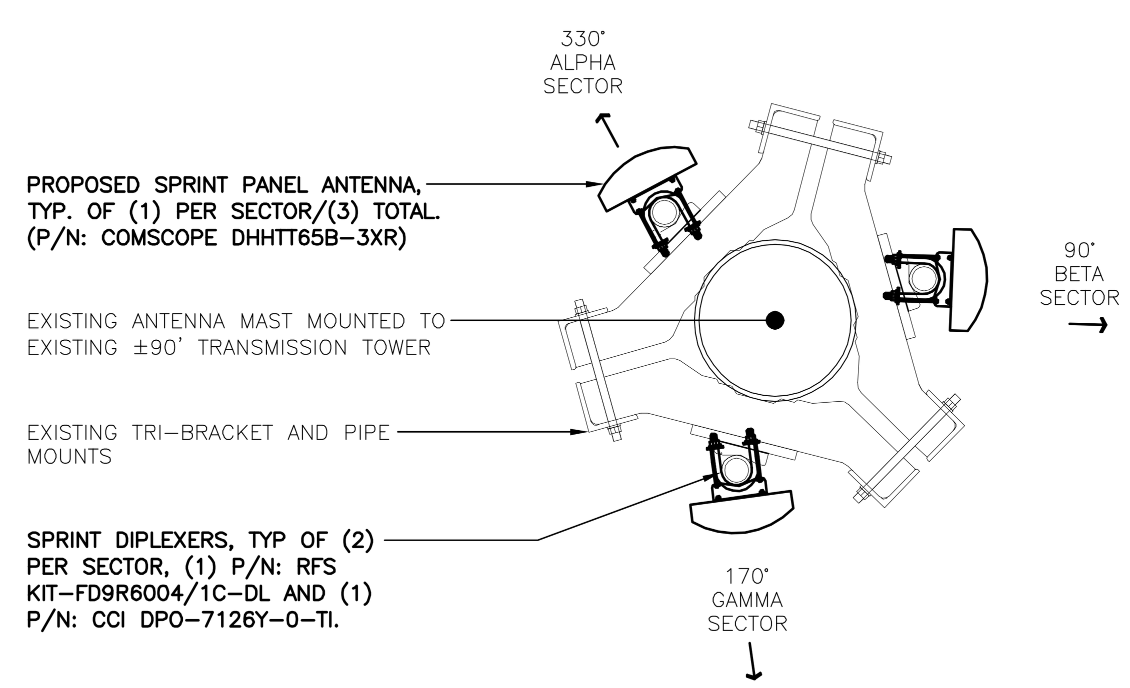
3 C–2 **DIPLEXER DETAIL**
SCALE: NOT TO SCALE



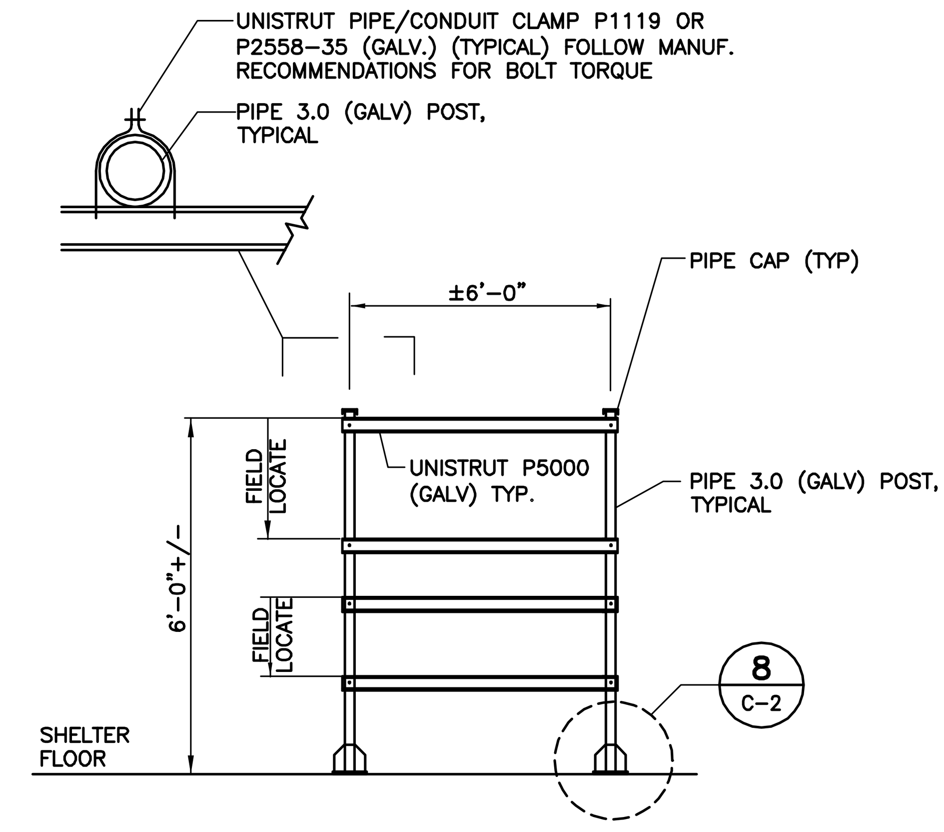
4 C–2 **PLUMBING DIAGRAM**
NOT TO SCALE



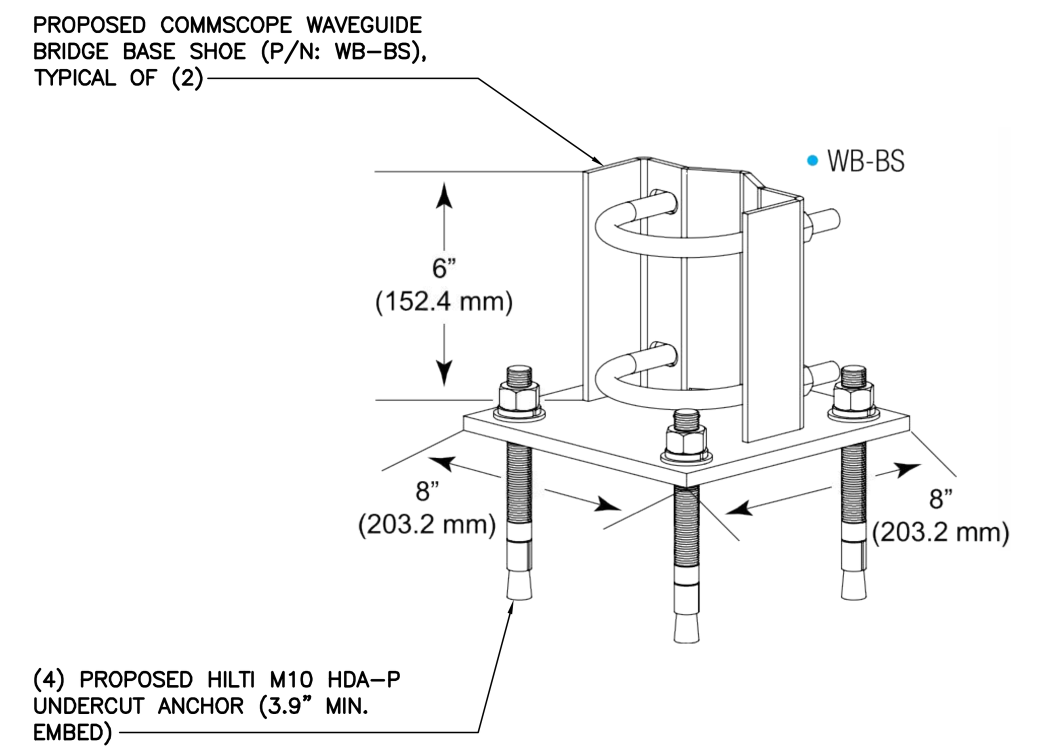
5 C–2 **EXISTING ANTENNA PLAN**
SCALE: = 1/4" = 1'



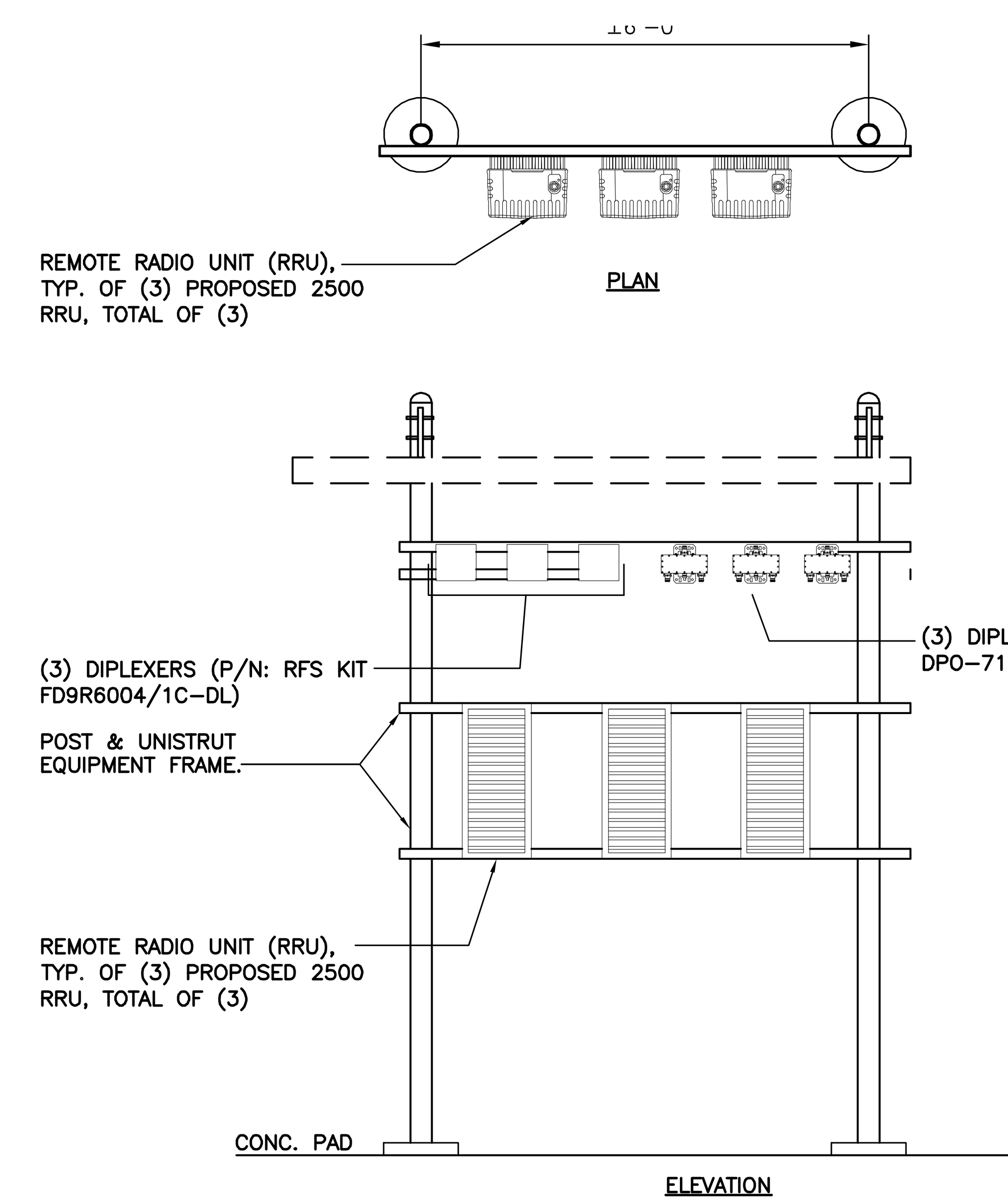
6 C–2 **PROPOSED ANTENNA PLAN**
SCALE: = 1/4" = 1'



7 C–2 **PROPOSED EQUIPMENT MOUNTING FRAME DETAIL**
SCALE: NOT TO SCALE



8 C–2 **EQUIPMENT FRAME POST ATTACHMENT DETAIL**
SCALE: NOT TO SCALE



9 C–2 **RRU MOUNTING CONFIG.**
SCALE: 1/2" = 1'– 0"

REV.	DATE	DRAWN BY	CHK'D BY	DESCRIPTION
0	3/25/19	TJL	CAG	ISSUED FOR CONSTRUCTION

PROFESSIONAL ENGINEER SEAL

Sprint

CENTEK engineering
Centered on Solutions™
(203) 488-0580
(203) 488-8587 Fax
63-2 North Branford Road
Branford, CT 06405
www.CentekEng.com

SPRINT
WIRELESS COMMUNICATIONS FACILITY
EVERSOURCE STRUCT.: 2683
SITE ID: CT54CX713
761 FEDERAL ROAD
BROOKFIELD, CT 06804

DATE: 01/11/18
SCALE: AS NOTED
JOB NO. 17159.18

TYPICAL DETAILS

C–2

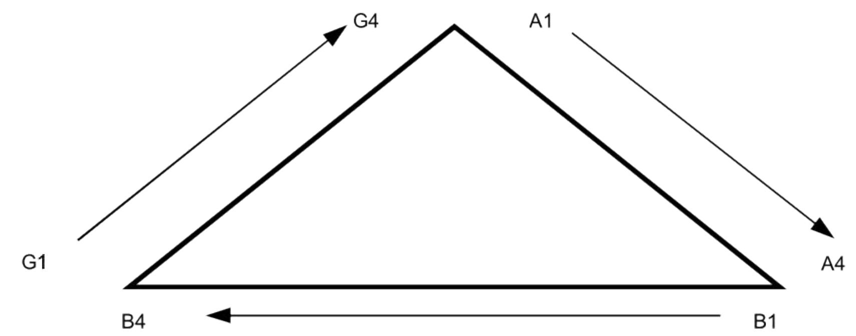
Sheet No. 4 of 5

NV CABLES				
BAND	INDICATOR		PORT	COLOR
800-1	YEL	GRN	NV-1	GRN
1900-1	YEL	RED	NV-2	BLU
1900-2	YEL	BRN	NV-3	BRN
1900-3	YEL	BLU	NV-4	WHT
1900-4	YEL	SLT	NV-5	RED
800-2	YEL	ORG	NV-6	SLT
SPARE	YEL	WHT	NV-7	PPL
2500	YEL	PPL	NV-8	ORG

HYBRID	
HYBRID	COLOR
1	GRN
2	BLU
3	BRN
4	WHT
5	RED
6	SLT
7	PPL
8	ORG

2.5 Band		
2500 Radio 1		COLOR
YEL	WHT	GRN
YEL	WHT	BLU
YEL	WHT	BRN
YEL	WHT	WHT
YEL	WHT	RED
YEL	WHT	SLT
YEL	WHT	PPL
YEL	WHT	ORG

Figure 1: Antenna Orientation



NOTES

1. *All cables shall be marked at the top and bottom with 2" colored tape, stencil tag colored tape, or colored heat shrink tubing*
2. *Colored tape may be obtained from Graybar Electronic. UV stabilized tape or heat shrink are preferred.*
3. *The first ring shall be closest to the end of the cable, and there shall be a 1" space between each ring.*
4. *The cable color code shall be applied in accordance to Table 19-1.*
   A. Table 19-1 only shows 3 sectors, but additional sectors are easily supported by adding the appropriate number of colored rings to the cable color code.
5. *After the cable color code is applied, the frequency color code, Table 19-2, must be applied for the specific frequency band in use on a*
   A.2" gap shall separate the cable color code from the frequency color code.
   B. The 2" color rings for the frequency code shall be placed next to each other with no spaces.
6. *Wrap 2" colored tape a minimum of 3 times around the coax, and keep the tape in the same area as much as possible. This will allow remova*
7. *Examples of the cable and frequency color codes are shown in Figure 19-1 and Figure 19-2.*

FIGURE 19.1 CABLE COLOR CODE

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

FIGURE 19.2 COLOR CODE

FREQUENC	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

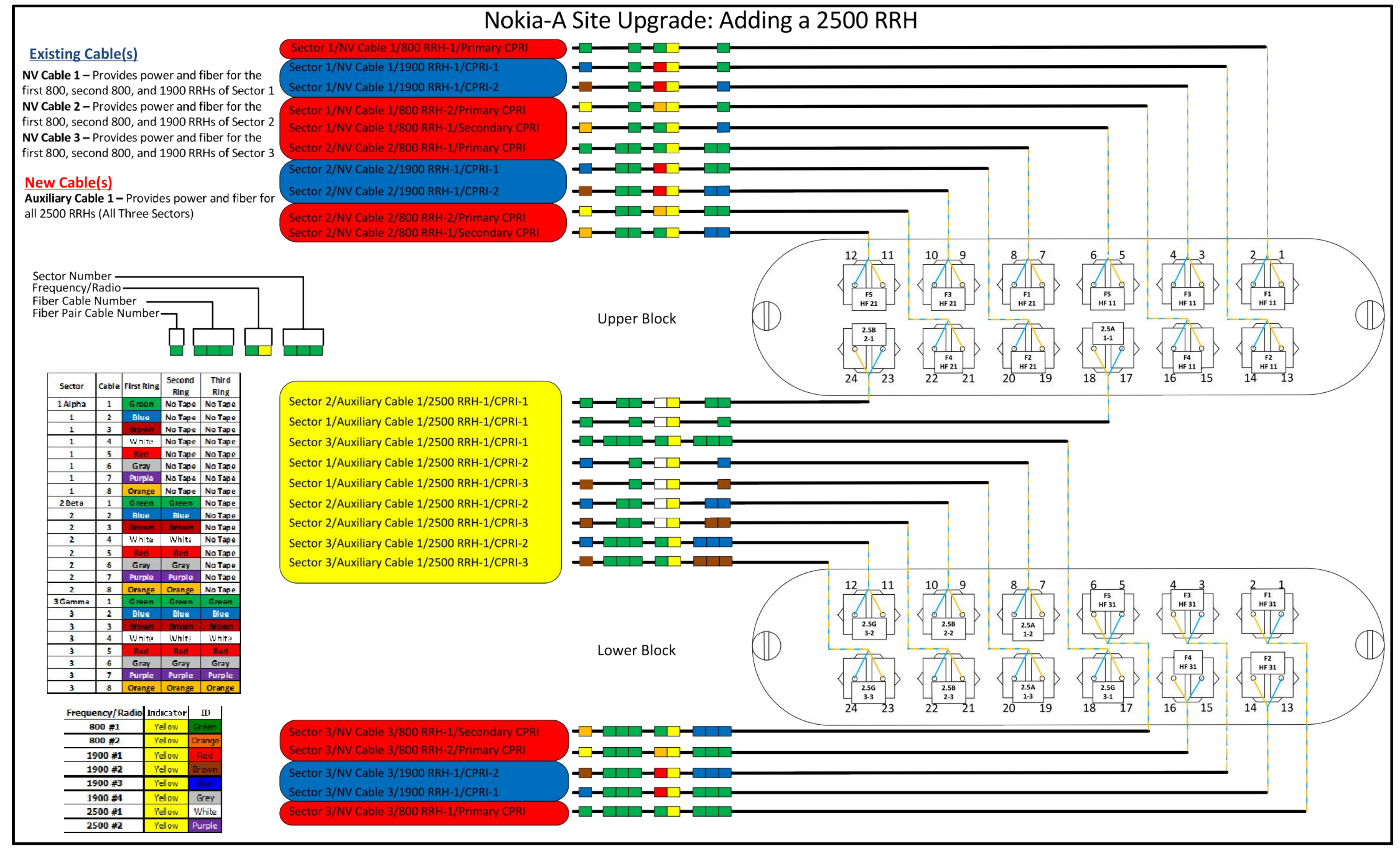
FREQUE	INDICATOR		ID
2500 -1	YEL	WHT	GRN
2500 -2	YEL	WHT	RED
2500 -3	YEL	WHT	BRN
2500 -4	YEL	WHT	BLU
2500 -5	YEL	WHT	SLT
2500 -6	YEL	WHT	ORG
2500 -7	YEL	WHT	WHT
2500 -8	YEL	WHT	PPL

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

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

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

1 / C-3 **COLOR CODE DIAGRAM**
NOT TO SCALE



2 / C-3 **CPRI DIAGRAM**
NOT TO SCALE

REV.	DATE	DRAWN BY	CHK'D BY	DESCRIPTION
0	3/25/19	TJL	CAG	ISSUED FOR CONSTRUCTION

PROFESSIONAL ENGINEER SEAL

Sprint

CENTEK engineering
Centered on Solutions℠
(203) 488-0580
(203) 488-8587 Fax
63-2 North Branford Road
Branford, CT 06405
www.CentekEng.com

SPRINT
WIRELESS COMMUNICATIONS FACILITY
EVERSOURCE STRUCT.: 2683
SITE ID: CT54CX713
761 FEDERAL ROAD
BROOKFIELD, CT 06804

DATE: 01/11/18
SCALE: AS NOTED
JOB NO. 17159.18

COLOR CODE AND CPRI DETAILS

C-3

Sheet No. 5 of 5

CENTEK engineering

Centered on Solutions℠

Structural Analysis of Antenna Mast and Tower

Sprint Site Ref: CT54XC713

Eversource Structure No. 2683
90' Electric Transmission Pole

761 Federal Road
Brookfield, CT

CENTEK Project No. 17159.18

~~Date: January 15, 2018~~
Rev 5: March 5, 2019

STATE OF CONNECTICUT
TIMOTHY J. LYNN
No. 29336
LICENSED
PROFESSIONAL ENGINEER

Prepared for:
Transcend Wireless
10 Industrial Ave, Suite 3
Mahwah, NJ 07430

Table of Contents

Introduction

The purpose of this report is to analyze the existing mast and 90' utility pole located at 761 Federal Road in Brookfield, CT for the proposed antenna and equipment upgrade by Sprint.

The existing/proposed loads consist of the following:

- AT&T (Existing):

  Antennas: Three (3) Powerwave 7770 panel antennas, three (3) CCI OPA-65R-LCUU-H6 panel antennas, six (6) CCI DTMABP7819VG12A TMAs and six (6) Powerwave LGP-21401 TMAs mounted on dual standoff mounts to the existing mast with a RAD center elevation of 97-ft above grade level.
  Coax Cables: Eighteen (18) 1-1/4" ∅ coax cables running on the exterior of the pole.

- SPRINT (Existing to Remain):
  Coax Cables: Eighteen (18) 1-1/4" ∅ coax cables running on the exterior of the pole and antenna mast.

- SPRINT (Existing to Remove):

  Antennas: Two (2) RFS APXVSPP18-C and one (1) RFS APXV9ERR18-C panel antennas panel antennas flush mounted on the existing mast with a RAD center elevation of 110-ft above grade level.

- **SPRINT (Proposed):**
  Antennas: Three (3) Commscope DHHTT65B-3XR panel antennas, three (3) RFS KIT-FD9R6004/1C-DL Diplexers and three (3) CCI DPO-7126Y-0-T1 Diplexers flush mounted to the existing mast with a RAD center elevation of 110-ft above grade level.

Primary assumptions used in the analysis

- Design steel stresses are defined by AISC-LRFD 14th edition for design of the antenna Mast and antenna supporting elements.
- ASCE Manual No. 48-11, "Design of Steel Transmission Pole Structures", defines allowable steel stresses for evaluation of the utility pole.
- All utility pole members are adequately protected to prevent corrosion of steel members.
- All proposed antenna mounts are modeled as listed above.
- Pipe mast will be properly installed and maintained.
- No residual stresses exist due to incorrect pole erection.
- All bolts are appropriately tightened providing the necessary connection continuity.
- All welds conform to the requirements of AWS D1.1.
- Pipe mast and utility pole will be in plumb condition.
- Utility pole was properly installed and maintained and all members were properly designed, detailed, fabricated, and installed and have been properly maintained since erection.
- Any deviation from the analyzed loading will require a new analysis for verification of structural adequacy.

Analysis

Structural analysis of the existing antenna mast was independently completed using the current version of RISA-3D computer program licensed to CENTEK Engineering, Inc.

The existing mast consisting of a 12” Sch. 40 x 22’ long pipe conforming to ASTM A53 Grade B (Fy = 35ksi) flange connected to a HSS16”x0.375” x 42’ long pipe conforming to ASTM A500 Grade B (Fy = 42ksi) connected at two points to the existing pole was analyzed for its ability to resist loads prescribed by the TIA standard. Section 5 of this report details these gravity and lateral wind loads. NESC prescribed loads were also applied to the mast in order to obtain reactions needed for analyzing the utility pole structure. These loads are developed in Section 7 of this report. Load cases and combinations used in RISA-3D for TIA/EIA loading and for NESC/NU loading are listed in report Sections 6 and 8, respectively.

An envelope solution was first made to determine maximum and minimum forces, stresses, and deflections to confirm the selected section as adequate. Additional analyses were then made to determine the NESC forces to be applied to the pole structure.

The RISA-3D program contains a library of all AISC shapes and corresponding section properties are computed and applied directly within the program. The program’s Steel Code Check option was also utilized. The forces calculated in RISA-3D using NESC guidelines were then applied to the pole using PLS-Pole. Maximum usage for the pole was calculated considering the additional forces from the mast and associated appurtenances.

Design Basis

Our analysis was performed in accordance with TIA/EIA-222-F-1996, ASCE Manual No. 72 – “Design of Steel Transmission Pole Structures Second Edition”, NESC C2-2007 and Northeast Utilities Design Criteria.

- UTILITY POLE ANALYSIS

  The purpose of this analysis is to determine the adequacy of the existing utility pole to support the proposed antenna loads. The loading and design requirements were analyzed in accordance with the NU Design Criteria Table, NESC C2-2007 ~ Construction Grade B, and ASCE Manual No. 72.

  Load cases considered:

  Load Case 1: NESC Heavy
  Wind Pressure.…………………………….. 4.0 psf
  Radial Ice Thickness………………………. 0.5”
  Vertical Overload Capacity Factor…………. 1.50
  Wind Overload Capacity Factor……………. 2.50
  Wire Tension Overload Capacity Factor…… 1.65

  Load Case 2: NESC Extreme
  Wind Speed.………………………………. 100 mph (1)
  Radial Ice Thickness………………………. 0”

  Note 1: NESC C2-2007, Section25, Rule 250C: Extreme Wind Loading, 1.25 x Gust Response Factor (wind speed: 3-second gust)

- MAST ASSEMBLY ANALYSIS

  Mast, appurtenances and connections to the utility tower were analyzed and designed in accordance with the NU Design Criteria Table, TIA-222-G and AISC standards.

  Load cases considered:

  Load Case 1:
  Wind Speed……………………………….... 93 mph (2016 CSBC Appendix-N)
  Radial Ice Thickness………………………. 0”

  Load Case 2:
  Wind Pressure..……………………………. 50 mph wind pressure
  Radial Ice Thickness……………………….. 0.75”

Results

- MAST ASSEMBLY

  The existing mast was determined to be structurally **adequate**.

Member	Stress Ratio (% of capacity)	Result
12” Sch. 40 pipe x 22-ft long	54.5%	**PASS**
HSS 16”x0.375” pipe x 42-ft long	63.1%	**PASS**
5/8” ∅ ASTM A325 Bolt	33.2%	**PASS**

- UTILITY POLE

  This analysis finds that the subject utility pole is adequate to support the proposed antenna mast and related appurtenances. The pole stresses meet the requirements set forth by the ASCE Manual No. 48-11, “Design of Steel Transmission Pole Structures”, for the applied NESC Heavy and Hi-Wind load cases. The detailed analysis results are provided in Section 6 of this report. The analysis results are summarized as follows:

  A maximum usage of **70.06%** occurs in the utility pole under the **NESC Heavy** loading condition.

  POLE SECTION:

  The utility pole was found to be within allowable limits.

Tower Section	Elevation	Stress Ratio (% of capacity)	Result
Tube Number 3	0’-20.67’ (AGL)	70.06%	**PASS**

  BASE PLATE:

  The base plate was found to be within allowable limits from the PLS output based on 10 bend lines.

Tower Component	Design Limit	Stress Ratio (percentage of capacity)	Result
Base Plate	Bending	58.03%	**PASS**

- FOUNDATION AND ANCHORS

  The existing foundation consists of a 10-ft square x 9-ft long reinforced concrete pier with (16) rock anchors. The base of the tower is connected to the foundation by means of (12) 2.25"∅, ASTM A615-75 anchor bolts embedded approximately 8-ft into the concrete foundation structure. Foundation information was obtained from NUSCO drawing # 01039-60001.

  <u>BASE REACTIONS:</u>

  From PLS-Pole analysis of pole based on NESC/NU prescribed loads.

Load Case	Shear	Axial	Moment
NESC Heavy Wind	23.47 kips	54.57 kips	1774.05 ft-kips
NESC Extreme Wind	26.29 kips	28.85 kips	1889.41 ft-kips

Note 1 – 10% increase applied to tower base reactions per OTRM 051

<u>ANCHOR BOLTS:</u>

The anchor bolts were found to be within allowable limits.

Tower Component	Design Limit	Stress Ratio (% of capacity)	Result
Anchor Bolts	Tension	35.72%	**PASS**

<u>FOUNDATION:</u>

The foundation was found to be within allowable limits.

Foundation	Design Limit	Allowable Load (1)	Proposed Loading (2)	Result
Reinf. Conc. Pier w/ Rock Anchors	OTM(3)	2973.5 ft-kips	2078.35 ft-kips	**PASS**

Note 1: Allowable Load taken from NUSCO drawing no. 01039-50002.
Note 2: 10% increase to PLS base reactions used in foundation analysis per OTRM 051.
Note 3: OTM denotes Overturning Moment

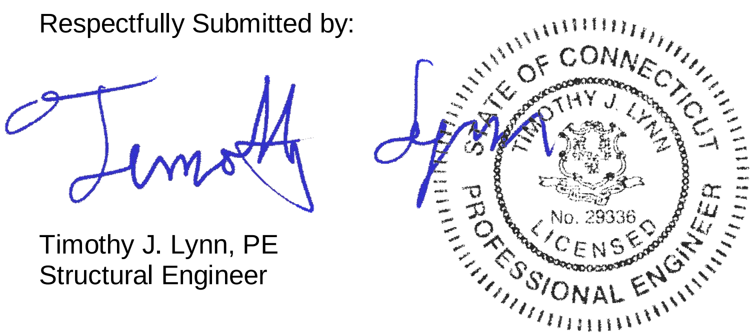
<u>Conclusion</u>

This analysis shows that the subject utility pole **<u>is adequate</u>** to support the proposed equipment upgrade.

The analysis is based, in part on the information provided to this office by Eversource and Sprint. If the existing conditions are different than the information in this report, CENTEK engineering, Inc. must be contacted for resolution of any potential issues.

Please feel free to call with any questions or comments.

Respectfully Submitted by:



Timothy J. Lynn, PE
Structural Engineer

STANDARD CONDITIONS FOR FURNISHING OF PROFESSIONAL ENGINEERING SERVICES ON EXISTING STRUCTURES

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

- Information supplied by the client regarding the structure itself, its foundations, the soil conditions, the antenna and feed line loading on the structure and its components, or other relevant information.

- Information from the field and/or drawings in the possession of CENTEK engineering, 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 CENTEK engineering, Inc. and used in the performance of our engineering services is correct and complete. In the absence of information to the contrary, we assume that all structures were constructed in accordance with the drawings and specifications and are in an un-corroded condition and have not deteriorated. It is therefore assumed that its capacity has not significantly changed from the “as new” condition.

- All services will be performed to the codes specified by the client, and we do not imply to meet any other codes or requirements unless explicitly agreed in writing. If wind and ice loads or other relevant parameters are to be different from the minimum values recommended by the codes, the client shall specify the exact requirement. In the absence of information to the contrary, all work will be performed in accordance with the latest revision of ANSI/ASCE10 & ANSI/EIA-222.

- All services are performed, results obtained, and recommendations made in accordance with generally accepted engineering principles and practices. CENTEK engineering, Inc. is not responsible for the conclusions, opinions and recommendations made by others based on the information we supply.

GENERAL DESCRIPTION OF STRUCTURAL ANALYSIS PROGRAM ~ RISA-3D

RISA-3D Structural Analysis Program is an integrated structural analysis and design software package for buildings, bridges, tower structures, etc.

Modeling Features:

- Comprehensive CAD-like graphic drawing/editing capabilities that let you draw, modify and load elements as well as snap, move, rotate, copy, mirror, scale, split, merge, mesh, delete, apply, etc.
- Versatile drawing grids (orthogonal, radial, skewed)
- Universal snaps and object snaps allow drawing without grids
- Versatile general truss generator
- Powerful graphic select/unselect tools including box, line, polygon, invert, criteria, spreadsheet selection, with locking
- Saved selections to quickly recall desired selections
- Modification tools that modify single items or entire selections
- Real spreadsheets with cut, paste, fill, math, sort, find, etc.
- Dynamic synchronization between spreadsheets and views so you can edit or view any data in the plotted views or in the spreadsheets
- Simultaneous view of multiple spreadsheets
- Constant in-stream error checking and data validation
- Unlimited undo/redo capability
- Generation templates for grids, disks, cylinders, cones, arcs, trusses, tanks, hydrostatic loads, etc.
- Support for all units systems & conversions at any time
- Automatic interaction with RISASection libraries
- Import DXF, RISA-2D, STAAD and ProSteel 3D files
- Export DXF, SDNF and ProSteel 3D files

Analysis Features:

- Static analysis and P-Delta effects
- Multiple simultaneous dynamic and response spectra analysis using Gupta, CQC or SRSS mode combinations
- Automatic inclusion of mass offset (5% or user defined) for dynamic analysis
- Physical member modeling that does not require members to be broken up at intermediate joints
- State of the art 3 or 4 node plate/shell elements
- High-end automatic mesh generation — draw a polygon with any number of sides to create a mesh of well-formed quadrilateral (NOT triangular) elements.
- Accurate analysis of tapered wide flanges - web, top and bottom flanges may all taper independently
- Automatic rigid diaphragm modeling
- Area loads with one-way or two-way distributions
- Multiple simultaneous moving loads with standard AASHTO loads and custom moving loads for bridges, cranes, etc.
- Torsional warping calculations for stiffness, stress and design
- Automatic Top of Member offset modeling
- Member end releases & rigid end offsets
- Joint master-slave assignments
- Joints detachable from diaphragms
- Enforced joint displacements
- 1-Way members, for tension only bracing, slipping, etc.

- 1-Way springs, for modeling soils and other effects
- Euler members that take compression up to their buckling load, then turn off.
- Stress calculations on any arbitrary shape
- Inactive members, plates, and diaphragms allows you to quickly remove parts of structures from consideration
- Story drift calculations provide relative drift and ratio to height
- Automatic self-weight calculations for members and plates
- Automatic subgrade soil spring generator

Graphics Features:

- Unlimited simultaneous model view windows
- Extraordinary “true to scale” rendering, even when drawing
- High-speed redraw algorithm for instant refreshing
- Dynamic scrolling stops right where you want
- Plot & print virtually everything with color coding & labeling
- Rotate, zoom, pan, scroll and snap views
- Saved views to quickly restore frequent or desired views
- Full render or wire-frame animations of deflected model and dynamic mode shapes with frame and speed control
- Animation of moving loads with speed control
- High quality customizable graphics printing

Design Features:

- Designs concrete, hot rolled steel, cold formed steel and wood
- ACI 1999/2002, BS 8110-97, CSA A23.3-94, IS456:2000,EC 2-1992 with consistent bar sizes through adjacent spans
- Exact integration of concrete stress distributions using parabolic or rectangular stress blocks
- Concrete beam detailing (Rectangular, T and L)
- Concrete column interaction diagrams
- Steel Design Codes: AISC ASD 9th, LRFD 2nd & 3rd, HSS Specification, CAN/CSA-S16.1-1994 & 2004, BS 5950-1-2000, IS 800-1984, Euro 3-1993 including local shape databases
- AISI 1999 cold formed steel design
- NDS 1991/1997/2001 wood design, including Structural Composite Lumber, multi-ply, full sawn
- Automatic spectra generation for UBC 1997, IBC 2000/2003
- Generation of load combinations: ASCE, UBC, IBC, BOCA, SBC, ACI
- Unbraced lengths for physical members that recognize connecting elements and full lengths of members
- Automatic approximation of K factors
- Tapered wide flange design with either ASD or LRFD codes
- Optimization of member sizes for all materials and all design codes, controlled by standard or user-defined lists of available sizes and criteria such as maximum depths
- Automatic calculation of custom shape properties
- Steel Shapes: AISC, HSS, CAN, ARBED, British, Euro, Indian, Chilean
- Light Gage Shapes: AISI, SSMA, Dale / Incor, Dietrich, Marino\WARE
- Wood Shapes: Complete NDS species/grade database
- Full seamless integration with RISAFoot (Ver 2 or better) for advanced footing design and detailing
- Plate force summation tool

Results Features:

- Graphic presentation of color-coded results and plotted designs
- Color contours of plate stresses and forces with quadratic smoothing, the contours may also be animated
- Spreadsheet results with sorting and filtering of: reactions, member & joint deflections, beam & plate forces/stresses, optimized sizes, code designs, concrete reinforcing, material takeoffs, frequencies and mode shapes
- Standard and user-defined reports
- Graphic member detail reports with force/stress/deflection diagrams and detailed design calculations and expanded diagrams that display magnitudes at any dialed location
- Saved solutions quickly restore analysis and design results.

GENERAL DESCRIPTION OF STRUCTURAL ANALYSIS PROGRAM ~ PLS-TOWER

PLS-TOWER is a Microsoft Windows program for the analysis and design of steel latticed towers used in electric power lines or communication facilities. Both self-supporting and guyed towers can be modeled. The program performs design checks of structures under user specified loads. For electric power structures it can also calculate maximum allowable wind and weight spans and interaction diagrams between different ratios of allowable wind and weight spans.

Modeling Features:

- Powerful graphics module (stress usages shown in different colors)
- Graphical selection of joints and members allows graphical editing and checking
- Towers can be shown as lines, wire frames or can be rendered as 3-d polygon surfaces
- Can extract geometry and connectivity information from a DXF CAD drawing
- CAD design drawings, title blocks, drawing borders or photos can be tied to structure model
- XML based post processor interface
- Steel Detailing Neutral File (SDNF) export to link with detailing packages
- Can link directly to line design program PLS-CADD
- Automatic generation of structure files for PLS-CADD
- Databases of steel angles, rounds, bolts, guys, etc.
- Automatic generation of joints and members by symmetries and interpolations
- Automated mast generation (quickly builds model for towers that have regular repeating sections) via graphical copy/paste
- Steel angles and rounds modeled either as truss, beam or tension-only elements
- Guys are easily handled (can be modeled as exact cable elements)

Analysis Features:

- Automatic handling of tension-only members
- Automatic distribution of loads in 2-part suspension insulators (v-strings, horizontal vees, etc.)
- Automatic calculation of tower dead, ice, and wind loads as well as drag coefficients according to:
    - ASCE 74-1991
    - NESC 2002
    - NESC 2007
    - IEC 60826:2003
    - EN50341-1:2001 (CENELEC)
    - EN50341-3-9:2001 (UK NNA)
    - EN50341-3-17:2001 (Portugal NNA)
    - ESAA C(b)1-2003 (Australia)
    - TPNZ (New Zealand)
    - REE (Spain)
    - EIA/TIA 222-F
    - ANSI/TIA 222-G
    - CSA S37-01
- Automated microwave antenna loading as per EIA/TIA 222-F and ANSI/TIA 222-G
- Minimization of problems caused by unstable joints and mechanisms
- Automatic bandwidth minimization and ability to solve large problems
- Design checks according to (other standards can be added easily):
    - ASCE Standard 10-90

- AS 3995 (Australian Standard 3995)
- BS 8100 (British Standard 8100)
- EN50341-1 (CENELEC, both empirical and analytical methods are available)
- ECCS 1985
- NGT-ECCS
- PN-90/B-03200
- EIA/TIA 222-F
- ANSI/TIA 222-G
- CSA S37-01
- EDF/RTE Resal
- IS 802 (India Standard 802)

Results Features:

- Design summaries printed for each group of members
- Easy to interpret text, spreadsheet and graphics design summaries
- Automatic determination of allowable wind and weight spans
- Automatic determination of interaction diagrams between allowable wind and weight spans
- Capability to batch run multiple tower configurations and consolidate the results
- Automated optimum angle member size selection and bolt quantity determination

Tool for interactive angle member sizing and bolt quantity determination.

Criteria for Design of PCS Facilities On or Extending Above Metal Electric Transmission Towers & Analysis of Transmission Towers Supporting PCS Masts (1)

Introduction

This criteria is the result from an evaluation of the methods and loadings specified by the separate standards, which are used in designing telecommunications towers and electric transmission towers. That evaluation is detailed elsewhere, but in summary; the methods and loadings are significantly different. This criteria specifies the manner in which the appropriate standard is used to design PCS facilities including masts and brackets (hereafter referred to as “masts”), and to evaluate the electric transmission towers to support PCS masts. The intent is to achieve an equivalent level of safety and security under the extreme design conditions expected in Connecticut and Massachusetts.

ANSI Standard TIA/EIA-222 covering the design of telecommunications structures specifies a working strength/allowable stress design approach. This approach applies the loads from extreme weather loading conditions, and designs the structure so that it does not exceed some defined percentage of failure strength (allowable stress).

ANSI Standard C2-2007 (National Electrical Safety Code) covering the design of electric transmission metal structures is based upon an ultimate strength/yield stress design approach. This approach applies a multiplier (overload capacity factor) to the loads possible from extreme weather loading conditions, and designs the structure so that it does not exceed its ultimate strength (yield stress).

Each standard defines the details of how loads are to be calculated differently. Most of the NU effort in “unifying” both codes was to establish what level of strength each approach would provide, and then increasing the appropriate elements of each to achieve a similar level of security under extreme weather loadings.

Two extreme weather conditions are considered. The first is an extreme wind condition (hurricane) based upon a 50-year recurrence (2% annual probability). The second is a winter condition combining wind and ice loadings.

The following sections describe the design criteria for any PCS mast extending above the top of an electric transmission tower, and the analysis criteria for evaluating the loads on the transmission tower from such a mast from the lower portions of such a mast, and loads on the pre-existing electric lower portions of such a mast, and loads on the pre-existing electric transmission tower and the conductors it supports.

Note 1: Prepared from documentation provide from Northeast Utilities.

PCS Mast

The PCS facility (mast, external cable/trays, including the initial and any planned future support platforms, antennas, etc. extending the full height above the top level of the electric transmission structure) shall be designed in accordance with the provisions of TIA/EIA Standard 222 with two exceptions:

1. An 85 mph extreme wind speed shall be used for locations in all counties throughout the NU system.
2. The stress increase of TIA Section 3.1.1.1 is disallowed. The combined wind and ice condition shall consider ½" radial ice in combination with the wind load (0.75 Wi) as specified in TIA section 2.3.16.

ELECTRIC TRANSMISSION TOWER

The electric transmission tower shall be analyzed using yield stress theory in accordance with the attached table titled "NU Design Criteria". This specifies uniform loadings (different from the TIA loadings) on the each of the following components of the installed facility:

- PCS mast for its total height above ground level, including the initial and planned future support platforms, antennas, etc. above the top of an electric transmission structure.
- Conductors are related devices and hardware.
- Electric transmission structure. The loads from the PCS facility and from the electric conductors shall be applied to the structure at conductor and PCS mast attachment points, where those load transfer to the tower.

The uniform loadings and factors specified for the above components in the table are based upon the National Electrical Safety Code 2007 Edition Extreme Wind (Rule 250C) and Combined Ice and Wind (Rule 250B-Heavy) Loadings. These provide equivalent loadings compared to TIA and its loads and factors with the exceptions noted above. (Note that the NESC does not require the projected wind surfaces of structures and equipment to be increased by the ice covering.)

In the event that the electric transmission tower is not sufficient to support the additional loadings of the PCS mast, reinforcement will be necessary to upgrade the strength of the overstressed members.

Attachment A
Eversource Design Criteria

Condition		Attachment A NU Design Criteria	Basic Wind Speed	Pressure	Height factor	Gust Factor	Load or Stress Factor	Force Coef. - Shape Factor
			V (MPH)	Q (PSF)	Kz	Gh		
Ice Condition	TIA/EIA	Antenna Mount	TIA	TIA (0.75Wi)	TIA	TIA	TIA, Section 3.1.1.1 disallowed for connection design	TIA
Ice Condition	NESC Heavy	Tower/Pole Analysis with antennas extending above top of Tower/Pole (Yield Stress)	____	4	1	1	2.50	1.6 Flat Surfaces 1.3 Round Surfaces
Ice Condition	NESC Heavy	Tower/Pole Analysis with antennas below top of Tower/Pole (on two faces)	____	4	1	1	2.50	1.6 Flat Surfaces 1.3 Round Surfaces
Ice Condition	NESC Heavy	Conductors:	Conductor Loads Provided by NU					
High Wind Condition	TIA/EIA	Antenna Mount	85	TIA	TIA	TIA	TIA, Section 3.1.1.1 disallowed for connection design	TIA
High Wind Condition	NESC Extreme Wind	Tower/Pole Analysis with antennas extending above top of Tower/Pole	For wind speed use OTRM 060 Map 1, Rule 250C: Extreme Wind Loading Apply a 1.25 X Gust Response Factor to all telecommunication equipment projected above top of tower/pole and apply a 1.0 x Gust Response Factor to the tower/pole structure					1.6 Flat Surfaces 1.3 Round Surfaces
High Wind Condition	NESC Extreme Wind	Tower/Pole Analysis with antennas below top of Tower/Pole	For wind speed use OTRM 060 Map 1, Rule 250C: Extreme Wind Loading Height above ground is based on overall height to top of tower/pole					1.6 Flat Surfaces 1.3 Round Surfaces
High Wind Condition	NESC Extreme Wind	Conductors:	Conductor Loads Provided by NU					
NESC Extreme Ice with Wind Condition*		Tower/Pole Analysis with antennas extending above top of Tower/Pole	For wind speed use OTRM 060 Map 1, Rule 250D: Extreme Ice with Wind Loading 4 PSF Wind Load 1.25 X Gust Response Factor Apply a 1.25 X Gust Response Factor to all telecommunication equipment projected above top of tower/pole and apply a 1.0 x Gust Response Factor to the tower/pole structure					1.6 Flat Surfaces 1.3 Round Surfaces
NESC Extreme Ice with Wind Condition*		Tower/Pole Analysis with antennas below top of Tower/Pole	For wind speed use OTRM 060 Map 1, Rule 250D: Extreme Ice with Wind Loading 4 PSF Wind Load Height above ground is based on overall height to top of tower/pole					1.6 Flat Surfaces 1.3 Round Surfaces
NESC Extreme Ice with Wind Condition*		Conductors:	Conductor Loads Provided by NU					
		* Only for structures installed after 2007						

mount as specified below, and shall include the wireless communication mast and antenna loads per NESC criteria)

The strength reduction factor obtained from the field investigation shall be applied to the members or connections that are showing signs of deterioration from their original condition

With the written approval of Eversource Transmission Line Engineering on a case by case the existing structures may be analyzed initially using the current NESC code, then it is permitted to use the original design code with the original conductor load should the existing tower fail the current NESC code.

The structure shall be analyzed using yield stress theory in accordance with Attachment A, "Eversource Design Criteria." This specifies uniform loadings (different from the TIA loadings) on each of the following components of the installed facility:

a) Wireless communication mast for its total height above ground level, including the initial and any planned future equipment (Support Platforms, Antennas, TMA's etc.) above the top of an electric transmission structure.

b) Conductors and related devices and hardware (wire loads will be provided by Eversource).

c) Electric Transmission Structure

   i) The loads from the wireless communication equipment components based on NESC and Eversource Criteria in Attachment A, and from the electric conductors shall be applied to the structure at conductor and wireless communication mast attachment points, where those loads transfer to the tower.

   ii) Shape Factor Multiplier:

NESC Structure Shape	Cd
Polyround (for polygonal steel poles)	1.3
Flat	1.6
Open Lattice	3.2
Pole with Coaxial Cable	1.6

   iii) When Coaxial Cables are mounted alongside the pole structure, the shape multiplier shall be:

Mount Type	Cable Cd	Pole Cd
Coaxial Cables on outside periphery (One layer)	1.45	1.45
Coaxial Cables mounted on stand offs	1.6	1.6

d) The uniform loadings and factors specified for the above components in Attachment A, "Eversource Design Criteria" are based upon the National Electric Safety Code 2007 Edition Extreme Wind (Rule 250C) and Combined Ice and Wind (Rule 250B-Heavy) Loadings. These provide equivalent loadings compared to the TIA and its loads and factors with the exceptions noted above.

   Note: The NESC does not require ice load be included in the supporting structure. (Ice on conductors and shield wire only, and Eversource will provide these loads).

e) Mast reaction loads shall be evaluated for local effects on the transmission structure members at the attachment points.

Project: 1618/1887 Line, Structure 2683
Date: 3/1/2019
Engineer: TG
Purpose: Recalculate wire loads for AT&T/ Sprint site.

Shield Wires:

1618: 0.457" 24F OPGW, tensioned to 4200# @ NESC 250B final
1887: 0.646" 48 OPGW, tensioned to 5500# @ NESC 250B final

Conductors:

1618: 336 ACSR tensioned to 4000# @ NESC 250B final
1887: 556 ACSS tensioned to 4000# @ NESC 250B final

NESC 250B

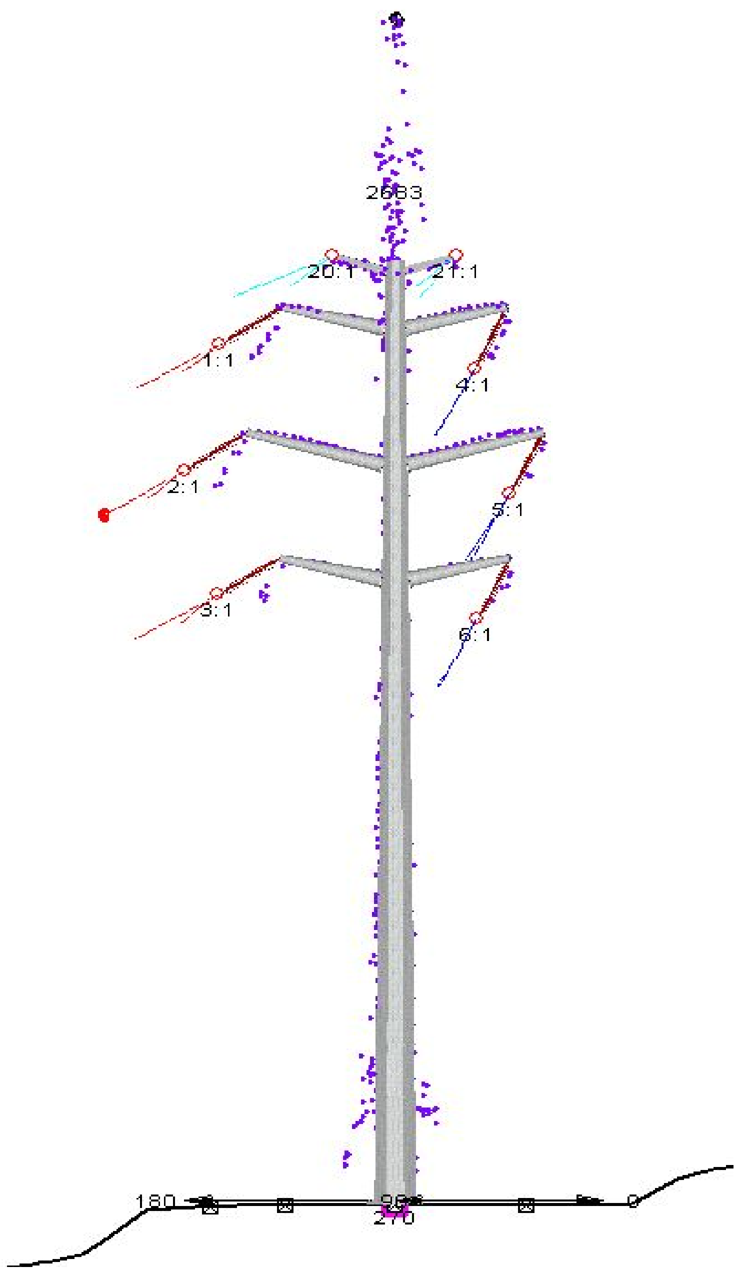
	Vert.	*Trans.*	*Long.*
1618 OPGW	871	-1715	105
1887 OPGW	1449	-2103	21
1618 Conductor	1581	-2183	124
1887 Conductor	2028	-2006	33

NESC 250C

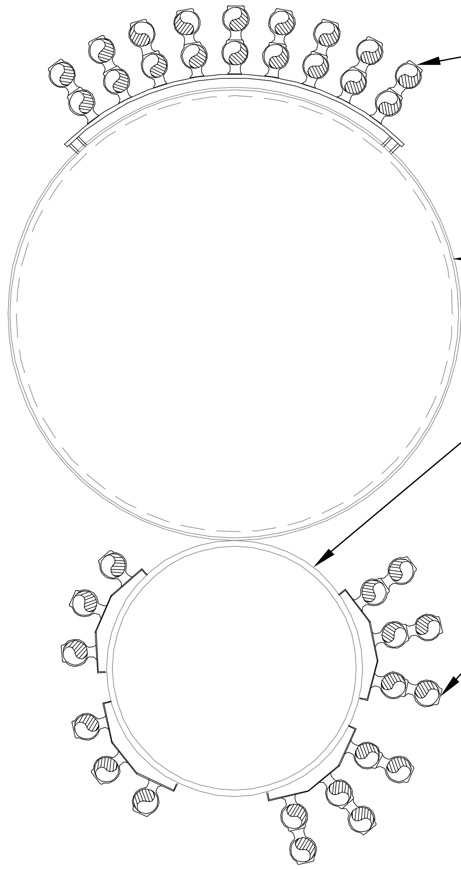
	Vert.	*Trans.*	*Long.*
1618 OPGW	249	-930	57
1887 OPGW	558	-1299	15
1618 Conductor	634	-1392	78
1887 Conductor	878	-1548	27

Historical NESC 250C

	Vert.	*Trans.*	*Long.*
1618 OPGW	240	-843	51
1887 OPGW	541	-1193	14
1618 Conductor	617	-1265	71
1887 Conductor	856	-1408	25

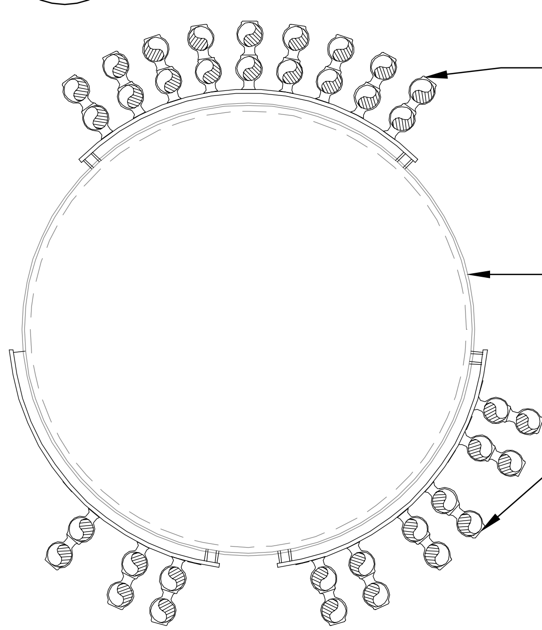


Positive transverse loads are in the 0 degree direction.
Looking east. 1618 Line is on attachment sets 1, 2, 3. 1887 Line is on attachment sets 4, 5, 6.
Positive longitudinal loads are toward the west.



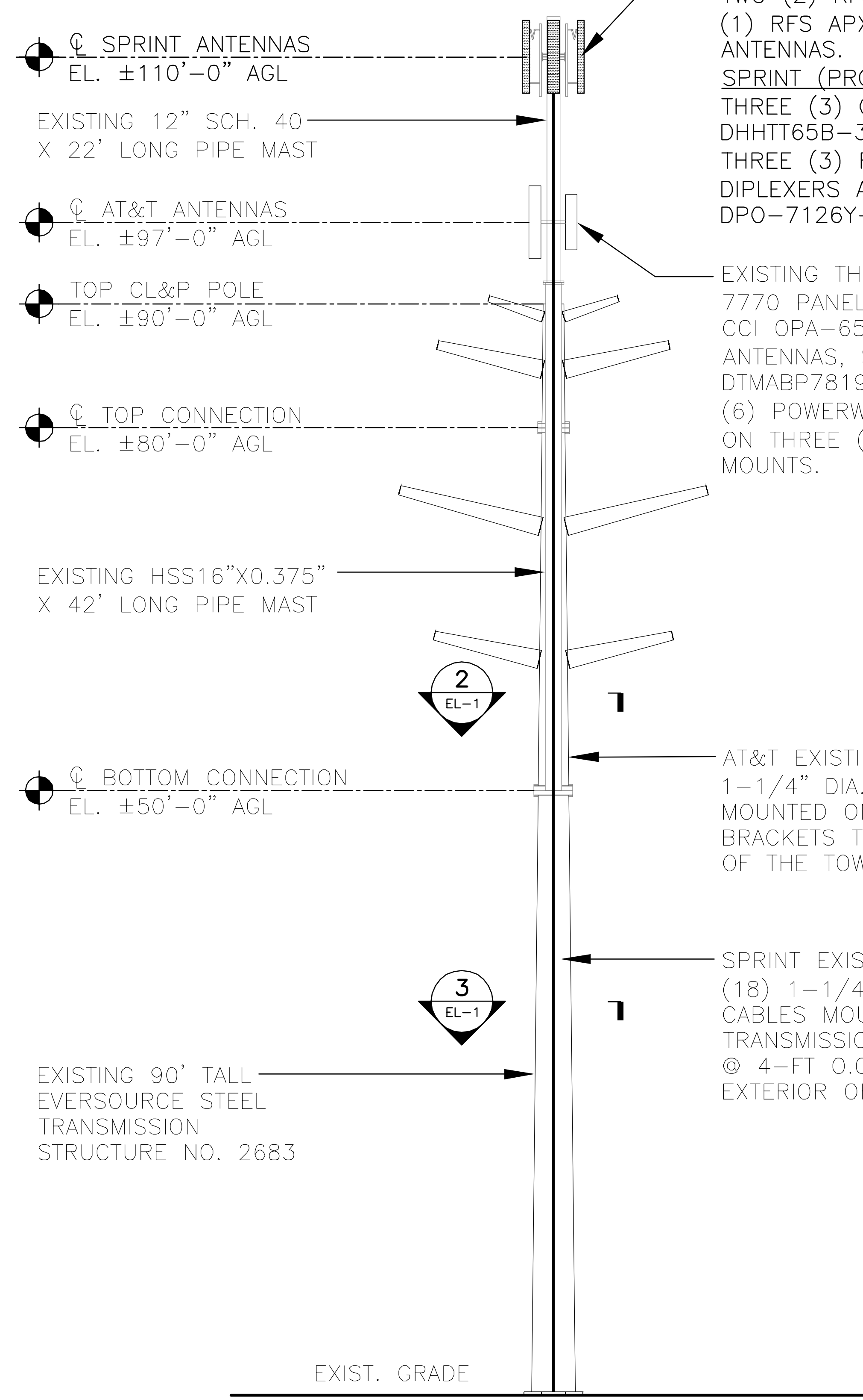
2 EL-1 COAX CABLE PLAN

SCALE: 1" = 1'-0"



3 EL-1 COAX CABLE PLAN

SCALE: 1" = 1'-0"



1 EL-1 TOWER & MAST ELEVATION

SCALE: NOT TO SCALE

REV.	DATE	DRAWN BY	CHK'D BY	DESCRIPTION
1	10/17/18	TJL	CAG	ISSUED FOR CONSTRUCTION
0	1/15/18	TJL	CAG	ISSUED FOR EVERSOURCE REVIEW

PROFESSIONAL ENGINEER SEAL

CENTEK engineering
Centered on Solutions™
(203) 488-0580
(203) 488-8587 Fax
63-2 North Branford Road
Branford, CT 06405
www.CentekEng.com

SPRINT

PROPOSED ANTENNA UPGRADE

CT54XC713

STRUCTURE 2683

761 FEDERAL ROAD
BROOKFIELD CT 06804

DATE: 1/15/18

SCALE: AS SHOWN

JOB NO. 17159.18

POLE AND MAST ELEVATION

SHEET NO.

EL-1

Sheet No. 1 of 1

Development of Design Heights, Exposure Coefficients, and Velocity Pressures Per TIA-222-G

Wind Speeds

Basic Wind Speed	$V := 93$	mph	(User Input - 2016 CSBC Appendix N)
Basic Wind Speed with Ice	$V_i := 50$	mph	(User Input per Annex B of TIA-222-G)

Input

Structure Type =	Structure_Type := Pole		(User Input)
Structure Category =	SC := III		(User Input)
Exposure Category =	Exp := C		(User Input)
Structure Height =	$h := 90$	ft	(User Input)
Height to Center of Antennas=	$z_{Sprint} := 110$	ft	(User Input)
Height to Center of Antennas=	$z_{ATT} := 97$	ft	(User Input)
Height to Center of Mast =	$z_{Mast2} := 103$	ft	(User Input)
Height to Center of Mast =	$z_{Mast1} := 71$	ft	(User Input)
Radial Ice Thickness =	$t_i := 0.75$	in	(User Input per Annex B of TIA-222-G)
Radial Ice Density =	$Id := 56.00$	pcf	(User Input)
Topograpic Factor =	$K_{zt} := 1.0$		(User Input)
	$K_a := 1.0$		(User Input)
Gust Response Factor =	$G_H := 1.35$		(User Input)

Output

Wind Direction Probability Factor =

$$K_d := \begin{cases} 0.95 & \text{if Structure\_Type = Pole} \\ 0.85 & \text{if Structure\_Type = Lattice} \end{cases} = 0.95$$

(Per Table 2-2 of TIA-222-G)

Importance Factors =

$$I_{Wind} := \begin{cases} 0.87 & \text{if SC = 1} \\ 1.00 & \text{if SC = 2} \\ 1.15 & \text{if SC = 3} \end{cases} = 1.15$$

(Per Table 2-3 of TIA-222-G)

$$I_{Wind\_w\_Ice} := \begin{cases} 0 & \text{if SC = 1} \\ 1.00 & \text{if SC = 2} \\ 1.00 & \text{if SC = 3} \end{cases} = 1$$

$$I_{ice} := \begin{cases} 0 & \text{if SC = 1} \\ 1.00 & \text{if SC = 2} \\ 1.25 & \text{if SC = 3} \end{cases} = 1.25$$

$K_{iz} := \left(\frac{z_{Sprint}}{33}\right)^{0.1} = 1.128$ $t_{iz.Sprt} := 2.0 \cdot t_i \cdot I_{ice} \cdot K_{iz} \cdot K_{zt}^{0.35} = 2.115$

Velocity Pressure Coefficient Antennas = $Kz_{Sprint} := 2.01 \left(\left(\frac{z_{Sprint}}{zg}\right)\right)^{\frac{2}{\alpha}} = 1.291$

Velocity Pressure w/o Ice Antennas = $qz_{Sprint} := 0.00256 \cdot K_d \cdot Kz_{Sprint} \cdot V^2 \cdot I_{Wind} = 31.235$

Velocity Pressure with Ice Antennas = $qz_{ice.Sprint} := 0.00256 \cdot K_d \cdot Kz_{Sprint} \cdot V_i^2 \cdot I_{Wind\_w\_Ice} = 7.851$

$K_{iz} := \left(\frac{z_{ATT}}{33}\right)^{0.1} = 1.114$ $t_{iz.ATT} := 2.0 \cdot t_i \cdot I_{ice} \cdot K_{iz} \cdot K_{zt}^{0.35} = 2.088$

Velocity Pressure Coefficient Antennas = $Kz_{ATT} := 2.01 \left(\left(\frac{z_{ATT}}{zg}\right)\right)^{\frac{2}{\alpha}} = 1.258$

Velocity Pressure w/o Ice Antennas = $qz_{ATT} := 0.00256 \cdot K_d \cdot Kz_{ATT} \cdot V^2 \cdot I_{Wind} = 30.419$

Velocity Pressure with Ice Antennas = $qz_{ice.ATT} := 0.00256 \cdot K_d \cdot Kz_{ATT} \cdot V_i^2 \cdot I_{Wind\_w\_Ice} = 7.646$

$K_{izMast2} := \left(\frac{z_{Mast2}}{33}\right)^{0.1} = 1.121$ $t_{izMast2} := 2.0 \cdot t_i \cdot I_{ice} \cdot K_{izMast2} \cdot K_{zt}^{0.35} = 2.101$

Velocity Pressure Coefficient Mast = $Kz_{Mast2} := 2.01 \left(\left(\frac{z_{Mast2}}{zg}\right)\right)^{\frac{2}{\alpha}} = 1.274$

Velocity Pressure w/o Ice Mast= $qz_{Mast2} := 0.00256 \cdot K_d \cdot Kz_{Mast2} \cdot V^2 \cdot I_{Wind} = 30.806$

Velocity Pressure with Ice Mast = $qz_{ice.Mast2} := 0.00256 \cdot K_d \cdot Kz_{Mast2} \cdot V_i^2 \cdot I_{Wind\_w\_Ice} = 7.743$

$K_{izMast1} := \left(\frac{z_{Mast1}}{33}\right)^{0.1} = 1.08$ $t_{izMast1} := 2.0 \cdot t_i \cdot I_{ice} \cdot K_{izMast1} \cdot K_{zt}^{0.35} = 2.024$

Velocity Pressure Coefficient Mast = $Kz_{Mast1} := 2.01 \left(\left(\frac{z_{Mast1}}{zg}\right)\right)^{\frac{2}{\alpha}} = 1.178$

Velocity Pressure w/o Ice Mast= $qz_{Mast1} := 0.00256 \cdot K_d \cdot Kz_{Mast1} \cdot V^2 \cdot I_{Wind} = 28.485$

Velocity Pressure with Ice Mast = $qz_{ice.Mast1} := 0.00256 \cdot K_d \cdot Kz_{Mast1} \cdot V_i^2 \cdot I_{Wind\_w\_Ice} = 7.16$

Development of Wind & Ice Load on Mast

Mast Data:	(12" Sch. 40 Pipe)		(User Input)
Mast Shape =	Round		(User Input)
Mast Diameter =	$D_{mast} := 12.75$	in	(User Input)
Mast Length =	$L_{mast} := 22.417$	ft	(User Input)
Mast Thickness =	$t_{mast} := 0.375$	in	(User Input)
Velocity Coefficient =	$C := \sqrt{I \cdot Kz_{Mast1}} \cdot V \cdot \frac{D_{mast}}{12} = 107$		
Mast Force Coefficient =	$CF_{mast} = 0.6$		

Wind Load (without ice)

Mast Projected Surface Area =	$A_{mast} := \frac{D_{mast}}{12} = 1.063$	sf/ft	
Total Mast Wind Force =	$qz_{Mast2} \cdot G_H \cdot CF_{mast} \cdot A_{mast} = 27$	plf	**BLC 5**

Wind Load (with ice)

Mast Projected Surface Area w/ Ice =	$AICE_{mast} := \frac{(D_{mast} + 2 \cdot t_{izMast2})}{12} = 1.413$	sf/ft	
Total Mast Wind Force w/ Ice =	$qz_{ice.Mast2} \cdot G_H \cdot CF_{mast} \cdot AICE_{mast} = 9$	plf	**BLC 4**

Gravity Loads (without ice)

Weight of the mast =	Self Weight	**(Computed internally by Risa-3D)**	plf	**BLC 1**

Gravity Loads (ice only)

Ice Area per Linear Foot =	$Ai_{mast} := \frac{\pi}{4}\left[(D_{mast} + t_{izMast2} \cdot 2)^2 - D_{mast}^2\right] = 98$	sq in	
Weight of Ice on Mast =	$W_{ICEmast2} := Id \cdot \frac{Ai_{mast}}{144} = 38$	plf	**BLC 3**

Development of Wind & Ice Load on Mast

Mast Data: (HSS16x0.375) (User Input)

Mast Shape = Round (User Input)

Mast Diameter = $D_{mast} := 16$ in (User Input)

Mast Length = $L_{mast} := 41.583$ ft (User Input)

Mast Thickness = $t_{mast} := 0.375$ in (User Input)

Velocity Coefficient = $C := \sqrt{I \cdot Kz_{Mast1}} \cdot V \cdot \frac{D_{mast}}{12} = 135$

Mast Force Coefficient = $CF_{mast} = 0.6$

Wind Load (without ice)

Mast Projected Surface Area = $A_{mast} := \frac{D_{mast}}{12} = 1.333$ sf/ft

Total Mast Wind Force = $qz_{Mast1} \cdot G_H \cdot CF_{mast} \cdot A_{mast} = 31$ plf **BLC 5**

Wind Load (with ice)

Mast Projected Surface Area w/ Ice = $AICE_{mast} := \frac{\left(D_{mast} + 2 \cdot t_{izMast1}\right)}{12} = 1.671$ sf/ft

Total Mast Wind Force w/ Ice = $qz_{ice.Mast1} \cdot G_H \cdot CF_{mast} \cdot AICE_{mast} = 10$ plf **BLC 4**

Gravity Loads (without ice)

Weight of the mast = Self Weight **(Computed internally by Risa-3D)** plf **BLC 1**

Gravity Loads (ice only)

Ice Area per Linear Foot = $Ai_{mast} := \frac{\pi}{4}\left[\left(D_{mast} + t_{izMast1} \cdot 2\right)^2 - D_{mast}^{\,2}\right] = 114.6$ sq in

Weight of Ice on Mast = $W_{ICEmast1} := Id \cdot \frac{Ai_{mast}}{144} = 45$ plf **BLC 3**

Development of Wind & Ice Load on Antennas

Antenna Data: (Sprint)

Antenna Model =	Commscope DHHTT65B-3XR			
Antenna Shape =	Flat		(User Input)	
Antenna Height =	$L_{ant} := 72.1$	in	(User Input)	
Antenna Width =	$W_{ant} := 11.9$	in	(User Input)	
Antenna Thickness =	$T_{ant} := 7.1$	in	(User Input)	
Antenna Weight =	$WT_{ant} := 46$	lbs	(User Input)	
Number of Antennas =	$N_{ant} := 3$		(User Input)	
Antenna Aspect Ratio =	$Ar_{ant} := \frac{L_{ant}}{W_{ant}} = 6.1$			
Antenna Force Coefficient =	$Ca_{ant} = 1.36$			

Wind Load (without ice)

Surface Area for One Antenna =	$SA_{ant} := \frac{L_{ant} \cdot W_{ant}}{144} = 6$	sf	
Antenna Projected Surface Area =	$A_{ant} := SA_{ant} \cdot N_{ant} = 17.9$	sf	
Total Antenna Wind Force =	$F_{ant} := qz_{Sprint} \cdot G_H \cdot Ca_{ant} \cdot K_a \cdot A_{ant} = 1024$	lbs	**BLC 5**

Wind Load (with ice)

Surface Area for One Antenna w/ Ice =	$SA_{ICEant} := \frac{\left(L_{ant} + 2 \cdot t_{iz.Sprt}\right) \cdot \left(W_{ant} + 2 \cdot t_{iz.Sprt}\right)}{144} = 8.5$	sf	
Antenna Projected Surface Area w/ Ice =	$A_{ICEant} := SA_{ICEant} \cdot N_{ant} = 25.6$	sf	
Total Antenna Wind Force w/ Ice =	$Fi_{ant} := qz_{ice.Sprint} \cdot G_H \cdot Ca_{ant} \cdot K_a \cdot A_{ICEant} = 369$	lbs	**BLC 4**

Gravity Load (without ice)

Weight of All Antennas =	$WT_{ant} \cdot N_{ant} = 138$	lbs	**BLC 2**

Gravity Loads (ice only)

Volume of Each Antenna =	$V_{ant} := L_{ant} \cdot W_{ant} \cdot T_{ant} = 6092$	cu in	
Volume of Ice on Each Antenna =	$V_{ice} := \left(L_{ant} + 2 \cdot t_{iz.Sprt}\right)\left(W_{ant} + 2 \cdot t_{iz.Sprt}\right) \cdot \left(T_{ant} + 2 \cdot t_{iz.Sprt}\right) - V_{ant} = 7857$	cu in	
Weight of Ice on Each Antenna =	$W_{ICEant} := \frac{V_{ice}}{1728} \cdot Id = 255$	lbs	
Weight of Ice on All Antennas =	$W_{ICEant} \cdot N_{ant} = 764$	lbs	**BLC 3**

Development of Wind & Ice Load on Antennas

Antenna Data: (Sprint)

Antenna Model =	RFS KIT-FD9R6004/1C-DL Diplexer		
Antenna Shape =	Flat		(User Input)
Antenna Height =	$L_{ant} := 5.8$	in	(User Input)
Antenna Width =	$W_{ant} := 6.5$	in	(User Input)
Antenna Thickness =	$T_{ant} := 4.6$	in	(User Input)
Antenna Weight =	$WT_{ant} := 7$	lbs	(User Input)
Number of Antennas =	$N_{ant} := 3$		(User Input)
Antenna Aspect Ratio =	$Ar_{ant} := \frac{L_{ant}}{W_{ant}} = 0.9$		
Antenna Force Coefficient =	$Ca_{ant} = 1.2$		

Wind Load (without ice)

Surface Area for One Antenna = $SA_{ant} := \frac{L_{ant} \cdot W_{ant}}{144} = 0.3$ sf

Antenna Projected Surface Area = $A_{ant} := SA_{ant} \cdot N_{ant} = 0.8$ sf

Total Antenna Wind Force = $F_{ant} := qz_{Sprint} \cdot G_H \cdot Ca_{ant} \cdot K_a \cdot A_{ant} = 40$ lbs **BLC 5**

Wind Load (with ice)

Surface Area for One Antenna w/ Ice = $SA_{ICEant} := \frac{(L_{ant} + 2 \cdot t_{iz.Sprt}) \cdot (W_{ant} + 2 \cdot t_{iz.Sprt})}{144} = 0.7$ sf

Antenna Projected Surface Area w/ Ice = $A_{ICEant} := SA_{ICEant} \cdot N_{ant} = 2.2$ sf

Total Antenna Wind Force w/ Ice = $Fi_{ant} := qz_{ice.Sprint} \cdot G_H \cdot Ca_{ant} \cdot K_a \cdot A_{ICEant} = 29$ lbs **BLC 4**

Gravity Load (without ice)

Weight of All Antennas = $WT_{ant} \cdot N_{ant} = 21$ lbs **BLC 2**

Gravity Loads (ice only)

Volume of Each Antenna = $V_{ant} := L_{ant} \cdot W_{ant} \cdot T_{ant} = 173$ cu in

Volume of Ice on Each Antenna = $V_{ice} := (L_{ant} + 2 \cdot t_{iz.Sprt})(W_{ant} + 2 \cdot t_{iz.Sprt}) \cdot (T_{ant} + 2 \cdot t_{iz.Sprt}) - V_{ant} = 777$ cu in

Weight of Ice on Each Antenna = $W_{ICEant} := \frac{V_{ice}}{1728} \cdot Id = 25$ lbs

Weight of Ice on All Antennas = $W_{ICEant} \cdot N_{ant} = 76$ lbs **BLC 3**

Development of Wind & Ice Load on Antennas

Antenna Data: (Sprint)

Antenna Model = CCI DPO-7126Y-0-T1 Diplexer

Antenna Shape = Flat (User Input)

Antenna Height = $L_{ant} := 4.07$ in (User Input)

Antenna Width = $W_{ant} := 7.42$ in (User Input)

Antenna Thickness = $T_{ant} := 6.26$ in (User Input)

Antenna Weight = $WT_{ant} := 8$ lbs (User Input)

Number of Antennas = $N_{ant} := 3$ (User Input)

Antenna Aspect Ratio = $Ar_{ant} := \frac{L_{ant}}{W_{ant}} = 0.5$

Antenna Force Coefficient = $Ca_{ant} = 1.2$

Wind Load (without ice)

Surface Area for One Antenna = $SA_{ant} := \frac{L_{ant} \cdot W_{ant}}{144} = 0.2$ sf

Antenna Projected Surface Area = $A_{ant} := SA_{ant} \cdot N_{ant} = 0.6$ sf

Total Antenna Wind Force = $F_{ant} := qz_{Sprint} \cdot G_H \cdot Ca_{ant} \cdot K_a \cdot A_{ant} = 32$ lbs **BLC 5**

Wind Load (with ice)

Surface Area for One Antenna w/ Ice = $SA_{ICEant} := \frac{(L_{ant} + 2 \cdot t_{iz.Sprt}) \cdot (W_{ant} + 2 \cdot t_{iz.Sprt})}{144} = 0.7$ sf

Antenna Projected Surface Area w/ Ice = $A_{ICEant} := SA_{ICEant} \cdot N_{ant} = 2$ sf

Total Antenna Wind Force w/ Ice = $Fi_{ant} := qz_{ice.Sprint} \cdot G_H \cdot Ca_{ant} \cdot K_a \cdot A_{ICEant} = 26$ lbs **BLC 4**

Gravity Load (without ice)

Weight of All Antennas = $WT_{ant} \cdot N_{ant} = 24$ lbs **BLC 2**

Gravity Loads (ice only)

Volume of Each Antenna = $V_{ant} := L_{ant} \cdot W_{ant} \cdot T_{ant} = 189$ cu in

Volume of Ice on Each Antenna = $V_{ice} := (L_{ant} + 2 \cdot t_{iz.Sprt})(W_{ant} + 2 \cdot t_{iz.Sprt}) \cdot (T_{ant} + 2 \cdot t_{iz.Sprt}) - V_{ant} = 825$ cu in

Weight of Ice on Each Antenna = $W_{ICEant} := \frac{V_{ice}}{1728} \cdot Id = 27$ lbs

Weight of Ice on All Antennas = $W_{ICEant} \cdot N_{ant} = 80$ lbs **BLC 3**

Development of Wind & Ice Load on Antenna Mounts

(per TIA/EIA-222-F-1996 Criteria)

Mount Data:	(Sprint)		
Mount Type:	Universal Tri-Bracket		
Mount Shape =	Flat		(User Input)
Pipe Mount Length =	$L_{mnt} := 72$	in	(User Input)
2 inch Pipe Mount Linear Weight =	$W_{mnt} := 3.66$	plf	(User Input)
Pipe Mount Outside Diameter =	$D_{mnt} := 2.375$	in	(User Input)
Number of Mounting Pipes =	$N_{mnt} := 3$		(User Input)
Tri Bracket Weight =	$W_{tb.mnt} := 197$	lbs	(User Input)
Mount Aspect Ratio =	$Ar_{mnt} := \frac{L_{mnt}}{D_{mnt}} = 30$		
Mount Force Coefficient =	$Ca_{mnt} := 2$		

Wind Load (without ice)

Assumes Mount is Shielded by Antenna

Mount Projected Surface Area =	$A_{mnt} := 0.0$	sf	
Total Mount Wind Force =	$F_{mnt} := qz_{Sprint} \cdot G_H \cdot Ca_{mnt} \cdot A_{mnt} = 0$	lbs	**BLC 5**

Wind Load (with ice)

Assumes Mount is Shielded by Antenna

Mount Projected Surface Area w/ Ice =	$A_{ICEmnt} := 0.0$	sf	
Total Mount Wind Force =	$Fi_{mnt} := qz_{ice.Sprint} \cdot G_H \cdot Ca_{mnt} \cdot A_{ICEmnt} = 0$	lbs	**BLC 4**

Gravity Loads (without ice)

Weight Each Pipe Mount =	$WT_{mnt} := W_{mnt} \cdot \frac{L_{mnt}}{12} = 22$	lbs	
Weight of All Mounts =	$WT_{mnt} \cdot N_{mnt} + W_{tb.mnt} = 263$	lbs	**BLC 2**

Gravity Loads (ice only)

Volume of Each Pipe =	$V_{mnt} := \frac{\pi}{4} \cdot D_{mnt}^{2} \cdot L_{mnt} = 319$	cu in	
Volume of Ice on Each Pipe =	$V_{ice} := \left[\frac{\pi}{4} \cdot \left[\left(D_{mnt} + 1\right)^2\right] \cdot \left(L_{mnt} + 1\right)\right] - V_{mnt} = 334$	cu in	
Weight of Ice each mount (incl, hardware) =	$W_{ICEmnt} := \frac{V_{ice}}{1728} \cdot Id = 11$	lbs	
Weight of Ice on All Mounts =	$W_{ICEmnt} \cdot N_{mnt} + 5 = 37$	lbs	**BLC 3**

Development of Wind & Ice Load on Antennas

Antenna Data: (AT&T)

Antenna Model = Powerwave 7770

Antenna Shape = Flat (User Input)

Antenna Height = $L_{ant} := 55$ in (User Input)

Antenna Width = $W_{ant} := 11$ in (User Input)

Antenna Thickness = $T_{ant} := 5$ in (User Input)

Antenna Weight = $WT_{ant} := 39$ lbs (User Input)

Number of Antennas = $N_{ant} := 3$ (User Input)

Antenna Aspect Ratio = $Ar_{ant} := \frac{L_{ant}}{W_{ant}} = 5.0$

Antenna Force Coefficient = $Ca_{ant} = 1.31$

Wind Load (without ice)

Surface Area for One Antenna = $SA_{ant} := \frac{L_{ant} \cdot W_{ant}}{144} = 4.2$ sf

Antenna Projected Surface Area = $A_{ant} := SA_{ant} \cdot N_{ant} = 12.6$ sf

Total Antenna Wind Force = $F_{ant} := qz_{ATT} \cdot G_H \cdot Ca_{ant} \cdot K_a \cdot A_{ant} = 679$ lbs **BLC 5**

Wind Load (with ice)

Surface Area for One Antenna w/ Ice = $SA_{ICEant} := \frac{(L_{ant} + 2 \cdot t_{iz.ATT}) \cdot (W_{ant} + 2 \cdot t_{iz.ATT})}{144} = 6.2$ sf

Antenna Projected Surface Area w/ Ice = $A_{ICEant} := SA_{ICEant} \cdot N_{ant} = 18.7$ sf

Total Antenna Wind Force w/ Ice = $Fi_{ant} := qz_{ice.ATT} \cdot G_H \cdot Ca_{ant} \cdot K_a \cdot A_{ICEant} = 253$ lbs **BLC 4**

Gravity Load (without ice)

Weight of All Antennas = $WT_{ant} \cdot N_{ant} = 117$ lbs **BLC 2**

Gravity Loads (ice only)

Volume of Each Antenna = $V_{ant} := L_{ant} \cdot W_{ant} \cdot T_{ant} = 3025$ cu in

Volume of Ice on Each Antenna = $V_{ice} := (L_{ant} + 2 \cdot t_{iz.ATT})(W_{ant} + 2 \cdot t_{iz.ATT}) \cdot (T_{ant} + 2 \cdot t_{iz.ATT}) - V_{ant} = 5217$ cu in

Weight of Ice on Each Antenna = $W_{ICEant} := \frac{V_{ice}}{1728} \cdot Id = 169$ lbs

Weight of Ice on All Antennas = $W_{ICEant} \cdot N_{ant} = 507$ lbs **BLC 3**

Development of Wind & Ice Load on Antennas

Antenna Data: (AT&T)

Antenna Model =	CCI OPA-65R-LCUU-H6		
Antenna Shape =	Flat		(User Input)
Antenna Height =	$L_{ant} := 72$	in	(User Input)
Antenna Width =	$W_{ant} := 14.8$	in	(User Input)
Antenna Thickness =	$T_{ant} := 7.4$	in	(User Input)
Antenna Weight =	$WT_{ant} := 75$	lbs	(User Input)
Number of Antennas =	$N_{ant} := 3$		(User Input)
Antenna Aspect Ratio =	$Ar_{ant} := \frac{L_{ant}}{W_{ant}} = 4.9$		
Antenna Force Coefficient =	$Ca_{ant} = 1.31$		

Wind Load (without ice)

Surface Area for One Antenna =	$SA_{ant} := \frac{L_{ant} \cdot W_{ant}}{144} = 7.4$	sf	
Antenna Projected Surface Area =	$A_{ant} := SA_{ant} \cdot N_{ant} = 22.2$	sf	
Total Antenna Wind Force =	$F_{ant} := qz_{ATT} \cdot G_H \cdot Ca_{ant} \cdot K_a \cdot A_{ant} = 1190$	lbs	**BLC 5**

Wind Load (with ice)

Surface Area for One Antenna w/ Ice =	$SA_{ICEant} := \frac{(L_{ant} + 2 \cdot t_{iz.ATT}) \cdot (W_{ant} + 2 \cdot t_{iz.ATT})}{144} = 10$	sf	
Antenna Projected Surface Area w/ Ice =	$A_{ICEant} := SA_{ICEant} \cdot N_{ant} = 30.1$	sf	
Total Antenna Wind Force w/ Ice =	$Fi_{ant} := qz_{ice.ATT} \cdot G_H \cdot Ca_{ant} \cdot K_a \cdot A_{ICEant} = 406$	lbs	**BLC 4**

Gravity Load (without ice)

Weight of All Antennas =	$WT_{ant} \cdot N_{ant} = 225$	lbs	**BLC 2**

Gravity Loads (ice only)

Volume of Each Antenna =	$V_{ant} := L_{ant} \cdot W_{ant} \cdot T_{ant} = 7885$	cu in	
Volume of Ice on Each Antenna =	$V_{ice} := (L_{ant} + 2 \cdot t_{iz.ATT})(W_{ant} + 2 \cdot t_{iz.ATT}) \cdot (T_{ant} + 2 \cdot t_{iz.ATT}) - V_{ant} = 8850$	cu in	
Weight of Ice on Each Antenna =	$W_{ICEant} := \frac{V_{ice}}{1728} \cdot Id = 287$	lbs	
Weight of Ice on All Antennas =	$W_{ICEant} \cdot N_{ant} = 860$	lbs	**BLC 3**

Development of Wind & Ice Load on Antennas

Antenna Data: (AT&T)

Antenna Model = Powerwave LGP-21401

Antenna Shape = Flat (User Input)

Antenna Height = $L_{ant} := 14.4$ in (User Input)

Antenna Width = $W_{ant} := 9.2$ in (User Input)

Antenna Thickness = $T_{ant} := 2.6$ in (User Input)

Antenna Weight = $WT_{ant} := 14.1$ lbs (User Input)

Number of Antennas = $N_{ant} := 6$ (User Input)

Antenna Aspect Ratio = $Ar_{ant} := \frac{L_{ant}}{W_{ant}} = 1.6$

Antenna Force Coefficient = $Ca_{ant} = 1.2$

Wind Load (without ice)

Surface Area for One Antenna = $SA_{ant} := \frac{L_{ant} \cdot W_{ant}}{144} = 0.9$ sf

Antenna Projected Surface Area = $A_{ant} := SA_{ant} \cdot N_{ant} = 5.5$ sf

Total Antenna Wind Force = $F_{ant} := qz_{ATT} \cdot G_H \cdot Ca_{ant} \cdot K_a \cdot A_{ant} = 272$ lbs **BLC 5**

Wind Load (with ice)

Surface Area for One Antenna w/ Ice = $SA_{ICEant} := \frac{(L_{ant} + 2 \cdot t_{iz.ATT}) \cdot (W_{ant} + 2 \cdot t_{iz.ATT})}{144} = 1.7$ sf

Antenna Projected Surface Area w/ Ice = $A_{ICEant} := SA_{ICEant} \cdot N_{ant} = 10.4$ sf

Total Antenna Wind Force w/ Ice = $Fi_{ant} := qz_{ice.ATT} \cdot G_H \cdot Ca_{ant} \cdot K_a \cdot A_{ICEant} = 128$ lbs **BLC 4**

Gravity Load (without ice)

Weight of All Antennas = $WT_{ant} \cdot N_{ant} = 85$ lbs **BLC 2**

Gravity Loads (ice only)

Volume of Each Antenna = $V_{ant} := L_{ant} \cdot W_{ant} \cdot T_{ant} = 344$ cu in

Volume of Ice on Each Antenna = $V_{ice} := (L_{ant} + 2 \cdot t_{iz.ATT})(W_{ant} + 2 \cdot t_{iz.ATT}) \cdot (T_{ant} + 2 \cdot t_{iz.ATT}) - V_{ant} = 1340$ cu in

Weight of Ice on Each Antenna = $W_{ICEant} := \frac{V_{ice}}{1728} \cdot Id = 43$ lbs

Weight of Ice on All Antennas = $W_{ICEant} \cdot N_{ant} = 260$ lbs **BLC 3**

Development of Wind & Ice Load on Antennas

Antenna Data: (AT&T)

Antenna Model = CCI DTMABP7819VG12A

Antenna Shape = Flat (User Input)

Antenna Height = $L_{ant} := 14.25$ in (User Input)

Antenna Width = $W_{ant} := 11.46$ in (User Input)

Antenna Thickness = $T_{ant} := 4.17$ in (User Input)

Antenna Weight = $WT_{ant} := 20$ lbs (User Input)

Number of Antennas = $N_{ant} := 6$ (User Input)

Antenna Aspect Ratio = $Ar_{ant} := \frac{L_{ant}}{W_{ant}} = 1.2$

Antenna Force Coefficient = $Ca_{ant} = 1.2$

Wind Load (without ice)

Surface Area for One Antenna = $SA_{ant} := \frac{L_{ant} \cdot W_{ant}}{144} = 1.1$ sf

Antenna Projected Surface Area = $A_{ant} := SA_{ant} \cdot N_{ant} = 6.8$ sf

Total Antenna Wind Force = $F_{ant} := qz_{ATT} \cdot G_H \cdot Ca_{ant} \cdot K_a \cdot A_{ant} = 335$ lbs **BLC 5**

Wind Load (with ice)

Surface Area for One Antenna w/ Ice = $SA_{ICEant} := \frac{\left(L_{ant} + 2 \cdot t_{iz.ATT}\right) \cdot \left(W_{ant} + 2 \cdot t_{iz.ATT}\right)}{144} = 2$ sf

Antenna Projected Surface Area w/ Ice = $A_{ICEant} := SA_{ICEant} \cdot N_{ant} = 12$ sf

Total Antenna Wind Force w/ Ice = $Fi_{ant} := qz_{ice.ATT} \cdot G_H \cdot Ca_{ant} \cdot K_a \cdot A_{ICEant} = 149$ lbs **BLC 4**

Gravity Load (without ice)

Weight of All Antennas = $WT_{ant} \cdot N_{ant} = 120$ lbs **BLC 2**

Gravity Loads (ice only)

Volume of Each Antenna = $V_{ant} := L_{ant} \cdot W_{ant} \cdot T_{ant} = 681$ cu in

Volume of Ice on Each Antenna = $V_{ice} := \left(L_{ant} + 2 \cdot t_{iz.ATT}\right)\left(W_{ant} + 2 \cdot t_{iz.ATT}\right) \cdot \left(T_{ant} + 2 \cdot t_{iz.ATT}\right) - V_{ant} = 1724$ cu in

Weight of Ice on Each Antenna = $W_{ICEant} := \frac{V_{ice}}{1728} \cdot Id = 56$ lbs

Weight of Ice on All Antennas = $W_{ICEant} \cdot N_{ant} = 335$ lbs **BLC 3**

Development of Wind & Ice Load on Antenna Mounts

Mount Data:

Mount Type:	Dual Standoff Mount		
Mount Shape =	Flat		(User Input)
Mount Projected Surface Area =	$CaAa := 4$	sf	(User Input)
Mount Projected Surface Area w/ Ice =	$CaAa_{ice} := 4.6$	sf	(User Input)
Mount Weight =	$WT_{mnt} := 610$	lbs	(User Input)
Mount Weight w/ Ice =	$WT_{mnt.ice} := 700$	lbs	

Wind Load (without ice)

Total Mount Wind Force =	$F_{mnt} := qz_{ATT} \cdot G_H \cdot CaAa = 164$	lbs	**BLC 5**

Wind Load (with ice)

Total Mount Wind Force =	$Fi_{mnt} := qz_{ice.ATT} \cdot G_H \cdot CaAa_{ice} = 47$	lbs	**BLC 4**

Gravity Loads (without ice)

Weight of All Mounts =	$WT_{mnt} = 610$	lbs	**BLC 2**

Gravity Loads (ice only)

Weight of Ice on All Mounts =	$WT_{mnt.ice} - WT_{mnt} = 90$	lbs	**BLC 3**

Development of Wind & Ice Load on Coax Cables

Coax Cable Data:

Coax Type = HELIAX 1-1/4"

Shape = Round (User Input)

Coax Outside Diameter = $D_{coax} := 1.55$ in (User Input)

Coax Cable Length = $L_{coax} := 64$ ft (User Input)

Weight of Coax per foot = $Wt_{coax} := 0.66$ plf (User Input)

Total Number of Coax = $N_{coax} := 18$ (User Input) Note: AT&T Existing/Proposed cables attached to Transmission Pole

Total Number of Exterior Coax = $Ne_{coax} := 18$ (User Input)

No. of Coax Projecting Outside Face of Mast = $NP_{coax} := 3$ (User Input)

Coax aspect ratio, $Ar_{coax} := \frac{(L_{coax} \cdot 12)}{D_{coax}} = 495.5$

Coax Cable Force Factor Coefficient = $Ca_{coax} = 1.2$

Wind Load (without ice)

Coax projected surface area = $A_{coax} := \frac{(NP_{coax} D_{coax})}{12} = 0.4$ sf/ft

Total Coax Wind Force = $F_{coax} := Ca_{coax} \cdot qz_{Mast1} \cdot G_H \cdot A_{coax} = 18$ plf **BLC 5**

Wind Load (with ice)

Coax projected surface area w/ Ice = $AICE_{coax} := \frac{(NP_{coax} \cdot D_{coax} + 2 \cdot t_{izMast1})}{12} = 0.7$ sf/ft

Total Coax Wind Force w/ Ice = $Fi_{coax} := Ca_{coax} \cdot qz_{ice.Mast1} \cdot G_H \cdot AICE_{coax} = 8$ plf **BLC 4**

Gravity Loads (without ice)

Weight of all cables w/o ice $WT_{coax} := Wt_{coax} \cdot N_{coax} = 12$ plf **BLC 2**

Gravity Loads (ice only)

Ice Area per Linear Foot = $Ai_{coax} := \frac{\pi}{4}\left[\left(D_{coax} + 2 \cdot t_{izMast1}\right)^2 - D_{coax}^{\ 2}\right] = 22.7$ sq in

Ice Weight All Coax per foot = $WTi_{coax} := N_{coax} \cdot Id \cdot \frac{Ai_{coax}}{144} = 159$ plf **BLC 3**

(Global) Model Settings

Display Sections for Member Calcs	5
Max Internal Sections for Member Calcs	97
Include Shear Deformation?	Yes
Increase Nailing Capacity for Wind?	Yes
Include Warping?	Yes
Trans Load Btwn Intersecting Wood Wall?	Yes
Area Load Mesh (in^2)	144
Merge Tolerance (in)	.12
P-Delta Analysis Tolerance	0.50%
Include P-Delta for Walls?	Yes
Automatically Iterate Stiffness for Walls?	No
Max Iterations for Wall Stiffness	3
Gravity Acceleration (ft/sec^2)	32.2
Wall Mesh Size (in)	12
Eigensolution Convergence Tol. (1.E-)	4
Vertical Axis	Y
Global Member Orientation Plane	XZ
Static Solver	Sparse Accelerated
Dynamic Solver	Standard Solver

Hot Rolled Steel Code	AISC 14th(360-10): LRFD
Adjust Stiffness?	Yes(Iterative)
RISAConnection Code	AISC 14th(360-10): ASD
Cold Formed Steel Code	AISI 1999: ASD
Wood Code	AF&PA NDS-91/97: ASD
Wood Temperature	< 100F
Concrete Code	ACI 318-02
Masonry Code	ACI 530-05: ASD
Aluminum Code	AA ADM1-05: ASD - Building
Stainless Steel Code	AISC 14th(360-10): ASD
Adjust Stiffness?	Yes(Iterative)

Number of Shear Regions	4
Region Spacing Increment (in)	4
Biaxial Column Method	PCA Load Contour
Parme Beta Factor (PCA)	.65
Concrete Stress Block	Rectangular
Use Cracked Sections?	Yes
Use Cracked Sections Slab?	Yes
Bad Framing Warnings?	No
Unused Force Warnings?	Yes
Min 1 Bar Diam. Spacing?	No
Concrete Rebar Set	REBAR_SET_ASTMA615
Min % Steel for Column	1
Max % Steel for Column	8

(Global) Model Settings, Continued

Seismic Code	UBC 1997
Seismic Base Elevation (ft)	Not Entered
Add Base Weight?	No
Ct X	.035
Ct Z	.035
T X (sec)	Not Entered
T Z (sec)	Not Entered
R X	8.5
R Z	8.5
Ca	.36
Cv	.54
Nv	1
Occupancy Category	4
Seismic Zone	3
Om Z	1
Om X	1
Rho Z	1
Rho X	1
Footing Overturning Safety Factor	1.5
Optimize for OTM/Sliding	No
Check Concrete Bearing	No
Footing Concrete Weight (k/ft^3)	0
Footing Concrete f'c (ksi)	3
Footing Concrete Ec (ksi)	4000
Lambda	1
Footing Steel fy (ksi)	60
Minimum Steel	0.0018
Maximum Steel	0.0075
Footing Top Bar	#3
Footing Top Bar Cover (in)	3.5
Footing Bottom Bar	#3
Footing Bottom Bar Cover (in)	3.5
Pedestal Bar	#3
Pedestal Bar Cover (in)	1.5
Pedestal Ties	#3

Hot Rolled Steel Properties

	Label	E [ksi]	G [ksi]	Nu	Therm (\1...	Density[k/ft^3]	Yield[ksi]	Ry	Fu[ksi]	Rt
1	A36 Gr.36	29000	11154	.3	.65	.49	36	1.5	58	1.2
2	A572 Gr.50	29000	11154	.3	.65	.49	50	1.1	58	1.2
3	A992	29000	11154	.3	.65	.49	50	1.1	58	1.2
4	A500 Gr.42	29000	11154	.3	.65	.49	42	1.3	58	1.1
5	A500 Gr.46	29000	11154	.3	.65	.49	46	1.2	58	1.1
6	A53 Gr. B	29000	11154	.3	.65	.49	35	1.5	58	1.2

Hot Rolled Steel Section Sets

	Label	Shape	Type	Design List	Material	Design ...	A [in2]	Iyy [in4]	Izz [in4]	J [in4]
1	Existing Upper ...	PIPE_12.0	Column	Pipe	A53 Gr. B	Typical	13.7	262	262	523
2	Existing Lower ...	HSS16x0.375	Column	Pipe	A500 Gr.42	Typical	17.2	526	526	1050

Hot Rolled Steel Design Parameters

	Label	Shape	Length[ft]	Lbyy[ft]	Lbzz[ft]	Lcomp top[ft]	Lcomp bot[ft]	L-torqu...	Kyy	Kzz	Cb	Function
1	M1	Existing Lo...	41.583	30		30						Lateral
2	M2	Existing Up...	22.417	30		30						Lateral

Member Primary Data

	Label	I Joint	J Joint	K Joint	Rotate(d...	Section/Shape	Type	Design List	Material	Design Rul...
1	M1	BOT_C...	SPLICE			Existing Lower Mast	Column	Pipe	A500 Gr....	Typical
2	M2	SPLICE	TOP_M...			Existing Upper Mast	Column	Pipe	A53 Gr. B	Typical

Joint Coordinates and Temperatures

	Label	X [ft]	Y [ft]	Z [ft]	Temp [F]	Detach From Dia...
1	BOT_CONN	0	0	0	0	
2	TOP_CONN	0	30	0	0	
3	SPLICE	0	41.583	0	0	
4	TOP_MAST	0	64	0	0	
5	CL_SPRINT	0	60.667	0	0	
6	CL_ATT	0	47	0	0	

Joint Boundary Conditions

	Joint Label	X [k/in]	Y [k/in]	Z [k/in]	X Rot.[k-ft/rad]	Y Rot.[k-ft/rad]	Z Rot.[k-ft/rad]
1	BOT_CONN	Reaction	Reaction	Reaction		Reaction	
2	TOP_CONN	Reaction	Reaction	Reaction		Reaction	

Member Point Loads

Member Label	Direction	Magnitude[k,k-ft]	Location[ft,%]
No Data to Print ...			

Member Distributed Loads (BLC 2 : Weight of Appurtenances)

	Member Label	Direction	Start Magnitude[k/ft,F,ksf]	End Magnitude[k/...	Start Location[ft,%]	End Location[ft,%]
1	M1	Y	-.012	-.012	0	0
2	M2	Y	-.012	-.012	0	0

Member Distributed Loads (BLC 3 : Weight of Ice Only)

	Member Label	Direction	Start Magnitude[k/ft,F,ksf]	End Magnitude[k/...	Start Location[ft,%]	End Location[ft,%]
1	M2	Y	-.038	-.038	0	0
2	M1	Y	-.045	-.045	0	0
3	M1	Y	-.159	-.159	0	0
4	M2	Y	-.159	-.159	0	0

Member Distributed Loads (BLC 4 : (x) TIA Wind with Ice)

	Member Label	Direction	Start Magnitude[k/ft,F,ksf]	End Magnitude[k/...	Start Location[ft,%]	End Location[ft,%]
1	M2	X	.009	.009	0	0
2	M1	X	.01	.01	0	0
3	M1	X	.008	.008	0	0
4	M2	X	.008	.008	0	0

Member Distributed Loads (BLC 5 : (x) TIA Wind)

	Member Label	Direction	Start Magnitude[k/ft,F,ksf]	End Magnitude[k/...	Start Location[ft,%]	End Location[ft,%]
1	M2	X	.027	.027	0	0
2	M1	X	.031	.031	0	0
3	M1	X	.018	.018	0	0
4	M2	X	.018	.018	0	0

Basic Load Cases

	BLC Description	Category	X Gravity	Y Gravity	Z Gravity	Joint	Point	Distribu...	Area(M...	Surface...
1	Self Weight (Mast)	None		-1						
2	Weight of Appurtenances	None				9		2		
3	Weight of Ice Only	None				9		4		
4	(x) TIA Wind with Ice	None				8		4		
5	(x) TIA Wind	None				8		4		

Load Combinations

	Description	So...	P...	S...	BLC	Fac...	BLC	Fac...	BLC	Fac...	BLC	Fac...	BLC	Fac...	BLC	Fac...	BLC	Fac...	BLC	Fac...	BLC	Fac...	BLC	Fac...
1	1.2D + 1.6W (X-d..	Yes	Y		1	1.2	2	1.2	5	1.6														
2	0.9D + 1.6W (X-d..	Yes	Y		1	.9	2	.9	5	1.6														
3	1.2D + 1.0Di + 1....	Yes	Y		1	1.2	2	1.2	3	1	4	1												

Envelope Joint Reactions

	Joint		X [k]	LC	Y [k]	LC	Z [k]	LC	MX [k-ft]	LC	MY [k-ft]	LC	MZ [k-ft]	LC
1	BOT_CONN	max	4.507	1	4.329	3	0	3	0	3	0	3	0	3
2		min	1.125	3	.952	2	0	1	0	1	0	1	0	1
3	TOP_CONN	max	-3.662	3	18.598	3	0	3	0	3	0	3	0	3
4		min	-15.359	1	4.313	2	0	1	0	1	0	1	0	1
5	Totals:	max	-2.537	3	22.928	3	0	3						
6		min	-10.852	1	5.265	2	0	1						

Envelope Joint Displacements

	Joint		X [in]	LC	Y [in]	LC	Z [in]	LC	X Rotation [...	LC	Y Rotation [...	LC	Z Rotation [...	LC
1	BOT_CONN	max	0	3	0	3	0	3	0	3	0	3	8.962e-03	1
2		min	0	1	0	1	0	1	0	1	0	1	2.217e-03	3
3	TOP_CONN	max	0	3	0	3	0	3	0	3	0	3	-4.714e-03	3
4		min	0	1	0	1	0	1	0	1	0	1	-1.913e-02	1
5	SPLICE	max	3.982	1	-.001	2	0	3	0	3	0	3	-8.839e-03	3
6		min	.981	3	-.004	3	0	1	0	1	0	1	-3.586e-02	1
7	TOP_MAST	max	16.162	1	-.002	2	0	3	0	3	0	3	-1.2e-02	3
8		min	3.997	3	-.009	3	0	1	0	1	0	1	-4.838e-02	1

Envelope Joint Displacements (Continued)

	Joint		X [in]	LC	Y [in]	LC	Z [in]	LC	X Rotation [...	LC	Y Rotation [...	LC	Z Rotation [...	LC
9	CL_SPRINT	max	14.227	1	-.002	2	0	3	0	3	0	3	-1.2e-02	3
10		min	3.517	3	-.009	3	0	1	0	1	0	1	-4.837e-02	1
11	CL_ATT	max	6.579	1	-.002	2	0	3	0	3	0	3	-1.062e-02	3
12		min	1.622	3	-.006	3	0	1	0	1	0	1	-4.297e-02	1

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

	Member	Shape	Code Check	Loc...	LC	Shea...	Loc......		L...	phi*Pn..	phi*Pn..	phi*M...	phi*M...	...	Eqn
1	M1	HSS16x0.375	.631	29....	1	.044	30....		1	394.312	650.16	269.325	269.325	1..	H1-1b
2	M2	PIPE_12.0	.545	0	1	.060	0		1	305.067	431.55	140.963	140.963	2..	H1-1b

Joint Reactions

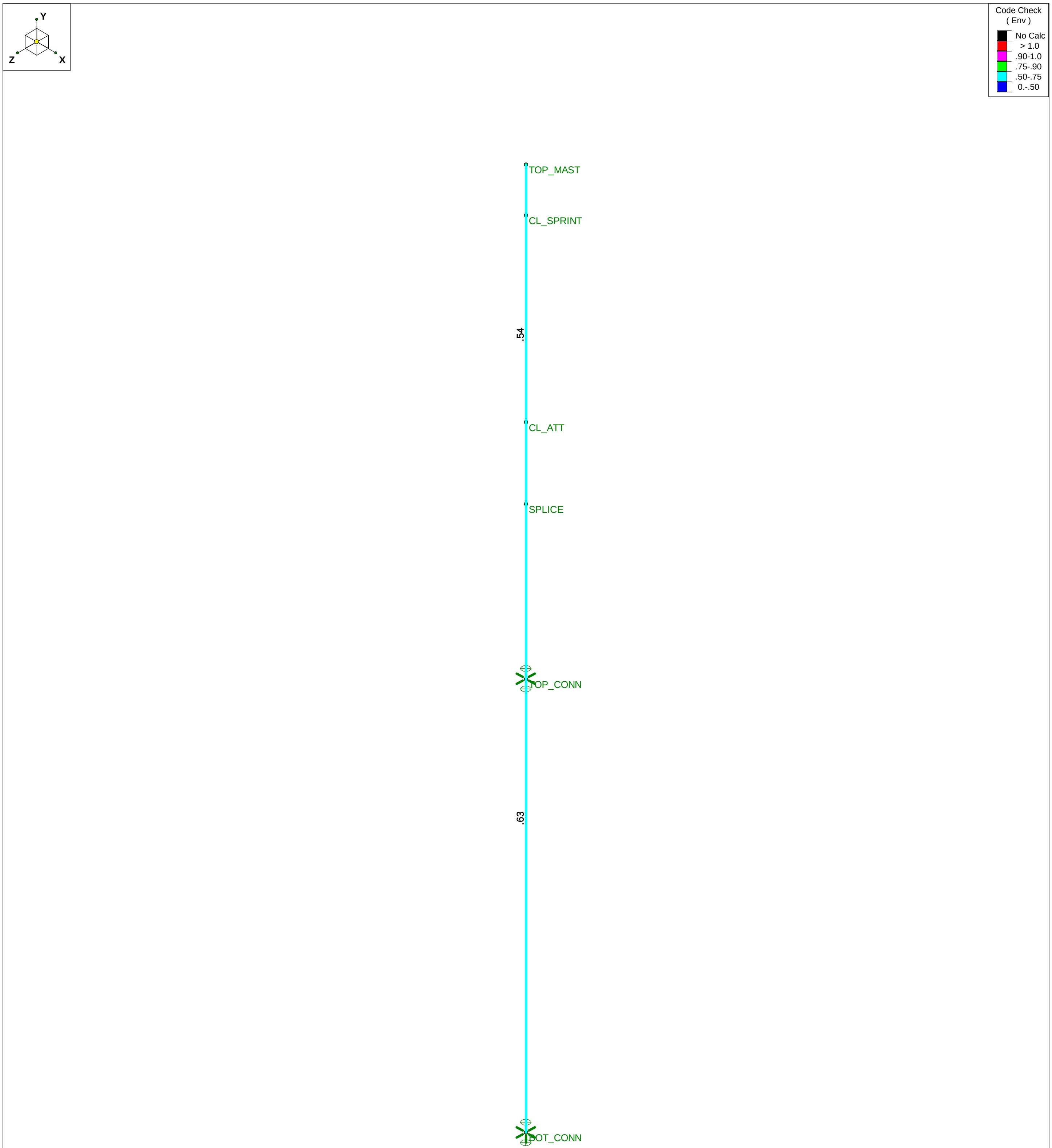
	LC	Joint Label	X [k]	Y [k]	Z [k]	MX [k-ft]	MY [k-ft]	MZ [k-ft]
1	1	BOT_CONN	4.507	1.269	0	0	0	0
2	1	TOP_CONN	-15.359	5.75	0	0	0	0
3	1	Totals:	-10.852	7.02	0			
4	1	COG (ft):	X: 0	Y: 36.203	Z: 0			

Joint Reactions

	LC	Joint Label	X [k]	Y [k]	Z [k]	MX [k-ft]	MY [k-ft]	MZ [k-ft]
1	2	BOT_CONN	4.483	.952	0	0	0	0
2	2	TOP_CONN	-15.334	4.313	0	0	0	0
3	2	Totals:	-10.852	5.265	0			
4	2	COG (ft):	X: 0	Y: 36.203	Z: 0			

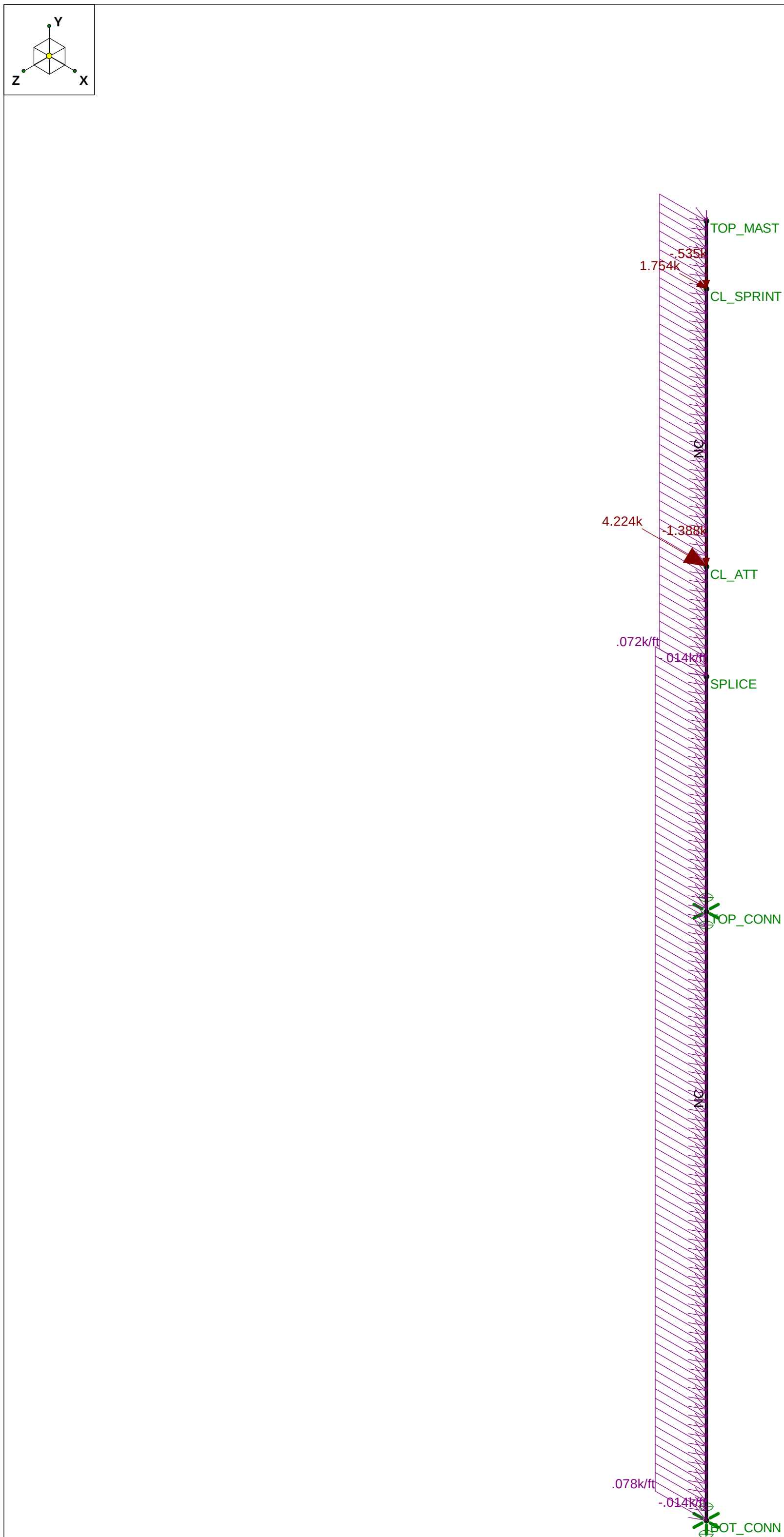
Joint Reactions

	LC	Joint Label	X [k]	Y [k]	Z [k]	MX [k-ft]	MY [k-ft]	MZ [k-ft]
1	3	BOT_CONN	1.125	4.329	0	0	0	0
2	3	TOP_CONN	-3.662	18.598	0	0	0	0
3	3	Totals:	-2.537	22.928	0			
4	3	COG (ft):	X: 0	Y: 35.684	Z: 0			



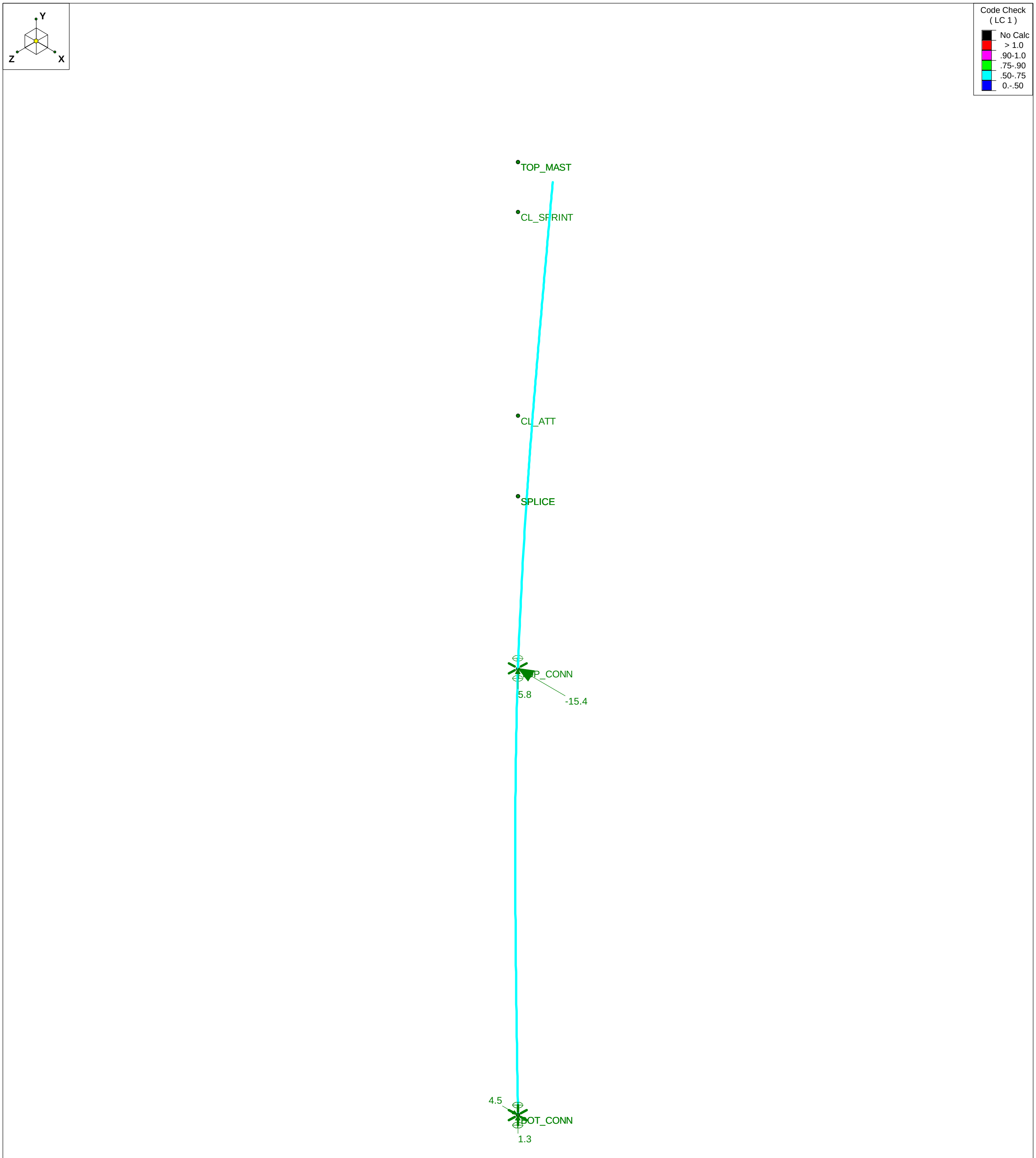
Member Code Checks Displayed (Enveloped)
Envelope Only Solution

CENTEK Engineering, INC.		
tjl, cfc	Struct # 2683 - Mast	Oct 17, 2018 at 8:05 AM
17159.18 /Sprint CT54XC7...	Unity Check	TIA Loads.r3d



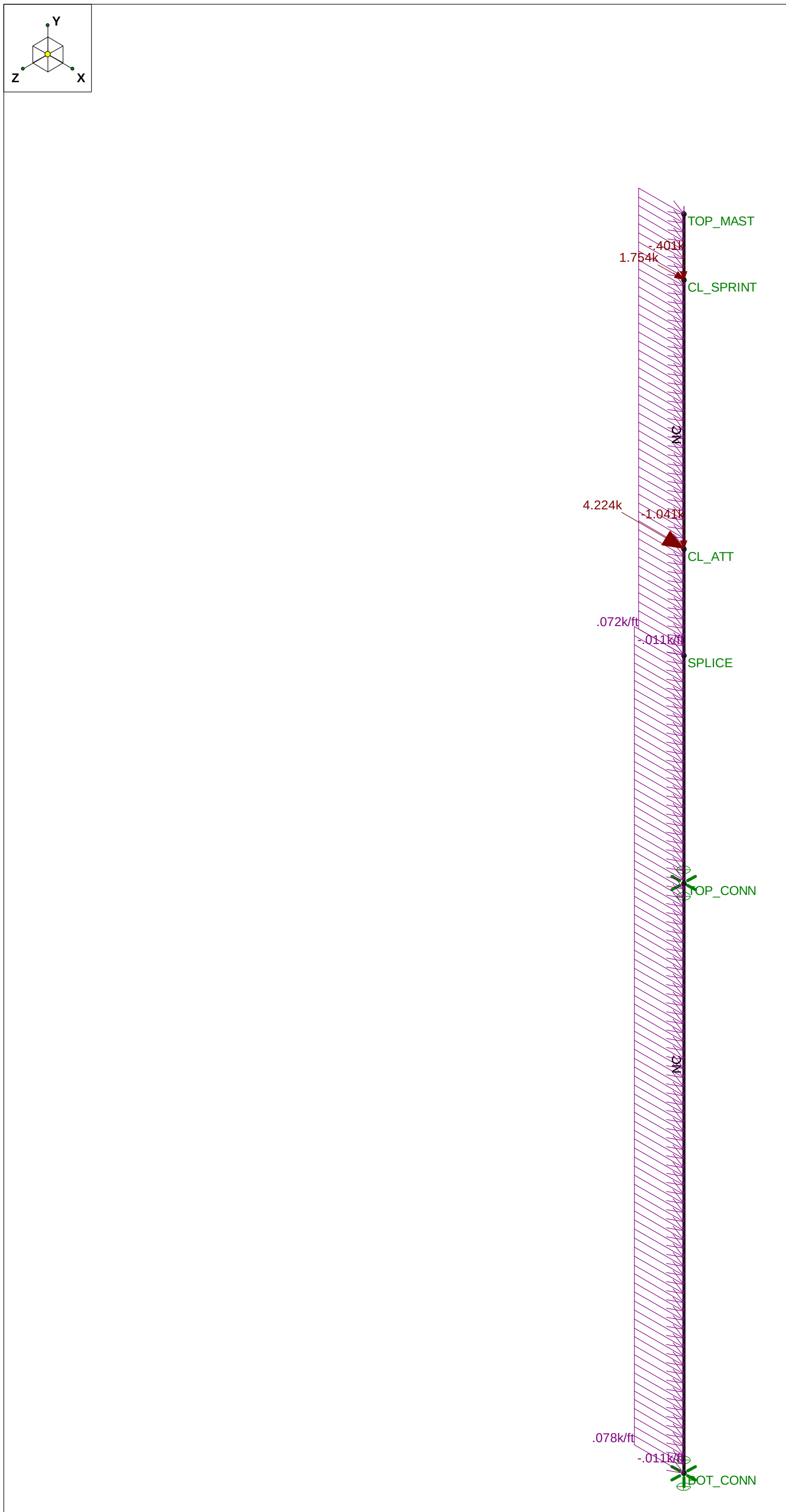
Member Code Checks Displayed
Loads: LC 1, 1.2D + 1.6W (X-direction)

CENTEK Engineering, INC.		
tjl, cfc	Struct # 2683 - Mast	Oct 17, 2018 at 8:05 AM
17159.18 /Sprint CT54XC7...	LC #1 Loads	TIA Loads.r3d



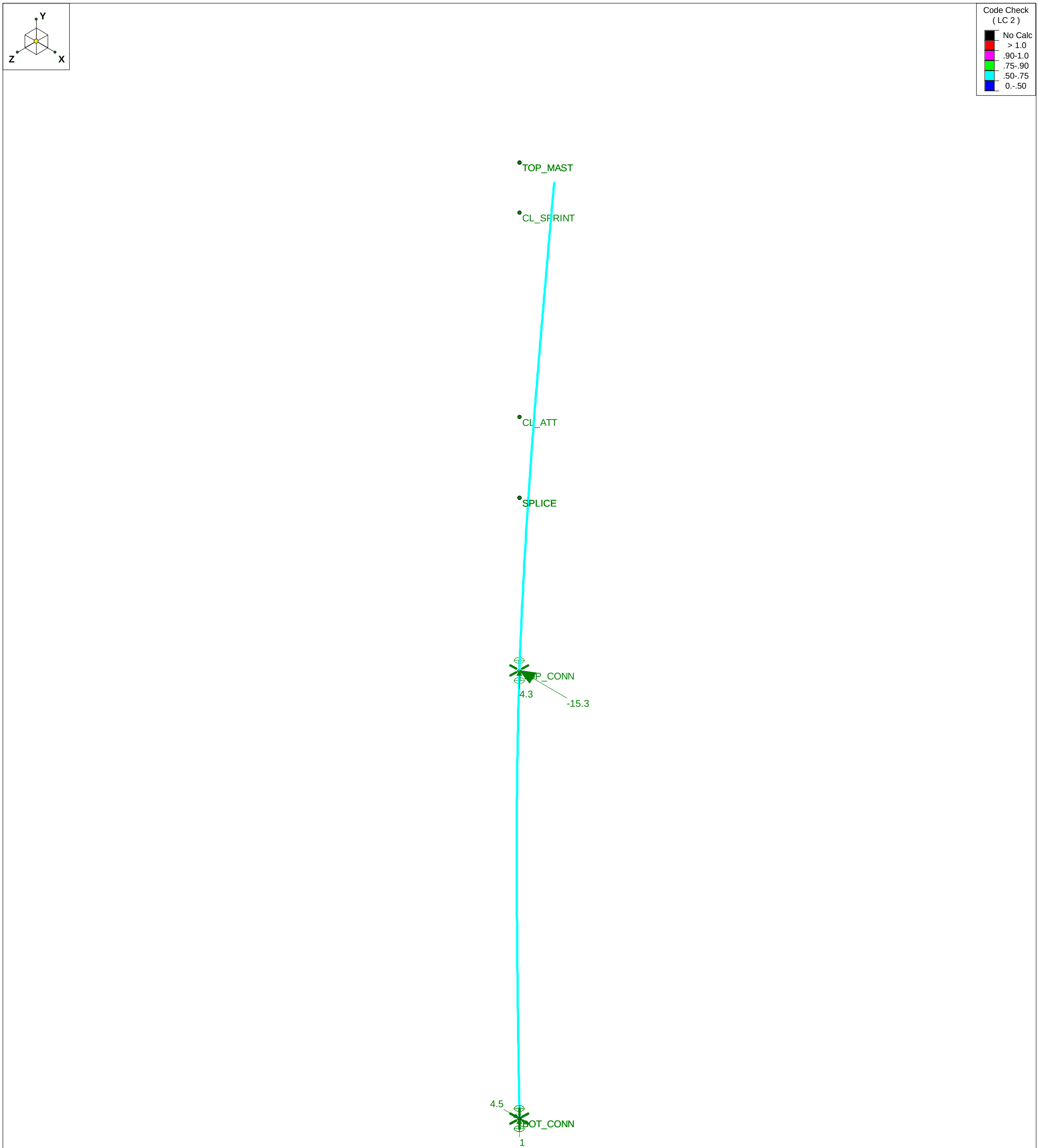
Member Code Checks Displayed
Results for LC 1, 1.2D + 1.6W (X-direction)
Reaction and Moment Units are k and k-ft

CENTEK Engineering, INC.		
tjl, cfc	Struct # 2683 - Mast	Oct 17, 2018 at 8:07 AM
17159.18 /Sprint CT54XC7...	LC #1 Reactions and Deflected Shape	TIA Loads.r3d



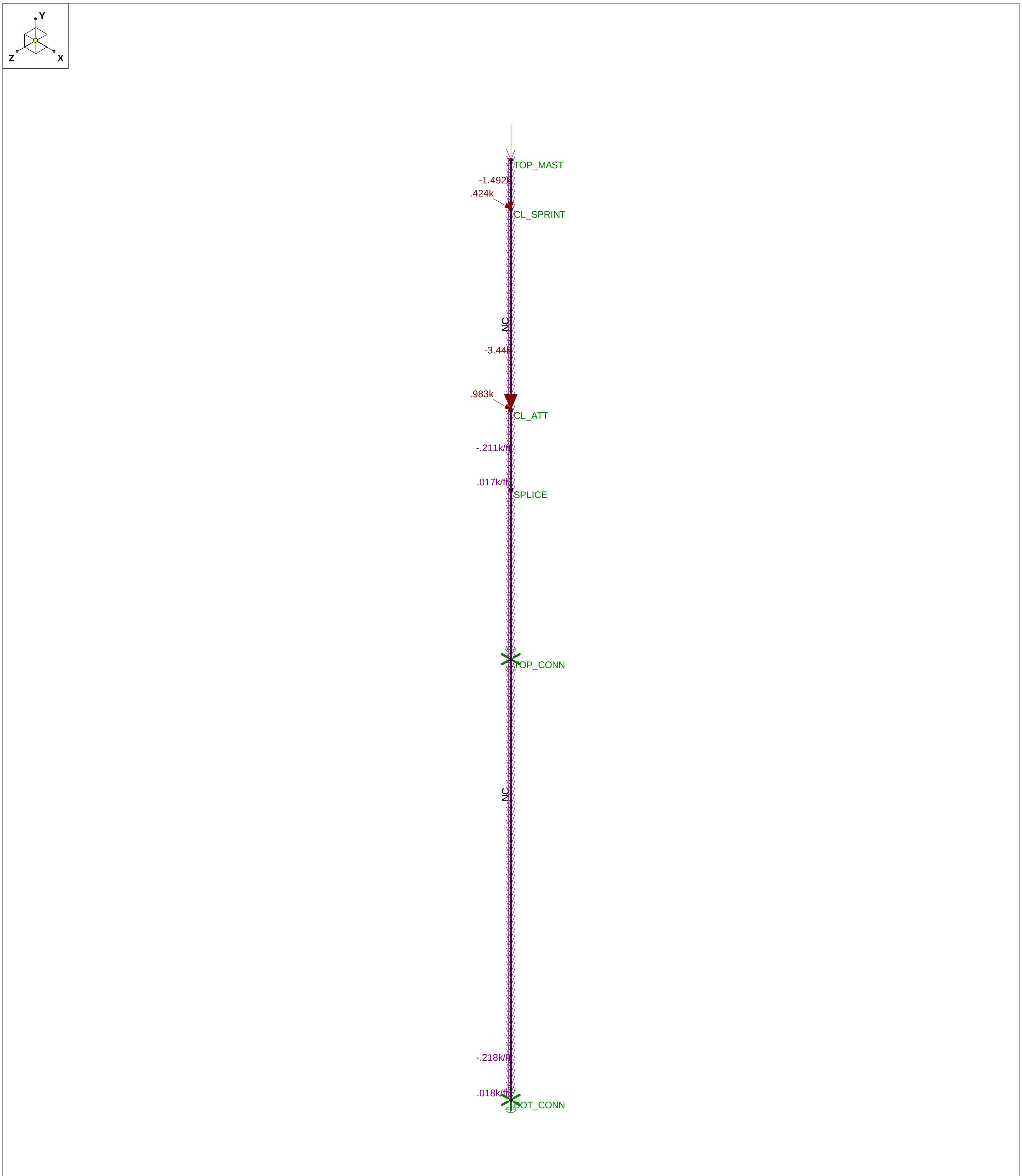
Member Code Checks Displayed
Loads: LC 2, 0.9D + 1.6W (X-direction)

CENTEK Engineering, INC.	Struct # 2683 - Mast	
tjl, cfc		Oct 17, 2018 at 8:06 AM
17159.18 /Sprint CT54XC7...	LC #2 Loads	TIA Loads.r3d



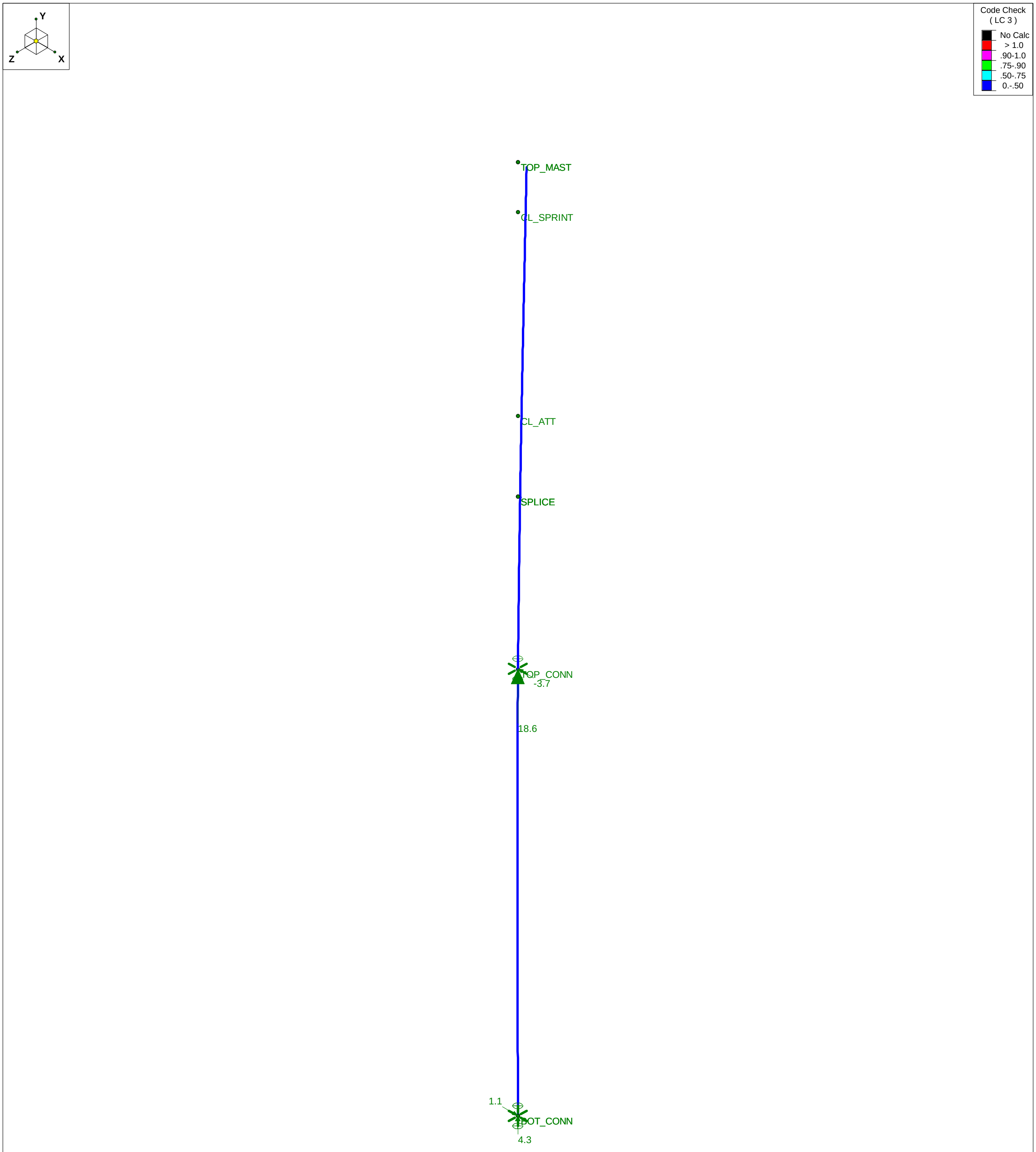
Member Code Checks Displayed
Results for LC 2, 0.9D + 1.6W (X-direction)
Reaction and Moment Units are k and k-ft

CENTEK Engineering, INC.		
tjl, cfc	Struct # 2683 - Mast	Oct 17, 2018 at 8:07 AM
17159.18 /Sprint CT54XC7...	LC #2 Reactions and Deflected Shape	TIA Loads.r3d



Member Code Checks Displayed
Loads: LC 3, 1.2D + 1.0Di + 1.0Wi (X-direction)

CENTEK Engineering, INC.		
tjl, cfc	Struct # 2683 - Mast	Oct 17, 2018 at 8:06 AM
17159.18 /Sprint CT54XC7...	LC #3 Loads	TIA Loads.r3d



Member Code Checks Displayed
Results for LC 3, 1.2D + 1.0Di + 1.0Wi (X-direction)
Reaction and Moment Units are k and k-ft

CENTEK Engineering, INC.		
tjl, cfc	Struct # 2683 - Mast	Oct 17, 2018 at 8:07 AM
17159.18 /Sprint CT54XC7...	LC #3 Reactions and Deflected Shape	TIA Loads.r3d

CENTEK engineering
Centered on Solutions™ www.centekeng.com
63-2 North Branford Road P: (203) 488-0580
Branford, CT 06405 F: (203) 488-8587

Subject:	Connection of Mast to Pole # 2683
Location:	Brookfield, CT
Rev. 0: 1/15/18	Prepared by: T.J.L. Checked by: C.F.C. Job No. 17159.18

Mast Connection to Tower:

Reactions:

Moment = $Moment := 0 \cdot kips$ (Input From Risa-3D)

Vertical = $Vertical := 5.8 \cdot kips$ (Input From Risa-3D)

Horizontal x-dir = $Horizontal_x := 15.4 \cdot kips$ (Input From Risa-3D)

Horizontal z-dir = $Horizontal_z := 15.4 \cdot kips$ (Input From Risa-3D)

Bolt Data:

Bolt Type = ASTMA325 (User Input)

Bolt Diameter = $D := 0.625 \cdot in$ (User Input)

Number of Bolts = $N_b := 4$ (User Input)

Design Tensile Strength = $F_t := 20.7 \cdot kips$ (User Input)

Design Shear Strength = $F_v := 12.4 \cdot kips$ (User Input)

Shear Force = $f_v := \frac{\sqrt{Horizontal_z^{\,2} + Vertical^2}}{N_b} = 4.1 \cdot kips$

Bolt Shear % of Capacity = $\frac{f_v}{F_v} = 33.18 \cdot \%$

Check Bolt Shear = $Bolt\_Shear := if\left(\frac{f_v}{F_v} \le 1.00, \text{"OK"}, \text{"Overstressed"}\right)$

$Bolt\_Shear = \text{"OK"}$

Tension Force = $f_t := \frac{Horizontal_x}{N_b} = 3.9 \cdot kips$

Bolt Tenison % of Capacity = $\frac{f_t}{F_t} = 18.6 \cdot \%$

Check Bolt Tension = $Bolt\_Tension := if\left(\frac{f_t}{F_t} \le 1.00, \text{"OK"}, \text{"Overstressed"}\right)$

$Bolt\_Tension = \text{"OK"}$

Basic Components

Heavy Wind Pressure =	$p := 4.00$	psf	(User Input NESC 2007 Figure 250-1 & Table 250-1)
Basic Windspeed =	$V := 100$	mph	(User Input NESC 2007 Figure 250-2(e))
Radial Ice Thickness =	$Ir := 0.50$	in	(User Input)
Radial Ice Density =	$Id := 56.0$	pcf	(User Input)

Factors for Extreme Wind Calculation

Elevation of Top of Mast Above Grade = $TME := 114$ ft (User Input)

Multiplier Gust Response Factor = $m := 1.25$ (User Input - Only for NESC Extreme wind case)

NESC Factor = $kv := 1.43$ (User Input from NESC 2007 Table 250-3 equation)

Importance Factor = $I := 1.0$ (User Input from NESC 2007 Section 250.C.2)

Velocity Pressure Coefficient = $Kz := 2.01 \cdot \left(\frac{TME}{900}\right)^{\frac{2}{9.5}} = 1.301$ (NESC 2007 Table 250-2)

Exposure Factor = $Es := 0.346 \left[\frac{33}{(0.67 \cdot TME)}\right]^{\frac{1}{7}} = 0.307$ (NESC 2007 Table 250-3)

Response Term = $Bs := \frac{1}{\left(1 + 0.375 \cdot \frac{TME}{220}\right)} = 0.837$ (NESC 2007 Table 250-3)

Gust Response Factor = $Grf := \frac{\left[1 + \left(2.7 \cdot Es \cdot Bs^{\frac{1}{2}}\right)\right]}{kv^2} = 0.86$ (NESC 2007 Table 250-3)

Wind Pressure = $qz := 0.00256 \cdot Kz \cdot V^2 \cdot Grf \cdot I = 28.6$ psf (NESC 2007 Section 250.C.2)

Shape Factors

Shape Factor for Round Members = $Cd_R := 1.3$ (User Input)

Shape Factor for Flat Members = $Cd_F := 1.6$ (User Input)

Shape Factor for Coax Cables Attached to Outside of Pole = $Cd_{coax} := 1.6$ (User Input)

Overload Factors

Overload Factors for Wind Loads:

NESC Heavy Loading =	**2.5**	(User Input)	Apply in Risa-3D Analysis
NESC Extreme Loading =	**1.0**	(User Input)	Apply in Risa-3D Analysis

Overload Factors for Vertical Loads:

NESC Heavy Loading =	**1.5**	(User Input)	Apply in Risa-3D Analysis
NESC Extreme Loading =	**1.0**	(User Input)	Apply in Risa-3D Analysis

Development of Wind & Ice Load on PCS Mast

Existing Upper PCS Mast Data: (Pipe 12 STD)

Mast Shape =	Round		(User Input)
Mast Diameter =	$D_{mast} := 12.8$	in	(User Input)
Mast Length =	$L_{mast} := 22.417$	ft	(User Input)
Mast Thickness =	$t_{mast} := 0.375$	in	(User Input)

Wind Load (NESC Extreme)

Mast Projected Surface Area = $A_{mast} := \frac{D_{mast}}{12} = 1.067$ sf/ft

Total Mast Wind Force (Above NU Structure) = $qz \cdot Cd_{coax} \cdot A_{mast} \cdot m = 61$ plf **BLC 5**

Wind Load (NESE Heavy)

Mast Projected Surface Area w/ Ice = $AICE_{mast} := \frac{(D_{mast} + 2 \cdot Ir)}{12} = 1.15$ sf/ft

Total Mast Wind Force w/ Ice = $p \cdot Cd_{coax} \cdot AICE_{mast} = 7$ plf **BLC 4**

Gravity Loads (without ice)

Weight of the mast = Self Weight **(Computed internally by Risa-3D)** plf **BLC 1**

Gravity Loads (ice only)

Ice Area per Linear Foot = $Ai_{mast} := \frac{\pi}{4}\left[(D_{mast} + Ir \cdot 2)^2 - D_{mast}^{\,2}\right] = 20.9$ sq in

Weight of Ice on Mast = $W_{ICEmast} := Id \cdot \frac{Ai_{mast}}{144} = 8$ plf **BLC 3**

Development of Wind & Ice Load on PCS Mast

Existing Lower PCS Mast Data: HSS16.0x0.375

Mast Shape =	Round		(User Input)
Mast Diameter =	$D_{mast} := 16.0$	in	(User Input)
Mast Length =	$L_{mast} := 41.583$	ft	(User Input)
Mast Thickness =	$t_{mast} := 0.375$	in	(User Input)

Wind Load (NESC Extreme)

Mast Projected Surface Area = $A_{mast} := \frac{D_{mast}}{12} = 1.333$ sf/ft

Total Mast Wind Force (Below NU Structure) = $qz \cdot Cd_{coax} \cdot A_{mast} = 61$ plf **BLC 5**

Wind Load (NESE Heavy)

Mast Projected Surface Area w/ Ice = $AICE_{mast} := \frac{(D_{mast} + 2 \cdot Ir)}{12} = 1.417$ sf/ft

Total Mast Wind Force w/ Ice = $p \cdot Cd_{coax} \cdot AICE_{mast} = 9$ plf **BLC 4**

Gravity Loads (without ice)

Weight of the mast = Self Weight **(Computed internally by Risa-3D)** plf **BLC 1**

Gravity Loads (ice only)

Ice Area per Linear Foot = $Ai_{mast} := \frac{\pi}{4}\left[(D_{mast} + Ir \cdot 2)^2 - D_{mast}^{\ 2}\right] = 25.9$ sq in

Weight of Ice on Mast = $W_{ICEmast} := Id \cdot \frac{Ai_{mast}}{144} = 10$ plf **BLC 3**

Development of Wind & Ice Load on Antennas

Antenna Data:

Antenna Model =	Commscope DHHTT65B-3XR		
Antenna Shape =	Flat		(User Input)
Antenna Height =	$L_{ant} := 72.1$	in	(User Input)
Antenna Width =	$W_{ant} := 11.9$	in	(User Input)
Antenna Thickness =	$T_{ant} := 7.1$	in	(User Input)
Antenna Weight =	$WT_{ant} := 46$	lbs	(User Input)
Number of Antennas =	$N_{ant} := 3$		(User Input)

Gravity Load (without ice)

Weight of All Antennas = $Wt_{ant1} := WT_{ant} \cdot N_{ant} = 138$ lbs

Gravity Load (ice only)

Volume of Each Antenna = $V_{ant} := L_{ant} \cdot W_{ant} \cdot T_{ant} = 6092$ cu in

Volume of Ice on Each Antenna = $V_{ice} := (L_{ant} + 2 \cdot Ir)(W_{ant} + 2 \cdot Ir)(T_{ant} + 2 \cdot Ir) - V_{ant} = 1546$ cu in

Weight of Ice on Each Antenna = $W_{ICEant} := \frac{V_{ice}}{1728} \cdot Id = 50$ lbs

Weight of Ice on All Antennas = $Wt_{ice.ant1} := W_{ICEant} \cdot N_{ant} = 150$ lbs

Wind Load (NESC Heavy)

Assumes Maximum Possible Wind Pressure Applied to all Antennas Simultaneously

Surface Area for One Antenna w/ Ice = $SA_{ICEant} := \frac{(L_{ant} + 2 \cdot Ir) \cdot (W_{ant} + 2 \cdot Ir)}{144} = 6.5$ sf

Antenna Projected Surface Area w/ Ice = $A_{ICEant} := SA_{ICEant} \cdot N_{ant} = 19.6$ sf

Total Antenna Wind Force w/ Ice = $Fi_{ant1} := p \cdot Cd_F \cdot A_{ICEant} = 126$ lbs

Wind Load (NESC Extreme)

Assumes Maximum Possible Wind Pressure Applied to all Antennas Simultaneously

Surface Area for One Antenna = $SA_{ant} := \frac{L_{ant} \cdot W_{ant}}{144} = 6$ sf

Antenna Projected Surface Area = $A_{ant} := SA_{ant} \cdot N_{ant} = 17.9$ sf

Total Antenna Wind Force = $F_{ant1} := qz \cdot Cd_F \cdot A_{ant} \cdot m = 1024$ lbs

Development of Wind & Ice Load on Antennas

Antenna Data:

Antenna Model = RFS KIT-FD9R6004/1C-DL Diplexer

Antenna Shape = Flat (User Input)

Antenna Height = $L_{ant} := 5.8$ in (User Input)

Antenna Width = $W_{ant} := 6.5$ in (User Input)

Antenna Thickness = $T_{ant} := 4.6$ in (User Input)

Antenna Weight = $WT_{ant} := 7$ lbs (User Input)

Number of Antennas = $N_{ant} := 3$ (User Input)

Gravity Load (without ice)

Weight of All Antennas = $Wt_{ant2} := WT_{ant} \cdot N_{ant} = 21$ lbs

Gravity Load (ice only)

Volume of Each Antenna = $V_{ant} := L_{ant} \cdot W_{ant} \cdot T_{ant} = 173$ cu in

Volume of Ice on Each Antenna = $V_{ice} := (L_{ant} + 2 \cdot Ir)(W_{ant} + 2 \cdot Ir)(T_{ant} + 2 \cdot Ir) - V_{ant} = 112$ cu in

Weight of Ice on Each Antenna = $W_{ICEant} := \frac{V_{ice}}{1728} \cdot Id = 4$ lbs

Weight of Ice on All Antennas = $Wt_{ice.ant2} := W_{ICEant} \cdot N_{ant} = 11$ lbs

Wind Load (NESC Heavy)

Assumes Maximum Possible Wind Pressure Applied to all Antennas Simultaneously

Surface Area for One Antenna w/ Ice = $SA_{ICEant} := \frac{(L_{ant} + 2 \cdot Ir) \cdot (W_{ant} + 2 \cdot Ir)}{144} = 0.4$ sf

Antenna Projected Surface Area w/ Ice = $A_{ICEant} := SA_{ICEant} \cdot N_{ant} = 1.1$ sf

Total Antenna Wind Force w/ Ice = $Fi_{ant2} := p \cdot Cd_F \cdot A_{ICEant} = 7$ lbs

Wind Load (NESC Extreme)

Assumes Maximum Possible Wind Pressure Applied to all Antennas Simultaneously

Surface Area for One Antenna = $SA_{ant} := \frac{L_{ant} \cdot W_{ant}}{144} = 0.3$ sf

Antenna Projected Surface Area = $A_{ant} := SA_{ant} \cdot N_{ant} = 0.8$ sf

Total Antenna Wind Force = $F_{ant2} := qz \cdot Cd_F \cdot A_{ant} \cdot m = 45$ lbs

Development of Wind & Ice Load on Antennas

Antenna Data:

Antenna Model =	CCI DPO-7126Y-0-T1 Diplexer		
Antenna Shape =	Flat		(User Input)
Antenna Height =	$L_{ant} := 4.07$	in	(User Input)
Antenna Width =	$W_{ant} := 7.42$	in	(User Input)
Antenna Thickness =	$T_{ant} := 6.26$	in	(User Input)
Antenna Weight =	$WT_{ant} := 8$	lbs	(User Input)
Number of Antennas =	$N_{ant} := 3$		(User Input)

Gravity Load (without ice)

Weight of All Antennas = $Wt_{ant3} := WT_{ant} \cdot N_{ant} = 24$ lbs

Gravity Load (ice only)

Volume of Each Antenna = $V_{ant} := L_{ant} \cdot W_{ant} \cdot T_{ant} = 189$ cu in

Volume of Ice on Each Antenna = $V_{ice} := (L_{ant} + 2 \cdot Ir)(W_{ant} + 2 \cdot Ir)(T_{ant} + 2 \cdot Ir) - V_{ant} = 121$ cu in

Weight of Ice on Each Antenna = $W_{ICEant} := \frac{V_{ice}}{1728} \cdot Id = 4$ lbs

Weight of Ice on All Antennas = $Wt_{ice.ant3} := W_{ICEant} \cdot N_{ant} = 12$ lbs

Wind Load (NESC Heavy)

Assumes Maximum Possible Wind Pressure Applied to all Antennas Simultaneously

Surface Area for One Antenna w/ Ice = $SA_{ICEant} := \frac{(L_{ant} + 2 \cdot Ir) \cdot (W_{ant} + 2 \cdot Ir)}{144} = 0.3$ sf

Antenna Projected Surface Area w/ Ice = $A_{ICEant} := SA_{ICEant} \cdot N_{ant} = 0.9$ sf

Total Antenna Wind Force w/ Ice = $Fi_{ant3} := p \cdot Cd_F \cdot A_{ICEant} = 6$ lbs

Wind Load (NESC Extreme)

Assumes Maximum Possible Wind Pressure Applied to all Antennas Simultaneously

Surface Area for One Antenna = $SA_{ant} := \frac{L_{ant} \cdot W_{ant}}{144} = 0.2$ sf

Antenna Projected Surface Area = $A_{ant} := SA_{ant} \cdot N_{ant} = 0.6$ sf

Total Antenna Wind Force = $F_{ant3} := qz \cdot Cd_F \cdot A_{ant} \cdot m = 36$ lbs

Development of Wind & Ice Load on Antenna Mounts

Mount Data:	(Sprint)		
Mount Type:	Universal Tri-Bracket		
Mount Shape =	Flat		(User Input)
Pipe Mount Length =	$L_{mnt} := 72$	in	(User Input)
2 inch Pipe Mount Linear Weight =	$W_{mnt} := 3.66$	plf	(User Input)
Pipe Mount Outside Diameter =	$D_{mnt} := 2.375$	in	(User Input)
Number of Mounting Pipes =	$N_{mnt} := 3$		(User Input)
Tri-Bracket Weight =	$W_{tb.mnt} := 197$	lbs	(User Input)

Wind Load (NESC Extreme)

Assumes Mount is Shielded by Antenna

Mount Projected Surface Area = $A_{mnt} := 0.0$ sf

Total Mount Wind Force = $F_{mnt} := qz \cdot Cd_F \cdot A_{mnt} \cdot m = 0$ lbs **BLC 5**

Wind Load (NESC Heavy)

Assumes Mount is Shielded by Antenna

Mount Projected Surface Area w/ Ice = $A_{ICEmnt} := 0.0$ sf

Total Mount Wind Force = $Fi_{mnt} := p \cdot Cd_F \cdot A_{ICEmnt} = 0$ lbs **BLC 4**

Gravity Loads (without ice)

Weight Each Pipe Mount = $WT_{mnt} := W_{mnt} \cdot \frac{L_{mnt}}{12} = 22$ lbs

Weight of All Mounts = $WT_{mnt} \cdot N_{mnt} + W_{tb.mnt} = 263$ lbs **BLC 2**

Gravity Load (ice only)

Volume of Each Pipe = $V_{mnt} := \frac{\pi}{4} \cdot D_{mnt}^{2} \cdot L_{mnt} = 319$ cu in

Volume of Ice on Each Pipe = $V_{ice} := \left[\frac{\pi}{4} \cdot \left[\left(D_{mnt} + 1\right)^2\right] \cdot \left(L_{mnt} + 1\right)\right] - V_{mnt} = 334$ cu in

Weight of Ice each mount (incl, hardware) = $W_{ICEmnt} := \frac{V_{ice}}{1728} \cdot Id = 11$ lbs

Weight of Ice on All Mounts = $W_{ICEmnt} \cdot N_{mnt} + 5 = 37$ lbs **BLC 3**

Development of Wind & Ice Load on Antennas

Existing Antenna Data: (AT&T)

Antenna Model =	Powerwave 7770.00		
Antenna Shape =	Flat		(User Input)
Antenna Height =	$L_{ant} := 55$	in	(User Input)
Antenna Width =	$W_{ant} := 11.0$	in	(User Input)
Antenna Thickness =	$T_{ant} := 5$	in	(User Input)
Antenna Weight =	$WT_{ant} := 39$	lbs	(User Input)
Number of Antennas =	$N_{ant} := 3$		(User Input)

Wind Load (NESC Extreme)

Assumes Maximum Possible Wind Pressure Applied to all Antennas Simultaneously

Surface Area for One Antenna = $SA_{ant} := \frac{L_{ant} \cdot W_{ant}}{144} = 4.2$ sf

Antenna Projected Surface Area = $A_{ant} := SA_{ant} \cdot N_{ant} = 12.6$ sf

Total Antenna Wind Force = $F_{ant} := qz \cdot Cd_F \cdot A_{ant} \cdot m = 722$ lbs **BLC 5**

Wind Load (NESC Heavy)

Assumes Maximum Possible Wind Pressure Applied to all Antennas Simultaneously

Surface Area for One Antenna w/ Ice = $SA_{ICEant} := \frac{(L_{ant} + 1) \cdot (W_{ant} + 1)}{144} = 4.7$ sf

Antenna Projected Surface Area w/ Ice = $A_{ICEant} := SA_{ICEant} \cdot N_{ant} = 14$ sf

Total Antenna Wind Force w/ Ice = $Fi_{ant} := p \cdot Cd_F \cdot A_{ICEant} = 90$ lbs **BLC 4**

Gravity Load (without ice)

Weight of All Antennas = $WT_{ant} \cdot N_{ant} = 117$ lbs **BLC 2**

Gravity Load (ice only)

Volume of Each Antenna = $V_{ant} := L_{ant} \cdot W_{ant} \cdot T_{ant} = 3025$ cu in

Volume of Ice on Each Antenna = $V_{ice} := (L_{ant} + 1)(W_{ant} + 1) \cdot (T_{ant} + 1) - V_{ant} = 1007$ cu in

Weight of Ice on Each Antenna = $W_{ICEant} := \frac{V_{ice}}{1728} \cdot Id = 33$ lbs

Weight of Ice on All Antennas = $W_{ICEant} \cdot N_{ant} = 98$ lbs **BLC 3**

Development of Wind & Ice Load on Antennas

Proposed Antenna Data: (AT&T)

Antenna Model =	CCI OPA-65R-LCUU-H6		
Antenna Shape =	Flat		(User Input)
Antenna Height =	$L_{ant} := 72$	in	(User Input)
Antenna Width =	$W_{ant} := 14.8$	in	(User Input)
Antenna Thickness =	$T_{ant} := 7.4$	in	(User Input)
Antenna Weight =	$WT_{ant} := 75$	lbs	(User Input)
Number of Antennas =	$N_{ant} := 3$		(User Input)

Wind Load (NESC Extreme)

Assumes Maximum Possible Wind Pressure Applied to all Antennas Simultaneously

Surface Area for One Antenna = $SA_{ant} := \frac{L_{ant} \cdot W_{ant}}{144} = 7.4$ sf

Antenna Projected Surface Area = $A_{ant} := SA_{ant} \cdot N_{ant} = 22.2$ sf

Total Antenna Wind Force = $F_{ant} := qz \cdot Cd_F \cdot A_{ant} \cdot m = 1271$ lbs **BLC 5**

Wind Load (NESC Heavy)

Assumes Maximum Possible Wind Pressure Applied to all Antennas Simultaneously

Surface Area for One Antenna w/ Ice = $SA_{ICEant} := \frac{(L_{ant} + 1) \cdot (W_{ant} + 1)}{144} = 8$ sf

Antenna Projected Surface Area w/ Ice = $A_{ICEant} := SA_{ICEant} \cdot N_{ant} = 24$ sf

Total Antenna Wind Force w/ Ice = $Fi_{ant} := p \cdot Cd_F \cdot A_{ICEant} = 154$ lbs **BLC 4**

Gravity Load (without ice)

Weight of All Antennas = $WT_{ant} \cdot N_{ant} = 225$ lbs **BLC 2**

Gravity Load (ice only)

Volume of Each Antenna = $V_{ant} := L_{ant} \cdot W_{ant} \cdot T_{ant} = 7885$ cu in

Volume of Ice on Each Antenna = $V_{ice} := (L_{ant} + 1)(W_{ant} + 1) \cdot (T_{ant} + 1) - V_{ant} = 1803$ cu in

Weight of Ice on Each Antenna = $W_{ICEant} := \frac{V_{ice}}{1728} \cdot Id = 58$ lbs

Weight of Ice on All Antennas = $W_{ICEant} \cdot N_{ant} = 175$ lbs **BLC 3**

Development of Wind & Ice Load on TMA's

Existing TMA Data: (AT&T)

TMA Model =	Powerwave LGP 21401		
TMA Shape =	Flat		(User Input)
TMA Height =	$L_{TMA} := 14.4$	in	(User Input)
TMA Width =	$W_{TMA} := 9.2$	in	(User Input)
TMA Thickness =	$T_{TMA} := 2.6$	in	(User Input)
TMA Weight =	$WT_{TMA} := 14.1$	lbs	(User Input)
Number of TMA's =	$N_{TMA} := 6$		(User Input)

Wind Load (NESC Extreme)

Assumes Maximum Possible Wind Pressure Applied to All TMA's Simultaneously

Surface Area for One TMA = $SA_{TMA} := \frac{L_{TMA} \cdot W_{TMA}}{144} = 0.9$ sf

TMA Projected Surface Area = $A_{TMA} := SA_{TMA} \cdot N_{TMA} = 5.5$ sf

Total TMA Wind Force = $F_{TMA} := qz \cdot Cd_F \cdot A_{TMA} \cdot m = 316$ lbs **BLC 5**

Wind Load (NESC Heavy)

Assumes Maximum Possible Wind Pressure Applied to All TMA's Simultaneously

Surface Area for One TMA w/ Ice = $SA_{ICETMA} := \frac{(L_{TMA} + 1) \cdot (W_{TMA} + 1)}{144} = 1.1$ sf

TMA Projected Surface Area w/ Ice = $A_{ICETMA} := SA_{ICETMA} \cdot N_{TMA} = 6.5$ sf

Total TMA Wind Force w/ Ice = $Fi_{TMA} := p \cdot Cd_F \cdot A_{ICETMA} = 42$ lbs **BLC 4**

Gravity Load (without ice)

Weight of All TMA's = $WT_{TMA} \cdot N_{TMA} = 85$ lbs **BLC 2**

Gravity Load (ice only)

Volume of Each TMA = $V_{TMA} := L_{TMA} \cdot W_{TMA} \cdot T_{TMA} = 344$ cu in

Volume of Ice on Each TMA = $V_{ice} := (L_{TMA} + 1)(W_{TMA} + 1)(T_{TMA} + 1) - V_{TMA} = 221$ cu in

Weight of Ice on Each TMA = $W_{ICETMA} := \frac{V_{ice}}{1728} \cdot Id = 7$ lbs

Weight of Ice on All TMA's $W_{ICETMA} \cdot N_{TMA} = 43$ lbs **BLC 3**

Development of Wind & Ice Load on TMA's

Proposed TMA Data: (AT&T)

TMA Model = CCI DTMABP7819VG12A

TMA Shape = Flat (User Input)

TMA Height = $L_{TMA} := 10.63$ in (User Input)

TMA Width = $W_{TMA} := 11.02$ in (User Input)

TMA Thickness = $T_{TMA} := 3.78$ in (User Input)

TMA Weight = $WT_{TMA} := 20$ lbs (User Input)

Number of TMA's = $N_{TMA} := 6$ (User Input)

Wind Load (NESC Extreme)

Assumes Maximum Possible Wind Pressure Applied to All TMA's Simultaneously

Surface Area for One TMA = $SA_{TMA} := \frac{L_{TMA} \cdot W_{TMA}}{144} = 0.8$ sf

TMA Projected Surface Area = $A_{TMA} := SA_{TMA} \cdot N_{TMA} = 4.9$ sf

Total TMA Wind Force = $F_{TMA} := qz \cdot Cd_F \cdot A_{TMA} \cdot m = 280$ lbs **BLC 5**

Wind Load (NESC Heavy)

Assumes Maximum Possible Wind Pressure Applied to All TMA's Simultaneously

Surface Area for One TMA w/ Ice = $SA_{ICETMA} := \frac{(L_{TMA} + 1) \cdot (W_{TMA} + 1)}{144} = 1$ sf

TMA Projected Surface Area w/ Ice = $A_{ICETMA} := SA_{ICETMA} \cdot N_{TMA} = 5.8$ sf

Total TMA Wind Force w/ Ice = $Fi_{TMA} := p \cdot Cd_F \cdot A_{ICETMA} = 37$ lbs **BLC 4**

Gravity Load (without ice)

Weight of All TMA's = $WT_{TMA} \cdot N_{TMA} = 120$ lbs **BLC 2**

Gravity Load (ice only)

Volume of Each TMA = $V_{TMA} := L_{TMA} \cdot W_{TMA} \cdot T_{TMA} = 443$ cu in

Volume of Ice on Each TMA = $V_{ice} := (L_{TMA} + 1)(W_{TMA} + 1)(T_{TMA} + 1) - V_{TMA} = 225$ cu in

Weight of Ice on Each TMA = $W_{ICETMA} := \frac{V_{ice}}{1728} \cdot Id = 7$ lbs

Weight of Ice on All TMA's $W_{ICETMA} \cdot N_{TMA} = 44$ lbs **BLC 3**

Development of Wind & Ice Load on Mounts

Mount Data: (AT&T)

Mount Type = (3) Valmont Dual Standoff Mounts w/ Universal Tri-Bracket

Mount Shape = Flat (User Input)

Mount Area = $A_{mnt} := 4.0$ sq ft (User Input)

Mount Area w/ Ice = $A_{ICEmnt} := 4.6$ sq ft (User Input)

Mount Weight = $WT_{mnt} := 580$ lbs (User Input)

Mount Weight w/ Ice = $WT_{ICEmnt} := 650$ lbs (User Input)

Wind Load (NESC Extreme)

Total Mount Wind Force = $F_{mnt} := qz \cdot Cd_F \cdot A_{mnt} \cdot m = 229$ lbs **BLC 5**

Wind Load (NESC Heavy)

Total Mount Wind Force w/ Ice = $Fi_{mnt} := p \cdot Cd_F \cdot A_{ICEmnt} = 29$ lbs **BLC 4**

Gravity Load (without ice)

Weight of Mount = $WT_{mnt} = 580$ lbs **BLC 2**

Gravity Load (ice only)

Weight of Ice on Mount = $WT_{ICEmnt} - WT_{mnt} = 70$ lbs **BLC 3**

Development of Wind & Ice Load on Coax Cables

Existing Coax Cable Data: (Sprint)

Coax Type = HELIAX 1-1/4"

Shape = Round (User Input)

Coax Outside Diameter = $D_{coax} := 1.55$ in (User Input)

Coax Cable Length = $L_{coax} := 64$ ft (User Input)

Weight of Coax per foot = $Wt_{coax} := 0.66$ plf (User Input)

Total Number of Coax = $N_{coax} := 18$ (User Input)

No. of Coax Projecting Outside Face of PCS Mast = $NP_{coax} := 3$ (User Input) Note: AT&T Existing/Proposed cables attached to CL&P Pole

Wind Load (NESC Extreme)

Coax projected surface area = $A_{coax} := \frac{(NP_{coax} D_{coax})}{12} = 0.4$ sf/ft

Total Coax Wind Force (Above NU Structure) = $F_{coax} := qz \cdot Cd_{coax} \cdot A_{coax} \cdot m = 22$ plf **BLC 5**

Total Coax Wind Force (Below NU Structure) = $F_{coax} := qz \cdot Cd_{coax} \cdot A_{coax} = 18$ plf **BLC 5**

Wind Load (NESC Heavy)

Coax projected surface area w/ Ice = $AICE_{coax} := \frac{(NP_{coax} \cdot D_{coax} + 2 \cdot Ir)}{12} = 0.5$ sf/ft

Total Coax Wind Force w/ Ice = $Fi_{coax} := p \cdot Cd_{coax} \cdot AICE_{coax} = 3$ plf **BLC 4**

Gravity Loads (without ice)

Weight of all cables w/o ice $WT_{coax} := Wt_{coax} \cdot N_{coax} = 12$ plf **BLC 2**

Gravity Load (ice only)

Ice Area per Linear Foot = $Ai_{coax} := \frac{\pi}{4}\left[(D_{coax} + 2 \cdot Ir)^2 - D_{coax}^{\ 2}\right] = 3.2$ sq in

Ice Weight All Coax per foot = $WTi_{coax} := N_{coax} \cdot Id \cdot \frac{Ai_{coax}}{144} = 23$ plf **BLC 3**

(Global) Model Settings

Display Sections for Member Calcs	5
Max Internal Sections for Member Calcs	97
Include Shear Deformation?	Yes
Increase Nailing Capacity for Wind?	Yes
Include Warping?	Yes
Trans Load Btwn Intersecting Wood Wall?	Yes
Area Load Mesh (in^2)	144
Merge Tolerance (in)	.12
P-Delta Analysis Tolerance	0.50%
Include P-Delta for Walls?	Yes
Automatically Iterate Stiffness for Walls?	No
Max Iterations for Wall Stiffness	3
Gravity Acceleration (ft/sec^2)	32.2
Wall Mesh Size (in)	12
Eigensolution Convergence Tol. (1.E-)	4
Vertical Axis	Y
Global Member Orientation Plane	XZ
Static Solver	Sparse Accelerated
Dynamic Solver	Standard Solver

Hot Rolled Steel Code	AISC 9th: ASD
RISAConnection Code	AISC 14th(360-10): ASD
Cold Formed Steel Code	AISI 1999: ASD
Wood Code	AF&PA NDS-91/97: ASD
Wood Temperature	< 100F
Concrete Code	ACI 318-02
Masonry Code	ACI 530-05: ASD
Aluminum Code	AA ADM1-05: ASD - Building
Stainless Steel Code	AISC 14th(360-10): ASD
Adjust Stiffness?	Yes(Iterative)

Number of Shear Regions	4
Region Spacing Increment (in)	4
Biaxial Column Method	PCA Load Contour
Parme Beta Factor (PCA)	.65
Concrete Stress Block	Rectangular
Use Cracked Sections?	Yes
Use Cracked Sections Slab?	Yes
Bad Framing Warnings?	No
Unused Force Warnings?	Yes
Min 1 Bar Diam. Spacing?	No
Concrete Rebar Set	REBAR_SET_ASTMA615
Min % Steel for Column	1
Max % Steel for Column	8

(Global) Model Settings, Continued

Seismic Code	UBC 1997
Seismic Base Elevation (ft)	Not Entered
Add Base Weight?	No
Ct X	.035
Ct Z	.035
T X (sec)	Not Entered
T Z (sec)	Not Entered
R X	8.5
R Z	8.5
Ca	.36
Cv	.54
Nv	1
Occupancy Category	4
Seismic Zone	3
Om Z	1
Om X	1
Rho Z	1
Rho X	1
Footing Overturning Safety Factor	1.5
Optimize for OTM/Sliding	No
Check Concrete Bearing	No
Footing Concrete Weight (k/ft^3)	0
Footing Concrete f'c (ksi)	3
Footing Concrete Ec (ksi)	4000
Lambda	1
Footing Steel fy (ksi)	60
Minimum Steel	0.0018
Maximum Steel	0.0075
Footing Top Bar	#3
Footing Top Bar Cover (in)	3.5
Footing Bottom Bar	#3
Footing Bottom Bar Cover (in)	3.5
Pedestal Bar	#3
Pedestal Bar Cover (in)	1.5
Pedestal Ties	#3

Hot Rolled Steel Properties

	Label	E [ksi]	G [ksi]	Nu	Therm (\1...	Density[k/ft^3]	Yield[ksi]	Ry	Fu[ksi]	Rt
1	A36 Gr.36	29000	11154	.3	.65	.49	36	1.5	58	1.2
2	A572 Gr.50	29000	11154	.3	.65	.49	50	1.1	58	1.2
3	A992	29000	11154	.3	.65	.49	50	1.1	58	1.2
4	A500 Gr.42	29000	11154	.3	.65	.49	42	1.3	58	1.1
5	A500 Gr.46	29000	11154	.3	.65	.49	46	1.2	58	1.1
6	A53 Gr. B	29000	11154	.3	.65	.49	35	1.5	58	1.2

Hot Rolled Steel Section Sets

	Label	Shape	Type	Design List	Material	Design ...	A [in2]	Iyy [in4]	Izz [in4]	J [in4]
1	Existing Upper ...	PIPE_12.0	Column	Pipe	A53 Gr. B	Typical	13.7	262	262	523
2	Existing Lower ...	HSS16x0.375	Column	Pipe	A500 Gr.42	Typical	17.2	526	526	1050

Hot Rolled Steel Design Parameters

	Label	Shape	Length...	Lbyy[ft]	Lbzz[ft]	Lcomp to...	Lcomp bo...	Kyy	Kzz	Cm-yy	Cm-zz	Cb	y sway	z sway	Function
1	M1	Existing L...	41.583	30		30									Lateral
2	M2	Existing ...	22.417	30		30									Lateral

Member Primary Data

	Label	I Joint	J Joint	K Joint	Rotate(d...	Section/Shape	Type	Design List	Material	Design Rul...
1	M1	BOT_C...	SPLICE			Existing Lower Mast	Column	Pipe	A500 Gr....	Typical
2	M2	SPLICE	TOP_M...			Existing Upper Mast	Column	Pipe	A53 Gr. B	Typical

Joint Coordinates and Temperatures

	Label	X [ft]	Y [ft]	Z [ft]	Temp [F]	Detach From Dia...
1	BOT_CONN	0	0	0	0	
2	TOP_CONN	0	30	0	0	
3	SPLICE	0	41.583	0	0	
4	TOP_MAST	0	64	0	0	
5	CL_SPRINT	0	60	0	0	
6	CL_ATT	0	47	0	0	

Joint Boundary Conditions

	Joint Label	X [k/in]	Y [k/in]	Z [k/in]	X Rot.[k-ft/rad]	Y Rot.[k-ft/rad]	Z Rot.[k-ft/rad]
1	BOT_CONN	Reaction	Reaction	Reaction		Reaction	
2	TOP_CONN	Reaction	Reaction	Reaction		Reaction	

Member Point Loads

Member Label	Direction	Magnitude[k,k-ft]	Location[ft,%]
No Data to Print ...			

Member Distributed Loads (BLC 2 : Weight of Appurtenances)

	Member Label	Direction	Start Magnitude[k/ft,F,ksf]	End Magnitude[k/...	Start Location[ft,%]	End Location[ft,%]
1	M1	Y	-.012	-.012	0	0
2	M2	Y	-.012	-.012	0	14.5

Member Distributed Loads (BLC 3 : Weight of Ice Only on PCS Struct)

	Member Label	Direction	Start Magnitude[k/ft,F,ksf]	End Magnitude[k/...	Start Location[ft,%]	End Location[ft,%]
1	M1	Y	-.01	-.01	0	0
2	M2	Y	-.008	-.008	0	0
3	M1	Y	-.023	-.023	0	0
4	M2	Y	-.023	-.023	0	14.5

Member Distributed Loads (BLC 4 : NESC Heavy Wind on PCS Structure)

	Member Label	Direction	Start Magnitude[k/ft,F,ksf]	End Magnitude[k/...	Start Location[ft,%]	End Location[ft,%]
1	M1	X	.009	.009	0	0
2	M2	X	.007	.007	0	2.5
3	M2	X	.007	.007	9	14.5
4	M1	X	.003	.003	0	0
5	M2	X	.003	.003	0	2.5
6	M2	X	.003	.003	9	14.5

Member Distributed Loads (BLC 5 : NESC Extreme Wind on PCS Structu)

	Member Label	Direction	Start Magnitude[k/ft,F,ksf]	End Magnitude[k/...	Start Location[ft,%]	End Location[ft,%]
1	M1	X	.061	.061	0	0
2	M2	X	.061	.061	0	2.5
3	M2	X	.061	.061	9	14.5
4	M1	X	.018	.018	0	0
5	M2	X	.022	.022	0	2.5
6	M2	X	.022	.022	9	14.5

Basic Load Cases

	BLC Description	Category	X Gravity	Y Gravity	Z Gravity	Joint	Point	Distribu...	Area(M...	Surface...
1	Self Weight (Mast)	None		-1						
2	Weight of Appurtenances	None				9		2		
3	Weight of Ice Only on PCS Struct	None				9		4		
4	NESC Heavy Wind on PCS Structure	None				8		6		
5	NESC Extreme Wind on PCS Structu	None				8		6		

Load Combinations

	Description	So..	P...	S...	BLC	Fac..	BLC	Fac..	BLC	Fac..	BLC	Fac..	BLC	Fac..	BLC	Fac..	BLC	Fac..	BLC	Fac..	BLC	Fac..	BLC	Fac...
1	NESC Heavy Wind on PC...	Yes			1	1.5	2	1.5	3	1.5	4	2.5												
2	NESC Extreme Wind on ...	Yes			1	1	2	1	5	1														
3	Self Weight				1	1																		

Envelope Joint Reactions

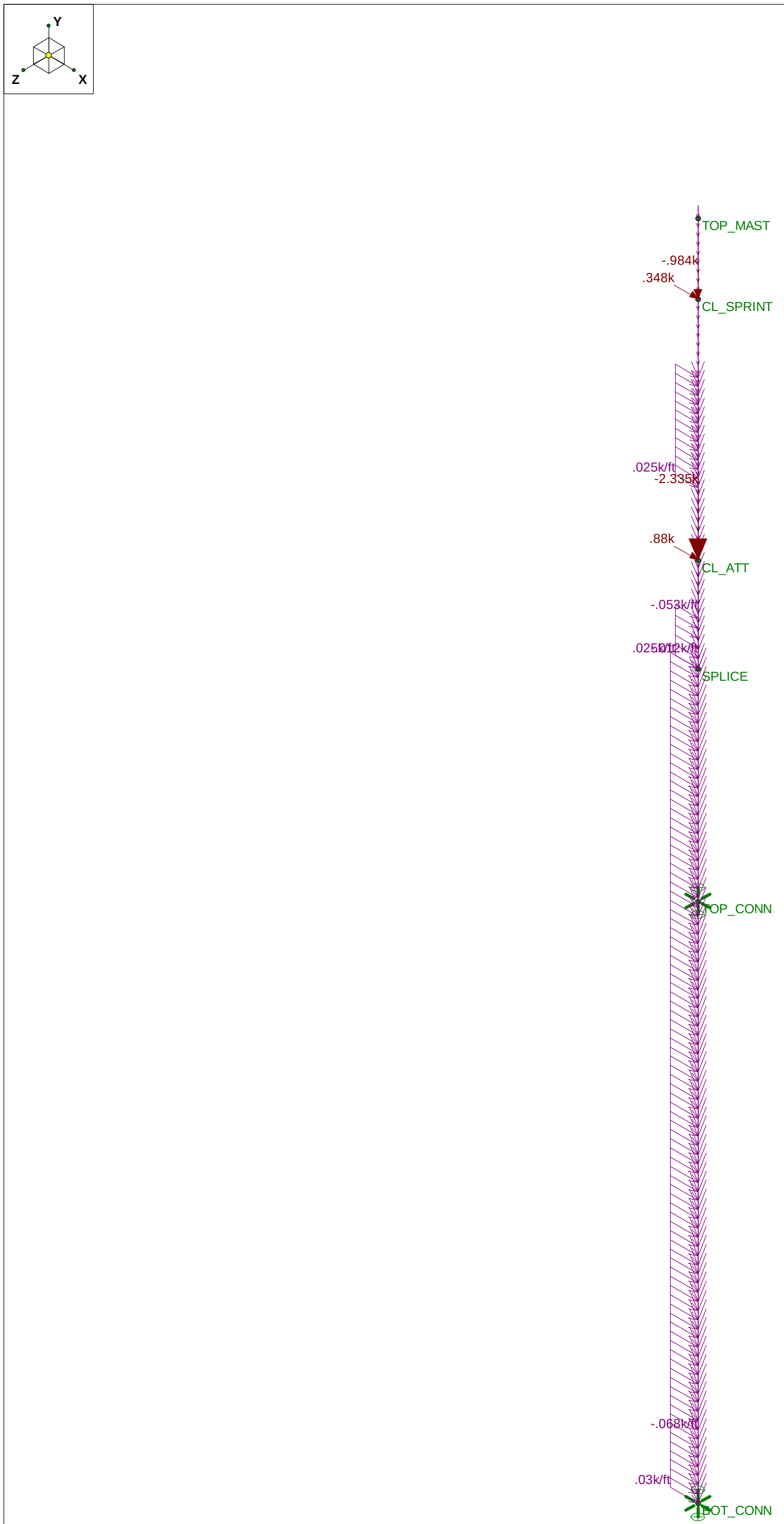
	Joint		X [k]	LC	Y [k]	LC	Z [k]	LC	MX [k-ft]	LC	MY [k-ft]	LC	MZ [k-ft]	LC
1	BOT_CONN	max	2.137	2	2.329	1	0	2	0	2	0	2	0	2
2		min	.597	1	1.058	2	0	1	0	1	0	1	0	1
3	TOP_CONN	max	-3.272	1	10.045	1	0	2	0	2	0	2	0	2
4		min	-10.009	2	4.667	2	0	1	0	1	0	1	0	1
5	Totals:	max	-2.675	1	12.375	1	0	2						
6		min	-7.872	2	5.725	2	0	1						

Joint Reactions (By Combination)

	LC	Joint Label	X [k]	Y [k]	Z [k]	MX [k-ft]	MY [k-ft]	MZ [k-ft]
1	1	BOT_CONN	.597	2.329	0	0	0	0
2	1	TOP_CONN	-3.272	10.045	0	0	0	0
3	1	Totals:	-2.675	12.375	0			
4	1	COG (ft):	X: 0	Y: 35.33	Z: 0			

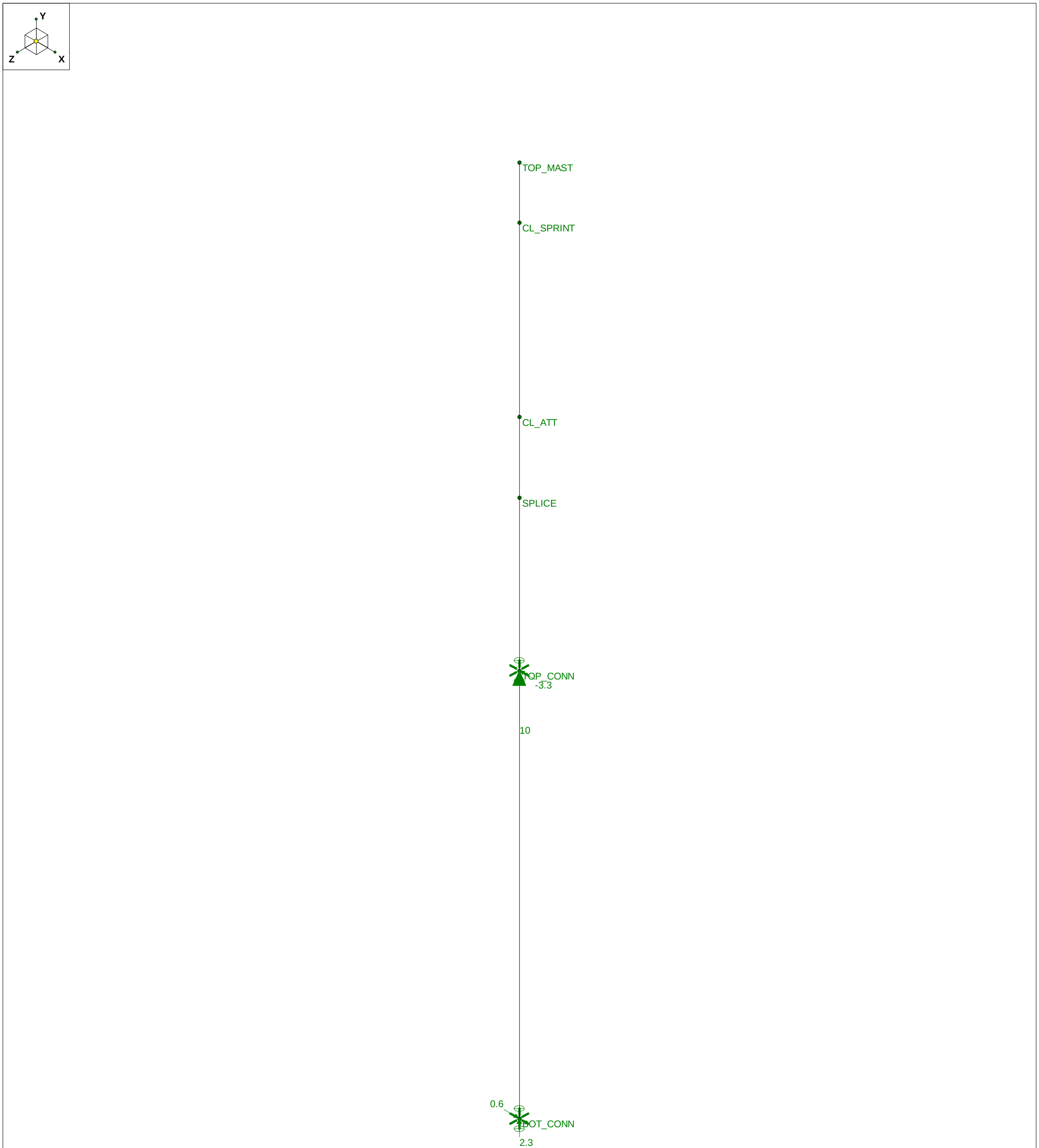
Joint Reactions (By Combination)

	LC	Joint Label	X [k]	Y [k]	Z [k]	MX [k-ft]	MY [k-ft]	MZ [k-ft]
1	2	BOT_CONN	2.137	1.058	0	0	0	0
2	2	TOP_CONN	-10.009	4.667	0	0	0	0
3	2	Totals:	-7.872	5.725	0			
4	2	COG (ft):	X: 0	Y: 35.699	Z: 0			



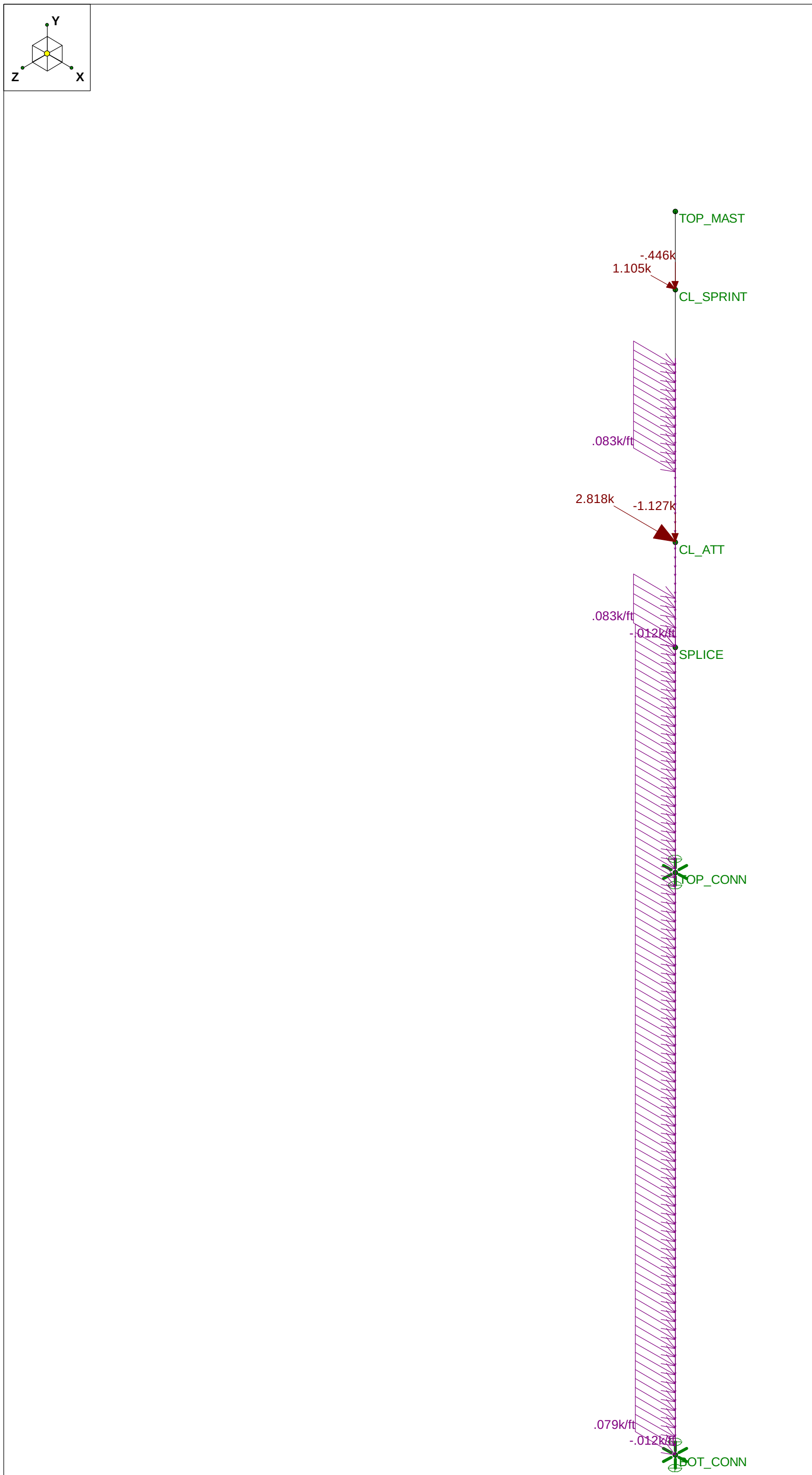
Loads: LC 1, NESC Heavy Wind on PCS Structure
Envelope Only Solution

CENTEK Engineering, INC.		
tjl, cfc	Struct # 2683 - Mast	Jan 18, 2019 at 8:27 AM
17159.18 /Sprint CT54XC7...	LC #1 Loads	NESC Loads.r3d



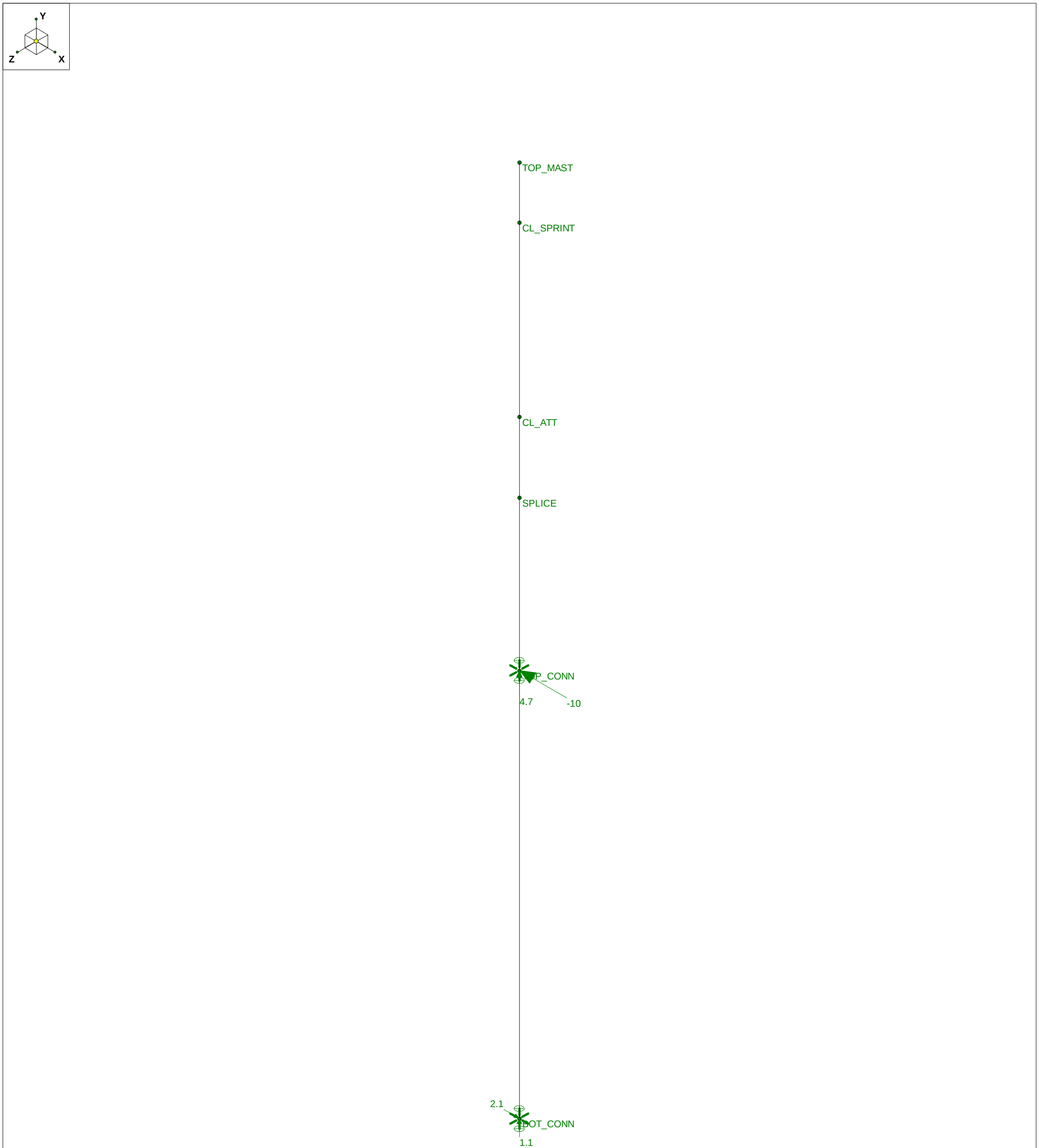
Results for LC 1, NESC Heavy Wind on PCS Structure
Reaction and Moment Units are k and k-ft

CENTEK Engineering, INC.		
tjl, cfc	Struct # 2683 - Mast	Jan 18, 2019 at 8:44 AM
17159.18 /Sprint CT54XC7...	LC #1 Reactions	NESC Loads.r3d



Loads: LC 2, NESC Extreme Wind on PCS Structure
Envelope Only Solution

CENTEK Engineering, INC.		
tjl, cfc	Struct # 2683 - Mast	Jan 18, 2019 at 8:27 AM
17159.18 /Sprint CT54XC7...	LC #2 Loads	NESC Loads.r3d



Results for LC 2, NESC Extreme Wind on PCS Structure
Reaction and Moment Units are k and k-ft

CENTEK Engineering, INC.		
tjl, cfc	Struct # 2683 - Mast	Jan 18, 2019 at 8:44 AM
17159.18 /Sprint CT54XC7...	LC #2 Reactions	NESC Loads.r3d

Coax Cable on CL&P Pole (Below 50-ft AGL)

Heavy Wind Pressure = $p := 4 \cdot psf$ *(User Input)*

Radial Ice Thickness = $Ir := 0.5 \cdot in$ *(User Input)*

Radial Ice Density = $Id := 56 \cdot pcf$ *(User Input)*

Basic Windspeed = $V := 100$ mph (User Input NESC 2007 Figure 250-2(e))

Height to Top of Coax Above Grade = $TC := 90$ ft (User Input)

NESC Factor = $kv := 1.43$ (User Input from NESC 2007 Table 250-3 equation)

Importance Factor = $I := 1.0$ (User Input from NESC 2007 Section 250.C.2)

Velocity Pressure Coefficient = $Kz := 2.01 \cdot \left(\frac{0.67TC}{900}\right)^{\frac{2}{9.5}} = 1.138$ (NESC 2007 Table 250-2)

Exposure Factor = $Es := 0.346 \left[\frac{33}{(0.67 \cdot TC)}\right]^{\frac{1}{7}} = 0.317$ (NESC 2007 Table 250-3)

Response Term = $Bs := \frac{1}{\left(1 + 0.375 \cdot \frac{TC}{220}\right)} = 0.867$ (NESC 2007 Table 250-3)

Gust Response Factor = $Grf := \frac{\left[1 + \left(2.7 \cdot Es \cdot Bs^{\frac{1}{2}}\right)\right]}{kv^2} = 0.879$ (NESC 2007 Table 250-3)

Wind Pressure = $qz := 0.00256 \cdot Kz \cdot V^2 \cdot Grf \cdot I = 25.6$ psf (NESC 2007 Section 250.C.2)

Coaxial Cable Span = $Coax_{Span} := \begin{pmatrix} 10 \\ 10 \\ 10 \\ 10 \end{pmatrix} \cdot ft$ *(User Input)* Cables start on tower at 10-ft above grade

Diameter of Coax Cable = $D_{coax1} := 1.55 \cdot in$ *(User Input)*

Weight of Coax Cable = $W_{coax1} := 0.66 \cdot plf$ *(User Input)*

Number of Coax Cables = $N_{coax1} := 36$ *(User Input)* 18 AT&T Cables and 18 Sprint Cables

Number of Projected Coax Cables = $NP_{coax1} := 4$ *(User Input)*

Shape Factor = $Cd_{coax} := 1.6$ *(User Input)*

Overload Factor for NESC Heavy Wind Load = $OF_{HW} := 2.5$ *(User Input)*

Overload Factor for NESC Extreme Wind Load = $OF_{EW} := 1.0$ *(User Input)*

Overload Factor for NESC Heavy Vertical Load = $OF_{HV} := 1.5$ *(User Input)*

Overload Factor for NESC Extreme Vertical Load = $OF_{EV} := 1.0$ *(User Input)*

Wind Area with Ice = $A_{ice} := \left(NP_{coax1} \cdot D_{coax1} + 2 \cdot Ir\right) = 7.2 \cdot in$

Wind Area without Ice = $A := \left(NP_{coax1} \cdot D_{coax1}\right) = 6.2 \cdot in$

Ice Area per Liner Ft = $Ai_{coax1} := 85 \cdot in^2$

Weight of Ice on All Coax Cables = $W_{ice} := Ai_{coax1} \cdot Id = 33 \cdot plf$

Heavy Vertical Load =

$$Heavy_{Vert} := \overrightarrow{\left[\left(N_{coax1} \cdot W_{coax1} + W_{ice}\right) \cdot Coax_{Span} \cdot OF_{HV}\right]}$$

Heavy Transverse Load =

$$Heavy_{Trans} := \overrightarrow{\left(p \cdot A_{ice} \cdot Cd_{coax} \cdot Coax_{Span} \cdot OF_{HW}\right)}$$

$$Heavy_{Vert} = \begin{pmatrix} 852 \\ 852 \\ 852 \\ 852 \end{pmatrix} lb \qquad Heavy_{Trans} = \begin{pmatrix} 96 \\ 96 \\ 96 \\ 96 \end{pmatrix} lb$$

Extreme Vertical Load =

$$Extreme_{Vert} := \overrightarrow{\left[\left(N_{coax1} \cdot W_{coax1}\right) \cdot Coax_{Span} \cdot OF_{EV}\right]}$$

Extreme Transverse Load =

$$Extreme_{Trans} := \overrightarrow{\left[\left(qz \cdot psf \cdot A \cdot Cd_{coax}\right) \cdot Coax_{Span} \cdot OF_{EW}\right]}$$

$$Extreme_{Vert} = \begin{pmatrix} 238 \\ 238 \\ 238 \\ 238 \end{pmatrix} lb \qquad Extreme_{Trans} = \begin{pmatrix} 212 \\ 212 \\ 212 \\ 212 \end{pmatrix} lb$$

Coax Cable on CL&P Pole (Above 50-ft AGL)

Heavy Wind Pressure = $p := 4 \cdot psf$ *(User Input)*

Radial Ice Thickness = $Ir := 0.5 \cdot in$ *(User Input)*

Radial Ice Density = $Id := 56 \cdot pcf$ *(User Input)*

Basic Windspeed = $V := 100$ mph (User Input NESC 2007 Figure 250-2(e))

Height to Top of Coax Above Grade = $TC := 90$ ft (User Input)

NESC Factor = $kv := 1.43$ (User Input from NESC 2007 Table 250-3 equation)

Importance Factor = $I := 1.0$ (User Input from NESC 2007 Section 250.C.2)

Velocity Pressure Coefficient = $Kz := 2.01 \cdot \left(\frac{0.67TC}{900}\right)^{\frac{2}{9.5}} = 1.138$ (NESC 2007 Table 250-2)

Exposure Factor = $Es := 0.346 \left[\frac{33}{(0.67 \cdot TC)}\right]^{\frac{1}{7}} = 0.317$ (NESC 2007 Table 250-3)

Response Term = $Bs := \frac{1}{\left(1 + 0.375 \cdot \frac{TC}{220}\right)} = 0.867$ (NESC 2007 Table 250-3)

Gust Response Factor = $Grf := \frac{\left[1 + \left(2.7 \cdot Es \cdot Bs^{\frac{1}{2}}\right)\right]}{kv^2} = 0.879$ (NESC 2007 Table 250-3)

Wind Pressure = $qz := 0.00256 \cdot Kz \cdot V^2 \cdot Grf \cdot I = 25.6$ psf (NESC 2007 Section 250.C.

Coaxial Cable Span = $Coax_{Span} := \begin{pmatrix} 10 \\ 10 \\ 10 \\ 10 \end{pmatrix} \cdot ft$ *(User Input)*

Diameter of Coax Cable = $D_{coax1} := 1.55 \cdot in$ *(User Input)*

Weight of Coax Cable = $W_{coax1} := 0.66 \cdot plf$ *(User Input)*

Number of Coax Cables = $N_{coax1} := 18$ *(User Input)* 18 AT&T Cables

Number of Projected Coax Cables = $NP_{coax1} := 2$ *(User Input)* Sprint Cables on Mast

Shape Factor = $Cd_{coax} := 1.6$ *(User Input)*

Overload Factor for NESC Heavy Wind Load = $OF_{HW} := 2.5$ *(User Input)*

Overload Factor for NESC Extreme Wind Load = $OF_{EW} := 1.0$ *(User Input)*

Overload Factor for NESC Heavy Vertical Load = $OF_{HV} := 1.5$ *(User Input)*

Overload Factor for NESC Extreme Vertical Load = $OF_{EV} := 1.0$ *(User Input)*

Wind Area with Ice = $A_{ice} := \left(NP_{coax1} \cdot D_{coax1} + 2 \cdot Ir\right) = 4.1 \cdot in$

Wind Area without Ice = $A := \left(NP_{coax1} \cdot D_{coax1}\right) = 3.1 \cdot in$

Ice Area per Liner Ft = $Ai_{coax1} := 50 \cdot in^2$

Weight of Ice on All Coax Cables = $W_{ice} := Ai_{coax1} \cdot Id = 19 \cdot plf$

Heavy Vertical Load =

$$Heavy_{Vert} := \overrightarrow{\left[\left(N_{coax1} \cdot W_{coax1} + W_{ice}\right) \cdot Coax_{Span} \cdot OF_{HV}\right]}$$

Heavy Transverse Load =

$$Heavy_{Trans} := \overrightarrow{\left(p \cdot A_{ice} \cdot Cd_{coax} \cdot Coax_{Span} \cdot OF_{HW}\right)}$$

$$Heavy_{Vert} = \begin{pmatrix} 470 \\ 470 \\ 470 \\ 470 \end{pmatrix} lb \qquad Heavy_{Trans} = \begin{pmatrix} 55 \\ 55 \\ 55 \\ 55 \end{pmatrix} lb$$

Extreme Vertical Load =

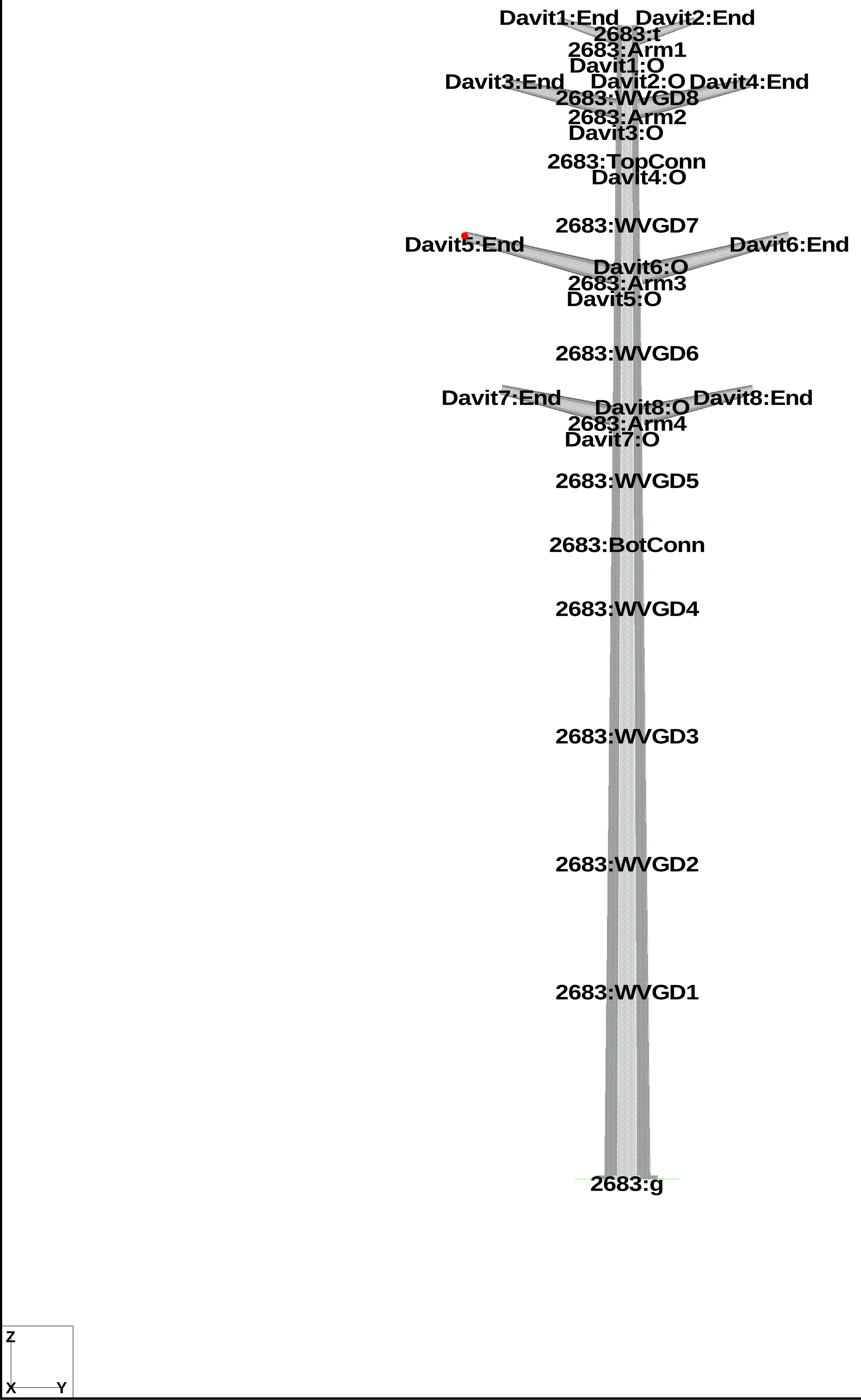
$$Extreme_{Vert} := \overrightarrow{\left[\left(N_{coax1} \cdot W_{coax1}\right) \cdot Coax_{Span} \cdot OF_{EV}\right]}$$

Extreme Transverse Load =

$$Extreme_{Trans} := \overrightarrow{\left[\left(qz \cdot psf \cdot A \cdot Cd_{coax}\right) \cdot Coax_{Span} \cdot OF_{EW}\right]}$$

$$Extreme_{Vert} = \begin{pmatrix} 119 \\ 119 \\ 119 \\ 119 \end{pmatrix} lb \qquad Extreme_{Trans} = \begin{pmatrix} 106 \\ 106 \\ 106 \\ 106 \end{pmatrix} lb$$

Centek Engineering Inc, Project: "cl&p structure # 2683"
PLS-POLE Version 12.50, 4:32:05 PM Tuesday, March 05, 2019
Undeformed geometry displayed



Project Name : 17159.18 - Brookfield, CT
Project Notes: Struct # 2683/ Sprint - CT54XC713
Project File : J:\Jobs\1715900.WI\18_CT54XC713 Brookfield\04_Structural\Calcs\Rev (5)\PLS Pole\cl&p structure # 2683.pol
Date run : 4:30:51 PM Tuesday, March 05, 2019
by : PLS-POLE Version 12.50
Licensed to : Centek Engineering Inc

Successfully performed nonlinear analysis

The model has 0 warnings.

Loads from file: j:\jobs\1715900.wi\18_ct54xc713 brookfield\04_structural\calcs\rev (5)\pls pole\cl&p #2683.lca

*** Analysis Results:

Maximum element usage is 70.06% for Steel Pole "2683" in load case "NESC Extreme"
Maximum insulator usage is 13.80% for Clamp "Clamp17" in load case "NESC Extreme"

Summary of Joint Support Reactions For All Load Cases:

Load Case	Joint Label	Long. Force (kips)	Tran. Force (kips)	Vert. Force (kips)	Shear Force (kips)	Tran. Moment (ft-k)	Long. Moment (ft-k)	Bending Moment (ft-k)	Vert. Moment (ft-k)	Found. Usage %
NESC Heavy	2683:g	-0.60	-23.46	-54.57	23.47	1773.39	-48.28	1774.05	-3.34	0.00
NESC Extreme	2683:g	-0.39	-26.28	-28.85	26.29	1889.17	-30.39	1889.41	-1.85	0.00

Summary of Tip Deflections For All Load Cases:

Note: postive tip load results in positive deflection

Load Case	Joint Label	Long. Defl. (in)	Tran. Defl. (in)	Vert. Defl. (in)	Resultant Defl. (in)	Long. Rot. (deg)	Tran. Rot. (deg)	Twist (deg)
NESC Heavy	2683:t	0.93	34.33	-0.74	34.35	0.09	-3.17	0.02
NESC Extreme	2683:t	0.58	36.14	-0.80	36.15	0.05	-3.28	0.01

Tubes Summary:

Pole Label	Tube Num.	Weight (lbs)	Load Case	Maximum Usage %	Resultant Moment (ft-k)
2683	1	3397	NESC Heavy	47.77	519.12
2683	2	5750	NESC Extreme	59.88	1372.44
2683	3	3427	NESC Extreme	70.06	1889.41

*** Overall summary for all load cases - Usage = Maximum Stress / Allowable Stress

Summary of Steel Pole Usages:

Steel Pole Label	Maximum Usage %	Load Case	Segment Number	Weight (lbs)
2683	70.06	NESC Extreme	25	13920.9

Summary of Tubular Davit Usages:

Tubular Davit Label	Maximum Usage %	Load Case	Segment Number	Weight (lbs)
Davit1	1.86	NESC Heavy	1	77.9
Davit2	11.40	NESC Heavy	1	77.9
Davit3	3.18	NESC Heavy	1	321.0
Davit4	6.75	NESC Heavy	1	321.0
Davit5	4.25	NESC Heavy	1	434.7
Davit6	9.44	NESC Heavy	1	434.7
Davit7	3.26	NESC Heavy	1	321.0
Davit8	6.80	NESC Heavy	1	321.0

*** Maximum Stress Summary for Each Load Case

Summary of Maximum Usages by Load Case:

Load Case	Maximum Usage %	Element Label	Element Type
NESC Heavy	69.73	2683	Steel Pole
NESC Extreme	70.06	2683	Steel Pole

Summary of Steel Pole Usages by Load Case:

Load Case	Maximum Usage %	Steel Pole Label	Segment Number
NESC Heavy	69.73	2683	25
NESC Extreme	70.06	2683	25

Summary of Base Plate Usages by Load Case:

Load Case	Pole Label	Bend Line #	Length (in)	Vertical Load (kips)	X Moment (ft-k)	Y Moment (ft-k)	Bending Stress (ksi)	Bolt Moment Sum (ft-k)	# Bolts Acting On Bend Line	Max Bolt Load For Bend Line (kips)	Minimum Plate Thickness (in)	Usage %
NESC Heavy	2683	5	14.956	53.218	1773.388	-48.277	31.714	59.288	2	84.971	2.278	57.66
NESC Extreme	2683	5	14.956	27.500	1889.167	-30.384	31.915	59.663	2	86.194	2.285	58.03

Summary of Tubular Davit Usages by Load Case:

Load Case	Maximum Usage %	Tubular Davit Label	Segment Number
NESC Heavy	11.40	Davit2	1
NESC Extreme	5.30	Davit2	1

Summary of Insulator Usages:

Insulator Label	Insulator Type	Maximum Usage %	Load Case	Weight (lbs)
Clamp1	Clamp	2.41	NESC Heavy	0.0
Clamp2	Clamp	3.19	NESC Heavy	0.0
Clamp3	Clamp	3.37	NESC Heavy	0.0

Clamp4	Clamp	3.57	NESC Heavy	0.0
Clamp5	Clamp	3.37	NESC Heavy	0.0
Clamp6	Clamp	3.57	NESC Heavy	0.0
Clamp7	Clamp	3.37	NESC Heavy	0.0
Clamp8	Clamp	3.57	NESC Heavy	0.0
Clamp9	Clamp	1.07	NESC Heavy	0.0
Clamp10	Clamp	1.07	NESC Heavy	0.0
Clamp11	Clamp	1.07	NESC Heavy	0.0
Clamp12	Clamp	1.07	NESC Heavy	0.0
Clamp13	Clamp	0.59	NESC Heavy	0.0
Clamp14	Clamp	0.59	NESC Heavy	0.0
Clamp15	Clamp	0.59	NESC Heavy	0.0
Clamp17	Clamp	13.80	NESC Extreme	0.0
Clamp18	Clamp	3.01	NESC Heavy	0.0
Clamp19	Clamp	0.59	NESC Heavy	0.0

*** Weight of structure (lbs):

Weight of Tubular Davit Arms:	2309.3
Weight of Steel Poles:	13920.9
Total:	16230.2

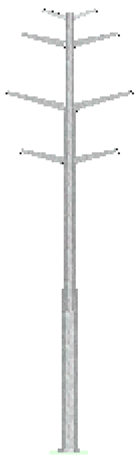
*** End of Report

```
***************************************************************************
*                                                                         *
*                                PLS-POLE                                 *
*                   POLE AND FRAME ANALYSIS AND DESIGN                    *
*               Copyright Power Line Systems, Inc. 1999-2011              *
*                                                                         *
***************************************************************************
```

Project Name : 17159.18 - Brookfield, CT
Project Notes: Struct # 2683/ Sprint - CT54XC713
Project File : J:\Jobs\1715900.WI\18_CT54XC713 Brookfield\04_Structural\Calcs\Rev (5)\PLS Pole\cl&p structure # 2683.pol
Date run   : 4:30:51 PM Tuesday, March 05, 2019
by   : PLS-POLE Version 12.50
Licensed to : Centek Engineering Inc

Successfully performed nonlinear analysis

The model has 0 warnings.



Modeling options:
  Offset Arms from Pole/Mast: Yes
  Offset Braces from Pole/Mast: Yes
  Offset Guys from Pole/Mast: Yes
  Offset Posts from Pole/Mast: Yes
  Offset Strains from Pole/Mast: Yes
  Use Alternate Convergence Process: No
  Steel poles checked with ASCE/SEI 48-05

Default Modulus of Elasticity for Steel = 29000.00 (ksi)
Default Weight Density for Steel = 490.00 (lbs/ft^3)

Steel Pole Properties:

Steel Pole Property	Stock Number	Length	Default Embedded	Base Plate	Shape	Tip Diameter	Base Diameter	Taper	Default Drag	Tubes	Modulus of Elasticity	Weight Density	Shape At	Strength Check	Distance From	Ultimate	Ultimate

Label		(ft)	Length (ft)			(in)	(in)	(in/ft)	Coef.		Override (ksi)	Override (lbs/ft^3)	Base	Type	Tip (ft)	Trans. Load (kips)	Long. Load (kips)
CL&P2683	2683	90.00	0	Yes	8F	19.63	43.21	0	1.6	3 tubes	0	0		Calculated	0.000	0.0000	0.0000

Steel Tubes Properties:

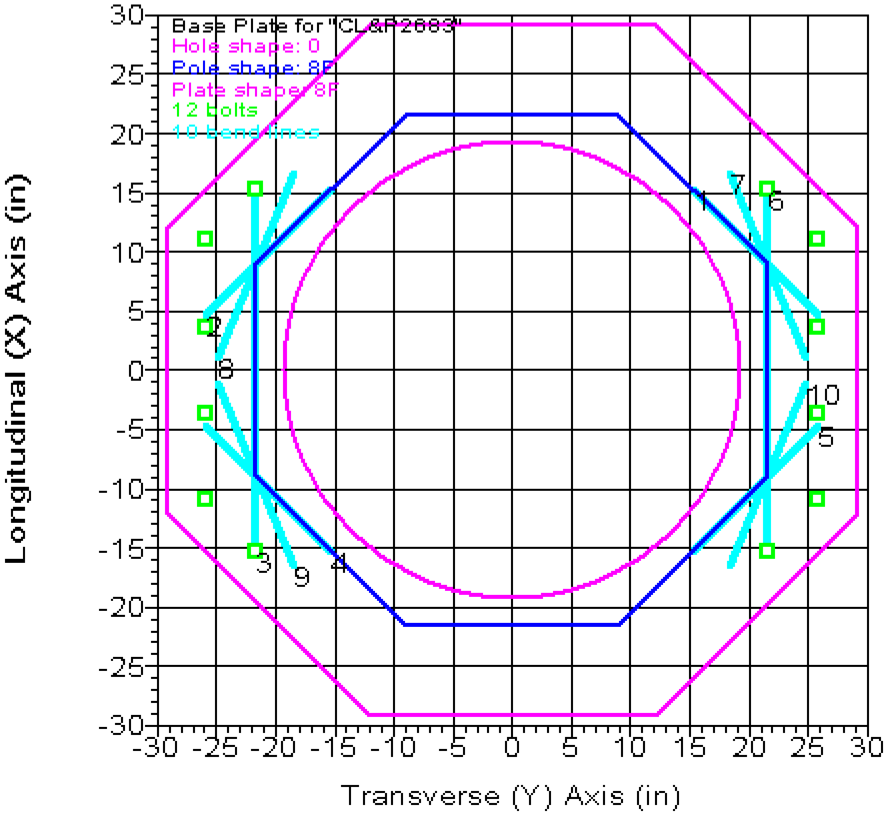
Pole Property	Tube No.	Length (ft)	Thickness (in)	Lap Length (ft)	Lap Factor	Lap Gap (in)	Yield Stress (ksi)	Moment Cap. Override (ft-k)	Tube Weight (lbs)	Center of Gravity (ft)	Calculated Taper (in/ft)	Tube Top Diameter (in)	Tube Bot. Diameter (in)	1.5x Diam. Lap Length (ft)	Actual Overlap (ft)
CL&P2683	1	39	0.3125	4.167	0.000	0.000	65.000	0.000	3397	20.92	0.27728	19.63	30.44	3.727	4.167
CL&P2683	2	40.1667	0.375	5.250	0.000	0.000	65.000	0.000	5750	21.18	0.27728	28.66	39.80	4.881	5.250
CL&P2683	3	20.25	0.375	0.000	0.000	0.000	65.000	0.000	3427	10.36	0.27728	37.59	43.20	0.000	0.000

Base Plate Properties:

Pole Property	Plate Diam. (in)	Plate Shape	Plate Thick. (in)	Plate Weight (lbs)	Bend Line Length Override (in)	Hole Diam. (in)	Hole Shape	Steel Density (lbs/ft^3)	Steel Yield Stress (ksi)	Bolt Diam. (in)	Bolt Pattern Diam. (in)	Num. Of Bolts	Bolt Cage X Inertia (in^4)	Bolt Cage Y Inertia (in^4)
CL&P2683	58.250	8F	3.000	1347	0.000	38.750	0	490.00	55.000	2.250	51.750	12	28733.01	5839.56

Base Plate Bolt Coordinates for Property "CL&P2683":

Bolt X Coord.	Bolt Y Coord.	Bolt Angle (deg)
0.5894	0.8357	0
0.4251	1	0
0.1425	1	0



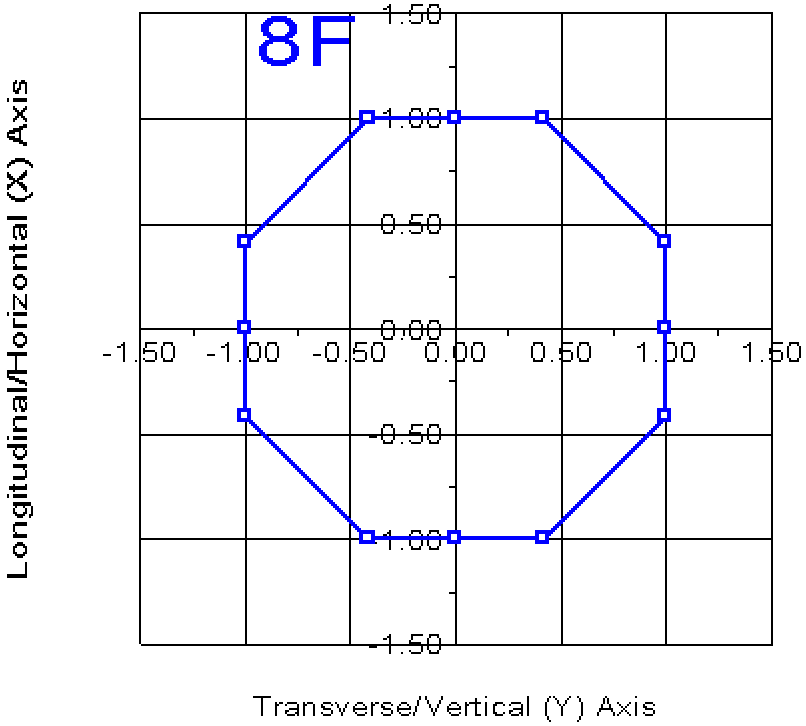
Steel Pole Connectivity:

Pole Label	Tip Joint	Base Joint	X of Base (ft)	Y of Base (ft)	Z of Base (ft)	Inclin. About X (deg)	Inclin. About Y (deg)	Property Set	Attach. Labels	Base Connect	Embed % Override	Embed C. Override (ft)
2683			0	0	0	0	0	CL&P2683	14 labels	Fixed	0.00	0

Relative Attachment Labels for Steel Pole "2683":

Joint Label	Distance From Origin/Top Joint (ft)	Global Z of Attach (ft)
2683:WVGD1	0.00	15.00
2683:WVGD2	0.00	25.00
2683:WVGD3	0.00	35.00
2683:WVGD4	0.00	45.00
2683:WVGD5	0.00	55.00

2683:WVGD6	0.00	65.00
2683:WVGD7	0.00	75.00
2683:TopConn	0.00	80.00
2683:BotConn	0.00	50.00
2683:WVGD8	0.00	85.00
2683:Arm1	0.00	88.92
2683:Arm2	0.00	83.50
2683:Arm3	0.00	70.50
2683:Arm4	0.00	59.50



Pole Steel Properties:

Warning: Capacities and usages printed in splices are listed for the inner tube except at the splice top which uses the outer tube. ??

Element Label	Joint Label	Joint Position	Rel. Dist. (ft)	Outer Diam. (in)	Area (in^2)	T-Moment Inertia (in^4)	L-Moment Inertia (in^4)	D/t	W/t Max.	Fy (ksi)	Fa Min. (ksi)	T-Moment Capacity (ft-k)	L-Moment Capacity (ft-k)
2683	2683:t	2683:t Ori	0.00	19.63	20.00	985.95	985.95	0.00	21.9	65.00	65.00	544.26	544.26
2683	2683:Arm1	2683:Arm1 End	1.08	19.92	20.31	1032.52	1032.52	0.00	22.3	65.00	65.00	561.40	561.40
2683	2683:Arm1	2683:Arm1 Ori	1.08	19.92	20.31	1032.52	1032.52	0.00	22.3	65.00	65.00	561.40	561.40
2683	2683:WVGD8	2683:WVGD8 End	5.00	21.01	21.43	1213.85	1213.85	0.00	23.7	65.00	65.00	625.85	625.85
2683	2683:WVGD8	2683:WVGD8 Ori	5.00	21.01	21.43	1213.85	1213.85	0.00	23.7	65.00	65.00	625.85	625.85
2683	2683:Arm2	2683:Arm2 End	6.50	21.43	21.87	1288.49	1288.49	0.00	24.3	65.00	65.00	651.44	651.44

2683	2683:Arm2	2683:Arm2	Ori	6.50	21.43	21.87	1288.49	1288.49	0.00	24.3	65.00	65.00	651.44	651.44
2683	2683:TopConn	2683:TopConn	End	10.00	22.40	22.87	1474.42	1474.42	0.00	25.5	65.00	65.00	713.14	713.14
2683	2683:TopConn	2683:TopConn	Ori	10.00	22.40	22.87	1474.42	1474.42	0.00	25.5	65.00	65.00	713.15	713.15
2683	2683:WVGD7	2683:WVGD7	End	15.00	23.78	24.31	1769.84	1769.84	0.00	27.4	65.00	65.00	806.14	806.14
2683	2683:WVGD7	2683:WVGD7	Ori	15.00	23.78	24.31	1769.84	1769.84	0.00	27.4	65.00	65.00	806.14	806.14
2683	2683:Arm3	2683:Arm3	End	19.50	25.03	25.60	2067.33	2067.33	0.00	29.0	65.00	65.00	894.70	894.70
2683	2683:Arm3	2683:Arm3	Ori	19.50	25.03	25.60	2067.33	2067.33	0.00	29.0	65.00	65.00	894.70	894.70
2683	#2683:0	Tube 1	End	22.25	25.79	26.39	2264.58	2264.58	0.00	30.0	65.00	65.00	951.09	951.09
2683	#2683:0	Tube 1	Ori	22.25	25.79	26.39	2264.58	2264.58	0.00	30.0	65.00	65.00	951.09	951.09
2683	2683:WVGD6	2683:WVGD6	End	25.00	26.56	27.18	2474.00	2474.00	0.00	31.1	65.00	65.00	1009.21	1009.21
2683	2683:WVGD6	2683:WVGD6	Ori	25.00	26.56	27.18	2474.00	2474.00	0.00	31.1	65.00	65.00	1009.21	1009.21
2683	#2683:1	Tube 1	End	27.75	27.32	27.97	2695.95	2695.95	0.00	32.1	65.00	65.00	1069.06	1069.06
2683	#2683:1	Tube 1	Ori	27.75	27.32	27.97	2695.95	2695.95	0.00	32.1	65.00	65.00	1069.06	1069.06
2683	2683:Arm4	2683:Arm4	End	30.50	28.08	28.76	2930.78	2930.78	0.00	33.1	65.00	64.24	1117.35	1117.35
2683	2683:Arm4	2683:Arm4	Ori	30.50	28.08	28.76	2930.78	2930.78	0.00	33.1	65.00	64.24	1117.35	1117.35
2683	#2683:2	SpliceT	End	34.83	29.28	30.00	3327.87	3327.87	0.00	34.7	65.00	62.89	1191.09	1191.09
2683	#2683:2	SpliceT	Ori	34.83	29.28	30.00	3327.87	3327.87	0.00	34.7	65.00	62.89	1191.10	1191.10
2683	2683:WVGD5	2683:WVGD5	End	35.00	28.70	35.20	3734.31	3734.31	0.00	27.6	65.00	65.00	1409.35	1409.35
2683	2683:WVGD5	2683:WVGD5	Ori	35.00	28.70	35.20	3734.31	3734.31	0.00	27.6	65.00	65.00	1409.35	1409.35
2683	#2683:3	SpliceB	End	39.00	29.81	36.58	4190.24	4190.24	0.00	28.8	65.00	65.00	1522.59	1522.59
2683	#2683:3	SpliceB	Ori	39.00	29.81	36.58	4190.24	4190.24	0.00	28.8	65.00	65.00	1522.59	1522.59
2683	2683:BotConn	2683:BotConn	End	40.00	30.09	36.93	4309.75	4309.75	0.00	29.1	65.00	65.00	1551.58	1551.58
2683	2683:BotConn	2683:BotConn	Ori	40.00	30.09	36.93	4309.75	4309.75	0.00	29.1	65.00	65.00	1551.58	1551.58
2683	2683:WVGD4	2683:WVGD4	End	45.00	31.48	38.65	4941.47	4941.47	0.00	30.6	65.00	65.00	1700.66	1700.66
2683	2683:WVGD4	2683:WVGD4	Ori	45.00	31.48	38.65	4941.47	4941.47	0.00	30.6	65.00	65.00	1700.66	1700.66
2683	#2683:4	Tube 2	End	50.00	32.86	40.37	5632.09	5632.09	0.00	32.2	65.00	65.00	1856.57	1856.57
2683	#2683:4	Tube 2	Ori	50.00	32.86	40.37	5632.09	5632.09	0.00	32.2	65.00	65.00	1856.57	1856.57
2683	2683:WVGD3	2683:WVGD3	End	55.00	34.25	42.09	6384.24	6384.24	0.00	33.7	65.00	63.72	1979.56	1979.56
2683	2683:WVGD3	2683:WVGD3	Ori	55.00	34.25	42.09	6384.24	6384.24	0.00	33.7	65.00	63.72	1979.56	1979.56
2683	#2683:5	Tube 2	End	60.00	35.64	43.82	7200.54	7200.54	0.00	35.2	65.00	62.42	2102.06	2102.06
2683	#2683:5	Tube 2	Ori	60.00	35.64	43.82	7200.54	7200.54	0.00	35.2	65.00	62.42	2102.06	2102.06
2683	2683:WVGD2	2683:WVGD2	End	65.00	37.02	45.54	8083.61	8083.61	0.00	36.8	65.00	61.12	2224.22	2224.22
2683	2683:WVGD2	2683:WVGD2	Ori	65.00	37.02	45.54	8083.61	8083.61	0.00	36.8	65.00	61.12	2224.22	2224.22
2683	#2683:6	SpliceT	End	69.75	38.34	47.18	8986.78	8986.78	0.00	38.2	65.00	59.89	2339.57	2339.57
2683	#2683:6	SpliceT	Ori	69.75	38.34	47.18	8986.78	8986.78	0.00	38.2	65.00	59.89	2339.57	2339.57
2683	#2683:7	Tube 2	End	72.38	38.32	47.15	8971.06	8971.06	0.00	38.2	65.00	59.91	2337.64	2337.64
2683	#2683:7	Tube 2	Ori	72.38	38.32	47.15	8971.06	8971.06	0.00	38.2	65.00	59.91	2337.64	2337.64
2683	2683:WVGD1	2683:WVGD1	End	75.00	39.05	48.05	9497.27	9497.27	0.00	39.0	65.00	59.23	2400.97	2400.97
2683	2683:WVGD1	2683:WVGD1	Ori	75.00	39.05	48.05	9497.27	9497.27	0.00	39.0	65.00	59.23	2400.97	2400.97
2683	#2683:8	Tube 3	End	80.00	40.43	49.78	10555.72	10555.72	0.00	40.5	65.00	57.93	2520.52	2520.52
2683	#2683:8	Tube 3	Ori	80.00	40.43	49.78	10555.72	10555.72	0.00	40.5	65.00	57.93	2520.52	2520.52
2683	#2683:9	Tube 3	End	85.00	41.82	51.50	11690.03	11690.03	0.00	42.0	65.00	56.63	2638.31	2638.31
2683	#2683:9	Tube 3	Ori	85.00	41.82	51.50	11690.03	11690.03	0.00	42.0	65.00	56.63	2638.31	2638.31
2683	2683:g	2683:g	End	90.00	43.20	53.22	12902.82	12902.82	0.00	43.6	65.00	55.27	2751.00	2751.00

Tubular Davit Properties:

Davit Property Label	Stock Number	Steel Shape	Thickness (in)	Base Diameter or Depth (in)	Tip Diameter or Depth (in)	Taper (in/ft)	Drag Coef.	Modulus of Elasticity (ksi)	Geometry	Strength Check Type	Vertical Capacity (lbs)	Tension Capacity (lbs)	Compres. Capacity (lbs)	Long. Capacity (lbs)	Yield Stress (ksi)	Weight Density Override (lbs/ft^3)	Steel Shape At End
ARM A		0	0.1875	10.76	6	0	1.3	29000	1 point	Calculated	0	0	0	0	65	0	
ARM B		0	0.25	18.5	9	0	1.3	29000	1 point	Calculated	0	0	0	0	65	0	

ARM C	0	0.25	18.5	9	0	1.3	29000	1 point	Calculated	0	0	0	0	65	0

Intermediate Joints for Davit Property "ARM A":

Joint Label	Horz. Offset (ft)	Vert. Offset (ft)
End	4.5	-1.5

Intermediate Joints for Davit Property "ARM B":

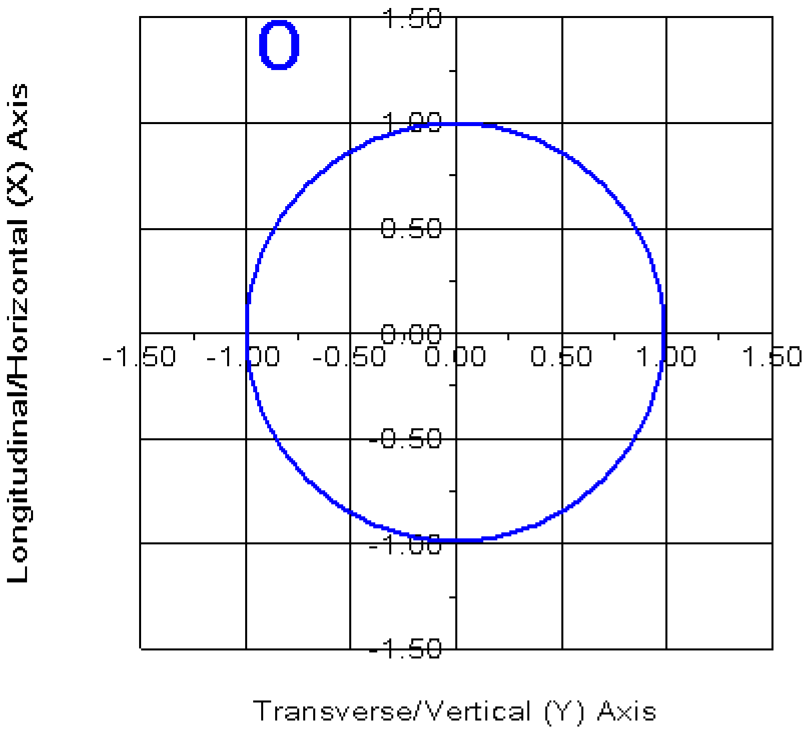
Joint Label	Horz. Offset (ft)	Vert. Offset (ft)
End	8.67	-2

Intermediate Joints for Davit Property "ARM C":

Joint Label	Horz. Offset (ft)	Vert. Offset (ft)
End	11.67	-3

Tubular Davit Arm Connectivity:

Davit Label	Attach Label	Davit Property Set	Azimuth (deg)
Davit1	2683:Arm1	ARM A	180
Davit2	2683:Arm1	ARM A	0
Davit3	2683:Arm2	ARM B	180
Davit4	2683:Arm2	ARM B	0
Davit5	2683:Arm3	ARM C	180
Davit6	2683:Arm3	ARM C	0
Davit7	2683:Arm4	ARM B	180
Davit8	2683:Arm4	ARM B	0



Tubular Davit Arm Steel Properties:

Element Label	Joint Label	Joint Position	Rel. Dist. (ft)	Outer Diam. (in)	Area (in^2)	V-Moment Inertia (in^4)	H-Moment Inertia (in^4)	D/t	W/t Max.	Fy (ksi)	Fa Min. (ksi)	V-Moment Capacity (ft-k)	H-Moment Capacity (ft-k)
Davit1	Davit1:O	Origin	0.00	10.76	6.23	87.04	87.04	57.39	0.0	65.00	65.00	87.64	87.64
Davit1	Davit1:End	End	4.74	6.00	3.42	14.47	14.47	32.00	0.0	65.00	65.00	26.13	26.13
Davit2	Davit2:O	Origin	0.00	10.76	6.23	87.04	87.04	57.39	0.0	65.00	65.00	87.64	87.64
Davit2	Davit2:End	End	4.74	6.00	3.42	14.47	14.47	32.00	0.0	65.00	65.00	26.13	26.13
Davit3	Davit3:O	Origin	0.00	18.50	14.33	596.86	596.86	74.00	0.0	65.00	65.00	349.51	349.51
Davit3	#Davit3:0	End	4.45	13.75	10.60	241.63	241.63	55.00	0.0	65.00	65.00	190.37	190.37
Davit3	#Davit3:0	Origin	4.45	13.75	10.60	241.63	241.63	55.00	0.0	65.00	65.00	190.37	190.37
Davit3	Davit3:End	End	8.90	9.00	6.87	65.82	65.82	36.00	0.0	65.00	65.00	79.23	79.23
Davit4	Davit4:O	Origin	0.00	18.50	14.33	596.86	596.86	74.00	0.0	65.00	65.00	349.51	349.51
Davit4	#Davit4:0	End	4.45	13.75	10.60	241.63	241.63	55.00	0.0	65.00	65.00	190.37	190.37
Davit4	#Davit4:0	Origin	4.45	13.75	10.60	241.63	241.63	55.00	0.0	65.00	65.00	190.37	190.37
Davit4	Davit4:End	End	8.90	9.00	6.87	65.82	65.82	36.00	0.0	65.00	65.00	79.23	79.23
Davit5	Davit5:O	Origin	0.00	18.50	14.33	596.86	596.86	74.00	0.0	65.00	65.00	349.51	349.51

Davit5	#Davit5:0	End	5.00	14.56	11.24	287.65	287.65	58.23	0.0	65.00	65.00	214.05	214.05
Davit5	#Davit5:0	Origin	5.00	14.56	11.24	287.65	287.65	58.23	0.0	65.00	65.00	214.05	214.05
Davit5	#Davit5:1	End	8.52	11.78	9.05	150.51	150.51	47.12	0.0	65.00	65.00	138.43	138.43
Davit5	#Davit5:1	Origin	8.52	11.78	9.05	150.51	150.51	47.12	0.0	65.00	65.00	138.43	138.43
Davit5	Davit5:End	End	12.05	9.00	6.87	65.82	65.82	36.00	0.0	65.00	65.00	79.23	79.23
Davit6	Davit6:O	Origin	0.00	18.50	14.33	596.86	596.86	74.00	0.0	65.00	65.00	349.51	349.51
Davit6	#Davit6:0	End	5.00	14.56	11.24	287.65	287.65	58.23	0.0	65.00	65.00	214.05	214.05
Davit6	#Davit6:0	Origin	5.00	14.56	11.24	287.65	287.65	58.23	0.0	65.00	65.00	214.05	214.05
Davit6	#Davit6:1	End	8.52	11.78	9.05	150.51	150.51	47.12	0.0	65.00	65.00	138.43	138.43
Davit6	#Davit6:1	Origin	8.52	11.78	9.05	150.51	150.51	47.12	0.0	65.00	65.00	138.43	138.43
Davit6	Davit6:End	End	12.05	9.00	6.87	65.82	65.82	36.00	0.0	65.00	65.00	79.23	79.23
Davit7	Davit7:O	Origin	0.00	18.50	14.33	596.86	596.86	74.00	0.0	65.00	65.00	349.51	349.51
Davit7	#Davit7:0	End	4.45	13.75	10.60	241.63	241.63	55.00	0.0	65.00	65.00	190.37	190.37
Davit7	#Davit7:0	Origin	4.45	13.75	10.60	241.63	241.63	55.00	0.0	65.00	65.00	190.37	190.37
Davit7	Davit7:End	End	8.90	9.00	6.87	65.82	65.82	36.00	0.0	65.00	65.00	79.23	79.23
Davit8	Davit8:O	Origin	0.00	18.50	14.33	596.86	596.86	74.00	0.0	65.00	65.00	349.51	349.51
Davit8	#Davit8:0	End	4.45	13.75	10.60	241.63	241.63	55.00	0.0	65.00	65.00	190.37	190.37
Davit8	#Davit8:0	Origin	4.45	13.75	10.60	241.63	241.63	55.00	0.0	65.00	65.00	190.37	190.37
Davit8	Davit8:End	End	8.90	9.00	6.87	65.82	65.82	36.00	0.0	65.00	65.00	79.23	79.23

*** Insulator Data

Clamp Properties:

Label	Stock Number	Holding Capacity (lbs)
clamp	clamp1	8e+004

Clamp Insulator Connectivity:

Clamp Label	Structure And Tip Attach	Property Set	Min. Required Vertical Load (uplift) (lbs)
Clamp1	Davit1:End	clamp	No Limit
Clamp2	Davit2:End	clamp	No Limit
Clamp3	Davit3:End	clamp	No Limit
Clamp4	Davit4:End	clamp	No Limit
Clamp5	Davit5:End	clamp	No Limit
Clamp6	Davit6:End	clamp	No Limit
Clamp7	Davit7:End	clamp	No Limit
Clamp8	Davit8:End	clamp	No Limit
Clamp9	2683:WVGD1	clamp	No Limit
Clamp10	2683:WVGD2	clamp	No Limit
Clamp11	2683:WVGD3	clamp	No Limit
Clamp12	2683:WVGD4	clamp	No Limit
Clamp13	2683:WVGD5	clamp	No Limit
Clamp14	2683:WVGD6	clamp	No Limit
Clamp15	2683:WVGD7	clamp	No Limit
Clamp17	2683:TopConn	clamp	No Limit
Clamp18	2683:BotConn	clamp	No Limit
Clamp19	2683:WVGD8	clamp	No Limit

PLS-CADD Link Cable Sets:

Insulator Label	Conductor Attach Label	Insulator Type	Set Number	Phase Number	Set Description	Dead End
Clamp1	Davit1:End	Clamp	20	1		No
Clamp2	Davit2:End	Clamp	21	1		No
Clamp3	Davit3:End	Clamp	1	1		No
Clamp4	Davit4:End	Clamp	4	1		No
Clamp5	Davit5:End	Clamp	2	1		No
Clamp6	Davit6:End	Clamp	5	1		No
Clamp7	Davit7:End	Clamp	3	1		No
Clamp8	Davit8:End	Clamp	6	1		No
Clamp9	2683:WVGD1	Clamp	0	0		No
Clamp10	2683:WVGD2	Clamp	0	0		No
Clamp11	2683:WVGD3	Clamp	0	0		No
Clamp12	2683:WVGD4	Clamp	0	0		No
Clamp13	2683:WVGD5	Clamp	0	0		No
Clamp14	2683:WVGD6	Clamp	0	0		No
Clamp15	2683:WVGD7	Clamp	0	0		No
Clamp17	2683:TopConn	Clamp	0	0		No
Clamp18	2683:BotConn	Clamp	0	0		No
Clamp19	2683:WVGD8	Clamp	0	0		No

*** Loads Data

Loads from file: j:\jobs\1715900.wi\18_ct54xc713 brookfield\04_structural\calcs\rev (5)\pls pole\cl&p #2683.lca

Insulator dead and wind loads are already included in the point loads printed below.

Loading Method Parameters:

Structure Height Summary (used for calculating wind/ice adjust with height):

Z of ground for wind height adjust	0.00 (ft) and structure Z coordinate that will be put on the centerline ground profile in PLS-CADD.
Ground elevation shift	0.00 (ft)
Z of ground with shift	0.00 (ft)
Z of structure top (highest joint)	90.42 (ft)
Structure height	90.42 (ft)
Structure height above ground	90.42 (ft)

Vector Load Cases:

Load Case Description	Dead Load Factor	Wind Area Factor	SF for Steel Poles Tubular and Towers	SF for Wood Poles	SF for Conc. Ult.	SF for Conc. First Crack	SF for Conc. Zero Tens.	SF for Guys and Cables	SF for Non Tubular Arms	SF for Braces	SF for Insuls.	SF For Found.	Point Loads	Wind/Ice Model	Trans. Wind Pressure (psf)	Longit. Wind Pressure (psf)	Ice Thick. (in)	Ice Density (lbs/ft^3)	Temperature (deg F)	Pole Deflection Check	Pole Deflection Limit % or (ft)
NESC Heavy	1.5000	2.5000	1.00000	0.6500	0.0000	1.0000	0.0000	1.0000	1.0000	1.0000	1.0000	1.0000	18 loads	Wind on All	4	0	0.000	0.000	0.0	No Limit	0
NESC Extreme	1.0000	1.0000	1.00000	0.6500	0.0000	1.0000	0.0000	1.0000	1.0000	1.0000	1.0000	1.0000	18 loads	NESC 2012	25.6	0	0.000	0.000	0.0	No Limit	0

Point Loads for Load Case "NESC Heavy":

Joint Label	Vertical Load (lbs)	Transverse Load (lbs)	Longitudinal Load (lbs)	Load Comment
Davit1:End	871	1715	105	
Davit2:End	1449	2103	21	
Davit3:End	1581	2183	124	
Davit4:End	2028	2006	33	
Davit5:End	1581	2183	124	
Davit6:End	2028	2006	33	
Davit7:End	1581	2183	124	
Davit8:End	2028	2006	33	
2683:TopConn	10045	3272	0	
2683:BotConn	2329	-597	0	
2683:WVGD1	852	96	0	
2683:WVGD2	852	96	0	
2683:WVGD3	852	96	0	
2683:WVGD4	852	96	0	
2683:WVGD5	470	55	0	
2683:WVGD6	470	55	0	

2683:WVGD7	470	55	0
2683:WVGD8	470	55	0

Point Loads for Load Case "NESC Extreme":

Joint Label	Vertical Load (lbs)	Transverse Load (lbs)	Longitudinal Load (lbs)	Load Comment
Davit1:End	249	930	57	
Davit2:End	558	1299	15	
Davit3:End	634	1392	78	
Davit4:End	878	1548	27	
Davit5:End	634	1392	78	
Davit6:End	878	1548	27	
Davit7:End	634	1392	78	
Davit8:End	878	1548	27	
2683:TopConn	4667	10009	0	
2683:BotConn	1058	-2137	0	
2683:WVGD1	238	212	0	
2683:WVGD2	238	212	0	
2683:WVGD3	238	212	0	
2683:WVGD4	238	212	0	
2683:WVGD5	119	106	0	
2683:WVGD6	119	106	0	
2683:WVGD7	119	106	0	
2683:WVGD8	119	106	0	

Detailed Pole Loading Data for Load Case "NESC Extreme":

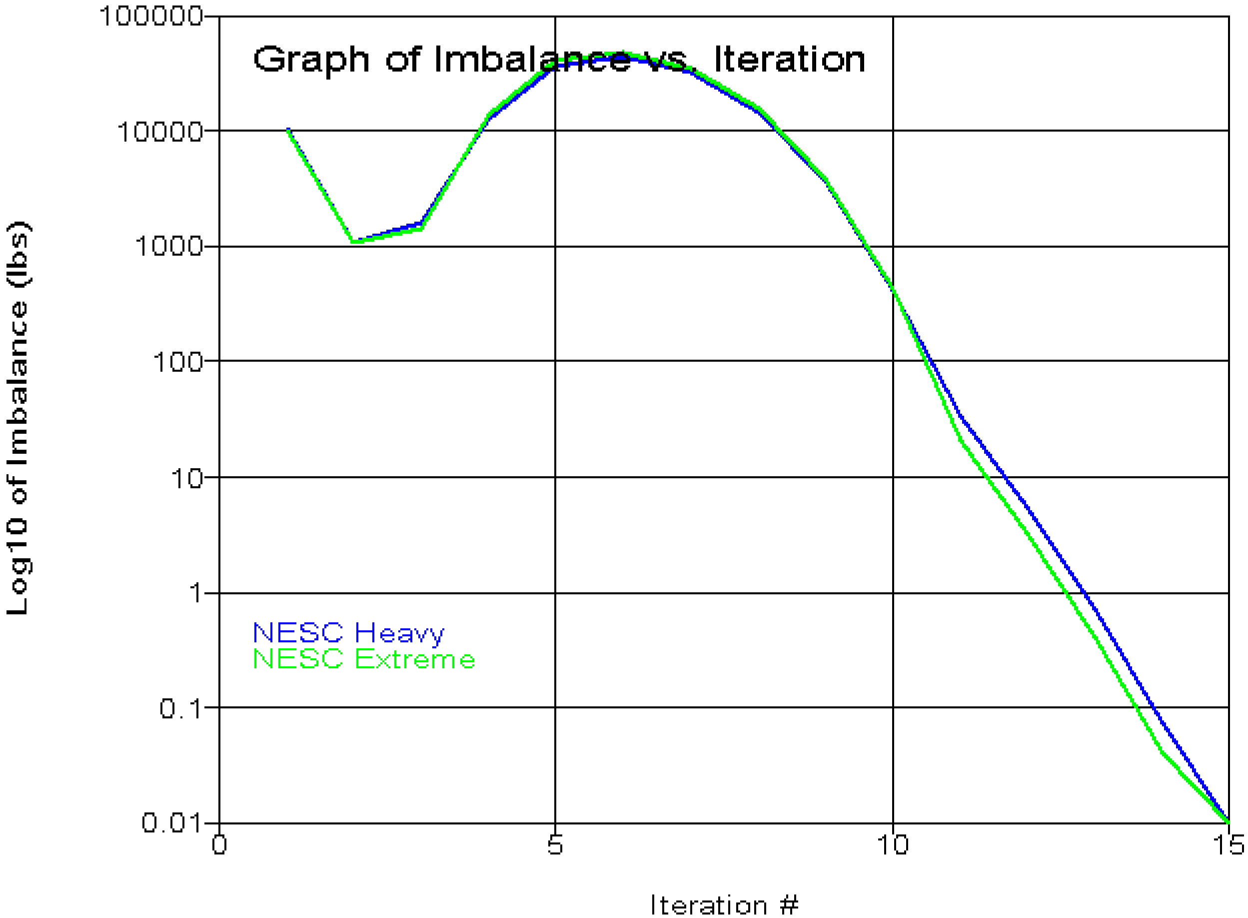
Notes: Does not include loads from equipment, arms, guys, braces, etc. or user input loads.
Wind load is calculated for the undeformed shape of a pole.

Pole Label	Top Joint	Bottom Joint	Section Top Z (ft)	Section Bottom Z (ft)	Section Average Elevation (ft)	Outer Diameter (in)	Reynolds Number	Drag Coef.	Adjusted Wind Pressure (psf)	Adjusted Ice Thickness (in)	Pole Vert. Load (lbs)	Pole Wind Load (lbs)	Pole Ice Vertical Load (lbs)	Pole Ice Wind Load (lbs)	Tran. Wind Load (lbs)	Long. Wind Load (lbs)
2683	2683:t	2683:Arm1	90.00	88.92	89.46	19.775	1.5e+006	1.000	25.60	0.00	74.07	45.56	0.00	0.00	45.56	0.00
2683	2683:Arm1	2683:WVGD8	88.92	85.00	86.96	20.468	1.55e+006	1.000	25.60	0.00	278.40	171.18	0.00	0.00	171.18	0.00
2683	2683:WVGD8	2683:Arm2	85.00	83.50	84.25	21.219	1.61e+006	1.000	25.60	0.00	110.50	67.91	0.00	0.00	67.91	0.00
2683	2683:Arm2	2683:TopConn	83.50	80.00	81.75	21.913	1.66e+006	1.000	25.60	0.00	266.39	163.63	0.00	0.00	163.63	0.00
2683	2683:TopConn	2683:WVGD7	80.00	75.00	77.50	23.091	1.75e+006	1.000	25.60	0.00	401.32	246.32	0.00	0.00	246.32	0.00
2683	2683:WVGD7	2683:Arm3	75.00	70.50	72.75	24.408	1.85e+006	1.000	25.60	0.00	382.07	234.33	0.00	0.00	234.33	0.00
2683	2683:Arm3		70.50	67.75	69.13	25.413	1.93e+006	1.000	25.60	0.00	243.23	149.10	0.00	0.00	149.10	0.00
2683		2683:WVGD6	67.75	65.00	66.38	26.176	1.98e+006	1.000	25.60	0.00	250.62	153.58	0.00	0.00	153.58	0.00
2683	2683:WVGD6		65.00	62.25	63.63	26.938	2.04e+006	1.000	25.60	0.00	258.01	158.05	0.00	0.00	158.05	0.00
2683		2683:Arm4	62.25	59.50	60.88	27.701	2.1e+006	1.000	25.60	0.00	265.40	162.52	0.00	0.00	162.52	0.00
2683	2683:Arm4		59.50	55.17	57.33	28.683	2.17e+006	1.000	25.60	0.00	433.19	265.17	0.00	0.00	265.17	0.00
2683		2683:WVGD5	55.17	55.00	55.08	28.994	2.2e+006	1.000	25.60	0.00	36.98	10.31	0.00	0.00	10.31	0.00
2683	2683:WVGD5		55.00	51.00	53.00	29.259	2.22e+006	1.000	25.60	0.00	905.35	249.70	0.00	0.00	249.70	0.00
2683		2683:BotConn	51.00	50.00	50.50	29.952	2.27e+006	1.000	25.60	0.00	125.15	63.90	0.00	0.00	63.90	0.00
2683	2683:BotConn	2683:WVGD4	50.00	45.00	47.50	30.784	2.33e+006	1.000	25.60	0.00	642.92	328.39	0.00	0.00	328.39	0.00
2683	2683:WVGD4		45.00	40.00	42.50	32.171	2.44e+006	1.000	25.60	0.00	672.23	343.18	0.00	0.00	343.18	0.00
2683		2683:WVGD3	40.00	35.00	37.50	33.557	2.54e+006	1.000	25.60	0.00	701.54	357.97	0.00	0.00	357.97	0.00
2683	2683:WVGD3		35.00	30.00	32.50	34.943	2.65e+006	1.000	25.60	0.00	730.85	372.76	0.00	0.00	372.76	0.00
2683		2683:WVGD2	30.00	25.00	27.50	36.330	2.75e+006	1.000	25.60	0.00	760.16	387.55	0.00	0.00	387.55	0.00
2683	2683:WVGD2		25.00	20.25	22.63	37.682	2.85e+006	1.000	25.60	0.00	749.30	381.87	0.00	0.00	381.87	0.00
2683			20.25	17.63	18.94	38.329	2.9e+006	1.000	25.60	0.00	842.55	214.66	0.00	0.00	214.66	0.00

2683		2683:WVGD1	17.63	15.00	16.31	38.682	2.93e+006	1.000	25.60	0.00	858.71	216.63	0.00	0.00	216.63	0.00
2683	2683:WVGD1		15.00	10.00	12.50	39.739	3.01e+006	1.000	25.60	0.00	832.34	423.91	0.00	0.00	423.91	0.00
2683			10.00	5.00	7.50	41.125	3.12e+006	1.000	25.60	0.00	861.55	438.70	0.00	0.00	438.70	0.00
2683		2683:g	5.00	0.00	2.50	42.512	3.22e+006	1.000	25.60	0.00	890.86	453.49	0.00	0.00	453.49	0.00

*** Analysis Results:

Maximum element usage is 70.06% for Steel Pole "2683" in load case "NESC Extreme"
Maximum insulator usage is 13.80% for Clamp "Clamp17" in load case "NESC Extreme"



*** Analysis Results for Load Case No. 1 "NESC Heavy" - Number of iterations in SAPS 15

Equilibrium Joint Positions and Rotations for Load Case "NESC Heavy":

Joint Label	X-Displ (ft)	Y-Displ (ft)	Z-Displ (ft)	X-Rot (deg)	Y-Rot (deg)	Z-Rot (deg)	X-Pos (ft)	Y-Pos (ft)	Z-Pos (ft)
2683:g	0	0	0	0.0000	0.0000	0.0000	0	0	0
2683:t	0.0774	2.861	-0.06206	-3.1663	0.0866	0.0203	0.0774	2.861	89.94
2683:Arm1	0.07579	2.801	-0.06041	-3.1663	0.0866	0.0203	0.07579	2.801	88.86

2683:WVGD8	0.06998	2.585	-0.05442	-3.1495	0.0862	0.0198	0.06998	2.585	84.95
2683:Arm2	0.06776	2.503	-0.05215	-3.1400	0.0859	0.0196	0.06776	2.503	83.45
2683:TopConn	0.06266	2.312	-0.04691	-3.0970	0.0846	0.0183	0.06266	2.312	79.95
2683:WVGD7	0.05552	2.045	-0.03965	-3.0034	0.0820	0.0169	0.05552	2.045	74.96
2683:Arm3	0.04929	1.814	-0.03355	-2.8916	0.0790	0.0157	0.04929	1.814	70.47
2683:WVGD6	0.04206	1.544	-0.02676	-2.7100	0.0741	0.0135	0.04206	1.544	64.97
2683:Arm4	0.03529	1.294	-0.02087	-2.5011	0.0686	0.0116	0.03529	1.294	59.48
2683:WVGD5	0.03017	1.104	-0.01672	-2.3087	0.0634	0.0099	0.03017	1.104	54.98
2683:BotConn	0.02492	0.9113	-0.01283	-2.1040	0.0579	0.0083	0.02492	0.9113	49.99
2683:WVGD4	0.02015	0.7365	-0.009602	-1.8918	0.0521	0.0070	0.02015	0.7365	44.99
2683:WVGD3	0.01212	0.4431	-0.004941	-1.4605	0.0402	0.0048	0.01212	0.4431	35
2683:WVGD2	0.006143	0.2247	-0.002204	-1.0342	0.0284	0.0031	0.006143	0.2247	25
2683:WVGD1	0.002187	0.08015	-0.0008004	-0.6130	0.0168	0.0017	0.002187	0.08015	15
Davit1:O	0.07616	2.802	-0.01455	-3.1663	0.0866	0.0203	0.07616	1.972	88.91
Davit1:End	0.08075	2.892	0.2309	-3.1517	0.0891	0.0266	0.08075	-2.438	90.65
Davit2:O	0.07543	2.8	-0.1063	-3.1663	0.0866	0.0203	0.07543	3.63	88.81
Davit2:End	0.07576	2.878	-0.364	-3.2928	0.0870	0.0191	0.07576	8.208	90.06
Davit3:O	0.06814	2.504	-0.003251	-3.1400	0.0859	0.0196	0.06814	1.611	83.5
Davit3:End	0.07521	2.626	0.4651	-3.0997	0.0873	0.0242	0.07521	-6.937	85.97
Davit4:O	0.06739	2.501	-0.1011	-3.1400	0.0859	0.0196	0.06739	3.394	83.4
Davit4:End	0.06677	2.6	-0.5875	-3.2353	0.0861	0.0183	0.06677	12.16	84.91
Davit5:O	0.04965	1.815	0.01906	-2.8916	0.0790	0.0157	0.04965	0.7719	70.52
Davit5:End	0.0588	1.979	0.5956	-2.8193	0.0817	0.0243	0.0588	-10.73	74.1
Davit6:O	0.04893	1.812	-0.08617	-2.8916	0.0790	0.0157	0.04893	2.855	70.41
Davit6:End	0.04925	1.953	-0.6998	-3.0730	0.0794	0.0134	0.04925	14.67	72.8
Davit7:O	0.03559	1.295	0.03019	-2.5011	0.0686	0.0116	0.03559	0.1247	59.53
Davit7:End	0.04061	1.389	0.403	-2.4598	0.0699	0.0163	0.04061	-8.451	61.9
Davit8:O	0.03499	1.293	-0.07193	-2.5011	0.0686	0.0116	0.03499	2.463	59.43
Davit8:End	0.03526	1.373	-0.4607	-2.5972	0.0688	0.0104	0.03526	11.21	61.04

Joint Support Reactions for Load Case "NESC Heavy":

Joint Label	X Force (kips)	X Usage %	Y Force (kips)	Y Usage %	H-Shear Usage %	Z Force (kips)	Comp. Usage %	Uplift Usage %	Result. Force (kips)	Result. Usage %	X Moment (ft-k)	X-M. Usage %	Y Moment (ft-k)	Y-M. Usage %	H-Bend-M Usage %	Z Moment (ft-k)	Z-M. Usage %	Max. Usage %
2683:g	-0.60	0.0	-23.46	0.0	0.0	-54.57	0.0	0.0	59.40	0.0	1773.39	0.0	-48.3	0.0	0.0	-3.34	0.0	0.0

Detailed Steel Pole Usages for Load Case "NESC Heavy":

Element Label	Joint Label	Joint Position	Rel. Dist. (ft)	Trans. Defl. (in)	Long. Defl. (in)	Vert. Defl. (in)	Trans. Mom. (Local Mx) (ft-k)	Long. Mom. (Local My) (ft-k)	Tors. Mom. (ft-k)	Axial Force (kips)	Tran. Shear (kips)	Long. Shear (kips)	P/A (ksi)	M/S. (ksi)	V/Q. (ksi)	T/R. (ksi)	Res. (ksi)	Max. Usage %	At Pt.
2683	2683:t	Origin	0.00	34.33	0.93	-0.74	0.00	0.00	0.0	-0.06	0.02	-0.00	-0.00	0.00	0.00	0.00	0.00	0.0	4
2683	2683:Arm1	End	1.08	33.61	0.91	-0.72	0.02	-0.00	0.0	-0.06	0.02	-0.00	-0.00	0.00	0.00	0.00	0.01	0.0	2
2683	2683:Arm1	Origin	1.08	33.61	0.91	-0.72	8.92	-0.20	0.4	-2.66	4.06	-0.13	-0.13	1.04	0.16	0.03	1.22	1.9	2
2683	2683:WVGD8	End	5.00	31.02	0.84	-0.65	24.81	-0.71	0.4	-2.66	4.06	-0.13	-0.12	2.61	0.15	0.02	2.75	4.2	2
2683	2683:WVGD8	Origin	5.00	31.02	0.84	-0.65	24.81	-0.71	0.4	-3.41	4.23	-0.13	-0.16	2.61	0.16	0.02	2.78	4.3	2
2683	2683:Arm2	End	6.50	30.03	0.81	-0.63	31.15	-0.91	0.4	-3.41	4.23	-0.13	-0.16	3.15	0.15	0.02	3.32	5.1	2
2683	2683:Arm2	Origin	6.50	30.03	0.81	-0.63	44.37	-1.24	1.3	-8.03	8.75	-0.30	-0.37	4.48	0.32	0.07	4.89	7.5	2
2683	2683:TopConn	End	10.00	27.75	0.75	-0.56	74.98	-2.28	1.3	-8.03	8.75	-0.30	-0.35	6.92	0.30	0.06	7.30	11.2	2
2683	2683:TopConn	Origin	10.00	27.75	0.75	-0.56	74.98	-2.29	1.3	-18.40	12.70	-0.31	-0.80	6.92	0.44	0.06	7.77	12.0	2
2683	2683:WVGD7	End	15.00	24.55	0.67	-0.48	138.45	-3.85	1.3	-18.40	12.70	-0.31	-0.76	11.29	0.42	0.06	12.08	18.6	2
2683	2683:WVGD7	Origin	15.00	24.55	0.67	-0.48	138.45	-3.86	1.3	-19.47	12.92	-0.31	-0.80	11.29	0.42	0.06	12.12	18.6	2
2683	2683:Arm3	End	19.50	21.76	0.59	-0.40	196.60	-5.27	1.3	-19.47	12.92	-0.31	-0.76	14.44	0.40	0.05	15.22	23.4	2
2683	2683:Arm3	Origin	19.50	21.76	0.59	-0.40	215.66	-5.76	2.5	-24.65	17.46	-0.48	-0.96	15.84	0.54	0.10	16.84	25.9	2
2683	Tube 1	End	22.25	20.12	0.55	-0.36	263.69	-7.07	2.5	-24.65	17.46	-0.48	-0.93	18.22	0.53	0.09	19.19	29.5	2

2683	Tube 1	Origin	22.25	20.12	0.55	-0.36	263.69	-7.08	2.5	-25.05	17.54	-0.48	-0.95	18.22	0.53	0.09	19.20	29.5	2
2683	2683:WVGD6	End	25.00	18.53	0.50	-0.32	311.91	-8.39	2.5	-25.05	17.54	-0.48	-0.92	20.31	0.51	0.09	21.26	32.7	2
2683	2683:WVGD6	Origin	25.00	18.53	0.50	-0.32	311.91	-8.39	2.5	-25.93	17.69	-0.48	-0.95	20.31	0.52	0.09	21.29	32.8	2
2683	Tube 1	End	27.75	17.00	0.46	-0.28	360.54	-9.70	2.5	-25.93	17.69	-0.48	-0.93	22.17	0.50	0.08	23.11	35.6	2
2683	Tube 1	Origin	27.75	17.00	0.46	-0.28	360.54	-9.70	2.5	-26.35	17.76	-0.48	-0.94	22.17	0.50	0.08	23.13	35.6	2
2683	2683:Arm4	End	30.50	15.52	0.42	-0.25	409.37	-11.01	2.5	-26.35	17.76	-0.48	-0.92	23.80	0.49	0.08	24.73	38.5	2
2683	2683:Arm4	Origin	30.50	15.52	0.42	-0.25	422.61	-11.34	3.4	-31.31	22.23	-0.64	-1.09	24.57	0.61	0.10	25.69	41.5	2
2683	SpliceT	End	34.83	13.33	0.36	-0.20	518.92	-14.09	3.4	-31.31	22.23	-0.64	-1.04	27.71	0.59	0.10	28.77	47.7	2
2683	SpliceT	Origin	34.83	13.33	0.36	-0.20	518.92	-14.09	3.3	-31.70	22.27	-0.64	-1.06	27.71	0.59	0.10	28.79	47.8	2
2683	2683:WVGD5	End	35.00	13.25	0.36	-0.20	522.63	-14.20	3.3	-31.70	22.27	-0.64	-0.90	24.38	0.50	0.08	25.30	38.9	2
2683	2683:WVGD5	Origin	35.00	13.25	0.36	-0.20	522.63	-14.20	3.3	-32.90	22.41	-0.64	-0.93	24.38	0.51	0.08	25.33	39.0	2
2683	SpliceB	End	39.00	11.38	0.31	-0.16	612.26	-16.74	3.3	-32.90	22.41	-0.64	-0.90	26.43	0.49	0.08	27.35	42.1	2
2683	SpliceB	Origin	39.00	11.38	0.31	-0.16	612.26	-16.74	3.3	-33.72	22.47	-0.64	-0.92	26.43	0.49	0.08	27.37	42.1	2
2683	2683:BotConn	End	40.00	10.94	0.30	-0.15	634.73	-17.37	3.3	-33.72	22.47	-0.64	-0.91	26.89	0.48	0.08	27.82	42.8	2
2683	2683:BotConn	Origin	40.00	10.94	0.30	-0.15	634.73	-17.38	3.3	-36.69	22.03	-0.64	-0.99	26.89	0.47	0.08	27.90	42.9	2
2683	2683:WVGD4	End	45.00	8.84	0.24	-0.12	744.87	-20.54	3.3	-36.69	22.03	-0.64	-0.95	28.79	0.45	0.07	29.76	45.8	2
2683	2683:WVGD4	Origin	45.00	8.84	0.24	-0.12	744.87	-20.55	3.3	-38.61	22.25	-0.63	-1.00	28.79	0.46	0.07	29.81	45.9	2
2683	Tube 2	End	50.00	6.96	0.19	-0.08	856.13	-23.70	3.3	-38.61	22.25	-0.63	-0.96	30.32	0.44	0.06	31.29	48.1	2
2683	Tube 2	Origin	50.00	6.96	0.19	-0.08	856.13	-23.71	3.3	-39.72	22.36	-0.63	-0.98	30.32	0.44	0.06	31.31	48.2	2
2683	2683:WVGD3	End	55.00	5.32	0.15	-0.06	967.91	-26.84	3.3	-39.72	22.36	-0.63	-0.94	31.51	0.42	0.06	32.47	51.0	2
2683	2683:WVGD3	Origin	55.00	5.32	0.15	-0.06	967.91	-26.85	3.3	-41.73	22.58	-0.63	-0.99	31.51	0.43	0.06	32.52	51.0	2
2683	Tube 2	End	60.00	3.90	0.11	-0.04	1080.78	-29.97	3.3	-41.73	22.58	-0.63	-0.95	32.46	0.41	0.05	33.42	53.5	2
2683	Tube 2	Origin	60.00	3.90	0.11	-0.04	1080.78	-29.98	3.3	-42.93	22.68	-0.62	-0.98	32.46	0.41	0.05	33.45	53.6	2
2683	2683:WVGD2	End	65.00	2.70	0.07	-0.03	1194.17	-33.07	3.3	-42.93	22.68	-0.62	-0.94	33.19	0.40	0.05	34.14	55.9	2
2683	2683:WVGD2	Origin	65.00	2.70	0.07	-0.03	1194.17	-33.08	3.3	-45.00	22.89	-0.62	-0.99	33.19	0.40	0.05	34.19	55.9	2
2683	SpliceT	End	69.75	1.76	0.05	-0.02	1302.92	-36.00	3.3	-45.00	22.89	-0.62	-0.95	33.73	0.38	0.05	34.70	57.9	2
2683	SpliceT	Origin	69.75	1.76	0.05	-0.02	1302.92	-36.01	3.3	-46.25	22.98	-0.62	-0.98	33.73	0.39	0.05	34.72	58.0	2
2683	Tube 2	End	72.38	1.33	0.04	-0.01	1363.23	-37.62	3.3	-46.25	22.98	-0.62	-0.98	35.34	0.39	0.05	36.32	60.6	2
2683	Tube 2	Origin	72.38	1.33	0.04	-0.01	1363.23	-37.62	3.3	-47.57	23.03	-0.61	-1.01	35.34	0.39	0.05	36.35	64.0	2
2683	2683:WVGD1	End	75.00	0.96	0.03	-0.01	1423.69	-39.22	3.3	-47.57	23.03	-0.61	-0.99	35.52	0.38	0.04	36.52	61.7	2
2683	2683:WVGD1	Origin	75.00	0.96	0.03	-0.01	1423.69	-39.23	3.3	-49.76	23.22	-0.61	-1.04	35.52	0.38	0.04	36.56	65.3	2
2683	Tube 3	End	80.00	0.43	0.01	-0.01	1539.77	-42.26	3.3	-49.76	23.22	-0.61	-1.00	35.79	0.37	0.04	36.80	63.5	2
2683	Tube 3	Origin	80.00	0.43	0.01	-0.01	1539.77	-42.27	3.3	-51.11	23.31	-0.60	-1.03	35.79	0.37	0.04	36.82	67.5	2
2683	Tube 3	End	85.00	0.11	0.00	-0.00	1656.33	-45.28	3.3	-51.11	23.31	-0.60	-0.99	35.95	0.36	0.04	36.95	65.3	2
2683	Tube 3	Origin	85.00	0.11	0.00	-0.00	1656.32	-45.29	3.3	-52.51	23.41	-0.60	-1.02	35.95	0.36	0.04	36.98	69.7	2
2683	2683:g	End	90.00	0.00	0.00	0.00	1773.39	-48.28	3.3	-52.51	23.41	-0.60	-0.99	36.03	0.35	0.04	37.02	67.0	2

Detailed Tubular Davit Arm Usages for Load Case "NESC Heavy":

Element Label	Joint Label	Joint Position	Rel. Dist. (ft)	Trans. Defl. (in)	Long. Defl. (in)	Vert. Defl. (in)	Vert. Mom. (ft-k)	Horz. Mom. (ft-k)	Tors. Mom. (ft-k)	Axial Force (kips)	Vert. Shear (kips)	Horz. Shear (kips)	P/A (ksi)	M/S. (ksi)	V/Q. (ksi)	T/R. (ksi)	Res. (ksi)	Max. Usage %	At Pt.
Davit1	Davit1:O	Origin	0.00	33.63	0.91	-0.17	-1.09	0.51	0.0	-1.94	0.23	-0.11	-0.31	0.89	0.08	0.00	1.21	1.9	1
Davit1	Davit1:End	End	4.74	34.70	0.97	2.77	-0.00	0.00	0.0	-1.94	0.23	-0.11	-0.57	0.00	0.15	0.00	0.62	1.0	1
Davit2	Davit2:O	Origin	0.00	33.60	0.91	-1.28	-9.52	-0.11	0.0	1.63	2.01	0.02	0.26	7.06	0.64	0.00	7.41	11.4	1
Davit2	Davit2:End	End	4.74	34.53	0.91	-4.37	0.00	0.00	0.0	1.63	2.01	0.02	0.48	0.00	1.17	0.00	2.09	3.2	1
Davit3	Davit3:O	Origin	0.00	30.05	0.82	-0.04	-9.96	1.13	0.0	-2.63	1.23	-0.13	-0.18	1.86	0.17	0.00	2.07	3.2	1
Davit3	#Davit3:0	End	4.45	30.78	0.86	2.78	-4.48	0.57	0.0	-2.63	1.23	-0.13	-0.25	1.54	0.23	0.00	1.83	2.8	1
Davit3	#Davit3:0	Origin	4.45	30.78	0.86	2.78	-4.48	0.57	0.0	-2.56	1.01	-0.13	-0.24	1.54	0.19	0.00	1.81	2.8	1
Davit3	Davit3:End	End	8.90	31.51	0.90	5.58	-0.00	0.00	0.0	-2.56	1.01	-0.13	-0.37	0.00	0.30	0.00	0.63	1.0	1
Davit4	Davit4:O	Origin	0.00	30.02	0.81	-1.21	-22.76	-0.33	-0.0	1.57	2.68	0.04	0.11	4.23	0.37	0.00	4.39	6.8	1
Davit4	#Davit4:0	End	4.45	30.60	0.80	-4.11	-10.84	-0.16	-0.0	1.57	2.68	0.04	0.15	3.70	0.51	0.00	3.95	6.1	1
Davit4	#Davit4:0	Origin	4.45	30.60	0.80	-4.11	-10.84	-0.16	0.0	1.62	2.44	0.04	0.15	3.70	0.46	0.00	3.94	6.1	1
Davit4	Davit4:End	End	8.90	31.19	0.80	-7.05	0.00	0.00	0.0	1.62	2.44	0.04	0.24	0.00	0.71	0.00	1.25	1.9	1

Davit5	Davit5:O	Origin	0.00	21.78	0.60	0.23	-13.66	1.53	0.0	-2.70	1.32	-0.13	-0.19	2.56	0.18	0.00	2.76	4.3	1
Davit5	#Davit5:0	End	5.00	22.60	0.64	3.12	-7.08	0.89	0.0	-2.70	1.32	-0.13	-0.24	2.17	0.24	0.00	2.44	3.8	1
Davit5	#Davit5:0	Origin	5.00	22.60	0.64	3.12	-7.08	0.89	0.0	-2.62	1.08	-0.13	-0.23	2.17	0.19	0.00	2.42	3.7	1
Davit5	#Davit5:1	End	8.52	23.17	0.67	5.14	-3.28	0.45	0.0	-2.62	1.08	-0.13	-0.29	1.55	0.24	0.00	1.89	2.9	1
Davit5	#Davit5:1	Origin	8.52	23.17	0.67	5.14	-3.28	0.45	0.0	-2.57	0.93	-0.13	-0.28	1.55	0.21	0.00	1.87	2.9	1
Davit5	Davit5:End	End	12.05	23.74	0.71	7.15	-0.00	0.00	0.0	-2.57	0.93	-0.13	-0.37	0.00	0.27	0.00	0.60	0.9	1
Davit6	Davit6:O	Origin	0.00	21.75	0.59	-1.03	-32.23	-0.44	-0.0	1.46	2.87	0.04	0.10	5.99	0.40	0.00	6.14	9.4	1
Davit6	#Davit6:0	End	5.00	22.44	0.59	-4.03	-17.88	-0.26	-0.0	1.46	2.87	0.04	0.13	5.43	0.51	0.00	5.63	8.7	1
Davit6	#Davit6:0	Origin	5.00	22.44	0.59	-4.03	-17.88	-0.26	-0.0	1.52	2.62	0.04	0.14	5.43	0.47	0.00	5.62	8.6	1
Davit6	#Davit6:1	End	8.52	22.93	0.59	-6.19	-8.65	-0.13	-0.0	1.52	2.62	0.04	0.17	4.06	0.58	0.00	4.35	6.7	1
Davit6	#Davit6:1	Origin	8.52	22.93	0.59	-6.19	-8.65	-0.13	0.0	1.55	2.45	0.04	0.17	4.06	0.54	0.00	4.34	6.7	1
Davit6	Davit6:End	End	12.05	23.44	0.59	-8.40	0.00	0.00	0.0	1.55	2.45	0.04	0.23	0.00	0.71	0.00	1.26	1.9	1
Davit7	Davit7:O	Origin	0.00	15.54	0.43	0.36	-10.22	1.13	0.0	-2.62	1.26	-0.13	-0.18	1.91	0.18	0.00	2.12	3.3	1
Davit7	#Davit7:0	End	4.45	16.11	0.46	2.61	-4.61	0.56	0.0	-2.62	1.26	-0.13	-0.25	1.58	0.24	0.00	1.88	2.9	1
Davit7	#Davit7:0	Origin	4.45	16.11	0.46	2.61	-4.61	0.56	0.0	-2.55	1.04	-0.13	-0.24	1.58	0.20	0.00	1.86	2.9	1
Davit7	Davit7:End	End	8.90	16.67	0.49	4.84	-0.00	0.00	0.0	-2.55	1.04	-0.13	-0.37	0.00	0.30	0.00	0.64	1.0	1
Davit8	Davit8:O	Origin	0.00	15.51	0.42	-0.86	-22.92	-0.32	-0.0	1.54	2.70	0.04	0.11	4.26	0.38	0.00	4.42	6.8	1
Davit8	#Davit8:0	End	4.45	15.99	0.42	-3.17	-10.92	-0.16	-0.0	1.54	2.70	0.04	0.15	3.73	0.51	0.00	3.97	6.1	1
Davit8	#Davit8:0	Origin	4.45	15.99	0.42	-3.17	-10.92	-0.16	0.0	1.59	2.46	0.04	0.15	3.73	0.46	0.00	3.96	6.1	1
Davit8	Davit8:End	End	8.90	16.48	0.42	-5.53	0.00	0.00	0.0	1.59	2.46	0.04	0.23	0.00	0.71	0.00	1.26	1.9	1

Summary of Clamp Capacities and Usages for Load Case "NESC Heavy":

Clamp Label	Force (kips)	Input Holding Capacity (kips)	Factored Holding Capacity (kips)	Usage %
Clamp1	1.926	80.00	80.00	2.41
Clamp2	2.554	80.00	80.00	3.19
Clamp3	2.698	80.00	80.00	3.37
Clamp4	2.853	80.00	80.00	3.57
Clamp5	2.698	80.00	80.00	3.37
Clamp6	2.853	80.00	80.00	3.57
Clamp7	2.698	80.00	80.00	3.37
Clamp8	2.853	80.00	80.00	3.57
Clamp9	0.857	80.00	80.00	1.07
Clamp10	0.857	80.00	80.00	1.07
Clamp11	0.857	80.00	80.00	1.07
Clamp12	0.857	80.00	80.00	1.07
Clamp13	0.473	80.00	80.00	0.59
Clamp14	0.473	80.00	80.00	0.59
Clamp15	0.473	80.00	80.00	0.59
Clamp17	10.564	80.00	80.00	13.21
Clamp18	2.404	80.00	80.00	3.01
Clamp19	0.473	80.00	80.00	0.59

*** Analysis Results for Load Case No. 2 "NESC Extreme" - Number of iterations in SAPS 15

Equilibrium Joint Positions and Rotations for Load Case "NESC Extreme":

Joint Label	X-Displ (ft)	Y-Displ (ft)	Z-Displ (ft)	X-Rot (deg)	Y-Rot (deg)	Z-Rot (deg)	X-Pos (ft)	Y-Pos (ft)	Z-Pos (ft)
2683:g	0	0	0	0.0000	0.0000	0.0000	0	0	0
2683:t	0.04816	3.012	-0.06687	-3.2835	0.0535	0.0111	0.04816	3.012	89.93
2683:Arm1	0.04716	2.95	-0.0651	-3.2835	0.0535	0.0111	0.04716	2.95	88.85
2683:WVGD8	0.04357	2.726	-0.05867	-3.2737	0.0532	0.0108	0.04357	2.726	84.94
2683:Arm2	0.0422	2.64	-0.05622	-3.2681	0.0531	0.0107	0.0422	2.64	83.44
2683:TopConn	0.03904	2.441	-0.05055	-3.2412	0.0523	0.0101	0.03904	2.441	79.95
2683:WVGD7	0.03461	2.161	-0.04263	-3.1636	0.0507	0.0093	0.03461	2.161	74.96
2683:Arm3	0.03075	1.916	-0.03593	-3.0522	0.0489	0.0087	0.03075	1.916	70.46
2683:WVGD6	0.02626	1.632	-0.02847	-2.8651	0.0460	0.0075	0.02626	1.632	64.97
2683:Arm4	0.02206	1.367	-0.022	-2.6432	0.0426	0.0064	0.02206	1.367	59.48
2683:WVGD5	0.01886	1.167	-0.01748	-2.4389	0.0395	0.0055	0.01886	1.167	54.98
2683:BotConn	0.01559	0.963	-0.01325	-2.2212	0.0361	0.0046	0.01559	0.963	49.99
2683:WVGD4	0.01261	0.7785	-0.00976	-1.9962	0.0325	0.0039	0.01261	0.7785	44.99
2683:WVGD3	0.007598	0.4689	-0.004784	-1.5418	0.0251	0.0026	0.007598	0.4689	35
2683:WVGD2	0.003855	0.2382	-0.001941	-1.0937	0.0178	0.0017	0.003855	0.2382	25
2683:WVGD1	0.001374	0.08513	-0.0005793	-0.6499	0.0105	0.0009	0.001374	0.08513	15
Davit1:O	0.04737	2.951	-0.01755	-3.2835	0.0535	0.0111	0.04737	2.121	88.9
Davit1:End	0.05007	3.045	0.238	-3.2888	0.0548	0.0145	0.05007	-2.285	90.66
Davit2:O	0.04696	2.949	-0.1127	-3.2835	0.0535	0.0111	0.04696	3.779	88.81
Davit2:End	0.04728	3.028	-0.376	-3.3414	0.0537	0.0102	0.04728	8.358	90.04
Davit3:O	0.04241	2.641	-0.005326	-3.2681	0.0531	0.0107	0.04241	1.749	83.49
Davit3:End	0.0466	2.769	0.4846	-3.2565	0.0539	0.0137	0.0466	-6.793	85.98
Davit4:O	0.04198	2.639	-0.1071	-3.2681	0.0531	0.0107	0.04198	3.531	83.39
Davit4:End	0.04182	2.739	-0.6088	-3.3151	0.0532	0.0097	0.04182	12.3	84.89
Davit5:O	0.03096	1.918	0.01961	-3.0522	0.0489	0.0087	0.03096	0.8749	70.52
Davit5:End	0.03645	2.094	0.6343	-3.0322	0.0506	0.0141	0.03645	-10.62	74.13
Davit6:O	0.03055	1.915	-0.09146	-3.0522	0.0489	0.0087	0.03055	2.958	70.41
Davit6:End	0.031	2.06	-0.7277	-3.1431	0.0493	0.0068	0.031	14.77	72.77
Davit7:O	0.02223	1.368	0.03196	-2.6432	0.0426	0.0064	0.02223	0.198	59.53
Davit7:End	0.02525	1.469	0.4285	-2.6309	0.0435	0.0094	0.02525	-8.371	61.93
Davit8:O	0.02188	1.366	-0.07596	-2.6432	0.0426	0.0064	0.02188	2.536	59.42
Davit8:End	0.02218	1.449	-0.4822	-2.6908	0.0428	0.0054	0.02218	11.29	61.02

Joint Support Reactions for Load Case "NESC Extreme":

Joint Label	X Force (kips)	X Usage %	Y Force (kips)	Y Usage %	H-Shear Usage %	Z Force (kips)	Comp. Usage %	Uplift Usage %	Result. Force (kips)	Result. Usage %	X Moment (ft-k)	X-M. Usage %	Y Moment (ft-k)	Y-M. Usage %	H-Bend-M Usage %	Z Moment (ft-k)	Z-M. Usage %	Max. Usage %
2683:g	-0.39	0.0	-26.28	0.0	0.0	-28.85	0.0	0.0	39.03	0.0	1889.17	0.0	-30.4	0.0	0.0	-1.85	0.0	0.0

Detailed Steel Pole Usages for Load Case "NESC Extreme":

Element Label	Joint Label	Joint Position	Rel. Dist. (ft)	Trans. Defl. (in)	Long. Defl. (in)	Vert. Defl. (in)	Trans. Mom. (Local Mx) (ft-k)	Long. Mom. (Local My) (ft-k)	Tors. Mom. (ft-k)	Axial Force (kips)	Tran. Shear (kips)	Long. Shear (kips)	P/A (ksi)	M/S. (ksi)	V/Q. (ksi)	T/R. (ksi)	Res. (ksi)	Max. Usage %	At Pt.
2683	2683:t	Origin	0.00	36.14	0.58	-0.80	-0.00	0.00	0.0	-0.04	0.02	-0.00	-0.00	0.00	0.00	0.00	0.00	0.0	4
2683	2683:Arm1	End	1.08	35.40	0.57	-0.78	0.03	-0.00	0.0	-0.04	0.02	-0.00	-0.00	0.00	0.00	0.00	0.01	0.0	2

2683	2683:Arm1	Origin	1.08	35.40	0.57	-0.78	5.04	-0.11	0.2	-1.04	2.43	-0.07	-0.05	0.59	0.10	0.01	0.67	1.0	2
2683	2683:WVGD8	End	5.00	32.71	0.52	-0.70	14.57	-0.40	0.2	-1.04	2.43	-0.07	-0.05	1.53	0.09	0.01	1.59	2.4	2
2683	2683:WVGD8	Origin	5.00	32.71	0.52	-0.70	14.57	-0.40	0.2	-1.35	2.67	-0.07	-0.06	1.53	0.10	0.01	1.60	2.5	2
2683	2683:Arm2	End	6.50	31.68	0.51	-0.67	18.58	-0.51	0.2	-1.35	2.67	-0.07	-0.06	1.87	0.10	0.01	1.95	3.0	2
2683	2683:Arm2	Origin	6.50	31.68	0.51	-0.67	27.07	-0.72	0.7	-3.50	5.86	-0.18	-0.16	2.73	0.21	0.04	2.92	4.5	2
2683	2683:TopConn	End	10.00	29.29	0.47	-0.61	47.60	-1.36	0.7	-3.50	5.86	-0.18	-0.15	4.39	0.20	0.03	4.56	7.0	2
2683	2683:TopConn	Origin	10.00	29.29	0.47	-0.61	47.60	-1.36	0.7	-7.94	16.34	-0.19	-0.35	4.39	0.57	0.03	4.85	7.5	2
2683	2683:WVGD7	End	15.00	25.93	0.42	-0.51	129.29	-2.30	0.7	-7.94	16.34	-0.19	-0.33	10.50	0.53	0.03	10.87	16.7	2
2683	2683:WVGD7	Origin	15.00	25.93	0.42	-0.51	129.29	-2.30	0.7	-8.47	16.70	-0.19	-0.35	10.50	0.55	0.03	10.90	16.8	2
2683	2683:Arm3	End	19.50	23.00	0.37	-0.43	204.44	-3.14	0.7	-8.47	16.70	-0.19	-0.33	14.95	0.52	0.03	15.31	23.5	2
2683	2683:Arm3	Origin	19.50	23.00	0.37	-0.43	216.91	-3.46	1.4	-11.01	19.97	-0.30	-0.43	15.86	0.62	0.05	16.33	25.1	2
2683	Tube 1	End	22.25	21.26	0.34	-0.39	271.82	-4.27	1.4	-11.01	19.97	-0.30	-0.42	18.70	0.60	0.05	19.15	29.5	2
2683	Tube 1	Origin	22.25	21.26	0.34	-0.39	271.82	-4.27	1.4	-11.29	20.11	-0.29	-0.43	18.70	0.60	0.05	19.16	29.5	2
2683	2683:WVGD6	End	25.00	19.58	0.32	-0.34	327.13	-5.08	1.4	-11.29	20.11	-0.29	-0.42	21.20	0.59	0.05	21.65	33.3	2
2683	2683:WVGD6	Origin	25.00	19.58	0.32	-0.34	327.13	-5.08	1.4	-11.70	20.37	-0.29	-0.43	21.20	0.59	0.05	21.66	33.3	2
2683	Tube 1	End	27.75	17.96	0.29	-0.30	383.15	-5.89	1.4	-11.70	20.37	-0.29	-0.42	23.44	0.58	0.04	23.89	36.7	2
2683	Tube 1	Origin	27.75	17.96	0.29	-0.30	383.15	-5.89	1.4	-12.00	20.52	-0.29	-0.43	23.44	0.58	0.04	23.90	36.8	2
2683	2683:Arm4	End	30.50	16.40	0.26	-0.26	439.59	-6.70	1.4	-12.00	20.52	-0.29	-0.42	25.43	0.57	0.04	25.87	40.3	2
2683	2683:Arm4	Origin	30.50	16.40	0.26	-0.26	448.13	-6.91	1.9	-14.41	23.76	-0.40	-0.50	25.93	0.66	0.06	26.46	41.2	2
2683	SpliceT	End	34.83	14.09	0.23	-0.21	551.09	-8.64	1.9	-14.41	23.76	-0.40	-0.48	29.28	0.63	0.05	29.79	47.4	2
2683	SpliceT	Origin	34.83	14.09	0.23	-0.21	551.09	-8.64	1.9	-14.69	23.88	-0.40	-0.49	29.28	0.63	0.05	29.80	47.4	2
2683	2683:WVGD5	End	35.00	14.00	0.23	-0.21	555.07	-8.71	1.9	-14.69	23.88	-0.40	-0.42	25.77	0.54	0.05	26.20	40.3	2
2683	2683:WVGD5	Origin	35.00	14.00	0.23	-0.21	555.07	-8.71	1.9	-15.31	24.12	-0.40	-0.43	25.77	0.54	0.05	26.22	40.3	2
2683	SpliceB	End	39.00	12.03	0.19	-0.17	651.54	-10.31	1.9	-15.31	24.12	-0.40	-0.42	28.00	0.52	0.04	28.43	43.7	2
2683	SpliceB	Origin	39.00	12.03	0.19	-0.17	651.54	-10.31	1.9	-15.87	24.27	-0.40	-0.43	28.00	0.53	0.04	28.45	43.8	2
2683	2683:BotConn	End	40.00	11.56	0.19	-0.16	675.81	-10.71	1.9	-15.87	24.27	-0.40	-0.43	28.50	0.52	0.04	28.94	44.5	2
2683	2683:BotConn	Origin	40.00	11.56	0.19	-0.16	675.81	-10.71	1.9	-17.45	22.34	-0.40	-0.47	28.50	0.48	0.04	28.98	44.6	2
2683	2683:WVGD4	End	45.00	9.34	0.15	-0.12	787.51	-12.70	1.9	-17.45	22.34	-0.40	-0.45	30.30	0.46	0.04	30.76	47.3	2
2683	2683:WVGD4	Origin	45.00	9.34	0.15	-0.12	787.51	-12.70	1.8	-18.43	22.85	-0.40	-0.48	30.30	0.47	0.04	30.79	47.4	2
2683	Tube 2	End	50.00	7.37	0.12	-0.08	901.76	-14.69	1.8	-18.43	22.85	-0.40	-0.46	31.78	0.45	0.04	32.25	49.6	2
2683	Tube 2	Origin	50.00	7.37	0.12	-0.08	901.76	-14.69	1.8	-19.20	23.15	-0.40	-0.48	31.78	0.45	0.04	32.27	49.6	2
2683	2683:WVGD3	End	55.00	5.63	0.09	-0.06	1017.49	-16.67	1.8	-19.20	23.15	-0.40	-0.46	32.97	0.44	0.03	33.44	52.5	2
2683	2683:WVGD3	Origin	55.00	5.63	0.09	-0.06	1017.49	-16.68	1.8	-20.24	23.67	-0.40	-0.48	32.97	0.45	0.03	33.47	52.5	2
2683	Tube 2	End	60.00	4.13	0.07	-0.04	1135.84	-18.65	1.8	-20.24	23.67	-0.40	-0.46	33.96	0.43	0.03	34.43	55.2	2
2683	Tube 2	Origin	60.00	4.13	0.07	-0.04	1135.84	-18.66	1.8	-21.08	23.99	-0.40	-0.48	33.96	0.43	0.03	34.45	55.2	2
2683	2683:WVGD2	End	65.00	2.86	0.05	-0.02	1255.78	-20.62	1.8	-21.08	23.99	-0.40	-0.46	34.74	0.42	0.03	35.22	57.6	2
2683	2683:WVGD2	Origin	65.00	2.86	0.05	-0.02	1255.78	-20.63	1.8	-22.16	24.52	-0.39	-0.49	34.74	0.43	0.03	35.24	57.7	2
2683	SpliceT	End	69.75	1.87	0.03	-0.01	1372.25	-22.49	1.8	-22.16	24.52	-0.39	-0.47	35.37	0.41	0.03	35.84	59.9	2
2683	SpliceT	Origin	69.75	1.87	0.03	-0.01	1372.25	-22.49	1.8	-23.03	24.77	-0.39	-0.49	35.37	0.42	0.03	35.86	59.9	2
2683	Tube 2	End	72.38	1.41	0.02	-0.01	1437.27	-23.52	1.8	-23.03	24.77	-0.39	-0.49	37.08	0.42	0.03	37.58	62.7	2
2683	Tube 2	Origin	72.38	1.41	0.02	-0.01	1437.27	-23.52	1.8	-23.93	24.95	-0.39	-0.51	37.08	0.42	0.03	37.60	62.8	2
2683	2683:WVGD1	End	75.00	1.02	0.02	-0.01	1502.75	-24.55	1.8	-23.93	24.95	-0.39	-0.50	37.32	0.41	0.02	37.83	63.9	2
2683	2683:WVGD1	Origin	75.00	1.02	0.02	-0.01	1502.75	-24.55	1.8	-25.09	25.42	-0.39	-0.52	37.32	0.42	0.02	37.85	63.9	2
2683	Tube 3	End	80.00	0.45	0.01	-0.00	1629.84	-26.50	1.8	-25.09	25.42	-0.39	-0.50	37.71	0.40	0.02	38.22	66.0	2
2683	Tube 3	Origin	80.00	0.45	0.01	-0.00	1629.84	-26.51	1.8	-26.03	25.76	-0.39	-0.52	37.71	0.41	0.02	38.24	66.0	2
2683	Tube 3	End	85.00	0.11	0.00	-0.00	1758.63	-28.45	1.8	-26.03	25.76	-0.39	-0.51	38.00	0.40	0.02	38.51	68.0	2
2683	Tube 3	Origin	85.00	0.11	0.00	-0.00	1758.63	-28.45	1.8	-27.00	26.11	-0.39	-0.52	38.00	0.40	0.02	38.53	68.0	2
2683	2683:g	End	90.00	0.00	0.00	0.00	1889.17	-30.38	1.8	-27.00	26.11	-0.39	-0.51	38.21	0.39	0.02	38.72	70.1	2

Detailed Tubular Davit Arm Usages for Load Case "NESC Extreme":

Element Label	Joint Label	Joint Position	Rel. Dist. (ft)	Trans. Defl. (in)	Long. Defl. (in)	Vert. Defl. (in)	Vert. Mom. (ft-k)	Horz. Mom. (ft-k)	Tors. Mom. (ft-k)	Axial Force (kips)	Vert. Shear (kips)	Horz. Shear (kips)	P/A (ksi)	M/S. (ksi)	V/Q. (ksi)	T/R. (ksi)	Res. (ksi)	Max. Usage %	At Pt.
Davit1	Davit1:O	Origin	0.00	35.42	0.57	-0.21	0.40	0.27	0.0	-0.97	-0.08	-0.06	-0.16	0.36	0.03	0.00	0.52	0.8	1
Davit1	Davit1:End	End	4.74	36.54	0.60	2.86	-0.00	0.00	0.0	-0.97	-0.08	-0.06	-0.28	0.00	0.06	0.00	0.30	0.5	1

Davit2	Davit2:O	Origin	0.00	35.38	0.56	-1.35	-4.36	-0.07	0.0	1.10	0.92	0.02	0.18	3.23	0.30	0.00	3.45	5.3	1
Davit2	Davit2:End	End	4.74	36.34	0.57	-4.51	0.00	0.00	0.0	1.10	0.92	0.02	0.32	0.00	0.54	0.00	0.98	1.5	1
Davit3	Davit3:O	Origin	0.00	31.70	0.51	-0.06	-3.09	0.70	0.0	-1.58	0.42	-0.08	-0.11	0.59	0.06	0.00	0.71	1.1	1
Davit3	#Davit3:0	End	4.45	32.47	0.53	2.88	-1.23	0.35	0.0	-1.58	0.42	-0.08	-0.15	0.44	0.08	0.00	0.60	0.9	1
Davit3	#Davit3:0	Origin	4.45	32.47	0.53	2.88	-1.23	0.35	0.0	-1.53	0.28	-0.08	-0.14	0.44	0.05	0.00	0.59	0.9	1
Davit3	Davit3:End	End	8.90	33.23	0.56	5.82	-0.00	0.00	0.0	-1.53	0.28	-0.08	-0.22	0.00	0.08	0.00	0.27	0.4	1
Davit4	Davit4:O	Origin	0.00	31.66	0.50	-1.29	-11.34	-0.25	-0.0	1.34	1.36	0.03	0.09	2.11	0.19	0.00	2.23	3.4	1
Davit4	#Davit4:0	End	4.45	32.26	0.50	-4.28	-5.31	-0.13	-0.0	1.34	1.36	0.03	0.13	1.81	0.26	0.00	1.99	3.1	1
Davit4	#Davit4:0	Origin	4.45	32.26	0.50	-4.28	-5.31	-0.13	0.0	1.37	1.19	0.03	0.13	1.81	0.23	0.00	1.98	3.0	1
Davit4	Davit4:End	End	8.90	32.87	0.50	-7.31	0.00	0.00	0.0	1.37	1.19	0.03	0.20	0.00	0.35	0.00	0.63	1.0	1
Davit5	Davit5:O	Origin	0.00	23.02	0.37	0.24	-4.27	0.95	0.0	-1.62	0.47	-0.08	-0.11	0.81	0.07	0.00	0.93	1.4	1
Davit5	#Davit5:0	End	5.00	23.89	0.40	3.30	-1.94	0.56	0.0	-1.62	0.47	-0.08	-0.14	0.61	0.08	0.00	0.77	1.2	1
Davit5	#Davit5:0	Origin	5.00	23.89	0.40	3.30	-1.94	0.56	0.0	-1.56	0.32	-0.08	-0.14	0.61	0.06	0.00	0.76	1.2	1
Davit5	#Davit5:1	End	8.52	24.51	0.42	5.46	-0.80	0.28	0.0	-1.56	0.32	-0.08	-0.17	0.40	0.07	0.00	0.59	0.9	1
Davit5	#Davit5:1	Origin	8.52	24.51	0.42	5.46	-0.80	0.28	0.0	-1.53	0.23	-0.08	-0.17	0.40	0.05	0.00	0.58	0.9	1
Davit5	Davit5:End	End	12.05	25.12	0.44	7.61	-0.00	0.00	0.0	-1.53	0.23	-0.08	-0.22	0.00	0.07	0.00	0.25	0.4	1
Davit6	Davit6:O	Origin	0.00	22.98	0.37	-1.10	-16.43	-0.34	-0.0	1.28	1.50	0.03	0.09	3.06	0.21	0.00	3.17	4.9	1
Davit6	#Davit6:0	End	5.00	23.70	0.37	-4.24	-8.94	-0.20	-0.0	1.28	1.50	0.03	0.11	2.72	0.27	0.00	2.87	4.4	1
Davit6	#Davit6:0	Origin	5.00	23.70	0.37	-4.24	-8.94	-0.20	-0.0	1.32	1.32	0.03	0.12	2.72	0.24	0.00	2.86	4.4	1
Davit6	#Davit6:1	End	8.52	24.21	0.37	-6.47	-4.27	-0.10	-0.0	1.32	1.32	0.03	0.15	2.01	0.29	0.00	2.21	3.4	1
Davit6	#Davit6:1	Origin	8.52	24.21	0.37	-6.47	-4.27	-0.10	0.0	1.34	1.21	0.03	0.15	2.01	0.27	0.00	2.20	3.4	1
Davit6	Davit6:End	End	12.05	24.72	0.37	-8.73	0.00	0.00	0.0	1.34	1.21	0.03	0.19	0.00	0.35	0.00	0.64	1.0	1
Davit7	Davit7:O	Origin	0.00	16.42	0.27	0.38	-3.25	0.70	0.0	-1.57	0.44	-0.08	-0.11	0.62	0.06	0.00	0.74	1.1	1
Davit7	#Davit7:0	End	4.45	17.03	0.28	2.77	-1.31	0.35	0.0	-1.57	0.44	-0.08	-0.15	0.46	0.08	0.00	0.63	1.0	1
Davit7	#Davit7:0	Origin	4.45	17.03	0.28	2.77	-1.31	0.35	0.0	-1.53	0.29	-0.08	-0.14	0.46	0.06	0.00	0.62	0.9	1
Davit7	Davit7:End	End	8.90	17.63	0.30	5.14	-0.00	0.00	0.0	-1.53	0.29	-0.08	-0.22	0.00	0.09	0.00	0.27	0.4	1
Davit8	Davit8:O	Origin	0.00	16.39	0.26	-0.91	-11.48	-0.25	-0.0	1.32	1.37	0.03	0.09	2.14	0.19	0.00	2.25	3.5	1
Davit8	#Davit8:0	End	4.45	16.89	0.26	-3.34	-5.37	-0.12	-0.0	1.32	1.37	0.03	0.12	1.84	0.26	0.00	2.01	3.1	1
Davit8	#Davit8:0	Origin	4.45	16.89	0.26	-3.34	-5.37	-0.12	0.0	1.35	1.21	0.03	0.13	1.84	0.23	0.00	2.00	3.1	1
Davit8	Davit8:End	End	8.90	17.39	0.27	-5.79	0.00	0.00	0.0	1.35	1.21	0.03	0.20	0.00	0.35	0.00	0.64	1.0	1

Summary of Clamp Capacities and Usages for Load Case "NESC Extreme":

Clamp Label	Force (kips)	Input Holding Capacity (kips)	Factored Holding Capacity (kips)	Usage %
Clamp1	0.964	80.00	80.00	1.21
Clamp2	1.414	80.00	80.00	1.77
Clamp3	1.532	80.00	80.00	1.91
Clamp4	1.780	80.00	80.00	2.22
Clamp5	1.532	80.00	80.00	1.91
Clamp6	1.780	80.00	80.00	2.22
Clamp7	1.532	80.00	80.00	1.91
Clamp8	1.780	80.00	80.00	2.22
Clamp9	0.319	80.00	80.00	0.40
Clamp10	0.319	80.00	80.00	0.40
Clamp11	0.319	80.00	80.00	0.40
Clamp12	0.319	80.00	80.00	0.40
Clamp13	0.159	80.00	80.00	0.20
Clamp14	0.159	80.00	80.00	0.20

Clamp15	0.159	80.00	80.00	0.20
Clamp17	11.044	80.00	80.00	13.80
Clamp18	2.385	80.00	80.00	2.98
Clamp19	0.159	80.00	80.00	0.20

*** Overall summary for all load cases - Usage = Maximum Stress / Allowable Stress

Summary of Steel Pole Usages:

Steel Pole Label	Maximum Usage %	Load Case	Segment Number	Weight (lbs)
2683	70.06	NESC Extreme	25	13920.9

Base Plate Results by Bend Line:

Pole Label	Load Case	Bend Line #	Start X (ft)	Start Y (ft)	End X (ft)	End Y (ft)	Length (in)	Bending Stress (ksi)	Bolt Mom. Sum (ft-k)	# Bolts Acting	Bolt Max Load (kips)	Min Plate Thickness (in)	Actual Thickness (in)	Usage %
2683	NESC Heavy	1	1.271	1.275	0.390	2.156	14.956	27.586	51.571	2	76.293	2.125	3.000	50.16
2683	NESC Heavy	2	0.390	-2.156	1.271	-1.275	14.956	28.178	52.677	2	-76.101	2.147	3.000	51.23
2683	NESC Heavy	3	-1.273	-1.800	1.273	-1.800	30.544	26.823	102.411	6	-76.101	2.095	3.000	48.77
2683	NESC Heavy	4	-1.271	-1.275	-0.390	-2.156	14.956	24.050	44.960	2	-67.424	1.984	3.000	43.73
2683	NESC Heavy	5	-0.390	2.156	-1.271	1.275	14.956	31.714	59.288	2	84.971	2.278	3.000	57.66
2683	NESC Heavy	6	1.273	1.800	-1.273	1.800	30.544	30.140	115.075	6	84.971	2.221	3.000	54.80
2683	NESC Heavy	7	1.381	1.537	0.097	2.069	16.676	26.592	55.431	3	79.178	2.086	3.000	48.35
2683	NESC Heavy	8	0.097	-2.069	1.381	-1.537	16.676	26.403	55.035	3	-76.101	2.079	3.000	48.00
2683	NESC Heavy	9	-1.381	-1.537	-0.097	-2.069	16.676	23.366	48.707	3	-70.308	1.955	3.000	42.48
2683	NESC Heavy	10	-0.097	2.069	-1.381	1.537	16.676	29.629	61.760	3	84.971	2.202	3.000	53.87
2683	NESC Extreme	1	1.271	1.275	0.390	2.156	14.956	29.317	54.806	2	80.733	2.190	3.000	53.30
2683	NESC Extreme	2	0.390	-2.156	1.271	-1.275	14.956	30.087	56.247	2	-81.611	2.219	3.000	54.70
2683	NESC Extreme	3	-1.273	-1.800	1.273	-1.800	30.544	29.484	112.571	6	-81.611	2.197	3.000	53.61
2683	NESC Extreme	4	-1.271	-1.275	-0.390	-2.156	14.956	27.490	51.390	2	-76.150	2.121	3.000	49.98
2683	NESC Extreme	5	-0.390	2.156	-1.271	1.275	14.956	31.915	59.663	2	86.194	2.285	3.000	58.03
2683	NESC Extreme	6	1.273	1.800	-1.273	1.800	30.544	31.198	119.114	6	86.194	2.259	3.000	56.72
2683	NESC Extreme	7	1.381	1.537	0.097	2.069	16.676	28.105	58.585	3	82.548	2.145	3.000	51.10
2683	NESC Extreme	8	0.097	-2.069	1.381	-1.537	16.676	28.349	59.093	3	-81.611	2.154	3.000	51.54
2683	NESC Extreme	9	-1.381	-1.537	-0.097	-2.069	16.676	26.438	55.110	3	-77.965	2.080	3.000	48.07
2683	NESC Extreme	10	-0.097	2.069	-1.381	1.537	16.676	30.016	62.568	3	86.194	2.216	3.000	54.58

Summary of Tubular Davit Usages:

Tubular Davit Label	Maximum Usage %	Load Case	Segment Number	Weight (lbs)
Davit1	1.86	NESC Heavy	1	77.9
Davit2	11.40	NESC Heavy	1	77.9
Davit3	3.18	NESC Heavy	1	321.0
Davit4	6.75	NESC Heavy	1	321.0
Davit5	4.25	NESC Heavy	1	434.7
Davit6	9.44	NESC Heavy	1	434.7
Davit7	3.26	NESC Heavy	1	321.0
Davit8	6.80	NESC Heavy	1	321.0

*** Maximum Stress Summary for Each Load Case

Summary of Maximum Usages by Load Case:

Load Case Maximum Element Element

	Usage %	Label	Type
NESC Heavy	69.73	2683	Steel Pole
NESC Extreme	70.06	2683	Steel Pole

Summary of Steel Pole Usages by Load Case:

Load Case	Maximum Usage %	Steel Pole Label	Segment Number
NESC Heavy	69.73	2683	25
NESC Extreme	70.06	2683	25

Summary of Base Plate Usages by Load Case:

Load Case	Pole Label	Bend Line #	Length (in)	Vertical Load (kips)	X Moment (ft-k)	Y Moment (ft-k)	Bending Stress (ksi)	Bolt Moment Sum (ft-k)	# Bolts Acting On Bend Line	Max Bolt Load For Bend Line (kips)	Minimum Plate Thickness (in)	Usage %
NESC Heavy	2683	5	14.956	53.218	1773.388	-48.277	31.714	59.288	2	84.971	2.278	57.66
NESC Extreme	2683	5	14.956	27.500	1889.167	-30.384	31.915	59.663	2	86.194	2.285	58.03

Summary of Tubular Davit Usages by Load Case:

Load Case	Maximum Usage %	Tubular Davit Label	Segment Number
NESC Heavy	11.40	Davit2	1
NESC Extreme	5.30	Davit2	1

Summary of Insulator Usages:

Insulator Label	Insulator Type	Maximum Usage %	Load Case	Weight (lbs)
Clamp1	Clamp	2.41	NESC Heavy	0.0
Clamp2	Clamp	3.19	NESC Heavy	0.0
Clamp3	Clamp	3.37	NESC Heavy	0.0
Clamp4	Clamp	3.57	NESC Heavy	0.0
Clamp5	Clamp	3.37	NESC Heavy	0.0
Clamp6	Clamp	3.57	NESC Heavy	0.0
Clamp7	Clamp	3.37	NESC Heavy	0.0
Clamp8	Clamp	3.57	NESC Heavy	0.0
Clamp9	Clamp	1.07	NESC Heavy	0.0
Clamp10	Clamp	1.07	NESC Heavy	0.0
Clamp11	Clamp	1.07	NESC Heavy	0.0
Clamp12	Clamp	1.07	NESC Heavy	0.0
Clamp13	Clamp	0.59	NESC Heavy	0.0
Clamp14	Clamp	0.59	NESC Heavy	0.0
Clamp15	Clamp	0.59	NESC Heavy	0.0
Clamp17	Clamp	13.80	NESC Extreme	0.0
Clamp18	Clamp	3.01	NESC Heavy	0.0
Clamp19	Clamp	0.59	NESC Heavy	0.0

Loads At Insulator Attachments For All Load Cases:

Load Case	Insulator Label	Insulator Type	Structure Attach Label	Structure Attach Load X (kips)	Structure Attach Load Y (kips)	Structure Attach Load Z (kips)	Structure Attach Load Res. (kips)
NESC Heavy	Clamp1	Clamp	Davit1:End	0.105	1.715	0.871	1.926
NESC Heavy	Clamp2	Clamp	Davit2:End	0.021	2.103	1.449	2.554
NESC Heavy	Clamp3	Clamp	Davit3:End	0.124	2.183	1.581	2.698
NESC Heavy	Clamp4	Clamp	Davit4:End	0.033	2.006	2.028	2.853
NESC Heavy	Clamp5	Clamp	Davit5:End	0.124	2.183	1.581	2.698
NESC Heavy	Clamp6	Clamp	Davit6:End	0.033	2.006	2.028	2.853
NESC Heavy	Clamp7	Clamp	Davit7:End	0.124	2.183	1.581	2.698
NESC Heavy	Clamp8	Clamp	Davit8:End	0.033	2.006	2.028	2.853
NESC Heavy	Clamp9	Clamp	2683:WVGD1	0.000	0.096	0.852	0.857
NESC Heavy	Clamp10	Clamp	2683:WVGD2	0.000	0.096	0.852	0.857
NESC Heavy	Clamp11	Clamp	2683:WVGD3	0.000	0.096	0.852	0.857
NESC Heavy	Clamp12	Clamp	2683:WVGD4	0.000	0.096	0.852	0.857
NESC Heavy	Clamp13	Clamp	2683:WVGD5	0.000	0.055	0.470	0.473
NESC Heavy	Clamp14	Clamp	2683:WVGD6	0.000	0.055	0.470	0.473
NESC Heavy	Clamp15	Clamp	2683:WVGD7	0.000	0.055	0.470	0.473
NESC Heavy	Clamp17	Clamp	2683:TopConn	0.000	3.272	10.045	10.564
NESC Heavy	Clamp18	Clamp	2683:BotConn	0.000	-0.597	2.329	2.404
NESC Heavy	Clamp19	Clamp	2683:WVGD8	0.000	0.055	0.470	0.473
NESC Extreme	Clamp1	Clamp	Davit1:End	0.057	0.930	0.249	0.964
NESC Extreme	Clamp2	Clamp	Davit2:End	0.015	1.299	0.558	1.414
NESC Extreme	Clamp3	Clamp	Davit3:End	0.078	1.392	0.634	1.532
NESC Extreme	Clamp4	Clamp	Davit4:End	0.027	1.548	0.878	1.780
NESC Extreme	Clamp5	Clamp	Davit5:End	0.078	1.392	0.634	1.532
NESC Extreme	Clamp6	Clamp	Davit6:End	0.027	1.548	0.878	1.780
NESC Extreme	Clamp7	Clamp	Davit7:End	0.078	1.392	0.634	1.532
NESC Extreme	Clamp8	Clamp	Davit8:End	0.027	1.548	0.878	1.780
NESC Extreme	Clamp9	Clamp	2683:WVGD1	0.000	0.212	0.238	0.319
NESC Extreme	Clamp10	Clamp	2683:WVGD2	0.000	0.212	0.238	0.319
NESC Extreme	Clamp11	Clamp	2683:WVGD3	0.000	0.212	0.238	0.319
NESC Extreme	Clamp12	Clamp	2683:WVGD4	0.000	0.212	0.238	0.319
NESC Extreme	Clamp13	Clamp	2683:WVGD5	0.000	0.106	0.119	0.159
NESC Extreme	Clamp14	Clamp	2683:WVGD6	0.000	0.106	0.119	0.159
NESC Extreme	Clamp15	Clamp	2683:WVGD7	0.000	0.106	0.119	0.159
NESC Extreme	Clamp17	Clamp	2683:TopConn	0.000	10.009	4.667	11.044
NESC Extreme	Clamp18	Clamp	2683:BotConn	0.000	-2.137	1.058	2.385
NESC Extreme	Clamp19	Clamp	2683:WVGD8	0.000	0.106	0.119	0.159

Overturning Moments For User Input Concentrated Loads:

Moments are static equivalents based on central axis of 0,0 (i.e. a single pole).

Load Case	Total Tran. Load (kips)	Total Long. Load (kips)	Total Vert. Load (kips)	Transverse Overturning Moment (ft-k)	Longitudinal Overturning Moment (ft-k)	Torsional Moment (ft-k)
NESC Heavy	19.664	0.597	30.809	1545.165	46.011	3.370
NESC Extreme	20.193	0.387	12.496	1608.289	29.663	1.862

*** Weight of structure (lbs):

Weight of Tubular Davit Arms:	2309.3
Weight of Steel Poles:	13920.9
Total:	16230.2

*** End of Report

Anchor Bolt Analysis:

Input Data:

Bolt Force:

Maximum Tensile Force = $T_{Max} := 87 \cdot kips$ (User Input from PLS-Pole)

Anchor Bolt Data:

Use ASTM A615 Grade 75

Number of Anchor Bolts =	$N := 12$	(User Input)
Bolt "Column" Distance =	$l := 3.0 \cdot in$	(User Input)
Bolt Ultimate Strength =	$F_u := 100 \cdot ksi$	(User Input)
Bolt Yeild Strength=	$F_y := 75 \cdot ksi$	(User Input)
Bolt Modulus =	$E := 29000 \cdot ksi$	(User Input)
Diameter of Anchor Bolts =	$D := 2.25 \cdot in$	(User Input)
Threads per Inch =	$n := 4.5$	(User Input)

Anchor Bolt Analysis:

Calculated Anchor Bolt Properties:

Net Area of Bolt = $A_n := \frac{\pi}{4} \cdot \left(D - \frac{0.9743 \cdot in}{n}\right)^2 = 3.248 \cdot in^2$

Bolt Tension Check:

Allowable Tensile Force (Net Area) = $T_{ALL.Net} := 1.0 \cdot \left(A_n \cdot F_y\right) = 243.576 \cdot kips$

Bolt Tension % of Capacity = $\frac{T_{Max}}{T_{ALL.Net}} = 35.72 \cdot \%$

Condition1 = $Condition1 := if\left(\frac{T_{Max}}{T_{ALL.Net}} \le 1.00, \text{"OK"}, \text{"Overstressed"}\right)$

Condition1 = "OK"

Product Specifications

COMMSCOPE®

DHHTT65B-3XR

Multiband Antenna, 790–960, 2 x 1710–2180 and 2 x 2490-2690 MHz, 65° horizontal beamwidth, internal electrical tilt with individual tilt available for the 850 MHz band, 1900 MHz bands and 2500 MHz bands.

Electrical Specifications

Frequency Band, MHz	790–896	870–960	1710–1880	1850–1990	1920–2180	2490–2690
Connector Interface	7-16 DIN Female	7-16 DIN Female	7-16 DIN Female	7-16 DIN Female	7-16 DIN Female	4.1-9.5 DIN Female
Connector Location	Bottom	Bottom	Bottom	Bottom	Bottom	Bottom
Gain, dBi	15.5	15.5	17.3	17.4	17.5	17.2
Beamwidth, Horizontal, degrees	64	63	71	69	66	60
Beamwidth, Vertical, degrees	11.2	10.3	5.6	5.4	5.1	4.3
Beam Tilt, degrees	0–10	0–10	0–8	0–8	0–8	0–8
USLS (First Lobe), dB	15	16	15	16	15	18
Front-to-Back Ratio at 180°, dB	28	31	31	29	25	26
CPR at Boresight, dB	20	19	20	20	18	16
CPR at Sector, dB	9	9	9	9	7	4
Isolation, dB	25	25	25	25	25	25
Isolation, Intersystem, dB	30	30	30	30	30	30
VSWR | Return Loss, dB	1.5 | 14.0	1.5 | 14.0	1.5 | 14.0	1.5 | 14.0	1.5 | 14.0	1.5 | 14.0
PIM, 3rd Order, 2 x 20 W, dBc	-153	-153	-153	-153	-153	-150
Input Power per Port, maximum, watts	350	350	300	300	300	250
Polarization	±45°	±45°	±45°	±45°	±45°	±45°
Impedance	50 ohm	50 ohm	50 ohm	50 ohm	50 ohm	50 ohm

Electrical Specifications, BASTA*

Frequency Band, MHz	790–896	870–960	1710–1880	1850–1990	1920–2180	2490–2690
Gain by all Beam Tilts, average, dBi	15.0	15.1	17.0	17.1	17.1	17.1
Gain by all Beam Tilts Tolerance, dB	±0.4	±0.3	±0.3	±0.3	±0.3	±0.6
Gain by Beam Tilt, average, dBi	0 ° | 15.0 5 ° | 15.1 10 ° | 15.0	0 ° | 15.0 5 ° | 15.1 10 ° | 15.0	0 ° | 16.8 4 ° | 17.0 8 ° | 17.0	0 ° | 17.0 4 ° | 17.1 8 ° | 17.1	0 ° | 17.0 4 ° | 17.1 8 ° | 17.1	0 ° | 17.1 4 ° | 17.2 8 ° | 17.0
Beamwidth, Horizontal Tolerance, degrees	±2.5	±1.8	±3.2	±2.7	±5	±6.6
Beamwidth, Vertical Tolerance, degrees	±0.8	±0.6	±0.2	±0.2	±0.4	±0.3
USLS, beampeak to 20° above beampeak, dB	16	17	16	17	16	19
Front-to-Back Total Power at 180° ± 30°, dB	24	26	26	25	23	23
CPR at Boresight, dB	21	20	22	22	21	16
CPR at Sector, dB	9	10	13	10	8	5

* CommScope® supports NGMN recommendations on Base Station Antenna Standards (BASTA). To learn more about the benefits of BASTA, download the whitepaper Time to Raise the Bar on BSAs.

General Specifications

Antenna Brand	Andrew®
Antenna Type	DualPol® multiband with internal RET
Band	Multiband
Brand	DualPol®

Operating Frequency Band	1710 – 2180 MHz | 2490 – 2690 MHz | 790 – 960 MHz
Performance Note	Outdoor usage

Mechanical Specifications

Color	Light gray
Lightning Protection	dc Ground
Radiator Material	Copper | Low loss circuit board
Radome Material	ASA, UV stabilized
Reflector Material	Aluminum
RF Connector Interface	4.1-9.5 DIN Female | 7-16 DIN Female
RF Connector Location	Bottom
RF Connector Quantity, total	10
Wind Loading, frontal	618.0 N @ 150 km/h 138.9 lbf @ 150 km/h
Wind Speed, maximum	241 km/h | 150 mph

Dimensions

Depth	181.0 mm | 7.1 in
Length	1832.0 mm | 72.1 in
Width	301.0 mm | 11.9 in
Net Weight	20.6 kg | 45.4 lb

Remote Electrical Tilt (RET) Information

Input Voltage	10–30 Vdc
Power Consumption, idle state, maximum	2.0 W
Power Consumption, normal conditions, maximum	13.0 W
Protocol	3GPP/AISG 2.0 (Multi-RET)
RET Interface	8-pin DIN Female | 8-pin DIN Male
RET Interface, quantity	1 female | 1 male

Packed Dimensions

Depth	299.0 mm | 11.8 in
Length	1954.0 mm | 76.9 in
Width	409.0 mm | 16.1 in
Shipping Weight	33.2 kg | 73.2 lb

Regulatory Compliance/Certifications

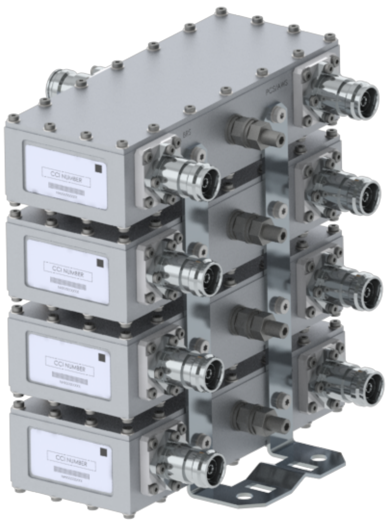
Agency	**Classification**
RoHS 2011/65/EU	Compliant by Exemption
China RoHS SJ/T 11364-2006	Above Maximum Concentration Value (MCV)
ISO 9001:2008	

Filters & Combiners

DATA SHEET

Outdoor Diplexer

DPO-7126Y-0x1



- Combines the frequencies covering PCS/AWS (1695-2180 MHz) with BRS (2496-2690 MHz)
- High power 250 W per port with low insertion loss in a small, lightweight enclosure
- Low intermodulation with isolation of >50 dB port to port
- High reliability of >500K Hours MTBF and multi-strike lightning protection
- Designed and produced to ISO 9001:2008 certification standards
- Weatherproof enclosure (IP67) with available outdoor pole or wall mounting options

Overview

The CCI Outdoor Diplexer passes the PCS and AWS bands covering 1695-2180 MHz on its low band input port and the full BRS band which covers 2496-2690 MHz on its high band input port. The Diplexer combines the low band and high band signals on to a common port and is specifically intended for use in multi-band systems with limited feeder lines. The Diplexer facilitates the addition of new technologies including LTE and new spectrum to existing sites while providing a high degree of isolation between systems. Decreasing the number of feeder lines lowers tower loading, leasing and installation expenditures and significantly reduces the total cost to upgrade a site.

The CCI Outdoor Diplexer provides full band performance for each band with low insertion loss, low Intermodulation, and high 250 W per port power handling. Excellent return loss performance delivers the best match to the antennas and base station, saving precious transmit power. The CCI Diplexer is available in a single, twin or quad unit configuration.

Technical Description:

The CCI Outdoor Diplexer consists of multiple filters and can be used as either a splitter or combiner to aggregate the PCS/AWS with the BRS bands on to a common feeder line. The fully weatherproof tower mount Diplexer has internal multi-strike lightning protection using a multi-stage surge protection circuit.

The unit has been designed to minimize insertion loss while maximizing isolation. Particular attention has been given to the intermodulation performance of the Diplexer to minimize any passive intermodulation products from occurring. The Diplexer housing is constructed from die cast aluminum and consists of an IP67 moisture proof enclosure, with IP68 immersion proof connectors suited to long-life masthead mounting. The Diplexer can be pole or wall mounted with the included bracket. The RF ports are configured with DIN 7-16.

CCI filter and combiner products are designed and produced to ISO 9001:2008 certification standards for reliability and quality at our state-of-the-art engineering and manufacturing facilities.

Filters & Combiners

SPECIFICATIONS

Outdoor Diplexer

DPO-7126Y-0x1

Electrical

RF Parameters	Ports	Frequency(MHz)	Specification
Return Loss	COMMON	1695 - 2180	18 dB minimum, 20 dB typical
		2496 - 2690	18 dB minimum, 20 dB typical
	PCS/AWS	1695 - 2180	18 dB minimum, 20 dB typical
	BRS	2496 - 2690	18 dB minimum, 20 dB typical
Insertion Loss	COMMON to PCS/AWS	1695 - 2180	0.2 dB typical, 0.25 dB maximum
	COMMON to BRS	2496 - 2690	0.2 dB typical, 0.25 dB maximum
Rejection	COMMON to PCS/AWS	2496 - 2690	50 dB minimum
	COMMON to BRS	1695 - 2180	50 dB minimum
Isolation	PCS/AWS to BRS	1695 - 2180	50 dB minimum
	BRS to PCS/AWS	2496 - 2690	50 dB minimum

General Characteristics	
General Impedance	50 ohms
Continuous Average Power	250 W maximum (input ports), 500 W maximum (Common port)
Peak Envelope Power	1 kW maximum (input ports), 3 kW maximum (Common port)
Intermodulation Performance	<-117 dBm (-160 dBc) at 2 x +43 dBm tones all bands

Environmental

Operating Temperature	-40˚C to +65˚C
Enclosure	Enclosure IP67, Connectors IP68
MTBF	>500,000 hours
Lightning Protection	8/20us, ±20KA maximum, 10 strikes per IEC61000-4-5

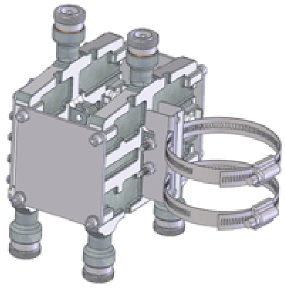
Mechanical

Model	DPO-7126Y-0-S1	DPO-7126Y-0-T1	DPO-7126Y-0-Q1
Modularity	Single	Twin	Quad
Weight with brackets	3.7 lbs (1.6 Kg)	7.3 lbs (3.3 Kg)	14.4 lbs (6.6 Kg)
Dimensions with brackets	6.26 x 7.42 x 2.02 in. (159 x 188.5 x 51.4 mm)	6.26 x 7.42 x 4.07 in. (159 x 188.5 x 103.4 mm)	6.26x 7.42 x 8.17 in. (159 x 188.5 x 207.4 mm)
Dimensions enclosure only	2.95 x 7.42 x 1.95 in. (75 x 188.5 x 48.8 mm)		
Connectors	3 x 7-16 DIN female long neck		
Mounting	Pole/Wall mounting bracket		

RADIO FREQUENCY SYSTEMS
The Clear Choice®

ShareLite™ Wideband Diplexer Kit – In-line 698-960 MHz/1710-2200 MHz, full DC/AISG pass

The ShareLite FD9R6004 Series of diplexers are designed to enable feeder sharing between systems in the 698-960 MHz range and in the 1710-2200 MHz range, including all the new AWS-3 paired spectrum blocks (G, H, I, J).. The diplexer is equipped with in-line connector placement so it can be installed in the BTS cabinet or at the tower top. This is especially valuable in crowded sites or when the feeders are not easily accessible. Due to its wideband design, the FD9R6004 Series can accommodate many combining solutions between 698-960 MHz and 1710-2200 MHz systems such as LTE 700 MHz, Cellular 800 MHz with PCS, GSM900 with GSM1800, or GSM900 with UMTS. This diplexer features a highly selective filter. It provides a high level of isolation between ports, while keeping the insertion loss on both paths at an extremely low level. The FD9R6004 diplexers are available with various DC pass options, helpful in configurations with or without the Tower Mount Amplifiers installed.



FEATURES / BENEFITS

- LTE and AWS-3 ready design
- Extremely Low Insertion Loss
- High level of Rejection between bands – Protection against interferences
- Extremely High Power Handling Capability
- DC/AISG 1.1/2.0 pass through all ports
- Very compact & small size design – Easy installation and reduced tower load
- In-line long-neck connectors for easy connection & waterproofing
- Exceptional reliability & environmental protection (IP 67)
- Equipped with 1 * Breathable Vent – Prevent any humidity inside the product
- Mounting hardware for Wall and Pole mount provided (P/N SEM2-1A)
- Grounding already provided through the mounting bracket

Technical Features

GENERAL SPECIFICATIONS		
Product Type		Diplexer/Cross Band Combiner
Application		LTE700, GSM900, UMTS, GSM1800, Cellular 800, PCS, AWS-1, AWS-3
Configuration		ShareLite Kit consisting of (2) in-line long neck connector diplexers (Full DC Pass), (1) mounting hardware SEM2-1A, & (1) assembly kit SEM2-3 disassembled
ELECTRICAL SPECIFICATIONS		
Frequency Range 1	MHz	698 - 960
Frequency Range 2	MHz	1710 - 2200
Return Loss All Ports	dB	19 Min/23 Typ.
Power Handling Continuous, Max	W	1250 at common port; 750 in low frequency path & 500 in high frequency path
Power Handling Peak, Max	W	15000 in low frequency path & 8000 in high frequency path
Impedance	Ω	50.0
Insertion Loss, Path 1	dB	0.07 typ.
Insertion Loss, Path 2	dB	0.13 typ.
Rejection Between Bands Min/Typ	dB	58/64@698-960MHz 57/70@1710-2200MHz
Group Delay, Path 1	ns	3 Max.
Group Delay, Path 2	ns	3 Max.
IMP Level at the COM Port	dBm (dBc)	-112 (-155) @2x43 typ.
DC Pass in Path 1		Yes
DC Pass in Path 2		Yes

MECHANICAL SPECIFICATIONS		
Mounting		Wall Mounting: With 4 screws (maximum 6mm diameter) Pole Mounting: With included clamp set 40-110mm (1.57-4.33)
RF Connectors		In-line long-neck 7-16-Female
Weight	kg (lb)	2.9 (6.4)
Dimensions, H x W x D	mm (in)	147 x 164 x 118 (5.8 x 6.5 x 4.6)
Shipping Dimensions, H x W x D	mm (in)	254 x 406 x 82 (10 x 16 x 3.2) for 1 * Dual unit in 1 * box, 280 x 406 x 241 (11 x 16 x 9.5) for 3 * Dual units = 3 * Boxes in 1 * overwrap
Housing		Aluminum
TESTING AND ENVIRONMENTAL		
Temperature Range	°C (°F)	-40 to 60 (-40 to 140)
Environmental		ETSI 300-019-2-4 Class 4.1E
Ingress Protection		IP 67
Lightning Protection		EN/IEC61000-4-5 Level 4

External Document Links

RFS Diplexer Field Test Procedure

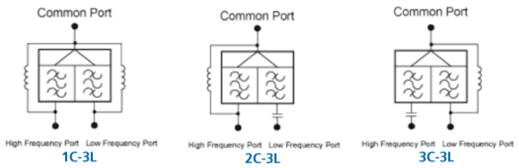
KIT-FD9R6004/1C-DL Installation Instructions

Notes

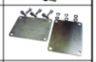
RADIO FREQUENCY SYSTEMS
The Clear Choice®

ShareLite™ Wideband Diplexer Kit – In-line 698-960 MHz/1710-2200 MHz, full DC/AISG pass

Selection Guide Diplexer	698-960 / 1710-2200MHz				
	Model Number	Full DC Pass	DC Pass High Band	DC Pass Low Band	Mounting Hardware Included
Single	FD9R6004/1C-3L				X
	FD9R6004/2C-3L				X
	FD9R6004/3C-3L				X
Dual	KIT-FD9R6004/1C-DL				X
	KIT-FD9R6004/2C-DL				X
	KIT-FD9R6004/3C-DL				X



The FD9R6004 Series is upgradeable to a Dual Diplexer kit by means of 2 diplexers and mounting hardware kits SEM2-1A and SEM2-3

Mounting Hardware and Ground Cable Ordering Information		
Model Number	**Description**	
SEM2-1A	Mounting Hardware, Pole mount ø40-110mm (Included with the Single and Dual Diplexer) Wall Screws M6 (Not included with the product)	
SEM2-3	Assembly kit for 2 pcs of FD9R6004/xC-3L (Can be ordered separately but included with the Dual Diplexer Kit)	
CA020-2	Ground Cable, 2m, includes lugs (Optional)	
CA030-2	Ground Cable, 3m, includes lugs (Optional)	
SEM6	Mounting Hardware for 6 Diplexers, Tower Base (Optional)	