Robinson+Cole

KENNETH C. BALDWIN

280 Trumbull Street
Hartford, CT 06103-3597
Main (860) 275-8200
Fax (860) 275-8299
kbaldwin@rc.com
Direct (860) 275-8345

Also admitted in Massachusetts

October 16, 2018

Melanie A. Bachman, Esq.
Executive Director/Staff Attorney
Connecticut Siting Council
10 Franklin Square
New Britain, CT 06051

Re: **Docket No. 475 – Cellco Partnership d/b/a Verizon Wireless Telecommunications Facility, Folly Lane, Coventry, Connecticut**

Dear Ms. Bachman:

At its meeting of July 19, 2018, the Siting Council approved the Development and Management ("D&M") Plan submitted for the above-referenced telecommunications facility in Coventry, CT. Enclosed please find the original and fifteen (15) copies of a substitute tower and tower foundation design package for the approved Coventry NW telecommunications facility.

Please let me know if you have any questions or need any additional information.

Sincerely,

Kenneth C. Baldwin

KCB/kmd
Enclosures
Copy to:
Andrew Candiello (*via e-mail*)
John Tierney (*via e-mail*)
Greg Milano (*via e-mail*)
Eric Campbell (*via e-mail*)
Douglas Roberts (*via e-mail*)

18567524-v1

Sabre Industries™
Towers and Poles

# Structural Design Report

140' Extendible to 160' Monopole
Site: Coventry Northwest, CT

Prepared for: VERIZON WIRELESS
by: Sabre Towers & Poles ™

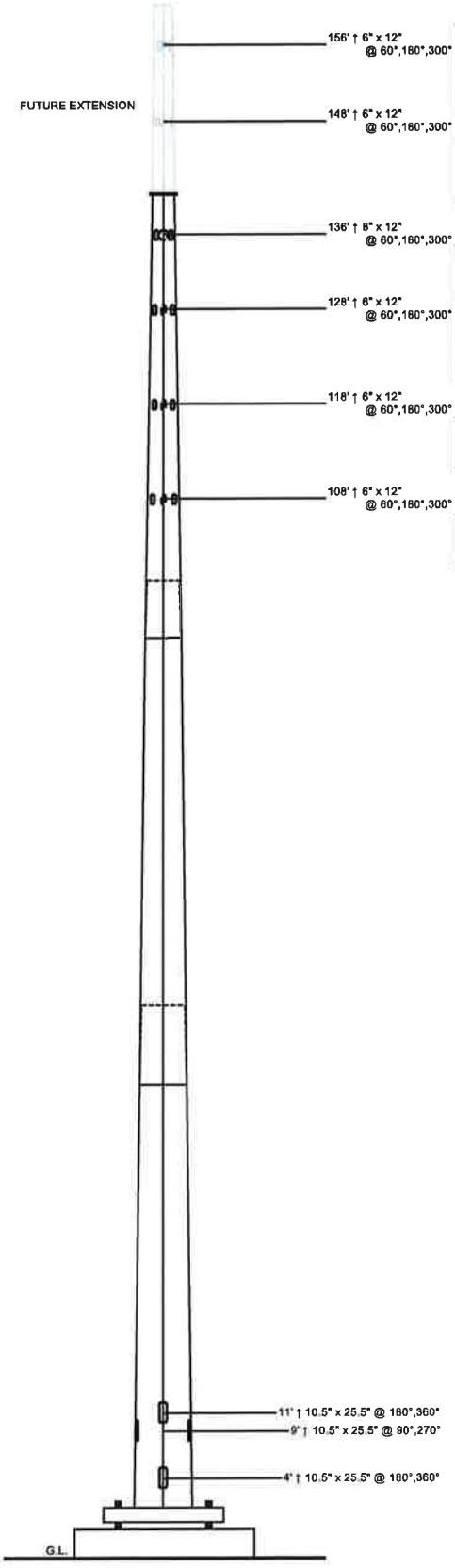
Job Number: 418393
Revision A

**October 15, 2018**




10/15/18

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Length (ft) | 53'-3" | 53'-6" | 47'-0" | 20'-0" | | | | | | |
| Number Of Sides | | 18 | | | | | | | | |
| Thickness (in) | | 1/2" | 3/8" | 1/4" | | | | | | |
| Lap Splice (ft) | | 8' - 6" | | | 6' - 3" | | | | | |
| Top Diameter (in) | 56.53" | 41.77" | 28.25" | 21" | | | | | | |
| Bottom Diameter (in) | 75.18" | 60.51" | 44.71" | 28" | | | | | | |
| Taper (in/ft) | | | | | | | 0.3502 | | | |
| Grade | | | | | | | A572-65 | | | |
| Weight (lbs) | 22823 | 15501 | 7920 | 1857 | | | | | | |
| Overall Steel Height (ft) | | 139 | | | | | | | | 20 (Extension) |




## Designed Appurtenance Loading

| Elev | Description | Tx-Line |
|---|---|---|
| 160*** | (1) 200 sq.ft. (no ice) 225 sq.ft. (ice) | (12) 1 5/8" |
| 150*** | (1) 200 sq.ft. (no ice) 225 sq.ft. (ice) | (12) 1 5/8" |
| 140 | (1) 250 Sq. Ft. EPA (3000 lbs) | (18) 1 5/8" |
| 130 | (1) 200 sq.ft. (no ice) 225 sq.ft. (ice) | (12) 1 5/8" |
| 120 | (1) 200 sq.ft. (no ice) 225 sq.ft. (ice) | (12) 1 5/8" |
| 110 | (1) 200 sq.ft. (no ice) 225 sq.ft. (ice) | (12) 1 5/8" |

## Load Case Reactions

| Description | Axial (kips) | Shear (kips) | Moment (ft-k) | Deflection (ft) | Sway (deg) |
|---|---|---|---|---|---|
| 3s Gusted Wind | 85.11 | 94.23 | 11717.65 | 11.24 | 8.07 |
| 3s Gusted Wind 0.9 Dead | 63.83 | 94.21 | 11610 | 11.1 | 7.96 |
| 3s Gusted Wind&Ice | 140.42 | 28.06 | 3632.15 | 3.6 | 2.55 |
| Service Loads | 70.95 | 18.61 | 2311.89 | 2.25 | 1.6 |

## Base Plate Dimensions

| Shape | Width | Thickness | Bolt Circle | Bolt Qty | Bolt Diameter |
|---|---|---|---|---|---|
| Square | 83.5" | 2.75" | 82.75" | 28 | 2.25" |

## Anchor Bolt Dimensions

| Length | Diameter | Hole Diameter | Weight | Type | Finish |
|---|---|---|---|---|---|
| 84" | 2.25" | 2.625" | 3390.8 | A615-75 | Galv |

## Notes

1) Antenna Feed Lines Run Inside Pole
2) All dimensions are above ground level, unless otherwise specified.
3) Weights shown are estimates. Final weights may vary.
4) The Monopole was designed for a basic wind speed of 101 mph with 0" of radial ice, and 50 mph with 1" of radial ice, in accordance with ANSI/TIA-222-G, Structure Class II, Exposure Category C, Topographic Category 1.
5) Full Height Step Bolts
6) The tower design meets the requirements for an Ultimate Wind Speed of 130 mph (Risk Category II), in accordance with the 2016 Connecticut Building Code.
7) Tower Rating: 100%

*** These Appurtenances cannot be installed until the Monopole has been extended.

Sabre Industries
Towers and Poles

**Sabre Communications Corporation**
7101 Southbridge Drive
P.O. Box 658
Sioux City, IA 51102-0658
Phone: (712) 258-6690
Fax: (712) 279-0614



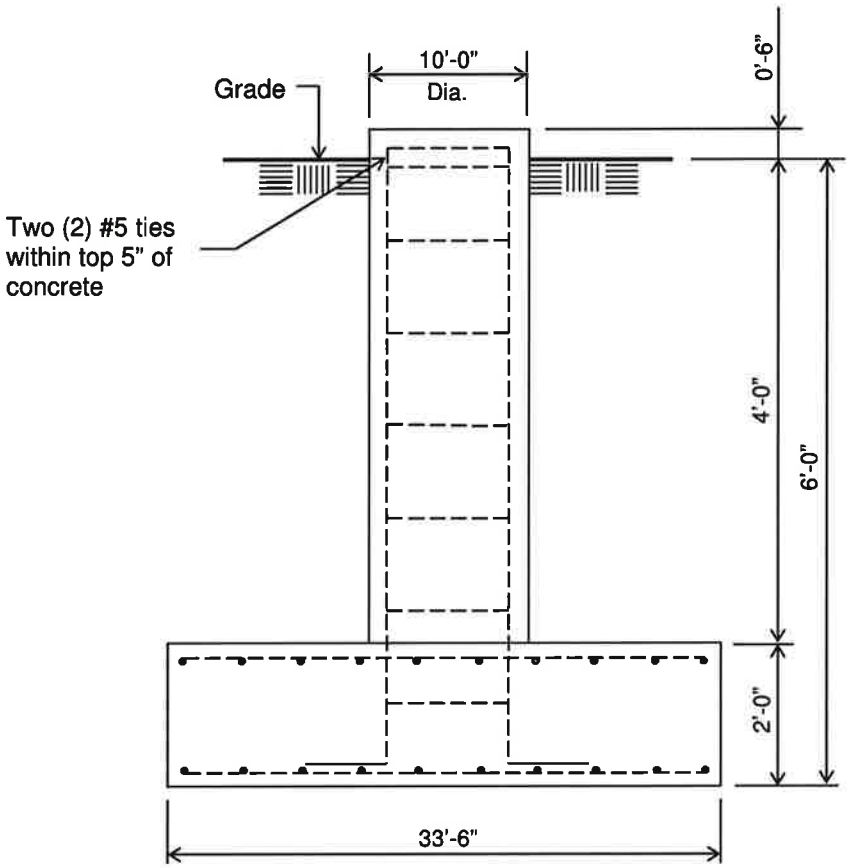
| | |
|---|---|
| Job: | **418393A** |
| Customer: | VERIZON WIRELESS |
| Site Name: | Coventry Northwest, CT |
| Description: | 140' ext. 160' Monopole |
| Date: | 10/15/2018 By: REB |

Sabre Industries™
Towers and Poles

No.: 418393

Date: 10/15/18
By: NM
Revision A

**Customer: VERIZON WIRELESS**
**Site: Coventry Northwest, CT**
140' Monopole Extendible to 160' at
101 mph wind and 50 mph wind with 1" ice per ANSI/TIA-222-G.




**ELEVATION VIEW**
(96.22 Cu. Yds.)
(1 REQUIRED; NOT TO SCALE)

**Notes:**

1) Concrete shall have a minimum 28-day compressive strength of 4,500 psi, in accordance with ACI 318-11.

2) Rebar to conform to ASTM specification A615 Grade 60.

3) All rebar to have a minimum of 3" concrete cover.

4) All exposed concrete corners to be chamfered 3/4".

5) The foundation design is based on the geotechnical report by Hudson Design Group, LLC., Project Name "VZW Coventry NW CT; Rev 1" dated: March 2nd, 2018 and the addendum letter dated: October 18, 2018.

6) See the geotechnical report for compaction requirements, if specified.

7) 4 ft of soil cover is required over the entire area of the foundation slab.

8) The foundation is based on the following factored loads:
   Moment = 11,717.65 k-ft
   Axial = 85.11 k
   Shear = 94.23 k

| Rebar Schedule for Pad and Pier | |
|---|---|
| Pier | (58) #9 vertical rebar w/ hooks at bottom w/ #5 ties, two within top 5" of pier, then 12" C/C |
| Pad | (74) #9 horizontal rebar evenly spaced each way top and bottom (296 total) |



7101 Southbridge Drive - P.O. Box 658 - Sioux City, IA 51102-0658 - Phone 712.258.6690 - Fax 712.279.0814

(USA 222-G) - Monopole Spatial Analysis (c)2015 Guymast Inc.

Tel:(416)736-7453 Fax:(416)736-4372 Web:www.guymast.com

Processed under license at:

Sabre Towers and Poles on: 15 oct 2018 at: 14:39:02

140' ext. 160' Monopole / Coventry Northwest, CT

* All pole diameters shown on the following pages are across corners.
See profile drawing for widths across flats.

POLE GEOMETRY

| ELEV ft | SECTION NAME | No. SIDE | OUTSIDE DIAM in | THICK -NESS in | RESISTANCES ♦*Pn kip | ♦*Mn ft-kip | SPLICE TYPE | ...OVERLAP... LENGTH ft | RATIO | w/t |
|---|---|---|---|---|---|---|---|---|---|---|
| 159.0 | | | | | | | | | | |
| | | | 21.32 | 0.250 | 1223.3 | 520.0 | | | | |
| | A | 18 | | | | | | | | 13.0 |
| | | | 28.44 | 0.250 | 1590.4 | 906.9 | | | | |
| 139.0 | | | | | | | | | | |
| | | | 28.69 | 0.375 | 2465.3 | 1406.1 | | | | |
| | B | 18 | | | | | | | | 11.5 |
| | | | 43.17 | 0.375 | 3609.4 | 3125.3 | | | | |
| 98.2 | | | | | | | | | | |
| | | | 43.17 | 0.375 | 3609.4 | 3125.3 | | | | |
| | B/C | 18 | | | | | SLIP | 6.25 | 1.71 | |
| | | | 44.65 | 0.500 | 5125.9 | 4567.6 | | | | |
| 92.0 | | | | | | | | | | |
| | | | 44.65 | 0.500 | 5125.9 | 4567.6 | | | | |
| | C | 18 | | | | | | | | 13.7 |
| | | | 58.41 | 0.500 | 6483.9 | 7597.7 | | | | |
| 53.2 | | | | | | | | | | |
| | | | 58.41 | 0.500 | 6483.9 | 7597.7 | | | | |
| | C/D | 18 | | | | | SLIP | 8.50 | 1.71 | |
| | | | 60.44 | 0.500 | 6641.9 | 8059.2 | | | | |
| 44.7 | | | | | | | | | | |
| | | | 60.44 | 0.500 | 6641.9 | 8059.2 | | | | |
| | D | 18 | | | | | | | | 19.2 |
| | | | 76.34 | 0.500 | 7711.0 | 11858.6 | | | | |
| 0.0 | | | | | | | | | | |

POLE ASSEMBLY

| SECTION NAME | BASE ELEV ft | .....BOLTS AT BASE OF SECTION..... NUMBER | TYPE | DIAM in | STRENGTH ksi | THREADS IN SHEAR PLANE | CALC BASE ELEV ft |
|---|---|---|---|---|---|---|---|
| A | 139.000 | 0 | A325 | 0.00 | 92.0 | 0 | 139.000 |
| B | 92.000 | 0 | A325 | 0.00 | 92.0 | 0 | 92.000 |
| C | 44.750 | 0 | A325 | 0.00 | 92.0 | 0 | 44.750 |
| D | 0.000 | 0 | A325 | 0.00 | 92.0 | 0 | 0.000 |

POLE SECTIONS

| SECTION NAME | No.of SIDES | LENGTH ft | OUTSIDE.DIAMETER BOT * in | TOP * in | BEND RAD in | MAT-ERIAL ID | FLANGE.ID BOT | TOP | FLANGE.WELD ..GROUP.ID.. BOT | TOP |
|---|---|---|---|---|---|---|---|---|---|---|
| A | 18 | 20.00 | 28.44 | 21.32 | 0.000 | 1 | 0 | 0 | 0 | 0 |
| B | 18 | 47.00 | 45.40 | 28.69 | 0.000 | 2 | 0 | 0 | 0 | 0 |
| C | 18 | 53.50 | 61.44 | 42.42 | 0.000 | 3 | 0 | 0 | 0 | 0 |
| D | 18 | 53.25 | 76.34 | 57.41 | 0.000 | 4 | 0 | 0 | 0 | 0 |

* - Diameter of circumscribed circle

MATERIAL TYPES

| TYPE OF SHAPE | TYPE NO | NO OF ELEM. | ORIENT & | HEIGHT | WIDTH | .THICKNESS. WEB | FLANGE | IRREGULARITY .PROJECTION. % OF AREA | ORIENT |
|---|---|---|---|---|---|---|---|---|---|
| | | | deg | in | in | in | in | | deg |
| PL | 1 | 1 | 0.0 | 28.44 | 0.25 | 0.250 | 0.250 | 0.00 | 0.0 |
| PL | 2 | 1 | 0.0 | 45.40 | 0.38 | 0.375 | 0.375 | 0.00 | 0.0 |
| PL | 3 | 1 | 0.0 | 61.44 | 0.50 | 0.500 | 0.500 | 0.00 | 0.0 |
| PL | 4 | 1 | 0.0 | 76.34 | 0.50 | 0.500 | 0.500 | 0.00 | 0.0 |

& - With respect to vertical

MATERIAL PROPERTIES

| MATERIAL TYPE NO. | ELASTIC MODULUS ksi | UNIT WEIGHT pcf | .. STRENGTH .. Fu ksi | Fy ksi | THERMAL COEFFICIENT /deg |
|---|---|---|---|---|---|
| 1 | 29000.0 | 490.0 | 80.0 | 65.0 | 0.00001170 |
| 2 | 29000.0 | 490.0 | 80.0 | 65.0 | 0.00001170 |
| 3 | 29000.0 | 490.0 | 80.0 | 65.0 | 0.00001170 |
| 4 | 29000.0 | 490.0 | 80.0 | 65.0 | 0.00001170 |

* Only 3 condition(s) shown in full
* Some concentrated wind loads may have been derived from full-scale wind tunnel testing

LOADING CONDITION A

101 mph wind with no ice. Wind Azimuth: 0♦

LOADS ON POLE

| LOAD TYPE | ELEV ft | APPLY..LOAD..AT RADIUS ft | AZI | LOAD AZI | .....FORCES..... HORIZ kip | DOWN kip | .....MOMENTS..... VERTICAL ft-kip | TORSNAL ft-kip |
|---|---|---|---|---|---|---|---|---|
| C | 159.000 | 0.00 | 0.0 | 0.0 | 12.2018 | 3.7200 | 0.0000 | 0.0000 |
| C | 157.000 | 0.00 | 0.0 | 0.0 | 0.0000 | 2.3512 | 0.0000 | 0.0000 |
| C | 149.000 | 0.00 | 0.0 | 0.0 | 0.0000 | 2.2314 | 0.0000 | 0.0000 |
| C | 149.000 | 0.00 | 0.0 | 0.0 | 12.0372 | 3.7200 | 0.0000 | 0.0000 |
| C | 139.000 | 0.00 | 0.0 | 0.0 | 14.8295 | 3.6000 | 0.0000 | 0.0000 |
| C | 137.000 | 0.00 | 0.0 | 0.0 | 0.0000 | 3.0776 | 0.0000 | 0.0000 |
| C | 129.000 | 0.00 | 0.0 | 0.0 | 0.0000 | 1.9319 | 0.0000 | 0.0000 |
| C | 129.000 | 0.00 | 0.0 | 0.0 | 11.6799 | 3.7200 | 0.0000 | 0.0000 |
| C | 119.000 | 0.00 | 0.0 | 0.0 | 0.0000 | 1.7821 | 0.0000 | 0.0000 |
| C | 119.000 | 0.00 | 0.0 | 0.0 | 11.4848 | 3.7200 | 0.0000 | 0.0000 |
| C | 109.000 | 0.00 | 0.0 | 0.0 | 0.0000 | 1.6324 | 0.0000 | 0.0000 |
| C | 109.000 | 0.00 | 0.0 | 0.0 | 11.2763 | 3.7200 | 0.0000 | 0.0000 |
| D | 159.000 | 0.00 | 180.0 | 0.0 | 0.0732 | 0.0702 | 0.0000 | 0.0000 |
| D | 139.000 | 0.00 | 180.0 | 0.0 | 0.0889 | 0.0870 | 0.0000 | 0.0000 |
| D | 139.000 | 0.00 | 180.0 | 0.0 | 0.0989 | 0.1474 | 0.0000 | 0.0000 |
| D | 125.417 | 0.00 | 180.0 | 0.0 | 0.0989 | 0.1474 | 0.0000 | 0.0000 |
| D | 125.417 | 0.00 | 180.0 | 0.0 | 0.1117 | 0.1703 | 0.0000 | 0.0000 |
| D | 111.833 | 0.00 | 180.0 | 0.0 | 0.1117 | 0.1703 | 0.0000 | 0.0000 |
| D | 111.833 | 0.00 | 180.0 | 0.0 | 0.1235 | 0.1931 | 0.0000 | 0.0000 |
| D | 98.250 | 0.00 | 180.0 | 0.0 | 0.1235 | 0.1931 | 0.0000 | 0.0000 |
| D | 98.250 | 0.00 | 180.0 | 0.0 | 0.1315 | 0.4850 | 0.0000 | 0.0000 |
| D | 92.000 | 0.00 | 180.0 | 0.0 | 0.1315 | 0.4850 | 0.0000 | 0.0000 |
| D | 92.000 | 0.00 | 180.0 | 0.0 | 0.1363 | 0.2967 | 0.0000 | 0.0000 |
| D | 79.083 | 0.00 | 180.0 | 0.0 | 0.1363 | 0.2967 | 0.0000 | 0.0000 |
| D | 79.083 | 0.00 | 180.0 | 0.0 | 0.1446 | 0.3257 | 0.0000 | 0.0000 |
| D | 66.167 | 0.00 | 180.0 | 0.0 | 0.1446 | 0.3257 | 0.0000 | 0.0000 |
| D | 66.167 | 0.00 | 180.0 | 0.0 | 0.1512 | 0.3547 | 0.0000 | 0.0000 |
| D | 53.250 | 0.00 | 180.0 | 0.0 | 0.1512 | 0.3547 | 0.0000 | 0.0000 |
| D | 53.250 | 0.00 | 180.0 | 0.0 | 0.1550 | 0.7520 | 0.0000 | 0.0000 |
| D | 44.750 | 0.00 | 180.0 | 0.0 | 0.1550 | 0.7520 | 0.0000 | 0.0000 |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| D | 44.750 | 0.00 | 180.0 | 0.0 | 0.1542 | 0.3953 | 0.0000 | 0.0000 |
| D | 33.562 | 0.00 | 180.0 | 0.0 | 0.1542 | 0.3953 | 0.0000 | 0.0000 |
| D | 33.562 | 0.00 | 180.0 | 0.0 | 0.1531 | 0.4205 | 0.0000 | 0.0000 |
| D | 22.375 | 0.00 | 180.0 | 0.0 | 0.1531 | 0.4205 | 0.0000 | 0.0000 |
| D | 22.375 | 0.00 | 180.0 | 0.0 | 0.1464 | 0.4457 | 0.0000 | 0.0000 |
| D | 11.188 | 0.00 | 180.0 | 0.0 | 0.1464 | 0.4457 | 0.0000 | 0.0000 |
| D | 11.188 | 0.00 | 180.0 | 0.0 | 0.1495 | 0.4709 | 0.0000 | 0.0000 |
| D | 0.000 | 0.00 | 180.0 | 0.0 | 0.1495 | 0.4709 | 0.0000 | 0.0000 |

LOADING CONDITION M

101 mph wind with no ice. Wind Azimuth: 0♦

LOADS ON POLE

| LOAD TYPE | ELEV ft | APPLY..LOAD..AT RADIUS ft | AZI | LOAD AZI | .....FORCES..... HORIZ kip | DOWN kip | .....MOMENTS..... VERTICAL ft-kip | TORSNAL ft-kip |
|---|---|---|---|---|---|---|---|---|
| C | 159.000 | 0.00 | 0.0 | 0.0 | 12.2018 | 2.7900 | 0.0000 | 0.0000 |
| C | 157.000 | 0.00 | 0.0 | 0.0 | 0.0000 | 1.7634 | 0.0000 | 0.0000 |
| C | 149.000 | 0.00 | 0.0 | 0.0 | 0.0000 | 1.6736 | 0.0000 | 0.0000 |
| C | 149.000 | 0.00 | 0.0 | 0.0 | 12.0372 | 2.7900 | 0.0000 | 0.0000 |
| C | 139.000 | 0.00 | 0.0 | 0.0 | 14.8295 | 2.7000 | 0.0000 | 0.0000 |
| C | 137.000 | 0.00 | 0.0 | 0.0 | 0.0000 | 2.3082 | 0.0000 | 0.0000 |
| C | 129.000 | 0.00 | 0.0 | 0.0 | 0.0000 | 1.4489 | 0.0000 | 0.0000 |
| C | 129.000 | 0.00 | 0.0 | 0.0 | 11.6799 | 2.7900 | 0.0000 | 0.0000 |
| C | 119.000 | 0.00 | 0.0 | 0.0 | 0.0000 | 1.3366 | 0.0000 | 0.0000 |
| C | 119.000 | 0.00 | 0.0 | 0.0 | 11.4848 | 2.7900 | 0.0000 | 0.0000 |
| C | 109.000 | 0.00 | 0.0 | 0.0 | 0.0000 | 1.2243 | 0.0000 | 0.0000 |
| C | 109.000 | 0.00 | 0.0 | 0.0 | 11.2763 | 2.7900 | 0.0000 | 0.0000 |
| D | 159.000 | 0.00 | 180.0 | 0.0 | 0.0732 | 0.0526 | 0.0000 | 0.0000 |
| D | 139.000 | 0.00 | 180.0 | 0.0 | 0.0889 | 0.0653 | 0.0000 | 0.0000 |
| D | 139.000 | 0.00 | 180.0 | 0.0 | 0.0989 | 0.1105 | 0.0000 | 0.0000 |
| D | 125.417 | 0.00 | 180.0 | 0.0 | 0.0989 | 0.1105 | 0.0000 | 0.0000 |
| D | 125.417 | 0.00 | 180.0 | 0.0 | 0.1117 | 0.1277 | 0.0000 | 0.0000 |
| D | 111.833 | 0.00 | 180.0 | 0.0 | 0.1117 | 0.1277 | 0.0000 | 0.0000 |
| D | 111.833 | 0.00 | 180.0 | 0.0 | 0.1235 | 0.1449 | 0.0000 | 0.0000 |
| D | 98.250 | 0.00 | 180.0 | 0.0 | 0.1235 | 0.1449 | 0.0000 | 0.0000 |
| D | 98.250 | 0.00 | 180.0 | 0.0 | 0.1315 | 0.3637 | 0.0000 | 0.0000 |
| D | 92.000 | 0.00 | 180.0 | 0.0 | 0.1315 | 0.3637 | 0.0000 | 0.0000 |
| D | 92.000 | 0.00 | 180.0 | 0.0 | 0.1363 | 0.2225 | 0.0000 | 0.0000 |
| D | 79.083 | 0.00 | 180.0 | 0.0 | 0.1363 | 0.2225 | 0.0000 | 0.0000 |
| D | 79.083 | 0.00 | 180.0 | 0.0 | 0.1446 | 0.2443 | 0.0000 | 0.0000 |
| D | 66.167 | 0.00 | 180.0 | 0.0 | 0.1446 | 0.2443 | 0.0000 | 0.0000 |
| D | 66.167 | 0.00 | 180.0 | 0.0 | 0.1512 | 0.2660 | 0.0000 | 0.0000 |
| D | 53.250 | 0.00 | 180.0 | 0.0 | 0.1512 | 0.2660 | 0.0000 | 0.0000 |
| D | 53.250 | 0.00 | 180.0 | 0.0 | 0.1550 | 0.5640 | 0.0000 | 0.0000 |
| D | 44.750 | 0.00 | 180.0 | 0.0 | 0.1550 | 0.5640 | 0.0000 | 0.0000 |
| D | 44.750 | 0.00 | 180.0 | 0.0 | 0.1542 | 0.2965 | 0.0000 | 0.0000 |
| D | 33.562 | 0.00 | 180.0 | 0.0 | 0.1542 | 0.2965 | 0.0000 | 0.0000 |
| D | 33.562 | 0.00 | 180.0 | 0.0 | 0.1531 | 0.3154 | 0.0000 | 0.0000 |
| D | 22.375 | 0.00 | 180.0 | 0.0 | 0.1531 | 0.3154 | 0.0000 | 0.0000 |
| D | 22.375 | 0.00 | 180.0 | 0.0 | 0.1464 | 0.3343 | 0.0000 | 0.0000 |
| D | 11.188 | 0.00 | 180.0 | 0.0 | 0.1464 | 0.3343 | 0.0000 | 0.0000 |
| D | 11.188 | 0.00 | 180.0 | 0.0 | 0.1495 | 0.3532 | 0.0000 | 0.0000 |
| D | 0.000 | 0.00 | 180.0 | 0.0 | 0.1495 | 0.3532 | 0.0000 | 0.0000 |

LOADING CONDITION Y

50 mph wind with 1 ice. Wind Azimuth: 0♦

LOADS ON POLE

| LOAD TYPE | ELEV ft | APPLY..LOAD..AT RADIUS ft | AZI | LOAD AZI | .....FORCES..... HORIZ kip | DOWN kip | .....MOMENTS..... VERTICAL ft-kip | TORSNAL ft-kip |
|---|---|---|---|---|---|---|---|---|
| C | 159.000 | 0.00 | 0.0 | 0.0 | 2.9633 | 9.3408 | 0.0000 | 0.0000 |

| | | | | | 418393A - Extension | | | |
|---|---|---|---|---|---|---|---|---|
| C | 157.000 | 0.00 | 0.0 | 0.0 | 0.0000 | 2.3512 | 0.0000 | 0.0000 |
| C | 149.000 | 0.00 | 0.0 | 0.0 | 0.0000 | 2.2314 | 0.0000 | 0.0000 |
| C | 149.000 | 0.00 | 0.0 | 0.0 | 2.9163 | 9.3047 | 0.0000 | 0.0000 |
| C | 139.000 | 0.00 | 0.0 | 0.0 | 7.5207 | 10.5329 | 0.0000 | 0.0000 |
| C | 137.000 | 0.00 | 0.0 | 0.0 | 0.0000 | 3.0776 | 0.0000 | 0.0000 |
| C | 129.000 | 0.00 | 0.0 | 0.0 | 0.0000 | 1.9319 | 0.0000 | 0.0000 |
| C | 129.000 | 0.00 | 0.0 | 0.0 | 2.8150 | 9.2253 | 0.0000 | 0.0000 |
| C | 119.000 | 0.00 | 0.0 | 0.0 | 0.0000 | 1.7821 | 0.0000 | 0.0000 |
| C | 119.000 | 0.00 | 0.0 | 0.0 | 2.7599 | 9.1814 | 0.0000 | 0.0000 |
| C | 109.000 | 0.00 | 0.0 | 0.0 | 0.0000 | 1.6324 | 0.0000 | 0.0000 |
| C | 109.000 | 0.00 | 0.0 | 0.0 | 2.7013 | 9.1341 | 0.0000 | 0.0000 |
| D | 159.000 | 0.00 | 180.0 | 0.0 | 0.0250 | 0.1403 | 0.0000 | 0.0000 |
| D | 154.000 | 0.00 | 180.0 | 0.0 | 0.0250 | 0.1403 | 0.0000 | 0.0000 |
| D | 154.000 | 0.00 | 180.0 | 0.0 | 0.0265 | 0.1507 | 0.0000 | 0.0000 |
| D | 149.000 | 0.00 | 180.0 | 0.0 | 0.0265 | 0.1507 | 0.0000 | 0.0000 |
| D | 149.000 | 0.00 | 180.0 | 0.0 | 0.0279 | 0.1611 | 0.0000 | 0.0000 |
| D | 144.000 | 0.00 | 180.0 | 0.0 | 0.0279 | 0.1611 | 0.0000 | 0.0000 |
| D | 144.000 | 0.00 | 180.0 | 0.0 | 0.0293 | 0.1715 | 0.0000 | 0.0000 |
| D | 139.000 | 0.00 | 180.0 | 0.0 | 0.0293 | 0.1715 | 0.0000 | 0.0000 |
| D | 139.000 | 0.00 | 180.0 | 0.0 | 0.0321 | 0.2412 | 0.0000 | 0.0000 |
| D | 125.417 | 0.00 | 180.0 | 0.0 | 0.0321 | 0.2412 | 0.0000 | 0.0000 |
| D | 125.417 | 0.00 | 180.0 | 0.0 | 0.0356 | 0.2764 | 0.0000 | 0.0000 |
| D | 111.833 | 0.00 | 180.0 | 0.0 | 0.0356 | 0.2764 | 0.0000 | 0.0000 |
| D | 111.833 | 0.00 | 180.0 | 0.0 | 0.0388 | 0.3113 | 0.0000 | 0.0000 |
| D | 98.250 | 0.00 | 180.0 | 0.0 | 0.0388 | 0.3113 | 0.0000 | 0.0000 |
| D | 98.250 | 0.00 | 180.0 | 0.0 | 0.0409 | 0.6115 | 0.0000 | 0.0000 |
| D | 92.000 | 0.00 | 180.0 | 0.0 | 0.0409 | 0.6115 | 0.0000 | 0.0000 |
| D | 92.000 | 0.00 | 180.0 | 0.0 | 0.0422 | 0.4289 | 0.0000 | 0.0000 |
| D | 79.083 | 0.00 | 180.0 | 0.0 | 0.0422 | 0.4289 | 0.0000 | 0.0000 |
| D | 79.083 | 0.00 | 180.0 | 0.0 | 0.0443 | 0.4679 | 0.0000 | 0.0000 |
| D | 66.167 | 0.00 | 180.0 | 0.0 | 0.0443 | 0.4679 | 0.0000 | 0.0000 |
| D | 66.167 | 0.00 | 180.0 | 0.0 | 0.0460 | 0.5060 | 0.0000 | 0.0000 |
| D | 53.250 | 0.00 | 180.0 | 0.0 | 0.0460 | 0.5060 | 0.0000 | 0.0000 |
| D | 53.250 | 0.00 | 180.0 | 0.0 | 0.0469 | 0.9099 | 0.0000 | 0.0000 |
| D | 44.750 | 0.00 | 180.0 | 0.0 | 0.0469 | 0.9099 | 0.0000 | 0.0000 |
| D | 44.750 | 0.00 | 180.0 | 0.0 | 0.0464 | 0.5560 | 0.0000 | 0.0000 |
| D | 33.562 | 0.00 | 180.0 | 0.0 | 0.0464 | 0.5560 | 0.0000 | 0.0000 |
| D | 33.562 | 0.00 | 180.0 | 0.0 | 0.0454 | 0.5869 | 0.0000 | 0.0000 |
| D | 0.000 | 0.00 | 180.0 | 0.0 | 0.0437 | 0.6307 | 0.0000 | 0.0000 |

==========

(USA 222-G) - Monopole Spatial Analysis (c)2015 Guymast Inc.

Tel:(416)736-7453 Fax:(416)736-4372 Web:www.guymast.com

Processed under license at:

Sabre Towers and Poles on: 15 oct 2018 at: 14:39:02

==========

140' ext. 160' Monopole / Coventry Northwest, CT

MAXIMUM POLE DEFORMATIONS CALCULATED(w.r.t. wind direction)

| MAST ELEV ft | .....DEFLECTIONS (ft)..... HORIZONTAL ..... ALONG | ACROSS | DOWN | .....ROTATIONS (deg)..... TILT ..... ALONG | ACROSS | TWIST |
|---|---|---|---|---|---|---|
| 159.0 | 11.24C | -0.01R | 1.11C | 8.07C | -0.01R | 0.00I |
| 154.0 | 10.55C | -0.01R | 1.01C | 8.03C | -0.01R | 0.00I |
| 149.0 | 9.86C | -0.01R | 0.92C | 7.92C | -0.01R | 0.00I |
| 144.0 | 9.19C | -0.01R | 0.83C | 7.75C | -0.01R | 0.00I |
| 139.0 | 8.54C | -0.01R | 0.74C | 7.51C | -0.01R | 0.00I |
| 125.4 | 6.85C | -0.01R | 0.53C | 6.88C | -0.01R | 0.00I |
| 111.8 | 5.34C | -0.01R | 0.36C | 6.04C | -0.01R | 0.00I |
| 98.2 | 4.03C | -0.01R | 0.23C | 5.06C | -0.01R | 0.00I |

| | | | | | | |
|---|---|---|---|---|---|---|
| 92.0 | 3.50C | 0.00R | 0.19C | 4.70C | -0.01R | 0.00I |
| 79.1 | 2.54C | 0.00R | 0.11C | 3.93C | -0.01R | 0.00I |
| 66.2 | 1.74C | 0.00R | 0.06C | 3.19C | 0.00R | 0.00I |
| 53.2 | 1.10C | 0.00R | 0.03C | 2.49C | 0.00R | 0.00I |
| 44.7 | 0.77C | 0.00R | 0.02C | 2.05C | 0.00R | 0.00I |
| 33.6 | 0.42C | 0.00R | 0.01C | 1.49C | 0.00R | 0.00I |
| 22.4 | 0.18C | 0.00R | 0.00C | 0.96C | 0.00R | 0.00I |
| 11.2 | 0.04C | 0.00R | 0.00AC | 0.46C | 0.00R | 0.00I |
| 0.0 | 0.00A | 0.00A | 0.00A | 0.00A | 0.00A | 0.00A |

MAXIMUM POLE FORCES CALCULATED(w.r.t. to wind direction)

| MAST ELEV ft | TOTAL AXIAL kip | SHEAR.w.r.t.WIND.DIR ALONG kip | ACROSS kip | MOMENT.w.r.t.WIND.DIR ALONG ft-kip | ACROSS ft-kip | TORSION ft-kip |
|---|---|---|---|---|---|---|
| 159.0 | 9.35 Y | 12.24 U | -0.02 N | -0.12 W | -0.04 N | 0.01 N |
| | 12.40 Y | 12.61 U | -0.02 N | -64.45 E | 0.05 N | -0.02 F |
| 154.0 | 12.39 AI | 12.64 I | 0.05 L | -64.52 E | 0.11 W | 0.02 Q |
| | 13.15 AI | 13.03 I | 0.05 L | -131.69 F | -0.18 L | -0.05 F |
| 149.0 | 24.68 AI | 25.07 H | -0.06 N | -131.74 F | 0.26 F | -0.07 F |
| | 25.49 AI | 25.48 H | -0.06 N | -264.34 D | 0.47 R | -0.08 F |
| 144.0 | 25.50 AC | 25.50 D | -0.10 R | -264.46 D | 0.46 R | -0.08 F |
| | 26.35 AC | 25.93 D | -0.10 R | -399.58 D | 0.94 R | -0.13 R |
| 139.0 | 36.88 AC | 40.83 C | -0.12 C | -399.55 D | 0.92 R | -0.13 R |
| | 54.39 AC | 53.84 C | -0.12 C | -1032.46 C | 2.14 C | -0.28 I |
| 125.4 | 54.40 AC | 53.82 C | -0.09 C | -1032.47 C | 2.15 C | -0.28 I |
| | 69.11 AC | 66.82 C | -0.09 C | -1894.11 C | 3.45 C | -0.48 I |
| 111.8 | 69.12 AC | 66.81 C | 0.09 F | -1894.10 C | 3.47 C | -0.48 I |
| | 84.11 AC | 79.76 C | 0.09 F | -2978.19 C | 4.67 C | -0.66 I |
| 98.2 | 84.11 AC | 79.81 C | 0.15 F | -2978.25 C | 4.70 C | -0.66 I |
| | 87.93 AC | 80.63 C | 0.15 F | -3499.59 C | 5.00 C | -0.75 I |
| 92.0 | 87.93 AC | 80.57 C | -0.14 R | -3499.53 C | 5.08 C | -0.76 I |
| | 93.47 AC | 82.33 C | -0.14 R | -4592.55 C | -5.91 F | -0.88 I |
| 79.1 | 93.46 AC | 82.35 C | 0.13 X | -4592.59 C | 5.87 R | -0.88 I |
| | 99.51 AC | 84.21 C | 0.13 X | -5705.93 C | 7.40 R | -1.01 I |
| 66.2 | 99.50 AC | 84.20 C | 0.14 X | -5705.95 C | 7.38 R | -1.00 I |
| | 106.04 AC | 86.15 C | 0.14 X | -6839.80 C | 8.91 R | -1.10 I |
| 53.2 | 106.04 AC | 86.16 C | -0.14 R | -6839.83 C | 8.91 R | -1.10 I |
| | 113.77 AC | 87.48 C | -0.14 R | -7597.56 C | 10.09 R | -1.13 I |
| 44.7 | 113.77 AC | 87.47 C | 0.13 X | -7597.53 C | 10.08 R | -1.14 I |
| | 119.99 AC | 89.19 C | 0.13 X | -8608.17 C | 11.22 R | -1.16 I |

| | | | | | | |
|---|---|---|---|---|---|---|
| 33.6 | 119.99 AC | 89.21 C | -0.12 R | -8608.17 C | 11.21 R | -1.16 I |
| | 126.64 AC | 90.92 C | -0.12 R | -9632.47 C | 12.54 R | -1.19 I |
| 22.4 | 126.64 AC | 90.92 C | 0.13 X | -9632.43 C | 12.55 R | -1.19 I |
| | 133.45 AC | 92.56 C | 0.13 X | -10669.18 C | 13.71 R | -1.20 I |
| 11.2 | 133.45 AC | 92.56 C | 0.13 X | -10669.16 C | 13.69 R | -1.20 I |
| | 140.42 AC | 94.23 C | 0.13 X | -11717.65 C | 15.00 R | -1.21 I |
| base reaction | 140.42 AC | -94.23 C | -0.13 X | 11717.65 C | -15.00 R | 1.21 I |

COMPLIANCE WITH 4.8.2 & 4.5.4

| ELEV ft | AXIAL | BENDING | SHEAR + TORSIONAL | TOTAL | SATISFIED | D/t(w/t) | MAX ALLOWED |
|---|---|---|---|---|---|---|---|
| 159.00 | 0.01Y | 0.00W | 0.02U | 0.01AI | YES | 13.05A | 45.2 |
| | 0.01Y | 0.11E | 0.02U | 0.11E | YES | 14.28A | 45.2 |
| 154.00 | 0.01AI | 0.11E | 0.02I | 0.11E | YES | 14.28A | 45.2 |
| | 0.01AI | 0.19F | 0.02I | 0.19F | YES | 15.52A | 45.2 |
| 149.00 | 0.02AI | 0.19F | 0.04H | 0.20F | YES | 15.52A | 45.2 |
| | 0.02AI | 0.33D | 0.03H | 0.34D | YES | 16.75A | 45.2 |
| 144.00 | 0.02AC | 0.33D | 0.03D | 0.34D | YES | 16.75A | 45.2 |
| | 0.02AC | 0.44D | 0.03D | 0.45D | YES | 17.99A | 45.2 |
| 139.00 | 0.01AC | 0.28D | 0.03C | 0.29D | YES | 11.52A | 45.2 |
| | 0.02AC | 0.53C | 0.04C | 0.55C | YES | 13.76A | 45.2 |
| 125.42 | 0.02AC | 0.53C | 0.04C | 0.55C | YES | 13.76A | 45.2 |
| | 0.02AC | 0.75C | 0.04C | 0.76C | YES | 16.00A | 45.2 |
| 111.83 | 0.02AC | 0.75C | 0.04C | 0.76C | YES | 16.00A | 45.2 |
| | 0.02AC | 0.95C | 0.04C | 0.97C | YES | 18.23A | 45.2 |
| 98.25 | 0.02AC | 0.70C | 0.03C | 0.71C | YES | 13.23A | 45.2 |
| | 0.02AC | 0.74C | 0.03C | 0.75C | YES | 14.01A | 45.2 |
| 92.00 | 0.02AC | 0.77C | 0.03C | 0.78C | YES | 13.74A | 45.2 |
| | 0.02AC | 0.82C | 0.03C | 0.83C | YES | 15.34A | 45.2 |
| 79.08 | 0.02AC | 0.82C | 0.03C | 0.83C | YES | 15.34A | 45.2 |
| | 0.02AC | 0.87C | 0.03C | 0.88C | YES | 16.93A | 45.2 |
| 66.17 | 0.02AC | 0.87C | 0.03C | 0.88C | YES | 16.93A | 45.2 |
| | 0.02AC | 0.90C | 0.03C | 0.91C | YES | 18.53A | 45.2 |
| 53.25 | 0.02AC | 0.90C | 0.03C | 0.91C | YES | 18.53A | 45.2 |
| | 0.02AC | 0.92C | 0.03C | 0.93C | YES | 19.58A | 45.2 |
| 44.75 | 0.02AC | 0.94C | 0.03C | 0.95C | YES | 19.22A | 45.2 |
| | 0.02AC | 0.96C | 0.03I | 0.97C | YES | 20.61A | 45.2 |
| 33.56 | 0.02AC | 0.96C | 0.03C | 0.97C | YES | 20.61A | 45.2 |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| | 0.02AC | 0.97C | 0.03I | 0.98C | YES | 21.99A | 45.2 |
| 22.37 | ..... | | | | | | |
| | 0.02AC | 0.97C | 0.03O | 0.98C | YES | 21.99A | 45.2 |
| | 0.02AC | 0.98C | 0.02I | 0.99C | YES | 23.37A | 45.2 |
| 11.19 | ..... | | | | | | |
| | 0.02AC | 0.98C | 0.02I | 0.99C | YES | 23.37A | 45.2 |
| | 0.02AC | 0.99C | 0.02I | 1.00C | YES | 24.75A | 45.2 |
| 0.00 | ..... | | | | | | |

MAXIMUM LOADS ONTO FOUNDATION(w.r.t. wind direction)

| DOWN | SHEAR.w.r.t.WIND.DIR ALONG | ACROSS | MOMENT.w.r.t.WIND.DIR ALONG | ACROSS | TORSION |
|---|---|---|---|---|---|
| kip | kip | kip | ft-kip | ft-kip | ft-kip |
| 140.42 | 94.23 | 0.13 | -11717.65 | 15.00 | -1.21 |
| AC | C | X | C | R | I |

(USA 222-G) - Monopole Spatial Analysis (c)2015 Guymast Inc.

Tel:(416)736-7453 Fax:(416)736-4372 Web:www.guymast.com

Processed under license at:

Sabre Towers and Poles on: 15 oct 2018 at: 14:39:11

140' ext. 160' Monopole / Coventry Northwest, CT

**********
********** Service Load Condition **********
**********

* Only 1 condition(s) shown in full
* Some concentrated wind loads may have been derived from full-scale wind tunnel testing

LOADING CONDITION A

60 mph wind with no ice. Wind Azimuth: 0♦

LOADS ON POLE

| LOAD TYPE | ELEV ft | APPLY..LOAD..AT RADIUS ft | AZI | LOAD AZI | .....FORCES..... HORIZ kip | DOWN kip | .....MOMENTS..... VERTICAL ft-kip | TORSNAL ft-kip |
|---|---|---|---|---|---|---|---|---|
| C | 159.000 | 0.00 | 0.0 | 0.0 | 2.4080 | 3.1000 | 0.0000 | 0.0000 |
| C | 157.000 | 0.00 | 0.0 | 0.0 | 0.0000 | 1.9594 | 0.0000 | 0.0000 |
| C | 149.000 | 0.00 | 0.0 | 0.0 | 0.0000 | 1.8595 | 0.0000 | 0.0000 |
| C | 149.000 | 0.00 | 0.0 | 0.0 | 2.3755 | 3.1000 | 0.0000 | 0.0000 |
| C | 139.000 | 0.00 | 0.0 | 0.0 | 2.9266 | 3.0000 | 0.0000 | 0.0000 |
| C | 137.000 | 0.00 | 0.0 | 0.0 | 0.0000 | 2.5646 | 0.0000 | 0.0000 |
| C | 129.000 | 0.00 | 0.0 | 0.0 | 0.0000 | 1.6099 | 0.0000 | 0.0000 |
| C | 129.000 | 0.00 | 0.0 | 0.0 | 2.3050 | 3.1000 | 0.0000 | 0.0000 |
| C | 119.000 | 0.00 | 0.0 | 0.0 | 0.0000 | 1.4851 | 0.0000 | 0.0000 |
| C | 119.000 | 0.00 | 0.0 | 0.0 | 2.2665 | 3.1000 | 0.0000 | 0.0000 |
| C | 109.000 | 0.00 | 0.0 | 0.0 | 0.0000 | 1.3603 | 0.0000 | 0.0000 |
| C | 109.000 | 0.00 | 0.0 | 0.0 | 2.2254 | 3.1000 | 0.0000 | 0.0000 |
| D | 159.000 | 0.00 | 180.0 | 0.0 | 0.0144 | 0.0585 | 0.0000 | 0.0000 |
| D | 139.000 | 0.00 | 180.0 | 0.0 | 0.0175 | 0.0725 | 0.0000 | 0.0000 |
| D | 139.000 | 0.00 | 180.0 | 0.0 | 0.0195 | 0.1228 | 0.0000 | 0.0000 |
| D | 125.417 | 0.00 | 180.0 | 0.0 | 0.0195 | 0.1228 | 0.0000 | 0.0000 |
| D | 125.417 | 0.00 | 180.0 | 0.0 | 0.0220 | 0.1419 | 0.0000 | 0.0000 |
| D | 111.833 | 0.00 | 180.0 | 0.0 | 0.0220 | 0.1419 | 0.0000 | 0.0000 |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| D | 111.833 | 0.00 | 180.0 | 0.0 | 0.0244 | 0.1609 | 0.0000 | 0.0000 |
| D | 98.250 | 0.00 | 180.0 | 0.0 | 0.0244 | 0.1609 | 0.0000 | 0.0000 |
| D | 98.250 | 0.00 | 180.0 | 0.0 | 0.0259 | 0.4041 | 0.0000 | 0.0000 |
| D | 92.000 | 0.00 | 180.0 | 0.0 | 0.0259 | 0.4041 | 0.0000 | 0.0000 |
| D | 92.000 | 0.00 | 180.0 | 0.0 | 0.0269 | 0.2472 | 0.0000 | 0.0000 |
| D | 79.083 | 0.00 | 180.0 | 0.0 | 0.0269 | 0.2472 | 0.0000 | 0.0000 |
| D | 79.083 | 0.00 | 180.0 | 0.0 | 0.0285 | 0.2714 | 0.0000 | 0.0000 |
| D | 66.167 | 0.00 | 180.0 | 0.0 | 0.0285 | 0.2714 | 0.0000 | 0.0000 |
| D | 66.167 | 0.00 | 180.0 | 0.0 | 0.0298 | 0.2956 | 0.0000 | 0.0000 |
| D | 53.250 | 0.00 | 180.0 | 0.0 | 0.0298 | 0.2956 | 0.0000 | 0.0000 |
| D | 53.250 | 0.00 | 180.0 | 0.0 | 0.0306 | 0.6266 | 0.0000 | 0.0000 |
| D | 44.750 | 0.00 | 180.0 | 0.0 | 0.0306 | 0.6266 | 0.0000 | 0.0000 |
| D | 44.750 | 0.00 | 180.0 | 0.0 | 0.0304 | 0.3295 | 0.0000 | 0.0000 |
| D | 33.562 | 0.00 | 180.0 | 0.0 | 0.0304 | 0.3295 | 0.0000 | 0.0000 |
| D | 33.562 | 0.00 | 180.0 | 0.0 | 0.0302 | 0.3505 | 0.0000 | 0.0000 |
| D | 22.375 | 0.00 | 180.0 | 0.0 | 0.0302 | 0.3505 | 0.0000 | 0.0000 |
| D | 22.375 | 0.00 | 180.0 | 0.0 | 0.0289 | 0.3714 | 0.0000 | 0.0000 |
| D | 11.188 | 0.00 | 180.0 | 0.0 | 0.0289 | 0.3714 | 0.0000 | 0.0000 |
| D | 11.188 | 0.00 | 180.0 | 0.0 | 0.0295 | 0.3924 | 0.0000 | 0.0000 |
| D | 0.000 | 0.00 | 180.0 | 0.0 | 0.0295 | 0.3924 | 0.0000 | 0.0000 |

MAXIMUM POLE DEFORMATIONS CALCULATED(w.r.t. wind direction)

| MAST ELEV ft | DEFLECTIONS (ft) HORIZONTAL ALONG | HORIZONTAL ACROSS | DOWN | ROTATIONS (deg) TILT ALONG | TILT ACROSS | TWIST |
|---|---|---|---|---|---|---|
| 159.0 | 2.25D | 0.00B | 0.05D | 1.60D | 0.00B | 0.00B |
| 154.0 | 2.11D | 0.00B | 0.04D | 1.59D | 0.00B | 0.00B |
| 149.0 | 1.97D | 0.00B | 0.04D | 1.57D | 0.00B | 0.00B |
| 144.0 | 1.83D | 0.00B | 0.04D | 1.54D | 0.00B | 0.00B |
| 139.0 | 1.70D | 0.00B | 0.03D | 1.49D | 0.00B | 0.00C |
| 125.4 | 1.36D | 0.00B | 0.02D | 1.36D | 0.00B | 0.00C |
| 111.8 | 1.06D | 0.00B | 0.02D | 1.19D | 0.00B | 0.00C |
| 98.2 | 0.80D | 0.00B | 0.01D | 1.00D | 0.00B | 0.00C |
| 92.0 | 0.69D | 0.00B | 0.01D | 0.93D | 0.00B | 0.00C |
| 79.1 | 0.50D | 0.00B | 0.01D | 0.78D | 0.00B | 0.00C |
| 66.2 | 0.34D | 0.00B | 0.00D | 0.63D | 0.00B | 0.00C |
| 53.2 | 0.22D | 0.00B | 0.00D | 0.49D | 0.00B | 0.00C |
| 44.7 | 0.15D | 0.00B | 0.00D | 0.41D | 0.00B | 0.00C |
| 33.6 | 0.08D | 0.00B | 0.00D | 0.29D | 0.00B | 0.00C |
| 22.4 | 0.04D | 0.00B | 0.00D | 0.19D | 0.00B | 0.00C |
| 11.2 | 0.01D | 0.00B | 0.00I | 0.09D | 0.00B | 0.00C |
| 0.0 | 0.00A | 0.00A | 0.00A | 0.00A | 0.00A | 0.00A |

MAXIMUM POLE FORCES CALCULATED(w.r.t. to wind direction)

| MAST ELEV ft | TOTAL AXIAL kip | SHEAR.w.r.t.WIND.DIR ALONG kip | SHEAR.w.r.t.WIND.DIR ACROSS kip | MOMENT.w.r.t.WIND.DIR ALONG ft-kip | MOMENT.w.r.t.WIND.DIR ACROSS ft-kip | TORSION ft-kip |
|---|---|---|---|---|---|---|
| 159.0 | 3.10 L | 2.41 L | 0.00 C | 0.01 F | 0.01 E | 0.00 E |
| | 5.36 L | 2.48 L | 0.00 C | -12.84 I | 0.02 C | 0.00 K |
| 154.0 | 5.36 D | 2.49 F | -0.01 L | -12.84 K | 0.01 C | 0.00 K |

| | | | | | | |
|---|---|---|---|---|---|---|
| | 5.68 D | 2.56 F | -0.01 L | -26.20 F | 0.06 L | 0.00 L |
| 149.0 | | | | | | |
| | 10.64 C | 4.94 F | -0.01 L | -26.21 F | 0.05 L | 0.00 L |
| | 10.98 C | 5.02 F | -0.01 L | -52.57 F | 0.10 L | 0.00 L |
| 144.0 | | | | | | |
| | 10.98 C | 5.03 F | -0.01 F | -52.56 F | 0.09 L | 0.00 L |
| | 11.33 C | 5.12 F | -0.01 F | -79.38 F | 0.09 L | 0.00 L |
| 139.0 | | | | | | |
| | 14.33 C | 8.05 D | 0.01 B | -79.37 F | 0.09 L | 0.00 L |
| | 23.27 C | 10.62 D | 0.01 B | -204.89 D | -0.23 B | 0.01 B |
| 125.4 | | | | | | |
| | 23.27 B | 10.62 D | 0.01 H | -204.89 D | -0.23 B | 0.01 B |
| | 29.78 B | 13.19 D | 0.01 B | -375.48 D | -0.41 B | 0.01 B |
| 111.8 | | | | | | |
| | 29.78 I | 13.19 D | 0.01 B | -375.47 D | -0.42 B | 0.01 B |
| | 36.43 I | 15.75 D | 0.01 B | -589.68 D | -0.58 B | -0.02 E |
| 98.2 | | | | | | |
| | 36.43 B | 15.74 F | 0.02 B | -589.68 D | -0.58 B | 0.02 C |
| | 38.95 I | 15.90 F | 0.02 B | -692.51 D | -0.68 B | 0.02 C |
| 92.0 | | | | | | |
| | 38.96 B | 15.91 D | 0.02 B | -692.50 D | -0.67 B | 0.02 C |
| | 42.15 B | 16.26 D | 0.02 B | -908.01 D | -0.94 B | 0.02 C |
| 79.1 | | | | | | |
| | 42.15 B | 16.26 D | 0.02 I | -908.00 D | -0.95 B | 0.02 B |
| | 45.65 B | 16.62 D | 0.02 I | -1127.25 D | -1.15 B | -0.03 E |
| 66.2 | | | | | | |
| | 45.65 B | 16.63 D | 0.02 I | -1127.26 D | -1.15 B | 0.03 C |
| | 49.47 B | 17.01 D | 0.02 I | -1350.47 D | -1.35 B | 0.03 C |
| 53.2 | | | | | | |
| | 49.47 B | 17.01 D | 0.01 B | -1350.47 D | -1.35 B | 0.03 C |
| | 54.80 B | 17.27 D | 0.01 B | -1499.64 D | -1.47 B | 0.03 C |
| 44.7 | | | | | | |
| | 54.80 B | 17.27 D | 0.01 C | -1499.66 D | -1.48 B | 0.03 C |
| | 58.48 B | 17.61 D | 0.01 C | -1698.67 D | -1.57 B | 0.04 C |
| 33.6 | | | | | | |
| | 58.48 B | 17.62 D | 0.01 C | -1698.67 D | -1.58 B | 0.04 C |
| | 62.40 B | 17.96 D | 0.01 C | -1900.49 D | -1.67 B | 0.04 C |
| 22.4 | | | | | | |
| | 62.40 B | 17.95 D | 0.01 B | -1900.49 D | -1.67 B | 0.04 C |
| | 66.56 B | 18.28 D | 0.01 B | -2104.91 D | -1.77 B | 0.04 C |
| 11.2 | | | | | | |
| | 66.56 B | 18.28 D | 0.01 L | -2104.91 D | -1.77 B | 0.04 C |
| | 70.95 B | 18.61 D | 0.01 L | -2311.89 D | -1.88 B | 0.04 C |
| base reaction | 70.95 B | -18.61 D | -0.01 L | 2311.89 D | 1.88 B | -0.04 C |

COMPLIANCE WITH 4.8.2 & 4.5.4

| ELEV ft | AXIAL | BENDING | SHEAR + TORSIONAL | | TOTAL SATISFIED | D/t(w/t) | MAX ALLOWED |
|---|---|---|---|---|---|---|---|
| 159.00 | 0.00L | 0.00F | 0.00L | 0.00F | YES | 13.05A | 45.2 |
| | 0.00L | 0.02I | 0.00L | 0.03I | YES | 14.28A | 45.2 |
| 154.00 | 0.00D | 0.02K | 0.00F | 0.03K | YES | 14.28A | 45.2 |
| | 0.00D | 0.04F | 0.00F | 0.04F | YES | 15.52A | 45.2 |
| 149.00 | | | | | | | |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| | 0.01C | 0.04F | 0.01F | 0.04F | YES | 15.52A | 45.2 |
| | 0.01C | 0.06F | 0.01F | 0.07F | YES | 16.75A | 45.2 |
| 144.00 | | | | | | | |
| | 0.01C | 0.06F | 0.01F | 0.07F | YES | 16.75A | 45.2 |
| | 0.01C | 0.09F | 0.01F | 0.09F | YES | 17.99A | 45.2 |
| 139.00 | | | | | | | |
| | 0.01C | 0.06F | 0.01D | 0.06F | YES | 11.52A | 45.2 |
| | 0.01C | 0.11D | 0.01D | 0.11D | YES | 13.76A | 45.2 |
| 125.42 | | | | | | | |
| | 0.01B | 0.11D | 0.01D | 0.11D | YES | 13.76A | 45.2 |
| | 0.01B | 0.15D | 0.01D | 0.16D | YES | 16.00A | 45.2 |
| 111.83 | | | | | | | |
| | 0.01I | 0.15D | 0.01D | 0.16D | YES | 16.00A | 45.2 |
| | 0.01I | 0.19D | 0.01D | 0.20D | YES | 18.23A | 45.2 |
| 98.25 | | | | | | | |
| | 0.01B | 0.14D | 0.01F | 0.15D | YES | 13.23A | 45.2 |
| | 0.01I | 0.15D | 0.01F | 0.15D | YES | 14.01A | 45.2 |
| 92.00 | | | | | | | |
| | 0.01B | 0.15D | 0.01D | 0.16D | YES | 13.74A | 45.2 |
| | 0.01B | 0.16D | 0.01D | 0.17D | YES | 15.34A | 45.2 |
| 79.08 | | | | | | | |
| | 0.01B | 0.16D | 0.01D | 0.17D | YES | 15.34A | 45.2 |
| | 0.01B | 0.17D | 0.01D | 0.18D | YES | 16.93A | 45.2 |
| 66.17 | | | | | | | |
| | 0.01B | 0.17D | 0.01D | 0.18D | YES | 16.93A | 45.2 |
| | 0.01B | 0.18D | 0.01D | 0.19D | YES | 18.53A | 45.2 |
| 53.25 | | | | | | | |
| | 0.01B | 0.18D | 0.01D | 0.19D | YES | 18.53A | 45.2 |
| | 0.01B | 0.18D | 0.01D | 0.19D | YES | 19.58A | 45.2 |
| 44.75 | | | | | | | |
| | 0.01B | 0.19D | 0.01D | 0.19D | YES | 19.22A | 45.2 |
| | 0.01B | 0.19D | 0.01D | 0.20D | YES | 20.61A | 45.2 |
| 33.56 | | | | | | | |
| | 0.01B | 0.19D | 0.01D | 0.20D | YES | 20.61A | 45.2 |
| | 0.01B | 0.19D | 0.00D | 0.20D | YES | 21.99A | 45.2 |
| 22.37 | | | | | | | |
| | 0.01B | 0.19D | 0.00D | 0.20D | YES | 21.99A | 45.2 |
| | 0.01B | 0.19D | 0.00D | 0.20D | YES | 23.37A | 45.2 |
| 11.19 | | | | | | | |
| | 0.01B | 0.19D | 0.00D | 0.20D | YES | 23.37A | 45.2 |
| | 0.01B | 0.19D | 0.00D | 0.20D | YES | 24.75A | 45.2 |
| 0.00 | | | | | | | |

MAXIMUM LOADS ONTO FOUNDATION(w.r.t. wind direction)

| DOWN | SHEAR.w.r.t.WIND.DIR ALONG | ACROSS | MOMENT.w.r.t.WIND.DIR ALONG | ACROSS | TORSION |
|---|---|---|---|---|---|
| kip | kip | kip | ft-kip | ft-kip | ft-kip |
| 70.95 | 18.61 | 0.01 | -2311.89 | -1.88 | 0.04 |
| B | D | L | D | B | C |

Sabre Industries™
Towers and Poles

SO#: 418393A
Site Name: Coventry Northwest, CT
Date: 10/15/2018

# Round Flange Plate and Bolts per ANSI/TIA 222-G
## Elevation = 139 feet

### Pole Data

| | | |
|---|---|---|
| Diameter: | 28 | in |
| Thickness: | 0.25 | in |
| Yield (Fy): | 65 | ksi |
| # of Sides: | 18 | "0" IF Round |
| Strength (Fu): | 80 | ksi |

### Reactions

| | | |
|---|---|---|
| Moment, Mu: | 399.58 | ft-kips |
| Axial, Pu: | 17.25 | kips |
| Shear, Vu: | 40.83 | kips |

### Bolt Data

| | | | |
|---|---|---|---|
| Quantity: | 12 | | |
| Diameter: | 1 | in | |
| Bolt Material: | A325 | | |
| Strength (Fu): | 120 | ksi | |
| Yield (Fy): | 92 | ksi | |
| BC Diam. (in): | 31.5 | BC Override: | |

### Flange Bolt Results

| | |
|---|---|
| Allowable Φ*Rnt: | 54.54 kips |
| Adjusted Φ*Rnt (due to shear): | 54.33 kips |
| Maximum Bolt Tension: | 49.30 kips |
| Bolt Interaction Ratio: | **90.7%** **Pass** |

### Plate Data

| | | | |
|---|---|---|---|
| Diameter (in): | 34 | Dia. Override: | |
| Thickness: | 1.5 | in | |
| Center Hole Diam.: | 18 | in | |
| Yield (Fy): | 50 | ksi | |
| Single-Rod B-eff: | 7.41 | in | |
| Drain Hole: | 1 | in. diameter | |
| Drain Location: | 13 | in. center of pole to center of drain hole | |

### Flange Plate Results

| | |
|---|---|
| Compression Side Plate (Mu/Z): | 15.1 ksi |
| Allowable Φ*Fy: | 45.0 ksi |
| Compr. Plate Interaction Ratio: | **33.5%** **Pass** |

Sabre Industries™
Towers and Poles

SO#: 418393A
Site Name: Coventry Northwest, CT
Date: 10/15/2018

# Square Base Plate and Anchor Rods per ANSI/TIA 222-G

## Pole Data

| | | |
|---|---|---|
| Diameter: | 75.180 | in (flat to flat) |
| Thickness: | 0.5 | in |
| Yield (Fy): | 65 | ksi |
| # of Sides: | 18 | "0" IF Round |
| Strength (Fu): | 80 | ksi |

## Reactions

| | | |
|---|---|---|
| Moment, Mu: | 11717.65 | ft-kips |
| Axial, Pu: | 85.11 | kips |
| Shear, Vu: | 94.23 | kips |

## Anchor Rod Data

| | | |
|---|---|---|
| Quantity: | 28 | (multiple of 4) |
| Diameter: | 2.25 | in |
| Rod Material: | A615 | |
| Strength (Fu): | 100 | ksi |
| Yield (Fy): | 75 | ksi |
| BC Diam. (in): | 82.75 | BC Override: |
| Rod Spacing: | 6 | in |

## Anchor Rod Results

| | | |
|---|---|---|
| Maximum Rod (Pu+ Vu/η): | 252.5 Kips | |
| Allowable Φ*Rnt: | 260.0 Kips | (per 4.9.9) |
| Anchor Rod Interaction Ratio: | **97.1%** **Pass** | |

## Plate Data

| | | |
|---|---|---|
| Width (in): | 83.5 | Width Override: |
| Thickness: | 2.75 | in |
| Yield (Fy) | 50 | ksi |
| Eff. Width: | 42.91 | in |
| Corner Clip | 21.00 | in |
| Drain Hole: | 2.625 | in. diameter |
| Drain Location: | 35.5 | in. center of pole to center of drain hole |
| Center Hole: | 63 | in. diameter |

## Base Plate Results

| | | |
|---|---|---|
| Base Plate (Mu/Z): | 43.5 ksi | |
| Allowable Φ*Fy: | 45 ksi | (per AISC) |
| Base Plate Interaction Ratio: | **96.6%** **Pass** | |

**MAT FOUNDATION DESIGN BY SABRE TOWERS & POLES**
160' Monopole VERIZON WIRELESS Coventry Northwest, CT (418393) 10/15/18 NM

| | | | |
|---|---|---|---|
| **Overall Loads:** | | | |
| Factored Moment (ft-kips) | 11717.65 | | |
| Factored Axial (kips) | 85.11 | | |
| Factored Shear (kips) | 94.23 | | |
| Bearing Design Strength (ksf) | 6 | Max. Net Bearing Press. (ksf) | 5.34 |
| Water Table Below Grade (ft) | 10 | | |
| Width of Mat (ft) | 33.5 | Allowable Bearing Pressure (ksf) | 4.00 |
| Thickness of Mat (ft) | 2 | Safety Factor | 2.00 |
| Depth to Bottom of Slab (ft) | 6 | Ultimate Bearing Pressure (ksf) | 8.00 |
| Quantity of Bolts in Bolt Circle | 28 | Bearing Φs | 0.75 |
| Bolt Circle Diameter (in) | 82.75 | | |
| Top of Concrete to Top of Bottom Threads (in) | 60 | | |
| Diameter of Pier (ft) | 10 | Minimum Pier Diameter (ft) | 8.23 |
| Ht. of Pier Above Ground (ft) | 0.5 | Equivalent Square b (ft) | 8.86 |
| Ht. of Pier Below Ground (ft) | 4 | Square Pier? (Y/N) | N |
| Quantity of Bars in Mat | 74 | | |
| Bar Diameter in Mat (in) | 1.128 | | |
| Area of Bars in Mat ($in^2$) | 73.95 | | |
| Spacing of Bars in Mat (in) | 5.41 | Recommended Spacing (in) | 5 to 12 |
| Quantity of Bars Pier | 58 | | |
| Bar Diameter in Pier (in) | 1.128 | | |
| Tie Bar Diameter in Pier (in) | 0.625 | | |
| Spacing of Ties (in) | 12 | | |
| Area of Bars in Pier ($in^2$) | 57.96 | Minimum Pier $A_s$ ($in^2$) | 56.55 |
| Spacing of Bars in Pier (in) | 6.05 | Recommended Spacing (in) | 5 to 12 |
| f'c (ksi) | 4.5 | | |
| fy (ksi) | 60 | | |
| Unit Wt. of Soil (kcf) | 0.125 | | |
| Unit Wt. of Concrete (kcf) | 0.15 | | |
| Volume of Concrete ($yd^3$) | 96.22 | | |
| **Two-Way Shear Action:** | | | |
| Average d (in) | 19.872 | | |
| $\phi v_c$ (ksi) | 0.217 | $v_u$ (ksi) | 0.199 |
| $\phi v_c = \phi(2 + 4/\beta_c)f'_c{}^{1/2}$ | 0.342 | | |
| $\phi v_c = \phi(\alpha_s d/b_o+2)f'_c{}^{1/2}$ | 0.217 | | |
| $\phi v_c = \phi 4f'_c{}^{1/2}$ | 0.228 | | |
| Shear perimeter, $b_o$ (in) | 439.42 | | |
| $\beta_c$ | 1 | | |
| **One-Way Shear:** | | | |
| $\phi V_c$ (kips) | 911.0 | $V_u$ (kips) | 637.0 |
| **Stability:** | | | |
| Overturning Design Strength (ft-k) | 14810.7 | Total Applied M (ft-k) | 12330.1 |

**Pier Design:**

| | | | |
|---|---|---|---|
| $\phi V_n$ (kips) | 1318.7 | $V_u$ (kips) | 94.2 |
| $\phi V_c=\phi 2(1+N_u/(2000A_g))f'_c{}^{1/2}b_wd$ | 1318.7 | | |
| $V_s$ (kips) | 0.0 | *** $V_s$ max = 4 $f'_c{}^{1/2}b_wd$ (kips) | 3091.1 |
| Maximum Spacing (in) | 6.10 | (Only if Shear Ties are Required) | |
| Actual Hook Development (in) | 18.74 | Req'd Hook Development $l_{dh}$ (in) | 13.78 |
| | | *** Ref. To Spacing Requirements ACI 11.5.4.3 | |

**Flexure in Slab:**

| | | | |
|---|---|---|---|
| $\phi M_n$ (ft-kips) | 6132.8 | $M_u$ (ft-kips) | 6110.7 |
| a (in) | 2.89 | | |
| Steel Ratio | 0.00926 | | |
| $\beta_1$ | 0.825 | | |
| Maximum Steel Ratio ($\rho_t$) | 0.0197 | | |
| Minimum Steel Ratio | 0.0018 | | |
| Rebar Development in Pad (in) | 144.83 | Required Development in Pad (in) | 31.39 |

| Condition | 1 is OK, 0 Fails |
|---|---|
| Maximum Soil Bearing Pressure | 1 |
| Pier Area of Steel | 1 |
| Pier Shear | 1 |
| Interaction Diagram Visual Check | 1 |
| Two-Way Shear Action | 1 |
| One-Way Shear Action | 1 |
| Overturning | 1 |
| Flexure | 1 |
| Steel Ratio | 1 |
| Length of Development in Pad | 1 |
| Hook Development | 1 |