

KENNETH C. BALDWIN

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Also admitted in Massachusetts
and New York

April 22, 2022

Via Federal Express

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

Re: **Docket No. 500 – Application of ARX Wireless Infrastructure, LLC for a Certificate of Environmental Compatibility and Public Need for the Construction, Maintenance and Operation of a Wireless Telecommunications Facility Located at 1061-1063 Boston Post Road, Milford, Connecticut**

D&M Plan Revisions for Verizon Wireless Installation

Dear Ms. Bachman:

On behalf of Cellco Partnership d/b/a Verizon Wireless (“Cellco”), please accept for review and approval, the following request for revisions to the Docket No. 500 D&M Plan as it relates to the proposed Cellco installation. Since the Council’s approval of the Docket No. 500 D&M Plan on January 28, 2022, Cellco has revised its antenna and related equipment requirements for the Milford tower site.

Enclosed please find fifteen (15) copies of revised D&M Plan drawings showing the Cellco’s antenna and equipment modifications and a revised structural analysis confirming that the ARX tower can accommodate Cellco’s antennas and equipment revisions.

We respectfully request your review and approval of these proposed D&M Plan modifications. If you have any questions or need any additional information, please feel free to contact me.

Melanie A. Bachman, Esq.
April 22, 2022
Page 2

Sincerely,

A handwritten signature in black ink, appearing to read "Kenneth C. Baldwin". The signature is fluid and cursive, with a long horizontal stroke at the end.

Kenneth C. Baldwin

KCB/kmd
Enclosures
Copy to:

David A. Ball, Esq. (*via electronic mail*)
Philip C. Pires, Esq. (*via electronic mail*)
Kristen Motel, Esq. (*via electronic mail*)
Lucia Chiochio, Esq. (*via electronic mail*)
John W. Knuff, Esq. (*via electronic mail*)
Jeffrey P. Nichols, Esq. (*via electronic mail*)



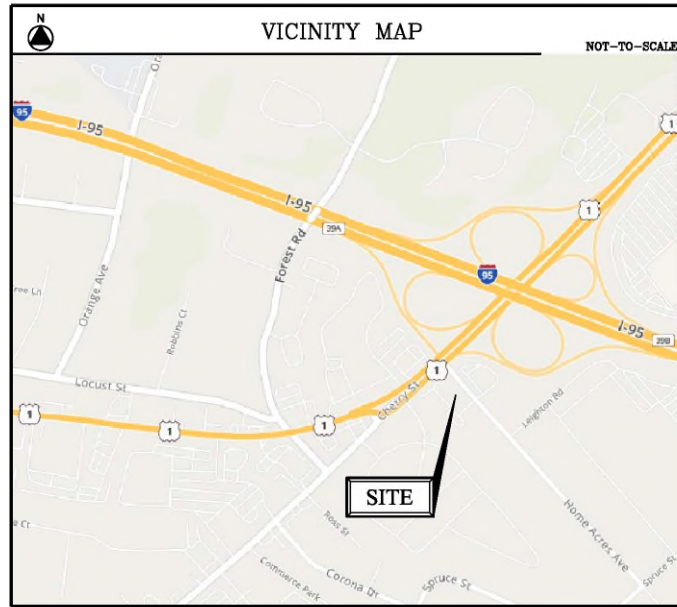
WIRELESS COMMUNICATIONS FACILITY

SITE NAME: FOREST HEIGHTS CT

ARX WIRELESS SITE #CT0030
 1063 BOSTON POST RD.
 MILFORD, CT 06460

PROJECT SUMMARY	
SITE NAME:	FOREST HEIGHTS CT
SITE ADDRESS:	1063 BOSTON POST RD. MILFORD, CT 06460
PROPERTY OWNER & MAILING ADDRESS:	LEE PARTNERS, LLP 1061-1063 BOSTON POST RD. MILFORD, CT 06460
TOWER OWNER:	ARX WIRELESS INFRASTRUCTURE, LLC 110 WASHINGTON AVE. NORTH HAVEN, CT 06473
PARCEL ID:	077-813-25
TOWER COORDINATES:	41° 13' 54.21" N 73° 02' 34.28" W
APPLICANT:	CELLCO PARTNERSHIP d.b.a. VERIZON WIRELESS 20 ALEXANDER DR. WALLINGFORD, CT 06492
VERIZON WIRELESS CONSTRUCTION:	MIKE HUMPHREYS - CONSTRUCTION STRUCTURE CONSULTING GROUP
LEGAL/REGULATORY COUNSEL:	KENNETH C. BALDWIN, ESQ. ROBINSON & COLE, LLP (860) 275-8345

PROJECT DESCRIPTION
- INSTALLATION OF (1) OUTDOOR EQUIPMENT CABINET AND NATURAL GAS FUELED EMERGENCY GENERATOR ON A NEW 18'x10' CONCRETE PAD WITHIN A FENCED COMPOUND
- INSTALLATION OF (12) PANEL ANTENNAS AND ASSOCIATED DEVICES ON THE MONOPOLE
- INSTALLATION OF (2) GPS ANTENNAS ON EQUIPMENT CANOPY
- INSTALLATION OF CABLING FROM EQUIP. CABINETS TO ANTENNAS
- ELECTRICAL, TELEPHONE & GAS SERVICES ROUTED UNDERGROUND TO EXISTING UTILITY DEMARCATION POINTS AT COMPOUND




DRAWING SCHEDULE	
SHEET NO.	SHEET DESCRIPTION
T-1	TITLE SHEET
A-1	COMPOUND PLAN, EQUIPMENT PLAN & NORTH ELEVATION
A-2	ANTENNA PLAN & DETAILS

verizon
WIRELESS COMMUNICATIONS FACILITY

20 ALEXANDER DRIVE
WALLINGFORD, CT 06492

On Air Engineering, LLC
88 Foundry Pond Rd.
Cold Spring, NY 10516
onair@optonline.net
201-456-4624

Licensure



DAVID WEINPAHL, P.E.
CT LIC. NO. 22184

NO.	DATE	SUBMISSIONS
0	03.17.22	REVIEW
1	03.25.22	CSC FILING

DRAWN BY: AS	CHECKED BY: DW
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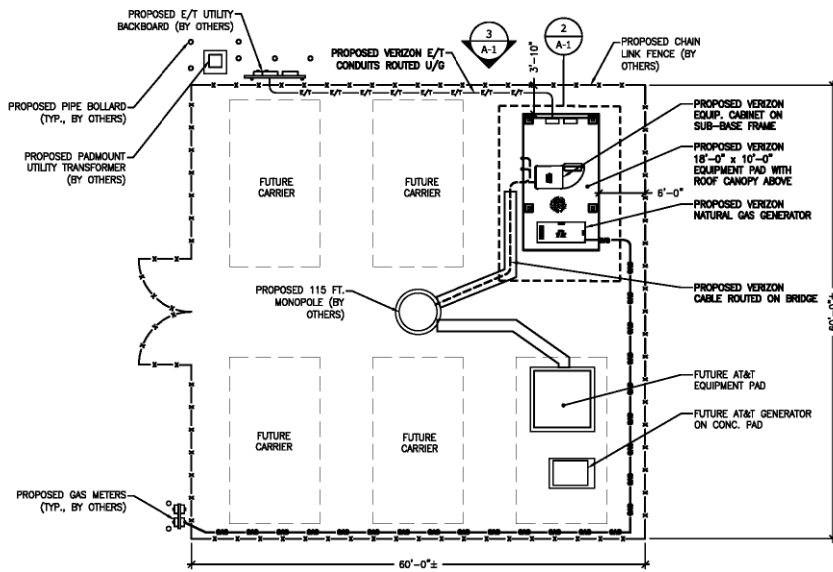
SITE NAME:
FOREST HEIGHTS CT

PROJECT DESCRIPTION:
MACRO RELO

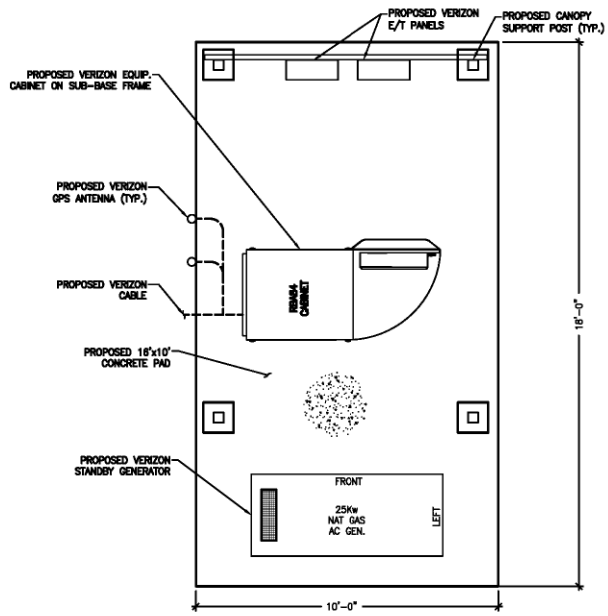
PROJECT INFORMATION:
ARX MONOPOLE
1063 BOSTON POST RD.
MILFORD, CT

DRAWING TITLE:
TITLE SHEET

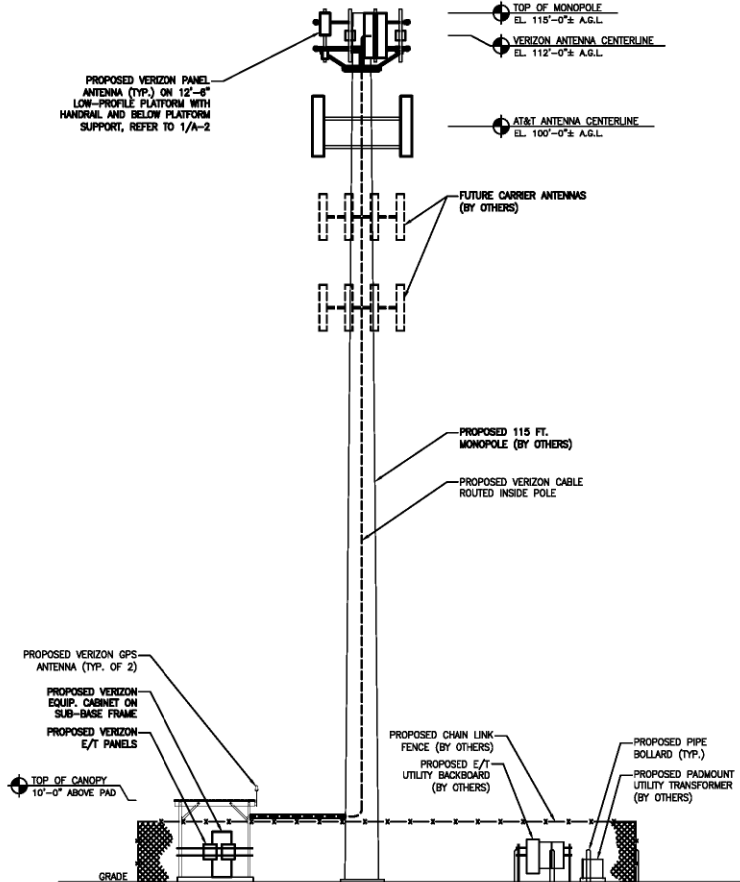
SHEET NUMBER:
T-1



1
A-1
COMPOUND PLAN
Scale: 1/8" = 1'-0"



2
A-1
EQUIPMENT PLAN
Scale: 1/2" = 1'-0"



3
A-1
NORTH ELEVATION
Scale: 1/8" = 1'-0"

verizon
WIRELESS COMMUNICATIONS FACILITY

20 ALEXANDER DRIVE
WALLINGFORD, CT 06492

On Air Engineering, LLC

88 Foundry Pond Rd.
Cold Spring, NY 10516
onair@optonline.net
201-456-4624

LICENSURE



DAVID WEINPAHL, P.E.
CT LIC. NO. 22144

NO.	DATE	SUBMISSIONS
0	03.17.22	REVIEW
1	03.25.22	CSC FILING

DRAWN BY: AS
CHECKED BY: DW

SITE NAME:
FOREST HEIGHTS CT

PROJECT DESCRIPTION:
MACRO RELO

PROJECT INFORMATION:
**ARX MONOPOLE
1063 BOSTON POST RD.
MILFORD, CT**

DRAWING TITLE:
**COMPOUND PLAN,
EQUIPMENT PLAN &
NORTH ELEVATION**

SHEET NUMBER:
A-1

Structural Analysis 115-ft Monopole

Prepared For:
ARX Wireless
110 Washington Ave.
North Haven, CT 06473

MFP Project #23521-319 r2
TAPP #TP-20260 / CP-0613

Site Location:
CT0030 Milford
New Haven Co., CT
Lat/Long: 41°13'54.32", -73°2'34.55"

Analysis Type:
ANSI/TIA-222-G
Structure Rating - 69.7% Passing

April 13, 2022



Michael F. Plahovinsak, P.E.
18301 State Route 161 W, Plain City, OH 43064
614-398-6250 - mike@mfpeng.com

Project Summary:

I have completed a structural analysis of the existing monopole for the following new configuration:

- 112' – Verizon:
 - (6) JMA MX06FRO660-03 Antennas
 - (3) Samsung MT6407-77A Antennas at 113'-6"
 - (3) Samsung XXDWMM-12.5-65-8T Antennas at 109'-6"
 - (3) Samsung BR049 B2/B66A + (3) BR04C B5/B13 RRU's
 - (3) Samsung MT-6407-77A + (3) CBRS RRH-RT4401-48A RRU's
 - (1) 12 OVP
 - (1) 12x24 Hybrid
 - Sector Mounts w/ JMA 91900314-02 Brackets
- 100' – AT&T:
 - (3) CCI TPA65R-BU8DA-K + (3) DMP65R-BU8DA-K Antennas
 - (3) Ericsson 4415 B30 + (3) 4449 B5/B12 RRU's
 - (3) Ericsson 4478 B14 + (3) 8843 B2/B66A RRU's
 - (3) DC6-48-60-0-8F + (3) DC9-48-60-24-8C-EV
 - (12) DC + (3) Fiber
 - Sector Mounts

The pole has been analyzed in accordance with the requirements of the International Building Code per IBC section 3108, and the recommendations of the Telecommunications Industry Association "*Structural Standard for Steel Antenna Supporting Structures*" **ANSI/TIA-222-G**.

This analysis may be considered a "Rigorous Structural Analysis" as defined in ANSI/TIA-222-G 15.5.2.

As indicated in the conclusions of this analysis, I have determined that the existing pole and foundation have *sufficient capacity* to support the existing, reserved and proposed antenna loads as detailed herein. Based on the results of my analysis, structural modifications are not required at this time.

Source of Data:

Resource	Source	Job Number	Date
Pole and Foundation Drawings	Michael F. Plahovinsak, PE	23521-319	04/09/22
Geotechnical Report	Welti Geotechnical	N/A	10/04/21

Michael F. Plahovinsak, P.E. - Since 2011

mike@mfpeng.com

Analysis Criteria:

International Building Code 2006-2015 Section 3108
Structural Standards for Steel Antenna Supporting Structures **ANSI/TIA-222-G**

- TIA-222-G Wind Speed 112 mph (V_{asd} / 3-Second Gust)
- Equivalent ASCE-7-10 Wind 145 mph (V_{ult})
- TIA-222-G Wind w/ 3/4" Ice 50 mph (3-Sec Gust)
- Operational Wind Speed 60 mph (3-Sec Gust)

Structure Class	Exposure Category	Topographic Category
III (I = 1.0)	C	I

Appurtenance Listing:

Status	Elev.	Antenna / Mounting	Coax	Owner
Proposed	112'	(6) JMA MX06FRO660-03 Antennas (3) Samsung MT6407-77A Antennas at 113'-6" (3) Samsung XXDWMM-12.5-65-8T Antennas at 109'-6" (3) Samsung BR049 B2/B66A + (3) BR04C B5/B13 RRU's (3) Samsung MT-6407-77A + (3) CBRS RRH-RT4401-48A RRU's (1) 12 OVP Sector Mounts w/ JMA 91900314-02 Brackets	(1) 12x24 Hybrid	Verizon
Proposed	100'	(3) CCI TPA65R-BU8DA-K + (3) DMP65R-BU8DA-K Antennas (3) Ericsson 4415 B30 + (3) 4449 B5/B12 RRU's (3) Ericsson 4478 B14 + (3) 8843 B2/B66A RRU's (3) DC6-48-60-0-8F + (3) DC9-48-60-24-8C-EV Sector Mounts	(12) DC + (3) Fiber	AT&T

All antenna lines assumed internally mounted, not exposed to the wind.

Michael F. Plahovinsak, P.E. - Since 2011

mike@mfpeng.com

Foundation Analysis:

The existing monopole foundation design was analyzed in conjunction with site specific geotechnical report. The existing foundation has sufficient capacity to support the pole with the proposed antenna configuration.

Conclusion:

I have completed a structural analysis of the existing monopole and foundation in accordance with the project specifics outlined above. My analysis indicates that the existing monopole and foundation are structurally adequate when considering the existing plus proposed loading. Please refer to the attached calculations for an itemized listing of all member stress ratios. The existing pole is safe and adequate to support the proposed loads, and no structural reinforcing is required to support the above loading.

Recommendations:

As a part of routine maintenance, I recommend periodic inspection of the pole and foundation structure for signs of fatigue or corrosion.

If you have any questions about the contents of this structural report or require any additional information, please feel free to contact my office.

Sincerely,

Michael F. Plahovinsak, P.E.



mike@mfpeng.com - 614.398-6250

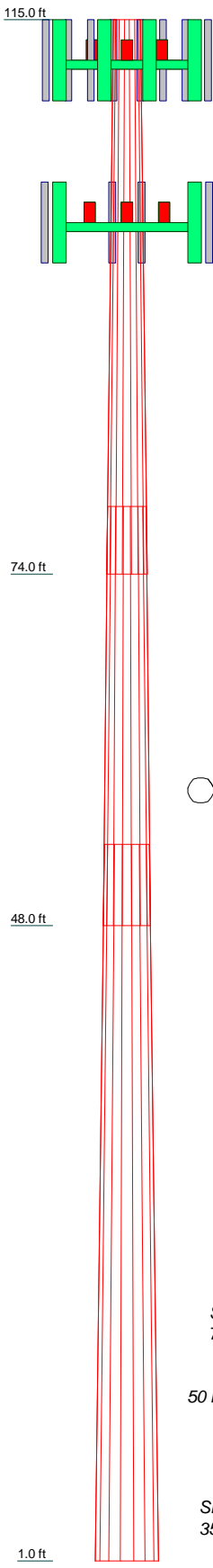
**Standard Conditions for Providing Structural Consulting
Services on Existing Structures**

1. The following standard conditions are a general overview of key issues regarding the work product supplied.
2. If the existing conditions are not as represented in this structural report or attached sketches, I should be contacted to evaluate the significance of the deviation and revise the structural assessment accordingly.
3. The structural analysis has been performed assuming that the structure is in "like new" condition. No allowance was made for excessive corrosion, damaged or missing structural members, loose bolts, etc. If there are any known deficiencies in the structure that potentially compromise structural integrity, I should be made aware of the deficiencies. If I am aware of a deficiency that exists in a structure at the time of my analysis, a general explanation of the structural concern due to the deficiency will be included in the structural report, but the deficiency will not be reflected in capacity calculations.
4. The structural analysis provided is an assessment of the primary load carrying capacity of the structure. I provide a limited scope of service in that I have not verified the capacity of every weld, plate, connection detail, etc. In most cases, structural fabrication details are unknown at the time of my analysis, and the detailed field measurement of this information is beyond the scope of my services. In instances where I have not performed connection capacity calculations, it is assumed that existing manufactured connections develop the full capacity of the primary members being connected.
5. The structural integrity of the existing foundation system can only be verified if exact foundation sizes and soils conditions are known. I will not accept any responsibility for the adequacy of the existing foundations unless this site-specific data is supplied.
6. Miscellaneous items such as antenna mounts, coax supports, etc. have not been designed, detailed, or specified as part of my work. It is assumed that material of adequate size and strength will be purchased from a reputable component manufacturer. The attached report and sketches are schematic in nature and should not be used to fabricate or purchase hardware and accessories to be attached to the structure. I recommend field measurement of the structure before fabricating or purchasing new hardware and accessories. I am not responsible for proper fit and clearance of hardware and accessory items in the field.
7. The structural analysis has been performed considering minimum code requirements or recommendations. If alternate wind, ice, or deflection criteria are to be considered, then I shall be made aware of the alternate criteria.

Michael F. Plahovinsak, P.E. - Since 2011

mike@mfpeng.com

Section	1	2	3	
Length (ft)	41.00	31.00	53.00	
Number of Sides	18	18	18	
Thickness (in)	0.1875	0.3125	0.5000	
Socket Length (ft)	5.00	6.00	40.3904	
Top Dia (in)	24.0000	33.8882	40.3904	
Bot Dia (in)	35.6886	42.7259	55.5000	
Grade	2.5	A572-65	13.6	20.0
Weight (K)		4.0		



DESIGNED APPURTENANCE LOADING

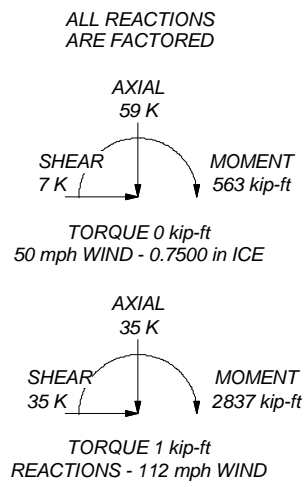
TYPE	ELEVATION	TYPE	ELEVATION
Samsung MT6407-77A w/ mount pipe (Verizon)	113.5	Samsung XXDWMM-12.5-65-8T-CBRS (Verizon)	109.5
Samsung MT6407-77A w/ mount pipe (Verizon)	113.5	Samsung XXDWMM-12.5-65-8T-CBRS (Verizon)	109.5
Samsung MT6407-77A w/ mount pipe (Verizon)	113.5	CCI TPA-65R-BU8DA-K (ATT)	100
(2) JMA MX06FRO660-03 (Verizon)	112	CCI DMP65R-BU8D w/ mount pipe (ATT)	100
(2) JMA MX06FRO660-03 (Verizon)	112	CCI TPA-65R-BU8DA-K (ATT)	100
(2) JMA MX06FRO660-03 (Verizon)	112	CCI DMP65R-BU8D w/ mount pipe (ATT)	100
(3) Samsung BR049 B2/B66A RRH (Verizon)	112	CCI TPA-65R-BU8DA-K (ATT)	100
(3) Samsung BR04C B5/B13 RRH (Verizon)	112	CCI DMP65R-BU8D w/ mount pipe (ATT)	100
(3) Samsung MT6407-77A w/ mount pipe (Verizon)	112	(3) Ericsson 4415 B30 (ATT)	100
(3) Samsung CBRS RRH-RT4401-48A (Verizon)	112	(3) Ericsson 4449 B5/B12 (ATT)	100
Raycap OVP 12 (Verizon)	112	(3) Ericsson 4478 B14 (ATT)	100
Sector Mounts (Verizon)	112	(3) Ericsson 8843 B2/B66A (ATT)	100
Samsung XXDWMM-12.5-65-8T-CBRS (Verizon)	109.5	(3) Raycap DC6-48-60-0-8F (ATT)	100
		(3) Raycap DC9-48-60-24-8C-EV (ATT)	100
		Sector Mounts (ATT)	100

MATERIAL STRENGTH

GRADE	Fy	Fu	GRADE	Fy	Fu
A572-65	65 ksi	80 ksi			

TOWER DESIGN NOTES

1. Tower designed for Exposure C to the TIA-222-G Standard.
2. Tower designed for a 112 mph basic wind in accordance with the TIA-222-G Standard.
3. Tower is also designed for a 50 mph basic wind with 0.75 in ice. Ice is considered to increase in thickness with height.
4. Deflections are based upon a 60 mph wind.
5. Tower Structure Class III.
6. Topographic Category 1 with Crest Height of 0.00 ft
7. TOWER RATING: 69.7%



Michael Plahovinsak, P.E.		
18301 State Route 161 Plain City, OH 43064 Phone: 614-398-6250 FAX: mike@mfpeng.com		
Job: 115-ft Pole - MFP #23521-319 r2	Project: CT0030 Milford	
Client: TP-20260	Drawn by: JC	App'd:
Code: TIA-222-G	Date: 04/13/22	Scale: NTS
Path:	Dwg No. E-1	

tnxTower Michael Plahovinsak, P.E. 18301 State Route 161 Plain City, OH 43064 Phone: 614-398-6250 FAX: mike@mfpeng.com	Job 115-ft Pole - MFP #23521-319 r2	Page 1 of 7
	Project CT0030 Milford	Date 14:25:52 04/13/22
	Client TP-20260	Designed by JC

Tower Input Data

The tower is a monopole.

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

The following design criteria apply:

Basic wind speed of 112 mph.

Structure Class III.

Exposure Category C.

Topographic Category 1.

Crest Height 0.00 ft.

Nominal ice thickness of 0.7500 in.

Ice thickness is considered to increase with height.

Ice density of 56 pcf.

A wind speed of 50 mph is used in combination with ice.

Temperature drop of 50 °F.

Deflections calculated using a wind speed of 60 mph.

A non-linear (P-delta) analysis was used.

Pressures are calculated at each section.

Stress ratio used in pole design is 1.

Local bending stresses due to climbing loads, feed line supports, and appurtenance mounts are not considered.

Tapered Pole Section Geometry

Section	Elevation ft	Section Length ft	Splice Length ft	Number of Sides	Top Diameter in	Bottom Diameter in	Wall Thickness in	Bend Radius in	Pole Grade
L1	115.00-74.00	41.00	5.00	18	24.0000	35.6886	0.1875	0.7500	A572-65 (65 ksi)
L2	74.00-48.00	31.00	6.00	18	33.8882	42.7259	0.3125	1.2500	A572-65 (65 ksi)
L3	48.00-1.00	53.00		18	40.3904	55.5000	0.5000	2.0000	A572-65 (65 ksi)

Tapered Pole Properties

Section	Tip Dia. in	Area in ²	I in ⁴	r in	C in	I/C in ³	J in ⁴	It/Q in ²	w in	w/t
L1	24.3413	14.1714	1015.2211	8.4534	12.1920	83.2694	2031.7780	7.0871	3.8940	20.768
	36.2102	21.1276	3364.1157	12.6029	18.1298	185.5572	6732.6580	10.5658	5.9512	31.74
L2	35.8102	33.3029	4743.1621	11.9194	17.2152	275.5220	9492.5655	16.6546	5.4143	17.326
	43.3368	42.0688	9560.9920	15.0567	21.7047	440.5024	19134.5645	21.0384	6.9698	22.303
L3	42.6732	63.3060	12726.7625	14.1611	20.5183	620.2640	25470.2711	31.6590	6.2287	12.457
	56.2790	87.2850	33358.1875	19.5250	28.1940	1183.1662	66760.2686	43.6508	8.8880	17.776

Tower Elevation ft	Gusset Area (per face) ft ²	Gusset Thickness in	Gusset Grade	Adjust. Factor A _f	Adjust. Factor A _r	Weight Mult.	Double Angle Stitch Bolt Spacing Diagonals in	Double Angle Stitch Bolt Spacing Horizontals in	Double Angle Stitch Bolt Spacing Redundants in
L1 115.00-74.00				1	1	1			
L2 74.00-48.00				1	1	1			
L3 48.00-1.00				1	1	1			

tnxTower Michael Plahovinsak, P.E. 18301 State Route 161 Plain City, OH 43064 Phone: 614-398-6250 FAX: mike@mfpeng.com	Job 115-ft Pole - MFP #23521-319 r2	Page 2 of 7
	Project CT0030 Milford	Date 14:25:52 04/13/22
	Client TP-20260	Designed by JC

Feed Line/Linear Appurtenances - Entered As Area

Description	Face or Leg	Allow Shield	Exclude From Torque Calculation	Component Type	Placement ft	Total Number		C _{AA} ft ² /ft	Weight plf
12x24 (Verizon)	C	No	Yes	Inside Pole	112.00 - 1.00	1	No Ice	0.00	0.92
							1/2" Ice	0.00	0.92
							1" Ice	0.00	0.92
**									
1 5/8" (ATT)	C	No	Yes	Inside Pole	100.00 - 1.00	12	No Ice	0.00	0.92
							1/2" Ice	0.00	0.92
							1" Ice	0.00	0.92
1 5/8" (ATT)	C	No	Yes	Inside Pole	100.00 - 1.00	3	No Ice	0.00	0.92
							1/2" Ice	0.00	0.92
							1" Ice	0.00	0.92

Feed Line/Linear Appurtenances Section Areas

Tower Section	Tower Elevation ft	Face	A _R ft ²	A _F ft ²	C _{AA} In Face ft ²	C _{AA} Out Face ft ²	Weight K
L1	115.00-74.00	A	0.000	0.000	0.000	0.000	0.00
		B	0.000	0.000	0.000	0.000	0.00
		C	0.000	0.000	0.000	0.000	0.39
L2	74.00-48.00	A	0.000	0.000	0.000	0.000	0.00
		B	0.000	0.000	0.000	0.000	0.00
		C	0.000	0.000	0.000	0.000	0.38
L3	48.00-1.00	A	0.000	0.000	0.000	0.000	0.00
		B	0.000	0.000	0.000	0.000	0.00
		C	0.000	0.000	0.000	0.000	0.69

Feed Line/Linear Appurtenances Section Areas - With Ice

Tower Section	Tower Elevation ft	Face or Leg	Ice Thickness in	A _R ft ²	A _F ft ²	C _{AA} In Face ft ²	C _{AA} Out Face ft ²	Weight K
L1	115.00-74.00	A	2.081	0.000	0.000	0.000	0.000	0.00
		B		0.000	0.000	0.000	0.000	0.00
		C		0.000	0.000	0.000	0.000	0.39
L2	74.00-48.00	A	1.992	0.000	0.000	0.000	0.000	0.00
		B		0.000	0.000	0.000	0.000	0.00
		C		0.000	0.000	0.000	0.000	0.38
L3	48.00-1.00	A	1.820	0.000	0.000	0.000	0.000	0.00
		B		0.000	0.000	0.000	0.000	0.00
		C		0.000	0.000	0.000	0.000	0.69

Discrete Tower Loads

Description	Face or Leg	Offset Type	Offsets: Horz Lateral ft	Vert ft	Azimuth Adjustment °	Placement ft	C _{AA} Front ft ²	C _{AA} Side ft ²	Weight K	
(2) JMA MX06FRO660-03 (Verizon)	A	From Face	3.00	0.0000		112.00	No Ice	9.89	8.76	0.08
			0.00				1/2" Ice	10.36	9.71	0.17

tnxTower Michael Plahovinsak, P.E. 18301 State Route 161 Plain City, OH 43064 Phone: 614-398-6250 FAX: mike@mfpeng.com	Job		115-ft Pole - MFP #23521-319 r2		Page		3 of 7	
	Project		CT0030 Milford		Date		14:25:52 04/13/22	
	Client		TP-20260		Designed by		JC	

Description	Face or Leg	Offset Type	Offsets:		Azimuth Adjustment	Placement	CAAA Front	CAAA Side	Weight	
			Horz	Lateral						Vert
Samsung MT6407-77A w/ mount pipe (Verizon)	A	From Face	0.00		0.0000	113.50	1" Ice	10.84	10.53	0.26
			3.00				No Ice	4.71	2.42	0.09
			0.00				1/2" Ice	5.00	2.83	0.13
			0.00				1" Ice	5.30	3.26	0.17
Samsung XXDWMM-12.5-65-8T-CBR S (Verizon)	A	From Face	3.00		0.0000	109.50	No Ice	0.89	0.17	0.00
			0.00				1/2" Ice	1.01	0.25	0.01
			0.00				1" Ice	1.14	0.34	0.02
			0.00							
(2) JMA MX06FRO660-03 (Verizon)	B	From Face	3.00		0.0000	112.00	No Ice	9.89	8.76	0.08
			0.00				1/2" Ice	10.36	9.71	0.17
			0.00				1" Ice	10.84	10.53	0.26
			0.00							
Samsung MT6407-77A w/ mount pipe (Verizon)	B	From Face	3.00		0.0000	113.50	No Ice	4.71	2.42	0.09
			0.00				1/2" Ice	5.00	2.83	0.13
			0.00				1" Ice	5.30	3.26	0.17
			0.00							
Samsung XXDWMM-12.5-65-8T-CBR S (Verizon)	B	From Face	3.00		0.0000	109.50	No Ice	0.89	0.17	0.00
			0.00				1/2" Ice	1.01	0.25	0.01
			0.00				1" Ice	1.14	0.34	0.02
			0.00							
(2) JMA MX06FRO660-03 (Verizon)	C	From Face	3.00		0.0000	112.00	No Ice	9.89	8.76	0.08
			0.00				1/2" Ice	10.36	9.71	0.17
			0.00				1" Ice	10.84	10.53	0.26
			0.00							
Samsung MT6407-77A w/ mount pipe (Verizon)	C	From Face	3.00		0.0000	113.50	No Ice	4.71	2.42	0.09
			0.00				1/2" Ice	5.00	2.83	0.13
			0.00				1" Ice	5.30	3.26	0.17
			0.00							
Samsung XXDWMM-12.5-65-8T-CBR S (Verizon)	C	From Face	3.00		0.0000	109.50	No Ice	0.89	0.17	0.00
			0.00				1/2" Ice	1.01	0.25	0.01
			0.00				1" Ice	1.14	0.34	0.02
			0.00							
(3) Samsung BR049 B2/B66A RRH (Verizon)	A	From Face	2.00		0.0000	112.00	No Ice	1.88	1.25	0.08
			0.00				1/2" Ice	2.05	1.39	0.10
			0.00				1" Ice	2.22	1.54	0.12
			0.00							
(3) Samsung BR04C B5/B13 RRH (Verizon)	B	From Face	2.00		0.0000	112.00	No Ice	1.88	1.01	0.07
			0.00				1/2" Ice	2.05	1.14	0.09
			0.00				1" Ice	2.22	1.28	0.11
			0.00							
(3) Samsung MT6407-77A w/ mount pipe (Verizon)	C	From Face	2.00		0.0000	112.00	No Ice	4.71	2.42	0.09
			0.00				1/2" Ice	5.00	2.83	0.13
			0.00				1" Ice	5.30	3.26	0.17
			0.00							
(3) Samsung CBRS RRH-RT4401-48A (Verizon)	A	From Face	2.00		0.0000	112.00	No Ice	0.99	0.50	0.02
			0.00				1/2" Ice	1.12	0.60	0.03
			0.00				1" Ice	1.26	0.70	0.04
			0.00							
Raycap OVP 12 (Verizon)	B	From Face	2.00		0.0000	112.00	No Ice	3.78	2.51	0.03
			0.00				1/2" Ice	4.03	2.72	0.06
			0.00				1" Ice	4.29	2.94	0.10
			0.00							
Sector Mounts (Verizon)	C	None			0.0000	112.00	No Ice	30.00	30.00	2.00
							1/2" Ice	35.00	35.00	2.20
							1" Ice	40.00	40.00	2.40
**										
CCI TPA-65R-BU8DA-K (ATT)	A	From Face	3.00		0.0000	100.00	No Ice	18.09	10.10	0.11
			0.00				1/2" Ice	18.72	11.52	0.23
			0.00				1" Ice	19.36	12.80	0.36
			0.00							
CCI DMP65R-BU8D w/ mount pipe (ATT)	A	From Face	3.00		0.0000	100.00	No Ice	17.87	10.02	0.15
			0.00				1/2" Ice	18.50	11.44	0.27
			0.00				1" Ice	19.14	12.72	0.40
			0.00							
CCI TPA-65R-BU8DA-K (ATT)	B	From Face	3.00		0.0000	100.00	No Ice	18.09	10.10	0.11
			0.00				1/2" Ice	18.72	11.52	0.23
			0.00				1" Ice	19.36	12.80	0.36
			0.00							
CCI DMP65R-BU8D w/ (ATT)	B	From Face	3.00		0.0000	100.00	No Ice	17.87	10.02	0.15
			0.00							

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Description	Face or Leg	Offset Type	Offsets: Horz Lateral Vert ft ft ft	Azimuth Adjustment °	Placement ft	CAAA Front ft ²	CAAA Side ft ²	Weight K
mount pipe (ATT)			0.00			1/2" Ice 18.50	11.44	0.27
			0.00			1" Ice 19.14	12.72	0.40
CCI TPA-65R-BU8DA-K (ATT)	C	From Face	3.00	0.0000	100.00	No Ice 18.09	10.10	0.11
			0.00			1/2" Ice 18.72	11.52	0.23
			0.00			1" Ice 19.36	12.80	0.36
CCI DMP65R-BU8D w/ mount pipe (ATT)	C	From Face	3.00	0.0000	100.00	No Ice 17.87	10.02	0.15
			0.00			1/2" Ice 18.50	11.44	0.27
			0.00			1" Ice 19.14	12.72	0.40
(3) Ericsson 4415 B30 (ATT)	A	From Face	2.00	0.0000	100.00	No Ice 1.84	0.82	0.05
			0.00			1/2" Ice 2.01	0.94	0.06
			0.00			1" Ice 2.19	1.07	0.08
(3) Ericsson 4449 B5/B12 (ATT)	B	From Face	2.00	0.0000	100.00	No Ice 1.97	1.41	0.07
			0.00			1/2" Ice 2.14	1.56	0.09
			0.00			1" Ice 2.33	1.73	0.11
(3) Ericsson 4478 B14 (ATT)	C	From Face	2.00	0.0000	100.00	No Ice 2.02	1.25	0.06
			0.00			1/2" Ice 2.20	1.40	0.08
			0.00			1" Ice 2.39	1.55	0.10
(3) Ericsson 8843 B2/B66A (ATT)	A	From Face	2.00	0.0000	100.00	No Ice 1.64	1.35	0.07
			0.00			1/2" Ice 1.80	1.50	0.09
			0.00			1" Ice 1.97	1.65	0.11
(3) Raycap DC6-48-60-0-8F (ATT)	B	From Face	2.00	0.0000	100.00	No Ice 0.92	0.92	0.03
			0.00			1/2" Ice 1.46	1.46	0.05
			0.00			1" Ice 1.64	1.64	0.07
(3) Raycap DC9-48-60-24-8C-EV (ATT)	C	From Face	2.00	0.0000	100.00	No Ice 4.78	2.74	0.03
			0.00			1/2" Ice 5.06	2.96	0.07
			0.00			1" Ice 5.35	3.20	0.11
Sector Mounts (ATT)	C	None		0.0000	100.00	No Ice 30.00	30.00	2.00
						1/2" Ice 35.00	35.00	2.20
						1" Ice 40.00	40.00	2.40

Load Combinations

Comb. No.	Description
1	Dead Only
2	1.2 Dead+1.6 Wind 0 deg - No Ice
3	0.9 Dead+1.6 Wind 0 deg - No Ice
4	1.2 Dead+1.6 Wind 90 deg - No Ice
5	0.9 Dead+1.6 Wind 90 deg - No Ice
6	1.2 Dead+1.6 Wind 180 deg - No Ice
7	0.9 Dead+1.6 Wind 180 deg - No Ice
8	1.2 Dead+1.0 Ice+1.0 Temp
9	1.2 Dead+1.0 Wind 0 deg+1.0 Ice+1.0 Temp
10	1.2 Dead+1.0 Wind 90 deg+1.0 Ice+1.0 Temp
11	1.2 Dead+1.0 Wind 180 deg+1.0 Ice+1.0 Temp
12	Dead+Wind 0 deg - Service
13	Dead+Wind 90 deg - Service
14	Dead+Wind 180 deg - Service

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Maximum Member Forces

Section No.	Elevation ft	Component Type	Condition	Gov. Load Comb.	Axial K	Major Axis Moment kip-ft	Minor Axis Moment kip-ft
L1	115 - 74	Pole	Max Tension	2	0.00	0.00	-0.00
			Max. Compression	8	-26.50	0.24	-1.16
			Max. Mx	4	-10.82	-563.04	-0.29
			Max. My	2	-10.78	0.94	577.88
			Max. Vy	4	22.67	-563.04	-0.29
			Max. Vx	2	-23.23	0.94	577.88
L2	74 - 48	Pole	Max. Torque	5			-1.33
			Max Tension	1	0.00	0.00	0.00
			Max. Compression	8	-34.02	0.24	-1.16
			Max. Mx	4	-15.68	-1174.29	-1.27
			Max. My	2	-15.66	1.91	1203.13
			Max. Vy	4	26.27	-1174.29	-1.27
L3	48 - 1	Pole	Max. Vx	2	-26.83	1.91	1203.13
			Max. Torque	5			-1.33
			Max Tension	1	0.00	0.00	0.00
			Max. Compression	8	-58.89	0.24	-1.16
			Max. Mx	4	-34.50	-2779.18	-3.31
			Max. My	2	-34.50	3.94	2837.50
Max. Vy	4	34.12	-2779.18	-3.31			
Max. Vx	2	-34.67	3.94	2837.50			
Max. Torque	5			-1.33			

Maximum Tower Deflections - Service Wind

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
L1	115 - 74	5.394	12	0.4475	0.0012
L2	79 - 48	2.351	12	0.3073	0.0004
L3	54 - 1	1.039	12	0.1827	0.0002

Critical Deflections and Radius of Curvature - Service Wind

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
113.50	Samsung MT6407-77A w/ mount pipe	12	5.255	0.4423	0.0012	63398
112.00	(2) JMA MX06FRO660-03	12	5.116	0.4370	0.0011	63398
109.50	Samsung XXDWMM-12.5-65-8T-CBRS	12	4.885	0.4283	0.0011	57634
100.00	CCI TPA-65R-BU8DA-K	12	4.025	0.3941	0.0008	21132

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Maximum Tower Deflections - Design Wind

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
L1	115 - 74	38.693	2	3.2101	0.0086
L2	79 - 48	16.869	2	2.2055	0.0029
L3	54 - 1	7.457	2	1.3115	0.0012

Critical Deflections and Radius of Curvature - Design Wind

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
113.50	Samsung MT6407-77A w/ mount pipe	2	37.696	3.1726	0.0084	8894
112.00	(2) JMA MX06FRO660-03	2	36.700	3.1351	0.0081	8894
109.50	Samsung	2	35.044	3.0723	0.0076	8085
100.00	XXDWMM-12.5-65-8T-CBRS CCI TPA-65R-BU8DA-K	2	28.874	2.8279	0.0060	2964

Pole Design Data

Section No.	Elevation ft	Size	L ft	L _u ft	Kl/r	A in ²	P _u K	φP _n K	Ratio $\frac{P_u}{\phi P_n}$
L1	115 - 74 (1)	TP35.6886x24x0.1875	41.00	0.00	0.0	20.2793	-10.78	1198.08	0.009
L2	74 - 48 (2)	TP42.7259x33.8882x0.3125	31.00	0.00	0.0	40.3721	-15.66	2772.40	0.006
L3	48 - 1 (3)	TP55.5x40.3904x0.5	53.00	0.00	0.0	87.2850	-34.50	6323.23	0.005

Pole Bending Design Data

Section No.	Elevation ft	Size	M _{ux} kip-ft	φM _{ux} kip-ft	Ratio $\frac{M_{ux}}{\phi M_{ux}}$	M _{uy} kip-ft	φM _{uy} kip-ft	Ratio $\frac{M_{uy}}{\phi M_{uy}}$
L1	115 - 74 (1)	TP35.6886x24x0.1875	577.88	841.47	0.687	0.00	841.47	0.000
L2	74 - 48 (2)	TP42.7259x33.8882x0.3125	1203.13	2320.88	0.518	0.00	2320.88	0.000
L3	48 - 1 (3)	TP55.5x40.3904x0.5	2837.50	7142.72	0.397	0.00	7142.72	0.000

Pole Shear Design Data

Section No.	Elevation ft	Size	Actual V _u K	φV _n K	Ratio $\frac{V_u}{\phi V_n}$	Actual T _u kip-ft	φT _n kip-ft	Ratio $\frac{T_u}{\phi T_n}$
L1	115 - 74 (1)	TP35.6886x24x0.1875	23.23	599.04	0.039	0.23	1686.40	0.000
L2	74 - 48 (2)	TP42.7259x33.8882x0.3125	26.83	1386.20	0.019	0.23	4652.81	0.000
L3	48 - 1 (3)	TP55.5x40.3904x0.5	34.67	3161.62	0.011	0.23	14322.50	0.000

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Pole Interaction Design Data

Section No.	Elevation ft	Ratio P_u	Ratio M_{ux}	Ratio M_{uy}	Ratio V_u	Ratio T_u	Comb. Stress Ratio	Allow. Stress Ratio	Criteria
		ϕP_n	ϕM_{nx}	ϕM_{ny}	ϕV_n	ϕT_n			
L1	115 - 74 (1)	0.009	0.687	0.000	0.039	0.000	0.697	1.000	4.8.2 ✓
L2	74 - 48 (2)	0.006	0.518	0.000	0.019	0.000	0.524	1.000	4.8.2 ✓
L3	48 - 1 (3)	0.005	0.397	0.000	0.011	0.000	0.403	1.000	4.8.2 ✓

Section Capacity Table

Section No.	Elevation ft	Component Type	Size	Critical Element	P K	ϕP_{allow} K	% Capacity	Pass Fail	
L1	115 - 74	Pole	TP35.6886x24x0.1875	1	-10.78	1198.08	69.7	Pass	
L2	74 - 48	Pole	TP42.7259x33.8882x0.3125	2	-15.66	2772.40	52.4	Pass	
L3	48 - 1	Pole	TP55.5x40.3904x0.5	3	-34.50	6323.23	40.3	Pass	
							Summary		
							Pole (L1)	69.7	Pass
							RATING =	69.7	Pass

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Anchor Rod and Base Plate Calculation

ANSI/TIA-222-G

<i>Factored Base Reactions:</i>	<i>Pole Shape:</i>	<i>Anchor Rods:</i>	<i>Base Plate:</i>
Moment: 2837 ft-kips	18-Sided	(22) 2.25 in. A615 GR. 75	2.5 in. x 69 in. Round
Shear: 35 kips	<i>Pole Dia. (D_f):</i>	Anchor Rods Evenly Spaced	fy = 50 ksi
Axial: 35 kips	55.50 in	On a 63 in Bolt Circle	

Anchor Rod Calculation According to TIA-222-G section 4.9.9

$\phi_t, \phi_v = 0.80$ TIA 4.9.9
 $I_{bolts} = 10914.75 \text{ in}^2$ Momet of Inertia
 $P_u = 100 \text{ kips}$ Compr Force
 $V_u = 1.6 \text{ kips}$ Shear Force
 $R_{nt} = 325.00 \text{ kips}$ Nominal Tensile Strength
 $n = 0.50$ for detail type (d)
Stress Rating = 39.6% Satisfies TIA-G 4.9.9

Base Plate Calculation According to TIA-222-G

$\phi = 0.90$ TIA 4.7
 $M_{PL} = 225.6 \text{ in-kip}$ Plate Moment
 $L = 7.9 \text{ in}$ Section Length
 $Z = 12.4$ Plastic Section Modulus
 $M_P = 619.2 \text{ in-kip}$ Plastic Moment
 $\phi M_n = 557.3 \text{ in-kip}$ Factored Resistance

Calculated Moment vs Factored Resistance

$225.63 \text{ in-kip} \leq 557 \text{ in-kip}$

Stress Rating = 40.5%

Anchor Rods Are Adequate	39.6% <input checked="" type="checkbox"/>
Base Plate is Adequate	40.5% <input checked="" type="checkbox"/>

Monopole Spread Footing Calculation

ANSI/TIA-222-G

Factored Base Reactions:	Footing Dimensions:		Concrete:
Moment: 2837 ft-kips	29 ft x 29 ft	7.5 ft Square Pier	f'c = 4500 psi
Shear: 35 kips	x 3.5 ft thick	w/6 in Reveal	Steel fy = 60 ksi
Axial: 35 kips	Bearing 6 ft B.G.	115.3 Yd3 Concrete	f = 0.75
Soil Backfill 120 pcf	Ultimate Bearing:	8000 psf	Water Table n/a

Foundation Weight

Weight of Pole	35.0 kips
Weight of Concrete	466.8375 kips
Weight of Soil	235.425 kips
Bouyancy of Water	0.0 kips
Total	737.3 kips

Overturning Resistance:

Overturning Moment (M_u)	3064.5 ft-kips	2837 ft-kips + (35 kips x 6.5 ft)
Resisting Moment (R_s)	10690.306 ft-kips	737.2625 kips x 29 ft / 2
$\phi \times R_s > M_u$	$M_{\text{overturning}} / f M_{\text{resist}}$	38.2% OK

Soil Bearing Pressure:

Eccentricity (e)	4.16 ft	3064.5 ft-kips / 737.2625 kips
6(e)	24.9 ft <	29.0 ft OK
Maximum Soil Bearing	1630.5553 psf	Calculated across corners
Soil Overburden	-720 psf	
Net Soil Bearing	910.55527 psf	
Resisting Soil Bearing (R_s)	8000 psf	
Net Soil Bearing < $\phi \times R_s$	Net Bearing / f R_s	15.2% OK

Bending Moment in Pier:

Bending Moment	2942 ft-kips	2837 ft-kips + (35 kips x 3 ft)
Min. Pier Steel	40.5 in ²	1/2% (Based on Square Pier)

Bending Moment in Footing:

Max Bending Moment	1830.4714 ft-kips	Σ Moments about pier face
Footing Steel Req'd (Loads)	0.47 in ² /ft	
Min. Footing Steel	0.91 in ² /ft	0.18%