STATE OF CONNECTICUT
CONNECTICUT SITING COUNCIL

IN RE:
NEW CINGULAR WIRELESS PCS, LLC (AT&T) PETITION FOR A DECLARATORY RULING, PURSUANT TO CONNECTICUT GENERAL STATUTES §4-176 AND §16-50K, FOR THE INSTALLATION OF A WIRELESS TELECOMMUNICATIONS FACILITY ON PROPERTY LOCATED 50 BIDWELL STREET/ RAMER DRIVE, MANCHESTER, CONNECTICUT.

PETITION NO. 1512

July 6, 2022

RESPONSES OF NEW CINGULAR WIRELESS PCS, LLC (AT&T) TO CONNECTICUT SITING COUNCIL INTERROGATORIES SET TWO

Q16. The Petition and construction drawings (Sheet A-1) state that the proposed pole would be 37 feet 6 inches above ground level. The Structural Analysis provided with the Petition and in response to interrogatory 12 state that the centerline of the proposed antenna would be 29 feet 3 inches above grade. The Radio Frequency Analysis states that the antenna would be 29 feet above ground level. Please clarify the proposed length of the pole, height to the top of the pole above ground level including the height of the equipment enclosure at the base, and centerline height of the proposed antenna.

A16. The height to the top of the proposed light pole small cell facility is approximately 37'-6" and the centerline of the proposed antenna is approximately 36'-3" as shown in the drawings submitted with the petition.

Q17. In reference to the response to interrogatory 16, please provide a revised Structural Analysis and Radio Frequency Analysis, as necessary.

A17. Included in Attachments 1 and 2 respectively are an updated structural report and an updated Radio Frequency Analysis Report. Please note that AT&T will install the required signage as detailed in the updated Radio Frequency Analysis Report.

Q18. What is the height of the existing adjacent light pole?

A18. The height of the existing adjacent light pole is approximately 27'-10" above grade level ("AGL").

Q19. Page 11 of the Radio Frequency Analysis provided with the Petition states the nearest structure is a 3-story building located about 110 feet to the northwest, while the response to interrogatory 5 states horizontal distance to the nearest rooftop is approximately 208 feet. Please clarify.

A19. The updated Radio Frequency Analysis Report in Attachment 2 indicates that the nearest building is approximately 210' to the northwest.

Q20. The response to interrogatory 13 states the pole will be bolted to the poured foundation. The response to interrogatory 14 states that the pole would not extend through the

equipment enclosure at the base. Please clarify how the pole would be bolted directly to the foundation if it does not extend through the enclosure at the base.

Q20. Included in Attachment 3 is a copy of the foundation analysis. Page 5 of the enclosed foundation analysis provides a clear visual of how the pole is stacked. The foundation is poured, the equipment base is mounted to the foundation, and the pole is mounted to the equipment base.

CERTIFICATE OF SERVICE

I hereby certify that on this day, one original and fifteen (15) hard copies of the foregoing was sent via overnight Federal Express and electronically to the Connecticut Siting Council in accordance with the Connecticut Siting Council directives.

July 6, 2022

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(914)-761-1300
Attorney for the Applicant

cc: AT&T

ATTACHMENT 1

STRUCTURAL ANALYSIS REPORT

For

CRAN_RCTB_MANC_003

60 Bidwell Street
Manchester, CT 06040

Equipment Mounted on Proposed Light Pole

Prepared for:

CENTERLINE COMMUNICATIONS

at&t

Dated: December 14, 2020

Prepared by:

HUDSON Design Group LLC

45 Beechwood Drive
North Andover, MA 01845
Phone: (978) 557-5553
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SCOPE OF WORK:

Hudson Design Group LLC (HDG) has been authorized by AT&T to conduct a structural evaluation of the proposed light pole supporting the proposed AT&T equipment.

This report represents this office's findings, conclusions and recommendations pertaining to the support of the proposed AT&T equipment listed below.

This office conducted an on-site visual survey of the above areas on May 21, 2020. Attendees included Patrick Barrett (HDG – Field Technician).

CONCLUSION SUMMARY:

Based on our evaluation, we have determined that the proposed pole **is in conformance** with the National Electric Safety Code 2017 (NESC). The proposed light pole structure is rated at 3.0%.

APPURTENANCES CONFIGURATION:

Appurtenances	Elev.	Mount
(1) GQ2410-06670 Antenna	36'-3"	Top of Light Pole
(1) Load Center	3'-6"	Equipment Enclosure
(1) Main Disconnect	3'-6"	Equipment Enclosure
(1) CBC1923Q-43 Diplexers	3'-0"	Equipment Enclosure
(1) 8843B2/B66A RRH	2'-4"	Equipment Enclosure
(1) 4449 RRH	2'-4"	Equipment Enclosure
(1) Power Meter	2'-0"	Equipment Enclosure

ANALYSIS RESULTS SUMMARY:

Component	Max. Stress Ratio	Elev. of Component (ft.)	Pass/Fail
8.0'" Light Pole (Proposed)	**3.0%**	**0 – 27.8**	**PASS**

DESIGN CRITERIA:

National Electric Safety Code 2017 (NESC) and the 2018 Connecticut State Building Code Amendments		
Wind		
City/Town:	Manchester	
County:	Hartford	
NESC Rule	Rule 250B	NESC Section 25
Construction Grade	C	NESC Section 25
Wind Load:	39.53 mph	NESC Table 230-2
Ice		
Loading District	Heavy	NESC Figure 250-1
Radial Ice Thickness:	0.50 in	NESC Table 250-1

1. Approximate height above grade to center of the proposed antenna: 36'-3" +/-

***Calculations and referenced documents are attached.**

HUDSON Design Group LLC

PROPOSED STRUCTURE:

The proposed 37'- 6" +/- light pole is assumed to have an 8.0" diameter installed on a 2'-6"x4'-0" tall square equipment enclosure base. If field conditions differ from what is assumed in this report, then the engineer of record is to be notified as soon as possible.

ANTENNA SUPPORT RECOMMENDATIONS

The new antenna is proposed to be installed on a top mount kit secured to the new light pole using thru bolts.

EQUIPMENT SUPPORT RECOMMENDATIONS:

The new equipment is proposed to be installed within the new equipment enclosure base with unistrut components.

Limitations and assumptions:

1. Reference the latest HDG construction drawings for all the equipment locations details.
2. Mount all equipment per manufacturer's specifications.
3. All structural members and their connections are assumed to be in good condition and are free from defects with no deterioration to its member capacities. Contractor to perform pre-inspection prior to construction.
4. All antennas and waveguide cables are assumed to be properly installed and supported as per the manufacturer requirements.
5. HDG is not responsible for any modifications completed prior to and hereafter which HDG was not directly involved.
6. If field conditions differ from what is assumed in this report, then the engineer of record is to be notified as soon as possible.
7. HDG did not perform any geotechnical analysis / or / investigation. Soil Information is unknown.

FIELD PHOTOS:

Photo 1: Sample photo illustrating the existing light pole.

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Design Group LLC

Calculations

Date: 12/11/2020
Project Name: CRAN_RCTB_MANC_003
Designed By: RL **Checked By:** MSC

HUDSON Design Group LLC

2.6.5.2 Velocity Pressure Coeff:

$K_z = 2.01\ (z/z_g)^{2/\alpha}$

z=	36.25	(ft)
z_g=	900	(ft)
α=	9.5	

K_z= 0.977

Kzmin ≤ Kz ≤ 2.01

Table 2-4

Exposure	Z_g	α	K_{zmin}	K_e
B	1200 ft	7.0	0.70	0.9
C	900 ft	9.5	0.85	1.0
D	700 ft	11.5	1.03	1.1

2.6.6.4 Topographic Factor:

Table 2-5

Topo. Category	K_t	f
2	0.43	1.25
3	0.53	2.0
4	0.72	1.5

$K_{zt} = [1+(K_e K_t/K_h)]^2$

$K_h = e^{(f*z/H)}$

K_{zt}= 1

(If Category 1 then K_{zt} =1.0)

Category= **1**

K_h=	1	
K_e=	1.0	(from Table 2-4)
K_t=		(from Table 2-5)
f=		(from Table 2-5)
z=	36.25	
H=		(Ht. of the crest above surrounding terrain)
K_{zt}=	1.00	
K_{iz} =	0.99	(from Sec. 2.6.8)

2.6.8 Design Ice Thickness

Max Ice Thickness = t_i = 0.50 in

Importance Factor, I_{ice} = I_{ice}= 1.00 (from Table 2-3)

$t_{iz} = 2.0*t_i*I_{ice}*K_{iz}*(Kzt)^{0.35}$ t_{iz} = 0.99 in

Date: 12/11/2020
Project Name: CRAN_RCTB_MANC_003
Designed By: RL Checked By: MSC

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2.6.7 Gust Effect Factor

2.6.7.1 Self Supporting Lattice Structures

Gh = 1.0 Latticed Structures > 600 ft

Gh = 0.85 Latticed Structures 450 ft or less

Gh = 0.85 + 0.15 [h/150 - 3.0] h= ht. of structure

h=	36	Gh=	0.85

2.6.7.2 Guyed Masts Gh= 0.85

2.6.7.3 Pole Structures Gh= 1.1

2.6.9 Appurtenances Gh= 1.0

2.6.7.4 Structures Supported on Other Structures
(Cantilivered tubular or latticed spines, pole, structures on buildings (ht. : width ratio > 5)

Gh=	1.35	**Gh=**	**1.00**

2.6.9.2 Design Wind Force on Appurtenances

$F = q_z * Gh * (EPA)_A$

$q_z = 0.00256 * K_z * K_{zt} * K_d * V_{max}^2 * I$

		K_z=	0.977	
		K_{zt}=	1.0	
q_z=	**3.71**	K_d=	0.95	(from Table 2-2)
$q_{z\ (ice)}$=	**2.14**	V_{max}=	39.53	
		$V_{max\ (ice)}$=	30	
		I=	1.0	(from Table 2-3)
		I_{wice}=	1.0	(from Table 2-3)

Table 2-2

Structure Type	Wind Direction Probability Factor, Kd
Latticed structures with triangular, square or rectangular cross sections	0.85
Tubular pole structures, latticed structures with other cross sections, appurtenances	0.95

Date: 12/11/2020
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Designed By: RL Checked By: MSC

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Determine Ca:

Table 2-8

Force Coefficients (Ca) for Appurtenances				
Member Type		**Aspect Ratio ≤ 2.5**	**Aspect Ratio = 7**	**Aspect Ratio ≥ 25**
		Ca	**Ca**	**Ca**
Flat		1.2	1.4	2.0
Round	**C < 32** (Subcritical)	0.7	0.8	1.2
	32 ≤ C ≤ 64 (Transitional)	$3.76/(C^{0.485})$	$3.37/(C^{0.415})$	$38.4/(C^{-1.0})$
	C > 64 (Supercritical)	0.5	0.6	0.6

Aspect Ratio is the overall length/width ratio in the plane normal to the wind direction.
(Aspect ratio is independent of the spacing between support points of a linear appurtenance, and the section length considered to have uniform wind load).

Note: Linear interpolation may be used for aspect ratios other than those shown.

Ice Thickness = **0.99** **in**

Appurtenances	Height	Width	Depth	Flat Area	Aspect Ratio	Ca	Force (lbs)	Force (lbs) (w/Ice)
GQ2410-06670 Antenna	23.3	23.3	6.0	3.77	1.00	1.20	**17**	**11**
GQ2410-06670 Antenna (Side)	23.3	6.0	23.3	0.97	3.88	1.26	**5**	**4**
8" Light Pole	8.6	12.0	-	0.72	0.72	1.20	**3**	

Date: 12/11/2020
Project Name: CRAN_RCTB_MANC_003
Designed By: RL **Checked By:** MSC

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Wind Analysis → Equipment Enclosure

Reference Codes:

-National Electric Safety Code 2017 (NESC 2017)

-Minimum Design Loads for Buildings and Other Structures (ASCE 7-10)

Structure Classification		II		(ASCE 7-10 Table 1.5-1)
Basic Wind Speed, V		39.53	mph	(ASCE 7-10 Table 1.5-1)
Importance Factor, I		1		(ASCE 7-10 Table 1.5-2)
Exposure Category		C		(ASCE 7-10 Section 26.7)
Height Above Ground Level, z		4	ft	(Top of Enclosure)
Exposure Coefficient, K_z		0.85		(ASCE 7-10 Table 29-3.1)
Wind Directionality Coef., K_d		0.90		(ASCE 7-10 Table 26.6-1)
Topographic Factor, K_{zt}		1.00		(ASCE 7-10 Section 26.8.2)
Velocity Pressure, q_z	$= 0.00256K_zK_{zt}K_dV^2$			(ASCE 7-10 Equation 29.3-1)
	= **3.06** **psf**			
Gust Factor, G		1.00		(ASCE 7-10 Section 26.9)
Enclosure Shape:		Square		
Net Force Coefficient, C_f		1.90		(ASCE 7-10 Figure 29.5-1)
Area Wind Force, F	= q_zGC_f			(ASCE 7-10 Equation 29.5-2)
	= **5.81** **psf**			

Date: 12/14/2020
Project Name: CRAN_RCTB_MANC_003
Designed By: RL **Checked By:** MSC

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ICE WEIGHT CALCULATIONS

Thickness of ice:	0.99	in.
Density of ice:	56	pcf

GQ2410-06670 Antenna

Weight of ice based on total radial SF area:

Height (in):	23.3	
Width (in):	23.3	
Depth (in):	6.0	
Total weight of ice on object:		59 lbs
Weight of object:	26.0	lbs
Combined weight of ice and object:		85 lbs

8" Light Pole

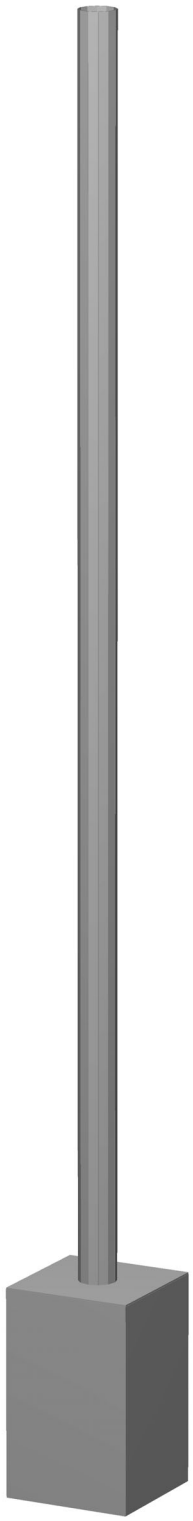
Per foot weight of ice:

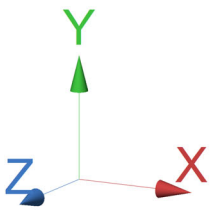
diameter (in):	8.63	
Per foot weight of ice on object:		12 plf

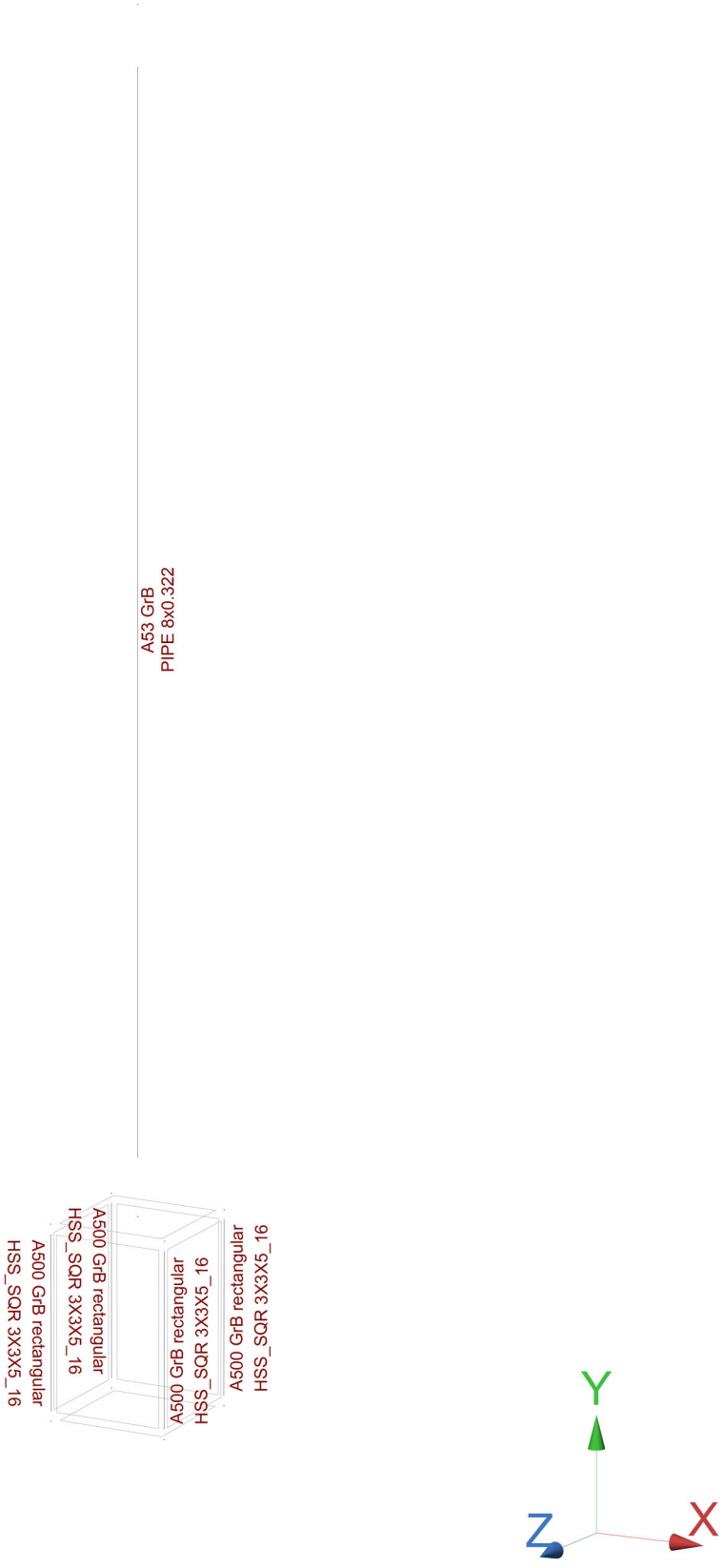
Pole Cab Enclosure

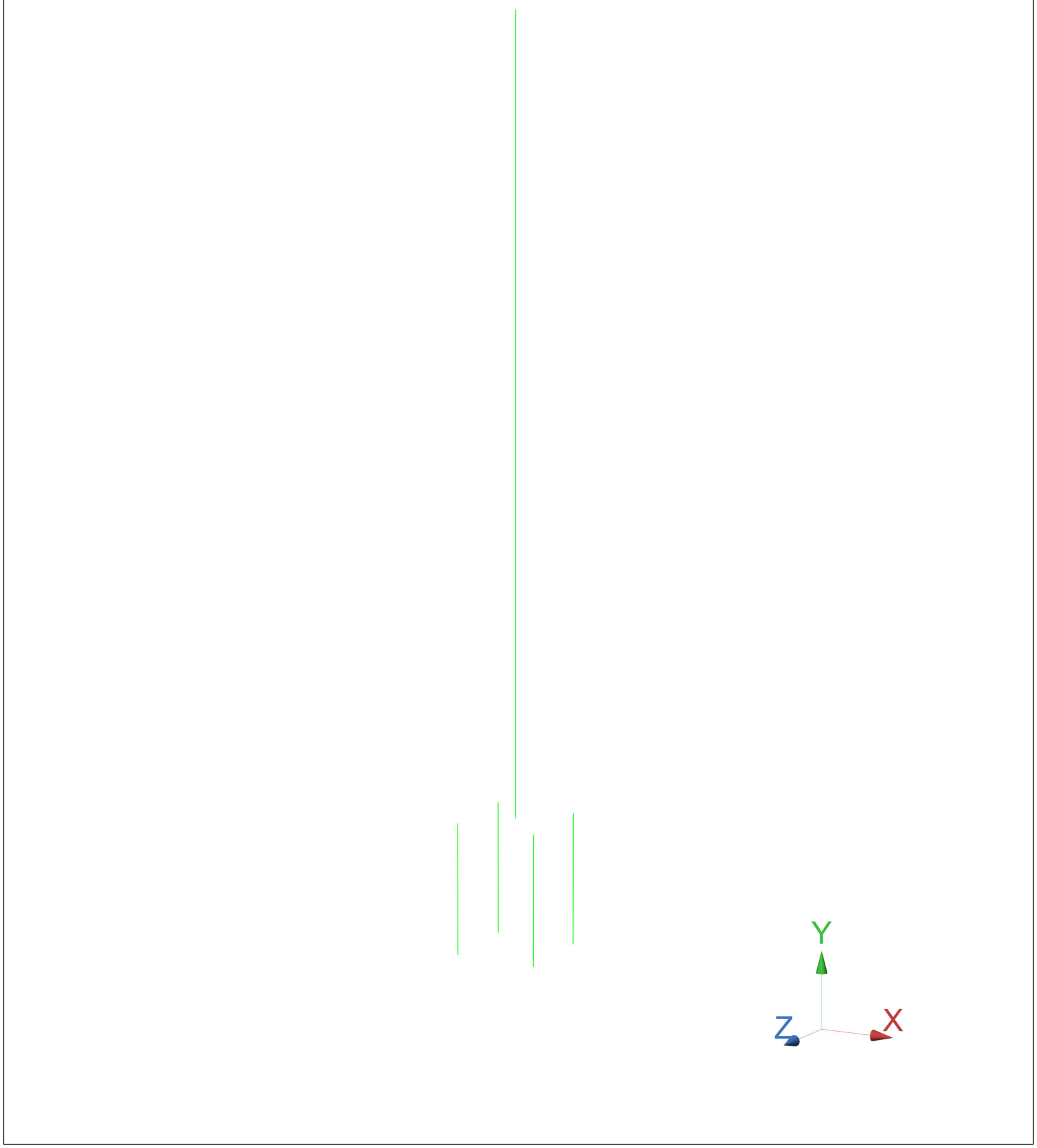
Weight of ice based on total radial SF area:

Height (in):	12	
Width (in):	12	
Per foot weight of ice on object:		22 plf




Y
Z
X


A53 GrB
PIPE 8x0.322
A500 GrB rectangular
HSS_SQR 3X3X5_16
A500 GrB rectangular
HSS_SQR 3X3X5_16
A500 GrB rectangular
HSS_SQR 3X3X5_16
A500 GrB rectangular
HSS_SQR 3X3X5_16
Y
Z
X


Y
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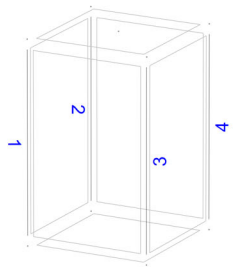

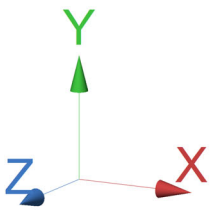

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Load data

GLOSSARY

Comb : Indicates if load condition is a load combination

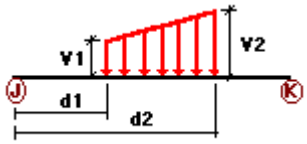
Load Conditions

Condition	Description	Comb.	Category
DL	Dead Load	No	DL
WL1	Wind Load (Side 1)	No	WIND
WL2	Wind Load (Side 2)	No	WIND
WL3	Wind Load (Side 3)	No	WIND
WL4	Wind Load (Side 4)	No	WIND
DI	Ice Load	No	LL

Load on nodes

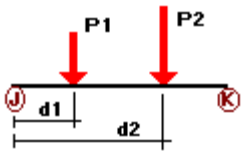
Condition	Node	FX [Kip]	FY [Kip]	FZ [Kip]	MX [Kip*ft]	MY [Kip*ft]	MZ [Kip*ft]
WL1	11	0.00	0.00	0.00	-0.024	0.00	0.00
WL2	11	0.00	0.00	0.00	0.00	0.00	0.006
WL3	11	0.00	0.00	0.00	0.024	0.00	0.00
WL4	11	0.00	0.00	0.00	0.00	0.00	-0.006

Distributed force on members



Condition	Member	Dir1	Val1 [Kip/ft]	Val2 [Kip/ft]	Dist1 [ft]	%	Dist2 [ft]	%
WL1	5	z	-0.003	-0.003	0.00	No	100.00	Yes
WL2	5	x	-0.003	-0.003	0.00	No	100.00	Yes
WL3	5	z	0.003	0.003	0.00	No	100.00	Yes
WL4	5	x	0.003	0.003	0.00	No	100.00	Yes
DI	5	y	-0.012	-0.012	0.00	No	100.00	Yes

Concentrated forces on members



Condition	Member	Dir1	Value1 [Kip]	Dist1 [ft]	%
DL	5	y	-0.026	0.00	No
WL1	5	z	-0.017	0.00	No
WL2	5	x	-0.005	0.00	No
WL3	5	z	0.017	0.00	No
WL4	5	x	0.005	0.00	No
DI	5	y	-0.059	0.00	No

Load on shells

Condition	Shell	Pressure [Kip/ft2]	Temp. [F]
WL1	3	-0.006	0.00
WL2	4	-0.006	0.00
WL3	5	-0.006	0.00
WL4	6	-0.006	0.00
DI	2	-0.022	0.00

Self weight multipliers for load conditions

Condition	Description	Self weight multiplier			
		Comb.	MultX	MultY	MultZ
DL	Dead Load	No	0.00	-1.00	0.00
WL1	Wind Load (Side 1)	No	0.00	0.00	0.00
WL2	Wind Load (Side 2)	No	0.00	0.00	0.00
WL3	Wind Load (Side 3)	No	0.00	0.00	0.00
WL4	Wind Load (Side 4)	No	0.00	0.00	0.00
DI	Ice Load	No	0.00	0.00	0.00

Earthquake (Dynamic analysis only)

Condition	a/g	Ang. [Deg]	Damp. [%]
DL	0.00	0.00	0.00
WL1	0.00	0.00	0.00
WL2	0.00	0.00	0.00
WL3	0.00	0.00	0.00
WL4	0.00	0.00	0.00
DI	0.00	0.00	0.00

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Steel Code Check

Report: Summary - Group by member

Load conditions to be included in design :

LC1=1.4DL
LC2=1.2DL+1.6DI
LC3=1.2DL+0.5WL1
LC4=1.2DL+0.5WL2
LC5=1.2DL+0.5WL3
LC6=1.2DL+0.5WL4
LC7=1.2DL+WL1
LC8=1.2DL+WL2
LC9=1.2DL+WL3
LC10=1.2DL+WL4
LC11=1.2DL+WL1+DI
LC12=1.2DL+WL2+DI
LC13=1.2DL+WL3+DI
LC14=1.2DL+WL4+DI
LC15=0.9DL+WL1
LC16=0.9DL+WL2
LC17=0.9DL+WL3
LC18=0.9DL+WL4

Description	Section	Member	Ctrl Eq.	Ratio	Status	Reference
	HSS_SQR 3X3X5_16	**1**	LC11 at 100.00%	0.01	OK	
		2	LC13 at 100.00%	**0.01**	**OK**	
		3	LC11 at 100.00%	0.01	OK	
		4	LC13 at 100.00%	0.01	OK	
	PIPE 8x0.322	**5**	LC11 at 100.00%	**0.03**	**OK**	

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Geometry data

GLOSSARY

Cb22, Cb33	: Moment gradient coefficients
Cm22, Cm33	: Coefficients applied to bending term in interaction formula
d0	: Tapered member section depth at J end of member
DJX	: Rigid end offset distance measured from J node in axis X
DJY	: Rigid end offset distance measured from J node in axis Y
DJZ	: Rigid end offset distance measured from J node in axis Z
DKX	: Rigid end offset distance measured from K node in axis X
DKY	: Rigid end offset distance measured from K node in axis Y
DKZ	: Rigid end offset distance measured from K node in axis Z
dL	: Tapered member section depth at K end of member
Ig factor	: Inertia reduction factor (Effective Inertia/Gross Inertia) for reinforced concrete members
K22	: Effective length factor about axis 2
K33	: Effective length factor about axis 3
L22	: Member length for calculation of axial capacity
L33	: Member length for calculation of axial capacity
LB pos	: Lateral unbraced length of the compression flange in the positive side of local axis 2
LB neg	: Lateral unbraced length of the compression flange in the negative side of local axis 2
RX	: Rotation about X
RY	: Rotation about Y
RZ	: Rotation about Z
TO	: 1 = Tension only member 0 = Normal member
TX	: Translation in X
TY	: Translation in Y
TZ	: Translation in Z

Nodes

Node	X [ft]	Y [ft]	Z [ft]	Rigid Floor
2	-1.25	0.00	1.25	0
3	1.25	0.00	1.25	0
4	-1.25	0.00	-1.25	0
5	1.25	0.00	-1.25	0
6	-1.25	4.00	1.25	0
7	1.25	4.00	1.25	0
8	-1.25	4.00	-1.25	0
9	1.25	4.00	-1.25	0
10	0.00	4.00	0.00	0
11	0.00	27.8333	0.00	0

Restraints

Node	TX	TY	TZ	RX	RY	RZ
2	1	1	1	0	0	0
3	1	1	1	0	0	0
4	1	1	1	0	0	0
5	1	1	1	0	0	0

Members

Member	NJ	NK	Description	Section	Material	d0 [in]	dL [in]	lg factor
1	2	6		HSS_SQR 3X3X5_16	A500 GrB rectangular	0.00	0.00	0.00
2	4	8		HSS_SQR 3X3X5_16	A500 GrB rectangular	0.00	0.00	0.00
3	3	7		HSS_SQR 3X3X5_16	A500 GrB rectangular	0.00	0.00	0.00
4	5	9		HSS_SQR 3X3X5_16	A500 GrB rectangular	0.00	0.00	0.00
5	11	10		PIPE 8x0.322	A53 GrB	0.00	0.00	0.00

Rigid end offsets

Member	DJX [in]	DJY [in]	DJZ [in]	DKX [in]	DKY [in]	DKZ [in]
1	1.50	0.00	-1.50	1.50	0.00	-1.50
2	1.50	0.00	1.50	1.50	0.00	1.50
3	-1.50	0.00	-1.50	-1.50	0.00	-1.50
4	-1.50	0.00	1.50	-1.50	0.00	1.50

Shells

Shell	Description	Material	Thickness [in]	Center of gravity [ft]	Area [ft2]	N1, N2, ..., Nn
1		A36 (weightless)	0.75	(0.00, 0.00, 0.00)	6.25	2, 3, 5, 4
2		A36 (weightless)	0.75	(0.00, 4.00, 0.00)	6.25	6, 7, 9, 8
3		A36 (weightless)	0.13	(0.00, 2.00, 1.25)	10.00	3, 7, 6, 2
4		A36 (weightless)	0.13	(1.25, 2.00, 0.00)	10.00	5, 9, 7, 3
5		A36 (weightless)	0.13	(0.00, 2.00, -1.25)	10.00	4, 8, 9, 5
6		A36 (weightless)	0.13	(-1.25, 2.00, 0.00)	10.00	2, 6, 8, 4

ATTACHMENT 2

Radio Frequency Safety Survey Prediction

AT&T New England Light Pole Facility

Site Name: CRAN_RCTB_MANC_003 **FA:** 14367840 **USID:** 193363 **Address:** 60 Adams Street Dup1, Manchester, CT 06040 **Latitude:** 41.794048 **Longitude:** -72.555360	**Prepared for:** AT&T New England on behalf of AT&T New England **Report Writer:** Alex Van Abbema **Date:** July 5, 2022 **Report Reviewer:** Brandon Green

Statement of Compliance

AT&T New England will be compliant with FCC Regulations upon installation of recommended mitigation measures.

TABLE OF CONTENTS

1.0 GENERAL SUMMARY

Centerline Communications, LLC ("Centerline") has been contracted to provide a Radio Frequency (RF) Analysis for the following AT&T New England wireless light pole facility to determine whether the facility is in compliance with federal standards and regulations regarding RF emissions. This analysis includes theoretical emissions calculations for all equipment for AT&T New England .

1.1 SITE SUMMARY

Analysis Site Data	
Site Name:	CRAN_RCTB_MANC_003
Site Address:	60 Adams Street Dup1, Manchester CT 06040
Site Latitude:	41.794048 N
Site Longitude:	-72.555360 W
Facility Type:	Light Pole
Compliance Summary	
Compliance Status:	Compliant Upon Mitigation Installation
Maximum Modeled MPE% the Ground Level AT&T New England (General Public Limit):	0.43%
Maximum Modeled MPE% on the Nearest Rooftop AT&T New England (General Public Limit):	0.02 %
Maximum Modeled MPE% at the Antenna Level AT&T New England (General Public Limit):	1374.10 %
Site Data Information	
CD:	CRAN_RCTB_MANC_003_CD_REVA_05.27.20

There are areas near the proposed antenna that are predicted to exceed MPE limits. The table below shows the distance from the antenna these areas extend.

Horizontal Safety Distance (from Antenna Face)	
General Public Limit (ft.)	13'
Occupational Limit (ft.)	4'
Vertical Safety Distance (From Bottom Tip of Antenna)	
General Public Limit (ft.)	7'
Occupational Limit (ft.)	6'

Signage and barriers are the primary means of mitigating access to accessible areas of exposure. Below is a summary of existing and recommended signage at this AT&T New England facility.

Existing Signage			
Sign Type	**Sign Size**	**# of Signs**	**Sign Placement**
None	N/A	N/A	N/A

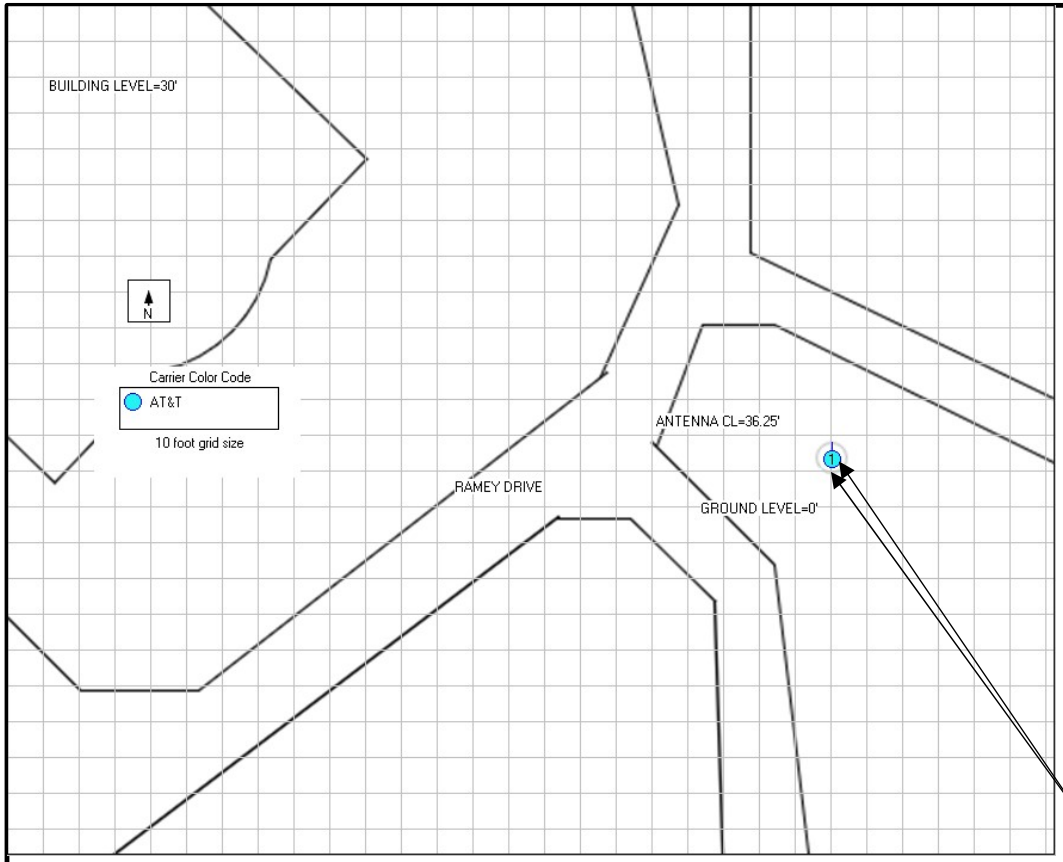
Recommended Signage			
Sign Type	**Sign Size**	**# of Signs**	**Sign Placement**
Yellow Caution	10.25” x 10.25”	2	7' below the bottom tip of the antenna

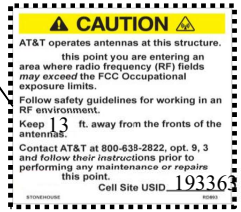
NOTE: Place two signs opposite each other on the mounting structure (e.g., utility pole) 7' below the bottom tip of the antenna. Upper edge of each sign must be positioned at the bottom distance.

Signage Dimension Guidelines:

Safe Distance (ft.)	**Sign dimensions Height x Length**	**Attachment location**
1-3	2.5” x 6.5”	Radome bottom surface
4-7	6” x 6”	Below antenna bottom tip
8-11	8.25” x 8.25”	Below antenna bottom tip
12-15	10.25” x 10.25”	Below antenna bottom tip
16-18	12.25” x 12.25”	Below antenna bottom tip
19+	14.25” x 14.25”	Below antenna bottom tip

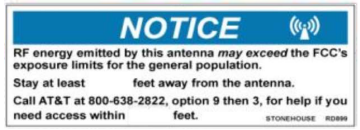
2.0 SITE SCALE MAP

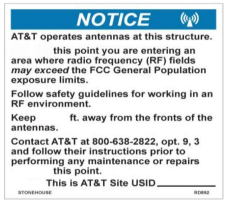




10.25" x 10.25"

Place two signs opposite each other on the mounting structure (e.g., utility pole) 7' below the bottom tip of the antenna. Upper edge of each sign must be positioned at the bottom distance.





Existing Sign | Proposed Sign | Existing Barrier | Proposed Barrier

Signage/ Mitigation Plan

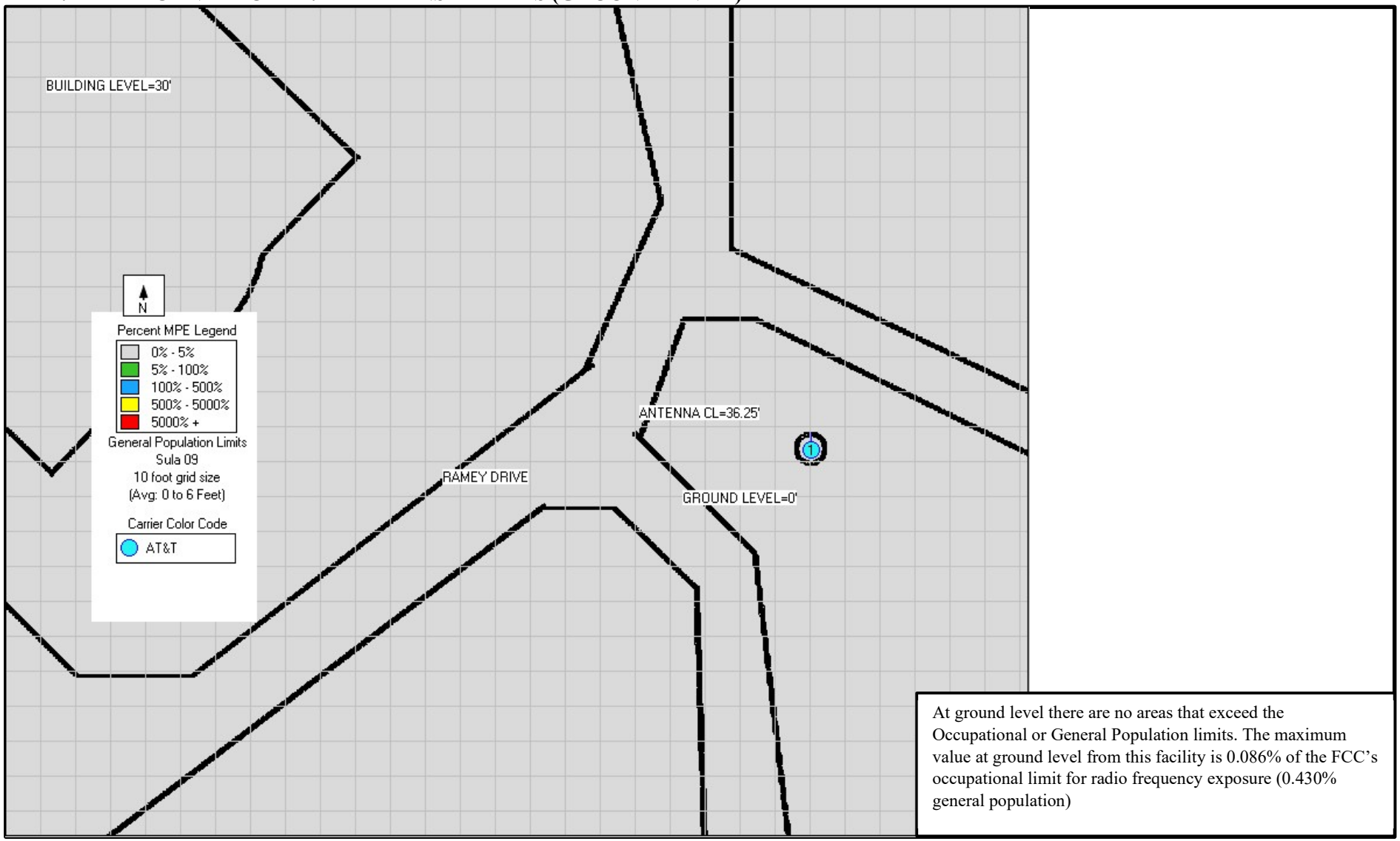
3.0 ANTENNA INVENTORY

Ant Num	Name	(MHz) Freq	ERP	TX Count	TPO (W)	TPO (dBm)	Gain in dbd	Total Loss	Mfg	Model	(ft) X	(ft) Y	(ft) Z	Azimuth	Horizontal BW	MDT	Length (ft.)
1	AT&T	1900	653.31	4	40.00	58.15	6.11	0.00	GALTRONICS	GQ2410-06621	231.70	128.60	28.06	0.00	157.00	0.00	2.08
1	AT&T	2100	1030.89	4	60.00	60.13	6.33	0.00	GALTRONICS	GQ2410-06621	231.70	128.60	28.06	0.00	168.00	0.00	2.08
1	AT&T	5150	1.05	2	0.32	30.21	2.15	0.00	GALTRONICS	GQ2410-06621	231.70	128.60	28.06	0.00	211.00	0.00	2.08

*Table 1: Total Site data table **(Z Value is distance from bottom of antenna to walking surface)*

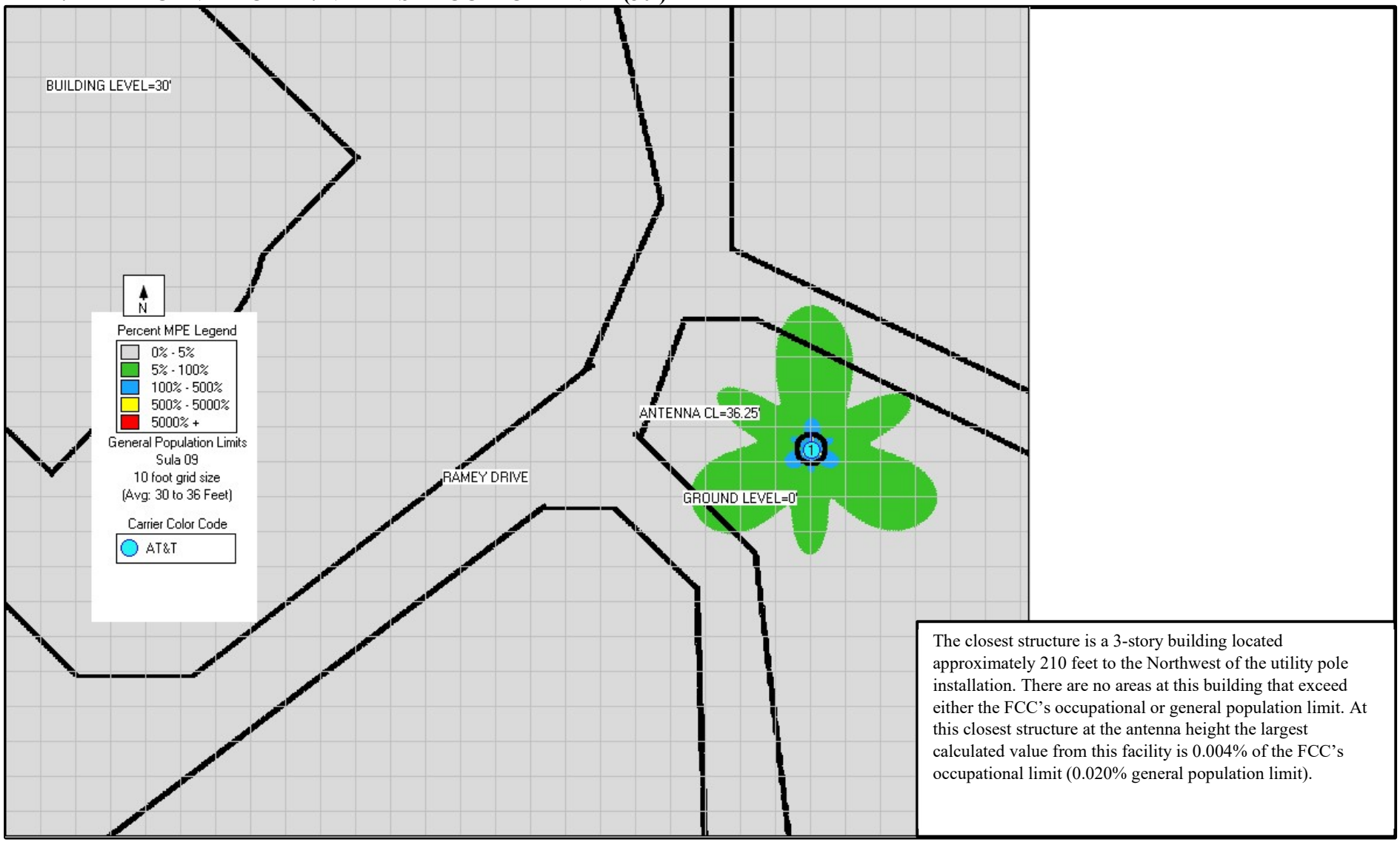
4.0 ANALYSIS

4.1 PREDICTIVE MODEL: ALL TRANSMITTERS (GROUND LEVEL)



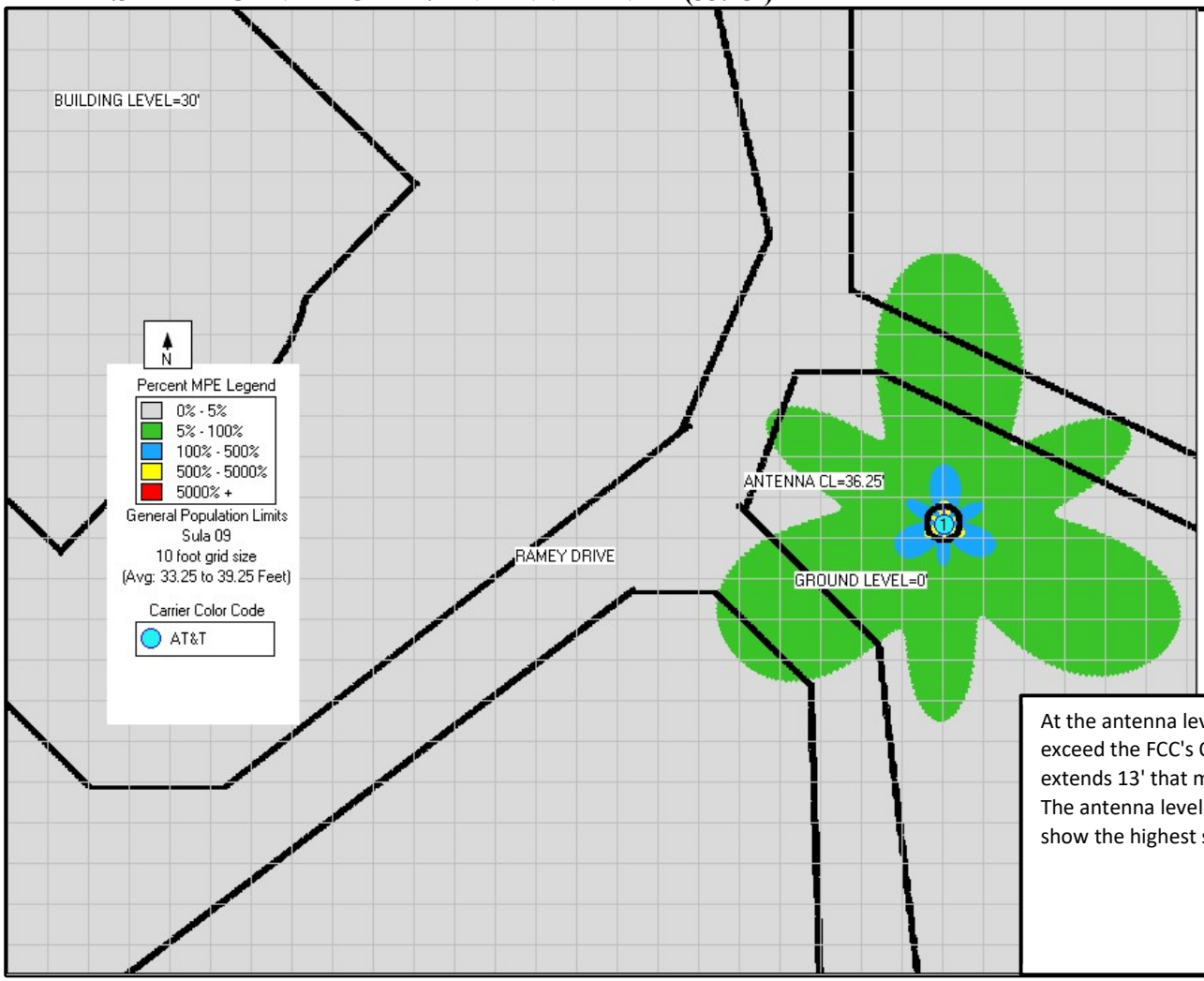
At ground level there are no areas that exceed the Occupational or General Population limits. The maximum value at ground level from this facility is 0.086% of the FCC's occupational limit for radio frequency exposure (0.430% general population)

4.2 PREDICTIVE MODEL: NEAREST ROOFTOP LEVEL (30')



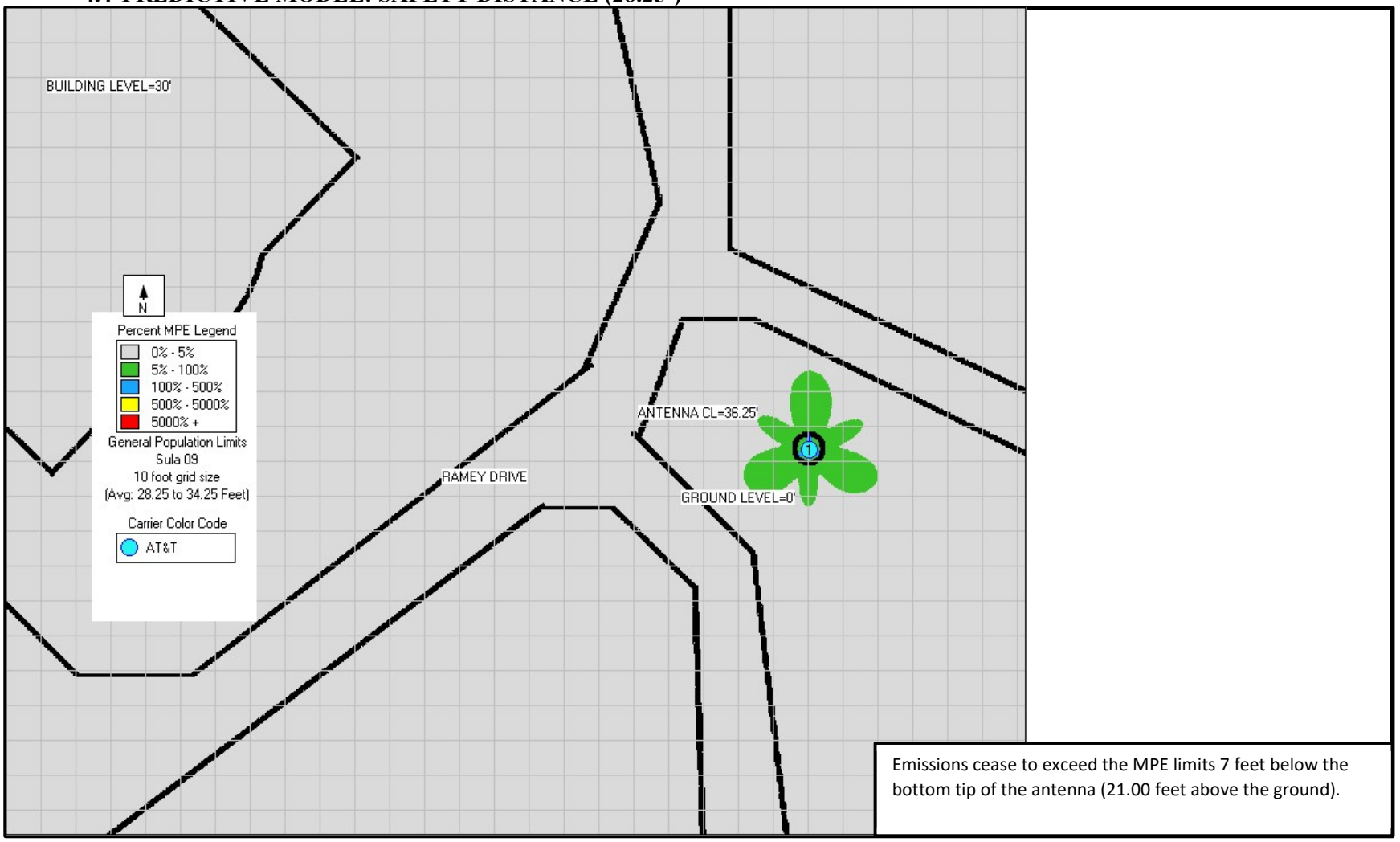
The closest structure is a 3-story building located approximately 210 feet to the Northwest of the utility pole installation. There are no areas at this building that exceed either the FCC's occupational or general population limit. At this closest structure at the antenna height the largest calculated value from this facility is 0.004% of the FCC's occupational limit (0.020% general population limit).

4.3 PREDICTIVE MODEL: ANTENNA LEVEL (33.25')



At the antenna level there is an area that extends 4' that may exceed the FCC's Occupational limits and an area that extends 13' that may exceed the FCC's General Public limits. The antenna level diagram is run 3 feet below the antenna to show the highest spatially averaged MPE levels.

4.4 PREDICTIVE MODEL: SAFETY DISTANCE (28.25')



Emissions cease to exceed the MPE limits 7 feet below the bottom tip of the antenna (21.00 feet above the ground).

5.0 STATEMENT OF COMPLIANCE

Centerline conducted worst case modeling to determine whether the light pole facility located at 60 Adams Street Dup1 in Manchester, Connecticut is in compliance with FCC Regulations.

5.1 STATEMENT OF AT&T MOBILITY COMPLIANCE

Based on the information analyzed, AT&T New England will be compliant with FCC Regulations once the mitigation measures recommended in this report are implemented.

5.2 RECOMMENDATIONS

Recommended Signage			
Sign Type	**Sign Size**	**# of Signs**	**Sign Placement**
Yellow Caution	10.25" x 10.25"	2	7' below the bottom tip of the antenna

Signage Installation Detail

- Place two signs opposite each other on the mounting structure (e.g., utility pole) 7' below the bottom tip of the antenna. Upper edge of each sign must be positioned at the bottom distance.

5.3 DESCRIPTION OF MPE-LIMIT EXCEEDING AREAS

Based on worst-case predictive modeling, there are no modeled exposures on any accessible walking/working surface related to AT&T New England's proposed antennas that exceed the FCC's occupational and/or general population exposure limits at this site.

At the antenna level there is an area that extends 4' that may exceed the FCC's Occupational limits and an area that extends 13' that may exceed the FCC's General Public limits.

There is an area that extends 6' below the bottom tip of the antenna that may exceed the FCC's Occupational limits and an area that extends 7' that may exceed the FCC's General Public limits.

5.4 CARRIER SIGNIFICANT CONTRIBUTION AREAS

At ground level there are no areas predicted to exceed 1% MPE of the general population limit.

The closest structure is a 3-story building located approximately 210 feet to the Northwest of the utility pole installation. There are no areas at this building that exceed either the FCC's occupational or general population limit. At this closest structure at the antenna height the largest calculated value from this facility is 0.004% of the FCC's occupational limit (0.020% general population limit).

5.5 COLLOCATOR SIGNIFICANT CONTRIBUTION AREAS

Based on review of construction drawings and aerial photographs, no collocators were identified onsite.

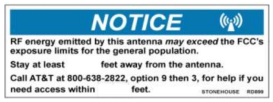
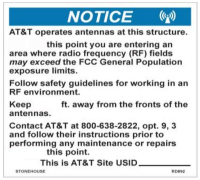
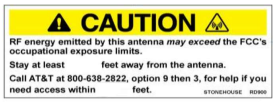
Based on worst-case predictive modeling, there are no modeled exposures on any accessible walking/working surface related to the carrier's proposed antennas that exceed the FCC's occupational and/or general population exposure limits at this site.

6.0 FALL ARREST AND PARAPET INFORMATION

As per AT&T New England barrier policy, rooftop edges that are protected with a 39-inch parapet wall or guardrail are safe for work activity within six (6) feet of the edge. OSHA has stated that an existing 39-inch guardrail or parapet provides sufficient protection for employees. The height of the top rail or equivalent component of guardrail systems in new construction shall be at least 42 inches above the walking or working surface. It should also be noted that the height of the parapet or guardrail may be reduced to no less than 30 inches at any point provided the sum of the depth (horizontal distance) of the top edge, and the height of the top edge (vertical distance from the work surface to the top edge of the top member, is at least 48 inches. If there is no reason for working atop the roof, then edge protection is not required. In addition, workers may use personnel lifts or temporary fall protection measures to perform work within 6 feet of the roof edge in place of permanent edge protection. Reference: 29 CFR 1910.28, 29 CFR 1910.23 (NPRM-1990); OSHA Letters of Interpretation 2/9/83 and 3/8/9

APPENDIX A: RF SIGNAGE

RF Signage

Sign	Description	Sign	Description
	**Blue Notice Decal** Used to alert individuals that they are entering an area that may exceed the FCC's General Population emissions limit. Must be positioned such that persons approaching from any angle have ample warning to avoid the marked areas.		**Blue Notice Sign** Used to alert individuals that they are entering an area that may exceed the FCC's General Population emissions limit. Must be positioned such that persons approaching from any angle have ample warning to avoid the marked areas.
	**Yellow Caution Decal** Used to inform individuals that they are entering an area that may exceed the FCC's Occupational emissions limit. Must be positioned such that persons approaching from any angle have ample warning to avoid the marked areas.		**Yellow Caution Sign** Used to inform individuals that they are entering an area that may exceed the FCC's Occupational emissions limit. Must be positioned such that persons approaching from any angle have ample warning to avoid the marked areas.

APPENDIX B: FCC GUIDELINES AND EMISSIONS THRESHOLD LIMITS

All power density values used in this report were 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 public may be exposed or in which persons who are exposed as a consequence of their employment may not be made fully aware of the potential for exposure or cannot exercise control over their exposure. Therefore, members of the general public would always be considered under this category when exposure is not employment related, for example, in the case of a telecommunications tower that exposes persons in a nearby residential area.

Public exposure to radio frequencies is regulated and enforced in units of microwatts per square centimeter ($\mu W/cm^2$). The general population exposure limit for the 700 and 800 MHz Bands is approximately 467 $\mu W/cm^2$ and 567 $\mu W/cm^2$ respectively, and the general population exposure limit for the 1900 MHz PCS and 2100 MHz AWS 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.

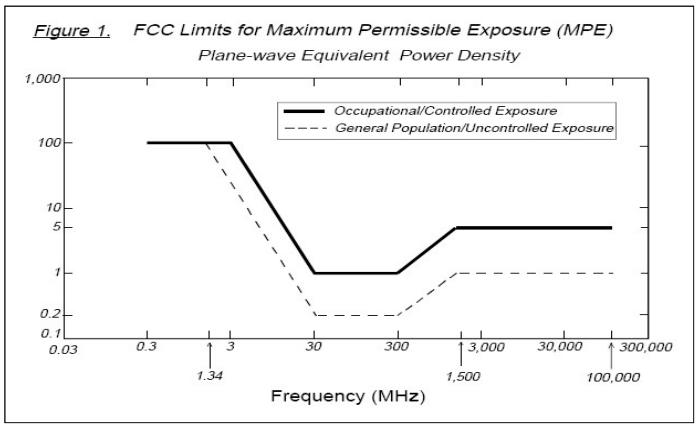
Occupational/Controlled exposure limits apply to situations in which persons are exposed as a consequence of their employment and in which those persons who are exposed have been made fully aware of the potential for exposure, have been properly trained in RF safety and can exercise control over their 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, have been trained in RF safety and can exercise control over his or her exposure by leaving the area or by some other appropriate means. The Occupational/Controlled exposure limits all utilized frequency bands is five (5) times the FCC's General Public / Uncontrolled exposure limit.

Additional details can be found in FCC OET 65.

Table 1: Limits for Maximum Permissible Exposure (MPE)				
(A) Limits for Occupational/Controlled Exposure				
Frequency Range (MHz)	**Electric Field Strength (E) (V/m)**	**Magnetic Field Strength (H) (A/m)**	**Power Density (S) (mW/cm^2)**	**Averaging Time $[E]^2$, $[H]^2$, or S (minutes)**
0.3-3.0	614	1.63	(100)*	6
3.0-30	1842/f	4.89/f	($900/f^2$)*	6
30-300	61.4	0.163	1.0	6
300-I,500	--	--	f/300	6
1,500-100,000	--	--	5	6
(B) Limits for General Public/Uncontrolled Exposure				
Frequency Range (MHz)	**Electric Field Strength (E) (V/m)**	**Magnetic Field Strength (H) (A/m)**	**Power Density (S) (mW/cm^2)**	**Averaging Time $[E]^2$, $[H]^2$, or S (minutes)**
0.3-1.34	614	1.63	(100)*	30
1.34-30	824/f	2.19/f	($180/f^2$)*	30
30-300	27.5	0.073	0.2	30
300-I,500	--	--	f/1,500	30
1,500-100,000	--	--	1.0	30

f = Frequency in (MHz)

* Plane-wave equivalent power density



APPENDIX C: CALCULATION METHODOLOGY

Centerline Communications, LLC has performed theoretical modeling using Waterford Consultants' RoofMaster™ 2020 Version 21.9.04.20 which uses a cylindrical model for conservative power density predictions within the near field of the antenna where the antenna pattern has not truly formed yet. Within this area power density values tend to decrease based upon an inverse distance function. At the point where it is appropriate for modeling to change from near-field calculations to far-field calculations the power decreases inversely with the square of the distance. This modeling technique is very accurate with very low antenna centerlines, such as rooftops, where persons can get very close to the antennas and pass through fields in close proximity.

The modeling is based on worst-case assumptions for the number of antennas and transmitter power.

APPENDIX D: CERTIFICATIONS

I, Alex Van Abbema, preparer of this report certify that I am fully trained and aware of the Rules and Regulations of both the Federal Communications Commissions (FCC) and the Occupational Safety and Health Administration (OSHA) with regard to Human Exposure to Radio Frequency Radiation. I have been trained in the procedures and requirements outlined in AT&T New England's RF Exposure: Responsibilities, Procedures & Guidelines document.

Alex Van Abbema

7/5/2022

I, Brandon Green, reviewer and approver of this report certify that I am fully trained and aware of the Rules and Regulations of both the Federal Communications Commissions (FCC) and the Occupational Safety and Health Administration (OSHA) with regard to Human Exposure to Radio Frequency Radiation. I have been trained in the procedures and requirements outlined in AT&T New England's RF Exposure: Responsibilities, Procedures & Guidelines document.

Brandon Green

7/5/2022

APPENDIX E: PROPRIETARY STATEMENT

This report was prepared for the use of AT&T New England to meet requirements specified in AT&T New England's corporate RF safety guidelines. It was performed in accordance with generally accepted practices of other consultants undertaking similar studies at the same time and in the same locale under like circumstances. The conclusions provided by Centerline Communications, LLC are based solely on the information provided by AT&T New England and all observations in this report are valid on the date of the investigation. Any additional information that becomes available concerning the site should be provided to Centerline Communications, LLC so that our conclusions may be revised and modified, if necessary. This report has been prepared in accordance with Standard Conditions for Engagement and authorized proposal, both of which are integral parts of this report. No other warranty, expressed or implied, is made.

ATTACHMENT 3

COMMSCOPE®

VARIOUS SITES THROUGHOUT THE STATE OF CONNECTICUT

STRUCTURAL CALCULATIONS FOR
NEW UP TO 33'-0" MAXIMUM CONCEALMENT POLE DESIGN FOR METROCELL (SSC-760240957xxx33xx)

MAXIMUM WIND SPEED OF V_{ASD} = 120 MPH

IBC 2015
ASCE 7-10
TIA-222-G

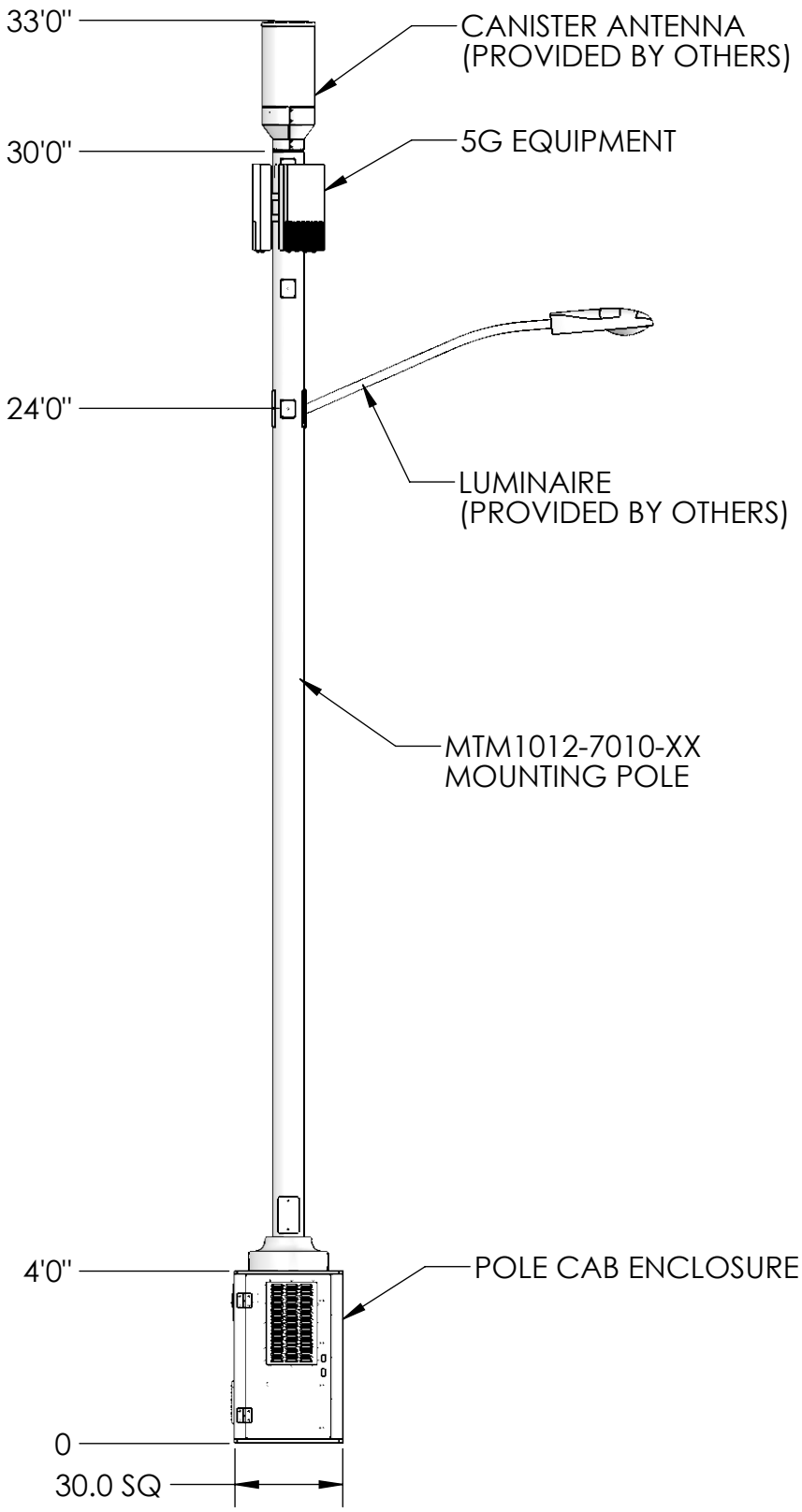
STRUCTURAL CALCULATIONS
REVISION 0

June 22, 2021

Revision #	Date Issued	Description
0	6/22/2021	Initial Calculations

J5 INFRASTRUCTURE PARTNERS

REVISIONS			
REV.	DESCRIPTION	BY	DATE
A	DRAWING RELEASE	MJP	05/06/2021



ALL DIMENSIONS ARE IN INCHES U.O.S.
TOLERANCES UNLESS OTHERWISE SPECIFIED:

.X = ±	.12	ANGLES	±2°
.XX = ±	.06	FRACTIONS	±1/32
.XXX= ±	.031		

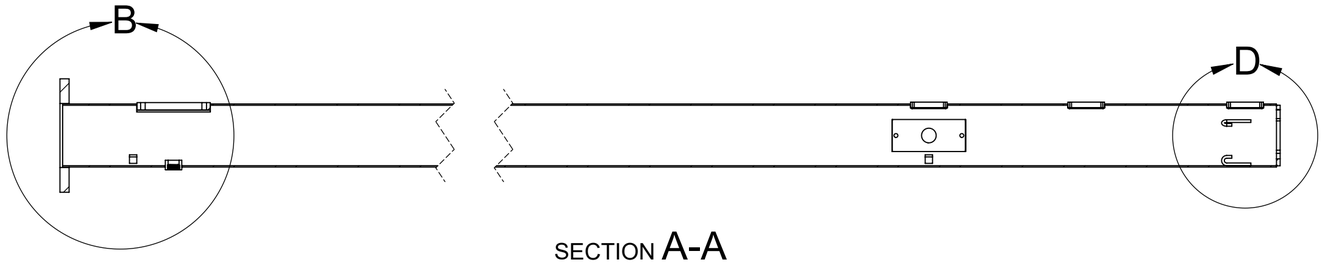
REMOVE BURRS AND BREAK EDGES .005

DO NOT SCALE THIS PRINT

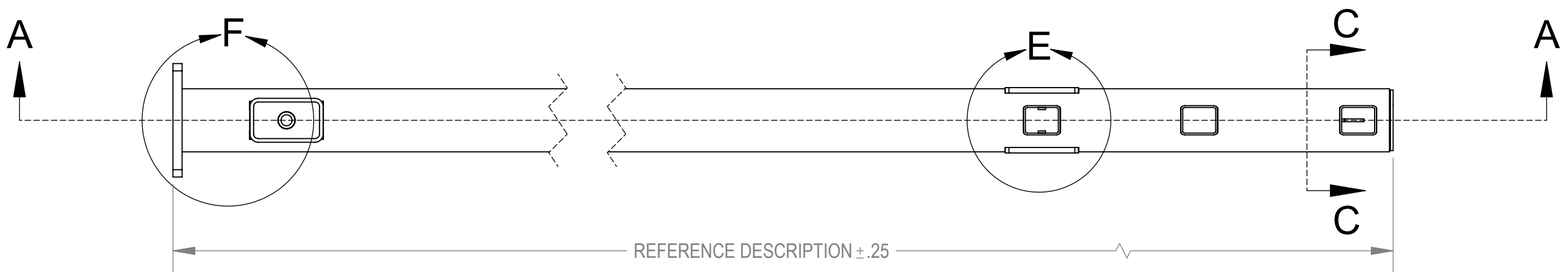
DRAWN BY: MJP	SHEET: 3 of 1	PART NUMBER: 760240957xxx33xx	
CHECKED BY:	SCALE:	DESCRIPTION: METRO CELL, POLECAB, 5G, 33FT	
DATE:	MATERIAL:	DRAWING TYPE:	
REVISION: A	FINISH:	COMMSCOPE®	
	WEIGHT		

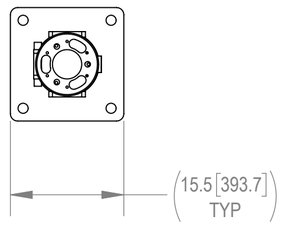
1.0 GENERAL NOTES
1.1 ALL METRIC DIMENSIONS ARE IN BRACKETS.
2.0 DESIGN NOTES
△E 2.1 QTY (2EA) FOR MTM1012-7421-XX.
3.0 MANUFACTURING/SPECIAL REQUIREMENTS
3.1 WELDING WORKMANSHIP PER AWS D1.1, TABLE 6.1.
3.2 GALVANIZE PER ASTM A123
3.3 FINISH: POWDERCOAT. -XX SUFFIX ON PRODUCT PART NUMBER REPRESENTS SPECIFIC COLOR. AND/OR FINISH. REFER TO METROCELL PRODUCT COLOR/FINISH SPECIFICATION MTM1004 FOR SPECIFIC REQUIREMENTS.
3.4 CLEAN HOLES AND CHASE THREADS AFTER GALVANIZING.
4.0 TEST
5.0 PACKAGING

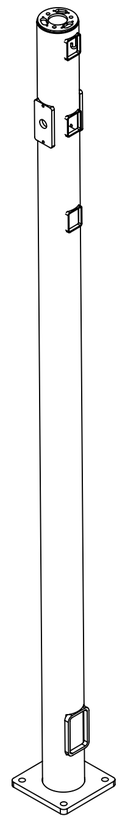
REVISIONS				
REV.	ECN	DESCRIPTION	BY	DATE
A	8000031433	INITIAL RELEASE	MMCFALL	9/11/2018
B	8000032336	UPDATE CUTOUTS	MMCFAL	10/30/2018
C	8000034759	ADD 26' POLE	GR1010	4/2/2019
D	8000036564	ADD 29' POLE	GR1010	7/18/2019
E	8000037040	ADD 7' POLE, ADD NOTE 2.1	MMCFALL	9/4/2019



SECTION A-A







BOM TABLE			
ITEM	PART NO.	DESCRIPTION	QTY.
1	MTM1012-76XX	POLE,xx' X 8.63"OD, POLE CAB (SEE TABLE)	1
2	MTM101230	HANDHOLE, 6" X 10"	1
3	MTM101231	4" X 5" HAND HOLE FOR MTC3170 POLE	3
4	MTC399902	LUMINAIRE MOUNT PLATE	2
5	MTC394026	1-1/4 HALF COUPLING, BLACK, MMC4513K76	1
6	MTC399926	J-HOOK	3
7	MTC3999101	PLATE, POLE TOP	1
8	MTM101221	POLE BASE PLATE, 8.625" OD POLE, 17" BC, 1-1/4" HOLES	1
9	MTM1029-711	WELD PLATE FOR CLIP SCREW MOUNT	4

POLE WELDMENT TABLE			
PART NUMBER	DESCRIPTION	POLE	WEIGHT (LBS)
MTM1012-7400-XX	POLE WLDMNT, 16'X8.63"OD, POLECAB	MTM1012-7600	355
MTM1012-7401-XX	POLE WLDMNT, 17'X8.63"OD, POLECAB	MTM1012-7601	372
MTM1012-7402-XX	POLE WLDMNT, 18'X8.63"OD, POLECAB	MTM1012-7602	388
MTM1012-7403-XX	POLE WLDMNT, 19'X8.63"OD, POLECAB	MTM1012-7603	405
MTM1012-7404-XX	POLE WLDMNT, 20'X8.63"OD, POLECAB	MTM1012-7604	422
MTM1012-7405-XX	POLE WLDMNT, 21'X8.63"OD, POLECAB	MTM1012-7605	439
MTM1012-7406-XX	POLE WLDMNT, 22'X8.63"OD, POLECAB	MTM1012-7606	456
MTM1012-7407-XX	POLE WLDMNT, 23'X8.63"OD, POLECAB	MTM1012-7607	473
MTM1012-7408-XX	POLE WLDMNT, 24'X8.63"OD, POLECAB	MTM1012-7608	490
MTM1012-7409-XX	POLE WLDMNT, 25'X8.63"OD, POLECAB	MTM1012-7609	506
MTM1012-7410-XX	POLE WLDMNT, 26'X8.63"OD, POLECAB	MTM1012-7610	523
MTM1012-7411-XX	POLE WLDMNT, 27'X8.63"OD, POLECAB	MTM1012-7611	540
MTM1012-7412-XX	POLE WLDMNT, 28'X8.63"OD, POLECAB	MTM1012-7612	557
MTM1012-7413-XX	POLE WLDMNT, 28'X8.63"OD, POLECAB	MTM1012-7613	557
MTM1012-7414-XX	POLE WLDMNT, 29'X8.63"OD, POLECAB	MTM1012-7614	574
MTM1012-7415-XX	POLE WLDMNT, 30'X8.63"OD, POLECAB	MTM1012-7615	591
MTM1012-7416-XX	POLE WLDMNT, 31'X8.63"OD, POLECAB	MTM1012-7616	608
MTM1012-7417-XX	POLE WLDMNT, 32'X8.63"OD, POLECAB	MTM1012-7617	624
MTM1012-7418-XX	POLE WLDMNT, 33'X8.63"OD, POLECAB	MTM1012-7618	641
MTM1012-7419-XX	POLE WLDMNT, 26'X8.63"OD, POLECAB	MTM1012-7619	523
MTM1012-7420-XX	POLE WLDMNT, 29'X8.63"OD, POLECAB	MTM1012-7620	569
MTM1012-7421-XX	POLE WLDMNT, 7'X8.63"OD, POLECAB	MTM1012-7621	199

△E

DENSITY		lbs/in³
MASS	485.28	lbs
VOLUME	1722.08	in³
SURFACE AREA	15908.57	in²
HEIGHT		
LENGTH		
WIDTH		

COMMSCOPE, INC. OF NORTH CAROLINA

TOLERANCES
0 PLACE X ± .25
1 PLACE .X ± .12
2 PLACE .XX ± 0.06
ANGLES ± 2°

SAP MATERIAL MASTER: MTM1012-74XX-XX

FINISH: SEE NOTES

MATERIAL: N/A

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES INTERPRET PER ANSI Y 14.5M-1994

	NAME	DATE
CE	MSM	09/12/18
RW	MMCFALL	10/14/2019
RV		
AD	MMCFALL	10/14/2019
RE	MMCFALL	10/14/2019

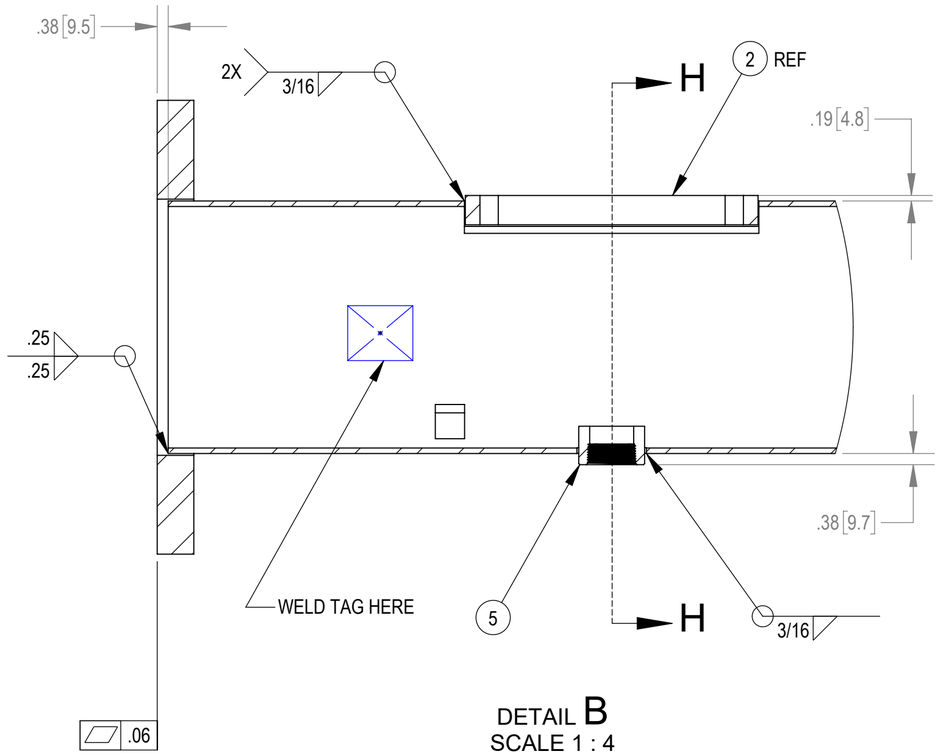
ECN 008000037220

TITLE: POLE WLDMNT, xx' X 8.63"OD, POLECAB

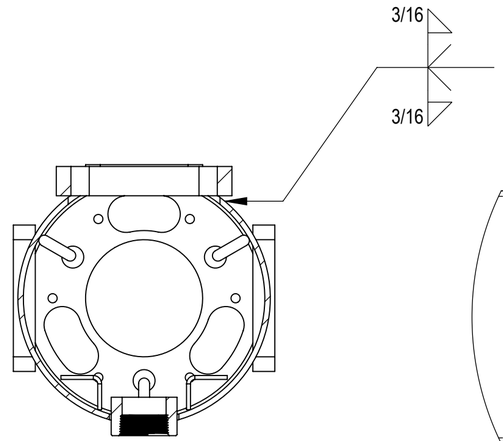
SCALE: 1:16

DOCUMENT NO.: MTM1012-74XX

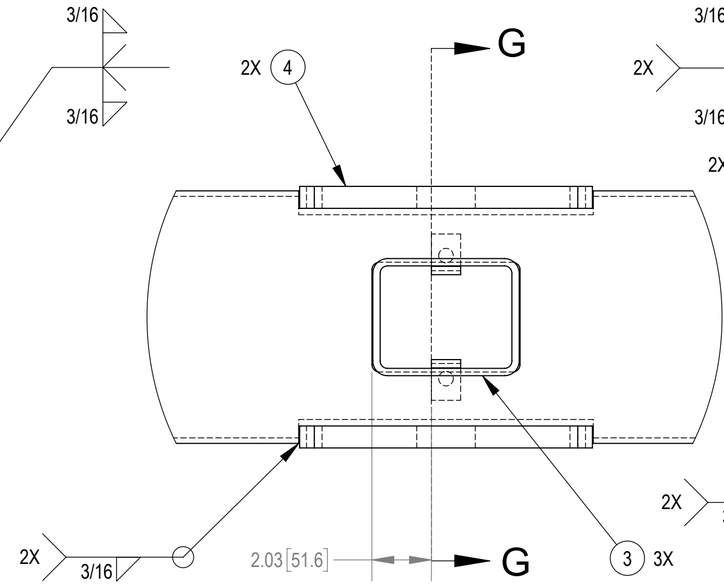
SIZE	WORK AREA	24	MODEL			DRAWING			SHEET
			VERSION	STATUS	REVISION	VERSION	STATUS	REVISION	
C			04	RE	E	07	RE	E	1 OF 2



DETAIL B
SCALE 1 : 4

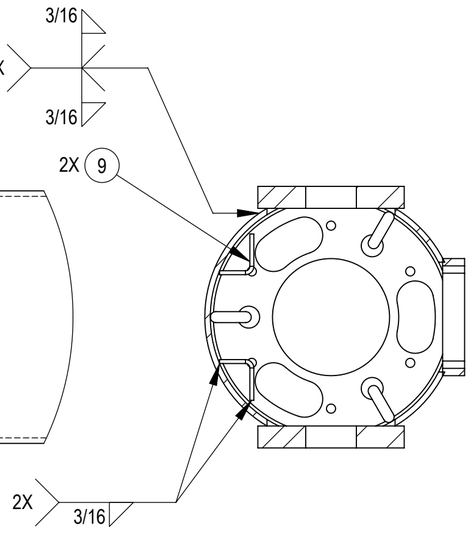


SECTION H-H
SCALE 1 : 4

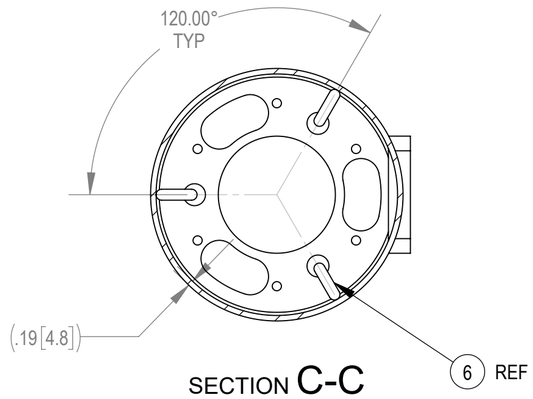


LUMINAIRE MOUNT 4 X 10

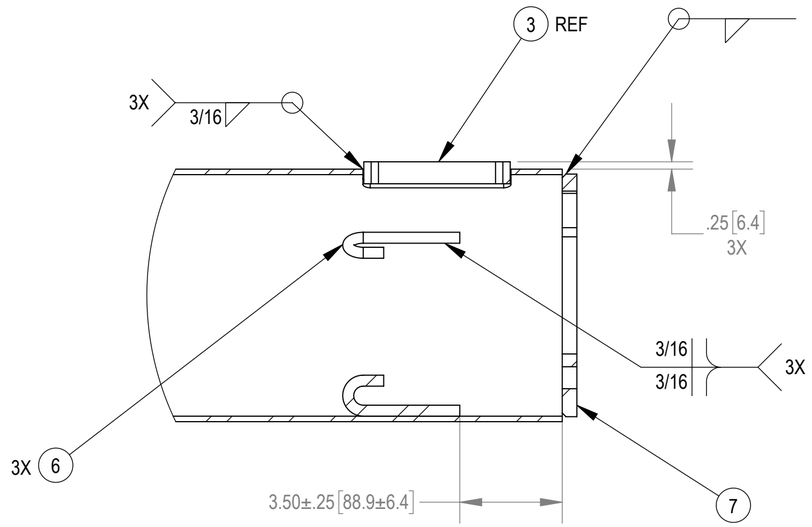
DETAIL E
SCALE 1 : 4



SECTION G-G
SCALE 1 : 4

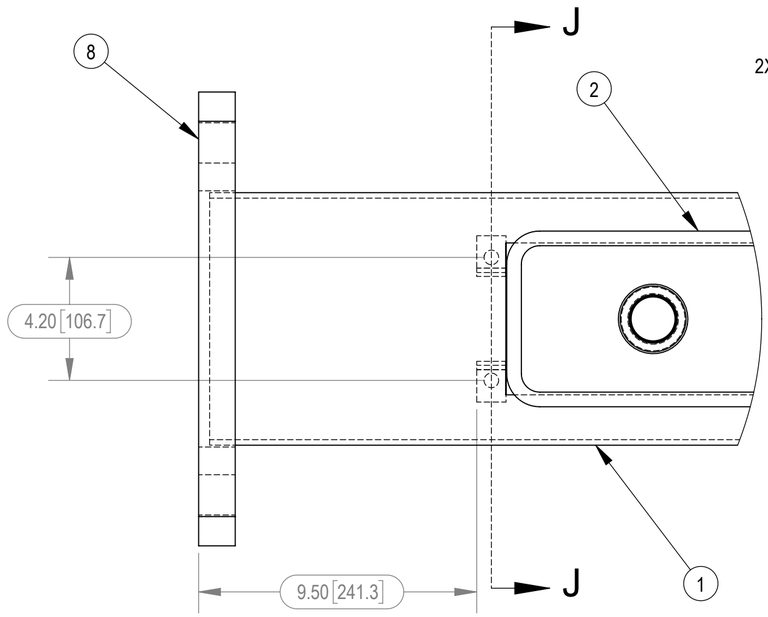


SECTION C-C
SCALE 1 : 4



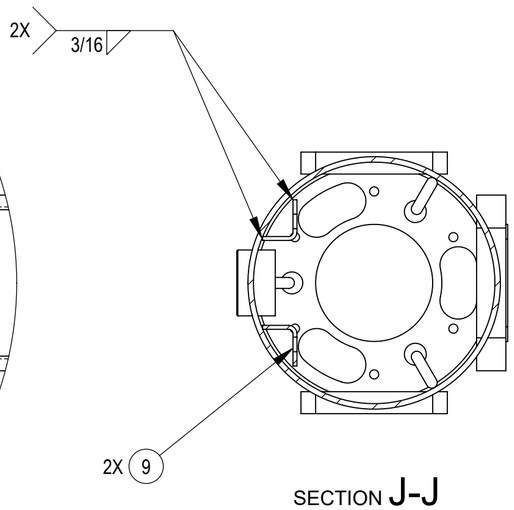
J-HOOK

DETAIL D
SCALE 1 : 4



HANDHOLE 6 X 10

DETAIL F
SCALE 1 : 4



SECTION J-J
SCALE 1 : 4

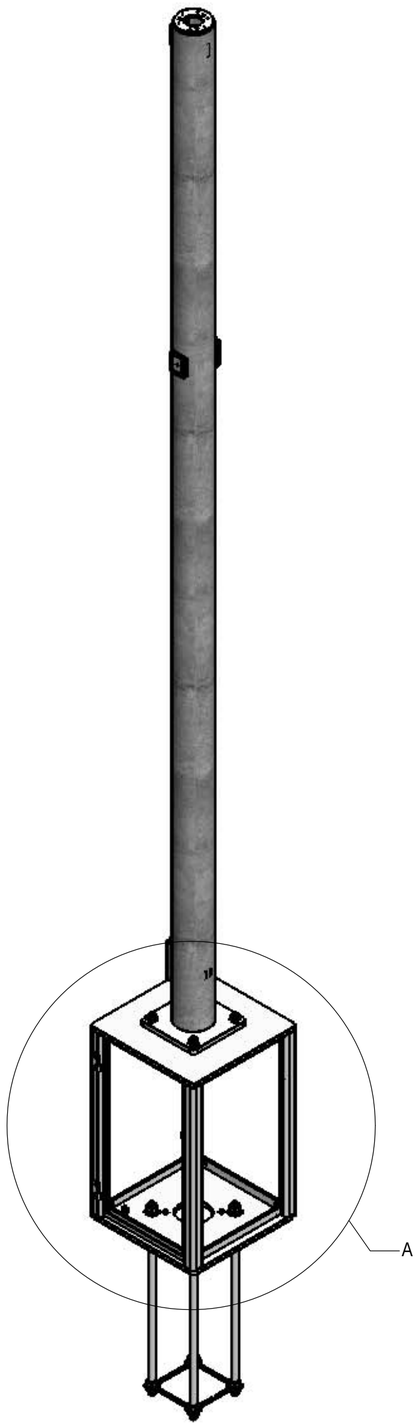
COMMSCOPE, INC. OF NORTH CAROLINA			
TITLE: POLE WLDMNT, xx' X 8.63"OD, POLECAB			
SIZE: C	SCALE: 1:16	DOCUMENT NO.: MTM1012-74XX	
		DRAWING	SHEET
		VERSION: 07 / STATUS: RE / REVISION: E	2 OF 2

NOTES:

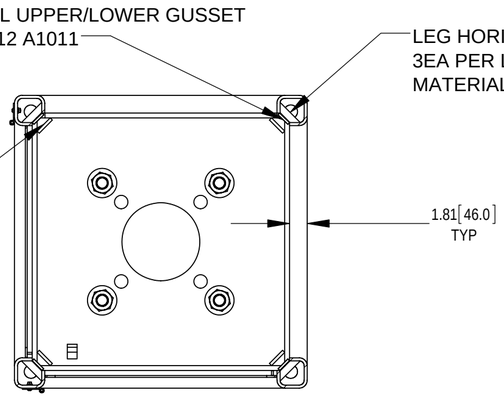
1.0 ALL METRIC DIMENSIONS ARE IN BRACKETS.
2.0 MARK PART WITH IDENTIFICATION NUMBER.
3.0 WELDING WORKMANSHIP PER AWS D1.1, TABLE 6.1.

THIS DRAWING IS INTENTED FOR STRUCTURE ANALYSIS ONLY

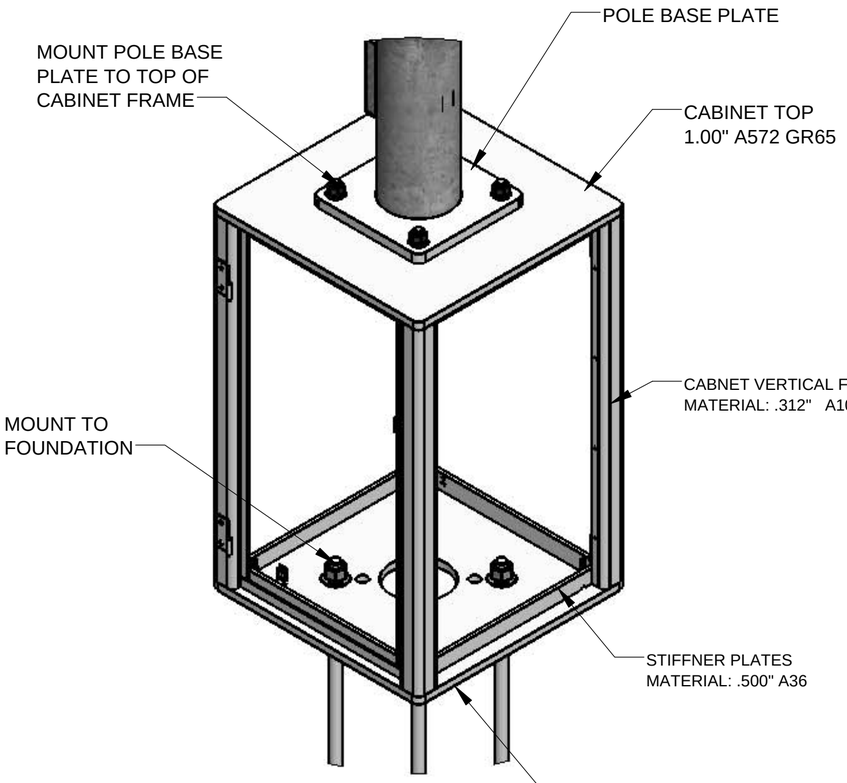
REVISIONS				
REV.	ECN	DESCRIPTION	BY	DATE
A		INITIAL RELEASE	MSM	04/10/18

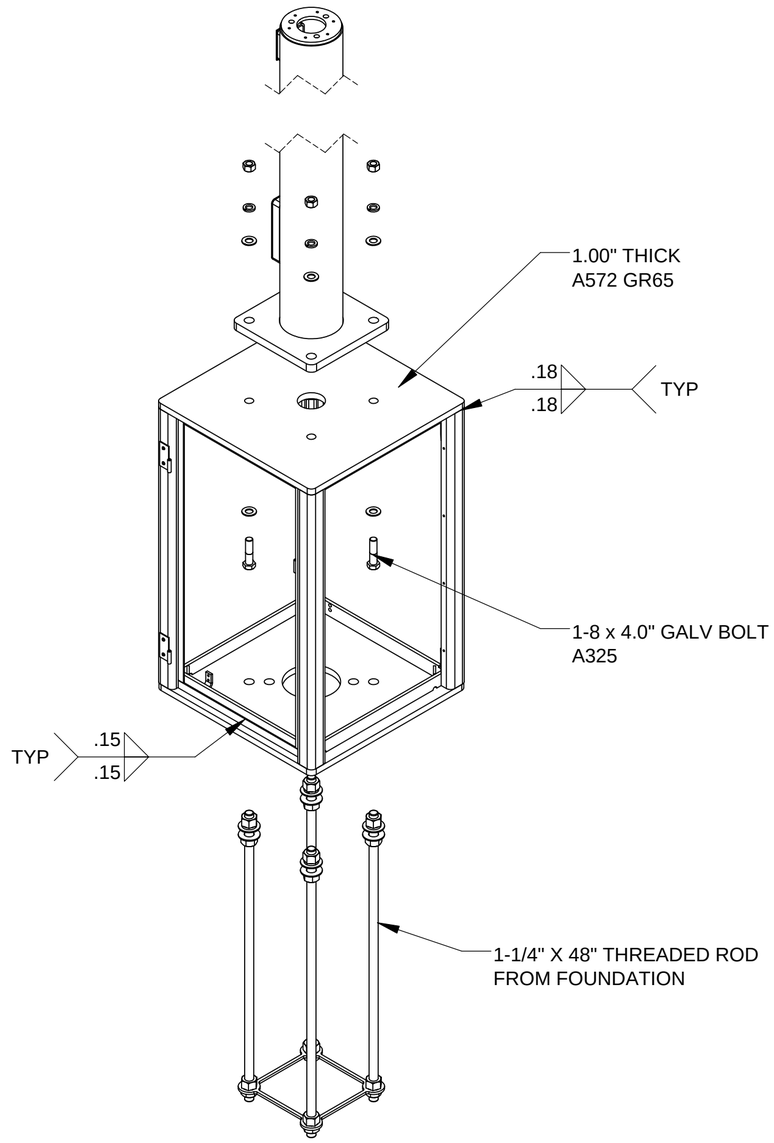


DETAIL A
SCALE 1 : 12



SECTION B-B
SCALE 1 : 12





DENSITY	0.28	lbs/in³
MASS	1227.30	lbs
VOLUME	4355.93	in³
SURFACE AREA		in²
HEIGHT		
LENGTH		
WIDTH		

COMMSCOPE, INC. OF NORTH CAROLINA

TOLERANCES
0 PLACE X ± .25
1 PLACE .X ± .12
2 PLACE .XX ± .06
ANGLES ± 2°

SAP MATERIAL MASTER: **pole_frame_setup**

FINISH: N/A

MATERIAL: A572, A1011, A36

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN MILLIMETERS INTERPRET PER ISO STANDARDS HANDBOOK TECHNICAL DRAWINGS, VOLUMES 1 & 2, THIRD EDITION (2002)

	NAME	DATE
CE	-	-
RW		
RV		
AD		
RE	TP	-
ECN	800000	

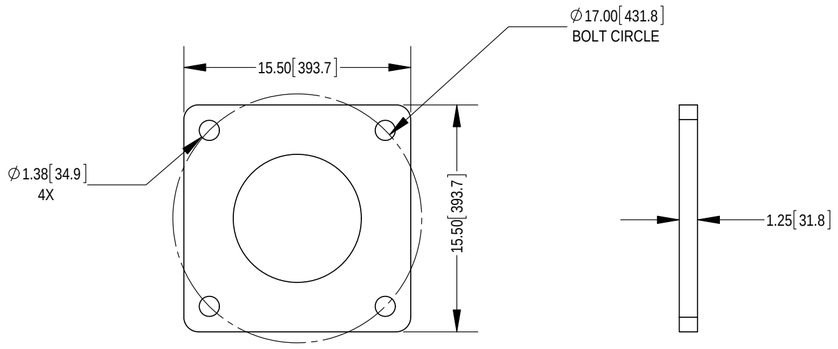
TITLE: **POLE-CABINET-INTERFACE PLATES STRUCTURE LAY-OUT FOR ANALYSIS**

SCALE: 1:16

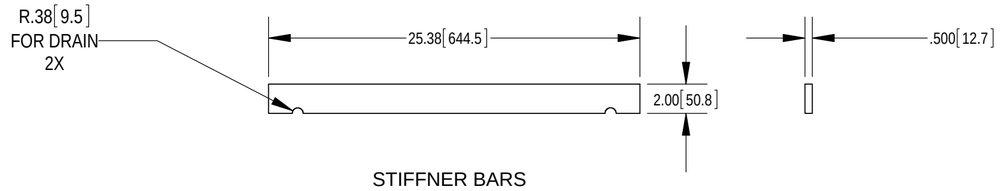
DOCUMENT NO.: **pole_frame_setup**

SIZE	WORK AREA	MODEL			DRAWING			SHEET
		VERSION	STATUS	REVISION	VERSION	STATUS	REVISION	
C							A	1 OF 2

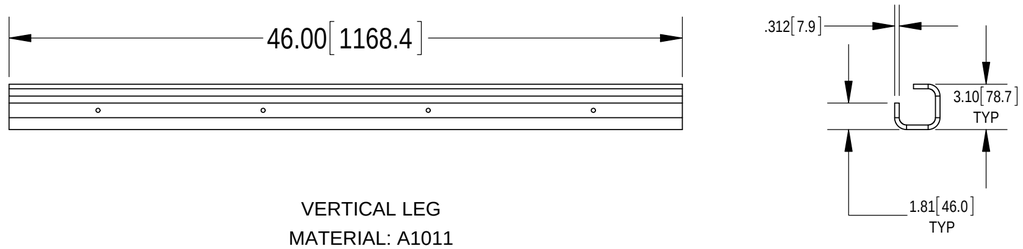
NOTES: 1.0 ALL METRIC DIMENSIONS ARE IN BRACKETS.



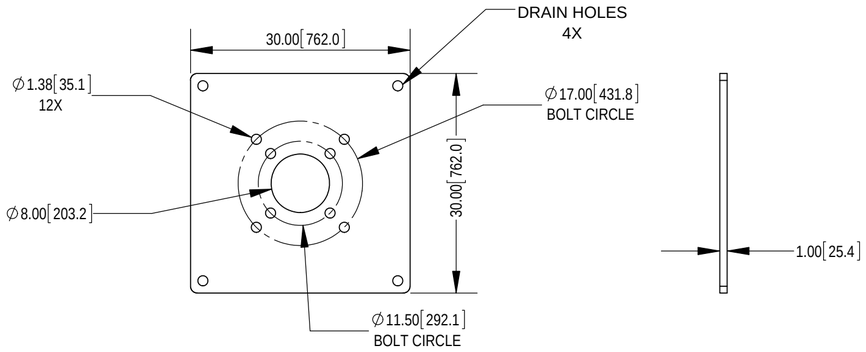
POLE BASE PLATE MOUNTED TO TOP OF CABINET
MATERIAL: A572



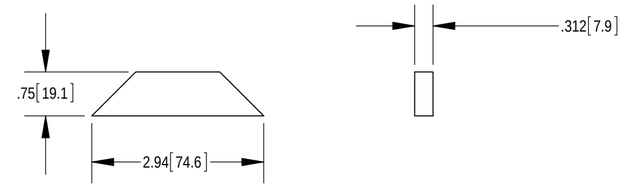
STIFFNER BARS
MATERIAL: A1011



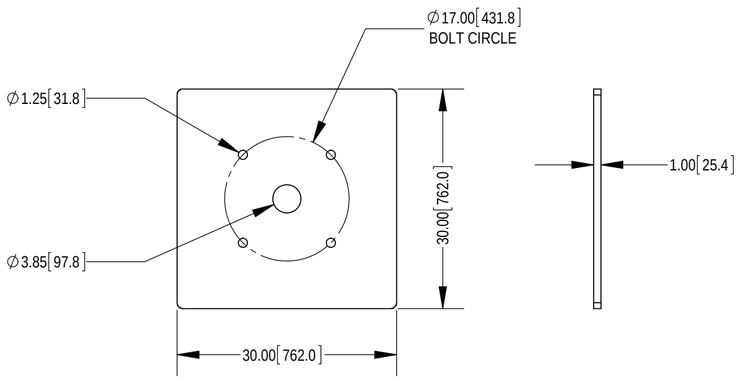
VERTICAL LEG
MATERIAL: A1011



BOTTOM PLATE OF CABINET
MATERIAL: A572 GR65



GUSSET, LEG
MATERIAL: A1011



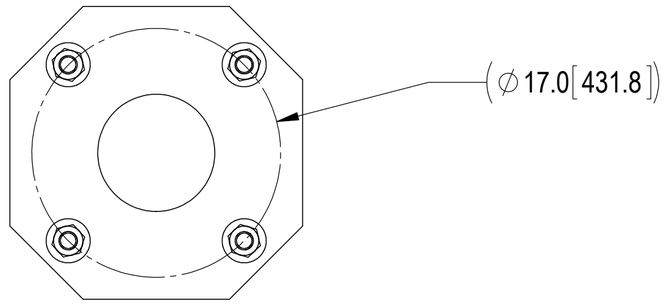
TOP PLATE OF CABINET
MATERIAL: A572 GR65

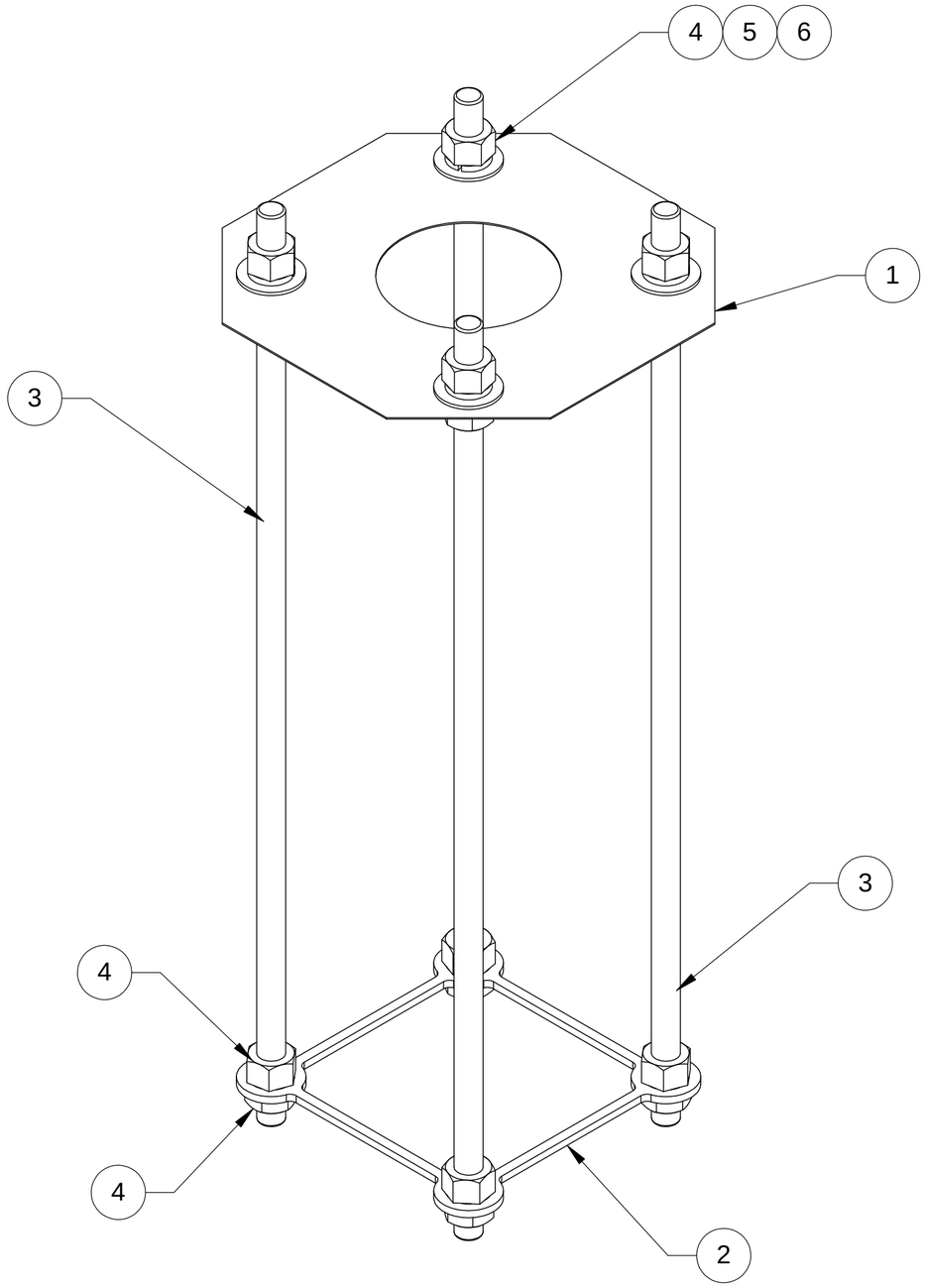
COMMSCOPE, INC. OF NORTH CAROLINA

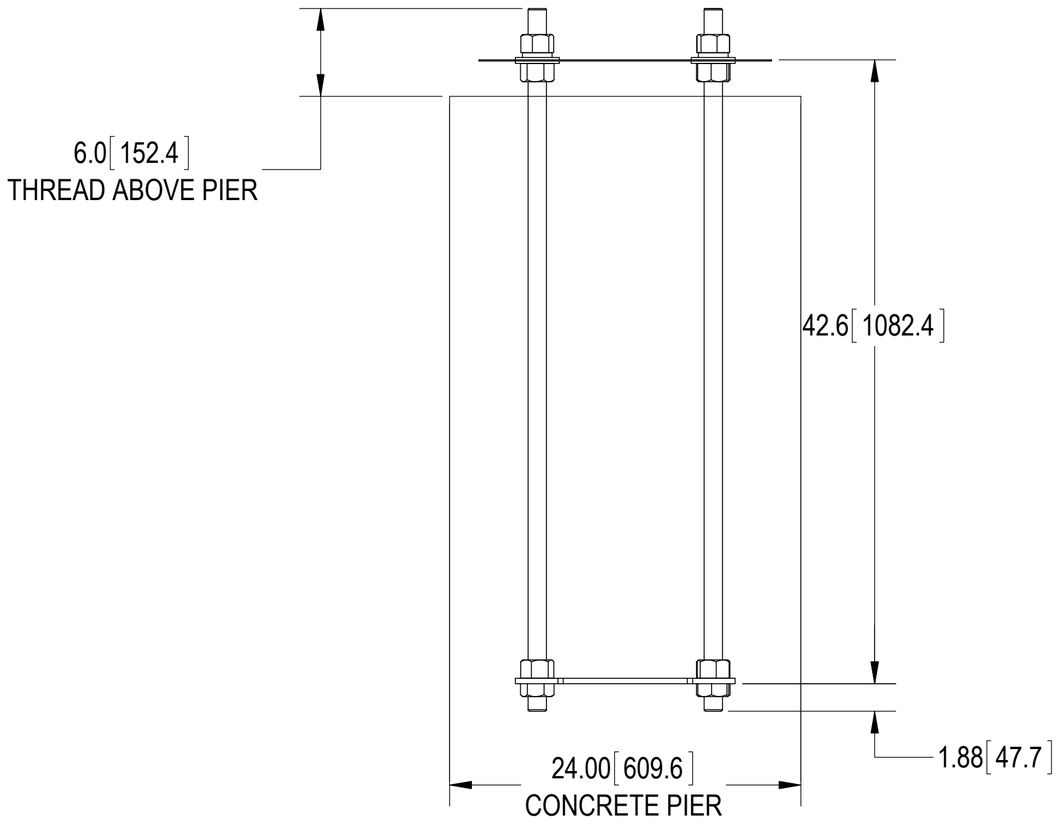
TITLE
POLE BASE PLATE, 8.625" OD POLE, 17" BC, 1-1/4" HOLES

SIZE	SCALE	DOCUMENT NO.			
C	1:16	**pole_frame_setup**			
		DRAWING			SHEET
		VERSION	STATUS	REVISION	
				A	2 OF 2

NOTES: 1.0 ALL METRIC DIMENSIONS ARE IN BRACKETS.
2.0 SET THREADED ROD TO BE 6.0" ABOVE FOUNDATION.







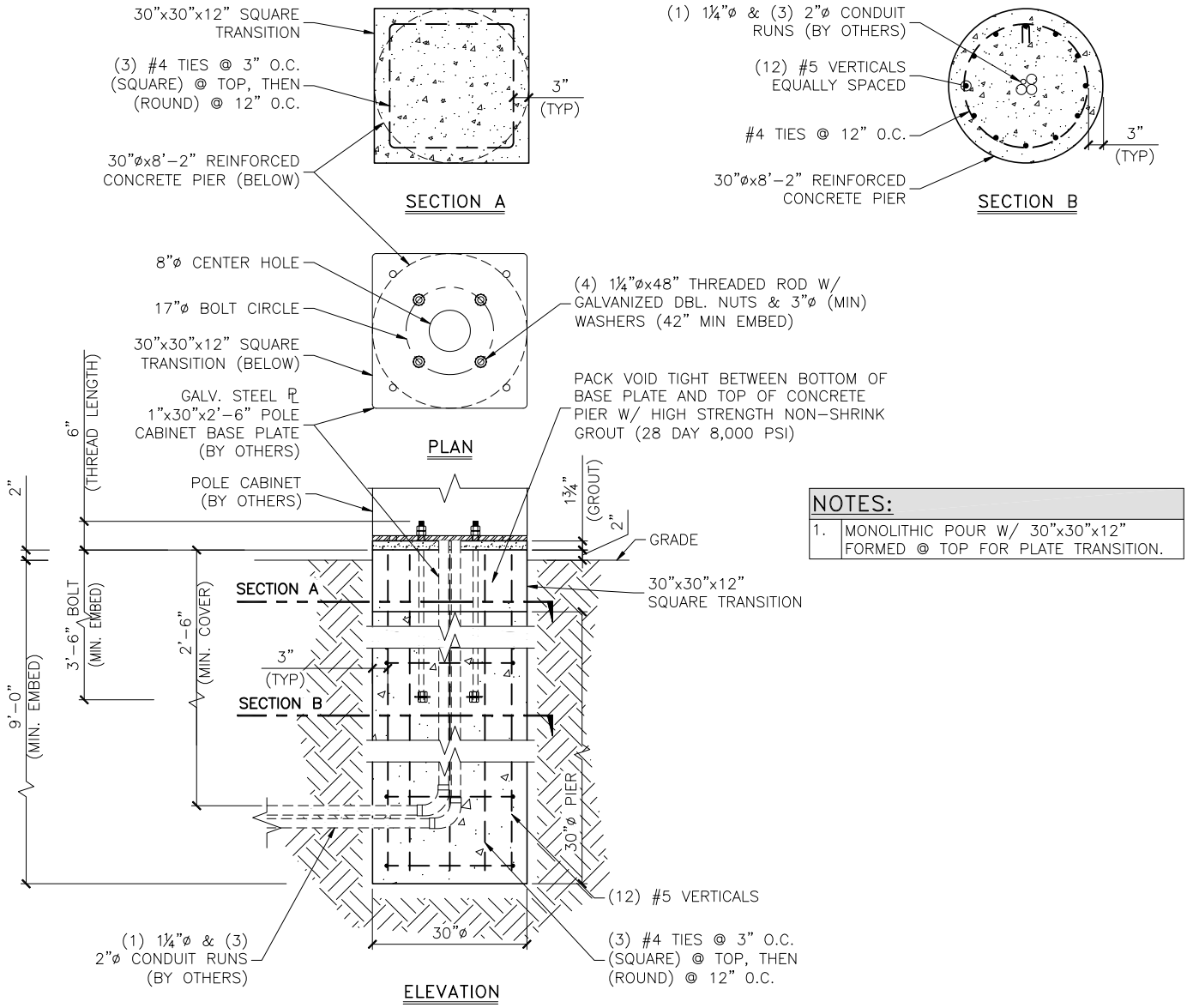
ITEM	PART NO.	DESCRIPTION	QTY.	WEIGHT	NOTE NO.
1	MTC3985FK01	FOUNDATION TEMPLATE, 1.25 HOLES X 17" BC	1	6.14 LBS	
2	MTC3985FK02	FOUNDATION TEMPLATE BOTTOM, 1.25 HOLES X 17" BC	1	4.35 LBS	
3	MT39312548	THREADED ROD, 1.25-7 X 48,F1554 GR55, GALV	4	16.59 LBS	
4	GN-10A	HEX NUT GALV, 1.25-7, HEAVY	16	0.872 LBS	
5	GWL-10	GALV WASHER, LOCK, 1-1/4"	4	0.168 LBS	
6	GWF-10A	GALV WASHER FLAT, 1.25" X 3"OD	8	0.260 LBS	

COMMSCOPE, INC. OF NORTH CAROLINA

TITLE

FOUNDATION KIT, 1.25 HOLES X 48" RODS X 17"BC

SIZE	SCALE	DOCUMENT NO.			
C	1:8	MTC3985FK			
		DRAWING			SHEET
		VERSION	STATUS	REVISION	
				B	2 OF 2



NOTES:

1.	MONOLITHIC POUR W/ 30"x30"x12" FORMED @ TOP FOR PLATE TRANSITION.

A S1 S1 POLE CABINET PIER FOUNDATION DETAIL
SCALE: 3/8"=1'-0"

CONCRETE & STEEL NOTES:

1.	ALL STEEL SHALL BE GALVANIZED PER ASTM A123 & CONFORM TO THE FOLLOWING MINIMUM SPECS.: PLATE ASTM A572 GR65, THREADED ROD ASTM F1554 GR.55
2.	ALL BOLTS SHALL BE GALVANIZED PER ASTM A153 AND CONFORM TO ASTM A325 U.N.O. ALL BOLTED CONNECTIONS SHALL BE EQUIPPED WITH AN APPROVED NUT-LOCKING DEVICE.
3.	ALL WELDING WORK SHALL CONFORM TO THE AWS D1.1 STRUCTURAL WELDING CODE. ALL WELDING SHALL BE PERFORMED BY CERTIFIED WELDERS ONLY. WELDING ELECTRODES SHALL BE E70XX.
4.	ALL DETAILING, FABRICATION AND ERECTION OF STRUCTURAL STEEL SHALL CONFORM TO AISC SPECS AND CODES, LATEST EDITION.
5.	TORCH-CUTTING OF ANY KIND SHALL NOT BE PERMITTED.
6.	ALL BOLTS SHALL BE TIGHTENED TO A "SNUG-TIGHT" CONDITION AS DEFINED IN AISC 13TH EDITION, PAGE 16.2-46, SECTION 8.1. THE SNUG-TIGHTENED CONDITION IS DEFINED AS THE TIGHTNESS THAT IS ATTAINED WITH A FEW IMPACTS OF AN IMPACT WRENCH OR THE FULL EFFORT OF AN IRONWORKER USING AN ORDINARY SPUD WRENCH TO BRING THE CONNECTED PLIES INTO FIRM CONTACT.
7.	f'_c=4000 PSI, Fy= 60 (KSI) SPECIAL INSPECTION REQUIRED FOR CONCRETE STRENGTH OVER 2500 PSI.

NOTE:

ALL DIMENSIONS, SECTIONS AND DETAILS OF THE EXISTING STRUCTURE ARE INCLUDED FOR INFORMATION PURPOSED ONLY. THE CONTRACTOR SHALL VERIFY ALL RELEVANT INFORMATION PRIOR TO CONSTRUCTION OR FABRICATION. FABRICATION AND/OR FIT-UP ISSUES ARE SOLELY THE RESPONSIBILITY OF THE CONTRACTOR TO IDENTIFY PRIOR TO THE START OF CONSTRUCTION. SHOULD THERE BE ANY DISCREPANCIES, ERRORS, OR OMISSIONS ON THIS SKETCH, NOTIFY THE ENGINEER OF RECORD IMMEDIATELY FOR RESOLUTION. ALL NEW WORK SHALL ACCOMMODATE EXISTING CONDITIONS.

DESIGNED FOR: COMMSCOPE®	DESIGNED BY: INFRASTRUCTURE PARTNERS	PROJECT NAME:	POLE CAB (60240957XXX33XX)
		PROJECT ADDRESS:	CONNECTICUT
		SHEET TITLE:	PIER FOUNDATION DETAIL
		BY: RWB DATE: 6/22/2021	SHEET NUMBER: S1

G:\My Drive\COMMSCOPE (ALL STATES)\CSI_8.5x11 (CONNECTICUT)\2021-06-22_100% REV 0 (60240957XXX33XX)

PROJECT: Commscope Up to 33'-0" Pole-Cab Lightpole Foundation

Project No. SSC-760240957xxx33xx

Height 33 ft

LOCATION: Various Sites throughout Connecticut Market

DESCRIPTION: Design a foundation for the up to 33'-0" Pole-Cab Lightpole for Connecticut Market for the loading below for the maximum design criteria below

LOADING:

(1) 16"ø x 24" Canister Antenna at top
w/ Antenna Mount

Weight 100 lbs

(3) 5G Equipment Radios at the 29'-0" level.

Weight 150 lbs

(1) Optional Luminaire Arm at the 24'-0" level.

Weight 125 lbs

(1) Optional Luminaires at the 26'-0" level.

Weight 40 lbs

(1) Metrocell Cabinet Base, 30"x30"x48" High

Weight 1000 lbs

POLE SIZE: 8.625x0.1875 thick

Top Diameter 8.625 inches

Bottom Diameter 8.625 inches

Steel Grade ASTM A500 Gr. C

Fy 46 ksi

Note:** ***Assume all pole opening sections have provided stiffness to have equivalent section properties of original pole

BASEPLATE: 1"x2'-6"x2'-6"

Thickness 1 inches

Width 30 inches

Steel Grade ASTM A572 GR.65

Fy 65 ksi

FOUNDATION:

Option A Anchor Bolts Embedded in Concrete Pier

Pier Size 30 inches

DESIGN CODE:

IBC 2015
ASCE 7-10
TIA-222-G
Exposure C
Structure Type II
Soil Site Class D
**** Note:*** ***Pole shall be installed more than 660ft from Open Water to qualify for use of Exposure C***

DESIGN LOADS:

(Look up values form Wind, Ice, and Seismic Table in G-Code)

Max. Wind Speed	120	V_{ASD} (G-Code)
	140	Vult (factored) Per IBC 2015
Location	Various Counties	
Max. Ice Wind Speed	50	mph
Location	Various Counties	
Max. Ice	1.5	inch
Location	Various Counties	

Since this is a Lightpole, it will likely on be used in City and Town areas, not in Mountains, so assume a Topography Category 1 and Exposure C for wind

Wind Presure	0.95	Kd
	0.85	Kz
	1	Kzt
	47.62829	psf (Factored)
Wind Force on Cabinet	F = q Gh Ca A	
	1.1	Gh
	1.2	Ca
	10	A
	629	lbs (Factored)
Max. Ss	0.41	g

Seismic may be ignored per Section 2.7.3 of G-Code

Use Method 1, Equivalent Later Force Procedure, from TIA-222-G Code (Section 2.7.7)

Fa	1.45	
Sms	0.5945	
Sds	0.396333	g
R	1.5	for pole structures
I	1	for Structural Class II and I
Structure Weight:	1823.3333	lbs (from TNX model and Commscope info)
Pole/Antenna/Light	823.3333	lbs
Cabinet	1000	lbs
Vs	482	lbs

WIND CONTROLS

TOWER BASE REACTIONS:

Take values from TNX model

	Factored			Unfactored (Use for Foundation Design)	
Axial	0.988	k	"---->	0.82	k
Shear	1.326	k		0.83	k
Moment	25.836	k-ft		16.15	k-ft
Wind from Cabinet	629	lbs		0.39	k
Moment from Cabinet	1257	lbs-ft		0.79	k-ft
Moment from Shear	5.304			3.315	k-ft
Total Moment	32.397			20.25	k-ft

Location for Wind Shear in Enercalc Foundation Model: 16.57 ft

Location for Shear Load in Enercalc

SEISMIC VERTICAL FORCE DISTRIBUTION:

TIA-222-G Section 2.7.7.1

frequency	1.027956	Hz
ke	1.607528	

E	29000	ksi
Iavg	41.30	in^4
Itop	41.30	in^4
Ibtm	41.30	in^4
Wu	0.14	k
Wt	1.82	k
Wl	1.683333	k
L	396	in
g	387.36	in/s^2

Level	wx (lbs)	hx (ft)	wx hx ^ k	Fsz (lbs)
Canister Antenna	100	31.5	25619.79	94.36
5G Radios	150	29	33646.23	123.92
Luminaire	40	26	7527.811	27.73
Luminaire Arm	125	25	22087.02	81.35
Pole	409	17	38878	143.19
Cabinet	1000	2	3047.292	11.22
Total	1824		130806.2	481.77

SEISMIC BASE REACTIONS:

Axial	1.82	k
Shear	0.48	k
Moment	11.78	k-ft

Location for Seismic Shear in Enercalc Foundation Model: 24.446 ft

Doesn't apply if Wind Controls

Note: Calculations use Ω factor of 1.5 for connection Design

SOIL PROPS:

Since we don't know location, assume minimul values from 2015 IBC

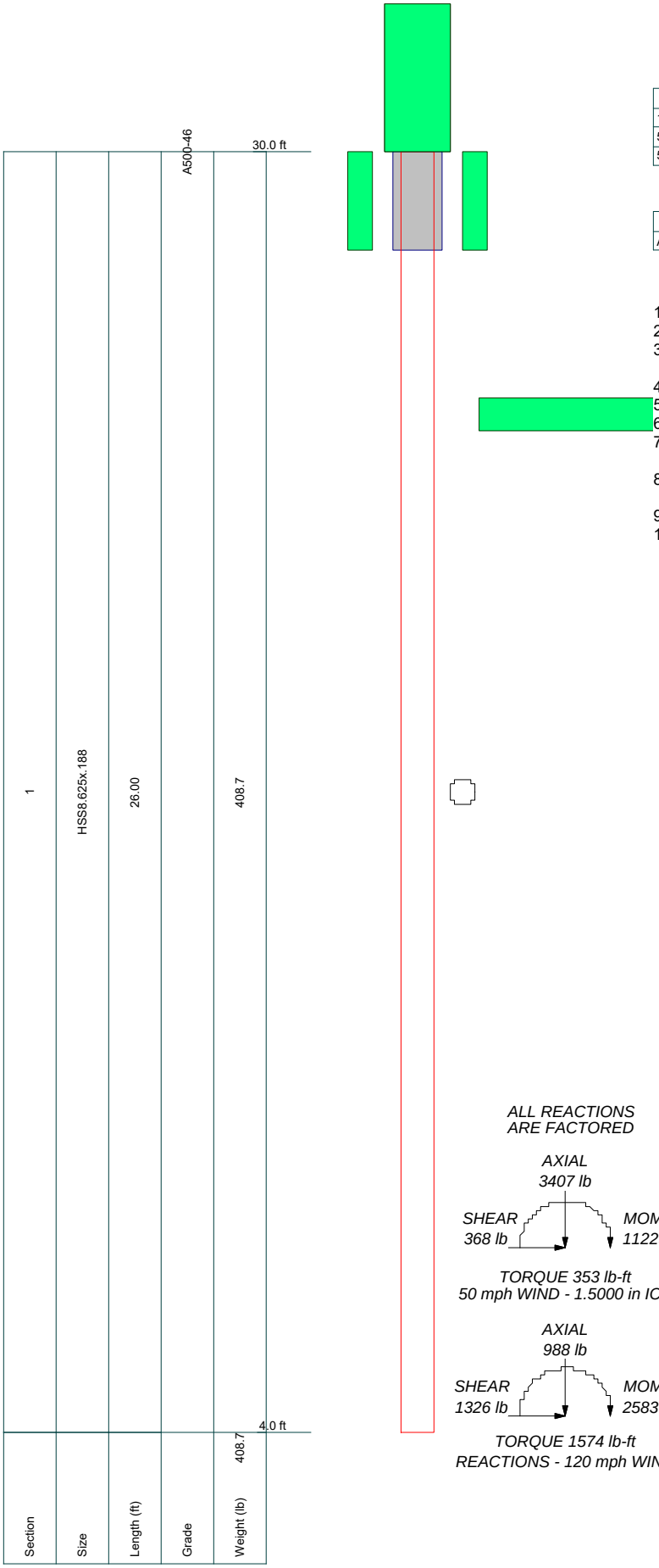
Lateral Bearing	100	psf/ft	
Soil Bearing	1500	psf	

Per IBC 1806.3.4, Design as Isolate pier, so double lateral bearing

Design Lateral Bearing	200	psf/ft	(use this value in Enercalc)
Max. Lateral Bearing	3000	psf	(use this value in Enercalc)

CONCRETE PIER REBAR:

Area	706.85835	in^2	
As	3.5342917	in^2	(minimum of As = 0.0050 * A)
Area #5 Bar	0.31	in^2	
Quantity Required	12		Use (12) #5 Vertical Rebar Exceeds the minimum rebar required from Caison model



DESIGNED APPURTENANCE LOADING

TYPE	ELEVATION	TYPE	ELEVATION
16"x3' Omni	31.5	5G Antenna 24x12x5	29
5G Antenna 24x12x5	29	24" Wx24"Dx6"H Street Light	26
5G Antenna 24x12x5	29	12' Light Arm (Street Light Mount)	25

MATERIAL STRENGTH

GRADE	Fy	Fu	GRADE	Fy	Fu
A500-46	46 ksi	62 ksi			

TOWER DESIGN NOTES

1. Tower designed for Exposure C to the TIA-222-G Standard.
2. Tower designed for a 120 mph basic wind in accordance with the TIA-222-G Standard.
3. Tower is also designed for a 50 mph basic wind with 1.50 in ice. Ice is considered to increase in thickness with height.
4. Deflections are based upon a 60 mph wind.
5. Tower Structure Class II.
6. Topographic Category 1 with Crest Height of 0.00 ft
7. Connections use galvanized A325 bolts, nuts and locking devices. Installation per TIA/EIA-222 and AISC Specifications.
8. Tower members are "hot dipped" galvanized in accordance with ASTM A123 and ASTM A153 Standards.
9. Welds are fabricated with ER-70S-6 electrodes.
10. TOWER RATING: 62.6%

ALL REACTIONS ARE FACTORED

AXIAL
3407 lb

SHEAR
368 lb

MOMENT
11229 lb-ft

TORQUE 353 lb-ft
50 mph WIND - 1.5000 in ICE

AXIAL
988 lb

SHEAR
1326 lb

MOMENT
25836 lb-ft

TORQUE 1574 lb-ft
REACTIONS - 120 mph WIND

J5 Infrastructure Partners

J5 Infrastructure Partners
Star, ID 83669
Phone: (949) 247-7767
FAX:

Job: ***SSC-760240957xxx33xx***			
Project: ***Foundation Design***			
Client: Commscope	Drawn by: Eric Rawlins, P.E., S.E.	App'd:	
Code: TIA-222-G	Date: 06/22/21	Scale: NTS	
Path:		Dwg No. E-1	

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 120 mph.
Structure Class II.
Exposure Category C.
Topographic Category 1.
Crest Height 0.00 ft.
Nominal ice thickness of 1.5000 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.
Connections use galvanized A325 bolts, nuts and locking devices. Installation per TIA/EIA-222 and AISC Specifications..
Tower members are "hot dipped" galvanized in accordance with ASTM A123 and ASTM A153 Standards..
Welds are fabricated with ER-70S-6 electrodes..
A non-linear (P-delta) analysis was used.
Pressures are calculated at each section.
Stress ratio used in pole design is 1.
Local bending stresses due to climbing loads, feed line supports, and appurtenance mounts are not considered.

Options

	Consider Moments - Legs		Distribute Leg Loads As Uniform		Use ASCE 10 X-Brace Ly Rules
	Consider Moments - Horizontals		Assume Legs Pinned		Calculate Redundant Bracing Forces
	Consider Moments - Diagonals		Assume Rigid Index Plate		Ignore Redundant Members in FEA
	Use Moment Magnification		Use Clear Spans For Wind Area		SR Leg Bolts Resist Compression
√	Use Code Stress Ratios		Use Clear Spans For KL/r		All Leg Panels Have Same Allowable
√	Use Code Safety Factors - Guys		Retension Guys To Initial Tension		Offset Girt At Foundation
	Escalate Ice	√	Bypass Mast Stability Checks	√	Consider Feed Line Torque
	Always Use Max Kz	√	Use Azimuth Dish Coefficients	√	Include Angle Block Shear Check
	Use Special Wind Profile	√	Project Wind Area of Appurt.		Use TIA-222-G Bracing Resist. Exemption
	Include Bolts In Member Capacity		Autocalc Torque Arm Areas		Use TIA-222-G Tension Splice Exemption
	Leg Bolts Are At Top Of Section		Add IBC .6D+W Combination		Poles
	Secondary Horizontal Braces Leg		Sort Capacity Reports By Component		Include Shear-Torsion Interaction
	Use Diamond Inner Bracing (4 Sided)		Triangulate Diamond Inner Bracing		Always Use Sub-Critical Flow
	SR Members Have Cut Ends		Treat Feed Line Bundles As Cylinder		Use Top Mounted Sockets
	SR Members Are Concentric		Ignore KL/ry For 60 Deg. Angle Legs		Pole Without Linear Attachments
					Pole With Shroud Or No Appurtenances
					Outside and Inside Corner Radii Are Known

Pole Section Geometry

Section	Elevation ft	Section Length ft	Pole Size	Pole Grade	Socket Length in
L1	30.00-4.00	26.00	HSS8.625x.188	A500-46 (46 ksi)	

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 30.00-4.00				1	1	1			

Feed Line/Linear Appurtenances - Entered As Round Or Flat

Description	Face or Leg	Allow Shield	Exclude From Torque Calculation	Component Type	Placement ft	Total Number	Number Per Row	Clear Spacing in	Width or Diameter in	Perimeter in	Weight plf
* EXISTING *											

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_A ft^2/ft	Weight plf
* EXISTING *								

Feed Line/Linear Appurtenances Section Areas

Tower Section	Tower Elevation ft	Face	A_R ft^2	A_F ft^2	C_AA_A In Face ft^2	C_AA_A Out Face ft^2	Weight lb
L1	30.00-4.00	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	0.00

Feed Line/Linear Appurtenances Section Areas - With Ice

Tower Section	Tower Elevation ft	Face or Leg	Ice Thickness in	A_R ft^2	A_F ft^2	C_AA_A In Face ft^2	C_AA_A Out Face ft^2	Weight lb
L1	30.00-4.00	A	2.807	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	0.00

Feed Line Center of Pressure

Section	Elevation	CP_X	CP_Z	CP_X Ice	CP_Z Ice
	ft	in	in	in	in
L1	30.00-4.00	0.0000	0.0000	0.0000	0.0000

Note: For pole sections, center of pressure calculations do not consider feed line shielding.

Shielding Factor Ka

Tower Section	Feed Line Record No.	Description	Feed Line Segment Elev.	K_a No Ice	K_a Ice

Discrete Tower Loads

Description	Face or Leg	Offset Type	Offsets: Horz Lateral Vert ft ft ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight lb
* EXISTING *									
16"x3' Omni	C	None		0.0000	31.50	No Ice	2.00	2.00	100.00
						1/2" Ice	3.06	3.06	137.59
						1" Ice	3.33	3.33	178.80
						2" Ice	3.89	3.89	272.67
12' Light Arm	B	From Leg	4.00	-30.0000	25.00	No Ice	0.13	4.80	125.00
(Street Light Mount)			0.00			1/2" Ice	0.18	5.63	167.81
			0.00			1" Ice	0.24	6.46	220.67
						2" Ice	0.37	8.15	357.30
24" Wx24"Dx6"H Street	B	From Leg	8.00	-30.0000	26.00	No Ice	1.20	1.20	40.00
Light			0.00			1/2" Ice	1.37	1.37	69.78
			0.00			1" Ice	1.55	1.55	103.26
						2" Ice	1.93	1.93	182.07
5G Antenna 24x12x5	A	From Leg	1.00	0.0000	29.00	No Ice	2.40	1.09	50.00
			0.00			1/2" Ice	2.60	1.24	66.53
			0.00			1" Ice	2.81	1.41	85.91
						2" Ice	3.26	1.77	134.00
5G Antenna 24x12x5	B	From Leg	1.00	0.0000	29.00	No Ice	2.40	1.09	50.00
			0.00			1/2" Ice	2.60	1.24	66.53
			0.00			1" Ice	2.81	1.41	85.91
						2" Ice	3.26	1.77	134.00
5G Antenna 24x12x5	C	From Leg	1.00	0.0000	29.00	No Ice	2.40	1.09	50.00
			0.00			1/2" Ice	2.60	1.24	66.53
			0.00			1" Ice	2.81	1.41	85.91
						2" Ice	3.26	1.77	134.00

Dishes

Description	Face or Leg	Dish Type	Offset Type	Offsets: Horz Lateral Vert ft	Azimuth Adjustment °	3 dB Beam Width °	Elevation ft	Outside Diameter ft	Aperture Area ft^2	Weight lb
* EXISTING *										

Force Totals

Load Case	Vertical Forces lb	Sum of Forces X lb	Sum of Forces Z lb	Sum of Overturning Moments, M_x lb-ft	Sum of Overturning Moments, M_z lb-ft	Sum of Torques lb-ft
Leg Weight	408.71					
Bracing Weight	0.00					
Total Member Self-Weight	408.71			439.65	-761.49	
Total Weight	823.71			439.65	-761.49	
Wind 0 deg - No Ice		0.00	-828.89	-15124.95	-761.49	978.85
Wind 30 deg - No Ice		329.48	-717.84	-13039.69	-6759.49	945.08
Wind 60 deg - No Ice		570.67	-414.44	-7342.65	-11150.33	658.07
Wind 90 deg - No Ice		658.96	0.00	439.65	-12757.49	194.74
Wind 120 deg - No Ice		570.67	414.44	8221.95	-11150.33	-320.78
Wind 150 deg - No Ice		329.48	717.84	13918.98	-6759.49	-750.34
Wind 180 deg - No Ice		0.00	828.89	16004.24	-761.49	-978.85
Wind 210 deg - No Ice		-329.48	717.84	13918.98	5236.50	-945.08
Wind 240 deg - No Ice		-570.67	414.44	8221.95	9627.34	-658.07
Wind 270 deg - No Ice		-658.96	0.00	439.65	11234.50	-194.74
Wind 300 deg - No Ice		-570.67	-414.44	-7342.65	9627.34	320.78
Wind 330 deg - No Ice		-329.48	-717.84	-13039.69	5236.50	750.34
Member Ice	1019.54					
Total Weight Ice	3242.45			2351.16	-4072.33	
Wind 0 deg - Ice		0.00	-368.03	-4043.95	-4072.33	339.43
Wind 30 deg - Ice		154.92	-318.72	-3187.16	-6658.82	328.51
Wind 60 deg - Ice		268.32	-184.01	-846.39	-8552.26	229.57
Wind 90 deg - Ice		309.83	0.00	2351.16	-9245.31	69.12
Wind 120 deg - Ice		268.32	184.01	5548.72	-8552.26	-109.86
Wind 150 deg - Ice		154.92	318.72	7889.49	-6658.82	-259.39
Wind 180 deg - Ice		0.00	368.03	8746.27	-4072.33	-339.43
Wind 210 deg - Ice		-154.92	318.72	7889.49	-1485.85	-328.51
Wind 240 deg - Ice		-268.32	184.01	5548.72	407.59	-229.57
Wind 270 deg - Ice		-309.83	0.00	2351.16	1100.64	-69.12
Wind 300 deg - Ice		-268.32	-184.01	-846.39	407.59	109.86
Wind 330 deg - Ice		-154.92	-318.72	-3187.16	-1485.85	259.39
Total Weight	823.71			439.65	-761.49	
Wind 0 deg - Service		0.00	-235.06	-3687.40	-761.49	218.95
Wind 30 deg - Service		98.53	-203.57	-3134.48	-2425.90	211.40
Wind 60 deg - Service		170.65	-117.53	-1623.88	-3644.33	147.20
Wind 90 deg - Service		197.05	0.00	439.65	-4090.31	43.56
Wind 120 deg - Service		170.65	117.53	2503.17	-3644.33	-71.75
Wind 150 deg - Service		98.53	203.57	4013.78	-2425.90	-167.84
Wind 180 deg - Service		0.00	235.06	4566.70	-761.49	-218.95
Wind 210 deg - Service		-98.53	203.57	4013.78	902.91	-211.40
Wind 240 deg - Service		-170.65	117.53	2503.17	2121.34	-147.20
Wind 270 deg - Service		-197.05	0.00	439.65	2567.32	-43.56

Load Case	Vertical Forces lb	Sum of Forces X lb	Sum of Forces Z lb	Sum of Overturning Moments, M_x lb-ft	Sum of Overturning Moments, M_z lb-ft	Sum of Torques lb-ft
Wind 300 deg - Service		-170.65	-117.53	-1623.88	2121.34	71.75
Wind 330 deg - Service		-98.53	-203.57	-3134.48	902.91	167.84

Load Combinations

Comb. No.	Description
1	Dead Only
2	1.2 Dead+1.6 Wind 0 deg - No Ice
3	0.9 Dead+1.6 Wind 0 deg - No Ice
4	1.2 Dead+1.6 Wind 30 deg - No Ice
5	0.9 Dead+1.6 Wind 30 deg - No Ice
6	1.2 Dead+1.6 Wind 60 deg - No Ice
7	0.9 Dead+1.6 Wind 60 deg - No Ice
8	1.2 Dead+1.6 Wind 90 deg - No Ice
9	0.9 Dead+1.6 Wind 90 deg - No Ice
10	1.2 Dead+1.6 Wind 120 deg - No Ice
11	0.9 Dead+1.6 Wind 120 deg - No Ice
12	1.2 Dead+1.6 Wind 150 deg - No Ice
13	0.9 Dead+1.6 Wind 150 deg - No Ice
14	1.2 Dead+1.6 Wind 180 deg - No Ice
15	0.9 Dead+1.6 Wind 180 deg - No Ice
16	1.2 Dead+1.6 Wind 210 deg - No Ice
17	0.9 Dead+1.6 Wind 210 deg - No Ice
18	1.2 Dead+1.6 Wind 240 deg - No Ice
19	0.9 Dead+1.6 Wind 240 deg - No Ice
20	1.2 Dead+1.6 Wind 270 deg - No Ice
21	0.9 Dead+1.6 Wind 270 deg - No Ice
22	1.2 Dead+1.6 Wind 300 deg - No Ice
23	0.9 Dead+1.6 Wind 300 deg - No Ice
24	1.2 Dead+1.6 Wind 330 deg - No Ice
25	0.9 Dead+1.6 Wind 330 deg - No Ice
26	1.2 Dead+1.0 Ice+1.0 Temp
27	1.2 Dead+1.0 Wind 0 deg+1.0 Ice+1.0 Temp
28	1.2 Dead+1.0 Wind 30 deg+1.0 Ice+1.0 Temp
29	1.2 Dead+1.0 Wind 60 deg+1.0 Ice+1.0 Temp
30	1.2 Dead+1.0 Wind 90 deg+1.0 Ice+1.0 Temp
31	1.2 Dead+1.0 Wind 120 deg+1.0 Ice+1.0 Temp
32	1.2 Dead+1.0 Wind 150 deg+1.0 Ice+1.0 Temp
33	1.2 Dead+1.0 Wind 180 deg+1.0 Ice+1.0 Temp
34	1.2 Dead+1.0 Wind 210 deg+1.0 Ice+1.0 Temp
35	1.2 Dead+1.0 Wind 240 deg+1.0 Ice+1.0 Temp
36	1.2 Dead+1.0 Wind 270 deg+1.0 Ice+1.0 Temp
37	1.2 Dead+1.0 Wind 300 deg+1.0 Ice+1.0 Temp
38	1.2 Dead+1.0 Wind 330 deg+1.0 Ice+1.0 Temp
39	Dead+Wind 0 deg - Service
40	Dead+Wind 30 deg - Service
41	Dead+Wind 60 deg - Service
42	Dead+Wind 90 deg - Service
43	Dead+Wind 120 deg - Service
44	Dead+Wind 150 deg - Service
45	Dead+Wind 180 deg - Service
46	Dead+Wind 210 deg - Service
47	Dead+Wind 240 deg - Service
48	Dead+Wind 270 deg - Service
49	Dead+Wind 300 deg - Service

Comb. No.	Description
50	Dead+Wind 330 deg - Service

Maximum Reactions

Location	Condition	Gov. Load Comb.	Vertical lb	Horizontal, X lb	Horizontal, Z lb
Pole	Max. Vert	37	3407.19	268.32	184.01
	Max. H_x	21	741.34	1054.33	-0.00
	Max. H_z	2	988.45	-0.00	1326.22
	Max. M_x	3	24780.08	-0.00	1326.22
	Max. M_z	8	20419.88	-1054.33	-0.00
	Max. Torsion	14	1573.60	-0.00	-1326.22
	Min. Vert	5	741.34	-527.16	1148.54
	Min. H_x	9	741.34	-1054.33	-0.00
	Min. H_z	14	988.45	-0.00	-1326.22
	Min. M_x	14	-25818.70	-0.00	-1326.22
	Min. M_z	21	-18713.39	1054.33	-0.00
	Min. Torsion	2	-1573.93	-0.00	1326.22

Tower Mast Reaction Summary

Load Combination	Vertical lb	$Shear_x$ lb	$Shear_z$ lb	Overturning Moment, M_x lb-ft	Overturning Moment, M_z lb-ft	Torque lb-ft
Dead Only	823.71	0.00	0.00	448.30	-776.49	0.00
1.2 Dead+1.6 Wind 0 deg - No Ice	988.45	0.00	-1326.22	-24739.75	-933.52	1573.93
0.9 Dead+1.6 Wind 0 deg - No Ice	741.34	0.00	-1326.22	-24780.08	-696.01	1571.37
1.2 Dead+1.6 Wind 30 deg - No Ice	988.45	527.16	-1148.54	-21353.85	-10675.58	1521.27
0.9 Dead+1.6 Wind 30 deg - No Ice	741.34	527.16	-1148.54	-21407.08	-10400.68	1518.52
1.2 Dead+1.6 Wind 60 deg - No Ice	988.45	913.08	-663.11	-12101.34	-17808.61	1060.88
0.9 Dead+1.6 Wind 60 deg - No Ice	741.34	913.08	-663.11	-12190.07	-17506.22	1058.66
1.2 Dead+1.6 Wind 90 deg - No Ice	988.45	1054.33	0.00	539.70	-20419.88	315.69
0.9 Dead+1.6 Wind 90 deg - No Ice	741.34	1054.33	0.00	402.40	-20107.42	314.58
1.2 Dead+1.6 Wind 120 deg - No Ice	988.45	913.08	663.11	13180.62	-17808.51	-514.07
0.9 Dead+1.6 Wind 120 deg - No Ice	741.34	913.08	663.11	12994.78	-17506.17	-513.80
1.2 Dead+1.6 Wind 150 deg - No Ice	988.45	527.16	1148.54	22432.90	-10675.41	-1205.45
0.9 Dead+1.6 Wind 150 deg - No Ice	741.34	527.16	1148.54	22211.62	-10400.59	-1203.88
1.2 Dead+1.6 Wind 180 deg - No Ice	988.45	0.00	1326.22	25818.70	-933.34	-1573.60
0.9 Dead+1.6 Wind 180 deg - No Ice	741.34	0.00	1326.22	25584.53	-695.91	-1571.13
1.2 Dead+1.6 Wind 210 deg -	988.45	-527.16	1148.54	22432.29	8807.99	-1520.58

Load Combination	Vertical lb	$Shear_x$ lb	$Shear_z$ lb	Overturning Moment, M_x lb-ft	Overturning Moment, M_z lb-ft	Torque lb-ft
No Ice 0.9 Dead+1.6 Wind 210 deg - No Ice	741.34	-527.16	1148.54	22211.16	9008.23	-1517.85
1.2 Dead+1.6 Wind 240 deg - No Ice	988.45	-913.08	663.11	13180.05	15939.60	-1060.40
0.9 Dead+1.6 Wind 240 deg - No Ice	741.34	-913.08	663.11	12994.33	16112.72	-1058.15
1.2 Dead+1.6 Wind 270 deg - No Ice	988.45	-1054.33	0.00	539.79	18550.16	-315.78
0.9 Dead+1.6 Wind 270 deg - No Ice	741.34	-1054.33	0.00	402.45	18713.39	-314.65
1.2 Dead+1.6 Wind 300 deg - No Ice	988.45	-913.08	-663.11	-12100.62	15939.51	513.62
0.9 Dead+1.6 Wind 300 deg - No Ice	741.34	-913.08	-663.11	-12189.54	16112.67	513.32
1.2 Dead+1.6 Wind 330 deg - No Ice	988.45	-527.16	-1148.54	-21353.16	8807.84	1205.21
0.9 Dead+1.6 Wind 330 deg - No Ice	741.34	-527.16	-1148.54	-21406.58	9008.15	1203.55
1.2 Dead+1.0 Ice+1.0 Temp	3407.19	0.00	0.00	2657.02	-4602.10	0.00
1.2 Dead+1.0 Wind 0 deg+1.0 Ice+1.0 Temp	3407.19	0.00	-368.03	-4096.15	-4602.03	352.98
1.2 Dead+1.0 Wind 30 deg+1.0 Ice+1.0 Temp	3407.19	154.92	-318.72	-3191.56	-7332.02	343.37
1.2 Dead+1.0 Wind 60 deg+1.0 Ice+1.0 Temp	3407.19	268.33	-184.01	-719.84	-9330.47	241.76
1.2 Dead+1.0 Wind 90 deg+1.0 Ice+1.0 Temp	3407.19	309.84	0.00	2656.69	-10061.81	75.39
1.2 Dead+1.0 Wind 120 deg+1.0 Ice+1.0 Temp	3407.19	268.33	184.02	6033.23	-9330.02	-111.16
1.2 Dead+1.0 Wind 150 deg+1.0 Ice+1.0 Temp	3407.19	154.92	318.72	8505.14	-7331.39	-267.91
1.2 Dead+1.0 Wind 180 deg+1.0 Ice+1.0 Temp	3407.19	0.00	368.03	9409.92	-4601.29	-352.89
1.2 Dead+1.0 Wind 210 deg+1.0 Ice+1.0 Temp	3407.19	-154.92	318.72	8505.29	-1871.42	-343.33
1.2 Dead+1.0 Wind 240 deg+1.0 Ice+1.0 Temp	3407.19	-268.32	184.02	6033.54	126.85	-241.78
1.2 Dead+1.0 Wind 270 deg+1.0 Ice+1.0 Temp	3407.19	-309.83	0.00	2657.14	858.10	-75.41
1.2 Dead+1.0 Wind 300 deg+1.0 Ice+1.0 Temp	3407.19	-268.32	-184.01	-719.15	126.47	111.16
1.2 Dead+1.0 Wind 330 deg+1.0 Ice+1.0 Temp	3407.19	-154.91	-318.72	-3191.26	-1872.05	267.99
Dead+Wind 0 deg - Service	823.71	0.00	-235.06	-3730.22	-776.52	220.29
Dead+Wind 30 deg - Service	823.71	98.53	-203.57	-3170.41	-2461.56	212.87
Dead+Wind 60 deg - Service	823.71	170.65	-117.53	-1640.95	-3695.11	148.41
Dead+Wind 90 deg - Service	823.71	197.05	0.00	448.33	-4146.62	44.18
Dead+Wind 120 deg - Service	823.71	170.65	117.53	2537.61	-3695.10	-71.89
Dead+Wind 150 deg - Service	823.71	98.53	203.57	4067.06	-2461.55	-168.69
Dead+Wind 180 deg - Service	823.71	0.00	235.06	4626.87	-776.50	-220.29
Dead+Wind 210 deg - Service	823.71	-98.53	203.57	4067.05	908.53	-212.86
Dead+Wind 240 deg - Service	823.71	-170.65	117.53	2537.61	2142.05	-148.41
Dead+Wind 270 deg - Service	823.71	-197.05	0.00	448.34	2593.55	-44.18
Dead+Wind 300 deg - Service	823.71	-170.65	-117.53	-1640.94	2142.04	71.88
Dead+Wind 330 deg - Service	823.71	-98.53	-203.57	-3170.39	908.52	168.69

Solution Summary

	Sum of Applied Forces			Sum of Reactions			
Load Comb.	PX lb	PY lb	PZ lb	PX lb	PY lb	PZ lb	% Error
1	0.00	-823.71	0.00	-0.00	823.71	-0.00	0.000%
2	0.00	-988.45	-1326.22	-0.00	988.45	1326.22	0.000%
3	0.00	-741.34	-1326.22	-0.00	741.34	1326.22	0.000%
4	527.16	-988.45	-1148.54	-527.16	988.45	1148.54	0.000%
5	527.16	-741.34	-1148.54	-527.16	741.34	1148.54	0.000%
6	913.08	-988.45	-663.11	-913.08	988.45	663.11	0.000%
7	913.08	-741.34	-663.11	-913.08	741.34	663.11	0.000%
8	1054.33	-988.45	0.00	-1054.33	988.45	-0.00	0.000%
9	1054.33	-741.34	0.00	-1054.33	741.34	-0.00	0.000%
10	913.08	-988.45	663.11	-913.08	988.45	-663.11	0.000%
11	913.08	-741.34	663.11	-913.08	741.34	-663.11	0.000%
12	527.16	-988.45	1148.54	-527.16	988.45	-1148.54	0.000%
13	527.16	-741.34	1148.54	-527.16	741.34	-1148.54	0.000%
14	0.00	-988.45	1326.22	-0.00	988.45	-1326.22	0.000%
15	0.00	-741.34	1326.22	-0.00	741.34	-1326.22	0.000%
16	-527.16	-988.45	1148.54	527.16	988.45	-1148.54	0.000%
17	-527.16	-741.34	1148.54	527.16	741.34	-1148.54	0.000%
18	-913.08	-988.45	663.11	913.08	988.45	-663.11	0.000%
19	-913.08	-741.34	663.11	913.08	741.34	-663.11	0.000%
20	-1054.33	-988.45	0.00	1054.33	988.45	-0.00	0.000%
21	-1054.33	-741.34	0.00	1054.33	741.34	-0.00	0.000%
22	-913.08	-988.45	-663.11	913.08	988.45	663.11	0.000%
23	-913.08	-741.34	-663.11	913.08	741.34	663.11	0.000%
24	-527.16	-988.45	-1148.54	527.16	988.45	1148.54	0.000%
25	-527.16	-741.34	-1148.54	527.16	741.34	1148.54	0.000%
26	0.00	-3407.19	0.00	-0.00	3407.19	-0.00	0.000%
27	0.00	-3407.19	-368.03	-0.00	3407.19	368.03	0.000%
28	154.92	-3407.19	-318.72	-154.92	3407.19	318.72	0.000%
29	268.32	-3407.19	-184.01	-268.33	3407.19	184.01	0.000%
30	309.83	-3407.19	0.00	-309.84	3407.19	-0.00	0.000%
31	268.32	-3407.19	184.01	-268.33	3407.19	-184.02	0.000%
32	154.92	-3407.19	318.72	-154.92	3407.19	-318.72	0.000%
33	0.00	-3407.19	368.03	-0.00	3407.19	-368.03	0.000%
34	-154.92	-3407.19	318.72	154.92	3407.19	-318.72	0.000%
35	-268.32	-3407.19	184.01	268.32	3407.19	-184.02	0.000%
36	-309.83	-3407.19	0.00	309.83	3407.19	-0.00	0.000%
37	-268.32	-3407.19	-184.01	268.32	3407.19	184.01	0.000%
38	-154.92	-3407.19	-318.72	154.91	3407.19	318.72	0.000%
39	0.00	-823.71	-235.06	-0.00	823.71	235.06	0.000%
40	98.53	-823.71	-203.57	-98.53	823.71	203.57	0.000%
41	170.65	-823.71	-117.53	-170.65	823.71	117.53	0.000%
42	197.05	-823.71	0.00	-197.05	823.71	-0.00	0.000%
43	170.65	-823.71	117.53	-170.65	823.71	-117.53	0.000%
44	98.53	-823.71	203.57	-98.53	823.71	-203.57	0.000%
45	0.00	-823.71	235.06	-0.00	823.71	-235.06	0.000%
46	-98.53	-823.71	203.57	98.53	823.71	-203.57	0.000%
47	-170.65	-823.71	117.53	170.65	823.71	-117.53	0.000%
48	-197.05	-823.71	0.00	197.05	823.71	-0.00	0.000%
49	-170.65	-823.71	-117.53	170.65	823.71	117.53	0.000%
50	-98.53	-823.71	-203.57	98.53	823.71	203.57	0.000%

Non-Linear Convergence Results

Load Combination	Converged?	Number of Cycles	Displacement Tolerance	Force Tolerance

1	Yes	4	0.00000001	0.00000001
2	Yes	5	0.00000001	0.00000001
3	Yes	5	0.00000001	0.00000001
4	Yes	5	0.00000001	0.00000001
5	Yes	5	0.00000001	0.00000001
6	Yes	5	0.00000001	0.00000001
7	Yes	4	0.00000001	0.00071657
8	Yes	4	0.00000001	0.00035128
9	Yes	4	0.00000001	0.00021535
10	Yes	4	0.00000001	0.00056114
11	Yes	4	0.00000001	0.00034774
12	Yes	5	0.00000001	0.00000001
13	Yes	4	0.00000001	0.00091948
14	Yes	5	0.00000001	0.00000001
15	Yes	5	0.00000001	0.00000001
16	Yes	5	0.00000001	0.00000001
17	Yes	5	0.00000001	0.00000001
18	Yes	5	0.00000001	0.00000001
19	Yes	4	0.00000001	0.00071960
20	Yes	4	0.00000001	0.00030158
21	Yes	4	0.00000001	0.00019268
22	Yes	4	0.00000001	0.00052594
23	Yes	4	0.00000001	0.00033944
24	Yes	5	0.00000001	0.00000001
25	Yes	4	0.00000001	0.00076027
26	Yes	4	0.00000001	0.00026856
27	Yes	4	0.00000001	0.00067832
28	Yes	4	0.00000001	0.00086528
29	Yes	4	0.00000001	0.00079396
30	Yes	4	0.00000001	0.00054118
31	Yes	4	0.00000001	0.00062909
32	Yes	5	0.00000001	0.00007155
33	Yes	5	0.00000001	0.00008409
34	Yes	5	0.00000001	0.00006786
35	Yes	4	0.00000001	0.00054289
36	Yes	4	0.00000001	0.00016130
37	Yes	4	0.00000001	0.00011357
38	Yes	4	0.00000001	0.00034318
39	Yes	4	0.00000001	0.00000001
40	Yes	4	0.00000001	0.00000001
41	Yes	4	0.00000001	0.00000001
42	Yes	4	0.00000001	0.00000001
43	Yes	4	0.00000001	0.00000001
44	Yes	4	0.00000001	0.00000001
45	Yes	4	0.00000001	0.00000001
46	Yes	4	0.00000001	0.00000001
47	Yes	4	0.00000001	0.00000001
48	Yes	4	0.00000001	0.00000001
49	Yes	4	0.00000001	0.00000001
50	Yes	4	0.00000001	0.00000001

Maximum Tower Deflections - Service Wind

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
L1	30 - 4	1.492	44	0.4062	0.0418

Critical Deflections and Radius of Curvature - Service Wind

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
31.50	16"x3' Omni	44	1.492	0.4062	0.0418	Inf
29.00	5G Antenna 24x12x5	44	1.435	0.3905	0.0402	Inf
26.00	24" Wx24"Dx6"H Street Light	44	1.263	0.3437	0.0353	Inf
25.00	12' Light Arm	44	1.205	0.3281	0.0337	Inf

Maximum Tower Deflections - Design Wind

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
L1	30 - 4	7.591	14	1.9904	0.2984

Critical Deflections and Radius of Curvature - Design Wind

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
31.50	16"x3' Omni	14	7.591	1.9904	0.2984	Inf
29.00	5G Antenna 24x12x5	14	7.299	1.9139	0.2869	Inf
26.00	24" Wx24"Dx6"H Street Light	14	6.424	1.6842	0.2525	Inf
25.00	12' Light Arm	14	6.132	1.6076	0.2410	Inf

Compression Checks

Pole Design Data

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	A in^2	P_u lb	ϕP_n lb	Ratio $\frac{P_u}{\phi P_n}$
L1	30 - 28.7	HSS8.625x.188	26.00	0.00	0.0	4.6196	-310.33	191253.00	0.002
	28.7 - 27.4					4.6196	-333.83	191253.00	0.002
	27.4 - 26.1					4.6196	-357.38	191253.00	0.002
	26.1 - 24.8					4.6196	-2195.61	191253.00	0.011
	24.8 - 23.5					4.6196	-2271.01	191253.00	0.012
	23.5 - 22.2					4.6196	-2346.48	191253.00	0.012
	22.2 - 20.9					4.6196	-2421.98	191253.00	0.013
	20.9 - 19.6					4.6196	-663.71	191253.00	0.003
	19.6 - 18.3					4.6196	-688.51	191253.00	0.004
	18.3 - 17					4.6196	-713.60	191253.00	0.004
	17 - 15.7					4.6196	-738.99	191253.00	0.004
	15.7 - 14.4					4.6196	-764.73	191253.00	0.004

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	A in^2	P_u lb	ϕP_n lb	Ratio $\frac{P_u}{\phi P_n}$
	14.4 - 13.1					4.6196	-790.83	191253.00	0.004
	13.1 - 11.8					4.6196	-817.31	191253.00	0.004
	11.8 - 10.5					4.6196	-844.21	191253.00	0.004
	10.5 - 9.2					4.6196	-871.54	191253.00	0.005
	9.2 - 7.9					4.6196	-899.35	191253.00	0.005
	7.9 - 6.6					4.6196	-927.65	191253.00	0.005
	6.6 - 5.3					4.6196	-956.46	191253.00	0.005
	5.3 - 4					4.6196	-985.83	191253.00	0.005

Pole Bending Design Data

Section No.	Elevation ft	Size	M_{ux} lb-ft	ϕM_{nx} lb-ft	Ratio $\frac{M_{ux}}{\phi M_{nx}}$	M_{uy} lb-ft	ϕM_{ny} lb-ft	Ratio $\frac{M_{uy}}{\phi M_{ny}}$
L1	30 - 28.7	HSS8.625x.188	445.23	41696.92	0.011	0.00	41696.92	0.000
	28.7 - 27.4		1004.63	41696.92	0.024	0.00	41696.92	0.000
	27.4 - 26.1		1604.18	41696.92	0.038	0.00	41696.92	0.000
	26.1 - 24.8		5529.24	41696.92	0.133	0.00	41696.92	0.000
	24.8 - 23.5		5791.23	41696.92	0.139	0.00	41696.92	0.000
	23.5 - 22.2		6066.64	41696.92	0.145	0.00	41696.92	0.000
	22.2 - 20.9		6355.15	41696.92	0.152	0.00	41696.92	0.000
	20.9 - 19.6		7777.03	41696.92	0.187	0.00	41696.92	0.000
	19.6 - 18.3		9070.92	41696.92	0.218	0.00	41696.92	0.000
	18.3 - 17		10405.17	41696.92	0.250	0.00	41696.92	0.000
	17 - 15.7		11779.08	41696.92	0.282	0.00	41696.92	0.000
	15.7 - 14.4		13191.92	41696.92	0.316	0.00	41696.92	0.000
	14.4 - 13.1		14643.25	41696.92	0.351	0.00	41696.92	0.000
	13.1 - 11.8		16132.50	41696.92	0.387	0.00	41696.92	0.000
	11.8 - 10.5		17659.17	41696.92	0.424	0.00	41696.92	0.000
	10.5 - 9.2		19222.75	41696.92	0.461	0.00	41696.92	0.000
	9.2 - 7.9		20822.75	41696.92	0.499	0.00	41696.92	0.000
	7.9 - 6.6		22458.58	41696.92	0.539	0.00	41696.92	0.000
	6.6 - 5.3		24129.75	41696.92	0.579	0.00	41696.92	0.000
	5.3 - 4		25835.58	41696.92	0.620	0.00	41696.92	0.000

Pole Shear Design Data

Section No.	Elevation ft	Size	Actual V_u lb	ϕV_n lb	Ratio $\frac{V_u}{\phi V_n}$	Actual T_u lb-ft	ϕT_n lb-ft	Ratio $\frac{T_u}{\phi T_n}$
L1	30 - 28.7	HSS8.625x.188	414.86	95626.30	0.004	0.46	66014.25	0.000
	28.7 - 27.4		445.78	95626.30	0.005	0.46	66014.25	0.000
	27.4 - 26.1		476.67	95626.30	0.005	0.46	66014.25	0.000
	26.1 - 24.8		198.81	95626.30	0.002	111.21	66014.25	0.002
	24.8 - 23.5		209.41	95626.30	0.002	111.21	66014.25	0.002
	23.5 - 22.2		219.49	95626.30	0.002	111.20	66014.25	0.002
	22.2 - 20.9		229.32	95626.30	0.002	111.20	66014.25	0.002
	20.9 - 19.6		986.04	95626.30	0.010	1575.13	66014.25	0.024
	19.6 - 18.3		1016.07	95626.30	0.011	1575.04	66014.25	0.024
	18.3 - 17		1045.90	95626.30	0.011	1574.93	66014.25	0.024
	17 - 15.7		1075.51	95626.30	0.011	1574.81	66014.25	0.024
	15.7 - 14.4		1104.87	95626.30	0.012	1574.66	66014.25	0.024

Section No.	Elevation ft	Size	Actual V_u lb	ϕV_n lb	Ratio $\frac{V_u}{\phi V_n}$	Actual T_u lb-ft	ϕT_n lb-ft	Ratio $\frac{T_u}{\phi T_n}$
	14.4 - 13.1		1133.97	95626.30	0.012	1574.51	66014.25	0.024
	13.1 - 11.8		1162.78	95626.30	0.012	1574.34	66014.25	0.024
	11.8 - 10.5		1191.27	95626.30	0.012	1574.17	66014.25	0.024
	10.5 - 9.2		1219.43	95626.30	0.013	1574.01	66014.25	0.024
	9.2 - 7.9		1247.23	95626.30	0.013	1573.86	66014.25	0.024
	7.9 - 6.6		1274.63	95626.30	0.013	1573.72	66014.25	0.024
	6.6 - 5.3		1301.63	95626.30	0.014	1573.63	66014.25	0.024
	5.3 - 4		1328.17	95626.30	0.014	1573.56	66014.25	0.024

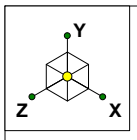
Pole Interaction Design Data

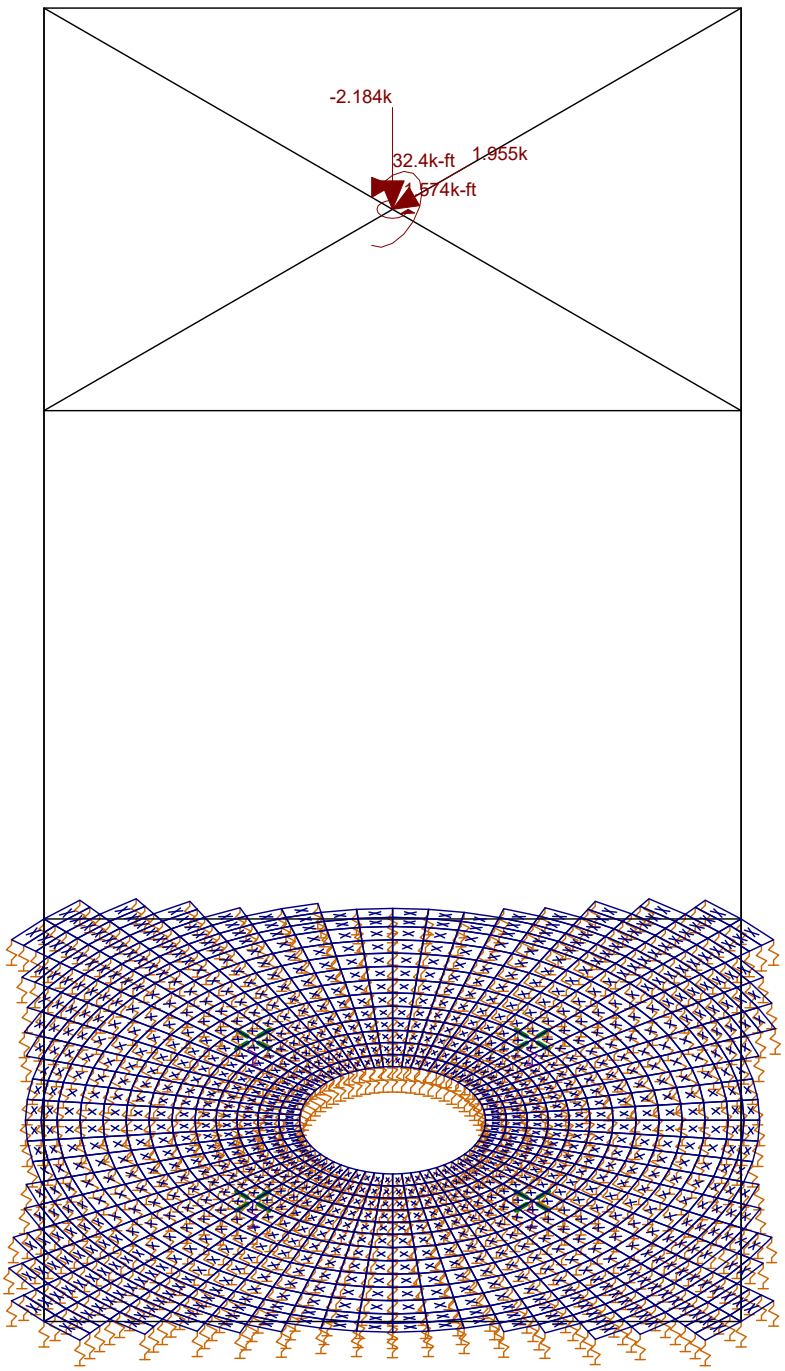
Section No.	Elevation ft	Ratio $\frac{P_u}{\phi P_n}$	Ratio $\frac{M_{ux}}{\phi M_{nx}}$	Ratio $\frac{M_{uy}}{\phi M_{ny}}$	Ratio $\frac{V_u}{\phi V_n}$	Ratio $\frac{T_u}{\phi T_n}$	Comb. Stress Ratio	Allow. Stress Ratio	Criteria
L1	30 - 28.7	0.002	0.011	0.000	0.004	0.000	0.012 ✔	1.000	4.8.2 ✔
	28.7 - 27.4	0.002	0.024	0.000	0.005	0.000	0.026 ✔	1.000	4.8.2 ✔
	27.4 - 26.1	0.002	0.038	0.000	0.005	0.000	0.040 ✔	1.000	4.8.2 ✔
	26.1 - 24.8	0.011	0.133	0.000	0.002	0.002	0.144 ✔	1.000	4.8.2 ✔
	24.8 - 23.5	0.012	0.139	0.000	0.002	0.002	0.151 ✔	1.000	4.8.2 ✔
	23.5 - 22.2	0.012	0.145	0.000	0.002	0.002	0.158 ✔	1.000	4.8.2 ✔
	22.2 - 20.9	0.013	0.152	0.000	0.002	0.002	0.165 ✔	1.000	4.8.2 ✔
	20.9 - 19.6	0.003	0.187	0.000	0.010	0.024	0.191 ✔	1.000	4.8.2 ✔
	19.6 - 18.3	0.004	0.218	0.000	0.011	0.024	0.222 ✔	1.000	4.8.2 ✔
	18.3 - 17	0.004	0.250	0.000	0.011	0.024	0.254 ✔	1.000	4.8.2 ✔
	17 - 15.7	0.004	0.282	0.000	0.011	0.024	0.288 ✔	1.000	4.8.2 ✔
	15.7 - 14.4	0.004	0.316	0.000	0.012	0.024	0.322 ✔	1.000	4.8.2 ✔
	14.4 - 13.1	0.004	0.351	0.000	0.012	0.024	0.357 ✔	1.000	4.8.2 ✔
	13.1 - 11.8	0.004	0.387	0.000	0.012	0.024	0.392 ✔	1.000	4.8.2 ✔
	11.8 - 10.5	0.004	0.424	0.000	0.012	0.024	0.429 ✔	1.000	4.8.2 ✔
	10.5 - 9.2	0.005	0.461	0.000	0.013	0.024	0.467 ✔	1.000	4.8.2 ✔
	9.2 - 7.9	0.005	0.499	0.000	0.013	0.024	0.505 ✔	1.000	4.8.2 ✔
	7.9 - 6.6	0.005	0.539	0.000	0.013	0.024	0.545	1.000	4.8.2 ✔

Section No.	Elevation ft	Ratio $\frac{P_u}{\phi P_n}$	Ratio $\frac{M_{ux}}{\phi M_{nx}}$	Ratio $\frac{M_{uy}}{\phi M_{ny}}$	Ratio $\frac{V_u}{\phi V_n}$	Ratio $\frac{T_u}{\phi T_n}$	Comb. Stress Ratio	Allow. Stress Ratio	Criteria
	6.6 - 5.3	0.005	0.579	0.000	0.014	0.024	0.585 ✔	1.000	4.8.2 ✔
	5.3 - 4	0.005	0.620	0.000	0.014	0.024	0.626 ✔	1.000	4.8.2 ✔

Section Capacity Table

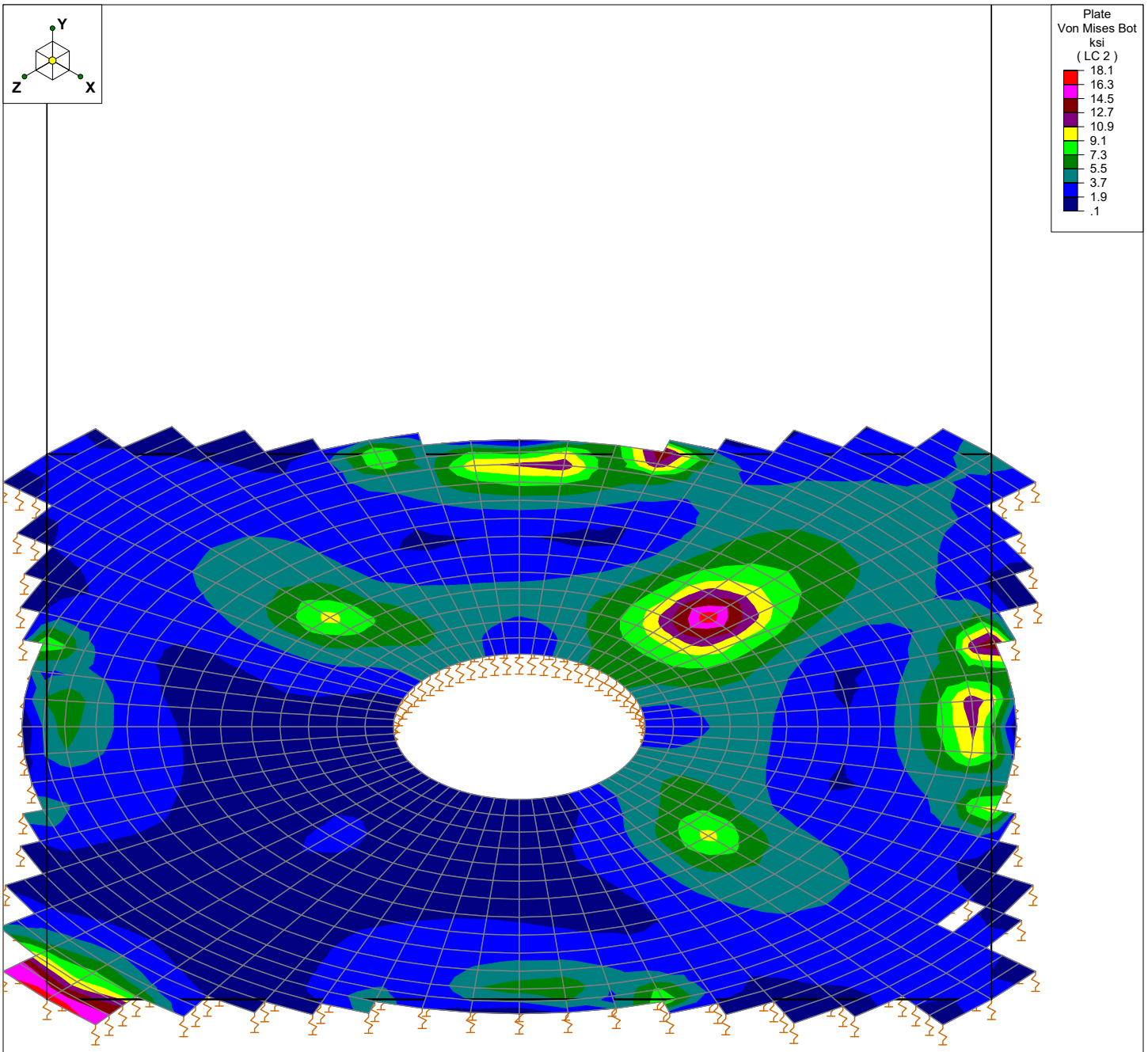
Section No.	Elevation ft	Component Type	Size	Critical Element	P lb	ϕP_{allow} lb	% Capacity	Pass Fail
L1	30 - 4	Pole	HSS8.625x.188	1	-985.83	191253.00	62.6	Pass
							Summary	
						Pole (L1)	62.6	Pass
						RATING =	**62.6**	**Pass**





Loads: LC 1, 1.2D+1.0W

Commscope	Pole-Cab Baseplate	SK - 1
Danh Ho, E.I.T		June 22, 2021 at 2:07 PM
SSC-760240957xxx33xx		Commscope SSC-760240957xxx3...



Loads: LC 1, 1.2D+1.0W
Results for LC 2, 0.9D+1.0W

Commscope	Pole-Cab Baseplate	SK - 2
Danh Ho, E.I.T		June 22, 2021 at 2:11 PM
SSC-760240957xxx33xx		Commscope SSC-760240957xxx3...

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	N326	Reaction	S2965	Reaction			
2	N342	Reaction	S2965	Reaction			
3	N358	Reaction	S2965	Reaction			
4	N374	Reaction	S2965	Reaction			
5	N1		CS1000				
6	N2		CS1000				
7	N3		CS1000				
8	N4		CS1000				
9	N5		CS1000				
10	N6		CS1000				
11	N7		CS1000				
12	N8		CS1000				
13	N9		CS1000				
14	N10		CS1000				
15	N11		CS1000				
16	N12		CS1000				
17	N13		CS1000				
18	N14		CS1000				
19	N15		CS1000				
20	N16		CS1000				
21	N17		CS1000				
22	N18		CS1000				
23	N19		CS1000				
24	N20		CS1000				
25	N21		CS1000				
26	N22		CS1000				
27	N23		CS1000				
28	N24		CS1000				
29	N25		CS1000				
30	N26		CS1000				
31	N27		CS1000				
32	N28		CS1000				
33	N29		CS1000				
34	N30		CS1000				
35	N31		CS1000				
36	N32		CS1000				
37	N33		CS1000				
38	N34		CS1000				
39	N35		CS1000				
40	N36		CS1000				
41	N37		CS1000				
42	N38		CS1000				
43	N39		CS1000				
44	N40		CS1000				
45	N41		CS1000				
46	N42		CS1000				
47	N43		CS1000				
48	N44		CS1000				
49	N45		CS1000				
50	N46		CS1000				
51	N47		CS1000				
52	N48		CS1000				
53	N49		CS1000				
54	N50		CS1000				
55	N51		CS1000				
56	N52		CS1000				

Joint Boundary Conditions (Continued)

	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]
1083	N1412		CS1000				
1084	N1426		CS1000				
1085	N1428		CS1000				
1086	N1429		CS1000				
1087	N1443		CS1000				
1088	N1444		CS1000				
1089	N1445		CS1000				
1090	N1459		CS1000				
1091	N1460		CS1000				
1092	N1461		CS1000				
1093	N1475		CS1000				
1094	N1476		CS1000				
1095	N1477		CS1000				
1096	N1491		CS1000				

Plate Primary Data

	Label	A Joint	B Joint	C Joint	D Joint	Material	Thickness[in]
1	P1	N1	N2	N67	N66	gen_Steel	1
2	P2	N2	N3	N68	N67	gen_Steel	1
3	P3	N3	N4	N69	N68	gen_Steel	1
4	P4	N4	N5	N70	N69	gen_Steel	1
5	P5	N5	N6	N71	N70	gen_Steel	1
6	P6	N6	N7	N72	N71	gen_Steel	1
7	P7	N7	N8	N73	N72	gen_Steel	1
8	P8	N8	N9	N74	N73	gen_Steel	1
9	P9	N9	N10	N75	N74	gen_Steel	1
10	P10	N10	N11	N76	N75	gen_Steel	1
11	P11	N11	N12	N77	N76	gen_Steel	1
12	P12	N12	N13	N78	N77	gen_Steel	1
13	P13	N13	N14	N79	N78	gen_Steel	1
14	P14	N14	N15	N80	N79	gen_Steel	1
15	P15	N15	N16	N81	N80	gen_Steel	1
16	P16	N16	N17	N82	N81	gen_Steel	1
17	P17	N17	N18	N83	N82	gen_Steel	1
18	P18	N18	N19	N84	N83	gen_Steel	1
19	P19	N19	N20	N85	N84	gen_Steel	1
20	P20	N20	N21	N86	N85	gen_Steel	1
21	P21	N21	N22	N87	N86	gen_Steel	1
22	P22	N22	N23	N88	N87	gen_Steel	1
23	P23	N23	N24	N89	N88	gen_Steel	1
24	P24	N24	N25	N90	N89	gen_Steel	1
25	P25	N25	N26	N91	N90	gen_Steel	1
26	P26	N26	N27	N92	N91	gen_Steel	1
27	P27	N27	N28	N93	N92	gen_Steel	1
28	P28	N28	N29	N94	N93	gen_Steel	1
29	P29	N29	N30	N95	N94	gen_Steel	1
30	P30	N30	N31	N96	N95	gen_Steel	1
31	P31	N31	N32	N97	N96	gen_Steel	1
32	P32	N32	N33	N98	N97	gen_Steel	1
33	P33	N33	N34	N99	N98	gen_Steel	1
34	P34	N34	N35	N100	N99	gen_Steel	1
35	P35	N35	N36	N101	N100	gen_Steel	1
36	P36	N36	N37	N102	N101	gen_Steel	1
37	P37	N37	N38	N103	N102	gen_Steel	1
38	P38	N38	N39	N104	N103	gen_Steel	1

Plate Primary Data (Continued)

	Label	A Joint	B Joint	C Joint	D Joint	Material	Thickness[in]
951	P1088	N1166	N1103	N1168	N1231	gen_Steel	1
952	P1089	N1168	N1169	N1234	N1233	gen_Steel	1
953	P1090	N1169	N1170	N1235	N1234	gen_Steel	1
954	P1103	N1182	N1183	N1248	N1247	gen_Steel	1
955	P1104	N1183	N1184	N1249	N1248	gen_Steel	1
956	P1105	N1184	N1185	N1250	N1249	gen_Steel	1
957	P1106	N1185	N1186	N1251	N1250	gen_Steel	1
958	P1119	N1198	N1199	N1264	N1263	gen_Steel	1
959	P1120	N1199	N1200	N1265	N1264	gen_Steel	1
960	P1121	N1200	N1201	N1266	N1265	gen_Steel	1
961	P1122	N1201	N1202	N1267	N1266	gen_Steel	1
962	P1135	N1214	N1215	N1280	N1279	gen_Steel	1
963	P1136	N1215	N1216	N1281	N1280	gen_Steel	1
964	P1137	N1216	N1217	N1282	N1281	gen_Steel	1
965	P1138	N1217	N1218	N1283	N1282	gen_Steel	1
966	P1151	N1230	N1231	N1296	N1295	gen_Steel	1
967	P1152	N1231	N1168	N1233	N1296	gen_Steel	1
968	P1153	N1233	N1234	N1299	N1298	gen_Steel	1
969	P1168	N1248	N1249	N1314	N1313	gen_Steel	1
970	P1169	N1249	N1250	N1315	N1314	gen_Steel	1
971	P1184	N1264	N1265	N1330	N1329	gen_Steel	1
972	P1185	N1265	N1266	N1331	N1330	gen_Steel	1
973	P1186	N1266	N1267	N1332	N1331	gen_Steel	1
974	P1199	N1279	N1280	N1345	N1344	gen_Steel	1
975	P1200	N1280	N1281	N1346	N1345	gen_Steel	1
976	P1201	N1281	N1282	N1347	N1346	gen_Steel	1
977	P1215	N1295	N1296	N1361	N1360	gen_Steel	1
978	P1216	N1296	N1233	N1298	N1361	gen_Steel	1
979	P1217	N1298	N1299	N1364	N1363	gen_Steel	1
980	P1232	N1313	N1314	N1379	N1378	gen_Steel	1
981	P1233	N1314	N1315	N1380	N1379	gen_Steel	1
982	P1248	N1329	N1330	N1395	N1394	gen_Steel	1
983	P1249	N1330	N1331	N1396	N1395	gen_Steel	1
984	P1264	N1345	N1346	N1411	N1410	gen_Steel	1
985	P1265	N1346	N1347	N1412	N1411	gen_Steel	1
986	P1280	N1361	N1298	N1363	N1426	gen_Steel	1
987	P1281	N1363	N1364	N1429	N1428	gen_Steel	1
988	P1296	N1378	N1379	N1444	N1443	gen_Steel	1
989	P1297	N1379	N1380	N1445	N1444	gen_Steel	1
990	P1312	N1394	N1395	N1460	N1459	gen_Steel	1
991	P1313	N1395	N1396	N1461	N1460	gen_Steel	1
992	P1328	N1410	N1411	N1476	N1475	gen_Steel	1
993	P1329	N1411	N1412	N1477	N1476	gen_Steel	1
994	P1344	N1426	N1363	N1428	N1491	gen_Steel	1

Joint Loads and Enforced Displacements (BLC 1 : Dead)

	Joint Label	L,D,M	Direction	Magnitude[(k,k-ft), (in,rad), (k*s^2/in, k*s^2*in)]
1	N877A	L	Y	-1.82

Joint Loads and Enforced Displacements (BLC 2 : Wind)

	Joint Label	L,D,M	Direction	Magnitude[(k,k-ft), (in,rad), (k*s^2/in, k*s^2*in)]
1	N877A	L	Z	1.955
2	N877A	L	Mx	32.4
3	N877A	L	My	1.574

Basic Load Cases

	BLC Description	Category	X Gravity	Y Gravity	Z Gravity	Joint	Point	Distribut...	Area(Me...	Surface(...
1	Dead	DL				1				
2	Wind	WL				3				

Load Combinations

	Description	Solve	PDe..	SRSS	B...	Fa...	BLC	Fa...	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...
1	1.2D+1.0W	Yes	Y		1	1.2	2	1																
2	0.9D+1.0W	Yes	Y		1	.9	2	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	N358	max	.558	2	-10.453	1	-.429	2	0	2	0	2	0	2
2		min	.558	1	-10.695	2	-.429	1	0	1	0	1	0	1
3	N374	max	-.002	1	-5.76	1	-1.108	2	0	2	0	2	0	2
4		min	-.002	2	-5.913	2	-1.108	1	0	1	0	1	0	1
5	N342	max	0	2	-5.712	1	.01	2	0	2	0	2	0	2
6		min	0	1	-5.866	2	.01	1	0	1	0	1	0	1
7	N1428	max	0	2	5.079	1	0	2	0	2	0	2	0	2
8		min	0	1	5.078	2	0	1	0	1	0	1	0	1
9	N1363	max	0	2	3.359	1	0	2	0	2	0	2	0	2
10		min	0	1	3.354	2	0	1	0	1	0	1	0	1
11	N1298	max	0	2	1.928	1	0	2	0	2	0	2	0	2
12		min	0	1	1.922	2	0	1	0	1	0	1	0	1
13	N1429	max	0	2	1.619	2	0	2	0	2	0	2	0	2
14		min	0	1	1.618	1	0	1	0	1	0	1	0	1
15	N1491	max	0	2	1.618	2	0	2	0	2	0	2	0	2
16		min	0	1	1.617	1	0	1	0	1	0	1	0	1
17	N326	max	-.557	2	-1.283	1	-.428	1	0	2	0	2	0	2
18		min	-.557	1	-1.341	2	-.428	2	0	1	0	1	0	1
19	N1426	max	0	2	1.247	1	0	2	0	2	0	2	0	2
20		min	0	1	1.246	2	0	1	0	1	0	1	0	1
21	N1364	max	0	2	1.204	1	0	2	0	2	0	2	0	2
22		min	0	1	1.203	2	0	1	0	1	0	1	0	1
23	N1233	max	0	2	.933	1	0	2	0	2	0	2	0	2
24		min	0	1	.926	2	0	1	0	1	0	1	0	1
25	N1361	max	0	2	.868	1	0	2	0	2	0	2	0	2
26		min	0	1	.863	2	0	1	0	1	0	1	0	1
27	N1299	max	0	2	.779	1	0	2	0	2	0	2	0	2
28		min	0	1	.775	2	0	1	0	1	0	1	0	1
29	N1296	max	0	2	.451	1	0	2	0	2	0	2	0	2
30		min	0	1	.442	2	0	1	0	1	0	1	0	1
31	N1234	max	0	2	.385	1	0	2	0	2	0	2	0	2
32		min	0	1	.377	2	0	1	0	1	0	1	0	1
33	N1168	max	0	2	.287	1	0	2	0	2	0	2	0	2
34		min	0	1	.277	2	0	1	0	1	0	1	0	1
35	N33	max	0	2	.277	2	0	2	0	2	0	2	0	2
36		min	0	1	.271	1	0	1	0	1	0	1	0	1
37	N32	max	0	2	.267	2	0	2	0	2	0	2	0	2
38		min	0	1	.261	1	0	1	0	1	0	1	0	1
39	N34	max	0	2	.267	2	0	2	0	2	0	2	0	2
40		min	0	1	.261	1	0	1	0	1	0	1	0	1
41	N31	max	0	2	.239	2	0	2	0	2	0	2	0	2
42		min	0	1	.233	1	0	1	0	1	0	1	0	1
43	N35	max	0	2	.238	2	0	2	0	2	0	2	0	2

Envelope Joint Reactions (Continued)

	Joint		X [k]	LC	Y [k]	LC	Z [k]	LC	MX [k-ft]	LC	MY [k-ft]	LC	MZ [k-ft]	LC
2153	N1394	max	0	2	0	2	0	2	0	2	0	2	0	2
2154		min	0	1	0	1	0	1	0	1	0	1	0	1
2155	N1395	max	0	2	0	2	0	2	0	2	0	2	0	2
2156		min	0	1	0	1	0	1	0	1	0	1	0	1
2157	N1396	max	0	2	0	2	0	2	0	2	0	2	0	2
2158		min	0	1	0	1	0	1	0	1	0	1	0	1
2159	N1410	max	0	2	0	2	0	2	0	2	0	2	0	2
2160		min	0	1	0	1	0	1	0	1	0	1	0	1
2161	N1411	max	0	2	0	2	0	2	0	2	0	2	0	2
2162		min	0	1	0	1	0	1	0	1	0	1	0	1
2163	N1412	max	0	2	0	2	0	2	0	2	0	2	0	2
2164		min	0	1	0	1	0	1	0	1	0	1	0	1
2165	N1443	max	0	2	0	2	0	2	0	2	0	2	0	2
2166		min	0	1	0	1	0	1	0	1	0	1	0	1
2167	N1444	max	0	2	0	2	0	2	0	2	0	2	0	2
2168		min	0	1	0	1	0	1	0	1	0	1	0	1
2169	N1445	max	0	2	0	2	0	2	0	2	0	2	0	2
2170		min	0	1	0	1	0	1	0	1	0	1	0	1
2171	N1459	max	0	2	0	2	0	2	0	2	0	2	0	2
2172		min	0	1	0	1	0	1	0	1	0	1	0	1
2173	N1460	max	0	2	0	2	0	2	0	2	0	2	0	2
2174		min	0	1	0	1	0	1	0	1	0	1	0	1
2175	N1461	max	0	2	0	2	0	2	0	2	0	2	0	2
2176		min	0	1	0	1	0	1	0	1	0	1	0	1
2177	N1475	max	0	2	0	2	0	2	0	2	0	2	0	2
2178		min	0	1	0	1	0	1	0	1	0	1	0	1
2179	N1476	max	0	2	0	2	0	2	0	2	0	2	0	2
2180		min	0	1	0	1	0	1	0	1	0	1	0	1
2181	N1477	max	0	2	0	2	0	2	0	2	0	2	0	2
2182		min	0	1	0	1	0	1	0	1	0	1	0	1
2183	Totals:	max	0	2	2.184	1	-1.955	1						
2184		min	0	1	1.638	2	-1.955	2						

Envelope Plate/Shell Principal Stresses

	Plate		Surf...	Sigma1 [ksi]	LC	Sigma2 [ksi]	LC	Tau Max [ksi]	LC	Angle [rad]	LC	Von Mises [ksi]	LC
1	P289	max	T	-14.464	1	-17.92	1	1.768	2	1.117	2	16.85	2
2		min		-14.802	2	-18.337	2	1.728	1	1.116	1	16.466	1
3		max	B	18.412	2	15.268	2	1.572	2	-.381	1	17.059	2
4		min		17.995	1	14.93	1	1.532	1	-.382	2	16.675	1
5	P288	max	T	-14.647	1	-18.052	1	1.742	2	1.967	2	16.997	2
6		min		-14.984	2	-18.469	2	1.702	1	1.966	1	16.613	1
7		max	B	18.278	2	15.091	2	1.594	2	.448	1	16.911	2
8		min		17.861	1	14.753	1	1.554	1	.447	2	16.528	1
9	P353	max	T	-14.191	1	-17.36	1	1.626	2	1.838	1	16.384	2
10		min		-14.515	2	-17.766	2	1.584	1	1.837	2	16.013	1
11		max	B	17.956	2	14.37	2	1.793	2	.219	2	16.458	2
12		min		17.55	1	14.047	1	1.751	1	.219	1	16.087	1
13	P352	max	T	-14.35	1	-17.537	1	1.634	2	1.375	1	16.552	2
14		min		-14.674	2	-17.942	2	1.593	1	1.375	2	16.18	1
15		max	B	17.782	2	14.212	2	1.785	2	-.281	2	16.293	2
16		min		17.377	1	13.888	1	1.745	1	-.282	1	15.922	1
17	P729	max	T	16.055	2	4.972	2	5.541	2	1.476	2	14.235	2
18		min		15.667	1	4.852	1	5.408	1	1.476	1	13.892	1
19		max	B	-4.869	1	-15.762	1	5.58	2	-.096	2	14.322	2
20		min		-4.989	2	-16.149	2	5.447	1	-.096	1	13.978	1

Envelope Plate/Shell Principal Stresses (Continued)

	Plate		Surf...	Sigma1 [ksi]	LC	Sigma2 [ksi]	LC	Tau Max [ksi]	LC	Angle [rad]	LC	Von Mises [ksi]	LC
3954		min		.287	1	-.289	2	.284	1	1.642	1	.492	1
3955		max	B	.283	2	-.287	1	.289	2	.075	2	.501	2
3956		min		.276	1	-.295	2	.281	1	.075	1	.488	1
3957	P824	max	T	.012	1	-.473	1	.249	2	-.224	1	.493	2
3958		min		.011	2	-.487	2	.243	1	-.226	2	.48	1
3959		max	B	.49	2	-.003	2	.246	2	1.296	2	.491	2
3960		min		.476	1	-.004	1	.24	1	1.295	1	.478	1
3961	P777	max	T	.013	1	-.471	1	.248	2	.246	2	.49	2
3962		min		.012	2	-.484	2	.242	1	.245	1	.477	1
3963		max	B	.489	2	-.003	2	.246	2	1.826	2	.491	2
3964		min		.476	1	-.004	1	.24	1	1.825	1	.478	1
3965	P948	max	T	.211	2	-.198	1	.207	2	1.468	1	.358	2
3966		min		.205	1	-.203	2	.202	1	1.468	2	.349	1
3967		max	B	.205	2	-.208	1	.21	2	-.113	1	.363	2
3968		min		.2	1	-.214	2	.204	1	-.113	2	.354	1
3969	P825	max	T	-.023	1	-.227	1	.105	2	-.023	2	.225	2
3970		min		-.027	2	-.237	2	.102	1	-.035	1	.217	1
3971		max	B	.245	2	.034	2	.105	2	1.542	2	.23	2
3972		min		.236	1	.03	1	.103	1	1.53	1	.222	1
3973	P776	max	T	-.021	1	-.234	1	.109	2	.063	1	.232	2
3974		min		-.025	2	-.243	2	.106	1	.051	2	.224	1
3975		max	B	.239	2	.042	2	.099	2	1.556	1	.221	2
3976		min		.229	1	.038	1	.096	1	1.545	2	.213	1

JS INFRASTRUCTURE PARTNERS 2030 Main Street, Suite 200 Irvine, CA 92614	Project Name: SSC-760240957xxx33xx	Prepared by: DVH	Reviewer: EVR
	Project Description: CAB. BASE PLATE & ANCHOR BOLTS	Date: 6/22/2021	

Base Reactions :

Axial:	2.184	k
Shear:	1.955	k
Moment:	32.4	k-ft

Base Plate Check

BASEPLATE DESIGN	
THICKNESS (in)	1
STEEL GRADE (KSI)	65.00
fmax (KSI)	17.06
ADJUSTMENT PLASTIC SECTION(KSI)	11.37
fall (0.9Fy)(KSI)	58.50
PLATE STRESS	19.4%

Refer to Risa3D For Base Plate Max. Stress

Anchor Bolts Check

ANCHOR BOLT DESIGN	
QUANTITY	4
DIAMETER (in)	1.25
ULTIMATE STRENGTH (ksi)	75
MAX TENSION (K)	10.7
EFFECTIVE AREA (in^2)	0.981748
ALLOWABLE TENSION	58.90486
η = 0.55 (GROUTED); 0.50 (ELEVATED)	0.55
MAX SHEAR (K)	1.955
INTERACTION CHECK	19.7%

Refer Risa Reaction for Anchor Bolt Max Reaction

Company:	J5 Infrastructure Partners	Page:	1
Address:	2030 Main Street, Suite 200, Irvine, CA 92614	Specifier:	Danh Ho / Eric Rawlins
Phone I Fax:	|	E-Mail:	
Design:	COMMSCOPE (SSC-760240957xxx33xx) 33ft_Pole-Commscope	Date:	6/22/2021
Fastening point:			

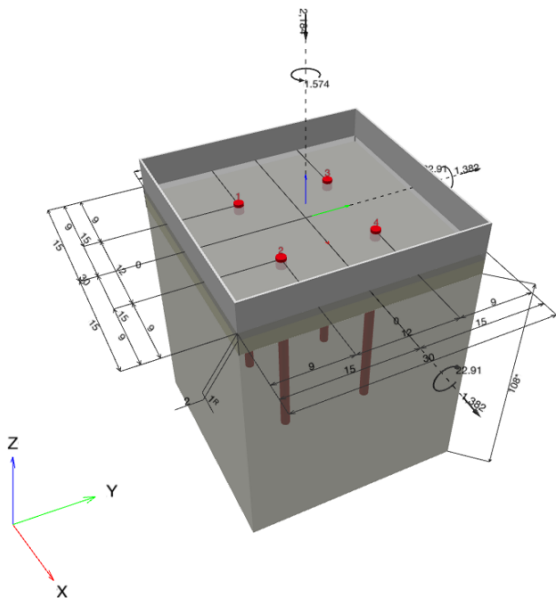
Specifier's comments: 33ft Pole-Cab with 5G for Connecticut

1 Input data

Anchor type and diameter:	**Heavy Hex Head ASTM F 1554 GR. 55 1 1/4**
Item number:	not available
Additional plate or washer (17.4.2.8):	d_{plate} = 1.500 in., t_{plate} = 0.250 in.
Effective embedment depth:	h_{ef} = 24.000 in., $h_{ef,17.4.2.8}$ = 0.000 in.
Material:	ASTM F 1554
Evaluation Service Report:	Hilti Technical Data
Issued I Valid:	- | -
Proof:	Design Method ACI 318-14 / CIP
Stand-off installation:	without clamping (anchor); restraint level (anchor plate): 2.00; e_b = 2.000 in.; t = 1.000 in.
	Hilti Grout: CB-G EG, epoxy, $f_{c,Grout}$ = 14,939 psi
Anchor plate[R] :	l_x x l_y x t = 30.000 in. x 30.000 in. x 1.000 in.; (Recommended plate thickness: not calculated)
Profile:	Square HSS (AISC), ; (L x W x T) = 30.000 in. x 30.000 in. x 0.250 in.
Base material:	cracked concrete, 4000, f_c' = 4,000 psi; h = 108.000 in.
Reinforcement:	tension: condition A, shear: condition B; anchor reinforcement: tension
	edge reinforcement: > No. 4 bar with stirrups

[R] - The anchor calculation is based on a rigid anchor plate assumption.

Geometry [in.] & Loading [lb, ft.kip]

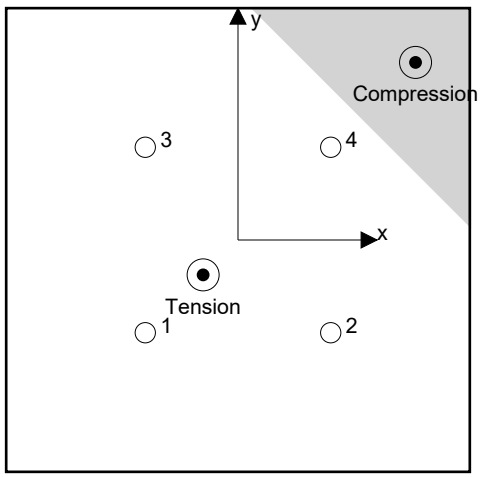


Company:	J5 Infrastructure Partners	Page:	2
Address:	2030 Main Street, Suite 200, Irvine, CA 92614	Specifier:	Danh Ho / Eric Rawlins
Phone I Fax:	|	E-Mail:	
Design:	COMMSCOPE (SSC-760240957xxx33xx) 33ft_Pole-Commscope	Date:	6/22/2021
Fastening point:			

1.1 Design results

Case	Description	Forces [lb] / Moments [ft.kip]	Seismic	Max. Util. Anchor [%]
1	Combination 1	N = -2,184; V_x = 1,382; V_y = 1,382; M_x = -22.91000; M_y = 22.91000; M_z = 1.57400;	no	24

2 Load case/Resulting anchor forces



Anchor reactions [lb]

Tension force: (+Tension, -Compression)

Anchor	Tension force	Shear force	Shear force x	Shear force y
1	7,962	741	739	-48
2	4,544	1,045	739	739
3	4,544	68	-48	-48
4	1,126	741	-48	739

max. concrete compressive strain:	0.14 [‰]
max. concrete compressive stress:	619 [psi]
resulting tension force in (x/y)=(-2.256/-2.256):	18,176 [lb]
resulting compression force in (x/y)=(11.489/11.489):	20,360 [lb]

Anchor forces are calculated based on the assumption of a rigid anchor plate.

3 Tension load

	Load N_{ua} [lb]	Capacity ϕ N_n [lb]	Utilization $\beta_N = N_{ua}/\phi$ N_n	Status
Steel Strength*	7,962	54,506	15	OK
Pullout Strength*	7,962	50,109	16	OK
Concrete Breakout Failure**[1]	N/A	N/A	N/A	N/A
Concrete Side-Face Blowout, direction y-**	12,506	124,864	11	OK

* highest loaded anchor **anchor group (anchors in tension)

[1] Tension Anchor Reinforcement has been selected!

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Design:	COMMSCOPE (SSC-760240957xxx33xx) 33ft_Pole-	Date:	6/22/2021
Fastening point:	Commscope		

3.1 Steel Strength

$N_{sa} = A_{se,N} f_{uta}$ ACI 318-14 Eq. (17.4.1.2)
$\phi N_{sa} \geq N_{ua}$ ACI 318-14 Table 17.3.1.1

Variables

$A_{se,N}$ [in.^{2}]	f_{uta} [psi]
0.97	75,000

Calculations

N_{sa} [lb]
72,675

Results

N_{sa} [lb]	ϕ_{steel}	ϕN_{sa} [lb]	N_{ua} [lb]
72,675	0.750	54,506	7,962

3.2 Pullout Strength

$N_{pN} = \psi_{c,p} N_p$ ACI 318-14 Eq. (17.4.3.1)
$N_p = 8 A_{brg} f'_c$ ACI 318-14 Eq. (17.4.3.4)
$\phi N_{pN} \geq N_{ua}$ ACI 318-14 Table 17.3.1.1

Variables

$\psi_{c,p}$	A_{brg} [in.^{2}]	λ_a	f'_c [psi]
1.000	2.24	1.000	4,000

Calculations

N_p [lb]
71,584

Results

N_{pn} [lb]	$\phi_{concrete}$	ϕN_{pn} [lb]	N_{ua} [lb]
71,584	0.700	50,109	7,962

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Design:	COMMSCOPE (SSC-760240957xxx33xx) 33ft_Pole-	Date:	6/22/2021
Fastening point:	Commscope		

3.3 Concrete Side-Face Blowout, direction y-

$N_{sb} = 160\, c_{a1} \sqrt{A_{brg}}\, \lambda_a \sqrt{f'_c}$ ACI 318-14 Eq. (17.4.4.1)

$N_{sbg} = \alpha_{group}\, N_{sb}$ ACI 318-14 Eq. (17.4.4.2)

$\phi\, N_{sbg} \geq N_{ua}$ ACI 318-14 Table 17.3.1.1

$\alpha_{group} = \left(1 + \frac{s}{6\, c_{a1}}\right)$ see ACI 318-14, Section 17.4.4.2, Eq. (17.4.4.2)

Variables

c_{a1} [in.]	c_{a2} [in.]	A_{brg} [in.^{2}]	λ_a	f'_c [psi]	s [in.]
9.000	9.000	2.24	1.000	4,000	12.000

Calculations

α_{group}	N_{sb} [lb]
1.222	136,215

Results

N_{sbg} [lb]	$\phi_{concrete}$	$\phi\, N_{sbg}$ [lb]	$N_{ua,edge}$ [lb]
166,485	0.750	124,864	12,506

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Fastening point:			

4 Shear load

	Load V_{ua} [lb]	Capacity ϕ V_n [lb]	Utilization $\beta_V = V_{ua}/\phi$ V_n	Status
Steel Strength*	1,045	22,675	5	OK
Steel failure (with lever arm)*	1,045	4,428	24	OK
Pryout Strength*	1,045	21,689	5	OK
Concrete edge failure in direction y+**	2,090	11,460	19	OK

* highest loaded anchor **anchor group (relevant anchors)

4.1 Steel Strength

$V_{sa} = 0.6\ A_{se,V}\ f_{uta}$ ACI 318-14 Eq. (17.5.1.2b)
$\phi\ V_{steel} \geq V_{ua}$ ACI 318-14 Table 17.3.1.1

Variables

$A_{se,V}$ [in.^{2}]	f_{uta} [psi]
0.97	75,000

Calculations

V_{sa} [lb]
43,605

Results

V_{sa} [lb]	ϕ_{steel}	ϕ_{eb}	$\phi\ V_{sa}$ [lb]	V_{ua} [lb]
43,605	0.650	0.800	22,675	1,045

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Fastening point:	Commscope		

4.2 Steel failure (with lever arm)

V_s^M	$= \frac{\alpha_M \cdot M_s}{L_b}$	bending equation for stand-off
M_s	$= M_s^0 \left(1 - \frac{N_{ua}}{\phi N_{sa}}\right)$	resultant flexural resistance of anchor
M_s^0	$= (1.2)\ (S)\ (f_{u,min})$	characteristic flexural resistance of anchor
$\left(1 - \frac{N_{ua}}{\phi N_{sa}}\right)$		reduction for tensile force acting simultaneously with a shear force on the anchor
S	$= \frac{\pi (d)^3}{32}$	elastic section modulus of anchor bolt at concrete surface
L_b	$= z + (n)(d_0)$	internal lever arm adjusted for spalling of the surface concrete
ϕV_s^M	$\geq V_{ua}$	ACI 318-14 Table 17.3.1.1

Variables

α_M	$f_{u,min}$ [psi]	N_{ua} [lb]	ϕN_{sa} [lb]	z [in.]	n	d_0 [in.]
2.00	75,000	4,544	54,506	2.500	0.500	1.250

Calculations

M_s^0 [ft.kip]	$\left(1 - \frac{N_{ua}}{\phi N_{sa}}\right)$	M_s [ft.kip]	L_b [in.]
0.96779	0.917	0.88711	3.125

Results

V_s^M [lb]	ϕ_{steel}	ϕV_s^M [lb]	V_{ua} [lb]
6,813	0.650	4,428	1,045

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Fastening point:			

4.3 Pryout Strength

$V_{cp} = k_{cp} \left[\left(\frac{A_{Nc}}{A_{Nc0}} \right) \psi_{ed,N} \psi_{c,N} \psi_{cp,N} N_b \right]$ ACI 318-14 Eq. (17.5.3.1a)

$\phi V_{cp} \geq V_{ua}$ ACI 318-14 Table 17.3.1.1

A_{Nc} see ACI 318-14, Section 17.4.2.1, Fig. R 17.4.2.1(b)

$A_{Nc0} = 9 h_{ef}^2$ ACI 318-14 Eq. (17.4.2.1c)

$\psi_{ec,N} = \left(\frac{1}{1 + \frac{2 e'_N}{3 h_{ef}}} \right) \leq 1.0$ ACI 318-14 Eq. (17.4.2.4)

$\psi_{ed,N} = 0.7 + 0.3 \left(\frac{c_{a,min}}{1.5 h_{ef}} \right) \leq 1.0$ ACI 318-14 Eq. (17.4.2.5b)

$\psi_{cp,N} = MAX\left(\frac{c_{a,min}}{c_{ac}}, \frac{1.5 h_{ef}}{c_{ac}} \right) \leq 1.0$ ACI 318-14 Eq. (17.4.2.7b)

$N_b = k_c \lambda_a \sqrt{f'_c} h_{ef}^{1.5}$ ACI 318-14 Eq. (17.4.2.2a)

Variables

k_{cp}	h_{ef} [in.]	$e_{c1,N}$ [in.]	$e_{c2,N}$ [in.]	$c_{a,min}$ [in.]
2	6.000	0.000	0.000	9.000

$\psi_{c,N}$	c_{ac} [in.]	k_c	λ_a	f'_c [psi]
1.000	∞	24	1.000	4,000

Calculations

A_{Nc} [in.^{2}]	A_{Nc0} [in.^{2}]	$\psi_{ec1,N}$	$\psi_{ec2,N}$	$\psi_{ed,N}$	$\psi_{cp,N}$	N_b [lb]
225.00	324.00	1.000	1.000	1.000	1.000	22,308

Results

V_{cp} [lb]	$\phi_{concrete}$	ϕV_{cp} [lb]	V_{ua} [lb]
30,984	0.700	21,689	1,045

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4.4 Concrete edge failure in direction y+

$V_{cbg} = \left(\frac{A_{Vc}}{A_{Vc0}}\right) \psi_{ec,V} \psi_{ed,V} \psi_{c,V} \psi_{h,V} \psi_{parallel,V} V_b$ ACI 318-14 Eq. (17.5.2.1b)

$\phi V_{cbg} \geq V_{ua}$ ACI 318-14 Table 17.3.1.1

A_{Vc} see ACI 318-14, Section 17.5.2.1, Fig. R 17.5.2.1(b)

$A_{Vc0} = 4.5 c_{a1}^2$ ACI 318-14 Eq. (17.5.2.1c)

$\psi_{ec,V} = \left(\frac{1}{1 + \frac{2e'_v}{3c_{a1}}}\right) \leq 1.0$ ACI 318-14 Eq. (17.5.2.5)

$\psi_{ed,V} = 0.7 + 0.3\left(\frac{c_{a2}}{1.5c_{a1}}\right) \leq 1.0$ ACI 318-14 Eq. (17.5.2.6b)

$\psi_{h,V} = \sqrt{\frac{1.5c_{a1}}{h_a}} \geq 1.0$ ACI 318-14 Eq. (17.5.2.8)

$V_b = 9 \lambda_a \sqrt{f'_c} c_{a1}^{1.5}$ ACI 318-14 Eq. (17.5.2.2b)

Variables

c_{a1} [in.]	c_{a2} [in.]	e_{cV} [in.]	$\psi_{c,V}$	h_a [in.]
9.000	9.000	4.243	1.400	108.000

l_e [in.]	λ_a	d_a [in.]	f'_c [psi]	$\psi_{parallel,V}$
10.000	1.000	1.250	4,000	1.000

Calculations

A_{Vc} [in.^{2}]	A_{Vc0} [in.^{2}]	$\psi_{ec,V}$	$\psi_{ed,V}$	$\psi_{h,V}$	V_b [lb]
405.00	364.50	0.761	0.900	1.000	15,369

Results

V_{cbg} [lb]	$\phi_{concrete}$	ϕV_{cbg} [lb]	V_{ua} [lb]
16,371	0.700	11,460	2,090

5 Combined tension and shear loads

β_N	β_V	ζ	Utilization $\beta_{N,V}$ [%]	Status
0.159	0.236	5/3	14	OK

$\beta_{NV} = \beta_N^{\zeta} + \beta_V^{\zeta} <= 1$

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Fastening point:			

6 Warnings

- The anchor design methods in PROFIS Engineering require rigid anchor plates per current regulations (AS 5216:2018, ETAG 001/Annex C, EOTA TR029 etc.). This means load re-distribution on the anchors due to elastic deformations of the anchor plate are not considered - the anchor plate is assumed to be sufficiently stiff, in order not to be deformed when subjected to the design loading. PROFIS Engineering calculates the minimum required anchor plate thickness with CBFEM to limit the stress of the anchor plate based on the assumptions explained above. The proof if the rigid anchor plate assumption is valid is not carried out by PROFIS Engineering. Input data and results must be checked for agreement with the existing conditions and for plausibility!
- Condition A applies where the potential concrete failure surfaces are crossed by supplementary reinforcement proportioned to tie the potential concrete failure prism into the structural member. Condition B applies where such supplementary reinforcement is not provided, or where pullout or pryout strength governs.
- ACI 318 does not specifically address anchor bending when a stand-off condition exists. PROFIS Engineering calculates a shear load corresponding to anchor bending when stand-off exists and includes the results as a shear Design Strength!
- For additional information about ACI 318 strength design provisions, please go to https://submittals.us.hilti.com/PROFISAnchorDesignGuide/
- The design of Anchor Reinforcement is beyond the scope of PROFIS Engineering. Refer to ACI 318-14, Section 17.4.2.9 for information about Anchor Reinforcement.
- Anchor Reinforcement has been selected as a design option, calculations should be compared with PROFIS Engineering calculations.

Fastening meets the design criteria!

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Fastening point:			

7 Installation data

Profile: Square HSS (AISC), ; (L x W x T) = 30.000 in. x 30.000 in. x 0.250 in.

Hole diameter in the fixture: d_f = 1.312 in.

Plate thickness (input): 1.000 in.

Recommended plate thickness: not calculated

Anchor type and diameter: Heavy Hex Head ASTM F 1554 GR. 55 1 1/4

Item number: not available

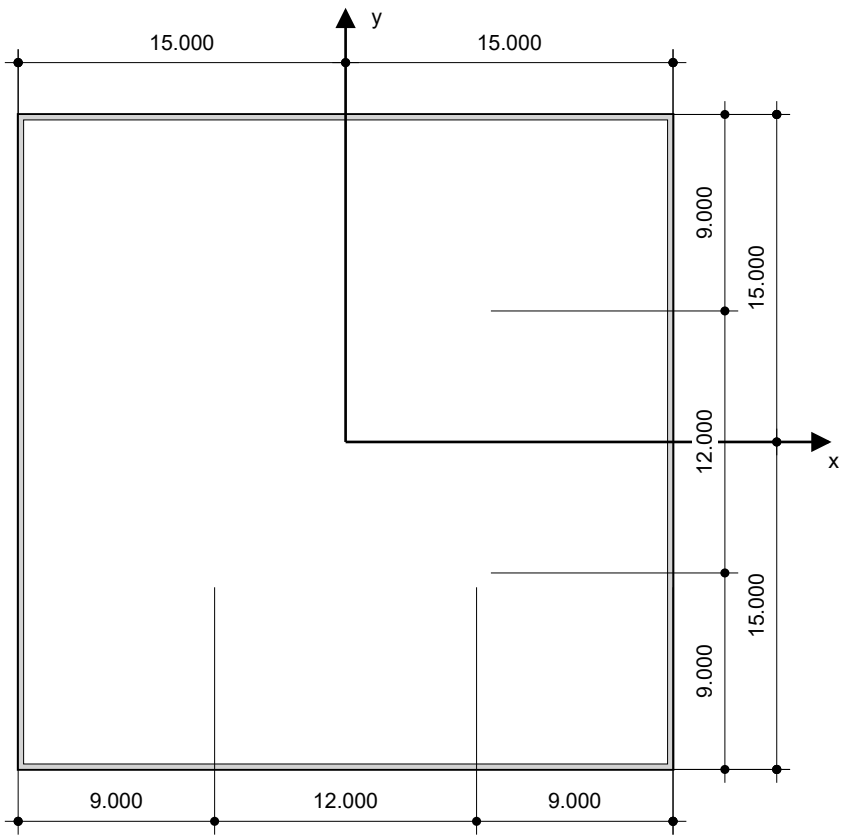
Maximum installation torque: -

Hole diameter in the base material: - in.

Hole depth in the base material: 24.000 in.

Minimum thickness of the base material: 25.344 in.

Hilti Heavy Hex Head headed stud anchor with 24 in embedment, 1 1/4, Steel galvanized, installation per instruction for use



Coordinates Anchor [in.]

Anchor	x	y	c_{-x}	c_{+x}	c_{-y}	c_{+y}
1	-6.000	-6.000	9.000	21.000	9.000	21.000
2	6.000	-6.000	21.000	9.000	9.000	21.000
3	-6.000	6.000	9.000	21.000	21.000	9.000
4	6.000	6.000	21.000	9.000	21.000	9.000

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Fastening point:			

8 Remarks; Your Cooperation Duties

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*
* CAISSON - Pier Foundations Analysis and Design - Copyright Power Line Systems, Inc. 1993-2011 *
*
*
****

Project Title: Commscope 33 Max Pole-Cab
Project Notes: Max Connecticut Design Criteria

Calculation Method: Full 8CD

******* I N P U T D A T A

Pier Properties

Diameter (ft)	Distance of Top of Pier above Ground (ft)	Concrete Strength (ksi)	Steel Yield Strength (ksi)
2.50	0.17	4.00	60.00

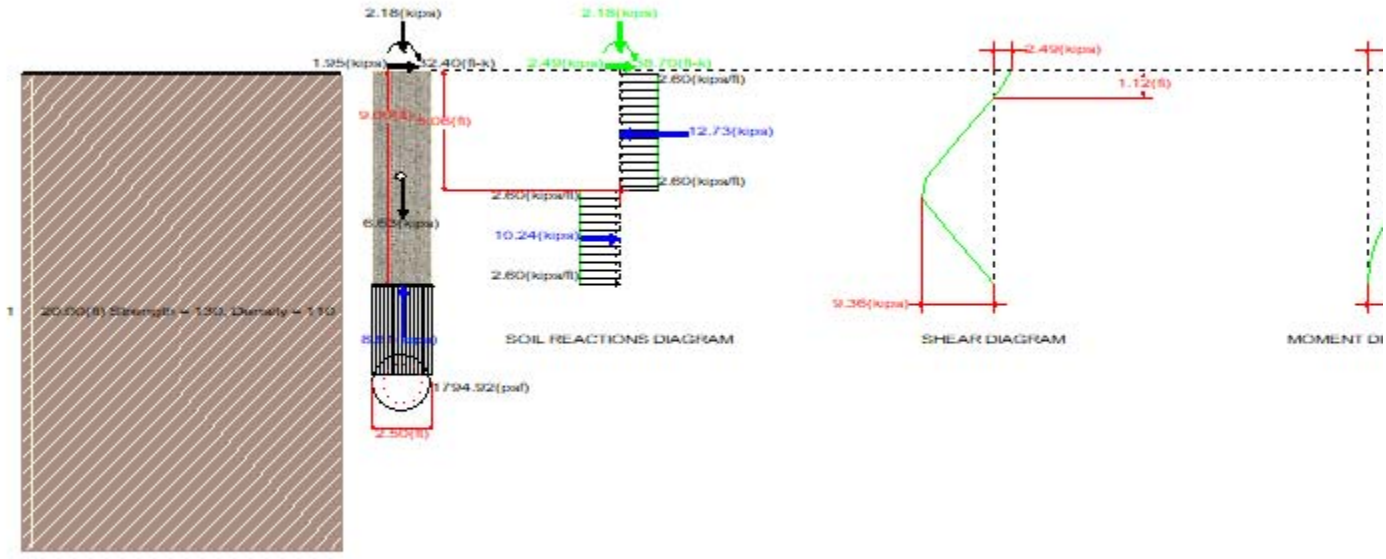
Soil Properties

Layer	Type	Thickness (ft)	Depth at Top of Layer (ft)	Density (lbs/ft^3)	CU (psf)	KP	PHI (deg)
1	Clay	20.00	0.00	110.0	130.0		

Design (Factored) Loads at Top of Pier

Moment (ft-k)	Axial Load (kips)	Shear Load (kips)	Additional Safety Factor Against Soil Failure
32.4	2.2	1.95	1.00

******* R E S U L T S



Calculated Pier Properties

Length (ft)	Weight (kips)	Pressure Due To Axial Load (psf)	Pressure Due To Weight (psf)	Total End-Bearing Pressure (psf)
9.000	6.627	444.9	1350.0	1794.9

Ultimate Resisting Forces Along Pier

Type	Distance of Top of Layer to Top of Pier (ft)	Thickness (ft)	Density (lbs/ft^3)	CU (psf)	KP	Force (kips)	Arm (ft)
Clay	0.17	4.90	110.0	130.0		12.73	2.61
Clay	5.06	3.94	110.0	130.0	-	10.24	7.03

Shear and Moments Along Pier

Distance below Top of Pier (ft)	Shear (with Safety Factor) (kips)	Moment (with Safety Factor) (ft-k)	Shear (without Safety Factor) (kips)	Moment (without Safety Factor) (ft-k)

0.00		2.5		38.7		2.5	
0.90		0.6		40.2		0.6	
1.80		-1.8		39.7		-1.8	
2.70		-4.1		37.1		-4.1	
3.60		-6.4		32.3		-6.4	
4.50		-8.8		25.5		-8.8	
5.40		-9.4		16.8		-9.4	
6.30		-7.0		9.5		-7.0	
7.20		-4.7		4.2		-4.7	
8.10		-2.3		1.1		-2.3	
9.00		0.0		-0.0		0.0	

Reinforcement and Capacity

Total Reinforcement Percent	Reinforcement Area (in^2)	Usable Axial Capacity (kips)	Usable Moment Capacity (ft-k)
0.34	2.40	2.2	132.9

US Standard Re-Bars (Select one of the following)

Quantity	Name	Area (in^2)	Diameter (in)	Spacing (in)
13	#4	0.20	0.500	4.83
8	#5	0.31	0.625	7.85
6	#6	0.44	0.750	10.47
5	#7	0.60	0.875	12.57
4	#8	0.79	1.000	15.71
3	#9	1.00	1.128	20.94
2	#10	1.27	1.270	31.42
2	#11	1.56	1.410	31.42
2	#14	2.25	1.693	31.42

Title Block Line 1
You can change this area
using the "Settings" menu item
and then using the "Printing &
Title Block" selection.
Title Block Line 6

Project Title: SSC-760240957xxx33xx
Engineer: Eric Rawlins, P.E
Project ID:
Project Descr: Foundation Design

Printed: 22 JUN 2021, 2:17PM

Pole Footing Embedded in Soil

File: Commscope 33_ Pole-Cab Foundation Embed Design for CT.ec6

Lic. # : KW-06007480
J5 INFRASTRUCTURE PARTNERS

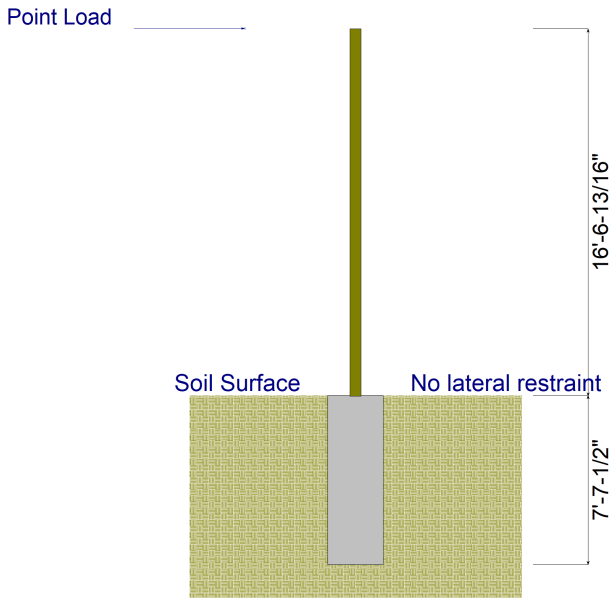
DESCRIPTION: 33' Pole-Cab Foundation, for CT

Code References

Calculations per IBC 2015 1807.3, CBC 2016, ASCE 7-10
Load Combinations Used : IBC 2015

General Information

Pole Footing Shape	Circular
Pole Footing Diameter	30.0 in
Calculate Min. Depth for Allowable Pressures	
No Lateral Restraint at Ground Surface	
Allow Passive	200.0 pcf
Max Passive	3,000.0 psf



Controlling Values

Governing Load Combination : +D+0.60W

Lateral Load	1.173 k
Moment	19.437 k-ft
NO Ground Surface Restraint	
Pressures at 1/3 Depth	
Actual	498.863 psf
Allowable	500.04 psf
Minimum Required Depth	**7.625 ft**
Footing Base Area	4.909 ft^2
Maximum Soil Pressure	0.3913 ksf

Applied Loads

	Lateral Concentrated Load (k)		Lateral Distributed Loads (klf)		Vertical Load (k)	
D : Dead Load		k		k/ft	1.820	k
Lr : Roof Live		k		k/ft		k
L : Live		k		k/ft		k
S : Snow		k		k/ft		k
W : Wind	1.955	k		k/ft		k
E : Earthquake	0.480	k		k/ft		k
H : Lateral Earth		k		k/ft		k
Load distance above ground surface	16.570	ft	TOP of Load above ground surface	ft		
			BOTTOM of Load above ground surface	ft		

Load Combination Results

Load Combination	Forces @ Ground Surface Loads - (k)	Moments - (ft-k)	Required Depth - (ft)	Pressure at 1/3 Depth Actual - (psf)	Allow - (psf)	Soil Increase Factor
D Only	0.000	0.000	0.13	0.0	0.0	1.000
+D+0.60W	1.173	19.437	7.63	498.9	500.0	1.000
+1.055D+0.70E	0.336	5.568	4.88	316.0	317.8	1.000
+D+0.450W	0.880	14.577	6.75	448.8	449.7	1.000
+1.042D+0.5250E	0.252	4.176	4.38	285.0	286.8	1.000
+0.60D+0.60W	1.173	19.437	7.63	498.9	500.0	1.000
+0.5445D+0.70E	0.336	5.568	4.88	316.0	317.8	1.000