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Job No. _____ By _____

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TOWER TRAINING

EXAMPLE # 1

120' SELF-SUPPORTING TOWER

PER RS-222-B, C STANDARD

ERITOWER MODEL FILE:
FALCON120C.ERI

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FOR ILLUSTRATIVE PURPOSES THE FOLLOWING ITEMS WERE IGNORED:

1. AREA AND WEIGHT OF GUSSET PLATES
2. AREA AND WEIGHT OF REDUNDANT MEMBERS
3. WEIGHT OF PAINT / GALVANIZING
4. CLIMBING LADDERS
5. LIGHTING - FAA
6. LIGHTENING PROTECTION
7. SAFETY CLIMB DEVICES

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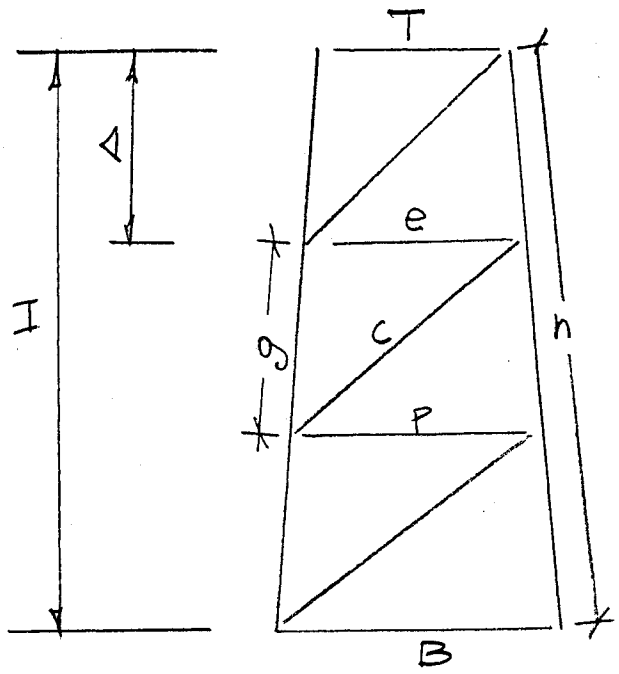
MAST CALCULATIONS



n = No. PANELS

$A = H/n$

$K = \frac{B-T}{n}$

$e = T + K$

$p = T + K * 2$ ... etc.

3 SIDED

$$h = \sqrt{H^2 + \frac{(B-T)^2}{3}}$$

$g = h/n$

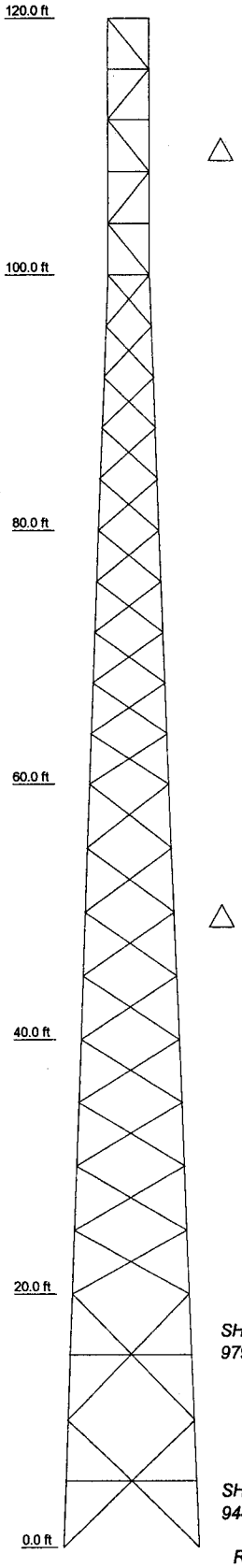
$$c = \frac{1}{2}\sqrt{(e+p)^2 + 4A^2 + \frac{K^2}{3}}$$

4 SIDED

$$h = \sqrt{H^2 + \frac{(B-T)^2}{2}}$$

$g = h/n$

$$c = \frac{1}{2}\sqrt{(e+p)^2 + 4A^2 + K^2}$$



Section	T5	T4	T3	T2	T1	L1
Legs	SR 3 1/2	SR 3 1/4	SR 3	SR 2 1/2	SR 2	SR 1 3/4
Leg Grade	A572-50					
Diagonals	L2 1/2x2 1/2x1/4	L2x2x1/4	L1 3/4x1 3/4x3/16	L1 1/2x1 1/2x3/16		2L1 1/2x1 1/2x3/16x3/8
Diagonal Grade	A36					
Top Girts			N.A.			L1 1/2x1 1/2x3/16
Bottom Girts			N.A.			L1 1/2x1 1/2x3/16
Horizontals			N.A.			L1 1/2x1 1/2x3/16
Sec. Horizontals	L1 3/4x1 3/4x3/16		N.A.			
Face Width (ft) 10.9167	9.41666	7.91666	6.41666	4.91666	3.41666	3.41666
# Panels @ (ft)	2 @ 10	8 @ 5		10 @ 4		5 @ 4
Weight (lb) 10352.8	2788.0	2462.0	1858.0	1376.8	953.4	884.6

APPURTENANCES

TYPE	ELEVATION	TYPE	ELEVATION
(9) FV90	120	Pirod 13' Low Profile Platform	120

MATERIAL STRENGTH

GRADE	Fy	Fu	GRADE	Fy	Fu
A572-50	50 ksi	65 ksi	A36	36 ksi	58 ksi

TOWER DESIGN NOTES

1. Tower designed for Zone A - 30 psf/22.5 psf w/0.50 in ice to the EIA-222-C Standard.
2. Wind pressure multiplier is 0.75 for the ice condition.
3. TOWER RATING: 58.7%

MAX PIER FORCES:
DOWN: 75418 lb
UPLIFT: -64409 lb
SHEAR: 6127 lb

AXIAL
18331 lb

SHEAR
9798 lb

MOMENT
655 kip-ft

0.5000 in ICE
AXIAL
12827 lb

SHEAR
9447 lb

MOMENT
649 kip-ft

REACTIONS - Zone A - 30 psf

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Job: ***Example 1 - 120' Self-Supporting Tower***
Project: ***Training Seminar***
Client: C-Concepts, Inc. | Drawn by: dhorn | App'd:
Code: EIA-222-C | Date: 11/11/03 | Scale: NTS
Path: M:\2001\J010000 Towers\SpectraSite Towers\HendCalcs\Falcon120C.er | Dwg No. E-1

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Project 120' FALCON TOWER

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WIND PRESSORE

h=120' ZONE "A" q_z = 30PSF

W/ICE USE .75 q_{zICE} = 22.5 PSF

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Project 120' SELF-SUP. TOWER

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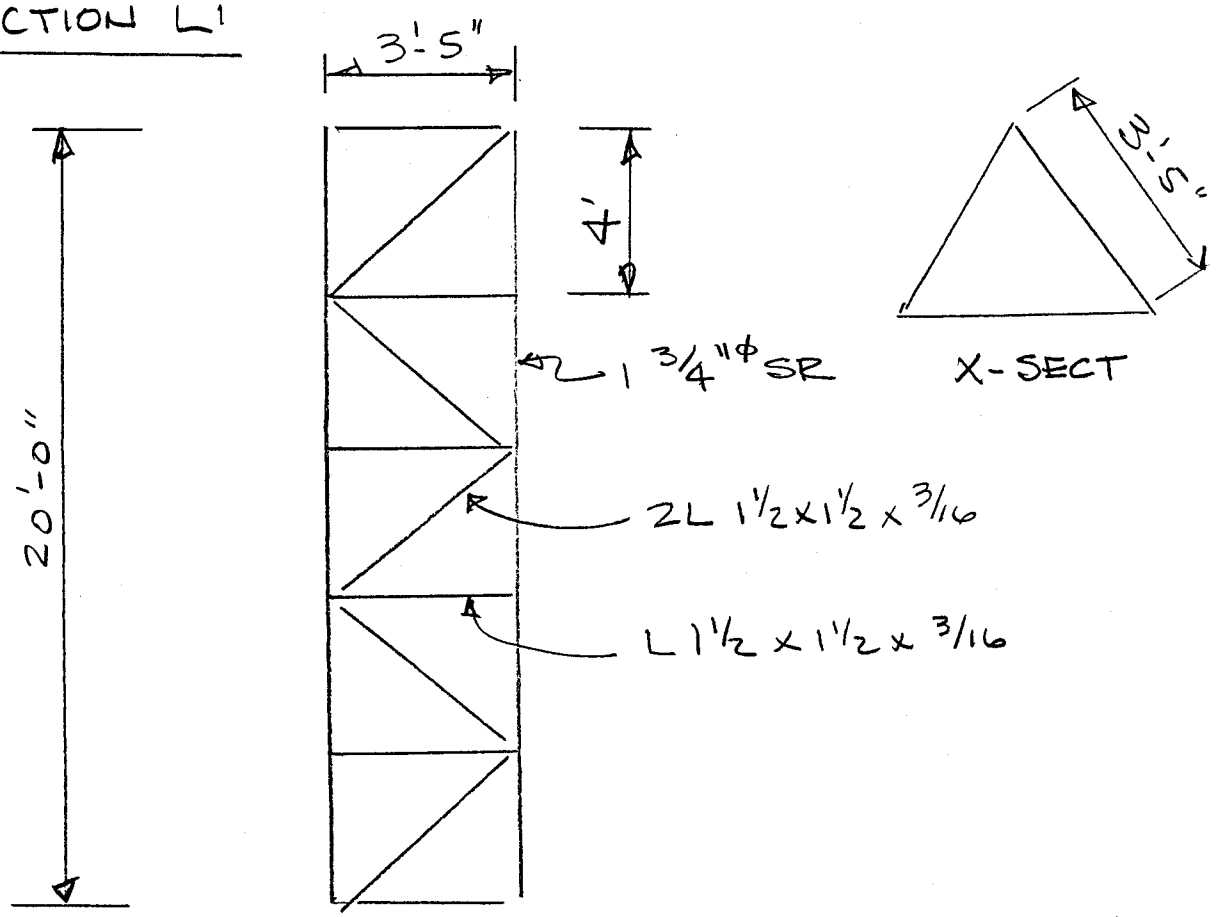
CALCULATE, A_E

NOTE: FEEDLINES ARE TREATED AS $C_A A_A$

SECTION L1



$A_G = 20' \times (3'\text{-}5" + 1\ 3/4") = 20 \times 3.5625 = 71.25\ \square'$

COMPONENT	L	W/	A_F	A_R
LEG	40	.1458		5.833
DIAG	26.3	.125	3.288	
GIRT	20.5	.125	2.563	
			5.851	5.833

$$e = \frac{5.833 + 5.851}{71.25} \qquad (2.3.5.1)$$

$$e = .164$$

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Project 120' SELF-SUP TOWER

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$R_z = 2/3$ $DF = D_{12} = 1.5$

$A_E = 1.5(5.851 + 2/3 \times 5.833) = 14.6095$

COAX - 9 - 1 5/8" NEXTEL OD = 1.70"

$A_C = 20' \times (1.70 \times \frac{2}{3}) / 12 \times 9 = 17$ D'

$14.6095 + 17 = 31.6095$ D' $\times 30$ PSF $= 948.3$ #

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CALCULATE WT OF SECTION

COMPONENT	L	#	WT/FT	WT (lb)
LEG	20'	3	8.18	491.1
DIAG	5.26	15	3.59	283.3
GIRT	3.42	18	1.794	110.4
				884.8
WT OF COAX	9 x .80 PLF x 20			144.0
			TOTAL	1028.0

CALCULATE PROPERTIES FOR 1/2" ICE

$A_G = 20'(3'\text{-}5" + 1\tfrac{3}{4}" + 2\times\tfrac{1}{2}") = 72.917^{\square'}$

COMPONENT	L	W_{equiv}	A_F	A_R
LEG	40	.229		9.1667
DIAG*	26.3	.181	4.749	
GIRT*	20.5	.181	3.701	
			8.450	9.167

* 

$W_{equiv} = 1.5 + 2 \times \tfrac{2}{3} \times (.5) = 2.1666"$ (.181')

$t \times \tfrac{2}{3}$ FOR EQIVALENT A_F

$$e = \frac{(8.450 + 9.167)}{72.917} = .242$$

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Project 120' SELF SUP TOWER

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$R_R = 2/3$ $DF = D_R = 1.5$

$A_E = 1.5(8.45 + 2/3 \times 9.167) = 21.842\ \square'$

COAX OD = 2.70"

$A = 20' \times (2.7 \times 2/3)/12 \times 9 = 27\ \square'$

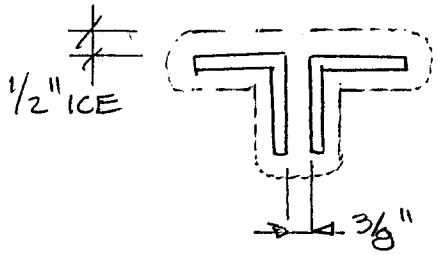
$21.842 + 27 = 48.842 \times 22.5\ PSF = 1098.95\#$

CALCULATE WT OF ICE 56 PCF

1 3/4" SE. UNIT WT $= \left((2 \times 1/2 + 1\,3/4)^2 - (1\,3/4)^2\right) \times \frac{\pi}{4} \times \frac{56}{144}$

$= 1.374\ \#/1$

2L 1 1/2 x 1 1/2 x 3/16 x 3/8"



$\left(\left((2 \times 1\,1/2 + 4 \times 1\,1/2) + \frac{6\pi}{4} \times 1/2\right) \times (1/2) + \left(\frac{3}{8}\right) \times 1\,1/2\right) \times \frac{56}{144}$

$= 2.427\ \#/1$

L 1 1/2 x 1 1/2 x 3/16

$\left(2 \times (1\,1/2 + 1\,1/2) + \frac{5\pi}{4} \times 1/2\right) \times (1/2) \times \frac{56}{144}$

$= 1.548\ \#/1$

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Project 120' SELF-SUP. TOWER

Job No. _____ By _____

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ICE WEIGHT

COMPONENT	L	#	WT/FT	WTICE (lb)
LEG	20	3	1.374	82.4
DIAG	5.26	15	2.427	191.5
GIRT	3.42	18	1.548	95.2
				369.1

WT OF ICE ON COAX

$9 \times (2.10 - .80) \times 20' =$ 234.0

TOTAL WT ICE 603.1

TOTAL SELF WT OF MAST

$WT_{STL} + WT_{ICE}$ 884.8 + 369.1 = 1253.9

TOTAL ADD. WT OF COAX

$WT_{NOICE} + W_{TICE}$ 144 + 234 = 378.0

TOTAL WT 1631.9

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Project 120' SELF-SUP TOWER

Job No. _____ By _____

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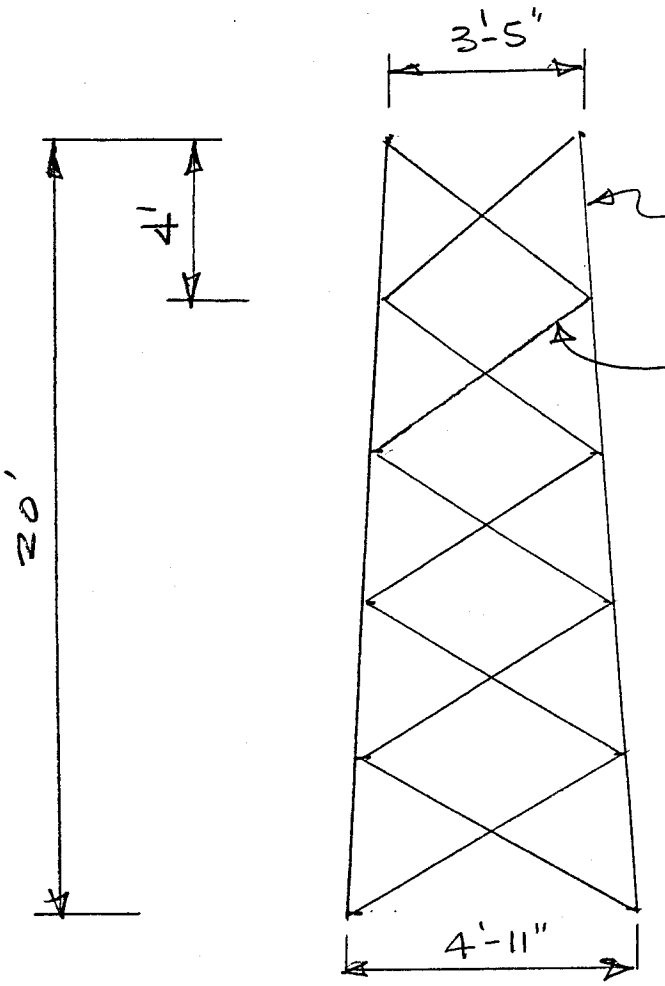
SECTION T1

TAPER = (10.91666 − 3.41666) / 5 = 1.5' / 20' SECTION



FW

3.4166 L_D = 5.3592

3.7166 L_D = 5.5633

4.0166 L_D = 5.7705

4.3016 L_D = 5.9903

4.6166 L_D = 6.2226

4.9166

$$A_G = 20 \times \left(\frac{(3'\text{-}5'' + 2'') + (4'\text{-}11'' + 2'')}{2} \right) = 86.67^{\square'}$$

COMPONENT	L	W	A_F	A_R
LEG	40.02	.1666		6.67
DIAG.	57.812	.125	7.23	

$$e = \frac{6.67 + 7.23}{86.67} = .160 \quad (2.3.5.1)$$

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$R_{R2} = 2/3$ $D_F = D_R = 1.5$

$A_E = 1.5(7.23 + 2/3 \times 6.07) = 17.515$ □'

COAX = 17 □'

$17.515 + 17 = 34.515 \times 30$ PSF $= 1035.45$ □

CALCULATE WT OF SECTION

COMPONENT	L	#	WT/FT	WT (lb)
LEG	20.01	3	10.69	641.73
DIAG.	57.812	3	1.794	311.14
				952.9
WT OF COAX	9 x .80 x 20			144.0
			TOTAL	1096.9

CALCULATE PROPERTIES FOR 1/2" ICE

$$A_G = \frac{20 \times \left((3'\text{-}5" + 2" + 2 \times 1/2") + (4'\text{-}11" + 2" + 2 \times 1/2")\right)}{2} = 88.33$$ □'

COMPONENT	L	W	A_F	A_R
LEG	40.02	.250		10.01
DIAG	57.812	.181*	10.464	

*SAME SECT. L1

$$e = \frac{(10.01 + 10.464)}{88.33} = .232$$

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$R_R = 2/3 \quad D_F = D_E = 1.5$

$A_E = 1.5\ (10.464 + 2/3 \times 10.01) = 25.706\ \square'$

COAX

$A = 27.0\ \square'$

$25.706 + 27 = 52.706\ \square' \times 22.5\ PSF = 1185.9\ \#$

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CALCULATE WT OF ICE

$2"\Phi$ SR UNIT W $= \left((2 \times 1\tfrac{1}{2}" + 2)^2 - (2)^2\right) \times \frac{\pi}{4} \times \frac{56}{144}$

$= 1.527$ #/1

L1½ SAME AS L1 $= 1.548$ #/1

ICE WEIGHT

COMPONENT	L	#	WT/FT	WT ICE
LEG	20.01	3	1.527	91.7
DIAG	57.812	3	1.548	268.5
				360.1

WT OF ICE ON COAX
$9 \times (2.10 - .80) \times 20$ = 234.0

TOTAL WT OF ICE = 594.1

TOTAL SELF WT OF MAST

$9529 + 360.1 = 13313$

TOTAL ADD WT OF COAX

$144.0 + 234.0 =$ 378

TOTAL WT = 1691

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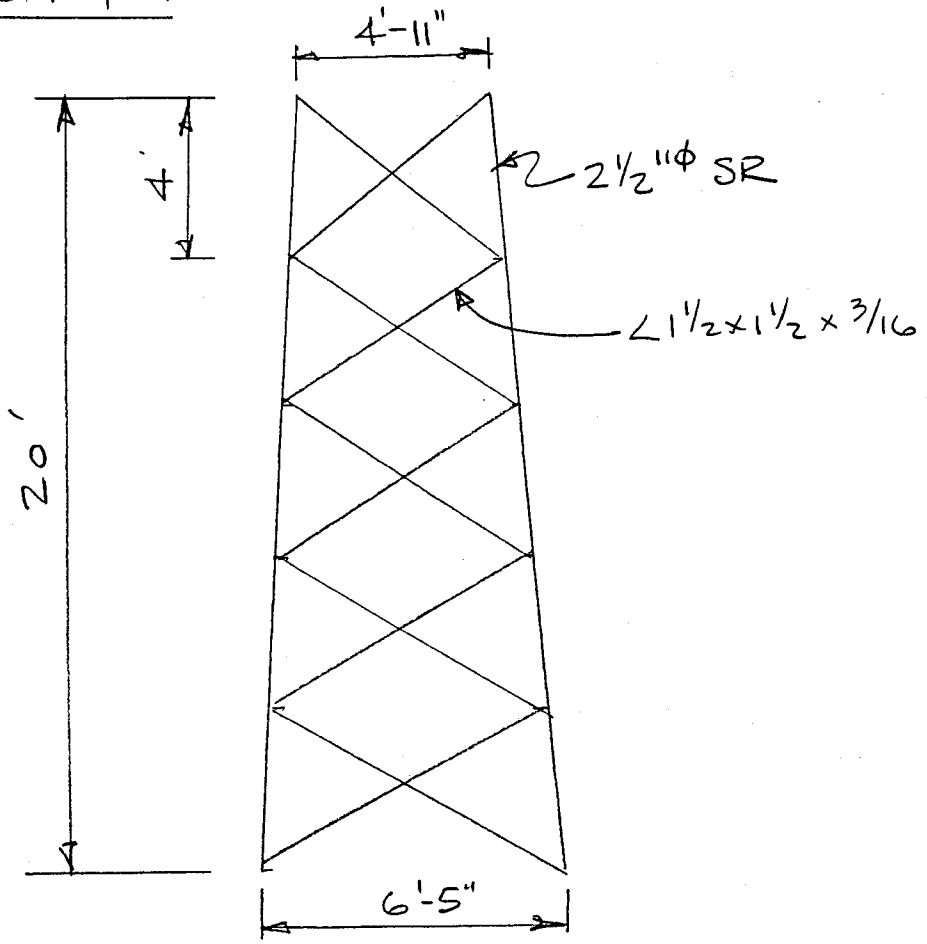
SECTION T2



FW
4.9166
L_D = 6.4553
5.2166
L_D = 6.6933
5.5166
L_D = 6.9362
5.8166
L_D = 7.1833
6.1166
L_D = 7.4343
6.4166

$$A_G = 20 \times \frac{\left((4'\text{-}11" + 2\tfrac{1}{2}") + (6'\text{-}5" + 2\tfrac{1}{2}")\right)}{2} = 117.50 \text{ D'}$$

COMPONENT	L	W/	A_F	A_R
LEG	40.02	.2083		8.3375
DIAG	69.4048	.125	8.6756	

$$e = \frac{(8.3375 + 8.6756)}{117.5} = .145 \quad (2.3.5.1)$$

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$R_R = 2/3 \quad D_F = D_R = 1.5$

$A_E = 1.5\ (8.6756 + 2/3 \times 8.3375) = 21.35^{\square'}$

COAX $= 17.0^{\square'}$

$21.35 + 17 = 38.35^{\square'} \times 30\ PSF = 1150.5^{\#}$

CALCULATE WT OF SECTION

COMPONENT	L	#	WT/FT	WT (lb)
LEG	20.01	3	16.703	1002.7
DIAG	69.4048	3	1.794	373.5
				1376.2
WT OF COAX 9x.80x20				144.0
			TOTAL	1520.2

CALCULATE PROPERTIES FOR 1/2" ICE

$$A_G = 20 \times \left(\frac{(4'-11" + 2\tfrac{1}{2}" + 2 \times \tfrac{1}{2}") + (6'-5" + 2\tfrac{1}{2}" + 2 \times \tfrac{1}{2}")}{2} \right) = 119.17$$

COMPONENT	L	W	A_F	A_R
LEG	40.02	.2917		11.674
DIAG	69.4048	.181*	12.562	

* SAME AS SECT L1

$$e = \frac{(11.674 + 12.562)}{119.17} = .203$$

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$R_R = 2/3 \quad D_R = D_E = 1.5$

$A_E = 1.5(12.562 + 2/3 \times 11.674) = 30.517^{\square'}$

$COAX = 27^{\square'}$

$30.517 + 27 = 57.517^{\square'} \times 22.5 = 1294^{\#}$

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CALCULATE WT OF ICE

$2\frac{1}{2}$"Φ SR UNIT WT = $\left(\left(2\frac{1}{2} + 2\times\frac{1}{2}\right)^2 - (2)^2\right) \times \frac{\pi}{4} \times \frac{56}{144}$

= 1.833 #/'

L1½ SAME AS L1 = 1.548 #/'

ICE WEIGHT

COMPONENT	L	#	WT/FT	WTICE
LEG	20.01	3	1.833	110.0
DIAG	69.4048	3	1.548	322.3
				432.3
WT OF ICE ON COAX 9x(2.10-.80)x20				234.0
TOTAL WT OF ICE				666.3

TOTAL SELF WT OF MAST
1376.2 + 432.3 = 1808.5

TOTAL ADD WT OF COAX
144 + 234 = 378

TOTAL WT 2186.5

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Project 120' SELF-SUP TOWER

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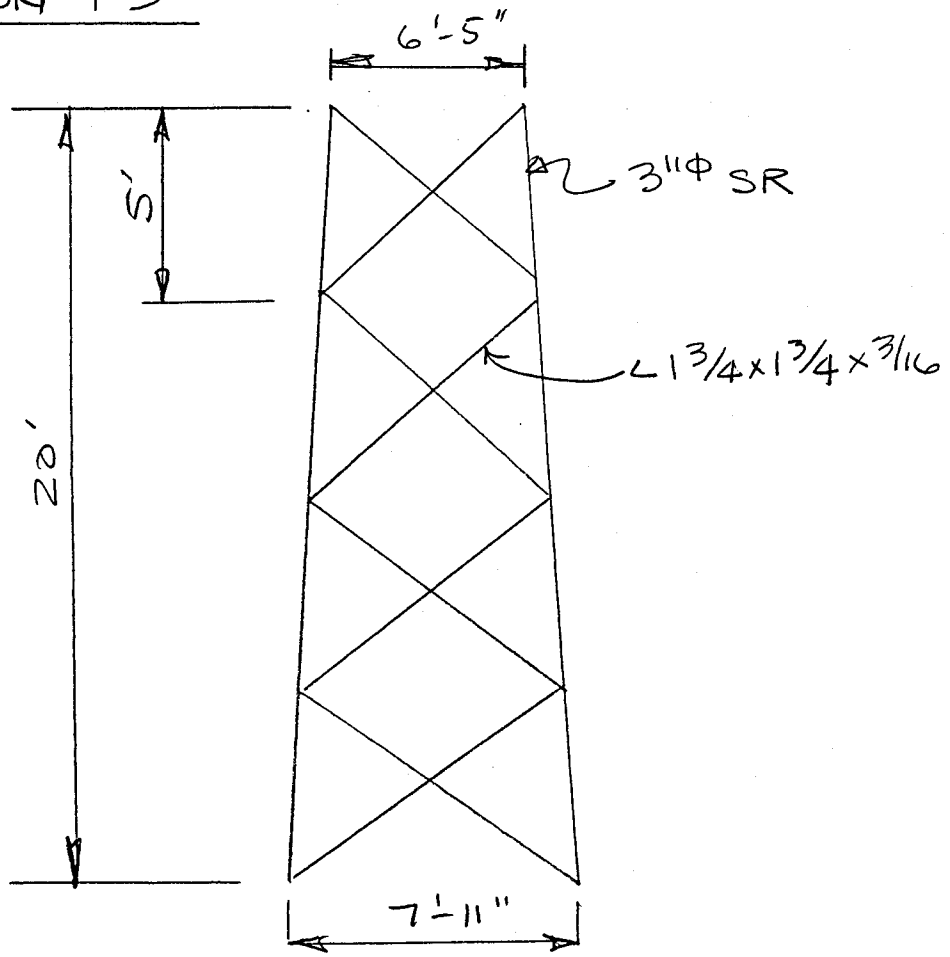
SECTION T3



FW
6.4166
L_D = 8.2834
6.7916
L_D = 8.5853
7.1666
L_D = 8.8929
7.5416
L_D = 9.2054
7.9166

$$A_G = 20 \times \frac{(6'\text{-}5" + 3") + (7'\text{-}11" + 3")}{2} = 148.333 \square'$$

COMPONENT	L	W	A_F	A_R
LEG	40.02	.250		10.005
DIAG	69.934	.14583	10.1987	

$$e = \frac{(10.005 + 10.1987)}{148.333} = .136 \quad (2.3.5.1)$$

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$R_R = 2/3 \quad D_F = D_R = 1.5$

$A_E = 1.5\ (10.1987 + \frac{2}{3} \times 10.005) = 25.303^{\square'}$

COAX $= 17^{\square'}$

$25.303 + 17 = 42.303 \times 30\,PSF = 1269.1\#$

CALCULATE WT OF SECTION

COMPONENT	L	#	WT/FT	WT (LB)
LEG	20.01	3	24.05	1443.9
DIAG	69.934	3	2.12	444.8
				1888.7
			WT OF COAX 9x.80x20'	144.0
			TOTAL	2032.7

CALCULATE PROPERTIES FOR 1/2" ICE

$$A_G = 20' \times \left(\frac{(6'\text{-}5" + 3" + 2\times 1/2") + (7'\text{-}11" + 3" + 2\times 1/2")}{2} \right) = 150.0$$

COMPONENT	L	W	A_F	A_R
LEG	40.02	.333		13.333
DIAG	69.934	.201 *	14.083	

$*(13/4 + 2\times 1/2" \times 2/3)/12 = .201'$

$$e = \frac{(13.333 + 14.083)}{150.0} = .183$$

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$R_R = 2/3 \quad D_E = D_R = 1.5$

$A_E = 1.5 \left(14.083 + 2/3 \times 7.827\right) = 34.46 \text{ ft}^2$

$COAX = 27 \text{ ft}^2$

$34.46 + 27 = 61.46 \text{ ft}^2 \times 22.5 \text{ PSF} = 1382.8\#$

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CALULATE WT OF ICE

$3^{11}\Phi$ SR UNIT WT $\left(\left(3+2\times 1/2\right)^2-(3)^2\right)\times\frac{\pi}{4}\times\frac{56}{144}$

$= 2.138\#/1$

$L\ 1\frac{3}{4}\times 1\frac{3}{4}\times\frac{3}{16}$

$\left(2\times\left(1\frac{3}{4}+1\frac{3}{4}\right)+\frac{5\pi}{4}\times 1/2\right)\left(1/2\right)\times\frac{56}{144}$

$= 1.743\#/1$

ICE WEIGHT

COMPONENT	L	#	WT/FT	WTICE
LEG	20.01	3	2.138	128.34
DIAG	69.934	3	1.743	365.68
				494.0

WT OF ICE ON COAX
$9\times(2.10-.80)\times 20$ 234.0

TOTAL WT OFICE 728.0

TOTAL SELF WT OF MAST
1888.7 + 494.0 2382.7

TOTAL ADD WT OF COAX
144.0 + 234.0 378.0

TOTAL WT 2760.7

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Project 120' SELF-SUP TOWER

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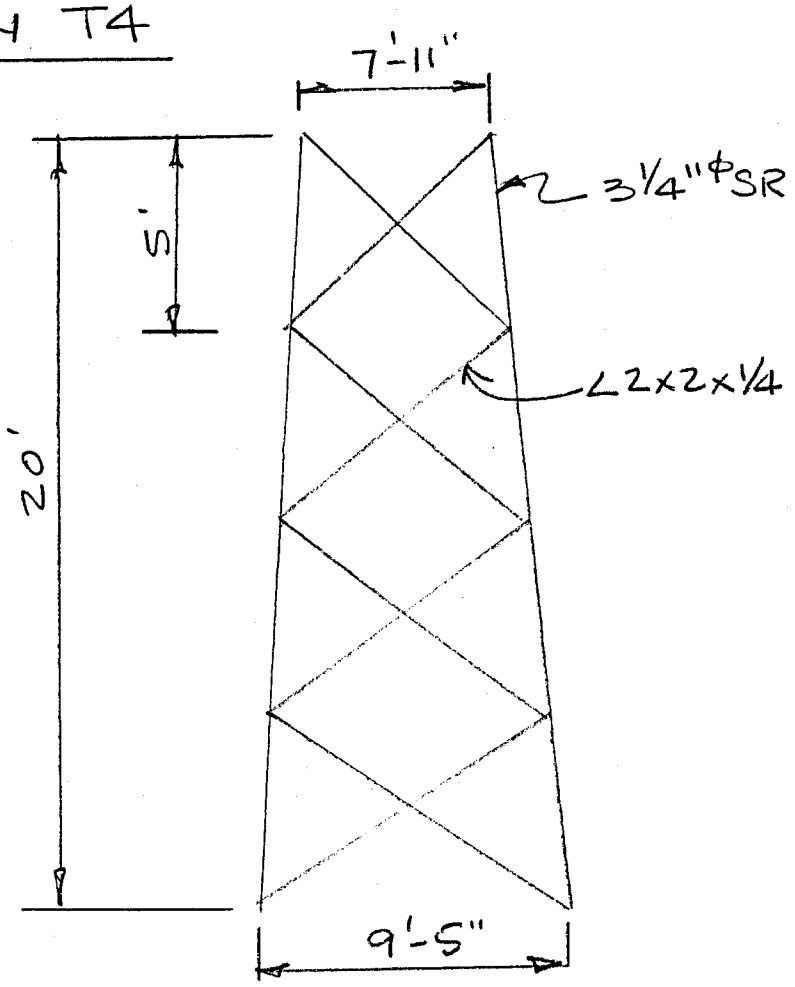
SECTION T4



FW
7.9166
L_D = 9.5224
8.2916
L_D = 9.8435
8.6666
L_D = 10.1683
9.0416
L_D = 10.4965
9.4166

$$A_G = 20' \times \left(\frac{(7'\text{-}11" + 3¼") + (9'\text{-}5" + 3¼")}{2} \right) = 178.75$$

COMPONENT	L	W	A_F	A_R
LEG	40.04	.2708		10.844
DIAG	80.06	.1666	13.338	

$$e = \frac{(10.844 + 13.338)}{178.75} = .135 \quad (2.3.5.1)$$

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$R_R = 2/3$ $DF = D_R = 1.5$

$A_E = 1.5\left(13.338 + \frac{2}{3} \times 10.844\right) = 30.85$ SQ'

COAX = 17 SQ'

30.85 + 17 = 47.85 SQ' × 30 PSF = 1435.5 #

CALCULATE WT OF SECTION

COMPONENT	L	#	WT/FT	WT (LB)
LEG	20.02	3	28.23	1695.4
DIAG	80.06	3	3.19	766.2
				2461.6
			WT OF COAX 9×.80×20	144.0
			TOTAL	2605.6

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CALCULATE PROPERTIES FOR 1/2" ICE

$$A_G = 20' \times \left(\frac{(7'-11" + 3\frac{1}{4} + 2\times\frac{1}{2}") + (9'-5" + 3\frac{1}{4}" + 2\times\frac{1}{2}")}{2} \right) = 180.4$$

COMPONENT	L	W	A_F	A_R
LEG	40.04	.354		14.18
DIAG	80.06	.222*	17.791	

* $(2" + 2\times\frac{1}{2}" \times 2/3)/12 = .222$

$$e = \frac{(14.18 + 17.791)}{180.4} = .177$$

$R_R = 2/3 \quad D = D_R = 1.5$

$A_E = 1.5\,(17.791 + 2/3 \times 14.18) = 40.87\ \square'$

COAX = $27\ \square'$

$40.87 + 27 = 67.87\ \square' \times 22.5\ PSF = 1527.1\#$

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CALCULATE WT OF ICE

$3\frac{1}{4}$" ϕ SR $\left(\left(3\frac{1}{4}+2\times\frac{1}{2}\right)^2-\left(3\frac{1}{4}\right)^2\right)\frac{\pi}{4}\times\frac{56}{144}=2.291$ #/'

L 2x2x¼

$\left(2\times(2+2)+\frac{5\pi}{4}\times\frac{1}{2}\right)\left(\frac{1}{2}\right)\frac{56}{144}=1.937$ #/'

ICE WEIGHT

COMPONENT	L	#	WT/FT	WTICE
LEG	20.02	3	2.291	137.60
DIAG	80.06	3	1.937	465.23
				602.83
			WT OF ICE ON COAX 9x(2.1-.8)x20	234.0
				836.83
			TOTAL SELF WT OF MAST 2461.6 + 602.83	3064.4
			TOTAL ADD. WT OF COAX 144 + 234	378
			TOTAL WT	3442

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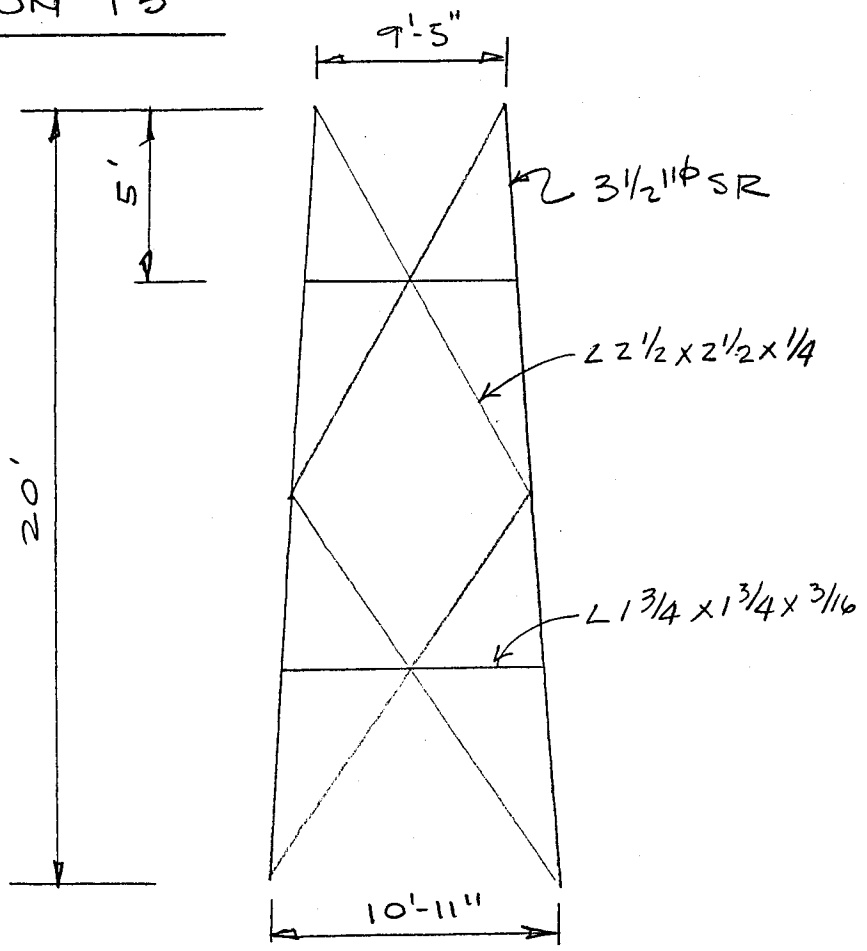
SECTION T5



FW
9.41666
9.7916
L_D = 14'
10.1666
10.5416
L_D = 14.53
10.9166

$$A_G = 20' \times \left(\frac{(9'\text{-}5" + 3\tfrac{1}{2}") + (10'\text{-}11" + 3\tfrac{1}{2}")}{2}\right) = 209.17$$

COMPONENT	L	W	A_F	A_R
LEG	40.04	.292		11.678
DIAG	57.06	.208	11.868	
HORZ	20.33	.146	2.965	
			14.833	

$$e = \frac{(11.678 + 14.833)}{209.17} = .127$$

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$R_R = 2/3 \quad D_E = D_R = 1.5$

$A_E = 1.5\,(14.833 + 2/3 \times 11.678) = 33.93^{D'}$

$COAX = 17^{D'}$

$33.93 + 17 = 50.93^{D'} \times 30\ PSF = 1528^{\#}$

CALCULATE WT OF SECTION

COMPONENT	L	#	WT/FT	WT (LB)
LEG	20.02	3	32.738	1966
DIAG	57.06	3	4.05	693
HORZ	20.33	3	2.12	129
				2788

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CALCULATE PROPERTIES FOR 1/2" ICE

$$A_G = 20' \times \frac{((9'-5"+3\tfrac{1}{2}"+2\times\tfrac{1}{2}")+(10'-11"+3\tfrac{1}{2}"+2\times\tfrac{1}{2}"))}{2} = 210.8$$

COMPONENT	L	W	A_F	A_R
LEG	40.04	.375		15.02
DIAG	57.06*	.264	15.06	
HORZ	20.33**	.201	4.09	
			19.15	

* $(2\tfrac{1}{2}"+2\times\tfrac{1}{2}"\times 2/3)/12 = .264$

** $(1\tfrac{3}{4}"+2\times\tfrac{1}{2}"\times 2/3)\,12 = .201$

$$e = \frac{(15.02+19.15)}{210.8} = .162$$

$R_R = 2/3 \quad D_E = D_L = 1.5$

$A_E = 1.5 \times (19.15 + 2/3 \times 15.02) = 43.74^{\#'}$

$COAX = 27^{\#'}$

$43.74 + 27 = 70.74^{\#'} \times 22.5\,PSF = 1591.6^{\#}$

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CALCULATE WT OF ICE

$3\frac{1}{2}$"Φ SR $\left((3\frac{1}{2}+2\times\frac{1}{2})^2-(3\frac{1}{2})^2\right)\frac{\pi}{4}\times\frac{56}{144}=2.443$ #/'

$\angle 2\frac{1}{2}\times 2\frac{1}{2}\times\frac{1}{4}$

$\left(2\times(2\frac{1}{2}+2\frac{1}{2})+\frac{5\pi}{4}\times\frac{1}{2}\right)\left(\frac{1}{2}\right)\frac{56}{144}=2.326$ #/'

$\angle 1\frac{3}{4}\times 1\frac{3}{4}\times\frac{3}{16}$

$\left(2\times(1\frac{3}{4}+1\frac{3}{4})+\frac{5\pi}{4}\times\frac{1}{2}\right)\left(\frac{1}{2}\right)\frac{56}{144}=1.743$ #/'

ICE WEIGHT

COMPONENT	L	#	WT/FT	WTICE
LEG	20.02	3	2.443	146.73
DIAG	57.06	3	2.326	398.16
HORZ	20.33	3	1.743	106.31
				651.20
WT OF ICE ON COAX 9"(2.1-.8)×20				234.00
				885.2
TOTAL SELF WT OF MAST 2788 + 651.2				3439.2
TOTAL ADD. WT OF COAX 144 + 234				378
			TOTAL WT.	3817.2

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CALCULATE MAST SHEAR & MOMENT

SECT	Z	ADD WT	SELF WT	F	OTM (FXZ)
L1	110	144	884.8	948.3	104,313
T1	90	144	952.9	1035.45	93,191
T2	70	144	1376.2	1150.5	80,535
T3	50	144	1888.7	1269.1	63,455
T4	30	144	2461.6	1435.5	43,065
T5	10	144	2788	1528	15,280
		864	10352	7367#	399,839

W/ICE

L1	110	378	1253.9	1099	120,890
T1	90	378	1313.0	1185.9	106,731
T2	70	378	1808.5	1294	90,580
T3	50	378	2382.7	1382.8	69,140
T4	30	378	3064.4	1527.1	45,813
T5	10	378	3439.2	1591.6	15,916
		2268	13262	8080	449,070

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APPURTENANCE LOADINGS

PIROD 13' LO-PRO PLATFORM

A = 15.30 □' Z = 120' q = 30 PSF

F = 15.30 x 30 = 459 #

OTM = 459 x 120 = 55080 ' #

WT = 1340 #

W/ICE

A = 17.0 □' q = 22.5 PSF

F = 17 x 22.5 = 382.5 #

OTM = 382.5 x 120 = 45,900 ' #

WT 2080 #

FV90-12 (9)

A = 9 x 6 □' = 54 □' Z = 120' q = 30 PSF

F = 54 x 30 = 1620 #

OTM = 1620 x 120 = 194,400 ' #

WT = 9 x 30 = 270 #

W/ICE

A = 9 x 6.6 = 59.4 □' q = 22.5 PSF

F = 59.4 x 22.5 = 1336.5 #

OTM = 1336.5 x 120 = 160390 ' #

WT = 9 x 80 = 720 #

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Project 120' SELF SUP TOWER

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SUMMARY

	ADD WT	SELF WT	APPURT WT	F	OTM
NO ICE	864	10352	1610	9446 #	649,319 '#
		12826			
1/2" ICE	2268	13262	2800	9799 #	655,350 '#
		18330			

ERITOWER RESULTS

NO ICE	864	10352.79	1610	9446.9 #	649,350 '#
		12826.79			
1/2 ICE	2268	13263.02	2800	9798.06 #	655,240 '#
		18331.35			

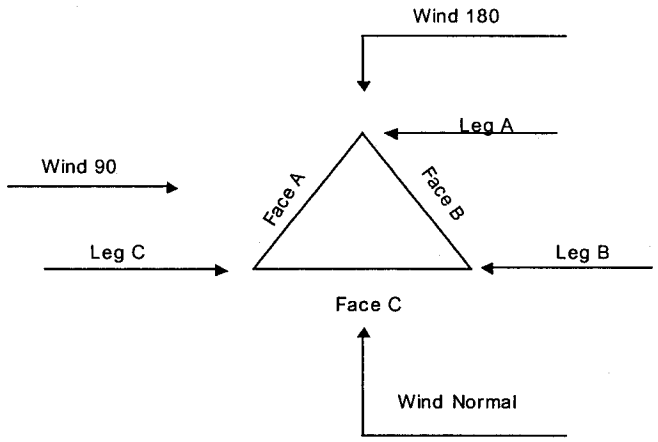
Tower Input Data

The main tower is a 3x free standing tower with an overall height of 120.00 ft above the ground line.
The base of the tower is set at an elevation of 0.00 ft above the ground line.
The face width of the tower is 3.42 ft at the top and 10.92 ft at the base.
There is a 3 sided latticed pole with a face width of 3.42 ft.
This tower is designed using the EIA-222-C standard.
The following design criteria apply:

EIA-222-C Zone A - 30 psf/22.5 psf w/0.50 in ice.
Wind pressure multiplier with ice used: 0.750000.
Nominal ice thickness of 0.5000 in.
Ice density of 56 pcf.
Pressures are calculated at each section.
Stress ratio used in latticed pole member design is 1.
Stress ratio used in tower member design is 1.
Local bending stresses due to climbing loads and feedline supports are not considered.

Options

Consider Moments - Legs	√ Distribute Leg Loads As Uniform	Treat Feedline Bundles As Cylinder
Consider Moments - Horizontals	Assume Legs Pinned	Use ASCE 10 X-Brace Ly Rules
Consider Moments - Diagonals	√ Assume Rigid Index Plate	√ Calculate Redundant Bracing Forces
Use Moment Magnification	Use Clear Spans For Wind Area	Consider Feedline Torque
√ Use Code Stress Ratios	Use Clear Spans For KL/r	√ SR Leg Bolts Resist Compression
√ Use Code Safety Factors - Guys	Retension Guys To Initial Tension	√ All Leg Panels Have Same Allowable
Escalate Ice	Bypass Mast Stability Checks	Offset Girt At Foundation
Always Use Max Kz	Use Azimuth Dish Coefficients	Poles
Use Special Wind Profile	Project Wind Area of Appurt.	Include Shear-Torsion Interaction
Include Bolts In Member Capacity	Autocalc Torque Arm Areas	Always Use Sub-Critical Flow
√ Leg Bolts Are At Top Of Section	SR Members Have Cut Ends	√ Use Top Mounted Sockets
√ Secondary Horizontal Braces Leg		



Triangular Tower

3 Sided Latticed Pole Section Geometry

Tower Section	Tower Elevation ft	Assembly Database	Description	Section Width ft	Number of Sections	Section Length ft
L1	120.00-100.00			3.42	1	20.00

3 Sided Latticed Pole Section Geometry *(cont'd)*

Tower Section	Tower Elevation ft	Diagonal Spacing ft	Bracing Type	Has K Brace End Panels	Has Horizontals	Top Girt Offset in	Bottom Girt Offset in
L1	120.00-100.00	4.00	K Brace Right	No	Yes	0.0000	0.0000

3 Sided Latticed Pole Section Geometry *(cont'd)*

Tower Elevation ft	Leg Type	Leg Size	Leg Grade	Diagonal Type	Diagonal Size	Diagonal Grade
L1 120.00-100.00	Solid Round	1 3/4	A572-50 (50 ksi)	Double Angle	2L1 1/2x1 1/2x3/16x3/8	A36 (36 ksi)

3 Sided Latticed Pole Section Geometry *(cont'd)*

Tower Elevation ft	Top Girt Type	Top Girt Size	Top Girt Grade	Bottom Girt Type	Bottom Girt Size	Bottom Girt Grade
L1 120.00-100.00	Single Angle	L1 1/2x1 1/2x3/16	A36 (36 ksi)	Single Angle	L1 1/2x1 1/2x3/16	A36 (36 ksi)

3 Sided Latticed Pole Section Geometry *(cont'd)*

Tower Elevation ft	No. of Mid Girts	Mid Girt Type	Mid Girt Size	Mid Girt Grade	Horizontal Type	Horizontal Size	Horizontal Grade
L1 120.00-100.00	None	Flat Bar		A36 (36 ksi)	Single Angle	L1 1/2x1 1/2x3/16	A36 (36 ksi)

3 Sided Latticed Pole Section Geometry *(cont'd)*

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
L1 120.00-100.00	0.00	0.5000	A36 (36 ksi)	1	1	1	36.0000	36.0000

3 Sided Latticed Pole Section Geometry *(cont'd)*

Tower Elevation ft	Calc K Single Angles	Calc K Solid Rounds	K Factors[1] Legs	X Brace Diags X Y	K Brace Diags X Y	Single Diags X Y	Girts X Y	Horiz. X Y	Sec. Horiz. X Y	Inner Brace X Y	Truss Leg X Brace	Truss Leg Z Brace
L1 120.00-100.00	No	No	1	1 1	1 1	1 1	1 1	1 1	1 1	1 1	0.5	0.85

[1]*Note: K factors are applied to member segment lengths. K-braces without inner supporting members will have the K factor in the out-of-plane direction applied to the overall length.*

3 Sided Latticed Pole Section Geometry *(cont'd)*

Tower Elevation ft	Leg		Diagonal		Top Girt		Bottom Girt		Mid Girt		Long Horizontal		Short Horizontal	
	Net Width Deduct in	U	Net Width Deduct in	U	Net Width Deduct in	U	Net Width Deduct in	U	Net Width Deduct in	U	Net Width Deduct in	U	Net Width Deduct in	U
L1 120.00-100.00	0.8125	1	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75

Tower Section Geometry

Tower Section	Tower Elevation ft	Assembly Database	Description	Section Width ft	Number of Sections	Section Length ft
T1	100.00-80.00			3.42	1	20.00
T2	80.00-60.00			4.92	1	20.00
T3	60.00-40.00			6.42	1	20.00
T4	40.00-20.00			7.92	1	20.00
T5	20.00-0.00			9.42	1	20.00

Tower Section Geometry *(cont'd)*

Tower Section	Tower Elevation ft	Diagonal Spacing ft	Bracing Type	Has K Brace End Panels	Has Horizontals	Top Girt Offset in	Bottom Girt Offset in
T1	100.00-80.00	4.00	X Brace	No	No	0.0000	0.0000
T2	80.00-60.00	4.00	X Brace	No	No	0.0000	0.0000
T3	60.00-40.00	5.00	X Brace	No	No	0.0000	0.0000
T4	40.00-20.00	5.00	X Brace	No	No	0.0000	0.0000
T5	20.00-0.00	10.00	X Brace	No	Yes	0.0000	0.0000

Tower Section Geometry *(cont'd)*

Tower Elevation ft	Leg Type	Leg Size	Leg Grade	Diagonal Type	Diagonal Size	Diagonal Grade
T1 100.00-80.00	Solid Round	2	A572-50 (50 ksi)	Single Angle	L1 1/2x1 1/2x3/16	A36 (36 ksi)
T2 80.00-60.00	Solid Round	2 1/2	A572-50 (50 ksi)	Single Angle	L1 1/2x1 1/2x3/16	A36 (36 ksi)
T3 60.00-40.00	Solid Round	3	A572-50 (50 ksi)	Single Angle	L1 3/4x1 3/4x3/16	A36 (36 ksi)
T4 40.00-20.00	Solid Round	3 1/4	A572-50 (50 ksi)	Single Angle	L2x2x1/4	A36 (36 ksi)
T5 20.00-0.00	Solid Round	3 1/2	A572-50 (50 ksi)	Single Angle	L2 1/2x2 1/2x1/4	A36 (36 ksi)

Tower Section Geometry *(cont'd)*

Tower Elevation ft	Secondary Horizontal Type	Secondary Horizontal Size	Secondary Horizontal Grade	Inner Bracing Type	Inner Bracing Size	Inner Bracing Grade
T5 20.00-0.00	Single Angle	L1 3/4x1 3/4x3/16	A36 (36 ksi)	Solid Round		A36 (36 ksi)

Tower Section Geometry *(cont'd)*

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
T1 100.00-80.00	0.00	0.5000	A36 (36 ksi)	1	1	1	36.0000	36.0000
T2 80.00-60.00	0.00	0.5000	A36 (36 ksi)	1	1	1	36.0000	36.0000
T3 60.00-40.00	0.00	0.5000	A36 (36 ksi)	1	1	1	36.0000	36.0000
T4 40.00-20.00	0.00	0.5000	A36 (36 ksi)	1	1	1	36.0000	36.0000
T5 20.00-0.00	0.00	0.5000	A36 (36 ksi)	1	1	1	36.0000	36.0000

Tower Section Geometry *(cont'd)*

Tower Elevation ft	Calc K Single Angles	Calc K Solid Rounds	K Factors[1] Legs	X Brace Diags X Y	K Brace Diags X Y	Single Diags X Y	Girts X Y	Horiz. X Y	Sec. Horiz. X Y	Inner Brace X Y	Truss Leg X Brace	Truss Leg Z Brace
T1 100.00-80.00	No	No	1	1 1	1 1	1 1	1 1	1 1	1 1	1 1	0.5	0.85
T2 80.00-60.00	No	No	1	1 1	1 1	1 1	1 1	1 1	1 1	1 1	0.5	0.85
T3 60.00-40.00	No	No	1	1 1	1 1	1 1	1 1	1 1	1 1	1 1	0.5	0.85
T4 40.00-20.00	No	No	1	1 1	1 1	1 1	1 1	1 1	1 1	1 1	0.5	0.85
T5 20.00-0.00	No	No	1	1 1	1 1	1 1	1 1	1 1	1 1	1 1	0.5	0.85

[1]*Note: K factors are applied to member segment lengths. K-braces without inner supporting members will have the K factor in the out-of-plane direction applied to the overall length.*

Tower Section Geometry *(cont'd)*

Tower Elevation ft	Leg		Diagonal		Top Girt		Bottom Girt		Mid Girt		Long Horizontal		Short Horizontal	
	Net Width Deduct in	U	Net Width Deduct in	U	Net Width Deduct in	U	Net Width Deduct in	U	Net Width Deduct in	U	Net Width Deduct in	U	Net Width Deduct in	U
T1 100.00-80.00	0.8125	1	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75
T2 80.00-60.00	0.8125	1	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75
T3 60.00-40.00	0.8125	1	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75
T4 40.00-20.00	0.8125	1	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75
T5 20.00-0.00	0.8125	1	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75

Feed Line/Linear Appurtenances - Entered As Area

Description	Face	Allow Shield	Component Type	Placement ft	Total Number		C_AA_A ft^2/ft	Weight plf
Nextel 1 5/8	C	No	CaAa (In Face)	100.00 - 0.00	9	No Ice	0.09	0.80
						1/2" Ice	0.15	2.10
						1" Ice	0.21	3.40
						2" Ice	0.32	6.00
						4" Ice	0.54	11.20
Nextel 1 5/8	C	No	CaAa (In Face)	120.00 - 100.00	9	No Ice	0.09	0.80
						1/2" Ice	0.15	2.10
						1" Ice	0.21	3.40
						2" Ice	0.32	6.00
						4" Ice	0.54	11.20

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	120.00-100.00	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	16.999	0.000	144.00
T1	100.00-80.00	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	16.999	0.000	144.00
T2	80.00-60.00	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	16.999	0.000	144.00
T3	60.00-40.00	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	16.999	0.000	144.00
T4	40.00-20.00	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	16.999	0.000	144.00
T5	20.00-0.00	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	16.999	0.000	144.00

Feed Line/Linear Appurtenances Section Areas - With Ice

Tower Section	Tower Elevation ft	Face	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	120.00-100.00	A	0.500	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	27.000	0.000	378.00
T1	100.00-80.00	A	0.500	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	27.000	0.000	378.00
T2	80.00-60.00	A	0.500	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	27.000	0.000	378.00
T3	60.00-40.00	A	0.500	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	27.000	0.000	378.00
T4	40.00-20.00	A	0.500	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	27.000	0.000	378.00
T5	20.00-0.00	A	0.500	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	27.000	0.000	378.00

Discrete Tower Loads

Description	Face or Leg	Offset Type	Offsets: Horz Lateral Vert ft	Azimuth Adjustment deg	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight lb
(9) FV90	C	None		0.0000	120.00	No Ice	6.00	6.00	30.00
						1/2" Ice	6.60	6.60	80.04
						1" Ice	7.20	7.20	136.17
						2" Ice	8.40	8.40	267.48
						4" Ice	10.80	10.80	611.78
Pirod 13' Low Profile Platform	C	None		0.0000	120.00	No Ice	15.30	15.30	1340.00
						1/2" Ice	17.00	17.00	2080.00
						1" Ice	18.70	18.70	2820.00
						2" Ice	22.10	22.10	4300.00
						4" Ice	28.90	28.90	7260.00

Tower Pressures - No Ice

$G_H = 1.000$

Section Elevation ft	z ft	K_Z	q_z psf	A_G ft^2	Face	A_F ft^2	A_R ft^2	A_{leg} ft^2	Leg %	C_AA_A In Face ft^2	C_AA_A Out Face ft^2
L1 120.00-100.00	110.00	1	30	71.250	A	5.850	5.833	5.833	49.93	16.999	0.000
					B	5.850	5.833		49.93		

Section Elevation ft	z ft	K_Z	q_z psf	A_G ft²	Face	A_F ft²	A_R ft²	A_{leg} ft²	Leg %	C_AA_A In Face ft²	C_AA_A Out Face ft²
					C	5.850	5.833		49.93		
T1 100.00-80.00	90.00	1	30	86.669	A	7.230	6.673	6.673	48.00	16.999	0.000
					B	7.230	6.673		48.00		
					C	7.230	6.673		48.00		
T2 80.00-60.00	70.00	1	30	117.503	A	8.676	8.341	8.341	49.02	16.999	0.000
					B	8.676	8.341		49.02		
					C	8.676	8.341		49.02		
T3 60.00-40.00	50.00	1	30	148.337	A	10.200	10.009	10.009	49.53	16.999	0.000
					B	10.200	10.009		49.53		
					C	10.200	10.009		49.53		
T4 40.00-20.00	30.00	1	30	178.754	A	13.344	10.843	10.843	44.83	16.999	0.000
					B	13.344	10.843		44.83		
					C	13.344	10.843		44.83		
T5 20.00-0.00	10.00	1	30	209.171	A	14.848	11.678	11.678	44.02	16.999	0.000
					B	14.848	11.678		44.02		
					C	14.848	11.678		44.02		

Tower Pressure - With Ice

$G_H = 1.000$

Section Elevation ft	z ft	K_Z	q_z psf	t_Z in	A_G ft²	Face	A_F ft²	A_R ft²	A_{leg} ft²	Leg %	C_AA_A In Face ft²	C_AA_A Out Face ft²
L1 120.00-100.00	110.00	1	23	0.5000	72.917	A	8.451	9.167	9.167	52.03	27.000	0.000
						B	8.451	9.167		52.03		
						C	8.451	9.167		52.03		
T1 100.00-80.00	90.00	1	23	0.5000	88.337	A	10.443	10.009	10.009	48.94	27.000	0.000
						B	10.443	10.009		48.94		
						C	10.443	10.009		48.94		
T2 80.00-60.00	70.00	1	23	0.5000	119.171	A	12.533	11.678	11.678	48.23	27.000	0.000
						B	12.533	11.678		48.23		
						C	12.533	11.678		48.23		
T3 60.00-40.00	50.00	1	23	0.5000	150.005	A	14.085	13.346	13.346	48.65	27.000	0.000
						B	14.085	13.346		48.65		
						C	14.085	13.346		48.65		
T4 40.00-20.00	30.00	1	23	0.5000	180.422	A	17.793	14.180	14.180	44.35	27.000	0.000
						B	17.793	14.180		44.35		
						C	17.793	14.180		44.35		
T5 20.00-0.00	10.00	1	23	0.5000	210.838	A	19.146	15.014	15.014	43.95	27.000	0.000
						B	19.146	15.014		43.95		
						C	19.146	15.014		43.95		

Tower Pressure - Service

$G_H = 1.000$

Section Elevation ft	z ft	K_Z	q_z psf	A_G ft²	Face	A_F ft²	A_R ft²	A_{leg} ft²	Leg %	C_AA_A In Face ft²	C_AA_A Out Face ft²

Section Elevation ft	z ft	K_Z	q_z psf	A_G ft²	Face	A_F ft²	A_R ft²	A_{leg} ft²	Leg %	C_AA_A In Face ft²	C_AA_A Out Face ft²
L1 120.00-100.00	110.00	1	20	71.250	A	5.850	5.833	5.833	49.93	16.999	0.000
					B	5.850	5.833		49.93		
					C	5.850	5.833		49.93		
T1 100.00-80.00	90.00	1	20	86.669	A	7.230	6.673	6.673	48.00	16.999	0.000
					B	7.230	6.673		48.00		
					C	7.230	6.673		48.00		
T2 80.00-60.00	70.00	1	20	117.503	A	8.676	8.341	8.341	49.02	16.999	0.000
					B	8.676	8.341		49.02		
					C	8.676	8.341		49.02		
T3 60.00-40.00	50.00	1	20	148.337	A	10.200	10.009	10.009	49.53	16.999	0.000
					B	10.200	10.009		49.53		
					C	10.200	10.009		49.53		
T4 40.00-20.00	30.00	1	20	178.754	A	13.344	10.843	10.843	44.83	16.999	0.000
					B	13.344	10.843		44.83		
					C	13.344	10.843		44.83		
T5 20.00-0.00	10.00	1	20	209.171	A	14.848	11.678	11.678	44.02	16.999	0.000
					B	14.848	11.678		44.02		
					C	14.848	11.678		44.02		

Tower Forces - No Ice - Wind Normal To Face

Section Elevation ft	Add Weight lb	Self Weight lb	Face	e	C_F	R_R	D_F	D_R	A_E ft²	F lb	w plf	Ctrl. Face
L1 120.00-100.00	144.00	884.63	A	0.164	1	0.667	1.5	1.5	14.609	948.24	47.41	C
			B	0.164	1	0.667	1.5	1.5	14.609			
			C	0.164	1	0.667	1.5	1.5	14.609			
T1 100.00-80.00	144.00	953.38	A	0.16	1	0.667	1.5	1.5	17.518	1035.52	51.78	C
			B	0.16	1	0.667	1.5	1.5	17.518			
			C	0.16	1	0.667	1.5	1.5	17.518			
T2 80.00-60.00	144.00	1376.80	A	0.145	1	0.667	1.5	1.5	21.356	1150.65	57.53	C
			B	0.145	1	0.667	1.5	1.5	21.356			
			C	0.145	1	0.667	1.5	1.5	21.356			
T3 60.00-40.00	144.00	1887.96	A	0.136	1	0.667	1.5	1.5	25.309	1269.24	63.46	C
			B	0.136	1	0.667	1.5	1.5	25.309			
			C	0.136	1	0.667	1.5	1.5	25.309			
T4 40.00-20.00	144.00	2461.98	A	0.135	1	0.667	1.5	1.5	30.860	1435.78	71.79	C
			B	0.135	1	0.667	1.5	1.5	30.860			
			C	0.135	1	0.667	1.5	1.5	30.860			
T5 20.00-0.00	144.00	2788.04	A	0.127	1	0.667	1.5	1.5	33.950	1528.48	76.42	C
			B	0.127	1	0.667	1.5	1.5	33.950			
			C	0.127	1	0.667	1.5	1.5	33.950			
Sum Weight:	864.00	10352.79						OTM	399.87 kip-ft	7367.90		

Tower Forces - No Ice - Wind 60 To Face

Section Elevation ft	Add Weight lb	Self Weight lb	Face	e	C_F	R_R	D_F	D_R	A_E ft²	F lb	w plf	Ctrl. Face
L1 120.00-	144.00	884.63	A	0.164	1	0.667	1.5	1.5	14.609	948.24	47.41	C

Section Elevation ft	Add Weight lb	Self Weight lb	Face	e	C_F	R_R	D_F	D_R	A_E ft^2	F lb	w plf	Ctrl. Face
100.00			B	0.164	1	0.667	1.5	1.5	14.609			
			C	0.164	1	0.667	1.5	1.5	14.609			
T1 100.00-80.00	144.00	953.38	A	0.16	1	0.667	1.5	1.5	17.518	1035.52	51.78	C
			B	0.16	1	0.667	1.5	1.5	17.518			
			C	0.16	1	0.667	1.5	1.5	17.518			
T2 80.00-60.00	144.00	1376.80	A	0.145	1	0.667	1.5	1.5	21.356	1150.65	57.53	C
			B	0.145	1	0.667	1.5	1.5	21.356			
			C	0.145	1	0.667	1.5	1.5	21.356			
T3 60.00-40.00	144.00	1887.96	A	0.136	1	0.667	1.5	1.5	25.309	1269.24	63.46	C
			B	0.136	1	0.667	1.5	1.5	25.309			
			C	0.136	1	0.667	1.5	1.5	25.309			
T4 40.00-20.00	144.00	2461.98	A	0.135	1	0.667	1.5	1.5	30.860	1435.78	71.79	C
			B	0.135	1	0.667	1.5	1.5	30.860			
			C	0.135	1	0.667	1.5	1.5	30.860			
T5 20.00-0.00	144.00	2788.04	A	0.127	1	0.667	1.5	1.5	33.950	1528.48	76.42	C
			B	0.127	1	0.667	1.5	1.5	33.950			
			C	0.127	1	0.667	1.5	1.5	33.950			
Sum Weight:	864.00	10352.79						OTM	399.87 kip-ft	7367.90		

Tower Forces - No Ice - Wind 90 To Face

Section Elevation ft	Add Weight lb	Self Weight lb	Face	e	C_F	R_R	D_F	D_R	A_E ft^2	F lb	w plf	Ctrl. Face
L1 120.00-100.00	144.00	884.63	A	0.164	1	0.667	1.5	1.5	14.609	948.24	47.41	C
			B	0.164	1	0.667	1.5	1.5	14.609			
			C	0.164	1	0.667	1.5	1.5	14.609			
T1 100.00-80.00	144.00	953.38	A	0.16	1	0.667	1.5	1.5	17.518	1035.52	51.78	C
			B	0.16	1	0.667	1.5	1.5	17.518			
			C	0.16	1	0.667	1.5	1.5	17.518			
T2 80.00-60.00	144.00	1376.80	A	0.145	1	0.667	1.5	1.5	21.356	1150.65	57.53	C
			B	0.145	1	0.667	1.5	1.5	21.356			
			C	0.145	1	0.667	1.5	1.5	21.356			
T3 60.00-40.00	144.00	1887.96	A	0.136	1	0.667	1.5	1.5	25.309	1269.24	63.46	C
			B	0.136	1	0.667	1.5	1.5	25.309			
			C	0.136	1	0.667	1.5	1.5	25.309			
T4 40.00-20.00	144.00	2461.98	A	0.135	1	0.667	1.5	1.5	30.860	1435.78	71.79	C
			B	0.135	1	0.667	1.5	1.5	30.860			
			C	0.135	1	0.667	1.5	1.5	30.860			
T5 20.00-0.00	144.00	2788.04	A	0.127	1	0.667	1.5	1.5	33.950	1528.48	76.42	C
			B	0.127	1	0.667	1.5	1.5	33.950			
			C	0.127	1	0.667	1.5	1.5	33.950			
Sum Weight:	864.00	10352.79						OTM	399.87 kip-ft	7367.90		

Tower Forces - With Ice - Wind Normal To Face

Section Elevation ft	Add Weight lb	Self Weight lb	Face	e	C_F	R_R	D_F	D_R	A_E ft²	F lb	w plf	Ctrl. Face
L1 120.00-100.00	378.00	1253.83	A	0.242	1	0.667	1.5	1.5	21.842	1098.95	54.95	C
			B	0.242	1	0.667	1.5	1.5	21.842			
			C	0.242	1	0.667	1.5	1.5	21.842			
T1 100.00-80.00	378.00	1313.79	A	0.232	1	0.667	1.5	1.5	25.675	1185.18	59.26	C
			B	0.232	1	0.667	1.5	1.5	25.675			
			C	0.232	1	0.667	1.5	1.5	25.675			
T2 80.00-60.00	378.00	1809.30	A	0.203	1	0.667	1.5	1.5	30.476	1293.22	64.66	C
			B	0.203	1	0.667	1.5	1.5	30.476			
			C	0.203	1	0.667	1.5	1.5	30.476			
T3 60.00-40.00	378.00	2382.06	A	0.183	1	0.667	1.5	1.5	34.473	1383.15	69.16	C
			B	0.183	1	0.667	1.5	1.5	34.473			
			C	0.183	1	0.667	1.5	1.5	34.473			
T4 40.00-20.00	378.00	3064.90	A	0.177	1	0.667	1.5	1.5	40.869	1527.05	76.35	C
			B	0.177	1	0.667	1.5	1.5	40.869			
			C	0.177	1	0.667	1.5	1.5	40.869			
T5 20.00-0.00	378.00	3439.15	A	0.162	1	0.667	1.5	1.5	43.734	1591.51	79.58	C
			B	0.162	1	0.667	1.5	1.5	43.734			
			C	0.162	1	0.667	1.5	1.5	43.734			
Sum Weight:	2268.00	13263.02						OTM	448.96 kip-ft	8079.06		

Tower Forces - With Ice - Wind 60 To Face

Section Elevation ft	Add Weight lb	Self Weight lb	Face	e	C_F	R_R	D_F	D_R	A_E ft²	F lb	w plf	Ctrl. Face
L1 120.00-100.00	378.00	1253.83	A	0.242	1	0.667	1.5	1.5	21.842	1098.95	54.95	C
			B	0.242	1	0.667	1.5	1.5	21.842			
			C	0.242	1	0.667	1.5	1.5	21.842			
T1 100.00-80.00	378.00	1313.79	A	0.232	1	0.667	1.5	1.5	25.675	1185.18	59.26	C
			B	0.232	1	0.667	1.5	1.5	25.675			
			C	0.232	1	0.667	1.5	1.5	25.675			
T2 80.00-60.00	378.00	1809.30	A	0.203	1	0.667	1.5	1.5	30.476	1293.22	64.66	C
			B	0.203	1	0.667	1.5	1.5	30.476			
			C	0.203	1	0.667	1.5	1.5	30.476			
T3 60.00-40.00	378.00	2382.06	A	0.183	1	0.667	1.5	1.5	34.473	1383.15	69.16	C
			B	0.183	1	0.667	1.5	1.5	34.473			
			C	0.183	1	0.667	1.5	1.5	34.473			
T4 40.00-20.00	378.00	3064.90	A	0.177	1	0.667	1.5	1.5	40.869	1527.05	76.35	C
			B	0.177	1	0.667	1.5	1.5	40.869			
			C	0.177	1	0.667	1.5	1.5	40.869			
T5 20.00-0.00	378.00	3439.15	A	0.162	1	0.667	1.5	1.5	43.734	1591.51	79.58	C
			B	0.162	1	0.667	1.5	1.5	43.734			
			C	0.162	1	0.667	1.5	1.5	43.734			
Sum Weight:	2268.00	13263.02						OTM	448.96 kip-ft	8079.06		

Tower Forces - With Ice - Wind 90 To Face

Section Elevation ft	Add Weight lb	Self Weight lb	Face	e	C_F	R_R	D_F	D_R	A_E ft²	F lb	w plf	Ctrl. Face
L1 120.00-100.00	378.00	1253.83	A	0.242	1	0.667	1.5	1.5	21.842	1098.95	54.95	C
			B	0.242	1	0.667	1.5	1.5	21.842			
			C	0.242	1	0.667	1.5	1.5	21.842			
T1 100.00-80.00	378.00	1313.79	A	0.232	1	0.667	1.5	1.5	25.675	1185.18	59.26	C
			B	0.232	1	0.667	1.5	1.5	25.675			
			C	0.232	1	0.667	1.5	1.5	25.675			
T2 80.00-60.00	378.00	1809.30	A	0.203	1	0.667	1.5	1.5	30.476	1293.22	64.66	C
			B	0.203	1	0.667	1.5	1.5	30.476			
			C	0.203	1	0.667	1.5	1.5	30.476			
T3 60.00-40.00	378.00	2382.06	A	0.183	1	0.667	1.5	1.5	34.473	1383.15	69.16	C
			B	0.183	1	0.667	1.5	1.5	34.473			
			C	0.183	1	0.667	1.5	1.5	34.473			
T4 40.00-20.00	378.00	3064.90	A	0.177	1	0.667	1.5	1.5	40.869	1527.05	76.35	C
			B	0.177	1	0.667	1.5	1.5	40.869			
			C	0.177	1	0.667	1.5	1.5	40.869			
T5 20.00-0.00	378.00	3439.15	A	0.162	1	0.667	1.5	1.5	43.734	1591.51	79.58	C
			B	0.162	1	0.667	1.5	1.5	43.734			
			C	0.162	1	0.667	1.5	1.5	43.734			
Sum Weight:	2268.00	13263.02						OTM	448.96 kip-ft	8079.06		

Tower Forces - Service - Wind Normal To Face

Section Elevation ft	Add Weight lb	Self Weight lb	Face	e	C_F	R_R	D_F	D_R	A_E ft²	F lb	w plf	Ctrl. Face
L1 120.00-100.00	144.00	884.63	A	0.164	1	0.667	1.5	1.5	14.609	632.16	31.61	C
			B	0.164	1	0.667	1.5	1.5	14.609			
			C	0.164	1	0.667	1.5	1.5	14.609			
T1 100.00-80.00	144.00	953.38	A	0.16	1	0.667	1.5	1.5	17.518	690.34	34.52	C
			B	0.16	1	0.667	1.5	1.5	17.518			
			C	0.16	1	0.667	1.5	1.5	17.518			
T2 80.00-60.00	144.00	1376.80	A	0.145	1	0.667	1.5	1.5	21.356	767.10	38.35	C
			B	0.145	1	0.667	1.5	1.5	21.356			
			C	0.145	1	0.667	1.5	1.5	21.356			
T3 60.00-40.00	144.00	1887.96	A	0.136	1	0.667	1.5	1.5	25.309	846.16	42.31	C
			B	0.136	1	0.667	1.5	1.5	25.309			
			C	0.136	1	0.667	1.5	1.5	25.309			
T4 40.00-20.00	144.00	2461.98	A	0.135	1	0.667	1.5	1.5	30.860	957.19	47.86	C
			B	0.135	1	0.667	1.5	1.5	30.860			
			C	0.135	1	0.667	1.5	1.5	30.860			
T5 20.00-0.00	144.00	2788.04	A	0.127	1	0.667	1.5	1.5	33.950	1018.99	50.95	C
			B	0.127	1	0.667	1.5	1.5	33.950			
			C	0.127	1	0.667	1.5	1.5	33.950			
Sum Weight:	864.00	10352.79						OTM	266.58 kip-ft	4911.93		

Tower Forces - Service - Wind 60 To Face

Section Elevation ft	Add Weight lb	Self Weight lb	Face	e	C_F	R_R	D_F	D_R	A_E ft²	F lb	w plf	Ctrl. Face
L1 120.00-100.00	144.00	884.63	A	0.164	1	0.667	1.5	1.5	14.609	632.16	31.61	C
			B	0.164	1	0.667	1.5	1.5	14.609			
			C	0.164	1	0.667	1.5	1.5	14.609			
T1 100.00-80.00	144.00	953.38	A	0.16	1	0.667	1.5	1.5	17.518	690.34	34.52	C
			B	0.16	1	0.667	1.5	1.5	17.518			
			C	0.16	1	0.667	1.5	1.5	17.518			
T2 80.00-60.00	144.00	1376.80	A	0.145	1	0.667	1.5	1.5	21.356	767.10	38.35	C
			B	0.145	1	0.667	1.5	1.5	21.356			
			C	0.145	1	0.667	1.5	1.5	21.356			
T3 60.00-40.00	144.00	1887.96	A	0.136	1	0.667	1.5	1.5	25.309	846.16	42.31	C
			B	0.136	1	0.667	1.5	1.5	25.309			
			C	0.136	1	0.667	1.5	1.5	25.309			
T4 40.00-20.00	144.00	2461.98	A	0.135	1	0.667	1.5	1.5	30.860	957.19	47.86	C
			B	0.135	1	0.667	1.5	1.5	30.860			
			C	0.135	1	0.667	1.5	1.5	30.860			
T5 20.00-0.00	144.00	2788.04	A	0.127	1	0.667	1.5	1.5	33.950	1018.99	50.95	C
			B	0.127	1	0.667	1.5	1.5	33.950			
			C	0.127	1	0.667	1.5	1.5	33.950			
Sum Weight:	864.00	10352.79						OTM	266.58 kip-ft	4911.93		

Tower Forces - Service - Wind 90 To Face

Section Elevation ft	Add Weight lb	Self Weight lb	Face	e	C_F	R_R	D_F	D_R	A_E ft²	F lb	w plf	Ctrl. Face
L1 120.00-100.00	144.00	884.63	A	0.164	1	0.667	1.5	1.5	14.609	632.16	31.61	C
			B	0.164	1	0.667	1.5	1.5	14.609			
			C	0.164	1	0.667	1.5	1.5	14.609			
T1 100.00-80.00	144.00	953.38	A	0.16	1	0.667	1.5	1.5	17.518	690.34	34.52	C
			B	0.16	1	0.667	1.5	1.5	17.518			
			C	0.16	1	0.667	1.5	1.5	17.518			
T2 80.00-60.00	144.00	1376.80	A	0.145	1	0.667	1.5	1.5	21.356	767.10	38.35	C
			B	0.145	1	0.667	1.5	1.5	21.356			
			C	0.145	1	0.667	1.5	1.5	21.356			
T3 60.00-40.00	144.00	1887.96	A	0.136	1	0.667	1.5	1.5	25.309	846.16	42.31	C
			B	0.136	1	0.667	1.5	1.5	25.309			
			C	0.136	1	0.667	1.5	1.5	25.309			
T4 40.00-20.00	144.00	2461.98	A	0.135	1	0.667	1.5	1.5	30.860	957.19	47.86	C
			B	0.135	1	0.667	1.5	1.5	30.860			
			C	0.135	1	0.667	1.5	1.5	30.860			
T5 20.00-0.00	144.00	2788.04	A	0.127	1	0.667	1.5	1.5	33.950	1018.99	50.95	C
			B	0.127	1	0.667	1.5	1.5	33.950			
			C	0.127	1	0.667	1.5	1.5	33.950			
Sum Weight:	864.00	10352.79						OTM	266.58 kip-ft	4911.93		

Discrete Appurtenance Pressures - No Ice $G_H = 1.000$

Description	Aiming Azimuth deg	Weight lb	$Offset_x$ ft	$Offset_z$ ft	z ft	K_z	q_z psf	C_AA_C Front ft^2	C_AA_C Side ft^2
FV90	0.0000	270.00	0.00	0.00	120.00	1.000	30	54.00	54.00
Pirod 13' Low Profile Platform	0.0000	1340.00	0.00	0.00	120.00	1.000	30	15.30	15.30
	Sum Weight:	1610.00							

Discrete Appurtenance Pressures - With Ice $G_H = 1.000$

Description	Aiming Azimuth deg	Weight lb	$Offset_x$ ft	$Offset_z$ ft	z ft	K_z	q_z psf	C_AA_C Front ft^2	C_AA_C Side ft^2	t_z in
FV90	0.0000	720.33	0.00	0.00	120.00	1.000	23	59.40	59.40	0.5000
Pirod 13' Low Profile Platform	0.0000	2080.00	0.00	0.00	120.00	1.000	23	17.00	17.00	0.5000
	Sum Weight:	2800.33								

Discrete Appurtenance Pressures - Service $G_H = 1.000$

Description	Aiming Azimuth deg	Weight lb	$Offset_x$ ft	$Offset_z$ ft	z ft	K_z	q_z psf	C_AA_C Front ft^2	C_AA_C Side ft^2
FV90	0.0000	270.00	0.00	0.00	120.00	1.000	20	54.00	54.00
Pirod 13' Low Profile Platform	0.0000	1340.00	0.00	0.00	120.00	1.000	20	15.30	15.30
	Sum Weight:	1610.00							

Force Totals

Load Case	Vertical Forces lb	Sum of Forces X lb	Sum of Forces Z lb	Sum of Overturning Moments, M_x kip-ft	Sum of Overturning Moments, M_z kip-ft	Sum of Torques kip-ft
Leg Weight	7242.21					
Bracing Weight	3110.58					
Total Member Self-Weight	10352.79			0.00	0.00	
Wind 0 deg - No Ice	12826.79	0.00	-9446.90	-649.35	0.00	0.00
Wind 90 deg - No Ice	12826.79	9446.90	0.00	0.00	-649.35	0.00
Wind 180 deg - No Ice	12826.79	0.00	9446.90	649.35	0.00	0.00
Member Ice	2910.23			0.00	0.00	
Wind 0 deg - Ice	18331.35	0.00	-9798.06	-655.24	0.00	0.00
Wind 90 deg - Ice	18331.35	9798.06	0.00	0.00	-655.24	0.00
Wind 180 deg - Ice	18331.35	0.00	9798.06	655.24	0.00	0.00
Wind 0 deg - Service	12826.79	0.00	-6297.93	-432.90	0.00	0.00
Wind 90 deg - Service	12826.79	6297.93	0.00	0.00	-432.90	0.00
Wind 180 deg - Service	12826.79	0.00	6297.93	432.90	0.00	0.00

Load Combinations

Comb. No.	Description
1	Dead Only
2	Dead+Wind 0 deg - No Ice
3	Dead+Wind 90 deg - No Ice
4	Dead+Wind 180 deg - No Ice
5	Dead+Ice
6	Dead+Wind 0 deg+Ice
7	Dead+Wind 90 deg+Ice
8	Dead+Wind 180 deg+Ice
9	Dead+Wind 0 deg - Service
10	Dead+Wind 90 deg - Service
11	Dead+Wind 180 deg - Service

Maximum Reactions

Location	Condition	Gov. Load Comb.	Vertical lb	Horizontal, X lb	Horizontal, Z lb
Leg C	Max. Vert	8	40764.19	2477.77	-2182.49
	Max. H_x	8	40764.19	2477.77	-2182.49
	Max. H_z	7	-53911.59	-4222.58	2003.76
	Min. Vert	3	-55206.72	-4165.04	1998.98
	Min. H_x	7	-53911.59	-4222.58	2003.76
	Min. H_z	8	40764.19	2477.77	-2182.49
Leg B	Max. Vert	7	66132.49	-4823.59	-2350.75
	Max. H_x	2	-30066.54	1911.46	1806.29
	Max. H_z	6	-28543.29	1876.76	1835.49
	Min. Vert	2	-30066.54	1911.46	1806.29
	Min. H_x	7	66132.49	-4823.59	-2350.75
	Min. H_z	7	66132.49	-4823.59	-2350.75
Leg A	Max. Vert	6	75417.94	0.03	6127.11
	Max. H_x	6	75417.94	0.03	6127.11
	Max. H_z	6	75417.94	0.03	6127.11
	Min. Vert	4	-64408.67	0.01	-5356.14
	Min. H_x	7	6110.45	-751.89	346.99
	Min. H_z	8	-63197.03	0.02	-5433.13

Tower Mast Reaction Summary

Load Combination	Vertical lb	$Shear_x$ lb	$Shear_z$ lb	Overturning Moment, M_x kip-ft	Overturning Moment, M_z kip-ft	Torque kip-ft
Dead Only	12826.79	0.00	0.00	0.00	0.00	0.00
Dead+Wind 0 deg - No Ice	12826.79	0.00	-9446.90	-649.35	0.00	0.00
Dead+Wind 90 deg - No Ice	12826.79	9446.90	0.00	0.00	-649.35	0.00
Dead+Wind 180 deg - No Ice	12826.79	0.00	9446.90	649.35	0.00	0.00
Dead+Ice	18331.35	0.00	0.00	0.00	0.00	0.00
Dead+Wind 0 deg+Ice	18331.35	0.00	-9798.06	-655.24	0.00	0.00
Dead+Wind 90 deg+Ice	18331.35	9798.06	0.00	0.00	-655.24	0.00
Dead+Wind 180 deg+Ice	18331.35	0.00	9798.06	655.24	0.00	0.00
Dead+Wind 0 deg - Service	12826.79	0.00	-6297.93	-432.90	0.00	0.00
Dead+Wind 90 deg - Service	12826.79	6297.93	0.00	0.00	-432.90	0.00
Dead+Wind 180 deg - Service	12826.79	0.00	6297.93	432.90	0.00	0.00

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	-12826.79	0.00	0.00	12826.79	0.00	0.000%
2	0.00	-12826.79	-9446.90	0.00	12826.79	9446.90	0.000%
3	9446.90	-12826.79	0.00	-9446.90	12826.79	0.00	0.000%
4	0.00	-12826.79	9446.90	0.00	12826.79	-9446.90	0.000%
5	0.00	-18331.35	0.00	0.00	18331.35	0.00	0.000%
6	0.00	-18331.35	-9798.06	0.00	18331.35	9798.06	0.000%
7	9798.06	-18331.35	0.00	-9798.06	18331.35	0.00	0.000%
8	0.00	-18331.35	9798.06	0.00	18331.35	-9798.06	0.000%
9	0.00	-12826.79	-6297.93	0.00	12826.79	6297.93	0.000%
10	6297.93	-12826.79	0.00	-6297.93	12826.79	0.00	0.000%
11	0.00	-12826.79	6297.93	0.00	12826.79	-6297.93	0.000%