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STRUCTURAL
DESIGN, S.C.

CONSULTING ENGINEERS

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Milwaukee, WI 53217-1633
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Project _____

Job No. _____ By _____

Date _____ Page ____ of ____

TOWER TRAINING
EXAMPLE #2
150' MONOPOLE
PER TIA 222-F

ERITOWER FILE:
SUMMITPOLE.ERI

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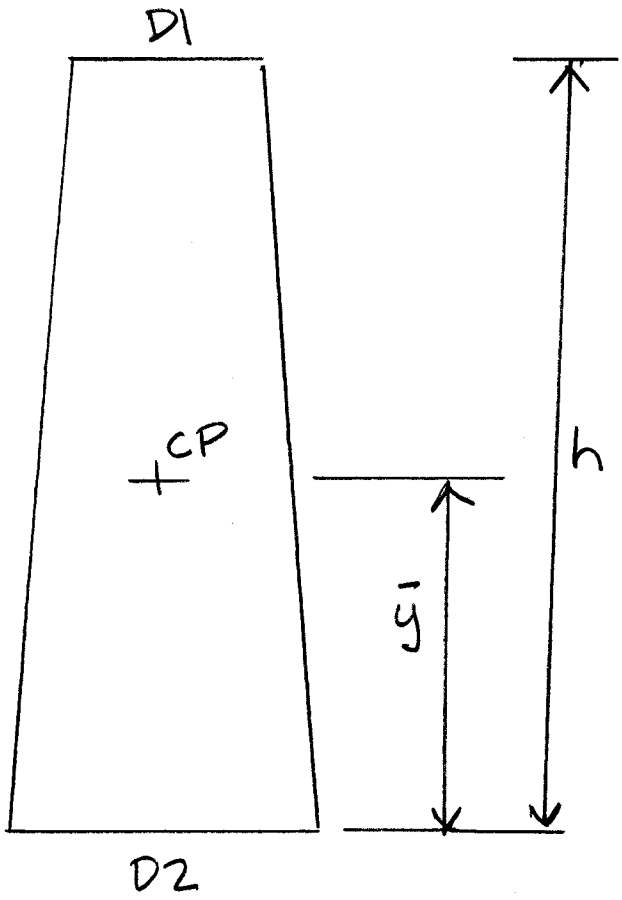
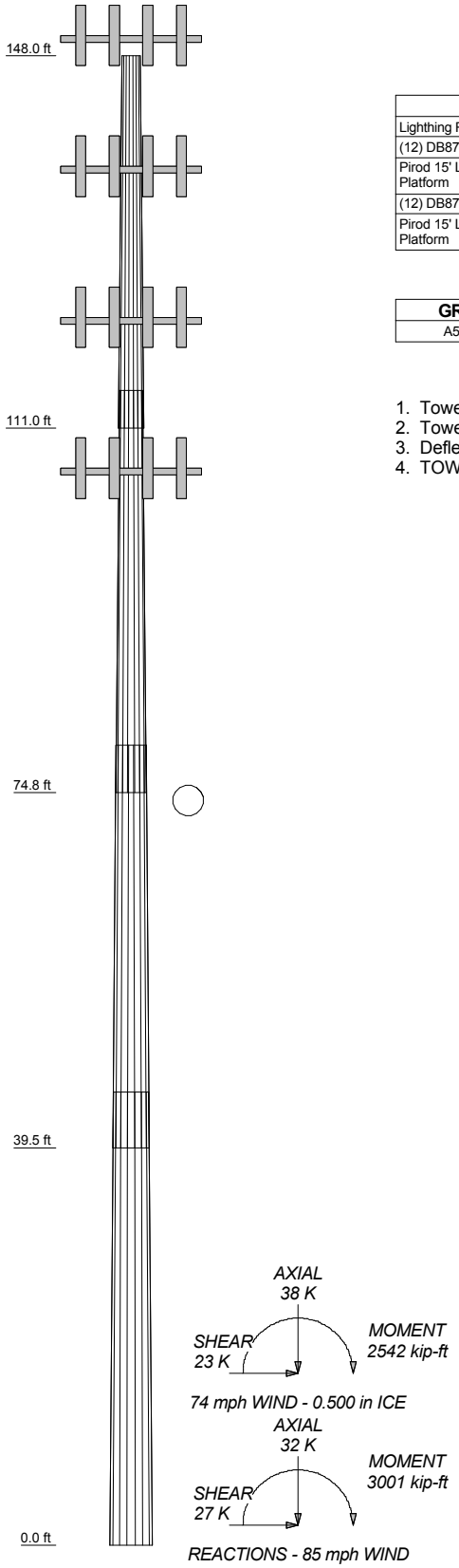


$$\bar{y} = \frac{2D_1 + D_2}{3(D_1 + D_2)} \times h$$

Section	1	2	3	4
Length (ft)	37.000	40.000	40.000	45.000
Number of Sides	18	18	18	18
Thickness (in)	0.219	0.250	0.313	0.375
Lap Splice (ft)	3.750	4.750	5.500	
Top Dia (in)	22.000	28.380	35.106	41.554
Bot Dia (in)	29.586	36.580	43.307	50.780
Grade	A572-65			
Weight (K)	2.3	3.5	5.3	8.4

19.5



DESIGNED APPURTENANCE LOADING

TYPE	ELEVATION	TYPE	ELEVATION
Lighthing Rod 5/8x4'	152	(12) DB874H	122
(12) DB874H	150	Pirod 15' Low Profile Rotable Platform	122
Pirod 15' Low Profile Rotable Platform	150	(12) DB874H	107
(12) DB874H	137	Pirod 15' Low Profile Rotable Platform	107
Pirod 15' Low Profile Rotable Platform	137		

MATERIAL STRENGTH

GRADE	YIELD	GRADE	YIELD
A572-65	65 ksi		

TOWER DESIGN NOTES

1. Tower designed for a 85 mph basic wind in accordance with the TIA/EIA-222-F Standard.
2. Tower is also designed for a 74 mph basic wind with 0.50 in ice.
3. Deflections are based upon a 50 mph wind.
4. TOWER RATING: 99.3%

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Job: ***Example #2***		
Project: ***Summit Pole***		
Client: CSD	Drawn by: horn	App'd:
Code: TIA/EIA-222-F	Date: 07/15/03	Scale: NTS
Path: C:\MSDEV\PROJECTS\ERITower\Debug\benchmarks\summitpole.eri		Dwg No. E-1

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Project 150' MONOPOLE
Job No TRAINING By DGH
Date _____ Page 1 of _____

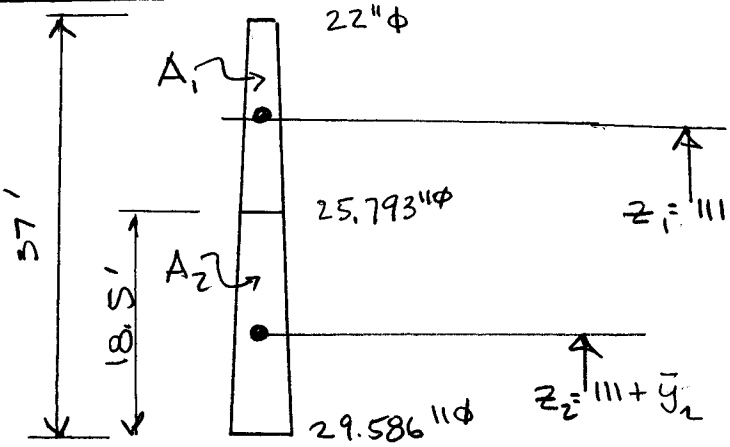
DETERMINE WIND PRESSURES

$h = 148'$ $V = 85$ MPH 74 MPH + 1/2" ICE

$G_H = 1.69$ (2.3.4.2)

TO SATISFY 2.3.9.3, CALCULATE PRESSURES ON EACH SECTION USING TWO PARTS

SECTION 1



$$\bar{y}_i = \frac{2D_{TOP} + D_{BOT}}{3(D_{TOP} + D_{BOT})} \times h$$

$K_z = \left(\frac{z}{33}\right)^{2/7}$

$q_z = .00256 K_z V^2$

	z_i	K_{z_i}	q_{z_i}	$q_{z_{ICE_i}}$	A_i	$\bar{y}_i$	A_{ICE}	$\bar{y}_{ICE}$
1	138.5	1.507	27.87	21.12	36.84	9.005	38.38	9.015
2	120.04	1.446	26.75	20.27	42.69	9.039	44.23	9.046
					79.53		82.61	

	$F = G_H q_z A$	$F \times z$	F_{ICE}	$F_{ICE} \times z$
1	1735.2	240322	1370	189,730
2	1929.9	231,665	1515	181,879
	3665	471,987	2885	371609

$z_{equiv} = \frac{471987}{3665} = 128.78'$ $K_{z_{equiv}} = \left(\frac{128.78}{33}\right)^{2/7} = 1.476$

$q_{z_{equiv}} = \frac{3665}{1.69 \times 79.53} = 27.27$ psf $\frac{2885}{1.69 \times 82.61} = 20.66$ psf

$C_F = .65$ $(C = \sqrt{1.476} \times 85 \times 22/12 = 189.64)$

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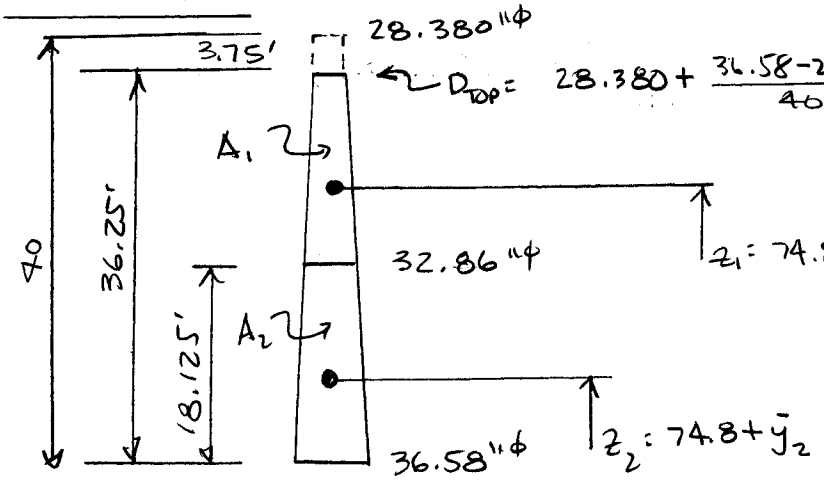
Project 150' MONOPOLE

Job No. _____ By _____

Date _____ Page 2 of _____

SECTION 2



	z_i	K_{z_i}	q_{z_i}	q_{zICEi}	A_i	$\bar{y}_1$	A_{ICE}	$\bar{y}_{ICEi}$
1	101.81	1.380	25.52	19.34	46.83	8.882	48.34	8.887
2	83.70	1.305	24.13	18.29	52.44	8.900	53.95	8.905
					99.27		103.29	

	$F = G_H q_z A$	$F \times z$	F_{ICE}	$F_{ICE} \times z$
1	2019.7	205,626	1579.97	160,860
2	2138.5	178,992	1667.6	139,578
	4158	384,618	3248	300,438

z_{equiv}: $\frac{384,618}{4158} = 92.5$ $\frac{300438}{3248} = 92.5$

$q_{equiv} = \frac{4158}{1.69 \times 99.27} = 24.78$ psf $\frac{3248}{1.69 \times 103.29} = 18.6$

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Project 150' MONOPOLE

Job No. _____ By _____

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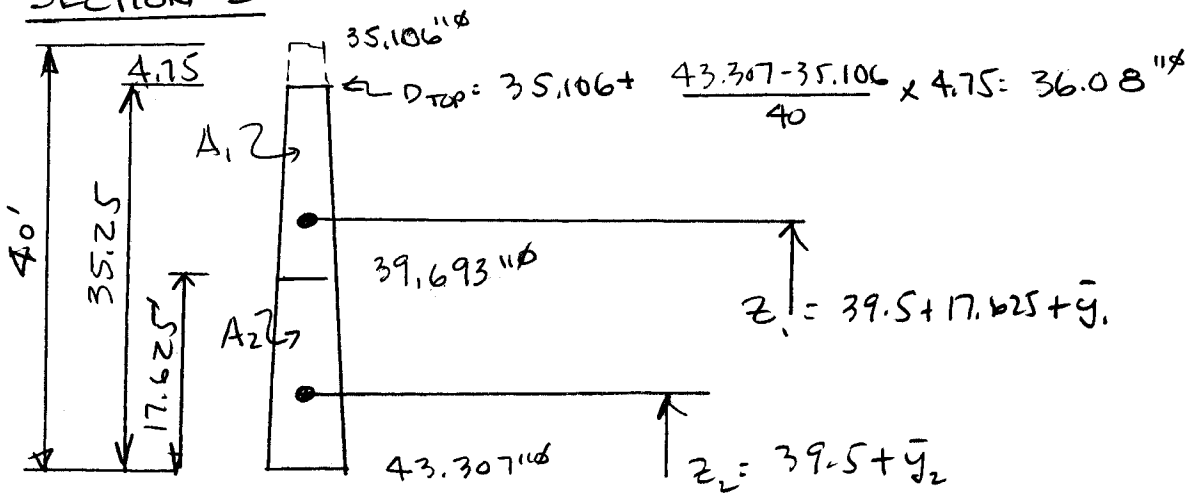
SECTION 3



	z_i	K_{z_i}	q_z	$q_{z_{ICE}}$	A_i	$\bar{y}_i$	A_{ICE}	$\bar{y}_{ICE}$
1	65.795	1.218	22.52	17.07	55.65	8.67	57.11	8.68
2	48.18	1.114	20.6	15.6	60.95	8.68	62.42	8.69
					116.160		119.54	

	$F = G_H q_z A$	$F \times z$	F_{ICE}	$F_{ICE} \times z$
1	2117.97	139,352	1647.5	
2	2121.91	102,234	1648.3	
	4240	241,586	3296	

$z_{equiv} = \frac{241586}{4240} = 56.98$

$q_{equiv} = \frac{4240}{1.69 \times 116.6} = 21.52$ $\quad \frac{3296}{1.69 \times 119.54} = 16.31$

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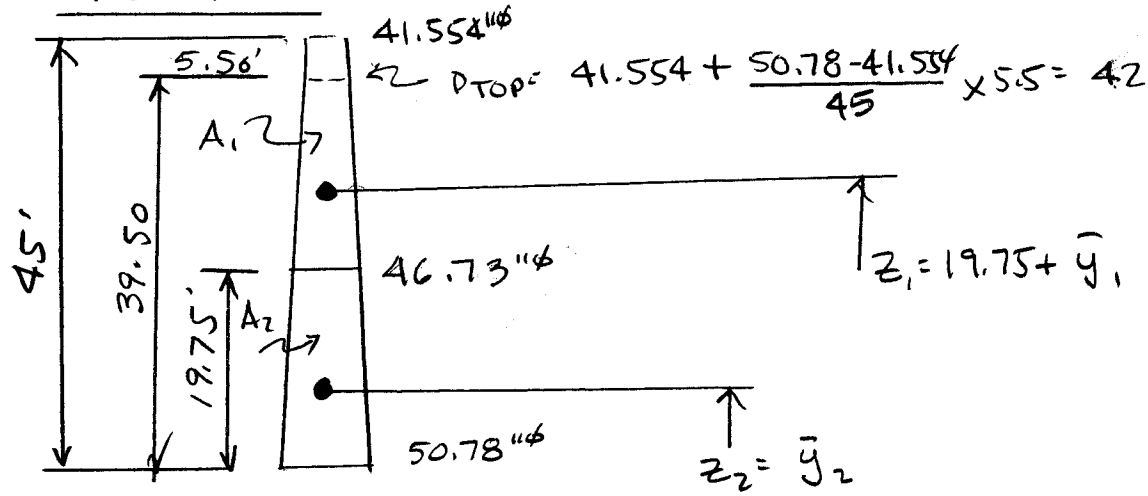
Project 150' MONOPOLE

Job No. _____ By _____

Date _____

SECTION 4



	z_i	K_{z_i}	q_{z_i}	q_{ice_i}	A_i	$\bar{y}_i$	A_{ICE}	$\bar{y}_{ICE}$
1	29.48	1.0	18.5	14.0	73.58	9.73	75.22	9.73
2	9.74	1.0	18.5	14.0	80.24	9.74	81.89	9.74
					153.82		157.11	

	$F = G_H q_z A$	$F \times z$	F_{ICE}	$F_{ICE} \times z$
1	2300.5	67819	1779.7	52466
2	2508.7	24435	1937.5	18,871
	4809.2	92253	3717.2	71337

$z_{equiv} = \frac{92253}{4809.2} = 19.18$

$q_{equiv} = \frac{4809.2}{1.69 \times 153.82} = 18.5$ $\quad \frac{3717.2}{1.69 \times 157.11} = 14.0$

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Project 150' MONOPOLE

Job No. _____ By _____

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$A_R = 1.03 * A_G$ (ASSUMED FOR STEP BOLTS)

$F = q_z G_H * C_F * A_R = .65 \times 1.03 * G_H q_z A$

$C_F = .65$

FROM SHT 1-4

SECTION	A_G	A_R	$G_H q_z A$	F	z	OTM
1	79.53	81.92	3665	2453	128.78	315,897
2	99.27	102.2	4158	2784	92.5	257,520
3	116.6	120.1	4240	2839	56.98	161,766
4	153.82	158.4	4809	3220	19.18	61,760
				11,296		796.9 K

WITH 1/2" ICE

1	82.61	85.09	2885	1932	128.78	248,803
2	103.29	106.39	3248	2175	92.5	201,188
3	119.54	123.13	3296	2207	56.98	125,755
4	157.11	161.82	3717	2489.	19.18	47,739
				8,803		623.5 K

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Project 150' MONOPOLE

Job No. _____ By _____

Date _____ Page 6 of _____

CALCULATE SELF-WEIGHT

$A = 3.174 * (D-t)(t)$ D = DIA ACROSS FLATS

t	D_1	A_1	D_2	A_2	L	Wt	* 1.01*
.2188	22	15.126	29.586	20.395	37'	2236	2258
.250	28.38	22.32	36.58	28.828	40'	3481	3515
.3125	35.106	34.51	43.307	42.645	40'	5251	5303
.375	41.554	49.01	50.78	60.0	45'	8346	8429
							19505

* MULT. TO INCLUDE STEP BOLTS, GALVANIZING ETC.

WT OF ICE (56 PCF)

t	D_1	A_1	D_2	A_2	L	WT
.5	23	35.7	30.586	47.75	37	600.4
.5	30.149	47.05	37.580	58.85	36.25	746.4
.5	37.08	58.05	44.307	69.52	35.25	874.4
.5	43.68	68.52	51.78	81.38	39.5	1151.4
						3373

FEEDLINE WT (INSIDE POLE)

SIZE	#	L	UNIT WT	WT
7/8	12	148	.54	959
7/8	12	137	.54	888
7/8	12	122	.54	791
7/8	12	107	.54	693
				3331

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Project 150' MONOPOLE

Job No. _____ By _____

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DISCRETE APPURTENANCES

DESCR.	z	K_z	q_z	UNIT $C_A A_A$	F*	OTM
LIGHT. ROD	152	1.547	28.6	.25	12.09	1,838 ^IK
(12) DB874H	150	1.541	28.5	5.6	3237	485.5 ^IK
15' PLATFORM	150	1.541	28.5	20.6	992	148.8 ^IK
(12) DB874H	137	1.502	27.8	5.6	3155	432.2 ^IK
15' PLATFORM	137	1.502	27.8	20.6	967	132.5 ^IK
(12) DB874H	122	1.453	26.9	5.6	3052	372.3 ^IK
15' PLATFORM	122	1.453	26.9	20.6	936	114.1 ^IK
(12) DB874H	107	1.399	25.9	5.6	2939	314.4 ^IK
15' PLATFORM	107	1.399	25.9	20.6	900.8	96.4 ^IK
					16,191	2098 ^IK

*$F = G_H q_z C_A A_A$

WITH 1/2" ICE

DESCR	z	K_z	q_z	UNIT CAA_A	F	OTM
LIGHT. ROD	152	1.547	21.7	.664	24	3.68 ^IK
(12) DB874H	150	1.541	21.6	6.19	2712	406.8 ^IK
15' PLATFORM	150	1.541	21.6	25.2	920	138.0 ^IK
(12) DB874H	137	1.502	21.1	6.19	2643	362.1 ^IK
15' PLATFORM	137	1.502	21.1	25.2	897	122.9 ^IK
(12) DB874H	122	1.453	20.4	6.19	2557	311.95 ^IK
15' PLATFORM	122	1.453	20.4	25.2	867	105.8 ^IK
(12) DB874H	107	1.399	19.6	6.19	2462	263.4 ^IK
15' PLATFORM	107	1.399	19.6	25.2	835	89.4 ^IK
					13,917	1804 ^IK

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WT OF DISCRETE APPURT.

DESCR.	UNIT WT	WT	UNIT WT ICE	WT ICE
LIGHT ROD	31	31	34	34
(48) DB874-1	15	720	47	2256
(4) 15' PLATFORM	2050	8200	2325	9300
		8951		11590

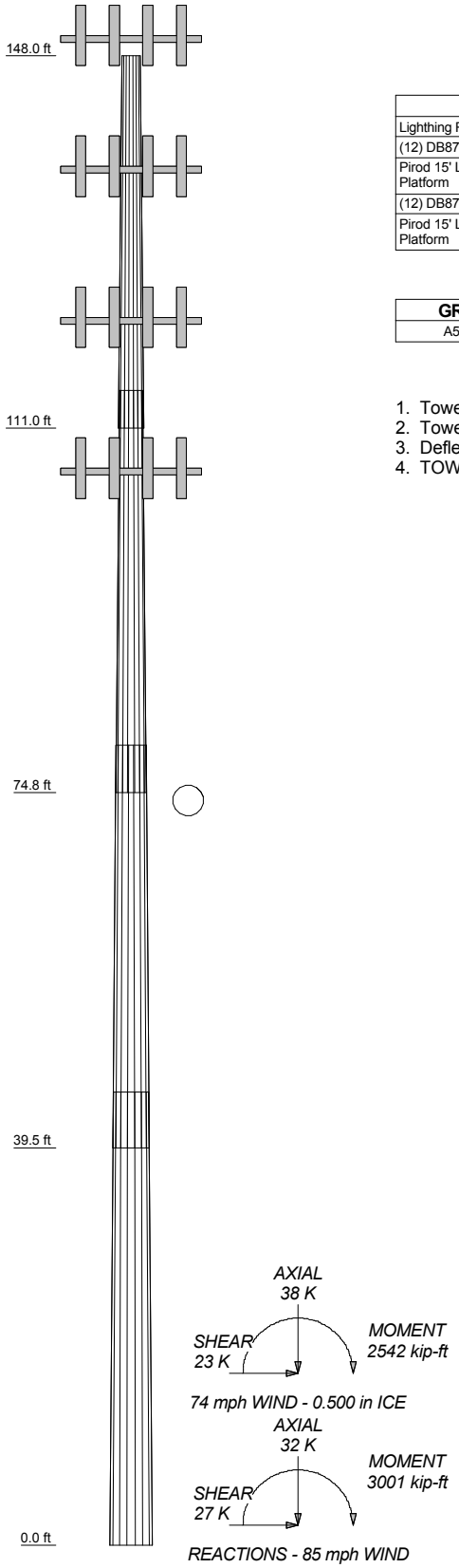
FORCE SUMMARY

			ERITOWER
SELF WT	19505		19507
TOTAL WT	19505 + 3331 + 8951 =	31787	31788
WIND F	11296 + 16191 =	27487	27488
OTM	797 + 2098 =	2895 IK	2895 / 3001*
WT_{ICE}	19505 + 3331 + 3573 + 11590 =	37799	37800
F_{ICE}	8805 + 13917 =	22720	22723
OTM_{ICE}	624 + 1804 =	2428	2427 / 2534*

* WITH P-DELTA INCLUDED

Section	1	2	3	4
Length (ft)	37.000	40.000	40.000	45.000
Number of Sides	18	18	18	18
Thickness (in)	0.219	0.250	0.313	0.375
Lap Splice (ft)	3.750	4.750	5.500	
Top Dia (in)	22.000	28.380	35.106	41.554
Bot Dia (in)	29.586	36.580	43.307	50.780
Grade	A572-65			
Weight (K)	2.3	3.5	5.3	8.4

19.5



DESIGNED APPURTENANCE LOADING

TYPE	ELEVATION	TYPE	ELEVATION
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Pirod 15' Low Profile Rotable Platform	150	(12) DB874H	107
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Pirod 15' Low Profile Rotable Platform	137		

MATERIAL STRENGTH

GRADE	YIELD	GRADE	YIELD
A572-65	65 ksi		

TOWER DESIGN NOTES

1. Tower designed for a 85 mph basic wind in accordance with the TIA/EIA-222-F Standard.
2. Tower is also designed for a 74 mph basic wind with 0.50 in ice.
3. Deflections are based upon a 50 mph wind.
4. TOWER RATING: 99.3%

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Job: ***Example #2***		
Project: ***Summit Pole***		
Client: CSD	Drawn by: horn	App'd:
Code: TIA/EIA-222-F	Date: 07/15/03	Scale: NTS
Path: C:\MSDEV\PROJECTS\ERITower\Debug\benchmarks\summitpole.eri		Dwg No. E-1

Tower Input Data

There is a pole section.
This tower is designed using the TIA/EIA-222-F standard.
The following design criteria apply:

Basic wind speed of 85 mph.
Nominal ice thickness of 0.500 in.
Ice density of 56 pcf.
A wind speed of 74 mph is used in combination with ice.
Deflections calculated using a wind speed of 50 mph.
A non-linear (P-delta) analysis was used.
Pressures are calculated at each section.
Stress ratio used in pole design is 1.333.
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	v	Calculate Redundant Bracing Forces
	Use Moment Magnification		Use Clear Spans For Wind Area		Consider Feedline Torque
v	Use Code Stress Ratios		Use Clear Spans For KL/r	v	SR Leg Bolts Resist Compression
v	Use Code Safety Factors - Guys		Retension Guys To Initial Tension	v	All Leg Panels Have Same Allowable
	Escalate Ice	v	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
			Autocalc Torque Arm Areas		Always Use Sub-Critical Flow
					Use Top Mounted Sockets

Tapered Pole Section Geometry

Section	*Elevation* *ft*	*Section Length* *ft*	*Splice Length* *ft*	*Number of Sides*	*Top Diameter* *in*	*Bottom Diameter* *in*	*Wall Thickness* *in*	*Bend Radius* *in*	*Pole Grade*
L1	148.000-111.000	37.000	3.750	18	22.000	29.586	0.219	0.875	A572-65 (65 ksi)
L2	111.000-74.750	40.000	4.750	18	28.380	36.580	0.250	1.000	A572-65 (65 ksi)
L3	74.750-39.500	40.000	5.500	18	35.106	43.307	0.313	1.250	A572-65 (65 ksi)
L4	39.500-0.000	45.000		18	41.554	50.780	0.375	1.250	A572-65 (65 ksi)

Tapered Pole Properties

Section	*Tip Dia.* *in*	*Area* *in²*	*I* *in⁴*	*r* *in*	*C* *in*	*I/C* *in³*	*J* *in⁴*	*It/Q* *in²*	*w* *in*	*w/t*
L1	22.339 30.042	15.123 20.390	906.444 2221.684	7.732 10.425	11.176 15.030	81.106 147.820	1814.080 4446.291	7.563 10.197	3.487 4.822	15.941 22.044

Section	Tip Dia. in	Area in^2	I in^4	r in	C in	I/C in^3	J in^4	It/Q in^2	w in	w/t
L2	29.598	22.321	2231.399	9.986	14.417	154.777	4465.735	11.163	4.555	18.219
	37.144	28.828	4807.071	12.897	18.583	258.686	9620.468	14.417	5.998	23.992
L3	36.637	34.511	5278.330	12.352	17.834	295.971	10563.605	17.259	5.629	18.012
	43.975	42.645	9959.398	15.263	22.000	452.701	19931.901	21.327	7.072	22.631
L4	43.340	49.014	10500.631	14.619	21.110	497.433	21015.079	24.512	6.742	17.978
	51.563	59.995	19257.349	17.894	25.796	746.518	38540.037	30.003	8.365	22.307

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 148.000-111.000				1	1.03	1.01		
L2 111.000-74.750				1	1.03	1.01		
L3 74.750-39.500				1	1.03	1.01		
L4 39.500-0.000				1	1.03	1.01		

Feed Line/Linear Appurtenances - Entered As Area

Description	Face	Allow Shield	Component Type	Placement ft	Total Number		C_AA_A ft^2/ft	Weight klf
7/8	C	No	Inside Pole	148.000 - 0.000	12	No Ice	0.000	0.001
						1/2" Ice	0.000	0.001
						1" Ice	0.000	0.001
						2" Ice	0.000	0.001
						4" Ice	0.000	0.001
7/8	C	No	Inside Pole	137.000 - 0.000	12	No Ice	0.000	0.001
						1/2" Ice	0.000	0.001
						1" Ice	0.000	0.001
						2" Ice	0.000	0.001
						4" Ice	0.000	0.001
7/8	C	No	Inside Pole	122.000 - 0.000	12	No Ice	0.000	0.001
						1/2" Ice	0.000	0.001
						1" Ice	0.000	0.001
						2" Ice	0.000	0.001
						4" Ice	0.000	0.001
7/8	C	No	Inside Pole	107.000 - 0.000	12	No Ice	0.000	0.001
						1/2" Ice	0.000	0.001
						1" Ice	0.000	0.001
						2" Ice	0.000	0.001
						4" Ice	0.000	0.001

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 K
L1	148.000-111.000	A	0.000	0.000	0.000	0.000	0.000
		B	0.000	0.000	0.000	0.000	0.000
		C	0.000	0.000	0.000	0.000	0.480
L2	111.000-74.750	A	0.000	0.000	0.000	0.000	0.000

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 K
		B	0.000	0.000	0.000	0.000	0.000
		C	0.000	0.000	0.000	0.000	0.914
L3	74.750-39.500	A	0.000	0.000	0.000	0.000	0.000
		B	0.000	0.000	0.000	0.000	0.000
		C	0.000	0.000	0.000	0.000	0.914
L4	39.500-0.000	A	0.000	0.000	0.000	0.000	0.000
		B	0.000	0.000	0.000	0.000	0.000
		C	0.000	0.000	0.000	0.000	1.024

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 K
L1	148.000-111.000	A	0.500	0.000	0.000	0.000	0.000	0.000
		B		0.000	0.000	0.000	0.000	0.000
		C		0.000	0.000	0.000	0.000	0.480
L2	111.000-74.750	A	0.500	0.000	0.000	0.000	0.000	0.000
		B		0.000	0.000	0.000	0.000	0.000
		C		0.000	0.000	0.000	0.000	0.914
L3	74.750-39.500	A	0.500	0.000	0.000	0.000	0.000	0.000
		B		0.000	0.000	0.000	0.000	0.000
		C		0.000	0.000	0.000	0.000	0.914
L4	39.500-0.000	A	0.500	0.000	0.000	0.000	0.000	0.000
		B		0.000	0.000	0.000	0.000	0.000
		C		0.000	0.000	0.000	0.000	1.024

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 K
Lighthing Rod 5/8x4'	C	None		0.000	152.000	No Ice	0.250	0.250	0.031
						1/2" Ice	0.664	0.664	0.034
						1" Ice	0.973	0.973	0.039
						2" Ice	1.494	1.494	0.059
						4" Ice	2.683	2.683	0.137
(12) DB874H	C	None		0.000	150.000	No Ice	5.600	5.600	0.015
						1/2" Ice	6.190	6.190	0.047
						1" Ice	6.780	6.780	0.079
						2" Ice	7.960	7.960	0.143
						4" Ice	10.320	10.320	0.271
Pirod 15' Low Profile Rotable Platform	C	None		0.000	150.000	No Ice	20.600	20.600	2.050
						1/2" Ice	25.200	25.200	2.325
						1" Ice	29.800	29.800	2.600
						2" Ice	39.000	39.000	3.150
						4" Ice	57.400	57.400	4.250
(12) DB874H	C	None		0.000	137.000	No Ice	5.600	5.600	0.015
						1/2" Ice	6.190	6.190	0.047
						1" Ice	6.780	6.780	0.079
						2" Ice	7.960	7.960	0.143

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 K
Pirod 15' Low Profile Rotable Platform	C	None		0.000	137.000	4" Ice	10.320	10.320	0.271
						No Ice	20.600	20.600	2.050
						1/2" Ice	25.200	25.200	2.325
						1" Ice	29.800	29.800	2.600
						2" Ice	39.000	39.000	3.150
						4" Ice	57.400	57.400	4.250
(12) DB874H	C	None		0.000	122.000	No Ice	5.600	5.600	0.015
						1/2" Ice	6.190	6.190	0.047
						1" Ice	6.780	6.780	0.079
						2" Ice	7.960	7.960	0.143
						4" Ice	10.320	10.320	0.271
Pirod 15' Low Profile Rotable Platform	C	None		0.000	122.000	No Ice	20.600	20.600	2.050
						1/2" Ice	25.200	25.200	2.325
						1" Ice	29.800	29.800	2.600
						2" Ice	39.000	39.000	3.150
						4" Ice	57.400	57.400	4.250
(12) DB874H	C	None		0.000	107.000	No Ice	5.600	5.600	0.015
						1/2" Ice	6.190	6.190	0.047
						1" Ice	6.780	6.780	0.079
						2" Ice	7.960	7.960	0.143
						4" Ice	10.320	10.320	0.271
Pirod 15' Low Profile Rotable Platform	C	None		0.000	107.000	No Ice	20.600	20.600	2.050
						1/2" Ice	25.200	25.200	2.325
						1" Ice	29.800	29.800	2.600
						2" Ice	39.000	39.000	3.150
						4" Ice	57.400	57.400	4.250

Tower Pressures - No Ice

$G_H = 1.690$

Section Elevation ft	z ft	K_Z	q_z ksf	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 148.000-111.000	128.781	1.476	0.027	79.528	A	0.000	81.914	81.914	100.00	0.000	0.000
					B	0.000	81.914		100.00		
					C	0.000	81.914		100.00		
L2 111.000-74.750	92.445	1.342	0.025	99.277	A	0.000	102.256	102.256	100.00	0.000	0.000
					B	0.000	102.256		100.00		
					C	0.000	102.256		100.00		
L3 74.750-39.500	56.982	1.169	0.022	116.600	A	0.000	120.098	120.098	100.00	0.000	0.000
					B	0.000	120.098		100.00		
					C	0.000	120.098		100.00		
L4 39.500-0.000	19.180	1	0.018	153.823	A	0.000	158.438	158.438	100.00	0.000	0.000
					B	0.000	158.438		100.00		
					C	0.000	158.438		100.00		

Tower Pressure - With Ice

G_H = 1.690

Section Elevation ft	z ft	K_Z	q_z ksf	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 148.000-111.000	128.781	1.476	0.021	0.500	82.612	A	0.000	85.090	85.090	100.00	0.000	0.000
						B	0.000	85.090		100.00		
						C	0.000	85.090		100.00		
L2 111.000-74.750	92.445	1.342	0.019	0.500	102.298	A	0.000	105.367	105.367	100.00	0.000	0.000
						B	0.000	105.367		100.00		
						C	0.000	105.367		100.00		
L3 74.750-39.500	56.982	1.169	0.016	0.500	119.537	A	0.000	123.123	123.123	100.00	0.000	0.000
						B	0.000	123.123		100.00		
						C	0.000	123.123		100.00		
L4 39.500-0.000	19.180	1	0.014	0.500	157.114	A	0.000	161.828	161.828	100.00	0.000	0.000
						B	0.000	161.828		100.00		
						C	0.000	161.828		100.00		

Tower Pressure - Service

G_H = 1.690

Section Elevation ft	z ft	K_Z	q_z ksf	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 148.000-111.000	128.781	1.476	0.009	79.528	A	0.000	81.914	81.914	100.00	0.000	0.000
					B	0.000	81.914		100.00		
					C	0.000	81.914		100.00		
L2 111.000-74.750	92.445	1.342	0.009	99.277	A	0.000	102.256	102.256	100.00	0.000	0.000
					B	0.000	102.256		100.00		
					C	0.000	102.256		100.00		
L3 74.750-39.500	56.982	1.169	0.007	116.600	A	0.000	120.098	120.098	100.00	0.000	0.000
					B	0.000	120.098		100.00		
					C	0.000	120.098		100.00		
L4 39.500-0.000	19.180	1	0.006	153.823	A	0.000	158.438	158.438	100.00	0.000	0.000
					B	0.000	158.438		100.00		
					C	0.000	158.438		100.00		

Tower Forces - No Ice - Wind Normal To Face

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	R_R	D_F	D_R	A_E ft²	F K	w klf	Ctrl. Face
L1 148.000-111.000	0.480	2.258	A	1	0.65	1	1	1	81.914	2.453	0.066	C
			B	1	0.65	1	1	1	81.914			
			C	1	0.65	1	1	1	81.914			
L2 111.000-	0.914	3.516	A	1	0.65	1	1	1	102.256	2.784	0.077	C

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	R_R	D_F	D_R	A_E ft^2	F K	w klf	Ctrl. Face
74.750			B	1	0.65	1	1	1	102.256			
			C	1	0.65	1	1	1	102.256			
L3 74.750-39.500	0.914	5.303	A	1	0.65	1	1	1	120.098	2.840	0.081	C
			B	1	0.65	1	1	1	120.098			
			C	1	0.65	1	1	1	120.098			
L4 39.500-0.000	1.024	8.429	A	1	0.65	1	1	1	158.438	3.219	0.081	C
			B	1	0.65	1	1	1	158.438			
			C	1	0.65	1	1	1	158.438			
Sum Weight:	3.331	19.507						OTM	796.848 kip-ft	11.296		

Tower Forces - No Ice - Wind 60 To Face

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	R_R	D_F	D_R	A_E ft^2	F K	w klf	Ctrl. Face
L1 148.000-111.000	0.480	2.258	A	1	0.65	1	1	1	81.914	2.453	0.066	C
			B	1	0.65	1	1	1	81.914			
			C	1	0.65	1	1	1	81.914			
L2 111.000-74.750	0.914	3.516	A	1	0.65	1	1	1	102.256	2.784	0.077	C
			B	1	0.65	1	1	1	102.256			
			C	1	0.65	1	1	1	102.256			
L3 74.750-39.500	0.914	5.303	A	1	0.65	1	1	1	120.098	2.840	0.081	C
			B	1	0.65	1	1	1	120.098			
			C	1	0.65	1	1	1	120.098			
L4 39.500-0.000	1.024	8.429	A	1	0.65	1	1	1	158.438	3.219	0.081	C
			B	1	0.65	1	1	1	158.438			
			C	1	0.65	1	1	1	158.438			
Sum Weight:	3.331	19.507						OTM	796.848 kip-ft	11.296		

Tower Forces - No Ice - Wind 90 To Face

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	R_R	D_F	D_R	A_E ft^2	F K	w klf	Ctrl. Face
L1 148.000-111.000	0.480	2.258	A	1	0.65	1	1	1	81.914	2.453	0.066	C
			B	1	0.65	1	1	1	81.914			
			C	1	0.65	1	1	1	81.914			
L2 111.000-74.750	0.914	3.516	A	1	0.65	1	1	1	102.256	2.784	0.077	C
			B	1	0.65	1	1	1	102.256			
			C	1	0.65	1	1	1	102.256			
L3 74.750-39.500	0.914	5.303	A	1	0.65	1	1	1	120.098	2.840	0.081	C
			B	1	0.65	1	1	1	120.098			
			C	1	0.65	1	1	1	120.098			
L4 39.500-0.000	1.024	8.429	A	1	0.65	1	1	1	158.438	3.219	0.081	C
			B	1	0.65	1	1	1	158.438			

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	R_R	D_F	D_R	A_E ft²	F K	w klf	Ctrl. Face
Sum Weight:	3.331	19.507	C	1	0.65	1	1	1 OTM	158.438 796.848 kip-ft	11.296		

Tower Forces - With Ice - Wind Normal To Face

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	R_R	D_F	D_R	A_E ft²	F K	w klf	Ctrl. Face
L1 148.000-111.000	0.480	2.858	A	1	0.65	1	1	1	85.090	1.932	0.052	C
			B	1	0.65	1	1	1	85.090			
			C	1	0.65	1	1	1	85.090			
L2 111.000-74.750	0.914	4.262	A	1	0.65	1	1	1	105.367	2.174	0.060	C
			B	1	0.65	1	1	1	105.367			
			C	1	0.65	1	1	1	105.367			
L3 74.750-39.500	0.914	6.178	A	1	0.65	1	1	1	123.123	2.206	0.063	C
			B	1	0.65	1	1	1	123.123			
			C	1	0.65	1	1	1	123.123			
L4 39.500-0.000	1.024	9.581	A	1	0.65	1	1	1	161.828	2.492	0.063	C
			B	1	0.65	1	1	1	161.828			
			C	1	0.65	1	1	1	161.828			
Sum Weight:	3.331	22.879						OTM	623.260 kip-ft	8.804		

Tower Forces - With Ice - Wind 60 To Face

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	R_R	D_F	D_R	A_E ft²	F K	w klf	Ctrl. Face
L1 148.000-111.000	0.480	2.858	A	1	0.65	1	1	1	85.090	1.932	0.052	C
			B	1	0.65	1	1	1	85.090			
			C	1	0.65	1	1	1	85.090			
L2 111.000-74.750	0.914	4.262	A	1	0.65	1	1	1	105.367	2.174	0.060	C
			B	1	0.65	1	1	1	105.367			
			C	1	0.65	1	1	1	105.367			
L3 74.750-39.500	0.914	6.178	A	1	0.65	1	1	1	123.123	2.206	0.063	C
			B	1	0.65	1	1	1	123.123			
			C	1	0.65	1	1	1	123.123			
L4 39.500-0.000	1.024	9.581	A	1	0.65	1	1	1	161.828	2.492	0.063	C
			B	1	0.65	1	1	1	161.828			
			C	1	0.65	1	1	1	161.828			
Sum Weight:	3.331	22.879						OTM	623.260 kip-ft	8.804		

Tower Forces - With Ice - Wind 90 To Face

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	R_R	D_F	D_R	A_E ft^2	F K	w klf	Ctrl. Face
L1 148.000-111.000	0.480	2.858	A	1	0.65	1	1	1	85.090	1.932	0.052	C
			B	1	0.65	1	1	1	85.090			
			C	1	0.65	1	1	1	85.090			
L2 111.000-74.750	0.914	4.262	A	1	0.65	1	1	1	105.367	2.174	0.060	C
			B	1	0.65	1	1	1	105.367			
			C	1	0.65	1	1	1	105.367			
L3 74.750-39.500	0.914	6.178	A	1	0.65	1	1	1	123.123	2.206	0.063	C
			B	1	0.65	1	1	1	123.123			
			C	1	0.65	1	1	1	123.123			
L4 39.500-0.000	1.024	9.581	A	1	0.65	1	1	1	161.828	2.492	0.063	C
			B	1	0.65	1	1	1	161.828			
			C	1	0.65	1	1	1	161.828			
Sum Weight:	3.331	22.879						OTM	623.260 kip-ft	8.804		

Tower Forces - Service - Wind Normal To Face

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	R_R	D_F	D_R	A_E ft^2	F K	w klf	Ctrl. Face
L1 148.000-111.000	0.480	2.258	A	1	0.65	1	1	1	81.914	0.849	0.023	C
			B	1	0.65	1	1	1	81.914			
			C	1	0.65	1	1	1	81.914			
L2 111.000-74.750	0.914	3.516	A	1	0.65	1	1	1	102.256	0.963	0.027	C
			B	1	0.65	1	1	1	102.256			
			C	1	0.65	1	1	1	102.256			
L3 74.750-39.500	0.914	5.303	A	1	0.65	1	1	1	120.098	0.983	0.028	C
			B	1	0.65	1	1	1	120.098			
			C	1	0.65	1	1	1	120.098			
L4 39.500-0.000	1.024	8.429	A	1	0.65	1	1	1	158.438	1.114	0.028	C
			B	1	0.65	1	1	1	158.438			
			C	1	0.65	1	1	1	158.438			
Sum Weight:	3.331	19.507						OTM	275.726 kip-ft	3.909		

Tower Forces - Service - Wind 60 To Face

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	R_R	D_F	D_R	A_E ft^2	F K	w klf	Ctrl. Face
L1 148.000-111.000	0.480	2.258	A	1	0.65	1	1	1	81.914	0.849	0.023	C
			B	1	0.65	1	1	1	81.914			
			C	1	0.65	1	1	1	81.914			
L2 111.000-	0.914	3.516	A	1	0.65	1	1	1	102.256	0.963	0.027	C

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	R_R	D_F	D_R	A_E ft^2	F K	w klf	Ctrl. Face
74.750			B	1	0.65	1	1	1	102.256			
			C	1	0.65	1	1	1	102.256			
L3 74.750-39.500	0.914	5.303	A	1	0.65	1	1	1	120.098	0.983	0.028	C
			B	1	0.65	1	1	1	120.098			
			C	1	0.65	1	1	1	120.098			
L4 39.500-0.000	1.024	8.429	A	1	0.65	1	1	1	158.438	1.114	0.028	C
			B	1	0.65	1	1	1	158.438			
			C	1	0.65	1	1	1	158.438			
Sum Weight:	3.331	19.507						OTM	275.726 kip-ft	3.909		

Tower Forces - Service - Wind 90 To Face

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	R_R	D_F	D_R	A_E ft^2	F K	w klf	Ctrl. Face
L1 148.000-111.000	0.480	2.258	A	1	0.65	1	1	1	81.914	0.849	0.023	C
			B	1	0.65	1	1	1	81.914			
			C	1	0.65	1	1	1	81.914			
L2 111.000-74.750	0.914	3.516	A	1	0.65	1	1	1	102.256	0.963	0.027	C
			B	1	0.65	1	1	1	102.256			
			C	1	0.65	1	1	1	102.256			
L3 74.750-39.500	0.914	5.303	A	1	0.65	1	1	1	120.098	0.983	0.028	C
			B	1	0.65	1	1	1	120.098			
			C	1	0.65	1	1	1	120.098			
L4 39.500-0.000	1.024	8.429	A	1	0.65	1	1	1	158.438	1.114	0.028	C
			B	1	0.65	1	1	1	158.438			
			C	1	0.65	1	1	1	158.438			
Sum Weight:	3.331	19.507						OTM	275.726 kip-ft	3.909		

Force Totals

Load Case	Vertical Forces K	Sum of Forces X K	Sum of Forces Z K	Sum of Overturning Moments, M_x kip-ft	Sum of Overturning Moments, M_z kip-ft	Sum of Torques kip-ft
Total Member Self-Weight	19.507			0.000	0.000	
Wind 0 deg - No Ice	31.788	0.000	-27.488	-2895.313	0.000	0.000
Wind 90 deg - No Ice	31.788	27.488	0.000	0.000	-2895.313	0.000
Wind 180 deg - No Ice	31.788	0.000	27.488	2895.313	0.000	0.000
Member Ice	3.373			0.000	0.000	
Wind 0 deg - Ice	37.800	0.000	-22.723	-2427.437	0.000	0.000
Wind 90 deg - Ice	37.800	22.723	0.000	0.000	-2427.437	0.000
Wind 180 deg - Ice	37.800	0.000	22.723	2427.437	0.000	0.000
Wind 0 deg - Service	31.788	0.000	-9.511	-1001.839	0.000	0.000
Wind 90 deg - Service	31.788	9.511	0.000	0.000	-1001.839	0.000
Wind 180 deg - Service	31.788	0.000	9.511	1001.839	0.000	0.000

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 Member Forces

Section No.	Elevation ft	Component Type	Condition	Gov. Load Comb.	Force K	Major Axis Moment kip-ft	Minor Axis Moment kip-ft
L1	148 - 111	Pole	Max Tension	1	0.000	0.000	0.000
			Max. Compression	5	-11.662	0.000	0.000
			Max. Mx	3	-7.647	-322.622	0.000
			Max. My	2	-7.647	0.000	322.622
			Max. Vy	3	15.375	-322.622	0.000
			Max. Vx	2	-15.375	0.000	322.622
L2	111 - 74.75	Pole	Max Tension	1	0.000	0.000	0.000
			Max. Compression	5	-19.412	0.000	0.000
			Max. Mx	3	-14.072	-1022.554	0.000
			Max. My	2	-14.072	0.000	1022.554
			Max. Vy	3	22.047	-1022.554	0.000
			Max. Vx	2	-22.047	0.000	1022.554
L3	74.75 - 39.5	Pole	Max Tension	1	0.000	0.000	0.000
			Max. Compression	5	-26.110	0.000	0.000
			Max. Mx	3	-20.535	-1827.826	0.000
			Max. My	2	-20.535	0.000	1827.826
			Max. Vy	3	24.564	-1827.826	0.000
			Max. Vx	2	-24.564	0.000	1827.826
L4	39.5 - 0	Pole	Max Tension	1	0.000	0.000	0.000
			Max. Compression	5	-37.800	0.000	0.000
			Max. Mx	3	-31.766	-3000.597	0.000
			Max. My	2	-31.766	0.000	3000.597
			Max. Vy	3	27.514	-3000.597	0.000
			Max. Vx	2	-27.514	0.000	3000.597

Maximum Reactions

Location	Condition	Gov. Load Comb.	Vertical K	Horizontal, X K	Horizontal, Z K
Pole	Max. Vert	6	37.800	0.000	22.723
	Max. H_x	11	31.788	0.000	-9.511
	Max. H_z	2	31.788	0.000	27.488
	Max. M_x	2	3000.597	0.000	27.488
	Max. M_z	3	3000.597	-27.488	0.000

Location	Condition	Gov. Load Comb.	Vertical K	Horizontal, X K	Horizontal, Z K
	Max. Torsion	1	0.000	0.000	0.000
	Min. Vert	1	31.788	0.000	0.000
	Min. H_x	3	31.788	-27.488	0.000
	Min. H_z	4	31.788	0.000	-27.488
	Min. M_x	4	-3000.597	0.000	-27.488
	Min. M_z	1	0.000	0.000	0.000
	Min. Torsion	1	0.000	0.000	0.000

Tower Mast Reaction Summary

Load Combination	Vertical K	$Shear_x$ K	$Shear_z$ K	Overturning Moment, M_x kip-ft	Overturning Moment, M_z kip-ft	Torque kip-ft
Dead Only	31.788	0.000	0.000	0.000	0.000	0.000
Dead+Wind 0 deg - No Ice	31.788	0.000	-27.488	-3000.597	0.000	0.000
Dead+Wind 90 deg - No Ice	31.788	27.488	0.000	0.000	-3000.597	0.000
Dead+Wind 180 deg - No Ice	31.788	0.000	27.488	3000.597	0.000	0.000
Dead+Ice	37.800	0.000	0.000	0.000	0.000	0.000
Dead+Wind 0 deg+Ice	37.800	0.000	-22.723	-2541.816	0.000	0.000
Dead+Wind 90 deg+Ice	37.800	22.723	0.000	0.000	-2541.816	0.000
Dead+Wind 180 deg+Ice	37.800	0.000	22.723	2541.816	0.000	0.000
Dead+Wind 0 deg - Service	31.788	0.000	-9.511	-1040.041	0.000	0.000
Dead+Wind 90 deg - Service	31.788	9.511	0.000	0.000	-1040.041	0.000
Dead+Wind 180 deg - Service	31.788	0.000	9.511	1040.041	0.000	0.000

Solution Summary

	Sum of Applied Forces			Sum of Reactions			
Load Comb.	PX K	PY K	PZ K	PX K	PY K	PZ K	% Error
1	0.000	-31.788	0.000	0.000	31.788	0.000	0.000%
2	0.000	-31.788	-27.488	0.000	31.788	27.488	0.000%
3	27.488	-31.788	0.000	-27.488	31.788	0.000	0.000%
4	0.000	-31.788	27.488	0.000	31.788	-27.488	0.000%
5	0.000	-37.800	0.000	0.000	37.800	0.000	0.000%
6	0.000	-37.800	-22.723	0.000	37.800	22.723	0.000%
7	22.723	-37.800	0.000	-22.723	37.800	0.000	0.000%
8	0.000	-37.800	22.723	0.000	37.800	-22.723	0.000%
9	0.000	-31.788	-9.511	0.000	31.788	9.511	0.000%
10	9.511	-31.788	0.000	-9.511	31.788	0.000	0.000%
11	0.000	-31.788	9.511	0.000	31.788	-9.511	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	4	0.00000001	0.00030937
3	Yes	4	0.00000001	0.00030937
4	Yes	4	0.00000001	0.00030937
5	Yes	4	0.00000001	0.00000001
6	Yes	4	0.00000001	0.00064930

7	Yes	4	0.00000001	0.00064930
8	Yes	4	0.00000001	0.00064930
9	Yes	4	0.00000001	0.00011362
10	Yes	4	0.00000001	0.00011362
11	Yes	4	0.00000001	0.00011362

Maximum Tower Deflections - Service Wind

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt deg	Twist deg
L1	148 - 111	38.358	9	2.254	0.000
L2	114.75 - 74.75	23.318	9	1.984	0.000
L3	79.5 - 39.5	10.813	9	1.328	0.000
L4	45 - 0	3.377	10	0.692	0.000

Critical Deflections and Radius of Curvature - Service Wind

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt deg	Twist deg	Radius of Curvature ft
152.000	Lighthing Rod 5/8x4'	9	38.358	2.254	0.000	24812
150.000	(12) DB874H	9	38.358	2.254	0.000	24812
137.000	(12) DB874H	9	33.207	2.189	0.000	11278
122.000	(12) DB874H	9	26.417	2.068	0.000	4770
107.000	(12) DB874H	9	20.188	1.871	0.000	3523

Maximum Tower Deflections - Design Wind

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt deg	Twist deg
L1	148 - 111	110.407	3	6.491	0.000
L2	114.75 - 74.75	67.162	2	5.717	0.000
L3	79.5 - 39.5	31.169	2	3.828	0.000
L4	45 - 0	9.739	2	1.995	0.000

Critical Deflections and Radius of Curvature - Design Wind

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt deg	Twist deg	Radius of Curvature ft
152.000	Lighthing Rod 5/8x4'	3	110.407	6.491	0.000	8813
150.000	(12) DB874H	3	110.407	6.491	0.000	8813
137.000	(12) DB874H	3	95.600	6.309	0.000	4004
122.000	(12) DB874H	2	76.075	5.962	0.000	1691
107.000	(12) DB874H	2	58.157	5.382	0.000	1244

Compression Checks

Pole Design Data:

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	F_a ksi	A in^2	Actual P K	Allow. P_a K	Ratio $\frac{P}{P_a}$
L1	148 - 111 (1)	TP29.586x22x0.219	37.000	0.000	0.0	39.000	19.856	-7.647	774.393	0.010
L2	111 - 74.75 (2)	TP36.58x28.38x0.25	40.000	0.000	0.0	39.000	28.055	-14.072	1094.150	0.013
L3	74.75 - 39.5 (3)	TP43.307x35.106x0.313	40.000	0.000	0.0	39.000	41.527	-20.535	1619.540	0.013
L4	39.5 - 0 (4)	TP50.78x41.554x0.375	45.000	0.000	0.0	39.000	59.995	-31.766	2339.790	0.014

Pole Bending Design Data:

Section No.	Elevation ft	Size	Actual M_x kip-ft	Actual f_{bx} ksi	Allow. F_{bx} ksi	Ratio $\frac{f_{bx}}{F_{bx}}$	Actual M_y kip-ft	Actual f_{by} ksi	Allow. F_{by} ksi	Ratio $\frac{f_{by}}{F_{by}}$
L1	148 - 111 (1)	TP29.586x22x0.219	322.622	-27.623	39.000	0.708	0.000	0.000	39.000	0.000
L2	111 - 74.75 (2)	TP36.58x28.38x0.25	1022.550	-50.093	39.000	1.284	0.000	0.000	39.000	0.000
L3	74.75 - 39.5 (3)	TP43.307x35.106x0.313	1827.825	-51.106	39.000	1.310	0.000	0.000	39.000	0.000
L4	39.5 - 0 (4)	TP50.78x41.554x0.375	3000.600	-48.233	39.000	1.237	0.000	0.000	39.000	0.000

Pole Interaction Design Data:

Section No.	Elevation ft	Size	Ratio $\frac{P}{P_a}$	Ratio $\frac{f_{bx}}{F_{bx}}$	Ratio $\frac{f_{by}}{F_{by}}$	Comb. Stress Ratio	Allow. Stress Ratio	Criteria
L1	148 - 111 (1)	TP29.586x22x0.219	0.010	0.708	0.000	0.718 ✔	1.333	H1-3 ✔
L2	111 - 74.75 (2)	TP36.58x28.38x0.25	0.013	1.284	0.000	1.297 ✔	1.333	H1-3 ✔
L3	74.75 - 39.5 (3)	TP43.307x35.106x0.313	0.013	1.310	0.000	1.323 ✔	1.333	H1-3 ✔
L4	39.5 - 0 (4)	TP50.78x41.554x0.375	0.014	1.237	0.000	1.250 ✔	1.333	H1-3 ✔

Section Capacity Table

Section No.	Elevation ft	Component Type	Size	Critical Element	P K	$SF*P_{allow}$ K	% Capacity	Pass Fail
L1	148 - 111	Pole	TP29.586x22x0.219	1	-7.647	1032.266	53.9	Pass
L2	111 - 74.75	Pole	TP36.58x28.38x0.25	2	-14.072	1458.502	97.3	Pass
L3	74.75 - 39.5	Pole	TP43.307x35.106x0.313	3	-20.535	2158.847	99.3	Pass
L4	39.5 - 0	Pole	TP50.78x41.554x0.375	4	-31.766	3118.940	93.8	Pass
							Summary	
						Pole (L3)	99.3	Pass
						RATING =	**99.3**	**Pass**