

Ground Wire Properties		
Type	48 Fiber Alumocore	
Diameter	0.724	inches
Weight	0.53	lbs / ft
Design Tensions	4500	lbs NESC ML

Conductor Properties		
Type	1590 kcmil 45/7	
Diameter	1.504	inches
Weight	1.79	lbs / ft
Design Tensions	10000	lbs NESC ML

Design Values				
LineAngle	HorzSpan	VertSpan	GW	NESC Med
0	1400	1700	Cond	NESC Med
		1700	GW	Heavy Ice
		1700	Cond	Heavy Ice

	Ice	Wind	K	Total Load Incl. 'K'	Wire Tension	% of Span Retained for Broken		Horz Unit Load	Vert Unit Load	Hardware Weight	OLF Tension	OLF Wind	Calculated Ultimate Loads per Cable Set
						LineAngle	HorzSpan						
Transverse													
1.1	0.25	4	0	0.9274 A1 & A2	4500	0	1400	--	--	0.4080	--	--	1428
1.2	0.25	4	0	0.9274 A1 & A2	4500	0	1400	--	--	0.4080	--	1.75	1000
2	0.25	4	0	0.9274 A1	4500	0	840	0.6	--	0.4080	--	2.5	857
3	0.25	4	0	0.9274 A2	4500	0	1400	--	--	0.4080	--	2.5	1428
4.1	0.25	4	0	2.4290 B1	10000	0	1400	--	--	0.6680	--	2.5	2338
4.2	0.25	4	0	2.4290 B2	10000	0	1400	--	--	0.6680	--	2.5	2338
4.3	0.25	4	0	2.4290 B3	10000	0	1400	--	--	0.6680	--	2.5	2338
4.4	0.25	4	0	2.4290 B1	10000	0	1400	--	--	0.6680	--	2.5	2338
4.5	0.25	4	0	2.4290 B2	10000	0	1400	--	--	0.6680	--	2.5	2338
4.6	0.25	4	0	2.4290 B3	10000	0	1400	--	--	0.6680	--	2.5	2338
5	0.25	4	0	2.4290 B1	10000	0	840	0.6	--	0.6680	--	2.5	1403
6.1	0.25	4	0	2.4290 B2	10000	0	1400	--	--	0.6680	--	2.5	2338
6.2	0.25	4	0	2.4290 B3	10000	0	1400	--	--	0.6680	--	2.5	2338
7				Wind on Tower									
Longitudinal													
8	0.25	4	0	0.9274 A1	4500	--	--	--	--	--	1	n/a	4500
9	0.25	4	0	0.9274 B1	10000	--	--	--	--	--	1	n/a	10000
10	0.25	4	0	0.9274 any GW	4500	--	--	--	--	--	1	n/a	4500
11	0.25	4	0	0.9274 any Cond.	10000	--	--	--	--	--	1	n/a	10000
Vertical													
12	0.25	4	0	0.9274 A1 & A2	--	--	--	--	1700	--	0.8328	n/a	2124
13	0.25	4	0	0.9274 A1	--	--	--	0.6	1020	--	0.8328	n/a	1274
14	0.25	4	0	0.9274 A2	--	--	--	--	1700	--	0.8328	n/a	2124
15.1	0.25	4	0	2.4290 B1	--	--	--	--	1700	--	2.3353	n/a	5955
15.2	0.25	4	0	2.4290 B2	--	--	--	--	1700	--	2.3353	n/a	5955
15.3	0.25	4	0	2.4290 B3	--	--	--	--	1700	--	2.3353	n/a	5955
16	0.25	4	0	2.4290 B1	--	--	--	0.6	1020	--	2.3353	n/a	3573
17.1	0.25	4	0	2.4290 B2	--	--	--	--	1700	--	2.3353	n/a	5955
17.2	0.25	4	0	2.4290 B3	--	--	--	--	1700	--	2.3353	n/a	5955
18	0.75	0	0	1.9047 A1, A2	--	--	--	--	1700	--	1.9047	n/a	4857
19.1	0.75	0	0	3.8922 B1	--	--	--	--	1700	--	3.8922	n/a	9925
19.2	0.75	0	0	3.8922 B2	--	--	--	--	1700	--	3.8922	n/a	9925
19.3	0.75	0	0	3.8922 B3	--	--	--	--	1700	--	3.8922	n/a	9925
20				Weight of Tower									

NEW TOWER DESIGN							
Calculated from This Sheet							
Cond Height (ft) =		68	19.177		= Body Width (transverse) (ft)		
Load #	No. Cable Sets	Attach Height (ft)	Case I All Wires Intact (ft-kips)	Case II 1-GW Broken (ft-kips)	Case III 1-Cond. Broken (ft-kips)	Case IV Heavy Ice (ft-kips)	Case V Special (ft-kips)
Transverse							
1.1	2	83	237.0				
1.2	2	83			165.9		
2	1	83		71.1			
3	1	83		118.5			
4.1	1	68	159.0				
4.2	1	68	159.0				
4.3	1	68	159.0				
4.4	1	68		159.0			
4.5	1	68		159.0			
4.6	1	68		159.0			
5	1	68			95.4		
6.1	1	68			159.0		
6.2	1	68			159.0		
7							
Longitudinal							
8	1	83		373.5			
9	1	68			680.0		
10	1	83					373.5
11	1	68					680.0
Vertical							
12	2		4.2		4.2		
13	1			1.3			
14	1			2.1			
15.1	1		6.0	6.0			
15.2	1		6.0	6.0			
15.3	1		6.0	6.0			
16	1				3.6		
17.1	1				6.0		
17.2	1				6.0		
18	2					9.7	
19.1	1					9.9	
19.2	2					19.9	
19.3	2					19.9	
20							

Sum of Transverse Moments (ft-kips) =	714.0	666.6	579.3	0.0	0.0
Sum of Longitudinal Moments (ft-kips) =	0.0	373.5	680.0	0.0	680.0
Sum of Vertical Loads (kips) =	22.1	21.3	19.7	59.3	0.0

Leg 1	Leg 3	Leg 1 =	-24.1	-32.4	-37.8	-14.8	-17.7
		Leg 2 =	-24.1	-13.0	-2.3	-14.8	17.7
Leg 2	Leg 4	Leg 3 =	13.1	2.3	-7.6	-14.8	-17.7
Verify Leg Arrangement vs Formulas		Leg 4 =	13.1	21.8	27.9	-14.8	17.7

Maximum(total) Compression in Leg (kips) =	-24.1	-32.4	-37.8	-14.8	-17.7
Maximum(total) Tension Leg (kips) =	13.1	21.8	27.9	-14.8	17.7

Largest Compression =	-37.8	FAIL
Largest Tension =	27.9	

Controlling Load Case	Case III
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Ground Wire Properties		
Type	48 Fiber Alumocore	
Diameter	0.724	inches
Weight	0.53	lbs / ft
Design Tensions	4500	lbs NESC ML

Conductor Properties		
Type	1590 kcmil 45/7	
Diameter	1.504	inches
Weight	1.79	lbs / ft
Design Tensions	10000	lbs NESC ML

Design Values				
LineAngle	HorzSpan	VertSpan	GW	NESC Med
0	1400	2000	Cond	NESC Med
		2000	GW	Heavy Ice
		2000	Cond	Heavy Ice

	Ice	Wind	K	Total Load Incl. 'K'	Wire Tension	% of Span Retained for Broken		Horz Unit Load	Vert Unit Load	Hardware Weight	OLF Tension	OLF Wind	Calculated Ultimate Loads per Cable Set
						LineAngle	HorzSpan						
Transverse													
1.1	0.25	4	0	0.9274 A1 & A2	4500	0	1400	--	--	0.4080	--	--	1428
1.2	0.25	4	0	0.9274 A1 & A2	4500	0	1400	--	--	0.4080	--	--	1000
2	0.25	4	0	0.9274 A1	4500	0	840	0.6	--	0.4080	--	--	857
3	0.25	4	0	0.9274 A2	4500	0	1400	--	--	0.4080	--	--	1428
4.1	0.25	4	0	2.4290 B1	10000	0	1400	--	--	0.6680	--	--	2338
4.2	0.25	4	0	2.4290 B2	10000	0	1400	--	--	0.6680	--	--	2338
4.3	0.25	4	0	2.4290 B3	10000	0	1400	--	--	0.6680	--	--	2338
4.4	0.25	4	0	2.4290 B1	10000	0	1400	--	--	0.6680	--	--	2338
4.5	0.25	4	0	2.4290 B2	10000	0	1400	--	--	0.6680	--	--	2338
4.6	0.25	4	0	2.4290 B3	10000	0	1400	--	--	0.6680	--	--	2338
5	0.25	4	0	2.4290 B1	10000	0	840	0.6	--	0.6680	--	--	1403
6.1	0.25	4	0	2.4290 B2	10000	0	1400	--	--	0.6680	--	--	2338
6.2	0.25	4	0	2.4290 B3	10000	0	1400	--	--	0.6680	--	--	2338
7				Wind on Tower									
Longitudinal													
8	0.25	4	0	0.9274 A1	4500	--	--	--	--	--	1	--	4500
9	0.25	4	0	0.9274 B1	10000	--	--	--	--	--	1	--	10000
10	0.25	4	0	0.9274 any GW	4500	--	--	--	--	--	1	--	4500
11	0.25	4	0	0.9274 any Cond.	10000	--	--	--	--	--	1	--	10000
Vertical													
12	0.25	4	0	0.9274 A1 & A2	--	--	--	--	2000	--	0.8328	--	2498
13	0.25	4	0	0.9274 A1	--	--	--	0.6	1200	--	0.8328	--	1499
14	0.25	4	0	0.9274 A2	--	--	--	--	2000	--	0.8328	--	2498
15.1	0.25	4	0	2.4290 B1	--	--	--	--	2000	--	2.3353	--	7006
15.2	0.25	4	0	2.4290 B2	--	--	--	--	2000	--	2.3353	--	7006
15.3	0.25	4	0	2.4290 B3	--	--	--	--	2000	--	2.3353	--	7006
16	0.25	4	0	2.4290 B1	--	--	--	0.6	1200	--	2.3353	--	4204
17.1	0.25	4	0	2.4290 B2	--	--	--	--	2000	--	2.3353	--	7006
17.2	0.25	4	0	2.4290 B3	--	--	--	--	2000	--	2.3353	--	7006
18	0.75	0	0	1.9047 A1, A2	--	--	--	--	2000	--	1.9047	--	5714
19.1	0.75	0	0	3.8922 B1	--	--	--	--	2000	--	3.8922	--	11677
19.2	0.75	0	0	3.8922 B2	--	--	--	--	2000	--	3.8922	--	11677
19.3	0.75	0	0	3.8922 B3	--	--	--	--	2000	--	3.8922	--	11677
20				Weight of Tower									

NEW TOWER DESIGN							
Calculated from This Sheet							
Cond Height (ft) =		68	19.177		= Body Width (transverse) (ft)		
Load #	No. Cable Sets	Attach Height (ft)	Case I All Wires Intact (ft-kips)	Case II 1-GW Broken (ft-kips)	Case III 1-Cond. Broken (ft-kips)	Case IV Heavy Ice (ft-kips)	Case V Special (ft-kips)
Transverse							
1.1	2	83	237.0				
1.2	2	83			165.9		
2	1	83		71.1			
3	1	83		118.5			
4.1	1	68	159.0				
4.2	1	68	159.0				
4.3	1	68	159.0				
4.4	1	68		159.0			
4.5	1	68		159.0			
4.6	1	68		159.0			
5	1	68			95.4		
6.1	1	68			159.0		
6.2	1	68			159.0		
7							
Longitudinal							
8	1	83		373.5			
9	1	68			680.0		
10	1	83					373.5
11	1	68					680.0
Vertical							
12	2		5.0		5.0		
13	1			1.5			
14	1			2.5			
15.1	1		7.0	7.0			
15.2	1		7.0	7.0			
15.3	1		7.0	7.0			
16	1				4.2		
17.1	1				7.0		
17.2	1				7.0		
18	2					11.4	
19.1	1					11.7	
19.2	2					23.4	
19.3	2					23.4	
20							

Sum of Transverse Moments (ft-kips) =	714.0	666.6	579.3	0.0	0.0
Sum of Longitudinal Moments (ft-kips) =	0.0	373.5	680.0	0.0	680.0
Sum of Vertical Loads (kips) =	26.0	25.0	23.2	69.8	0.0

Leg 1	Leg 3	Leg 1 =	-25.1	-33.4	-38.6	-17.5	-17.7
		Leg 2 =	-25.1	-13.9	-3.2	-17.5	17.7
Leg 2	Leg 4	Leg 3 =	12.1	1.4	-8.4	-17.5	-17.7
Verify Leg Arrangement vs Formulas		Leg 4 =	12.1	20.9	27.0	-17.5	17.7

Maximum(total) Compression in Leg (kips) =	-25.1	-33.4	-38.6	-17.5	-17.7
Maximum(total) Tension Leg (kips) =	12.1	20.9	27.0	-17.5	17.7

Largest Compression = -38.6 **FAIL**
Largest Tension = 27.0

Controlling Load Case Case III

Ground Wire Properties		
Type	7 No. 9 Alumoweld	
Diameter	0.343	inches
Weight	0.2076	lbs / ft
Design Tensions	4500	lbs NESC ML

Conductor Properties		
Type	636 kcmil 26/7	
Diameter	0.991	inches
Weight	0.874	lbs / ft
Design Tensions	7000	lbs NESC ML

Design Values		
LineAngle	HorzSpan	VertSpan
0	1200	2000
		2000
		2000
		GW NESC Med
		Cond NESC Med
		GW Heavy Ice
		Cond Heavy Ice

	Ice	Wind	K	Total Load Incl. 'K'	Wire Tension	% of Span Retained for Broken		Horz Unit Load	Vert Unit Load	Hardware Weight	OLF Tension	OLF Wind	Calculated Ultimate Loads per Cable Set
						LineAngle	HorzSpan						
Transverse													
1.1	0.25	4	0	0.4823 A1 & A2	4500	0	1200	--	--	--	1.65	2.5	843
1.2	0.25	4	0	0.4823 A1 & A2	4500	0	1200	--	--	--	1.65	1.75	590
2	0.25	4	0	0.4823 A1	4500	0	720	0.6	--	--	1	2.5	506
3	0.25	4	0	0.4823 A2	4500	0	1200	--	--	--	1	2.5	843
4.1	0.25	4	0	1.3543 B1	7000	0	1200	--	--	--	1.65	2.5	1491
4.2	0.25	4	0	1.3543 B2	7000	0	1200	--	--	--	1.65	2.5	1491
4.3	0.25	4	0	1.3543 B3	7000	0	1200	--	--	--	1.65	2.5	1491
4.4	0.25	4	0	1.3543 B1	7000	0	1200	--	--	--	1	2.5	1491
4.5	0.25	4	0	1.3543 B2	7000	0	1200	--	--	--	1	2.5	1491
4.6	0.25	4	0	1.3543 B3	7000	0	1200	--	--	--	1	2.5	1491
5	0.25	4	0	1.3543 B1	7000	0	720	0.6	--	--	1	2.5	895
6.1	0.25	4	0	1.3543 B2	7000	0	1200	--	--	--	1	2.5	1491
6.2	0.25	4	0	1.3543 B3	7000	0	1200	--	--	--	1	2.5	1491
7				Wind on Tower									
Longitudinal													
8	0.25	4	0	0.4823 A1	4500	--	--	--	--	--	1	--	4500
9	0.25	4	0	0.4823 B1	7000	--	--	--	--	--	1	--	7000
10	0.25	4	0	0.4823 any GW	4500	--	--	--	--	--	1	--	4500
11	0.25	4	0	0.4823 any Cond.	7000	--	--	--	--	--	1	--	7000
Vertical													
12	0.25	4	0	0.4823 A1 & A2	--	--	--	--	2000	--	0.3920	--	1176
13	0.25	4	0	0.4823 A1	--	--	--	0.6	1200	--	0.3920	--	706
14	0.25	4	0	0.4823 A2	--	--	--	--	2000	--	0.3920	--	1176
15.1	0.25	4	0	1.3543 B1	--	--	--	--	2000	--	1.2598	--	3779
15.2	0.25	4	0	1.3543 B2	--	--	--	--	2000	--	1.2598	--	3779
15.3	0.25	4	0	1.3543 B3	--	--	--	--	2000	--	1.2598	--	3779
16	0.25	4	0	1.3543 B1	--	--	--	0.6	1200	--	1.2598	--	2268
17.1	0.25	4	0	1.3543 B2	--	--	--	--	2000	--	1.2598	--	3779
17.2	0.25	4	0	1.3543 B3	--	--	--	--	2000	--	1.2598	--	3779
18	0.75	0	0	1.2270 A1, A2	--	--	--	--	2000	--	1.2270	--	3681
19.1	0.75	0	0	2.4978 B1	--	--	--	--	2000	--	2.4978	--	7493
19.2	0.75	0	0	2.4978 B2	--	--	--	--	2000	--	2.4978	--	7493
19.3	0.75	0	0	2.4978 B3	--	--	--	--	2000	--	2.4978	--	7493
20				Weight of Tower									

NEW TOWER DESIGN							
Calculated from This Sheet							
Cond Height (ft) =		120	34.885		= Body Width (transverse) (ft)		
Load #	No. Cable Sets	Attach Height (ft)	Case I All Wires Intact (ft-kips)	Case II 1-GW Broken (ft-kips)	Case III 1-Cond. Broken (ft-kips)	Case IV Heavy Ice (ft-kips)	Case V Special (ft-kips)
Transverse							
1.1	2	135	227.6				
1.2	2	135			159.3		
2	1	135		68.3			
3	1	135		113.8			
4.1	1	120	178.9				
4.2	1	120	178.9				
4.3	1	120	178.9				
4.4	1	120		178.9			
4.5	1	120		178.9			
4.6	1	120		178.9			
5	1	120			107.4		
6.1	1	120			178.9		
6.2	1	120			178.9		
7							
Longitudinal							
8	1	135		607.5			
9	1	120			840.0		
10	1	135					607.5
11	1	120					840.0
Vertical							
12	2		2.4		2.4		
13	1			0.7			
14	1			1.2			
15.1	1		3.8	3.8			
15.2	1		3.8	3.8			
15.3	1		3.8	3.8			
16	1				2.3		
17.1	1				3.8		
17.2	1				3.8		
18	2					7.4	
19.1	1					7.5	
19.2	2					15.0	
19.3	2					15.0	
20							

Sum of Transverse Moments (ft-kips) =	764.4	718.8	624.5	0.0	0.0
Sum of Longitudinal Moments (ft-kips) =	0.0	607.5	840.0	0.0	840.0
Sum of Vertical Loads (kips) =	13.7	13.2	12.2	44.8	0.0

Leg 1	Leg 3	Leg 1 =	-14.4	-22.3	-24.0	-11.2	-12.0
		Leg 2 =	-14.4	-4.9	0.0	-11.2	12.0
Leg 2	Leg 4	Leg 3 =	7.5	-1.7	-6.1	-11.2	-12.0
Verify Leg Arrangement vs Formulas		Leg 4 =	7.5	15.7	17.9	-11.2	12.0

Maximum(total) Compression in Leg (kips) =	-14.4	-22.3	-24.0	-11.2	-12.0
Maximum(total) Tension Leg (kips) =	7.5	15.7	17.9	-11.2	12.0

Largest Compression = -24.0 PASS
Largest Tension = 17.9

Controlling Load Case Case III

Ground Wire Properties		
Type	7 No. 9 Alumoweld	
Diameter	0.343	inches
Weight	0.2076	lbs / ft
Design Tensions	4500	lbs NESC ML

Conductor Properties		
Type	636 kcmil 26/7	
Diameter	0.991	inches
Weight	0.874	lbs / ft
Design Tensions	7000	lbs NESC ML

Design Values				
LineAngle	HorzSpan	VertSpan	GW	NESC Med
0	1200	1700	Cond	NESC Med
		1700	GW	Heavy Ice
		1700	Cond	Heavy Ice

	Ice	Wind	K	Total Load Incl. 'K'	Wire Tension	% of Span Retained for Broken		Horz Unit Load	Vert Unit Load	Hardware Weight	OLF Tension	OLF Wind	Calculated Ultimate Loads per Cable Set
						LineAngle	HorzSpan						
Transverse													
1.1	0.25	4	0	0.4823 A1 & A2	4500	0	1200	--	--	--	1.65	2.5	843
1.2	0.25	4	0	0.4823 A1 & A2	4500	0	1200	--	--	--	1.65	1.75	590
2	0.25	4	0	0.4823 A1	4500	0	720	0.6	--	--	1	2.5	506
3	0.25	4	0	0.4823 A2	4500	0	1200	--	--	--	1	2.5	843
4.1	0.25	4	0	1.3543 B1	7000	0	1200	--	--	--	1.65	2.5	1491
4.2	0.25	4	0	1.3543 B2	7000	0	1200	--	--	--	1.65	2.5	1491
4.3	0.25	4	0	1.3543 B3	7000	0	1200	--	--	--	1.65	2.5	1491
4.4	0.25	4	0	1.3543 B1	7000	0	1200	--	--	--	1	2.5	1491
4.5	0.25	4	0	1.3543 B2	7000	0	1200	--	--	--	1	2.5	1491
4.6	0.25	4	0	1.3543 B3	7000	0	1200	--	--	--	1	2.5	1491
5	0.25	4	0	1.3543 B1	7000	0	720	0.6	--	--	1	2.5	895
6.1	0.25	4	0	1.3543 B2	7000	0	1200	--	--	--	1	2.5	1491
6.2	0.25	4	0	1.3543 B3	7000	0	1200	--	--	--	1	2.5	1491
7				Wind on Tower									
Longitudinal													
8	0.25	4	0	0.4823 A1	4500	--	--	--	--	--	1	--	4500
9	0.25	4	0	0.4823 B1	7000	--	--	--	--	--	1	--	7000
10	0.25	4	0	0.4823 any GW	4500	--	--	--	--	--	1	--	4500
11	0.25	4	0	0.4823 any Cond.	7000	--	--	--	--	--	1	--	7000
Vertical													
12	0.25	4	0	0.4823 A1 & A2	--	--	--	--	1700	--	0.3920	--	999
13	0.25	4	0	0.4823 A1	--	--	--	0.6	1020	--	0.3920	--	600
14	0.25	4	0	0.4823 A2	--	--	--	--	1700	--	0.3920	--	999
15.1	0.25	4	0	1.3543 B1	--	--	--	--	1700	--	1.2598	--	3213
15.2	0.25	4	0	1.3543 B2	--	--	--	--	1700	--	1.2598	--	3213
15.3	0.25	4	0	1.3543 B3	--	--	--	--	1700	--	1.2598	--	3213
16	0.25	4	0	1.3543 B1	--	--	--	0.6	1020	--	1.2598	--	1928
17.1	0.25	4	0	1.3543 B2	--	--	--	--	1700	--	1.2598	--	3213
17.2	0.25	4	0	1.3543 B3	--	--	--	--	1700	--	1.2598	--	3213
18	0.75	0	0	1.2270 A1, A2	--	--	--	--	1700	--	1.2270	--	3129
19.1	0.75	0	0	2.4978 B1	--	--	--	--	1700	--	2.4978	--	6369
19.2	0.75	0	0	2.4978 B2	--	--	--	--	1700	--	2.4978	--	6369
19.3	0.75	0	0	2.4978 B3	--	--	--	--	1700	--	2.4978	--	6369
20				Weight of Tower									

NEW TOWER DESIGN							
Calculated from This Sheet							
Cond Height (ft) =		120	34.885		= Body Width (transverse) (ft)		
Load #	No. Cable Sets	Attach Height (ft)	Case I All Wires Intact (ft-kips)	Case II 1-GW Broken (ft-kips)	Case III 1-Cond. Broken (ft-kips)	Case IV Heavy Ice (ft-kips)	Case V Special (ft-kips)
Transverse							
1.1	2	135	227.6				
1.2	2	135			159.3		
2	1	135		68.3			
3	1	135		113.8			
4.1	1	120	178.9				
4.2	1	120	178.9				
4.3	1	120	178.9				
4.4	1	120		178.9			
4.5	1	120		178.9			
4.6	1	120		178.9			
5	1	120			107.4		
6.1	1	120			178.9		
6.2	1	120			178.9		
7							
Longitudinal							
8	1	135		607.5			
9	1	120			840.0		
10	1	135					607.5
11	1	120					840.0
Vertical							
12	2		2.0		2.0		
13	1			0.6			
14	1			1.0			
15.1	1		3.2	3.2			
15.2	1		3.2	3.2			
15.3	1		3.2	3.2			
16	1				1.9		
17.1	1				3.2		
17.2	1				3.2		
18	2					6.3	
19.1	1					6.4	
19.2	2					12.7	
19.3	2					12.7	
20							

Sum of Transverse Moments (ft-kips) =	764.4	718.8	624.5	0.0	0.0
Sum of Longitudinal Moments (ft-kips) =	0.0	607.5	840.0	0.0	840.0
Sum of Vertical Loads (kips) =	11.6	11.2	10.4	38.1	0.0

Leg 1	Leg 3	Leg 1 =	-13.9	-21.8	-23.6	-9.5	-12.0
		Leg 2 =	-13.9	-4.4	0.5	-9.5	12.0
Leg 2	Leg 4	Leg 3 =	8.0	-1.2	-5.7	-9.5	-12.0
Verify Leg Arrangement vs Formulas		Leg 4 =	8.0	16.2	18.4	-9.5	12.0

Maximum(total) Compression in Leg (kips) =	-13.9	-21.8	-23.6	-9.5	-12.0
Maximum(total) Tension Leg (kips) =	8.0	16.2	18.4	-9.5	12.0

Largest Compression = -23.6 PASS
Largest Tension = 18.4

Controlling Load Case Case III

Ground Wire Properties		
Type	7/16 Steel	
Diameter	0.435	inches
Weight	0.399	lbs / ft
Design Tensions	4500	lbs NESC ML

Conductor Properties		
Type	795 kcmil 26/7	
Diameter	1.107	inches
Weight	1.093	lbs / ft
Design Tensions	7000	lbs NESC ML

Design Values				
LineAngle	HorzSpan	VertSpan	GW	NESC Med
0	1300	1700	Cond	NESC Med
		1700	GW	Heavy Ice
		1700	Cond	Heavy Ice

	Ice	Wind	K	Total Load Incl. 'K'	Wire Tension	% of Span Retained for Broken		Horz Unit Load	Vert Unit Load	Hardware Weight	OLF Tension	OLF Wind	Calculated Ultimate Loads per Cable Set
						LineAngle	HorzSpan						
Transverse													
1.1	0.25	4	0	0.6868 A1 & A2	4500	0	1300	--	--	--	1.65	2.5	1013
1.2	0.25	4	0	0.6868 A1 & A2	4500	0	1300	--	--	--	1.65	1.75	709
2	0.25	4	0	0.6868 A1	4500	0	780	0.6	--	--	1	2.5	608
3	0.25	4	0	0.6868 A2	4500	0	1300	--	--	--	1	2.5	1013
4.1	0.25	4	0	1.6068 B1	7000	0	1300	--	--	--	1.65	2.5	1741
4.2	0.25	4	0	1.6068 B2	7000	0	1300	--	--	--	1.65	2.5	1741
4.3	0.25	4	0	1.6068 B3	7000	0	1300	--	--	--	1.65	2.5	1741
4.4	0.25	4	0	1.6068 B1	7000	0	1300	--	--	--	1	2.5	1741
4.5	0.25	4	0	1.6068 B2	7000	0	1300	--	--	--	1	2.5	1741
4.6	0.25	4	0	1.6068 B3	7000	0	1300	--	--	--	1	2.5	1741
5	0.25	4	0	1.6068 B1	7000	0	780	0.6	--	--	1	2.5	1045
6.1	0.25	4	0	1.6068 B2	7000	0	1300	--	--	--	1	2.5	1741
6.2	0.25	4	0	1.6068 B3	7000	0	1300	--	--	--	1	2.5	1741
7				Wind on Tower									
Longitudinal													
8	0.25	4	0	0.6868 A1	4500	--	--	--	--	--	1	--	4500
9	0.25	4	0	0.6868 B1	7000	--	--	--	--	--	1	--	7000
10	0.25	4	0	0.6868 any GW	4500	--	--	--	--	--	1	--	4500
11	0.25	4	0	0.6868 any Cond.	7000	--	--	--	--	--	1	--	7000
Vertical													
12	0.25	4	0	0.6868 A1 & A2	--	--	--	--	1700	--	0.6120	--	1560
13	0.25	4	0	0.6868 A1	--	--	--	0.6	1020	--	0.6120	--	936
14	0.25	4	0	0.6868 A2	--	--	--	--	1700	--	0.6120	--	1560
15.1	0.25	4	0	1.6068 B1	--	--	--	--	1700	--	1.5149	--	3863
15.2	0.25	4	0	1.6068 B2	--	--	--	--	1700	--	1.5149	--	3863
15.3	0.25	4	0	1.6068 B3	--	--	--	--	1700	--	1.5149	--	3863
16	0.25	4	0	1.6068 B1	--	--	--	0.6	1020	--	1.5149	--	2318
17.1	0.25	4	0	1.6068 B2	--	--	--	--	1700	--	1.5149	--	3863
17.2	0.25	4	0	1.6068 B3	--	--	--	--	1700	--	1.5149	--	3863
18	0.75	0	0	1.5042 A1, A2	--	--	--	--	1700	--	1.5042	--	3836
19.1	0.75	0	0	2.8250 B1	--	--	--	--	1700	--	2.8250	--	7204
19.2	0.75	0	0	2.8250 B2	--	--	--	--	1700	--	2.8250	--	7204
19.3	0.75	0	0	2.8250 B3	--	--	--	--	1700	--	2.8250	--	7204
20				Weight of Tower									

NEW TOWER DESIGN							
Calculated from This Sheet							
Cond Height (ft) =		108	31.291		= Body Width (transverse) (ft)		
Load #	No. Cable Sets	Attach Height (ft)	Case I All Wires Intact (ft-kips)	Case II 1-GW Broken (ft-kips)	Case III 1-Cond. Broken (ft-kips)	Case IV Heavy Ice (ft-kips)	Case V Special (ft-kips)
Transverse							
1.1	2	123	249.2				
1.2	2	123			174.4		
2	1	123		74.8			
3	1	123		124.6			
4.1	1	108	188.0				
4.2	1	108	188.0				
4.3	1	108	188.0				
4.4	1	108		188.0			
4.5	1	108		188.0			
4.6	1	108		188.0			
5	1	108			112.8		
6.1	1	108			188.0		
6.2	1	108			188.0		
7							
Longitudinal							
8	1	123		553.5			
9	1	108			756.0		
10	1	123					553.5
11	1	108					756.0
Vertical							
12	2		3.1		3.1		
13	1			0.9			
14	1			1.6			
15.1	1		3.9	3.9			
15.2	1		3.9	3.9			
15.3	1		3.9	3.9			
16	1				2.3		
17.1	1				3.9		
17.2	1				3.9		
18	2					7.7	
19.1	1					7.2	
19.2	2					14.4	
19.3	2					14.4	
20							

Sum of Transverse Moments (ft-kips) =	813.2	763.4	663.3	0.0	0.0
Sum of Longitudinal Moments (ft-kips) =	0.0	553.5	756.0	0.0	756.0
Sum of Vertical Loads (kips) =	14.7	14.1	13.2	43.7	0.0

Leg 1	Leg 3	Leg 1 =	-16.7	-24.6	-26.0	-10.9	-12.1
		Leg 2 =	-16.7	-6.9	-1.8	-10.9	12.1
Leg 2	Leg 4	Leg 3 =	9.3	-0.2	-4.8	-10.9	-12.1
Verify Leg Arrangement vs Formulas		Leg 4 =	9.3	17.5	19.4	-10.9	12.1

Maximum(total) Compression in Leg (kips) =	-16.7	-24.6	-26.0	-10.9	-12.1
Maximum(total) Tension Leg (kips) =	9.3	17.5	19.4	-10.9	12.1

Largest Compression = -26.0 PASS
Largest Tension = 19.4

Controlling Load Case Case III

Ground Wire Properties		
Type	7/16 HS Steel	
Diameter	0.435	inches
Weight	0.399	lbs / ft
Design Tensions	4500	lbs NESC ML

Conductor Properties		
Type	795kCM 26/7 ACSR	
Diameter	1.108	inches
Weight	1.094	lbs / ft
Design Tensions	9000	lbs NESC ML

Design Values					
LineAngle	HorzSpan	VertSpan	GW	NESC Med	
0	1300	1800	Cond	NESC Med	
		1800	GW	Heavy Ice	
		1800	Cond	Heavy Ice	

	Ice	Wind	K	Total Load Incl. 'K'	Wire Tension	LineAngle	HorzSpan	% of Span Retained for Broken Wire Loads	VertSpan	Horz Unit Load	Vert Unit Load	Hardware Weight	OLF Tension	OLF Wind	Calculated Ultimate Loads per Cable Set	Calculated vs. Drawing	Allowable Ultimate Loads	OLF from Drawing HC-31030	Load from Drawing HC-31030
Transverse																			
1.1	0.25	4	0	0.6868 A1 & A2	4500	0	1300	--	--	0.3117	--	--	1.75	4	1621	NG 1.01	1600	4	400
1.2	0.25	4	0	0.6868 A1 & A2	4500	0	1300	--	--	0.3117	--	--	1.75	1.75	709	NG 1.01	700	1.75	400
2	0.25	4	0	0.6868 A1	4500	0	780	0.6	--	0.3117	--	--	1.75	1.75	425	ok 0.97	437.5	1.75	250
3	0.25	4	0	0.6868 A2	4500	0	1300	--	--	0.3117	--	--	1.75	1.75	709	NG 1.01	700	1.75	400
4.1	0.25	4	0	1.6081 B1	9000	0	1300	--	--	0.5360	--	--	1.75	4	2787	ok 1.00	2800	4	700
4.2	0.25	4	0	1.6081 B2	9000	0	1300	--	--	0.5360	--	--	1.75	4	2787	ok 1.00	2800	4	700
4.3	0.25	4	0	1.6081 B3	9000	0	1300	--	--	0.5360	--	--	1.75	4	2787	ok 1.00	2800	4	700
4.4	0.25	4	0	1.6081 B1	9000	0	1300	--	--	0.5360	--	--	1.75	1.75	1219	ok 1.00	1225	1.75	700
4.5	0.25	4	0	1.6081 B2	9000	0	1300	--	--	0.5360	--	--	1.75	1.75	1219	ok 1.00	1225	1.75	700
4.6	0.25	4	0	1.6081 B3	9000	0	1300	--	--	0.5360	--	--	1.75	1.75	1219	ok 1.00	1225	1.75	700
5	0.25	4	0	1.6081 B1	9000	0	780	0.6	--	0.5360	--	--	1.75	1.75	732	NG 1.05	700	1.75	400
6.1	0.25	4	0	1.6081 B2	9000	0	1300	--	--	0.5360	--	--	1.75	1.75	1219	ok 1.00	1225	1.75	700
6.2	0.25	4	0	1.6081 B3	9000	0	1300	--	--	0.5360	--	--	1.75	1.75	1219	ok 1.00	1225	1.75	700
7				Wind on Tower															
Longitudinal																			
8	0.25	4	0	0.6868 A1	4500	--	--	--	--	--	--	--	OLF Tension	n/a	7875	ok 1.00	7875	1.75	4500
9	0.25	4	0	0.6868 B1	9000	--	--	--	--	--	--	--	1.75	--	15750	ok 1.00	15750	1.75	9000
10	0.25	4	0	0.6868 any GW	4500	--	--	--	--	--	--	--	1.75	--	7875	ok 1.00	7875	1.75	4500
11	0.25	4	0	0.6868 any Cond.	9000	--	--	--	--	--	--	--	1.75	--	15750	ok 1.00	15750	1.75	9000
Vertical																			
12	0.25	4	0	0.6868 A1 & A2	--	--	--	--	1800	--	0.6120	--	OLF Vertical	n/a	1377	ok 0.98	1400	1.75	800
13	0.25	4	0	0.6868 A1	--	--	--	0.6	1080	--	0.6120	--	1.25	--	826	NG 1.05	787.5	1.75	450
14	0.25	4	0	0.6868 A2	--	--	--	--	1800	--	0.6120	--	1.25	--	1377	ok 0.98	1400	1.75	800
15.1	0.25	4	0	1.6081 B1	--	--	--	--	1800	--	1.5162	--	1.5	--	4094	NG 1.09	3762.5	1.75	2150
15.2	0.25	4	0	1.6081 B2	--	--	--	--	1800	--	1.5162	--	1.5	--	4094	NG 1.09	3762.5	1.75	2150
15.3	0.25	4	0	1.6081 B3	--	--	--	--	1800	--	1.5162	--	1.5	--	4094	NG 1.09	3762.5	1.75	2150
16	0.25	4	0	1.6081 B1	--	--	--	0.6	1080	--	1.5162	--	1.25	--	2047	NG 1.02	2012.5	1.75	1150
17.1	0.25	4	0	1.6081 B2	--	--	--	--	1800	--	1.5162	--	1.5	--	4094	NG 1.09	3762.5	1.75	2150
17.2	0.25	4	0	1.6081 B3	--	--	--	--	1800	--	1.5162	--	1.5	--	4094	NG 1.09	3762.5	1.75	2150
18	0.75	0	0	1.5042 A1, A2	--	--	--	--	1800	--	1.5042	--	1.75	--	4738	ok 0.90	5250	1.75	3000
19.1	0.75	0	0	2.8269 B1	--	--	--	--	1800	--	2.8269	--	1.75	--	8905	ok 1.00	8925	1.75	5100
19.2	0.75	0	0	2.8269 B2	--	--	--	--	1800	--	2.8269	--	1.75	--	8905	ok 1.00	8925	1.75	5100
19.3	0.75	0	0	2.8269 B3	--	--	--	--	1800	--	2.8269	--	1.75	--	8905	ok 1.00	8925	1.75	5100
20				Weight of Tower															

ORIGINAL TOWER DESIGN							
Calculated from Original Loading							
Greatest Uplift Occurs at 108' A20 Tower							
Cond Height (ft) =	108	34.885		= Body Width (transverse) (ft)			
Load #	No. Cable Sets	Attach Height (ft)	Case I All Wires Intact (ft-kips)	Case II 1-GW Broken (ft-kips)	Case III 1-Cond. Broken (ft-kips)	Case IV Heavy Ice (ft-kips)	Case V Special (ft-kips)
Transverse							
1.1	2	123	393.6				
1.2	2	123			172.2		
2	1	123		53.8			
3	1	123		86.1			
4.1	1	108	302.4				
4.2	1	108	302.4				
4.3	1	108	302.4				
4.4	1	108		132.3			
4.5	1	108		132.3			
4.6	1	108		132.3			
5	1	108			75.6		
6.1	1	108			132.3		
6.2	1	108			132.3		
7							
Longitudinal							
8	1	123		968.6			
9	1	108			1701.0		
10	1	123					968.6
11	1	108					1701.0
Vertical							
12	2		2.8		2.8		
13	1			0.8			
14	1			1.4			
15.1	1		3.8	3.8			
15.2	1		3.8	3.8			
15.3	1		3.8	3.8			
16	1				2.0		
17.1	1				3.8		
17.2	1				3.8		
18	2					10.5	
19.1	1					8.9	
19.2	2					17.9	
19.3	2					17.9	
20							

Sum of Transverse Moments (ft-kips) =	1300.8	536.8	512.4	0.0	0.0
Sum of Longitudinal Moments (ft-kips) =	0.0	968.6	1701.0	0.0	1701.0
Sum of Vertical Loads (kips) =	14.1	13.5	12.3	55.1	0.0

Leg 1	Leg 3	Leg 1 =	-22.2	-24.9	-34.8	-13.8	-24.4
		Leg 2 =	-22.2	2.8	14.0	-13.8	24.4
Leg 2	Leg 4	Leg 3 =	15.1	-9.6	-20.1	-13.8	-24.4
Verify Leg Arrangement vs Formulas		Leg 4 =	15.1	18.2	28.6	-13.8	24.4

Maximum(total) Compression in Leg (kips) =	-22.2	-24.9	-34.8	-13.8	-24.4
Maximum(total) Tension Leg (kips) =	15.1	18.2	28.6	-13.8	24.4

Largest Compression =	-34.8
Largest Tension =	28.6