

Section	1	2	
Length (ft)	23.632	38.714	
Number of Sides	18	18	
Thickness (in)	0.1181	0.1575	
Socket Length (ft)	2.346		
Top Dia (in)	6.7717	9.5142	
Bot Dia (in)	10.0787	14.9213	
Grade			A572-65
Weight (K)	0.3	0.8	1.0

60.0 ft

36.4 ft

0.0 ft



DESIGNED APPURTENANCE LOADING

TYPE	ELEVATION	TYPE	ELEVATION
lantern and bracket	60		

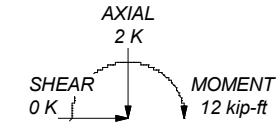
MATERIAL STRENGTH

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

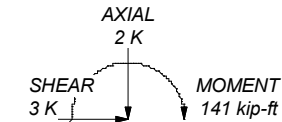
TOWER DESIGN NOTES

1. Tower is located in Lackawanna County, Pennsylvania.
2. Tower designed for Exposure C to the TIA-222-H Standard.
3. Tower designed for a 120 mph basic wind in accordance with the TIA-222-H Standard.
4. Tower is also designed for a 40 mph basic wind with 0.75 in ice. Ice is considered to increase in thickness with height.
5. Deflections are based upon a 60 mph wind.
6. Tower Risk Category II.
7. Topographic Category 1 with Crest Height of 0.000 ft
8. TOWER RATING: 87.5%

ALL REACTIONS
ARE FACTORED



40 mph WIND - 0.7500 in ICE



REACTIONS - 120 mph WIND

Tower Input Data

The tower is a monopole.

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

The following design criteria apply:

1. Tower is located in Lackawanna County, Pennsylvania.
2. Tower base elevation above sea level: 0.000 ft.
3. Basic wind speed of 120 mph.
4. Risk Category II.
5. Exposure Category C.
6. Simplified Topographic Factor Procedure for wind speed-up calculations is used.
7. Topographic Category: 1.
8. Crest Height: 0.000 ft.
9. Nominal ice thickness of 0.7500 in.
10. Ice thickness is considered to increase with height.
11. Ice density of 56.000 pcf.
12. A wind speed of 40 mph is used in combination with ice.
13. Temperature drop of 50.000 °F.
14. Deflections calculated using a wind speed of 60 mph.
15. Non-linear (P-delta) analysis was used.
16. Pressures are calculated at each section.
17. Stress ratio used in pole design is 1.
18. Local bending stresses due to climbing loads, feed line supports, and appurtenance mounts are not considered.

Options

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

Tapered Pole Section Geometry

Section	Elevation	Section Length	Splice Length	Number of Sides	Top Diameter	Bottom Diameter	Wall Thickness	Bend Radius	Pole Grade
	ft	ft	ft		in	in	in	in	
L1	60.000-36.368	23.632	2.346	18	6.7717	10.0787	0.1181	0.4724	A572-65 (65 ksi)



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STRALOS SERIES | 60 FT HIGH-MAST LIGHT POLE

TIA-222-H | 120 MPH DESIGN WIND | EXPOSURE C | RISK CATEGORY II

Structural calculations preserved from original engineering analysis

PAGE 2 OF 12

JOB

60ft-120mph

DATE

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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
L2	36.368-0.000	38.714		18	9.5142	14.9213	0.1575	0.6299	A572-65 (65 ksi)

Tapered Pole Properties

Section	Tip Dia. in	Area in ²	I in ⁴	r in	C in	I/C in ³	J in ⁴	It/Q in ²	w in	w/t
L1	6.8579	2.4943	13.9505	2.3620	3.4400	4.0554	27.9194	1.2474	0.9839	8.331
	10.2160	3.7341	46.8049	3.5360	5.1200	9.1416	93.6714	1.8674	1.5660	13.259
L2	9.9694	4.6769	51.7305	3.3217	4.8332	10.7031	103.5291	2.3389	1.3973	8.873
	15.1272	7.3796	203.2181	5.2411	7.5800	26.8098	406.7037	3.6905	2.3490	14.916

Tower Elevation ft	Gusset Area (per face) ft ²	Gusset Thickness in	Gusset Grade	Adjust. Factor A _f	Adjust. Factor A _r	Weight Mult.	Double Angle Stitch Bolt Spacing Diagonals in	Double Angle Stitch Bolt Spacing Horizontals in	Double Angle Stitch Bolt Spacing Redundants in
L1 60.000-36.368				1	1	1			
L2 36.368-0.000				1	1	1			

Monopole Base Plate Data

Base Plate Data

Base plate is square	
Base plate is grouted	√
Anchor bolt grade	F1554-55
Anchor bolt size	1.2500 in
Number of bolts	8
Embedment length	42.0000 in
f _c	4.000 ksi
Grout space	2.0000 in
Base plate grade	A572-50
Base plate thickness	1.3800 in
Bolt circle diameter	19.2913 in
Outer diameter	22.8346 in
Inner diameter	15.0000 in
Base plate type	Plain Plate

Feed Line/Linear Appurtenances - Entered As Area

Description	Face or Leg	Allow Shield	Exclude From Torque Calculation	Component Type	Placement ft	Total Number		C _A A _A ft ² /ft	Weight klf
cable	C	No	Yes	CaAa (Out Of Face)	59.055 - 0.000	1	No Ice 1/2" Ice 1" Ice	0.202 0.302 0.402	0.002 0.002 0.002

STRUCTURAL ENGINEERING REPORT

STRALOS SERIES | 60 FT HIGH-MAST LIGHT POLE

TIA-222-H | 120 MPH DESIGN WIND | EXPOSURE C | RISK CATEGORY II

Structural calculations preserved from original engineering analysis

PAGE 3 OF 12

JOB

60ft-120mph

DATE

04/02/26

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Feed Line/Linear Appurtenances Section Areas

Tower Section	Tower Elevation ft	Face	A_R ft ²	A_F ft ²	$C_A A_A$ In Face ft ²	$C_A A_A$ Out Face ft ²	Weight K
L1	60.000-36.368	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	4.583	0.047
		D	0.000	0.000	0.000	0.000	0.000
L2	36.368-0.000	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	7.346	0.075
		D	0.000	0.000	0.000	0.000	0.000

Feed Line/Linear Appurtenances Section Areas - With Ice

Tower Section	Tower Elevation ft	Face or Leg	Ice Thickness in	A_R ft ²	A_F ft ²	$C_A A_A$ In Face ft ²	$C_A A_A$ Out Face ft ²	Weight K
L1	60.000-36.368	A	0.778	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	8.111	0.047
		D		0.000	0.000	0.000	0.000	0.000
L2	36.368-0.000	A	0.704	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	13.003	0.075
		D		0.000	0.000	0.000	0.000	0.000

Discrete Tower Loads

Description	Face or Leg	Offset Type	Offsets: Horz Lateral Vert ft ft ft	Azimuth Adjustment °	Placement ft	$C_A A_A$ Front ft ²	$C_A A_A$ Side ft ²	Weight K
lantern and bracket	C	None		0.0000	60.000	No Ice	30.139	0.724
						1/2" Ice	0.000	0.000
						1" Ice	0.000	0.000

Tower Pressures - No Ice

$$G_H = 1.100$$



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STRALOS SERIES | 60 FT HIGH-MAST LIGHT POLE

TIA-222-H | 120 MPH DESIGN WIND | EXPOSURE C | RISK CATEGORY II

Structural calculations preserved from original engineering analysis

PAGE 4 OF 12

JOB

60ft-120mph

DATE

04/02/26

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Section Elevation	z	K _Z	q _z	A _G	F a c e	A _F	A _R	A _{leg}	Leg %	C _A A _A In Face	C _A A _A Out Face
ft	ft		ksf	ft ²		ft ²	ft ²	ft ²		ft ²	ft ²
L1 60.000-36.368	47.411	1.082	0.038	16.812	A	0.000	16.812	16.812	100.00	0.000	0.000
					B	0.000	16.812		100.00	0.000	0.000
					C	0.000	16.812		100.00	0.000	4.583
					D	0.000	16.812		100.00	0.000	0.000
L2 36.368-0.000	17.487	0.877	0.031	38.030	A	0.000	38.030	38.030	100.00	0.000	0.000
					B	0.000	38.030		100.00	0.000	0.000
					C	0.000	38.030		100.00	0.000	7.346
					D	0.000	38.030		100.00	0.000	0.000

Tower Pressure - With Ice

$$G_H = 1.100$$

Section Elevation	z	K _Z	q _z	t _z	A _G	F a c e	A _F	A _R	A _{leg}	Leg %	C _A A _A In Face	C _A A _A Out Face
ft	ft		ksf	in	ft ²		ft ²	ft ²	ft ²		ft ²	ft ²
L1 60.000-36.368	47.411	1.082	0.004	0.7777	19.875	A	0.000	19.875	19.875	100.00	0.000	0.000
						B	0.000	19.875		100.00	0.000	0.000
						C	0.000	19.875		100.00	0.000	8.111
						D	0.000	19.875		100.00	0.000	0.000
L2 36.368-0.000	17.487	0.877	0.003	0.7039	42.744	A	0.000	42.744	42.744	100.00	0.000	0.000
						B	0.000	42.744		100.00	0.000	0.000
						C	0.000	42.744		100.00	0.000	13.003
						D	0.000	42.744		100.00	0.000	0.000

Tower Pressure - Service

$$G_H = 1.100$$

Section Elevation	z	K _Z	q _z	A _G	F a c e	A _F	A _R	A _{leg}	Leg %	C _A A _A In Face	C _A A _A Out Face
ft	ft		ksf	ft ²		ft ²	ft ²	ft ²		ft ²	ft ²
L1 60.000-36.368	47.411	1.082	0.008	16.812	A	0.000	16.812	16.812	100.00	0.000	0.000
					B	0.000	16.812		100.00	0.000	0.000
					C	0.000	16.812		100.00	0.000	4.583
					D	0.000	16.812		100.00	0.000	0.000
L2 36.368-0.000	17.487	0.877	0.007	38.030	A	0.000	38.030	38.030	100.00	0.000	0.000
					B	0.000	38.030		100.00	0.000	0.000
					C	0.000	38.030		100.00	0.000	7.346
					D	0.000	38.030		100.00	0.000	0.000

Tower Forces - No Ice - Wind Normal To Face



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STRALOS SERIES | 60 FT HIGH-MAST LIGHT POLE

TIA-222-H | 120 MPH DESIGN WIND | EXPOSURE C | RISK CATEGORY II

Structural calculations preserved from original engineering analysis

PAGE 5 OF 12

JOB

60ft-120mph

DATE

04/02/26

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Section Elevation ft	Add Weight K	Self Weight K	F a c e	e	C _F	q _z ksf	D _F	D _R	A _E ft ²	F K	w klf	Ctrl. Face
L1 60.000-36.368	0.047	0.250	A	1	0.73	0.038	1	1	16.812	0.702	0.030	D
			B	1	0.73		1	1	16.812			
			C	1	0.73		1	1	16.812			
			D	1	0.73		1	1	16.812			
L2 36.368-0.000	0.075	0.794	A	1	0.73	0.031	1	1	38.030	1.216	0.033	D
			B	1	0.73		1	1	38.030			
			C	1	0.73		1	1	38.030			
			D	1	0.73		1	1	38.030			
Sum Weight:	0.121	1.045						OTM	54.570 kip-ft	1.919		

Tower Forces - No Ice - Wind 45 To Face

Section Elevation ft	Add Weight K	Self Weight K	F a c e	e	C _F	q _z ksf	D _F	D _R	A _E ft ²	F K	w klf	Ctrl. Face
L1 60.000-36.368	0.047	0.250	A	1	0.73	0.038	1	1	16.812	0.702	0.030	D
			B	1	0.73		1	1	16.812			
			C	1	0.73		1	1	16.812			
			D	1	0.73		1	1	16.812			
L2 36.368-0.000	0.075	0.794	A	1	0.73	0.031	1	1	38.030	1.216	0.033	D
			B	1	0.73		1	1	38.030			
			C	1	0.73		1	1	38.030			
			D	1	0.73		1	1	38.030			
Sum Weight:	0.121	1.045						OTM	54.570 kip-ft	1.919		

Tower Forces - With Ice - Wind Normal To Face

Section Elevation ft	Add Weight K	Self Weight K	F a c e	e	C _F	q _z ksf	D _F	D _R	A _E ft ²	F K	w klf	Ctrl. Face
L1 60.000-36.368	0.047	0.459	A	1	1.2	0.004	1	1	19.875	0.148	0.006	D
			B	1	1.2		1	1	19.875			
			C	1	1.2		1	1	19.875			
			D	1	1.2		1	1	19.875			
L2 36.368-0.000	0.075	1.208	A	1	1.2	0.003	1	1	42.296	0.245	0.007	D
			B	1	1.2		1	1	42.296			
			C	1	1.2		1	1	42.296			
			D	1	1.2		1	1	42.296			
Sum Weight:	0.121	1.667						OTM	11.308 kip-ft	0.393		



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STRALOS SERIES | 60 FT HIGH-MAST LIGHT POLE

TIA-222-H | 120 MPH DESIGN WIND | EXPOSURE C | RISK CATEGORY II

Structural calculations preserved from original engineering analysis

PAGE 6 OF 12

JOB

60ft-120mph

DATE

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Tower Forces - With Ice - Wind 45 To Face

Section Elevation ft	Add Weight K	Self Weight K	F a c e	e	C _F	q _z ksf	D _F	D _R	A _E ft ²	F K	w klf	Ctrl. Face
L1 60.000-36.368	0.047	0.459	A	1	1.2	0.004	1	1	19.875	0.148	0.006	D
			B	1	1.2		1	1	19.875			
			C	1	1.2		1	1	19.875			
			D	1	1.2		1	1	19.875			
L2 36.368-0.000	0.075	1.208	A	1	1.2	0.003	1	1	42.296	0.245	0.007	D
			B	1	1.2		1	1	42.296			
			C	1	1.2		1	1	42.296			
			D	1	1.2		1	1	42.296			
Sum Weight:	0.121	1.667						OTM	11.308 kip-ft	0.393		

Tower Forces - Service - Wind Normal To Face

Section Elevation ft	Add Weight K	Self Weight K	F a c e	e	C _F	q _z ksf	D _F	D _R	A _E ft ²	F K	w klf	Ctrl. Face
L1 60.000-36.368	0.047	0.250	A	1	1.094	0.008	1	1	16.812	0.214	0.009	D
			B	1	1.094		1	1	16.812			
			C	1	1.094		1	1	16.812			
			D	1	1.094		1	1	16.812			
L2 36.368-0.000	0.075	0.794	A	1	0.895	0.007	1	1	38.030	0.321	0.009	D
			B	1	0.895		1	1	38.030			
			C	1	0.895		1	1	38.030			
			D	1	0.895		1	1	38.030			
Sum Weight:	0.121	1.045						OTM	15.760 kip-ft	0.535		

Tower Forces - Service - Wind 45 To Face

Section Elevation ft	Add Weight K	Self Weight K	F a c e	e	C _F	q _z ksf	D _F	D _R	A _E ft ²	F K	w klf	Ctrl. Face
L1 60.000-36.368	0.047	0.250	A	1	1.094	0.008	1	1	16.812	0.214	0.009	D
			B	1	1.094		1	1	16.812			
			C	1	1.094		1	1	16.812			
			D	1	1.094		1	1	16.812			
L2 36.368-0.000	0.075	0.794	A	1	0.895	0.007	1	1	38.030	0.321	0.009	D
			B	1	0.895		1	1	38.030			
			C	1	0.895		1	1	38.030			
			D	1	0.895		1	1	38.030			
Sum Weight:	0.121	1.045						OTM	15.760 kip-ft	0.535		

STRUCTURAL ENGINEERING REPORT

STRALOS SERIES | 60 FT HIGH-MAST LIGHT POLE

TIA-222-H | 120 MPH DESIGN WIND | EXPOSURE C | RISK CATEGORY II

Structural calculations preserved from original engineering analysis

PAGE 7 OF 12

JOB

60ft-120mph

DATE

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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
Leg Weight	1.045					
Bracing Weight	0.000					
Total Member Self-Weight	1.045			0.000	0.000	
Total Weight	1.890			0.000	0.000	
Wind 0 deg - No Ice		0.000	-3.238	-133.746	0.000	0.000
Wind 45 deg - No Ice		2.290	-2.290	-94.573	-94.573	0.000
Wind 90 deg - No Ice		3.238	0.000	0.000	-133.746	0.000
Member Ice	0.622					
Total Weight Ice	1.788			0.000	0.000	
Wind 0 deg - Ice		0.000	-0.393	-11.308	0.000	0.000
Wind 45 deg - Ice		0.278	-0.278	-7.996	-7.996	0.000
Wind 90 deg - Ice		0.393	0.000	0.000	-11.308	0.000
Total Weight	1.890			0.000	0.000	
Wind 0 deg - Service		0.000	-0.830	-33.470	0.000	0.000
Wind 45 deg - Service		0.587	-0.587	-23.667	-23.667	0.000
Wind 90 deg - Service		0.830	0.000	0.000	-33.470	0.000

Load Combinations

Comb. No.	Description
1	Dead Only
2	1.2 Dead+1.0 Wind 0 deg - No Ice
3	0.9 Dead+1.0 Wind 0 deg - No Ice
4	1.2 Dead+1.0 Wind 45 deg - No Ice
5	0.9 Dead+1.0 Wind 45 deg - No Ice
6	1.2 Dead+1.0 Wind 90 deg - No Ice
7	0.9 Dead+1.0 Wind 90 deg - No Ice
8	1.2 Dead+1.0 Ice+1.0 Temp
9	1.2 Dead+1.0 Wind 0 deg+1.0 Ice+1.0 Temp
10	1.2 Dead+1.0 Wind 45 deg+1.0 Ice+1.0 Temp
11	1.2 Dead+1.0 Wind 90 deg+1.0 Ice+1.0 Temp
12	Dead+Wind 0 deg - Service
13	Dead+Wind 45 deg - Service
14	Dead+Wind 90 deg - Service

Maximum Member Forces

Section No.	Elevation ft	Component Type	Condition	Gov. Load Comb.	Axial K	Major Axis Moment kip-ft	Minor Axis Moment kip-ft
L1	60 - 36.3681	Pole	Max Tension	1	0.000	0.000	0.000
			Max. Compression	1	-0.987	0.000	0.000
			Max. Mx	6	-0.900	-37.553	0.000
			Max. My	2	-0.900	0.000	37.553
			Max. Vy	6	2.087	-37.553	0.000

STRUCTURAL ENGINEERING REPORT

STRALOS SERIES | 60 FT HIGH-MAST LIGHT POLE

TIA-222-H | 120 MPH DESIGN WIND | EXPOSURE C | RISK CATEGORY II

Structural calculations preserved from original engineering analysis

PAGE 8 OF 12

JOB

60ft-120mph

DATE

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Section No.	Elevation ft	Component Type	Condition	Gov. Load Comb.	Axial K	Major Axis Moment kip-ft	Minor Axis Moment kip-ft
L2	36.3681 - 0	Pole	Max. Vx	2	-2.087	0.000	37.553
			Max Tension	1	0.000	0.000	0.000
			Max. Compression	6	-2.257	-140.871	0.000
			Max. Mx	6	-2.257	-140.871	0.000
			Max. My	2	-2.257	0.000	140.871
			Max. Vy	6	3.246	-140.871	0.000
			Max. Vx	2	-3.246	0.000	140.871

Maximum Reactions

Location	Condition	Gov. Load Comb.	Vertical K	Horizontal, X K	Horizontal, Z K
Pole	Max. Vert	6	2.268	-3.238	0.000
	Max. H _x	12	1.890	0.000	0.830
	Max. H _z	3	1.701	0.000	3.238
	Max. M _x	2	140.871	0.000	3.238
	Max. M _z	6	140.871	-3.238	0.000
	Max. Torsion	10	0.000	-0.278	0.278
	Min. Vert	5	1.701	-2.290	2.290
	Min. H _x	7	1.701	-3.238	0.000
	Min. H _z	1	1.890	0.000	0.000
	Min. M _x	1	0.000	0.000	0.000
	Min. M _z	1	0.000	0.000	0.000
	Min. Torsion	5	0.000	-2.290	2.290

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	1.890	0.000	0.000	0.000	0.000	0.000
1.2 Dead+1.0 Wind 0 deg - No Ice	2.268	0.000	-3.238	-140.871	0.000	0.000
0.9 Dead+1.0 Wind 0 deg - No Ice	1.701	0.000	-3.238	-138.799	0.000	0.000
1.2 Dead+1.0 Wind 45 deg - No Ice	2.268	2.290	-2.290	-99.611	-99.611	0.000
0.9 Dead+1.0 Wind 45 deg - No Ice	1.701	2.290	-2.290	-98.145	-98.145	0.000
1.2 Dead+1.0 Wind 90 deg - No Ice	2.268	3.238	0.000	0.000	-140.871	0.000
0.9 Dead+1.0 Wind 90 deg - No Ice	1.701	3.238	0.000	0.000	-138.799	0.000
1.2 Dead+1.0 Ice+1.0 Temp	2.193	0.000	0.000	0.000	0.000	0.000
1.2 Dead+1.0 Wind 0 deg+1.0 Ice+1.0 Temp	2.193	0.000	-0.393	-11.609	0.000	0.000
1.2 Dead+1.0 Wind 45 deg+1.0 Ice+1.0 Temp	2.193	0.278	-0.278	-8.209	-8.209	0.000
1.2 Dead+1.0 Wind 90 deg+1.0 Ice+1.0 Temp	2.193	0.393	0.000	0.000	-11.609	0.000
Dead+Wind 0 deg - Service	1.890	0.000	-0.830	-35.084	0.000	0.000
Dead+Wind 45 deg - Service	1.890	0.587	-0.587	-24.808	-24.808	0.000

STRUCTURAL ENGINEERING REPORT

STRALOS SERIES | 60 FT HIGH-MAST LIGHT POLE

TIA-222-H | 120 MPH DESIGN WIND | EXPOSURE C | RISK CATEGORY II

Structural calculations preserved from original engineering analysis

PAGE 9 OF 12

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60ft-120mph

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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+Wind 90 deg - Service	1.890	0.830	0.000	0.000	-35.084	0.000

Solution Summary

Load Comb.	Sum of Applied Forces			Sum of Reactions			% Error
	PX K	PY K	PZ K	PX K	PY K	PZ K	
1	0.000	-1.890	0.000	0.000	1.890	0.000	0.000%
2	0.000	-2.268	-3.238	0.000	2.268	3.238	0.000%
3	0.000	-1.701	-3.238	0.000	1.701	3.238	0.000%
4	2.290	-2.268	-2.290	-2.290	2.268	2.290	0.000%
5	2.290	-1.701	-2.290	-2.290	1.701	2.290	0.000%
6	3.238	-2.268	0.000	-3.238	2.268	0.000	0.000%
7	3.238	-1.701	0.000	-3.238	1.701	0.000	0.000%
8	0.000	-2.193	0.000	0.000	2.193	0.000	0.000%
9	0.000	-2.193	-0.393	0.000	2.193	0.393	0.000%
10	0.278	-2.193	-0.278	-0.278	2.193	0.278	0.000%
11	0.393	-2.193	0.000	-0.393	2.193	0.000	0.000%
12	0.000	-1.890	-0.830	0.000	1.890	0.830	0.000%
13	0.587	-1.890	-0.587	-0.587	1.890	0.587	0.000%
14	0.830	-1.890	0.000	-0.830	1.890	0.000	0.000%

Non-Linear Convergence Results

Load Combination	Converged?	Number of Cycles	Displacement Tolerance	Force Tolerance
1	Yes	4	0.00000001	0.00000001
2	Yes	5	0.00000001	0.00000001
3	Yes	5	0.00000001	0.00000001
4	Yes	7	0.00000001	0.00000001
5	Yes	6	0.00000001	0.00004968
6	Yes	5	0.00000001	0.00000001
7	Yes	5	0.00000001	0.00000001
8	Yes	4	0.00000001	0.00000001
9	Yes	5	0.00000001	0.00000001
10	Yes	5	0.00000001	0.00000001
11	Yes	5	0.00000001	0.00000001
12	Yes	5	0.00000001	0.00000001
13	Yes	6	0.00000001	0.00000001
14	Yes	5	0.00000001	0.00000001

Maximum Tower Deflections - Service Wind

Section No.	Elevation ft	Horz. Deflection ft	Gov. Load Comb.	Tilt °	Twist °
L1	60 - 36.3681	1.587	14	2.7903	0.0000
L2	38.7139 - 0	0.671	14	1.9460	0.0000

Critical Deflections and Radius of Curvature - Service Wind

Elevation	Appurtenance	Gov. Load Comb.	Deflection	Tilt	Twist	Radius of Curvature
ft			ft	°	°	ft
60.000	lantern and bracket	14	1.587	2.7903	0.0000	3320

Maximum Tower Deflections - Design Wind

Section No.	Elevation	Horz. Deflection	Gov. Load Comb.	Tilt	Twist
	ft	ft		°	°
L1	60 - 36.3681	6.476	6	11.5673	0.0000
L2	38.7139 - 0	2.718	6	7.9465	0.0000

Critical Deflections and Radius of Curvature - Design Wind

Elevation	Appurtenance	Gov. Load Comb.	Deflection	Tilt	Twist	Radius of Curvature
ft			ft	°	°	ft
60.000	lantern and bracket	6	6.476	11.5673	0.0000	845

Base Plate Design Data

Plate Thickness	Number of Anchor Bolts	Anchor Bolt Size	Actual Allowable Ratio Bolt Tension K	Actual Allowable Ratio Concrete Stress ksi	Actual Allowable Ratio Plate Stress ksi	Actual Allowable Ratio Stiffener Stress ksi	Controlling Condition	Critical Ratio
in		in						
1.3800	8	1.2500	34.897	2.290	37.651		Plate	0.84
			54.512	4.080	45.000			✓
			0.64	0.56	0.84			

Compression Checks

Pole Design Data

Section No.	Elevation ft	Size	L ft	L _u ft	Kl/r	A in ²	P _u K	φP _n K	Ratio $\frac{P_u}{\phi P_n}$
L1	60 - 36.3681 (1)	TP10.0787x6.7717x0.1181	23.632	60.000	210.6	3.6110	-0.900	18.400	0.049
L2	36.3681 - 0 (2)	TP14.9213x9.5142x0.1575	38.714	60.000	137.4	7.3795	-2.257	88.340	0.026

Pole Bending Design Data

Section No.	Elevation ft	Size	M _{ux} kip-ft	φM _{nx} kip-ft	Ratio $\frac{M_{ux}}{\phi M_{nx}}$	M _{uy} kip-ft	φM _{ny} kip-ft	Ratio $\frac{M_{uy}}{\phi M_{ny}}$
L1	60 - 36.3681 (1)	TP10.0787x6.7717x0.1181	37.553	52.908	0.710	0.000	52.908	0.000
L2	36.3681 - 0 (2)	TP14.9213x9.5142x0.1575	140.872	165.986	0.849	0.000	165.986	0.000

Pole Shear Design Data

Section No.	Elevation ft	Size	Actual V _u K	φV _n K	Ratio $\frac{V_u}{\phi V_n}$	Actual T _u kip-ft	φT _n kip-ft	Ratio $\frac{T_u}{\phi T_n}$
L1	60 - 36.3681 (1)	TP10.0787x6.7717x0.1181	2.087	63.373	0.033	0.000	53.458	0.000
L2	36.3681 - 0 (2)	TP14.9213x9.5142x0.1575	3.246	129.511	0.025	0.000	167.450	0.000

Pole Interaction Design Data

Section No.	Elevation ft	Ratio $\frac{P_u}{\phi P_n}$	Ratio $\frac{M_{ux}}{\phi M_{nx}}$	Ratio $\frac{M_{uy}}{\phi M_{ny}}$	Ratio $\frac{V_u}{\phi V_n}$	Ratio $\frac{T_u}{\phi T_n}$	Comb. Stress Ratio	Allow. Stress Ratio	Criteria
L1	60 - 36.3681 (1)	0.049	0.710	0.000	0.033	0.000	0.760	1.000	✓
L2	36.3681 - 0 (2)	0.026	0.849	0.000	0.025	0.000	0.875	1.000	✓

Section Capacity Table

Section No.	Elevation ft	Component Type	Size	Critical Element	P K	φP _{allow} K	% Capacity	Pass Fail
L1	60 - 36.3681	Pole	TP10.0787x6.7717x0.1181	1	-0.900	18.400	76.0	Pass
L2	36.3681 - 0	Pole	TP14.9213x9.5142x0.1575	2	-2.257	88.340	87.5	Pass
Summary								

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Section No.	Elevation ft	Component Type	Size	Critical Element	P K	ϕP_{allow} K	% Capacity	Pass Fail
						Pole (L2)	87.5	Pass
						Base Plate	83.7	Pass
						RATING =	87.5	Pass

Program Version 8.3.1.2 - 12/12/20
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