

Technical Data

PoleEnforcer®

PHASERAISER®

PRS

PoleEnforcer SRS®
Spliced Reinforcement System

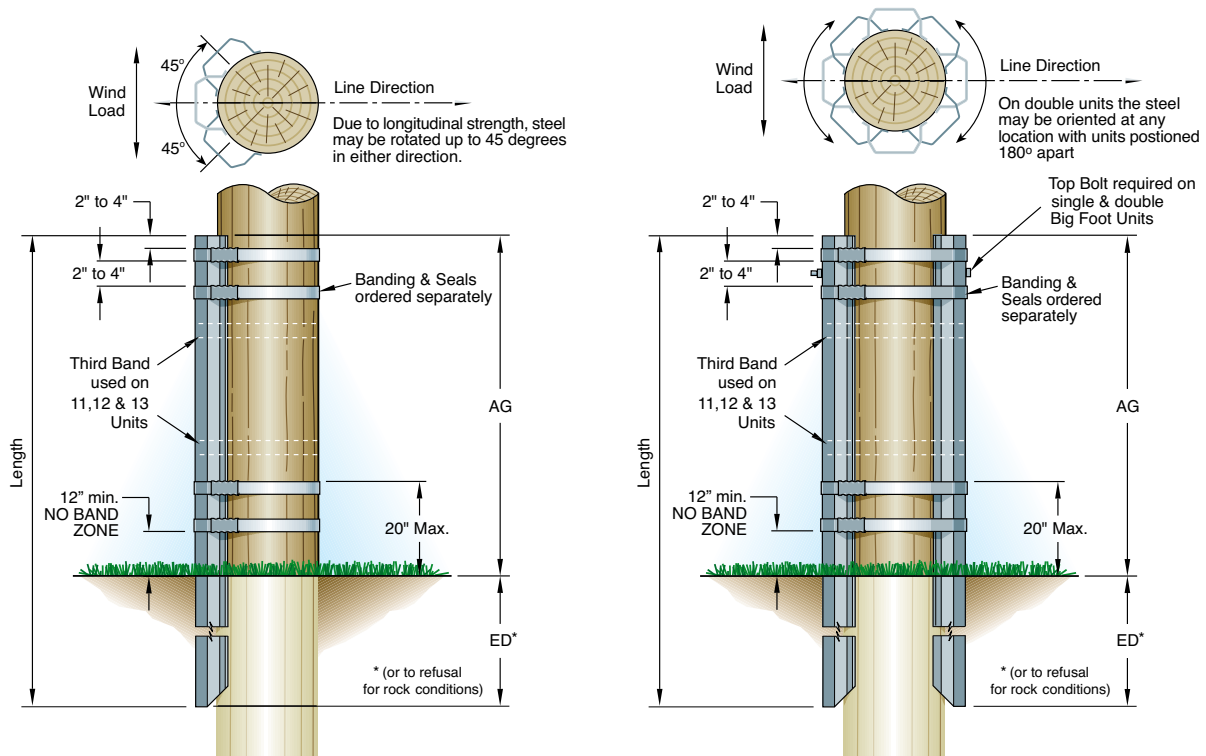
- Installation Recommendations
- Material Specifications
- Sizing Charts
- Tools & Accessories

View LWS steel product installation videos
online at: www.lwsinc.com

LWS

LAMINATED WOOD SYSTEMS

Single & Double Installation



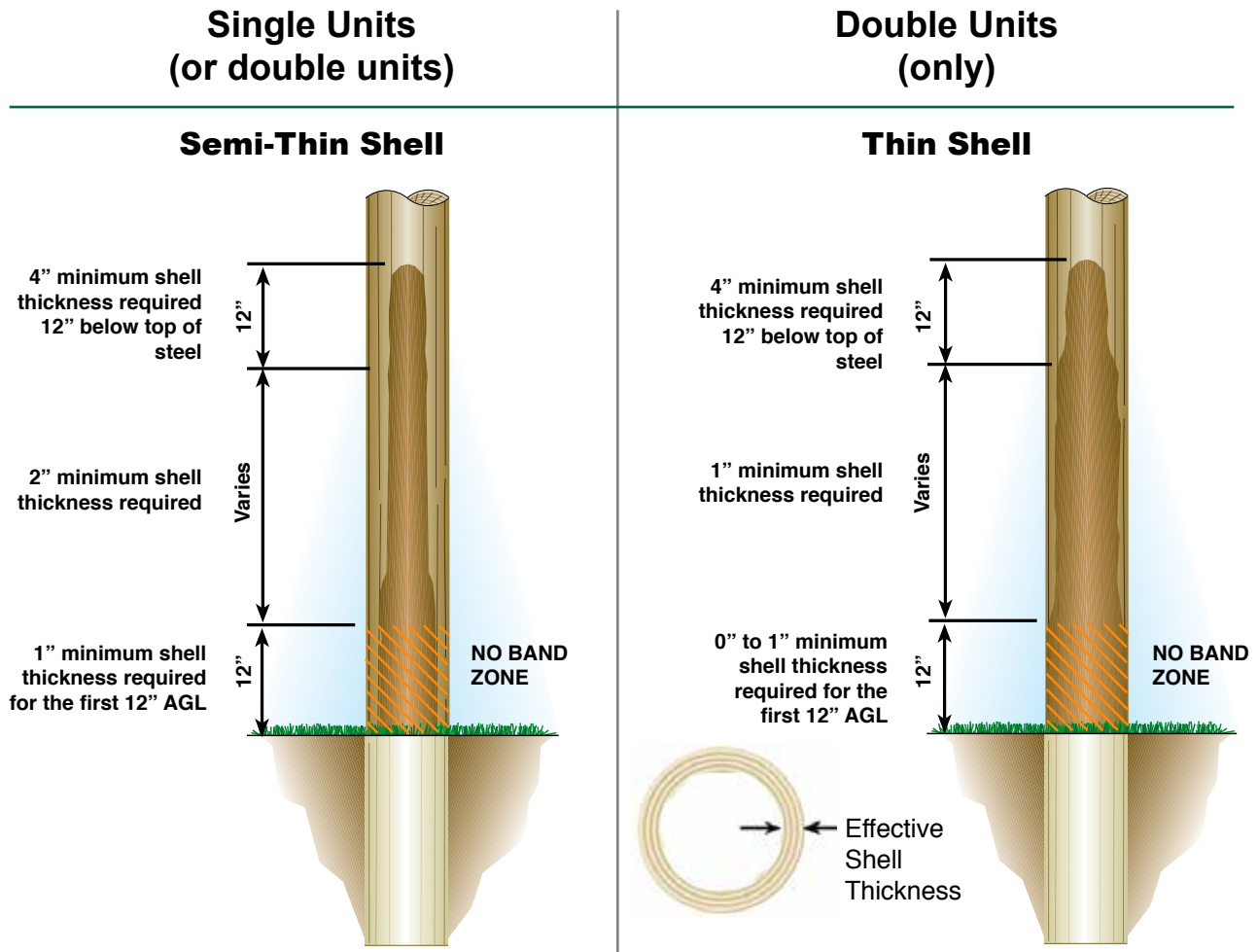
PoleEnforcer® Strength Chart

	PoleEnforcer® Unit Number	Ultimate Transverse Strength (Ft.-Lbs.)		Longitudinal Strength	Unit Dimensions			E D* Embedment Depth (Feet)	A G Above Ground (Feet)	Unit Weight (Lbs.) Single Unit
		Single Unit	Double Unit	Single Unit	Width	Length	Thickness			
60ksi A-572 Grade 60 Steel	PE - 26 - 10	26,000	52,000	20,000	5"	10'	1/4"	5.0	5.0	101
	PE - 35 - 10	35,000	70,000	30,000	5-3/4"	10'	1/4"	5.0	5.0	119
	PE - 56 - 10	56,000	112,000	35,000	7-1/8"	10'	1/4"	5.0	5.0	154
	7 - 10 - 4	62,800	125,600	37,000	7"	10'	1/4"	5.0	5.0	145
	7 - 10 - 5	78,300	156,600	49,000	7"	10'	5/16"	5.0	5.0	180
80ksi A-572 Grade 80 Steel	8 - 10 - 4	73,700	147,400	42,000	8"	10'	1/4"	5.0	5.0	154
	8 - 11 - 5	91,700	183,400	56,000	8"	11'	5/16"	5.5	5.5	210
	9 - 11 - 4	85,200	170,400	47,000	9"	11'	1/4"	5.5	5.5	179
	9 - 11 - 5	108,000	216,000	62,000	9"	11'	5/16"	5.5	5.5	222
	9 - 11 - 6	128,600	257,200	72,000	9"	11'	3/8"	6.0	5.0	266
	10 - 11 - 5	123,700	247,400	69,000	10"	11'	5/16"	6.0	5.0	234
	10 - 11 - 6	148,100	296,200	80,000	10"	11'	3/8"	6.0	5.0	286
	11 - 11 - 6	169,500	339,000	87,000	11"	11'	3/8"	6.0	5.0	294
	12 - 12 - 6	191,500	383,000	95,000	12"	12'	3/8"	6.0	6.0	337
	13 - 12 - 6	211,500	423,000	103,000	13"	12'	3/8"	6.0	6.0	352

All PoleEnforcers are hot dip galvanized per ASTM A-123 specifications.

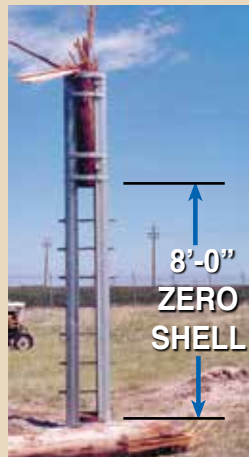
*Longer lengths or SRS® units are available for higher decay applications.

Minimum Shell Thickness



PhaseRaiser® Test... “Zero Thin Shell”

Tests conducted on the patented PhaseRaiser® structure lifting system (whose steel design is based on the patented PoleEnforcer®) proved the remarkable strength of the PoleEnforcer® in thin shell applications. The test simulated the equivalent of 8'-0" of ZERO SHELL THICKNESS.



50'-0" Class 3 Pole

Pole
Failure..... 3,550 lbs

Loaded.... 48'-0" AGL

Groundline
Moment
Failure..... 170,400 ft-lbs

No permanent deformation of steel.

PoleEnforcer® + Crossbolts = PhaseRaiser®

PoleEnforcer® Selection Guide / Grade "B" Construction

SEMI-THIN SHELL

Pole Length	Pole Class										
	H-4	H-3	H-2	H-1	1	2	3	4	5	6	7
30 ft.					8-10-4	56-10	56-10	56-10	35-10	26-10	26-10
35 ft.			10-11-5	9-11-5	9-11-4	8-10-4	56-10	56-10	35-10	35-10	26-10
40 ft.	12-12-6	11-11-6	10-11-6	10-11-5	9-11-5	7-10-5	7-10-4	56-10	56-10	35-10	
45 ft.	13-12-6	12-12-6	11-11-6	9-11-6	9-11-5	8-11-5	8-10-4	7-10-4	56-10	56-10	
50 ft.	10-11-5D	13-12-6	12-12-6	10-11-6	10-11-5	9-11-5	9-11-4	8-10-4	56-10		
55 ft.	10-11-6D	10-11-5D	12-12-6	11-11-6	10-11-6	10-11-5	8-11-5	8-10-4			
60 ft.	10-11-6D	10-11-5D	13-12-6	12-12-6	10-11-6	10-11-5	9-11-5	7-10-5			
65 ft.	11-11-6D	10-11-6D	10-11-5D	12-12-6	11-11-6	10-11-6	9-11-5	9-11-4			
70 ft.	13-12-6D	11-11-6D	10-11-6D	10-11-5D	13-12-6	11-11-6	10-11-6	9-11-5			
75 ft.	13-12-6D	12-12-6D	11-11-6D	9-11-6D	9-11-5D	12-12-6	10-11-6				
80 ft.		12-12-6D	11-11-6D	10-11-6D	10-11-5D	12-12-6	11-11-6				
85 ft.		13-12-6D	12-12-6D	10-11-6D	10-11-5D	13-12-6	11-11-6				
90 ft.			12-12-6D	11-11-6D	10-11-6D	9-11-5D	12-12-6				
95 ft.			13-12-6D	11-11-6D	10-11-6D	10-11-5D					
100 ft.			13-12-6D	12-12-6D	10-11-6D	10-11-5D					
105 ft.				12-12-6D	11-11-6D	9-11-6D					
110 ft.				13-12-6D	11-11-6D	10-11-6D					
115 ft.				13-12-6D	11-11-6D	10-11-6D					
120 ft.				13-12-6D	12-12-6D	10-11-6D					
125 ft.					12-12-6D	11-11-6D					

LARGER
UNITS
AVAILABLE
UPON
REQUEST

PoleEnforcer® Selection Guide / Grade "B" Construction

THIN SHELL - DOUBLE UNITS

Pole Length	Pole Class										
	H-4	H-3	H-2	H-1	1	2	3	4	5	6	7
30 ft.					35-10D	35-10D	26-10D	26-10D	26-10D	26-10D	26-10D
35 ft.			7-10-4D	56-10D	56-10D	35-10D	35-10D	26-10D	26-10D	26-10D	26-10D
40 ft.	8-11-5D	7-10-5D	8-10-4D	7-10-4D	56-10D	56-10D	35-10D	26-10D	26-10D	26-10D	
45 ft.	9-11-5D	8-11-5D	7-10-5D	8-10-4D	56-10D	56-10D	56-10D	35-10D	26-10D	26-10D	
50 ft.	10-11-5D	9-11-5D	8-11-5D	8-10-4D	7-10-4D	56-10D	56-10D	35-10D	26-10D		
55 ft.	10-11-6D	10-11-5D	9-11-5D	9-11-4D	8-10-4D	56-10D	56-10D	56-10D			
60 ft.	10-11-6D	10-11-5D	9-11-5D	8-11-5D	8-10-4D	7-10-4D	56-10D	56-10D			
65 ft.	11-11-6D	10-11-6D	10-11-5D	9-11-5D	9-11-4D	8-10-4D	56-10D	56-10D			
70 ft.	13-12-6D	11-11-6D	10-11-6D	10-11-5D	9-11-5D	9-11-4D	8-10-4D	56-10D			
75 ft.	13-12-6D	12-12-6D	11-11-6D	9-11-6D	9-11-5D	8-11-5D	8-10-4D				
80 ft.		12-12-6D	11-11-6D	10-11-6D	10-11-5D	9-11-5D	7-10-5D				
85 ft.		13-12-6D	12-12-6D	10-11-6D	10-11-5D	9-11-5D	9-11-4D				
90 ft.			12-12-6D	11-11-6D	10-11-6D	9-11-5D	8-11-5D				
95 ft.			13-12-6D	11-11-6D	10-11-6D	10-11-5D					
100 ft.			13-12-6D	12-12-6D	10-11-6D	10-11-5D					
105 ft.				12-12-6D	11-11-6D	9-11-6D					
110 ft.				13-12-6D	11-11-6D	10-11-6D					
115 ft.				13-12-6D	11-11-6D	10-11-6D					
120 ft.				13-12-6D	12-12-6D	10-11-6D					
125 ft.					12-12-6D	11-11-6D					

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PoleEnforcer® Selection Guide / Grade "C" Construction

SEMI-THIN SHELL

Pole Length	Pole Class										
	H-4	H-3	H-2	H-1	1	2	3	4	5	6	7
30 ft.					8-11-5	8-10-4	7-10-4	56-10	56-10	35-10	26-10
35 ft.			11-11-6	9-11-6	9-11-5	8-11-5	8-10-4	7-10-4	56-10	56-10	26-10
40 ft.	10-11-5D	13-12-6	12-12-6	10-11-6	10-11-5	9-11-5	9-11-4	8-10-4	56-10	56-10	
45 ft.	10-11-6D	10-11-5D	13-11-6	11-11-6	10-11-6	10-11-5	9-11-5	7-10-5	7-10-4	56-10	
50 ft.	11-11-6D	10-11-6D	10-11-5D	12-12-6	11-11-6	10-11-6	9-11-5	9-11-4	8-10-4		
55 ft.	11-11-6D	10-11-6D	9-11-6D	13-12-6	12-12-6	10-11-6	10-11-5	9-11-5			
60 ft.	12-12-6D	11-11-6D	10-11-6D	10-11-5D	12-12-6	11-11-6	9-11-6	9-11-5			
65 ft.	13-12-6D	12-12-6D	11-11-6D	9-11-6D	13-12-6	12-12-6	10-11-6	10-11-5			
70 ft.		12-12-6D	11-11-6D	10-11-6D	10-11-5D	12-12-6	11-11-6	10-11-5			
75 ft.		13-12-6D	12-12-6D	10-11-6D	10-11-5D	13-12-6	11-11-6				
80 ft.			12-12-6D	11-11-6D	10-11-6D	9-11-5D	12-12-6				
85 ft.			13-12-6D	11-11-6D	10-11-6D	10-11-5D	12-12-6				
90 ft.			13-12-6D	12-12-6D	10-11-6D	10-11-5D	13-12-6				
95 ft.				12-12-6D	11-11-6D	9-11-6D					
100 ft.				13-12-6D	11-11-6D	10-11-6D					
105 ft.				13-12-6D	12-12-6D	10-11-6D					
110 ft.					12-12-6D	11-11-6D					
115 ft.					12-12-6D	11-11-6D					
120 ft.					13-12-6D	11-11-6D					
125 ft.					13-12-6D	12-12-6D					

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PoleEnforcer® Selection Guide / Grade "C" Construction

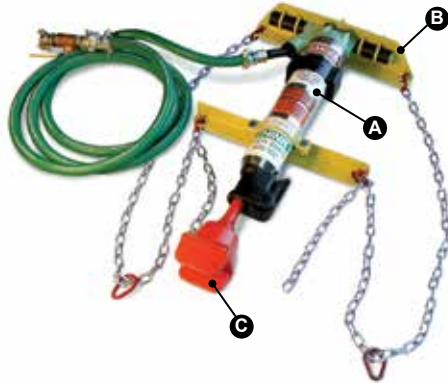
THIN SHELL - DOUBLE UNITS

Pole Length	Pole Class										
	H-4	H-3	H-2	H-1	1	2	3	4	5	6	7
30 ft.					56-10D	56-10D	35-10D	26-10D	26-10D	26-10D	26-10D
35 ft.	9-11-5D	8-11-5D	7-10-5D	8-10-4D	56-10D	56-10D	56-10D	35-10D	26-10D	26-10D	26-10D
40 ft.	10-11-5D	9-11-5D	8-11-5D	8-10-4D	7-10-4D	56-10D	56-10D	35-10D	26-10D	26-10D	
45 ft.	10-11-6D	10-11-5D	9-11-5D	9-11-4D	8-10-4D	7-10-4D	56-10D	56-10D	35-10D	26-10D	
50 ft.	11-11-6D	10-11-6D	10-11-5D	9-11-5D	9-11-4D	8-10-4D	56-10D	56-10D	35-10D		
55 ft.	11-11-6D	10-11-6D	9-11-6D	9-11-5D	8-11-5D	8-10-4D	7-10-4D	56-10D			
60 ft.	12-12-6D	11-11-6D	10-11-6D	10-11-5D	9-11-5D	9-11-4D	8-10-4D	56-10D			
65 ft.	13-12-6D	12-12-6D	11-11-6D	9-11-6D	9-11-5D	8-11-5D	8-10-4D	56-10D			
70 ft.		12-12-6D	11-11-6D	10-11-6D	10-11-5D	9-11-5D	7-10-5D	7-10-4D			
75 ft.		13-12-6D	12-12-6D	10-11-6D	10-11-5D	9-11-5D	9-11-4D				
80 ft.			12-12-6D	11-11-6D	10-11-6D	9-11-5D	8-11-5D				
85 ft.			13-12-6D	11-11-6D	10-11-6D	10-11-5D	9-11-5D				
90 ft.			13-12-6D	12-12-6D	10-11-6D	10-11-5D	9-11-5D				
95 ft.				12-12-6D	11-11-6D	9-11-6D					
100 ft.				13-12-6D	11-11-6D	10-11-6D					
105 ft.				13-12-6D	12-12-6D	10-11-6D					
110 ft.					12-12-6D	11-11-6D					
115 ft.					12-12-6D	11-11-6D					
120 ft.					13-12-6D	11-11-6D					
125 ft.					13-12-6D	12-12-6D					

LARGER
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Pneumatic Driving System

PE90HNB-BD Air Hammer & Bracket Assembly



- | | | |
|---------------------|-----------------------|---------|
| (A) PE-90-AH | 90lb. Air Hammer | 90 lbs. |
| (B) PE90HB | Bracket & Hammer | 22 lbs. |
| (C) PE2118DH | Shoe & Shank Assembly | 26 lbs. |

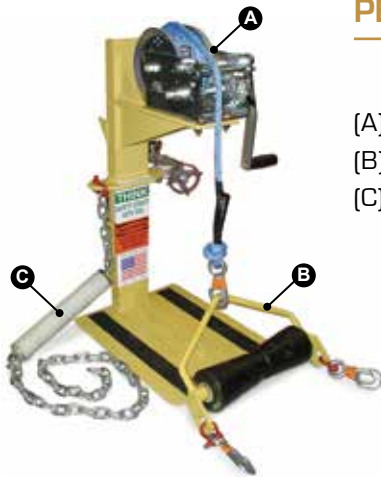
PE90WP 18'-6" Sectional Winch Pole Assembly

- (A) **PEPY** Pole Yoke
(B) **W2000** Winch

54 lbs. Total



PE90TWB Pull Down Winch Assembly



- | | | |
|------------------|------------------------|---------|
| (A) W3200 | Pull Down Winch | 73 lbs. |
| (B) PEBR | Bridal Roller (black) | 10 lbs. |
| (C) PETR | Tension Roller (white) | 2 lbs. |

PE-90-PDS Complete Pneumatic Driving System Tool Package

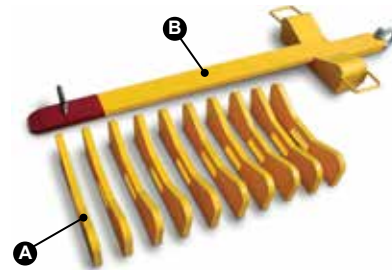
- | | |
|-------------------|--------------------------|
| PE90HNB-BD | Air Hammer Assembly |
| PE90WP | Winch Pole Assembly |
| PE90TWB | Pull Down Winch Assembly |
| DH1-2 | Banding Dispenser |
| PEAT2 | Air Tensioner |

- | | |
|-----------------|------------------------------------|
| PEAS2 | Sealer |
| PEBS2 | Manual Banding Shear |
| PE-FRL | Filter Regulator Lubricator |
| PE38AH25 | (2 ea) 3/8" Tool Hose (25 ft. ea.) |
| PE152RT | Nylon Ratchet Strap |

Drop Weight Driving System

PE-500-DWS Drop Weight System

- (A) **PE-25-WW-1B-LT** 25lb. Wafer Weights (10) 25 lbs. ea.
- (B) **PE-250-DS** Driving Shank w/ Shackle and Eyebolt 250 lbs.



Banding and Sealing Tools

PEMT2P Manual Tensioner

3/4" to 2" Push Tensioner 8 lbs.



PEAT2 Air Tensioner

2" Push Air Tensioner 9 lbs.



PEMS2 Manual Sealer

2" Manual Sealer 11 lbs.



PEAS2 Air Sealer

2" Air Sealer 25 lbs.



PEBS2 Manual Banding Shear

2" Manual Banding Shear 7 lbs.



DH1-2 2" Banding Dispenser

2" Banding Dispenser 46 lbs.



PEOS2GL Galvanized Seals

2" x 4-1/4" Open Crimp Seal



Safety Caps

- PE2SC** Cap w/ Nails (6" to 9" units)
- PE3SC** Cap w/ Nails (10" to 13" units)



PEB2G85ROLL 2" Galvanized Banding

2" x .044" Steel Banding
12,000 lbs. Ultimate Tensile Strength



Installation Accessories

PE-FRL Filter/Regulator

Filter-Regulator-Lubricator Assy
6 lbs.



PE38AH25 3/8" Tool Hose

25' Air Hose Assembly 5 lbs.



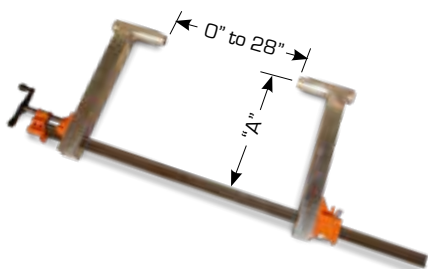
PE152RT Nylon Securing Strap

10' x 2" Ratchet Strap 4 lbs.



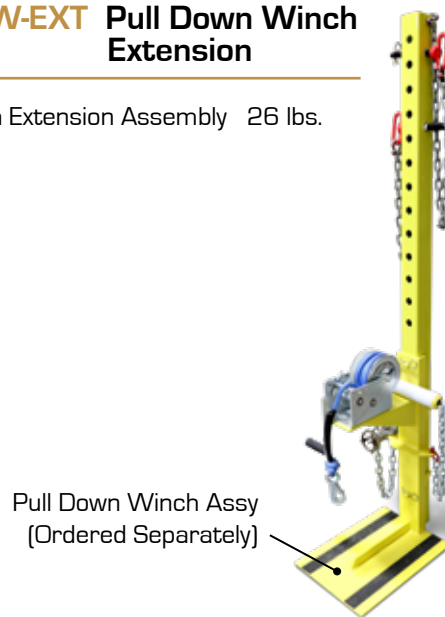
Drilling Alignment Tool

PE78DJ Small Alignment Tool ("A"=16") 12 lbs.
PE78DJ2 Large Alignment Tool ("A"=20") 14 lbs.



PEPDW-EXT Pull Down Winch Extension

6' Winch Extension Assembly 26 lbs.



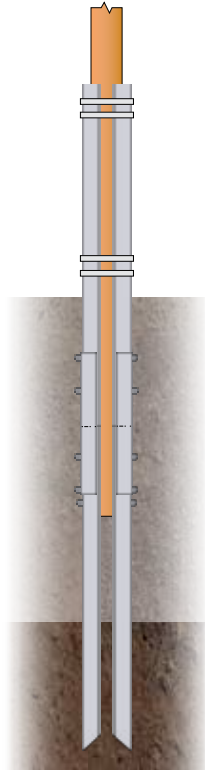
RP-2 Standard Roller Plate

Roller Plate (used double units and
w/ winch extension)
8 lbs.



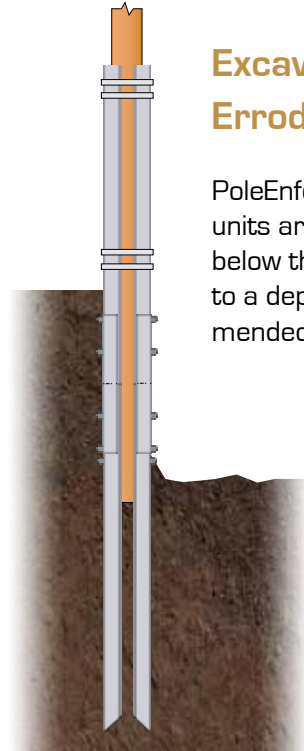
PoleEnforcer SRS®
Spliced Reinforcement System

Typical Applications



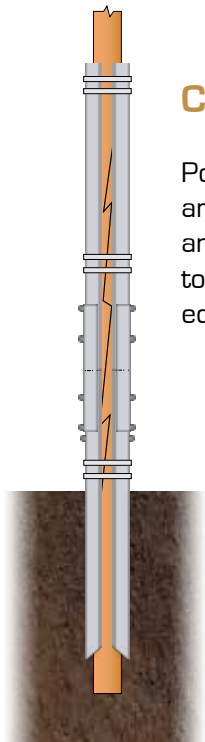
Soft Soil

PoleEnforcer SRS® units are driven below the pole butt into the good soil to a depth recommended by LWS.



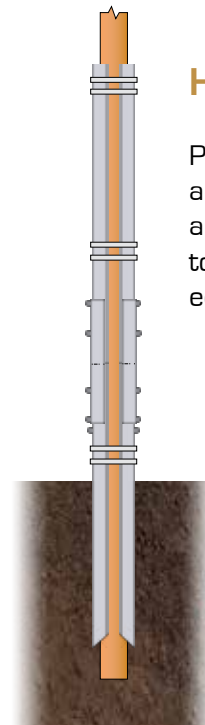
Excavated or Eroded Soil

PoleEnforcer SRS® units are driven below the pole butt to a depth recommended by LWS.



Car Breaks

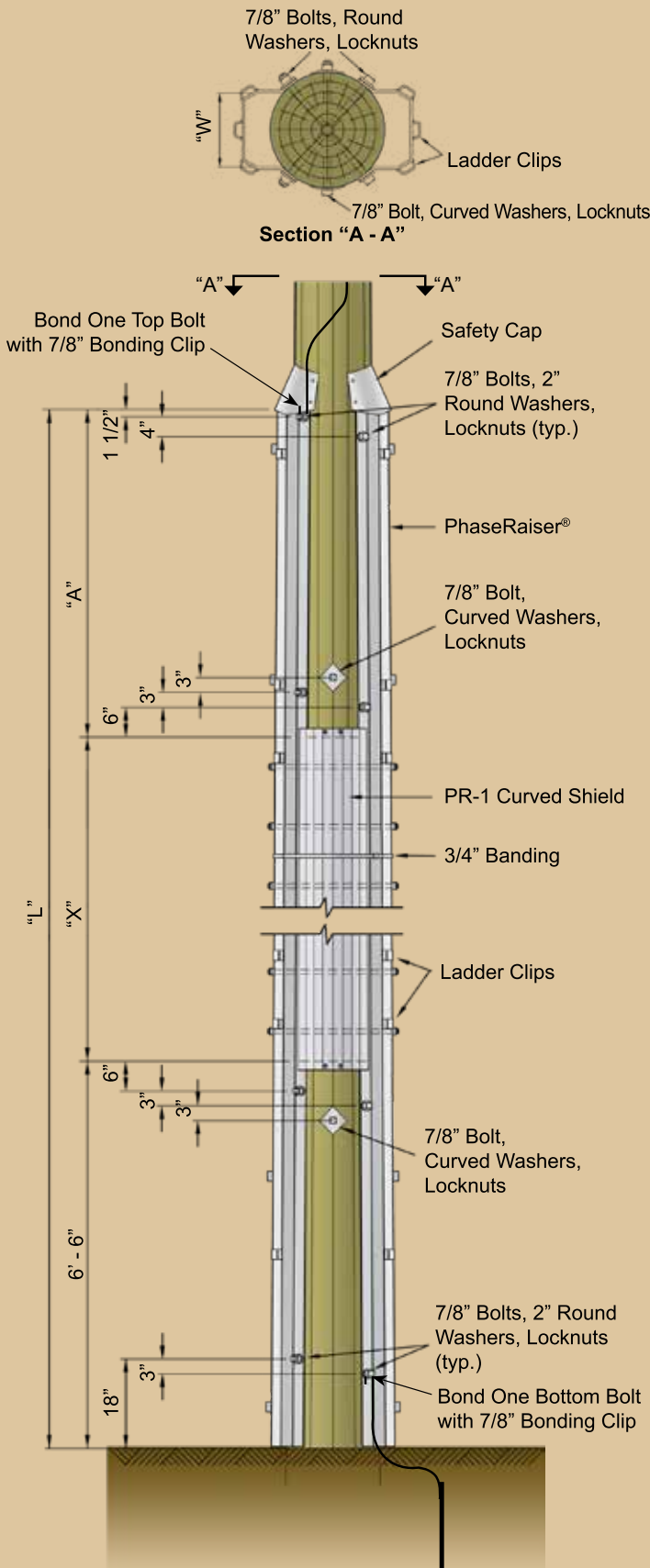
PoleEnforcer SRS® units are driven below grade and extend above grade to a height recommended by LWS.



High Decay

PoleEnforcer SRS® units are driven below grade and extend above grade to a height recommended by LWS.

Standard Assembly for "PRH"



PHASERAISER®

Type "PRH" - Raise Only For H-Frames or other Multiple Pole Structures

Standard Raises are 5', 10', 15' or 20'

"X" = Lift Height

For lifts 0 to 15 feet:

"L" = "X" + 12'-0"

"A" = 5'-6"

For lifts 16 to 20 feet:

"L" = "X" + 13'-0"

"A" = 6'-6"



20 ft. lift - North Dakota

Add additional X-brace to span gap for lifts 16ft or greater. X-brace assemblies available from LWS (ordered separately).

NOTE: Most H-frame strengths are limited by the pole capacity above the X-brace. However, the capacity of the structure after lift needs to be checked either with the use of PLS-POLE or by LWS to determine if additional X-bracing is required.

ORDERING INFORMATION

Minimum Unit Size					
Existing Pole Length	Existing Pole Class				
	H2	H1	1	2	3
50'-0"	PRH9	PRH9	PRH7	PRH7	PRH7
55'-0"	PRH10	PRH9	PRH8	PRH7	PRH7
60'-0"	PRH11	PRH10	PRH9	PRH7	PRH7
65'-0"	PRH11	PRH10	PRH9	PRH8	PRH7
70'-0"	PRH12	PRH11	PRH10	PRH8	PRH7
75'-0"	PRH13	PRH12	PRH10	PRH9	PRH8
80'-0"	PRH13	PRH12	PRH11	PRH9	PRH8
85'-0"	PRH14	PRH13	PRH11	PRH10	PRH8
90'-0"	PRH14	PRH13	PRH12	PRH10	PRH9
95'-0"	PRH15-80	PRH14	PRH12	PRH10	—
100'-0"	PRH15-80	PRH14	PRH13	PRH11	—
105'-0"	PRH15-80	PRH14	PRH13	PRH11	—
110'-0"	PRH15-80	PRH15-80	PRH13	PRH12	—

Contact LWS for sizes not shown.

Ordering Example:

Need - Raise Structure 10'-0" (X=10'-0")

Existing Pole - 75'-0" Class 2

Note: Material to be galvanized. For weathering steel add "W", for painted steel add "P". Example:

PRH9 - 22LW

PRH9 - 22LP

Order - **PRH9 - 22L**

└─ "W" Width of steel
└─ "L" Length of steel ("X" + 12'-0")

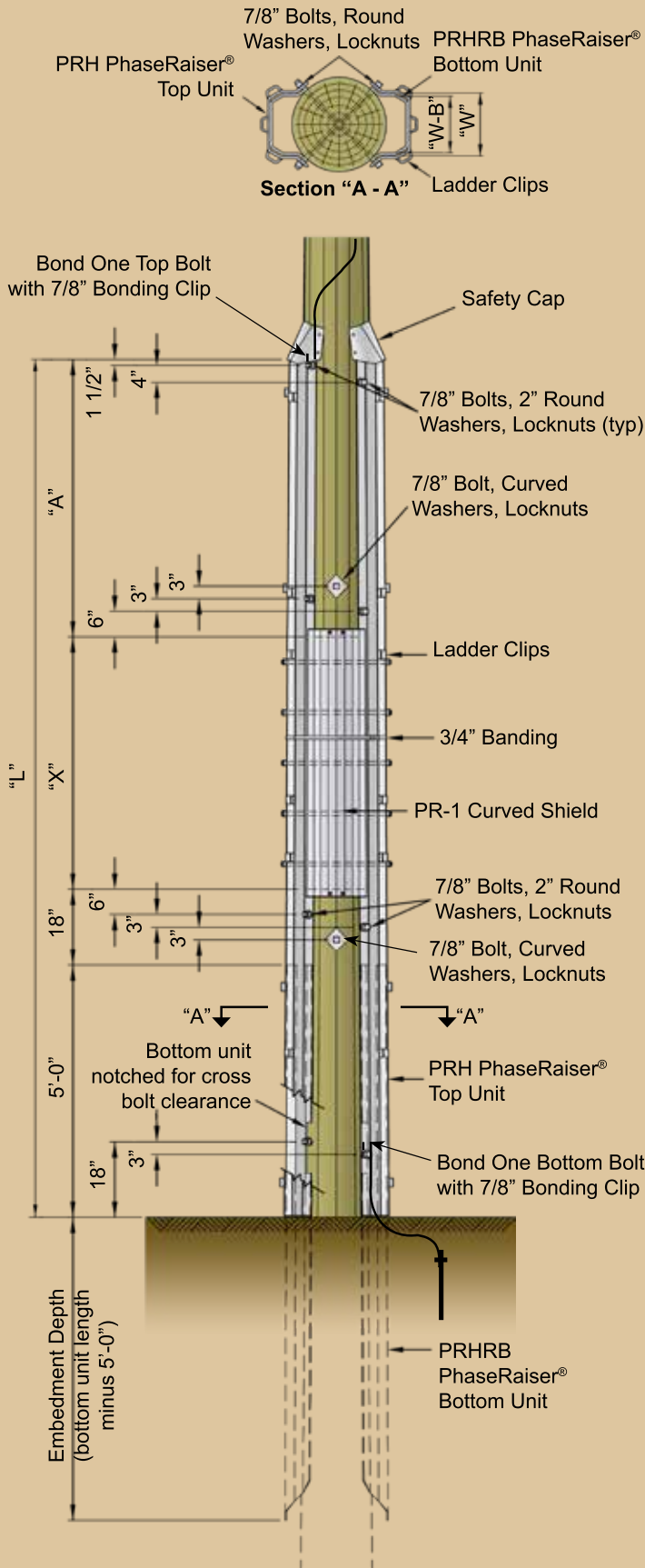
PhaseRaiser unit size from table above.

All PhaseRaiser® steel Units include mounting hardware, caps, and side shields.



345kV H-frame structure raised 15 feet (Iowa)

Standard Assembly for "PRHR"



Type "PRHR" - Raise & Reinforce

Used when Groundline Decay Is, or Could be an Issue & All Single Pole Applications

"X" = Lift Height

Standard Raises are
5', 10', 15' or 20'

For lifts 0 to 15 feet:
"L" = "X" + 12'-0"
"A" = 5'-6"

For lifts 16 to 20 feet
(H-Frames Only)
"L" = "X" + 13'-0"
"A" = 6'-6"
(For lifts 16' - 20' add additional X-brace)

Note: Material to be galvanized. For weathering steel add "W", for painted steel add "P".



115kV Single Pole Structure
Raised (& Reinforced)
10 feet - Alberta

ORDERING INFORMATION

Top Unit Minimum Size

Existing Pole Length	Existing Pole Class				
	H2	H1	1	2	3
50'-0"	PRH9	PRH9	PRH7	PRH7	PRH7
55'-0"	PRH10	PRH9	PRH8	PRH7	PRH7
60'-0"	PRH11	PRH10	PRH9	PRH7	PRH7
65'-0"	PRH11	PRH10	PRH9	PRH8	PRH7
70'-0"	PRH12	PRH11	PRH10	PRH8	PRH7
75'-0"	PRH13	PRH12	PRH10	PRH9	PRH8
80'-0"	PRH13	PRH12	PRH11	PRH9	PRH8
85'-0"	PRH14	PRH13	PRH11	PRH10	PRH8
90'-0"	PRH14	PRH13	PRH12	PRH10	PRH9
95'-0"	PRH15-80	PRH14	PRH12	PRH10	-
100'-0"	PRH15-80	PRH14	PRH13	PRH11	-
105'-0"	PRH15-80	PRH14	PRH13	PRH11	-
110'-0"	PRH15-80	PRH15-80	PRH13	PRH12	-

The PRHR system is required for all single pole applications. The system is also used for multi-pole structures where groundline decay is, or could be, an issue.

Bottom Unit Minimum Size (Embedment depth = "L" minus 5'-0")

Existing Pole Length	Existing Pole Class				
	H2	H1	1	2	3
50'-0"	PRHRB58-11	PRHRB58-11	PRHRB5A6-10	PRHRB5A6-10	PRHRB5A6-10
55'-0"	PRHRB59-11	PRHRB58-11	PRHRB5A7-10	PRHRB5A6-10	PRHRB5A6-10
60'-0"	PRHRB510-11	PRHRB59-11	PRHRB58-11	PRHRB5A6-10	PRHRB5A6-10
65'-0"	PRHRB510-11	PRHRB59-11	PRHRB58-11	PRHRB5A7-10	PRHRB5A6-10
70'-0"	PRHRB511-11	PRHRB510-11	PRHRB59-11	PRHRB5A7-10	PRHRB5A6-10
75'-0"	PRHRB512-11	PRHRB511-11	PRHRB59-11	PRHRB58-11	PRHRB5A7-10
80'-0"	PRHRB512-11	PRHRB511-11	PRHRB510-11	PRHRB58-11	PRHRB5A7-10
85'-0"	PRHRB513-11	PRHRB512-11	PRHRB510-11	PRHRB59-11	PRHRB5A7-10
90'-0"	PRHRB513-11	PRHRB512-11	PRHRB511-11	PRHRB59-11	PRHRB58-10
95'-0"	PRHRB614-12	PRHRB513-11	PRHRB511-11	PRHRB59-11	-
100'-0"	PRHRB614-12	PRHRB513-11	PRHRB512-11	PRHRB510-11	-
105'-0"	PRHRB614-12	PRHRB513-11	PRHRB512-11	PRHRB510-11	-
110'-0"	PRHRB614-12	PRHRB614-12	PRHRB512-11	PRHRB511-11	-

Ordering Example:

Need - Raise Structure 10'-0"
(X=10'-0")

Existing Pole - 75'-0" Class 1

Order - **PRHR 10 - 2 2 L**
 PhaseRaiser top unit size from table above. "W" Width of top unit steel "L" Length of top steel ("X" + 12'-0")

(Consists of two PRH10-22L Top Units and two PRHRB59-11 Bottom Units)
 "W-B" Width of bottom unit steel

Note: Material to be galvanized. For weathering steel add "W", for painted steel add "P".

Example:
 PRH9 - 2 2 L W
 PRH9 - 2 2 L P

All PhaseRaiser® steel Units include mounting hardware, caps, and side shields.

Structure Information Worksheet

Use this form to provide LWS engineers information regarding your structure and unique lift requirements. LWS can provide a complete computer analysis on your structure(s) and will recommend & supply complete material kits that will: raise, raise and reinforce the ground line, or raise, reinforce and reclassify the poles for each structure. LWS designers may recommend additional X-braces or foundation systems with the material kits.

Complete the following form and send it to LWS at: engineering@lwsinc.com - **OR** fill out **ONLINE** at www.lwsinc.com
- OR submit simple spreadsheet containing quantity and size required from charts on pages 10 & 11

Customer Information

Customer Name: _____ Phone: _____
 Contact Name: _____ Fax: _____
 Project Name: _____ Email: _____
 Project Address: _____ Constr Start Date: _____
 City / State: _____ Delivery Location: City / State / Zip _____

Structure Type

No. of Vee Braces 0 2 4

Send detailed drawing if available

Single H-Frame

Pole Information

Pole Height(s): _____
 Pole Class(es): _____
 Species: Douglas-fir Southern Pine
 Cedar
 Pole Condition at Groundline: _____
 Inspection Report Available? Yes No

Structure Information

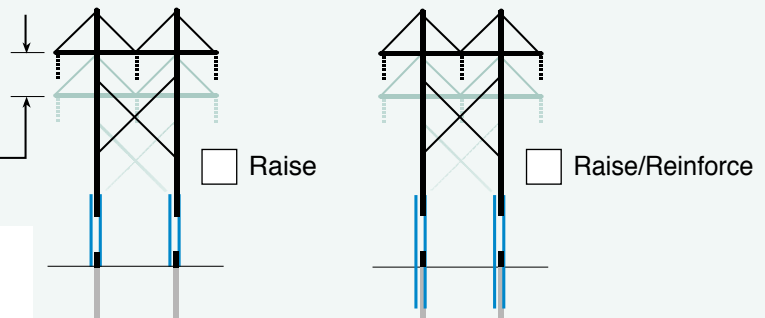
Line Voltage: 345kV 230kV 161kV 138kV
 115kV 69kV Other _____
 Conductor Size: _____
 Shield Wire Size: _____ Span Length: _____ Date Line Built: _____

Lift and Reinforcement Needed

NOTE: Illustrations show PhaseRaisers rotated 90° on poles for clarity.

Desired Lift (5 to 20ft)

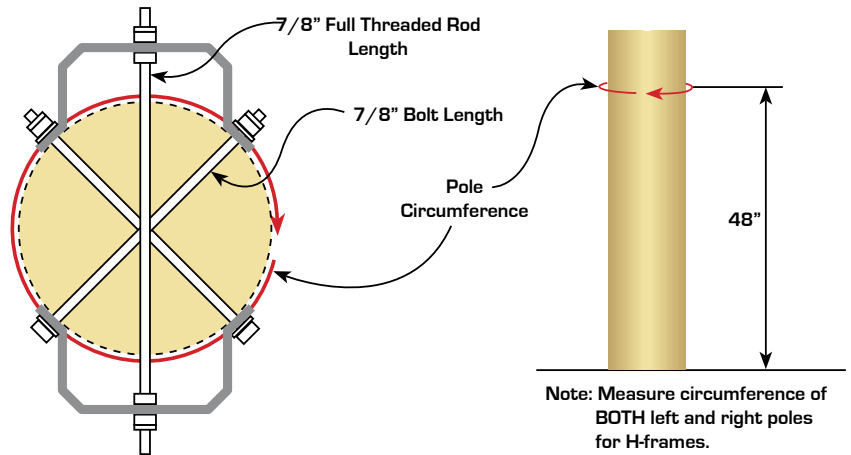
Additional Comments (I.E. - cable TV, Telephone etc.)



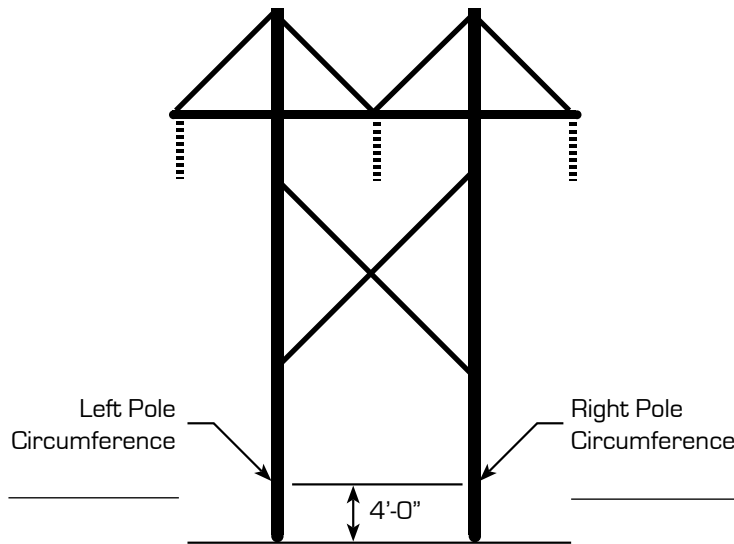
Important PhaseRaiser® Field Information

The owner should provide the pole circumference measurement taken at 48" above ground to insure that proper bolt and threaded rod lengths are supplied by LWS. This information will insure that bolt and threaded rod lengths are calculated accurately.

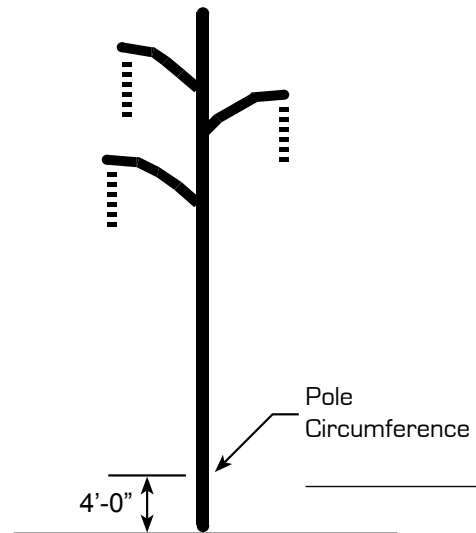
LWS reserves the right to refuse any returned material if pole measurements are not provided as specified above. When measurements are not provided, LWS will reference ANSI O5.1-2008 Pole Dimensions to determine bolt and rod lengths. Based on these estimated dimensions, the customer will be responsible for any expedited material and delivery costs of replacement bolts and rods.



H-Frame Structures



Single Pole Structures



Use the PhaseRaiser® Wizard with PLS-CADD™ to Simulate Raising Conductor Clearances

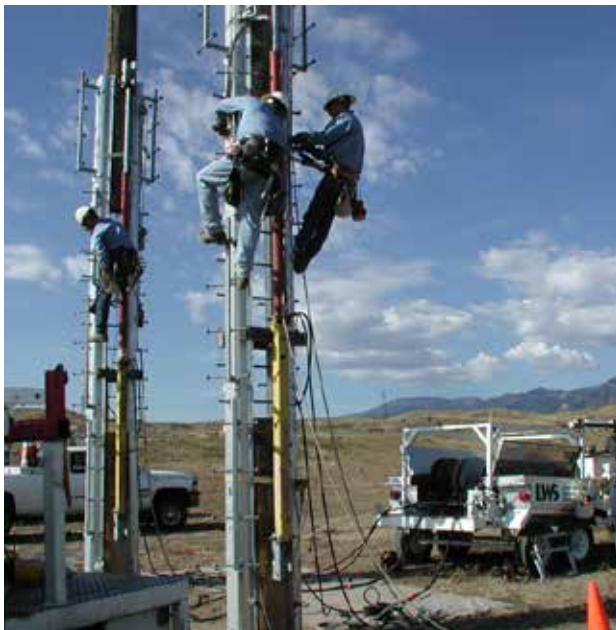
The PLS-CADD PhaseRaiser Wizard allows users to easily and accurately model the effects of a PhaseRaiser installation on each specific structure as well as the adjacent structures.



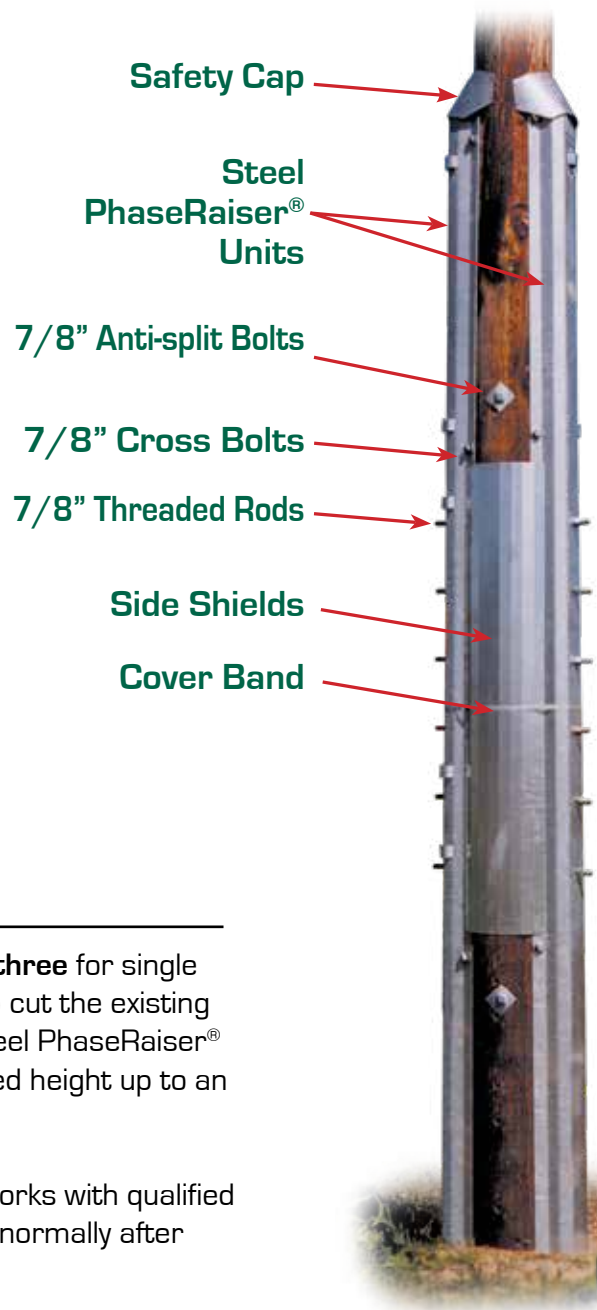
Materials, Equipment & Manpower Required for Typical Installations

PhaseRaiser® units are made of high strength galvanized steel. All bolts conform to ANSI C135.1

The PhaseRaiser® units are also available in painted and weathering steel.



Materials



Personnel

The PhaseRaiser® system enables a crew as small as **three** for single pole or a crew of **five (or six)** for H-frame structures to cut the existing poles, install custom designed galvanized or painted steel PhaseRaiser® units, then raise and secure the structure to the desired height up to an additional twenty feet.

LWS Field Training - A skilled field trainer from LWS works with qualified lineworkers until they develop a comfortable skill level - normally after raising two to three structures.

Equipment



The PhaseRaiser® system requires specialized training, tools and equipment for installation. This equipment is available for purchase or rent and includes on-site training by LWS field personnel as well as the following specialized tools and equipment:

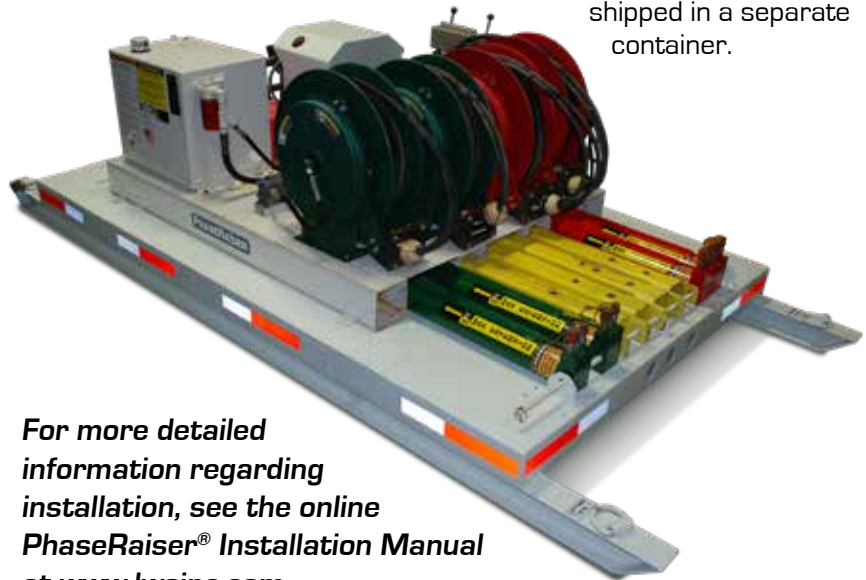
- **Custom Equipment Trailer w/ Tool Boxes**
 - Hydraulic Lifting Unit
 - Hydraulic Hoses
 - 4" x 8' Hydraulic Cylinders
 - 4" x 14' Hydraulic Cylinders
- **Cylinder Extensions**
- **Galvanized Lifting Vangs**
- **Cylinder Pins** • **Nylon Ratchet Straps**
- **Banding Dispenser** • **Banding Shear**
- **Drilling Alignment Tools**
- **4' Working Ladders**

In addition to the equipment trailer, a line or boom truck, chain saw and air compressor are also needed.



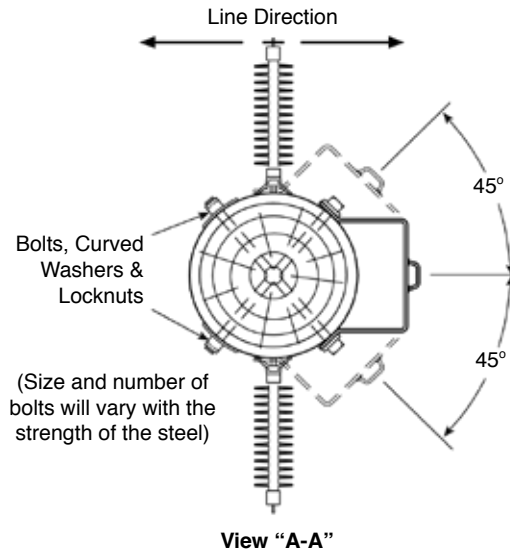
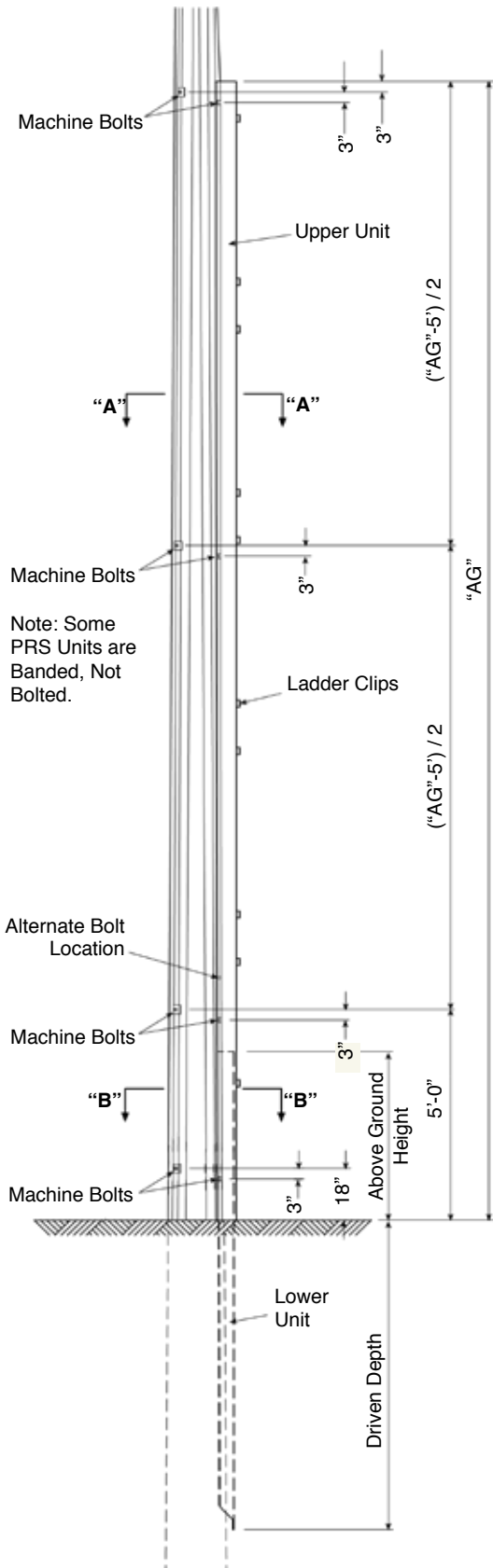
Skid Mounted Hydraulic System

For use in remote access areas or environmentally sensitive locations where conventional equipment cannot be used. Additional tools are shipped in a separate container.

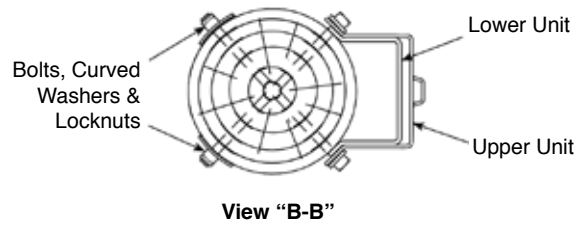


For more detailed information regarding installation, see the online PhaseRaiser® Installation Manual at www.lwsinc.com.

Components of the PRS System



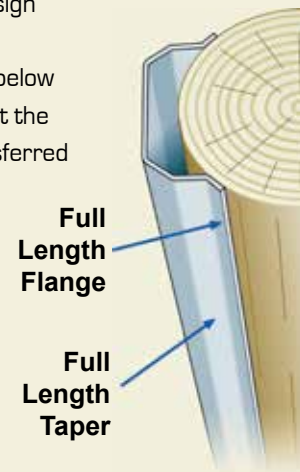
The patented design of the PRS steel unit gives it significant transverse strength, allowing it to be installed at 45° in either direction around the pole to accommodate risers and other existing attachments.



PRS Unique Patented Features

The PRS system utilizes the patented features of the PoleEnforcer® groundline reinforcement system. As the lower steel units are driven into the ground, the full length taper design forces the full length flanges to maintain contact with the pole below the groundline. This insures that the increased load is properly transferred to the pole butt and soil.

PRS upper units incorporate a full length flange. Depending on the design, the upper units can either be tapered or straight.

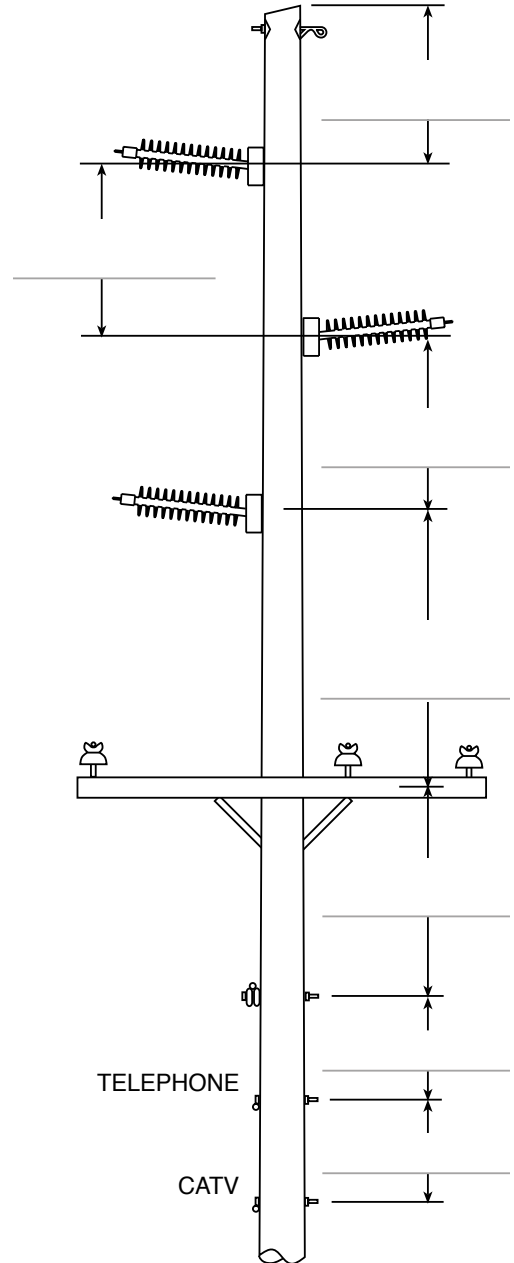


PATENT NO. 5,383,749

PRS Engineering Worksheet

The LWS engineering staff will assist you in determining which standard PRS configuration will best suit your needs. Complete structural engineering analysis including foundation design is provided at no extra cost. Just fill in the requested information on this page along with a sketch of your current configuration and send to engineering@lwsinc.com. OR you may fill out this form online by visiting www.lwsinc.com.

Please attach your standard drawing(s) which include the required information as shown below:



Customer Name _____

Contact Name _____

Project Name _____

Project Address _____

Phone _____ Fax _____

Email _____

Delivery Address _____

Construction Type _____

Line Voltage(s) _____

Number of Conductors _____

Conductor Size _____

Underbuild Conductor Size _____

Underbuild Number of Wires _____

Number of Neutral/Shield Wires _____

Cable TV ___ Diameter _____ No. of Wires _____

Telephone ___ Diameter _____ No. of Wires _____

Neutral/Shield Wire Size _____

Spans (feet) _____ to _____

Loading Conditions _____

Example - NESC Heavy Loading, Grade B Construction, Extreme Wind

Pole Height, Range _____ to _____

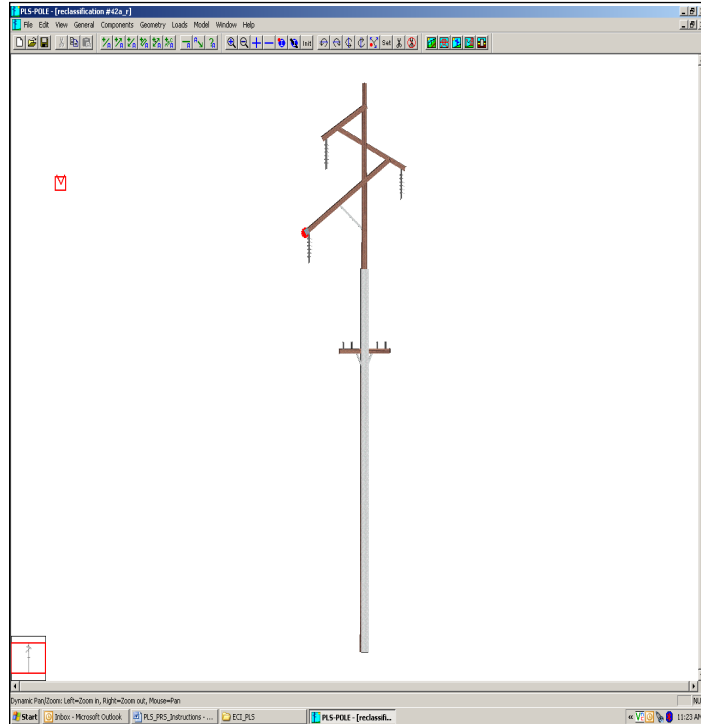
Pole Class _____ Soil Type _____

Age of Line _____ Leaners ___Yes ___No

Additional Comments: _____

Using PLS-Pole to Size PRS Units

PRS-Pole software may be used to analyze PRS steel reinforcement units on existing wood poles. LWS engineers will verify the analysis prior to specifying PRS units. The following steps illustrate the process.



Joint's Geometry

Joint's need only be specified for complex structures such as A Frames. Do NOT input joints here for single poles or for the joints that lie along an element. Instead, these joints can be specified as "relative joints" in the pole or arm tables below.

	Joint Label	Symmetry Code	X Coord. (ft)	Y Coord. (ft)	Z Coord. (ft)	X Disp. Rest.	Y Disp. Rest.	Z Disp. Rest.	X Rot. Rest.	Y Rot. Rest.	Z Rot. Rest.
1	0rad	None	0	0	0	Fixed	Fixed	Fixed	Fixed	Fixed	Fixed
2											
3											
4											
5											
6											
7											
8											
9											
10											
11											
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24											
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28											
29											
30											
31											
32											
33											

OK Cancel

STEP 1

Add a global joint at the groundline as shown at left.

Menu Tabs: Geometry - Joints

STEP 2

Add a label "prst" at the estimated height of the top of the reinforcing steel as shown at right.

Menu Tabs: Geometry - Wood Poles - Attach Labels

Note: poles may be located in one of two ways:
 1) By tip and base point. This is only appropriate for A-Frame, Y-Frame and other complicated structures.
 2) By X, Y and Z of base and X, Y inclination angles. This should be used for single poles and simple frames. For example, to locate a single pole at 0.0,0 leave the tip, base, X, Y, Z, and X, Y angle columns all blank.

Pole Label	Tip Joint	Base Joint	X of Base (ft)	Y of Base (ft)	Z of Base (ft)	Inclin. About X (deg)	Inclin. About Y (deg)	Wood Pole Property Set	Material Property Set	Attach. Labels	Base Connect	Embed % Override	Embed C. Override (ft)	Top Cut Length (ft)	Bot. Cut Length (ft)
1	wp		0	0	0	0	0	WR-4-60	Western Red Cedar	Edit (8 pos)	Fixed	0.000	0	0.000	0.000

Joint Label	Distance From Origin/Top Joint (ft)	Global Z of Attach (ft)
1 wp:a	0.71	0
2 wp:b	2.2	0
3 wp:c	5.6	0
4 wp:d	9	0
5 wp:h	13.5	0
6 wp:d1st1	24.5	0
7 wp:d1st2	26.5	0
8 wp:prst	0	35

X-Arm Properties (From file "\\wsd\01\users9\myoung\desktop\eci_pls\rea.ssm")

	Cross Arm Property Label	Stock Number	Cross Section Area (in ²)	X Inertia (in ⁴)	Z Inertia (in ⁴)	Weight (lbs)	Depth (in)	Width (in)	Length (ft)	Modulus of Elasticity (ksi)	Drag Coef.	Geometry	Strength Check Type	Use Steel S.F.	Vertical Capacity (lbs)	Trans. Capacity (lbs)	L _c Cap (ft)
1	PRST0-40	4.899	58.88	58.88	67	20	10	40	29000	1.6		Nominal	Yes	293933	123885	12388	
2	PRST0-35	4.899	58.88	58.88	584	20	10	35	29000	1.6		Nominal	Yes	293933	123885	12388	
3	PRST0-30	4.899	58.88	58.88	501	20	10	30	29000	1.6		Nominal	Yes	293933	123885	12388	
4	PRST0-25	4.899	58.88	58.88	417	20	10	25	29000	1.6		Nominal	Yes	293933	123885	12388	
5	PRST0-20	4.899	58.88	58.88	334	20	10	20	29000	1.6		Nominal	Yes	293933	123885	12388	
6															NA	NA	
7	Type 01	12.91	26.4216	13.1751	22.35	4.625	3.625	4	1920	1	Edit (7)	Calculated	No	NA	NA		
8	Type 01 (Double)	25.81	52.8433	538.651	44.71	4.625	7.25	4	1920	1	Edit (7)	Calculated	No	NA	NA		
9	Type 02	12.91	26.4216	13.1751	31.2	4.625	3.625	5.5833	1920	1	Edit (9)	Calculated	No	NA	NA		
10	Type 02 (Double)	25.81	52.8433	538.651	62.41	4.625	7.25	5.5833	1920	1	Edit (9)	Calculated	No	NA	NA		
11	Type 03	12.91	26.4216	13.1751	44.71	4.625	3.625	8	1920	1	Edit (11)	Calculated	No	NA	NA		
12	Type 03 (Double)	25.81	52.8433	538.651	89.42	4.625	7.25	8	1920	1	Edit (11)	Calculated	No	NA	NA		
13	Type 04	12.91	26.4216	13.1751	44.71	4.625	3.625	8	1920	1	Edit (11)	Calculated	No	NA	NA		
14	Type 04 (Double)	25.81	52.8433	538.651	89.42	4.625	7.25	8	1920	1	Edit (11)	Calculated	No	NA	NA		
15	Type 05	12.91	26.4216	13.1751	55.89	4.625	3.625	10	1920	1	Edit (11)	Calculated	No	NA	NA		
16	Type 05 (Double)	25.81	52.8433	538.651	111.77	4.625	7.25	10	1920	1	Edit (11)	Calculated	No	NA	NA		
17	4"x(1)3.625 x 9.375	29.53	230.684	30.1464	45.31	9.374	3.625	4	1920	1		Calculated	No	NA	NA		
18	4"x(2)3.625 x 9.375	59.0599	461.368	1232.507	90.63	9.374	7.25	4	1920	1		Calculated	No	NA	NA		
19	4"x(1)3.625 x 5.625	16.41	48.3695	16.748	27.19	5.625	3.625	4	1920	1		Calculated	No	NA	NA		
20	4"x(2)3.625 x 5.625	32.81	96.7391	684.726	54.38	5.625	7.25	4	1920	1		Calculated	No	NA	NA		
21	4"x(1)4.125 x 5.125	16.75	41.4878	22.3332	28.19	5.125	4.125	4	1920	1		Calculated	No	NA	NA		
22	4"x(2)4.125 x 5.125	33.5	82.9756	786.256	56.38	5.125	8.249	4	1920	1		Calculated	No	NA	NA		
23	4"x(1)4.625 x 5.625	21.09	62.1894	35.5956	34.69	5.625	4.625	4	1920	1		Calculated	No	NA	NA		
24	4"x(2)4.625 x 5.625	42.1899	124.379	1106.98	69.38	5.625	9.249	4	1920	1		Calculated	No	NA	NA		
25	4"x(1)5.375 x 7.625	35.11	184.335	80.6417	54.65	7.624	5.375	4	1920	1		Calculated	No	NA	NA		
26	4"x(2)5.375 x 7.625	70.22	368.67	1612.83	109.3	7.624	10.75	4	1920	1		Calculated	No	NA	NA		
27	4"x(1)5.625 x 7.375	35.41	174.415	89.2632	55.31	7.375	5.625	4	1920	1		Calculated	No	NA	NA		
28	5"x(1)3.625 x 9.375	29.53	230.684	30.1464	45.64	9.374	3.625	5	1920	1		Calculated	No	NA	NA		

STEP 3

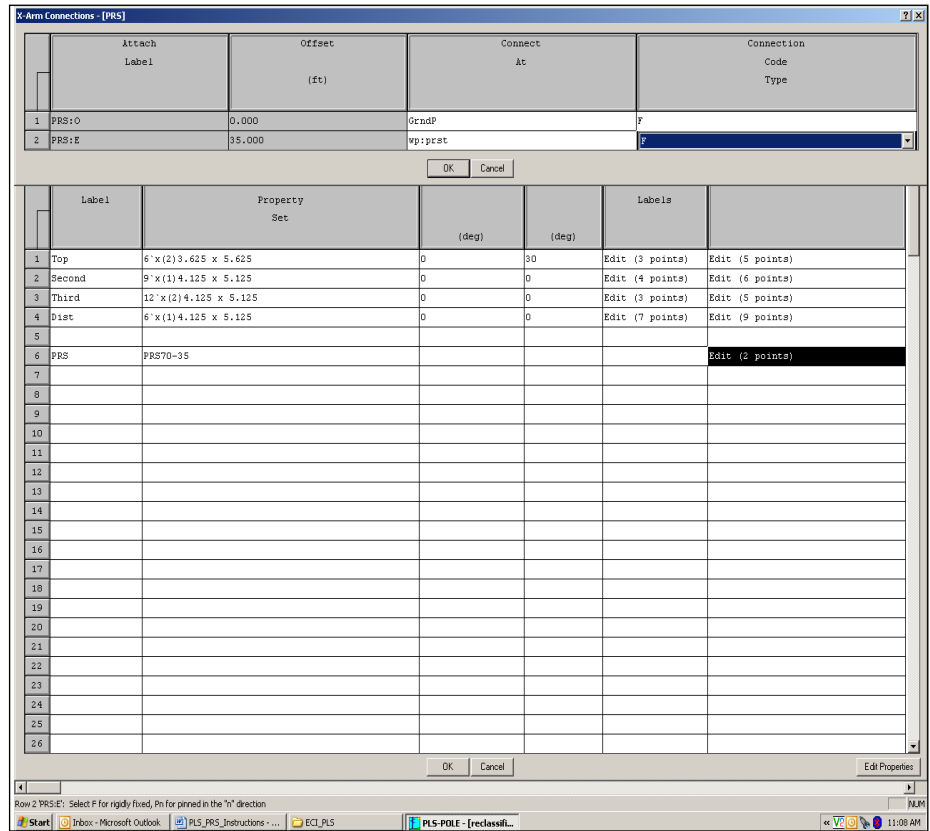
Add PRS "crossarm" properties to the Component table (properties provided by LWS).

Menu Tabs: Components - Crossarms

STEP 4

Attach the PRS “crossarm” to the pole by adding a crossarm entry. Select the PRS unit that matches the estimated reinforcement height. One end of the PRS unit connects at the “Grnd” global joint. The other end of the PRS unit connects at the “prst” label on the pole. Both locations are “fixed”.

Menu Tabs: *Geometry - Crossarms*



STEP 5

Adjust the PRS steel length and steel as necessary.

To adjust the length:

- A) Change the “Global Z” dimension in the Wood Pole Labels section.
- B) Select the PRS unit that matches the new “Global Z” dimension.

Visit www.lwsinc.com for more information on LWS steel products and to view installation videos.

LWS

LAMINATED WOOD SYSTEMS

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 Seward, Nebraska 68434
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