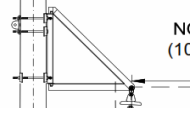


Project Name: NDTA Direct Embedded Steel Pole

				Questions										
	Status (Open/Closed)	Receive Date	Close Date	Question or Clarification	RFP Section Reference	Owners Response								
1	Closed	8/13/2025	8/15/2025	Manufacturer shall require loads for H-frames (crossarms)	<table><tr><td>30</td><td>1</td><td>EA</td><td>CROSSARM, ENGINEERED, DESIGNED BY POLE SUPPLIER FOR SPECIFIED LOADS</td></tr></table> <table><tr><td>30A</td><td>1</td><td>EA</td><td>115KV, 28' LONG CROSSARM, ENGINEERED, DESIGNED BY POLE SUPPLIER FOR SPECIFIED LOADS</td></tr></table>	30	1	EA	CROSSARM, ENGINEERED, DESIGNED BY POLE SUPPLIER FOR SPECIFIED LOADS	30A	1	EA	115KV, 28' LONG CROSSARM, ENGINEERED, DESIGNED BY POLE SUPPLIER FOR SPECIFIED LOADS	H-frame loading information attached.
30	1	EA	CROSSARM, ENGINEERED, DESIGNED BY POLE SUPPLIER FOR SPECIFIED LOADS											
30A	1	EA	115KV, 28' LONG CROSSARM, ENGINEERED, DESIGNED BY POLE SUPPLIER FOR SPECIFIED LOADS											
2	Closed	8/13/2025	8/15/2025	Clarification required, regarding attachment points vs vang attached, all attachment points currently displayed as bolt on?	-Structures may be round or 12-sided -Direct Embedded Steel Poles -All attachment points provided utilize welded through vangs -*Freight and Tax Included	Both welded through vangs preferred, bolted attachment points are acceptable.								
3	Closed	8/13/2025	8/15/2025	Will Manufacturer be required to provide the swign brackets?		No, Ottertail Power Company will provide the swing angle brackets. Swing angle bracket vangs to match OTP swing angle specs (attached, 2848-F)								
4	Closed	8/13/2025	8/15/2025	At slip joint construction, slip joint lock bars shall be provided. Will the shipment of lock bars be required in a weather resistant container?	E. Bolts, nuts, and other small hardware shall be kitted in weather resistant packaging or shipped in buckets or barrels to prevent loss or damage. Weather resistant cardboard boxes are not acceptable. Bolts, nuts, and miscellaneous hardware shall be identified by packing list to enable efficient match-up with respective structure shaft.	The slip joints shall be secured with through-bolts, and a conductive grounding strap to be attached from top to bottom section at the joint location. No lock bars.								
5	Closed	8/13/2025	8/15/2025	Will it be required that the structural hardware be provided by structure, or allowed at bulk shipment?		It is required that structural hardware be provided by individual structure. No bulk hardware packaging.								
6	Closed	8/13/2025	8/15/2025	will it be required the cross arm support straps be in weather resistant packaging?		Crossarm support straps can be packaged in structure hardware buckets if space allows. Otherwise they may be attached to the crossarm. No weather resistant packaging required for the support straps.								
7	Closed	8/13/2025	8/15/2025	Would it be preferred framing holes are sleeved?	F. Design structures to eliminate water and refuse traps. 1. Painted and weathering steel tubular sections shall be sealed from moisture entering inside of pole.	Yes, framing sleeves should be used to prevent deformation of the structural pieces at hardware locations.								

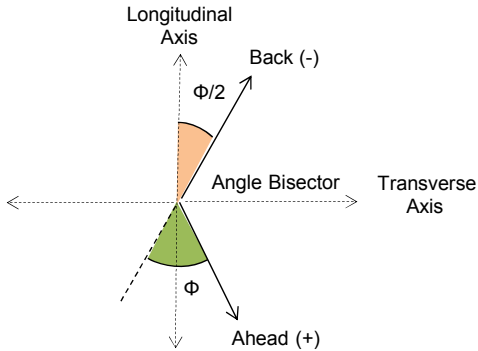
Structure Name: SHT-115-14

CONDUCTOR INPUTS

Conductor Name:	954 kcmil 54/7 "Cardinal" ACSR
Structure Type:	Suspension
Conductor Unit Weight (lb/ft)	1.227
Conductor Diameter (in):	1.196
Conductor Qty Per Phase:	1
Min Line Angle (deg):	0
Max Line Angle (deg):	2
Wind Span (ft)	700
Weight Span (ft)	1000
Ruling Span (ft)	700

SHIELDWIRE INPUTS

Shieldwire Name:	3/8" 7-Strand EHS Steel
Structure Type:	Suspension
Shieldwire Unit Weight (lb/ft)	0.273
Shieldwire Diameter (in):	0.360
Wire Qty Per Attachment:	1
Min Line Angle (deg):	0
Max Line Angle (deg):	2
Wind Span (ft)	700
Weight Span (ft)	1000
Ruling Span (ft)	700



Design By: Nelson Vang

Checked By: Chad Pederson

Client: Otter Tail Power

Project Name: 115 kV Replacement Structure

Project Number: 77910

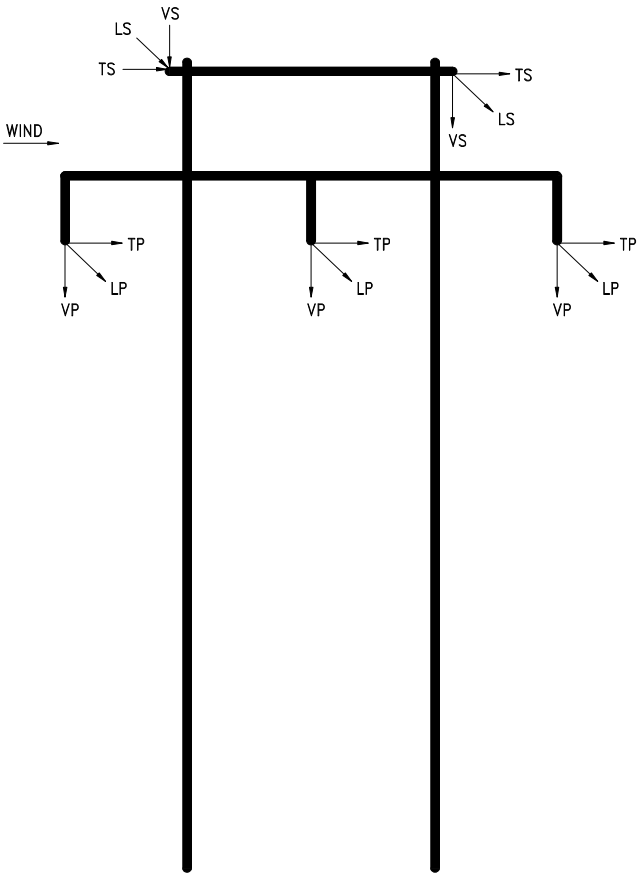
Date: 1/2/2015 Rev 1

LOADINGS

Load Cases	Wind (mph)	Wind (psf)	Structure Wind (mph)	Structure Wind (psf)	Structure Wind Factor	θ	Ice (in)	Temp (°F)	F/I	Vertical Load Factor	Wind Load Factor	Wire Load Factor	Conductor Tension Ahead (lbs)	Conductor Tension Back (lbs)	Shieldwire Tension Ahead (lbs)	Shieldwire Tension Back (lbs)	Insulator Weight (lbs)	Insulator Iced Weight Factor	Lineman Weight (lbs)	Misc Conductor Weight (lbs)	Misc Shieldwire Weight (lbs)	Density of Ice (lbs/ft ³)
NESC 250B, Heavy	39.5	4.0	39.5	4.0	1.0	90	0.50	0	I	1.50	2.50	1.65	13200	13200	6000	6000	100	1.0	400	0	10	57
NESC 250C, Extreme Wind	90.0	20.7	90.0	20.7	1.0	90	0.00	60	I	1.10	1.10	1.00	10000	10000	4000	4000	100	1.0	400	0	10	57
NESC 250D, Extreme Ice w/ Concurrent Wind	60.0	9.2	60.0	9.2	1.0	90	1.00	15	I	1.10	1.10	1.00	13000	13000	5800	5800	100	1.0	400	0	10	57
Deflection	28.0	2.0	28.0	2.0	1.0	90	0.00	60	F	1.00	1.00	1.00	8000	8000	3500	3500	100	1.0	400	0	10	57

SUSPENSION / POST LOADS

Load Cases	Wind (mph)	Wind (psf)	Structure Wind (mph)	Structure Wind (psf)	θ	Ice (in)	Temp (°F)	F/I	VS (k)	TS (k)	LS (k)	VP (k)	TP (k)	LP (k)	W (psf)	K
NESC 250B, Heavy	39.5	4.0	39.5	4.0	90	0.50	0	I	1.83	1.14	0.00	4.17	2.04	0.00	10.0	1.50
NESC 250C, Extreme Wind	90.0	20.7	90.0	20.7	90	0.00	60	I	0.75	0.62	0.00	1.90	1.94	0.00	22.8	1.10
NESC 250D, Extreme Ice w/ Concurrent Wind	60.0	9.2	60.0	9.2	90	1.00	15	I	2.61	1.60	0.00	4.90	2.34	0.00	10.1	1.10
Deflection	28.0	2.0	28.0	2.0	90	0.00	60	F	0.68	0.16	0.00	1.73	0.42	0.00	2.0	1.00



LOADING TREE



Project: NERC Mitigation (133445)
 Client: Otter Tail Power
 Structure Type: SHT-230 (Replacement Structure)
 Drawing: SHT-230-18
 Notes:

Designer: Danny Frederick
 Date: June 20, 2014
 Checker: Claire Gottliebson
 Date: June 17, 2014

Loadtree Calculations

Loading Conditions

Load Case	Load Description	Temp	Radial Ice	Wire Wind	Wire Condition	Wire OLF's			Snub-Off Condition	Str Shape Factor	Str Wind	Pole OLF's			Str Gust Factor
						Trans.	Long.	Vert.				Trans.	Long.	Vert.	
1	NESC 250B: NESC Heavy	0 °F	0.500"	4.00 psf	Initial	2.50	1.65	1.50	NO	1.00	4.00 psf	2.50	1.65	1.50	1.00
2	NESC 250C: Extreme Wind	60 °F	0.000"	20.74 psf	Initial	1.00	1.00	1.00	NO	1.00	20.74 psf	1.00	1.00	1.00	1.00
3	NESC 250D: Concurrent Ice & Wind	15 °F	1.000"	9.22 psf	Initial	1.00	1.00	1.00	NO	1.00	9.22 psf	1.00	1.00	1.00	1.00
4	Camber	60 °F	0.000"	2.00 psf	Final	1.00	1.00	1.00	NO	1.00	2.00 psf	1.00	1.00	1.00	1.00

Wire Data

Wire Number	Wire Description	Wires Per Phase	Number of Phases	Wire Diameter	Wire Weight	Wire Shape Factor	Min Line Angle	Max Line Angle	Ins. & Hardware Weight	Const. Weight	Snub-Off Angle	Ahead Horizontal Span	Back Horizontal Span	Max Weight Span	Min % Weight Span
1	SW: 3/8" EHS	1	1	0.360"	0.273 #/ft	1.00	0.0°	2.0°	25 #	400 #	0.0°	1,000'	1,000'	1,200'	---
2	OPGW: DNO-3825	1	1	0.465"	0.314 #/ft	1.00	0.0°	2.0°	25 #	400 #	0.0°	1,000'	1,000'	1,200'	---
3	Conductor: 230kV "Cardinal" 954 ACSR	1	3	1.196"	1.229 #/ft	1.00	0.0°	2.0°	200 #	400 #	0.0°	1,000'	1,000'	1,200'	---

Wire Tensions

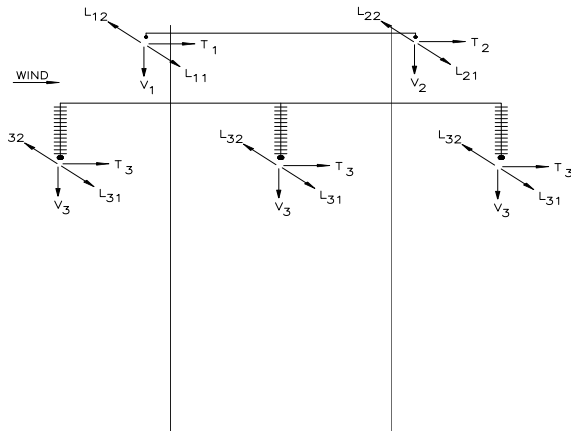
Load Case	Load Description	Wire 1 Ahead Tension	Wire 2 Ahead Tension	Wire 3 Ahead Tension	Wire 4 Ahead Tension	Wire 5 Ahead Tension	Wire 6 Ahead Tension	Wire 7 Ahead Tension	Wire 1 Back Tension	Wire 2 Back Tension	Wire 3 Back Tension	Wire 4 Back Tension	Wire 5 Back Tension	Wire 6 Back Tension	Wire 7 Back Tension
1	NESC 250B: NESC Heavy	8,000 #	7,000 #	12,500 #	N/A	N/A	N/A	N/A	6,000 #	7,000 #	12,500 #	N/A	N/A	N/A	N/A
2	NESC 250C: Extreme Wind	4,500 #	5,700 #	11,600 #	N/A	N/A	N/A	N/A	4,500 #	5,700 #	11,600 #	N/A	N/A	N/A	N/A
3	NESC 250D: Concurrent Ice & Wind	8,800 #	10,100 #	16,800 #	N/A	N/A	N/A	N/A	8,800 #	10,100 #	16,800 #	N/A	N/A	N/A	N/A
4	Camber	3,000 #	3,700 #	7,300 #	N/A	N/A	N/A	N/A	3,000 #	3,700 #	7,300 #	N/A	N/A	N/A	N/A

POWER ENGINEERS, INC.
 6/20/2014

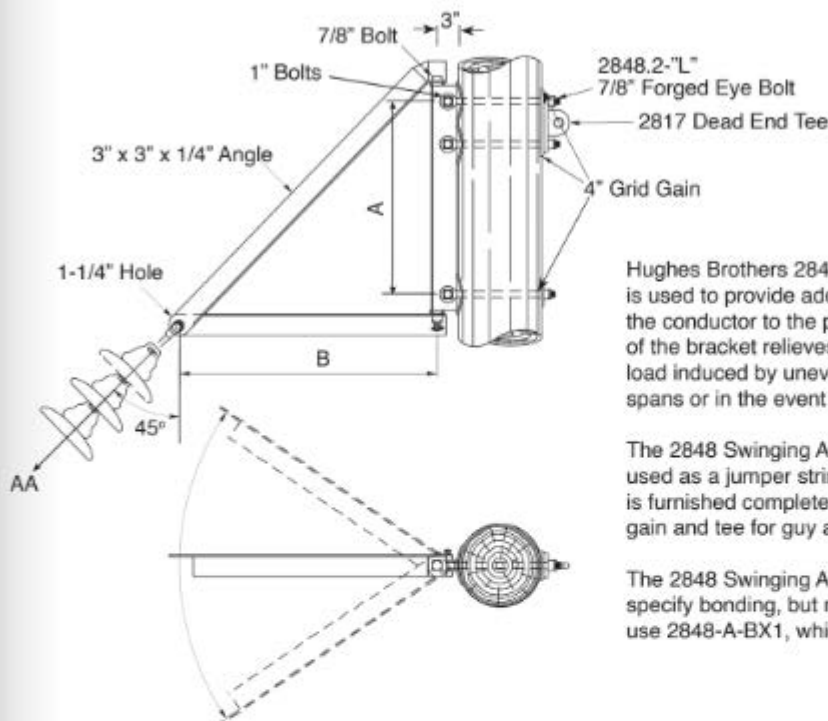
CLIENT: Otter Tail Power
 PROJECT: NERC Mitigation (133445)
 STRUCTURE TYPE: SHT-230 (Replacement Structure)
 STRUCTURE DRAWING: SHT-230-18

WIRE NUMBER	LOAD DESCRIPTION	LOAD CASE											
		1	2	3	4	5	6	7	8	9	10	11	12
---	WIND PRESSURE (psf)	10.00	20.74	9.22	2.00	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
1	TRANSVERSE LOAD - T1, (kips)	1.48	0.78	2.12	0.16	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	VERTICAL LOAD - V1, (kips)	2.09	0.75	2.78	0.75	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	LONGITUDINAL LOAD AHEAD - L11, (kips)	9.90	4.50	8.80	3.00	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	LONGITUDINAL LOAD BACK - L12, (kips)	9.90	4.50	8.80	3.00	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
2	TRANSVERSE LOAD - T2, (kips)	1.62	1.00	2.25	0.21	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	VERTICAL LOAD - V2, (kips)	2.28	0.80	2.99	0.80	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	LONGITUDINAL LOAD AHEAD - L21, (kips)	11.55	5.70	10.10	3.70	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	LONGITUDINAL LOAD BACK - L22, (kips)	11.55	5.70	10.10	3.70	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
3	TRANSVERSE LOAD - T3, (kips)	2.55	2.47	3.03	0.45	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	VERTICAL LOAD - V3, (kips)	5.01	2.07	5.35	2.07	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	LONGITUDINAL LOAD AHEAD - L31, (kips)	20.63	11.60	16.60	7.30	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	LONGITUDINAL LOAD BACK - L32, (kips)	20.63	11.60	16.60	7.30	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

Sketch



2848 Swinging Angle Bracket



Hughes Brothers 2848 Swinging Angle Bracket is used to provide additional clearance from the conductor to the pole. The swinging action of the bracket relieves the pole from the torque load induced by uneven tensions in adjacent spans or in the event of a broken conductor.

The 2848 Swinging Angle Bracket can also be used as a jumper string support. The bracket is furnished complete with mounting bolts, grid gain and tee for guy attachment.

The 2848 Swinging Angle Bracket does not specify bonding, but most all 2848 applications use 2848-A-BX1, which has bonding hardware.

NOTE: Supplied with (1) 16" and (2) 18" eyebolts.

Ordering example for other lengths:

2848 - ★ - 20-22

20" and 22"
2848.2 Eye Bolts

Stock No.	"A"	"B"	Weight Lbs. ea.	Ultimate Load Rating "AA"
2848-A	1'-9"	2'-0"	71	30,000 lbs
2848-B	1'-9"	2'-6"	75	
2848-C	1'-9"	3'-0"	81	
2848-D	2'-0"	2'-6"	77	
2848-E	2'-0"	3'-0"	86	
2848-F	2'-3"	3'-0"	88	
2848-G	2'-3"	3'-6"	94	
2848-H	2'-3"	4'-0"	102	
2848-J	2'-3"	5'-0"	112	
2848-K	2'-6"	3'-6"	69	
2848-L	3'-0"	4'-0"	108	
2848-M	3'-0"	4'-6"	116	