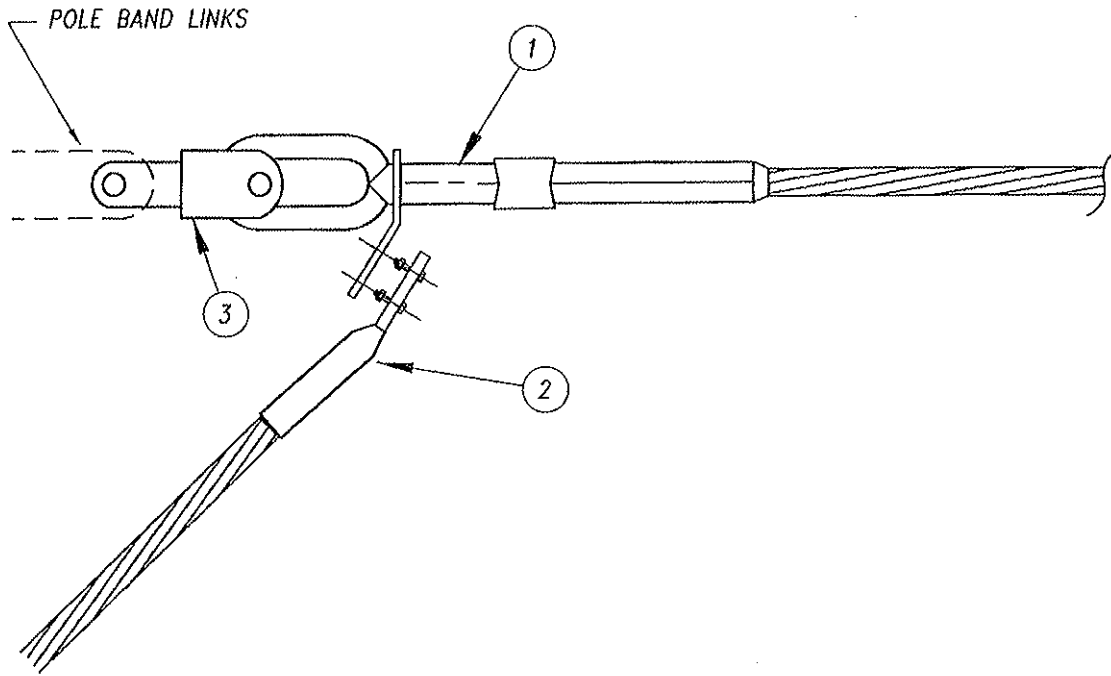


OHSW SUSPENSION

MAX. LINE ANGLE = 30°

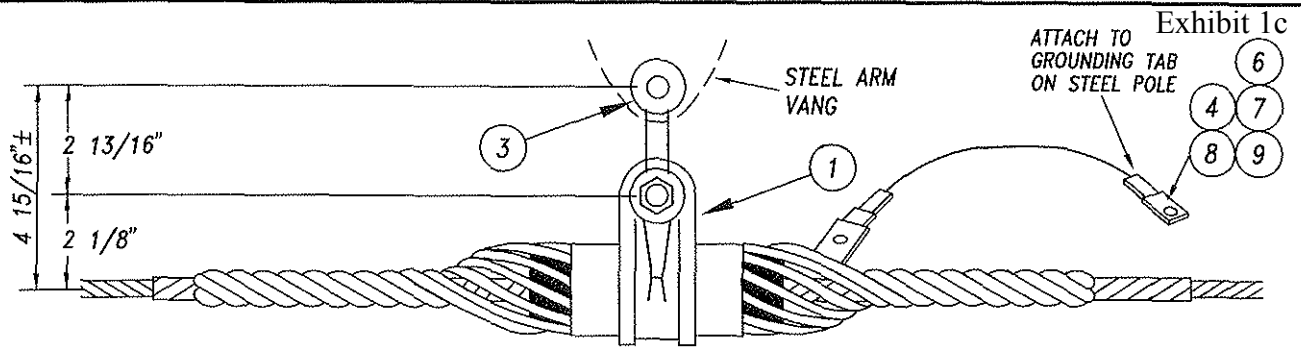
3/8" EHS 7 STRAND GALV.

ITEM NO.	BHP CODE	DESCRIPTION	MANUF.	CAT. NO.	QUANTITY				
					T-4A	T-4B	T-4S		
1	40-7104	AGS SUSPENSION ASSY; 15k	PREFORMED	AGS-7104	1	1	1		
2	48-5207	Y-CLEVIS - EYE; 20k	ANDERSON	YCS-05-90		1			
3	48-5206	Y-CLEVIS - EYE; 20k	ANDERSON	YCS-05			1		
DSGN. DR. CRC APPROVED BY _____ DATE _____					TRANSMISSION STANDARD OHSW SUSPENSION ATTACHMENT BLACK HILLS POWER			REV. DATE 12/13/06 DRAWING NO. T-4ABS	REV. NO. 3 SHEET 1

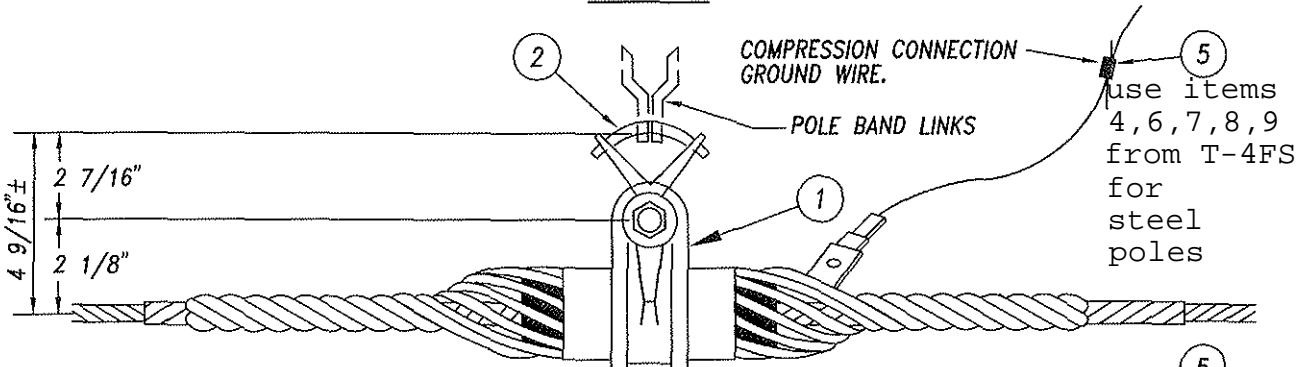


OHSW COMPRESSION DEADEND
3/8" EHS 7 STRAND GALV.

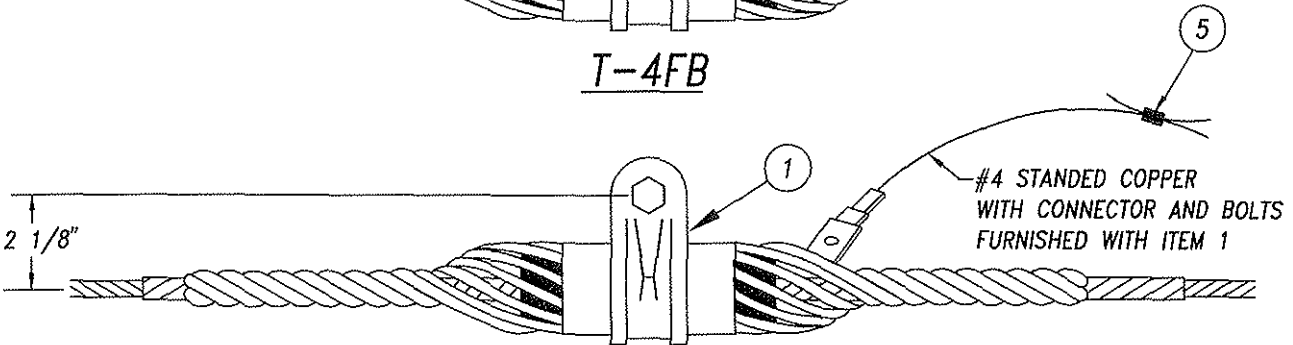
ITEM NO.	BHP CODE	DESCRIPTION	MANUF.	CAT. NO.	QUANTITY	T-4D			
1	42-3800	COMPRESSION DEADEND ASSY. W/PRECOMPR. EYE	ALCOA	V3814.386-T	1				
2	42-3802	COMPRESSION JUMPER TERMINAL 15' w/BOLTS	ALCOA	3914.386	1				
3	48-3669	"Y" CLEVIS - CLEVIS; 30k	ANDERSON	YCC-30	1				
DSGN. DR. CRC APPROVED BY _____ DATE _____		TRANSMISSION STANDARD OHSW COMPRESSION DEADEND BLACK HILLS POWER			REV. DATE 12/13/06 DRAWING NO. T-4DC	REV. NO. 1 SHEET 1			



T-4FS



T-4FB



T-4FA

**OPGW SUSPENSION
.443" FIBEROPTIC CABLE**

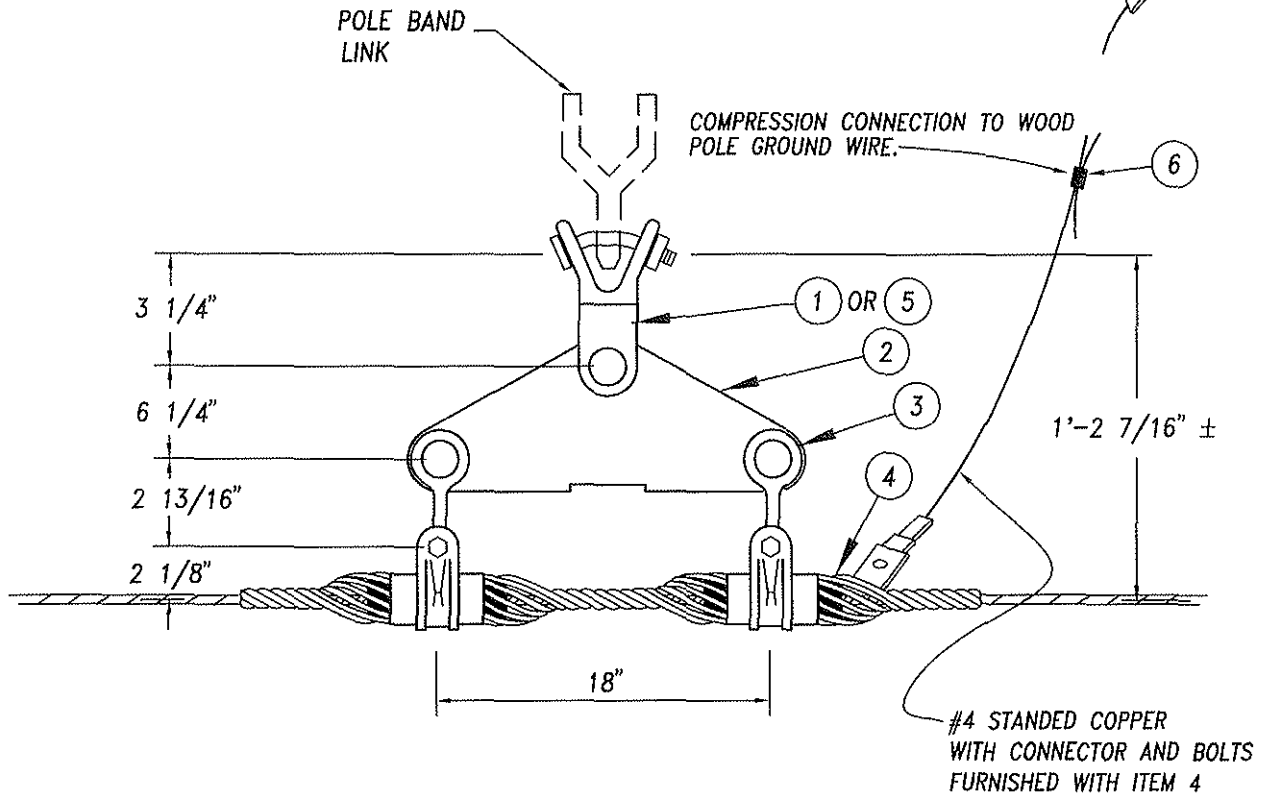
MAX. LINE ANGLE = 30°

BHP CODE	ITEM NO.	DESCRIPTION	MANUF.	CAT. NO.	QUANTITY		
					T-4FA	T-4FB	T-4FS
N.S.	1	FIBERLIGN SUSPENSION ASSY. W/ GROUNDWIRE	PREFORMED	4300104G	1	1	1
48-5207	2	Y-CLEVIS - EYE, 90°; 20k	ANDERSON	YCS-05-90		1	
48-5206	3	Y-CLEVIS - EYE; 20k	ANDERSON	YCS-05			1
N.S.	4	1/0 AWG COPPER COMPRESSION CONNECTOR	ANDERSON	VHCL-1/0-12			1
N.S.	5	COMPRESSION CONNECTOR, #4 TO #4	HOMAC	CC44	1		
20-0012	6	1/2" X 1 1/4" GALV. BOLT					1
20-0013	7	1/2" GALV. NUT					1
22-0712	8	1/2" GALV. WASHER					1
20-0014	9	1/2" GALV. LOCK WASHER					1

DSGN. M.C.	TRANSMISSION STANDARD		REV. DATE	REV. NO.
DR. KM	FIBEROPTIC SUSPENSION		12/17/67	3
APPROVED BY	DATE	BLACK HILLS POWER	DRAWING NO.	SHEET
			T-4FABS	1

FOR USE ON STEEL POLES
TO ATTACH TO GROUNDING PAD

7 8 9 10 11 Exhibit 1c



FIBEROPTIC DOUBLE SUSPENSION

.443" FIBEROPTIC CABLE

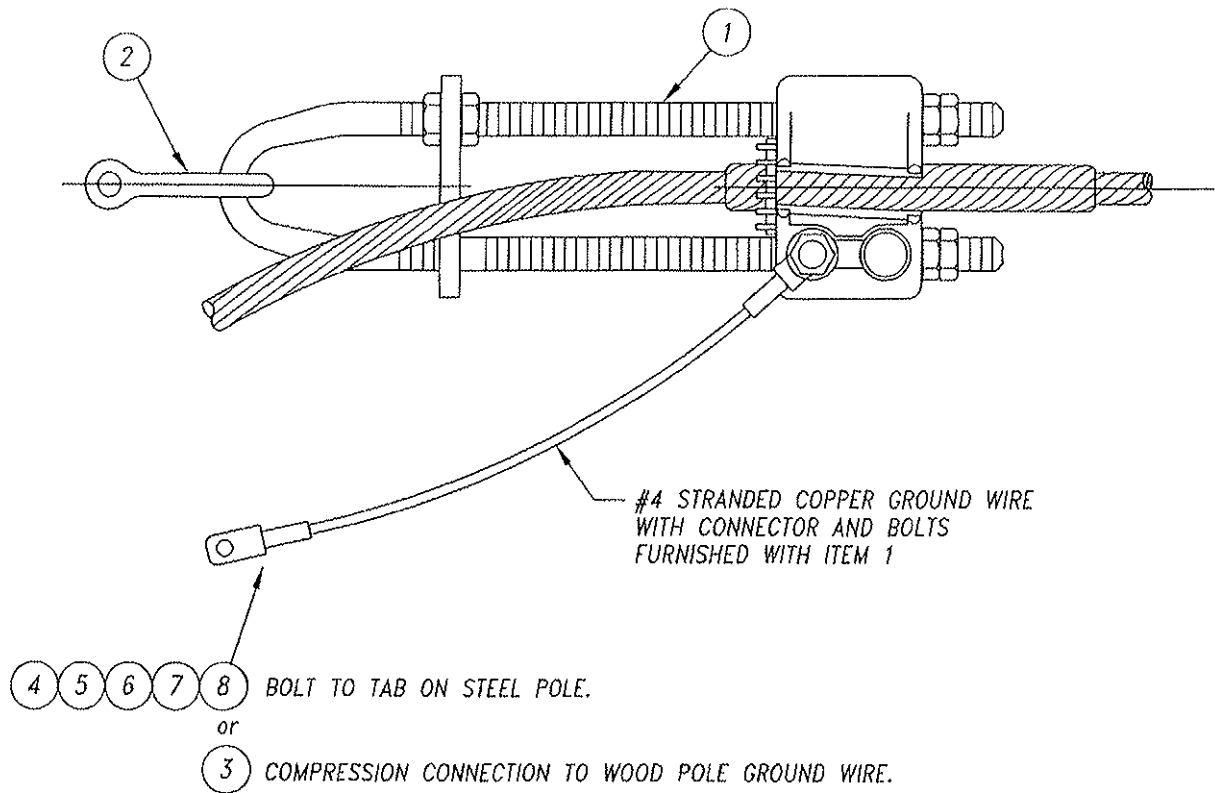
MAX LINE ANGLE = 60°

USE T-4FC FOR ATTACHMENT TO WOOD POLE BAND OR STEEL POLE WITH VERTICAL ATTACHMENT PLATE.

USE T-4FCS FOR STEEL POLE WITH HORIZONTAL ATTACHMENT PLATE.

USE ITEM 1 IN LIEU OF ITEM 5 FOR TS-MRA TYPE OVER 30 DEGS

BHP CODE	ITEM NO.	DESCRIPTION	MANUF.	CAT. NO.	QUANTITY				
					T-4FC	T-4FCS			
48-5208	1	90° Y-CLEVIS-CLEVIS; 30k	ANDERSON	YCC-30-90	1				
48-5180	2	AGS YOKE PLATE; 18" SPACING; 1/2" PLATE; 30k	HUGHES	AS2585-Z	1	1			
48-5206	3	Y-CLEVIS-EYE; 20k	ANDERSON	YCS-05	2	2			
N.S.	4	FIBERLIGN DOUBLE SUSPENSION W/GROUND WIRE	PREFORMED	4300204G	1	1			
48-3669	5	Y-CLEVIS - CLEVIS; 30k	ANDERSON	YCC-30		1			
N.S.	6	COPPER COMPRESSION CONNECTOR, #4 TO #4	HOMAC	CC44	1				
N.S.	7	#4 AWG COPPER COMPRESSION CONNECTOR	ANDERSON	VHCL-1/0-12		1			
20-0012	8	1/2" x 1 1/4" GALV. BOLT				1			
20-0013	9	1/2" GALV. NUT				1			
22-0712	10	1/2" GALV. WASHER				1			
20-0014	11	1/2" GALV. LOCK WASHER				1			
DSGN. M.C.	TRANSMISSION STANDARD				REV. DATE	REV. NO.			
DR. KM	FIBEROPTIC DOUBLE SUSPENSION				12/17/07	1			
APPROVED BY	DATE	BLACK HILLS POWER				DRAWING NO.	SHEET		
						T-4FCS	1		



OPGW DEADEND

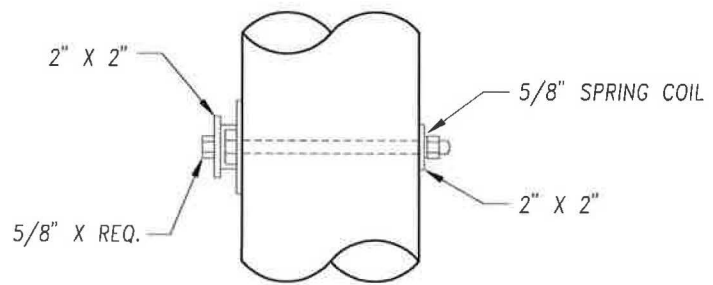
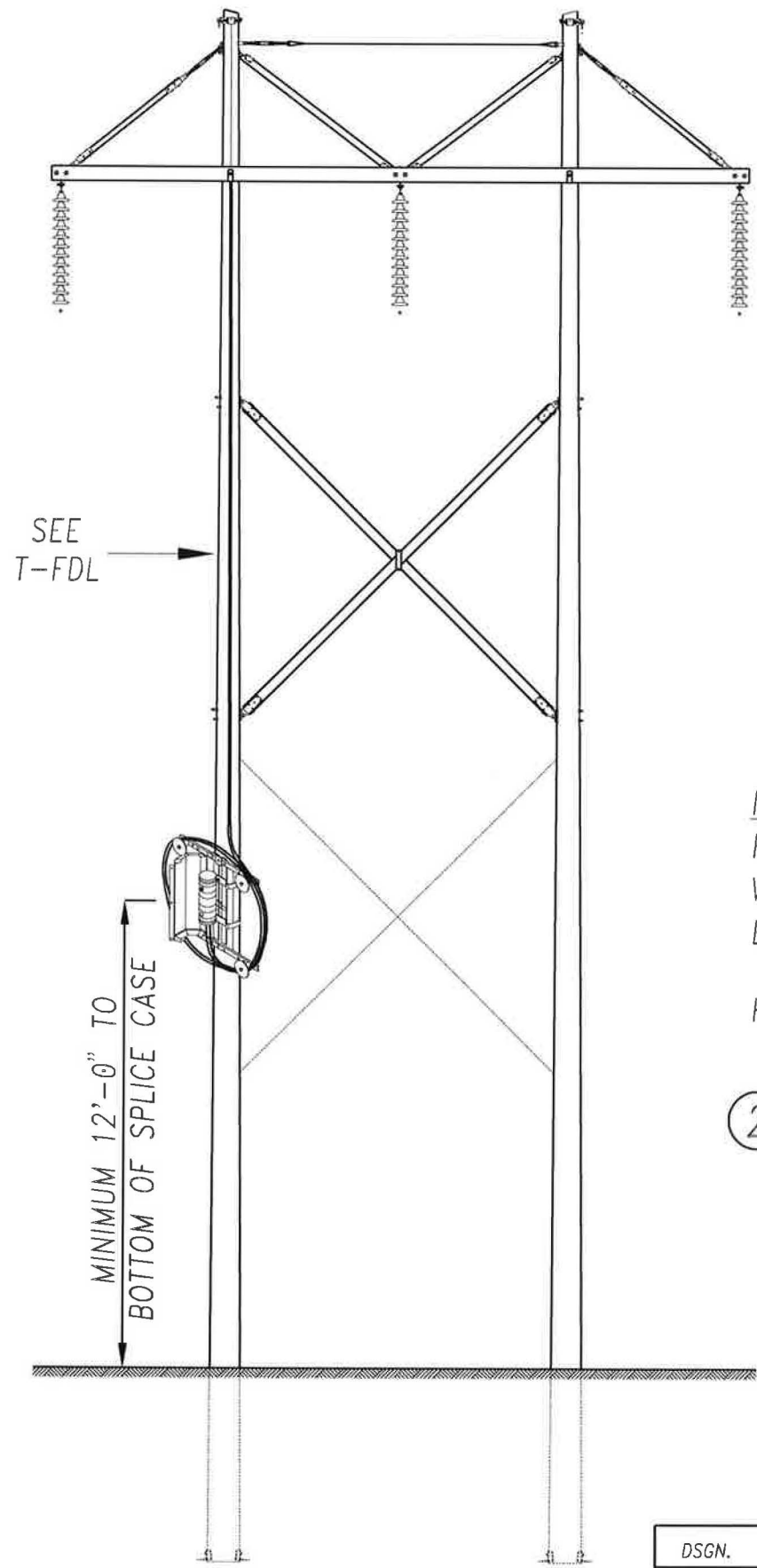
.443" FIBEROPTIC CABLE

NOTES:

1. FIBER OPTIC CABLE CONTINUOUS THROUGH DEADEND
2. T-4FDS IS FOR ATTACHMENT ON STEEL POLE, OR SUBSTATION STRUCTURE
T-4FDW IS FOR ATTACHMENT ON WOOD POLE.

BHP CODE	ITEM NO.	DESCRIPTION	MANUF.	CAT. NO.	QUANTITY	
					T-4FDS	T-4FDW
N.S.	1	FIBER OPTIC DEADEND, 18" U-BOLT (48 FIBER), W/GROUND WIRE	PREFORMED	2801303G	1	1
N.S.	2	ANCHOR SHACKLE, 30K, BNK	ANDERSON	AS-25-BNK	1	1
N.S.	3	COPPER COMPRESSION CONNECTOR, #4 TO #4	HOMAC	CC44		1
N.S.	4	1/0 AWG COPPER COMPRESSION CONNECTOR	ANDERSON	VHCL-1/0-12	1	
22-0012	5	1/2" X 1 1/4" GALV. BOLT			1	
20-0013	6	1/2" GALV. NUT			1	
22-0712	7	1/2" GALV. WASHER			1	
20-0014	8	1/2" GALV. LOCK WASHER			1	
TRANSMISSION STANDARD					REV. DATE	REV. NO.
FIBEROPTIC DEADEND					12/17/07	3
BLACK THIS POWER					DRAWING NO.	SHEET
DSCN. M.C. DR. KV APPROVED BY DATE					T-4FDS	1

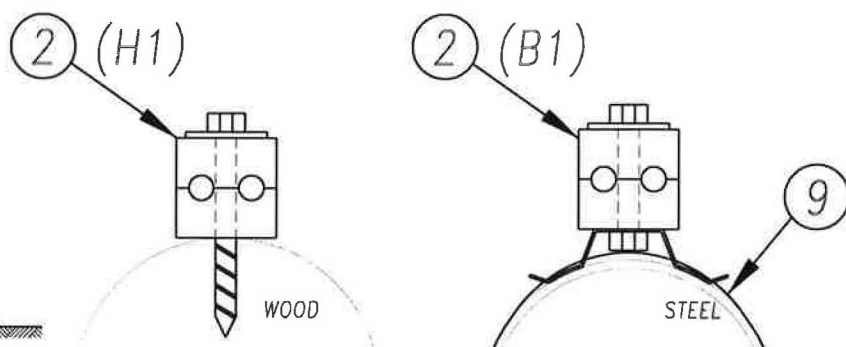
ITEM	REQD.	CAT. NO.	DESCRIPTION
1	1	8006553	6.5" COYOTE SPLICE CASE
2	10	8663041-H1/B1	DOWNLEAD CUSHION W/ HARDWARE WOOD (H1), STEEL (B1)
3	2	8003411	GREEN SEALANT KIT
4	1	8003569	VERTICAL CABLE STORAGE ASSEMBLY
5	2	80805514	SPLICE TRAY KIT
6	1	8003472	VERTICAL MOUNTING BRACKET KIT
7	4		5/8" x REQ. BOLT, NUT, LW, FW
8	1	8003491	COYOTE DEFENDER
9	AS REQ'D	BAB-38XX	BOLT-A-BAND 3/4" x AS REQ'D



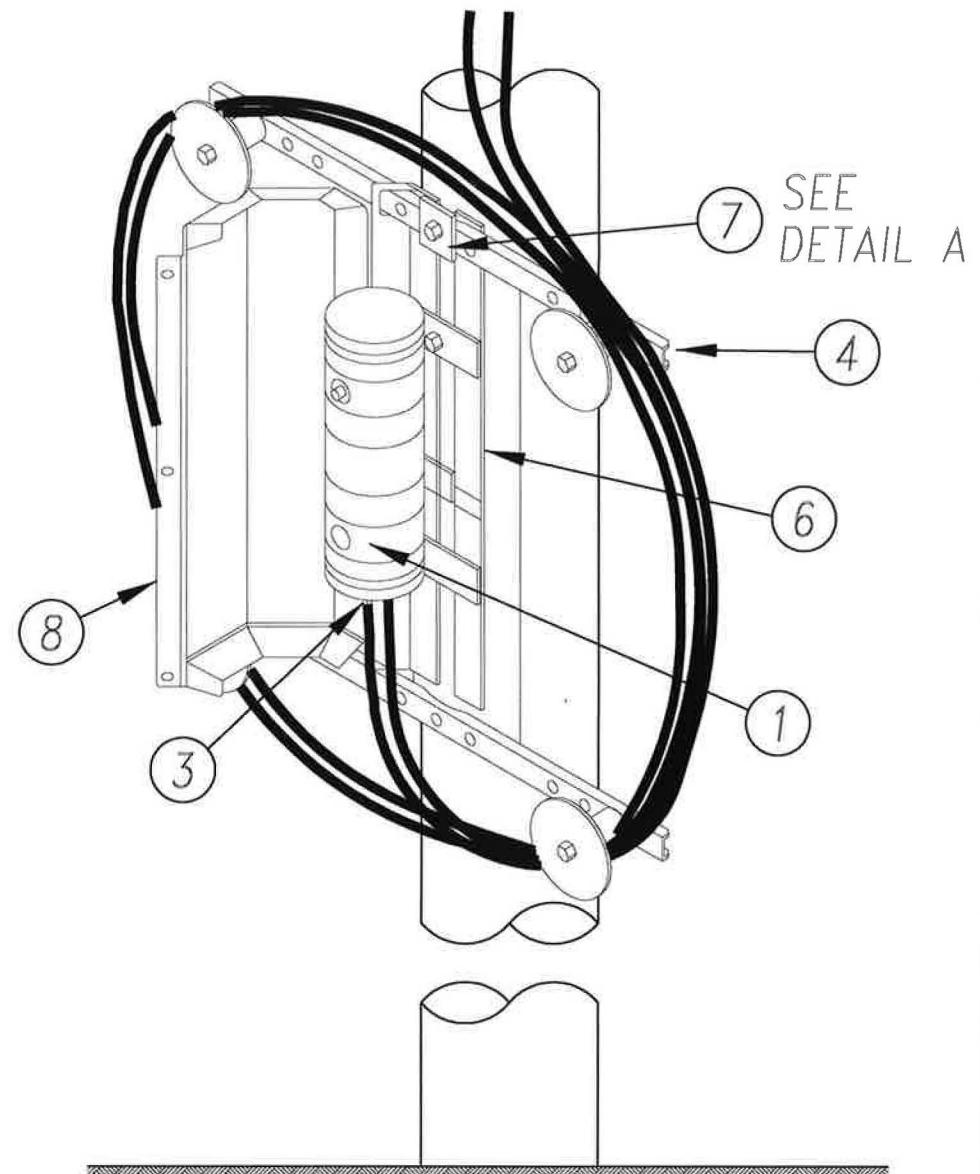
**DETAIL - A
BRACKET MOUNTING DETAIL**

NOTE:
FOR WOOD MOUNTING - USE 5/8" M. A. BOLT WITH 2"X2" SQUARE WASHER AT HEAD AND NUT END. USE 5/8" SPRING COIL AT NUT END.

FOR STEEL POLES, USE ITEM 9.

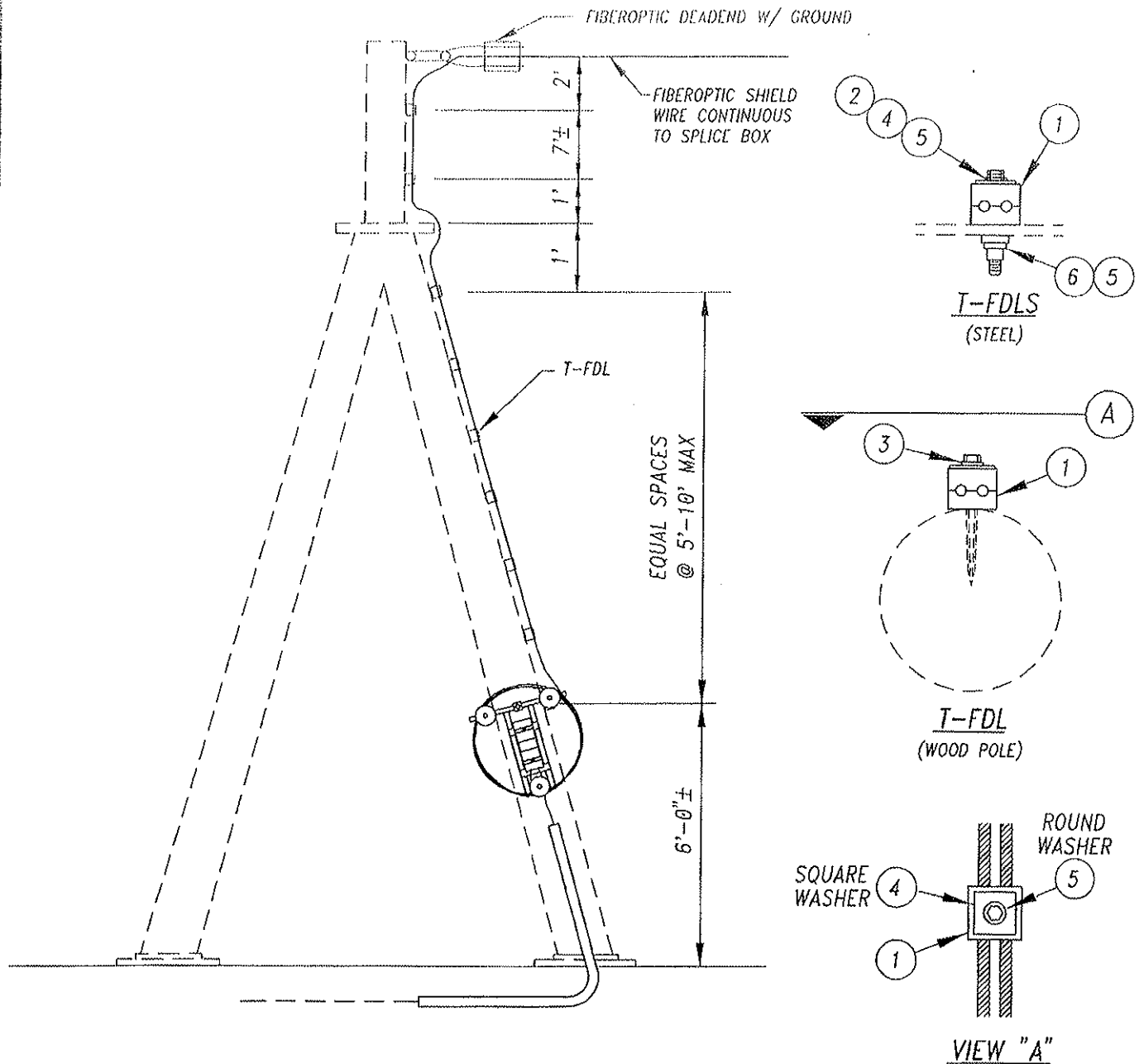


**DETAIL - B
CUSHION MOUNTING DETAIL**



OPGW SPLICE DETAIL

DSGN.	TRANSMISSION STANDARD		REV. DATE:	REV. NO.
DR. AP	FIBEROPTIC SPLICE CASE		6/16/15	1
APPROVED BY	DATE	BLACK HILLS POWER	DRAWING NO.	SHEET
			T-FSC	1

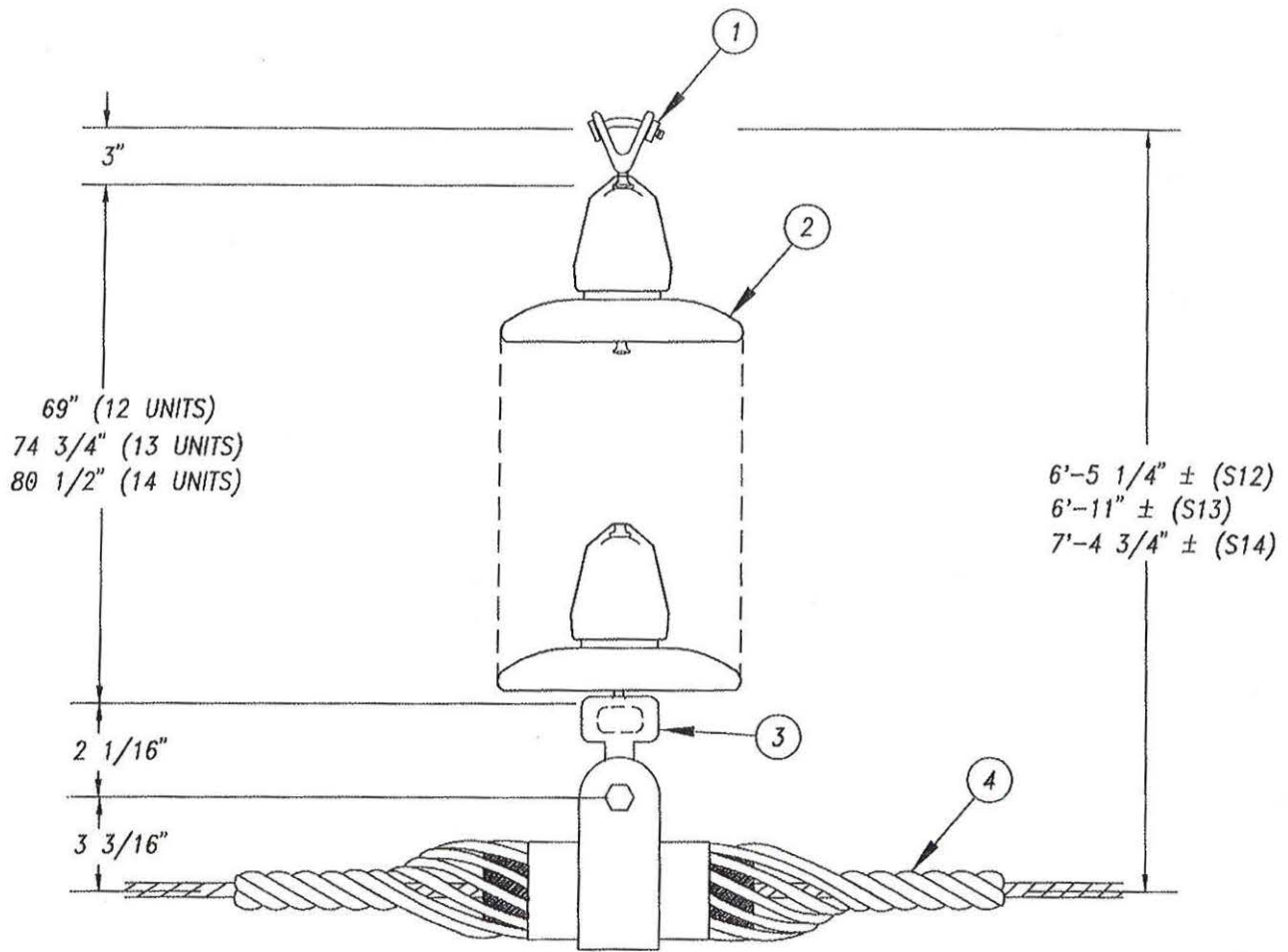


INSTALLATION PLAN

UNIT T-FDL CONSISTS OF ONE DOWNLEAD CUSHION INSTALLED, AND INCLUDES DRILLING HOLES IN A-FRAME LEG IF REQUIRED. SPECIFIC QUANTITY REQUIRED OF T-FDL WILL VARY WITH SUBSTATION STRUCTURE.

BHP CODE	ITEM NO.	DESCRIPTION	MANUF.	CAT. NO.	QUANTITY	T-FDLS	T-FDL
N.S.	1	DOWNLEAD CUSHION KIT.443 OPGW	PREFORMED	8003041		1	1
N.S.	2	BOLT, 1/2"x4" GALV. STEEL w/ NUT	HUGHES	B54-1-1/4	1		
STOCK	3	1/2"x4" LAG	HUGHES	LS54			1
20-1245	4	WASHER, 2" SQ, 9/16" HOLE	HUGHES	SW2-50	1	1	
22-2200	5	1/2" GALV. WASHER			2	1	
20-0014	6	1/2" GALV. LOCK WASHER			1		

DSON. M.C.	TRANSMISSION STANDARD FIBER OPTIC DOWNLEAD BLACK HILLS POWER	REV. DATE 12/17/07	REV. NO. 5
DR. KM		DRAWING NO.	SHEET
APPROVED BY		DATE	T-FDL



CONDUCTOR SUSPENSION

1272 KCM ACSR "BITTERN"

USE S14 THIS PROJECT

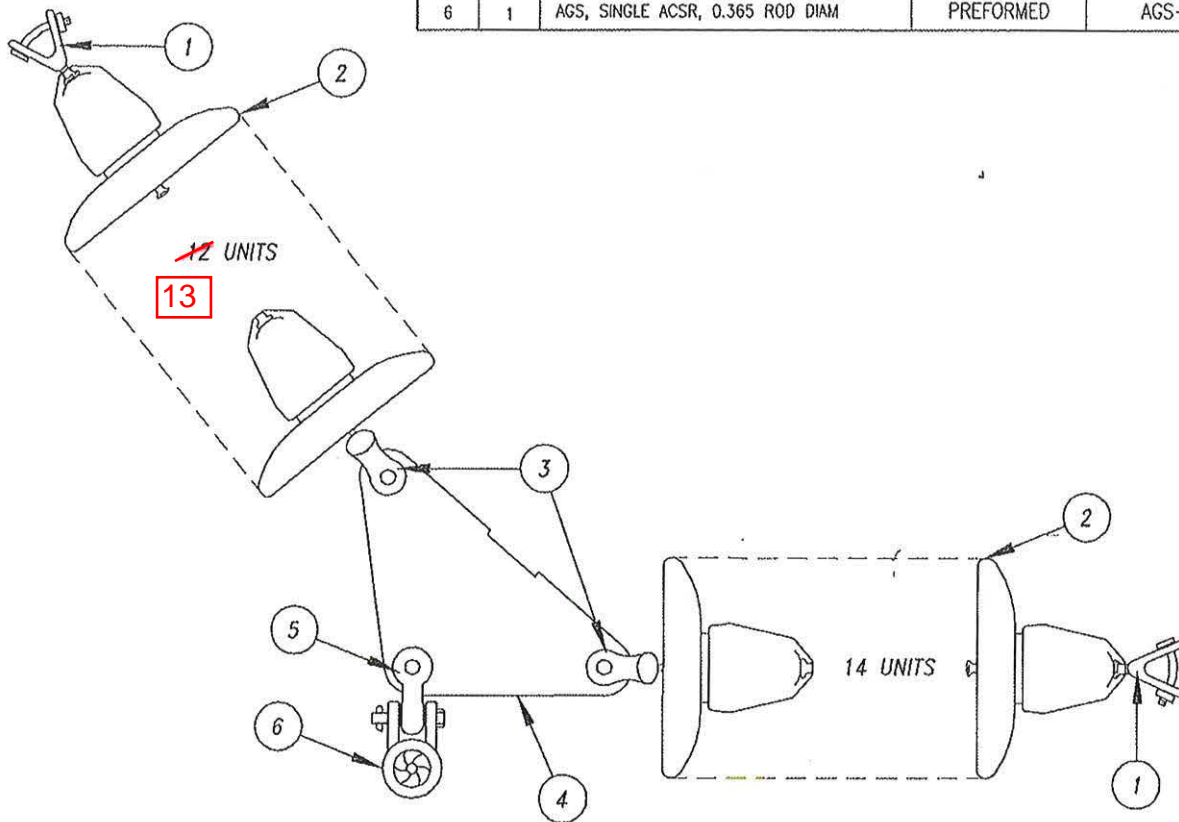
S12 ASSEMBLY WEIGHT = 161 LBS.
 S13 ASSEMBLY WEIGHT = 172 LBS.
 S14 ASSEMBLY WEIGHT = 184 LBS.
 MAX LINE ANGLE = 30'

ITEM NO.	BHP CODE	DESCRIPTION	MANUF.	CAT. NO.	QUANTITY	T-S12	T-S13	T-S14		
1	48-3054	Y - CLEVIS BALL, 30k	ANDERSON	YBC-30	1	1	1			
2	48-8200	20,000# M&E; B&S INSULATOR, ANSI 52-3	LAPP	8200-70	12	13	14			
3	42-7020	AGS SOCKET EYE; 30k	ANDERSON	SA-10.5-13	1	1	1			
4	40-1272	AGS SUSPENSION ASSY.;25k	PREFORMED	AGS-5139	1	1	1			
DSGN. _____ DR. CRC APPROVED BY _____ DATE _____					TRANSMISSION STANDARD CONDUCTOR SUSPENSION ATTACHMENT BLACK HILLS POWER				REV. DATE 12/20/86 DRAWING NO.	REV. NO. 3 SHEET
					T-S12,13,14 1					

LIST OF MATERIALS

Exhibit 1c

ITEM	QTY.	ITEM DESCRIPTION	MANUFACTURER	CATALOG NUMBER
1	2	Y-CLEVIS BALL; 30K	ANDERSON	YBC--30
2	27	20,000# M&E INSULATORS, ANSI 52-3	LAPP	8200-70
3	2	SOCKET Y-Clevis	ANDERSON	SYC -30
4	1	YOKE PLATE, 12" IN LENGTH	HUGHES	AS2585-A
5	1	anchor shackle w/bnk. 60 kip	ANDERSON	AS-50-BNK
6	1	AGS, SINGLE ACSR, 0.365 ROD DIAM	PREFORMED	AGS-5139



CONDUCTOR STR-D DOUBLE SUSPENSION

1272 KCM ACSR "BITTERN"

2S13-D ASSEMBLY WEIGHT = 349 LBS.

USE FOR 230D TYPE THIS PROJECT

PROJECT TITLE **BLACK HILLS POWER 230KV T-LINE**
~~DONKEY CREEK TO PUMPKIN BUTTE~~

SHEET TITLE
CONDUCTOR DOUBLE SUSPENSION
T-2S13-D

PROJECT NUMBER
BHPL-44548

PROJECT MANAGER
W. BAUER

DATE
02-07-2008

REFERENCE SHEET
1 OF 1

REFERENCE DOCUMENT
SA-03.DWG

EXHIBIT NUMBER
T-2S13-D

BLACK HILLS POWER
RAPID CITY, SOUTH DAKOTA

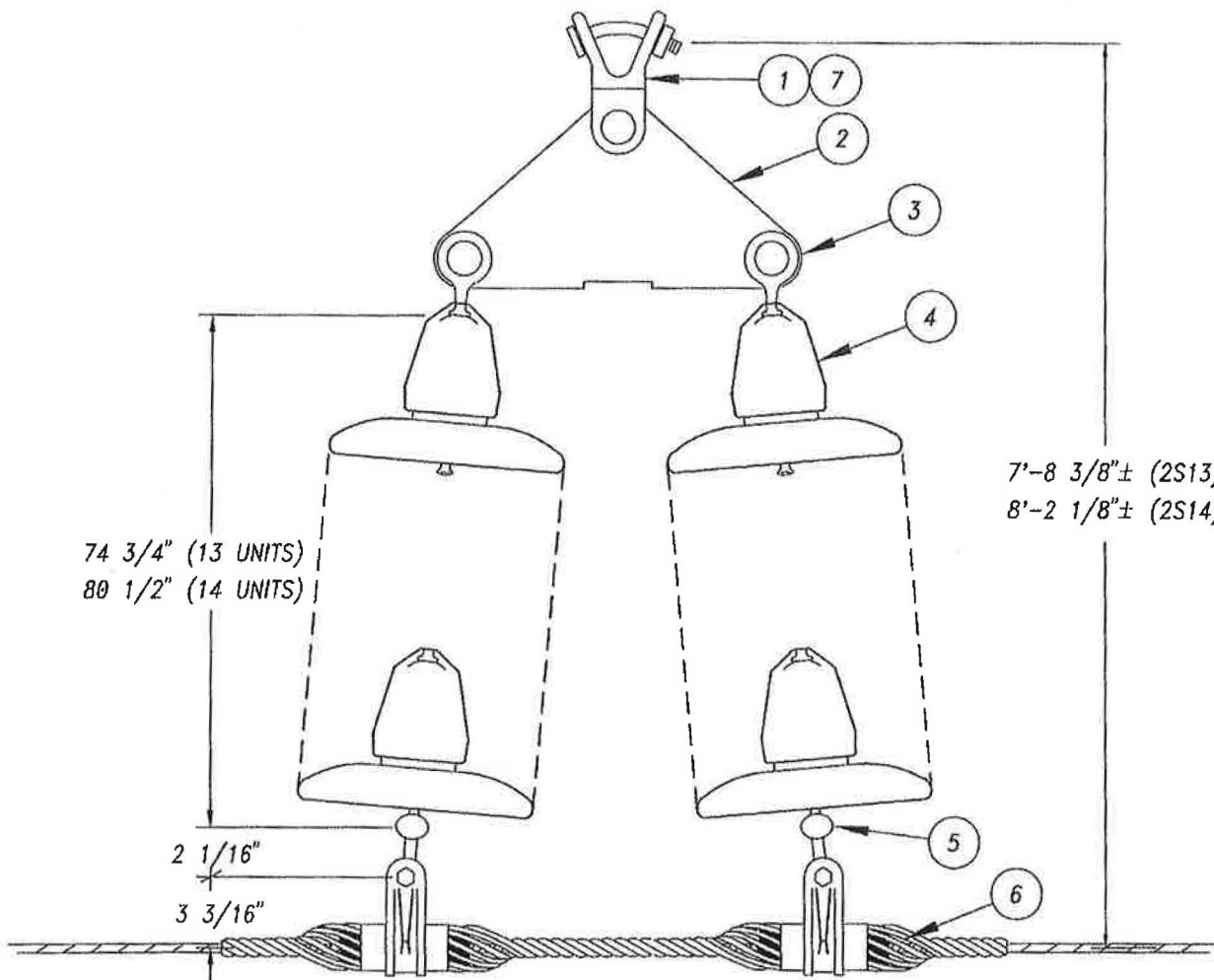
PUMPKIN BUTTE - WINDSTAR
230 KV TRANSMISSION LINE

STRUCTURE ASSEMBLY DRAWINGS
T-2S13,14 & T-2S13-D



FILENAME SA-03.DWG
SCALE NONE

SHEET
SA-03



Use item 1 in lieu of item 7 for TS-MRA steel pole structures

CONDUCTOR DOUBLE SUSPENSION

1272 KCM ACSR "BITTERN"

2S13 ASSEMBLY WEIGHT = 349 LBS.

2S14 ASSEMBLY WEIGHT = 372 LBS.

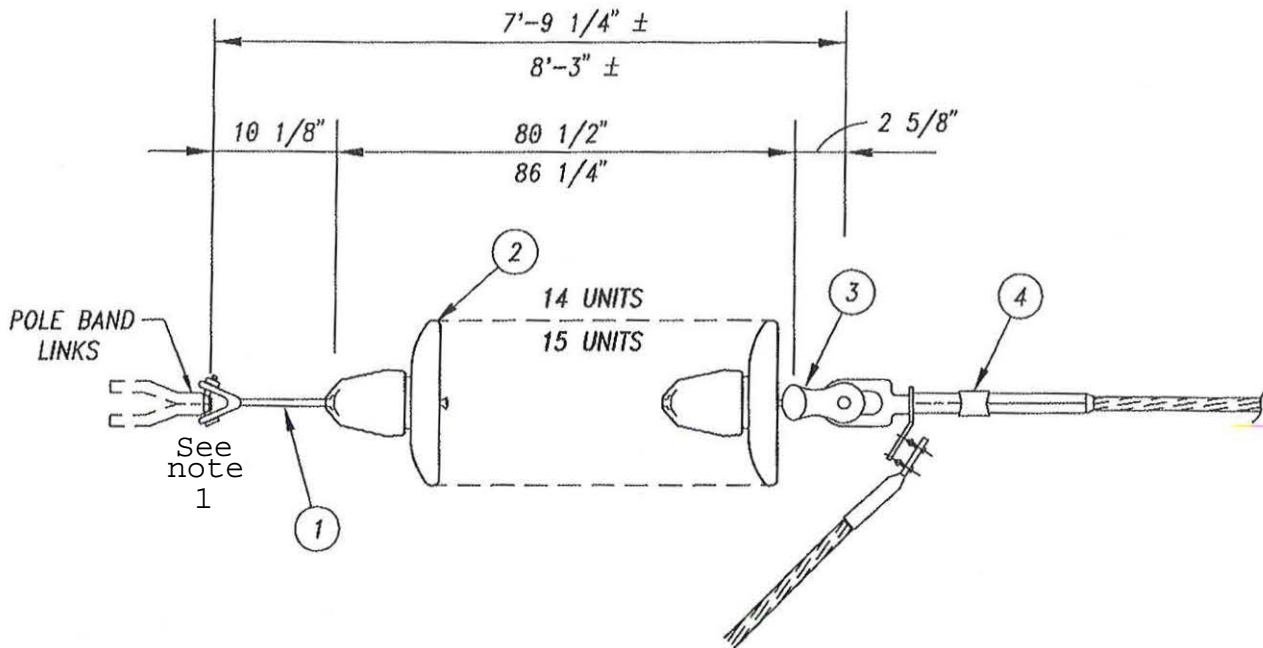
MAX LINE ANGLE = 60°

Note:

Use T-2S14 for TS-MRA type over 30 degs

ITEM NO.	BHP CODE	DESCRIPTION	MANUF.	CAT. NO.	QUANTITY	T-2S13	T-2S14		
						1	1		
1		90° Y CLEVIS-CLEVIS; 30k	ANDERSON	YCC-30-90		1			
2		AGS YOKE PLATE; 18" SPACING; 5/8" PLATE; 40k	HUGHES	AS2585-Z		1	1		
3		BALL CLEVIS ; 30k	ANDERSON	BC-30		2	2		
4		20,000# M&E INSULATOR, ANSI 52-3	LAPP	8200-70		26	28		
5		AGS SOCKET EYE; 30K	ANDERSON	SA-10.5-13		2	2		
6		AGS DOUBLE SUSPENSION ASSY; 50k	PREFORMED	AGS-5840		1	1		
7		Y CLEVIS - CLEVIS 30k	ANDERSON	YCC-30			1		

DSGN.		TRANSMISSION STANDARD CONDUCTOR DOUBLE SUSPENSION BLACK HILLS POWER	REV. DATE 12/28/86	REV. NO. 3
DR.	CRC		DRAWING NO.	SHEET
APPROVED BY	DATE		T-2S13,2S14	1



CONDUCTOR COMPRESSION DEADEND
1272 KCM ACSR "BITTERN"

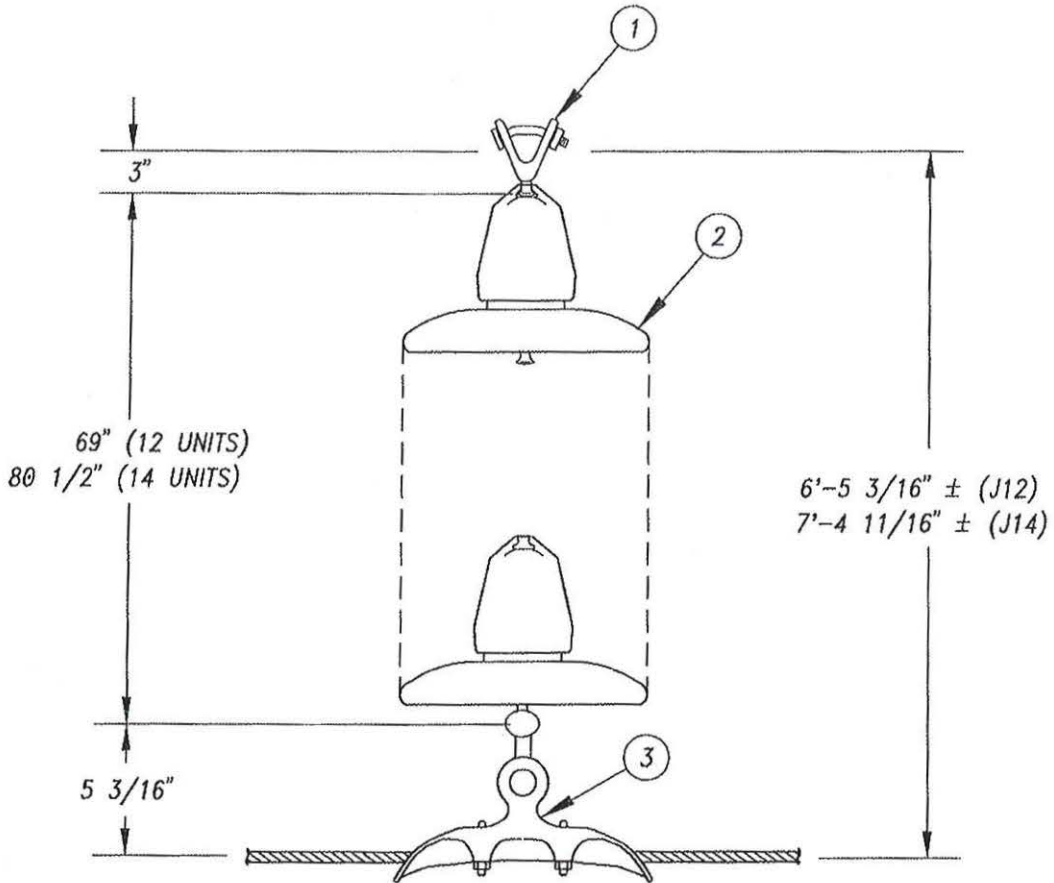
NOTE:

1. For all 230H and J structures under 55 deg line angle install 24" clevis link with pin and cotter

ASSEMBLY WEIGHT = 212 LBS. (14 UNITS)
 = 223 LBS. (15 UNITS)

USE 15 UNITS THIS PROJECT

ITEM NO.	BHP CODE	DESCRIPTION	MANUF.	CAT. NO.	QUANTITY						
					T-CDE14L	T-CDE15L					
1	4B-3056	Y - CLEVIS BALL, HOT LINE; 35k	BETHEA	YCBHL-65A	1	1					
2	4B-B300	30,000# M&E; B&S INSULATOR, ANSI 52-5	LAPP	5960G	14	15					
3	4B-0005	SOCKET CLEVIS; 30k	ANDERSON	SC-30	1	1					
4	42-B240	COMPRESSION DEADEND ASSY. W/15' TERMINAL	ALCOA	VES-153	1	1					
DSGN. _____ DR. CEI/DCL _____ APPROVED BY _____ DATE _____					TRANSMISSION STANDARD CONDUCTOR COMPRESSION DEADEND, LONG SPAN BLACK HILLS POWER					REV. DATE 02/14/02 DRAWING NO. _____ SHEET 9	
					T-CDE14L,15L 1						



JUMPER SUPPORT
1272 KCM ACSR "BITTERN"

USE J14 THIS PROJECT

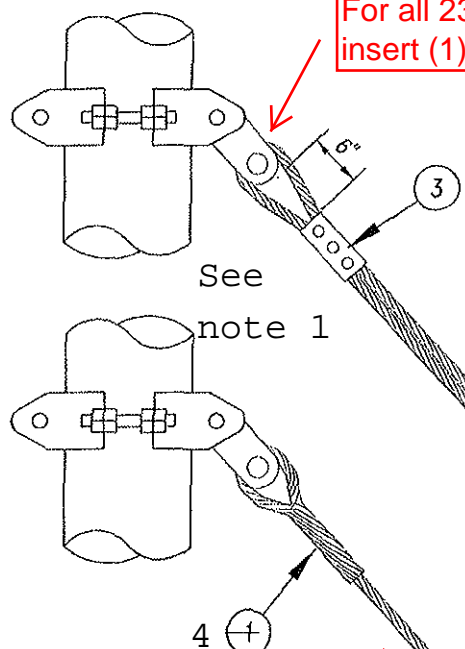
J12 ASSEMBLY WEIGHT = 146 LBS
J14 ASSEMBLY WEIGHT = 169 LBS

ITEM NO.	BHP CODE	DESCRIPTION	MANUF.	CAT. NO.	QUANTITY	T-J12	T-J14					
1	48-3054	Y - CLEVIS BALL; 30k	ANDERSON	YBC-30		1	1					
2	48-8200	20,000# M&E; ANSI 52-3 B&S INSULATOR	LAPP	8200-70		12	14					
3	42-0147	SUSPENSION CLAMP W/ SOCKET (ALUM);25k	ANDERSON	HAS-147-S		1	1					
DSGN. _____ DR. CRC/OCL _____ APPROVED BY _____ DATE _____					TRANSMISSION STANDARD JUMPER SUPPORT BLACK HILLS POWER				REV. DATE 12/20/06 DRAWING NO. T-J12,14		REV. NO. 3 SHEET 1	

For all 230H and J structures less than 55 degree line angle insert (1) 80 kip Maclean guy strain insulator Item 38B here.

NOTE :

GROUND ALL GUYS TO POLE WITH SINGLE BOLT PARALLEL CLAMP AND C CONNECTOR (wood pole) or TANK GROUND (steel pole) and #4 Ground Wire FOR STEEL POLES ON RAVENS CREEK INSTALL GUY MARKERS FULL LENGTH OF GUY



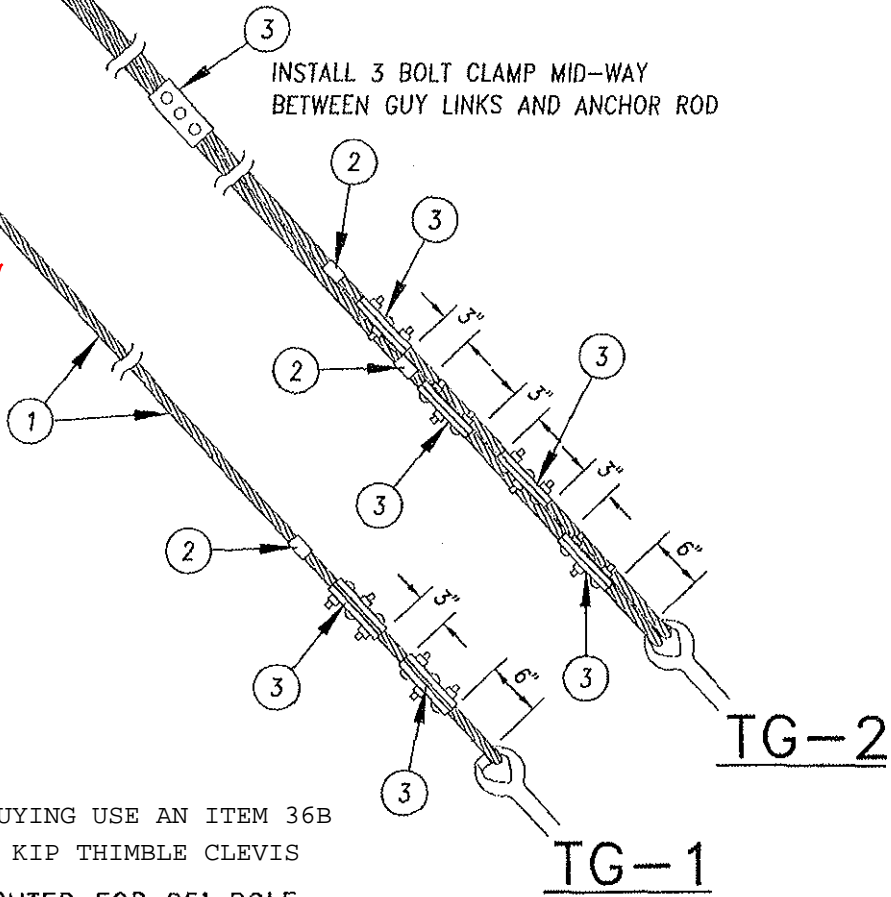
INSTALL 3 BOLT CLAMP MID-WAY BETWEEN GUY LINKS AND ANCHOR ROD

For all 230H, J, 230B splice box and BPTAN-DESW structure shield wire guys cut and center on lowest 230kv conductor and/or jumper being passed (2) item 4 guy grips and (1) item 38A 21 kip guy strain insulator

NOTE :

- FOR ALL STEEL POLE GUYING USE AN ITEM 36B MACLEAN FSA-100-6 40 KIP THIMBLE CLEVIS

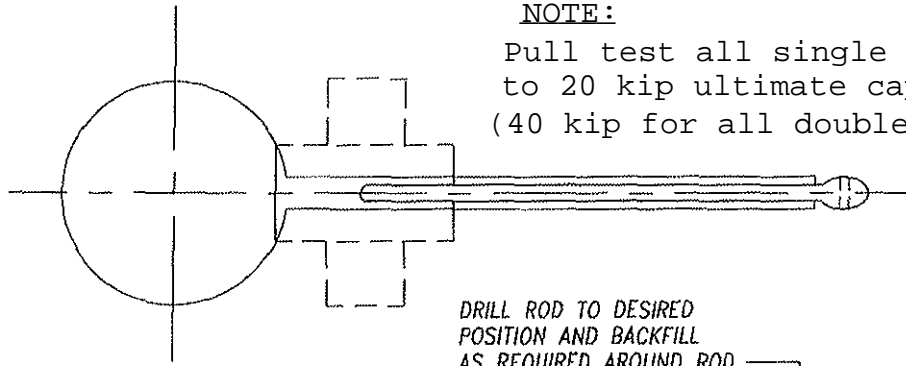
GUY WIRE QUANTITY COMPUTED FOR 85' POLE



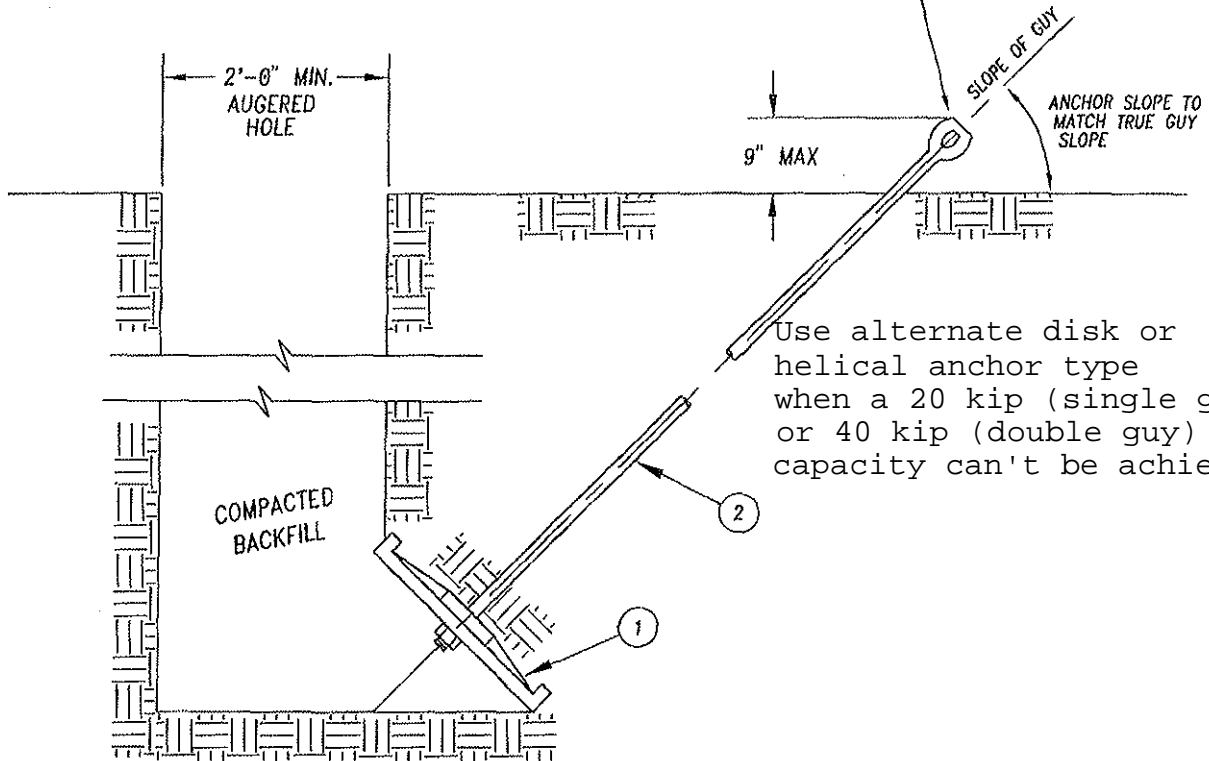
ITEM NO.	BHP CODE	DESCRIPTION	MANUF.	CAT. NO.	QUANTITY		
					TG-1	TG-2	
1	18-7167	7/16" E.H.S. STEEL 7-STRAND GUY WIRE	---	---	110'	175'	
2	18-7455	SLEEVE, SERVING GUY, 7/16"	CHANCE	6455	1	2	
3	18-5816	3-BOLT GUY CLAMP, 6" LONG	JOSLYN	J931	2	6	
4	18-7168	GUY DEADEND GRIP; FOR 7/16" EHS	PREFORMED	GDE-2108	1	-	
TRANSMISSION STANDARD GUY ASSEMBLIES BLACK HILLS POWER					REV. DATE 12/14/86	REV. NO. 2	
DSGN. DR. CRC APPROVED BY _____ DATE _____					DRAWING NO. TG-1,2	SHEET 1	

NOTE:

Pull test all single guy anchors to 20 kip ultimate capacity.
(40 kip for all double guy anchors)



DRILL ROD TO DESIRED POSITION AND BACKFILL AS REQUIRED AROUND ROD.



Use alternate disk or helical anchor type when a 20 kip (single guy) or 40 kip (double guy) capacity can't be achieved

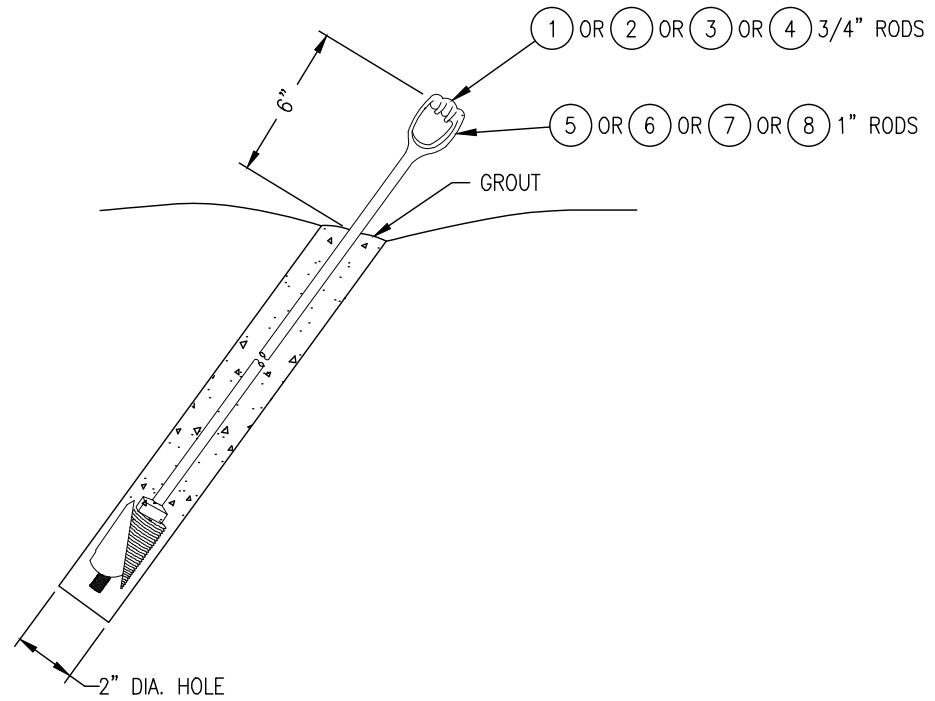
Holding capacity limited by rod strength in ordinary soil.(except TA-P2

TA-P1 = 36000# (20 kip in soils down to class 7)

TA-P2 = 58000# (40 kip in soils down to class 4)

ITEM NO.	BHP CODE	DESCRIPTION	MANUF.	CAT. NO.	QUANTITY	
					TA-P1	TA-P2
1	18-1102	ROD, ANCHOR, TWIN EYE 1" X 10'. 36K	JOSLYN	J7540	1	
2	18-1024	ANCHOR, CROSS-PLATE TYPE, 400 IN BEARING AREA	JOSLYN	J3524	1	
3	N.S.	ROD, ANCHOR, TRIPLE EYE, 1-1/4" X 10', 58K	JOSLYN	J7350		1
4	N.S.	ANCHOR, CROSS-PLATE TYPE, 400 IN BEARING AREA	JOSLYN	J3524-1		1

DSGN.		TRANSMISSION STANDARD PLATE ANCHOR AUGERED BLACK HILLS POWER	REV. DATE 12/14/06	REV. NO. 1
DR.	CRC		DRAWING NO.	SHEET
APPROVED BY	DATE		TA-P1,2	1



NOTES:

- HOLE SHALL BE DRILLED WITH A ROCK CORING DEVICE.
- DRILL HOLE AND INSTALL ROD TO WITHIN 5' OF ACTUAL GUY SLOPE.
- DRILL HOLE A MINIMUM DEPTH OF 18" INTO SOLID NON FRACTURED ROCK.
- ULTIMATE ROD STRENGTHS ARE 23 kips AND 36 kips RESPECTIVELY FOR 3/4" & 1" RODS.
- USE 3/4" RODS FOR TG-1 SINGLE GUYS AND 1" RODS FOR TG-2 DOUBLE GUYS. CONSULT WITH ENGINEER TO VERIFY ULTIMATE GUY LOAD REQUIREMENT WHEN PROPOSING TG-2 GUYS ON 1" RODS.

MATERIAL LIST

ITEM NO.	BHP CODE	QTY REQ'D	DESCRIPTION	MANUFACTURER	CATALOG NO.
1	-	AS REQ'D	ANCHOR, ROCK, EXPANDABLE, 3/4" x 30"	CHANGE	R330
2	-	AS REQ'D	ANCHOR, ROCK, EXPANDABLE, 3/4" x 60"	CHANGE	R360
3	-	AS REQ'D	ANCHOR, ROCK, EXPANDABLE, 3/4" x 84"	CHANGE	R384
4	-	AS REQ'D	ANCHOR, ROCK, EXPANDABLE, 3/4" x 96"	CHANGE	R396
5	-	AS REQ'D	ANCHOR, ROCK, EXPANDABLE, 1" x 30"	CHANGE	R130L
6	-	AS REQ'D	ANCHOR, ROCK, EXPANDABLE, 1" x 53"	CHANGE	R153L
7	-	AS REQ'D	ANCHOR, ROCK, EXPANDABLE, 1" x 72"	CHANGE	R172L
8	-	AS REQ'D	ANCHOR, ROCK, EXPANDABLE, 1" x 96"	CHANGE	R196L

DATE	DRAWN BY	NO.	APPROVED BY	REVISION DESCRIPTION

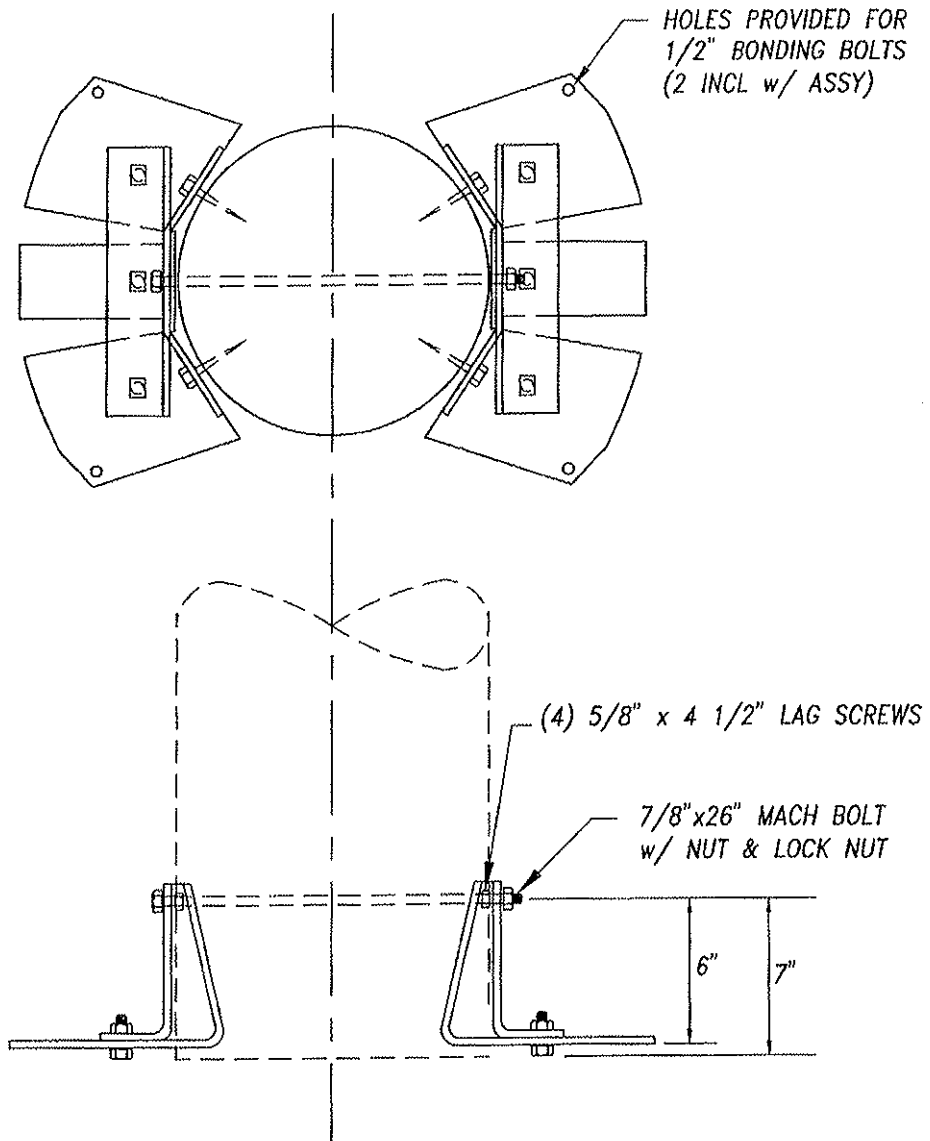
BLACK HILLS POWER

DETAIL
TA-RA
ROCK ANCHOR ASSEMBLY

DATE XX XX DATE XX
DRAWN BY XX DATE XX
APPROVED BY XX DATE XX

DWG NO. **BHP-T-243** SHT. 1 OF 1

NOTE: Use on all poles this project



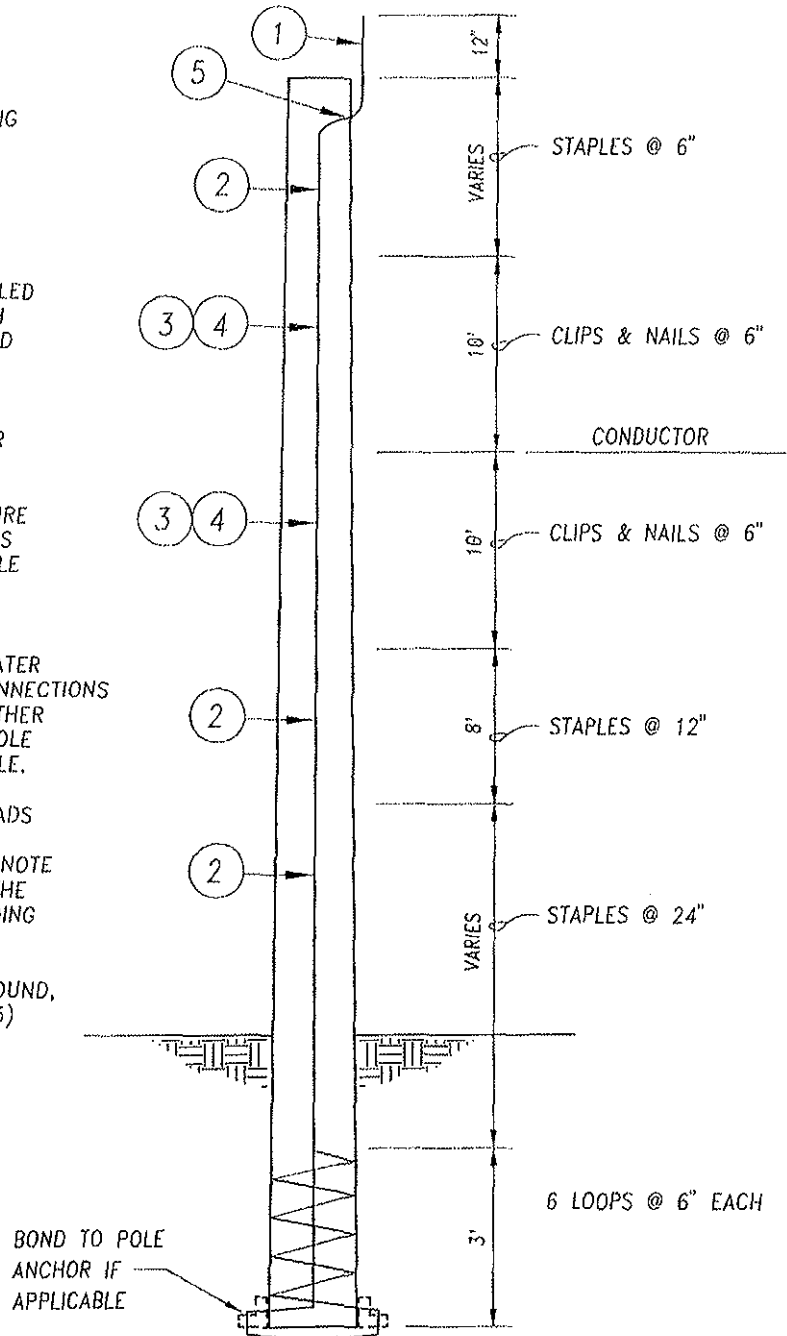
NOTE:

ANCHORS ARE FURNISHED COMPLETE WITH 7/8" MOUNTING BOLT AND 5/8" x 4 1/2" LAG SCREWS.

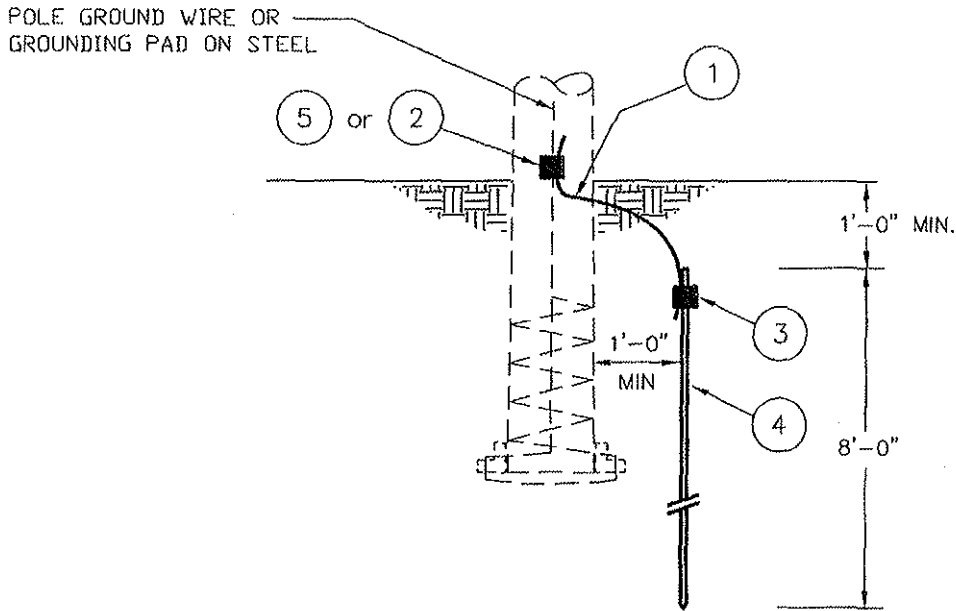
BHP CODE	ITEM NO.	DESCRIPTION	MANUF.	CAT. NO.	QUANTITY	TP-A			
18-1895	1	ANCHOR ASSEMBLY WITH BOLTS; PAIR	HUGHES	A-1895-2		1			
DSGN.	TRANSMISSION STANDARD POLE ANCHOR ASSEMBLY BLACK HILLS POWER				REV. DATE	REV. NO.			
DR. CRC					12/14/93	1			
APPROVED BY					DATE	DRAWING NO.	SHEET		
					TP-A	1			

NOTES:

1. BOND ALL POLE HARDWARE TO POLE GROUND . USE BONDING CLIP.
2. ON 230/69 kV CONSTRUCTION BOND ALL 69 kV HARDWARE SAME AS 230kV.
3. GROUND WIRE SHALL BE INSTALLED FOR THE FULL LENGTH OF EACH POLE, ACROSS THE BOTTOM, AND BACK UP IN WRAP TURNS AS SHOWN. STAPLE THE WRAPS AT EACH INTERSECTION OF THE DOWNLEAD, AND EVERY 12" FOR THE LENGTH OF THE WRAPS.
4. THIS UNIT INCLUDES THE MEASURE AND RECORDING OF EACH POLE'S FOOTING RESISTANCE, AFTER POLE SETTING IS COMPLETED AND BEFORE INSTALLING THE OHSW.
5. FOR FOOTING RESISTANCES GREATER THAN 15 OHMS, GROUNDING CONNECTIONS SHALL BE USED TO BOND TOGETHER THE GROUND WIRES OF EACH POLE AND GUY ANCHORS IF APPLICABLE.
6. IF THE FOOTING RESISTANCE READS GREATER THAN 15 OHMS AFTER INSTALLATION PROCEDURES PER NOTE 5, CONTRACTOR SHALL NOTIFY THE ENGINEER FOR FURTHER GROUNDING INSTRUCTIONS.
7. BOND STATIC WIRE TO POLE GROUND, USE FARGO CONNECTOR.(ITEM #5)
8. SEE INDIVIDUAL STRUCTURE DRAWINGS FOR REMAINING DIMENSIONS.



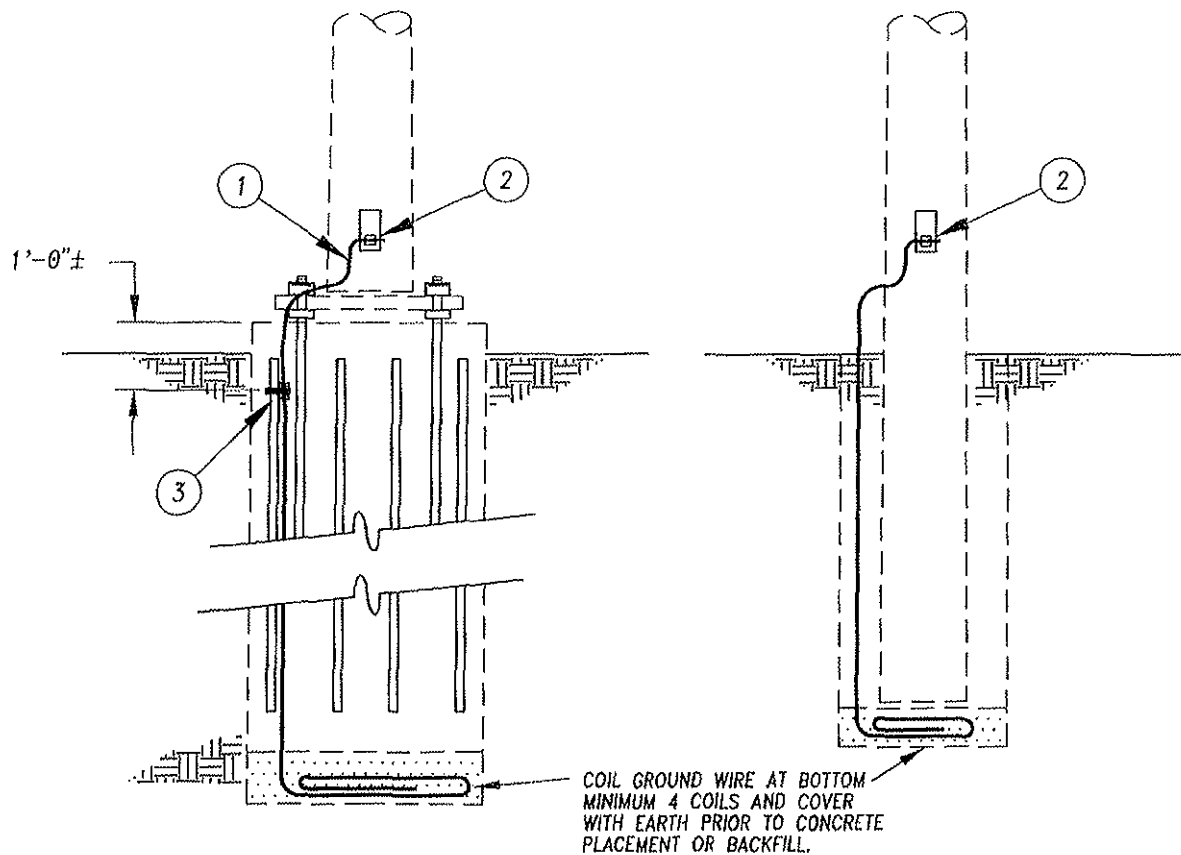
ITEM NO.	BHP CODE	DESCRIPTION	MANUF.	CAT. NO.	QUANTITY	TM-9	
						REV. DATE	REV. NO.
1	36-4000	GROUNDWIRE, #4CU SD; 40% CONDUCTIVITY			125'		
2	46-7494	STAPLE, 1 1/2X 3/8 CU-COATED, BARBED	JOSLYN	J7682	1		
3	46-7460	NAIL, 10D, CU-COATED	JOSLYN	J7260	1		
4	46-2729	CLIP, CU-COATED	KEARNEY	5730-1	40		
5	46-6810	FARGO CONNECTOR					
TRANSMISSION STANDARD WOOD POLE GROUNDING BLACK HILLS POWER						REV. DATE 12/26/05	REV. NO. 0
DSGH. DR. CRC/DCL APPROVED BY _____ DATE _____						DRAWING NO. TM-9	SHEET 1



NOTES:

1. TO BE USED WHEN DIRECTED BY ENGINEER, WHEN POLE GROUNDING ALONE IS INSUFFICIENT TO REDUCE FOOTING RESISTANCE BELOW 15 OHMS.
2. TM-9A IS FOR WOOD POLES.
3. TM-9SA IS FOR STEEL POLES.

BHP CODE	ITEM NO.	DESCRIPTION	MANUF.	CAT. NO.	QUANTITY					
					TM-9A	TM-9SA				
36-4000	①	GROUNDWIRE, #4CU SD; 40% CONDUCTIVITY			6'	6'				
44-0006	②	"C" CONNECTOR #4--#4, CU	BURNDY	YGHC2C2	1					
46-0058	③	GROUND ROD CLAMP, 5/8" COPPER WELD ROD	JOSLYN	J8492AB	1	1				
46-0588	④	5/8" x 8' COPPER WELD ROD	JOSLYN	J8338	1	1				
46-0018	⑤	GROUND CLAMP	ANDERSON	GC-141A-G2		1				
DSGN. _____ DR. CRC APPROVED BY _____ DATE _____					TRANSMISSION STANDARD GROUND ROD ASSEMBLY(TM-9A, TM-9SA) BLACK HILLS POWER				REV. DATE 03/18/63 DRAWING NO.	REV. NO. 3 SHEET
					TM-9A		1			



TM-9S
POLE ON CONCRETE FOUNDATION

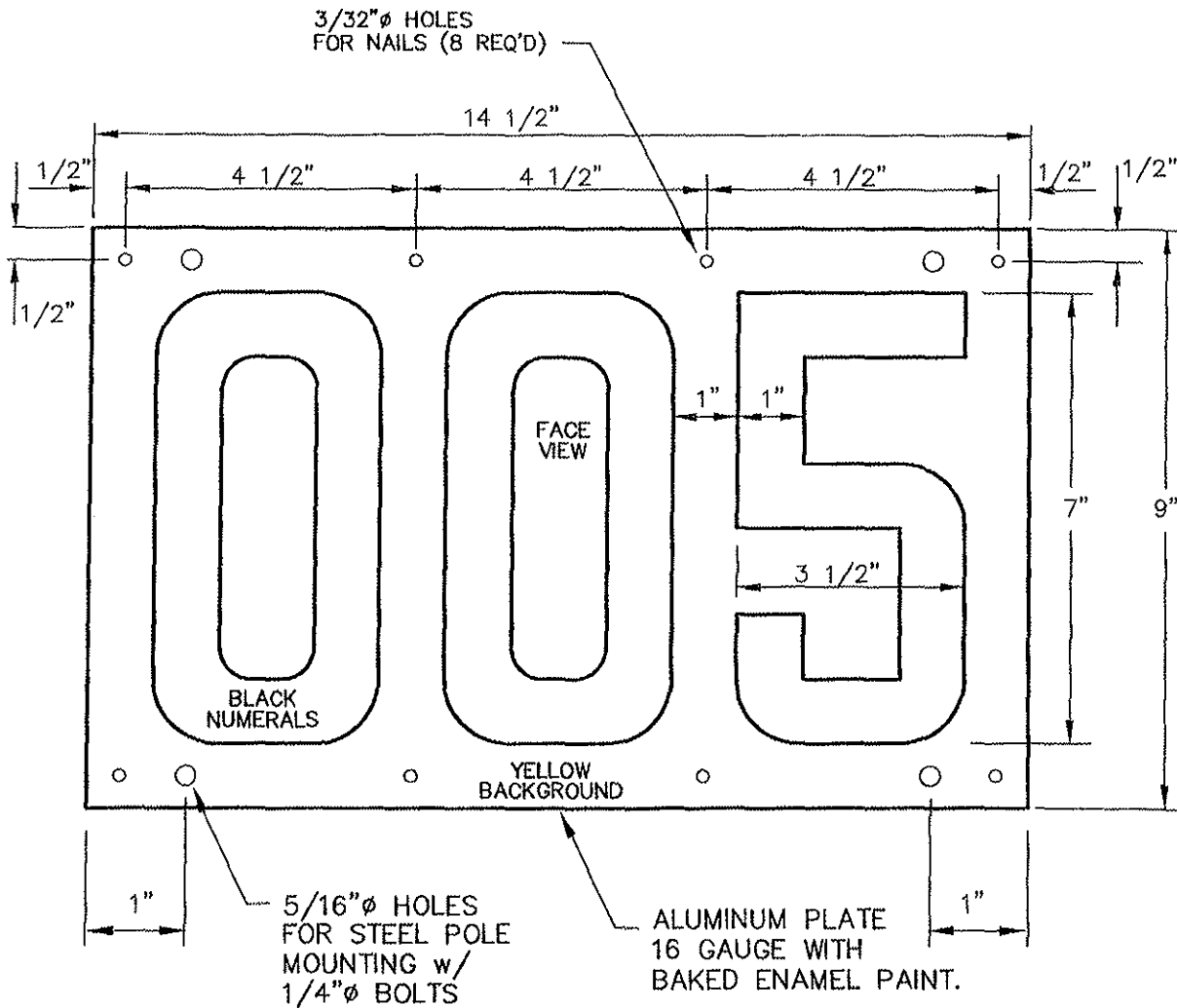
TM-9SD
DIRECT EMBEDDED STEEL POLE

NOTES:

1. FOR CONCRETE FOUNDATIONS, GROUND CLAMP AND STEEL GROUND WIRE TO BE INSTALLED ON REBAR PRIOR TO CONCRETE PLACEMENT. LEAVE SUFFICIENT WIRE TAIL FOR LATER ATTACHMENT TO STEEL POLE GROUNDING PAD. GROUND WIRE END TO BE COILED AND BURIED AT BOTTOM OF PIER EXCAVATION BELOW CONCRETE. (LENGTH AS REQUIRED).
2. THIS UNIT INCLUDES THE MEASURING AND RECORDING OF FOOTING RESISTANCE AFTER POLE IS ERECTED AND PRIOR TO INSTALLING OHSW.
3. IF MEASURED FOOTING RESISTANCE IS GREATER THAN 15 OHMS, CONTRACTOR SHALL NOTIFY ENGINEER FOR ADDITIONAL GROUNDING INSTRUCTIONS. GROUND ROD (SEPARATE PAY UNIT) MAY BE INSTALLED AND CONNECTED TO GROUNDING PAD ON POLE.

ITEM NO.	BHP CODE	DESCRIPTION	MANUF.	CAT. NO.	QUANTITY	TM-9S	TM-9SD		
						30'	25'		
1	36-0100	5/16" SOFT ANNEALED, GALVANIZED, 3 STRAND	NATIONAL STRAND						
2	46-0019	GROUND CLAMP, GALV., 4/0 TO FLAT	ANDERSON	GC-141A-02-WOR		1	1		
3	N.S.	GROUND CLAMP, BRONZE, 4/0 TO #11 REBAR	ANDERSON	GC-111-5C		1			

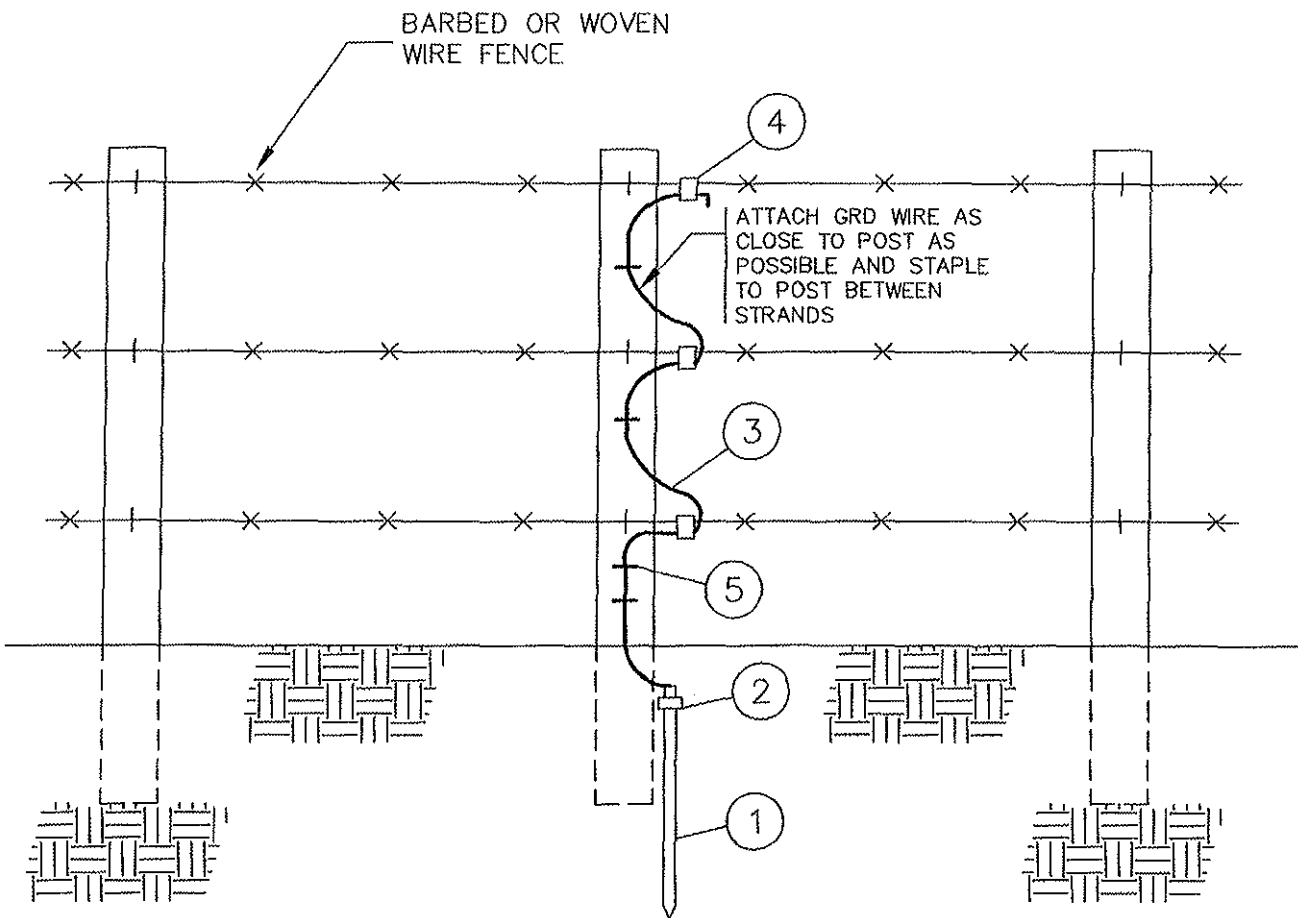
DSGN.		TRANSMISSION STANDARD STEEL POLE GROUNDING BLACK HILLS POWER	REV. DATE 12/14/86	REV. NO. 1
DR.	GHL		DRAWING NO.	SHEET
APPROVED BY	DATE		TM-9S,SD	1



NOTES:

1. INSTALL 2 SIGN PLATES PER BID UNIT
2. MOUNT ON CROSSARM WHERE PRESENT. USE CENTER 4 HOLES ONLY IF POLE MOUNTING IS REQUIRED.
3. SPECIFIC STRUCTURE NUMBERS WILL BE SPECIFIED ON STAKING SHEETS.

BHP CODE	ITEM NO.	DESCRIPTION	MANUF.	CAT. NO.	QUANTITY	TM-SN				
	①	AERIAL NUMBER SIGN							2	
	②	NAILS. 3D OR 1/4"x1" BOLT w/WASHER, LOCKWASHER & NUT			4					
DSGH DR. GHL APPROVED BY _____ DATE _____					TRANSMISSION STANDARD AERIAL NUMBERS BLACK HILLS POWER				REV. DATE 02/15/91 DRAWING NO.	REV. NO. 0 SHEET
					TM-SN		1			



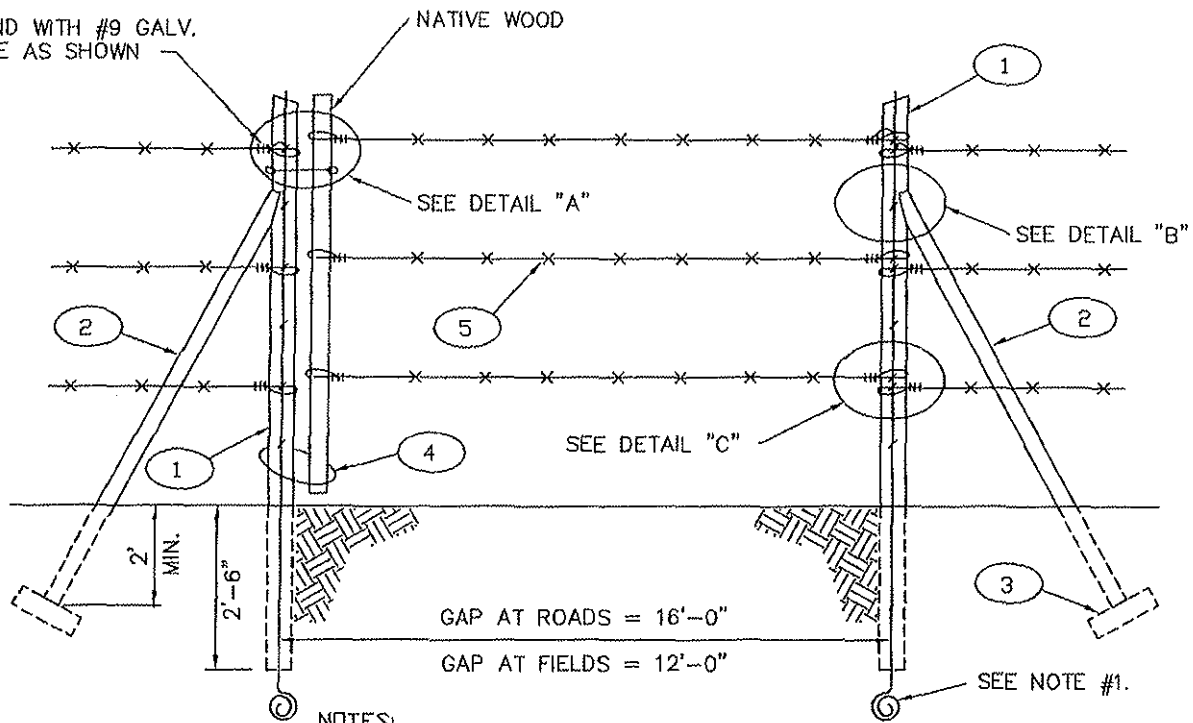
NOTES:

1. INSTALL GROUNDING AS SHOWN WHENEVER FENCE PARALLELS LINE FOR A DISTANCE OF 1300', WITHIN 150' FROM CENTERLINE, AND AT EACH SIDE OF R/W WHERE FENCE CROSSES R/W.
2. FOR WOVEN WIRE FENCE BOND TO BOTTOM HEAVY WIRE OF FENCE.

BHP CODE	ITEM NO.	DESCRIPTION	MANUF.	CAT. NO.	QUANTITY	TM-FG			
	①	5/8" x 5' COPPEWELD GROUND ROD	JOSLYN	J8335		1			
	②	5/8" COPPERWELD GROUND ROD CLAMP	JOSLYN	J8492AB		1			
	③	GROUNDWIRE, #4 CU, SOFTDRAWN BARE COPPER				6'			
	④	SPLIT BOLT CONNECTOR	BLACKBURN	2H		3			
	⑤	STAPLE, 1 1/2" x 3/8" CU COATED, BARBED	JOSLYN	J7682		5			

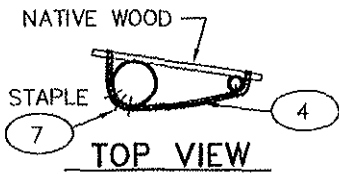
DSCR.		TRANSMISSION STANDARD FENCE GROUND BLACK HILLS POWER	REV. DATE 02/15/91	REV. NO. 0
DR.	GHL		DRAWING NO.	SHEET
APPROVED BY	DATE		TM-FG	1

BOND WITH #9 GALV. WIRE AS SHOWN

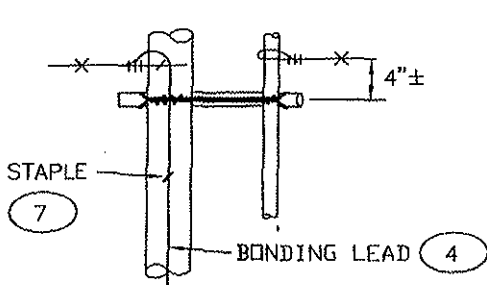


NOTES:

1. INSTALL #9 GALV. WIRE BONDING LEAD & BOND TO FENCE AS SHOWN. DROP 3'-0" OF COILED LEAD INTO POSTHOLE BEFORE SETTING POST & STAPLE TO POST. BOND ALL ISOLATED OR INSULATED SECTIONS OF FENCE TO LEAD.
2. INSTALL GAP AT APPROXIMATE 1/2 OF R/W UNLESS OBSTACLES OR TERRAIN DICTATE OTHERWISE.

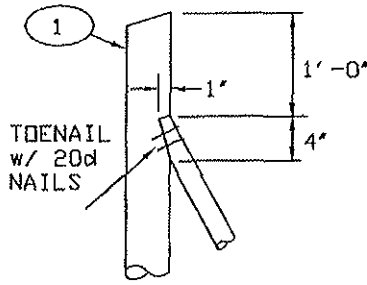


TOP VIEW

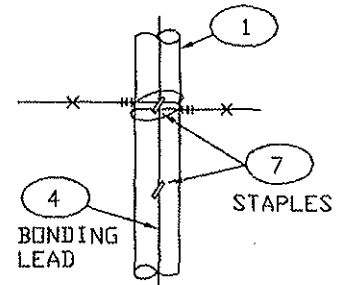


FRONT VIEW

DETAIL "A"



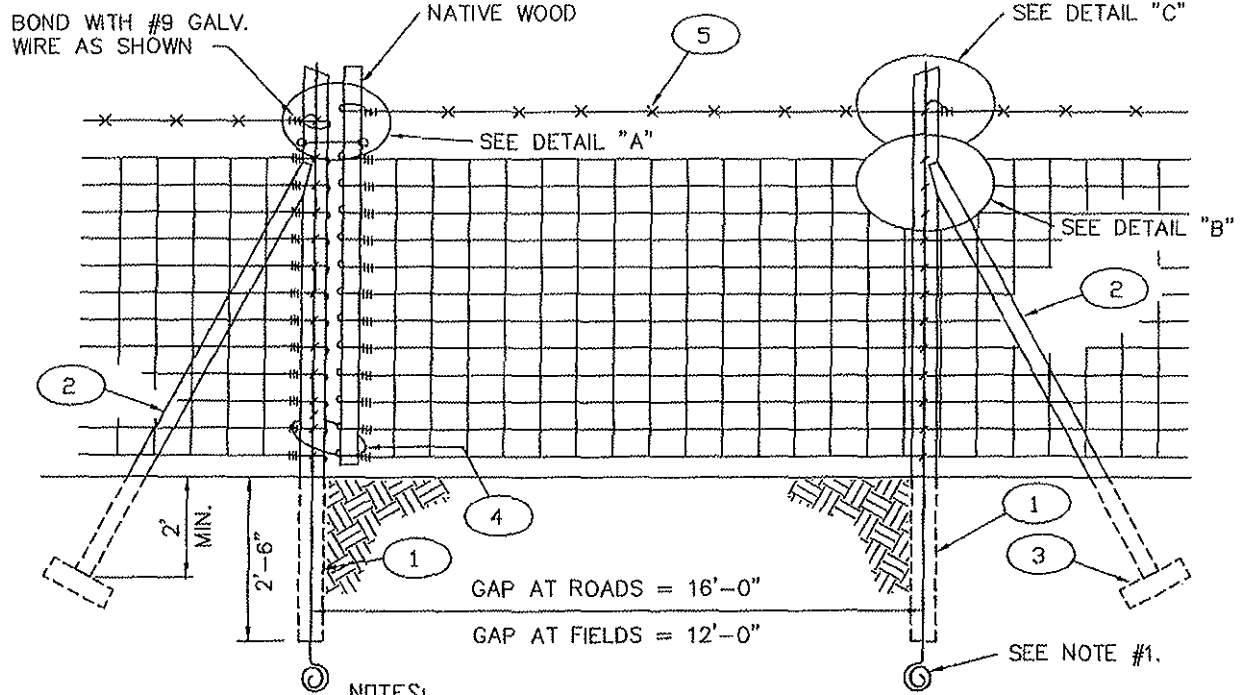
DETAIL "B"



DETAIL "C"

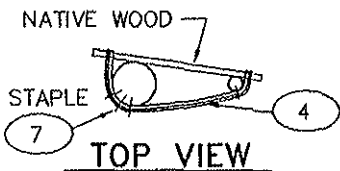
* SALVAGE EXISTING MATERIALS IF PRACTICAL. IF NOT, CONTRACTOR SHALL FURNISH MATERIAL AS REQUIRED.

BHP CODE	ITEM NO.	DESCRIPTION	MANUF.	CAT. NO.	QUANTITY	TM-G1
	①*	3-1/2"x4-1/2"x7'-0" RED CEDAR POSTS			2	
	②	STANDARD DISTRIBUTION CROSSARM OR 3-1/2" MIN. DIA. RED CEDAR POST			2	
	③	2'-0" LENGTH OF CROSSARM (TREATED) OR 6" MIN. DIA. RED CEDAR POST			2	
	④	#9 GALV. WIRE			30'	
	⑤*	BARBED WIRE			30'	
	⑥	20d NAILS			8	
	⑦	STAPLES			60	

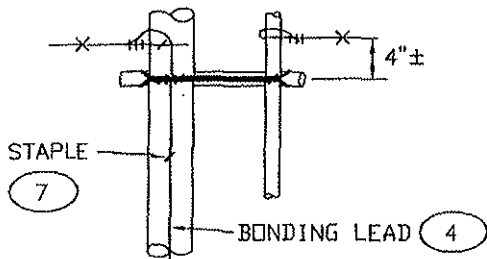


NOTES:

1. INSTALL #9 GALV. WIRE BONDING LEAD & BOND TO FENCE AS SHOWN. DROP 3'-0" OF COILED LEAD INTO POSTHOLE BEFORE SETTING POST & STAPLE TO POST. BOND ALL ISOLATED OR INSULATED SECTIONS OF FENCE TO LEAD.
2. INSTALL GAP AT APPROXIMATE 1/2 OF R/W UNLESS OBSTACLES OR TERRAIN DICTATE OTHERWISE.

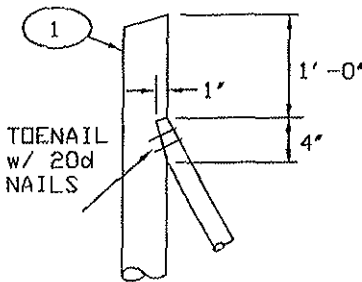


TOP VIEW

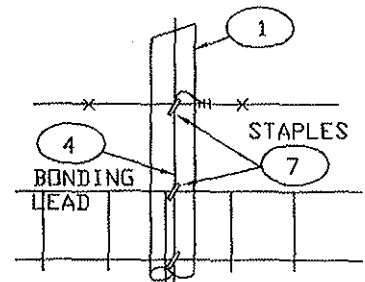


FRONT VIEW

DETAIL "A"



DETAIL "B"



DETAIL "C"

* SALVAGE EXISTING MATERIALS IF PRACTICAL.
IF NOT, CONTRACTOR SHALL FURNISH MATERIAL AS REQUIRED.

BHP CODE	ITEM NO.	DESCRIPTION	MANUF.	CAT. NO.	QUANTITY			
					TM-G2			
	①*	3-1/2"x4-1/2"x7'-0" RED CEDAR POSTS			2			
	②	STANDARD DISTRIBUTION CROSSARM OR 3-1/2" MIN. DIA. RED CEDAR POST			2			
	③	2'-0" LENGTH OF CROSSARM (TREATED) OR 6" MIN. DIA. RED CEDAR POST			2			
	④	#9 GALV. WIRE			40'			
	⑤*	BARBED WIRE			20'			
	⑥*	STD. 48" FARM FENCE. #9 TOP & BOTTOM. #11 @ 6" SPACING			20'			
	⑦	STAPLES			80			
	⑧	20d NAILS			8			