

### Document Information Form

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From:

Person N/A

Company UTAH POWER & LIGHT COMPANY

Date Sent: N/A

Explanation:

SIX HAZARDOUS STRUCTURES TO EAGLES.

cc:

File in:

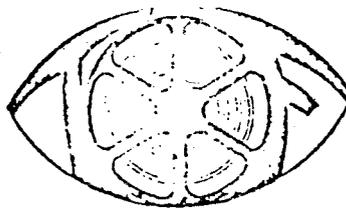
C1 015, 019, Incoming

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Date \_\_\_\_\_ For additional information

# TUNDRA



(208) 343-0212  
73 Eastway  
Boise, Idaho 83702

# FILMS

Conservation through visual education

## UTAH POWER & LIGHT COMPANY

### SIX HAZARDOUS STRUCTURES TO EAGLES <sup>1/</sup>

The six structures submitted for testing were divided into two groups. The first four to be considered did not require a trained eagle to be flown for a check because of other research completed on the subject.

Type "DS" UB-47833-C does not have a serious problem for any large birds under normal conditions of weather. However, during wet weather, the jumper going over the crossarm can be a hazard with contact to the pole ground wire. This hazard can be completely eliminated by covering the pole ground wire from two feet below the crossarm and three feet above it. In this way, the entire structure would be safe and useful to all birds of prey because it has both a clear top for resting and hunting from as well as a crossarm with a high pole going above it. The high pole above the cr

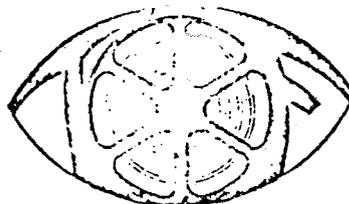
sun and during hc  
the crossarm inst  
the desired perc)

File in:  
 Confidential  
 Shelf  
 Expandable  
Refer to Record No. 0002 Date \_\_\_\_\_  
In Cl. 015, 019, Incoming  
For additional information

ection from the  
shade provided on  
pole which is usually

<sup>1/</sup> Morlan W. Nelson, 73 East Way, Boise, Idaho, 83702

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<sup>1/</sup> Morlan W. Nelson, 73 East Way, Boise, Idaho, 83702

The distance between the jumper going over the crossarm and the pole ground wire is over four feet. This means that even the largest eagle could not make a skin-to-skin contact with a conductor and the ground wire. Therefore, the only hazard would be in wet weather and a minimum of insulation above and below the crossarm, as stated, would make the structure entirely safe.

Type "YS" UB-51553 is a safe structure on the top portion carrying the high voltage but the distribution underbuild using a crossarm is dangerous because two conductors are on one side of the crossarm. The pole ground wire is also a problem near this crossarm. It should be insulated for two feet below the arm and three above it.

The brace for the crossarm in this drawing is metal and seems to be grounded to the pole ground wire. If this is true, the head of the bolt holding the brace would have to be covered. If that bolt were not insulated, even small raptors would be in danger by touching the grounded bolt and the nearest conductor.

A standard inverted V guard placed between the two conductors on the one side of the arm would force birds to the safe side as long as the pole ground wire was insulated along with the crossarm bolts on both sides of the crossarm.

Three points have to be met to make the structure safe; the ground wire insulated, as stated, the crossarm bolts either not grounded or covered, and the inverted V to force birds to the safe side of the crossarm.

Type "HP" UB-42395-C is safe on the top portion carrying high voltage. The underbuild distribution configuration is dangerous.

Exactly the same points are to be considered in this cross-arm as described above.

Three points have to be considered to make this portion of the structure safe; the pole ground wire insulated for three feet above and two feet below the crossarm, the crossarm bolts either not grounded or covered, and the inverted V guard placed between the two conductors on one side of the crossarm to force the birds to the safe side.

Type "Star Burst" UB-61194 is a safe structure as it is because it is impossible for large birds to complete a circuit. The insulators on this structure are very large and do not offer a perch and the top of the pole is an excellent perch with no hazard to the birds.

Type "IS" TUB-63038 is a safe structure as it is designed. The trained eagle was flown to the crossarm under different wind conditions to see if there was a possibility of a hazard. The structure is safe as it is even if the crossarm brace bolts were grounded. This is true because the birds, in landing, cannot touch the conductors below the crossarm and the pole ground wire or a grounded bolt.

The center conductor is so high above the crossarm that it is impossible for an eagle to touch the conductor and the grounded base to the insulator or the ground wire. The vertical

configuration of the center phase, insulator base and ground wire on one side and nothing on the other, makes the structure safe even under wet-feather conditions. The wooden brace for the crossarm makes this true as the bolt for the brace is not grounded.

Type "I" UB-32340-C is a safe structure with one correction. The pole ground wire should be insulated for two feet below and three feet above the crossarm. This would shield the bolts through the center of the pole at the crossarm as well as the ground wire.

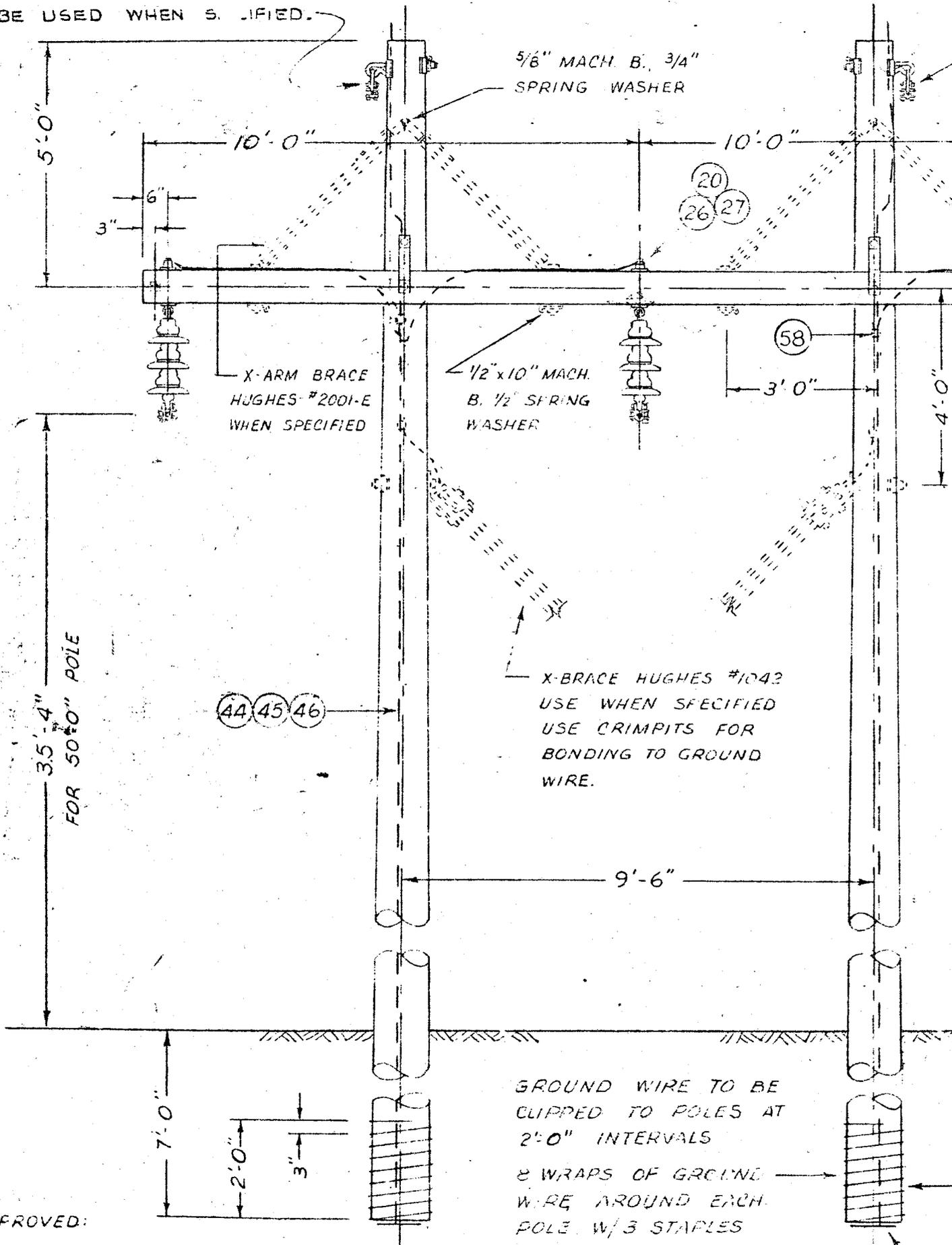
A trained eagle was flown to the structure under different wind conditions and angle of approach. No conditions were found where there was the possibility of the bird's wings touching one conductor and the ground wire. This flying was completed in dry weather, the only time trained or wild eagles would fly, and would not have been a problem for feathers touching at the 46K.V. or even 69.5K.V.

The only reason for insulating the pole ground wire is for safety during wet weather when an eagle, drying out, might spread its wings to dry and touch one conductor and the pole ground wire. This is a situation where the structure may be safe as it is, but the cost of making certain, by insulating the pole ground wire, may be worth the expense, even with this low hazard.

Our research with feather conductivity establishes this structure as low-hazard. The same work also points out that very cheap insulation would protect the birds from making two contacts.

It is not necessary to have the same insulation as required for humans under these conditions, and therefore, I recommend that the pole ground wires be covered for five feet as stated.

SECOND SHIELD WIRE CONNECTION  
TO BE USED WHEN SPECIFIED.



APPROVED:

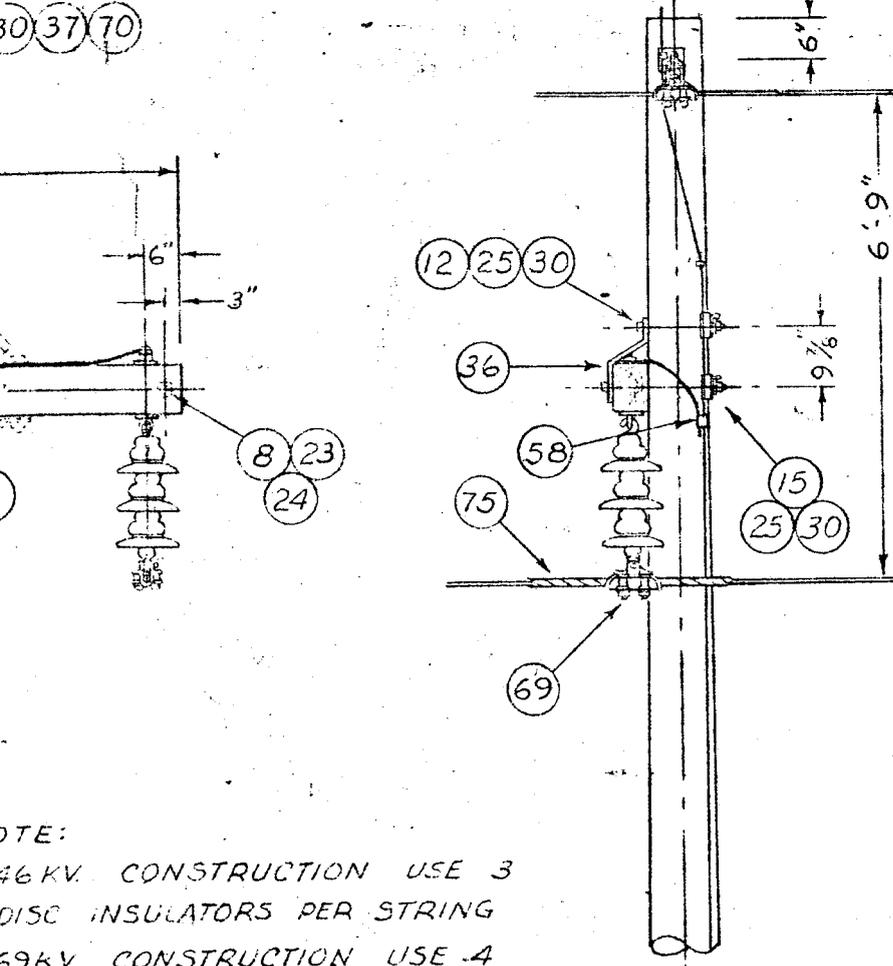
*H. B. ...*

CHIEF ENGINEER

DRAWN BY  
CHECKED BY  
CORRECT

(48)

BILL OF MATERIAL



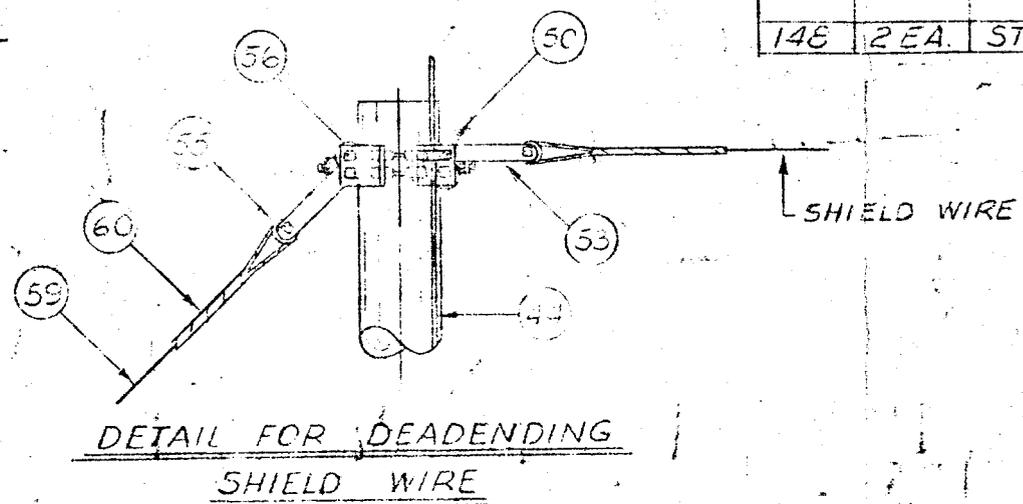
NOTE:  
 46KV CONSTRUCTION USE 3 DISC INSULATORS PER STRING  
 69KV CONSTRUCTION USE 4 DISC INSULATORS PER STRING

CROSSARM TO BE GROUNDED AS SHOWN (FOR BONDING USE CRIMPTS)

ALL BOLTS 1/2" D. OR LARGER TO BE DRIVE POINT UNLESS FACTORY ASSEMBLED

ITEM	QTY	DESCRIPTION
1	2 EA	POLES, WESTERN RED
2	1 EA	6" x 8" x 20'-0" S4S FIR
8	2 EA	1/2" x 7" MACHINE BOLT
12	2 EA	3/4" x 12" MACHINE BOL
15	2 EA	3/4" x 18" MACHINE BO
20	3 EA	3/4" x 10" SHOULDEREYE
23	2 EA	1/2" ROUND WASHER
24	2 EA	1/2" SPRING WASHER
25	6 EA	3/4" SPRING WASHER
26	3 EA	3/4" WASHER NUT
27	3 EA	3/4" LOCKNUT
30	6 EA	4" SQ. CURVED WASHER
36	2 EA	X-ARM SUPPORT BRA
37	2 EA	SHIELD WIRE BRACK
44	200FT	POLE GROUND WIRE
45	50EA	GROUND WIRE CLIPS
46	60EA	10d GALV. BOX NAILS
47	6 EA	1 3/4" STAPLES
48	2 EA	GROUND BUTT PLAT
58	2 EA	CABELOK CRIMPIT
67	9-12	10" DISC INSULATOR
68	3 EA	SUSPENSION HOOK
69	3 EA	SUSPENSION CLAMP W/
70	2 EA	SUSPENSION CLAMP C
75	3SETS	PREFORMED ARMOR

BILL OF MATERIAL FOR DEAD		
50	2 EA	4 WAY WIRE BAND W/
53	4 PR	CONNECTING LINKS 9
55	4 EA	GUY ROLLER
56	4 PR	POLE BAND SPACER W
59		H.S. STEEL GUY STRAIN
60	8 EA	PREFORMED GUY GR
63	2 EA	GUY STRAIN INSULA
65	2 EA	ANCHOR, ROD, & GUY
146	2 EA	STRANDWISE



46 KV.  
 LONG S  
 UTAH POWER  
 SALT  
 SCALE: NONE

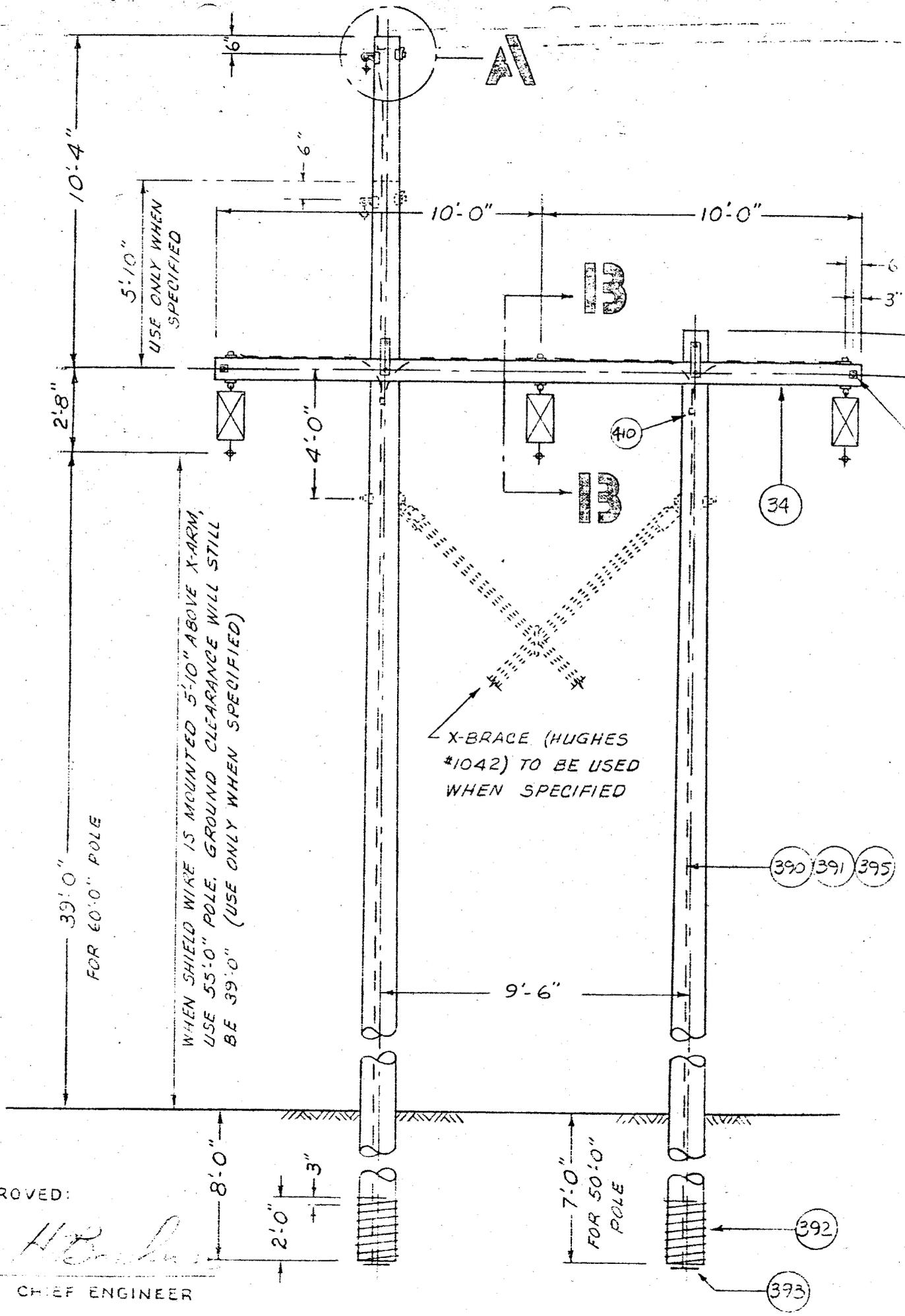
8-1-73 / REMEMBERED BILL OF MAT / JTD  
 3-10-71 REVISED & ADD BILL OF MAT. HLN.

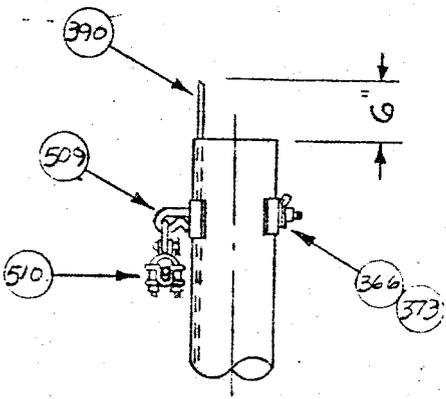
DRAWN BY	EMM
CHECKED BY	DIMC
CORRECT	

APPROVED:

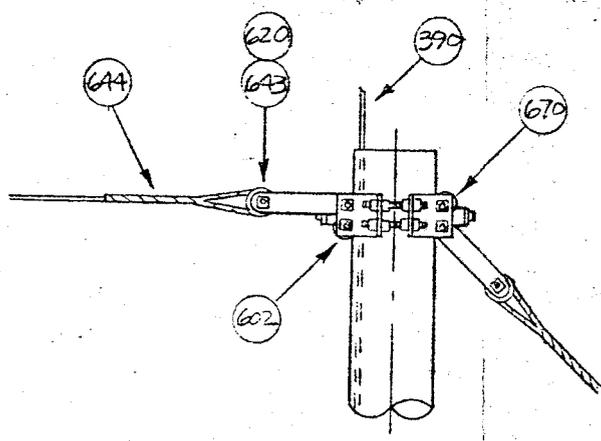
*H. B. ...*

CHIEF ENGINEER

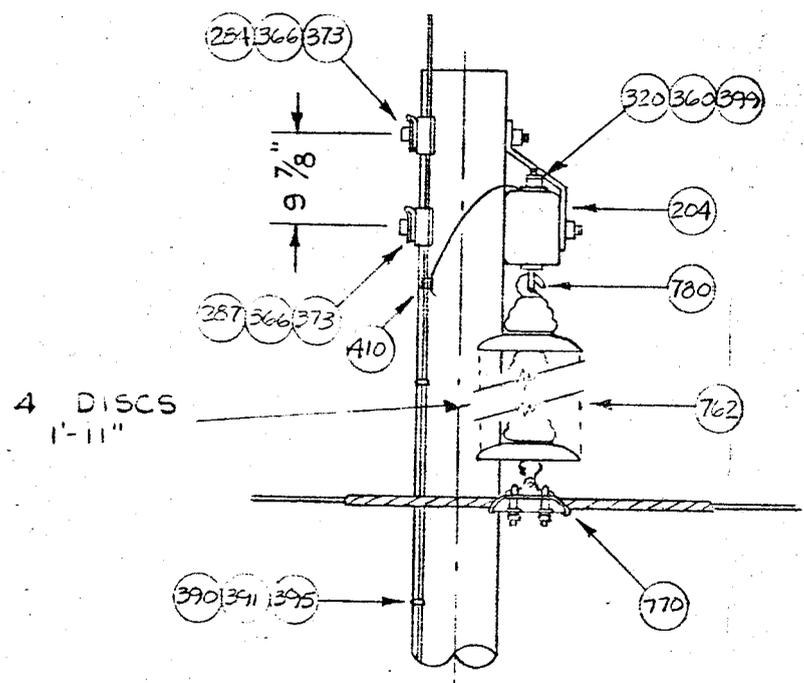




DETAIL A



DETAIL FOR DEADENDING SHIELD WIRE



DETAIL 13-13

BILL OF		
ITEM	QTY.	DESCR
1	2	POLE, WES
34	1	FIR CROSSARM
204	2	CROSSARM
251	2	1/2" x 7" MACH
284	2	3/4" x 12" MACH
287	2	3/4" x 18" MACH
320	3	3/4" x 10" SHO
359	2	1/2" ROUND
360	3	3/4" WASHER
365	2	1/2" SPRING
366	5	3/4" SPRING
373	5	4" SQ. CURV
390	210 FT	GROUND WIR
391	50	GROUND WI
392	6	1 3/4" STAPL
395	55	10 d BOX N
398	2	BUTT PLAT
399	3	3/4" LOCKN
410	2	CRIMPIT
509	1	SHIELD WI
510	1	SUSPENSIO
762	12	10" DISC
770	3	SUSP CLAMP
780	2	SUSPENSION

MATERIAL FOR

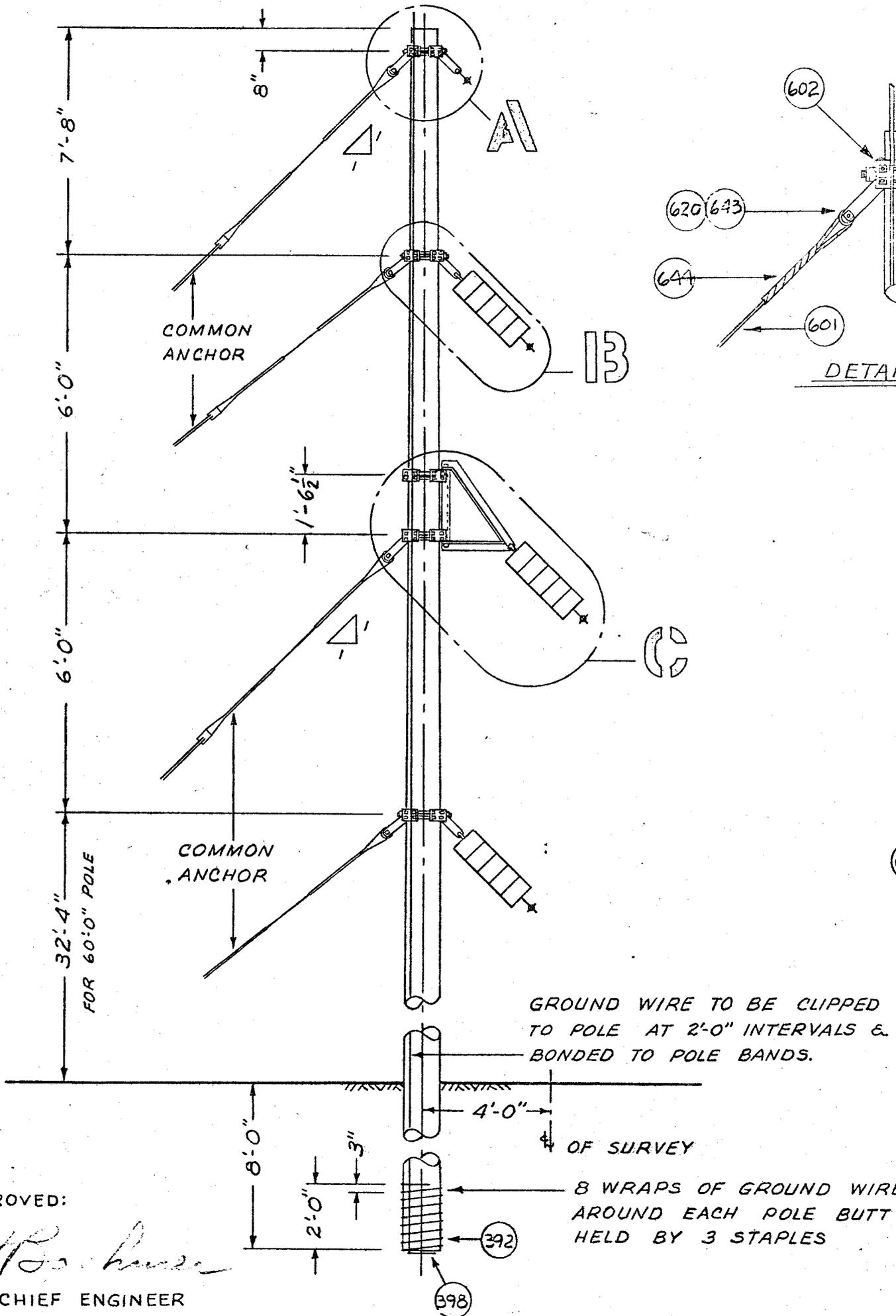
602	1	POLE BAND V
622	2 PR.	CONNECTING
643	2	GUY ROLLER
644	4	PREFORMED
648	1	GUY INSULA
654	1	STRANDVISE
655	1	ANCHOR ROD
656	1	GUY PROTECT
657	1	ANCHOR, DOM
670	4	SPACER WASH

ROUND CROSSARM AS SHOWN UNLESS OTHERWISE SPECIFIED.  
 GROUND WIRE CLIPPED TO POLE AT 2'-0" INTERVALS  
 AND BONDED TO SHIELD WIRE BRACKET, 8 WRAPS  
 AROUND EACH POLE BUTT HELD BY 3 STAPLES.  
 ALL BOLTS 1/2" DIA. OR LARGER TO BE DRIVE POINT  
 UNLESS FACTORY ASSEMBLED.  
 ALL METAL TO WOOD FITTINGS TO BE TAPPED.  
 ALL LOCKNUTS TO BE M.F.

46 K.V.  
 TYPE  
 LONG S  
 UTAH POWER  
 SALT  
 SCALE: NONE

B-1-73/RENUMBER BILL OF MATERIALS  
 7-8-71 / ADD. B/M / HLN

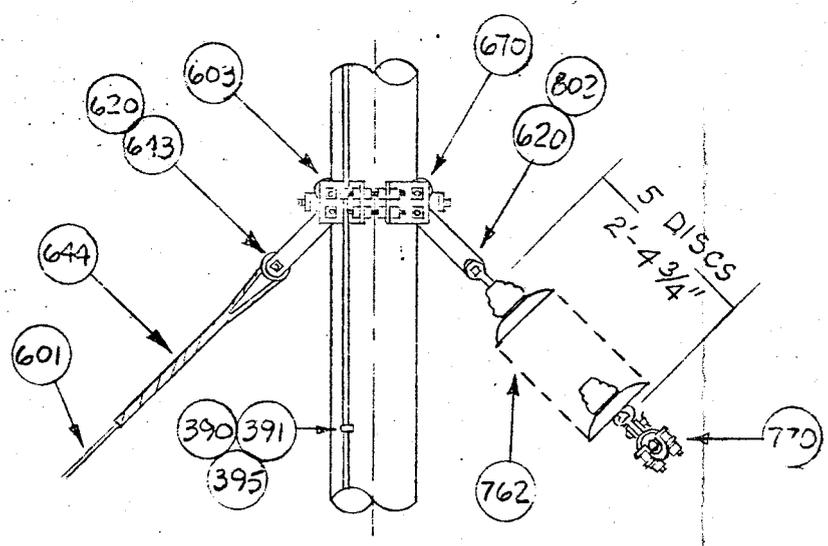
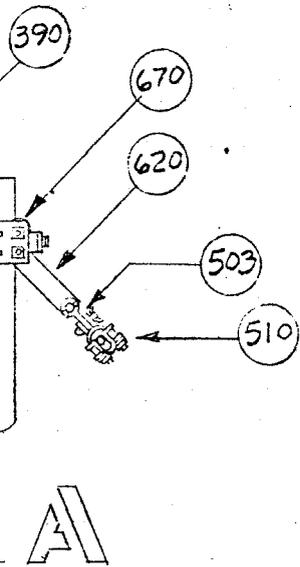
DRAWN	DM
CHECKED	FILE
CORRECT	FILE



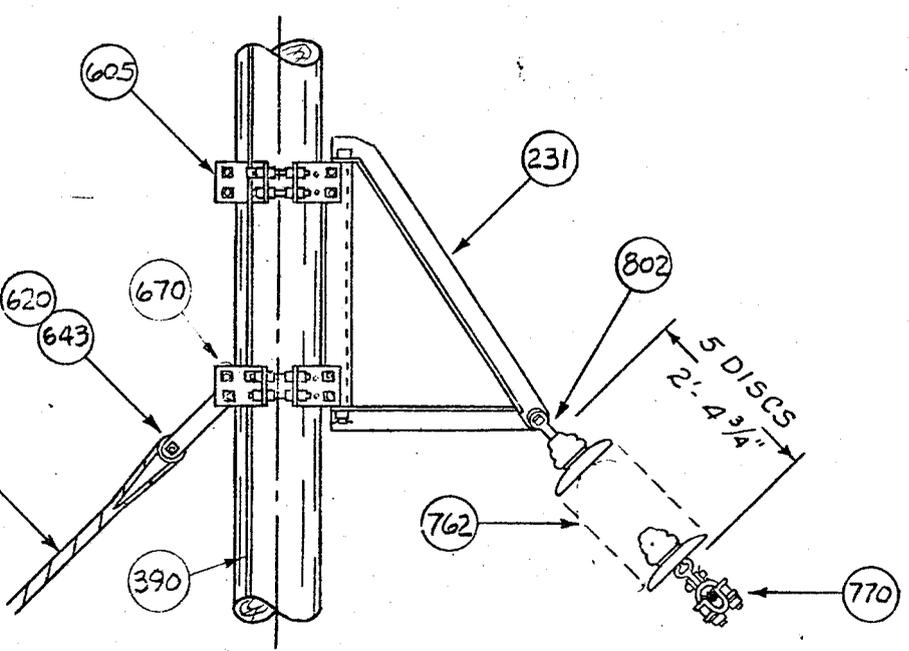
APPROVED:

*H. P. Hansen*

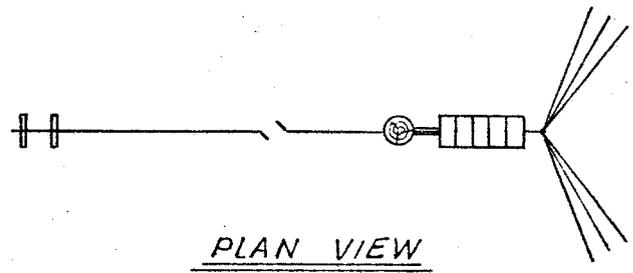
CHIEF ENGINEER



DETAIL B



DETAIL C



PLAN VIEW

BILL OF		
ITEM	QTY.	DESC
1	1	POLE, V
231	1	SWINGING
390	130FT	GROUND
391	35	GROUND
392	3	1 3/4"
395	40	10 d GA
398	1	BUTT P
503	1	5/8" SHA
510	1	SUSPEN
601	-	EHS, ST
602	1	POLE BA
603	2	POLE BAN
605	2	POLE BAN
620	7 PR.	CONNECT
643	4	GUY RO
644	12	PREFORME
654	4	STRAND
655	2	ANCHOR
656	2	GUY PRO
657	2	ANCHOR
670	14	SPACER
762	15	10" DIS
770	3	SUSP. CL
802	3'	Y-CLEVI

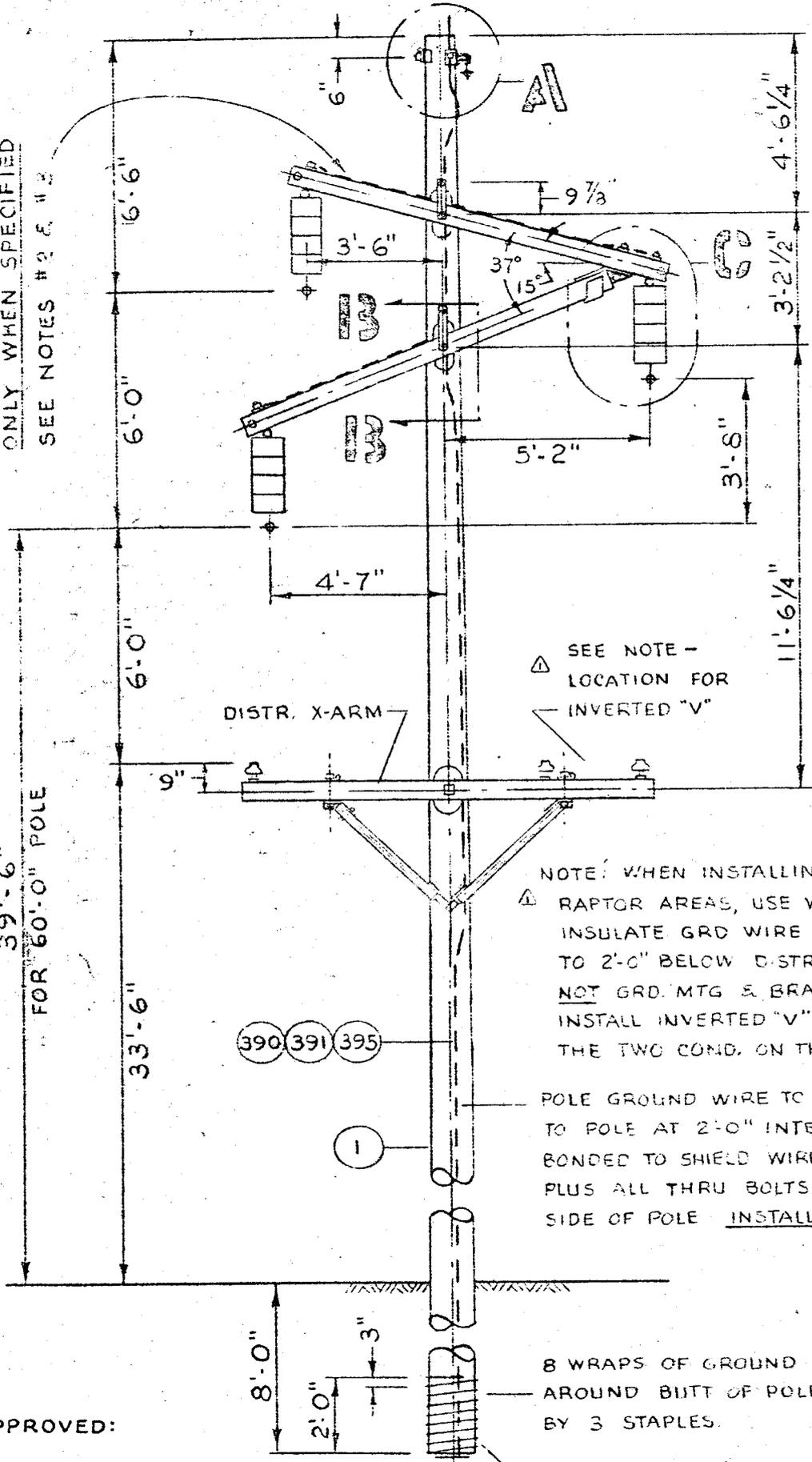
46 K.V.  
 T  
 MEDIUM  
 UTAH POW  
 SALT  
 SCALE: NONE

Δ 3-31-80 REVISED DISTR TO ACCOMMODATE RAPTORS *DM*

DRAWN BY	<i>DM</i>
CHECKED BY	<i>DJMC</i>
CORRECT	<i>HQZ/DJMC</i>

GRD. WIRE ALONG X-ARM  
 ONLY WHEN SPECIFIED  
 SEE NOTES #2 & #3

39'-6" FOR 60'-0" POLE



SEE NOTE -  
 LOCATION FOR  
 INVERTED "V"

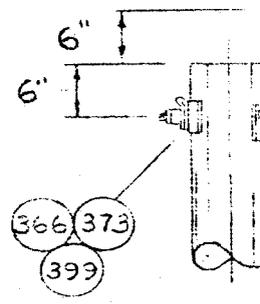
NOTE: WHEN INSTALLING DISTR IN  
 Δ RAPTOR AREAS, USE WOOD BRACE,  
 INSULATE GRD WIRE 3'-0" ABOVE  
 TO 2'-0" BELOW DISTR X-ARM, DO  
 NOT GRD. MTG & BRACE BOLTS,  
 INSTALL INVERTED "V" BETWEEN  
 THE TWO COND. ON THE ONE SIDE

POLE GROUND WIRE TO BE CLIPPED  
 TO POLE AT 2'-0" INTERVALS &  
 BONDED TO SHIELD WIRE BRACKET  
 PLUS ALL THRU BOLTS ON BELLY  
 SIDE OF POLE INSTALL AS SHOWN

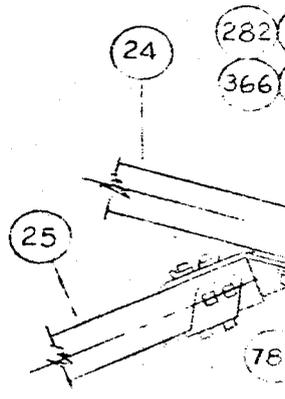
8 WRAPS OF GROUND WIRE  
 AROUND BIIT OF POLE HELD  
 BY 3 STAPLES.

APPROVED:

*[Signature]*  
 TRANS. ENGINEER



DETAIL

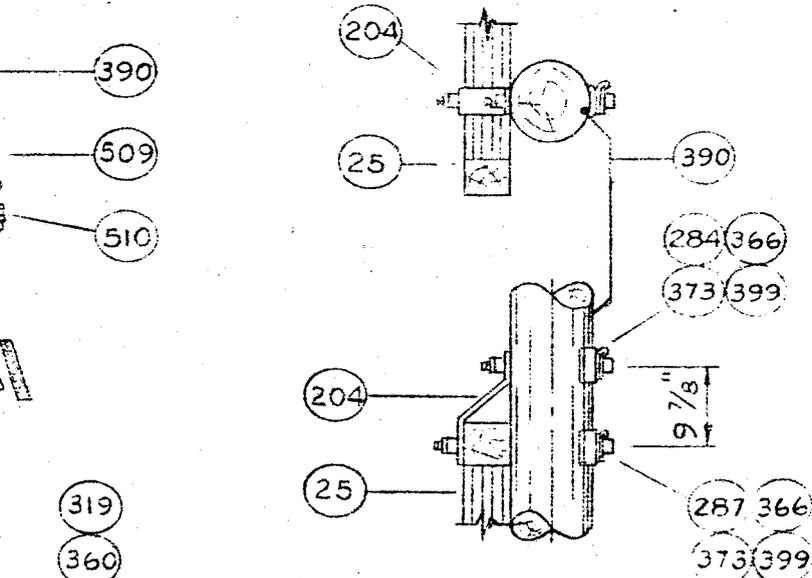


DETAIL

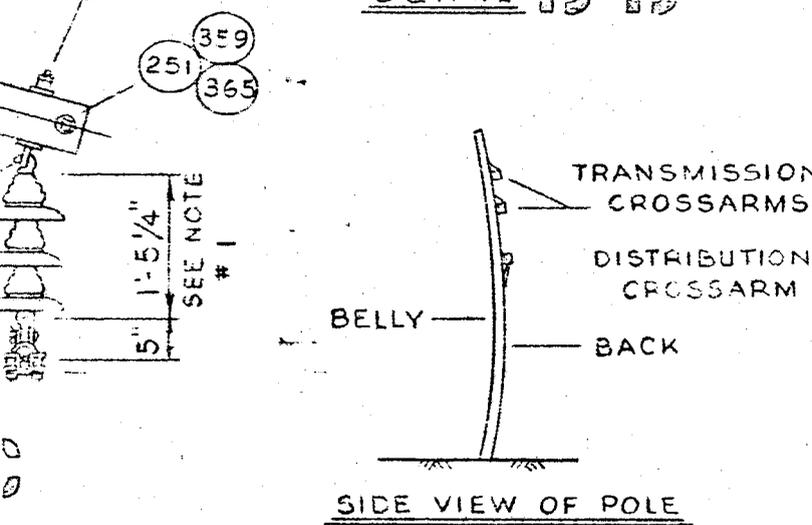
- 251
- 359
- 365
- 302
- 762
- 770

# BILL OF MATERIALS

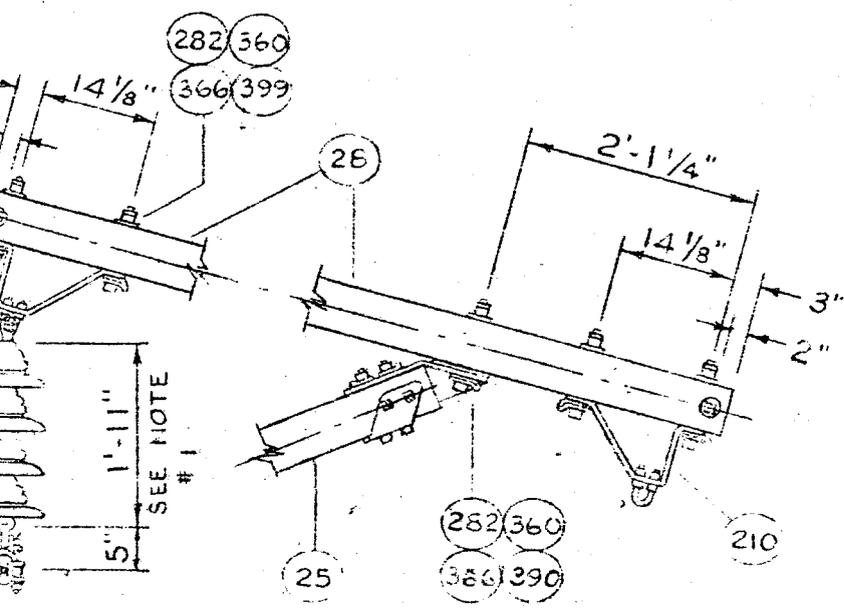
ITEM	QUANTITY		DESCRIPTION
	YS	W/BRKT	
1	1 EA.	1 EA.	POLE, WESTERN RED
24	1 EA.	-	6" x 6" x 10'-0" CROSSARM
25	1 EA.	1 EA.	6" x 6" x 10'-0" CROSSARM
28	-	1 EA.	6" x 6" x 12'-0" CROSSARM
204	2 EA.	2 EA.	CROSSARM SUPPORT
210	-	2 EA.	ANGLE BRACKET
251	3 EA.	3 EA.	1/2" x 7" MACHINE BOLT
282	1 EA.	5 EA.	3/4" x 8" MACHINE BOLT
284	2 EA.	2 EA.	3/4" x 12" MACHINE BO
287	2 EA.	2 EA.	3/4" x 18" MACHINE BO
319	3 EA.	1 EA.	3/4" x 8" SHOULDER EYE
359	3 EA.	3 EA.	1/2" ROUND WASHER
360	4 EA.	6 EA.	3/4" WASHERNUT
365	3 EA.	3 EA.	1/2" SPRING WASHER
366	6 EA.	10 EA.	3/4" SPRING WASHER
373	5 EA.	5 EA.	4" SQ. CURVED WASHER
390	110 FT.	110 FT.	GROUND WIRE
391	26 EA.	26 EA.	GROUND WIRE CLIP
392	3 EA.	3 EA.	1 3/4" STAPLES
395	31 EA.	31 EA.	10d GALV. BOX NAILS
398	1 EA.	1 EA.	GROUND BUTT PLATE
399	9 EA.	11 EA.	3/4" LOCKNUT
509	1 EA.	1 EA.	SHIELD WIRE BRACKET
510	1 EA.	1 EA.	SUSPENSION CLAMP
762	▲	▲	10" DISC INSULATORS
770	3 EA.	3 EA.	SUSPENSION CLAMP
780	3 EA.	7	SUSPENSION HOOK
802	-	3 EA.	"Y" CLEVIS BALL



**DETAIL 13-13**



**SIDE VIEW OF POLE**



**ANGLE BRACKET DETAILS**  
USE ONLY WHEN SPECIFIED

- ▲ 1. USE 3 DISC INSULATORS PER STRING FOR ...
- USE 4 DISC INSULATORS PER STRING FOR ...
- 2. USE 5 DISC INSULATORS WHEN CROSSARM ...
- 3. WHEN GROUNDING HARDWARE ON CROSSARM, BOND TO RUN ADDITIONAL PIECE OF ...
- ARM, BOND END FITTING & SHOULDER ...
- GROUNDING TO BE USED ONLY WHEN ...
- TELEPHONE UNDERBUILT.

46/69 K.V.
TY TANGENT
UTAH POWER SALT L
SCALE: NONE

REDRAWN FROM  
MAR 11, 1966