

APPENDIX B:
HALLETTSVILLE CONSTRUCTION SPECIFICATIONS

(Separate PDF Document)

City of Hallettsville – General Construction Specifications

1. Majority of Specifications reference 2002 LCRA Distribution Line Design specifications and RUS standard underground construction specifications.
2. Transformers are located above the neutral.
3. On three phase taps, the fused cutouts are mounted on the dead-end arm.
4. All framing to be installed as fiberglass and not wood unless noted otherwise.
5. Single cutout/arrestor units are mounted on an 18” fiberglass standoff bracket.
6. All poles are to be buried ten percent plus three feet unless otherwise noted.
7. All existing secondary services to be re-used unless otherwise noted.
8. Existing V-phase overhead poles with tangent framing to be constructed with three-phase framing units. City of Hallettsville to pull third phase at later date to be determined.
9. Existing V-phase overhead transformer banks to be replaced with three-phase overhead banks. Third transformer to remain idle on V-phase overhead until the City of Hallettsville pulls-in third phase at later date to be determined.
10. Anchor assemblies use (TAF-150-36) Double Helix Anchor, (TAE-150-42) Anchor Extension Rod, and (TAA-150-103) Triple Eye Guy Adapter.

Miscellaneous Construction Units

1. B7 (10): 7.2/12.5 KV. PRIMARY, 2-PHASE, 10FT CROSSARM CONSTRUCTION DEADEND (SINGLE) (ALL CONDUCTORS)
2. B8 (10): 7.2/12.5 KV. PRIMARY, 2-PHASE, 10FT CROSSARM CONSTRUCTION DEADEND (DOUBLE) (ALL CONDUCTORS)
3. F-40K: Barrel Fuse for Cutout - 40A, K-Curve
4. F-50K: Barrel Fuse for Cutout - 50A, K-Curve
5. F-65K: Barrel Fuse for Cutout - 65A, K-Curve
6. C7 (10): 7.2/12.5 KV. PRIMARY, 3-PHASE, 10FT CROSSARM CONSTRUCTION DEADEND (SINGLE) (ALL CONDUCTORS)
7. C7X: 7.2/12.5 KV. PRIMARY, 3-PHASE, CONSTRUCTION DEADEND OFF BACK OF EXISTING CROSSARM(SINGLE) (ALL CONDUCTORS)

8. CT-400:5: CT PACKAGE - OVERHEAD - 400:5 RATIO
9. M32-4: Pole Set with Foam Backfill
10. M26-5-2C: SECURITY LIGHT INSTALLATION GUIDE - 2FT COBRAHEAD
11. M26-5-4C: SECURITY LIGHT INSTALLATION GUIDE - 4FT COBRAHEAD
12. M9-13-600: 7.2/12.5 KV. THREE PHASE 600kVAR CAPACITOR ASSEMBLY (FIXED)
13. PJ#1/0-1/0: PREFORM JUMPER, #1/0 - #1/0
14. PJ#336-1/0: PREFORM JUMPER, #336 - #1/0
15. PJ#336-336: PREFORM JUMPER, #336 - #336
16. PJ-#2-2: PREFORM JUMPER, #2 - #2
17. PJ-#2-4: PREFORM JUMPER, #2 - #4
18. PJ-#4-2: PREFORM JUMPER, #4 - #2
19. PJ-#4-4: PREFORM JUMPER, #4 - #4
20. PJ-#4-4HDCU: PREFORM JUMPER, #4 - #4HDCU
21. PJ-#4HDCU-4HDCU: PREFORM JUMPER, #4HDCU - #4HDCU
22. PJ-#6-6: PREFORM JUMPER, #6 - #6
23. PJ-#6-6HDCU: PREFORM JUMPER, #6 - #6HDCU
24. PJC#1/0: PREFORM JUMPER TO CUTOUT OFF #1/0
25. PJC#2: PREFORM JUMPER TO CUTOUT OFF #2
26. PJC#336: PREFORM JUMPER TO CUTOUT OFF #336
27. PJC#4: PREFORM JUMPER TO CUTOUT OFF #4
28. PJC-#4HDCU: PREFORM JUMPER TO CUTOUT OFF #4HDCU
29. PT-2.5:1: PT PACKAGE - OVERHEAD - 2.5:1 RATIO
30. WR-159: CONN, PG SQUEEZON #2-#6

31. WR-189: CONN, PG SQUEEZON #1/0-#6
32. WR-279: Connector, PG Squeeze-On, #2/0-2/0 Fit (#1/0-1/0)
33. WR-815: Connector, PG Squeeze-On, #6-477 Fit (Large Wire to Ground)
34. WR-885: Connector, PG Squeeze-On, #4/0-336 Fit (#336-336)

McCord Engineering, Inc., Firm # F-2664
 916 Southwest Parkway, East
 College Station, Texas 77840

31-Mar-2026

System Designation : City of Hallettsville
 Location : 2026 Pole Replacement, Glen's, and PepsiCo
 Work Order Number : 7204

ASSEMBLY UNIT SUMMARY
New Construction Units (N)

WIRE, TRENCH, AND CONDUIT TOTALS			UNIT TOTALS	
<u>WIRE TYPE</u>	<u>FOOTAGE</u>		<u>PRIMARY UNIT</u>	<u>QUANTITY</u>
#1/0 ACSR	1372		35-4	2
#2 TPLX	225		40-1	1
#4/0 QPLX	398		40-3	5
			45-2	4
			45-3	24
			50-1	2
			B7	5
			B7 (10)	1
			B8	1
			B8 (10)	1
			C1	13
			C1-2	4
			C7	3
			C7 (10)	5
			C7X	1
			C8X	5
			CT-400:5	15
			E2-2H	2
			E3-10	13
			E3-4H	1
			E9-2H	15
			F-40K	7
			F-50K	1
			F-65K	6
			F1-4	13
			G310X-15	4
			G310X-25	1
			G310X-37.5	1
			G311X-75	2
			G312X-50	1

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WIRE, TRENCH, AND CONDUIT TOTALS		UNIT TOTALS	
<u>WIRE TYPE</u>	<u>FOOTAGE</u>	<u>PRIMARY UNIT</u>	<u>QUANTITY</u>
		G35X-25	2
		K14C	48
		M2-11	22
		M2-12	16
		M2-15	1
		M22-1	10
		M26-5-2C	10
		M26-5-4C	1
		M3-15W	1
		M32-4	40
		M40-10	58
		M40-1A	8
		M40-STG	30
		M5-1	10
		M5-10	10
		M5-15	115
		M5-2	6
		M5-25	1
		M5-31	8
		M5-32	10
		M5-4	26
		M52-3	4
		M8-11	1
		M8-12	3
		M8-6	1
		M8-9	1
		M9-13-600	1
		MCP	36
		MNB	2
		PJ#1/0-1/0	4

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<u>WIRE TYPE</u>	<u>FOOTAGE</u>	<u>PRIMARY UNIT</u>	<u>QUANTITY</u>
		PJ#336-1/0	5
		PJ#336-336	1
		PJ-#2-2	7
		PJ-#2-4	4
		PJ-#4-2	3
		PJ-#4-4	12
		PJ-#4-4HDCU	3
		PJ-#4HDCU-4HDCU	2
		PJ-#6-6	3
		PJ-#6-6HDCU	1
		PJC#1/0	8
		PJC#2	11
		PJC#336	18
		PJC#4	5
		PJC-#4HDCU	2
		PT-2.5:1	3
		UA2	1
		UC2-1	1
		UGPB1.1	3
		WR-159	123
		WR-189	9
		WR-279	12
		WR-815	15
		WR-885	8

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ASSEMBLY UNIT SUMMARY
Retire Units (R)

WIRE, TRENCH, AND CONDUIT TOTALS			UNIT TOTALS	
<u>WIRE TYPE</u>	<u>FOOTAGE</u>		<u>PRIMARY UNIT</u>	<u>QUANTITY</u>
#1/0 HDCU	432		15-3	1
#1/0 QPLX	316		15-4	1
#2 TPLX	506		25-6	2
#4 ACSR	569		30-6	1
#4/0 QPLX	312		35-4	1
			35-5	3
			40-3	5
			40-4	20
			45-3	4
			B1	3
			B7	3
			B7B	3
			B8	2
			C1	9
			C1-1	1
			C1-2	1
			C1BX	1
			C4-1	1
			C5-1	1
			C7	7
			C7X	1
			C8	1
			C8X	3
			CT-400:5	15
			E1-2	15
			E2-2	7
			E3-10	9
			E3-4	1
			F-40K	6
			F-50K	1

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ASSEMBLY UNIT SUMMARY
Retire Units (R)

WIRE, TRENCH, AND CONDUIT TOTALS		UNIT TOTALS	
<u>WIRE TYPE</u>	<u>FOOTAGE</u>	<u>PRIMARY UNIT</u>	<u>QUANTITY</u>
		F1-2	14
		G210X-10/25	2
		G210X-15/25	1
		G210X-15/37.5	1
		G210X-25/15	1
		G210X-50	1
		G35X-25	2
		G36X-15	1
		G385X-100/167/100	1
		G385X-50	1
		K11	1
		K14C	80
		K15C	1
		K16C	4
		K17	1
		M2-11	17
		M2-12	16
		M2-15	1
		M26-5-2S	11
		M26-5-4C	1
		M3-15W	1
		M40-10	41
		M40-1A	4
		M40-DTG	3
		M40-STG	10
		M5-1	2
		M5-15	103
		M5-21	1
		M5-25	3
		M5-31	2

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ASSEMBLY UNIT SUMMARY
Retire Units (R)

WIRE, TRENCH, AND CONDUIT TOTALS			UNIT TOTALS	
<u>WIRE TYPE</u>	<u>FOOTAGE</u>		<u>PRIMARY UNIT</u>	<u>QUANTITY</u>
			M5-32	2
			M5-33	8
			M5-4	34
			M5-9	2
			M52-3	3
			M8-11	1
			M8-12	2
			M8-6	1
			PT-2.5:1	3
			UA2	1
			UC2-1	1

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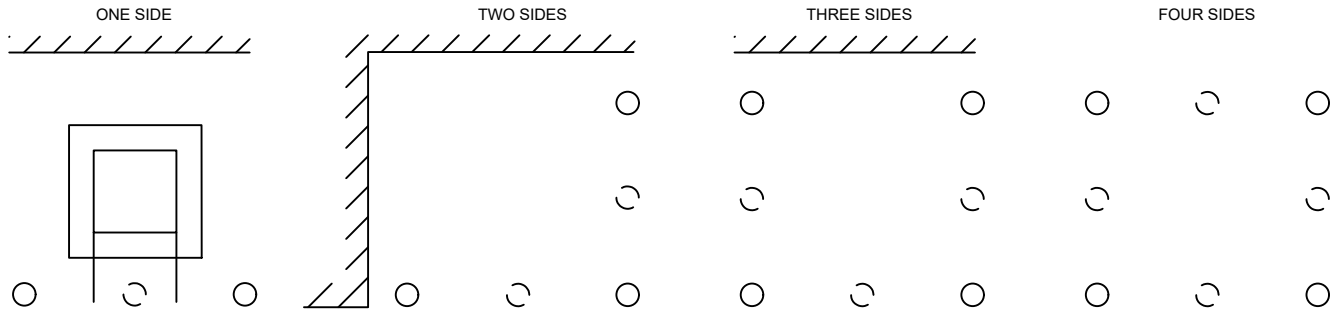
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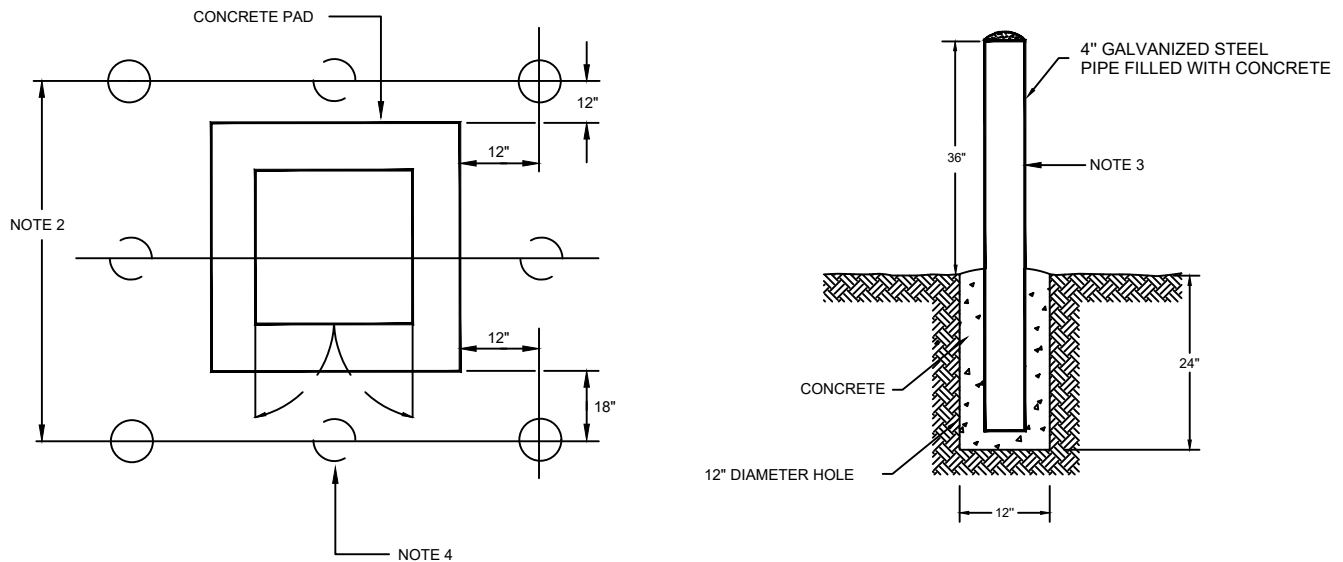
ASSEMBLY UNIT SUMMARY
Transferred Units (Q)

WIRE, TRENCH, AND CONDUIT TOTALS			UNIT TOTALS	
<u>WIRE TYPE</u>	<u>FOOTAGE</u>		<u>PRIMARY UNIT</u>	<u>QUANTITY</u>
			35-4	1
			DRS	41
			E2-2	1
			M52-3	35
			M8-6X	1
			M8-9	1
			MTC	51

GUARD POST INSTALLATION



TYPICAL LAYOUT FOR TRAFFIC AND PARKING



Notes:

1. Install guard post where protection from damage due to vehicular traffic is needed.
2. Distance between posts should not exceed 4 feet. Add additional where necessary to meet this condition.
3. Increase height to 48" and depth to 36" in truck loading areas, and increase size to 6" galvanized pipe.
4. Verify location of post in front of transformer to allow for door opening. Bollard needs to be removable. Install sleeve in concrete to allow for this standard.



CITY OF HALLETTSVILLE

4" Galvanized Steel

Protection Bollard

PAGE 1 OF 1

DRAWING NAME:

HA-1

SCALE: NTS	DATE: 03-21-2026
DRAWN BY: JAM	REV. BY: -

UGPB1.1

II. SPECIFICATIONS FOR CONSTRUCTION

A. SPECIFICATIONS FOR OVERHEAD ELECTRIC DISTRIBUTION

1. General

All construction work shall be done in a thorough and workman-like manner in accordance with the Staking Sheets, Plans and Specifications, and the Construction Drawings.

The latest Edition of the National Electrical Safety Code shall be followed except where local regulations are more stringent, in which case local regulations shall govern.

2. Distributing Poles

In distributing the poles; large, choice, close-grained poles shall be used for transformer, deadend, angle and corner poles.

3. Pole Setting

The minimum depth for setting poles shall be as follows:

Length of Pole (feet)	Setting in Soil (feet)	Setting in All Solid Rock (feet)
20	4.0	3.0
25	5.0	3.5
30	5.5	3.5
35	6.0	4.0
40	6.0	4.0
45	6.5	4.5
50	7.0	4.5
55	7.5	5.0
60	8.0	5.0

“Setting in Soil” specifications shall apply:

- a. Where poles are to be set in soil.
- b. Where there is a layer of soil of more than two (2) feet in depth over solid rock.
- c. Where the hole in solid rock is not substantially vertical or the diameter of the hole at the surface of the rock exceeds approximately twice the diameter of the pole at the same level.

“Settings in All Solid Rock” specifications shall apply where poles are to be set in solid rock and where the hole is substantially vertical, approximately uniform in diameter and large enough to permit the use of hydraulic or pneumatic tamping equipment the full depth of the hole.

Where there is a layer of soil two (2) feet or less in depth over solid rock, the depth of the hole shall be the depth of the soil in addition to the depth specified under “Setting in All Solid

Rock" provided, however, that such depth shall not exceed the depth specified under "Setting in Soil".

On sloping ground, the depth of the hole always shall be measured from the low side of the hole.

Poles shall be set so that alternate crossarm gains face in opposite directions, except at terminals and deadends where the gains of the last two poles shall be on the side facing the terminals or deadend. On unusually long spans, the poles shall be set so that the crossarm comes on the side of the pole away from the long span. Where pole top pins are used, they shall be on the opposite side of the pole from the gains, with the flat side against the pole.

Poles shall be set in alignment and plumb. Poles shall be plumb after installation of conductor, adjusting guy tension as necessary.

Pole backfill must be thoroughly tamped the full depth with hydraulic or pneumatic tamping equipment. Excess dirt must be banked around the pole.

4. Grading of Line

When using high poles to clear obstacles such as buildings, foreign wire crossings, railroads, etc., there shall be no upstrain on pin-type insulators in grading the line each way to lower poles.

5. Guys and Anchors

Guys shall be placed before the conductors are strung and shall be attached to the pole as shown in the Construction Drawings.

All anchors and rods shall be in line with the strain and shall be so installed that approximately six inches of the rod remains out of the ground. In cultivated fields or other locations, as deemed necessary, the projection of the anchor rod above earth may be increased to a maximum of 12 inches to prevent burial of the rod eye. The backfill of all anchor holes must be thoroughly tamped the full depth.

When a cone anchor is used, the hole, after the anchor has been set in place, shall be backfilled with coarse crushed rock for two feet above the anchor, tamping during the filling with the remainder of the hole to be backfilled and tamped with dirt.

6. Locknuts

A locknut shall be installed with each nut, eyenut or other fastener on all bolts or threaded hardware such as insulator pins, upset bolts, double arming bolts, etc.

7. Conductors

Conductors must be handled with care. Conductors shall not be tramped on nor run over by vehicles. Each reel shall be examined and the wire shall be inspected for cuts, kinks, or other injuries. Injured portions shall be cut out and the conductor spliced. The conductors shall be pulled over suitable rollers or stringing blocks properly mounted on pole or crossarm if necessary to prevent binding while stringing.

The neutral conductor should be maintained on one side of the pole (preferably the roadside) for tangent construction and for angles not exceeding 30 degrees.

With pin-type insulators the conductors shall be tied in the top groove of the insulator on tangent poles and on the side of the insulator away from the strain at angles. Pin-type insulators shall be tight on the pins and on tangent construction the top groove must be in line with the conductor after tying in.

For neutral and secondary conductors on poles, insulated brackets (Material Item da) may be substituted for the single and double upset bolts on angles of 0° to 5° in locations known to be subject to considerable conductor vibration.

All conductors shall be cleaned thoroughly by wire brushing before splicing or installing a connector or clamp. For aluminum, the conductor shall be wire brushed, a suitable inhibitor liberally applied, and wire brushed a second time.

8. Splices and Dead-ends

Conductors shall be spliced and dead-ended as shown on the Construction Drawings. There shall be not more than one splice per conductor in any given span and splicing sleeves shall be located at least ten feet from the conductor support. No splices shall be located in Grade B crossing spans, and preferably not in the adjacent spans.

9. Taps and Jumpers

Jumpers and other leads connected to line conductors shall have sufficient slack to allow free movement of the conductors. Where slack is not shown on the Construction Drawings, it will be provided by at least two bends in a vertical plane, or one in a horizontal plane, or the equivalent. In areas where aeolian vibration occurs, special measures to minimize the effects of jumper breaks shall be used as specified.

All leads on equipment such as transformers, reclosers, etc., shall be a minimum of #6 copper conductivity. Where aluminum jumpers are used, a connection to an unplated bronze terminal shall be made by splicing a short stub of copper to the aluminum jumper using a suitable aluminum compression sleeve, OR by installing an approved connector suitable for the application.

10. Hot-Line Clamps and Connectors

Connectors and hot-line clamps suitable for the purpose shall be installed as shown on Guide Drawings. On all hot-line clamp installations, the clamp jumpers shall be installed so that they are permanently bonded to the load side of the line, allowing the jumper to be de-energized when the clamp is disconnected. This applies in all cases, even where the line layout is such that the tap line is in actuality the main back to the power source. Hot-line clamps shall only be attached to the main (tensioned) conductor utilizing stirrups.

11. Lightning Arrester Gap Settings

The external gap electrodes of lightning arresters, combination arrester-cutouts, and transformer-mounted arresters shall be adjusted to the manufacturers' recommended spacing. Care shall be taken that the adjusted gap is not disturbed when the equipment is installed.

12. Conductor Ties

Ties shall be in accordance with Construction Drawings. Hot-line ties shall not be used at grade "B" crossings.

13. Sagging of Conductors

Conductors shall be sagged in accordance with the conductor manufacturers' recommendations. All conductors shall be sagged evenly. A certified etched glass thermometer shall determine the air temperature at the time and place of sagging.

The sag of all conductors after stringing shall be in accordance with the conductor manufacturers' recommendation, except that a maximum increase of three inches of the specified sag in any span will be acceptable. However, under no circumstances will a decrease in the specified sag be allowed.

Sagging shall be avoided during inclement weather, and particularly in high winds. Unless approved by the Engineer, conductor shall not be left in stringing equipment longer than 24 hours prior to tensioning. Sagging of conductors shall be done within 4 hours of tensioning.

14. Secondary and Service Drops

Secondary conductors may be bare or covered wires or multi-conductor service cable. The conductors shall be sagged in accordance with the manufacturers' recommendations.

Conductors for secondary underbuild on primary lines will normally be bare except in those instances where prevailing conditions may limit primary span lengths to the extent that covered wires or service cables may be used. Service drops shall be covered wire or service cable.

Secondary and service drops shall be so installed as not to obstruct climbing space. There shall not be more than one splice per conductor in any span, splicing sleeves shall be located at least ten feet from the conductor support. Where the same covered conductors or service cable are to be used for the secondary and service drop, they may be installed in one continuous run.

15. Grounds

Ground rods shall be driven full length in undisturbed earth in accordance with the Construction Drawings. The top shall be at least 12 inches below the surface of the earth. The ground wire shall be attached to the rod with a clamp and secured to wood poles with staples, or to non-wood poles with suitable clamps. The staples on the ground wire shall be spaced two feet apart, except for a distance of eight feet above the ground and eight feet down from the top of the pole where they shall be six inches apart.

All equipment shall have at least two connections from the frame, case or tank to the multi-grounded neutral conductor.

The equipment ground, neutral wires, and lightning-protective equipment shall be interconnected and attached to a common ground wire.

16. Clearing right-of-way

In preparing the right-of-way, trees shall be removed, underbrush cleared and trees trimmed so that the right-of-way shall be clear from ground up and for the width required. Trees fronting each side of the right-of-way shall be trimmed symmetrically unless otherwise specified. Dead trees beyond the right-of-way, which would strike the line in falling, shall be removed. Leaning trees beyond the right-of-way which would strike the line in falling and which would require topping if not removed shall either be removed or topped except that shade, fruit, or ornamental trees shall be trimmed and not removed unless otherwise authorized.

17. Prefixes

I Denotes Removal – shall be before all units to be removed.

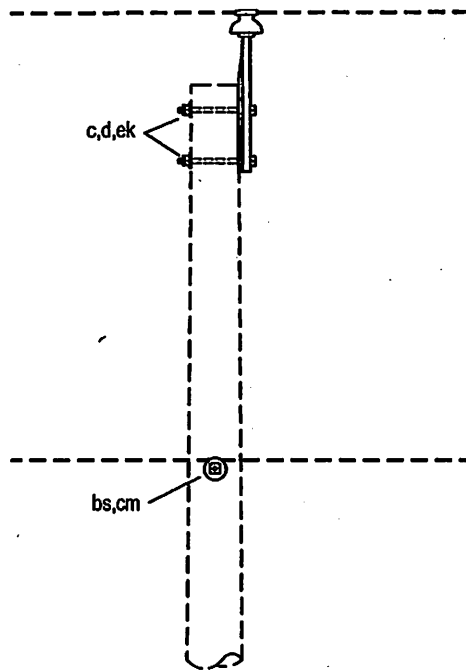
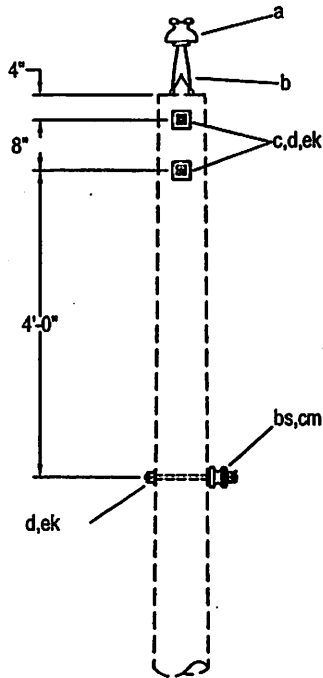
Example: IA1, I35-7, IM2-2, etc.

18. Suffixes

N Denotes Less Neutral.

Example: (1) CIN is a C1 less J8

(2) C8N is a C8 less 2J6



Note:
 2" Minimum clear wood clearance of all hardware.
 No bolts to extend more than 2" beyond locknut.
 Jumpers and connectors as required.
 The seal appearing on this document was authorized
 by C. W. MAY, JR, P.E. 28281 on 10/2/02.

ITEM	NO.	MATERIAL	ITEM	NO.	MATERIAL
a	1	Insulator, pin type, class 55-4			
b	1	Pin, pole top, 20"			
c	2	Bolt, machine, 5/8" x required length			
d	3	Washer, square, 2-1/4" x 3/16 x 11/16" hole			
bs	1	Bolt, single upset, 5/8" x req'd length			
cm	1	Insulator, spool type, class 53-2			
ek	3	Locknut, 5/8"			



LCRA
 ENERGY • WATER • COMMUNITY SERVICES

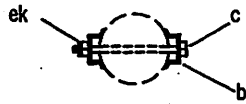
LOWER COLORADO RIVER AUTHORITY
 DISTRIBUTION LINE DESIGN
 AUSTIN, TEXAS

DRAWN: J. Brooks
 CHECKED: _____
 APPROVED: M. Lee

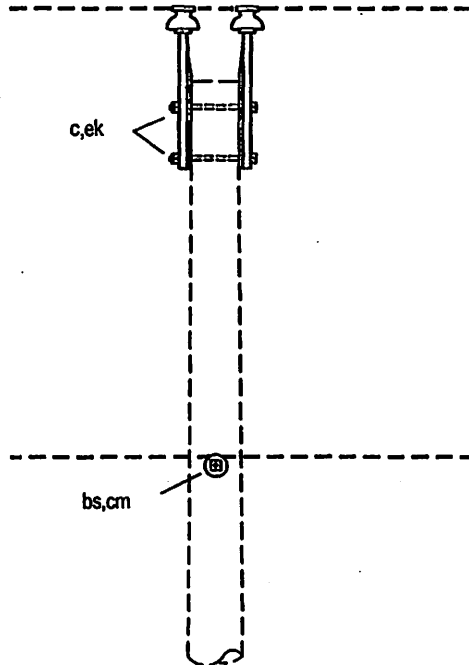
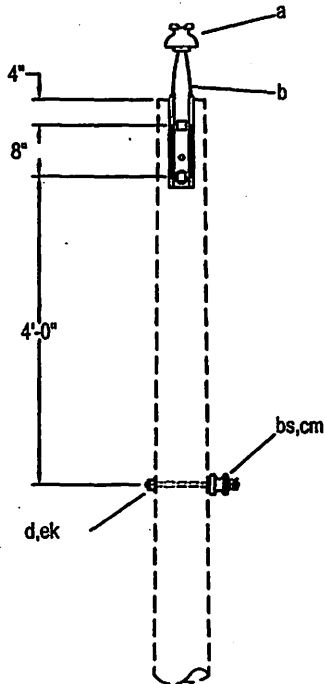
7.2/12.5 KV. PRIMARY, 1-PHASE
 SINGLE PRIMARY SUPPORT
 TANGENT
 (ALL CONDUCTORS)

DATE: 5/02

A1



POLE TOP PIN ASSEMBLY



Note:
 2" Minimum clear wood clearance of all hardware.
 No bolts to extend more than 2" beyond locknut.
 Jumpers and connectors as required.
 The seal appearing on this document was authorized
 by C. W. MAY, JR, P.E. 28281 on 10/2/02.

ITEM	NO.	MATERIAL	ITEM	NO.	MATERIAL
a	2	Insulator, pin type, class 55-4			
b	2	Pin, pole top, 20"			
c	2	Bolt, machine, 5/8" x required length			
d	1	Washer, square, 2-1/4" x 3/16, 11/16" hole			
bs	1	Bolt, single upset, 5/8" x req'd length			
cm	1	Insulator, spool type, class 53-2			
ek	3	Locknut, 5/8"			

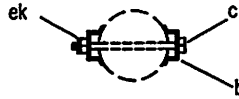


DRAWN: J. Brooks
 CHECKED: _____
 APPROVED: M. Lee

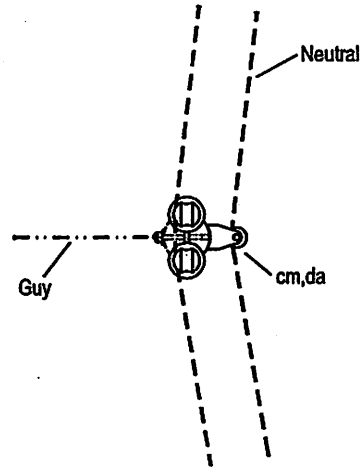
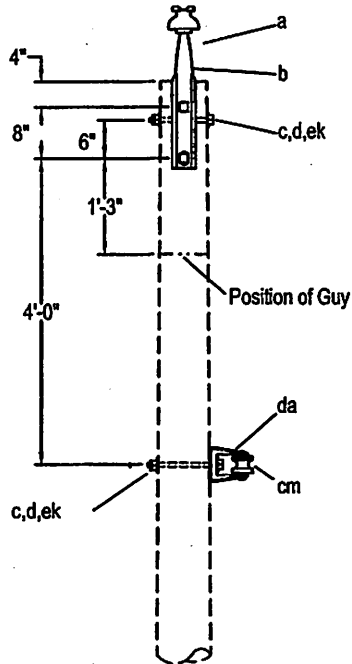
7.2/12.5 KV. PRIMARY, 1-PHASE
 DOUBLE PRIMARY SUPPORT
 TANGENT
 (ALL CONDUCTORS)

DATE:
 5/02

A1-1

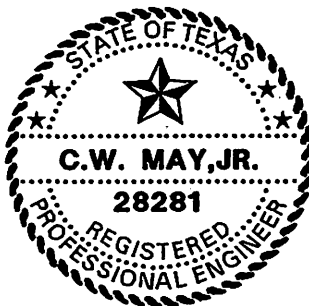


POLE TOP PIN ASSEMBLY



Note:
 2" Minimum clear wood clearance of all hardware.
 No bolts to extend more than 2" beyond locknut.
 Jumpers and connectors as required.
 The seal appearing on this document was authorized
 by C. W. MAY, JR, P.E. 28281 on 10/2/02.

ITEM	NO.	MATERIAL	ITEM	NO.	MATERIAL
a	2	Insulator, pin type, class 55-4			
b	2	Pin, pole top, 20"			
c	4	Bolt, machine, 5/8" x required length			
d	3	Washer, square, 2-1/4" x 3/16", 11/16" hole			
cm	1	Insulator, spool type, class 53-2			
da	1	Bracket, neutral			
ek	4	Locknut, 5/8"			



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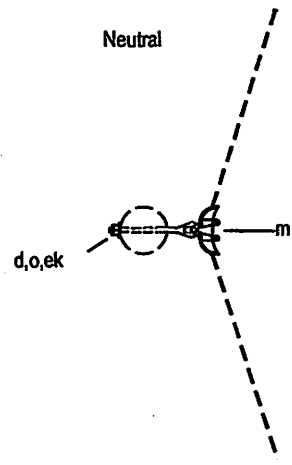
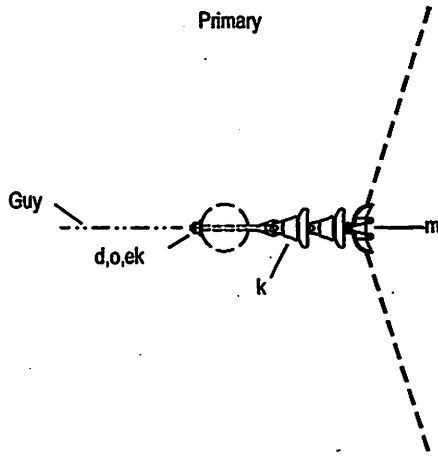
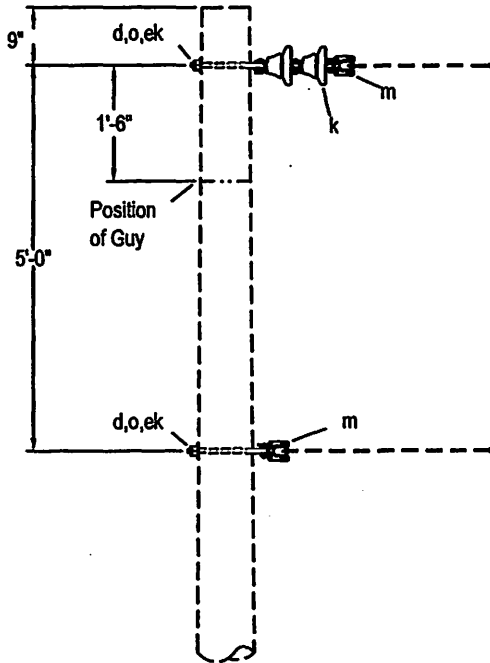
LOWER COLORADO RIVER AUTHORITY
 DISTRIBUTION LINE DESIGN
 AUSTIN, TEXAS

DRAWN: J. Brooks
 CHECKED: _____
 APPROVED: M. Lee

7.2/12.5 KV. PRIMARY, 1-PHASE
 DOUBLE PRIMARY SUPPORT
 0° TO 30° ANGLE
 (SMALL CONDUCTORS)

DATE:
 5/02

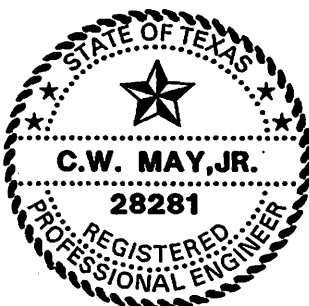
A2



Note:

2" Minimum clear wood clearance of all hardware.
 No bolts to extend more than 2" beyond locknut.
 Jumpers and connectors as required.
 The seal appearing on this document was authorized
 by C. W. MAY, JR, P.E. 28281 on 10/2/02.

ITEM	NO.	MATERIAL	ITEM	NO.	MATERIAL
d	2	Washer, square, 2-1/4" x 3/16", 11/16" hole			
k	2	Insulator, suspension type, class 52-1			
o	2	Bolt, eye, 5/8" x required length			
m	2	Clamp, suspension			
ek	2	Locknut, 5/8"			



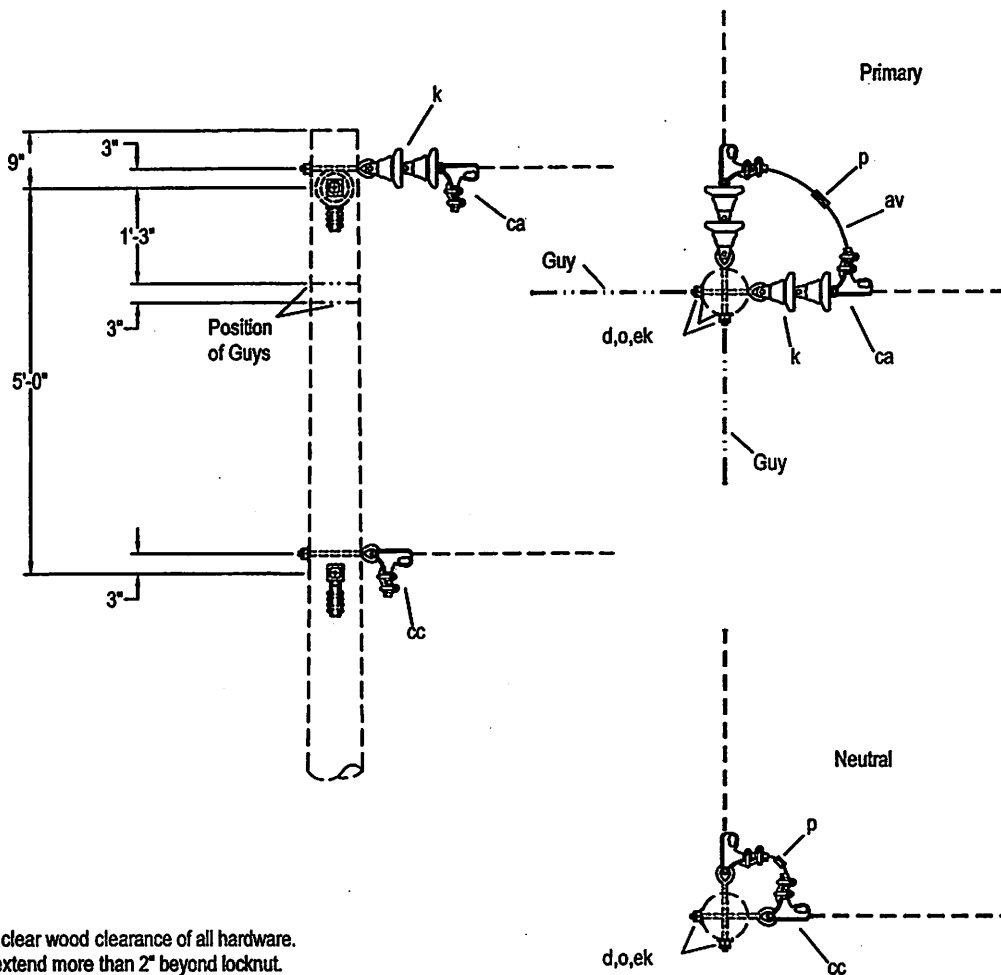
LCRA
 ENERGY • WATER • COMMUNITY SERVICES
 LOWER COLORADO RIVER AUTHORITY
 DISTRIBUTION LINE DESIGN
 AUSTIN, TEXAS

DRAWN: F. Brooks
 CHECKED: _____
 APPROVED: M. Lee

7.2/12.5 KV. PRIMARY, 1-PHASE
 VERTICAL CONSTRUCTION
 30° TO 60° ANGLE
 (ALL CONDUCTORS)

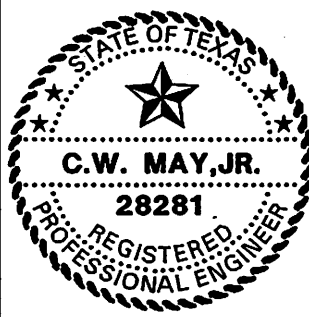
DATE: _____
 5/02

A3



Note:
 2" Minimum clear wood clearance of all hardware.
 No bolts to extend more than 2" beyond locknut.
 Jumpers and connectors as required
 The seal appearing on this document was authorized
 by C. W. MAY, JR, P.E. 28281 on 10/2/02.

ITEM	NO.	MATERIAL	ITEM	NO.	MATERIAL
d	4	Washer, square, 2-1/4" x 3/16", 11/16" hole			
k	4	Insulator, suspension type, class 52-1			
o	4	Bolt, eye, 5/8" x required length			
p		Connectors, as needed			
av		Jumpers, as needed			
ca	2	Deadend assembly, primary			
cc	2	Deadend assembly, neutral			
ek	4	Locknut, 5/8"			



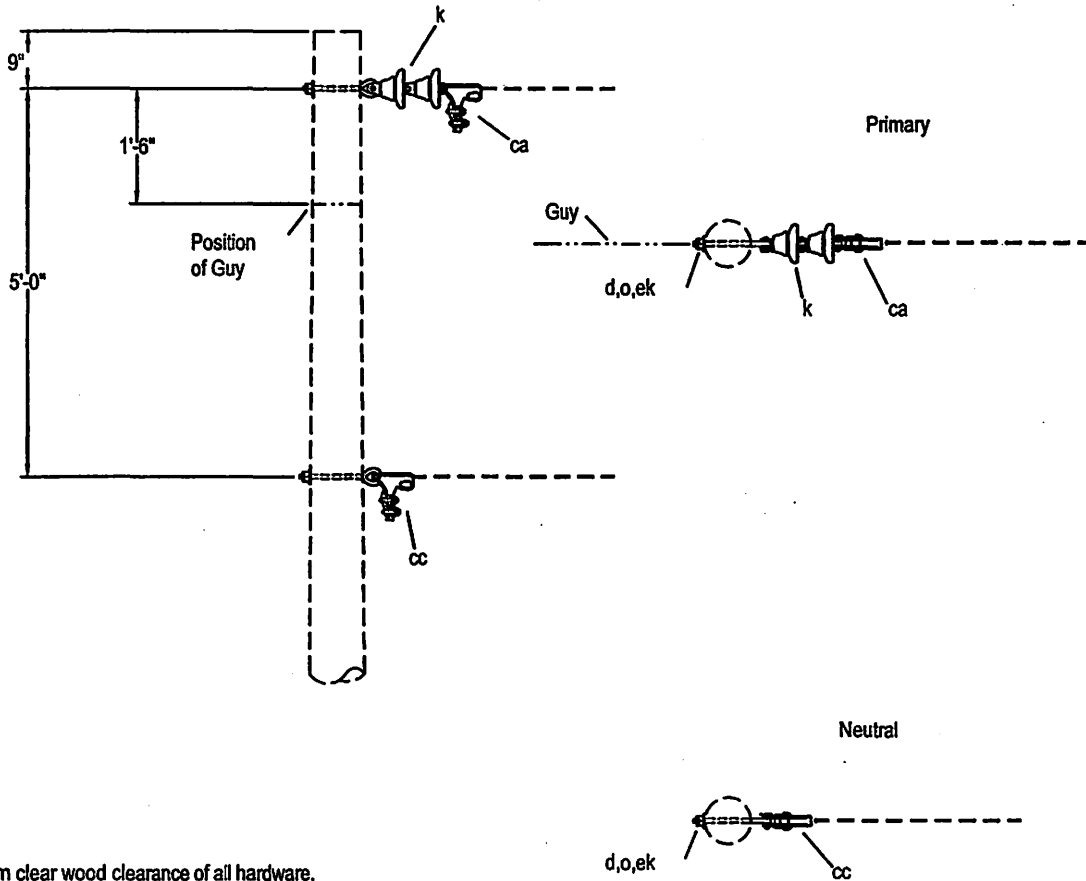
LCRA
 ENERGY • WATER • COMMUNITY SERVICES
 LOWER COLORADO RIVER AUTHORITY
 DISTRIBUTION LINE DESIGN
 AUSTIN, TEXAS

DRAWN: J. Brooks
 CHECKED: _____
 APPROVED: M. Lee

7.2/12.5 KV. PRIMARY, 1-PHASE
 VERTICAL CONSTRUCTION
 DEADEND (DOUBLE) 60° TO 90° ANGLE
 (ALL CONDUCTORS)

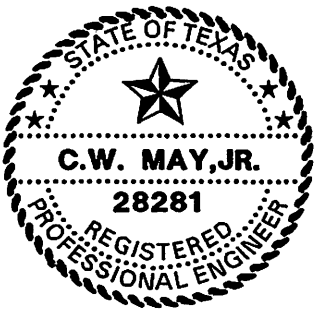
DATE:
 5/02

A4



Note:
 2" Minimum clear wood clearance of all hardware.
 No bolts to extend more than 2" beyond locknut.
 Jumpers and connectors as required.
 The seal appearing on this document was authorized
 by C. W. MAY, JR, P.E. 28281 on 10/2/02.

ITEM	NO.	MATERIAL	ITEM	NO.	MATERIAL
d	2	Washer, square, 2-1/4" x 3/16, 11/16" hole			
k	2	Insulator, suspension type, class 52-1			
o	2	Bolt, eye, 5/8" x required length			
ca	1	Deadend assembly, primary			
cc	1	Deadend assembly, neutral			
ek	2	Locknut, 5/8"			



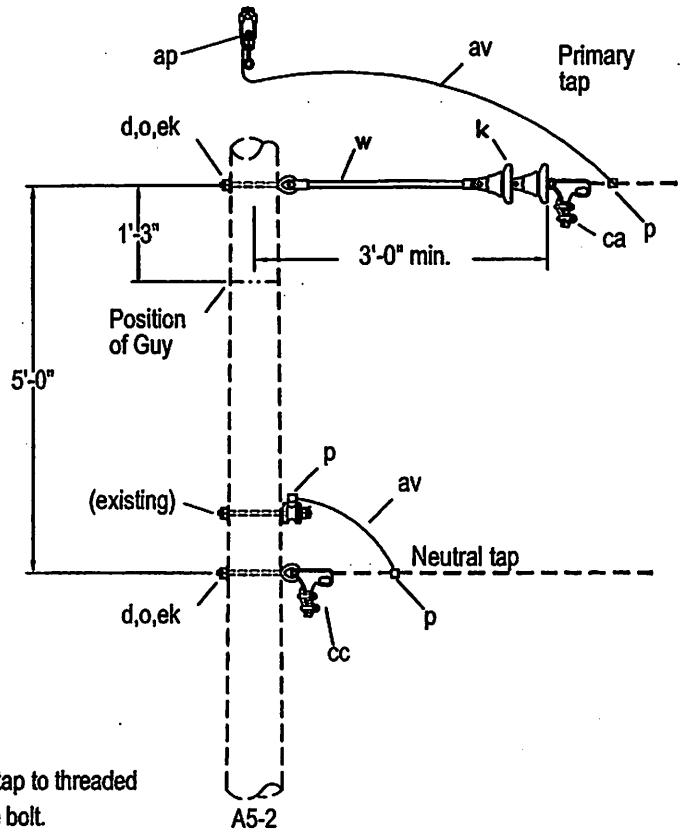
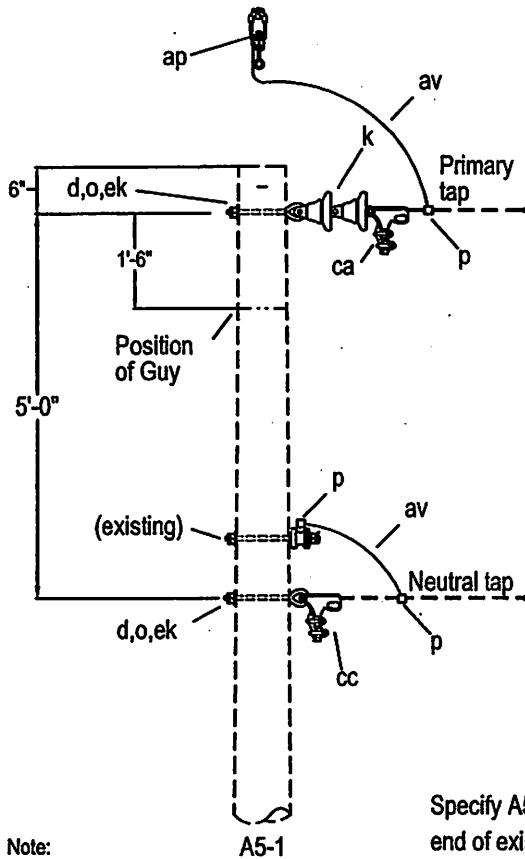
LCRA
 ENERGY • WATER • COMMUNITY SERVICES
 LOWER COLORADO RIVER AUTHORITY
 DISTRIBUTION LINE DESIGN
 AUSTIN, TEXAS

DRAWN: J. Brooks
 CHECKED: _____
 APPROVED: M. Lee

7.2/12.5 KV. PRIMARY, 1-PHASE
 DEADEND (SINGLE)
 (ALL CONDUCTORS)

DATE:
 5/02

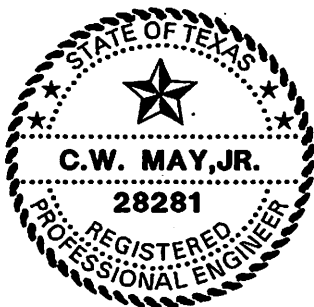
A5



Specify A5-2A for tap to threaded end of existing eye bolt.

Note:
 2" Minimum clear wood clearance of all hardware.
 No bolts to extend more than 2" beyond locknut.
 Jumpers and connectors as required.
 The seal appearing on this document was authorized by C. W. MAY, JR, P.E. 28281 on 10/2/02.

ITEM	MATERIAL	ASSEMBLY UNIT		
		A5-1	A5-2	A5-2A
d	Washer, square, 2-1/4" x 3/16", 11/16" hole	2	2	
k	Insulator, suspension type, class 52-1	2	2	2
o	Bolt, eye, 5/8" x required length	2	2	1
p	Connector	as required	as required	as required
w	Insulator, guy strain, 24", 15,000#		1	1
aa	Nut, eye, 5/8"			1
ap	Clamp, hot line, with stirrup	1	1	1
av	Jumper	as required	as required	as required
ca	Deadend assembly, primary	1	1	1
cc	Deadend assembly, neutral	1	1	1
ek	Locknut, 5/8"	2	2	1



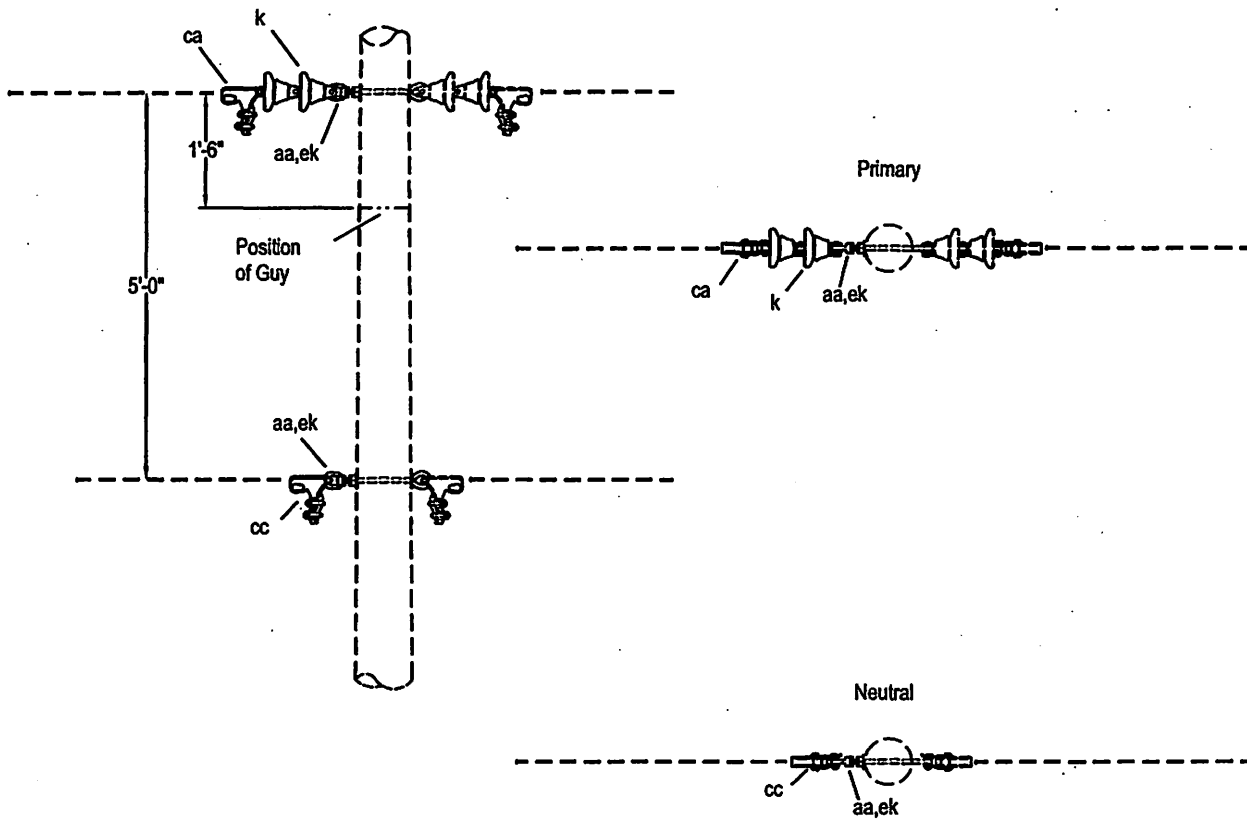
LCRA
 ENERGY • WATER • COMMUNITY SERVICES
 LOWER COLORADO RIVER AUTHORITY
 DISTRIBUTION LINE DESIGN
 AUSTIN, TEXAS

DRAWN: F. Brooks
 CHECKED: _____
 APPROVED: M. Lee

7.2/12.5 KV. PRIMARY, 1-PHASE
 SINGLE PHASE TAP
 (ALL CONDUCTORS)

DATE:
 5/02

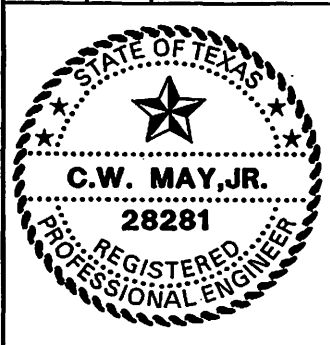
A5-1, A5-2, A5-2A



Note:

2" Minimum clear wood clearance of all hardware.
 No bolts to extend more than 2" beyond locknut.
 Jumpers and Connectors as required.
 The seal appearing on this document was authorized
 by C. W. MAY, JR, P.E. 28281 on 10/2/02.

ITEM	NO.	MATERIAL	ITEM	NO.	MATERIAL
k	2	Insulator, suspension type, class 52-1			
aa	2	Nut, eye, 5/8"			
ca	1	Deadend assembly, primary			
cc	1	Deadend assembly, neutral			
ek	2	Locknut, 5/8"			



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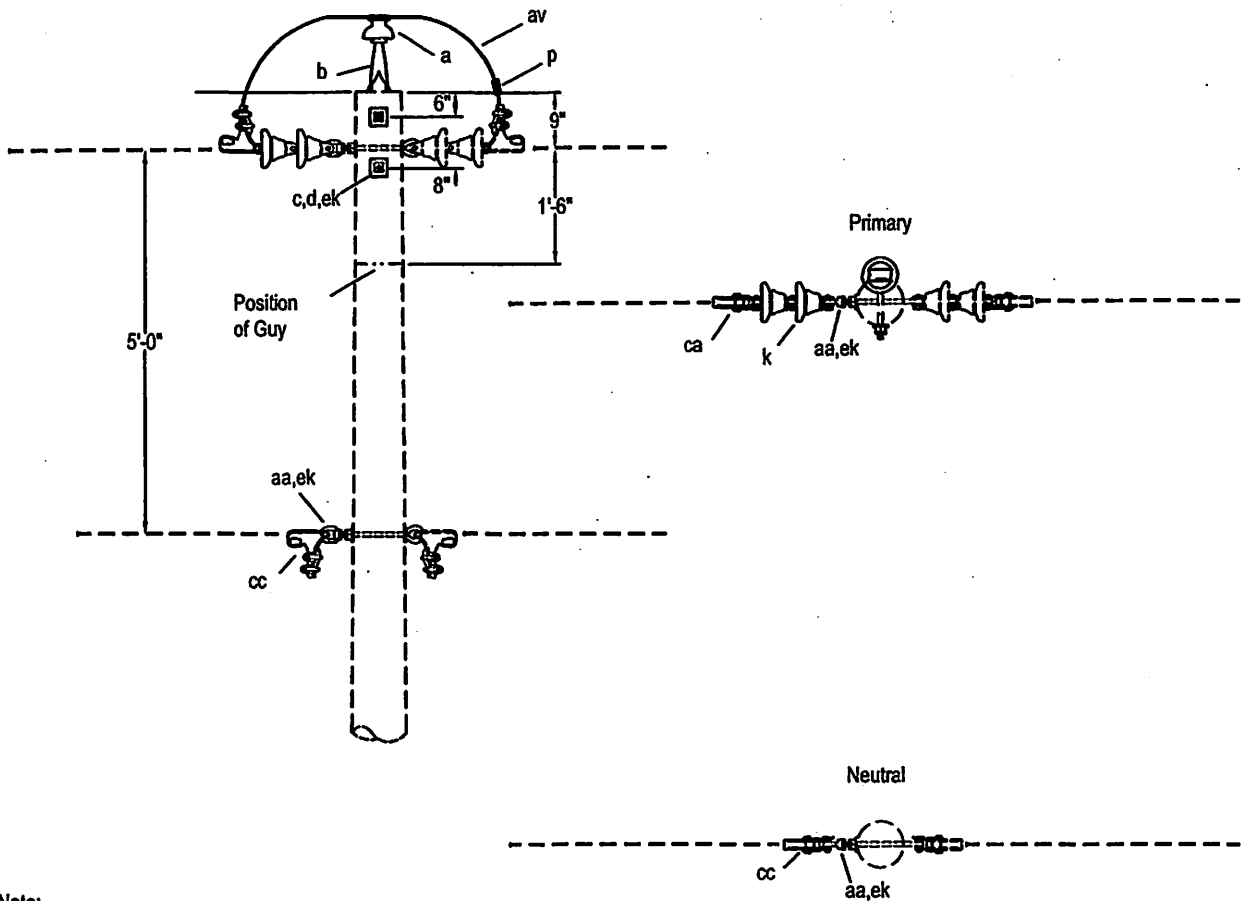
LOWER COLORADO RIVER AUTHORITY
 DISTRIBUTION LINE DESIGN
 AUSTIN, TEXAS

DRAWN: F. Brooks
 CHECKED: _____
 APPROVED: M. Lee

7.2/12.5 KV. PRIMARY, 1-PHASE
 SINGLE PHASE TAP
 (ALL CONDUCTORS)

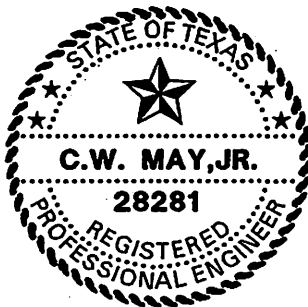
DATE:
 5/02

A5-3



Note:
 2" Minimum clear wood clearance of all hardware.
 No bolts to extend more than 2" beyond locknut.
 Jumpers and Connectors as required.
 The seal appearing on this document was authorized
 by C. W. MAY, JR, P.E. 28281 on 10/2/02.

ITEM	NO.	MATERIAL	ITEM	NO.	MATERIAL
a	1	Insulator, pin type, class 55-4	ek	3	Locknut, 5/8"
b	1	Pin, pole top, 20"			
c	2	Bolt, 5/8" x required length			
d	2	Washer, square, 2-14" x 3/16", 11/16" hole			
k	2	Insulator, suspension type, class 52-1			
p		Connector, as required			
aa	2	Nut, eye, 5/8"			
av		Jumpers, as required			
ca	1	Deadend assembly, primary			
cc	1	Deadend assembly, neutral			



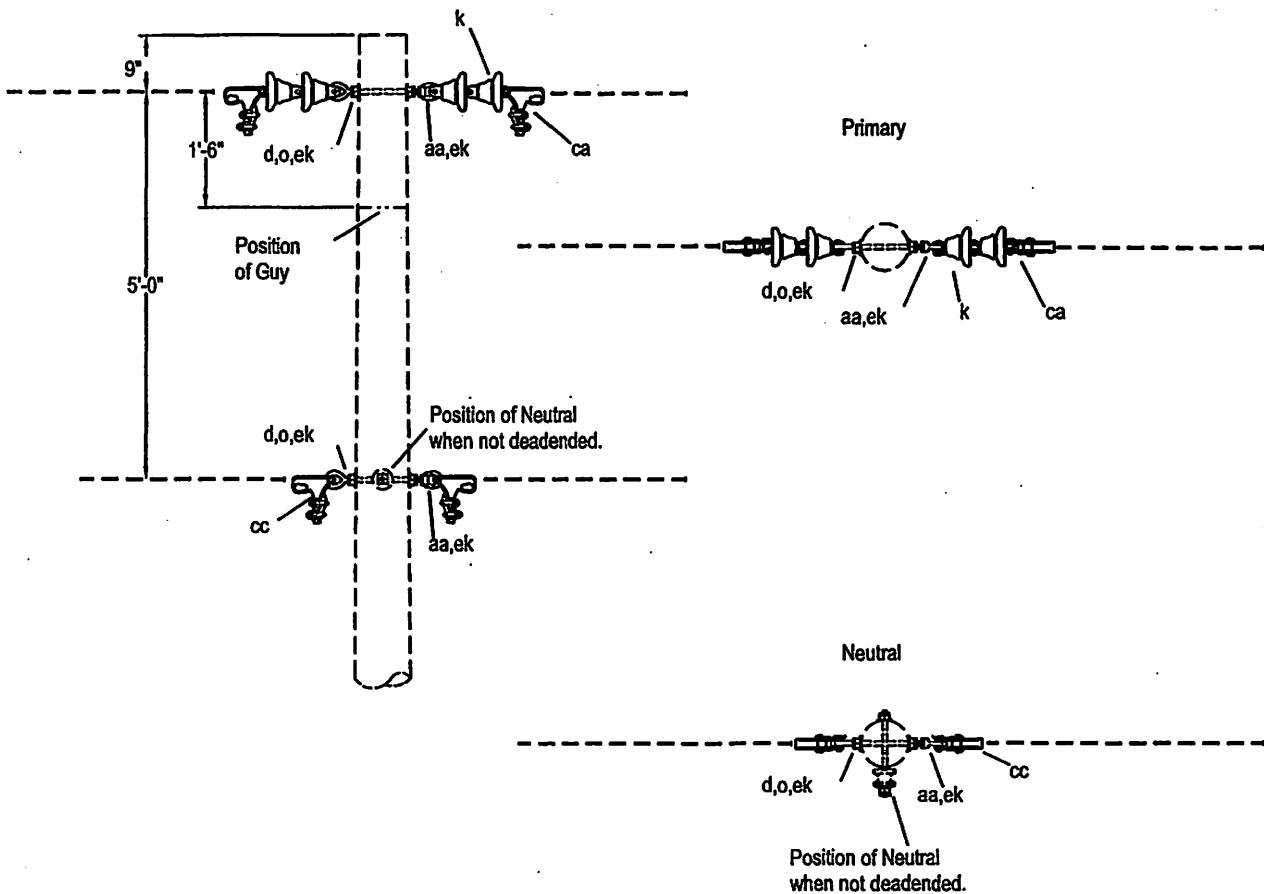
LOWER COLORADO RIVER AUTHORITY
 DISTRIBUTION LINE DESIGN
 AUSTIN, TEXAS

DRAWN: J. Brooks
 CHECKED: _____
 APPROVED: M. Lee

7.2/12.5 KV. PRIMARY, 1-PHASE
 SINGLE PHASE TAP
 (ALL CONDUCTORS)

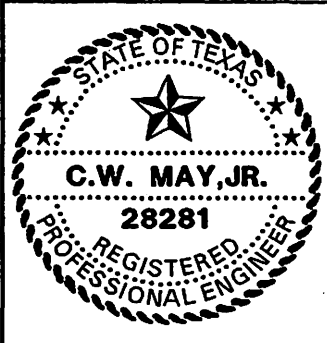
DATE:
 5/02

A5-4



Note:
 2" Minimum clear wood clearance of all hardware.
 No bolts to extend more than 2" beyond locknut.
 Jumpers and Connectors as required.
 The seal appearing on this document was authorized
 by C. W. MAY, JR, P.E. 28281 on 10/2/02.

ITEM	NO.	MATERIAL	ITEM	NO.	MATERIAL
d	4	Washer, square, 2-1/4" x 3/16", 11/16 hole			
k	4	Insulator, suspension type, class 52-1			
o	2	Bolt, eye, 5/8" x required length			
aa	2	Nut, eye, 5/8"			
ca	2	Deadend assembly, primary			
cc	2	Deadend assembly, neutral			
ek	6	Locknut, 5/8"			



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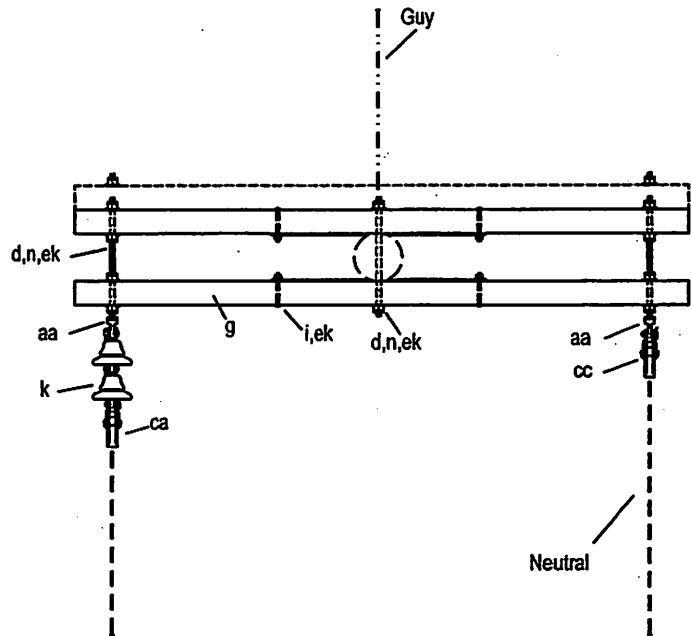
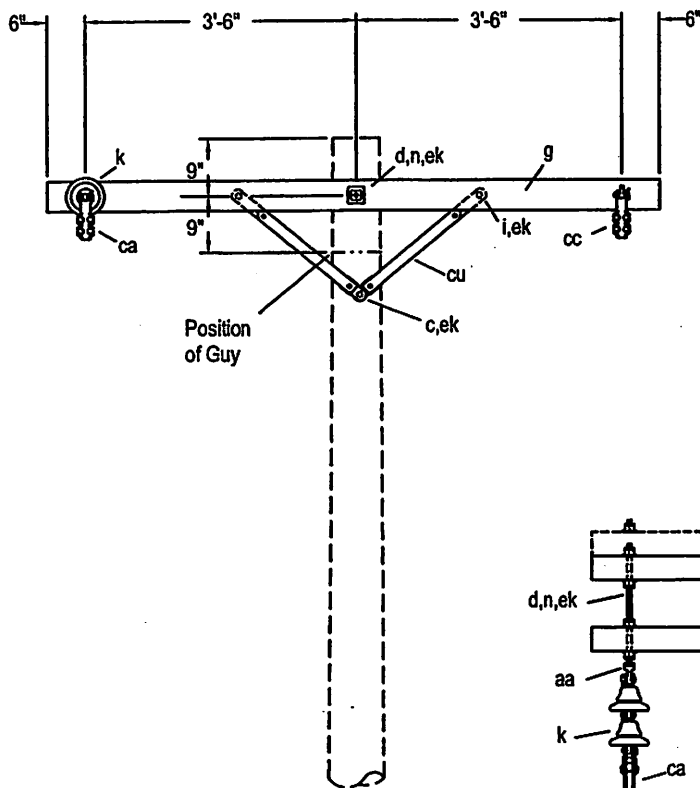
LOWER COLORADO RIVER AUTHORITY
 DISTRIBUTION LINE DESIGN
 AUSTIN, TEXAS

DRAWN: F. Crocker
 CHECKED: _____
 APPROVED: M. Lee

7.2/12.5 PRIMARY, 1-PHASE
 DEADEND (DOUBLE)
 (ALL CONDUCTORS)

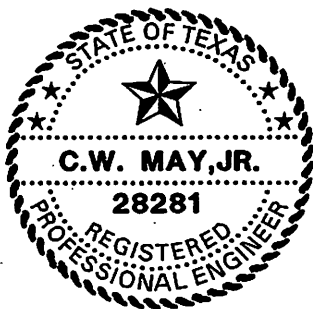
DATE:
 5/02

A6



Note:
 Designate as A7-1 for assembly with three crossarms.
 2" Minimum clear wood clearance of all hardware.
 No bolts to extend more than 2" beyond locknut.
 Jumpers and connectors as required.
 The seal appearing on this document was authorized
 by C. W. MAY, JR, P.E. 28281 on 10/2/02.

ITEM	NO.	MATERIAL	ITEM	NO.	MATERIAL
c	1	Bolt, machine, 1/2" x required length	ek	4	Locknut, 3/8"
d	10	Washer, square, 2-1/4" x 3/16", 11/16" hole	ek	1	Locknut, 1/2"
g	2/3	Crossarm, 3-3/4" x 4-3/4" x 8'-0"	ek	12	Locknut, 5/8"
i	4	Bolt, carriage, 3/8" x 4-1/2"			
k	2	Insulator, suspension type, class 52-1			
n	3	Bolt, double arming, 5/8" x req'd length			
aa	2	Nut, eye, 5/8"			
ca	1	Deadend assembly, primary			
cc	1	Deadend assembly, primary			
cu	2pr.	Brace, wood, 38" span, 17-3/4" drop			

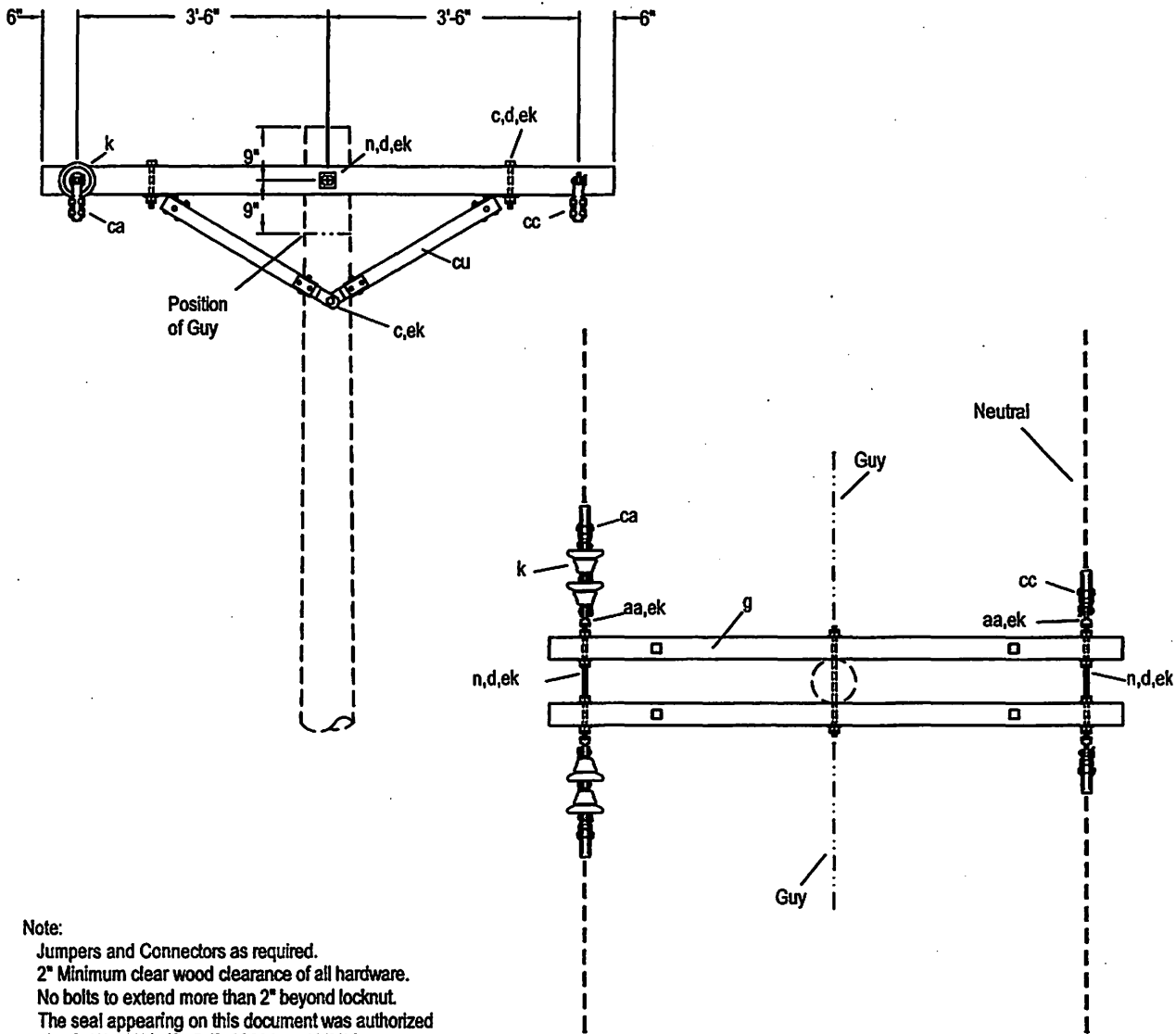


DRAWN: F. Brooks
 CHECKED: _____
 APPROVED: M. Lee

7.2/12.5 KV. PRIMARY, 1-PHASE
 CROSSARM CONSTRUCTION
 DEADEND (SINGLE)
 (ALL CONDUCTORS)

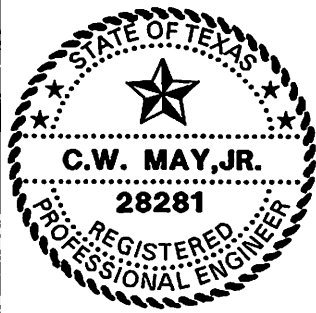
DATE:
 5/02

A7,A7-1



Note:
 Jumpers and Connectors as required.
 2" Minimum clear wood clearance of all hardware.
 No bolts to extend more than 2" beyond locknut.
 The seal appearing on this document was authorized
 by C. W. MAY, JR, P.E. 28281 on 10/2/02.

ITEM	NO.	MATERIAL	ITEM	NO.	MATERIAL
c	4	Bolt, machine, 1/2" x required length	cu	2pr.	Brace, wood, 60" span, 18" drop
c	1	Bolt, machine, 5/8" x required length	ek	4	Locknut, 1/2"
d	4	Washer, round, 1-3/8" diameter, 9/16" hole	ek	15	Locknut, 5/8"
d	10	Washer, square, 2-1/4" x 3/16", 11/16" hole			
g	2	Crossarm, 3-3/4" x 4-3/4" x 8'-0"			
k	4	Insulator, suspension type, class 52-1			
n	3	Bolt, double arming, 5/8" x required length			
aa	4	Nut, eye, 5/8"			
ca	2	Deadend assembly, primary			
cc	2	Deadend assembly, neutral			



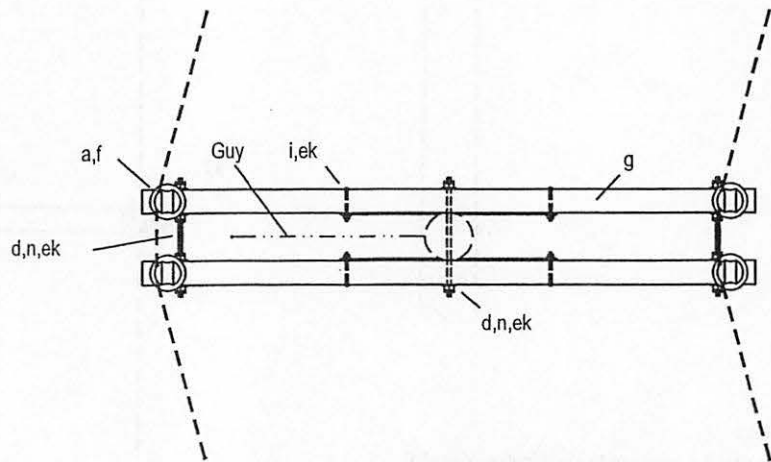
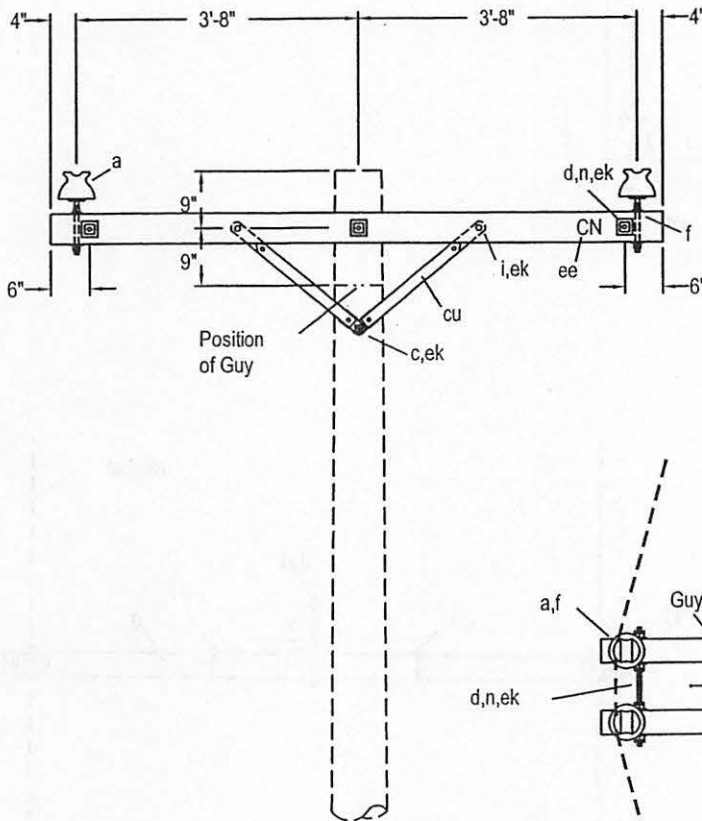
LCRA
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 LOWER COLORADO RIVER AUTHORITY
 DISTRIBUTION LINE DESIGN
 AUSTIN, TEXAS

DRAWN: J. Brooks
 CHECKED: _____
 APPROVED: M. Lee

7.2/12.5 KV. PRIMARY 1-PHASE
 CROSSARM CONSTRUCTION
 DEADEND (DOUBLE)
 (ALL CONDUCTORS)

DATE:
 5/02

A8



Note:
 Use M52-4 for guide to identification of neutral.
 No bolts to extend more than 2" beyond locknut.
 2" Minimum clear wood clearance of all hardware.
 Jumpers and connectors as required.
 The seal appearing on this document was authorized
 by C. W. MAY, JR, P.E. 28281 on 10/2/02.

ITEM NO.	MATERIAL	ITEM NO.	MATERIAL
a 4	Insulator, pin type, class 55-4	ek 1	Locknut, 1/2"
a 2	Insulator, pin type, class 55-3, brown or white	ek 10	Locknut, 5/8"
c 1	Bolt, machine, 1/2" x required length	ee	2" letters "CN", 1" nail, as required
d 10	Washer, square, 2-1/4" x 3/16", 11/16 hole		
f 4	Pin, crossarm, steel, 5/8" x 10-3/4"		
g 2	Crossarm, 3-3/4" x 4-3/4" x 8'-0"		
i 4	Bolt, carriage, 3/8" x 4-1/2"		
n 3	Bolt, double arming, 5/8" x required length		
cu 2pr.	Brace, wood, 38" span, 17-3/4" drop		
ek 4	Locknut, 3/8"		



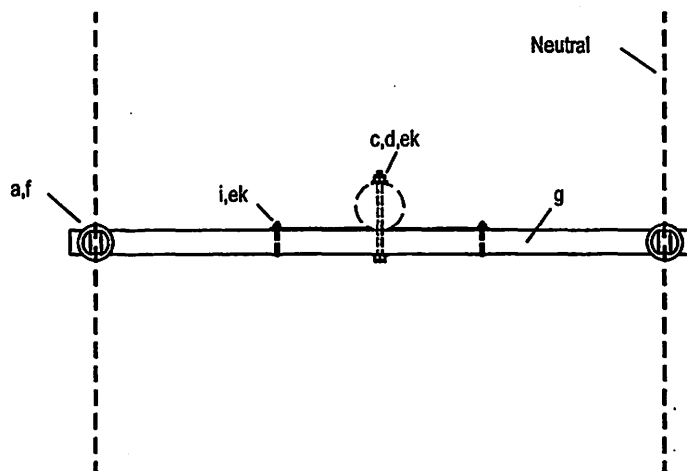
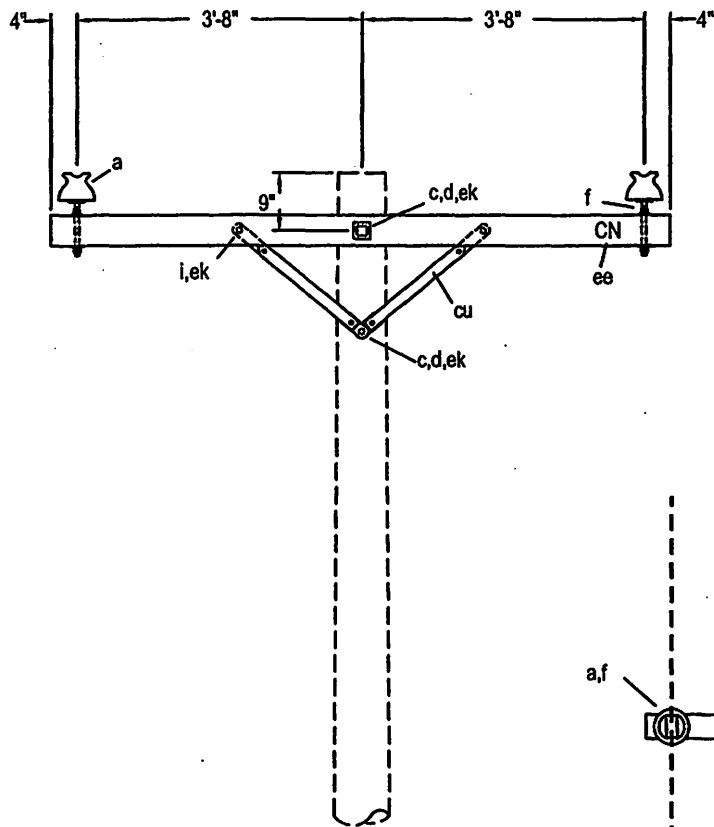
LOWER COLORADO RIVER AUTHORITY
 DISTRIBUTION LINE DESIGN
 AUSTIN, TEXAS

DRAWN: J. Brooks
 CHECKED: _____
 APPROVED: M. Lee

7.2/12.5 KV. PRIMARY, 1-PHASE
 CROSSARM CONSTRUCTION
 DOUBLE LINE ARM 0° TO 30° ANGLE
 (SMALL CONDUCTORS)

DATE:
 5/02

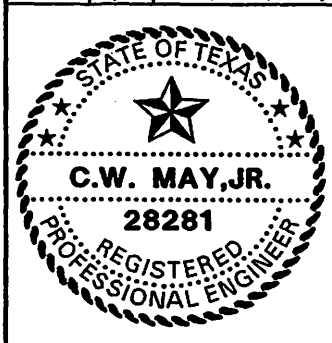
A9



Note:

Use M52-4 for guide to identification of neutral.
 No bolts to extend more than 2" beyond locknut.
 2" Minimum clear wood clearance of all hardware.
 Jumpers and connectors as required.
 The seal appearing on this document was authorized
 by C. W. MAY, JR, P.E. 28281 on 10/2/02.

ITEM	NO.	MATERIAL	ITEM	NO.	MATERIAL
a	2	Insulator, pin type, class 55-4, skygray	ek	2	Locknut, 3/8"
a	1	Insulator, pin type, classe 55-3, brown or white	ek	1	Locknut, 1/2"
c	1	Bolt, machine, 1/2" x required length	ek	1	Locknut, 5/8"
c	1	Bolt, machine, 5/8" x required length	ee		2" letters "CN", 1" nail
d	1	Washer, round, 1-3/8", 9/16" hole			
d	2	Washer, square, 2-1/4" x 3/16", 11/16" hole			
f	2	Pin, crossarm, steel, 5/8" x 10-3/4"			
g	1	Crossarm, 3-3/4" x 4-3/4" x 8'-0"			
i	2	Bolt, carriage, 3/8" x 4-1/2"			
cu	1pr.	Brace, wood, 38" span, 17-3/4" drop			



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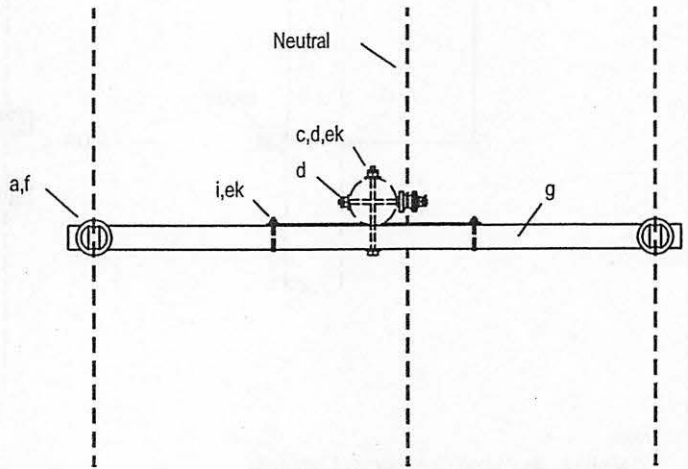
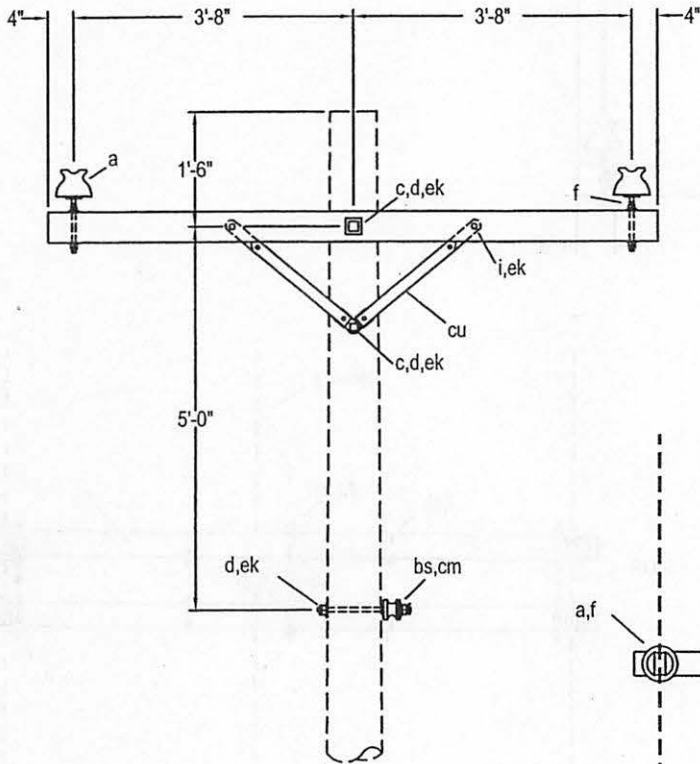
LOWER COLORADO RIVER AUTHORITY
 DISTRIBUTION LINE DESIGN
 AUSTIN, TEXAS

DRAWN: F. Brooks
 CHECKED: _____
 APPROVED: M. Lee

7.2/12.5 KV. PRIMARY 1-PHASE
 CROSSARM CONSTRUCTION
 SINGLE LINE ARM
 (SMALL CONDUCTORS)

DATE:
 5/02

A9-1



Note:
 2" Minimum clear wood clearance of all hardware.
 No bolts to extend more than 2" beyond locknut.
 Jumpers and connectors as required.
 The seal appearing on this document was authorized
 by C. W. MAY, JR, P.E. 28281 on 10/2/02.

ITEM	NO.	MATERIAL	ITEM	NO.	MATERIAL
a	2	Insulator, pin type, class 55-4	cu	1pr.	Brace, wood 38" span, 17-3/4" drop
c	1	Bolt, machine, 1/2" x required length	ek	1	Locknut, 3/8"
c	1	Bolt, machine, 5/8" x required length	ek	1	Locknut, 1/2"
d	1	Washer, round, 1-3/8", 9/16 hole	ek	1	Locknut, 5/8"
d	3	Washer, square, 2-1/4" x 3/16", 11/16" hole			
f	2	Pin, crossarm, steel, 5/8" x 10-3/4"			
g	1	Crossarm, 3-3/4" x 4-3/4" x 8'-0"			
i	2	Bolt, carriage, 3/8" x 4-1/2"			
bs	1	Bolt, single upset, 5/8" x required length, with locknut			
cm	1	Insulator, spool type, class 53-2			

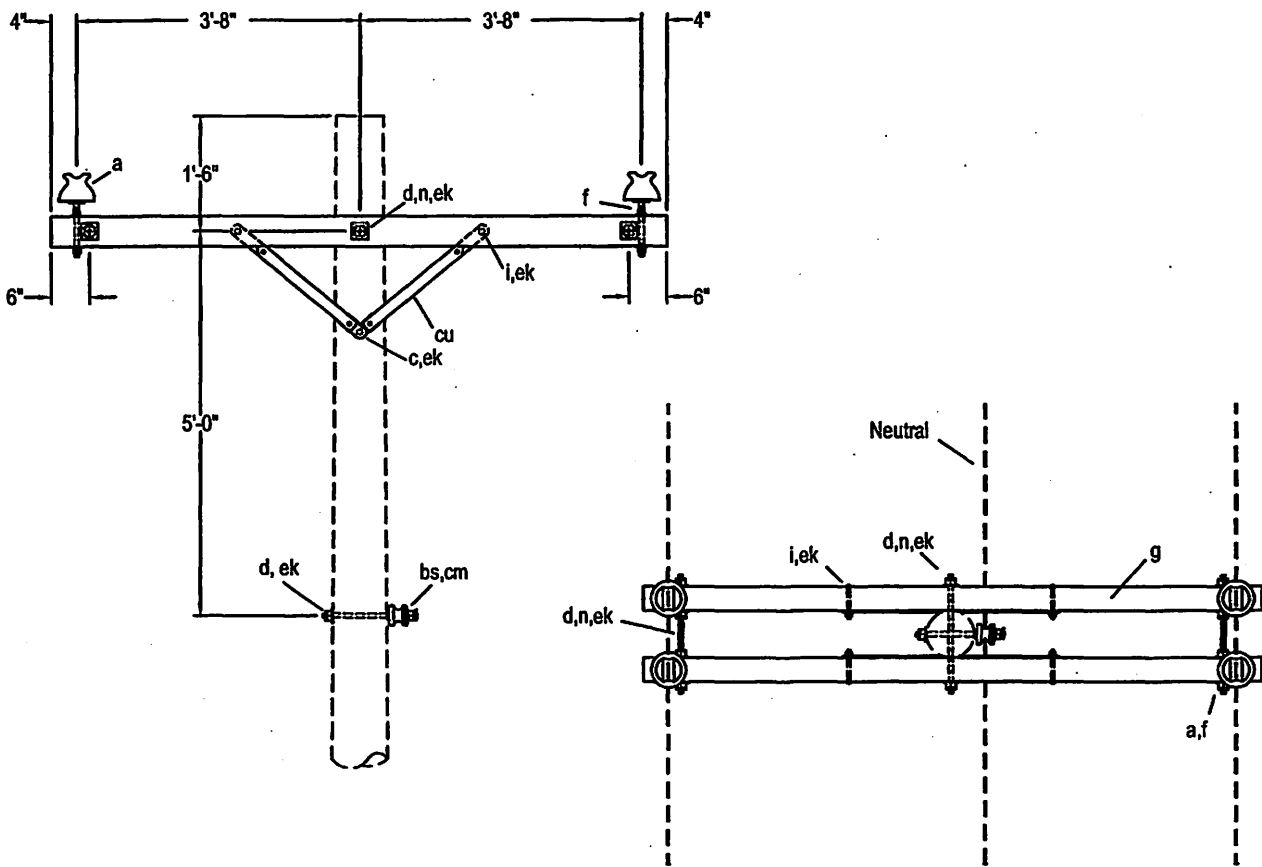


DRAWN: J. Brooks
 CHECKED: _____
 APPROVED: M. Lee

7.2/12.5 KV. PRIMARY, 2-PHASE
 CROSSARM CONSTRUCTION
 SINGLE PRIMARY SUPPORT
 (SMALL CONDUCTORS)

DATE:
 5/02

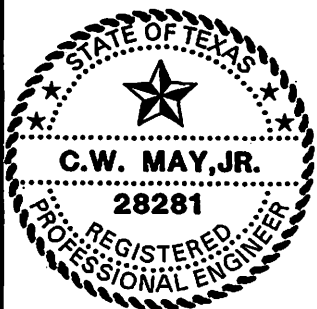
B1



Note:

2" Minimum clear wood clearance of all hardware.
 No bolts to extend more than 2" beyond locknut.
 Jumpers and connectors as required.
 The seal appearing on this document was authorized
 by C. W. MAY, JR, P.E. 28281 on 10/2/02.

ITEM	NO.	MATERIAL	ITEM	NO.	MATERIAL
a	4	Insulator, pin type, class 55-4	ek	4	Locknut, 3/8"
c	1	Bolt, machine, 1/2" x required length	ek	1	Locknut, 1/2"
d	11	Washer, square, 2-1/4"	ek	10	Locknut, 5/8"
f	4	Pin, crossarm, steel, 5/8" x 10-3/4"			
g	2	Crossarm, 3-3/4" x 4-3/4" x 8'-0"			
i	4	Bolt, carriage, 3/8" x 4-1/2"			
n	3	Bolt, double arming, 5/8" x req'd length			
bs	1	Bolt, single upset, 5/8" x req'd length, with locknut			
cm	1	Insulator, spool type, class 53-2			
cu	2pr.	Brace, wood, 38" span, 17-3/4" drop			



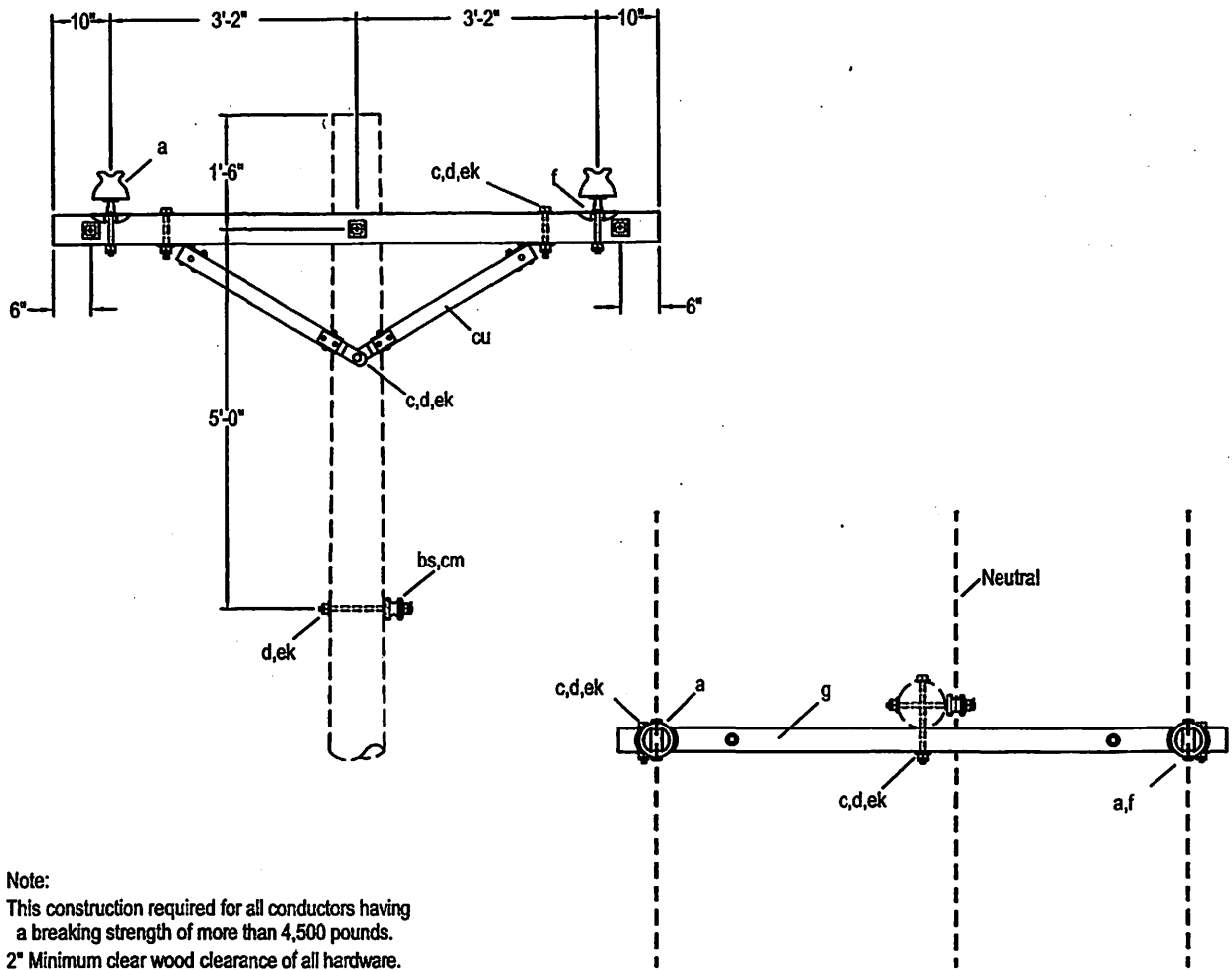
LOWER COLORADO RIVER AUTHORITY
 DISTRIBUTION LINE DESIGN
 AUSTIN, TEXAS

DRAWN: J. A. GORZA
 CHECKED: _____
 APPROVED: M. L.

7.2/12.5 KV. PRIMARY, 2-PHASE
 CROSSARM CONSTRUCTION
 DOUBLE PRIMARY SUPPORT
 (SMALL CONDUCTORS)

DATE:
 5/02

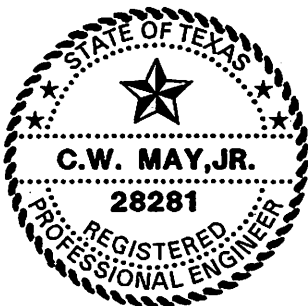
B1-1



Note:

This construction required for all conductors having a breaking strength of more than 4,500 pounds.
 2" Minimum clear wood clearance of all hardware.
 No bolts to extend more than 2" beyond locknut.
 The seal appearing on this document was authorized by C. W. MAY, JR, P.E. 28281 on 10/2/02.

ITEM	NO.	MATERIAL	ITEM	NO.	MATERIAL
a	2	Insulator, pin type, class 55-4	ek	2	Locknut, 1/2"
c	2	Bolt, machine, 1/2" x required length	ek	4	Locknut, 5/8"
c	4	Bolt, machine, 5/8" x required length			
d	8	Washer, square, 2-1/4" x 3/16", 11/16" hole			
d	2	Washer, round, 1-3/8" diameter, 9/16" hole			
f	2	Pin, crossarm, clamp type			
g	1	Crossarm, 3-3/4" x 4-3/4" x 8'-0"			
bs	1	Bolt, single upset, 5/8" x req'd length, with locknut			
cm	1	Insulator, spool type, class 53-2			
cu	1pr.	Brace, wood, 60" span, 18" drop			



LOWER COLORADO RIVER AUTHORITY
 DISTRIBUTION LINE DESIGN
 AUSTIN, TEXAS

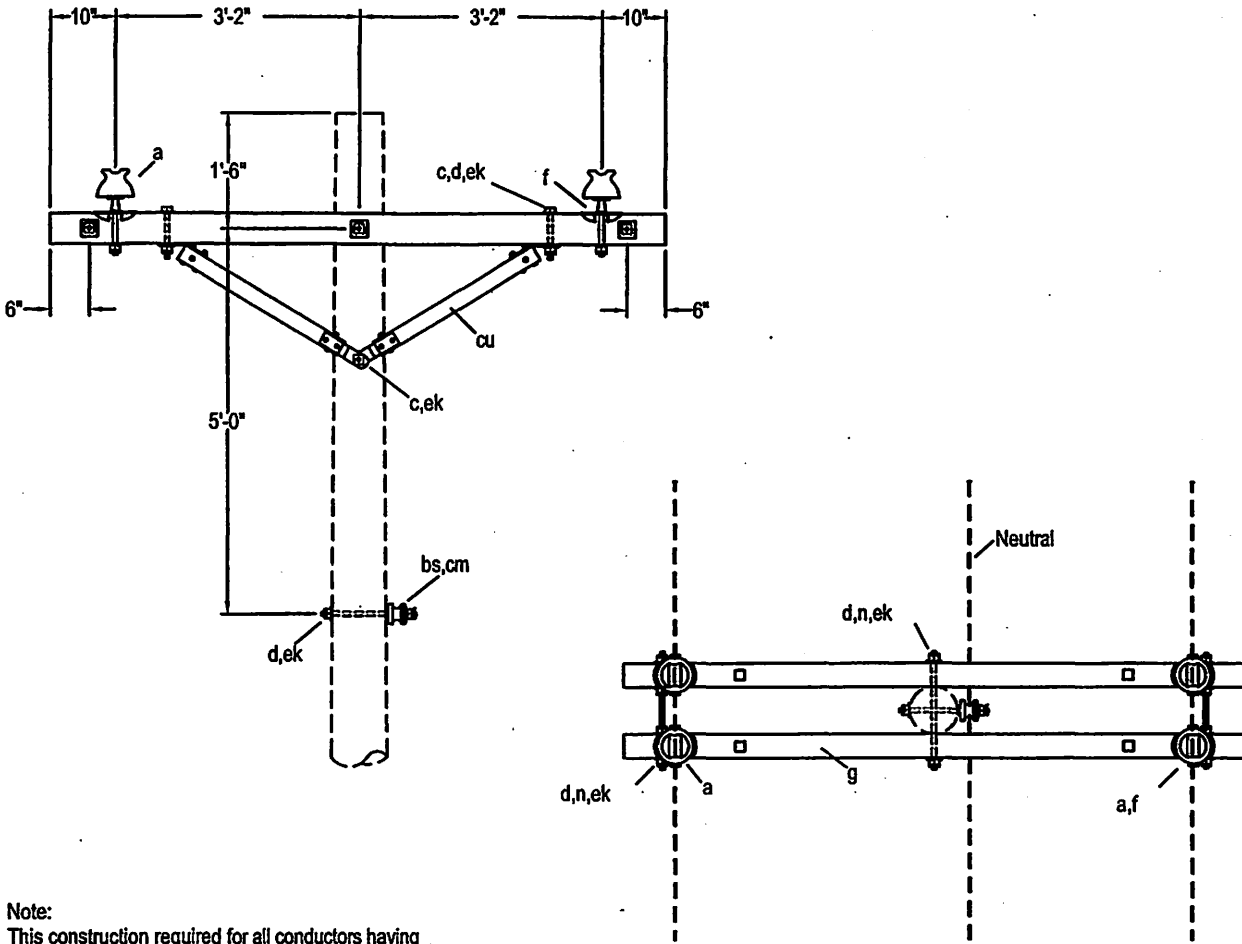
DRAWN: F. Brooks
 CHECKED: _____
 APPROVED: M. Lee

7.2/12.5 KV. PRIMARY, 2-PHASE
 CROSSARM CONSTRUCTION
 SINGLE PRIMARY SUPPORT
 (LARGE CONDUCTORS)

DATE:

5/02

B1-2



Note:
 This construction required for all conductors having
 a breaking strength of more than 4,500 pounds
 2" Minimum clear wood clearance of all hardware.
 No bolts to extend more than 2" beyond locknut.
 The seal appearing on this document was authorized
 by C. W. MAY, JR, P.E. 28281 on 10/2/02.

ITEM	NO.	MATERIAL	ITEM	NO.	MATERIAL
a	4	Insulator, pin type, class 55-4	cu	2pr.	Brace, wood, 60" span, 18" drop
c	4	Bolt, machine, 1/2" x required length	ek	4	Locknut, 1/2"
c	1	Bolt, machine, 5/8" x required length	ek	11	Locknut, 5/8"
d	11	Washer, square, 2-1/4" x 3/16", 11/16" hole			
d	4	Washer, round, 1-3/8" diameter, 9/16" hole			
f	4	Pin, crossarm, clamp type			
g	2	Crossarm, 3-3/4" x 4-3/4" x 8'-0"			
n	3	Bolt, double arming, 5/8" x req'd length			
bs	1	Bolt, single upset, 5/8" x req'd length, with locknut			
cm	1	Insulator, spool type, class 53-2			



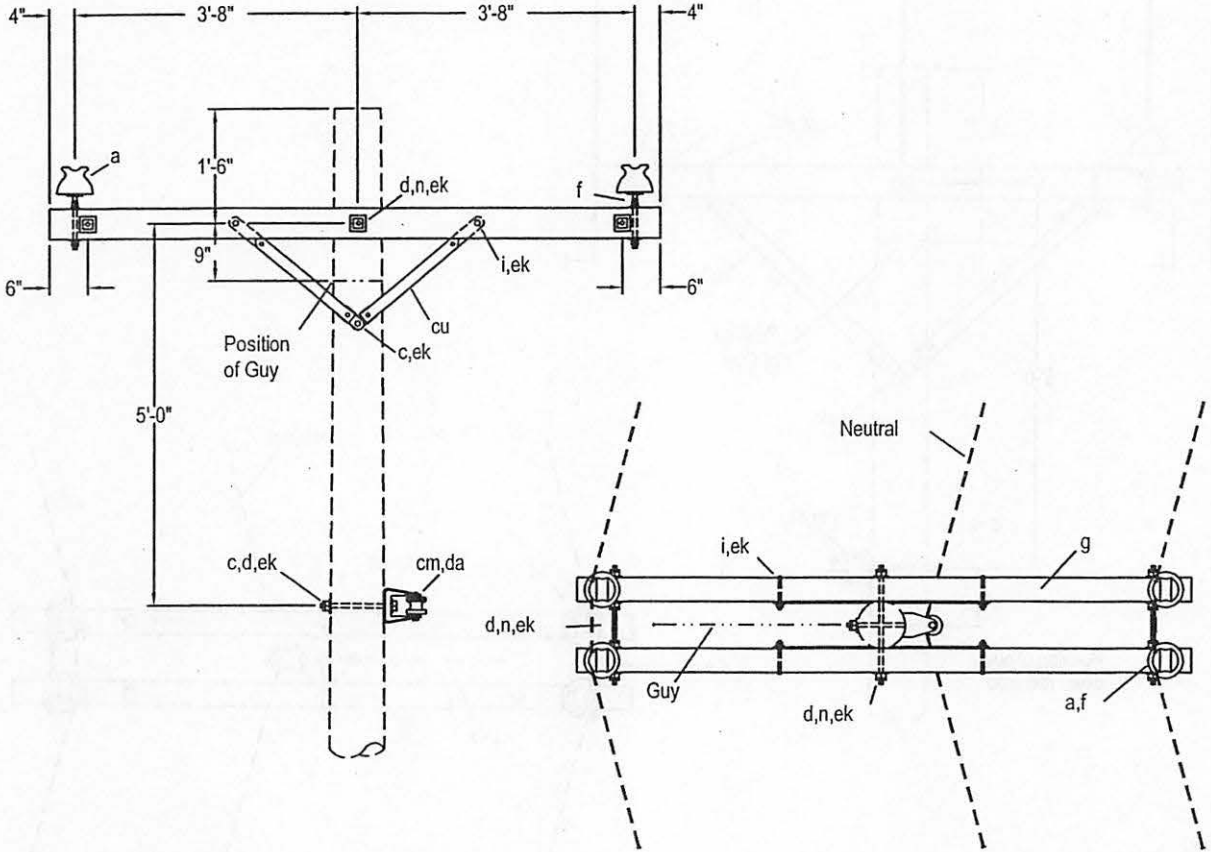
LCRA
 ENERGY • WATER • COMMUNITY SERVICES

LOWER COLORADO RIVER AUTHORITY
 DISTRIBUTION LINE DESIGN
 AUSTIN, TEXAS

DRAWN: J. Brooks
 CHECKED: _____
 APPROVED: M. Lee

7.2/12.5 KV. PRIMARY, 2-PHASE
 CROSSARM CONSTRUCTION
 DOUBLE PRIMARY SUPPORT
 (LARGE CONDUCTORS)

DATE: 5/02	B1-3
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Note:
 2" Minimum clear wood clearance of all hardware.
 No bolts to extend more than 2" beyond locknut.
 The seal appearing on this document was authorized
 by C. W. MAY, JR, P.E. 28281 on 10/2/02.

ITEM	NO.	MATERIAL	ITEM	NO.	MATERIAL
a	4	Insulator, pin type, class 55-4	da	1	Bracket, neutral
c	1	Bolt, machine, 1/2" x required length	ek	4	Locknut, 3/8"
c	1	Bolt, machine, 5/8" x required length	ek	1	Locknut, 1/2"
d	11	Washer, square, 2-1/4"	ek	11	Locknut, 5/8"
f	4	Pin, crossarm, steel, 5/8" x 10-3/4"			
g	4	Bolt, carriage, 3/8" x 4-1/2"			
i	4	Bolt, carriage, 3/8" x 4-1/2"			
n	3	Bolt, double arming, 5/8" x req'd length			
cm	1	Insulator, spool type, class 53-2			
cu	2pr.	Brace, wood, 38" span, 17-3/4" drop			



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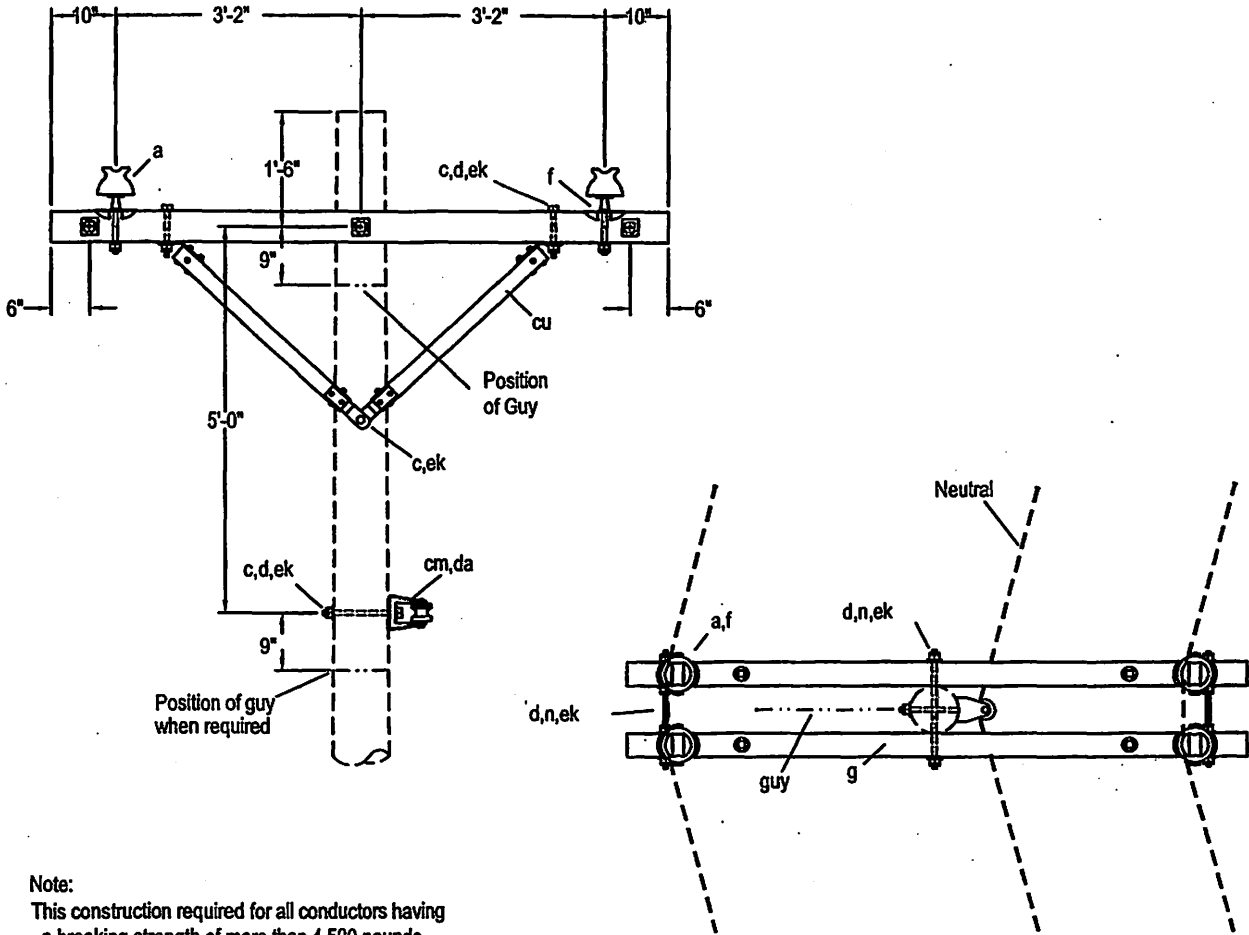
LOWER COLORADO RIVER AUTHORITY
 DISTRIBUTION LINE DESIGN
 AUSTIN, TEXAS

DRAWN: J. Brooks
 CHECKED: _____
 APPROVED: M. Lee

7.2/12.5 KV. PRIMARY, 2-PHASE
 CROSSARM CONSTRUCTION
 DOUBLE PRIMARY SUPPORT
 0° TO 30° ANGLE (SMALL CONDUCTORS)

DATE: _____
 5/02

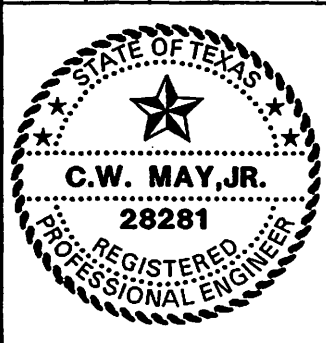
B2



Note:

This construction required for all conductors having a breaking strength of more than 4,500 pounds.
 2" Minimum clear wood clearance of all hardware.
 No bolts to extend more than 2" beyond locknut.
 Jumpers and Connectors as required.
 The seal appearing on this document was authorized by C. W. MAY, JR, P.E. 28281 on 10/2/02.

ITEM NO.	MATERIAL	ITEM NO.	MATERIAL
a 4	Insulator, pin type, class 55-4	da 1	Bracket, neutral
c 4	Boit, machine, 1/2" x required length	ek 4	Locknut, 1/2"
c 2	Boit, machine, 5/8" x required length	ek 11	Locknut, 5/8"
d 11	Washer, square, 2-1/4" x 3/16", 11/16" hole		
d 4	Washer, round, 1-3/8" diameter, 9/16" hole		
f 4	Pin, crossarm, clamp type		
g 2	Crossarm, 3-3/4" x 4-3/4" x 8'-0"		
n 3	Boit, double arming, 5/8" x req'd length		
cm 1	Insulator, spool type, class 53-2		
cu 2pr.	Brace, wood, 60" span, 30" drop		



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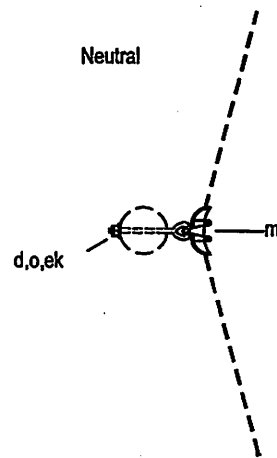
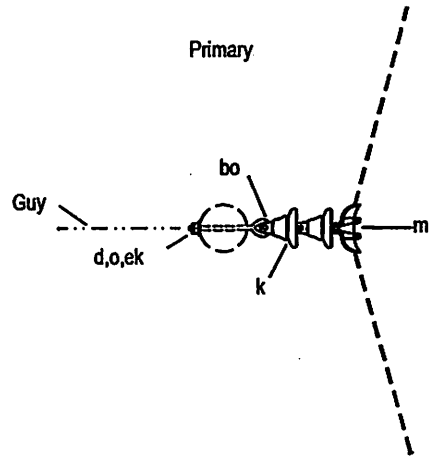
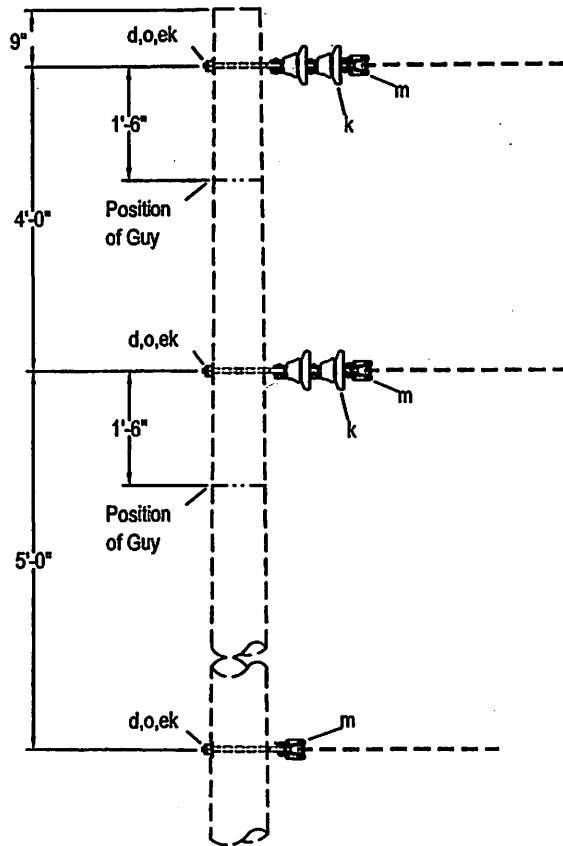
LOWER COLORADO RIVER AUTHORITY
 DISTRIBUTION LINE DESIGN
 AUSTIN, TEXAS

DRAWN: J. Brooks
 CHECKED: _____
 APPROVED: M. Lee

7.2/12.5 KV. PRIMARY, 2-PHASE
 CROSSARM CONSTRUCTION
 DOUBLE PRIMARY SUPPORT
 0° TO 30° (LARGE CONDUCTORS)

DATE: 5/02

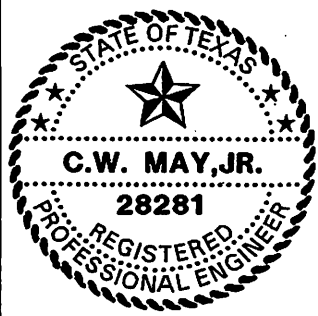
B2-2



Note:

If future conversion to 3-phase is likely, allow space for installation of middle phase and designate as B3A.
 2" Minimum clear wood clearance of all hardware.
 No bolts to extend more than 2" beyond locknut.
 Jumpers and Connectors as required.
 The seal appearing on this document was authorized by C. W. MAY, JR, P.E. 28281 on 10/2/02.

ITEM	NO.	MATERIAL	ITEM	NO.	MATERIAL
d	3	Washer, square, 2-1/4" x 3/16", 11/16" hole			
k	4	Insulator, suspension type, class 52-1			
o	3	Bolt, eye, 5/8" x required length			
m	3	Clamp, suspension			
ek	3	Locknut, 5/8"			



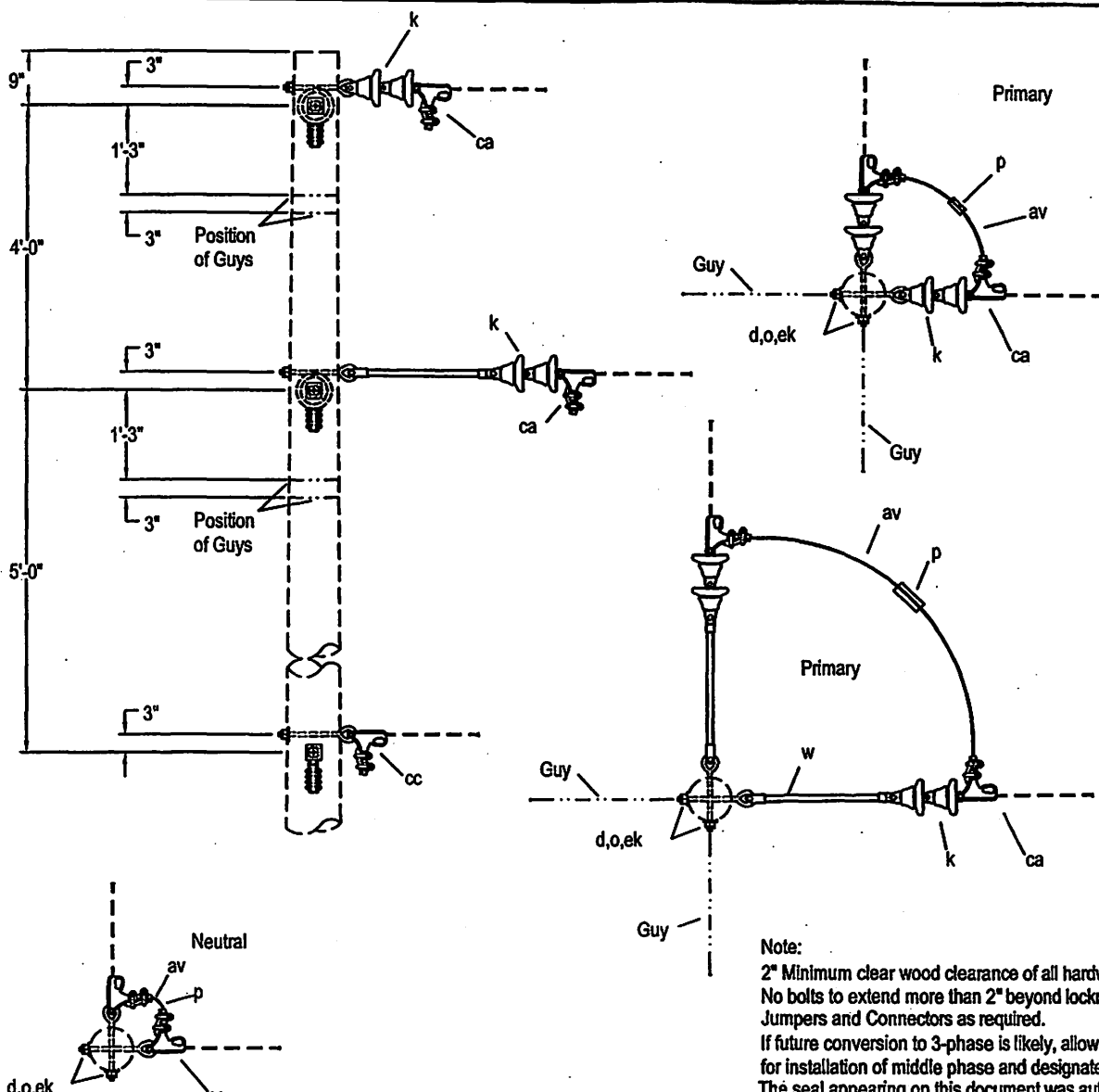
LCRA
 ENERGY • WATER • COMMUNITY SERVICES
 LOWER COLORADO RIVER AUTHORITY
 DISTRIBUTION LINE DESIGN
 AUSTIN, TEXAS

DRAWN: J. Crooks
 CHECKED: _____
 APPROVED: M. Lee

7.2/12.5 KV. PRIMARY, 2-PHASE
 VERTICAL CONSTRUCTION
 30° TO 60° ANGLE
 (ALL CONDUCTORS)

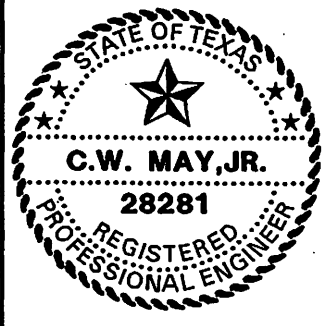
DATE: _____
 5/02

B3,B3A



Note:
 2" Minimum clear wood clearance of all hardware.
 No bolts to extend more than 2" beyond locknut.
 Jumpers and Connectors as required.
 If future conversion to 3-phase is likely, allow space for installation of middle phase and designate as B4-1A.
 The seal appearing on this document was authorized by C. W. MAY, JR, P.E. 28281 on 10/2/02.

ITEM	NO.	MATERIAL	ITEM	NO.	MATERIAL
d	6	Washer, square, 2-1/4" x 3/16", 11/16" hole			
k	8	Insulator, suspension type, class 52-1			
o	6	Bolt, eye, 5/8" x required length			
w	2	Insulator, guy strain, 24", 16,000#			
ca	4	Deadend assembly, primary			
cc	2	Deadend assembly, neutral			
ek	8	Locknut, 5/8"			



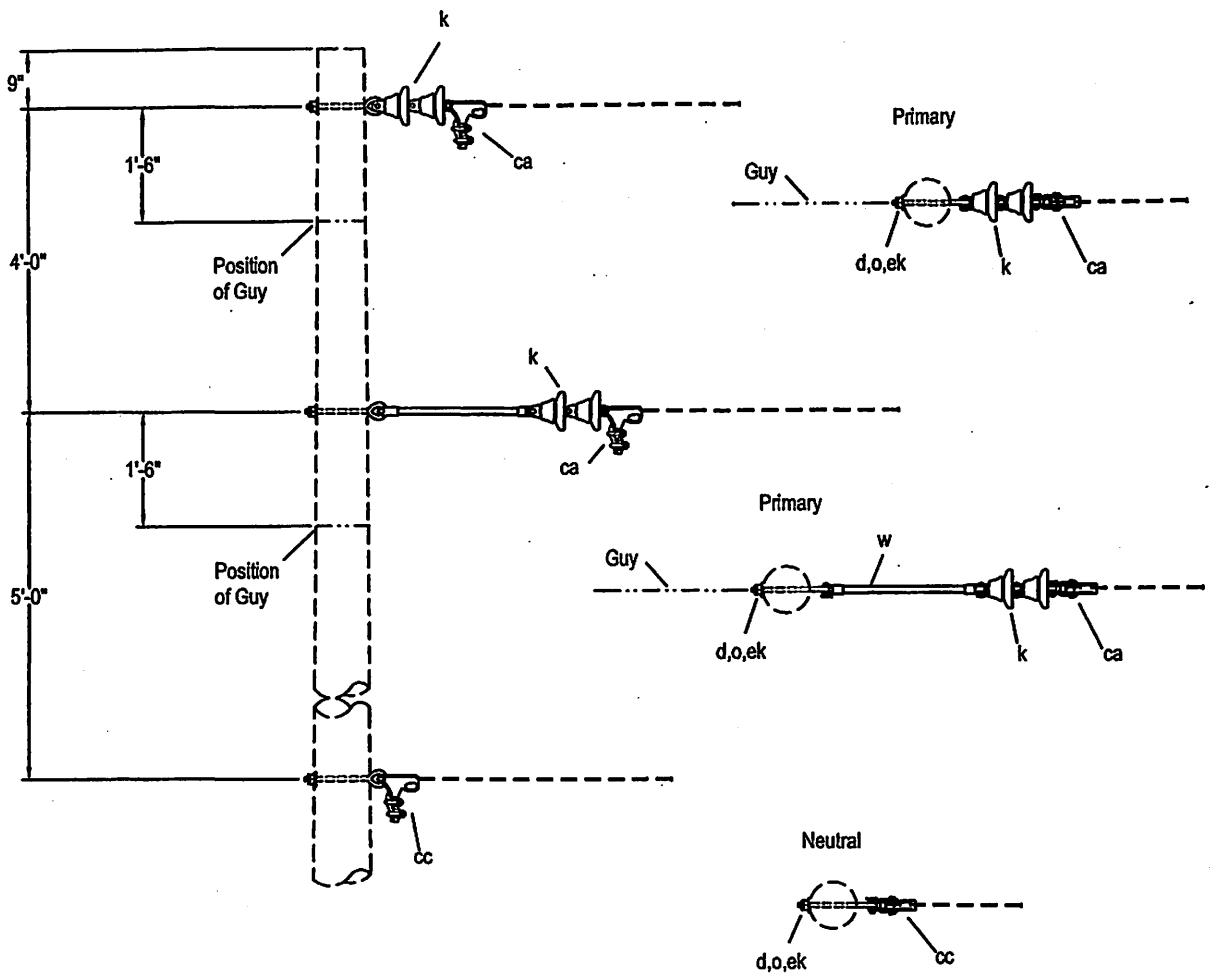
LCRA
 ENERGY • WATER • COMMUNITY SERVICES
 LOWER COLORADO RIVER AUTHORITY
 DISTRIBUTION LINE DESIGN
 AUSTIN, TEXAS

DRAWN: J. Brooks
 CHECKED: _____
 APPROVED: M. Lee

7.2/12.5 KV. PRIMARY, 2-PHASE
 VERTICAL CONSTRUCTION
 DEADEND (DOUBLE) 60° TO 90° ANGLE
 (ALL CONDUCTORS)

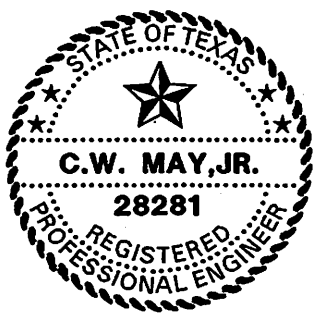
DATE: 5/02

B4-1, B4-1A



Note:
 2" Minimum clear wood clearance of all hardware.
 No bolts to extend more than 2" beyond locknut.
 Jumpers and Connectors as required.
 If future conversion to 3-phase is likely, allow space
 for installation of middle phase and designate as B5-1A.
 The seal appearing on this document was authorized
 by C. W. MAY, JR, P.E. 28281 on 10/2/02.

ITEM	NO.	MATERIAL	ITEM	NO.	MATERIAL
d	3	Washer, square, 2-1/4" x 3/16", 11/16" hole			
k	4	Insulator, suspension type, class 52-1			
o	3	Bolt, eye, 5/8" x required length			
w	1	Insulator, guy strain, 24", 16,000#			
ca	2	Deadend assembly, primary			
cc	1	Deadend assembly, neutral			
ek	3	Locknut, 5/8"			



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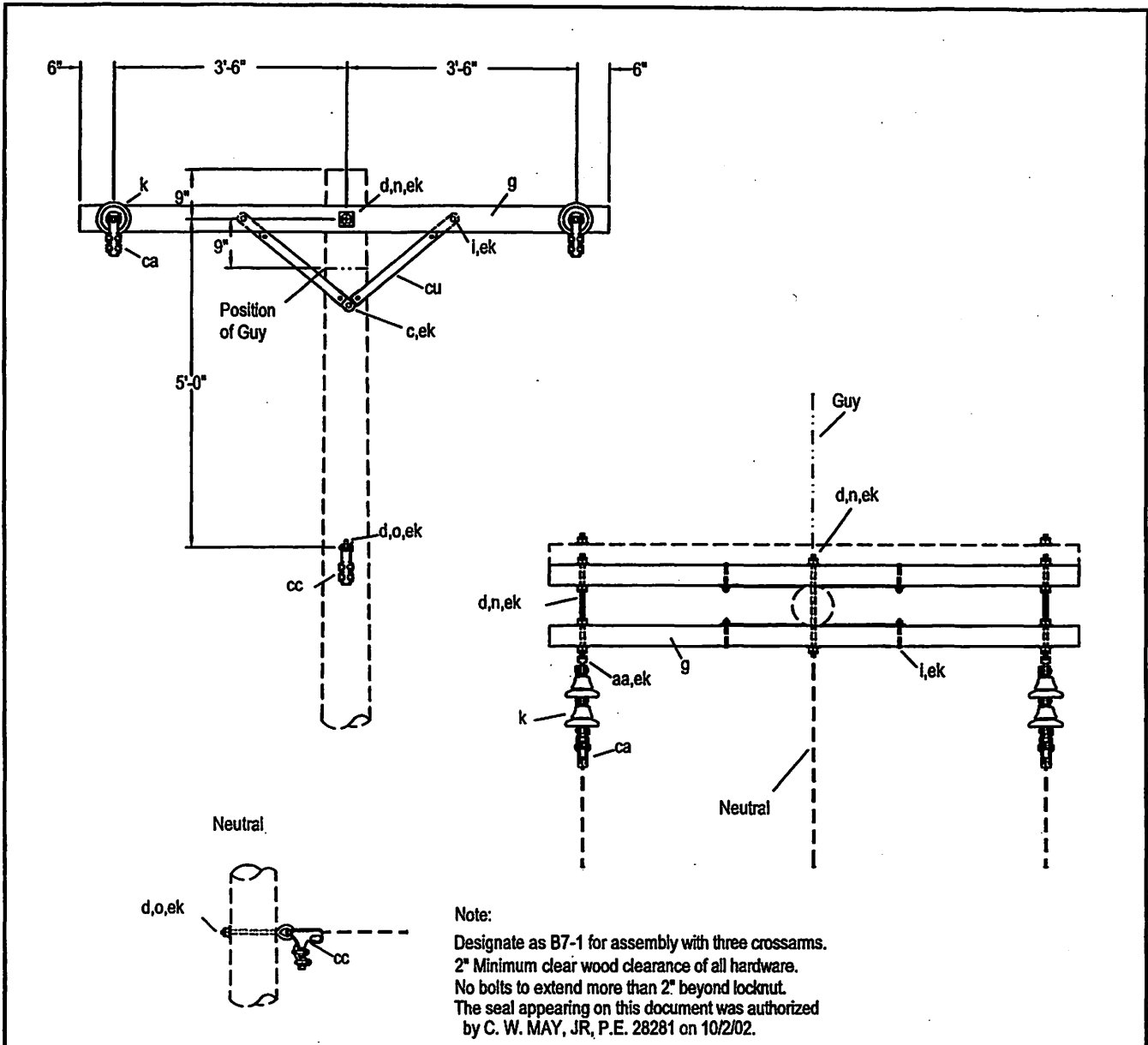
LOWER COLORADO RIVER AUTHORITY
 DISTRIBUTION LINE DESIGN
 AUSTIN, TEXAS

DRAWN: F. Brooks
 CHECKED: _____
 APPROVED: M. Lee

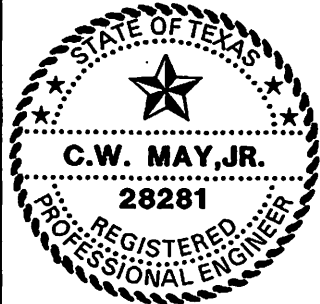
7.2/12.5 KV. PRIMARY 2-PHASE
 VERTICAL CONSTRUCTION
 DEADEND (SINGLE)
 (ALL CONDUCTORS)

DATE: _____
 5/02

B5-1, B5-1A



ITEM	NO.	MATERIAL	ITEM	NO.	MATERIAL
c	1	Bolt, machine, 1/2" x required length	cu	2pr.	Brace, wood, 38" span, 17-3/4" drop
d	11	Washer, square, 2-1/4" x 3/16, 11/16" hole	ek	4	Locknut, 3/8"
g	2/3	Crossarm, 3-3/4" x 4-3/4" x 8'-0"	ek	1	Locknut, 1/2"
i	4	Bolt, carriage, 3/8" x 4-1/2"	ek	13	Locknut, 5/8"
k	4	Insulator, suspension type, class 52-1			
n	3	Bolt, double arming, 5/8" x req'd length			
o	1	Bolt, eye, 5/8" x required length			
aa	2	Nut, eye, 5/8"			
ca	2	Deadend assembly, primary			
cc	1	Deadend assembly, neutral			

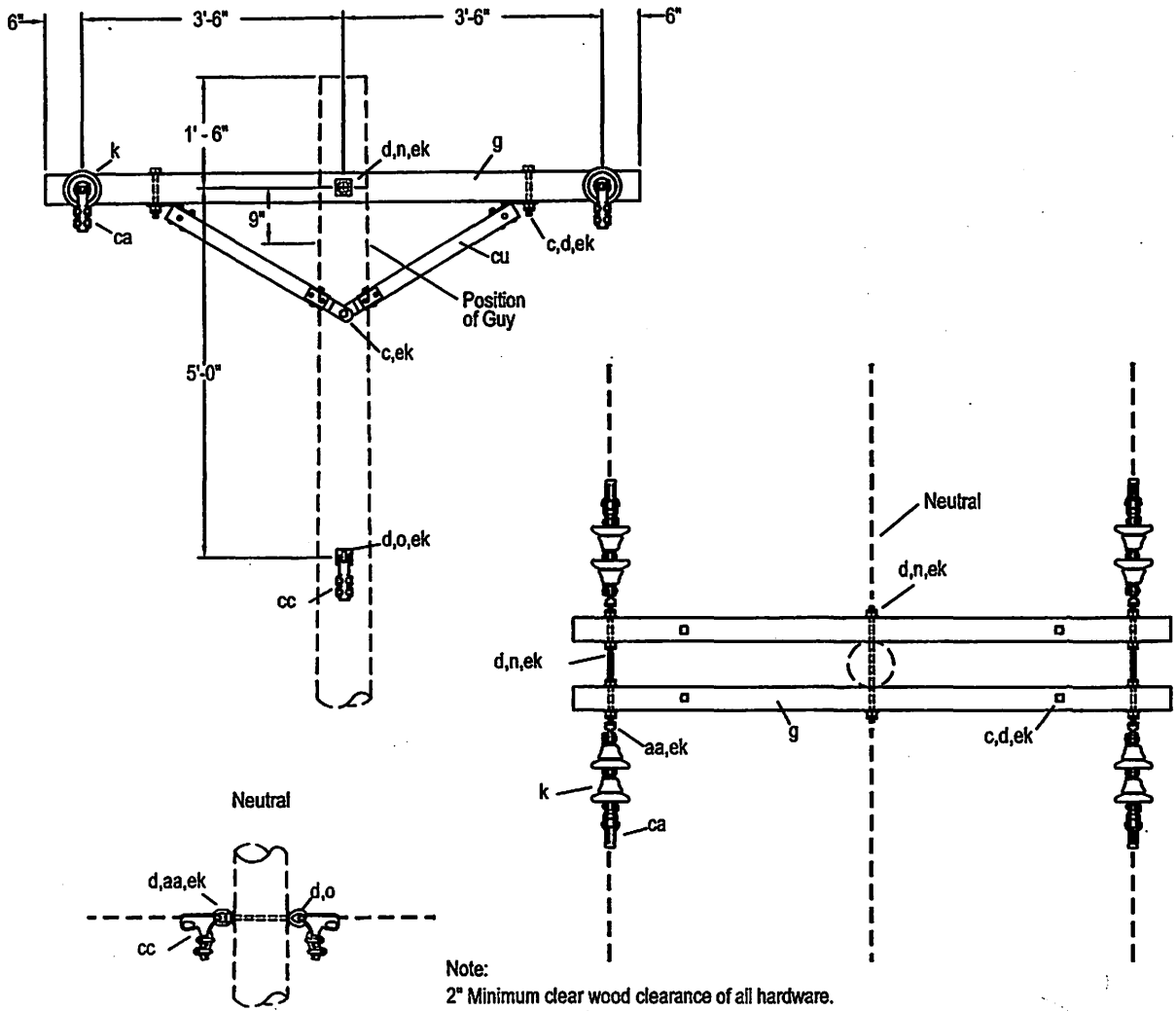


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 ENERGY • WATER • COMMUNITY SERVICES
 LOWER COLORADO RIVER AUTHORITY
 DISTRIBUTION LINE DESIGN
 AUSTIN, TEXAS

DRAWN: F. Brooks
 CHECKED: _____
 APPROVED: M. Lee

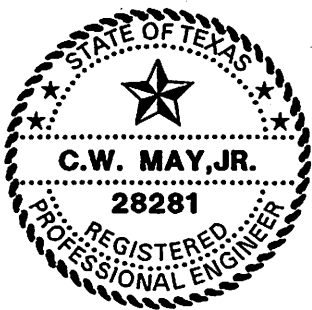
7.2/12.5 KV. PRIMARY, 2-PHASE
 CROSSARM CONSTRUCTION
 DEADEND (SINGLE)
 (ALL CONDUCTORS)

DATE:	B7,B7-1
5/02	



Note:
 2" Minimum clear wood clearance of all hardware.
 No bolts to extend more than 2" beyond locknut.
 Jumpers and Connectors as required.
 The seal appearing on this document was authorized
 by C. W. MAY, JR, P.E. 28281 on 10/2/02.

ITEM	NO.	MATERIAL	ITEM	NO.	MATERIAL
c	4	Bolt, machine, 1/2" x required length	cc	2	Deadend assembly, neutral
c	1	Bolt, machine, 5/8" x required length	cu	2pr.	Brace, wood, 60" span, 18" drop
d	4	Washer, round, 1-3/8" diameter, 9/16" hole	ek	4	Locknut, 1/2"
d	12	Washer, square, 2-1/4" x 3/16", 11/16" hole	ek	15	Locknut, 5/8"
g	2	Crossarm, 3-3/4" x 4-3/4" x 8'-0"			
k	8	Insulator, suspension type, class 52-1			
n	3	Bolt, double arming, 5/8" x req'd length			
o	1	Bolt, eye, 5/8" x required length			
aa	5	Nut, eye, 5/8"			
ca	4	Deadend assembly, primary			



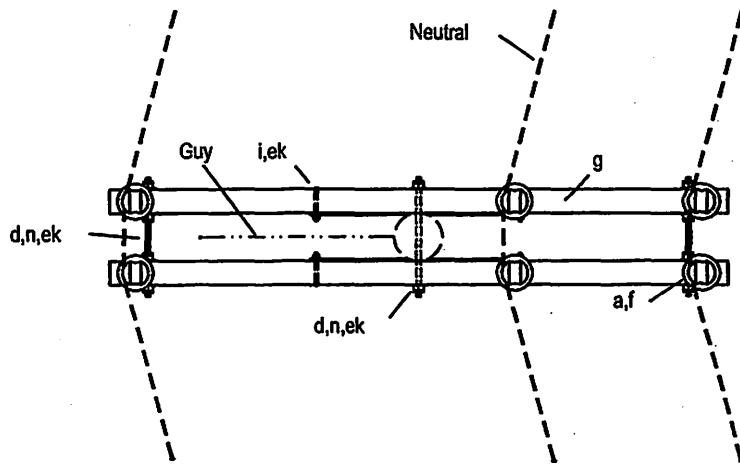
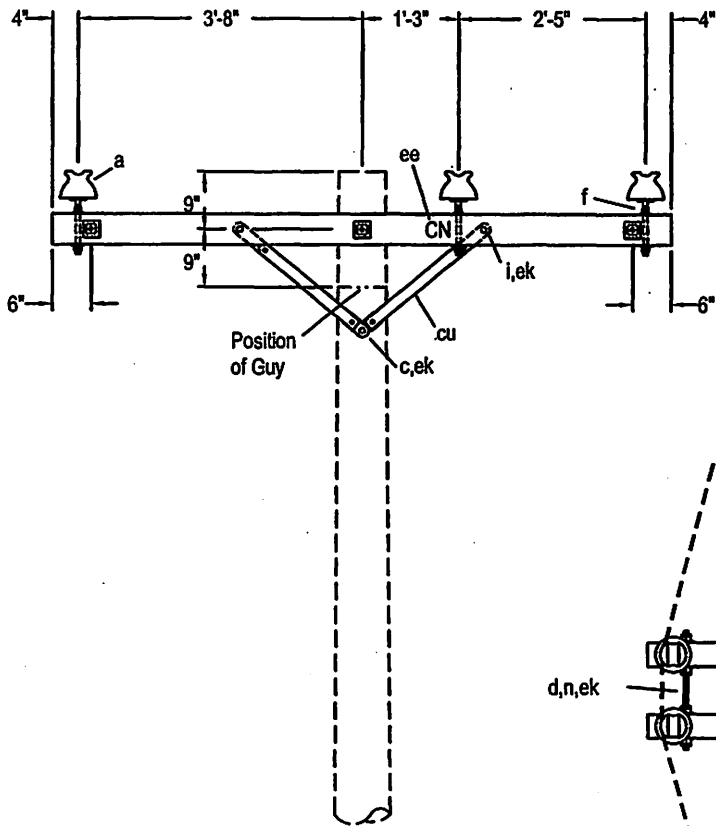
LCRA
 ENERGY • WATER • COMMUNITY SERVICES
 LOWER COLORADO RIVER AUTHORITY
 DISTRIBUTION LINE DESIGN
 AUSTIN, TEXAS

DRAWN: J. Brooks
 CHECKED: _____
 APPROVED: M. Lee

7.2/12.5 DV. PRIMARY 2-PHASE
 CROSSARM CONSTRUCTION
 DEADEND (DOUBLE)
 (ALL CONDUCTORS)

DATE:
 5/02

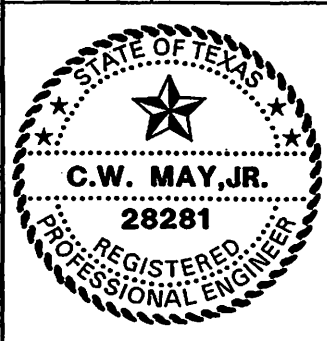
B8



Note:

2" Minimum clear wood clearance of all hardware.
 No bolts to extend more than 2" beyond locknut.
 Use M52-4 for guide to neutral identification.
 The seal appearing on this document was authorized
 by C. W. MAY, JR, P.E. 28281 on 10/2/02.

ITEM	NO.	MATERIAL	ITEM	NO.	MATERIAL
a	4	Insulator, pin type, class 55-4, sky gray	ek	1	Locknut, 1/2"
a	1	Insulator, pin type, class 55-3, brown or white	ek	10	Locknut, 5/8"
c	1	Bolt, machine, 1/2" x required length	ee		2" letter "CN", 1" nail
d	10	Washer, square, 2-1/4" x 3/16", 11/16" hole			
f	6	Pin, crossarm, steel, 5/8" x 10-3/4"			
g	2	Crossarm, 3-3/4" x 4-3/4" x 8'-0"			
i	4	Bolt, carriage, 3/8" x 4-1/2"			
n	3	Bolt, double arming, 5/8" x required length			
cu	2pr.	Brace, wood, 38" span, 17-3/4"			
ek	4	Locknut, 3/8"			



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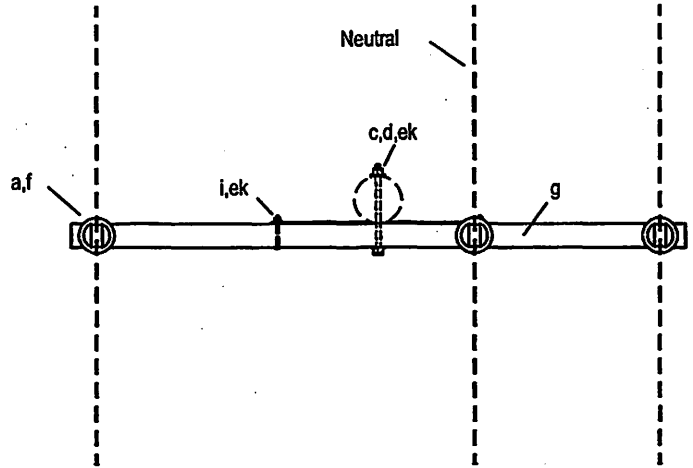
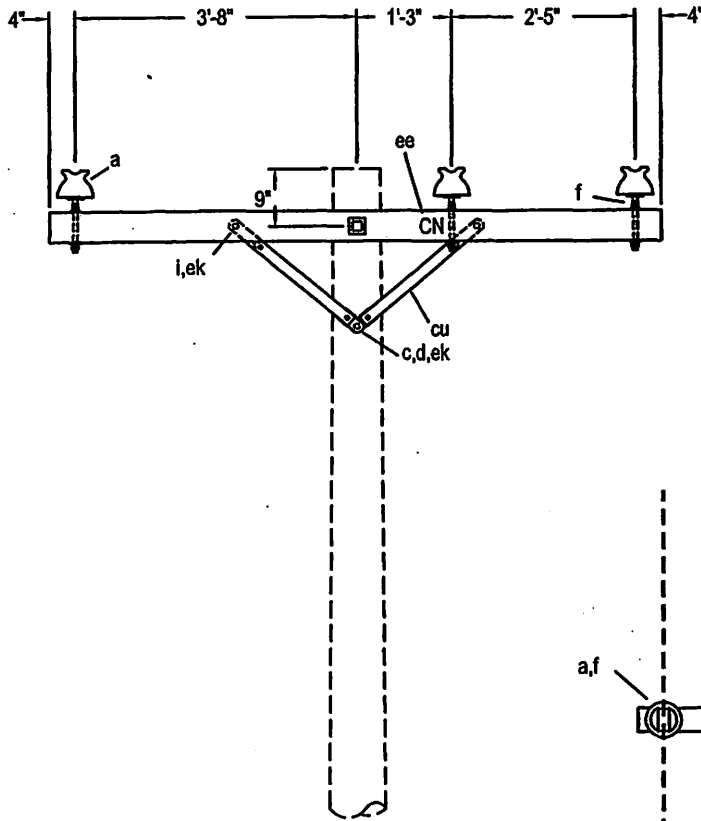
LOWER COLORADO RIVER AUTHORITY
 DISTRIBUTION LINE DESIGN
 AUSTIN, TEXAS

DRAWN: F. Brooks
 CHECKED: _____
 APPROVED: M. Lee

7.2/12.5 KV. PRIMARY 2-PHASE
 CROSSARM CONSTRUCTION
 DOUBLE LINE ARM 0° TO 30° ANGLE
 (SMALL CONDUCTORS)

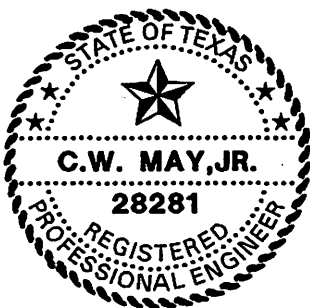
DATE: 5/02

B9



Note:
 Use M52-4 for guide to neutral identification.
 2" Minimum clear wood clearance of all hardware.
 No bolts to extend more than 2" beyond locknut.
 Jumpers and connectors as required.
 The seal appearing on this document was authorized
 by C. W. MAY, JR, P.E. 28281 on 10/2/02.

ITEM	NO.	MATERIAL	ITEM	NO.	MATERIAL
a	2	Insulator, pin type, class 55-4, sky gray	ek	2	Locknut, 3/8"
a	1	Insulator, pin type, class 55-3, brown or white	ek	1	Locknut, 1/2"
c	1	Bolt, machine, 1/2" x required length	ek	1	Locknut, 5/8"
c	1	Bolt, machine, 5/8" x required length	ee		2" letter "CH", 1" nail
d	1	Washer, round, 1-3/8" diameter, 9/16" hole			
d	2	Washer, square, 2-1/4" x 3/16", 11/16" hole			
f	3	Pin, crossarm, 5/8" x 10-3/4"			
g	1	Crossarm, 3-3/4" x 4-3/4" x 8'-0"			
i	2	Bolt, carriage, 3/8" x 4-1/2"			
cu	1pr.	Brace, wood, 38" span, 17-3/4" drop			



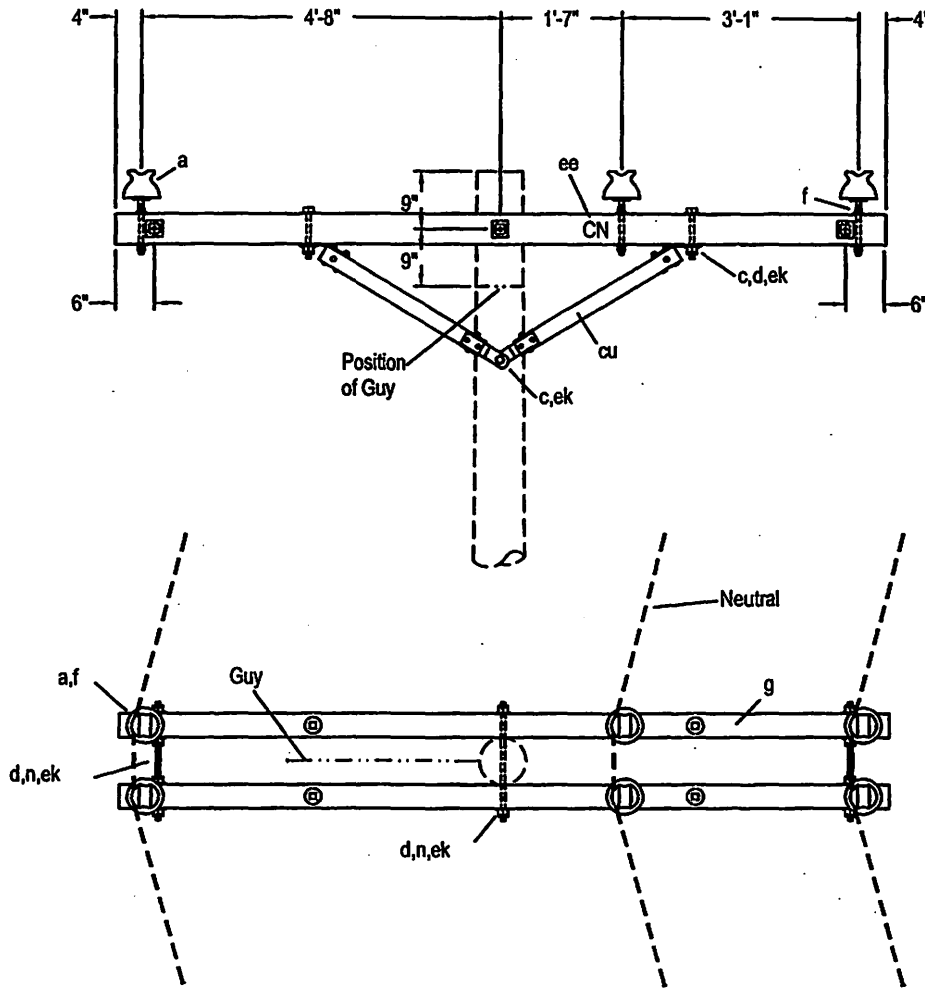
LOWER COLORADO RIVER AUTHORITY
 DISTRIBUTION LINE DESIGN
 AUSTIN, TEXAS

DRAWN: F. Brooks
 CHECKED: _____
 APPROVED: _____

7.2/12.5 KV. PRIMARY, 2-PHASE
 CROSSARM CONSTRUCTION
 SINGLE LINE ARM
 (SMALL CONDUCTORS)

DATE:
 5/02

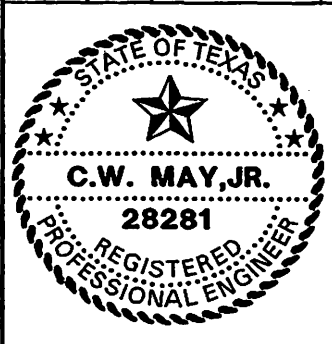
B9-1



Note:

Use M52-4 for guide to neutral identification.
 This construction should be used when future conversion to three phase is likely.
 2" Minimum clear wood clearance of all hardware.
 No bolts to extend more than 2" beyond locknut.
 Jumpers and connectors as required.
 The seal appearing on this document was authorized
 by C. W. MAY, JR, P.E. 28281 on 10/2/02.

ITEM	NO.	MATERIAL	ITEM	NO.	MATERIAL
a	4	Insulator, pin type, class 55-4, sky gray	ek	4	Locknut, 1/2"
a	2	Insulator, pin type, class 55-3, brown or white	ek	11	Locknut, 5/8"
c	4	Bolt, machine, 1/2" x required length	ee		2" letter "CH", 1" nail
c	1	Bolt, machine, 5/8" x required length			
d	4	Washer, round, 1-3/8" diameter, 9/16" hole			
d	10	Washer, square, 2-1/4" x 3/16", 11/16" hole			
f	6	Pin, crossarm, steel, 5/8" x 10-3/4"			
g	2	Crossarm, 3-3/4" x 4-3/4" x 10'-0"			
n	3	Bolt, double arming, 5/8" x req'd length			
cu	2pr.	Brace, wood, 60° span, 18" drop			



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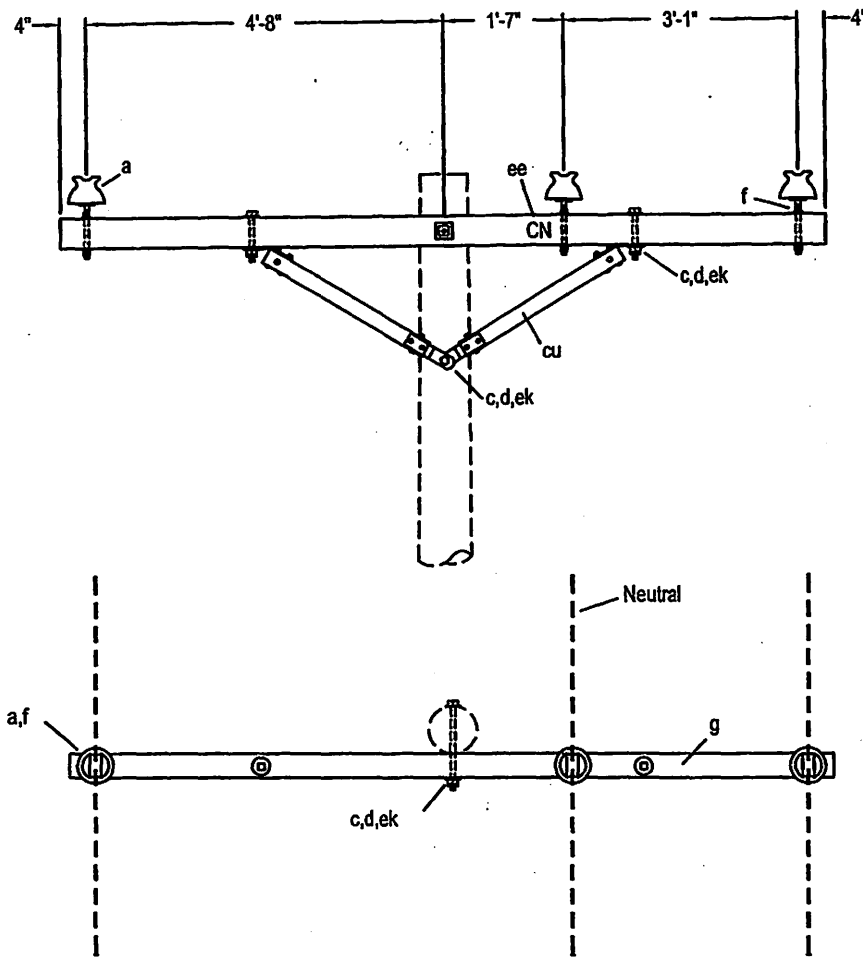
LOWER COLORADO RIVER AUTHORITY
 DISTRIBUTION LINE DESIGN
 AUSTIN, TEXAS

DRAWN: J. Brooks
 CHECKED: _____
 APPROVED: M. Lee

7.2/12.5 KV: PRIMARY 2-PHASE
 CROSSARM CONSTRUCTION
 DOUBLE LINE ARM 0° TO 30° ANGLE
 (SMALL CONDUCTORS)

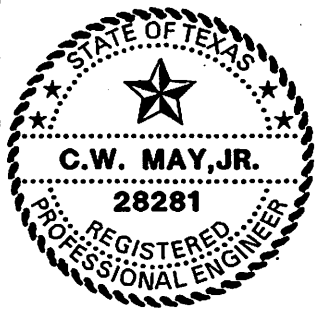
DATE: _____
 5/02

B9-2



Note:
 2" Minimum clear wood clearance of all hardware.
 No bolts to extend more than 2" beyond locknut.
 Jumpers and Connectors as required.
 This construction should be used when future conversion to three phase is likely.
 Use M52-4 for guide to neutral identification.
 The seal appearing on this document was authorized
 by C. W. MAY, JR, P.E. 28281 on 10/2/02.

ITEM	NO.	MATERIAL	ITEM	NO.	MATERIAL
a	2	Insulator, pin type, class 55-4, sky gray	ek	2	Locknut, 5/8"
a	1	Insulator, pin type, class 55-3, brown or white	ee		2" letter "CH", 1" nail
c	2	Bolt, machine, 1/2" x required length			
c	2	Bolt, machine, 5/8" x required length			
d	2	Washer, round, 1-3/8" diameter, 9/16" hole			
d	3	Washer, square, 2-1/4" x 3/16", 11/16" hole			
f	3	Pin, crossarm, steel, 5/8" x 10-3/4"			
g	1	Crossarm, 3-3/4" x 4-3/4" x 10'-0"			
cu	1pr.	Brace, wood, 60" span, 18" drop			
ek	2	Locknut, 1/2"			

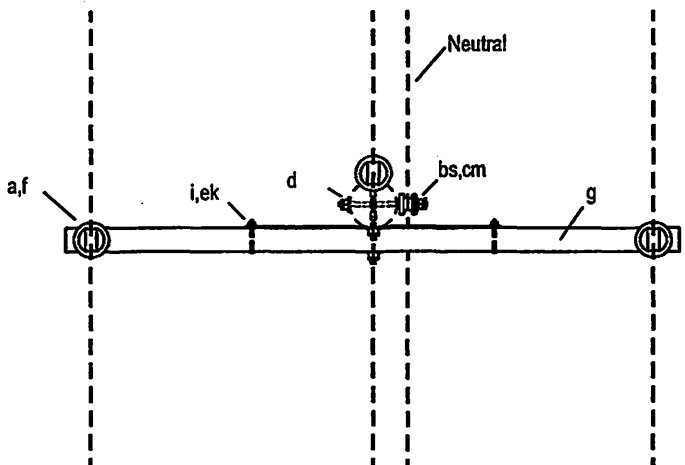
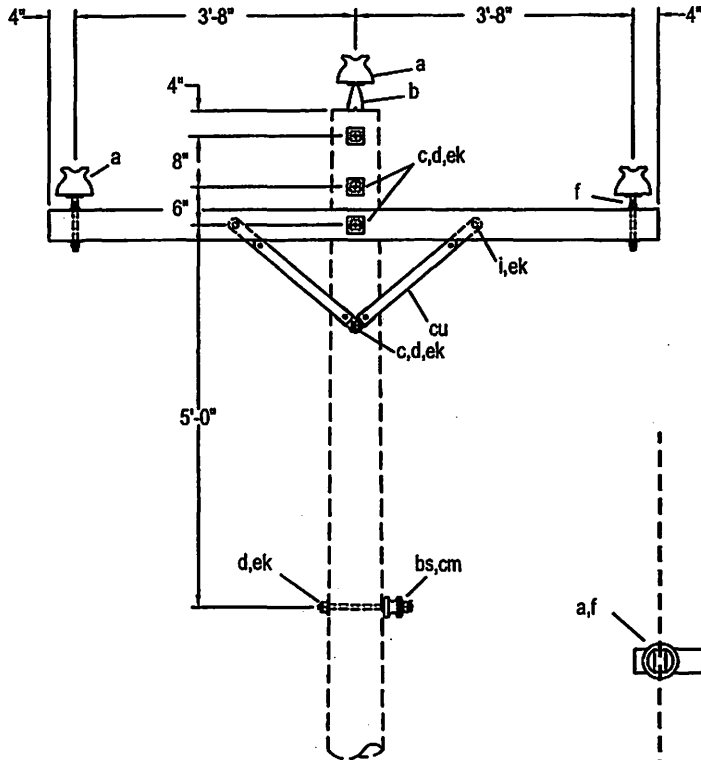


DRAWN: J. Brooks
 CHECKED: _____
 APPROVED: Mh Lee

7.2/12.5 KV. PRIMARY 2-PHASE
 CROSSARM CONSTRUCTION
 SINGLE LINE ARM
 (SMALL CONDUCTORS)

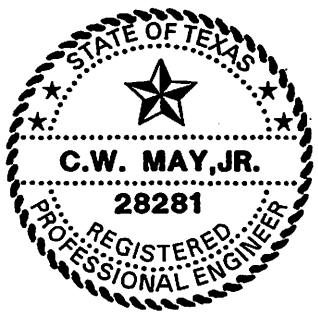
DATE:
 5/02

B9-3



Note:
 2" Minimum clear wood clearance of all hardware.
 No bolts to extend more than 2" beyond locknut.
 Jumpers and connectors as required.
 The seal appearing on this document was authorized
 by C. W. MAY, JR, P.E. 28281 on 10/2/02.

ITEM	NO.	MATERIAL	ITEM	NO.	MATERIAL
a	3	Insulator, pin type, class 55-4	cu	1pr.	Insulator, spool type, class 53-2
b	1	Pin, pole top, 20"	cu	1pr.	Brace, wood, 38" span, 17-3/4" drop
c	3	Bolt, machine, 1/2" x required length	ek	2	Locknut, 3/8"
c	3	Bolt, machine, 5/8" x required length	ek	1	Locknut, 1/2"
d	1	Washer, round, 1-3/8", 9/16" hole	ek	4	Locknut, 5/8"
d	5	Washer, square, 2-1/4" x 3/16", 11/16" hole			
f	2	Pin, crossarm, steel, 5/8" x 10-3/4"			
g	1	Crossarm, 3-3/4" x 4-3/4" x 8'-0"			
i	2	Bolt, carriage, 3/8" x 4-3/4"			
bs	1	Bolt, single upset, 5/8" x required length, with locknut			



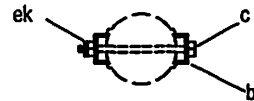
LCRA
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 LOWER COLORADO RIVER AUTHORITY
 DISTRIBUTION LINE DESIGN
 AUSTIN, TEXAS

DRAWN: J. Brooks
 CHECKED: _____
 APPROVED: M. Lee

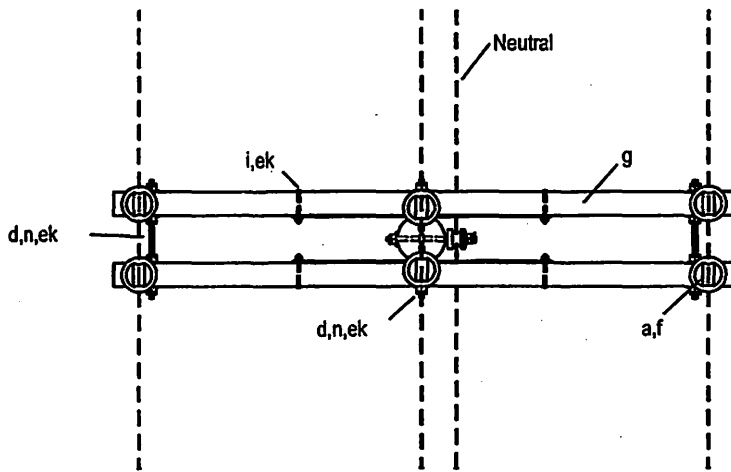
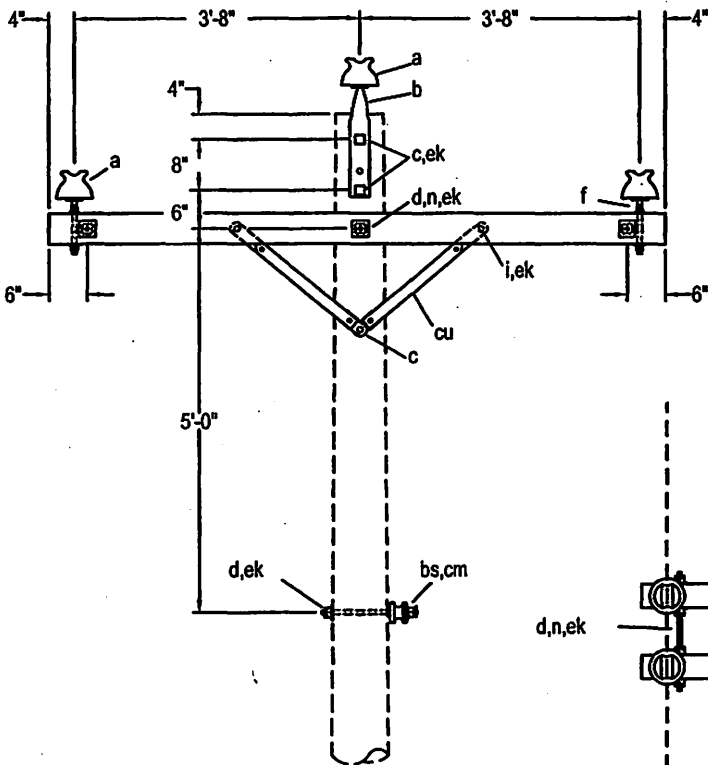
7.2/12.5 KV. PRIMARY, 3-PHASE
 CROSSARM CONSTRUCTION
 SINGLE PRIMARY SUPPORT
 (SMALL CONDUCTORS)

DATE:
 5/02

C1



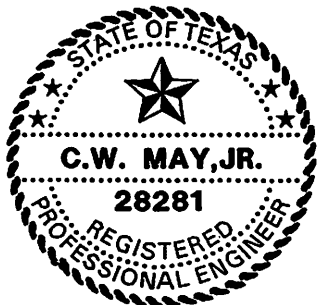
POLE TOP PIN ASSEMBLY



Note:

2" Minimum clear wood clearance of all hardware.
 No bolts to extend more than 2" beyond locknut.
 Jumpers and connectors as required.
 The seal appearing on this document was authorized
 by C. W. MAY, JR, P.E. 28281 on 10/2/02.

ITEM	NO.	MATERIAL	ITEM	NO.	MATERIAL
a	6	Insulator, pin type, class 55-4	cm	1	Insulator, spool type, class 53-2
b	2	Pin, pole top, 20"	cu	2pr.	Brace, wood, 38" span, 17-3/4" drop
c	1	Bolt, machine, 1/2" x required length	ek	4	Locknut, 3/8"
c	2	Bolt, machine, 5/8" x required length	ek	1	Locknut, 1/2"
d	11	Washer, square, 2-1/4" x 3/16", 11/16" hole	ek	13	Locknut, 5/8"
f	4	Pin, crossarm, steel, 5/8" x 10-3/4"			
g	2	Crossarm, 3-3/4" x 4-3/4" x 8'-0"			
i	4	Bolt, carriage, 3/8" x 4-1/2"			
n	3	Bolt, double arming, 5/8" x required length			
bs	1	Bolt, single upset, 5/8" x required length, with locknut			

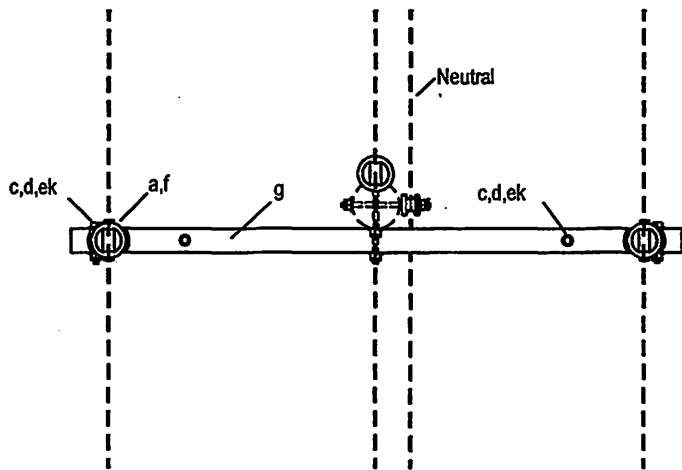
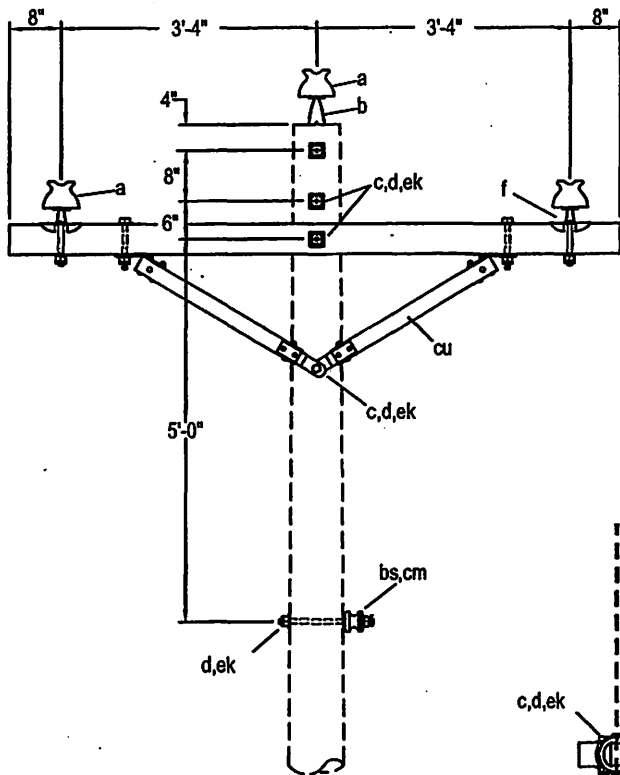


DRAWN: J. Brooks
 CHECKED: _____
 APPROVED: M. Lee

7.2/12.5 KV. PRIMARY, 3-PHASE
 CROSSARM CONSTRUCTION
 DOUBLE PRIMARY SUPPORT
 (SMALL CONDUCTORS)

DATE:
 5/02

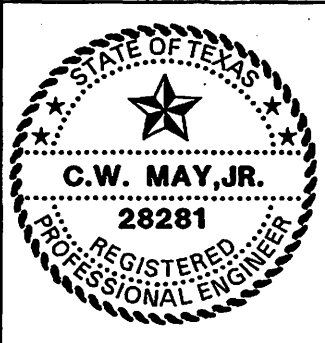
C1-1



Note:

This construction required for all conductors having a breaking strength of more than 4,500 pounds.
 2" Minimum clear wood clearance of all hardware.
 No bolts to extend more than 2" beyond locknut.
 The seal appearing on this document was authorized by C. W. MAY, JR, P.E. 28281 on 10/2/02.

ITEM	NO.	MATERIAL	ITEM	NO.	MATERIAL
a	3	Insulator, pin type, class 55-4	cu	1pr.	Brace, wood, 60" span, 18" drop
b	1	Pin, pole top, 20"	ek	2	Locknut, 1/2"
c	2	Bolt, machine, 1/2" x required length	ek	4	Locknut, 5/8"
c	4	Bolt, machine, 5/8" x required length			
d	6	Washer, square, 2-1/4" x 3/16", 11/16" hole			
d	2	Washer, round, 1-3/8" diameter, 9/16" hole			
f	2	Pin, crossarm, clamp type			
g	1	Crossarm, 3-3/4" x 4-3/4" x 8'-0"			
bs	1	Bolt, single upset, 5/8" x required length, with locknut			
cm	1	Insulator, spool type, class 53-2			



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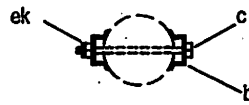
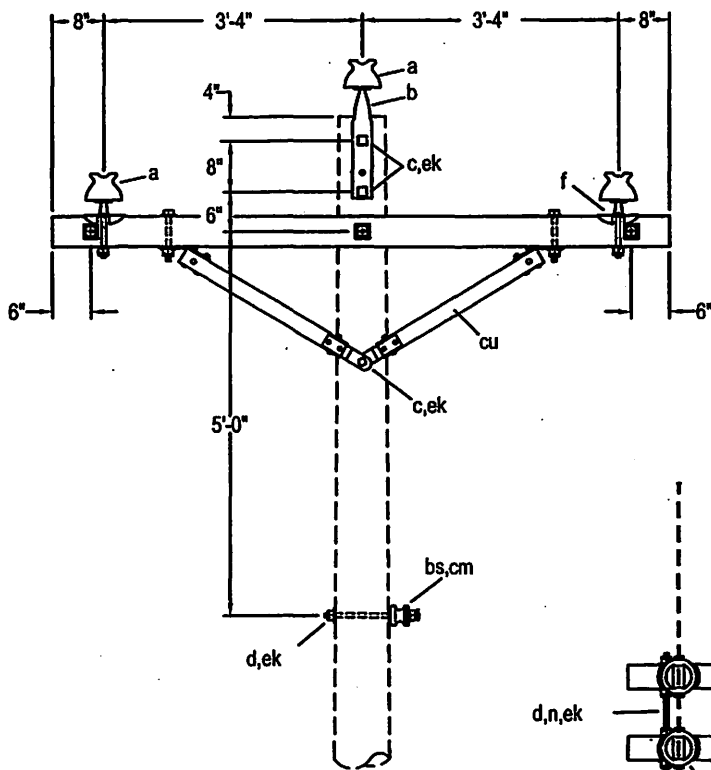
LOWER COLORADO RIVER AUTHORITY
 DISTRIBUTION LINE DESIGN
 AUSTIN, TEXAS

DRAWN: J. Brooks
 CHECKED: _____
 APPROVED: M. Lee

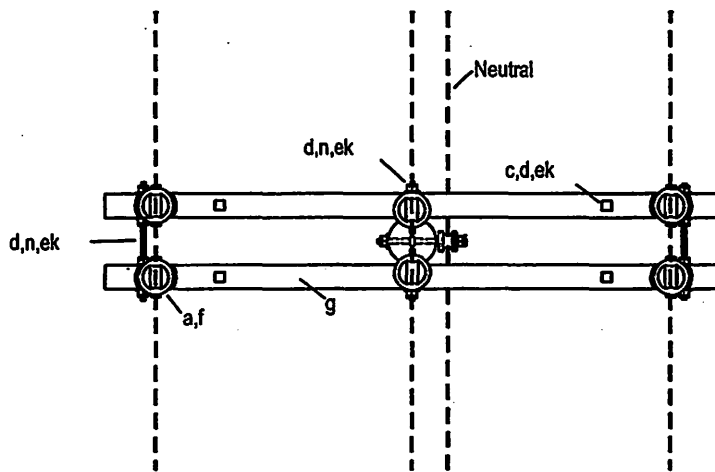
7.2/12.5 KV. PRIMARY, 3-PHASE
 CROSSARM CONSTRUCTION
 SINGLE PRIMARY SUPPORT
 (LARGE CONDUCTORS)

DATE: _____
 5/02

C1-2



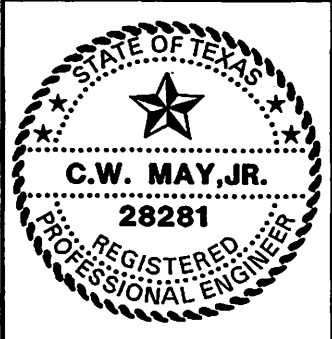
POLE TOP PIN ASSEMBLY



Note:

2" Minimum clear wood clearance of all hardware.
 No bolts to extend more than 2" beyond locknut.
 Jumpers and connectors as required.
 The seal appearing on this document was authorized
 by C. W. MAY, JR, P.E. 28281 on 10/2/02.

ITEM	NO.	MATERIAL	ITEM	NO.	MATERIAL
a	6	Insulator, pin type, class 55-4	cm	1	Insulator, spool type, class 53-2
b	2	Pin, pole top, 20"	cu	2pr.	Brace, wood, 60" span, 18" drop
c	4	Bolt, machine, 1/2" x required length	ek	4	Locknut, 1/2"
c	3	Bolt, machine, 5/8" x required length	ek	13	Locknut, 5/8"
d	11	Washer, square, 2-1/4" x 3/16", 11/16" hole			
d	4	Washer, round, 1-3/8" diameter			
f	4	Pin, crossarm, clamp type			
g	2	Crossarm, 3-3/4" x 4-3/4" x 8'-0"			
n	3	Bolt, double arming, 5/8" x req'd length			
bs	1	Bolt, single upset, 5/8" x req'd length			



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LOWER COLORADO RIVER AUTHORITY
 DISTRIBUTION LINE DESIGN
 AUSTIN, TEXAS

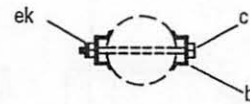
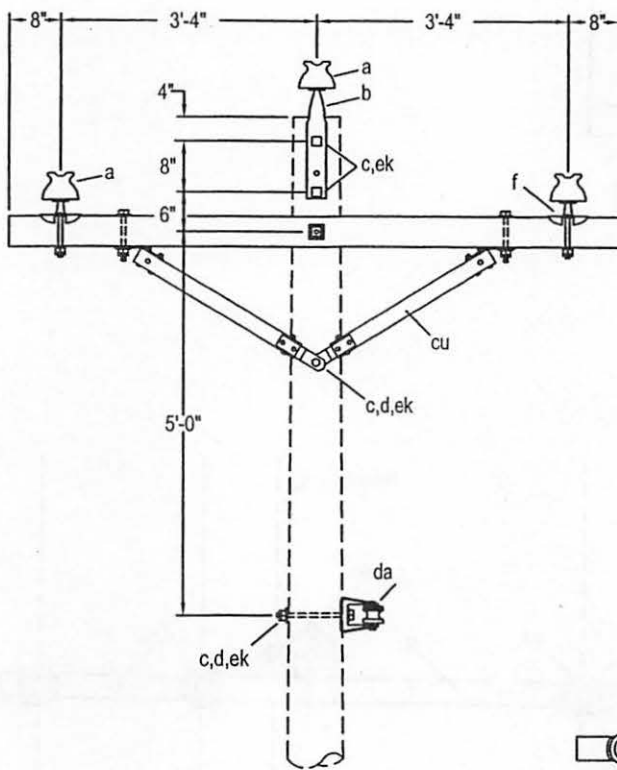
DRAWN: J. Brooks
 CHECKED: _____
 APPROVED: M. Lee

7.2/12.5 KV. PRIMARY, 3-PHASE
 CROSSARM CONSTRUCTION
 DOUBLE PRIMARY SUPPORT
 (LARGE CONDUCTORS)

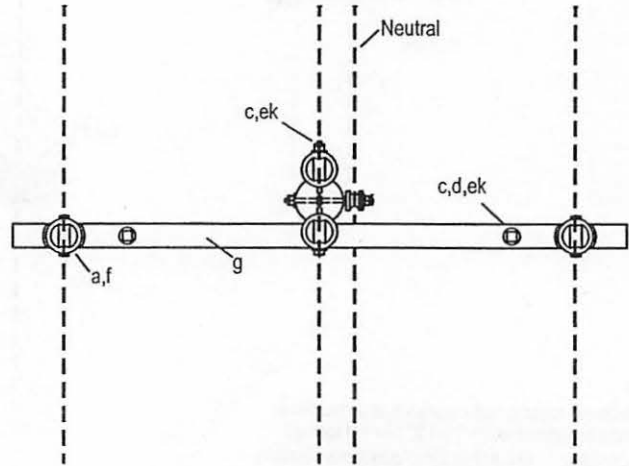
DATE: _____

5/02

C1-3



POLE TOP PIN ASSEMBLY



Note:
 2" Minimum clear wood clearance of all hardware.
 No bolts to extend more than 2" beyond locknut.
 Jumpers and connectors as required.
 The seal appearing on this document was authorized
 by C. W. MAY, JR, P.E. 28281 on 10/2/02.

ITEM	NO.	MATERIAL	ITEM	NO.	MATERIAL
a	4	Insulator, pin type, class 55-4	ek	2	Locknut, 1/2"
b	2	Pin, pole top, 20"	ek	5	Locknut, 5/8"
c	2	Bolt, machine, 1/2" x required length			
c	5	Bolt, machine, 5/8" x required length			
d	4	Washer, square, 2-1/4"			
d	2	Washer, round, 1-3/8" diameter, 9/16" hole			
f	2	Pin, crossarm, clamp type			
g	1	Crossarm, 3-3/4" x 4-3/4" x 8'-0"			
cu	1pr.	Brace, wood, 60" span, 18" drop			
da	1	Bracket, insulated			



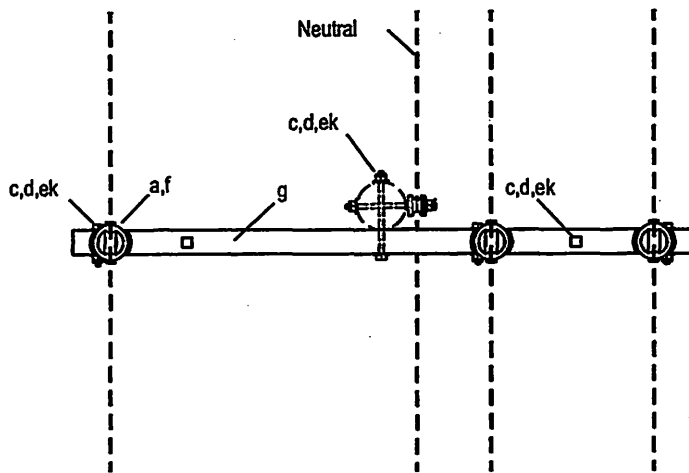
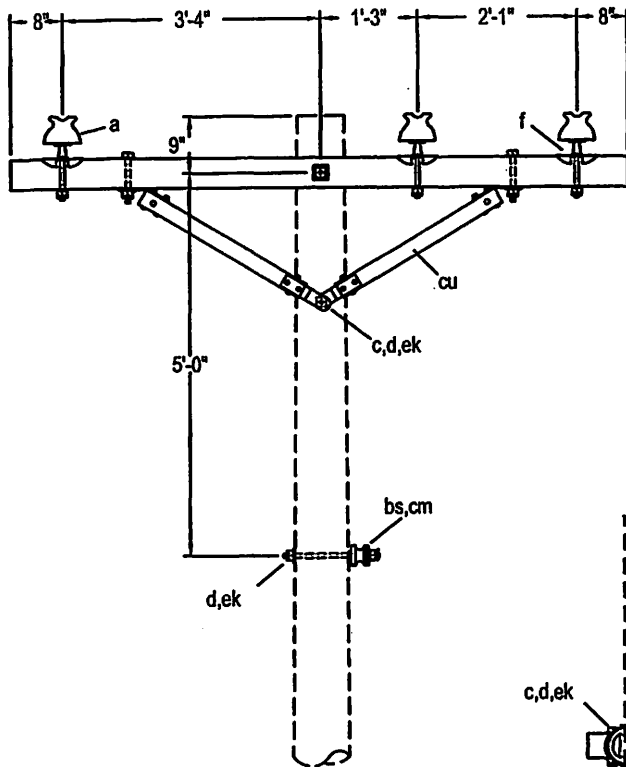
LOWER COLORADO RIVER AUTHORITY
 DISTRIBUTION LINE DESIGN
 AUSTIN, TEXAS

DRAWN: J. Brooks
 CHECKED: _____
 APPROVED: M. Lee

7.2/12.5 KV. PRIMARY, 3-PHASE
 CROSSARM CONSTRUCTION
 2° TO 5° ANGLE
 (LARGE CONDUCTORS)

DATE:
 5/02

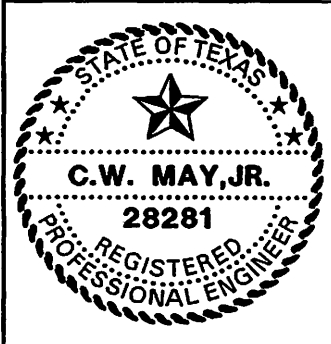
C1-4



Note:

2" Minimum clear wood clearance of all hardware.
 No bolts to extend more than 2" beyond locknut.
 This construction required for all conductors having
 a breaking strength of more than 4,500 pounds.
 The seal appearing on this document was authorized
 by C. W. MAY, JR, P.E. 28281 on 10/2/02.

ITEM	NO.	MATERIAL	ITEM	NO.	MATERIAL
a	3	Insulator, pin type, class 5-4	ek	2	Locknut, 1/2"
c	2	Bolt, machine, 1/2" x required length	ek	2	Locknut, 5/8"
c	2	Bolt, machine, 5/8" x required length			
d	2	Washer, square, 2-1/4" x 3/16", 11/16" hole			
d	3	Washer, round, 1-3/8" diameter, 9/16" hole			
f	3	Pin, crossarm, clamp type			
g	1	Crossarm, 3-3/4" x 4-3/4" x 8'-0"			
bs	1	Bolt, single upset, 5/8" x req'd length, with locknut			
cm	1	Insulator, spool type, class 53-2			
cu	1pr.	Brace, wood, 60" span, 18" drop			



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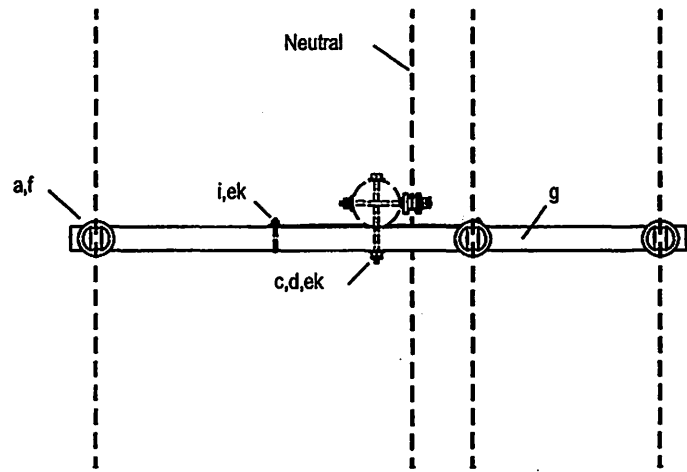
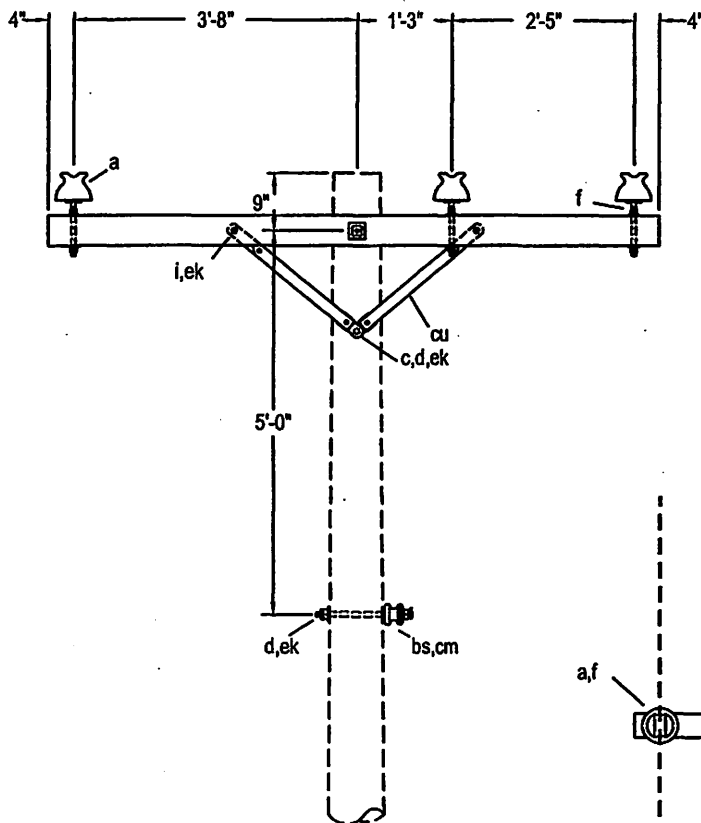
LOWER COLORADO RIVER AUTHORITY
 DISTRIBUTION LINE DESIGN
 AUSTIN, TEXAS

DRAWN: F. Brooks
 CHECKED: _____
 APPROVED: M. Lee

7.2/12.5 KV. PRIMARY, 3-PHASE
 CROSSARM CONSTRUCTION
 SINGLE LINE ARM
 (LARGE CONDUCTORS)

DATE: 5/02

C1-5

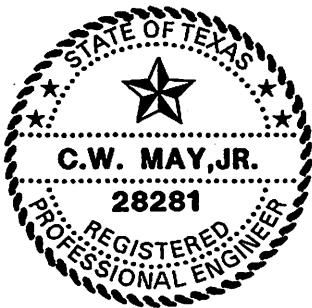


Note:

2" Minimum clear wood clearance of all hardware.
 No bolts to extend more than 2" beyond locknut.
 Jumpers and connectors as required.

The seal appearing on this document was authorized
 by C. W. MAY, JR, P.E. 28281 on 10/2/02.

ITEM	NO.	MATERIAL	ITEM	NO.	MATERIAL
a	3	Insulator, pin type, class 55-4	cm	1	Insulator, spool type, class 53-2
c	1	Bolt, machine, 1/2" x required length	ek	2	Locknut, 3/8"
c	1	Bolt, machine, 5/8" x required length	ek	1	Locknut, 1/2"
d	1	Washer, round, 1-3/8", 9/16" hole	ek	1	Locknut, 5/8"
d	2	Washer, square, 2-1/4" x 3/16", 11/16" hole			
f	3	Pin, crossarm, steel, 5/8" x 10-3/4"			
g	1	Crossarm, 3-3/4" x 4-3/4" x 8'-0"			
i	2	Bolt, carriage, 3/8" x 4-1/2"			
bs	1	Bolt, single upset, 5/8" x required length, with locknut			
cu	1pr.	Brace, wood, 38" span, 17-3/4" drop			



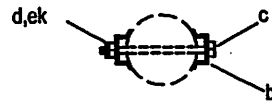
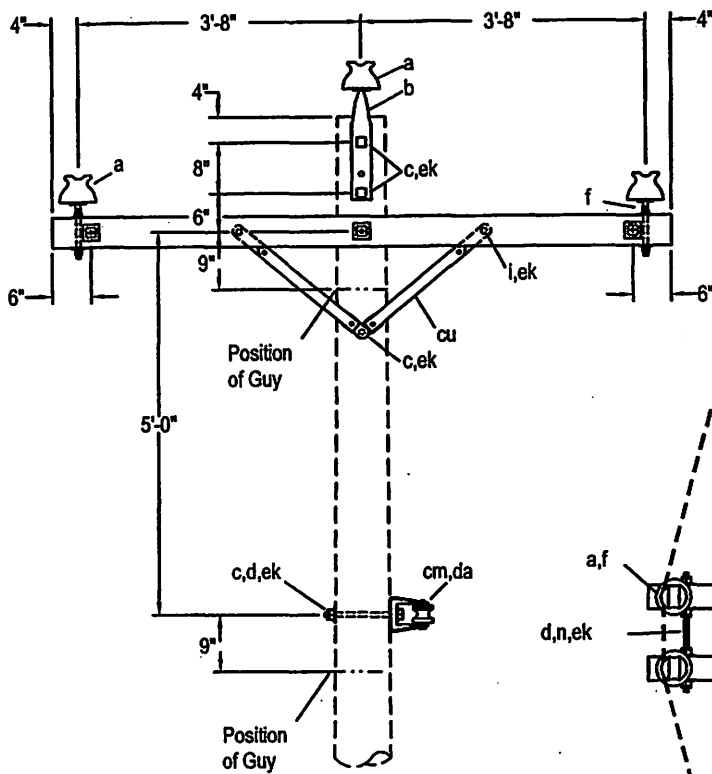
LOWER COLORADO RIVER AUTHORITY
 DISTRIBUTION LINE DESIGN
 AUSTIN, TEXAS

DRAWN: J. Brooks
 CHECKED: _____
 APPROVED: M. Lee

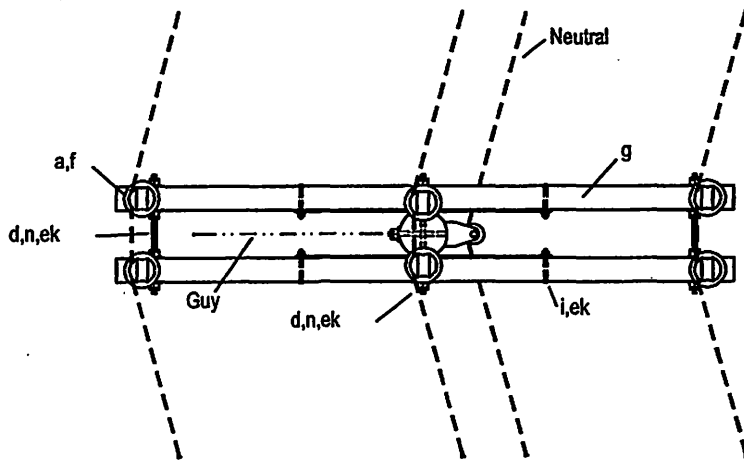
7.2/12.5 KV. PRIMARY 3-PHASE
 CROSSARM CONSTRUCTION
 SINGLE LINE ARM SINGLE PRIMARY SUPPORT
 (SMALL CONDUCTORS)

DATE:
 5/02

C1-6



POLE TOP PIN ASSEMBLY



Note:

When the transverse load is more than 500 pounds per pin, substitute C2-1 or C2-2 as required.

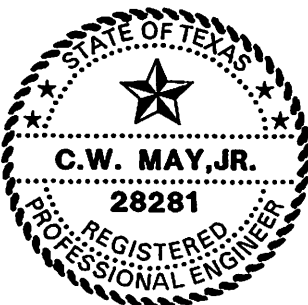
2" Minimum clear wood clearance of all hardware.

No bolts to extend more than 2" beyond locknut.

Jumpers and connectors as required.

The seal appearing on this document was authorized by C. W. MAY, JR, P.E. 28281 on 10/2/02.

ITEM NO.	MATERIAL	ITEM NO.	MATERIAL
a 6	Insulator, pin type, class 55-4	cu 2pr.	Brace, wood, 38" span, 17-3/4" drop
b 2	Pin, pole top, 20"	da 1	Bracket, neutral
c 1	Bolt, machine, 1/2" x required length	ek 4	Locknut, 3/8"
c 3	Bolt, machine, 5/8" x required length	ek 1	Locknut, 1/2"
d 11	Washer, square, 2-1/4" x 3/16", 11/16" hole	ek 13	Locknut, 5/8"
f 4	Pin, crossarm, steel, 5/8" x 10-3/4"		
g 2	Crossarm, 3-3/4" x 4-3/4" x 8'-0"		
i 4	Bolt, carriage, 3/8" x 4-3/4"		
n 3	Bolt, double arming, 5/8" x req'd length		
cm 1	Insulator, spool type, class 53-2 with locknut		



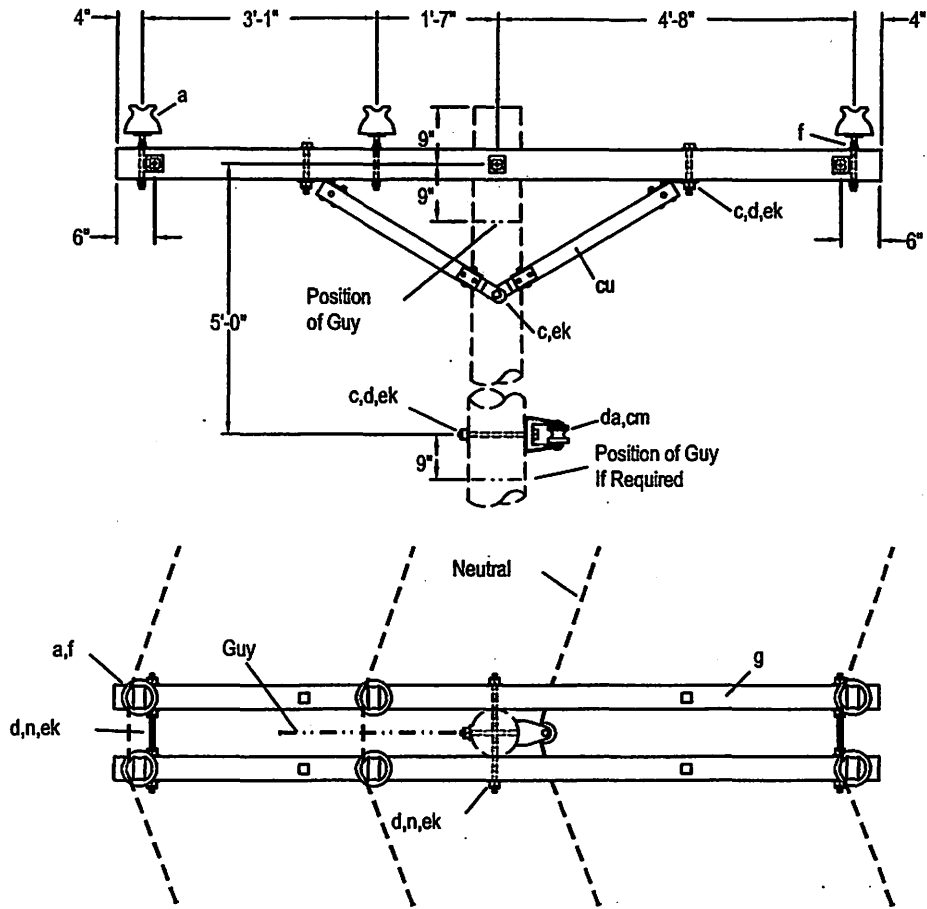
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 LOWER COLORADO RIVER AUTHORITY
 DISTRIBUTION LINE DESIGN
 AUSTIN, TEXAS

DRAWN: J. Brooks
 CHECKED: _____
 APPROVED: M. Lee

7.2/12.5 KV. PRIMARY, 3-PHASE
 CROSSARM CONSTRUCTION
 DOUBLE PRIMARY SUPPORT
 0° TO 30° ANGLE (SMALL CONDUCTORS)

DATE:
 5/02

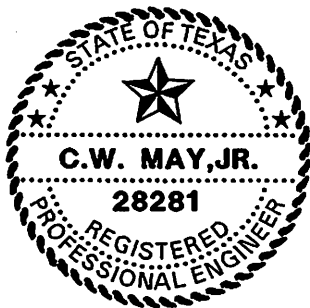
C2



Note:

2" Minimum clear wood clearance of all hardware.
 No bolts to extend more than 2" beyond locknut.
 Jumpers and Connectors as required.
 Center phase wire or neutral wire may be located on opposite side of pole when necessary to avoid crossing of wires in midspan.
 When the transverse load is more than 500 pounds per pin, install a 2-1/4" washer on the top of the crossarm for each pin. If the load is more than 750 pounds, use the construction shown on C2-2.
 The seal appearing on this document was authorized by C. W. MAY, JR, P.E. 28281 on 10/2/02.

ITEM	NO.	MATERIAL	ITEM	NO.	MATERIAL
a	6	Insulator, pin type, class 55-4	da	1	Bracket, neutral
c	4	Bolt, machine, 1/2" x required length	ek	4	Locknut, 1/2"
c	2	Bolt, machine, 5/8" x required length	ek	12	Locknut, 5/8"
d	11	Washer, square, 2-1/4" x 3/16", 11/16" hole			
d	4	Washer, round, 1-3/8" diameter, 9/16" hole			
f	6	Pin, crossarm, steel, 5/8" x 10-3/4"			
g	2	Crossarm, 3-3/4" x 4-3/4" x 10'-0"			
n	3	Bolt, double arming, 5/8" x req'd length			
cm	1	Insulator, spool type, class 53-2			
cu	2pr.	Brace, wood, 60" span, 18" drop			



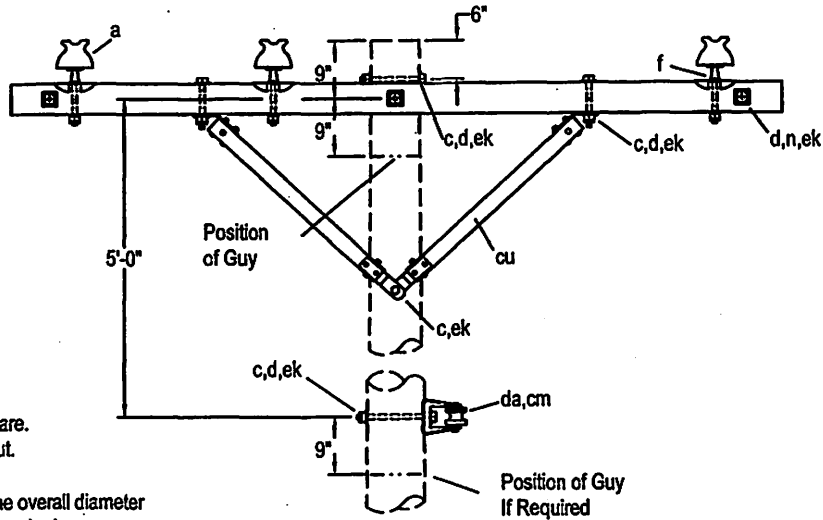
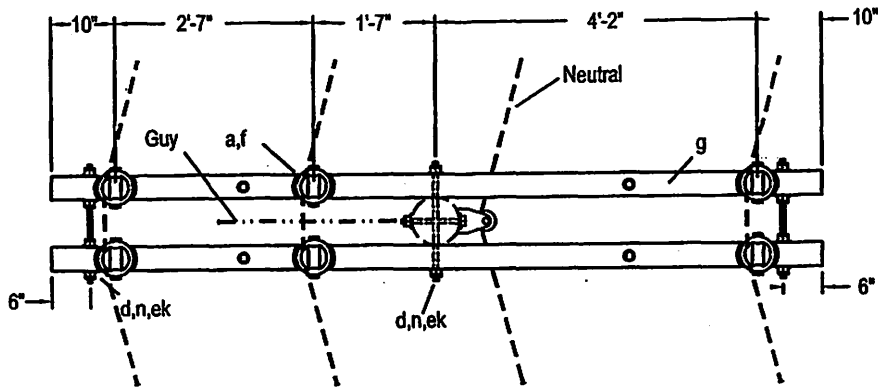
LOWER COLORADO RIVER AUTHORITY
 DISTRIBUTION LINE DESIGN
 AUSTIN, TEXAS

DRAWN: J. Brooks
 CHECKED: _____
 APPROVED: M. Lee

7.2/12.5 KV. PRIMARY 3-PHASE
 CROSSARM CONSTRUCTION
 DOUBLE LINE ARM 0° TO 30° ANGLE
 (SMALL CONDUCTORS)

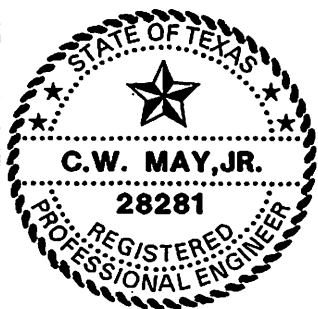
DATE:
 5/02

C2-1



Note:
 2" Minimum clear wood clearance of all hardware.
 No bolts to extend more than 2" beyond locknut.
 Jumpers and connectors as required.
 Side groove of insulator must be larger than the overall diameter of the conductor including armor rods when required.
 This construction required for all conductors having a breaking strength of more than 4,500 pounds.
 Center phase wire or neutral may be located on the opposite side of the pole where necessary to avoid crossing wires in mid span.
 If transverse loading exceeds 1000 lbs./pin, use vertical construction.
 The seal appearing on this document was authorized by C. W. MAY, JR, P.E. 28281 on 10/2/02.

ITEM	NO.	MATERIAL	ITEM	NO.	MATERIAL
a	6	Insulator, pin type, class 55-4	da	1	Bracket, neutral
c	4	Bolt, machine, 1/2" x required length	ek	4	Locknut, 1/2"
c	3	Bolt, machine, 5/8" x required length	ek	20	Locknut, 5/8"
d	21	Washer, square, 2-1/4" x 3/16", 11/16" hole			
d	4	Washer, round, 1-3/8" diameter, 9/16" hole			
f	6	Pin, crossarm, clamp type			
g	2	Crossarm, 3-3/4" x 4-3/4" x 10'-0"			
n	3	Bolt, double arming, 5/8" x req'd length			
cm	1	Insulator, spool type, class 53-2			
cu	2pr.	Brace, wood, 60" span, 30" drop			



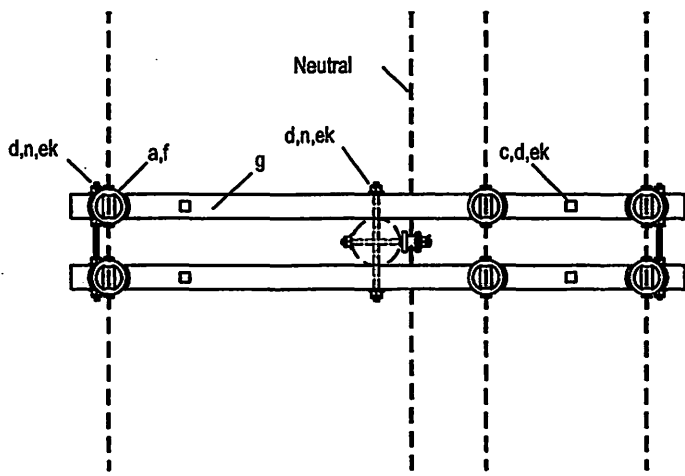
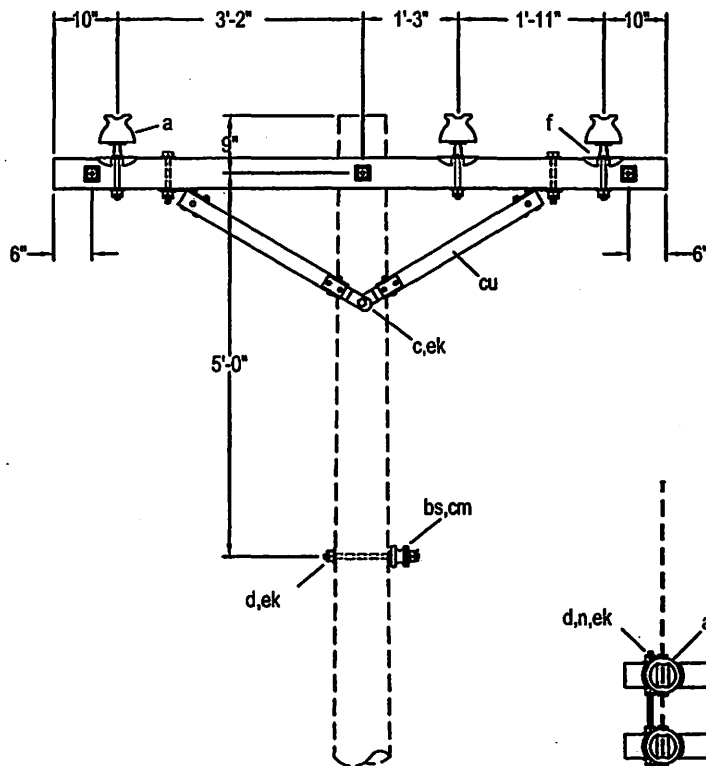
LOWER COLORADO RIVER AUTHORITY
 DISTRIBUTION LINE DESIGN
 AUSTIN, TEXAS

DRAWN: J. Brooks
 CHECKED: _____
 APPROVED: M. Lee

7.2/12.5-KV. PRIMARY 3-PHASE
 CROSSARM CONSTRUCTION
 DOUBLE LINE ARM 0° TO 30° ANGLE
 (LARGE CONDUCTORS)

DATE:
 5/02

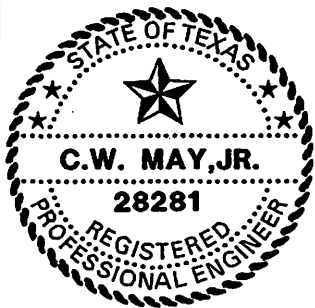
C2-2



Note:

2" Minimum clear wood clearance of all hardware.
 No bolts to extend more than 2" beyond locknut.
 Jumpers and Connectors as required.
 This construction required for all conductors having
 a breaking strength of more than 4,500 pounds.
 The seal appearing on this document was authorized
 by C. W. MAY, JR, P.E. 28281 on 10/2/02.

ITEM	NO.	MATERIAL	ITEM	NO.	MATERIAL
a	6	Insulator, pin type, class 55-4	cu	2pr.	Brace, wood, 60" span, 18" drop
c	4	Bolt, machine, 1/2" x required length	ek	4	Locknut, 1/2"
d	1	Bolt, machine, 5/8" x required length	ek	11	Locknut, 5/8"
d	11	Washer, square, 2-1/4" x 3/16", 11/16" hole			
d	4	Washer, round, 1-3/8" diameter, 9/16" hole			
f	6	Pin, crossarm, clamp type			
g	2	Crossarm, 3-3/4" x 4-3/4" x 8'-0"			
n	3	Bolt, double arming, 5/8" x req'd length			
bs	1	Bolt, single upset, 5/8" x req'd length, with locknut			
cm	1	Insulator, spool type, class 53-2			



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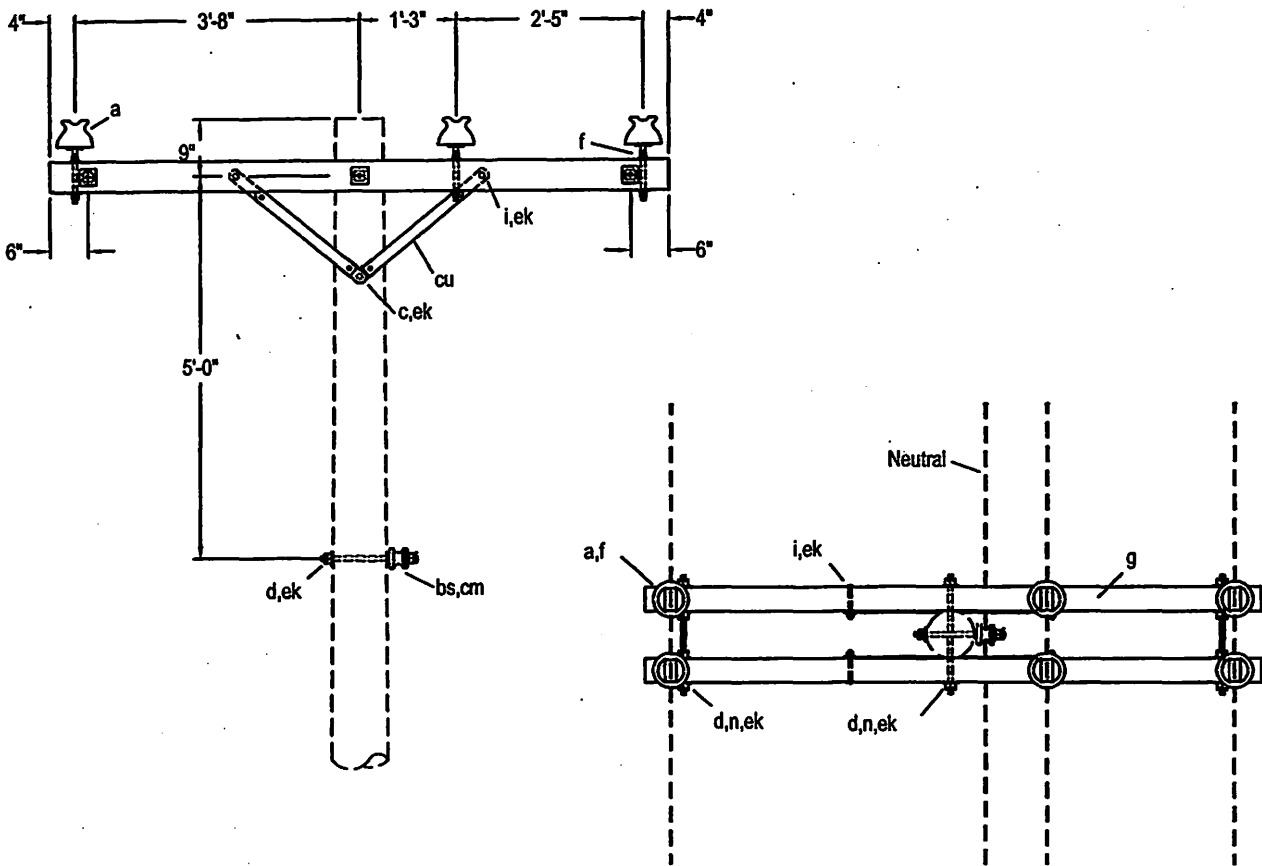
LOWER COLORADO RIVER AUTHORITY
 DISTRIBUTION LINE DESIGN
 AUSTIN, TEXAS

DRAWN: F. Brooks
 CHECKED: _____
 APPROVED: M. Lee

7.2/12.5 KV. PRIMARY, 3-PHASE
 CROSSARM CONSTRUCTION
 DOUBLE PRIMARY SUPPORT
 (LARGE CONDUCTORS)

DATE:
 5/02

C2-5



Note:

2" Minimum clear wood clearance of all hardware.
 No bolts to extend more than 2" beyond locknut.
 Jumpers and connectors as required.
 The seal appearing on this document was authorized
 by C. W. MAY, JR, P.E. 28281 on 10/20/02.

ITEM	NO.	MATERIAL	ITEM	NO.	MATERIAL
a	6	Insulator, pin type, class 55-4	ek	4	Locknut, 3/8"
c	1	Bolt, machine, 1/2" x required length	ek	1	Locknut, 1/2"
d	11	Washer, square, 2-1/4"	ek	10	Locknut, 5/8"
f	6	Pin, crossarm, steel, 5/8" x 10-3/4"			
g	2	Crossarm, 3-3/4" x 4-3/4" x 8'-0"			
i	4	Bolt, carriage, 3/8" x 4-1/2"			
n	3	Bolt, double arming, 5/8" x req'd length			
bs	1	Bolt, single upset, 5/8" x req'd length, with locknut			
cm	1	Insulator, spool type, class 53-2			
cu	2pr.	Brace, wood, 38" span, 17-3/4" drop			



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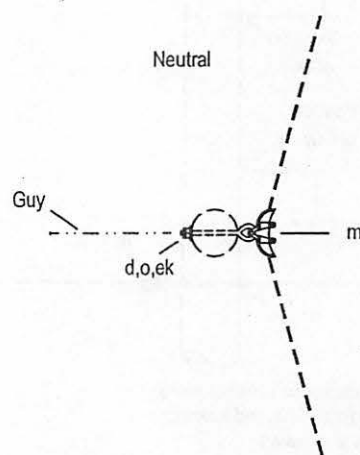
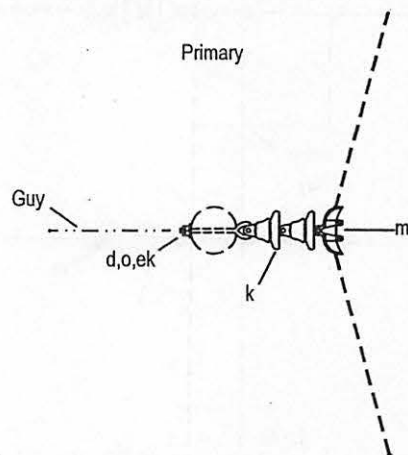
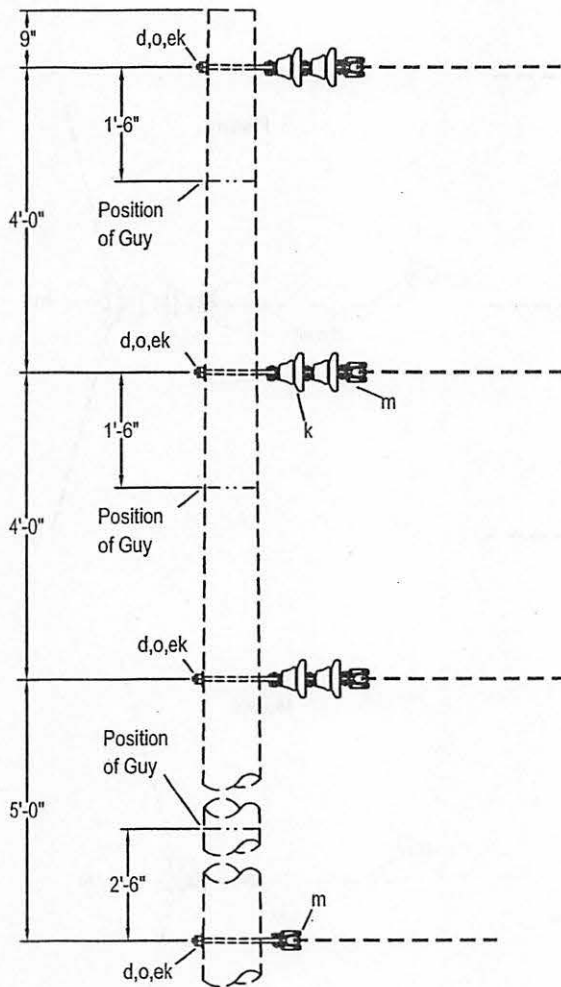
LOWER COLORADO RIVER AUTHORITY
 DISTRIBUTION LINE DESIGN
 AUSTIN, TEXAS

DRAWN: J. 822223
 CHECKED: _____
 APPROVED: M. Lee

7.2/12.5 KV. PRIMARY, 3-PHASE
 CROSSARM CONSTRUCTION
 DOUBLE PRIMARY SUPPORT
 (SMALL CONDUCTORS)

DATE: 5/02

C2-6



Note:
 2" Minimum clear wood clearance of all hardware.
 No bolts to extend more than 2" beyond locknut.
 Jumpers and connectors as required.
 The seal appearing on this document was authorized
 by C. W. MAY, JR, P.E. 28281 on 10/2/02.

ITEM	NO.	MATERIAL	ITEM	NO.	MATERIAL
d	4	Washer, square, 2-1/4" x 3/16", 11/16" hole			
k	6	Insulator, suspension type, class 52-1			
o	4	Bolt, eye, 5/8" x required length			
m	4	Clamp, suspension			
ek	4	Locknut, 5/8"			



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LOWER COLORADO RIVER AUTHORITY
 DISTRIBUTION LINE DESIGN
 AUSTIN, TEXAS

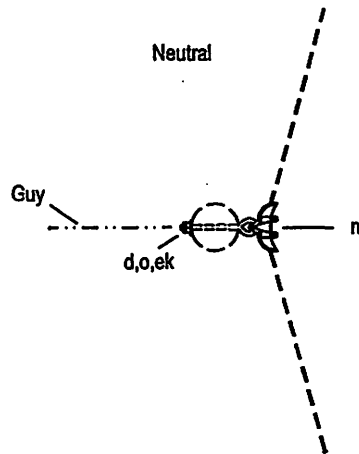
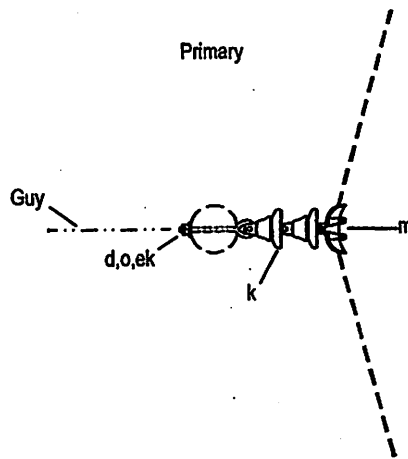
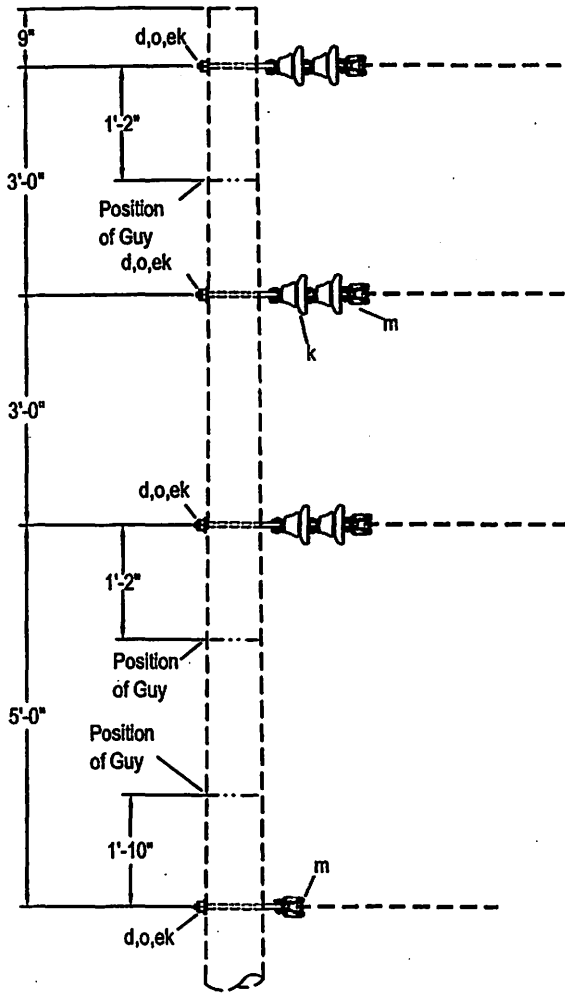
DRAWN: J. Brooks
 CHECKED: _____
 APPROVED: M. Lee

7.2/12.5 KV. PRIMARY, 3-PHASE
 VERTICAL CONSTRUCTION
 30° TO 60° ANGLE
 (ALL CONDUCTORS)

DATE: _____

5/02

C3



Note:
 2" Minimum clear wood clearance of all hardware.
 No bolts to extend more than 2" beyond locknut.
 Jumpers and connectors as required.
 The seal appearing on this document was authorized
 by C. W. MAY, JR, P.E. 28281 on 10/2/02.

ITEM	NO.	MATERIAL	ITEM	NO.	MATERIAL
d	4	Washer, square, 2-1/4"			
k	6	Insulator, suspension type, class 52-1			
o	4	Bolt, eye, 5/8" x required length			
m	4	Clamp, suspension			
ek	4	Locknut, 5/8"			



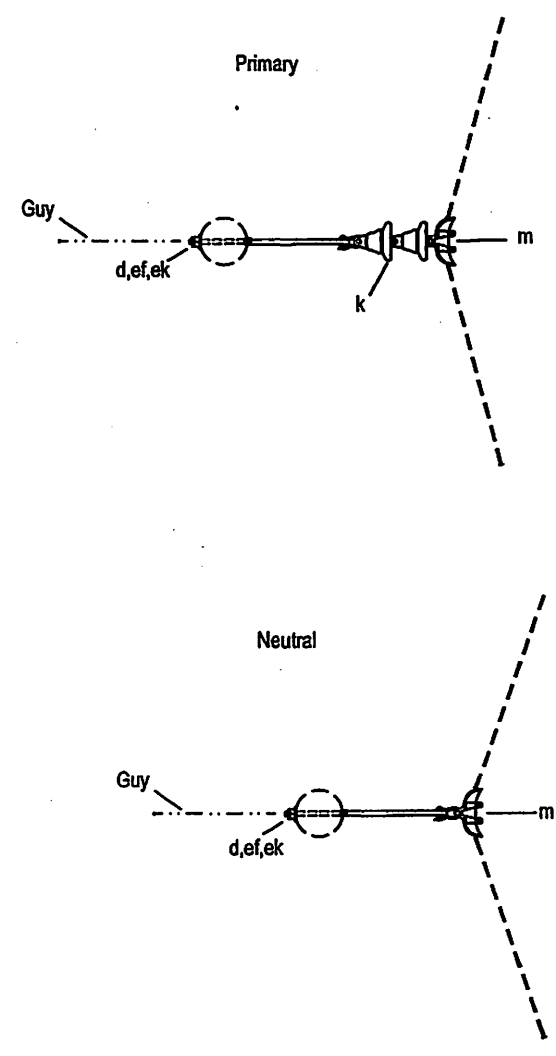
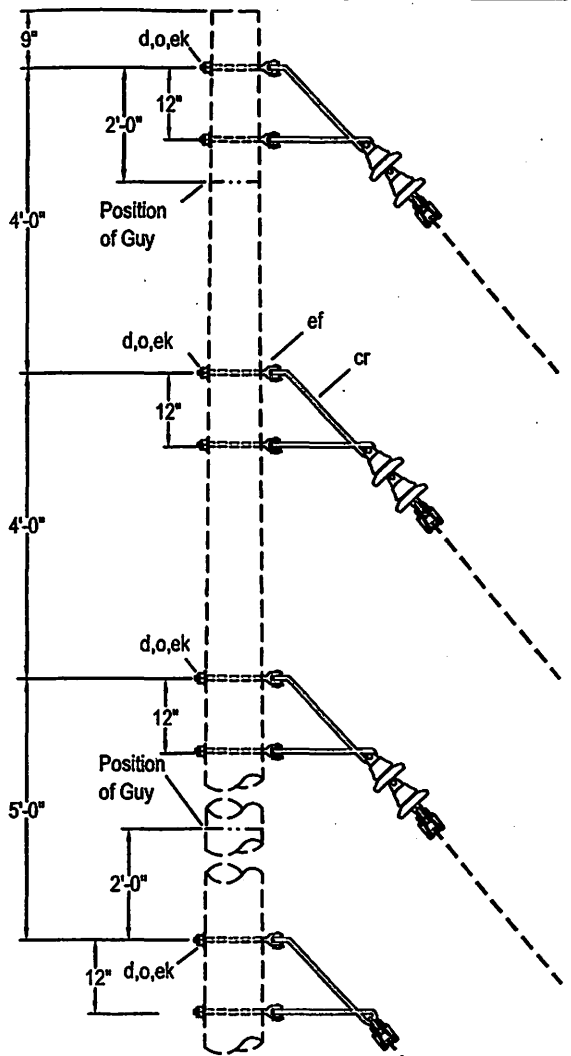
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LOWER COLORADO RIVER AUTHORITY
 DISTRIBUTION LINE DESIGN
 AUSTIN, TEXAS

DRAWN: F. Brooks
 CHECKED: _____
 APPROVED: M. Lee

7.2/12.5 KV. PRIMARY, 3-PHASE
 VERTICAL CONSTRUCTION
 30° TO 60° ANGLE
 (ALL CONDUCTORS)

DATE: 5/02	C3X
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Note:
 2" Minimum clear wood clearance of all hardware.
 No bolts to extend more than 2" beyond locknut.
 Jumpers and connectors as required.
 The seal appearing on this document was authorized
 by C. W. MAY, JR, P.E. 28281 on 10/2/02.

ITEM	NO.	MATERIAL	ITEM	NO.	MATERIAL
d	8	Washer, square, 2-1/4" x 3/16", 11/16" hole			
k	6	Insulator, suspension type, class 52-1			
m	4	Clamp, suspension			
bo	4	Shackle, anchor			
cr	4	Bracket, angle, 5/8"			
ef	8	Bolt, clevis, 5/8" x required length			
ek	8	Locknut, 5/8"			



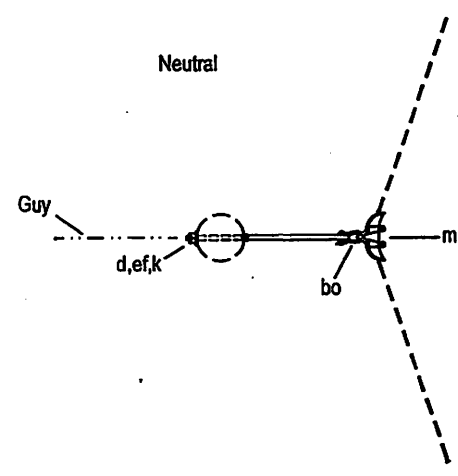
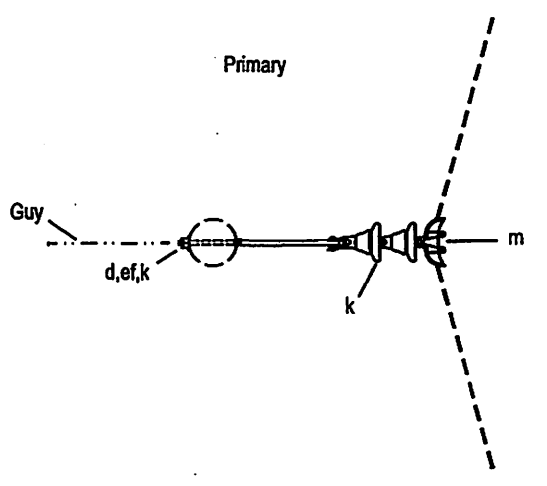
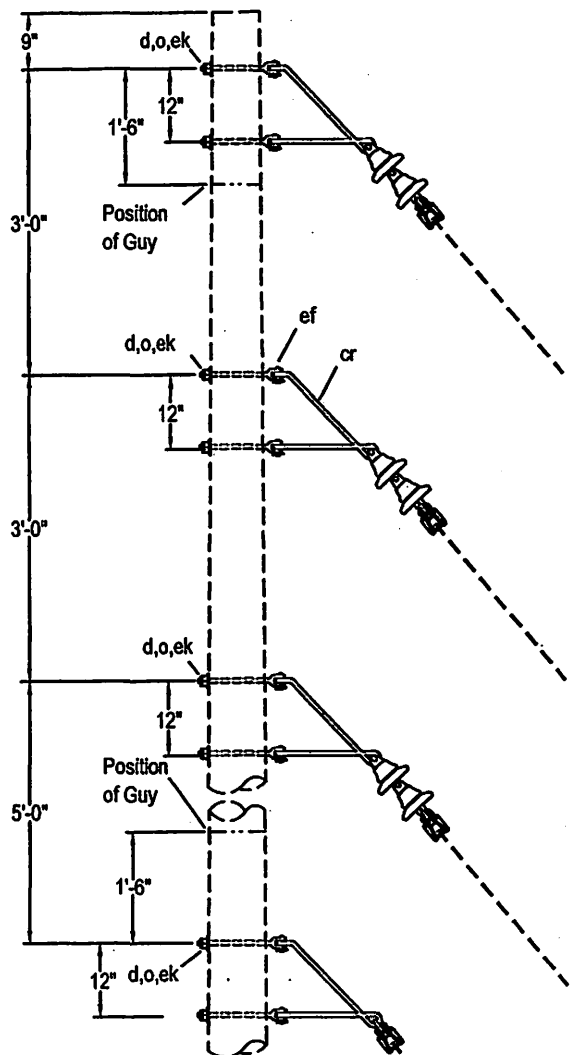
LCRA
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 LOWER COLORADO RIVER AUTHORITY
 DISTRIBUTION LINE DESIGN
 AUSTIN, TEXAS

DRAWN: F. Orschi
 CHECKED: _____
 APPROVED: M. Lee

7.2/12.5 KV. PRIMARY, 3-PHASE
 VERTICAL CONSTRUCTION
 10° TO 20° ANGLE
 (LARGE CONDUCTORS)

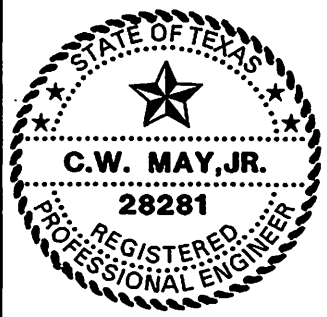
DATE:
 5/02

C3-1



Note:
 2" Minimum clear wood clearance of all hardware.
 No bolts to extend more than 2" beyond locknut.
 Jumpers and connectors as required.
 The seal appearing on this document was authorized
 by C. W. MAY, JR, P.E. 28281 on 10/2/02.

ITEM	NO.	MATERIAL	ITEM	NO.	MATERIAL
d	8	Washer, square, 2-1/4" X 3/16", 11/16" hole			
k	6	Insulator, suspension type, class 52-1			
m	4	Clamp, suspension			
bo	4	Shackle, anchor			
cr	4	Bracket, angle, 5/8"			
ef	8	Bolt, clevis, 5/8" x required length			
ek	8	Locknut, 5/8"			



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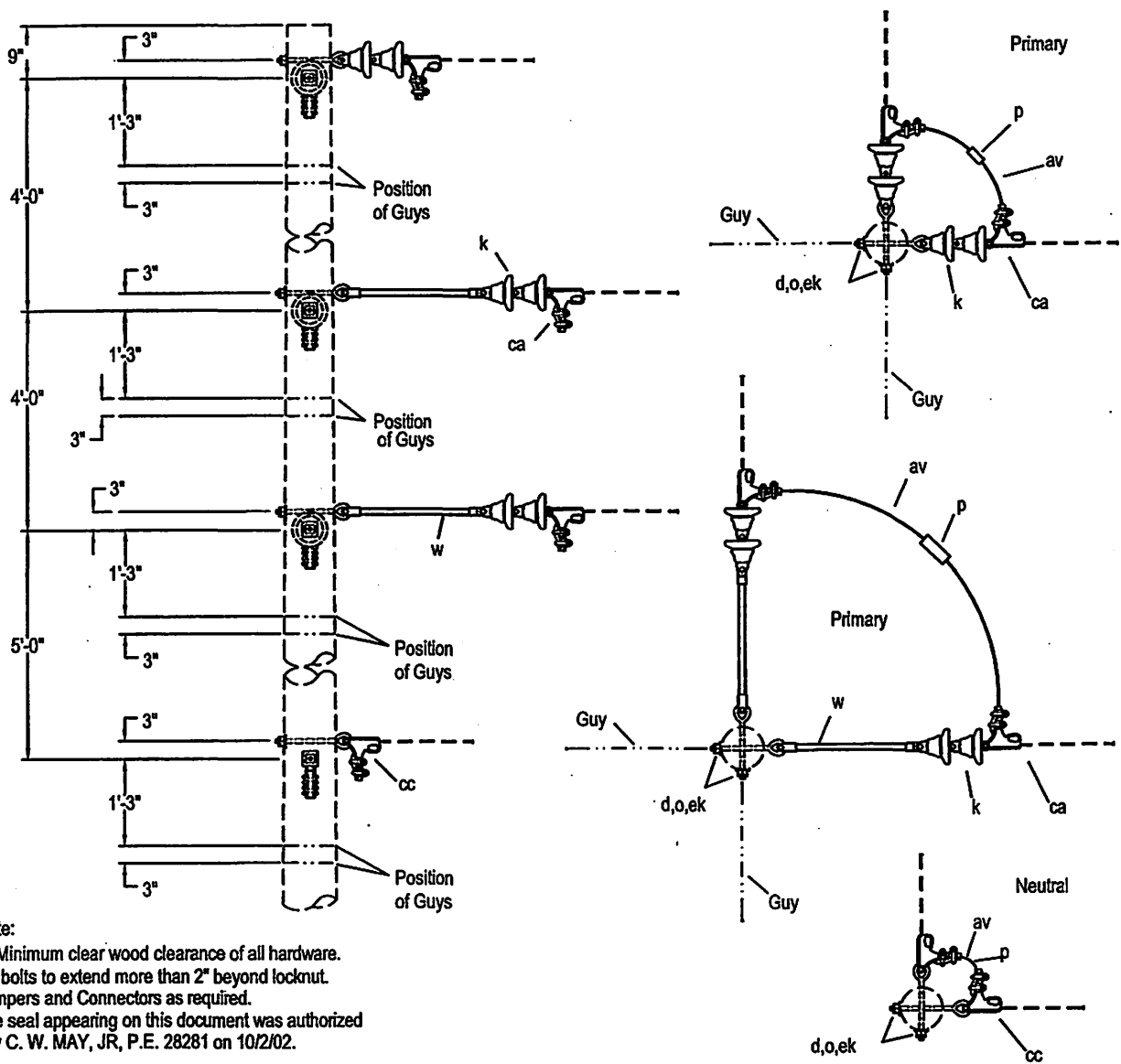
LOWER COLORADO RIVER AUTHORITY
 DISTRIBUTION LINE DESIGN
 AUSTIN, TEXAS

DRAWN: F. Brooks
 CHECKED: _____
 APPROVED: M. Lee

7.2/12.5 KV. PRIMARY, 3-PHASE
 VERTICAL CONSTRUCTION
 10° TO 20° ANGLE
 (LARGE CONDUCTORS)

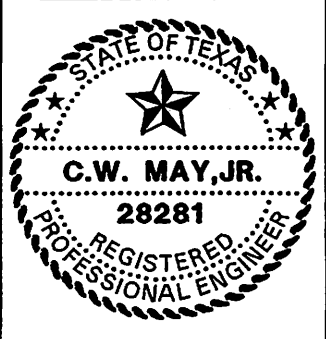
DATE: 5/02

C3-1X



Note:
 2" Minimum clear wood clearance of all hardware.
 No bolts to extend more than 2" beyond locknut.
 Jumpers and Connectors as required.
 The seal appearing on this document was authorized
 by C. W. MAY, JR, P.E. 28281 on 10/2/02.

ITEM	NO.	MATERIAL	ITEM	NO.	MATERIAL
d	8	Washer, square, 2-1/4" x 3/16", 11/16" hole			
k	12	Insulator, suspension type, class 52-1			
o	8	Bolt, eye, 5/8" x required length			
p		Jumpers, as required			
w	4	Insulator, guy strain, 24", 24,000#			
av		Jumpers, as required			
cc	2	Deadend assembly, primary			
ca	2	Deadend assembly, neutral			
ek	8	Locknut, 5/8"			



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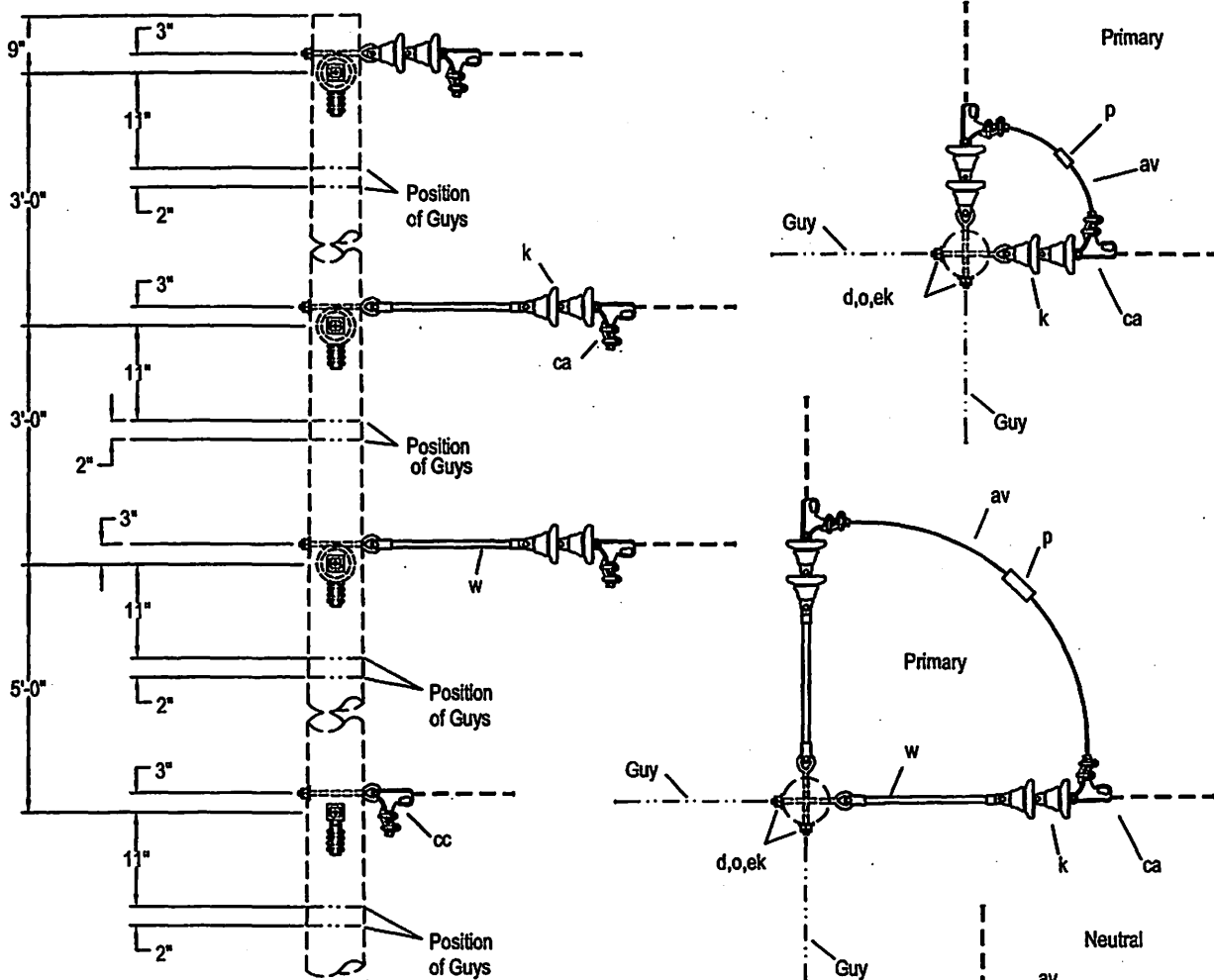
LOWER COLORADO RIVER AUTHORITY
 DISTRIBUTION LINE DESIGN
 AUSTIN, TEXAS

DRAWN: J. Brooks
 CHECKED: _____
 APPROVED: M. Lee

7.2/12.5 KV. PRIMARY, 3-PHASE
 VERTICAL CONSTRUCTION
 DEADEND (DOUBLE) 60° TO 90° ANGLE
 (ALL CONDUCTORS)

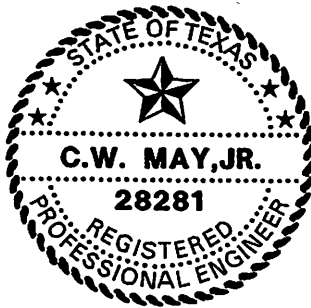
DATE: 5/02

C4-1



Note:
 2" Minimum clear wood clearance of all hardware.
 No bolts to extend more than 2" beyond locknut.
 Jumpers and Connectors as required.
 The seal appearing on this document was authorized
 by C. W. MAY, JR, P.E. 28281 on 10/2/02.

ITEM NO.	MATERIAL	ITEM NO.	MATERIAL
d	8 Washer, square, 2-1/4" x 3/16", 11/16" hole		
k	12 Insulator, suspension type, class 52-1		
o	8 Bolt, eye, 5/8" x required length		
p	Jumpers, as required		
w	4 Insulator, guy strain, 24", 24,000#		
av	Jumpers, as required		
cc	2 Deadend assembly, primary		
ca	2 Deadend assembly, neutral		
ek	8 Locknut, 5/8"		



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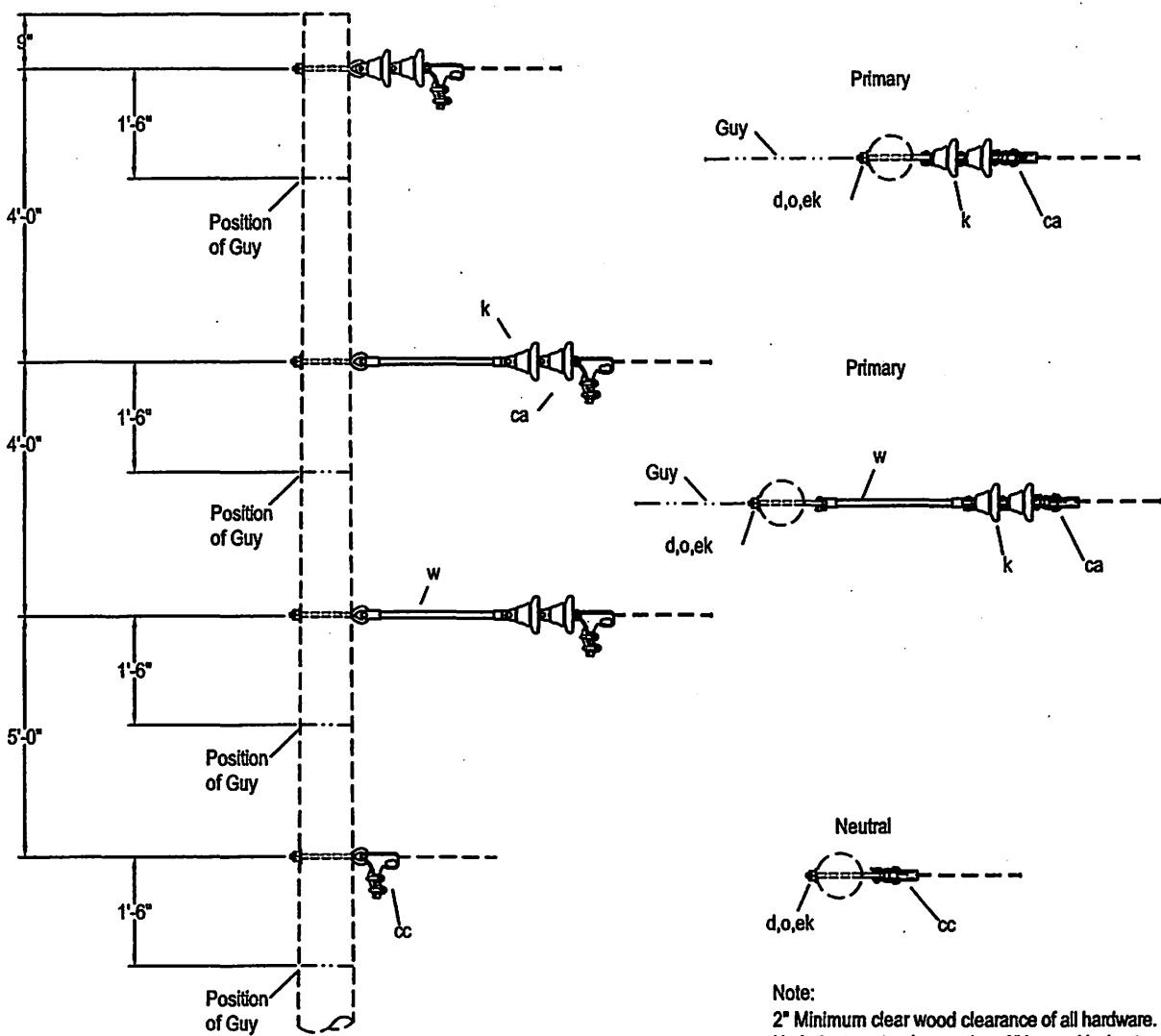
LOWER COLORADO RIVER AUTHORITY
 DISTRIBUTION LINE DESIGN
 AUSTIN, TEXAS

DRAWN: J. Brooks
 CHECKED: _____
 APPROVED: M. Lee

7.2/12.5 KV. PRIMARY, 3-PHASE
 VERTICAL CONSTRUCTION
 DEADEND (DOUBLE) 60° TO 90° ANGLE
 (ALL CONDUCTORS)

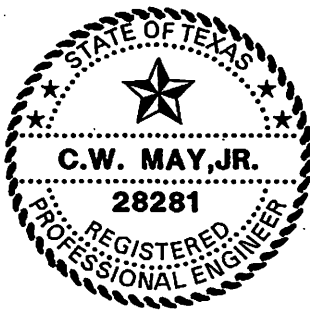
DATE:
 5/02

C4-1X



Note:
 2" Minimum clear wood clearance of all hardware.
 No bolts to extend more than 2" beyond locknut.
 Jumpers and connectors as required.
 The seal appearing on this document was authorized
 by C. W. MAY, JR, P.E. 28281 on 10/2/02.

ITEM	NO.	MATERIAL	ITEM	NO.	MATERIAL
d	4	Washer, square, 2-1/4" x 3/16", 11/16" hole			
k	6	Insulator, suspension type, class 52-1			
o	4	Bolt, eye, 5/8" x required length			
w	2	Insulator, guy strain, 24", 16,000#			
ca	3	Deadend assembly, primary			
cc	1	Deadend assembly, neutral			
ek	6	Locknut, 5/8"			



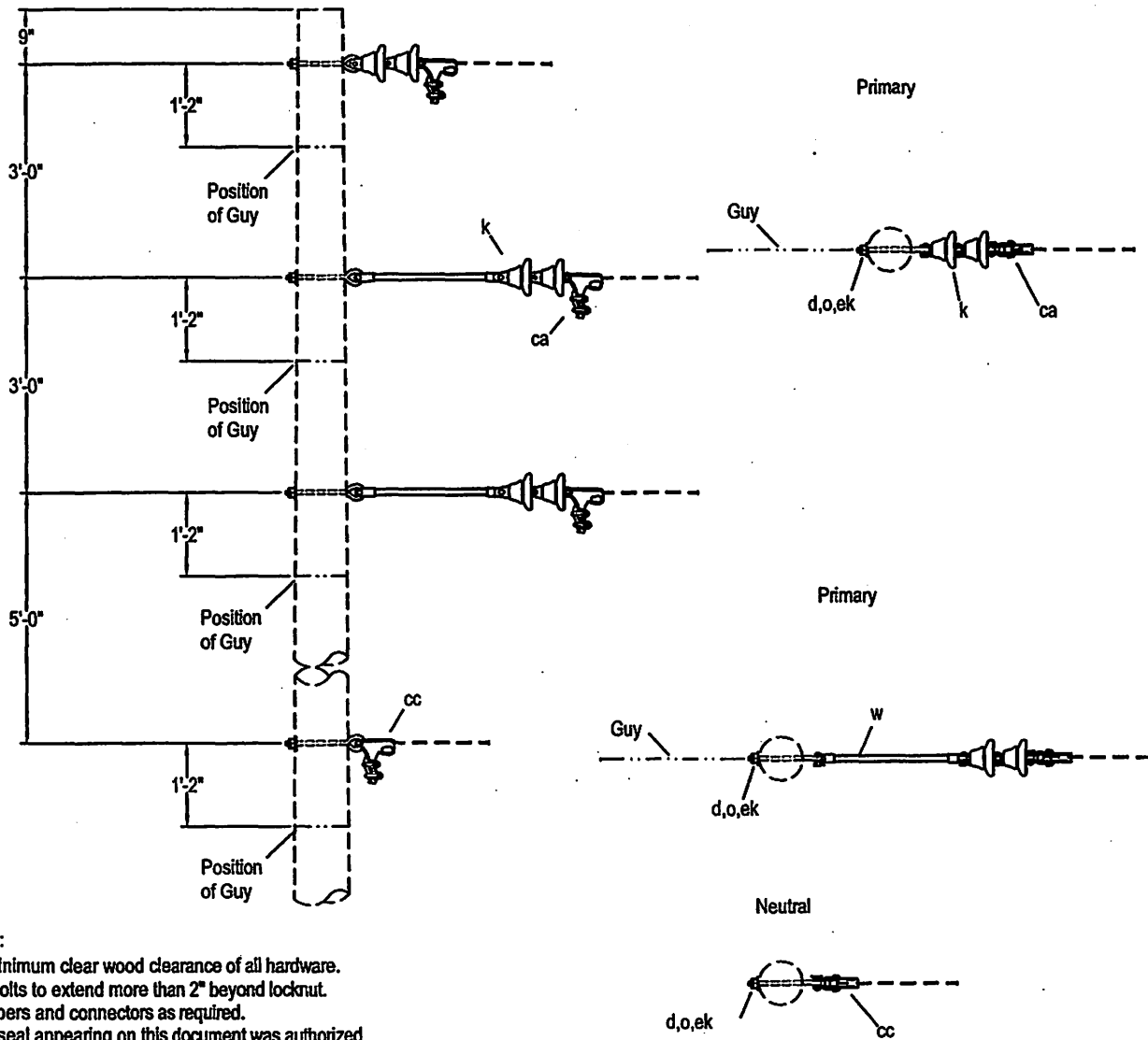
LCRA
 ENERGY • WATER • COMMUNITY SERVICES
 LOWER COLORADO RIVER AUTHORITY
 DISTRIBUTION LINE DESIGN
 AUSTIN, TEXAS

DRAWN: J. Brooks
 CHECKED: _____
 APPROVED: M. Lee

7.2/12.5 KV. PRIMARY 3-PHASE
 VERTICAL CONSTRUCTION
 DEADEND (SINGLE) SINGLE PRIMARY SUPPORT
 (ALL CONDUCTORS)

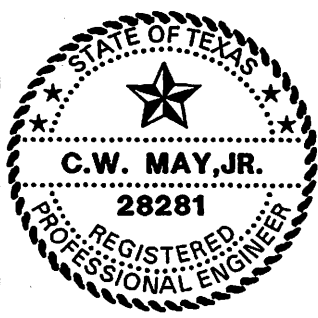
DATE: 5/02

C5-1



Note:
 2" Minimum clear wood clearance of all hardware.
 No bolts to extend more than 2" beyond locknut.
 Jumpers and connectors as required.
 The seal appearing on this document was authorized
 by C. W. MAY, JR, P.E. 28281 on 10/2/02.

ITEM	NO.	MATERIAL	ITEM	NO.	MATERIAL
d	4	Washer, square, 2-1/4" x 3/16", 11/16" hole			
k	6	Insulator, suspension type, class 52-1			
o	4	Bolt, eye, 5/8" x required length			
w	2	Insulator, guy strain, 24", 16,000#			
ca	3	Deadend assembly, primary			
cc	1	Deadend assembly, neutral			
ek	4	Locknut, 5/8"			



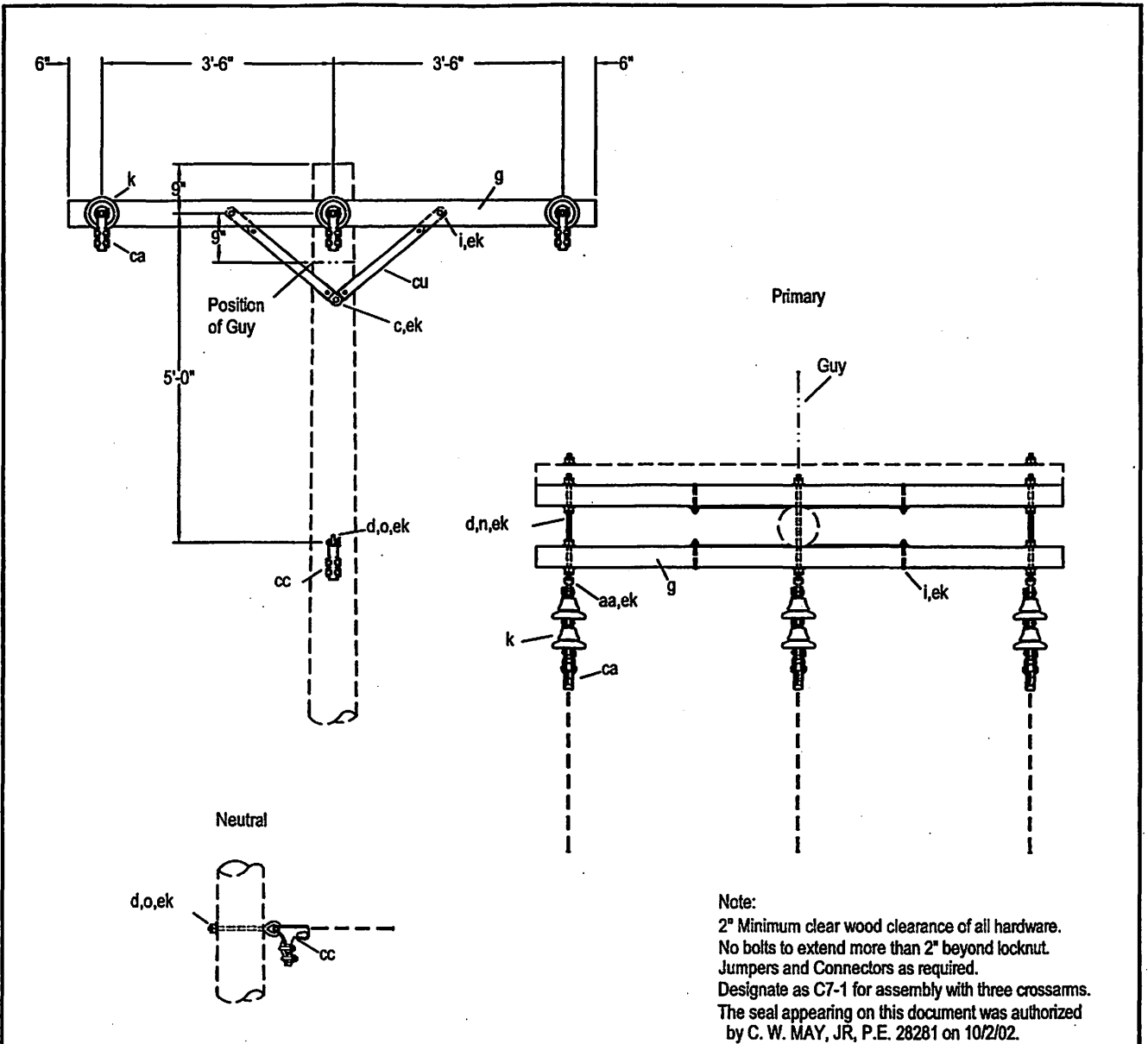
LCRA
 ENERGY • WATER • COMMUNITY SERVICES
 LOWER COLORADO RIVER AUTHORITY
 DISTRIBUTION LINE DESIGN
 AUSTIN, TEXAS

DRAWN: F. Brooks
 CHECKED: _____
 APPROVED: M. Lee

7.2/12.5 KV. PRIMARY 3-PHASE
 VERTICAL CONSTRUCTION
 DEADEND (SINGLE) SINGLE PRIMARY SUPPORT
 (ALL CONDUCTORS)

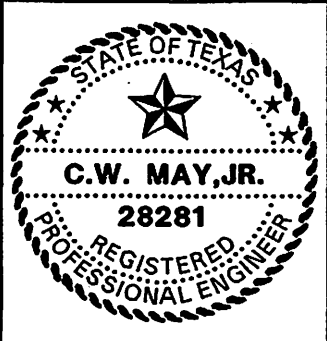
DATE: 5/02

C5-1X



Note:
 2" Minimum clear wood clearance of all hardware.
 No bolts to extend more than 2" beyond locknut.
 Jumpers and Connectors as required.
 Designate as C7-1 for assembly with three crossarms.
 The seal appearing on this document was authorized
 by C. W. MAY, JR, P.E. 28281 on 10/2/02.

ITEM	NO.	MATERIAL	ITEM	NO.	MATERIAL
c	1	Bolt, machine, 1/2" x required length	cu	2pr.	Brace, wood, 38" span, 17-3/4" drop
d	11	Washer, square, 2-1/4" x 3/16", 11/16" hole	ek	4	Locknut, 3/8"
g	2/3	Crossarm, 3-3/4" x 4-3/4" x 8'-0"	ek	1	Locknut, 1/2"
i	4	Bolt, carriage, 3/8" x 4-1/2"	ek	14	Locknut, 5/8"
k	6	Insulator, suspension type, class 52-1			
n	3	Bolt, double arming, 5/8" x required length			
o	1	Bolt, eye, 5/8" x required length			
aa	3	Nut, eye, 5/8"			
ca	3	Deadend assembly, primary			
cc	1	Deadend assembly, neutral			



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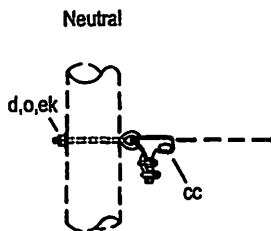
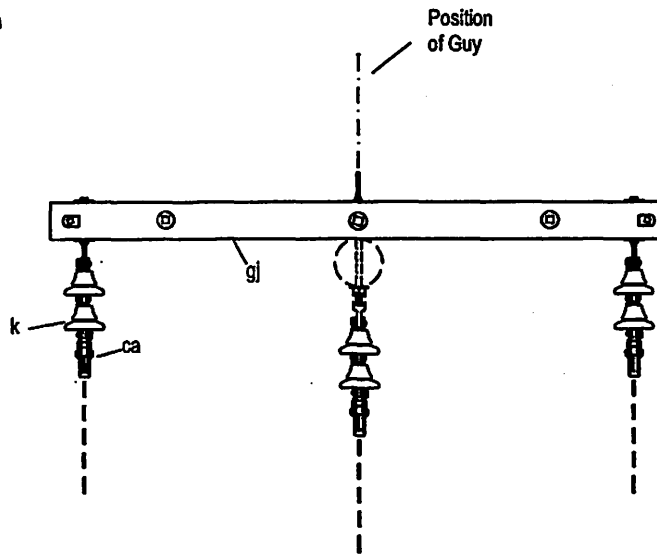
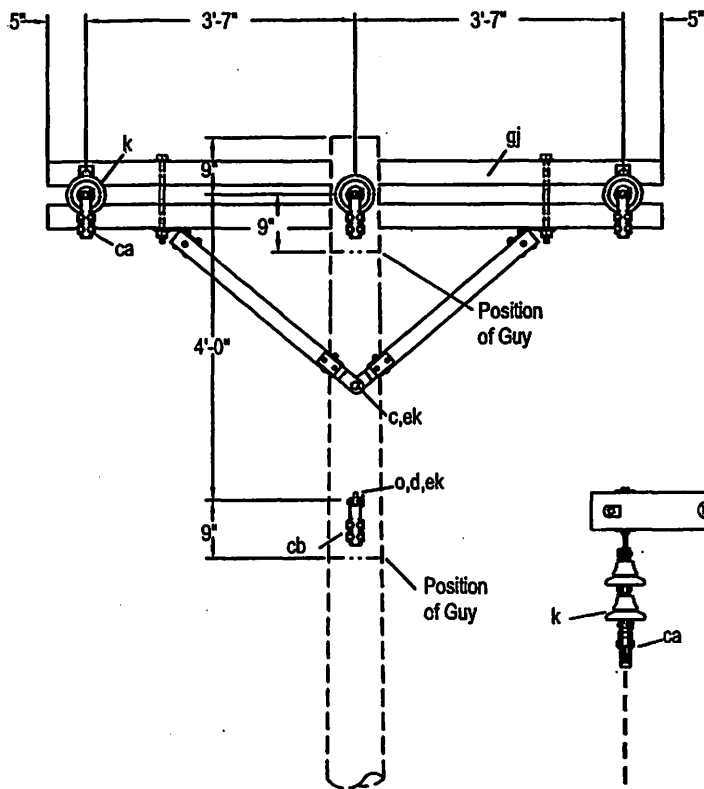
LOWER COLORADO RIVER AUTHORITY
 DISTRIBUTION LINE DESIGN
 AUSTIN, TEXAS

DRAWN: J. Brooks
 CHECKED: _____
 APPROVED: M. Lee

7.2/12.5 KV. PRIMARY, 3-PHASE
 CROSSARM CONSTRUCTION
 DEADEND (SINGLE)
 (SMALL CONDUCTORS)

DATE: 5/02

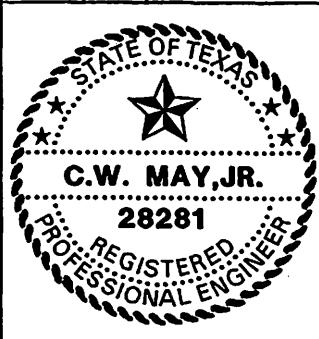
C7,C7-1



Note:

2" Minimum clear wood clearance of all hardware.
 No bolts to extend more than 2" beyond locknut.
 Jumpers and Connectors as required.
 Designate C7-5 for construction with 7,500# (max.) / attachment.
 Designate C7-6 for construction with 9,500# (max.) / attachment.
 The seal appearing on this document was authorized
 by C. W. MAY, JR, P.E. 28281 on 10/2/02.

ITEM	NO.	MATERIAL	ITEM	NO.	MATERIAL
c	1	Bolt, machine, 5/8" x required length			
d	2	Washer, square, 2-1/4" x 3/16", 11/16" hole			
k	6	Insulator, suspension type, class 52-1			
o	1	Bolt, eye, 5/8" x required length			
ca	3	Deadend assembly, primary			
cc	1	Deadend assembly, neutral			
ek	2	Locknut, 5/8"			
gj	1	Assembly, deadend, 8'-0", 7,500# / attachment			
gj	1	Assembly, deadend, 8'-0", 9,500# / attachment			



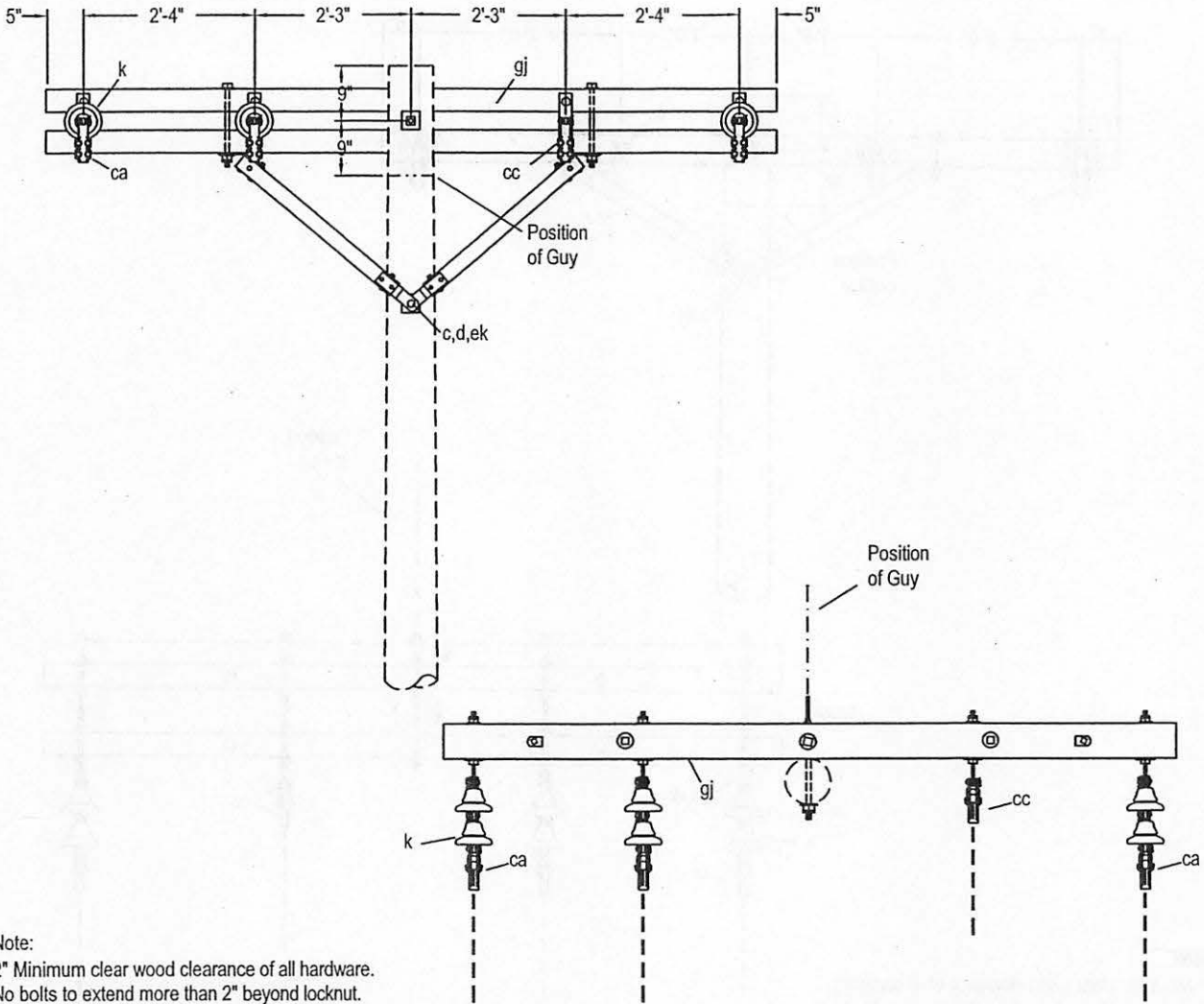
LCRA
 ENERGY • WATER • COMMUNITY SERVICES
 LOWER COLORADO RIVER AUTHORITY
 DISTRIBUTION LINE DESIGN
 AUSTIN, TEXAS

DRAWN: J. Bracke
 CHECKED: _____
 APPROVED: M. Lee

7.2/12.5 KV. PRIMARY, 3-PHASE
 3-PHASE CROSSARM CONSTRUCTION
 DEADEND (SINGLE)
 (LARGE CONDUCTORS)

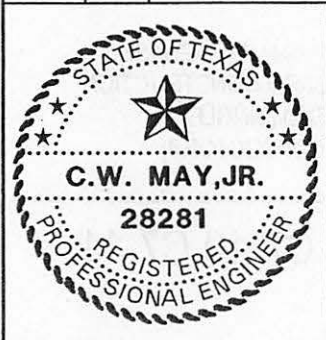
DATE: 5/02

C7-5, C7-6



Note:
 2" Minimum clear wood clearance of all hardware.
 No bolts to extend more than 2" beyond locknut.
 Jumpers and connectors as required.
 Designate C7-8 for construction with 5,000# / attachment (max).
 Designate C7-9 for construction with 6000# / attachment (max).
 The seal appearing on this document was authorized
 by C. W. MAY, JR, P.E. 28281 on 10/2/02.

ITEM	NO.	MATERIAL	ITEM	NO.	MATERIAL
c	1	Bolt, machine, 5/8" x required length			
d	1	Washer, square, 2-1/4", 3/16", 11/16" hole			
k	6	Insulator, suspension type, class 52-1			
ca	3	Deadend assembly, primary			
cc	1	Deadend assembly, neutral			
ek	1	Locknut, 5/8"			
gj	1	Assembly, deadend, 10'-0", 5,000# / attachment			
gi	1	Assembly, deadend, 10'-0", 6,000# / attachment			



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LOWER COLORADO RIVER AUTHORITY
 DISTRIBUTION LINE DESIGN
 AUSTIN, TEXAS

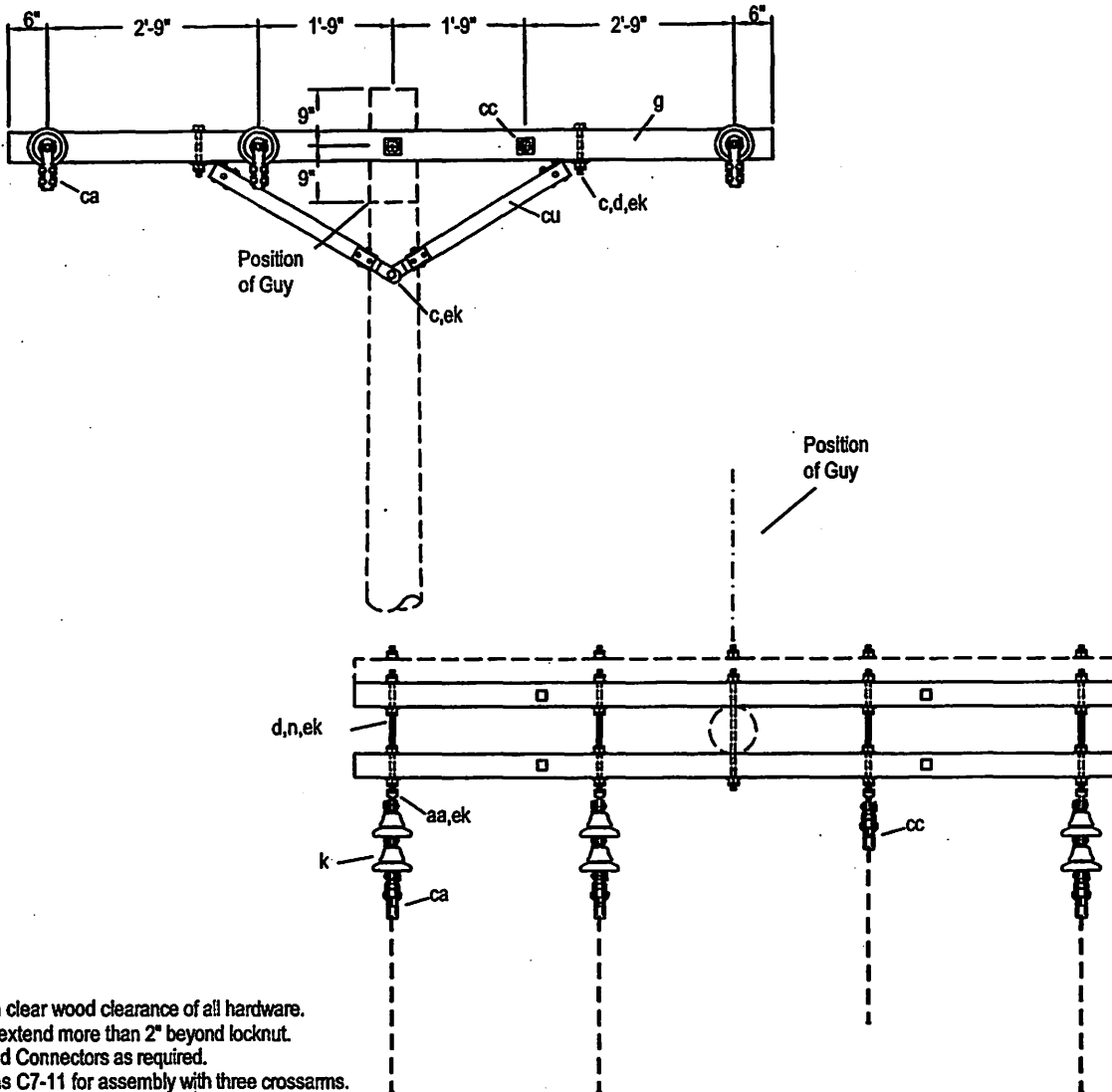
DRAWN: J. Brooks
 CHECKED: _____
 APPROVED: M. Lu

7.2/12.5 KV. PRIMARY, 3-PHASE
 3-PHASE CROSSARM CONSTRUCTION
 DEADEND (SINGLE)
 (LARGE CONDUCTORS)

DATE: _____

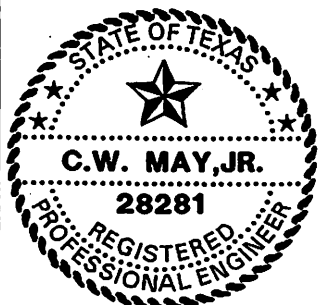
5/02

C7-8,C7-9



Note:
 2" Minimum clear wood clearance of all hardware.
 No bolts to extend more than 2" beyond locknut.
 Jumpers and Connectors as required.
 Designate as C7-11 for assembly with three crossarms.
 The seal appearing on this document was authorized
 by C. W. MAY, JR, P.E. 28281 on 10/2/02.

ITEM	NO.	MATERIAL	ITEM	NO.	MATERIAL
c	4	Bolt, machine, 1/2" x required length	cu	2pr.	Brace, wood, 60"span, 18" drop
c	1	Bolt, machine, 5/8" x required length	ek	4	Locknut, 1/2"
d	18	Square, square, 2-1/4" x 3/16", 11/16" hole	ek	23	Locknut, 5/8"
d	4	Washer, round 1 3/8" diameter, 9/16" hole			
g	2/3	Crossarm, 3-3/4" x 4-3/4" x 10'-0"			
k	6	Insulator, suspension type, class 52-1			
n	5	Bolt, double arming, 5/8" x req'd length			
aa	4	Nut, eye, 5/8"			
ca	3	Deadend assembly, primary			
cc	1	Deadend assembly, neutral			



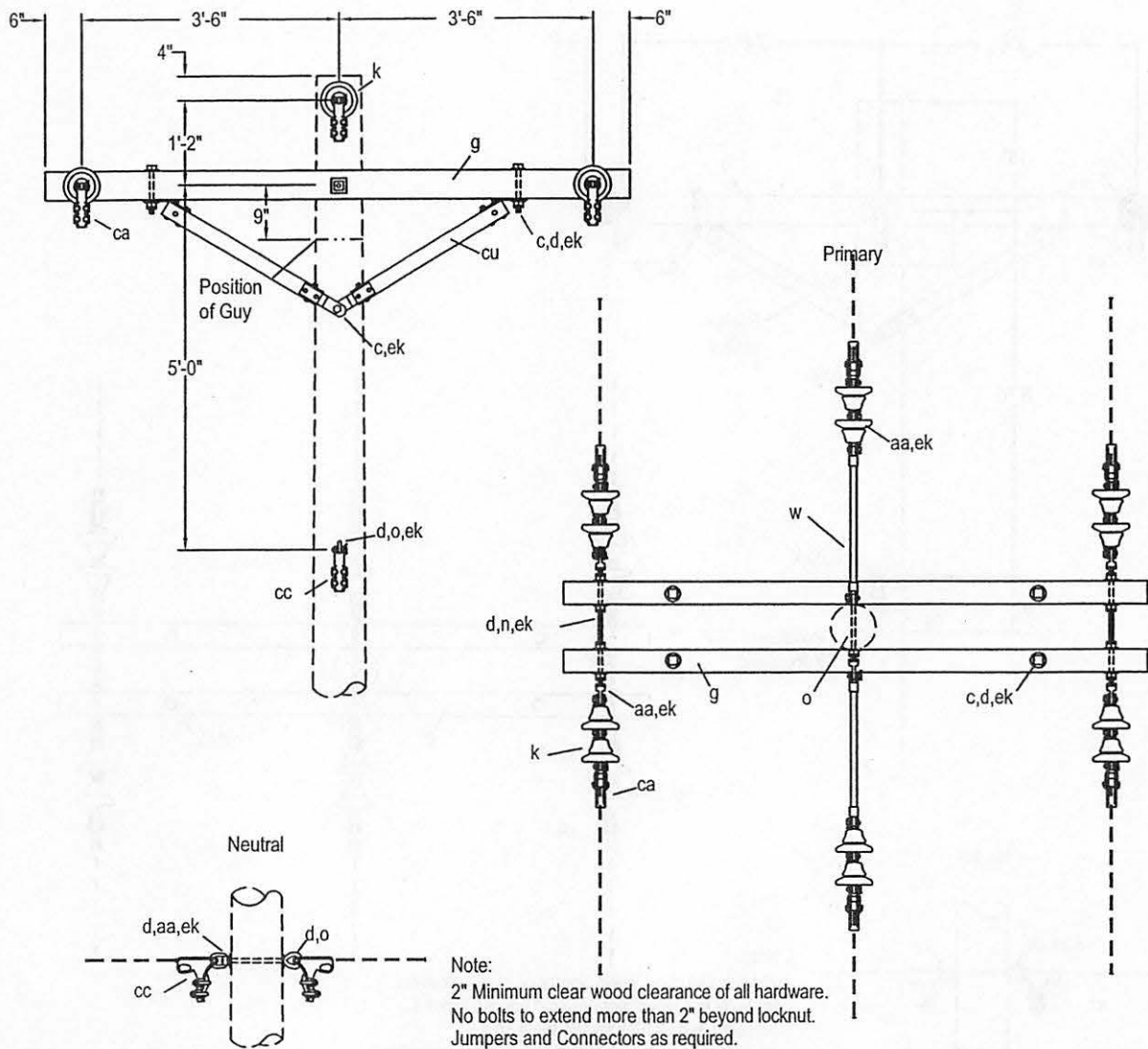
LOWER COLORADO RIVER AUTHORITY
 DISTRIBUTION LINE DESIGN
 AUSTIN, TEXAS

DRAWN: F. Brooks
 CHECKED: _____
 APPROVED: M. Lee

7.2/12.5 KV. PRIMARY, 3-PHASE
 3-PHASE CROSSARM CONSTRUCTION
 DEADEND (SINGLE)
 (SMALL CONDUCTORS)

DATE:
 5/02

C7-10, C7-11



Note:
 2" Minimum clear wood clearance of all hardware.
 No bolts to extend more than 2" beyond locknut.
 Jumpers and Connectors as required.
 The seal appearing on this document was authorized
 by C. W. MAY, JR, P.E. 28281 on 10/2/02.

ITEM	NO.	MATERIAL	ITEM	NO.	MATERIAL
c	4	Bolt, machine, 1/2" x required length	ca	6	Deadend assembly, primary
c	1	Bolt, machine, 5/8" x required length	cc	2	Deadend assembly, neutral
d	4	Washer, round, 1-3/8" diameter, 9/16" hole	cu	2pr.	Brace, wood, 60" span, 18" drop
d	12	Washer, square, 2-1/4" x 3/16", 11/16" hole	ek	4	Locknut, 1/2"
g	2	Crossarm, 3-3/4" x 4-3/4" x 8'-0"	ek	19	Locknut, 5/8"
k	12	Insulator, suspension type, class 52-1			
n	3	Bolt, double arming, 5/8" x req'd length			
o	2	Bolt, eye, 5/8" x required length			
w	2	Insulator, guy strain, 24", 16,000#			
aa	6	Nut, eye, 5/8"			



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LOWER COLORADO RIVER AUTHORITY
 DISTRIBUTION LINE DESIGN
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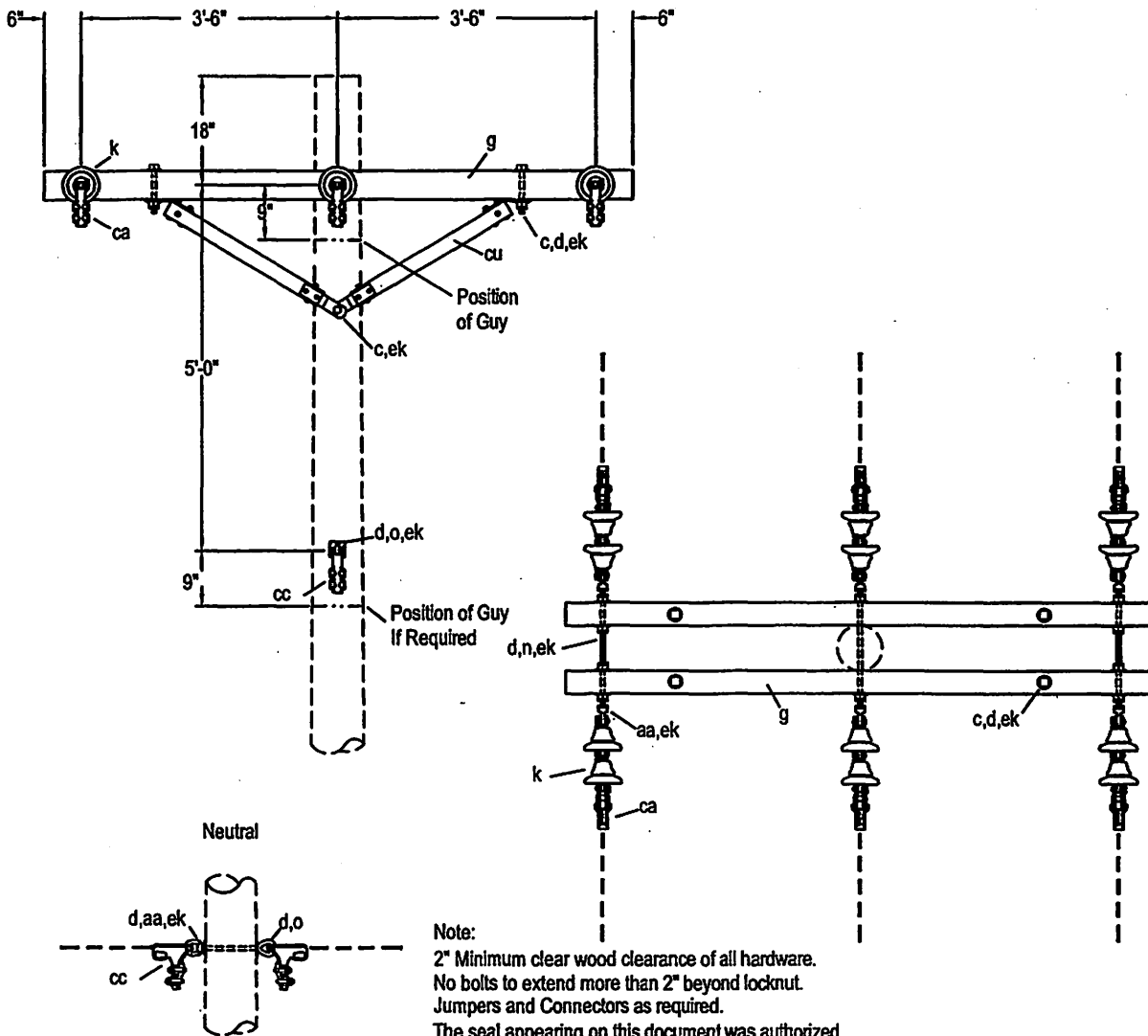
DRAWN: F. Brooks
 CHECKED: _____
 APPROVED: M. Lee

7.2/12.5 KV. PRIMARY, 3-PHASE
 CROSSARM CONSTRUCTION
 DEADEND (DOUBLE)
 (ALL CONDUCTORS)

DATE: _____

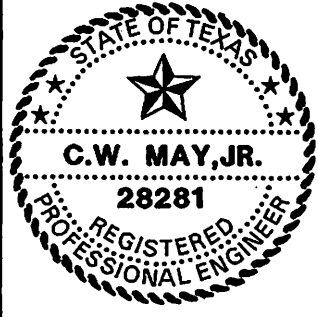
5/02

C8



Note:
 2" Minimum clear wood clearance of all hardware.
 No bolts to extend more than 2" beyond locknut.
 Jumpers and Connectors as required.
 The seal appearing on this document was authorized
 by C. W. MAY, JR, P.E. 28281 on 10/2/02.

ITEM	NO.	MATERIAL	ITEM	NO.	MATERIAL
c	4	Bolt, machine, 1/2" x required length	cc	2	Deadend assembly, neutral
c	1	Bolt, machine, 5/8" x required length	cu	2pr.	Brace, wood, 60" span, 18" drop
d	4	Washer, round, 1-3/8" diameter, 9/16" hole	ek	4	Locknut, 1/2"
d	12	Washer, square, 2-1/4" x 3/16", 11/16" hole	ek	19	Locknut, 5/8"
g	2	Crossarm, 3-3/4" x 4-3/4" x 8'-0"			
k	12	Insulator, suspension type, class 52-1			
n	3	Bolt, double arming, 5/8" x required length			
o	1	Bolt, eye, 5/8" x required length			
aa	7	Nut, eye, 5/8"			
ca	6	Deadend assembly, primary			



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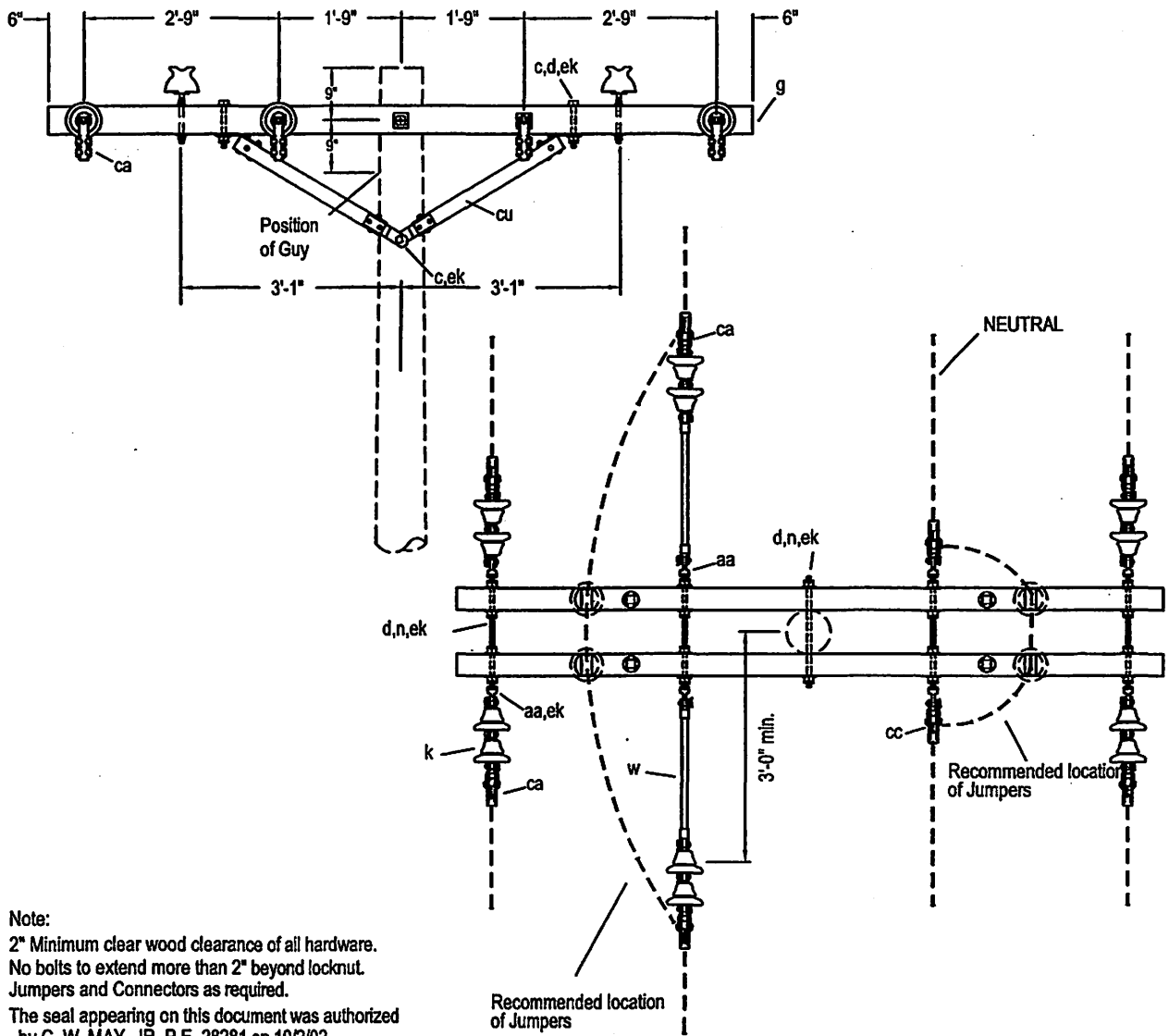
LOWER COLORADO RIVER AUTHORITY
 DISTRIBUTION LINE DESIGN
 AUSTIN, TEXAS

DRAWN: F. Brooks
 CHECKED: _____
 APPROVED: M. Lee

7.2/12.5 KV. PRIMARY, 3-PHASE
 CROSSARM CONSTRUCTION
 DEADEND (DOUBLE)
 (ALL CONDUCTORS)

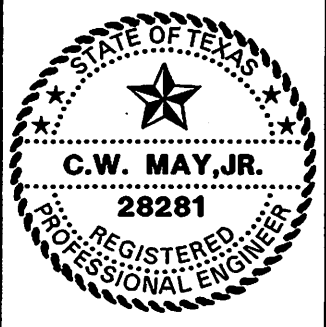
DATE: 5/02

C8X



Note:
 2" Minimum clear wood clearance of all hardware.
 No bolts to extend more than 2" beyond locknut.
 Jumpers and Connectors as required.
 The seal appearing on this document was authorized
 by C. W. MAY, JR, P.E. 28281 on 10/2/02.

ITEM	NO.	MATERIAL	ITEM	NO.	MATERIAL
c	1	Bolt, machine, 5/8" x required length	cc	2	Deadend assembly, neutral
c	4	Bolt, machine, 1/2" x required length	cu	2pr.	Brace, wood, 60" span, 30" drop
d	4	Washer, round, 1-3/8" diameter, 9/16" hole	ek	4	Locknut, 1/2"
d	18	Washer, square, 2-1/4" x 3/16" hole	ek	27	Locknut, 5/8"
g	2	Crossarm, 3-3/4" x 4-3/4" x 10'-0"			
k	12	Insulator, suspension			
n	5	Bolt, double arming, 5/8" x req'd length			
w	2	Insulator, guy strain, 24", 16,000#			
aa	8	Nut, eye, 5/8"			
ca	6	Deadend assembly, primary			



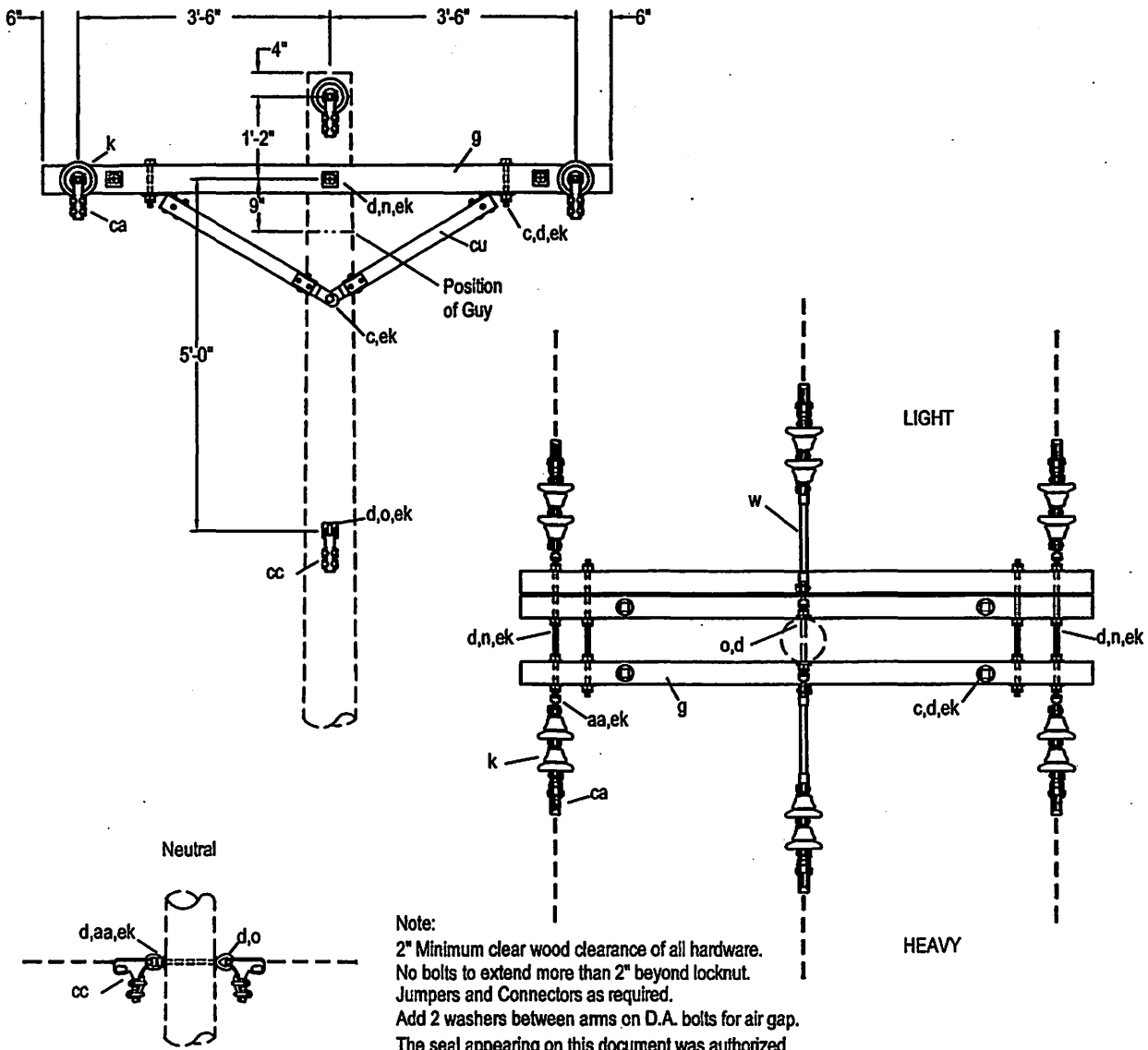
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 LOWER COLORADO RIVER AUTHORITY
 DISTRIBUTION LINE DESIGN
 AUSTIN, TEXAS

DRAWN: J. Brooks
 CHECKED: _____
 APPROVED: M. Lee

7.2/12.5 KV. PRIMARY, 3-PHASE
 CROSSARM CONSTRUCTION
 DEADEND (DOUBLE)
 (ALL CONDUCTORS)

DATE: _____
 5/02

C8-1



Note:
 2" Minimum clear wood clearance of all hardware.
 No bolts to extend more than 2" beyond locknut.
 Jumpers and Connectors as required.
 Add 2 washers between arms on D.A. bolts for air gap.
 The seal appearing on this document was authorized
 by C. W. MAY, JR, P.E. 28281 on 10/2/02.

ITEM	NO.	MATERIAL	ITEM	NO.	MATERIAL
c	4	Bolt, machine, 1/2" x required length	aa	6	Nut, eye, 5/8"
c	1	Bolt, machine, 5/8" x required length	ca	6	Deadend assembly, primary
d	4	Washer, round, 1-3/8" diameter, 9/16" hole	cc	2	Deadend assembly, neutral
d	32	Washer, square, 2-1/4" x 3/16", 11/16" hole	cu	2pr.	Brace, wood, 60" span, 18" drop
g	3	Crossarm, 3-3/4" x 4-3/4" x 8'-0"	ek	4	Locknut, 1/2"
k	12	Insulator, suspension	ek	26	Locknut, 5/8"
n	5	Bolt, double arming, 5/8" x req'd length			
o	2	Bolt, eye, 5/8" x required length			
p		Connector, as required			
w	2	Insulator, guy strain, 24", 16,000#			



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LOWER COLORADO RIVER AUTHORITY
 DISTRIBUTION LINE DESIGN
 AUSTIN, TEXAS

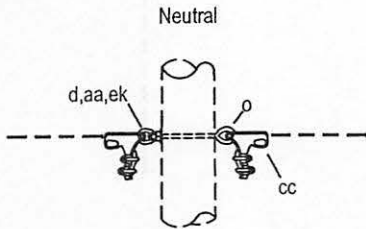
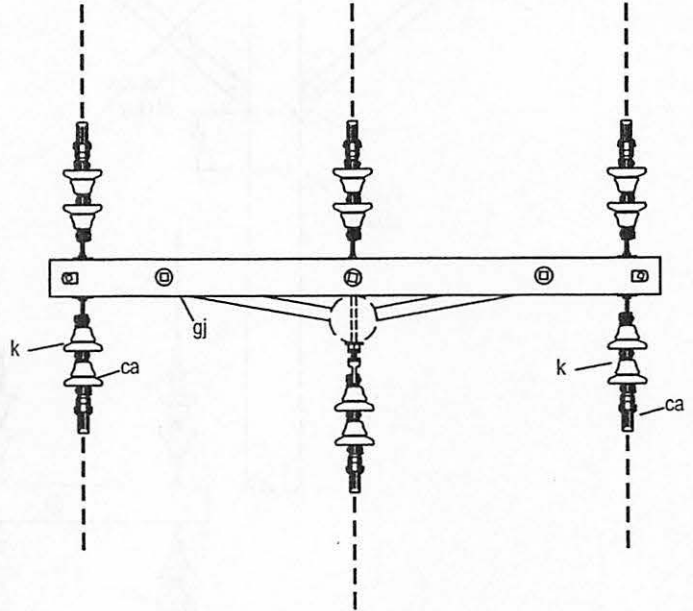
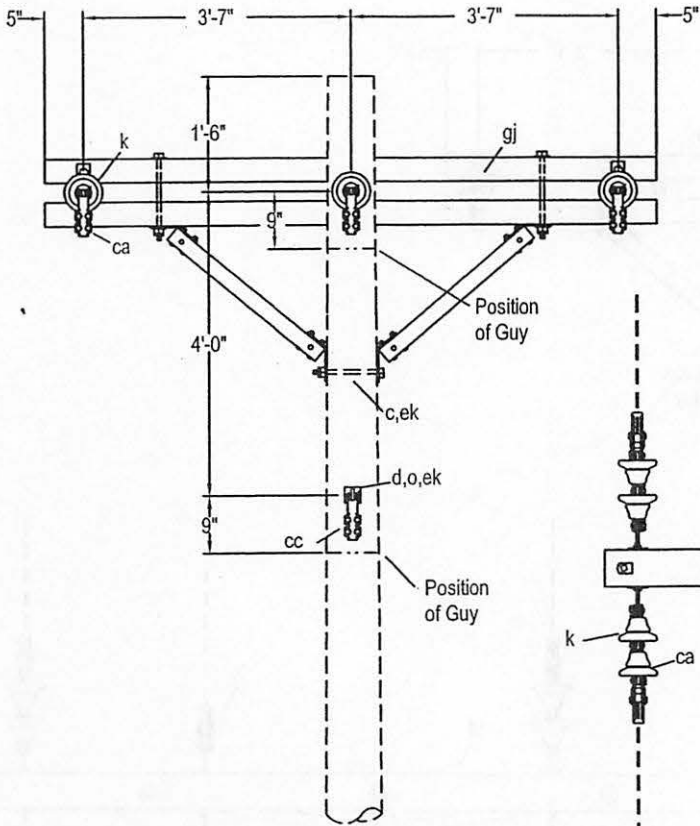
DRAWN: J. Bracke
 CHECKED: _____
 APPROVED: M. Lee

7.2/12.5 KV. PRIMARY, 3-PHASE
 CROSSARM CONSTRUCTION-DEADEND (DOUBLE)
 SMALL CONDUCTORS WITH UNBALANCED LOADS

DATE: _____

5/02

C8-3



Note:
 2" Minimum clear wood clearance of all hardware.
 No bolts to extend more than 2" beyond locknut.
 Jumpers and Connectors as required.
 Designate C8-5 for construction with 7,500# (max.) / attachment.
 Designate C8-6 for construction with 9,500# (max.) / attachment.
 The seal appearing on this document was authorized
 by C. W. MAY, JR, P.E. 28281 on 10/2/02.

ITEM	NO.	MATERIAL	ITEM	NO.	MATERIAL
c	1	Bolt, machine, 5/8" x required length			
d	2	Washer, square, 2-1/4" x 3/16", 11/16" hole			
k	12	Insulator, suspension type, class 52-1			
o	1	Bolt, eye, 5/8" x required length			
aa	1	Nut, eye, 5/8"			
ca	6	Deadend assembly, primary			
cc	2	Deadend assembly, neutral			
ek	4	Locknut, 5/8"			
gj	1	Assembly, deadend, 8'-0", 7,500# / attachment			
gj	1	Assembly, deadend, 8'-0", 9,500# / attachment			



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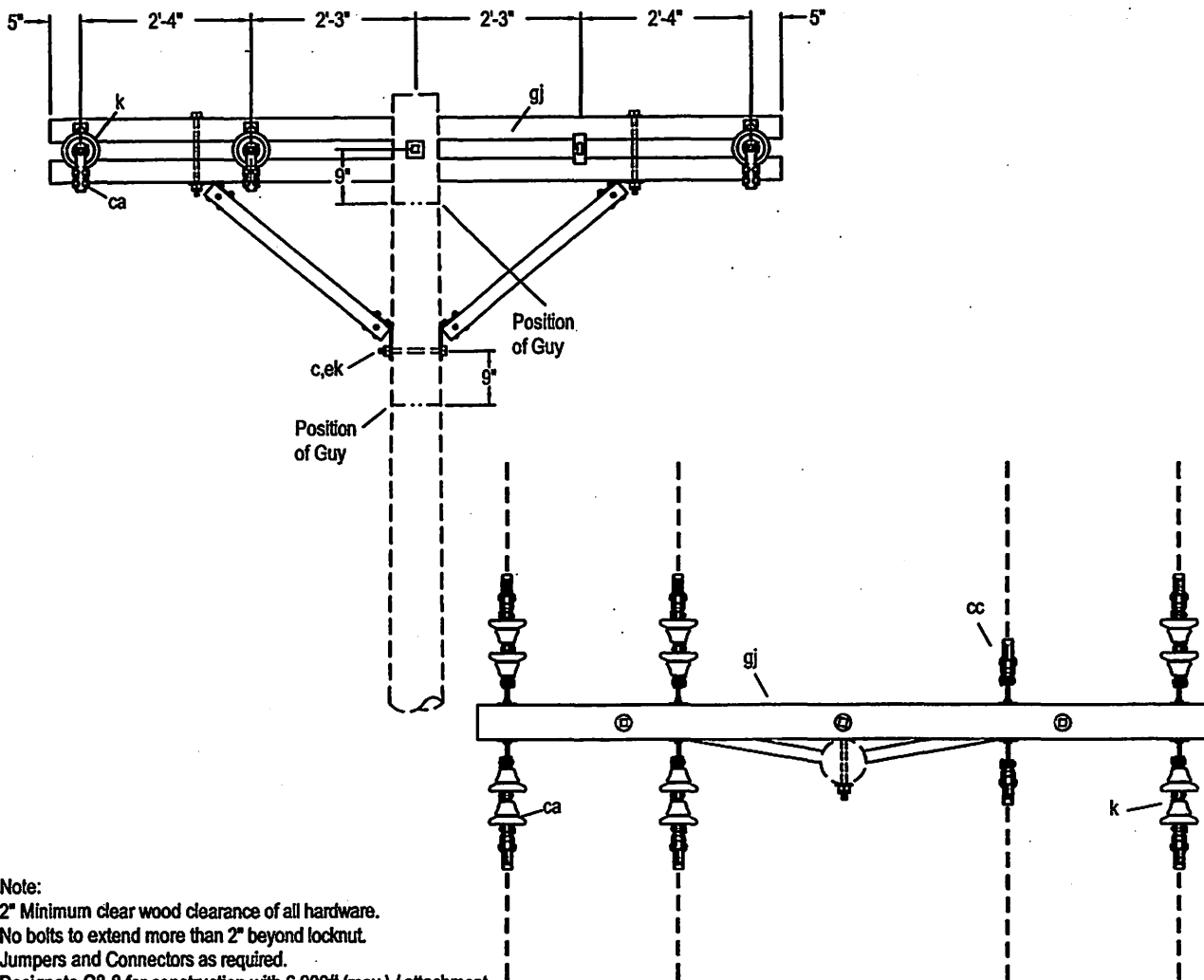
LOWER COLORADO RIVER AUTHORITY
 DISTRIBUTION LINE DESIGN
 AUSTIN, TEXAS

DRAWN: J. Brooks
 CHECKED: _____
 APPROVED: M. Lee

7.2/14.4 KV PRIMARY, 3-PHASE
 CROSSARM CONSTRUCTION
 DEADEND (DOUBLE)
 (LARGE CONDUCTORS)

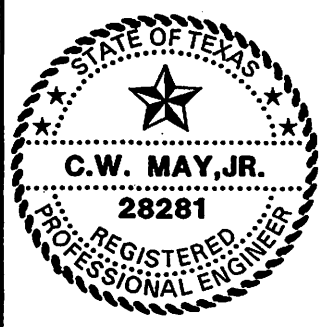
DATE: _____
 5/02

C8-5, C8-6



Note:
 2" Minimum clear wood clearance of all hardware.
 No bolts to extend more than 2" beyond locknut.
 Jumpers and Connectors as required.
 Designate C8-8 for construction with 6,000# (max.) / attachment.
 Designate C8-8 for construction with 6,000# (max.) / attachment.
 The seal appearing on this document was authorized
 by C. W. MAY, JR, P.E. 28281 on 10/2/02.

ITEM	NO.	MATERIAL	ITEM	NO.	MATERIAL
c	1	Bolt, machine, 5/8" x required length			
k	12	Insulator, suspension			
ca	6	Deadend assembly, primary			
cc	2	Deadend assembly, neutral			
ek	1	Locknut, 5/8"			
gj	1	Assembly, deadend, 10'-0", 5,000# / attachment			
gj	1	Assembly, deadend, 10'-0", 6,000# / attachment			



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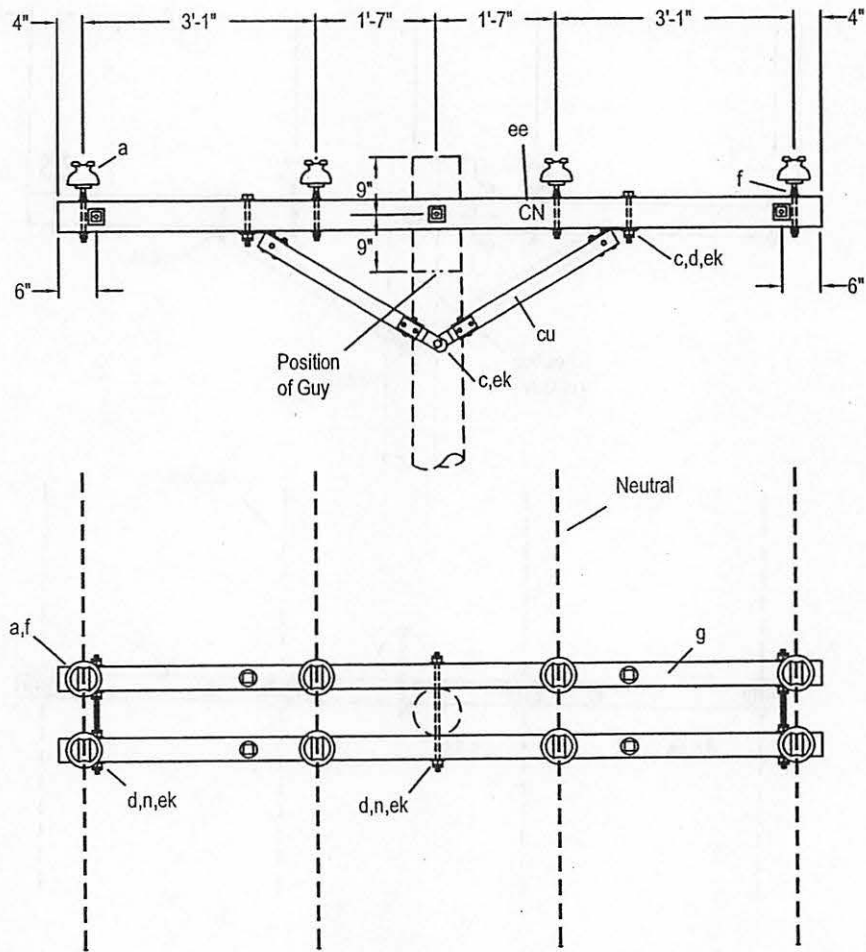
LOWER COLORADO RIVER AUTHORITY
 DISTRIBUTION LINE DESIGN
 AUSTIN, TEXAS

DRAWN: J. Brooks
 CHECKED: _____
 APPROVED: M. Lee

7.2/12.5 KV PRIMARY, 3-PHASE
 3-PHASE CROSSARM CONSTRUCTION
 DEADEND (DOUBLE)
 (LARGE CONDUCTORS)

DATE: 5/02

C8-8, C8-9



Note:
 2" Minimum clear wood clearance of all hardware.
 No bolts to extend more than 2" beyond locknut.
 Jumpers and Connectors as required.
 Use M52-4 for guide to identification of neutral.
 The seal appearing on this document was authorized
 by C. W. MAY, JR, P.E. 28281 on 10/2/02.

ITEM	NO.	MATERIAL	ITEM	NO.	MATERIAL
a	2	Insulator, pin type, class 55-3, brown or white	ee		2" letters "CN", 1" nails
a	6	Insulator, pin type, class 55-4, sky gray	ek	4	Locknut, 1/2"
c	4	Bolt, machine, 1/2" x required length	ek	11	Locknut, 5/8"
c	1	Bolt, machine, 5/8" x required length			
d	10	Washer, square, 2-1/4" x 3/16", 11/16" hole			
d	4	Washer, round, 1-3/8" diameter, 9/16" hole			
f	8	Pin, crossarm, steel, 5/8" x 10-3/4"			
g	2	Crossarm, 3-3/4" x 4-3/4" x 10'-0"			
n	3	Bolt, double arming, 5/8" x req'd length			
cu	2 pr.	Brace, wood, 60" span, 18" drop			



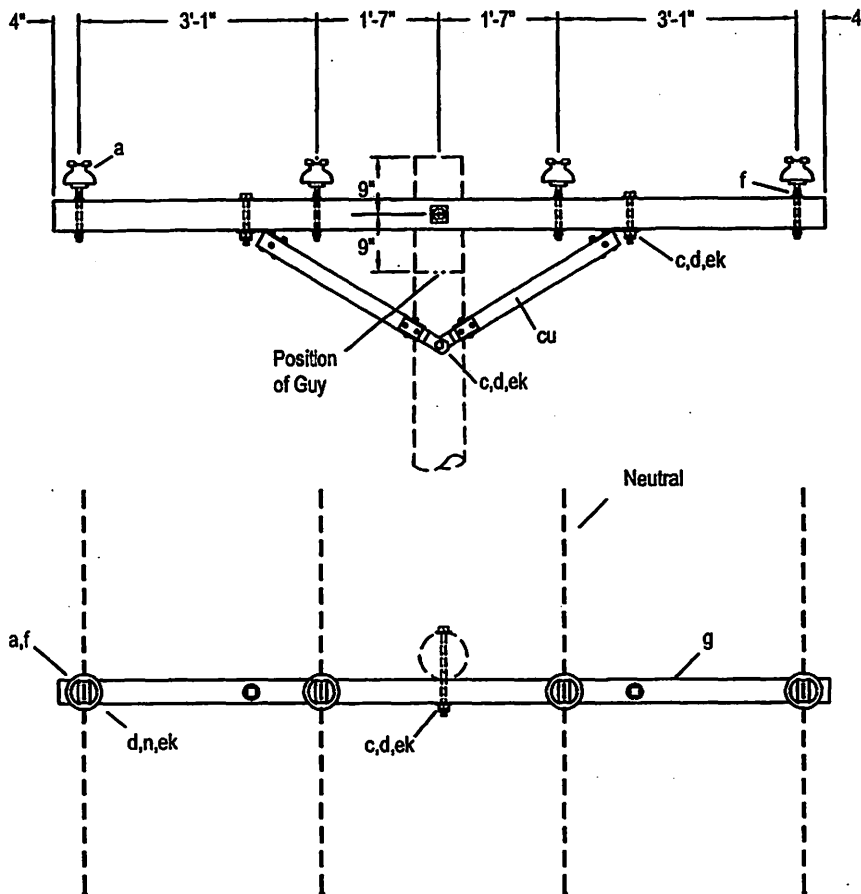
LOWER COLORADO RIVER AUTHORITY
 DISTRIBUTION LINE DESIGN
 AUSTIN, TEXAS

DRAWN: J. Brooks
 CHECKED: _____
 APPROVED: M. Lee

7.2/12.5 KV. PRIMARY, 3-PHASE
 CROSSARM CONSTRUCTION-DOUBLE LINE ARM
 (SMALL CONDUCTORS)

DATE:
 5/02

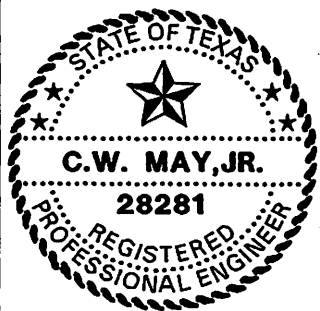
C9



Note:

2" Minimum clear wood clearance of all hardware.
 No bolts to extend more than 2" beyond locknut.
 Jumpers and Connectors as required.
 Use M52-4 for guide to identification of neutral.
 The seal appearing on this document was authorized
 by C. W. MAY, JR, P.E. 28281 on 10/2/02.

ITEM	NO.	MATERIAL	ITEM	NO.	MATERIAL
a	1	Insulator, pin type, class 55-3, brown or white	ek	2	Locknut, 1/2"
a	3	Insulator, pin type, class 55-4, sky grey	ek	2	Locknut, 5/8"
c	2	Bolt, machine, 1/2" x required length			
c	2	Bolt, machine, 5/8" x required length			
d	3	Washer, square, 2-1/4" x 3/16", 11/16" hole			
d	2	Washer, round, 1-3/8" diameter, 9/16" hole			
f	4	Pin, crossarm, steel, 5/8" x 10-3/4"			
g	1	Crossarm, 3-3/4" x 4-3/4" x 10'-0"			
cu	1pr.	Brace, wood, 60" span, 18" drop			
ee		2" letters "CN", 1" nails			



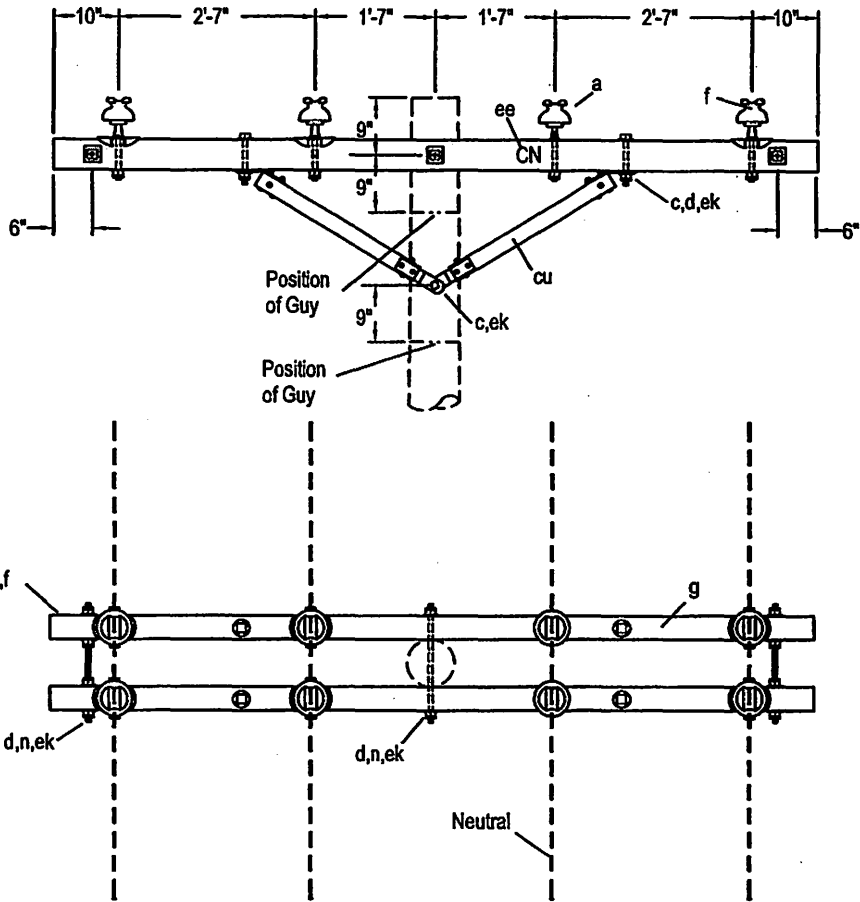
LOWER COLORADO RIVER AUTHORITY
 DISTRIBUTION LINE DESIGN
 AUSTIN, TEXAS

DRAWN: F. Brooks
 CHECKED: _____
 APPROVED: M. Lee

7.2/12.5 KV.
 3-PHASE CROSSARM CONSTRUCTION
 SINGLE LINE ARM
 (SMALL CONDUCTOR)

DATE:
 5/02

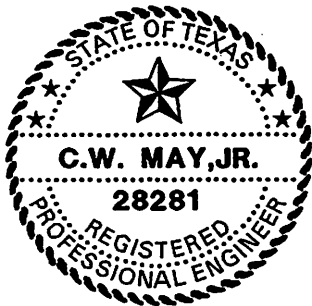
C9-1



Note:

2" Minimum clear wood clearance of all hardware.
 No bolts to extend more than 2" beyond locknut.
 Jumpers and connectors as required.
 Use M52-4 for guide to identification of neutral.
 This construction required for all conductors having
 a breaking strength of more than 4,500 pounds.
 The seal appearing on this document was authorized
 by C. W. MAY, JR, P.E. 28281 on 10/2/02.

ITEM	NO.	MATERIAL	ITEM	NO.	MATERIAL
a	6	Insulator, pin type, class 55-4, sky grey	cu	2pr.	Brace, wood, 60" span, 30" drop
a	2	Insulator, pin type, class 55-3, brown or white	ee		2" letters "CN", 1" nails
c	4	Bolt, machine, 1/2" x required length	ek	4	Locknut, 1/2"
c	1	Bolt, machine, 5/8" x required length	ek	19	Locknut, 5/8"
d	18	Washer, square, 2-1/4" x 3/16", 11/16" hole			
d	4	Washer, round, 1-3/8" diameter, 9/16" hole			
f	2	Pin, crossarm, steel, 5/8" x 10-3/4"			
f	6	Pin, crossarm, clamp type			
g	2	Crossarm, 3-3/4" x 4-3/4" x 10'-0"			
n	5	Bolt, double arming, 5/8" x req'd length			



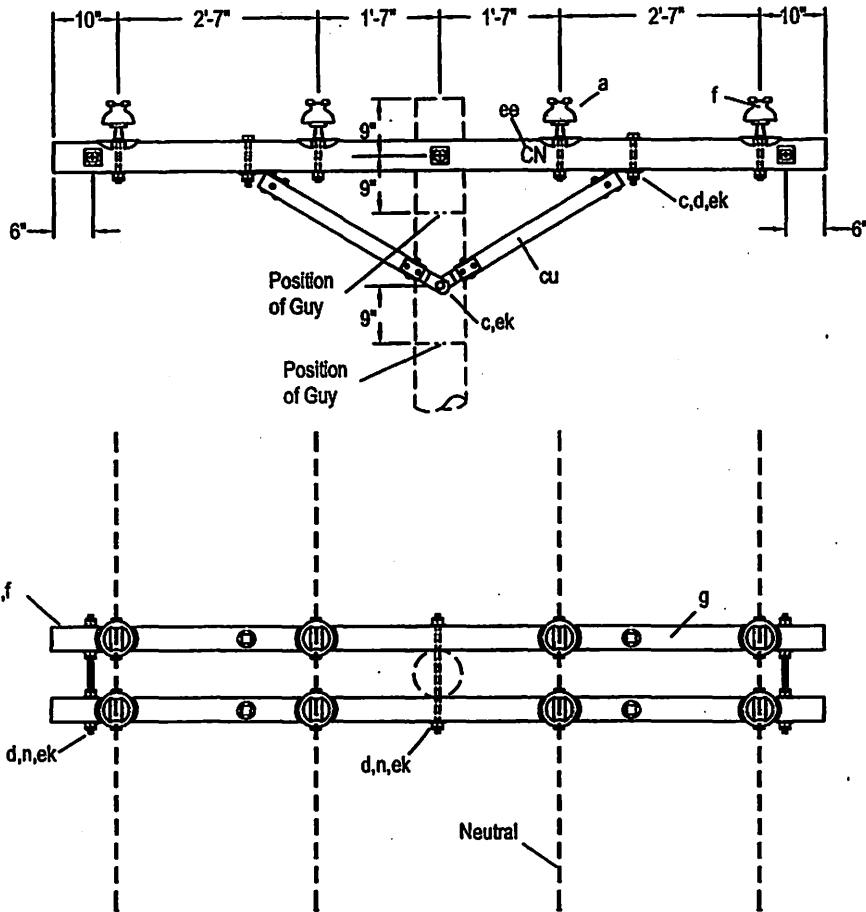
LOWER COLORADO RIVER AUTHORITY
 DISTRIBUTION LINE DESIGN
 AUSTIN, TEXAS

DRAWN: J. Brooks
 CHECKED: _____
 APPROVED: _____

7.2/12.5 KV. PRIMARY, 3-PHASE
 CROSSARM CONSTRUCTION-DOUBLE LINE ARM
 0° TO 5° ANGLE (LARGE CONDUCTORS)

DATE:
 5/02

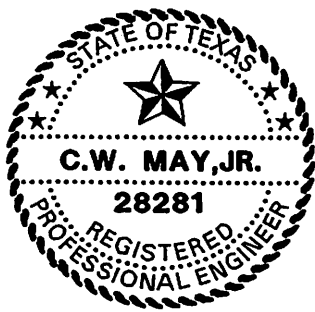
C9-2



Note:

2" Minimum clear wood clearance of all hardware.
 No bolts to extend more than 2" beyond locknut.
 Jumpers and connectors as required.
 Use M52-4 for guide to identification of neutral.
 This construction required for all conductors having
 a breaking strength of more than 4,500 pounds.
 The seal appearing on this document was authorized
 by C. W. MAY, JR, P.E. 28281 on 10/2/02.

ITEM	NO.	MATERIAL	ITEM	NO.	MATERIAL
a	6	Insulator, pin type, class 55-4, sky gray	ee		2" letter "CN", 1" nails
a	2	Insulator, pin type, class 55-3, brown or white	ek	4	Locknut, 1/2"
c	4	Bolt, machine, 1/2" x required length	ek	19	Locknut, 5/8"
c	1	Bolt, machine, 5/8" x required length			
d	18	Washer, square, 2-1/4" x 3/16", 11/16" hole			
d	4	Washer, round, 1-3/8" diameter, 9/16" hole			
f	8	Pin, crossarm, clamp type			
g	2	Crossarm, 3-3/4" x 4-3/4" x 10'-0"			
n	5	Bolt, double arming, 5/8" x req'd length			
cu	2pr.	Brace, wood, 60" span, 30" drop			



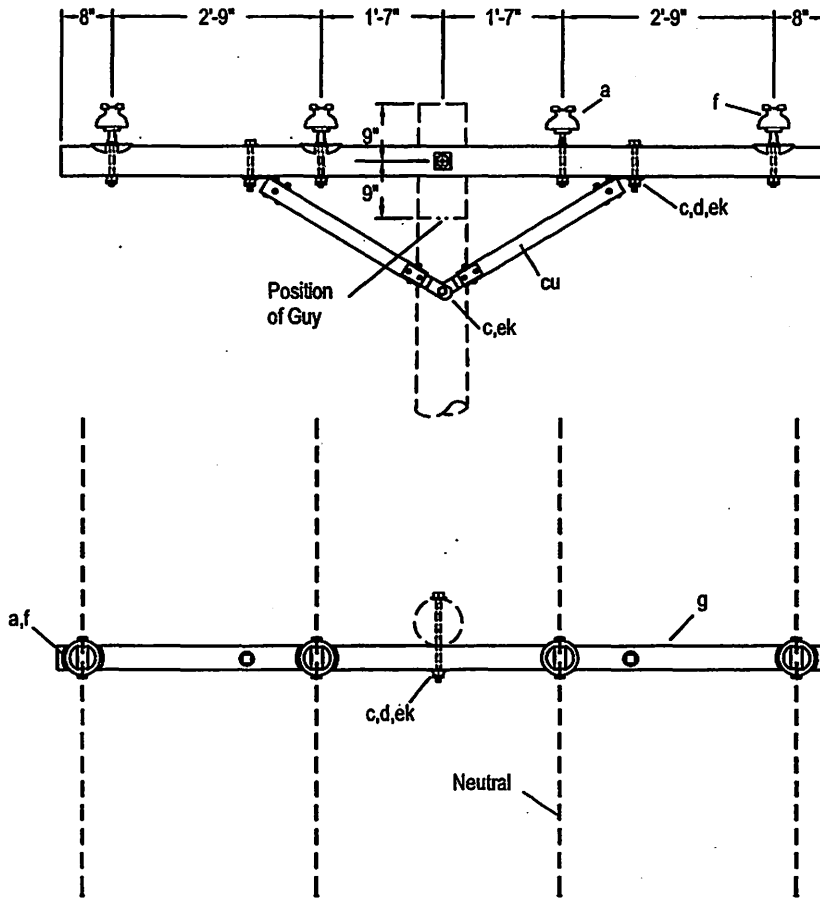
LOWER COLORADO RIVER AUTHORITY
 DISTRIBUTION LINE DESIGN
 AUSTIN, TEXAS

DRAWN: J. Brooks
 CHECKED: _____
 APPROVED: M. Lee

7.2/12.5 KV. PRIMARY, 3-PHASE
 CROSSARM CONSTRUCTION-DOUBLE LINE ARM
 0° TO 5° ANGLE (LARGE CONDUCTORS)

DATE:
 5/02

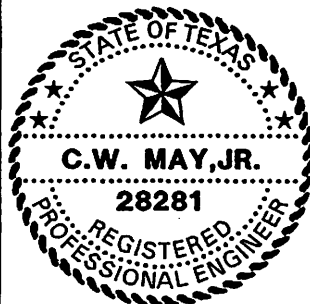
C9-2X



Note:

2" Minimum clear wood clearance of all hardware.
 No bolts to extend more than 2" beyond locknut.
 Jumpers and connectors as required.
 Use M52-4 for guide to identification of neutral.
 This construction required for all conductors having
 a breaking strength of more than 4,500 pounds.
 The seal appearing on this document was authorized
 by C. W. MAY, JR, P.E. 28281 on 10/2/02.

ITEM	NO.	MATERIAL	ITEM	NO.	MATERIAL
a	3	Insulator, pin type, class 55-4, sky grey	ee		2" letters "CN", 1" nails
a	1	Insulator, pin type, class 55-3, brown or white	ek	2	Locknut, 1/2"
c	2	Bolt, machine, 1/2" x req'd length	ek	3	Locknut, 5/8"
c	3	Bolt, machine, 5/8" x req'd length			
d	5	Washer, square, 2-1/4" x 3/16", 11/16" hole			
d	2	Washer, round, 1-3/8", 9/16" hole			
f	3	Pin, crossarm, steel, clamp type			
f	1	Pin, crossarm, steel, 5/8" x 10 3/4"			
g	1	Crossarm, 3-3/4" x 4-3/4" x 10'-0"			
cu	1 pr.	Brace, wood, 60" span, 18" drop			



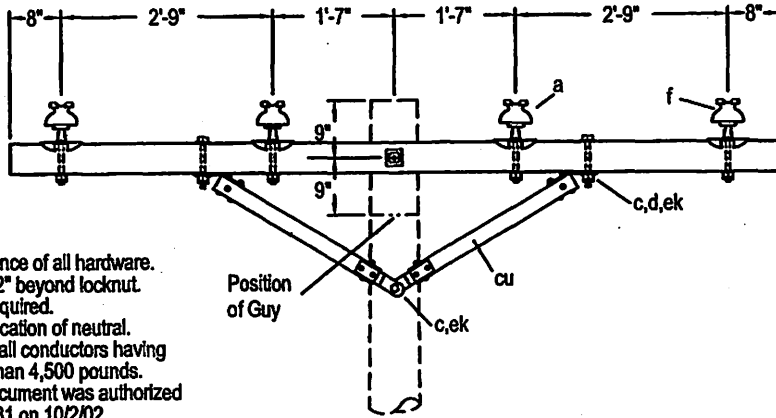
LOWER COLORADO RIVER AUTHORITY
 DISTRIBUTION LINE DESIGN
 AUSTIN, TEXAS

DRAWN: J. Brooks
 CHECKED: _____
 APPROVED: M. Lee

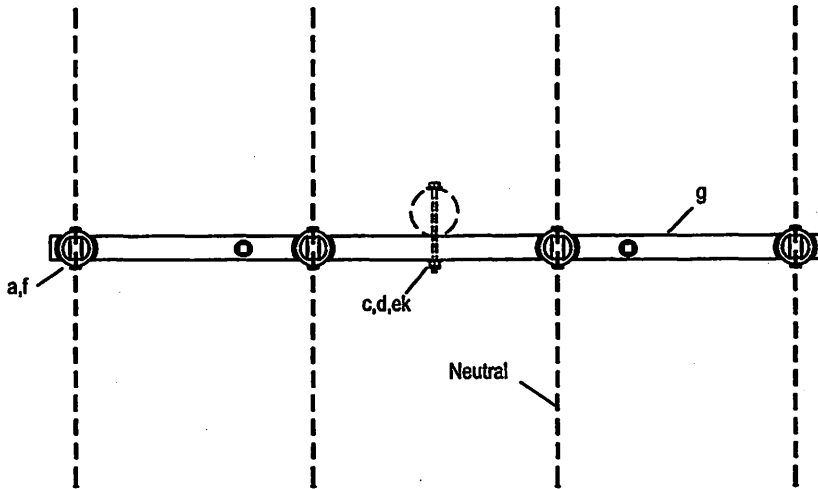
7.2/12.5 KV. PRIMARY 3-PHASE
 CROSSARM CONSTRUCTION
 SINGLE LINE ARM

DATE:
 5/02

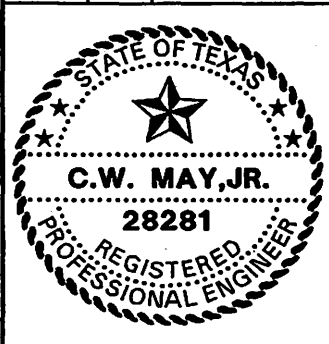
C9-3



Note:
 2" Minimum clear wood clearance of all hardware.
 No bolts to extend more than 2" beyond locknut.
 Jumpers and connectors as required.
 Use M52-4 for guide to identification of neutral.
 This construction required for all conductors having
 a breaking strength of more than 4,500 pounds.
 The seal appearing on this document was authorized
 by C. W. MAY, JR, P.E. 28281 on 10/2/02.



ITEM	NO.	MATERIAL	ITEM	NO.	MATERIAL
a	3	Insulator, pin type, class 55-4, sky grey	ek	2	Locknut, 5/8"
a	2	Insulator, pin type, class 55-3, brown or white			
c	2	Bolt, machine, 1/2" x req'd length			
c	2	Bolt, machine, 5/8" x req'd length			
d	3	Washer, square, 2-1/4" x 3/16", 11/16" hole			
d	2	Washer, round, 1-3/8", 9/16" hole			
f	4	Pin, crossarm, steel, clamp type			
g	1	Crossarm, 3-3/4" x 4-3/4" x 10'-0"			
cu	1pr.	Brace, wood, 60" span, 18" drop			
ee		2" letters "CN", 1" nails			



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LOWER COLORADO RIVER AUTHORITY
 DISTRIBUTION LINE DESIGN
 AUSTIN, TEXAS

DRAWN: J. Brooks
 CHECKED: _____
 APPROVED: M. Lee

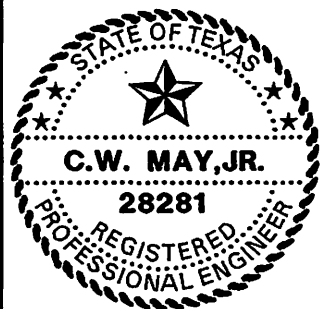
7.2/12.5 KV. PRIMARY, 3-PHASE
 CROSSARM CONSTRUCTION
 SINGLE LINE ARM

DATE:
 5/02

C9-3X

- DSC Splice primary conductor.
- DRS Re-sag and re-attach one span of multiplex service conductor.
- DSS Splice, re-sag and re-attach one span of multiplex service conductor.
- DRC Sag primary conductor.

Note :
 The seal appearing on this document was authorized
 by C. W. MAY, JR, P.E. 28281 on 10/2/02.

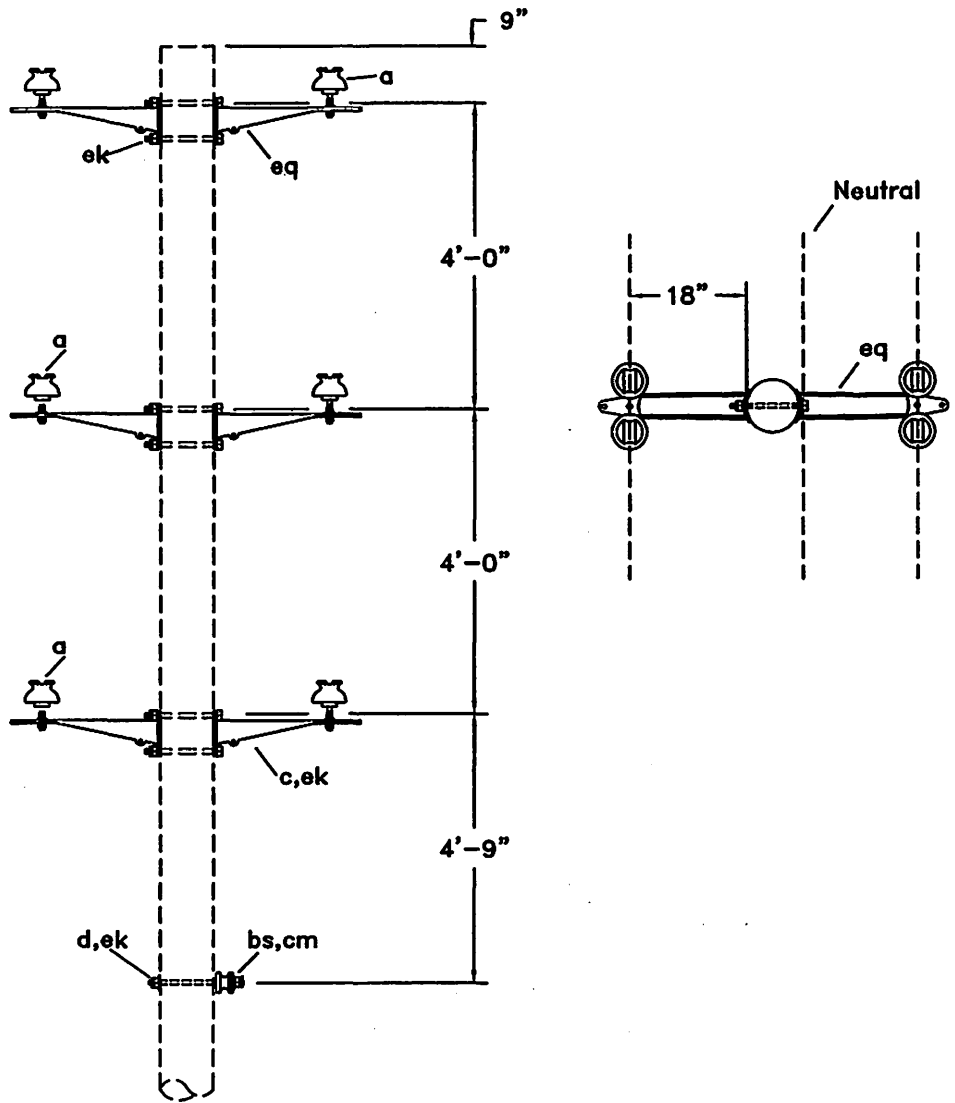


DRAWN: J. Bracke
 CHECKED: _____
 APPROVED: M. Lee

CONDUCTOR RELATED ITEMS

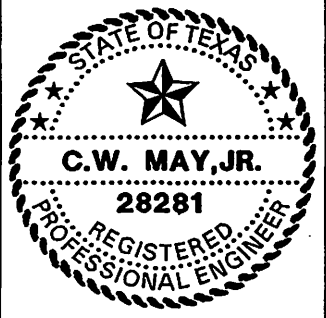
DATE:
 5/02

DSC,DRS
 DSS,DRC



2" Minimum clear wood clearance of all hardware.
 No bolts to extend more than 2" beyond locknut.
 The seal appearing on this document was authorized
 by C. W. MAY, JR, P.E. 28281 on 10/2/02.

ITEM	NO.	MATERIAL	ITEM	NO.	MATERIAL
a	12	Insulator, pin type, class 55-4			
c	6	Bolt, machine, 5/8" x required length			
d	1	Washer, square, 2-1/4" x 3/16 x 11/16" hole			
f	12	Pin, crossarm, for metal arm			
bs	1	Bolt, single upset, 5/8" x required length			
cm	1	Insulator, spool type, class 53-2			
ek	6	Locknut, 5/8"			
eq	6	Bracket, metal, 18" double pin			



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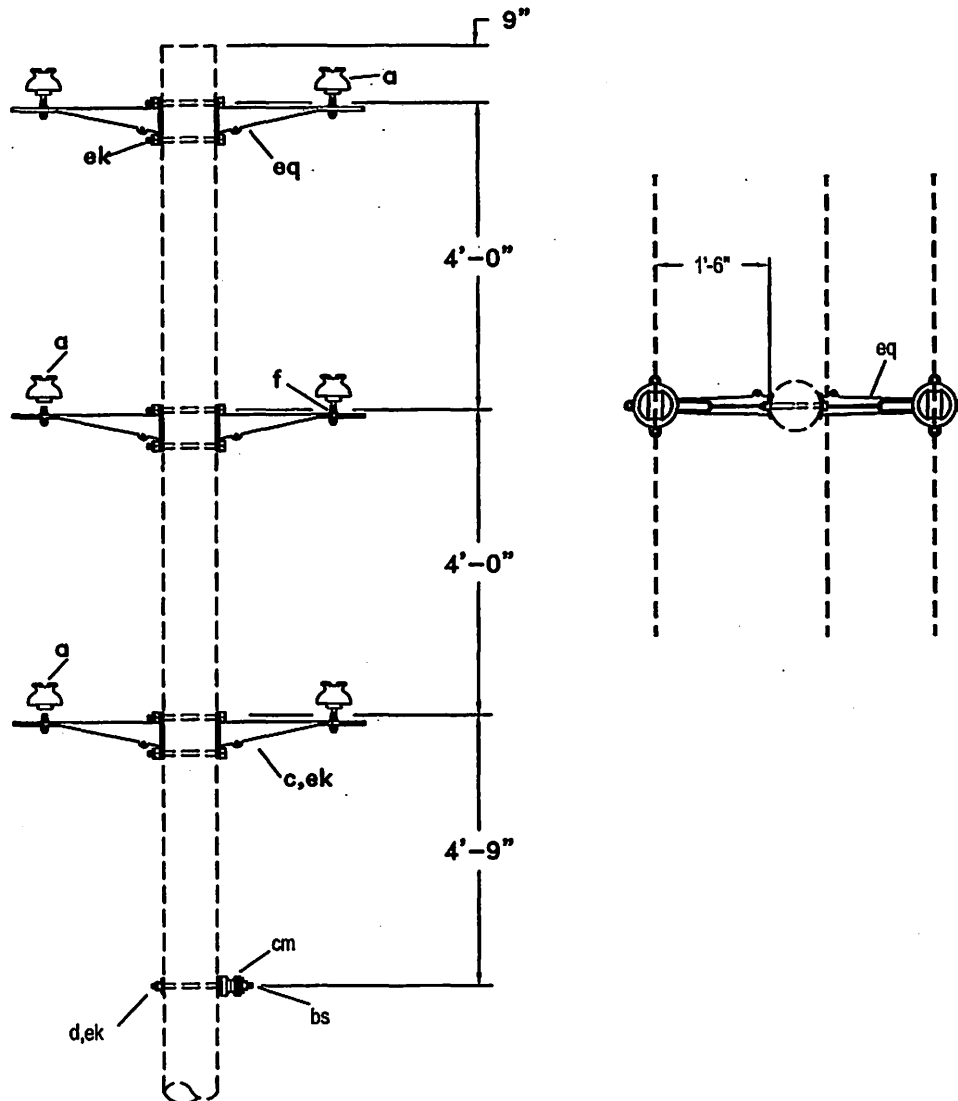
DRAWN: B. Kendall
 CHECKED: _____
 APPROVED: M. Lee

7.2/12.5 KV. PRIMARY
 3-PHASE ARMLESS CONSTRUCTION
 DOUBLE PRIMARY SUPPORT
 0° TO 5° ANGLE

DATE: _____

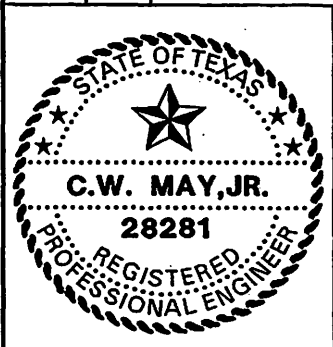
5/02

DC-C1-1X



2" Minimum clear wood clearance of all hardware.
 No bolts to extend more than 2" beyond locknut.
 The seal appearing on this document was authorized
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ITEM	NO.	MATERIAL	ITEM	NO.	MATERIAL
a	6	Insulator, pin type, class 55-4			
c	6	Bolt, machine, 5/8" x required length			
d	1	Washer, square, 2-1/4" x 3/16 x 11/16" hole			
f	6	Pin, crossarm, for metal arm			
bd	1	Bolt, single upset, 5/8" x required length			
cm	1	Insulator, spool type, class 53-2			
ek	6	Locknut, 5/8"			
eq	6	Bracket, metal, 18" double pin			



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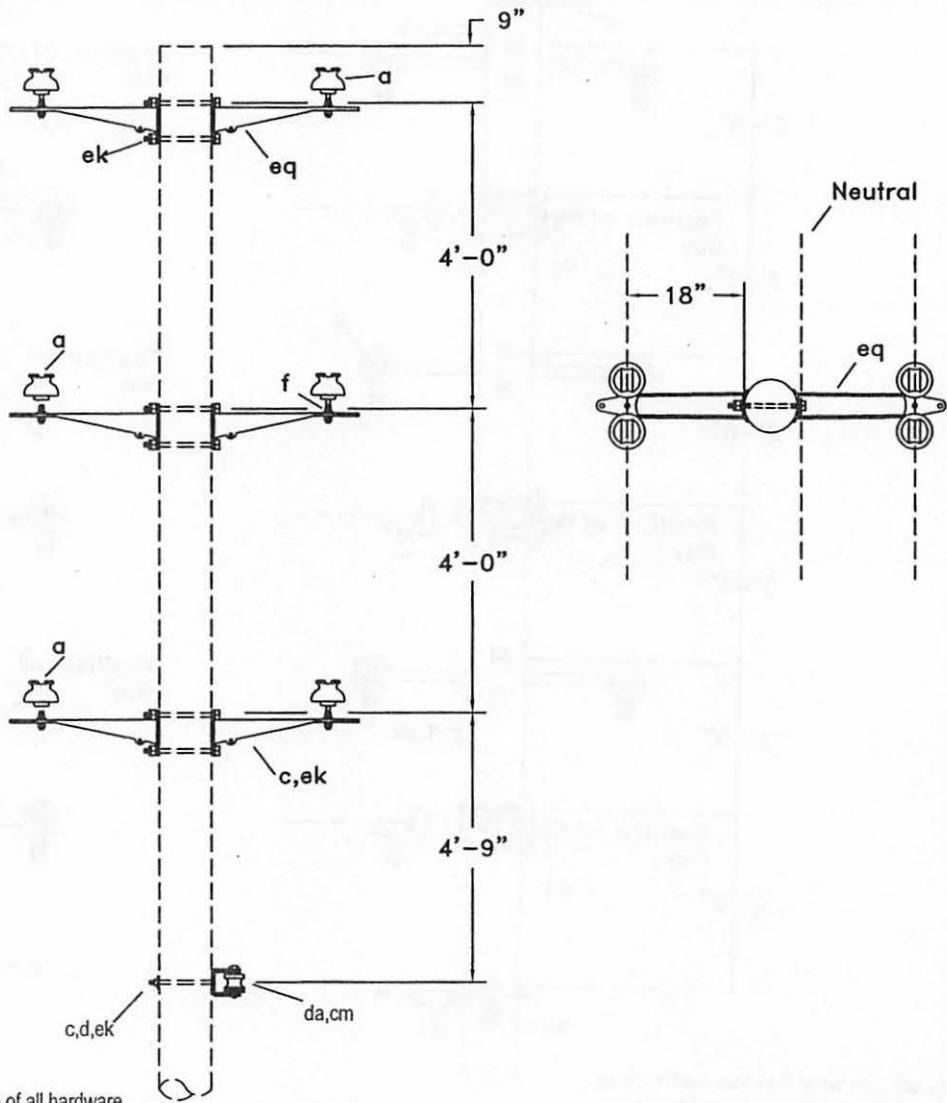
LOWER COLORADO RIVER AUTHORITY
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 AUSTIN, TEXAS

DRAWN: D. Kendall
 CHECKED: _____
 APPROVED: M. Lee

7.2/12.5 KV. PRIMARY
 3-PHASE ARMLESS CONSTRUCTION
 SINGLE PRIMARY SUPPORT
 0° TO 5° ANGLE

DATE:
 5/02

DC-C1B



2" Minimum clear wood clearance of all hardware.
 No bolts to extend more than 2" beyond locknut.
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ITEM	NO.	MATERIAL	ITEM	NO.	MATERIAL
a	10	Insulator, pin type, class 55-4			
c	7	Bolt, machine, 5/8" x required length			
d	1	Washer, square, 2-1/4" x 3/16 x 11/16" hole			
f	10	Pin, crossarm, for metal arm			
da	1	Bracket, neutral			
cm	1	Insulator, spool type, class 53-2			
ek	6	Locknut, 5/8"			
eq	6	Bracket, metal, 18" double pin			



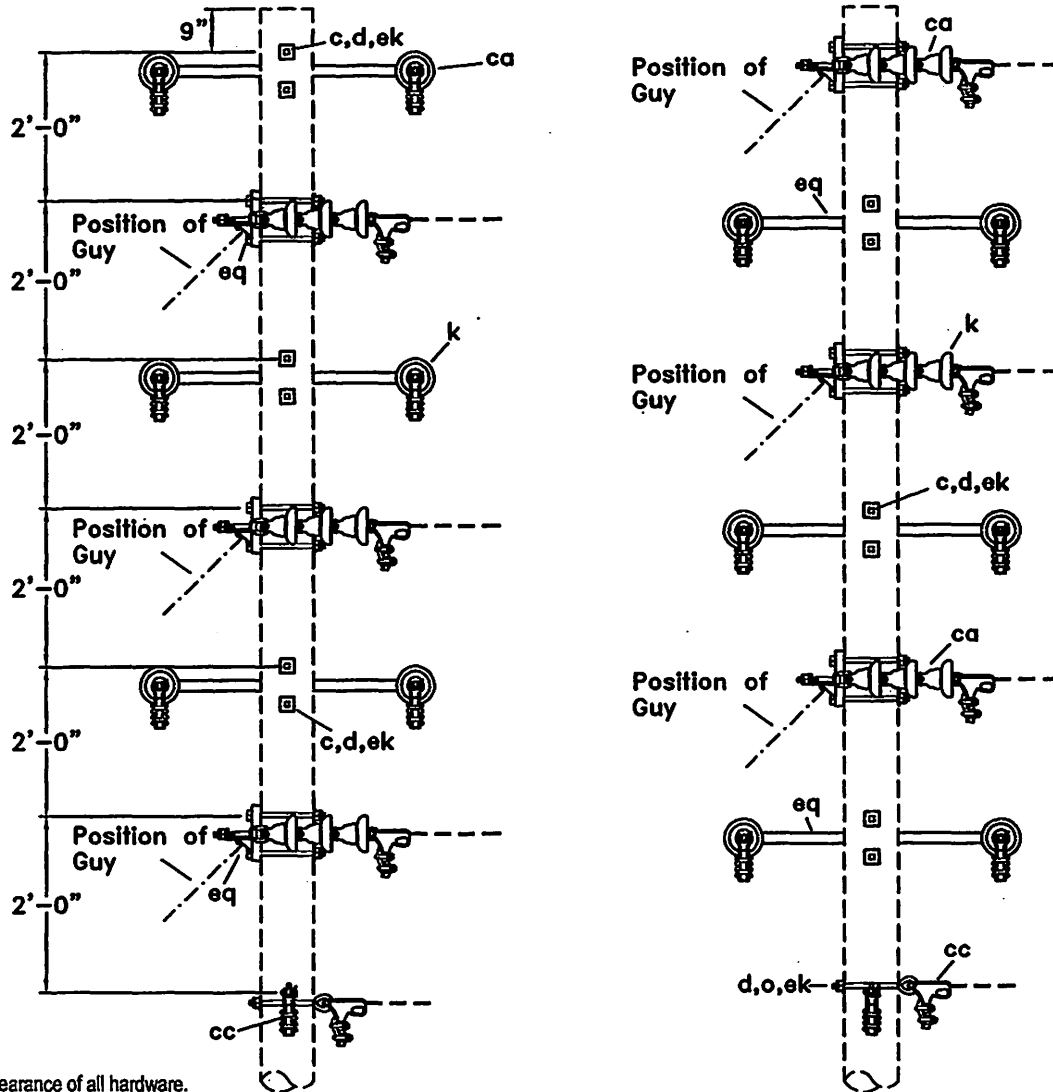
LOWER COLORADO RIVER AUTHORITY
 DISTRIBUTION LINE DESIGN
 AUSTIN, TEXAS

DRAWN: B. Kendall
 CHECKED: _____
 APPROVED: M. Lee

7.2/12.5 KV. PRIMARY
 3-PHASE ARMLESS CONSTRUCTION
 DOUBLE PRIMARY SUPPORT
 0° TO 5° ANGLE

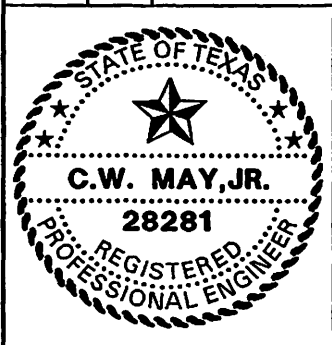
DATE:
 5/02

DC-C2B



Note:
 2" Minimum clear wood clearance of all hardware.
 No bolts to extend more than 2" beyond locknut.
 Jumpers and connectors as required.
 The seal appearing on this document was authorized
 by C. W. MAY, JR, P.E. 28281 on 10/2/02.

ITEM	NO.	MATERIAL	ITEM	NO.	MATERIAL
c	12	Bolt, machine, 5/8" x required length			
d	14	Washer, square, 2-1/4" x 3/16 x 11/16" hole			
k	36	Insulator, suspension, 52-1			
o	2	Bolt, eye, 5/8 x required length			
ca	12	Deadend assembly, primary			
cc	2	Deadend assembly, neutral			
ek	14	Locknut, 5/8"			
eq	6	Deadend, metal assembly, 40"			



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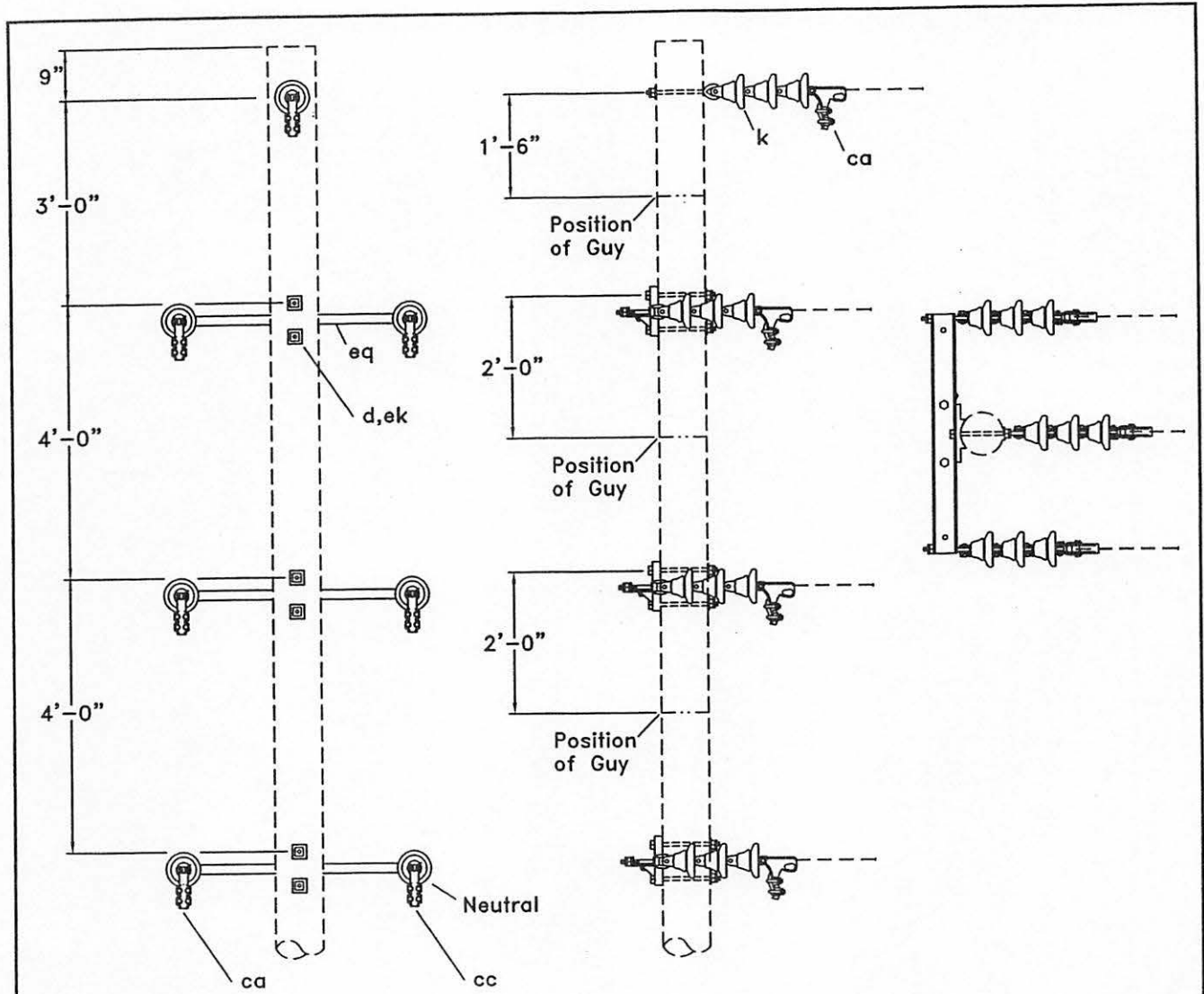
DRAWN: J. Brooks
 CHECKED: _____
 APPROVED: M. Lee

7.2/12.5 KV. PRIMARY
 DOUBLE CIRCUIT
 3-PHASE ARMLESS CONSTRUCTION
 DOUBLE DEADEND

DATE: _____

5/02

DC-C4B



2" Minimum clear wood clearance of all hardware.
 No bolts to extend more than 2" beyond locknut.
 The seal appearing on this document was authorized
 by C. W. MAY, JR, P.E. 28281 on 10/2/02.

ITEM	NO.	MATERIAL	ITEM	NO.	MATERIAL
c	6	Bolt, machine, 5/8" x required length			
d	7	Washer, square, 2-1/4" x 3/16 x 11/16" hole			
k	18	Insulator,suspension,52-1			
o	1	Bolt,eye,5/8 x required length			
ca	6	Deadend assembly,primary			
cc	1	Deadend assembly,neutral			
ek	7	Locknut, 5/8"			
eq	3	Deadend,metal assembly,40"			



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 DISTRIBUTION LINE DESIGN
 AUSTIN, TEXAS

DRAWN: B. Kendall
 CHECKED: _____
 APPROVED: M. Lee

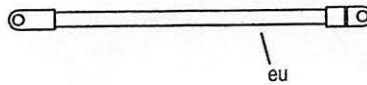
7.2/12.5 KV. PRIMARY
 DOUBLE CIRCUIT
 3-PHASE ARMLESS CONSTRUCTION
 SINGLE DEADEND

DATE:
 5/02

DC-C5B

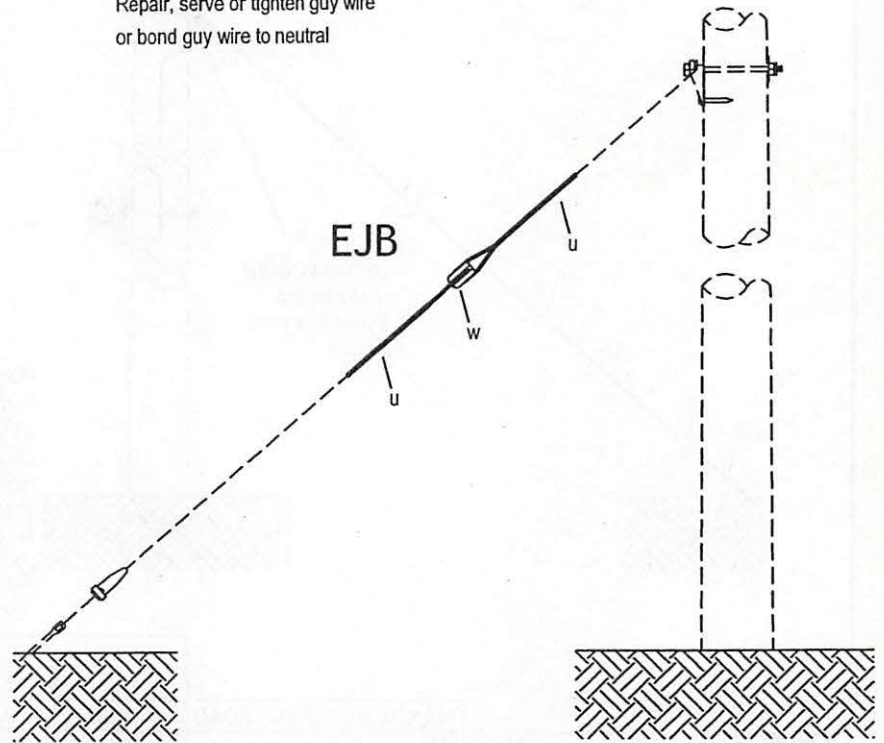
EGR

Extension link



EM

Repair, serve or tighten guy wire
or bond guy wire to neutral



NOTES:

- 1) Install guy strain insulator 8' from guy attachment.
- 2) Other accepted and equivalent dead-end material (item u) may be substituted for the ones shown.

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ITEM	NO.	MATERIAL	ITEM	NO.	MATERIAL
w	1	Guy strain insulator			
u	2	Deadend for guy strand			
eu		link, fiberglass extension			

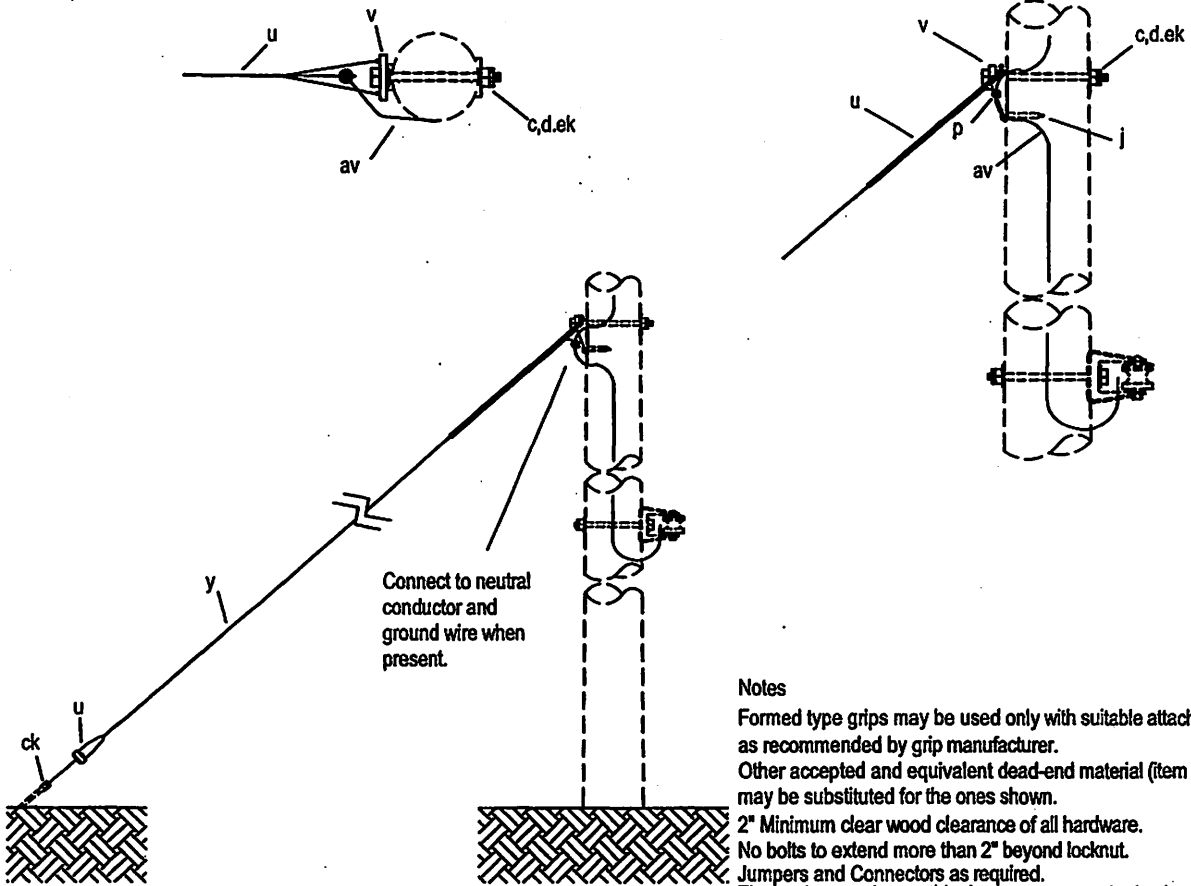


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AUSTIN, TEXAS

DRAWN: J. Brooks
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APPROVED: M. Lee

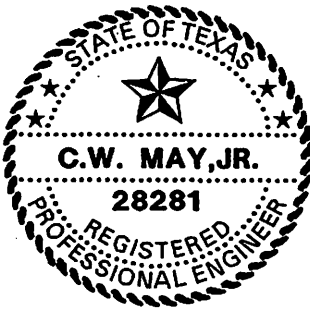
DATE:	EM, EJB, EGR
5/02	



Notes

Formed type grips may be used only with suitable attachments as recommended by grip manufacturer.
 Other accepted and equivalent dead-end material (item u) may be substituted for the ones shown.
 2" Minimum clear wood clearance of all hardware.
 No bolts to extend more than 2" beyond locknut.
 Jumpers and Connectors as required.
 The seal appearing on this document was authorized by C. W. MAY, JR, P.E. 28281 on 10/2/02.

		ASSEMBLY UNIT				
		E1-2	E1-2H	E1-2X	E1-3X	E1-4X
		6,255#	9,720#	13,860#	18,720#	24,210#
MAXIMUM NESC LOAD		3/8" Wire	3/8" Wire	3/8" Wire	7/16" Wire	1/2" Wire
ITEM	MATERIAL					
c	Bolt machine, 5/8" x required length	1	1			
c	Bolt, machine, 3/4" x required length			1	1	
c	Bolt, machine, 7/8" x required length					1
d	Washer, square, 2-1/4" x 3/16", 11/16" hole	1				
d	Washer, square, curved, ribbed, 3", 11/16" hole		1			
w	Washer, square, curved, ribbed, 4", 15/16" hole			1	1	1
j	Screw, lag, 1/2" x 4"	1	1	1	1	1
p	Connector	as req'd	as req'd	as req'd	as req'd	as req'd
v	Deadend for guy strand	2	2	2	2	2
v	Guy attachment, heavy duty	1	1			
v	Guy attachment, extra heavy duty			1	1	1
y	Guy wire, S.M., 7 strand	as req'd				
y	Guy wire, high strength, 7 strand		as req'd			
y	Guy wire, extra high strength, 7 strand			as req'd	as req'd	as req'd
av	Jumper, #6 SD. copper or equivalent	as req'd	as req'd	as req'd	as req'd	as req'd
ck	Clamp, anchor rod bonding	1	1	1	1	1
ek	Locknut	1-5/8"	1-5/8"	1-3/4"	1-3/4"	1-7/8"



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 DISTRIBUTION LINE DESIGN
 AUSTIN, TEXAS

DRAWN: J. Brooks
 CHECKED: _____
 APPROVED: M. Lee

SINGLE DOWN GUY
 THROUGH BOLT TYPE

DATE:
 5/02

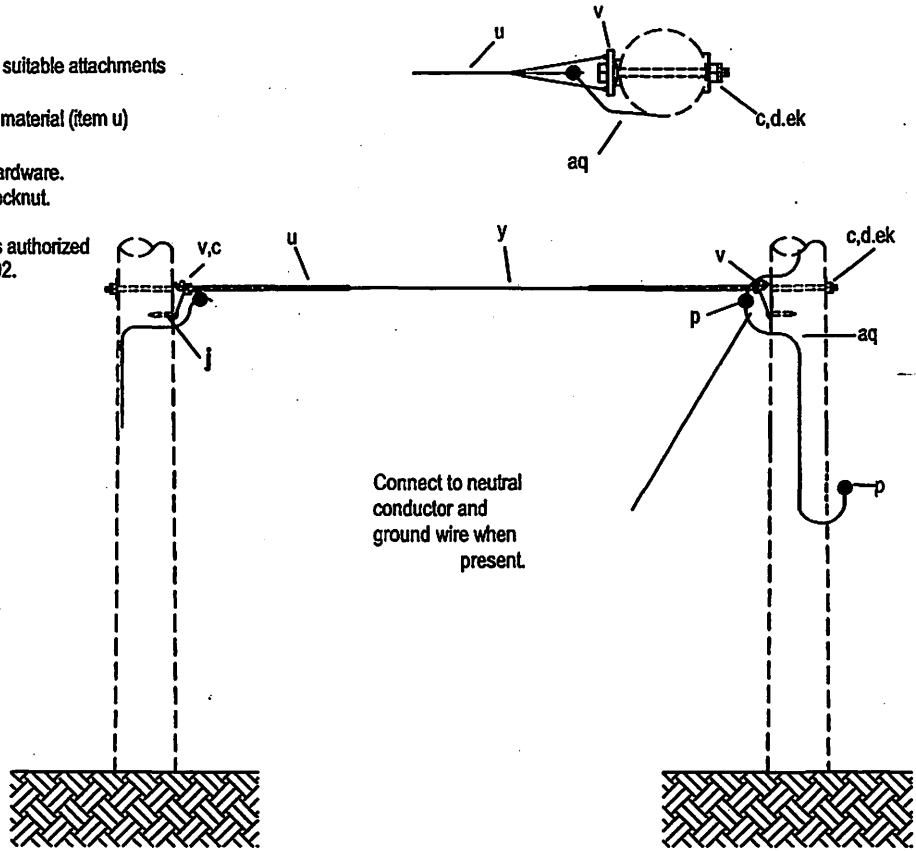
E1-2, E1-2H, E1-2X
 E1-3X, E1-4X

Notes

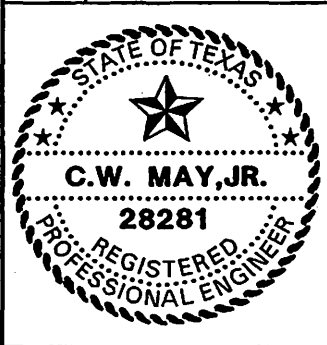
Formed type grips may be used only with suitable attachments as recommended by grip manufacturer.
Other accepted and equivalent dead-end material (item u) may be substituted for the ones shown.

2" Minimum clear wood clearance of all hardware.
No bolts to extend more than 2" beyond locknut.
Jumpers and Connectors as required.

The seal appearing on this document was authorized by C. W. MAY, JR, P.E. 28281 on 10/2/02.



ITEM	MATERIAL	ASSEMBLY UNIT				
		MAXIMUM NESC LOAD	E2-2	E2-2H	E2-2X	E2-3X
		6,255#	9,720#	13,860#	18,720#	24,210#
		3/8" Wire	3/8" Wire	3/8" Wire	7/16" Wire	1/2" Wire
c	Bolt machine, 5/8" x required length	2	2	2		
c	Bolt, machine, 3/4" x required length				2	
c	Bolt, machine, 7/8" x required length					2
d	Washer, square, 2-1/4" x 3/16", 11/16" hole	2				
d	Washer, square, curved, ribbed, 3", 11/16" hole		2	2	2	
d	Washer, square, curved, ribbed, 4", 15/16" hole					2
i	Screw, lag, 1/2" x 4"	2	2	2	2	2
p	Connector	as req'd	as req'd	as req'd	as req'd	as req'd
v	Deadend for guy strand	2	2	2	2	2
v	Guy attachment, heavy duty	2	2			
v	Guy attachment, extra heavy duty			2	2	2
y	Guy wire, S.M., 7 strand	as req'd				
y	Guy wire, high strength, 7 strand		as req'd			
y	Guy wire, extra high strength, 7 strand			as req'd	as req'd	as req'd
av	Jumper, #6 SD. copper or equivalent	as req'd	as req'd	as req'd	as req'd	as req'd
ek	Locknut	2-5/8"	2-5/8"	2-5/8"	2-3/4"	2-7/8"



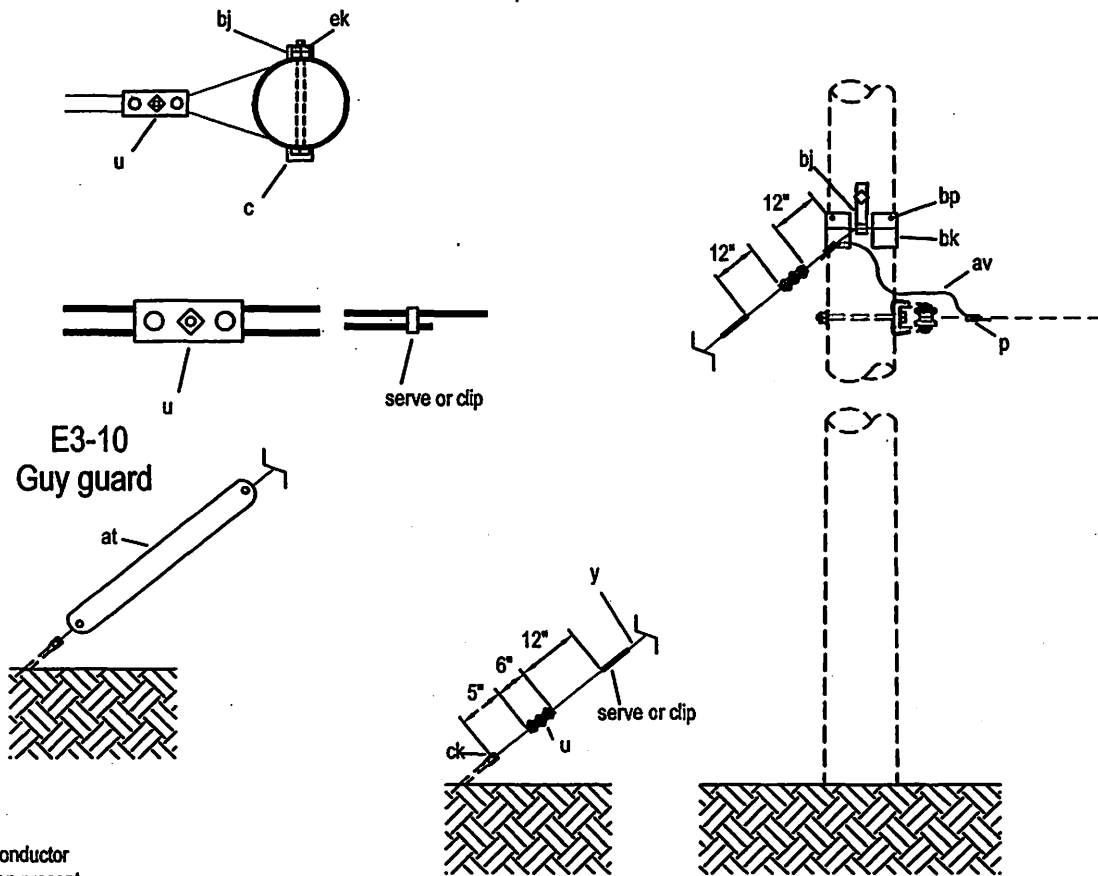
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DISTRIBUTION LINE DESIGN
AUSTIN, TEXAS

DRAWN: J. Brooks
CHECKED: _____
APPROVED: M. Lee

SINGLE OVERHEAD
THROUGH BOLT TYPE

DATE: 5/02	E2-2, E2-2H, E2-2X E2-3X, E2-4X
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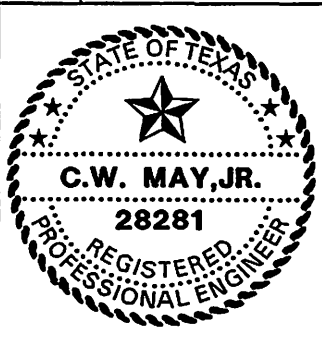


Note:

Connect to neutral conductor and ground wire when present.
 2" Minimum clear wood clearance of all hardware.
 No bolts to extend more than 2" beyond locknut.
 Jumpers and Connectors as required.

The seal appearing on this document was authorized by C. W. MAY, JR, P.E. 28281 on 10/2/02.

ITEM	MATERIAL	ASSEMBLY UNIT		
		E3-2	E3-3	E3-10
	MAXIMUM NESC LOAD	6255#	8415"	
c	Bolt, 5/8" x required length	3/8"	7/16"	
p	Connectors	1	1	
u	Clamp, guy	as req'd	as req'd	
y	Guy wire, S.M., 7 strand	2-heavy duty	2-heavy duty	
at	Guy guard, 8' minimum	as req'd	as req'd	1
av	Jumper, #6 S.D., copper or equivalent			
bj	Guy hook, J	as req'd	as req'd	
bk	Guy plate, 4" x 8", 14 gauge	2	2	
bp	Nail, 8 penny, galvanized	2	2	
ck	Clamp, anchor rod bonding	8	8	
ek	Locknut, 5/8"	1	1	



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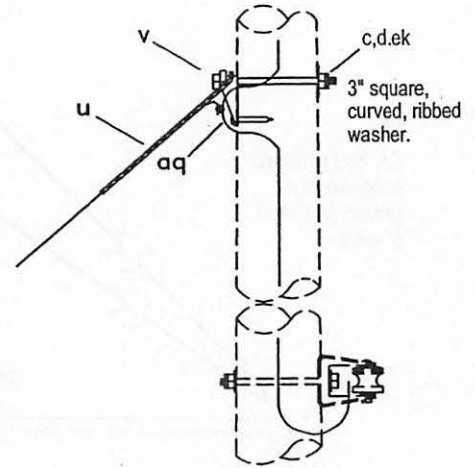
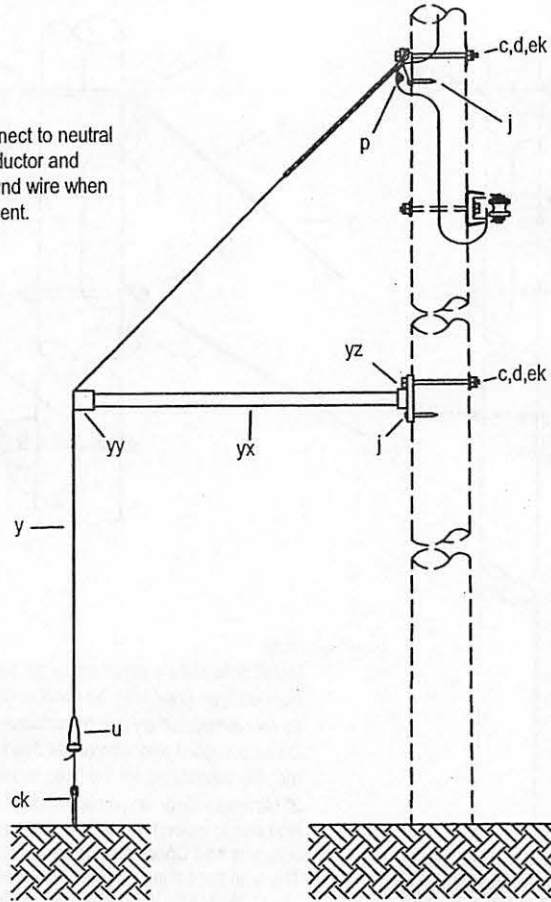
DRAWN: J. Brooks
 CHECKED: _____
 APPROVED: M. Lee

7.2/12.5 K.V.
 SINGLE DOWN GUY, WRAPPED TYPE

DATE: 5/02

E3-2, E3-3, E3-10

Connect to neutral conductor and ground wire when present.



Install pole plate a minimum of 10' above ground.
 Formed type grips may be used only with suitable attachments, as recommended by grip manufacturer.
 Other accepted and equivalent dead-end material (item u) may be substituted for the ones shown.
 2" Minimum clear wood clearance of all hardware.
 No bolts to extend more than 2" beyond locknut.
 Jumpers and Connectors as required.
 The seal appearing on this document was authorized by C. W. MAY, JR, P.E. 28281 on 10/2/02.

ITEM	MATERIAL	ASSEMBLY UNIT		
		E3-4	E3-4H	E3-4X
	MAXIMUM NESC LOAD	6,255#	9,720#	13,860#
		3/8" Wire	3/8" Wire	3/8" Wire
c	Bolt machine, 5/8" x required length	2	2	2
d	Washer, square, 2-1/4" x 3/16", 11/16" hole	1	1	1
d	Washer, square, curved, ribbed, 3", 11/16" hole	1	1	1
i	Screw, lag, 1/2" x 4"	1	1	1
p	Connector	as req'd	as req'd	as req'd
u	Deadend for guy strand	2	2	2
v	Guy attachment, heavy duty	1	1	1
y	Guy wire, S.M., 7 strand	as req'd		
y	Guy wire, high strength, 7 strand		as req'd	
y	Guy wire, extra high strength, 7 strand			as req'd
av	Jumper, #4 stranded aluminum alloy or equivalent	as req'd	as req'd	as req'd
ck	Clamp, anchor rod bonding	1	1	1
ek	Locknut, 5/8"	2	2	2
yx	Pipe, galvanized, 2" x req'd length	1	1	1
yy	Clamp, end fitting, for 2" pipe	1	1	1
yz	Plate, pole, galvanized, for 2" pipe	1	1	1



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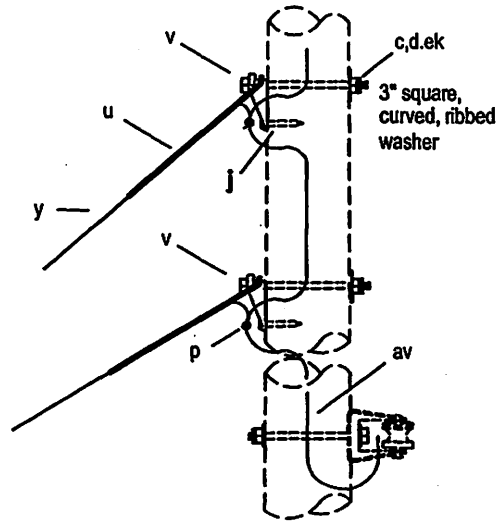
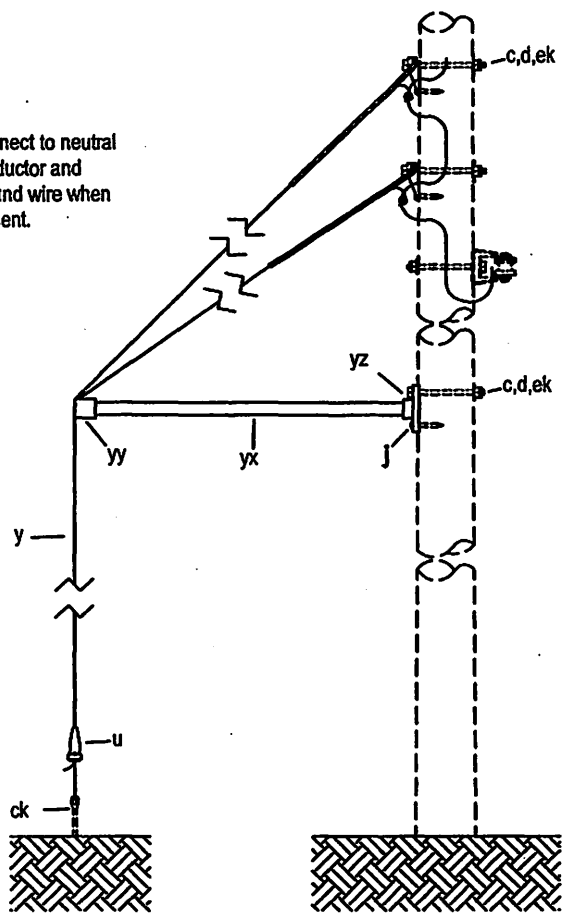
DRAWN: J. Brooks
 CHECKED: _____
 APPROVED: M. Lee

SIDEWALK GUY
 SINGLE DOWN GUY

DATE: 5/02

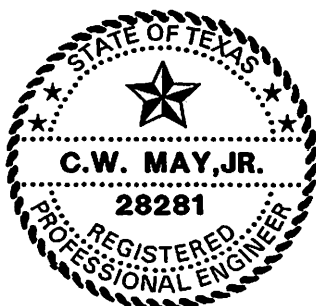
E3-4, E3-4H, E3-4X

Connect to neutral conductor and ground wire when present.



Note:
 Install pole plate a minimum of 10' above ground.
 Formed type grips may be used only with suitable attachments, as recommended by grip manufacturer.
 Other accepted and equivalent dead-end material (item u) may be substituted for the ones shown.
 2" Minimum clear wood clearance of all hardware.
 No bolts to extend more than 2" beyond locknut.
 Jumpers and Connectors as required.
 The seal appearing on this document was authorized by C. W. MAY, JR, P.E. 28281 on 10/2/02.

ITEM	MATERIAL	ASSEMBLY UNIT		
		MAXIMUM NESC LOAD	E3-5	E3-5H
		6,255#	9,720#	13,860#
c	Bolt machine, 5/8" x required length	3/8" Wire	3/8" Wire	3/8" Wire
d	Washer, square, 2-1/4" x 3/16", 11/16" hole	3	3	3
d	Washer, square, curved, ribbed, 3", 11/16" hole	1	1	1
d	Washer, square, curved, ribbed, 3", 11/16" hole	2	2	2
i	Screw, lag, 1/2" x 4"	4	4	4
p	Connector	as req'd	as req'd	as req'd
u	Deadend for guy strand	4	4	4
v	Guy attachment, heavy duty	2	2	2
y	Guy wire, S.M., 7 strand	as req'd		
y	Guy wire, high strength, 7 strand		as req'd	
y	Guy wire, extra high strength, 7 strand			as req'd
av	Jumper, #6 S.D. copper or equivalent	as req'd	as req'd	as req'd
ck	Clamp, anchor rod bonding	1	1	1
ek	Locknut, 5/8"	3	3	3
yx	Pipe, galvanized, 2" x req'd length	1	1	1
yy	Clamp, end fitting, for 2" pipe, double support	1	1	1
yz	Plate, pole, galvanized, for 2" pipe	1	1	1



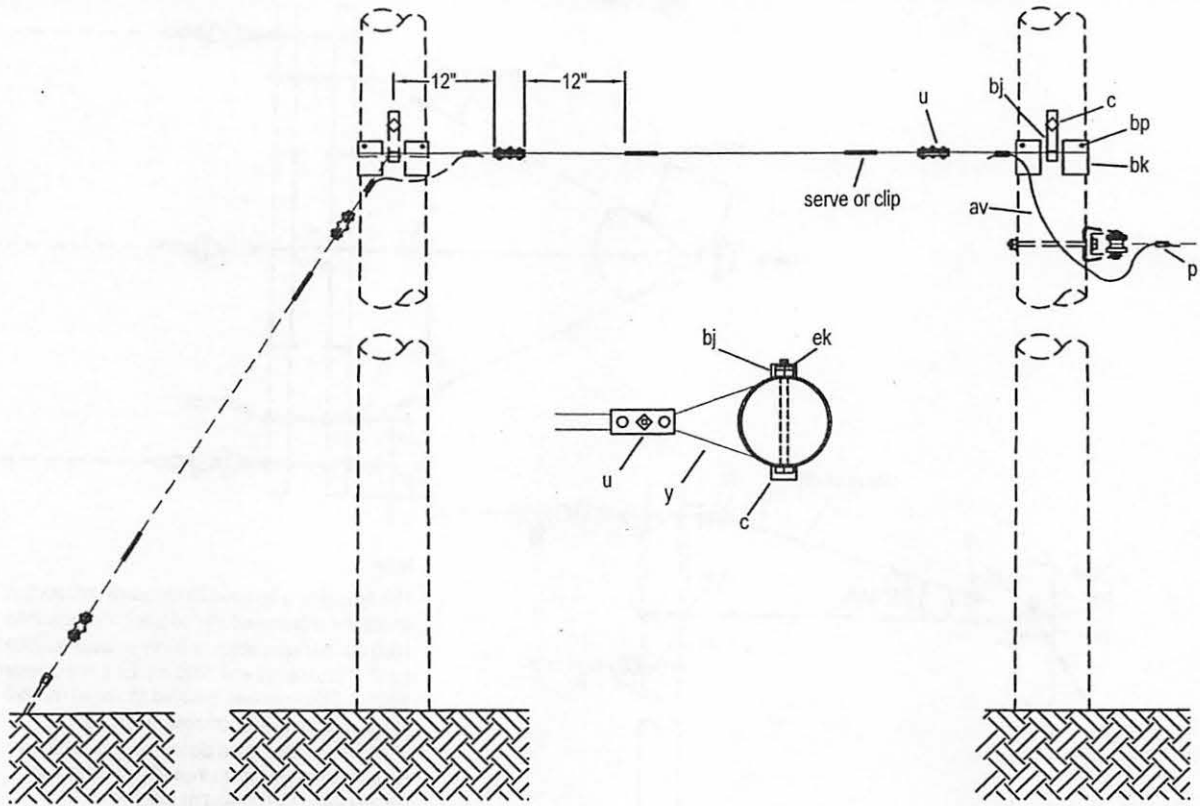
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 AUSTIN, TEXAS

DRAWN: J. Brooks
 CHECKED: _____
 APPROVED: M. Lee

SIDEWALK GUY
 DOUBLE DOWN GUY

DATE:
 5/02

E3-5, E3-5H, E3-5X



Note:

Connect to neutral conductor and ground wire when present.

2" Minimum clear wood clearance of all hardware.

No bolts to extend more than 2" beyond locknut.

Jumpers and Connectors as required.

The seal appearing on this document was authorized by C. W. MAY, JR, P.E. 28281 on 10/2/02.

ITEM	MATERIAL	ASSEMBLY UNIT			
		E4-2	E4-3		
	MAXIMUM NESC LOAD	6255#	8415#		
		3/8"	7/16"		
c	Bolt, 5/8" x required length	1	1		
p	Connectors	as req'd	as req'd		
u	Clamp, guy	2-heavy duty	2-heavy duty		
y	Guy wire, S.M., 7 strand	as req'd	as req'd		
av	Jumper, #6 S.D., copper or equivalent	as req'd	as req'd		
bj	Guy hook, J	2	2		
bk	Guy plate, 4" x 8", 14 gauge	2	2		
bp	Nail, 8 penny, galvanized	8	8		
ek	Locknut, 5/8"	1	1		



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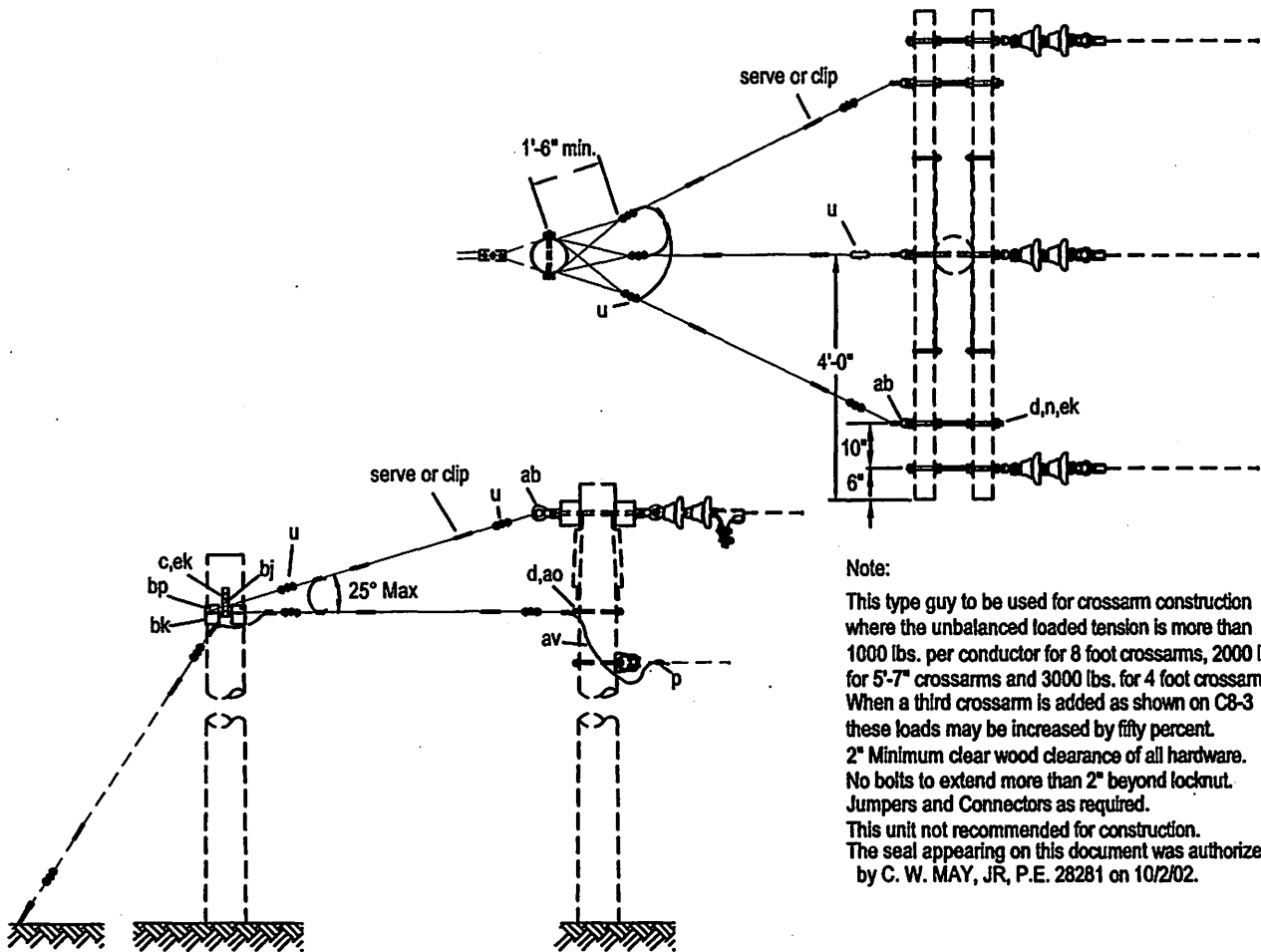
LOWER COLORADO RIVER AUTHORITY
DISTRIBUTION LINE DESIGN
AUSTIN, TEXAS

DRAWN: J. Brooks
CHECKED: _____
APPROVED: M. Lee

7.2/12.5 K.V.
SINGLE OVERHEAD GUY
WRAPPED TYPE

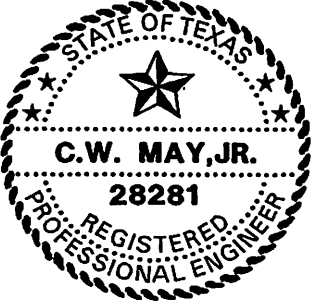
DATE: _____
5/02

E4-2, E4-3



Note:
 This type guy to be used for crossarm construction where the unbalanced loaded tension is more than 1000 lbs. per conductor for 8 foot crossarms, 2000 lbs. for 5'-7" crossarms and 3000 lbs. for 4 foot crossarms. When a third crossarm is added as shown on C8-3 these loads may be increased by fifty percent.
 2" Minimum clear wood clearance of all hardware.
 No bolts to extend more than 2" beyond locknut.
 Jumpers and Connectors as required.
 This unit not recommended for construction.
 The seal appearing on this document was authorized by C. W. MAY, JR, P.E. 28281 on 10/2/02.

ITEM	MATERIAL	ASSEMBLY UNIT	
		E5-1	E5-2
	MAXIMUM NESC LOAD	2,835#	6255#
c	Bolt, 5/8" x required length	1/4"	3/8"
d	Washer, square, 2-1/4" x 3/16", 11/16" hole	1	1
p	Connector	9	9
u	Deadend, for guy strand	as req'd	as req'd
y	Guy wire, S.M., 7 strand	as req'd	as req'd
ab	Nut, thimble eye, 5/8"	as req'd	as req'd
av	Jumper, #6 S.D. copper or equivalent	2	2
bk	Guy plate, 4" x 8", 14 gauge	as req'd	as req'd
bj	Guy hook, J	2	2
bp	Nail, 8 penny, galvanized	2	2
ek	Locknut, 5/8"	2	2
		1	1



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 AUSTIN, TEXAS

DRAWN: J. Brooks
 CHECKED: _____
 APPROVED: M. Lee

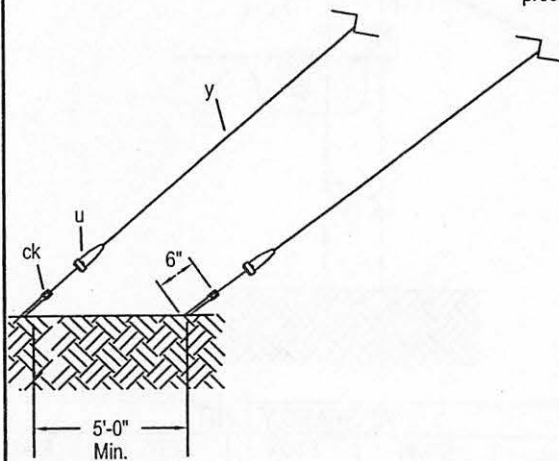
7.2/12.5 K.V.
 DEADEND GUY
 CROSSARM CONSTRUCTION

DATE:
 5/02

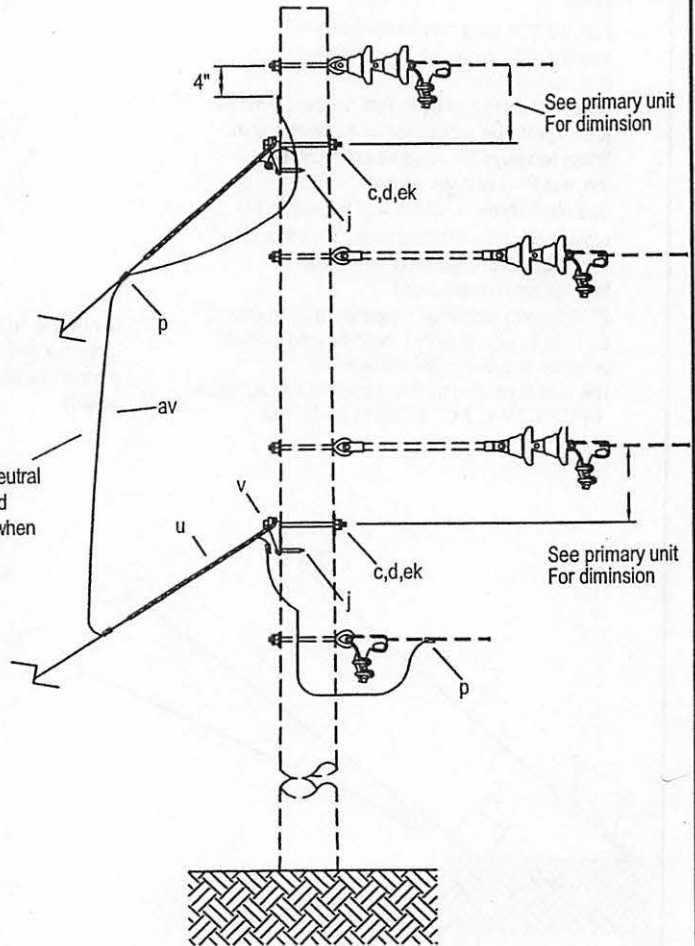
E5-1, E5-2

NOTES:

Formed type grips may be used only with suitable attachments as recommended by grip manufacturer.
 Other accepted and equivalent deadend material (item u) may be substituted for the ones shown.
 When two guys are attached to one anchor rod, use F1-3 or larger anchor.
 Spacing between anchors shall be sufficient to provide maximum holding power of each anchor.
 For loose soils, concrete or other pole footings are recommended.
 2" Minimum clear wood clearance of all hardware.
 No bolts to extend more than 2" beyond locknut.
 Jumpers and Connectors as required.
 The seal appearing on this document was authorized by C. W. MAY, JR, P.E. 28281 on 10/2/02.



Connect to neutral conductor and ground wire when present.



ASSEMBLY UNIT

ITEM	MATERIAL	MAXIMUM NESC LOAD				
		E6-2	E6-2H	E6-2X	E6-3	E6-3X
		6,255#	9,720#	13,860#	8,415#	18,720#
		3/8"	3/8"	3/8"	7/16"	7/16"
c	Bolt machine, 5/8" x required length	2	2	2	2	2
d	Washer, square, 2-1/4" x 3/16", 11/16" hole	2				
d	Washer, square, curved, ribbed, 3", 11/16" hole	2	2	2	2	2
j	Screw, lag, 1/2" x 4"	2	2	2	2	2
p	Connector	as req'd	as req'd	as req'd	as req'd	as req'd
u	Deadend for guy strand	4	4	4	4	4
v	Guy attachment, heavy duty	2	2	2	2	2
y	Guy wire, S.M., 7 strand	as req'd			as req'd	
y	Guy wire, high strength, 7 strand			as req'd		
y	Guy wire, extra high strength, 7 strand			as req'd		as req'd
av	Jumper, #4 stranded aluminum alloy or equivalent	as req'd	as req'd	as req'd	as req'd	as req'd
ck	Clamp, anchor rod bonding	2	2	2	2	2
ek	Locknut, 5/8"	2	2	2	2	2



LOWER COLORADO RIVER AUTHORITY
 DISTRIBUTION LINE DESIGN
 AUSTIN, TEXAS

DRAWN: J. Brooks
 CHECKED: _____
 APPROVED: M. Lee

DOUBLE DOWN GUY
 THROUGH BOLT TYPE

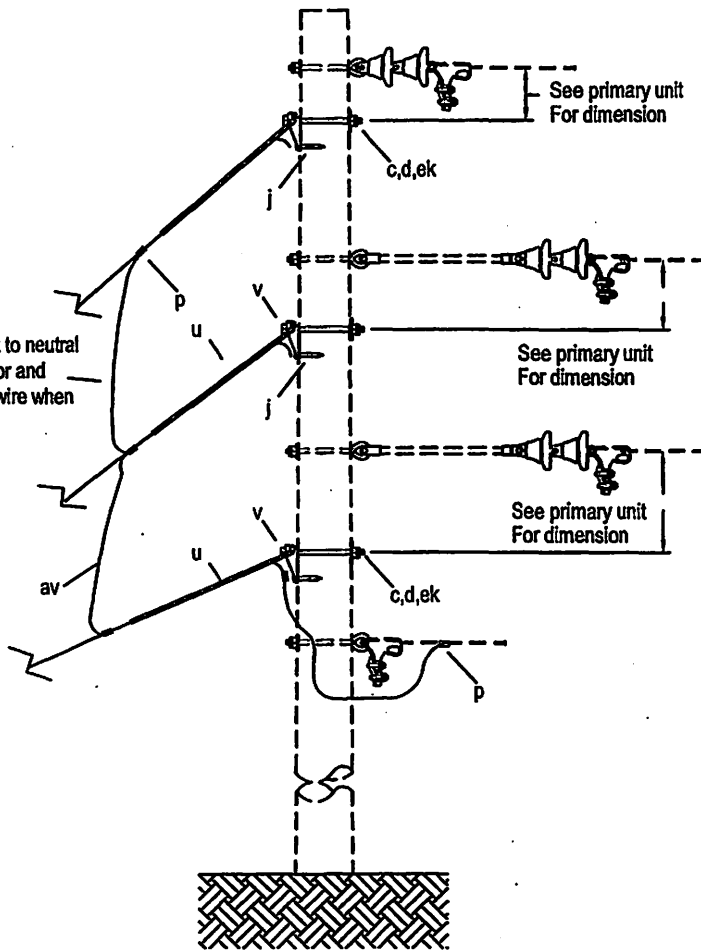
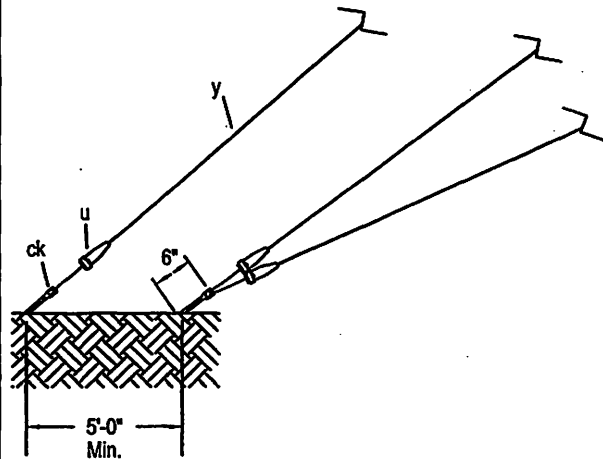
DATE:
 5/02

E6-2, E6-2H, E6-2X
 E6-3, E6-3X

NOTES:

Formed type grips may be used only with suitable attachments as recommended by grip manufacturer.
 Other accepted and equivalent deadend material (item u) may be substituted for the ones shown.
 When two guys are attached to one anchor rod, use F1-3 or larger anchor.
 Spacing between anchors shall be sufficient to provide maximum holding power of each anchor.
 For loose soils, concrete or other pole footings are recommended.
 2" Minimum clear wood clearance of all hardware.
 No bolts to extend more than 2" beyond locknut.
 Jumpers and Connectors as required.
 The seal appearing on this document was authorized by C. W. MAY, JR, P.E. 28281 on 10/2/02.

Connect to neutral conductor and ground wire when present.



ASSEMBLY UNIT

ITEM	MATERIAL	MAXIMUM NESC LOAD				
		E7-2	E7-2H	E7-2X	E7-3	E7-3X
		6,255#	9,720#	13,860#	8,415#	18,720#
		3/8" Wire	3/8" Wire	3/8" Wire	7/16" Wire	7/16" Wire
c	Bolt machine, 5.8" x required length	3	3	3	3	3
d	Washer, curved, ribbed, 3", 11/16" hole	3	3	3	3	3
j	Screw, lag, 1/2" x 4"	3	3	3	3	3
p	Connector	as req'd	as req'd	as req'd	as req'd	as req'd
u	Deadend for guy strand	6	6	6	6	6
v	Guy attachment, heavy duty	3	3	3	3	3
y	Guy wire, S.M., 7 strand	as req'd			as req'd	
y	Guy wire, high strength, 7 strand		as req'd			
y	Guy wire, extra high strength, 7 strand			as req'd		as req'd
av	Jumper, #4 stranded aluminum alloy or equivalent	as req'd	as req'd	as req'd	as req'd	as req'd
ck	Clamp, anchor rod bonding	2	2	2	2	2
ek	Locknut, 5/8"	3	3	3	3	3



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 DISTRIBUTION LINE DESIGN
 AUSTIN, TEXAS

DRAWN: F. Brooks
 CHECKED: _____
 APPROVED: M. Lee

THREE DOWN GUY THROUGH BOLT TYPE

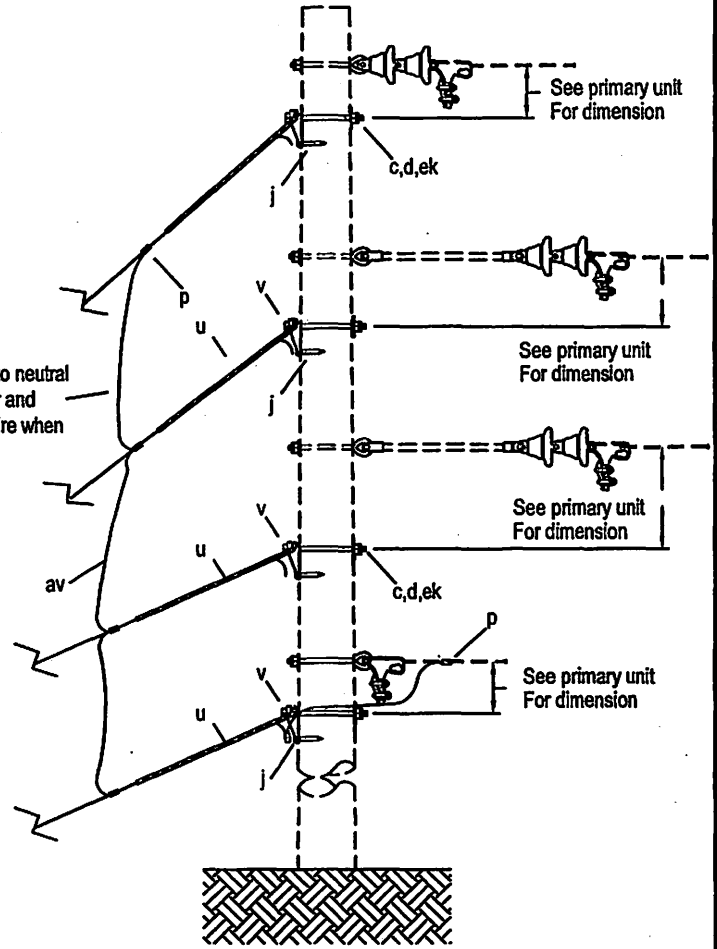
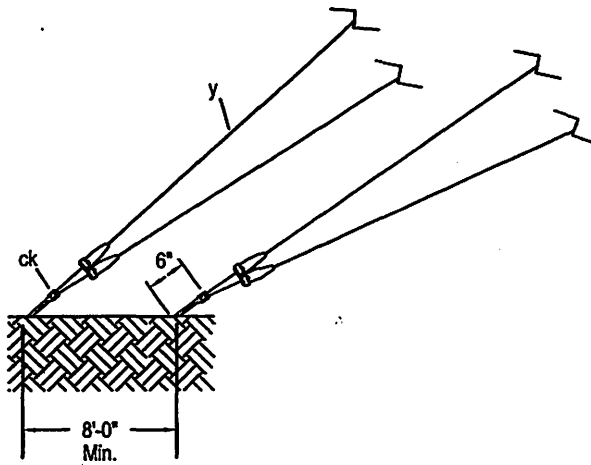
DATE:
5/02

**E7-2, E7-2H, E7-2X
 E7-3, E7-3X**

Notes

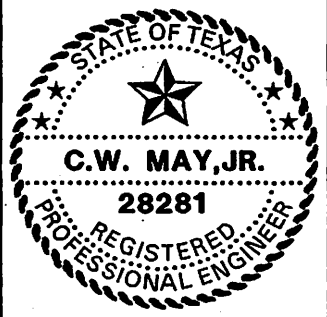
Formed type grips may be used only with suitable attachments as recommended by grip manufacturer.
 Other accepted and equivalent deadend material (item u) may be substituted for the ones shown.
 When two guys are attached to one anchor rod, use F1-3 or larger anchor.
 Spacing between anchors shall be sufficient to provide maximum holding power of each anchor.
 For loose soils, concrete or other pole footings are recommended.
 2" Minimum clear wood clearance of all hardware.
 No bolts to extend more than 2" beyond locknut.
 Jumpers and Connectors as required.
 The seal appearing on this document was authorized by C. W. MAY, JR, P.E. 28281 on 10/2/02.

Connect to neutral conductor and ground wire when present.



ASSEMBLY UNIT

ITEM	MATERIAL	MAXIMUM NESC LOAD				
		E8-2	E8-2H	E8-2X	E8-3	E8-3X
c	Bolt machine, 5.8" x required length	4	4	4	4	4
d	Washer, curved, ribbed, 3", 11/16" hole	4	4	4	4	4
j	Screw, lag, 1/2" x 4"	4	4	4	4	4
p	Connector	as req'd	as req'd	as req'd	as req'd	as req'd
u	Deadend for guy strand	8	8	8	8	8
v	Guy attachment, heavy duty	4	4	4	4	4
y	Guy wire, S.M., 7 strand	as req'd			as req'd	
y	Guy wire, high strength, 7 strand		as req'd			
y	Guy wire, extra high strength, 7 strand			as req'd		
av	Jumper, #4 stranded aluminum alloy or equivalent	as req'd	as req'd	as req'd	as req'd	as req'd
ck	Clamp, anchor rod bonding	2	2	2	2	2
ek	Locknut, 5/8"	4	4	4	4	4



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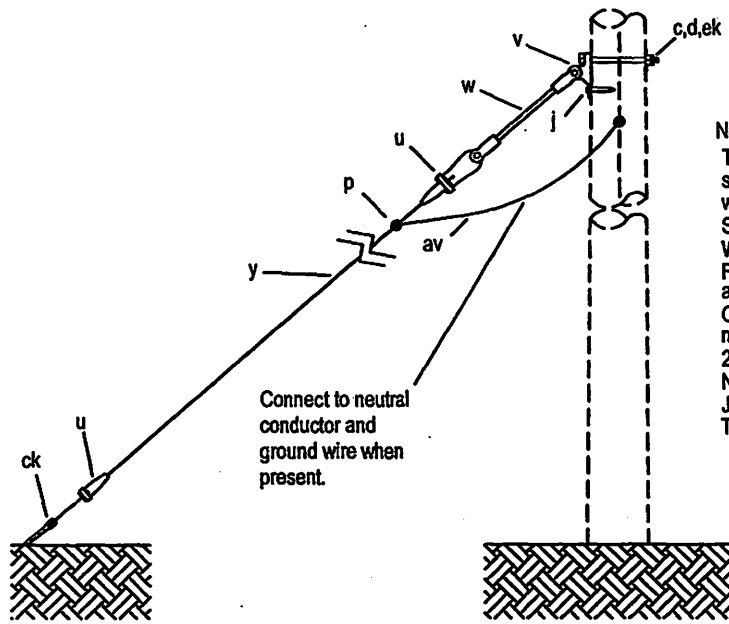
LOWER COLORADO RIVER AUTHORITY
 DISTRIBUTION LINE DESIGN
 AUSTIN, TEXAS

DRAWN: J. Brooks
 CHECKED: _____
 APPROVED: M. Lee

FOUR DOWN GUYS
 THROUGH BOLT TYPE

DATE: 5/02

E8-2, E8-2H, E8-2X
 E8-3, E8-3X

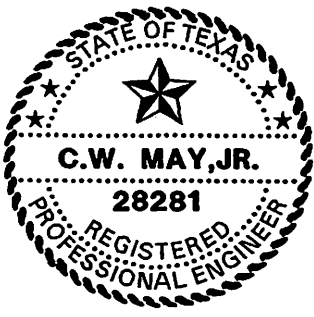


Notes
 This guy with strain insulator is to be used where the minimum separation between guy attachment hardware and hardware associated with energized parts are less than the values in the table below. Specify one E9- unit for each guy used on a multiple guy structure. When multiple wires are used interconnect guy wires near upper end. Formed type grips may be used only with suitable attachments, as recommended by grip manufacturer. Other accepted and equivalent dead-end material (item u) may be substituted for the ones shown. 2" Minimum clear wood clearance of all hardware. No bolts to extend more than 2" beyond locknut. Jumpers and Connectors as required. The seal appearing on this document was authorized by C. W. MAY, JR, P.E. 28281 on 10/2/02.

Voltage	Min. Separation
12.5 kV	7"
24.9 kV	10-5/8"

(All voltages are phase to phase)

ITEM	MATERIAL	MAXIMUM NESC LOAD	ASSEMBLY UNIT		
			E9-2	E9-2H	E9-2X
		6,255#	9,720#	13,860#	
		3/8" Wire	3/8" Wire	3/8" Wire	
c	Bolt machine, 5/8" x required length	1	1		
c	Bolt, machine, 3/4" x required length			1	
d	Washer, square, curved, ribbed, 3", 11/16" hole	1	1		
d	Washer, square, curved, ribbed, 3", 11/16" hole	1	1		
j	Screw, lag, 1/2" x 4"	2	2	2	
p	Connector	as req'd	as req'd	as req'd	
u	Deadend for guy strand	2	2	2	
v	Guy attachment, pole-eye plate	2	2	2	
v	Guy attachment, pole-eye plate, extra heavy duty			1	
w	Insulator, guy strain, 42", 15,000#	1	1	1	
y	Guy wire, S.M., 7 strand	as req'd			
y	Guy wire, high strength, 7 strand		as req'd		
y	Guy wire, extra high strength, 7 strand			as req'd	
av	Jumper, #6 S.D. copper or equivalent	as req'd	as req'd	as req'd	
ck	Clamp, anchor rod bonding	1	1	1	
ek	Locknut, 5/8"	1	1	1	



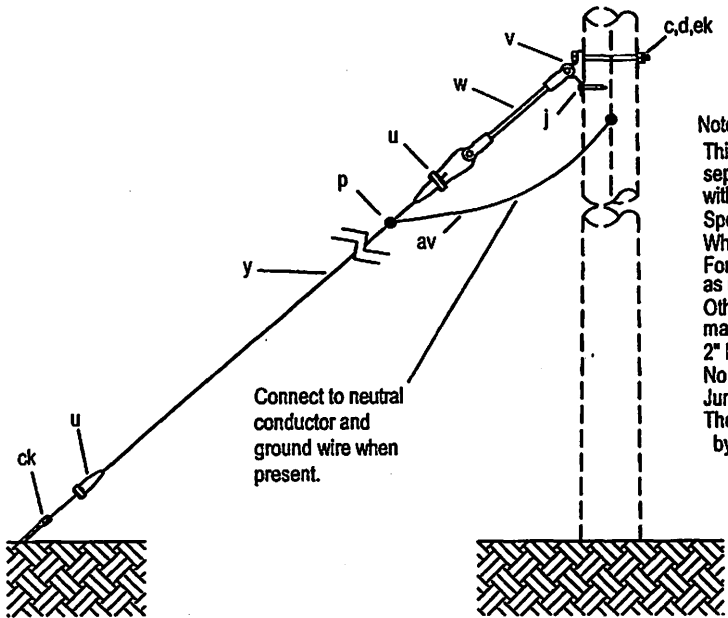
LOWER COLORADO RIVER AUTHORITY
 DISTRIBUTION LINE DESIGN
 AUSTIN, TEXAS

DRAWN: J. Brooks
 CHECKED: _____
 APPROVED: M. Lee

SINGLE DOWN GUY
 NARROW PROFILE

DATE:
 5/02

E9-2, E9-2H, E9-2X



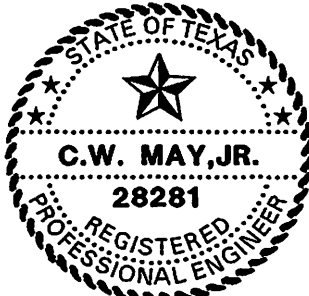
Connect to neutral conductor and ground wire when present.

Notes
 This guy with strain insulator is to be used where the minimum separation between guy attachment hardware and hardware associated with energized parts are less than the values in the table below. Specify one E9- unit for each guy used on a multiple guy structure. When multiple wires are used interconnect guy wires near upper end. Formed type grips may be used only with suitable attachments, as recommended by grip manufacturer. Other accepted and equivalent dead-end material (item u) may be substituted for the ones shown. 2" Minimum clear wood clearance of all hardware. No bolts to extend more than 2" beyond locknut. Jumpers and Connectors as required. The seal appearing on this document was authorized by C. W. MAY, JR, P.E. 28281 on 10/2/02.

Voltage	Min. Separation
12.5 kV	7"
24.9 kV	10-5/8"

(All voltages are phase to phase)

ITEM	MATERIAL	ASSEMBLY UNIT	
		MAXIMUM NESC LOAD	
		E9-3X 18,720# 7/16" Wire	E9-4X 24,210# 1/2" Wire
c	Bolt machine, 3/4" x required length	1	
c	Bolt, machine, 7/8" x required length		1
d	Washer, square, curved, ribbed, 4", 15/16" hole	1	1
j	Screw, lag, 1/2" x 4"	1	1
p	Connector	as req'd	as req'd
u	Deadend for guy strand	2	2
v	Guy attachment, pole eye plate, extra heavy duty	1	1
w	Insulator, guy strain, 42", 21,000#	1	1
y	Guy wire, extra high strength, 7 strand	as req'd	as req'd
av	Jumper, #6 S.D. copper or equivalent	as req'd	as req'd
ck	Clamp, anchor rod bonding	1	1
ek	Locknut, 3/4"	1	
ek	Locknut, 7/8"		1



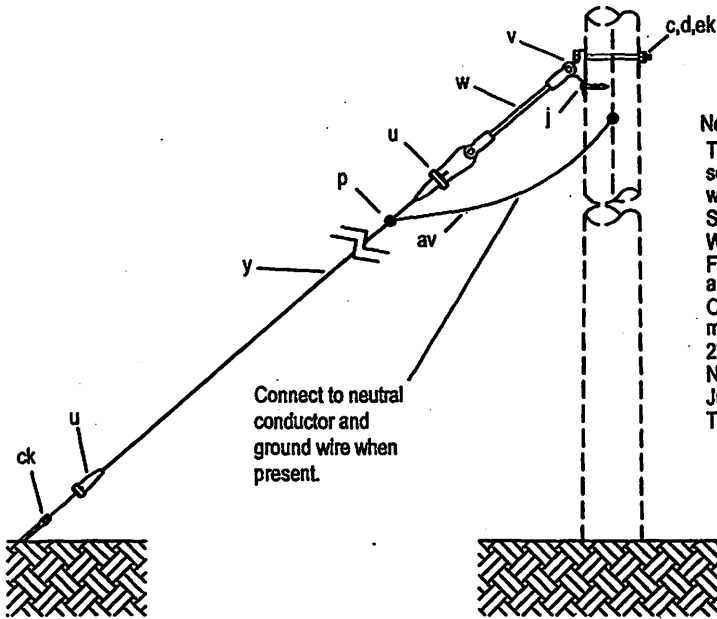
LOWER COLORADO RIVER AUTHORITY
 DISTRIBUTION LINE DESIGN
 AUSTIN, TEXAS

DRAWN: J. Brooks
 CHECKED: _____
 APPROVED: M. Lee

SINGLE DOWN GUY
 NARROW PROFILE

DATE:
 5/02

E9-3X, E9-4X



Connect to neutral conductor and ground wire when present.

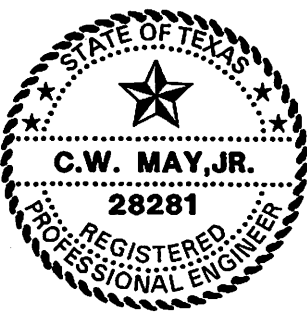
Notes

This guy with strain insulator is to be used where the minimum separation between guy attachment hardware and hardware associated with energized parts are less than the values in the table below. Specify one E10- unit for each guy used on a multiple guy structure. When multiple wires are used interconnect guy wires near upper end. Formed type grips may be used only with suitable attachments, as recommended by grip manufacturer. Other accepted and equivalent dead-end material (item u) may be substituted for the ones shown. 2" Minimum clear wood clearance of all hardware. No bolts to extend more than 2" beyond locknut. Jumpers and Connectors as required. The seal appearing on this document was authorized by C. W. MAY, JR, P.E. 28281 on 10/2/02.

Voltage	Min. Separation
12.5 kV	7"
24.9 kV	10-5/8"

(All voltages are phase to phase)

ITEM	MATERIAL	ASSEMBLY UNIT	
		E10-2	E10-2H
	MAXIMUM NESC LOAD	6,225#	9,720#
		3/8" Wire	3/8" Wire
c	Bolt machine, 5/8" x required length	1	1
d	Washer, square, curved, ribbed, 3", 11/16" hole	1	1
j	Screw, lag, 1/2" x 4"	2	2
p	Connector	as req'd	as req'd
u	Deadend for guy strand	2	2
v	Guy attachment, pole eye plate	1	1
w	Insulator, guy strain, 42", 15,000#	1	1
y	Guy wire, S.M., 7 strand	as req'd	
y	Guy wire, high strength, 7 strand		as req'd
av	Jumper, #6 S.D. copper or equivalent	as req'd	as req'd
ck	Clamp, anchor rod bonding	1	1
ek	Locknut, 5/8"	1	1



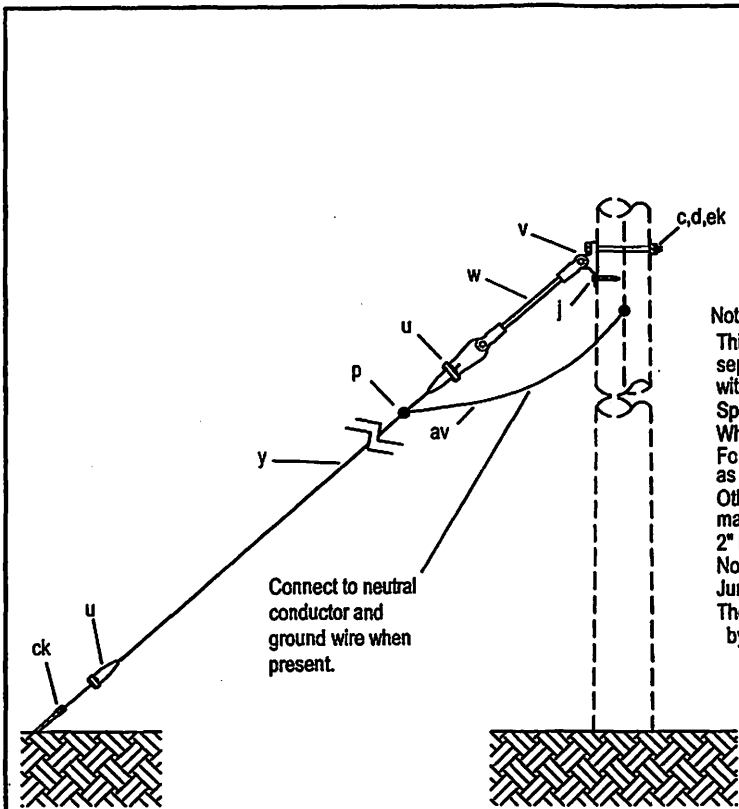
LOWER COLORADO RIVER AUTHORITY
DISTRIBUTION LINE DESIGN
AUSTIN, TEXAS

DRAWN: J. Brooks
CHECKED: _____
APPROVED: M. Lee

SINGLE DOWN GUY
NARROW PROFILE

DATE:
5/02

E10-2, E10-2H

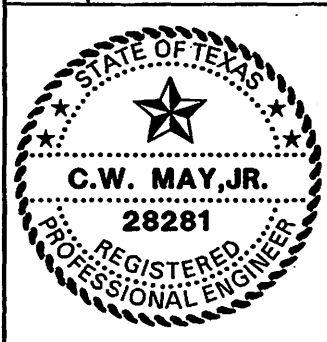


Notes
 This guy with strain insulator is to be used where the minimum separation between guy attachment hardware and hardware associated with energized parts are less than the values in the table below. Specify one E10- unit for each guy used on a multiple guy structure. When multiple wires are used interconnect guy wires near upper end. Formed type grips may be used only with suitable attachments, as recommended by grip manufacturer. Other accepted and equivalent dead-end material (item u) may be substituted for the ones shown. 2" Minimum clear wood clearance of all hardware. No bolts to extend more than 2" beyond locknut. Jumpers and Connectors as required. The seal appearing on this document was authorized by C. W. MAY, JR, P.E. 28281 on 10/2/02.

Voltage	Min. Separation
12.5 kV	7"
24.9 kV	10-5/8"

(All voltages are phase to phase)

ITEM	MATERIAL	ASSEMBLY UNIT		
		MAXIMUM NESC LOAD		
		E10-2X 13,860# 3/8" Wire	E10-3X 18,720# 7/16" Wire	E10-4X 24,210# 1/2" Wire
c	Bolt machine, 3/4" x required length	1	1	
c	Bolt machine, 7/8" x required length			1
d	Washer, square, curved, ribbed, 4", 15/16" hole	1	1	1
i	Screw, lag, 1/2" x 4"	2	2	2
p	Connector	as req'd	as req'd	as req'd
u	Deadend, for guy strand	2	2	2
v	Guy attachment, pole eye plate, extra heavy duty	1	1	1
w	Insulator, guy strain, 42", 15,000#	1	1	
w	Insulator, guy strain, 42", 21,000#			1
y	Guy wire, extra high strength, 7 strand	as req'd	as req'd	as req'd
av	Jumper, #6 S.D. copper or equivalent	as req'd	as req'd	as req'd
ck	Clamp, anchor rod bonding	1	1	1
ek	Locknut, 3/4"	1	1	
ek	Locknut, 7/8"			1



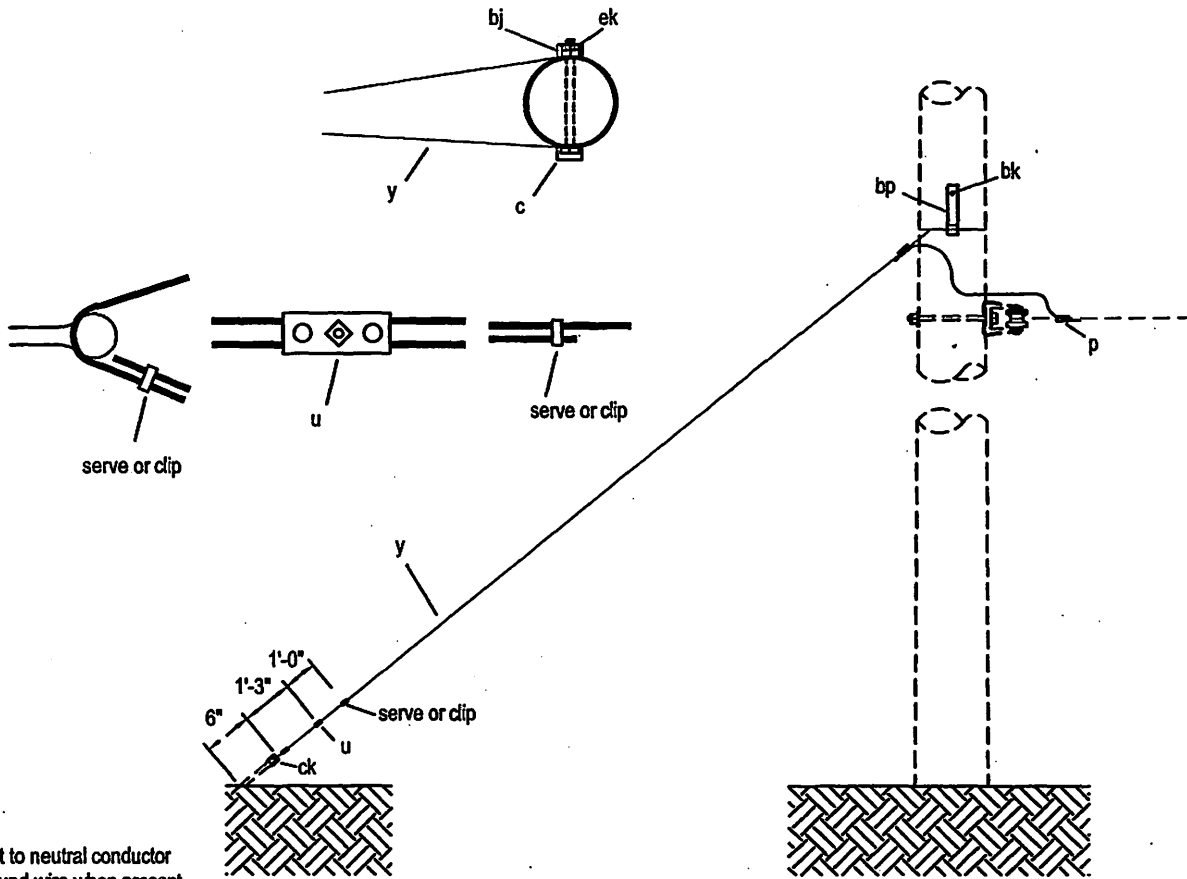
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 DISTRIBUTION LINE DESIGN
 AUSTIN, TEXAS

DRAWN: J. Bracke
 CHECKED: _____
 APPROVED: M. Lee

SINGLE DOWN GUY
 NARROW PROFILE

DATE: 5/02

E10-2X, E10-3X
 E10-4X



Note:

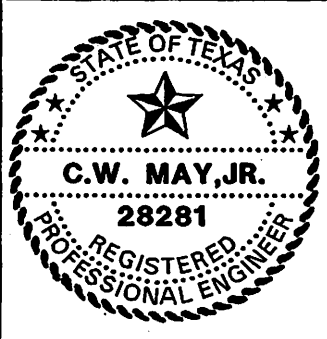
Connect to neutral conductor and ground wire when present.
 2" Minimum clear wood clearance of all hardware.
 No bolts to extend more than 2" beyond locknut.
 Jumpers and Connectors as required.

The seal appearing on this document was authorized by C. W. MAY, JR, P.E. 28281 on 10/2/02.

MAXIMUM NESC LOAD

ASSEMBLY UNIT

ITEM	MATERIAL	ASSEMBLY UNIT	
		E11	E12
		2,835#	6,255#
		1/4" Wire	1/4" Wire
c	Bolt, 5/8" x required length	1	1
p	Connectors	as req'd	as req'd
u	Clamp, guy	1-light duty	1-heavy duty
y	Guy wire, S.M., 7 strand	as req'd	as req'd
ck	Clamp, anchor rod bonding	1	1
bj	Guy hook, J	2	2
bk	Guy plate, 4' x 8", 14 gauge	2	2
bp	Nail, 8 penny, galvanized	8	8
av	Jumper, #6 S.D. copper or equivalent	as req'd	as req'd
ek	Locknut, 5/8"	1	1



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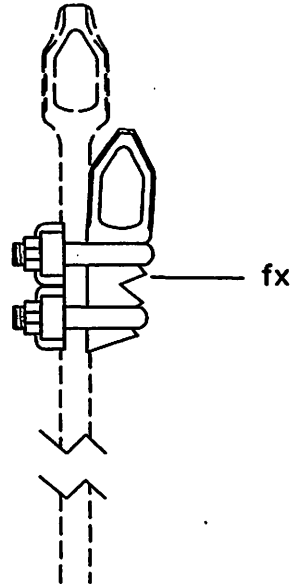
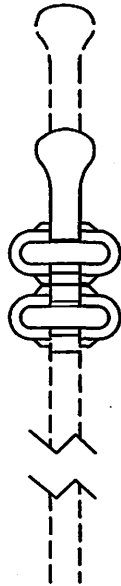
LOWER COLORADO RIVER AUTHORITY
 DISTRIBUTION LINE DESIGN
 AUSTIN, TEXAS

DRAWN: J. Crooks
 CHECKED: _____
 APPROVED: M. Lee

7.2/12.5 K.V.
 SINGLE LOOP GUY, WRAPPED TYPE

DATE: _____
 5/02

E11, E12

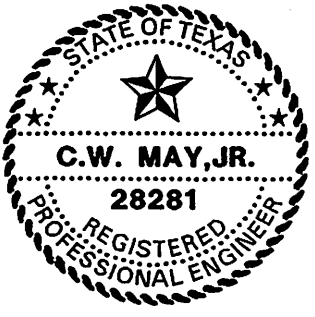


FX

NOTE:

Install auxiliary eye on existing rod to accommodate an added guy.
 The seal appearing on this document was authorized
 by C. W. MAY, JR, P.E. 28281 on 10/2/02.

ITEM	NO.	MATERIAL	ITEM	NO.	MATERIAL
fx	1	Auxiliary eye			



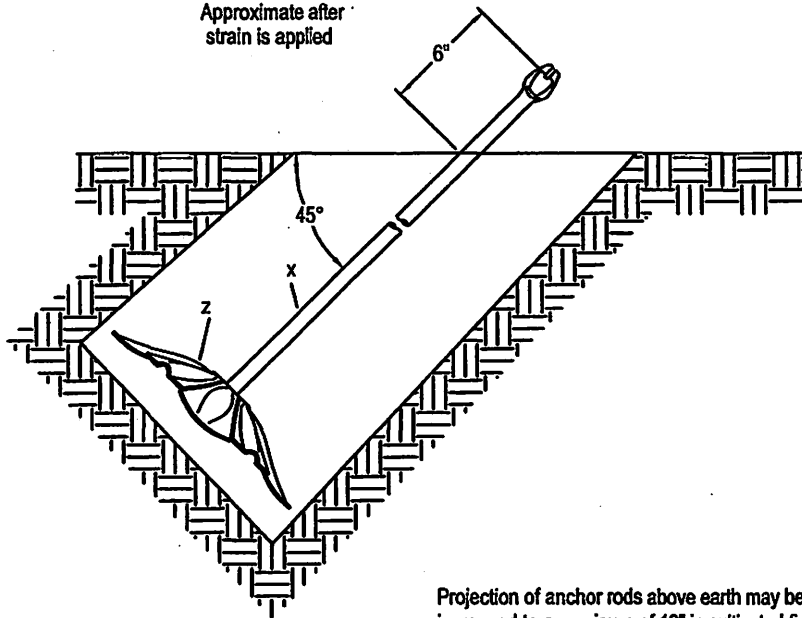
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LOWER COLORADO RIVER AUTHORITY
 DISTRIBUTION LINE DESIGN
 AUSTIN, TEXAS

DRAWN: J. Brooks
 CHECKED: _____
 APPROVED: M. Lee

MISCELLANEOUS ANCHOR UNIT	
DATE: 5/02	FX

Approximate after strain is applied



Projection of anchor rods above earth may be increased to a maximum of 12" in cultivated fields or other locations where necessary to prevent burying of the rod eye.

NOTES:

- 1) Use proper auger size.
- 2) Dig hole in line with strain.
- 3) Install to proper depth.
- 4) Expand anchor fully.
- 5) Tamp well. (pneumatic tamp preferable)
- 6) Designate X suffix for 10' rod.
- 7) Designate S suffix for screw type anchors.

The seal appearing on this document was authorized by C. W. MAY, JR, P.E. 28281 on 10/2/02.

ASSEMBLY UNIT

ITEM	MATERIAL	ASSEMBLY UNIT				
		F1-2	F1-3	F1-4	F1-5	
	Auger size	8"	8"	10"	12"	
x	Rod, anchor, thimble eye	5/8" x 7' - 0"				
x	Rod, anchor, twin eye	3/4" x 8' - 0"	3/4" x 8' - 0"	1" x 8' - 0"		
z	Anchor, expanding, 8 way	135 sq. in.	135 sq. in.	200 sq. in.	300 sq. in.	



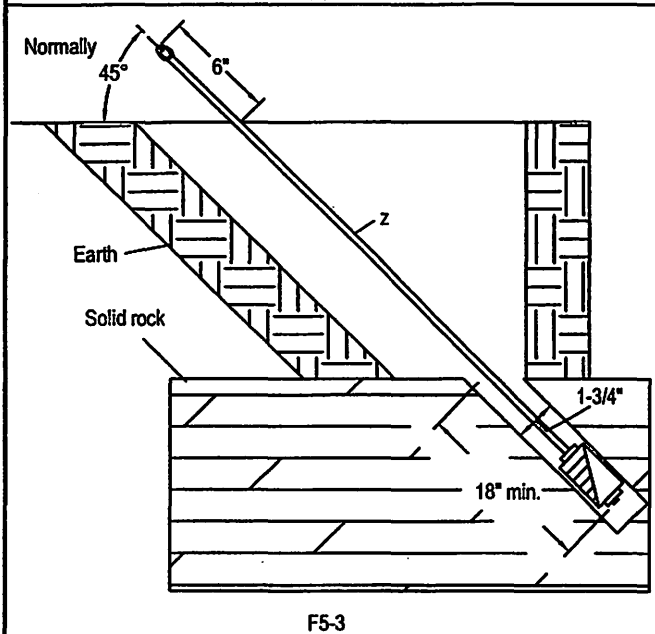
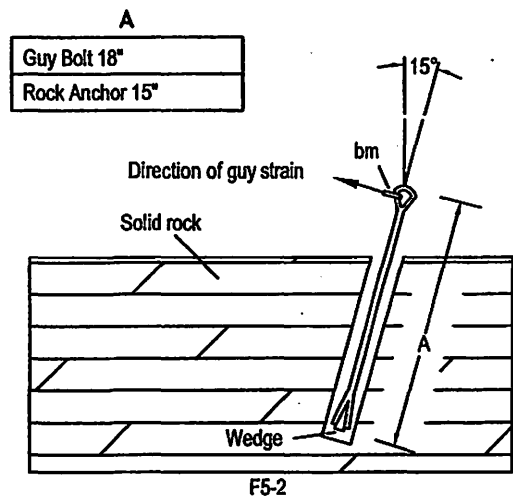
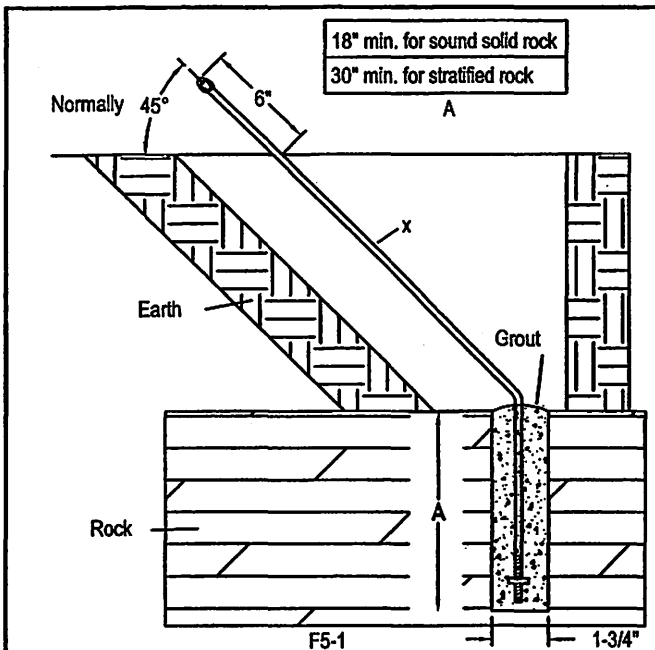
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 DISTRIBUTION LINE DESIGN
 AUSTIN, TEXAS

DRAWN: J. Brooks
 CHECKED: _____
 APPROVED: M. Lee

EXPANDING ANCHOR ASSEMBLY

DATE: 5/02

F1-2 TO F1-5

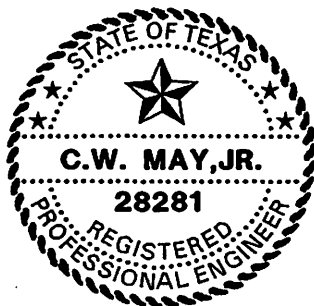


NOTES:

- 1) Only one guy shall be attached to a rock anchor. Where more than one anchor is required, space anchors a minimum of 2 ft. apart and where practical they shall be in direct line with pole.
 - 2) Do not anchor to any boulder measuring less than 5 ft. in two directions at right angles to each other.
- The seal appearing on this document was authorized by C. W. MAY, JR, P.E. 28281 on 10/2/02.

ASSEMBLY UNIT

ITEM	MATERIAL	ASSEMBLY UNIT		
		F5-1	F5-2	F5-3
x	Rod, anchor or thimble eye	1		
z	Anchor, rock		1	1
bm	Thimble, guy		1	



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AUSTIN, TEXAS

DRAWN: J. Brooks
CHECKED: _____
APPROVED: M. Lee

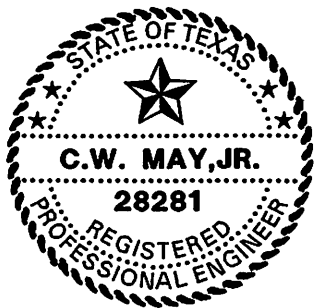
ROCK ANCHOR ASSEMBLY

DATE:
05/02

F5-1 TO F5-3

G ___ Install transformer only, reconnect all equipment and wiring.

The seal appearing on this document was authorized
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LOWER COLORADO RIVER AUTHORITY
DISTRIBUTION LINE DESIGN
AUSTIN, TEXAS

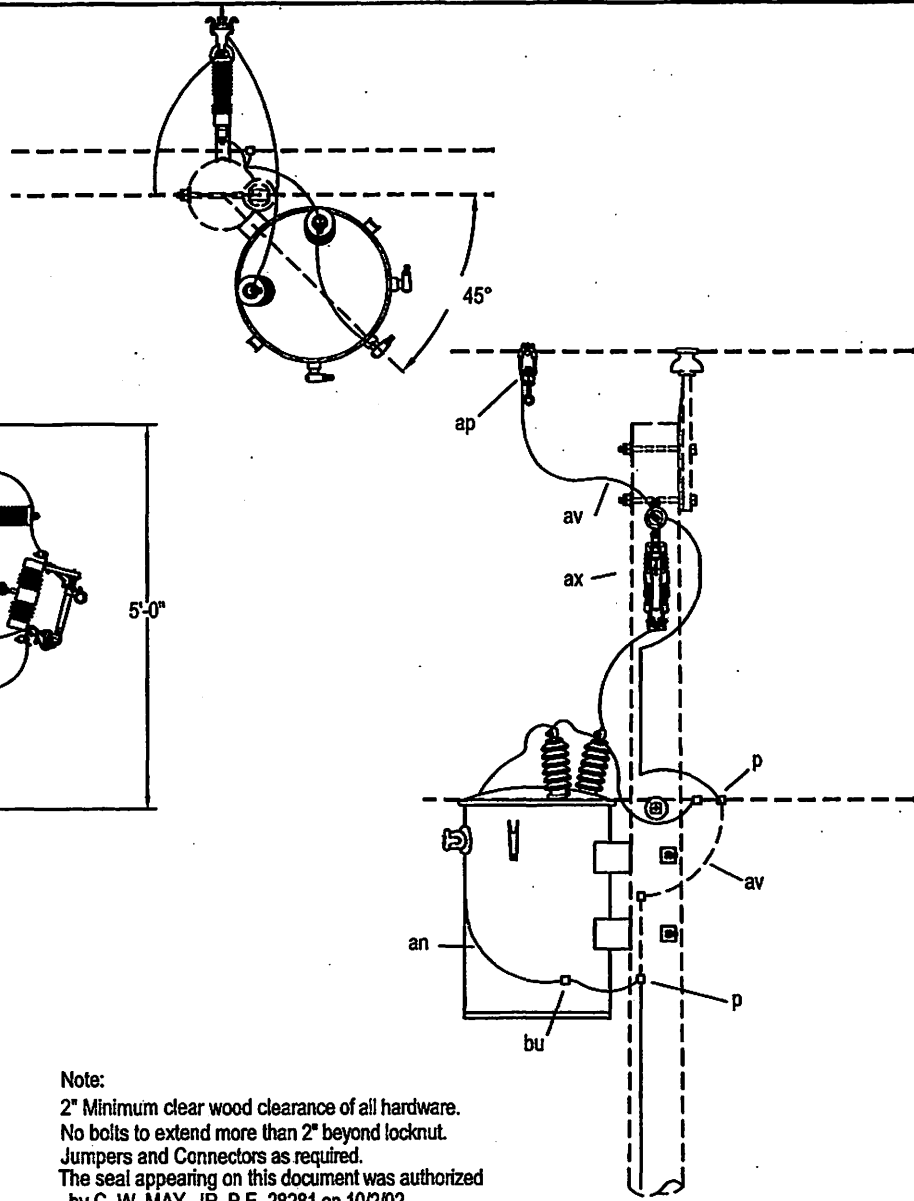
DRAWN: J. Brooks
CHECKED: _____
APPROVED: M. Lee

MISC. TRANSFORMER UNITS

DATE:

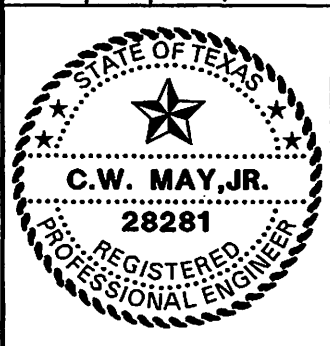
5/02

G _____



Note:
 2" Minimum clear wood clearance of all hardware.
 No bolts to extend more than 2" beyond locknut.
 Jumpers and Connectors as required.
 The seal appearing on this document was authorized
 by C. W. MAY, JR, P.E. 28281 on 10/2/02.

ITEM	NO.	MATERIAL	ITEM	NO.	MATERIAL
c	3	Bolt, machine, 5/8" x required length			
d	3	Washer, square, 2-1/4" x 3/16", 11/16" hole			
j	1	Screw, lag, 1/2" x 4"			
an	1	Transformer			
ap	1	Clamp, hotline, with stirrup			
av		Jumper, as required			
ax	1	Combination, cutout and arrester			
bu	1	Connector, transformer ground			
ek	3	Locknut, 5/8"			
fn	1	Bracket, cutout and arrester			



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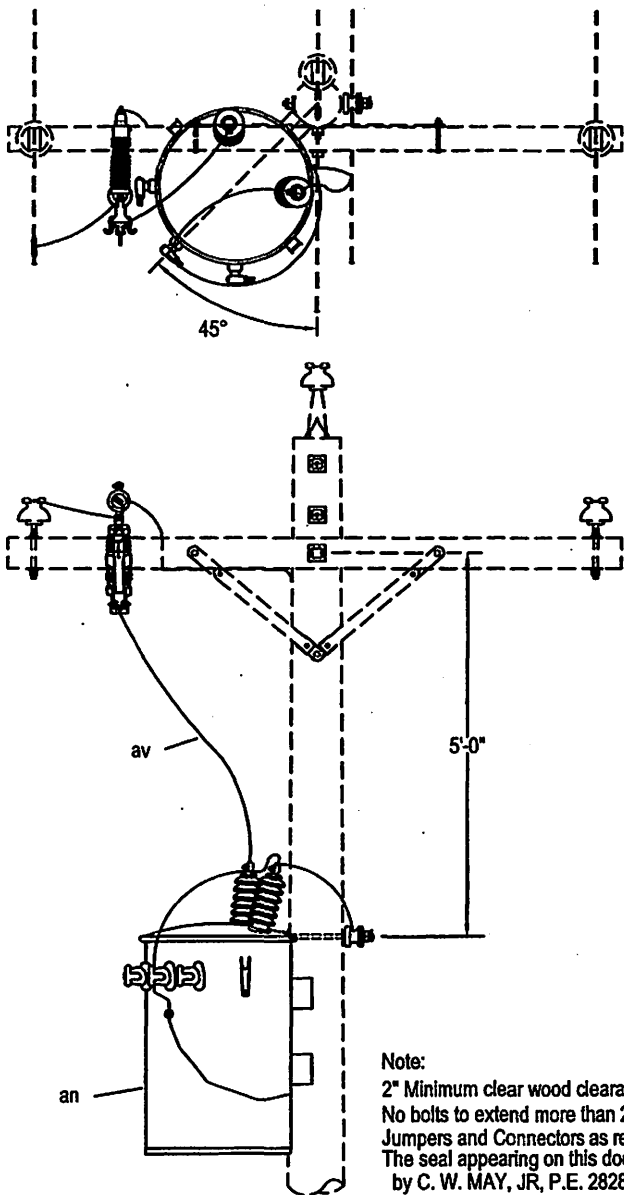
LOWER COLORADO RIVER AUTHORITY
 DISTRIBUTION LINE DESIGN
 AUSTIN, TEXAS

DRAWN: J. Brooks
 CHECKED: _____
 APPROVED: M. Lee

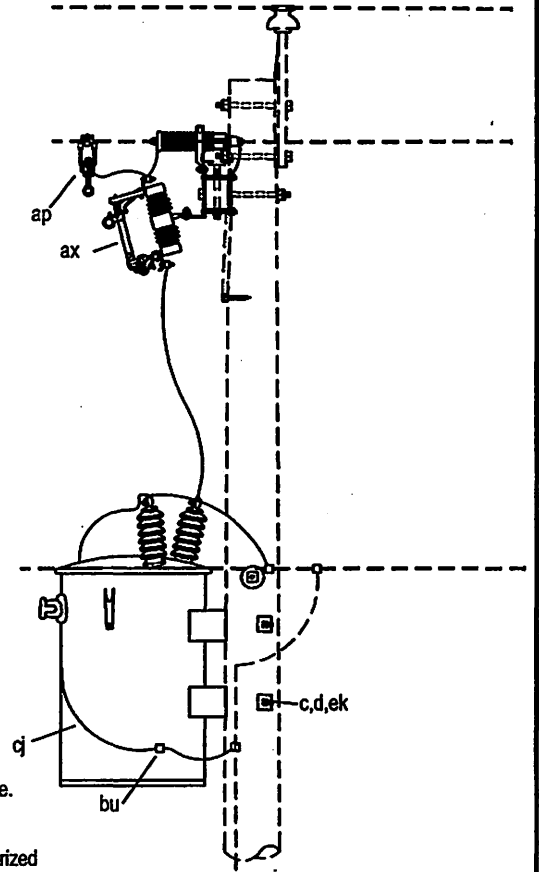
7.2/12.5 KV
 SINGLE PHASE TRANSFORMER
 POLE MOUNTED CUTOUT AND ARRESTER

DATE: 5/02

G35X-__



NOTE:
Reverse for connection to
other outside phase.



Note:
2" Minimum clear wood clearance of all hardware.
No bolts to extend more than 2" beyond locknut.
Jumpers and Connectors as required.
The seal appearing on this document was authorized
by C. W. MAY, JR, P.E. 28281 on 10/2/02.

ITEM	NO.	MATERIAL	ITEM	NO.	MATERIAL
an	1	Transformer			
ap	1	Clamp, hotline / stirrup			
av		Jumper, as required			
ax	1	Cutout and arrester combination			
c	2	Bolt, machine, 5/8" x required length			
d	2	Washer, square, 2-1/4" x 3/16", 11/16" hole			
ek	2	Locknut, 5/8"			
p		Connector, as required			
cj		Ground wire, #6 S.D. Cu, as required			
bu	1	Connector, transformer ground			



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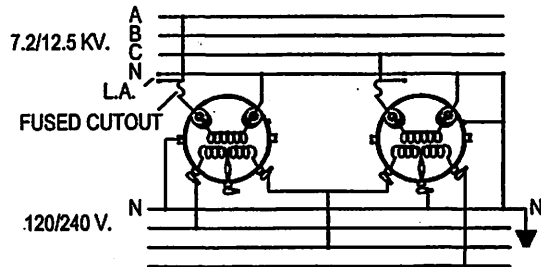
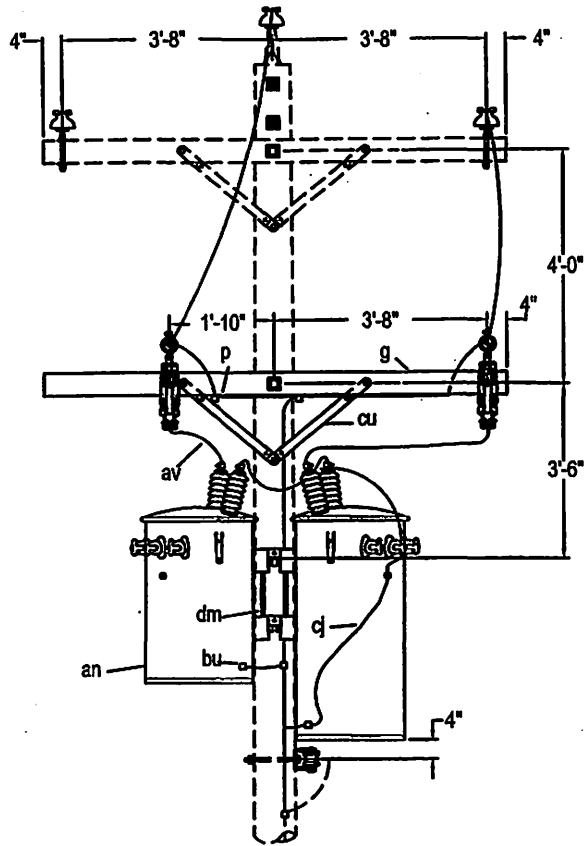
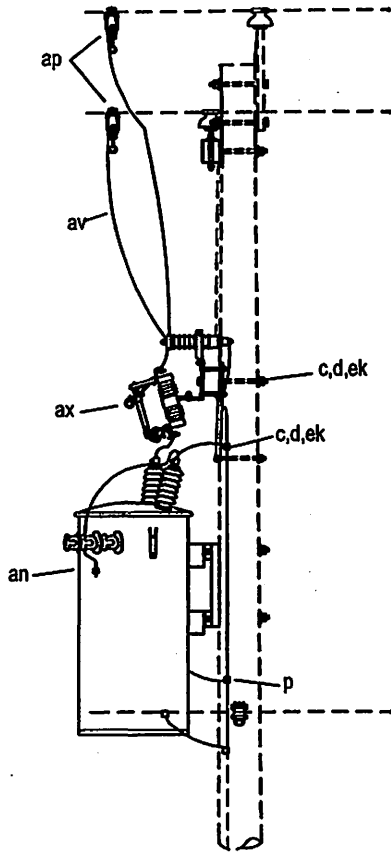
LOWER COLORADO RIVER AUTHORITY
DISTRIBUTION LINE DESIGN
AUSTIN, TEXAS

DRAWN: J. Brooks
CHECKED: _____
APPROVED: M. Lee

7.2/12.5 KV
SINGLE PHASE TRANSFORMER
CROSSARM MOUNTED
CUTOUT AND ARRESTER

DATE: 5/02

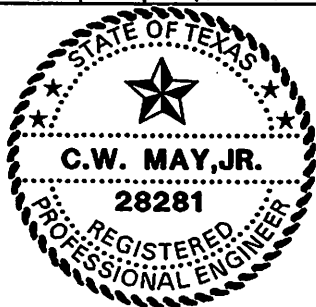
G36X - _ _ _



WIRING DIAGRAM

Note:
 For transformers over 25 KVA, use cluster mount.
 2" Minimum clear wood clearance of all hardware.
 No bolts to extend more than 2" beyond locknut.
 Jumpers and Connectors as required.
 The seal appearing on this document was authorized
 by C. W. MAY, JR, P.E. 28281 on 10/2/02.

ITEM	NO.	MATERIAL	ITEM	NO.	MATERIAL
c	1	Bolt, machine, 1/2" x required length	av		Jumper, as required
c	3	Bolt, machine, 5/8" x required length	ax	2	Cutout and arrester combination
d	1	Washer, round, 1-3/8", 9/16" hole	bu	2	Connector, transformer ground
d	4	Washer, square, 2-1/4" x 3/16", 11/16" hole	cj		Wire, ground, #6 S.D. copper, as required
g	1	Crossarm, 3-3/4" x 4-3/4" x 8'-0"	cu	1pr.	Brace, wood, 28"
i	2	Bolt, carriage, 3/8" x 4-1/2"	dm	1	Bracket, transformer
p		Connector, as required	ek	1	Locknut, 1/2"
an	2	Transformer, conventional	ek	3	Locknut, 5/8"
ap	2	Clamp, hotline, with stirrup			



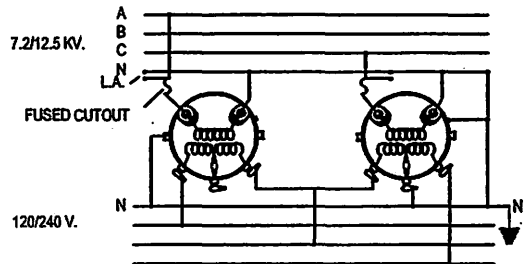
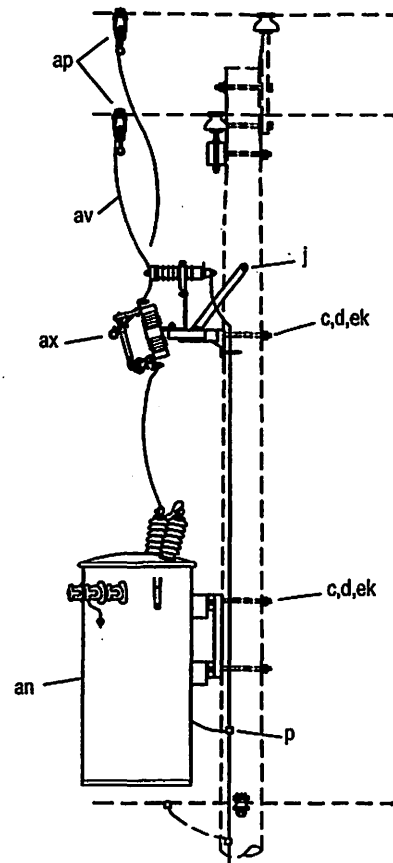
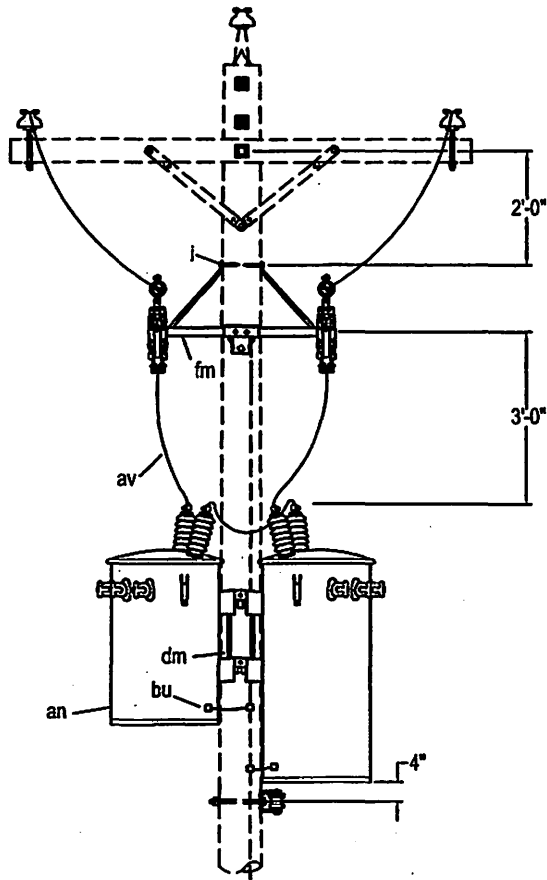
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 ENERGY • WATER • COMMUNITY SERVICES
 LOWER COLORADO RIVER AUTHORITY
 DISTRIBUTION LINE DESIGN
 AUSTIN, TEXAS

DRAWN: S. Brooks
 CHECKED: _____
 APPROVED: M. Lee

7.2/12.5 KV. TWO TRANSFORMER CLUSTER
 MOUNTED OPEN WYE FOR 120/240
 VOLT POWER LOADS

DATE:
 5/02

G210

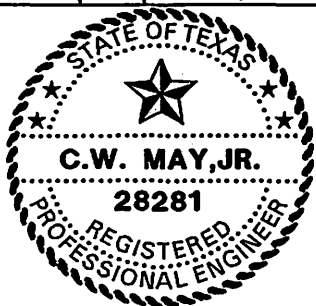


WIRING DIAGRAM

Note:

For transformers over 25 KVA, use cluster mount.
 2" Minimum clear wood clearance of all hardware.
 No bolts to extend more than 2" beyond locknut.
 Jumpers and Connectors as required.
 The seal appearing on this document was authorized
 by C. W. MAY, JR, P.E. 28281 on 10/2/02.

ITEM NO.	MATERIAL	ITEM NO.	MATERIAL
c	3 Bolt, machine, 5/8" x required length	cj	Wire, ground, #6 S.D. copper, as required
d	3 Washer, square, 2-1/4" x 3/16", 11/16" hole	dm	1 Bracket, transformer
j	3 Screw, lag, 1/2" x 4"	ek	3 Locknut, 5/8"
p	Connector, as required	fm	1 Bracket, for 2 cutout/arrestor combination
an	2 Transformer, conventional		
ap	2 Clamp, hotline, with stirrup		
av	Jumper, as required		
ax	2 Cutout and arrestor combination		
bu	2 Connector, transformer ground		



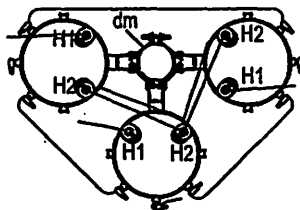
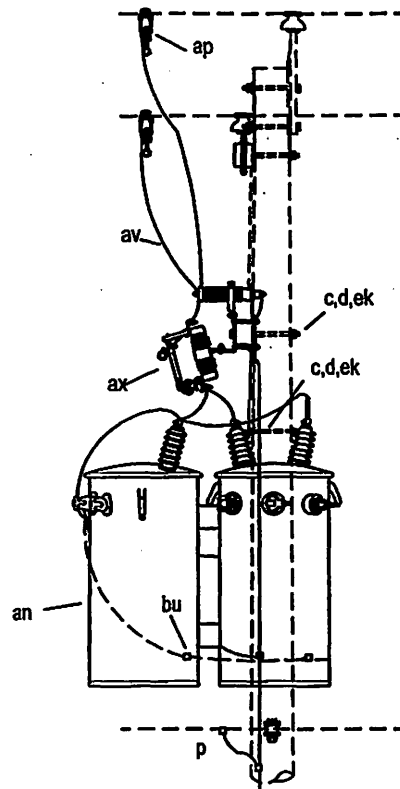
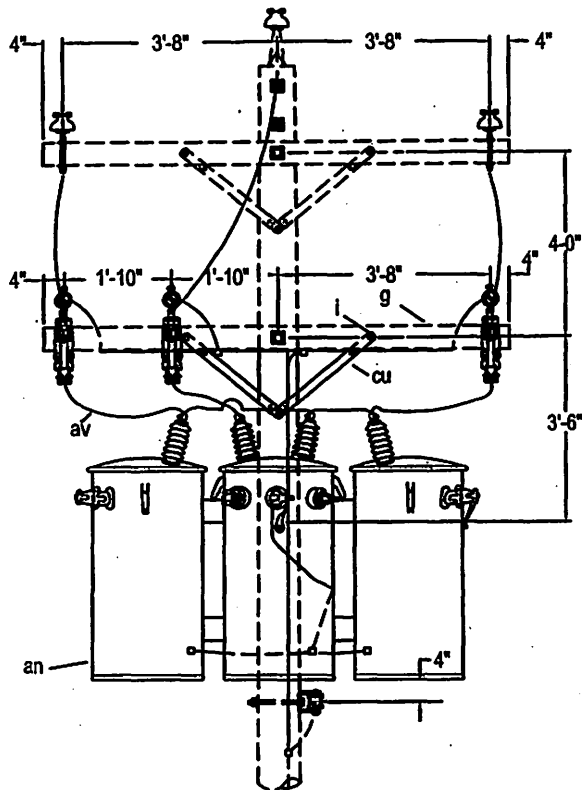
LOWER COLORADO RIVER AUTHORITY
 DISTRIBUTION LINE DESIGN
 AUSTIN, TEXAS

DRAWN: J. Brooks
 CHECKED: _____
 APPROVED: M. Lee

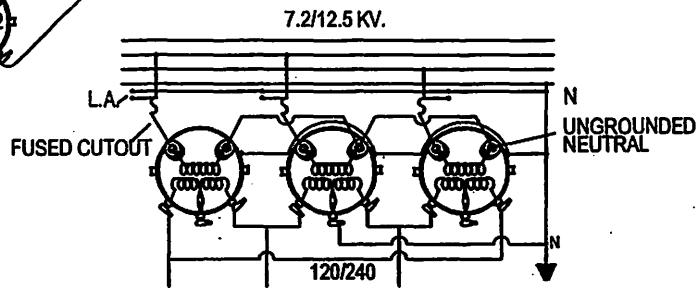
7.2/12.5 KV. TWO TRANSFORMER CLUSTER
 MOUNTED OPEN DELTA FOR 120/240
 VOLT POWER LOADS

DATE:
 5/02

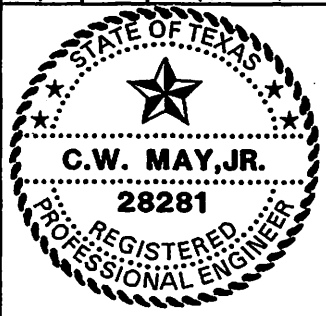
G210X



Note:
 All tanks to be grounded.
 Secondary neutrals of all transformers except one shall be disconnected from tanks and not be grounded.
 When used for combined 1-phase and 3-phase load the transformer for the 1-phase load shall not be larger than twice the capacity of larger than twice the capacity of one of the others.
 2" Minimum clear wood clearance of all hardware.
 No bolts to extend more than 2" beyond locknut.
 Jumpers and Connectors as required.
 The seal appearing on this document was authorized by C. W. MAY, JR, P.E. 28281 on 10/2/02.



ITEM	NO.	MATERIAL	ITEM	NO.	MATERIAL
c	1	Bolt, machine, 1/2" x required length	av		Jumper, as required
c	1	Bolt, machine, 5/8" x required length	ax	3	Cutout and arrestor combination
d	1	Washer, round, 1-3/8", 9/16" hole	bu	3	Connector, transformer ground
d	1	Washer, square, 2-1/4" x 3/16", 11/16" hole	cj		Wire, ground, #6 S.D. copper, as required
g	1	Crossarm, 3-3/4" x 4-3/4" x 8'-0"	cu	1pr.	Brace, wood, 28"
i	2	Bolt, carriage, 3/8" x 4-1/2"	dm	1	Bracket, transformer
p		Connector, as required	ek	1	Locknut, 1/2"
an	3	Transformer, conventional	ek	1	Locknut, 5/8"
ap	3	Clamp, hotline, with stirrup			



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LOWER COLORADO RIVER AUTHORITY
 DISTRIBUTION LINE DESIGN
 AUSTIN, TEXAS

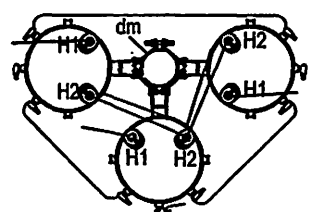
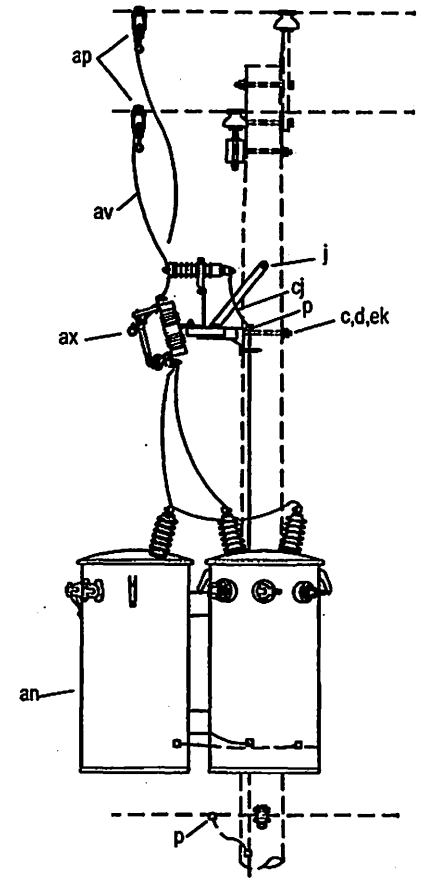
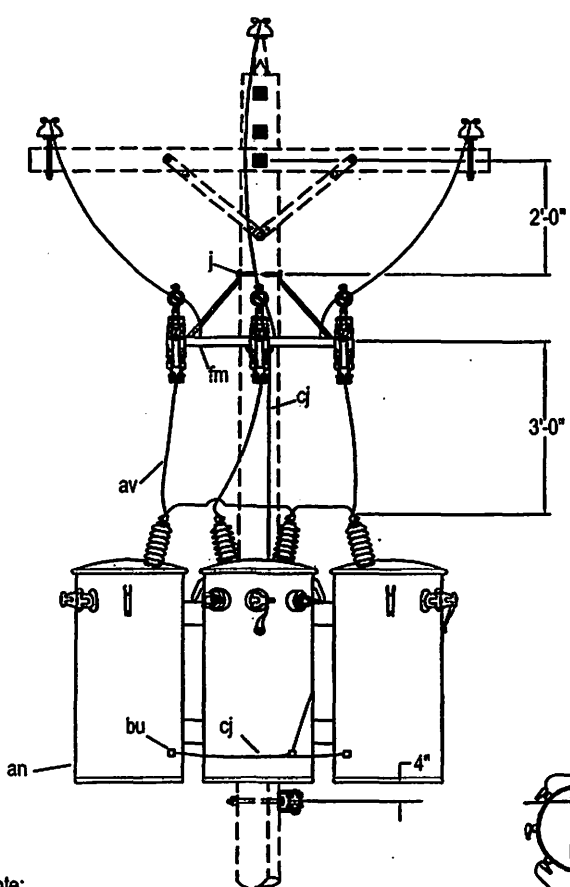
DRAWN: J. Brooks
 CHECKED: _____
 APPROVED: M. Lee

7.2/12.5 KV. THREE TRANSFORMER
 CLUSTER MOUNTED UNGROUNDED WYE
 CENTER TAP GROUNDED DELTA FOR
 120/240 VOLT POWER LOADS

DATE: _____

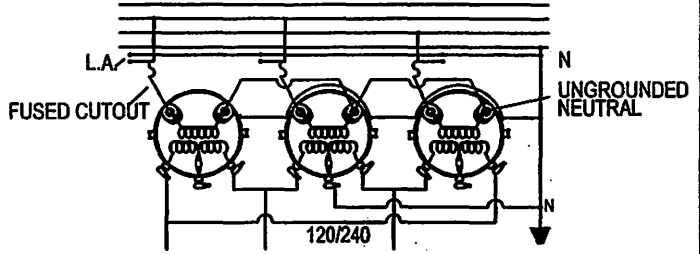
5/02

G310

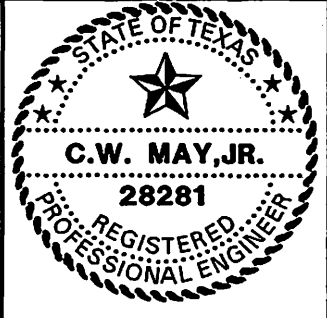


Note:
 All tanks to be grounded.
 Secondary neutrals of all transformers except one shall be disconnected from tanks and not be grounded.
 When used for combined 1-phase and 3-phase load the transformer for the 1-phase load shall not be larger than twice the capacity of larger than twice the capacity of one of the others.
 2" Minimum clear wood clearance of all hardware.
 No bolts to extend more than 2" beyond locknut.
 Jumpers and Connectors as required.
 The seal appearing on this document was authorized by C. W. MAY, JR, P.E. 28281 on 10/2/02.

7.2/12.5 KV.



ITEM	NO.	MATERIAL	ITEM	NO.	MATERIAL
c	1	Bolt, machine, 5/8" x required length	cj		Wire, ground, #6 S.D. copper, as required
d	1	Washer, square, 2-1/4"	dm	1	Bracket, transformer
j	3	Screw, lag, 1/2" x 4"	ek	1	Locknut, 5/8"
p		Connector, as required	fm	1	Bracket, for 3 cutout/arrester combination
an	3	Transformer, conventional			
ap	3	Clamp, hotline, with stirrup			
av		Jumper, as required			
ax	3	Cutout and arrester combination			
bu	3	Connector, transformer ground			



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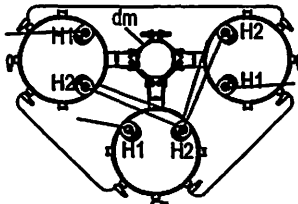
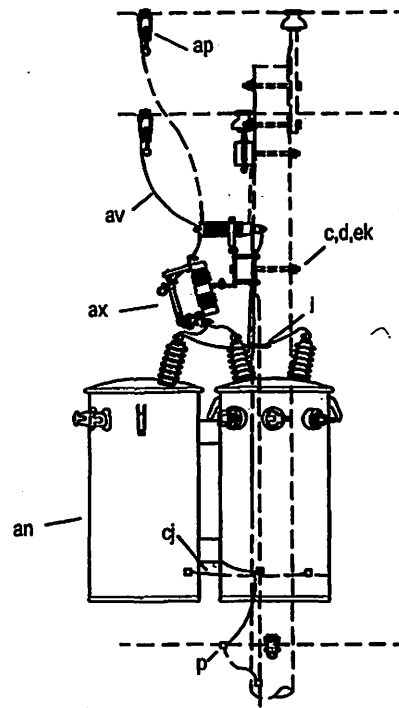
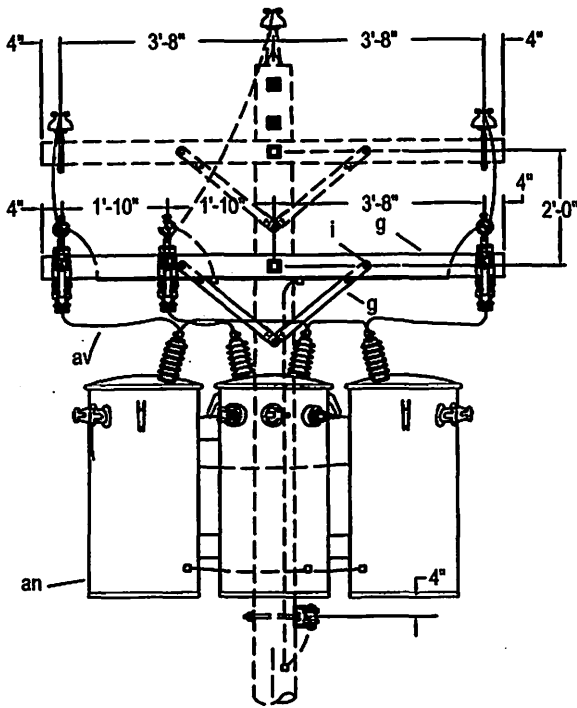
LOWER COLORADO RIVER AUTHORITY
 DISTRIBUTION LINE DESIGN
 AUSTIN, TEXAS

DRAWN: F. Brooks
 CHECKED: _____
 APPROVED: M. Lee

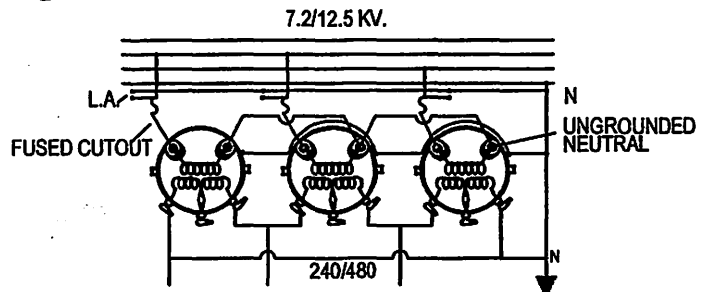
7.2/12.5 KV. THREE TRANSFORMER CLUSTER
 MOUNTED UNGROUNDING WYE CENTER TAP
 GROUNDED DELTA FOR 120/240 VOLT
 POWER LOADS

DATE: _____
 5/02

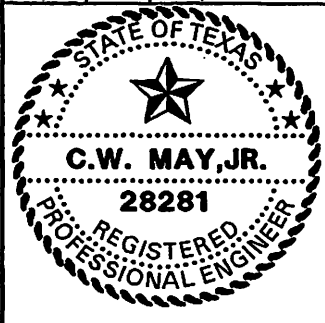
G310X-__



Note:
 All tanks to be grounded.
 Secondary neutrals of all transformers except one shall be disconnected from tanks and not be grounded.
 When used for combined 1-phase and 3-phase load the transformer for the 1-phase load shall not be larger than twice the capacity of larger than twice the capacity of one of the others.
 2" Minimum clear wood clearance of all hardware.
 No bolts to extend more than 2" beyond locknut.
 Jumpers and Connectors as required.
 The seal appearing on this document was authorized by C. W. MAY, JR, P.E. 28281 on 10/2/02.



ITEM	NO.	MATERIAL	ITEM	NO.	MATERIAL
c	3	Bolt, machine, 5/8" x required length	aq		Jumper, as required
d	4	Washer, square, 2-1/4"	ax	3	Cutout and arrestor combination
g	1	Crossarm, 3-3/4" x 4-3/4" x 8'-0"	cu	1pr.	Brace, wood, 28"
i	2	Bolt, carriage, 3/8" x 4-1/2"	dm	1	Bracket, transformer
j	1	Screw, lag, 1/2" x 4"	ek	3	Locknut, 5/8"
p		Connector, as required			
	3	Clamp, stirrup			
an	3	Transformer, conventional			
ap	3	Clamp, hotline			



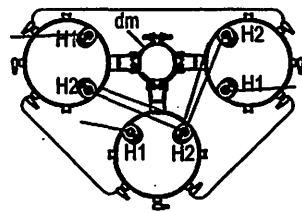
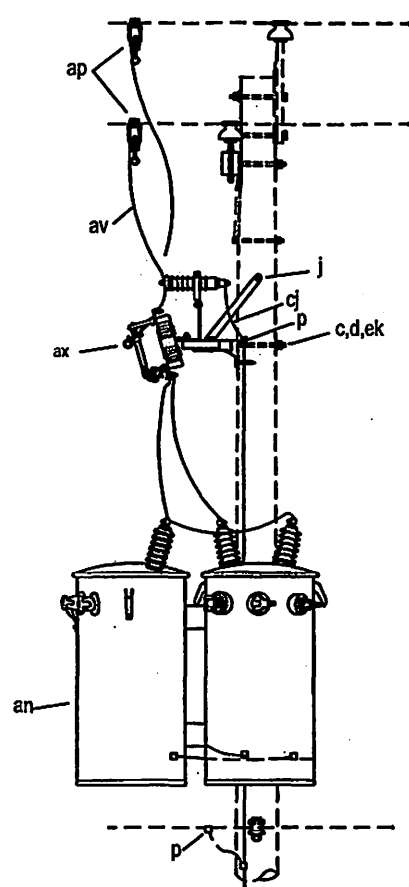
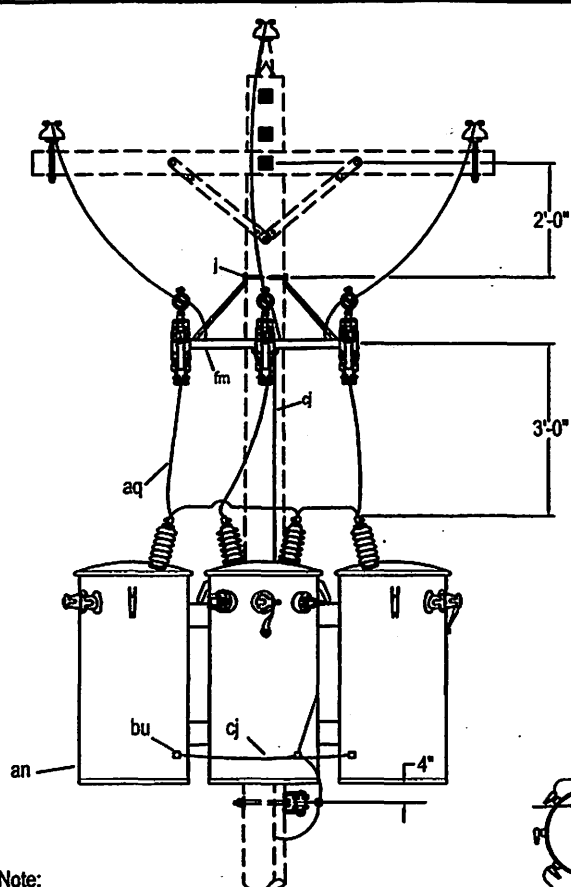
LCRA
 ENERGY • WATER • COMMUNITY SERVICES
 LOWER COLORADO RIVER AUTHORITY
 DISTRIBUTION LINE DESIGN
 AUSTIN, TEXAS

DRAWN: J. Brooks
 CHECKED: _____
 APPROVED: _____

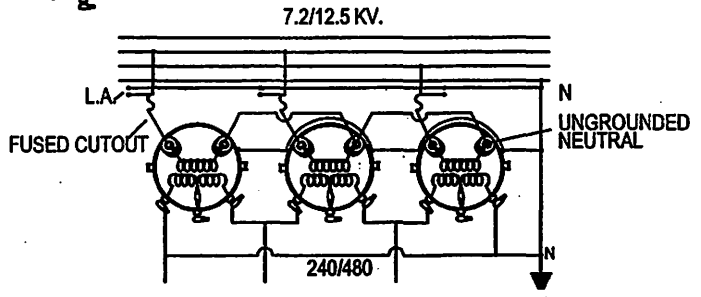
7.2/12.5 KV. THREE TRANSFORMER CLUSTER
 MOUNTED UNGROUNDED WYE-CORNER
 GROUNDED DELTA
 240/480 VOLT POWER LOADS

DATE: _____
 5/02

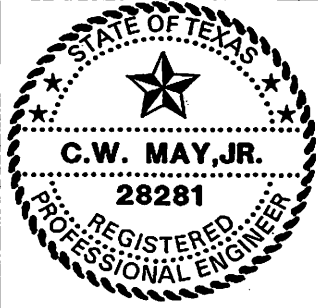
G311



Note:
 All tanks to be grounded.
 Secondary neutrals of all transformers except one shall be disconnected from tanks and not be grounded.
 When used for combined 1-phase and 3-phase load the transformer for the 1-phase load shall not be larger than twice the capacity of larger than twice the capacity of one of the others.
 Ground transformer brackets.
 2" Minimum clear wood clearance of all hardware.
 No bolts to extend more than 2" beyond locknut.
 Jumpers and Connectors as required.
 The seal appearing on this document was authorized by C. W. MAY, JR, P.E. 28281 on 10/2/02.



ITEM	NO.	MATERIAL	ITEM	NO.	MATERIAL
c	1	Bolt, machine, 5/8" x required length	cj		Wire, ground, #6 S.D. copper, as required
d	1	Washer, square, 2-1/4" x 3/16", 11/16" hole	dm	1	Bracket, transformer
j	3	Screw, lag, 1/2" x 4"	ek	1	Locknut, 5/8"
p		Connector, as required	fm	1	Bracket, for 3 cutout/arrestor combination
an	3	Transformer, conventional			
ap	3	Clamp, hotline, with stirrup			
av		Jumper, as required			
ax	3	Cutout and arrestor combination			
bu	3	Connector, transformer ground			



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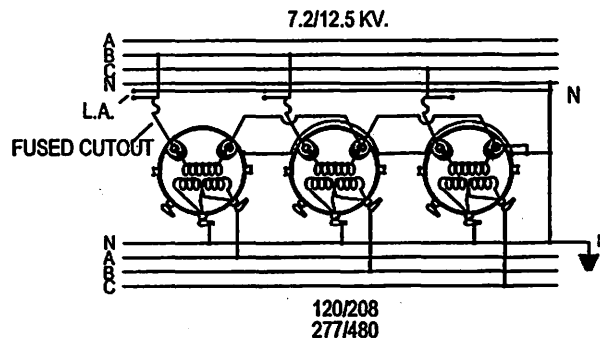
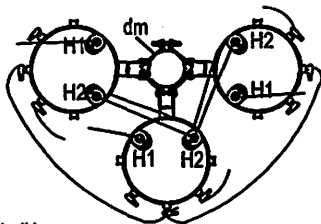
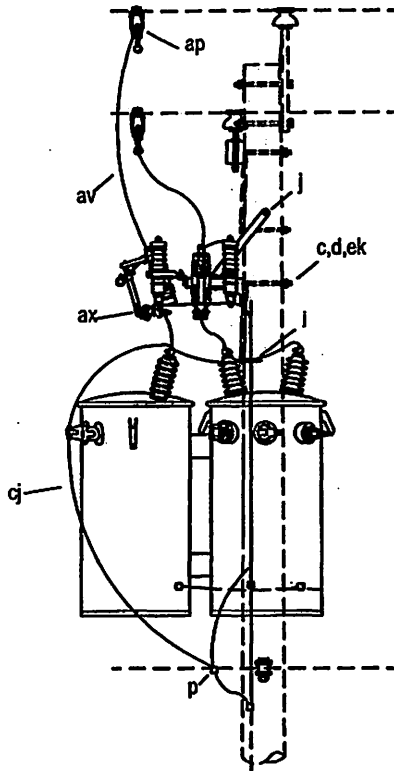
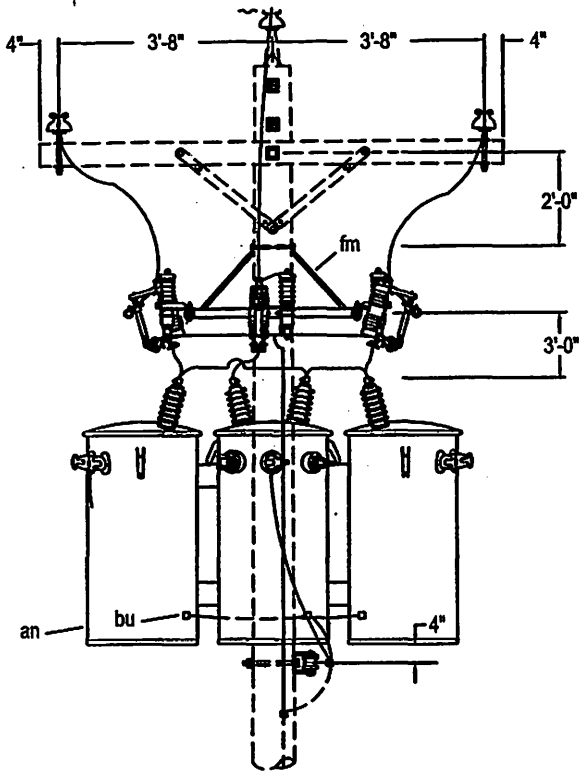
LOWER COLORADO RIVER AUTHORITY
 DISTRIBUTION LINE DESIGN
 AUSTIN, TEXAS

DRAWN: F. Brooks
 CHECKED: _____
 APPROVED: M. Lee

7.2/12.5 KV. THREE TRANSFORMER CLUSTER
 MOUNTED UNGROUNDED WYE CORNER
 GROUNDED DELTA 240/480 VOLT POWER LOADS

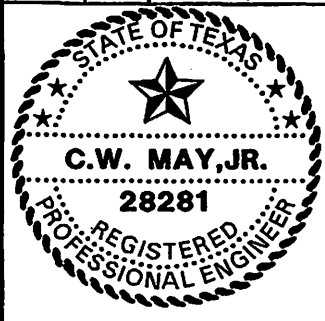
DATE: 5/02

G311X-__



Note:
 All tanks to be grounded.
 Secondary neutrals of all transformers shall be disconnected from tanks and not grounded.
 Re-connect internal windings as shown.
 2" Minimum clear wood clearance of all hardware.
 No bolts to extend more than 2" beyond locknut.
 Jumpers and Connectors as required.
 The seal appearing on this document was authorized by C. W. MAY, JR, P.E. 28281 on 10/2/02.

ITEM	NO.	MATERIAL	ITEM	NO.	MATERIAL
c	1	Bolt, machine, 5/8" x required length	cj		Wire, ground, #6 S.D. copper, as required
d	1	Washer, square, 2-1/4" x 3/16", 11/16" hole	dm	1	Bracket, transformer
j	3	Screw, lag, 1/2" x 4"	ek	1	Locknut, 5/8"
p		Connector, as required	fm	1	Bracket, for 3 cutout/arrestor combination
an	3	Transformer, conventional			
ap	3	Clamp, hotline, with stirrup			
av		Jumper, as required			
ax	3	Cutout and arrestor combination			
bu	3	Connector, transformer ground			



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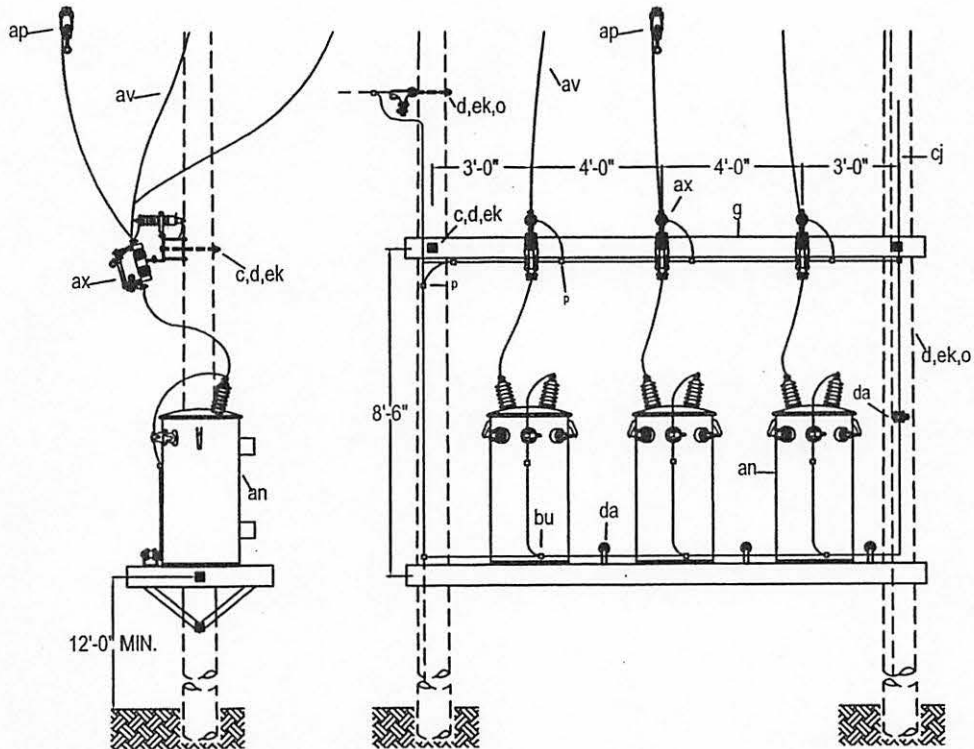
LOWER COLORADO RIVER AUTHORITY
 DISTRIBUTION LINE DESIGN
 AUSTIN, TEXAS

DRAWN: J. Brooks
 CHECKED: _____
 APPROVED: M. Lee

7.2/12.5 KV. THREE TRANSFORMER CLUSTER
 MOUNTED 4 WIRE GROUNDED WYE
 GROUNDED WYE FOR 120/208 AND 277/480 VOLT
 POWER LOADS

DATE: _____
 5/02

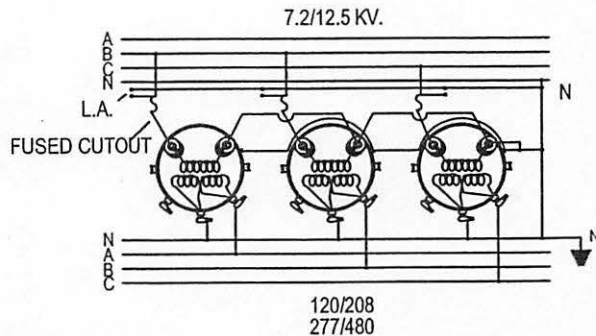
G312X-__



Note:

All tanks to be grounded.
 Re-connect internal windings of transformer as shown.
 2" Minimum clear wood clearance of all hardware.
 No bolts to extend more than 2" beyond locknut.
 Jumpers and Connectors as required.

The seal appearing on this document was authorized by C. W. MAY, JR, P.E. 28281 on 10/2/02.



ITEM	NO.	MATERIAL	ITEM	NO.	MATERIAL
c	4	Bolt, machine, 5/8" x required length	ax	3	Cutout and arrestor combination
c	2	Bolt, machine, 3/4" x required length	bu	3	Connector transformer ground
d	6	Washer, square, 2-1/4" x 3/16", 11/16" hole	cj		Wire, ground, #6 S.D. copper, as required
d	2	Washer, square, 3" x 1/4", 13/16" hole	cj		Wire, ground, #2 S.D. copper, as required
g	1	Crossarm, 5-3/4" x 7-3/4" x 16'-0"	da	4	Bracket, insulated
p		Connector, as required	ek	4	Locknut, 5/8"
an	3	Transformer	ek	2	Locknut, 3/4"
ap	3	Clamp, hotline, with stirrup			
av		Jumper, as required			



LCRA
 ENERGY • WATER • COMMUNITY SERVICES

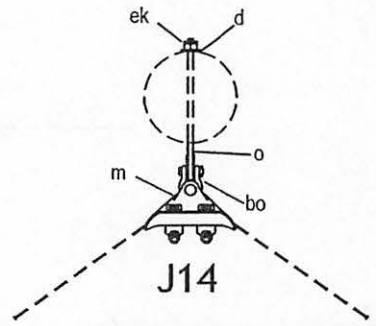
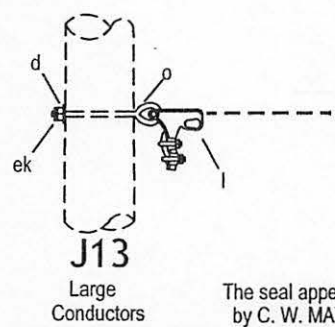
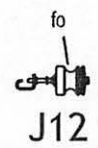
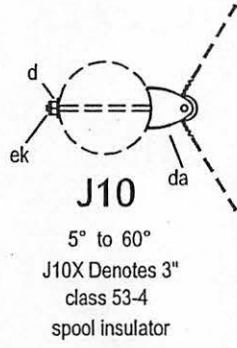
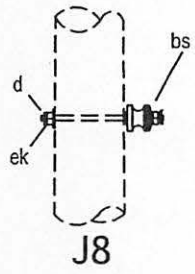
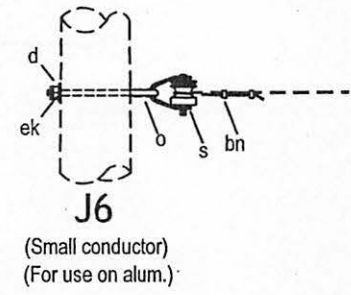
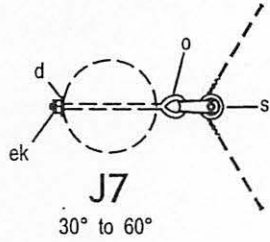
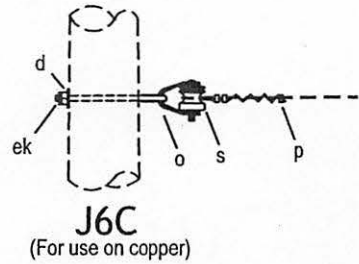
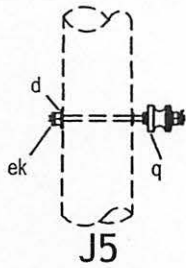
LOWER COLORADO RIVER AUTHORITY
 DISTRIBUTION LINE DESIGN
 AUSTIN, TEXAS

DRAWN: J. Brooks
 CHECKED: _____
 APPROVED: M. Lee

7.2/12.5 KV.
 THREE TRANSFORMER, PLATFORM MOUNTED
 4 WIRE GROUNDED WYE GROUNDED WYE
 FOR 120/208 VOLT POWER LOAD

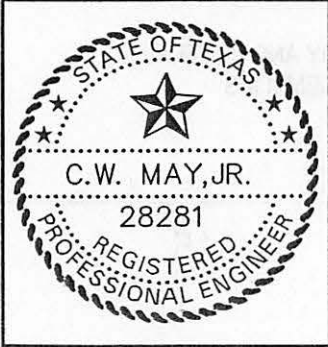
DATE: 5/02

G385X-__



The seal appearing on this document was authorized by C. W. MAY, JR, P.E. 28281 on 10/2/02.

ITEM	NO.	MATERIAL	ITEM	NO.	MATERIAL
c	1	Bolt, machine, 5/8" x required length	bo	1	Shackle, anchor
d	1	Washer, square, 2-1/4" x 3/16", 11/16" hole	da	1	Bracket, insulated
l	1	Clamp, deadend	ek	1	Locknut, 5/8"
m	1	Clamp, suspension	fo	1	Transformer secondary bracket
o	1	Bolt, eye, 5/8" x required length			
p		Connector, as required			
q	1	Bolt, double upset, insulated			
s	1	Clevis, secondary, swinging, insulated			
bs	1	Bolt single upset, insulated			
bn	1	Clamp, loop, deadend			



LCRA
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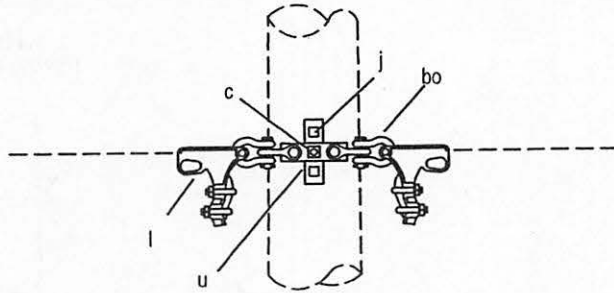
LOWER COLORADO RIVER AUTHORITY
DISTRIBUTION LINE DESIGN
AUSTIN, TEXAS

DRAWN: F. Brooks
CHECKED: _____
APPROVED: M. Lee

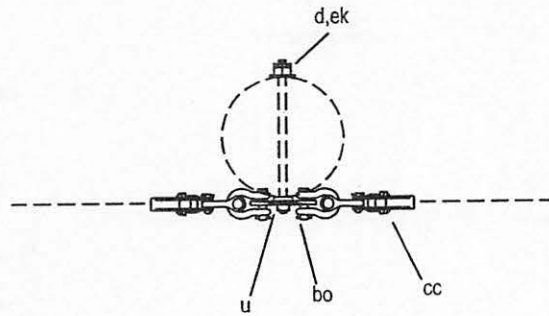
SECONDARY AND NEUTRAL ASSEMBLIES

DATE: 5/02

J5 TO J14



J15



The seal appearing on this document was authorized by C. W. MAY, JR, P.E. 28281 on 10/2/02.

ITEM	NO.	MATERIAL	ITEM	NO.	MATERIAL
c	1	Bolt, machine, 5/8" x required length			
d	1	Washer, square, 2-1/4"			
i	2	Clamp, deadend			
j	2	Screw, lag, 1/2" x 4"			
u	1	Clamp, guy, 6", heavy duty			
bo	4	Shackle, anchor			
ek	1	Locknut, 5/8"			



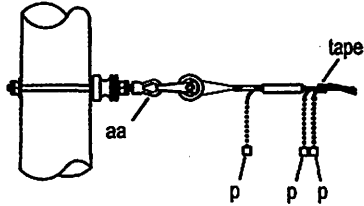
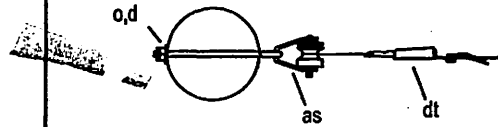
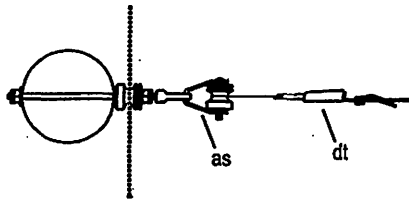
LCRA
 ENERGY • WATER • COMMUNITY SERVICES
 LOWER COLORADO RIVER AUTHORITY
 DISTRIBUTION LINE DESIGN
 AUSTIN, TEXAS

DRAWN: J. Brooks
 CHECKED: _____
 APPROVED: M. Lee

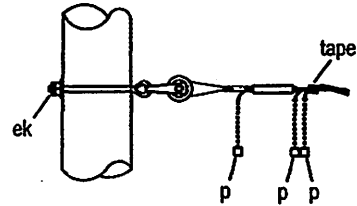
SECONDARY AND NEUTRAL ASSEMBLIES

DATE: 5/02

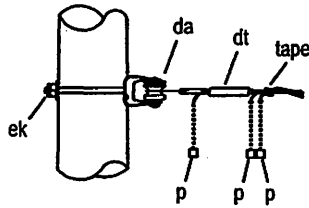
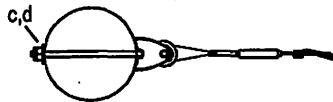
J15



K15C



K11C



K14C

NOTES:

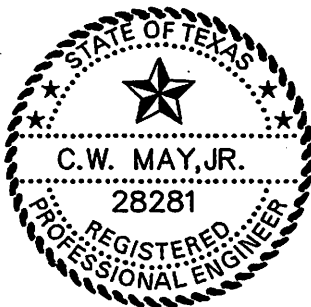
- 1) This type construction should be used for 3 or 4 conductor service cables with bare A.C.S.R. neutral.
- 2) Groove diameter of insulator is 1-3/4" minimum for loop deadends.



KC

The seal appearing on this document was authorized by C. W. MAY, JR, P.E. 28281 on 10/2/02.

ITEM	NO.	MATERIAL	ITEM	NO.	MATERIAL
c		Bolt, machine, 5/8" x required length			
d		Washer, square, 2-1/4" x 3/16", 11/16" hole			
o		Bolt, eye, 5/8" x required length			
p		Connector, as required			
aa		Nut, eye, 5/8"			
as		Clevis, service, swinging, insulated			
da		Bracket, insulated, 3" spool insulator, class 53-2			
dt		Service deadend			
ek		Locknut, 5/8"			



LOWER COLORADO RIVER AUTHORITY
DISTRIBUTION LINE DESIGN
AUSTIN, TEXAS

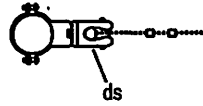
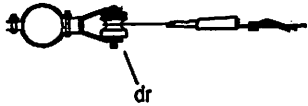
DRAWN: J. Brooks
CHECKED: _____
APPROVED: M. Lee

SERVICE ASSEMBLIES, CABLE

DATE:

5/02

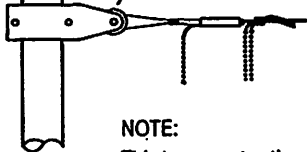
KC, K11C, K14C
K15C



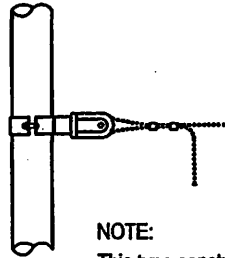
2-1/2" conduit

Groove diameter of insulator 1-3/4" minimum

K16C



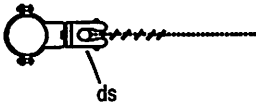
NOTE:
This type construction should be used for three conductor service cables with bare ACSR neutral.



K17L

NOTE:
This type construction should be used for No. 2 aluminum weather proof conductor.

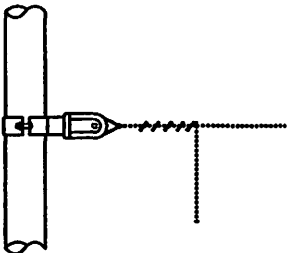
NOTE:
Connectors to be applied over bare wire and then taped as required



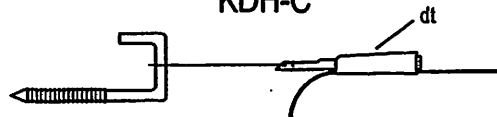
KDH



K17



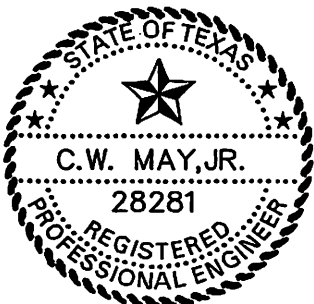
KDH-C



HUBBARD DRIVEHOOK

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ITEM	NO.	MATERIAL	ITEM	NO.	MATERIAL
p		Connector, as required			
bn		Clamp, loop, deadend			
dt		Service deadend			
dr		Clevis, conduit, insulated			
ds		Wireholder, conduit			
		Hook, drive, 7/16" x 4-3/4"			



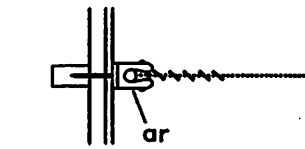
LOWER COLORADO RIVER AUTHORITY
DISTRIBUTION LINE DESIGN
AUSTIN, TEXAS

DRAWN: F. Brooks
CHECKED: _____
APPROVED: M. Lee

SERVICE ASSEMBLIES

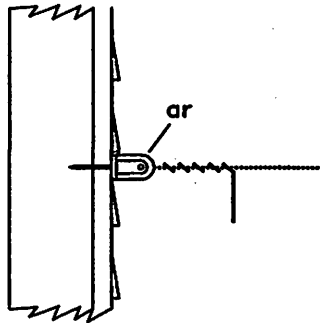
DATE:
5/02

KDH, KDH-C, K16C,
K17L, K17

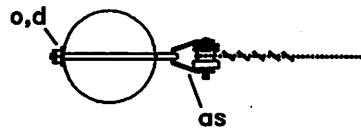


PLAN

K10

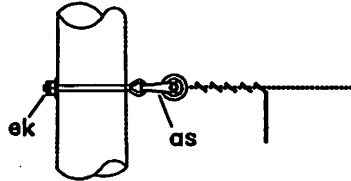


ELEVATION

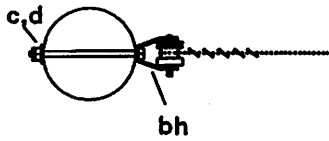


PLAN

K11

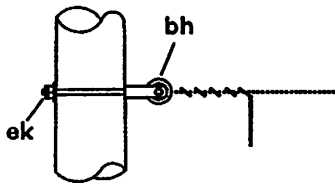


ELEVATION



PLAN

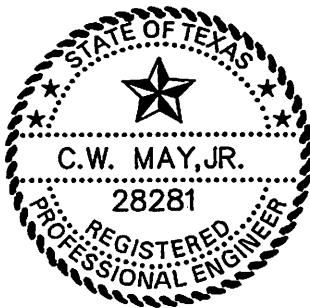
K14



ELEVATION

The seal appearing on this document was authorized by C. W. MAY, JR, P.E. 28281 on 10/2/02.

ITEM	NO.	MATERIAL	ITEM	NO.	MATERIAL
c		Bolt, machine, 5/8" x required length			
d		Washer, square, 2-1/4" x 3/16", 11/16" hole			
o		Bolt, eye, 5/8" x required length			
ar		Wireholder			
as		Clevis, service, swinging, insulated			
bh		Clevis, service, insulated			
ek		Locknut, 5/8"			



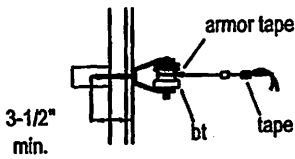
LOWER COLORADO RIVER AUTHORITY
DISTRIBUTION LINE DESIGN
AUSTIN, TEXAS

DRAWN: F. Brooks
CHECKED: _____
APPROVED: M. Lee

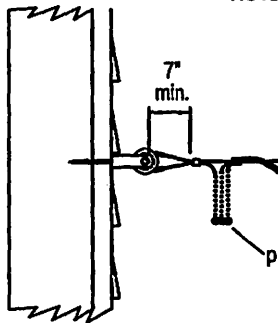
SERVICE ASSEMBLIES

DATE:
5/02

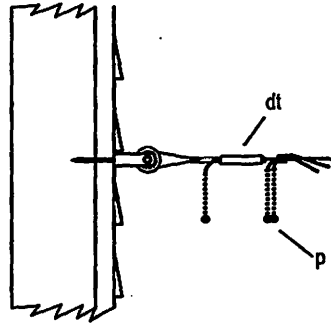
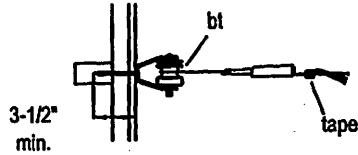
K10, K11, K14



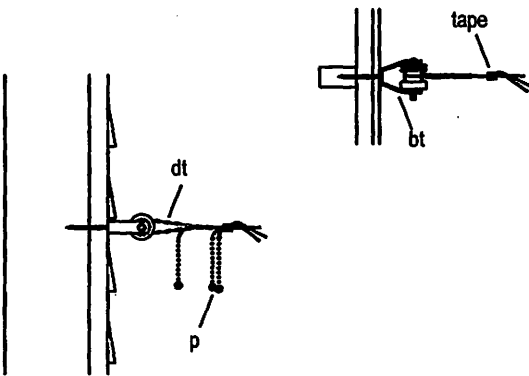
NOTE:
Groove diameter of insulator 1-3/4"



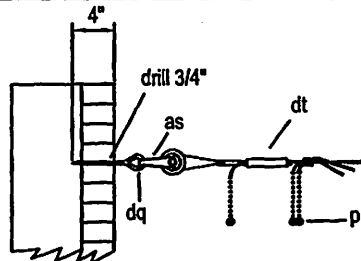
LOOP TYPE



WEDGE TYPE



PREFORMED TYPE



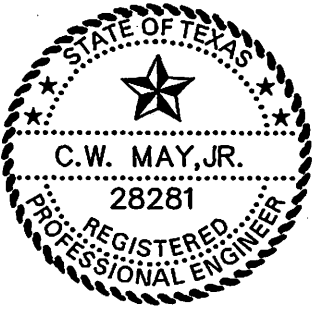
BRICK OR MASONRY

Note:
1) Wedge and preformed service deadends in sizes shown on page dt of the List of Materials may be subst. for those shown on K11C, K14C, K15C, and K16C. This type construction should be used for 3 or 4 conductor service cable with bare ACSR neutral.
2) Drill pilot hole of appropriate dia. to prevent splitting or cracking when installing service attachments.

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ITEM	NO.	MATERIAL
bt		Wireholder, devis type
		#24 wood screw, insulated
p		Connector, as required
bn		Clamp, loop deadend
as		Clevis, service, insulated
dt		Service deadend, wedge type
dt		Service deadend, preformed type
dq		Eye screw, elliptical, 1/2" x 6"
		3/4" x 3-1/2" expansion shield

ITEM	NO.	MATERIAL



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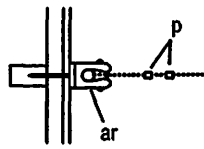
LOWER COLORADO RIVER AUTHORITY
DISTRIBUTION LINE DESIGN
AUSTIN, TEXAS

DRAWN: F. Brooks
CHECKED: _____
APPROVED: M. Lee

SERVICE ASSEMBLIES, CABLE

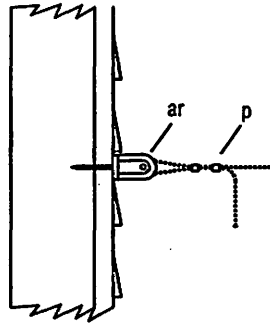
DATE: 5/02

K10C

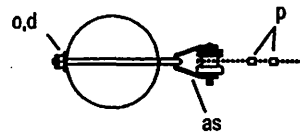


PLAN

K10L

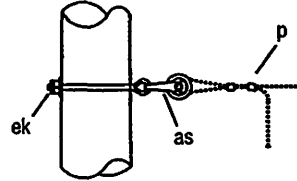


ELEVATION

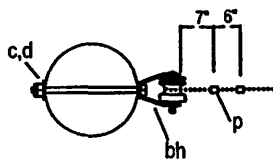


PLAN

K11L

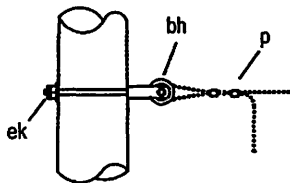


ELEVATION



PLAN

K14L



ELEVATION

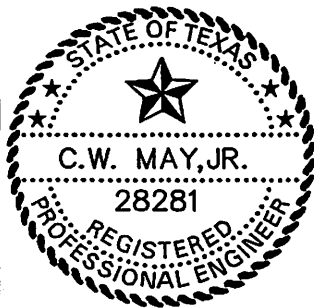
NOTES:

1) This type construction should be used for No. 2 aluminum weatherproof conductor and larger.

2) Connectors to be applied over bare wire and then taped as required.

The seal appearing on this document was authorized by C. W. MAY, JR, P.E. 28281 on 10/2/02.

ITEM	NO.	MATERIAL	ITEM	NO.	MATERIAL
c		Bolt, machine, 5/8" x required length			
d		Washer, square, 2-1/4" x 3/16", 11/16" hole			
o		Bolt, eye, 5/8" x required length			
p		Connector, as required			
ar		Wireholder			
as		Clevis, service, swinging, insulated			
bh		Clevis, service, insulated			
ek		locknut, 5/8"			



DRAWN: F. Brooks
 CHECKED: _____
 APPROVED: M. Lee

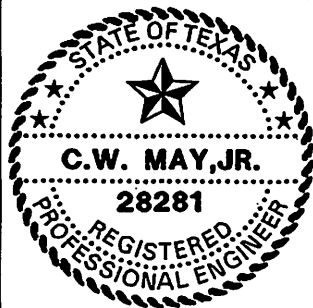
SERVICE ASSEMBLIES
(LARGE CONDUCTORS)

DATE:
5/02

K10L, K11L, K14L

MAB	Install aerial marker ball.
MCA	DOT Controlled access highway crossing.
MCP	Change out pole in place.
MDF	Disposal fee for toxic or chemical waste, (PCB).
MDS	Drill steel pole.
M2M	Repair, restaple, or splice ground wire.
M5-2M	Replace 12 kv. pin type insulator including untying and tying.
MH	Tighten hardware and / or replace nuts and locknuts.
MNA	DOT Non-controlled access highway, crossing 4-lane.
MNB	DOT Non-controlled access highway, crossing 2-lane.
MPM	Pull or install meter.
MPP	Plumb pole (straighten pole vertically).
MRR	Railroad property access.
MSP	Saw pole (cut a length of pole off).
MTC	Install communication connection.
M40-STG	Install tie, single top groove.
M40-SSG	Install tie, single side groove.
M40-DTG	Install tie, double top groove.
M40-DSG	Install tie, double side groove.
M40-12	Install armor rods.
M40-12X	Install line guards.

Note:
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by C. W. MAY, JR, P.E. 28281 on 10/2/02.



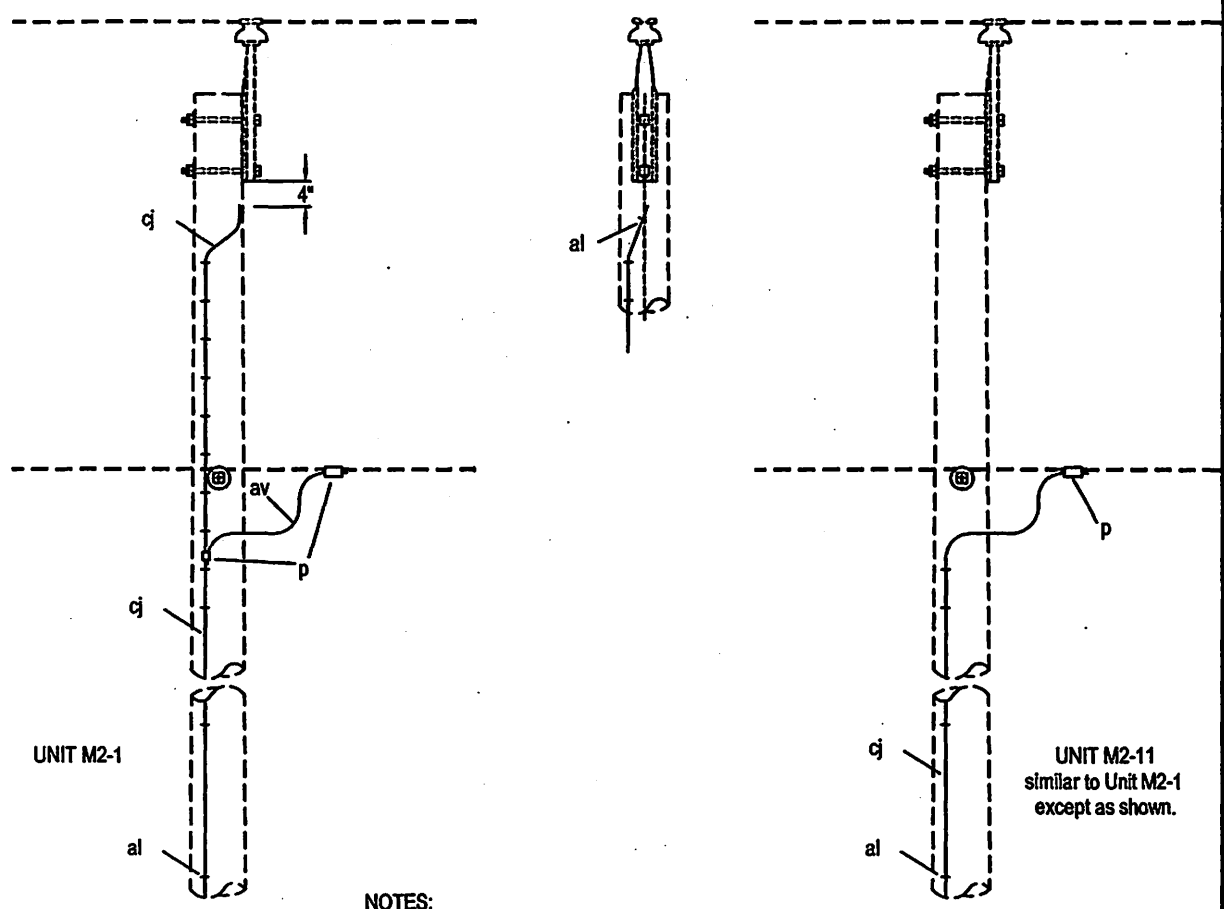
LOWER COLORADO RIVER AUTHORITY
DISTRIBUTION LINE DESIGN
AUSTIN, TEXAS

DRAWN: J. Brooks
CHECKED: _____
APPROVED: M. Lee

MISC. MAINTENANCE UNITS

DATE:
5/02

M _____



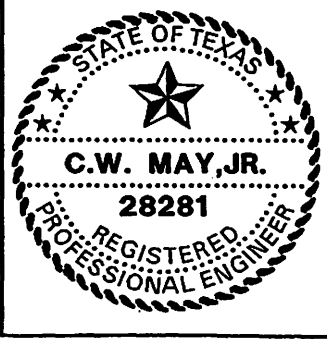
NOTES:

- 1) Ground wire to be located on same side as Neutral conductor and in quadrant opposite climbing space or pole top pin.
- 2) Staples on ground wire shall be 2'-0" apart, except for a distance of 8'-0" above ground and 8'-0" from top of pole where they shall be 6" apart.
- 3) Ground wire to clear all hardware by 2" min. and shall be stapled to maintain this position.

The seal appearing on this document was authorized by C. W. MAY, JR, P.E. 28281 on 10/2/02.

ASSEMBLY UNIT				
M2-1	M2-11			
2	1			
1	1			
1	1			
as required	as required			
as required				
as required	as required			

ITEM	MATERIAL
p	Connector
ai	Rod, ground, 5/8" x 8' - 0"
aj	Clamp, ground rod
al	Staples, ground wire
av	Jumper, #6 copper or equivalent
cj	Ground wire, #6 S.D. copper or equivalent



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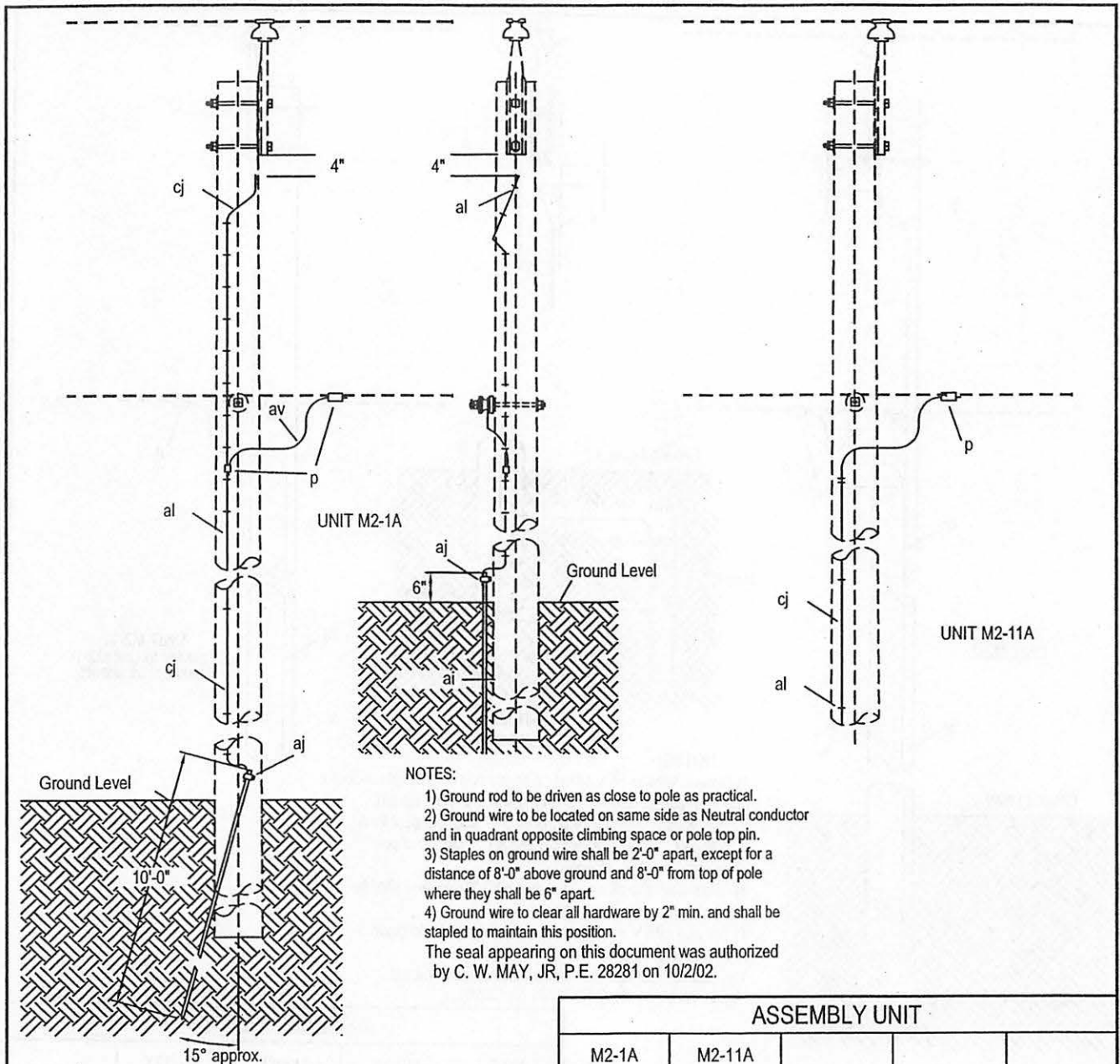
LOWER COLORADO RIVER AUTHORITY
 DISTRIBUTION LINE DESIGN
 AUSTIN, TEXAS

DRAWN: J. Brooks
 CHECKED: _____
 APPROVED: Mh. Lee

GROUNDING ASSEMBLY
 GROUND ROD TYPE

DATE: 5/02

M2-1, M2-11



NOTES:
 1) Ground rod to be driven as close to pole as practical.
 2) Ground wire to be located on same side as Neutral conductor and in quadrant opposite climbing space or pole top pin.
 3) Staples on ground wire shall be 2'-0" apart, except for a distance of 8'-0" above ground and 8'-0" from top of pole where they shall be 6" apart.
 4) Ground wire to clear all hardware by 2" min. and shall be stapled to maintain this position.
 The seal appearing on this document was authorized by C. W. MAY, JR, P.E. 28281 on 10/2/02.

		ASSEMBLY UNIT			
		M2-1A	M2-11A		
ITEM	MATERIAL				
p	Connector	3	2		
ai	Rod, ground, 5/8" x 10' - 0"	1	1		
aj	Clamp, ground rod, tamper proof	1	1		
al	Staples, ground wire	as required	as required		
av	Jumper, #6 copper or equivalent	as required	as required		
cj	Ground wire, #6 S.D. cu.	as required	as required		



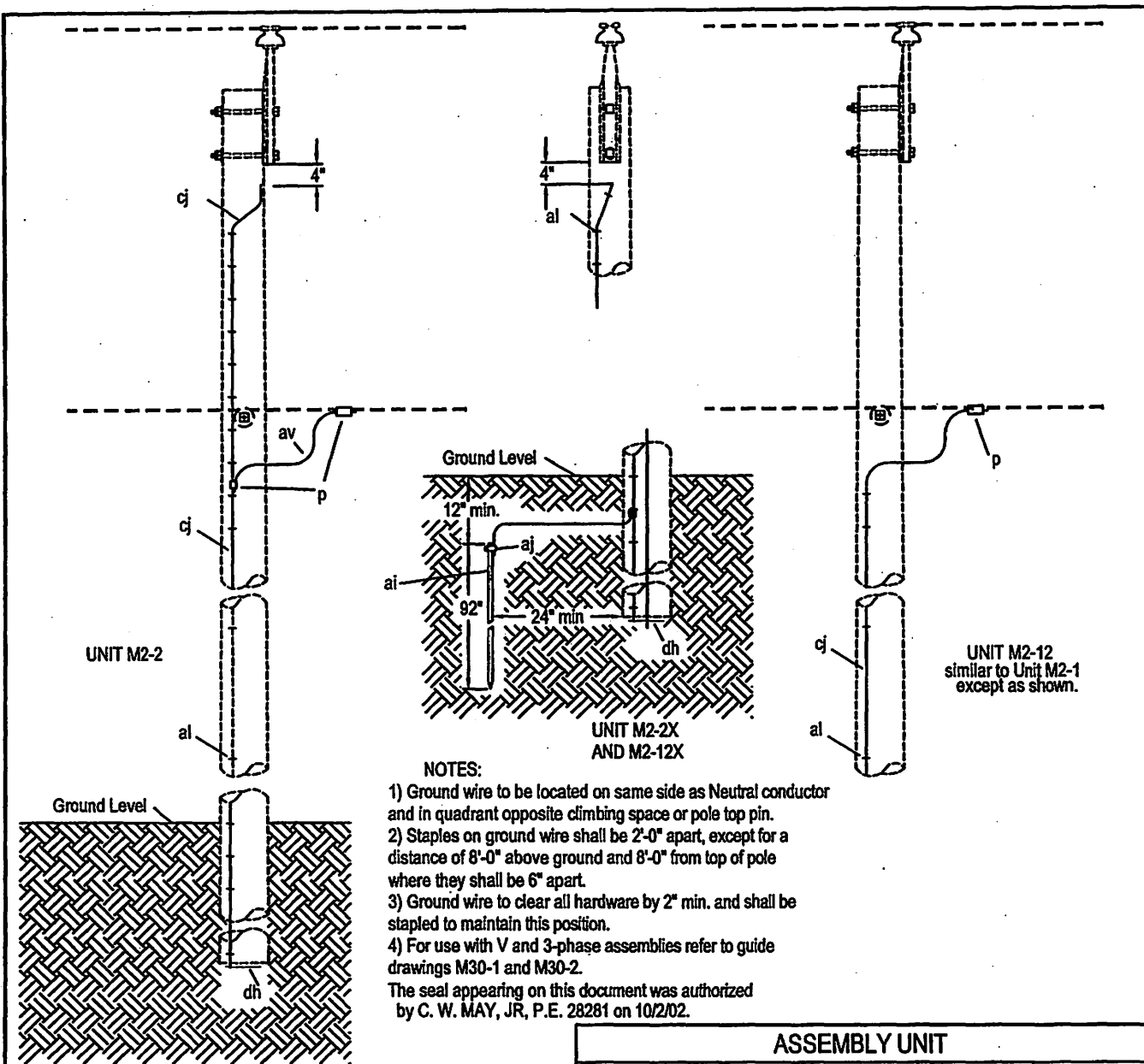
LCRA
 ENERGY • WATER • COMMUNITY SERVICES
 LOWER COLORADO RIVER AUTHORITY
 DISTRIBUTION LINE DESIGN
 AUSTIN, TEXAS

DRAWN: J. Brooks
 CHECKED: _____
 APPROVED: M. Lee

GROUNDING ASSEMBLY
 GROUND ROD TYPE

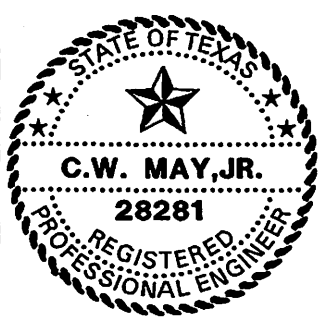
DATE: 05/02

M2-1A, M2-11A



- NOTES:**
- 1) Ground wire to be located on same side as Neutral conductor and in quadrant opposite climbing space or pole top pin.
 - 2) Staples on ground wire shall be 2'-0" apart, except for a distance of 8'-0" above ground and 8'-0" from top of pole where they shall be 6" apart.
 - 3) Ground wire to clear all hardware by 2" min. and shall be stapled to maintain this position.
 - 4) For use with V and 3-phase assemblies refer to guide drawings M30-1 and M30-2.
- The seal appearing on this document was authorized by C. W. MAY, JR, P.E. 28281 on 10/2/02.

ASSEMBLY UNIT				
	M2-2	M2-2X	M2-12	M2-12X
ITEM				
p	2	3	1	2
ai		1		1
aj		1		1
al	as required	as required	as required	as required
av	as required	as required		
cj	as required	as required	as required	as required
dh	1	1	1	1



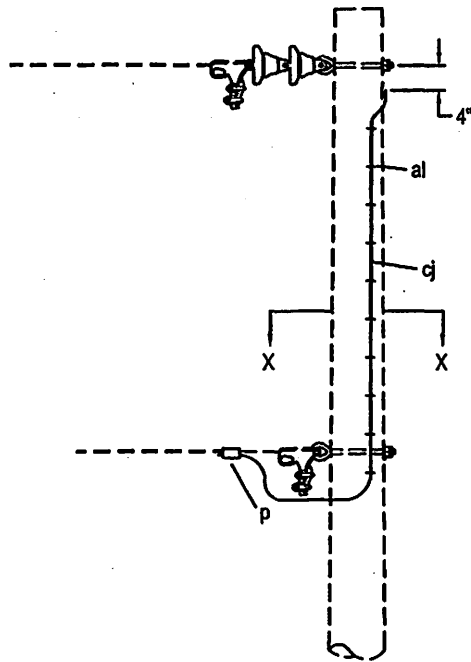
LCRA
 ENERGY • WATER • COMMUNITY SERVICES
 LOWER COLORADO RIVER AUTHORITY
 DISTRIBUTION LINE DESIGN
 AUSTIN, TEXAS

DRAWN: J. Brooks
 CHECKED: _____
 APPROVED: M. Lee

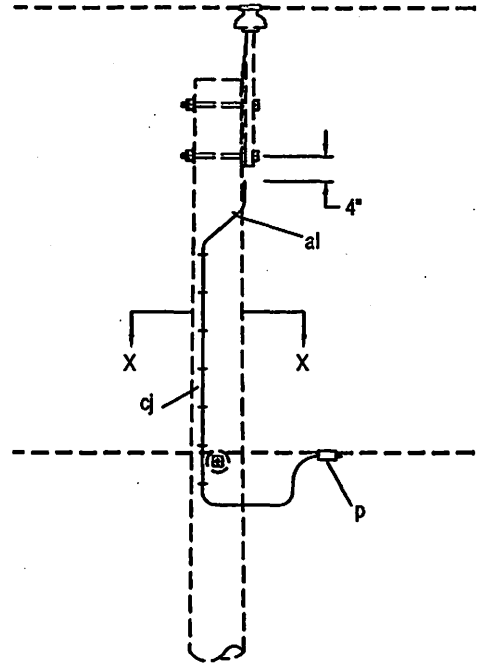
**GROUNDING ASSEMBLY
 GROUND ROD TYPE**

DATE: 5/02

**M2-2, M2-2X,
 M2-12, M2-12X**

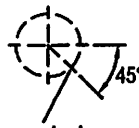


DEADEND ARRANGEMENT



TANGENT ARRANGEMENT

SECTION X-X



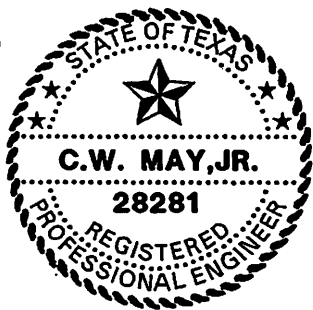
ground wire

NOTES:

- 1) Ground wire to be located on same side as neutral conductor and in quadrant opposite climbing space or pole top pin.
- 2) Staples on ground wire shall be 6" apart.
- 3) Ground wire to clear all hardware by 2" minimum and shall be stapled to maintain this position.

The seal appearing on this document was authorized by C. W. MAY, JR, P.E. 28281 on 10/2/02.

ITEM	MATERIAL	ASSEMBLY UNIT			
		M2-9			
p	Connector	1			
al	Staples, ground wire	As required			
cj	Ground wire, #6 copper or equivalent	As required			



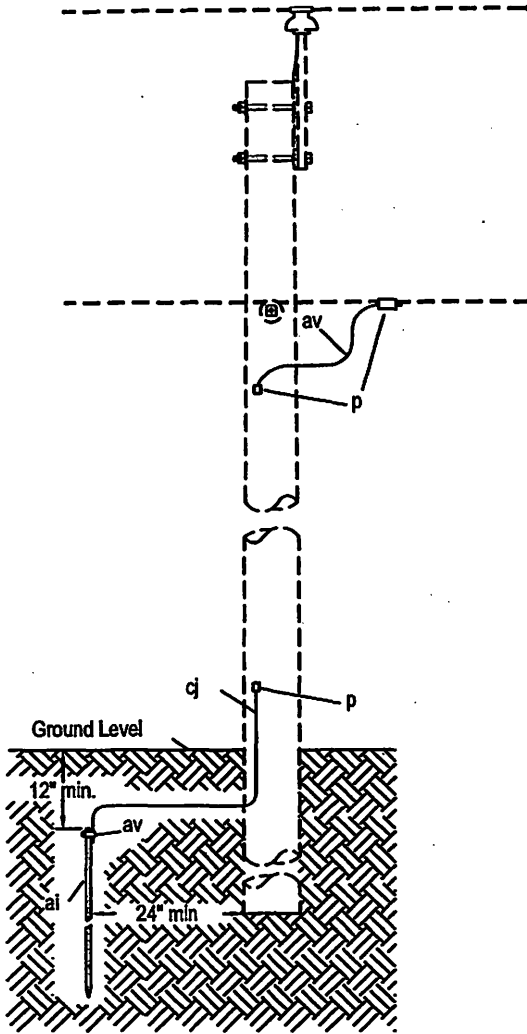
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AUSTIN, TEXAS

DRAWN: J. Brooks
CHECKED: _____
APPROVED: M. Lee

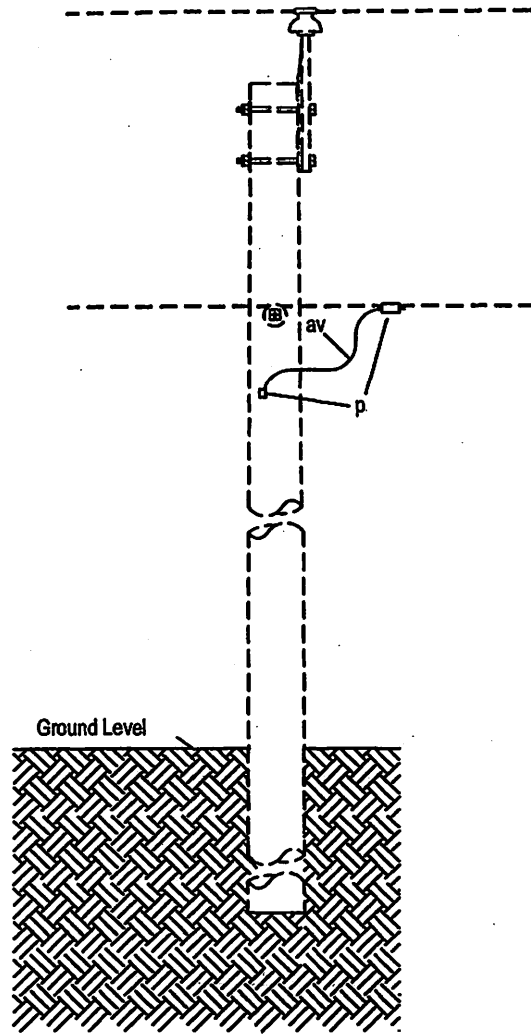
POLE TOP PROTECTION ASSEMBLY

DATE:
05/02

M2-9



UNIT M2-11S



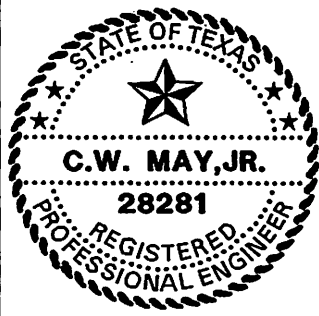
UNIT M2-12S

NOTES:

- 1) Ground wire to be located on same side as Neutral conductor and in quadrant opposite climbing space or pole top pin.
 - 2) Ground wire to clear all hardware by 2" minimum.
- The seal appearing on this document was authorized by C. W. MAY, JR, P.E. 28281 on 10/2/02.

ASSEMBLY UNIT

ITEM	MATERIAL	ASSEMBLY UNIT			
		M2-11S	M2-12S		
p	Connector	3	2		
ai	Rod, ground, 5/8" x 8' - 0"	1			
aj	Clamp, ground rod	1			
av	Jumper, #6 copper or equivalent	as required	as required		
cj	Ground wire, #6 S.D. copper or equivalent	As required			



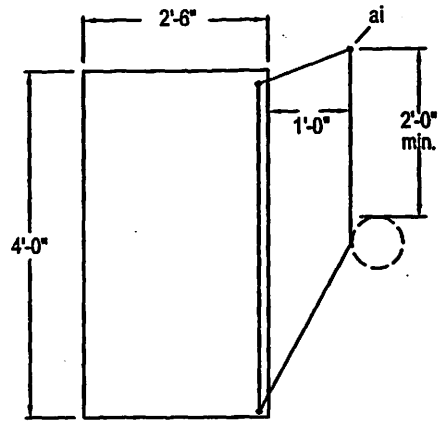
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 CHECKED: _____
 APPROVED: M. Lee

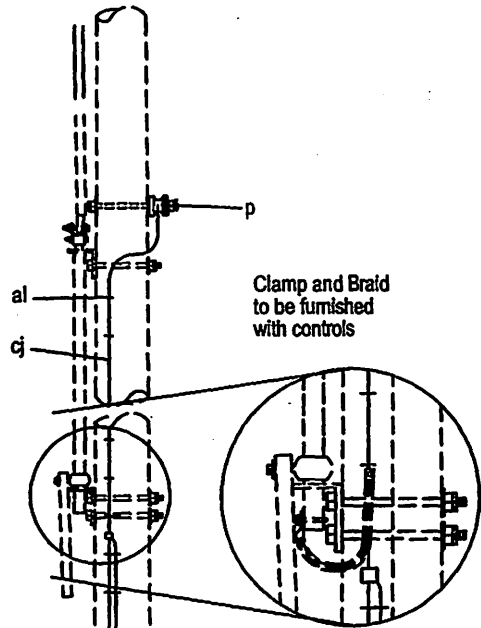
GROUNDING ASSEMBLY FOR STEEL POLE

DATE:
05/02

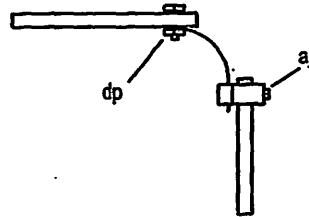
M2-11S, M2-12S



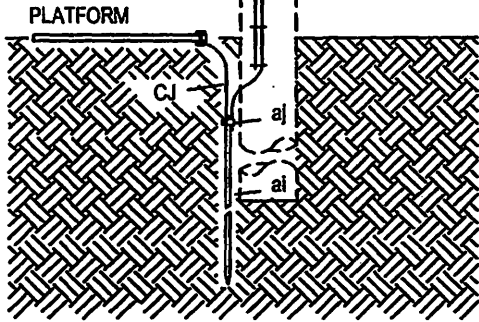
DETAIL OF PLATFORM



Clamp and Braid to be furnished with controls



DETAIL OF PLATFORM GROUND

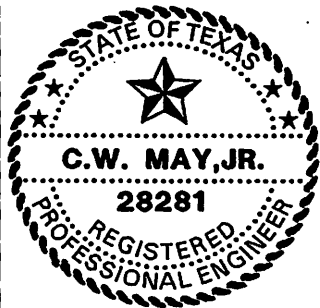


Notes:

- 1) 2" Minimum clear wood clearance of all hardware.
 - 2) No bolts to extend more than 2" beyond locknut.
 - 3) Jumpers and Connectors as required.
- The seal appearing on this document was authorized by C. W. MAY, JR, P.E. 28281 on 10/2/02.

ASSEMBLY UNIT

ITEM	MATERIAL	M2-15A			
p	Connector	as required			
ai	Rod, ground, 5/8" x 8' - 0"	1			
aj	Clamp, ground rod	1			
ai	Staples, ground wire	as required			
cj	Ground wire, #6 S.D. copper or equivalent	as required			
dp	Grounding connector and lockwasher	2			
	Grounding iron platform plate	1			



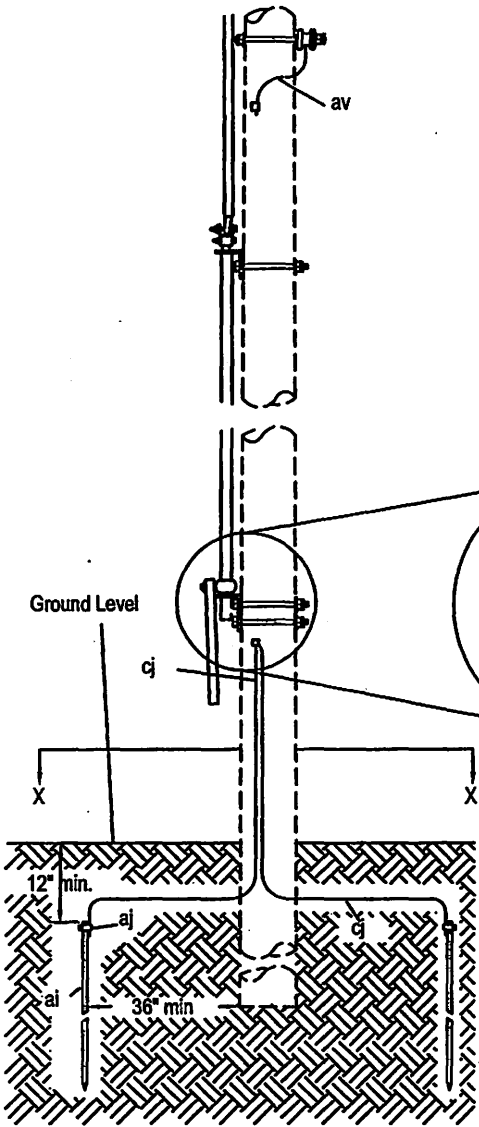
LOWER COLORADO RIVER AUTHORITY
DISTRIBUTION LINE DESIGN
AUSTIN, TEXAS

DRAWN: J. Brooks
CHECKED: _____
APPROVED: M. Lu

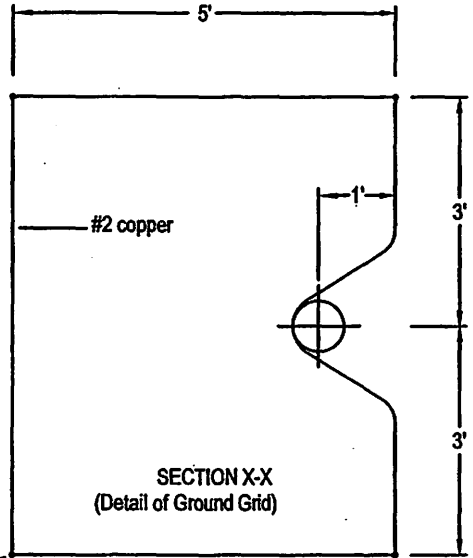
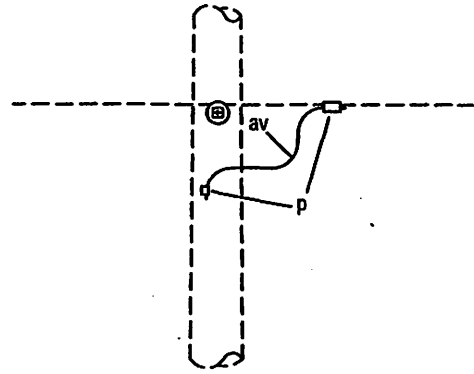
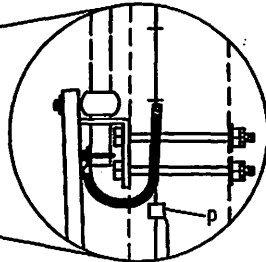
GROUNDING ASSEMBLY - PLATFORM TYPE
FOR SECTIONALIZING AIR BREAK SWITCH

DATE:
05/02

M2-15A



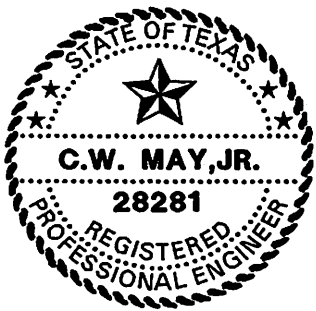
Clamp and Braid to be furnished with controls



NOTES:
 1) Ground wire to be located on same side as Neutral conductor and in quadrant opposite climbing space or pole top pin.
 2) Ground wire to clear all hardware by 2" minimum.
 The seal appearing on this document was authorized by C. W. MAY, JR, P.E. 28281 on 10/2/02.

ASSEMBLY UNIT				
M2-15S				

ITEM	MATERIAL
p	Connector
ai	Rod, ground, 5/8" x 8' - 0"
aj	Clamp, ground rod
av	Jumper, #6 copper or equivalent
cj	Ground wire, #2 S.D. copper or equivalent



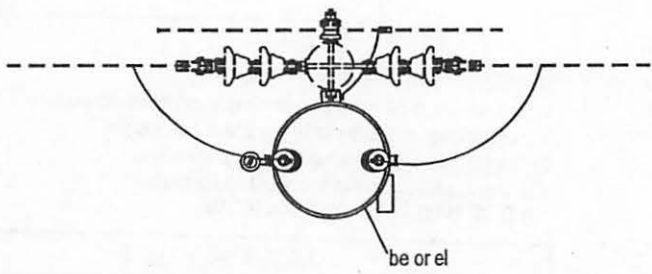
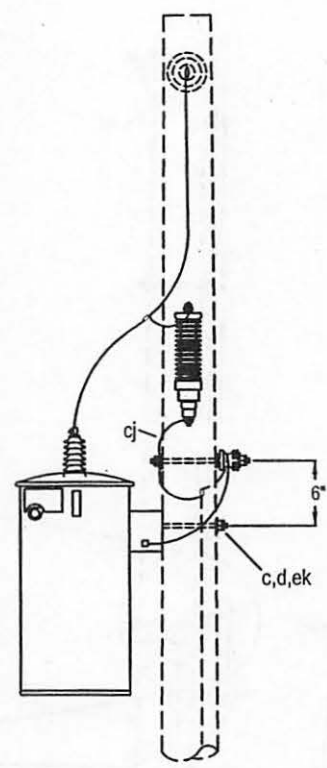
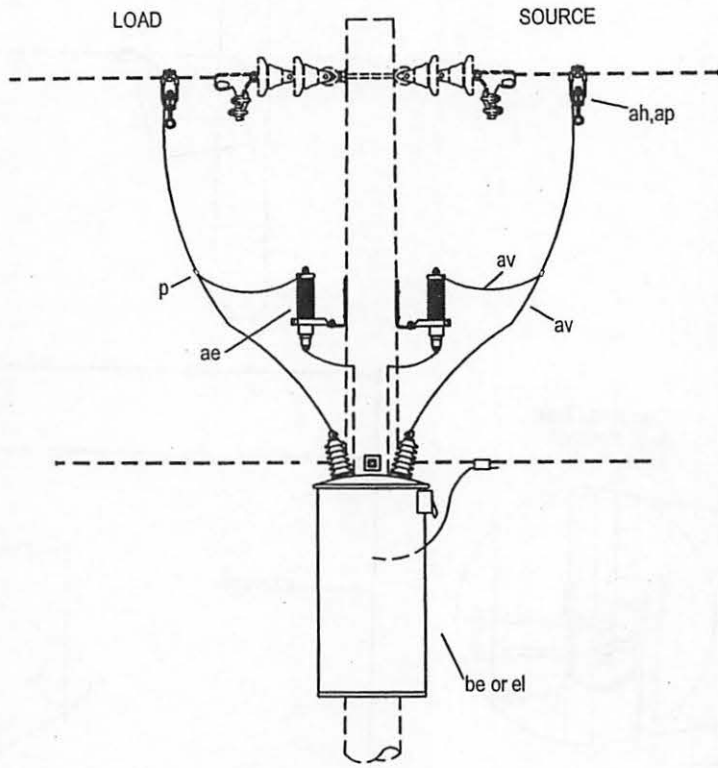
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 DISTRIBUTION LINE DESIGN
 AUSTIN, TEXAS

DRAWN: J. Brooks
 CHECKED: _____
 APPROVED: M. Lee

STEEL POLE GROUNDING ASSEMBLY
 GROUND ROD TYPE

DATE: 05/02

M2-15S



Note:
 1) 2" Minimum clear wood clearance of all hardware.
 2) No bolts to extend more than 2" beyond locknut.
 3) Jumpers and Connectors as required.
 4) The terminal bushing connected directly to the coil should be connected to the source.
 Where necessary to provide for this connection the recloser may be mounted on the opposite side of pole and the neutral deadended.
 The seal appearing on this document was authorized by C. W. MAY, JR, P.E. 28281 on 10/2/02.

ITEM	NO.	MATERIAL	ITEM	NO.	MATERIAL
c	1	Bolt, machine, 5/8" x required length	ek	1	Locknut, 5/8"
d	1	Washer, square, 2-1/4"			
j		Log screw, 1/2" x 4"			
p		Connector, as required			
ae	2	Lightning arrester			
ap	2	Clamp, hotline/ stirrup			
av		Jumper, as required			
be	1	Recloser, oil circuit (M3-10 only)			
cj		Ground wire, #6 S.D. cu.			
el	1	Sectionalizer (M3-41 only)			



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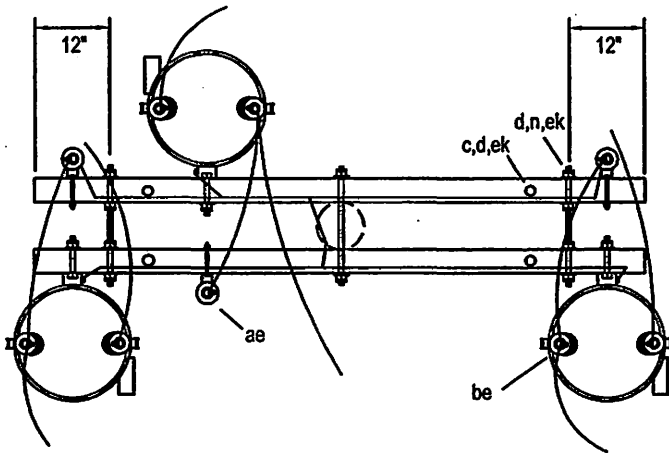
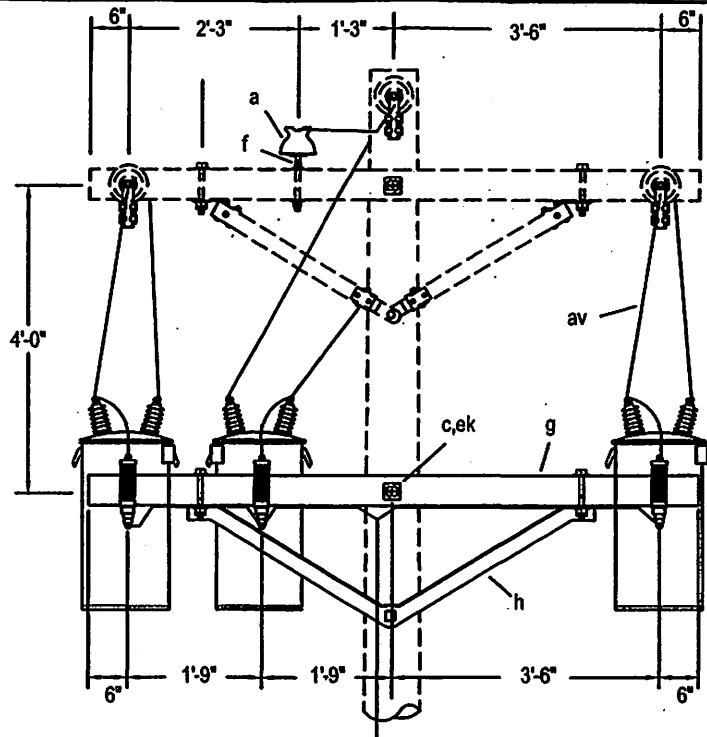
LOWER COLORADO RIVER AUTHORITY
 DISTRIBUTION LINE DESIGN
 AUSTIN, TEXAS

DRAWN: J. Brooks
 CHECKED: _____
 APPROVED: M. Lee

7.2/12.5 KV.
 SINGLE PHASE SECTIONALIZER OR OIL CIRCUIT
 RECLOSER

DATE: _____
 05/02

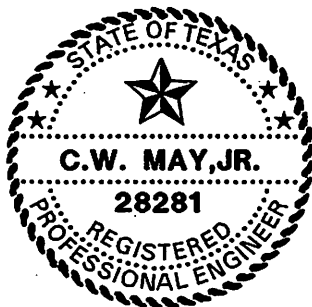
M3-10, M3-41



NOTES:

- 1) The terminal bushing connected directly to the coil should be connected to the source.
 - 2) For V-phase installation omit center phase and adjust material list and designate M3-11.
 - 3) Each recloser tank shall have two connections to ground.
 - 4) 2" Minimum clear wood clearance of all hardware.
 - 5) No bolts to extend more than 2" beyond locknut.
 - 6) Jumpers and Connectors as required.
- The seal appearing on this document was authorized by C. W. MAY, JR, P.E. 28281 on 10/2/02.

ITEM	NO.	MATERIAL	ITEM	NO.	MATERIAL
a	2	Insulator, pin type	ae	3	Lightning arrester
c	4	Bolt, machine, 1/2" x required length	ap	6	Clamp, hot line/ stirrup
c	4	Bolt, machine, 5/8" x required length	av		Jumper, as required
d	4	Washer, round, 1-3/8" diameter 9/16" hole	be	3	Recloser, oil circuit
d	14	Washer, square, 2-1/4" x 3/16", 11/16" hole	ek	14	Locknut, 5/8"
f	2	Pin, crossarm, steel 5/8" x 10 3/4"	ek	4	Locknut, 1/2"
g	2	Crossarm, 3-3/4" x 4-3/4" x 8'-0"			
h	2	Brace, 1-1/2"x1-1/2"x3/16"x60" span			
n	3	Bolt, double arming, 5/8" x req'd length			
p		Connector, as required			



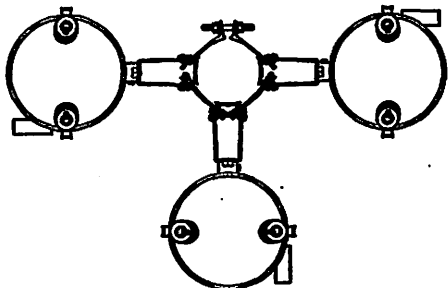
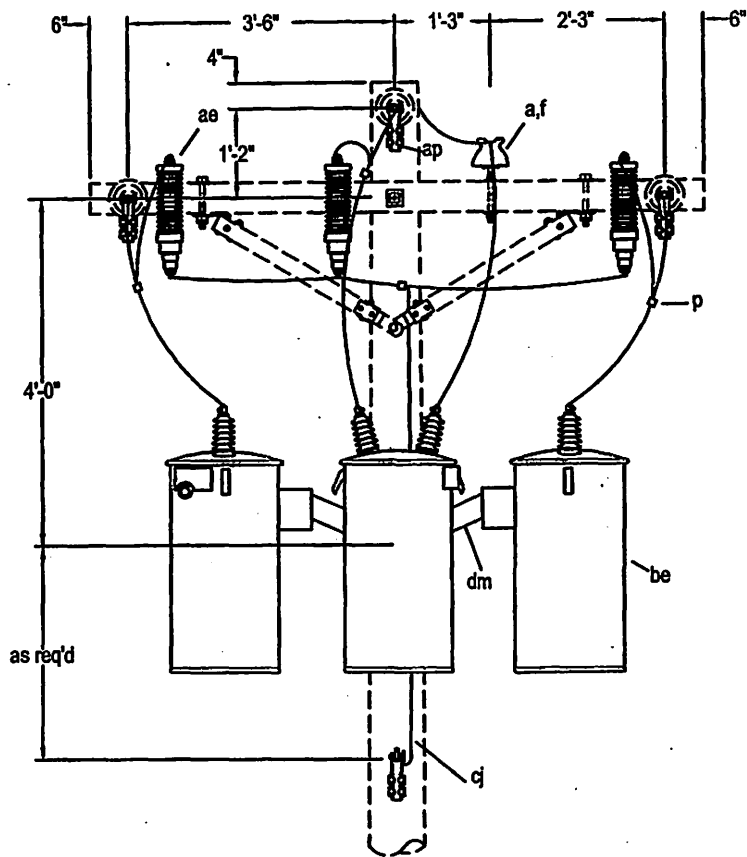
LOWER COLORADO RIVER AUTHORITY
DISTRIBUTION LINE DESIGN
AUSTIN, TEXAS

DRAWN: F. Brooks
CHECKED: _____
APPROVED: M. Lee

7.2/12.5 KV
2 OR 3 PHASE, SECTIONALIZERS OR
OIL CIRCUIT RECLOSERS
CROSSARM MOUNT

DATE:
05/02

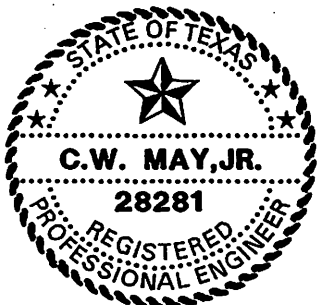
M3-11, M3-12



Note:

- 1) 2" Minimum clear wood clearance of all hardware.
- 2) No bolts to extend more than 2" beyond locknut.
- 3) Jumpers and Connectors as required.
- 4) The terminal bushing connected directly to the coil should be connected to the source.
- 5) For V-phase installation omit center phase and adjust material list and designate M3-11A.
- 6) Each recloser tank shall have two connections to ground. The seal appearing on this document was authorized by C. W. MAY, JR, P.E. 28281 on 10/202.

ITEM	NO.	MATERIAL	ITEM	NO.	MATERIAL
a	2	Insulator, pin type			
f	2	Pin, crossarm, steel, 5/8" x 10-3/4"			
p		Connector, as required			
ae	3	Lightning arrester			
ap	6	Clamp, hotline / with strirup			
av		Jumper, as required			
be	3	Recloser, oil circuit			
cj		Ground wire, #6 S.D. cu., as required			
dm	1	Bracket, cluster mount			
ek	2	Locknut, 5/8"			



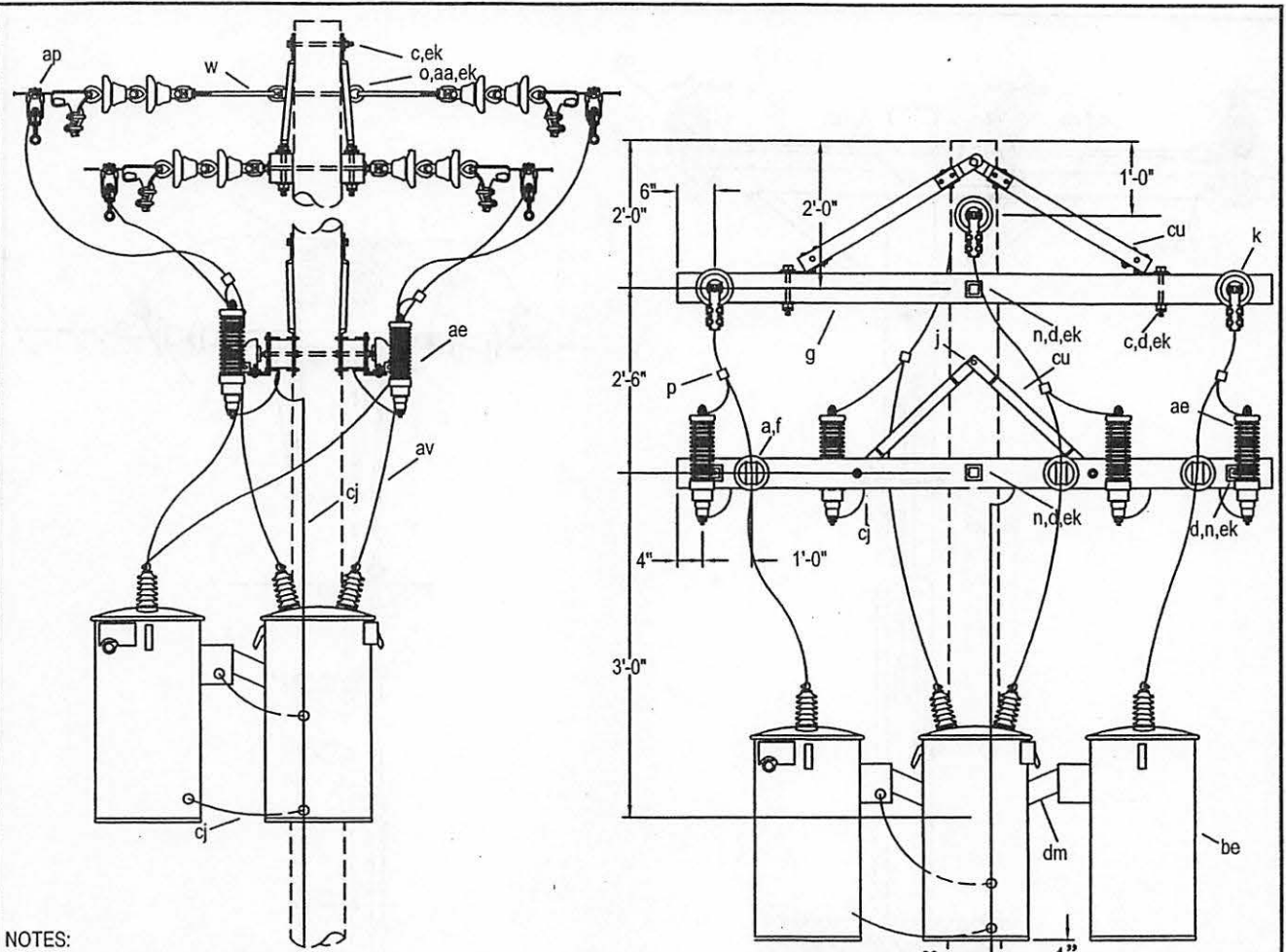
LOWER COLORADO RIVER AUTHORITY
DISTRIBUTION LINE DESIGN
AUSTIN, TEXAS

DRAWN: J. Brooks
CHECKED: _____
APPROVED: M. Lee

7.2/12.5 KV
2 OR 3 PHASE, SECTIONALIZERS
OIL CIRCUIT RECLOSERS
BRACKET MOUNT

DATE:
05/02

M3-11A, M3-12A



NOTES:

- 1) The terminal bushing connected directly to the coil should be connected to the source.
- 2) For V-phase installation omit center phase and adjust material list and designate M3-11X.
- 3) Each recloser tank shall have two connections to ground.

- 4) 2" Minimum clear wood clearance of all hardware.
 - 5) No bolts to extend more than 2" beyond locknut.
 - 6) Jumpers and Connectors as required.
- The seal appearing on this document was authorized by C. W. MAY, JR, P.E. 28281 on 10/2/02.

ITEM	NO.	MATERIAL	ITEM	NO.	MATERIAL
a	6	Insulator, pin type, class 55-4	aa	6	Nut, eye, 5/8"
c	4	Bolt, machine, 1/2" x required length	ae	6	Lightning arresters
c	1	Bolt, machine, 5/8" x required length	ap	6	Connector, hot line clamp/ stirrup
d	4	Washer, round, 1-3/8" diameter, 9/16" hole	av		Jumper, as required
d	22	Washer, square, 2-1/4" x 3/16", 11/16" hole	be	3	Recloser, or Sectionalizer
f	6	Pin, crossarm, steel, 5/8" x 10-3/4"	ca	6	Deadend, assembly, primary
g	4	Crossarm, 3-5/8" x 4-5/8" x 8'-0"	cc	2	Deadend, assembly, neutral
i	4	Bolt, carriage, 3/8" x 4-1/2"	cj		Ground wire, #6 cu., as required
k	12	Insulator, suspension	cu	2 pr.	Brace, crossarm, wood, 28" span
n	6	Bolt, double arming, 5/8" x required length	cu	2 pr.	Brace, crossarm, wood, 60" span
o	2	Bolt, eye, 5/8" x required length	dm	1	Bracket, cluster mount
p		Connector, as required	ek	24	Locknut, 5/8"
w	2	Insulator, guy strain, 24", 16,000#	ek	4	Locknut, 1/2"



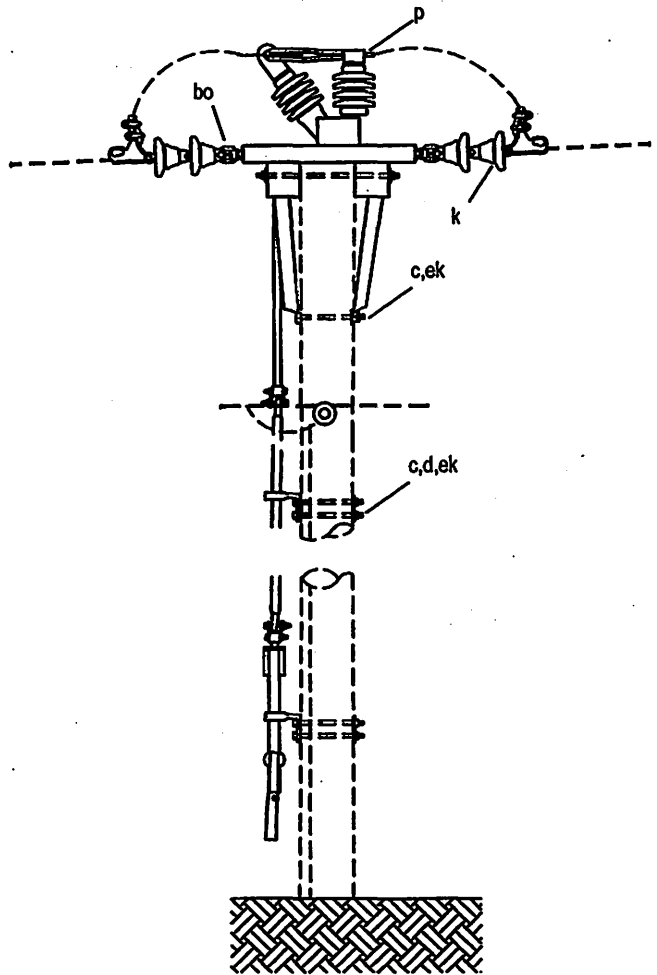
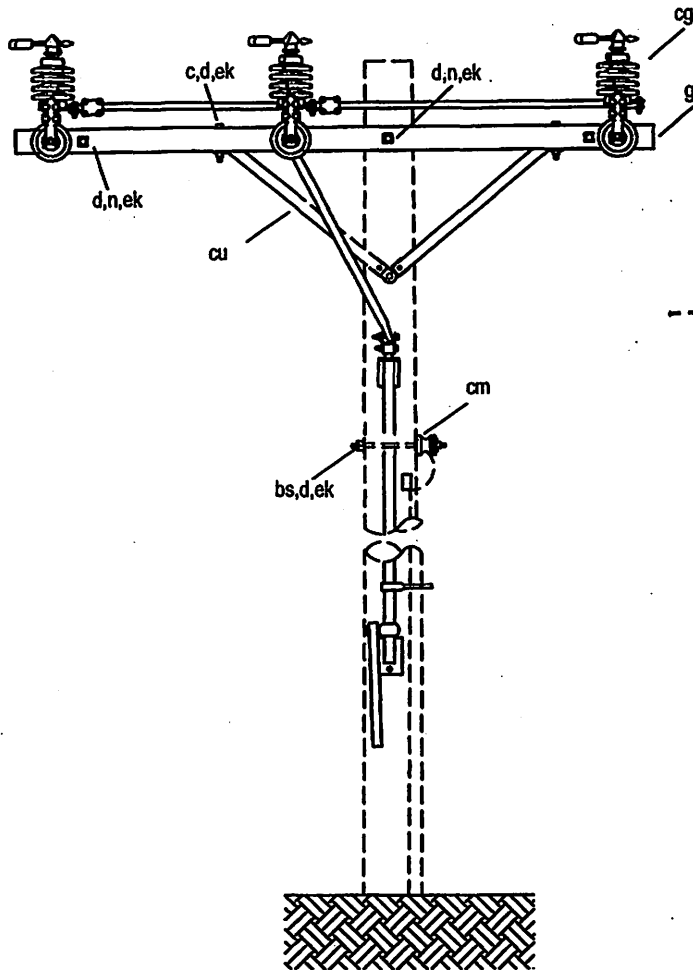
LOWER COLORADO RIVER AUTHORITY
DISTRIBUTION LINE DESIGN
AUSTIN, TEXAS

DRAWN: J. Brooks
CHECKED: _____
APPROVED: M. Lee

7.2 / 12.5 KV
2 OR 3 PHASE SECTIONALIZERS OR
CIRCUIT RECLOSERS
WITH DEADEND ASSEMBLY

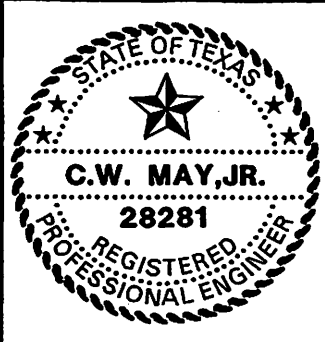
DATE:
05/02

M3-11X-__AMPS
M3-12X-__AMPS



Note:
 2" Minimum clear wood clearance of all hardware.
 No bolts to extend more than 2" beyond locknut.
 Jumpers and Connectors as required.
 The seal appearing on this document was authorized
 by C. W. MAY, JR., P.E. 28281 on 10/2/02.

ITEM	NO.	MATERIAL	ITEM	NO.	MATERIAL
c	16	Bolt, machine, 5/8" x required length	cg	1	Switch, air-break, 3-pole, with operating mechanism
c	4	Bolt, 1/2" x required length	cm	1	Insulator, spool, (class 53-2)
d	26	Washer, square, 2 1/4" x required length	cu	2pr	Brace, wood, 60" span, 18" drop
k	12	Insulator, suspension (class 52-1)	ek		Locknuts, 1/2", as required
n	3	Bolt, double arming, 5/8" x required length	ek		Locknuts, 5/8", as required
p	6	Connector, switch terminal			
p		Connectors, as required			
bo	6	Shackle, anchor			
bs	1	Bolt, single upset, 5/8" x 12"			
ca	6	Deadend assembly, primary			



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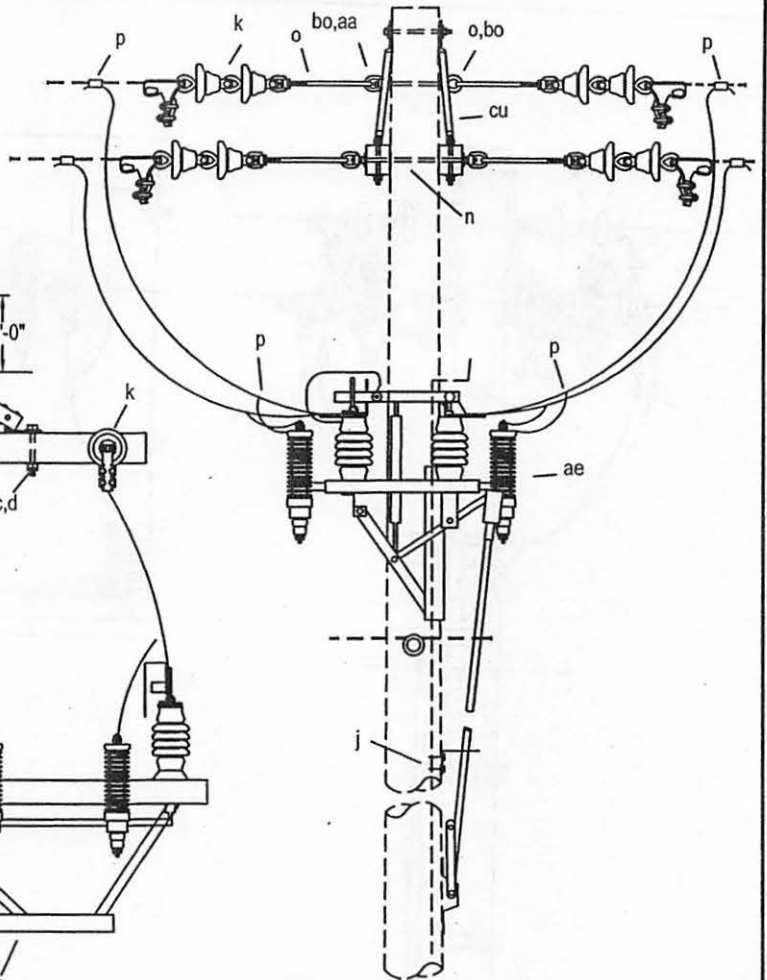
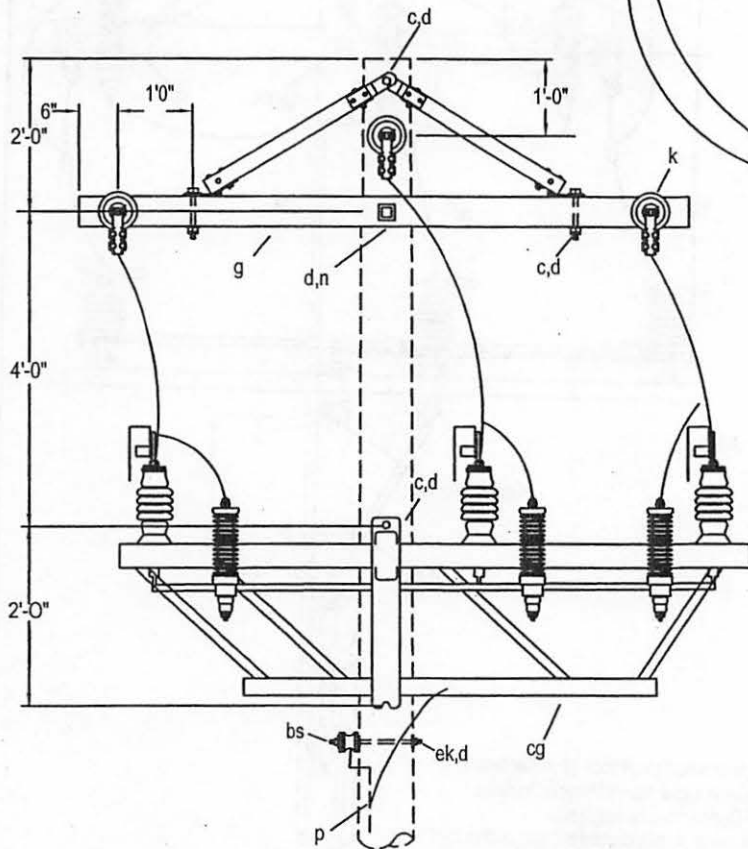
7.2 / 12.5 KV.
 SECTIONALIZING AIR BREAK SWITCH

DATE: 05/02

M3-15

Note:

2" Minimum clear wood clearance of all hardware.
 No bolts to extend more than 2" beyond locknut.
 Jumpers and Connectors as required.
 The seal appearing on this document was authorized
 by C. W. MAY, JR, P.E. 28281 on 10/2/02.



ITEM	NO.	MATERIAL	ITEM	NO.	MATERIAL
c	4	Bolt, machine, 1/2" x 6"	ao	3	Clamp, stirrup
c	1	Bolt, machine, 5/8" x required length	ap	3	Clamp, hotline
c	2	Bolt, machine, 3/4" x required length	bo	6	Shackle, anchor
d	4	Washer, round, 1 - 3/8" diameter	bs	1	Bolt, single upset, 5/8" x required length
d	12	Washer, square, 2 - 1/4"	ca	6	Deadend, assembly, primary
g	2	Crossarm, 3 - 3/4" x 4 - 3/4" x 8' - 0"	cg	1	Switch, gang operated, Westinghouse 600 amp catalog # 634A038A01
j	6	Screw, lag, 1/2" x 4"	ek		Locknut, as required
k	12	Insulator, suspension, class 52-1			Pipe, galvanized, 1 - 1/2" diameter x required length
n	3	Bolt, double arming, 5/8" x required length			
o	7	Bolt, eye, 5/8" x required length			
p		Connectors, as required			
aa	7	Nut, eye, 5/8"			
ae	6	Lightning arrester			



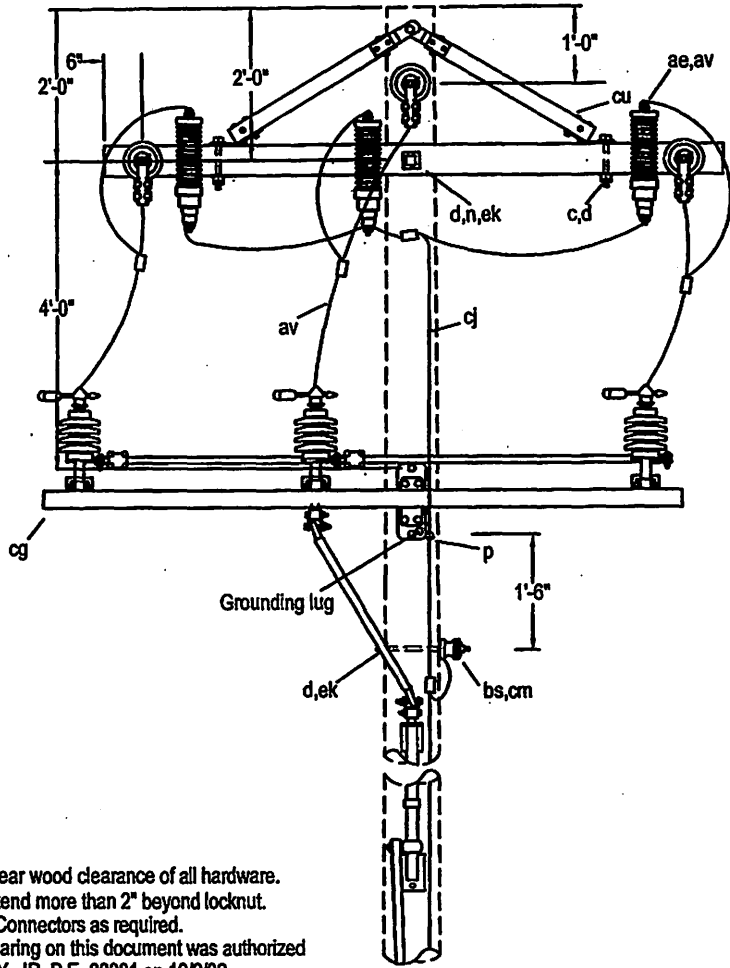
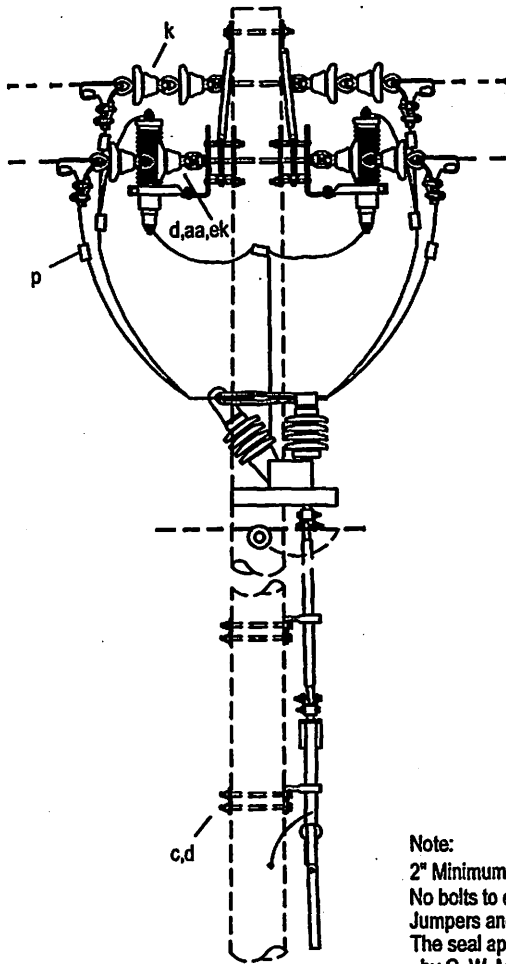
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 AUSTIN, TEXAS

DRAWN: J. Brooks
 CHECKED: _____
 APPROVED: M. Lee

STANDARD
 GANG OPERATED, 15 KV LOAD BREAK SWITCH

DATE: _____
 05/02

M3-15W



Note:
 2" Minimum clear wood clearance of all hardware.
 No bolts to extend more than 2" beyond locknut.
 Jumpers and Connectors as required.
 The seal appearing on this document was authorized
 by C. W. MAY, JR, P.E. 28281 on 10/2/02.

ITEM	NO.	MATERIAL	ITEM	NO.	MATERIAL
c	4	Bolt, machine, 1/2" x required length	av		Jumper, as required
c	7	Bolt, machine, 5/8" x required length	bs	1	Bolt, single upset, 5/8" x required length
d	16	Washer, square, 2-1/4" x 3/16", 11/16" hole	ca	6	Deadend assembly, primary
d	4	Washer, round, 1-3/8" diameter, 9/16" hole	cg	1	Switch, air, side mount
g	2	Crossarm, 3-3/4" x 4-3/4" x 8'-0"	cj		Ground wire, #6 S.D. cu., as required
k	12	Insulator, suspension, class 52-1	cm	1	Insulator, spool, class 53-2
n	3	Bolt, double arming, 5/8" x required length	cu	2pr.	Brace, wood, 60" span, 18" drop
o	1	Bolt, eye, 5/8" x required length	ek	4	Locknut, 1/2"
p	6	Connector, pad, terminal	ek	23	Locknut, 5/8"
p		Connector, as required			
aa	5	Nut, eye, 5/8"			
ae	6	Lightning arrester			
al		Staples, ground wire, as required			



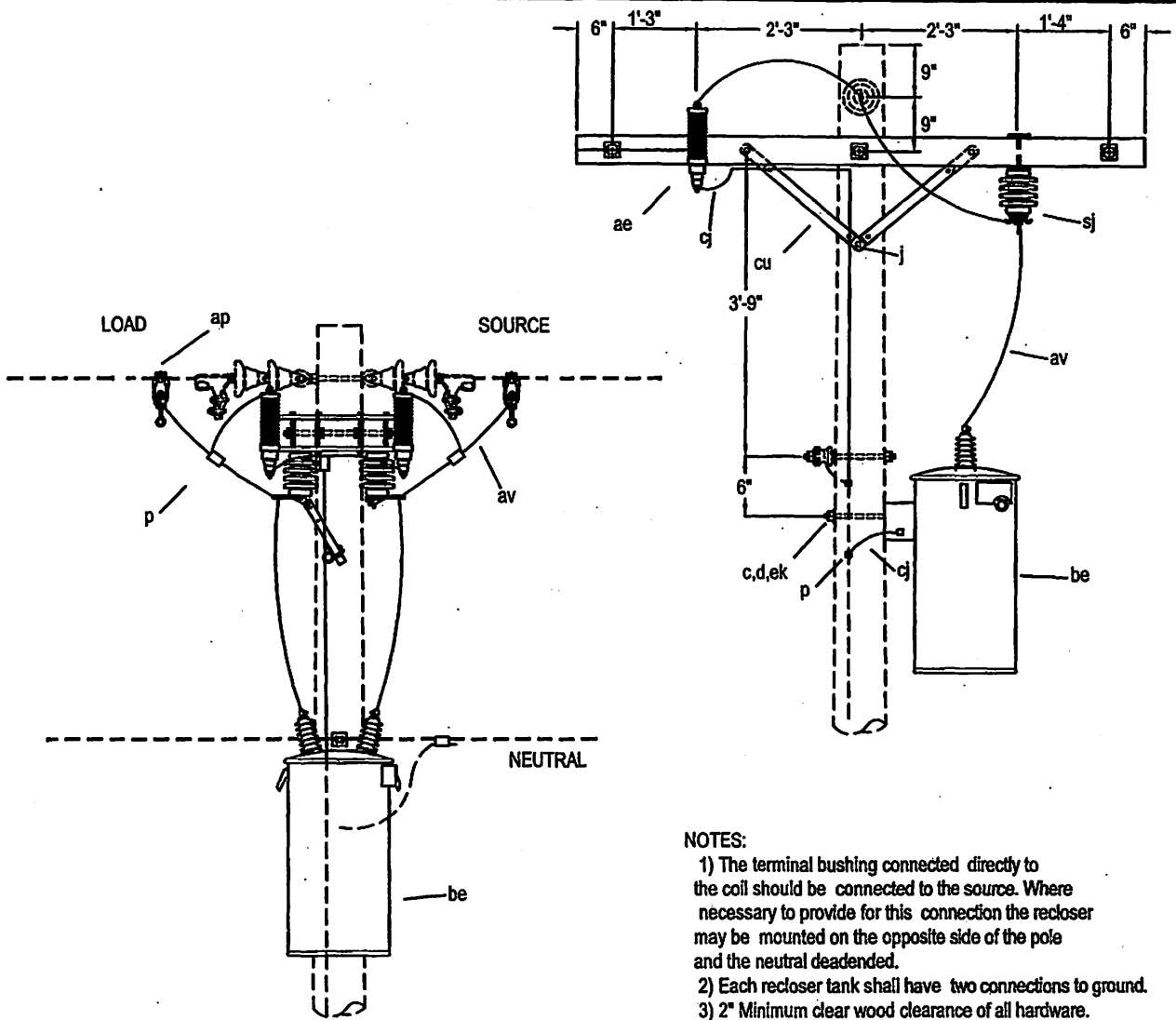
LCRA
 ENERGY • WATER • COMMUNITY SERVICES
 LOWER COLORADO RIVER AUTHORITY
 DISTRIBUTION LINE DESIGN
 AUSTIN, TEXAS

DRAWN: F. Brooks
 CHECKED: _____
 APPROVED: M. Lee

7.2/12.5 KV
 3-PHASE CROSSARM CONSTRUCTION
 STANDARD
 SECTIONALIZING AIR BREAK SWITCH

DATE:
 5/02

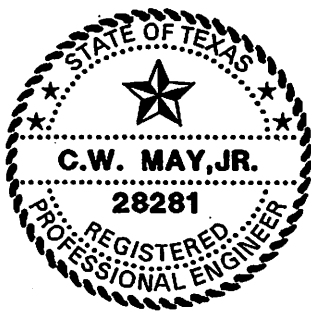
M3-15X



NOTES:

- 1) The terminal bushing connected directly to the coil should be connected to the source. Where necessary to provide for this connection the recloser may be mounted on the opposite side of the pole and the neutral deadended.
 - 2) Each recloser tank shall have two connections to ground.
 - 3) 2" Minimum clear wood clearance of all hardware.
 - 4) No bolts to extend more than 2" beyond locknut.
 - 5) Jumpers and Connectors as required.
- The seal appearing on this document was authorized by C. W. MAY, JR, P.E. 28281 on 10/2/02.

ITEM	NO.	MATERIAL	ITEM	NO.	MATERIAL
c	1	Bolt, machine, 5/8" x required length	av		Jumper, as required
d	11	Washer, square, 2-1/4" x 3/16", 11/16" hole	be	1	Recloser, oil circuit
g	2	Crossarm, 3-3/4" x 4-3/4" x 8'-0"	cj		Ground wire, #6 S.D. cu., as required
cu	2pr.	Brace, wood, 28"	ek	9	Locknut, 5/8"
i	4	Bolt, carriage 3/8" x 4-1/2"			
j	2	Screw, lag, 1/2" x 4"			
n	3	Bolt, double arming, 5/8" x req'd length			
p		Connector, as required			
sj	1	Switch, recloser by-pass			
ae	2	Lightning arrester			



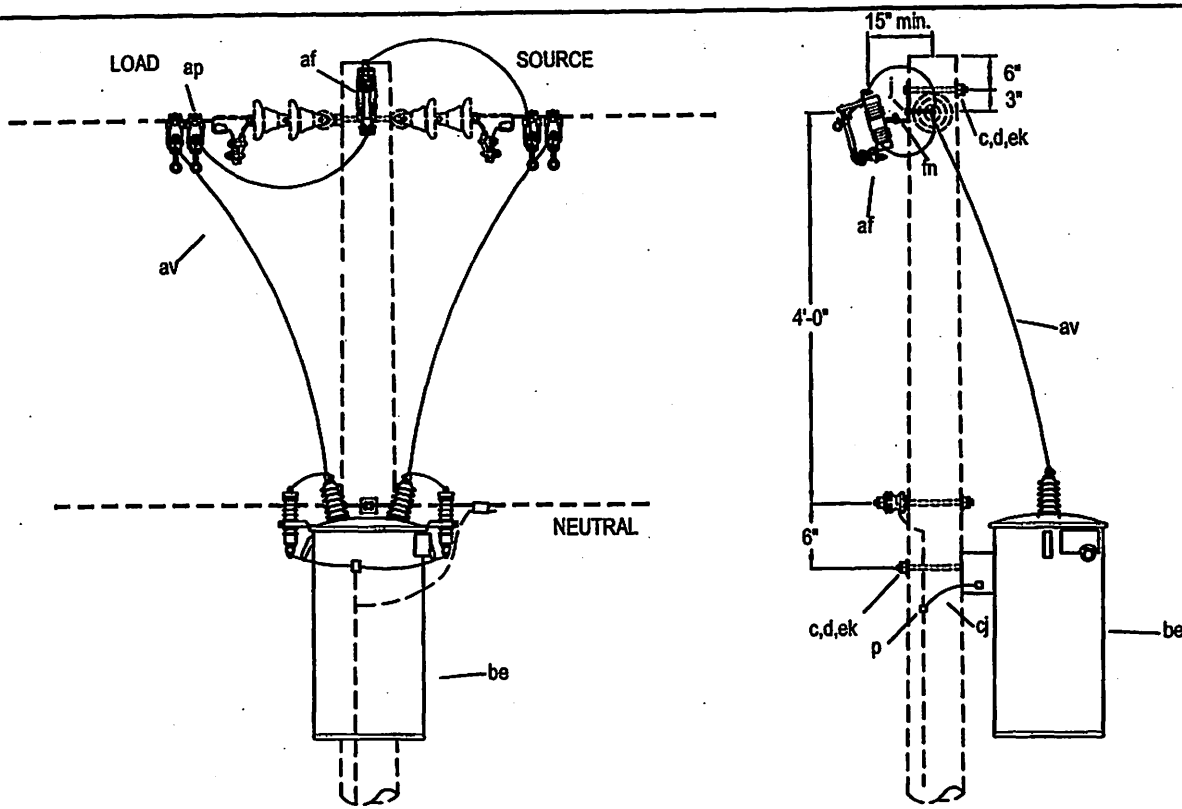
LCRA
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 LOWER COLORADO RIVER AUTHORITY
 DISTRIBUTION LINE DESIGN
 AUSTIN, TEXAS

DRAWN: J. Brooks
 CHECKED: _____
 APPROVED: M. Lee

7.2/12.5 KV.
 ONE SECTIONALIZER/ OIL CIRCUIT RECLOSER
 WITH BY-PASS SWITCH

DATE:
 05/02

M3-23

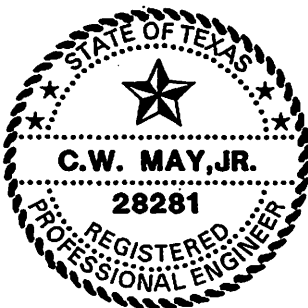


NOTES:

- 1) The terminal bushing connected directly to the coil should be connected to the source. Where necessary to provide for this connection the recloser may be mounted on the opposite side of the pole and the neutral deadended.
- 2) Each recloser tank shall have two connections to ground.
- 3) 2" Minimum clear wood clearance of all hardware.
- 4) No bolts to extend more than 2" beyond locknut.
- 5) Jumpers and Connectors as required.
- 6) Mount cutout so that exhaust blast of arc is directed away from lineman.
- 7) At borrower's option, cutout may be mounted on opposite side of pole.

The seal appearing on this document was authorized by C. W. MAY, JR, P.E. 28281 on 10/2/02.

ITEM NO.	MATERIAL	ITEM NO.	MATERIAL
c 2	Bolt, machine, 5/8" x required length	fn 1	Bracket, extension, L type
d 2	Washer, square, 2-1/4" x 3/16", 11/16" hole		
j 1	Screw, lag, 1/2" x 4"		
p	Connector, as required		
ae 2	Surge arrester		
af 1	Cutout		
ap 4	Clamp, hotline, with stirrup		
av	Jumpers, stranded, as required		
be 1	Recloser, oil circuit		
ek 2	Locknut, 5/8"		



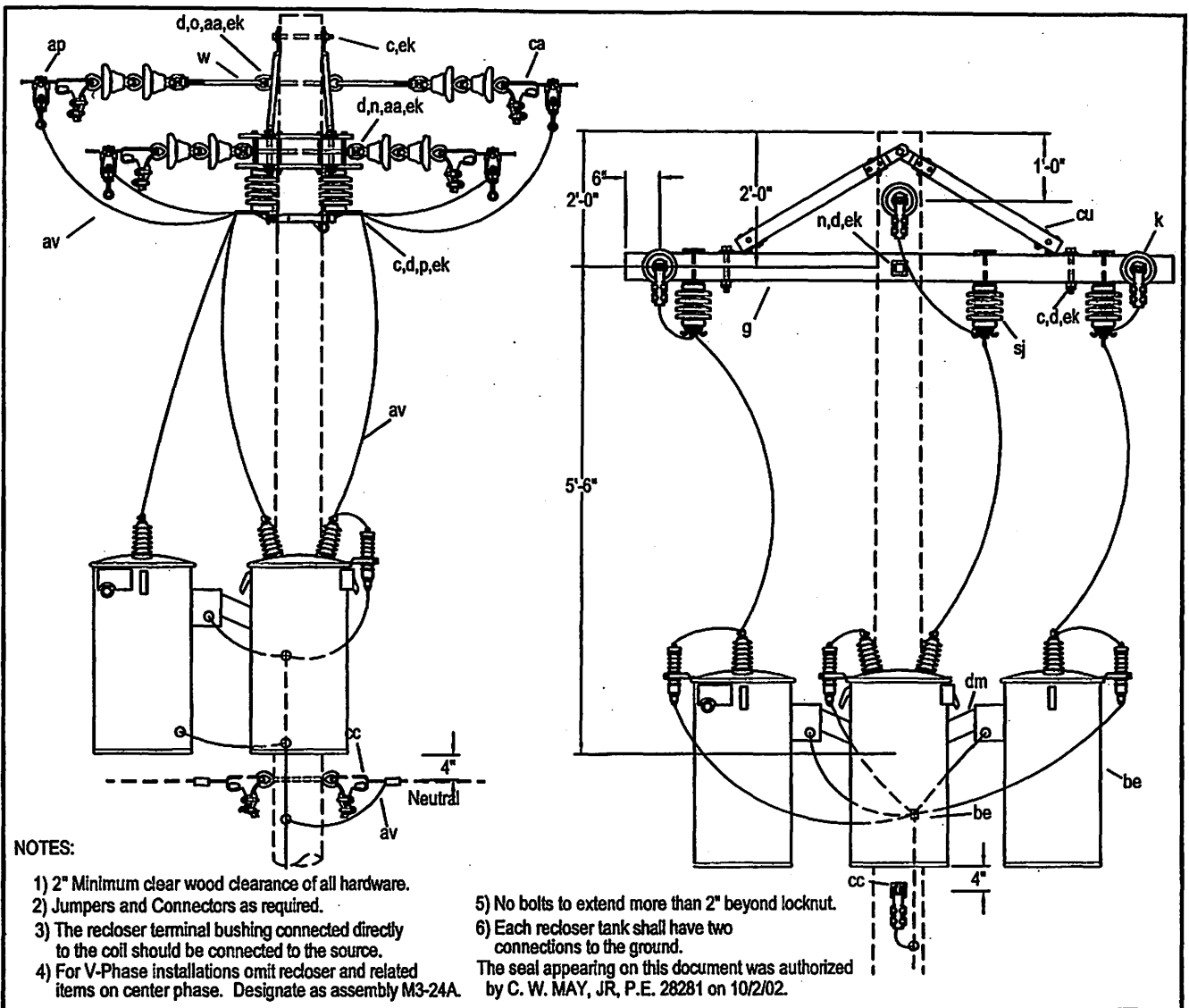
LCRA
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 LOWER COLORADO RIVER AUTHORITY
 DISTRIBUTION LINE DESIGN
 AUSTIN, TEXAS

DRAWN: J. Brooks
 CHECKED: _____
 APPROVED: M. Lee

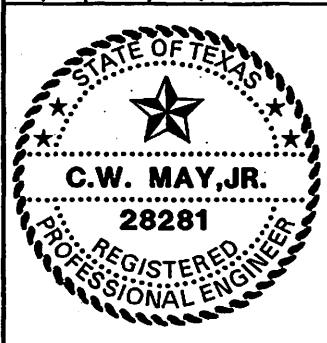
7.2/12.5 KV. 1 - PHASE
 ONE SECTIONALIZER/ OIL CIRCUIT RECLOSER
 WITH BY-PASS CUTOUT

DATE:
 05/02

M3-23A



ITEM	NO.	MATERIAL	ITEM	NO.	MATERIAL
c	16	Bolt, machine, 1/2" x required length	av		Jumper, as required
c	1	Bolt, machine, 5/8" x required length	be	3	Recloser, oil circuit
d	16	Washer, round, 1 3/8", 9/16" hole	ca	6	Deadend assembly, primary
d	14	Washer, square, 2 1/4" x 3/16", 11/16" hole	cc	2	Deadend assembly, neutral
g	2	Crossarm, 3-5/8 x 4-5/8" x 8'-0"	cu	2 pr.	Brace, crossarm, wood, 60" span
k	12	Insulator, suspension	dm	1	Bracket, cluster type
n	3	Bolt, double arming, 5/8" x required length	ek	10	Locknut, 5/8"
o	2	Bolt, eye, 5/8" x required length	ek	16	Locknut, 1/2"
p		Connectors, as required	sj	3	Switch, recloser by-pass
w	2	Insulator, guy strain, 24", 16,000#			
aa	6	Nut, eye, 5/8"			
ae	3	Lightning arrester			
ap	6	Clamp, hotline, with stirrup			



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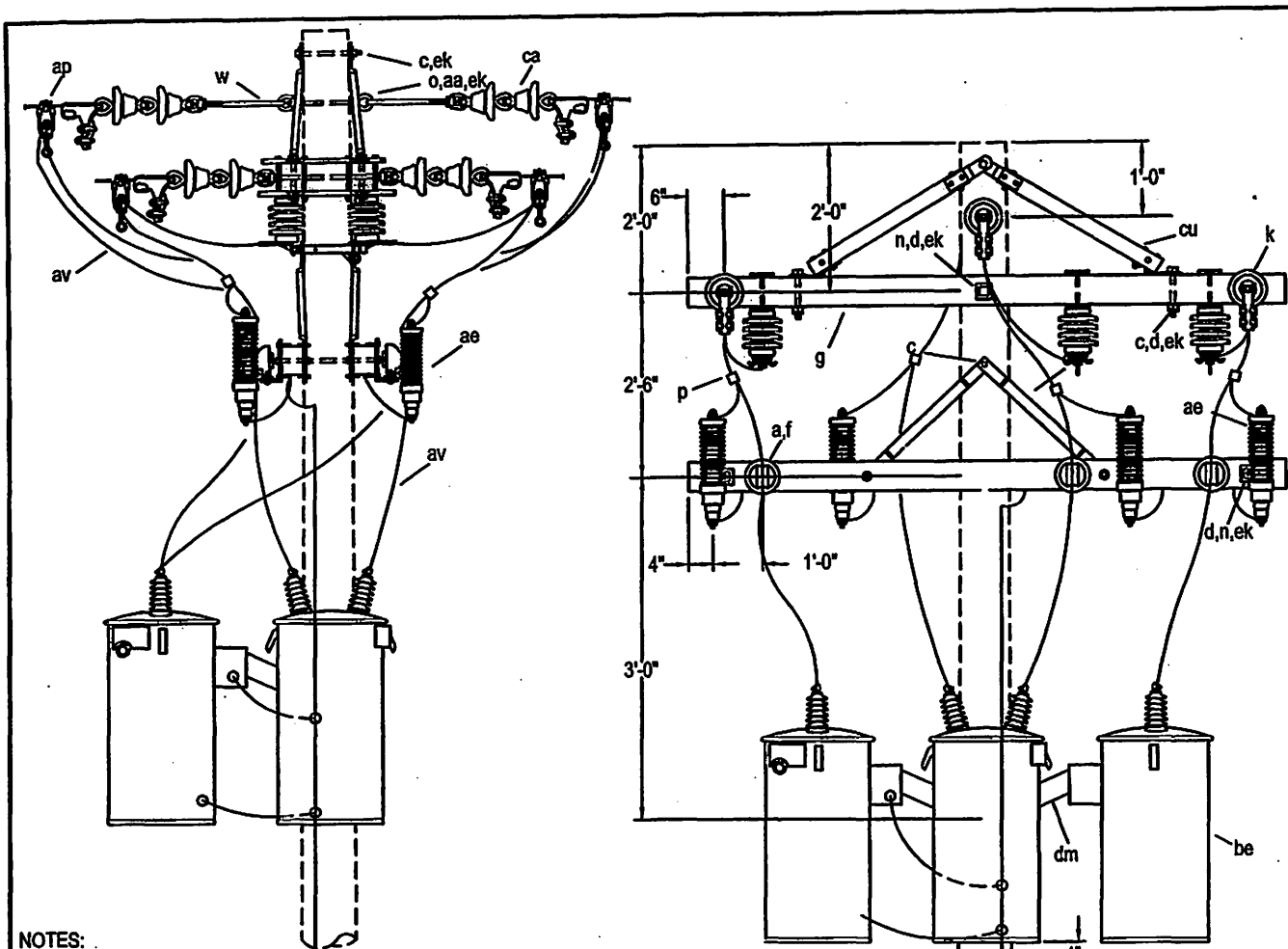
LOWER COLORADO RIVER AUTHORITY
DISTRIBUTION LINE DESIGN
AUSTIN, TEXAS

DRAWN: J. Crooks
CHECKED: _____
APPROVED: M. LEE

7.2/12.5 KV.
2 OR 3 SINGLE PHASE SECTIONALIZERS
OR OIL CIRCUIT RECLOSERS

DATE: _____
5/02

M3-24A, M3-25A



NOTES:

- 1) The terminal bushing connected directly to the coil should be connected to the source.
- 2) For V-phase installation omit center phase and adjust material list and designate M3-11X.
- 3) Each recloser tank shall have two connections to ground.

- 4) 2" Minimum clear wood clearance of all hardware.
- 5) No bolts to extend more than 2" beyond locknut.
- 6) Jumpers and Connectors as required.

The seal appearing on this document was authorized by C. W. MAY, JR, P.E. 28281 on 10/2/02.

ITEM	NO.	MATERIAL	ITEM	NO.	MATERIAL
a	6	Insulator, pin-type	aa	2	Nut, eye, 5/8"
c	1	Bolt, machine, 5/8" x required length	ae	6	Lightning arrester
c	5	Bolt, machine, 1/2" x required length	ap	12	Connector, hotline tap assembly
d	4	Washer, round, 1-3/8" diameter, 9/16" hole	av		Leads or jumpers as required
d	22	Washer, square, 2-1/4" x 3/16" x 11/16" hole	be	3	Recloser, oil circuit
f	6	Pin, crossarm, steel, 5/8" x 10-3/4"	ca	6	Deadend assembly, primary
g	4	Crossarm, 3-5/8" x 4-5/8" x 8'-0"	cc	2	Deadend assembly, neutral
i	4	Bolt, carriage, 3/8" x 4-1/2"	cj		Ground wire, #6 S.D. copper or equivalent
k	12	Insulator, suspension	cu	2pr.	Brace, crossarm, wood, 28" span
n	6	Bolt, double arming, 5/8" x required length	cu	2pr.	Brace, crossarm, wood, 60" span
o	2	Bolt, eye, 5/8" x required length	dm	1	Bracket, cluster, for OCR'S
p		Connector, as required	SJ	3	Bracket, cluster mount, for OCR's
w	2	Insulator, guy strain, 24", 16,000#	ek		Locknut, as required



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LOWER COLORADO RIVER AUTHORITY
DISTRIBUTION LINE DESIGN
AUSTIN, TEXAS

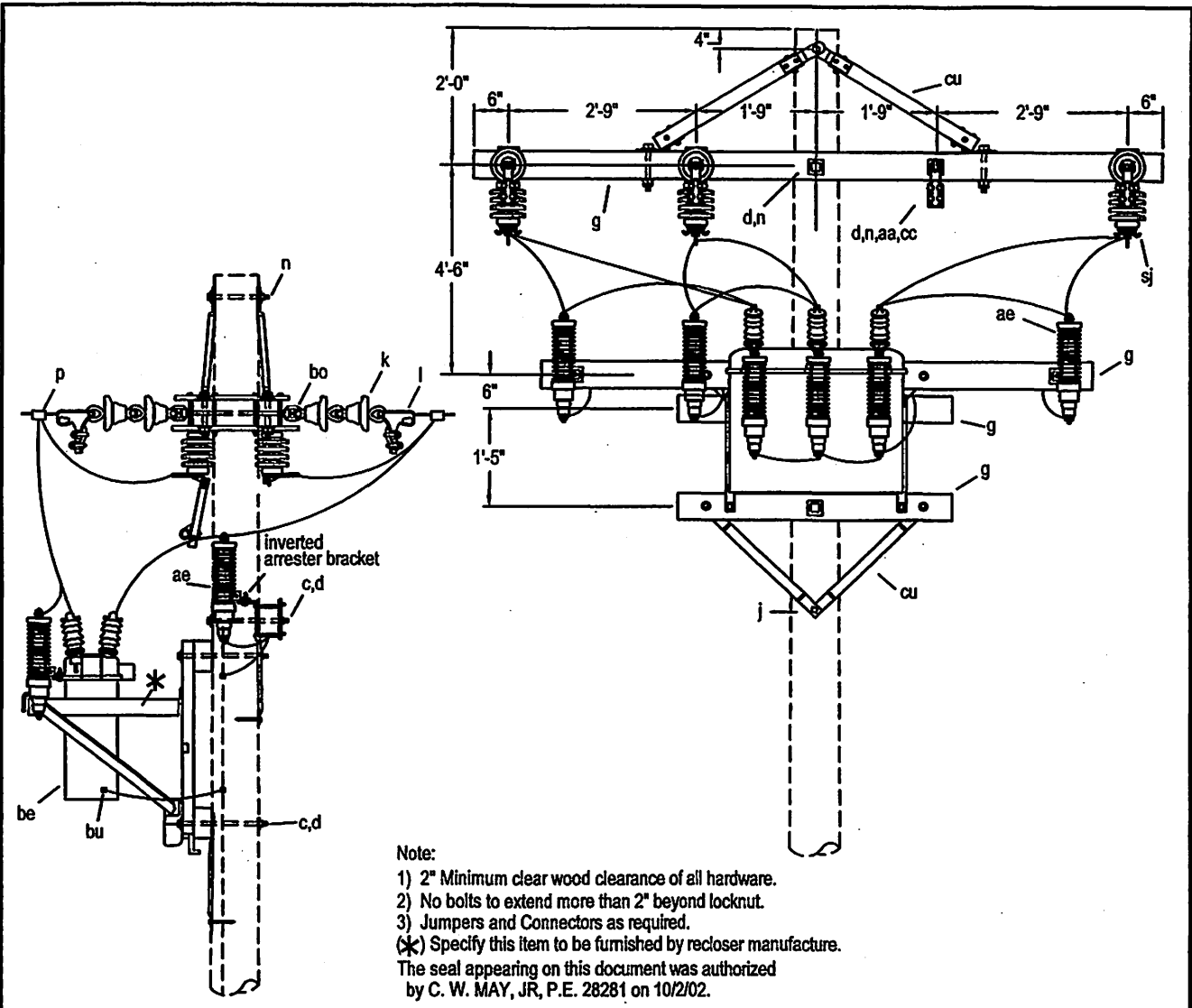
DRAWN: F. Bracke
CHECKED: _____
APPROVED: M. Lu

7.2/12.5 KV.
2 OR 3 SINGLE PHASE SECTIONALIZERS
OR OIL CIRCUIT RECLOSERS WITH
BYPASS SWITCHES

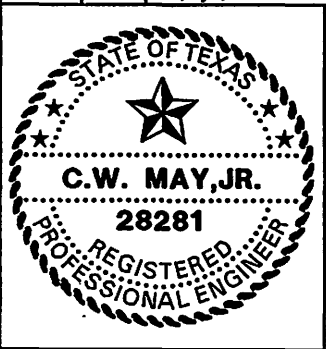
DATE: _____

M3-24X, M3-25X

5/02



ITEM	NO.	MATERIAL	ITEM	NO.	MATERIAL
c	4	Bolt, machine, 1/2" x required length	ae	6	Lightning arrester
c	15	Bolt, machine, 5/8" x required length	av		Jumper, as required
d	4	Washer, round, 1-3/8" diameter	be	1	Recloser, oil circuit, 3 phase
d	12	Washer, square, 2-1/4" x 11/16" hole	bo	6	Shackle, anchor
g	2	Crossarm, 3-3/4" x 4-3/4" x 4' - 0"	bu	1	connector, solderless
g	1	Crossarm, 3-3/4" x 4-3/4" x 8' - 0"	ca	6	Deadend assembly, primary
g	2	Crossarm, 3-3/4" x 4-3/4" x 10' - 0"	cc	2	Deadend assembly, neutral
i	8	Clamp, deadend	cu	2pr.	Brace, crossarm, wood, 28" span
j	2	Screw, lag, 1/2" x 4"	cu	2pr.	Brace, crossarm, wood, 60" span
k	12	Insulator, suspension	aj	3	Switch, bypass
n	3	Bolt, double arming, 5/8" x required length	ek	24	Locknut, 5/8"
p		Connector, as required	ek	4	Locknut, 1/2"
aa	4	Nut, eye, 5/8"			



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LOWER COLORADO RIVER AUTHORITY
 DISTRIBUTION LINE DESIGN
 AUSTIN, TEXAS

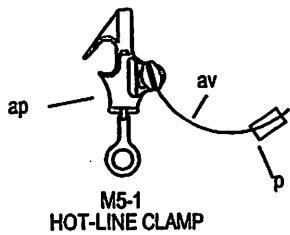
DRAWN: F. Brooks
 CHECKED: _____
 APPROVED: M. Lu

3Ø OIL CIRCUIT RECLOSER
 WITH BYPASS SWITCHES

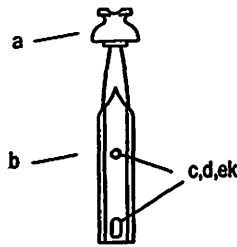
DATE: _____

5/02

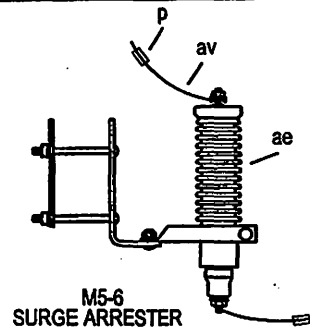
M3-30



M5-1
HOT-LINE CLAMP



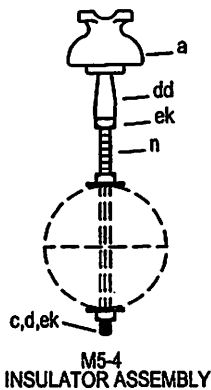
M5-2
POLE-TOP PIN / INSULATOR ASSEMBLY



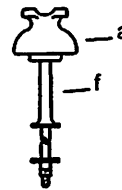
M5-6
SURGE ARRESTER



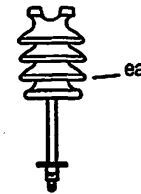
M5-3
PIN INSULATOR



M5-4
INSULATOR ASSEMBLY



M5-5
INSULATOR

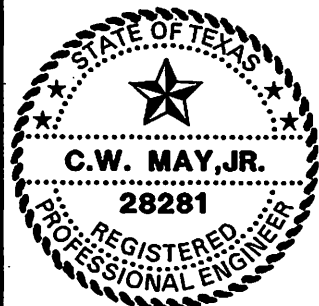


M5-7
INSULATOR

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by C. W. MAY, JR, P.E. 28281 on 10/2/02.

ASSEMBLY UNIT

ITEM	MATERIAL	M5-1	M5-2	M5-3	M5-4	M5-5	M5-6	M5-7
a	Insulator, pin type		1	1	1	1		
b	Pin, pole top, 20"		1					
c	Bolt, machine, 5/8" x required length		2					
d	Washer, square, 2 1/4" x 3/16", 11/16" hole		2		2			1
f	Pin, crossarm, steel, 5/8" x 10 3/4"					1		
n	Bolt, double arming, 5/8" x required length				1			
p	Connector	1					2	
ae	Lightning arrester						1	
ap	Clamp, hot line	1						
av	Jumper	1					2	
dd	Adapter, insulator				1			
ea	Insulator, post type, 7" stud							1
ek	Locknut, 5/8"		2		3			



LOWER COLORADO RIVER AUTHORITY
DISTRIBUTION LINE DESIGN
AUSTIN, TEXAS

DRAWN: J. Brooks
CHECKED: _____
APPROVED: M. Lee

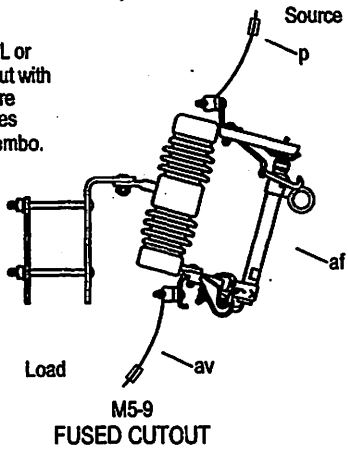
MISCELLANEOUS PRIMARY UNITS

DATE:
5/02

M5-1 THRU M5-7

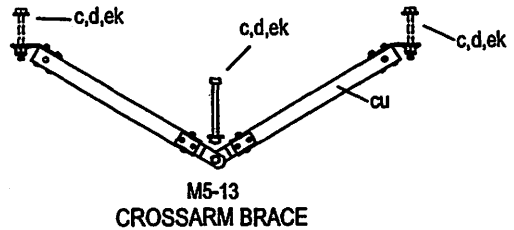
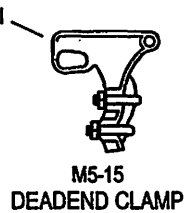
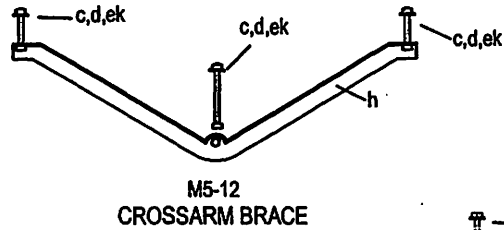
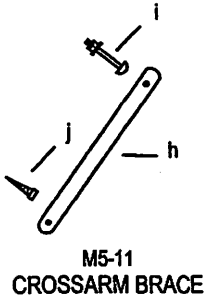
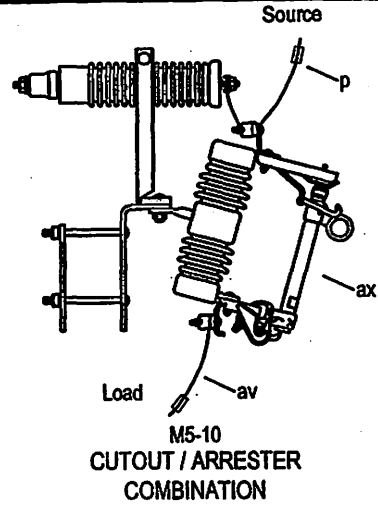
NOTE:

1. Specify M5-9L or M5-9XL for cutout with load break feature
2. M5-9X denotes pole mounted combo.



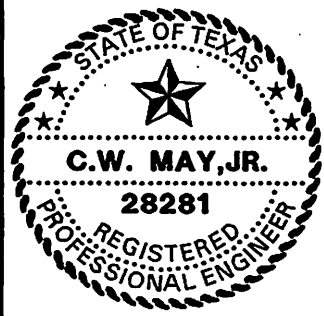
NOTE:

1. Specify M5-10L or M5-10XL for cutout with load break feature
2. M5-10X denotes pole mounted combo.



The seal appearing on this document was authorized by C. W. MAY, JR, P.E. 28281 on 10/2/02.

ITEM	MATERIAL	ASSEMBLY UNIT					
		M5-9	M5-10	M5-11	M5-12	M5-13	M5-15
c	Bolt, machine, 1/2" x required length				2	2	
c	Bolt, machine, 5/8" x required length				1	1	
d	Washer, square, 2 1/4" x 3/16", 11/16" hole				1	1	
d	Washer, round, 1 3/8" diameter, 9/16" hole				2	2	
h	Brace, flat, 1 1/4" x 1/4" x 28"			1			
h	Brace, angle, 1 1/2" x 1 1/2" x 3/16", 60° span				1		
i	Bolt, carriage, 3/8" x 4 1/2"			1			
j	Screw, lag, 1/2" x 4"			1			
l	Clamp, deadend						1
p	Connector	2	2				
af	Cutout, single shot	1					
av	Jumper	2	2				
ax	Cutout and arrester combination		1				
cu	Brace, wood, 60° span, pair					1	
ek	Locknuts, as required				3	3	



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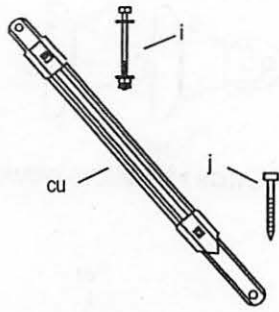
LOWER COLORADO RIVER AUTHORITY
DISTRIBUTION LINE DESIGN
AUSTIN, TEXAS

DRAWN: J. Brooks
CHECKED: _____
APPROVED: M. Lee

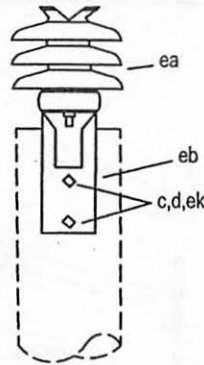
MISCELLANEOUS PRIMARY UNITS

DATE: 5/02

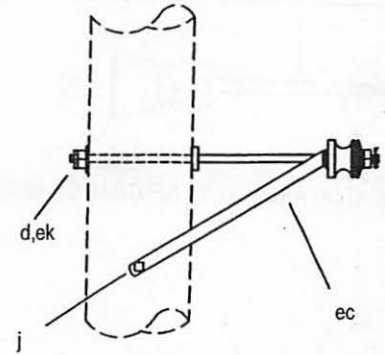
M5-9 THRU M9-13,
M5-15



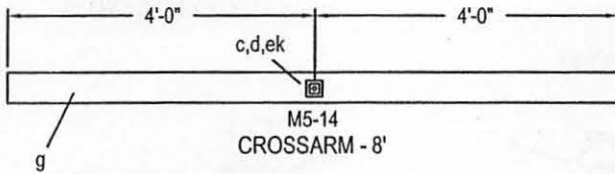
M5-17
CROSSARM BRACE



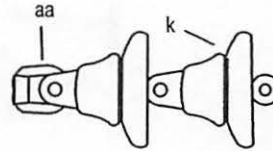
M5-18
CROSSARM PIN
POST INSULATOR



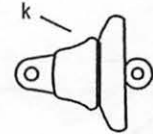
M5-19
NEUTRAL OFFSET BRACKET



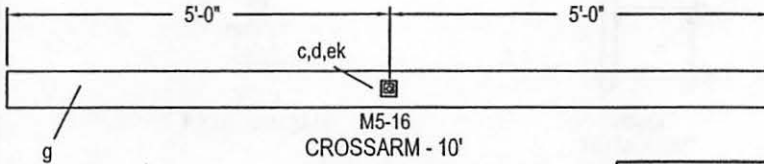
M5-14
CROSSARM - 8'



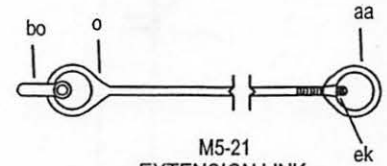
M5-20
SUSPENSION INSULATOR STRING



M5-20X
SUSPENSION INSULATOR



M5-16
CROSSARM - 10'



M5-21
EXTENSION LINK

The seal appearing on this document was authorized
by C. W. MAY, JR, P.E. 28281 on 10/2/02.

ASSEMBLY UNIT

ITEM	MATERIAL	M5-14	M5-16	M5-17	M5-18	M5-19	M5-20	M5-20X	M5-21
c	Bolt, machine, 5/8" x required length	1	1		2				
d	Washer, square	1	1		2	1			
g	Crossarm, 3 5/8" x 4 5/8" x 8' - 0"	1							
g	Crossarm, 3 5/8" x 4 5/8" x 10' - 0"		1						
i	Bolt, carriage, 3/8" x 4 1/2"			1					
j	Screw, lag, 1/2" x 4"			1		1			
k	Insulator, suspension						2	1	
o	Bolt, eye, 5/8" x required length								1
aa	Nut, eye, 5/8"						1		1
bo	Shackle, anchor								1
cu	Brace, wood, 28"			1					
ea	Insulator, post type, 1 3/4" stud				1				
eb	Bracket, for post type insulator				1				
ec	Bracket, offset, neutral, insulated					1			
ek	Locknut, 5/8"	1	1		2	1			1



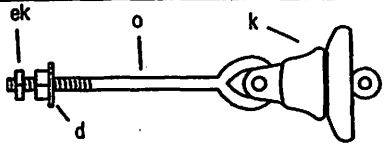
LCRA
ENERGY • WATER • COMMUNITY SERVICES
LOWER COLORADO RIVER AUTHORITY
DISTRIBUTION LINE DESIGN
AUSTIN, TEXAS

DRAWN: F. Brooks
CHECKED: _____
APPROVED: M. Lee

MISCELLANEOUS PRIMARY UNITS

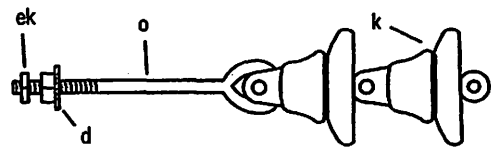
DATE:
5/02

M5-14, M5-16
THRU M5-21



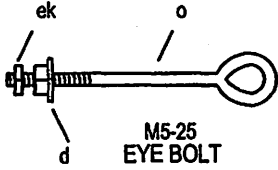
M5-26

INSULATOR ASSEMBLY - NEUTRAL OR SECONDARY

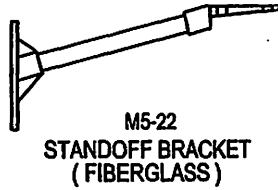


M5-24

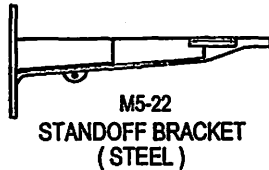
INSULATOR ASSEMBLY - PRIMARY



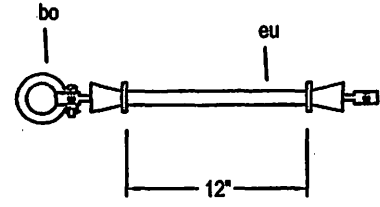
M5-25
EYE BOLT



M5-22
STANDOFF BRACKET
(FIBERGLASS)



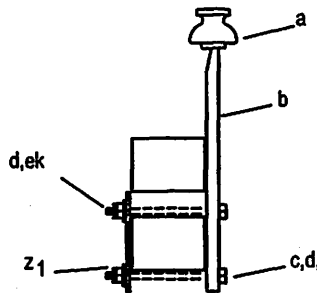
M5-22
STANDOFF BRACKET
(STEEL)



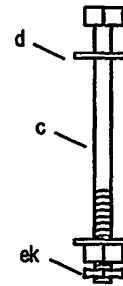
M5-23
INSULATED EXTENSION LINK



M5-27
ALLEY ARM BRACE



M5-28
INSULATOR



M5-29
MACHINE BOLT

ASSEMBLY UNIT

The seal appearing on this document was authorized by C. W. MAY, JR, P.E. 28281 on 10/20/02.

ITEM	MATERIAL	M5-22	M5-23	M5-25	M5-26	M5-26	M5-27	M5-28	M5-29
a	Insulator, pin type							1	
b	Pin, pole top, 20"							1	
c	Bolt, machine, 3/8" x required length							2	
c	Bolt, machine, 5/8" x required length						1		1
d	Washer, round, 1 3/8" diameter, 9/16" hole							4	
d	Washer, square, 2 1/4" x 3/16", 11/16" hole			1	1	1	1		2
j	Screw, lag, 1/2" x 4"						2		
k	Insulator, suspension			2		1			
o	Bolt, eye, 5/8" x required length			1	1	1			
z1	Cutout bracket backstrap							1	
ac	Brace, alley arm, 1 3/4" x 3/16" x 7' - 0"						1		
bo	Shackle, anchor		1						
ek	Locknuts, 5/8"			1	1	1	1	2	1
eq	Bracket, Metal, 18", Double Pin	1							
eq	Bracket, Fiberglass, 18", Double Pin	1							
eu	Link, extension, insulated		1						



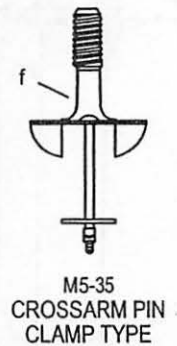
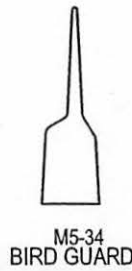
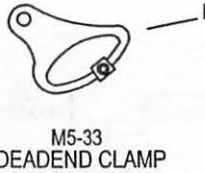
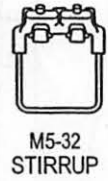
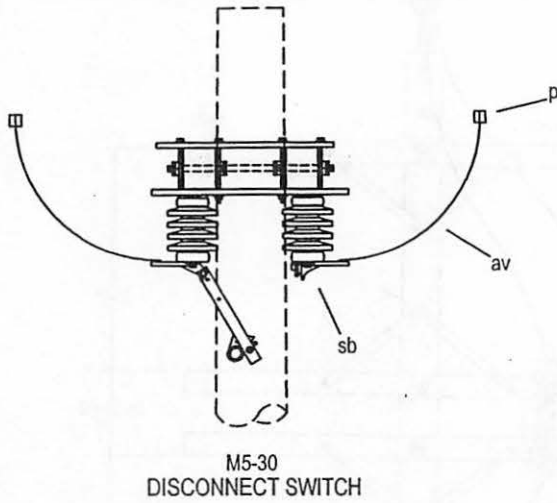
LCRA
ENERGY • WATER • COMMUNITY SERVICES
LOWER COLORADO RIVER AUTHORITY
DISTRIBUTION LINE DESIGN
AUSTIN, TEXAS

DRAWN: J. Brooks
CHECKED: _____
APPROVED: M. Lee

MISCELLANEOUS
PRIMARY ASSEMBLIES

DATE:
05/02

M5-22 THRU M5-29



The seal appearing on this document was authorized by C. W. MAY, JR, P.E. 28281 on 10/2/02.

ITEM	MATERIAL	ASSEMBLY UNIT					
		M5-30	M5-31	M5-32	M5-33	M5-34	M5-35
f	Pin, crossarm, clamp type						1
l	clamp, deadend				1		
p	Connector	2					
aa	Nut, eye, 5/8"		1				
av	Jumper	2					
sb	Switch, disconnect, single - pole	1					
	Clamp, stirrup			1			
	Guard, bird				1		



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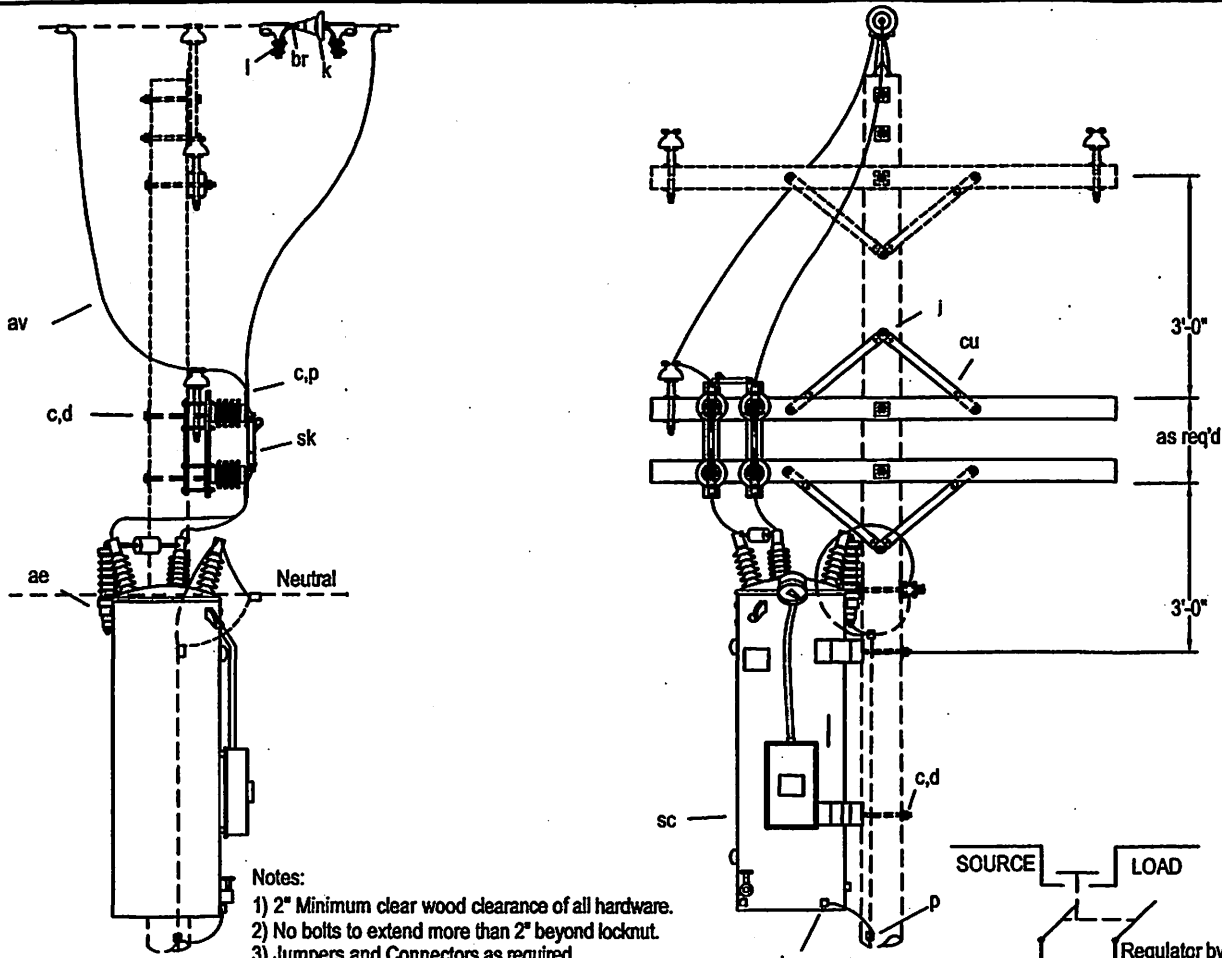
LOWER COLORADO RIVER AUTHORITY
DISTRIBUTION LINE DESIGN
AUSTIN, TEXAS

DRAWN: J. Brooks
CHECKED: _____
APPROVED: M. Lee

MISCELLANEOUS
PRIMARY ASSEMBLIES

DATE: _____
05/02

M5-30 TO M5-35

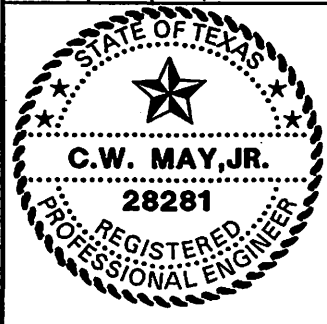


Notes:

- 1) 2" Minimum clear wood clearance of all hardware.
- 2) No bolts to extend more than 2" beyond locknut.
- 3) Jumpers and Connectors as required.
- 4) Where strength of existing pole is inadequate for regulator weight, use two pole structure as shown on drawing M7-13.
- 5) Control box may be located on the pole below regulator. If so add the required amount of control cable.
- 6) Control cabinet must be grounded when separate from the regulator tank.

* Specify this item to be furnished by the Regulator manufacturer.
The seal appearing on this document was authorized
by C. W. MAY, JR, P.E. 28281 on 10/2/02.

ITEM	NO.	MATERIAL	ITEM	NO.	MATERIAL
a	1	Insulator, pin type	p		Connector, as required
c	4	Bolt, machine, 1/2" x required length	ae	2	Lightning arrester
c	4	Bolt, machine, 5/8" x required length	ae	1	*Bypass arrester
d	4	Washer, round, 1-3/8", 9/16"	av		Jumpers, stranded, as required
d	9	Washer, square, 2-1/4" x 3/16", 11/16" hole	br	1	Chain link, 5/8" x 3-3/4"
f	1	Pin, crossarm, 5/8" x 10-3/4"	bu		Connector, grounding, as required
h	2	Crossarm, 3-5/8" x 4-5/8" x 8'-0"	cj		Ground wire, cu., as required
i	4	Bolt, carriage, 3/8" x 4"	cu	2pr.	Brace, wood, 28"
j	4	Screw, lag, 1/2" x 4"	ek		Locknut, 5/8"
k	1	Insulator, suspension	sc	1	Regulator, step type
l	2	Clamp, deadend	sk	1	Switch, regulator, step type



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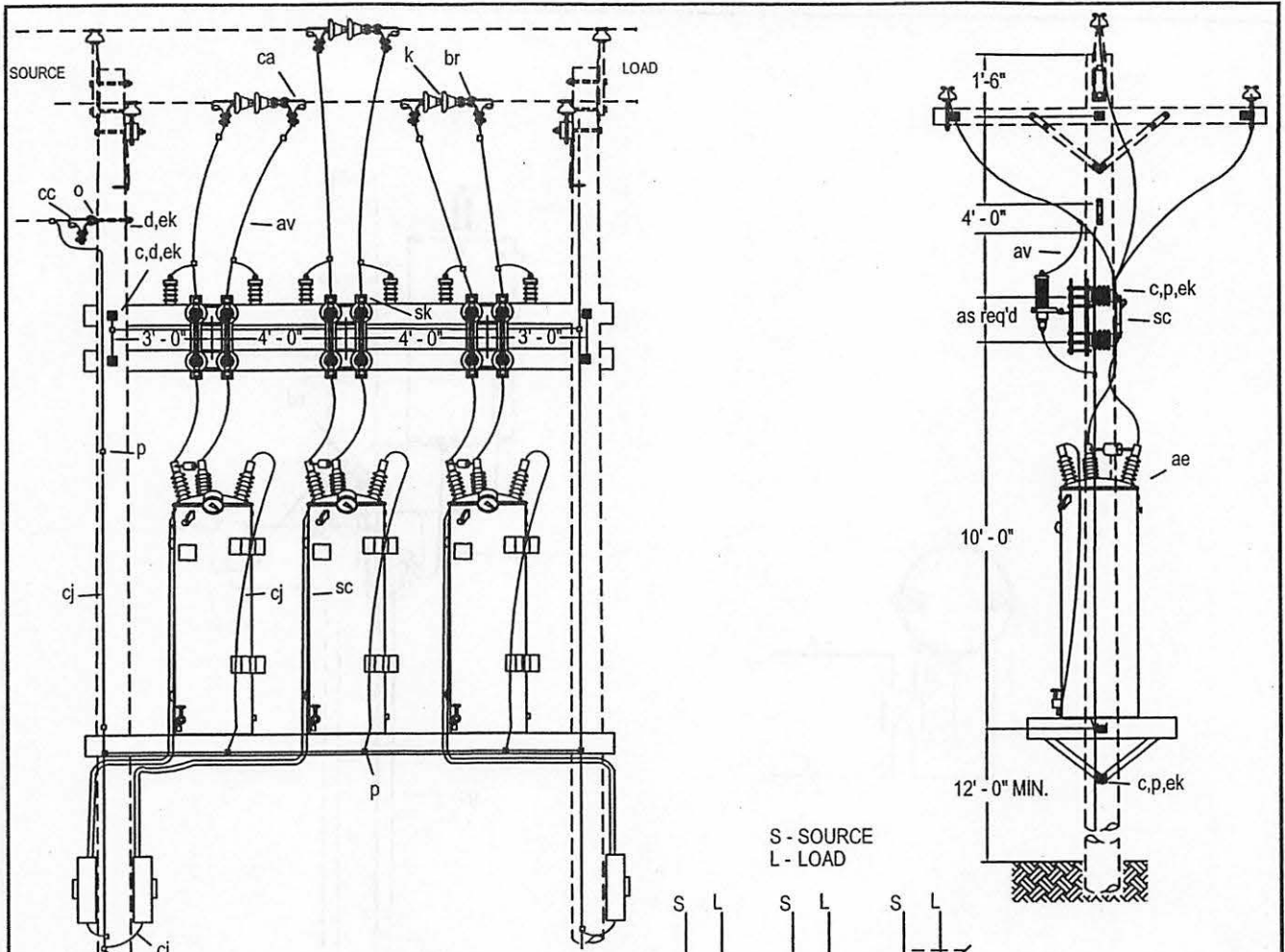
DRAWN: F. Brooks
CHECKED: _____
APPROVED: M. Lee

7.2/12.5 K.V.
ONE VOLTAGE REGULATOR
POLE MOUNTED

DATE: _____

5/02

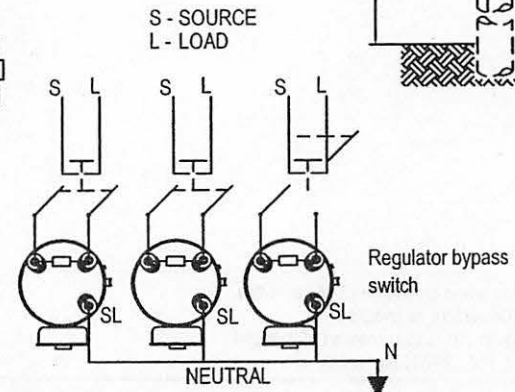
M7-11



Note:

- 1) 2" Minimum clear wood clearance of all hardware.
- 2) No bolts to extend more than 2" beyond locknut.
- 3) Jumpers and Connectors as required.
- 4) All structural timber and planks to be treated as per R.E.A. specifications

(* Specify this item to be furnished by the regulator manufacturer
The seal appearing on this document was authorized by C. W. MAY, JR, P.E. 28281 on 10/2/02.



ITEM NO.	MATERIAL	ITEM NO.	MATERIAL
c 36	Bolt, machine, 1/2" x required length	av	Jumper, as required
c 12	Bolt, machine, 3/4" x required length	br 3	Chain link, 5/8" x 3-3/4"
c 4	Bolt, machine, 5/8" x required length	ca 6	Deadend assembly, primary
d 20	Washer, square, 2-1/4" x 3/16", 11/16" hole	cj	Ground wire, #6 S.D. Cu., as required
d 4	Washer, square, 3" x 1/4", 13/16" hole	cj	Ground wire, #2 S.D. Cu., as required
d 12	Washer, round, 13/8" diameter, 9/16" hole	ek	Locknut, 5/8"
g 2	Crossarm, 3-5/8" x 5-5/8" x 16'-0"	ek 36	Locknut, 1/2"
j	Screw, lag, 1/2" x 4"	ek 4	Locknut, 3/4"
k 6	Insulator, suspension	sc 3	Switch, regulator by-pass
p	Connector, as required	sk 3	Regulator, step type
ae 6	Lightning arrester		Platform, 14'-9" assembly strength
ae 3	*Bypass arrester		



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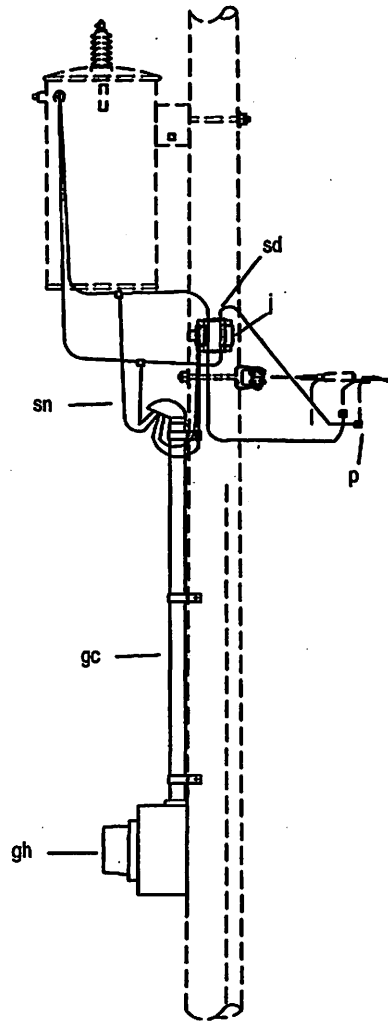
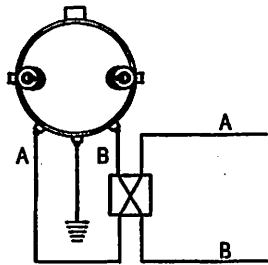
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DISTRIBUTION LINE DESIGN
AUSTIN, TEXAS

DRAWN: F. Brooks
CHECKED: _____
APPROVED: M. Lee

7.2 / 12.5 K.V.
THREE VOLTAGE REGULATORS
POLE MOUNTED

DATE: _____
5/02

M7-13



Notes:

- 1) 2" Minimum clear wood clearance of all hardware.
- 2) Jumpers and Connectors as required.

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ITEM	NO.	MATERIAL	ITEM	NO.	MATERIAL
j	2	Screw, lag, 1/2" x 4"			
p		Connectors, as required			
gc		Conduit, 1-1/4" x required length			
	3	Strap, conduit			
gh	1	Meter box, meter and test block			
sd	1	Transformer, current			
sn		Wire, size as required			
	1	Service head			



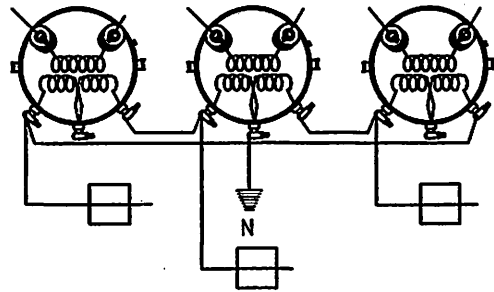
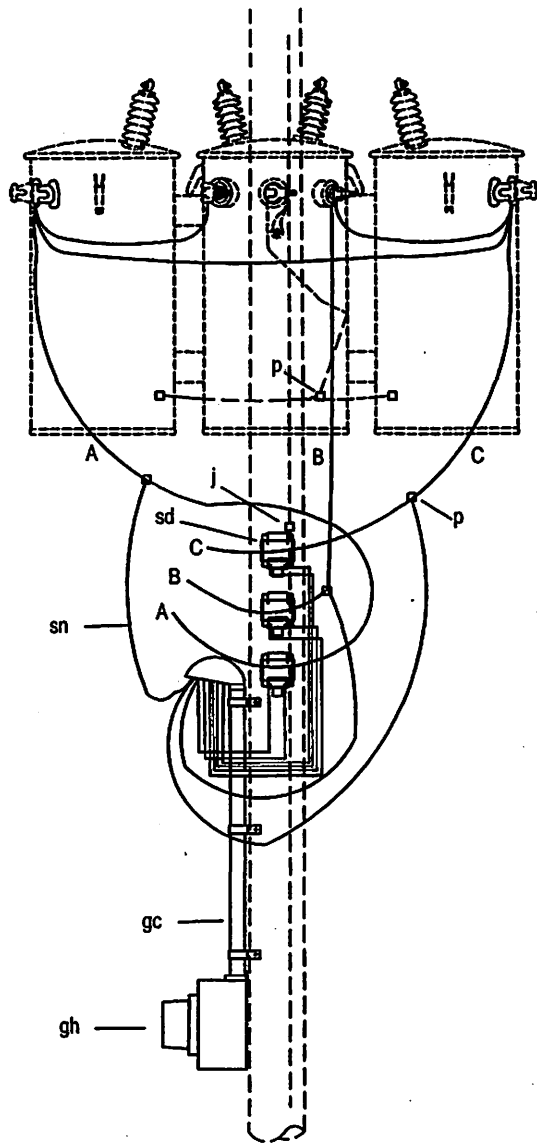
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DISTRIBUTION LINE DESIGN
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DRAWN: F. Brooks
CHECKED: _____
APPROVED: M. Lee

SECONDARY METERING GUIDE
SINGLE PHASE 120/240
CT RATED METER

DATE:
5/02

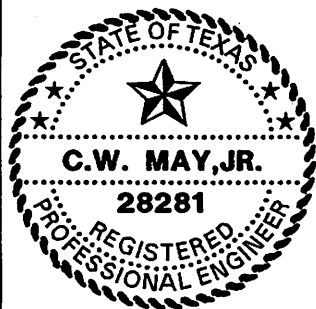
M8



NOTES:

- 1) C.T. with 2 wires should have twice primary rating of single wire C.T.
 - 2) This arrangement of metering equipment is designed for use with the transformer drawing G310
- The seal appearing on this document was authorized by C. W. MAY, JR, P.E. 28281 on 10/2/02.

ITEM	NO.	MATERIAL	ITEM	NO.	MATERIAL
j	4	Screw, lag, 1/2" x 4"			
p		Connectors, as required			
gc		Conduit, 1-1/4", as required			
		Strap, conduit, as required			
gh	1	Meter box, meter			
sd	2	Transformer, current			
sn		Wire, size as required			
	1	Service head			



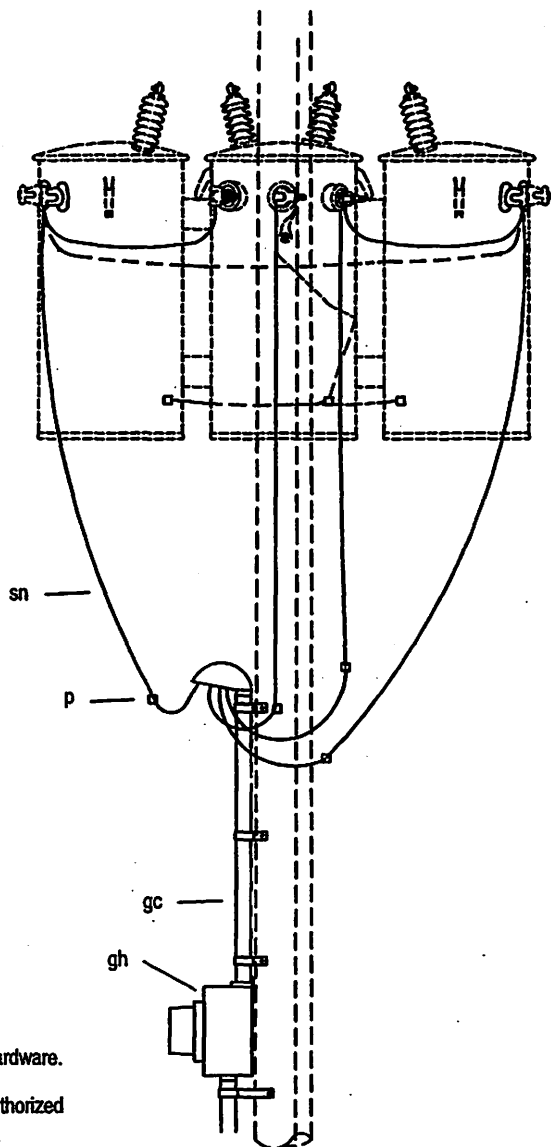
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 AUSTIN, TEXAS

DRAWN: J. Brooks
 CHECKED: _____
 APPROVED: M. Lee

SECONDARY METERING GUIDE
 THREE PHASE 120/240 VOLT
 4 WIRE DELTA
 CT RATED METER (FORM 8 S)

DATE:
 5/02

M8-6



Notes:

- 1) 2" Minimum clear wood clearance of all hardware.
- 2) Jumpers and Connectors as required.

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ITEM	NO.	MATERIAL	ITEM	NO.	MATERIAL
p		Connector, as required			
gc		Conduit, 1-1/4", as required			
		Strap, conduit, as required			
gh	1	Meter box			
sn		Wire, size as required			
	1	Service head			



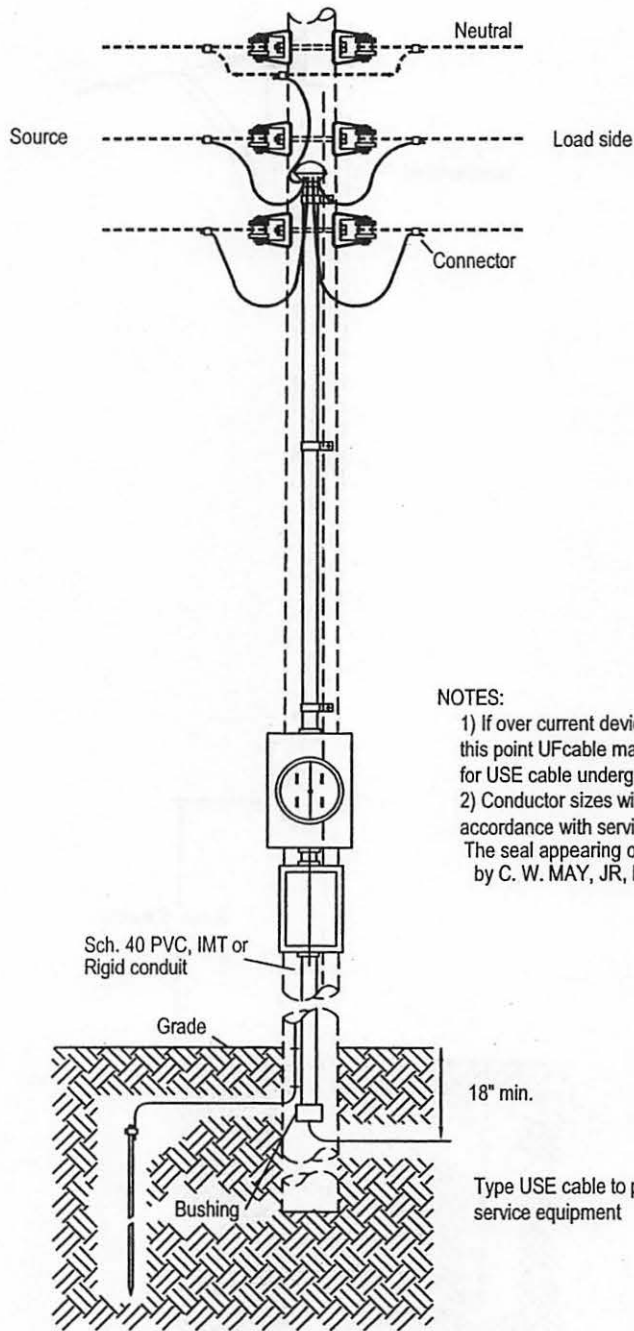
LOWER COLORADO RIVER AUTHORITY
DISTRIBUTION LINE DESIGN
AUSTIN, TEXAS

DRAWN: F. Brooks
CHECKED: _____
APPROVED: M. Lee

SECONDARY METERING GUIDE
THREE PHASE 120/240 VOLT
4 WIRE DELTA
SELF CONTAINED METER

DATE:
5/02

M8-6X



NOTES:

- 1) If over current device is used at this point UF cable may be substituted for USE cable underground.
- 2) Conductor sizes will be in accordance with service load.

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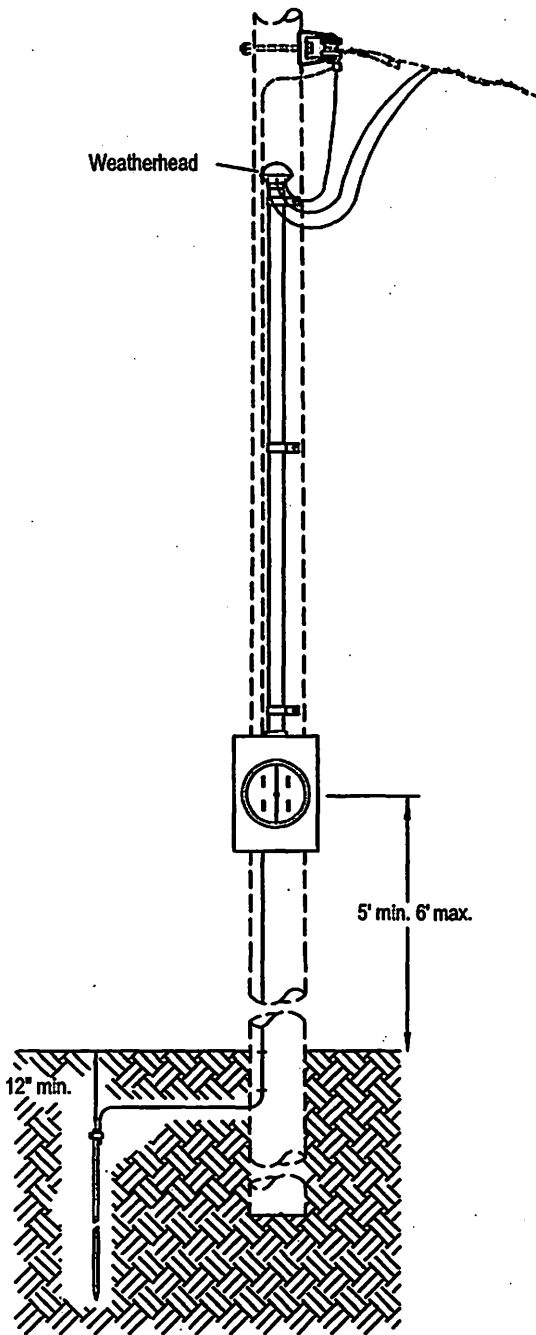
DRAWN: J. Brooks
CHECKED: _____
APPROVED: M. Lee

**GUIDE TO YARD POLE METER INSTALLATION
SHOWING PUMP SERVICE CARRIED UNDERGROUND**

DATE:

5/02

M8-9



NOTES:

Conductor sizes will be in accordance with service load.

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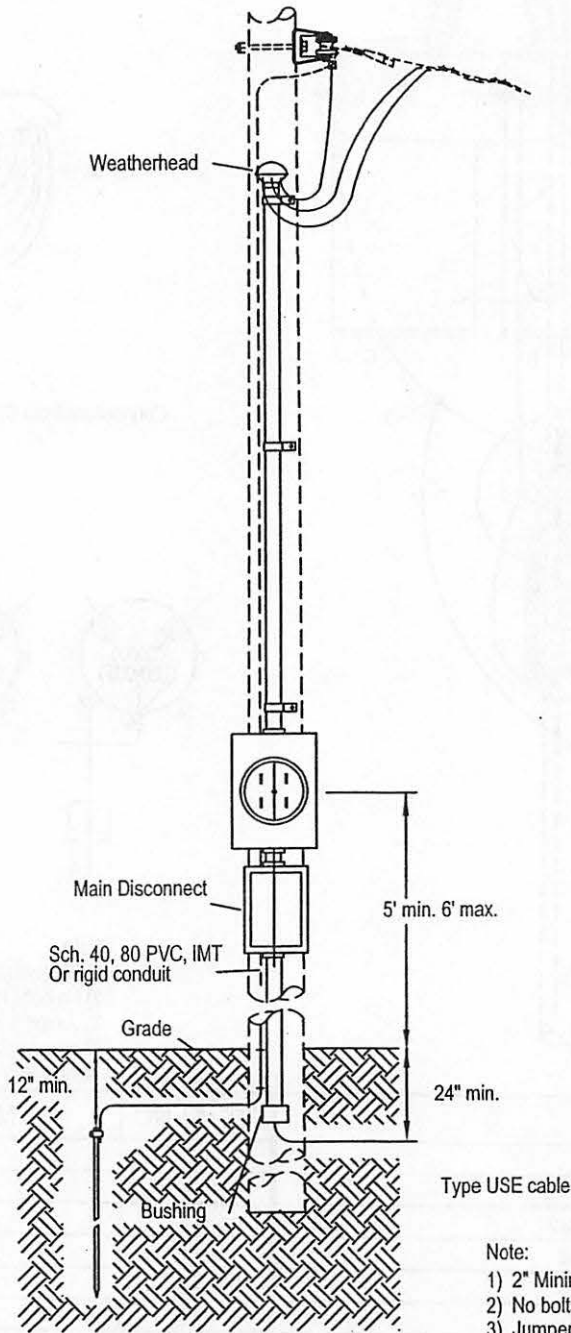
LOWER COLORADO RIVER AUTHORITY
DISTRIBUTION LINE DESIGN
AUSTIN, TEXAS

DRAWN: J. Brooks
CHECKED: _____
APPROVED: M. Lee

GUIDE TO METER INSTALLATION

DATE:
05/02

M8-9X



Note:

- 1) 2" Minimum clear wood clearance of all hardware.
- 2) No bolts to extend more than 2" beyond locknut.
- 3) Jumpers and Connectors as required.
- 4) Conductor sizes will be in accordance with service load.

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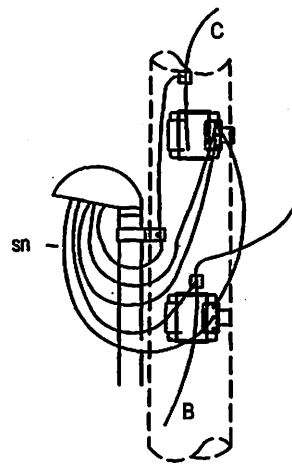
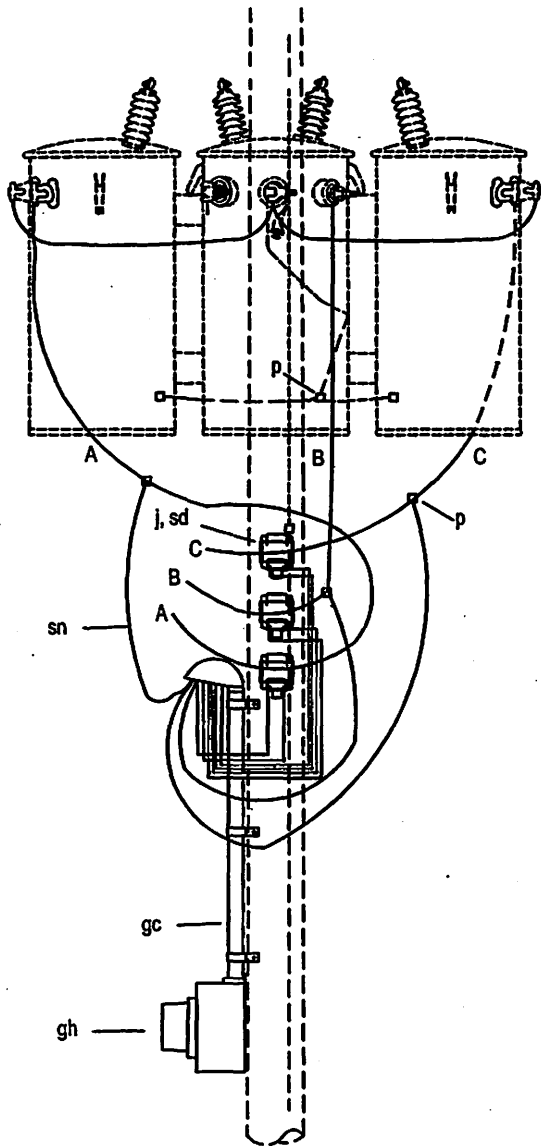
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 AUSTIN, TEXAS

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 CHECKED: _____
 APPROVED: M. Lee

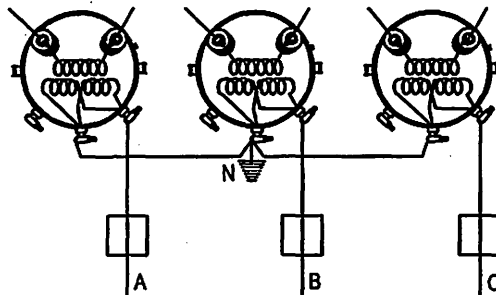
GUIDE TO YARD POLE METER INSTALLATION
 SHOWING BUILDING SERVICE CARRIED
 UNDERGROUND

DATE: 5/02

M8-10X



Connections from C.T. to service head

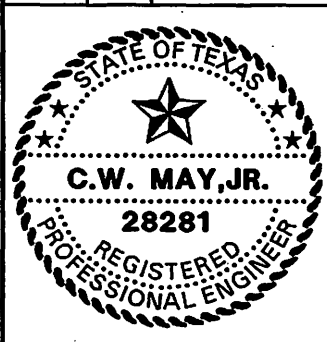


Note:

- 1) 2" Minimum clear wood clearance of all hardware.
- 2) No bolts to extend more than 2" beyond locknut.
- 3) Jumpers and Connectors as required.

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ITEM	NO.	MATERIAL	ITEM	NO.	MATERIAL
j	6	Screw, lag, 1/2" x 4"			
p		Connector, as required			
gc		Conduit, 1-1/4", as required			
		Strap, conduit, as required			
gh	1	Meter box, meter			
sd	3	Transformer, current			
sn		Wire, size as required			
	1	Service head			



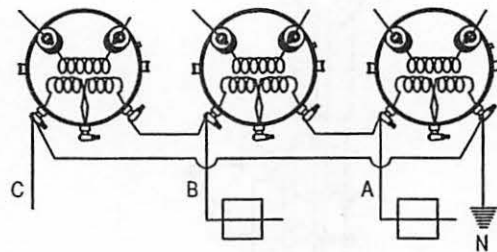
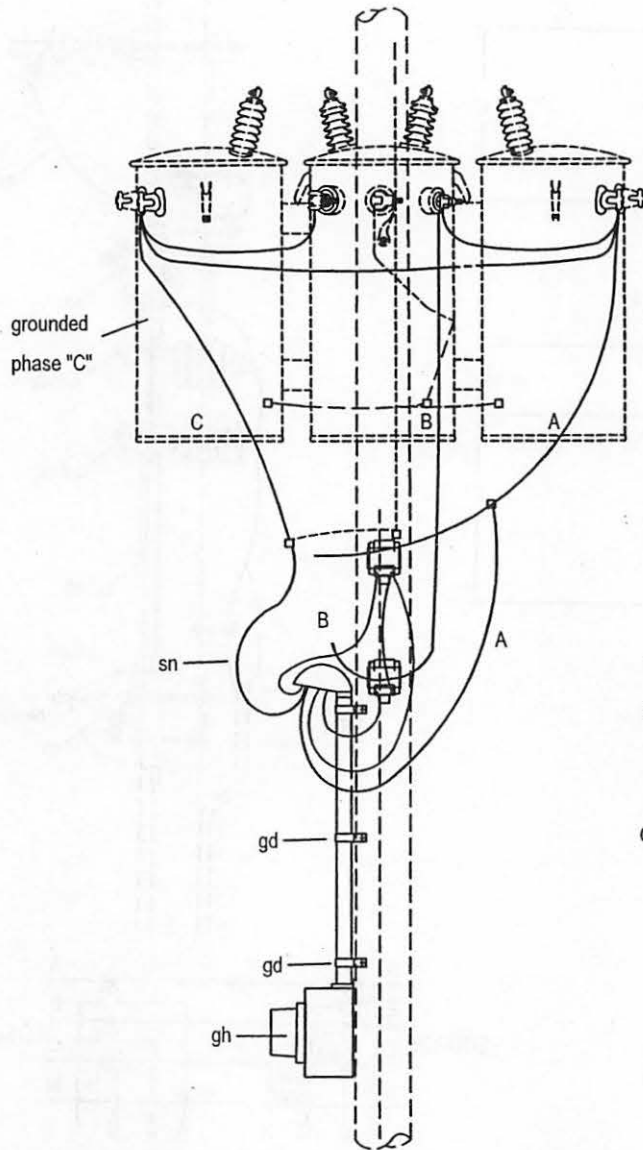
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APPROVED: M. Lee

SECONDARY METERING GUIDE
THREE PHASE 120/208 OR 277/480 VOLT
4 WIRE GROUNDED WYE
C.T. RATED METER

DATE:	M8-11
5/02	



Note:

- 1) 2" Minimum clear wood clearance of all hardware.
- 2) No bolts to extend more than 2" beyond locknut.
- 3) Jumpers and Connectors as required.

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ITEM	NO.	MATERIAL	ITEM	NO.	MATERIAL
j	4	Screw, lag, 1/2" x 4"			
p		Connector, as required			
gc		Conduit, 1-1/4", as required			
		Strap, conduit, as required			
gh	1	Meter box, meter			
sd	2	Transformer, current			
sn		Wire, size as required			
	1	Service head			



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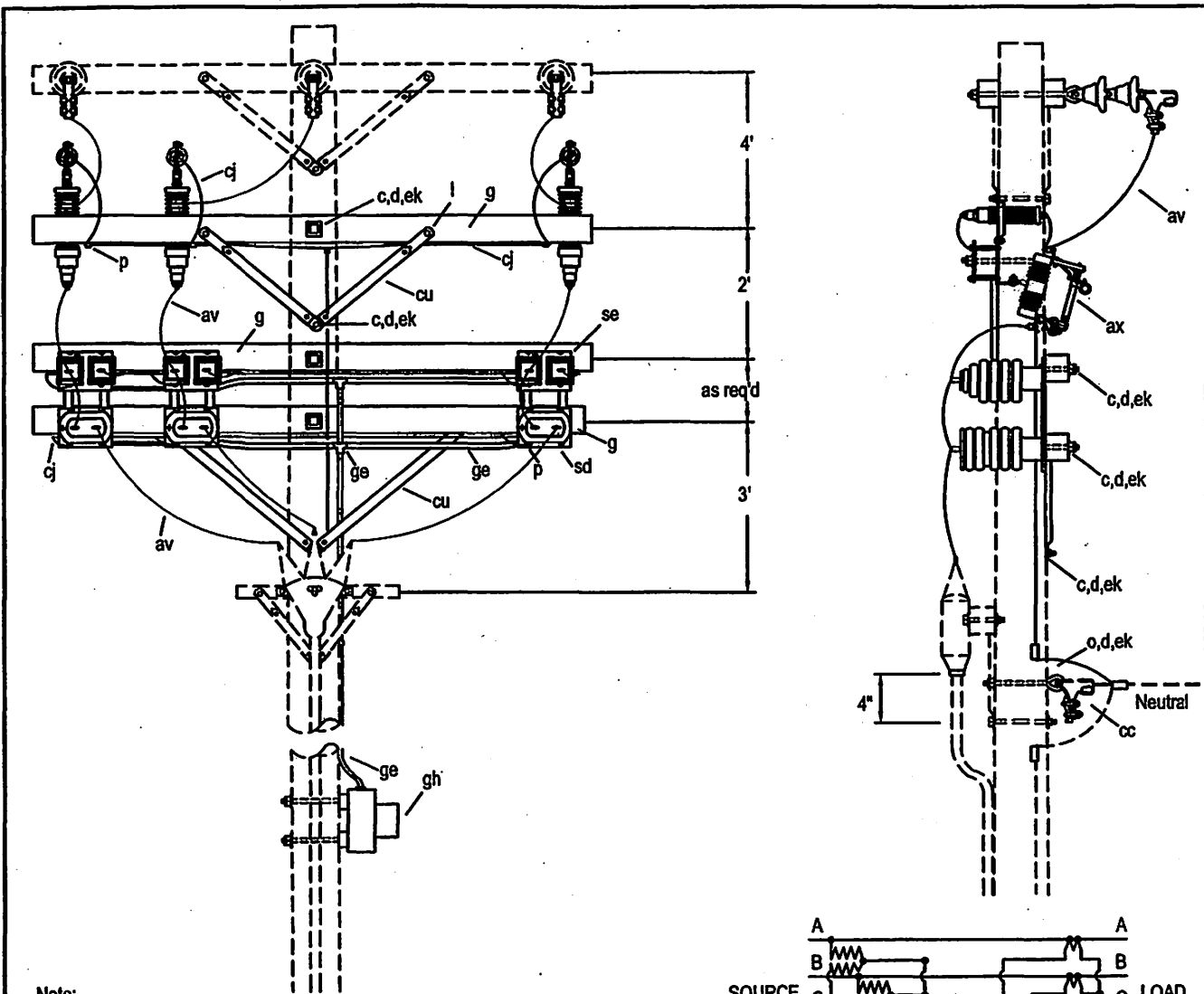
DRAWN: F. Crooks
CHECKED: _____
APPROVED: M. Lee

SECONDARY METERING GUIDE
THREE PHASE 240 VOLT
3 WIRE CORNER GROUNDED DELTA
C.T. RATED METER (FORM 5S)

DATE:

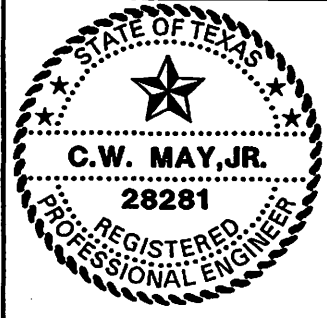
5/02

M8-12



Note:
 1) 2" Minimum clear wood clearance of all hardware.
 2) No bolts to extend more than 2" beyond locknut.
 3) Jumpers and Connectors as required.
 4) For use with Form 9S meter.
 The seal appearing on this document was authorized
 by C. W. MAY, JR, P.E. 28281 on 10/2/02.

ITEM NO.	MATERIAL	ITEM NO.	MATERIAL
c 16	Bolt, machine, 5/8" x required length	cu 1pr.	Brace, wood, 28"
c 29	Bolt, machine, 1/2" x required length	cu 1pr.	Brace, wood, 60" span
d 22	Washer, 2 1/4" square x 3/16", 13/16" hole	ek	Locknuts
d 4	Washer, round, 1 3/8" diameter	ge	Conduit & fittings, as required
g 3	Crossarm, 3 5/8" x 4 5/8" x 10'-0"	gh	Meter box, meter and test block
l 2	Bolt, carriage, 3/8" x 4 1/2"	sd 3	Transformer, current
o 1	Bolt, eye, 5/8" x required length	se 3	Transformer, potential
p	Connectors, as required	*	6 Mounting brackets
av	Jumper, primary, bare, as required		Metering cable as required; 10 conductor #10
ax 3	Cutout and arrester combination		
cc 1	Deadend assembly, neutral		
ci	Wire, ground, #6 S.D.copper, as required		



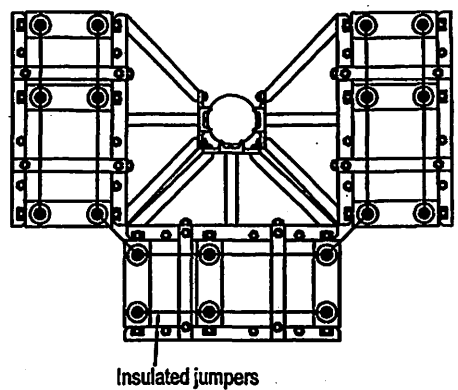
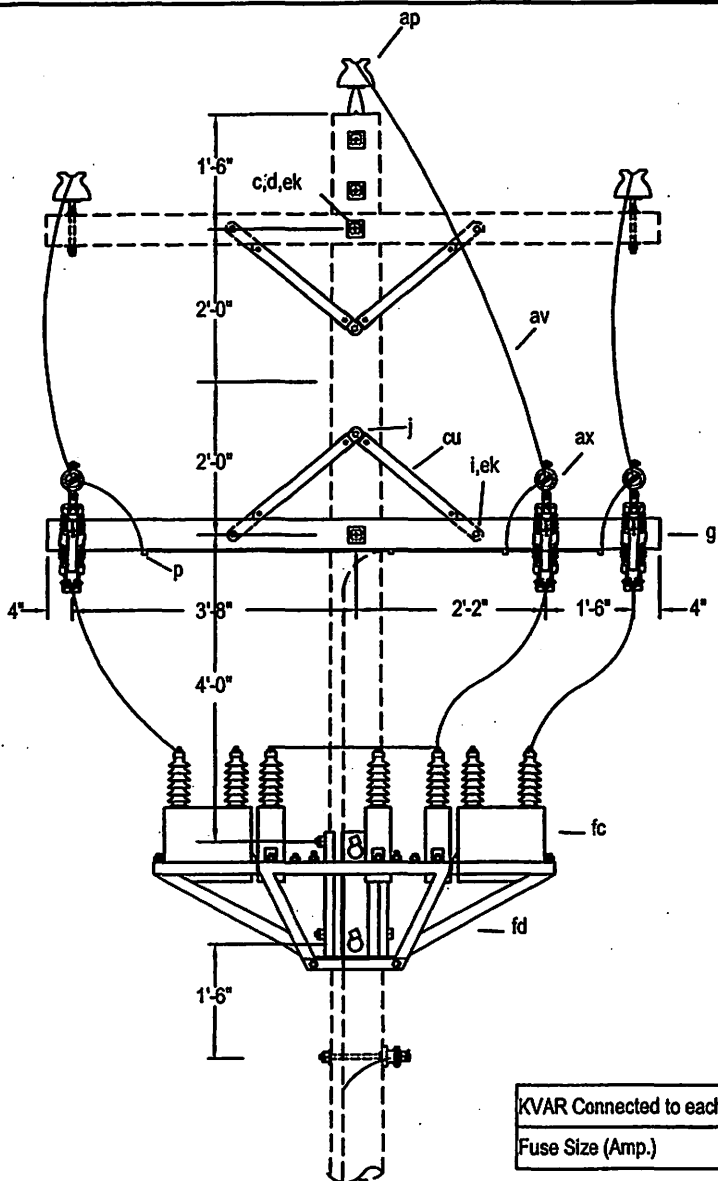
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 AUSTIN, TEXAS

DRAWN: F. Brooks
 CHECKED: _____
 APPROVED: M. Lee

7.2 / 12.5 K.V. METERING GUIDE
 THREE PHASE 4-WIRE STAR

DATE: _____

M8-15

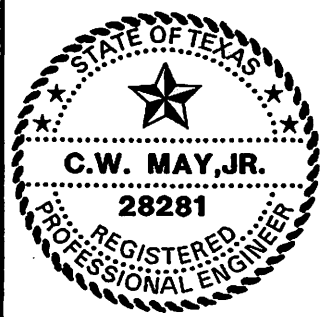


- Notes:
- 1) Specify number and KVAR required.
 - 2) Load break cutouts for installations over 75 KVAR per phase.
 - 3) For V-Phase installations omit capacitors and related items for center phase and designate as assembly M9-12.
 - 4) Specify insulating caps for primary terminal bushings.
 - 5) 2" Minimum clear wood clearance of all hardware.
 - 6) No bolts to extend more than 2" beyond locknut.
 - 7) Jumpers and Connectors as required.
- The seal appearing on this document was authorized by C. W. MAY, JR, P.E. 28281 on 10/2/02.

KVAR Connected to each cutout	25	50	75	100	150	200	300
Fuse Size (Amp.)	5	10	15	20	30	40	50

Care must be taken to coordinate fuse with sectionalizing plan

ITEM	NO.	MATERIAL	ITEM	NO.	MATERIAL
c		Bolt, machine, 5/8" x required length - as required	fc		Capacitor, kvar as required
d		Washer, square, 2-1/4" - as required	fd	1	Capacitor hanger, pole mounted
g	1	Crossarm, 3-5/8" x 4-5/8" x 8'-0"	ek		Locknut, as required
i	2	Bolt, carriage, 3/8" x 4-1/4"			
j	1	Screw, lag, 1/2" x 4"			
p		Connector, as required			
ap	3	Clamp, hotline, with stirrup			
av		Jumper, as required			
ax	3	Combination, cutout & arrester			
cu	1 pr.	Brace, wood, 28"			



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LOWER COLORADO RIVER AUTHORITY
DISTRIBUTION LINE DESIGN
AUSTIN, TEXAS

DRAWN: J. Brooks
CHECKED: _____
APPROVED: M. Lee

7.2/12.5 KV.
TWO OR THREE PHASE CAPACITOR ASSEMBLY
(FIXED)

DATE: _____
05/02

M9-12, M9-13

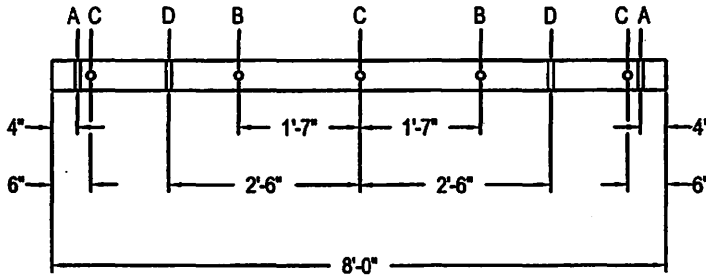


FIG. 1

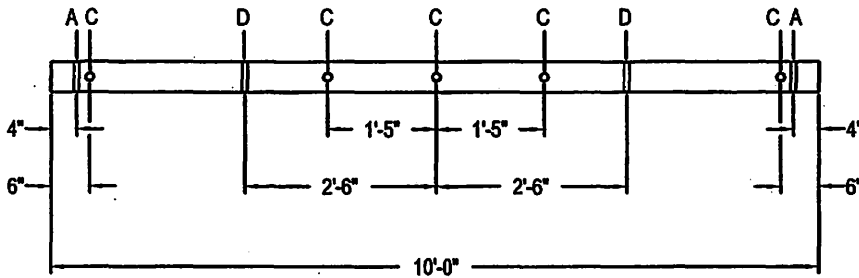
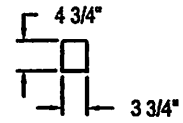
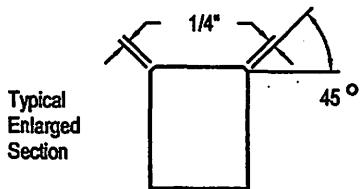
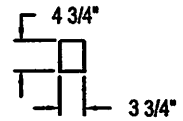


FIG. 2



Tolerances
Sizes of Holes

	Nominal	Go	No Go
A	11/16"	5/8"	3/4"
B	7/16"	3/8"	1/2"
C	11/16"	5/8"	3/4"
D	9/16"	1/2"	5/8"

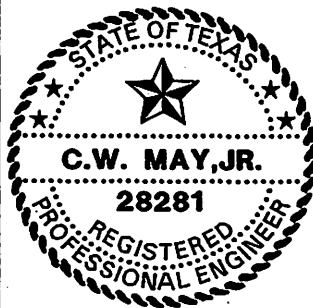
TREATMENT:

Wood crossarms shall meet REA specifications, dated 1987 as per REA Bulletin #50-17 for Douglas Fir, to be Penta treated, no Creosote, after Treatment crossarm should be and remain reasonably clean to the touch.

NOTE:

1) Cross section dimensions shall be $\pm 1/8$ inch.

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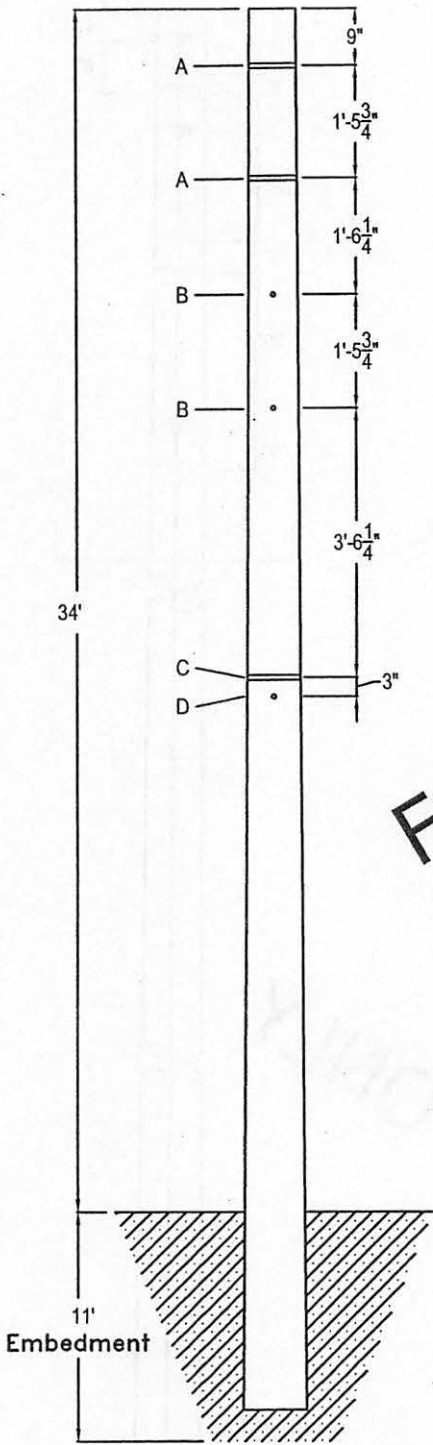


DRAWN: J. Brooks
 CHECKED: _____
 APPROVED: M. Lee

CROSSARM DRILLING AND TREATMENT GUIDE

DATE:
05/02

M19X



HOLES: 11/16" diameter.

FOR REFERENCE ONLY

STRUCTURE DESIGN CRITERIA

Conductor: _____
 NESC Heavy Loading MDT: _____
 60° F Initial Tension: ____
 Line Angle: ____
 Wind and Weight Span: _____

CONDUCTOR ATTACHMENT

A: _Conductors
 B: _Conductors
 C: _Conductor
 D: _Conductor

11'
Embedment



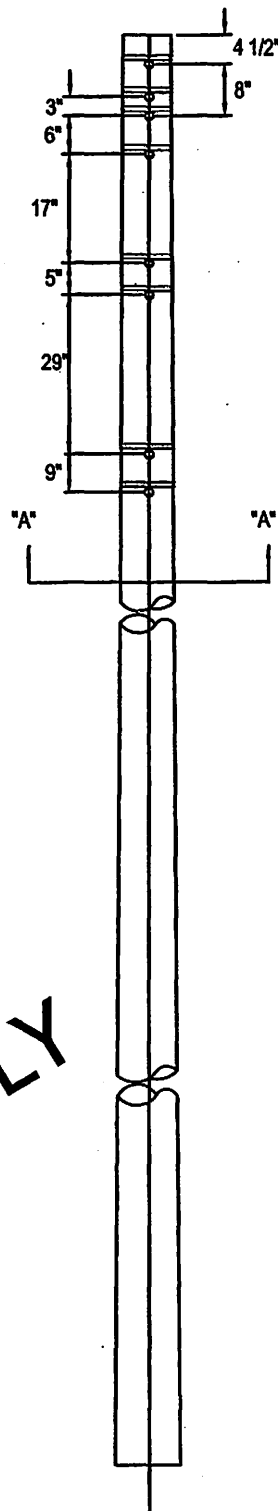
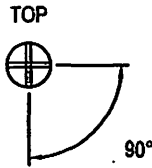
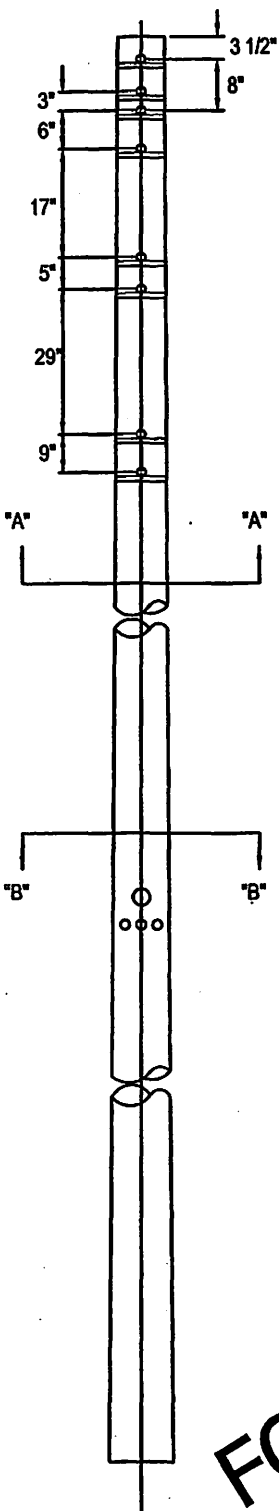
LOWER COLORADO RIVER AUTHORITY
 DISTRIBUTION LINE DESIGN
 AUSTIN, TEXAS

DRAWN: J. Brooks
 CHECKED: _____
 APPROVED: M. Lee

CONCRETE
 DISTRIBUTION POLE
 DOUBLE DEADEND
 90° UNGUYED

DATE:
 05/02

M20C



SECTION "A"

- 1) HOLES: Drill 11/16" diameter.
- 2) Through bolt holes must be parallel and in same direction.

SECTION "B"

- 1) Labels are to be of a permanent nature and located 10'± 1" from the pole butt; 14'± 1" for pole 55' and longer.
- 1) Label with Manufactures Mark and date of manufacture.
- 2) Label with proper length and class.

FOR REFERENCE ONLY



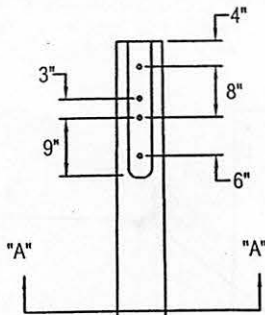
LOWER COLORADO RIVER AUTHORITY
DISTRIBUTION LINE DESIGN
AUSTIN, TEXAS

DRAWN: J. Brooks
CHECKED: _____
APPROVED: M. Lee

STEEL DISTRIBUTION POLE
DRILLING AND LABELING GUIDE
WOOD CROSSARM CONSTRUCTION

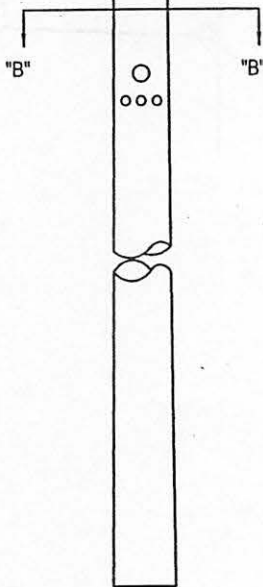
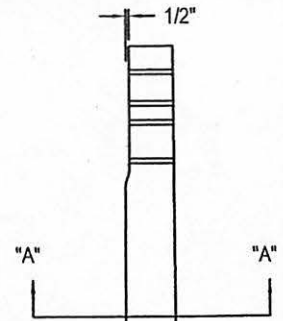
DATE:
05/02

M20S



SECTION "A"

- 1) HOLES: Drill 11/16" diameter.
- 2) GAINS: Gains are to be flat with plane at right angles to bolt hole.
- 3) Through-bolt holes must be parallel and in the same plane.
- 4) All poles treated full-length must be bored, roofed and gained before treatment.
- 5) Roofs may be flat or at a 15° angle at the producer's option.



SECTION "B"

- 1) Bottom of brand or center of metal disk shall be 10'±1" from pole butt; 14'±1" mark for poles 55' and longer.
- 2) Brand with Manufacturers Mark and date of treatment (month and year).
- 3) Brand with proper length and class.
- 4) Brand with species, preservation code and retention.
- 5) Brand butt with proper length and class.

TREATMENT:

- 1) Poles must meet REA specifications DT-5C dated 1987 as per REA bulletin #50-24 with 7.5 lbs. final retention required by assay using extraction method.
- 2) Inspection to be done by independent agency.



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LOWER COLORADO RIVER AUTHORITY
DISTRIBUTION LINE DESIGN
AUSTIN, TEXAS

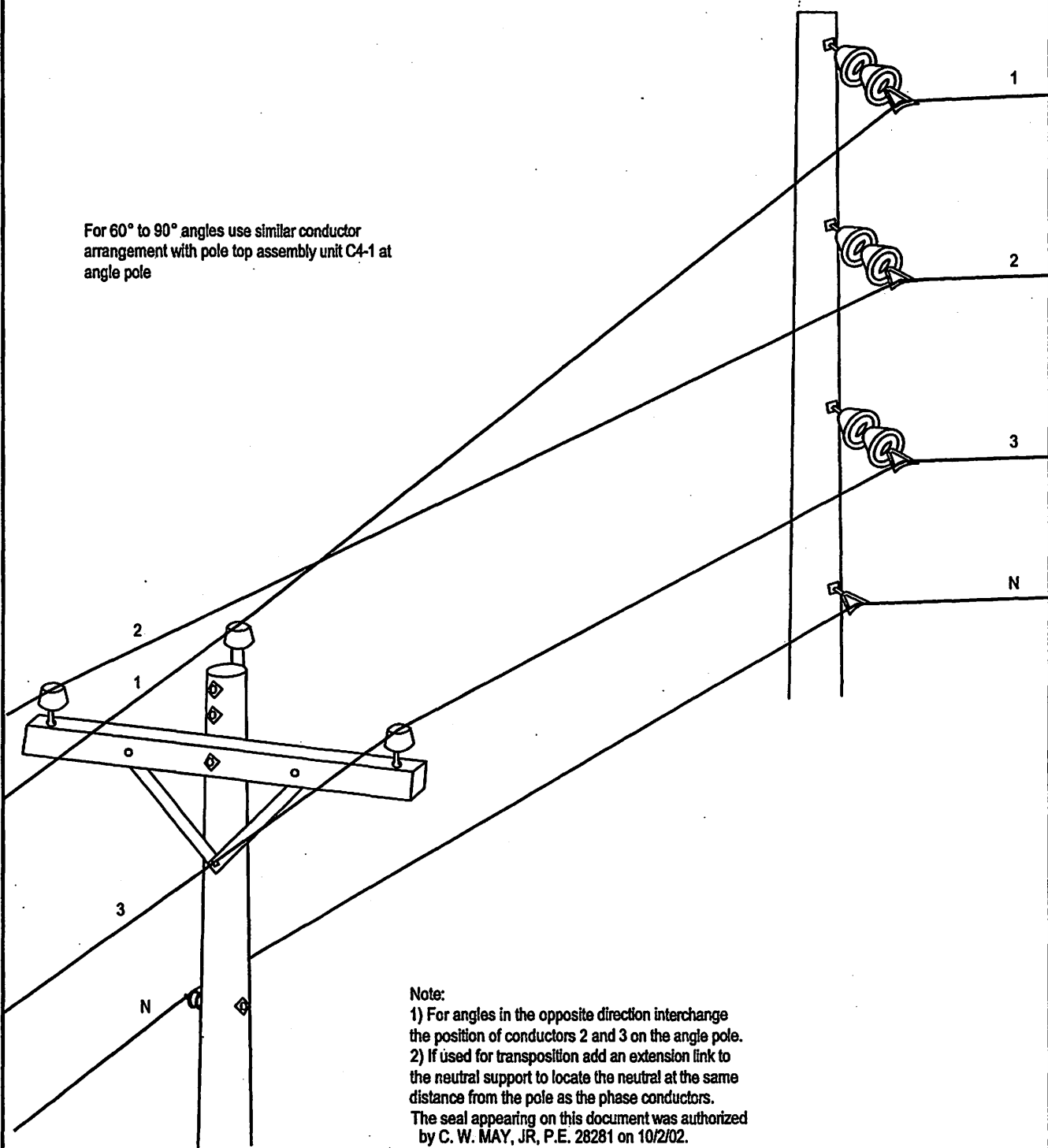
DRAWN: J. Crocker
CHECKED: _____
APPROVED: M. Lu

WOOD POLE FRAMING AND TREATMENT GUIDE

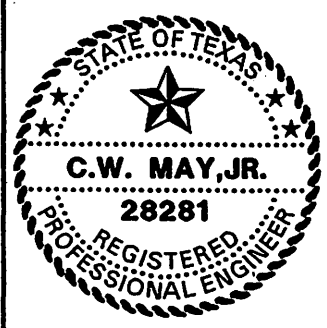
DATE:
05/02

M20X

For 60° to 90° angles use similar conductor arrangement with pole top assembly unit C4-1 at angle pole



Note:
 1) For angles in the opposite direction interchange the position of conductors 2 and 3 on the angle pole.
 2) If used for transposition add an extension link to the neutral support to locate the neutral at the same distance from the pole as the phase conductors.
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LCRA
 ENERGY • WATER • COMMUNITY SERVICES

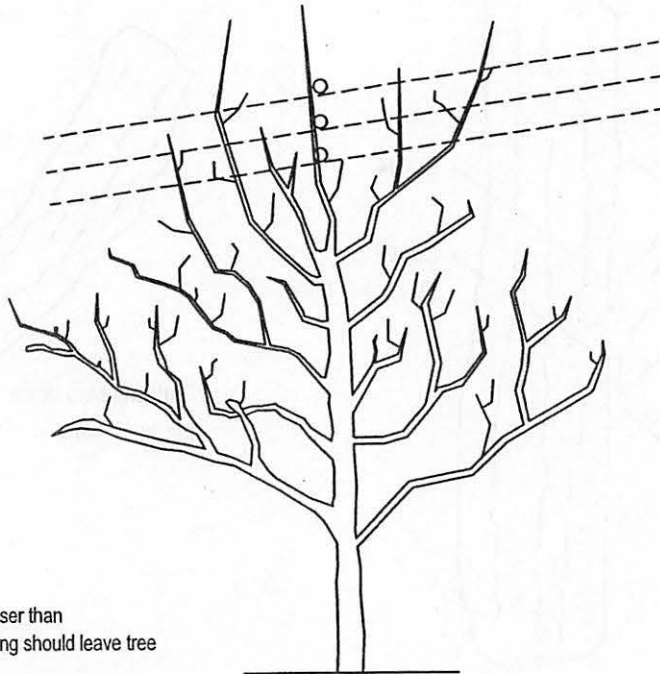
LOWER COLORADO RIVER AUTHORITY
 DISTRIBUTION LINE DESIGN
 AUSTIN, TEXAS

DRAWN: F. Brooks
 CHECKED: _____
 APPROVED: M. Lee

ANGLE CONSTRUCTION GUIDE
 CROSSARM TO VERTICAL CONSTRUCTION
 30° TO 60° ANGLE

DATE:
 05/02

M21

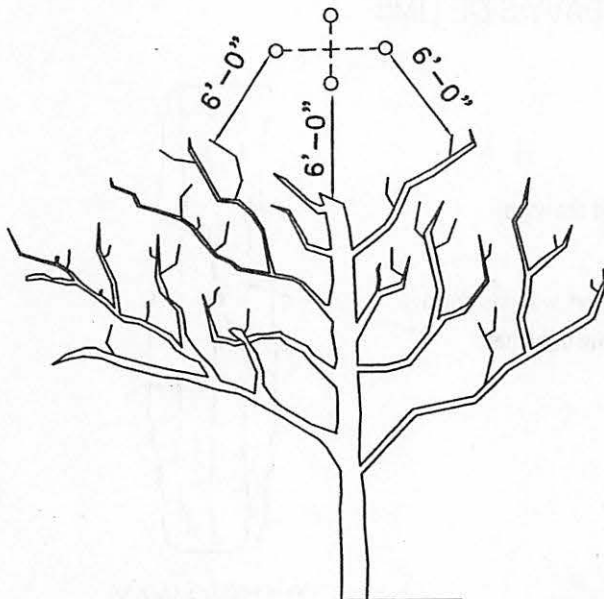


BEFORE TRIMMING

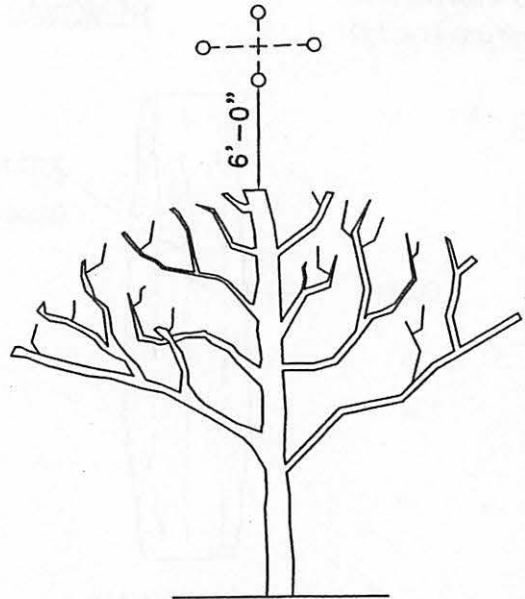
NOTES:

No part of the tree should be closer than 6'-0" from open wiring. Trimming should leave tree with symmetrical appearance.

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RIGHT WAY



WRONG WAY



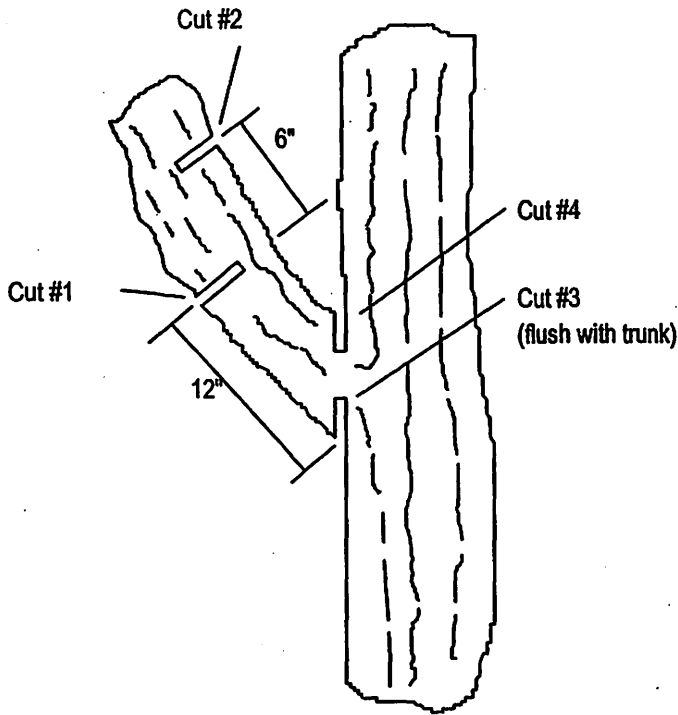
LOWER COLORADO RIVER AUTHORITY
DISTRIBUTION LINE DESIGN
AUSTIN, TEXAS

DRAWN: J. Brooks
CHECKED: _____
APPROVED: M. Lee

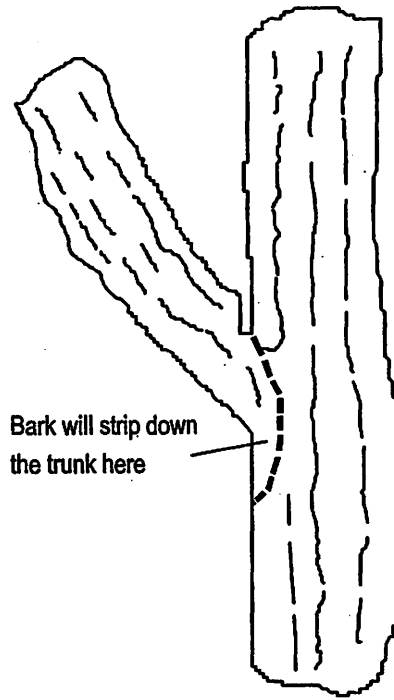
TREE TRIMMING GUIDE

DATE:
5/02

M22-1



RIGHT WAY

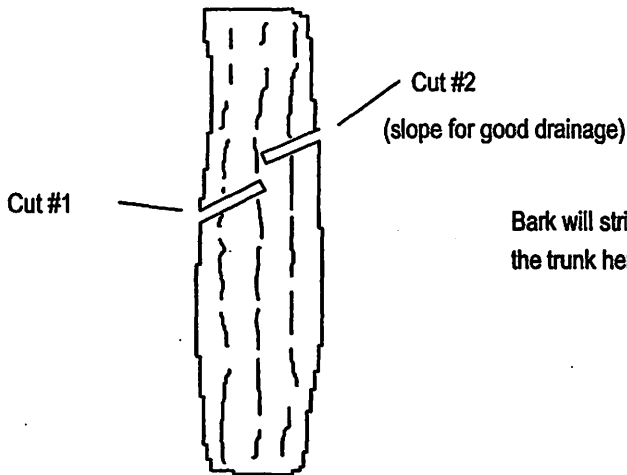


WRONG WAY

Bark will strip down the trunk here

For small branches omit cuts #1 and #2

REMOVAL OF HEAVY SIDE LIMB



RIGHT WAY



WRONG WAY

Bark will strip down the trunk here

NOTES:

Coat final cut with tree paint

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REMOVAL OF VERTICAL LIMB

TREE TRIMMING GUIDE

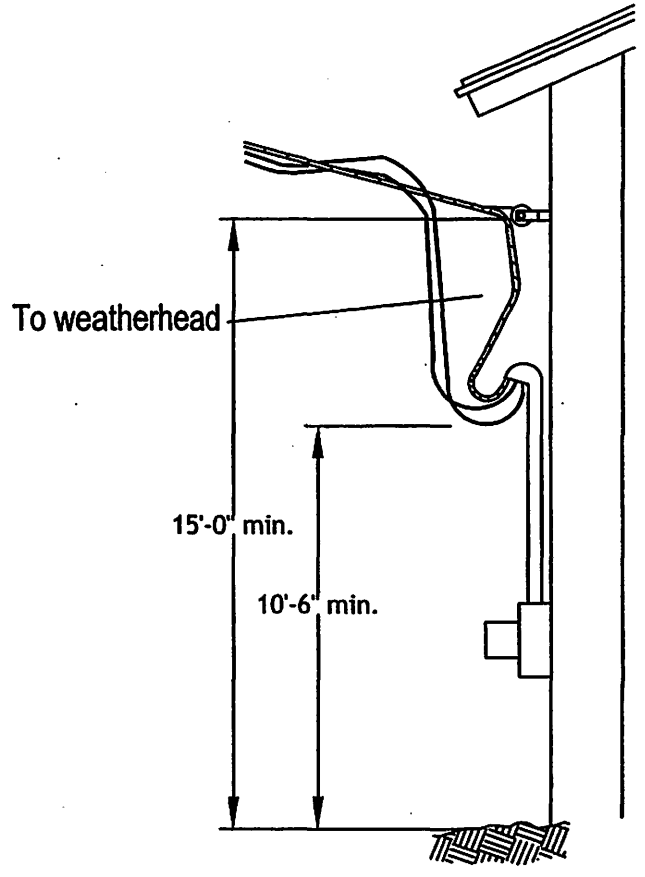
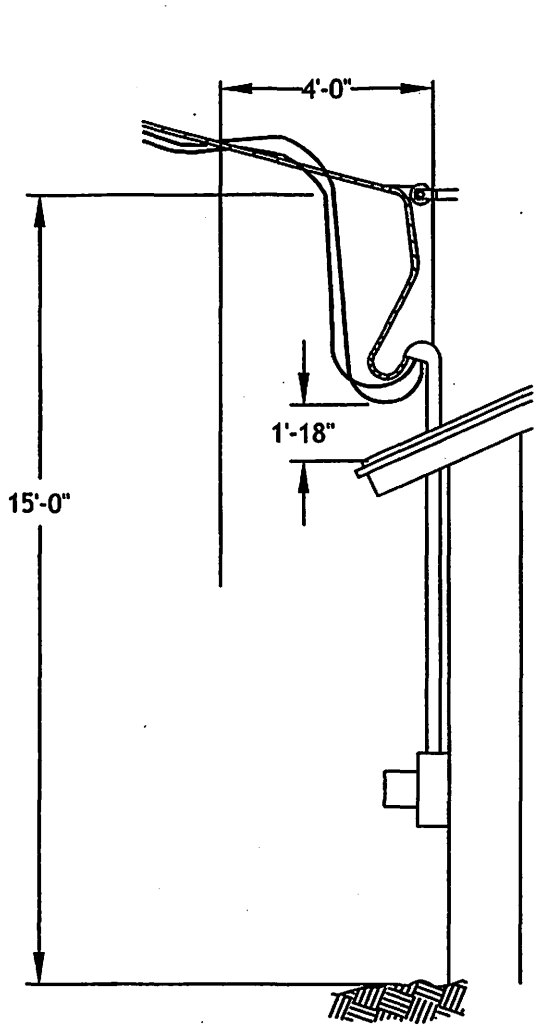


LCRA
 ENERGY • WATER • COMMUNITY SERVICES
 LOWER COLORADO RIVER AUTHORITY
 DISTRIBUTION LINE DESIGN
 AUSTIN, TEXAS

DRAWN: F. Brooks
 CHECKED: _____
 APPROVED: M. Lee

DATE:
05/02

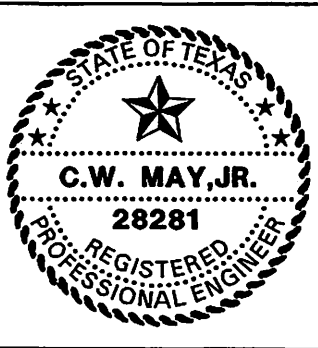
M22-2



NOTES:

Where distance from service mast to edge of roof exceeds 4'-0", vertical clearance from roof to service wire equals 3'-0" (min.) for minimum roof slope of 4:12.

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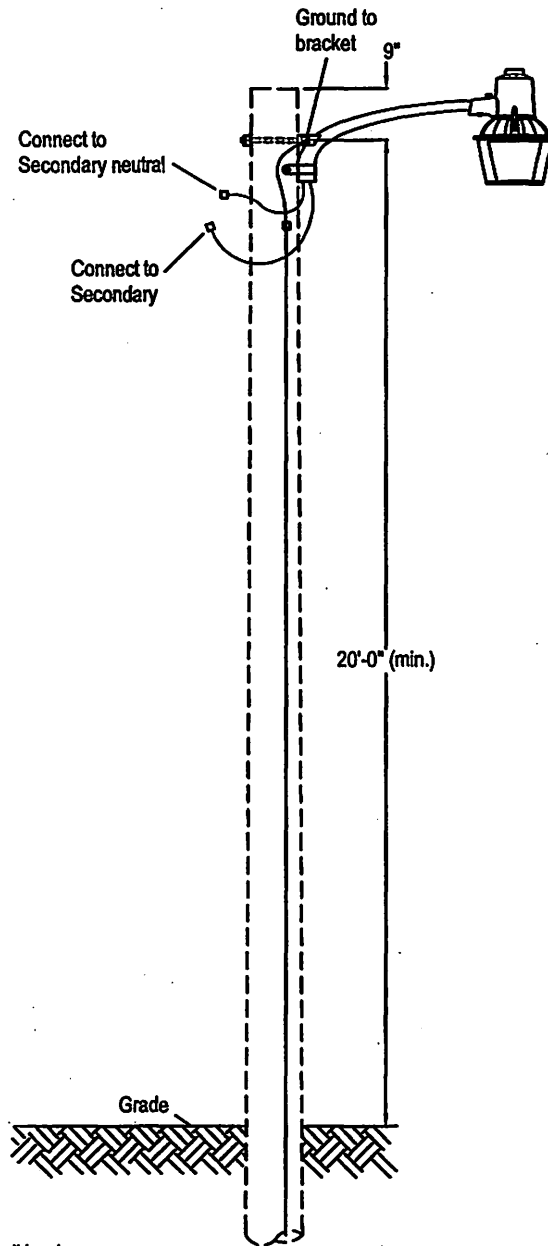
LOWER COLORADO RIVER AUTHORITY
DISTRIBUTION LINE DESIGN
AUSTIN, TEXAS

DRAWN: F. Brooks
CHECKED: _____
APPROVED: M. Lee

CABLE SERVICE ASSEMBLY GUIDE

DATE:
05/02

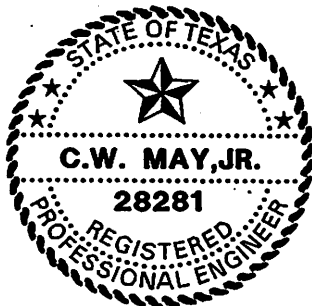
M24



Note:

- 1) 2" Minimum clear wood clearance of all hardware.
- 2) No bolts to extend more than 2" beyond locknut.
- 3) Jumpers and Connectors as required.

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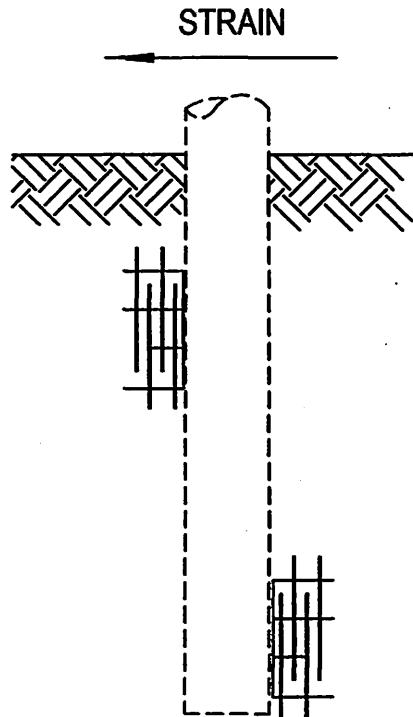
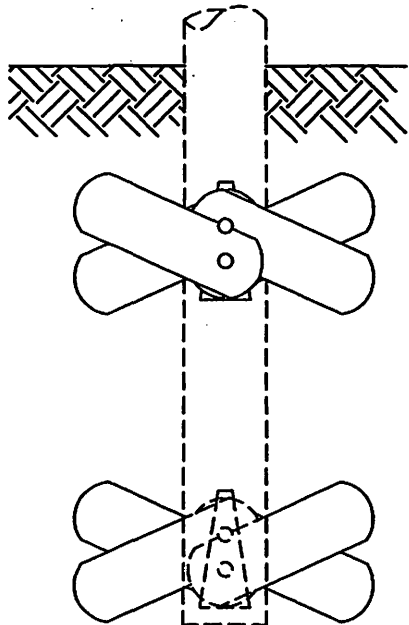
LCRA
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 LOWER COLORADO RIVER AUTHORITY
 DISTRIBUTION LINE DESIGN
 AUSTIN, TEXAS

DRAWN: F. Brooks
 CHECKED: _____
 APPROVED: M. Lee

SECURITY LIGHT INSTALLATION GUIDE
 UNMETERED

DATE:
 5/02

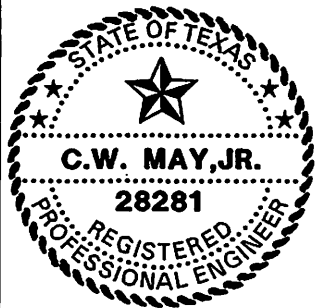
M26-5



M32-1

NOTES:

- 1) For M32-2, set pole 5 foot deeper than normal specified depth.
- The seal appearing on this document was authorized by C. W. MAY, JR, P.E. 28281 on 10/2/02.



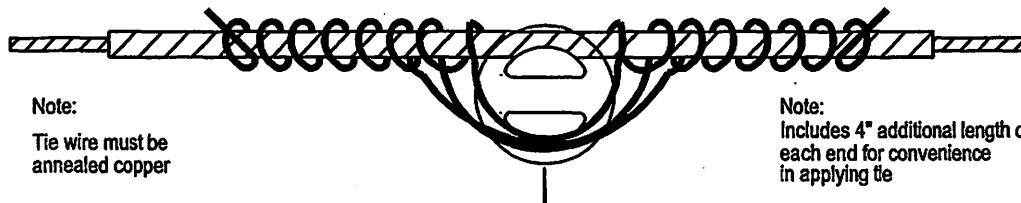
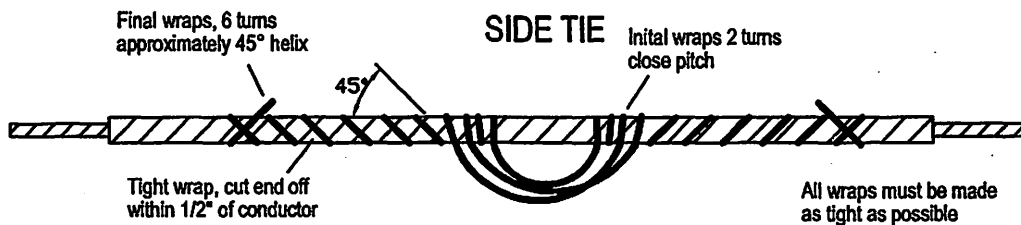
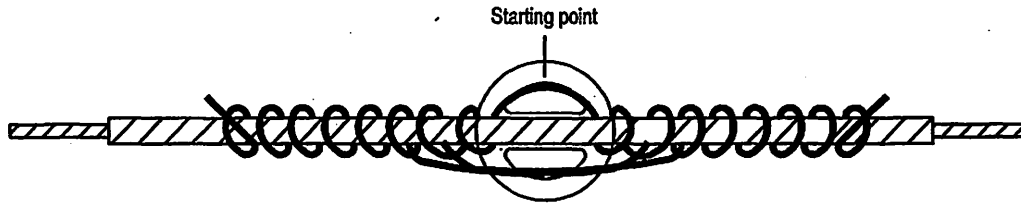
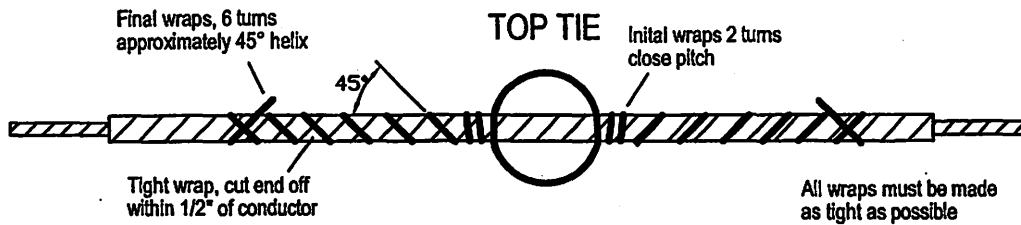
LOWER COLORADO RIVER AUTHORITY
DISTRIBUTION LINE DESIGN
AUSTIN, TEXAS

DRAWN: J. Bracke
CHECKED: _____
APPROVED: _____

POLE KEY ASSEMBLY

DATE:
05/02

M32-1, M32-2



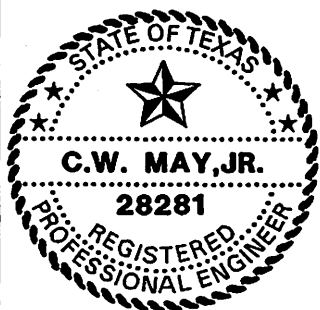
Note:
Tie wire must be annealed copper

Note:
Includes 4" additional length on each end for convenience in applying tie

Starting point

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CONDUCTOR	CONDUCTOR DIAMETER	ARMOR ROD	OVERALL DIAMETER	COPPER TIE WIRE AWG	TOP TIE LENGTH	SIDE TIE LENGTH
3/0 7 Strand HD copper	.464	.162	.788	4	110"	116"
2/0 7 Strand HD copper	.414	.162	.738	4	104"	110"
1/0 7 Strand HD copper	.368	.128	.624	4	90"	96"
#2 3 Strand copper	.320	.102	.576	6	82"	88"
#4A Copperweld - copper	.290	.102	.494	6	72"	78"
#4 Copper wire	.204	.102	.408	6	66"	72"
#6 Copper wire	.162	.102	.366	8	60"	66"
#6A Copperweld - copper	.230	.102	.434	8	65"	71"
#8A & 8D Copperweld - copper	.219	.102	.423	8	64"	70"



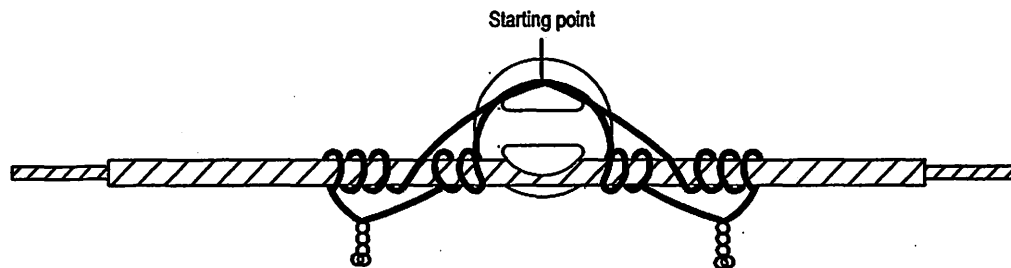
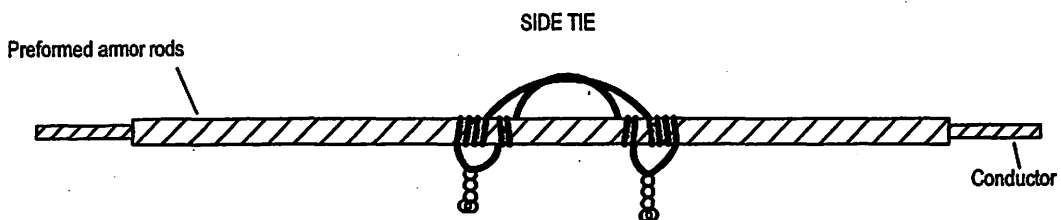
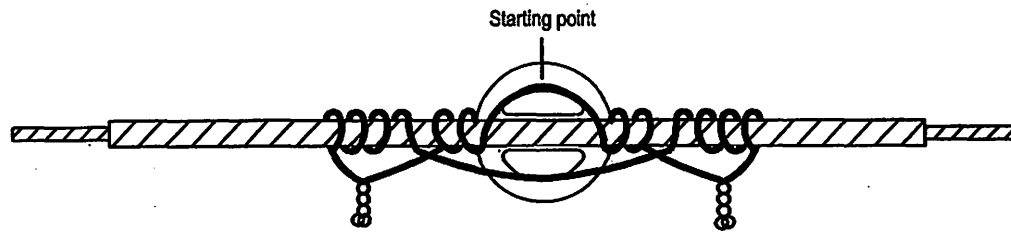
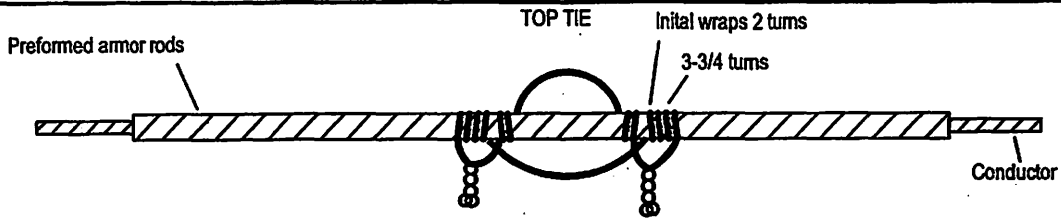
LOWER COLORADO RIVER AUTHORITY
DISTRIBUTION LINE DESIGN
AUSTIN, TEXAS

DRAWN: F. Brooks
CHECKED: _____
APPROVED: M. Lee

TYING GUIDE, SINGLE INSULATOR
ONE PIECE TIE - COPPER TYPE CONDUCTORS
WITH PREFORMED ARMOR RODS

DATE:
05/02

M40-1A



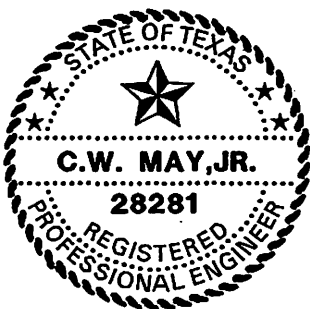
Note:

1) Tie wire assembly should be as tight as can be wrapped by hand, and ends twisted with pliers or hot line tools. Twist lefthand ends clockwise, righthand counterclockwise. With hot line loops, tie wires must be 8" longer than shown.

2) Tie wire lengths listed below can be used with insulators having neck diameter up to and including 3-1/2".

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CONDUCTOR	CONDUCTOR DIAMETER	ARMOR ROD	OVERALL DIAMETER	COPPER TIE WIRE AWG	TOP TIE LENGTH	SIDE TIE LENGTH
3/0 7 Strand HD copper	.464	.162	.788	4	110"	116"
2/0 7 Strand HD copper	.414	.162	.738	4	104"	110"
1/0 7 Strand HD copper	.368	.128	.624	4	90"	96"
#2 3 Strand copper	.320	.102	.576	6	82"	88"
#4A Copperweld - copper	.290	.102	.494	6	72"	78"
#4 Copper wire	.204	.102	.408	6	66"	72"
#6 Copper wire	.162	.102	.366	8	60"	66"
#6A Copperweld - copper	.230	.102	.434	8	65"	71"
#8A & 8D Copperweld - copper	.219	.102	.423	8	64"	70"



LOWER COLORADO RIVER AUTHORITY
DISTRIBUTION LINE DESIGN
AUSTIN, TEXAS

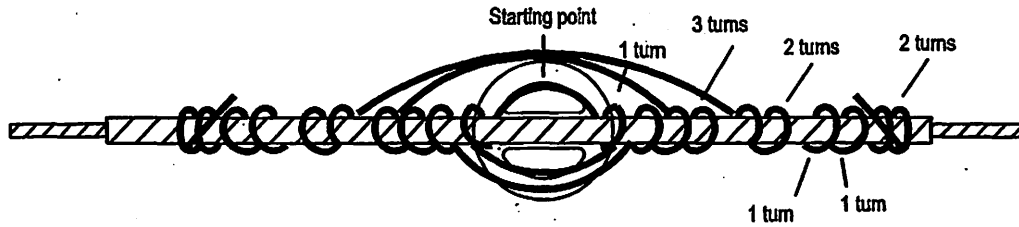
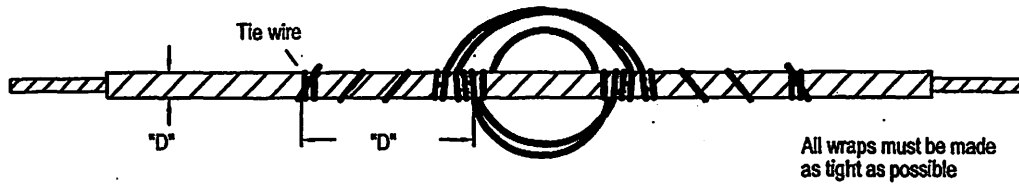
DRAWN: J. Brooks
CHECKED: _____
APPROVED: M. Lee

TYING GUIDE, SINGLE INSULATOR
TWO PIECE TIE - COPPER TYPE CONDUCTORS
WITH PREFORMED ARMOR RODS

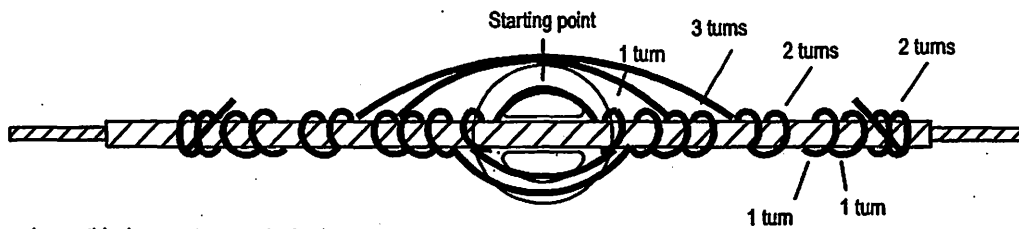
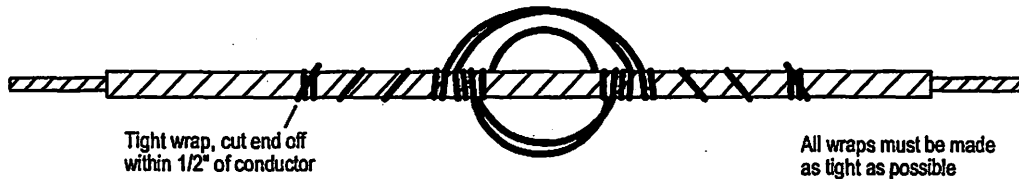
DATE:
05/02

M40-1A2

TOP TIE

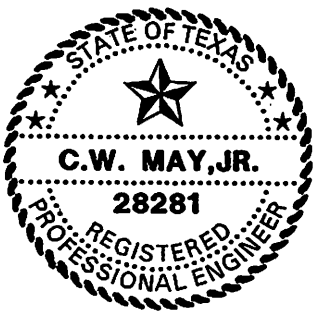


SIDE TIE



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CONDUCTOR	CONDUCTOR DIAMETER	ARMOR ROD DIAMETER	TIE WIRE SIZE	LENGTH		
#4 ACSR	.257"	.542"	4	7'-3"		
#2 ACSR	.325"	.558"	4	7'-5"		
1/0 7 ACSR	.398"	.732"	4	8'-3"		
2/0 ACSR	.447"	.781"	4	8'-3"		
4/0 ACSR	.563"	.927"	4	9'-3"		
336.4 MCM AAC	.668"	1.030"	4	9'-10"		
477 MCM AAC	.793"	1.293"	4	11'-2"		
795 MCM AAC	1.026"	1.646"	4	12'-11"		



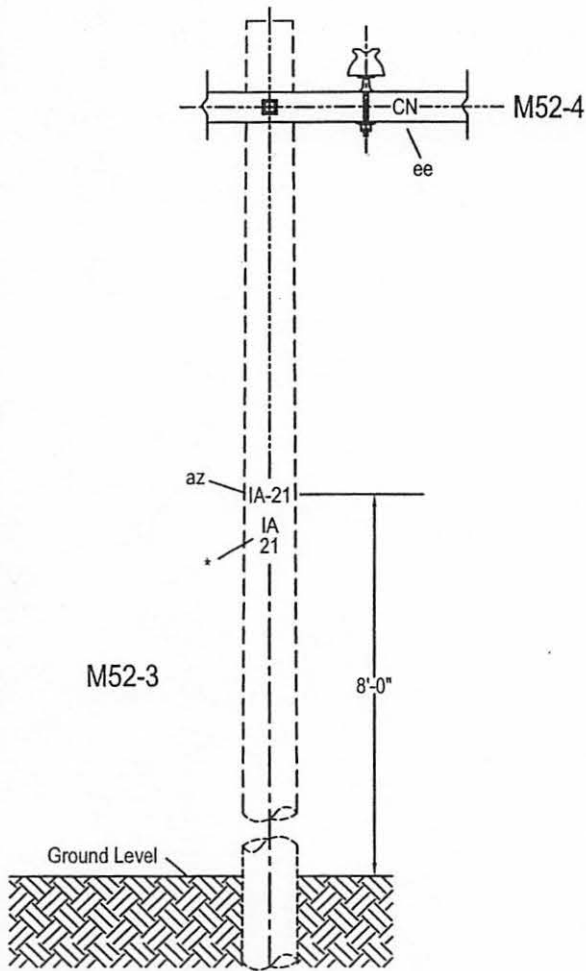
LOWER COLORADO RIVER AUTHORITY
DISTRIBUTION LINE DESIGN
AUSTIN, TEXAS

DRAWN: J. Brooks
CHECKED: _____
APPROVED: M. Lee

TYING GUIDE, SINGLE INSULATOR
ALUMINUM TIE WIRE FOR ACSR, AAC
CONDUCTORS WITH PREFORMED ARMOR RODS

DATE:
05/02

M40-10



- Note:
- Number and letters shall:
 - be of cutout aluminum or electrogalvanized soft steel, fastened to pole with galvanized or aluminum barbed 1" round head nails, or
 - be either die stamped or printed with a reflectorized background on individual pieces of aluminum and mounted in an aluminum holder and fastened to pole with aluminum barbed round head nails. if numbers smaller than 2-1/2" are used, they shall be reflectorized.
 - Pole legends to be 2-1/2" to 3-1/2" high. Reflectorized number and letters may be 2" to 3" high.
 - "CN" legend to be 2" high.
 - Pole legend to be staggered 30° from direct facing highway. When line crosses highway or R.R., legend should face same.
 - On poles having limited climbing space due to special equipment, pole legend should be so located as to leave climbing space quadrant unobstructed.
 - (*) Pole legend numbers may be stacked to improve readability

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ASSEMBLY UNIT				
M52-3	M52-4			

ITEM	MATERIAL
az	Letters or numbers
ee	Letters "CN"
	1" nails



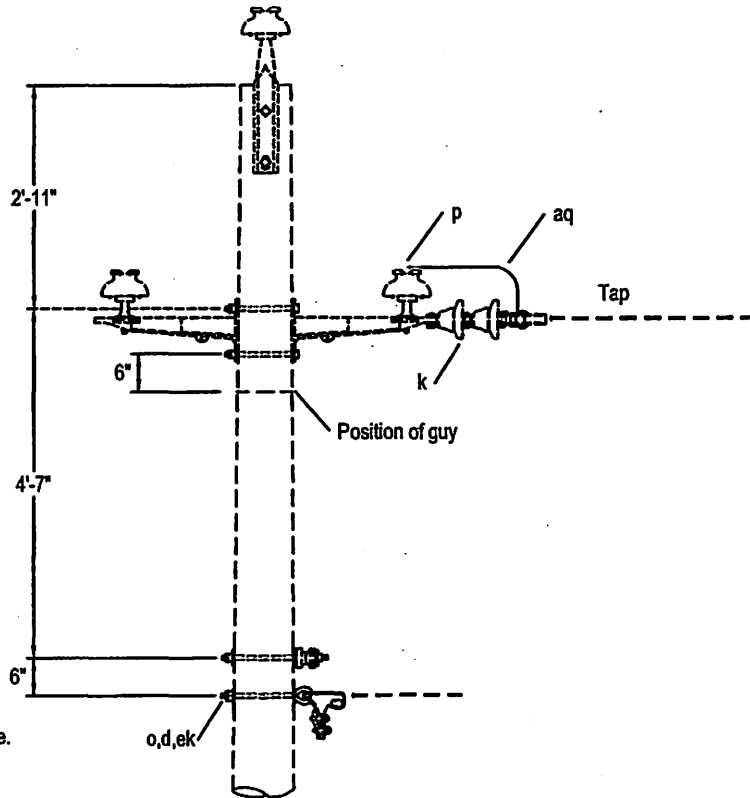
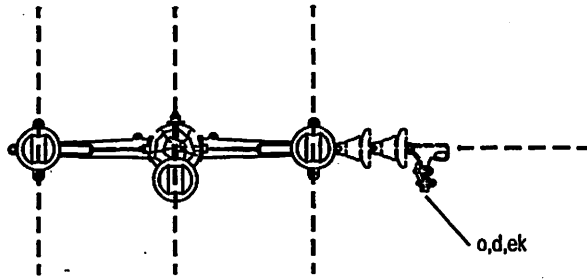
LCRA
ENERGY • WATER • COMMUNITY SERVICES

LOWER COLORADO RIVER AUTHORITY
DISTRIBUTION LINE DESIGN
AUSTIN, TEXAS

DRAWN: J. Brooks
 CHECKED: _____
 APPROVED: M. Lee

POLE NUMBERING AND
NEUTRAL IDENTIFICATION GUIDE

DATE:	M52-3, M52-4
5/02	



Note:
 2" Minimum clear wood clearance of all hardware.
 No bolts to extend more than 2" beyond locknut.
 Jumpers and Connectors as required.
 The seal appearing on this document was authorized
 by C. W. MAY, JR, P.E. 28281 on 10/2/02

ITEM	NO.	MATERIAL	ITEM	NO.	MATERIAL
d	1	Washer, square, 2-1/4" x 3/16 x 11/16" hole			
k	3	Insulator, suspension, 52-1			
o	1	Bolt, eye, 5/8" x required length			
p		Connector,			
aq		Jumpers			
ca	1	Deadend assembly, primary			
cc	1	Deadend assembly, neutral			
ek	1	Locknut, 5/8"			



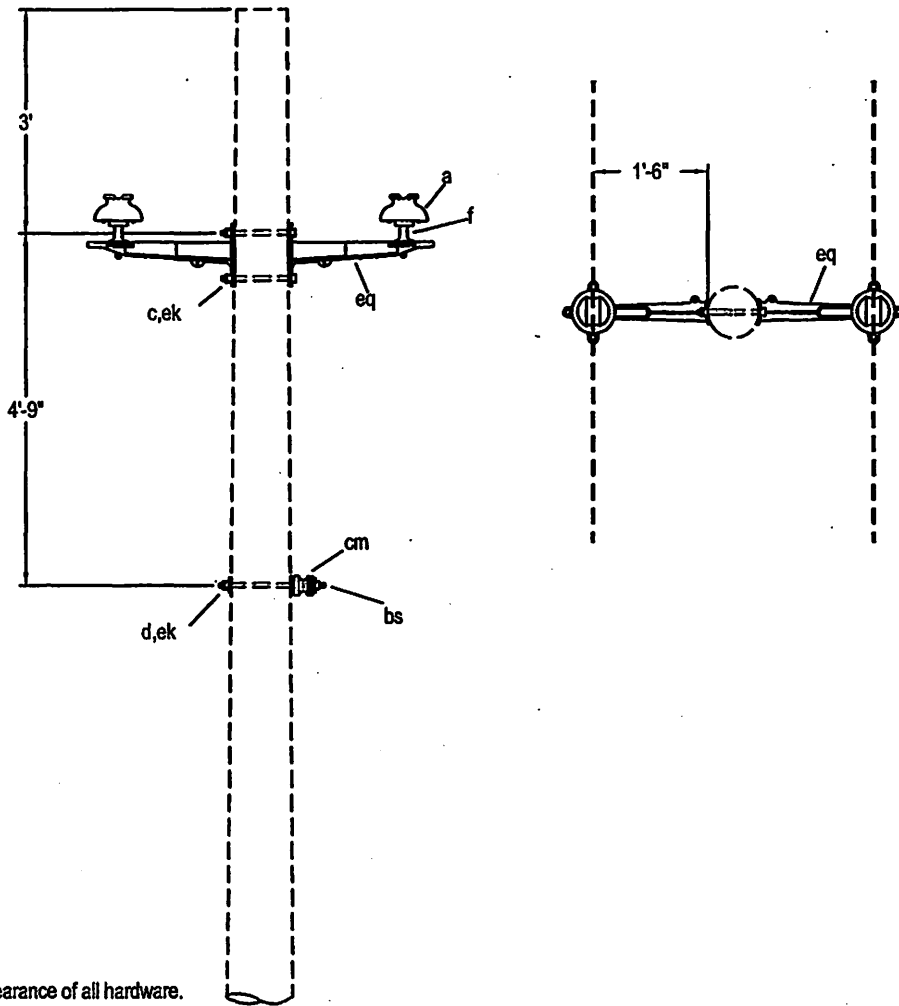
LCRA
 ENERGY • WATER • COMMUNITY SERVICES
 LOWER COLORADO RIVER AUTHORITY
 DISTRIBUTION LINE DESIGN
 AUSTIN, TEXAS

DRAWN: S. Kendall
 CHECKED: _____
 APPROVED: M. Lee

7.2/12.5 KV. PRIMARY
 1-PHASE ARMLESS CONSTRUCTION
 PRIMARY SINGLE PHASE TPA

DATE:
 5/02

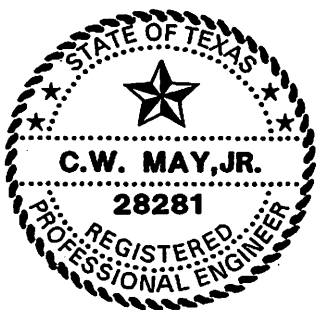
A5-2B



Note:

2" Minimum clear wood clearance of all hardware.
 No bolts to extend more than 2" beyond locknut.
 The seal appearing on this document was authorized
 by C. W. MAY, JR, P.E. 28281 on 10/2/02

ITEM	NO.	MATERIAL	ITEM	NO.	MATERIAL
a	2	Insulator, pin type, class 55-4			
c	2	Bolt, machine, 5/8" x required length			
d	1	Washer, square, 2-1/4" x 3/16 x 11/16" hole			
f	2	Pin, crossarm, for metal arm			
bs	1	Bolt, single upset, 5/8" x required length			
cm	1	Insulator, spool type, class 53-2			
ek	2	Locknut, 5/8"			
eq	2	Bracket, metal, 18" single pin			



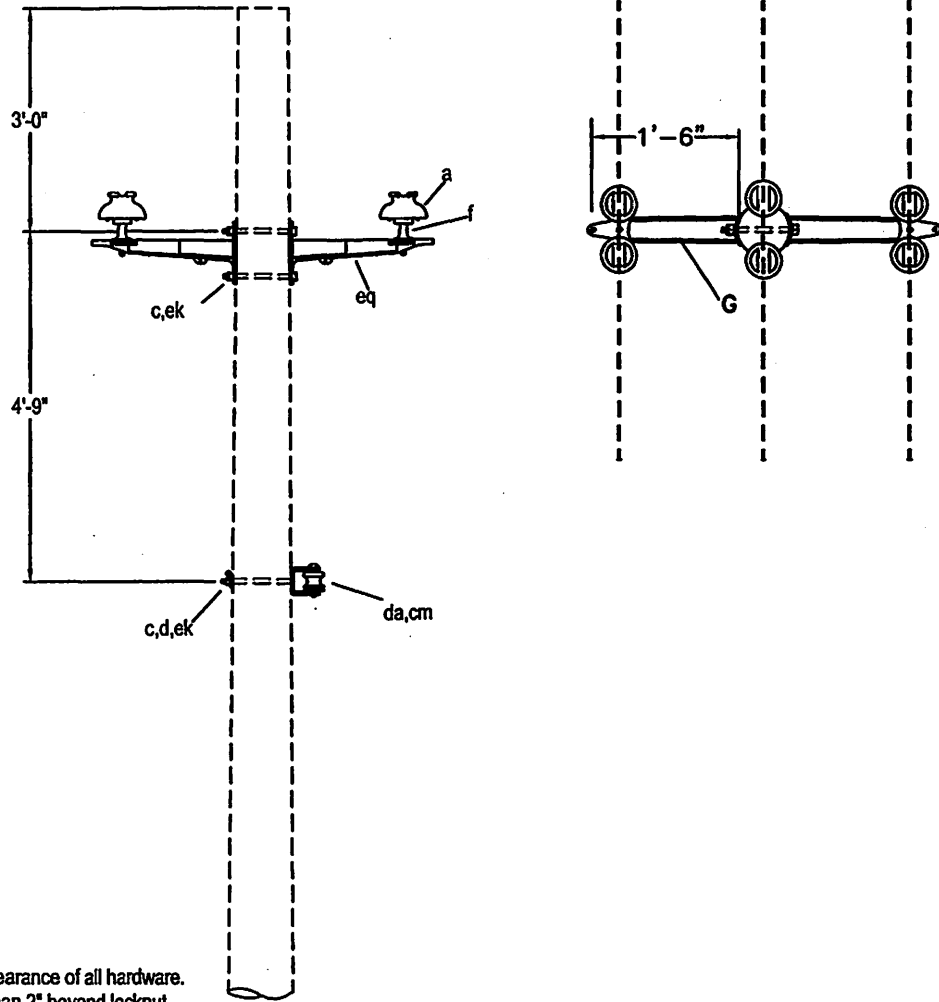
LCRA
 ENERGY • WATER • COMMUNITY SERVICES
 LOWER COLORADO RIVER AUTHORITY
 DISTRIBUTION LINE DESIGN
 AUSTIN, TEXAS

DRAWN: E. Kendall
 CHECKED: _____
 APPROVED: M. Lee

7.2/12.5 KV. PRIMARY
 2-PHASE ARMLESS CONSTRUCTION
 SINGLE PRIMARY SUPPORT
 0° TO 5° ANGLE

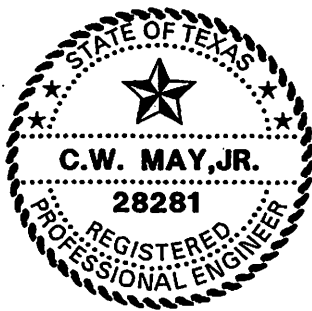
DATE:
 5/02

B1B



Note:
 2" Minimum clear wood clearance of all hardware.
 No bolts to extend more than 2" beyond locknut.
 The seal appearing on this document was authorized
 by C. W. MAY, JR, P.E. 28281 on 10/2/02

ITEM	NO.	MATERIAL	ITEM	NO.	MATERIAL
a	4	Insulator, pin type, class 55-4			
c	2	Bolt, machine, 5/8" x required length			
d	1	Washer, square, 2-1/4" x 3/16 x 11/16" hole			
f	2	Pin, crossarm, for metal arm			
cm	1	Insulator, spool type, class 53-2			
da	1	Bracket, neutral			
ek	3	Locknut, 5/8"			
eq	2	Bracket, metal, 18" double pin			



LOWER COLORADO RIVER AUTHORITY
 DISTRIBUTION LINE DESIGN
 AUSTIN, TEXAS

DRAWN: D. Kendall
 CHECKED: _____
 APPROVED: M. Lee

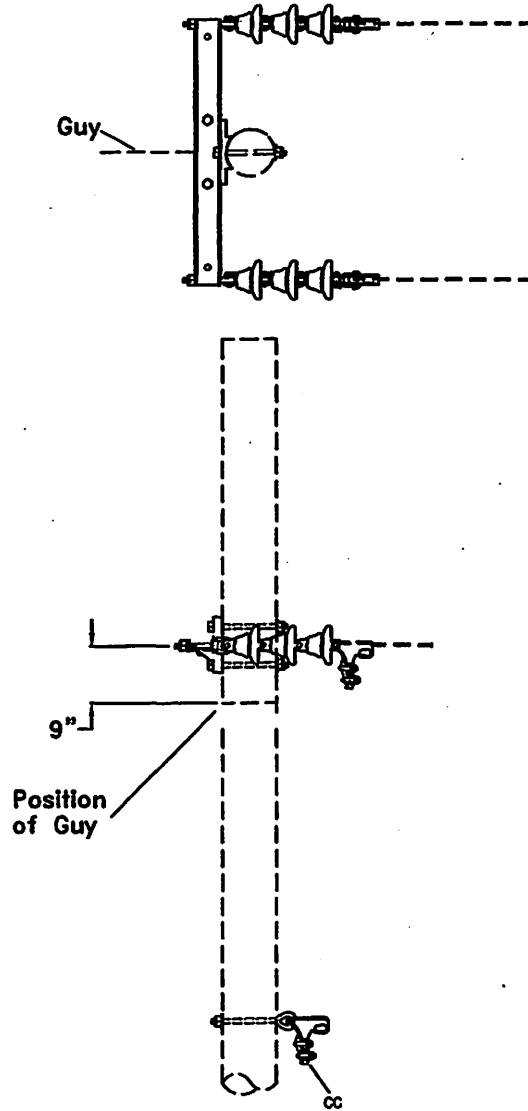
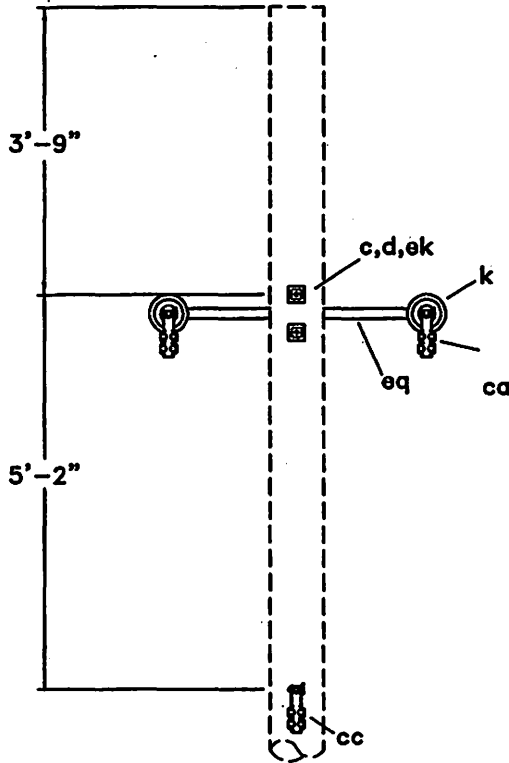
7.2/12.5 KV. PRIMARY
 2-PHASE ARMLESS CONSTRUCTION
 DOUBLE PRIMARY SUPPORT
 0° TO 5° ANGLE

DATE:
 5/02

B2B

NOTE:

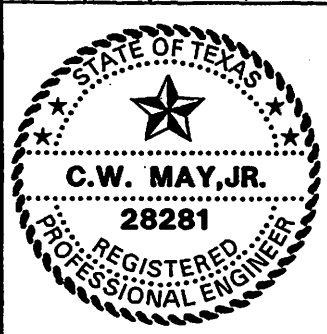
- 1) Designate B7-1B for construction where maximum loading per phase will not exceed 10,000#.



Note:

2" Minimum clear wood clearance of all hardware.
 No bolts to extend more than 2" beyond locknut.
 The seal appearing on this document was authorized
 by C. W. MAY, JR, P.E. 28281 on 10/2/02

ITEM	NO.	MATERIAL	ITEM	NO.	MATERIAL
c	2	Bolt, machine, 5/8" x required length	eq	1	Deadend, metal assembly
d	3	Washer, square, 2-1/4" x 3/16 x 11/16" hole			
k	6	Insulator, suspension, 52-1			
f	2	Pin, crossarm, for metal arm			
bs	1	Bolt, single upset, 5/8" x required length			
cm	1	Insulator, spool type, class 53-2			
o	1	Bolt, eye, 5/8" x required length			
ca	2	Deadend assembly, primary			
cc	1	Deadend assembly, neutral			
ek	3	Locknuts, 5/8"			



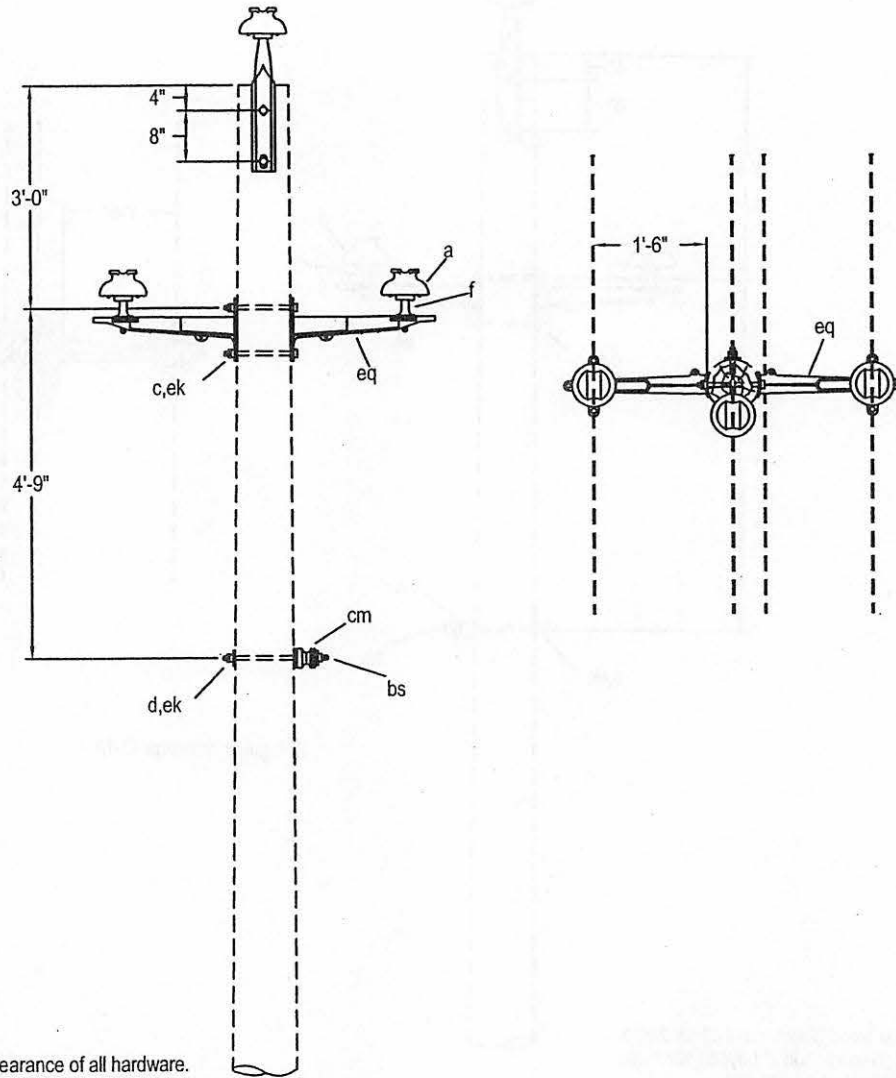
LCRA
 ENERGY • WATER • COMMUNITY SERVICES
 LOWER COLORADO RIVER AUTHORITY
 DISTRIBUTION LINE DESIGN
 AUSTIN, TEXAS

DRAWN: D. Kendall
 CHECKED: _____
 APPROVED: M. Lee

7.2/12.5 KV. PRIMARY
 2-PHASE ARMLESS CONSTRUCTION
 SINGLE DEADEND

DATE: 5/02

B7B, B7-1B



Note:
 2" Minimum clear wood clearance of all hardware.
 No bolts to extend more than 2" beyond locknut.
 The seal appearing on this document was authorized
 by C. W. MAY, JR, P.E. 28281 on 10/2/02

ITEM	NO.	MATERIAL	ITEM	NO.	MATERIAL
a	3	Insulator, pin type, class 55-4			
b	2	Pin, pole top, 20"			
c	4	Bolt, machine, 5/8" x required length			
d	3	Washer, square, 2-1/4" x 3/16 x 11/16" hole			
f	2	Pin, crossarm, for metal arm			
bs	1	Bolt, single upset, 5/8" x required length			
cm	1	Insulator, spool type, class 53-2			
ek	5	Locknut, 5/8"			
eq	2	Bracket, metal, 18" double pin			

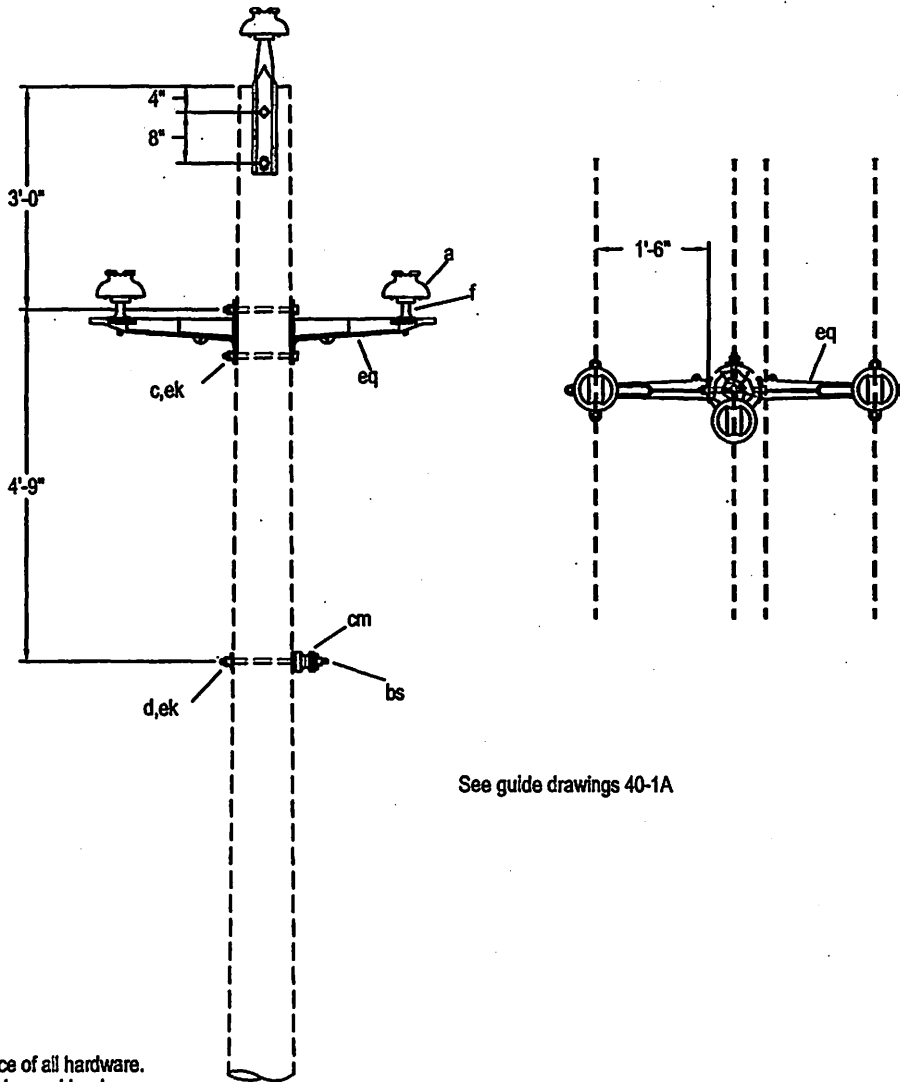


DRAWN: D. Kendall
 CHECKED: _____
 APPROVED: M. Lee

7.2/12.5 KV. PRIMARY
 3-PHASE ARMLESS CONSTRUCTION
 SINGLE PRIMARY SUPPORT
 0° TO 5° ANGLE

DATE:
 5/02

C1B



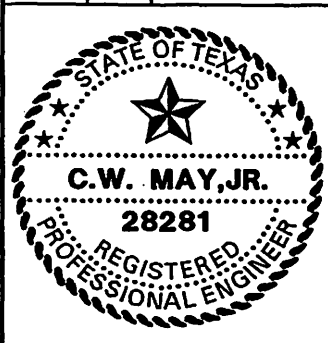
See guide drawings 40-1A

Note:

2" minimum clear wood clearance of all hardware.
 No bolts to extend more than 2" beyond hardware.
 Jumpers and connectors as required.

The seal appearing on this document was authorized
 by C. W. MAY, JR, P.E. 28281 on 10/2/02.

ITEM	NO.	MATERIAL	ITEM	NO.	MATERIAL
a	3	Insulator, pin type, class 55-4			
b	2	Pin, pole top, 20"			
c	4	Bolt, machine, 5/8" x required length			
d	3	Washer, square, 2-1/4", 11/16" hole			
f	2	Pin, crossarm, for metal arm			
eq	2	Bracket, metal, 18" double pin			
bs	1	Bolt, single upset, 5/8" x required length			
cm	1	Insulator, spool, class 53-2			
ek	5	Locknut, 5/8"			



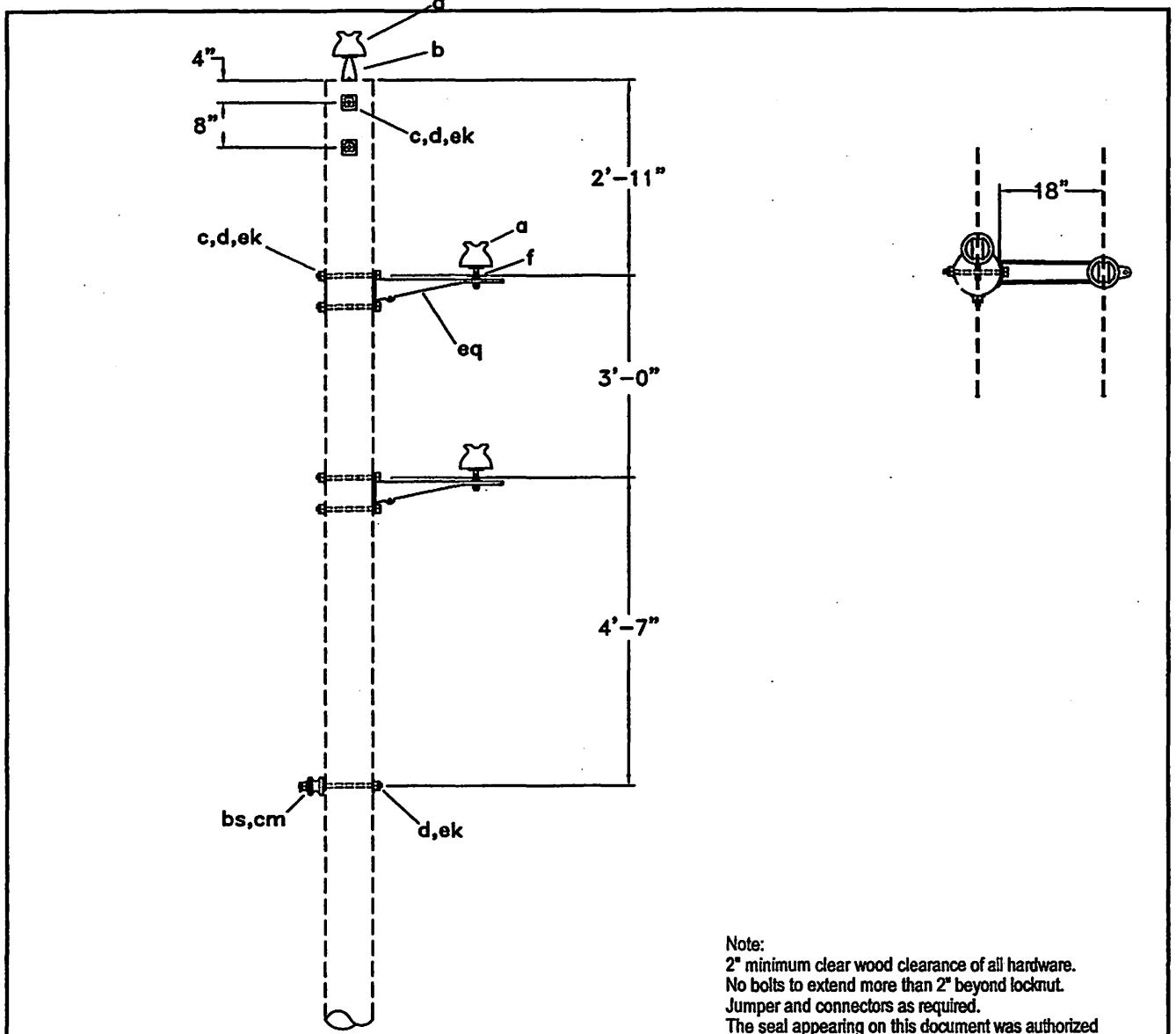
LOWER COLORADO RIVER AUTHORITY
 DISTRIBUTION LINE DESIGN
 AUSTIN, TEXAS

DRAWN: J. Brooks
 CHECKED: _____
 APPROVED: M. JEE

7.2/12.5 KV.
 3-PHASE ARMLESS CONSTRUCTION
 SINGLE PRIMARY SUPPORT
 0° TO 5° ANGLE

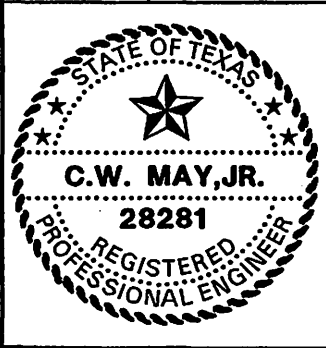
DATE:
 5/02

C1BX



Note:
 2" minimum clear wood clearance of all hardware.
 No bolts to extend more than 2" beyond locknut.
 Jumper and connectors as required.
 The seal appearing on this document was authorized
 by C. W. MAY, JR, P.E. 28281 on 10/2/02.

ITEM	NO.	MATERIAL	ITEM	NO.	MATERIAL
a	3	Insulator, pin type, class 55-4			
b	1	Pin, pole top, 20"			
c	6	Bolt, machine, 5/8" x required length			
d	7	Washer, square, 2-1/4" x 3/16" x 11/16" hole			
f	2	Pin, crossarm, for metal bracket			
bs	1	Bolt, single upset, 5/8" x required length			
cm	1	Insulator, spool type, class 53-2			
ek	4	Locknut, 5/8"			
eq	2	Bracket, metal, 18", single pin			



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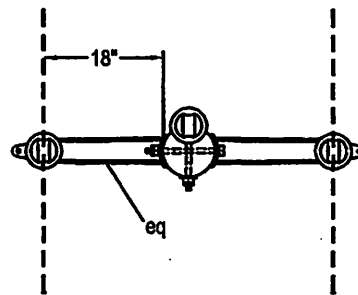
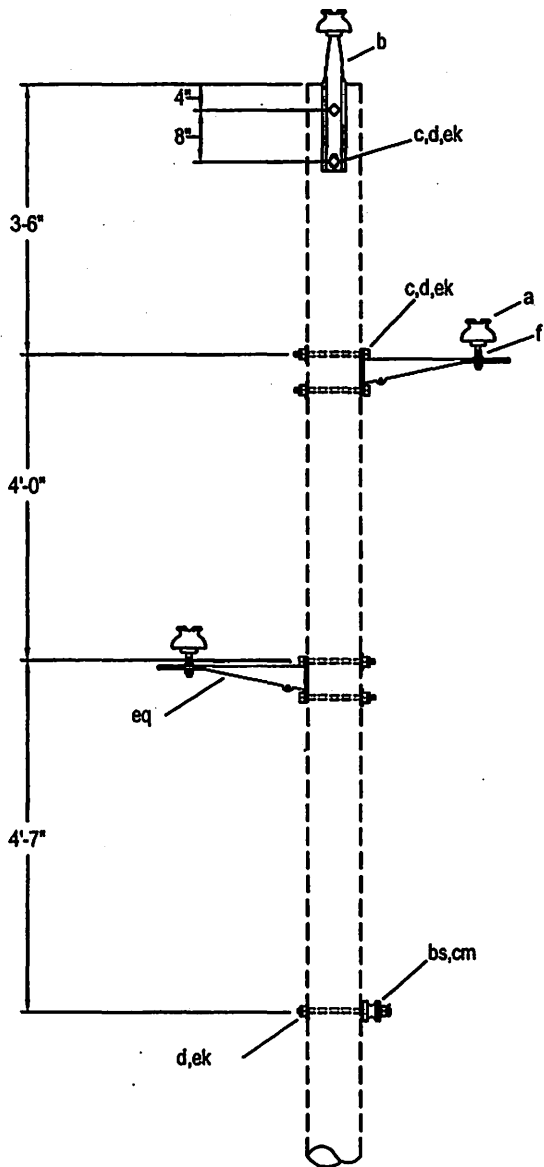
LOWER COLORADO RIVER AUTHORITY
 DISTRIBUTION LINE DESIGN
 AUSTIN, TEXAS

DRAWN: J. Brooks
 CHECKED: _____
 APPROVED: M. Lee

7.2/12.5 KV. PRIMARY 3-PHASE
 ARMLESS CONSTRUCTION
 (SMALL CONDUCTOR)

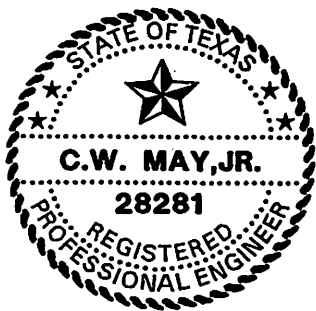
DATE: 5/02

C1BX



Note:
 2" Minimum clear wood clearance of all hardware.
 No bolts to extend more than 2" beyond locknut.
 Jumpers and connectors as required.
 The seal appearing on this document was authorized
 by C. W. MAY, JR, P.E. 28281 on 10/2/02.

ITEM	NO.	MATERIAL	ITEM	NO.	MATERIAL
a	3	Insulator, pin type, class 55-4			
b	1	Pin, pole top, 20"			
c	6	Bolt, machine, 5/8" x required length			
d	7	Washer, square, 2-1/4" x 3/16", 11/16" hole			
f	2	Pin, crossarm, for metal arm			
bs	1	Bolt, single upset, 5/8" x required length, with locknut			
cm	1	Insulator, spool, class 53-2			
ek	6	Locknut, 5/8"			
eq	2	Bracket, metal, 18", single pin			



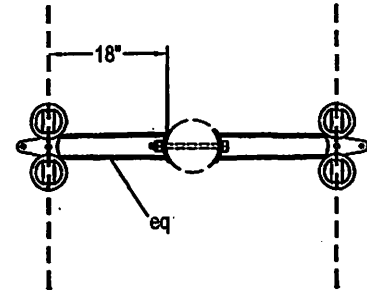
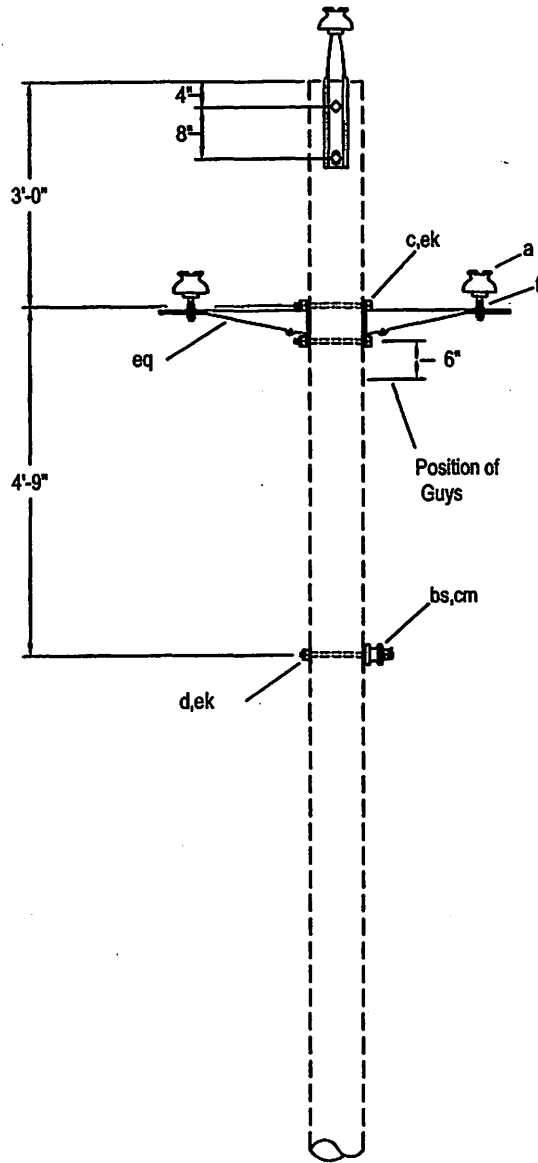
LOWER COLORADO RIVER AUTHORITY
 DISTRIBUTION LINE DESIGN
 AUSTIN, TEXAS

DRAWN: J. A20033
 CHECKED: _____
 APPROVED: M. Lee

7.2/12.5 KV. PRIMARY, 3-PHASE
 ARMLESS CONSTRUCTION
 SINGLE VERTICAL PRIMARY SUPPORT

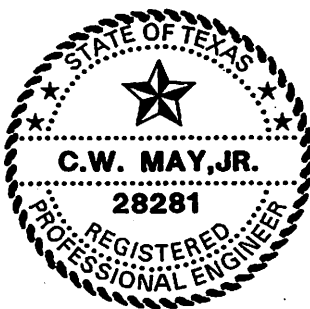
DATE:
 5/02

C1-VB



Note:
 2" Minimum clear wood clearance of all hardware.
 No bolts to extend more than 2" beyond locknut.
 Stub pole may be necessary for proper guying.
 The seal appearing on this document was authorized
 by C. W. MAY, JR, P.E. 28281 on 10/2/02

ITEM	NO.	MATERIAL	ITEM	NO.	MATERIAL
a	6	Insulator, pin type, class 55-4			
b	2	Pin, pole top, 20"			
c	5	Bolt, machine, 5/8" x required length			
d	3	Washer, round, 1-3/8", 9/16" hole			
f	4	Pin, crossarm, for metal arm			
eq	2	Bracket, metal, 18" double pin			
cm	1	Insulator, spool class 53-2			
bs	1	Bolt, single upset, 5/8" x required length, with locknut			
ek	5	Locknut, 5/8"			



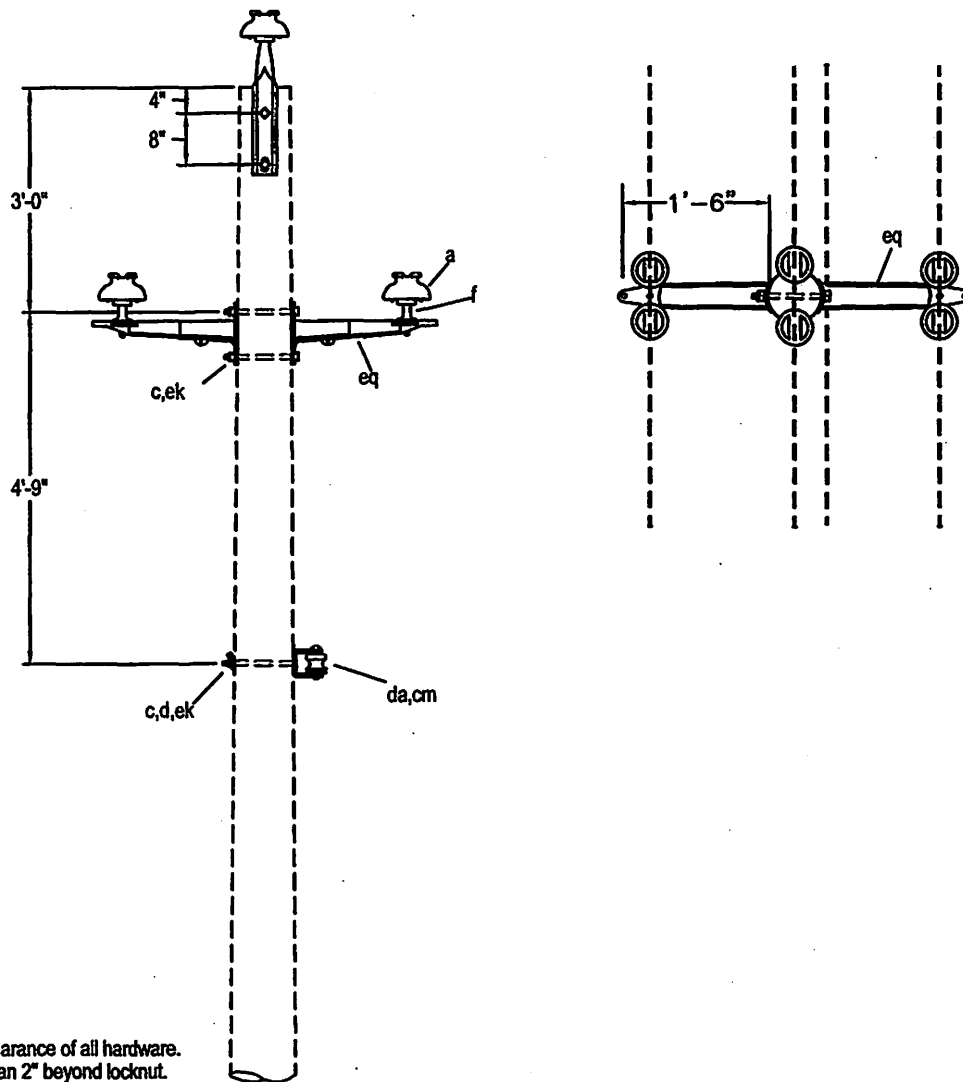
LOWER COLORADO RIVER AUTHORITY
 DISTRIBUTION LINE DESIGN
 AUSTIN, TEXAS

DRAWN: D. Kendall
 CHECKED: _____
 APPROVED: M. Lee

7.2/12.5 KV. PRIMARY, 3-PHASE
 ARMLESS CONSTRUCTION
 DOUBLE PRIMARY SUPPORT
 0° TO 5° ANGLE

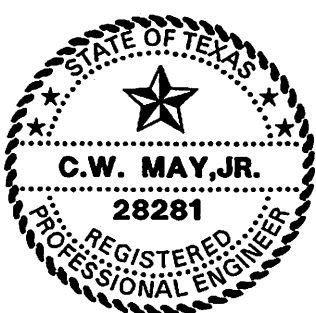
DATE:
 5/02

C1-1B



Note:
 2" minimum clear wood clearance of all hardware.
 No bolts to extend more than 2" beyond locknut.
 Jumper and connectors as required.
 The seal appearing on this document was authorized
 by C. W. MAY, JR, P.E. 28281 on 10/2/02.

ITEM	NO.	MATERIAL	ITEM	NO.	MATERIAL
a	6	Insulator, pin type, class 55-4			
b	2	Pin, pole top, 20"			
c	6	Bolt, machine, 5/8" x required length			
d	3	Washer, square, 2-1/4" x 3/16 x 11/16" hole			
f	4	Pin, crossarm, for metal arm			
cm	1	Insulator, spool type, class 53-2			
da	1	Bracket, neutral			
ek	6	Locknut, 5/8"			
eq	2	Bracket, metal, 18" double pin			



LOWER COLORADO RIVER AUTHORITY
 DISTRIBUTION LINE DESIGN
 AUSTIN, TEXAS

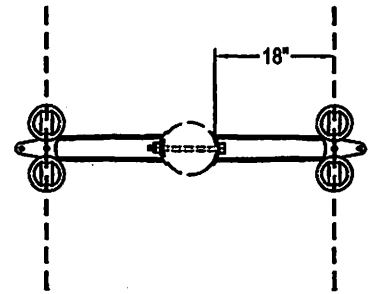
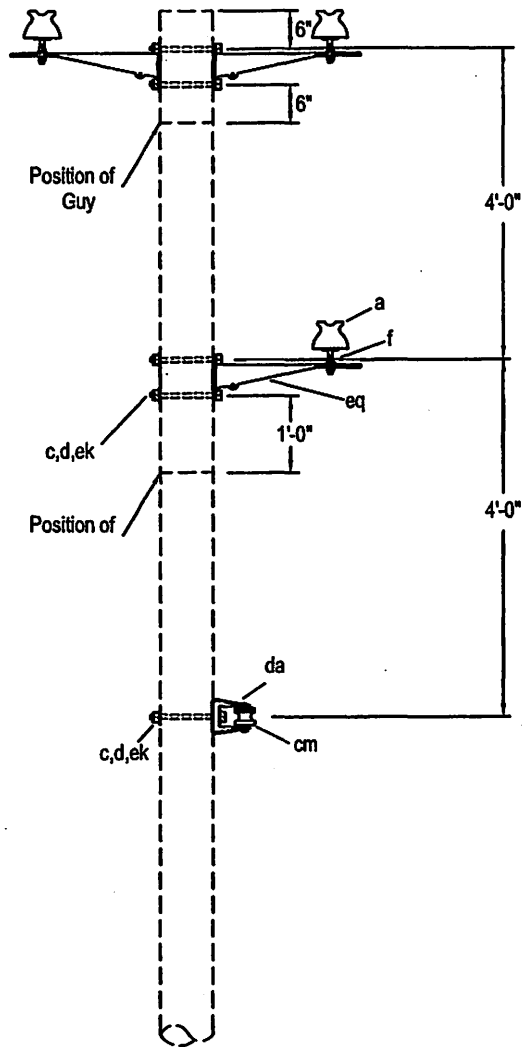
DRAWN: D. Kendall
 CHECKED: _____
 APPROVED: M. Lee

7.2/12.5 KV. PRIMARY
 3-PHASE ARMLESS CONSTRUCTION
 DOUBLE PRIMARY SUPPORT
 0° TO 5° ANGLE

DATE:
 5/02

C2B

The seal appearing on this document was authorized
 by C. W. MAY, JR, P.E. 28281 on 10/2/02.



Note:
 2" minimum clear wood clearance of all hardware.
 No bolts to extend more than 2" beyond locknut.
 Jumper and connectors as required.
 The seal appearing on this document was authorized
 by C. W. MAY, JR, P.E. 28281 on 10/2/02.

ITEM	NO.	MATERIAL	ITEM	NO.	MATERIAL
a	6	Insulator, pin type, class 55-4			
c	5	Bolt, machine, 5/8" x required length			
d	3	Washer, square, 2-1/4" x 3/16 x 11/16" hole			
f	6	Pin, crossarm, for metal arm			
cm	1	Insulator, spool type, class 53-2			
da	1	Bracket, neutral			
ek	5	Locknut, 5/8"			
eq	3	Bracket, metal, 18" double pin			



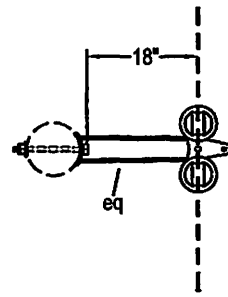
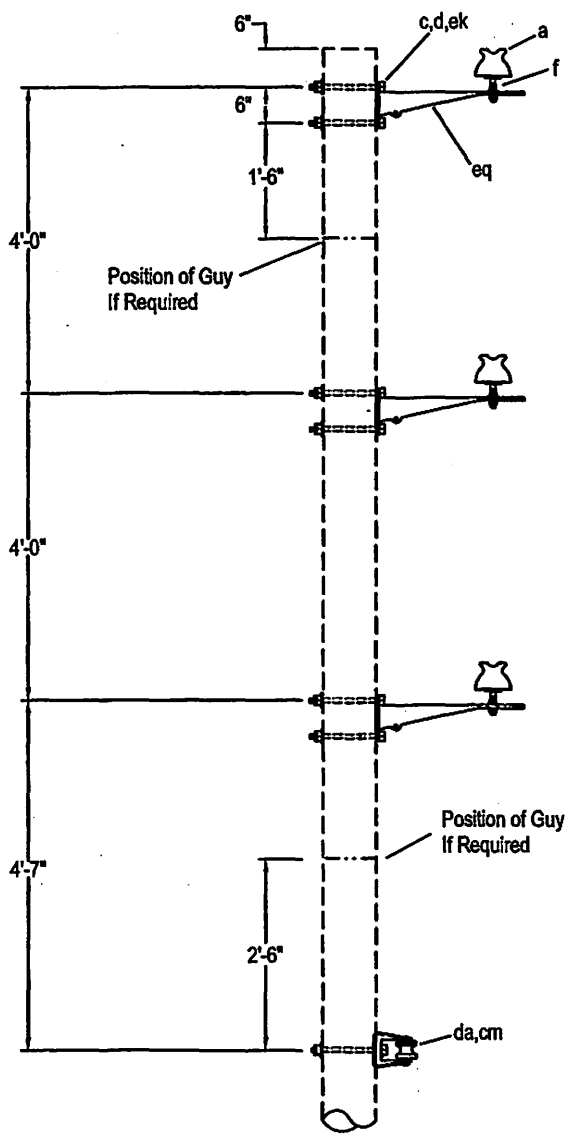
LOWER COLORADO RIVER AUTHORITY
 DISTRIBUTION LINE DESIGN
 AUSTIN, TEXAS

DRAWN: B. Kendall
 CHECKED: _____
 APPROVED: M. Lee

7.2/12.5 KV. PRIMARY
 3-PHASE ARMLESS CONSTRUCTION
 DOUBLE PRIMARY SUPPORT
 3° TO 20° ANGLE

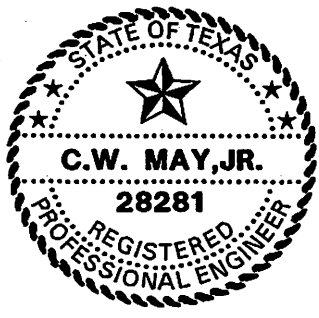
DATE:
 5/02

C2-2B



Note:
 2" Minimum clear wood clearance of all hardware.
 No bolts to extend more than 2" beyond locknut.
 Jumpers and connectors as required.
 The seal appearing on this document was authorized
 by C. W. MAY, JR, P.E. 28281 on 10/2/02.

ITEM	NO.	MATERIAL	ITEM	NO.	MATERIAL
a	6	Insulator, pin type, class 55-4			
c	7	Bolt, machine, 5/8" x required length			
d	7	Washer, 2-1/4" x 3/16", 11/16" hole			
f	6	Pin, crossarm, for metal bracket			
cm	1	Insulator, spool type, class 53-2			
da	1	Bracket, neutral			
ek	7	Locknut, 5/8"			
eq	3	Bracket, standoff, 18" (double pin)			



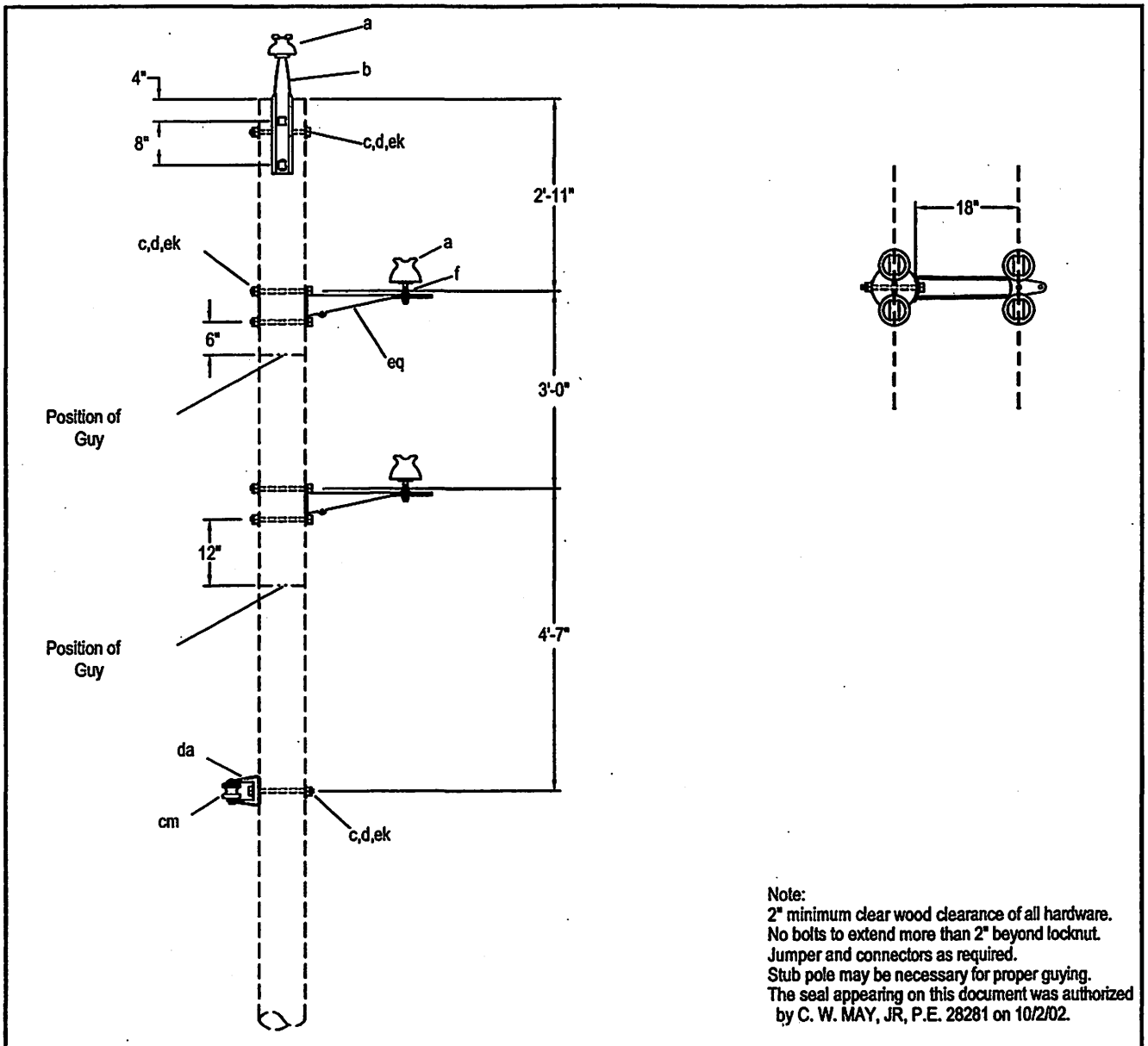
LCRA
 ENERGY • WATER • COMMUNITY SERVICES
 LOWER COLORADO RIVER AUTHORITY
 DISTRIBUTION LINE DESIGN
 AUSTIN, TEXAS

DRAWN: F. Brooks
 CHECKED: _____
 APPROVED: W. Lee

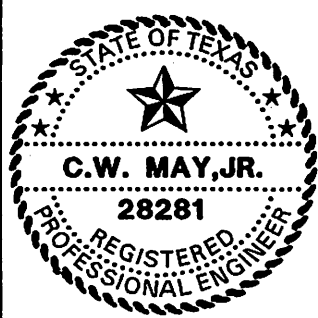
7.2/12.5 KV. PRIMARY 3-PHASE
 VERTICAL CONSTRUCTION
 DOUBLE PRIMARY SUPPORT
 AT 2° TO 15° ANGLE

DATE: 5/02

C3-1B



ITEM	NO.	MATERIAL	ITEM	NO.	MATERIAL
a	6	Insulator, pin type, class 55-4			
b	2	Pin, pole top, 20"			
c	8	Bolt, machine, 5/8" x required length			
d	7	Washer, square, 2-1/4" x 3/16" x 11/16" hole			
f	4	Pin, crossarm, for metal bracket			
cm	1	Insulator, spool type, class 53-2			
da	1	Bracket, neutral			
ek	8	Locknut, 5/8"			
eq	2	Bracket, metal, 18", double pin			



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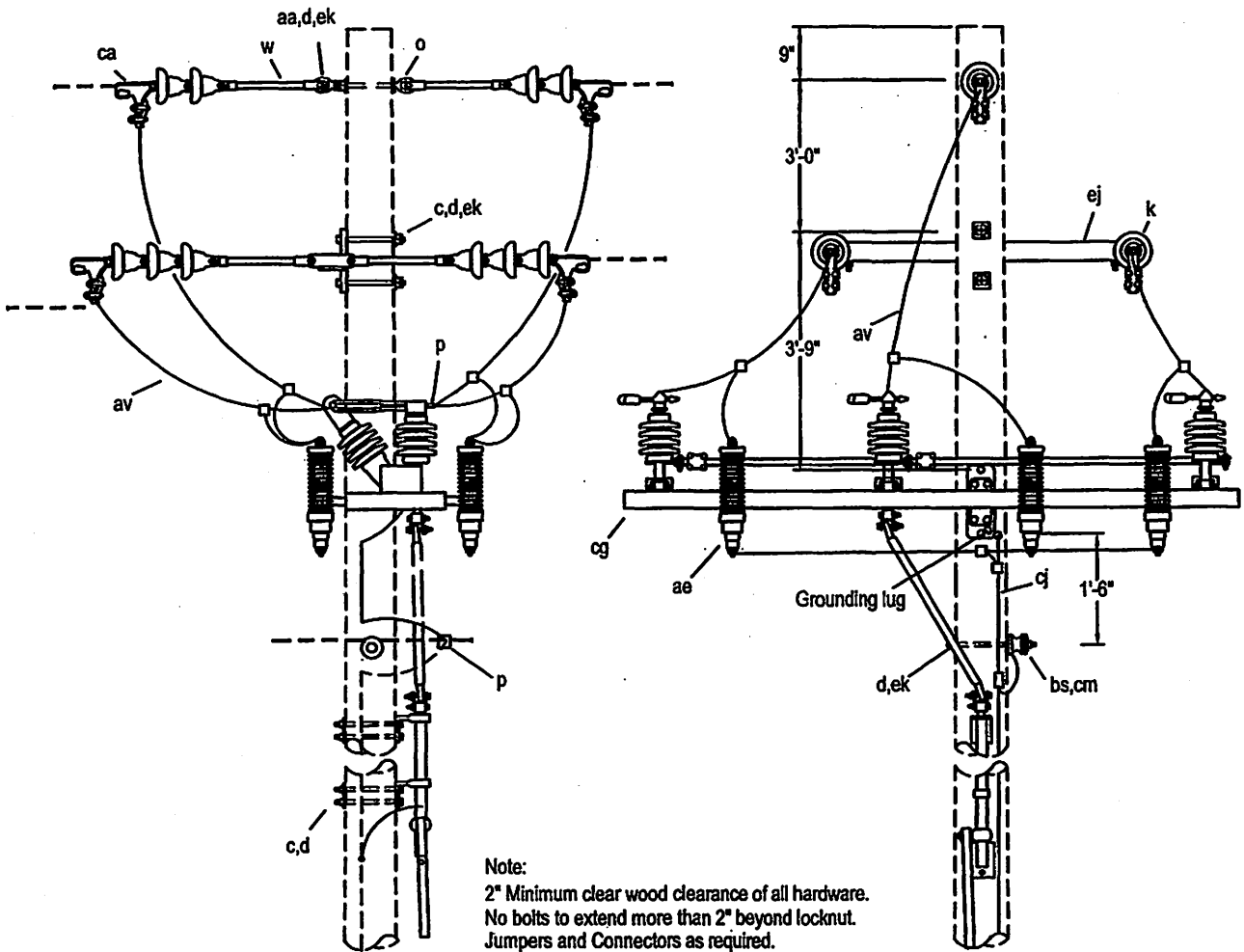
LOWER COLORADO RIVER AUTHORITY
DISTRIBUTION LINE DESIGN
AUSTIN, TEXAS

DRAWN: J. Brooks
CHECKED: _____
APPROVED: M. Lee

7.2/12.5 KV. PRIMARY 3-PHASE
ARMLESS CONSTRUCTION
DOUBLE PRIMARY SUPPORT 0° TO 30° ANGLE
(SMALL CONDUCTOR)

DATE: 5/02

C3-1XB



Note:
 2" Minimum clear wood clearance of all hardware.
 No bolts to extend more than 2" beyond locknut.
 Jumpers and Connectors as required.
 The seal appearing on this document was authorized
 by C. W. MAY, JR, P.E. 28281 on 10/2/02.

ITEM	NO.	MATERIAL	ITEM	NO.	MATERIAL
c	8	Bolt, machine, 1/2" x required length	ca	6	Deadend assembly, primary
c	6	Bolt, machine, 5/8" x required length	cg	1	Switch, air, S & C cat No. 137412R6
d	9	Washer, square, 2-1/4" x 3/16", 11/16" hole	cj		Ground wire, #6 S.D. copper, as required
d	8	Washer, round, 1-3/8" diameter, 9/16" hole	cm	1	Insulator, spool, class 53-2
k	16	Insulator, suspension, class 52-1	ek	8	Locknut, 1/2"
o	7	Bolt, eye, 5/8" x required length	ek	10	Locknut, 5/8"
p	6	Connector, pad, terminal			
p		Connector, as required			
w	6	Insulator, guy strain, 24", 24,000#			
aa	1	Nut, eye, 5/8"			
ae	6	Lightning arrester			
al		staples, ground wire, as required			
av		Jumper, as required			



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 ENERGY • WATER • COMMUNITY SERVICES

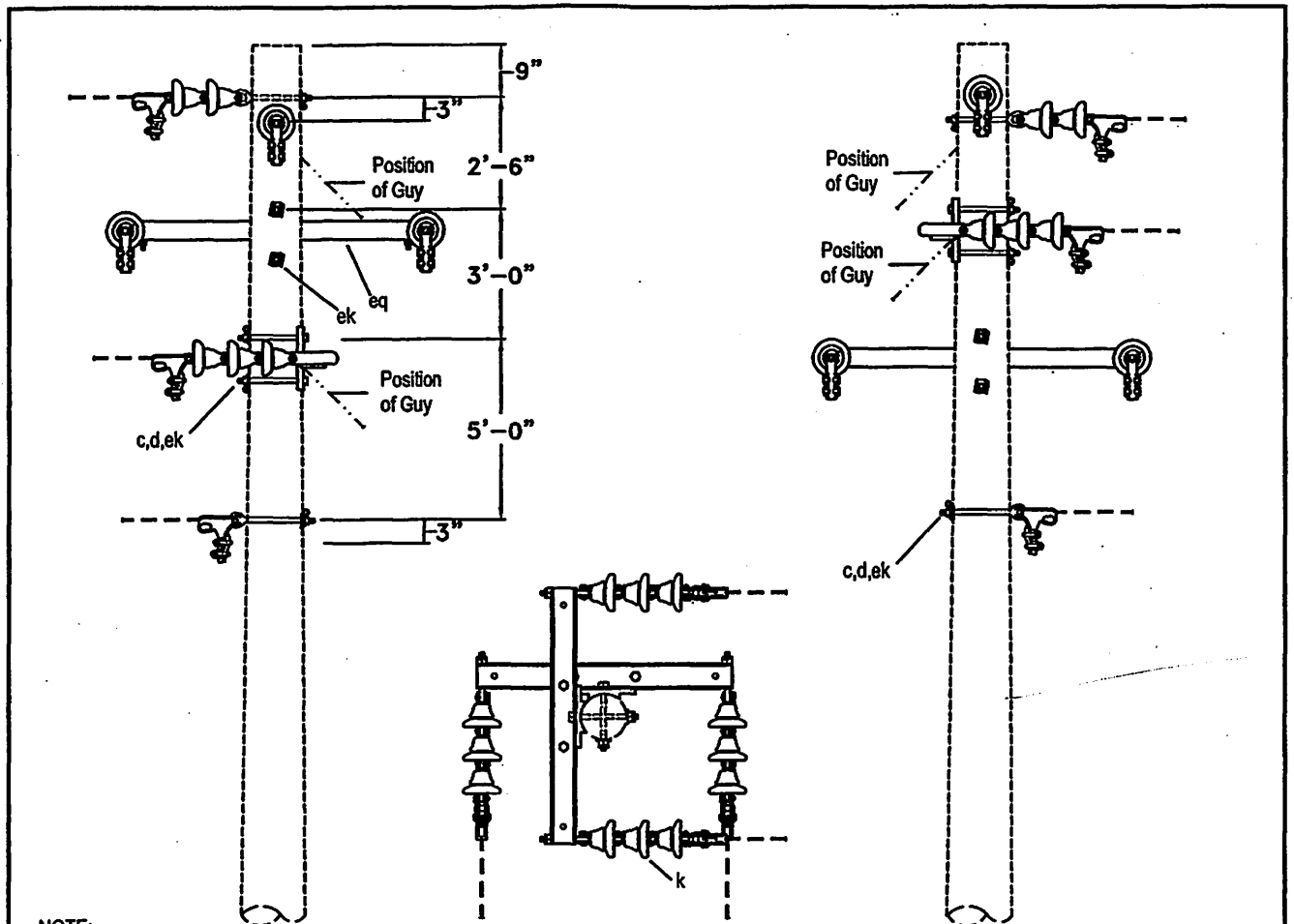
LOWER COLORADO RIVER AUTHORITY
 DISTRIBUTION LINE DESIGN
 AUSTIN, TEXAS

DRAWN: F. Brooks
 CHECKED: _____
 APPROVED: M. Lee

7.2/12.5 KV
 3-PHASE ARMLESS CONSTRUCTION
 STANDARD
 SECTIONALIZING AIR BREAK SWITCH

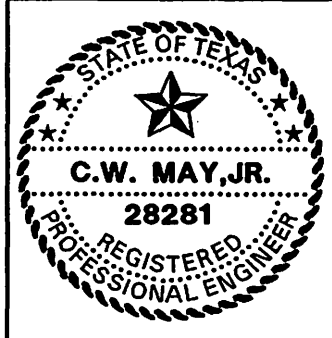
DATE: 5/02

M3-15B



NOTE:
 2" Minimum clear wood clearance of all hardware.
 No bolts to extend more than 2" beyond locknut.
 Jumpers and connectors as required.
 Designate C4-2B for construction where maximum loading per phase will not exceed 10,000#.
 Stub pole may be necessary for proper guying.
 The seal appearing on this document was authorized by C. W. MAY, JR, P.E. 28281 on 10/2/02.

ITEM	NO.	MATERIAL	ITEM	NO.	MATERIAL
c	4	Bolt, machine, 5/8" x required length			
d	8	Washer, square, 2-1/4" x 3/16 x 11/16" hole			
k	16	Insulator, suspension, 52-1			
o	4	Bolt, eye, 5/8 x required length			
ca	6	Deadend assembly, primary			
cc	2	Deadend assembly, neutral			
ek	8	Locknut, 5/8"			
eq	3	Deadend, metal assembly, 40"			



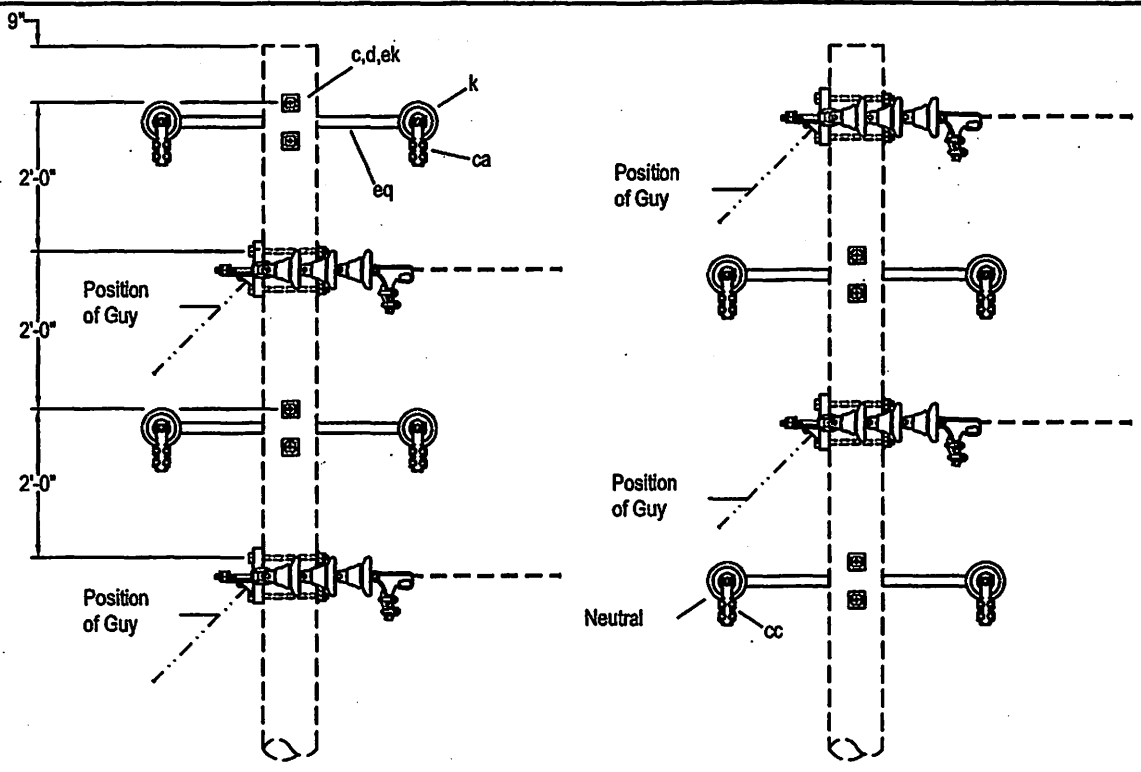
LCRA
 ENERGY • WATER • COMMUNITY SERVICES
 LOWER COLORADO RIVER AUTHORITY
 DISTRIBUTION LINE DESIGN
 AUSTIN, TEXAS

DRAWN: D. Kendall
 CHECKED: _____
 APPROVED: M. LEE

7.2/12.5 KV. PRIMARY
 3-PHASE ARMLESS CONSTRUCTION
 DOUBLE DEADEND

DATE: _____
 5/02

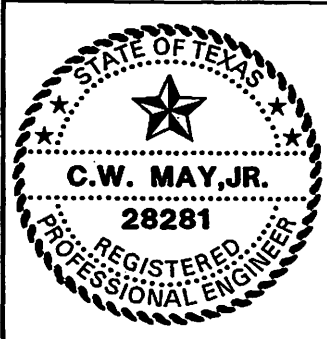
C4B



NOTE:

2" Minimum clear wood clearance of all hardware.
 No bolt to extend more than 2" beyond all hardware.
 Designate C4-1B for construction where maximum loading per phase will not exceed 6000#.
 Designate C4-2B for construction where maximum loading per phase will not exceed 10,000#.
 Stub pole may be necessary for proper guying.
 The seal appearing on this document was authorized by C. W. MAY, JR, P.E. 28281 on 10/2/02.

ITEM	NO.	MATERIAL	ITEM	NO.	MATERIAL
c	8	Bolt, machine, 5/8" x required length			
d	8	Washer, square, 2-1/4" x 3/16" x 11/16" hole			
k	24	Insulator, suspension type, class 52-1			
ca	6	Deadend assembly, primary			
cc	2	Deadend assembly, neutral			
ek	8	Locknut, 5/8"			
eq	4	Deadend, metal assembly, 40" (6000#)			
eq		Deadend, metal assembly, 40" (10000#)			



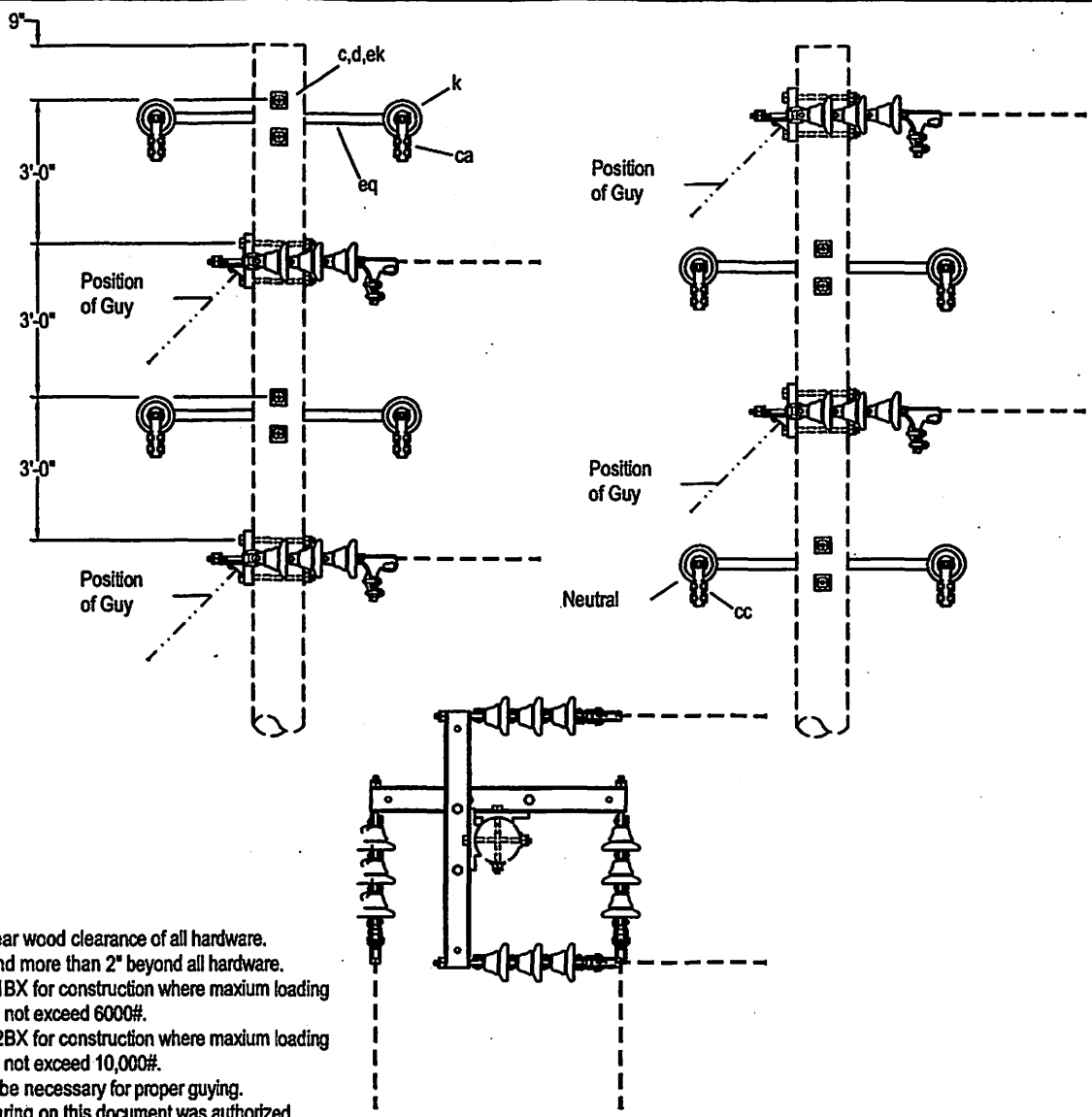
LCRA
 ENERGY • WATER • COMMUNITY SERVICES

LOWER COLORADO RIVER AUTHORITY
 DISTRIBUTION LINE DESIGN
 AUSTIN, TEXAS

DRAWN: J. Brooks
 CHECKED: _____
 APPROVED: M. Lee

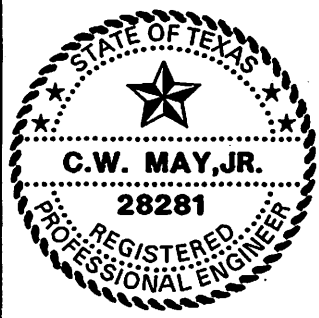
7.2/12.5 KV. PRIMARY 3-PHASE
 ARMLESS CONSTRUCTION, DOUBLE DEADEND
 (ALL CONDUCTORS)

DATE: 5/02	C4-1B, C4-2B
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NOTE:
 2" Minimum clear wood clearance of all hardware.
 No bolt to extend more than 2" beyond all hardware.
 Designate C4-1BX for construction where maximum loading per phase will not exceed 6000#.
 Designate C4-2BX for construction where maximum loading per phase will not exceed 10,000#.
 Stub pole may be necessary for proper guying.
 The seal appearing on this document was authorized by C. W. MAY, JR, P.E. 28281 on 10/2/02.

ITEM	NO.	MATERIAL	ITEM	NO.	MATERIAL
c	8	Bolt, machine, 5/8" x required length			
d	8	Washer, square, 2-1/4" x 3/16" x 11/16" hole			
k	24	Insulator, suspension type, class 52-1			
ca	6	Deadend assembly, primary			
cc	2	Deadend assembly, neutral			
ek	8	Locknut, 5/8"			
eq	4	Deadend, metal assembly, 40" (6000#)			
eq		Deadend, metal assembly, 40" (10000#)			



LCRA
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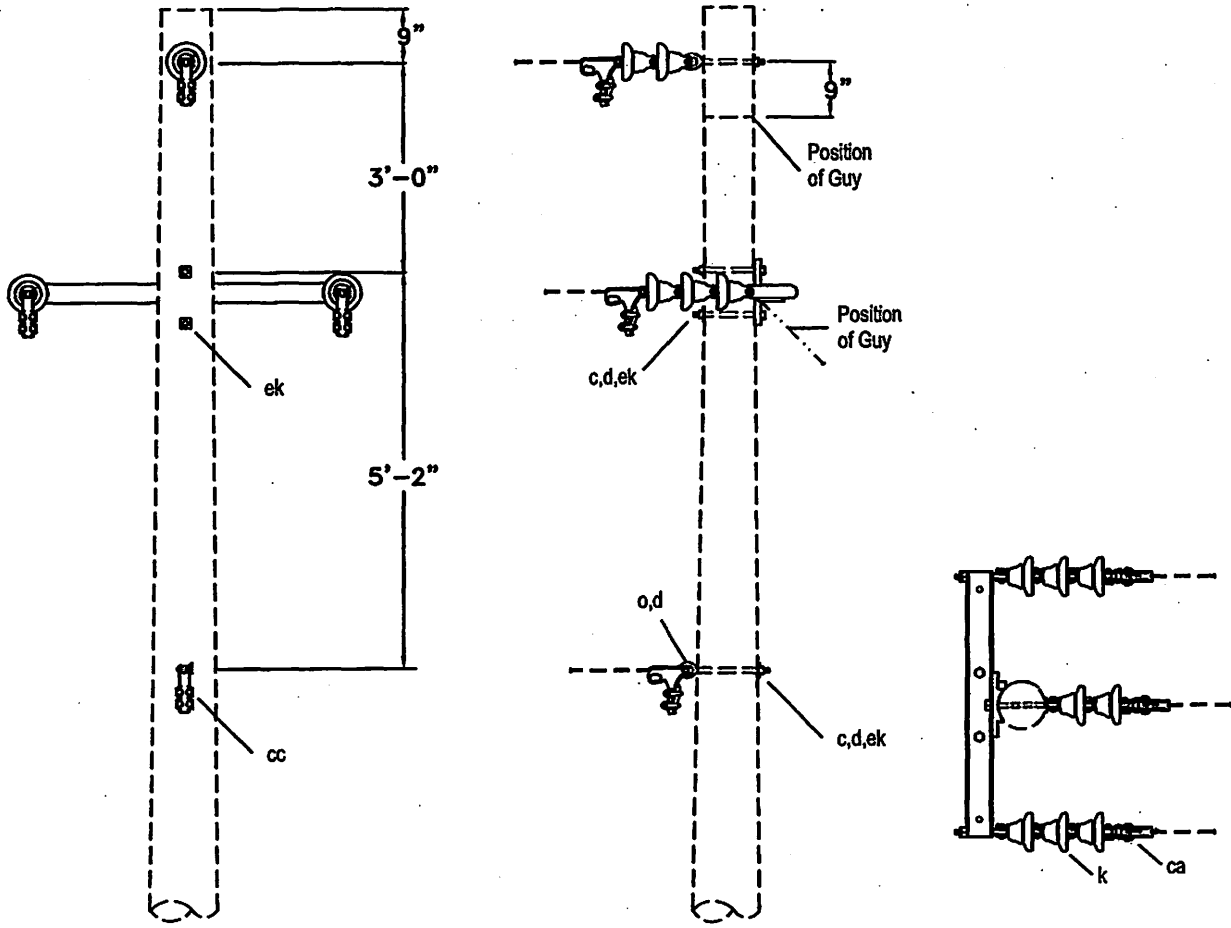
LOWER COLORADO RIVER AUTHORITY
 DISTRIBUTION LINE DESIGN
 AUSTIN, TEXAS

DRAWN: F. Brooks
 CHECKED: _____
 APPROVED: M. Lee

7.2/12.5 KV. PRIMARY 3-PHASE
 ARMLESS CONSTRUCTION, DOUBLE DEADEND
 (ALL CONDUCTORS)

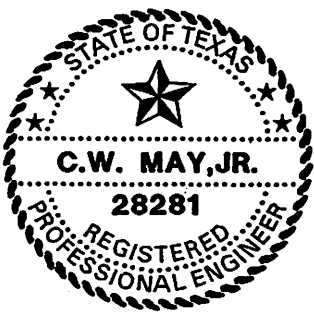
DATE: 5/02

C4-1BX, C4-2BX



Note:
 2" Minimum clear wood clearance of all hardware.
 No bolts to extend more than 2" beyond locknut.
 The seal appearing on this document was authorized
 by C. W. MAY, JR, P.E. 28281 on 10/2/02.

ITEM	NO.	MATERIAL	ITEM	NO.	MATERIAL
c	2	Bolt, machine, 5/8" x required length			
d	4	Washer, square, 2-1/4" x 3/16 x 11/16" hole			
k	8	Insulator, suspension, 52-1			
o	2	Bolt, eye, 5/8 x required length			
ca	3	Deadend assembly, primary			
cc	1	Deadend assembly, neutral			
ek	4	Locknut, 5/8"			
eq	1	Deadend, metal assembly, 40"			



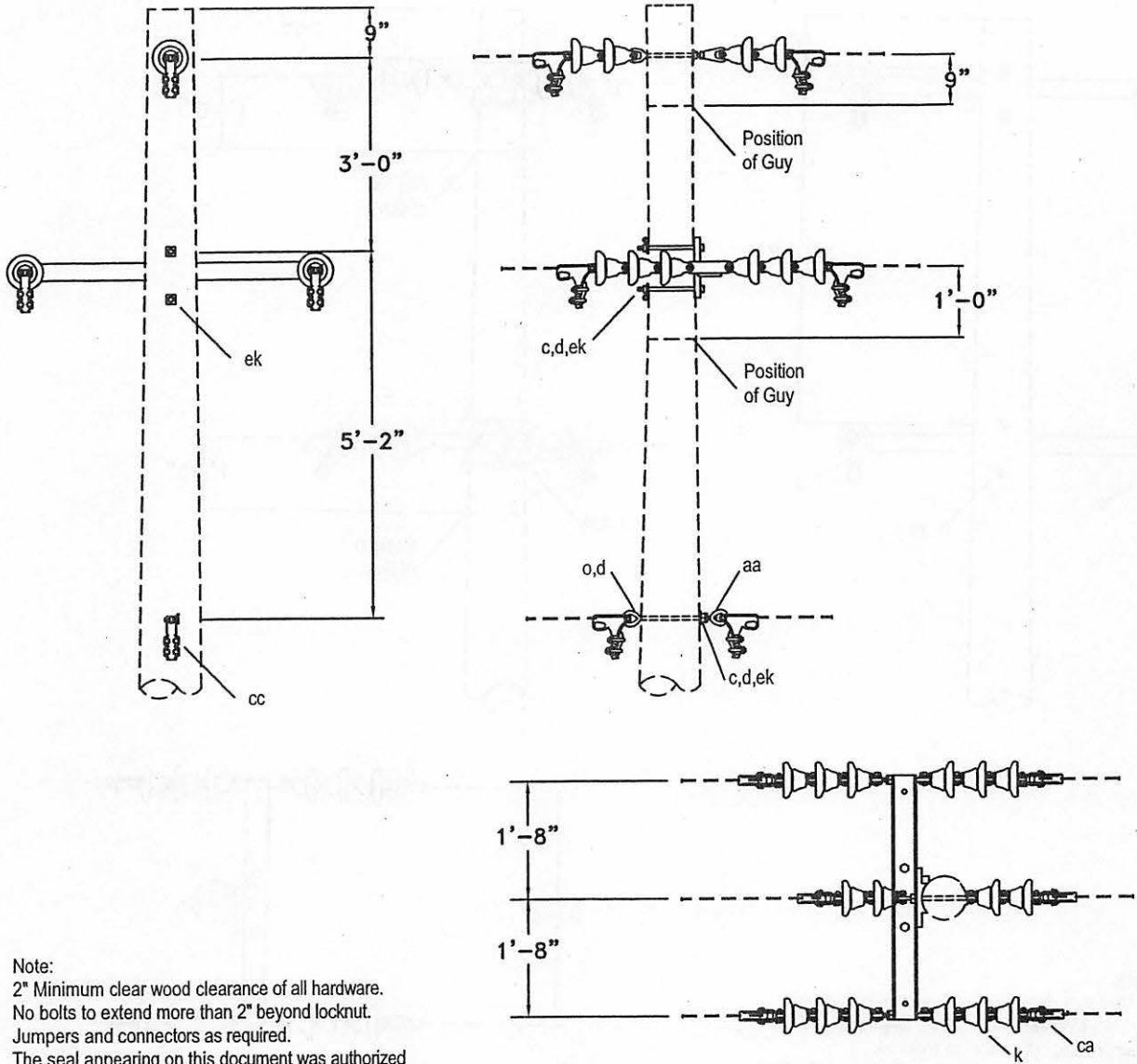
LCRA
 ENERGY • WATER • COMMUNITY SERVICES
 LOWER COLORADO RIVER AUTHORITY
 DISTRIBUTION LINE DESIGN
 AUSTIN, TEXAS

DRAWN: J. Bracke
 CHECKED: _____
 APPROVED: M. Lee

7.2/12.5 KV. PRIMARY
 3-PHASE ARMLESS CONSTRUCTION
 SINGLE DEADEND

DATE: 5/02

C7B



Note:
 2" Minimum clear wood clearance of all hardware.
 No bolts to extend more than 2" beyond locknut.
 Jumpers and connectors as required.
 The seal appearing on this document was authorized
 by C. W. MAY, JR, P.E. 28281 on 10/2/02.

ITEM	NO.	MATERIAL	ITEM	NO.	MATERIAL
c	2	Bolt, machine, 5/8" x required length			
d	4	Washer, square, 2-1/4" x 3/16 x 11/16" hole			
k	8	Insulator,suspension,52-1			
o	2	Bolt,eye,5/8 x required length			
aa	4	Nut,eye,5/8"			
ca	6	Deadend assembly,primary			
cc	2	Deadend assembly,neutral			
ek	4	Locknut, 5/8"			
eq	1	Deadend,metal assembly,40"			



LOWER COLORADO RIVER AUTHORITY
 DISTRIBUTION LINE DESIGN
 AUSTIN, TEXAS

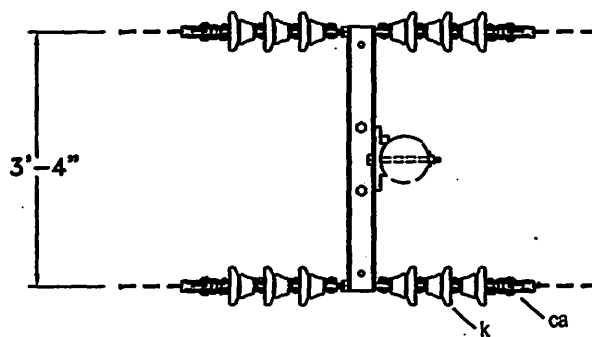
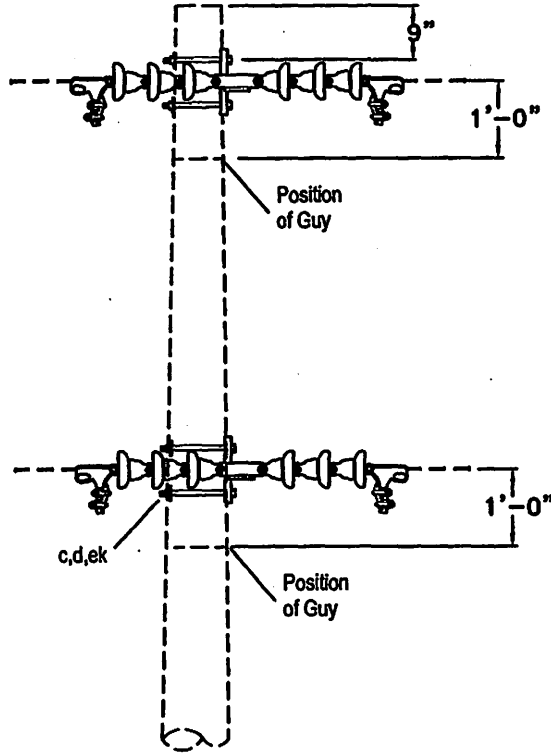
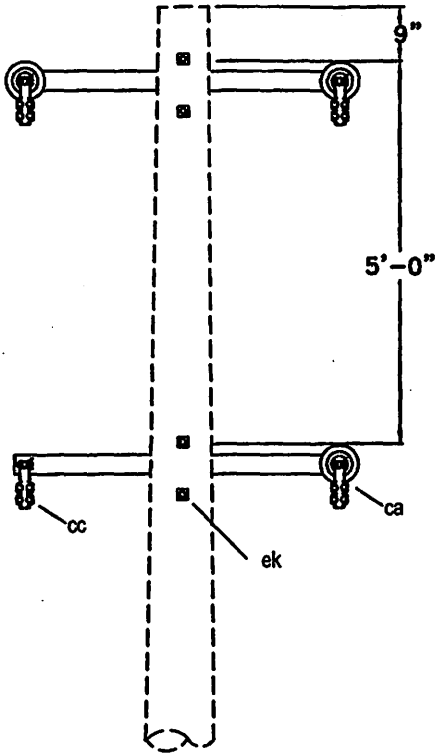
DRAWN: J. Brooks
 CHECKED: _____
 APPROVED: M. Lee

7.2/12.5 KV. PRIMARY
 3-PHASE ARMLESS CONSTRUCTION
 DOUBLE DEADEND

DATE:

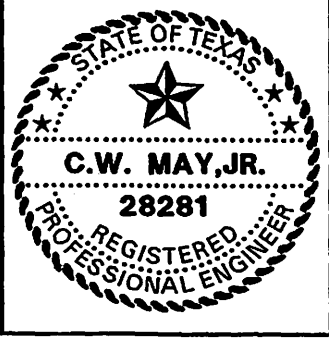
5/02

C8B



Note:
 2" Minimum clear wood clearance of all hardware.
 No bolts to extend more than 2" beyond locknut.
 Jumpers and connectors as required.
 The seal appearing on this document was authorized
 by C. W. MAY, JR, P.E. 28281 on 10/2/02.

ITEM NO.	MATERIAL	ITEM NO.	MATERIAL
c 4	Bolt, machine, 5/8" x required length		
d 4	Washer, square, 2-1/4" x 3/16 x 11/16" hole		
k 18	Insulator, suspension, 52-1		
aa 4	Nut, eye, 5/8"		
ca 6	Deadend assembly, primary		
cc 6	Deadend assembly, neutral		
ek 8	Locknut, 5/8"		
eq 2	Deadend, metal, assembly, 40"		



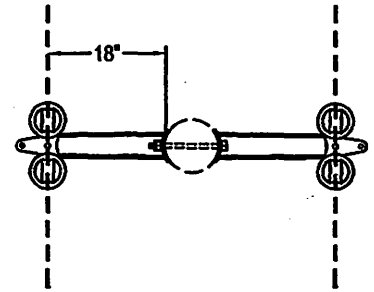
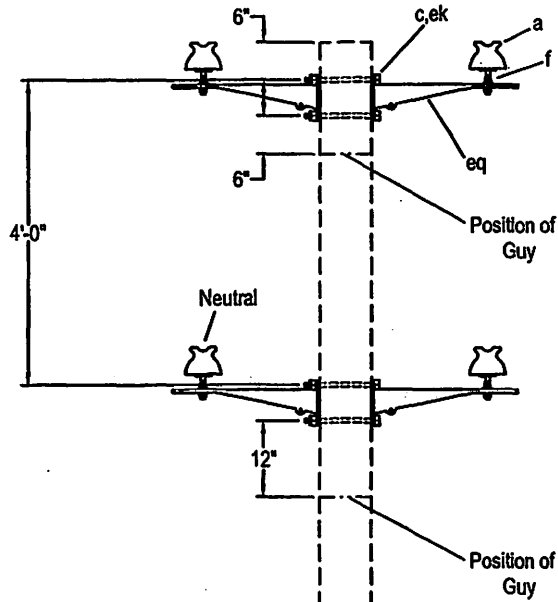
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LOWER COLORADO RIVER AUTHORITY
 DISTRIBUTION LINE DESIGN
 AUSTIN, TEXAS

DRAWN: J. 0200023
 CHECKED: _____
 APPROVED: M. Lee

7.2/12.5 KV. PRIMARY
 3-PHASE ARMLESS CONSTRUCTION
 DOUBLE DEADEND

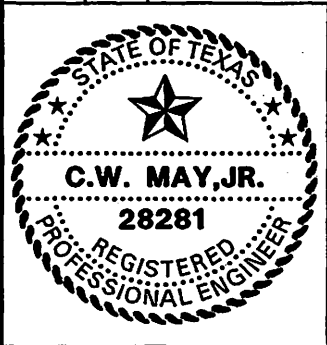
DATE: 5/02	C8-1B
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NOTE:

2" Minimum clear wood clearance of all hardware.
 No bolt to extend more than 2" beyond all hardware.
 Stub pole may be necessary for proper guying.
 The seal appearing on this document was authorized
 by C. W. MAY, JR, P.E. 28281 on 10/2/02.

ITEM	NO.	MATERIAL	ITEM	NO.	MATERIAL
a	8	Insulator, pin type, class 55-4			
c	4	Bolt, machine, 5/8" x required length			
f	8	Pin, crossarm, for metal bracket			
ek	4	Locknut, 5/8"			
eq	4	Bracket, metal, 18", double pin			



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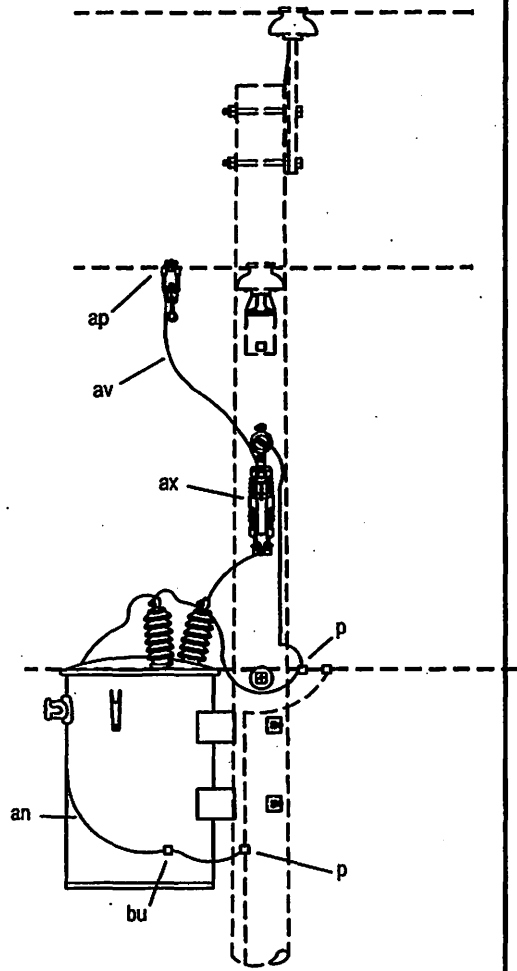
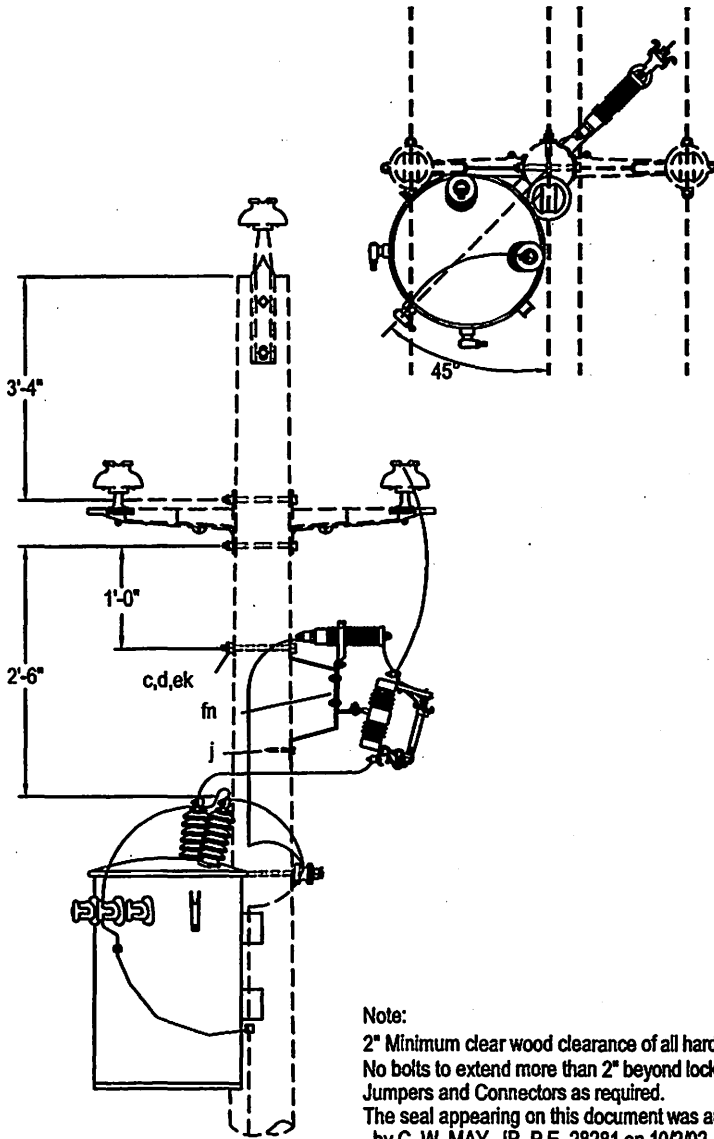
LOWER COLORADO RIVER AUTHORITY
 DISTRIBUTION LINE DESIGN
 AUSTIN, TEXAS

DRAWN: J. Bracke
 CHECKED: _____
 APPROVED: M. Lee

7.2/12.5 KV. PRIMARY 3-PHASE
 ARMLESS CONSTRUCTION
 DOUBLE PRIMARY SUPPORT 0° TO 30° ANGLE
 (LARGE CONDUCTORS)

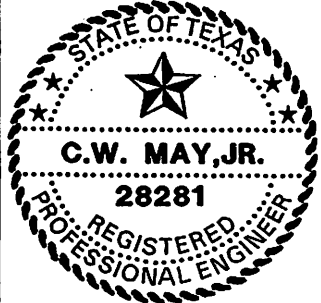
DATE: _____
 5/02

C9B



Note:
 2" Minimum clear wood clearance of all hardware.
 No bolts to extend more than 2" beyond locknut.
 Jumpers and Connectors as required.
 The seal appearing on this document was authorized
 by C. W. MAY, JR, P.E. 28281 on 10/2/02.

ITEM NO.	MATERIAL	ITEM NO.	MATERIAL
c 3	Bolt, machine, 5/8" x required length	ek 3	Locknut, 5/8"
d 3	Washer, square, 2-1/4" x 3/16", 11/16" hole	fn 1	Bracket, cutout and arrester
j 1	Screw, lag, 1/2" x 4"		
p	Connector, as required		
an 1	Transformer		
ap 1	Clamp, hot line, with stirrup		
av	Jumpers, as required		
ax 1	Cutout and arrester combination		
bu 1	Connector, transformer ground		
cj	Ground wire, #6 S.D. Cu, as required		



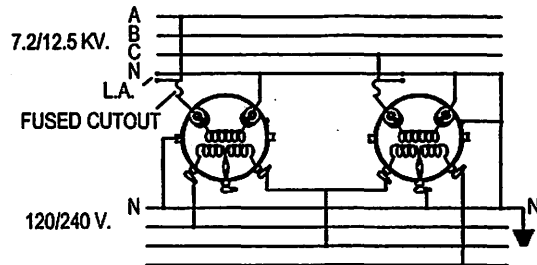
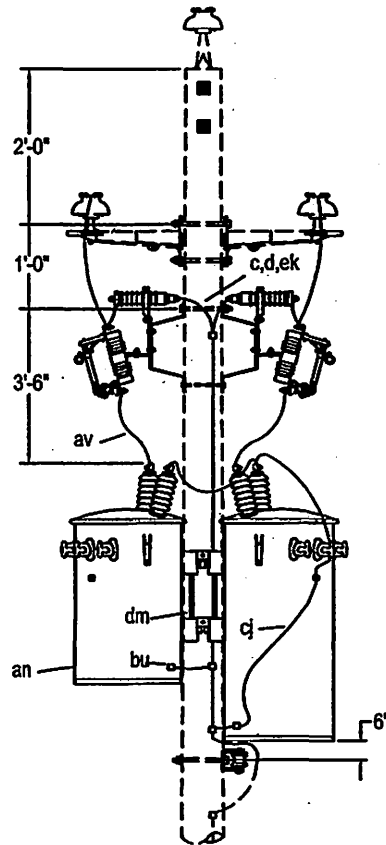
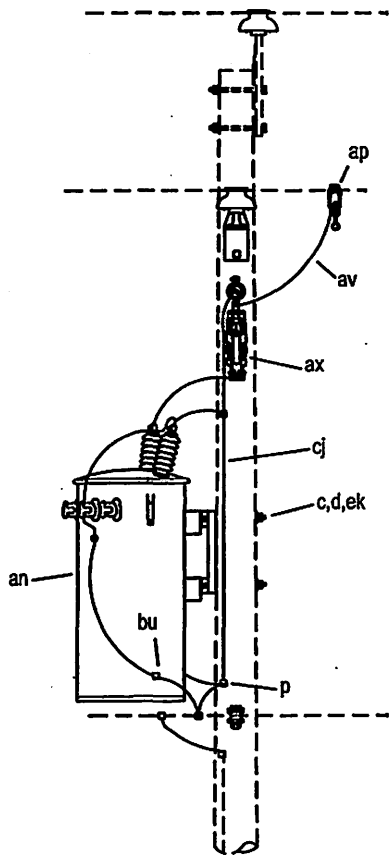
LOWER COLORADO RIVER AUTHORITY
 DISTRIBUTION LINE DESIGN
 AUSTIN, TEXAS

DRAWN: F. Crocker
 CHECKED: _____
 APPROVED: M. Lee

7.2/12.5 KV
 SINGLE PHASE TRANSFORMER
 POLE MOUNTED CUTOUT AND ARRESTER

DATE:
 5/02

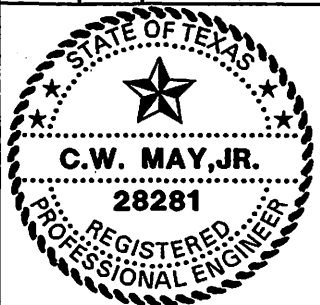
G36B - _ _ _



WIRING DIAGRAM

Note:
 For transformers over 25 KVA, use cluster mount.
 2" Minimum clear wood clearance of all hardware.
 No bolts to extend more than 2" beyond locknut.
 Jumpers and Connectors as required.
 The seal appearing on this document was authorized
 by C. W. MAY, JR, P.E. 28281 on 10/2/02.

ITEM	NO.	MATERIAL	ITEM	NO.	MATERIAL
c	3	Bolt, machine, 5/8" x required length	cj		Wire, ground, #6 S.D. copper, as required
d	2	Washer, square, 2-1/4" x 3/16", 11/16" hole	dm	1	Bracket, transformer
j	2	Screw, lag, 1/2" x 4"	ek	3	Locknut, 5/8"
p		Connector, as required	fn	2	Bracket, cutout and arrester
an	2	Transformer, conventional			
ap	2	Clamp, hotline, with stirrup			
av		Jumper, as required			
ax	2	Cutout and arrester combination			
bu	2	Connector, transformer ground			



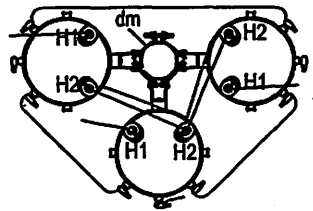
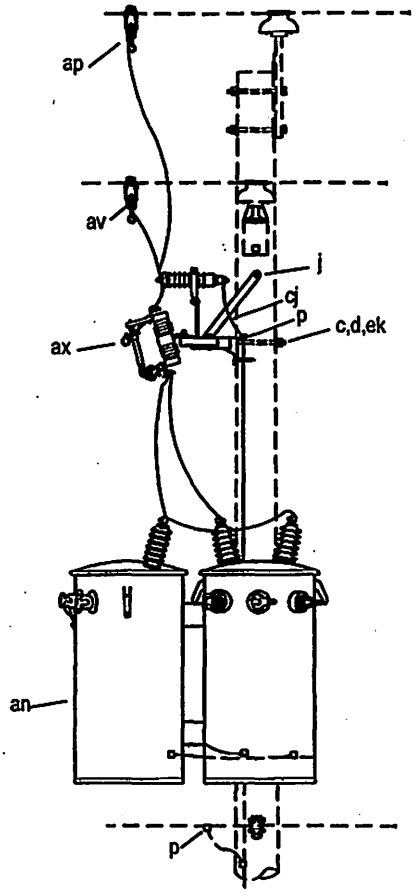
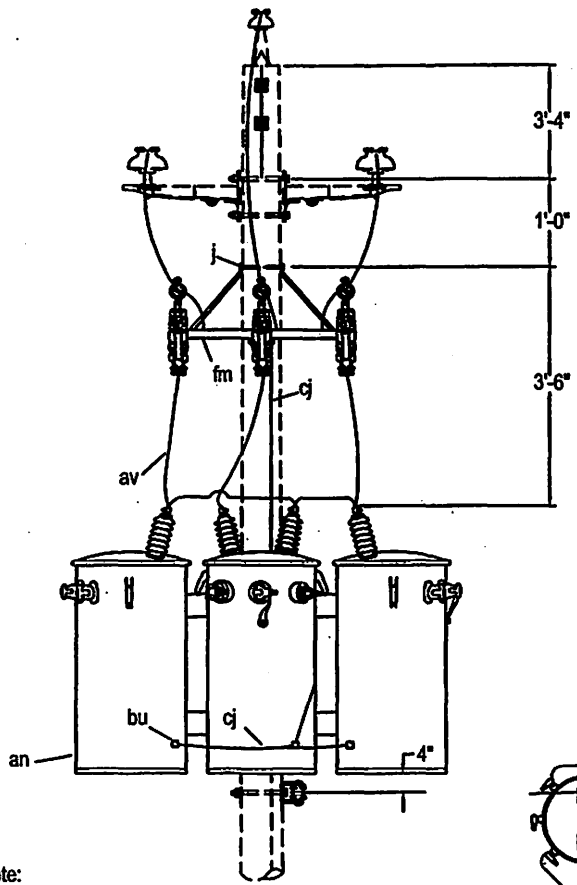
LOWER COLORADO RIVER AUTHORITY
 DISTRIBUTION LINE DESIGN
 AUSTIN, TEXAS

DRAWN: J. Bracke
 CHECKED: _____
 APPROVED: M. Lee

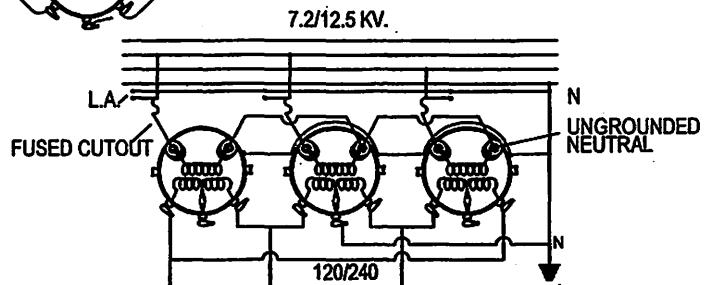
7.2/12.5 KV. TWO TRANSFORMER CLUSTER
 MOUNTED OPEN WYE FOR 120/240
 VOLT POWER LOADS

DATE:
 5/02

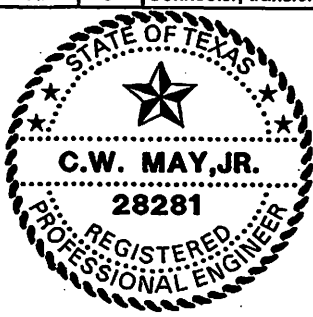
G210B



Note:
 All tanks to be grounded.
 Secondary neutrals of all transformers except one shall be disconnected from tanks and not be grounded.
 When used for combined 1-phase and 3-phase load the transformer for the 1-phase load shall not be larger than twice the capacity of larger than twice the capacity of one of the others.
 2" Minimum clear wood clearance of all hardware.
 No bolts to extend more than 2" beyond locknut.
 Jumpers and Connectors as required.
 The seal appearing on this document was authorized by C. W. MAY, JR, P.E. 28281 on 10/2/02.



ITEM NO.	MATERIAL	ITEM NO.	MATERIAL
c 2	Bolt, machine, 5/8" x required length	cj	Wire, ground, #6 S.D. copper, as required
d 1	Washer, square, 2-1/4"	dm 1	Bracket, transformer
j 3	Screw, lag, 1/2" x 4"	ek 3	Locknut, 5/8"
p	Connector, as required	fm 1	Bracket, for 3 cutout/arrester combination
an 3	Transformer, conventional		
ap 3	Clamp, hotline, with stirrup		
av	Jumper, as required		
ax 3	Cutout and arrester combination		
bu 3	Connector, transformer ground		



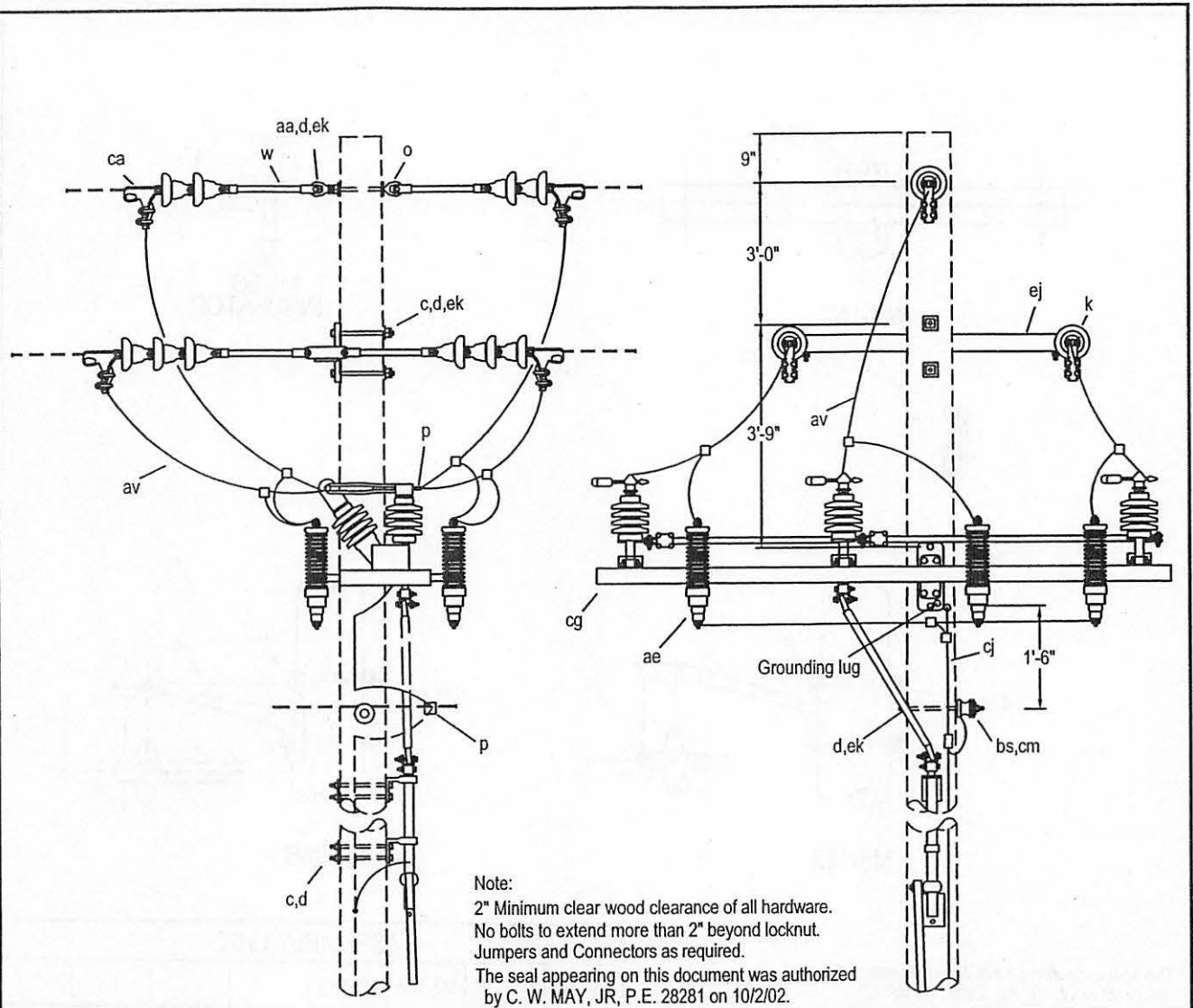
LCRA
 ENERGY • WATER • COMMUNITY SERVICES
 LOWER COLORADO RIVER AUTHORITY
 DISTRIBUTION LINE DESIGN
 AUSTIN, TEXAS

DRAWN: J. Brooks
 CHECKED: _____
 APPROVED: M. Lee

7.2/12.5 KV. THREE TRANSFORMER CLUSTER
 MOUNTED UNGROUNDED WYE CENTER TAP
 GROUNDED DELTA FOR 120/240 VOLT
 POWER LOADS

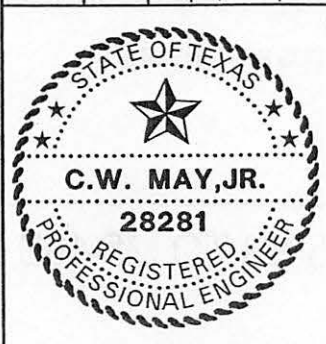
DATE: _____
 5/02

G310B-__



Note:
 2" Minimum clear wood clearance of all hardware.
 No bolts to extend more than 2" beyond locknut.
 Jumpers and Connectors as required.
 The seal appearing on this document was authorized
 by C. W. MAY, JR., P.E. 28281 on 10/2/02.

ITEM	NO.	MATERIAL	ITEM	NO.	MATERIAL
c	8	Bolt, machine, 1/2" x required length	ca	6	Deadend assembly, primary
c	6	Bolt, machine, 5/8" x required length	cg	1	Switch, air, S & C cat No. 137412R6
d	9	Washer, square, 2-1/4" x 3/16", 11/16" hole	cj		Ground wire, #6 S.D. copper, as required
d	8	Washer, round, 1-3/8" diameter, 9/16" hole	cm	1	Insulator, spool, class 53-2
k	16	Insulator, suspension, class 52-1	ek	8	Locknut, 1/2"
o	7	Bolt, eye, 5/8" x required length	ek	10	Locknut, 5/8"
p	6	Connector, pad, terminal			
p		Connector, as required			
w	6	Insulator, guy strain, 24", 24,000#			
aa	1	Nut, eye, 5/8"			
ae	6	Lightning arrester			
al		staples, ground wire, as required			
av		Jumper, as required			



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LOWER COLORADO RIVER AUTHORITY
 DISTRIBUTION LINE DESIGN
 AUSTIN, TEXAS

DRAWN: J. Crooks
 CHECKED: _____
 APPROVED: M. Lee

7.2/12.5 KV
 3-PHASE ARMLESS CONSTRUCTION
 STANDARD
 SECTIONALIZING AIR BREAK SWITCH

DATE: _____
 5/02

M3-15B

RUS Bulletin 1728F-806 Viewing Instructions

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2. To go to the destination specified by a bookmark, click the bookmark text or double-click the page icon to the left of the bookmark name.

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**United States
Department of
Agriculture**

Rural
Utilities
Service

RUS Bulletin
1728F-806
(D-806)

June 2000

Specifications and Drawings for Underground Electric Distribution

UNITED STATES DEPARTMENT OF AGRICULTURE
Rural Utilities Service

BULLETIN 1728F-806

SUBJECT: Specifications and Drawings for Underground Electric Distribution

Incorporated by reference (IBR) in 7 CFR Part 1728

TO: RUS Electric Staff
RUS Electric Borrowers

DATES:

Effective Date: June 26, 2000*.

Incorporation by Reference: IBR approved by the Director, Office of the Federal Register June 26, 2000.

Expiration Date: Date of change in 7 CFR Part 1728 by rulemaking.

OFFICE OF PRIMARY INTEREST: Electric Staff Division

FILING INSTRUCTIONS: This bulletin replaces Bulletin 50-6 (D-806), Specifications and Drawings for Underground Electric Distribution, dated February 27, 1990. Discard Bulletin 50-6 and replace it with this bulletin, RUS Bulletin 1728F-806.

AVAILABILITY: This bulletin is available on the RUS electric web page at:
<http://www.usda.gov/rus>.

PURPOSE: This bulletin contains complete specifications setting forth the RUS requirements for constructing rural underground electric distribution systems using state-of-the-art materials, equipment, and construction methods. This information is incorporated by reference in 7 CFR Part 1728.



Assistant Administrator
Electric Program

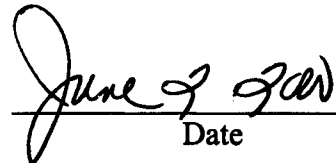

Date

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Attachment A: Index of Drawings

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SPECIFICATIONS AND STANDARDS:

Construction Specifications and Drawings – Bul. 1728F-806

Underground Electric Distribution – Bul. 1728F-806

UNDERGROUND DISTRIBUTION:

Underground Rural Distribution – Bul. 1728F-806

1. GENERAL

1.1 These specifications provide for the construction of underground distribution power facilities as specified by the owner. The owner is the organization contracting for the services and, when used in connection with RUS financed facilities, is synonymous with the term borrower as defined in §1710.2.

1.2 It is the responsibility of the borrower to ensure that all construction work shall be accomplished in a thorough and workmanlike manner in accordance with the staking sheets, plans and specifications, and the construction drawings.

1.3 If construction work is performed by the Owner's force account crews instead of a contractor, any reference to "Contractor" apply to the force account crews.

1.4 The provisions of section §1724.50, Compliance with National Electrical Safety Code (NESC) apply to all borrower electric system facilities regardless of the source of financing.

- a. A borrower must ensure that its electric system, including all electric distribution, transmission, and generating facilities, is designed, constructed, operated, and maintained in accordance with all applicable provisions of the most current and accepted criteria of the NESC and all applicable and current electrical and safety requirements of any State or local government entity. Copies of the NESC may be obtained from the Institute of Electrical and Electronic Engineers, Inc., 345 East 47th Street, New York, New York 10017-2394. This requirement applies to the borrower's electric system regardless of the source of financing.
- b. Any electrical standard requirements established by RUS are in addition to, and not in substitution for or a modification of, the most current and accepted criteria of the NESC and any applicable electrical or safety requirements of any State or local governmental entity.
- c. Overhead distribution circuits shall be constructed with not less than the Grade C strength requirements as described in Section 26, Strength Requirements, of the NESC when subjected to the loads specified in NESC Section 25, Loadings for Grades B and C. Overhead transmission circuits shall be constructed with not less than the Grade B strength requirements as described in NESC Section 26.

2. STORAGE OF MATERIAL AND EQUIPMENT: It is the responsibility of the borrower to ensure that all material and equipment to be used in construction must be stored so as to be protected from deteriorating effects of the elements. If outdoor storage cannot be avoided, the material and equipment must be stacked on supports well above the ground line and protected from the elements as appropriate, and with due regard to public safety.

3. HANDLING OF CABLE: It is the responsibility of the borrower to ensure that the cable shall be handled carefully at all times to avoid damage, and shall not be dragged across the ground, fences or sharp projections. Care shall be exercised to avoid excessive bending of the cable. The borrower shall ensure that the ends of the cable be sealed at all times against moisture with suitable end caps. Where it is necessary to cut the cable, the ends will be terminated or sealed immediately after the cutting operation.

4. PLOWING

4.1 When cables are to be installed by plowing, it is the responsibility of the borrower to ensure that the plowing equipment be subject to the approval of the Owner and the public authorities having jurisdiction over highway and road rights-of-way. The plow must be provided with a means to assure positive holddown of the plow blade to provide proper depth at all times.

4.2 The design of the plowshare must ensure that the cable passing through the plow will not be bent in a radius less than 12 times the outside diameter of the cable. The equipment must be capable of extending the plow a minimum of 6 inches below the specified depth under all terrain conditions of plow utilization.

4.3 The borrower must ensure that equipment and construction methods used during construction cause minimum displacement of the soil. The slot made in the soil by the cable plows must be closed immediately by driving a vehicle track or wheel over the slot or by other suitable means.

4.4 Starting and terminating points of the plowing operation must be excavated prior to cable installation to reduce possible cable damage and to assure sufficient burial depth.

4.5 During the plowing operation, care is to be exercised to feed the cable or wire into the ground through the plow loosely and at minimum tension. Besides using proper equipment and construction methods, supervision by the borrower or the borrower's representative shall be furnished at all times at the site of plowing operations to assure compliance with these specifications.

4.6 If, during the plowing operation, the plow should strike a buried object or rock that would stop the equipment and necessitate removal of the plow from the ground, the plow must be removed from the ground carefully and, if practical, without backing the plow. If it should be necessary to back the plow to remove it from the ground, the cable must be uncovered a sufficient distance back for inspection by the Owner to determine whether the cable or wire has been damaged.

4.7 The cable must be inspected carefully as it is payed out from the reel to be certain that it is free from visible defects. Every instance of damaged cable observed at any time, whether prior to installation, during installation, or when discovered by test or observation subsequent to installation in plant, shall be immediately called to the attention of the Owner. Repair or correction of such damage must be completed promptly and in accordance with the written instruction of the Owner. The location of any such repair must be indicated on the staking sheet.

5. SPECIAL REQUIREMENTS FOR COORDINATION BETWEEN OWNER AND CONTRACTOR WHERE CABLE IS TO BE INSTALLED BY PLOWING

5.1 It is the responsibility of the borrower to ensure that the Contractor and the Owner shall jointly review the staking sheets prior to the start of construction. At that time, the Contractor shall propose any desirable changes or clarifications. These changes, if approved by the Owner, shall be made and recorded on the staking sheets. No changes on the staking sheets shall be made by the Contractor without the prior written approval of the Owner. A representative of the Owner shall remain in the immediate vicinity of the plowing operations at all times and shall consider and possibly approve any acceptable changes proposed by the Contractor. A representative of the Owner shall also inspect any damage to cable and approve acceptable methods of repair or correction of such damage in accordance with the provisions of these specifications.

5.2 In the event that rock is encountered during the plowing operation so that the buried cable cannot be installed to the required minimum depths in soil, the Contractor shall determine for the Owner the nature and extent of the rock encountered. Based on this information, the Owner shall determine whether the cable is to be rerouted, trenched in rock or a change made to aerial construction. This decision shall be made promptly, and appropriate changes in units shall be made on the staking sheets. Such changes shall be in writing, dated, and initialed by the Owner.

5.3 Due to the necessity of making on-the-spot corrections and changes on staking sheets, it may not be possible for the Owner to issue revised staking sheets to the Contractor in all cases. When changes are made, dated, and initialed by the Owner on a set of the Contractor's staking sheets, it shall be the Contractor's responsibility to transfer these changes to all other sets of staking sheets being used by the Contractor for construction purposes.

5.4 The Contractor shall provide a competent representative to work with the Owner on the inventory and inspection of buried cable units. The inventory of buried cable will be made as soon after the plowing operation as practical to avoid later disagreements on the quantity of cable installed when changes are required in the project.

6. TRENCHING

6.1 It is the responsibility of the borrower to ensure that all trenching depths specified are minimum as measured from the final grade to the top surface of the cable. The routing must be as shown on the staking sheets and plans and specifications unless conditions encountered are such that changes are necessary to accomplish the work. In such event, the Owner shall be notified promptly. If rock or other difficult digging is involved, the Contractor shall determine the nature and extent of the difficulty, and the Owner shall determine whether rerouting, rock trenching, plowing or other changes are necessary. Loose soil or crumbly rock shall not be considered as "difficult digging." The trench widths specified are minimum and should be increased as necessary to obtain the required depths in loose soils.

6.2 Where trenches are intended for more than one cable, particular care must be taken to provide for extra depth and width to allow for soil falling into the trench during the laying of the first cables.

6.3 Care shall be exercised to minimize the likelihood of waterflow since this may cause trench damage and reduction in trench depth. If this occurs, the trench must be cleared to the specified depth before installing the cable.

6.4 All trenches must follow straight lines between staked points to the greatest extent possible. Secondary and service trenches must extend in a straight line from takeoff points wherever possible. The trenches must be dug so that the bottom has a smooth grade. Large rocks, stones and gravel in excess of 1 inch must be removed from the bottom of the trench. Where this cannot be accomplished, a 2 inch bed of sand or clean soil must be placed in the bottom of the trench.

6.5 Construction shall be arranged so that trenches may be left open for the shortest practical time to avoid creating a hazard to the public and to minimize the likelihood of collapse of the trench due to other construction activity, rain, accumulation of water in the trench, etc.

7. INSTALLING CABLE IN TRENCH

7.1 It is the responsibility of the borrower to ensure that the cable must be placed in the trench as soon after the trenching operation as feasible. Wherever possible, cable must be payed out from the reel mounted on a moving vehicle or trailer. The reel must be supported so that it can turn easily without undue strain on the cable. The cable must be carefully placed in the trench by hand. All cable placement will be done under constant supervision by the borrower or the borrower's representative who assure that no damage to the cable occurs.

7.2 The cable must be inspected carefully as it is removed from the reel in laying operations to be certain that it is free from visible defects. The Owner shall decide upon corrective action when defects are discovered.

7.3 Where more than one cable is to be placed in a trench, the spacings required by the specifications must be observed. Care must be taken that any soil falling into the trench during the laying of the first cable does not reduce the clearances of the last cable below that specified. Should this occur, the excess soil must be removed carefully by hand or with equipment that will not damage the installed cables.

7.4 Sufficient slack, and in no case less than 24 inches, must be left at all risers, transformer pads, pedestals and terminal points so that movements of cable after backfilling will not cause damaging strain on the cable or terminals. The cable trench must be mechanically compacted at least 36 inches from all riser poles, pads, pedestals and terminal points.

7.5 The ends of all secondary cable terminated below ground must be long enough to reach at least 12 inches above the top of the underground enclosure.

8. MINIMUM BENDING RADIUS OF CABLE: It is the responsibility of the borrower to ensure that the minimum bending radius of primary cable is 12 times the overall diameter of the cable. The minimum bending radius of secondary and service cable is six times the overall diameter of the cable. In all cases the minimum radius specified is measured to the surface of the cable on the inside of the bend. Cable bends must not be made within 6 inches of a cable terminal base.

9. CONDUIT: It is the responsibility of the borrower to ensure that all exposed ends of conduit must be plugged during construction to prevent the entrance of foreign matter and moisture into the conduit. Burrs or sharp projections which might injure the cable must be removed. Riser shield or conduit must extend at least 18 inches below grade at all riser poles. If full round conduit is used as a riser shield, an end bell must be installed on the lower end to prevent damage to the cable.

10. TAGGING OF CABLES AT TERMINATION POINTS: As the cables are laid, it is the responsibility of the borrower to ensure that they must be identified and tagged. The identification must be of a permanent type, such as that done on plastic or corrosion resistant metal tags. The tag must be securely attached to the cable. Paper or cloth tags are not acceptable.

11. SPLICES

11.1 It is the responsibility of the borrower to ensure that cable splices must be of the pre-molded rubber, heat-shrink, or cold-shrink type, of the correct voltage rating and must be installed in accordance with the splice manufacturer's instructions. Splices that depend solely on tape for a moisture barrier must not be used.

11.2 Not more than one splice may be permitted for each 2000 feet of cable installed unless authorized by the Owner. No bends may be permitted within 12 inches of the ends of a splice. The cable or circuit numbers and the exact location of all splices must be noted on the staking sheets (as built).

12. PRIMARY CABLE TERMINATION AND STRESS CONES: It is the responsibility of the borrower to ensure that prefabricated stress cones or terminations must be installed in accordance with the manufacturer's instructions at all primary cable terminals. They must be suitable for the size and type of cable that they are used with and for the environment in which they will operate. Any indication of misfit, such as a loose or exceptionally tight fit, must be called to the Owner's attention. The outer conductive surface of the termination must be bonded to the system neutral. A heat-shrink or cold-shrink sleeve must be installed to seal between the body of the termination and the cable jacket.

13. SPECIAL PRECAUTIONS FOR CABLE SPLICES AND TERMINATIONS: It is the responsibility of the borrower to ensure that a portable covering or shelter must be available for use when splices or terminations are being prepared and when prefabricated terminations are being switched. The shelter must be used as necessary to keep rain, snow and windblown dust off the insulating surfaces of these devices. Since cleanliness is essential in the preparation and installation of primary cable fittings, care shall be exercised to prevent the transfer of conducting particles from the hands to insulating surfaces. Mating surfaces must be wiped with a solvent such as denatured alcohol to remove any possible accumulation of dirt, moisture or other conducting materials. A silicone grease or similar lubricant should be applied afterwards in accordance with the manufacturer's recommendations. Whenever prefabricated cable devices are opened, the unenergized mating surfaces must be lubricated with silicone grease before the fittings are reconnected.

14. SECONDARY AND SERVICE CONNECTIONS

14.1 It is the responsibility of the borrower to ensure that a suitable inhibiting compound must be used with all secondary and service connections.

14.2 All secondary cable connections located below grade or in secondary pedestals must be made with pre-insulated secondary connector blocks. Diving bells with open terminals, insulating boots or moisture barriers that depend solely on tape are not acceptable.

14.3 All transformer secondary phase terminal connections must be completely insulated. If the secondary phase terminals are threaded studs, the connection must be made with a pre-insulated secondary transformer connection block. If the transformer secondary phase terminals are insulated cable leads, connection must be made with a pre-insulated secondary connector block or with a secondary prefabricated splice when the transformer leads continue directly to the service.

14.4 If a transformer is so large that it must have secondary spades, the spades must be taped or otherwise insulated. Boots used for insulation must be taped so that they cannot be readily slipped off.

14.5 Secondary connections to terminals of pole-mounted transformers must be made so that moisture cannot get inside the cable insulation. This may be accomplished by covering the terminals and bare conductor ends with an appropriate moisture sealant or providing a drip loop.

14.6 The secondary connections and insulation must have accommodations for all future and existing services as shown on the plans and specifications.

15. PEDESTALS: Where required, it is the responsibility of the borrower to ensure that pedestal stakes must be driven vertically into the bottom of the trench before cables are placed, and shall be located as shown on the staking sheets. Pedestal posts and supporting stakes must be in place before the cable is installed. All pedestals should be approximately at the same height above finished grade.

16. INSPECTION AND INVENTORY OF BURIED UNITS: Before any backfilling operations are begun, it is the responsibility of the borrower to ensure that the Contractor and Owner shall jointly inspect all trenches, cable placement, risers, pedestal stakes, and other construction that will not be accessible after backfilling, and an inventory of units shall be taken. If corrections are required, a second inspection shall be made after completion of the changes.

17. BACKFILLING

17.1 It is the responsibility of the borrower to ensure that the first 6 inches of trench backfill shall be free from rock, gravel or other material which might damage the cable jacket. In lieu of cleaning the trench, the Contractor may, at the Contractor's option, place a 2 inch bed of clean sand or soil under the cable and 4 inches of clean soil above the cable. Cleaned soil backfill when used shall contain no solid material larger than 1 inch. This soil layer must be carefully compacted so that the cable will not be damaged.

17.2 Backfilling must be completed in such a manner that voids will be minimized. Excess soil must be piled on top and must be well tamped. All rock and debris must be removed from the site, and any damage to the premises repaired immediately.

17.3 Pieces of scrap cable or other material remaining after installation must not be buried in the trench as a means of disposal.

18. EQUIPMENT PADS: It is the responsibility of the borrower to ensure that the site for the pad shall be on undisturbed earth adjacent to but not over the trench. The site shall be cleared of all debris and excavated to the specified depth. Gravel or sand may be added to the site and thoroughly compacted. The pad shall be installed level at the specified elevation.

19. TRANSFORMERS: It is the responsibility of the borrower to ensure that transformers shall be handled carefully to avoid damage to the finish and shall be positioned in accordance with the staking sheets and the plans and specifications. Only qualified and experienced personnel shall be allowed to make connections and cable terminations.

20. EQUIPMENT ENCLOSURES: It is the responsibility of the borrower to ensure that excavations for sleeve-type transformer pads and other below-grade enclosures shall be made so as to disturb the surrounding earth as little as practical. Enclosures shall be installed with side walls plumb. When enclosures are of fiber, plastic, or other semiflexible material, backfilling should be done with covers in place and with careful tamping so as to avoid distortion of the enclosure. When installation is complete, the cover of the enclosure shall not be lower than and not more than 2 inches higher than the grade specified by the Owner. Soil in the immediate vicinity shall be tamped and sloped away from the enclosure. At the Owner's option, the excess soil shall be removed from the site or spread evenly over the surface of the ground to the satisfaction of the Owner.

21. UTILITY SAFETY SIGNS: It is the responsibility of the borrower to ensure that utility safety signs must be in accordance with ANSI Z535.2, Environmental and Facility Safety Signs, and shall be applied in accordance with RUS drawings. Copies of the ANSI Z535.2 may be obtained from the National Electrical Manufacturers Association (NEMA), 1300 North 17th Street, Suite 1847, Rosslyn, Virginia 22209.

22. SACRIFICIAL ANODES: It is the responsibility of the borrower to ensure that sacrificial anodes specified shall be installed with backfill package intact and connecting leads positioned for proper connection after the equipment is in place. Anodes shall neither be moved, positioned, lifted, nor lowered into place by pulling on the connecting leads.

23. GROUNDING

23.1 It is the responsibility of the borrower to ensure that all neutral conductors, grounding electrodes, sacrificial anodes and groundable parts of equipment shall be interconnected. All interconnections shall be made as shown on the construction drawings. A copper-clad or galvanized steel ground rod with minimum length of 8 feet shall be installed at all equipment locations as shown in the construction drawings and at all cable splices and taps.

23.2 All pad-mounted equipment enclosures, including transformers, shall be grounded in such a manner that two separate grounding paths exist between the enclosure and the grounding rod(s).

24. CABLE LOCATION MARKERS: It is the responsibility of the borrower to ensure that location of permanent cable markers shall be as shown on the staking sheets.

25. INSTALLED CABLE AND ACCEPTANCE TESTS

25.1 It is the responsibility of the borrower to ensure that:

- a. Continuity: After installation of the cable and prior to the high potential test specified below, authorized personnel shall perform a simple continuity test on the system. This can easily be accomplished by grounding the conductor at the source and checking for continuity from the end of each tap with an ohmmeter or with a battery and ammeter.
- b. High Potential: After successful continuity tests, authorized personnel should perform high potential tests on each length of cable, with terminations in place but disconnected from the system.

25.2 The installation shall withstand for a minimum of 15 minutes a DC test potential as follows:

Primary URD Cable (XLP-TR, and EPR)		
<u>Rated Voltage</u>	<u>Insulation Thickness Inches</u>	<u>Field DC Acceptance Test Voltage</u>
15 kV	.220	64.0 kV
25 kV	.260	80.0 kV
25 kV	.345	100.0 kV

The voltage may either be increased continuously or in steps to the maximum test value:

- a. If increased continuously, the rate of increase of test voltage should be approximately uniform and increasing to maximum voltage in not less than 10 seconds and in not more than approximately 60 seconds.
- b. If applied in steps, the rate of increase of test voltage from one step to the next should be approximately uniform. The duration at each step shall be long enough for the absorption current to attain reasonable stabilization (1 minute minimum). Current and voltage readings should be taken at the end of each step duration. The number of steps should be from five to eight.

25.3 **Warning:** A hazardous voltage may still exist on the cable after the above testing has been completed. Therefore, before handling the cable, it is the responsibility of the borrower to ensure that the conductor shall be grounded to permit any charge to drain to earth.

Attachment A

INDEX OF DRAWINGS

Primary Terminal Pole Assemblies:

UA1	Single Phase Cable Deadend Terminal Pole
UA2	Single Phase Cable Deadend Terminal Pole
UA3	Single Phase Cable Tangent Terminal Pole
UB1	Vee-Phase Cable Terminal Pole with Cutouts and Crossarm Mounting Arresters
UB2	Vee-Phase Cable Terminal Pole with Cutouts and Bracket Mounting Arresters
UB3	Vee-Phase Cable Terminal Pole without Cutout, with Crossarm Mounting Arresters
UB4	Vee-Phase Cable Terminal Pole without Cutout, with Bracket Mounting Arresters
UC1	Three Phase Cable Terminal Pole with Cutouts and Crossarm Mounting Arresters
UC2	Three Phase Cable Terminal Pole with Cutouts and Bracket Mounting Arresters
UC2-1	Three Phase Cable Deadend Terminal Pole
UC2-2	Three Phase Cable Tangent Terminal Pole
UC5-1	Three Phase Cable Deadend Terminal Pole with Disconnect Switches
UC6-1	Three Phase Cable Tangent Terminal Pole with Disconnect Switches

Transformer Assemblies:

UG6, UG6B,	Single Phase Pad-Mounted Transformer (Radial Feed)
UG7, UG7B	Single Phase Pad Mounted Transformer (Loop Feed)
UG17, UG17B	Three Phase Pad Mounted Transformer (Radial Feed)
UG17-2, UG17-2B	Three Phase Pad Mounted Transformer (Loop Feed)
UG17-3, UG17-3B	Three Phase Pad Mounted Loop Feed Transformer with Radial Feed

Secondary Assemblies:

UJ1, UJ2	Secondary Connector Blocks
UK5	Secondary Pedestal Underground Cable
UK6	Secondary Handhole Underground Cable

Pad Assemblies:

UM1-5C, UM1-5NC	Pad Assemblies
UM1-6C	Three Phase Transformer Concrete Pads
UM1-7C, UM1-7NC	Ground Sleeve Assembly

Sectionalizing Assemblies:

UM3-14	Single Phase Sectionalizing Enclosure
UM3-44, UM3-45	Single Phase Pad Mounted Sectionalizer or Recloser
UM3-46	Three, Single Phase Pad Mounted Reclosers

UM3E	Fuse/Switch Enclosure Installation
UM3E-1, UM3E-2	Single Pole Switching 200 AMP Fuse Enclosure Installation Wiring Diagrams (Single Phase and Two Phase)
UM3E-3	Fuse Enclosure (200 - 600 AMP) Wiring Diagrams (Three Phase)

Secondary Terminal Pole Assemblies:

UM5	Secondary Cable Terminal Pole
UM5-6, UM5-6A	Secondary Cable Terminal to Meter Base

Miscellaneous Accessories:

UM6-1 – UM6-8	Miscellaneous Accessories
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Regulator Assembly:

UM7-1	Single Phase Regulator Assembly with By-Pass Switching Function Underground to Underground
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Metering Assemblies:

UM8	Meter Installation Underground Source
UM8-2	Meter Pedestal Wood Post
UM8-3 UM8-3A	Trough Type Meter Pedestal
UM8-4, UM8-4A	Meter & Switch Installation Underground Source
UM8-5	Pad Mounted Switch Installation Underground Source
UM8-6	C.T. Meter Installation Single Phase
UM8-7	C.T. Meter Installation Three Phase

Miscellaneous Assemblies:

- UM9-2 Pad Mounted Switched Capacitor Enclosure
- UM12 Cable Route Marker

Corrosion Control Assemblies:

- UM27-1 Sacrificial Anode for Cable Splice Protection
 (Bare to Jacketed Cable)
- UM27-2 Sacrificial Anode for Equipment Ground Protection
- UM27-3 Sacrificial Anode for Cable Ground Protection
- UM28 Test Station

Sectionalizing Assembly:

- UM33 Multi Phase Sectionalizing Enclosure Pad or Sleeve
 Mounted

Grounding Assemblies:

- UM48-1 Grounding Assembly for Pad Mounted Single Phase
 Transformers and Enclosures
- UM48-2 Grounding Assembly for Pad Mounted Multi Phase
 Transformers and Enclosures
- UM48-3 Grounding Assembly for Underground Primary Cable
- UM48-4 Grounding Assembly for Underground Primary Cable
 (with Test Station)
- UM48-5 Grounding Grid for Pad Mounted Equipment
 Installation
- UM48-6 Grounding Array for Pad Mounted Equipment
 Installation

Conduit and Trenching Assemblies:

- UR2 to Trenches for Direct Burial Cables
UR2-2

UR2-3 to Trenches for Direct Burial Cables
UR2-5

UR2-NT Trenches for Direct Burial Cable
UR2-ST

Guideline Drawings:

UX1 Open Delta Connection with Single Phase Pad Mount
 Transformers

UX2 Single Phase Pad Mounted Transformer Deferred Unit
 Pedestal Type

UX3 Single Phase Padmounted Transformer Deferred Unit
 Pad-Sleeve Type

UX4 Installation of Neutral Connection in Above Grade
 Pedestal

UX5 Sectionalizing Pedestal Grounding

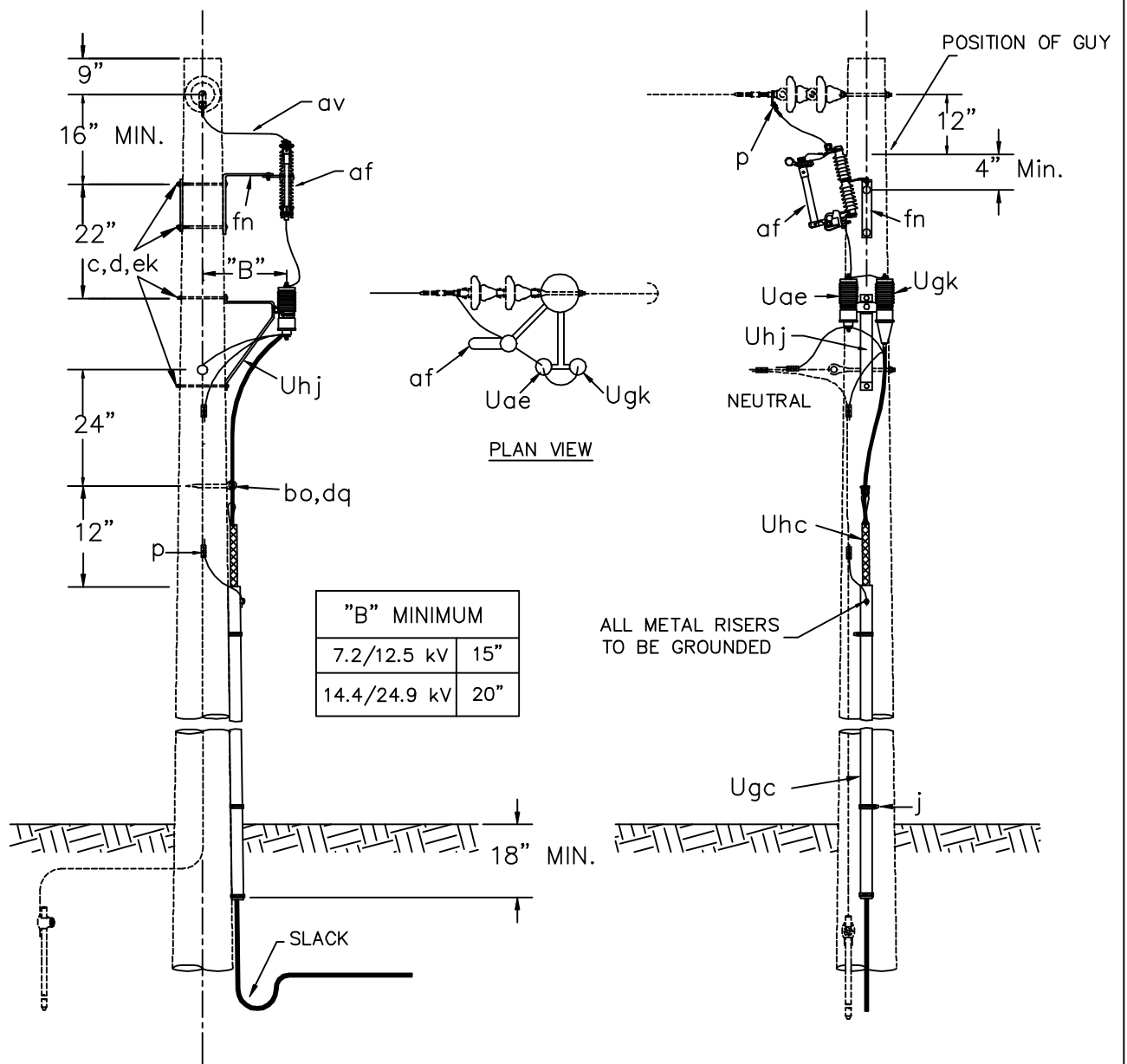
UX7 Location Methods for Below Grade Enclosure

UX8 Temporary Primary or Secondary Cable Termination
 for Future Use

UX11 Connection of Terminator/Arrester to Overhead Line

Attachment B

Construction Drawings



"B" MINIMUM	
7.2/12.5 kV	15"
14.4/24.9 kV	20"

ITEM	QTY.	MATERIAL
c	4	Bolt, machine, 5/8" x required length.
d	4	Washer, square 2 1/4".
j		Screws, lag 1/2" X 4" as required.
p		Connectors, as required.
af	1	Fuse link.
af	1	Cutout
av		Jumpers, as required.
bo	1	Anchor, shackle. Do not use if drive hook is used.
dq	1	Eye screw, elliptical or drive hook.
ek	4	Locknuts
fn	1	Bracket, cutout extension.
Uae	1*	Surge arrester
Ugc	1	Cable riser shield. Length as required.
Ugk	1	Cable termination.
Uhc	1	Cable support.
Uhj	1	Bracket combination.

NOTES:

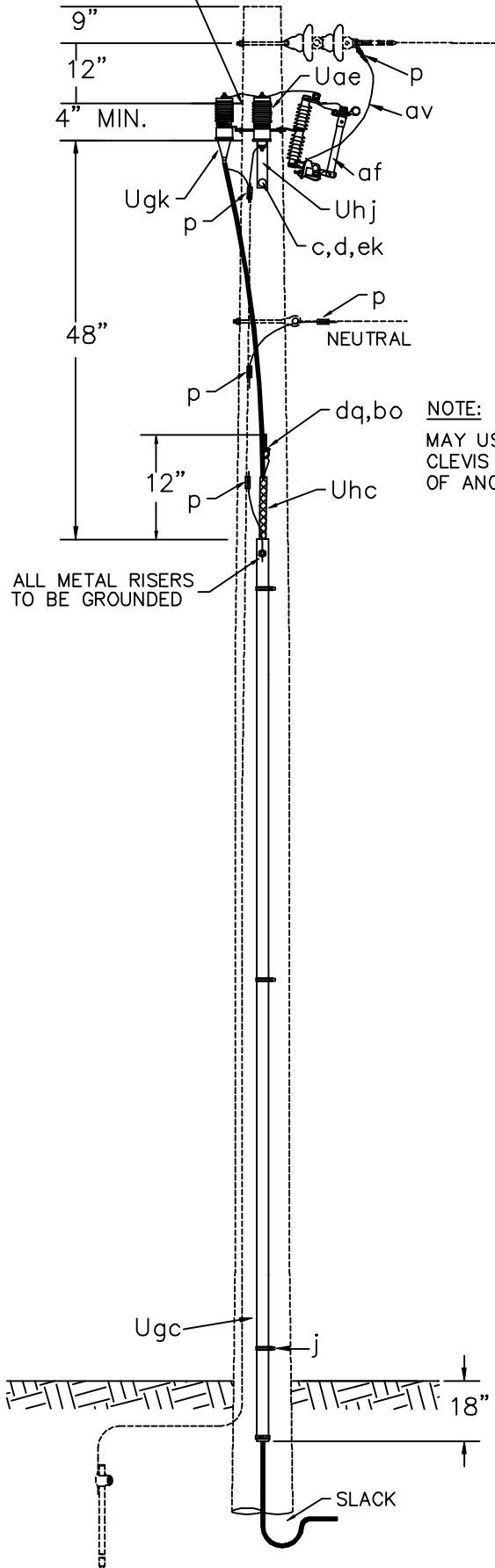
1. TOTAL ARRESTER LEAD LENGTH MUST BE UNDER 3'.
2. NO BENDS PERMITTED WITHIN 6" OF CABLE TERMINAL BASE.
3. ALLOW MINIMUM CABLE SLACK OF 24" AT BOTTOM OF RISER.

SINGLE PHASE CABLE DEADEND
TERMINAL POLE

2000

UA1

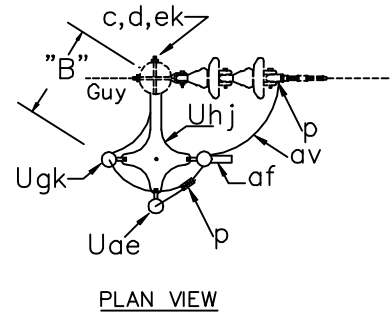
POSITION OF GUY



"B" MINIMUM	
7.2/12.5 kV	15"
14.4/24.9 kV	20"

NOTE:

MAY USE 2" SWINGING CLEVIS (ITEM s) INSTEAD OF ANCHOR SHACKLE.



PLAN VIEW

NOTES:

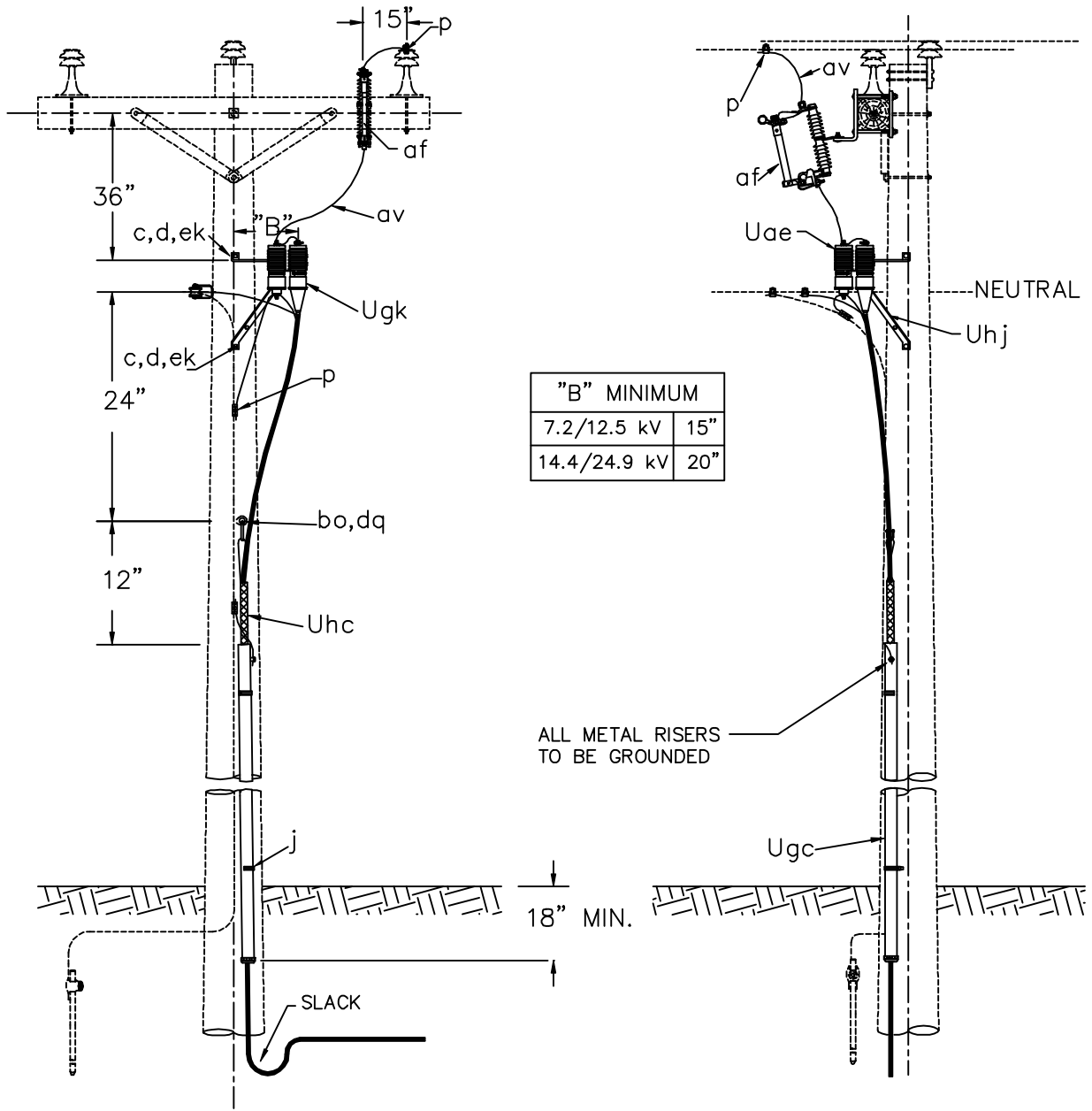
1. TOTAL ARRESTER LEAD LENGTH MUST BE UNDER 3'.
2. NO BENDS PERMITTED WITHIN 6" OF CABLE TERMINAL BASE.
3. ALLOW MINIMUM CABLE SLACK OF 24" AT BOTTOM OF RISER.

ITEM	QTY.	MATERIAL
c	2	Bolt, machine, 5/8" x required length.
d	2	Washer, square 2 1/4".
p		Connectors, as required.
j		Screw, lag, 1/2" x 4", as required.
af	1	Fuse link.
af	1	Cutout
av		Jumpers, as required.
bo	1	Anchor, shackle. Do not use if drive hook is used.
dq	1	Eye screw, elliptical or drive hook.
ek	2	Locknuts, as required.
Uae	1*	Surge arrester
Ugc		Cable Riser Shield, length as required
Ugk	1	Cable termination.
Uhc	1	Cable support.
Uhj	1	Equipment support bracket.

SINGLE PHASE CABLE DEADEND
TERMINAL POLE

2000

UA2



"B" MINIMUM	
7.2/12.5 kV	15"
14.4/24.9 kV	20"

ITEM	QTY.	MATERIAL
c	2	Bolt, machine, 5/8" x required length.
d	2	Washer, square 2 1/4".
j		Screw, lag 1/2" x 4" as required.
p		Connectors, as required.
af	1	Fuse link.
af	1	Cutout
av		Jumpers, as required.
bo	1	Anchor, shackle. Do not use if drive hook is used.
dq	1	Eye screw, elliptical or drive hook.
ek	2	Locknuts
Uae	1*	Surge arrester
Ugc	1	Cable riser shield. Length as required.
Uqk	1	Cable termination.
Uhc	1	Cable support.
Uhj	1	Bracket combination.

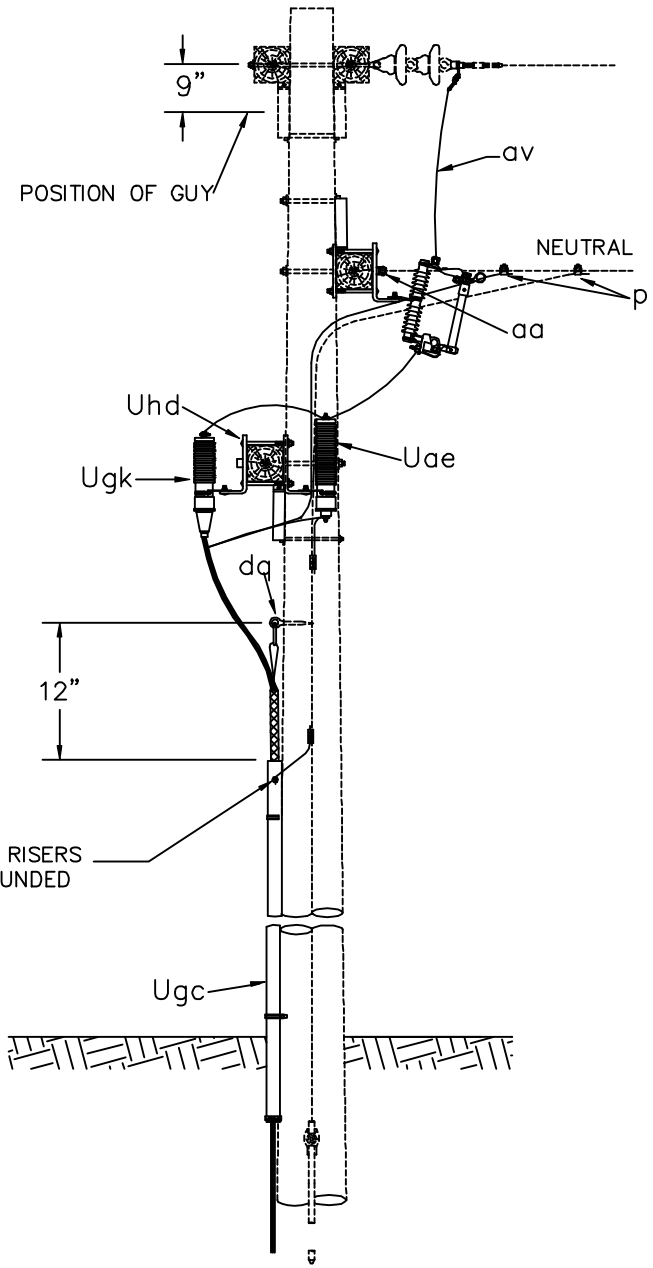
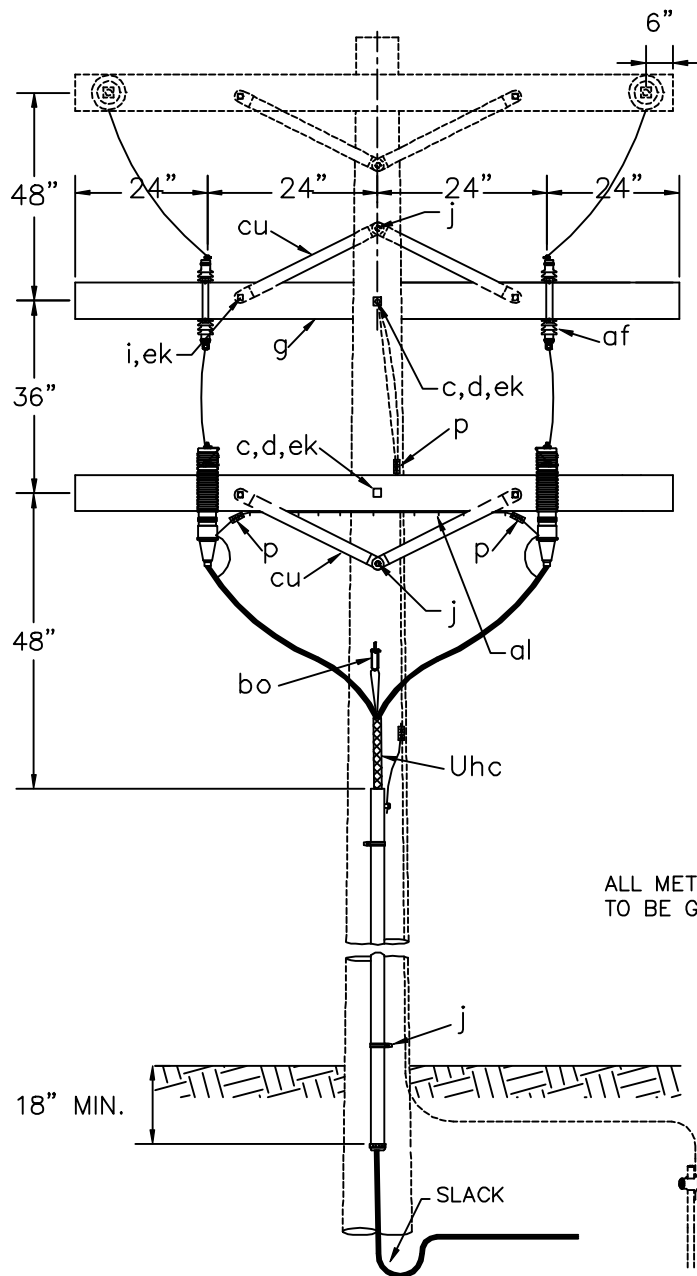
NOTES:

- TOTAL ARRESTER LEAD LENGTH MUST BE UNDER 3'.
- NO BENDS PERMITTED WITHIN 6" OF CABLE TERMINAL BASE.
- ALLOW MINIMUM CABLE SLACK OF 24" AT BOTTOM OF RISER.

SINGLE PHASE CABLE TANGENT
TERMINAL POLE

2000

UA3



ALL METAL RISERS TO BE GROUNDED

ITEM	QTY.	MATERIAL
c	2	Bolt, machine, 5/8" x required length.
d	2	Washer, square 2 1/4".
g	2	Crossarm, 3 5/8" x 4 5/8" x 8'-0"
i	4	Bolt, carriage, 3/8" x 4 1/2"
j		Screw, lag 1/2" x 4" as required.
p		Connectors, as required.
aa	1	Eyenuts, 5/8"
af	2	Cutout
al		Staples, as required.
av		Jumpers, as required.
bo	1	Anchor, shackle.
cu	4	Brace, wood, 28"
dq	1	Eye screw, elliptical or drive hook.
ek	6	Locknuts, as required.
Uae	2*	Surge arrester
Ugc	1	Cable riser shield. Length as required.
Ugk	2	Cable termination.
Uhc	2	Cable support.
Uhd	2	Crossarm mounting bracket.

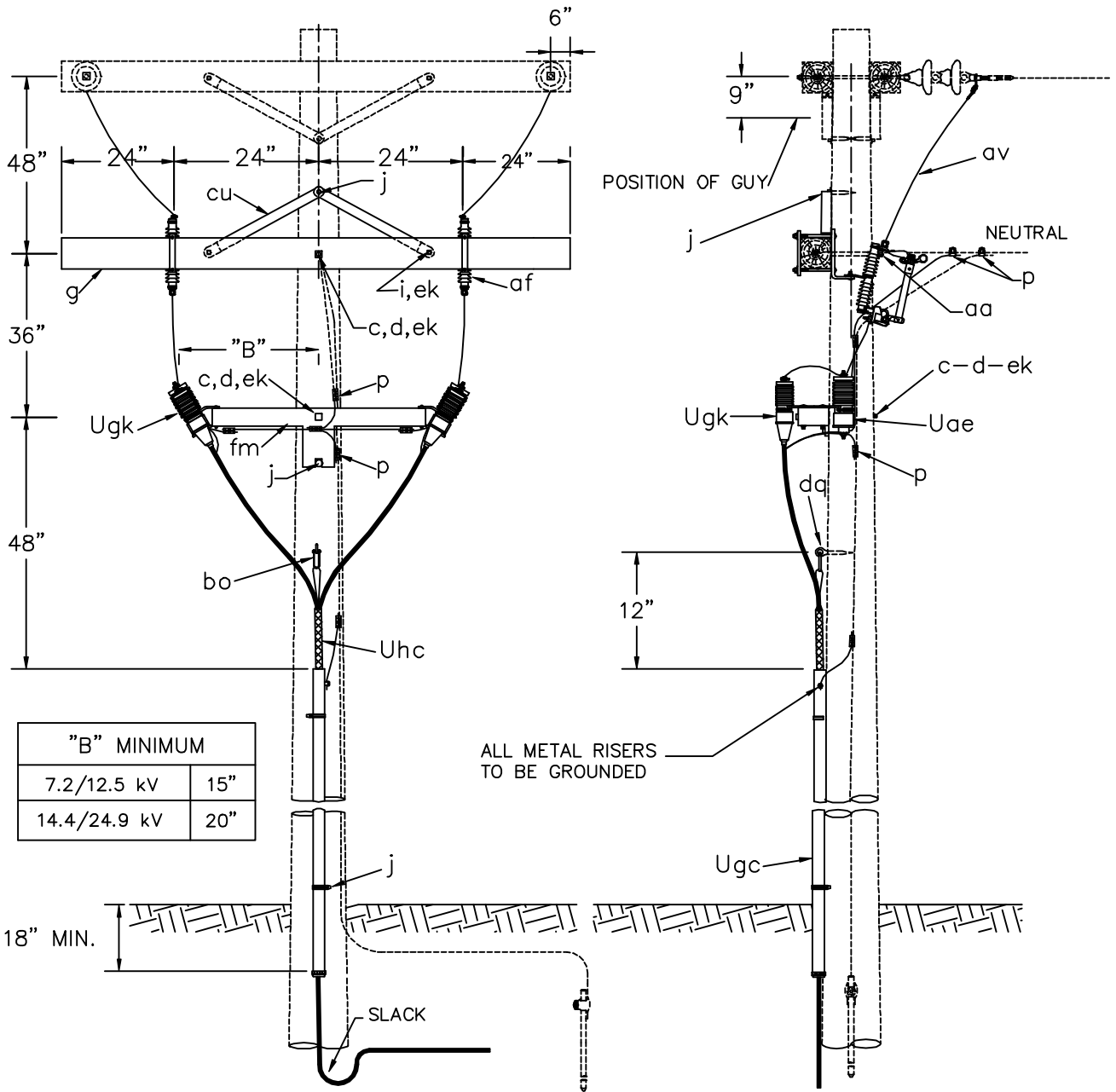
NOTES:

1. TOTAL ARRESTER LEAD LENGTH MUST BE UNDER 3'.
2. NO BENDS PERMITTED WITHIN 6" OF CABLE TERMINAL BASE.
3. ALLOW MINIMUM CABLE SLACK OF 24" AT BOTTOM OF RISERS.

VEE-PHASE CABLE TERMINAL POLE WITH CUTOUTS AND CROSSARM MOUNTING ARRESTERS

2000

UB1



"B" MINIMUM	
7.2/12.5 kV	15"
14.4/24.9 kV	20"

ITEM	QTY.	MATERIAL
c	2	Bolt, machine, 5/8" x required length.
d	2	Washer, square 2 1/4".
g	1	Crossarm, 3 5/8" x 4 5/8" x 8'-0"
i	2	Bolt, carriage, 3/8" x 4 1/2"
j		Screw, lag 1/2" x 4" as required.
p		Connectors, as required.
aa	1	Eyenuts, 5/8"
af	2	Cutout
av		Jumpers, as required.
bo	1	Anchor, shackle.
cu	2	Brace, wood, 28"
dq	1	Eye screw, elliptical or drive hook.
ek	3	Locknuts, as required.
fm	1	Mounting bracket.
Uae	2*	Surge arrester
Ugc	1	Cable riser shield. Length as required.
Ugk	2	Cable termination.
Uhc	2	Cable support.

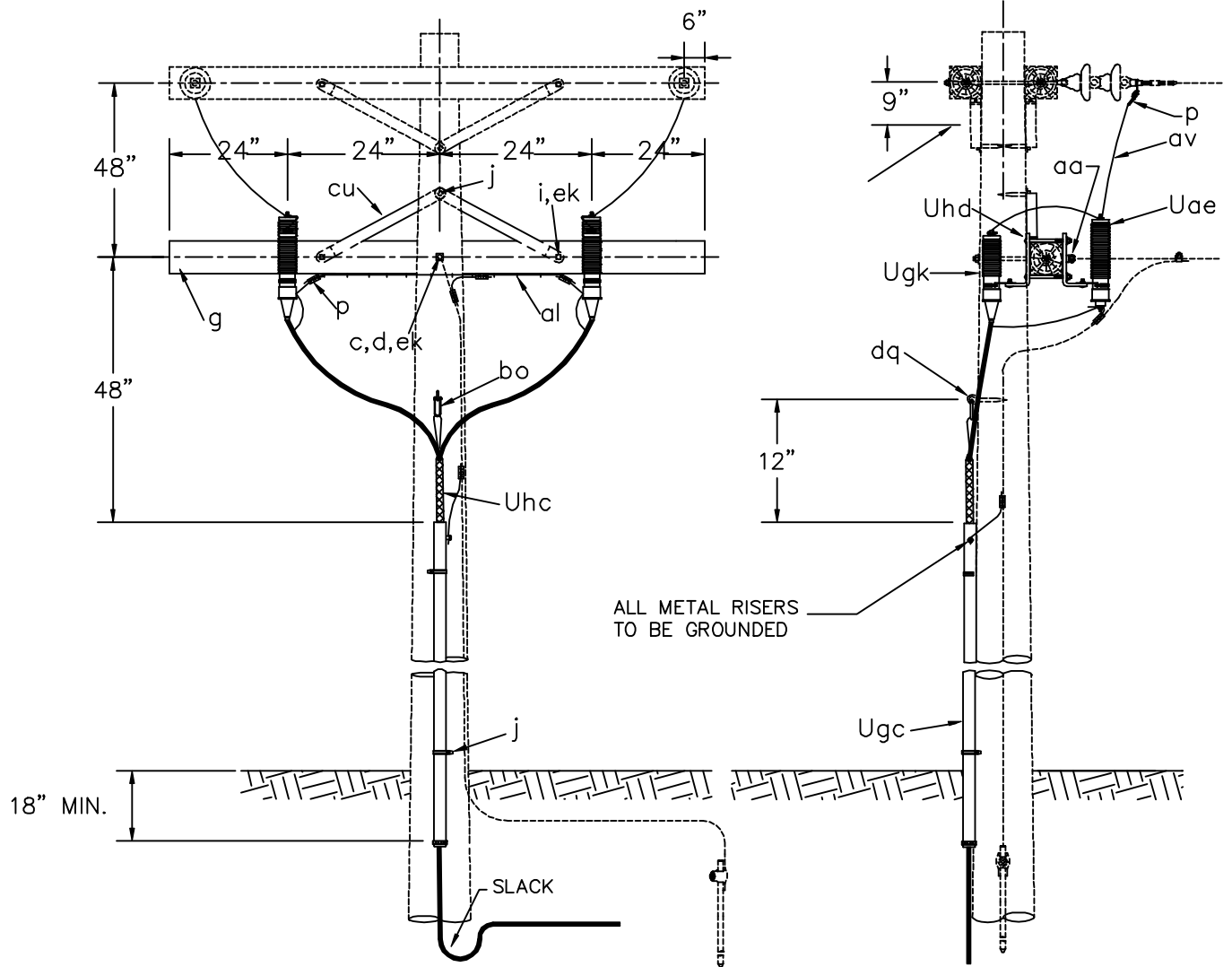
NOTES:

1. TOTAL ARRESTER LEAD LENGTH MUST BE UNDER 3'.
2. NO BENDS PERMITTED WITHIN 6" OF CABLE TERMINAL BASE.
3. ALLOW MINIMUM CABLE SLACK OF 24" AT BOTTOM OF RISER.

VEE-PHASE CABLE TERMINAL POLE
WITH CUTOUTS AND BRACKET
MOUNTING ARRESTERS

2000

UB2



ITEM	QTY.	MATERIAL
c	1	Bolt, machine, 5/8" x required length.
d	1	Washer, square 2 1/4".
g	1	Crossarm, 3 5/8" x 4 5/8" x 8'-0"
i	2	Bolt, carriage, 3/8" x 4 1/2"
j		Screw, lag 1/2" x 4" as required.
p		Connectors, as required.
aa	1	Nut, eye, 5/8"
al		Staples, as required.
av		Jumpers, as required.
bo	1	Anchor, shackle.
cu	2	Brace, wood, 28"
dq	1	Eye screw, elliptical or drive hook.
ek	3	Locknuts, as required.
Uae	2*	Surge arrester
Ugc	1	Cable riser shield. Length as required.
Ugk	2	Cable termination.
Uhc	2	Cable support.
Uhd	2	Crossarm mounting bracket.

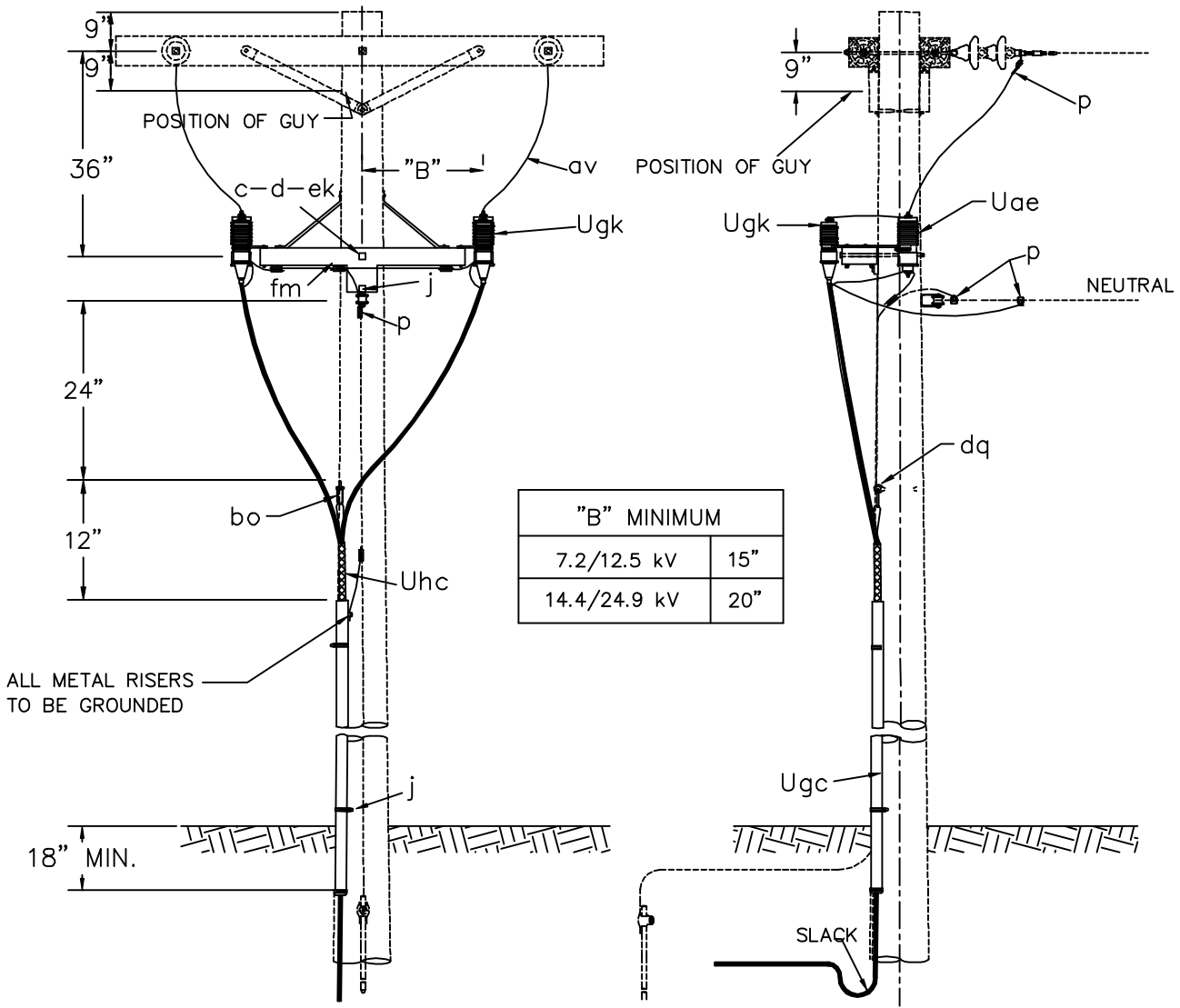
NOTES:

1. TOTAL ARRESTER LEAD LENGTH MUST BE UNDER 3'.
2. NO BENDS PERMITTED WITHIN 6" OF CABLE TERMINAL BASE.
3. ALLOW MINIMUM CABLE SLACK OF 24" AT BOTTOM OF RISER.

VEE-PHASE CABLE TERMINAL POLE
WITHOUT CUTOUT, WITH CROSSARM
MOUNTING ARRESTERS

2000

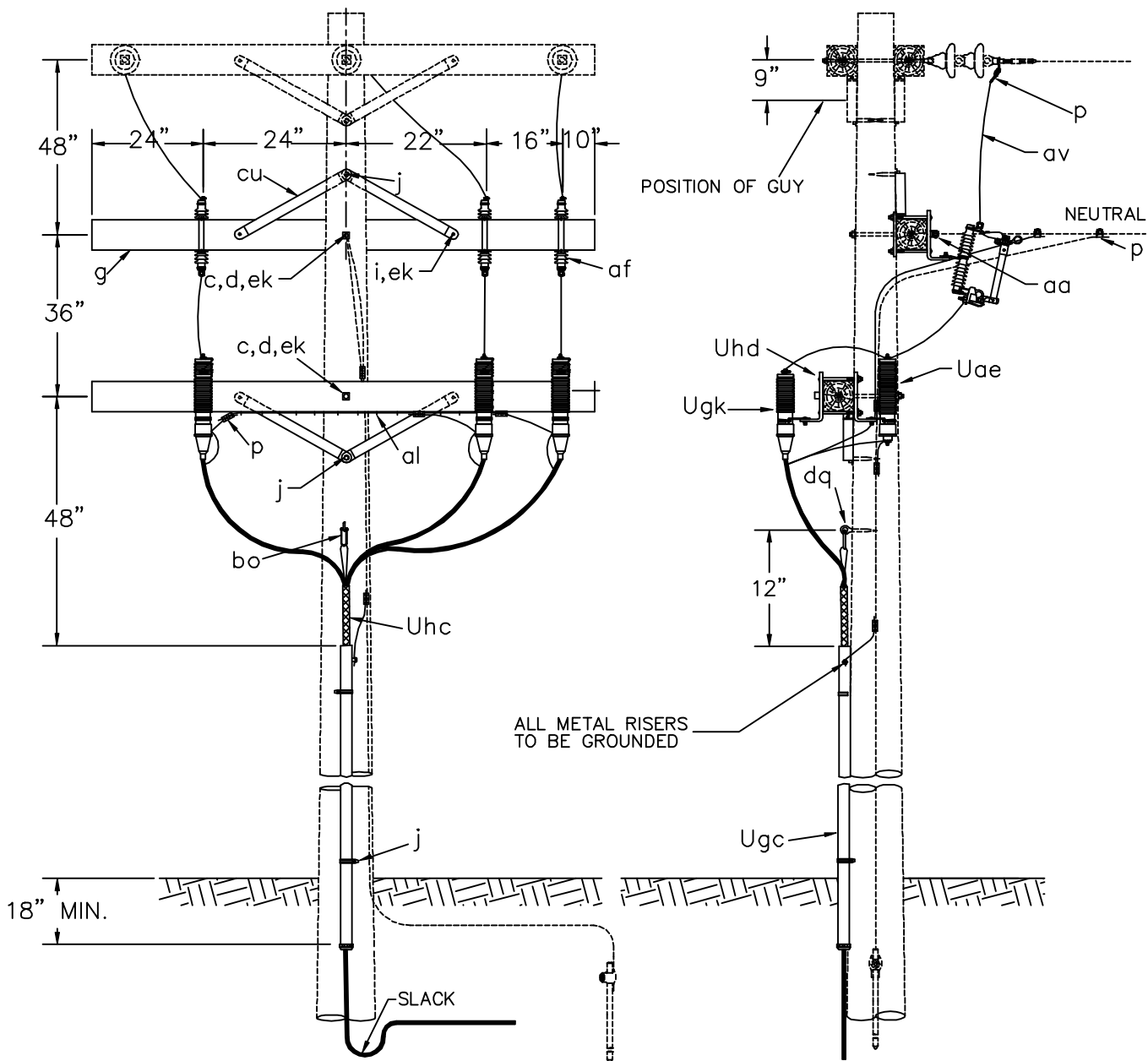
UB3



ITEM	QTY.	MATERIAL
c	1	Bolt, machine, 5/8" x required length.
d	1	Washer, square 2 1/4".
j		Screw, lag 1/2" x 4" as required.
p		Connectors, as required.
av		Jumpers, as required.
bo	1	Anchor, shackle.
dq	1	Eye screw, elliptical or drive hook.
ek		Locknuts, as required.
fm	1	Mounting bracket.
Uae	2*	Surge arrester
Ugc		Cable riser shield. Length as required.
Ugk	2	Cable termination.
Uhc	2	Cable support.

- NOTES:**
- TOTAL ARRESTER LEAD LENGTH MUST BE UNDER 3'.
 - NO BENDS PERMITTED WITHIN 6" OF CABLE TERMINAL BASE.
 - ALLOW MINIMUM CABLE SLACK OF 24" AT BOTTOM OF RISER.

VEE-PHASE CABLE TERMINAL POLE WITHOUT CUTOUT, WITH BRACKET MOUNTING ARRESTERS		
	2000	UB4



ITEM	QTY.	MATERIAL
c	2	Bolt, machine, 5/8" x required length.
d	2	Washer, square 2 1/4".
g	2	Crossarm, 3 5/8" x 4 5/8" x 8'-0"
i	4	Bolt, carriage, 3/8" x 4 1/2"
j		Screw, lag 1/2" x 4" as required.
p		Connectors, as required.
aa	1	Eyenut, 5/8"
af	3	Cutout
al		Staples, as required.
av		Jumpers, as required.
bo	1	Anchor, shackle.
cu	4	Brace, wood, 28"
dq	1	Eye screw, elliptical or drive hook.
ek	6	Locknuts, as required.
Uae	3*	Surge arrester
Ugc	1	Cable riser shield. Length as required.
Ugk	3	Cable termination.
Uhc	3	Cable support.
Uhd	2	Crossarm mounting bracket.

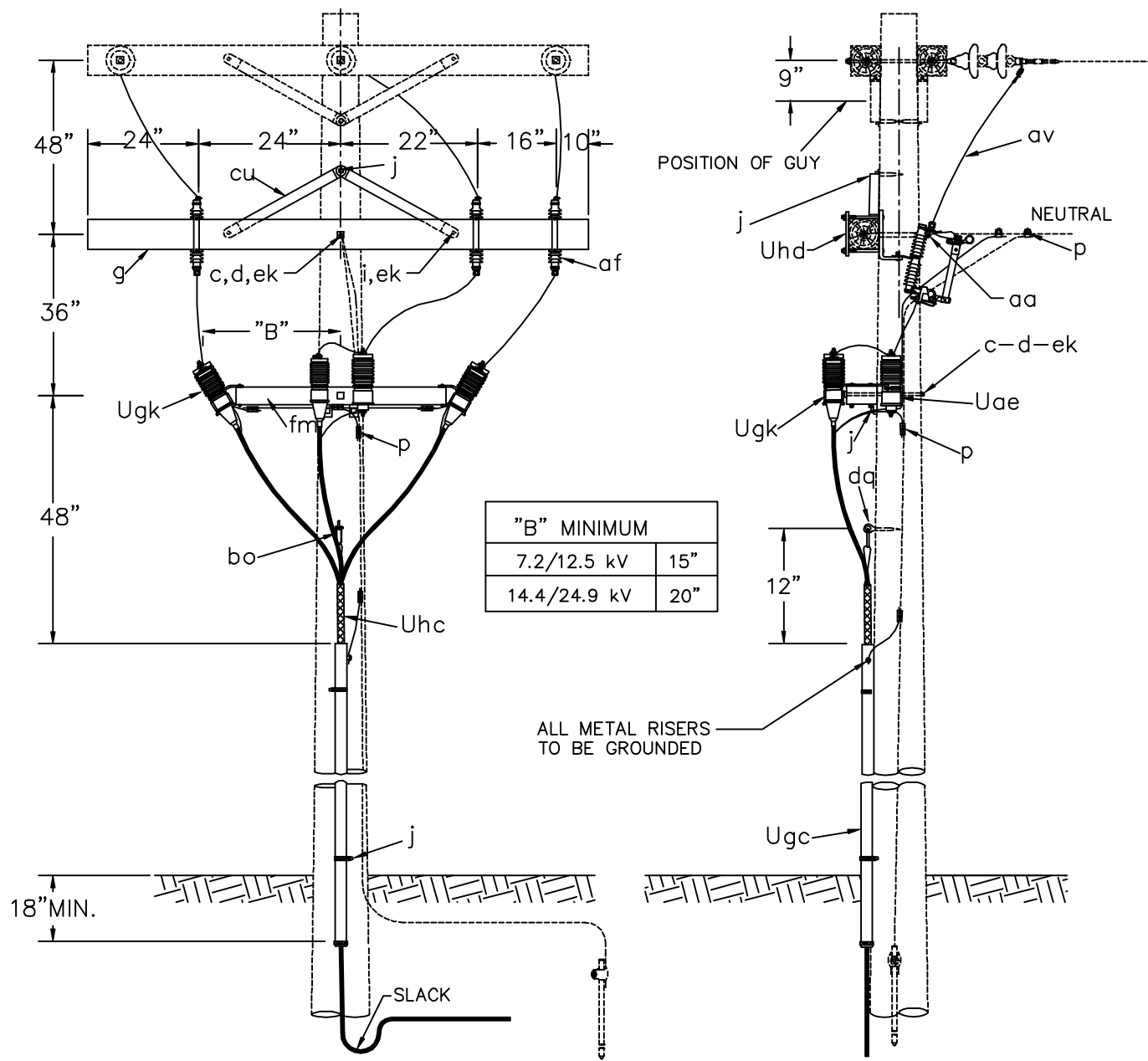
NOTES:

1. TOTAL ARRESTER LEAD LENGTH MUST BE UNDER 3'.
2. NO BENDS PERMITTED WITHIN 6" OF CABLE TERMINAL BASE.
3. ALLOW MINIMUM CABLE SLACK OF 24" AT BOTTOM OF RISER.

THREE PHASE CABLE TERMINAL POLE WITH CUTOUTS AND CROSSARM MOUNTING ARRESTERS

2000

UC1



"B" MINIMUM	
7.2/12.5 kV	15"
14.4/24.9 kV	20"

ALL METAL RISERS TO BE GROUNDED

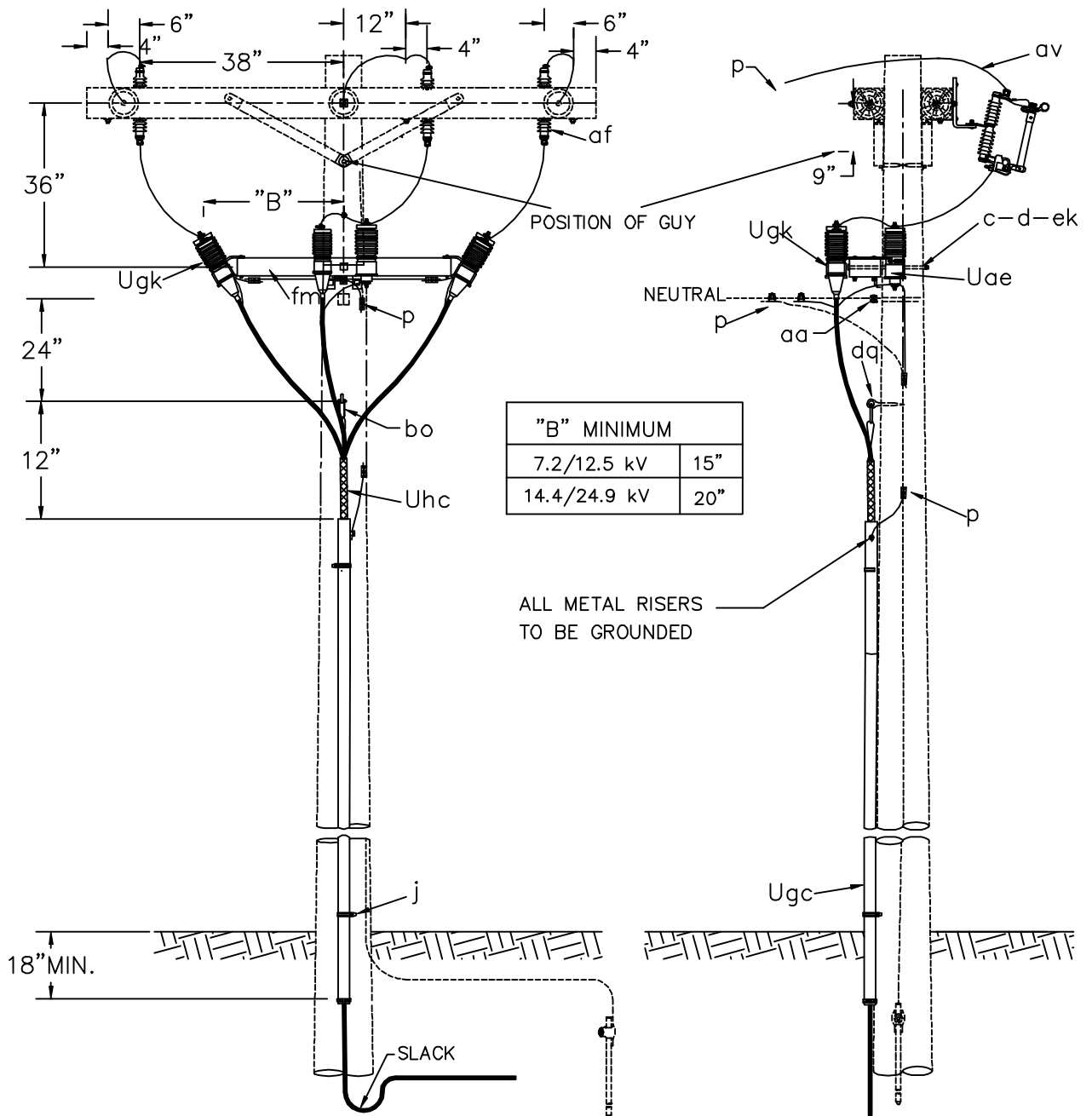
ITEM	QTY.	MATERIAL
c	2	Bolt, machine, 5/8" x required length.
d	2	Washer, square 2 1/4".
g	1	Crossarm, 3 5/8" x 4 5/8" x 8'-0"
i	2	Bolt, carriage, 3/8" x 4 1/2"
j		Screw, lag 1/2" x 4" as required.
p		Connectors, as required.
aa	1	Eyenuit, 5/8"
af	3	Cutout
av		Jumpers, as required.
bo	1	Anchor, shackle.
cu	2	Brace, wood, 28"
dq	1	Eye screw, elliptical or drive hook.
ek	4	Locknuts, as required.
fm	1	Mounting bracket.
Uae	3*	Surge arrester
Ugc	1	Cable riser shield. Length as required.
Ugk	3	Cable termination.
Uhc	3	Cable support.

NOTES:

1. TOTAL ARRESTER LEAD LENGTH MUST BE UNDER 3'.
2. NO BENDS PERMITTED WITHIN 6" OF CABLE TERMINAL BASE.
3. ALLOW MINIMUM CABLE SLACK OF 24" AT BOTTOM OF RISER.

THREE PHASE CABLE TERMINAL POLE WITH CUTOUTS AND BRACKET MOUNTING ARRESTERS

2000 UC2



"B" MINIMUM	
7.2/12.5 kV	15"
14.4/24.9 kV	20"

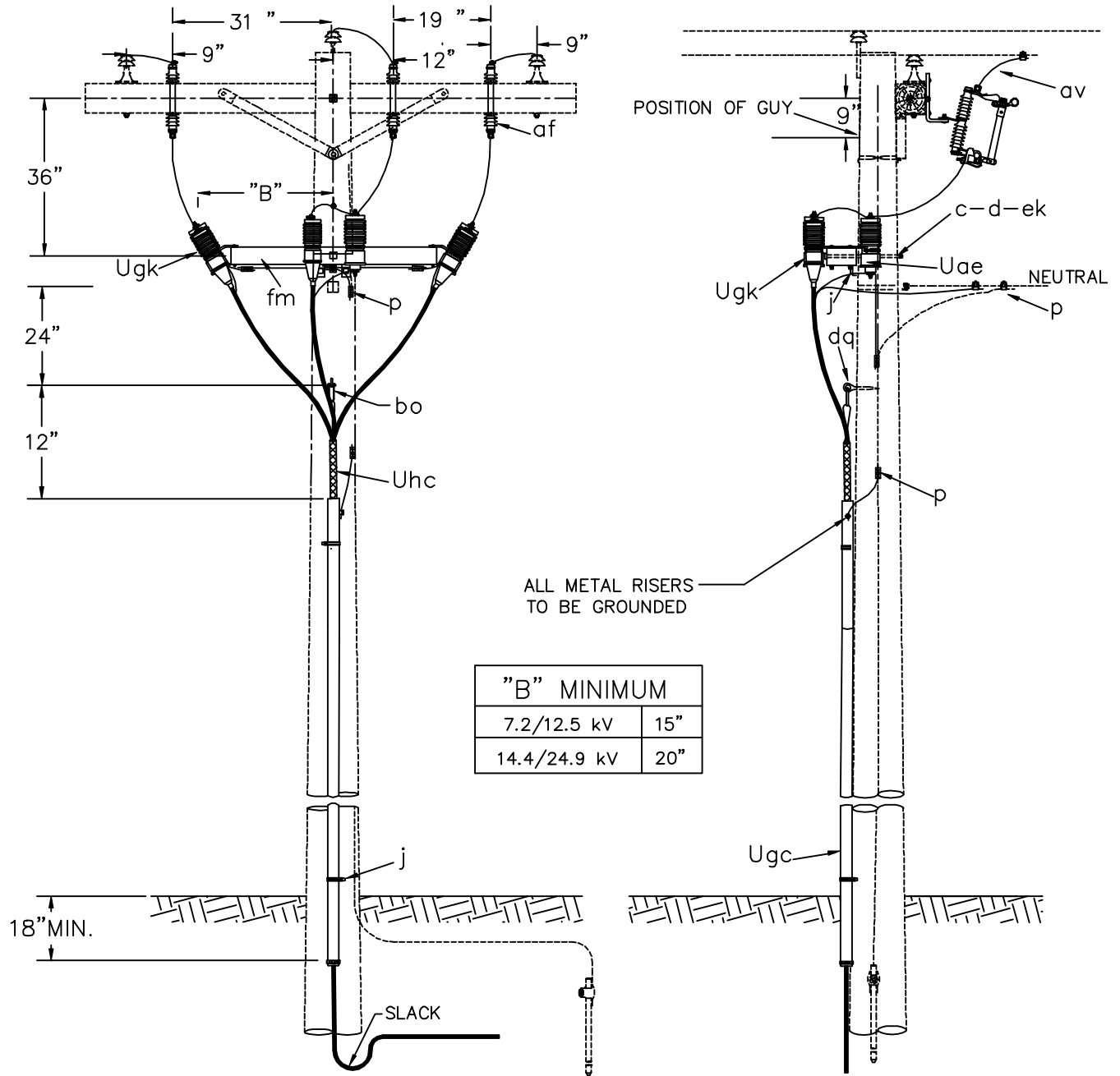
ALL METAL RISERS TO BE GROUNDED

ITEM	QTY.	MATERIAL
a	3	Insulator, pin type
c	1	Bolt, machine, 5/8" x required length.
d	1	Washer, square 2 1/4".
f	3	Pin, crossarm
j		Screw, lag 1/2" x 4" as required.
p		Connectors, as required.
aa	1	Eyenuit, 5/8"
af	3	Cutout
av		Jumpers, as required.
bo	1	Anchor, shackle.
dq	1	Eye screw, elliptical or drive hook.
ek		Locknuts, as required.
fm	1	Mounting bracket.
Uae	3*	Surge arrester
Ugc	1	Cable riser shield. Length as required.
Ugk	3	Cable termination.
Uhc	3	Cable support.

NOTES:

- TOTAL ARRESTER LEAD LENGTH MUST BE UNDER 3'.
- NO BENDS PERMITTED WITHIN 6" OF CABLE TERMINAL BASE.
- ALLOW MINIMUM CABLE SLACK OF 24" AT BOTTOM OF RISER.

THREE PHASE CABLE DEADEND
TERMINAL POLE

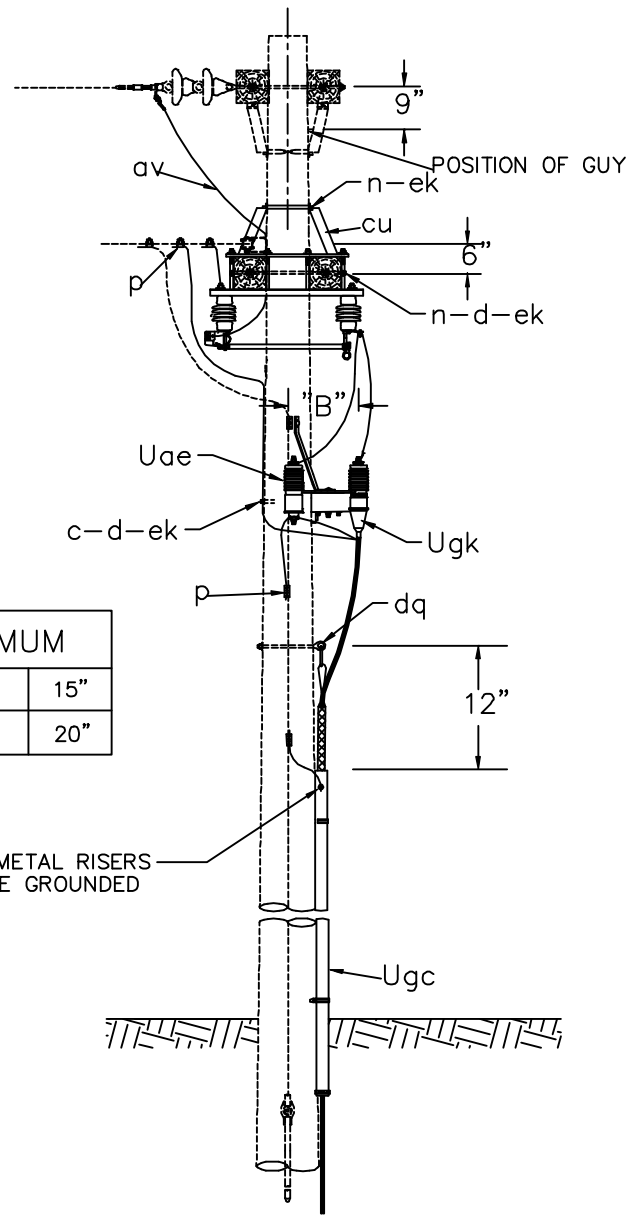
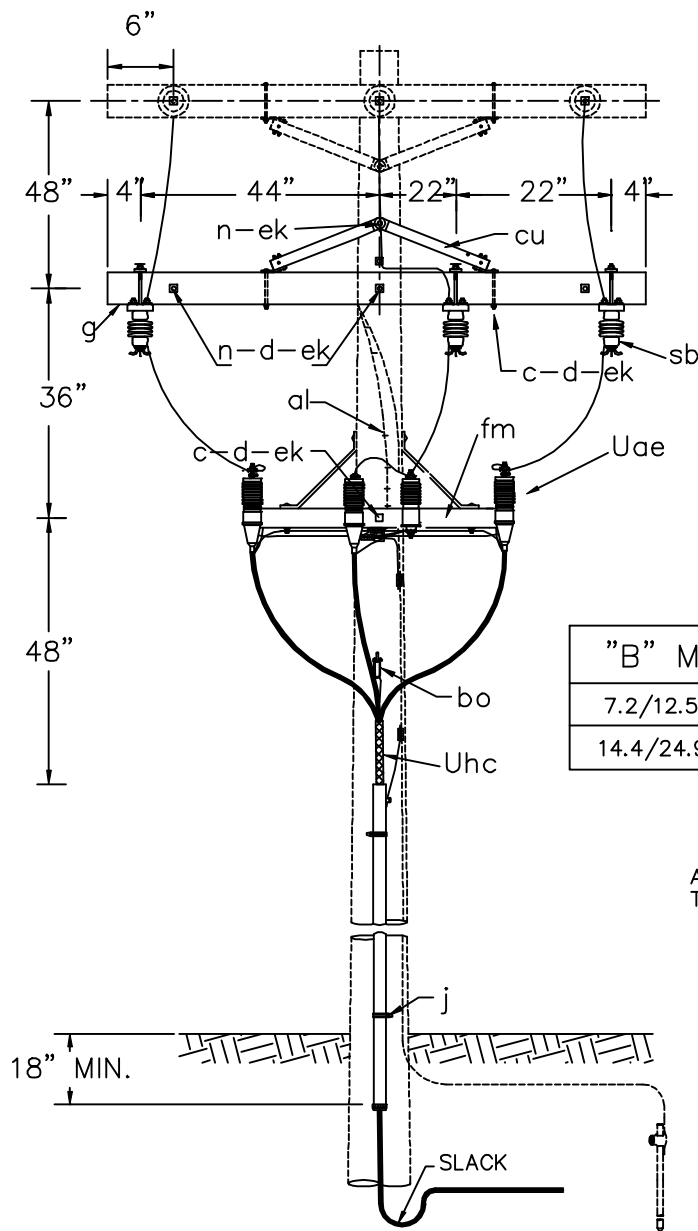


"B" MINIMUM	
7.2/12.5 kV	15"
14.4/24.9 kV	20"

ITEM	QTY.	MATERIAL
c	1	Bolt, machine, 5/8" x required length.
d	1	Washer, square 2 1/4".
j		Screw, lag 1/2" x 4" as required.
p		Connectors, as required.
aa	1	Eyenuit, 5/8"
af	3	Cutout
av		Jumpers, as required.
bo	1	Anchor, shackle.
dq	1	Eye screw, elliptical or drive hook.
ek		Locknuts, as required.
fm	1	Mounting bracket.
Uae	3*	Surge arrester
Ugc	1	Cable riser shield. Length as required.
Ugk	3	Cable termination.
Uhc	3	Cable support.

- NOTES:**
- TOTAL ARRESTER LEAD LENGTH MUST BE UNDER 3'.
 - NO BENDS PERMITTED WITHIN 6" OF CABLE TERMINAL BASE.
 - ALLOW MINIMUM CABLE SLACK OF 24" AT BOTTOM OF RISER.

THREE PHASE CABLE TANGENT TERMINAL POLE	
2000	UC2-2



"B" MINIMUM	
7.2/12.5 kV	15"
14.4/24.9 kV	20"

ALL METAL RISERS TO BE GROUNDED

ITEM	QTY.	MATERIAL
c	5	Bolt, machine, 5/8" x as required
d	4	Washer, 1 3/8" x 9/16" round
d	12	Washer, 2 1/2" square
g	2	Crossarm, 3 5/8" x 4 5/8" x 8'-0"
j		Screw, lag 1/2" x 4", as required
n	4	Bolt, double arming, 5/8" x req'd length
p		Connectors, as required.
al		Staples, as required.
av		Jumpers, as required.
bo	1	Anchor, shackle.
cu	4	Brace, crossarm 60" span
dq	1	Eye screw, elliptical or drive hook.
ek	16	Locknuts, as required.
fm	1	Bracket, pothead-arrester 3 phase
sb	3	Disconnect, 600 A load break
Uae	3	Surge arrester
Ugc	1	Cable riser shield. Length as required.
Ugk	3	Cable termination.
Uhc	3	Grips

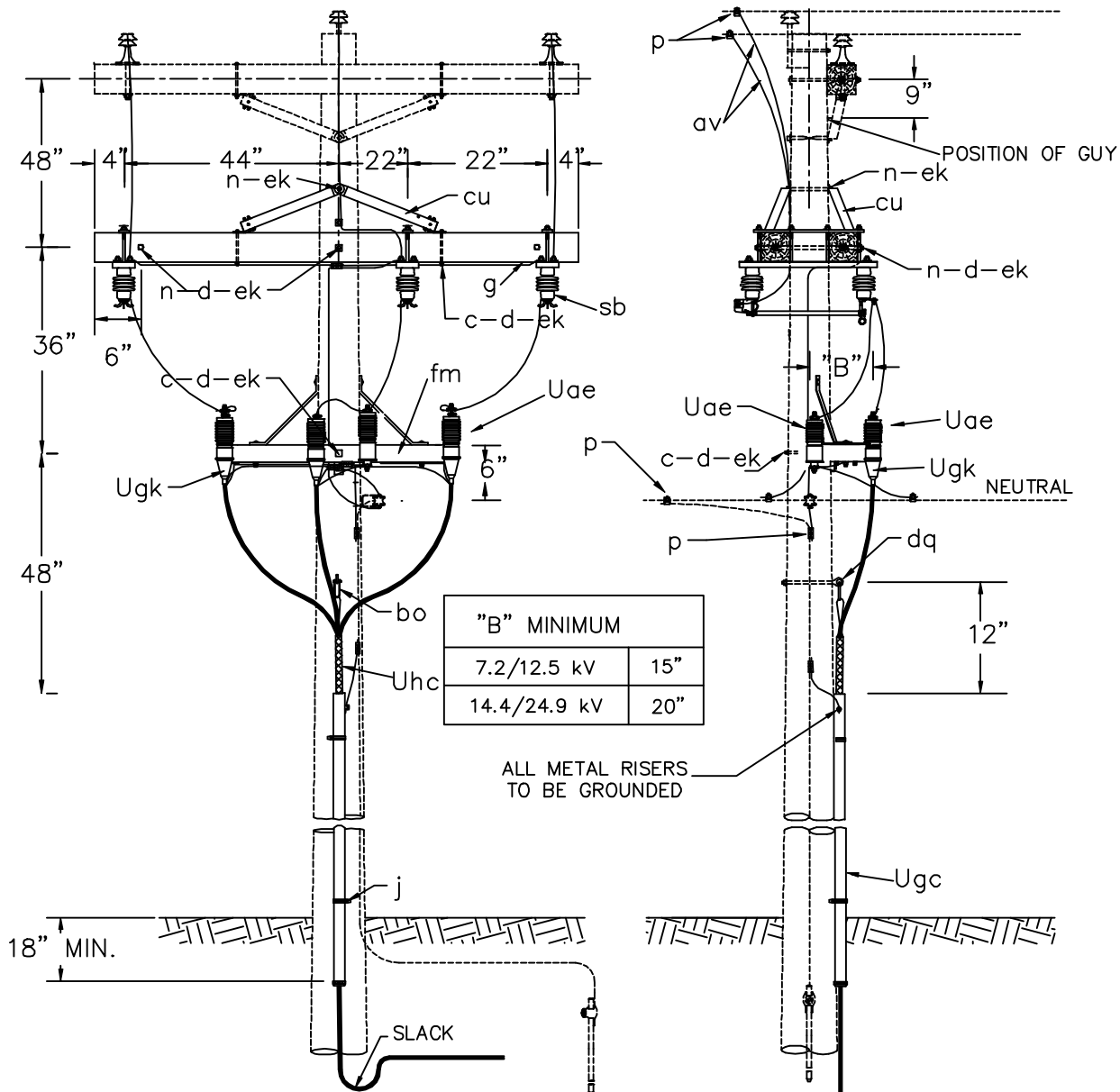
NOTES:

- TOTAL ARRESTER LEAD LENGTH MUST BE UNDER 3'.
- NO BENDS PERMITTED WITHIN 6" OF CABLE TERMINAL BASE.
- ALLOW MINIMUM CABLE SLACK OF 24" AT BOTTOM OF RISER.

THREE PHASE CABLE DEADEND
TERMINAL POLE WITH
DISCONNECT SWITCHES

2000

UC5-1



ITEM	QTY.	MATERIAL
c	4	Bolt, machine, 5/8" x as required
d	4	Washer, 1 3/8" x 9/16" round
d	12	Washer, 2 1/2" square
g	2	Crossarm, 3 5/8" x 4 5/8" x 8'-0"
j		Screw, lag 1/2" x 4", as required
n	4	Bolt, double arming, 5/8" x req'd length
p		Connectors, as required.
al		Staples, as required.
av		Jumpers, as required.
bo	1	Anchor, shackle.
cu	4	Brace, crossarm 60" span
dq	1	Eye screw, elliptical or drive hook.
ek		Locknuts, as required.
fm	1	Bracket, pothead-arrester 3 phase
sb	3	Disconnect, 600 A load break
Uae	3	Surge arrester
Ugc		Cable riser shield. Length as required.
Ugk	3	Cable termination.
Uhc	3	Grips

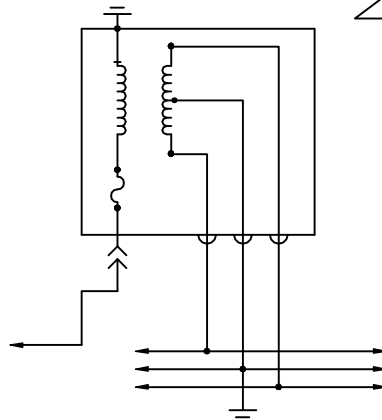
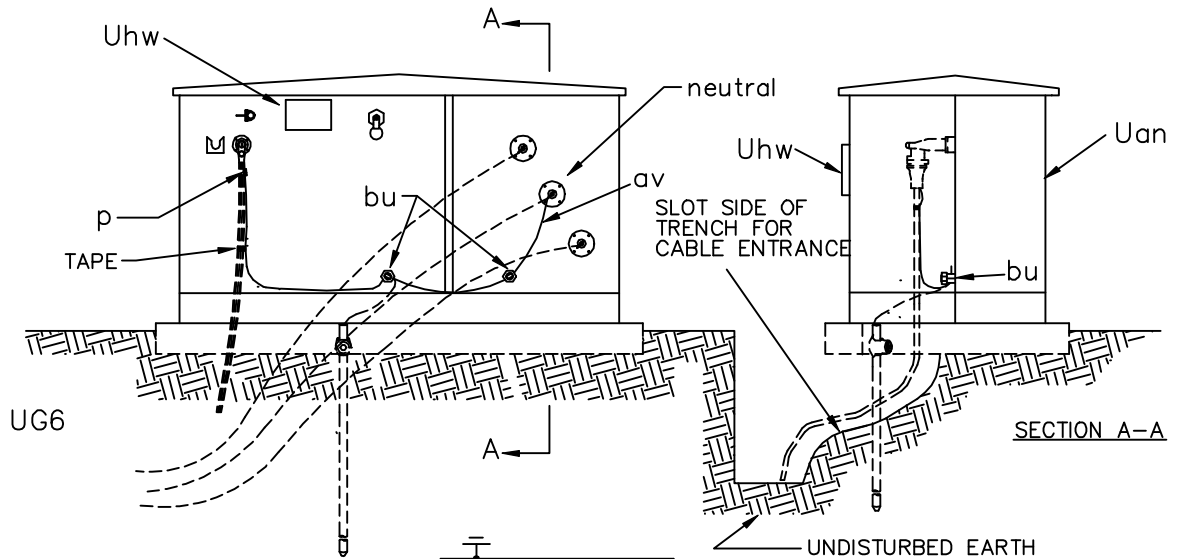
NOTES:

1. TOTAL ARRESTER LEAD LENGTH MUST BE UNDER 3'.
2. NO BENDS PERMITTED WITHIN 6" OF CABLE TERMINAL BASE.
3. ALLOW MINIMUM CABLE SLACK OF 24" AT BOTTOM OF RISER.

THREE PHASE CABLE TANGENT
TERMINAL POLE WITH
DISCONNECT SWITCHES

2000

UC6-1



WIRING DIAGRAM
UG6

DESIGNATE AS:

TRANSFORMER WITHOUT SECONDARY BREAKERS	TRANSFORMER WITH SECONDARY BREAKERS	
UG6	UG6B	SINGLE TERMINATION TYPE WITH INTERNAL FUSE

ITEM	QTY.	MATERIAL
p		Connectors, as required
av		Jumpers, copper as required
bu	2	Connector, equipment ground
Uan	1	Transformer, pad mounted, single primary load break bushing and internal fuse (UG6 & UG6B).
Uhw	2	Signs, "DANGER" and "WARNING"
		Tape, as required

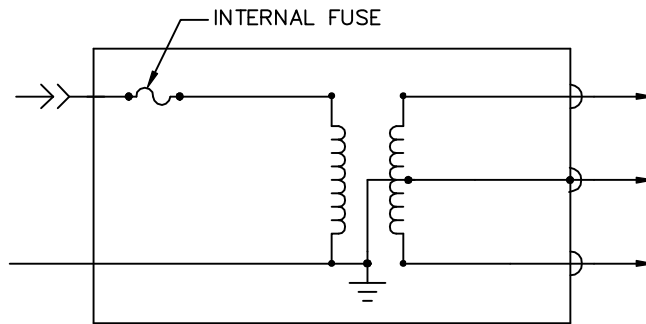
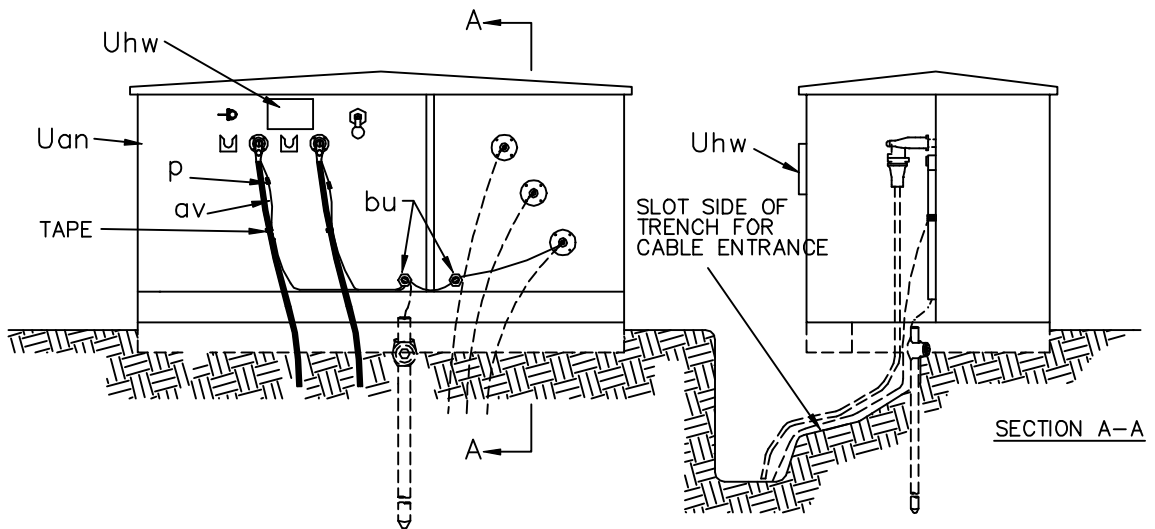
NOTES:

1. PROVIDE SUFFICIENT PRIMARY NEUTRAL PIGTAIL AND CABLE SLACK TO PERMIT READY DISCONNECTION OF ELBOW AND MOUNTING ON PARKING STAND. TRAIN CABLES AS SHOWN.
2. INSTALL WITH UNIT UM48-1 OR OTHER GROUNDING UNIT TO BE SPECIFIED SEPARATELY.
3. SPECIFY PAD OR SLEEVE SEPARATELY.
4. INSTALL "DANGER" SIGN ON TRANSFORMER INSIDE ENCLOSURE. INSTALL "WARNING" SIGN ON OUTSIDE SURFACE OF ENCLOSURE.

SINGLE PHASE
PAD-MOUNTED TRANSFORMER
(RADIAL FEED)

2000

UG6,
UG6B



WIRING DIAGRAM
UG7

DESIGNATE AS:

TRANSFORMER WITHOUT SECONDARY BREAKERS	TRANSFORMER WITH SECONDARY BREAKERS	
UG7	UG17B	UNIT WITH INTERNAL FUSE

ITEM	QTY.	MATERIAL
p		Connectors, as required
av		Jumpers, copper as required
bu	2	Connector, equipment ground
Uan	1	Transformer, pad mounted, single phase with one load break bushing per phase and internal fuses (UG7 & UG17B)
Uhw	2	Signs, "DANGER" and "WARNING"
Uhp	1	Elbow Termination
		Ground wire (See Note #3)
		Tape, as required

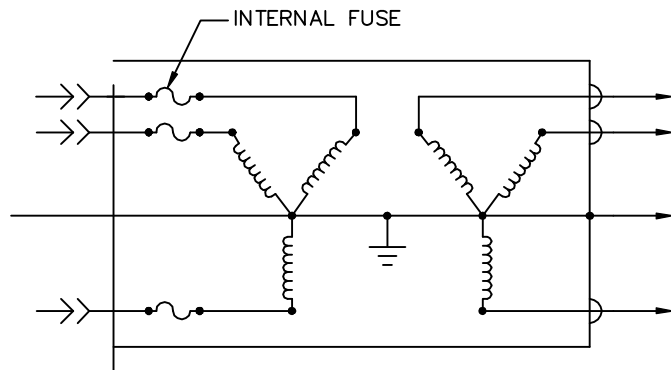
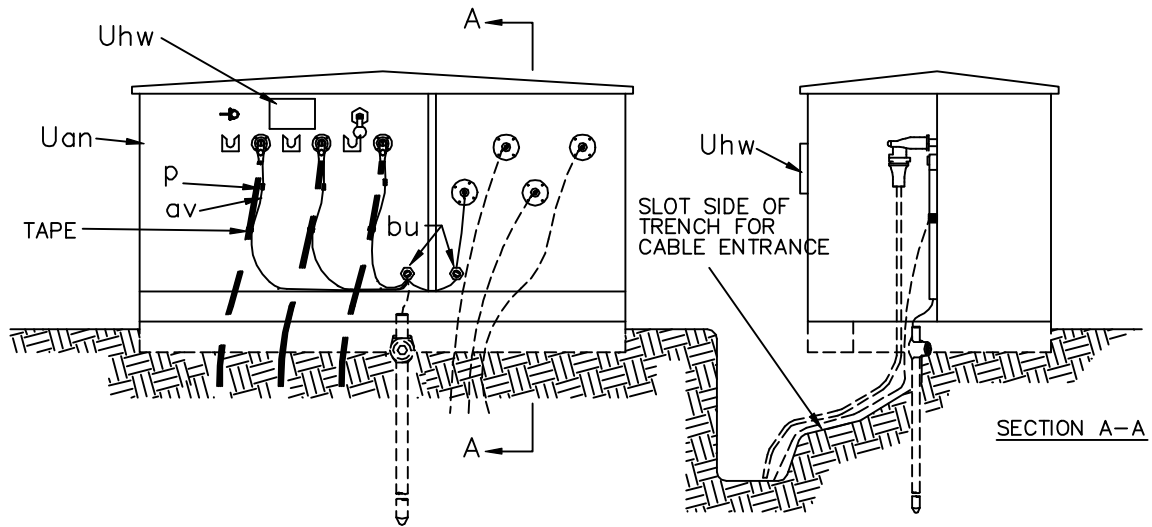
NOTES:

1. PROVIDE SUFFICIENT PRIMARY NEUTRAL PIGTAIL AND CABLE SLACK TO PERMIT READY DISCONNECTION OF ELBOW AND MOUNTING ON PARKING STAND. TRAIN CABLES AS SHOWN.
2. INSTALL WITH UNIT UM48-1 OR OTHER GROUNDING UNIT TO BE SPECIFIED SEPARATELY.
3. SPECIFY PAD OR SLEEVE UNIT SEPARATELY.
4. INSTALL "DANGER" SIGN ON TRANSFORMER AND "WARNING" SIGN ON ENCLOSURE.

SINGLE PHASE
PAD MOUNTED TRANSFORMER
(LOOP FEED)

2000

UG7
UG7B



DESIGNATE AS:

WIRING DIAGRAM
UG 17

TRANSFORMER WITHOUT SECONDARY BREAKERS	TRANSFORMER WITH SECONDARY BREAKERS	
UG17	UG17B	UNIT WITH INTERNAL FUSE

NOTES:

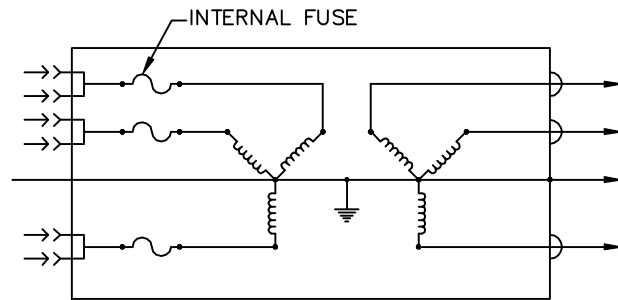
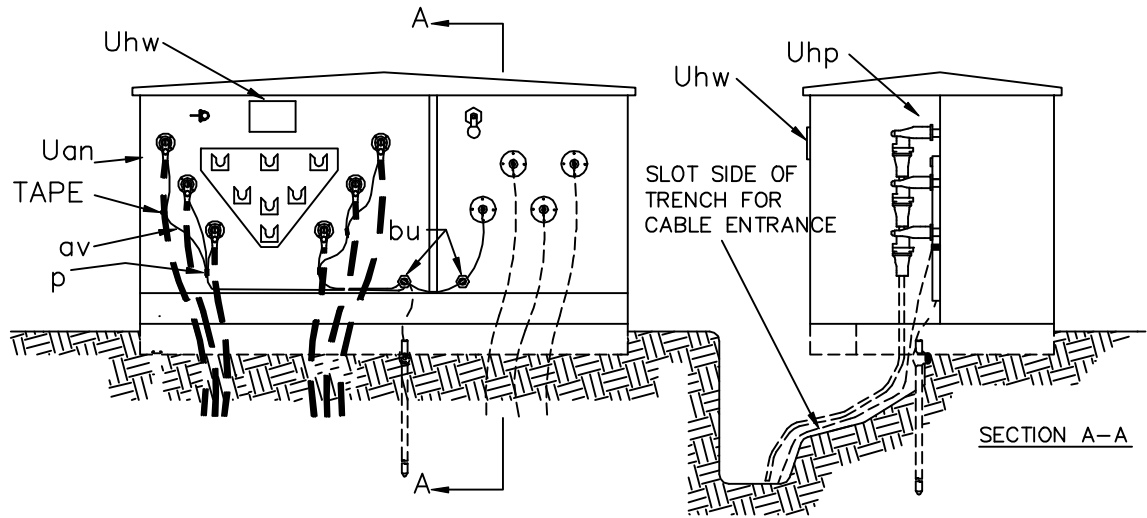
- ONLY THE WYE-WYE CONNECTION SHOULD BE USED TO MINIMIZE FERRO-RESONANCE.
- PROVIDE SUFFICIENT PRIMARY NEUTRAL PIGTAIL AND CABLE SLACK TO PERMIT READY DISCONNECTION OF ELBOW AND MOUNTING ON PARKING STAND. TRAIN CABLES AS SHOWN.
- INSTALL WITH UNIT UM48-1 OR OTHER GROUNDING UNIT TO BE SPECIFIED SEPARATELY.
- SPECIFY PAD OR SLEEVE UNIT SEPARATELY.
- INSTALL "DANGER" SIGN ON TRANSFORMER INSIDE ENCLOSURE. INSTALL "WARNING" SIGN ON OUTSIDE SURFACE OF ENCLOSURE.
- THREE PHASE SWITCHING OF PRIMARY SHOULD BE INSTALLED WHERE FERRORESONANCE MAY OCCUR.

ITEM	QTY.	MATERIAL
p		Connectors, as required
av		Jumpers, copper as required
bu	2	Connector, equipment ground
Uan	1	Transformer, pad mounted, three phase with one load break bushing per phase and internal fuses (UG17 & UG17B)
Uhw	2	Signs, "DANGER" and "WARNING"
Uhp	3	Elbow Termination
		Ground wire (See Note #3)
		Tape, as required

THREE PHASE PAD MOUNTED
TRANSFORMER
(RADIAL FEED)

2000

UG17
UG17B



WIRING DIAGRAM
UG17-2

DESIGNATE AS:

TRANSFORMER WITHOUT SECONDARY BREAKERS	TRANSFORMER WITH SECONDARY BREAKERS	
UG17-2	UG17-2B	UNIT WITH INTERNAL FUSE

NOTES:

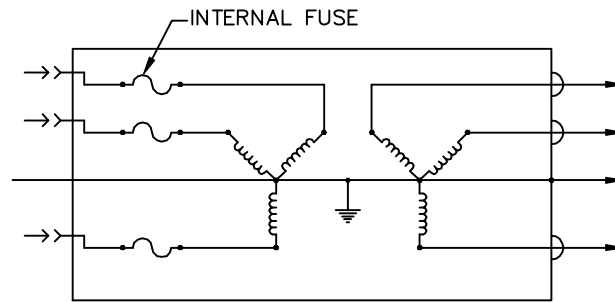
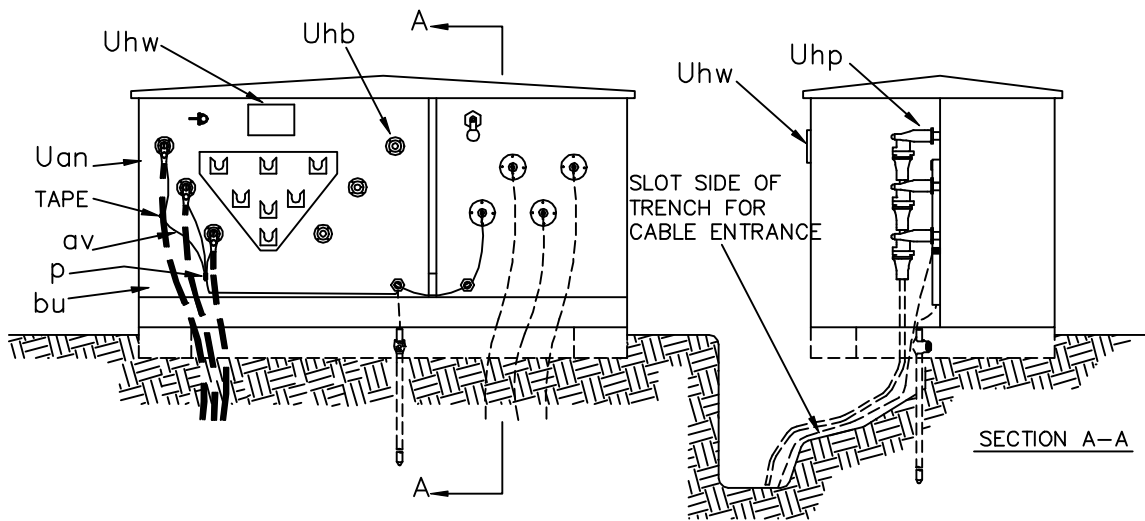
- ONLY THE WYE-WYE CONNECTION SHOULD BE USED TO AVOID FERRORESONANCE.
- PROVIDE SUFFICIENT PRIMARY NEUTRAL PIGTAIL AND CABLE SLACK TO PERMIT READY DISCONNECTION OF ELBOW AND MOUNTING ON PARKING STAND. TRAIN CABLES AS SHOWN.
- INSTALL WITH GROUNDING ASSEMBLY TO BE SPECIFIED.
- SPECIFY kVA SIZE OF TRANSFORMER.
- SPECIFY PAD OR SLEEVE UNIT SEPARATELY.
- INSTALL "DANGER" SIGN ON TRANSFORMER INSIDE ENCLOSURE. INSTALL "WARNING" SIGN ON OUTSIDE SURFACE OF ENCLOSURE.

ITEM	QTY.	MATERIAL
p		Connectors, as required
av		Jumpers, copper, as required
bu	2	Connector, equipment ground
Uan	1	Transformer, pad mounted, three phase with two load break bushings per phase and internal fuse.
Uhv	2	Signs, "DANGER" and "WARNING"
Uhp	6	Elbow termination
		Tape, as required
		Ground wire (See Note #3)

THREE PHASE
PAD MOUNTED TRANSFORMER
(LOOP FEED)

2000

UG17-2
UG17-2B



WIRING DIAGRAM

DESIGNATE AS:

TRANSFORMER WITHOUT SECONDARY BREAKERS	TRANSFORMER WITH SECONDARY BREAKERS	
UG17-3	UG17-3B	UNIT WITH INTERNAL FUSE

NOTES:

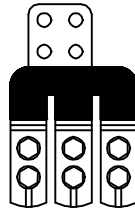
1. ONLY THE WYE-WYE CONNECTION SHOULD BE USED TO AVOID FERRORESONANCE.
2. PROVIDE SUFFICIENT PRIMARY NEUTRAL PIGTAIL AND CABLE SLACK TO PERMIT READY DISCONNECTION OF ELBOW AND MOUNTING ON PARKING STAND. TRAIN CABLES AS SHOWN.
3. INSTALL WITH GROUNDING ASSEMBLY TO BE SPECIFIED SEPARATELY.
4. SPECIFY PAD OR SLEEVE UNIT SEPARATELY.
5. INSTALL "DANGER" SIGN ON TRANSFORMER INSIDE ENCLOSURE. INSTALL "WARNING" SIGN ON OUTSIDE SURFACE OF ENCLOSURE.

ITEM	QTY.	MATERIAL
p		Connectors, as required
av		Jumpers, copper, as required
bu	2	Connector, equipment ground
Uan	1	Transformer, pad mounted, three phase, with two load break bushings per phase and internal fuse.
Uhb	3	Insulated covers
Uhw	2	Signs, "DANGER" and "WARNING"
Uhp	3	Elbow termination
		Tape, as required
		Ground wire (See Note #3)

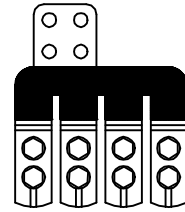
THREE PHASE PAD MOUNTED LOOP FEED TRANSFORMER WITH RADIAL FEED	
2000	UG17-3 UG17-3B



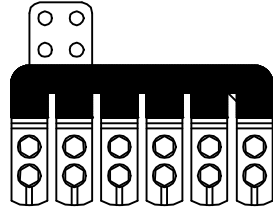
UJ1-2



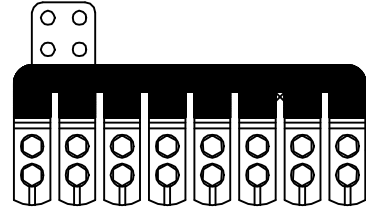
UJ1-3



UJ1-4

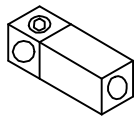


UJ1-6

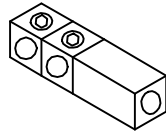


UJ1-8

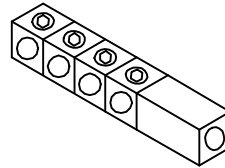
CONNECTOR BLOCKS



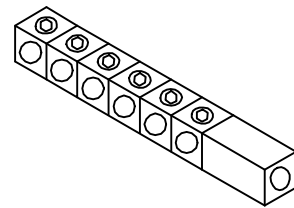
UJ2-1



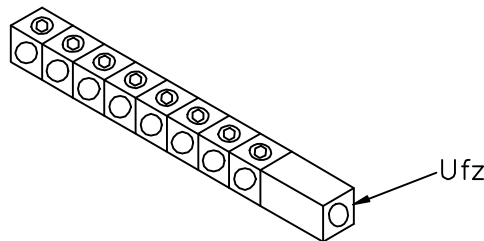
UJ2-2



UJ2-4



UJ2-6

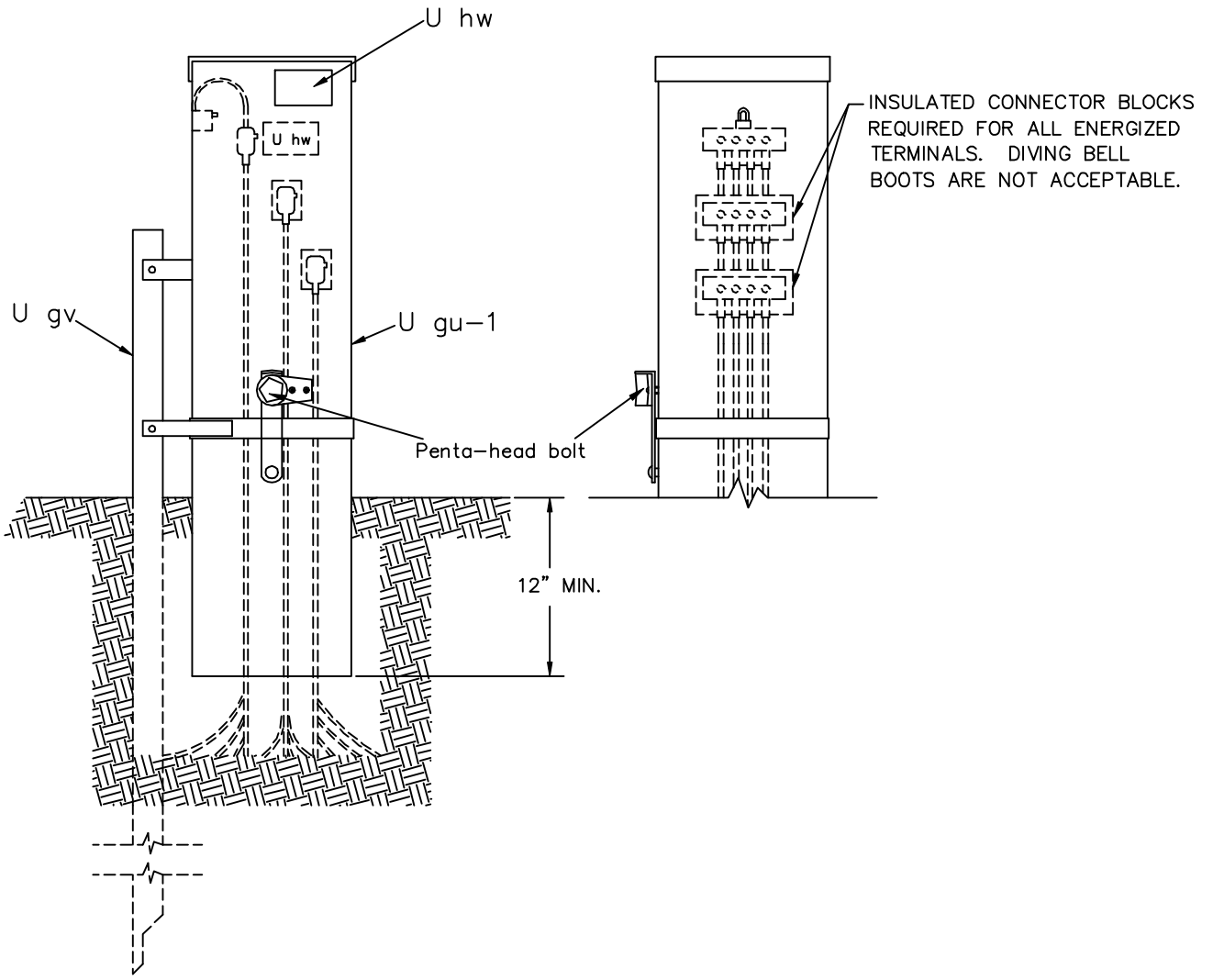


UJ2-8

TRANSFORMER CONNECTOR BLOCKS

NOTE: Insulated covers are not shown.

ITEM	QTY.	MATERIAL	SECONDARY CONNECTOR BLOCKS	
Ufz		Transformer connector blocks, as required	2000	UJ1-__
Ugp		Connector blocks, as required		UJ2-__

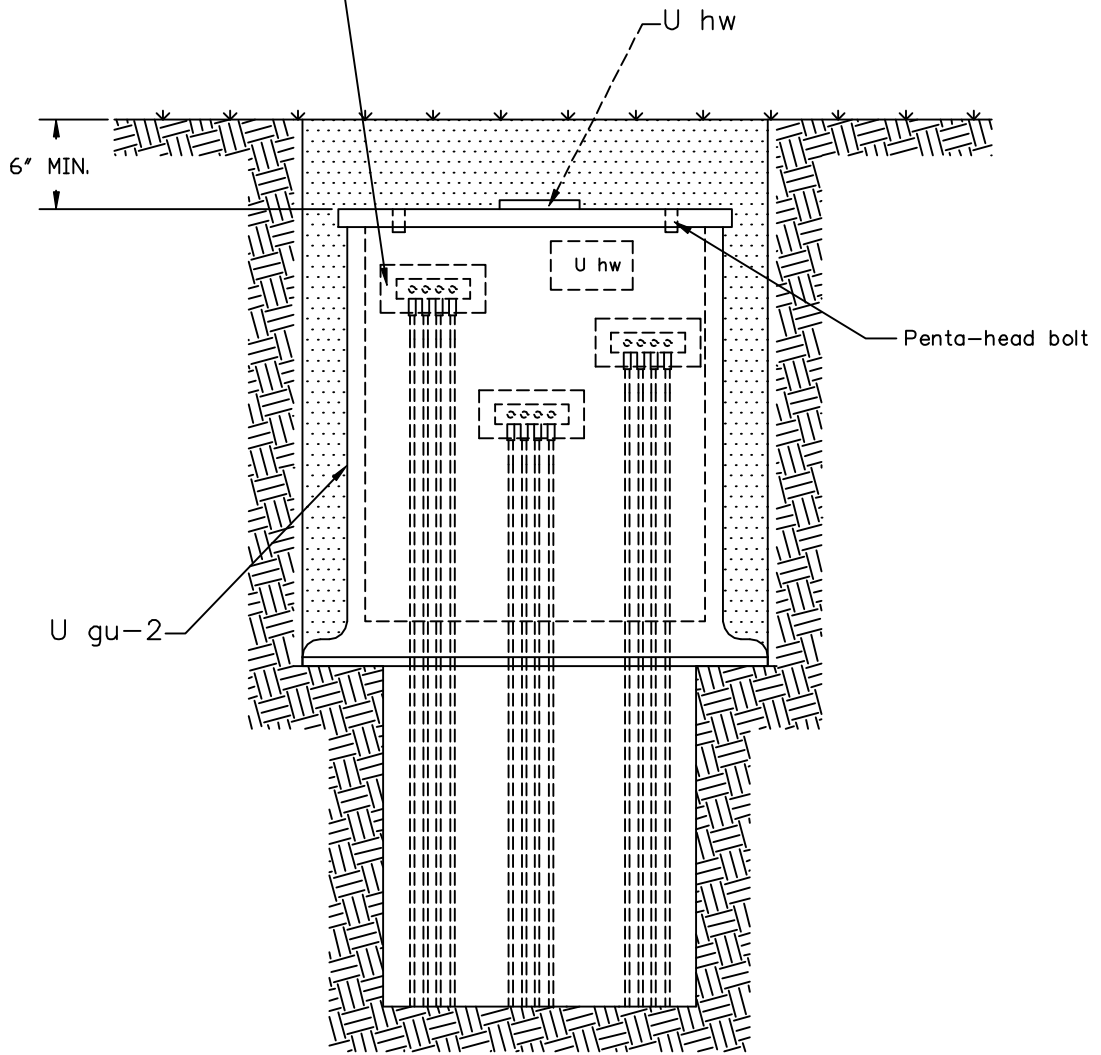


NOTES:

1. INSTALL "WARNING" SIGN ON OUTSIDE OF PEDESTAL.
2. ITEM Ugv OPTIONAL – SEE PEDESTAL MANUFACTURER'S SPECIFICATIONS AND RECOMMENDATIONS.
3. ALL PEDESTALS SHALL BE GROUNDED IN ACCORDANCE WITH THE NATIONAL ELECTRICAL SAFETY CODE (NESC).

ITEM	QTY.	MATERIAL		
Ugu-1	1	Power pedestal	SECONDARY PEDESTAL UNDERGROUND CABLE	
Ugv	1	Stake (if necessary)		
Uhw	1	Sign, "WARNING" (outside pedestal)		
Uhw	1	Sign, "DANGER" (inside pedestal)	2000	UK5

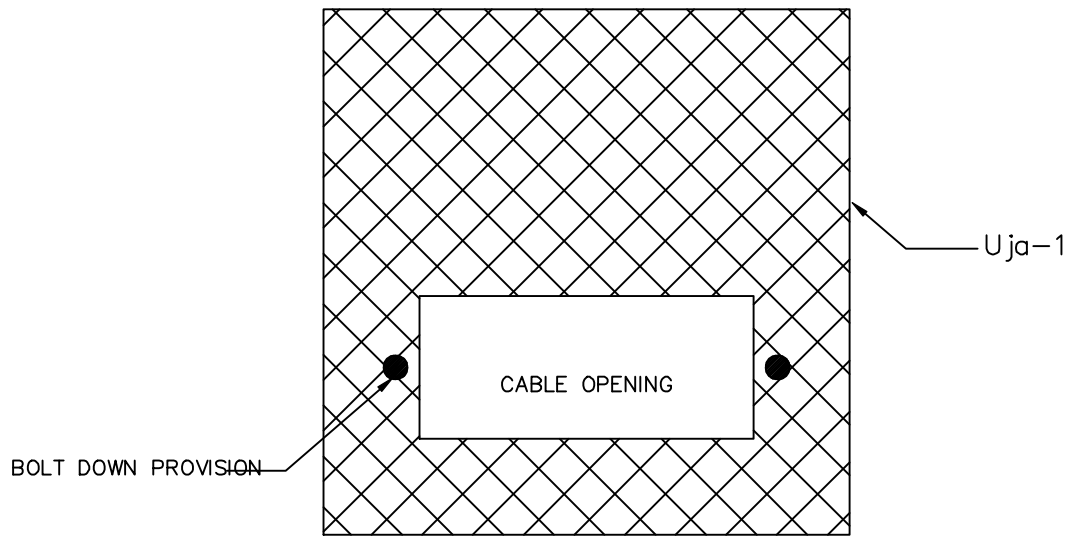
INSULATED SUBMERSIBLE CONNECTOR BLOCKS
 REQUIRED FOR ALL TERMINALS.
 DIVING BELL BOOTS ARE NOT ACCEPTABLE.



NOTES:

1. OWNER TO SPECIFY WHETHER UNIT IS TO BE BURIED AS SHOWN OR INSTALLED FLUSH WITH FINAL GRADE. METAL COVER IF USED SHOULD BE GROUNDED.
2. ALL PEDESTALS SHALL BE GROUNDED IN ACCORDANCE WITH THE NATIONAL ELECTRICAL SAFETY CODE (NEC).

ITEM	QTY.	MATERIAL			
U gu-2	1	Power pedestal, buried type	SECONDARY HANDHOLE UNDERGROUND CABLE		
U hw	1	Sign, "DANGER" (inside pedestal)			
U hw	1	Sign, "WARNING" (outside pedestal)			
			2000	UK6	



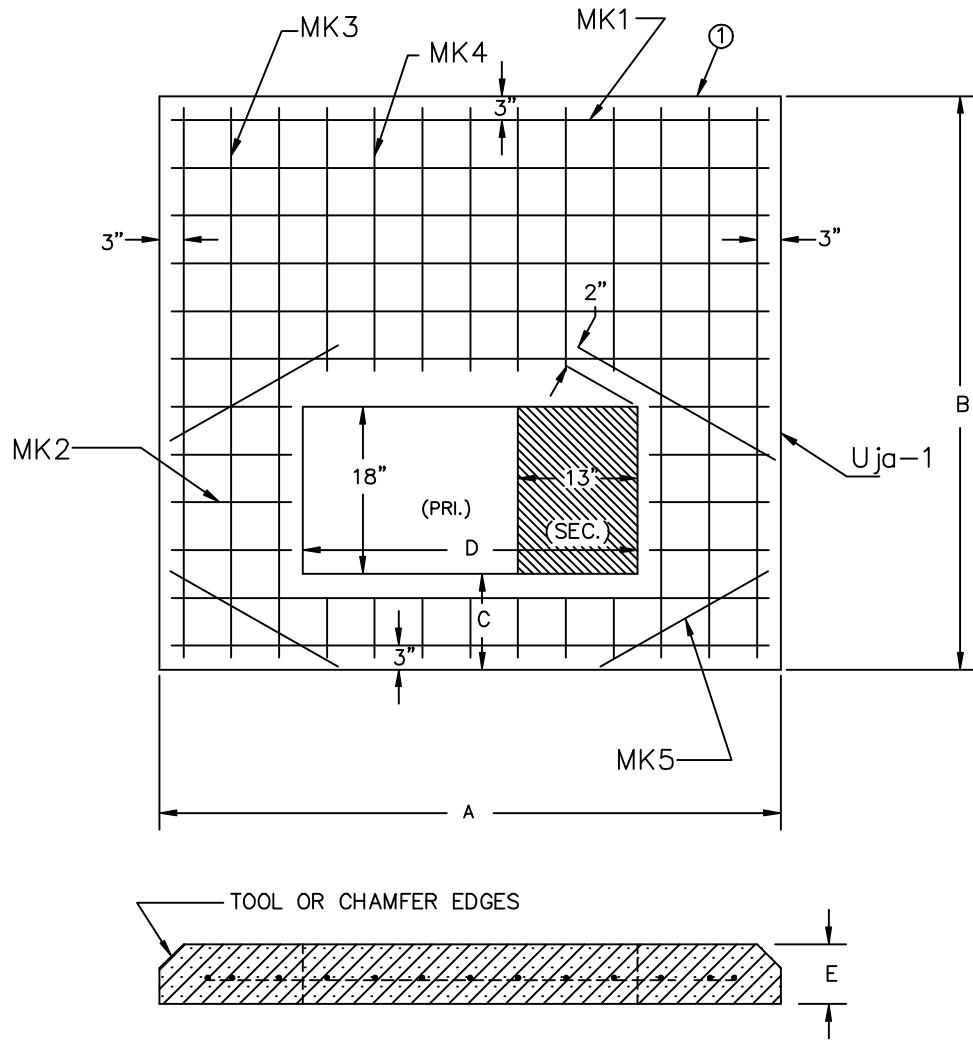
NOTES:

1. PAD ASSEMBLIES INCLUDE SITE PREPARATION, BEDDING AND DRAINAGE.
2. EQUIPMENT SHALL BE SECURED TO PAD IN ACCORDANCE WITH MANUFACTURERS INSTRUCTIONS.
3. CABLE OPENING AND PAD DIMENSIONS SHALL BE AS REQUIRED.

UNIT DESIGNATION:

UM1-5C	CONCRETE
UM1-5NC	NON-CONCRETE

	PAD ASSEMBLIES		
	2000	UM1-5C UM1-5NC	

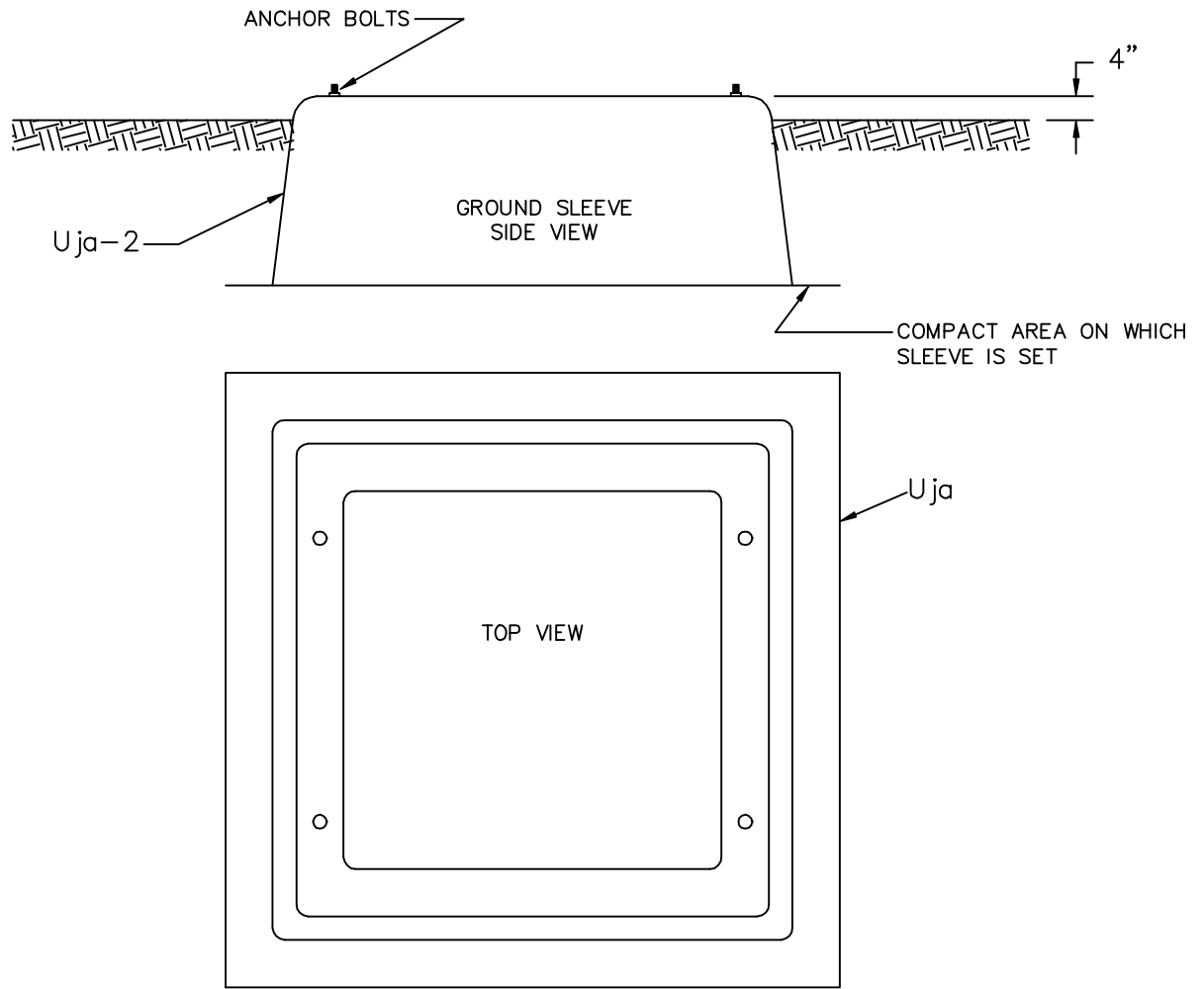


PAD	3-PHASE TRANSF. kVA	DIMENSIONS IN INCHES					REINFORCING BARS				
		A	B	C	D	E	MK1	MK2	MK3	MK4	MK5
#1	75, 112 1/2, 150, 225, 300, 500	76	62	10	42	6	7 #4 70"	4 #4 10"	6 #4 57"	6 #4 28"	4 #4 26"
#2	750, 1000 1500, 2500	104	100	10	54	8	12 #4 98"	6 #4 19"	6 #4 94"	7 #4 66"	4 #4 29"

NOTES:

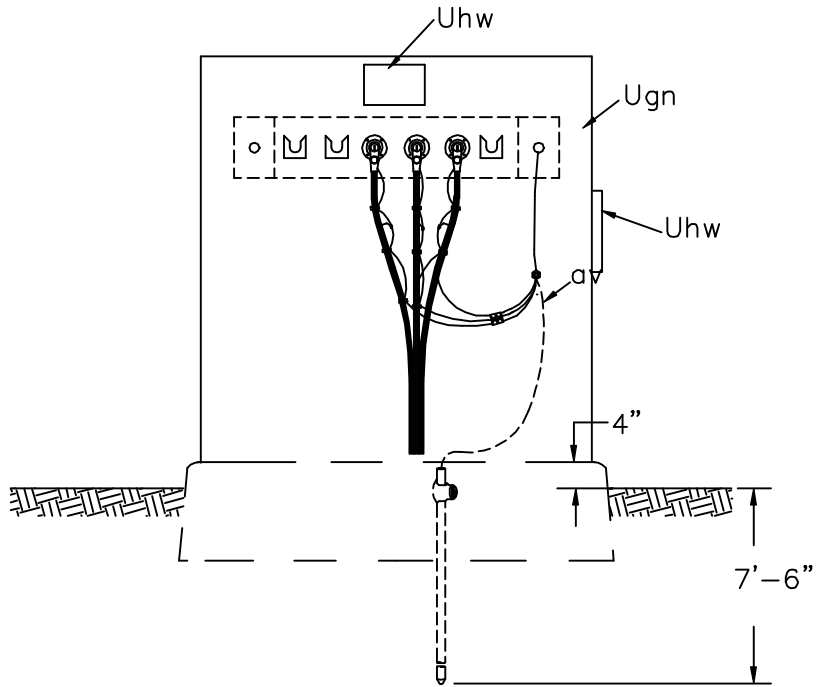
1. CONCRETE TESTING, 3000 POUNDS MIN. PER SQUARE INCH; 4% TO 6% ENTRAINED AIR, 3/4" MAXIMUM SIZE AGGREGATE.
2. REINFORCING STEEL, ATSM-A615 GRADE 60, PLACE APPROX. 6" O.C. EACH WAY AND SECURELY TIED TOGETHER.
3. MINIMUM CONCRETE COVER OVER REINFORCING STEEL 2 INCHES UNLESS NOTED.
4. WOOD FLOAT FINISH, LEAVING NO DEPRESSIONS.

		THREE PHASE TRANSFORMER CONCRETE PADS	
		2000	UM1-6C



UNIT DESIGNATIONS:
 UM1-7C CONCRETE
 UM1-7NC NON-CONCRETE

		GROUND SLEEVE ASSEMBLY	
	2000	UM1-7C UM1-7NC	



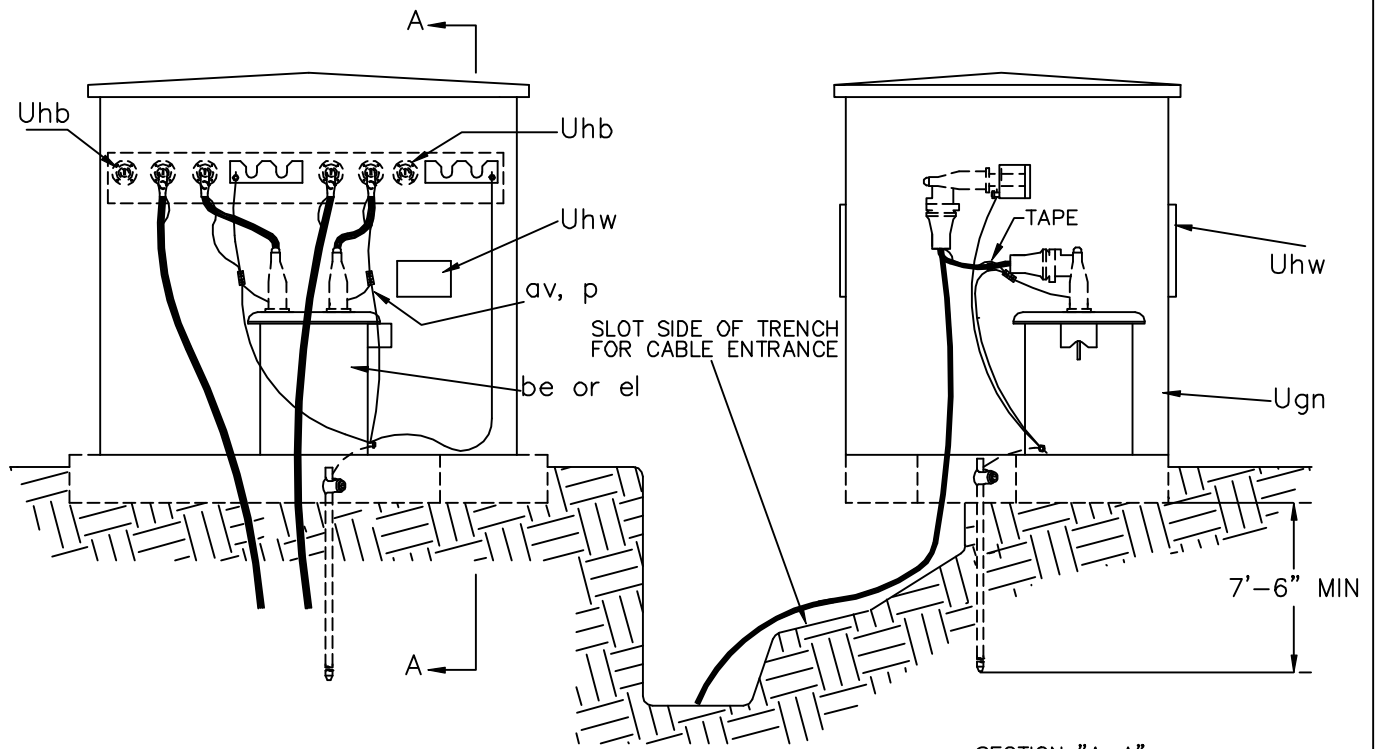
NOTE:

1. THE FOLLOWING UNITS/ASSEMBLIES ARE NOT PART OF THIS UNIT. SPECIFY SEPARATELY:
 - A. MULTIPPOINT TERMINATION AND OTHER ACCESSORIES
 - B. FUSED OR NON-FUSED LOADBREAK ELBOWS
 - C. GROUNDING ASSEMBLY UM48-1 OR OTHER
 - D. PAD OR SLEEVE (IF REQUIRED)

2. INSTALL "WARNING" SIGN ON OUTSIDE SURFACE OF ENCLOSURE AND "DANGER" SIGN INSIDE ENCLOSURE.

3. PROVIDE SUFFICIENT PRIMARY NEUTRAL PIGTAIL AND CABLE SLACK TO PERMIT READY DISCONNECTION OF ELBOW AND MOUNTING ON PARKING STAND.

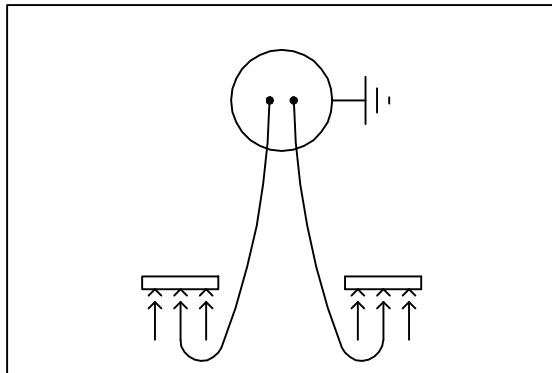
ITEM	QTY.	MATERIAL		
p		Connectors, as required		
av		Jumpers, as required		
Ugn	1	Enclosure	SINGLE PHASE SECTIONALIZING ENCLOSURE	
Uhw	2	Signs, "DANGER" and "WARNING"		
Ugc		Cable riser shield, length as required		
			2000	UM3-14



DESIGNATE AS:

RECLOSER ASSEMBLY UM3-44

SECTIONALIZER ASSEMBLY UM3-45



WIRING DIAGRAM

NOTES:

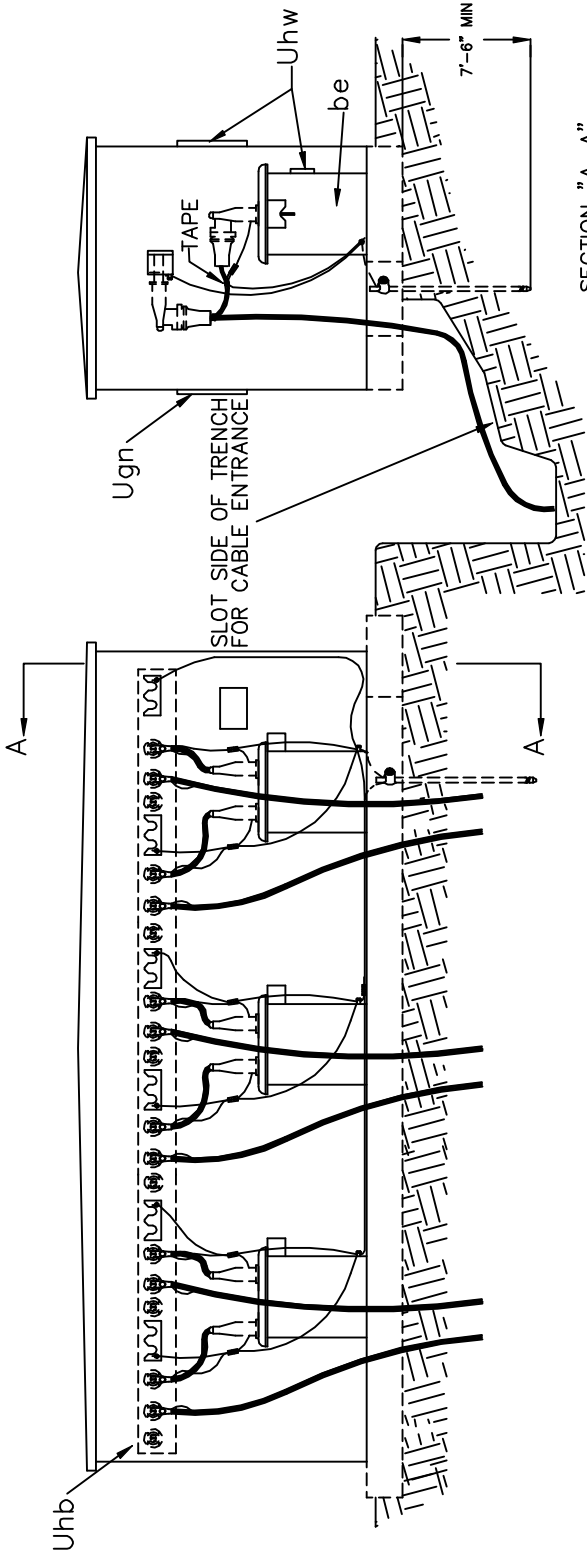
1. THE FOLLOWING UNITS/ASSEMBLIES ARE NOT PART OF THIS UNIT. SPECIFY SEPARATELY:
 - A. MULTIPoint TERMINATIONS AND OTHER ACCESSORIES
 - B. LOADBREAK ELBOWS
 - C. GROUNDING ASSEMBLY UM48-1 OR OTHER
 - D. PAD ASSEMBLY
2. PROVIDE SUFFICIENT SLACK IN ALL CABLES TO PERMIT READY DISCONNECTION OF ELBOW AND MOUNTING ON PARKING STAND.
3. ANCHOR RECLOSER AND ENCLOSURE TO PAD.
4. INSTALL "WARNING" SIGN OUTSIDE SURFACE OF ENCLOSURE AND "DANGER" SIGN INSIDE ENCLOSURE.

ITEM	QTY.	MATERIAL
p		Connectors, as required
av		Jumpers, as required
be	1	Recloser, oil circuit with bushing wells (UM3-44).
el	1	Sectionalizer, with bushing wells (UM3-45).
Ugn	1	Enclosure
Uhb	2	Insulated covers
Uhw	2	Signs, "DANGER" and "WARNING"

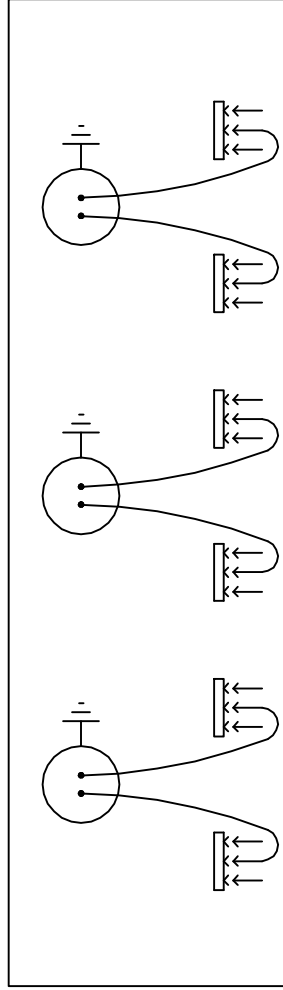
SINGLE PHASE PAD MOUNTED
SECTIONALIZER OR RECLOSER

2000

UM3-44
UM3-45



SECTION "A-A"



WIRING DIAGRAM

NOTES:

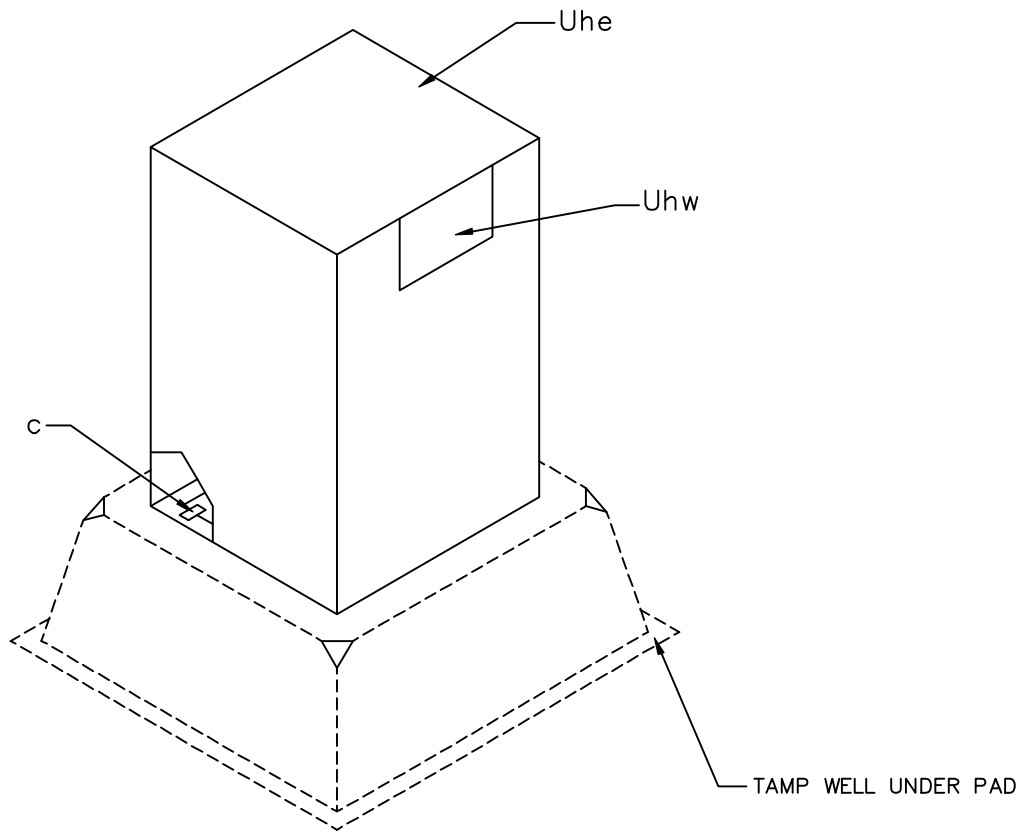
1. THE FOLLOWING UNITS/ASSEMBLIES ARE NOT PART OF THIS UNIT. SPECIFY SEPARATELY:
 - A. MULTIPoint TERMINATIONS AND OTHER ACCESSORIES
 - B. LOADBREAK ELBOWS
 - C. GROUNDING ASSEMBLY UM48-1 OR OTHER
 - D. PAD ASSEMBLY
2. PROVIDE SUFFICIENT SLACK IN ALL CABLES TO PERMIT READY DISCONNECTION OF ELBOW AND MOUNTING ON PARKING STAND.
3. ANCHOR RECLOSER AND ENCLOSURE TO PAD.
4. INSTALL "WARNING" SIGN OUTSIDE SURFACE OF ENCLOSURE AND "DANGER" SIGN INSIDE ENCLOSURE.

ITEM	QTY.	MATERIAL
be	3	Recloser, oil circuit with bushing wells
Ugn	1	Enclosure
Uhb	6	Insulated covers
Uhw	2	Signs, "DANGER" and "WARNING"

THREE, SINGLE PHASE
PAD MOUNTED RECLOSERS

2000

UM3-46



SPECIFICATION NUMBERING CODES:
 UM3E-(1,2 or 3) - (FIG. NO.)

SEE DRAWING UM3E-1, 2, OR 3
 NUMBER OF PHASES

EXAMPLE:

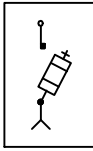
UM3E-3-9
 WIRING DIAGRAM
 THREE PHASE CONFIGURATION
 FUSE ENCLOSURE

NOTES:

1. PAD OR GROUND SLEEVE LOAD BREAK ELBOWS, STRESS CONES, FUSES OR SWITCH BLADES ARE NOT PART OF THIS ASSEMBLY. THEY SHOULD BE SPECIFIED SEPARATELY ON THE STAKING SHEETS.
2. TAMP WELL UNDER SLEEVE. LEAVE SLACK COIL OF CABLE IN GROUND SLEEVE.
3. PLACE 6" OF FILL AGAINST INSIDE EDGE OF GROUND SLEEVE.
4. ON DEAD FRONT FUSE ENCLOSURES USE GROUNDING ASSEMBLY TO BE SPECIFIED SEPARATELY.
5. TOP OF GROUND SLEEVE TO BE INSTALLED 3" ABOVE GROUND LEVEL.
6. INSTALL "DANGER" SIGN ON EQUIPMENT INSIDE ENCLOSURE. INSTALL "WARNING" SIGN ON OUTSIDE SURFACE OF ENCLOSURE.
7. GROUND SLEEVES ARE SPECIFIED.

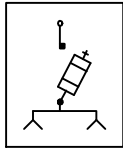
ITEM	QTY.	MATERIAL		
C		Bolt, machine, as necessary		
Uhe	1	Enclosure as specified	FUSE / SWITCH ENCLOSURE INSTALLATION	
Uhw	2	Signs, "DANGER" and "WARNING"		
			2000	UM3E-__ -__

FIG. 1A



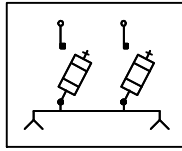
SINGLE PHASE
RADIAL FEED
1 - FUSE

FIG. 1B



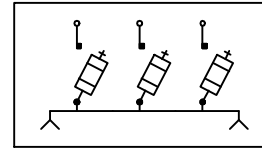
SINGLE PHASE
LOOP FEED
1 - FUSE

FIG. 1C



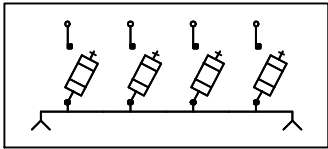
SINGLE PHASE
LOOP FEED
2 - FUSE

FIG. 1D



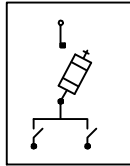
SINGLE PHASE
LOOP FEED
3 - FUSE

FIG. 1E



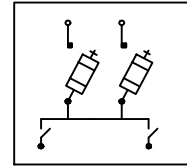
SINGLE PHASE
LOOP FEED
4 - FUSE

FIG. 1F



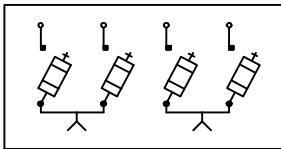
SINGLE PHASE
LOOP FEED
1 - FUSE

FIG. 1G



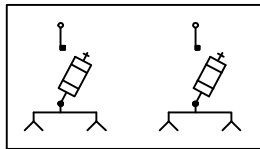
SINGLE PHASE
LOOP FEED
2 - FUSE

FIG. 2A



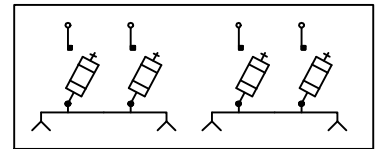
TWO PHASE
RADIAL FEED
2 - FUSE

FIG. 2B



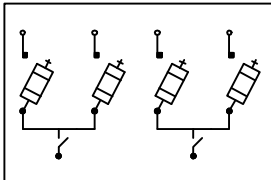
TWO PHASE
LOOP FEED
1 - FUSE

FIG. 2C



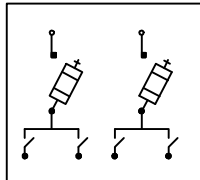
TWO PHASE
LOOP FEED
2 - FUSE

FIG. 2D



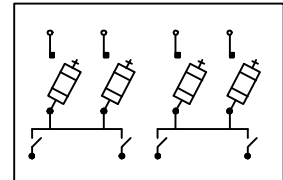
TWO PHASE
RADIAL FEED
2 - FUSE

FIG. 2E




TWO PHASE
RADIAL FEED
1 - FUSE

FIG. 2F



TWO PHASE
LOOP FEED
2 - FUSE

 — FUSE

• — TERMINATIONS CAN BE WITH ELBOWS, STRESS CONES OR TERMINATORS

^ — LOADBREAK ELBOW LINE SWITCHING

 — SINGLE POLE SOLID BLADE SWITCHING

SINGLE POLE SWITCHING
200 AMP FUSE ENCLOSURE
INSTALLATION WIRING DIAGRAMS
(SINGLE PHASE AND TWO PHASE)

2000

UM3E-1
UM3E-2

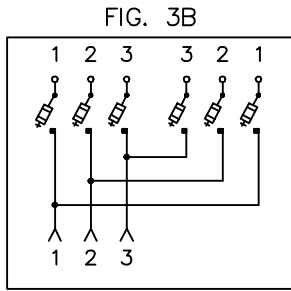


FIG. 3B
ELBOW SWITCH
2 - FUSE

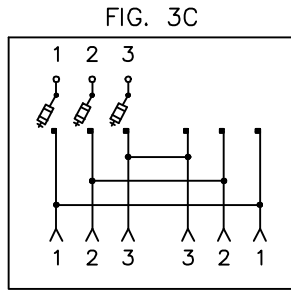


FIG. 3C
ELBOW SWITCH
1 - FUSE

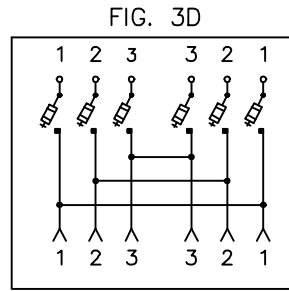


FIG. 3D
ELBOW SWITCH
2 - FUSE

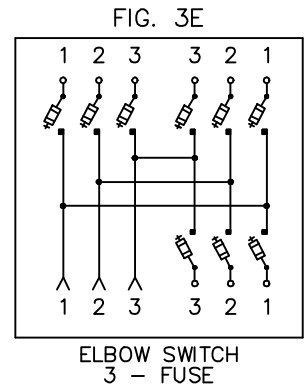


FIG. 3E
ELBOW SWITCH
3 - FUSE

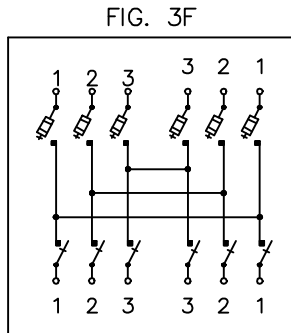


FIG. 3F
SINGLE POLE SWITCH
2 - FUSE

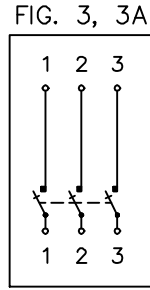


FIG. 3, 3A
THREE PHASE
SWITCH

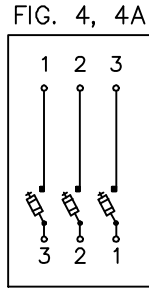


FIG. 4, 4A
THREE PHASE
SWITCH OR
FUSE

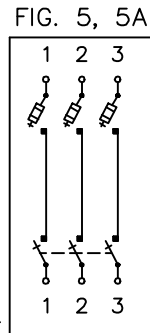


FIG. 5, 5A
THREE PHASE
SWITCH
1 - FUSE

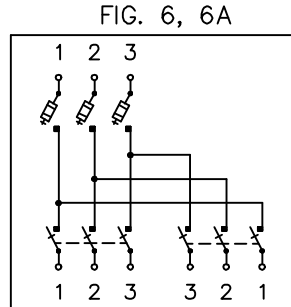


FIG. 6, 6A
THREE PHASE
SWITCHES
1 - FUSE

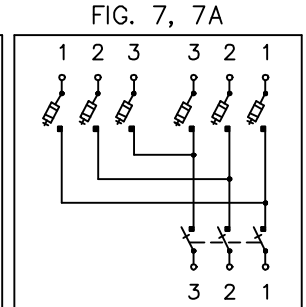


FIG. 7, 7A
THREE PHASE
SWITCH
2 - FUSE

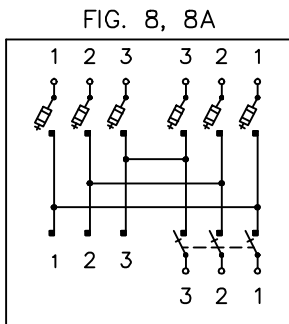


FIG. 8, 8A
THREE PHASE SWITCH
2 - FUSE
1 - TERMINAL

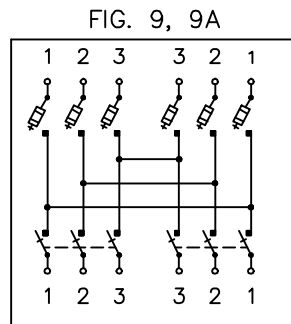


FIG. 9, 9A
THREE PHASE SWITCHES
2 - FUSES

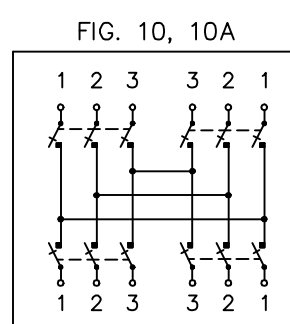


FIG. 10, 10A
THREE PHASE SWITCHES

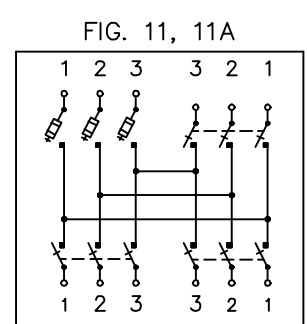


FIG. 11, 11A
THREE PHASE SWITCHES
1 - FUSE

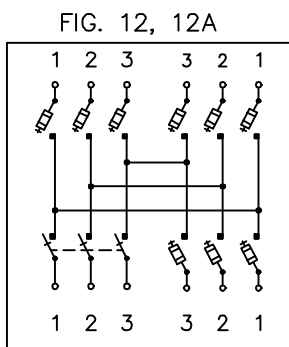


FIG. 12, 12A
THREE SWITCH
3 - FUSES

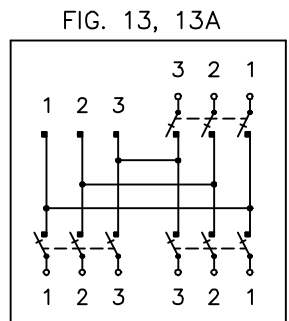


FIG. 13, 13A
THREE PHASE SWITCHES
1 - TERMINAL

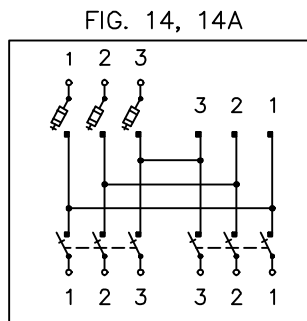


FIG. 14, 14A
THREE PHASE SWITCHES
1 - FUSE
1 - TERMINAL

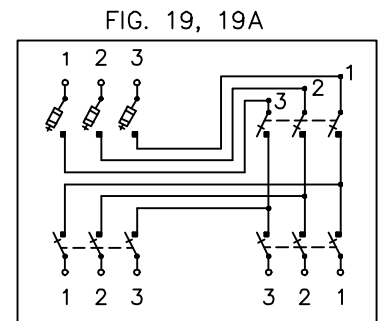


FIG. 19, 19A
THREE PHASE SWITCHES
THREE PHASE SWITCHED / FUSE TAP

EXAMPLE:

FIG. 3 = 600 AMP MAIN
LINE SWITCH

FIG. 3A = 200 AMP MAIN
LINE SWITCH

□ - FUSE

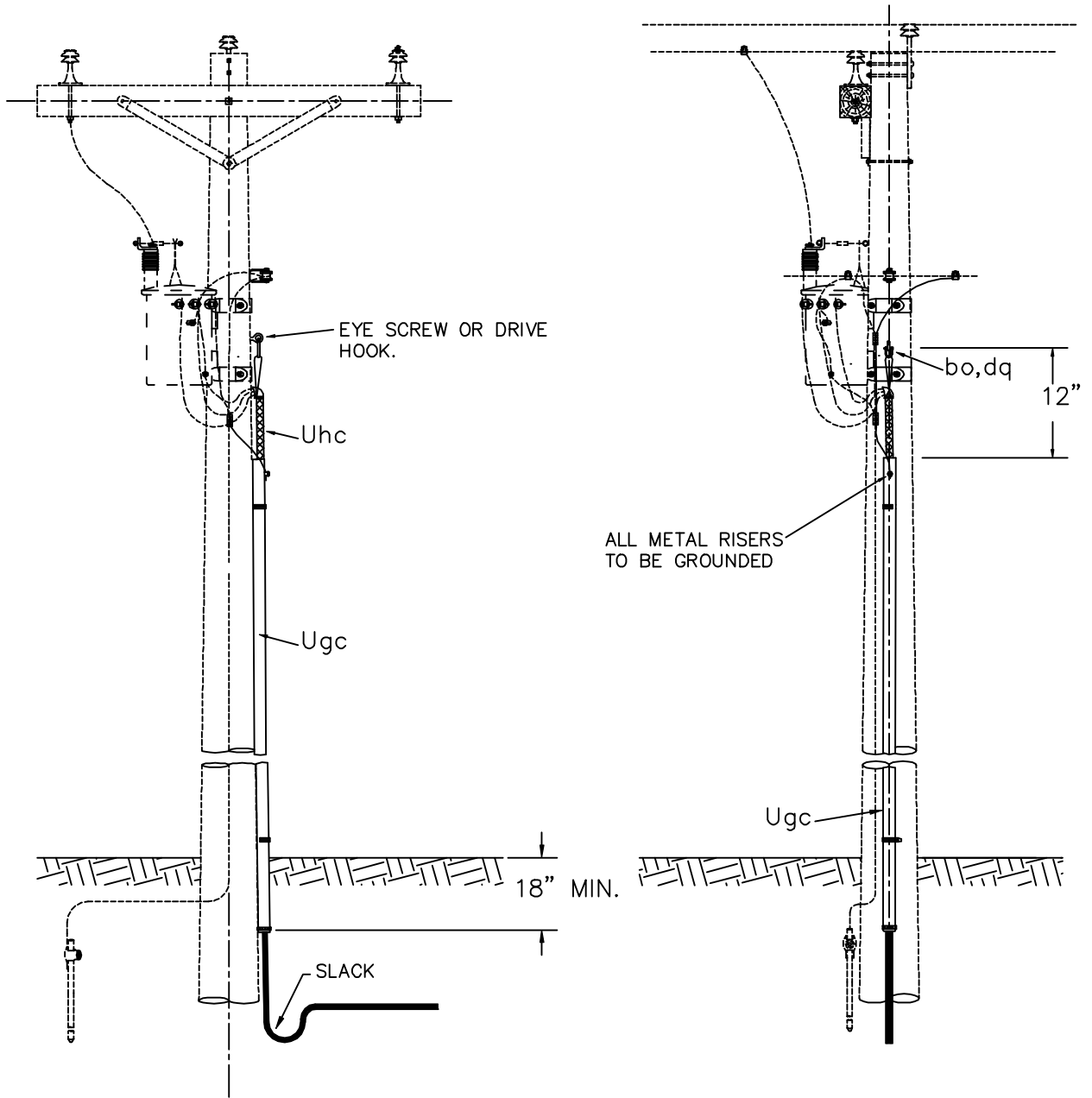
• - TERMINATIONS CAN BE
WITH ELBOWS, STRESS
CONES OR TERMINATORS

∧ - LOADBREAK ELBOW LINE
SWITCHING

FUSE ENCLOSURE (200 - 600 AMP)
WIRING DIAGRAMS
(THREE PHASE)

2000

UM3E-3



NOTES:

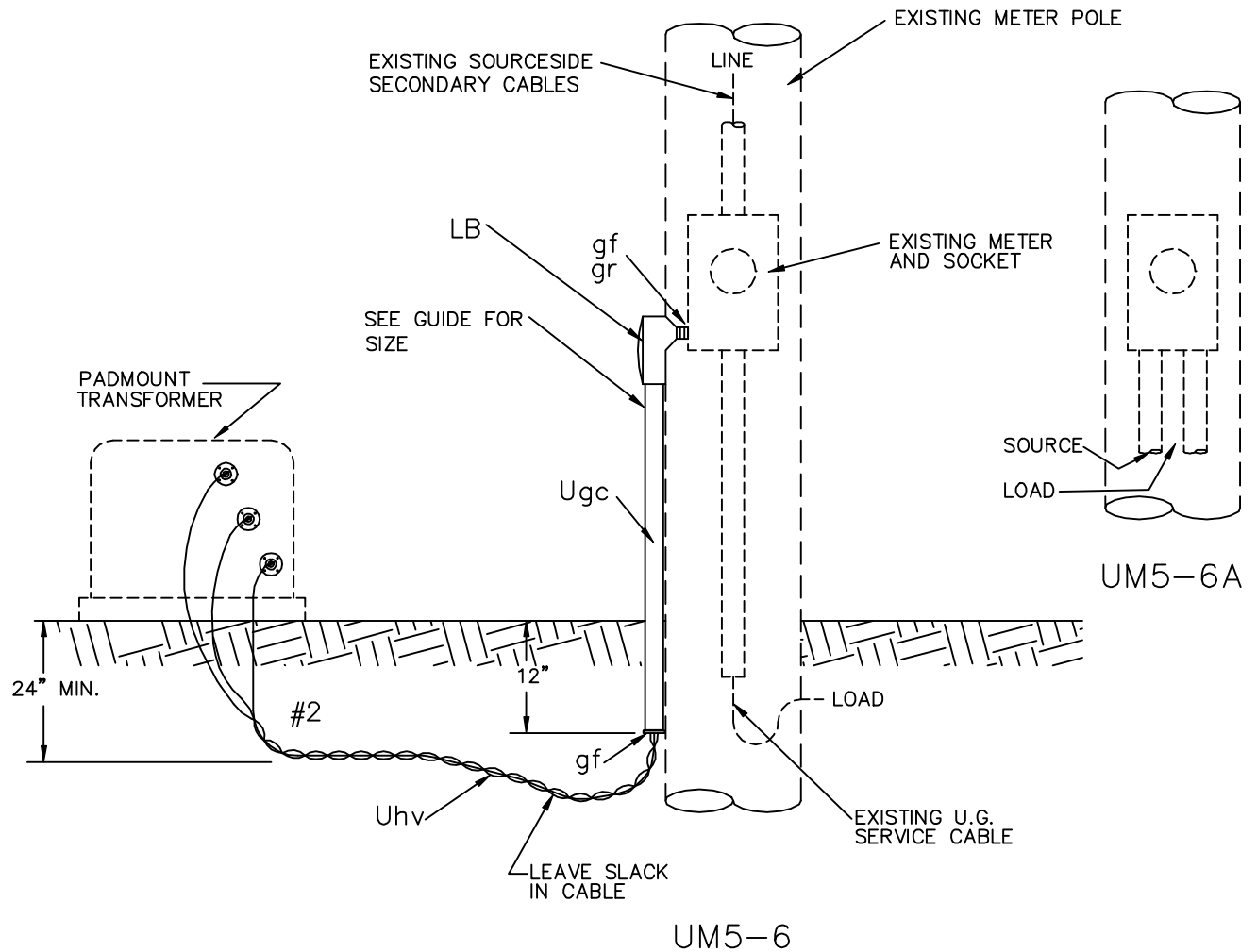
1. ALLOW MINIMUM CABLE SLACK OF 24" AT BOTTOM OF RISER.

ITEM	QTY.	MATERIAL
bo		Anchor, shackle. Do not use if drive hook is used.
dq	1	Eye screw, elliptical or drive hook.
Ugc	1	Cable riser shield. Length as required.
Uhc	1	Cable support.

SECONDARY CABLE TERMINAL POLE

2000

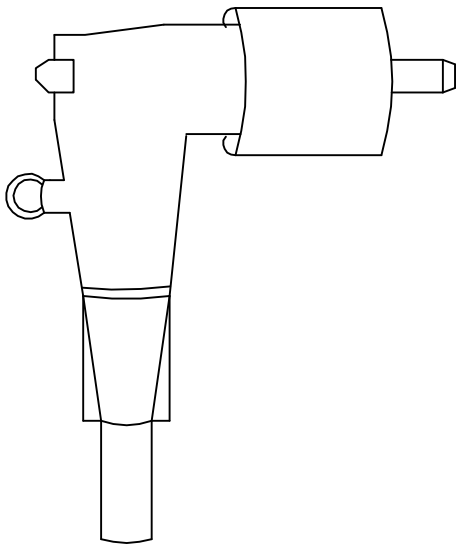
UM5



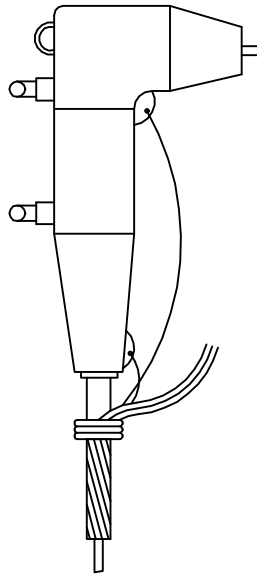
NOTES:

1. DISCONNECT SOURCESIDE CONDUCTORS IN METER SOCKET.
2. CONNECT NEW CABLE TO SOURCESIDE OF METER SOCKET.
3. SECONDARY CABLE, UNIT Uhv, SPECIFIED ON SEPARATE UNIT.
4. IF UNIT UM5-6A IS SPECIFIED, EXISTING METER SOCKET AND TYPE "LB" CONDUIT FITTING ARE REPLACED BY A METER SOCKET WITH TWO CONDUIT KNOCKOUTS ON BOTTOM SIDE.

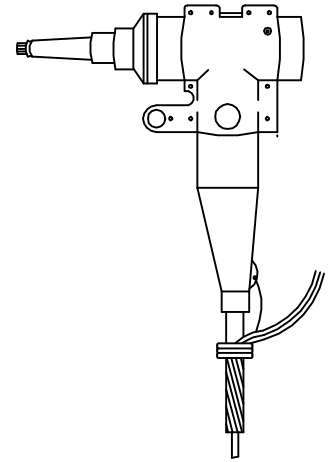
ITEM	QTY.	MATERIAL		
gf	2	Bushings, insulated		
gr	2	Locknut		
	1	Type "LB" conduit fitting		
	1	conduit short nipple, with bushing		
Ugc		Conduit, as required		
Uhv		Cable, underground, 600 V, as required		
			SECONDARY CABLE TERMINAL TO METER BASE	
			2000	UM5-6 UM5-6A



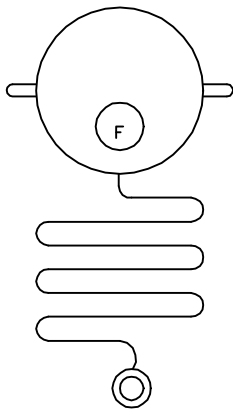
UM6-1 Uhp
LOAD BREAK ELBOW
(200 A)



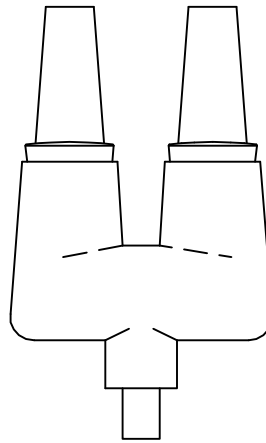
UM6-2 Uhp
FUSED ELBOW TERMINATION
(200 A)



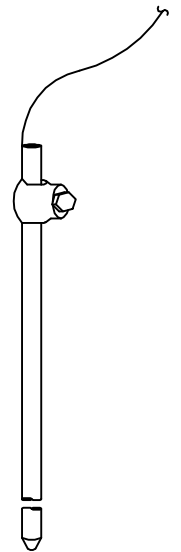
UM6-3 Uhb
DEAD BREAK TERMINATION
(600 A)



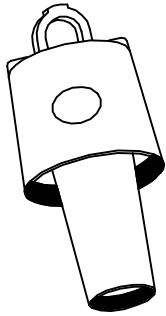
UM6-4 Ugo
FAULT INDICATOR



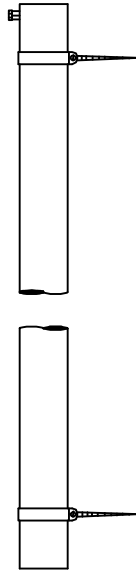
UM6-5 Uhb
FEED THROUGH LOAD BREAK INSERT



UM6-6 ai, aj, cj
GROUND ROD ASSEMBLY



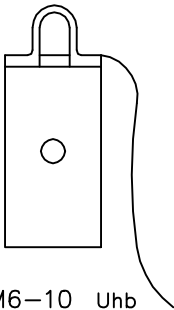
UM6-7 Uhb
BUSHING WELL PLUG
(200 A)



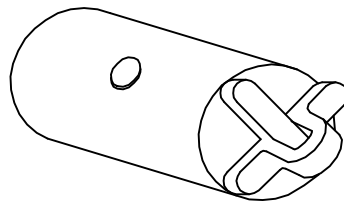
UM6-8 Ugc
RISER SHIELD (U GUARD)



UM6-9 Ugc
CONDUIT CABLE RISER



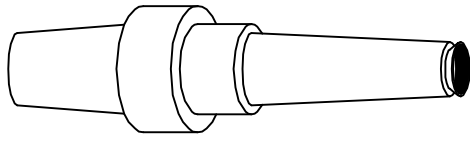
UM6-10 Uhb
INSULATED PROTECTIVE CAP
(200 A)



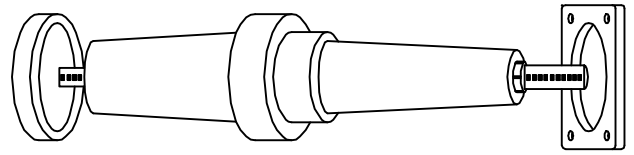
UM6-11 Uhb
INSULATED PROTECTIVE CAP
(600 A)



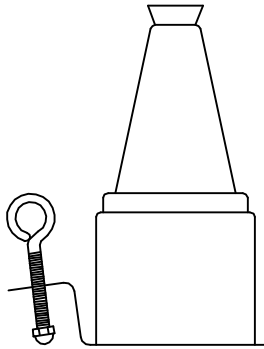
UM6-12 Uhx
CABLE MARKER ASSEMBLY



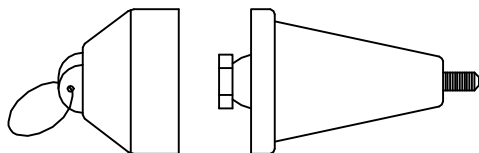
UM6-13 Uhb
LOAD BREAK INSERT
(200 A)



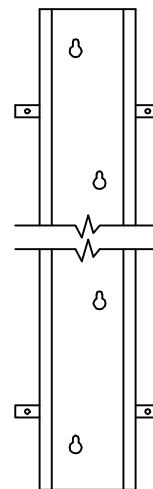
UM6-14 Uhb
DEADBREAK INSERT
(600 A)



UM6-15 Uhq
STAND-OFF INSULATOR
(200 A)

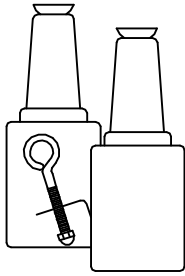


UM6-17 Uhb
INSULATING PLUG
600 AMP CONNECTOR

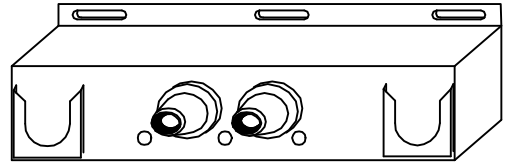


UM6-18
BACKING PLATE FOR
U-GUARD RISER SHIELD

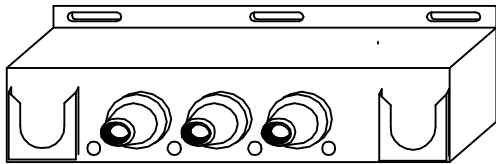
MISCELLANEOUS ACCESSORIES



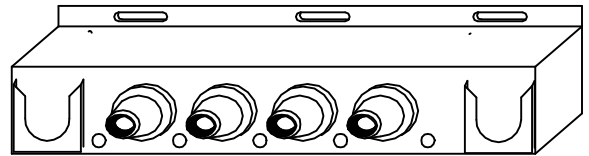
UM6-19 Uhq
STAND-OFF INSULATOR
FEED THROUGH
(200 A)



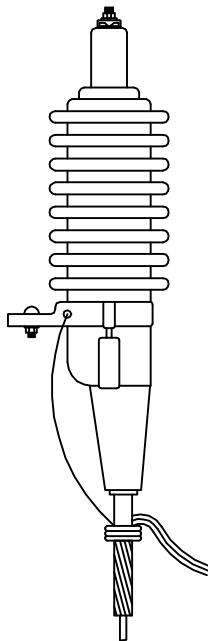
UM6-20 Uhq
TWO POINT JUNCTION
(200 A)



UM6-21 Uhq
THREE POINT JUNCTION
(200 A)



UM6-22 Uhq
FOUR POINT JUNCTION
(200 A)



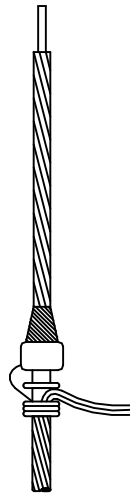
UM6-24 Ugk
OUTDOOR TERMINATION

MISCELLANEOUS ACCESSORIES

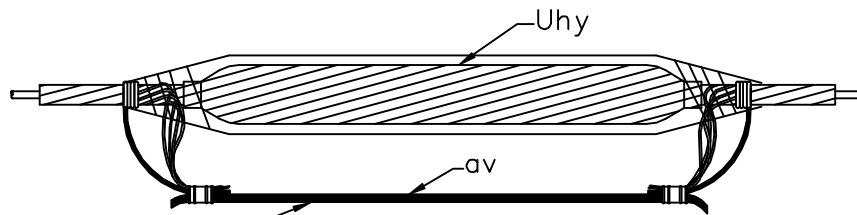
2000

Page 4 of 8

UM6-__



UM6-26 U_{gk}
INDOOR STRESS RELIEF CONE



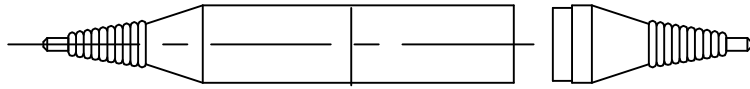
CONCENTRIC NEUTRAL
OR
EQUIVALENT EXTENSION

UM6-28 U_{hy}
IN LINE PRIMARY SPLICE
(FOR JACKETED CABLE)

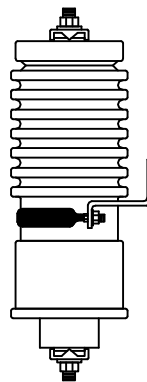
NOTES:

1. Jacketed cable restoration and termination sealing kits (items U_{hf}) are available for resealing concentric neutral wires after installation of splices, elbows, and outdoor terminations; also for connecting a grounding lead wire to the concentric neutral wires and resealing the jacket.

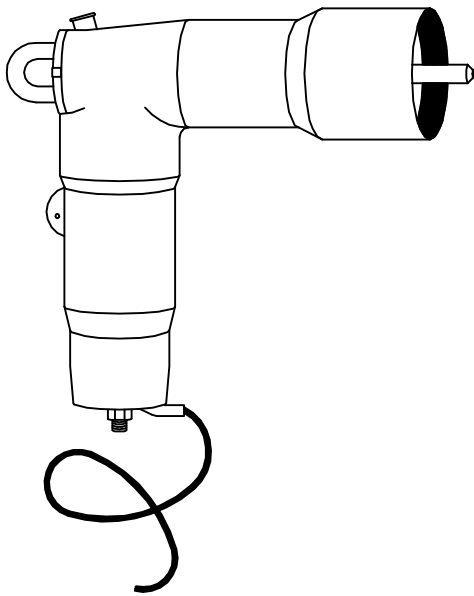
MISCELLANEOUS ACCESSORIES		
2000	Page 5 of 8	UM6-__



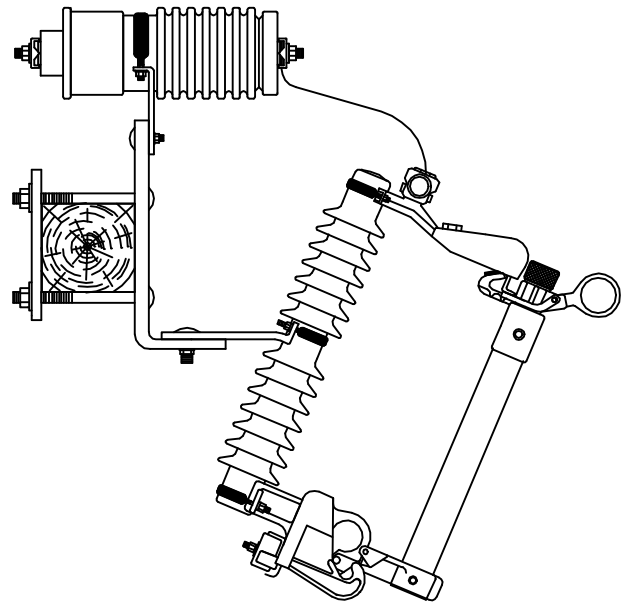
UM6-32 U_{gq}
BOOT OR SLEEVE - INSULATED
(600 VOLT)



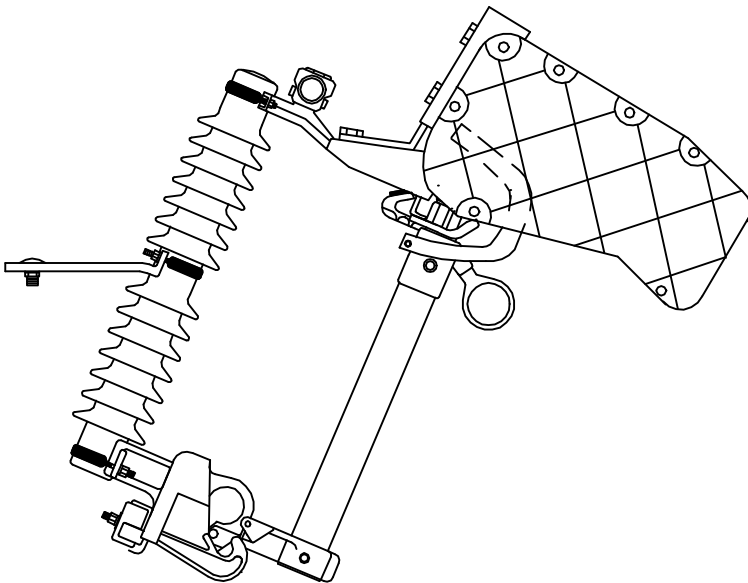
UM6-33 U_{ae}
SURGE ARRESTER



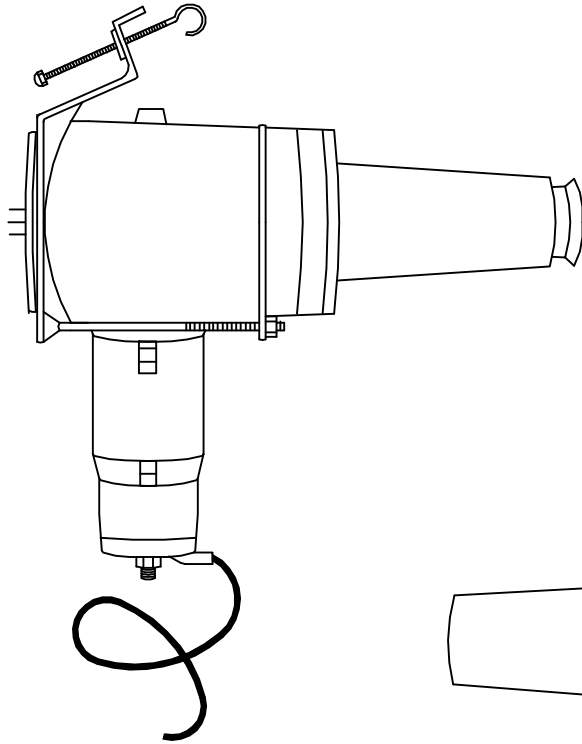
UM6-34 U_{ae}
DEAD BREAK ELBOW
SURGE ARRESTER



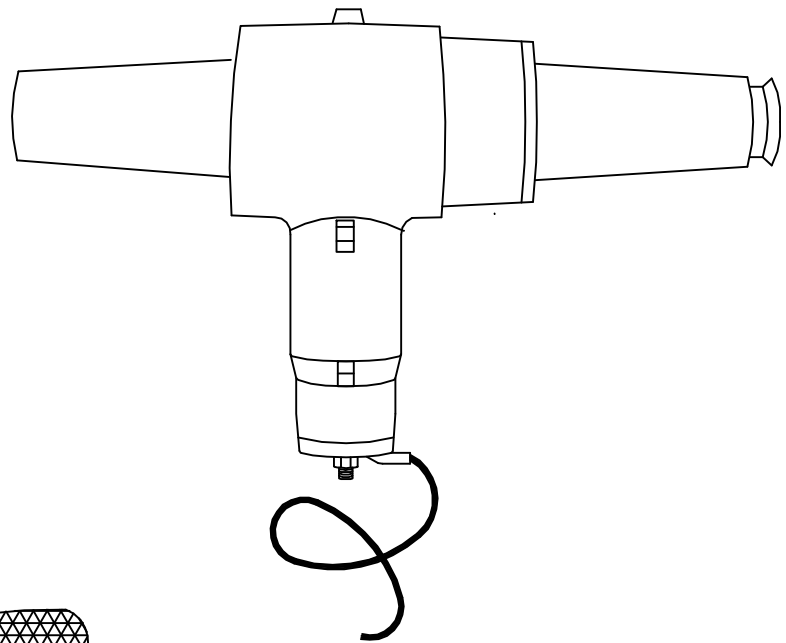
UM6-35 U_{ax}
CUTOUT-ARRESTER COMBINATION



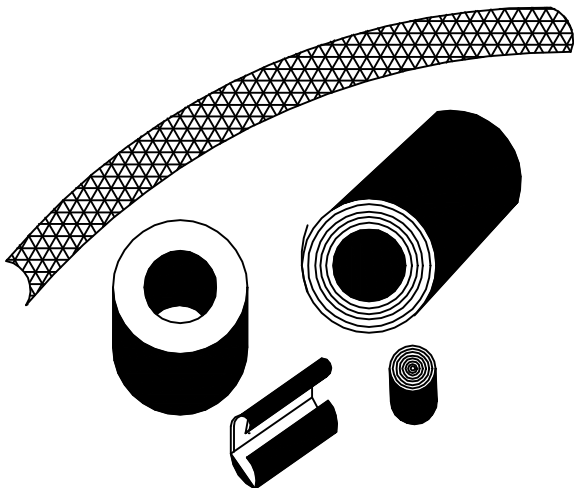
UM6-36 of
LOAD BREAK CUTOUT



UM6-37 Uae
PARKING STAND ARRESTER

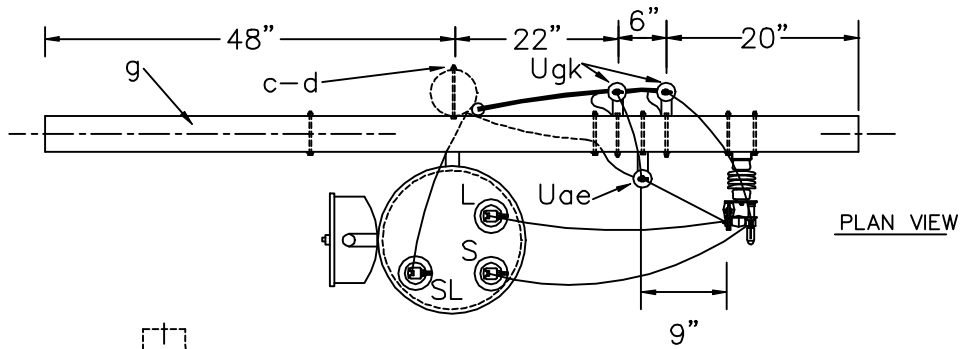


UM6-38 Uae
BUSHING ARRESTERS

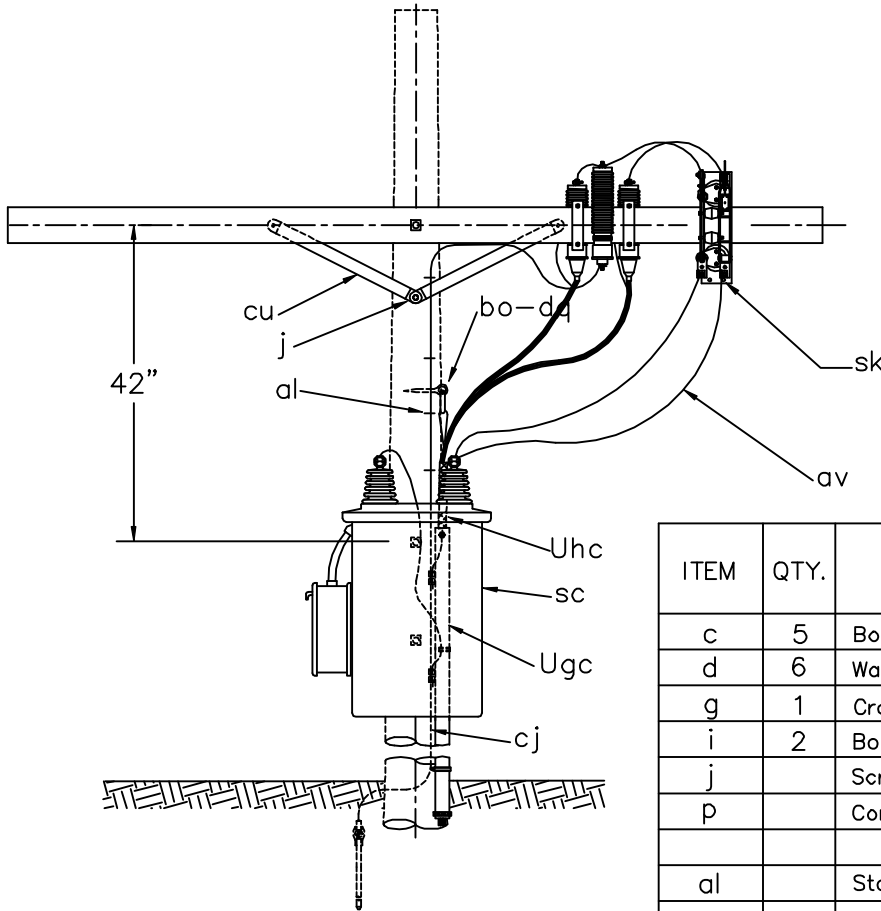


UM6-39 Uhf
JACKETED CABLE GROUNDING KITS

			MISCELLANEOUS ACCESSORIES
2000	Page 8 of 8	UM6-__	

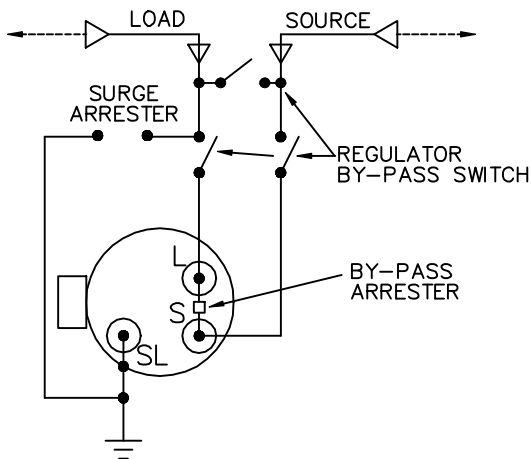


PLAN VIEW



NOTES:

1. Three of these assemblies may be used for three phase installation.
2. Total arrester lead length must be under 3 feet if possible.
3. All clearances must meet NESC requirements.



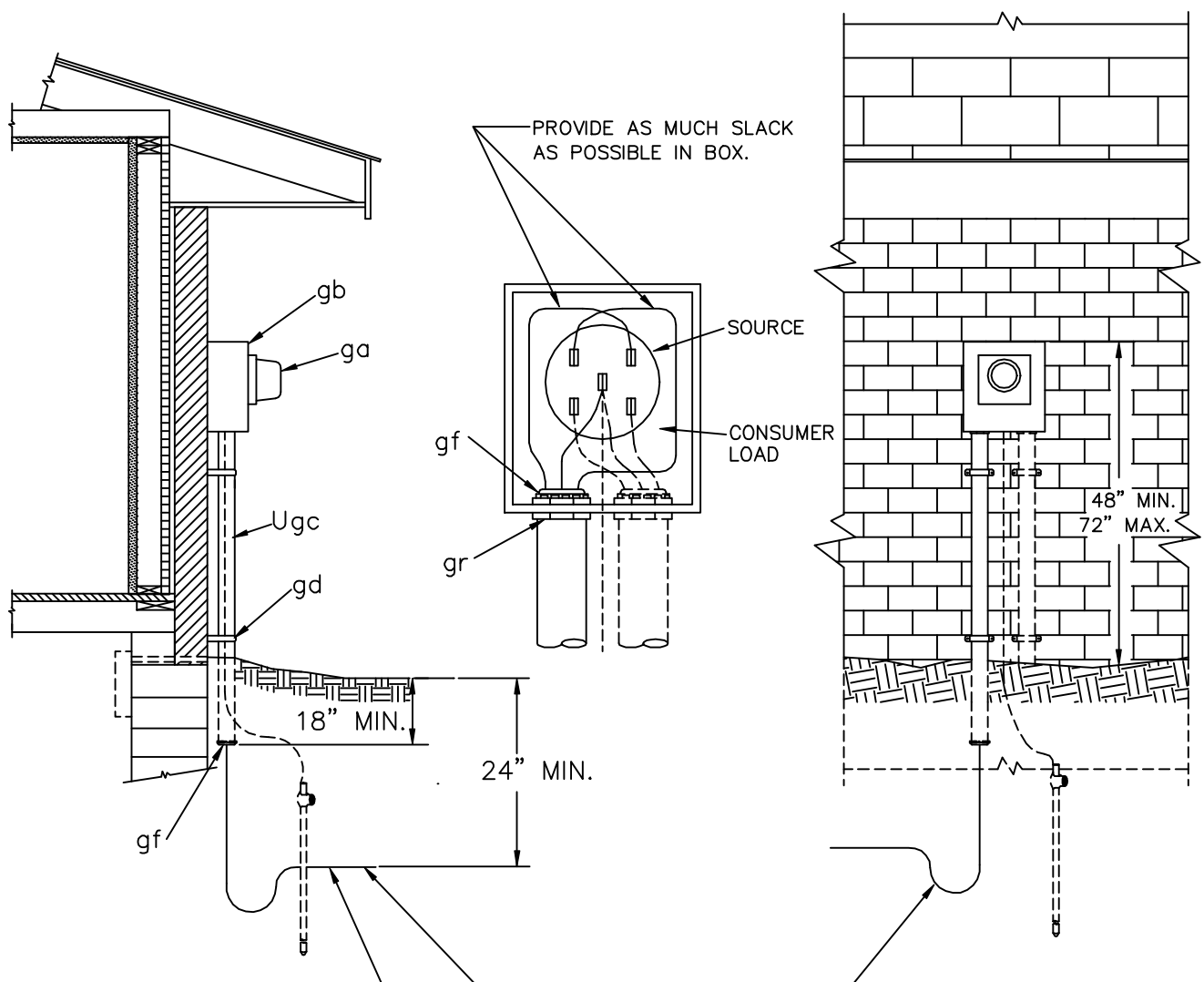
WIRING DIAGRAM

ITEM	QTY.	MATERIAL
c	5	Bolt, machine, 5/8" x required length.
d	6	Washer, square 2 1/4".
g	1	Crossarm, 3 5/8" x 4 5/8" x 8'-0".
i	2	Bolt, carriage, 3/8" x 4 1/2"
j		Screw, lag 1/2" x 4" as required.
p		Connectors, as required.
al		Staples, as required.
av		Jumpers, as required.
bo	1	Anchor, shackle. Omit if drive hook is used.
cj		Ground wire, as required.
cu	2	Brace, wood, 28"
dq	1	Eye screw, elliptical or drive hook.
ek		Locknuts
fn	1	Bracket, cutout, extension.
sc	1	Regulator, step type.
sk	1	Regulator, by-pass switch.
Uae	1*	Surge arrester
Ugc	1	Cable riser shield. Length as required.
Ugk	2	Cable termination.
Uhc	2	Cable support.
Uhd	2	Crossarm mounting bracket.

SINGLE PHASE REGULATOR ASSEMBLY WITH BY-PASS SWITCHING FUNCTION UNDERGROUND TO UNDERGROUND

2000

UM7-1

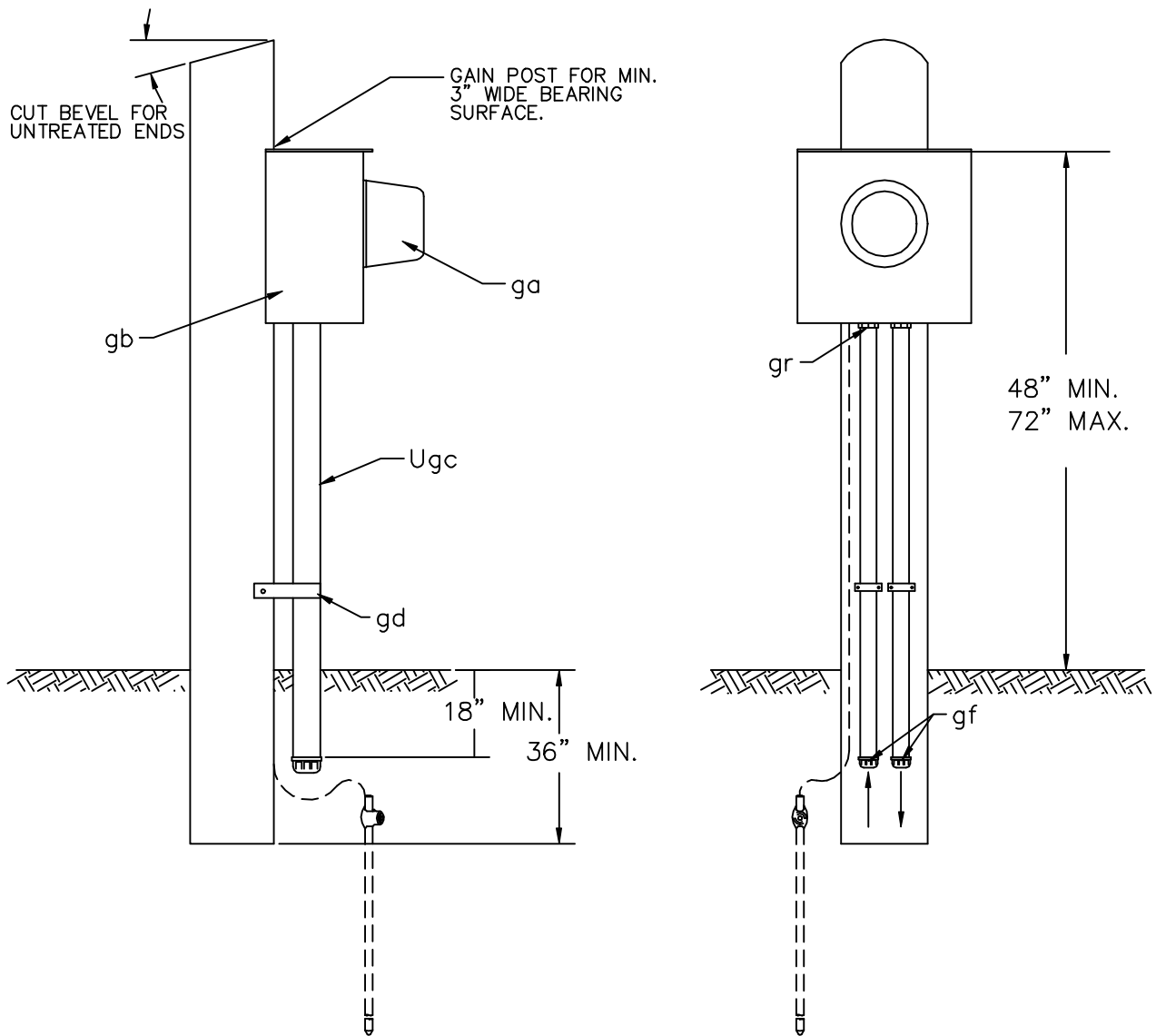


HAND TAMP, PREFERABLY WITH PNEUMATIC TOOL. BACKFILL WITH CLEAN MATERIAL.

SLACK SHALL BE PROVIDED TO PREVENT DAMAGING STRAIN ON THE CABLE AFTER BACKFILLING.

ITEM	QTY.	MATERIAL
ga	1	Meter, as required
gb	1	Meter socket
gd	2	Pipe strap
gf	2	Insulated bushing, size as required
gr	2	Conduit locknuts, size as required
Ugc	1	Conduit, diameter and length as required

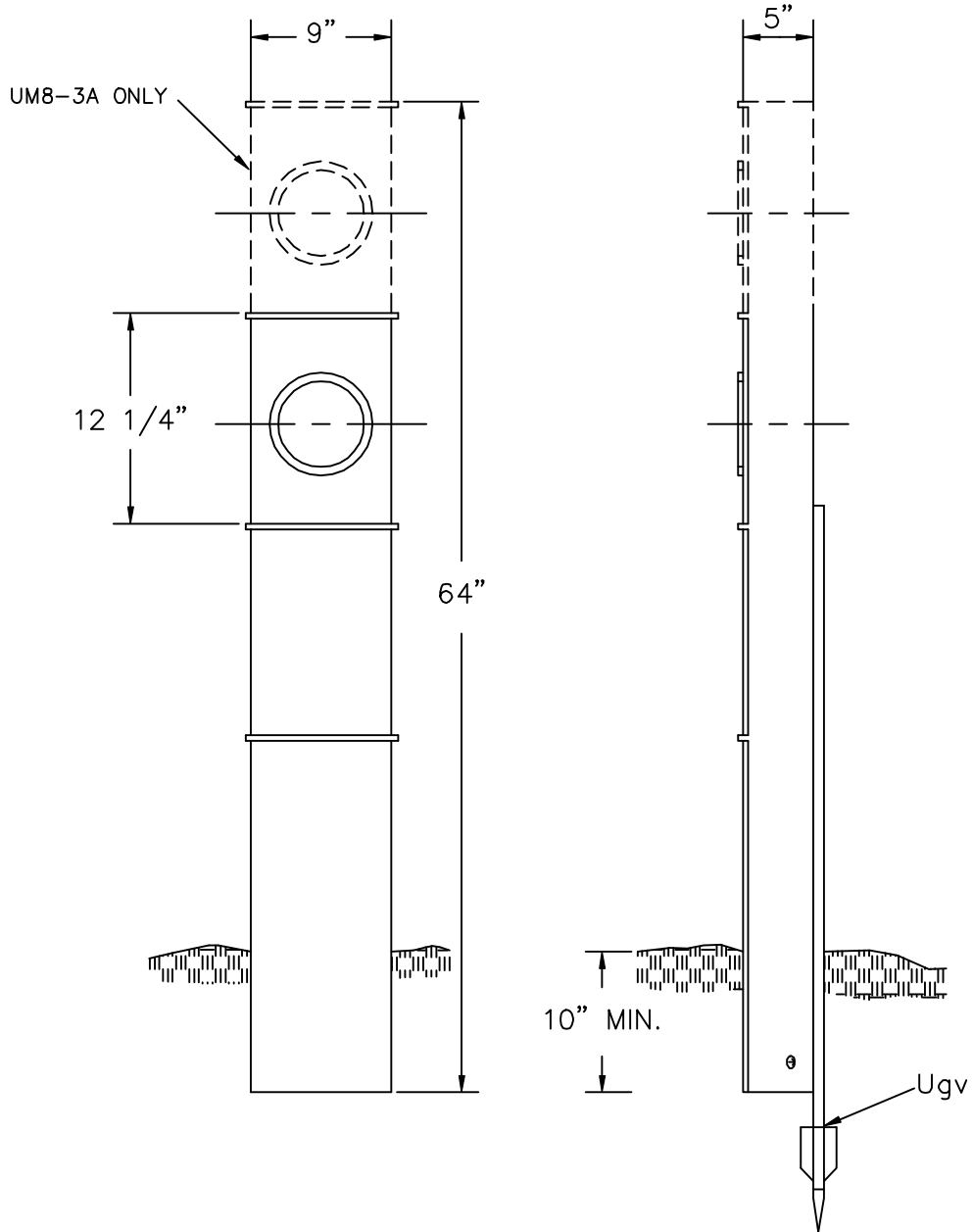
METER INSTALLATION UNDERGROUND SOURCE		
	2000	UM8



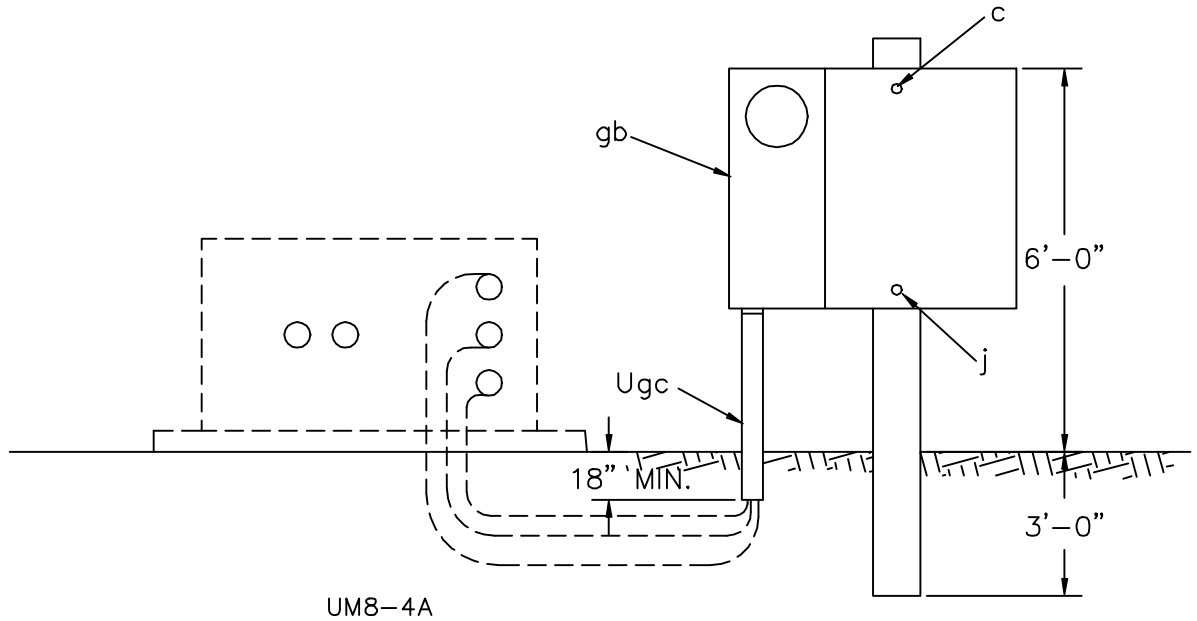
NOTE: MINIMUM POST SIZE SHALL BE FOUR INCHES SQUARE OR IN DIAMETER.

ITEM	QTY.	MATERIAL
	1	Wood post, approx. 9 ft. long, treated
ga	1	Meter, as required
gb	1	Meter socket
gd	1	Pipe strap
gf	2	Insulated bushings, size as required
gr	2	Conduit locknuts, size as required
Ugc	2	Conduit, diameter and length as required

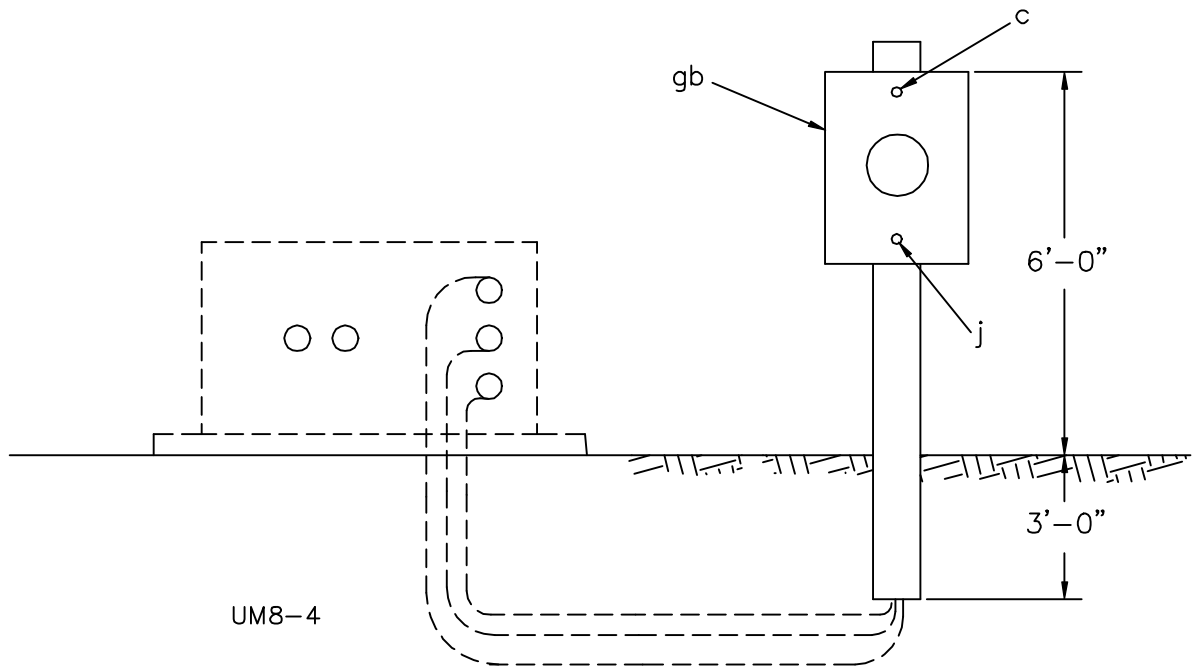
METER PEDESTAL WOOD POST		
	2000	UM8-2



ITEM	QTY.	MATERIAL		
	1	Meter, pedestal, 200 A Main, 200 Amp. per position (UM8-3)		
	1	Meter, pedestal, 400 A Main, 200 Amp. per position (UM8-3A)		
			TROUGH TYPE METER PEDESTAL	
Ugv	1	Stake, support	2000	UM8-3 UM8-3A



UM8-4A



UM8-4

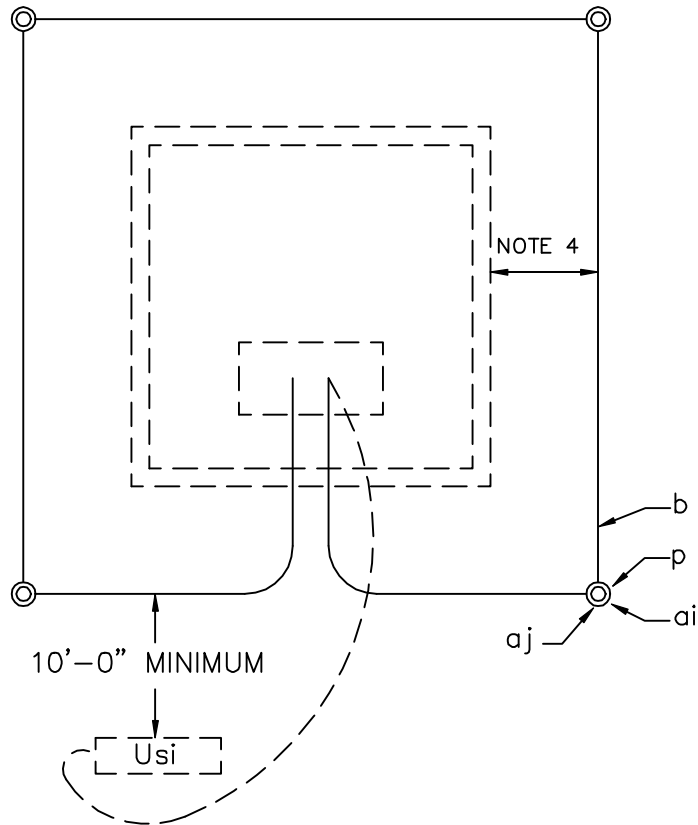
ITEM	QTY.	MATERIAL
		Stub pole, 9'-0"
		Switch, as required
c	1	Machine bolt, 1/2" x 10"
d	1	Washer, square, 2" x 2"
j	1	Lag screw, 1/2" x 4"
ek	1	Locknut, 1/2"
gb		Meter base, as required
Ugc		Conduit, as required

METER & SWITCH INSTALLATION
UNDERGROUND SOURCE

2000

UM8-4
UM8-4A

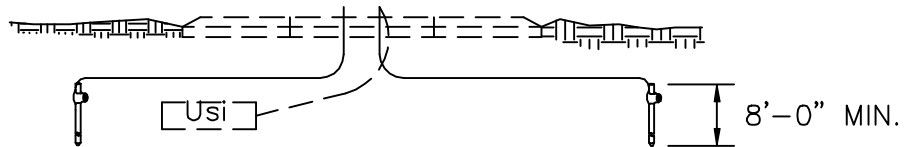
TOP VIEW



NOTE:

CONNECT ANODE, LEAD INSIDE PAD MOUNTED ENCLOSURES FOR TESTING PURPOSES.

FRONT VIEW



NOTES:

1. PLACE ONE GROUND ROD AT EACH CORNER.
2. GROUNDING GRID 1/0 BARE COPPER BURIED 6" BELOW GROUND, RUN WIRE INTO BASEMENT AND ALLOW 5'-0" FOR GROUNDING LIVE FRONT SWITCH / FUSE ENCLOSURES.
3. PAD OR BASEMENT IS NOT PART OF THIS UNIT.
4. PLACE GROUND WIRE A MINIMUM OF 24" AWAY FROM THE SIDE OR SIDES OF PAD THAT A PERSON WOULD STAND TO OPERATE THE EQUIPMENT. THE GROUND WIRE MAY BE PLACED WITHIN 12" OF THE OTHER SIDES.
5. SPECIFY LENGTH OF GROUND RODS AT EACH CORNER.

ITEM	QTY.	MATERIAL
av		1/0 bare copper (as required) 30'-0" Min.
p		Connectors (as required)
ai	4	Ground rods
aj	4	Clamp, ground rod, 1 per rod

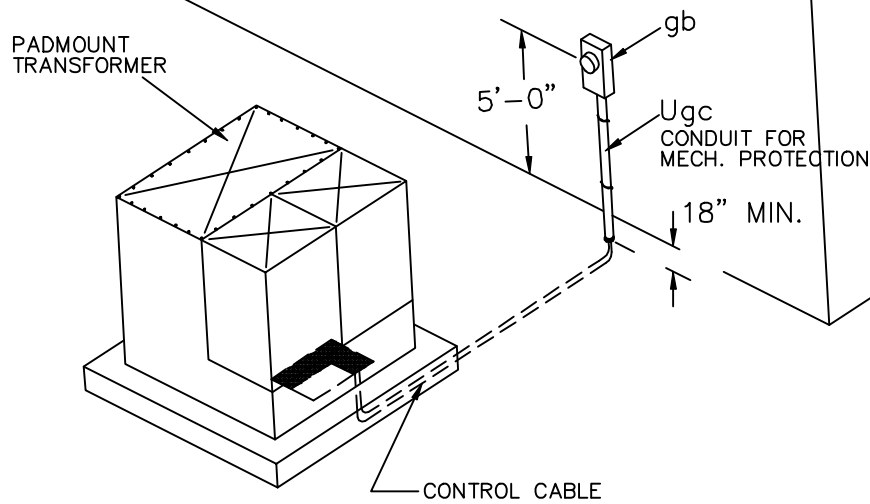
GROUNDING GRID FOR PAD MOUNTED EQUIPMENT INSTALLATION

2000

UM48-5

METHOD 1

PREFERRED METHOD FOR INSTALLATION OF METERING IS TO MOUNT METER SOCKET ON BUILDING WALL.



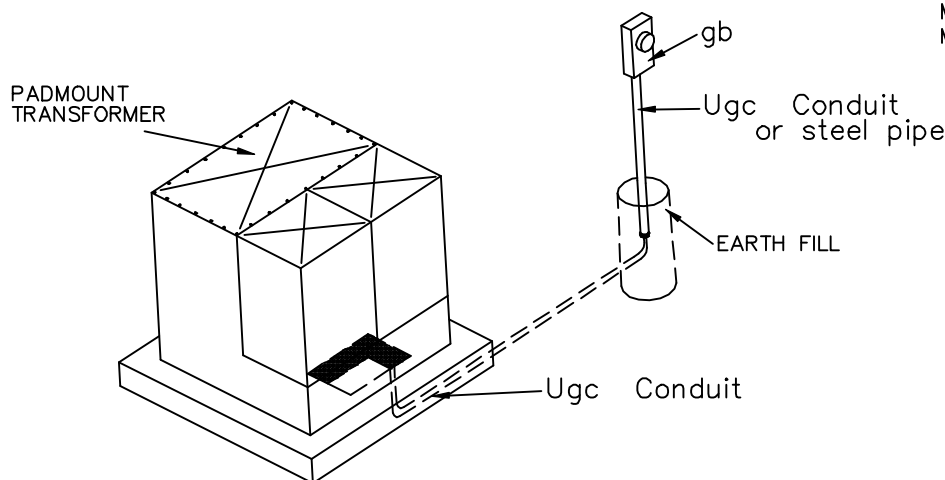
METER HEIGHT SHALL BE 5'-0" TO CENTER OF METER.

METER SOCKET MUST NOT BE ATTACHED DIRECTLY TO PADMOUNTED TRANSFORMER.

CONDUIT SHALL BE USED FOR SECONDARY CONTROL WIRES TO METER SOCKETS.

METHOD 2

METHOD TO USE IF METER CABINET MUST BE MOUNTED FREE STANDING.



METER SOCKET MUST NOT BE ATTACHED DIRECTLY TO PADMOUNTED TRANSFORMER.

4'-0" MINIMUM HEIGHT TO CENTER OF METER.

CONDUIT SHALL BE USED FOR SECONDARY CONTROL WIRES TO METER SOCKET.

NOTE: CT & PT TO BE MOUNTED AS REQUIRED IN TRANSFORMER ENCLOSURE.

ITEM	QTY.	MATERIAL
		Control cable, as required
		Pipe strap, as required
gb	1	Meter socket
se		Potential transformer, as required
Ugc		Steel pipe, as required
Ugc		Conduit, as required
Usd		Current transformer, as required

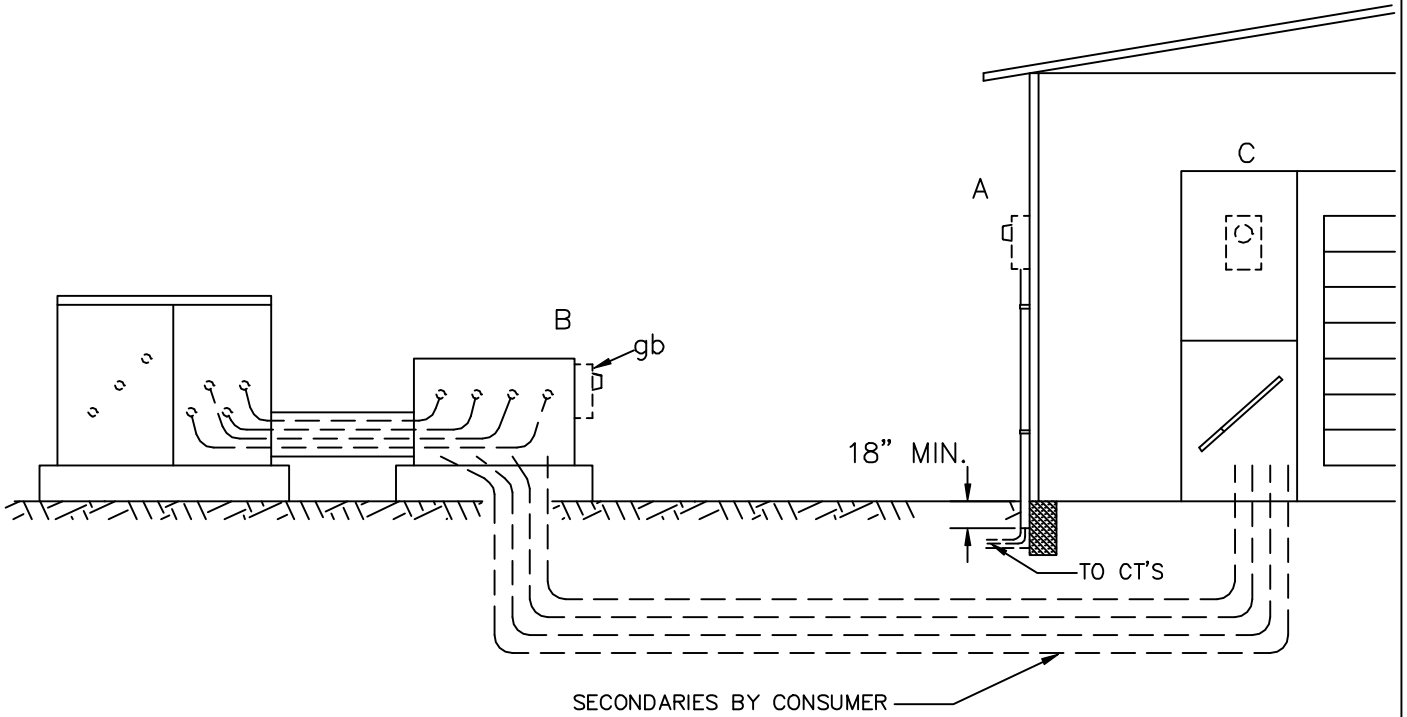
C.T. METER INSTALLATION
SINGLE PHASE

2000

UM8-6

- UM8-7-A METER ON BUILDING
- UM8-7-B METER ON TAP BOX
- UM8-7-C METER ON LOAD CENTER

METER SOCKET MUST NOT BE ATTACHED DIRECTLY TO PADMOUNTED TRANSFORMER.

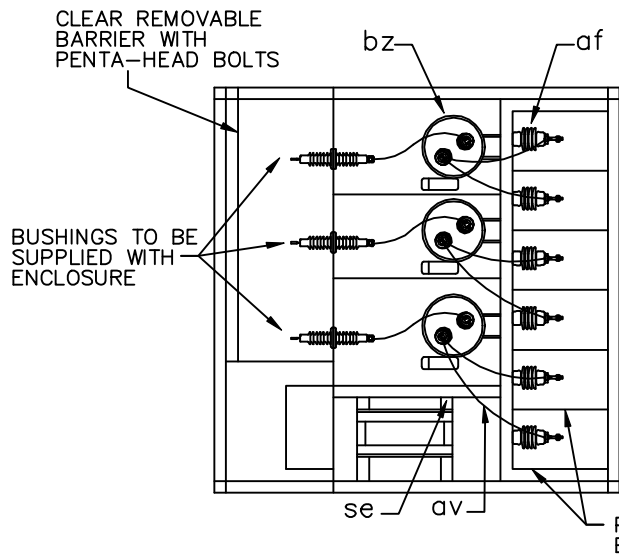


ITEM	QTY.	MATERIAL
		Control cable, as required
		Pipe strap, as required
gb	1	Meter socket
se		Potential transformer, as required
Ugc		Conduit, as required
Ugc		Steel pipe, as required
Usd		Current transformer, as required

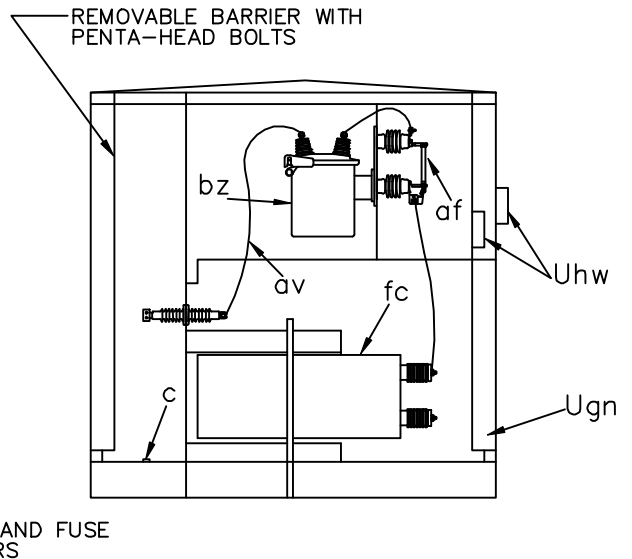
C.T. METER INSTALLATION
THREE PHASE

2000

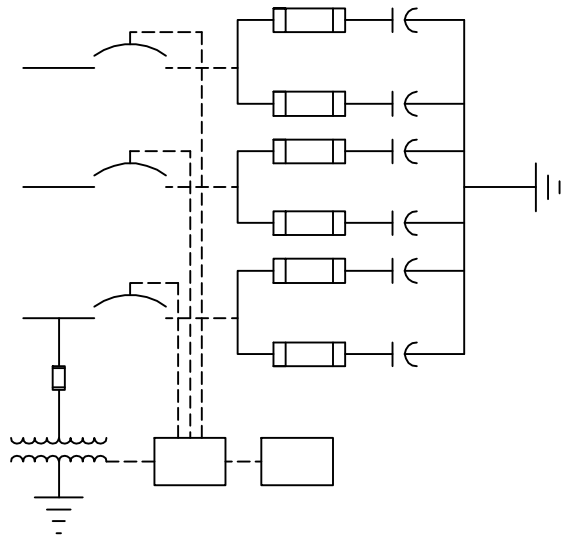
UM8-7-__



TOP VIEW



SIDE VIEW



ONE LINE DIAGRAM

ITEM	QTY.	MATERIAL
C		Bolts, machine, as required
af	6	Power fuse, current limiting
av		Jumpers, copper, as required
bz	3	Single phase oil switch
fc	6	Shunt capacitor
se	1	Potential transformer line voltage to 120 VAC
	3	Bushing with spade
Ugn	1	Enclosure, as specified
Uhw	2	Signs, "DANGER" and "WARNING"

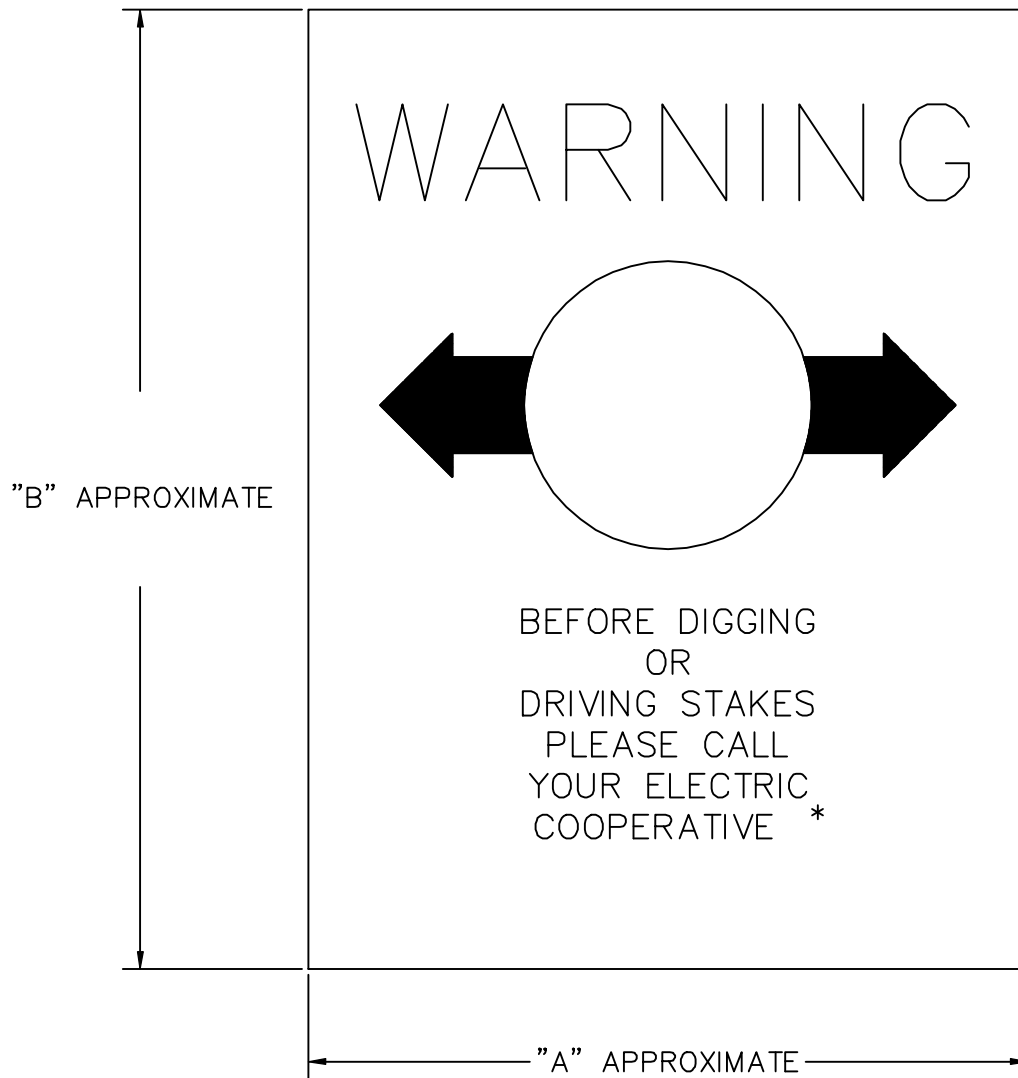
NOTES:

1. LOAD BREAK ELBOWS, STRESS CONES, FUSES OR SWITCH BLADES; GROUND SLEEVE IS NOT PART OF THIS ASSEMBLY. THEY SHOULD BE SPECIFIED SEPARATELY ON THE STAKING SHEETS.
2. TAMP WELL UNDER SLEEVE, LEAVE SLACK COIL OF CABLE IN GROUND SLEEVE.
3. PLACE 6" OF FILL AGAINST INSIDE EDGE OF GROUND SLEEVE.
4. GROUNDING UNIT TO BE SPECIFIED SEPARATELY.
5. INSTALL "WARNING" SIGN ON OUTSIDE OF ENCLOSURE AND "DANGER" SIGN INSIDE ENCLOSURE.

PAD MOUNTED SWITCHED CAPACITOR ENCLOSURE

2000

UM9-2



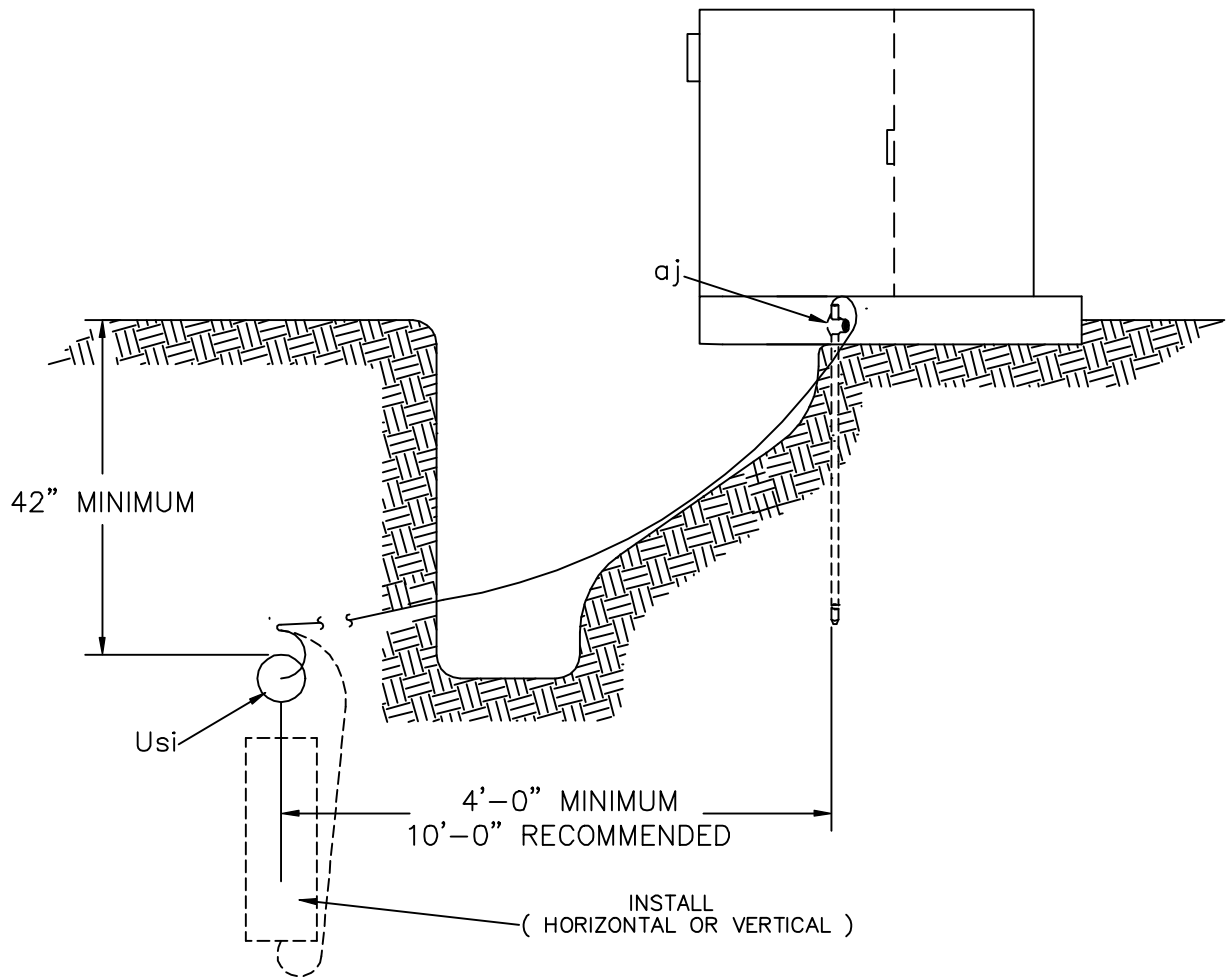
* COOPERATIVE NAME AND TELEPHONE NUMBER MAY BE INSERTED AS AN ALTERNATE.

NOTES:

1. BACKING MATERIAL SHALL BE 16 GAUGE GALVANIZED STEEL, OR EQUAL.
2. SIGN SHALL HAVE A YELLOW BACKGROUND WITH BLACK LETTERS.
3. SIGN SHALL BE SUPPORTED AND DISPLAYED AS SPECIFIED BY OWNER.
4. SIGN SHALL MEET ANSI Z535 STANDARD.

WIDTH ("A")	HEIGHT ("B")
4"	5"
7"	12"
3"	12"

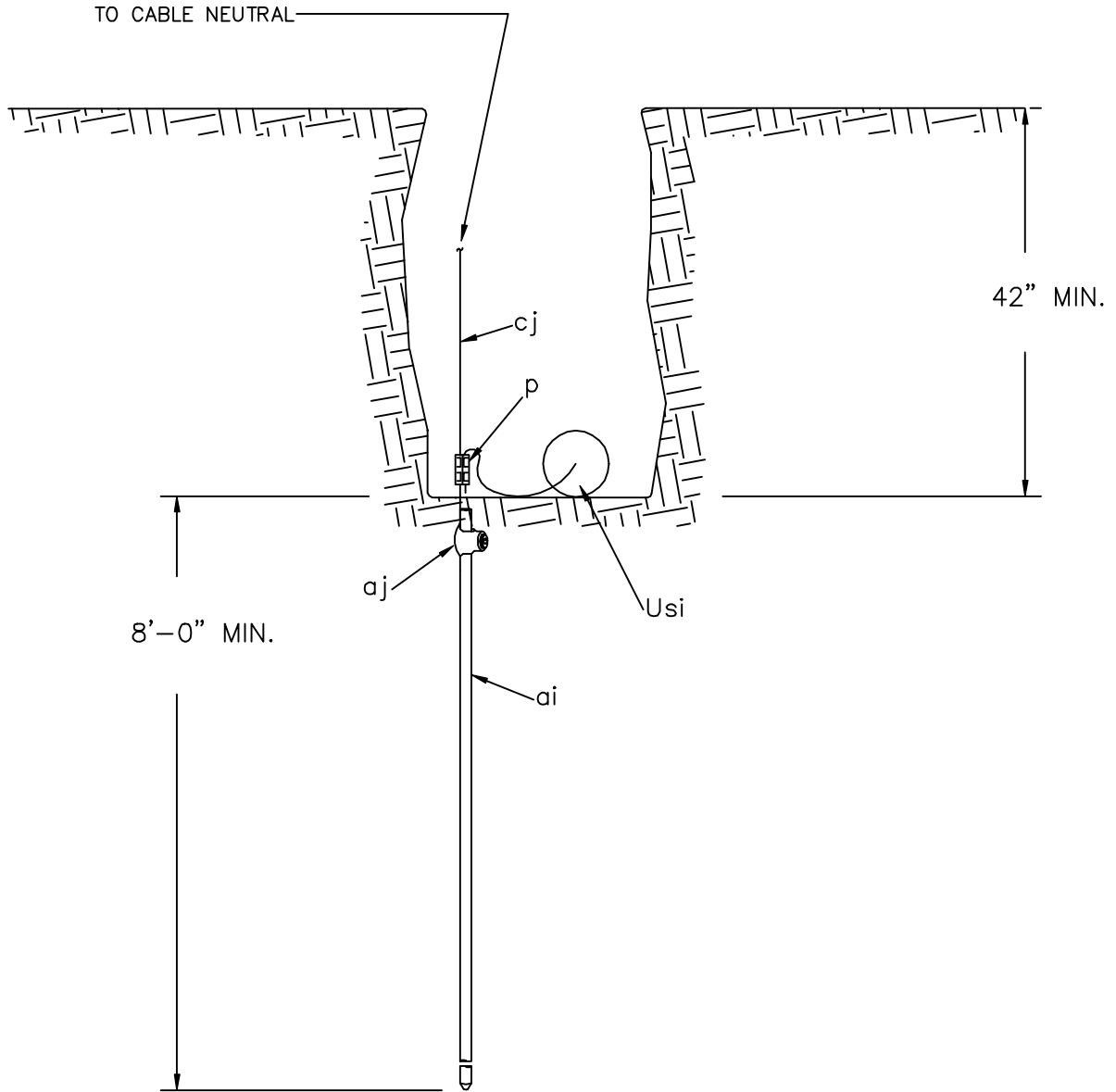
	CABLE ROUTE MARKER	
	2000	UM12



NOTE:

1. CONNECT ANODE LEAD WIRE INSIDE PADMOUNTED EQUIPMENT TO ENABLE TESTING OF ANODE OUTPUT.

ITEM	QTY.	MATERIAL		
p		Connectors, compression, as required		
aj		Clamps, ground rod, as required	SACRIFICIAL ANODE FOR EQUIPMENT GROUND PROTECTION	
Usi		Anode, sacrificial, as required		
			2000	UM27-2



NOTES:

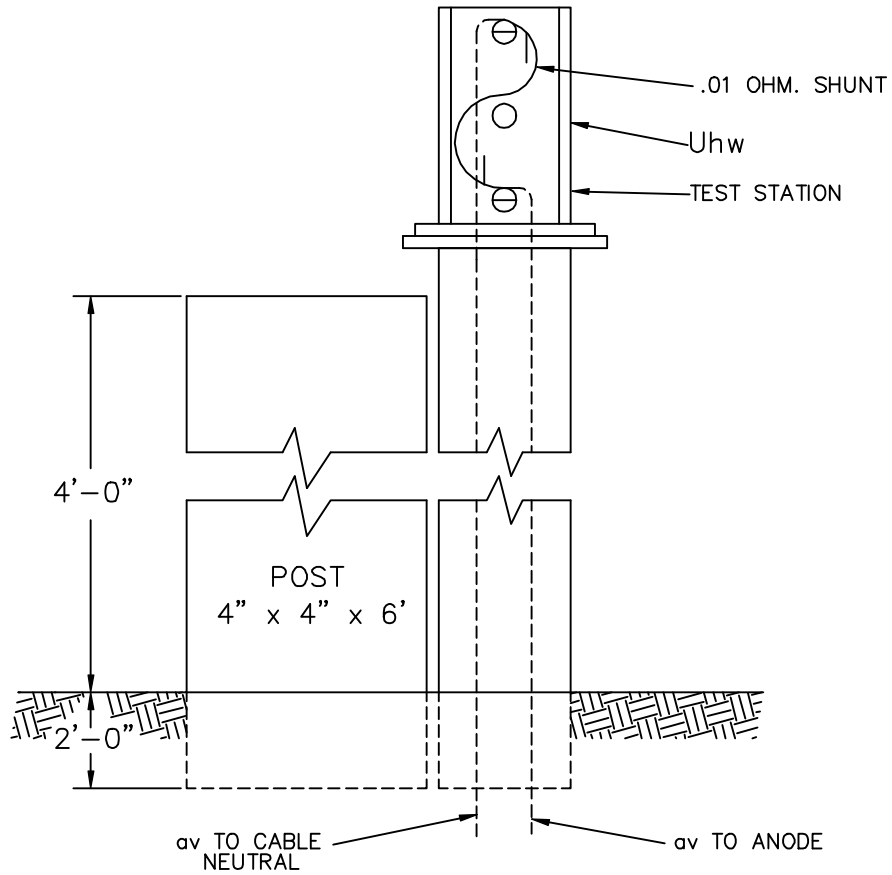
1. INSTALLATION OF AN ANODE IS NOT REQUIRED AT ALL GROUNDING LOCATIONS.
2. ROUTE ANODE LEAD SO AS TO BE ACCESSIBLE FOR TESTING WHENEVER FEASIBLE. (SEE UNITS UM28 OR UM28-1.)

ITEM	QTY.	MATERIAL
p	1	Connector, compression
ai	1	Ground rod, 5/8" x 8'-0" Copper clad
aj	1	Clamp, ground rod
cj		Ground wire, #6 S.D. copper (min.)
Usi	1	Anode, sacrificial

SACRIFICIAL ANODE
FOR
CABLE GROUND PROTECTION

2000

UM27-3



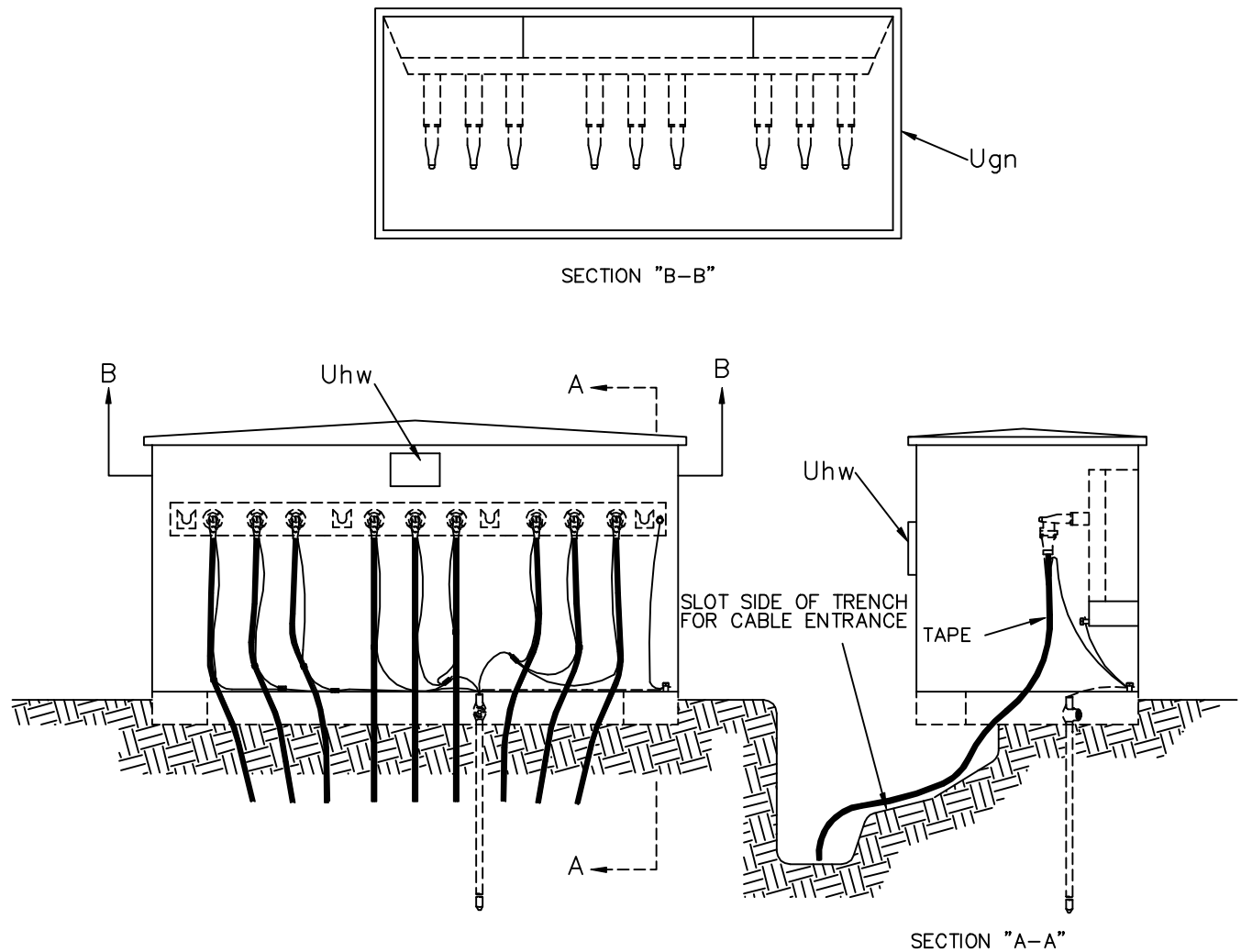
UM28 ABOVE GROUND LEVEL.

UM28-1 FLUSH WITH GROUND LEVEL
(DELETE POST AND ADD SUITABLE METHOD
FOR LOCATING.)

NOTE:

CONNECTIONS TO BE MADE IN ACCORDANCE WITH MANUFACTURER'S INSTRUCTIONS.

ITEM	QTY.	MATERIAL		
	1	4" x 4" x 6' Treated post		
	1	Test station, anode		
	1	Shunt, anode		
av		Jumper, insulated, as required	TEST STATION	
Uhw	1	Sign, "WARNING"	2000	UM28

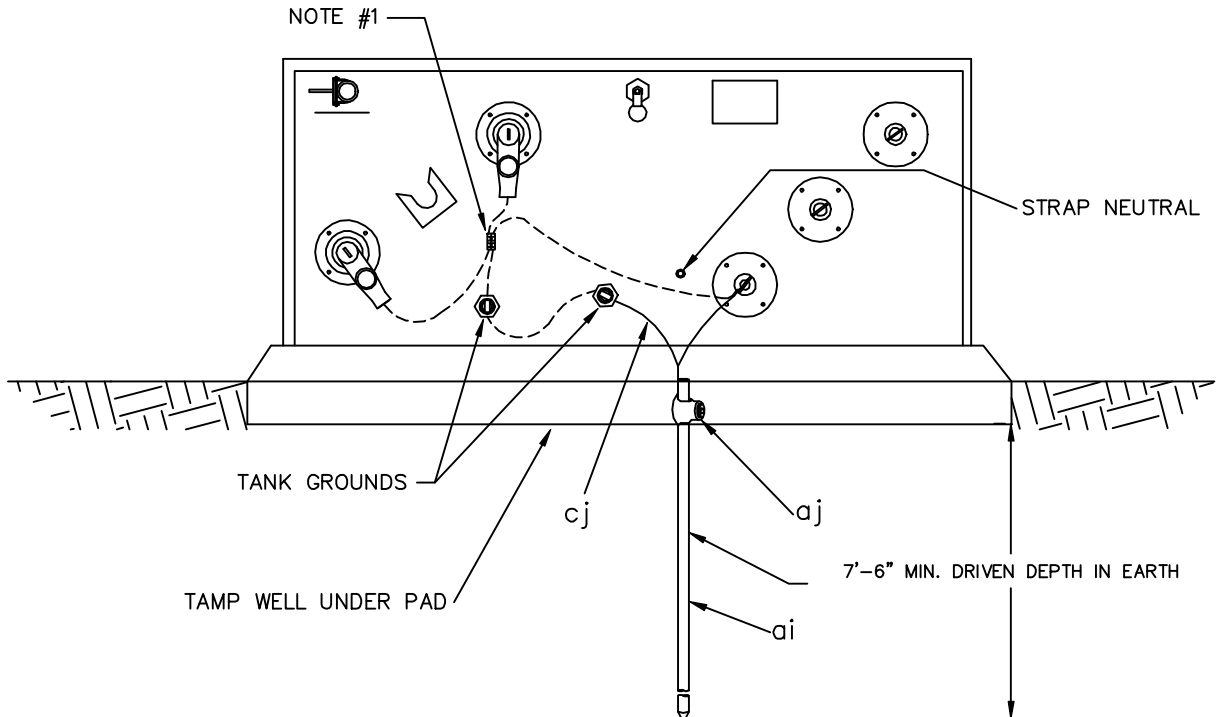


NOTES:

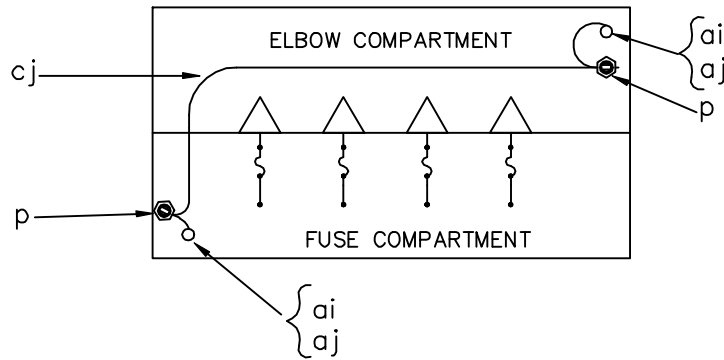
1. THE FOLLOWING UNITS/ASSEMBLIES ARE NOT PART OF THIS UNIT. SPECIFY SEPARATELY:
 - A. MULTIPOINT TERMINATIONS AND OTHER ACCESSORIES
 - B. FUSED OR NON-FUSED LOADBREAK ELBOWS
 - C. GROUNDING ASSEMBLIES UM48-1 OR OTHER
 - D. PAD OR SLEEVE ASSEMBLIES (IF REQUIRED)
2. ALL NEUTRALS AND METALLIC NON-CURRENT CARRYING PARTS SHALL BE INTERCONNECTED AND GROUNDED.
3. INSTALL "WARNING" SIGN ON OUTSIDE SURFACE OF ENCLOSURE AND "DANGER" SIGN INSIDE ENCLOSURE.

ITEM	QTY.	MATERIAL			
p		Connectors, as required			
av		Jumpers, as required			
Ugn	1	Enclosure	MULTI PHASE SECTIONALIZING ENCLOSURE PAD OR SLEEVE MOUNTED		
Uhw	2	Signs, "DANGER" and "WARNING"			
			2000	UM33	

TRANSFORMER INSTALLATION
(FRONT VIEW)



DEADFRONT FUSE ENCLOSURE
(TOP VIEW)



NOTES:

1. TIE CONCENTRIC NEUTRALS TOGETHER BEFORE TAP TO GROUND LOOP TO ASSURE SAME CONDUCTIVITY AS CABLE NEUTRAL.

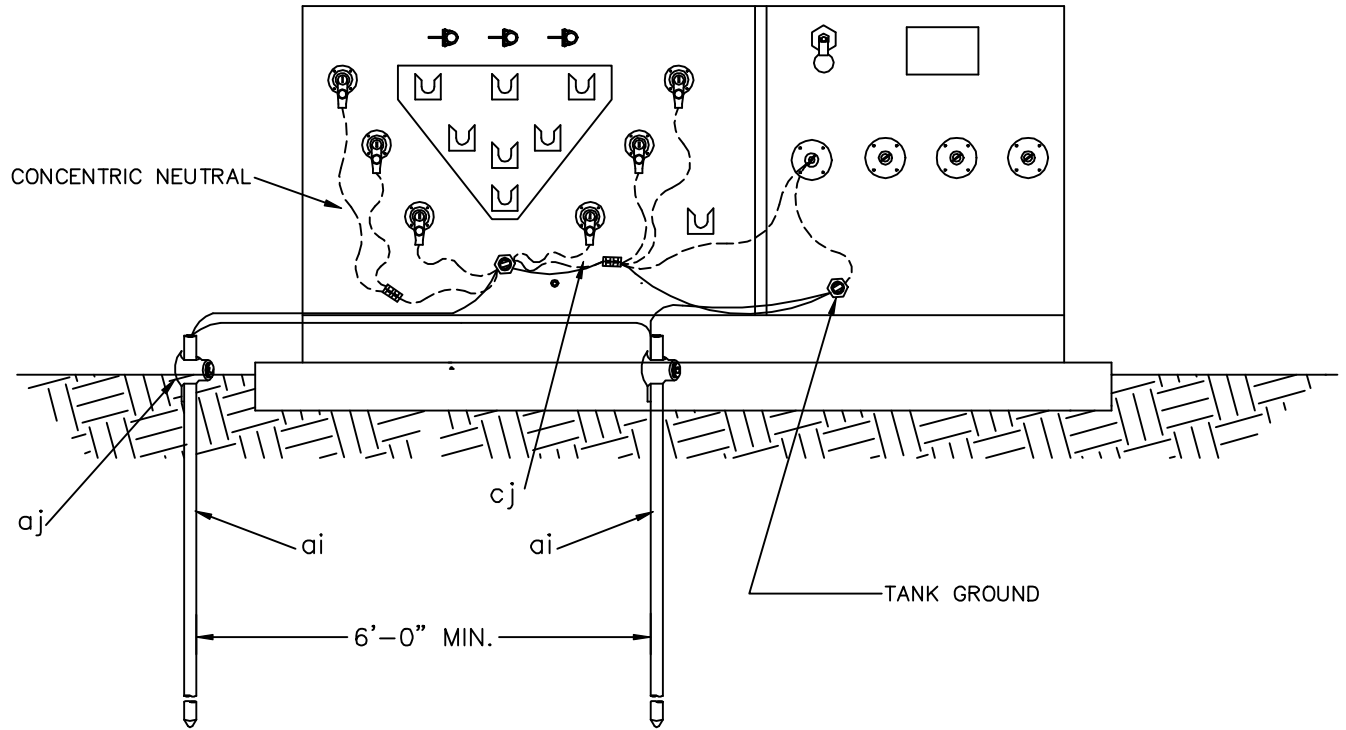
ITEM	QTY	MATERIAL
p		Connectors, (as required)
ai		Ground rods, specify number and length
aj		Clamp, ground rod (1 per rod)
cj		Ground wire, #4 copper (as required)

GROUNDING ASSEMBLY FOR
PAD MOUNTED SINGLE PHASE
TRANSFORMERS AND ENCLOSURES

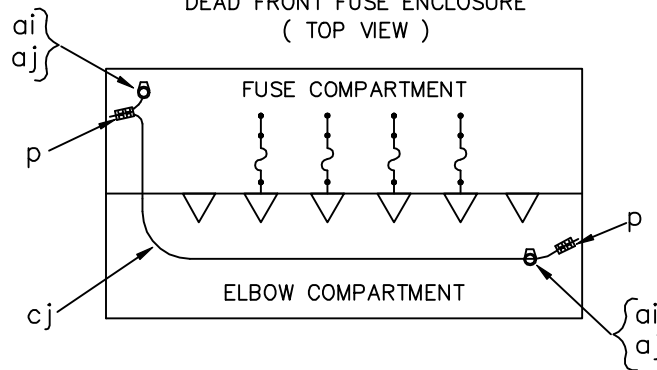
2000

UM48-1

TRANSFORMER INSTALLATION
(FRONT VIEW)



DEAD FRONT FUSE ENCLOSURE
(TOP VIEW)



NOTES:

1. TIE CONCENTRIC NEUTRALS TOGETHER BEFORE TAP TO GROUND LOOP TO ASSURE SAME CONDUCTIVITY AS CABLE NEUTRAL.
2. MULTIPLE RODS MAY NOT FIT INSIDE ENCLOSURE. ONLY 1 ROD MUST BE INSTALLED INSIDE ENCLOSURE.
3. THE QUANTITY OF RODS IS TO BE DETERMINED BY THE SPECIFIER. THE USE OF TWO RODS RATHER THAN ONE AT A MULTI-PHASE TRANSFORMER OR ENCLOSURE IS NOT A STANDARD OR REQUIREMENT BY RUS.

ITEM	QTY	MATERIAL
p		Connectors, as required
ai		Ground rods, specify number and length
aj		Clamp, ground rod (1 per rod)
		Jumpers, copper, as required
cj		Ground wire, #4 copper min. (as required)

GROUNDING ASSEMBLY FOR
PAD MOUNTED MULTI PHASE
TRANSFORMERS AND ENCLOSURES

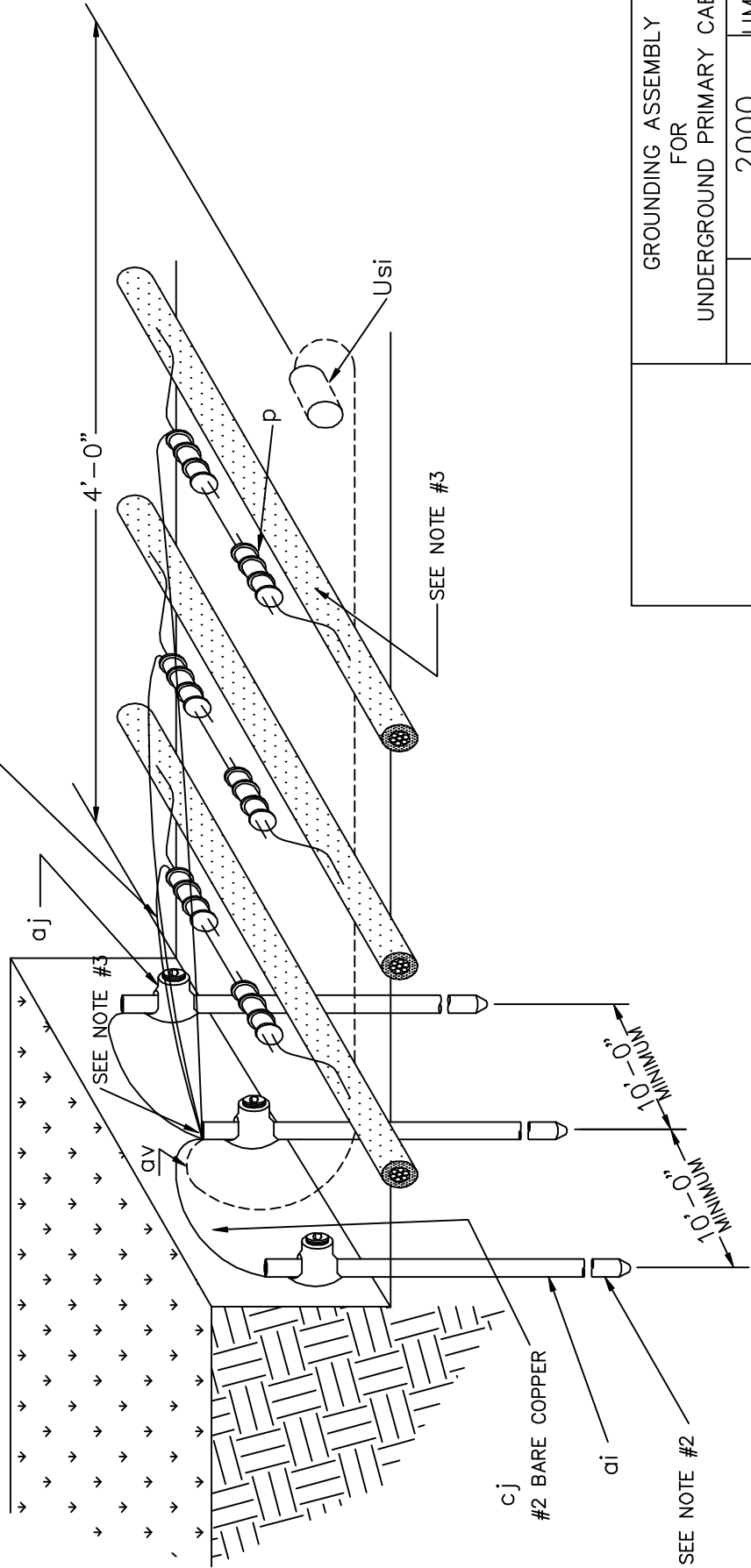
2000

UM48-2

NOTES:

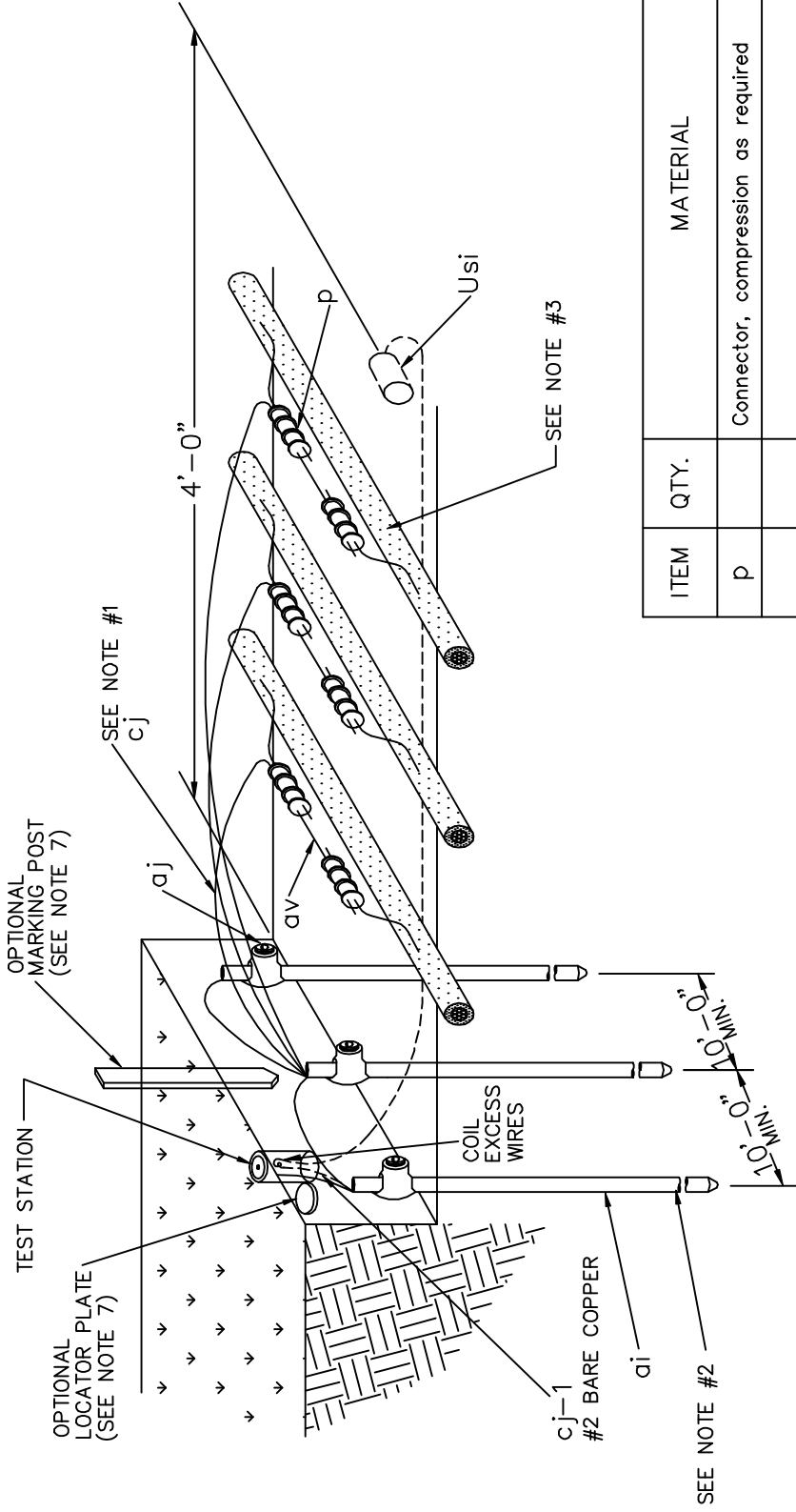
1. #2 THRU 4/0 CONDUCTOR - USE #4 BARE, SOLID CU JUMPER (av) #4 STRD CU GROUND WIRE (cj) 500 MCM CONDUCTOR - USE #2/0 BARE SOLID CU JUMPER (av) #2 STRD CU GROUND WIRE (cj).
2. ENGINEER TO SPECIFY NUMBER AND LENGTH OF GROUND RODS.
3. MOISTURE SEAL AROUND CONNECTIONS TO THE JACKETED CABLE NEUTRAL. USE SOLID COPPER INSIDE AND EXTENDED THROUGH MOISTURE SEAL.
4. FOUR GROUNDS PER MILE MINIMUM. MORE REQUIRED WITH HIGH GROUND RESISTANCE.
5. GROUND RODS MAY BE INSTALLED IN SEPARATE PITS SPACED 30 FEET APART.

SEE NOTE #1
cj



ITEM	QTY.	MATERIAL
p		Connector, compression as required
ai		Ground rods
aj		Clamp, ground rod, as required
av		Jumper, See Note #1
cj		Grounding wire, #4, #2, copper
cj		Jumpers, (2) - #14 stranded leads

GROUNDING ASSEMBLY FOR UNDERGROUND PRIMARY CABLE	
2000	UM48-3

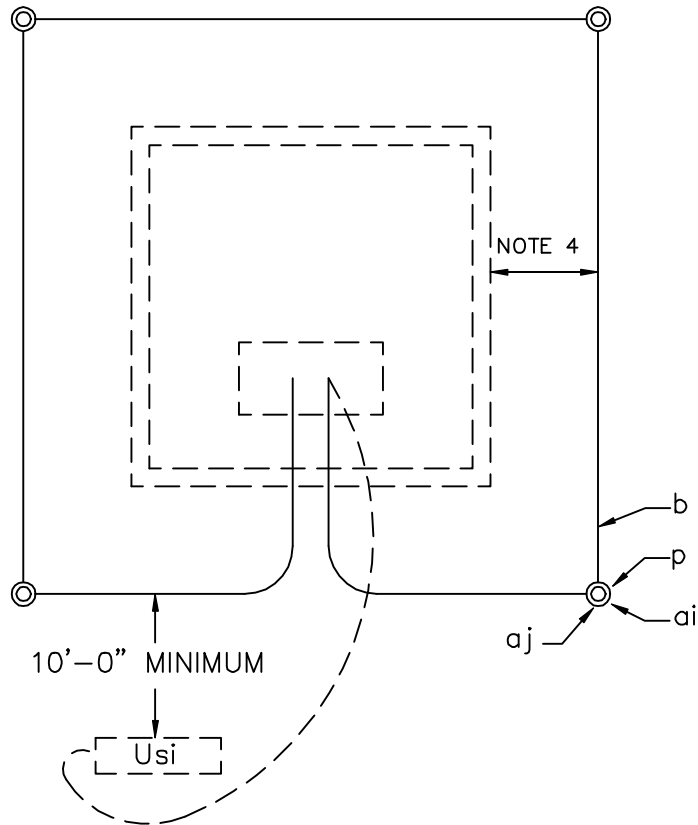


NOTES:

1. #2 THRU 4/0 CONDUCTOR - USE #4 BARE, SOLID CU. JUMPER (av) #4 STRD. CU. GROUND WIRE (cj) 500 MCM CONDUCTOR - USE #2/0 BARE, SOLID CU. JUMPER (av) #2 STRD. CU. GROUND WIRE (cj).
2. ENGINEER TO SPECIFY NUMBER AND LENGTH OF GROUND RODS.
3. MOISTURE SEAL AROUND CONNECTIONS TO THE JACKETED CABLE NEUTRAL. USE SOLID COPPER INSIDE EXTENDED THROUGH MOISTURE SEAL.
4. FOUR (4) GROUNDS PER MILE MINIMUM. MORE REQUIRED WITH HIGH GROUND RESISTANCE.
5. INSTALL TEST STATION EVEN WITH GRADE.
6. GROUND RODS MAY BE INSTALLED IN SEPARATE PITS SPACED 30 FEET APART.
7. SEE DRAWING UX-7 FOR POSSIBLE LOCATING METHODS.

ITEM	QTY.	MATERIAL
p		Connector, compression as required
ai		Ground rods
aj		Clamp, ground rod, as required
av		Jumper, copper (See Note #1)
cj		Grounding wire #4, #2, copper
cj		Jumper (2) - #14 stranded leads
	1	Test station, flush mount
GROUNDING ASSEMBLY FOR UNDERGROUND PRIMARY CABLE (WITH TEST STATION)		
		2000
		UM48-4

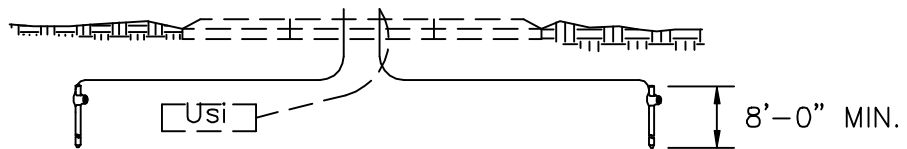
TOP VIEW



NOTE:

CONNECT ANODE, LEAD INSIDE PAD MOUNTED ENCLOSURES FOR TESTING PURPOSES.

FRONT VIEW



NOTES:

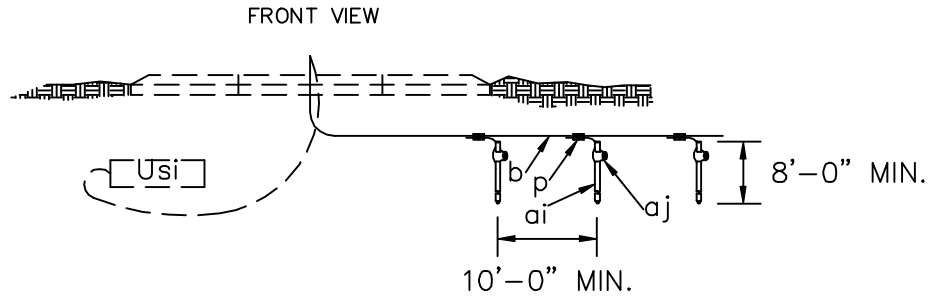
1. PLACE ONE GROUND ROD AT EACH CORNER.
2. GROUNDING GRID 1/0 BARE COPPER BURIED 6" BELOW GROUND, RUN WIRE INTO BASEMENT AND ALLOW 5'-0" FOR GROUNDING LIVE FRONT SWITCH / FUSE ENCLOSURES.
3. PAD OR BASEMENT IS NOT PART OF THIS UNIT.
4. PLACE GROUND WIRE A MINIMUM OF 24" AWAY FROM THE SIDE OR SIDES OF PAD THAT A PERSON WOULD STAND TO OPERATE THE EQUIPMENT. THE GROUND WIRE MAY BE PLACED WITHIN 12" OF THE OTHER SIDES.
5. SPECIFY LENGTH OF GROUND RODS AT EACH CORNER.

ITEM	QTY.	MATERIAL
av		1/0 bare copper (as required) 30'-0" Min.
p		Connectors (as required)
ai	4	Ground rods
aj	4	Clamp, ground rod, 1 per rod

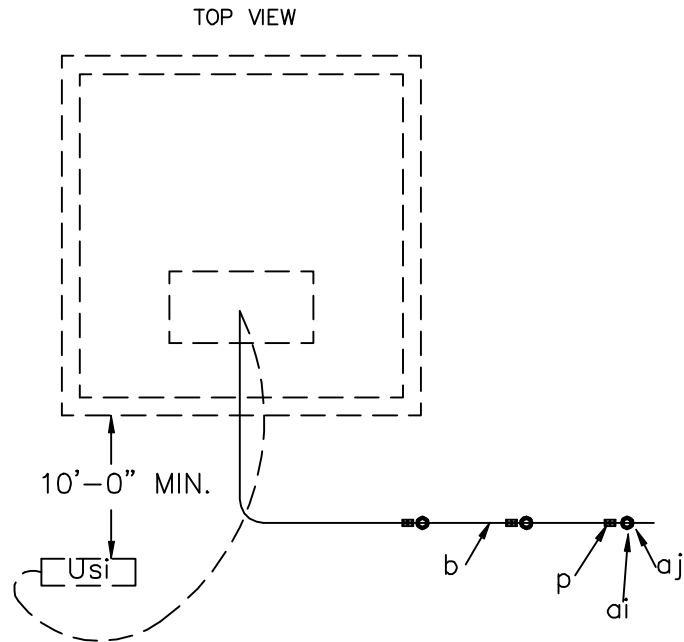
GROUNDING GRID FOR PAD MOUNTED EQUIPMENT INSTALLATION

2000

UM48-5



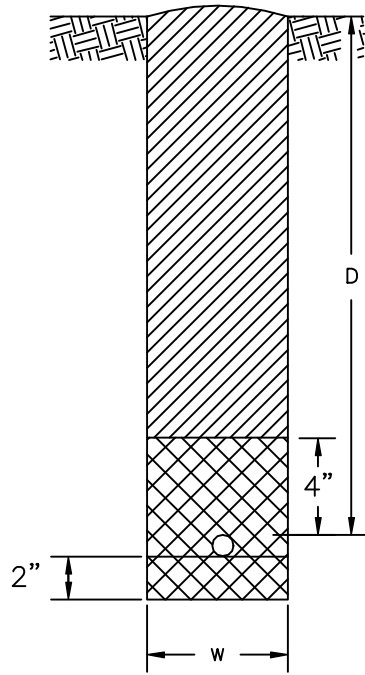
NOTE:
CONNECT ANODE LEAD INSIDE PAD MOUNTED ENCLOSURES FOR TESTING PURPOSES



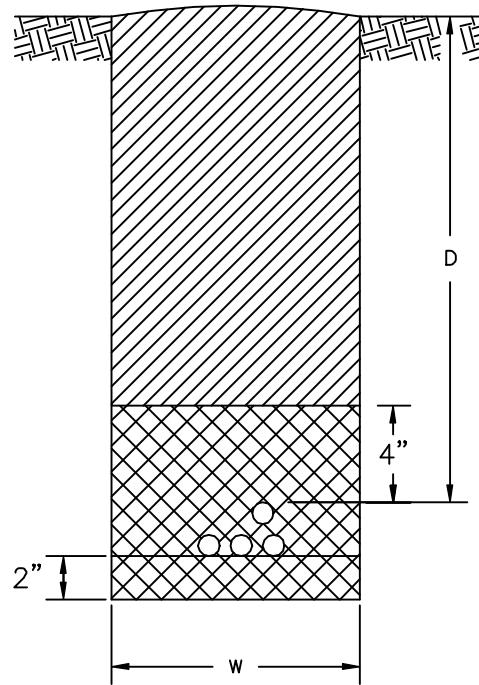
NOTES:

1. PLACE A MINIMUM OF TWO GROUND RODS IN SERIES. MINIMUM DISTANCE BETWEEN GROUND UNIT ASSEMBLIES - 10'-0".
2. GROUNDING GRID 1/0 BARE COPPER BURIED 6" BELOW GROUND, RUN WIRE INTO BASEMENT AND ALLOW 5'-0" FOR GROUNDING LIVE FRONT SWITCH / FUSE ENCLOSURES.
3. PAD OR BASEMENT IS NOT PART OF THIS UNIT.
4. SPECIFY NUMBER AND LENGTH OF GROUND RODS.

ITEM	QTY.	MATERIAL		
av		1/0 bare copper as required	GROUNDING ARRAY FOR PAD MOUNTED EQUIPMENT INSTALLATION	
p		Connectors, as required		
ai		Ground rods		
aj		Clamp, ground rod, 1 per rod		
			2000	UM48-6






UR2 (D x W)
TRENCHING UNIT
ONE CABLE OR
CABLE ASSEMBLY



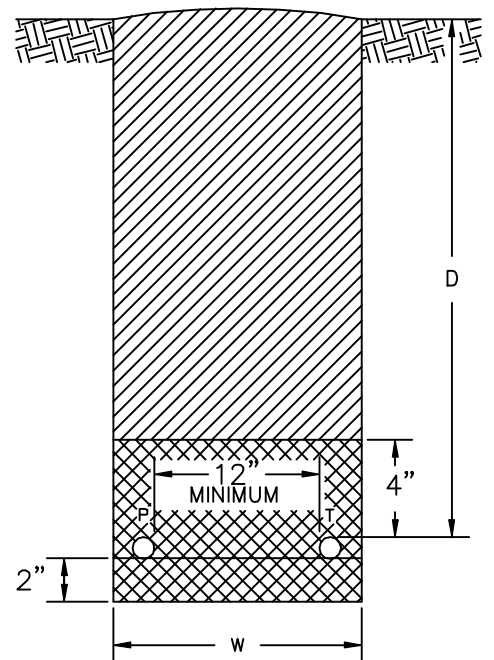
UR2-1 (D x W)
TRENCHING UNIT
MULTIPLE POWER CABLES
PRIMARY, SECONDARY OR SERVICE

LEGEND

-  SAND OR CLEAN SOIL
-  COMPACTED BACKFILL UNLESS OTHERWISE SPECIFIED
-  UNDISTURBED EARTH

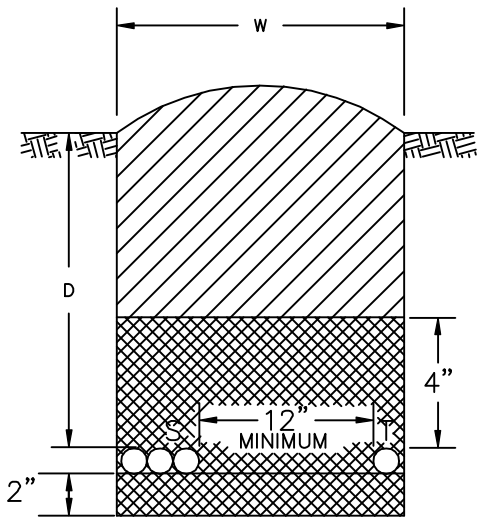
NOTES:

1. DEPTH (D) AND WIDTH (W) ARE SPECIFIED IN DESCRIPTION OF UNITS.
2. DEPTHS SPECIFIED ARE TO FINISHED GRADE.
3. OVER-EXCAVATE TRENCHES AS NECESSARY TO ALLOW FOR (a) SAND BEDDING OR (b) LOOSE SANDY SOILS OR (c) WHERE MORE THAN ONE CABLE WILL INSTALLED IN TRENCH AND LAYING FIRST CABLE MAY CAUSE TRENCH DAMAGE AND REDUCTION IN DEPTH.
4. SAND BEDDING IS NOT PART OF THESE UNITS AND WILL BE SPECIFIED AS NEEDED.
5. BACKFILLING IS PART OF ALL TRENCHING UNITS INCLUDING JOINT-USE TRENCHES.
6. OPTIONAL WARNING TAPE IS RECOMMENDED TO BE PLACED ABOVE THE INSTALLED CABLE.



UR2-2 (D x W)
TRENCHING UNIT
POWER AND TELEPHONE CABLE

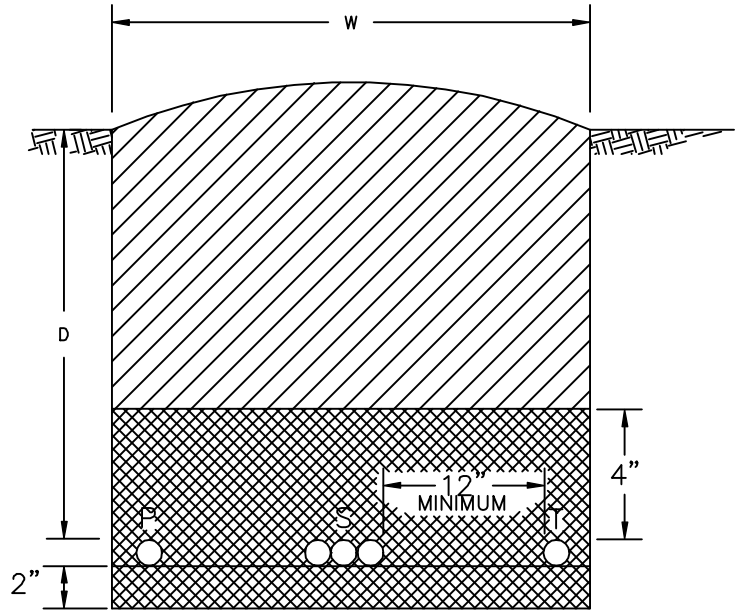
TRENCHES FOR DIRECT BURIAL CABLES		
	2000	UR2 TO UR2-2



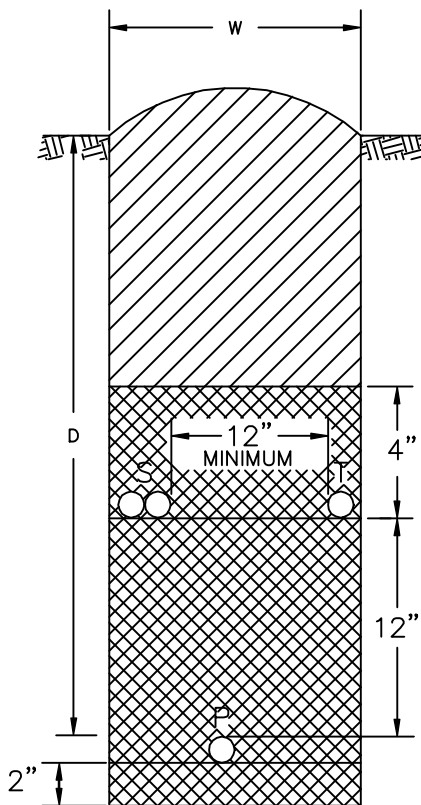
UR2-3 (D x W)
SERVICE OR SECONDARY
AND
TELEPHONE

LEGEND

- BEDDING SAND OR CLEAN SOIL
- COMPACTED BACKFILL UNLESS OTHERWISE SPECIFIED
- UNDISTURBED EARTH



UR2-5 (D x W)
PRIMARY, SECONDARY
AND
TELEPHONE

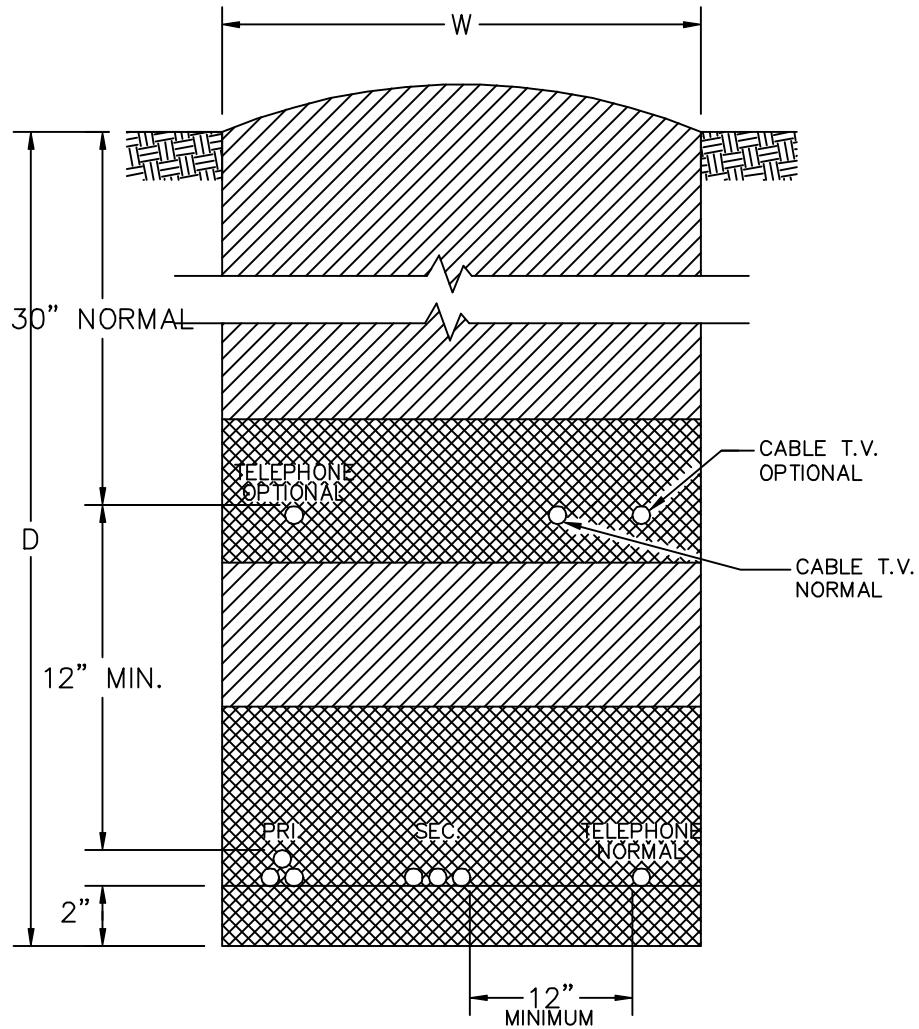


UR2-4 (D x W)
PRIMARY
AND
SECONDARY OR TELEPHONE

NOTES:

1. DEPTH (D) AND WIDTH (W) ARE SPECIFIED IN DESCRIPTION OF UNITS.
2. DEPTHS SPECIFIED ARE TO FINISHED GRADE.
3. OVER-EXCAVATE TRENCHES AS NECESSARY TO ALLOW FOR (a) SAND BEDDING OR (b) LOOSE AND SANDY SOILS OR (c) WHERE MORE THAN ONE CABLE WILL BE INSTALLED IN TRENCH AND LAYING OF FIRST CABLE MAY CAUSE TRENCH DAMAGE AND REDUCTION IN DEPTH.
4. SAND BEDDING IS NOT PART OF THESE UNITS AND WILL BE SPECIFIED AS NEEDED.
5. BACKFILLING IS PART OF ALL TRENCHING UNITS INCLUDING JOINT-USE TRENCHES.

TRENCHES FOR DIRECT BURIAL CABLES		
	2000	UR2-3 TO UR2-5



LEGEND

 BEDDING SAND OR CLEAN SOIL

 COMPACTED BACKFILL UNLESS OTHERWISE SPECIFIED

 UNDISTURBED EARTH

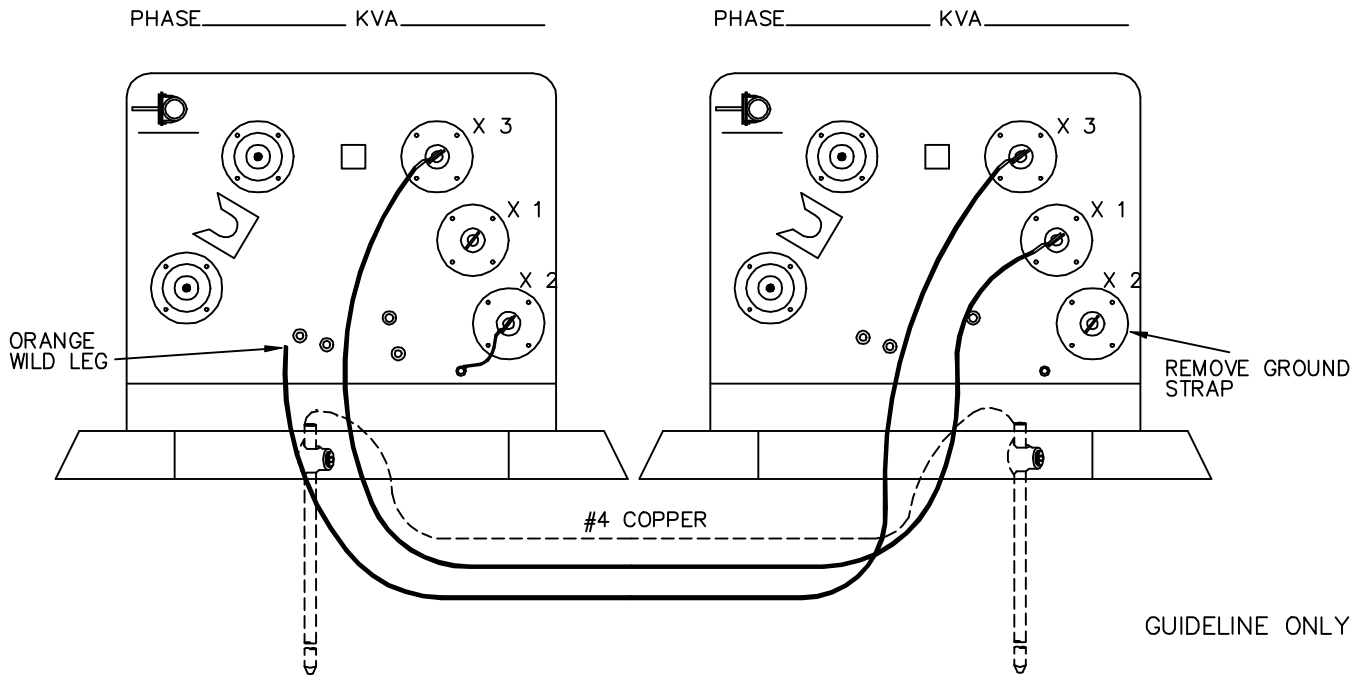
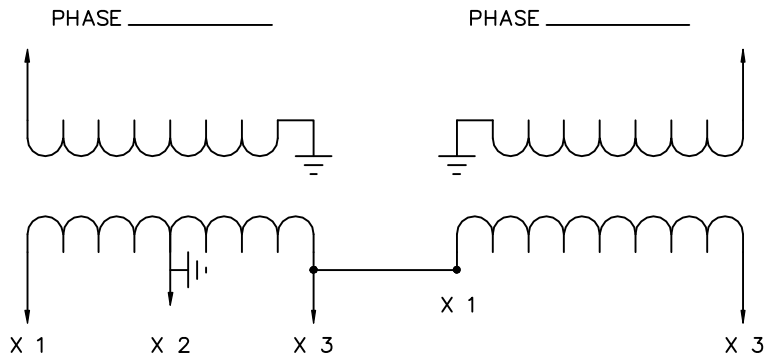
PRI. = PRIMARY SUPPLY CABLES
SEC. = SECONDARY OR STREETLIGHT WIRES

URT-NT = NORMAL TRENCH 42" - 48" DEPTH
URT-ST = SUPER TRENCH 60" + DEPTH
W = 18" - 24" NORMAL

NOTES:

1. DEPTH (D) AND WIDTH (W) ARE SPECIFIED IN DESCRIPTION OF UNITS.
2. DEPTHS SPECIFIED ARE TO FINISHED GRADE.
3. OVER-EXCAVATE TRENCHES AS NECESSARY TO ALLOW FOR (a) SAND BEDDING OR (b) LOOSE AND SANDY SOILS OR (c) WHERE MORE THAN ONE CABLE WILL BE INSTALLED IN TRENCH AND LAYING OF FIRST CABLE MAY CAUSE TRENCH DAMAGE AND REDUCTION IN DEPTH.
4. SAND BEDDING IS NOT PART OF THESE UNITS AND WILL BE SPECIFIED AS NEEDED.
5. BACKFILLING IS PART OF ALL TRENCHING UNITS INCLUDING JOINT-USE TRENCHES.

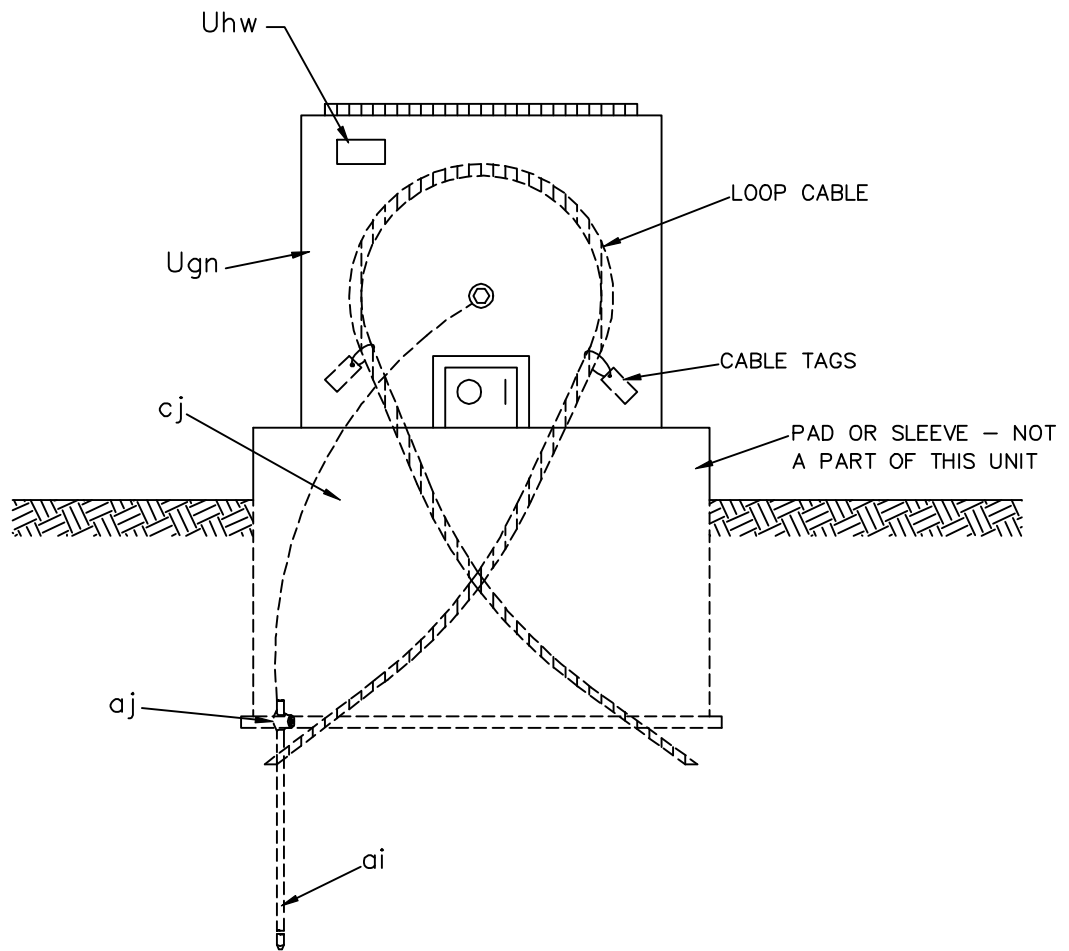
		TRENCHES FOR DIRECT BURIAL CABLE	
		2000	UR2-NT UR2-ST



NOTE:

1. SPECIFY (2) APPLICABLE SINGLE PHASE TRANSFORMER ASSEMBLIES.

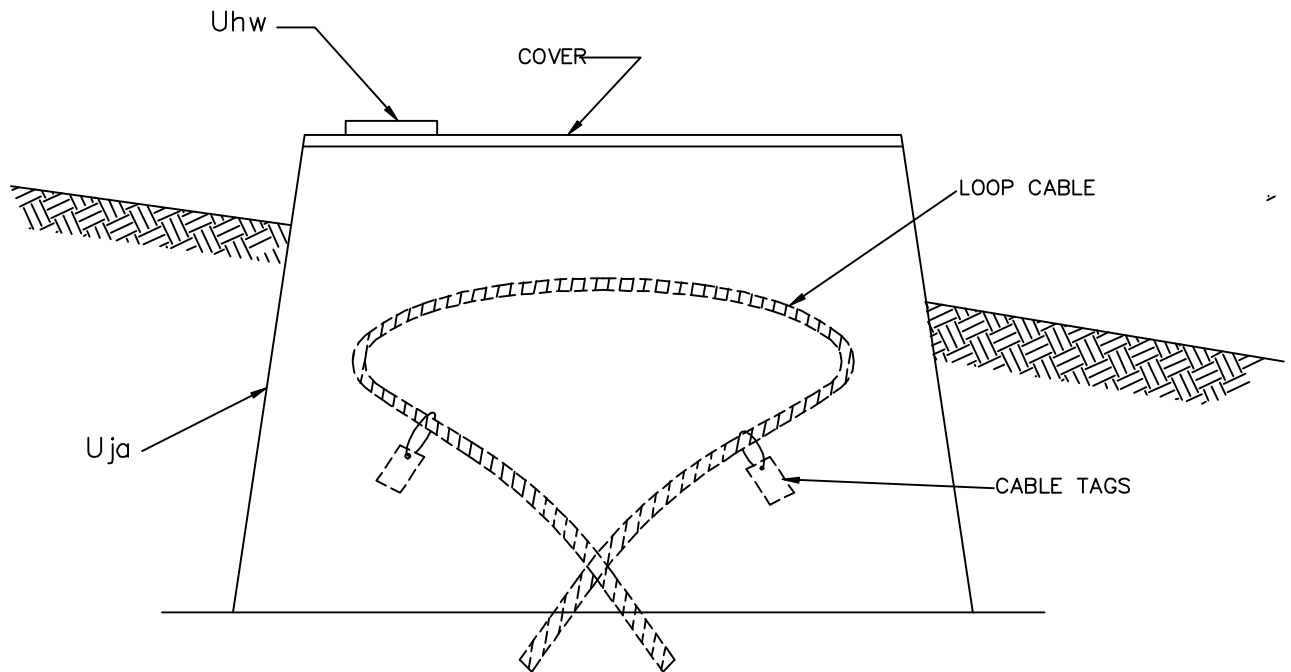
OPEN DELTA CONNECTION WITH SINGLE PHASE PADMOUNT TRANSFORMERS		
	2000	UX1



INSTALLATION NOTES:

1. LOOP CABLE TO PROVIDE SUFFICIENT LENGTH FOR TERMINATING IN A PAD-MOUNTED TRANSFORMER.
2. INSTALL CABLE TAGS ON CABLE.

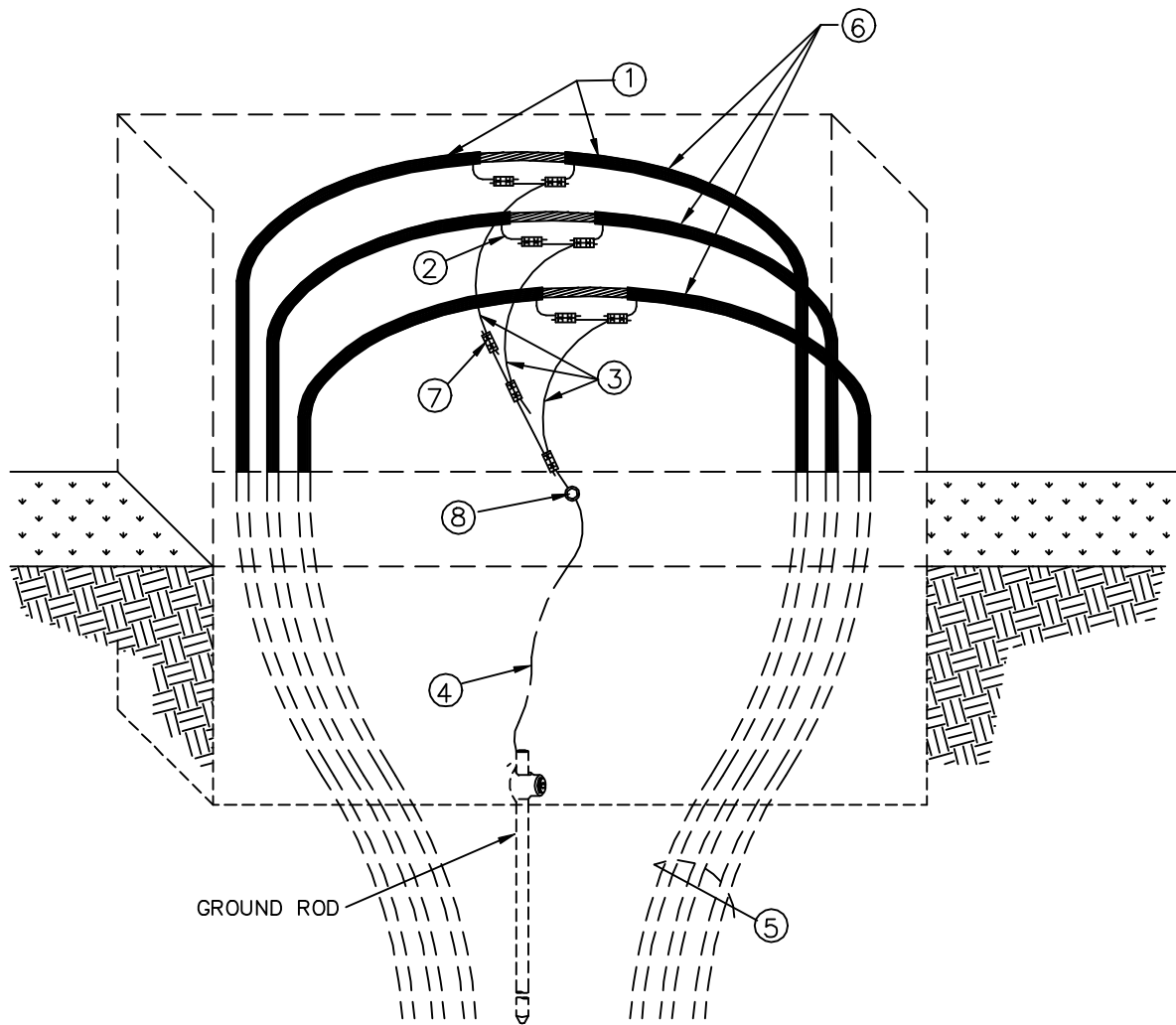
ITEM	QTY.	MATERIAL			
ai	1	Ground rod			
aj	1	Clamp, ground rod			
cj		As required			
Ugn	1	Primary junction enclosure	SINGLE PHASE PAD-MOUNTED TRANSFORMER DEFERRED UNIT PEDESTAL TYPE		
Uhw	1	Sign, "WARNING"			
			2000	UX2	



INSTALLATION NOTES:

1. LOOP CABLE TO PROVIDE SUFFICIENT LENGTH FOR TERMINATING IN A LOW PROFILE TRANSFORMER.
2. INSTALL CABLE TAGS ON CABLE.
3. COVER, IF METAL, SHALL BE GROUNDED

ITEM	QTY.	MATERIAL			
Uhw	1	Sign, "WARNING"	SINGLE PHASE PADMOUNTED TRANSFORMER DEFERRED UNIT PAD-SLEEVE TYPE		
Uja	1	Transformer pad-sleeve combination			
Uja	1	Cover			
			2000	UX3	



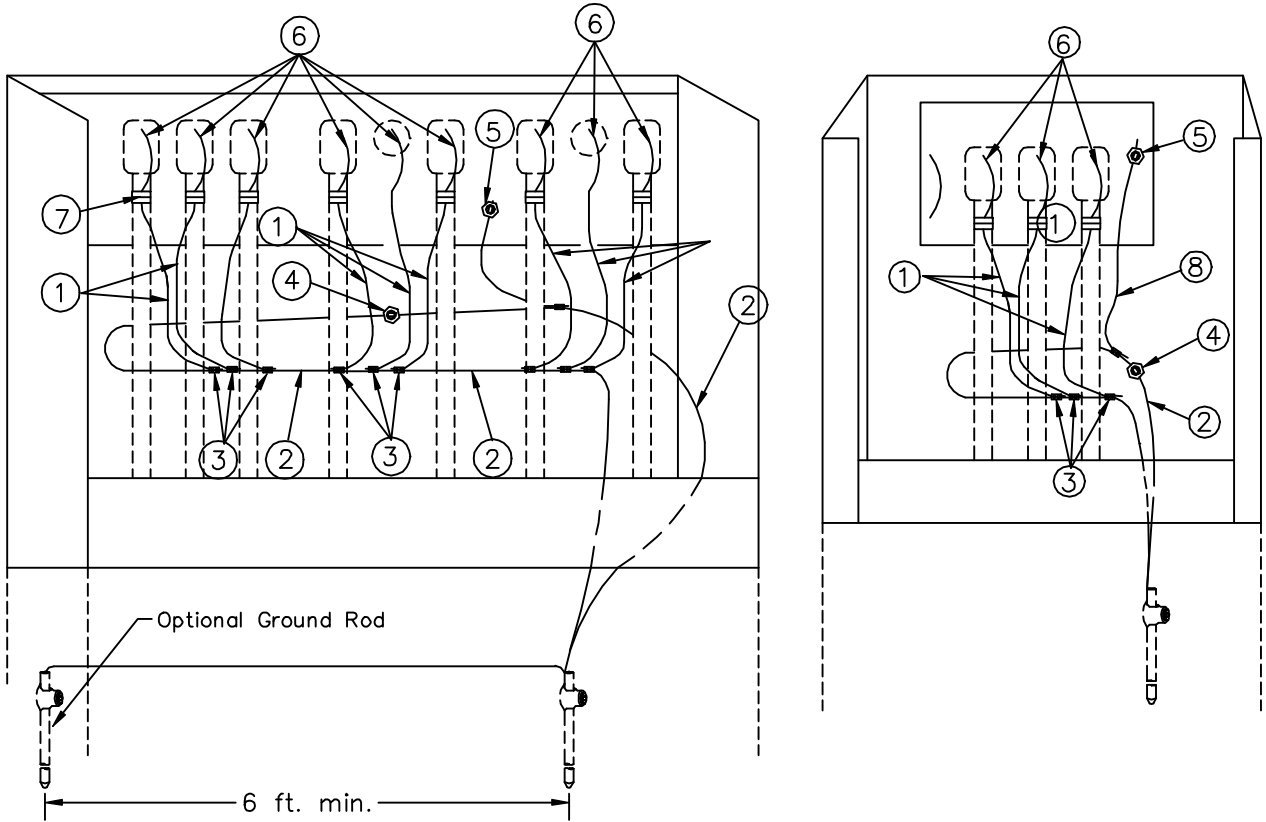
REFERENCE NO.	MATERIAL
①	Label cable for direction leaving sectionalizer
②	Seal cable
③	Neutral extension
④	Ground bus
⑤	Leave sufficient slack in cable for future terminating
⑥	Label cable per phase (A, B or C)
⑦	Parallel compression connector
⑧	Box grounding connector

GUIDELINE ONLY

INSTALLATION OF
NEUTRAL CONNECTION IN
ABOVE GRADE PEDESTAL

2000

UX4



NOTE:

1. LEAVE SUFFICIENT SLACK IN NEUTRAL EXTENSION AND GROUND BUS TO FACILITATE REMOVAL AND PARKING OF PRIMARY CABLES.
2. MULTIPLE GROUND RODS MAY NOT FIT INSIDE ENCLOSURE.
3. MULTIPLE GROUND RODS MAY NOT BE NECESSARY.

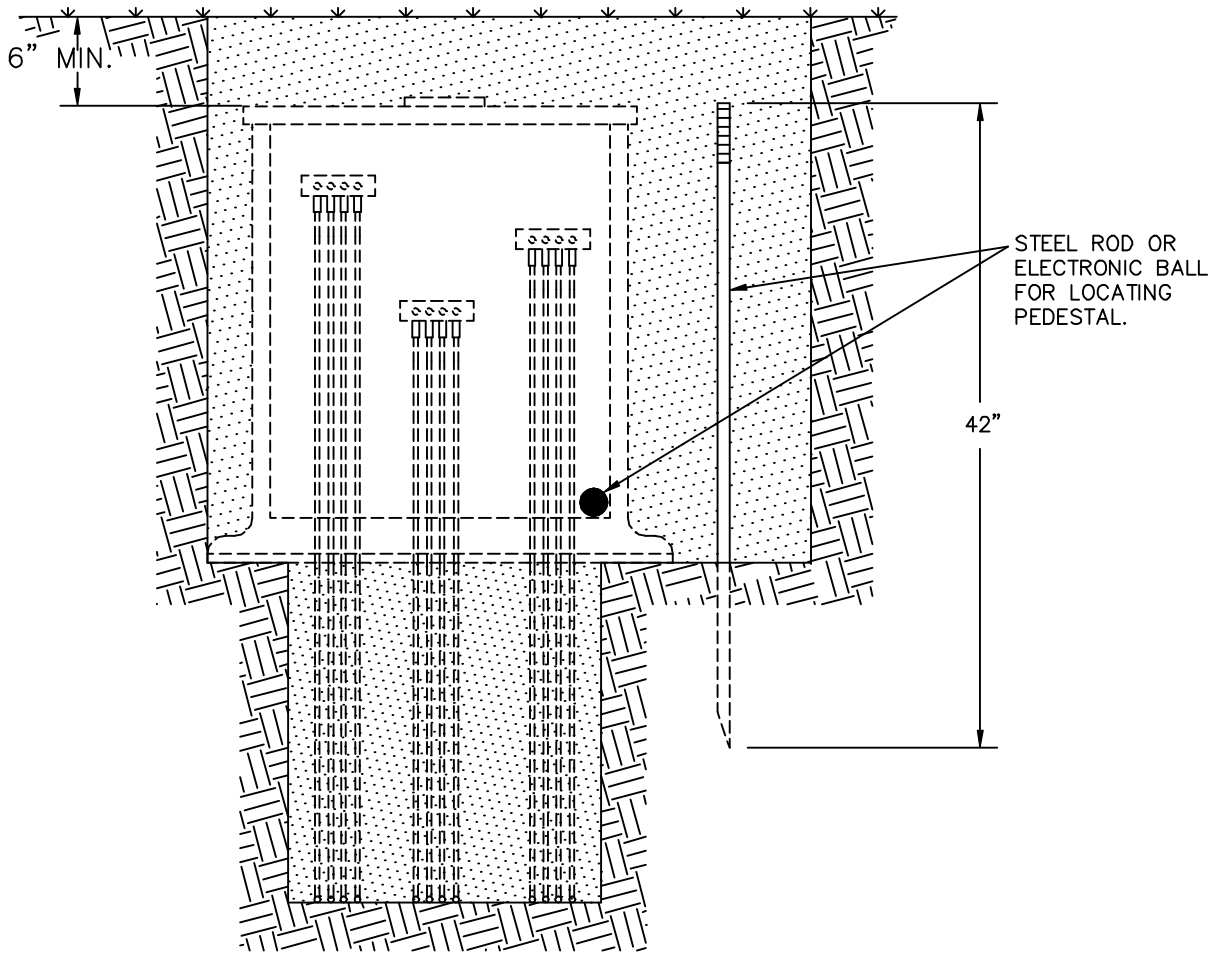
REFERENCE NO.	MATERIAL
①	Neutral extension
②	Ground bus
③	Parallel compression connector
④	Box grounding connector
⑤	Plate grounding connector
⑥	Bleed wire from elbow termination
⑦	Bleed wire compression connector
⑧	#6 SD CU

GUIDELINE ONLY

SECTIONALIZING PEDESTAL GROUNDING

2000

UX5

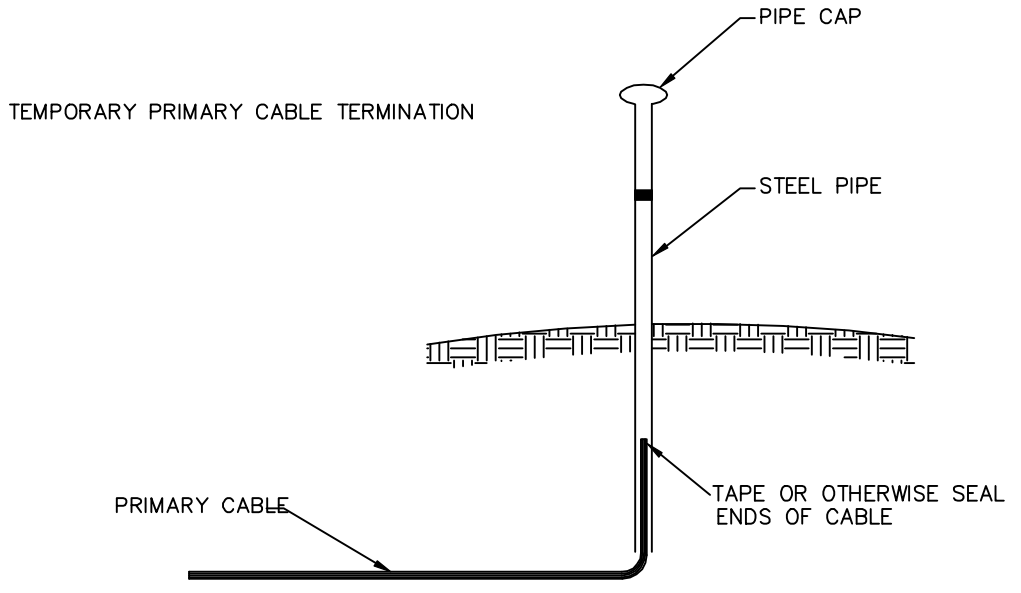


NOTE:

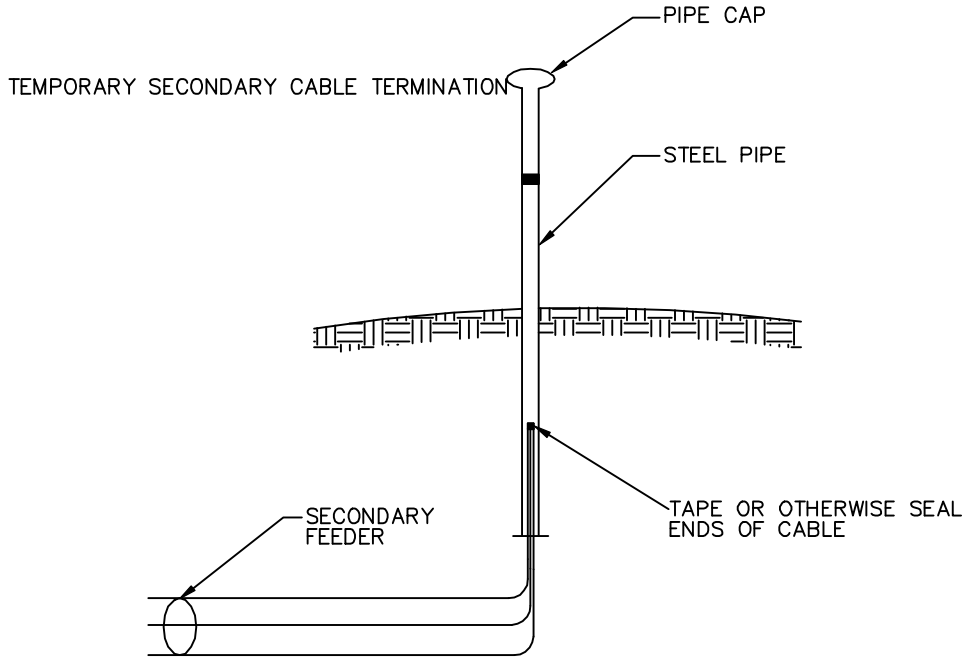
SEE DRAWING UK6

GUIDELINE ONLY

	LOCATION METHODS FOR BELOW GRADE ENCLOSURE	
	2000	UX7

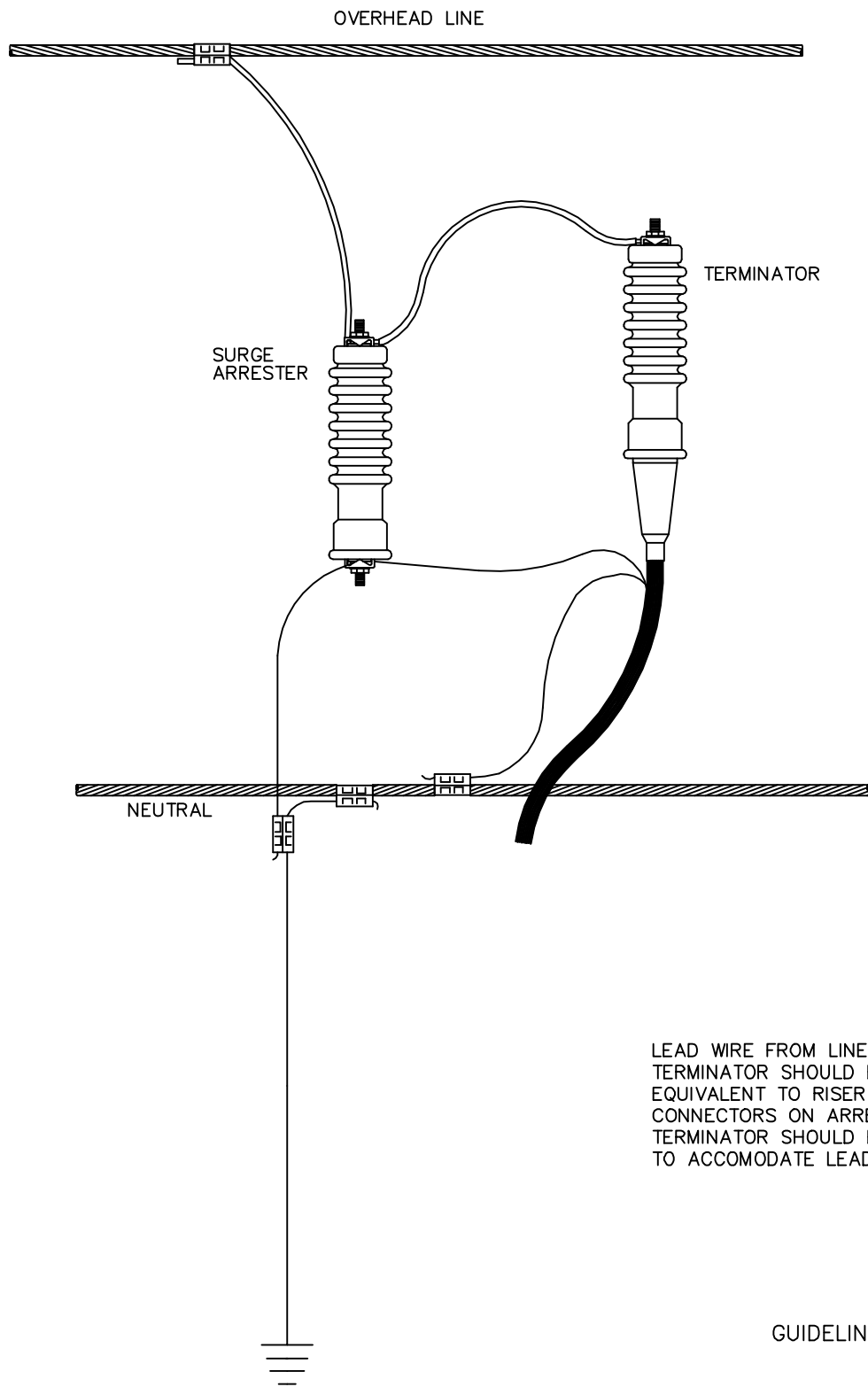


OR



GUIDELINE ONLY

TEMPORARY PRIMARY OR SECONDARY CABLE TERMINATION FOR FUTURE USE		
	2000	UX8



CONNECTION OF TERMINATOR / ARRESTER TO OVERHEAD LINE		
	2000	UX11