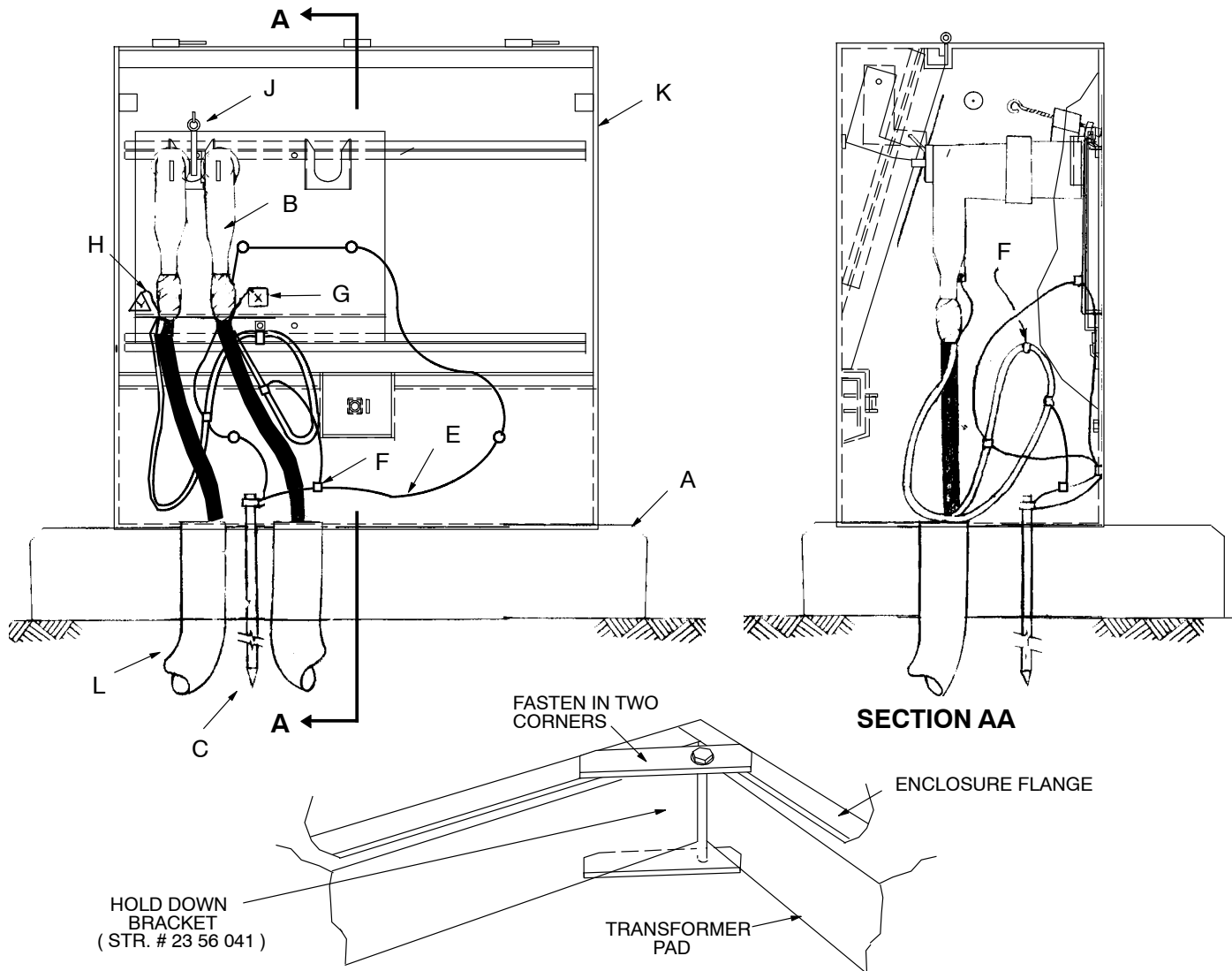


# UNDERGROUND EQUIPMENT

50

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**HOLD DOWN BRACKET DETAIL**

**NOTES:**

1. Secure compartment to pad using hold down plates and hold down brackets. Hold down plates will be furnished with the composite pads and hold down brackets will be furnished with the compartments. If hold down brackets are missing or if additional brackets are required they may be ordered (Stock #23-56-041).
2. See Dist. Std. **34 21 05 \*\*** for the location of conduits.
3. Train cables so that elbows can be operated safely and easily. Ground as shown.
4. Remove the shipping caps from a feed thru bushing and wipe the surfaces clean. Apply silicone grease (Stock #31-51-050) before installing a loadbreak elbow, insulating cap, or elbow lightning arrester. Place the feed thru bushing into one of the parking stands provided. If more than two cable positions are required, use Dist. Std. **51-11-06 \*\***.
5. DO NOT ENERGIZE a feed thru bushing with a shipping cover in place. Covers are only intended to keep the bushing interfaces clean during shipping and handling. Use a high voltage insulating cap (Stock #17-55-227) to cover an unused position on the feed thru bushing.

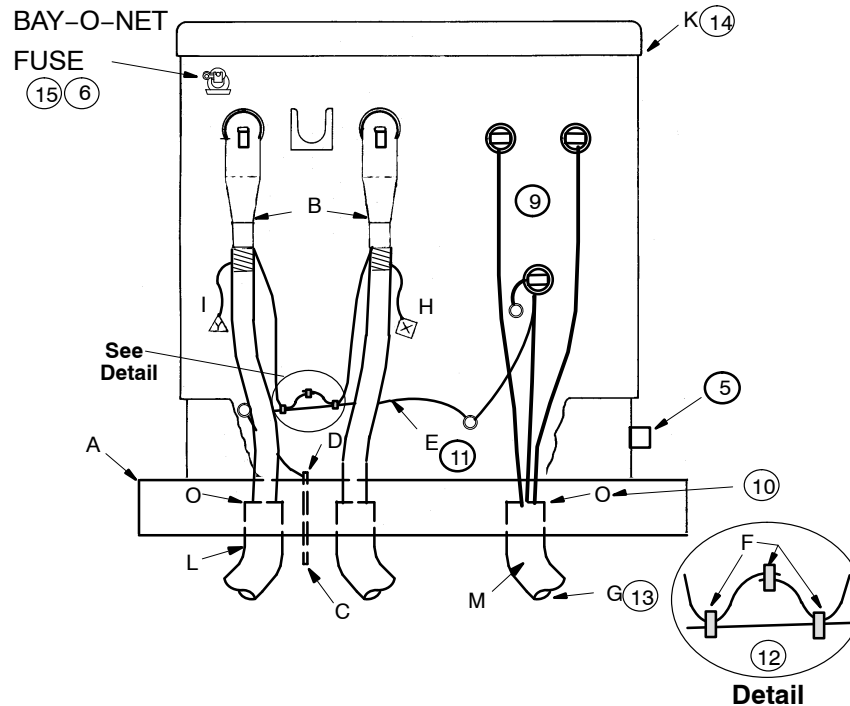
**EQUIPMENT - COMPARTMENT**  
**Padmounted - Dead Front - Single Phase Dummy Transformer**  
**For # 2 Al 15 kV Cable Only**

**51 11 02 \*\***  
**Sheet 2 of 2**

6. In Missouri residential developments, the contractor will install the pad and bends. Use Standard 51 11 02 02.
7. A minimum clearance of 10' shall be provided at the front of the compartment.
8. Faulted circuit indicators (Stock #60-55-001) may be installed on the out-going cables.

		Std. / Stk. No.	Description	51 11 02 **	01	02*
6	A	12 06 198	Pad - Transf. 42" x 42" x 4", Composite		1	
	B	42 34 62 01	Termination - Elbow, #2		2	2
	C	23 63 069	Rod - Grd. 5/8" x 8'		1	1
	D	17 52 032	Clamp - Grd. Rod. 5/8" for #8 - 1/0		1	1
	E	18 52 025	Wire - Cu., # 2 S.D. (ft.)		10	10
	F	17 54 373	Connector - Split Bolt		3	3
	@ G	16 51 079	Tag - Letter X, Red Sq.		1	1
	@ H	16 51 080	Tag - Letter Y, Blue Tri.		1	1
	J	17 55 228	Bushing - Feed Thru		1	1
	K	54 07 235	Enclosure - Primary Pedestal		1	1
6	L	12 51 173	Bend - Plastic, 3", 36" Rad		2	
		12 51 176	Bend - Plastic 4", 36" Rad			
	M	23 56 041	Bracket - Hold Down		4	4

\*See Note 6



**Construction Note(s):**

1. Train cables and provide enough concentric neutral length to allow movement of the elbows from the bushings to the parking stand.
2. Bolts and hold down plates for securing the transformer to the pad are provided with the pad.
3. See DCS **34 21 05 \*\*** for pad installation.
4. For 4/0 cable, substitute elbow termination with DCS **42 34 62 02**.
5. External provision for grounding – for use by communication companies.
6. Positions of bay-o-net fuses may vary.
7. For most Illinois transformer installations, Ameren will install the pad and bends–see DCS **51 11 04 04**. For Missouri residential and commercial developments the contractor will install the pad and bends – see DCS **51 11 04 02**. For some Missouri individual transformer installations, Ameren will install the pad and bends–see DCS **51 11 04 03**.
8. Elbow arresters should be installed at all open points including the last transformer in a radial feed – see DCS **54 11 01 01**.
9. Transformers are delivered with slip-fit set screw type lugs on each secondary bushing stud. The lugs have eight positions and will accommodate cables up to 500 kcmil. If larger cables are used, the lugs can be replaced with five position lugs that will accommodate cables up to 750 kcmil. For 75kVA and smaller transformers use Stock #17-55-230. For 100kVA and larger transformers use Stock #17-55-229.
10. If bends are cut off, apply a bell end coupling (O) over the end of each conduit.
11. Run continuous length of #2 bare CU ground wire to connect an open port of the X2 connector, to the two lower tank grounds, and to the ground rod
12. Grounding practices are different in Missouri and Illinois.  
In Missouri – Connect cable concentric neutrals to the #2 bare CU ground and then end--to--end using 3 split bolt connectors as shown in this detail.  
In Illinois – Cable Concentric neutrals may be single-point connected to the #2 bare CU ground using hot-line clamps or split bolt connectors.

**UG EQUIPMENT TRANSFORMERS**  
**Padmounted–Single–Phase 2400, 7200, 7620, 7970 Volts**  
**25 KVA And Above**

**51 11 04 \*\***

Sheet 2 of 2

51 11 04 01	Ameren Installed With Lightweight Pad
51 11 04 02	Contractor Installed With Heavy Pad
51 11 04 03	Ameren Installed With Heavy Pad
51 11 04 04	Ameren Installed With Lightweight Pad and Conduit (See note 13)

		Std. / Stk. No.	Description	51 11 04 **	01	02	03	04
7	A	<b>34 21 05 01</b>	Pad, Transformer, Lightweight		1	–	–	1
		<b>34 21 05 02</b>	Pad, Transformer, Heavy		–	C	1	–
4	B	<b>42 34 62 01</b>	Elbow, Termination, #2 Al.		2	2	2	2
	C	23 63 069	Rod, Ground, 5/8" x 8'		1	1	1	1
	D	17 52 032	Clamp, Ground Rod, 5/8" For #8 – 1/0		1	1	1	1
	E	18 52 025	Wire, Cu., #2 S.D. (ft.)		5	5	5	5
	F	17 54 373	Connector, Split Bolt		3	3	3	3
	G	12 01 263	Conduit, 2–1/2", SCH 40 PVC, 10' Length		–	–	–	2
13 @	H	16 51 079	Tag, Letter "X", Red Sq.		1	1	1	1
	I	16 51 080	Tag, Letter "Y", Blue Tri.		1	1	1	1
14 @	K	MR – – – X	Transformer, 7200V or		1	1	1	1
		MZ – – – X	Transformer, 7200V or		1	1	1	1
		TR – – – X	Transformer, 7970V or		1	1	1	1
		WR – – – X	Transformer, 2400V x 7200V or		1	1	1	1
		SR – – – X	Transformer, 7620V or		1	1	1	1
		SZ – – – X	Transformer, 7620V or		1	1	1	1
		ZR – – – X	Transformer, 2400V x 7200V x 7620V or		1	1	1	1
		ZZ – – – X	Transformer, 2400V x 7200V x 7620V		1	1	1	1
13 @	L	12 51 173	Bend, Conduit, PVC, 3", 36" Rad. (Primary)		2	C	2	2
		12 51 173	Bend, Conduit, PVC, 3", 36" Rad. (Secondary & 400A Service)		–	C	–	–
8 @	M	12 51 331	Bend, Conduit, PVC, 1 1/2", 24" Rad. (Streetlight)		–	C	–	–
		12 51 264	Bend, Conduit, PVC, 2 1/2", 24" Rad. (200 A Service )		–	–	–	2
10 @	N	<b>54 11 01 01</b>	Arrester, 10kV Elbow or		2	–	2	2
		<b>54 11 01 03</b>	Arrester, 10kV Parking Stand		1		1	1
	O	40 83 492	Coupling–Conduit, PVC, Bell End, 1 1/2"		–	C	–	–
		12 51 398	Coupling–Conduit, PVC, Bell End, 2 1/2"		–	–	–	–
		12 51 008	Coupling–Conduit, PVC, Bell End, 3"		2	C	2	2
	P	49 55 520	Marker, Buried conduit, Red		–	–	–	2

"C" = Contractor Installed Materials (Missouri Only)

Engineering Note(s):

13. DCS 51 11 04 04 is required in Illinois for residential subdivision developments when the transformer is placed on the property line. It includes Item M (12 51 264), Item G (12 01 263) and item P (49 55 520) for future use.

14. See DCS **13 00 01 02** for single–phase padmount transformer selection.  
 See DCS **13 00 04 01** for typical transformer dimensions, weight, and oil volumes.

Operating Note(s):

15. See DCS **59 51 53 40** for bay–o–net fuse operation and replacement.

**DISTRIBUTION**  
**CONSTRUCTION STANDARDS**



ENG: DG  
 REV. NO: 21  
 REV. DATE: 07/01/20

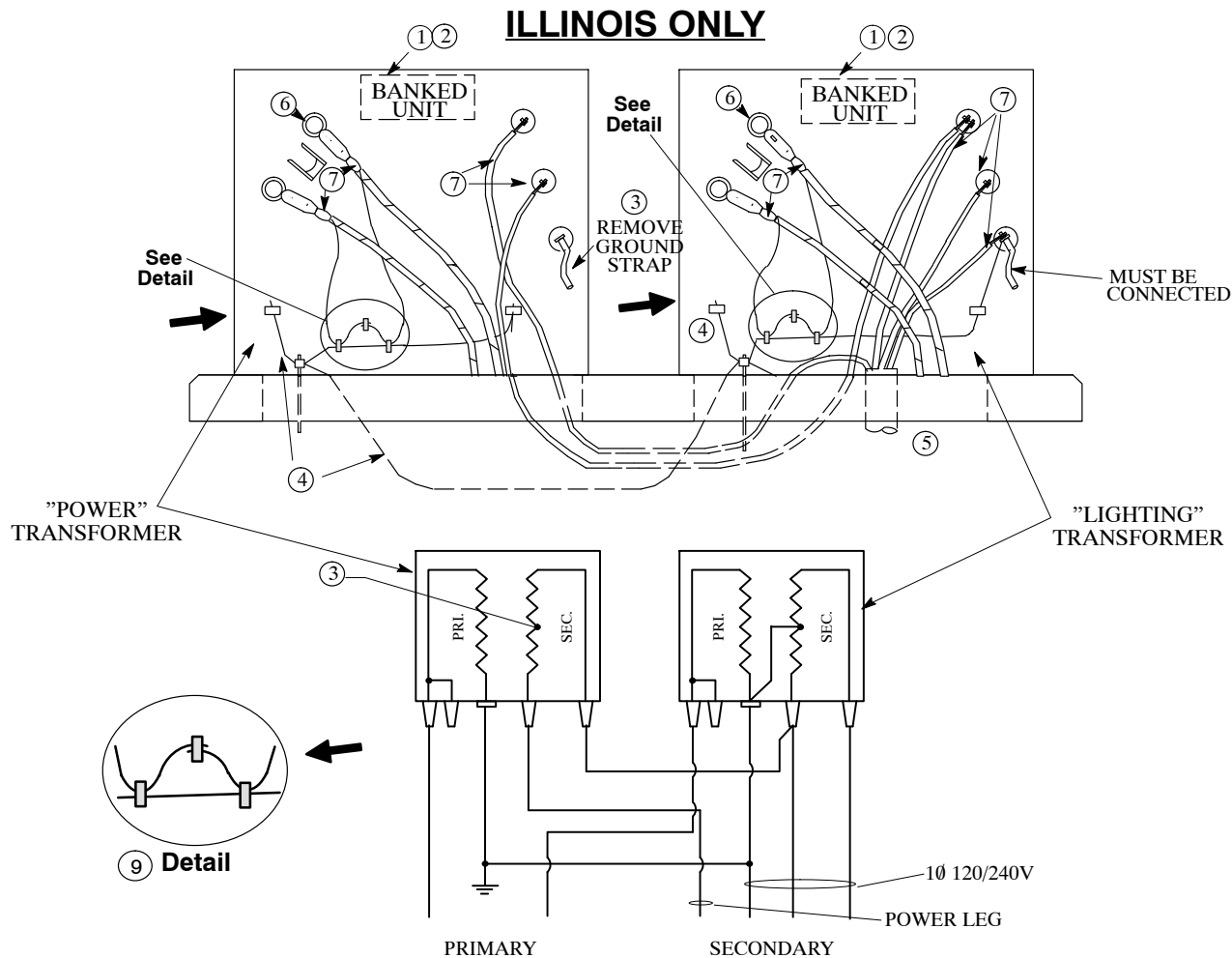
# EQUIPMENT – TRANSFORMERS

## Open WYE Primary

### Two Single Phase Padmount Transformers

51 11 05 01

Sheet 1 of 1



#### NOTES:

1. This installation should only be used where three primary phases are not available. 120/240 volt, 3-phase, 4-wire, open delta service is provided with this connection.
2. Apply "BANKED UNIT" label in secondary compartment of both transformers. Use label stock #16-04-979.
3. REMOVE THE GROUND STRAP FROM THE SECONDARY NEUTRAL LUG OF THE POWER TRANSFORMER AND INSULATE THE NEUTRAL TERMINAL LUG WITH TAPE. If the transformer does not have an insulated secondary neutral terminal (no bushing), do not use as power transformer because this would require getting inside the transformer and disconnecting the secondary neutral winding.
4. Primary concentric neutral shall be grounded to ground rod and transformer case.

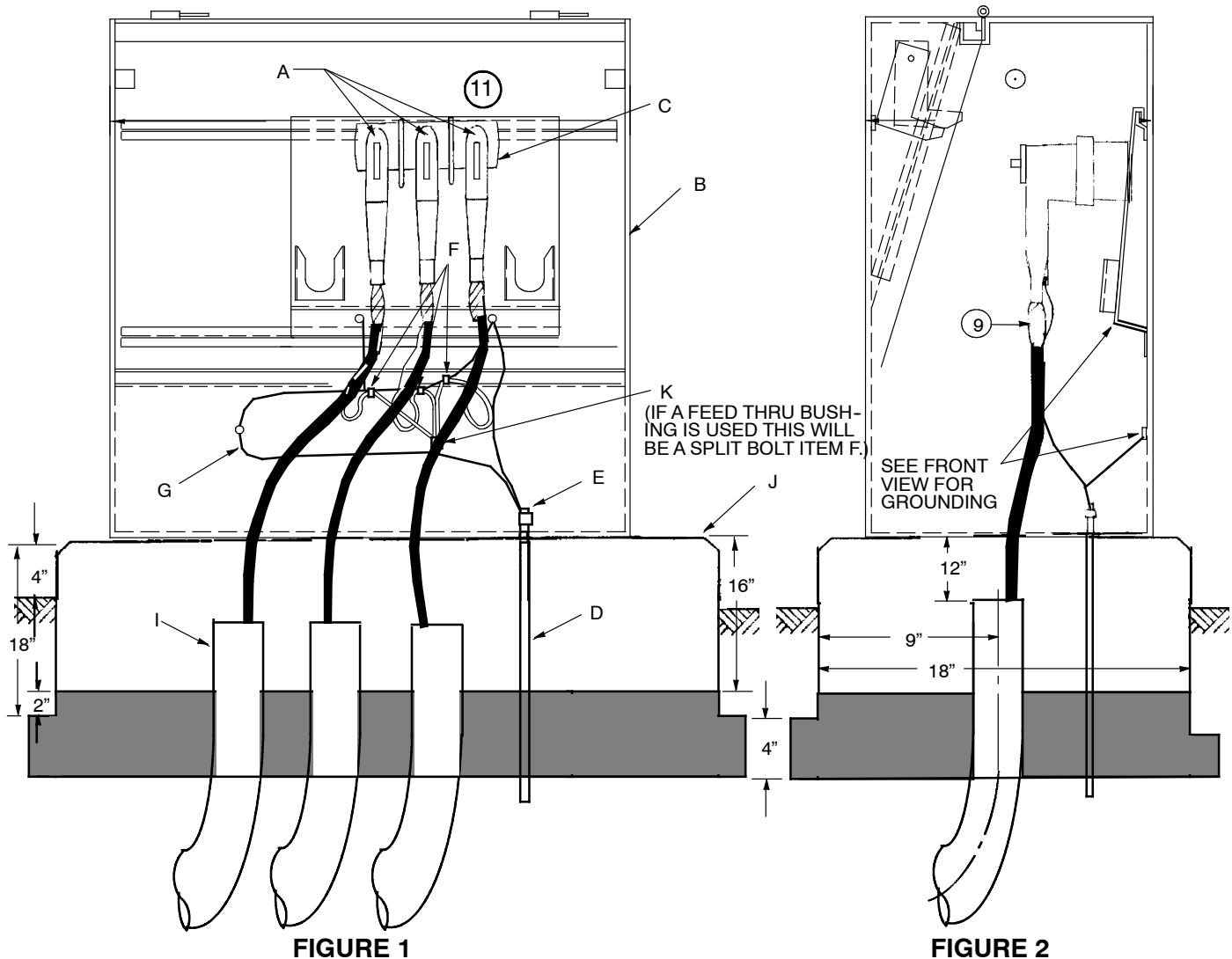
**CAUTION:** The transformer cases and ground rods must be interconnected before the transformers are energized.

5. The customer must supply wire of sufficient length to extend from the lighting to the power transformer.
6. When primary loop is normally left open, use a parking stand arrester (Stk.# 10-01-151) in the parking stand and install an elbow arrester (Stk. # 10-01-138) on the unused transformer bushing.
7. Install transformer identification numbers and cable identifiers.
8. Primary cable risers and terminators should originate from the same pole. Cables should run along the same route and in the same trench if possible.
9. Connect cable concentric neutrals to the #2 bare CU ground and then end-to-end using 3 split bolts.

**DISTRIBUTION  
CONSTRUCTION STANDARDS**



ENG:DG  
REV. NO: 4  
REV. DATE: 05/02/14



**NOTES:**

1. An initial depth of 18" shall be excavated and all loose soil shall be removed or tamped. The length and width of the hole should be sized to allow a minimum of 6" of clearance on all sides.
2. To install the 36" radius bends, an increase in the initial excavation depth will be required. After the bends have been installed, crushed stone screening shall be placed and tamped to the level shown in Figure 1.
3. The final depth should be adjusted to provide 4" of exposed ground sleeve pad at final grade.
4. Stabilize the ground sleeve pad over the conduits before backfilling so that there will be no shifting. Provide 12" of space between the load bearing surface of the ground sleeve pad and the end of each conduits. See Figure 2.
5. To further stabilize the ground sleeve pad and the bends, place additional screening inside the ground sleeve pad and hand tamp in place.
6. Backfill with loose material, DO NOT backfill next to the ground sleeve pad with chunks of material or rocks. Pack loose backfill by foot tamping and do not tamp excessively close to the ground sleeve pad sides. NOTE: Hydraulic tamping is not recommended.
7. To install 3-way or 4-way junctions, remove the mounting plate from the enclosure. Mount 3-way junctions using the two "U" straps and bolts furnished with the junctions. Mount 4-way junctions using the three "U" straps and bolts furnished with the junction. Mount the junctions so that the center line is approximately 24" from the top of the pad. After the junction is installed, replace the mounting plate. Secure the plate in a convenient location.



**EQUIPMENT - ENCLOSURE**  
**2-Way, 3-Way, 4-Way Primary Pedestal**  
**15kV, 200 Amp Loadbreak, Single Phase (For #2Al 15 kV Only)**

**51 11 06 \*\***

Sheet 2 of 2

NOTE: If only two cables will be installed, use a feed thru bushing. Place the feed thru bushing into one of the parking stands. If the installation is to be a dummy transformer, see Dist. Std. **51 11 02 01**.

8. Train cables so that elbows can be operated safely and easily. Ground as shown.
9. Remove the shipping covers from the junctions and wipe the surfaces clean. Apply silicone grease (Stock #31-51-050) before installing a loadbreak elbow, insulating cap, or lightning arrester.
10. **CAUTION:** If all junction positions are not used, a high voltage insulating cap (Stock #17-55-227) must be installed on the unused positions.  
**DO NOT ENERGIZE** a junction with a shipping cover in place. Covers are only intended to keep the bushing interfaces clean during shipping and handling.
11. 10' minimum clearance shall be provided at the front of the primary pedestal.
12. Faulted circuit indicators should be installed on the elbows at the cable entrance. All concentric neutral wires must be outside of the faulted circuit indicator closed core CT. Faulted circuit indicators should be installed on the out-going cables.
13. In Missouri residential developments, the contractor will install the sleeve and bends. See Stds. 51 11 06 04 thru 06.
14. Lightning protection should be installed at open points. See Dist. Std. **54 11 01 \*\***.
15. If bends are cut off apply a bell end coupling (M) over the end of each conduit.

		Std./ Stk. No.	Description	51 11 06 **	01	02	03	04*	05*	06*
	A	42 34 62 01	Termination - Elbow, #2		2	3	4	2	3	4
	B	54 07 235	Enclosure - Primary Pedestal		1	1	1	1	1	1
	C	17 07 137	Junction - Load Break 3-way			1			1	
		17 07 138	Junction - Load Break 4-way				1			1
	D	23 63 069	Rod - Grd. 5/8" x 8'		1	1	1	1	1	1
	E	17 52 032	Clamp - Grd Rod 5/8" For #8 - 1/0		1	1	1	1	1	1
	F	17 54 373	Conector - Split Bolt		3	3	4	3	3	4
	G	18 52 025	Wire - Cu. #2 S.D. (ft.)		12	12	12	12	12	12
	H	17 55 228	Bushing - Feed Thru		1			1		
	I	12 51 173	Bend - Plastic, 3" 36" Rad		2	3	4			
		12 51 176	Bend - Plastic, 4" 36" Rad							
@	J	12 06 134	Pad - Ground Sleeve		1	1	1			
	K	17 54 140	Connector - 2 Bolt			1	1		1	1
@	L	60 55 001	Indicator - Faulted Circuit		1	2	3	1	2	3
@	M	12 51 008	Coupling - Conduit, Plastic, Bell End, 3"		2	3	4			
		12 51 254	Coupling - Conduit, Plastic, Bell End, 4"		2	3	4			

\*See Note 13.

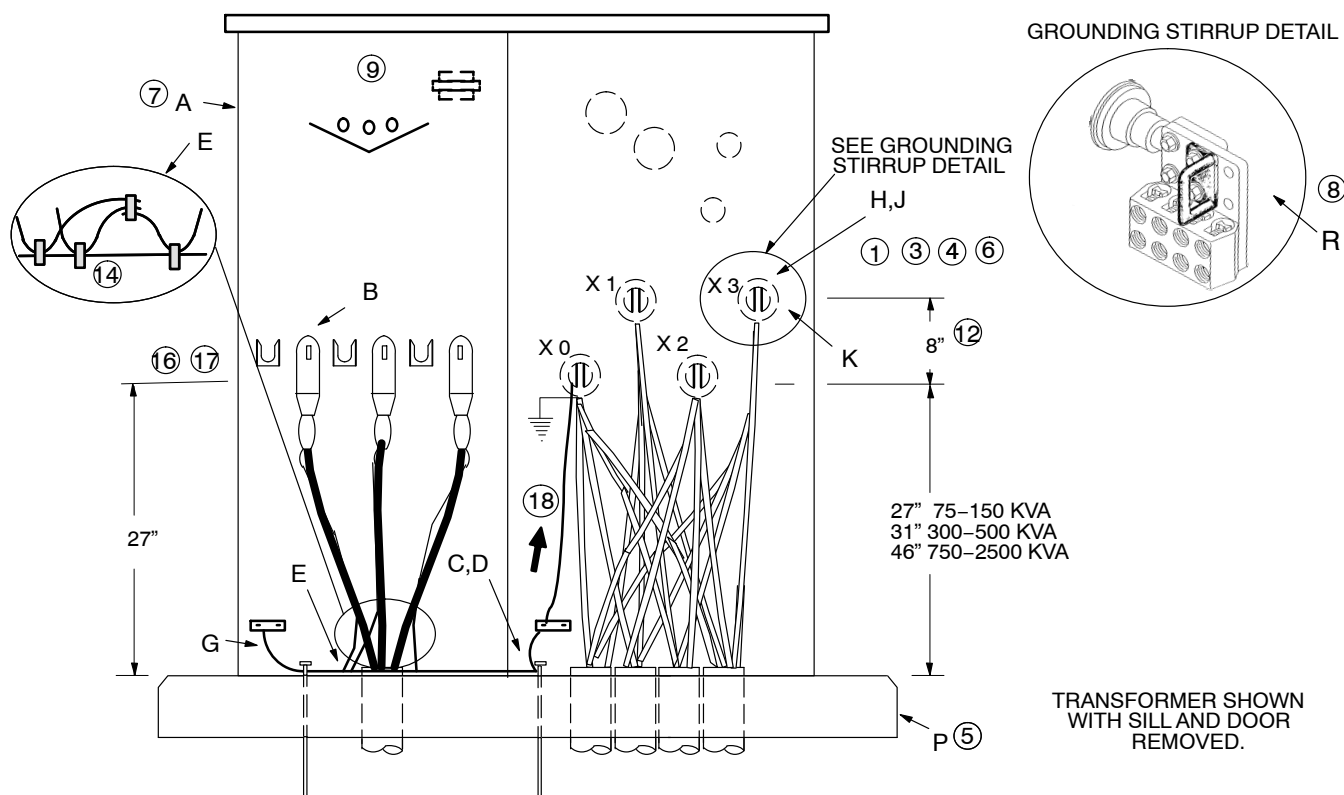
# EQUIPMENT – TRANSFORMERS

## Padmounted – Dead Front – Three Phase

### Radial Feed 75 Through 2500 KVA – 15kV and Below

51 12 00 \*\*

Sheet 1 of 3



#### NOTES:

1. When installing secondary lugs use the maximum number of mounting holes that will align with the spade holes.
2. Provide enough concentric neutral length to attach to ground and also allow movement of the elbow from the bushing to the parking stand.
3. Stainless steel machine bolts and belleville spring washers are required for bolting aluminum lugs to secondary terminals. Clean the lugs and terminals and apply inhibitor to the mating interfaces. See DCS 59 52 00 43 for Belleville washer installation instructions. Everdur bolts and brass washers are to be used for bolting copper lugs to secondary terminals.
4. Preferred number of secondary cables per terminal is six or less. In no case shall the number of cables per terminal exceed twelve.
5. See DCS 34 21 05 04 or 34 21 05 05 for pad installations. See also DCS 34 21 04 05 if vault is needed for cable training.
6. Verify that lugs are available for specific operating company.
7. See DCS 13 00 04 01 for typical dimensions, weights, and gallons of oil.
8. If the grounding stirrup is installed, longer bolts may be required.
9. Some transformers may have Bay-O-Net fuses. See DCS 59 51 53 40.
10. Install ground rod clamp 3" below top of rod to provide space for attaching ground set.
11. 480 Volt Three Wire Service From 480Y/277 Volt Four Wire Transformer

**CAUTION: DO NOT MAKE THIS CONVERSION ON WYE-WYE TRANSFORMERS WITH INTERNALLY CONNECTED PRIMARY AND SECONDARY NEUTRALS.**

a. If 480 volt three-wire grounded is required, follow these steps to convert a 480Y/277 volt four-wire transformer.

- Remove the secondary neutral ground strap.
- Tape the secondary neutral terminal to prevent accidental contact and any misunderstanding as to which terminals are being used and the type service being provided.

- Run a #2 copper lead from the "A" phase secondary terminal to the tank ground connector. Ground the transformer tank to a driven ground rod and to the common system neutral (if present).

**CAUTION: AFTER THE "A" SECONDARY TERMINAL IS ENERGIZED, THE TAPED NEUTRAL TERMINAL IS ENERGIZED.**

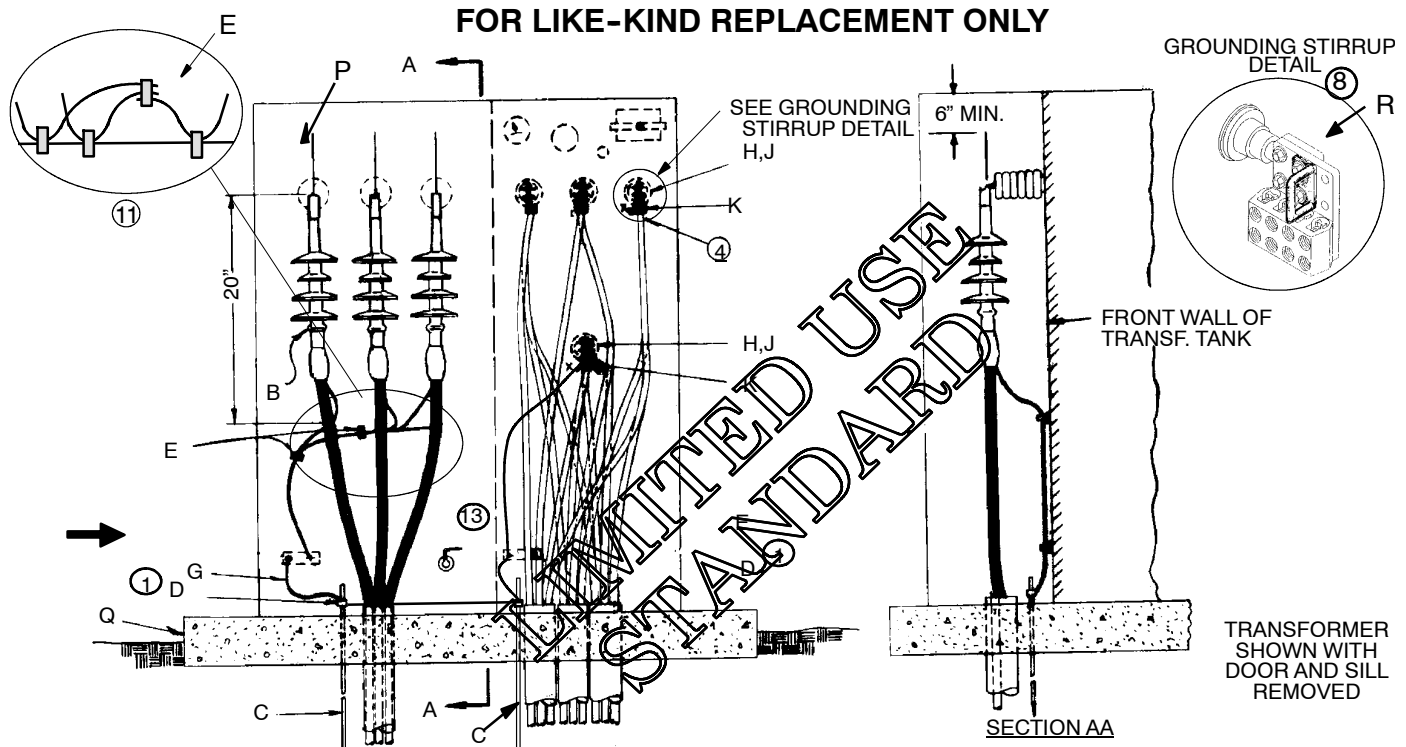
- Before connecting the customer's cable, determine which cable the customer has grounded (if any) and connect that cable to the now grounded "A" phase secondary terminal.
- b. If 480 volt three-wire ungrounded service is required, follow these steps to convert a 480Y/277 volt four-wire transformer:
- Remove the secondary neutral ground strap.
  - Ground the transformer tank to the driven ground rod and to the common system neutral (if present).
12. 150kVA and smaller transformers manufactured prior to mid-2010 will have 6" vertical spacing between secondary bushings.
  13. For non-standard primary cable sizes, see DCS **42 34 62 \*\*** for proper elbow termination. 4kV transformers 1500kVA and larger require 600 amp non-load break terminations (DCS **42 34 64 \*\***).
  14. Connect cable concentric neutrals to the #2 bare CU ground, then end-to-end using 4 split bolt connectors.
  15. The Aluminum lugs can be used for Aluminum or Copper conductors.
  16. Three-phase radial-feed padmount transformers connected to EPR insulated primary cable do not need arresters. If connected to XLPE insulated primary cable, replace the single-bushing inserts with double-bushing inserts and install elbow lightning arresters.
  17. Fault current indicators can be installed to aid in determining if a fault has occurred in the transformer or the cable feeding the transformer.
  18. Run continuous length of #2 bare CU ground wire to connect an open port of the X0 connector to the two lower tank grounds and to the ground rods.

**EQUIPMENT – TRANSFORMERS**  
 Padmounted – Dead Front – Three Phase  
 Radial Feed 75 Through 2500 KVA – 15kV and Below

**51 12 00 \*\***

Sheet 3 of 3

		Stnd. / Stk. No.	Description	51 12 00 **	
				02	04
@7,9 13	A		Transformer, Three-Phase, Dead Front	1	1
	B	42 34 62 01	Termination, 15kV, #2 Elbow	3	
		42 34 62 02	Termination, 15kV, #4/0 Elbow		3
	C	23 63 027	Rod, Ground, 5/8" x 8'	2	2
	D	17 52 032	Clamp, Ground Rod, 5/8" For #8 – 1/0	2	2
14	E	17 54 373	Connector, Split Bolt, #2 Str. CU.	3	3
14	E	17 54 182	Connector, Split Bolt, #3 Str. CU.	1	1
18	G	18 52 025	Wire, Copper, #2 Solid, Soft Drawn	15	15
@3,8	H	21 56 078	Bolt, Machine, 1/2" x 2" Stainless	–	–
		21 53 022	Bolt, Machine, 1/2" x 1-3/4", Everdur	–	–
		21 54 316	Bolt, Machine, 1/2" x 2-1/2", Stainless	–	–
		21 56 075	Bolt, Machine, 1/2" x 1-1/2", Stainless	–	–
@3	J	21 75 042	Washer, Round, 9/16", Brass	–	–
		12 56 052	Washer, Belleville Spring, 1/2", S.S.	–	–
		12 56 053	Washer, Flat, 1/2", S.S. (2 ea. per Belleville)	–	–
@4,6,15	K	17 55 177	Lug, CU., 2 – #4/0 to 500 kcmil	–	–
		17 55 176	Lug, CU., 3 – #4/0 to 500 kcmil	–	–
		17 55 180	Lug, CU., 3 – 500 – 1000 kcmil	–	–
		17 55 190	Lug, Alum 1 – 1/0 to 1000 kcmil, Lay-In	–	–
		17 55 289	Lug, Alum 2 – 1/0 to 1000 kcmil, Lay-In	–	–
		17 55 209	Lug, Alum 3 – 1/0 to 1000 kcmil, Lay-In	–	–
		17 55 233	Lug, Alum 6 – 1/0 to 500 kcmil, Lay-In	–	–
		17 55 232	Lug, Alum 6 – 1/0 to 1000 kcmil, Lay-In	–	–
		17 55 343	Lug, Alum 1-1/0-750 kcmil	–	–
		17 55 344	Lug, Alum 2-1/0-750 kcmil	–	–
		17 55 345	Lug, Alum 4-1/0-750 kcmil	–	–
		17 55 346	Lug, Alum 5-1/0-750 kcmil	–	–
		17 55 349	Lug, Alum 6-1/0-750 kcmil	–	–
		17 55 350	Lug, Alum 8-1/0-750 kcmil	–	–
@5	P	12 06 123 12 06 124	Pad, Composite, 75-750 KVA OR Pad, Composite, 1000-2500 KVA	1	1
@8	R	17 55 510	Stirrup, Grounding, Bolted	3	3
@16	S	17 55 265	15kV Bushing Insert, 200A Feed-Thru	3	3
@16	T	10 01 138	10 kV Elbow Arrester	3	3
@16		10 01 244	10kV Bushing Well Arrester	3	3
@17	U	60 55 001	Indicator, Fault Current, 1 Phase	3	3



**CAUTION:**

YOU MUST MAINTAIN A 6" CLEARANCE FROM THE TOP OF THE STINGER TO THE CABLE COMPARTMENT ROOF. ON SOME SMALLER SIZE TRANSFORMERS, IT MAY BE NECESSARY TO CUT OFF ABOUT 1" OF THE STINGER TO ACCOMPLISH THIS. THE STINGER SHOULD EXTEND ABOVE THE EYEBOLT, NOT BELOW, TO REDUCE STRAIN ON THE AL. CABLE.

**NOTES:**

1. Install ground rod clamp 3" below top of rod to provide space for attaching ground set.
2. Stainless steel machine bolts and Belleville spring washers required for bolting aluminum lugs to secondary terminals. Clean lugs, terminals and use inhibitor. See DCS **59 52 00 43** for Belleville washer installation instructions. Everdur bolt and brass washer to be used for bolting copper lugs to secondary terminals.
3. Preferred number of secondary cables per terminal is six or less. In no case shall the number of cables per terminal exceed twelve.
4. Secondary connections as shown are for 208Y/120 or 480Y/277. For 480 volt three wire service, see the instructions below.
5. If 750 kcmil Al. cable is used on 1500-2500 KVA 4160 volt transformers, use terminator Stock #17-07-142 and pin terminal Stock #17-54-248.
6. See DCS **13 00 04 01** for typical dimensions, weights, and gallons of oil.
7. See DCS **34 21 05 04**, or **34 21 05 05** for pad installation.
8. If the grounding stirrup is installed, longer bolts may be required.
9. When installing secondary lugs use the maximum number of mounting holes that align with the spade holes.
10. Verify that lugs are available for specific operating company.G

**480 VOLT THREE WIRE SERVICE FROM 480Y/277 VOLT FOUR WIRE TRANSFORMER**

**CAUTION: DO NOT MAKE THIS CONVERSION ON TRANSFORMERS CONNECTED WYE-WYE.**

- If an external ground strap is connected to the secondary neutral (Xo) terminal, it must be removed.
- Tape the secondary neutral terminal to prevent accidental contact and any misunderstanding as to which terminals are being used and the type service being provided.
- Run a #2 copper lead from the "A" phase secondary terminal to the tank ground connector. Ground the transformer tank to a driven ground rod and to the common system neutral (if present).

**EQUIPMENT - TRANSFORMERS**  
Padmounted – Live Front – Three Phase  
Radial Feed – 15kV and Below

**51 12 01 \*\***

Sheet 2 of 3

- Before connecting the customer's cable, determine which cable the customer has grounded (if any) and connect that cable to the now grounded "A" phase secondary terminal.

CAUTION: After the "A" phase secondary terminal is energized, the taped neutral terminal is energized.

11. Connect cable concentric neutrals to the #2 bare CU ground, then connect end-to-end using 4 split bolt connectors.
12. The Aluminum lugs can be used for Aluminum or Copper conductors.
13. Run continuous length of #2 bare CU ground wire to connect an open port of the X0 connector to the two lower tank grounds and to the ground rods.

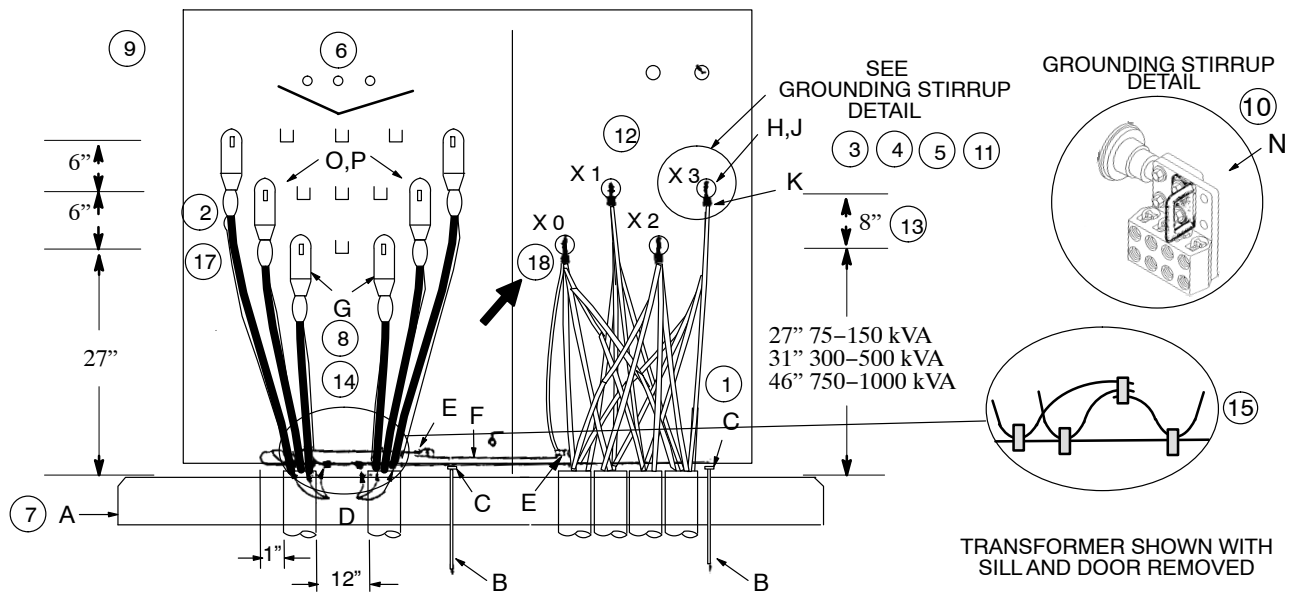
**EQUIPMENT - TRANSFORMERS**  
 Padmounted - Live Front - Three Phase  
 Radial Feed - 15kV and Below

**51 12 01 \*\***

Sheet 3 of 3

		Std. / Stk. No.	Description	51 12 01 **	02	04
@			Transformer, Three Phase		1	1
	B	17 07 145	Termination, 15kV, #2-4/0		3	3
	C	23 63 069	Rod, Ground, 5/8" x 8'		2	2
	D	17 52 032	Clamp, Ground Rod, 5/8" For #8 - 1/0		2	2
	11	E	17 54 373	Connector, Split Bolt, #2 Str. CU.	3	3
			17 54 182	Connector, Split Bolt, 3-#2 Str. CU	1	1
	13	G	18 52 025	Wire, Copper, #2 Solid, Soft Drawn	15	15
	@2		21 56 078	Bolt, Machine, 1/2" x 2" Stainless	-	-
		H	21 53 022	Bolt, Machine, 1/2" x 1-3/4", Everdur	-	-
			21 54 316	Bolt, Machine, 1/2" x 2-1/2", Stainless	-	-
			21 56 075	Bolt, Machine, 1/2" x 1-1/2", Stainless	-	-
	@2		21 75 042	Washer, Round, 9/16", Brass	-	-
		J	12 56 052	Washer, Belleville Spring, 1/2", S.S.	-	-
			12 56 053	Washer, Flat, 1/2", S.S. (2 ea. per Belleville)	-	-
	@3,8,9,10,12		17 55 177	Lug, CU., 2 - #4/0 to 500 kcmil	-	-
			17 55 176	Lug, CU., 3 - #4/0 to 500 kcmil	-	-
			17 55 180	Lug, CU., 3 - 500 to 1000 kcmil	-	-
			17 55 190	Lug, Alum., 1 - 1/0 to 1000 kcmil, Lay-In	-	-
			17 55 289	Lug, Alum., 2 - 1/0-1000 kcmil, Lay-In	-	-
			17 55 209	Lug, Alum 3-1/0 to 1000 kcmil, Lay-In	-	-
		K	17 55 232	Lug, Alum., 6-1/0 to 1000 kcmil, Lay-In	-	-
			17 55 233	Lug, Alum., 6 - 1/0 to 500 kcmil, Lay-In	-	-
			17 55 343	Lug, Alum 1-1/0 to 750 kcmil	-	-
			17 55 344	Lug, Alum 2-1/0 to 750 kcmil	-	-
			17 55 345	Lug, Alum 4-1/0 to 750 kcmil	-	-
			17 55 346	Lug, Alum 5-1/0 to 750 kcmil	-	-
			17 55 349	Lug, Alum 6-1/0 to 750 kcmil	-	-
			17 55 350	Lug, Alum 8-1/0 to 750 kcmil	-	-
	5	P	17 54 232	Connector, Pin Terminal #2	3	
			17 54 233	Connector, Pin Terminal 4/0		3
	@7	Q	12 06 123	Pad, Composite, 75-750 kVA OR	1	1
			12 06 124	Pad, Composite, 1000-2500 kVA		
	@8	R	17 55 510	Stirrup, Grounding, Bolted	3	3

Padmounted – Three-Phase – Loopfeed  
75 Thru 1000 kVA



## NOTES:

1. Install ground rod clamp 3" below top of rod to provide space for attaching ground set.
2. Ensure concentric is long enough to allow movement of elbow from bushing to center parking stand.
3. Stainless steel machine bolts and Belleville spring washers required for bolting aluminum lugs to secondary terminals. Clean lugs, terminals, and use inhibitor. See DCS 59 52 00 43 for Belleville washer installation instructions.
4. Preferred number of secondary cables per bushing is six or less. In no case shall the number of cables per bushing exceed twelve.
5. When installing secondary lugs use the maximum number of mounting holes that align with the spade holes.
6. See DCS 59 51 53 40 for bay-o-net fuse information.
7. See DCS 34 21 05 05 for pad installation. See also DCS 34 21 04 05 if vault is needed for cable training.
8. Elbow arresters should be installed at all open points. DCS 54 11 01 \*\* shows a single-phase elbow arrester installation. Make adjustments for three-phase use.
9. See DCS 13 00 04 01 for typical transformer dimensions, weights and oil volumes.
10. If the grounding stirrup is installed, longer bolts may be required.
11. Verify that lugs are available for specific operating company.
12. 480 Volt Three Wire Service From 480Y/277 Volt Four Wire Transformer  
**CAUTION: WYE-WYE TRANSFORMERS WITH INTERNALLY CONNECTED PRIMARY AND SECONDARY NEUTRALS CANNOT BE USED FOR THREE-WIRE SERVICE.**

- a. If 480 volt three-wire grounded service is required, follow these steps to convert a 480Y/277 volt four-wire transformer:
  - Remove the secondary neutral ground strap.
  - Tape the secondary neutral terminal to prevent accidental contact and any misunderstanding as to which terminals are being used and the type service being provided.
  - Run a #2 copper lead from the "A" phase secondary terminal to the tank ground connector. Ground the transformer tank to a driven ground rod and to the common system neutral (if present).



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**CAUTION: After the “A” phase secondary terminal is energized, the taped neutral terminal is energized.**

- Before connecting the customer’s cable, determine which cable the customer has grounded (if any) and connect that cable to the now grounded “A” phase secondary terminal.
- b. For ungrounded 480 volt three–wire service:
  - Remove the secondary neutral ground strap.
  - Ground the transformer tank to a driven ground rod and to the common system neutral (if present).
- 13. 150kVA and smaller transformers manufactured prior to mid–2010 will have 6” vertical spacing between secondary bushings.
- 14. For non–standard primary cable sizes, see DCS **42 34 62 \*\*** for proper elbow termination.
- 15. Connect cable concentric neutrals to the #2 bare CU ground, then connect end–to–end using 4 split bolt connect-ors.
- 16. The Aluminum lugs can be used for Aluminum or Copper conductors.
- 17. Fault current indicators can be installed to aid in determining if fault has occurred in the transformer or the cable feeding the transformer.
- 18. Run continuous length of #2 bare CU ground wire to connect an open port of the X0 connector to the two lower tank grounds and to the ground rods.

## EQUIPMENT – TRANSFORMERS

51 12 02 \*\*

Padmounted – Three-Phase – Loopfeed  
75 Thru 1000 kVA

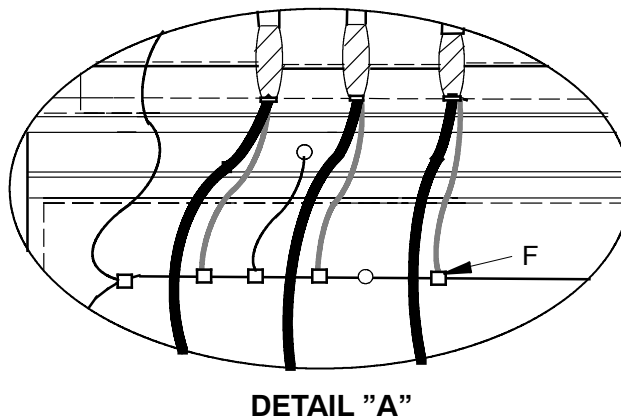
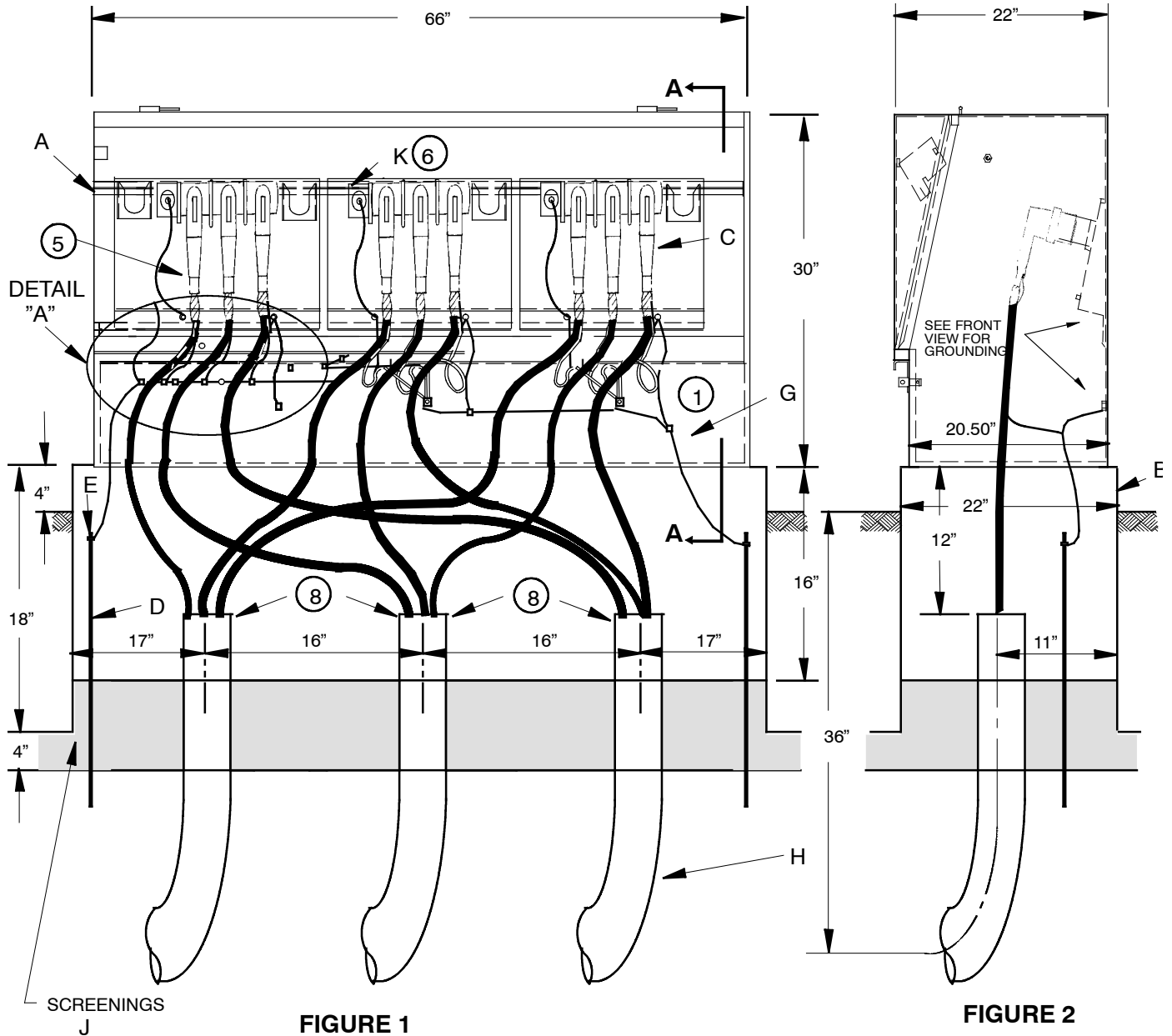
Sheet 3 of 3

		Std. / Stk. No.	Description	51 12 02 **	01	02
@9			Transformer, 3Ø Loopfeed		1	1
@7	A	12 06 124	Pad, Composite, 1000 kVA & below		1	1
	B	23 63 027	Rod, Ground, 5/8" x 8'		2	2
	C	17 52 032	Clamp, Ground Rod, 5/8" For #8 – 1/0		2	2
15	D	17 54 373	Connector, Split Bolt, #2 Str. CU		6	6
		17 54 182	Connector, Split Bolt, 3-#2 Str. CU		2	2
	E	69 58 121	Connector, Ground, Trans. Tank		3	3
18	F	18 52 025	Wire, Copper, #2 Solid S.D.		15	15
14	G	42 34 62 01	Termination, Elbow #2		6	
		42 34 62 02	Termination, Elbow 4/0			6
	H	21 56 075	Bolt, Machine 1/2" x 1-1/2" Stainless		-	-
@3,10		21 56 078	Bolt, Machine 1/2" x 2" Stainless		-	-
		21 54 316	Bolt, Machine 1/2" x 2-1/2" Stainless		-	-
@3	J	12 56 052	Washer, Belleville Spring, 1/2", S.S.		-	-
		12 56 053	Washer, Flat, 1/2", S.S. (2 ea. per Belleville)		-	-
@4,5,11,16	K	17 55 190	Lug, Alum 1-1/0-1000, Lay-In		-	-
		17 55 289	Lug, Alum 2-1/0-1000, Lay-In		-	-
		17 55 209	Lug, Alum 3-1/0-1000 kcmil, Lay-In		-	-
		17 55 233	Lug, Alum 6 – 1/0 to 500 kcmil, Lay-In		-	-
		17 55 232	Lug, Alum 6 – 1/0 to 1000 kcmil, Lay-In		-	-
		17 55 343	Lug, Alum 1-1/0-750 kcmil		-	-
		17 55 344	Lug, Alum 2-1/0 – 750 kcmil		-	-
		17 55 345	Lug, Alum 4-1/0-750 kcmil		-	-
		17 55 346	Lug, Alum 5-1/0-750 kcmil		-	-
		17 55 349	Lug, Alum 6-1/0-750 kcmil		-	-
		17 55 350	Lug, Alum 8-1/0-750 kcmil		-	-
@8	L	54 11 01 01	Arrester, 10kV Elbow		-	-
@10	N	17 55 510	Stirrup, Grounding, Bolted		3	3
@	O	16 51 079	Tag, Letter "X", Red Sq.		3	3
@	P	16 51 080	Tag, Letter "Y", Red Sq.		3	3
@17	Q	60 55 001	Indicator, Fault Current, 1 Phase		3	3

**EQUIPMENT - ENCLOSURE**  
**4-Way Primary Pedestal**  
**15kV, 200 AMP Loadbreak, Three Phase**

**51 12 03 \*\***

Sheet 1 of 2



**EQUIPMENT - ENCLOSURE**  
**4-Way Primary Pedestal**  
**15kV, 200 AMP Loadbreak, Three Phase**

**51 12 03 \*\***

Sheet 2 of 2

**INSTRUCTION FOR EXCAVATION AND PLACEMENT OF FIBERGLASS GROUND SLEEVE PAD- STK. NO. 12-06-120**

1. An initial depth of 18" shall be excavated and all loose soil shall be removed or tamped. The length and width of the hole should be sized to allow a minimum of 6" of clearance on all sides.
2. To install the 36" radius bends, an increase in the initial excavation depth will be required. After the bends have been installed, crushed stone screenings shall be placed and tamped to the level shown in Figure 1.
3. The final depth should be adjusted to provide 4" of exposed ground sleeve pad at final grade.
4. Stabilize the ground sleeve pad over the conduits before backfilling so that there will be no shifting. Provide 12" of space between the load bearing surface of the ground sleeve pad and the end of each conduit. See Figure 2.
5. To further stabilize the ground sleeve pad and the bends, place additional screenings inside the ground sleeve pad and hand tamp in place.
6. Backfill with loose material, DO NOT backfill next to the ground sleeve pad with chunks of material or rocks. Pack loose backfill by foot tamping and do not tamp excessively close to the ground sleeve pad sides. NOTE: Hydraulic tamping is not recommended
7. Reduce center to center conduit spacing to 13 inches for 4-way installation.
8. If bends are cut off apply a bell end coupling (L) over the end of each conduit.

This installation will not withstand pulling long cable lengths through the bends. If restrained bends are needed, refer to Dist. Std. **31 47 01 \*\***.

**ACCESSORY INSTALLATION**

1. Connect concentric neutral wires from each cable to the #2 copper wire connected to the ground rods. Also attach the #2 copper wire to each ground connector in the primary pedestal.
2. Install elbows as required.
3. All exposed bushings must be covered with insulating caps, elbows, or elbow arresters.
4. 10' minimum clearance shall be provided at the front of the primary pedestal.
5. Faulted circuit indicators should be installed at the elbows below the cable entrance. All concentric neutral wires must be outside of the faulted circuit indicator closed core CT. Faulted circuit indicators should be installed on the out-going cables.
6. Cover any open positions with an insulating cap.

		Std. / Stk. No.	Description	51 12 03 **	01
@	A	54 07 297	Enclosure - Primary Pedestal 3 Ø		1
	B	12 06 120	Pad-Ground Sleeve		1
	C	42 34 62 01	Termination - #2 Elbow		As Req'd.
		42 34 62 02	Termination - 4/0 Elbow		As Req'd.
		42 34 62 05	Termination - 1/0 Elbow		As Req'd.
@	D	23 63 069	Rod - Ground, 5/8" x 8'		2
	E	17 52 032	Clamp - Ground Rod, 5/8" For #8 - 1/0		2
	F	17 54 373	Connector - Split Bolt		15
	G	18 52 025	Wire - Cu, #2 S. D. (Ft.)		12
	H	12 51 176	Bend - Plastic, 4" 36" Rad.		3
5@	I	60 55 001	Indicator - Faulted Circuit		As Req'd.
	J		Screenings		As Req'd.
6@	K	17 55 227	Cap - Insulating, 15kV		1
8@	L	12 51 254	Coupling - Conduit, Plastic, Bell End, 4"		3

**DISTRIBUTION  
CONSTRUCTION STANDARDS**

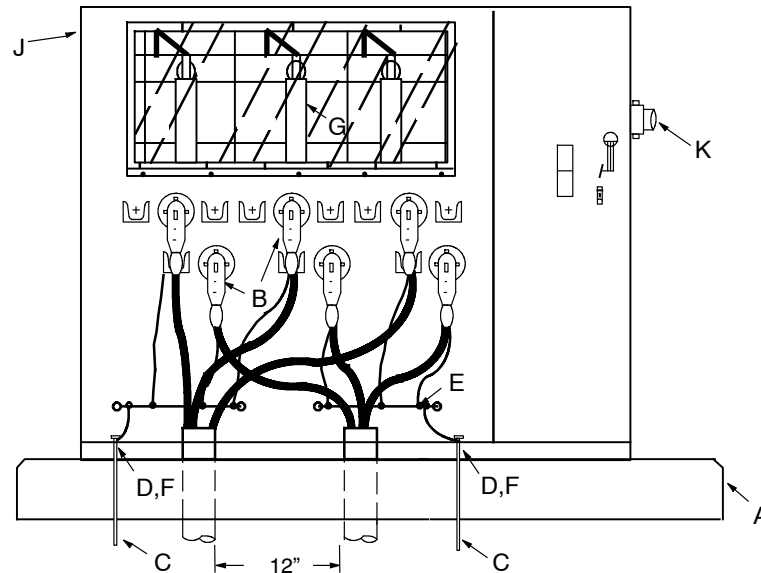


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REV. NO: 13  
REV. DATE: 09/07/17

**EQUIPMENT - CAPACITOR BANK - SWITCHED**  
 Padmounted - 3 Phase - Loop or Radial Feed  
 12kV, 600 thru 1800 kVAR

**51 12 04 \*\***

Sheet 1 of 1



**NOTES:**

1. Insure that the concentric neutral wires and the cable is long enough to allow movement of the elbow from bushing to parking stand. Some of the elbows must be raised to the level of the parking stands.
2. OPEN CAPACITOR BANK BEFORE REMOVING ELBOWS.
3. Per the Spec. all padmounted capacitors are supplied with the required fusing plus a set of refills. Fuses listed in this standard are for replacement only. Check the nameplate of the unit to determine the proper fusing.

		Std./Stk. No	Description	51 12 04 **	02	04	06
@	A	12 06 124	Pad - Composite, 7'x 6'x 5"		1	1	1
	B	42 34 62 01	Termination, 15kV, #2 Elbow		6	6	6
		42 34 62 02	Termination, 15kV, 4/0 Elbow		6	6	6
		C	23 63 069	Rod - Ground, 5/8" x 8'		2	2
	D	17 52 032	Clamp - Ground Rod, 5/8" For #8 - 1/0		2	2	2
	E	17 54 132	Connector - Two Bolt, #8-350 kcmil		8	8	8
@ 3	F	18 52 025	Wire - Copper, #2 Solid S.D.		10	10	10
	G	20 04 527	Fuse - 65A, Type NX		-	-	-
		20 04 852	Fuse - 1.5A, Type NX		-	-	-
		20 04 853	Fuse - 50A, Type NX		-	-	-
@ 3	H	20 04 480	Fuse - 65A, Type NXC		-	-	-
@ 3	I	20 04 486	Fuse - 40A, Type NXC		-	-	-
	J	69 11 198	Capacitor - 12kV, 600 kVAR, Padmount		1		
		69 11 200	Capacitor - 12kV, 1200 kVAR, Padmount			1	
		69 11 199	Capacitor - 12kV, 1800 kVAR, Padmount				1
@	K	69 11 300	Control, Capacitor, Meter Mount		1	1	1
@	L	69 11 296	Sensor - Neutral Current (Used With Control)		1	1	1

**600 kVAR**  
**51 12 04 02**

**1200 kVAR**  
**51 12 04 04**

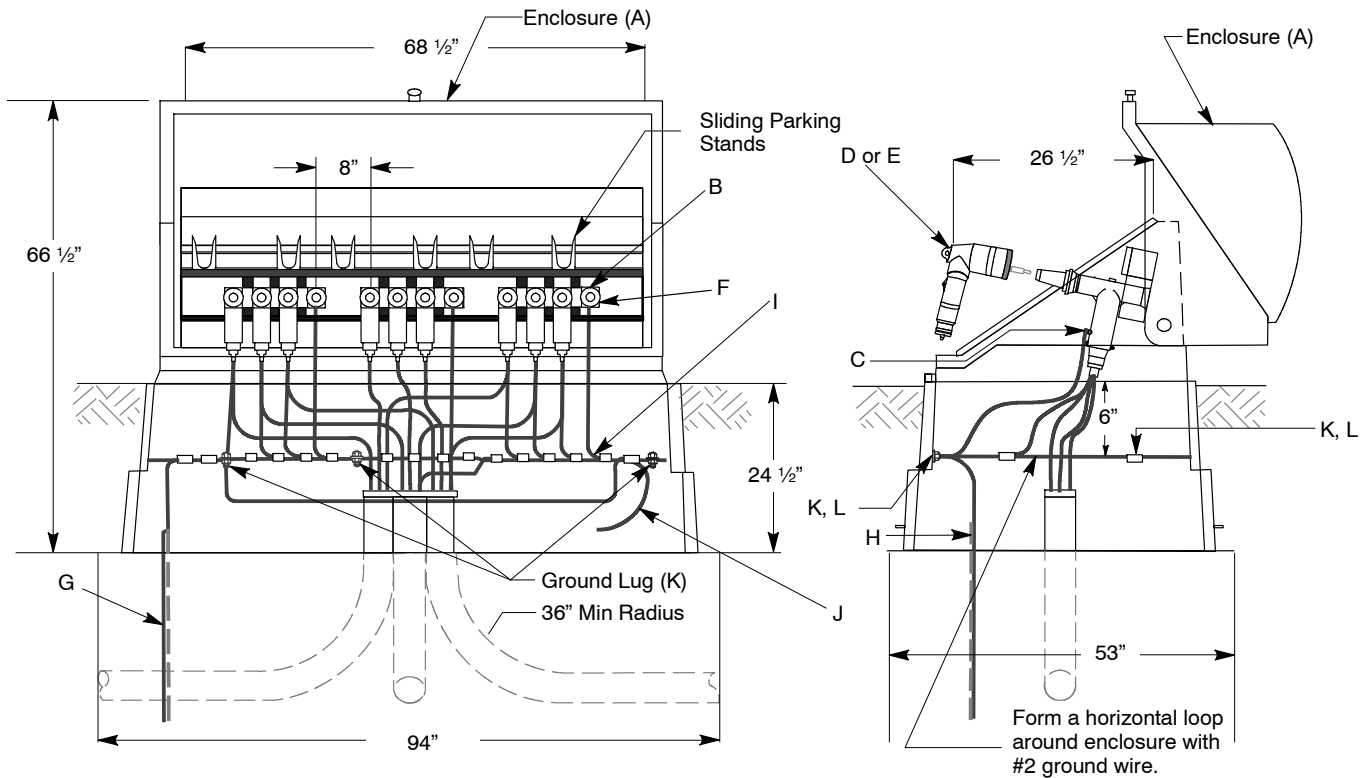
**1800 kVAR**  
**51 12 04 06**

**EQUIPMENT - ENCLOSURE**  
**Primary Pedestal**  
**15kV 600 Amp, Dead-break, Three Phase**

**51 12 05 \*\***

Sheet 1 of 2

**3-Way or 4-Way Dead-break Junction**



			Dist. Std. /Stk. No.	Description	51 12 05 **	01	02
		A	54 07 498	Enclosure-Primary Cable Junction, 15 kV, 600 A, 3ph		1	1
		B	17 07 239	Junction - 15 kV, 600 Amp, Bolted, 3-Way w/U Straps		3	
			17 07 242	Junction - 15 kV, 600 Amp, Bolted, 4-Way w/U Straps			3
1	@	C	<b>42 34 64 **</b>	Termination - 15 kV, 600 Amp, 4/0 AWG-750 kcmil		-	-
2	@	D	10 01 138	Arrester - Lighting, Elbow, 10 kV		-	-
2	@	E	17 55 227	Cap - Insulating, 15 kV, 200 Amp		-	-
1	@	F	17 55 386	Cap - Insulating, 15 kV, 600 Amp		-	-
		G	23 63 027	Rod - Ground, 5/8" x 8'		2	2
		H	17 52 032	Clamp - Ground Rod, 5/8", For #8 to 1/0		2	2
		I	17 54 132	Connector - Wire, 8-350 kcmil, CU		11	14
		J	18 52 025	Wire - #2, S.D. (Ft.)		9	9
		K	17 54 435	Connector - Grounding, #8 to 2/0		8	8
		L	21 61 007	Nut - Hex, 1/2", 13 TPI, Everdur		8	8

**Notes:**

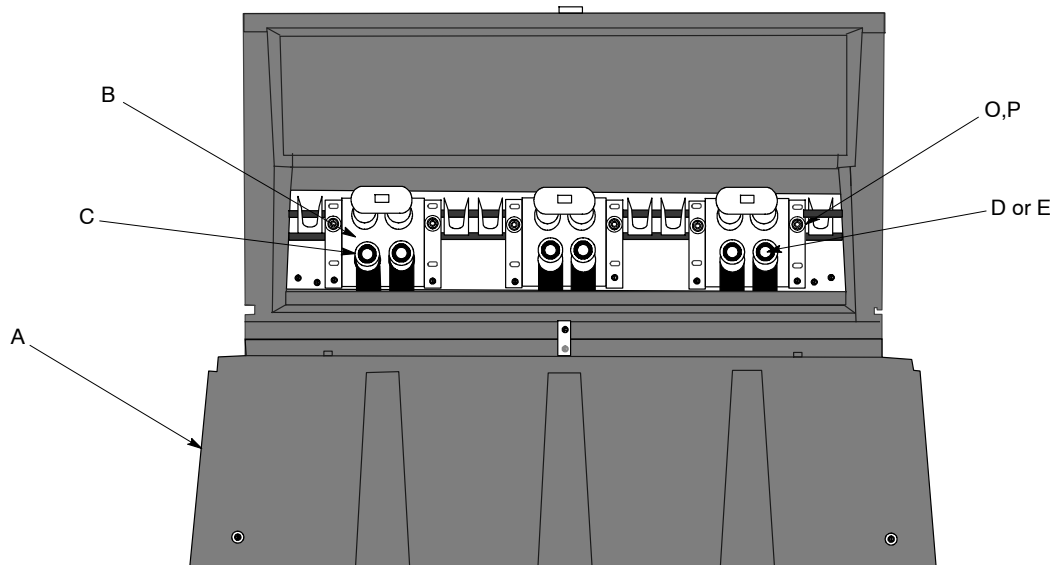
- Each junction position will be covered with either a T-body cable termination or a 600 amp cap.
- Each T-body cable termination will have the rear 200 amp tap covered with either an elbow arrester or a 200 amp cap.

**EQUIPMENT - ENCLOSURE**  
**Primary Pedestal**  
**15kV 600 Amp, Dead-break, Three Phase**

**51 12 05 \*\***

Sheet 2 of 2

**CLEER 600 Amp Load-break Connector**



			Dist. Std. / Stk. No.	Description	51 12 05 **	03
		A	54 07 498	Enclosure - Primary Cable Junction, 15 kV, 600 A, 3ph		1
		B	17 07 256	Junction - 15 kV, 600 Amp, Load-break, 2 Position Square		3
1	@	C	<b>42 34 64 **</b>	Termination - 15 kV, 600 Amp, 4/0 AWG - 750 kcmil		6
2	@	D	10 01 138	Arrester - Lighting, Elbow, 10 kV		-
2	@	E	17 55 227	Cap - Insulating, 15 kV, 200 Amp, Load-break		-
1	@	F	17 55 386	Cap - Insulating, 15 kV, 600 Amp, Load-break		-
		G	23 63 027	Rod - Ground, 5/8" x 8'		2
		H	17 52 032	Clamp - Ground Rod, 5/8", For #8 to 1/0		2
		I	17 54 132	Connector - Wire, 8-350 kcmil, CU		11
		J	18 52 025	Wire- #2, S. D. (Ft.)		9
3		K	17 05 513	Bushing - Standoff, Double, 15 kV, 600 Amp,		3
3		L	17 55 835	Cap - Insulating, 15 kV, 600 Amp, Load-break		6
		M	17 54 435	Connector - Grounding, #8 to 2/0		8
		N	21 61 007	Nut - Hex, 1/2", 13 TPI, Everdur		8
		O	21 56 078	Bolt - Hex, 1/2", Stainless, w / Nut		6
		P	21 75 105	Washer - 1/2", Stainless, 1 1/4" OD		6

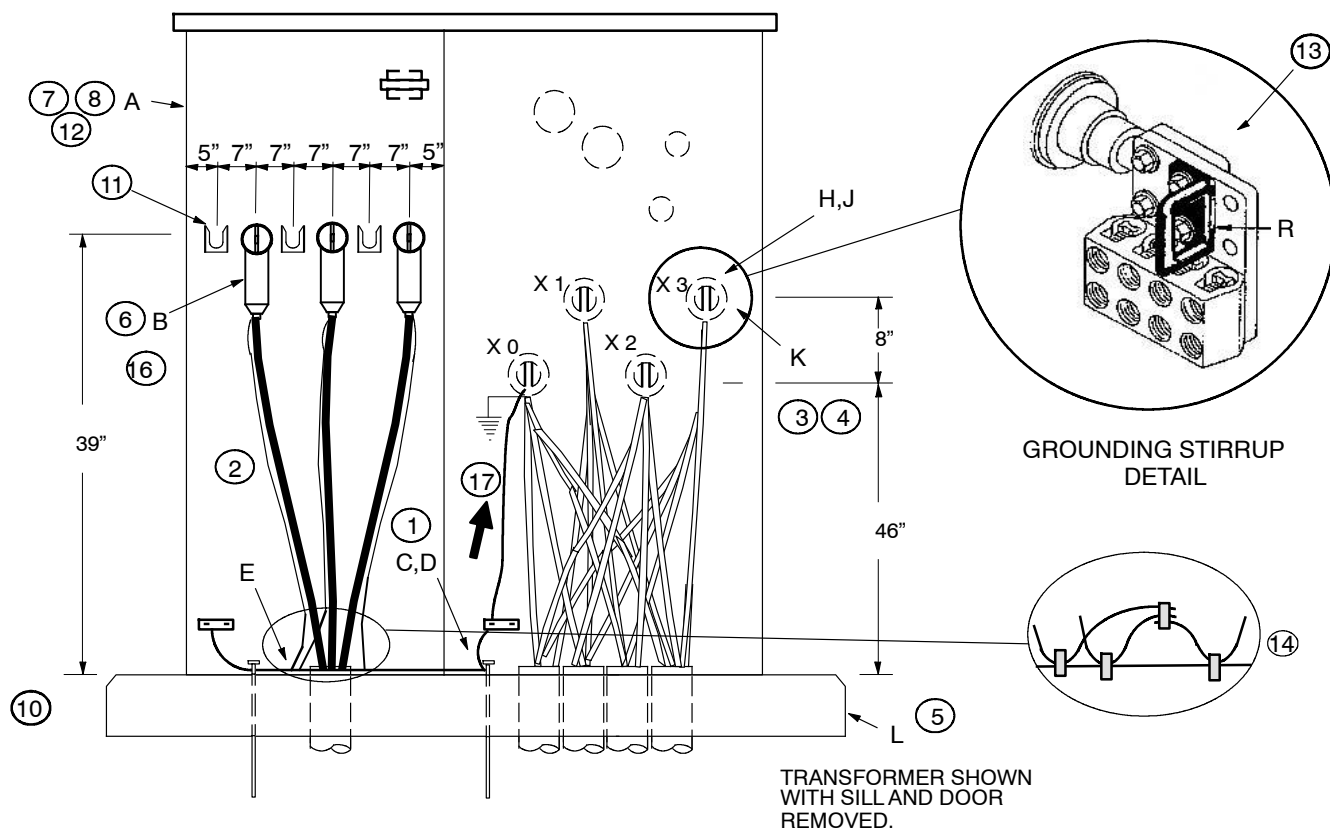
**Notes:**

- Each junction position will be covered with either a T-body cable termination or a 600 amp dead-break cap.
- Each T-body cable termination will have the rear 200 amp tap covered with either an elbow arrester or a 200 amp cap.
- Three double standoff bushings will be left in each junction for resting the 600 amp link when pulled open. These double standoff bushings shall be covered with six load-break caps when the 600 amp link is closed in.

**EQUIPMENT - TRANSFORMERS**  
**Padmounted - Dead Front - Three-Phase**  
**Radial Feed 1500 Through 3000 KVA - 35kV**

**51 12 34 01**

Sheet 1 of 2



**NOTES:**

1. Install ground rod clamp 3" below top of rod to provide space for attaching ground set.
2. Provide enough concentric neutral length to attach to ground and also allow movement of the elbow from the bushing to the parking stand.
3. Stainless steel machine bolts and belleville spring washers are required for bolting aluminum lugs to secondary terminals. Clean the lugs and terminals and apply inhibitor to the mating interfaces. See Dist. Std. **59 52 00 43**. Everdur bolts and brass washers are to be used for bolting copper lugs to secondary terminals.
4. Preferred number of secondary cables per terminal is six or less. In no case shall the number of cables per terminal exceed twelve.
5. See DCS **34 11 00 00**, for poured-in-place pad instructions.
6. The 200A loadbreak reducing tap plug on the end of the 600A nonloadbreak elbow will be covered with a 35kV elbow arrester (Stk.#10-01-163). Construction personnel are to install an elbow arrester on each elbow.
7. Transformer will be equipped with a storage rack inside the primary cable compartment for storing grounding elbows. Construction personnel are to leave three grounding elbows on the storage rack. Coil the leads and leave the interfaces covered.
8. Transformers will be equipped with a storage pocket on the inside of the primary cable compartment door for storing fuse refills. Construction personnel are to leave three extra refills in the pocket.
9. See DCS **13 00 04 01** for typical transformer weights and dimensions.
10. Protective barriers/fences or other obstructions should be at least 3' from the edge of the transformer pad with a minimum unobstructed work area of 10' in front of the transformer.
11. If the 600A nonloadbreak elbows are removed from the transformer bushings, they must be placed on 35kV, 600A standoff bushings (Stk.#17-05-323). Construction personnel are to install a standoff bushing in each parking stand.
12. Construction personnel are to leave an elbow installation tool (Stk.#85-36-281) in the storage pocket.
13. Grounding stirrups may be added. Longer bolts may be required when grounding stirrups are used.E



**EQUIPMENT - TRANSFORMERS**  
**Padmounted – Dead Front – Three-Phase**  
**Radial Feed 1500 Through 3000 KVA – 35kV**

**51 12 34 01**

Sheet 2 of 2

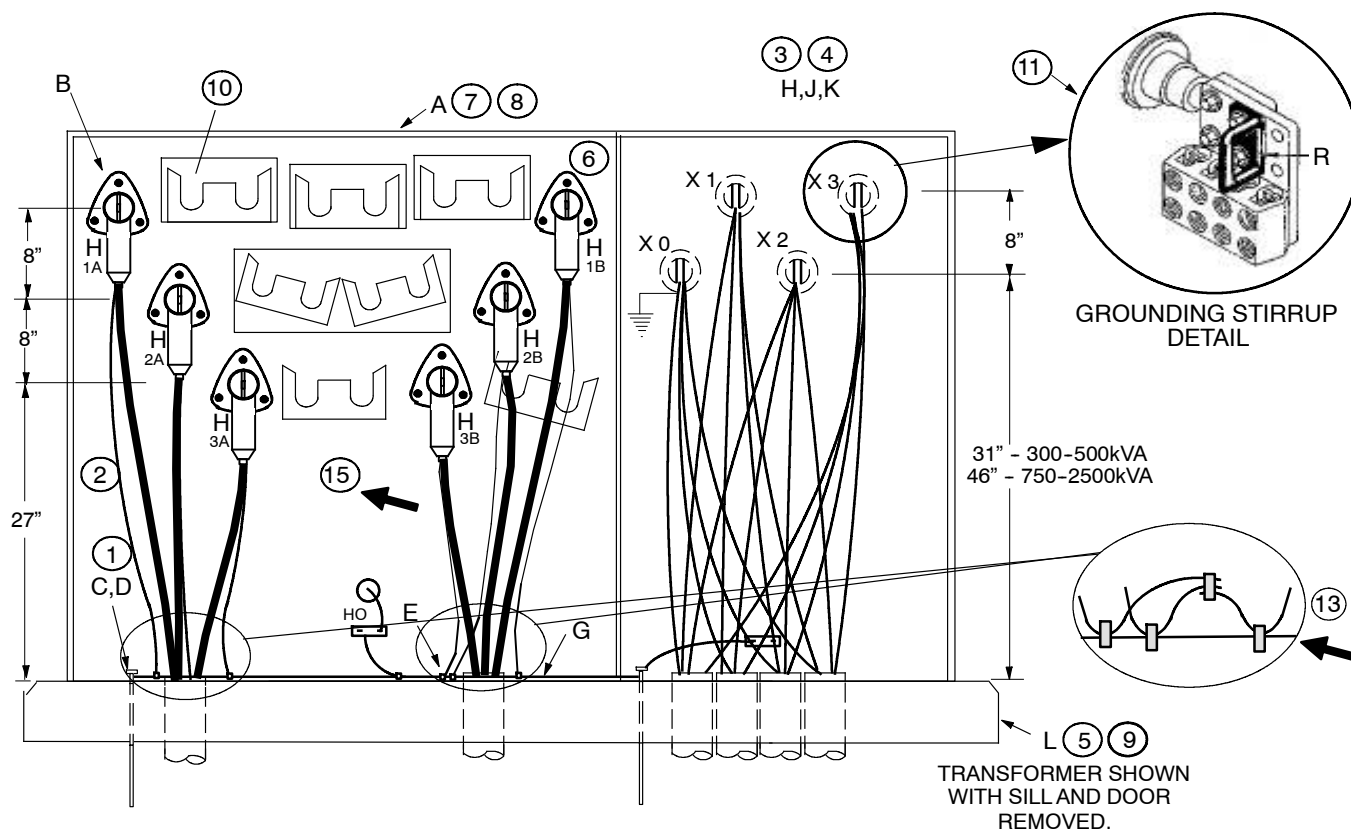
14. Connect cable concentric neutrals to the #2 bare CU ground, then end-to-end using 4 split bolt connectors.
15. The Aluminum lugs can be used for Aluminum or Copper conductors.
16. Fault current indicators can be installed to aid in determining if fault has occurred in the transformer or the cable feeding the transformer.
17. Run continuous length of #2 bare CU ground wire to connect an open port of the X0 connector to the two lower tank grounds and to the ground rods.

		Std. / Stk. No.	Description	51 12 34 01	
@9	A	QF ____ M	Transformer, Three-Phase, Dead Front		1
	2,6	B	42 44 13 01	Termination, 35kV, 600A Deadbreak Elbow	3
		C	23 63 069	Rod, Ground, 5/8" x 8'	2
		D	17 52 032	Clamp, Ground Rod, 5/8" For #8 - 1/0	2
14	E	17 54 373	Connector, Split Bolt, #2 Str. CU.		3
		17 54 182	Connector, Split Bolt, 3-#2 Str. CU.		1
17	G	18 52 025	Wire, Copper, #2 Solid, Soft Drawn		15
		21 56 078	Bolt, Machine, 1/2" x 2" Stainless		-
@3	H	21 53 022	Bolt, Machine, 1/2" x 1-3/4", Everdur		-
		21 54 316	Bolt, Machine, 1/2" x 2-1/2", Stainless		-
		21 56 075	Bolt, Machine, 1/2" x 1-1/2", Stainless		-
@3	J	21 75 042	Washer, Round, 9/16", Brass		-
		12 56 052	Washer, Belleville Spring, 1/2", S.S.		-
		12 56 053	Washer, Flat, 1/2", S.S. (2 ea. per Belleville)		-
@4,15	K	17 55 177	Lug, CU, 2-#4/0-500 kcmil		-
		17 55 176	Lug, CU, 3-#4/0-500 kcmil		-
		17 55 180	Lug, CU, 3-500-1000 kcmil		-
		17 55 190	Lug, Alum, 1-1/0-1000 kcmil, Lay-In		-
		17 55 289	Lug, Alum, 2-1/0-1000 kcmil, Lay-In		-
		17 55 209	Lug, Alum, 3-1/0-1000 kcmil, Lay-In		-
		17 55 233	Lug, Alum, 6-1/0-500 kcmil, Lay-In		-
		17 55 232	Lug, Alum, 6-1/0-1000 kcmil, Lay-In		-
		17 55 343	Lug, Alum, 1-1/0-750 kcmil		-
		17 55 344	Lug, Alum, 2-1/0-750 kcmil		-
		17 55 345	Lug, Alum, 4-1/0-750 kcmil		-
		17 55 346	Lug, Alum, 5-1/0-750 kcmil		-
		17 55 349	Lug, Alum, 6-1/0-750 kcmil		-
		17 55 350	Lug, Alum, 8-1/0-750 kcmil		-
5	L	34 11 00 00	Pad, Concrete, 1500-2500 KVA		1
@8	M		Refill, Fuse (Sized by Engineer)		3
7	N	17 63 295	Ground, Elbow, 35kV		3
6	O	10 01 163	Arrester, Lightning, 35kV		3
11	P	17 05 323	Bushing, Standoff, 35kV		3
12	Q	85 36 281	Tool – Elbow Installation (Elastimold)		1
@13	R	17 55 510	Stirrup, Grounding		3
@16	S	60 55 001	Indicator, Fault Current, 1 Phase		3

**EQUIPMENT - TRANSFORMERS**  
**Padmounted - Dead Front - Three-Phase**  
**Loop Feed 300 Through 2500 kVA - 35kV**

**51 12 34 02**

Sheet 1 of 3



**NOTES:**

1. Install ground rod clamp 3" below top of rod to provide space for attaching ground set.
2. Provide enough concentric neutral length to attach to ground and also allow movement of the elbow from the bushing to the parking stand.
3. Stainless steel machine bolts and belleville spring washers are required for bolting aluminum lugs to secondary terminals. Clean the lugs and terminals and apply inhibitor to the mating interfaces. See DCS. 59 52 00 43. Everdur bolts and brass washers are to be used for bolting copper lugs to secondary terminals.
4. Preferred number of secondary cables per terminal is six or less. In no case shall the number of cables per terminal exceed twelve.
5. Use legacy company poured-in-place pad or contact Distribution Standards. Pad should have minimum dimensions of 12' wide x 9' deep x 8" thick.
6. If transformer is used as open point in the cable loop, install elbow arresters (stock # 10-01-177) in the open bushings and install feed-thru bushing stand-offs (stock # 17-63-245) with elbow arresters for the open cable termination.
7. Transformer will be equipped with a storage rack inside the primary cable compartment for storing grounding elbows. Construction personnel are to leave three grounding elbows on the storage rack. Coil the leads and leave the interfaces covered.
8. See DCS 13 00 04 01 for typical transformer weights and dimensions.
9. Protective barriers/fences or other obstructions should be at least 3' from the edge of the transformer pad with a minimum unobstructed work area of 10' in front of the transformer.
10. If the 200A loadbreak elbows are removed from the transformer bushings, they must be placed on 35kV, 200A standoff bushings (Stk.#17-63-246). Construction personnel are to install three standoff bushings in each transformer.
11. Grounding stirrups may be added. Longer bolts may be required when grounding stirrups are used.G

**EQUIPMENT - TRANSFORMERS**  
Padmounted - Dead Front - Three-Phase  
Loop Feed 300 Through 2500 kVA - 35kV

**51 12 34 02**

Sheet 2 of 3

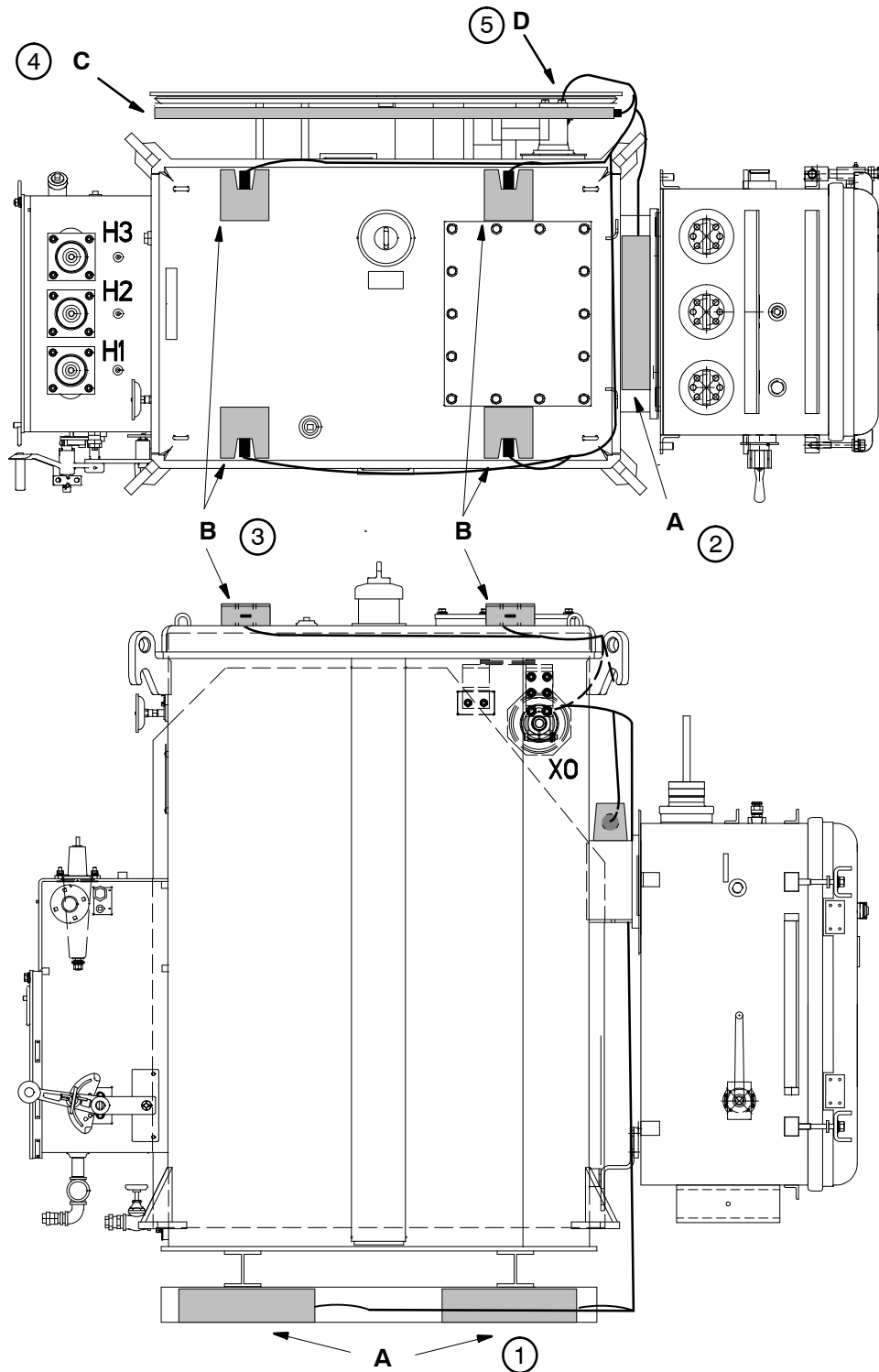
- 
12. Contact Distribution Standards for replacement fuse stock #.
  13. Connect cable concentric neutrals to the #2 bare CU ground, then end-to-end using 4 split bolt connectors.
  14. The Aluminum lugs can be used for Aluminum or Copper conductors.
  15. Fault current indicators can be installed to aid in determining if fault has occurred in the transformer or the cable feeding the transformer.
  16. Run continuous length of #2 bare CU ground wire to connect an open port of the XO connector to the two lower tank grounds and to the ground rods.

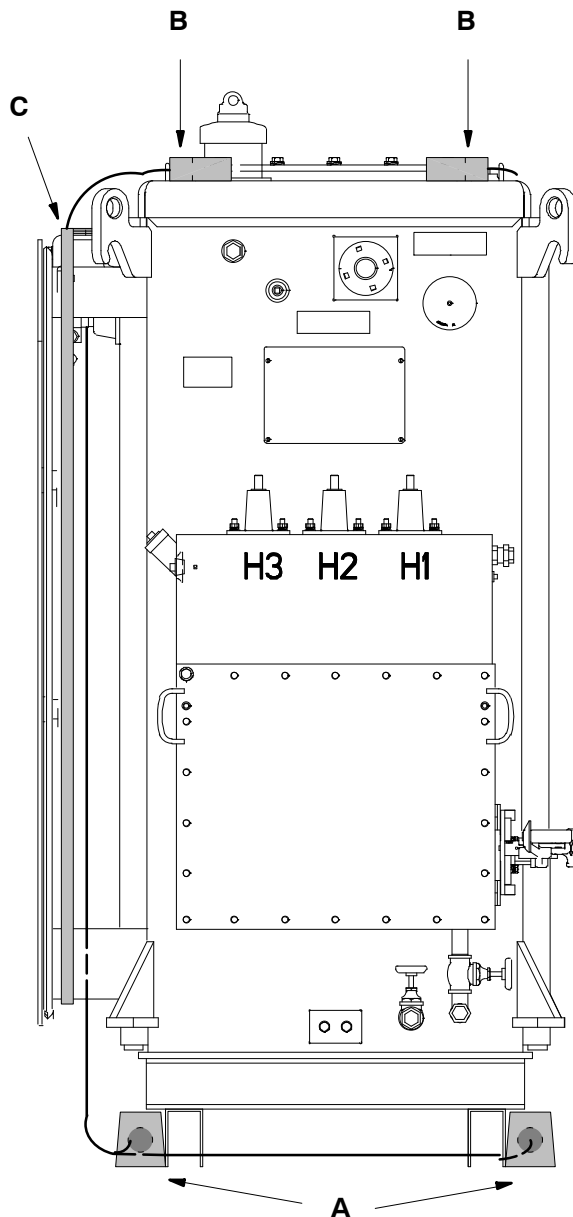
**EQUIPMENT - TRANSFORMERS**  
**Padmounted - Dead Front - Three-Phase**  
**Loop Feed 300 Through 2500 kVA - 35kV**

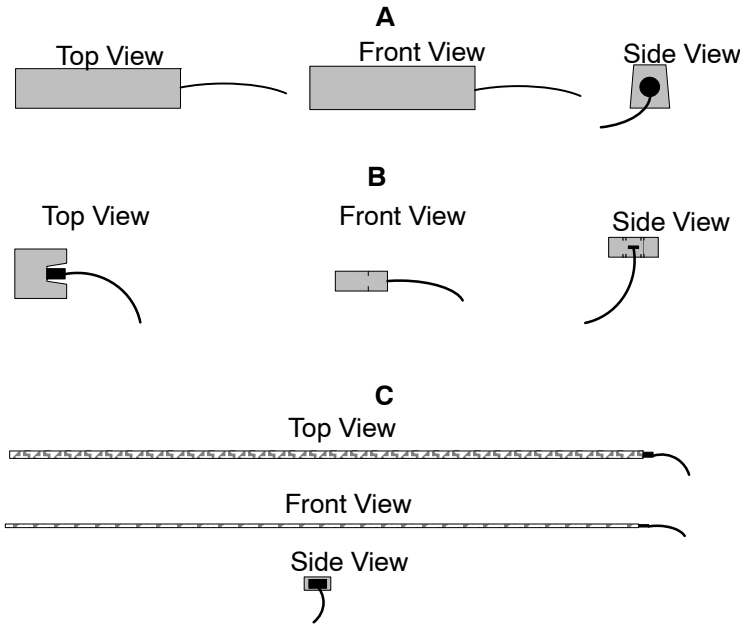
**51 12 34 02**

Sheet 3 of 3

		Std. / Stk. No.	Description	51 12 34 02
@8	A	QC____L	Xfmr, 3-Phase, 35kVΔ-208Y/120, Loopfeed	1
		QF____L	Xfmr, 3-Phase, 35kVΔ-480Y/277, Loopfeed	1
		VC____L	Xfmr, 3-Phase, 35kV Grd Y-208Y/120, Loopfeed	1
		VF____L	Xfmr, 3-Phase, 35kV Grd Y-480Y/277, Loopfeed	1
2,6	B	17 05 228	Termination, 35kV, 200A Loadbreak Elbow	6
		23 63 069	Rod, Ground, 5/8" x 8'	2
		17 52 032	Clamp, Ground Rod, 5/8" For #8 - 1/0	2
13	E	17 54 373	Connector, Split Bolt, #2 Str. CU.	8
		17 54 182	Connector, Split Bolt, 3-#2 Str. CU.	2
16	G	18 52 025	Wire, Copper, #2 Solid, Soft Drawn	10
@3,11	H	21 56 078	Bolt, Machine, 1/2" x 2" Stainless	-
		21 53 022	Bolt, Machine, 1/2" x 1-3/4", Everdur	-
		21 54 316	Bolt, Machine, 1/2" x 2-1/2", Stainless	-
		21 56 075	Bolt, Machine, 1/2" x 1-1/2", Stainless	-
@3	J	21 75 042	Washer, Round, 9/16", Brass	-
		12 56 052	Washer, Belleville Spring, 1/2", S.S.	-
		12 56 053	Washer, Flat, 1/2", S.S. (2 ea. per Belleville)	-
@4,11,14	K	17 55 177	Lug, CU 2 - #4/0 to 500 kcmil	-
		17 55 176	Lug, CU 3 - #4/0 to 500 kcmil	-
		17 55 180	Lug, CU 3 - 500 - 1000 kcmil	-
		17 55 190	Lug, Alum 1 - 1/0 to 1000 kcmil, Lay-In	-
		17 55 209	Lug, Alum 3-1/0-1000 kcmil, Lay-In	-
		17 55 289	Lug, Alum 2-1/0-1000 kcmil, Lay-In	-
		17 55 233	Lug, Alum 6 - 1/0 to 500 kcmil, Lay-In	-
		17 55 232	Lug, Alum 6-1/0 to 1000 kcmil, Lay-In	-
		17 55 343	Lug, Alum 1-1/0-750 kcmil	-
		17 55 344	Lug, Alum 2-1/0-750 kcmil	-
		17 55 345	Lug, Alum 4-1/0-750 kcmil	-
		17 55 346	Lug, Alum 5-1/0-750 kcmil	-
		17 55 349	Lug, Alum 6-1/0-750 kcmil	-
		17 55 350	Lug, Alum 8-1/0-750 kcmil	-
5	L		Pad, Concrete, Poured-in-Place	1
T12	M		Fuse, Current Limiting	3
7	N	17 63 296	Ground, Elbow, 35kV, Large Interface	3
@6	O	10 01 177	Arrester, Lightning, 35kV, Large Interface	-
10	P	17 63 246	Bushing, Standoff, 35kV, Large Interface	3
@11	R	17 55 510	Stirrup, Grounding	3
@6	S	17 63 245	Bushing, Standoff, Feed-Thru, 35kV	-
@15	T	60 55 001	Indicator, Fault Current, 1 Phase	3







		Std. / Stk. No.	Description	51 13 02 01	Qty
	A	40 54 490	17 Lb. Magnesium anode with 20' #10 CU		5
	B	40 54 491	3 Lb. Magnesium anode with 15' #10 CU		4
	C	40 54 492	7' Ribbon Magnesium anode with 13.5' #10 CU		1
	D	17 51 114	Lug, Bolted, #8-2/0		1

## NOTES:

- Four 17 lb. magnesium anodes shall be placed on the floor next to U-channel under the transformer.
- One 17 lb. magnesium anode shall be placed on the network protector throat. The anode shall be secured with a small bead of silicone caulk, approximately one inch long, on both ends of the anode. A continuous bead of silicone shall not be applied around the base of the anode and no silicone shall be applied to the mating surface of the anode.
- Four 3 lb. magnesium anodes shall be placed on the top surface of the transformer. The anode shall be secured to the transformer with 4 small beads of silicone caulk at the corners of the anode. Each bead shall be approximately one inch long. Do not use a continuous bead of caulk around the anode or apply any silicone caulk to the mating surface of the anode.
- One 7 ft. long magnesium anode ribbon shall be shaped and positioned on the transformer cooling panel brackets. The anode shall be secured with a small bead of silicone caulk that shall be applied on the side of the anode where it contacts to cooling panel bracket. Do not use a continuous bead of caulk around the anode or apply any silicone caulk to the mating surface of the anode.
- Each individual wire for all ten anodes shall be routed and bonded to the transformer X0 bushing with connector.

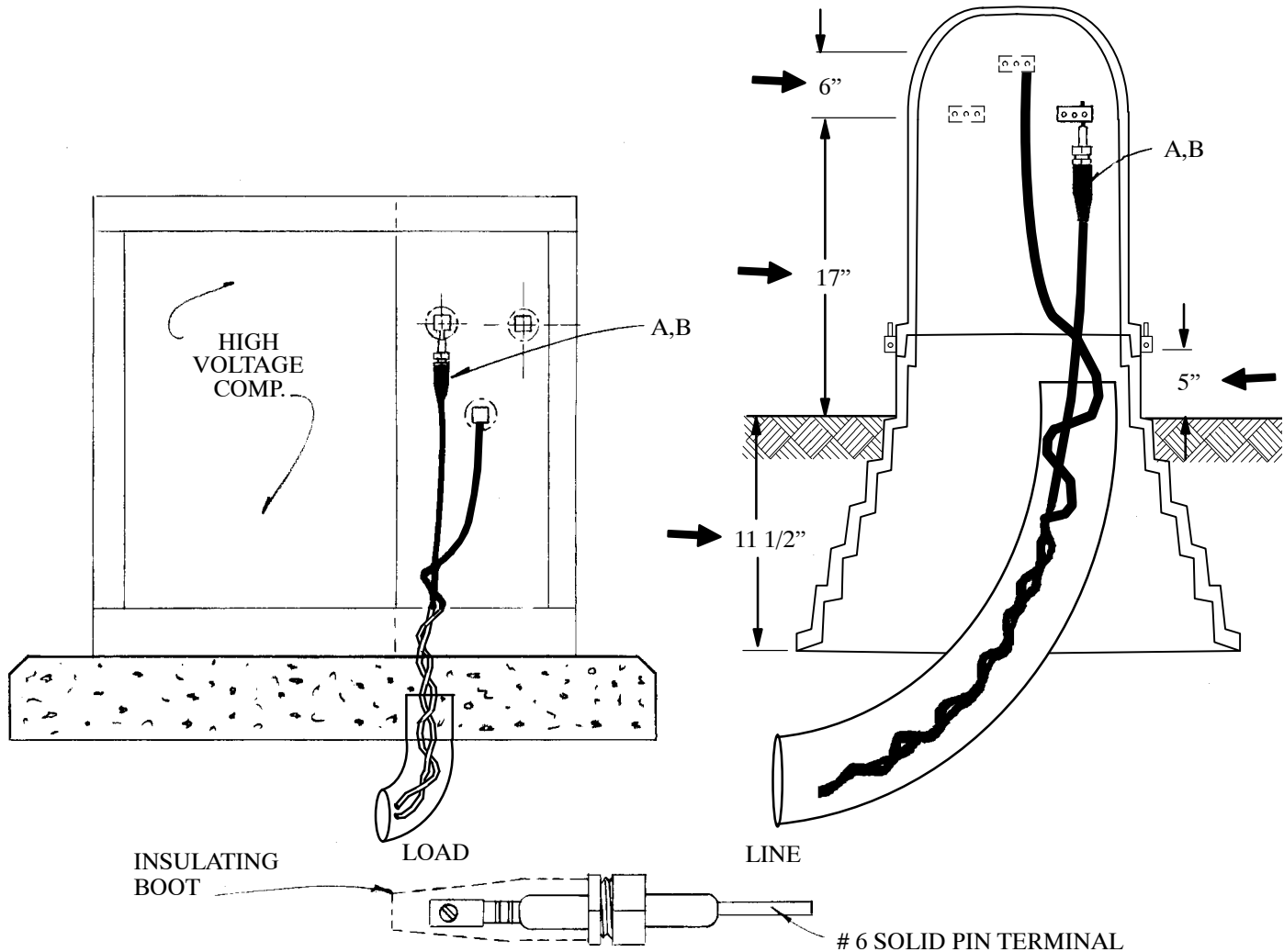
# EQUIPMENT – CONNECTIONS

## Fused Multiple Streetlight Cable Connections

### Connection at Pad Mtd. Transformer or Pedestal

**52 00 01 \*\***

Sheet 1 of 1



**FUSEHOLDER W/COPPER TERMINAL**

See Note 2		Std. / Stk. No.	Description	52 00 01 **	01	02
	A	20 76 141	Fuseholder-InLine, with Copper Pin Terminal		1	
		20 76 144	Fuseholder-InLine, with Two Screw Terminals			1
	B	20 76 140	Fuse-Cartridge, 30 Amp.		1	1

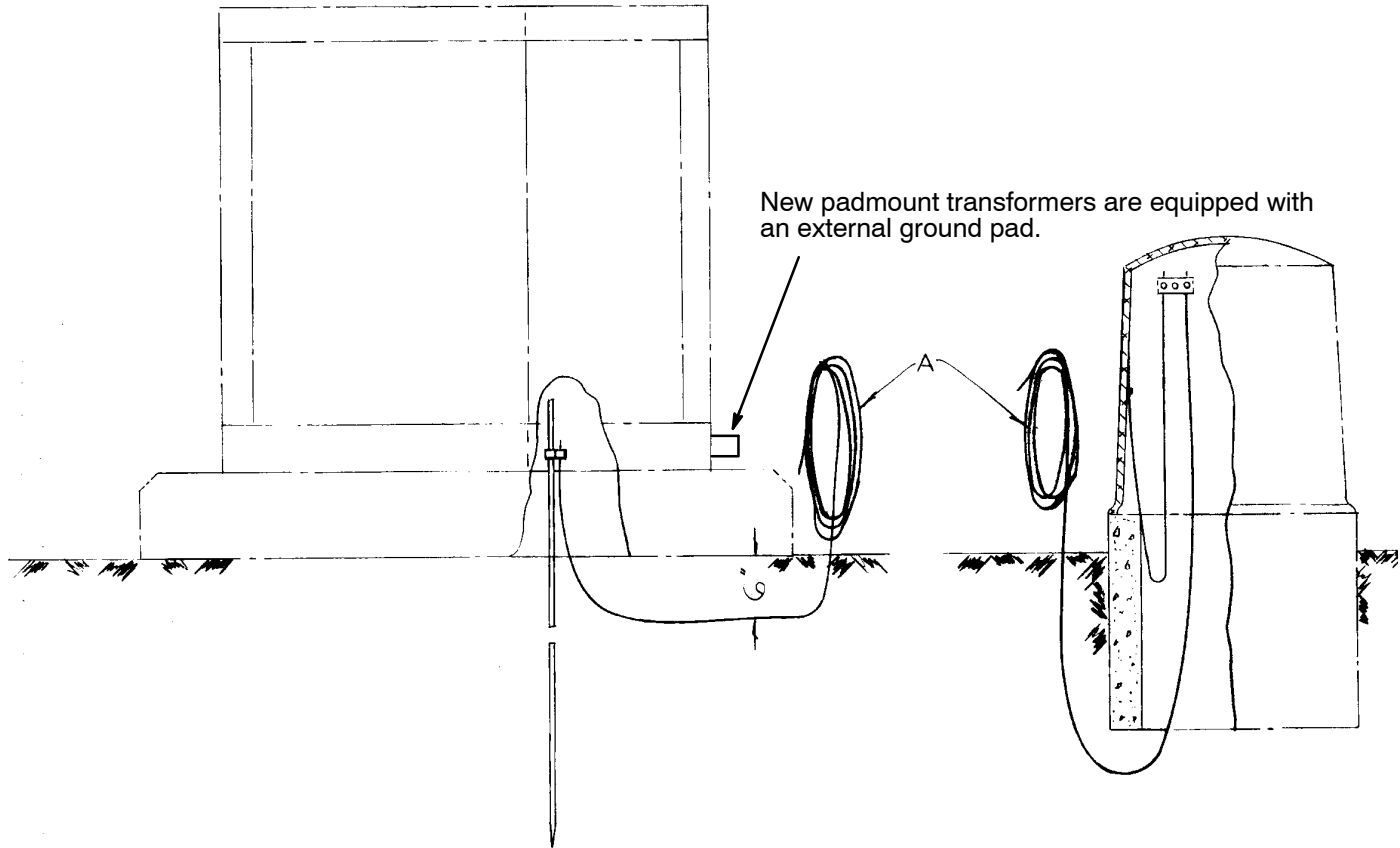
**NOTES;**

1. To fuse underground streetlight cable on overhead secondaries, see Dist. Std. **15 74 50 01**.
2. Fuseholder, Stock No. 20 76 144, is stocked with a cable connector on each end. This fuseholder should be used whenever connectors are too full of cables to readily use fuseholder, Stk. No. 20 76 141 or if the connectors are covered with a PVC insulated cover that prevents the pin terminal from being inserted.



52 00 02 01 Ameren connects ground wire at time of transformer or pedestal installation and leaves wire coiled for Telephone Co.

52 00 02 02 Ameren connects ground wire left by Telephone Co. after transformer or pedestal have been installed.



**NOTES:**

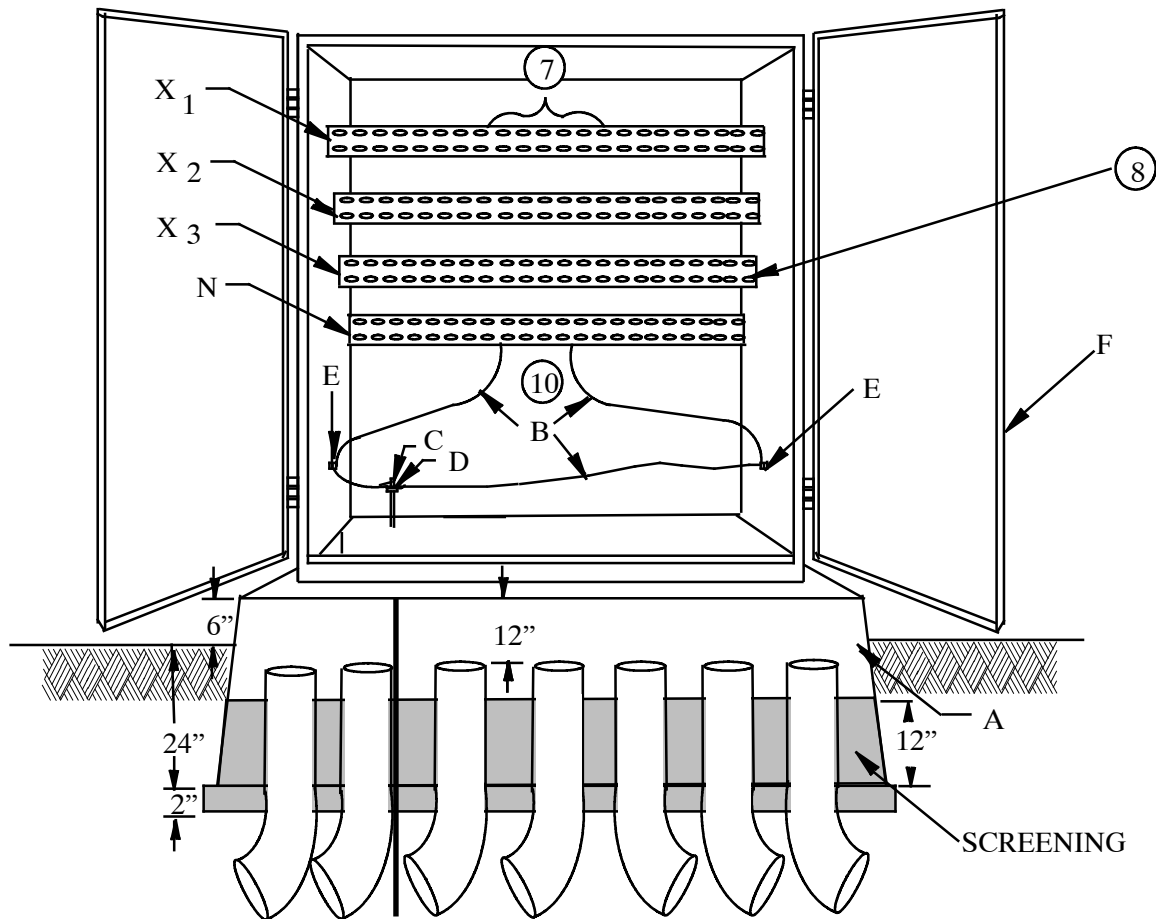
1. Operation Codes include labor units for hand trenching and other operations necessary for connection of grd. wire.
2. Estimator shall prepare Form U-307 listing each ground wire connection.

		Std. / Stk. No.	Description	52 00 02 **	01	02
	A	18 51 021	Wire - Cu., #6 Poly Cov. Ft.		18	
	B	17 52 032	Clamp - Grd. Rod. 5/8" For #8 - 1/0		1	1
	C	712	Operation Code		1	
		713	Operation Code			1

**EQUIPMENT CONNECTIONS**  
Three Phase Multiple Secondary/Service  
Termination Cabinet

**52 10 01 00**

Sheet 1 of 2



**NOTES:**

1. An initial depth of 26" shall be excavated and all loose soil shall be removed or tamped. The length + width of the hole shall be sized to allow a minimum of 6" of clearance on all sides.
2. Add 2" of screening, compact, and set box pad.<sup>1</sup>
3. Final depth should be adjusted to provide 6" of exposed ground pad at final grade.
4. Provide 12" of space between the top of the box pad and the end of the conduits.
5. Stabilize the box pad and conduits by placing 12" of crushed stone screening inside the box pad and tamp in place.
6. Backfill with loose material, DO NOT backfill next to the ground sleeve pad with chinks of material or rocks. Pack loose backfill by foot tamping and do not tamp excessively close to the ground sleeve pad sides. NOTE: Hydraulic tamping is not recommended.
7. Center positions of each bus are reserved for Ameren feed cables.
8. Bus has lay-in style connectors. Clean the contact surfaces of connectors and cables then coat them with inhibitor.
9. Secure the enclosure to the pad.
10. Be sure that the enclosure is grounded by attaching ground wires to the ground rod and to the neutral bus.

**EQUIPMENT CONNECTIONS**  
Three Phase Multiple Secondary/Service  
Termination Cabinet

**52 10 01 00**

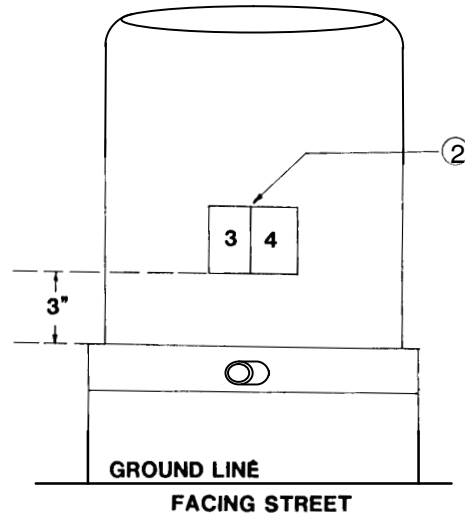
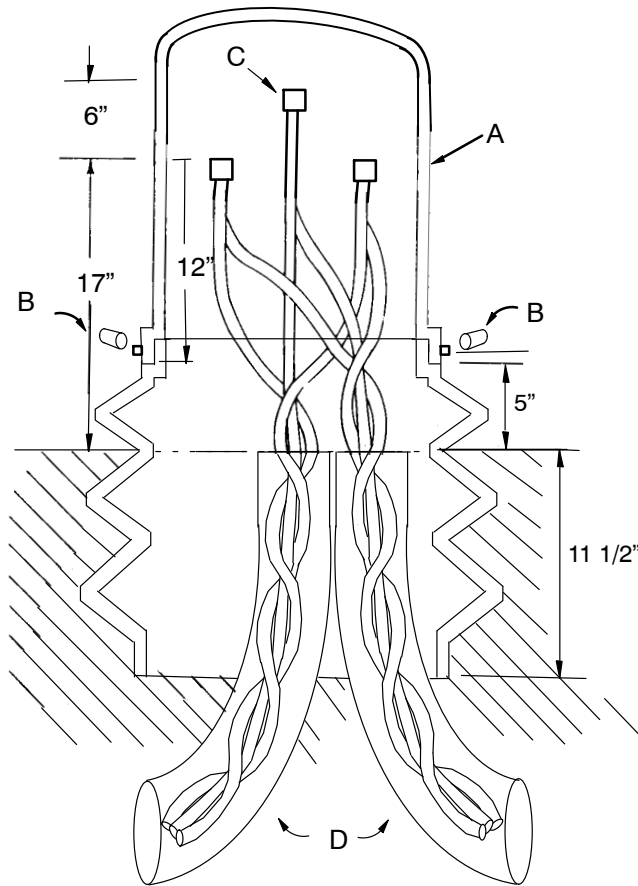
Sheet 2 of 2

		Std. / Stk. No.	Description	.52 10 01 00	
	A	12 06 196	Pad - Fiberglass 49" x 24" x 30"		1
	B	18 52 025	Wire - Copper, #2 Solid, Soft Drawn		12
	C	23 63 069	Rod - Ground, 5/8" x 8'		1
	D	17 52 032	Clamp - Ground Rod, 5/8" #8 - 1/0		1
	E	69 58 121	Connector - Ground		2
	F	54 07 236	Enclosure - Padmount, 3 Ph Secondary		1

**EQUIPMENT – CONNECTIONS**  
**Secondary Power Pedestal**  
**Above Grade – Polyethylene**

**52 11 01 \*\***

Sheet 1 of 2



Three (3) ft. minimum clearance  
 required from obstructions such  
 as buildings, street light poles,  
 bell or catv pedestals, etc.

**Construction Note(s):**

1. When used for 3 phase applications, the dome should be marked "3 PH " using reflective numbers and letters.
2. Use reflective numbers (Stock Numbers 16 04 108 thru 16 04 116) to show the LAST 2 DIGITS of the source pad transformer.
3. See Dist. Std. **59 40 00 10** for conduit/cable burial depths.

**EQUIPMENT – CONNECTIONS**  
**Secondary Power Pedestal**  
**Above Grade – Polyethylene**

**52 11 01 \*\***

Sheet 2 of 2

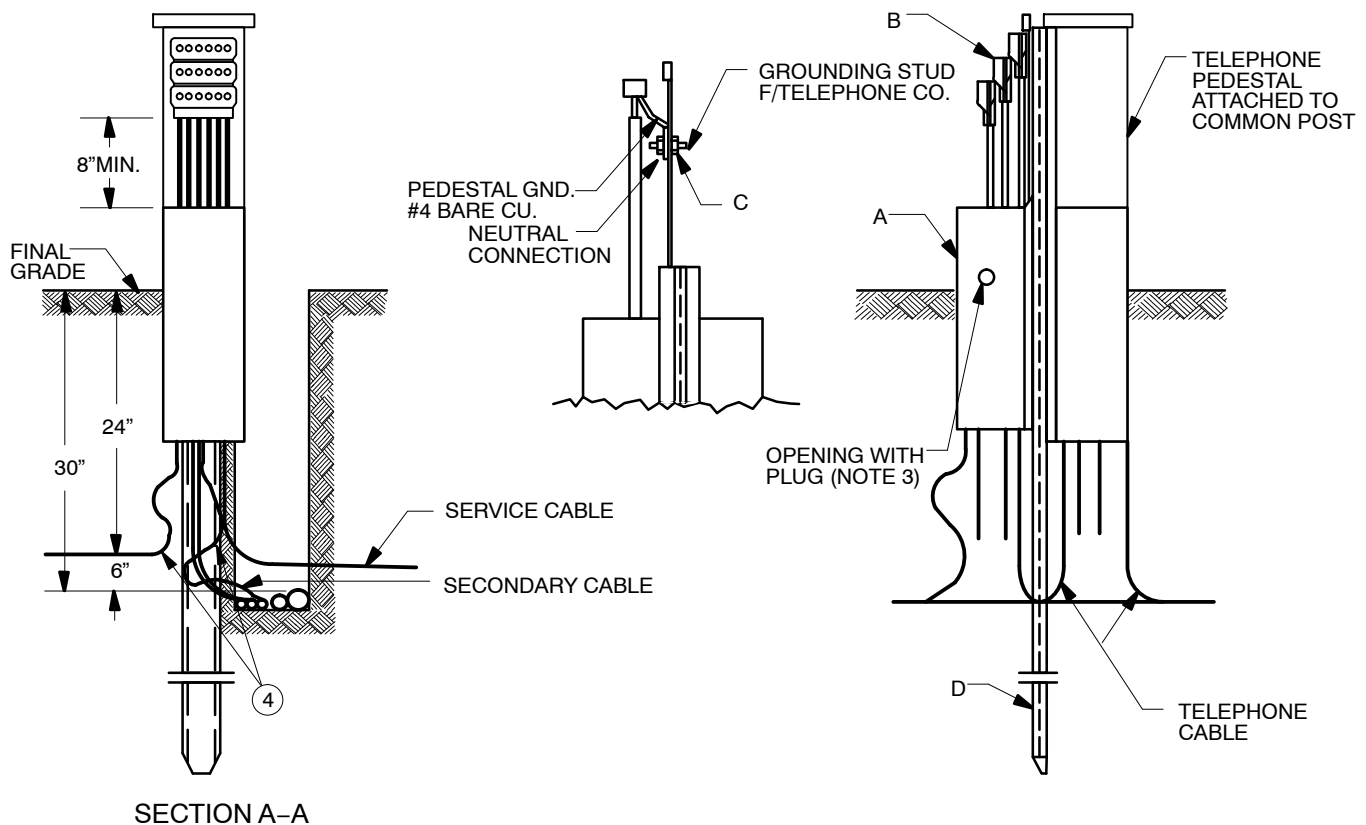
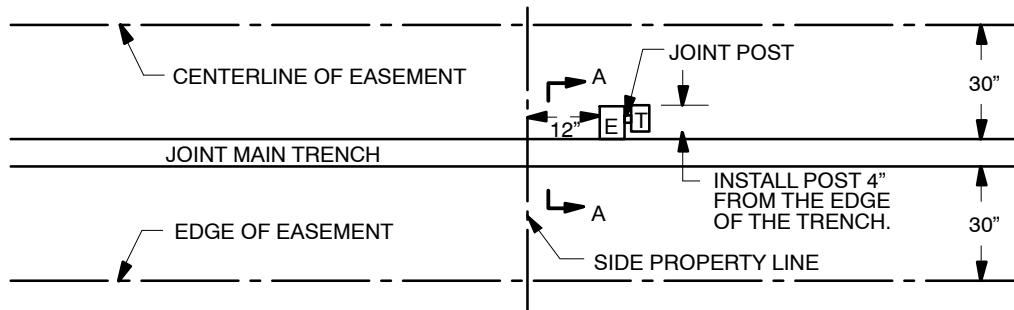
52 11 01 01 & 06  
52 11 01 02  
52 11 01 03 – 05  
52 11 01 07

Ameren Installed 1 Phase  
Contractor Installed 1 Phase  
Ameren Installed 3 Phase  
Ameren III Installed 1 Phase

	Stk. No.	Description	01	02	03	04	05	06	07
5@	A	12 05 049 Pedestal – Above Ground, Polyethylene	1		1	1	1	1	1
	B	12 55 034 Cap, Pedestal Latch, 1.5", Dark Green	2		2	2	2	2	2
	C	17 64 218 Connector – Ped, 6 Pos., 6–500 kcmil, Insulated	3	3	4				3
		17 64 219 Connector – 4 Pos., 1/0–750 kcmil, w/cover				4			
		17 64 220 Connector – 6 Pos., 1/0–750 kcmil, w/cover					4		
		17 64 238 Connector – Ped, 4 Pos., 6–500 kcmil, Insulated						3	
	D	12 51 252 Bend–Plastic, 2", 24" Rad. (Streetlight )	As Req'd						
		12 51 173 Bend–Plastic, 3', 36" Rad. (Secondary & 400 A Service )	As Req'd						
		12 51 264 Bend–Plastic, 2 1/2", 24" Rad. (200 A Service )	As Req'd						2
	E	12 01 263 Conduit, 2 1/2", Sch 40, 10'							2
	F	49 55 520 Marker, Buried Conduit, Red							2

Engineering Note(s):

- For Missouri residential developments the contractor will install the pedestal, pedestal caps, and bends. See Std. 52 11 01 02.
- DCS 52 11 01 07 is required in Illinois for residential subdivision developments when the pedestal is placed on the property line. It includes Item D (12 51 264) and Item E (12 01 263), for future use.

AMEREN ILLINOISAMEREN ILLINOISAMEREN ILLINOIS**RANDOM LAY OR NON-JOINT CONSTRUCTION**

SECTION A-A

## NOTES:

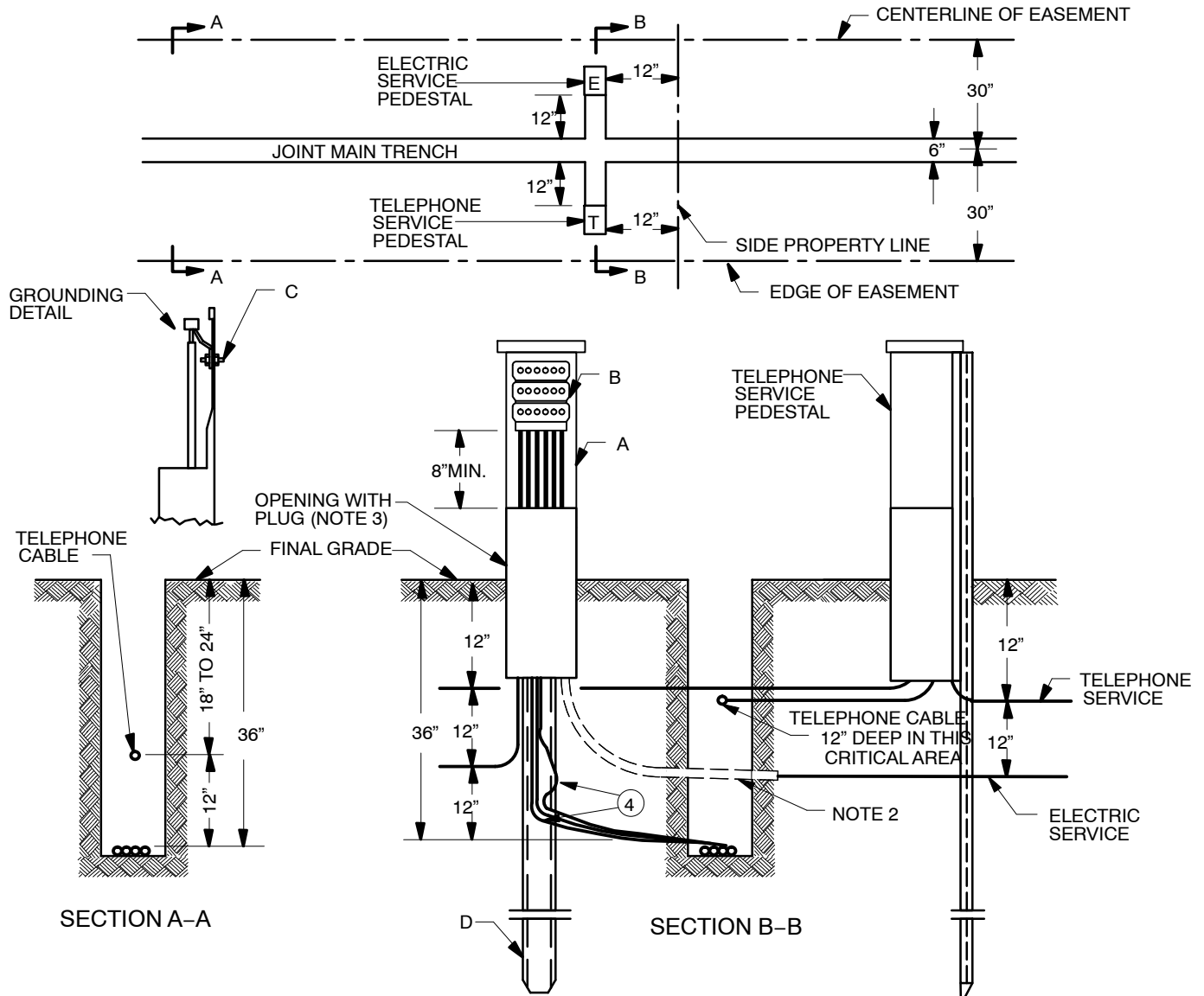
1. Upper portion of post shall be 22" above final grade.
2. Flexible conduit (12 51 238) shall be placed on all secondary and service cables as they are installed. Conduit to extend three feet beyond pedestal.
3. This temporary entrance is to be used to restore service or when ground conditions prevent trenching. Leave plug inside pedestal when removed.
4. Install secondary and service conductors with "S" curve slack to allow for settling

**AMEREN ILLINOIS**

**AMEREN ILLINOIS**

**AMEREN ILLINOIS**

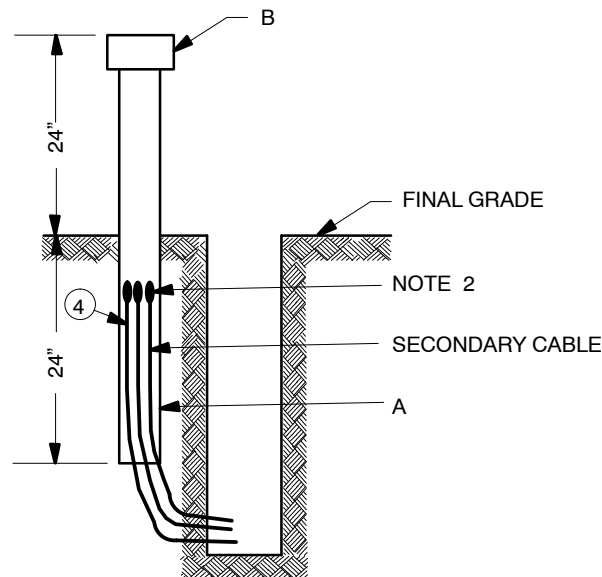
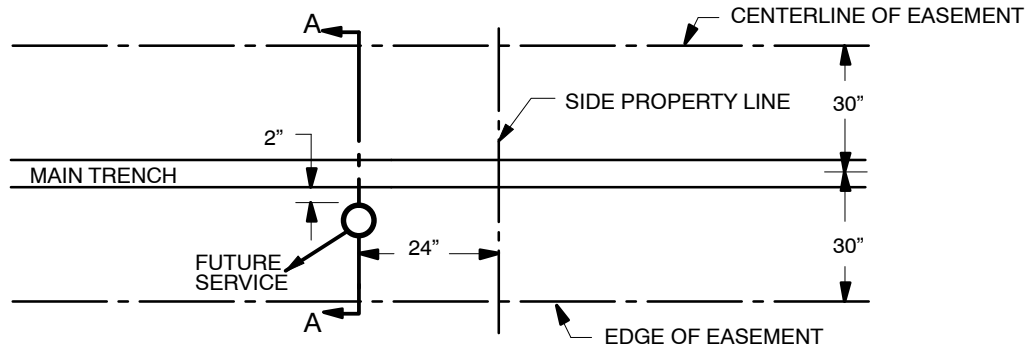
**JOINT CONSTRUCTION WITH A 12" FIXED SEPARATION**



NOTES ON PREVIOUS PAGE

	Stk. No.	Description	52 11 03 00
A	12 05 052	Pedestal – Above Ground – Steel	1
B	17 64 218	Conn – Ped, 6C, 6–500 kcmil, Insulated	3
C	17 64 208	Conn – Post Type, 3/8", #2 AWG.	1
D	12 55 035	Post – Ped, 6', Stl.	1

**AMEREN ILLINOIS ONLY** **AMEREN ILLINOIS ONLY** **AMEREN ILLINOIS ONLY**



**SECTION A-A**  
**CONDUIT PEDESTAL**

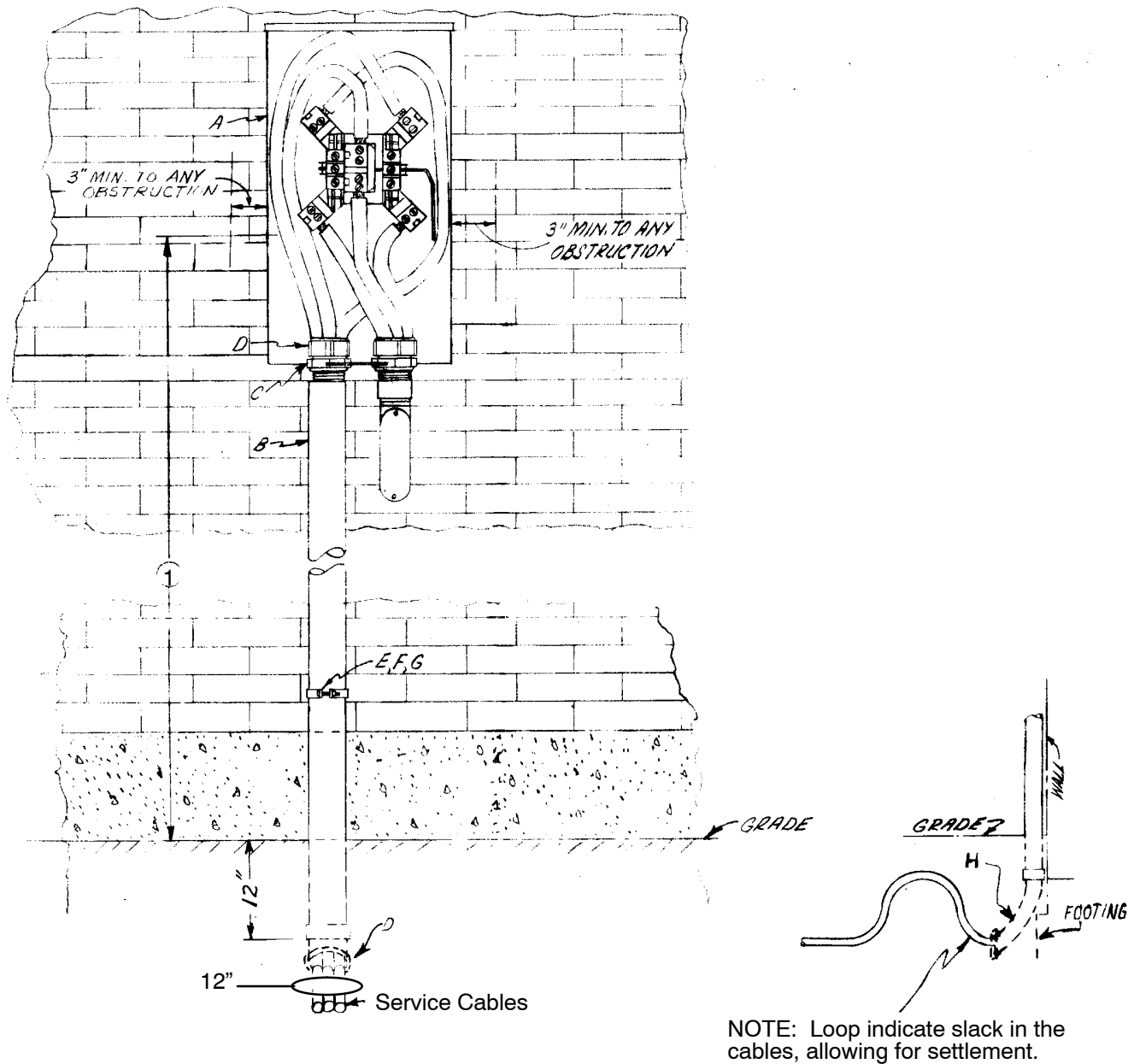
**NOTES**

1. Install conduit pedestal on the side of the trench that is adjacent to future service. Pedestal to be made of 3" plastic conduit with an end cap.
2. Seal the ends of the secondary cable with plastic tape and cover with "Scotchkote".
3. When the future service is to be installed, removed the temporary pedestal and make a direct buried splice.
4. Install cable identifier.

	Stk. No.	Description	52 11 04 00	
A	12 01 279	Conduit – 3", Sch. 40, 10" Length		1
B	12 51 312	Cap – 3", Conduit End		1



**DIRECT BURIED SERVICE**



**NOTES:**

1. See Page D-4 of the Service Manual for mounting height.
2. All materials except supply cables shall be furnished, installed and connected by customer.
3. Service cable shall have a minimum of 24" of cover. See National Electric Code Article 300, Part A, Section 5.

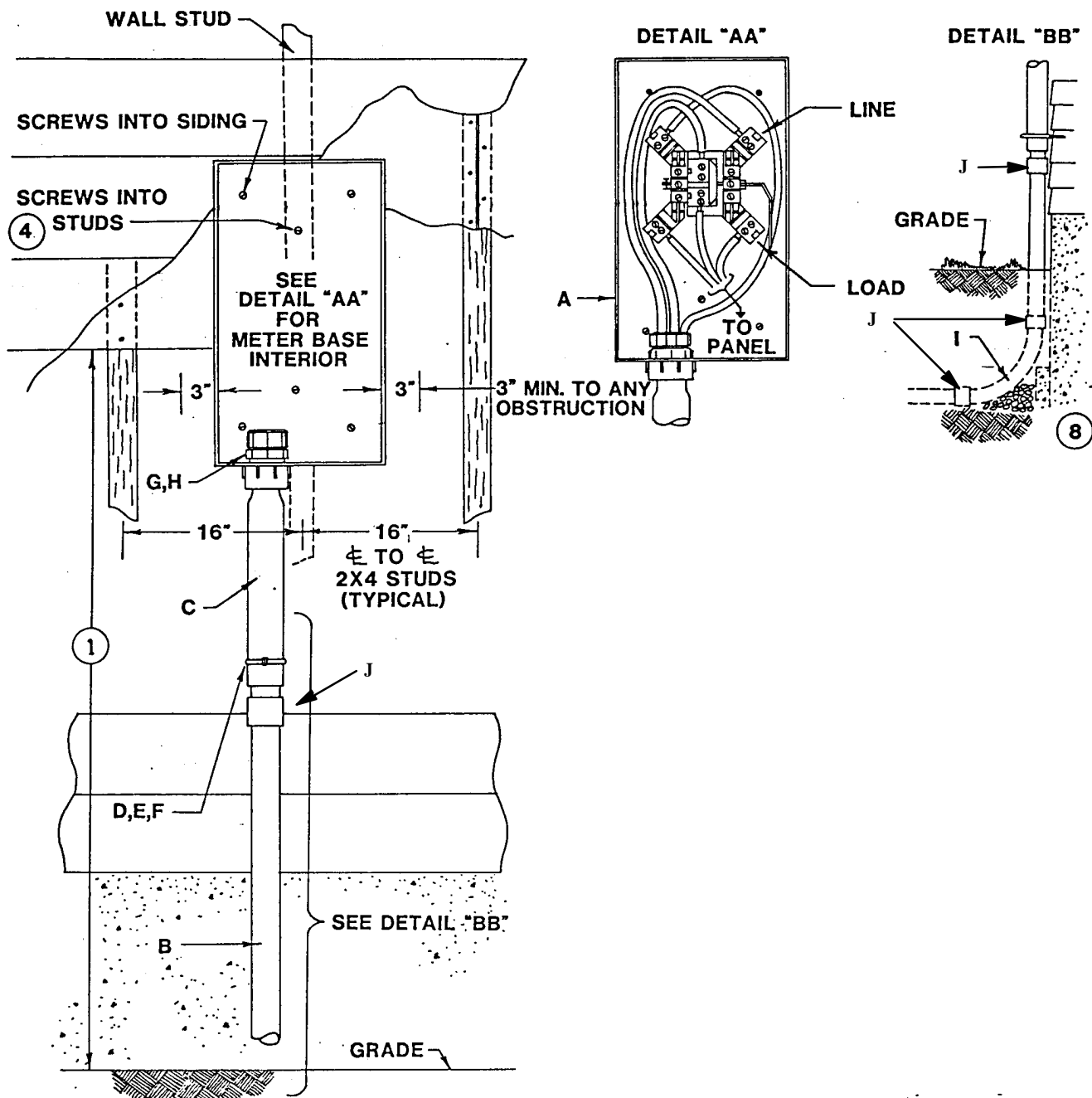
**DIRECT BURIED SERVICE**

	<b>MATERIAL FURNISHED, INSTALLED, AND OWNED BY CUSTOMER</b>	<b>0 – 200 Amp</b>	<b>201 Thru 400 Amp</b>
A	Socket, Meter, 200 Amp, I.D. 228	1	1
	Socket Meter, 400 Amp, (Class 320), I.D. 235		1
B	Conduit, Sch. 40, PVC, 2-1/2"	*	
	Conduit, Sch. 40, PVC, 3"		*
C	Nut, Lock, 2-1/2"	1	
	Nut, Lock, 3"		1
D	Bushing, Conduit, 2-1/2"	1	
	Bushing, Conduit, 3"		1
E	Hanger, Conduit	*	*
F	Screw, Lag	*	*
G	Shield, Expansion	*	*
H	Bend, Conduit, 2-1/2", 45°	1	
	Bend, Conduit, 3", 45°		1

\* As Required



## CONDUIT SERVICE



NOTES:

1. See page D-4 of the Service Manual for mounting height.
2. All materials except the supply cables shall be furnished, installed and connected by customer.
3. Where subject to mechanical damage provide protection.
4. To properly secure the meter socket, use #14 x 3" wood screws. In brick, use expansion shields and lag screws.
5. See 59 81 40 40 2 of 2 for additional serv. cond. instructions and materials.
6. The conduit hanger shall be secured by a lag screw into the floor joist. If attached to the foundation a lead expansion shield shall be used. An alternate to the expansion shield is a stud shot into the foundation.

**CONDUIT SERVICE**

7. When backfilled, expansion coupling "C" shall be fully closed.
8. The area underneath the bend shall consist of good quality fill material and dirt free of debris. The area shall be compacted to a density in excess of 90% of the soil density outside the disturbed area around the foundation wall. Acceptable fill materials: Sand, limestone screenings, concrete slurry, concrete.
9. See 59 81 40 41 for additional service conduit instructions and materials.

	<b>MATERIAL FURNISHED AND INSTALLED BY CUSTOMER</b>	<b>0 to 200 Amp</b>	<b>201 to 400 Amp</b>
A	Socket, Meter 200 Amp, I.D. 228	1	
	Socket, Meter 400 Amp (Class 320), I.D. 235		1
B	Conduit, Schedule 40, PVC, 2-1/2"	As Req'd	As Req'd
	Conduit, Schedule 40, PVC, 3"		
C	Coupling-Conduit, Expansion Sch 40, 2-1/2", PVC, (Allows 8" tall)	1	
	Coupling-Conduit, Expansion Sch 40, 3", PVC, (Allows 8" tall)		1
D	Hanger, Conduit	1	1
E	Screw, Lag		
F	Shield, Expansion		
G	Nut, Lock, 2-1/2"	1	
	Nut, Lock, 3"		1
H	Bushing – Conduit 2-1/2"	1	
	Bushing – Conduit, 3"		1
I	Bend – Conduit, Sch 40 PVC 2-1/2" 90, 24" Radius	*	
	Bend – Conduit, Sch 40 PVC 3" 90, 36" Radius		*
J	Coupling – Conduit, Sch 40 PVC 2-1/2"	1	
	Coupling – Conduit, Sch 40 PVC, 3"		1

\* Minimum radius, 24" for 2-1/2" conduits and 36" for 3" conduits.

**MOBILE HOME METER**  
Pedestal Installation  
Single or Dual Meter Posts

52 18 04 00

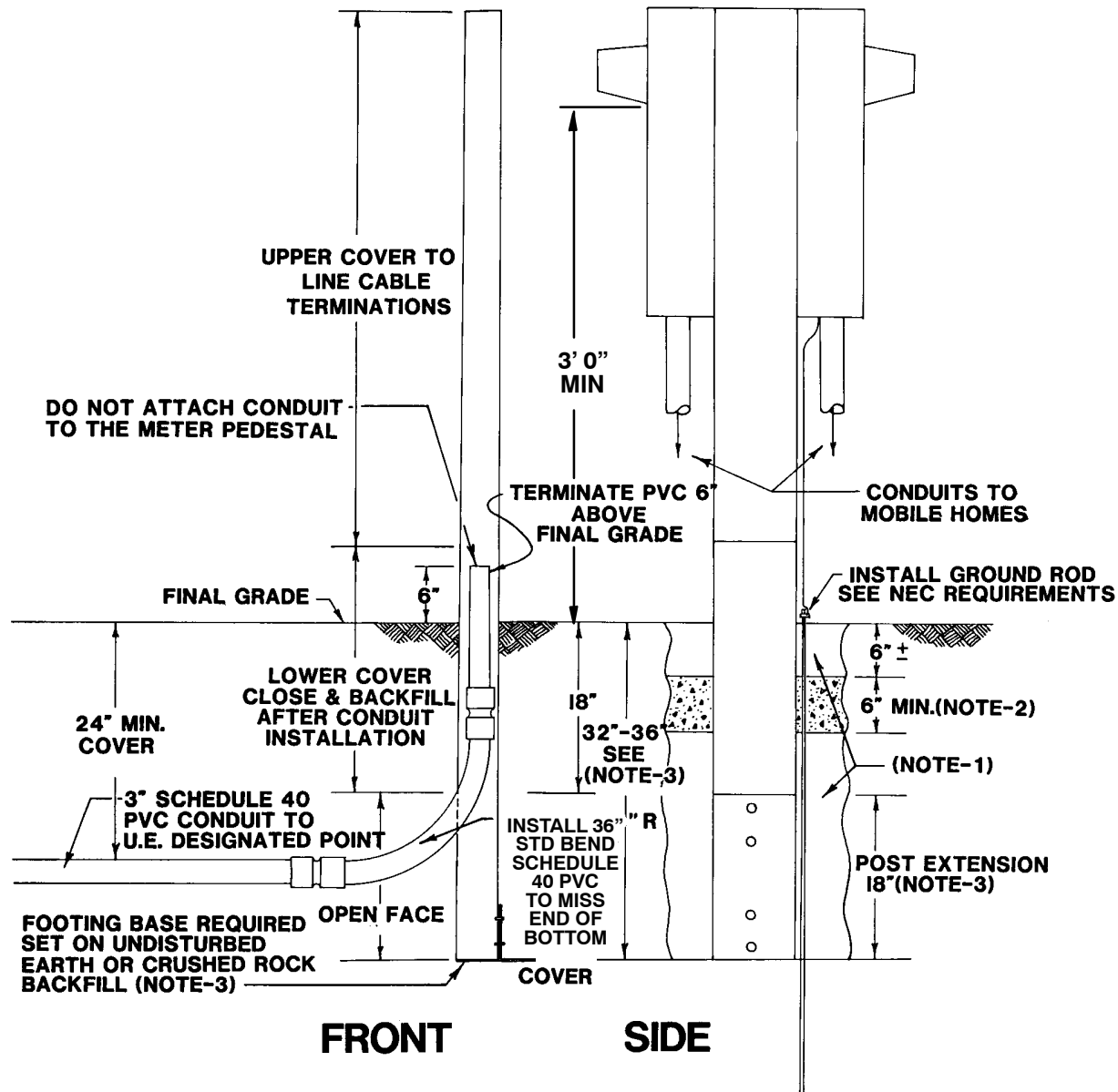
Sheet 1 of 1

➔ **AMEREN MISSOURI ONLY**

**REQUIREMENTS:**

All materials except supply cables shall be furnished and installed by customer.

■ Pedestals shall be labeled for service equipment by U.L. and approved by Ameren Missouri.



**NOTES:**

1. Backfill with tamped crushed rock screening including entire conduit elbow.
2. Place concrete collar 6" thick, min., 6" below grade to firm earth as shown.
3. 32" to 36" pedestal embedment required. Order post extension and footing base with meter post as shown.
4. Owner shall be responsible to see that pedestal is firmly embedded in ground, and plumb to within 1" in 12" vertical.
5. Conduit shown 3" for dual pedestal, use 2-1/2" conduit and 24" radius bend for single pedestal.

**DISTRIBUTION  
CONSTRUCTION STANDARDS**



ENG: EJB  
REV. NO: 3  
REV. DATE: 01/30/12

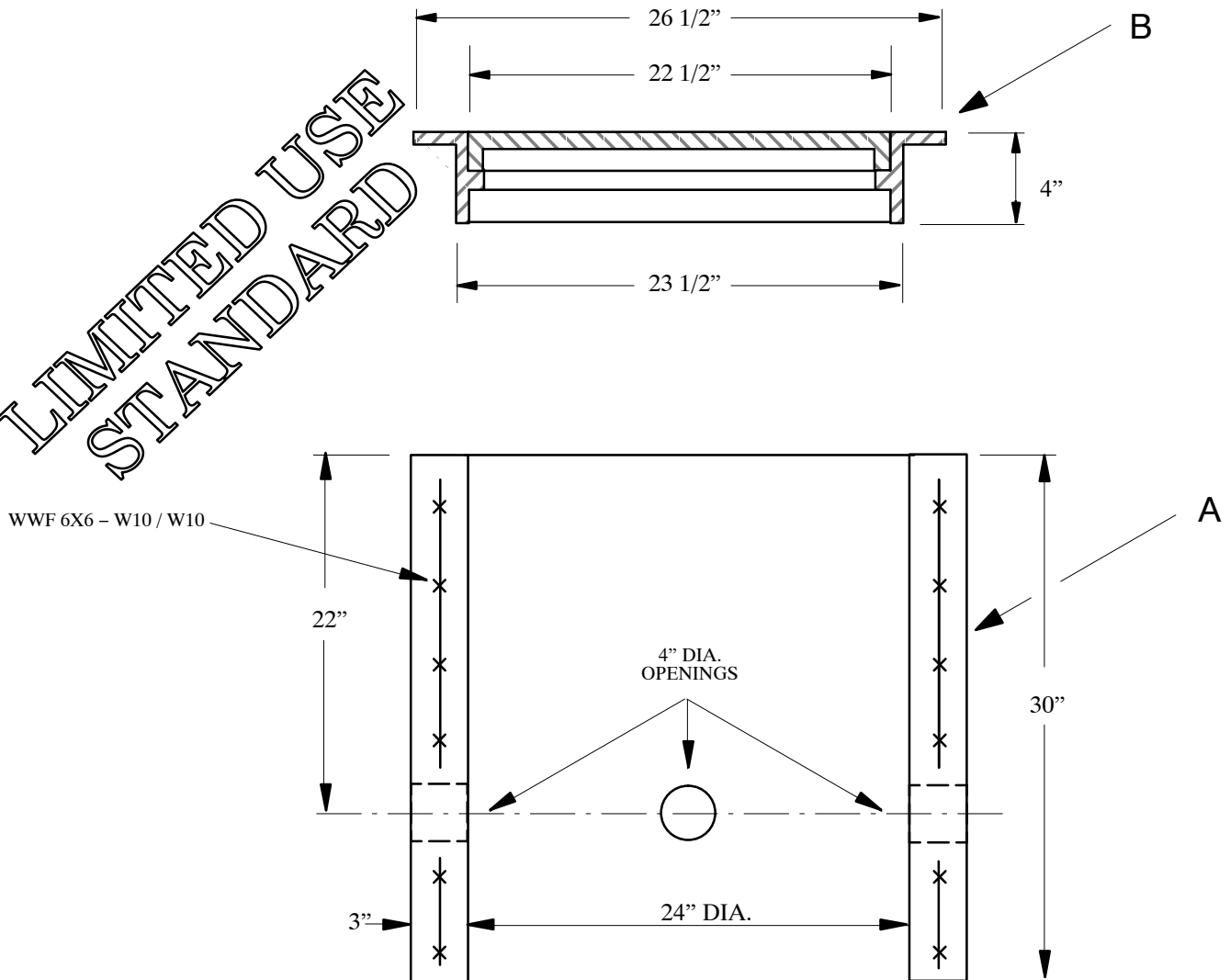
# EQUIPMENT – CONNECTIONS

Handhole 24 Inch Round  
30 Inches Deep

52 21 00 01

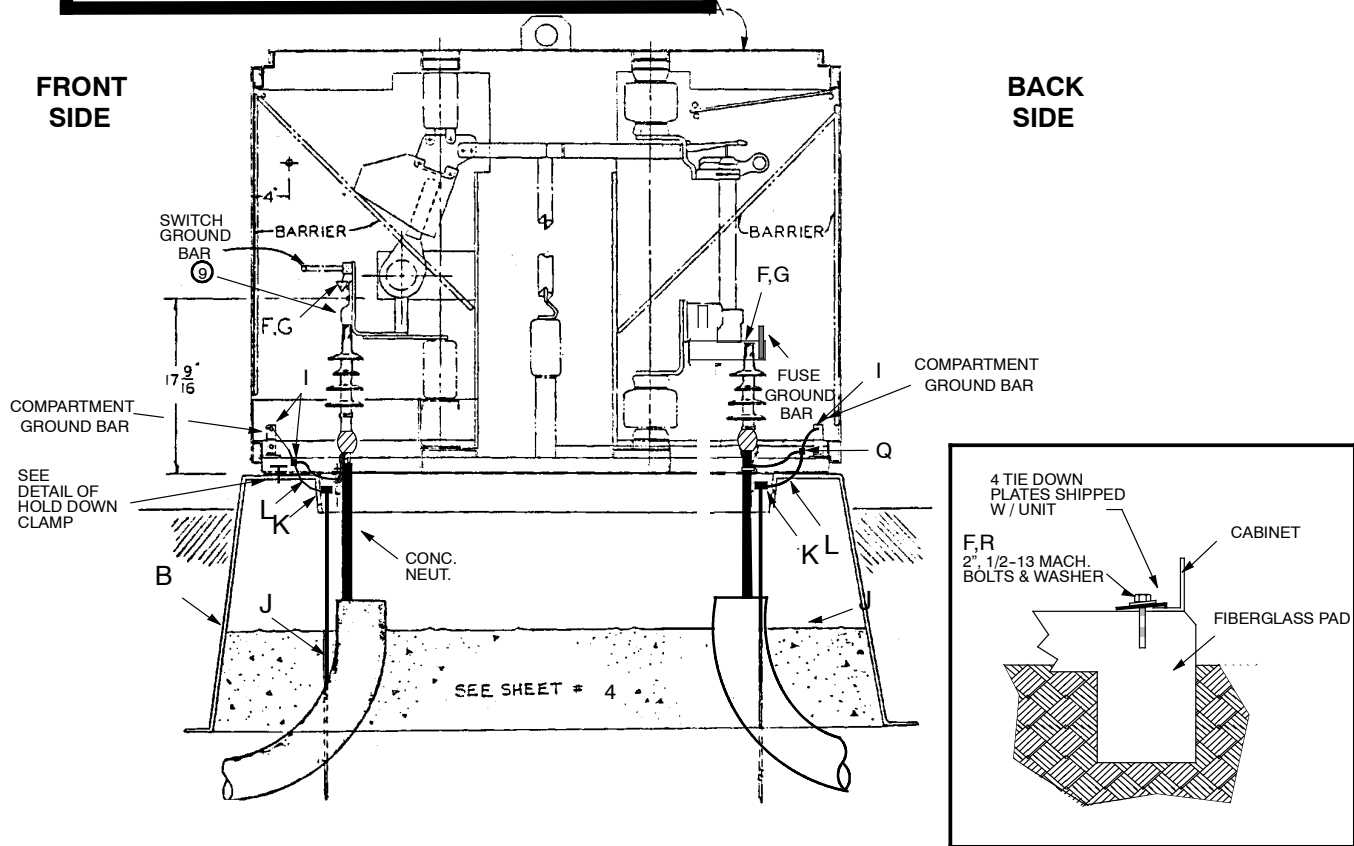
Sheet 1 of 1

LIMITED USE  
STANDARD



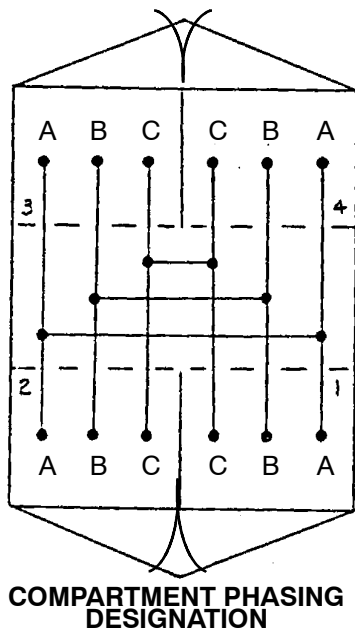
		Std. / Stk. No.	Description	Qty.
@	A	12 06 027	Handhole 24" Round (Concrete)	1
	B	12 06 045	Cover, 24" Round with Frame (Cast Iron)	1
		MEXC	Excavation ( C.X. )	1
		MBF	Backfill	1
		ATMP	Tamping	3
	C		Surface Removal ( S.F. )	7
	D		Surface Replacement ( S.F. )	7
	E	98 00 014	Crushed Rock c.y.	As Req'd

**LIMITED USE STANDARD**



**SECTION RIGHT-HAND SIDE SWITCH GEAR & PAD**

**HOLD DOWN CLAMP DETAIL**



**NOTES:**

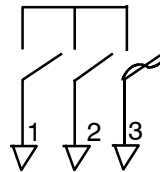
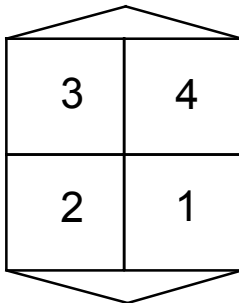
1. Connect conc. neutral from each cable to #2 Cu. wire connected to grd. rod and compartment grd. bar SIMILAR CONNECTIONS TO BE MADE IN EACH EQUIPPED COMPARTMENT.
2. 10' min. clearance shall be provided at front and back of switchgear for operation. 4' min. clearance shall be provided at sides of switchgear.
3. Typical installations will require 3 terminations per compartment sized according to the particular cable being used.
4. Install a label on the switchgear where it can be seen from the street with the proper Pad number. Use the appropriate Reflective Numbers 16-04-1XX.
5. Install a label on each compartment door with the letters LAT\_\_\_\_ or DIP. Use Reflective Letters 16-04-320, 16-04-317, 16-04-321 or 16-04-418, 16-04-419, 16-04-737 and the appropriate Reflective Numbers 16-04-1XX.

## LIMITED USE STANDARD

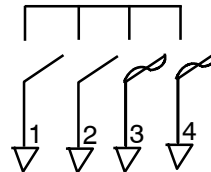
6. Install a label by each switch handle with the letter D \_\_\_\_\_. Use Reflective Letter 16-04-418 and the appropriate Reflective Numbers 16-04-1XX.
7. See Dist. Std. **59 52 00 43** for procedures on installation of belleville washers.
8. See sheets 3 & 4 for composite pad installation instructions.
9. Mount all cables in the lower two hole positions so that fault indicators may be installed.
10. Install Faulted Circuit Indicator on the lug barrel.
11. Place spare fuse refills in fuse compartment door fuse holders.
12. In Missouri residential developments, the contractor will install the box pad and bends.
13. Stock items 54 07 433 and 54 07 435 are for maintenance only.W
14. For duct banks terminating in padmounted switchgear, retain approximately 5 ft. of 4/0 copper bond wire and connect it to a ground rod using a 2 bolt clamp (17-54-132).

### ONE LINE DIAGRAMS OF AVAILABLE UNITS WITH COMPARTMENT LOCATION

COMPARTMENT NUMBER  
DESIGNATION



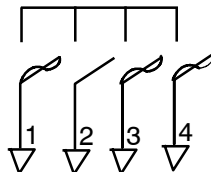
TYPE 6  
53 11 04 01  
53 11 04 09\*\*



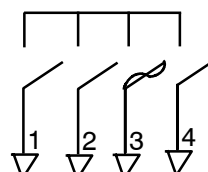
TYPE 9  
53 11 04 02  
53 11 04 08 (PMS)\*  
53 11 04 10\*\*



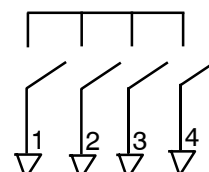
TYPE 4  
53 11 04 07



TYPE 12  
53 11 04 04  
53 11 04 11\*\*



TYPE 11  
53 11 04 05  
53 11 04 12\*\*



TYPE 10  
53 11 04 06

\*200A Switching and Fusing Only.  
\*\* Peoria Only



**LIMITED USE STANDARD**

**SMU -20 Fusing**

		<b>Dist Stnd. / Stk No.</b>	<b>Material Description</b>	<b>53 11 04 **</b>	<b>01</b>	<b>02</b>	<b>04</b>	<b>05</b>	<b>06</b>	<b>07</b>	<b>08</b>
	A	54 07 212	Switchgear - 2 Sw, 3 Fuses	1							
		54 07 213	Switchgear - 2 Sw, 6 Fuses		1						
		54 07 216	Switchgear - 1 Sw, 9 Fuses			1					
		54 07 217	Switchgear - 3 Sw, 3 Fuses				1				
		54 07 218	Switchgear - 4 Sw					1			
13		54 07 433	Switchgear - 3 Fuses							1	
13		54 07 435	Switchgear - 2 Sw, 6 Fuses (All 200 Amp)								1
8	B	12 06 109	Pad - Switchgear, Composite	1	1	1	1	1			
@	C	<b>42 34 61 **</b>	Termination - 750 Al.								
@	D	<b>42 34 59 02</b>	Termination - #2 Al.								
@	E	42 34 59 04	Termination - 4/0 Al.								
	F	21 56 078	Bolt - Mach., S.S., Hex, 1/2" x 2"	22	28	28	28	28	10		
7	G	12 56 052	Washers - Belleville Spring, 1/2", S.S.	18	24	24	24	24	6		
		12 56 053	Washers - Flat, 1/2", S.S.	36	48	48	48	48	12		
	I	17 54 132	Connector - Wire, 8-350 kcmil Cu.	9	10	7	13	16	3		
	J	23 63 069	Rod - Ground, 5/8" x 8'	3	4	4	4	4	2		
	K	17 52 032	Clamp - Ground Rod, 5/8" For #8 - 1/0	3	4	4	4	4	2		
	L	18 52 025	Wire - Cu. #2, S.D. (Ft.)	27	36	36	36	36	9		
@	N	16 51 079	Tag - Square, Red "X"	3	3	-	-	-	-		
@	P	16 51 080	Tag - Triangle, Blue, "Y"	3	3	3	-	-	-		
	Q	17 54 373	Connector-Wire, 2 Cu, Split Bolt	3	6	9	3	-	3		
	R	21 75 105	Washer - Rnd, 1/2", S.S.	4	4	4	4	4	4		
@	S		Refill - Fuse 14.4 kV	6	12	18	6	-	6		
10 @	V	60 55 001	Indicator - Faulted Circuit, 1 PH, Auto Reset								

**LIMITED USE STANDARD**

**SM -4 Fusing (Peoria Only)**

		Dist Stnd. / Stk No.	Material Description	53 11 04 **	09	10	11	12	06
	A	54 07 566	Switchgear - 2 Sw, 3 Fuses		1				
		54 07 563	Switchgear - 2 Sw, 6 Fuses			1			
		54 07 565	Switchgear - 1 Sw, 9 Fuses				1		
		54 07 564	Switchgear - 3 Sw, 3 Fuses					1	
		54 07 218	Switchgear - 4 Sw						1
8	B	12 06 109	Pad - Switchgear, Composite		1	1	1	1	1
@	C	42 34 61 **	Termination - 750 Al.						
@	D	42 34 59 02	Termination - #2 Al.						
@	E	42 34 59 04	Termination - 4/0 Al.						
	F	21 56 078	Bolt - Mach., S.S, Hex, 1/2" x 2"		22	28	28	28	28
7	G	12 56 052	Washers - Bellville Spring, 1/2", S.S.		18	24	24	24	24
		12 56 053	Washers - Flat, 1/2", S.S.		36	48	48	48	48
	I	17 54 132	Connector - Wire, 8*-350 Kcmil Cu.		9	10	7	13	16
	J	23 63 069	Rod - Ground, 5/8" x 8"		3	4	4	4	4
	K	17 52 032	Clamp - Ground Rod, 5/8" for #8 - 1/0		3	4	4	4	4
	L	18 52 025	Wire - Cu. #2, S.D. (Ft.)		27	36	36	36	36
@	N	16 51 079	Tag - Triangle, Red, "X"		3	3	-	-	-
@	P	16 51 080	Tag - Triangle, Blue, "Y"		3	3	3	-	-
	Q	17 54 373	Connector - Wire, 2 Cu, Split Bolt		3	6	9	3	-
	R	21 75 105	Washer - Rnd, 1/2", S.S.		4	4	4	4	4
@	S		Refill - Fuse 14.4kV		6	12	18	6	-
10@	V	60 55 001	Indicator - Faulted Circuit, 1 PH, Auto Reset						

## **LIMITED USE STANDARD**

INSTRUCTIONS FOR EXCAVATION AND PLACEMENT OF SWITCHGEAR BOXPAD STOCK NO. 12 06 109

### Placing The Bends

Place the bends as described in Figure 1. Note that a 36 inch radius bend on the lateral side at a 36 inch depth will almost touch the side of the box when it is placed at depth. An increase of final burial depth or angling of the conduit may be necessary to clear the box flange.

### Excavation And Final Depth

An initial depth of 33 inches shall be excavated removing or tamping all loose soil. The length and width of the hole should be 85" by 79". This allows 5" of side clearance. The longer dimension is the door side of the gear.

Crushed stone screenings shall be placed and tamped to a final level depth of 30 inches. The area bearing the pad-box shall be leveled with a carpenter's level. The final depth of 30 inches will leave the required 6 inches of box exposed at final grade.

### Place The Box

Place the box with the longer side where the doors will be, as described on the Engineering Layout.

### Backfilling

Stabilize the box before backfilling the outside of the box to prevent shifting. A 3" base must be prepared and thoroughly tamped. Level the box pad and place 1 - 2" of soil on the flange to keep the box pad in place.

### Stabilizing

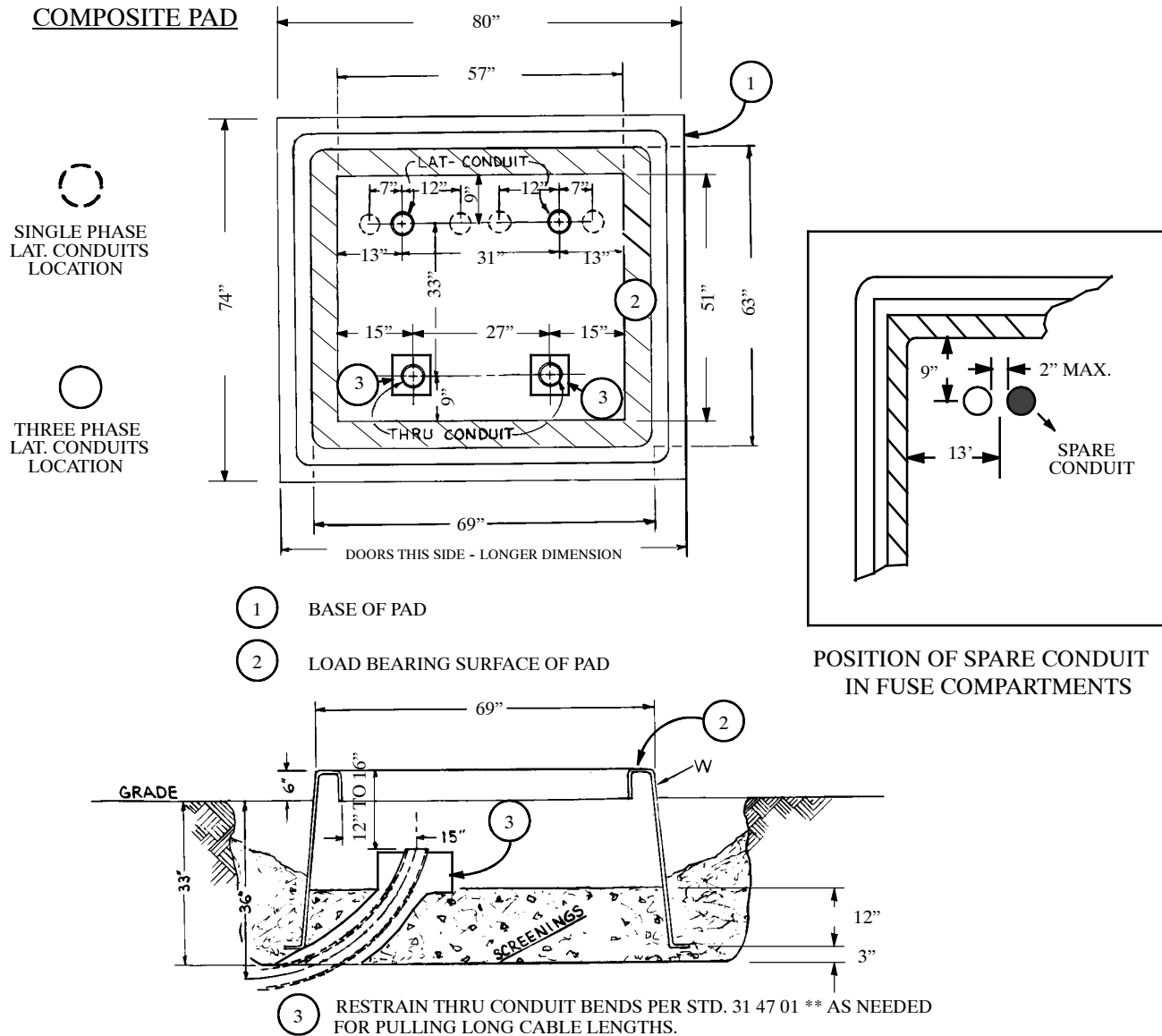
To further stabilize the box and conduit bends, place 12 inches of screenings inside the box and tamp in place.

### Bend - Final Preparation

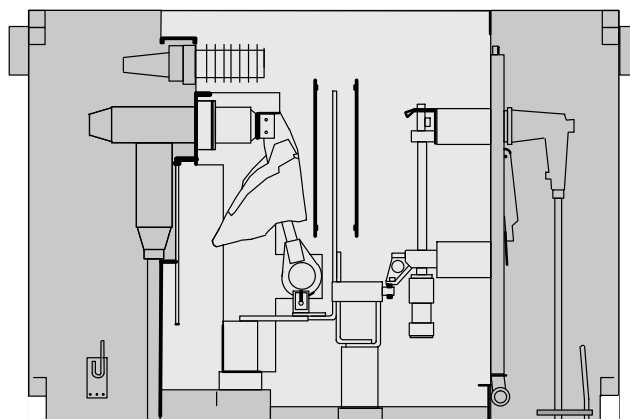
The conduit bend should be cut off below the box's switchgear mounting flange. The rule is as follows: 5 inch diameter bend shall be cut a minimum of 16 inches below the flange. A 4 inch conduit cut a minimum of 12 inches below.

NOTE: This installation will not withstand pulling long cable lengths through the bends at the switchgear. Install restrained bends per Dist. Standard 31 47 01 \*\*. Recommended for pulling 750 Al or Cu cables more than 250 ft. See composite pad drawing.

**LIMITED USE STANDARD**



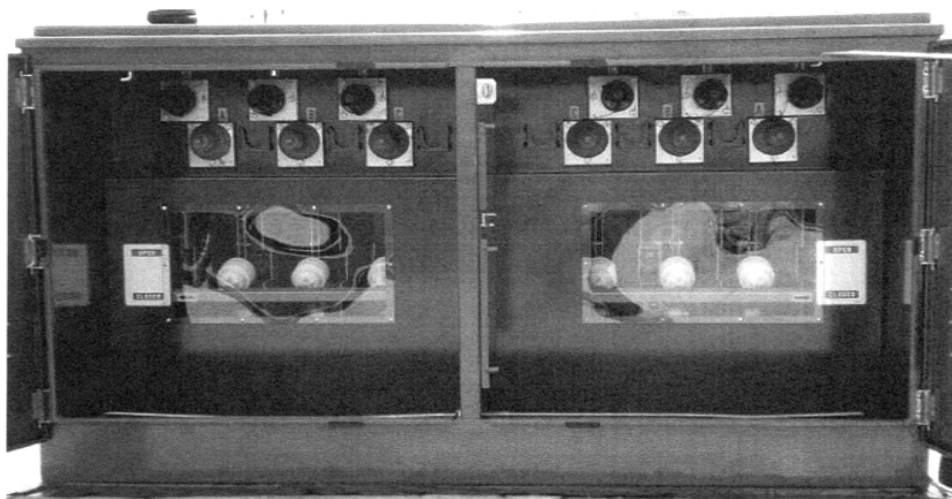
600 Amp  
Switch Side



200 Amp  
Fuse Side

Side View of a Deadfront Switchgear

**600 Amp Switch Side Operation:**



Front View of 600 Amp Switch Side

1. Confirm the visible break through the windows. This eliminates the need to move the 600 amp elbow connectors.
2. The operating sequence is similar to that of a live front switch.
3. See Dist. Std. **42 34 64 \*\*** and **59 40 60 01** for 600 amp elbow terminator details.
4. 200 Amp loadbreak elbows with #2 AWG cables may be installed in the switch compartments when necessary. Install a 200 amp to 600 amp bushing adaptor (Stk.# 17-05-256) on each 600 amp bushing. See Dist. Std. **59 40 60 01**.
5. 200 Amp bushings are for grounding elbows.
6. For duct banks terminating in padmounted switchgear, retain approximately 5ft of 4/0 copper bond wire and connect it to a ground rod using a 2 bolt clamp (17-54-132).

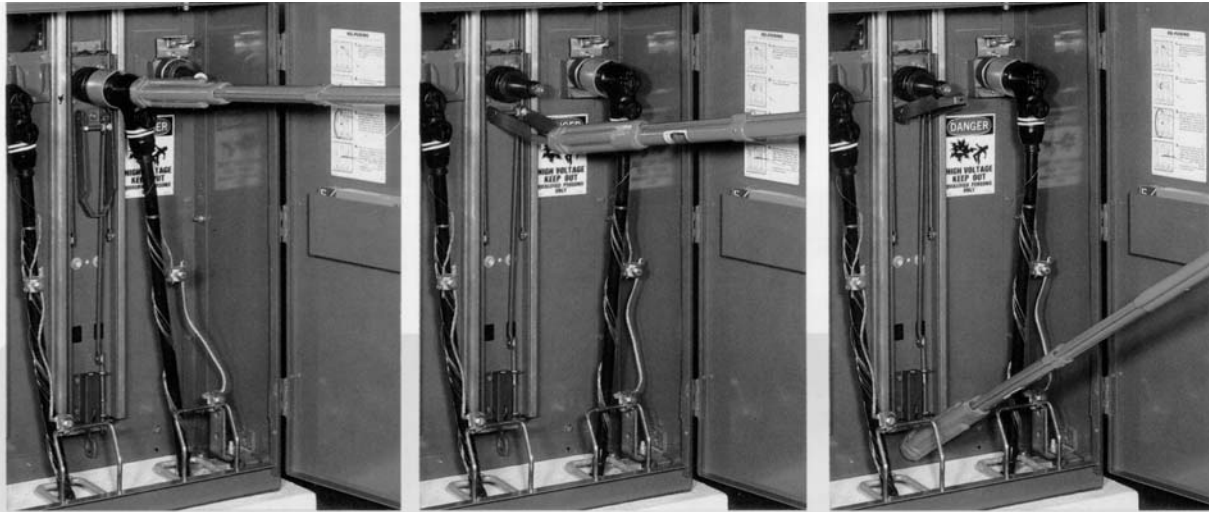
**CAUTION:** 600 amp elbows are non-loadbreak and can only be removed from a de-energized bushing.

**EQUIPMENT-SWITCHING**  
Padmounted-3 Phase, 15 kV  
Deadfront

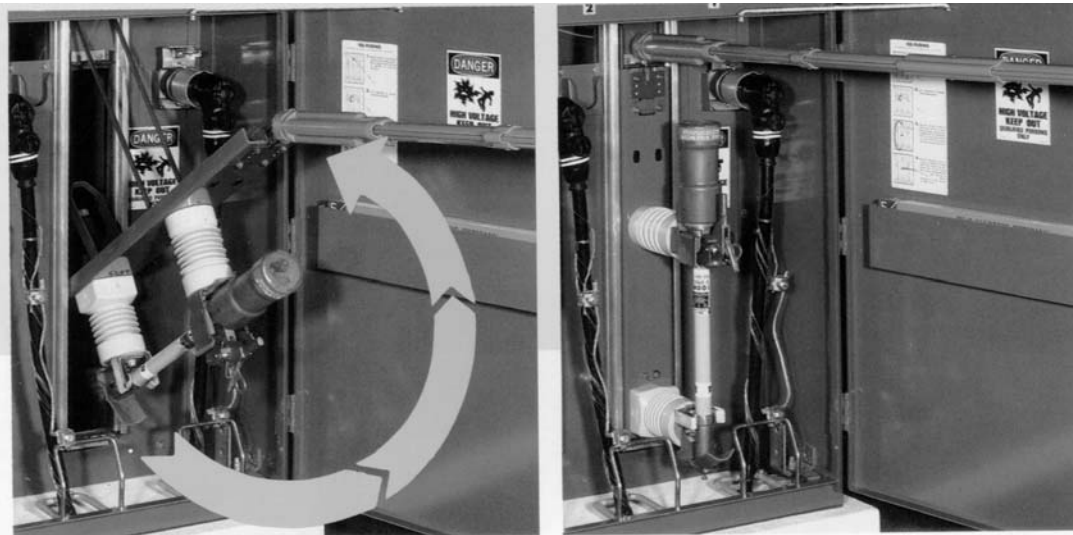
**53 11 05 \*\***  
Sheet 2 of 14

- 
7. Install a label on the switchgear where it can be seen from the street with the proper pad number. Use the appropriate reflective numbers 16-04-108 to 16-04-116.
  8. Install a label on each compartment door with the letters LAT \_\_\_\_\_ or DIP \_\_\_\_\_. Use reflective letters 16-04-320, 16-04-317, 16-04-321 or 16-04-148, 16-04-419, 16-04-737 and the appropriate reflective numbers 16-04-108 to 16-04-116.
  9. Install a label by each switch handle with the letter D \_\_\_\_\_. Use reflective letter 16-04-418 and the appropriate reflective numbers 16-04-108 to 16-04-116.

**200 Amp Fuse Side Operation (S&C):**



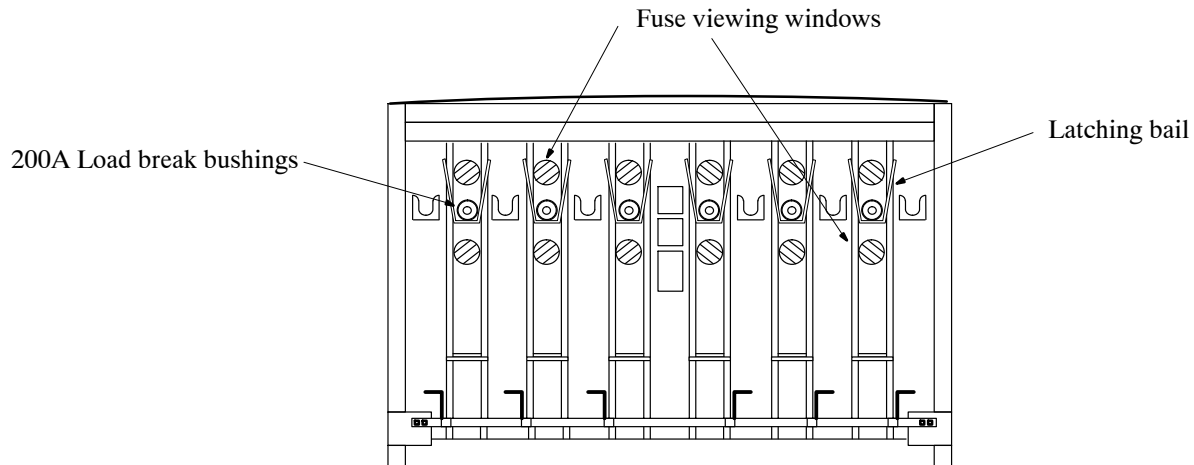
1. The operator moves the loadbreak elbow to a feedthru or standoff insulator on the parking stand, interrupting any fuse load.
2. This allows the mechanical interlock to be raised, unlocking the TransFuser Mounting.
3. A slight pull unlatches the TransFuser Mounting.



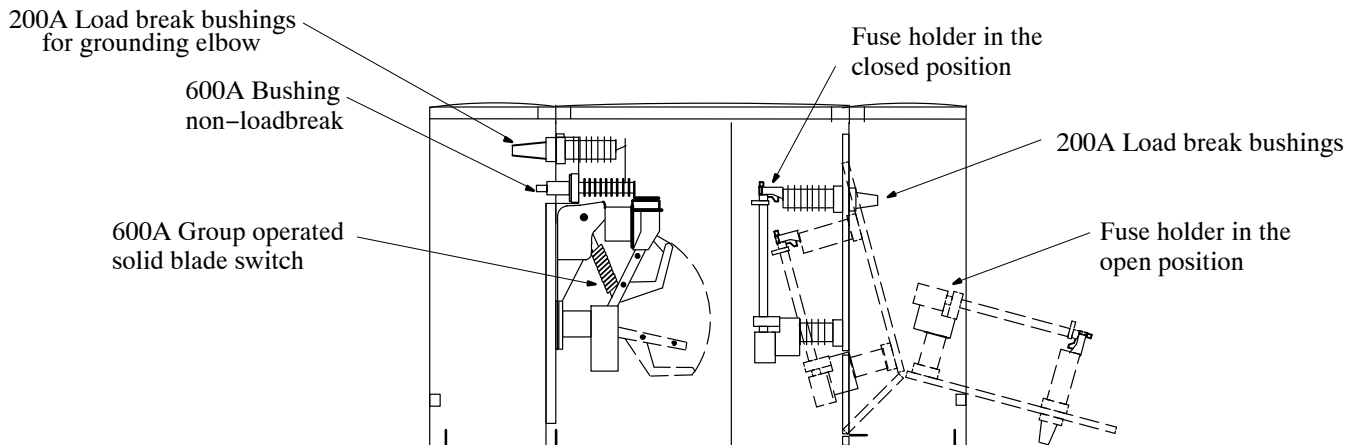
4. The balanced mounting virtually self-pivots to its open position and latches in place – its a swift, controlled action that guards against exposure to energized live parts.
5. In the open position, the de-energized and isolated fuse is accessible to the operator for replacement.

1. Always use hotline tools when replacing fuses.
2. The fuse installation procedure is a reverse of fuse removal.
3. S & C SMU – 20 fuses and fuse mountings are standard. S&C Deadfront Switchgear uses SME-20 fuse end fittings (20-04-498).

**200 Amp Fuse Side Operation (Federal Pacific & A.B. Chance):**



**Front View of 200 Amp Fuse Side**

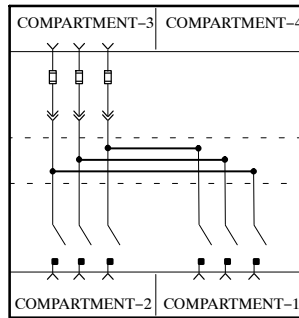


**Side View of Switchgear**

1. Always use hotline tools when replacing fuses.
2. Loadbreak elbow must be placed on a parking stand before the latching bail can be raised.
3. After the elbow has been parked, the latching bail on the fuse door can be raised with a shotgun stick and the fuse door lowered into position.
4. The fuse can then be removed from the holder with the shotgun stick.
5. These units require S&C SMU-20 fuses, and S&C SML-20 fuse end fittings stock number 20-04-499.

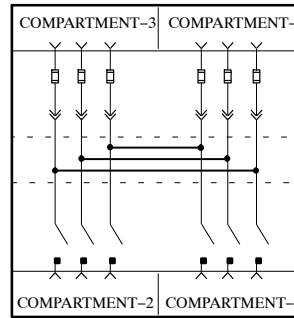


**Switchgear Configurations:**



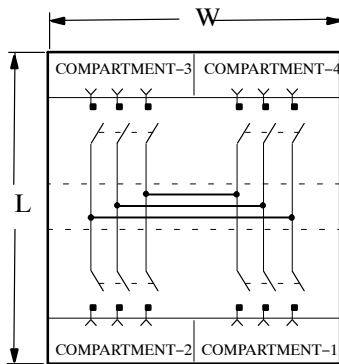
Type: 6

53 11 05 05



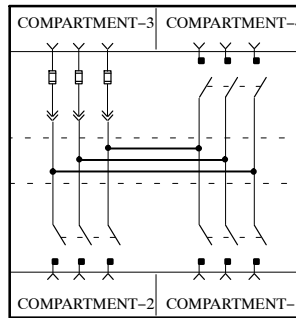
Type: 9

53 11 05 01



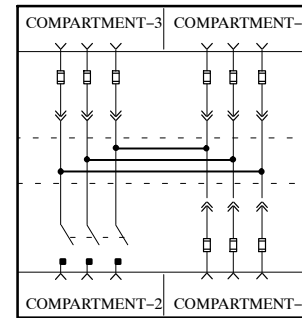
Type: 10

53 11 05 02



Type: 11

53 11 05 03



Type: 12

53 11 05 04

**Switchgear Dimensions:**

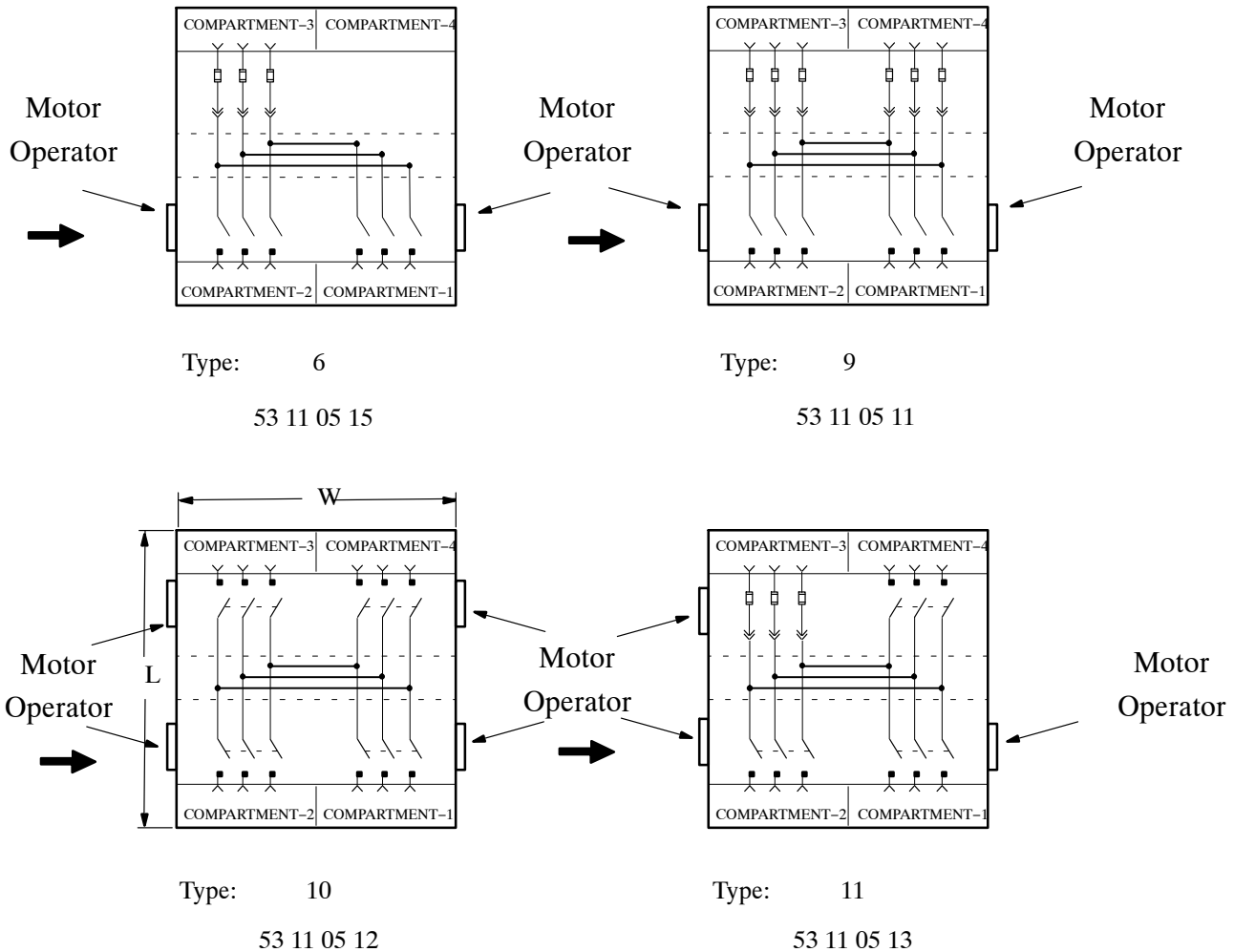
Height = 45 1/8" + 6" Base Adapter ( All Types )

Width(W) = 75" ( All Types )

Length(L) = 69 3/4" ( Types 6, 9, and 12 )

= 72 3/4" ( Types 10 and 11 )

**Automated Switchgear Configurations:**



**Switchgear Dimensions:**

Height = 45 1/8" + 6" Base Adapter ( All Types )  
 Width(W) = 75" ( All Types ) \*  
 Length(L) = 69 3/4" ( Types 6, and 9 )  
               = 72 3/4" ( Types 10 and 11 )

➔ \* Each motor operator extends 14" beyond the cabinet width

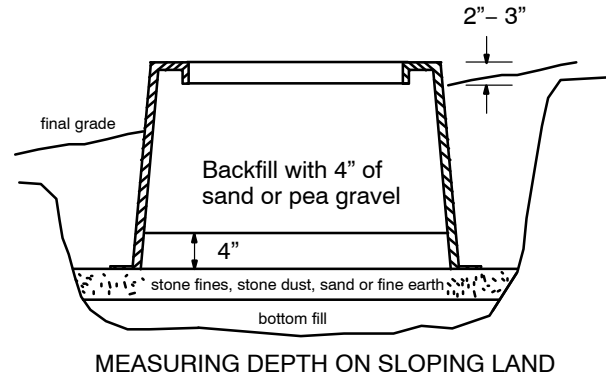
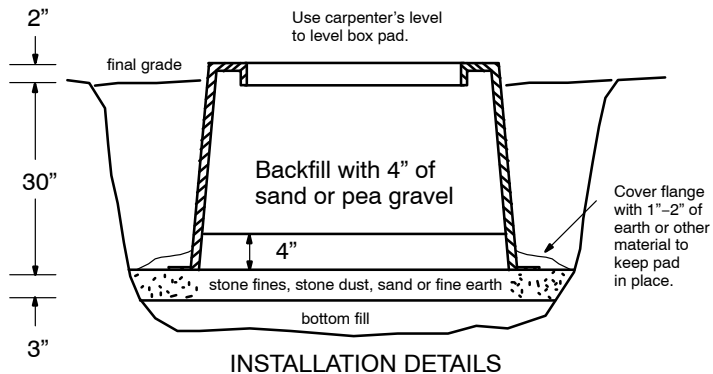
**Composite Box Pad Installation for Direct Buried Cables:**

**Base Preparation**

The bottom flange must rest on a firm foundation, and a 3" base must be prepared and thoroughly tamped. After the box pad has been placed in position and levelled, 1"-2" of soil should be placed on the flange to keep the box pad in place. Place 4" of sand inside the box pad to hold it in place.

**Backfilling**

Make sure no large boulders are resting against the sides of the box, because they produce high pressure points. Sand is not a good back fill material since it provides very little resistance to surface loads.



**Composite Box Pad Installation for Conduit Systems:**

**Backfilling**

Stabilize the box before backfilling the outside of the box to prevent shifting. A 3" base must be prepared and thoroughly tamped. Level the box pad and place 1 – 2" of soil on the flange to keep the box pad in place.

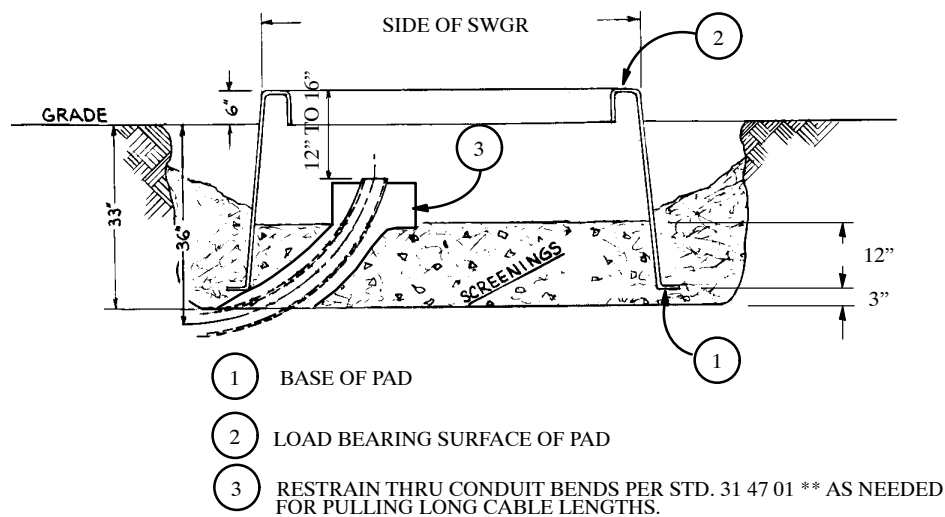
**Stabilizing**

To further stabilize the box and conduit bends, place 12 inches of screenings inside the box and tamp in place.

**Bend – Final Preparation**

The conduit bend should be cut off below the box's switchgear mounting flange. The rule is as follows: 5 inch diameter bend shall be cut a minimum of 16 inches below the flange. A 4 inch conduit cut a minimum of 12 inches below.

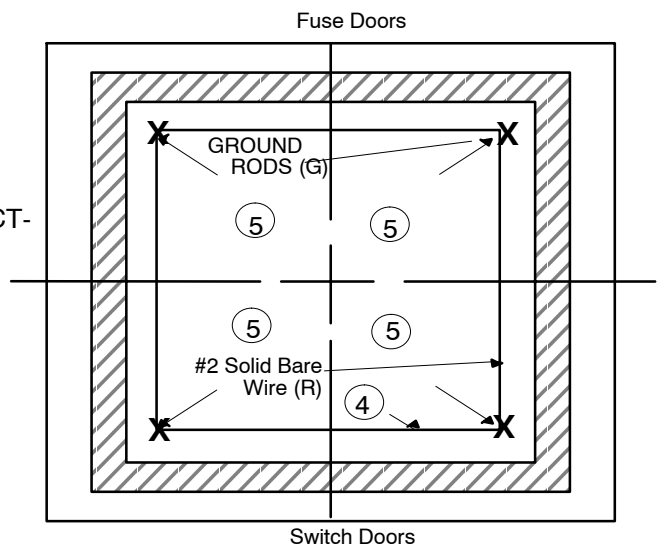
NOTE: The installation will not withstand pulling long cable lengths through the bends at the switchgear. Install restrained bends per Dist. Standard 31 47 01 \*\*. Recommended for pulling 750 Al or Cu cables more than 250 ft.



**Grounding Systems**

④. PLACE GROUND RODS AT CORNERS (x) AND LOOP #2 BARE WIRE AROUND THE PAD CONNECTING TO THE RODS WITH GROUND ROD CLAMPS

⑤. CONNECT THE GROUND RODS TO THE SWITCHGEAR GROUND BARS.



# EQUIPMENT-SWITCHING

## Padmounted-3 Phase, 15 kV

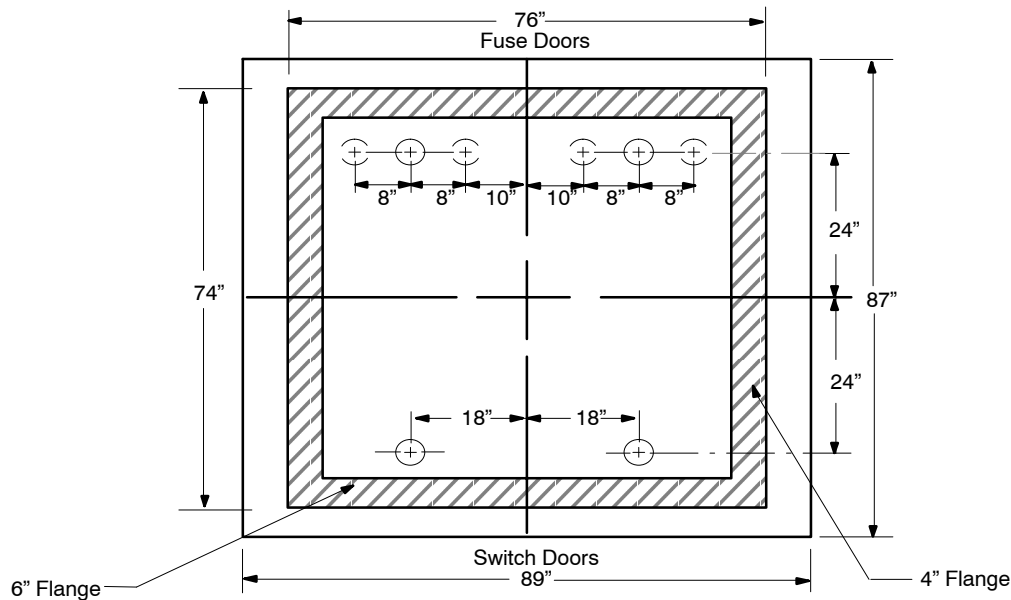
### Deadfront

53 11 05 \*\*

Sheet 9 of 14

#### Conduit Locations – Deadfront Pad (12-06-165):

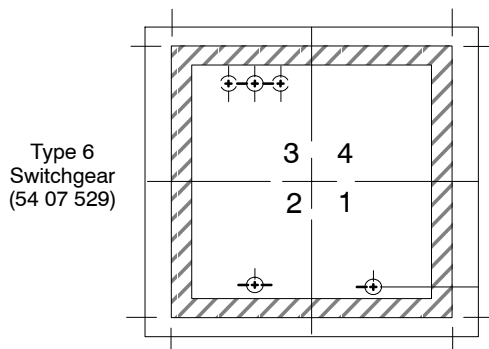
This is the preferred pad for deadfront switchgear.



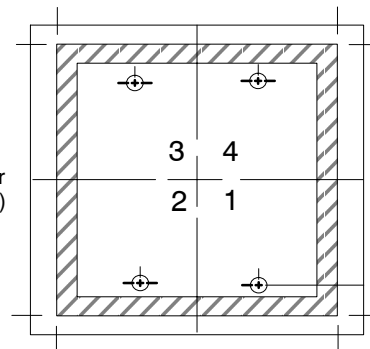
Type 9 Switchgear (54 07 287)

- Single Phase Lateral Conduit Location
- Three Phase Lateral Conduit Location

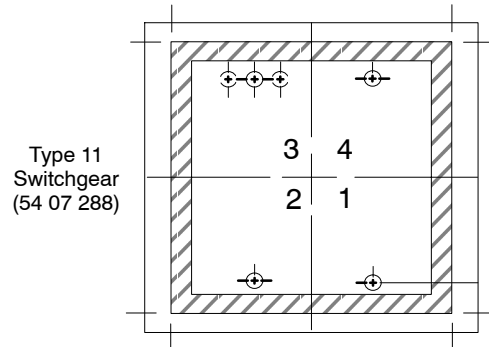
For the following switchgear conduit layouts, use the appropriate dimensions from the Type 9 conduit layout drawing above.



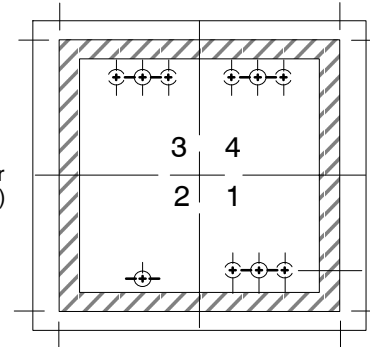
Type 6  
Switchgear  
(54 07 529)



Type 10  
Switchgear  
(54 07 300)



Type 11  
Switchgear  
(54 07 288)



Type 12  
Switchgear  
(54 07 290)

# EQUIPMENT-SWITCHING

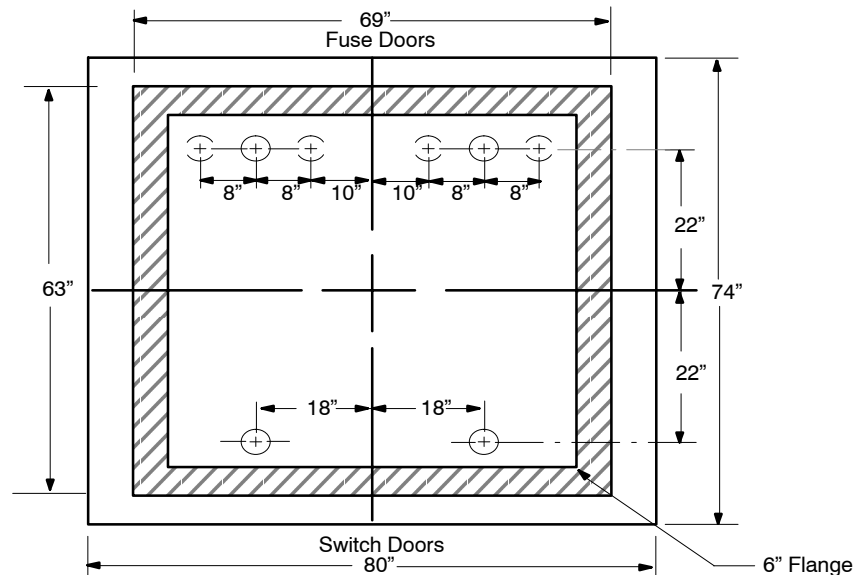
## Padmounted-3 Phase, 15 kV

### Deadfront

53 11 05 \*\*  
Sheet 10 of 14

#### Conduit Locations – Livefront Pad (12-06-109):

This pad is for deadfront switchgear with a base-spacer-adapter.



Type 9 Switchgear (54 07 287)

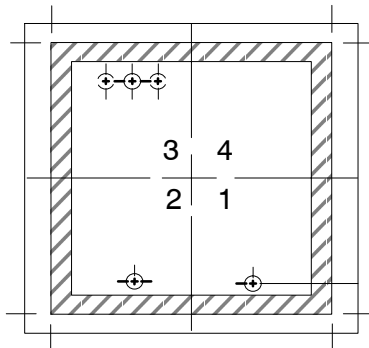


Single Phase Lateral Conduit Location

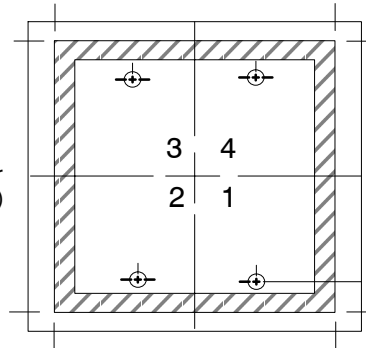
Three Phase Lateral Conduit Location

For the following switchgear conduit layouts, use the appropriate dimensions from the Type 9 conduit layout drawing above.

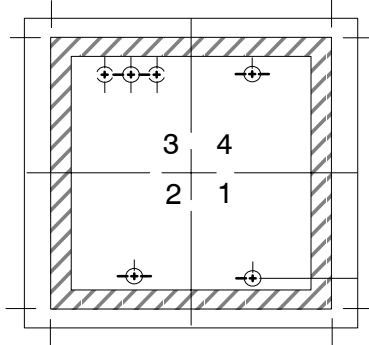
Type 6  
Switchgear  
(54 07 529)



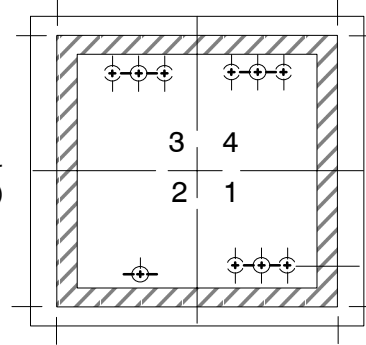
Type 10  
Switchgear  
(54 07 300)



Type 11  
Switchgear  
(54 07 288)



Type 12  
Switchgear  
(54 07 290)



**DEADBREAK CONNECTIONS IN SWITCHED COMPARTMENTS (600A)**

		<b>Dist Std. / Stk No.</b>	<b>Material Description</b>	<b>53 11 05 **</b>	<b>01</b>	<b>02</b>	<b>03</b>	<b>04</b>	<b>05</b>
<div style="display: flex; flex-direction: column; align-items: center;"> <div>@</div> <div>@ 1</div> <div>@</div> <div>@ 2</div> <div>@</div> <div>@ 7</div> <div>@</div> <div>4</div> <div>@ 6</div> </div>	A	54 07 287	Switchgear – Type 9, 2 Sw, 6 Fuses		1				
		54 07 300	Switchgear – Type 10, 4 Sw			1			
		54 07 288	Switchgear – Type 11, 3 Sw, 3 Fuses				1		
		54 07 290	Switchgear – Type 12, 1 Sw, 9 Fuses					1	
		54 07 529	Switchgear – Type 6, 2 Sw, 3 Fuses						1
	B	12 06 165	Pad Composite– Deadfront Switchgear,		1	1	1	1	1
		12 06 109	Pad – Livefront Switchgear, Composite		1	1	1	1	1
	C	<b>42 34 64 **</b>	Terminator – Elbow, Deadbreak 600A		6	12	9	3	6
	D	<b>42 34 62 01</b>	Elbow – Loadbreak, 200A, #2 AWG		6	–	3	9	3
		<b>42 34 62 02</b>	Elbow – Loadbreak, 200A, 4/0 AWG		6	–	3	9	3
		<b>42 34 62 03</b>	Elbow – Loadbreak, 200A, 1/0 AWG		6	–	3	9	3
	G	23 13 069	Rod – Ground 5/8" x 8'		4	4	4	4	3
	H	17 52 032	Clamp – Ground Rod, 5/8" For #8 – 1/0		8	8	8	8	6
	I	17 54 132	Connector – Wire, 8–350 kcmil Cu.		10	16	13	7	10
	J	17 54 373	Connector – Wire, #2 Cu, Split Bolt		6	–	3	9	3
	K	16 06 276	Holder – Tag, Black, 5 Position						
		16 06 277	Holder – Tag, Black, 7 Position						
	L		Refill – Fuse, 14.4 kV, SMU – 20		6	–	3	9	3
	M	60 55 001	Indicator – Faulted Circuit, 1 PH						
	N	<b>54 11 01 01</b>	Arrester – Elbow, 10 kV						
	O	17 55 227	Cap – Insulating, 15 kV, 200 A		12	24	18	6	12
	P	18 52 025	Wire – Cu., #2 S.D. (ft)		48	48	48	48	39
	Q	12 06 195	Base Adapter – Type 6, 9, and 12						
		12 06 194	Base Adapter – Type 10 and 11						

Notes:

- Cover all 200 amp load reducing tap plugs on 600 amp elbows with an insulated cap (17–55–227) or an elbow arrester (10–01–138).
- Add appropriate letters and numbers (stock #'s 16–01–195 through 16–01–225) to tag holders.
- 600 amp insulated cap (17–55–386) or a 200 amp to 600 amp bushing adapter (17–05–256) can be used to cover an open 600 amp bushing.
- Cover all open 200 amp bushings with insulated caps (17–55–227). Cover all grounding bushings with insulated caps.
- 600 amp elbows are installed on bushings in the switchgear using a "T" wrench (stock # 85–41–370) or an "OAT" Operating Tool (stock# 83–28–045).
- For Federal Pacific switchgear installed on livefront pad 12–06–109, order base adapter 12–06–195 for type 6, 9, 12, or base adapter 12–06–194 for type 10 or 11.
- A fiber optic cable (18–66–658) can be added to each fault indicator installed for remote viewing on the door.

**LOADBREAK CONNECTIONS IN SWITCHED COMPARTMENTS (200A)**

		<b>Dist Std. / Stk No.</b>	<b>Material Description</b>	<b>53 11 05 **</b>	<b>06</b>	<b>07</b>	<b>08</b>	<b>09</b>	<b>10</b>
	A	54 07 287	Switchgear – Type 9, 2 Sw, 6 Fuses		1				
		54 07 300	Switchgear – Type 10, 4 Sw			1			
		54 07 288	Switchgear – Type 11, 3 Sw, 3 Fuses				1		
		54 07 290	Switchgear – Type 12, 1 Sw, 9 Fuses					1	
		54 07 529	Switchgear – Type 6, 2 Sw, 3 Fuses						1
@	B	12 06 165	Pad – Deadfront Switchgear, Composite		1	1	1	1	1
		12 06 109	Pad – Livefront Switchgear, Composite		1	1	1	1	1
@	C	17 05 256	Bushing Adapter – 200A to 600A		6	12	9	3	6
	D	<b>42 34 62 01</b>	Elbow – Loadbreak, 200A, #2 AWG		12	12	12	12	9
		<b>42 34 62 02</b>	Elbow – Loadbreak, 200A, 4/0 AWG		12	12	12	12	9
		<b>42 34 62 03</b>	Elbow – Loadbreak, 200A, 1/0 AWG		12	12	12	12	9
	G	23 13 069	Rod – Ground 5/8" x 8'		4	4	4	4	3
	H	17 52 032	Clamp – Ground Rod, 5/8" For #8 – 1/0		8	8	8	8	6
	I	17 54 132	Connector – Wire, 8–350 kcmil Cu.		10	16	13	7	10
	J	17 54 373	Connector – Wire, #2 Cu, Split Bolt		6	–	3	9	3
@1	K	16 06 276	Holder – Tag, Black, 5 Position						
		16 06 277	Holder – Tag, Black, 7 Position						
@	L		Refill – Fuse, 14.4 kV, SMU – 20		6	–	3	9	3
@ 4	M	60 55 001	Indicator – Faulted Circuit, 1 PH						
@	N	<b>54 11 01 01</b>	Arrester – Elbow, 10 kV						
2	O	17 55 227	Cap – Insulating, 15 kV, 200 A		6	12	9	3	6
	P	18 52 025	Wire – Cu., #2 S.D. (ft)		48	48	48	48	39
@ 3	Q	12 06 195	Base Adapter – Type 6, 9, and 12						
		12 06 194	Base Adapter – Type 10 and 11						

Notes:

1. Add appropriate letters and numbers (stock #'s 16–01–195 through 16–01–225) to tag holders.
2. Cover all open 200 amp bushings with insulated caps (17–55–227). Cover all grounding bushings with insulated caps.
3. For Federal Pacific switchgear installed on livefront pad 12–06–109, order base adapter 12–06–195 for type 6, 9, 12, or base adapter 12–06–194 for type 10 or 11.
4. A fiber optic cable (18–66–658) can be added to each fault indicator installed for remote viewing on the door.



**AUTOMATED SWITCHGEAR**  
**DEADBREAK CONNECTIONS IN SWITCHED COMPARTMENTS (600A)**

		Dist Std. / Stk No.	Material Description	53 11 05 **	11	12	13	15
8	A	54 07 547	Switchgear – Type 9, 2 Sw, 6 Fuses, M.O. on 1 & 2	1				
		54 07 546	Switchgear – Type 10, 4 Sw, M.O. on 1,2,3 & 4		1			
		54 07 567	Switchgear – Type 11, 3 Sw, 3 Fuses, M.O. on 1,2 & 3			1		
		54 07 570	Switchgear – Type 6, 2 Sw, 3 Fuses, M.O. on 1 & 2				1	
@	B	12 06 165	Pad – Deadfront Switchgear, Composite	1	1	1	1	
		12 06 109	Pad – Livefront Switchgear, Composite	1	1	1	1	
@1	C	42 34 64 **	Terminator – Elbow, Deadbreak 600A	6	12	9	6	
@	D	42 34 62 01	Elbow – Loadbreak, 200A, #2 AWG	6	–	3	3	
		42 34 62 02	Elbow – Loadbreak, 200A, 4/0 AWG	6	–	3	3	
		42 34 62 03	Elbow – Loadbreak, 200A, 1/0 AWG	6	–	3	3	
	G	23 13 069	Rod – Ground Rod 5/8" x 8'	4	4	4	3	
	H	17 52 032	Clamp – Ground Rod, 5/8" for #8 - 1/0	8	8	8	6	
	I	17 54 132	Connector – Wire, 8–350 kcmil Cu.	10	16	13	10	
	J	17 54 373	Connector – Wire, #2 Cu, Split Bolt	6	–	3	3	
@2	K	16 06 276	Holder – Tag, Black, 5 Position					
		16 06 277	Holder – Tag, Black, 7 Position					
@	L		Refill – Fuse, 14.4 kV, SMU – 20	6	–	3	3	
@7	M	60 55 001	Indicator – Faulted Circuit, 1 PH					
@	N	54 11 01 01	Arrestor – Elbow, 10 kV					
4	O	17 55 227	Cap – Insulating, 15 kV, 200 A	12	24	18	12	
	P	18 52 025	Wire – Cu., #2 S.D. (ft)	48	48	48	39	
@6	Q	12 06 195	Base Adapter – Type 6, 9, and 12					
		12 06 194	Base Adapter – Type 10 and 11					

Notes:

- Cover all 200 amp load reducing tap plugs on 600 amp elbows with an insulated cap (17–55–227) or an elbow arrester (10–01–138).
- Add appropriate letters and numbers (stock #'s 16–01–195 through 16–01–225) to tag holders.
- 600 amp insulated cap (17–55–386) or a 200 amp to 600 amp bushing adapter (17–05–256) can be used to cover an open 600 amp bushing.
- Cover all open 200 amp bushings with insulated caps (17–55–227). Cover all grounding bushings with insulated caps.
- 600 amp elbows are installed on bushings in the switchgear using a "T" wrench (stock # 85–41–370) or an "OAT" Operating Tool (stock# 83–28–045).
- For Federal Pacific switchgear installed on livefront pad 12–06–109, order base adapter 12–06–195 for type 6, 9, or base adapter 12–06–194 for type 10 or 11.
- A fiber optic cable (18–66–658) can be added to each fault indicator installed for remote viewing on the door.
- Motor Operator (M.O.'s) are on switched compartments.

## AUTOMATED SWITCHGEAR

### LOADBREAK CONNECTIONS IN SWITCHED COMPARTMENTS (200A)

		Dist Std. / Stk No.	Material Description	53 11 05 **	16	17	18	20
8	A	54 07 547	Switchgear – Type 9, 2 Sw, 6 Fuses, M.O. on 1 & 2		1			
		54 07 546	Switchgear – Type 10, 4 Sw, M.O. on 1, 2, 3 & 4			1		
		54 07 567	Switchgear – Type 11, 3 Sw, 3 Fuses, M.O. on 1, 2 & 3				1	
		54 07 570	Switchgear – Type 6, 2 Sw, 3 Fuses, M.O. on 1 & 2					1
@	B	12 06 165	Pad – Deadfront Switchgear, Composite		1	1	1	1
		12 06 109	Pad – Livefront Switchgear, Composite		1	1	1	1
@	C	17 05 256	Bushing Adapter – 200A to 600A		6	12	9	6
		42 34 62 01	Elbow – Loadbreak, 200A, #2 AWG		12	12	12	9
		42 34 62 02	Elbow – Loadbreak, 200A, 4/0 AWG		12	12	12	9
		42 34 62 03	Elbow – Loadbreak, 200A, 1/0 AWG		12	12	12	9
	G	23 13 069	Rod – Ground 5/8" x 8'		4	4	4	3
		17 52 032	Clamp – Ground Rod, 5/8" for #8 – 1/0		8	8	8	6
		17 54 132	Connector – Wire, 8–350 kcmil Cu.		10	16	13	10
		17 54 373	Connector – Wire, #2 Cu, Split Bolt		6	–	3	3
@1	K	16 06 276	Holder – Tag, Black, 5 Position					
		16 06 277	Holder – Tag, Black, 7 Position					
@	L		Refill – Fuse, 14.4 kV, SMU – 20		6	–	3	3
@4	M	60 55 001	Indicator – Faulted Circuit, 1 PH					
@	N	54 11 01 01	Arrester – Elbow, 10 kV					
2	O	17 55 227	Cap – Insulating, 15 kV, 200A		6	12	9	6
	P	18 52 025	Wire – Cu., #2 S.D. (ft)		48	48	48	39
@3	Q	12 06 195	Base Adapter – Type 6, 9, and 12					
		12 06 194	Base Adapter – Type 10 and 11					

**Notes:**

1. Add appropriate letters and numbers (stock #'s 16–01–195 through 16–01–225) to tag holders.
2. Cover all open 200 amp bushings with insulated caps (17–55–227). Cover all grounding bushings with insulated caps.
3. For Federal Pacific switchgear installed on livefront pad 12–06–109, order base adapter 12–06–195 for type 6, 9, 12, or base adapter 12–06–194 for type 10 or 11.
4. A fiber optic cable (18–66–658) can be added to each fault indicator installed for remote viewing on the door.
5. Motor Operators (M.O.'s) are on switched compartments.

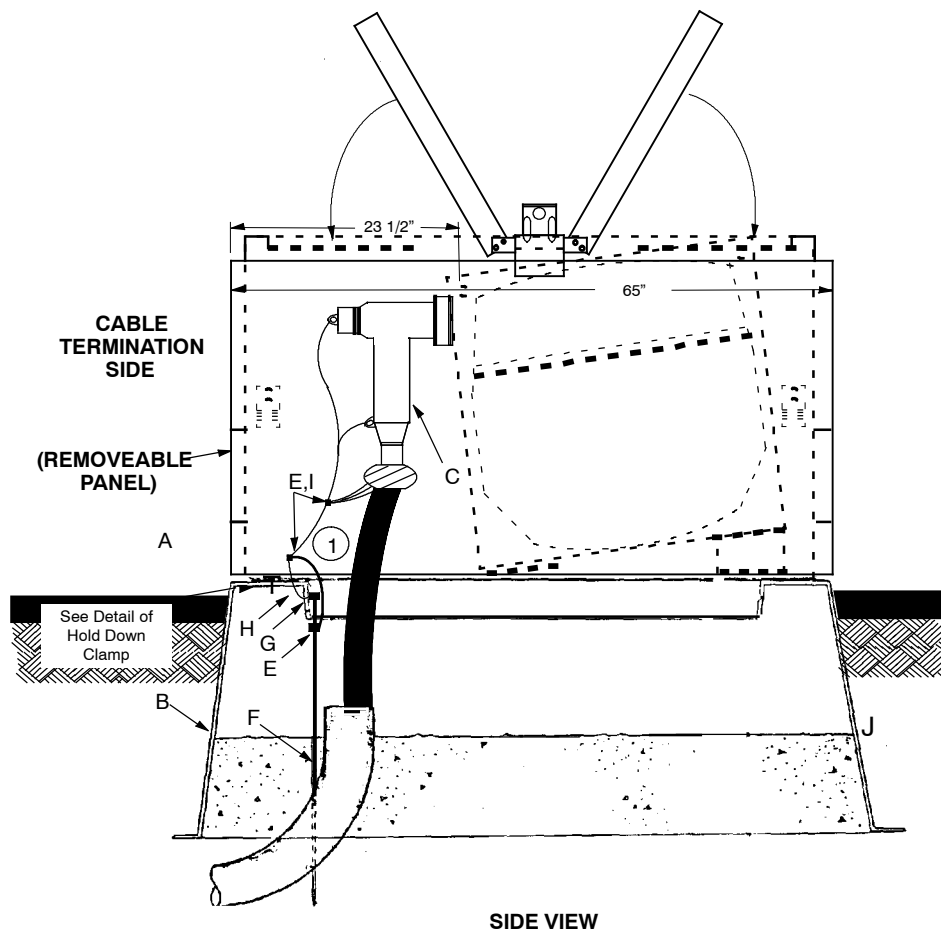
# EQUIPMENT-SWITCHING

## Padmounted-3 Phase, 35 kV

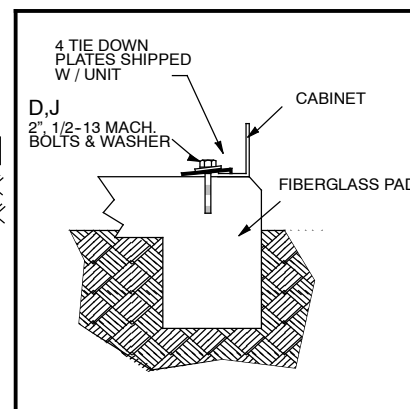
### Vacuum Type

53 11 06 \*\*

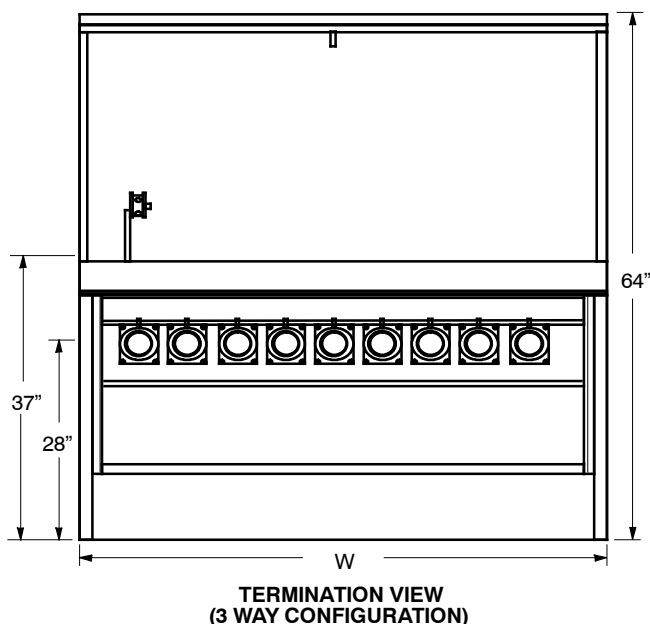
Sheet 1 of 6



SWITCH / INTERRUPTER  
CONTROL SIDE



HOLD DOWN CLAMP DETAIL



#### NOTES:

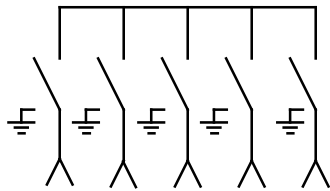
1. Connect neutral wires from each cable to #2 Cu. wire connected to grd. rod and compartment grd. bar. Construct compartment ground bar using 3 ground rods and 2 bolt connectors.
2. For Stk. # 54-07-438 : W=113"  
For Stk. # 54-07-437 and 54-07-445:W=79"  
For Stk. # 54-07-534: W=79"
3. Install a label on the switchgear where it can be seen from the street with the proper Pad number. Use the appropriate Reflective Numbers 16-04-1XX.
4. Install a label on the inside of the compartment lid (both termination and control side) with the letters LAT\_\_\_\_ or DIP\_\_\_\_. Use Reflective Letters 16-04-320, 16-04-317, 16-04-321 or 16-04-148, 16-04-419, 16-04-737 and the appropriate Reflective Numbers 16-04-108 to 16-04-116. Also install "35kV" below each LAT or DIP label using Reflective Numbers 16-04-111 and 16-04-113 and Reflective Letters 16-04-420 and 16-14-041.

**EQUIPMENT-SWITCHING**  
Padmounted-3 Phase, 35 kV  
Vacuum Type

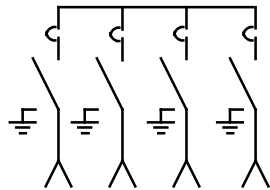
**53 11 06 \*\***

Sheet 2 of 6

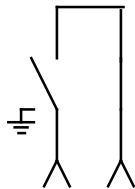
5. Install a label by each switch handle with the letter D\_\_\_\_. Use Reflective Letter 16-04-418 and the appropriate Reflective Numbers 16-04-1XX.
6. See sheets 3 & 4 for fiberglass pad installation instructions.
7. Install Faulted Circuit Indicator above the cable jacket cut off.
8. Cover over unused bushings with 35kV insulated caps (stk.# 17 55 509).
9. The 200A tap on the back of each 600A termination can be covered with an elbow arrester (stk.# 10 01 163 or stk.# 10 01 177) instead of an insulated cap.
10. Add at least 3 grounding elbows per switchgear. Choose type(s) of grounding elbows depending on cable size(s).



5 Load Interrupter Switches  
Stk.#: 54-07-438

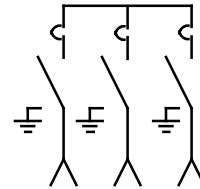


4 Fault Interrupter Switches  
Stk.#: 54-07-527

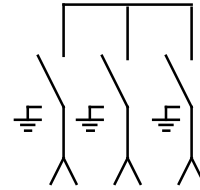


1 Load Interrupter Switch  
Stk.#: 54-07-534

**Switchgear  
Configurations**



3 Fault Interrupter Switches  
Stk.#: 54-07-437



3 Load Interrupter Switches  
Stk.#: 54-07-445

**EQUIPMENT-SWITCHING**  
Padmounted-3 Phase, 35 kV  
Vacuum Type

**53 11 06 \*\***

Sheet 3 of 6

		Dist Std. / Stk No.	Material Description	53 11 06 **	01	02	03	04	05
8 @	A	54 07 438	Switchgear - 5 L.I. Sw.		1				
		54 07 437	Switchgear - 3 F.I. Sw.			1			
		54 07 445	Switchgear - 3 L.I. Sw.				1		
		54 07 527	Switchgear - 4 F.I. Sw.					1	
		54 07 534	Switchgear - 1 L.I. Sw.						1
	B	12 06 154	Pad - Switchgear, Fiberglass, 74" x 118" x 36"		1				
		12 06 155	Pad - Switchgear, Fiberglass, 66" x 84" x 36"			1	1	1	1
	C	42 44 14 01	Termination - 750 Cu., 35kV	-	-	-	-	-	-
		42 44 13 **	Termination - 1/0 Al. and 350 Cu., 35kV	-	-	-	-	-	-
	D	21 56 078	Bolt - Mach., S.S., Hex, 1/2" x 2"		8	8	8	8	8
	E	17 54 132	Connector - Wire, 8-350 kcmil Cu.		17	11	11	14	8
	F	23 63 069	Rod - Ground, 5/8" x 8'		3	3	3	3	3
	G	17 52 032	Clamp - Ground Rod, 5/8" For #8 - 1/0		2	2	2	2	2
	H	18 52 025	Wire - Cu. #2, S.D. (ft.)		65	47	47	56	38
	I	17 54 182	Connector - Wire, #2 Cu., Split Bolt		30	18	18	24	12
9 @	J	21 75 105	Washers - Rnd., 1/2", S.S.		8	8	8	8	8
	K	17 55 509	Cap - Protective, 600A, 35kV Bushing	-	-	-	-	-	-
10@	L	60 55 024	Indicator - Fault, CRNT Reset, Vari. Trip	-	-	-	-	-	-
	M	10 01 163	Arrester - 34kV Elbow, 200A (for 1/0 AWG)	-	-	-	-	-	-
		10 01 177	Arrester - 34kV Elbow, 200A (for 750 kcmil)	-	-	-	-	-	-
	N	17 63 296	Elbow - Grounding, 35kV, 750 kcmil		3	3	3	3	3
		17 63 295	Elbow - Grounding, 35kV, 1/0 AWG and 350 kcmil		3	3	3	3	3

**INSTRUCTIONS FOR EXCAVATION AND PLACEMENT OF SWITCHGEAR BOXPAD**

Placing The Bends

Place the bends as described in the figure. Note that a 36 inch radius bend on the lateral side at a 36 inch depth will almost touch the side of the box when it is placed at depth. An increase of final burial depth or angling of the conduit may be necessary to clear the box flange.

Excavation And Final Depth

An initial depth of 33 inches shall be excavated removing or tamping all loose soil. The length and width of the hole is the maximum length and width of the box plus 5" of clearance on each side. The longer dimension is the door side of the gear.

Crushed stone screenings shall be placed and tamped to a final level depth of 30 inches. The area bearing the pad-box shall be leveled with a carpenter's level. The final depth of 30 inches will leave the required 6 inches of box exposed at final grade.

Place The Box

Place the box with the longer side where the doors will be, as described on the Engineering Layout.

Backfilling

Stabilize the box before backfilling the outside of the box to prevent shifting.

Stabilizing

To further stabilize the box and conduit bends, place 12 inches of screenings inside the box and tamp in place.

---

Bend - Final Preparation

The conduit bend should be cut off below the box's switchgear mounting flange. A 5 inch diameter bend shall be cut a minimum of 16 inches below the flange.

Do not tamp excessively close to the box because the side will tend to bow in.

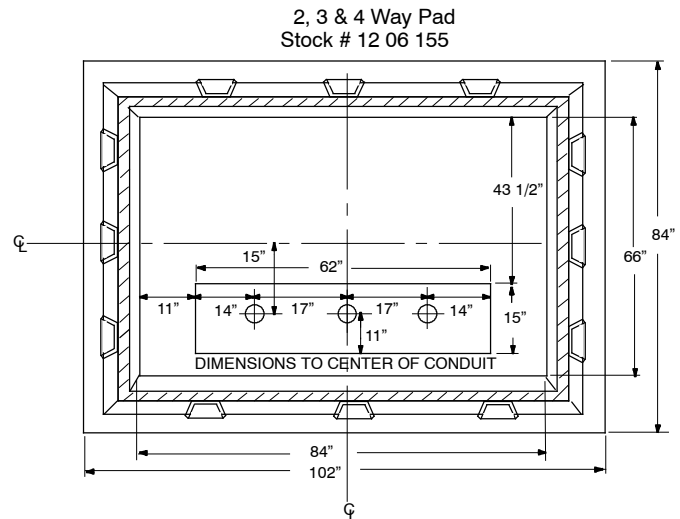
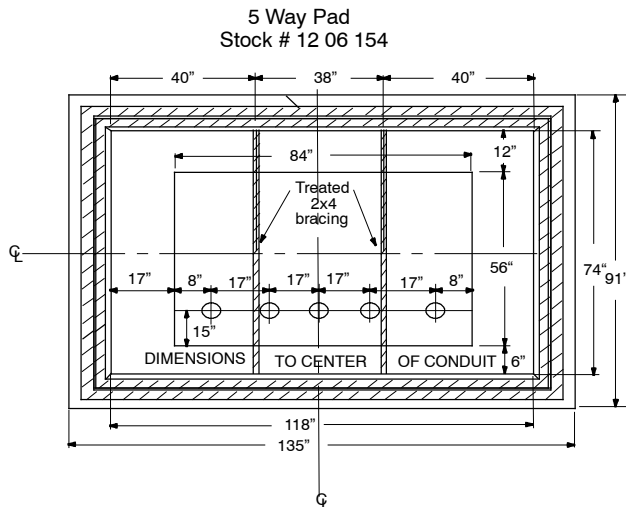
NOTE: This installation will not withstand pulling long cable lengths through the bends at the switchgear. Install re-strained bends per Dist. Standard **31 47 01 \*\***. Recommended for pulling 750 Al or Cu cables more than 250 ft. See fiberglass pad drawing.

CONCRETE OPERATING PAD

The switchgear box pad shall be surrounded by a concrete pad. The poured in place pad shall be a minimum of 4 inches thick. The pad shall be a minimum length of 16 feet on the cable termination side of the switchgear and a minimum of 6 feet on the switch/interrupter control side of the switchgear.

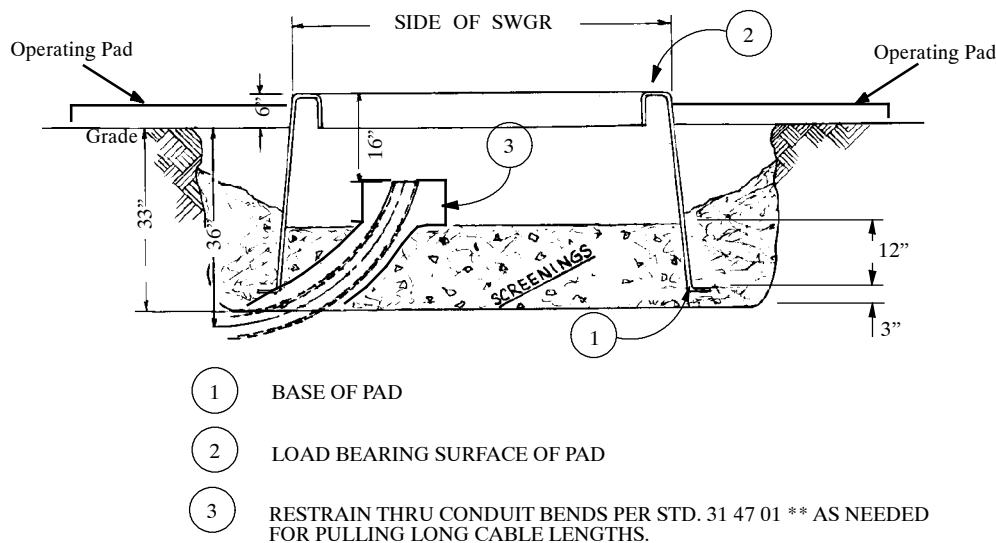
The operating pad shall have a minimum width of 5 feet on both sides of the switchgear mounting sleeve.

**Fiberglass Pads with Conduit Bend Placements**

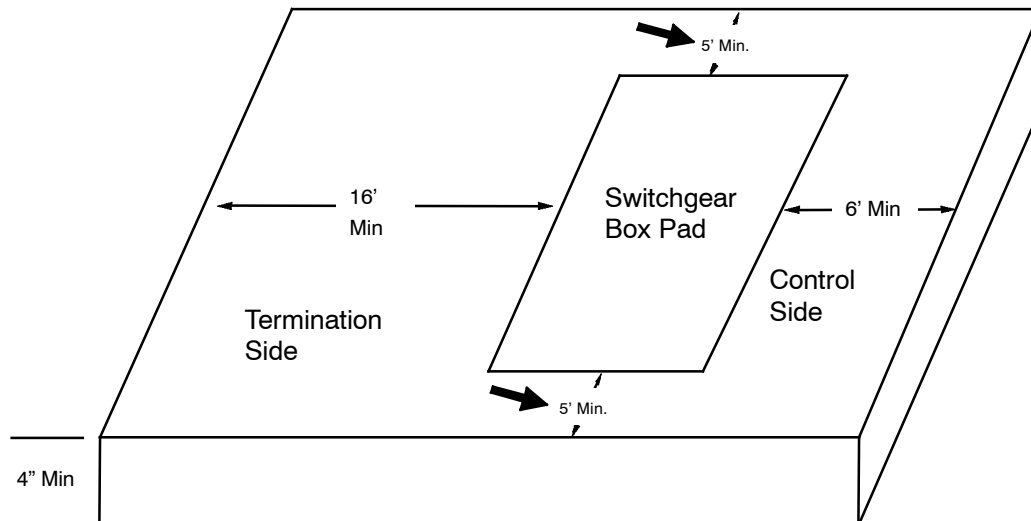


(Note: For 4-Way Swgr. add 1 conduit and reduce the end dimensions from 14" to 5.5". For 2-Way Swgr., install the center and left conduits as shown and install the vacuum tank at the left end of the cable pit.)

**Fiberglass Pads - Placement Depth**



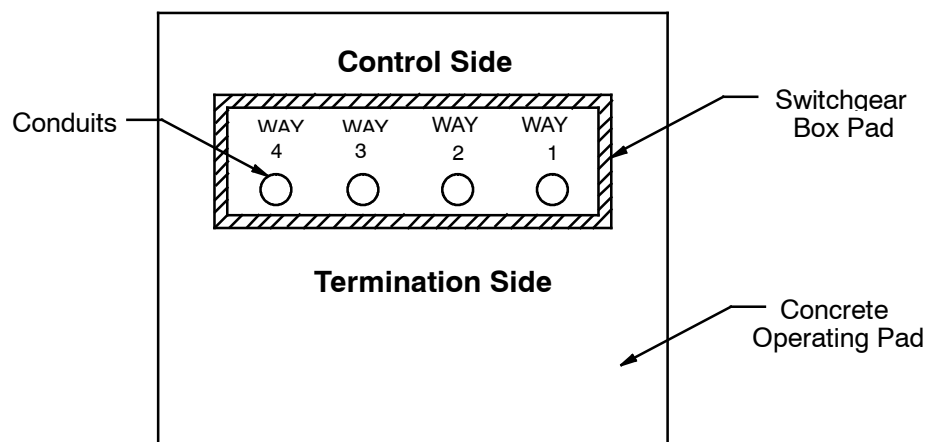
**CONCRETE OPERATING PAD**



For 5-Way switchgear, approximately 6.14 cubic yards of concrete is needed to construct the operating pad.

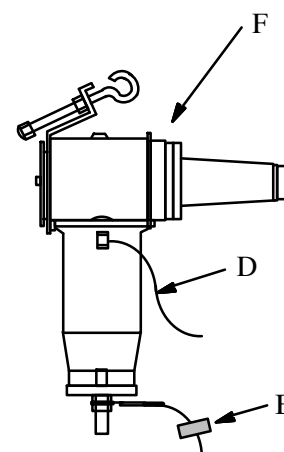
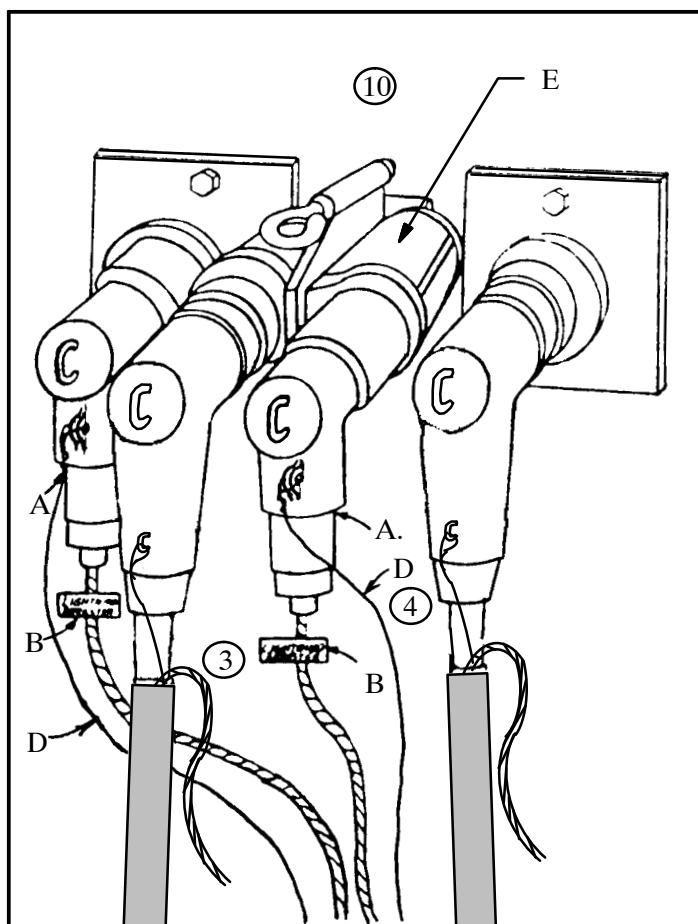
For 2, 3, or 4-Way switchgear, approximately 5.26 cubic yards of concrete is needed to construct the operating pad.

**DESIGNATION OF CONDUIT POSITIONS**





**SINGLE-PHASE INSTALLATION SHOWN. ADJUST QUANTITIES FOR THREE-PHASE APPLICATIONS.**



**PARKING  
STAND  
ARRESTER**

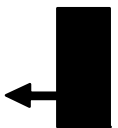
- 54 11 01 01 – Installation on transformer w/under oil arrester
- 54 11 01 01 – No under oil arrester increase items “A” & “B” to 2 each
- 54 11 01 02 – No under oil arrester and limited space between bushings
- 54 11 01 03 – Installation on transformer w/under oil arrester and limited space between bushings

		Std. / Stk. No.	Description	01	02	03
3	A	10 01 138	10 kV Elbow Arrester	1*	1	
	B	16 01 147	Plate, Name, 1-1/4 x 2, Red, "Lightning Arrester"	1*	2	1
	C	23 78 183	Hot Line Clamp	1	2	1
5	D	18 52 018	Wire, Copper, Binding, #14	4 ft.	8ft.	4ft.
@	E	17 55 228	Bushing – Feed Thru, 15kV	1		
6	F	10 01 151	10 kV Parking Stand Arrester		1	1

\* If an elbow arrester is to be installed on both the stand-off bushing and the spare transformer/enclosure bushing, then enter a quantity of 2 when estimating this standard.

Notes:

1. Arresters are for 4160 Grd. Y/2400V, 12470 Grd. Y/7200V, 13200 Grd. Y/7620 and 13800 Grd. Y/7970 volt pad-mounted transformers and padmounted junction enclosures. Elbow arresters are not installed on radial feed 3Ø padmount transformers.
2. Care must be taken to avoid confusing elbow arresters with grounding elbows. Grounding elbows are for grounding isolated URD primary cables and are generally either yellow or orange in color. Care must also be taken to avoid confusing a parking stand arrester with an insulating standoff bushing.
3. Elbow arresters and parking stand arresters should always be identified with the special "Lightning Arrester" nameplate. The nameplate should be attached to the ground lead prior to installing the arrester.
4. The arrester mating interface must be coated with a thin layer of silicone lubricant prior to installation.
5. When installing arresters, the ground lead must always be attached first. The ground lead must be attached to the transformer/enclosure ground using a hot line clamp. A #14 copper drain wire must be attached from the arrester body to the transformer/enclosure ground connection.
6. Install elbow arresters on feed thru bushings or equipment bushings in a manner similar to installing a loadbreak elbow. Due to space limitations in the Type II transformers it may be necessary to use a parking stand arrester instead of a feed thru bushing and elbow arrester. The parking stand arrester is installed in a manner similar to installing a feed thru bushing. The open point loadbreak elbow is installed on the parking stand arrester and an elbow arrester is installed on the open equipment bushing.
7. Elbow arresters are to be removed with an elbow pulling tool (Stk.#83-38-032). The pulling tool must be attached to the pull-ring on the back of the elbow arrester.
8. Whenever installing or removing arresters care must be taken to avoid bending or twisting the arrester. If arresters are subjected to excessive bending, twisting, or pounding or if the arresters appear to be defective they must not be used.
9. If open points are found while performing routine work, they should be retrofitted with arresters.
10. All transformers shall have an arrester installed at open points will be needed unless the transformer is equipped with an under oil lightning arrester. If the transformer has an under oil arrester, an arrester will not be placed on the open transformer bushing. Instead of an arrester an insulating cap (Stk.#17-55-227) will be placed on the open transformer bushing.

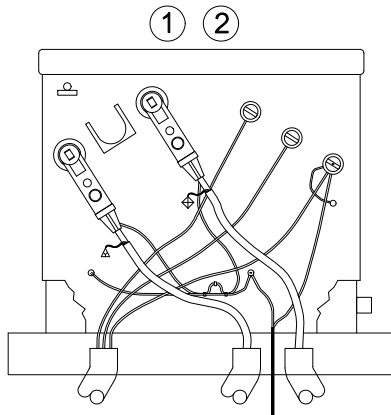


# EQUIPMENT TRANSFORMERS

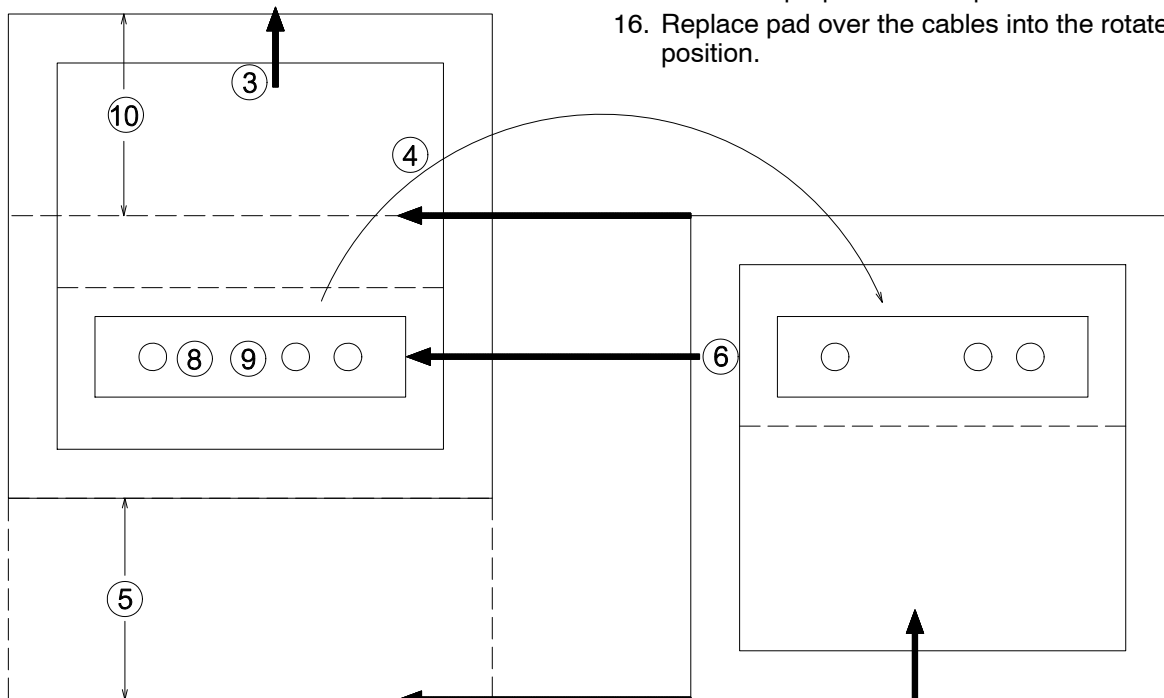
Padmounted, Single-Phase, 2400, 7200, 7620, 7970 Volts  
Replacement of Low-Profile with High-Profile

54 12 01 \*\*

Sheet 1 of 3



**TYPE II - 24" HIGH**

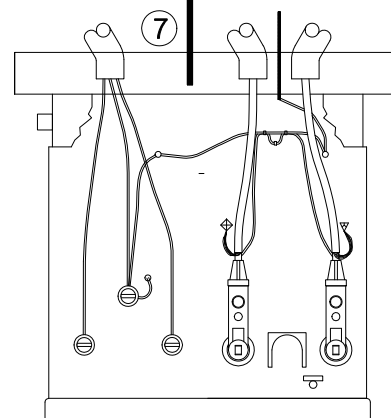


## Option 1 – Rotate Pad 180 Degrees

The Transformer pad can be rotated 180 degrees if a) the easement allows, b) there are no obstructions in front of the rotated pad to prevent 10 FT. access, and c) primary cables and secondary wire were installed per low-profile standards.

11. De-energize the transformer and primary cables feeding into the transformer.
12. Disconnect and ground all cable and wire connections.
13. Remove the low-profile transformer from the pad.
14. Remove the pad.
15. Level and prepare rotated pad location.
16. Replace pad over the cables into the rotated position.

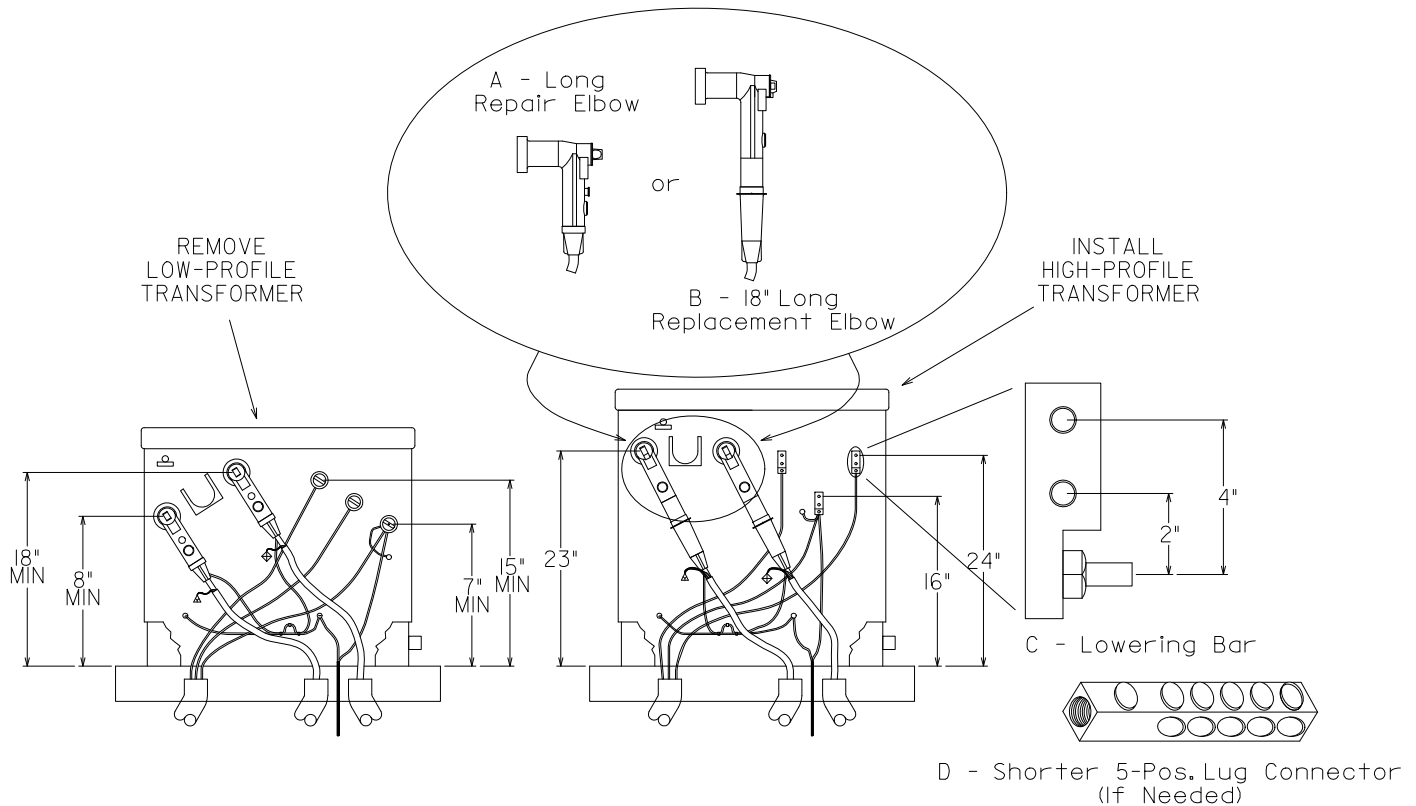
17. Place new high-profile transformer onto the rotated pad.
18. Reorient and reconnect all cables and wires to the new transformer.
19. Reenergize the primary cables and the new transformer.
20. Back-fill and restore remainder of the old pad location as needed.



**TYPE I - 32" HIGH**

**Option 2 – Keep Pad Orientation and Re-Terminate Primary Cables and Secondary Wires**

If the transformer pad cannot be rotated 180 degrees, the primary cables and secondary wires will likely not be long enough. The following materials can be used as needed to re-terminate the cable and wires to the new High-Profile transformer.

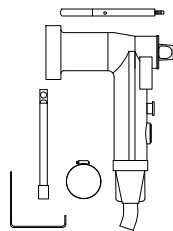


**Load-Break Repair or Replacement Elbows**

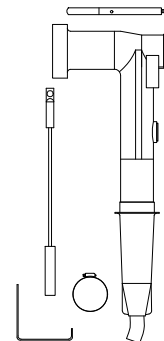
There are two versions of longer load-break elbows available that can be used to re-terminate the primary cables so they will reach the higher mounted primary bushings:

A – The “Long Repair” elbow has an extended length contact and elbow housing that results in a net gain of 3-1/4 inches in length.

B – The “18” Long Replacement” elbow has an extended length contact and elbow housing that results in a net gain of 8-7/8 inches in length.



A - Long Repair Elbow



B - 18" Long Replacement Elbow

# EQUIPMENT TRANSFORMERS

Padmounted, Single-Phase, 2400, 7200, 7620, 7970 Volts  
Replacement of Low-Profile with High-Profile

**54 12 01 \*\***

Sheet 3 of 3

## C – Secondary Bushing Lowering Bar

The secondary connectors can be disconnected from the low-profile transformer and secondary lowering bars installed to provide lower conductor connection points on the replacement high-profile transformer. The existing connectors are then reinstalled onto the stud of the lowering bar. In many cases this may lower the connectors enough to allow connection of the secondary conductors without splicing.

There are two secondary bushing lowering bars. Both provide for lowering the connectors either 2" or 4".

- Stock # 18 12 052 has 5/8" slip-fit holes for connection to transformers up to 75 kVA.
- Stock # 18 12 051 has 1" slip-fit holes for connection to transformers from 100 to 167 kVA.

## D – Shorter 5-Position Secondary Lug Connector

In some cases, the connectors on the transformer being replaced may be too long and when installed on the lowering bar, cause inadequate clearance to the door of the transformer. In these cases, the lug connectors will need to be replaced with shorter lug connectors. These shorter lug connectors are limited to 5 conductors with a range of 1/0 to 750 per conductor position.

- Stock # 17 55 230 has 5/8" slip-fit holes for connection to transformers up to 75 kVA.
- Stock # 17 55 229 has 1" slip-fit holes for connection to transformers from 100 to 167 kVA.

		Std. / Stk. No.	Description	41 12 01 **	1	2	3	4	5	6	7	8	9	10
@	A	17 05 250	#2 AWG Al, STR, 175 or 220 Mil (Long Repair)		2									
		17 05 303	#2 AWG Al, SOL, 175 Mil (Long Repair)			2								
		17 05 304	1/0 AWG Al, STR, 175 Mil (Long Repair)				2							
		17 05 514	3/0 AWG Al, CPR, 175 Mil (Long Repair)					2						
		17 05 305	4/0 AWG Al, STR, 175 Mil (Long Repair)						2					
	B	17 05 494	#2 AWG Al, STR, 175 or 220 Mil (18 Inch Long Replacement)							2				
		17 05 498	#2 AWG Al, SOL, 175 or 220 Mil (18 Inch Long Replacement)								2			
		17 05 499	1/0 AWG Al, STR, 175 Mil (18 Inch Long Replacement)									2		
		17 05 515	3/0 AWG Al, CPR, 175 Mil (18 Inch Long Replacement)										2	
		17 05 493	4/0 AWG Al, STR, 175 Mil (18 Inch Long Replacement)											2
@	C	18 12 052	Lowering Bar, 5/8" Slip-Fit for Up to 75 kVA		3	3	3	3	3	3	3	3	3	3
		18 12 051	Lowering Bar, 1" Slip-Fit for 100-167 kVA		3	3	3	3	3	3	3	3	3	3
@	D	17 55 230	Lug, 5-Pos., 5/8" Slip-Fit for Up to 75 kVA		3	3	3	3	3	3	3	3	3	3
		17 55 229	Lug, 5-Pos., 1" Slip-Fit for 100-167kVA		3	3	3	3	3	3	3	3	3	3

## **Option 3 – Splice or Replace Primary Cables and Secondary Conductors**

If neither Options 1 or 2 allow the primary cables and secondary conductors to be reconnected to the replacement high-profile transformer, then splicing or replacement of primary and secondary cables/conductors will be required.

For the 600 V secondary, refer to DCS **41 14 36 \*\*** or **41 14 37 01** for splicing materials and instructions.

For the 15 kV primary cable, refer to DCS **41 34 33 03**, **41 34 34 \*\***, or **41 34 35 \*\*** for splicing materials and instructions. Refer to DCS **42 34 62 \*\*** for loadbreak elbow materials and instructions.

# NOTES