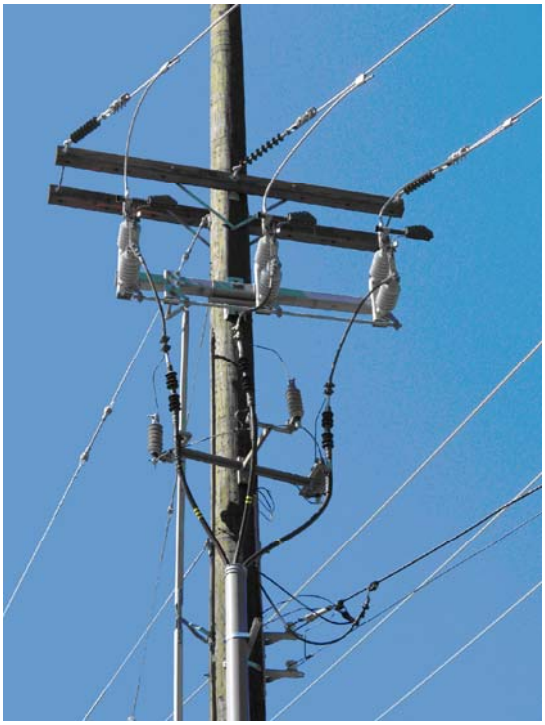
Seattle City Light

CONSTRUCTION STANDARD

TERMINAL POLE WITH PRIMARY SWITCH, 600 AMP



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1. Scope

This construction standard covers the construction requirements, equipment, assembly hardware and directions needed to build a 600 Amp Primary Switch Terminal Pole with a single set of primary cables. See future Construction Standard, "Terminal Pole with Primary Switch, 1200 Amp," if two sets of primary cables are required.

2. Application

This document provides direction to SCL crews about how to construct a 600 Amp Primary Switch Terminal Pole. This Standard is used to inform them of what equipment and assembly hardware is required and how the equipment are to be arranged, connected and installed. A primary switch terminal pole is typically located at a deadend pole.

3. Definitions

Terminal pole: The pole where the electrical system transitions from overhead to underground or from underground to overhead.

standards coordinator	*standards manager*	*unit director*
Curtis Lu	John Shipek	Pamela S. Johnson

4. Details and Design

4.1 Terminal Pole

Figure 4.1, Terminal Pole, overview

page 3
4.2 Cross Arm

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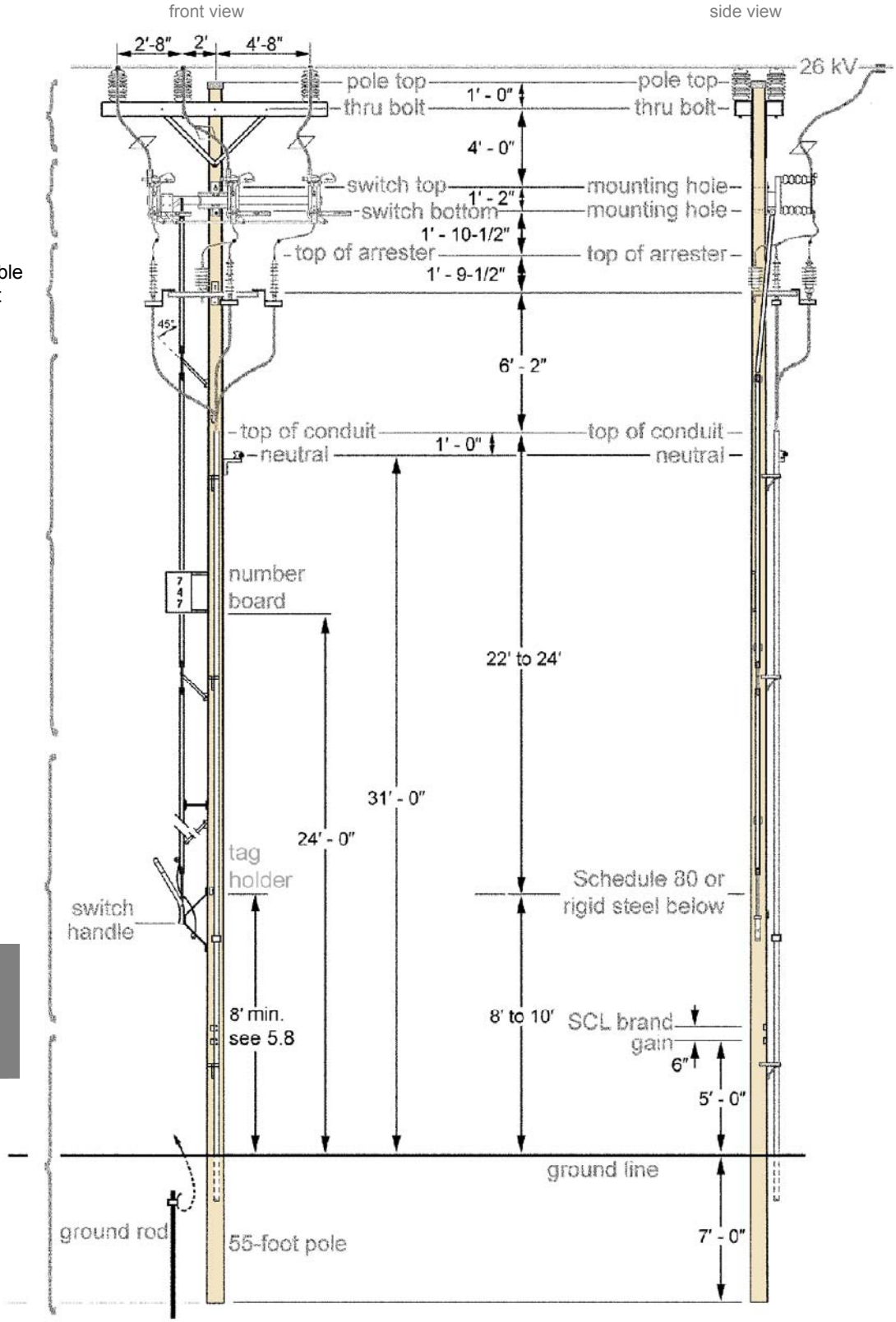
4.3 Switch

page 5
4.4 Arrester and Cable Termination Bracket Installation

page 6
4.5 Switch Handle

see section 5, Construction Notes, for height of switch handle

page 7
4.6 Grounding



4. Details and Design, continued

4.2 Cross Arm

Figure 4.2a, Cross Arm, front view

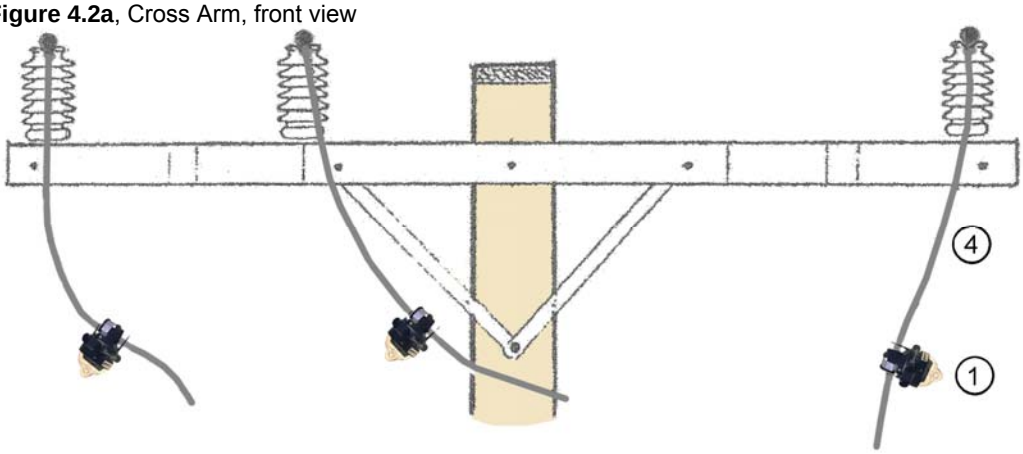


Figure 4.2b, Cross Arm, side view

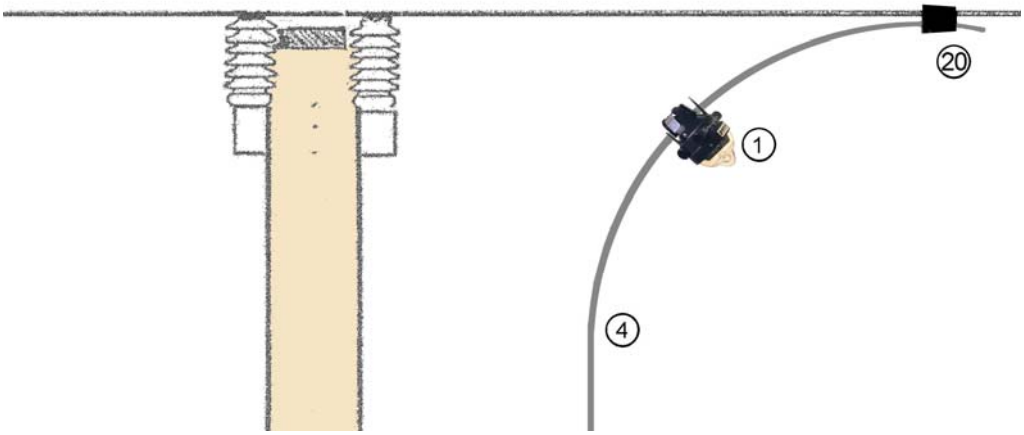
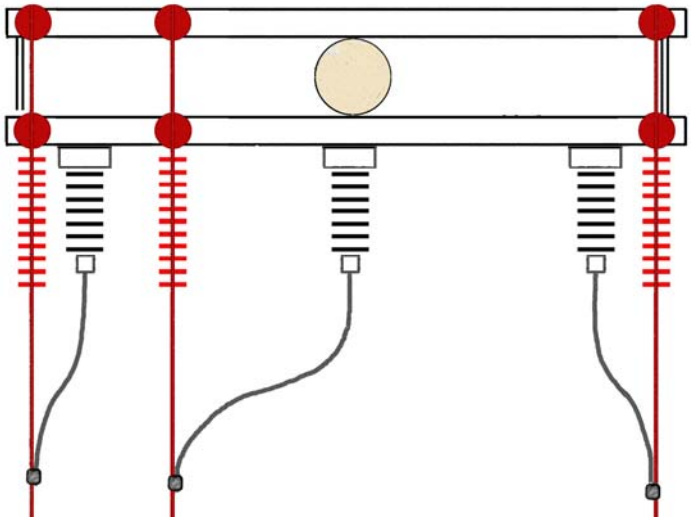


Figure 4.2c, Cross Arm, top view



Refer to section 5, Construction Notes

4. Details and Design, continued

4.3 Switch

Figure 4.3a, Switch, front view

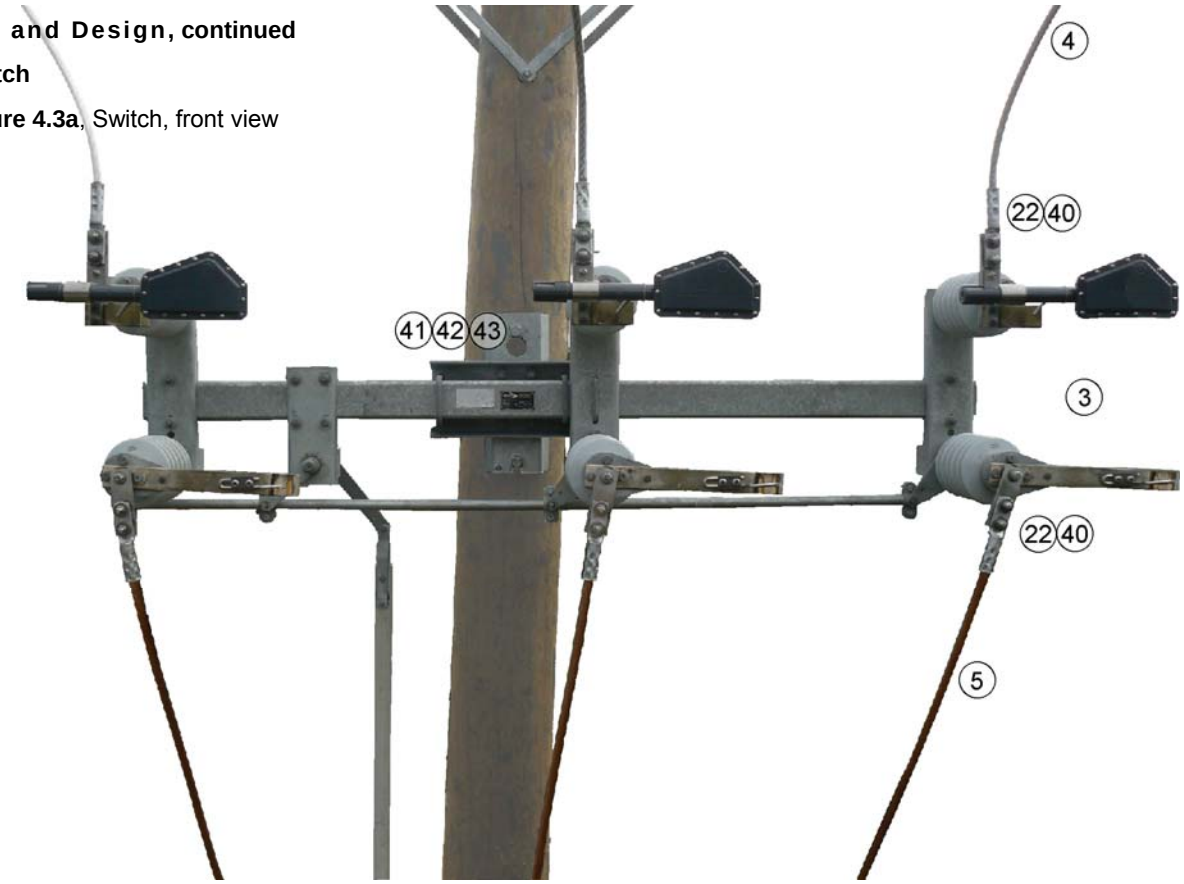
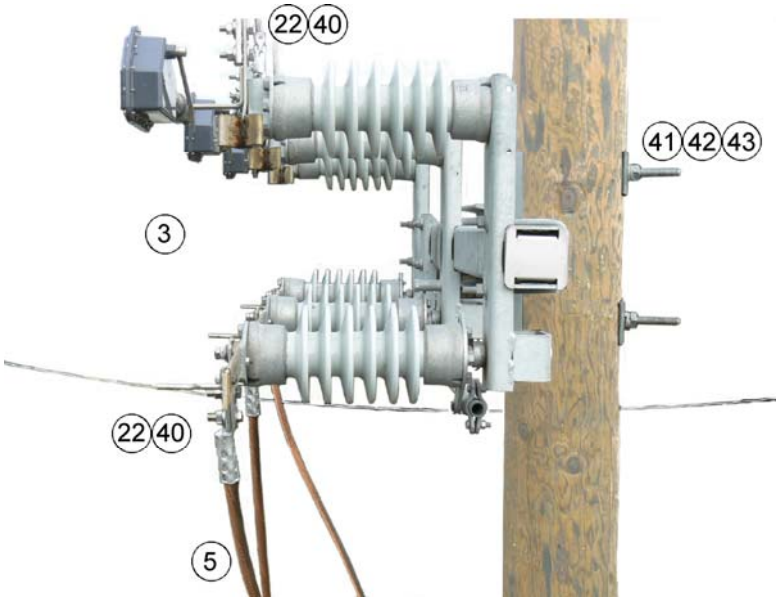


Figure 4.3b, Switch, Connector, side view



4. Details and Design, continued

4.4 Arrester and Cable Termination Bracket Installation

Figure 4.4a, Arrester and Terminator, front view

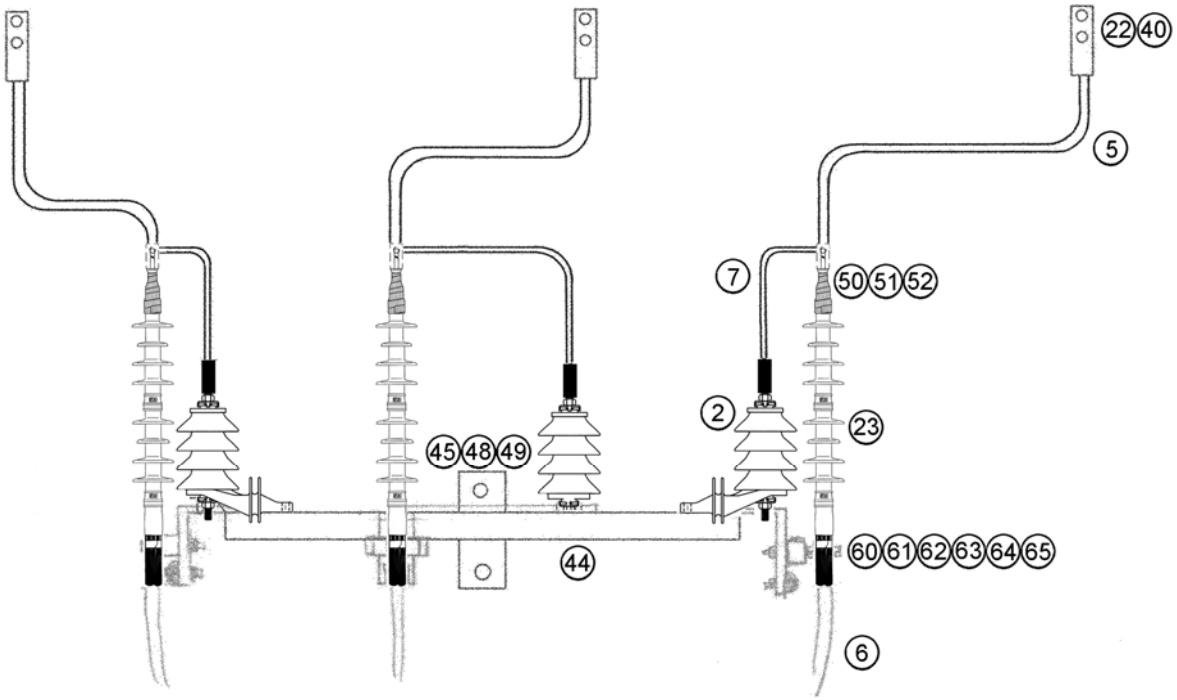


Figure 4.4b, Arrester and Terminator Detail, side view

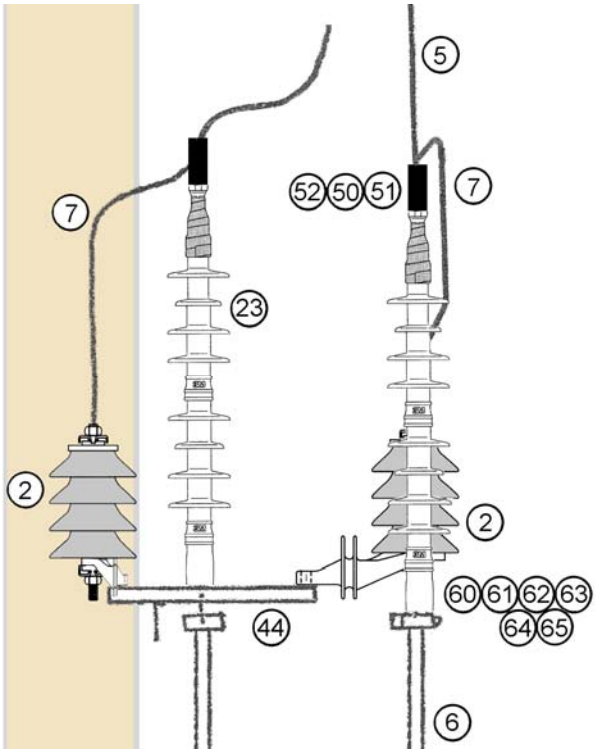
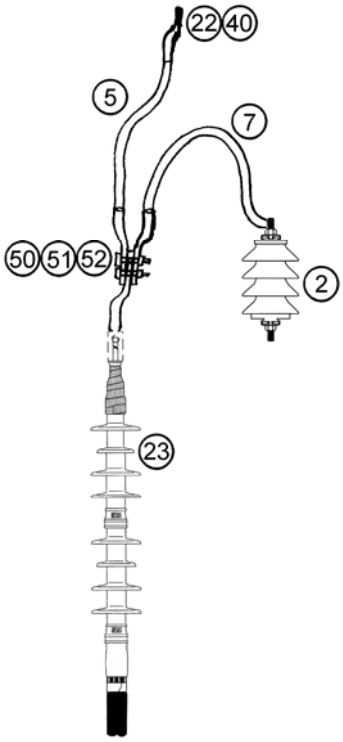


Figure 4.4c, Three Lug Connection Detail, side view



4. Details and Design, continued

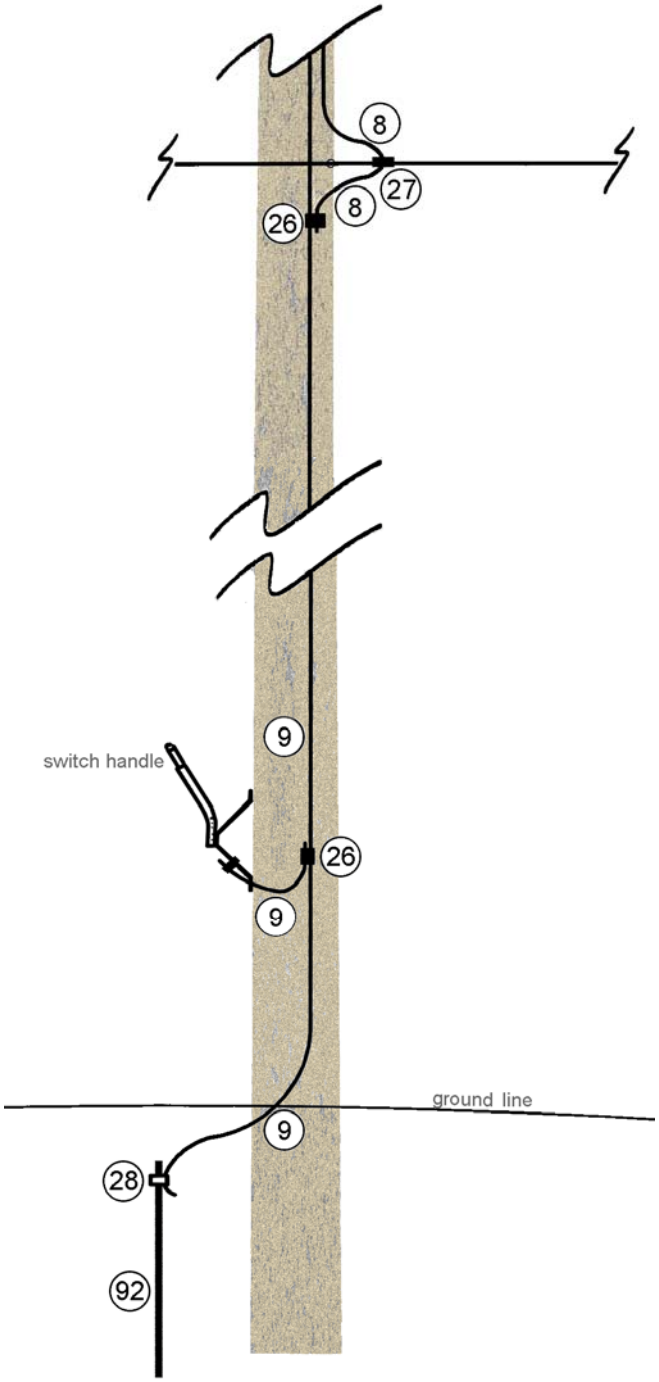
4.5 Switch Handle

Figure 4.5a, Switch Handle, front view

Figure 4.5b, Switch Handle, side view

4.6 Grounding

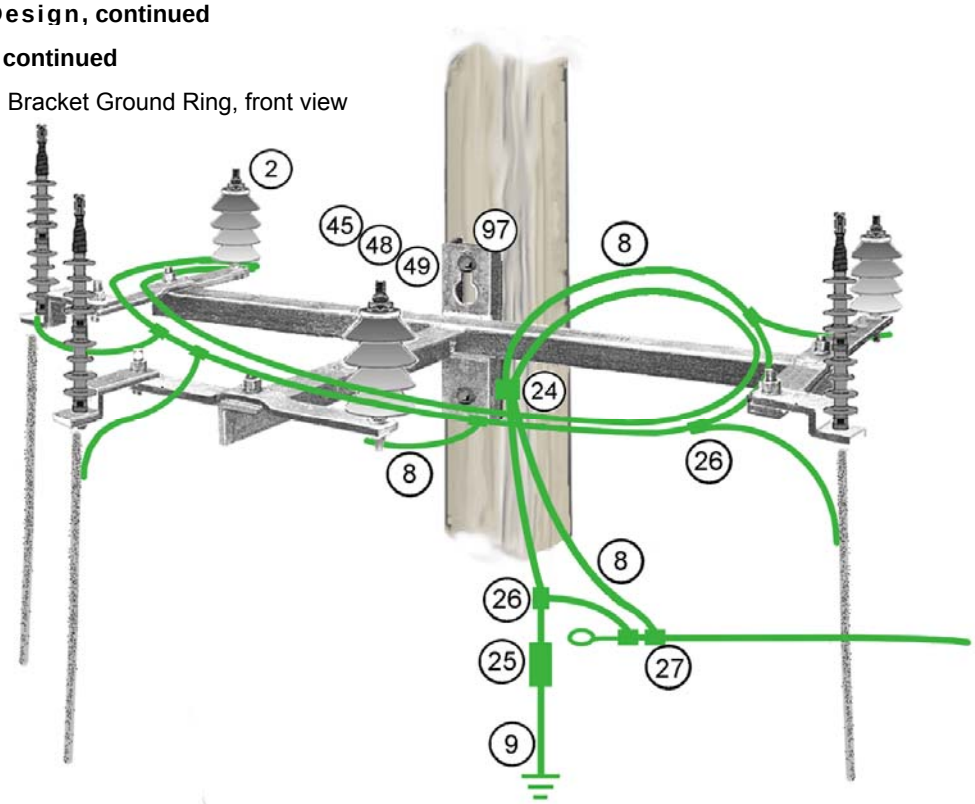
Figure 4.6a, Pole ground, overview



4. Details and Design, continued

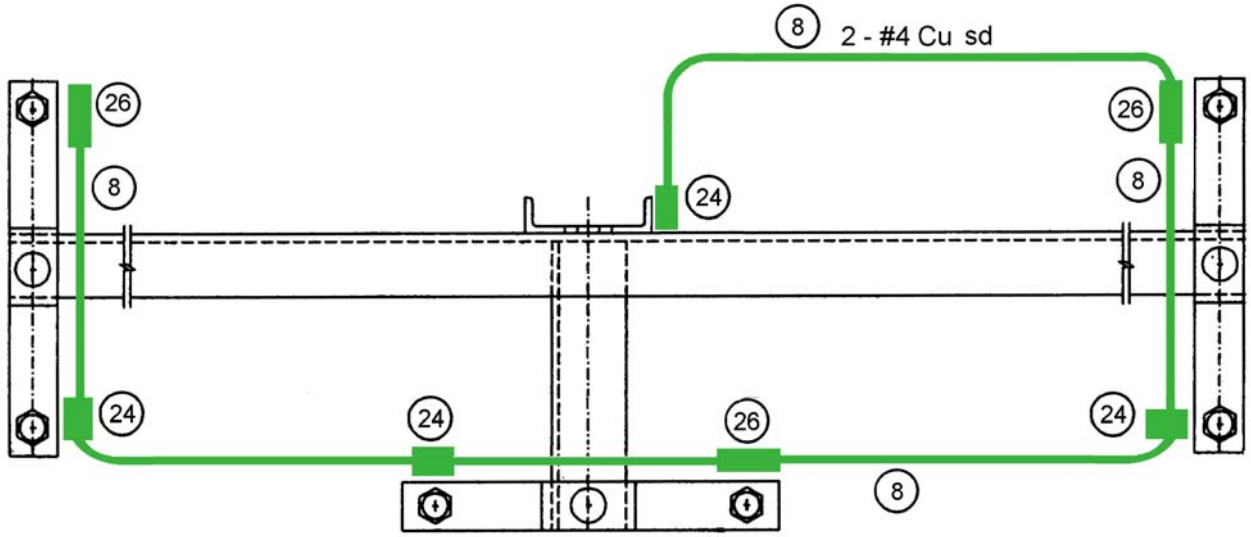
4.6 Grounding, continued

Figure 4.6b, Bracket Ground Ring, front view



Refer to section 5, Construction Notes

Figure 4.6c, Bracket Ground Ring, top view



5. Construction Notes

5.1 Arrestor and Cable Termination Bracket Installation (see Figures 4.7a, b, c)

The bracket (Stock No. 686835) may be installed offset to the face of the pole in order to avoid switch riser.

Install bracket using one through bolt (top) and one lag bolt (bottom).

Install double wire grounding as specified in Figures 4.7a, b, c.

5.2 Switch Handle Installation and Placement (see Figure 4.1)

On street side less than 3 feet from street – The switch handle, when in the down position, shall be installed at a minimum of 15 feet above ground line.

On Street Side greater than 3 feet from street - The switch handle shall be installed at 3 feet-6 inches above ground line.

On Sidewalk Side less than 2 feet from sidewalk - The switch handle, when in the down position, shall be installed at a minimum of 10 feet above ground line

On Sidewalk Side greater than 2 feet from sidewalk - The switch handle shall be installed at 3 feet-6 inches above ground line.

5.3 Avian Protection

Refer to Construction Standard 0072.01.

5.4 Arrestor Ground Lead Installation (see Figure 4.7b)

When connecting to an arrester with a ground lead disconnect, make sure the connection is as short and as direct as possible. The ground lead must be flexible enough to allow the disconnector to operate properly.

5.5 Line Angle (see Figure 4.2c)

Maximum feeder line angle at a terminal pole is 15 degrees.

5.6 Overhead Fault Indicator

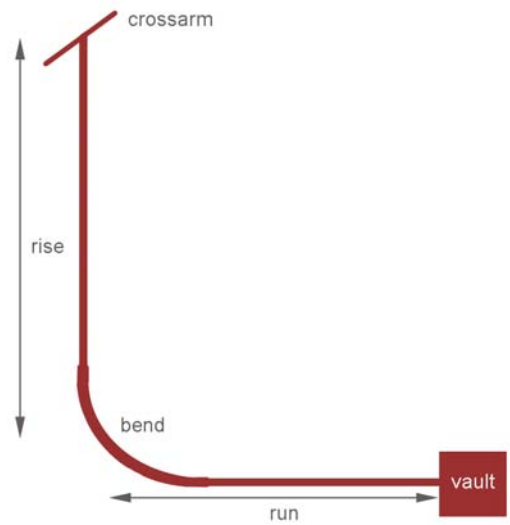
When installing an overhead fault indicator record the following on the work order drawing/redlines:

1. date of manufacture
2. manufacturer's name
3. part/catalog number

Once recorded, call in to system control center and send the work order drawing to GIS for mapping.

5.7 Cable Support

A cable grip is only needed when the rise is greater than the run. For this purpose, measure the run as the horizontal distance from the center of the curve of the 90 degree bend at the base of the pole to the first vault or handhole. For the rise, measure the vertical distance from the center of the curve to the crossarm. Of course the rise conduit will not extend all the way to the crossarm, only to the support bracket below the crossarm.



5.8 Operator Tag Holder Placement

The tag holder is installed using two nails on the pole face one foot above switch handle with a minimum height of eight feet.

6. Materials

Complete Material Request using Compatible Units List.

6.1 Compatible Units (CU) List

Description	Category	Compatible Unit ID 1/0	350	500	750	1000	Unit Quantity
arrester/terminator	**AT**	017320A1	017320A3	017320A5	017320A7	017320A9	1
grounding	**GND**	017320G	017320G	017320G	017320G	017320G	1
switch number board	**NB**	SWNB	SWNB	SWNB	SWNB	SWNB	1
switch	**SW**	017320S5	017320S5	017320S5	017320S9	017320S9	1
undergrounding	**UG**	017320U1	017320U3	017320U5	017320U7	017320U9	1
Additional Materials		Stock No.					Item Quantity
overhead fault indicator		765872	765872	765872	765872	765872	3
jumper wire	397.5 AAC	600113	600113	600113	600113	600113	30
	954 AAC	600126	600126	600126	600126	600126	30
wedge taps	954:954	651107	651107	651107	651107	651107	3
	954:397.5	651100	651100	651100	651100	651100	3
	397.5:397.5	651101	651101	651101	651101	651101	3

6.2 Material List

Item	Component Description		Stock No.	1/0	350	500	750	1000	AT	GND	NB	SW	UG
	Equipment												
1	OVERHEAD FAULT INDICATOR		765872	3	3	3	3	3	no Cu, use Stk. No.				
2	SURGE ARRESTOR, metal oxide, intermediate		012593	3	3	3	3	3	3				
3	600A PRIMARY SWITCH		250151	1	1	1	1	1				1	
	Wire/Cable												
4	JUMPER WIRE, depends on feeder size,	397.5 AAC bare Al	600113	30	30	30	+	+	no Cu use Stk. No.				
		954 AAC bare Al	600126	+	+	+	30	30					
5	WIRE, bare, stranded, Cu soft drawn,	500 kcmil	610397		30	30	30	30				30	
		250 kcmil	610412	30								30	
6	CABLE,	round wire concentric neutral jacketed Al, 1/0	012098	+									+
		flat strap shielded Al, 350	012099		+								+
		flat strap shielded Cu, 500	012100			+							+
		flat strap shielded Cu, 750	012101				+						+
		flat strap shielded Cu, 1000	012102					+					+

+engineer has choice of quantity

*crew has choice of quantity, exempt items only

6. Materials, continued

6.2 Material List

Item	Component Description		Stock No.	1/0	350	500	750	1000	AT	GND	NB	SW	UG
7	GROUND WIRE, #2 Cu soft drawn		610434	30	30	30	30	30		30			
8	GROUND WIRE, #4 Cu soft drawn		610208	25	25	25	25	25		25			
9	GROUND WIRE, #4 Copperclad steel		012702	75	75	75	75	75		75			
10	CABLE, UG single conductor, 600 V, XLPE, 750 kcmil, Cu		613743				30	30				30	
11	CABLE, UG single conductor, 600 V, XLPE	#2	613730	+									+
		2/0	613733		+	+	+	+					+
	Connections												
20	WEDGE TAPS, Al and Cu, Ampact type,	954:954	651107	*	*	*	3	3	no Cu, use Stk. No.				
		954:397.5	651100	*	*	*	*	*					
		397.5:397.5	651101	3	3	3	*	*					
23	TERMINATOR, cold shrink,	1/0 EA	686532	3					3				
		350-500 EA	012125		3	3			3				
		750-1000 EA	012126				3	3	3				
24	CLAMP CONNECTOR, flat bar to cable(s)		676694	4	4	4	4	4		4			
25	SPLICE, #4		677355E	3	3	3	3	3		3			
26	VICE JAW CONNECTOR, #4		012173E	5	5	5	5	5		5			
27	WEDGE TAP CONNECTOR, 4/0:#4		651099	1	1	1	1	1		1			
28	GROUND ROD CLAMP, 5/8″		564012E	1	1	1	1	1		1			
	Hardware												
40	WASHER BOLT ASSEMBLY, 2-1/2″		782041	12	12	12	12	12	6			6	
41	BOLT, square head, for switch install, 3/4″ x 16″		780877E	3	3	3	3	3	1			2	
42	WASHER, curved square zinc, 4″ x 4″, 5/8″-7/8″		584775E	3	3	3	3	3	1			2	
43	WASHER, double coil lock, 3/4″		584267E	3	3	3	3	3	1			2	
44	BRACKET, terminator and arrestor mounting		686835	1	1	1	1	1	1				
45	BOLT, square head, for switch handle install, 5/8″ x 16″		780847E									2	
48	WASHER, square zinc, 2-1/4″ x 2-1/4″, 5/8″		585135E	2	2	2	2	2				2	
49	WASHER, double coil lock, 5/8″		584261E	2	2	2	2	2				2	
50	PIGTAIL ADAPTER,	1/0	680056	3									
		350	680578		3								
		500	680579			3							
		750	686075				3						
		1000	010320					3					

+engineer has choice of quantity

*crew has choice of quantity, exempt items only

6. Materials, continued

6.2 Material List

Item	Component Description		Stock No.	1/0	350	500	750	1000	AT	GND	NB	SW	UG
51	COMPRESSION CONNECTOR, Cu,	1/0	677075E	3									
		350	677087E		3								
		500	677091E			3							
		750	677100				3						
		1000	677110					3					
52	TWO BOLT TAP	250	669381E	3	3	3	3	3					
		500-1000	669384	3	3	3	3	3					
53	SPLIT BOLT TAP, #4		668864	3	3	3	3	3					
60	CABLE SUPPORT ADAPTOR		012465	3	3	3	3	3	3				
61	CABLE SUPPORT HEEL,	1/0	011961	3					3				
		350	011962		3				3				
		500	011963			3			3				
		750	011964				3		3				
		1000	012501					3	3				
62	"L" BRACKET		686466	3	3	3	3	3	3				
63	BOLT, 1/2″ x 2″		780796E	3	3	3	3	3	3				
64	WASHER, flat, 1/2″		585025E	3	3	3	3	3	3				
65	WASHER, lock, 1/2″		584255E	3	3	3	3	3	3				
80	STANDOFF BRACKET,	12-1/2″	686786E	2	2	2	2	2					2
		18″	686790E	*	*	*	*	*					*
81	BRACED STANDOFF BRACKET,	12-1/2″	686794E	1	1	1	1	1					1
		18″	686796E	*	*	*	*	*					*
82	CONDUIT STRAP, 5″		689774E	4*	4*	4*	4*	4*					4*
83	PADLOCK, SNM-1		non-stock	2	2	2	2	2				2	
84	CONDUIT, Schedule 40 PVC, 5″		734524	3	3	3	3	3					3
85	COUPLING, female adapter, 5″		734536	1	1	1	1	1					1
86	END BELL, PVC		734949	1	1	1	1	1					1
87	ADHESIVE KIT		012821	1	1	1	1	1					1
92	GROUND ROD, 5/8″ x 8′		564238E	1	1	1	1	1		1			
93	WIRE STAPLES, galvanized		583200E	*	*	*	*	*		*			
94	GROUND WIRE MOULDING, 8′		582060E	*	*	*	*	*		*			
95	CABLE GRIP		763555	3	3	3	3	3					3
96	J BOLT ASSEMBLY		720630	1	1	1	1	1					1
97	SCREW, lag, fetter, 1/2″ x 4″		785261E	16	16	16	16	16	1			6	9
98	TAG HOLDER		581799	1	1	1	1	1				1	
99	NAIL, large head		782483	2	2	2	2	2				2	
100	LABEL		non-stock	1	1	1	1	1				1	
101	NUMBER BOARD		shop made	1	1	1	1	1			1		

*crew has choice of quantity, exempt items only

6. Materials, continued

6.2 Material List

Item	Component Description	Stock No.	1/0	350	500	750	1000	AT	GND	NB	SW	UG
102	FLAT WASHER, bronze, 1/4″	788022E	2	2	2	2	2			2		
103	HEX NUT, bronze, 1/4″	783321E	2	2	2	2	2			2		
102	FLAT WASHER, bronze, 1/4″	788022E	2	2	2	2	2			2		
103	HEX NUT, bronze, 1/4″	783321E	2	2	2	2	2			2		
104	CAP SCREW, bronze, 1/4″	784505E	2	2	2	2	2			2		
105	LOCK WASHER, bronze, 1/4″	788121E	2	2	2	2	2			2		
106	LAG SCREW, 1/4″ x 4″	785216E	2	2	2	2	2			2		
107	FLAT WASHER, galvanized, 3/8″ x 1″	585020E	2	2	2	2	2			2		
108	BRACKET, number board mounting	563225	2	2	2	2	2			2		

7. References

0072.01; “Wildlife Protection, Small Birds and Animals”; Construction Standard; SCL

1299/C62.22.1-1996; *IEEE Guide for the Connection of Surge Arresters to Protect Insulated, Shielded Electric Power Cable Systems;* IEEE

D8-10; “Typical Number Board Installation”; Construction Guideline; SCL

D8-18; “Switch, 600 Amp - 3 Pole - Gang Operated for Wood Pole Mounting Vertical”; Construction Guideline; SCL

D14-1; “Ampact Tap Chart”; Construction Guideline; SCL

D16-2; “Grounding Rod Installation”; Construction Guideline; SCL

Detter, Chris; SCL Engineer, subject matter expert (Chris.Detter@seattle.gov)

DU5-15.6 (canceled); “Pole Termination, 3 Phase, 15/26 kV Distribution – 350, 500, 750 and 1000 kcmil, 27 kV Shielded Cable”; Construction Guideline; SCL

DU5-15.61 (canceled); “Pole Termination, 3 Phase, 15/26 kV Distribution, 350, 500, 750 and 1000 kcmil, 27 kV Shielded Cable, High Fault Current Areas”; Construction Guideline; SCL

Lu, Curtis; SCL Standards Engineer, subject matter expert and originator of Construction Standard 0173.20 (curtis.lu@seattle.gov)

Mimier, Dennis; SCL Crew Supervisor, subject matter expert (Dennis.Mimier@seattle.gov)

U7-10; “Conduit Risers on Poles”; Construction Guideline; SCL

U7-10.2; “Primary Conduit Riser Pole Base Detail”; Construction Guideline; SCL

U7-10.9; “Grounding Conduit Risers on Poles”; Construction Guideline; SCL