Appendix G

FOR RULE G-6 GROUNDS, PORTABLE PROTECTIVE, SPECIAL REQUIREMENTS

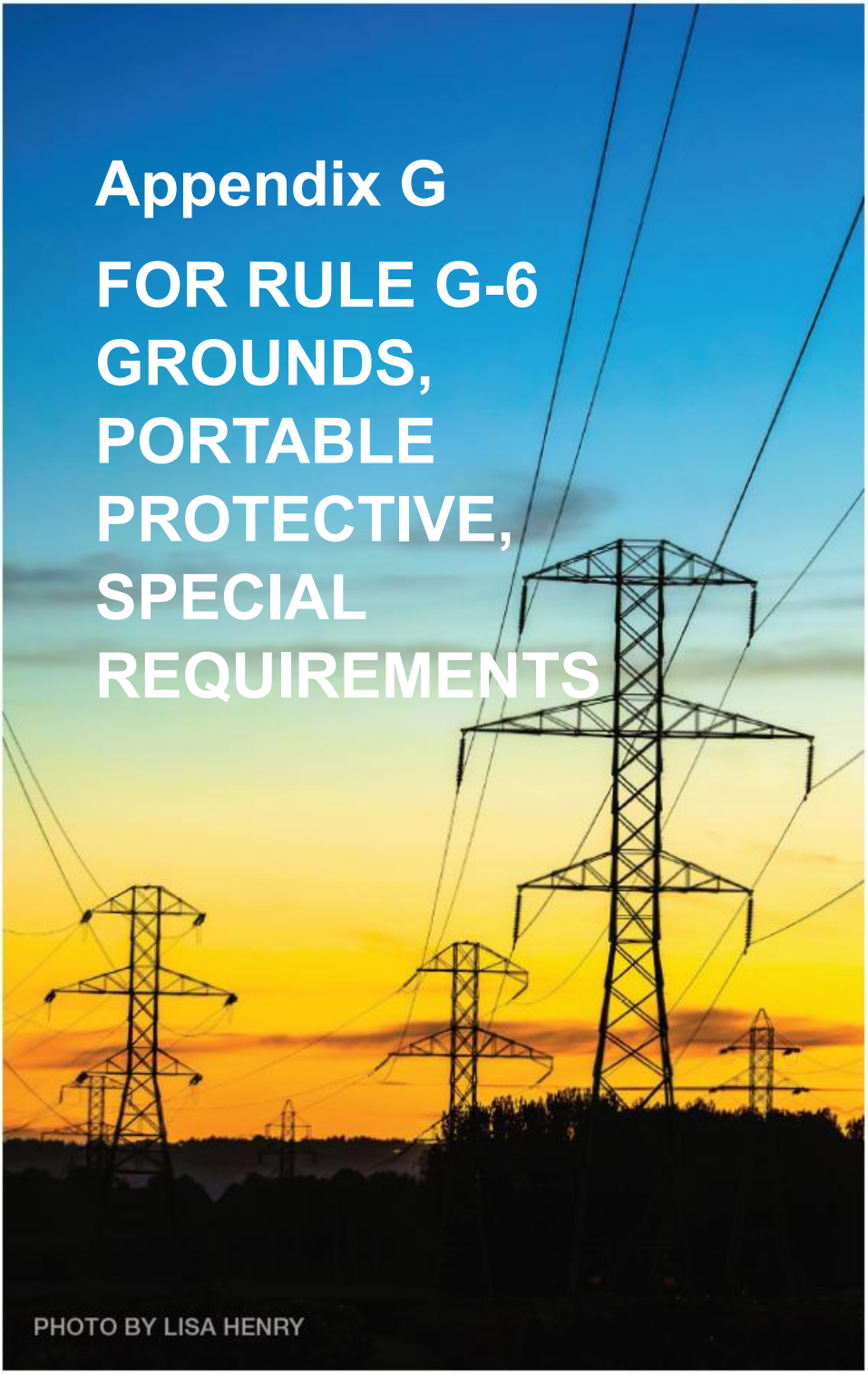


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Appendix G.1 – Substations Which Require Multiple 2/0 Protective Grounds

Substation	kV	# of 2/0 Grounds	Terminal / Bus	Notes
Aberdeen	13.2	3	Transformer #4, 13.2 kV Bus	2, 3, 5
	13.8	3	Transformer #5, 13.8 kV Bus	2, 3, 5
Albany	13.8	2	Transformer #1, 13.8 kV Bus	2, 3
Alcoa	34.5	2	Transformer #8, 34.5 kV Bus	2, 3, 5
	115	2	115 kV Bus	1
Allston	34.5	3	Transformer #1, 34.5 kV Bus	2, 3, 4, 5
	230	2	230 kV Bus	1
Alvey	13.2	4	Transformer #3, 13.2 kV Bus	2, 3, 5
	34.5	2	Transformer #5, 34.5 kV Bus	2, 3, 4, 5
Ashe	500	2	500 kV Bus	1
Bell	13.8	2	Transformer #6, 13.8 kV Bus	2, 3
	230	2	230 kV Bus	1

Substation	kV	# of 2/0 Grounds	Terminal / Bus	Notes
Bellingham	13.2	2	Transformer #2, 13.2 kV Bus	2, 3, 4, 5
Big Eddy	34.5	2	Transformer #2, 34.5 kV Bus	2, 3,4, 5
	115	2	Transformer #1, 115 kV Bus	1
	115	2	Transformer #7, 115 kV Bus	1
	115	2	Transformer #8, 115 kV Bus	1
	115	2	115 kV Bus	1
	230	2	230 kV Bus	1
	500	2	500 kV Bus	1
Boardman	7.2	2	Transformer #1, 7.2 kV Bus	2, 3, 5
Boundary	13.2	2	Transformer #1, 13.2 kV Bus	2, 3, 5
Celilo	500	2	500 kV Bus	1
Central Ferry	34.5	2	Transformer #1, 34.5 kV Bus	3, 5
Chemawa	13.2	3	Transformer #2, 13.2 kV Bus	2, 3, 5
Chenoweth	13.8	2	Transformer #1, 13.8 kV Bus	2, 3, 5

Substation	kV	# of 2/0 Grounds	Terminal / Bus	Notes
Chief Joseph	13.2	2	Transformer #1, 13.2 kV Bus	3, 4, 5
	230	2	230 kV Bus	1
	345	2	Transformer #1, 345 kV Bus	1
	345	2	Transformer #2, 345 kV Bus	1
Clatsop	13.8	2	Transformer #1, 13.8 kV Bus	2, 3, 5
Columbia	13.8	2	Transformer #1, 13.8 kV Bus	2, 3, 4, 5
	13.8	2	Transformer #2, 13.8 kV Bus	2, 3, 4, 5
	115	2	Transformer #3, 115 kV Bus	1, 2, 3, 5
	230	2	230 kV Bus	1
Conkelley	13.8	2	Transformer #4, 13.8 kV Bus	2, 5
Covington	34.5	2	Transformer #4, 34.5 kV Bus	2, 3, 4, 5
	34.5	2	Transformer #5, 34.5 kV Bus	2, 3, 4, 5
	230	2	230 kV Bus	1

Substation	kV	# of 2/0 Grounds	Terminal / Bus	Notes
Custer	34.5	2	Transformer #1, 34.5 kV Bus	2, 3, 4, 5
	34.5	2	Transformer #2, 34.5 kV Bus	2, 3, 4, 5
	230	2	230 kV Bus	1
Fairview	13.2	2	Transformer #1, 13.2 kV Bus	2, 3, 4, 5
Franklin	13.2	4	Transformer #4, 13.2 kV Bus	2, 3, 5
Grand Coulee	11.95	2	11.95 kV Bus	2, 3
	230	3	230 kV Bus	1
	287	3	Transformer KX17A, 287 kV Bus	1
	500	2	500 kV Bus	1
Goshen	161	2	161 kV Bus	1
Hanford	500	2	500 kV Bus	1

Substation	kV	# of 2/0 Grounds	Terminal / Bus	Notes
Hatwai	34.5	2	Transformer #1, 34.5 kV Bus	2, 3, 5
Horse Heaven	13.8	2	Transformer #1, 13.8 kV Bus	2, 3, 5
Hot Springs	34.5	2	Transformer #1, 34.5 kV Bus	2, 3, 4, 5
Intalco	0.24	2	Station Service Transformer #1, 0.24 kV Bus	2
	0.24	3	Station Service Transformer #2, 0.24 kV Bus	2
	13.8	3	Transformer #1, 13.8 kV Bus	2, 4
	13.8	3	Transformer #2, 13.8 kV Bus	2, 4
	13.8	3	Transformer #3, 13.8 kV Bus	2, 4
	13.8	3	Transformer #4, 13.8 kV Bus	2, 4
	13.8	3	Transformer #5, 13.8 kV Bus	2, 4
	13.8	3	Transformer #6, 13.8 kV Bus	2, 4
	13.8	3	Transformer #7, 13.8 kV Bus	2, 4

Substation	kV	# of 2/0 Grounds	Terminal / Bus	Notes
John Day	34.5	2	Transformer #1, 34.5 kV Bus	2
	500	2	500 kV Bus	1
Keeler	13.2	2	Transformer #1, 13.2 kV Bus	2, 3, 4, 5
	20	4	Transformer #4-SVC, 20 kV Bus	2, 3
	115	2	Transformer #1, 115 kV Bus	1
	115	2	Transformer #3, 115 kV Bus	1
	115	2	115 kV Bus	1
	230	2	230 kV Bus	1
Lexington	13.8	2	Transformer #1, 13.8 kV Bus	2, 3, 5

Substation	kV	# of 2/0 Grounds	Terminal / Bus	Notes
Longview	13.8	3	Transformer #1, 13.8 kV Bus	2, 3, 5
	69	2	Transformer #1, 69 kV Bus	2, 3, 5
	115	2	115 kV Bus	1
	230	2	230 kV Bus	1
Maple Valley	20	4	Transformer #3-SVC, 20 kV Bus	2, 3
	34.5	2	Transformer #2, 34.5 kV Bus	2, 3, 4, 5
	230	2	230 kV Bus	1
	345	2	Transformer #1, 345 kV Bus	1
McNary	115	2	115 kV Bus	1
	230	2	230 kV Bus	1
	345	2	Transformer #8, 345 kV Bus	1

Substation	kV	# of 2/0 Grounds	Terminal / Bus	Notes
Midway	13.8	3	Transformer #3, 13.8 kV Bus	2, 3, 4, 5
Monroe	34.5	2	Transformer #1, 34.5 kV Bus	2, 3, 4, 5
Murray	13.2	2	Transformer #1, 13.2 kV Bus	2, 3, 5
Olympia	13.2	4	Transformer #1, 13.2 kV Bus	2, 3, 4, 5
	13.8	2	Transformer #2, 13.8 kV Bus	2, 3, 4, 5
	115	2	115 kV Bus	1
Ostrander	34.5	2	Transformer #1, 34.5 kV Bus	2, 3, 5
Pearl	34.5	2	Transformer #1, 34.5 kV Bus	2, 3, 5
	230	2	230 kV Bus	1
Port Angeles	7.2	2	V212 Grounding Bank	2, 3

Substation	kV	# of 2/0 Grounds	Terminal / Bus	Notes
Raver	34.5	2	Transformer #1, 34.5 kV Bus	2, 3, 5
	230	2	Transformer #1, 230 kV Bus	1
	500	2	Transformer #1, 500 kV Bus	1
Rock Creek	34.5	2	Transformer #1, 34.5 kV Bus	2, 3, 5
Rocky Reach	230	2	Transformer #1, 230 kV Bus	1
Ross	115	2	115 kV Bus	1
Santiam	34.5	2	Transformer #4, 34.5 kV Bus	2, 3, 5
Schultz	500	2	500 kV Bus	1, 6
Shelton	13.2	2	Transformer #1, 13.2 kV Bus	2, 3, 5
Sickler	230	2	Transformer #1, 230 kV Bus 1	1

Substation	kV	# of 2/0 Grounds	Terminal / Bus	Notes
Sifton	13.8	2	Transformer #1, 13.8 kV Bus	2, 3, 5
	13.8	2	Transformer #2, 13.8 kV Bus	2, 3, 5
Slatt	34.5	2	Transformer #1, 34.5 kV Bus	2, 3, 5
	500	2	500 kV Bus	1
Snohomish	13.2	2	Transformer #2, 13.2 kV Bus	2, 3, 4, 5
	13.2	2	Transformer #3, 13.2 kV Bus	2, 3, 4, 5
	115	2	115 kV Bus	1
	230	2	230 kV Bus	1
	345	2	Transformer #5, 345 kV Bus	1
	345	2	Transformer #6, 345 kV Bus	1

Substation	kV	# of 2/0 Grounds	Terminal / Bus	Notes
Sno-King	13.2	2	Transformer #1, 13.2 kV Bus	2, 3
	115	2	115 kV Bus	1
	230	2	230 kV Bus	1
St. Johns	13.2	2	Transformer #1, 13.2 kV Bus	2, 3, 4, 5
Tacoma	34.5	2	Transformer #5, 34.5 kV Bus	2, 3, 5
	230	2	230 kV Bus	1
Trentwood	6.9	2	Transformer #1, 6.9 kV Bus	2
	6.9	2	Transformer #2, 6.9 kV Bus	2
	6.9	2	Transformer #3, 6.9 kV Bus	2
Troutdale	230	2	230 kV Bus	1, 7
Valhalla	13.8	2	Transformer #1, 13.8 kV Bus	2
	13.8	2	Transformer #2, 13.8 kV Bus	2
	115	2	115 kV Bus	1
Vantage	230	2	230 kV Bus	1
Wautoma	500	2	500 kV Bus	1
White Bluffs	13.8	2	Transformer #1, 13.8 kV Bus	2, 3, 5

NOTES:

1. Fifteen (15) cycle cable fusing time is used. If maximum fault current exceeds 56,000 amps, three 2/0 copper portable grounds are required. If maximum fault current exceeds 31,000 amps, two 2/0 copper portable grounds are required.
2. Thirty (30) cycle cable fusing time is used. If maximum fault current exceeds 62,000 amps, four 2/0 copper portable grounds are required. If maximum fault current exceeds 43,000 amps, three 2/0 copper portable grounds are required. If maximum fault current exceeds 23,700 amps, two 2/0 copper portable grounds are required.
3. If this transformer bank is de-energized and all of the windings are grounded according to the APM requirements and this transformer bus has no other possible sources of energization that require multiple grounds, for example another transformer tertiary, then only one 2/0 ground cable per phase is required on this bus.
4. Only a single set of portable protective ground cables is required on the load side of air core reactors which are used for station service to limit fault magnitudes. The reactors limit the fault current to below the 23,700 ampere 30 cycle fusing rating of a portable protective ground cable. This shall be verified by the System Protection and Control District Engineer every three years when this Standard is upgraded.

NOTES (continued)**:**

5. This tertiary bus is an ungrounded delta. A single set of 2/0 copper portable protective ground cables is required for any one of the following conditions:

   - Work is performed on the load side of current limiting fuses which limits the available fault current to less than the 2/0 copper fusing ampacity rating.
   - Work is performed on the load side of a switch whose line side is a section of conductor equal to or smaller than 1/0 copper, which has 80% of the 2/0 copper rating.

6. The grounding requirements for a series capacitor installation are the same as those for the substation bus when the capacitors are located at the substation. For series capacitors in midline, the grounding requirements are the same as for the transmission line section at the location of the series capacitors.
7. Yellow highlighted cells indicate changes to previous tables.

Appendix G.2 – Transmission Lines which require multiple 2/0 Protective Grounds

The following Transmission Lines require two or more 2/0 copper portable protective grounds from the listed substation to the listed structure or from the listed structure to the listed structure. Line sections beyond that point do not require multiple grounds.

These grounding requirements apply to all lines terminating at the listed substations and operating voltages, including lines owned and operated by foreign utilities.

Fifteen (15) cycle fusing time is used. Three 2/0 copper portable grounds are required if the maximum fault current exceeds 56,000 amps. Two 2/0 copper portable grounds are required if the maximum fault current exceeds 31,000 amps.

Line Name	kV	# of 2/0 Grounds	From	To	Notes
Alcoa - Felida 1	115	2	Alcoa	Str 2/1	
Alcoa - River Road 1	115	2	Entire Line	Entire Line	
Allston - Clatsop 1	230	2	Allston	Str 2/9	
Allston - Driscoll 1	230	2	Allston	Str 3/1	
Alvey Capacitor Tie 1	115	2	Entire Line	Entire Line	
Ashe - Hanford 1	500	2	Ashe	Str 2/2	
		2	Str 13/2	Hanford	12
Ashe - Marion 2	500	2	Ashe	Str 1/6	
Ashe - Slatt 1	500	2	Ashe	Str 1/6	
		2	Str 73/1	Slatt	

Line Name	kV	# of 2/0 Grounds	From	To	Notes
Bell - Boundary 3	230	2	Bell	Str 2/5	
Bell - Lancaster 1	230	2	Bell	Str 2/3	
Bell - Usk 1	230	2	Bell	Str 2/2	
Bellingham - Custer 1	230	2	Str 12/3	Custer	
Bettas Road - Columbia 1	230	2	Str 34/3	Columbia	
Big Eddy - Celilo 1	500	2	Entire Line	Entire Line	
Big Eddy - Celilo 2	500	2	Entire Line	Entire Line	
Big Eddy - Chemawa 1	230	2	Big Eddy	Str 2/4	
Big Eddy - DeMoss 1	115	2	Big Eddy	Str 2/1	
Big Eddy - Knight 1	500	2	Big Eddy	Str 3/1	
Big Eddy - Maupin 1	230	2	Big Eddy	Str 3/5	
Big Eddy - McLoughlin (PGE 1 & 2)	230	2	Big Eddy	Str 2/4	
Big Eddy - Ostrander 1	500	2	Big Eddy	Str 2/4	
Big Eddy - Quenette Creek 1	230	2	Big Eddy	Str 2/2	
Big Eddy - Quenette Creek 2	230	2	Big Eddy	Str 3/5	
Big Eddy - Spring Creek	230	2	Big Eddy	Str 3/2	

Line Name	kV	# of 2/0 Grounds	From	To	Notes
Big Eddy - Transformer 1, Tie 1	115	2	Entire Line	Entire Line	
Big Eddy - Transformer 2, Tie 1	500	2	Entire Line	Entire Line	
Big Eddy - Transformer 5, Tie 2	500	2	Entire Line	Entire Line	
Big Eddy - Troutdale 1	230	2	Big Eddy	Str 2/4	
		2	Str 77/1	Troutdale	12
Bonneville PH - Alcoa 1 & 2	115	2	Str 40/7	Alcoa	
Bothel (SCL) - Sno King 1	230	2	***	Sno King	5, 11
Bothel (SCL) - Sno King 2	230	2	***	Sno King	6, 11
Cattle Creek - Goshen 1	161	2	Str 21/6	Goshen	
CGS - Ashe 1	500	2	Entire Line	Entire Line	
Chehalis - Covington 1	230	2	Str 67/2	Covington	
Chief Joseph - East Omak 1	230	2	Chief Joseph	Str 2/2	12
Chief Joseph - Snohomish 3	230	2	Chief Joseph	Str 2/2	12
		2	131/6	Snohomish	

Line Name	kV	# of 2/0 Grounds	From	To	Notes
Chief Joseph - Snohomish 3	345	2	Chief Joseph	Str 2/2	12
		2	131/6	Snohomish	
Chief Joseph - Snohomish 4	230	2	Chief Joseph	Str 2/2	12
		2	131/6	Snohomish	
Chief Joseph - Snohomish 4	345	2	Chief Joseph	Str 2/2	12
		2	131/6	Snohomish	
Chief Joseph PH - Chief Joseph 1	230	2	Entire Line	Entire Line	
Chief Joseph PH - Chief Joseph 2	230	2	Entire Line	Entire Line	
Chief Joseph PH - Chief Joseph 3	230	2	Entire Line	Entire Line	
Chief Joseph PH - Chief Joseph 4	230	2	Entire Line	Entire Line	
Columbia - Ellensburg 1	115	2	Columbia	Str 2/2	
Columbia - Grand Coulee 1	230	2	Columbia	Str 2/5	
		2	71/2	Str 73/2	
		3	73/2	Grand Coulee	

Line Name	kV	# of 2/0 Grounds	From	To	Notes
Columbia - Grand Coulee 3	230	2	Columbia	Str 2/4	
		2	71/2	Str 73/4	
		3	73/4	Grand Coulee	
Columbia - Rapids (Douglas Co PUD) 1	230	2	Columbia	***	8, 11
Columbia - Rocky Ford (Grant Co PUD) 2	230	2	Columbia	***	9, 11
Columbia - Valhalla 1	115	2	Columbia	Str 2/1	
		2	Str 5/1	Valhalla	
Columbia - Valhalla 2	115	2	Columbia	Str 2/1	
		2	Str 5/1	Valhalla	
Columbia - Wanapum (Grant Co PUD) 1	230	2	Columbia	***	9, 11
Covington - Berrydale (PSE) 1	230	2	Entire Line	Entire Line	
Covington - Bettas Rd	230	2	Covington	Str 4/1	
Covington - Creston (SCL) 1	230	2	Covington	Str 4/1	
Covington - Duwamish (SCL) 1	230	2	Covington	Str 4/1	

Line Name	kV	# of 2/0 Grounds	From	To	Notes
Covington - Maple Valley 2	230	2	Covington	Str 4/1	
		2	Str 15/1	Maple Valley	
Covington - White River (PSE) 1&2	230	2	Covington	Str 4/1	
Coyote Springs - Slatt 1	500	2	Str 28/1	Slatt	
Custer - Intalco 1	230	2	Custer	Str 1/6	
Custer - Intalco 2	230	2	Custer	Str 1/6	
Goshen (BPA) - Drummond 1	161	2	Goshen BPA	Str 2/2	
Grand Coulee - Bell 3	230	3	Grand Coulee	Str 2/1	
		2	Str 2/1	Str 4/2	
		2	Str 84/1	Bell	
Grand Coulee - Bell 5	230	3	Grand Coulee	Str 2/1	
		2	Str 2/1	Str 4/2	
		2	Str 84/1	Bell	
Grand Coulee - Bell 6	500	2	Grand Coulee	Str 5/4	

Line Name	kV	# of 2/0 Grounds	From	To	Notes
Grand Coulee - Chief Joseph 1	230	3	Grand Coulee	Str 2/1	
		2	Str 2/1	Str 4/4	
		2	Str 32/4	Chief Joseph	12
Grand Coulee - Chief Joseph 2	230	3	Grand Coulee	Str 2/1	
		2	Str 2/1	Str 4/5	
		2	Str 32/4	Chief Joseph	12
Grand Coulee - Chief Joseph 3	500	2	Grand Coulee	Str 6/3	
Grand Coulee - Grand Coulee PH #19	500	2	Entire Line	Entire Line	
Grand Coulee - Grand Coulee PH #20	500	2	Entire Line	Entire Line	
Grand Coulee - Grand Coulee PH #21	500	2	Entire Line	Entire Line	
Grand Coulee - Grand Coulee PH #22	500	2	Entire Line	Entire Line	
Grand Coulee - Grand Coulee PH #23	500	2	Entire Line	Entire Line	
Grand Coulee - Grand Coulee PH #24	500	2	Entire Line	Entire Line	

Line Name	kV	# of 2/0 Grounds	From	To	Notes
Grand Coulee - Grand Coulee 500/230 kV Tie 1	500	2	Entire Line	Entire Line	
Grand Coulee - Hanford 1	500	3	Grand Coulee	Str 5/5	
		2	Str 92/4	Hanford	12
Grand Coulee - Schultz 1	500	3	Grand Coulee	Str 6/4	
		2	Str 93/2	Schultz	12
Grand Coulee - Schultz 2	500	3	Grand Coulee	Str 6/4	
		2	Str 93/2	Schultz	12
Grand Coulee - Westside (Avista) 1	230	3	Grand Coulee	Str 2/1	
		2	Str 2/1	Str 4/2	
Hanford - Wautoma 1	500	2	Hanford	Str 6/3	12
		2	Str 15/4	Wautoma	12
Hanford - Wautoma 2	500	2	Hanford	Str 6/3	12
		2	Str 15/4	Wautoma	12
Harvalum - Big Eddy 1	230	2	Str 22/5	Big Eddy	
Hawkins - Alvey 1	115	2	Str 7/6	Alvey	
Horizon (PGE) - Keeler 1	230	2	***	Keeler	7, 11
Horizon (PGE) - Keeler 2	230	2	***	Keeler	7, 11

Line Name	kV	# of 2/0 Grounds	From	To	Notes
John Day - Big Eddy 1	500	2	John Day	Str 8/1	
		2	Str 17/5	Big Eddy	
John Day - Big Eddy 2	500	2	John Day	Str 8/1	
		2	Str 17/5	Big Eddy	
John Day - Grizzly 1	500	2	John Day	Str 8/1	
John Day - Grizzly 2	500	2	John Day	Str 8/1	
John Day - Marion 1	500	2	John Day	Str 8/1	
John Day PH - John Day 1	500	2	Entire Line	Entire Line	
John Day PH - John Day 2	500	2	Entire Line	Entire Line	
John Day PH - John Day 3	500	2	Entire Line	Entire Line	
John Day PH - John Day 4	500	2	Entire Line	Entire Line	
Keeler - 230 kV Transformer 1	115	2	Entire Line	Entire Line	
Keeler - 230 kV Transformer 3	115	2	Entire Line	Entire Line	
Keeler - Forest Grove 1	115	2	Keeler	Str 2/2	

Line Name	kV	# of 2/0 Grounds	From	To	Notes
Keeler - Forest Grove 2	115	2	Keeler	Str 2/2	
Keeler - Oregon City 2	115	2	Keeler	Str 2/1	
Keeler - St Mary (PGE) 1	230	2	Keeler	***	7, 11
Lexington -Longview 1	115	2	Str 9/1	Longview	
Lexington - Longview 2	230	2	Str 8/6	Longview	
Longview - Allston 1	230	2	Longview	Str 2/2	
		2	Str 3/1	Allston	
Longview - Allston 2	230	2	Longview	Str 2/2	
		2	Str 3/1	Allston	
Longview - Allston 3	230	2	Longview	Str 2/3	
		2	Str 3/1	Allston	
Longview - Allston 4	115	2	Longview	Str 2/1	
Longview - Chehalis 1	230	2	Longview	Str 2/1	
Longview - Chemical (Cowlitz PUD) 1	230	2	Entire Line	Entire Line	
Longview – Cowlitz 1	115	2	Longview	Str 2/1	

Line Name	kV	# of 2/0 Grounds	From	To	Notes
Longview - Washington Way 1	115	2	Entire Line	Entire Line	
Lower Monumental - Ashe 1	500	2	Str 39/5	Ashe	
Lower Monumental - Hanford 1	500	2	Str 49/4	Hanford	12
Maple Valley - Duwamish (SCL) 1	230	2	Entire Line	Entire Line	
Maple Valley - Massachusetts (SCL) 1	230	2	Entire Line	Entire Line	
McNary - 230/115 Tie Line 1	230	2	Entire Line	Entire Line	
McNary - Badger Canyon 1	115	2	McNary	Str 1/12	
McNary - Franklin 2	230	2	McNary	Str 3/3	
McNary - Horse Heaven 1	230	2	McNary	Str 3/1	
McNary - John Day 2	500	2	Str 71/4	John Day	
McNary - Morrow Flat 1	230	2	McNary	Str 3/3	
McNary - Morrow Flat 2	230	2	McNary	Str 3/4	
McNary - Ross 1	230	2	McNary	Str 3/3	
McNary - Ross 1	345	2	McNary	Str 3/3	

Line Name	kV	# of 2/0 Grounds	From	To	Notes
McNary - Roundup 1	230	2	McNary	Str 3/8	
McNary P.H. - McNary 1	230	2	Entire Line	Entire Line	
McNary P.H. - McNary 2	230	2	Entire Line	Entire Line	
McNary P.H. - McNary 3	230	2	Entire Line	Entire Line	
McNary P.H. - McNary 4	230	2	Entire Line	Entire Line	
McNary P.H. - McNary 5	230	2	Entire Line	Entire Line	
McNary P.H. - McNary 6	115	2	Entire Line	Entire Line	
Midway - Vantage 1	230	2	Str 18/2	Vantage	
Mint Farm - Longview 1	115	2	Entire Line	Entire Line	
Mint Farm - Longview 1	230	2	Entire Line	Entire Line	
Monroe - Snohomish 1 (includes tap length to Horse Ranch (PSE))	230	2	Str 11/5	Snohomish	
Monroe - Snohomish 2 (includes tap length to Horse Ranch (PSE))	230	2	Str 11/5	Snohomish	

Line Name	kV	# of 2/0 Grounds	From	To	Notes
Murray - Custer 1 (Murray-Custer/Sedro Tap 1)	230	2	Str 64/1	Custer	
North Bonneville - Troutdale 1	230	2	Str 27/3	Troutdale	12
North Bonneville - Troutdale 2	230	2	Str 27/3	Troutdale	12
North Mountain (SCL) - Snohomish 1	230	2	Str 76/5	Snohomish	
Olympia - Grand Coulee 1	230	2	Str 226/2	Str 228/4	
		3	Str 228/4	Grand Coulee	
Olympia - Shelton 1	115	2	Olympia	Str 2/2	
Olympia - Shelton 2	115	2	Olympia	Str 2/3	
Olympia - South Elma 1	115	2	Olympia	Str 2/2	
Pearl - Sherwood (PGE) 1	230	2	Pearl	Str 2/2	
Pearl - Sherwood (PGE) 2	230	2	Pearl	Str 2/2	
Potholes - Grand Coulee 1	230	2	Str 64/6	Str 66/3	
		3	Str 66/3	Grand Coulee	
Raver - Covington 1	500	2	Raver	Str 2/1	

Line Name	kV	# of 2/0 Grounds	From	To	Notes
Raver - Covington 2	500	2	Raver	Str 2/1	
Raver - Covington 3	230	2	Raver	Str 3/1	
	230	2	Str 6/6	Covington	
Raver - Echo Lake 1	500	2	Raver	Str 2/2	
Raver - Paul 1	500	2	Raver	Str 2/2	
Raver - Transformer 1, Tie 1	500	2	Entire Line	Entire Line	
Rivergate (PGE) - Keeler 1	230	2	Str 8/3	Keeler	
Rock Creek - John Day 1	500	2	Str 8/1	John Day	
Rocky Ford - Grand Coulee 1	230	2	Str 50/6	Str 52/3	
		3	Str 52/3	Grand Coulee	
Rocky Reach - Columbia 1	230	2	Str 2/1	Columbia	
Rocky Reach (Chelan PUD) - Columbia 1	230	2	Rocky Reach (Chelan PUD)	Str 3/1	
Rocky Reach (Chelan PUD) - Columbia 2	230	2	***	Columbia	10, 11

Line Name	kV	# of 2/0 Grounds	From	To	Notes
Rocky Reach - Maple Valley 1	230	2	Rocky Reach	Str 3/1	
		2	Str 127/1	Maple Valley	
Rocky Reach - Maple Valley 1	345	2	Rocky Reach	Str 3/1	
		2	Str 127/1	Maple Valley	
Ross - Alcoa 2 & 4 1	115	2	Str 4/2	Str 4/9	
Ross – Alcoa 2 & 4 2	115	2	Ross	Str 2/1	
		2	Str 4/2	Alcoa	
Ross – Alcoa 2 & 4 4	115	2	Str 1/2	Str 2/1	
Ross - Carborundum (Clark PUD) 1	115	2	Ross	Str 2/1	
Ross - Vancouver Shipyard (Clark PUD) 1	115	2	Ross	Str 2/7	
Sacheen -Bell 1	230	2	Str 33/1	Bell	
Schultz - Echo Lake 1	500	2	Schultz	Str 6/2	12
Schultz - Raver 1	500	2	Schultz	Str 6/2	12
		2	Str 77/3	Raver	

Line Name	kV	# of 2/0 Grounds	From	To	Notes
Schultz - Raver 3	500	2	Schultz	Str 6/1	12
		2	Str 77/4	Raver	
Schultz - Raver 4	500	2	Schultz	Str 6/1	12
		2	Str 77/4	Raver	
Schultz - Wautoma 1	500	2	Schultz	Str 5/5	12
		2	Str 58/3	Wautoma	12
Sickler - Douglas Switchyard (Chelan PUD) 1	230	2	Entire Line	Entire Line	
Sickler - Schultz 1	500	2	Str 34/2	Shultz	12
Sifton - Ross 1	115	2	Str 8/4	Ross	
Slatt - Buckley 1	500	2	Slatt	Str 2/1	
Slatt - John Day 1	500	2	Slatt	Str 2/1	
		2	Str 24/2	John Day	
Sno King - Maple Valley 1 (SCL at Str 1/3 to Str 25/4)	230	2	Sno King	***	1, 11
		2	***	Maple Valley	1, 11
Sno King - Maple Valley 2 (SCL at Str 1/11 to Str 25/3)	230	2	Sno King	***	2, 11
		2	***	Maple Valley	2, 11

Line Name	kV	# of 2/0 Grounds	From	To	Notes
Snohomish - Beverly Park (Snohomish PUD) 3	115	2	Snohomish	Str 2/1	
Snohomish - Beverly Park (Snohomish PUD) 4	115	2	Snohomish	Str 2/1	
Snohomish - Beverly Park (Snohomish PUD) 9	230	2	Snohomish	Str 2/1	3
Snohomish - Bothell (SCL) 1	230	2	Snohomish	***	4, 11
Snohomish - Bothell (SCL) 2	230	2	Snohomish	***	4, 11
Snohomish - Murray 1	230	2	Snohomish	Str 2/1	
Snohomish - Snohomish PUD 3 (Scott)	115	2	Snohomish	Str 2/1	
Snohomish - Snohomish PUD 5	115	2	Snohomish	***	3, 11
Snohomish - Snohomish PUD 6	115	2	Snohomish	***	3, 11
Snohomish - Snohomish PUD 8 (Swamp Creek)	115	2	Snohomish	Str 2/1	
St. Johns - Keeler 2	115	2	Str 9/7	Keeler	
Tacoma - Covington 2	230	2	Tacoma	Str 2/5	
		2	Str 13/1	Covington	

Line Name	kV	# of 2/0 Grounds	From	To	Notes
Tacoma - Covington 3	230	2	Tacoma	Str 2/4	
		2	Str 13/1	Covington	
Tacoma - Covington 4	230	2	Tacoma	Str 2/4	
		2	Str 13/1	Covington	
Tacoma - Raver 1	500	2	Str 23/4	Raver	
The Dalles PH - Big Eddy 1	115	2	Entire Line	Entire Line	
The Dalles PH - Big Eddy 2	115	2	Entire Line	Entire Line	
The Dalles PH - Big Eddy 3	230	2	Entire Line	Entire Line	
The Dalles PH - Big Eddy 4	230	2	Entire Line	Entire Line	
The Dalles PH - Big Eddy 5	230	2	Entire Line	Entire Line	
The Dalles PH - Big Eddy 6	230	2	Entire Line	Entire Line	
Trojan - Allston 1	230	2	Str 8/4	Allston	
Trojan - Allston 2	230	2	Str 8/4	Allston	

Line Name	kV	# of 2/0 Grounds	From	To	Notes
Troutdale - Troutdale (PACW) 1	230	2	Entire Line	Entire Line	12
Troutdale - Troutdale (PACW) 2	230	2	Entire Line	Entire Line	12
Vantage Bus Tie 1	230	2	Entire Line	Entire Line	
Vantage Bus Tie 2	230	2	Entire Line	Entire Line	
Vantage - Columbia 1	230	2	Vantage	Str 3/1	
		2	Str 31/2	Columbia	
Vantage - Hanford 1	500	2	Str 20/2	Hanford	12
Vantage - Schultz 1	500	2	Str 30/4	Schultz	12
Wautoma - Knight 1	500	2	Wautoma	Str 4/5	12
Wautoma - Rock Creek 1	500	2	Wautoma	Str 4/4	12
Westside - Bell 1	230	2	Str 10/1	Bell	

NOTES:

1. BPA line ownership of SNOK-MPVL-1: 0.51 miles, from SNOK terminal to Str 1/3, & .17 miles, from Str 25/3 to MPVL terminal. SCL owns majority of line. Contact SCL for tower info corresponding to 2 miles from MPVL.
2. BPA line ownership of SNOK-MPVL-2: 0.54 miles, from SNOK terminal to Str 1/12, & 0.19 miles, from Str 25/3 to MPVL terminal. SCL owns majority of line. Contact SCL for tower info corresponding to 2 miles from MPVL.
3. Line owned by Snohomish PUD. Contact SNPUD for tower info corresponding to 2 miles from SNOH.
4. Line owned by SCL. Contact SCL for tower info corresponding to 2 miles from SHOH.
5. BPA line ownership of BOTH-SNOK-1: BPA owns 0.5076 miles from SNOK terminal to Str 3/1. SCL owns majority of line. Contact SCL for tower info corresponding to 2 miles from SNOK.
6. BPA line ownership of BOTH-SNOK-2: BPA owns 0.4907 miles from SNOK terminal to Str 3/1. SCL owns majority of line. Contact SCL for tower info corresponding to 2 miles from SNOK.
7. Line owned by PGE. Contact PGE for tower info corresponding to 2 miles from Keeler.
8. Line owned by Douglas Co PUD. Contact Douglas Co PUD for tower info corresponding to 2 miles from Columbia.
9. Line owned by Grant Co PUD. Contact Grant Co PUD for tower info corresponding to 2 miles from Columbia.
10. Line owned by Chelan PUD. Contact Chelan for tower info corresponding to 2 miles from Columbia.
11. *** denotes there are not any structures to identify since the line is foreign owned. Contact appropriate utility for Str # at the required distance from substation.
12. Yellow highlighted cells indicate changes from previous tables.



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