

October 1, 2022

APPENDIX G

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



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 Bua | 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, 4, 5 |
| | 34.5 | 2 | Transformer #5, 34.5 kV Bus | 2, 3, 4, 5 |
| | 115 | 2 | 115 kV Bus | 1 |
| Anaconda | 13.2 | 3 | Transformer #1, 13.2 kV Bus | 2, 3, 5 |
| | | | | |

| Substation | kV | # of 2/0 Grounds | Terminal / Bus | Notes |
|------------|------|------------------|-----------------------------|------------|
| 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 |
| 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 |
| | 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 |

| Substation | kV | # of 2/0 Grounds | Terminal / Bus | Notes |
|---------------|------|------------------|-----------------------------|------------|
| 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 |
| 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 |
| 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 |
| Conkelley | 13.8 | 2 | Transformer #4, 13.8 kV Bus | 2, 5 |

| Substation | kV | # of 2/0 Grounds | Terminal / Bus | Notes |
|--------------|------|------------------|-------------------------------|------------|
| 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 |
| 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 | 230 | 3 | 230 kV Bus | 1 |
| | 287 | 3 | Transformer KX17A, 287 kV Bus | 1 |
| | 500 | 2 | 500 kV Bus | 1 |

| Substation | kV | # of 2/0 Grounds | Terminal / Bus | Notes |
|--------------|------|------------------|-----------------------------|------------|
| Hanford | 500 | 2 | 500 kV Bus | 1 |
| 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 | 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 | 115 kV Bus | 1 |
| | 230 | 2 | 230 kV Bus | 1 |
| Lexington | 13.8 | 2 | Transformer #1, 13.8 kV Bus | 2, 3, 5 |
| 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 |

| Substation | kV | # of 2/O Grounds | Terminal / Bus | Notes |
|--------------|------|------------------|-------------------------------|------------|
| 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 |
| 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 |

| Substation | kV | # of 2/0 Grounds | Terminal / Bus | Notes |
|-------------|------|------------------|-----------------------------|------------|
| Olympia | 13.2 | 4 | Transformer #1, 13.2 kV Bus | 2, 3, 4, 5 |
| | 13.2 | 2 | Transformer #3, 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 |
| Paul D. | 115 | 2 | 115 kV Bus | 1 |
| Pearl | 34.5 | 2 | Transformer #1, 34.5 kV Bus | 2, 3, 5 |
| | 230 | 2 | 230 kV Bus | 1 |
| Raver | 34.5 | 2 | Transformer #1, 34.5 kV Bus | 2, 3, 5 |
| Rock Creek | 34.5 | 2 | Transformer #1, 34.5 kV Bus | 2, 3, 5 |
| Rocky Reach | 230 | 2 | Transformer #1, 230 kV Bus | 1 |

| Substation | kV | # of 2/0 Grounds | Terminal / Bus | Notes |
|------------|------|------------------|-----------------------------|---------|
| 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 |
| 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 |
| Statt | 34.5 | 2 | Transformer #1, 34.5 kV Bus | 2, 3, 5 |
| | 500 | 2 | 500 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 |
| 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 |
| | | 2 | Transformer #6, 345 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 |

| Substation | kV | # of 2/0 Grounds | Terminal / Bus | Notes |
|--------------|------|------------------|-----------------------------|---------|
| Trentwood | 6.9 | 2 | Transformer #1, 6.9 kV Bus | 2 |
| | 6.9 | 2 | Transformer #2, 6.9 kV Bus | |
| | 6.9 | 2 | Transformer #3, 6.9 kV Bus | |
| 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.

Notes: (continued)

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."
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.
 - If a permanently installed three-phase ground switch is available, use the ground switch instead of using multiple sets of portable grounds."
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 mid line, the grounding requirements are the same as for the transmission line section at the location of the series capacitors."

G.2. TRANSMISSION LINES WHICH REQUIRE MULTIPLE 2/0 PROTECTIVE GROUNDS

The following BPA 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 cable 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.

APPENDIX G.2 – TRANSMISSION LINES WHICH REQUIRE MULTIPLE 2/0 PROTECTIVE GROUNDS

| Substation | kV | Line Name | # of 2/0 of Grounds | From | To | Notes |
|------------|-----|-----------------------------|---------------------|-------|-------------|-------|
| Alcoa | 115 | Alcoa - Felida 1 | 2 | Alcoa | Str 2/1 | |
| | 115 | Alcoa - River Road 1 | 2 | Alcoa | Entire Line | |
| | 115 | Bonneville PH - Alcoa 1 & 2 | 2 | Alcoa | Str 40/7 | |
| | 115 | Ross - Alcoa 2 | 2 | Alcoa | Str 4/2 | |

| Substation | kV | Line Name | # of 2/O of Grounds | From | To | Notes |
|------------|-------|-------------------------|---------------------|----------|-------------|----------|
| Alliston | 230 | Alliston - Clatsop 1 | 2 | Alliston | Str 2/9 | |
| | 230 | Alliston - Driscoll 1 | 2 | Alliston | Str 3/1 | |
| | 230 | Longview - Alliston 1 | 2 | Alliston | Str 3/1 | |
| | 230 | Longview - Alliston 2 | 2 | Alliston | Str 3/1 | |
| | 230 | Longview - Alliston 3 | 2 | Alliston | Str 3/1 | |
| | 230 | Trojan - Alliston 1 | 2 | Alliston | Str 8/4 | |
| | 230 | Trojan - Alliston 2 | 2 | Alliston | Str 8/4 | |
| | Alvey | 115 | Eugene - Alvey 2 | 2 | Alvey | Str 12/6 |
| 115 | | Hawkins - Alvey 1 | 2 | Alvey | Str 7/6 | |
| 115 | | Lookout Point - Alvey 1 | 2 | Alvey | Str 15/9 | |
| 115 | | Lookout Point - Alvey 2 | 2 | Alvey | Str 15/11 | |
| 115 | | Capacitor Tie 1 | 2 | Alvey | Entire Line | |
| Ashe | 500 | Ashe - Hanford 1 | 2 | Ashe | Str 2/2 | |
| | 500 | Ashe - Marion 2 | 2 | Ashe | Str 1/6 | |

| Substation | kV | Line Name | # of 2/0 of Grounds | From | To | Notes |
|------------------|-----|-----------------------------|---------------------|----------|-------------|-------|
| Ashe (continued) | | | | | | |
| | 500 | Ashe - Slatt 1 | 2 | Ashe | Str 1/6 | |
| | 500 | Lower Monumental - Ashe 1 | 2 | Ashe | Str 39/5 | |
| | 500 | CGS - Ashe 1 | 2 | Ashe | Entire Line | |
| Bell | | | | | | |
| | 230 | Bell - Boundary 3 | 2 | Bell | Str 2/5 | |
| | 230 | Bell - Lancaster 1 | 2 | Bell | Str 2/3 | |
| | 230 | Bell - Usk 1 | 2 | Bell | Str 2/2 | |
| | 230 | Grand Coulee - Bell 3 | 2 | Bell | Str 84/1 | |
| | 230 | Grand Coulee - Bell 5 | 2 | Bell | Str 84/1 | |
| | 230 | Westside - Bell 1 | 2 | Bell | Str 10/1 | |
| | 230 | Sacheen - Bell 1 | 2 | Bell | Str 33/1 | |
| Big Eddy | | | | | | |
| | 115 | The Dalles PH - Big Eddy #1 | 2 | Big Eddy | Entire Line | |
| | 115 | The Dalles PH - Big Eddy #2 | 2 | Big Eddy | Entire Line | |
| | 115 | Big Eddy - DeMoss 1 | 2 | Big Eddy | Str 2/1 | |

| Substation | KV | Line Name | # of 2/O of Grounds | From | To | Notes |
|----------------------|-----|---------------------------------|---------------------|----------|-------------|-------|
| Big Eddy (continued) | | | | | | |
| | 115 | Big Eddy - Transformer 1, Tie 1 | 2 | Big Eddy | Entire Line | |
| | 230 | Big Eddy - Quenette Creek 1 | 2 | Big Eddy | Str 2/2 | |
| | 230 | Big Eddy - Quenette Creek 2 | 2 | Big Eddy | Str 3/5 | |
| | 230 | Big Eddy - Chemawa 1 | 2 | Big Eddy | Str 2/4 | |
| | 230 | Big Eddy - McLoughlin 1 (PGE) | 2 | Big Eddy | Str 2/4 | 1 |
| | 230 | Big Eddy – Spring Creek | 2 | Big Eddy | Str 3/2 | 1 |
| | 230 | Big Eddy – Redmond 1 | 2 | Big Eddy | Str 3/5 | 1 |
| | 230 | Big Eddy – Troutdale 1 | 2 | Big Eddy | Str 2/4 | 1 |
| | 230 | Harvalum - Big Eddy 1 | 2 | Big Eddy | Str 22/5 | |
| | 230 | The Dalles PH - Big Eddy 3 | 2 | Big Eddy | Entire Line | |
| | 230 | The Dalles PH - Big Eddy 4 | 2 | Big Eddy | Entire Line | |
| | 230 | The Dalles PH - Big Eddy 5 | 2 | Big Eddy | Entire Line | |
| | 230 | The Dalles PH - Big Eddy 6 | 2 | Big Eddy | Entire Line | |
| | 500 | Big Eddy - Celilo 1 | 2 | Big Eddy | Entire Line | |
| | 500 | Big Eddy - Celilo 2 | 2 | Big Eddy | Entire Line | |
| | 500 | Big Eddy - Transformer 2, Tie 1 | 2 | Big Eddy | Entire Line | |
| | 500 | Big Eddy - Transformer 5, Tie 2 | 2 | Big Eddy | Entire Line | |

| Substation | kV | Line Name | # of 2/O of Grounds | From | To | Notes |
|----------------------|-----|----------------------------|---------------------|-----------|-------------|-------|
| Big Eddy (continued) | | | | | | |
| | 500 | Big Eddy - Ostrander 1 | 2 | Big Eddy | Str 2/4 | |
| | 500 | Big Eddy - Knight 1 | 2 | Big Eddy | Str 3/1 | |
| | 500 | John Day - Big Eddy 1 | 2 | Big Eddy | Str 17/5 | |
| | 500 | John Day - Big Eddy 2 | 2 | Big Eddy | Str 17/5 | |
| Cello | | | | | | |
| | 500 | Big Eddy - Cello 1 | 2 | Cello | Entire Line | |
| | 500 | Big Eddy - Cello 2 | 2 | Cello | Entire Line | |
| Chief Joseph (Joe) | | | | | | |
| | 230 | Chief Joe PH - Chief Joe 1 | 2 | Chief Joe | Entire Line | |
| | 230 | Chief Joe PH - Chief Joe 2 | 2 | Chief Joe | Entire Line | |
| | 230 | Chief Joe PH - Chief Joe 3 | 2 | Chief Joe | Entire Line | |
| | 230 | Chief Joe PH - Chief Joe 4 | 2 | Chief Joe | Entire Line | |
| | 230 | Chief Joe - East Omak 1 | 2 | Chief Joe | Str 3/2 | |
| | 230 | Grand Coulee - Chief Joe 1 | 2 | Chief Joe | Str 31/8 | |
| | 230 | Grand Coulee - Chief Joe 2 | 2 | Chief Joe | Str 31/8 | |
| | 230 | Chief Joe - Snohomish 3 | 2 | Chief Joe | Str 3/3 | |
| | 230 | Chief Joe - Snohomish 4 | 2 | Chief Joe | Str 3/3 | |

| Substation | KV | Line Name | # of 2/O of Grounds | From | To | Notes |
|--------------------------------|-----|-----------------------------------|---------------------|-----------|-------------|-------|
| Chief Joseph (Joe) (continued) | | | | | | |
| | 345 | Chief Joe - Snohomish 3 | 2 | Chief Joe | Str 3/3 | |
| | 345 | Chief Joe - Snohomish 4 | 2 | Chief Joe | Str 3/3 | |
| Columbia | | | | | | |
| | 115 | Columbia - Ellensburg 1 | 2 | Columbia | Str 2/2 | |
| | 115 | Columbia - Valhalla 1 | 2 | Columbia | Str 2/1 | |
| | 115 | Columbia - Valhalla 2 | 2 | Columbia | Str 2/1 | |
| Covington | | | | | | |
| | 230 | Covington - Bettas Rd | 2 | Covington | Str 4/1 | |
| | 230 | Covington - Creston 1 (SCL) | 2 | Covington | Str 4/1 | |
| | 230 | Covington - Duwamish 1 (SCL) | 2 | Covington | Str 4/1 | |
| | 230 | Covington - Maple Valley 2 | 2 | Covington | Str 4/1 | |
| | 230 | Covington - White River 1&2 (PSE) | 2 | Covington | Str 4/1 | |
| | 230 | Covington - Berrydale (PSE) | 2 | Covington | Entire Line | |
| | 230 | Chehalis - Covington 1 | 2 | Covington | Str 67/2 | |
| | 230 | Tacoma - Covington 2 | 2 | Covington | Str 13/1 | |
| | 230 | Tacoma - Covington 3 | 2 | Covington | Str 13/1 | |

| Substation | kV | Line Name | # of 2/0 of Grounds | From | To | Notes |
|-----------------------|-----|-----------------------------------------------|---------------------|--------------|----------|-------|
| Covington (continued) | | | | | | |
| Covington | 230 | Tacoma - Covington 4 | 2 | Covington | Str 13/1 | |
| | 230 | Raver - Covington 3 | 2 | Covington | Str 6/6 | |
| Custer | | | | | | |
| | 230 | Bellingham - Custer 1 2 Custer | 2 | Custer | Str 12/3 | |
| | 230 | Custer - Intalco 1 2 Custer | 2 | Custer | Str 1/6 | |
| | 230 | Custer - Intalco 2 2 Custer | 2 | Custer | Str 1/6 | |
| | 230 | Murray - Custer 1 (Murray-Custer/Sedro Tap 1) | 2 | Custer | Str 64/1 | |
| Grand Coulee | | | | | | |
| | 230 | Columbia - Grand Coulee 1 | 3 | Grand Coulee | Str 73/2 | |
| | | | 2 | Str 73/2 | Str 71/2 | |
| | 230 | Columbia - Grand Coulee 3 | 3 | Grand Coulee | Str 73/4 | |
| | | | 2 | Str 73/4 | Str 71/2 | |

| Substation | kV | Line Name | # of 2/0 of Grounds | From | To | Notes |
|--------------------------|-----|------------------------------------|---------------------|--------------|----------|-------|
| Grand Coulee (continued) | | | | | | |
| Grand Coulee | 230 | Grand Coulee - Bell 3 | 3 | Grand Coulee | Str 2/1 | |
| | | | | Str 2/1 | Str 4/2 | |
| Grand Coulee | 230 | Grand Coulee - Bell 5 | 3 | Grand Coulee | Str 2/1 | |
| | | | | Str 2/1 | Str 4/2 | |
| Grand Coulee | 230 | Grand Coulee - Chief Joe 1 | 3 | Grand Coulee | Str 2/1 | |
| | | | | Str 2/1 | Str 4/4 | |
| Grand Coulee | 230 | Grand Coulee - Chief Joe 2 | 3 | Grand Coulee | Str 2/1 | |
| | | | | Str 2/1 | Str 4/5 | |
| Grand Coulee | 230 | Grand Coulee - Westside 1 (Avista) | 3 | Grand Coulee | Str 2/1 | |
| | | | | Str 2/1 | Str 4/2 | |
| Grand Coulee | 230 | Potholes - Grand Coulee 1 | 3 | Grand Coulee | Str 66/3 | |
| | | | | Str 66/3 | Str 64/6 | |

| Substation | KV | Line Name | # of 2/0 of Grounds | From | To | Notes |
|--------------------------|-----|------------------------------------|---------------------|--------------|-------------|-------|
| Grand Coulee (continued) | | | | | | |
| 230 | 230 | Rocky Ford - Grand Coulee 1 | 3 | Grand Coulee | Str 52/3 | |
| | | | 2 | Str 52/3 | Str 50/6 | |
| 230 | 230 | Olympia - Grand Coulee 1 | 3 | Grand Coulee | Str 228/4 | |
| | | | 2 | Str 228/4 | Str 226/2 | |
| 500 | 500 | Grand Coulee - Grand Coulee PH #19 | 2 | Grand Coulee | Entire Line | |
| 500 | 500 | Grand Coulee - Grand Coulee PH #20 | 2 | Grand Coulee | Entire Line | |
| 500 | 500 | Grand Coulee - Grand Coulee PH #21 | 2 | Grand Coulee | Entire Line | |
| 500 | 500 | Grand Coulee - Grand Coulee PH #22 | 2 | Grand Coulee | Entire Line | |

| Substation | kV | Line Name | # of 2/O of Grounds | From | To | Notes |
|--------------------------|-----|---------------------------------------------|---------------------|--------------|-------------|-------|
| Grand Coulee (continued) | | | | | | |
| | 500 | Grand Coulee - Grand Coulee PH #23 | 2 | Grand Coulee | Entire Line | |
| | 500 | Grand Coulee - Grand Coulee PH #24 | 2 | Grand Coulee | Entire Line | |
| | 500 | Grand Coulee - Grand Coulee 500/230KV Tie 1 | 2 | Grand Coulee | Entire Line | |
| | 500 | Grand Coulee - Schultz 1 | 2 | Grand Coulee | Str 6/4 | |
| | 500 | Grand Coulee - Schultz 2 | 2 | Grand Coulee | Str 6/4 | |
| | 500 | Grand Coulee - Bell 6 | 2 | Grand Coulee | Str 5/4 | |
| | 500 | Grand Coulee - Chief Joe 3 | 2 | Grand Coulee | Str 6/3 | |
| | 500 | Grand Coulee - Hanford 1 | 2 | Grand Coulee | Str 5/5 | |
| Hanford | | | | | | |
| | 500 | Ashe - Hanford 1 | 2 | Hanford | Str 14/3 | |
| | 500 | Grand Coulee - Hanford 1 | 2 | Hanford | Str 93/3 | |

| Substation | kV | Line Name | # of 2/0 of Grounds | From | To | Notes |
|---------------------|-----|------------------------------|---------------------|----------|-------------|-------|
| Hanford (continued) | | | | | | |
| | 500 | Hanford - Wautoma 1 | 2 | Hanford | Str 5/4 | |
| | 500 | Hanford - Wautoma 2 | 2 | Hanford | Str 5/4 | |
| | 500 | Vantage - Hanford 1 | 2 | Hanford | Str 21/2 | |
| | 500 | Lower Monumental - Hanford 1 | 2 | Hanford | Str 50/4 | |
| John Day | | | | | | |
| | 500 | John Day - Big Eddy 1 | 2 | John Day | Str 8/1 | |
| | 500 | John Day - Big Eddy 2 | 2 | John Day | Str 8/1 | |
| | 500 | John Day - Grizzly 1 | 2 | John Day | Str 8/1 | |
| | 500 | John Day - Grizzly 2 | 2 | John Day | Str 8/1 | |
| | 500 | John Day - Marion 1 | 2 | John Day | Str 8/1 | |
| | 500 | John Day PH - John Day 1 | 2 | John Day | Entire Line | |
| | 500 | John Day PH - John Day 2 | 2 | John Day | Entire Line | |
| | 500 | John Day PH - John Day 3 | 2 | John Day | Entire Line | |
| | 500 | John Day PH - John Day 4 | 2 | John Day | Entire Line | |
| | 500 | Rock Creek - John Day 1 | 2 | John Day | Str 8/1 | |
| | 500 | Statt - John Day 1 | 2 | John Day | Str 24/2 | |
| | 500 | McNary - John Day 2 | 2 | John Day | Str 71/4 | |

| Substation | KV | Line Name | # of 2/O of Grounds | From | To | Notes |
|------------|-----------------------------------|-------------------------------|---------------------|-------------|-------------|-------|
| Keeler | 115 | Keeler - 230 kV Transformer 1 | 2 | Keeler | Entire Line | |
| | 115 | Keeler - 230 kV Transformer 3 | 2 | Keeler | Entire Line | |
| | 115 | Keeler - Oregon City 2 | 2 | Keeler | Str 2/1 | |
| | 115 | Keeler - Forest Grove 2 | 2 | Keeler | Str 2/2 | |
| | 115 | Keeler - Forest Grove 1 | 2 | Keeler | Str 2/2 | |
| | 115 | St. Johns - Keeler 2 | 2 | Keeler | Str 9/7 | |
| | 230 | Rivergate (PGE) - Keeler 1 | 2 | Keeler | Str 8/3 | |
| | Longview | | | | | |
| 230 | Lexington - Longview 2 | 2 | Longview | Str 8/6 | | |
| 230 | Longview - Alliston 1 | 2 | Longview | Str 2/2 | | |
| 230 | Longview - Alliston 2 | 2 | Longview | Str 2/2 | | |
| 230 | Longview - Alliston 3 | 2 | Longview | Str 2/3 | | |
| 230 | Longview - Chehalis 1 | 2 | Longview | Str 2/1 | | |
| 230 | Longview - Cowlitz (Chemical) PUD | 2 | Longview | Entire Line | | |
| 230 | Mint Farm - Longview 1 | 2 | Longview | Entire Line | | |

| Substation | kV | Line Name | # of 2/O of Grounds | From | To | Notes |
|---------------------|-----|---------------------------------------------------|---------------------|--------------|-------------|-------|
| Maple Valley | | | | | | |
| | 230 | Covington - Maple Valley 2 | 2 | Maple Valley | Str 15/1 | |
| | 230 | Maple Valley - Duwamish 1 (SCL) | 2 | Maple Valley | Entire Line | |
| | 230 | Maple Valley - Massachusetts 1 (SCL) | 2 | Maple Valley | Entire Line | |
| | 230 | Sno King - Maple Valley 1 (SCL at Structure 25/4) | 2 | Maple Valley | 2 Miles | 2 |
| | 230 | Sno King - Maple Valley 2 (SCL at Str 25/3) | 2 | Maple Valley | 2 Miles | 3 |
| | 230 | Rocky Reach - Maple Valley 1 | 2 | Maple Valley | Str 127/1 | |
| | 345 | Rocky Reach - Maple Valley 1 | 2 | Maple Valley | Str 127/1 | |
| McNary | | | | | | |
| | 115 | McNary - Badger Canyon 1 | 2 | McNary | Str 1/12 | |
| | 115 | McNary PH - McNary 6 | 2 | McNary | Entire Line | |
| | 230 | McNary - 230/115 Tie Line 1 | 2 | McNary | Entire Line | |

| Substation | kV | Line Name | # of 2/O of Grounds | From | To | Notes |
|--------------------|-----|-------------------------|---------------------|---------|-------------|-------|
| McNary (continued) | | | | | | |
| | 230 | McNary - Franklin 2 | 2 | McNary | Str 3/3 | |
| | 230 | McNary - Horse Heaven 1 | 2 | McNary | Str 3/1 | |
| | 230 | McNary - Morrow Flat 1 | 2 | McNary | Str 3/3 | |
| | 230 | McNary P. H. - McNary 1 | 2 | McNary | Entire Line | |
| | 230 | McNary P. H. - McNary 2 | 2 | McNary | Entire Line | |
| | 230 | McNary P. H. - McNary 3 | 2 | McNary | Entire Line | |
| | 230 | McNary P. H. - McNary 4 | 2 | McNary | Entire Line | |
| | 230 | McNary P. H. - McNary 5 | 2 | McNary | Entire Line | |
| | 230 | McNary - Roundup 1 | 2 | McNary | Str 3/8 | |
| | 230 | McNary - Morrow Flat 2 | 2 | McNary | Str 3/4 | |
| | 230 | McNary - Ross 1 | 2 | McNary | Str 3/3 | |
| | 345 | McNary - Ross 1 | 2 | McNary | Str 3/3 | |
| Olympia | | | | | | |
| | 115 | Olympia - Shelton 1 | 2 | Olympia | Str 2/2 | |
| | 115 | Olympia - Shelton 2 | 2 | Olympia | Str 2/3 | |
| | 115 | Olympia - South Elma 1 | 2 | Olympia | Str 2/2 | |

| Substation | kV | Line Name | # of 2/O of Grounds | From | To | Notes |
|--------------------------|-----|---------------------------------------|---------------------|--------------------------|---------|-------|
| Pearl | 230 | Pearl - Sherwood 1 (PGE) | 2 | Pearl | Str 2/2 | |
| | 230 | Pearl - Sherwood 2 (PGE) | 2 | Pearl | Str 2/2 | |
| Raver | | | | | | |
| | 230 | Raver - Covington 3 | 2 | Raver | Str 3/1 | |
| Rocky Reach (Chelan PUD) | | | | | | |
| | | Rocky Reach (Chelan PUD) - Columbia 1 | 2 | Rocky Reach (Chelan PUD) | Str 3/1 | |
| Rocky Reach | | | | | | |
| | 230 | Rocky Reach - Maple Valley 1 | 2 | Rocky Reach | Str 3/1 | |
| | 345 | Rocky Reach - Maple Valley 1 | 2 | Rocky Reach | Str 3/1 | |
| Ross | | | | | | |
| | 115 | Ross - Alcoa 2 (Ross - Alcoa 2 & 4) | 2 | Ross | Str 2/1 | |
| | 115 | Ross - Carborundum 1 (Clark PUD) | 2 | Ross | Str 2/1 | |

| Substation | kV | Line Name | # of 2/O of Grounds | From | To | Notes |
|------------------|-----|---------------------------------------------|---------------------|---------|-------------|-------|
| Ross (continued) | | | | | | |
| | 115 | Ross - Vancouver Shipyard (Clark PUD) | 2 | Ross | Str 2/7 | |
| | 115 | Sifton - Ross 1 | 2 | Ross | Str 8/4 | |
| Schultz | | | | | | |
| | 500 | Grand Coulee - Schultz 1 | 2 | Schultz | Str 93/6 | |
| | 500 | Grand Coulee - Schultz 2 | 2 | Schultz | Str 93/6 | |
| | 500 | Schultz - Echo Lake 1 | 2 | Schultz | Str 5/2 | |
| | 500 | Schultz - Raver 1 | 2 | Schultz | Str 5/2 | |
| | 500 | Schultz - Raver 3 | 2 | Schultz | Str 5/3 | |
| | 500 | Schultz - Raver 4 | 2 | Schultz | Str 5/3 | |
| | 500 | Schultz - Wautoma 1 | 2 | Schultz | Str 5/1 | |
| | 500 | Sickler - Schultz 1 | 2 | Schultz | Str 35/1 | |
| | 500 | Vantage - Schultz 1 | 2 | Schultz | Str 31/4 | |
| Sickler | | | | | | |
| | 230 | Sickler - Douglas Switchyard 1 (Chelan PUD) | 2 | Sickler | Entire Line | |
| Siatt | | | | | | |
| | 500 | Siatt - John Day 1 | 2 | Siatt | Str 2/1 | |

| Substation | kV | Line Name | # of 2/O of Grounds | From | To | Notes |
|-------------------|-----|---------------------------------------------------|---------------------|-----------|-------------|-------|
| Slatt (continued) | | | | | | |
| | 500 | Slatt - Buckley 1 | 2 | Slatt | Str 2/1 | |
| | 500 | Ashe - Slatt 1 | 2 | Slatt | Str 73/1 | |
| | 500 | Coyote Springs - Slatt 1 | 2 | Slatt | Str 28/1 | |
| Sno King | | | | | | |
| | 230 | Sno King - Maple Valley 1 (SCL at Structure 1/3) | 2 | Sno King | 2 miles | 2 |
| | 230 | Sno King - Maple Valley 2 (SCL at Structure 1/11) | 2 | Sno King | 2 miles | 3 |
| | 230 | Bothel (SCL) - Sno King 1 | 2 | Sno King | Entire Line | |
| | 230 | Bothel (SCL) - Sno King 2 | 2 | Sno King | Entire Line | |
| Snohomish | | | | | | |
| | 115 | Snohomish - Beverly Park 3 (Snohomish PUD) | 2 | Snohomish | Str 2/1 | |
| | 115 | Snohomish - Beverly Park 4 (Snohomish PUD) | 2 | Snohomish | Str 2/1 | |
| | 115 | Snohomish - Snohomish PUD 3 (Scott) | 2 | Snohomish | Str 2/1 | |
| | 115 | Snohomish - Snohomish PUD 8 (Swamp Creek) | 2 | Snohomish | Str 2/1 | |

| Substation | kV | Line Name | # of 2/0 of Grounds | From | To | Notes |
|-----------------------|-----|-----------------------------------------------------------------|---------------------|-----------|-----------|-------|
| Snohomish (continued) | | | | | | |
| | 115 | Snohomish - Snohomish PUD 5 | 2 | Snohomish | 2 Miles | 4 |
| | 115 | Snohomish - Snohomish PUD 6 | 2 | Snohomish | 2 Miles | 4 |
| | 230 | North Mountain (SCL) - Snohomish 1 | 2 | Snohomish | 2 Miles | 5 |
| | 230 | Monroe - Snohomish 1 (includes tap length to Horse Ranch (PSE)) | 2 | Snohomish | Str 11/1 | |
| | 230 | Monroe - Snohomish 2 (includes tap length to Horse Ranch (PSE)) | 2 | Snohomish | Str 11/1 | |
| | 230 | Snohomish - Beverly Park 3 (Snohomish PUD) | 2 | Snohomish | Str 3/1 | |
| | 230 | Snohomish - Bothell 1 (SCL) | 2 | Snohomish | Str 3/5 | |
| | 230 | Snohomish - Bothell 2 (SCL) | 2 | Snohomish | 2 miles | 6 |
| | 230 | Snohomish - Murray 1 | 2 | Snohomish | Str 3/4 | |
| | 230 | Chief Joseph - Snohomish 3 | 2 | Snohomish | Str 131/1 | |
| | 230 | Chief Joseph - Snohomish 4 | 2 | Snohomish | Str 131/1 | |
| | 345 | Chief Joseph - Snohomish 3 | 2 | Snohomish | Str 131/1 | |
| | 345 | Chief Joseph - Snohomish 4 | 2 | Snohomish | Str 131/1 | |

| Substation | kV | Line Name | # of 2/0 of Grounds | From | To | Notes |
|------------|-----|------------------------|---------------------|----------|-------------|-------|
| Tacoma | 230 | Tacoma - Covington 2 | 2 | Tacoma | Str 2/5 | |
| | 230 | Tacoma - Covington 3 | 2 | Tacoma | Str 2/4 | |
| | 230 | Tacoma - Covington 4 | 2 | Tacoma | Str 2/4 | |
| Valhalla | 115 | Columbia - Valhalla 1 | 2 | Valhalla | Str 5/1 | |
| | 115 | Columbia - Valhalla 2 | 2 | Valhalla | Str 5/1 | |
| Vantage | 230 | Midway - Vantage 1 | 2 | Vantage | Str 18/2 | |
| | 230 | Vantage - Columbia 1 | 2 | Vantage | Str 3/1 | |
| | 230 | Vantage Bus Tie #1 | 2 | Vantage | Entire Line | |
| | 230 | Vantage Bus Tie #2 | 2 | Vantage | Entire Line | |
| Wautoma | 500 | Hanford - Wautoma 1 | 2 | Wautoma | Str 18/4 | |
| | 500 | Hanford - Wautoma 2 | 2 | Wautoma | Str 18/4 | |
| | 500 | Schultz - Wautoma 1 | 2 | Wautoma | Str 61/2 | |
| | 500 | Wautoma - Knight 1 | 2 | Wautoma | Str 1/7 | |
| | 500 | Wautoma - Rock Creek 1 | 2 | Wautoma | Str 1/6 | |

Notes:

1. Distances from Big Eddy assume that the Current Limiting Reactors (CLRs) in the bus sectionalizing positions, are always in service now as part of normal operation. If a CLR is bypassed, the SPC District Engineer needs to be consulted to review the grounding requirements at the station or on connecting lines.
2. BPA line ownership of SNOK-MPVL-1: 0.51 miles, from SNOK terminal to Str 1/3, & 0.17 miles, from Str 25/3 to MPVL terminal. SCL owns majority of line. Contact SCL for tower info corresponding to 2 miles from MPVL.
3. 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.
4. Line owned by Snohomish PUD. Contact SNPUD for tower info corresponding to 2 miles from SNOH.
5. BPA line ownership of NMTN-SNOH-1: 1.71 miles from Str 76/1 to SNOH terminal. Contact SCL for tower info corresponding to 2 miles from SNOH.
6. BPA line ownership of SNOH-BOTH-2: 1.56 miles from SNOH terminal to Str 2/4. Contact SCL for tower info corresponding to 2 miles from SNOH.