

**Transmission Planning
Attachment K – Q5 Public Input
Meeting**

Local Area Studies Update - PACW

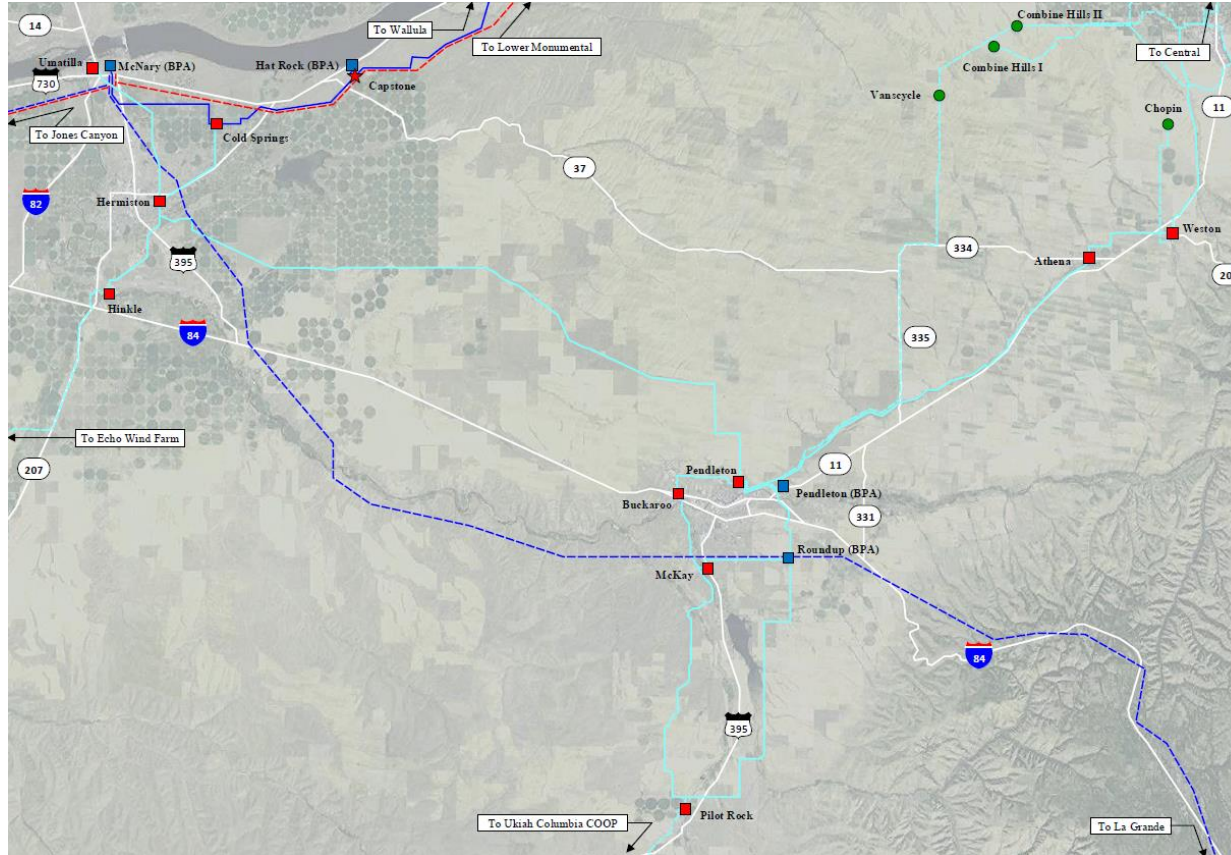
Kevin Putnam

March 23, 2017

Hermiston-Pendleton-Enterprise Study Finding Report

Jerry Vang

Hermiston-Pendleton System Overview



Study Covers:

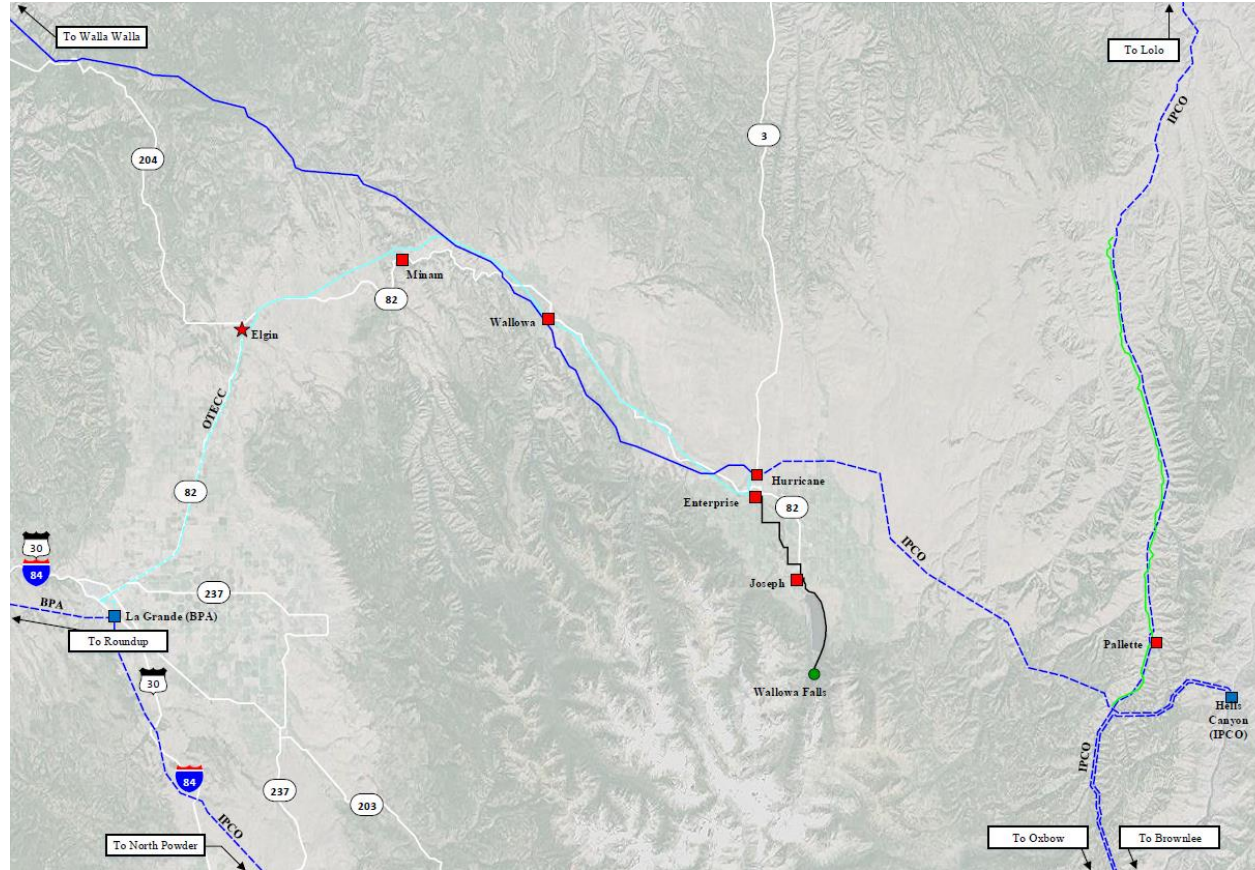
Hermiston Area

- Hermiston
- Hinkle
- Umatilla

Pendleton Area

- Athena
- Buckaroo
- Pendleton
- Pilot Rock
- Weston

Enterprise System Overview



Study Covers:

Enterprise Area

- Enterprise
- Joseph
- Minam
- Pallette
- Wallowa

Herm/Pend/Ent System Overview

Primary Sources

- Hermiston Area
 - Tapped 230 kV line from McNary (BPA) to Wallula via 230-69 kV Cold Springs Substation
 - 115-69 kV McNary (BPA) Substation
- Pendleton Area
 - 230 kV line from McNary (BPA) to La Grande (BPA) via Roundup (BPA) Substation
- Enterprise Area
 - 230 kV line from Walla Walla to Hells Canyon (IPCO) via Hurricane Substation
 - Palette served via 39.9 kV single phase from Pine Creek (IPCO)

Sub-transmission is mainly 69 kV

- N.O. tie between Hermiston and Pendleton
- N.O. tie between Pendleton and Walla Walla, Weston fed from Walla Walla source
- N.O. (out-of-phase) tie between Pacific Power and OTECC at Elgin

Local Area Generation

| Area | Capacity | Type | Facility Name |
|------------|----------|-------|--------------------------------|
| Hermiston | 64.55 MW | Wind | Echo |
| Hermiston | 40 MW | Wind | Butter Creek (In-Service 2019) |
| Pendleton | 18 MW | Wind | Chopin |
| Enterprise | 1.1 MW | Hydro | Wallowa |

Area Load Growth

Base System Load by Area

| Season (Non-Coincidental) | Hermiston | Pendleton | Enterprise |
|---------------------------|-----------|-----------|------------|
| Summer 2017 | 25 MW | 69 MW | 17.8 MW |
| Winter 2017-2018 | 26 MW | 67 MW | 20.2 MW |

Growth Rate by Area

| Season | Hermiston | Pendleton | Enterprise |
|--------|-----------|-----------|------------|
| Summer | 1.1% | 1.2% | 0.2% |
| Winter | 1.4% | 0.7% | 0.1% |

Projected Load Growth

| Season (Non-Coincidental) | Hermiston | Pendleton | Enterprise |
|---------------------------|-----------|-----------|------------|
| Summer 2021 | 26 MW | 73 MW | 18.0 MW |
| Winter 2021-2022 | 28 MW | 69 MW | 20.3 MW |

Proposed System Improvements Overview

Near-Term Planning Horizon (years 1 through 5):

- Pilot Rock Power Factor Correction

Long-Range Planning Horizon (beyond 5 years):

- Replace 230-69 kV Roundup transformers
- Reconductor 69 kV Roundup-Pendleton line
- Reconductor 69 kV McKay to Buckaroo line
- Install new 230-69 kV Hurricane transformer

Pilot Rock Power Factor Correction

Proposed Project:

- Install a two-stage 4.8 Mvar capacitor bank
- Install advance meters capable of 15 minute MW and Mvar reads
- Swap distribution feeders

Project Outcome:

- Correct low power factor in Pilot Rock Substation
- Perform accurate transformer or regulator loading analysis
- Defer possible regulator overload

Pendleton Transmission Reliability Projects

Proposed Project:

- Replace existing three 230-69 kV transformers at Roundup Substation with two larger capacity transformers (125 MVA)
- Reconductor 69 kV line from Roundup Substation to Pendleton Substation
- Reconductor 69 kV line from McKay Switching Station to Buckaroo Substation

Project Outcome:

- Mitigate N-1 contingency issues in Pendleton area
- Provide a regulated 69 kV sub-transmission voltage

Enterprise Transmission Reliability Project

Proposed Project:

- Install 230-69 kV, 25 MVA transformer at Hurricane Substation

Project Outcome:

- Mitigate N-1 contingency

Crescent City Area Study Finding Report

Adam Lint

Crescent City System Overview

Study Covers:

Transmission Substation:

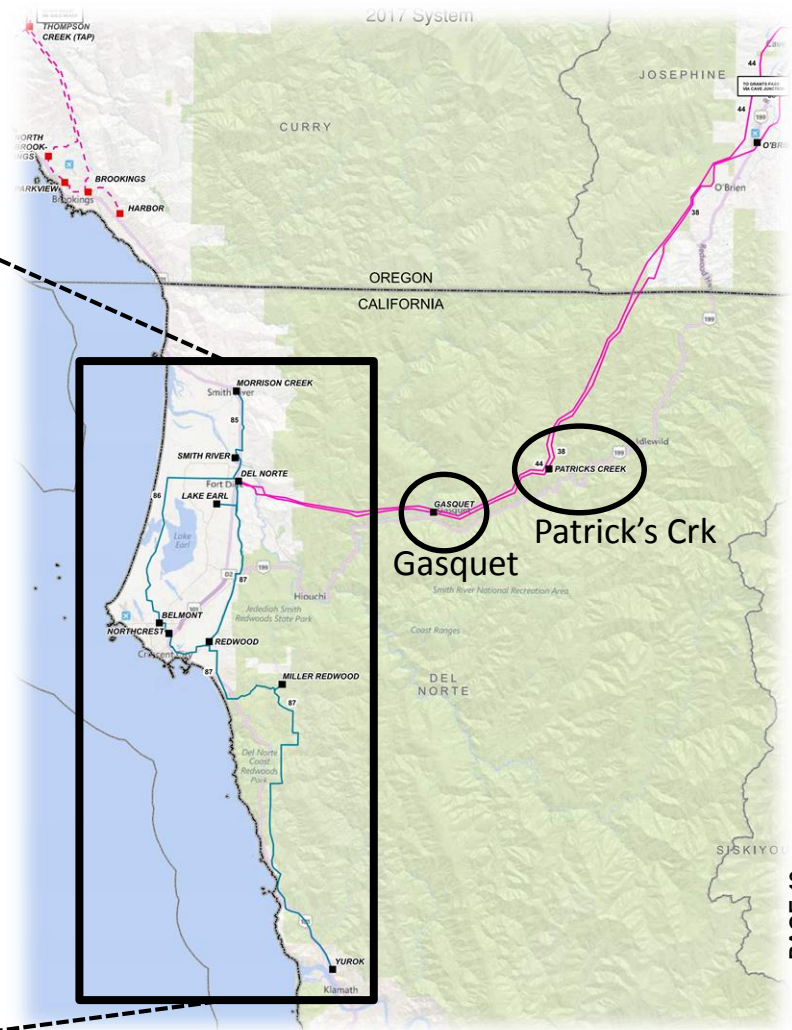
- Del Norte

115 kV Distribution Substations:

- Patrick's Creek
- Gasquet

69 kV Distribution Substations:

- Morrison Creek
- Smith River
- Lake Earl
- Belmont
- Northcrest
- Redwood
- Miller Redwood
- Yurok



Gasquet
Patrick's Crk

Crescent City System Overview

Transmission Source

- Two radial 115 kV lines from Grants Pass, Oregon
- 25 miles in common corridor

69 kV Transmission Open Loop (Line 86 and 87)

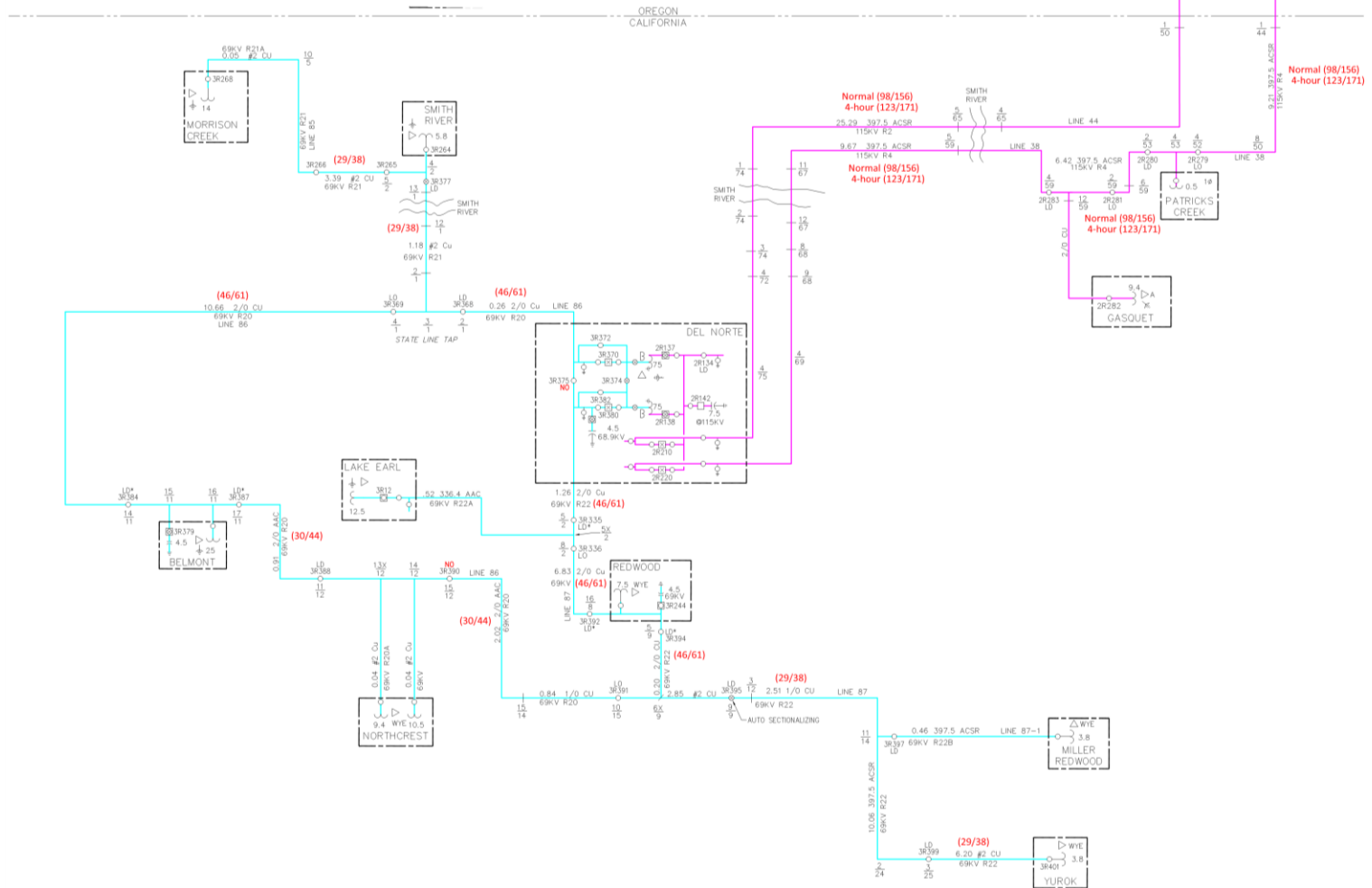
- Looped from Del Norte to Belmont, Northcrest, Redwood, and Lake Earl
- N.O. Switch between Northcrest and Redwood

69 kV Radial

- State Line Tap (between Del Norte and Belmont) feeds Smith River and Morrison Creek via Line 85
- Redwood Tap (between Northcrest and Redwood) feeds Miller Redwood and Yurok via Line 87.

No Local Generation

Crescent City System Overview



Area Load Growth

Base System Load

| Season (Non-Coincidental) | System Load | Utilization |
|---------------------------|-------------|-------------|
| Summer 2017 | 38.8 MW | 39.8% |
| Winter 2017-2018 | 58.5 MW | 47.9% |

Growth Rate

| Season | Crescent City |
|--------|---------------|
| Summer | 0.5% |
| Winter | 0.6% |

Projected Load Growth

| Season (Non-Coincidental) | System Load | Utilization |
|---------------------------|-------------|-------------|
| Summer 2021 | 39.5 MW | 40.6% |
| Winter 2021-2022 | 59.9 MW | 49.0% |

Proposed System Improvements Overview

Near-Term Planning Horizon (years 1 through 5):

- New Circuit from Del Norte to State Line Tap (0.26 mi.)
- Replace Del Norte 69 kV Get-Away and Breaker Leads
- Replace Del Norte 69 kV Bus Tie Switch with a Tie Breaker and Update Relaying.
- Replace Undersized Regulator at Northcrest Substation
- Yurok Substation Rebuild

Long-Range Planning Horizon (beyond 5 years):

- Del Norte Dynamic Voltage Support (STATCOM)
- Coos –Curry Tie

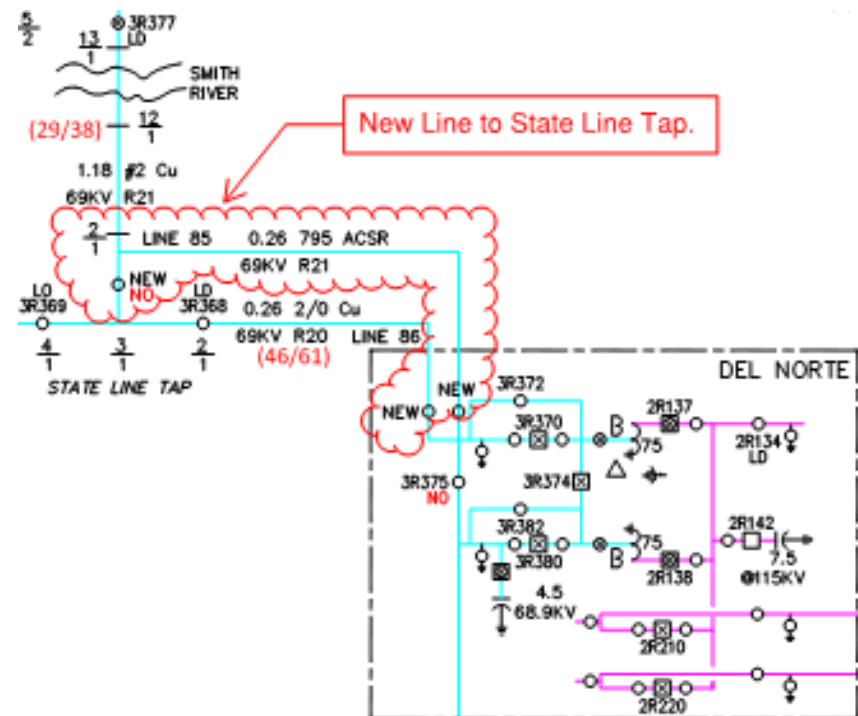
New Circuit from Del Norte to State Line Tap

Proposed Project:

- Construct a new circuit from Del Norte to State Line Tap, taking Smith River and Morrison Creek substations off of Line 86 and the 69 kV loop.

Project Outcome:

- Resolve all 69 kV outage deficiencies and eliminate load shedding exposure due to outages between Del Norte – State Line Tap and Del Norte – Lake Earl Tap.
- Resolve switching complications for Line 86 at State Line tap.
- Makes a significant advance toward a future 115 kV tie with Coos-Curry.



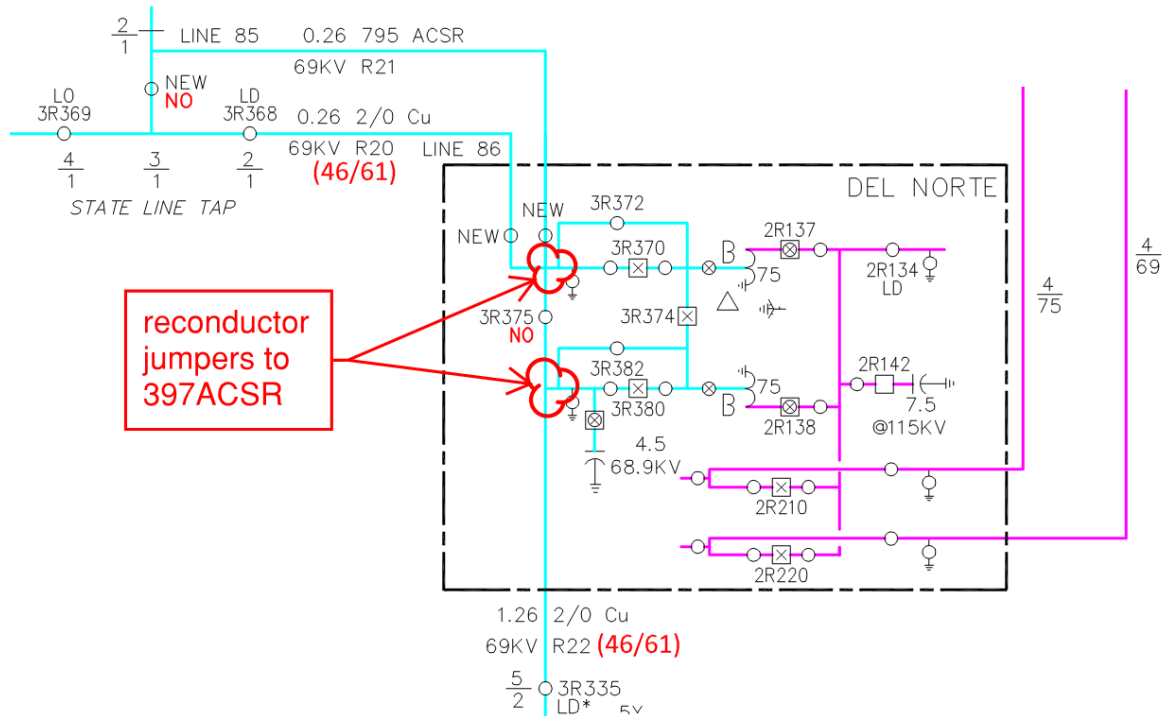
Replace Del Norte 69 kV Get-Away and Breaker Leads

Proposed Project:

- Reconductor both 69 kV line breaker leads and get-away cable at Del Norte with 397.5 ACSR to match the other existing substation conductor.

Project Outcome:

- Mitigate possible conductor overloads during breaker outage



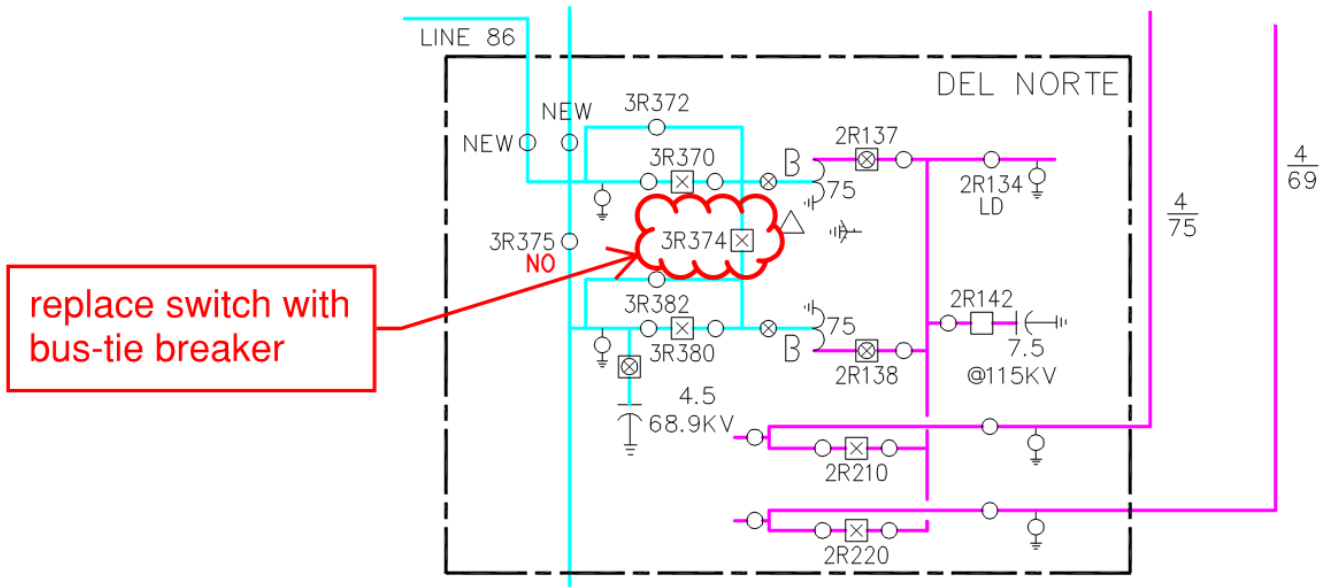
Del Norte Bus Tie Breaker

Proposed Project:

- Replace the 69 kV bus tie switch at Del Norte with a tie breaker. Upgrade Relaying.

Project Outcome:

- Increase Reliability by allowing the two transformers at Del Norte to be operated in Parallel. (Currently if the bus tie switch is closed, a low side bus fault or failure of one 69 kV circuit breaker clears both transformers).



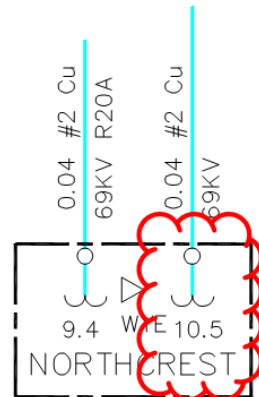
Northcrest Regulator

Proposed Project:

- Replace Regulator R-917 at Northcrest with a new 3 phase unit that matches the size of the transformer (10.5 MVA).

Project Outcome:

- Mitigates possible overloads of existing 750 KVA regulator. (Loading projected to reach 105% by the end of the study period).



Replace undersized Regulator R-917 with 10.5MVA 3-phase unit.

Yurok Substation Rebuild

Proposed Project:

- Rebuild Yurok substation on a new elevated platform with oil containment, or build a replacement substation on higher elevation property to the North.

Project Outcome:

- Eliminates flooding susceptibility.



Long-Range Planning: Dynamic Voltage Support

Proposed Project:

- Install a dynamic reactive power source such as a STATCOM at Del Norte Substation.

Project Outcome:

- Resolves voltage instability problems in the Crescent City Area due to loss of one of the 115 kV lines from Grants Pass.

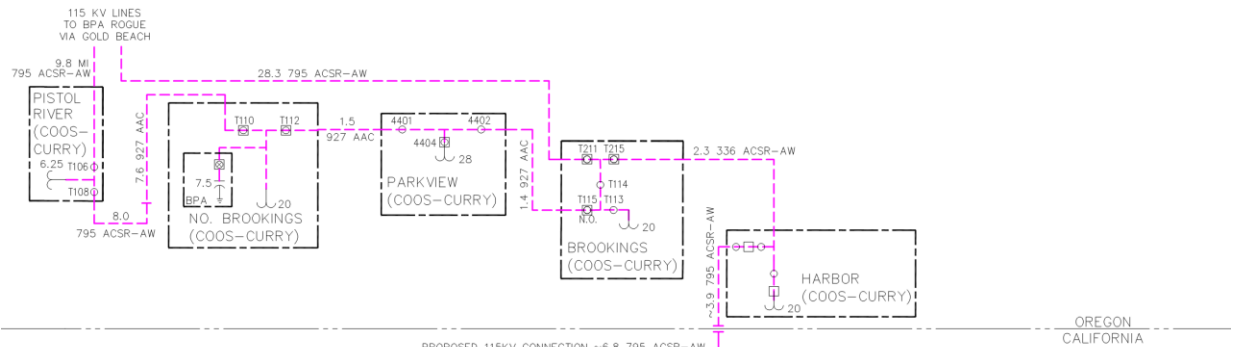
Interim Solution:

- 14 MW of Load transfer capability after the addition of a bypass switch at Applegate (Covered in the Grants Pass Study).

Long-Range Planning: Coos-Curry Tie

Proposed Project:

- Construct a normally open 115 kV tie from Morrison Creek Substation to Coos-Curry's Harbor Substation (approx. 11 mi.)



Project Outcome:

- The New 115 kV line would serve as a backup source for Crescent City in the event that the 115 kV Corridor from Grants Pass is lost.

