

Exhibit No. ____ (ECO-8)
Docket UE-152253
Witness: Elizabeth O'Connell

**BEFORE THE WASHINGTON
UTILITIES AND TRANSPORTATION COMMISSION**

**WASHINGTON UTILITIES AND
TRANSPORTATION COMMISSION,**

Complainant,

v.

**PACIFIC POWER & LIGHT
COMPANY,**

Respondent.

DOCKET UE-152253

**EXHIBIT TO
TESTIMONY OF**

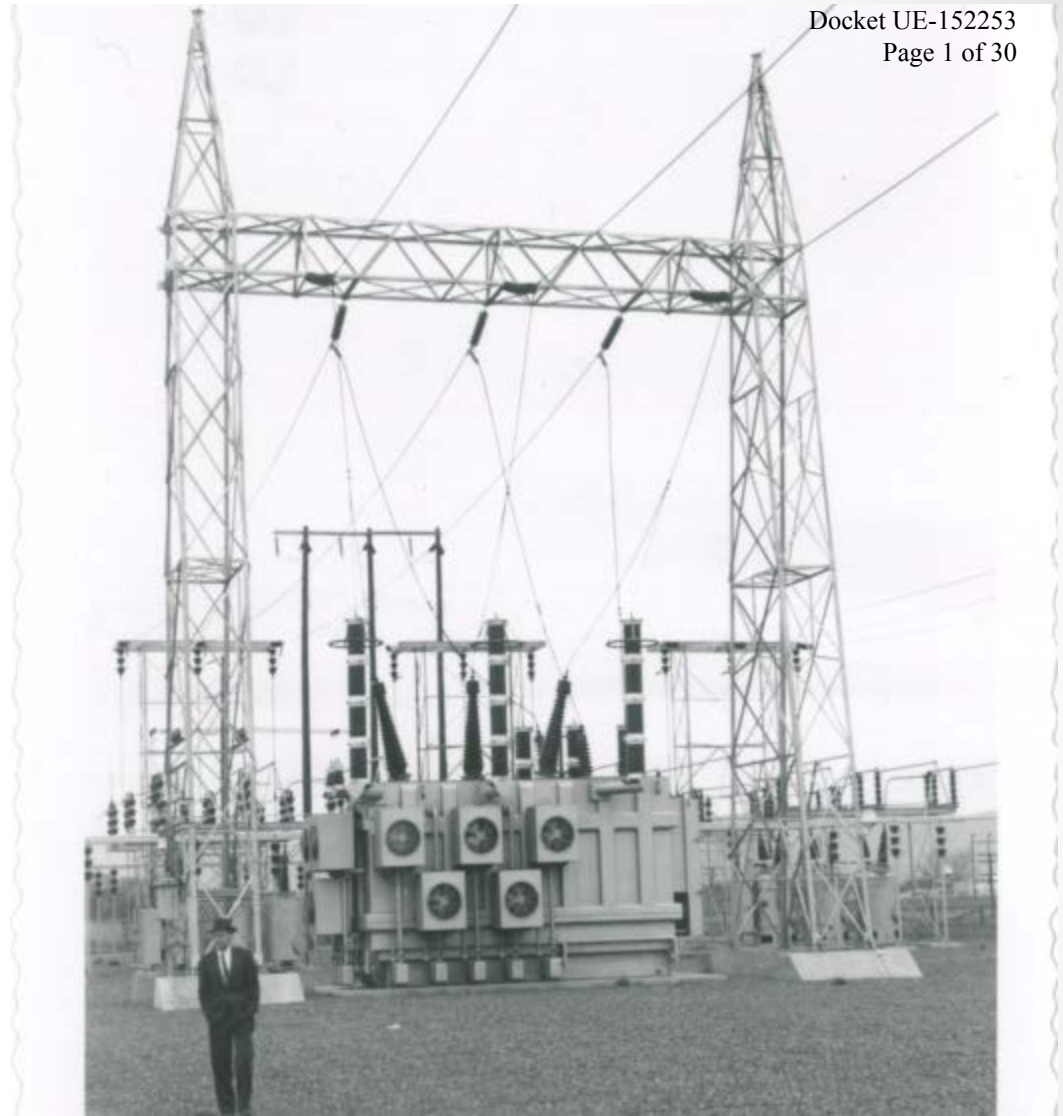
ELIZABETH C. O'CONNELL

**STAFF OF
WASHINGTON UTILITIES AND
TRANSPORTATION COMMISSION**

Union Gap Project Presentation.

March 17, 2016

Union Gap Phase II



Meeting with Washington UTC Staff
1/19/16 – LCT 17A

Union Gap Substation Overview

One of two 230 kV sources (with Pomona Heights) to the Upper Yakima Valley transmission system.

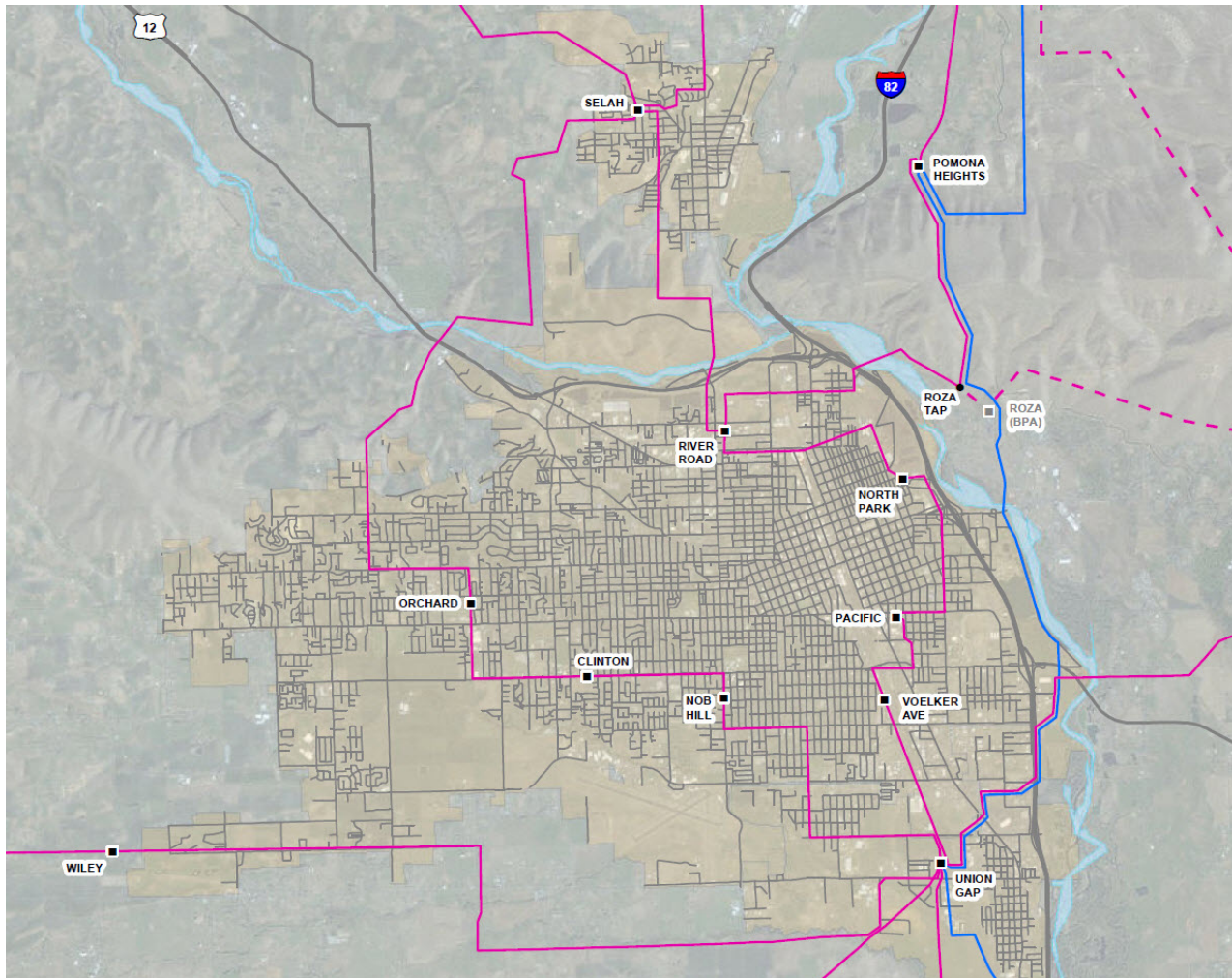
- (2) 230 kV Lines
- (6) 115 kV Lines
- (2) 230-115 kV, 150 MVA transformers
- (3) 115-12.47 kV transformers (41 MVA total)
- (6) 12.47 kV distribution feeders

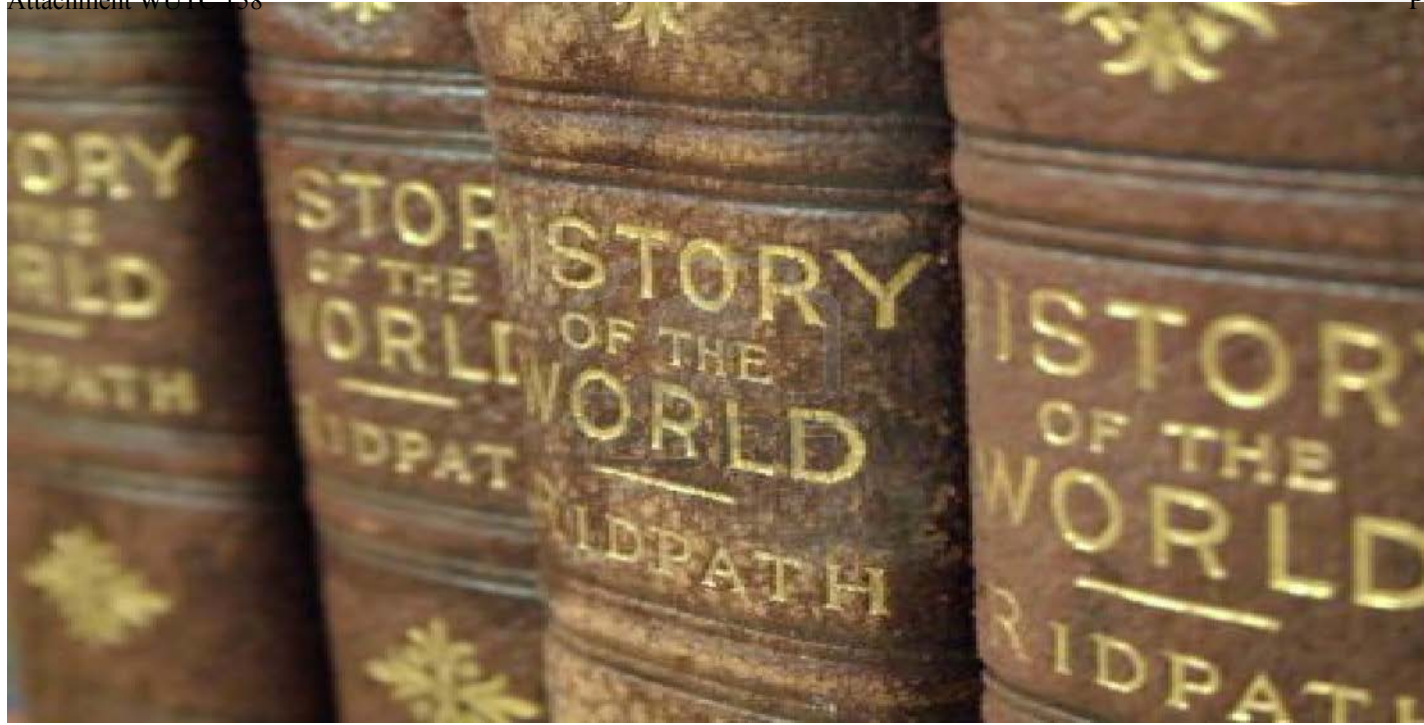
Upper Valley load: 402 MW summer, 506 MW winter

Location of the Project



Yakima Urban Core Area Map

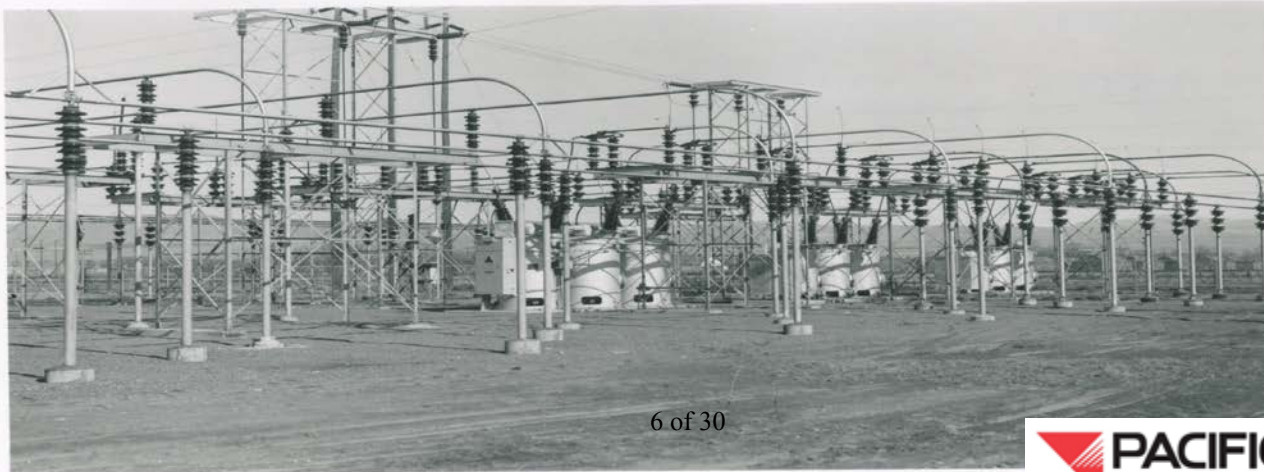




Historical Information

Unofficial History

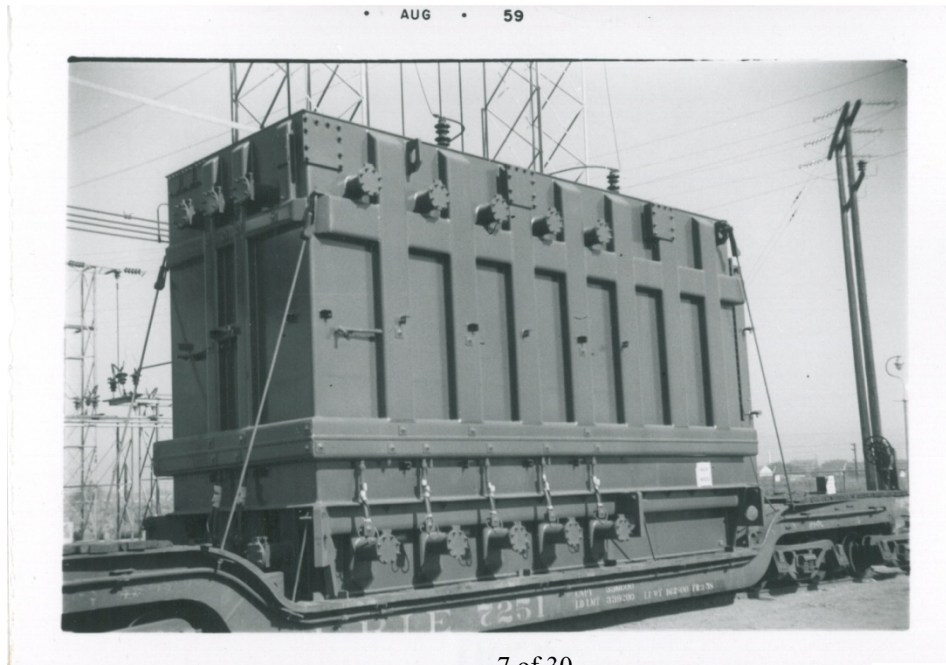
- First drawings of 66-11 kV substation and synchronous condenser in 1930
- Substation property deed recorded November 1934
- 66 kV lines to Condit and Pasco
- 66 kV line to Fruitvale (in Yakima)
- 66 kV line to Hanford, territory eventually transferred to Benton Co. PUD
- 115 kV line to Bonneville added circa 1949



6 of 30

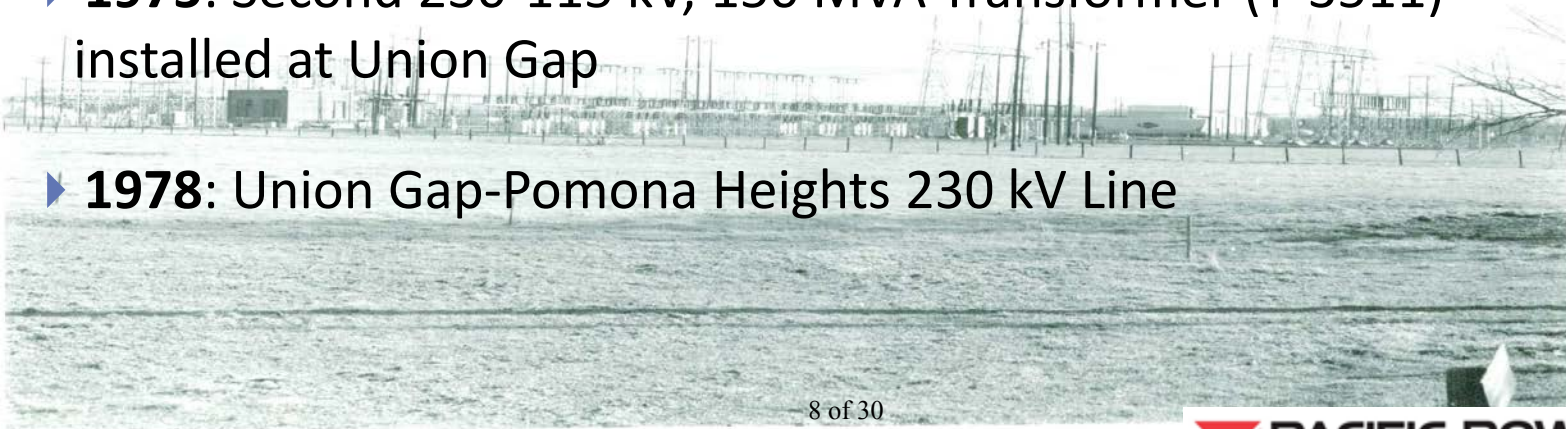
1959 – Added 230 kV Bus

- ▶ One 230-115 kV, 150 MVA transformer (T-2083) and single 230 kV line from Midway (Priest Rapids Dam).
- ▶ T-2083 was moved to Pomona Heights in 1972 when that station was constructed and is currently still in-service.



1966-1978

- ▶ **1966:** Second 230-115 kV, 150 MVA transformer (T-3194) at Union Gap
- ▶ **1972:** Pomona Heights provides second 230-115 kV source to Yakima upper valley
 - Union Gap T-2083 moved to Pomona Heights.
 - One 230-115 kV transformer at UG, one at POH.
- ▶ **1975:** Second 230-115 kV, 150 MVA Transformer (T-3511) installed at Union Gap
- ▶ **1978:** Union Gap-Pomona Heights 230 kV Line



Business Case Information and Details



Purpose and Necessity

NERC TPL Compliance Requirements

TPL-002 (single contingency)

- Outage of one Union Gap 230-115 kV transformer in summer peak loading conditions will overload the remaining transformer.
- Mitigation plan is to install a third 230-115 kV transformer at Union Gap.

TPL-003 (double contingency, bus faults, breaker failures)

- Thirteen outages involving 115 kV and 230 kV breaker failures, bus faults and protection systems failures at Union Gap result in thermal and voltage performance violations.
 - Existing 230 kV bus is loop in-loop out, on single breakers.
 - Existing 115 kV bus is main and transfer with bus tie used for distribution transformer high side protection.
- Mitigation plan is to rebuild the 230 kV and 115 kV buses into a breaker and a half topology.

Benefits

- After installation of the proposed transformer, the TPL-002 transformer overload violation will be corrected. Upgrading the substation's bus topologies will correct TPL-003 violations.
- In addition to the correction of TPL violations, this construction will also correct the following operational and reliability concerns associated with the existing bus configuration, equipment capabilities and insulators:
 - The existing 115 kV bus is a main and transfer configuration. In addition to the TPL-003 concerns associated with this configuration, there are several operational issues.
 - 230 kV circuit switchers 1Y4 and 1Y5, protecting the two 230/115 kV transformers, have insufficient fault interrupting capability to interrupt high duty faults on the transformers. The resulting outage has the same impact as the TPL-003 230 kV bus fault or breaker failure event.

Benefits Continued...

- 115 kV capacitor bank circuit switchers 2Y88 and 2Y89 have insufficient fault interrupting capability to interrupt high duty faults on the capacitor banks. The resulting outage has the same impact as the TPL-003 230 kV bus fault or breaker failure event.
- 115 kV fuses on 115/12.5 kV transformer T-3569 are over-dutied to 136% of their interrupting capability. If they are unable to operate for a fault, a 115 kV bus outage would result, with the same deficiencies noted for the TPL-003 115 kV bus fault or breaker failure event.
- Most of the existing 115 kV bus support insulators and switches and some of the 230 kV switches are brown glass cap-and-pin type. These insulators have been prone to failure in other PacifiCorp substations.
- Existing oil containment and many of the existing structures and foundations do not likely meet current design standards. Future projects to replace, rebuild or add to portions of the existing substation would risk increased costs and additional scope to remedy existing issues.



Alternatives Considered

- Alternative A: Replace both existing 230/115 kV, 150 MVA transformers at Union Gap with new 230/115 kV, 250 MVA transformers and rebuild the 230 kV and 115 kV buses. Estimated cost: \$55,795,000
- Alternative B: Construct a new 230/115 kV substation along the Pomona to Union Gap 230 kV line. Estimated cost: \$135,800,000.

Further Details of the Union Gap Project



Project Overview – Phase I

- Phase I – Distribution Upgrades – Placed in Service in 2014
 - Relocate existing 12.47 kV distribution circuits
 - Construct 115-12.47 kV positions
 - Eliminate T-600/T-666, the original 115-69-12.47 kV transformers from circa 1931
 - Re-route 230 kV and 115 kV transmission lines
 - Construction November 2013 – August 2014

Project Overview – Phase II

- Phase II – 230kV Switchyard – To be Placed in Service 2016
 - New control house
 - Construct new 230 kV bus
 - Install new 230-115 kV, 250 MVA transformer
 - Construction July 2015 – March 2016

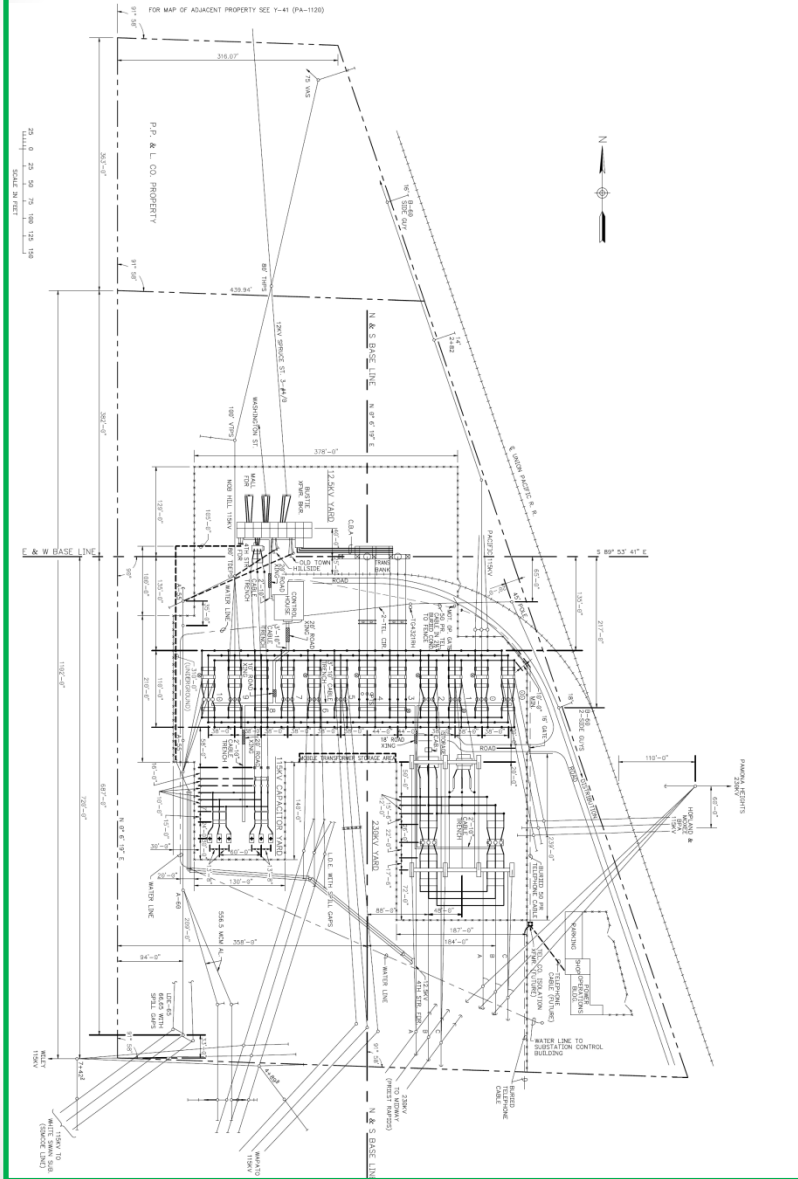
Project Overview – Phase III

- Phase III – 115kV Necessary Upgrades – To be Placed in Service 2017
 - Move existing 230-115 kV transformers
 - New 115 kV bus (position-by-position)
 - Construction April 2016 – May 2017

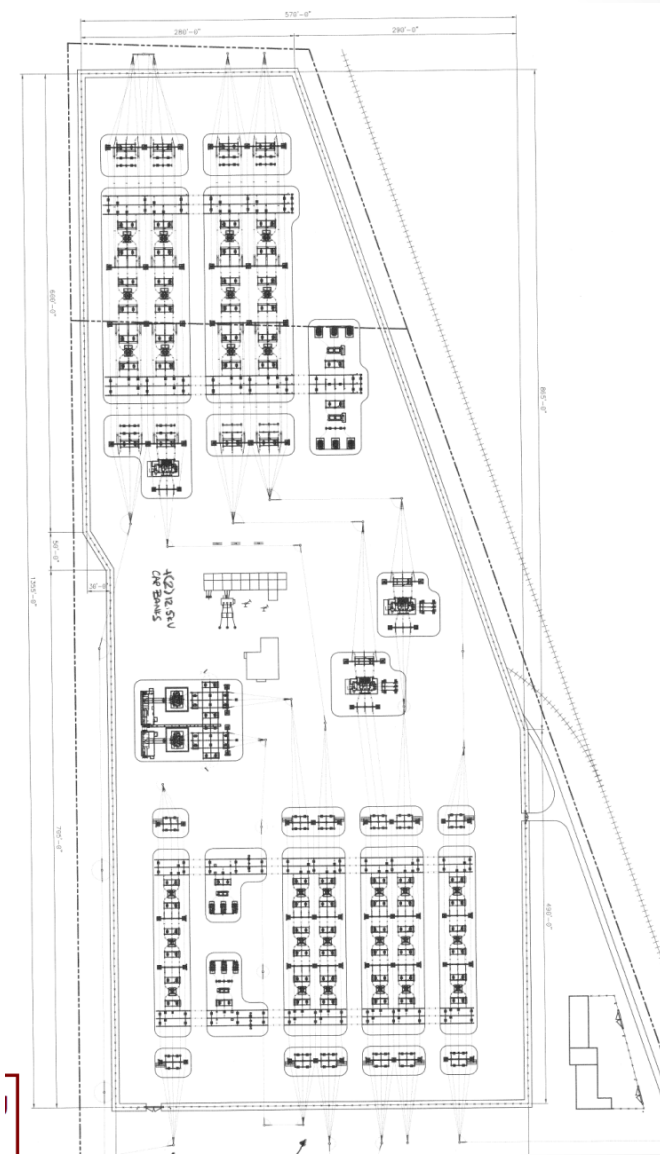
WA UE-152253

Attachment WUTC 158

Existing Infrastructure



Future Infrastructure



Project Milestones

- Project authorization: September 2010
- Phase 1 In Service : August 2014
- Phase 2 Design package complete: March 2015
- Phase 3 Design package complete: March 2016
- Phase 2 & 3 Order Long lead material: October 2015
- Phase 2 & 3 Construction contracts executed: July 2015
- Phase 2 Initiate Construction: August 2015
- Phase 2 In service May 2016
- Phase 3 Initiate Construction: March 2016
- Phase 3 In Service May 2017

Project Costs to Date and PPIS

	2012	2013	2014	2015	Total	Forecast to Spend	Grand Total
General	0	\$1,748	\$154,216	\$242,444	\$398,408	\$383,612	\$782,020
Transmission	\$243	\$241,620	\$3,005,956	\$10,363,308	\$13,611,128	\$6,091,122	\$19,702,250
					\$14,009,536		PPIS \$20,484,270

Major Purchase Orders – PH II

- Contractor Christenson Electric
 - \$8,771,171
- Hyundai Transformer
 - \$1,591,673
- Control House
 - \$500,000
- HVB Breakers
 - \$602,000
- Relay Panels
 - \$544,345

Current Status of Union Gap Phase II



Current Status of Phase II



Current Status of Phase II



Current Status of Phase II



Current Status of Phase II



Current Status of Phase II



Current Status of Phase II



Conclusion

- Phase II Schedule is Tracking to Meet the Aforementioned Milestones
- The Costs are as stated to date
- Major contracts and purchase orders not anticipated outside of what is stated in the presentation
- The most up to date IAD will be submitted in the near future



