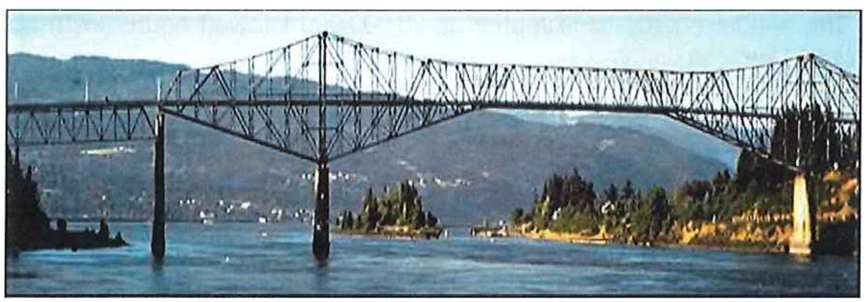
CITY OF CASCADE LOCKS

2014 Electric Utility Master Plan



Cascade Locks, Oregon

OCTOBER 2014

Project #CL13-002 Revision 0

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EXECUTIVE SUMMARY

We wish to express our sincere thank you to the City staff that provided the information and insights needed to prepare this Master Plan of the electric distribution system.

We also wish to express our thanks to Bonneville Power Association for their cooperation in providing pertinent information from their records regarding the Cascade Locks Substation facilities.

SUMMARY OF THE EXISTING SYSTEM

Bonneville Power Administration (BPA) supplies the electrical power to the City of Cascade Locks (City) 13.8 kV distribution system from the Cascade Locks (CL) and Acton Substations.

Power is delivered through 3-phase, 15 kV rated circuit breakers in these substations to the City Feeder and the South Bank Feeder. Power is distributed to 650 customers throughout the City, the rural (Wyeth area) east of the City, and the South Bank on the West side of the city with a combination of overhead and underground feeder construction.

The annual energy consumption is 20,000,000 kilowatt-hours (kwh) and an annual peak demand of 4,800 kilowatts (kW).

PRIMARY GOALS

The Master Plan consists of two plans, a 5-year "Work Plan" and a 20-year Long Range Plan. The Work Plan identifies additions or modifications of the electrical system that are needed to serve existing and anticipated new customers. An opinion of the probable construction cost for the recommended capital expenditures are included in the Work Plan for development of a financial plan for additional borrowing, as necessary, to finance these improvements.

A load forecast has been developed that is based on historical load trends over the past 5-years and anticipated load additions during the next 5-years. The long range plan identifies system infrastructure improvements that will be needed to serve the 20-year forecasted load. After 4-years we recommend that a new 5-year plan be developed and the Long Range Plan be extended another 5-years.

Frequently load growth, expected in the industrial park, will spawn growth in both residential and commercial customers and possibly more industrial customers. An updated Master Plan will address the impacts of these side effects.

WORK PLAN IMPROVEMENTS AND COST SUMMARY

Recommended capital expenditures during the next 5-years are summarized the in the following schedule:

WORK PLAN SUMMARY				
Year	**Description**	**Alt. A**	**Alt. B**	**Estimated Cost**
2014	Negotiate purchase of Cascade Locks Substation from BPA or identify a separate substation site.			No Construction
2014-15	Construct 3-phase, 12.5 kV, 600A, underground feeder (Industrial #1) from Pyramid Substation to the Industrial Park (approx. 1,500-ft.) and a set of three voltage regulators.			$250,000
2015	**Alternate A**: Purchase BPA CL Substation (RCNLD value). [1]	$206,500		
	Alternate B-1: Substation property, site development (mass grading, security fence, driveway, etc.) & Control Buiding (including AC, DC systems). **Alternate B-2**: 115 kV Line extension ($54,500 per 1000 ft.) from Pyramid Substation to new Substation. The amount includes construction labor, materials, and design, but does not include the cost of right-of-way!		$502,500 Substation location unknown	
2015-16	New 12/16/20 MVA Substation transformer and related substation additions.			$1,969,000
2016-17	Construct 3-phase, 12.5 kV, 600A overhead/ underground feeder (Industrial #2) from new substation transformer to the Industrial Park (approx. 2300-ft.).			$277,000
	Capital Expenditures	**$2,702,500**	**$2,998,500 Plus cost of transmission line extension**	

Notes:

1. Negotiated sale price may by more or less than Replacement Cost New Less Depreciation (RCNLD) results.
2. Estimates of probable construction cost are based on current labor and materials pricing. The estimates include an allowance for engineering (design, shop drawing review, and commissioning), owner overheads, and contingencies.

LONG RANGE RECOMMENDATIONS

Recommended additions, modifications or other capital improvements (milestones) that are discussed in the Long Range Plan are listed in the following summary. The timeline for implementation of these recommendations is beyond the next 5-years but are recommended to be completed within the next 20-years. These milestones should be used like you use road signs when you travel on a long trip. Sometimes unexpected detours are required due to road construction.

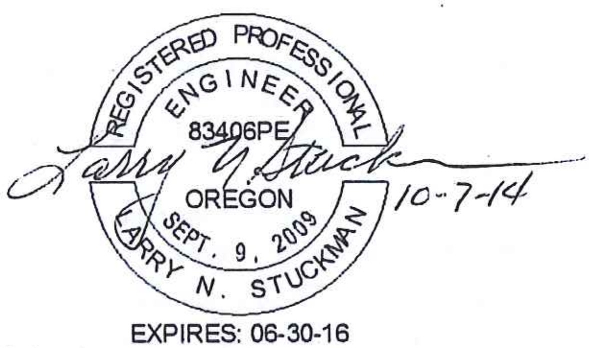
The opinion of probable construction cost for the respective milestones should be determined in 5-year intervals unless a significant failure (i.e. substation transformer) has occurred or is eminent. The long range goal is to maintain reliability of service to the customers in an efficient and cost effective manner.

The subsequent 5-year work plans will be useful tools for the City's Finance department to secure bonds or other borrowing, if necessary, or attain necessary reserve levels required by lending institutions or to finance capital improvements from operating margins.

LONG RANGE PLAN SUMMARY	
Section	**Description**
2.3 Distribution System	Add a grounded neutral to older 13.8 kV distribution lines. Monitor phase balance on 3-phase feeders. Reconnect distibution transformers for severe phase imbalance.
3.3 & 3.4 Feeder Loading	Monitor feeder loads versus conductor capacity. Updgrade conductors when peak load is 80% to 90% of capacity. Consolidate wire sizes for new construction or replacements to improve overcurrent coordination and reduce inventory costs. For feeders serving residential and/or small commercial customers, use 4/0 ACSR (340A rating) for overhead 3-phase lines or 350 AL URD cable (340A) for underground 3-phase lines.
6.2 Substation Facilities	Add a second 12/15/20 MVA transfomer and related facilites if an existing transformer fails or shows signs of eminent failure.
6.3 City Feeder	Construct a new 12.5 kV feeder to provide a looped feeder to the the existing City Feeder #1. Install voltage regulators at the tie point if the existing feeder is operating at a nominal 13.8 kV.
6.4 South Bank Feeder	Explore transferring distribution loads on the Acton Substation to the City and negotiate ownership transfer of the Acton Substation to the City.
6.5 Industrial Park Infrastructure	Develop a looped 12.5 kV distribution system in the Industrial Park. Provide Sectionalizing switchgear for main line sectioning and to provide taps for customer service transformers. The mainline sectionalizing switchgear should be rated 15kV, 600A. Make provisions for a third industrial feeder for the east end of the Industrial Park. Reserve a tap switch at the end of Cramblet Way, see Figure 8. for Backup from Industrial Feeder #1 or Industrial Feeder #2.
6.6 Substation Long Range Plan	The proposed 1-line Diagram for the Substation shows provisions for main breakers and a tie breaker on the 12.5 kV bus. Space should be reserved to install these breakers if necessary. Some industrial loads require a high degree of reliability to minimize the duration of an outage. Installation of these breakers and implementation of an automatic transfer control system will achieve a higher level of reliability.

ENGINEER'S CERTIFICATION

I certify that this 2014 Electrical System Master Plan was prepared by me or under my direct supervision and that I am a duly registered Professional Engineer under the laws of the state of Oregon.



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1.0 PURPOSE OF THE MASTER PLAN

The Master Plan provides a long-range strategy for system additions or modifications. Recommendations are based on providing an economical, cost effective and reliable electrical supply and distribution system.

1.1 SETTING GOALS AND OBJECTIVES

Predictions of population growth, electrical consumption, and usage patterns of customers are used to forecast future consumption and demand for electrical power. This information is utilized to assess the ability of the distribution facilities to provide reliable and economical service to the customers now and for the next 20-years.

1.2 LOAD FORECAST

A 20-year load forecast has been developed using past energy consumption data and trends in the peak demand during the past five-years. Energy consumption and the peak demand forecasts have been adjusted to incorporate expected large (1000 kVA or larger) industrial load additions.

1.3 SYSTEM ASSESSMENT

The main 3-phase feeder loads were analyzed to evaluate the ability of these feeders to reliably and efficiently supply power to the existing and future loads. The forecasted loads are prorated based on distribution transformer ratings shown on the electric distribution system maps in Appendix A.

Bottlenecks, poor power quality or system reliability, and lack of backup during a "single contingency outage" are identified. Strategies to improve reliability and power quality issues were developed.

1.4 OWNERSHIP AND OPERATION OF THE SUPPLY SUBSTATION

A valuation of the present value of CL Substation that is owned and operated by BPA is developed.

Presently the City pays BPA a "Utility Delivery Charge" for providing power at 13.8 kV at the CL Substation. The Utility Delivery Charge is based on the monthly demand (ranging from 2,000 kW to 4,900 kW). The annual charge has been the range of $36,000 to $37,000 per year.

A 25% rate increase will be applied In October 2014. Based on the existing load the annual Utility Delivery Charge will increase to at least $45,000 per year. Since the power is purchased at 115 kV at the Pyramid Substation, BPA does not assess a Utility Delivery Charge for power flow the Pyramid Substation. The City has started to utilize the Pyramid Substation about 50% to 75% of the time. The use of the Pyramid Substation will result in a reduction in the Utility Delivery Charge of $22,500 to $33,500 per year.

After the 6,800 kW of large industrial load is added, the Utility Delivery Charge will increase to $107,500 per year. BPA expects additional rate increases in the Utility Delivery Charge.

The report includes an alternative if negotiations with BPA to purchase the CL Substation fall apart.

2.0 EXISTING ELECTRICAL SYSTEM FACILITIES

2.1 BPA SUBSTATIONS

2.1.1 BPA owns and operates two substations, Cascade Locks (CL) Substation and Acton Substation. Both substations normally supply power to the City of Cascade Locks (City) 13.8kV distribution voltage.

2.1.2 Both BPA substations receive power from the BPA 115kV transmission system. The CL and Acton Substations transform the 115kV transmission voltage to 13.8kV with substation transformers rated 6 MVA (8 MVA with cooling fans).

2.1.3 The City's 3-phase, 13.8kV feeder exit from the CL Substation is the "City Feeder". The City Feeder serves the urban load within the City limits, and serves rural load in the Wyeth area that is east of the City.

2.1.4 The City's 3-phase, 13.8kV feeder exit from the Acton Substation is the "South Bank Feeder". The South Bank Feeder serves the rural load west of the Bridge of the Gods to the Multnomah Falls area.

2.1.5 The service territory has two separate and distinct feeders (i.e. "City Feeder" and "South Bank Feeder") with no distribution intertie.

2.2 PYRAMID SUBSTATION

2.2.1 The City owns the Pyramid Substation that is located across Interstate 84 from the CL Substation. The Pyramid Substation is connected to the BPA 115kV transmission system in the CL Substation.

2.2.2 The Pyramid Substation has a 115kV to 13.8kV power transformer with a 6 MVA rating. The rating can be increased to 6.25 MVA by adding cooling fans.

2.2.3 This substation is normally energized and is available to supply power to the City Feeder if the CL Substation transformer or circuit is out of service for maintenance or repairs.

2.3 DISTRIBUTION SYSTEM

2.3.1 The City of Cascade Locks distribution system maps are in Appendix A.

2.3.2 The City of Cascade Locks owns and operates over 72-miles of distribution lines. The distribution lines are a combination of 1, 2, and 3-phase, 13.8kV phase to phase 8kV phase to neutral configurations. The distribution lines consist of both overhead and underground construction.

2.3.3 The 3-phase distribution feeders were originally constructed as three phase, three wire, no neutral, lines. Some overhead lines and underground cable circuits are being constructed with a multi-grounded neutral wire. A neutral wire from the substation must be added to older lines when new overhead or underground lines are constructed. Most of the distribution transformers are still connected phase-to-phase, not phase-to-neutral.

3.0 HISTORICAL LOAD PROFILE

3.1 DEFINITION OF TERMINALOGY

3.1.1 Energy (kwh): The (kilowatt-hour) is typical unit of electric energy. Sometimes MWh (megawatt-hour) are used for large quantities of energy. One MWh is equal to 1000 kWh.

3.1.2 Demand (kW): The real power is the "rate that energy is consumed" during a specific period of time (i.e. The peak demand is the highest rate of consumption during a 15, 30 or 60-minute period).

A. The peak demand fluctuates during the day, (i.e. High Load (HL) period or during the night, Low Load (LL) period).

B. The peak demand has a seasonal variation during winter and summer. The winter peak occurs in January or February and the summer peak occurs in July – September. The annual peak demand is affected by weather conditions and has fluctuated from winter to summer during the last five years. The annual peak demand is often used to assess the ability of the system components to serve the load because the peak demand on the electrical system will utilize the highest percentage of the capacity of that component.

C. The average demand for a day, month or year is the total energy consumption during a period divided by the number of hours in that period.

D. kW demand is defined as "active" or "real power" (i.e. the real power is the work performed by the machine that is connected a motor's shaft. By definition 1 Hp = 0.746 kW.

3.1.3 Load Factor (LF): The load factor is the ratio of average demand (akW) divided by peak demand. An hourly, daily, monthly, seasonal or annual LF can be calculated.

3.1.4 Apparent Power (kVA): The apparent power is an electrical term that is the phase to neutral voltage times the amps divided by 1000 for single phase loads and phase to phase voltage time the amps divided by 1000 times e 3 for 3-phase load. Apparent power is a combination of real power and reactive power (kVAr). The "reactive" power of a motor is used to provide a rotating magnetic field than makes the output shaft of the motor rotate.

3.1.5 Power Factor (PF): The power factor is the ratio of real power divided by apparent power. The power factor is 100% if real power is equal to the apparent power and the reactive power is zero. The power factor is used when the kW is known to determine the "total" amperes flowing through a transformer and/or feeder conductors. The capacity of transformers and conductors is based on the amperage rating of the transformer windings and/or the conductors.

3.1.6 Customer Profile: The distribution load on the City's system consist of residential, light commercial/small industrial and public agency customer classifications. Each customer classification will have different profiles (i.e. load factor, power factor, etc.). A customer profile is determined for an average customer in each classification to allocate system load for sections of the main three phase feeders.

3.1.7 Coincidence Factor: The peak demand of the system is the coincident demand all customers. Not all of the customer groups will peak at the same time.

A. The residential customer group will typically peak at 5 to 6 pm, but not all residential customers will peak when the customer group is peaking.

B. Light commercial/industrial customers will typically peak at 10 am or 2 pm. Like the residential group, not all of the industrial customer will peak when the industrial group peaks.

C. An analytical tool used to estimate the peak demand is a coincidence factor. Statistical tools are used to determine the coincidence factor for the different customer classifications. The coincidence factor is also affected by the number of customers (i.e. the coincidence factor may be 80% for a group of 10 customers, but the coincidence factor may be 60% for a group of 100 customers).

3.2 DISTRIBUTION SYSTEM PEAK LOAD

3.2.1 The distribution system energy consumption from 2007 to 2013 is summarized in Table 1.

3.2.2 Figure 1 is a graphical representation of this data. A "least squares" regression analysis results in a slightly declining rate (-1.8% per year) of consumption during this time.

Year	Annual kWh
2007	21,677,415
2008	21,004,339
2009	20,446,534
2010	18,899,765
2011	19,319,702
2012	17,629,408
2013	18,477,227

Table 1: Historical Consumption Data

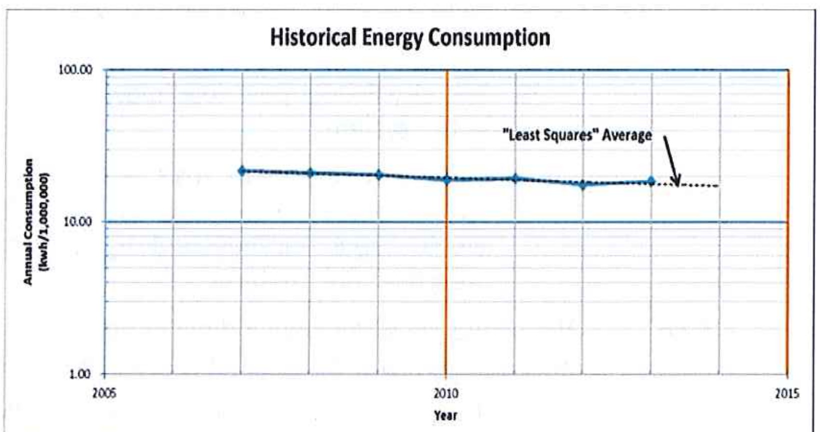


Figure 1: Annual Consumption (2007 - 2013)

3.2.3 The distribution system peak demand during the past 5-years (2009 to 2014) is summarized in Table 2.

3.2.4 Figure 2 is a graphical representation of this data. A "least squares" regression analysis results in an average 1.15% increase in annual kW demand during this time.

Year	Peak kW
2009	4,000
2010	4,500
2011	4,500
2012	5,140
2013	3,670
2014	4,830

Table 2: Historical Peak Demand

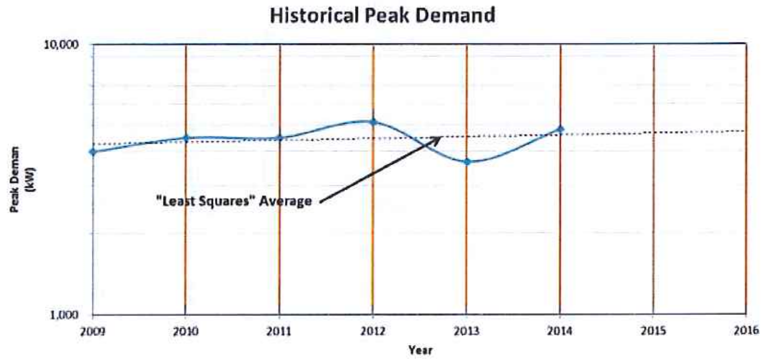


Figure 2: Peak Demand (2009-2014)

3.2.5 The following demand and other load characteristics are based on BPA CL Substation metering data:

A. Annual peak demand on the City Feeder was 4,830 kW in February 2014.

B. The average demand in the previous 12-months was 2,109 akW.

C. The annual load factor is 44%. A 42% to 48% load factor is typical for residential loads. Commercial/small Industrial, and Public Agency loads that operate 8-hours per day, 5-days per week will typically have load factors in the 45% - 55% range.

D. Note the annual peak demand was 7.5% higher in the summer of 2012 than the winter of 2014.

E. The City Feeder peak load may not be coincident with the peak load of the entire system.

F. The power factor, in 2013, was 98.5% on the City Feeder. This is a very "good" power factor. The majority (75%) of the load is "resistive" (i.e. electric heat, incandescent lighting, etc.) and only 25% of the load is "reactive" (i.e. motors).

3.2.6 The annual peak demand and power factor are critical measures of the capacity of the substation and distribution feeders that serve the load.

A. The peak apparent power was 4,919 kVA (4,830/0.985).

B. The CL Substation transformer was operating at 82% of its capacity (4,919/6,000 kVA).

C. If the power factor had been 80% instead of 98.5%, the substation transformer would have been slightly overloaded during the 2014 peak.

D. The current flowing through the transformer windings and feeder conductors generates heat due to the resistance of the wire. Excessive heat will result in failure of the insulation on underground cables or permanent damage (melting) to the wire. The current carrying capacity of the wire is called the "ampacity" of the cable or wire. Underground cables have a lower ampacity compared to overhead wires because heat dissipation is slower in the ground than in air.

3.3 CITY FEEDER LOADING

3.3.1 The main 3-phase feeder consists of five segments (Nodes C100 to C105). Each node signifies a change in wire size. Node C100 is at the CL Substation. A map of the City Feeder with the line node locations is shown in Appendix A. The conductor size of each segment varies as shown in Table 3.

CITY 3-PHASE FEEDER DETAILS						
Start	**End**	**Conductor Size**	**Conductor Ampacity**	**Coincident load (kVA)**	**Peak Load (A)**	**Spare Capacity**
C100	C101	1-0 Cu	378	4919	206	45.6%
C101	C102	4-0 ACSR	340	4817	202	40.7%
C102	C103	2 Cu	282	3829	160	43.2%
C103	C104	2 URD	135	1354	57	58.0%
C104	C105	2 Cu	282	56	2	99.2%

Table 3: City Feeder - Main 3-Phase Line Sections

3.3.2 During peak load conditions, the first three segments (C100 to C103) were operating at approximately 54% to 59% of the conductors' rating. The spare capacity is shown in the last column on the right of Table 3.

3.3.3 The capacity of the conductors is adequate for the existing load conditions. Load growth will decrease the spare capacity.

3.3.4 Consolidate wire sizes for rebuilds and new construction. Use 4/0 ACSR (340A rating) for overhead 3-phase lines or 350 AL URD cable (340A) for feeders with residential/small commercial customers. Large industrial conductor sizes are discussed in a later section.

3.4 SOUTH BANK FEEDER LOADING

3.4.1 The main 3-phase feeder consists of twelve segments (S100 to S112). Segment S100 is at the Acton Substation. The line segments are shown on Appendix A. The conductor size of each segment varies as shown in Table 4. Although line segments are lightly loaded, we recommend using 4/0 ACSR (340A rating) for overhead 3-phase lines or 350 AL URD cable (340A) when replacing conductors due to storm damage, road modifications, or other reasons. A uniform conductor size will improve overcurrent coordination and will result in improved reliability.

SOUTH BANK 3-PHASE FEEDER DETAILS						
Start	End	Conductor Size	Conductor Ampacity	Coincident load (kVA)	Peak Load (A)	Spare Capacity
S100	S101	2 Cu	282	830	35	87.7%
S101	S102	1-0Al	170	742	31	81.8%
S102	S103	4 Cu	210	398	17	92.1%
S103	S104	2 Cu	282	397	17	94.1%
S104	S105	6 Cu	140	397	17	88.1%
S105	S106	2 Cu	282	375	16	94.4%
S106	S107	4 Cu	210	348	15	93.1%
S107	S108	6 Cu	140	284	12	91.5%
S108	S109	2 Cu	282	263	11	96.1%
S109	S110	4 Cu	210	263	11	94.8%
S110	S111	6 Cu	140	232	10	93.1%
S111	S112	4 Cu	210	8	0	99.8%

Table 4: South Bank - Main 3-Phase Line Sections

3.4.2 The peak load on the South Bank Feeder in February 2014 was 830 kVA. During peak load conditions, all of the line segments were operating at 20% or much less than the conductors' capacity. The spare capacity is shown in the last column on the right of Table 4.

4.0 EXISTING INDUSTRIAL PARK INFRASTRUCTURE

4.1 OVERHEAD 3-PHASE

4.1.1 An existing 3-phase overhead line crosses the Bear Mountain and Port of Cascade Locks properties as shown in Figure 3. This line has been temporarily de-energized because of safety issues.

4.1.2 This line is scheduled to be relocated by City crews to as shown on Figure 3.

4.2 UNDERGROUND VAULTS AND CONDUIT

4.2.1 The Port of Cascade Locks has installed electrical vaults and underground conduits along Cramblet Way and Industrial Park Way as shown inside the cloud in Figure 3.

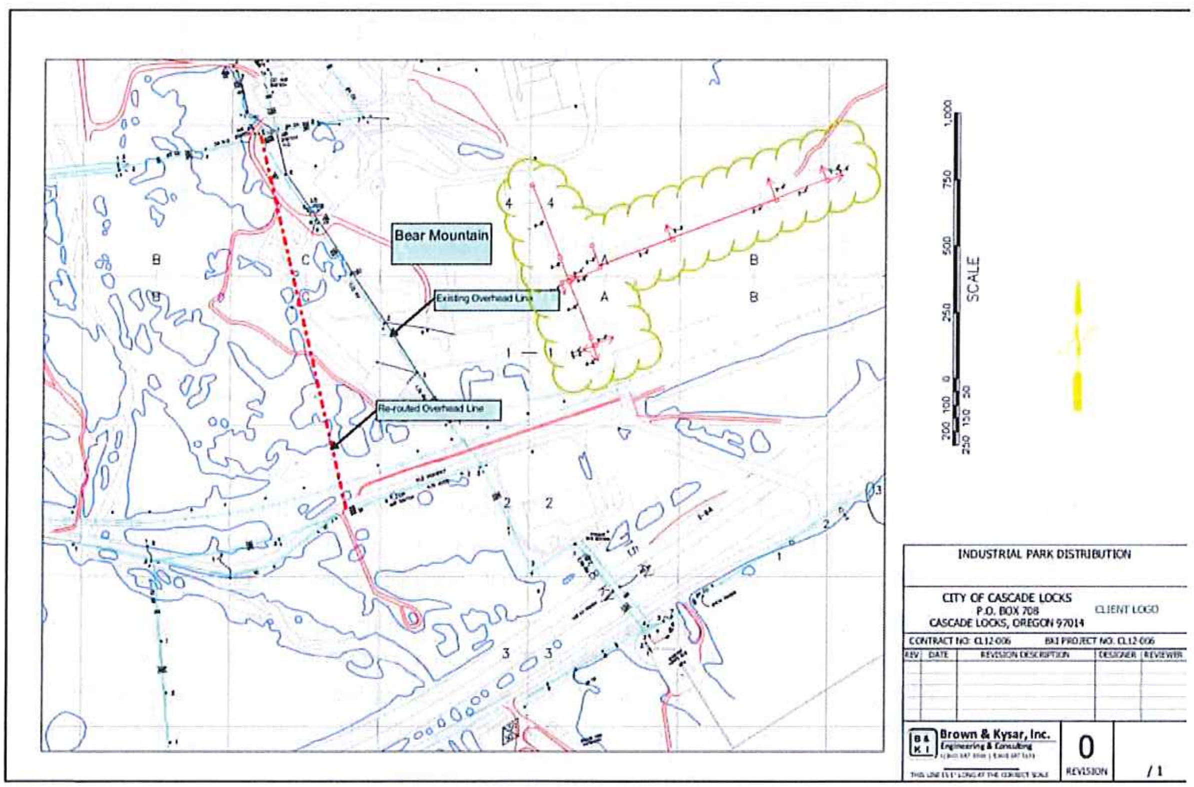


Figure 3: Existing Industrial Park Infrastructure

5.0 LOAD FORECAST

5.1 FORECAST OF INDUSTRIAL PARK LOAD

5.1.1 The Master Plan for Development of the Port of Cascade Locks Industrial Park was adopted by the Port Commission in 2014. The Master Plan for Development and input from the City staff is the basis for forecasting the large industrial load additions during the next five years. Bear Mountain is an existing customer, but is planning an expansion of their plant.

Industrial Load	Year	Type of Operation	Estimated kW Demand
Bear Mountain	2014	8/5	1,000
Nestles	2015	24/7	1,000
Fish Products	2015	24/7	1,000
Puff Factory	2015	8/5	1,000
Nestles	2017	24/7	1,000
Nestles	2018	24/7	1,800

Table 5: Large Industrial Load Additions

5.1.2 The addition of 6,800 kW over the next five years will have a dramatic impact on the substation facilities. The previous peak kW demand on the City Feeder was 5,140 kW. Using a 98.5% power factor, the apparent power is 5,218 kVA.

5.1.3 Both the BPA CL Substation and the Pyramid Substation (used for emergency backup) have substation transformers with a rating of 6,000 kVA. There is only a 13% margin of spare capacity when either substation is supplying the load. An abnormally hot summer or cold winter could easily consume this spare capacity.

5.2 "FIRM" SUBSTATION CAPACITY

5.2.1 The present configuration does provide a redundant power source for the City Feeder. This configuration is described as an "N-1" contingency. In the event of the failure of the substation transformer in the CL Substation, the Pyramid Substation is available to restore service to the distribution system after a relatively short outage.

5.2.2 The substation capacity that is available with the largest transformer out of service (N-1 contingency) is 6,000 kVA. This is the "firm" substation capacity. Although cooling fans can be added to both transformers to increase the transformer rating to 8,000 kVA for the CL Substation transformer and 6,250 kVA for the Pyramid Substation transformer, the firm capacity only increases a modest 250 kVA. If the larger CL Substation transformer is out of service, the Pyramid Substation is limited to 6,250 kVA.

5.2.3 The N-1 contingency condition does not hold true for a 115 kV transmission outage because an outage of the 115kV tap line disables both the CL Substation transformer and the Pyramid Substation transformer. The recommended configuration, described in a later section, of the CL Substation with two transformers or a new substation with two transformers is shown with two 115kV line taps to provide a redundant 115kV line tap (N-1 contingency configuration).

5.2.4 The light blue line in Figure 4 shows the historic peak kW demands and is a graph of the forecasted peak kW demand including anticipated large industrial loads.

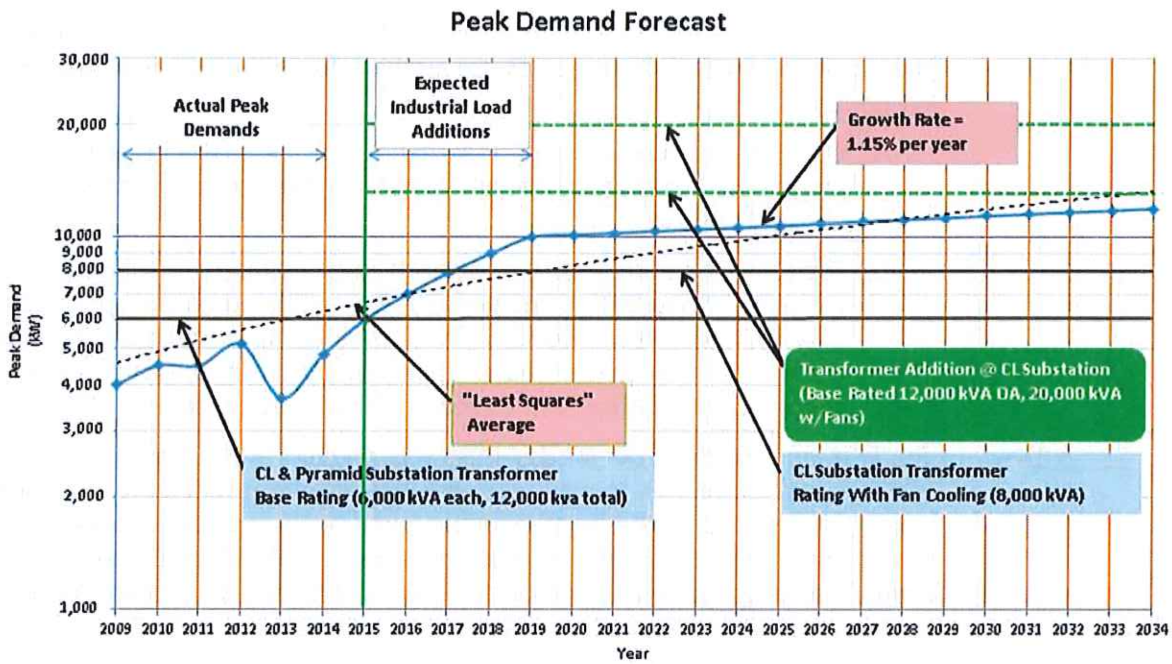


Figure 4: Peak Demand Forecast with Large Industrial Load Additions

5.2.5 The firm capacity of the substations is the black horizontal line at 6,000 kVA (Figure 4). This is equivalent to 5,900 kW with a 98.5% power factor. The system peak demand will exceed the firm capacity of the substations in 2015 (green line – Figure 4). This intersection identifies the need to add more transformer capacity to prevent a shortfall of firm capacity during an N-1 contingency.

5.2.6 We recommend adding a new 12/16/20 MVA transformer and related equipment in the CL Substation. The 12 MVA is the air cooled rating and the 16/20 MVA ratings are with 2-stages of cooling fans. This addition will increase the firm capacity to 12 MVA (i.e. the sum of the existing transformers <u>or</u> the new transformer). Therefore an outage of the largest transformer leaves at least 12 MVA (the horizontal dashed green line in Figure 4) of substation capacity.

5.2.7 The system peak demand rapidly increases until 2019 as large industrial loads are added. The peak demand is forecasted to be 10 MW in 2019. After 2019, the peak demand is forecasted using the historic growth rate of 1.15% per year.

5.3 INDUSTRIAL PARK DEVELOPMENT PLAN

5.3.1 The load forecast is based on large industrial load anticipated by the Port of Cascade Locks Master Plan during the next 5-years.

5.3.2 The Industrial Park encompasses about 200 acres as shown in Figure 5. About 70 acres of the Industrial Park are developable. SDS Lumber Company owns 14 acres of bare land ready for development. Approximately 10 acres are leased to Bear Mountain forest Products. A 25 acre lot had been set aside for a casino and is now available for development. The remaining 21 acres are bare land, but portions will require mass grading to level the sites to be ready for development.

5.3.3 Bear Mountain is located on a 10 acre parcel and the electrical demand with the plant expansion will be 2,000 kW. Based on this information, the load density is 200 kW per acre.

A. Using this as the "average" load density for all of the Industrial Park, the expected kW demand when all 70 acres in the Industrial Park is developed will be 14,000 kW.

B. Typically, the normal power factor of large industrial plants will be in the range of 70% to 90%. If the power factor is 80%, then the apparent power of a 10 MW load will be 12.5 MVA. The Large Industrial Rate will charge a penalty for low power factor. The penalty is an economic incentive to encourage the customer to correct their own power factor.

5.3.4 The Port of Cascade Locks Master Plan also predicts an increase in the Cascade Locks population of 14% in new residents (150 or more) related to the additional workforce required by the large industrial plant additions. This population growth has not been included in the forecasted demand in Figure 5. Based on historical residential usage patterns, a 1,500 to 2,500 kW coincident demand during peak load would be expected if all new family units built new houses.

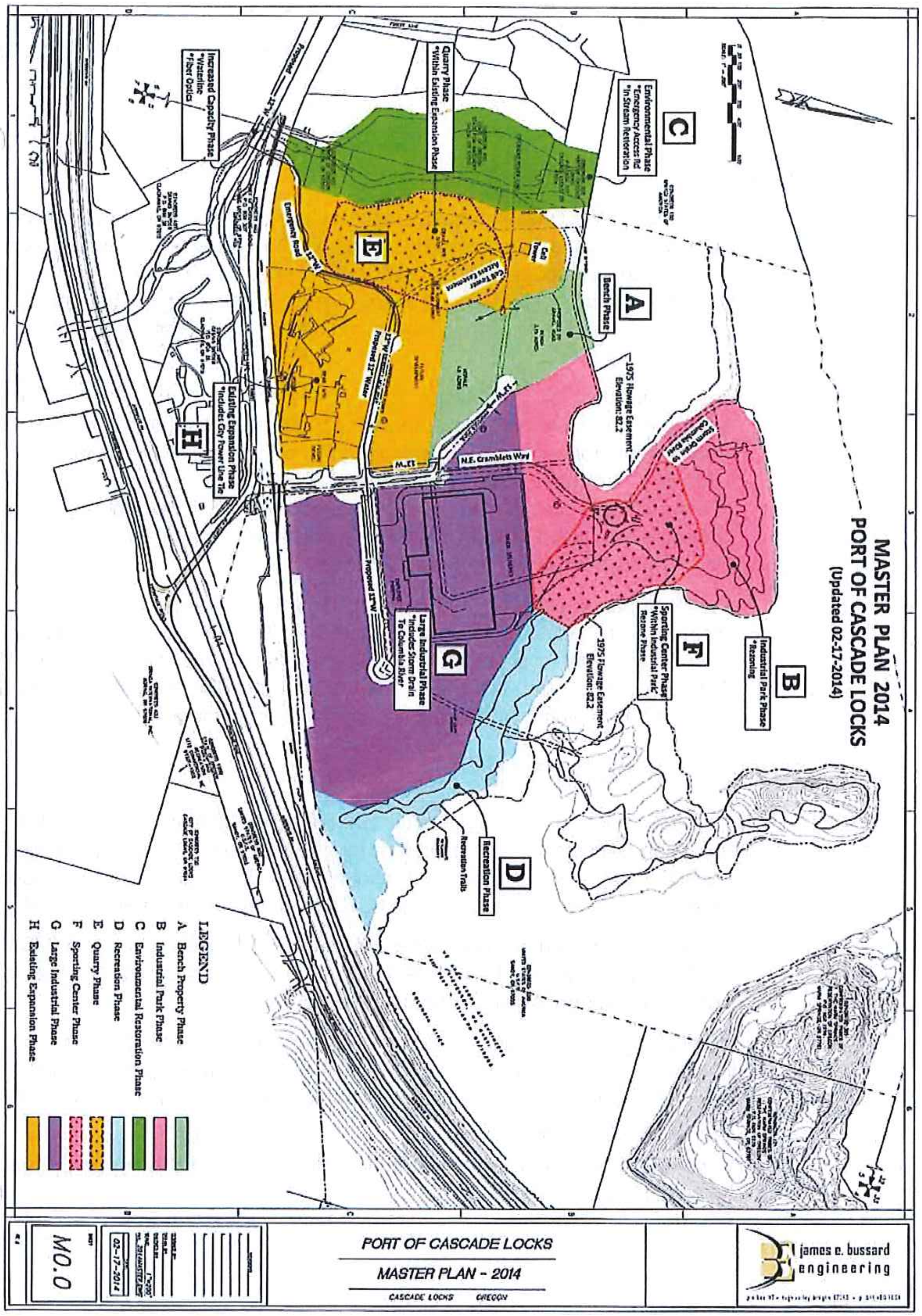


Figure 5: Port of Cascade Locks - Master Plan Excerpt

6.0 LONG-RANGE PLAN

6.1 INTENT

6.1.1 The intent of the Long Range Plan is to identify bottlenecks in the existing facilities to provide reliable, good quality service to the customers. The Long Range Plan recommends improvements or additions to provide a reliable, flexible, efficient, and economical system for growth of the existing load and additional new customer load. The growth of the combined load is forecasted for the next 20-years.

6.1.2 One component of the Master Plan is a Work Plan. The Work Plan includes recommended system improvements for the first 5-years of the Master Plan. The recommendations include an opinion of the Probable Construction Costs (Cost Estimate) for each recommendation. Some recommendations may include alternative approaches. Each alternative includes a cost estimate and comparison of advantages and disadvantages for consideration. One of the alternatives will be identified as our recommended alternative.

6.1.3 The Long-Range (Master Plan) should be reviewed every four years to address unforeseen changes in the load forecast and to develop the subsequent 5-year Work Plan with cost estimates. This approach will facilitate an organized development of the electrical system and provide insight for the Finance Department to plan for financing the capital improvements.

6.2 SUBSTATION FACILITIES

6.2.1 The peak load on the City Feeder in February 2014 was 4,919 kVA. The CL Substation transformer's air cooled rating is 6,000 kVA. The rating can be upgraded to 8,000 kVA if it is equipped with cooling fans. This transformer has about 1,000 kVA (about 15%) spare capacity. The CL Substation is owned and operated by BPA.

6.2.2 The Pyramid Substation transformer also has an air cooled rating of 6,000 kVA. This transformer has about 1,000 kVA (about 15%) spare capacity at peak load. The Pyramid Substation is owned and operated by the City.

6.2.3 The Pyramid Substation transformer is normally energized, and serves the distribution load about 50% to 75% of the time. The Pyramid Substation also provides backup when the CL Substation is out of service for maintenance or replacement of equipment.

6.2.4 A one-line schematic of the existing CL Substation and the Pyramid Substation is shown in Figure 6.

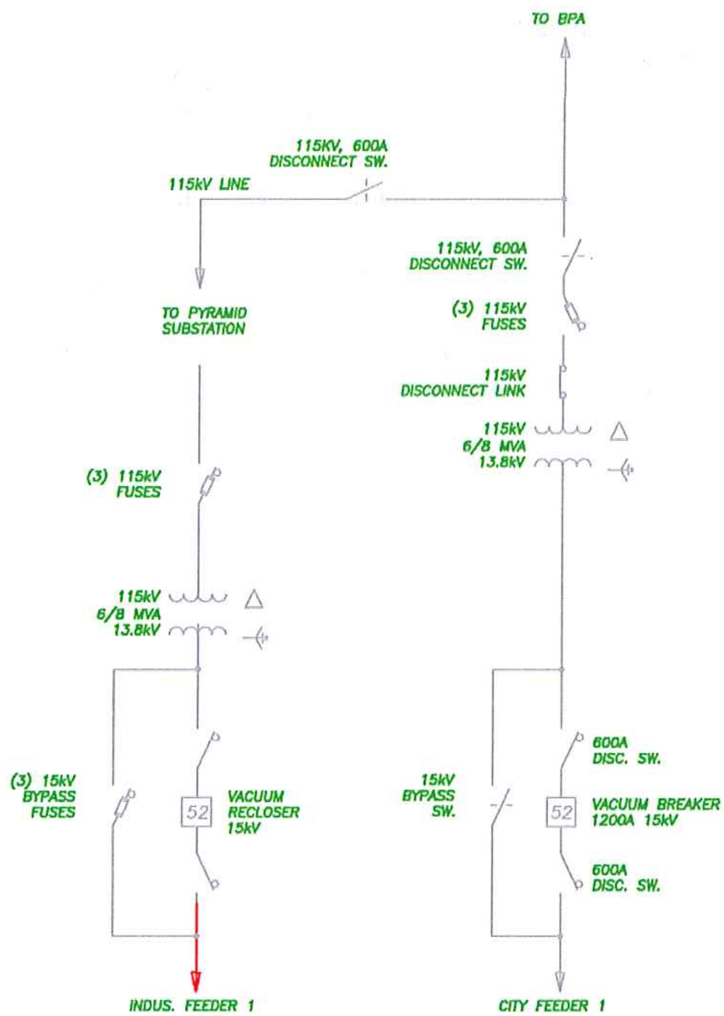


Figure 6: One-Line Diagram (Existing CL & Pyramid Substations)

6.2.5 The configuration of the distribution system does not allow sectionalizing to permit the CL Substation and Pyramid Substation to each serve 50% of the City Feeder load.

6.2.6 The addition of the new industrial load of 6,800 kW in the next four years will more than double the system load and will, by far, exceed the rating of each substation transformer. The first 1,000 kW of additional load will consume the spare capacity. Although cooling fans can be added to each transformer, we do not recommend adding the fans.

6.2.7 The CL Substation transformer was manufactured in 1951, and the typical design life of a power transformer is 40 years; This transformer has already exceeded the expected design life. This transformer has likely survived because the load has always been below its rating.

6.2.8 The Pyramid Substation transformer was manufactured in 1978. This transformer is also approaching the typical design life, but it has only been used occasionally since the City purchased it.

6.2.9 We recommend that a new 12/16/20 MVA substation transformer and related equipment be installed to upgrade the capacity of the substation to accommodate the large industrial load additions.

6.2.10 The one-line diagram of the substations, with a new 12 MVA transformer is shown in red in Figure 7.

6.2.11 The valuation analysis of the BPA CL Substation facilities is in Sections 7.0 to 11.0 of this report. If the City decides not to purchase the CL Substation from BPA and constructs a new substation, then the new substation site should be suitable for a second transformer.

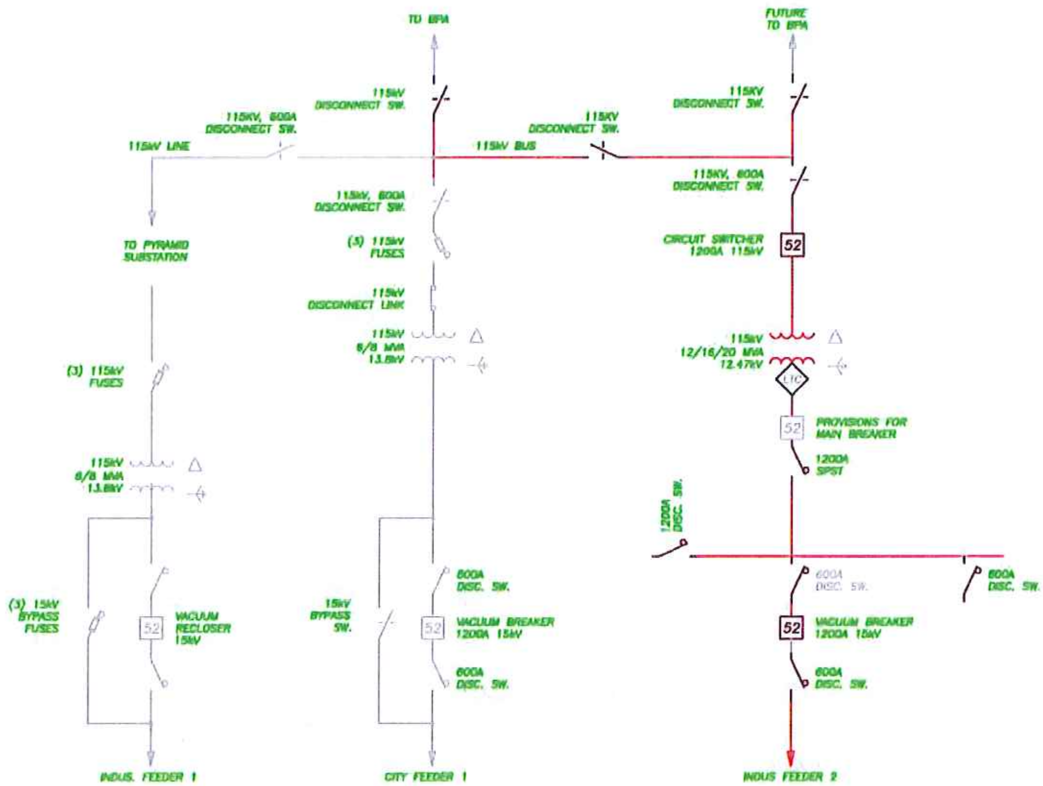


Figure 7: One-Line Diagram (New 12/16/20 MVA Transformer)

6.2.12 The opinion of probable construction cost for a new 12/16/20 Transformer and related substation facilities is summarized in Table 6.

CASCADE LOCKS SUBSTATION			
DESCRIPTION	QTY	UNIT	BUDGET W/ OVERHEADS
115kV STATION EQUIPMENT			$ 662,000
LINE TERMINAL & TIE SWITCH STRS (115 KV) W/TRUSSES	35,000	LBS	
STRUCTURE FDNS	21	CUYD	
BUS & FITTINGS (115 KV)	3	BAY	
BUS & EQUIP. SUPPORT PEDS. (6)	9,000	LBS	
BUS SUPPORT STRUCTURE FDNS	12	CUYD	
HS CIRCUIT SWITCHER W/DISC. SWITCH	1	EA	
HS CIRCUIT SWITCHER STRUCTURE	13,500	LBS	
CKT SWITCHER FDN	4	CUYD	
HS SURGE ARRESTORS	3	EA	
HS DISCONNECT SWITCH	3	SW	
SUBSTATION TRANSFORMER & EQUIPMENT			$ 959,000
TRANSFORMER, 12/16/20 MVA, W/LTC	1	UNIT	
SUBSTATION TRANSFORMER FDN	14	CUYD	
SPILL CONTAINMENT	7	CUYD	
LS SURGE ARRESTORS	3	EA	
15KV FEEDER EXIT EQUIPMENT			$ 186,000
LS STRUCTURE	2	BAY	
LS STRUCTURE FDN	4	CUYD	
BUS & FITTINGS (15 KV) 1200A	2	BAY	
15 kV INSTRUMENT TRANSFORMERS & METERING	1	LOT	
BREAKER, 15 KV, 1200A	1	BKR	
LS DISCONNECT SWITCH	12	EA	
LS TIE SWITCH 3PGO 15 kV, 1200A	1	EA	
BREAKER FDN	2	CUYD	
RELAYING 15 KV LINE & METERING/CONTROL PANEL	1	PKG	
SITE WORK, CONTROL BUILDING, STATION SERVICE & MISC.			$ 117,000
YARD SURFACING	237	CUYD	
STORM WATER DRAINAGE SYSTEM	1	LOT	
GROUND GRID (EXISTING MAY REQURE UPGRADE)	1	LOT	
CONTROL BUILDING, LOW VOLTAGE SYSTEMS & MISC.			$ 45,000
STATION SERVICE (DC) DIST. PANEL (ADD BKRS)	1	LOT	
OUTDOOR LIGHTING FIXTURES	1	SYS	
CONTROL CABLES & WIRING (OUTDOOR	1	LOT	
CONTROL CONDUITS	250	FT	
SCADA & COMMUNICATION EQUIPMENT/CONROL PANELS	1	PKG	
NEW SUBSTATION ESTIMATED COST			$ 1,969,000

Table 6: 12/16/20 MVA Transformer Addition

6.2.13 When the new 12/16/20 MVA substation transformer is in service, a new 12.5 kV, 600A feeder (Industrial Feeder #2) should be constructed from the new transformer to the overhead line on the West side of the Industrial Park as shown by the green dashed line in Figure 11.

6.2.14 We recommend that the City Feeder be transferred to a new underbuild circuit on the 115 kV structures and upgrade the existing distribution feeder crossing Interstate 84 for the Industrial Feeder #2. The Industrial Feeder #2 will provide dual source service to the Industrial Park and will allow transferring some load from the Pyramid Substation transformer and provide N-1 redundancy to the Industrial Park.

6.2.15 Although neither of the existing transformers is in "pristine" condition, they both have provided reliable service in the past. We recommend that annual gas analysis testing be performed on the Pyramid Substation transformer and the CL Substation transformer if the City owns it. After three years of taking oil samples, the gas test results should be trended to identify abnormally rapid increases in combustible gases and decide if these trends are indications of impending failure.

6.2.16 If either substation transformer shows signs of failure, plans should have been made to purchase a new 12/16/20 MVA substation transformer and related equipment as soon as possible. It usually takes 12 to 18 months from council authorization to purchase a new transformer and make it ready for service.

6.2.17 The second 12/16/20 MVA transformer should be added in the CL Substation or at the new substation site. The One-Line Diagram of the substation is shown in red in Figure 8.

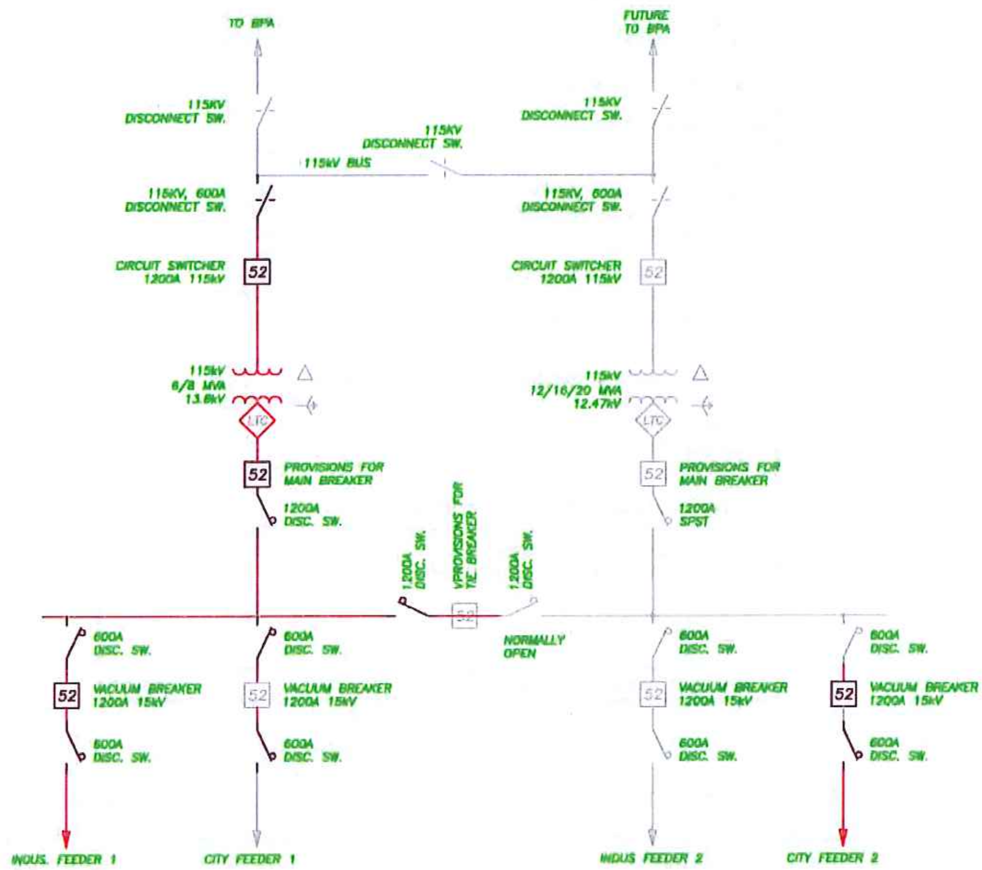


Figure 8: One-Line diagram (Dual Transformer Substation)

6.2.18 When the second 12 MVA substation transformer has been placed in service, the Industrial Feeder #1 should be disconnected from the Pyramid Substation and extended to the new transformer. We recommend the City Feeder be transferred to the upper circuit of the 115 kV structures and the underbuild circuit be used for Industrial Feeder #1. The rational is that the Industrial Feeder will be larger conductor than the City Feeder, and therefore the loading on the poles will be less with the larger conductor closer to the ground and line clearance between circuits will be reduced because the larger conductor will have more sag.

6.2.19 The Pyramid Substation should be dismantled and removed from the site after the second 12 MVA substation transformer is in operation.

6.2.20 When the second 12/16/20 MVA transformer is in-service the firm capacity will increase to 20 MVA. The two substation transformers will provide "N-1" redundancy.

6.3 CITY FEEDER

6.3.1 The peak load on this feeder is 54.6% of its capacity. If the historical growth rate in peak demand continues, the existing conductors have adequate capacity to supply the load at peak periods for the foreseeable future.

6.3.2 It is reasonable to expect the growth rate of the residential load to increase as new large industrial plants hire employees. The additional residents will stimulate housing as new homes are constructed. As the community grows, the General Services customer class will be revived as more retail stores, restaurants and other businesses startup or grow to serve the additional residents.

6.3.3 The existing feeder configuration is a "radial feeder". Frequently distribution feeders are constructed as radial lines because the initial load is small and radial line is the simplest and least expensive system to build. Operation and expansion are simple. A typical radial line is shown in Figure 9.

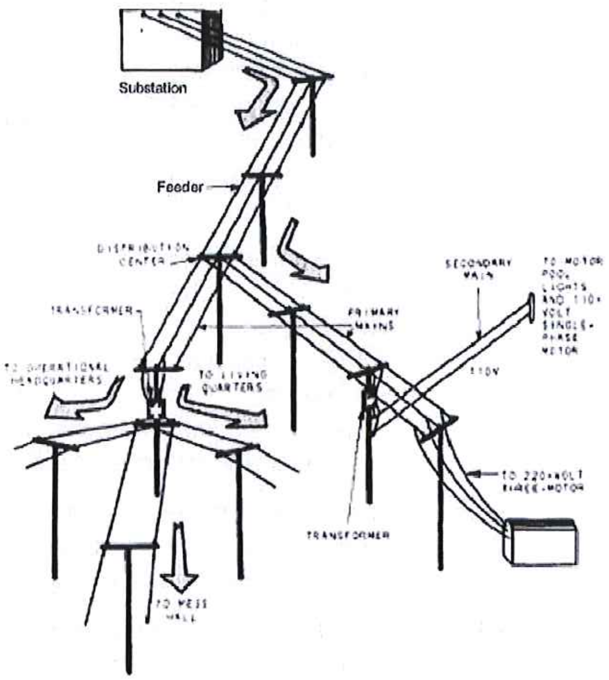


Figure 9: Typical Radial Feeder

6.3.4 A radial line exits the substation and has a large trunk line (like a tree) and has taps (like tree branches) to deliver electrical power to the customers.

6.3.5 A short circuit that blows a fuse or downed conductor on the feeder near the substation on a trunk line will result in outages to all customers downstream of the blown fuse or downed conductor. All of the downstream customers will be out of service until the faulted line or equipment is repaired or replaced.

6.3.6 Electrical service to all customers is also interrupted when any piece of line or equipment must be de-energized to perform routine maintenance and service. A radial feeder is not as reliable as a looped feeder.

6.3.7 A looped distribution feeder system has at least two feeder exits, preferably from different substation transformers. The feeders encircle the distribution area and include sectionalizing equipment to separate the distribution transformers and load centers on each feeder.

6.3.8 A looped feeder system is shown in Figure 10. A looped system is more expensive to build than the radial type, but it is more reliable. It may be justified in an area where continuity of service is of considerable importance, for example, a hospital, foundry, etc.

6.3.9 Circuit breakers, reclosers, distribution switches, or other devices are used to sectionalize the loop. Any or all distribution transformers can be connected to either source (i.e. substation transformer).

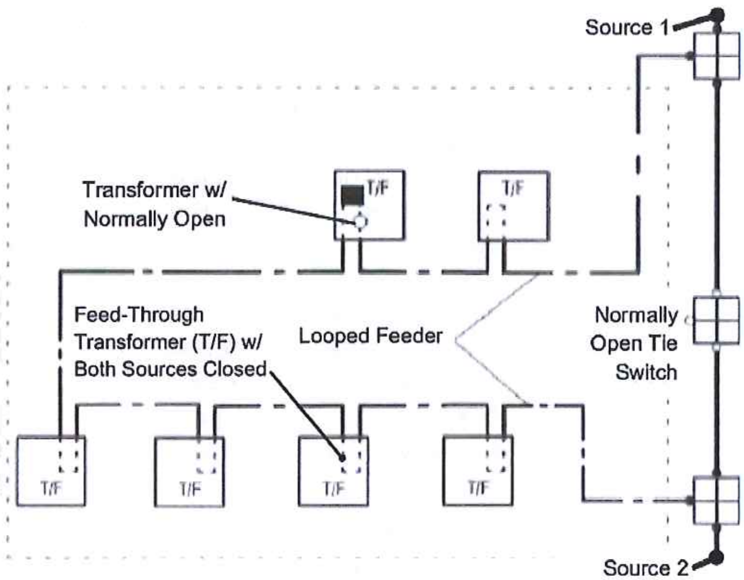


Figure 10: Looped Distribution Feeder

6.3.10 Since the load can be transferred to either source, maintenance or repairs can be accomplished with short or no outages to customers. Feeder sectionalizing also provides flexibility for balancing the load on each source.

6.3.11 Since the number of customers and load on the City Feeder is expected to have modest growth, we recommend a long range plan to provide a looped source to the City Feeder as shown in Appendix B.

6.3.12 The looped source will increase the reliability of service because customer outage duration will be significantly reduced because the looped feeder will have strategically located sectionalizing switches to de-energize small sections (minimize customers that are affected) of the loop for maintenance (i.e. tree trimming), repair faulty equipment or other devices, or upgrades (i.e. larger conductors).

6.3.13 Appendix B depicts a preferred route, from the CL Substation, along the Frontage Road and along back lot lines and streets to the intersection of WA NA PA Avenue and Benson Avenue. An alternate route is also shown along Columbia River Highway to the intersection of WA NA PA Avenue if easements are not available along the preferred route.

6.3.14 If the CL Substation is not purchased and a new substation is constructed North of Interstate 84, then the feeder loop route would change accordingly. The existing City Feeder will be connected to one of the substation transformers and the new

City Loop Feeder will be connected to another substation transformer to achieve full redundancy.

6.4 SOUTH BANK FEEDER

6.4.1 The peak load on this feeder is less than 20% of its capacity. The historical growth rate in peak demand is fairly steady and is mostly dependent on the outdoor temperature in the summer or winter. New customer additions are not likely due to state and federally controlled lands in the South Bank service area. The existing conductors have adequate capacity to supply the load at peak periods for the foreseeable future.

6.4.2 The existing feeder configuration is a "radial feeder" as shown In Figure 9. Since the peak load is stable and will more likely decrease than increase, we recommend that tree trimming be continued and conversion from overhead to underground should be considered if other highway improvement projects are undertaken or maintaining clearance to trees becomes too costly.

6.4.3 Installation of a new feeder from the Fish Hatchery to the West end of the City Feeder was considered. The opinion of probable construction cost of a new underground feeder is shown in Table 7. The costs of permitting requirements of the State of Oregon in the Columbia River Gorge are quite substantial.

UNDERGROUND THREE PHASE TIE FEEDER			
ITEM	QUANTITY	UNIT	SUB-TOTAL
Material			
Terminations, etc	30	each	
#1/0 Al, 15kV URD cable (single conductor)	15,840	lft	
Junction Box/Vault	5	each	
Bus bars (Modules) for 3PH vaults (3 per vault)	18	each	
2" conduit	15,840	lft	
3PH VFI - Cooper KPDO-VF5-33 or	1	each	
Estimated cost per mile			$98,000
Labor			
Primary junctions	5	each	
Trench and backfill	5,280	lft	
Conduit installed	15,840	lft	
15Kv Cable pulled and terminated	15,840	lft	
3PH VFI - Cooper KPDO-VF5-33 or equiv.	1	each	
Interstate Flagging, Limited Access, & Misc.	5,280	ft	
Estimated cost per mile			$255,000
Permitting	1	lot	
Utility Overheads	20%		
Engineering Design	15%		
Construction Observation	10%		
Contingencies	15%		
Total Per Mile Cost			$645,000
South Bank to City Feeder (mi)	2.5		$ 1,613,000

Table 7: 12.5kV, 150A Underground Tie Feeder (South Bank – City)

6.4.4 The 1/0 URD cable has a 3,200 kVA capacity and is the normal conductor size used by the City for underground feeders. This feeder would provide the capacity to utilize ½ of the Acton Substation capacity (6,000 ÷ 2). The other 3000 kVA is assumed to be reserved for BPA customers.

6.4.5 The levelized annual Fixed Charge Rate (FCR) is typically in the range of 13.5 to 16.5% for municipal utilities. The factors included in the FCR are operation and maintenance expense (2.5 – 3%). Depreciation rate (3% - 3.5%) and cost of capital (8% - 10%). The FCR is multiplied by the initial installed cost to determine the annual carrying costs for a capital expenditure.

6.4.6 Using an average 15% FCR, the carrying cost for this tie feeder is $241,950 per year. Therefore, the annual carrying costs far exceed the benefit of eliminating the Utility Delivery Charge of $1,750 per year. The South Bank load may even decline in the future if additional scenic Columbia River Gorge restrictions are implemented. If the tie feeder would be utilized to backup the City Feeder, the tie line is only capable to backup about ½ of the City Feeder load.

6.4.7 Although the South Bank load will not support a large investment in substation facilities, we recommend exploring the possibility of transferring other loads served at 13.8kV to the City to generate more income to support the substation investment and O&M costs. BPA has shown interest in selling portions the Acton Substation and perhaps the ownership transfer may have mutual benefit for both parties. As new transformers are placed in service for the City Feeder, one of the existing transformers could serve as a backup for the Acton Substation transformer.

6.5 INDUSTRIAL PARK INFRASTRUCTURE

6.5.1 Figure 3 shows the existing 3-phase overhead line (cyan color) by Bear Mountain that is de-energized. This line will be relocated (red dashed line) along the western limits of the Industrial Park. The City crew is planning to relocate this line in 2014. The line has been de-energized because of safety concerns.

6.5.2 In 2014-15, we recommend constructing a new 12.5kV, 600A underground feeder (Industrial Feeder #1), from the Pyramid Substation to the North side of the railroad right-of-way on Cramblet Way as shown by the red line in Figure 11. This Feeder will be extended to the Bear Mountain plant for the new 1,000 kW load addition.

6.5.3 The opinion of probable construction cost for the new Industrial Feeder #2 is shown in Table 8.

Industrial Park Service - Material List, & Labor Cost Estimate				
Description	**Unit**	**Quantity**	**Unit Cost**	**Sub-Total**
6" PVC SCH. 40	LFT.	1575		
15KV 1000 MCM EPR Jacketed	LFT.	4950		
3PH Vault w/ lid	EA.	2		
3PH VFI - Cooper KPDO-VF5-33 or equiv.	EA.	1		
Voltage Regulators	EA.	3		
600 AMP Elbows	EA.	18		
Bus bars (Modules) for 3PH vaults (3 per vault)	EA.	9		
1000 MCM potheads (terminators)	EA.	3		
15 KV riser class arresters	EA.	3		
Fault indicators	EA.	6		
Substation Riser	LOT	1		
MATERIALS SUBTOTAL:				**$121,000**
Labor & Constuction Equipment				
Trench, Backfill, Restoration, etc. (ft.)	LFT.	1575		
Existing Asphalt St. crossings (saw cut, CDF, hot patch)	XING	1		
Rail Crossing	XING	1		
Conduit Installation	LFT.	1575		
Vault installation	EA.	2		
Voltage Regulators	EA.	3		
Substation Riser	LOT	1		
Misc.	LOT	1		
ELECTRICAL CONTRACTOR SUBTOTAL:				**$68,000**
Contingencies	10%			
Environmental, Survey, Engineering Design [1]	20%			
Estimate of Probable Construction Cost for Underground Electrical System:				**$250,000**

Notes:

1. The amount shown is for design only, it does not include construction administration (i.e. bidding, construction observation or as-built documents).

Table 8: Industrial Feeder #1 (12.5kV, 600A URD)

6.5.4 We recommend that the Industrial Park distribution voltage be 12.5/7.2 kV instead of 13.8/7.97 kV used in the existing distribution system. The main reason for using 12.5kV is because service transformers for 12.5kV will more likely be in stock or short delivery times because that voltage is used by many utilities in the Northwest. The no load taps on the high voltage winding in the Pyramid Substation transformer will need to be adjusted for a 12.5kV output and/or voltage regulators added to the substation.

6.5.5 Line voltage regulators will be required at interties between the 13.8 kV line and 12.5kV lines. We recommend gradually converting the existing City Feeder from 13.8kV to 12.5kV.

6.5.6 The one-line diagram of the CL and Pyramid Substations are shown in Figure 6.

6.5.7 Additional infrastructure in the Industrial Park will be required when the new industrial plants are constructed. The configuration of the infrastructure within the Industrial Park must be coordinated with the Port of Cascade Locks. These cost estimates are not included in the scope of work for this report.

6.5.8 Figure 11 shows the long range configuration of the industrial park distribution system. Actual routing of feeders will depend on easements and/or future street locations.

6.5.9 As new large industrial customers are added in the Industrial Park, the Industrial Feeder #1 will be extended North and West to the new overhead line on the West side of the Industrial Park to form an Industrial Park loop as shown in Figure 11.

6.5.10 The industrial park system should be configured as a looped feeder system with strategically located sectionalizing switches to provide isolation of cable sections to minimize the number of customers affected and duration of an outage for repairs, modification or upgrades to the infrastructure.

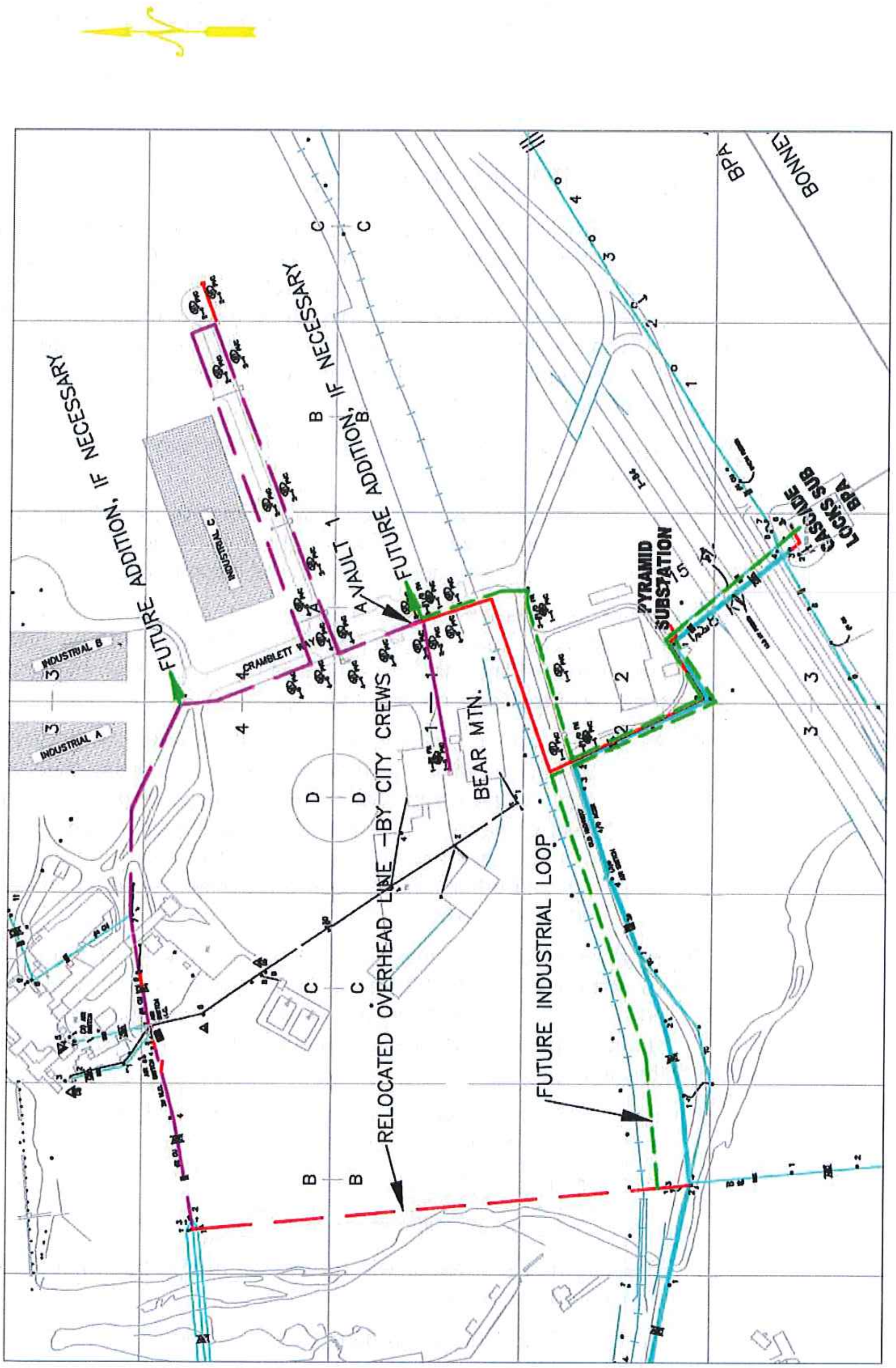


Figure 11: Long Range Infrastructure (12.47 kV Feeder) Configuration

7.0 BPA CASCADE LOCKS SUBSTATION VALUATION ASSESSMENT

7.1 ASSUMPTIONS AND LIMITING CONDITIONS

7.1.1 In the preparation of this valuation assessment and the opinions that follow, we have made certain assumptions with respect to condition of the substation facilities. In addition, we have used and relied upon certain information and assumptions provided to us by sources which we believe to be reliable. We believe the use of such information and assumptions is reasonable for the purposes of this report. To the extent there are changes to the underlying data and assumptions, the results of the valuation may change.

7.1.2 The conclusions and opinions of value are made expressly subject to the following conditions and stipulations:

A. No responsibility is assumed by Brown and Kysar for matters that are legal in nature, nor do we render any opinion as to the title, land and/or land rights, which are assumed to be good and marketable.

B. Except as otherwise stated in this report, no opinion is intended to be expressed for matters that would require specialized investigation or knowledge beyond that normally used by an appraiser engaged in valuing the type of assets described in this report.

C. All existing liens and encumbrances have been disregarded and the value of the property was valued as though free and clear and under responsible ownership. All necessary easements for necessary ingress/egress from public right-of-ways to the substation property will need to be recorded prior to ownership transfer. Easements for power lines that exit the substation and other utilities (spill containment system outflow, etc.) will also need to be recorded prior to ownership transfer.

D. Brown & Kysar personnel performed a field review of the Cascade Locks Substation on June 18, 2014 for a condition assessment. At that time, based on our observations of the visible, above-ground equipment, the facilities appeared to be in average condition for plant of comparable type, age and location.

E. This information regarding the substation was received from BPA and is included in Appendix C for reference:

   i. 110000-1-6 Cascade Locks One-line

   ii. 110043-1-2 Equipment Layout

F. The following information was received from BPA, but is not included in the Appendix of the report:

   i. 110188-1-0 Footing Plan

   ii. Oil Containment Calk51, 81-84_storm_12

iii. Substation Maintenance Reports

G. In performing the valuation, Brown & Kysar assumed that there are no other hidden or unapparent conditions that would make the Substation more or less valuable.

H. Brown & Kysar developed current replacement cost estimates based on recent bids received for equipment and construction labor and market prices.

I. Brown & Kysar used results of the 2000 Palmer, Groth and Pietka property appraisal and the 2013 Integra Realty valuation study that is included in the 2014 "Master Plan for Development of the Port of Cascade Locks Industrial Park".

J. For the purpose of the valuation, we have assumed that the Substation Property conforms to all applicable zoning and use regulations and restrictions.

K. Brown and Kysar have not conducted any investigations, nor have we reviewed studies performed by others, regarding environmental issues. For the purpose of this valuation, we have assumed that the Substation Property and the insulating oil in the substation transformer are in compliance with all federal, state and local environmental and regulatory requirements. We recommend that these assessments be completed before transfer of ownership and that adjustments to the sale price should be made to the account for necessary and proper remediation measures.

L. The studies and analyses undertaken in the preparation of the opinion contained herein have been performed in accordance with standard engineering practices and the Uniform Standards of Professional Appraisal Practice (USPAP).

7.2 VALUATION METHODOLOGIES

7.2.1 The Bonneville Power Administration (BPA) has indicated a willingness to transfer ownership and operation of the Cascade Locks Substation to the City of Cascade Locks. The City of Cascade Locks has expressed interest in owning and operating the Cascade Locks Substation if the purchase provides a positive or at least breakeven benefit to the utility customers.

7.2.2 This section addresses the fair market value of the substation property, equipment and other facilities on the substation site.

7.2.3 The most common valuation methods used to determine the "present value" of the substation assets are:

A. Original Cost Appreciated Less Depreciation (OCALD) methodology

i. This approach utilizes the original installed cost of the facilities that are recorded in the financial accounting records.

ii. The present cost of each asset is determined by multiplying the original cost times an appreciation factor. The "Handy-Whitman Index of Public Utility Construction Costs, Cost Trends of Electric Utility Construction" (Handy-Whitman Index) is typically used to determine the appreciation of the installed cost of the assets from the date it was installed to the present date.

iii. The Handy-Whitman Index is compiled and published by Whitman, Requardt & Associates, LLP. The index has been published continuously since 1924 and is updated annually. The index represents the cost trends of electric utility construction.

iv. The "present value" of each asset is determined by subtracting depreciation from the appreciated cost.

B. Replacement Cost New Less Depreciation (RCNLD) methodology

i. This approach utilizes the replacement cost new of a substation with a similar configuration as the existing substation.

ii. The "present value" of the substation is determined by subtracting depreciation from the replacement cost.

iii. The RCNLD approach is based on generally accepted valuation methods and procedures in accordance with the Uniform Standards of Professional Appraisal Practice (USPAP).

7.2.4 Using both methodologies will allow comparison of the results of both methods to come to a valuation conclusion. However, the necessary accounting information (i.e. original costs, depreciation rates, and accumulated depreciation) for the substation assets was requested from BPA to analyze the data using the OCALD methodology. BPA stated that this detailed information was not available.

7.3 REPLACEMENT COST NEW LESS DEPRECIATION (RCNLD) ANALYSIS

It is our opinion that the RCNLD methodology will yield a reasonable valuation of the assets in the Cascade Locks Substation.

The following components are part of the RCNLD analysis:

7.3.1 Condition Assessment

A. The present value of any asset is based on its condition and whether it has remaining useful life. The appraised value of a house is dependent on age, square footage, previous maintenance practices (i.e. none, normal or exceptional), original or recent remodeling, etc. The value of substation assets is also dependent on the "condition assessment" of the facilities.

B. The results of the "condition assessment" may affect the "remaining useful life" of an asset. For example, the economic life of a power transformer is usually 30 to 35-years. Typical "design life" is also about 35 to maybe 40-years.

7.3.2 Remaining Useful Life

A. Normal accounting practices will apply an annual depreciation expense that decreases the original cost at a uniform rate over the "economic life" of the asset. The "useful life" of an asset may be shorter or longer than the "economic life".

B. The substation transformer in the CL Substation was manufactured in 1951. It is 63-years old and has exceeded the typical "design life" and "economic life" of a power transformer; but this transformer is still in-service.

7.3.3 Replacement Cost Analysis

A. The Replacement Cost New (RCN) is the estimated cost, in today's dollars, to construct a substation today with similar equipment and configuration.

B. The estimated costs are based on Brown & Kysar's experience with design and construction projects for electric utilities, quotations from vendors and manufacturers, and industry cost guides. All costs are in 2014 dollars and include labor, materials and equipment. Overhead percentages were added to the direct costs to account for engineering, construction management and other indirect costs not specifically identified.

7.3.4 RCNLD (Present Value) Determination

A. The results of the replacement cost new analysis are used as the basis for weighting the remaining useful life of that asset.

B. The depreciation is determined by considering the condition assessment, the useful life of the asset, and the date of install/manufacture date to determine the remaining useful life.

C. The remaining useful life is determined by the Useful Life less depreciation (2014 – year of installation). The remaining useful life is weighted by the ratio of the replacement cost new of the asset divided the total substation cost new.

D. The RCNLD value of the substation is the RCN less depreciation.

8.0 SUBSTATION CONDITION ASSESSMENT

8.1.1 I observed the Cascade Locks (CL) Substation facilities (Figure 12) on June 18, 2014. Much of the substation is the same as the original construction in 1960. I noted the level of preventative maintenance and equipment replacements or upgrades made after the initial construction. An evaluation of compliance or non-compliance with current NESC and State Safety Regulations were noted.

Figure 12: BPA - Cascade Locks Substation

8.1.2 The Cascade Locks Substation is located South of Interstate 84 frontage road as shown in the purple rectangle in Figure 13. A 115 kV transmission line that crosses the CL Substation, the Interstate 84 corridor, and terminates at the City owned Pyramid Substation that is located adjacent to the SDS Lumber Company property in the Industrial Park.

8.1.3 The CL Substation was constructed in 1960, but some equipment was manufactured in the 1940's. Other equipment has been replaced since 1960 as listed in Table 8. The substation transformer was manufactured in 1951, some equipment was manufactured in 1944, and some equipment was replaced recently.

Figure 13: Cascade Locks Substation Location

8.1.4 Maintenance records received from BPA for the substation indicate:

A. Oil samples were taken on an annual maintenance schedule and tested in BPA labs for combustible gas analysis and dielectric strength.

B. Occasional replacement of

defective components, or

C. repair of leaks on the transformer were noted.

8.1.5 Table 9 is a list of the major substation equipment. This list was received from BPA. Equipment that is highlighted in yellow indicates replacement of components or additions since 1991.

CASCADE LOCKS SUBSTATION EQUIPMENT LIST

Description	Qty.	BPA Equip. Numbers	Position	Year of the Equipment
Outdoor Equipment				
PCB, 15.5KV, 1200A, 20KA, 5 CYCLE	1 ea	O02520		1991
Disconnect Sw.,115kV, Group Operated, 600A	1 ea	D02453	L-1437	1944
Disconnect Sw.,15kV, Group Operated, 600A	1 ea	D04125	L-1324	1951
Disconnect Sw.,15kV, Hook Operated, 600A	6 ea	D00230-35	L-1324	1942
Fuse Mount		F05539-41		2010
Fuse Mount		F00815-818		1947
Surge, Arresters		A02135		1960
Grounding, 4/0-2/0 CU, Gnd Rods & OHGW	2200lnft			1960
Current Transformer, 15kV, 200/400-5A	1 ea	C01758		1949
Current Transformer, 15kV, 200/400-5A	1 ea	C01853		1949
Current Transformer, 15kV, 200/400-5A	1 ea	C03632		1965
Voltage Transformer, 15kV Class, Metering	3 ea	P01302-04		1947
Cable & Control Wire, Outdoor-600V	775 lnft			2011
SS, Transformer 15/25kVA 1-Phase	1 ea			1960
Bus, Cooper 1" & 1 1/2"	90 lnft			1960
Insulator, Stacking,115/230kV	54 ea	D02453		1944
Conduit - Plastic, PVC 2" IPS	400 lnft			1960
Transformer, Pwr 6/8MVA, 115-12.5kV	1 ea	T00899		1951
Structures/Supports, 115kV BusPed, High 17'-7"	6 ea			1960
Station Equipment - Protective Equipment				2011
SWYD Lighting, w/J-Box & Recepticles	3 ea			1960
Indoor Equipment				
Switchboards and Panels and Relays				1960
Switchboards and Panels and Relays				1984
Switchboards and Panels and Relays				2011
Battery Charger, 48VDC, Panel & Gnd Det.	1 ea	B01832		1982
Battery Charger, RECTIFIER, 48VDC, 12 AMP DC		B02276		1991
Site Development & Environment				
Fencing (Inside yard)	520 lnft			1960
Ctrl/Meter Hse, Wood-Al Clasd, 6x6	1 ea	Z00322		1960
Foundations, Concrete	40 cuyd			1960
Oil Spill/Site Development/Walls-TRN	1 ea			2012
Parking, Roads, Bridges - TRANS				1960
Property Line Fence				1960
Water/Sewer System				1960
Land	1.53 AC			1960

Table 9: Cascade Locks Substation Major Equipment List

8.1.6 The substation maintenance seems to be adequate, although the transformer shows evidence of some oil leaks (dark areas near base - Figure 14).

Figure 14: Oil Leakage

8.1.7 Some broken components were noted (glass and possibly gauge - Figure 15).

8.1.8 The preventative maintenance program may extend the remaining useful life of this transformer, but anticipated increases in the transformer loading to the nameplate rating will accelerate aging of the winding insulation due to higher operating temperatures. It is unwise to depend on this transformer as the single source of power in the long term, unless an emergency standby unit is readily available for replacement due to a fatal fault in the existing unit.

8.1.9 Physical condition summary of other substation facilities:

Figure 15: Broken Gauge

- 115 kV equipment and support structures – The disconnect switch appears to be in acceptable operating condition. The Maintenance Records indicate occasional maintenance on the switch contacts. The brown cap and pin insulators on the switch are likely the original insulators. There is no ground mat at the switch operating handle. The transformer fuse mountings were replaced in 2010. The surge arrestors are 1960 vintage, but seem to be in acceptable operating condition. The bus support insulators are brown porcelain, cap and pin style and the 115 kV bus and steel supports are 1960 vintage. The structural steel has probably been repainted, but shows minor sign of rust.

- 15 kV equipment and support structures – The 15 kV Power Circuit Breaker was replaced in 1991. The exterior shows signs of touch-up painting (Figure 16). Other parts of the breaker seem to be in acceptable operating condition. The 15 kV switches and bus support insulators are brown porcelain, cap and pin style that are likely 1960 vintage insulators. The potential transformer and two of the three current transformers used for metering appear to be 1940's vintage. One current transformer was replaced in 1965. The support structure for the bus and switches is in fair condition and is likely 1960 vintage.

Figure 16: 15 kV Breaker

- Control Building, control panels, and miscellaneous station service equipment – The control building shell is in good condition. Protective relays, control battery cells and battery charger were replaced in 2011. All interior systems appear to be in good condition.

- Spill Prevention, Containment and Countermeasure (SPCC) system – A spill containment area around the substation transformer was constructed in 2012. A shallow (2'-deep) ditch was excavated around the transformer foundation, lined with a "geomembrane" liner, backfilled to 6-inches below finished grade, and topped off with an "Envirogrid" Polymeric Cellular

Confinement system. The outfall of the containment area is piped to an oil/water separator. A Spill Response Unit is located on-site in a tote and oil booms are in a small storage shed on-site. A geotechnical evaluation of the substation property should be conducted prior negotiating a final purchase price of the substation. Since soil contamination may have occurred prior to the SPCC system being installed. The valuation of the substation is assumes that any previous contamination has been removed and properly disposed of.

- Concrete Foundations – The visible portion of the concrete foundations are in fair condition. The existing foundations will likely be replaced if the substation configuration is changed to upgrade the substation transformer kVA rating.
- Ground Grid – Grounding "tales" to equipment and structures were noted. The configuration and condition of the sub-surface ground grid is unknown. The ground grid will likely need to be replaced or upgraded if a substation transformer is installed with a larger kVA rating.
- Substation Fence and Yard – An aerial view of the substation yard is shown in Figure 17. The fence and yard is in fair condition. Fence posts are bonded to the ground pigtail, but the fabric is not boded to the post or pigtail. Current grounding practices for bonding fence fabric and access gates should be implemented to comply with the current National Electric Safety Code (NESC) requirements. If the City purchases the substation then new safety signs should be installed that comply with current NESC requirements.
- Property Fence - The property line fence that is included on the BPA equipment list was not visible. Either it has not been maintained or it has been removed.
- Driveway and other improvements outside the Substation fence – The condition of the driveway, parking area are in fair condition.

Figure 17: Substation Aerial View

9.0 REMAINING USEFUL LIFE ANALYSIS

9.1 ECONOMIC LIFE VS. USEFUL LIFE

9.1.1 Financial systems will typically depreciate assets at a uniform rate over a fixed period of time using Generally Accepted Accounting Practices (GAAP). This period of time is often referred to as the "economic life" of an asset. The economic life may or may not correlate with the "design life" or the "useful life" of an asset. The annual financial statements report the depletion of the asset value as "depreciation" expense. The sum of the annual depreciation expenses is recorded in the accumulated depreciation account on the balance sheet. The original cost less the accumulated depreciation is the net book value of the asset.

9.1.2 The net book value in the financial records may not represent the remaining useful value of the asset. If a piece of equipment fails before it reaches if economic life, it is retired and replaced with a different piece of equipment.

9.1.3 An example of a useful life less than the economic life might be the 15 kV breaker. This breaker was replaced 31 years after the substation was originally constructed. If the economic life was 35 or 40-years, the net book value would reflect 4 to 9-years of remaining value, but the useful life was only 31-years.

9.1.4 An example of a useful life more than the economic life might be the substation transformer. The transformer was built in 1951 and is still in operation in 2014. Its current useful life of 63-years by far exceeds the typical economic life of 33-years. The net book value would reflect no remaining value, but actual useful life is almost double its economic life.

9.2 REMAINING USEFUL LIFE DETERMINATION

9.2.1 The useful life of an asset depends on a number of factors such as: environmental conditions (i.e. isochronic levels – lightning, costal or desert climates); loading conditions (i.e. lightly loaded, or overloaded); preventative maintenance policies (i.e. poor or exceptional), improvements in materials or manufacturing methods (i.e. technology), etc.

9.2.2 The substation condition assessment that was discussed in the previous section and the equipment lists, maintenance records, and other information provided by BPA was used to estimate the remaining useful life of the substation assets.

9.2.3 Professional judgment of the observed conditions at the substation facilities was used to estimate the remaining useful life of the substation.

9.2.4 The manufacture date and apparent condition of the major substation components (115 kV equipment, power transformer, 15 kV feeder breaker and other equipment, structural steel, etc.) was used to estimate the remaining useful life of the substation. The result of the remaining useful life analysis is shown in Table 10.

CASCADE LOCKS SUBSTATION							
Equipment	Estimated Replacement Cost @ 2014 [1]	Year [2]	Useful Life (Years)	Remaining Useful Life (2014) [3]	Cost Weighting Factor	Weighted Useful Life	Weighted Remaining Useful Life
Transformer - 6/8 MVA	$ 554,000	*1951*	50	0	0.43	21.50	0.00
High Side - Structures, Bus, Transformer Protection	$ 136,000	*1960*	40	0	0.10	4.00	0.00
Low Side Breaker	$ 47,000	1991	40	17	0.04	1.60	0.68
Substation structures, foundations, ground grid, fence, site work, control buiding, control panels, etc.	$ 416,000	1960	50	0	0.32	16.00	0.00
Recent Upgrades	$ 147,000						
HS fuses		2010	40	36	0.05	2.00	1.80
Protective Relays		2011	20	17	0.01	0.20	0.17
Spill Containment System		2012	20	18	0.04	0.80	0.72
Substation batteries, chargers		2014	20	20	0.01	0.20	0.20
NEW SUBSTATION ESTIMATED COST	$ 1,300,000				1.00	46	4

Substation constructed in 1960. Some equipment pre-dates the substation in-service date and was assumed to be in-service at another location. [3]

NOTES:

1. Replacement cost for each category includes the cost of materials/equipment, installation labor and overheads.
2. The dates are based on Substation Equipment List received from BPA.
3. It is assumed that depreciation starts when the plant asset is manufactured or placed "in-service". The 115 kV fuse mounting was replaced in 2010. Some relays/control equipment with related wiring was installed in 2010 or later. The majority of the substation assets are pre-1970 vintage (43+ years old).

Table 10: Substation Remaining Useful Life

9.2.5 The respective asset's useful life is weighted by the proportionate cost of that asset type to the total cost of the substation. The remaining useful life for the entire substation is the weighted average of the all of the substation assets. The RCNLD is determined by using the percentage of "remaining Useful Life" to "Useful Life" multiplied by the Replacement cost of each substation to determine the net remaining value.

9.2.6 Since detailed accounting records were not available from BPA, a comparative value of Appreciated Cost Less Depreciation methodology, using the Handy-Whitman Index could not be developed.

10.0 REPLACEMENT COST ESTIMATES

10.1.1 The Replacement Cost New Less Depreciation (RCNLD) methodology was used to determine the present value of the substation. The Replacement Cost New (RCN) is the cost in today's dollars, of a constructiOn a similar new substation today.

10.1.2 A summary of the estimated cost to construct a similar new substation in shown in Table 8.

10.1.3 The estimated costs were based on Brown & Kysar's experience with design and construction projects for electric utilities, quotations from vendors and manufacturers, and industry cost guides. All costs are in 2014 dollars and include labor, materials and equipment. Overhead percentages were added to the direct costs to account for engineering, construction management and other indirect costs not specifically identified. The RCN estimate assumes "greenfield" (initial) construction of the system.

10.1.4 The year of installation of the substation was 1960 per BPA records. Some equipment had been manufactured before 1960 and some of the 1960 equipment has been retired and replaced with newer equipment. The salvage value has been assumed to be equal to the removal cost.

10.1.5 As a side note, a power transformer or breaker that is contaminated with PCB's will have a greater removal cost than the salvage value because of the cost to dispose of the hazardous materials. Therefore, it is essential to take an oil sample from the transformer to a certified test laboratory to test for PCBs and combustible gas analysis to compare oil test results at the BPA test lab before negotiating a final sale agreement.

10.1.6 The replacement cost for a "like" substation is included in Table 11.

CASCADE LOCKS SUBSTATION			
DESCRIPTION [1]	QTY	UNIT	BUDGET W/ OVERHEADS
115kV STATION EQUIPMENT			$ 203,000
LINE TERMINAL STR (115 KV) W/TRUSSES	14,000	LBS	
TERMINAL STRUCTURE FDNS	6	CUYD	
BUS & FITTINGS (115 KV)	1	BAY	
BUS & EQUIP. SUPPORT PEDS.TRUSSES	1,500	LBS	
HS FUSES, 200A	3	EA	
HS SURGE ARRESTORS	3	EA	
HS DISCONNECT SWITCH	1	SW	
SUBSTATION TRANSFORMER & EQUIPMENT			$ 554,000
TRANSFORMER, 6/8 MVA, NO/LTC	1	UNIT	
SUBSTATION TRANSFORMER FDN	7	CUYD	
SPILL CONTAINMENT SYSTEM	1	LOT	
LS SURGE ARRESTORS	3	EA	
15KV FEEDER EXIT EQUIPMENT			$ 147,000
LS STRUCTURE (1 FDR)	1	BAY	
LS STRUCTURE FDN	2	CUYD	
BUS & FITTINGS (15 KV) 1200A	1	BAY	
15 kV INSTRUMENT TRANSFORMERS & METERING	3	LOT	
BREAKER, 15 KV, 1200A	1	BKR	
LS DISCONNECT SWITCH	6	EA	
LS BYPASS SWITCH 3PGO 15 kV, 1200A	1	EA	
BREAKER FDN	2	CUYD	
RELAYING 15 KV LINE & METERING/CONTROL PANEL	1	PKG	
SITE WORK, CONTROL BUILDING, STATION SERVICE & MISC.			$ 259,000
MASS GRADING	16,000	SQFT	
YARD SURFACING	593	CUYD	
DRIVEWAY, PARKING (GRAVEL)	350	CUYD	
SUBSTATION FENCE	520	LFT	
STORM WATER DRAINAGE SYSTEM	1	LOT	
GROUND GRID	1	LOT	
CONTROL BUILDING, LOW VOLTAGE SYSTEMS & MISC.			$ 137,000
CONTROL BUILDING 6' x 6'	1	BLDG	
BUILDING FDN	3	CUYD	
STATION SERVICE (AC) PANEL, BRANCH CIRCUITS	1	LOT	
STATION SERVICE TRANFORMERS (15, 25 KVA)	2	TX	
SUBSTATION BATTERIES & CHARGERS	1	LOT	
STATION SERVICE (DC) DIST. PANEL	1	LOT	
OUTDOOR LIGHTING FIXTURES	1	SYS	
CONTROL CABLES & WIRING (OUTDOOR	1	LOT	
CONTROL CONDUITS	150	FT	
SCADA & COMMUNICATION EQUIPMENT/CONROL PANELS	1	PKG	
NEW SUBSTATION ESTIMATED COST			$ 1,300,000
Property (1.5 ACRES) [2]			$ 106,500
TOTAL REPLACEMENT COST NEW (INCLUDING COST OF LAND)			$ 1,406,500

NOTES:

1. Recent additions noted on the Remaing Life Determination have been merged with similar equipment groups (i.e. 115 kV fuses are in 115 kV Station Equipment Group).

2. Bare Land, no City Utility (water, sewer) service - Palmer, Groth, Pietka appraisal (Industrial Park Master Plan)

Table 11: Replacement Cost Estimate

11.0 RCNLD (NET PRESENT VALUE) RESULTS

11.1 VALUATION SUMMARY

11.1.1 A summary of the net present value of the BPA CL Substation facilities and property value is shown in Table 12.

REPLACEMENT COST NEW LESS DEPRECIATION (RCNLD) SUMMARY						
SUBSTATION	WEIGHTED AVERAGE USEFUL LIFE (YRS) (2014) [1]	WEIGHTED AVERAGE REMAINING LIFE (YRS) (2014) [1]	ACCUM. DEPREC. (% OF PLANT COST) [2]	REMAINING USEFUL LIFE (% OF PLANT COST) [2]	ESTIMATED REPLACEMENT COST (2014)	REPLACEMENT COST NEW LESS DEPRECIATION (RCNLD)
CASCADE LOCKS SUBSTATION	46	4	92%	8%	$ 1,300,000	$ 100,000
Property [3]	N/A				$ 106,500	$ 106,500
TOTAL PRESENT VALUE						$ 206,500

NOTES:

1. Refer to the **Useful Life** schedule of values for details on determination of the Useful Life and the Remaining Useful Life of the substation.

2. Using a staight line depreciation rate of 2.17% (1/46), the accumulated depreciation over 42-years (46 - 4) is 92% of the plant cost. The Value of the substation, based on the remaining useful life (8%) $100,000.

3. The property value is based on a comparative market analyis of industrial properties in the vicinity of Cascade Locks. The property appraisal is discussed in the 2013 Industrial Park Master Plan. Similar substation properties that are owned by Investor Owned Utilities (IOU) are not located near Cascade Locks. The "green field" (no improvements such as sewer, water, electric utilities, etc.) value was used for the property.

4. The present value, in current dollars, is based on the Replacement Cost of an equivalent new substation in 2014 multiplied by remaining useful life percentage of the substation assets plus the present value of the property.

Table 12: BPA CL Substation Valuation

11.1.2 The $100,000 value is based on the remaining useful life of the substation assets and is stated in current dollars. The $106,500 estimated value of the property is based on "green field", unimproved land that is suitable for electric substation use. The Net Present value of the Substation is the sum of these values ($206,500).

11.1.3 An environmental assessment of the substation property should be completed prior to establishing a sale price for the substation. The environmental assessment should include an assessment or investigation of possible soil contamination and likely cost for remediation of any contamination. The cost for remediation is dependent on the type of contamination and the extent. Remediation costs can be substantial.

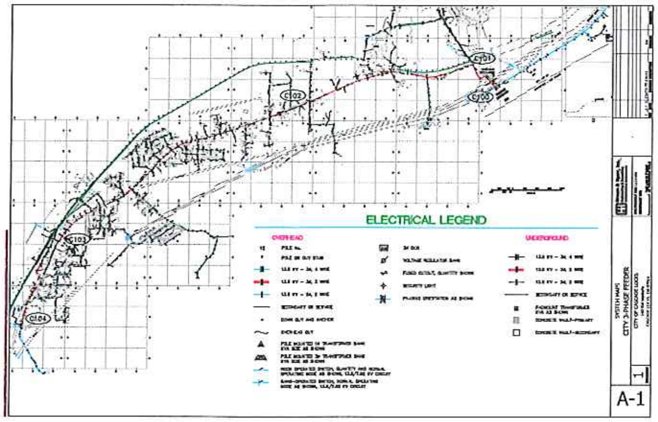
11.1.4 Easements for vehicle access and for transmission and distribution line exits should be mutually agreed to and recorded on the property deed prior to transfer of ownership.

APPENDICES

APPENDIX A
DISTRIBUTION FEEDER MAPS

APPENDIX B
PROPOSED LOOPED CITY FEEDER

APPENDIX C
BPA CASCADE LOCKS SUBSTATION INFORMATION (FOR REFERENCE)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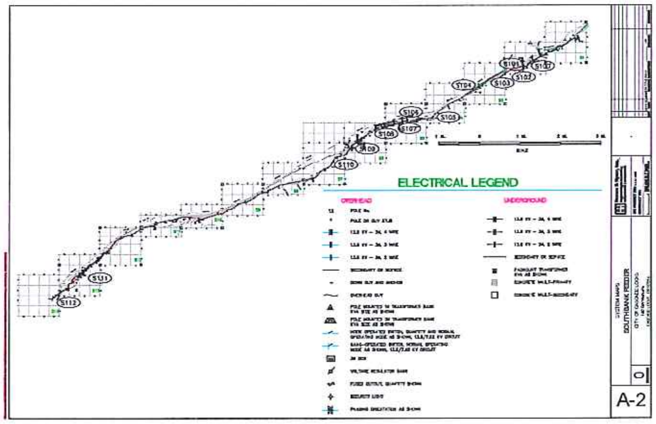
OVERHEAD
UNDERGROUND
SYSTEM MAPS
CITY 3-PHASE FEEDER
CITY OF CASCADE LOCKS
1
A-1



ELECTRICAL LEGEND
OVERHEAD
UNDERGROUND
S101
S102
S103
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SYSTEM MAPS
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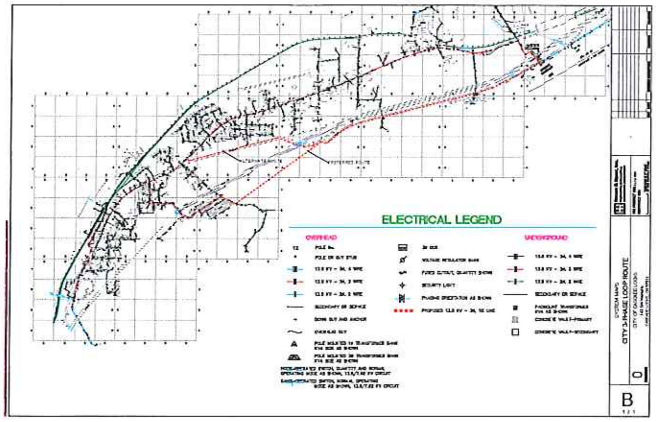
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OVERHEAD
UNDERGROUND
SYSTEM MAPS
CITY 3-PHASE LOOP ROUTE
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