ORCAS POWER & LIGHT COOPERATIVE

EASTSOUND, WASHINGTON

WASHINGTON 9, SAN JUAN

2013-2016 CONSTRUCTION WORK PLAN

Ulteig

2013-2016 Construction Work Plan

Orcas Power and Light Cooperative

Washington 9 San Juan

Eastsound, Washington

4/23/2012

K. Bjerke signing for Section I. Executive Summary through Appendix F. RUS Long Range Plan Approval Letter

April 2012

Ulteig Engineers

Bismarck - Cedar Rapids - Denver - Detroit Lakes - Fargo - Minneapolis

Sioux Falls - Williston

I. Executive Summary

A. Purpose, Results and General Basis of Study

1. Purpose of Report

This report documents the engineering analysis of, and summarizes the proposed construction for, Orcas Power and Light Cooperative's (OPALCO) electric distribution and sub-transmission systems covering the four-year planning period of 2013, 2014, 2015, and 2016. The report also provides engineering support in the form of descriptions, costs and justification of required new facilities for a loan application to RUS to finance the proposed construction program.

2. Results of Proposed Construction

Upon completion of construction of the facilities proposed herein, the system will provide adequate and dependable service to the projected 15,320 accounts in 2016 throughout San Juan County. OPALCO's loads are mostly single-phase loads currently with 12,816 residential service points, 1,668 small commercial and 6 street lighting. OPALCO owns and operates 42.7 miles of sub-transmission lines and ten substations. There are 24 three-phase and 1 single-phase distribution feeders comprised of 1,269 miles of line. Of those miles only 175 are constructed overhead with the remaining 1,094 underground.

3. General Basis of Study

The 2016 projected number of consumers and total peak system load were interpolated directly from the Cooperative's 2011 Power Requirements Study (PRS) as approved by RUS. The Cooperative's Long Range Plan (LRP) was completed in 2008 for a twelve-year period. All of the construction proposed herein is consistent with the LRP.

The Cooperative's 2010 operations and maintenance review (Review Rating Summary; RUS Form 300) will be used in part to determine construction required to replace physically deteriorated equipment and material, upgrade portions of the system to conform to code or safety requirements, and/or improve reliability or quality of service.

New distribution, transmission and power supply construction requirements were considered simultaneously as a "one system" approach for orderly and economical development of the total system.

An analysis, using as a basis RUS guidelines and the design criteria herein, of thermal loading, voltages and physical conditions and reliability was performed on all of the substations, distribution lines and major equipment of the existing system. "Windmil" distribution analysis software provided developed by Milsoft Integrated Solutions, Inc. was used to analyze the winter peak loading periods for 2016 on a 120 volt base. Existing system load balance is taken directly from the phase assignments of the individual consumers on the billing register for the peak billing month.

Areas with the largest calculated voltage drop are listed below:

- *San Juan Island*
  1. Circuit 73 from the Roche Harbor substation reaches 114 volts at the end.
  2. Circuit 113 from the Gravel Pit substation has the lowest calculated voltage at 102 volts
  3. Circuit 53 from the Friday Harbor substation reaches 114 volts

- *Orcas Island*
  1. Circuit 42 from the Orcas substation reaches 114 volts

- *Lopez Island*
  1. Circuit 23 from the Lopez substation reaches 110 volts

There are a number of other areas where the calculated voltage is below the acceptable 118 volts by small margins. Sample printouts of the voltage drop and feeder loading programs are included in Appendix A. For each deficiency that was determined, alternative solutions were investigated and economically evaluated, so that the most cost-effective construction could be proposed.

B. Service Area and Power Supply

Orcas Power and Light Cooperative (OPALCO) is an electric distribution cooperative located in the northwest corner of Washington and serves twenty islands in San Juan County. The four main islands are San Juan, Orcas, Lopez and Shaw. Headquarters are located in Eastsound, Washington, on Orcas Island. There are additional offices on Lopez Island and in Friday Harbor, the county seat is on San Juan Island.

OPALCO provides electricity and energy-related services to 14,490 service accounts throughout San Juan County. OPALCO's loads are mostly single-phase loads with 12,816 residential service points, 1,668 small commercial and 6 street lighting. OPALCO owns and operates 42.7 miles of sub-transmission lines and ten substations. There are 24 three-phase and 1 single-phase distribution feeders comprised of 1,269 miles of line. Of those miles only 175 are constructed overhead with the remaining 1,094 underground. The service area is shown on page 4.

Power supply is obtained from Bonneville Power Administration (BPA), which is a federal agency under the U.S. Department of Energy. They are headquartered in Portland, Oregon and serve the Pacific Northwest. Orcas Power and Light is supplied power by one oil-filled submarine transmission cable at 115 kV and one solid dielectric submarine transmission cables at 69 kV. Both transmission cables are from the BPA Fidalgo substation at Anacortes, WA. The 115 kV transmission line is transformed to 69 kV at BPA's Lopez substation. The 69 kV transmission cable comes directly from BPA's Anacortes substation. BPA's power is transmitted to its Anacortes substation on two parallel 115 kV lines owned and operated by Puget Sound Energy (PSE) to Burrows Bay

substation. From Burrows Bay Substation to BPA's Fidalgo substation a single, 5 mile long, 115 kV line is used. OPALCO has been in negotiations with PSE to install a second 115 kV line from the Burrows Bay substation and BPA's Fidalgo's substation. BPA and OPALCO are both continuing to talk with PSE to address the reliability issue of this single feed line. In addition, BPA has an agreement with PSE to allow for 15 MW's to be transmitted across PSE lines to the Fidalgo substation, this agreement increases the maximum energy transmission from 60 MW to 75 MW. OPALCO's peak usage, as monitored by BPA at its Fidalgo substation, has been 59 MW.

OPALCO was organized in 1937 and presently serves 14,490 accounts:

Residential	12,816
Commercial	1,668
Street Lighting	6
MWH Purchased in 2010	205,321
MWH Sold	192,060
Maximum kW demand	59,200
Consumers/mile	11.4

The overall physical condition of this system is good, but it contains some aging miles of line and poles, which are approaching the end of their useful life. The Cooperative staff has identified a number of underground distribution lines for replacement due to age and condition. With the relatively small amount of overhead distribution, the Cooperative projects to only change out approximately 50 poles per year throughout the plan.

MEMBERS SERVED:

	SUBSTATIONS	
1	DECATUR	357
2	LOPEZ	2265
3	SHAW	305
4	ORCAS	1747
5	FRIDAY HARBOR	3114
7	ROCHE HARBOR	2215
8	OLGA	1026
9	THATCHER	166
10	EASTSOUND	1381
11	FH GROVER ST.	885
	TOTAL	13461

SUBMARINE CABLES CROSSINGS:

TRANSMISSION:

A) LOPEZ TO SAN JUAN (69kV)
B) LOPEZ TO SHAW (69kV)
C) LOPEZ TO DECATUR (25kV)
D) SHAW TO ORCAS (69kV)
E) DECATUR TO BLAKELY (25kV)
F) BLAKELY TO ORCAS (25kV)

DISTRIBUTION (7.2kV):

LOPEZ TO CHARLES
SAN JUAN TO BROWN
SAN JUAN TO PEARL
SAN JUAN TO HENRY
SAN JUAN TO SPIEDEN
PEARL TO HENRY
SHAW TO CANOE
SHAW TO CRANE
ORCAS TO BELL
ORCAS TO FAWN
ORCAS TO LITTLE DOUBLE
ORCAS TO BIG DOUBLE
ORCAS TO OBSTRUCTION
BLAKELY TO ARMITAGE
DECATUR TO CENTER

Miles of Transmission: 43.6

Miles of Distribution: 1,065.97

OPALCO Service Area
ORCAS POWER & LIGHT CO.
ONE LINE DIAGRAM

C. Summary of Construction Program and Costs

Construction project values are summarized on pages 6 through 10 in Form 740C format. Project costs are based on historical data from the Cooperative and the Engineer. These costs have been adjusted for specific projects based on the Cooperative's experience with the terrain, consumer density, weather and other factors. Labor for installation has been included for all project costs. In general, engineering costs were calculated as approximately 15 percent of the construction cost unless a specific project dictated otherwise. Right-of-way costs were also included into the construction cost of each project. Right-of-way costs can vary greatly depending on land ownership and permitting requirements.

With the vast majority of the projects involving the installation of infrastructure such as underground power cable, fiber optic lines, a new substation and overcurrent protection devices it is assumed that these projects will exceed thirty-three years of life. A few pieces of equipment do have software applications that will more than likely become obsolete prior to thirty-three years. However the cost to upgrade only the software is expected to be minimal in comparison to the equipment costs themselves. Therefore, significantly less than ten percent of the total Construction Work Plan does not have a thirty-three year life expectancy.

Smart Grid is becoming more of a factor when determining which projects to include in the Construction Work Plan. Three projects in this CWP are entirely for Smart Grid purposes. The Deer Harbor Fiber (Code 706.1) and Eastsound to Olga Fiber (Code 706.2) projects only involve fiber optic line installation for monitoring and automation. The third project is an extensive Smart Grid, EMS, and Wireless Communications Infrastructure (Code 706.3). The cost for those three projects is $16,232,284, or 36.96% of the total CWP. The CWP does have other projects with Smart Grid components included. In fact, 58% of the funds included in this Construction Work Plan are for projects that contain some Smart Grid component. Those components include meters, fiber optic lines for monitoring and automation, and a wireless system for Cooperative communications.

A detailed breakdown of proposed construction projects for 2013-2016 is included in the Appendix B.

This data will be used by RUS to review your financial situation. Your response is required (7 USC 901 et seq.) and is not confidential.

USDA-RUS

Form Approved
OMB No. 0572-0032

COST ESTIMATES AND LOAN BUDGET

FOR ELECTRIC BORROWERS

To: U.S. Dept. of Agriculture, RUS, Washington, D. C. 20250

BORROWER AND LOAN DESIGNATION
Orcas Power and Light Cooperative
Washington 9 San Juan

COST ESTIMATES AS OF: (Month, Year)

INSTRUCTIONS *See tabs "Pg1 Instr" through "Pg4 Instr"*

SECTION A. COST ESTIMATES

LOAN PERIOD 4 YEARS

					BORROWER'S COST ESTIMATES	RUS USE ONLY
1. DISTRIBUTION						
100	a. New Line: (Excluding Tie-Lines)					
	Construction	Consumers		Miles		
101	Underground	800		0.00	$0	
102	Overhead	30		0.00	0	
	Total Consumers	830	Total Miles	0.00		
			Less Contributions		0	
	Subtotal (New Line - code 100).				$0	
200	b. New Tie-Lines					
	Line Designation			Miles		
201	Single phase 4/0 Al URD			0.45	$60,000	
202	Single phase 4/0 Al URD			0.40	52,500	
203	Single phase 4/0 Al URD			0.20	26,500	
204	Three phase 4/0 Al URD with Fiber			0.83	89,700	
205	Three phase 1/0 Al URD			0.65	138,000	
206	Single phase 1/0 Al URD			0.10	12,500	
	Subtotal from page 1A Miles			2.55	778,600	
	Subtotal (Includes subtotals from pages 1A). Miles			5.18	$1,157,800	
300	c. Conversion and Line Changes					
	Line Designation			Miles		
301	Replace single phase #6 HD Cu with three phase 4/0 Al URD with Fiber			1.89	$250,000	
302	Replace three phase #6 HD Cu with three phase 1/0 Al URD With Fiber			0.15	32,000	
303	Replace single phase #6 HD Cu with single phase 1/0 Al URD			0.57	75,000	
304	Replace single phase #6 HD Cu with single phase 1/0 Al URD			0.58	76,500	
305	Replace single phase #6 HD Cu with single phase 1/0 Al URD With Fiber			1.61	212,500	
306	Replace single phase #6 HD Cu with single phase 1/0 Al URD			0.16	21,250	
307	Replace single phase #6 HD Cu with single phase 1/0 Al URD			0.78	103,250	
308	Replace single phase #6 HD Cu with single phase 1/0 Al URD			0.04	5,000	
309	Replace single phase #6 HD Cu with single phase 1/0 Al URD			0.38	50,625	
310	Replace single phase #6 HD Cu with single phase 1/0 Al URD			0.09	11,250	
	Subtotal from page 1A Miles			21.34	4,726,008	
	Subtotal . (Includes subtotals from pages 1A) Miles			27.59	$5,563,383	
400	d. New Substations, Switching Stations, Metering Points, etc.					
	Station Designation		kVA	kV to kV		
401	Boyce Property Improvements				35,000	
402	Boyce Road Substation		20,000	69 to 12.47	2,000,000	
403						
404					0	
405					0	
406					0	
	Subtotal				$2,035,000	

COST ESTIMATE AND LOAN BUDGET FOR ELECTRIC BORROWERS	BORROWER AND LOAN DESIGNATION	Orcas Power and Light Cooperativ

	SECTION A. COST ESTIMATES (Page 1 Continuation Sheet)		BORROWER'S COST ESTIMATES	RUS USE ONLY
200	b. New Tie-Lines *(Continued)*			
	Line Designation	Miles		
207	Three phase 500 MCM Al URD	2.00	$633,600	
208	Three phase 500 MCM Al URD	0.55	145,000	
209		0.00	0	
210		0.00	0	
211		0.00	0	
212		0.00	0	
213		0.00	0	
214		0.00	0	
215		0.00	0	
216		0.00	0	
	Miles	2.55		
	Subtotal (transfers to page 1)		$778,600	
300	c. Conversion and Line Changes *(Continued)*			
	Line Designation	Miles		
311	Replace single phase #6 HD Cu with three phase 4/0 Al URD With Fiber	2.78	$588,000	
312	Replace single phase #1/0 Al URD with three phase 4/0 Al URD with Fiber	1.08	228,000	
313	Replace single phase #1/0 Al URD with three phase 500 MCM Al URD with F	0.28	75,000	
314	Replace single phase #1/0 Al URD with three phase 4/0 Al URD with Fiber	1.48	313,520	
315	Replace single phase #1/0 Al URD with three phase 4/0 Al URD with Fiber	0.98	131,538	
316	Replace three phase 4/0 Al URD with three phase 500 MCM Al URD with Fib	2.66	365,000	
317	Replace three phase 2/0 ACSR with three phase 336 ACSR With Fiber	1.10	145,000	
318	Replace two phase#1/0 Al URD with three phase 4/0 Al URD with Fiber	1.52	250,000	
319	Replace single phase #6 HD Cu with three phase 4/0 Al URD With Fiber	3.22	896,750	
320	Replace thre #4 ACSR with three phase 500 MCM Al URD With Fiber	1.88	742,500	
321	Replace three phase 2/0 ACSR with three phase 336 ACSR	0.89	75,200	
322	Replace three phase 1/0 ACSR with three phase 336 ACSR With Fiber	0.95	90,000	
323	Add underbuild 396 ACSR 12.47 kV 4-wire with Fiber tp T-line	0.34	18,000	
324	Replace three phase #6 HD Cu with three phase 1/0 Al URD With Fiber	1.99	787,500	
325	Replace three phase #6 HD Cu with three phase 1/0 Al URD	0.19	20,000	
326		0.00	0	
327		0.00	0	
328		0.00	0	
329		0.00	0	
330		0.00	0	
331		0.00	0	
332		0.00	0	
333		0.00	0	
334		0.00	0	
335		0.00	0	
336		0.00	0	
337		0.00	0	
338		0.00	0	
339		0.00	0	
340		0.00	0	
341		0.00	0	
342		0.00	0	
343		0.00	0	
344		0.00	0	
345		0.00	0	
346		0.00	0	
347		0.00	0	
348		0.00	0	
349		0.00	0	
350		0.00	0	
351		0.00	0	
352		0.00	0	
353		0.00	0	
354		0.00	0	
	Subtotal (transfers to page 1).	Mi 21.34	$4,726,008	

BORROWER AND LOAN DESIGNATION	Orcas Power and Light Cooperative	

SECTION A. COST ESTIMATES *(cont.)*						BORROWER'S COST ESTIMATES	RUS USE ONLY
500	e. Substation, Switching Station, Metering Point Changes						
	Station Designation			Description of Changes			
501	Decatur & Thatcher			Renovation of Thatcher and Dectur Substation		$200,000	
502							
503	Lopez			VAR control and Energy metering at Lopez		145,000	
504							
505							
506							
507						0	
508						0	
509						0	
	Subtotal From Page 2A					0	
	Subtotal					$345,000	
600	f. Miscellaneous Distribution Equipment						
601	(1) Transformers and Meters						
	Construction	Transformers			Meters		
	Underground	240	$624,000	3500	$1,050,000	$1,674,000	
	Overhead	0	$0	0	$0	0	
	Subtotal code 601 . . . (included in total of all 600 codes below)					$1,674,000	
602	(2) Sets of Service Wires to increase Capacity					0	
603	(3) Sectionalizing Equipment			(5) Three Phase VFI's and (7) Single Phase NOVA Recloser		587,000	
604	(4) Regulators			(12) line regulators & (3) substation regulators		635,000	
605	(5) Capacitors					0	
606	(6) Ordinary Replacements			175 Distribution Poles		437,500	
	(7)					0	
	(8) URD Cable Replacement:			Approximately 76 miles		8,000,000	
	-9					0	
	(10)					0	
	(11)					0	
	Subtotal ***ALL*** *600 codes*					$11,333,500	
700	g. Other Distribution Items						
701	(1) Engineering Fees					$0	
702	(2) Security Lights					0	
703	(3) Reimbursement of General Funds (see attached)					0	
706	Fiber for SCADA - Deer Harbor & Eastsound to Olga, Smart Grid, EMS, Wireless Comm. Infrastrucutre					16,232,284	
	Subtotal					$16,232,284	
	TOTAL DISTRIBUTION.					**$36,666,967**	
800	2. Transmission a. New Line						
	Line Designation	Voltage		Wire Size	Miles		
801	New Sub Transmission Line	69 kV		336 ACSR/350 MCM AL	3.79	$2,500,000	
802						0	
803						0	
804						0	
805						0	
806						0	
807						0	
808						0	
809						0	
810						0	
	Subtotal - Miles from Page 2A				0.00		
	Total Miles				3.79		
	Subtotal From Page 2A					0	
	Subtotal					$2,500,000	

COST ESTIMATE AND LOAN BUDGET FOR ELECTRIC BORROWERS	BORROWER AND LOAN DESIGNATION	Orcas Power and Light Cooperative

	SECTION A. COST ESTIMATES *(cont.)*			BORROWER'S COST ESTIMATES	RUS USE ONLY
900	b. New Substation, Switching Station, etc.				
	Station Designation	**kVA**	**kV TO kV**		
901	Decatur Switchyard		69	$550,000	
902				0	
903				0	
904				0	
905				0	
906				0	
907				0	
908				0	
	Subtotal From Page 3A			0	
	Subtotal			$550,000	
1000	c. Line and Station Changes				
	Line/Station Designation	Description of Changes			
1001	Lopez Island to San Juan Island	Replace 69 kV Submarine 350 MCM Cu with 500 MCM Cu		$3,000,000	
1002	Lopez N. Circuit Switchers	(2) 69 kV Circuit Switchers		250,000	
1003	Lopez W. Circuit Switchers	(2) 69 kV Circuit Switchers		250,000	
1004	Shaw N. Circuit Switchers	(2) 69 kV Circuit Switchers		250,000	
1005	Pole Replacements	30 Sub-transmission poles		450,000	
1006				0	
1007				0	
1008				0	
1009				0	
	Subtotal From page 3A through 3C			0	
	Subtotal			$4,200,000	
1100	d. Other Transmission Items				
1101	(1) R/W Procurement			$0	
1102	(2) Engineering Fees			0	
1103	(3) Reimbursement of General Funds (see schedule)			0	
1104	(4)			0	
	Subtotal			$0	
	TOTAL TRANSMISSION.			**$7,250,000**	
1200	3. GENERATION (including Step-up Station at Plant)				
1201	a Fuel	Nameplate Rating	kW	$0	
1202	b.			0	
	TOTAL GENERATION.			**$0**	
1300	4. HEADQUARTERS FACILITIES				
1301	a. New or additional Facilities	(Attach RUS Form 740g)		$0	
1302	b.			0	
	TOTAL HEADQUARTERS FACILITIES			**$0**	

COST ESTIMATE AND LOAN BUDGET FOR ELECTRIC BORROWERS	BORROWER AND LOAN DESIGNATION Orcas Power and Light Cooperative		
	SECTION A. COST ESTIMATES *(cont.)*	BORROWER'S COST ESTIMATES	RUS USE ONLY
1400	5. ACQUISITIONS		
1401	a. _____ Consumers _____ Miles	$0	
1402	b.	0	
	TOTAL ACQUISITIONS.	**$0**	
1500	6. ALL OTHER		
1501	a.	$0	
1502	b.	0	
1503	c.	0	
1504	d.	0	
1505	e.	0	
	TOTAL ALL OTHER.	**$0**	

SECTION B. SUMMARY OF AMOUNTS AND SOURCES OF FINANCING

1. GRAND TOTAL - ALL COSTS		$43,916,967	
2. FUNDS AND MATERIALS AVAILABLE FOR FACILITIES			
a. Loan Funds	$0		
b. Materials and Special Equipment	0		
c. General Funds . . . . . Purpose 1	$0		
Purpose 2	$0		
Purpose 3	$0		
Purpose 4	$0		
Total General Funds Applied	$0		
d. Total Available Funds and Materials		$0	
3. NEW FINANCING REQUESTED FOR FACILITIES		$43,916,967	
4. RUS LOAN REQUESTED FOR FACILITIES.	100%	$43,917,000	
5. TOTAL SUPPLEMENTAL LOAN REQUESTED		($33)	
National Rural Utilities Cooperative Finance Corporation			
Name of Supplemental Lender			
6. CAPITAL TERM CERTIFICATE PURCHASES (CFC Loan only)	0%	$0	
7. SUPPLEMENTAL LOAN REQUESTED FOR FACILITIES.	0%	($33)	
8. 100% SUPPLEMENTAL LOANS (SEE RUS Bulletin 20-14)*		$0	

** Identify in section A by budget purpose and separate subtotals.*

SECTION C. CERTIFICATION

We, the undersigned, certify that:

1. Upon completion of the electrical facilities contained herein and any others uncompleted at this time but for which financing is available, the system will be capable of adequately and dependably serving the projected load for the loan period as contained in our current RUS approved Power Requirement Study and Construction Work Plan.

2. Negotiations have been or will be initiated with our power supplier, where necessary, to obtain new delivery points and/or additional capacity at existing ones to adequately supply the projected load upon which this loan application is based.

3. The data contained herein and all supporting documents have, to the best of my knowledge, been prepared correctly and in accordance with 7 CFR 1710.401(a)(3)

_____ _____

Date *Signature of Borrower's Manager*

_____ _____

Date *Signature of Borrower's President*
David Lewis

_____

Corporate Name of Borrower

GFR Initials _____

II. Basis of Study and Proposed Construction

A. Design Criteria

Each of the following design criteria items was reviewed and approved by the RUS General Field Representative in June, 2010

Construction proposed herein is required to meet the following minimum standards of adequacy for voltages, thermal loading, safety and reliability on the system.

1. The maximum voltage drop on primary distribution lines is not to exceed 8 volts (120 volt base) without regulation.

2. The following equipment shall not be thermally loaded by more than the percentage shown of its nameplate rating:

   a. 100% - Power Transformers
   b. 100% - Substation and Line Voltage Regulators
   c. 70% - Oil Circuit Reclosers

3. Primary conductors not to be loaded over 80% of their thermal rating (50% for major tie lines between substations).

4. Poles and/or cross arms to be replaced if found to be physically deteriorated by visual inspection and/or tests (ordinary replacements).

5. Conductors (and associated poles and hardware as required) to be replaced if found to contain an average of over 2 splices per phase per span length.

6. Primary distribution lines to be rebuilt and/or relocated if they are found to be unsafe or in violation of the National Electric Safety Code (edition in effect when constructed) or other applicable code clearances.

7. System improvements to be considered, and made if necessary, in specific areas where members have experienced more than 2 outage hours per year, excluding outages caused by major storms or the power supplier, for the last 3 consecutive years.

8. Standard wire sizes – overhead and underground:

Overhead	Underground
1/0 ACSR distribution	1/0 Al URD distribution
336 ACSR distribution	4/0 Al URD distribution
336 ACSR transmission	350 MCM Al transmission
397 ACSR distribution	500 CU or Al URD distribution
	Submarine transmission 500 CU – 69 kV
	Submarine distribution 4/0 CU-7.2/12.5 kV

9. Primary new transmission construction is overhead (except for underwater crossings) and the preferred new primary distribution construction is underground.

10. All new transmission and distribution lines to be designed and built according to RUS standard construction specifications and guidelines.

    Note: It is recommended that proposed construction items required for voltage improvements, whose forecast need is based solely on calculated voltages from computerized circuit analysis printouts, not be authorized for construction until such calculated voltages are measured in the field and extrapolated to peak loading periods, and then compared to calculated values to corroborate that the actual voltages are below the minimum design levels.

B. Status of Previous Work Plan Items

The majority of items have been completed. A few of the items in the previous Work Plan were not completed due to low priority and lack of field data verifying their necessity. Three line conversion projects: Cattle Point Road Conversion (Code 316), Rouleau Road Conversion (Code 317) and Victorian Road Conversion (Code 318) are carried over to this work plan. Voltage regulator installations at three locations Shark Reef (Code 604.1), Mud Bay (Code 604.2) and Roche Harbor (Code 604.3) are carried over to this work plan as well. Those projects are described in detail along with the other projects. These carried over projects amount to $970,000 or 2.2% of the total for the 2013-2016 CWP.

One line conversion project, Douglas Rd Reconductor –CWP #5.4, from the previous CWP will be omitted. This project is no longer needed due to the proposed substation at the Boyce property with the future substation and circuit boundaries.

C. Analysis of Current System Studies

1. Long Range Plan

The current Long Range Plan was prepared in 2008 by Ulteig Engineers, Inc. OPALCO's board of directors approved it on June 26, 2008. On September 11, 2008 RUS completed their review and gave final approval. A copy of the RUS approval letter is included in Appendix F. All aspects of this Construction Work Plan originated from the Long Range Plan.

2. (RUS Form 300) 2010 O&M Survey

O&M Survey (Form 300) was recently updated and reviewed to determine areas requiring attention. The survey is used as the basis for the following conclusions and recommendations of the CWP. The Form was completed and signed on 3/3/10. A copy of the survey is included in Appendix D of this work plan. In general, the overhead and underground distribution facilities were found to be in satisfactory. The engineering programs were also found to be in satisfactory condition as well. Improvements have been made in recent years and projects within this CWP will continue to improve the system.

3. 2008-2011 Sectionalizing Study

The work proposed in the previous Sectionalizing Study (2008-2011) is complete. Other than the prosed circuit switchers on the 69 kV lines and provisions for feeding Blakely and Decatur Islands via distribution feeders no other sectionalizing changes are necessary at this time. A few reclosers and switches are proposed to be changed out in this CWP, but those are for operational purposes rather than sectionalizing.

D. Historical and Projected System Data

The following table (Table 1- Historical Annual Energy, Load and Consumer Data) indicates historical and projected consumption broken down by year. The table indicates peak energy usage and demand within the past 8 years and projects future energy and demand requirements for the years 2012-2016. The historical data is from the OPALCO's RUS Form 7 reports. The projected data is from the OPALCO Load Forecast Study 2011-2031 completed April 2011 by OPALCO engineering staff. This study predicted that OPALCO would purchase 219,507,756 kWh and sell 205,147,436 kWh. In 2011 the actual was219,125,098 kWh purchased and 205,961,384 kWh sold. OPALCO's board of director's approved the study on April 21, 2011 and the GFR approved it on May 13, 2011. A new OPALCO Load Forecast for 2012-2032 has been completed and has been approved by OPALCO's board of director's on March 2012. This study has validated the previous Load Forecast and indicates that OPALCO's energy usage is continuing to increase at a 1.57% annual growth rate.

1. Annual Energy, Load and Consumer Data

See Table 1-Historical Annual Energy, Load and Consumer Data on page 15.

Orcas Power & Light Cooperative

HISTORTICAL ANNUAL ENERGY, LOAD AND CONSUMER DATA

YEAR	ENERGY PURCHASED (MWH)	ENERGY SOLD (MWH)	ENERGY SOLD % INCREASE	ENERGY LOSS (MWH)	ENERGY LOSS % OF PURCHASED	NON-COINCIDENT PEAK BILLING DEMAND (KW)	NON-COINCIDENT PEAK BILLING DEMAND % INCREASE	% ANNUAL LOAD FACTOR	NUMBER OF CONSUMERS AVERAGE	NUMBER OF CONSUMERS % INCREASE
2003	187,578	174,204	-2.88%	13,374	7.1%	42,780	-14.01%	50.1%	12194	2.36%
2004	192,332	180,075	3.37%	12,257	6.4%	60,460	41.33%	36.3%	12495	2.47%
2005	207,914	186,658	3.66%	21,256	10.2%	59,650	-1.34%	39.8%	12768	2.18%
2006	211,322	192,176	2.96%	19,146	9.1%	55,640	-6.72%	43.4%	13461	5.43%
2007	215,835	199,572	3.85%	16,263	7.5%	57,030	2.50%	43.2%	13760	2.22%
2008	223,725	205,575	3.01%	18,150	8.1%	66,800	17.13%	38.2%	13982	1.61%
2009	216,010	203,257	-1.13%	12,753	5.9%	55,380	-17.10%	44.5%	14223	1.72%
2010	205,321	192,060	-5.51%	13,261	6.5%	59,200	6.90%	39.6%	14406	1.29%
7 YEAR AVERAGE					8.69%			47.9%		
7 YEAR COMPOUNDED AVERAGE			1.52%				1.06%			0.38%

Data compiled from the Cooperative's Financial and Statistical Reports (REA Form 7).
Headquarters usage is included in energy sold.

PROJECTED ANNUAL ENERGY, LOAD AND CONSUMER DATA

WORK PLAN YEAR	ENERGY PURCHASED (MWH)	ENERGY SOLD (MWH)	ENERGY SOLD % INCREASE	ENERGY LOSS (MWH)	ENERGY LOSS % OF PURCHASED	NON-COINCIDENT PEAK BILLING DEMAND (KW)	NON-COINCIDENT PEAK BILLING DEMAND % INCREASE	% ANNUAL LOAD FACTOR	NUMBER OF CONSUMERS AVERAGE	NUMBER OF CONSUMERS % INCREASE
2012										
INCREASE	2,475	2,324	1.13%	-5,628	6.1%	6,494	1.13%	41%	140	0.96%
TOTAL	221,983	208,465		13,518		62,134			14740	
2013										
INCREASE	2,504	2,349	1.13%	412	6.1%	3,635	1.13%	41%	478	0.98%
TOTAL	224,487	210,814		13,673		62,835			14884	
2014										
INCREASE	2,532	2,377	1.13%	155	6.1%	709	1.13%	41%	142	0.95%
TOTAL	227,019	213,191		13,828		63,544			15026	
2015										
INCREASE	2,560	2,403	1.13%	157	6.1%	716	1.13%	41%	145	0.96%
TOTAL	229,579	215,594		13,985		64,260			15171	
2016										
INCREASE	2,589	2,430	1.13%	159	6.1%	725	1.13%	41%	149	0.98%
TOTAL	232,168	218,024		14,144		64,985			15320	

The above increases in energy and demand are derived directly from the current Load Forecast Study.

Table 1- Historical Annual Energy, Load and Consumer Data

2. Substation Load Data

Orcas Power and Light Cooperative is presently served by ten substations. Following is a list of the substations with their projected 2016 demands:

Substation	kVA	Projected 2016 Peak kW	% Nameplate
Decatur	333	559	167.9
Lopez	20,000	7,878	39.4
Shaw	5,000	1,606	32.1
Orcas	20,000	6,983	34.9
Friday Harbor	20,000	18,020	90.1
Roche Harbor	20,000	8,538	42.7
Olga	10,500	4,628	44.1
Thatcher	1,500	852	56.8
Eastsound	20,000	9,614	48.1
Gravel Pit	20,000	7,247	36.2

There appears to be considerable reserve capacity at many of the substations with only three of them expecting to exceed 50%. The Friday Harbor substation would be at 90.1% by the end of the four year plan. However, when the annual peak occurs in the winter it is not uncommon for substation transformers to be loaded up to 110% of nominal nameplate rating.

This CWP proposes construction of another substation on San Juan Island that will absorb a large portion of the Friday Harbor load. There are also tie lines proposed in this CWP that will allow some of the Friday Harbor load to be transferred to the Gravel Pit Substation. The substation boundaries will then be clearly defined for the Gravel Pit, Roche Harbor, Friday Harbor and the new substation (Boyce Road Substation). Preliminary studies have been performed and with the construction of the new Substation the energy needs of San Juan Island will be meet well into the future.

The Decatur substation would reach a peak of over one and a half times its name plate rating and the Thatcher Substation would reach 56.8% of its rating. These two substations supply power to Decatur, Center, Blakely and Armitage Islands. OPALCO is proposing to renovate both Decatur and Thatcher substations in this CWP to accommodate the growing loads.

Since there are few areas of concentrated load development and the growth rate is low, no land use map has been prepared for this plan. The largest population concentration is at Friday Harbor and Eastsound areas. Other load centers include the Roche Harbor, Rosario, Lopez Village and Deer Harbor communities. While exact figures are not available, a significant number of property owners and taxpayers reside out of the county. Peak demands were projected to increase at the rate of 1% per year for all areas except for Friday Harbor, where a rate of 3% per year was used. Since these substation projected peak demands are independent values their totals do slightly surpass the overall system peak demand projection from the Load Forecast Study. The projected substation demands were allocated along each feeder according to the distributed kWh consumption data from the past peak month.

3. System Outages and Reliability

The average outage hours per consumer for the past years have been improving every year since 2004. Total number of outage hours per consumer was under 5 for 2008 and 2009. A tabulation of the number of outages per year for 2008 through 2010 by district and cause is included in Appendix E.

Service reliability becomes more difficult to maintain as the system ages. Besides the system improvements proposed to provide adequate voltage, this plan recognizes that some lines will have to be replaced before year 12 because of deterioration with age. The Cooperative staff has identified a number of underground distribution lines that have experienced three or more faults. Those lines are called out for replacement in the first half of this plan. Funds will be allocated for each of the following years to continue replacements as necessary. The Cooperative is in the process of replacing its existing underground cables constructed with an exposed concentric neutral. The new cables with the concentric neutral concealed by the jacket should last longer and improve the overall system reliability.

In addition to replacing cables, a number of tie lines are proposed in this CWP that will allow faults to be more isolated. With those tie lines providing loop feeds to some loads and methods to back feed other loads fewer consumers will be affected by an outage in those areas during the repairs.

4. Line Loss:

A comparison below indicates improvements in line loads after 2016 proposed changes are shown. The improvements are the result of the increased conductor sizes of existing lines for various projects throughout the system. Adjusting feeding lengths would further improve the line losses, but is prohibitive due to the geographical restrictions. Overall the line losses appear to be at acceptable levels.

Line Loss Comparison					
		Existing System Proposed Load (2016)		Proposed System Proposed Load (2016)	
		(kW)	%	(kW)	%
1	Decatur	31	5.5%	0	0%
2	Lopez	440	5.6%	437	5.1%
3	Shaw	98	6.1%	59	3.7%
4	Orcas	350	5.0%	332	4.8%
5	Friday Harbor	634	3.5%	604	3.5%
7	Roche Harbor	386	4.5%	375	4.4%
8	Olga	257	5.6%	262	5.0%
9	Thatcher	24	2.8%	0	0%
10	Eastsound	361	3.8%	339	3.6%
11	Gravel Pit	380	5.2%	390	5.4%
	Total System	2961		2798	

Table 2 Line Loss Comparison

The Decatur losses are included in the Lopez losses for the proposed system. The Thatcher losses are included in the Olga losses for the proposed system. The new substation proposed in this CWP is not included due to the fact that it won't be operational until the end of 2016 or early 2017.

Note: These values were derived from the calculated loss at the projected substation peaks. Distribution transformer losses are not considered in this comparison.

III Required Construction Items

A. Service to New Customers

All costs associated with adding new consumers to the system are paid for by the prospective customers. This policy is in place due to the large initial costs for building to the new consumer and then the great potential for the account to be idle for the vast majority of the year.

B. Service Changes to Existing Customers

All costs associated with increasing service sizes are paid for by the existing customer.

C. Distribution Lines - Additions and Changes

A complete list of additions and changes by project numbers (RUS Code) and cost is described below. Appendix B lists every project by year of construction and costs and each CWP project number can then be found on the proposed system circuit diagrams in the Appendix C.

Project #201 – Day Lake Rd Tie Line.

This project consists of installing approximately 2,400 feet of single phase 4/0 Al underground cable. This new line will provide a tie between Circuits 101 and 102 of the Eastsound Substation. This tie line will provide redundancy and allow faults to be isolated resulting in less consumers being affected during repairs. Both of the circuits are underground in this area so overhead construction was not considered. Projected costs for this tie line are $60,000.

Project #202 – Raccoon Pt to Eagle Lk Tie Line.

This project consists of installing approximately 2,100 feet of single phase 4/0 Al underground cable. This new line will provide a tie between Circuits 82 from the Olga Substation and 101 from Eastsound Substation and with a new open point allow load to be transferred from Circuit 82 to Circuit 101. This tie line will provide redundancy and allow faults to be isolated resulting in less consumers being affected during repairs. Both of the circuits are underground in this area so overhead construction was not considered. The new open point will be at location 2143320. That is the intersection of Sea Acres Rd, Point Lawrence Rd and Alderbrook Rd. The load along Alderbrook Rd and to the North will now be fed from Circuit 101. This will alleviate low voltage on Circuit 82 on A phase prior to the voltage regulator at the beginning of the single phase tap. Projected costs for this tie line are $52,500.

Project #203 – Aerie Road / Buck Mountain Rd Tie Line.

This project consists of installing approximately 1,060 feet of single phase 4/0 Al underground cable. This new line will provide a closed loop on portion Circuit 104 from the Eastsound Substation. This tie line will provide redundancy and allow faults to be isolated resulting in less consumers being affected during repairs. Both of the circuits are underground in this area so overhead construction was not considered. Projected costs for this tie line are $26,500.

Project #204 – Lopez Road Tie Line.
This project consists of installing approximately 4,365 feet of three phase 4/0 Al underground cable. This new line along Lopez Road will provide a three phase source to a commerce district. The ability to back feed this area will provide redundancy and allow faults to be isolated resulting in less consumers being affected during repairs. Projected costs for this tie line are $89,700.

Project #205 – Vista Road Tie Line.
This project consists of installing approximately 3,450 feet of three phase 1/0 Al underground cable along Vista Road. This new line will provide a loop on Circuit 22 from the Lopez Substation. This tie line will provide redundancy for the majority of the feeder and allow faults to be isolated resulting in less consumers being affected during repairs. Projected costs for this tie line are $138,000.

Project #206 – Davis Bay Tie Line.
This project consists of installing approximately 500 feet of single phase 1/0 Al underground cable. This new line will provide a closed loop on portion Circuit 22 from the Lopez Substation. This tie line will provide redundancy and allow faults to be isolated resulting in less consumers being affected during repairs. All lines are underground in this area so overhead construction was not considered. Projected costs for this tie line are $12,500.

Project #207 – Circuit 104.
This project consists of installing approximately 10,560 feet of three phase 500 MCM Al underground cable and fiber for communications. This new line will be a new circuit out of the Eastsound Substation, #104. The circuit will begin at the substation and go north for a short distance to Mt Baker Rd. The circuit will then go east along Mt Baker Rd and turn south on Terrill Beach Rd. The new line will end at Buck Mountain Rd and tie into Circuit 102. Circuit 102 comes in from the west at that location and will now be normally open. Therefore Circuit 104 will now feed the loads to the east and south of this location. The new Circuit 104 can be used as a backfeed for Circuit 102 and will continue to be a tie line to the Olga substation via Circuit 82 as Circuit 102 was before. Projected costs for this tie line are $633,600.

Project #208 – Circuit 114.
This project consists of installing approximately 2,900 feet of three phase 500 MCM Al underground cable and fiber for communications. This new line will be a new circuit out of the Gravel Pit Substation, #114. The circuit will begin at the substation and go east to Turning Point Road and tie into Circuit 51. Circuit 114 will now feed the loads to the east of this location. This load transfer will reduce to reliance on the Friday Harbor Substations to solely supply energy this area of the Island. Projected costs for this tie line are $145,000.

Project #301 – Egg Lake Road Conversion.
This project will convert approximately 10,000 feet of single phase #6 HD Cu overhead line to three phase 4/0 Al underground. The main purpose for this project is to provide a tie line between the planned new substation, at the intersection of Boyce Rd and Beaverton Valley Rd, and the Roche Harbor Substation. The tie line will be normally open at the north end near Roche Harbor Rd. The loads along Egg Lake Rd will then be fed by the new substation. The reduction in load along the Circuit 71 from Roche Harbor will allow that circuit to pick up more load from Circuit 52 from the Friday Harbor Substation with the normal open point moving to a location near University Rd. Due to numerous trees along the route and existing poles located in Egg Lake an overhead line was not selected. The underground option will provide better reliability for this tie line. Projected costs for this tie line are $250,000.

Project #302 – University Dr. Conversion.
This project will convert approximately 800 feet of three phase #6 HD Cu overhead line to three phase 1/0 Al underground just north of Friday Harbor on Circuit 52. The line is already underground on both ends of this project. This conversion will improve reliability along the entire line by eliminating outages caused by trees and wind. The Cooperative has standardized on 1/0 Al as the smallest cable to be installed and therefore no other sizes were considered. Projected costs for this conversion are $32,000.

Project #303 – Willis Road Conversion.
This project will convert approximately 3,000 feet of single phase #6 HD Cu overhead line to single phase 1/0 Al underground on Circuit 83 of the Olga Substation. This conversion will improve reliability along the entire route by eliminating outages caused by trees and coastal winds. The Cooperative has standardized on 1/0 Al as the smallest cable to be installed and therefore no other sizes were considered. Projected costs for this conversion are $75,000.

Project #304 – Grindstone Bay Conversion.
This project will convert approximately 3,060 feet of single phase #6 HD Cu overhead line to single phase 1/0 Al underground on the southeast end of Orcas Island in the Orcas Substation territory. This conversion will improve reliability along the entire route by eliminating outages caused by trees and coastal winds. The Cooperative has standardized on 1/0 Al as the smallest cable to be installed and therefore no other sizes were considered. Projected costs for this conversion are $76,500.

Project #305 – Shaw Island Conversion.
This project will convert approximately 8500 feet of single phase #6 HD Cu overhead line to single phase 1/0 Al underground with fiber for Smart Grid monitoring and control. This conversion along Hoffman Coe Road and Hix Bay Road will improve reliability along the entire route and loop along Squaw Bay Road by eliminating outages caused by trees and allow for the re-routing of power. The Cooperative has standardized on 1/0 Al as the smallest cable to be installed and therefore no other sizes were considered. Projected costs for this conversion are $212,500.

Project #306 – White Point Conversion.
This project will convert approximately 850 feet of single phase #6 HD Cu overhead line to single phase 1/0 Al underground on Circuit 72 of Roche Harbor Substation. This conversion along White Point Road will improve reliability at the end of this line by eliminating outages caused by trees. This small portion is the only overhead line in the area. The Cooperative has standardized on 1/0 Al as the smallest cable to be installed and therefore no other sizes were considered. Projected costs for this conversion are $21,250.

Project #307 – False Bay Conversion.
This project will convert approximately 4,130 feet of single phase #6 HD Cu overhead line to single phase 1/0 Al underground on Circuit 113 of the Gravel Pit Substation. This conversion along False Bay Drive will improve reliability at the end of this line by eliminating outages caused by trees. This small portion is the only overhead line in the area. The Cooperative has standardized on 1/0 Al as the smallest cable to be installed and therefore no other sizes were considered. Projected costs for this conversion are $103,250.

Project #308 –Eureka Conversion.
This project will convert approximately 200 feet of single phase #6 HD Cu overhead line to single phase 1/0 Al underground on Circuit 52 of the Friday Harbor Substation. This small portion near the intersection of Eureka Drive and Esther Lane is the only overhead line in the area. The Cooperative has standardized on 1/0 Al as the smallest cable to be installed and therefore no other sizes were considered. Projected costs for this conversion are $5,000.

Project #309 – Halvorsen Road Conversion.
This project will convert approximately 2,025 feet of single phase #6 HD Cu overhead line to single phase 1/0 Al underground on Circuit 52 of the Friday Harbor Substation. This conversion along Halvorsen Road will improve reliability of this line by eliminating outages caused by trees. This portion is in between two sections of existing underground lines and will complete the conversion. The Cooperative has standardized on 1/0 Al as the smallest cable to be installed and therefore no other sizes were considered. Projected costs for this conversion are $50,625.

Project #310 – Carter Avenue Conversion.
This project will convert approximately 450 feet of single phase #6 HD Cu overhead line to single phase 1/0 Al underground on Circuit 52 of the Friday Harbor Substation. This small portion at the end of the line along Jensen Alley is the only overhead line in the area. There are safety concerns with manmade structures encroaching on the overhead line. The Cooperative has standardized on 1/0 Al as the smallest cable to be installed and therefore no other sizes were considered. Projected costs for this conversion are $11,250

Project #311 – Nordstrom Lane / Crow Valley Road Conversion.
This project will convert approximately 14,700 feet of single phase #6 HD Cu overhead line to three phase 4/0 Al underground with fiber for Smart Grid use. This route is along Crow Valley Road and Nordstrom Lane and will complete a three phase loop on Circuit 43 from the Orcas Substation and allow for a three phase tie with Circuit 103 of the Eastsound Substation. The included fiber will allow for circuit monitoring and control. The wire size was selected since this route can now serve as a tie line between the two substations. Projected costs for this conversion are $588,000.

Project #312 – Dolphin Bay Road Conversion.
This project will convert approximately 5,700 feet of single phase 1/0 Al underground line to three phase 4/0 Al underground with fiber for Smart Grid use. This route is along Dolphin Bay Road and will complete a three phase loop and tie between Circuits 42 and 43 of the Orcas Substation. This tie line will provide redundancy and allow faults to be isolated resulting in less consumers being affected during repairs. Projected costs for this conversion are $228,000.

Project #313 – Grover Road Conversion.
This project will convert approximately 1,500 feet of single phase 1/0 Al underground line to three phase 500 Al underground. This route is along Grover Road and will complete a three phase loop on Circuit 112. The wire size was selected since this route can now serve as a tie line between the Gravel Pit Substation and the loads served by the Friday Harbor Substation. Projected costs for this conversion are $75,000.

Project #314 – Cessna Road Conversion.
This project will convert approximately 7,800 feet of single phase 1/0 Al underground line to three phase 4/0 Al underground with fiber for Smart Grid use. This route is along Cessna Road and Tarte Road and will complete a three phase loop and tie between Circuits 71 and 72 of the Roche Harbor Substation. This tie line will provide redundancy and allow faults to be isolated resulting in less consumers being affected during repairs. Projected costs for this conversion are $313,520.

Project #315 – Bartel Road Conversion.
This project will convert approximately 5,200 feet of single phase 2/0 Al underground line to three phase 2/0 Al underground with fiber for Smart Grid interconnect. This route is along Bartel Road and will complete a three phase loop on Circuit 104 of the Eastsound Substation allowing this area to be fed from both directions. This tie line will provide redundancy and allow faults to be isolated resulting in less consumers being affected during repairs. Projected costs for this conversion are $131,538.

Project #316 – Cattle Point Road Conversion.
This project is carried over from the previous Construction Work Plan. This project begins at the Pear Pt. S&C fuse pedestal where the existing 500 MCM Al ends and ends at Little Road where it will tie into the existing 500 MCM Al down line. This project will convert approximately 14,000 feet of direct buried unjacketed concentric neutral three phase 4/0 Al underground cable to three phase 500 MCM Al underground cable in conduit and fiber for Smart Grid interconnect on Circuit 113 of the Gravel Pit Substation. This portion is from Pear Point to Little Road and includes a protective device (VFI) for sectionalizing at Little Road. This conversion is necessary to provide better voltage levels to the entire circuit. Projected costs for this conversion are $365,000.

Project #317 – Rouleau Road Conversion.
This project is carried over from the previous Construction Work Plan. This project will convert approximately 5,800 feet of three phase 2/0 ACSR overhead line to three phase 336 ACSR overhead line with fiber for Smart Grid interconnect . This project is along Rouleau Road from Roche Harbor Road to Tarte Road. This conversion is necessary to provide better voltage levels to the end of the circuit and along with the Cessna Road Conversion #314 will provide a reliable three phase loop and tie between Circuits 71 and 72 of the Roche Harbor Substation. Projected costs for this conversion are $145,000.

Project #318 – Victorian Valley Conversion.
This project is carried over from the previous Construction Work Plan. This project will convert approximately 8,000 feet of two phase, unjacketed concentric neutral 1/0 Al underground line to three phase 4/0 Al underground line with fiber for Smart Grid interconnect. This conversion is necessary to provide better voltage levels to the end of the circuit and along with the Dolphin Bay Road project #312 will provide a reliable three phase loop and tie between Circuits 42 and 43 of the Orcas Substation. Projected costs for this conversion are $250,000.

Project #319 – Beaverton Valley Conversion.
This project will convert approximately 17,000 feet of single phase #6 HD Cu overhead line to three phase 4/0 Al underground with fiber for Smart Grid interconnect along Beaverton Valley Rd. This line will be the main feeder for the new Circuit to the East from the planned new substation, at the intersection of Boyce Rd and Beaverton Valley Rd and provide a tie line to the Friday Harbor area. The tie line will be normally open near Barnswallow Way. The loads west of the open point will then be fed by the new substation. The underground option will provide better reliability for this tie line and will move the present distribution overhead line out of several wet land areas, the new route will follow along Beaverton Valley Rd. A fiber optic line will be installed along this route as well for monitoring and automation purposes at the new substation and be part of OPALCO's Smart Grid network. Projected costs for this tie line are $896,750.

#320 – San Juan Conversion.
This project will convert approximately 9,900 feet of three phase #4 ACSR overhead line to three phase 500 MCM Al underground with fiber for Smart Grid interconnect along San Juan Valley Rd. This line will be the main feeder for the new Circuit to the Southeast from the planned new substation, at the intersection of Boyce Rd and Beaverton Valley Rd, and provide a tie line to the Friday Harbor area. The tie line will be normally open near Douglas Road. The loads west of the open point will then be fed by the new substation. The underground option will provide better reliability for this tie line. Projected costs for this tie line are $742,500.

Project #321 - Crescent Beach Conversion.
This project will convert approximately 4,700 feet of three phase 2/0 ACSR overhead line to three phase 336 ACSR overhead. This route is along Crescent Beach Drive from Madrona Street to Terrill Beach Road and will provide a more reliable tie between Circuits 102 of the Eastsound Substation and 82 of the Olga Substation and Circuits 102 and the planned 104. This tie line will provide redundancy and allow faults to be isolated resulting in less consumers being affected during repairs. A fiber optic line will be installed along this route to provide automation to a VFI switch at the east end of this project. Projected costs for this conversion are $75,200.

Project #322 – Ferry Road Conversion.
This project will convert approximately 5,000 feet of three phase 1/0 ACSR overhead line to three phase 336 ACSR overhead underground with fiber for Smart Grid interconnect. This conversion is located at the north end of Lopez Island along Ferry Road and will improve voltage levels at the end of the line. The existing line is showing signs of age and the new construction will provide better reliability to the critical ferry landing. A fiber optic line will be installed along this route to provide monitoring capabilities at the end of the circuit. Projected costs for this conversion are $90,000.

Project #323 – Circuit 111.
This project consists of building a distribution circuit under an existing transmission line for approximately 1,800 feet. This distribution feeder would be used to supply energy to the existing Friday Harbor Substation so that maintenance can be preformed to the Friday Harbor substation transformer. A 3 phase 396 ACSR 12.47 kV distribution line is proposed to be added. Projected costs for this project are $18,000.

Project #324 – Mt. Constitution Conversion.

This project will convert approximately 10,500 feet of three phase #6 HD Cu overhead line to three phase 1/0 Al underground with fiber for Smart Grid interconnect on Circuit 82 of the Olga Substation. This conversion will improve reliability along the entire route to the top of Mt. Constitution where numerous sensitive communication loads are located for the Cooperative as well as the county. Currently outages in this area are extended since access to this area is difficult due to narrow roads, trees and ledges. A fiber optic line will be installed along this route as well for monitoring purposes. The Cooperative has standardized on 1/0 Al as the smallest cable to be installed and therefore no other sizes were considered. Projected costs for this conversion are $787,500.

Project #325 – Football Field Conversion.

This project will convert approximately 1,000 feet of three phase #6 HD Cu overhead line to three phase 1/0 Al underground on Circuit 102 of the Eastsound Substation. This conversion will improve reliability in the village of Eastsound. This stretch of line is subject to outages caused by trees. The Cooperative has standardized on 1/0 Al as the smallest cable to be installed and therefore no other sizes were considered. Projected costs for this conversion are $20,000.

Substation by Substation Analysis:

Each substation was reviewed for voltage drop problems when 2016 non-coincidental peaks were projected on the substation per feeder. The billing file for winter 2010 was used to allocate the kW demand based on energy (kWh) used during that period. The allocation method used measured peak amps for each feeder. Problems identified were voltage drops, which exceeded 8 volts without regulation or 16 volts with one line regulator.

D. Substations (Metering Points) - Additions and Changes

Project #401 – Boyce Property Improvements .
This project is located at the intersection of Boyce Rd and Beaverton Valley Rd on San Juan Island. This will be the site of a new distribution substation on 5 acres of land. This project will consist of the civil site work and fence installation. Projected costs for this project are $35,000.

Project #402 – Boyce Road Substation .
This project is the addition of a distribution substation at the intersection of Boyce Rd and Beaverton Rd. The substation will consist of 69 kV to 12.47 kV 2 MVA transformer and three voltage regulators. In the future there will be four circuits exiting the substation. One circuit will be to the east along Beaverton Rd and feed to the end of existing Circuit 73 from the Roche Harbor Substation. One circuit will to the west along W Valley Rd to Mitchell Bay Rd and feed to the end of existing Circuit 73. North of Mitchell Bay Rd will remain on Circuit 73. The other two circuit will be to the south along Boyce Rd. They will split with one heading east along San Juan Valley Rd and the other continuing south along Wold Rd. Together they will feed the loads west of Douglas Rd that were on Circuit 51 from the Friday Harbor Substation. This will assist in converting the Friday Harbor Substation into a switching yard being fed by the Gravel Pit Substation. Projected costs for this substation project are 2,000,000.

Project #501 – Renovation of the Thatcher and Decatur Substations.
Both the Thatcher and Decatur substations are aging, located on islands with poor accessibility and lightly loaded. The Thatcher Substation transformer will be replaced with a transformer appropriate to accommodate projected growth on the Island for the next 30 years. OPALCO will also connect a distribution circuit from Olga Substation using existing conductors as a backup means for supplying the island needs. The Decatur will also be renovated with an approximately sized transformer to accommodate the projected growth on the island. OPALCO will also connect a distribution circuit from the Lopez Substation using existing conductors as a backup means for supplying the island needs. This project will consist mainly of upgrading of the existing transformers and minor bus and tie feeder modifications. Project costs are projected at $200,000.

Project #503 – VAR control and energy metering at Lopez.
OPALCO experiences poor power factor on its 69 kV system. This project will add PT's and CT's to monitor power factor and power quality. Capacitors or line reactors will be added at the Lopez Step Down Substation site on the 69 kV system to correct power factor. OPALCO lines have a leading power factor of between .95 and .89. The installation of the VAR control will regulate OPALCO's transmission line power factor to between .98 and .96. Projected costs for this project are $145,000.

E. Sectionalizing Equipment - Additions and Changes

Project #603.1 – Orcas to Blakely 15 kV Cables, Source Side.
Three phase 15 kV recloser is going to be added on the southeast portion of Orcas Island before the submarine crossing to Blakely Island. This device will assist in isolating faults along the circuit and preserve the submarine cables now feeding the Thatcher Substation. Projected costs for this project costs for this project are $68,000.

Project #603.2 – Orcas to Blakely 15 kV Cables, Load Side.
Three phase 15 kV pad mounted VFI and transformer is going to be added on the north side of Blakely Island after the submarine crossing from Orcas Island. The VFI device will assist in isolating faults along the circuit and preserve the submarine cables now feeding the Thatcher Substation. The transformer is a 1 MVA unit at a one to one voltage ratio with a wye-delta-wye winding. Since the submarine crossing is made up of three conductors without a neutral this unit will re-establish the connection to ground. Projected costs for this project costs for this project are $75,000.

Project #603.3 – Lopez to Decatur Submarine Cables.
Overcurrent protection devices will be installed at both ends of the submarine cables from Lopez Island to Decatur Island. This line is currently at 25 kV and is the transmission feed to the Decatur and Thatcher Substations. It will connect to the Lopez substation and become a 12.47 kV distribution circuit to feed Decatur Island. The added protective devices will assist in isolating faults along the circuit and preserve the submarine cables. Projected costs for this project are $95,000.

Project #603.4 – Fairgrounds VFI .
A pad mounted VFI switch will replace an existing switch on Circuit 112 of the Gravel Pit Substation on Argyle Ave. The switch will be a four way with over current protection on two bays. This switch will have the capability of being operated remotely. Projected cost for this project is $120,000.

Project #603.5– Pear Point VFI .
A pad mounted VFI switch will replace an existing switch on Circuit 113 of the Gravel Pit Substation at the intersection of Argyle Ave and Pear Point Rd. The switch will be a four way with over current protection on two bays and is a tie to Circuit 112. This switch will have the capability of being operated remotely. Projected cost for this project is $120,000.

Project #603.6– Ferry Road Nova's .
This project consists of replacing existing 3 hydraulic reclosers with Cooper's NOVA reclosers at the south end of Ferry Road on Circuit 21 of the Lopez Substation. The new reclosers have a microprocessor based control for greater coordination and automation capabilities. OPALCO's Smart Grid network will be connected to these reclosers with fiber. Projected cost for this project is $35,000.

Project #603.7– Richardson Road Nova's.
This project consists of replacing existing 3 hydraulic reclosers with Cooper's NOVA reclosers at the north end of Richardson Road on Circuit 22 of the Lopez Substation. The new reclosers have a microprocessor based control for greater coordination and automation capabilities. Projected cost for this project is $39,000.

Project #603.8 – Military Road Nova's.
This project consists of replacing a single existing hydraulic recloser with Cooper's NOVA recloser on Military Road on Circuit 21 of the Lopez Substation. OPALCO's Smart Grid network will be connected to this recloser with fiber. The new recloser has a microprocessor based control for greater coordination and automation capabilities. Projected cost for this project is $35,000.

F. Line Regulators - Additions and Changes

Several line regulators are called out for installation under ***RUS Code 604***. Regulators were selected based on the projected load current. They are referenced in *Appendix D* and shown on the Circuit Diagrams in *Appendix C* by CWP number.

Project #604.1 – Shark Reef Regulator.
This project is carried over from the previous Construction Work Pan. Add one 100 kVA pad mounted voltage regulator on Circuit 23 at pole location 3272408 to increase voltage levels along that long singe phase tap. Projected costs for this project are $50,000.

Project #604.2 – Mud Bay Regulators.
This project is carried over from the previous Construction Work Pan. Add three 100 kVA voltage regulators on Circuit 22 at location 3432439 to increase voltage levels along that entire circuit. Projected costs for this project are $85,000.

Project #604.3 – Roche Harbor Regulators.
This project is carried over from the previous Construction Work Pan. Add two 167 kVA pad mounted voltage regulators on phases A and B on Circuit 72 at location 1043405 to increase voltage levels at the end of the circuit. Projected costs for this project are $75,000.

Project #604.4 – Orcas Substation Regulators.
Add three substation rated voltage regulators at the Orcas Substation on the 12.47 kV bus. This substation has no voltage regulation devices. The regulators will stabilize the voltage levels throughout the circuits. Projected costs for this project are $325,000.

Project #604.5 –Decatur Regulators.
Add three 100 kVA regulators at the south end of Decatur Island on the recently converted 12.47 kV overhead line. These are required to keep adequate voltage levels on Decatur while being fed by the Lopez Substation. Projected costs for this project are $50,000.

Project #604.6 –Blakely Regulators.
Add three 100 kVA regulators at the north end of Blakely Island on the recently converted 12.47 kV overhead line. These are required to keep adequate voltage levels on Blakely while being fed by the Olga Substation. Projected costs for this project are $50,000.

G. Ordinary Replacements

Distribution Transformers:

The Cooperative anticipates changing out 60 transformers per year under ***RUS Code 601***.

Meters:

The Cooperative anticipates replacing approximately 875 meters per year under ***RUS Code 601***. The new meters will have AMI capabilities for Smart Grid utilization as the system continues to evolve. The primary initial functions used will be automatic meter reading and outage verification.

Poles: With the majority of the distribution system underground the Cooperative anticipates only changing out 45 poles per year under ***RUS Code 606***. For the sub-transmission lines the Cooperative anticipates changing 7 or 8 poles per year under ***RUS Code 1005***. With the limited number of poles on the system the Cooperative is able to have all of them tested once every five years.

URD Cable Replacements:

The Cooperative staff has identified a number of underground distribution lines that have experienced three or more faults. It is anticipated that cables for 76 miles of routing will be replaced during the planning period. Those lines are called out for replacement throughout this plan under ***RUS Code 608***. The Cooperative is in the process of replacing its existing underground cables constructed with an exposed concentric neutral. The new cables with the concentric neutral concealed by the jacket should last longer and improve the overall system reliability.

H. Other Distribution Items

Supervisory Control and Data Acquisition (SCADA): ***RUS Code 706 –*** Some line conversion projects have a fiber optic line included as designated in their descriptions for SCADA purposes. They will assist in monitoring and providing automation in some of the more remote locations of the system and allow for better system data gathering capabilities. The following projects are fiber optic only installations. These projects are identified by year of construction in Appendix D.

Project #706.1 – Deer Harbor Fiber.
This project will add a fiber optic line to Circuit 41 from the Orcas Substation for 16,000 feet for Smart Grid interconnection of reclosers and voltage regulators. This fiber line will be used to monitor and operate those devices and be used to enhance communication between OPALCO line crews and offices. This is an overhead line and the fiber will be attached to the poles. Projected costs for this project are $95,000.

Project #706.2 – Eastsound to Olga Fiber.
This project will add a fiber optic line from the Eastsound Substation to the Olga Substation along the existing circuits. This fiber line will replace existing radio equipment and be used to monitor and operate devices at the Olga Substation and allow for increased security monitoring and line crew communications at this site. OPALCO will replace an existing distribution switch with a SCADA controlled VFI. This is a combination of overhead and underground line. Projected costs for this project are $285,000.

Project #706.3 – Smart Grid, EMS, Wireless Communications Infrastructure.
OPALCO has long struggled with poor radio and cell phone communications. Because of low population and high cost, telecommunications providers have provided only limited and unreliable service. This project is to install the basic infrastructure to support a communications “backbone” which will allow district offices to communicate with line crews and members during adverse times. Using this communication infrastructure OPALCO will improve its emergency restoration abilities while increasing safety for OPALCO personnel and members by providing secure and reliable communications during times of need. Projected costs for this project are $15,852,284. These costs are outlined in *Appendix G.*

I Transmission Lines – Additions and Changes

A complete list of additions and changes by project numbers (RUS Code) and cost is described below. Appendix B lists every project by year of construction and costs and each CWP project number can then be found on the proposed system circuit diagrams in the Appendix C.

Project #801 – 69 Kv Sub-Transmission Line.
This project consists of installing a combination of 20,000 feet of 336 ACSR overhead and 350 MCM Al 69 kV cables in conduits from the from the north end of Egg Lake Road to the intersection of Boyce Rd and Beaverton Valley Rd. This will tap off the existing 69 kV line along Roche Harbor Rd and be the feed for the new substation. The county would only allow underground. Projected costs for this project are $2,500,000.

Project #901 – Decatur Switchyard.
This project will install a switchyard on Decatur Island to intercept the 69 kV overhead line that feeds the system from Bonneville Power Administration. The existing 69 kV line crosses Decatur Island in route to Lopez Island. At Lopez the voltage is transformed to 24.9 kV and feeds back to Decatur and then north across Blakely Island to Orcas Island ending at the Olga Substation. The 24.9 kV overhead transmission line has been reinsulated to 69 kV and there are 69 kV submarine cables in place between Decatur and Blakely and Blakely and Orcas. The switchyard would provide the tap for the Olga Substation to be fed at 69 kV and eventually create a 69 kV loop once a tie is established between the Eastsound Substation and the Olga Substation. At the switchyard Bonneville Power Administration (BPA) and OPALCO would have separate equipment in order to operate the switches independently. The separate equipment is a requirement of BPA for allowing a tap at this location. Project costs for the project are $550,000.

Project #1001 Lopez Island to San Juan Island submarine cable.
San Juan Island is presently supplied power by a pair of redundant 69 kV oil filled submarine cables (a Sumitomo and Furikawa manufactured cable). The Furikawa cable was installed in 1994 and the Sumitomo cable was installed in 1977. Cathodic testing of the 350 MCM copper Sumitomo cable is indicating an increase in corrosion of the protective shield surrounding the oil lines running through the cable. Although these tests are not conclusive, OPALCO needs to be pro-active towards any potential release of oil into an ecologically sensitive waterway. Because of the sensitive nature of the water ways around San Juan Island and the anticipated population growth on this Island, OPALCO foresees the need to replace this cable with non-oil filled (dielectirc) cable with fiber for Smart Grid interconnect and increase the cables size from 350 MCM to 500 MCM copper. Total distance: 2.9 miles. Cost: $3,000,000.

Project #1002 – Lopez N. Circuit Switchers.
Two three phase 69 kV circuit switchers are going to be added on the north side of Lopez Island before the submarine crossings to Shaw Island. These devices will assist in isolating faults along the sub-transmission system and preserve the submarine cables. Projected costs for this project costs for this project are $250,000.

Project #1003 – Lopez W. Circuit Switchers.
Two three phase 69 kV circuit switchers are going to be added on the west side of Lopez Island before the submarine crossings to San Juan Island. These devices will assist in isolating faults along the sub-transmission system and preserve the submarine cables. Projected costs for this project costs for this project are $250,000.

Project #1004 – Shaw N. Circuit Switchers.
Two three phase 69 kV circuit switchers are going to be added on the north side of Shaw Island before the submarine crossings to Orcas Island. These devices will assist in isolating faults along the sub-transmission system and preserve the submarine cables. Projected costs for this project costs for this project are $250,000.

IV Appendix

A. Samples of Analysis Used

1. Economic Analysis of Alternate Plans:

As was mentioned in the report, few major construction projects are being considered in this Construction Work Plan. Voltage drop problems are mainly being corrected with load balancing via phase switching and additional regulators. Because the price of an installed regulator is much less expensive compared to line construction of any length, no alternate plans were considered when the use of regulators alleviated the voltage drop problems.

2. Distribution Circuit Analysis Printout:

As described in the General Basis of Study voltage drop analysis was completed using Milsoft's software Windmil. A copy of the voltage drop results from a select feeder with proposed changes has been included as an example.

B. Construction Work Plan Projects

C. Circuit Diagrams

D. Operations and Maintenance Survey (RUS Form 300)

E. Outage History

F. RUS Long Range Plan Approval Letter

G. Smart Grid, EMS, Wireless Communications Infrastructure

APPENDIX A

2. Distribution Circuit Analysis Printout Voltage Drop Results for Circuit 22

Unbalanced Voltage Drop Report
Source: LOPEZ

Database: C:\PROJECTS\OPALCO\2013-2016\2013-2016CWP\EXISTING2013-2016.WM\
Title: Lopez Substation - Circuit 22
Case: Existing system with projected 4 yr load

Units Displayed In Volts
-Base Voltage:120.0-

Element Name	Parent Name	Cnf	Type/ Conductor	Pri kV	Base Volt	Element Drop	Accum Drop	Thru Amps	% Cap	Thru KW	KVAR	% PF	kW Loss	% Loss	mi From Src	Length (mi)	Element KW	Element KVAR	Element Cons On	Element Cons Thru	
LOPEZ		A	Lopez	7.38Y	123.0	0.00	0.00	366.96	38	2648	670	97	0.00	0.0	0.000	0.000	0	0	0	1116	
		B		7.38Y	123.0	0.00	0.00	358.72	37	2585	656	97					0	0	0	924	
		C		7.38Y	123.0	0.00	0.00	376.02	39	2697	685	97					0	0	0	688	
---------- Feeder No. 2 (RECL_82) Beginning with Device RECL_82 ----------																					
RECL_82	LOPEZ	A	CIR22-0	7.38Y	123.0	0.00	0.00	76.85	19	573	144	97	0.00	0.0	0.000	0.000	0	0	0	483	
		B		7.38Y	123.0	0.00	0.00	67.40	17	501	126	97					0	0	0	330	
		C		7.38Y	123.0	0.00	0.00	79.03	20	573	144	97					0	0	0	113	
PRUG13690	PRUG13689	A	500 Cu 15	7.38Y	123.0	0.00	0.04	0.25	0	2	1	89	0.00	0.0	0.188	0.000	0	0	0	2	
P		B		7.38Y	123.0	0.00	0.03	0.00	0	0	0	0					0	0	0	0	
		C		7.38Y	123.0	0.00	0.04	0.00	0	0	0	0					0	0	0	0	P
P PRUG13790	PROH4948	C	2 Al 15 kv	7.36Y	122.6	-0.00	0.36	-0.10	0	0	-1	0	0.00	0.0	0.710	0.006	0	0	0	1	P
P PRUG13789	FUSE_623	C	2 Al 15 kv	7.36Y	122.6	-0.00	0.36	-0.10	0	0	-1	0	0.00	0.0	0.900	0.190	0	0	0	1	P
P PRUG14079	PROH3326	B	2 Al 15 kv	7.35Y	122.5	-0.00	0.55	-0.05	0	0	0	100	0.00	0.0	1.422	0.002	0	0	0	0	P
P PRUG14081	FUSE_631	B	2 Al 15 kv	7.35Y	122.5	0.00	0.55	-0.04	0	0	0	100	0.00	0.0	1.424	0.003	0	0	0	0	P
P PRUG14080	PRUG14081	B	2 Al 15 kv	7.35Y	122.5	-0.00	0.55	-0.04	0	0	0	100	0.00	0.0	1.508	0.084	0	0	0	0	P
C SECOH244	TRAN_39292	B	4/0 TRPX	0.12Y	120.0	1.97	3.00	118.47	58	13	7	88	0.29	2.2	1.441	0.022	0	0	0	1	C
P PRUG12095	PROH4865	A	1/0 Al 15	7.32Y	122.1	-0.00	0.93	-0.02	0	0	0	100	0.00	0.0	2.014	0.037	0	0	0	1	P
P PRUG14194	PROH3174	A	2 Al 15 kv	7.29Y	121.5	0.00	1.45	0.04	0	0	0	100	0.00	0.0	3.512	0.006	0	0	0	1	P
P PRUG14193	FUSE_653	A	2 Al 15 kv	7.29Y	121.5	0.00	1.45	0.04	0	0	0	100	0.00	0.0	3.585	0.073	0	0	0	1	P
P PRUG12504	PRUG727	A	2 Al 15 kv	7.29Y	121.4	0.00	1.56	-0.01	0	0	0	100	0.00	0.0	4.143	0.022	0	0	0	0	P
L SECUG1228	TRAN_39846	A	4/0 TX	0.11Y	113.2	8.05	9.80	78.38	41	8	5	85	0.33	4.0	4.323	0.086	0	0	0	1	L
L 3491144-001	SECUG1228	A	Consumer	0.11Y	113.2	0.00	9.80	78.38	0	8	4	89	0.00	0.0	4.323	0.000	8	4	1	1	L
L SECUG11531	3491144-001	A	4/0 TX	0.11Y	113.2	0.00	9.80	0.00	0	0	0	100	0.00	0.0	4.338	0.015	0	0	0	0	L
P PRUG746	PRUG748	A	2 Al 15 kv	7.29Y	121.4	-0.00	1.57	-0.03	0	0	0	100	0.00	0.0	4.182	0.051	0	0	0	2	P
P PRUG447	PRUG1284	B	2 Al 15 kv	7.30Y	121.7	0.00	1.28	0.03	0	0	0	100	0.00	0.0	3.598	0.059	0	0	0	1	P
P PRUG1268	PRUG1267	B	2 Al 15 kv	7.30Y	121.6	0.00	1.35	0.03	0	0	0	100	0.00	0.0	4.074	0.066	0	0	0	1	P
P PRUG1265	PRUG143	B	2 Al 15 kv	7.30Y	121.6	0.00	1.35	0.04	0	0	0	100	0.00	0.0	3.922	0.050	0	0	0	1	P
P PRUG1257	PRUG1265	B	2 Al 15 kv	7.30Y	121.6	0.00	1.35	-0.02	0	0	0	100	0.00	0.0	3.968	0.046	0	0	0	0	P
P PRUG1260	PRUG737	B	2 Al 15 kv	7.29Y	121.5	-0.00	1.49	-0.03	0	0	0	100	0.00	0.0	4.396	0.055	0	0	0	0	P
P PRUG12452	PRUG316	B	1/0 Al 15	7.29Y	121.5	-0.00	1.50	-0.05	0	0	0	100	0.00	0.0	4.598	0.022	0	0	0	1	P
P PRUG12453	PRUG12452	B	1/0 Al 15	7.29Y	121.5	-0.00	1.50	-0.04	0	0	0	100	0.00	0.0	4.658	0.060	0	0	0	1	P
P PRUG314	PRUG315	B	2 Al 15 kv	7.29Y	121.5	0.00	1.50	0.06	0	0	0	100	0.00	0.0	4.674	0.080	0	0	0	1	P
P PRUG1255	PRUG151	B	2 Al 15 kv	7.29Y	121.5	0.00	1.48	-0.01	0	0	0	100	0.00	0.0	4.226	0.028	0	0	0	1	P
P PRUG13882	PROH4847	A	2 Al 15 kv	7.30Y	121.7	0.00	1.29	0.05	0	0	0	100	0.00	0.0	3.032	0.005	0	0	0	1	P
P PRUG13883	FUSE_642	A	2 Al 15 kv	7.30Y	121.7	-0.00	1.29	0.04	0	0	0	100	0.00	0.0	3.118	0.086	0	0	0	1	P
P PRUG378	PRUG379	A	2 Al 15 kv	7.31Y	121.8	-0.00	1.19	0.23	0	0	-2	0	0.00	0.0	2.896	0.057	0	0	0	2	P
P PRUG377	PRUG378	A	2 Al 15 kv	7.31Y	121.8	-0.00	1.19	0.20	0	0	-1	0	0.00	0.0	2.964	0.068	0	0	0	2	P
P PRUG41	PRUG377	A	1/0 Al 15	7.31Y	121.8	-0.00	1.19	0.16	0	0	-1	0	0.00	0.0	3.041	0.077	0	0	0	2	P
P PRUG42	PRUG41	A	1/0 Al 15	7.31Y	121.8	-0.00	1.19	0.11	0	0	-1	0	0.00	0.0	3.159	0.118	0	0	0	2	P
P PRUG43	PRUG42	A	1/0 Al 15	7.31Y	121.8	0.00	1.19	0.04	0	0	0	100	0.00	0.0	3.229	0.070	0	0	0	2	P
C SECUG11448	TRAN_37924	A	4/0 TX	0.12Y	120.4	0.84	2.63	143.92	75	16	8	89	0.06	0.4	2.779	0.005	0	0	0	2	C
P PRUG12517	PRUG1240	A	1/0 Al 15	7.31Y	121.8	0.00	1.21	0.09	0	0	-1	0	0.00	0.0	3.193	0.152	0	0	0	1	P

KEY-> L = Low Voltage H = High Voltage C = Capacity Over Limit (%capacity or load amps) G = Generator Out of kvar Limits P = Power Factor Low

Unbalanced Voltage Drop Report
Source: LOPEZ

Database: C:\PROJECTS\OPALCO\2013-2016\2013-2016CWP\EXISTING2013-2016.WM\
Title: Lopez Substation - Circuit 22
Case: Existing system with projected 4 yr load

Units Displayed In Volts
-Base Voltage:120.0-

Element Name	Parent Name	Cnf	Type/ Conductor	Pri kV	Base Volt	Element Drop	Accum Drop	Thru Amps	% Cap	Thru KW	KVAR	% PF	kW Loss	% Loss	mi From Src	Element Length (mi)	Element KW	Element KVAR	Element Cons On	Element Cons Thru	
P PRUG198	PRUG206	A	1/0 Al 15	7.31Y	121.8	-0.00	1.25	-0.05	0	0	0	100	0.00	0.0	3.767	0.078	0	0	0	0	P
P PRUG13566	PROH4861	A	2 Al 15 kv	7.32Y	122.0	0.00	1.04	0.05	0	0	0	100	0.00	0.0	2.220	0.006	0	0	0	1	P
P PRUG13565	FUSE_638	A	2 Al 15 kv	7.32Y	122.0	0.00	1.04	0.05	0	0	0	100	0.00	0.0	2.314	0.095	0	0	0	1	P
C TRAN_39369	PRUG12466	A	Transforme	0.12Y	121.4	0.59	1.58	1.88	90	12	7	86	0.05	0.4	2.106	0.000	0	0	0	2	C
C SECUG11435	TRAN_39369	A	4/0 TX	0.12Y	118.9	2.55	4.13	112.66	58	12	6	89	0.15	1.3	2.125	0.019	0	0	0	2	C
C TRAN_39366	PROH3138	C	Transforme	0.12Y	120.9	1.30	2.08	1.38	198	10	3	96	0.03	0.3	1.792	0.000	0	0	0	3	C
P PRUG14150	PROH4962	B	1/0 Al 15	7.32Y	122.0	-0.00	0.95	-0.08	0	0	-1	0	0.00	0.0	2.015	0.015	0	0	0	1	P
P PRUG14151	FUSE_655	B	1/0 Al 15	7.32Y	122.0	-0.00	0.95	-0.07	0	0	-1	0	0.00	0.0	2.023	0.008	0	0	0	1	P
P PRUG12455	PRUG14151	B	1/0 Al 15	7.32Y	122.0	-0.00	0.95	-0.07	0	0	0	100	0.00	0.0	2.125	0.102	0	0	0	1	P
P PRUG138	PRUG1652	A	2 Al 15 kv	7.22Y	120.3	0.00	2.72	-0.00	0	0	0	100	0.00	0.0	3.992	0.007	0	0	0	1	P
P PRUG1648	PRUG1653	A	2 Al 15 kv	7.21Y	120.2	0.00	2.77	0.16	0	1	-1	-71	0.00	0.0	4.199	0.087	0	0	0	2	P
P PRUG1646	PRUG1648	A	2 Al 15 kv	7.21Y	120.2	-0.00	2.77	-0.05	0	0	0	100	0.00	0.0	4.305	0.106	0	0	0	1	P
P PRUG1683	PRUG1682	A	2 Al 15 kv	7.20Y	120.0	0.00	3.04	0.05	0	0	0	100	0.00	0.0	5.119	0.117	0	0	0	2	P
P PRUG1670	PRUG1669	A	2 Al 15 kv	7.20Y	119.9	-0.00	3.06	-0.06	0	0	0	100	0.00	0.0	4.891	0.057	0	0	0	0	P
P PRUG1671	PRUG1670	A	2 Al 15 kv	7.20Y	119.9	-0.00	3.06	-0.03	0	0	0	100	0.00	0.0	4.959	0.069	0	0	0	0	P
P PRUG1500	PRUG1684	A	2 Al 15 kv	7.19Y	119.8	0.00	3.25	-0.00	0	0	0	100	0.00	0.0	5.300	0.009	0	0	0	0	P
P PRUG12462	PRUG1695	A	1/0 Al 15	7.18Y	119.7	-0.00	3.27	-0.02	0	0	0	100	0.00	0.0	5.533	0.033	0	0	0	0	P
L SECUG11654	SECUG11653	A	4/0 TX	0.12Y	117.4	0.27	5.56	41.35	21	4	2	89	0.01	0.0	5.475	0.006	0	0	0	3	L
L SECUG11656	SECUG11654	A	4/0 TX	0.12Y	117.4	0.07	5.63	21.54	11	2	1	89	0.00	0.0	5.477	0.003	0	0	0	2	L
L 3441311-025	SECUG11656	A	Consumer	0.12Y	117.4	0.00	5.63	21.54	0	2	1	89	0.00	0.0	5.477	0.000	2	1	2	2	L
L SECUG11655	SECUG11654	A	4/0 TX	0.12Y	117.3	0.18	5.73	19.81	10	2	1	89	0.00	0.0	5.482	0.008	0	0	0	1	L
L 3441311-020	SECUG11655	A	Consumer	0.12Y	117.3	0.00	5.73	19.81	0	2	1	89	0.00	0.0	5.482	0.000	2	1	1	1	L
P PRUG1662	PRUG1659	A	2 Al 15 kv	7.20Y	120.0	-0.00	3.00	-0.14	0	0	-1	0	0.00	0.0	4.812	0.185	0	0	0	0	P
P PRUG1661	PRUG1662	A	2 Al 15 kv	7.20Y	120.0	-0.00	3.00	-0.04	0	0	0	100	0.00	0.0	4.898	0.086	0	0	0	0	P
P PRUG74	PRUG713	A	1/0 Al 15	7.22Y	120.3	0.00	2.70	0.11	0	1	-1	-71	0.00	0.0	4.515	0.119	0	0	0	1	P
C TRAN_38033	PRUG1399	C	Transforme	0.12Y	118.1	0.45	4.92	2.69	77	18	6	95	0.11	0.6	5.148	0.000	0	0	0	1	C
L SECUG12379	TRAN_38033	C	4/0 TX	0.12Y	117.7	0.97	5.89	161.32	84	18	6	95	0.10	0.5	5.154	0.006	0	0	0	1	L
L 3513132-072	SECUG12379	C	Consumer	0.12Y	117.3	0.00	5.89	161.32	0	18	6	95	0.00	0.0	5.154	0.000	18	6	1	1	L
L SECUG118	3513132-072	C	4/0 TX	0.12Y	117.1	0.00	5.89	0.00	0	0	0	100	0.00	0.0	5.174	0.021	0	0	0	0	L
P PRUG373	PRUG1398	A	1/0 Al 15	7.18Y	119.7	-0.00	3.29	0.08	0	0	-1	0	0.00	0.0	5.554	0.035	0	0	0	4	P
P PRUG372	PRUG373	A	1/0 Al 15	7.18Y	119.7	-0.00	3.29	0.06	0	0	0	100	0.00	0.0	5.616	0.062	0	0	0	1	P
P PRUG371	PRUG372	A	1/0 Al 15	7.18Y	119.7	0.00	3.29	0.02	0	0	0	100	0.00	0.0	5.648	0.032	0	0	0	1	P
PRUG10703	PRUG12475	A	2 Al 15 kv	7.17Y	119.5	-0.02	3.47	-0.18	0	0	-1	0	0.15	0.1	6.032	0.293	0	0	0	0	
		B		7.19Y	119.8	0.17	3.18	14.93	9	105	37	94					0	0	0	55	
P		C		7.12Y	118.6	-0.02	4.39	-0.18	0	0	-1	0					0	0	0	1	P
PROH4936	PRUG10703	A	#1/0 ACSR	7.17Y	119.5	0.00	3.48	-0.03	0	0	0	100	0.01	0.0	6.084	0.052	0	0	0	0	
		B		7.19Y	119.8	0.02	3.20	14.98	7	104	38	94					0	0	0	55	
P		C		7.12Y	118.6	-0.01	4.38	-0.03	0	0	0	0					0	0	0	1	P
PROH4935	PROH4936	A	#1/0 ACSR	7.17Y	119.5	0.00	3.48	-0.03	0	0	0	100	0.01	0.0	6.144	0.060	0	0	0	0	
		B		7.19Y	119.8	0.02	3.22	14.41	6	101	36	94					0	0	0	53	
P		C		7.12Y	118.6	-0.01	4.37	-0.03	0	0	0	0					0	0	0	1	P
PRUG10657	PROH4935	A	2 Al 15 kv	7.17Y	119.5	-0.00	3.48	-0.03	0	0	0	100	0.00	0.0	6.185	0.041	0	0	0	0	
		B		7.19Y	119.8	0.00	3.22	0.22	0	2	1	94					0	0	0	1	
P		C		7.12Y	118.6	-0.00	4.37	-0.03	0	0	0	0					0	0	0	1	P

KEY-> L = Low Voltage H = High Voltage C = Capacity Over Limit (capacity or load amps) G = Generator Out of kvar Limits P = Power Factor Low

Unbalanced Voltage Drop Report
Source: LOPEZ

Database: C:\PROJECTS\OPALCO\2013-2016\2013-2016CWP\EXISTING2013-2016.MM\
Title: Lopez Substation - Circuit 22
Case: Existing system with projected 4 yr load

Units Displayed In Volts
-Base Voltage:120.0-

Element Name	Parent Name	Cnf	Type/ Conductor	Pri kV	Base Volt	Element Drop	Accum Drop	Thru Amps	% Cap	Thru KW	KVAR	% PF	kW Loss	% Loss	mi From Src	Element Length (mi)	Element KW	Element KVAR	Element Cons On	Element Cons Thru	
PRUG10656	PRUG10657	A	2 Al 15 kv	7.17Y	119.5	-0.00	3.48	-0.00	0	0	0	100	0.00	0.0	6.188	0.003	0	0	0	0	
		B		7.19Y	119.8	0.00	3.22	0.23	0	2	1	89					0	0	0	1	
P		C		7.12Y	118.6	-0.00	4.37	-0.00	0	0	0	0					0	0	0	0	P
P PRUG10655	PRUG10657	A	2 Al 15 kv	7.17Y	119.5	0.00	3.48	-0.00	0	0	0	100	0.00	0.0	6.192	0.007	0	0	0	0	P
P		B		7.19Y	119.8	0.00	3.22	-0.00	0	0	0	0					0	0	0	0	P
P		C		7.12Y	118.6	0.00	4.37	-0.00	0	0	0	0					0	0	0	0	P
P PRUG10654	PRUG10657	A	2 Al 15 kv	7.17Y	119.5	0.00	3.48	-0.00	0	0	0	100	0.00	0.0	6.193	0.008	0	0	0	0	P
P		B		7.19Y	119.8	0.00	3.22	-0.00	0	0	0	0					0	0	0	0	P
		C		7.12Y	118.6	0.00	4.37	-0.00	0	0	0	0					0	0	0	1	
P PRUG686	PRUG687	B	2 Al 15 kv	7.18Y	119.6	-0.00	3.41	-0.03	0	0	0	100	0.00	0.0	6.988	0.065	0	0	0	0	P
C SECUG12589	TRAN_40160	B	4/0 TX	0.12Y	117.6	1.36	5.44	150.29	78	16	8	89	0.11	0.7	7.026	0.008	0	0	0	1	C
P PRUG1366	PRUG1367	B	2 Al 15 kv	7.18Y	119.6	-0.00	3.36	-0.06	0	0	0	100	0.00	0.0	6.721	0.120	0	0	0	0	P
P PRUG660	PRUG13793	B	2 Al 15 kv	7.18Y	119.7	-0.00	3.29	-0.04	0	0	0	100	0.00	0.0	6.444	0.072	0	0	0	0	P
P PRUG1359	PRUG14012	B	2 Al 15 kv	7.18Y	119.7	0.00	3.32	0.03	0	0	0	100	0.00	0.0	6.990	0.060	0	0	0	1	P
C TRAN_39211	PROH3183	B	Transforme	0.12Y	119.1	0.59	3.91	1.90	91	12	6	89	0.05	0.4	6.864	0.000	0	0	0	2	C
C SECOH1643	TRAN_39211	B	4/0 TRPX	0.12Y	118.7	0.42	4.34	106.77	52	11	6	88	0.06	0.5	6.869	0.005	0	0	0	1	C
P PRUG96	PRUG97	A	1/0 Al 15	7.16Y	119.3	-0.00	3.66	0.06	0	0	0	100	0.00	0.0	6.285	0.036	0	0	0	1	P
P PRUG95	PRUG96	A	1/0 Al 15	7.16Y	119.3	-0.00	3.66	0.04	0	0	0	100	0.00	0.0	6.347	0.063	0	0	0	1	P
P PRUG12501	PRUG121	A	1/0 Al 15	7.15Y	119.2	0.00	3.76	-0.01	0	0	0	100	0.00	0.0	6.799	0.010	0	0	0	0	P
P PRUG1392	PRUG1389	A	2 Al 15 kv	7.16Y	119.3	0.00	3.69	0.08	0	1	0	100	0.00	0.0	6.361	0.070	0	0	0	2	P
P PRUG283	PRUG13897	A	2 Al 15 kv	7.16Y	119.3	-0.00	3.72	0.08	0	0	-1	0	0.00	0.0	6.285	0.031	0	0	0	1	P
P PRUG282	PRUG283	A	2 Al 15 kv	7.16Y	119.3	-0.00	3.72	-0.07	0	0	0	100	0.00	0.0	6.390	0.105	0	0	0	0	P
P PRUG14512	PRUG282	A	2 Al 15 kv	7.16Y	119.3	0.00	3.72	-0.01	0	0	0	100	0.00	0.0	6.404	0.014	0	0	0	0	P
P PRUG1384	PRUG282	A	2 Al 15 kv	7.16Y	119.3	0.00	3.72	-0.01	0	0	0	100	0.00	0.0	6.404	0.014	0	0	0	0	P
P PRUG13472	PROH3204	A	2 Al 15 kv	7.16Y	119.3	0.00	3.72	0.03	0	0	0	100	0.00	0.0	6.348	0.005	0	0	0	1	P
P PRUG13471	FUSE_746	A	2 Al 15 kv	7.16Y	119.3	0.00	3.72	0.03	0	0	0	100	0.00	0.0	6.407	0.060	0	0	0	1	P
P PRUG12500	PRUG104	A	2 Al 15 kv	7.15Y	119.2	0.00	3.77	-0.01	0	0	0	100	0.00	0.0	6.494	0.012	0	0	0	0	P
P PRUG1383	PRUG1386	A	2 Al 15 kv	7.15Y	119.2	-0.00	3.77	-0.05	0	0	0	100	0.00	0.0	6.746	0.091	0	0	0	0	P
P PRUG693	PRUG14060	A	1/0 Al 15	7.18Y	119.6	-0.00	3.41	0.04	0	0	0	100	0.00	0.0	5.632	0.065	0	0	0	1	P
P PRUG12499	PRUG468	A	2 Al 15 kv	7.19Y	119.8	0.00	3.20	-0.01	0	0	0	100	0.00	0.0	5.240	0.016	0	0	0	0	P
P PRUG466	PRUG465	A	2 Al 15 kv	7.20Y	120.0	0.00	3.01	0.05	0	0	0	100	0.00	0.0	5.023	0.037	0	0	0	1	P
P PRUG467	PRUG466	A	2 Al 15 kv	7.20Y	120.0	-0.00	3.01	-0.03	0	0	0	100	0.00	0.0	5.091	0.067	0	0	0	0	P
PRUG10701	PRUG10700	A	2 Al 15 kv	7.20Y	120.0	0.02	2.96	11.25	7	86	-5	-100	0.50	0.1	5.537	0.125	0	0	0	78	
		B		7.21Y	120.2	0.06	2.80	16.87	10	126	15	99					0	0	0	107	
L		C		7.04Y	117.4	0.18	5.61	40.31	24	283	58	98					0	0	0	66	L
P PRUG1326	PRUG1329	A	2 Al 15 kv	7.20Y	120.0	-0.00	2.97	0.21	0	0	-2	0	0.00	0.0	5.833	0.072	0	0	0	3	P
P PRUG1327	PRUG1326	A	1/0 Al 15	7.20Y	120.0	-0.00	2.97	0.17	0	0	-1	0	0.00	0.0	5.905	0.072	0	0	0	1	P
P PRUG1325	PRUG1327	A	2 Al 15 kv	7.20Y	120.0	-0.00	2.97	0.13	0	0	-1	0	0.00	0.0	5.963	0.058	0	0	0	1	P
P PRUG1447	PRUG1325	A	2 Al 15 kv	7.20Y	120.0	-0.00	2.97	0.10	0	0	-1	0	0.00	0.0	6.164	0.201	0	0	0	1	P
P PRUG11761	PRUG1438	A	2 Al 15 kv	7.20Y	120.0	-0.00	2.96	-0.03	0	0	0	100	0.00	0.0	5.757	0.051	0	0	0	0	P
PRUG10697	PRUG10701	A	1/0 Al 15	7.21Y	120.1	-0.06	2.90	7.20	3	53	-16	-96	0.82	0.2	5.832	0.295	0	0	0	46	
		B		7.21Y	120.1	0.10	2.90	16.88	7	126	15	99					0	0	0	107	
L		C		7.02Y	117.1	0.32	5.93	40.32	18	283	59	98					0	0	0	66	L
PRUG10699	PRUG10697	A	1/0 Al 15	7.21Y	120.2	-0.05	2.85	7.14	3	53	-14	-97	0.62	0.1	6.056	0.223	0	0	0	46	
		B		7.20Y	120.0	0.08	2.98	16.90	7	126	16	99					0	0	0	107	
L		C		7.01Y	116.8	0.24	6.17	40.36	18	282	60	98					0	0	0	66	L

KEY-> L = Low Voltage H = High Voltage C = Capacity Over Limit (%capacity or load amps) G = Generator Out of kvar Limits P = Power Factor Low

Unbalanced Voltage Drop Report
Source: LOPEZ

Database: C:\PROJECTS\OPALCO\2013-2016\2013-2016CWP\EXISTING2013-2016.MM\
Title: Lopez Substation - Circuit 22
Case: Existing system with projected 4 yr load

Units Displayed In Volts
-Base Voltage:120.0-

Element Name	Parent Name	Cnf	Type/ Conductor	Pri kV	Base Volt	Element Drop	Accum Drop	Thru Amps	% Cap	Thru KW	KVAR	% PF	kW Loss	% Loss	mi From Src	Element Length (mi)	Element KW	Element KVAR	Element Cons On	Element Cons Thru	
P PRUG10678	PRUG10699	A	1/0 Al 15	7.21Y	120.2	-0.01	2.84	3.13	1	8	-22	-34	0.08	0.1	6.219	0.163	0	0	0	12	P
		B		7.20Y	119.9	0.08	3.06	16.92	7	126	18	99					0	0	0	107	
L		C		7.01Y	116.8	-0.01	6.16	3.42	2	22	-12	-87					0	0	0	9	L
P PRUG516	PRUG10678	A	2 Al 15 kv	7.21Y	120.2	-0.00	2.84	-0.05	0	0	0	100	0.00	0.0	6.312	0.093	0	0	0	0	P
P PRUG10677	PRUG10678	A	1/0 Al 15	7.21Y	120.2	-0.01	2.83	2.86	1	7	-20	-33	0.07	0.0	6.355	0.136	0	0	0	11	P
		B		7.19Y	119.9	0.07	3.13	16.94	7	126	18	99					0	0	0	107	
L		C		7.01Y	116.8	-0.01	6.15	3.37	1	22	-11	-88					0	0	0	9	L
P PRUG10676	PRUG10677	A	1/0 Al 15	7.21Y	120.2	-0.01	2.82	2.82	1	5	-20	-24	0.07	0.0	6.494	0.139	0	0	0	10	P
		B		7.19Y	119.8	0.07	3.20	16.95	7	126	19	99					0	0	0	107	
L		C		7.01Y	116.9	-0.01	6.14	3.33	1	22	-11	-89					0	0	0	9	L
P PRUG10449	PRUG10676	A	1/0 Al 15	7.21Y	120.2	-0.01	2.81	2.73	1	5	-19	-25	0.08	0.1	6.656	0.162	0	0	0	10	P
		B		7.18Y	119.7	0.08	3.28	16.97	7	126	20	99					0	0	0	107	
L		C		7.01Y	116.9	-0.01	6.13	3.29	1	22	-10	-90					0	0	0	9	L
P PRUG12502	PRUG724	B	2 Al 15 kv	7.18Y	119.7	0.00	3.29	-0.00	0	0	0	100	0.00	0.0	6.789	0.006	0	0	0	0	P
P PRUG10675	PRUG10449	A	1/0 Al 15	7.21Y	120.2	-0.01	2.80	2.63	1	5	-19	-25	0.04	0.0	6.747	0.091	0	0	0	10	P
		B		7.18Y	119.7	0.04	3.33	15.70	7	117	17	99					0	0	0	102	
L		C		7.01Y	116.9	-0.00	6.13	3.25	1	22	-9	-91					0	0	0	9	L
P PRUG10674	PRUG10675	A	1/0 Al 15	7.21Y	120.2	-0.00	2.80	2.57	1	5	-18	-27	0.01	0.0	6.762	0.015	0	0	0	10	P
		B		7.18Y	119.7	0.01	3.33	15.71	7	117	18	99					0	0	0	102	
L		C		7.01Y	116.9	-0.00	6.13	3.23	1	22	-9	-92					0	0	0	9	L
P PRUG10448	PRUG10674	A	1/0 Al 15	7.21Y	120.2	-0.01	2.79	2.56	1	5	-18	-27	0.04	0.0	6.948	0.186	0	0	0	10	P
		B		7.18Y	119.6	0.06	3.39	10.79	5	80	14	98					0	0	0	73	
L		C		7.01Y	116.9	-0.00	6.13	3.22	1	22	-9	-92					0	0	0	9	L
L PRUG722	PRUG10448	C	1/0 Al 15	7.01Y	116.9	0.00	6.13	1.03	0	7	1	99	0.00	0.0	7.070	0.122	0	0	0	2	L
L PRUG723	PRUG722	C	1/0 Al 15	7.01Y	116.9	-0.00	6.13	-0.04	0	0	0	100	0.00	0.0	7.127	0.057	0	0	0	0	L
L TRAN_37571	PRUG722	C	Transforme	0.12Y	116.7	0.17	6.31	1.06	31	7	2	96	0.11	1.5	7.070	0.000	0	0	0	1	L
L SECUG12322	TRAN_37571	C	4/0 TX	0.12Y	116.2	0.45	6.75	63.87	33	7	2	96	0.02	0.3	7.077	0.007	0	0	0	1	L
L 3532233-007	SECUG12322	C	Consumer	0.12Y	116.2	0.00	6.75	63.87	0	7	2	96	0.00	0.0	7.077	0.000	7	2	1	1	L
L SECUG1189	3532233-007	C	4/0 TX	0.12Y	116.2	0.00	6.75	0.00	0	0	0	100	0.00	0.0	7.096	0.019	0	0	0	0	L
L PRUG11929	PRUG722	C	1/0 Al 15	7.01Y	116.9	-0.00	6.13	-0.02	0	0	0	100	0.00	0.0	7.106	0.036	0	0	0	1	L
L TRAN_39923	PRUG11929	C	Transforme	0.12Y	116.9	0.00	6.13	0.00	0	0	0	100	0.11	100.0	7.106	0.000	0	0	0	1	L
L SECUG12321	TRAN_39923	C	4/0 TX	0.12Y	116.9	0.00	6.13	0.00	0	0	0	100	0.00	0.0	7.112	0.005	0	0	0	1	L
L 3532235-001	SECUG12321	C	Consumer	0.12Y	116.9	0.00	6.13	0.00	0	0	0	100	0.00	0.0	7.112	0.000	0	0	1	1	L
L SECUG10777	3532235-001	C	4/0 TX	0.12Y	116.9	0.00	6.13	0.00	0	0	0	100	0.00	0.0	7.123	0.012	0	0	0	0	L
P PRUG10673	PRUG10448	A	1/0 Al 15	7.21Y	120.2	-0.01	2.78	-2.29	1	1	-17	-6	0.03	0.0	7.079	0.131	0	0	0	7	P
		B		7.17Y	119.6	0.04	3.44	10.81	5	80	15	98					0	0	0	73	
L		C		7.01Y	116.9	-0.00	6.12	2.36	1	15	-9	-82					0	0	0	7	L
P PRUG10672	PRUG10673	A	1/0 Al 15	7.21Y	120.2	-0.01	2.77	-2.21	1	1	-16	-6	0.03	0.0	7.231	0.152	0	0	0	7	P
		B		7.17Y	119.5	0.05	3.48	10.49	5	77	14	98					0	0	0	70	
L		C		7.01Y	116.9	-0.00	6.12	2.32	1	15	-9	-84					0	0	0	7	L
P PRUG10671	PRUG10672	A	1/0 Al 15	7.21Y	120.2	-0.01	2.76	-2.11	1	1	-15	-7	0.02	0.0	7.359	0.128	0	0	0	7	P
		B		7.17Y	119.5	0.04	3.53	10.35	5	76	15	98					0	0	0	69	
L		C		7.01Y	116.9	-0.00	6.11	2.27	1	15	-8	-86					0	0	0	7	L
P PRUG1484	PRUG1482	B	2 Al 15 kv	7.16Y	119.3	-0.00	3.66	-0.02	0	0	0	100	0.00	0.0	8.252	0.037	0	0	0	0	P
P PRUG501	PRUG1481	B	2 Al 15 kv	7.16Y	119.3	-0.00	3.65	-0.04	0	0	0	100	0.00	0.0	8.251	0.071	0	0	0	0	P
P PRUG10670	PRUG10671	A	1/0 Al 15	7.21Y	120.2	-0.01	2.75	-2.02	1	1	-15	-7	0.01	0.0	7.500	0.140	0	0	0	7	P
		B		7.17Y	119.5	0.02	3.54	4.17	2	32	-2	-100					0	0	0	34	
L		C		7.01Y	116.9	0.00	6.12	2.23	1	15	-8	-88					0	0	0	7	L
P PRUG10669	PRUG10670	A	1/0 Al 15	7.22Y	120.3	-0.00	2.75	-1.93	1	1	-14	-7	0.00	0.0	7.654	0.155	0	0	0	7	P
P		B		7.17Y	119.5	-0.00	3.54	-1.72	1	1	-12	0					0	0	0	6	P
L		C		7.01Y	116.9	0.01	6.13	2.18	1	15	-7	-89					0	0	0	7	L

KEY-> L = Low Voltage H = High Voltage C = Capacity Over Limit (%capacity or load amps) G = Generator Out of kvar Limits P = Power Factor Low

Unbalanced Voltage Drop Report
Source: LOPEZ

Database: C:\PROJECTS\OPALCO\2013-2016\2013-2016CWP\EXISTING2013-2016.WM\
Title: Lopez Substation - Circuit 22
Case: Existing system with projected 4 yr load

Units Displayed In Volts
-Base Voltage:120.0-

Element Name	Parent Name	Cnf	Type/ Conductor	Pri kV	Base Volt	Element Drop	Accum Drop	Thru Amps	% Cap	Thru KW	KVAR	% PF	kW Loss	% Loss	mi From Src	Element Length (mi)	Element KW	Element KVAR	Element Cons On	Element Cons Thru
P PRUG10668	PRUG10669	A	1/0 Al 15	7.22Y	120.3	-0.00	2.74	-1.83	1	1	-13	-8	0.00	0.0	7.742	0.088	0	0	0	7 P
P		B		7.17Y	119.5	-0.00	3.54	-1.62	1	1	-12	0					0	0	0	6 P
L		C		7.01Y	116.9	0.01	6.13	2.14	1	15	-6	-91					0	0	0	7 L
L PRUG717	PRUG10668	C	1/0 Al 15	7.01Y	116.9	0.00	6.13	2.03	1	14	4	96	0.00	0.0	7.773	0.031	0	0	0	1 L
L PRUG716	PRUG717	C	1/0 Al 15	7.01Y	116.9	0.01	6.14	2.03	1	14	4	96	0.00	0.0	7.859	0.086	0	0	0	1 L
L TRAN_40219	PRUG716	C	Transforme	0.12Y	116.4	0.42	6.56	2.05	98	14	4	96	0.05	0.4	7.859	0.000	0	0	0	1 L
L SECUG12342	TRAN_40219	C	4/0 TX	0.12Y	115.8	0.61	7.17	122.99	64	14	4	96	0.05	0.3	7.864	0.005	0	0	0	1 L
L 3451460-004	SECUG12342	C	Consumer	0.12Y	115.8	0.00	7.17	122.99	0	14	4	96	0.00	0.0	7.864	0.000	14	4	1	1 L
L SECUG348	3451460-004	C	4/0 TX	0.12Y	115.8	0.00	7.17	0.00	0	0	0	100	0.00	0.0	7.872	0.008	0	0	0	0 L
P PRUG10667	PRUG10668	A	1/0 Al 15	7.22Y	120.3	-0.00	2.74	-1.77	1	1	-13	-8	0.00	0.0	7.878	0.136	0	0	0	7 P
P		B		7.17Y	119.5	-0.00	3.54	-1.56	1	1	-11	0					0	0	0	6 P
L		C		7.01Y	116.9	-0.00	6.13	-1.40	1	1	-10	0					0	0	0	6 L
P PRUG10634	PRUG10667	A	1/0 Al 15	7.22Y	120.3	-0.00	2.74	-1.68	1	1	-12	-8	0.00	0.0	8.168	0.290	0	0	0	7 P
P		B		7.17Y	119.5	-0.00	3.53	-1.47	1	1	-11	0					0	0	0	6 P
L		C		7.01Y	116.9	-0.00	6.13	-1.31	1	1	-9	0					0	0	0	6 L
P PRUG10633	PRUG10634	A	1/0 Al 15	7.22Y	120.3	-0.00	2.74	-1.49	1	1	-11	-9	0.00	0.0	8.307	0.140	0	0	0	7 P
P		B		7.17Y	119.5	-0.00	3.53	-1.28	1	1	-9	0					0	0	0	6 P
L		C		7.01Y	116.9	-0.00	6.13	-1.13	0	1	-8	0					0	0	0	6 L
P PRUG10625	PRUG10633	A	2 Al 15 kv	7.22Y	120.3	-0.00	2.74	-1.40	1	1	-10	-10	0.00	0.0	8.364	0.057	0	0	0	7 P
P		B		7.17Y	119.5	-0.00	3.53	-1.19	1	1	-9	0					0	0	0	6 P
L		C		7.01Y	116.9	-0.00	6.13	-1.04	1	1	-7	0					0	0	0	6 L
P PRUG14743	PRUG10625	A	1/0 Al 15	7.22Y	120.3	-0.00	2.74	-1.37	1	1	-10	-10	0.00	0.0	8.435	0.071	0	0	0	7 P
P		B		7.17Y	119.5	-0.00	3.53	-1.16	1	1	-8	0					0	0	0	6 P
L		C		7.01Y	116.9	-0.00	6.13	-1.01	0	1	-7	0					0	0	0	6 L
P PRUG14812	PRUG14743	A	1/0 Al 15	7.22Y	120.3	0.00	2.74	-0.01	0	0	0	100	0.00	0.0	8.455	0.020	0	0	0	0 P
		B		7.17Y	119.5	0.00	3.53	-0.01	0	0	0	0					0	0	0	0
L		C		7.01Y	116.9	0.00	6.13	-0.01	0	0	0	0					0	0	0	0 L
TRAN_38515	PRUG14812	A	Transforme	0.12Y	120.3	0.00	2.74	0.00	0	0	0	100	0.39	100.0	8.455	0.000	0	0	0	0
		B		0.12Y	119.5	0.00	3.53	0.00	0	0	0	100					0	0	0	0
L		C		0.12Y	116.9	0.00	6.13	0.00	0	0	0	100					0	0	0	0 L
SECUG12348	TRAN_38515	A	4/0 TX	0.12Y	120.3	0.00	2.74	0.00	0	0	0	100	0.00	0.0	8.458	0.003	0	0	0	0
		B		0.12Y	119.5	0.00	3.53	0.00	0	0	0	100					0	0	0	0
L		C		0.12Y	116.9	0.00	6.13	0.00	0	0	0	100					0	0	0	0 L
3393351-001	SECUG12348	A	Consumer	0.12Y	120.3	0.00	2.74	0.00	0	0	0	100	0.00	0.0	8.458	0.000	0	0	0	0
		B		0.12Y	119.5	0.00	3.53	0.00	0	0	0	100					0	0	0	0
L		C		0.12Y	116.9	0.00	6.13	0.00	0	0	0	100					0	0	0	0 L
SECUG284	3393351-001	A	4/0 TX	0.12Y	120.3	0.00	2.74	0.00	0	0	0	100	0.00	0.0	8.466	0.008	0	0	0	0
		B		0.12Y	119.5	0.00	3.53	0.00	0	0	0	100					0	0	0	0
L		C		0.12Y	116.9	0.00	6.13	0.00	0	0	0	100					0	0	0	0 L
P PRUG14752	PRUG14743	A	1/0 Al 15	7.22Y	120.3	-0.00	2.74	-0.87	0	1	-6	-16	0.00	0.0	8.442	0.007	0	0	0	3 P
P		B		7.17Y	119.5	-0.00	3.53	-1.04	0	1	-7	0					0	0	0	4 P
L		C		7.01Y	116.9	-0.00	6.13	-0.94	0	1	-7	0					0	0	0	6 L
RECL_136	PRUG14752	A	3393380V1	7.22Y	120.3	0.00	2.74	-0.87	0	1	-6	-16	0.00	0.0	8.442	0.000	0	0	0	3
		B		7.17Y	119.5	0.00	3.53	-1.03	0	1	-7	0					0	0	0	4
L		C		7.01Y	116.9	0.00	6.13	-0.94	0	1	-7	0					0	0	0	6 L
P PRUG14751	RECL_136	A	1/0 Al 15	7.22Y	120.3	0.00	2.74	-0.87	0	1	-6	-16	0.00	0.0	8.444	0.002	0	0	0	3 P
P		B		7.17Y	119.5	-0.00	3.53	-1.03	0	1	-7	0					0	0	0	4 P
L		C		7.01Y	116.9	-0.00	6.13	-0.94	0	1	-7	0					0	0	0	6 L
P PRUG10617	PRUG14751	A	1/0 Al 15	7.22Y	120.3	-0.00	2.74	-0.87	0	1	-6	-16	0.00	0.0	8.515	0.071	0	0	0	3 P
P		B		7.17Y	119.5	-0.00	3.53	-1.03	0	1	-7	0					0	0	0	4 P
L		C		7.01Y	116.9	-0.00	6.13	-0.94	0	1	-7	0					0	0	0	6 L
P PRUG10624	PRUG10617	A	1/0 Al 15	7.22Y	120.3	-0.00	2.74	-0.82	0	1	-6	-16	0.00	0.0	8.583	0.068	0	0	0	3 P
P		B		7.17Y	119.5	-0.00	3.53	-0.98	0	1	-7	0					0	0	0	4 P
L		C		7.01Y	116.9	-0.00	6.13	-0.89	0	1	-6	0					0	0	0	6 L
P PRUG10623	PRUG10624	A	1/0 Al 15	7.22Y	120.3	-0.00	2.74	-0.77	0	1	-6	-16	0.00	0.0	8.719	0.135	0	0	0	3 P
P		B		7.17Y	119.5	-0.00	3.53	-0.92	0	1	-7	0					0	0	0	3 P
L		C		7.01Y	116.9	-0.00	6.13	-0.85	0	1	-6	0					0	0	0	6 L

KEY-> L = Low Voltage H = High Voltage C = Capacity Over Limit (%capacity or load amps) G = Generator Out of kvar Limits P = Power Factor Low

Unbalanced Voltage Drop Report
Source: LOPEZ

Database: C:\PROJECTS\OPALCO\2013-2016\2013-2016CWP\EXISTING2013-2016.WM\
Title: Lopez Substation - Circuit 22
Case: Existing system with projected 4 yr load

Units Displayed In Volts
-Base Voltage:120.0-

	Element Name	Parent Name	Cnf	Type/ Conductor	Pri kV	Base Volt	Element Drop	Accum Drop	Thru Amps	% Cap	Thru KW	KVAR	% PF	kW Loss	% Loss	mi From Src	Element Length (mi)	Element KW	Element KVAR	Element Cons On	Element Cons Thru	
P	PRUG10620	PRUG10623	A	1/0 Al 15	7.22Y	120.3	-0.00	2.74	-0.63	0	1	-5	-20	0.00	0.0	8.725	0.006	0	0	0	2	P
P			B		7.17Y	119.5	-0.00	3.53	-0.77	0	0	-6	0					0	0	0	2	P
L			C		7.01Y	116.9	-0.00	6.13	-0.71	0	1	-5	0					0	0	0	5	L
P	PRUG10622	PRUG10620	A	1/0 Al 15	7.22Y	120.3	-0.00	2.74	-0.06	0	0	0	100	0.00	0.0	8.809	0.085	0	0	0	0	P
P			B		7.17Y	119.5	0.00	3.53	-0.06	0	0	0	0					0	0	0	0	P
L			C		7.01Y	116.9	-0.00	6.13	-0.10	0	0	-1	0					0	0	0	3	L
	TRAN_38513	PRUG10622	A	Transforme	0.12Y	120.3	0.00	2.74	0.00	0	0	0	100	0.39	100.0	8.809	0.000	0	0	0	0	
			B		0.12Y	119.5	0.00	3.53	0.00	0	0	0	100					0	0	0	0	
L			C		0.12Y	116.9	0.00	6.13	0.00	0	0	0	100					0	0	0	2	L
	SECUG12354	TRAN_38513	A	4/0 TX	0.12Y	120.3	0.00	2.74	0.00	0	0	0	100	0.00	0.0	8.813	0.004	0	0	0	0	
			B		0.12Y	119.5	0.00	3.53	0.00	0	0	0	100					0	0	0	0	
L			C		0.12Y	116.9	0.00	6.13	0.00	0	0	0	100					0	0	0	1	L
L	3384425-001	SECUG12354	C	Consumer	0.12Y	116.9	0.00	6.13	0.00	0	0	0	100	0.00	0.0	8.813	0.000	0	0	1	1	L
L	SECUG280	3384425-001	C	4/0 TX	0.12Y	116.9	0.00	6.13	0.00	0	0	0	100	0.00	0.0	8.831	0.018	0	0	0	0	L
	SECUG12353	TRAN_38513	A	4/0 TX	0.12Y	120.3	0.00	2.74	0.00	0	0	0	100	0.00	0.0	8.813	0.004	0	0	0	0	
			B		0.12Y	119.5	0.00	3.53	0.00	0	0	0	100					0	0	0	0	
L			C		0.12Y	116.9	0.00	6.13	0.00	0	0	0	100					0	0	0	1	L
L	3384425-002	SECUG12353	C	Consumer	0.12Y	116.9	0.00	6.13	0.00	0	0	0	100	0.00	0.0	8.813	0.000	0	0	1	1	L
L	SECUG281	3384425-002	C	4/0 TX	0.12Y	116.9	0.00	6.13	0.00	0	0	0	100	0.00	0.0	8.825	0.011	0	0	0	0	L
L	PRUG264	PRUG10622	C	1/0 Al 15	7.01Y	116.9	-0.00	6.13	-0.05	0	0	0	100	0.00	0.0	8.886	0.077	0	0	0	1	L
L	TRAN_37422	PRUG264	C	Transforme	0.12Y	116.9	0.00	6.13	0.00	0	0	0	100	0.11	100.0	8.886	0.000	0	0	0	1	L
L	SECUG292	TRAN_37422	C	4/0 TX	0.12Y	116.9	0.00	6.13	0.00	0	0	0	100	0.00	0.0	8.947	0.060	0	0	0	1	L
L	3384427-001	SECUG292	C	Consumer	0.12Y	116.9	0.00	6.13	0.00	0	0	0	100	0.00	0.0	8.947	0.000	0	0	1	1	L
P	PRUG10632	PRUG10620	A	1/0 Al 15	7.22Y	120.3	-0.00	2.74	-0.47	0	0	-3	0	0.00	0.0	8.797	0.072	0	0	0	2	P
P			B		7.17Y	119.5	-0.00	3.53	-0.56	0	0	-4	0					0	0	0	1	P
L			C		7.01Y	116.9	-0.00	6.13	-0.49	0	0	-3	0					0	0	0	1	L
P	PRUG10631	PRUG10632	A	1/0 Al 15	7.22Y	120.3	-0.00	2.74	-0.42	0	0	-3	0	0.00	0.0	8.879	0.082	0	0	0	2	P
P			B		7.17Y	119.5	-0.00	3.53	-0.51	0	0	-4	0					0	0	0	1	P
L			C		7.01Y	116.9	-0.00	6.13	-0.44	0	0	-3	0					0	0	0	1	L
P	PRUG10630	PRUG10631	A	1/0 Al 15	7.22Y	120.3	-0.00	2.74	-0.33	0	0	-2	0	0.00	0.0	8.950	0.071	0	0	0	1	P
P			B		7.17Y	119.5	-0.00	3.53	-0.46	0	0	-3	0					0	0	0	1	P
L			C		7.01Y	116.9	-0.00	6.13	-0.39	0	0	-3	0					0	0	0	1	L
P	PRUG10629	PRUG10630	A	1/0 Al 15	7.22Y	120.3	-0.00	2.74	-0.28	0	0	-2	0	0.00	0.0	9.045	0.095	0	0	0	1	P
P			B		7.17Y	119.5	-0.00	3.53	-0.41	0	0	-3	0					0	0	0	1	P
L			C		7.01Y	116.9	-0.00	6.13	-0.34	0	0	-2	0					0	0	0	1	L
P	PRUG10628	PRUG10629	A	1/0 Al 15	7.22Y	120.3	0.00	2.74	-0.22	0	0	-2	0	0.00	0.0	9.133	0.088	0	0	0	0	P
P			B		7.17Y	119.5	-0.00	3.53	-0.35	0	0	-2	0					0	0	0	1	P
L			C		7.01Y	116.9	-0.00	6.13	-0.28	0	0	-2	0					0	0	0	1	L
P	PRUG160	PRUG10628	B	1/0 Al 15	7.17Y	119.5	-0.00	3.53	-0.13	0	0	-1	0	0.00	0.0	9.237	0.104	0	0	0	1	P
P	PRUG161	PRUG160	B	1/0 Al 15	7.17Y	119.5	-0.00	3.53	-0.06	0	0	0	100	0.00	0.0	9.334	0.097	0	0	0	1	P
P	PRUG10626	PRUG10628	A	1/0 Al 15	7.22Y	120.3	-0.00	2.74	-0.16	0	0	-1	0	0.00	0.0	9.252	0.119	0	0	0	0	P
P			B		7.17Y	119.5	-0.00	3.53	-0.16	0	0	-1	0					0	0	0	0	P
L			C		7.01Y	116.9	-0.00	6.13	-0.16	0	0	-1	0					0	0	0	0	L
P	PRUG10627	PRUG10626	A	1/0 Al 15	7.22Y	120.3	-0.00	2.74	-0.08	0	0	-1	0	0.00	0.0	9.378	0.126	0	0	0	0	P
P			B		7.17Y	119.5	-0.00	3.53	-0.08	0	0	-1	0					0	0	0	0	P
L			C		7.01Y	116.9	-0.00	6.13	-0.08	0	0	-1	0					0	0	0	0	L
	TRAN_38512	PRUG10627	A	Transforme	0.12Y	120.3	0.00	2.74	0.00	0	0	0	100	0.39	100.0	9.378	0.000	0	0	0	0	
			B		0.12Y	119.5	0.00	3.53	0.00	0	0	0	100					0	0	0	0	
L			C		0.12Y	116.9	0.00	6.13	0.00	0	0	0	100					0	0	0	0	L
	SECUG12360	TRAN_38512	A	4/0 TX	0.12Y	120.3	0.00	2.74	0.00	0	0	0	100	0.00	0.0	9.381	0.003	0	0	0	0	
			B		0.12Y	119.5	0.00	3.53	0.00	0	0	0	100					0	0	0	0	
L			C		0.12Y	116.9	0.00	6.13	0.00	0	0	0	100					0	0	0	0	L
	3384223-001	SECUG12360	A	Consumer	0.12Y	120.3	0.00	2.74	0.00	0	0	0	100	0.00	0.0	9.381	0.000	0	0	0	0	
			B		0.12Y	119.5	0.00	3.53	0.00	0	0	0	100					0	0	0	0	
L			C		0.12Y	116.9	0.00	6.13	0.00	0	0	0	100					0	0	0	0	L

KEY-> L = Low Voltage H = High Voltage C = Capacity Over Limit (+capacity or load amps) G = Generator Out of kvar Limits P = Power Factor Low

Unbalanced Voltage Drop Report
Source: LOPEZ

Database: C:\PROJECTS\OPALCO\2013-2016\2013-2016CWP\EXISTING2013-2016.WM\
Title: Lopez Substation - Circuit 22
Case: Existing system with projected 4 yr load

Units Displayed In Volts
-Base Voltage:120.0-

	Element Name	Parent Name	Cnf	Type/ Conductor	Pri kV	Base Volt	Element Drop	Accum Drop	Thru Amps	% Cap	Thru KW	KVAR	% PF	kW Loss	% Loss	mi From Src	Element Length (mi)	Element KW	Element KVAR	Element Cons On	Element Cons Thru	
	SECUG275	3384223-001	A	4/0 TX	0.12Y	120.3	0.00	2.74	0.00	0	0	0	100	0.00	0.0	9.394	0.013	0	0	0	0	
			B		0.12Y	119.5	0.00	3.53	0.00	0	0	0	100					0	0	0	0	
L			C		0.12Y	116.9	0.00	6.13	0.00	0	0	0	100					0	0	0	0	L
L	PRUG11697	PRUG10628	C	1/0 Al 15	7.01Y	116.9	-0.00	6.13	-0.07	0	0	0	100	0.00	0.0	9.244	0.111	0	0	0	1	L
L	TRAN_39799	PRUG11697	C	Transforme	0.12Y	116.9	0.00	6.13	0.00	0	0	0	100	0.05	0.0	9.244	0.000	0	0	0	1	L
L	SECUG12358	TRAN_39799	C	4/0 TX	0.12Y	116.9	0.00	6.13	0.00	0	0	0	100	0.00	0.0	9.250	0.006	0	0	0	1	L
L	3384120-001	SECUG12358	C	Consumer	0.12Y	116.9	0.00	6.13	0.00	0	0	0	100	0.00	0.0	9.250	0.000	0	0	1	1	L
L	SECUG10600	3384120-001	C	4/0 TX	0.12Y	116.9	0.00	6.13	0.00	0	0	0	100	0.00	0.0	9.265	0.015	0	0	0	0	L
P	PRUG278	PRUG10629	A	1/0 Al 15	7.22Y	120.3	0.00	2.74	-0.00	0	0	0	100	0.00	0.0	9.048	0.004	0	0	0	1	P
P	PRUG277	PRUG10631	A	1/0 Al 15	7.22Y	120.3	-0.00	2.74	-0.03	0	0	0	100	0.00	0.0	8.932	0.053	0	0	0	1	P
P	PRUG159	PRUG10620	A	1/0 Al 15	7.22Y	120.3	0.00	2.74	-0.11	0	0	-1	0	0.00	0.0	8.887	0.162	0	0	0	0	P
P			B		7.17Y	119.5	-0.00	3.53	-0.16	0	0	-1	0					0	0	0	1	P
L			C		7.01Y	116.9	-0.00	6.13	-0.10	0	0	-1	0					0	0	0	0	L
P	PRUG158	PRUG159	B	1/0 Al 15	7.17Y	119.5	-0.00	3.53	-0.05	0	0	0	100	0.00	0.0	8.966	0.079	0	0	0	1	P
L	PRUG263	PRUG10620	C	1/0 Al 15	7.01Y	116.9	-0.00	6.13	-0.01	0	0	0	100	0.00	0.0	8.742	0.017	0	0	0	1	L
L	PRUG261	PRUG263	C	1/0 Al 15	7.01Y	116.9	0.00	6.13	-0.00	0	0	0	100	0.00	0.0	8.745	0.003	0	0	0	1	L
L	TRAN_37423	PRUG261	C	Transforme	0.12Y	116.9	0.00	6.13	0.00	0	0	0	100	0.11	100.0	8.745	0.000	0	0	0	1	L
L	SECUG12351	TRAN_37423	C	4/0 TX	0.12Y	116.9	0.00	6.13	0.00	0	0	0	100	0.00	0.0	8.748	0.003	0	0	0	1	L
L	3384433-001	SECUG12351	C	Consumer	0.12Y	116.9	0.00	6.13	0.00	0	0	0	100	0.00	0.0	8.748	0.000	0	0	1	1	L
L	SECUG282	3384433-001	C	4/0 TX	0.12Y	116.9	0.00	6.13	0.00	0	0	0	100	0.00	0.0	8.757	0.010	0	0	0	0	L
P	PRUG10618	PRUG10623	A	1/0 Al 15	7.22Y	120.3	-0.00	2.74	-0.05	0	0	0	100	0.00	0.0	8.772	0.054	0	0	0	0	P
P			B		7.17Y	119.5	-0.00	3.53	-0.05	0	0	0	0					0	0	0	0	P
L			C		7.01Y	116.9	-0.00	6.13	-0.05	0	0	0	0					0	0	0	0	L
P	PRUG10619	PRUG10618	A	1/0 Al 15	7.22Y	120.3	0.00	2.74	-0.02	0	0	0	100	0.00	0.0	8.801	0.028	0	0	0	0	P
P			B		7.17Y	119.5	0.00	3.53	-0.02	0	0	0	0					0	0	0	0	P
L			C		7.01Y	116.9	0.00	6.13	-0.02	0	0	0	0					0	0	0	0	L
	TRAN_38514	PRUG10619	A	Transforme	0.12Y	120.3	0.00	2.74	0.00	0	0	0	100	0.70	100.0	8.801	0.000	0	0	0	0	
			B		0.12Y	119.5	0.00	3.53	0.00	0	0	0	100					0	0	0	0	
L			C		0.12Y	116.9	0.00	6.13	0.00	0	0	0	100					0	0	0	0	L
	SECUG12349	TRAN_38514	A	4/0 TX	0.12Y	120.3	0.00	2.74	0.00	0	0	0	100	0.00	0.0	8.802	0.002	0	0	0	0	
			B		0.12Y	119.5	0.00	3.53	0.00	0	0	0	100					0	0	0	0	
L			C		0.12Y	116.9	0.00	6.13	0.00	0	0	0	100					0	0	0	0	L
	3384423-001	SECUG12349	A	Consumer	0.12Y	120.3	0.00	2.74	0.00	0	0	0	100	0.00	0.0	8.802	0.000	0	0	0	0	
			B		0.12Y	119.5	0.00	3.53	0.00	0	0	0	100					0	0	0	0	
L			C		0.12Y	116.9	0.00	6.13	0.00	0	0	0	100					0	0	0	0	L
	SECUG283	3384423-001	A	4/0 TX	0.12Y	120.3	0.00	2.74	0.00	0	0	0	100	0.00	0.0	8.819	0.017	0	0	0	0	
			B		0.12Y	119.5	0.00	3.53	0.00	0	0	0	100					0	0	0	0	
L			C		0.12Y	116.9	0.00	6.13	0.00	0	0	0	100					0	0	0	0	L
P	PRUG273	PRUG10624	B	1/0 Al 15	7.17Y	119.5	-0.00	3.53	-0.02	0	0	0	100	0.00	0.0	8.621	0.038	0	0	0	1	P
P	PRUG14750	PRUG14743	A	1/0 Al 15	7.22Y	120.3	-0.00	2.74	-0.44	0	0	-3	0	0.00	0.0	8.445	0.010	0	0	0	4	P
P			B		7.17Y	119.5	-0.00	3.53	-0.07	0	0	0	0					0	0	0	2	P
L			C		7.01Y	116.9	0.00	6.13	-0.01	0	0	0	0					0	0	0	0	L
	RECL_74	PRUG14750	A	3393380V2	7.22Y	120.3	0.00	2.74	-0.43	0	0	-3	0	0.00	0.0	8.445	0.000	0	0	0	4	
			B		7.17Y	119.5	0.00	3.53	-0.06	0	0	0	0					0	0	0	2	
L			C		7.01Y	116.9	0.00	6.13	0.00	0	0	0	0					0	0	0	0	L
P	PRUG14749	RECL_74	A	1/0 Al 15	7.22Y	120.3	0.00	2.74	-0.43	0	0	-3	0	0.00	0.0	8.446	0.002	0	0	0	4	P
P			B		7.17Y	119.5	-0.00	3.53	-0.06	0	0	0	0					0	0	0	2	P
L			C		7.01Y	116.9	0.00	6.13	0.00	0	0	0	0					0	0	0	0	L
P	PRUG269	PRUG14749	A	1/0 Al 15	7.22Y	120.3	-0.00	2.74	-0.43	0	0	-3	0	0.00	0.0	8.527	0.081	0	0	0	4	P
P	PRUG275	PRUG269	A	1/0 Al 15	7.22Y	120.3	-0.00	2.74	-0.38	0	0	-3	0	0.00	0.0	8.593	0.066	0	0	0	4	P
P	PRUG276	PRUG275	A	1/0 Al 15	7.22Y	120.3	-0.00	2.74	-0.34	0	0	-2	0	0.00	0.0	8.678	0.085	0	0	0	4	P

KEY-> L = Low Voltage H = High Voltage C = Capacity Over Limit (%capacity or load amps) G = Generator Out of kvar Limits P = Power Factor Low

Unbalanced Voltage Drop Report
Source: LOPEZ

Database: C:\PROJECTS\OPALCO\2013-2016\2013-2016CWP\EXISTING2013-2016.WM\
Title: Lopez Substation - Circuit 22
Case: Existing system with projected 4 yr load

Units Displayed In Volts
-Base Voltage:120.0-

Element Name	Parent Name	Cnf	Type/ Conductor	Pri kV	Base Volt	Element Drop	Accum Drop	Thru Amps	% Cap	Thru KW	KVAR	% PF	kW Loss	% Loss	mi From Src	Element Length (mi)	Element KW	Element KVAR	Element Cons On	Element Cons Thru	
P PRUG268	PRUG276	A	1/0 Al 15	7.22Y	120.3	-0.00	2.74	-0.24	0	0	-2	0	0.00	0.0	8.758	0.080	0	0	0	3	P
P PRUG267	PRUG268	A	1/0 Al 15	7.22Y	120.3	-0.00	2.74	-0.18	0	0	-1	0	0.00	0.0	8.825	0.067	0	0	0	1	P
P PRUG266	PRUG267	A	1/0 Al 15	7.22Y	120.3	-0.00	2.74	-0.14	0	0	-1	0	0.00	0.0	8.903	0.078	0	0	0	1	P
P PRUG272	PRUG266	A	1/0 Al 15	7.22Y	120.3	-0.00	2.74	-0.09	0	0	-1	0	0.00	0.0	9.032	0.129	0	0	0	1	P
P PRUG271	PRUG272	A	1/0 Al 15	7.22Y	120.3	0.00	2.74	-0.00	0	0	0	100	0.00	0.0	9.037	0.004	0	0	0	1	P
P PRUG265	PRUG268	A	2 Al 15 kv	7.22Y	120.3	0.00	2.74	-0.00	0	0	0	100	0.00	0.0	8.764	0.006	0	0	0	2	P
P PRUG274	PRUG276	A	1/0 Al 15	7.22Y	120.3	-0.00	2.74	-0.04	0	0	0	100	0.00	0.0	8.741	0.063	0	0	0	1	P
P PRUG12496	PRUG14749	B	2 Al 15 kv	7.17Y	119.5	-0.00	3.53	-0.06	0	0	0	100	0.00	0.0	8.450	0.004	0	0	0	2	P
P PRUG270	PRUG12496	B	1/0 Al 15	7.17Y	119.5	-0.00	3.53	-0.06	0	0	0	100	0.00	0.0	8.537	0.087	0	0	0	2	P
P PRUG1303	PRUG1497	B	2 Al 15 kv	7.16Y	119.4	0.00	3.59	0.07	0	0	0	100	0.00	0.0	7.875	0.099	0	0	0	6	P
P PRUG709	PRUG10448	A	1/0 Al 15	7.21Y	120.2	-0.00	2.79	0.29	0	1	-2	-45	0.00	0.0	6.969	0.021	0	0	0	1	P
P PRUG708	PRUG709	A	1/0 Al 15	7.21Y	120.2	0.00	2.79	0.28	0	1	-2	-45	0.00	0.0	7.031	0.061	0	0	0	1	P
P PRUG12009	PRUG708	A	1/0 Al 15	7.21Y	120.2	-0.00	2.79	-0.23	0	0	-2	0	0.00	0.0	7.110	0.079	0	0	0	0	P
P PRUG12010	PRUG12009	A	1/0 Al 15	7.21Y	120.2	-0.00	2.78	-0.18	0	0	-1	0	0.00	0.0	7.187	0.077	0	0	0	0	P
P PRUG12011	PRUG12010	A	1/0 Al 15	7.21Y	120.2	-0.00	2.78	-0.13	0	0	-1	0	0.00	0.0	7.286	0.098	0	0	0	0	P
P PRUG12012	PRUG12011	A	1/0 Al 15	7.21Y	120.2	-0.00	2.78	-0.06	0	0	0	100	0.00	0.0	7.381	0.095	0	0	0	0	P
L SECUG1654	SECUG1655	B	4/0 TX	0.12Y	117.3	1.38	5.73	38.12	20	4	2	89	0.03	0.7	6.938	0.031	0	0	0	1	L
L 3532293-005	SECUG1654	B	Consumer	0.12Y	117.3	0.00	5.73	38.12	0	4	2	89	0.00	0.0	6.938	0.000	4	2	1	1	L
P PRUG1470	PRUG1471	B	2 Al 15 kv	7.18Y	119.6	0.00	3.36	0.09	0	0	-1	0	0.00	0.0	7.305	0.210	0	0	0	1	P
P PRUG12411	PRUG135	B	1/0 Al 15	7.18Y	119.6	0.00	3.41	-0.00	0	0	0	100	0.00	0.0	7.900	0.007	0	0	0	1	P
P PRUG134	PRUG135	B	1/0 Al 15	7.18Y	119.6	0.00	3.41	0.18	0	1	-1	-71	0.00	0.0	7.957	0.064	0	0	0	4	P
P PRUG137	PRUG1477	B	1/0 Al 15	7.18Y	119.6	-0.00	3.40	-0.03	0	0	0	100	0.00	0.0	7.743	0.047	0	0	0	0	P
P PRUG63	PRUG12565	B	1/0 Al 15	7.18Y	119.6	-0.00	3.35	0.27	0	0	-2	0	0.00	0.0	6.960	0.017	0	0	0	1	P
P PRUG62	PRUG63	B	1/0 Al 15	7.18Y	119.6	-0.00	3.35	0.26	0	0	-2	0	0.00	0.0	7.080	0.120	0	0	0	1	P
P PRUG61	PRUG62	B	1/0 Al 15	7.18Y	119.6	-0.00	3.35	0.18	0	0	-1	0	0.00	0.0	7.119	0.039	0	0	0	1	P
P PRUG60	PRUG61	B	1/0 Al 15	7.18Y	119.6	-0.00	3.35	0.16	0	0	-1	0	0.00	0.0	7.216	0.097	0	0	0	1	P
P PRUG59	PRUG60	B	1/0 Al 15	7.18Y	119.6	-0.00	3.35	0.09	0	0	-1	0	0.00	0.0	7.322	0.106	0	0	0	1	P
P PRUG58	PRUG59	B	1/0 Al 15	7.18Y	119.6	-0.00	3.35	0.03	0	0	0	100	0.00	0.0	7.365	0.042	0	0	0	1	P
P PRUG1461	PRUG10676	B	1/0 Al 15	7.19Y	119.8	-0.00	3.20	-0.02	0	0	0	100	0.00	0.0	6.526	0.032	0	0	0	0	P
P PRUG64	PRUG10678	A	1/0 Al 15	7.21Y	120.2	0.00	2.84	0.12	0	1	-1	-71	0.00	0.0	6.328	0.109	0	0	0	1	P
P PRUG12561	PRUG64	A	1/0 Al 15	7.21Y	120.2	-0.00	2.84	-0.07	0	0	0	100	0.00	0.0	6.430	0.102	0	0	0	0	P
L PRUG397	PRUG10699	C	2 Al 15 kv	7.01Y	116.8	0.02	6.20	37.93	23	259	73	96	0.05	0.0	6.069	0.014	0	0	0	57	L
L TRAN_37536	PRUG397	C	Transforme	0.12Y	116.8	0.20	6.40	1.26	36	9	3	95	0.11	1.2	6.069	0.000	0	0	0	2	L
L SECUG885	TRAN_37536	C	4/0 TX	0.12Y	116.4	0.22	6.62	52.80	27	6	2	95	0.01	0.0	6.074	0.004	0	0	0	1	L
L 3521311-044	SECUG885	C	Consumer	0.12Y	116.4	0.00	6.62	52.80	0	6	2	95	0.00	0.0	6.074	0.000	6	2	1	1	L
L SECUG11838	3521311-044	C	4/0 TX	0.12Y	116.4	0.00	6.62	0.00	0	0	0	100	0.00	0.0	6.076	0.003	0	0	0	0	L
L SECUG11837	TRAN_37536	C	4/0 TX	0.12Y	116.5	0.13	6.53	22.97	12	3	1	95	0.00	0.0	6.075	0.006	0	0	0	1	L
L 3521311-002	SECUG11837	C	Consumer	0.12Y	116.5	0.00	6.53	22.97	0	3	1	95	0.00	0.0	6.075	0.000	3	1	1	1	L
L SECUG884	3521311-002	C	4/0 TX	0.12Y	116.5	0.00	6.53	0.00	0	0	0	100	0.00	0.0	6.093	0.018	0	0	0	0	L
L PRUG396	PRUG397	C	1/0 Al 15	7.01Y	116.8	0.03	6.23	36.67	16	251	70	96	0.07	0.0	6.099	0.029	0	0	0	55	L

KEY-> L = Low Voltage H = High Voltage C = Capacity Over Limit (%capacity or load amps) G = Generator Out of kvar Limits P = Power Factor Low

Unbalanced Voltage Drop Report
Source: LOPEZ

Database: C:\PROJECTS\OPALCO\2013-2016\2013-2016CWP\EXISTING2013-2016.MM\
Title: Lopez Substation - Circuit 22
Case: Existing system with projected 4 yr load

Units Displayed In Volts
-Base Voltage:120.0-

Element Name	Parent Name	Cnf	Type/ Conductor	Pri kV	Base Volt	Element Drop	Accum Drop	Thru Amps	% Cap	Thru KW	KVAR	% PF	kW Loss	% Loss	mi From Src	Element Length (mi)	Element KW	Element KVAR	Element Cons On	Element Cons Thru	
L PRUG1458	PRUG396	C	1/0 Al 15	7.00Y	116.7	0.04	6.27	36.68	16	251	70	96	0.08	0.0	6.134	0.035	0	0	0	55	L
L PRUG1459	PRUG1458	C	1/0 Al 15	7.00Y	116.7	0.07	6.34	36.68	16	251	70	96	0.12	0.0	6.189	0.055	0	0	0	55	L
L PRUG1460	PRUG1459	C	1/0 Al 15	7.00Y	116.6	0.07	6.41	36.48	16	249	70	96	0.13	0.1	6.249	0.060	0	0	0	54	L
L PRUG1445	PRUG1460	C	1/0 Al 15	6.99Y	116.5	0.05	6.46	36.49	16	249	70	96	0.09	0.0	6.290	0.041	0	0	0	54	L
L PRUG1446	PRUG1445	C	1/0 Al 15	6.99Y	116.5	0.08	6.54	35.89	16	245	69	96	0.15	0.1	6.362	0.072	0	0	0	53	L
L PRUG14	PRUG1446	C	1/0 Al 15	6.99Y	116.5	-0.00	6.54	-0.03	0	0	0	100	0.00	0.0	6.416	0.055	0	0	0	1	L
L TRAN_37333	PRUG14	C	Transforme	0.12Y	116.5	0.00	6.54	0.00	0	0	0	100	0.11	100.0	6.416	0.000	0	0	0	1	L
L SECUG11839	TRAN_37333	C	4/0 TX	0.12Y	116.5	0.00	6.54	0.00	0	0	0	100	0.00	0.0	6.420	0.004	0	0	0	1	L
L 3522444-001	SECUG11839	C	Consumer	0.12Y	116.5	0.00	6.54	0.00	0	0	0	100	0.00	0.0	6.420	0.000	0	0	1	1	L
L SECUG9	3522444-001	C	4/0 TX	0.12Y	116.5	0.00	6.54	0.00	0	0	0	100	0.00	0.0	6.451	0.031	0	0	0	0	L
L PRUG552	PRUG1446	C	2 Al 15 kv	6.99Y	116.5	0.00	6.54	0.58	0	4	1	97	0.00	0.0	6.482	0.121	0	0	0	1	L
L TRAN_38009	PRUG552	C	Transforme	0.12Y	116.4	0.10	6.64	0.60	17	4	1	97	0.11	2.6	6.482	0.000	0	0	0	1	L
L SECUG11840	TRAN_38009	C	4/0 TX	0.12Y	116.3	0.17	6.81	35.99	19	4	1	97	0.00	0.0	6.487	0.005	0	0	0	1	L
L 3522441-024	SECUG11840	C	Consumer	0.12Y	116.2	0.00	6.81	35.99	0	4	1	97	0.00	0.0	6.487	0.000	4	1	1	1	L
L SECUG883	3522441-024	C	4/0 TX	0.12Y	116.2	0.00	6.81	0.00	0	0	0	100	0.00	0.0	6.509	0.022	0	0	0	0	L
L PRUG1443	PRUG1446	C	1/0 Al 15	6.98Y	116.4	0.08	6.62	35.33	15	240	68	96	0.15	0.1	6.435	0.073	0	0	0	51	L
L PRUG1444	PRUG1443	C	2 Al 15 kv	6.98Y	116.3	0.02	6.64	15.24	9	104	28	97	0.02	0.0	6.464	0.029	0	0	0	32	L
L PRUG1440	PRUG1444	C	2 Al 15 kv	6.98Y	116.3	0.05	6.69	15.24	9	104	28	97	0.04	0.0	6.533	0.068	0	0	0	32	L
L PRUG1428	PRUG1440	C	2 Al 15 kv	6.97Y	116.2	0.08	6.77	13.64	8	94	25	97	0.06	0.1	6.671	0.139	0	0	0	31	L
L PRUG1429	PRUG1428	C	2 Al 15 kv	6.97Y	116.2	0.01	6.78	12.05	7	83	22	97	0.01	0.0	6.687	0.016	0	0	0	27	L
L PRUG11800	PRUG1429	C	1/0 Al 15	6.97Y	116.2	-0.00	6.78	-0.18	0	0	-1	0	0.00	0.0	6.803	0.116	0	0	0	1	L
L PRUG11801	PRUG11800	C	1/0 Al 15	6.97Y	116.2	-0.00	6.78	-0.11	0	0	-1	0	0.00	0.0	6.904	0.101	0	0	0	1	L
L PRUG11802	PRUG11801	C	1/0 Al 15	6.97Y	116.2	-0.00	6.78	-0.04	0	0	0	100	0.00	0.0	6.973	0.069	0	0	0	1	L
L TRAN_39873	PRUG11802	C	Transforme	0.12Y	116.2	0.00	6.78	0.00	0	0	0	100	0.11	94.5	6.973	0.000	0	0	0	1	L
L SECUG11870	TRAN_39873	C	4/0 TX	0.12Y	116.2	0.00	6.78	0.06	0	0	0	100	0.00	0.0	6.977	0.004	0	0	0	1	L
L 3521237-001	SECUG11870	C	Consumer	0.12Y	116.2	0.00	6.78	0.06	0	0	0	100	0.00	0.0	6.977	0.000	0	0	1	1	L
L SECUG10706	3521237-001	C	4/0 TX	0.12Y	116.2	0.00	6.78	0.00	0	0	0	100	0.00	0.0	6.997	0.021	0	0	0	0	L
L PRUG12487	PRUG1429	C	2 Al 15 kv	6.97Y	116.2	0.00	6.78	-0.01	0	0	0	100	0.00	0.0	6.705	0.018	0	0	0	0	L
L SWIT_20-B	PRUG12487	C	Open	6.97Y	116.2	0.00	6.78	0.00	0	0	0	100	0.00	0.0	6.705	0.000	0	0	0	0	L
L PRUG1430	PRUG1429	C	2 Al 15 kv	6.97Y	116.2	0.03	6.81	12.10	7	82	24	96	0.02	0.0	6.738	0.051	0	0	0	26	L
L TRAN_37476	PRUG1430	C	Transforme	0.12Y	115.8	0.39	7.20	2.38	69	16	5	95	0.11	0.7	6.738	0.000	0	0	0	2	L
L SECUG11873	TRAN_37476	C	4/0 TX	0.12Y	115.5	0.34	7.54	68.17	35	8	2	97	0.01	0.2	6.743	0.005	0	0	0	1	L
L 3522101-001	SECUG11873	C	Consumer	0.12Y	115.5	0.00	7.54	68.17	0	8	2	97	0.00	0.0	6.743	0.000	8	2	1	1	L
L SECUG574	3522101-001	C	4/0 TX	0.12Y	115.5	0.00	7.54	0.00	0	0	0	100	0.00	0.0	6.749	0.006	0	0	0	0	L
L SECUG11872	TRAN_37476	C	4/0 TX	0.12Y	115.4	0.38	7.58	74.82	39	8	3	94	0.02	0.2	6.743	0.005	0	0	0	1	L
L 3522101-002	SECUG11872	C	Consumer	0.12Y	115.4	0.00	7.58	74.82	0	8	3	94	0.00	0.0	6.743	0.000	9	3	1	1	L
L SECUG575	3522101-002	C	4/0 TX	0.12Y	115.4	0.00	7.58	0.00	0	0	0	100	0.00	0.0	6.757	0.014	0	0	0	0	L
L PRUG1412	PRUG1430	C	2 Al 15 kv	6.97Y	116.2	0.03	6.84	9.73	6	67	19	96	0.02	0.0	6.809	0.070	0	0	0	24	L
L TRAN_38017	PRUG1412	C	Transforme	0.12Y	116.1	0.07	6.90	0.41	12	3	1	95	0.11	3.7	6.809	0.000	0	0	0	5	L
L SECUG11875	TRAN_38017	C	4/0 TX	0.12Y	116.0	0.07	6.97	13.58	7	2	0	100	0.00	0.0	6.814	0.005	0	0	0	2	L

KEY-> L = Low Voltage H = High Voltage C = Capacity Over Limit (%capacity or load amps) G = Generator Out of kvar Limits P = Power Factor Low

Unbalanced Voltage Drop Report
Source: LOPEZ

Database: C:\PROJECTS\OPALCO\2013-2016\2013-2016CWP\EXISTING2013-2016.MM\
Title: Lopez Substation - Circuit 22
Case: Existing system with projected 4 yr load

Units Displayed In Volts
-Base Voltage:120.0-

Element Name	Parent Name	Cnf	Type/ Conductor	Pri kV	Base Volt	Element Drop	Accum Drop	Thru Amps	% Cap	Thru KW	KVAR	% PF	kW Loss	% Loss	mi From Src	Element Length (mi)	Element KW	Element KVAR	Element Cons On	Element Cons Thru	
L 3522103-003	SECUG11875	C	Consumer	0.12Y	116.0	0.00	6.97	13.58	0	2	0	100	0.00	0.0	6.814	0.000	2	0	2	2	L
L SECUG453	3522103-003	C	4/0 TX	0.12Y	116.0	0.00	6.97	0.00	0	0	0	100	0.00	0.0	6.828	0.014	0	0	0	0	L
L SECUG11874	TRAN_38017	C	4/0 TX	0.12Y	116.0	0.05	6.95	11.18	6	1	0	100	0.00	0.0	6.813	0.005	0	0	0	3	L
L 3522103-023	SECUG11874	C	Consumer	0.12Y	116.0	0.00	6.95	11.18	0	1	0	100	0.00	0.0	6.813	0.000	1	0	3	3	L
L SECUG839	3522103-023	C	4/0 TX	0.12Y	116.0	0.00	6.95	0.00	0	0	0	100	0.00	0.0	6.828	0.014	0	0	0	0	L
L PRUG1413	PRUG1412	C	2 Al 15 kv	6.97Y	116.1	0.02	6.86	9.33	6	64	18	96	0.01	0.0	6.866	0.057	0	0	0	19	L
L PRUG1417	PRUG1413	C	2 Al 15 kv	6.97Y	116.1	0.00	6.86	5.52	3	38	11	96	0.00	0.0	6.879	0.013	0	0	0	9	L
L PRUG1418	PRUG1417	C	2 Al 15 kv	6.97Y	116.1	0.01	6.87	5.53	3	37	11	96	0.00	0.0	6.917	0.038	0	0	0	8	L
L PRUG1419	PRUG1418	C	2 Al 15 kv	6.97Y	116.1	0.01	6.88	4.00	2	27	8	96	0.00	0.0	6.955	0.038	0	0	0	6	L
L TRAN_38012	PRUG1419	C	Transforme	0.12Y	116.1	0.00	6.88	0.00	0	0	0	100	0.11	100.0	6.955	0.000	0	0	0	0	L
L PRUG1420	PRUG1419	C	2 Al 15 kv	6.97Y	116.1	0.01	6.89	4.00	2	27	8	96	0.00	0.0	7.003	0.048	0	0	0	6	L
L TRAN_39735	PRUG1420	C	Transforme	0.12Y	116.0	0.12	7.01	0.76	22	5	2	93	0.11	2.1	7.003	0.000	0	0	0	2	L
L SECUG11886	TRAN_39735	C	4/0 TX	0.12Y	115.8	0.14	7.15	32.91	17	4	1	97	0.00	0.0	7.008	0.004	0	0	0	1	L
L 3453410-021	SECUG11886	C	Consumer	0.12Y	115.8	0.00	7.15	32.91	0	4	1	97	0.00	0.0	7.008	0.000	4	1	1	1	L
L SECUG1215	3453410-021	C	4/0 TX	0.12Y	115.8	0.00	7.15	0.00	0	0	0	100	0.00	0.0	7.027	0.019	0	0	0	0	L
L SECUG11885	TRAN_39735	C	4/0 TX	0.12Y	115.9	0.06	7.07	12.52	6	1	0	100	0.00	0.0	7.008	0.005	0	0	0	1	L
L 3453410-019	SECUG11885	C	Consumer	0.12Y	115.9	0.00	7.07	12.52	0	1	0	100	0.00	0.0	7.008	0.000	1	0	1	1	L
L SECUG1214	3453410-019	C	4/0 TX	0.12Y	115.9	0.00	7.07	0.00	0	0	0	100	0.00	0.0	7.025	0.017	0	0	0	0	L
L PRUG1422	PRUG1420	C	2 Al 15 kv	6.97Y	116.1	0.00	6.89	0.94	1	6	2	95	0.00	0.0	7.068	0.065	0	0	0	1	L
L TRAN_37976	PRUG1422	C	Transforme	0.12Y	116.0	0.15	7.04	0.95	27	6	2	95	0.11	1.7	7.068	0.000	0	0	0	1	L
L SECUG11888	TRAN_37976	C	4/0 TX	0.12Y	115.6	0.31	7.35	56.72	29	6	2	95	0.01	0.2	7.073	0.006	0	0	0	1	L
L 3454300-030	SECUG11888	C	Consumer	0.12Y	115.6	0.00	7.35	56.72	0	6	2	95	0.00	0.0	7.073	0.000	7	2	1	1	L
L SECUG856	3454300-030	C	4/0 TX	0.12Y	115.6	0.00	7.35	0.00	0	0	0	100	0.00	0.0	7.098	0.025	0	0	0	0	L
L PRUG1421	PRUG1420	C	2 Al 15 kv	6.97Y	116.1	0.00	6.89	2.32	1	16	5	95	0.00	0.0	7.051	0.048	0	0	0	3	L
L TRAN_37341	PRUG1421	C	Transforme	0.12Y	115.7	0.38	7.27	2.32	67	16	5	95	0.11	0.7	7.051	0.000	0	0	0	3	L
L SECUG11889	TRAN_37341	C	4/0 TX	0.12Y	115.5	0.19	7.46	58.11	30	6	2	95	0.01	0.0	7.055	0.003	0	0	0	2	L
L 3454312-001	SECUG11889	C	Consumer	0.12Y	115.5	0.00	7.46	58.11	0	6	2	95	0.00	0.0	7.055	0.000	7	2	2	2	L
L SECUG11890	3454312-001	C	4/0 TX	0.12Y	115.5	0.00	7.46	0.00	0	0	0	100	0.00	0.0	7.079	0.024	0	0	0	0	L
L SECUG11887	TRAN_37341	C	4/0 TX	0.12Y	115.4	0.36	7.63	81.30	42	9	3	95	0.02	0.2	7.056	0.004	0	0	0	1	L
L 3454312-004	SECUG11887	C	Consumer	0.12Y	115.4	0.00	7.63	81.30	0	9	3	95	0.00	0.0	7.056	0.000	9	3	1	1	L
L SECUG1216	3454312-004	C	4/0 TX	0.12Y	115.4	0.00	7.63	0.00	0	0	0	100	0.00	0.0	7.075	0.019	0	0	0	0	L
L SECUG10575	TRAN_37341	C	4/0 TX	0.12Y	115.7	0.00	7.27	0.00	0	0	0	100	0.00	0.0	7.067	0.016	0	0	0	0	L
L 3454312002	SECUG10575	C	Consumer	0.12Y	115.7	0.00	7.27	0.00	0	0	0	100	0.00	0.0	7.067	0.000	0	0	0	0	L
L PRUG1411	PRUG1418	C	2 Al 15 kv	6.97Y	116.1	0.00	6.87	1.53	1	10	3	96	0.00	0.0	6.968	0.051	0	0	0	2	L
L TRAN_38013	PRUG1411	C	Transforme	0.12Y	115.9	0.26	7.13	1.54	44	10	3	96	0.11	1.0	6.968	0.000	0	0	0	2	L
L SECUG1218	TRAN_38013	C	4/0 TX	0.12Y	115.8	0.06	7.19	3.35	2	0	0	100	0.00	0.0	6.986	0.018	0	0	0	1	L
L 3453461-012	SECUG1218	C	Consumer	0.12Y	115.8	0.00	7.19	3.35	0	0	0	100	0.00	0.0	6.986	0.000	0	0	1	1	L
L SECUG1217	TRAN_38013	C	4/0 TX	0.11Y	114.4	1.43	8.56	89.18	46	10	3	96	0.08	0.8	6.984	0.016	0	0	0	1	L
L 3453461-013	SECUG1217	C	Consumer	0.11Y	114.4	0.00	8.56	89.18	0	10	3	96	0.00	0.0	6.984	0.000	10	3	1	1	L
L TRAN_38014	PRUG1417	C	Transforme	0.12Y	116.1	0.00	6.86	0.00	0	0	0	100	0.11	100.0	6.879	0.000	0	0	0	1	L

KEY-> L = Low Voltage H = High Voltage C = Capacity Over Limit (capacity or load amps) G = Generator Out of kvar Limits P = Power Factor Low

Unbalanced Voltage Drop Report
Source: LOPEZ

Database: C:\PROJECTS\OPALCO\2013-2016\2013-2016CWP\EXISTING2013-2016.MM\
Title: Lopez Substation - Circuit 22
Case: Existing system with projected 4 yr load

Units Displayed In Volts
-Base Voltage:120.0-

Element Name	Parent Name	Cnf	Type/ Conductor	Pri kV	Base Volt	Element Drop	Accum Drop	Thru Amps	% Cap	Thru KW	KVAR	% PF	kW Loss	% Loss	mi From Src	Element Length (mi)	Element KW	Element KVAR	Element Cons On	Element Cons Thru	
L SECUG11884	TRAN_38014	C	4/0 TX	0.12Y	116.1	0.00	6.86	0.00	0	0	0	100	0.00	0.0	6.882	0.003	0	0	0	1	L
L 3453452-001	SECUG11884	C	Consumer	0.12Y	116.1	0.00	6.86	0.00	0	0	0	100	0.00	0.0	6.882	0.000	0	0	1	1	L
L SECUG1219	3453452-001	C	4/0 TX	0.12Y	116.1	0.00	6.86	0.00	0	0	0	100	0.00	0.0	6.931	0.049	0	0	0	0	L
L PRUG1416	PRUG1413	C	2 Al 15 kv	6.97Y	116.1	0.01	6.87	3.81	2	26	7	97	0.00	0.0	6.943	0.077	0	0	0	10	L
L TRAN_37576	PRUG1416	C	Transforme	0.12Y	116.0	0.08	6.95	0.40	19	3	1	95	0.05	2.0	6.943	0.000	0	0	0	2	L
L SECUG11883	TRAN_37576	C	4/0 TX	0.12Y	116.0	0.09	7.05	19.67	10	2	1	89	0.00	0.0	6.948	0.005	0	0	0	1	L
L 3453451-001	SECUG11883	C	Consumer	0.12Y	116.0	0.00	7.05	19.67	0	2	1	89	0.00	0.0	6.948	0.000	2	1	1	1	L
L SECUG1213	3453451-001	C	4/0 TX	0.12Y	116.0	0.00	7.05	0.00	0	0	0	100	0.00	0.0	6.953	0.005	0	0	0	0	L
L SECUG11882	TRAN_37576	C	4/0 TX	0.12Y	116.0	0.02	6.97	4.30	2	0	0	100	0.00	0.0	6.948	0.004	0	0	0	1	L
L 3453451-002	SECUG11882	C	Consumer	0.12Y	116.0	0.00	6.97	4.30	0	0	0	100	0.00	0.0	6.948	0.000	0	0	1	1	L
L SECUG429	3453451-002	C	4/0 TX	0.12Y	116.0	0.00	6.97	0.00	0	0	0	100	0.00	0.0	6.962	0.015	0	0	0	0	L
L PRUG1414	PRUG1416	C	2 Al 15 kv	6.97Y	116.1	0.01	6.88	3.42	2	23	7	96	0.00	0.0	6.988	0.045	0	0	0	8	L
L TRAN_39734	PRUG1414	C	Transforme	0.12Y	116.1	0.03	6.91	0.20	6	1	0	100	0.11	7.5	6.988	0.000	0	0	0	1	L
L SECUG11878	TRAN_39734	C	4/0 TX	0.12Y	116.0	0.07	6.98	11.73	6	1	0	100	0.00	0.0	6.993	0.006	0	0	0	1	L
L 3453453-008	SECUG11878	C	Consumer	0.12Y	116.0	0.00	6.98	11.73	0	1	0	100	0.00	0.0	6.993	0.000	1	0	1	1	L
L SECUG1220	3453453-008	C	4/0 TX	0.12Y	116.0	0.00	6.98	0.00	0	0	0	100	0.00	0.0	7.009	0.015	0	0	0	0	L
L PRUG1415	PRUG1414	C	2 Al 15 kv	6.97Y	116.1	0.00	6.88	3.23	2	22	6	96	0.00	0.0	7.020	0.032	0	0	0	7	L
L PRUG1424	PRUG1415	C	2 Al 15 kv	6.97Y	116.1	0.00	6.88	1.54	1	11	3	96	0.00	0.0	7.035	0.015	0	0	0	5	L
L TRAN_38015	PRUG1424	C	Transforme	0.12Y	116.1	0.03	6.92	0.20	6	1	0	100	0.11	7.2	7.035	0.000	0	0	0	1	L
L SECUG11877	TRAN_38015	C	4/0 TX	0.12Y	116.0	0.08	6.99	12.29	6	1	0	100	0.00	0.0	7.041	0.006	0	0	0	1	L
L 3453455-025	SECUG11877	C	Consumer	0.12Y	116.0	0.00	6.99	12.29	0	1	0	100	0.00	0.0	7.041	0.000	1	0	1	1	L
L SECUG1221	3453455-025	C	4/0 TX	0.12Y	116.0	0.00	6.99	0.00	0	0	0	100	0.00	0.0	7.055	0.014	0	0	0	0	L
L PRUG1425	PRUG1424	C	2 Al 15 kv	6.97Y	116.1	0.00	6.89	1.34	1	9	3	95	0.00	0.0	7.068	0.034	0	0	0	4	L
L PRUG1426	PRUG1425	C	2 Al 15 kv	6.97Y	116.1	0.00	6.89	1.34	1	9	3	95	0.00	0.0	7.111	0.043	0	0	0	4	L
L PRUG1427	PRUG1426	C	2 Al 15 kv	6.97Y	116.1	0.00	6.89	1.34	1	9	3	95	0.00	0.0	7.142	0.030	0	0	0	2	L
L TRAN_38018	PRUG1427	C	Transforme	0.12Y	115.9	0.23	7.12	1.35	39	9	3	95	0.11	1.2	7.142	0.000	0	0	0	2	L
L SECUG1223	TRAN_38018	C	4/0 TX	0.11Y	114.2	1.73	8.85	80.80	42	9	3	95	0.09	1.0	7.163	0.021	0	0	0	2	L
L 3522170-017	SECUG1223	C	Consumer	0.11Y	114.2	0.00	8.85	80.80	0	9	3	95	0.00	0.0	7.163	0.000	9	3	2	2	L
L TRAN_37329	PRUG1426	C	Transforme	0.12Y	116.1	0.00	6.89	0.00	0	0	0	100	0.05	0.0	7.111	0.000	0	0	0	2	L
L SECUG11876	TRAN_37329	C	4/0 TX	0.12Y	116.1	0.00	6.89	0.28	0	0	0	100	0.00	0.0	7.116	0.005	0	0	0	2	L
L 3522159-001	SECUG11876	C	Consumer	0.12Y	116.1	0.00	6.89	0.28	0	0	0	100	0.00	0.0	7.116	0.000	0	0	2	2	L
L SECUG6	3522159-001	C	4/0 TX	0.12Y	116.1	0.00	6.89	0.00	0	0	0	100	0.00	0.0	7.130	0.015	0	0	0	0	L
L PRUG1423	PRUG1415	C	2 Al 15 kv	6.97Y	116.1	0.00	6.89	1.70	1	11	3	96	0.00	0.0	7.061	0.041	0	0	0	2	L
L TRAN_38016	PRUG1423	C	Transforme	0.12Y	115.8	0.28	7.16	1.70	49	11	4	94	0.11	0.9	7.061	0.000	0	0	0	2	L
L SECUG11880	TRAN_38016	C	4/0 TX	0.12Y	115.7	0.13	7.30	29.28	15	3	1	95	0.00	0.0	7.066	0.005	0	0	0	1	L
L 3522107-002	SECUG11880	C	Consumer	0.12Y	115.7	0.00	7.30	29.28	0	3	1	95	0.00	0.0	7.066	0.000	3	1	1	1	L
L SECUG11881	3522107-002	C	4/0 TX	0.12Y	115.7	0.00	7.30	0.00	0	0	0	100	0.00	0.0	7.083	0.017	0	0	0	0	L
L SECUG11879	TRAN_38016	C	4/0 TX	0.12Y	115.5	0.37	7.53	72.98	38	8	3	94	0.02	0.2	7.067	0.005	0	0	0	1	L
L 3522107-001	SECUG11879	C	Consumer	0.12Y	115.5	0.00	7.53	72.98	0	8	2	97	0.00	0.0	7.067	0.000	8	3	1	1	L
L SECUG1222	3522107-001	C	4/0 TX	0.12Y	115.5	0.00	7.53	0.00	0	0	0	100	0.00	0.0	7.073	0.007	0	0	0	0	L

KEY-> L = Low Voltage H = High Voltage C = Capacity Over Limit (%capacity or load amps) G = Generator Out of kvar Limits P = Power Factor Low

Unbalanced Voltage Drop Report
Source: LOPEZ

Database: C:\PROJECTS\OPALCO\2013-2016\2013-2016CWP\EXISTING2013-2016 WM\
Title: Lopez Substation - Circuit 22
Case: Existing system with projected 4 yr load

Units Displayed In Volts
-Base Voltage:120.0-

Element Name	Parent Name	Cnf	Type/ Conductor	Pri kV	Base Volt	Element Drop	Accum Drop	Thru Amps	% Cap	Thru KW	KVAR	% PF	kW Loss	% Loss	mi From Src	Element Length (mi)	Element KW	Element KVAR	Element Cons On	Element Cons Thru	
TRAN_38024	PRUG1428	C	Transforme	0.12Y	116.1	0.14	6.91	0.84	24	6	2	95	0.11	1.9	6.671	0.000	0	0	0	3	L
SECUG1163	TRAN_38024	C	4/0 TX	0.12Y	115.8	0.34	7.25	11.51	6	1	0	100	0.00	0.0	6.701	0.030	0	0	0	1	L
3521293-020	SECUG1163	C	Consumer	0.12Y	115.8	0.00	7.25	11.51	0	1	0	100	0.00	0.0	6.701	0.000	1	0	1	1	L
SECUG11871	TRAN_38024	C	4/0 TX	0.12Y	116.0	0.14	7.05	29.89	15	3	1	95	0.00	0.0	6.676	0.005	0	0	0	1	L
3521293-003	SECUG11871	C	Consumer	0.12Y	116.0	0.00	7.05	29.89	0	3	1	95	0.00	0.0	6.676	0.000	3	1	1	1	L
SECUG1164	3521293-003	C	4/0 TX	0.12Y	116.0	0.00	7.05	0.00	0	0	0	100	0.00	0.0	6.717	0.040	0	0	0	0	L
SECUG1162	TRAN_38024	C	4/0 TX	0.12Y	115.9	0.16	7.06	8.88	5	1	0	100	0.00	0.0	6.689	0.018	0	0	0	1	L
3521293-014	SECUG1162	C	Consumer	0.12Y	115.9	0.00	7.06	8.88	0	1	0	100	0.00	0.0	6.689	0.000	1	0	1	1	L
PRUG692	PRUG1428	C	2 Al 15 kv	6.97Y	116.2	0.00	6.77	0.77	0	5	1	98	0.00	0.0	6.761	0.090	0	0	0	1	L
TRAN_37556	PRUG692	C	Transforme	0.12Y	116.1	0.13	6.90	0.78	23	5	2	93	0.11	2.0	6.761	0.000	0	0	0	1	L
SECUG11869	TRAN_37556	C	4/0 TX	0.12Y	115.9	0.24	7.14	46.94	24	5	2	93	0.01	0.0	6.766	0.005	0	0	0	1	L
3521295-001	SECUG11869	C	Consumer	0.12Y	115.9	0.00	7.14	46.94	0	5	2	93	0.00	0.0	6.766	0.000	5	2	1	1	L
SECUG1161	3521295-001	C	4/0 TX	0.12Y	115.9	0.00	7.14	0.00	0	0	0	100	0.00	0.0	6.789	0.023	0	0	0	0	L
PRUG1439	PRUG1440	C	2 Al 15 kv	6.98Y	116.3	0.00	6.69	1.61	1	11	3	96	0.00	0.0	6.561	0.028	0	0	0	1	L
TRAN_38025	PRUG1439	C	Transforme	0.12Y	116.0	0.27	6.96	1.61	46	11	3	96	0.11	1.0	6.561	0.000	0	0	0	1	L
SECUG11868	TRAN_38025	C	4/0 TX	0.12Y	115.5	0.53	7.49	96.84	50	11	3	96	0.03	0.3	6.566	0.005	0	0	0	1	L
3521264-034	SECUG11868	C	Consumer	0.12Y	115.5	0.00	7.49	96.84	0	11	3	96	0.00	0.0	6.566	0.000	11	3	1	1	L
SECUG846	3521264-034	C	4/0 TX	0.12Y	115.5	0.00	7.49	0.00	0	0	0	100	0.00	0.0	6.591	0.025	0	0	0	0	L
PRUG1442	PRUG1443	C	2 Al 15 kv	6.98Y	116.4	0.01	6.63	4.24	3	28	10	94	0.00	0.0	6.479	0.044	0	0	0	6	L
PRUG39	PRUG1442	C	1/0 Al 15	6.98Y	116.4	0.00	6.63	1.26	1	9	2	98	0.00	0.0	6.534	0.055	0	0	0	3	L
TRAN_37349	PRUG39	C	Transforme	0.12Y	116.2	0.21	6.84	1.27	37	9	3	95	0.11	1.2	6.534	0.000	0	0	0	3	L
SECUG14987	TRAN_37349	C	4/0 TX	0.12Y	115.8	0.31	7.15	76.11	39	8	3	94	0.01	0.2	6.538	0.004	0	0	0	3	L
3522130-001	SECUG14987	C	Consumer	0.12Y	115.8	0.00	7.15	76.11	0	8	3	94	0.00	0.0	6.538	0.000	9	3	3	3	L
SECUG14986	3522130-001	C	4/0 TX	0.12Y	115.8	0.00	7.15	0.00	0	0	0	100	0.00	0.0	6.549	0.011	0	0	0	0	L
TRAN_37350	PRUG1442	C	Transforme	0.12Y	115.8	0.55	7.18	2.99	86	20	7	94	0.11	0.5	6.479	0.000	0	0	0	3	L
SECUG11843	TRAN_37350	C	4/0 TX	0.12Y	115.8	0.00	7.18	0.00	0	0	0	100	0.00	0.0	6.484	0.005	0	0	0	0	L
3522128-031	SECUG11843	C	Consumer	0.12Y	115.8	0.00	7.18	0.00	0	0	0	100	0.00	0.0	6.484	0.000	0	0	0	0	L
SECUG847	3522128-031	C	4/0 TX	0.12Y	115.8	0.00	7.18	0.00	0	0	0	100	0.00	0.0	6.497	0.013	0	0	0	0	L
SECUG11841	TRAN_37350	C	4/0 TX	0.12Y	115.6	0.02	7.20	3.91	2	0	0	100	0.00	0.0	6.484	0.004	0	0	0	1	L
3522128-030	SECUG11841	C	Consumer	0.12Y	115.8	0.00	7.20	3.91	0	0	0	100	0.00	0.0	6.484	0.000	0	0	1	1	L
SECUG11842	3522128-030	C	4/0 TX	0.12Y	115.8	0.00	7.20	0.00	0	0	0	100	0.00	0.0	6.502	0.018	0	0	0	0	L
SECUG254	TRAN_37350	C	4/0 TX	0.11Y	111.6	4.25	11.43	175.46	91	19	7	94	0.46	2.4	6.503	0.024	0	0	0	2	L
3522128-029	SECUG254	C	Consumer	0.11Y	111.6	0.00	11.43	175.46	0	19	6	95	0.00	0.0	6.503	0.000	20	6	2	2	L
PRUG1441	PRUG1443	C	1/0 Al 15	6.98Y	116.3	0.03	6.66	15.87	7	107	31	96	0.03	0.0	6.497	0.063	0	0	0	13	L
PRUG1324	PRUG1441	C	1/0 Al 15	6.98Y	116.3	0.02	6.68	15.88	7	107	32	96	0.02	0.0	6.546	0.048	0	0	0	13	L
PRUG1323	PRUG1324	C	1/0 Al 15	6.98Y	116.3	0.03	6.71	15.89	7	107	32	96	0.03	0.0	6.611	0.066	0	0	0	13	L
TRAN_40218	PRUG1323	C	Transforme	0.12Y	115.9	0.37	7.09	2.26	65	15	5	95	0.11	0.7	6.611	0.000	0	0	0	1	L
SECUG11857	TRAN_40218	C	4/0 TX	0.12Y	115.3	0.59	7.67	135.39	70	15	5	95	0.05	0.3	6.616	0.004	0	0	0	1	L
3522165-001	SECUG11857	C	Consumer	0.12Y	115.3	0.00	7.67	135.39	0	15	5	95	0.00	0.0	6.616	0.000	16	5	1	1	L
SECUG11858	3522165-001	C	4/0 TX	0.12Y	115.3	0.00	7.67	0.00	0	0	0	100	0.00	0.0	6.643	0.027	0	0	0	0	L

KEY-> L = Low Voltage H = High Voltage C = Capacity Over Limit (%capacity or load amps) G = Generator Out of kvar Limits P = Power Factor Low

Unbalanced Voltage Drop Report
Source: LOPEZ

Database: C:\PROJECTS\OPALCO\2013-2016\2013-2016CWP\EXISTING2013-2016.WM\
Title: Lopez Substation - Circuit 22
Case: Existing system with projected 4 yr load

Units Displayed In Volts
-Base Voltage:120.0-

Element Name	Parent Name	Cnf	Type/ Conductor	Pri kV	Base Volt	Element Drop	Accum Drop	Thru Amps	% Cap	Thru KW	KVAR	% PF	kW Loss	% Loss	mi From Src	Element Length (mi)	Element KW	Element KVAR	Element Cons On	Element Cons Thru	
PRUG770	PRUG1323	C	2 Al 15 kv	6.98Y	116.3	0.04	6.75	13.65	8	92	27	96	0.03	0.0	6.671	0.060	0	0	0	12	L
TRAN_37558	PRUG770	C	Transforme	0.12Y	116.0	0.28	7.03	1.40	67	9	3	95	0.05	0.6	6.671	0.000	0	0	0	1	L
SECUG11859	TRAN_37558	C	4/0 TX	0.12Y	115.9	0.38	7.42	84.26	44	9	3	95	0.02	0.2	6.675	0.005	0	0	0	1	L
3522267-001	SECUG11859	C	Consumer	0.12Y	115.6	0.00	7.42	84.26	0	9	3	95	0.00	0.0	6.675	0.000	10	3	1	1	L
SECUG1166	3522267-001	C	4/0 TX	0.12Y	115.6	0.00	7.42	0.00	0	0	0	100	0.00	0.0	6.686	0.010	0	0	0	0	L
PRUG771	PRUG770	C	1/0 Al 15	6.97Y	116.2	0.02	6.77	12.25	5	83	24	96	0.01	0.0	6.710	0.040	0	0	0	11	L
TRAN_38026	PRUG771	C	Transforme	0.12Y	116.0	0.28	7.05	1.71	49	11	4	94	0.11	0.9	6.710	0.000	0	0	0	2	L
SECUG11860	TRAN_38026	C	4/0 TX	0.12Y	115.8	0.55	7.59	102.65	53	11	4	94	0.03	0.3	6.716	0.005	0	0	0	2	L
3522369-045	SECUG11860	C	Consumer	0.12Y	115.4	0.00	7.59	102.65	0	11	4	94	0.00	0.0	6.716	0.000	12	4	2	2	L
SECUG107	3522369-045	C	4/0 TX	0.12Y	115.4	0.00	7.59	0.00	0	0	0	100	0.00	0.0	6.732	0.016	0	0	0	0	L
PRUG1315	PRUG771	C	1/0 Al 15	6.97Y	116.2	0.00	6.77	10.55	5	71	21	96	0.00	0.0	6.723	0.012	0	0	0	9	L
PRUG772	PRUG1315	C	1/0 Al 15	6.97Y	116.2	0.02	6.79	10.55	5	71	21	96	0.01	0.0	6.795	0.073	0	0	0	9	L
TRAN_38023	PRUG772	C	Transforme	0.12Y	115.9	0.32	7.12	1.96	56	13	4	96	0.11	0.8	6.795	0.000	0	0	0	1	L
SECUG11861	TRAN_38023	C	4/0 TX	0.12Y	115.4	0.50	7.62	117.40	61	13	4	96	0.04	0.3	6.800	0.004	0	0	0	1	L
3522273-041	SECUG11861	C	Consumer	0.12Y	115.4	0.00	7.62	117.40	0	13	4	96	0.00	0.0	6.800	0.000	13	4	1	1	L
SECUG844	3522273-041	C	4/0 TX	0.12Y	115.4	0.00	7.62	0.00	0	0	0	100	0.00	0.0	6.821	0.022	0	0	0	0	L
PRUG1314	PRUG772	C	1/0 Al 15	6.97Y	116.2	0.00	6.80	8.61	4	58	17	96	0.00	0.0	6.806	0.011	0	0	0	8	L
TRAN_37560	PRUG1314	C	Transforme	0.12Y	116.1	0.07	6.87	0.46	13	3	1	95	0.11	3.4	6.806	0.000	0	0	0	1	L
SECUG11862	TRAN_37560	C	4/0 TX	0.12Y	116.0	0.13	7.01	27.32	14	3	1	95	0.00	0.0	6.811	0.005	0	0	0	1	L
3522274-001	SECUG11862	C	Consumer	0.12Y	116.0	0.00	7.01	27.32	0	3	1	95	0.00	0.0	6.811	0.000	3	1	1	1	L
SECUG1175	3522274-001	C	4/0 TX	0.12Y	116.0	0.00	7.01	0.00	0	0	0	100	0.00	0.0	6.826	0.015	0	0	0	0	L
PRUG773	PRUG1314	C	1/0 Al 15	6.97Y	116.2	0.01	6.81	8.16	4	55	16	96	0.00	0.0	6.851	0.044	0	0	0	7	L
PRUG1322	PRUG773	C	1/0 Al 15	6.97Y	116.2	0.01	6.82	8.16	4	55	16	96	0.01	0.0	6.899	0.048	0	0	0	7	L
PRUG1321	PRUG1322	C	1/0 Al 15	6.97Y	116.2	0.01	6.83	8.17	4	55	16	96	0.00	0.0	6.921	0.022	0	0	0	7	L
PRUG518	PRUG1321	C	2 Al 15 kv	6.97Y	116.2	0.02	6.85	3.41	2	23	7	96	0.00	0.0	7.043	0.122	0	0	0	2	L
TRAN_38022	PRUG518	C	Transforme	0.12Y	115.8	0.57	7.42	3.43	99	23	8	94	0.11	0.5	7.043	0.000	0	0	0	2	L
SECUG11863	TRAN_38022	C	4/0 TX	0.11Y	114.9	0.66	8.08	146.68	76	16	5	95	0.06	0.4	7.047	0.004	0	0	0	1	L
3522291-036	SECUG11863	C	Consumer	0.11Y	114.5	0.00	8.08	146.68	0	16	5	95	0.00	0.0	7.047	0.000	17	5	1	1	L
SECUG857	3522291-036	C	4/0 TX	0.11Y	114.9	0.00	8.08	0.00	0	0	0	100	0.00	0.0	7.054	0.007	0	0	0	0	L
SECUG1649	TRAN_38022	C	4/0 TX	0.11Y	114.5	1.06	8.48	59.23	31	7	2	96	0.04	0.6	7.061	0.018	0	0	0	1	L
3522291-027	SECUG1649	C	Consumer	0.11Y	114.5	0.00	8.48	59.23	0	6	2	95	0.00	0.0	7.061	0.000	7	2	1	1	L
PRUG1432	PRUG1321	C	2 Al 15 kv	6.97Y	116.2	-0.01	6.84	4.76	3	32	9	96	0.00	0.0	6.955	0.034	0	0	0	5	L
PRUG1433	PRUG1432	C	2 Al 15 kv	6.97Y	116.2	0.01	6.85	4.77	3	32	9	96	0.00	0.0	7.005	0.050	0	0	0	5	L
PRUG1434	PRUG1433	C	2 Al 15 kv	6.97Y	116.1	0.01	6.86	3.78	2	25	7	96	0.00	0.0	7.071	0.066	0	0	0	4	L
TRAN_39759	PRUG1434	C	Transforme	0.12Y	115.7	0.41	7.27	2.50	72	17	5	96	0.11	0.6	7.071	0.000	0	0	0	3	L
SECUG11867	TRAN_39759	C	4/0 TX	0.12Y	115.3	0.46	7.73	97.40	50	11	3	96	0.03	0.3	7.076	0.005	0	0	0	1	L
3522185-003	SECUG11867	C	Consumer	0.12Y	115.3	0.00	7.73	97.40	0	11	3	96	0.00	0.0	7.076	0.000	11	3	1	1	L
SECUG841	3522185-003	C	4/0 TX	0.12Y	115.3	0.00	7.73	0.00	0	0	0	100	0.00	0.0	7.092	0.016	0	0	0	0	L
SECUG11866	TRAN_39759	C	4/0 TX	0.12Y	115.5	0.24	7.51	49.51	26	5	2	93	0.01	0.0	7.076	0.005	0	0	0	1	L
3522185-002	SECUG11866	C	Consumer	0.12Y	115.5	0.00	7.51	49.51	0	5	2	93	0.00	0.0	7.076	0.000	6	2	1	1	L

KEY-> L = Low Voltage H = High Voltage C = Capacity Over Limit (tcapacity or load amps) G = Generator Out of kvar Limits P = Power Factor Low

Unbalanced Voltage Drop Report
Source: LOPEZ

Database: C:\PROJECTS\OPALCO\2013-2016\2013-2016CWP\EXISTING2013-2016.MW\
Title: Lopez Substation - Circuit 22
Case: Existing system with projected 4 yr load

Units Displayed In Volts
-Base Voltage:120.0-

Element Name	Parent Name	Cnf	Type/ Conductor	Pri kV	Base Volt	Element Drop	Accum Drop	Thru Amps	% Cap	Thru KW	KVAR	% PF	kW Loss	% Loss	mi From Src	Element Length (mi)	Element KW	Element KVAR	Element Cons On	Element Cons Thru	
L SECUG842	3522185-002	C	4/0 TX	0.12Y	115.5	0.00	7.51	0.00	0	0	0	100	0.00	0.0	7.092	0.016	0	0	0	0	L
L SECUG11865	TRAN_39759	C	4/0 TX	0.12Y	115.7	0.01	7.28	3.35	2	0	0	100	0.00	0.0	7.074	0.003	0	0	0	1	L
L 3522185-010	SECUG11865	C	Consumer	0.12Y	115.7	0.00	7.28	3.35	0	0	0	100	0.00	0.0	7.074	0.000	0	0	1	1	L
L SECUG840	3522185-010	C	4/0 TX	0.12Y	115.7	0.00	7.28	0.00	0	0	0	100	0.00	0.0	7.084	0.010	0	0	0	0	L
L PRUG1435	PRUG1434	C	2 Al 15 kv	6.97Y	116.1	0.00	6.86	1.29	1	9	2	98	0.00	0.0	7.139	0.068	0	0	0	1	L
L TRAN_38019	PRUG1435	C	Transforme	0.12Y	115.9	0.23	7.09	1.31	38	9	3	95	0.11	1.2	7.139	0.000	0	0	0	1	L
L SECUG1650	TRAN_38019	C	4/0 TX	0.11Y	113.5	2.41	9.50	78.79	41	9	3	95	0.12	1.4	7.169	0.030	0	0	0	1	L
L 3522187-018	SECUG1650	C	Consumer	0.11Y	113.5	0.00	9.50	78.79	0	9	3	95	0.00	0.0	7.169	0.000	9	3	1	1	L
L PRUG1436	PRUG1435	C	2 Al 15 kv	6.97Y	116.1	-0.00	6.86	-0.06	0	0	0	100	0.00	0.0	7.205	0.066	0	0	0	0	L
L PRUG1431	PRUG1436	C	2 Al 15 kv	6.97Y	116.1	-0.00	6.86	-0.03	0	0	0	100	0.00	0.0	7.262	0.056	0	0	0	0	L
L SWIT_20-A	PRUG1431	C	Open	6.97Y	116.1	0.00	6.86	0.00	0	0	0	100	0.00	0.0	7.262	0.000	0	0	0	0	L
L TRAN_38021	PRUG1433	C	Transforme	0.12Y	116.0	0.16	7.01	1.00	29	7	2	96	0.11	1.6	7.005	0.000	0	0	0	1	L
L SECUG11864	TRAN_38021	C	4/0 TX	0.12Y	115.7	0.27	7.27	59.79	31	7	2	96	0.01	0.0	7.010	0.004	0	0	0	1	L
L 3522183-016	SECUG11864	C	Consumer	0.12Y	115.7	0.00	7.27	59.79	0	7	2	96	0.00	0.0	7.010	0.000	7	2	1	1	L
L SECUG843	3522183-016	C	4/0 TX	0.12Y	115.7	0.00	7.27	0.00	0	0	0	100	0.00	0.0	7.026	0.016	0	0	0	0	L
L TRAN_38020	PRUG1441	C	Transforme	0.12Y	116.2	0.00	6.66	0.00	0	0	0	100	0.11	100.0	6.497	0.000	0	0	0	0	L
L SECUG845	TRAN_38020	C	4/0 TX	0.12Y	116.3	0.00	6.66	0.00	0	0	0	100	0.00	0.0	6.503	0.006	0	0	0	0	L
L SECOH226	SECUG845	C	4/0 TRPX	0.12Y	116.3	0.00	6.66	0.00	0	0	0	100	0.00	0.0	6.529	0.025	0	0	0	0	L
L 3522161-016	SECOH226	C	Consumer	0.12Y	116.3	0.00	6.66	0.00	0	0	0	100	0.00	0.0	6.529	0.000	0	0	0	0	L
L TRAN_38010	PRUG1445	C	Transforme	0.12Y	116.4	0.10	6.55	0.60	17	4	1	97	0.11	2.6	6.290	0.000	0	0	0	1	L
L SECUG848	TRAN_38010	C	4/0 TX	0.12Y	116.2	0.20	6.75	36.26	19	4	1	97	0.00	0.0	6.296	0.006	0	0	0	1	L
L SECOH227	SECUG848	C	4/0 TRPX	0.12Y	115.4	0.85	7.60	36.26	18	4	1	97	0.03	0.8	6.323	0.028	0	0	0	1	L
L 3522421-015	SECOH227	C	Consumer	0.12Y	115.4	0.00	7.60	36.26	0	4	1	97	0.00	0.0	6.323	0.000	4	1	1	1	L
L TRAN_38002	PRUG1459	C	Transforme	0.12Y	116.6	0.03	6.37	0.22	6	2	0	100	0.11	6.8	6.189	0.000	0	0	0	1	L
L SECUG849	TRAN_38002	C	4/0 TX	0.12Y	116.6	0.07	6.44	13.02	7	1	0	100	0.00	0.0	6.194	0.005	0	0	0	1	L
L SECOH1627	SECUG849	C	4/0 TRPX	0.12Y	116.5	0.03	6.47	13.02	6	1	0	100	0.00	0.0	6.197	0.002	0	0	0	1	L
L 3521317-023	SECOH1627	C	Consumer	0.12Y	116.5	0.00	6.47	13.02	0	1	0	100	0.00	0.0	6.197	0.000	1	0	1	1	L
L SECOH46	3521317-023	C	4/0 TRPX	0.12Y	116.5	0.00	6.47	0.00	0	0	0	100	0.00	0.0	6.211	0.014	0	0	0	0	L
P PRUG697	PRUG699	A	1/0 Al 15	7.20Y	120.0	-0.00	2.98	-0.09	0	0	-1	0	0.00	0.0	7.095	0.067	0	0	0	0	P
P PRUG1409	PRUG697	A	1/0 Al 15	7.20Y	120.0	-0.00	2.98	-0.04	0	0	0	100	0.00	0.0	7.160	0.065	0	0	0	0	P
P PRUG14076	PROH3241	A	2 Al 15 kv	7.20Y	120.0	-0.00	2.98	-0.07	0	0	-1	0	0.00	0.0	6.667	0.007	0	0	0	1	P
P PRUG14075	FUSE_724	A	2 Al 15 kv	7.20Y	120.0	-0.00	2.98	-0.07	0	0	0	100	0.00	0.0	6.802	0.134	0	0	0	1	P
P PRUG100	PRUG14211	A	1/0 Al 15	7.19Y	119.9	0.00	3.10	0.14	0	1	-1	-71	0.00	0.0	8.339	0.074	0	0	0	1	P
P PRUG1455	PRUG417	A	2 Al 15 kv	7.20Y	119.9	0.00	3.07	0.03	0	0	0	100	0.00	0.0	7.924	0.062	0	0	0	1	P
P PRUG101	PRUG14313	A	2 Al 15 kv	7.20Y	119.9	-0.00	3.07	-0.07	0	0	-1	0	0.00	0.0	7.729	0.138	0	0	0	0	P
C TRAN_39329	PROH3240	A	Transforme	0.12Y	119.2	0.82	3.82	0.60	86	4	2	89	0.03	0.8	6.851	0.000	0	0	0	1	C
P PRUG1452	PRUG14199	A	2 Al 15 kv	7.20Y	120.0	-0.00	3.00	-0.10	0	0	-1	0	0.00	0.0	6.928	0.064	0	0	0	0	P
P PRUG1449	PRUG1452	A	2 Al 15 kv	7.20Y	120.0	-0.00	3.00	-0.06	0	0	0	100	0.00	0.0	6.972	0.044	0	0	0	0	P
P PRUG1450	PRUG1449	A	2 Al 15 kv	7.20Y	120.0	-0.00	3.00	-0.04	0	0	0	100	0.00	0.0	7.054	0.083	0	0	0	0	P
L TRAN_38066	PRUG1352	C	Transforme	0.12Y	117.3	0.24	5.67	1.44	42	10	3	96	0.11	1.1	5.502	0.000	0	0	0	1	L

KEY-> L = Low Voltage H = High Voltage C = Capacity Over Limit (%capacity or load amps) G = Generator Out of kvar Limits P = Power Factor Low

Unbalanced Voltage Drop Report
Source: LOPEZ

Database: C:\PROJECTS\OPALCO\2013-2016\2013-2016CWP\EXISTING2013-2016.MM\
Title: Lopez Substation - Circuit 22
Case: Existing system with projected 4 yr load

Units Displayed In Volts
-Base Voltage:120.0-

Element Name	Parent Name	Cnf	Type/ Conductor	Pri kV	Base Volt	Element Drop	Accum Drop	Thru Amps	% Cap	Thru KW	KVAR	% PF	kW Loss	% Loss	mi From Src	Element Length (mi)	Element KW	Element KVAR	Element Cons On	Element Cons Thru	
L SECUG11820	TRAN_38066	C	4/0 TX	0.12Y	116.9	0.39	6.06	86.50	45	10	3	96	0.02	0.2	5.507	0.005	0	0	0	1	L
L 3511431-001	SECUG11820	C	Consumer	0.12Y	116.9	0.00	6.06	86.50	0	10	3	96	0.00	0.0	5.507	0.000	10	3	1	1	L
L SECUG120	3511431-001	C	4/0 TX	0.12Y	116.9	0.00	6.06	0.00	0	0	0	100	0.00	0.0	5.521	0.015	0	0	0	0	L
L SECUG11810	TRAN_37369	C	4/0 TX	0.12Y	117.5	0.26	5.53	54.20	28	6	2	95	0.01	0.0	5.225	0.005	0	0	0	1	L
L 3511313-062	SECUG11810	C	Consumer	0.12Y	117.5	0.00	5.53	54.20	0	6	2	95	0.00	0.0	5.225	0.000	6	2	1	1	L
L SECUG35	3511313-062	C	4/0 TX	0.12Y	117.5	0.00	5.53	0.00	0	0	0	100	0.00	0.0	5.239	0.014	0	0	0	0	L
P PRUG1334	PRUG1333	A	2 Al 15 kv	7.20Y	120.0	-0.00	2.96	-0.04	0	0	0	100	0.00	0.0	5.422	0.081	0	0	0	0	P
P PRUG1336	PRUG10702	A	1/0 Al 15	7.20Y	120.0	0.00	2.96	0.17	0	1	-1	-71	0.00	0.0	5.034	0.104	0	0	0	1	P
P PRUG301	PRUG305	A	1/0 Al 15	7.20Y	120.0	-0.00	2.97	-0.06	0	0	0	100	0.00	0.0	5.147	0.094	0	0	0	0	P
P PRUG12559	PRUG13652	A	1/0 Al 15	7.20Y	120.1	-0.00	2.94	-0.04	0	0	0	100	0.00	0.0	4.762	0.063	0	0	0	0	P
L TRAN_38072	PRUG1349	C	Transforme	0.12Y	118.2	2.11	6.79	11.25	324	74	30	93	0.11	0.1	4.808	0.000	0	0	0	2	L
L SECUG640	TRAN_38072	C	4/0 TX	0.11Y	113.0	3.17	9.96	675.01	350	74	25	95	1.32	1.8	4.813	0.005	0	0	0	2	L
L 3512442-036	SECUG640	C	Consumer	0.11Y	113.0	0.00	9.96	675.01	0	73	23	95	0.00	0.0	4.813	0.000	77	24	2	2	L
L SECUG11776	3512442-036	C	4/0 TX	0.11Y	113.0	0.00	9.96	0.00	0	0	0	100	0.00	0.0	4.817	0.004	0	0	0	0	L
C TRAN_37519	PRUG453	C	Transforme	0.12Y	119.1	0.32	3.87	1.60	77	11	4	94	0.05	0.5	3.990	0.000	0	0	0	3	C
C TRAN_39301	PROH4994	A	Transforme	0.12Y	119.6	0.95	3.41	1.17	84	8	4	89	0.04	0.6	3.608	0.000	0	0	0	3	C
P PRUG729	PRUG730	A	2 Al 15 kv	7.24Y	120.6	-0.00	2.40	-0.08	0	0	-1	0	0.00	0.0	4.265	0.069	0	0	0	1	P
P PRUG728	PRUG729	A	2 Al 15 kv	7.24Y	120.6	-0.00	2.40	-0.05	0	0	0	100	0.00	0.0	4.360	0.096	0	0	0	1	P
P PRUG726	PRUG730	A	1/0 Al 15	7.24Y	120.6	-0.00	2.40	-0.12	0	0	-1	0	0.00	0.0	4.304	0.109	0	0	0	0	P
P PRUG725	PRUG726	A	2 Al 15 kv	7.24Y	120.6	-0.00	2.40	-0.04	0	0	0	100	0.00	0.0	4.390	0.087	0	0	0	0	P
P PRUG684	PRUG731	A	1/0 Al 15	7.24Y	120.6	-0.00	2.40	0.10	0	0	-1	0	0.00	0.0	4.235	0.153	0	0	0	1	P
P PRUG1644	PROH3335	B	2 Al 15 kv	7.27Y	121.1	-0.00	1.85	-0.04	0	0	0	100	0.00	0.0	3.669	0.088	0	0	0	1	P
P PRUG1638	PROH4988	A	2 Al 15 kv	7.25Y	120.8	0.00	2.17	0.07	0	0	0	100	0.00	0.0	3.399	0.150	0	0	0	1	P
P PRUG1637	PRUG141	B	2 Al 15 kv	7.27Y	121.2	0.00	1.75	-0.02	0	0	0	100	0.00	0.0	4.054	0.044	0	0	0	1	P
P PRUG1626	PRUG1624	B	2 Al 15 kv	7.27Y	121.2	0.00	1.75	0.03	0	0	0	100	0.00	0.0	3.785	0.055	0	0	0	1	P
P PRUG1615	PRUG1618	B	2 Al 15 kv	7.27Y	121.2	-0.00	1.82	-0.08	0	0	-1	0	0.00	0.0	4.256	0.154	0	0	0	3	P
P PRUG1607	PRUG775	B	2 Al 15 kv	7.27Y	121.2	0.00	1.84	0.06	0	0	0	100	0.00	0.0	4.508	0.071	0	0	0	1	P
P PRUG1608	PRUG1607	B	2 Al 15 kv	7.27Y	121.2	0.00	1.84	0.03	0	0	0	100	0.00	0.0	4.577	0.069	0	0	0	1	P
P PRUG689	PRUG162	B	2 Al 15 kv	7.27Y	121.1	-0.00	1.86	0.24	0	1	-2	-45	0.00	0.0	4.696	0.037	0	0	0	3	P
P PRUG688	PRUG689	B	2 Al 15 kv	7.27Y	121.1	0.00	1.86	0.22	0	1	-2	-45	0.00	0.0	4.916	0.220	0	0	0	2	P
P PRUG12077	PRUG688	B	1/0 Al 15	7.27Y	121.1	-0.00	1.86	-0.13	0	0	-1	0	0.00	0.0	5.048	0.132	0	0	0	1	P
P PRUG12078	PRUG12077	B	1/0 Al 15	7.27Y	121.1	-0.00	1.86	-0.04	0	0	0	100	0.00	0.0	5.112	0.064	0	0	0	1	P
P PRUG11693	PRUG14317	B	1/0 Al 15	7.27Y	121.1	-0.00	1.86	-0.08	0	0	-1	0	0.00	0.0	4.874	0.055	0	0	0	0	P
P PRUG11694	PRUG11693	B	1/0 Al 15	7.27Y	121.1	-0.00	1.86	-0.04	0	0	0	100	0.00	0.0	4.933	0.059	0	0	0	0	P
P PRUG13664	PROH4983	C	2 Al 15 kv	7.23Y	120.5	0.00	2.48	0.17	0	1	-1	-71	0.00	0.0	2.910	0.003	0	0	0	3	P
P PRUG13663	FUSE_658	C	2 Al 15 kv	7.23Y	120.5	-0.00	2.48	0.17	0	1	-1	-71	0.00	0.0	2.955	0.046	0	0	0	3	P
P PRUG12391	PRUG13663	C	1/0 Al 15	7.23Y	120.5	-0.00	2.48	-0.15	0	0	-1	0	0.00	0.0	3.048	0.093	0	0	0	2	P
P PRUG12392	PRUG12391	C	1/0 Al 15	7.23Y	120.5	-0.00	2.48	-0.09	0	0	-1	0	0.00	0.0	3.186	0.138	0	0	0	2	P
P PRUG14129	PROH4975	C	2 Al 15 kv	7.26Y	121.0	0.00	1.95	-0.12	0	0	-1	0	0.00	0.0	2.462	0.003	0	0	0	0	P
P PRUG14130	FUSE_657	C	2 Al 15 kv	7.26Y	121.0	-0.00	1.95	-0.12	0	0	-1	0	0.00	0.0	2.475	0.013	0	0	0	0	P

KEY-> L = Low Voltage H = High Voltage C = Capacity Over Limit (%capacity or load amps) G = Generator Out of kvar Limits P = Power Factor Low

Unbalanced Voltage Drop Report
Source: LOPEZ

Database: C:\PROJECTS\OPALCO\2013-2016\2013-2016CWP\EXISTING2013-2016.WM\
Title: Lopez Substation - Circuit 22
Case: Existing system with projected 4 yr load

Units Displayed In Volts
-Base Voltage:120.0-

Element Name	Parent Name	Cnf	Type/ Conductor	Pri kV	Base Volt	Element Drop	Accum Drop	Thru Amps	% Cap	Thru KW	KVAR	% PF	kW Loss	% Loss	mi From Src	Element Length (mi)	Element KW	Element KVAR	Element Cons On	Element Cons Thru	
P PRUG164	PRUG14130	C	2 Al 15 kv	7.26Y	121.1	-0.00	1.95	-0.11	0	0	-1	0	0.00	0.0	2.587	0.112	0	0	0	0	P
P PRUG166	PRUG164	C	2 Al 15 kv	7.26Y	121.1	-0.00	1.95	-0.05	0	0	0	100	0.00	0.0	2.692	0.104	0	0	0	0	P
P PRUG1590	PRUG13578	B	2 Al 15 kv	7.33Y	122.2	-0.00	0.75	-0.04	0	0	0	100	0.00	0.0	1.878	0.073	0	0	0	0	P
P PRUG84	PRUG1581	A	1/0 Al 15	7.35Y	122.5	-0.00	0.48	0.06	0	0	0	100	0.00	0.0	1.478	0.037	0	0	0	1	P
P PRUG85	PRUG84	A	1/0 Al 15	7.35Y	122.5	-0.00	0.48	0.03	0	0	0	100	0.00	0.0	1.527	0.048	0	0	0	1	P
P PRUG12460	PRUG1584	A	1/0 Al 15	7.35Y	122.5	-0.00	0.48	-0.03	0	0	0	100	0.00	0.0	1.470	0.047	0	0	0	1	P
P PRUG14137	PROH6396	C	1/0 Al 15	7.34Y	122.4	0.00	0.62	-0.05	0	0	0	100	0.00	0.0	1.128	0.003	0	0	0	0	P
P PRUG14138	FUSE_625	C	1/0 Al 15	7.34Y	122.4	0.00	0.62	-0.04	0	0	0	100	0.00	0.0	1.130	0.002	0	0	0	0	P
P PRUG12271	PRUG14138	C	1/0 Al 15	7.34Y	122.4	-0.00	0.62	-0.04	0	0	0	100	0.00	0.0	1.195	0.065	0	0	0	0	P
P PRUG1514	PRUG14506	C	1/0 Al 15	7.34Y	122.3	0.00	0.73	-0.02	0	0	0	100	0.00	0.0	1.332	0.017	0	0	0	0	P
P PRUG1508	PRUG1514	C	2 Al 15 kv	7.34Y	122.3	0.00	0.73	-0.01	0	0	0	100	0.00	0.0	1.355	0.023	0	0	0	0	P
C SECUG11416	TRAN_38190	C	4/0 TX	0.12Y	121.5	0.50	1.54	109.07	57	13	4	96	0.03	0.3	1.522	0.005	0	0	0	1	C
C FUSE_626	PROH6200	C	10K	7.34Y	122.3	0.00	0.73	11.50	113	81	25	96	0.00	0.0	1.312	0.000	0	0	0	6	C
C TRAN_38193	PRUG1509	C	Transforme	0.12Y	121.4	0.68	1.63	4.01	116	28	9	95	0.11	0.4	1.850	0.000	0	0	0	1	C
C SECUG11419	TRAN_38193	C	4/0 TX	0.12Y	120.2	1.19	2.83	240.67	125	28	9	95	0.18	0.6	1.855	0.005	0	0	0	1	C
C TRAN_39282	PROH3273	C	Transforme	0.12Y	121.1	0.96	1.89	1.76	127	12	4	95	0.04	0.4	1.786	0.000	0	0	0	1	C
C SECOH243	TRAN_39282	C	4/0 TRPX	0.12Y	120.1	1.01	2.90	105.61	52	12	4	95	0.12	1.0	1.797	0.011	0	0	0	1	C
C SECOH251	TRAN_39281	C	4/0 TRPX	0.12Y	118.4	3.35	4.58	125.17	61	15	4	97	0.46	3.2	1.715	0.032	0	0	0	1	C
P PRUG1516	PRUG1517	B	2 Al 15 kv	7.37Y	122.8	0.00	0.22	0.07	0	0	0	100	0.00	0.0	1.166	0.089	0	0	0	1	P
P PRUG11678	PRUG1519	B	1/0 Al 15	7.37Y	122.8	-0.00	0.21	-0.05	0	0	0	100	0.00	0.0	1.011	0.070	0	0	0	0	P
P PRUG12034	PRUG12033	A	1/0 Al 15	7.38Y	123.0	-0.00	0.02	-0.19	0	0	-1	0	0.00	0.0	0.390	0.163	0	0	0	0	P
P PRUG12035	PRUG12034	A	1/0 Al 15	7.38Y	123.0	-0.00	0.02	-0.08	0	0	-1	0	0.00	0.0	0.514	0.123	0	0	0	0	P
---------- Feeder No. 4 (RECL_81) Beginning with Device RECL_81 ----------																					
RECL_81	LOPEZ	A	CIR24-0	7.38Y	123.0	0.00	0.00	19.51	5	143	36	97	0.00	0.0	0.000	0.000	0	0	0	54	
		B		7.38Y	123.0	0.00	0.00	14.93	4	107	27	97					0	0	0	1	
		C		7.38Y	123.0	0.00	0.00	19.30	5	143	36	97					0	0	0	81	
---------- Feeder No. 1 (RECL_80) Beginning with Device RECL_80 ----------																					
RECL_80	LOPEZ	A	CIR21-0	7.38Y	123.0	0.00	0.00	152.14	38	1108	275	97	0.00	0.0	0.000	0.000	0	0	0	378	
		B		7.38Y	123.0	0.00	0.00	152.16	38	1109	279	97					0	0	0	432	
		C		7.38Y	123.0	0.00	0.00	168.78	42	1217	308	97					0	0	0	307	
---------- Feeder No. 3 (RECL_79) Beginning with Device RECL_79 ----------																					
RECL_79	LOPEZ	A	CIR23-0	7.38Y	123.0	0.00	0.00	118.47	30	859	215	97	0.00	0.0	0.000	0.000	0	0	0	200	
		B		7.38Y	123.0	0.00	0.00	124.24	31	895	224	97					0	0	0	160	
		C		7.38Y	123.0	0.00	0.00	108.91	27	787	197	97					0	0	0	186	

KEY-> L = Low Voltage H = High Voltage C = Capacity Over Limit (%capacity or load amps) G = Generator Out of kvar Limits P = Power Factor Low

	Load	Adjustment	Capacitance	Charging	Gen&Motors	Loops&Metas	Losses	No Load Losses	Total
KW	1569	-18	0	0	0	6283	44	51.46	7929
KVAR	693	-6	0	-334	0	1599	59		2011

Lowest Voltage	Highest Accumulated Voltage Drop	Highest Element Voltage Drop
A-Phase -> 113.20 volts on SECUG1228	9.80 volts on SECUG1228	8.05 volts on SECUG1228
B-Phase -> 117.27 volts on SECUG1654	5.73 volts on SECUG1654	1.97 volts on SECOH244
C-Phase -> 111.57 volts on SECUG254	11.43 volts on SECUG254	4.25 volts on SECUG254

Substation Summary:

Substation	KW	KW Losses	KVAR	KVAR Losses	KVA	% Capacity
LOPEZ	7878.54	96.00	2345.00	59.00	8180.48	39.09
Total:	7878.54	96.00	2345.00	59.00	8180.48	

Unbalanced Voltage Drop Report
Source: LOPEZ

Database: C:\PROJECTS\OPALCO\2013-2016\2013-2016CWP\PROPOSEDSYSTEMWDEC&THATCHNEWSUBBOYCE.WM\
Title: Lopez Substation - Circuit 22
Case. Proposed system with projected 4 yr load

Units Displayed In Volts
-Base Voltage:120.0-

Element Name	Parent Name	Cnf	Type/ Conductor	Pri kV	Base Volt	Element Drop	Accum Drop	Thru Amps	% Cap	Thru KW	KVAR	% PF	kW Loss	% Loss	mi From Src	Element Length (mi)	Element KW	Element KVAR	Element Cons On	Element Cons Thru	
LOPEZ		A	Lopez	7.38Y	123.0	0.00	0.00	410.05	43	2998	578	98	0.00	0.0	0.000	0.000	0	0	0	1241	
		B		7.38Y	123.0	0.00	0.00	391.08	41	2854	544	98					0	0	0	1042	
		C		7.38Y	123.0	0.00	0.00	375.28	39	2732	497	98					0	0	0	816	
---------- Feeder No. 2 (RECL_82) Beginning with Device RECL_82 ----------																					
RECL_82	LOPEZ	A	CIR22-0	7.38Y	123.0	0.00	0.00	116.05	29	866	178	98	0.00	0.0	0.000	0.000	0	0	0	552	
		B		7.38Y	123.0	0.00	0.00	67.16	17	506	99	98					0	0	0	330	
		C		7.38Y	123.0	0.00	0.00	79.01	20	580	113	98					0	0	0	113	
PRUG13690	PRUG13689	A	500 Cu 15	7.38Y	122.9	0.00	0.08	0.25	0	2	1	89	0.00	0.0	0.188	0.000	0	0	0	2	
P		B		7.38Y	123.0	0.00	0.03	0.00	0	0	0	0					0	0	0	0	P
		C		7.38Y	123.0	0.00	0.03	0.00	0	0	0	0					0	0	0	0	
P PRUG13790	PROH4948	C	2 Al 15 kv	7.36Y	122.6	0.00	0.39	-0.10	0	0	-1	0	0.00	0.0	0.710	0.006	0	0	0	1	P
P PRUG13789	FUSE_623	C	2 Al 15 kv	7.36Y	122.6	-0.00	0.39	-0.10	0	0	-1	0	0.00	0.0	0.900	0.190	0	0	0	1	P
P PRUG14079	PROH3326	B	2 Al 15 kv	7.37Y	122.8	0.00	0.22	-0.05	0	0	0	100	0.00	0.0	1.422	0.002	0	0	0	0	P
P PRUG14081	FUSE_631	B	2 Al 15 kv	7.37Y	122.8	-0.00	0.22	-0.05	0	0	0	100	0.00	0.0	1.424	0.003	0	0	0	0	P
P PRUG14080	PRUG14081	B	2 Al 15 kv	7.37Y	122.8	-0.00	0.22	-0.04	0	0	0	100	0.00	0.0	1.508	0.084	0	0	0	0	P
C SECOH244	TRAN_39292	B	4/0 TRPX	0.12Y	120.4	1.99	2.65	116.49	57	13	6	91	0.28	2.1	1.441	0.022	0	0	0	1	C
C RECL_124	PROH6440	A	50L	7.30Y	121.7	0.00	1.35	57.55	115	418	91	98	0.00	0.0	1.626	0.000	0	0	0	128	C
		B		7.37Y	122.8	0.00	0.21	16.55	33	120	39	95					0	0	0	59	
		C		7.33Y	122.1	0.00	0.92	2.15	4	16	4	97					0	0	0	6	
P PRUG12095	PROH4865	A	1/0 Al 15	7.27Y	121.2	-0.00	1.81	-0.02	0	0	0	100	0.00	0.0	2.014	0.037	0	0	0	1	P
P PRUG14194	PROH3174	A	2 Al 15 kv	7.21Y	120.2	0.00	2.78	0.04	0	0	0	100	0.00	0.0	3.512	0.006	0	0	0	1	P
P PRUG14193	FUSE_653	A	2 Al 15 kv	7.21Y	120.2	0.00	2.78	0.04	0	0	0	100	0.00	0.0	3.585	0.073	0	0	0	1	P
P PRUG12504	PRUG727	A	2 Al 15 kv	7.21Y	120.1	0.00	2.88	-0.01	0	0	0	100	0.00	0.0	4.143	0.022	0	0	0	0	P
L SECUG1228	TRAN_39846	A	4/0 TX	0.11Y	112.3	7.67	10.73	76.79	40	8	4	89	0.32	3.9	4.323	0.086	0	0	0	1	L
L 3491144-001	SECUG1228	A	Consumer	0.11Y	112.3	0.00	10.73	76.79	0	8	4	89	0.00	0.0	4.323	0.000	8	4	1	1	L
L SECUG11531	3491144-001	A	4/0 TX	0.11Y	112.3	0.00	10.73	0.00	0	0	0	100	0.00	0.0	4.338	0.015	0	0	0	0	L
P PRUG746	PRUG748	A	2 Al 15 kv	7.21Y	120.1	-0.00	2.89	-0.03	0	0	0	100	0.00	0.0	4.182	0.051	0	0	0	2	P
P PRUG447	PRUG1284	B	2 Al 15 kv	7.35Y	122.5	0.00	0.54	0.03	0	0	0	100	0.00	0.0	3.598	0.059	0	0	0	1	P
P PRUG1268	PRUG1267	B	2 Al 15 kv	7.34Y	122.4	0.00	0.62	0.03	0	0	0	100	0.00	0.0	4.074	0.066	0	0	0	1	P
P PRUG1265	PRUG143	B	2 Al 15 kv	7.34Y	122.4	0.00	0.61	0.04	0	0	0	100	0.00	0.0	3.922	0.050	0	0	0	1	P
P PRUG1257	PRUG1265	B	2 Al 15 kv	7.34Y	122.4	-0.00	0.61	-0.02	0	0	0	100	0.00	0.0	3.968	0.046	0	0	0	0	P
P PRUG1260	PRUG737	B	2 Al 15 kv	7.33Y	122.2	-0.00	0.75	-0.03	0	0	0	100	0.00	0.0	4.396	0.055	0	0	0	0	P
P PRUG12452	PRUG316	B	1/0 Al 15	7.33Y	122.2	-0.00	0.76	-0.06	0	0	0	100	0.00	0.0	4.598	0.022	0	0	0	1	P
P PRUG12453	PRUG12452	B	1/0 Al 15	7.33Y	122.2	-0.00	0.76	-0.04	0	0	0	100	0.00	0.0	4.658	0.060	0	0	0	1	P
P PRUG314	PRUG315	B	2 Al 15 kv	7.33Y	122.2	0.00	0.76	0.06	0	0	0	100	0.00	0.0	4.674	0.080	0	0	0	1	P
P UG32	PRUG1258	B	2 Al 15 kv	7.33Y	122.2	-0.00	0.75	-0.04	0	0	0	100	0.00	0.0	4.447	0.085	0	0	0	0	P
P PRUG12497	PRUG1256	B	2 Al 15 kv	7.34Y	122.3	0.00	0.75	-0.00	0	0	0	100	0.00	0.0	4.291	0.007	0	0	0	0	P
P PRUG1255	PRUG151	B	2 Al 15 kv	7.34Y	122.3	-0.00	0.74	-0.01	0	0	0	100	0.00	0.0	4.226	0.028	0	0	0	1	P
P PRUG13882	PROH4847	A	2 Al 15 kv	7.22Y	120.4	0.00	2.62	0.04	0	0	0	100	0.00	0.0	3.032	0.005	0	0	0	1	P
P PRUG13883	FUSE_642	A	2 Al 15 kv	7.22Y	120.4	-0.00	2.62	0.04	0	0	0	100	0.00	0.0	3.118	0.086	0	0	0	1	P
C FUSE_641	PRUG14287	A	25K	7.23Y	120.5	0.00	2.49	45.12	159	327	57	99	0.00	0.0	2.512	0.000	0	0	0	91	C
P PRUG378	PRUG379	A	2 Al 15 kv	7.23Y	120.5	-0.00	2.53	0.23	0	0	-2	0	0.00	0.0	2.896	0.057	0	0	0	2	P
P PRUG377	PRUG378	A	2 Al 15 kv	7.23Y	120.5	-0.00	2.53	0.20	0	0	-1	0	0.00	0.0	2.964	0.068	0	0	0	2	P

KEY-> L = Low Voltage H = High Voltage C = Capacity Over Limit (%capacity or load amps) G = Generator Out of kvar Limits P = Power Factor Low

Unbalanced Voltage Drop Report
Source: LOPEZ

Database: C:\PROJECTS\OPALCO\2013-2016\2013-2016CWP\PROPOSEDSYSTEMWDEC&THATCHNEWSUBBOYCE.WM\
Title: Lopez Substation - Circuit 22
Case: Proposed system with projected 4 yr load

Units Displayed In Volts
-Base Voltage:120 0-

Element Name	Parent Name	Cnf	Type/ Conductor	Pri kV	Base Volt	Element Drop	Accum Drop	Thru Amps	% Cap	Thru KW	KVAR	% PF	kW Loss	% Loss	mi From Src	Element Length (mi)	Element KW	Element KVAR	Element Cons On	Element Cons Thru	
P PRUG41	PRUG377	A	1/0 Al 15	7.23Y	120.5	-0.00	2.53	0.16	0	0	-1	0	0.00	0.0	3.041	0.077	0	0	0	2	P
P PRUG42	PRUG41	A	1/0 Al 15	7.23Y	120.5	-0.00	2.53	0.11	0	0	-1	0	0.00	0.0	3.159	0.118	0	0	0	2	P
P PRUG43	PRUG42	A	1/0 Al 15	7.23Y	120.5	0.00	2.53	0.05	0	0	0	100	0.00	0.0	3.229	0.070	0	0	0	2	P
C SECUG11448	TRAN_37924	A	4/0 TX	0.12Y	119.1	0.80	3.88	141.00	73	15	7	91	0.06	0.4	2.779	0.005	0	0	0	2	C
P PRUG12517	PRUG1240	A	1/0 Al 15	7.18Y	119.7	0.00	3.34	0.09	0	0	-1	0	0.00	0.0	3.193	0.152	0	0	0	1	P
P PRUG150	PRUG1239	A	2 Al 15 kv	7.15Y	119.2	0.00	3.82	0.01	0	0	0	100	0.00	0.0	3.290	0.026	0	0	0	1	P
P PRUG322	PRUG323	A	2 Al 15 kv	7.09Y	118.1	0.00	4.91	0.16	0	1	-1	-71	0.00	0.0	4.395	0.266	0	0	0	1	P
P PRUG37	PRUG1217	A	2 Al 15 kv	7.08Y	117.9	-0.00	5.07	-0.08	0	0	-1	0	0.00	0.0	4.738	0.086	0	0	0	1	P
P PRUG12164	PRUG37	A	1/0 Al 15	7.08Y	117.9	-0.00	5.07	-0.04	0	0	0	100	0.00	0.0	4.796	0.057	0	0	0	1	P
L SECUG13069	TRAN_37802	A	4/0 TX	0.12Y	117.3	0.43	5.69	90.03	47	10	2	98	0.03	0.3	4.696	0.005	0	0	0	1	L
L 3341292-001	SECUG13069	A	Consumer	0.12Y	117.3	0.00	5.69	90.03	0	10	2	98	0.00	0.0	4.696	0.000	11	2	1	1	L
L SECUG1052	3341292-001	A	4/0 TX	0.12Y	117.3	0.00	5.69	0.00	0	0	0	100	0.00	0.0	4.712	0.016	0	0	0	0	L
L SECUG13070	TRAN_37801	A	4/0 TX	0.12Y	117.0	0.65	5.97	119.76	62	14	3	98	0.05	0.4	4.707	0.006	0	0	0	2	L
L 3341290-001	SECUG13070	A	Consumer	0.12Y	117.0	0.00	5.97	119.76	0	14	3	98	0.00	0.0	4.707	0.000	14	3	2	2	L
L SECUG661	3341290-001	A	4/0 TX	0.12Y	117.0	0.00	5.97	0.00	0	0	0	100	0.00	0.0	4.722	0.015	0	0	0	0	L
L SECUG13071	TRAN_37793	A	4/0 TX	0.12Y	117.1	0.60	5.93	129.99	67	15	4	97	0.05	0.4	4.671	0.005	0	0	0	1	L
L 3344101-001	SECUG13071	A	Consumer	0.12Y	117.1	0.00	5.93	129.99	0	15	3	98	0.00	0.0	4.671	0.000	15	4	1	1	L
L SECUG188	3344101-001	A	4/0 TX	0.12Y	117.1	0.00	5.93	0.00	0	0	0	100	0.00	0.0	4.694	0.024	0	0	0	0	L
L TRAN_37538	PRUG13823	A	Transforme	0.12Y	117.4	0.51	5.59	3.83	110	26	7	97	0.11	0.4	4.511	0.000	0	0	0	1	L
L SECUG13067	TRAN_37538	A	4/0 TX	0.12Y	116.1	1.34	6.93	229.91	119	26	6	97	0.21	0.8	4.517	0.006	0	0	0	1	L
L 3342422-012	SECUG13067	A	Consumer	0.12Y	116.1	0.00	6.93	229.91	0	26	6	97	0.00	0.0	4.517	0.000	27	6	1	1	L
L SECUG1047	3342422-012	A	4/0 TX	0.12Y	116.1	0.00	6.93	0.00	0	0	0	100	0.00	0.0	4.531	0.013	0	0	0	0	L
L SECUG13065	TRAN_37797	A	4/0 TX	0.12Y	117.4	0.34	5.60	72.53	38	8	2	97	0.02	0.2	4.740	0.005	0	0	0	1	L
L 3342406-011	SECUG13065	A	Consumer	0.12Y	117.4	0.00	5.60	72.53	0	8	2	97	0.00	0.0	4.740	0.000	8	2	1	1	L
L SECUG662	3342406-011	A	4/0 TX	0.12Y	117.4	0.00	5.60	0.00	0	0	0	100	0.00	0.0	4.764	0.025	0	0	0	0	L
L SECUG13064	TRAN_37799	A	4/0 TX	0.12Y	117.5	0.28	5.52	57.46	30	7	2	96	0.01	0.2	4.882	0.005	0	0	0	2	L
L 3342108-014	SECUG13064	A	Consumer	0.12Y	117.5	0.00	5.52	57.46	0	7	2	96	0.00	0.0	4.882	0.000	7	2	2	2	L
L SECUG1055	3342108-014	A	4/0 TX	0.12Y	117.5	0.00	5.52	0.00	0	0	0	100	0.00	0.0	4.899	0.016	0	0	0	0	L
L SECUG13063	TRAN_37798	A	4/0 TX	0.12Y	117.3	0.43	5.75	84.60	44	10	2	98	0.02	0.3	5.085	0.006	0	0	0	1	L
L 3342201-001	SECUG13063	A	Consumer	0.12Y	117.3	0.00	5.75	84.60	0	10	2	98	0.00	0.0	5.085	0.000	10	2	1	1	L
L SECUG1054	3342201-001	A	4/0 TX	0.12Y	117.3	0.00	5.75	0.00	0	0	0	100	0.00	0.0	5.099	0.015	0	0	0	0	L
L SECUG1573	TRAN_37809	A	4/0 TX	0.12Y	116.0	1.79	6.99	93.83	49	11	3	96	0.11	1.1	4.323	0.021	0	0	0	1	L
L 3412245-008	SECUG1573	A	Consumer	0.12Y	116.0	0.00	6.99	93.83	0	11	2	98	0.00	0.0	4.323	0.000	11	3	1	1	L
L SECUG12976	TRAN_37795	A	4/0 TX	0.12Y	117.1	0.68	5.87	120.22	62	14	3	98	0.06	0.4	4.489	0.006	0	0	0	1	L
L 3343304-001	SECUG12976	A	Consumer	0.12Y	117.1	0.00	5.87	120.22	0	14	3	98	0.00	0.0	4.489	0.000	14	3	1	1	L
L SECUG663	3343304-001	A	4/0 TX	0.12Y	117.1	0.00	5.87	0.00	0	0	0	100	0.00	0.0	4.507	0.019	0	0	0	0	L
P PRUG1193	PRUG1181	A	2 Al 15 kv	7.08Y	118.1	0.00	4.94	0.03	0	0	0	100	0.00	0.0	4.558	0.062	0	0	0	2	P
P PRUG13895	PRUG1181	A	2 Al 15 kv	7.08Y	118.1	-0.00	4.94	-0.06	0	0	0	100	0.00	0.0	4.613	0.118	0	0	0	0	P
L SECUG12973	TRAN_37817	A	4/0 TX	0.12Y	117.2	0.62	5.82	114.16	59	13	3	97	0.05	0.4	4.483	0.006	0	0	0	1	L
L 3334416-001	SECUG12973	A	Consumer	0.12Y	117.2	0.00	5.82	114.16	0	13	3	97	0.00	0.0	4.483	0.000	13	3	1	1	L

KEY-> L = Low Voltage H = High Voltage C = Capacity Over Limit (%capacity or load amps) G = Generator Out of kvar Limits P = Power Factor Low

Unbalanced Voltage Drop Report
Source: LOPEZ

Database: C:\PROJECTS\OPALCO\2013-2016\2013-2016CWP\PROPOSEDSYSTEMWDEC&THATCHNEWSUBBOYCE.WM\
Title: Lopez Substation - Circuit 22
Case: Proposed system with projected 4 yr load

Units Displayed In Volts
-Base Voltage:120.0-

Element Name	Parent Name	Cnf	Type/ Conductor	Pri kV	Base Volt	Element Drop	Accum Drop	Thru Amps	% Cap	Thru KW	KVAR	% PF	kW Loss	% Loss	mi From Src	Element Length (mi)	Element KW	Element KVAR	Element Cons On	Element Cons Thru	
I SECUG1335	3334416-001	A	4/0 TX	0.12Y	117.2	0.00	5.82	0.00	0	0	0	100	0.00	0.0	4.501	0.018	0	0	0	0	L
C SECUG12975	TRAN_37816	A	4/0 TX	0.12Y	117.5	0.28	5.48	107.73	56	12	3	97	0.02	0.2	4.389	0.003	0	0	0	1	C
I SECUG13083	TRAN_39697	A	4/0 TX	0.12Y	117.4	0.50	5.61	123.18	64	14	3	98	0.04	0.3	4.156	0.004	0	0	0	1	L
L 3412147-029	SECUG13083	A	Consumer	0.12Y	117.4	0.00	5.61	123.18	0	14	3	98	0.00	0.0	4.156	0.000	14	3	1	1	L
L SECUG1291	3412147-029	A	4/0 TX	0.12Y	117.4	0.00	5.61	0.00	0	0	0	100	0.00	0.0	4.186	0.031	0	0	0	0	L
P PRUG1208	PRUG754	A	2 Al 15 kv	7.08Y	118.0	-0.00	5.00	-0.04	0	0	0	100	0.00	0.0	4.615	0.072	0	0	0	1	P
C TRAN_37452	PRUG1210	A	Transforme	0.12Y	117.6	0.37	5.41	5.79	83	40	10	97	0.11	0.3	4.664	0.000	0	0	0	4	C
L SECUG369	TRAN_37452	A	4/0 TX	0.12Y	117.3	0.29	5.69	58.21	30	7	2	96	0.01	0.2	4.670	0.005	0	0	0	1	L
L 3412223-005	SECUG369	A	Consumer	0.12Y	117.3	0.00	5.69	58.21	0	7	2	96	0.00	0.0	4.670	0.000	7	2	1	1	L
L SECUG13100	3412223-005	A	4/0 TX	0.12Y	117.3	0.00	5.69	0.00	0	0	0	100	0.00	0.0	4.674	0.005	0	0	0	0	L
L SECUG13099	TRAN_37452	A	4/0 TX	0.12Y	116.2	1.39	6.80	255.09	132	29	7	97	0.24	0.8	4.670	0.006	0	0	0	2	L
L 3412223-007	SECUG13099	A	Consumer	0.12Y	116.2	0.00	6.80	255.09	0	29	7	97	0.00	0.0	4.670	0.000	30	7	2	2	L
L SECUG370	3412223-007	A	4/0 TX	0.12Y	116.2	0.00	6.80	0.00	0	0	0	100	0.00	0.0	4.690	0.020	0	0	0	0	L
L SECUG13098	TRAN_37452	A	4/0 TX	0.12Y	117.4	0.16	5.56	34.32	18	4	1	97	0.00	0.0	4.669	0.005	0	0	0	1	L
L 3412223-003	SECUG13098	A	Consumer	0.12Y	117.4	0.00	5.56	34.32	0	4	1	97	0.00	0.0	4.669	0.000	4	1	1	1	L
L SECUG371	3412223-003	A	4/0 TX	0.12Y	117.4	0.00	5.56	0.00	0	0	0	100	0.00	0.0	4.687	0.018	0	0	0	0	L
L SECOH169	SECUG1285	A	4/0 TRPX	0.12Y	117.3	0.60	5.74	29.19	14	3	1	95	0.02	0.6	4.387	0.024	0	0	0	2	L
L SECUG13088	SECOH169	A	4/0 TX	0.12Y	117.2	0.07	5.80	29.19	15	3	1	95	0.00	0.0	4.390	0.003	0	0	0	2	L
L 3412257-009	SECUG13088	A	Consumer	0.12Y	117.2	0.00	5.80	29.19	0	3	1	95	0.00	0.0	4.390	0.000	3	1	2	2	L
L SECUG1284	3412257-009	A	4/0 TX	0.12Y	117.2	0.00	5.80	0.00	0	0	0	100	0.00	0.0	4.395	0.005	0	0	0	0	L
P PRUG13566	PROH4861	A	2 Al 15 kv	7.25Y	120.9	0.00	2.12	0.05	0	0	0	100	0.00	0.0	2.220	0.006	0	0	0	1	P
P PRUG13565	FUSE_638	A	2 Al 15 kv	7.25Y	120.9	0.00	2.12	0.05	0	0	0	100	0.00	0.0	2.314	0.095	0	0	0	1	P
C TRAN_39369	PRUG12466	A	Transforme	0.12Y	120.5	0.54	2.51	1.84	88	12	6	89	0.05	0.4	2.106	0.000	0	0	0	2	C
C SECUG11435	TRAN_39369	A	4/0 TX	0.12Y	118.1	2.43	4.94	110.37	57	12	6	89	0.15	1.2	2.125	0.019	0	0	0	2	C
C TRAN_39366	PROH3138	C	Transforme	0.12Y	121.0	1.11	2.04	1.35	194	9	3	95	0.03	0.3	1.792	0.000	0	0	0	3	C
P PRUG14150	PROH4962	B	1/0 Al 15	7.35Y	122.4	-0.00	0.58	-0.08	0	0	-1	0	0.00	0.0	2.015	0.015	0	0	0	1	P
P PRUG14151	FUSE_655	B	1/0 Al 15	7.35Y	122.4	-0.00	0.58	-0.07	0	0	-1	0	0.00	0.0	2.023	0.008	0	0	0	1	P
P PRUG12455	PRUG14151	B	1/0 Al 15	7.35Y	122.4	-0.00	0.58	-0.07	0	0	0	100	0.00	0.0	2.125	0.102	0	0	0	1	P
P UG33	PROH4992	A	1/0 Al 15	7.37Y	122.9	-0.00	0.09	-0.46	0	0	-3	0	0.00	0.0	4.010	0.505	0	0	0	0	P
P		B		7.38Y	122.9	-0.00	0.06	-0.46	0	0	-3	0					0	0	0	0	P
P		C		7.37Y	122.9	-0.00	0.15	-0.46	0	0	-3	0					0	0	0	0	P
P UG34	UG33	A	1/0 Al 15	7.37Y	122.9	-0.00	0.09	-0.12	0	0	-1	0	0.00	0.0	4.196	0.186	0	0	0	0	P
P		B		7.38Y	122.9	-0.00	0.06	-0.12	0	0	-1	0					0	0	0	0	P
P		C		7.37Y	122.9	-0.00	0.15	-0.12	0	0	-1	0					0	0	0	0	P
P PRUG138	PRUG1652	A	2 Al 15 kv	7.35Y	122.6	0.00	0.42	-0.00	0	0	0	100	0.00	0.0	3.992	0.007	0	0	0	1	P
P PRUG1648	PRUG1653	A	2 Al 15 kv	7.35Y	122.5	0.00	0.47	0.16	0	1	-1	-71	0.00	0.0	4.199	0.087	0	0	0	2	P
P PRUG1646	PRUG1648	A	2 Al 15 kv	7.35Y	122.5	-0.00	0.47	-0.05	0	0	0	100	0.00	0.0	4.305	0.106	0	0	0	1	P
P PRUG1683	PRUG1682	A	2 Al 15 kv	7.34Y	122.3	0.00	0.74	0.06	0	0	0	100	0.00	0.0	5.119	0.117	0	0	0	2	P
P PRUG1670	PRUG1669	A	2 Al 15 kv	7.33Y	122.2	-0.00	0.75	-0.07	0	0	0	100	0.00	0.0	4.891	0.057	0	0	0	0	P
P PRUG1671	PRUG1670	A	2 Al 15 kv	7.33Y	122.2	-0.00	0.75	-0.04	0	0	0	100	0.00	0.0	4.959	0.069	0	0	0	0	P
P PRUG1500	PRUG1684	A	2 Al 15 kv	7.32Y	122.1	0.00	0.94	-0.00	0	0	0	100	0.00	0.0	5.300	0.009	0	0	0	0	P
P PRUG12462	PRUG1695	A	1/0 Al 15	7.32Y	122.0	0.00	0.96	-0.02	0	0	0	100	0.00	0.0	5.533	0.033	0	0	0	0	P

KEY-> L = Low Voltage H = High Voltage C = Capacity Over Limit (%capacity or load amps) G = Generator Out of kvar Limits P = Power Factor Low

Unbalanced Voltage Drop Report
Source: LOPEZ

Database: C:\PROJECTS\OPALCO\2013-2016\2013-2016CWP\PROPOSEDSYSTEMWDEC&THATCHNEWSUBBOYCE.WM\
Title: Lopez Substation - Circuit 22
Case: Proposed system with projected 4 yr load

Units Displayed In Volts
-Base Voltage:120.0-

Element Name	Parent Name	Cnf	Type/ Conductor	Pri kV	Base Volt	Element Drop	Accum Drop	Thru Amps	% Cap	Thru KW	KVAR	% PF	kW Loss	% Loss	mi From Src	Element Length (mi)	Element KW	Element KVAR	Element Cons On	Element Cons Thru	
P PRUG1662	PRUG1659	A	2 Al 15 kv	7.34Y	122.3	-0.00	0.69	-0.14	0	0	-1	0	0.00	0.0	4.812	0.185	0	0	0	0	P
P PRUG1661	PRUG1662	A	2 Al 15 kv	7.34Y	122.3	-0.00	0.69	-0.04	0	0	0	100	0.00	0.0	4.898	0.086	0	0	0	0	P
P PRUG74	PRUG713	A	1/0 Al 15	7.36Y	122.6	0.00	0.41	0.12	0	1	-1	-71	0.00	0.0	4.515	0.119	0	0	0	1	P
C TRAN_38033	PRUG1399	C	Transforme	0.12Y	121.3	0.38	1.71	2.63	76	19	5	97	0.11	0.6	5.148	0.000	0	0	0	1	C
C SECUG12379	TRAN_38033	C	4/0 TX	0.12Y	120.4	0.90	2.61	157.74	82	18	5	96	0.09	0.5	5.154	0.006	0	0	0	1	C
P PRUG373	PRUG1398	A	1/0 Al 15	7.32Y	122.0	-0.00	0.98	0.08	0	0	-1	0	0.00	0.0	5.554	0.035	0	0	0	4	P
P PRUG372	PRUG373	A	1/0 Al 15	7.32Y	122.0	-0.00	0.98	0.06	0	0	0	100	0.00	0.0	5.616	0.062	0	0	0	1	P
P PRUG371	PRUG372	A	1/0 Al 15	7.32Y	122.0	0.00	0.98	0.02	0	0	0	100	0.00	0.0	5.648	0.032	0	0	0	1	P
PRUG10703	PRUG12475	A	2 Al 15 kv	7.31Y	121.8	-0.02	1.17	-0.18	0	0	-1	0	0.14	0.1	6.032	0.293	0	0	0	0	
		B		7.30Y	121.7	0.17	1.28	14.74	9	106	32	95					0	0	0	55	
P		C		7.31Y	121.8	-0.02	1.24	-0.18	0	0	-1	0					0	0	0	1	P
PROH4936	PRUG10703	A	#1/0 ACSR	7.31Y	121.8	0.00	1.17	-0.03	0	0	0	100	0.01	0.0	6.084	0.052	0	0	0	0	
		B		7.30Y	121.7	0.02	1.30	14.79	6	106	33	95					0	0	0	55	
P		C		7.31Y	121.8	-0.01	1.23	-0.03	0	0	0	0					0	0	0	1	P
PROH4935	PROH4936	A	#1/0 ACSR	7.31Y	121.8	0.00	1.17	-0.03	0	0	0	100	0.01	0.0	6.144	0.060	0	0	0	0	
		B		7.30Y	121.7	0.02	1.32	14.22	6	103	32	95					0	0	0	53	
P		C		7.31Y	121.8	-0.01	1.23	-0.03	0	0	0	0					0	0	0	1	P
PRUG10657	PROH4935	A	2 Al 15 kv	7.31Y	121.8	-0.00	1.17	-0.03	0	0	0	100	0.00	0.0	6.185	0.041	0	0	0	0	
		B		7.30Y	121.7	0.00	1.32	0.22	0	2	0	95					0	0	0	1	
P		C		7.31Y	121.8	-0.00	1.23	-0.03	0	0	0	0					0	0	0	1	P
PRUG10656	PRUG10657	A	2 Al 15 kv	7.31Y	121.8	0.00	1.17	-0.00	0	0	0	100	0.00	0.0	6.188	0.003	0	0	0	0	
		B		7.30Y	121.7	0.00	1.32	0.23	0	2	1	91					0	0	0	1	
P		C		7.31Y	121.8	0.00	1.23	-0.00	0	0	0	0					0	0	0	0	P
P PRUG10655	PRUG10657	A	2 Al 15 kv	7.31Y	121.8	0.00	1.17	-0.00	0	0	0	100	0.00	0.0	6.192	0.007	0	0	0	0	P
		B		7.30Y	121.7	0.00	1.32	-0.00	0	0	0	0					0	0	0	0	
P		C		7.31Y	121.8	0.00	1.23	-0.00	0	0	0	0					0	0	0	0	P
P PRUG10654	PRUG10657	A	2 Al 15 kv	7.31Y	121.8	0.00	1.17	-0.00	0	0	0	100	0.00	0.0	6.193	0.008	0	0	0	0	P
		B		7.30Y	121.7	0.00	1.32	-0.00	0	0	0	0					0	0	0	0	
P		C		7.31Y	121.8	0.00	1.23	-0.00	0	0	0	0					0	0	0	1	P
P PRUG686	PRUG687	B	2 Al 15 kv	7.29Y	121.5	-0.00	1.51	-0.03	0	0	0	100	0.00	0.0	6.988	0.065	0	0	0	0	P
C SECUG12589	TRAN_40160	B	4/0 TX	0.12Y	119.6	1.29	3.42	147.78	77	16	8	89	0.10	0.6	7.026	0.008	0	0	0	1	C
P PRUG1366	PRUG1367	B	2 Al 15 kv	7.29Y	121.5	-0.00	1.46	-0.06	0	0	0	100	0.00	0.0	6.721	0.120	0	0	0	0	P
P PRUG660	PRUG13793	B	2 Al 15 kv	7.30Y	121.6	-0.00	1.39	-0.04	0	0	0	100	0.00	0.0	6.444	0.072	0	0	0	0	P
P PRUG1359	PRUG14012	B	2 Al 15 kv	7.29Y	121.6	0.00	1.42	0.03	0	0	0	100	0.00	0.0	6.990	0.060	0	0	0	1	P
C TRAN_39211	PROH3183	B	Transforme	0.12Y	121.0	0.54	1.96	1.86	89	12	6	89	0.05	0.4	6.864	0.000	0	0	0	2	C
C SECOH1643	TRAN_39211	B	4/0 TRPX	0.12Y	120.6	0.43	2.39	104.98	51	11	5	91	0.05	0.5	6.869	0.005	0	0	0	1	C
P PRUG96	PRUG97	A	1/0 Al 15	7.30Y	121.7	-0.00	1.35	0.06	0	0	0	100	0.00	0.0	6.285	0.036	0	0	0	1	P
P PRUG95	PRUG96	A	1/0 Al 15	7.30Y	121.7	-0.00	1.35	0.04	0	0	0	100	0.00	0.0	6.347	0.063	0	0	0	1	P
P PRUG12501	PRUG121	A	1/0 Al 15	7.29Y	121.6	0.00	1.45	-0.01	0	0	0	100	0.00	0.0	6.799	0.010	0	0	0	0	P
P PRUG1392	PRUG1389	A	2 Al 15 kv	7.30Y	121.6	0.00	1.37	0.08	0	1	0	100	0.00	0.0	6.361	0.070	0	0	0	2	P
P PRUG283	PRUG13897	A	2 Al 15 kv	7.30Y	121.6	-0.00	1.40	0.08	0	0	-1	0	0.00	0.0	6.285	0.031	0	0	0	1	P
P PRUG282	PRUG283	A	2 Al 15 kv	7.30Y	121.6	-0.00	1.40	-0.07	0	0	0	100	0.00	0.0	6.390	0.105	0	0	0	0	P
P PRUG14512	PRUG282	A	2 Al 15 kv	7.30Y	121.6	0.00	1.40	-0.01	0	0	0	100	0.00	0.0	6.404	0.014	0	0	0	0	P
P PRUG1384	PRUG282	A	2 Al 15 kv	7.30Y	121.6	0.00	1.40	-0.01	0	0	0	100	0.00	0.0	6.404	0.014	0	0	0	0	P
P PRUG13472	PROH3204	A	2 Al 15 kv	7.30Y	121.6	0.00	1.40	0.03	0	0	0	100	0.00	0.0	6.348	0.005	0	0	0	1	P
P PRUG13471	FUSE_746	A	2 Al 15 kv	7.30Y	121.6	0.00	1.40	0.03	0	0	0	100	0.00	0.0	6.407	0.060	0	0	0	1	P
P PRUG104	PRUG105	A	2 Al 15 kv	7.29Y	121.6	0.00	1.45	0.02	0	0	0	100	0.00	0.0	6.482	0.029	0	0	0	4	P

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Unbalanced Voltage Drop Report
Source: LOPEZ

Database: C:\PROJECTS\OPALCO\2013-2016\2013-2016CWP\PROPOSEDSYSTEMWDEC&THATCHNEWSUBBOYCE.WM\
Title: Lopez Substation - Circuit 22
Case: Proposed system with projected 4 yr load

Units Displayed In Volts
-Base Voltage:120.0-

Element Name	Parent Name	Cnf	Type/ Conductor	Pri kV	Base Volt	Element Drop	Accum Drop	Thru Amps	% Cap	Thru KW	KVAR	% PF	kW Loss	% Loss	mi From Src	Element Length (mi)	Element KW	Element KVAR	Element Cons On	Element Cons Thru	
P PRUG12500	PRUG104	A	2 Al 15 kv	7.29Y	121.6	0.00	1.45	-0.01	0	0	0	100	0.00	0.0	6.494	0.012	0	0	0	0	P
P PRUG1383	PRUG1386	A	2 Al 15 kv	7.29Y	121.5	-0.00	1.46	-0.05	0	0	0	100	0.00	0.0	6.746	0.091	0	0	0	0	P
P PRUG693	PRUG14060	A	1/0 Al 15	7.31Y	121.9	-0.00	1.10	0.04	0	0	0	100	0.00	0.0	5.632	0.065	0	0	0	1	P
P PRUG12499	PRUG468	A	2 Al 15 kv	7.33Y	122.1	0.00	0.89	-0.01	0	0	0	100	0.00	0.0	5.240	0.016	0	0	0	0	P
P PRUG466	PRUG465	A	2 Al 15 kv	7.34Y	122.3	0.00	0.70	0.05	0	0	0	100	0.00	0.0	5.023	0.037	0	0	0	1	P
P PRUG467	PRUG466	A	2 Al 15 kv	7.34Y	122.3	-0.00	0.70	-0.03	0	0	0	100	0.00	0.0	5.091	0.067	0	0	0	0	P
P PRUG1326	PRUG1329	A	2 Al 15 kv	7.34Y	122.3	-0.00	0.65	0.21	0	0	-2	0	0.00	0.0	5.833	0.072	0	0	0	3	P
P PRUG1327	PRUG1326	A	1/0 Al 15	7.34Y	122.3	-0.00	0.65	0.18	0	0	-1	0	0.00	0.0	5.905	0.072	0	0	0	1	P
P PRUG1325	PRUG1327	A	2 Al 15 kv	7.34Y	122.3	-0.00	0.65	0.13	0	0	-1	0	0.00	0.0	5.963	0.058	0	0	0	1	P
P PRUG1447	PRUG1325	A	2 Al 15 kv	7.34Y	122.3	-0.00	0.65	0.10	0	0	-1	0	0.00	0.0	6.164	0.201	0	0	0	1	P
P PRUG11761	PRUG1438	A	2 Al 15 kv	7.34Y	122.4	-0.00	0.65	-0.03	0	0	0	100	0.00	0.0	5.757	0.051	0	0	0	0	P
P PRUG10678	PRUG10699	A	1/0 Al 15	7.35Y	122.5	-0.01	0.52	3.23	1	8	-23	-33	0.08	0.0	6.219	0.163	0	0	0	12	P
		B		7.31Y	121.8	0.08	1.19	16.86	7	128	11	100					0	0	0	107	
		C		7.20Y	120.0	-0.01	2.96	3.51	2	22	-14	-84					0	0	0	9	
P PRUG516	PRUG10678	A	2 Al 15 kv	7.35Y	122.5	-0.00	0.52	-0.05	0	0	0	100	0.00	0.0	6.312	0.093	0	0	0	0	P
P PRUG10677	PRUG10678	A	1/0 Al 15	7.35Y	122.5	-0.01	0.51	2.96	1	7	-21	-32	0.06	0.0	6.355	0.136	0	0	0	11	P
		B		7.30Y	121.7	0.07	1.26	16.87	7	128	12	100					0	0	0	107	
		C		7.20Y	120.0	-0.01	2.95	3.46	2	22	-13	-85					0	0	0	9	
P PRUG10676	PRUG10677	A	1/0 Al 15	7.35Y	122.5	-0.01	0.51	2.90	1	5	-21	-23	0.07	0.0	6.494	0.139	0	0	0	10	P
		B		7.30Y	121.7	0.07	1.33	16.88	7	128	13	99					0	0	0	107	
		C		7.20Y	120.1	-0.01	2.94	3.41	1	22	-13	-86					0	0	0	9	
P PRUG10449	PRUG10676	A	1/0 Al 15	7.35Y	122.5	-0.01	0.50	2.81	1	5	-20	-24	0.08	0.1	6.656	0.162	0	0	0	10	P
		B		7.30Y	121.6	0.08	1.41	16.89	7	128	14	99					0	0	0	107	
		C		7.20Y	120.1	-0.01	2.93	3.36	1	22	-12	-87					0	0	0	9	
P PRUG12502	PRUG724	B	2 Al 15 kv	7.30Y	121.6	0.00	1.42	-0.00	0	0	0	100	0.00	0.0	6.789	0.006	0	0	0	0	P
P PRUG10675	PRUG10449	A	1/0 Al 15	7.35Y	122.5	-0.01	0.49	2.70	1	5	-20	-24	0.04	0.0	6.747	0.091	0	0	0	10	P
		B		7.29Y	121.5	0.04	1.45	15.64	7	119	11	99					0	0	0	102	
		C		7.20Y	120.1	-0.01	2.93	3.31	1	22	-11	-89					0	0	0	9	
P PRUG10674	PRUG10675	A	1/0 Al 15	7.35Y	122.5	-0.00	0.49	2.64	1	5	-19	-25	0.01	0.0	6.762	0.015	0	0	0	10	P
		B		7.29Y	121.5	0.01	1.46	15.64	7	119	12	99					0	0	0	102	
		C		7.20Y	120.1	-0.00	2.93	3.29	1	22	-11	-89					0	0	0	9	
P PRUG10448	PRUG10674	A	1/0 Al 15	7.35Y	122.5	-0.01	0.48	2.63	1	5	-19	-25	0.04	0.0	6.948	0.186	0	0	0	10	P
		B		7.29Y	121.5	0.06	1.52	10.73	5	81	10	99					0	0	0	73	
		C		7.20Y	120.1	-0.00	2.92	3.28	1	22	-11	-89					0	0	0	9	
P PRUG723	PRUG722	C	1/0 Al 15	7.20Y	120.1	-0.00	2.93	-0.04	0	0	0	100	0.00	0.0	7.127	0.057	0	0	0	0	P
P PRUG11929	PRUG722	C	1/0 Al 15	7.20Y	120.1	0.00	2.93	-0.02	0	0	0	100	0.00	0.0	7.106	0.036	0	0	0	1	P
P PRUG10673	PRUG10448	A	1/0 Al 15	7.35Y	122.5	-0.01	0.47	-2.34	1	1	-17	-6	0.03	0.0	7.079	0.131	0	0	0	7	P
		B		7.29Y	121.4	0.04	1.56	10.74	5	81	11	99					0	0	0	73	
P		C		7.20Y	120.1	-0.01	2.92	2.44	1	15	-11	-79					0	0	0	7	P
P PRUG10672	PRUG10673	A	1/0 Al 15	7.35Y	122.5	-0.01	0.46	-2.25	1	1	-17	-6	0.03	0.0	7.231	0.152	0	0	0	7	P
		B		7.28Y	121.4	0.05	1.61	10.43	5	79	11	99					0	0	0	70	
		C		7.21Y	120.1	-0.01	2.91	2.38	1	15	-10	-81					0	0	0	7	
P PRUG10671	PRUG10672	A	1/0 Al 15	7.35Y	122.5	-0.01	0.45	-2.15	1	1	-16	-6	0.02	0.0	7.359	0.128	0	0	0	7	P
		B		7.28Y	121.3	0.04	1.65	10.29	5	78	11	99					0	0	0	69	
		C		7.21Y	120.1	-0.00	2.91	2.33	1	15	-9	-83					0	0	0	7	
P PRUG1484	PRUG1482	B	2 Al 15 kv	7.27Y	121.2	0.00	1.78	-0.02	0	0	0	100	0.00	0.0	8.252	0.037	0	0	0	0	P
P PRUG501	PRUG1481	B	2 Al 15 kv	7.27Y	121.2	-0.00	1.78	-0.04	0	0	0	100	0.00	0.0	8.251	0.071	0	0	0	0	P
P PRUG12486	PRUG1480	B	1/0 Al 15	7.27Y	121.2	0.00	1.78	-0.01	0	0	0	100	0.00	0.0	8.143	0.017	0	0	0	0	P
P PRUG10670	PRUG10671	A	1/0 Al 15	7.35Y	122.6	-0.01	0.45	-2.06	1	1	-15	-7	0.01	0.0	7.500	0.140	0	0	0	7	P
		B		7.28Y	121.3	0.02	1.67	4.20	2	32	-4	-99					0	0	0	34	
		C		7.21Y	120.1	0.00	2.91	2.28	1	15	-9	-85					0	0	0	7	

KEY-> L = Low Voltage H = High Voltage C = Capacity Over Limit (%capacity or load amps) G = Generator Out of kvar Limits P = Power Factor Low

Unbalanced Voltage Drop Report
Source: LOPEZ

Database: C:\PROJECTS\OPALCO\2013-2016\2013-2016CWP\PROPOSEDSYSTEMWDEC&THATCHNEWSUBBOYCE.WM\
Title: Lopez Substation - Circuit 22
Case: Proposed system with projected 4 yr load

Units Displayed In Volts
-Base Voltage:120.0-

Element Name	Parent Name	Cnf	Type/ Conductor	Pri kV	Base Volt	Element Drop	Accum Drop	Thru Amps	% Cap	Thru KW	KVAR	% PF	kW Loss	% Loss	mi From Src	Element Length (mi)	Element KW	Element KVAR	Element Cons On	Element Cons Thru	
P PRUG10669	PRUG10670	A	1/0 Al 15	7.35Y	122.6	-0.00	0.44	-1.97	1	1	-14	-7	0.00	0.0	7.654	0.155	0	0	0	7	P
P		B		7.28Y	121.3	-0.00	1.66	-1.75	1	1	-13	0					0	0	0	6	P
		C		7.20Y	120.1	0.01	2.92	2.23	1	15	-8	-86					0	0	0	7	
P PRUG10668	PRUG10669	A	1/0 Al 15	7.35Y	122.6	-0.00	0.44	-1.86	1	1	-14	-7	0.00	0.0	7.742	0.088	0	0	0	7	P
P		B		7.28Y	121.3	-0.00	1.66	-1.64	1	1	-12	0					0	0	0	6	P
		C		7.20Y	120.1	0.00	2.93	2.18	1	15	-7	-88					0	0	0	7	
C TRAN_40219	PRUG716	C	Transforme	0.12Y	119.7	0.36	3.29	2.00	96	14	4	96	0.05	0.4	7.859	0.000	0	0	0	1	C
C SECUG12342	TRAN_40219	C	4/0 TX	0.12Y	119.1	0.57	3.86	120.26	62	14	4	96	0.04	0.3	7.864	0.005	0	0	0	1	C
P PRUG10667	PRUG10668	A	1/0 Al 15	7.35Y	122.6	-0.00	0.44	-1.81	1	1	-13	-8	0.00	0.0	7.878	0.136	0	0	0	7	P
P		B		7.28Y	121.3	-0.00	1.66	-1.59	1	1	-12	0					0	0	0	6	P
P		C		7.20Y	120.1	-0.00	2.93	-1.44	1	1	-10	0					0	0	0	6	P
P PRUG10634	PRUG10667	A	1/0 Al 15	7.35Y	122.6	-0.00	0.43	-1.71	1	1	-13	-8	0.00	0.0	8.168	0.290	0	0	0	7	P
P		B		7.28Y	121.3	-0.00	1.66	-1.50	1	1	-11	0					0	0	0	6	P
P		C		7.20Y	120.1	-0.00	2.92	-1.35	1	1	-10	0					0	0	0	6	P
P PRUG10633	PRUG10634	A	1/0 Al 15	7.35Y	122.6	-0.00	0.43	-1.52	1	1	-11	-9	0.00	0.0	8.307	0.140	0	0	0	7	P
P		B		7.28Y	121.3	-0.00	1.66	-1.30	1	1	-9	0					0	0	0	6	P
P		C		7.20Y	120.1	-0.00	2.92	-1.16	1	1	-8	0					0	0	0	6	P
P PRUG10625	PRUG10633	A	2 Al 15 kv	7.35Y	122.6	-0.00	0.43	-1.43	1	1	-10	-10	0.00	0.0	8.364	0.057	0	0	0	7	P
P		B		7.28Y	121.3	-0.00	1.66	-1.21	1	1	-9	0					0	0	0	6	P
P		C		7.20Y	120.1	-0.00	2.92	-1.07	1	1	-8	0					0	0	0	6	P
P PRUG14743	PRUG10625	A	1/0 Al 15	7.35Y	122.6	-0.00	0.43	-1.40	1	1	-10	-10	0.00	0.0	8.435	0.071	0	0	0	7	P
P		B		7.28Y	121.3	-0.00	1.66	-1.18	1	1	-9	0					0	0	0	6	P
P		C		7.20Y	120.1	-0.00	2.92	-1.04	0	1	-7	0					0	0	0	6	P
P PRUG14812	PRUG14743	A	1/0 Al 15	7.35Y	122.6	0.00	0.43	-0.01	0	0	0	100	0.00	0.0	8.455	0.020	0	0	0	0	P
		B		7.28Y	121.3	0.00	1.66	-0.01	0	0	0	0					0	0	0	0	
		C		7.20Y	120.1	0.00	2.92	-0.01	0	0	0	0					0	0	0	0	
P PRUG14752	PRUG14743	A	1/0 Al 15	7.35Y	122.6	-0.00	0.43	-0.89	0	1	-7	-14	0.00	0.0	8.442	0.007	0	0	0	3	P
P		B		7.28Y	121.3	-0.00	1.66	-1.05	0	1	-8	0					0	0	0	4	P
P		C		7.20Y	120.1	-0.00	2.92	-0.97	0	1	-7	0					0	0	0	6	P
P PRUG14751	RECL_136	A	1/0 Al 15	7.35Y	122.6	0.00	0.43	-0.88	0	1	-7	-14	0.00	0.0	8.444	0.002	0	0	0	3	P
P		B		7.28Y	121.3	-0.00	1.66	-1.05	0	1	-8	0					0	0	0	4	P
P		C		7.20Y	120.1	0.00	2.92	-0.97	0	1	-7	0					0	0	0	6	P
P PRUG10617	PRUG14751	A	1/0 Al 15	7.35Y	122.6	-0.00	0.43	-0.88	0	1	-6	-16	0.00	0.0	8.515	0.071	0	0	0	3	P
P		B		7.28Y	121.3	-0.00	1.66	-1.05	0	1	-8	0					0	0	0	4	P
P		C		7.20Y	120.1	-0.00	2.92	-0.96	0	1	-7	0					0	0	0	6	P
P PRUG10624	PRUG10617	A	1/0 Al 15	7.35Y	122.6	-0.00	0.43	-0.84	0	1	-6	-16	0.00	0.0	8.583	0.068	0	0	0	3	P
P		B		7.28Y	121.3	-0.00	1.65	-1.00	0	1	-7	0					0	0	0	4	P
P		C		7.20Y	120.1	-0.00	2.92	-0.92	0	1	-7	0					0	0	0	6	P
P PRUG10623	PRUG10624	A	1/0 Al 15	7.35Y	122.6	-0.00	0.43	-0.79	0	1	-6	-16	0.00	0.0	8.719	0.135	0	0	0	3	P
P		B		7.28Y	121.3	-0.00	1.65	-0.93	0	1	-7	0					0	0	0	3	P
P		C		7.20Y	120.1	-0.00	2.92	-0.87	0	1	-6	0					0	0	0	6	P
P PRUG10620	PRUG10623	A	1/0 Al 15	7.35Y	122.6	-0.00	0.43	-0.64	0	1	-5	-20	0.00	0.0	8.725	0.006	0	0	0	2	P
P		B		7.28Y	121.3	-0.00	1.65	-0.79	0	0	-6	0					0	0	0	2	P
P		C		7.20Y	120.1	-0.00	2.92	-0.73	0	1	-5	0					0	0	0	5	P
P PRUG10622	PRUG10620	A	1/0 Al 15	7.35Y	122.6	-0.00	0.43	-0.06	0	0	0	100	0.00	0.0	8.809	0.085	0	0	0	0	P
P		B		7.28Y	121.3	0.00	1.65	-0.06	0	0	0	0					0	0	0	0	P
P		C		7.20Y	120.1	-0.00	2.92	-0.11	0	0	-1	0					0	0	0	3	P
P PRUG264	PRUG10622	C	1/0 Al 15	7.20Y	120.1	-0.00	2.92	-0.05	0	0	0	100	0.00	0.0	8.886	0.077	0	0	0	1	P
P PRUG10632	PRUG10620	A	1/0 Al 15	7.35Y	122.6	-0.00	0.43	-0.48	0	0	-3	0	0.00	0.0	8.797	0.072	0	0	0	2	P
P		B		7.28Y	121.3	-0.00	1.65	-0.57	0	0	-4	0					0	0	0	1	P
P		C		7.20Y	120.1	-0.00	2.92	-0.50	0	0	-4	0					0	0	0	1	P
P PRUG10631	PRUG10632	A	1/0 Al 15	7.35Y	122.6	-0.00	0.43	-0.43	0	0	-3	0	0.00	0.0	8.879	0.082	0	0	0	2	P
P		B		7.28Y	121.3	-0.00	1.65	-0.52	0	0	-4	0					0	0	0	1	P
P		C		7.20Y	120.1	-0.00	2.92	-0.45	0	0	-3	0					0	0	0	1	P
P PRUG10630	PRUG10631	A	1/0 Al 15	7.35Y	122.6	-0.00	0.43	-0.34	0	0	-2	0	0.00	0.0	8.950	0.071	0	0	0	1	P
P		B		7.28Y	121.3	-0.00	1.65	-0.46	0	0	-3	0					0	0	0	1	P
P		C		7.20Y	120.1	-0.00	2.92	-0.40	0	0	-3	0					0	0	0	1	P

KEY-> L = Low Voltage H = High Voltage C = Capacity Over Limit (%capacity or load amps) G = Generator Out of kvar Limits P = Power Factor Low

Unbalanced Voltage Drop Report
Source: LOPEZ

Database: C:\PROJECTS\OPALCO\2013-2016\2013-2016CWP\PROPOSEDSYSTEMWDEC&THATCHNEWSUBBOYCE.WM\
Title: Lopez Substation - Circuit 22
Case: Proposed system with projected 4 yr load

Units Displayed In Volts
-Base Voltage:120.0-

Element Name	Parent Name	Cnf	Type/ Conductor	Pri kV	Base Volt	Element Drop	Accum Drop	Thru Amps	% Cap	Thru KW	KVAR	% PF	kW Loss	% Loss	mi From Src	Element Length (mi)	Element KW	Element KVAR	Element Cons On	Element Cons Thru	
P PRUG10629	PRUG10630	A	1/0 Al 15	7.35Y	122.6	0.00	0.43	-0.29	0	0	-2	0	0.00	0.0	9.045	0.095	0	0	0	1	P
P		B		7.28Y	121.3	-0.00	1.65	-0.42	0	0	-3	0					0	0	0	1	P
P		C		7.20Y	120.1	-0.00	2.92	-0.35	0	0	-3	0					0	0	0	1	P
P PRUG10628	PRUG10629	A	1/0 Al 15	7.35Y	122.6	0.00	0.43	-0.22	0	0	-2	0	0.00	0.0	9.133	0.088	0	0	0	0	P
P		B		7.28Y	121.3	-0.00	1.65	-0.35	0	0	-3	0					0	0	0	1	P
P		C		7.20Y	120.1	-0.00	2.92	-0.29	0	0	-2	0					0	0	0	1	P
P PRUG160	PRUG10628	B	1/0 Al 15	7.28Y	121.3	-0.00	1.65	-0.13	0	0	-1	0	0.00	0.0	9.237	0.104	0	0	0	1	P
P PRUG161	PRUG160	B	1/0 Al 15	7.28Y	121.3	-0.00	1.65	-0.06	0	0	0	100	0.00	0.0	9.334	0.097	0	0	0	1	P
P PRUG10626	PRUG10628	A	1/0 Al 15	7.35Y	122.6	-0.00	0.43	-0.16	0	0	-1	0	0.00	0.0	9.252	0.119	0	0	0	0	P
P		B		7.28Y	121.3	-0.00	1.65	-0.16	0	0	-1	0					0	0	0	0	P
P		C		7.20Y	120.1	-0.00	2.92	-0.16	0	0	-1	0					0	0	0	0	P
P PRUG10627	PRUG10626	A	1/0 Al 15	7.35Y	122.6	-0.00	0.43	-0.08	0	0	-1	0	0.00	0.0	9.378	0.126	0	0	0	0	P
P		B		7.28Y	121.3	-0.00	1.65	-0.08	0	0	-1	0					0	0	0	0	P
P		C		7.20Y	120.1	-0.00	2.92	-0.08	0	0	-1	0					0	0	0	0	P
P PRUG11697	PRUG10628	C	1/0 Al 15	7.20Y	120.1	-0.00	2.92	-0.07	0	0	-1	0	0.00	0.0	9.244	0.111	0	0	0	1	P
P PRUG278	PRUG10629	A	1/0 Al 15	7.35Y	122.6	0.00	0.43	-0.00	0	0	0	100	0.00	0.0	9.048	0.004	0	0	0	1	P
P PRUG277	PRUG10631	A	1/0 Al 15	7.35Y	122.6	-0.00	0.43	-0.04	0	0	0	100	0.00	0.0	8.932	0.053	0	0	0	1	P
P PRUG159	PRUG10620	A	1/0 Al 15	7.35Y	122.6	0.00	0.43	-0.11	0	0	-1	0	0.00	0.0	8.887	0.162	0	0	0	0	P
P		B		7.28Y	121.3	-0.00	1.65	-0.16	0	0	-1	0					0	0	0	1	P
P		C		7.20Y	120.1	-0.00	2.92	-0.11	0	0	-1	0					0	0	0	0	P
P PRUG158	PRUG159	B	1/0 Al 15	7.28Y	121.3	-0.00	1.65	-0.05	0	0	0	100	0.00	0.0	8.966	0.079	0	0	0	1	P
P PRUG263	PRUG10620	C	1/0 Al 15	7.20Y	120.1	0.00	2.92	-0.01	0	0	0	100	0.00	0.0	8.742	0.017	0	0	0	1	P
P PRUG10618	PRUG10623	A	1/0 Al 15	7.35Y	122.6	-0.00	0.43	-0.06	0	0	0	100	0.00	0.0	8.772	0.054	0	0	0	0	P
P		B		7.28Y	121.3	-0.00	1.65	-0.05	0	0	0	0					0	0	0	0	P
P		C		7.20Y	120.1	0.00	2.92	-0.05	0	0	0	0					0	0	0	0	P
P PRUG10619	PRUG10618	A	1/0 Al 15	7.35Y	122.6	0.00	0.43	-0.02	0	0	0	100	0.00	0.0	8.801	0.028	0	0	0	0	P
P		B		7.28Y	121.3	0.00	1.65	-0.02	0	0	0	0					0	0	0	0	P
P		C		7.20Y	120.1	0.00	2.92	-0.02	0	0	0	0					0	0	0	0	P
P PRUG273	PRUG10624	B	1/0 Al 15	7.28Y	121.3	0.00	1.65	-0.02	0	0	0	100	0.00	0.0	8.621	0.038	0	0	0	1	P
P PRUG14750	PRUG14743	A	1/0 Al 15	7.35Y	122.6	-0.00	0.43	-0.45	0	0	-3	0	0.00	0.0	8.445	0.010	0	0	0	4	P
P		B		7.28Y	121.3	-0.00	1.66	-0.07	0	0	-1	0					0	0	0	2	P
		C		7.20Y	120.1	0.00	2.92	-0.01	0	0	0	0					0	0	0	0	
P PRUG14749	RECL_74	A	1/0 Al 15	7.35Y	122.6	0.00	0.43	-0.44	0	0	-3	0	0.00	0.0	8.446	0.002	0	0	0	4	P
P		B		7.28Y	121.3	-0.00	1.66	-0.06	0	0	0	0					0	0	0	2	P
		C		7.20Y	120.1	0.00	2.92	0.00	0	0	0	0					0	0	0	0	
P PRUG269	PRUG14749	A	1/0 Al 15	7.35Y	122.6	-0.00	0.43	-0.44	0	0	-3	0	0.00	0.0	8.527	0.081	0	0	0	4	P
P PRUG275	PRUG269	A	1/0 Al 15	7.35Y	122.6	-0.00	0.43	-0.39	0	0	-3	0	0.00	0.0	8.593	0.066	0	0	0	4	P
P PRUG276	PRUG275	A	1/0 Al 15	7.35Y	122.6	-0.00	0.43	-0.34	0	0	-3	0	0.00	0.0	8.678	0.085	0	0	0	4	P
P PRUG268	PRUG276	A	1/0 Al 15	7.35Y	122.6	-0.00	0.43	-0.24	0	0	-2	0	0.00	0.0	8.758	0.080	0	0	0	3	P
P PRUG267	PRUG268	A	1/0 Al 15	7.35Y	122.6	-0.00	0.43	-0.19	0	0	-1	0	0.00	0.0	8.825	0.067	0	0	0	1	P
P PRUG266	PRUG267	A	1/0 Al 15	7.35Y	122.6	-0.00	0.43	-0.14	0	0	-1	0	0.00	0.0	8.903	0.078	0	0	0	1	P
P PRUG272	PRUG266	A	1/0 Al 15	7.35Y	122.6	-0.00	0.43	-0.09	0	0	-1	0	0.00	0.0	9.032	0.129	0	0	0	1	P
P PRUG271	PRUG272	A	1/0 Al 15	7.35Y	122.6	0.00	0.43	-0.00	0	0	0	100	0.00	0.0	9.037	0.004	0	0	0	1	P
P PRUG265	PRUG268	A	2 Al 15 kv	7.35Y	122.6	0.00	0.43	-0.00	0	0	0	100	0.00	0.0	8.764	0.006	0	0	0	2	P
P PRUG274	PRUG276	A	1/0 Al 15	7.35Y	122.6	-0.00	0.43	-0.04	0	0	0	100	0.00	0.0	8.741	0.063	0	0	0	1	P
P PRUG12496	PRUG14749	B	2 Al 15 kv	7.28Y	121.3	0.00	1.66	-0.06	0	0	0	100	0.00	0.0	8.450	0.004	0	0	0	2	P
P PRUG270	PRUG12496	B	1/0 Al 15	7.28Y	121.3	-0.00	1.66	-0.06	0	0	0	100	0.00	0.0	8.537	0.087	0	0	0	2	P
P PRUG262	PRUG270	B	1/0 Al 15	7.28Y	121.3	0.00	1.66	-0.00	0	0	0	100	0.00	0.0	8.540	0.003	0	0	0	2	P
P PRUG1303	PRUG1497	B	2 Al 15 kv	7.28Y	121.3	0.00	1.71	0.07	0	0	0	100	0.00	0.0	7.875	0.099	0	0	0	6	P

KEY-> L = Low Voltage H = High Voltage C = Capacity Over Limit (%capacity or load amps) G = Generator Out of kvar Limits P = Power Factor Low

Unbalanced Voltage Drop Report
Source: LOPEZ

Database: C:\PROJECTS\OPALCO\2013-2016\2013-2016CWP\PROPOSEDSYSTEMWDEC&THATCHNEWSUBBOYCE.WW\
Title: Lopez Substation - Circuit 22
Case: Proposed system with projected 4 yr load

Units Displayed In Volts
-Base Voltage:120.0-

Element Name	Parent Name	Cnf	Type/ Conductor	Pri kV	Base Volt	Element Drop	Accum Drop	Thru Amps	% Cap	Thru KW	KVAR	% PF	kW Loss	% Loss	mi From Src	Element Length (mi)	Element KW	Element KVAR	Element Cons On	Element Cons Thru	
P PRUG709	PRUG10448	A	1/0 Al 15	7.35Y	122.5	-0.00	0.48	0.30	0	1	-2	-45	0.00	0.0	6.969	0.021	0	0	0	1	P
P PRUG708	PRUG709	A	1/0 Al 15	7.35Y	122.5	0.00	0.48	0.29	0	1	-2	-45	0.00	0.0	7.031	0.061	0	0	0	1	P
P PRUG12009	PRUG708	A	1/0 Al 15	7.35Y	122.5	-0.00	0.48	-0.23	0	0	-2	0	0.00	0.0	7.110	0.079	0	0	0	0	P
P PRUG12010	PRUG12009	A	1/0 Al 15	7.35Y	122.5	-0.00	0.48	-0.18	0	0	-1	0	0.00	0.0	7.187	0.077	0	0	0	0	P
P PRUG12011	PRUG12010	A	1/0 Al 15	7.35Y	122.5	-0.00	0.48	-0.13	0	0	-1	0	0.00	0.0	7.286	0.098	0	0	0	0	P
P PRUG12012	PRUG12011	A	1/0 Al 15	7.35Y	122.5	-0.00	0.48	-0.06	0	0	0	100	0.00	0.0	7.381	0.095	0	0	0	0	P
P PRUG1470	PRUG1471	B	2 Al 15 kv	7.29Y	121.5	0.00	1.49	0.10	0	0	-1	0	0.00	0.0	7.305	0.210	0	0	0	1	P
P PRUG134	PRUG135	B	1/0 Al 15	7.29Y	121.5	0.00	1.53	0.18	0	1	-1	-71	0.00	0.0	7.957	0.064	0	0	0	4	P
P PRUG401	PRUG134	B	1/0 Al 15	7.29Y	121.5	0.00	1.53	0.09	0	1	0	100	0.00	0.0	8.032	0.075	0	0	0	1	P
P PRUG137	PRUG1477	B	1/0 Al 15	7.29Y	121.5	-0.00	1.53	-0.03	0	0	0	100	0.00	0.0	7.743	0.047	0	0	0	0	P
P PRUG63	PRUG12565	B	1/0 Al 15	7.29Y	121.5	-0.00	1.48	0.28	0	0	-2	0	0.00	0.0	6.960	0.017	0	0	0	1	P
P PRUG62	PRUG63	B	1/0 Al 15	7.29Y	121.5	-0.00	1.48	0.27	0	0	-2	0	0.00	0.0	7.080	0.120	0	0	0	1	P
P PRUG61	PRUG62	B	1/0 Al 15	7.29Y	121.5	-0.00	1.48	0.19	0	0	-1	0	0.00	0.0	7.119	0.039	0	0	0	1	P
P PRUG60	PRUG61	B	1/0 Al 15	7.29Y	121.5	-0.00	1.48	0.16	0	0	-1	0	0.00	0.0	7.216	0.097	0	0	0	1	P
P PRUG59	PRUG60	B	1/0 Al 15	7.29Y	121.5	-0.00	1.48	0.10	0	0	-1	0	0.00	0.0	7.322	0.106	0	0	0	1	P
P PRUG58	PRUG59	B	1/0 Al 15	7.29Y	121.5	-0.00	1.48	0.03	0	0	0	100	0.00	0.0	7.365	0.042	0	0	0	1	P
P PRUG1461	PRUG10676	B	1/0 Al 15	7.30Y	121.7	-0.00	1.33	-0.02	0	0	0	100	0.00	0.0	6.526	0.032	0	0	0	0	P
P PRUG64	PRUG10678	A	1/0 Al 15	7.35Y	122.5	0.00	0.52	0.13	0	1	-1	-71	0.00	0.0	6.328	0.109	0	0	0	1	P
P PRUG12561	PRUG64	A	1/0 Al 15	7.35Y	122.5	-0.00	0.52	-0.07	0	0	-1	0	0.00	0.0	6.430	0.102	0	0	0	0	P
P PRUG14	PRUG1446	C	1/0 Al 15	7.18Y	119.7	-0.00	3.33	-0.04	0	0	0	100	0.00	0.0	6.416	0.055	0	0	0	1	P
P PRUG11800	PRUG1429	C	1/0 Al 15	7.17Y	119.4	-0.00	3.56	-0.19	0	0	-1	0	0.00	0.0	6.803	0.116	0	0	0	1	P
P PRUG11801	PRUG11800	C	1/0 Al 15	7.17Y	119.4	-0.00	3.56	-0.11	0	0	-1	0	0.00	0.0	6.904	0.101	0	0	0	1	P
P PRUG11802	PRUG11801	C	1/0 Al 15	7.17Y	119.4	-0.00	3.56	-0.04	0	0	0	100	0.00	0.0	6.973	0.069	0	0	0	1	P
C TRAN_37350	PRUG1442	C	Transforme	0.12Y	119.1	0.47	3.89	2.92	84	20	6	96	0.11	0.5	6.479	0.000	0	0	0	3	C
L SECUG254	TRAN_37350	C	4/0 TX	0.12Y	115.1	3.97	7.86	171.56	89	20	6	96	0.44	2.2	6.503	0.024	0	0	0	2	L
L 3522128-029	SECUG254	C	Consumer	0.12Y	115.1	0.00	7.86	171.56	0	19	5	97	0.00	0.0	6.503	0.000	20	5	2	2	L
C SECUG11857	TRAN_40218	C	4/0 TX	0.12Y	118.6	0.55	4.36	132.39	69	15	4	97	0.05	0.3	6.616	0.004	0	0	0	1	C
C SECUG11860	TRAN_38026	C	4/0 TX	0.12Y	118.7	0.51	4.30	100.37	52	12	3	97	0.03	0.3	6.716	0.005	0	0	0	2	C
C SECUG11861	TRAN_38023	C	4/0 TX	0.12Y	118.7	0.47	4.32	114.79	59	13	4	96	0.04	0.3	6.800	0.004	0	0	0	1	C
C TRAN_38022	PRUG518	C	Transforme	0.12Y	118.9	0.49	4.12	3.36	97	23	7	96	0.11	0.5	7.043	0.000	0	0	0	2	C
C SECUG11863	TRAN_38022	C	4/0 TX	0.12Y	118.3	0.61	4.73	143.42	74	16	4	97	0.06	0.4	7.047	0.004	0	0	0	1	C
L SECUG1650	TRAN_38019	C	4/0 TX	0.12Y	116.9	2.25	6.08	77.04	40	9	3	95	0.11	1.3	7.169	0.030	0	0	0	1	L
L 3522187-018	SECUG1650	C	Consumer	0.12Y	116.9	0.00	6.08	77.04	0	9	2	98	0.00	0.0	7.169	0.000	9	2	1	1	L
P PRUG1436	PRUG1435	C	2 Al 15 kv	7.16Y	119.4	-0.00	3.64	-0.06	0	0	0	100	0.00	0.0	7.205	0.066	0	0	0	0	P
P PRUG1431	PRUG1436	C	2 Al 15 kv	7.16Y	119.4	-0.00	3.64	-0.03	0	0	0	100	0.00	0.0	7.262	0.056	0	0	0	0	P
P PRUG697	PRUG699	A	1/0 Al 15	7.34Y	122.3	-0.00	0.66	-0.09	0	0	-1	0	0.00	0.0	7.095	0.067	0	0	0	0	P
P PRUG1409	PRUG697	A	1/0 Al 15	7.34Y	122.3	-0.00	0.66	-0.04	0	0	0	100	0.00	0.0	7.160	0.065	0	0	0	0	P
P PRUG14076	PROH3241	A	2 Al 15 kv	7.34Y	122.3	0.00	0.66	-0.07	0	0	-1	0	0.00	0.0	6.667	0.007	0	0	0	1	P
P PRUG14075	FUSE_724	A	2 Al 15 kv	7.34Y	122.3	-0.00	0.66	-0.07	0	0	-1	0	0.00	0.0	6.802	0.134	0	0	0	1	P
P PRUG100	PRUG14211	A	1/0 Al 15	7.33Y	122.2	0.00	0.77	0.15	0	1	-1	-71	0.00	0.0	8.339	0.074	0	0	0	1	P

KEY-> L = Low Voltage H = High Voltage C = Capacity Over Limit (%capacity or load amps) G = Generator Out of kvar Limits P = Power Factor Low

Unbalanced Voltage Drop Report
Source: LOPEZ

Database: C:\PROJECTS\OPALCO\2013-2016\2013-2016CWP\PROPOSEDSYSTEMWDEC&THATCHNEWSUBBOYCE.MM\
Title: Lopez Substation - Circuit 22
Case: Proposed system with projected 4 yr load

Units Displayed In Volts
-Base Voltage:120.0-

Element Name	Parent Name	Cnf	Type/ Conductor	Pri kV	Base Volt	Element Drop	Accum Drop	Thru Amps	% Cap	Thru KW	KVAR	% PF	kW Loss	% Loss	mi From Src	Element Length (mi)	Element KW	Element KVAR	Element Cons On	Element Cons Thru	
P PRUG1455	PRUG417	A	2 Al 15 kv	7.34Y	122.3	0.00	0.75	0.03	0	0	0	100	0.00	0.0	7.924	0.062	0	0	0	1	P
P PRUG101	PRUG14313	A	2 Al 15 kv	7.34Y	122.3	-0.00	0.74	-0.07	0	0	-1	0	0.00	0.0	7.729	0.138	0	0	0	0	P
C TRAN_39329	PROH3240	A	Transforme	0.12Y	121.6	0.74	1.43	0.59	84	4	2	89	0.03	0.8	6.851	0.000	0	0	0	1	C
P PRUG1452	PRUG14199	A	2 Al 15 kv	7.34Y	122.3	-0.00	0.68	-0.10	0	0	-1	0	0.00	0.0	6.928	0.064	0	0	0	0	P
P PRUG1449	PRUG1452	A	2 Al 15 kv	7.34Y	122.3	-0.00	0.68	-0.07	0	0	0	100	0.00	0.0	6.972	0.044	0	0	0	0	P
P PRUG1450	PRUG1449	A	2 Al 15 kv	7.34Y	122.3	-0.00	0.68	-0.04	0	0	0	100	0.00	0.0	7.054	0.083	0	0	0	0	P
P PRUG1334	PRUG1333	A	2 Al 15 kv	7.34Y	122.4	-0.00	0.65	-0.04	0	0	0	100	0.00	0.0	5.422	0.081	0	0	0	0	P
P PRUG1336	PRUG10702	A	1/0 Al 15	7.34Y	122.3	0.00	0.65	0.17	0	1	-1	-71	0.00	0.0	5.034	0.104	0	0	0	1	P
P PRUG301	PRUG305	A	1/0 Al 15	7.34Y	122.3	-0.00	0.66	-0.06	0	0	0	100	0.00	0.0	5.147	0.094	0	0	0	0	P
P PRUG12559	PRUG13652	A	1/0 Al 15	7.34Y	122.4	-0.00	0.63	-0.04	0	0	0	100	0.00	0.0	4.762	0.063	0	0	0	0	P
C TRAN_38072	PRUG1349	C	Transforme	0.12Y	119.6	1.82	3.35	11.00	317	76	26	95	0.11	0.1	4.808	0.000	0	0	0	2	C
L SECUG640	TRAN_38072	C	4/0 TX	0.12Y	116.7	2.96	6.31	660.01	342	76	23	96	1.26	1.7	4.813	0.005	0	0	0	2	L
L 3512442-036	SECUG640	C	Consumer	0.12Y	116.7	0.00	6.31	660.01	0	74	20	97	0.00	0.0	4.813	0.000	77	20	2	2	L
L SECUG11776	3512442-036	C	4/0 TX	0.12Y	116.7	0.00	6.31	0.00	0	0	0	100	0.00	0.0	4.817	0.004	0	0	0	0	L
C TRAN_39301	PROH4994	A	Transforme	0.12Y	122.0	0.87	1.04	1.14	82	8	4	89	0.04	0.6	3.608	0.000	0	0	0	3	C
P PRUG729	PRUG730	A	2 Al 15 kv	7.37Y	122.9	-0.00	0.12	-0.09	0	0	-1	0	0.00	0.0	4.265	0.069	0	0	0	1	P
P PRUG728	PRUG729	A	2 Al 15 kv	7.37Y	122.9	-0.00	0.12	-0.05	0	0	0	100	0.00	0.0	4.360	0.096	0	0	0	1	P
P PRUG726	PRUG730	A	1/0 Al 15	7.37Y	122.9	-0.00	0.12	-0.12	0	0	-1	0	0.00	0.0	4.304	0.109	0	0	0	0	P
P PRUG725	PRUG726	A	2 Al 15 kv	7.37Y	122.9	-0.00	0.12	-0.05	0	0	0	100	0.00	0.0	4.390	0.087	0	0	0	0	P
P PRUG684	PRUG731	A	1/0 Al 15	7.37Y	122.9	-0.00	0.12	0.10	0	0	-1	0	0.00	0.0	4.235	0.153	0	0	0	1	P
P PRUG1644	PROH3335	B	2 Al 15 kv	7.29Y	121.6	-0.00	1.45	-0.05	0	0	0	100	0.00	0.0	3.669	0.088	0	0	0	1	P
P PRUG1638	PROH4988	A	2 Al 15 kv	7.22Y	120.4	0.00	2.60	0.07	0	0	0	100	0.00	0.0	3.399	0.150	0	0	0	1	P
P PRUG141	PRUG765	B	2 Al 15 kv	7.30Y	121.6	0.00	1.35	0.26	0	2	-1	-89	0.00	0.0	4.010	0.288	0	0	0	4	P
P PRUG1637	PRUG141	B	2 Al 15 kv	7.30Y	121.6	-0.00	1.35	-0.02	0	0	0	100	0.00	0.0	4.054	0.044	0	0	0	1	P
P PRUG1626	PRUG1624	B	2 Al 15 kv	7.30Y	121.6	0.00	1.35	0.03	0	0	0	100	0.00	0.0	3.785	0.055	0	0	0	1	P
P PRUG1615	PRUG1618	B	2 Al 15 kv	7.30Y	121.6	-0.00	1.41	-0.08	0	0	-1	0	0.00	0.0	4.256	0.154	0	0	0	3	P
P PRUG1607	PRUG775	B	2 Al 15 kv	7.29Y	121.6	0.00	1.44	0.07	0	0	0	100	0.00	0.0	4.508	0.071	0	0	0	1	P
P PRUG1608	PRUG1607	B	2 Al 15 kv	7.29Y	121.6	0.00	1.44	0.03	0	0	0	100	0.00	0.0	4.577	0.069	0	0	0	1	P
P PRUG689	PRUG162	B	2 Al 15 kv	7.29Y	121.5	-0.00	1.45	0.24	0	1	-2	-45	0.00	0.0	4.696	0.037	0	0	0	3	P
P PRUG688	PRUG689	B	2 Al 15 kv	7.29Y	121.5	0.00	1.45	0.22	0	1	-2	-45	0.00	0.0	4.916	0.220	0	0	0	2	P
P PRUG12077	PRUG688	B	1/0 Al 15	7.29Y	121.5	-0.00	1.45	-0.13	0	0	-1	0	0.00	0.0	5.048	0.132	0	0	0	1	P
P PRUG12078	PRUG12077	B	1/0 Al 15	7.29Y	121.5	-0.00	1.45	-0.04	0	0	0	100	0.00	0.0	5.112	0.064	0	0	0	1	P
P PRUG11693	PRUG14317	B	1/0 Al 15	7.29Y	121.5	-0.00	1.46	-0.08	0	0	-1	0	0.00	0.0	4.874	0.055	0	0	0	0	P
P PRUG11694	PRUG11693	B	1/0 Al 15	7.29Y	121.5	-0.00	1.46	-0.04	0	0	0	100	0.00	0.0	4.933	0.059	0	0	0	0	P
P PRUG13664	PROH4983	C	2 Al 15 kv	7.23Y	120.4	0.00	2.56	0.17	0	1	-1	-71	0.00	0.0	2.910	0.003	0	0	0	3	P
P PRUG13663	FUSE_658	C	2 Al 15 kv	7.23Y	120.4	-0.00	2.56	0.17	0	1	-1	-71	0.00	0.0	2.955	0.046	0	0	0	3	P
P PRUG12391	PRUG13663	C	1/0 Al 15	7.23Y	120.4	-0.00	2.56	-0.15	0	0	-1	0	0.00	0.0	3.048	0.093	0	0	0	2	P
P PRUG12392	PRUG12391	C	1/0 Al 15	7.23Y	120.4	-0.00	2.56	-0.09	0	0	-1	0	0.00	0.0	3.186	0.138	0	0	0	2	P
P PRUG14129	PROH4975	C	2 Al 15 kv	7.26Y	121.0	0.00	2.04	-0.12	0	0	-1	0	0.00	0.0	2.462	0.003	0	0	0	0	P
P PRUG14130	FUSE_657	C	2 Al 15 kv	7.26Y	121.0	-0.00	2.04	-0.12	0	0	-1	0	0.00	0.0	2.475	0.013	0	0	0	0	P

KEY-> L = Low Voltage H = High Voltage C = Capacity Over Limit (%capacity or load amps) G = Generator Out of kvar Limits P = Power Factor Low

Unbalanced Voltage Drop Report
Source: LOPEZ

Database: C:\PROJECTS\OPALCO\2013-2016\2013-2016CWP\PROPOSEDSYSTEMWDEC&THATCHNEWSUBBOYCE.WM\
Title: Lopez Substation - Circuit 22
Case: Proposed system with projected 4 yr load

Units Displayed In Volts
-Base Voltage:120.0-

Element Name	Parent Name	Cnf	Type/ Conductor	Pri kV	Base Volt	Element Drop	Accum Drop	Thru Amps	% Cap	Thru KW	KVAR	% PF	kW Loss	% Loss	mi From Src	Element Length (mi)	Element KW	Element KVAR	Element Cons On	Element Cons Thru	
P PRUG164	PRUG14130	C	2 Al 15 kv	7.26Y	121.0	-0.00	2.04	-0.11	0	0	-1	0	0.00	0.0	2.587	0.112	0	0	0	0	P
P PRUG166	PRUG164	C	2 Al 15 kv	7.26Y	121.0	-0.00	2.04	-0.05	0	0	0	100	0.00	0.0	2.692	0.104	0	0	0	0	P
P PRUG1590	PRUG13578	B	2 Al 15 kv	7.36Y	122.6	-0.00	0.38	-0.04	0	0	0	100	0.00	0.0	1.878	0.073	0	0	0	0	P
P PRUG84	PRUG1581	A	1/0 Al 15	7.33Y	122.2	-0.00	0.81	0.06	0	0	0	100	0.00	0.0	1.478	0.037	0	0	0	1	P
P PRUG85	PRUG84	A	1/0 Al 15	7.33Y	122.2	-0.00	0.81	0.03	0	0	0	100	0.00	0.0	1.527	0.048	0	0	0	1	P
P PRUG12460	PRUG1584	A	1/0 Al 15	7.33Y	122.2	-0.00	0.81	-0.03	0	0	0	100	0.00	0.0	1.470	0.047	0	0	0	1	P
P PRUG14137	PROH6396	C	1/0 Al 15	7.34Y	122.3	-0.00	0.68	-0.05	0	0	0	100	0.00	0.0	1.128	0.003	0	0	0	0	P
P PRUG14138	FUSE_625	C	1/0 Al 15	7.34Y	122.3	0.00	0.68	-0.04	0	0	0	100	0.00	0.0	1.130	0.002	0	0	0	0	P
P PRUG12271	PRUG14138	C	1/0 Al 15	7.34Y	122.3	-0.00	0.68	-0.04	0	0	0	100	0.00	0.0	1.195	0.065	0	0	0	0	P
P PRUG1514	PRUG14506	C	1/0 Al 15	7.33Y	122.2	0.00	0.79	-0.02	0	0	0	100	0.00	0.0	1.332	0.017	0	0	0	0	P
P PRUG1508	PRUG1514	C	2 Al 15 kv	7.33Y	122.2	0.00	0.79	-0.01	0	0	0	100	0.00	0.0	1.355	0.023	0	0	0	0	P
C SECUG11416	TRAN_38190	C	4/0 TX	0.12Y	121.5	0.46	1.53	106.65	55	13	3	97	0.03	0.3	1.522	0.005	0	0	0	1	C
C FUSE_626	PROH6200	C	10K	7.33Y	122.2	0.00	0.79	11.25	110	80	21	97	0.00	0.0	1.312	0.000	0	0	0	6	C
C TRAN_38193	PRUG1509	C	Transforme	0.12Y	121.4	0.58	1.59	3.92	113	28	8	96	0.11	0.4	1.850	0.000	0	0	0	1	C
C SECUG11419	TRAN_38193	C	4/0 TX	0.12Y	120.3	1.11	2.70	235.32	122	28	8	96	0.17	0.6	1.855	0.005	0	0	0	1	C
C TRAN_39282	PROH3273	C	Transforme	0.12Y	121.2	0.82	1.81	1.72	124	12	3	97	0.04	0.4	1.786	0.000	0	0	0	1	C
C SECOH243	TRAN_39282	C	4/0 TRPX	0.12Y	120.2	1.00	2.81	103.26	50	12	3	97	0.11	0.9	1.797	0.011	0	0	0	1	C
C SECOH251	TRAN_39281	C	4/0 TRPX	0.12Y	118.4	3.34	4.58	122.39	60	14	4	96	0.44	3.1	1.715	0.032	0	0	0	1	C
P PRUG1516	PRUG1517	B	2 Al 15 kv	7.37Y	122.9	0.00	0.12	0.07	0	0	0	100	0.00	0.0	1.166	0.089	0	0	0	1	P
P PRUG11678	PRUG1519	B	1/0 Al 15	7.37Y	122.9	-0.00	0.12	-0.05	0	0	0	100	0.00	0.0	1.011	0.070	0	0	0	0	P
P PRUG12034	PRUG12033	A	1/0 Al 15	7.38Y	123.0	-0.00	0.04	-0.19	0	0	-1	0	0.00	0.0	0.390	0.163	0	0	0	0	P
P PRUG12035	PRUG12034	A	1/0 Al 15	7.38Y	123.0	-0.00	0.04	-0.08	0	0	-1	0	0.00	0.0	0.514	0.123	0	0	0	0	P
---------- Feeder No. 4 (RECL_81) Beginning with Device RECL_81 ----------																					
RECL_81	LOPEZ	A	CIR24-0	7.38Y	123.0	0.00	0.00	30.46	8	230	24	99	0.00	0.0	0.000	0.000	0	0	0	105	
		B		7.38Y	123.0	0.00	0.00	47.79	12	358	34	100					0	0	0	110	
		C		7.38Y	123.0	0.00	0.00	53.25	13	407	31	100					0	0	0	292	
---------- Feeder No. 1 (RECL_80) Beginning with Device RECL_80 ----------																					
RECL_80	LOPEZ	A	CIR21-0	7.38Y	123.0	0.00	0.00	152.26	38	1121	223	98	0.00	0.0	0.000	0.000	0	0	0	378	
		B		7.38Y	123.0	0.00	0.00	152.05	38	1121	224	98					0	0	0	441	
		C		7.38Y	123.0	0.00	0.00	168.61	42	1230	245	98					0	0	0	298	
---------- Feeder No. 3 (RECL_79) Beginning with Device RECL_79 ----------																					
RECL_79	LOPEZ	A	CIR23-0	7.38Y	123.0	0.00	0.00	111.42	28	819	153	98	0.00	0.0	0.000	0.000	0	0	0	205	
		B		7.38Y	123.0	0.00	0.00	124.32	31	904	187	98					0	0	0	160	
		C		7.38Y	123.0	0.00	0.00	74.72	19	546	107	98					0	0	0	112	

KEY-> L = Low Voltage H = High Voltage C = Capacity Over Limit (%capacity or load amps) G = Generator Out of kvar Limits P = Power Factor Low

	Load	Adjustment	Capacitance	Charging	Gen&Motors	Loops&Metas	Losses	No Load Losses	Total
KW	1841	-2	0	0	0	6634	56	55.03	8585
KVAR	684	2	0	-371	0	1229	75		1619

Lowest Voltage	Highest Accumulated Voltage Drop	Highest Element Voltage Drop
A-Phase -> 112.27 volts on SECUG1228	10.73 volts on SECUG1228	7.67 volts on SECUG1228
B-Phase -> 119.27 volts on SECUG1654	3.73 volts on SECUG1654	1.99 volts on SECOH244
C-Phase -> 115.14 volts on SECUG254	7.86 volts on SECUG254	3.97 volts on SECUG254

Substation Summary

Substation	KW	KW Losses	KVAR	KVAR Losses	KVA	% Capacity
LOPEZ	8529.97	112.00	1990.00	75.00	8735.83	42.62
Total:	8529.97	112.00	1990.00	75.00	8735.83	

APPENDIX B

Construction Work Plan Projects

Projects for 2013-2016 Construction Work Plan

300	Conversions & Line Chgs
500	Station, Sw Station, MP Changes
601	Transformers & Meters
603	Sectionalizing Equipment
604	Regulators
606	Ordinary Replacement
608	URD Replacements
609	LMS & SCADA
706	Smart Grid
1001	Ordinary Replacement
1002	Line Changes
1003	Line Changes
1600	Minor Projects

SYSTEM IMPROVEMENT PROJECTS DEFERRED TO NEW 2013-2016 CWP										
	Prev. CWP #	*YEAR TO COMPLETE*	*LENGTH*	*RUS 740C*			*OPALCO ESTIMATE*	General Location	*Funds for Smart Grid*	
Cattle Point Road Reconductor w/ FO	**11.3**	2013	14,000	316	San Juan		$365,000	1430412-1682318	$365,000	Replace 4/0 URD w /500 MCM URD
Rouleau Road Reconductor w/ FO	**7.7**	2014	5,808	317	San Juan		$145,000	1034494 to 1053210	$145,000	3Ø Convert 2/0 ACSR to 336 ACSR
Victorian Valley Replace w/ FO	**4.19**	2015	8,000	318	Orcas		$250,000	2245404-2287101	$250,000	2Ø Convert 1/0 URD to 4/0 URD
Shark Reef Regulator	**2.2**	2014		604.1	Lopez		$50,000	In General Area of 3264310		Install 100 kVA 1 ph, pad mount Reg
Mud Bay Regulators	**2.12**	2014		604.2	Lopez		$85,000	In General Area of 3512363		Install 100 kVA Regs (A,B,& C phase)
Roche Harbor Regulators	**7.17**	2015		604.3	San Juan		$75,000	In General area of 1081201		Add Pad Mt Reg on A & B phase
							$970,000		**$760,000**	

FUTURE STYSTEM IMPROVEMENTS FOR 2013-2016 CWP

		YEAR TO COMPLETE	LENGTH	RUS 740C	District		OPALCO ESTIMATE	General Location	Funds for Smart Grid	
Day Lake Road Loop		2014	2,400	201	Orcas		$60,000	2029450-2030377		Install in conduit 4/0 Al URD for single phase tie
Raccoon Pt to Eagle Lk Loop		2014	2,100	202	Orcas		$52,500	2059381-2059428		Install in conduit 4/0 Al URD for single phase tie
Aerie Road/Buck Mt Loop		2013	1,060	203	Orcas		$26,500	2042212-2042357		Install in conduit 4/0 Al URD for single phase tie
Lopez Road Loop with fiber		2014	4,365	204	Lopez		$89,700	3074196-3121223		Install in conduit 4/0 Al URD for 3 Ph UG tie
Vista Road Loop		2014	3,450	205	Lopez		$138,000	3433203-3433141		Install in conduit 1/0 Al URD for 3 Ph UG tie
Davis Bay Loop		2013	500	206	Lopez		$12,500	3414472-3414486		Install in conduit 1/0 Al URD for single phase tie
Circuit 104		2014	10,560	207	Orcas		$633,600	2022110-2039160		Install in conduit 3 ph 500 MCM & Sub Breakers
Circuit 114		2015	2,900	208	San Juan		$145,000	1130320-1490120		Install 500 MCM Circuit to Turn Pt Road
Egg Lake Road Conversion		2015	2,000	301	San Juan		$250,000	1242301-1234107		Convert #6 HD to 3 Ph 4/0 URD with Fiber
University Dr. Conversion		2014	800	302	San Juan		$32,000	1020144-1240350		Convert 3 Ph #6 HD to 3 Ph 1/0 URD with Fiber
Willis Road Conversion		2013	3,000	303	Orcas		$75,000	2276111-2277401		Convert #6 HD to 1 Ph 1/0 Al URD UG
Grindstone Bay Conversion		2014	3,060	304	Orcas		$76,500	2314169-2315242		Convert #6 HD to 1 Ph 1/0 Al URD UG
Shaw Island Conversion		2014	8,500	305	Lopez		$212,500	4039205-4054401	$212,500	Convert #6 HD to 1 Ph 1/0 URD with Fiber
White Point Conversion		2013	850	306	San Juan		$21,250	1081408-1081105		Convert #6 HD to 1 Ph 1/0 Al URD UG
False Bay Conversion		2016	4,130	307	San Juan		$103,250	1772201-1721411		Convert #6 HD to 1 Ph 1/0 Al URD UG
Eureka Conversion		2015	200	308	San Juan		$5,000	1254368-1321284		Convert #6 HD to 1 Ph 1/0 Al URD UG
Halvorsen Rd. Conversion		2013	2,025	309	San Juan		$50,625	1323417-1402229		Convert #6 HD to 1 Ph 1/0 Al URD UG
Carter Avenue Conversion		2014	450	310	San Juan		$11,250	1050332-1050338		Convert #6 HD to 1 Ph 1/0 Al URD UG
Nordstrom Ln/Crow Valley 3 Ph Tie w/ Fiber		2015	14,700	311	Orcas		$588,000	2064341-2178265	$588,000	Install in conduit 4/0 Al URD for 3 ph tie w / Fiber
Dolphin Bay 3 Ph Tie w/ Fiber		2013	5,700	312	Orcas		$228,000	2207303-2290386		Install in conduit 4/0 Al URD for 3 ph tie w / Fiber
Grover Street 3 Ph Tie w/ Fiber		2013	1,500	313	San Juan		$75,000	1210164-1210291		Install 500 MCM Tie
Cessna Road 3 Ph Tie w/ Fiber		2013	7,838	314	San Juan		$313,520	1034494-1053202		Convert 1 ph 1/0 URD to 3 ph 4/0 URD w / Fiber
Bartel Road Loop w/ Fiber		2013	2,700	315	Orcas		$131,538	2005406-2014101	$131,538	Install in conduit 4/0 Al URD for 3 ph tie w / Fiber
Beaverton Valley Recond w/ Fiber		2015	17,000	319	San Juan		$896,750	1360221-1383290	$896,750	Convert #6 HD to 3 Ph 4/0 URD with Fiber
San Juan Valley Reconductor w/ Fiber		2014	9,900	320	San Juan		$742,500	1463166-1483223	$742,500	Convert #4 ACSR to 500MCM URD w/ Fiber
Crescent Beach Reconductor		2014	4,700	321	Orcas		$75,200	2037140-2039206	$75,200	Recond 2/0 ACSR to 336 ACSR
Ferry Road Reconductor w/ FO		2013	5,000	322	Lopez		$90,000	3084276-3044116	$90,000	Recond 1/0 ACSR to 336 ACSR
Circuit 111		2016	1,800	323	San Juan		$18,000	1130322-1140120		Add 15kV undur biuld to existing FH Sub T-line
Mt. Constitution Conversion / FO		2013	10,500	324	Orcas		$787,500	2109107-2072244	$787,500	Convert #6 CU to 1/0 3 Ph URD w / Fiber
Football Field OH conversion		2013	1,000	325	Orcas		$20,000	2023108-2023150		Convert #6 CU to 4/0 3 Ph URD
Lopez N. Circuit Switchers		2016		504	Lopez		$250,000	3071299	$250,000	Install CS & PT's in Submarine Terminal
Lopez S. Circuit Switchers		2016		505	Lopez		$250,000	3214248	$250,000	Install CS & PT's in Submarine Terminal
Shaw S. Circuit Switchers		2016		506	Lopez		$250,000	4020251	$250,000	Install CS & PT's in Submarine Terminal
Fairgrounds VFI w/ Fiber		2013		603.4	San Juan		$120,000	1200428	$120,000	Replace S&C w /VFI w / Fiber
Pear Pt VFI w/ Fiber		2013		603.5	San Juan		$120,000	1430421	$120,000	Replace S&C with VFI w/ Fiber
Ferry Road Nova's w/ Fiber		2013		603.6	Lopez		$35,000	1200428	$35,000	Replace Existing Reclosers w/Nova's
Richardson Road Nova's w/ Fiber		2013		603.7	Lopez		$39,000	3081301	$39,000	Replace Existing Reclosers w/Nova's
Military Rd Nova's w/ Fiber		2013		603.8	Lopez		$35,000	3071490	$35,000	
Orcas Sub Regulators		2015		604.4	Orcas		$325,000	2225201		Install Regulators in Sub
Deer Harbor Reg/Recloser Fiber		2014	16,000	706.1	Orcas		$95,000	2225201-2149352	$95,000	Fiber to REG's and Reclsoer for SCADA
							$7,480,183		**$4,717,988**	

FUTURE SPECIAL PROJECTS FOR 2013-2016 CWP		YEAR TO COMPLETE	LENGTH	RUS 740C		OPALCO ESTIMATE	General Location	Funds for Smart Grid	
New Sub-Transmisson Line		2014-2015	20,000	801		$2,500,000	1242380-1383262		Install 69kV T-Line
69kV Submarine Cable Replacement		2013-2016	13,000	1001		$3,000,000	3214249-1611224	$3,000,000	Lopez to San Juan submarine cable
BPA 69kV Tap - Decatur Switchyard		2015-2016		901		$550,000	6073219		New 69 kV tap point from BPA to existing T-line
Boyce Property Improvements		2015-2016		401		$35,000	Near 1383244		
Boyce Road Substation		2014-2016		402		$2,000,000	Near 1383244		Substation to support west San Juan
Renovation Thatcher/Decatur Sub		2016		501		$200,000	6073219		Upgrade Transformers and station equipment
VAR Control @ Lopez Step-down		2016		503		$145,000	3253345		Pow er Factor correction
Orcas to Blakely 15 kV Cables, Source		2015		603.1		$68,000	Near 2296447		Recloser
Orcas to Blakely 15 kV Cables, Load		2015		603.2		$75,000	Near 5004126		VFI and transformer
Lopez to Decatur Submarine Cable, Source		2015		603.3		$95,000	Near 3253345		Lopez to Decatur
Decatur Regulators		2016		604.5		$50,000	6073219		Add voltage regulation to Island
Blakely Regulators		2016		604.6		$50,000	5028320		Add voltage regulation to Island
Eastsound to Olga Fiber with VFI		2013		706.2		$285,000	2039280-2256358	$285,000	VFI and Fiber From Eastsound to Olga
Smart Grid, EMS, Wireless Comm.		2013-2016		706.3		$15,852,284	San Juan County	$15,852,284	Wireless Comm for SG and EMS support
						$24,905,284		**$19,137,284**	
			Quantities						
Distribution Transformers			240	601		$624,000			
Meters			3,500	601		$1,050,000		$1,050,000	
Distribution Pole Replacements			175	606		$437,500			
Sub-Transmission Pole Replacements			30	606		$450,000			
URD Replacements			800,000'	608		$8,000,000			
						$10,561,500		**$1,050,000**	
					Grand Total	**$43,916,967**		**$25,665,272**	

Projects for 2013 Construction Work Plan

													Construction Time		$ Cost	
SYSTEM IMPROVEMENT PROJECTS DEFERRED TO NEW 2013-2016 CWP										Design/Operation Review	Purchase/ Contractor Bid	Construction	OPALCO Crew	Contractor	Labor	Material
	Priority	YEAR TO COMPLETE	Estimated LENGTH	RUS 740C		OPALCO ESTIMATE	General Location	Estimated Staking Sheets	Description of work							
Cattle Point Road Reconductor	3A	2013	3,700	316	San Juan	$365,000	1430412-1682318	60	Replace 4/0 URD w /500 MCM	9/20/2012-11/1/2012	11/15/2012	2/1/2013 - 6/1/2013	40%	60%	60%	40%
FUTURE SYSTEM IMPROVEMENTS FOR 2013 CWP																
	Priority	YEAR TO COMPLETE	LENGTH	RUS 740C	District	OPALCO ESTIMATE	General Location	Estimated Staking Sheets	Description of work							
Aerie Road/Buck Mt Loop	9	2013	1,060	203	Orcas	$26,500	2042212-2042357	12	Single phase tie 1/0 UG	5/1/2013-5/20/2013	6/1/2013	7/1/2013 - 9/1/2013	40%	60%	60%	40%
Davis Bay Loop	10	2013	500	206	Lopez	$12,500	3414472-3414486	6	Single phase tie 1/0 UG	6/1/2012-6/15/2012	7/1/2012	8/1/2013 - 10/1/2013	40%	60%	60%	40%
Willis Road Conversion	11	2013	3,000	303	Orcas	$75,000	2276111-2277401	16	Convert #6 HD to 1 Ph 1/0 UG	6/15/2013-7/1/2013	7/15/2013	8/1/2013 - 11/1/2013	50%	50%	65%	35%
White Point Conversion	12	2013	850	306	San Juan	$21,250	1081408-1081105	14	Convert #6 HD to 1 Ph 1/0 UG	10/1/2012-11/1/2012	11/15/2012	2/1/2013 - 3/1/2013	40%	60%	60%	40%
Halverson Rd. Conversion	4	2013	2,025	309	San Juan	$50,625	1323417-1402229	26	Convert #6 HD to 1 Ph 1/0 UG	10/1/2012-11/15/2012	12/1/2012	3/1/2013 - 2/1/2013	40%	60%	60%	40%
Dolphin Bay 3 Ph Tie	8	2013	5,700	312	Orcas	$228,000	2207303-2290386	60	4/0 UG 3 phase Tie	2/1/2013-4/1/2013	4/15/2012	6/1/2013 - 10/1/2013	40%	60%	55%	45%
Grover Street 3 Ph Tie	14	2013	1,500	313	San Juan	$75,000	GP Substation - 1210226	14	Install 500 MCM 3 phase Tie	6/1/2013-7/1/2013	7/15/2013	9/1/2013 - 12/1/2013	50%	50%	40%	60%
Cessna Road 3 Ph Tie	6	2013	7,838	314	San Juan	$313,520	1034494-1053202	60	Install 4/0 UG Tie	12/1/2012-2/1/2013	2/15/2013	5/1/2013 - 10/1/2013	40%	60%	55%	45%
Bartel Road Loop	13	2013	2,700	315	Orcas	$131,538	2005406-2014101	40	Install conduit, 4/0 3 Ph UG	2/1/2013-4/1/2013	4/15/2013	6/1/2013 - 11/1/2013	40%	60%	55%	45%
Ferry Road Reconductor w/ FO	5A	2013	5,000	322	Lopez	$90,000	3084276-3044116	45	Recond 1/0 ACSR to 336 ACSR	12/1/2012-12/15/2012	1/1/2013	3/1/2013 - 6/1/2013	100%	0%	40%	60%
Mt. Constitution Conversion / FO	2	2013	10,500	324	Orcas	$787,500	2109107-2072244	50	Convert #6 CU to 1/0 3 Ph UG w / Fiber	9/1/2012-11/15/2012	12/15/2012	3/15/2013 - 4/1/2013	40%	60%	65%	35%
Football Field OH conversion	7	2013	1,000	325	Orcas	$20,000	2023108-2023150	10	Convert #6 CU to 4/0 3 Ph UG	1/1/2013-2/15/2013	3/1/2013	5/1/2013 - 6/1/2013	40%	60%	50%	50%
Fairgrounds VFI	3C	2013		603.4	San Juan	$120,000	1200428	8	Replace S&C w /VFI. Install Fiber	10/1/2012-11/1/2012	11/15/2012	2/1/2013 - 3/1/2013	100%	0%	40%	60%
Pear Pt VFI	3B	2013		603.5	San Juan	$120,000	1430421	14	Replace S&C with VFI. Install Fiber	10/1/2012-11/1/2012	11/1/2012	2/1/2013 - 3/1/2013	100%	0%	40%	60%
Ferry Road Nova's	5B	2013		603.6	Lopez	$35,000	1200428	2	Replace Existing Reclosers w/Nova's	10/1/2012-11/15/2012	12/11/2012	3/1/2013 - 4/1/2013	100%	0%	40%	60%
Richardson Road Nova's	15	2013		603.7	Lopez	$39,000	3081301	6	Replace Existing Reclosers w/Nova's	11/1/2012-11/15/2012	12/11/2012	3/1/2013 - 4/1/2013	100%	0%	40%	60%
Military Rd Nova's	16	2013		603.8	Lopez	$35,000	3071490	4	Replace Existing Reclosers w/Nova's	11/1/2012-11/15/2012	12/1/2012	3/1/2013 - 4/1/2013	100%	0%	40%	60%
					Total	$2,180,433										
FUTURE SPECIAL PROJECTS FOR 2013 CWP																
		YEAR TO COMPLETE	LENGTH	RUS 740C		OPALCO ESTIMATE	General Location	Estimated Staking Sheets	Description of work							
69kV Submarine Cable Replacement	*1	2013		326	San Juan	$50,000	San Juan -Lopez	0	Environmental and Permitting	All year			0.0%	100%	100%	0%
Eastsound to Olga w/ FO	1	2013		706.2		$285,000	2039280-Olga Substation	110	Install fiber from ES to Olga Substation	9/1/2012-10/15/2012	11/1/2012	3/1/2013 - 7/1/2013	90%	10%	75%	25%
			Quantities													
Distribution Transformers		2013	60	601		$180,000		40	As Identified	9/1/2012-9/1/2013	11/1/2012	1/1/2013 - 12/1/2013	100%	0%	60%	40%
Meters			0	601		$0		0								
Distribution Pole Replacements		2013	45	606		$112,500		30	As Identified	9/1/2012-9/1/2013	As Identified	1/1/2013 - 12/1/2013	100%	0%	60%	40%
Sub-Transmission Pole Replacements		2013	7	606		$105,000		7	As Identified	9/1/2012-9/1/2013	As Identified	1/1/2013 - 12/1/2013	80%	20%	40%	60%
URD Replacements		2013	200,000'	608		$1,800,000		300	As Identified	9/1/2012-9/1/2013	As Identified	1/1/2013 - 12/1/2013	50%	50%	50%	50%
						$2,482,500										
					Grand Total	$4,662,933	Estimated Staking sheets	874								

*Multi Year Projects

Projects for 2014 Construction Work Plan

SYSTEM IMPROVEMENT PROJECTS DEFERRED TO NEW 2014 CWP														Conctruction Time		$ Cost	
	Priority	YEAR TO COMPLETE	LENGTH	RUS 740C			OPALCO ESTIMATE	General Location	Estimated Staking Sheets		Design/Operation Review	Purchase/ Contractor Bid	Construction Period	PALCO Cre	Contract	Labor	Material
Rouleau Road Reconductor w/ FO	2	2014	5,808	317	San Juan		$145,000	1034494 to 1053210	30	3Ø Convert 2/0 ACSR to 336 ACSR with Fiber	10/1/2013-11/1/2013	11/15/2013	2/15/2014 - 6/1/2014	100%	0%	60%	40%
Shark Reef Regulator	14	2014		604.1	Lopez		$50,000	3264310	2	Install 100 kVA 1 ph, pad mount Regulars	3/1/2014-4/1/2014	4/15/2014	6/1/2014 - 8/30/2014	100%	0%	40%	60%
Mud Bay Regulators	15	2014		604.2	Lopez		$85,000	3512363	2	Install 3-100 kVA Regulars	4/1/2014-5/1/2014	4/15/2014	6/1/2014 - 8/1/2014	100%	0%	40%	60%
FUTURE STYSTEM IMPROVEMENTS FOR 2014 CWP														Conctruction Time		$ Cost	
		YEAR TO COMPLETE	LENGTH	RUS 740C	District		OPALCO ESTIMATE	General Location	Estimated Staking Sheets		Design/Operation Review	Purchase/ Contractor Bid	Construction Period	PALCO Cre	Contract	Labor	Material
Day Lake Road Loop	5	2014	2,400	201	Orcas		$60,000	2029450-2030377	30	1/0 single phase tie	2/1/2014-3/1/2013	3/15/2014	5/1/2014 - 7/1/2014	40%	60%	60%	40%
Raccoon Pt to Eagle Lk Loop	6	2014	2,100	202	Orcas		$52,500	2059381-2059428	30	1/0 single phase tie	2/1/2014-3/1/2013	3/15/2014	5/1/2014 - 7/1/2014	40%	60%	60%	40%
Lopez Road Loop	7	2014	4,365	204	Lopez		$89,700	3074196-3121223	50	Install conduit, 1/0 3 Ph UG	3/1/2014-4/1/2014	4/15/2014	6/1/2014 - 10/30/2014	50%	50%	60%	40%
Vista Road Loop	8	2014	3,450	205	Lopez		$138,000	3433203-3433141	40	Install conduit, 1/0 3 Ph UG	4/1/2014-5/1/2014	4/15/2014	6/1/2014 - 11/1/2014	40%	60%	60%	40%
Circuit 104	9	2014	10,560	207	Orcas		$633,600	2022110-2039160	70	3Ø 500 MCM Feeder, Sub Bay/Breakers	5/1/2014-6/1/2014	6/15/2014	8/1/2014 - 12/1/2014	40%	60%	60%	40%
University Dr. Conversion	10	2014	800	302	San Juan		$32,000	1020144-1240350	12	Convert 3 Ph #6 HD to 3 Ph 1/0 UG	6/1/2014-7/1/2014	7/15/2014	8/1/2014 - 10/1/2014	40%	60%	55%	45%
Grindstone Bay Conversion	11	2014	3,060	304	Orcas		$76,500	2314169-2315242	30	Convert #6 HD to 1 Ph 1/0 UG	7/1/2014-8/1/2014	8/15/2014	9/1/2014 - 11/1/2014	40%	60%	60%	40%
Shaw Island Conversion	4	2014	8,500	305	Lopez		$212,500	4039205-4054401	50	Convert #6 HD to 1 Ph 1/0 UG	12/1/2013-2/1/2014	2/15/2014	4/1/2014 - 6/1/2014	40%	60%	60%	40%
Carter Avenue Conversion	12	2014	450	310	San Juan		$11,250	1050332-1050338	8	Convert #6 HD to 1 Ph 1/0 UG	8/1/2014-9/1/2014	9/15/2014	10/1/2014 - 12/1/2014	40%	60%	60%	40%
San Juan Valley Reconductor	3	2014	9,900	320	San Juan		$742,500	1463166-1483223	80	Convert #4 ACSR to 500MCM	11/1/2013-1/1/2014	1/15/2014	3/1/2014 - 10/1/2014	100%	0%	65%	35%
Crescent Beach Reconductor	13	2014	4,700	321	Orcas		$75,200	2037140-2039206	45	Recond 2/0 ACSR to 336 ACSR	9/1/2014-10/1/2014	10/15/2014	11/1/2014 - 12/15/2014	100%	0%	65%	35%
Beaverton Valley Recond	14	2014	17,000	319	San Juan		$896,750	1360221-1383290	80	Convert 1Ø #6HD CU to 3Ø 4/0 URD	4/1/2014-5/1/2014	4/15/2014	6/1/2014 - 11/1/2014	40%	60%	60%	40%
Deer Harbor Reg/Recloser Fiber	1	2014	16,000	706.1	Orcas		$95,000	2225201-2149352	100	Fiber to REG's and Reclsoer for SCADA	9/1/2013-11/15/2013	12/1/2013	3/15/2014 - 6/15/2014	100%	0%	60%	40%
						Sub Total	$3,395,500										
FUTURE SPECIAL PROJECTS FOR 2014CWP														Conctruction Time		$ Cost	
		YEAR TO COMPLETE	LENGTH	RUS 740C			OPALCO ESTIMATE	General Location	Estimated Staking Sheets		Design/Operation Review	Purchase/ Contractor Bid	Construction Period	PALCO Cre	Contract	Labor	Material
69kV Sub-Transmission Line	*15	2014-2016	20,000	801	San Juan		$1,400,000	1242380-1383262	100	69kV T-Line From Roche T Line to Sub Planning, permitting & specifying	All Year	9/15/2014	2/15/2015 - 6/1/2015	100%	0%	60%	40%
69kV Submarine Cable Replacement	*1	2014-2016		326	Lopez	San Juan	$50,000	Lopez to San Juan	0	Environmental and Permitting	All Year		0.0%	100%	100%	0%	
			Quantities														
Distribution Transformers		2014	60	601			$180,000	TBD	40	As Identified	9/1/2013-9/1/2014	As Identified	1/1/2014 - 12/1/2014	100%	0%	60%	40%
Meters			0	601			$0										
Distribution Pole Replacements		2014	45	606			$112,500	TBD	30	As Identified	9/1/2013-9/1/2014	As Identified	1/1/2014 - 12/1/2014	100%	0%	60%	40%
Transmission Pole Replacements		2014	8	606			$120,000	TBD	16	As Identified	9/1/2013-9/1/2014	As Identified	1/1/2014 - 12/1/2014	80%	20%	40%	60%
URD Replacements		2014	200,000'	608			$2,000,000	TBD	300	As Identified	9/1/2013-9/1/2014	As Identified	1/1/2014 - 12/1/2014	50%	50%	50%	50%
						Sub Total	$2,412,500										
					Grand Total		$5,808,000	Estimated Staking sheets	1145								

* Multi-year project

Projects for 2015 Construction Work Plan

SYSTEM IMPROVEMENT PROJECTS DEFERRED TO NEW 2015 CWP														Conctruction Time		$ Cost	
	Priority	YEAR TO COMPLETE	LENGTH	RUS 740C			OPALCO ESTIMATE	General Location	Estimated Staking Sheets	Description of work	Design/Operation Review	Purchase/ Contractor Bid	Construction Period	OPALCO Crew	Contract	Labor	Material
Victorian Valley Replace w/ FO	2	2015	8,000	318	Orcas		$250,000	2245403-2287437	60	Convert 1-ph 1/0 to 3-ph 4/0 UG	10/1/2014-11/1/2014	11/15/2014	2/15/2015 - 6/1/2015	100%	0%	60%	40%
Roche Harbor Regulators	12	2015		604.3	San Juan		$75,000	1034494	6	Add Pad Mt Reg on A & B phase	3/1/2014-4/1/2014	4/15/2015	6/1/2015 - 8/30/2015	100%	0%	40%	60%
							$325,000										
FUTURE STYSTEM IMPROVEMENTS FOR 2015 CWP																	
		YEAR TO COMPLETE	LENGTH	RUS 740C	District		OPALCO ESTIMATE	General Location	Estimated Staking Sheets	Description of work	Design/Operation Review	Purchase/ Contractor Bid	Construction Period	OPALCO Crew	Contract	Labor	Material
Circuit 114	7	2015	2,900	208	San Juan		$145,000	1130320-1490120	40	Install 500 MCM Circuit to Turn Pt Road	10/1/2014-11/1/2014	11/15/2014	2/15/2015 - 6/1/2015	100%	0%	60%	40%
Egg Lake Road Conversion	4	2015	2,000	301	San Juan		$250,000	1242301-1234107	30	Convert #6 HD to 3 Ph 4/0 UG	3/1/2014-4/1/2014	4/15/2015	6/1/2015 - 8/30/2015	100%	0%	40%	60%
Nordstrom Ln/Crow Valley 3 Ph Tie	3	2015	14,700	311	Orcas		$588,000	2064341-2178265	80	4/0 3 phase UG Tie	10/1/2014-1/1/2015	2/15/2015	5/1/2015 - 12/1/2015	100%	0%	60%	40%
Orcas Sub Regulators	12	2016		604.4	Orcas		$325,000	2225201	4	Install Regulators in Sub	3/1/2014-4/1/2014	4/15/2015	6/1/2015 - 8/30/2015	100%	0%	40%	60%
Eureka Conversion	6	2015	200	308	San Juan		$5,000	1254368-1321284	12	Convert #6 HD to 1 Ph 1/0 UG	4/1/2014-5/1/2014	4/15/2015	6/1/2015 - 8/1/2015	100%	0%	40%	60%
							$1,313,000										
FUTURE SPECIAL PROJECTS FOR 2015 CWP																	
		YEAR TO COMPLETE	LENGTH	RUS 740C			OPALCO ESTIMATE	General Location	Estimated Staking Sheets	Description of work	Design/Operation Review	Purchase/ Contractor Bid	Construction Period	OPALCO Crew	Contract	Labor	Material
Boyce Road Substation	13	2016		403	San Juan		$200,000	San Juan	12	New Substation for San Juan- Planning and Permiting	1/1/2015-12/1/2015	5/15/2015	2/15/2016 - 12/1/2016	0%	100%	0%	100%
69kV Submarine Cable Replacement	*1	2015	13,000	326	San Juan		$1,000,000	Lopez to San Juan	0	Cable Ordering and submarine Routing	1/1/2015-6/1/2015	7/1/2015	2016	0.0%	100%	100%	0%
69kV Sub-Transmission Line	*1	2015	20,000	801	San Juan		$1,400,000	1242380-1383262	100	Install 69kV UG From Roche T Line to Sub	10/1/2014-11/1/2014	11/15/2014	2/15/2015 - 6/1/2015	100%	0%	60%	40%
Boyce Property Improvements	11	2015		402	San Juan		$35,000	Near 1383244	12		3/1/2014-4/1/2014	4/15/2015	6/1/2015 - 8/30/2015	100%	0%	40%	60%
Orcas to Blakely 15 kV Cables, Source	10	2015		603.1	Lopez		$68,000	Near 2296447	6	Recloser	10/1/2014-11/1/2014	11/15/2014	2/15/2015 - 6/1/2015	100%	0%	60%	40%
Orcas to Blakely 15 kV Cables, Load	9	2015		603.2	Lopez		$75,000	Near 5004126	6	VFI and transformer	3/1/2014-4/1/2014	4/15/2015	6/1/2015 - 8/30/2015	100%	0%	40%	60%
Lopez to Decatur Submarine Cable, Source	8	2015		603.3	Lopez		$95,000	Near 3253345	6	Lopez to Decatur	4/1/2014-5/1/2014	4/15/2015	6/1/2015 - 8/1/2015	100%	0%	40%	60%
							$1,673,000										
			Quantities														
Distribution Transformers		2015	60	601			$180,000	TBD	40	As Identified	9/1/2014-9/1/2015	As Identified	1/1/2015 - 12/1/2015	100%	0%	60%	40%
Meters			0	601													
Distribution Pole Replacements		2015	50	606			$125,000	TBD	30	As Identified	9/1/2014-9/1/2015	As Identified	1/1/2015 - 12/1/2015	100%	0%	60%	40%
Transmission Pole Replacements		2015	9	606			$135,000	TBD	16	As Identified	9/1/2014-9/1/2015	As Identified	1/1/2015 - 12/1/2015	80%	20%	40%	60%
URD Replacements		2015	200,000'	608			$2,000,000	TBD	300	As Identified	9/1/2014-9/1/2015	As Identified	1/1/2015 - 12/1/2015	50%	50%	50%	50%
							$2,440,000										
					Grand Total		$5,751,000	Estimated Staking sheets	748								

* Multi-year project

Projects for 2016 Construction Work Plan

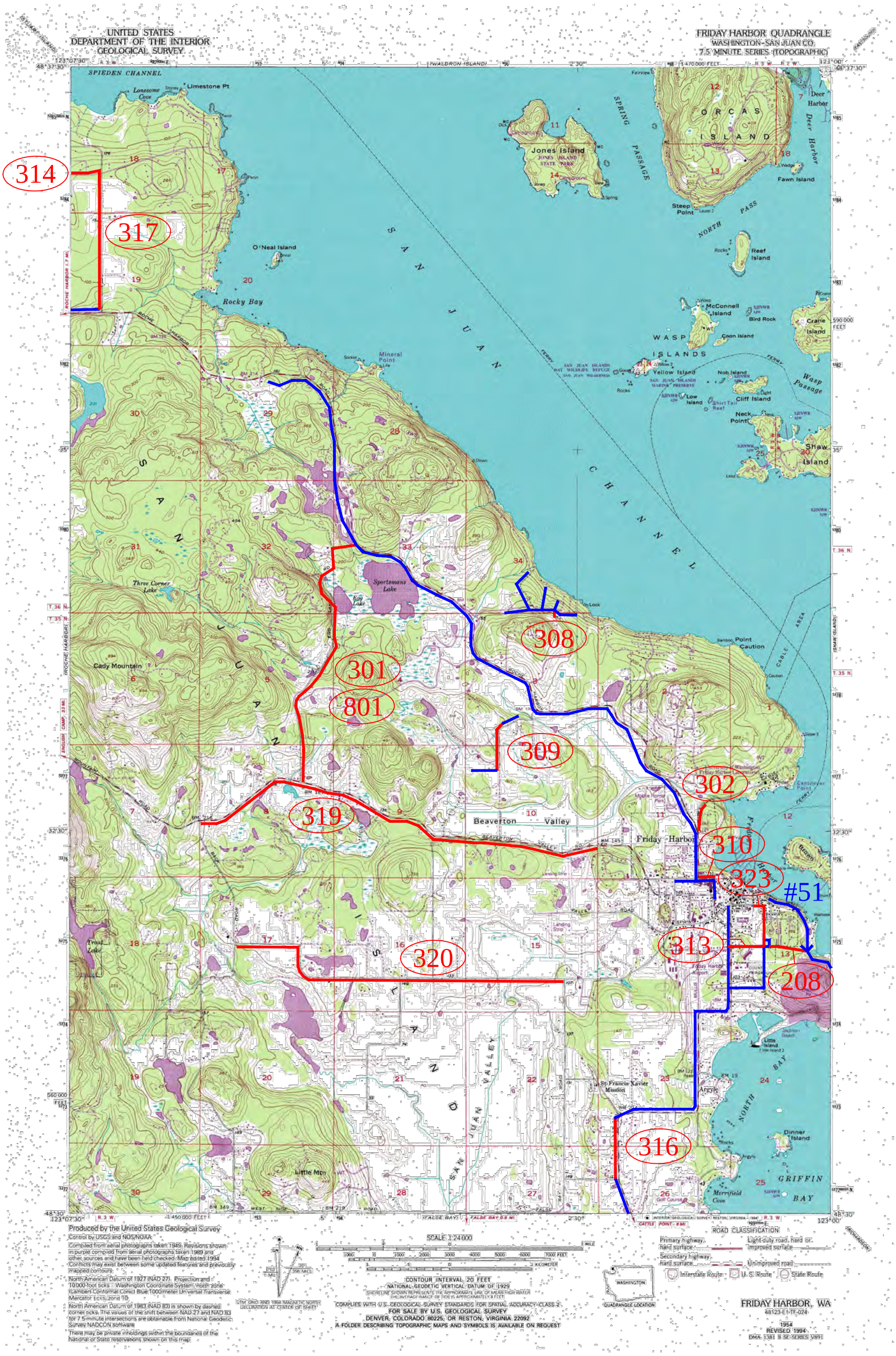
FUTURE STYSTEM IMPROVEMENTS FOR 2016 CWP														Conctruction Time		$ Cost	
	Priority	YEAR TO COMPLETE	LENGTH	RUS 740C	District		OPALCO ESTIMATE	General Location	Estimated Staking Sheets	Description of work	Design/Operation Review	Purchase/ Contractor Bid	Construction Period	OPALCO Crew	Contract	Labor	Material
False Bay Conversion	10	2016	4,130	307	San Juan		$103,250	1772201-1721411	30	Convert #6 HD to 1 Ph 1/0 UG	2/1/2016-3/1/2016	3/15/2016	5/1/2016 - 8/30/2016	40%	60%	60%	40%
Circuit 111	11	2016	1,800	323	San Juan		$18,000	1130322-1140120	30	Convert 69kV T line to 15kV circuit to FH Sub	3/1/2015-4/1/2015	4/15/2016	6/15/2016 - 10/1/2016	75%	25%	60%	40%
Lopez N. Circuit Switchers	4	2016		504	Lopez		$250,000	3071299	4	Install CS & PT's in Submarine Terminal	9/1/2015-11/1/2015	11/15/2015	3/1/2016 - 9/1/2016	60%	40%	55%	45%
Lopez S. Circuit Switchers	5	2016		505	Lopez		$250,000	3214248	4	Install CS & PT's in Submarine Terminal	9/1/2015-11/1/2015	11/15/2015	3/1/2016 - 9/1/2016	60%	40%	55%	45%
Shaw S. Circuit Switchers	6	2016		506	Lopez		$250,000	4020251	4	Install CS & PT's in Submarine Terminal	9/1/2015-11/1/2015	11/15/2015	3/1/2016 - 9/1/2016	60%	40%	55%	45%
							$871,250										
FUTURE SPECIAL PROJECTS FOR 2013-2016 CWP														Conctruction Time		$ Cost	
	Priority	YEAR TO COMPLETE	LENGTH	RUS 740C			OPALCO ESTIMATE	General Location	Estimated Staking Sheets	Description of work	Design/Operation Review	Purchase/ Contractor Bid	Construction Period	OPALCO Crew	Contract	Labor	Material
BPA 69kV Tap - Decatur Switchyard	3	2016		401	Lopez		$550,000		8	Decatur Island 69 kV tap from BPA	9/1/2015-11/1/2015	11/15/2015	4/1/2016 - 10/1/2016	50%	50%	50%	50%
69kV Submarine Cable Replacement	1	2016	13,000	326	Lopez	San Juan	$1,900,000		8	Lopez to San Juan	3/1/2014-12/1/2014	4/15/2015	3/1/2016 - 12/1/2016	20%	80%	40%	60%
Boyce Road Substation	2	2016		403	San Juan		$1,800,000		12	New Substation for San Juan	10/1/2014-11/1/2015	11/15/2015	2/15/2016 - 12/1/2016	20%	80%	40%	60%
Renovation Thatcher/Decatur Sub	8	2016		501	Lopez		$105,000		8	Modernize existing substation	1/1/2016-3/1/2016	3/15/2016	7/1/2016 - 10/30/2016	60%	40%	80%	20%
Remove Step-Down Transf	9	2016		502	Lopez		$35,000		8	Removal of excess Substation	11/1/2015-2/1/2016	2/15/2016	5/1/2016 - 12/1/2016	20%	80%	85%	15%
VAR Control @ Lopez Step-down	7	2016		503	Lopez		$145,000		12	For Pow er Factor control on T-Line	11/1/2015-3/1/2016	3/15/2016	6/1/2016 - 12/1/2016	80%	20%	50%	50%
Decatur Regulators	12	2016		604.5	Lopez		$50,000		10	Voltage regulation	5/1/2016-6/1/2016	6/15/2016	10/1/2016 - 12/1/2016	100%	0%	40%	60%
Blakely Regulators	13	2016		604.6	Lopez		$50,000		10	Voltage regulation	5/1/2016-6/1/2016	6/15/2016	10/1/2016 - 12/1/2016	100%	0%	40%	60%
							$4,635,000										
			Quantities														
Distribution Transformers		2016	60	601			$180,000	TBD	60		9/1/2015-10/1/2016	As Identified	1/1/2016 - 12/30/2016	100%	0%	60%	40%
Meters		2016	3,500	601			$1,050,000	TBD									
Distribution Pole Replacements		2016	45	606			$112,500	TBD	80		9/1/2015-10/1/2016	As Identified	1/1/2016 - 12/30/2016	100%	0%	60%	40%
Sub-Transmission Pole Replacements		2016	6	606			$90,000	TBD	12		9/1/2015-10/1/2016	As Identified	1/1/2016 - 12/30/2016	80%	20%	40%	60%
URD Replacements		2016	200,000'	608			$2,200,000	TBD	300		9/1/2015-10/1/2016	As Identified	1/1/2016 - 12/30/2016	50%	50%	50%	50%
							$3,632,500										
					Grand Total		$9,138,750	Estimated Staking sheets	600								

* Multi-year project

APPENDIX C

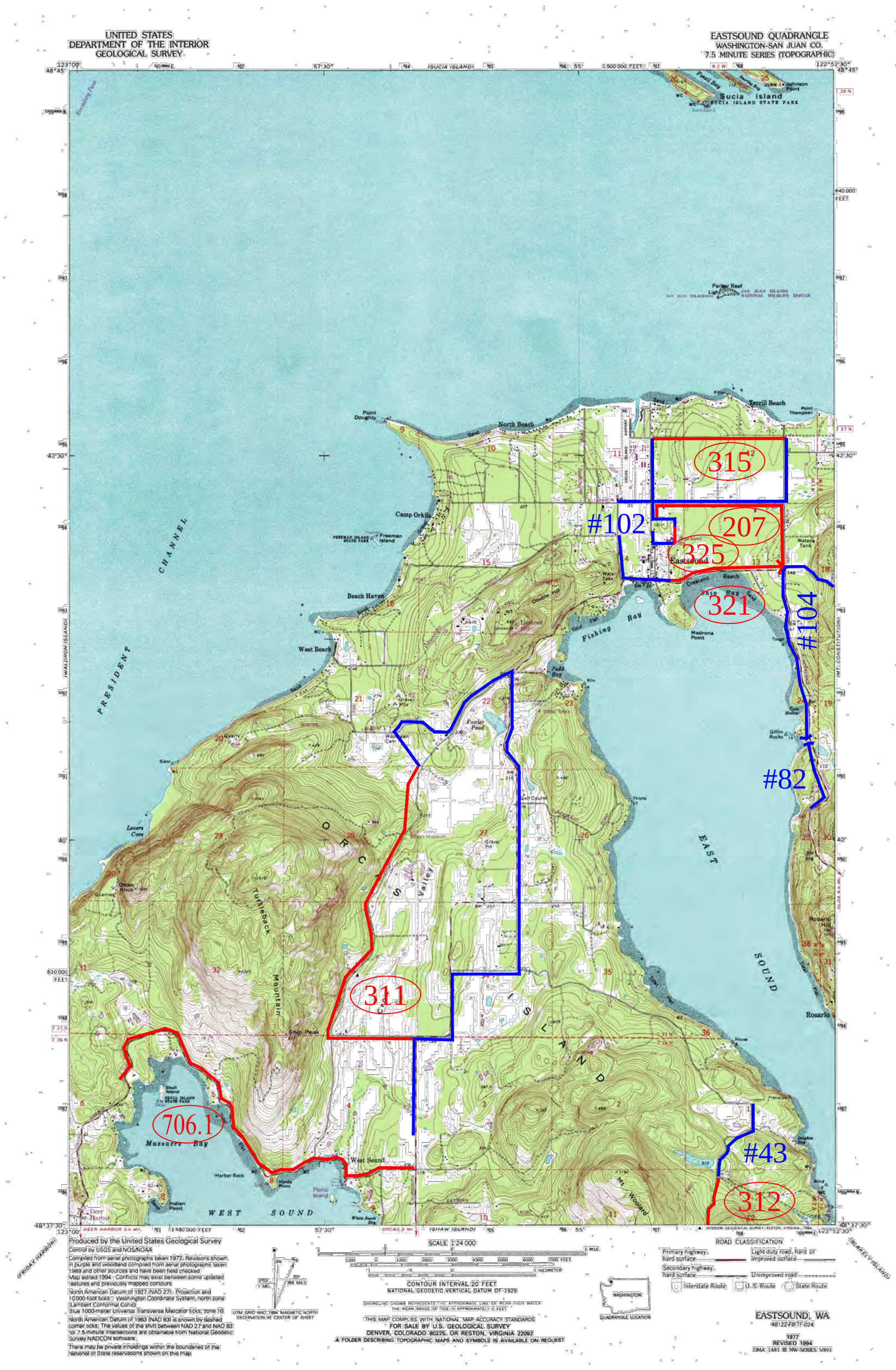
Circuit Diagrams

OPALCO
WA 9 SAN JUAN
UEI PROJECT #R11.00973

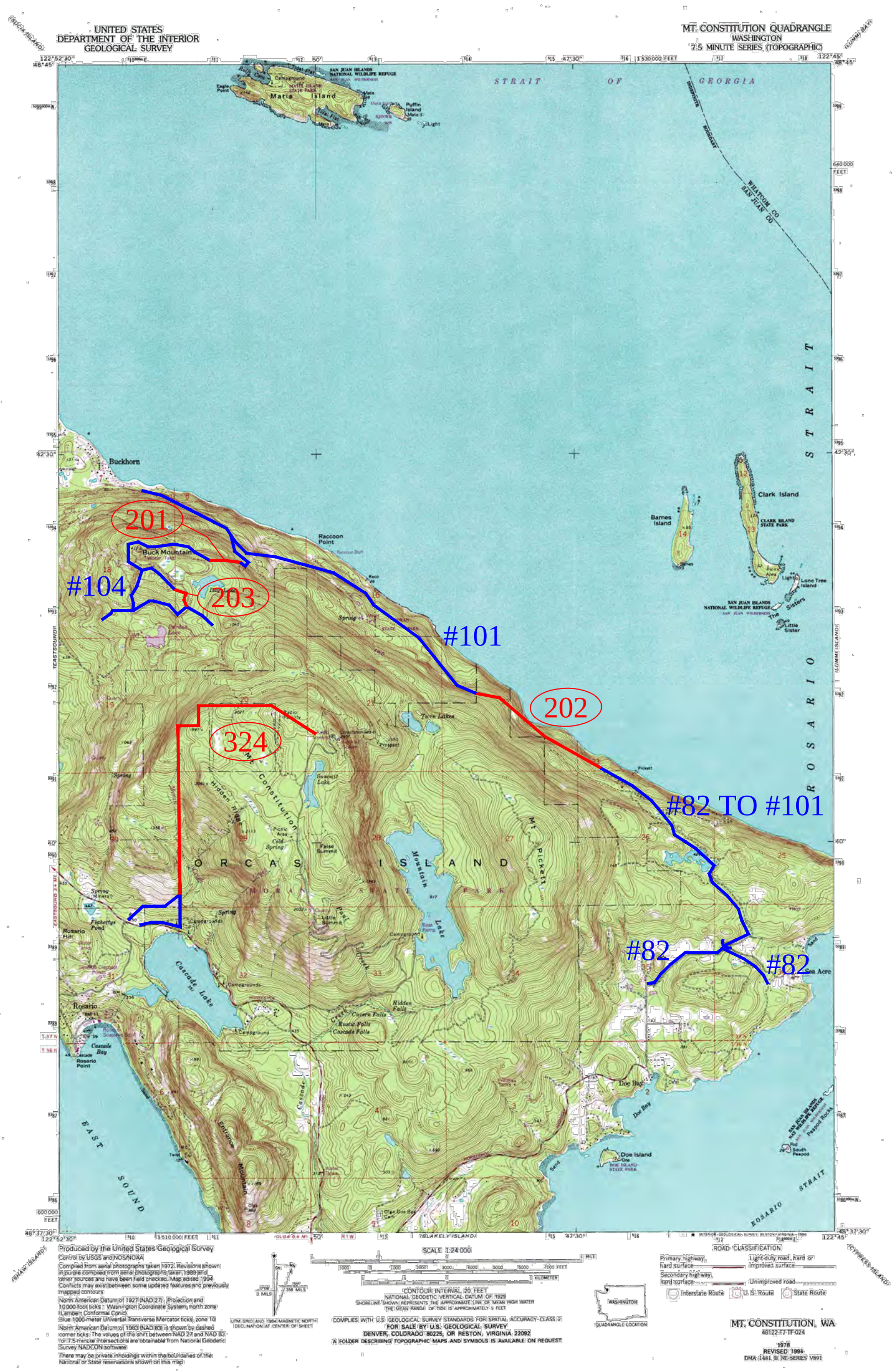


OPALCO
WA 9 SAN JUAN
UEI PROJECT #R11.00973

OPALCO
WA 9 SAN JUAN
UEI PROJECT #R11.00973

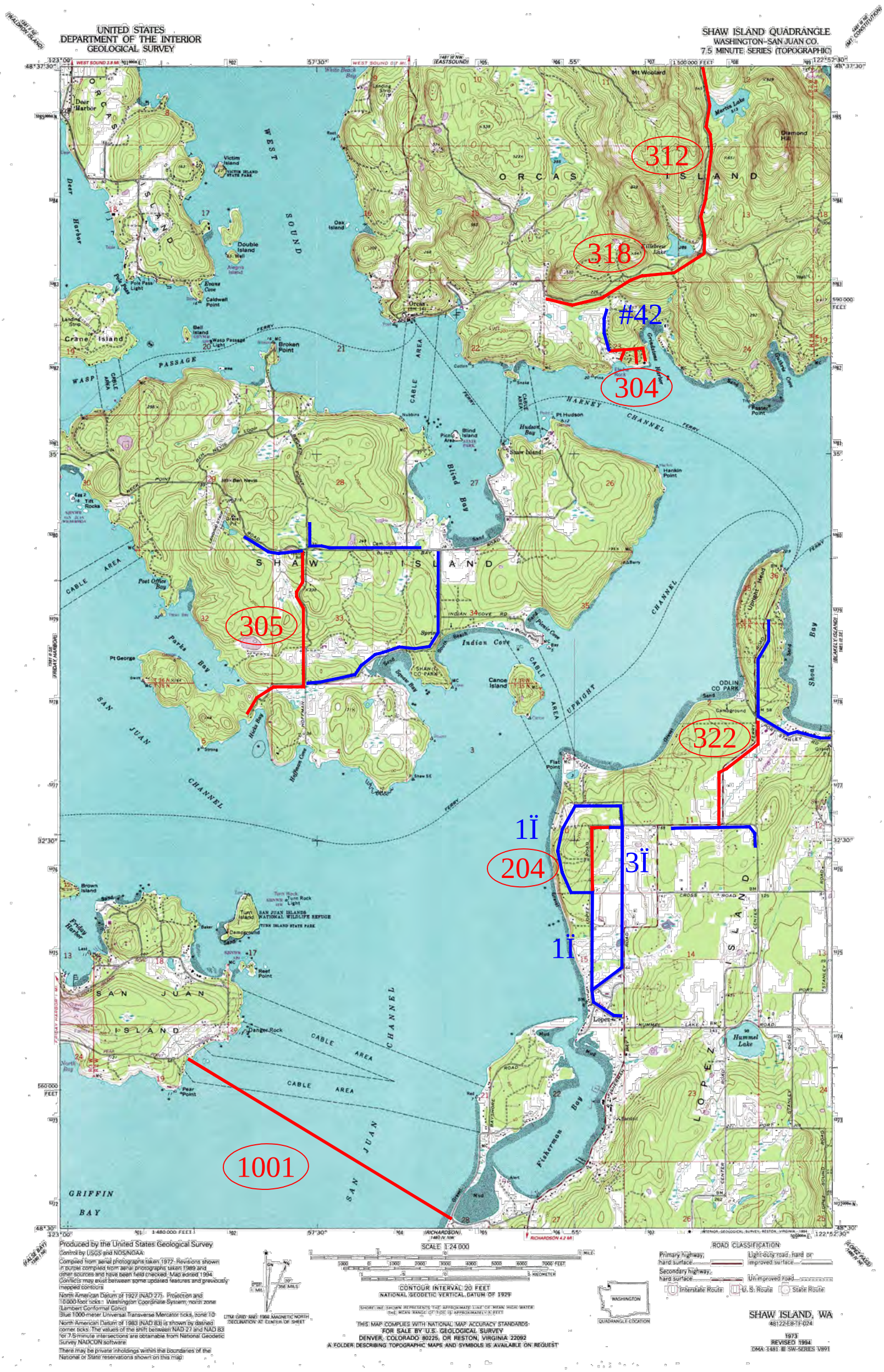


OPALCO
WA 9 SAN JUAN
UEI PROJECT #R11.00973



OPALCO
WA 9 SAN JUAN
UEI PROJECT #R11.00973

OPALCO
WA 9 SAN JUAN
UEI PROJECT #R11.00973



OPALCO
WA 9 SAN JUAN
UEI PROJECT #R11.00973

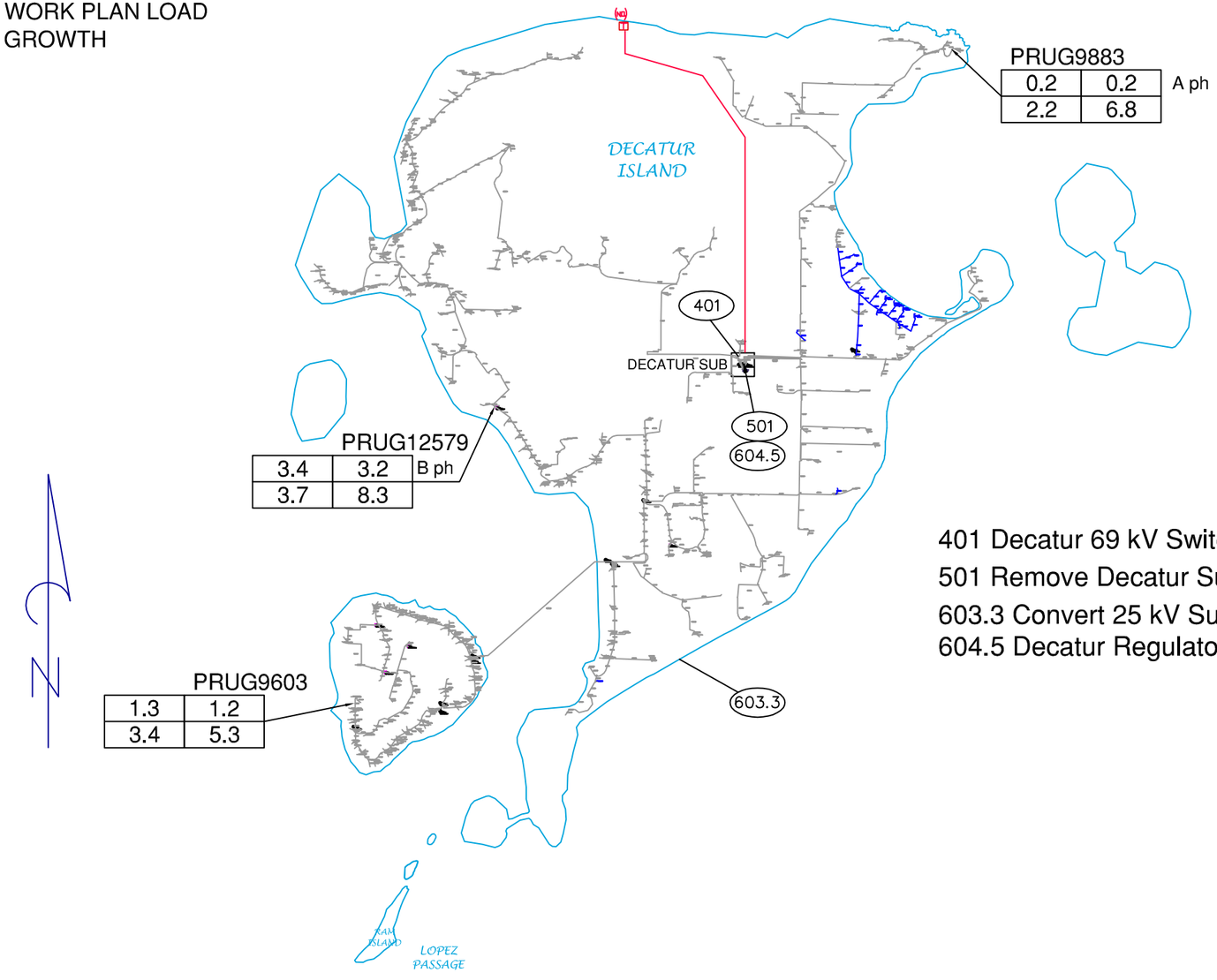
SECTION NO. (LOAD END) → XXXX
VOLTAGE DROP → X.X | X.X
MILES FROM SUBSTATION → XX.XX | XX.XX

PRESENT SYSTEM WITH PROJECTED WORK PLAN LOAD GROWTH

PROPOSED SYSTEM

OVERHEAD - PHASE C

UNDERGROUND - PHASE C



401 Decatur 69 kV Switchyard
501 Remove Decatur Substation
603.3 Convert 25 kV Sub Cables to 15 kV
604.5 Decatur Regulators

Orcas Power & Light Cooperative

Eastsound, Washington

Revision	Date	Number	By

PLAN NOTES OR GENERAL NOTES

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Fargo, North Dakota 58104
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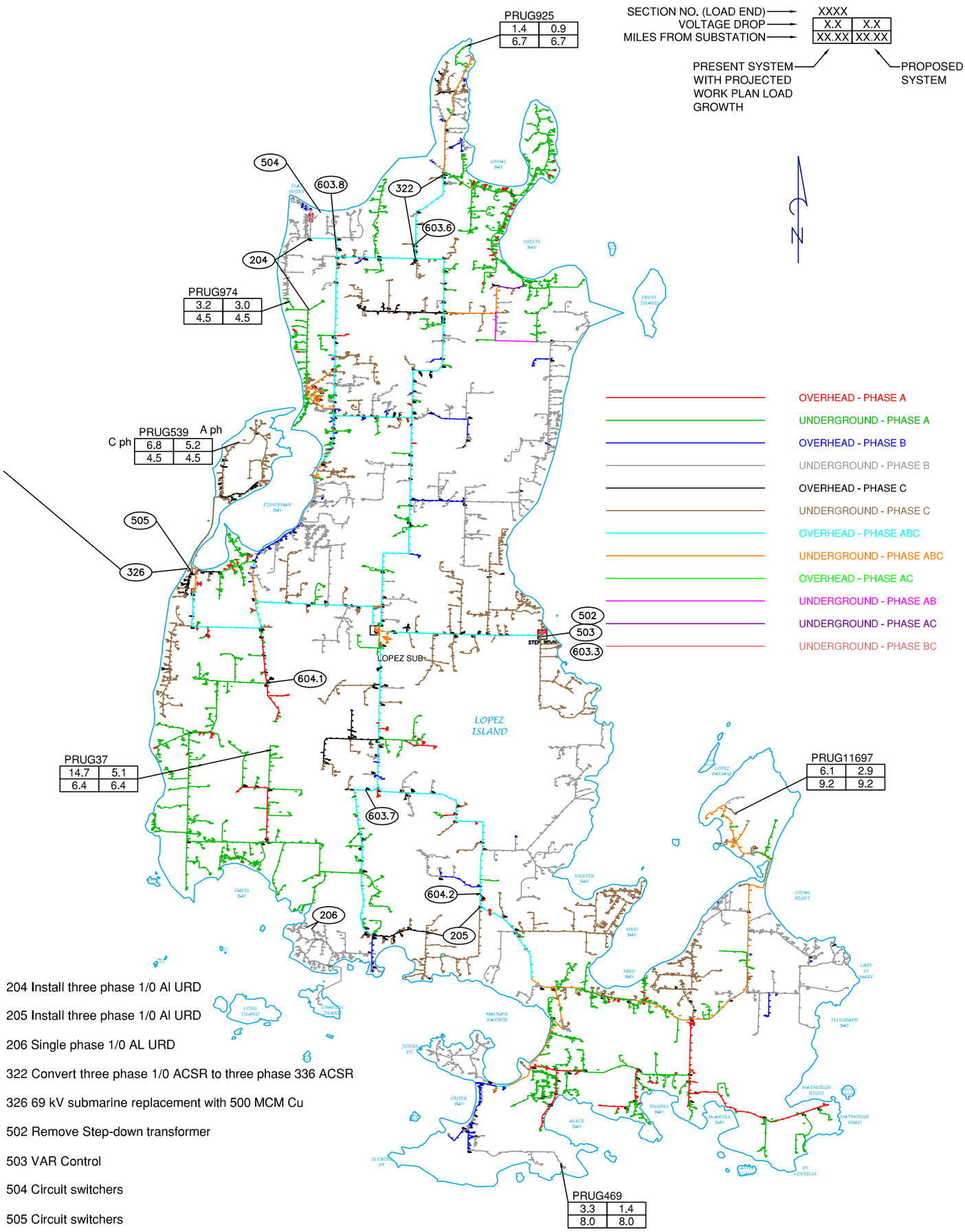
Web: www.ulteig.com
Drawn By: MDC
Checked By: Name
Approved By: Name

WORK PLAN
CIRCUIT DIAGRAM
DECATUR SUBSTATION

Project Number: R11.00973
Date: December 2011
Sheets: 1 of 10



204 Install three phase 1/0 Al URD

205 Install three phase 1/0 Al URD

206 Single phase 1/0 AL URD

322 Convert three phase 1/0 ACSR to three phase 336 ACSR

326 69 kV submarine replacement with 500 MCM Cu

502 Remove Step-down transformer

503 VAR Control

504 Circuit switchers

505 Circuit switchers

603.4 25 kV to 15 kV Cables

603.6 Nova reclosers

603.7 Nova reclosers

603.8 Nova reclosers

604.1 - Add 100 amp regulator

604.2 - Add 100 amp regulator on A,B,C phase

Orcas Power & Light Cooperative

Eastsound, Washington

Revision | Date | Number | By

PLAN NOTES OR GENERAL NOTES

WORK PLAN
CIRCUIT DIAGRAM
LOPEZ SUBSTATION

Project Number: R1L100972
Date: December 2011
Sheets: 2 of 10

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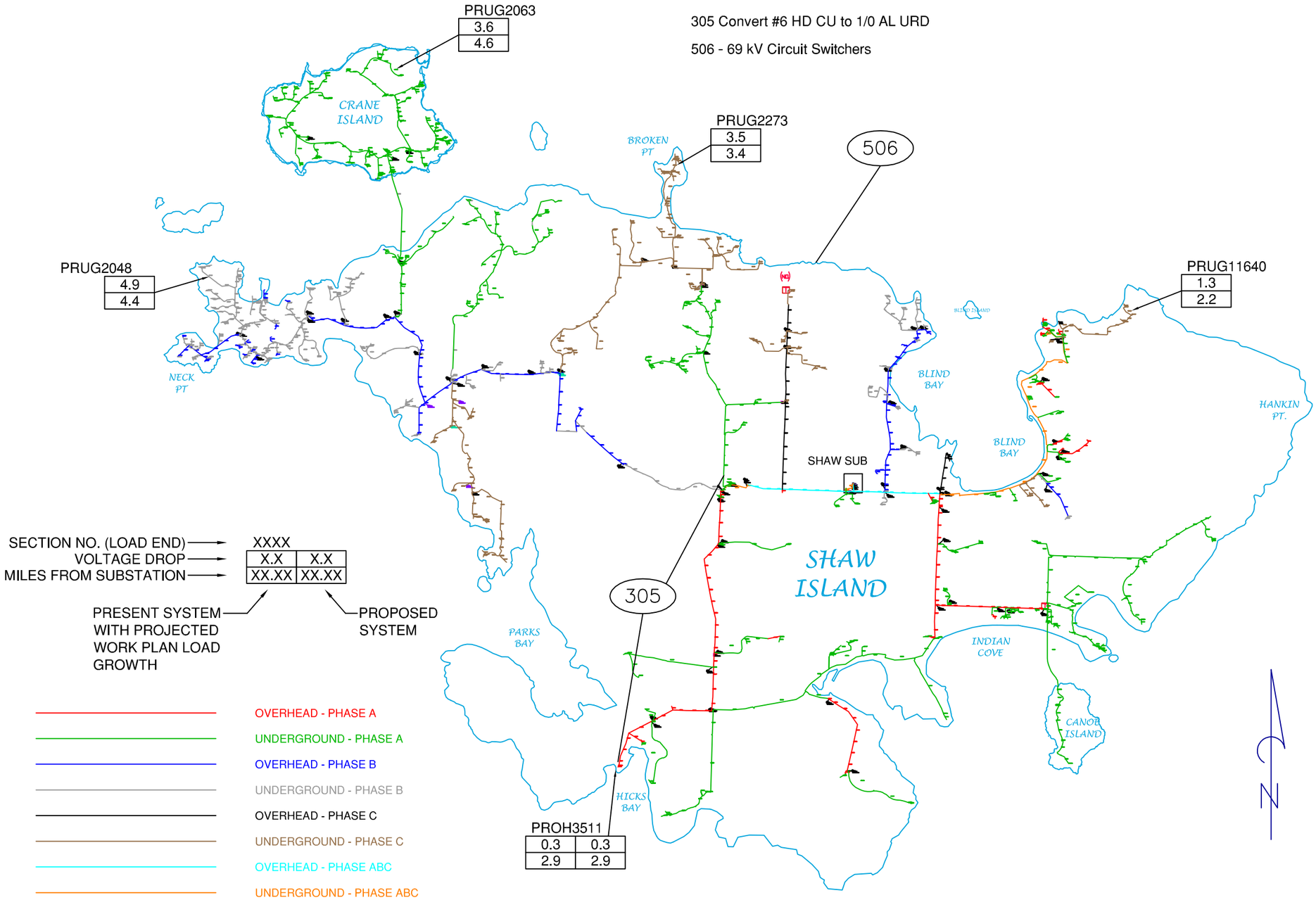
305 Convert #6 HD CU to 1/0 AL URD

506 - 69 kV Circuit Switchers



SECTION NO. (LOAD END) → XXXX
VOLTAGE DROP → X.X | X.X
MILES FROM SUBSTATION → XX.XX | XX.XX

PRESENT SYSTEM WITH PROJECTED WORK PLAN LOAD GROWTH

PROPOSED SYSTEM

- OVERHEAD - PHASE A
- UNDERGROUND - PHASE A
- OVERHEAD - PHASE B
- UNDERGROUND - PHASE B
- OVERHEAD - PHASE C
- UNDERGROUND - PHASE C
- OVERHEAD - PHASE ABC
- UNDERGROUND - PHASE ABC

Orcas Power & Light Cooperative

Eastsound, Washington

Revision	Date	Number	By

PLAN NOTES OR GENERAL NOTES

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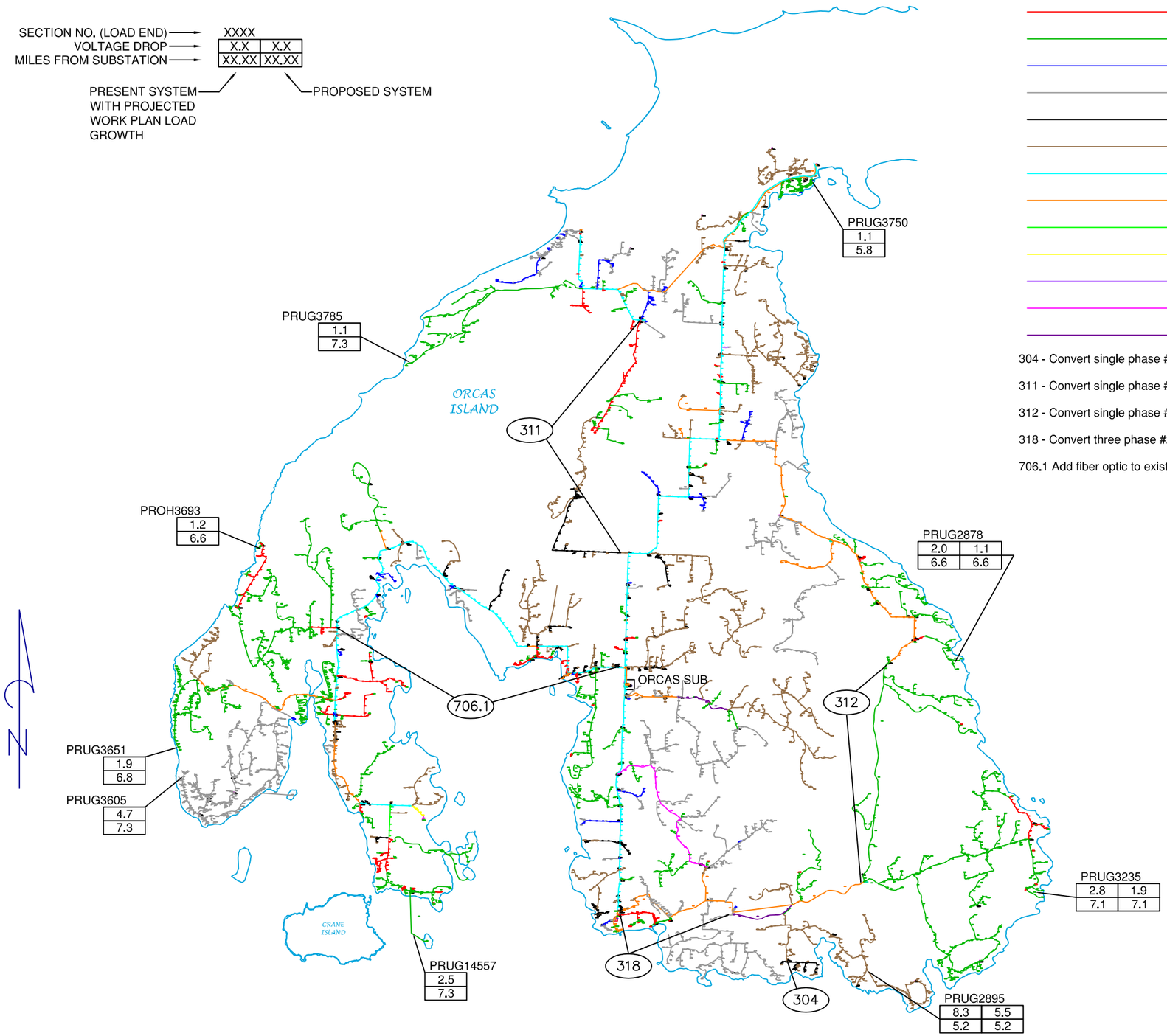
WORK PLAN
CIRCUIT DIAGRAM
SHAW SUBSTATION

Project Number: R11.00973
Date: December 2011
Sheets: 3 of 10

SECTION NO. (LOAD END) → XXXX
VOLTAGE DROP → X.X | X.X
MILES FROM SUBSTATION → XX.XX | XX.XX

PRESENT SYSTEM WITH PROJECTED WORK PLAN LOAD GROWTH

PROPOSED SYSTEM



OVERHEAD - PHASE A
UNDERGROUND - PHASE A
OVERHEAD - PHASE B
UNDERGROUND - PHASE B
OVERHEAD - PHASE C
UNDERGROUND - PHASE C
OVERHEAD - PHASE ABC
UNDERGROUND - PHASE ABC
OVERHEAD - PHASE AC
OVERHEAD - PHASE AB
OVERHEAD - PHASE BC
UNDERGROUND - PHASE AB
UNDERGROUND - PHASE AC

304 - Convert single phase #6 HD Cu to single phase 1/0 Al URD

311 - Convert single phase #6 HD CU to three phase 4.0 Al URD

312 - Convert single phase #2 Al URD to three phase 1/0 Al URD

318 - Convert three phase #2 Al URD to three phase 4/0 Al URD

706.1 Add fiber optic to existing line for Smart Grid

Orcas Power & Light Cooperative

Eastsound, Washington

Revision	Date	Number	By

PLAN NOTES OR GENERAL NOTES

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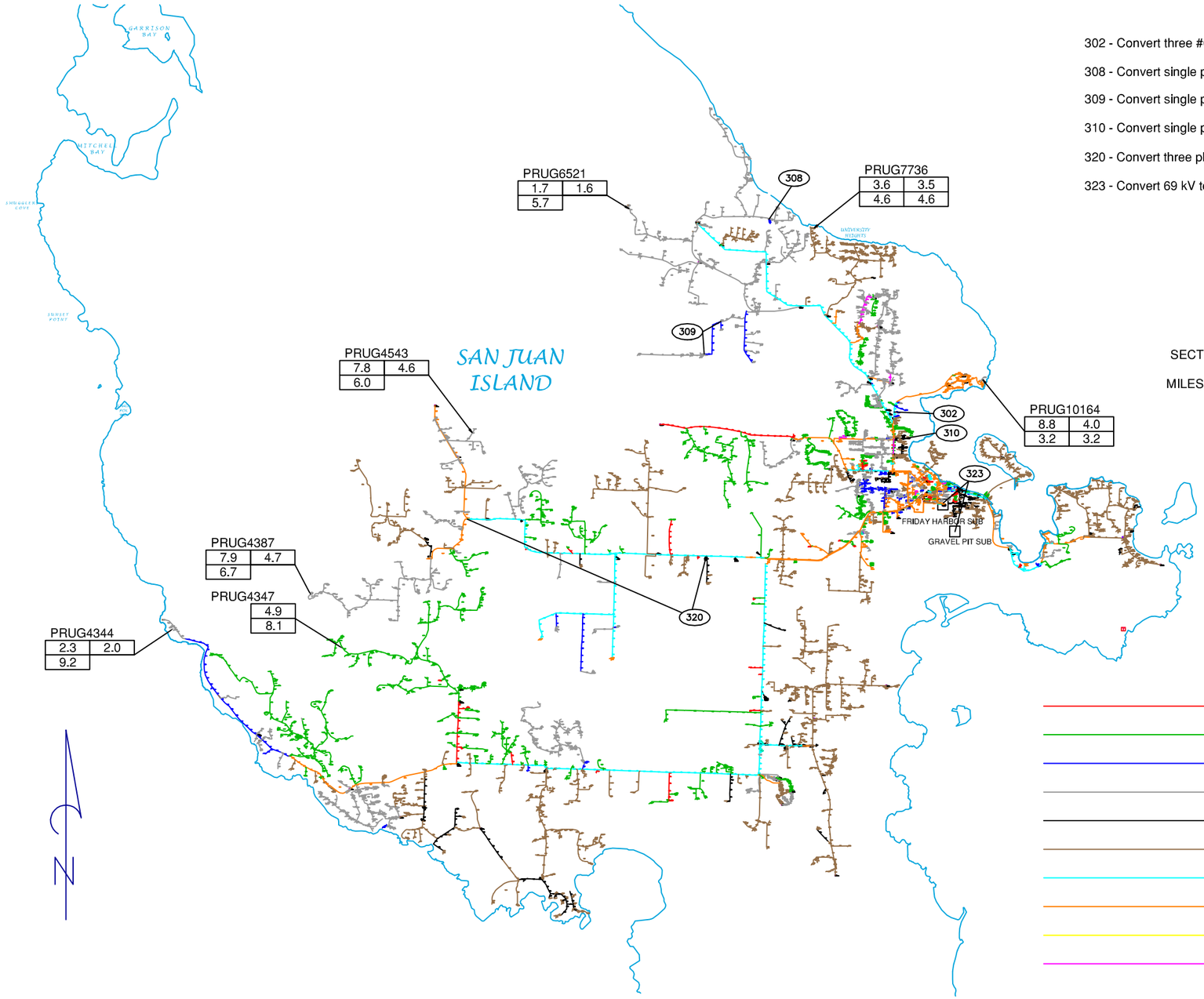
Approved By: Name

WORK PLAN
CIRCUIT DIAGRAM
ORCAS SUBSTATION

Project Number: R11.00973
Date: December 2011
Sheets: 4 of 10



302 - Convert three #6 HD Cu to three 1/0 Al URD

308 - Convert single phase #6 HD Cu to single phase 1/0 Al URD

309 - Convert single phase #6 HD Cu to single phase 1/0 Al URD

310 - Convert single phase #6 HD Cu to single phase 1/0 Al URD

320 - Convert three phase #4 ACSR to three 4/0 Al URD

323 - Convert 69 kV to 15 kV: Add neutral

SECTION NO. (LOAD END) → XXXX
VOLTAGE DROP → R | X.X | X.X
MILES FROM SUBSTATION → | XX.XX | XX.XX

PRESENT SYSTEM WITH PROJECTED WORK PLAN LOAD GROWTH

PROPOSED SYSTEM

OVERHEAD - PHASE A

UNDERGROUND - PHASE A

OVERHEAD - PHASE B

UNDERGROUND - PHASE B

OVERHEAD - PHASE C

UNDERGROUND - PHASE C

OVERHEAD - PHASE ABC

UNDERGROUND - PHASE ABC

OVERHEAD - PHASE AB

UNDERGROUND - PHASE AB

Orcas Power & Light Cooperative

Eastsound, Washington

Revision	Date	Number	By

PLAN NOTES OR GENERAL NOTES

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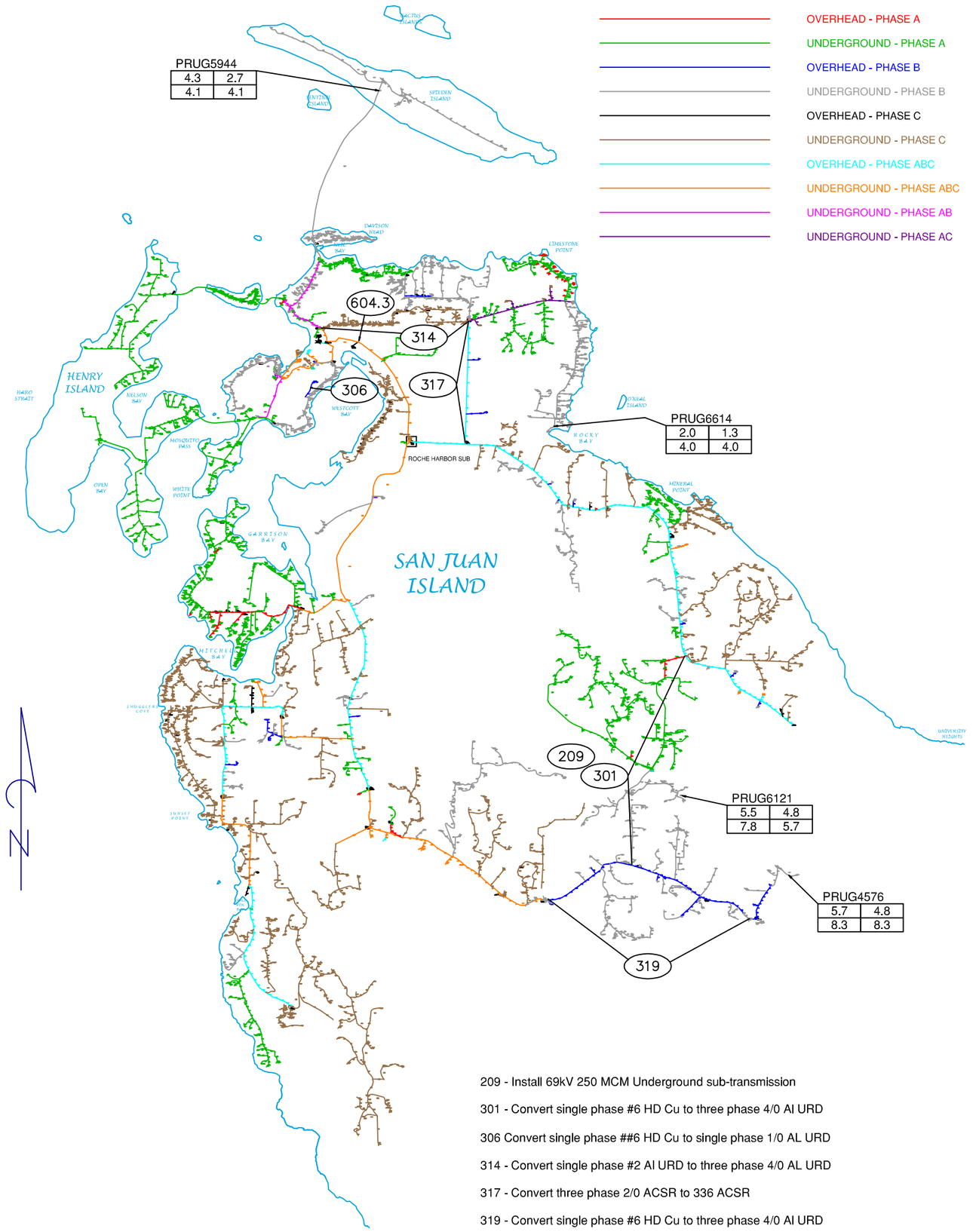
Approved By: Name

WORK PLAN
CIRCUIT DIAGRAM
FRIDAY HARBOR
SUBSTATION

Project Number: R11.00973
Date: December 2011
Sheets: 5 of 10



209 - Install 69kV 250 MCM Underground sub-transmission

301 - Convert single phase #6 HD Cu to three phase 4/0 Al URD

306 Convert single phase ##6 HD Cu to single phase 1/0 AL URD

314 - Convert single phase #2 Al URD to three phase 4/0 AL URD

317 - Convert three phase 2/0 ACSR to 336 ACSR

319 - Convert single phase #6 HD Cu to three phase 4/0 Al URD

604.3 - Install pad mounted regulators on A & B phases

SECTION NO. (LOAD END) → XXXX
VOLTAGE DROP →
MILES FROM SUBSTATION →

X.X	X.X
XX.XX	XX.XX

PRESENT SYSTEM WITH PROJECTED WORK PLAN LOAD GROWTH

PROPOSED SYSTEM

PLAN NOTES OR GENERAL NOTES

Revision	Date	Number	By

Orcas Power & Light Cooperative

Eastsound, Washington

WORK PLAN
CIRCUIT DIAGRAM
ROCHE HARBOR
SUBSTATION

Project Number: R1L100972
Date: December 2011
Sheets: 6 of 10

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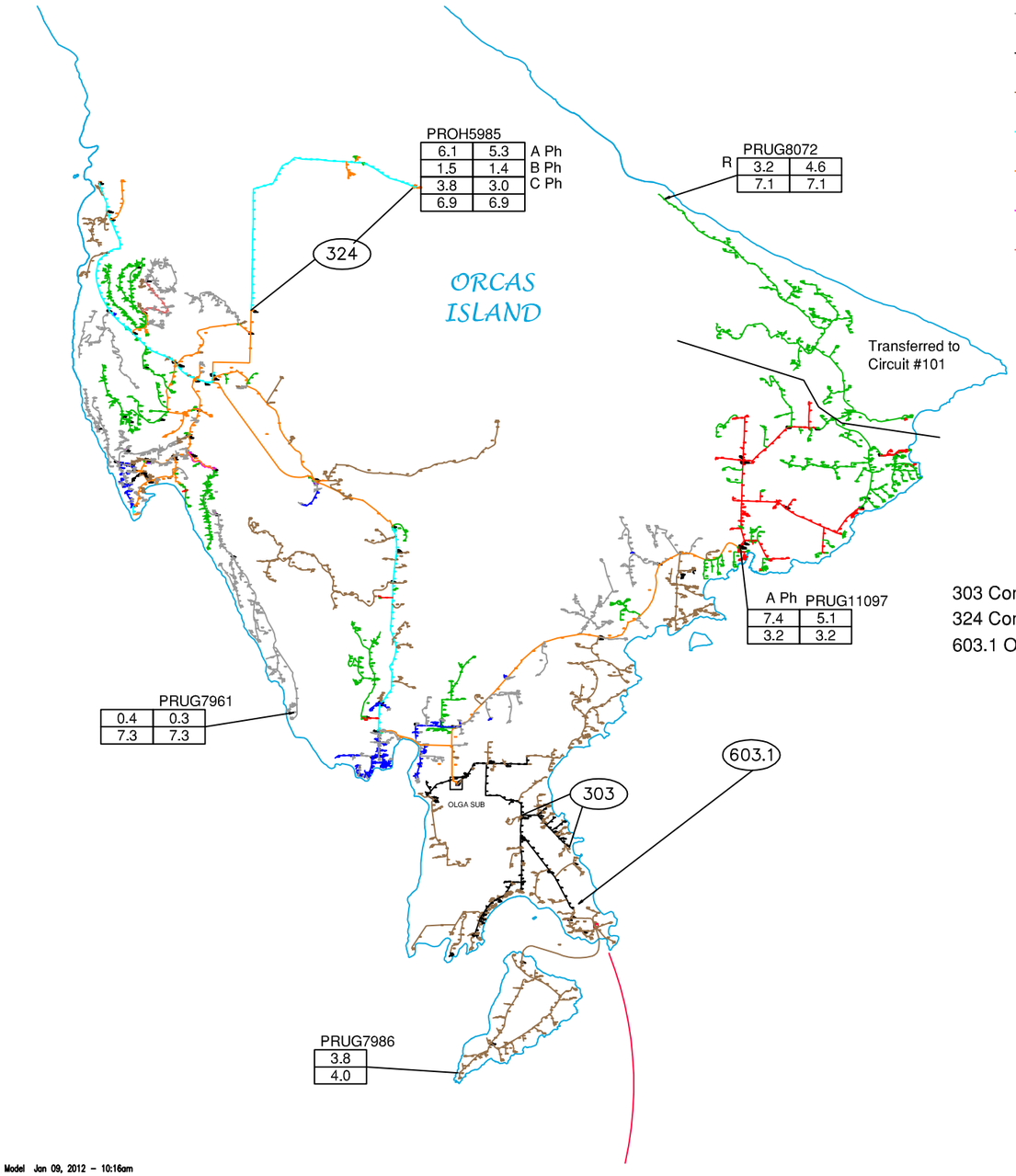

OVERHEAD - PHASE A

UNDERGROUND - PHASE A

OVERHEAD - PHASE B

UNDERGROUND - PHASE B

OVERHEAD - PHASE C

UNDERGROUND - PHASE C

OVERHEAD - PHASE ABC

UNDERGROUND - PHASE ABC

UNDERGROUND - PHASE AB

UNDERGROUND - PHASE BC

SECTION NO. (LOAD END) → XXXX
VOLTAGE DROP → X.X X.X
MILES FROM SUBSTATION → XX.XX XX.XX

PRESENT SYSTEM WITH PROJECTED WORK PLAN LOAD GROWTH

PROPOSED SYSTEM

303 Convert single phase #6 HD Cu to single phase 1/0 Al URD
324 Convert three phase #6 HD Cu to three phase 1/0 Al URD
603.1 Orcas to Blakely 15 kV Recloser

Orcas Power & Light Cooperative

Eastsound, Washington

Revision	Date	Number	By

PLAN NOTES OR GENERAL NOTES

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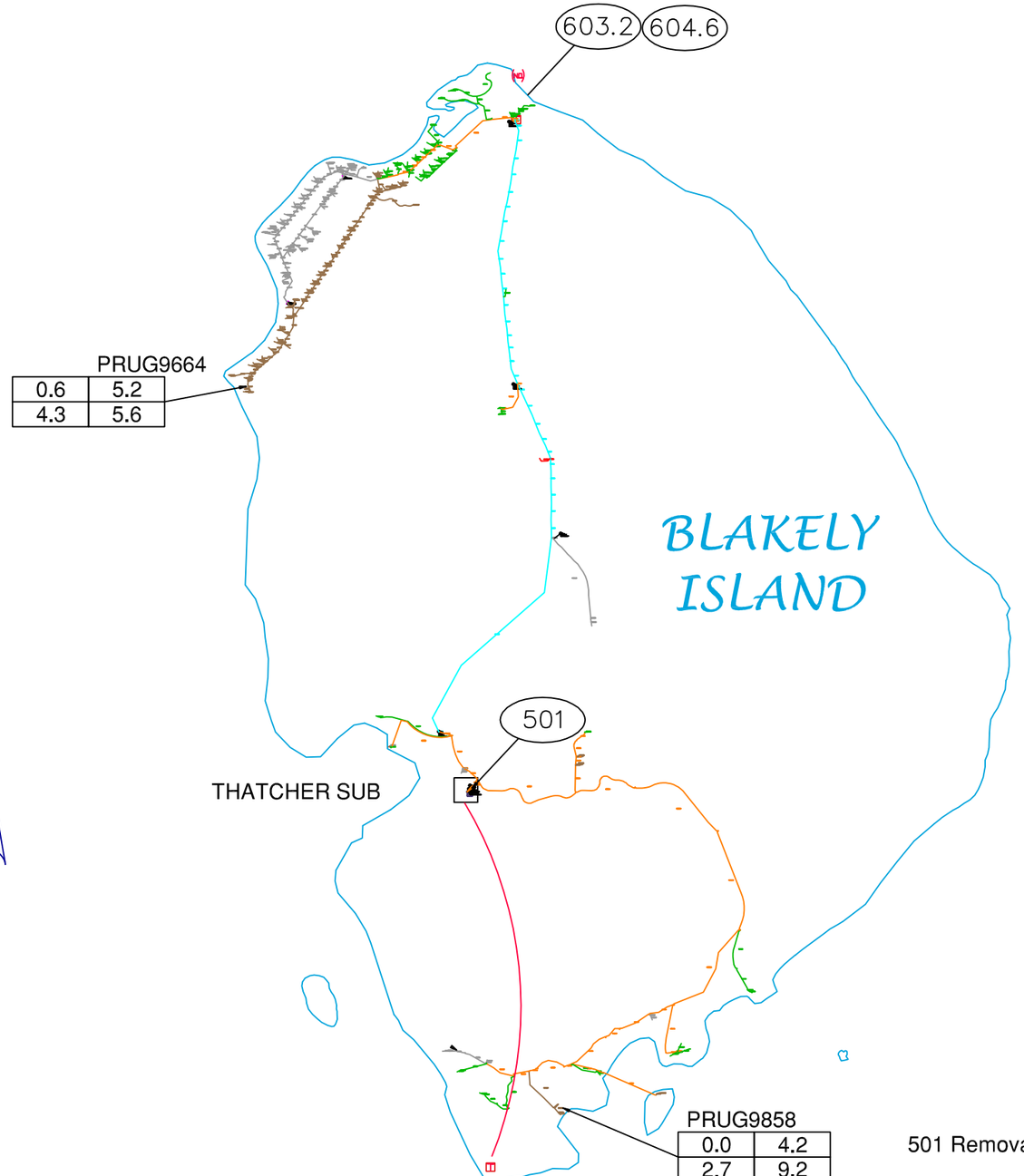
WORK PLAN
CIRCUIT DIAGRAM
OLGA SUBSTATION

Project Number: 107.0297
Date: July 31, 2008
Sheets: 7 of 10



OVERHEAD - PHASE A

UNDERGROUND - PHASE A

UNDERGROUND - PHASE B

UNDERGROUND - PHASE C

OVERHEAD - PHASE ABC

UNDERGROUND - PHASE ABC

SECTION NO. (LOAD END) → XXXX
VOLTAGE DROP → R | X.X | X.X
MILES FROM SUBSTATION → | XX.XX | XX.XX

PRESENT SYSTEM WITH PROJECTED WORK PLAN LOAD GROWTH

PROPOSED SYSTEM

501 Removal of Thatcher Sub

603.2 Orcas to Blakely 15 kV VFI & Transformer

604.6 Blakely Regulators

Orcas Power & Light Cooperative

Eastsound, Washington

Revision	Date	Number	By

PLAN NOTES OR GENERAL NOTES

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Web: www.ulteig.com
Drawn By: MDC
Checked By: Name
Approved By: Name

WORK PLAN
CIRCUIT DIAGRAM
THATCHER
SUBSTATION

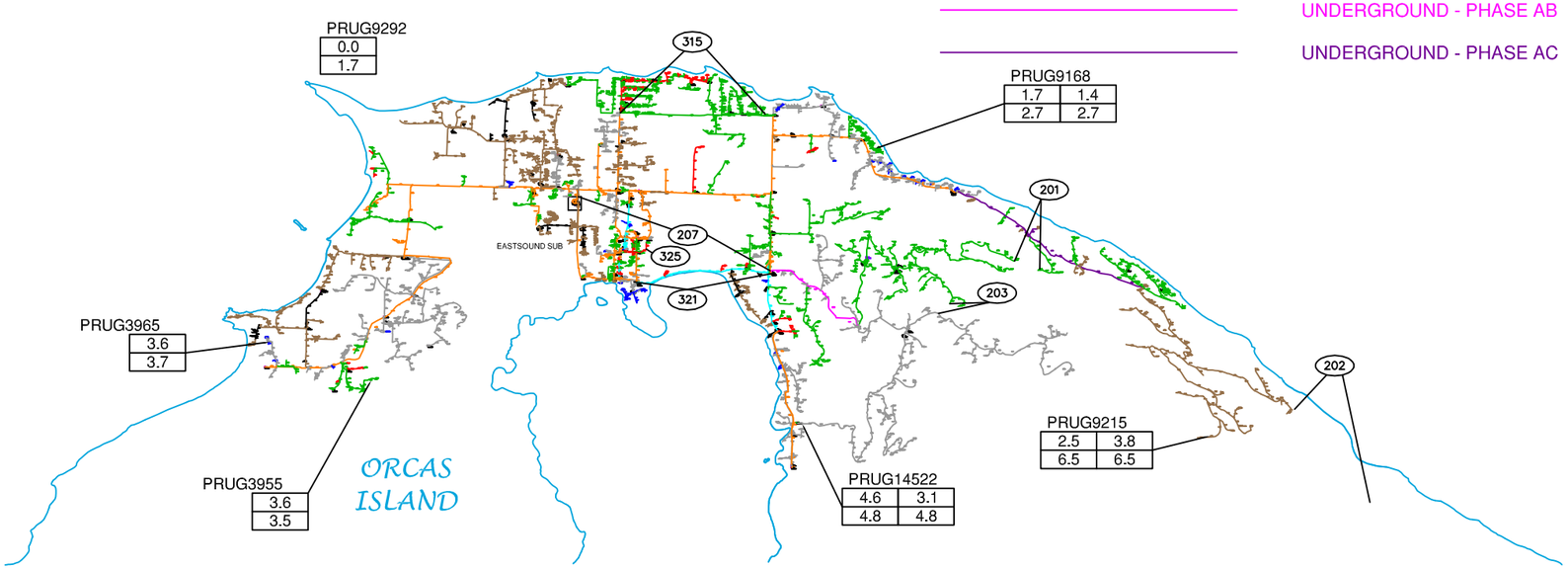
Project Number: R11.00973
Date: December 2011
Sheets: 8 of 10

SECTION NO. (LOAD END) → XXXX
VOLTAGE DROP → X.X | X.X
MILES FROM SUBSTATION → XX.XX | XX.XX

PRESENT SYSTEM WITH PROJECTED WORK PLAN LOAD GROWTH

PROPOSED SYSTEM

OVERHEAD - PHASE A
UNDERGROUND - PHASE A
OVERHEAD - PHASE B
UNDERGROUND - PHASE B
OVERHEAD - PHASE C
UNDERGROUND - PHASE C
OVERHEAD - PHASE ABC
UNDERGROUND - PHASE ABC
UNDERGROUND - PHASE AB
UNDERGROUND - PHASE AC



N

201 Install 1/0 single phase tie

202 Install 1/0 single phase tie

203 Install 1/0 single phase tie

207 Install 3 phase 500 MCM URD Feeder 104

315 Convert single phase #2 Al URD to three phase 1/0 Al URD

321 Convert three phase 2/0 ACSR to three phase 336 ACSR

325 Convert three phase #6 HD Cu to three phase 1/0 Al URD

Orcas Power & Light Cooperative

Eastsound, Washington

Revision	Date	Number	By

PLAN NOTES OR GENERAL NOTES

Ulteig

Bismarck - Detroit Lakes - Fargo - Minneapolis - Sioux Falls
3350 38th Avenue South
Fargo, North Dakota 58104
Phone: 701.237.3211 Fax: 701.237.3191
Web: www.ulteig.com
Drawn By: MDC
Checked By: Name
Approved By: Name

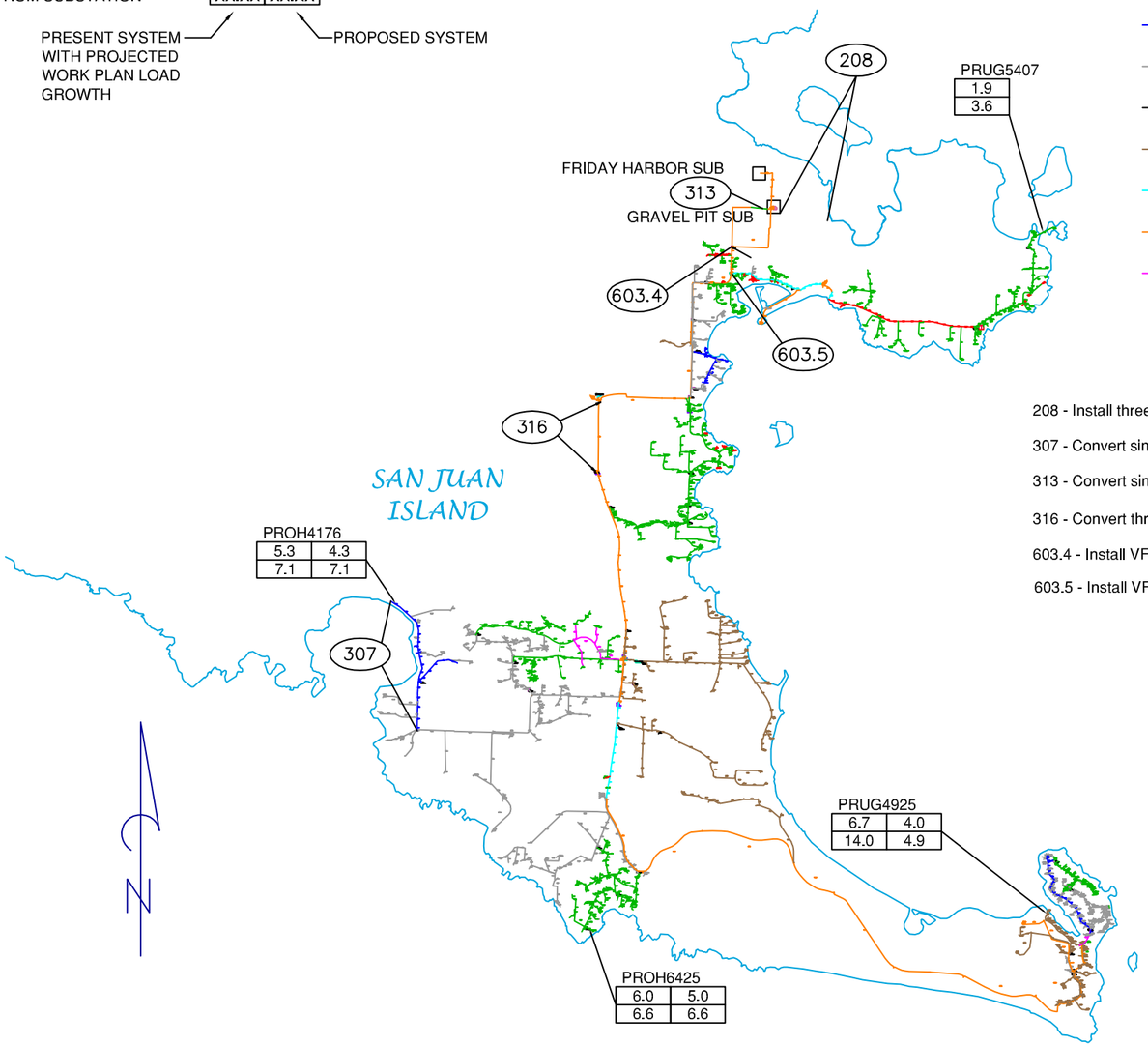
WORK PLAN
CIRCUIT DIAGRAM
EASTSOUND
SUBSTATION

Project Number: R11.00973
Date: December 2011
Sheets: 9 of 10

SECTION NO. (LOAD END) → XXXX
VOLTAGE DROP → X.X | X.X
MILES FROM SUBSTATION → XX.XX | XX.XX

PRESENT SYSTEM WITH PROJECTED WORK PLAN LOAD GROWTH

PROPOSED SYSTEM



OVERHEAD - PHASE A

UNDERGROUND - PHASE A

OVERHEAD - PHASE B

UNDERGROUND - PHASE B

OVERHEAD - PHASE C

UNDERGROUND - PHASE C

OVERHEAD - PHASE ABC

UNDERGROUND - PHASE ABC

UNDERGROUND - PHASE BC

208 - Install three phase 500 MCM Al URD

307 - Convert single phase #6 HD Cu to 1/0 AL URD

313 - Convert single #2 Al URD to three phase 500 Al URD

316 - Convert three phase 4/0 Al URD to 500 MCM Al URD

603.4 - Install VFI Switch

603.5 - Install VFI Switch

Orcas Power & Light Cooperative

Eastsound, Washington

Revision	Date	Number	By

PLAN NOTES OR GENERAL NOTES

Ulteig

Bismarck - Detroit Lakes - Fargo - Minneapolis - Sioux Falls
3350 38th Avenue South
Fargo, North Dakota 58104
Phone: 701.237.3211 Fax: 701.237.3191
Web: www.ulteig.com
Drawn By: MDC
Checked By: Name
Approved By: Name

WORK PLAN
CIRCUIT DIAGRAM
GRAVEL PIT
SUBSTATION

Project Number: R11.00973
Date: December 2011
Sheets: 10 of 10

APPENDIX D

Operations & Maintenance Survey

United States Department of Agriculture
Rural Development – Utilities Programs
Electric Program – Boise, Idaho Office

March 5, 2010

Mr. Randy Cornelius
General Manager
Orcas Power & Light Cooperative
PO Box 187
Eastsound, WA 98245-0187

Dear Mr. Cornelius:

In accordance with the Code of Federal Regulations (CFR) 7 CFR 1730 and the Rural Development Utilities Programs (RDUP) Bulletin 1730-1, a review and evaluation of Orcas Power & Light Cooperative's electric system and facilities as related to system operations and maintenance (SO&M) (as summarized on RUS Form 300) was conducted on March 1, 2, and 3, 2010.

The objectives of this review are: (1) to carry out RDUP's responsibilities for loan security, (2) to assure that your electric system is being operated and maintained in a safe and satisfactory manner, and (3) that Orcas Power & Light Cooperative (OPALCO) is providing an acceptable quality of service to its members.

My appraisal of OPALCO's operation and maintenance practices is based on a review of office records, field observations, and discussions with yourself and with members of your staff. My review indicates that OPALCO's facilities are generally being adequately operated and maintained. There have been substantive improvements in a number of areas since the last SO & M that was completed by Mr. Bowers. As with any operation, one continues to strive to improve and as such I encourage you and your staff to continue to work on those areas that you have improved upon and there are some limited areas that you should focus on additional improvements. USDA – RUS encouraged you to continue on improving your system such that you have a safe electrical system and an effective operation and maintenance program:

Areas of Commendation:

- SCADA – has provided improved monitoring of your system and will continue to be an asset for O & M of the system.
- The concept of Team Work and encouraging you staff to work together as that Team to provide an integrated solution to challenges through out your system. It is refreshing to see how well your staff works together.
- Continuation of the automation of O&M Reporting in context of an integrated, enterprise-wide systems approach.
- Improvements at substations in signage, vegetation control, circuit labeling, equipment testing, rocking, etc.
- Implementation of a meter testing and calibration program along with the installation of AMR meters within the system.
- Staffing of O&M Management with competent and motivated personnel.
- Timely exercise of your ERP, publishing of the Discrimination Notice in the Local Newspaper, and completion/ submission of your Form 7 information with RUS.

P. O. Box 140116, Boise, ID 83714-0116
Phone: (208) 321-8095 • Fax: (208) 321-8094 • Cell. (208) 484-8531

Areas of Future Focus:

- The installation of AMR meters has improved your revenue stream. Approximately 1/3 of the system is on AMR meters and I would encourage Orcas to move the program forward at an accelerated rate if at all possible in order to do two things: 1) decrease your line losses and 2) improve your revenue stream.
- Continue to implement your SCADA system through out the Orcas System. As fiber gets extended to the substations more electronic information will be able to be archived for monitoring and future engineering studies. Orcas has made great progress in this area and RUS would like to see you continuing in this process.
- Continue with your Preventative Maintenance program for both substation and line equipment.
- Continue improvements to older substations including resolution of clearance issues, adequate ground grids, painting of station equipment, and repair of minor oil bleeds on station equipment.
- Implementation of formal line patrols – at least annually for transmission lines and rotationally on distribution feeders on a 3-year cycle.
- Continue replacement of bare concentric neutral UG cable.
- Continue to work on reducing consumer outage hours per year. RUS fully understands the challenges of working on an Island and the problems in getting equipment to some of the other islands to safely restore power. I believe that you have been working on redundant feeds and sectionalizing areas which may reduce the number of consumers that will be affected by any outage. I encourage you to continue in this endeavor but we also realize that it is financially impractical to have major equipment on all of the islands.
- Work to reduce system losses. This will likely occur thru the installation of your AMR meters, improvements to your substations, and replacement of the URD that has bare concentric neutral, which has been previously discussed..
- Assure adequate O&M budgets/resources in light of escalating costs for equipment, materials and manpower. It appears that your O & M budget has been adequate to date given the recent improvements. RUS recommends that you continue to fund your O & M at these levels or a bit more to accelerate some of your improvements such as the AMR.

A review and evaluation of your system's O&M program should be completed at least every three years in accordance with RUS Bulletin 1730-1. You will find that your system's O&M program will be most effective if it is coordinated with the recommended RUS practice of having a Construction Work Plan prepared every two to four years according to RUS Bulletin 1724D-101B along with reviews of your system's Sectionalizing Study, Long Range Engineering Plan, Load Forecast, and other financial and system planning documents.

In general, some of the more important activities of an Operations & Maintenance program should include the following:

1. Monthly inspection/maintenance of system substation equipment.

2. A systematic inspection/maintenance program and formal line patrol.

3. A pole testing/pole replacement program on both Transmission and Distribution lines.

4. A Right of Way tree clearing/brush removal program.

5. A regular inspection/maintenance program for sectionalizing equipment (especially OCR's) and Voltage Regulators based upon the number of operations under load or a periodic time interval.

6. Annual inspection/maintenance program for the system's underground facilities particularly where bare neutral concentric URD cable was utilized. The use of RUS Spec. URD cable should reduce corrosion and "treeing" problems but will still require adequate O&M procedures and programs.

7. Periodic surveys as necessary of system service voltage conditions, substation feeder load balance, system losses, transformer loading/sizing/demands and power factor requirements.

8. Maintaining adequate record of equipment and consumer system conditions and service interruptions. RUS recommends that the total average consumer outage hours not exceed five hours per consumer per year. Maintaining adequate records should provide an indication where specific improvements can best be made to the system.

9. Budgeting for the annual costs of Operations & Maintenance enables the Cooperative to dedicate a proper and reasonable amount of capital and labor to accomplish the desired programs that allow the Cooperative to meet both legal and mortgage requirements.

A reasonable O&M program should save your system dollars in enabling facilities installed on the system to perform satisfactorily over an extended period of time. It should also provide your system's consumers with the established level of services recommended by RUS with respect to system conditions—especially outage/service reliability and voltage requirements.

Mr. Cornelius, I encourage you, your staff, and your Board of Directors to continue to maintain a satisfactory maintenance program supported by proper and detailed records. Also, I wish to express my appreciation to all of your office staff and especially to Messrs. Mark Tilstra, Todd Shaner, and Foster Hildreth for their cooperation and assistance with this review.

I am enclosing with this letter a copy of RUS Form 300 signed by me which indicates my acceptance of this SO&M review. This acceptance is given with the condition that the Cooperative's O&M program review be discussed and reviewed with OPALCO's Board of Directors and meets with their approval. I would appreciate you providing me a copy of the relevant Board minutes pertaining to this SO&M review discussion once it takes place.

If I can be of any additional assistance to you please contact me.

Sincerely,

Eric A. Marchegiani, P.E.
General Field Representative

Enclosure (1)

Cc: Mr. Charles Philpott - Chief-Northern Engineering Branch, RUS-NEB (With Attachment)
Mr. Mark Tilstra – Manager of Engineering, OPALCO (With Attachment)
Mr. Todd Shaner – Manager of Operations, OPALCO (With Attachment)
Mr. Foster Hildreth – Manager of Finance, OPALCO (With Attachment)

UNITED STATES DEPARTMENT OF AGRICULTURE
RURAL UTILITIES SERVICE

REVIEW RATING SUMMARY

BORROWER DESIGNATION: Orcas Power & Light (WA 0009)

DATE PREPARED: March 3, 2010

Ratings on form are: 0: Unsatisfactory -- No Records; 2: Acceptable, but Should be Improved -- See Attached Recommendations
NA: Not Applicable; 1: Corrective Action Needed; 3: Satisfactory -- No Additional Action Required at this Time

PART I. TRANSMISSION and DISTRIBUTION FACILITIES

	(Rating)
1. Substations (Transmission and Distribution)	
a. Safety, Clearance, Code Compliance	3
b. Physical Conditions: Structure, Major Equipment, Appearance	3
c. Inspection Records - Each Substation	3
d. Oil Spill Prevention	3
2. Transmission Lines	
a. Right-of-Way: Clearing, Erosion, Appearance, Intrusions	3
b. Physical Condition: Structure, Conductor, Guying	3
c. Inspection Program and Records	3
3. Distribution Lines - Overhead	
a. Inspection Program and Records	3
b. Compliance with Safety Codes: Clearances	3
Foreign Structures	3
Attachments	3
c. Observed Physical Condition from Field Checking: Right-of-Way	3
Other	3

	(Rating)
4. Distribution - Underground Cable	
a. Grounding and Corrosion Control	3
b. Surface Grading, Appearance	3
c. Riser Pole: Hazards, Guying, Condition	3
5. Distribution Line Equipment: Conditions and Records	
a. Voltage Regulators	3
b. Sectionalizing Equipment	3
c. Distribution Transformers	3
d. Pad Mounted Equipment	
Safety: Locking, Dead Front, Barriers	3
Appearance: Settlement, Condition	3
Other	3
e. Kilowatt-hour and Demand Meter Reading and Testing	3

PART II. OPERATIONS and MAINTENANCE

	(Rating)
6. Line Maintenance and Work Order Procedures	
a. Work Planning & Scheduling	3
b. Work Backlogs: Right-of-Way Maintenance	3
Poles	3
Retirement of Idle Services	3
Other	3

7. Service Interruptions

a. Average Annual Minutes/Consumer (Complete for each of the previous 5 years)

PREVIOUS 5 YEARS (Year)	POWER SUPPLIER a.	MAJOR STORM b.	PLANNED c.	ALL OTHER d.	TOTAL e.	(Rating)
2004			900.00	236.40	1,136.40	2
2005	465.00	41.40		96.60	603.00	2
2006	63.00	369.60	30.00	84.60	547.20	2
2007		249.60	60.00	163.80	473.40	2
2008			60.00	165.00	225.00	3

b. Emergency Restoration Plan: 3

	(Rating)
8. Power Quality	
a. General Freedom from Complaints	3
9. Loading and Load Balance	
a. Distribution Transformer Loading	3
b. Load Control Apparatus	N/A
c. Substation and Feeder Loading	3
10. Maps and Plant Records	
a. Operating Maps: Accurate and Up-to-Date	3
b. Circuit Diagrams	3
c. Staking Sheets	3

PART III. ENGINEERING

		(Rating)
11. System Load Conditions and Losses		
a. Annual System Losses	5.66%	3
b. Annual Load Factor	30.0%	3
c. Power Factor at Monthly Peak	99.0%	3
d. Ratios of Individual Substation Annual Peak kW to kVA		N/A
12. Voltage Conditions		
a. Voltage Surveys		3
b. Substation Transformer Output Voltage Spread		3

	(Rating)
13. Load Studies and Planning	
a. Long Range Engineering Plan	3
b. Construction Work Plan	3
c. Sectionalizing Study	3
d. Load Data for Engineering Studies	3
e. Load Forecasting Data	3

PART IV. OPERATION AND MAINTENANCE BUDGETS

YEAR	For Previous 2 Years		For Present Year	For Future 3 Years		
	2007	2008	2009	2010	2011	2012
	Actual $ Thousands	Actual $ Thousands	Budget $ Thousands	Budget $ Thousands	Budget $ Thousands	Budget $ Thousands
Normal Operation	2,177	2,003	2,063	2,125	2,189	2,255
Normal Maintenance	1,624	1,648	1,698	1,749	1,801	1,855
Additional (Deferred) Maintenance						
Total	3,800	3,652	3,761	3,874	3,990	4,110

14. Budgeting: Adequacy of Budgets for Needed Work 3 *(Rating)*

15. Date Discussed with Board of Directors _____ *(Date)*

EXPLANATORY NOTES

ITEM NO.	COMMENTS
1.b & c	Improvements to substations from last inspection & proposed projects within the CWP will continue to make improvements to Substations.
2.c	Inspection program for Transmission has improved with SCADA and record keeping has improved.
5.d	Previously there was some equipment that only were locked with Penta bolts. Present policy is to also install locks on all equipment & w/ bolts.
6.b	Idle Services have been pursued agressively and this area has reduced the number of idle services.
7.a	Service interuptions are driven primarily by major storm outages and due to the characteristics of servicing a number of islands, it is difficult to be able to respond in a short time frame on another island that does not have major equipment on it. It is impractical from a financial standpoint to have major equipment located on all islands serviced. The distribution system is now 80% underground and due to topography many taps are radial fed without the benefit of loops. This often accounts for the increase in average annual outage minutes per consumer noted on the Form 7.
9.a	Substation Loading has improved given the SCADA information available - most circuits balanced given seasonal loading changes.
10.b	Circuit Diagrams, All mapping and diagrams have improved dramatically. Work Crews have laptops with current mapping.
11.a	System losses have decreased, need to continue to monitor and be proactive in eliminating losses.
12.a	Voltage Surveys: this area has also improved with the SCADA system. Continue to complete data collection.
	General Comments: Overall, there has been improvement in all areas and future projects illustrated within the CWP will continue to expand on these improvements. The transition to the SCADA system & AMR installation have improved the electronic capabilities of Orcas P & L. It is recommended to continue on the program to install AMRs through out the system since it reduces losses and improves the revenue stream. Additionally, the continued expansion of the SCADA system in the substations and other locations provide valuable information for the Operational Crews but also for the Engineering Staff and Consultants in the development of future improvements to the system.

		TITLE	DATE
RATED BY:	Mark S. Tilstra	Manager of Engineering	03/03/10
REVIEWED BY:	Randy J. Cornelius	CEO & President	03/03/10
REVIEWED BY:	Eric A. Marchegiani	RUS GFR	03/03/10

STATUS OF O&M ACTIVITIES
ATTACHMENT TO RUS FORM 300

SYSTEM DESIGNATION	Orcas Power & Light -- WA 0009
Date Long Range System Engineering Plan Approved	Technical Acceptance by Mr. Bowers Sept 2008
Date Annual Work Plan Approved	CWP Approved by GFR Dec 29, 2008
Date of Last Load and Voltage Survey	

STATISTICS

YEAR	2004	2005	2006	2007	2008
Miles of Distribution Line	1,054	1,065	1,080	1,089	1,103
Miles of Transmission Line	47	44	44	44	44
Number of Substations					
Sum of Substation Peak Demands (kW)					
Average Number of Consumers	12,378	12,660	12,982	13,609	13,982
Plant Investment ($ x 1,000)	3,872	1,404	1,587	2,757	4,310
Operation Expense ($ x 1,000)	1,492	1,639	1,771	2,177	2,003
Maintenance Expense ($ x 1,000)	1,146	1,289	1,895	1,624	1,648
ROW CLEARING					
Units on System					
Units Recleared					
Regrowth Cycle (Years)					
POLES					
Number on System					
Number Inspected					
Number Condemned					
Number Replaced					
OIL CIRCUIT RECLOSERS					
Number on System					
Number Serviced					
LINE REGULATORS					
Number on System					
Number Serviced					
METERS					
Number on System					
Number Serviced					
PATROL AND MAINTENANCE					
Miles of Distribution Patrolled					
Miles Distribution Maintained					
Miles of Transmission Patrolled					
Miles of Transmission Maintained					
Number of Substations Serviced					
AVERAGE MINUTES OUTAGE PER CONSUMER					
Power Supply	0.00	465.00	63.00	0.00	0.00
Major Storm	0.00	41.40	369.60	249.60	0.00
All Other	1,136.40	96.60	114.60	223.80	225.00
Total	1,136.40	603.00	547.20	473.40	225.00

APPENDIX E

Outage History

ORCAS POWER AND LIGHT COOPERATIVE
DECEMBER 2008 OUTAGES

CAUSE OF OUTAGE		DEC	2008 YTD
100 - OPALCO CONSTRUCTION			
	ORCAS DISTRICT	0	**0**
	SAN JUAN DISTRICT	1	**1**
	LOPEZ DISTRICT	0	**1**
300/301 - FAULTY EQUIPMENT OR INSTALLATION			
	ORCAS DISTRICT	3	**12**
	SAN JUAN DISTRICT	0	**3**
	LOPEZ DISTRICT	1	**3**
350 - SECTIONALIZING			
	ORCAS DISTRICT	0	**0**
	SAN JUAN DISTRICT	0	**1**
	LOPEZ DISTRICT	0	**0**
351 - FU			
	ORCAS DISTRICT	0	**0**
	SAN JUAN DISTRICT	0	**0**
	LOPEZ DISTRICT	0	**0**
352/353 - ELECTRICAL/TRANSFORMER OVERLOAD			
	ORCAS DISTRICT	4	**5**
	SAN JUAN DISTRICT	1	**8**
	LOPEZ DISTRICT	1	**1**
400 - UNDERGROUND CABLE FAILURE			
	ORCAS DISTRICT	1	**17**
	SAN JUAN DISTRICT	2	**18**
	LOPEZ DISTRICT	3	**11**
403 - AGING MATERIAL/EQUIPMENT			
	ORCAS DISTRICT	0	**2**
	SAN JUAN DISTRICT	1	**3**
	LOPEZ DISTRICT	0	**1**
450 - TREES/RIGHT-OF-WAY			
	ORCAS DISTRICT	0	**4**
	SAN JUAN DISTRICT	0	**6**
	LOPEZ DISTRICT	1	**2**
500-509 - WEATHER (OTHER THAN SEVERE STORM)			
	ORCAS DISTRICT	13	**22**
d & Trees	SAN JUAN DISTRICT	1	**5**
Trees	LOPEZ DISTRICT	3	**6**
200 - SEVERE STORM			
	ORCAS DISTRICT	0	**0**
	SAN JUAN DISTRICT	0	**0**
	LOPEZ DISTRICT	0	**0**

600 - SMALL ANIMALS/RODENTS		
ORCAS DISTRICT	0	**0**
SAN JUAN DISTRICT	0	**1**
LOPEZ DISTRICT	1	**1**
601/602 - BIRDS		
ORCAS DISTRICT	0	**3**
SAN JUAN DISTRICT	0	**1**
LOPEZ DISTRICT	0	**1**
700/701 - CABLE DIG-IN		
ORCAS DISTRICT	0	**1**
SAN JUAN DISTRICT	0	**5**
LOPEZ DISTRICT	0	**2**
702 - TRAFFIC ACCIDENT		
ORCAS DISTRICT	0	**3**
SAN JUAN DISTRICT	1	**3**
LOPEZ DISTRICT	0	**1**
703 - FIRE		
ORCAS DISTRICT	1	**1**
SAN JUAN DISTRICT	0	**0**
LOPEZ DISTRICT	0	**0**
704 - SUBSTATION VANDALISM		
ORCAS DISTRICT	0	**1**
SAN JUAN DISTRICT	0	**0**
LOPEZ DISTRICT	0	**1**
705 - OTHER CONTRACTOR OR MEMBER CAUSED		
ORCAS DISTRICT	0	**2**
SAN JUAN DISTRICT	0	**4**
LOPEZ DISTRICT	0	**0**
800 - MEMBER SECONDARY OUTAGE		
ORCAS DISTRICT	1	**5**
SAN JUAN DISTRICT	2	**9**
LOPEZ DISTRICT	0	**5**
900 - Cause Unknown		
ORCAS DISTRICT	0	**4**
SAN JUAN DISTRICT	0	**2**
LOPEZ DISTRICT	0	**2**
SUB CABLE FAILURE	0	**1**
PLANNED	**0**	**0**
SUPPLIER-BONNEVILLE/PUGET	0	**1**
YTD TOTAL 2008 OUTAGES:	**42**	**192**
YTD TOT	2007 Outages	**175**
YTD TOT	2006 Outages	**291**

ORCAS POWER AND LIGHT COOPERATIVE
DECEMBER 2009 OUTAGES

CAUSE OF OUTAGE	DEC	2009 YTD
100 - OPALCO CONSTRUCTION		
ORCAS DISTRICT		
SAN JUAN DISTRICT		
LOPEZ DISTRICT		
300/301 - FAULTY EQUIPMENT OR INSTALLATION		
ORCAS DISTRICT		**4**
SAN JUAN DISTRICT		**6**
LOPEZ DISTRICT	1	**9**
350 - SECTIONALIZING		
ORCAS DISTRICT		
SAN JUAN DISTRICT		
LOPEZ DISTRICT		
351 - FU		
ORCAS DISTRICT	1	**4**
SAN JUAN DISTRICT		
LOPEZ DISTRICT		**1**
352/353 - ELECTRICAL/TRANSFORMER OVERLOAD		
ORCAS DISTRICT		**1**
SAN JUAN DISTRICT	1	**3**
LOPEZ DISTRICT		**1**
400 - UNDERGROUND CABLE FAILURE		
ORCAS DISTRICT		**20**
SAN JUAN DISTRICT		**23**
LOPEZ DISTRICT		**6**
403 - AGING MATERIAL/EQUIPMENT		
ORCAS DISTRICT		
SAN JUAN DISTRICT		**2**
LOPEZ DISTRICT		**2**
450 - TREES/RIGHT-OF-WAY		
ORCAS DISTRICT	1	**8**
SAN JUAN DISTRICT		**1**
LOPEZ DISTRICT		**4**
500-509 - WEATHER (OTHER THAN SEVERE STORM)		
ORCAS DISTRICT	1	**14**
SAN JUAN DISTRICT	1	**14**
LOPEZ DISTRICT	1	**13**
200 - SEVERE STORM		
ORCAS DISTRICT		
SAN JUAN DISTRICT		
LOPEZ DISTRICT		

600 - SMALL ANIMALS/RODENTS		
ORCAS DISTRICT		
SAN JUAN DISTRICT		**1**
LOPEZ DISTRICT		
601/602 - BIRDS		
ORCAS DISTRICT		**1**
SAN JUAN DISTRICT		
LOPEZ DISTRICT		**6**
700/701 - CABLE DIG-IN		
ORCAS DISTRICT		**3**
SAN JUAN DISTRICT		**5**
LOPEZ DISTRICT		**2**
702 - TRAFFIC ACCIDENT		
ORCAS DISTRICT		**4**
SAN JUAN DISTRICT		**6**
LOPEZ DISTRICT		
703 - FIRE		
ORCAS DISTRICT	1	**3**
SAN JUAN DISTRICT		**3**
LOPEZ DISTRICT		
704 - SUBSTATION VANDALISM		
ORCAS DISTRICT		
SAN JUAN DISTRICT		
LOPEZ DISTRICT		
705 - OTHER CONTRACTOR OR MEMBER CAUSED		
ORCAS DISTRICT		
SAN JUAN DISTRICT		
LOPEZ DISTRICT		**2**
800 - MEMBER SECONDARY OUTAGE		
ORCAS DISTRICT		**12**
SAN JUAN DISTRICT	2	**9**
LOPEZ DISTRICT	1	**4**
900 - Cause Unknown		
ORCAS DISTRICT		**2**
SAN JUAN DISTRICT		**3**
LOPEZ DISTRICT	1	**6**
SUB CABLE FAILURE		**0**
PLANNED		**0**
SUPPLIER-BONNEVILLE/PUGET		**2**
YTD TOTAL 2009OUTAGES:	**12**	**210**
YTD TOT	2008 Outages	**192**
YTD TOT	2007 Outages	**186**

ORCAS POWER AND LIGHT COOPERATIVE

CAUSE OF OUTAGE		DEC	2010 YTD
100 - OPALCO CONSTRUCTION			
	ORCAS DISTRICT		**2**
	SAN JUAN DISTRICT		**1**
	LOPEZ DISTRICT		**2**
300/301 - FAULTY EQUIPMENT OR INSTALLATION			
	ORCAS DISTRICT		**3**
	SAN JUAN DISTRICT		**4**
	LOPEZ DISTRICT	1	**3**
350 - SECTIONALIZING			
	ORCAS DISTRICT		
	SAN JUAN DISTRICT		
	LOPEZ DISTRICT		
351 - FUSES AND FUSING			
	ORCAS DISTRICT	2	**3**
	SAN JUAN DISTRICT		**2**
	LOPEZ DISTRICT		
352/353 - ELECTRICAL/TRANSFORMER OVERLOAD			
	ORCAS DISTRICT		**3**
	SAN JUAN DISTRICT	1	**7**
	LOPEZ DISTRICT		**2**
400 - UNDERGROUND CABLE FAILURE			
	ORCAS DISTRICT		**15**
	SAN JUAN DISTRICT	2	**21**
	LOPEZ DISTRICT		**12**
403 - AGING MATERIAL/EQUIPMENT			
	ORCAS DISTRICT		**2**
	SAN JUAN DISTRICT	2	**3**
	LOPEZ DISTRICT		
450 - TREES/RIGHT-OF-WAY			
	ORCAS DISTRICT		**4**
	SAN JUAN DISTRICT		**1**
	LOPEZ DISTRICT		
500-509 - WEATHER (OTHER THAN SEVERE STORM)			
	ORCAS DISTRICT		**23**
	SAN JUAN DISTRICT	2	**18**
	LOPEZ DISTRICT		**14**
200 - SEVERE STORM			
	ORCAS DISTRICT		
	SAN JUAN DISTRICT		
	LOPEZ DISTRICT		

600 - SMALL ANIMALS/RODENTS			
	ORCAS DISTRICT		**1**
	SAN JUAN DISTRICT		**2**
	LOPEZ DISTRICT		**2**
601/602 - BIRDS			
	ORCAS DISTRICT		**1**
	SAN JUAN DISTRICT		
	LOPEZ DISTRICT	1	**1**
700/701 - CABLE DIG-IN			
	ORCAS DISTRICT		**2**
	SAN JUAN DISTRICT		**1**
	LOPEZ DISTRICT		
702 - TRAFFIC ACCIDENT			
	ORCAS DISTRICT		**1**
	SAN JUAN DISTRICT		**3**
	LOPEZ DISTRICT		
703 - FIRE			
	ORCAS DISTRICT	1	**2**
	SAN JUAN DISTRICT		**1**
	LOPEZ DISTRICT		
704 - SUBSTATION VANDALISM			
	ORCAS DISTRICT		
	SAN JUAN DISTRICT		
	LOPEZ DISTRICT		
705 - OTHER CONTRACTOR OR MEMBER CAUSED			
	ORCAS DISTRICT	1	**6**
	SAN JUAN DISTRICT		
	LOPEZ DISTRICT		**1**
800 - MEMBER SECONDARY OUTAGE			
	ORCAS DISTRICT	2	**8**
	SAN JUAN DISTRICT	2	**9**
	LOPEZ DISTRICT	1	**3**
900 - Cause Unknown			
	ORCAS DISTRICT		
	SAN JUAN DISTRICT		
	LOPEZ DISTRICT	1	**2**
SUB CABLE FAILURE			
PLANNED			
SUPPLIER-BONNEVILLE/PUGET		1	**2**
YTD TOTAL 2010 OUTAGES:		**20**	**193**
YTD TOTAL 2009 OUTAGES:		**12**	**210**
YTD TOTAL 2008 OUTAGES:		**42**	**192**

ORCAS POWER AND LIGHT COOPERATIVE
December 2011 OUTAGES

CAUSE OF OUTAGE		DEC	2011 YTD
100 - OPALCO CONSTRUCTION			
	ORCAS DISTRICT		
	SAN JUAN DISTRICT		
	LOPEZ DISTRICT		
300/301 - FAULTY EQUIPMENT OR INSTALLATION			
	ORCAS DISTRICT		**3**
	SAN JUAN DISTRICT		**7**
	LOPEZ DISTRICT		
350 - SECTIONALIZING			
	ORCAS DISTRICT		
	SAN JUAN DISTRICT		
	LOPEZ DISTRICT		
351 - FUSES AND FUSING			
	ORCAS DISTRICT		**1**
	SAN JUAN DISTRICT		
	LOPEZ DISTRICT		
352/353 - ELECTRICAL/TRANSFORMER OVERLOAD			
	ORCAS DISTRICT		**1**
	SAN JUAN DISTRICT		**2**
	LOPEZ DISTRICT		
400 - UNDERGROUND CABLE FAILURE			
	ORCAS DISTRICT	3	**17**
	SAN JUAN DISTRICT	1	**24**
	LOPEZ DISTRICT	1	**6**
403 - AGING MATERIAL/EQUIPMENT			
	ORCAS DISTRICT		
	SAN JUAN DISTRICT		**5**
	LOPEZ DISTRICT		**1**
450 - TREES/RIGHT-OF-WAY			
	ORCAS DISTRICT		**5**
	SAN JUAN DISTRICT	1	**1**
	LOPEZ DISTRICT		**1**
500-509 - WEATHER (OTHER THAN SEVERE STORM)			
	ORCAS DISTRICT		**13**
	SAN JUAN DISTRICT		**3**
	LOPEZ DISTRICT		**15**
200 - SEVERE STORM			
	ORCAS DISTRICT		
	SAN JUAN DISTRICT		
	LOPEZ DISTRICT		
600 - SMALL ANIMALS/RODENTS			

	ORCAS DISTRICT		
	SAN JUAN DISTRICT		**2**
	LOPEZ DISTRICT		
601/602 - BIRDS			
	ORCAS DISTRICT		**1**
	SAN JUAN DISTRICT		
	LOPEZ DISTRICT	1	**2**
700/701 - CABLE DIG-IN			
	ORCAS DISTRICT		
	SAN JUAN DISTRICT		**3**
	LOPEZ DISTRICT	1	**2**
702 - TRAFFIC ACCIDENT			
	ORCAS DISTRICT		**1**
	SAN JUAN DISTRICT		**2**
	LOPEZ DISTRICT		
703 - FIRE			
	ORCAS DISTRICT		**1**
	SAN JUAN DISTRICT		**2**
	LOPEZ DISTRICT		**1**
704 - SUBSTATION VANDALISM			
	ORCAS DISTRICT		
	SAN JUAN DISTRICT		
	LOPEZ DISTRICT		
705 - OTHER CONTRACTOR OR MEMBER CAUSED			
	ORCAS DISTRICT		**6**
	SAN JUAN DISTRICT		**1**
	LOPEZ DISTRICT		**2**
800 - MEMBER SECONDARY OUTAGE			
	ORCAS DISTRICT	2	**10**
	SAN JUAN DISTRICT		**10**
	LOPEZ DISTRICT	1	**3**
900 - Cause Unknown			
	ORCAS DISTRICT		**1**
	SAN JUAN DISTRICT		**3**
	LOPEZ DISTRICT		**1**
SUB CABLE FAILURE **PLANNED** **SUPPLIER-BONNEVILLE/PUGET**			
YTD TOTAL 2011 OUTAGES:		**11**	**159**
YTD TOTAL 2010 OUTAGES:		**20**	**203**
YTD TOTAL 2009 OUTAGES:		**12**	**210**

ORCAS POWER AND LIGHT COOPERATIVE

MARCH 2012 OUTAGES

CAUSE OF OUTAGE		MARCH	2012 YTD
100 - OPALCO CONSTRUCTION			
	ORCAS DISTRICT		
	SAN JUAN DISTRICT		
	LOPEZ DISTRICT	**1**	**1**
300/301 - FAULTY EQUIPMENT OR INSTALLATION			
	ORCAS DISTRICT		
	SAN JUAN DISTRICT	**3**	**4**
	LOPEZ DISTRICT		
350 - SECTIONALIZING			
	ORCAS DISTRICT		
	SAN JUAN DISTRICT		
	LOPEZ DISTRICT		
351 - FUSES AND FUSING			
	ORCAS DISTRICT		
	SAN JUAN DISTRICT	**1**	**2**
	LOPEZ DISTRICT		
352/353 - ELECTRICAL/TRANSFORMER OVERLOAD			
	ORCAS DISTRICT		
	SAN JUAN DISTRICT		**2**
	LOPEZ DISTRICT		
400 - UNDERGROUND CABLE FAILURE			
	ORCAS DISTRICT		**1**
	SAN JUAN DISTRICT		**2**
	LOPEZ DISTRICT	**1**	**1**
403 - AGING MATERIAL/EQUIPMENT			
	ORCAS DISTRICT		
	SAN JUAN DISTRICT	**2**	**5**
	LOPEZ DISTRICT		**1**
450 - TREES/RIGHT-OF-WAY			
	ORCAS DISTRICT		**3**
	SAN JUAN DISTRICT	**1**	**1**
	LOPEZ DISTRICT		
500-509 - WEATHER (OTHER THAN SEVERE STORM)			
	ORCAS DISTRICT	**3**	**8**
	SAN JUAN DISTRICT	**1**	**4**
	LOPEZ DISTRICT	**2**	**4**
200 - SEVERE STORM			
	ORCAS DISTRICT		
	SAN JUAN DISTRICT		
	LOPEZ DISTRICT		
600 - SMALL ANIMALS/RODENTS			
	ORCAS DISTRICT		
	SAN JUAN DISTRICT		**2**
	LOPEZ DISTRICT		

ORCAS POWER AND LIGHT COOPERATIVE

MARCH 2012 OUTAGES

	LOPEZ DISTRICT		
700/701 - CABLE DIG-IN			
	ORCAS DISTRICT		
	SAN JUAN DISTRICT	**1**	**1**
	LOPEZ DISTRICT	**1**	**1**
702 - TRAFFIC ACCIDENT			
	ORCAS DISTRICT		
	SAN JUAN DISTRICT		**1**
	LOPEZ DISTRICT		
703 - FIRE			
	ORCAS DISTRICT	**1**	**1**
	SAN JUAN DISTRICT		
	LOPEZ DISTRICT		
704 - SUBSTATION VANDALISM			
	ORCAS DISTRICT		
	SAN JUAN DISTRICT		
	LOPEZ DISTRICT		
705 - OTHER CONTRACTOR OR MEMBER CAUSED			
	ORCAS DISTRICT		
	SAN JUAN DISTRICT		
	LOPEZ DISTRICT		
800 - MEMBER SECONDARY OUTAGE			
	ORCAS DISTRICT		**3**
	SAN JUAN DISTRICT	**2**	**2**
	LOPEZ DISTRICT		**1**
900 - Cause Unknown			
	ORCAS DISTRICT		**1**
	SAN JUAN DISTRICT		
	LOPEZ DISTRICT		
SUB CABLE FAILURE **PLANNED** **SUPPLIER-BONNEVILLE/PUGET**			
YTD TOTAL 2012 OUTAGES:		**20**	**52**
YTD TOTAL 2011 OUTAGES		**6**	**29**
YTD TOTAL 2010 OUTAGES:		**10**	**33**

APPENDIX F

RUS Long Range Plan Approval Letter

United States Department of Agriculture
Rural Development – Utilities Programs
Electric Program – Boise, Idaho Office

September 11, 2008

Randy Cornelius
General Manager
Orcas Power & Light Cooperative
PO Box 187
Eastsound, WA 98245-0187

Dear Mr. Cornelius:

On July 21, 2008, I sent you a letter *accepting* Orcas Power & Light Cooperative's (OPALCO) June 2008 *Long Range Plan* (LRP). My previous letter stated that Rural Development Utilities Program (RDUP) approval of Long Range Plans is a 2-step process, viz., an acceptance of the document by RDUP's Public Utilities Specialist, and a technical acceptance after RDUP HQ Engineering Branch review. I further commented in my July 21st letter that I would write to you again once the technical review was completed.

On September 11, 2008, the Branch Chief of RDUP's Northern Engineering Branch completed his technical review and gave his acceptance of OPALCO's LRP. He also provided me with several comments on the document. By this letter I am formally advising you that RDUP has granted *technical acceptance* of OPALCO's June 2008 Long Range Plan (LRP). With this acceptance, OPALCO may now utilize this LRP as a basis to develop other planning documents such as new Construction Work Plans (CWP) and associated Environmental Reports (ER) as well as serving as a basis for other planning studies such as system sectionalizing studies, communications and automated system control, or other special system plans.

Mr. Cornelius, RDUP's Engineering Branch Chief gave technical approval because the LRP met RDUP's criteria for Long Range Plans. However, his comments to me indicated that there are several areas that need to be revised/corrected in the upcoming CWP, viz.:

- The document utilizes coding in the 912 – 930 series which seem tied to various types of projects. These codes are not related to the RUS coding requirements as contained in RUS Bulletins and Regulations covering LRP and CWP plans. We have no objections to the use of these codes for OPALCO's "internal" use, but they will not be acceptable for inclusion in the upcoming Construction Work Plan (CWP).
- A second issue commented on by the Engineering Branch Chief relates to adequately addressing system aging/replacement strategies. The Engineer stated on Page 3, Section C of the LRP that the cooperative's staff had identified a number of lines for replacement due to age and condition, but the strategy and long-range plans to address the deficiencies were not discussed in any great detail elsewhere in the LRP document. This issue will need to be addressed more specifically in the upcoming new CWP.

RDUP Bulletin 1724D-101A - *Electric System Long Range Planning Guide* provides more guidance as to what is expected by RDUP in preparing LRP documents. RDUP Bulletin 1724D-101B provides similar guidance for development of Construction Work Plans (CWP) I would suggest a more in depth reference to these Bulletins prior to development of the new Construction Work Plan. No revisions need be made to the LRP document as any needed corrections can be made in the new CWP.

P. O. Box 140116, Boise, ID 83714-0116
Phone: (208) 321-8095 • Fax: (208) 321-8094 • Cell: (208) 484-8531

I wish to thank you, your staff, and consulting engineers for the cooperation I received in completing the review and acceptance of OPALCO's June 2008 Long Range Plan. If you have any questions on this acceptance, please contact me.

Sincerely,

Daniel K. Bowers

Daniel K. Bowers
PUS-RDUP

CC: Mr. Mark Tilstra, P.E. – Manager of Engineering, OPALCO
Mr. Joel Mietzner, P.E. – System Engineer, OPALCO
Mr. Chuck Mathson, P.E. – Project Manager – Transmission & Distribution – Ulteig Engineers
Mr. Charles M. Philpott – Chief, Northern Region Division Engineering Branch, RDUP

C:\Documents and Settings\dan.Bowers\My Documents\Washington Co-ops\WA09-Orcas Power & Light Company\20080911l.doc

APPENDIX G

Smart Grid, EMS & Wireless Communications Infrastructure

Smart Grid, EMS, Wireless Communications Infrastructure

Orcas Power and Light Cooperative

San Juan County, Washington

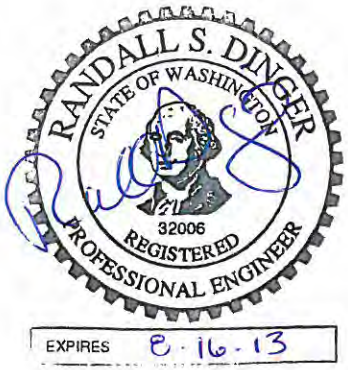
ID Consulting Solutions, LLC.

Boise, ID 83714

Smart Grid, EMS, Wireless Communications Infrastructure

Orcas Power and Light Cooperative

San Juan County, Washington



February 2012

ID Consulting Solutions, LLC.

5531 N Glenwood Street

Boise, ID 83714

OPALCO Infrastructure Expansion Project
12/16/2011

Alternatives Explored

OPALCO originally developed a fiber network in 1994 (with fiber from the mainland in a submarine cable replacement project) when it was demonstrated that CenturyLink (then CenturyTel) could not provide a reliable or adequate communication backbone for the Co-op's operations and equipment management. In exploring the options for this project, staff tried to work with local providers—investigating the possibility of meeting the need through existing cellular provider and/or internet service provider (ISP) expansion—and found none willing or able to meet the quality and bandwidth requirements and/or to make the investment. We explored available technologies (including power line carrier, copper cable and other local providers) and found the combination of fiber and wireless technologies to be the most robust and cost-effective system.

Project Description

OPALCO's Infrastructure Expansion Project's goal is to further deploy smart grid technologies and applications by extending the existing fiber optic network and building a wireless network platform to meet the Co-op's current and near future equipment communication and smart grid application needs. Currently, OPALCO's radio communications availability is unreliable; as we often cannot reach line crews in the field.

Our approach will leverage existing structures and utilize low-impact pole-top extensions where possible, to extend the network to reach an estimated 90% of the service territory. OPALCO's existing fiber network is serving approximately 10% of the service territory. The expansion will involve approximately 60 poles; 37% of which will be new. The structures will not only facilitate the OPALCO Infrastructure Expansion Project, but offer co-location opportunities for additional wireless services in the future.

In terms of operations, the expansion project will facilitate necessary improvement for the existing SCADA system, expand wireless communication in the field, two-way radio transmissions and mobile access to GIS mapping – in addition to expanded switch gear and substation communication that offer greater efficiency to the electrical network as whole, while providing a greater service to the cooperative membership .

This project is integral in OPALCO's initiative to move from an AMR (Automated Meter Reading) power-line carrier system to a more technologically advanced AMI (Automated Meter Infrastructure) fiber fed wireless network platform. With a smart grid infrastructure in place, OPALCO will be deploying a variety of efficiency and member cost saving applications, such as, but not limited to the following:

- Outage Notification
- Remote Connect / Disconnect
- Demand Side Management

- Load Management Programs
- Energy / Tamper Detection
- Home Energy Management
- Power Quality
- Asset Management

Most LTE system requires three core devices:

1. Transport Network (Core Equipment)
2. MU: Main Unit (LTE Aggregation Switch)
3. RRU: Remote Radio Unit (Per Panel Radio Equipment)

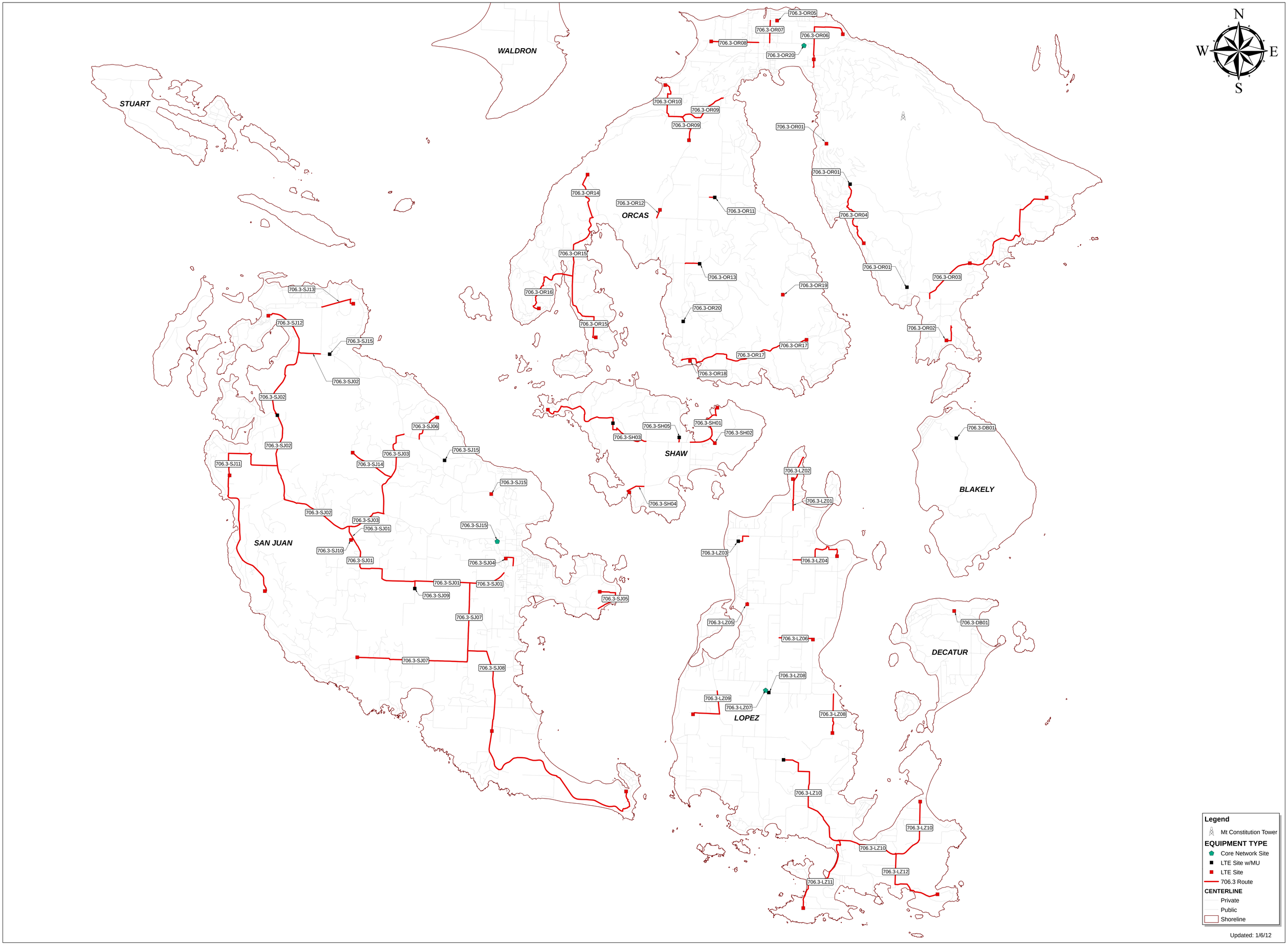
MU - is an outdoor Main Remote solution, optimized to deliver high radio performance for efficient wireless planning in a wide range of indoor and outdoor applications. The Main Remote RBS (Remote Battery System), in which each RRU is located near an antenna, reduces feeder losses and enables the system to use the same high performance network features at lower output power, thereby lowering power consumption and both capital and operational expenditure. Up to twelve Remote Radio Units (RRU) can be connected to a Main Unit (MU) to match any site requirements. The small units are easily carried to site and offer simple and discrete installation where space and access are decisive issues.

Each site has 3 RRU's which must be connected to a MU. Each MU can support up to (12) RRU's. This project will require an estimated 17 MU's, which must be fiber connected back to the Transport Network (Core Aggregation) point located in Friday Harbor, East Sound and Lopez Island.

In addition to the 3 types of sites described above, OPALCO is anticipating the need for 8 enhanced coverage areas. Enhanced coverage areas are areas of high data concentrations (Traffic) which requires additional equipment and facilities to manage the end user data load.

In summary, the Infrastructure Expansion Program deliveries a cost-effective, sophisticated energy management /control program infrastructure, providing real-time connectivity within the utility. Said network is to help improve service delivery, outage management, overall productivity and member satisfaction.

OPALCO - WORK PLAN MAP



OPALCO Capital Assumptions (Countywide Build-out) 1.19.12

Project Integration

	Unit	Units	Cost	Ext Cost
Program Management	%	2.0%	$ 10,353,141.54	$ 207,062.83
Environmental Assesment	%	1.5%	$ 10,353,141.54	$ 155,297.12
Field Engineering	%	6.0%	$ 10,353,141.54	$ 621,188.49
Construction Management	%	3.0%	$ 10,353,141.54	$ 310,594.25
			Project Integration	**$ 1,294,142.69**

WiFi System Installation

	Unit	Units	Cost	Ext Cost
AP Structure Replacement	EA	5	$5,000.00	$ 25,000.00
AP Installation	EA	5	$1,200.00	$ 6,000.00
Cabinet & Cabling Installation	EA	5	$2,500.00	$ 12,500.00
System Installation	EA	5	$1,000.00	$ 5,000.00
			WiFi System Install Total	**$ 48,500.00**

Operational System Installation

	Unit	Units	Cost	Ext Cost
WiFi System Management	EA	1	$7,000.00	$ 7,000.00
BB Wireless System Management	EA	1	$1,500,000.00	$ 1,500,000.00
System Installation	EA	1	$15,000.00	$ 15,000.00
			Operational System Install Total	**$ 1,522,000.00**

LTE Equipment

	Unit	Units	Cost	Ext Cost
Main Unit (LTE)	EA	17	$65,000.00	$ 1,105,000.00
RRSU	EA	180	$10,000.00	$ 1,800,000.00
System Installation	EA	60	$5,000.00	$ 300,000.00
			Operational System Install Total	**$ 3,205,000.00**

Frequency License

	Unit	Units	Cost	Ext Cost
License	EA	1	$1,000,000.00	$ 1,000,000.00

706.3 Construction Summary

	Ext Cost
Trench / Plow	$ 1,864,061.15
Conduit Placement	$ 460,808.61
Locate Items	$ 94,453.75
Remove & Restore	$ 84,124.56
Fiber Placement in Conduit	$ 225,789.72
Handholes	$ 343,000.00
Slack Coil	$ 23,699.12
Aerial	$ 277,048.14
Splicing Items	$ 231,743.90
Fiber Lengths	$ 470,236.99
Site	$ 4,677,528.00
Misc.	$ 30,147.60
Construction Installation	**$ 8,782,641.54**

Project Total	**$ 15,852,284.23**

Orcas Power & Light Coorperative - Unit Totals
OSP Construction Estimate
706.3 Enhanced Coverage Area (ECA)
Segment - As Requiered by Smart Grid equipment and customer requirements

Aerial	Underground	Existing Duct	Poles	AP's	Submarine Cable
0 '	0 '	0 '	0	0	

	Unit Description	Type	Unit Quantity	Material Cost	Labor/Equip. Cost	Total Unit Cost	Material Total	Labor/Equip. Total	Ext. Total
Trenching/ Plow									
	Trench New	24" Depth	'	n/a	$ 8.20	$ 8.20	n/a	$ -	$ -
15%	Rock Adder		'	n/a	$ 13.00	$ 13.00	n/a	$ -	$ -
Conduit Placement									
	Place (2) 2" HDPE	2	'	$ 1.61	$ 0.89	$ 2.49	$ -	$ -	$ -
Locate Items									
	Warning Tape	Non-Detect	'	$ 0.04	$ 0.12	$ 0.15	$ -	$ -	$ -
	Locate Wire (#12)	Insulated/Solid	'	$ 0.18	$ 0.18	$ 0.36	$ -	$ -	$ -
Remove & Restore									
3%	General R&R		400 '	n/a	$ 14.16	$ 14.16	n/a	$ 5,664.00	$ 5,664.00
Fiber Placement in Conduit									
	Fiber Optic Cable	12, 24 ,96	4,000 '	n/a	$ 0.78	$ 0.78	n/a	$ 3,120.00	$ 3,120.00
Handholes									
1,000 '	HH-3 (20k)		8	$ 1,200.00	$ 550.00	$ 1,750.00	$ 9,600.00	$ 4,400.00	$ 14,000.00
Slack Coil									
100 '	Slack Coil FOC in HH	12, 24, 96	800 '	n/a	$ 0.45	$ 0.45	n/a	$ 358.72	$ 358.72
200 '	Slack Coil FOC on Snowshoes	12, 24, 96	'	n/a	$ 0.92	$ 0.92	n/a	$ -	$ -
Aerial									
	Pole Attachment		0	$ 28.80	$ 41.30	$ 70.10	$ -	$ -	$ -
	Place ADSS FOC (roadside)		'	n/a	$ 1.30	$ 1.30	n/a	$ -	$ -
15%	Aerial Make Ready per Pole		0	$ 42.00	$ 177.00	$ 219.00	$ -	$ -	$ -
5%	Place Extension Arm		0	$ 54.00	$ 59.00	$ 113.00	$ -	$ -	$ -
10%	Place Anchor & Guy		0	$ 102.00	$ 295.00	$ 397.00	$ -	$ -	$ -
2,000 '	Place Snow-shoes		0	$ 114.00	$ 177.00	$ 291.00	$ -	$ -	$ -
Splicing Items									
	Splice Case	*>144*	0	$ 558.00	$ 295.00	$ 853.00	$ -	$ -	$ -
	Splice Trays	24 slot	0	$ 30.00	n/a	$ 30.00	$ -	n/a	$ -
	Fiber Splicing < 12			n/a	$ 47.20	$ 47.20	n/a	$ -	$ -
	Fiber Splicing > 96		768	n/a	$ 31.86	$ 31.86	n/a	$ 24,468.48	$ 24,468.48
	Fiber Testing (OTDR/PM)			n/a	$ 11.80	$ 11.80	n/a	$ -	$ -
	Fiber Tags	Wrap-Around	768	$ 1.32	n/a	$ 1.32	$ 1,013.76	n/a	$ 1,013.76
Fiber Lengths									
	Fiber+Slack	96	4,800 '	$ 1.032	n/a	$ 1.03	$ 4,953.60	n/a	$ 4,953.60
Site									
	Enhanced Area Coverage Site		8	$ 28,360.00	$ 13,500.00	$ 41,860.00	$ 226,880.00	$ 108,000.00	$ 334,880.00
	NEMA Cabinet, UPS, Disconnect		8	$ 8,200.00	$ 1,200.00	$ 9,400.00	$ 65,600.00	$ 9,600.00	$ 75,200.00
	Edge Equipment		8	$ 5,200.00	$ 1,250.00	$ 6,450.00	$ 41,600.00	$ 10,000.00	$ 51,600.00
	AC Power Connect (Service Drop)		8	$ 300.00	$ 1,416.00	$ 1,716.00	$ 2,400.00	$ 11,328.00	$ 13,728.00
	Antenna Array		8	$ 7,500.00	$ 750.00	$ 8,250.00	$ 60,000.00	$ 6,000.00	$ 66,000.00
	Cabling System		8	$ 720.00	$ 1,200.00	$ 1,920.00	$ 5,760.00	$ 9,600.00	$ 15,360.00
	Site Installation (Wireless)		8	n/a	$ 2,500.00	$ 2,500.00	n/a	$ 20,000.00	$ 20,000.00
	Site Prep		8	$ 5,000.00	$ 10,000.00	$ 15,000.00	$ 40,000.00	$ 80,000.00	$ 120,000.00
				$ -	$ -	$ -	$ -	$ -	$ -
Misc.									
500 '	Install Fiber Optic Marker Sign	Fiberglass	0	$ 60.00	$ 17.70	$ 77.70	$ -	$ -	$ -
				$ -	$ -	$ -	$ -	$ -	$ -
				$ -	$ -	$ -	$ -	$ -	$ -
						Subtotal Cost:	$ 457,807.36	$ 292,539.20	$ 750,346.56

Total Material Cost: $ 457,807.36
Labor/Equip. Total: $ 292,539.20
Total Construction Cost: $ 750,346.56

5/1/2012

Orcas Power & Light Coorperative - Unit Totals
OSP Construction Estimate
- Segment 706.3-DB01

Aerial	Underground	Existing Duct	Poles	AP's	Submarine Cable
0 '	0 '	0 '	0	2	

	Unit Description	Type	Unit Quantity	Material Cost	Labor/Equip. Cost	Total Unit Cost	Material Total	Labor/Equip. Total	Ext. Total
Trenching/ Plow									
	Trench New	24" Depth	'	n/a	$ 8.20	$ 8.20	n/a	$ -	$ -
0%	Rock Adder		'	n/a	$ 13.00	$ 13.00	n/a	$ -	$ -
Conduit Placement									
	Place (2) 2" HDPE	2	'	$ 1.61	$ 0.89	$ 2.49	$ -	$ -	$ -
Locate Items									
	Warning Tape	Non-Detect	'	$ 0.04	$ 0.12	$ 0.15	$ -	$ -	$ -
	Locate Wire (#12)	Insulated/Solid	'	$ 0.18	$ 0.18	$ 0.36	$ -	$ -	$ -
Remove & Restore									
0%	General R&R		'	n/a	$ 14.16	$ 14.16	n/a	$ -	$ -
Fiber Placement in Conduit									
	Fiber Optic Cable	12, 24 ,96	'	n/a	$ 0.78	$ 0.78	n/a	$ -	$ -
Handholes									
1,000 '	HH-3 (20k)		0	$ 1,200.00	$ 550.00	$ 1,750.00	$ -	$ -	$ -
Slack Coil									
100 '	Slack Coil FOC in HH	12, 24, 96	'	n/a	$ 0.45	$ 0.45	n/a	$ -	$ -
200 '	Slack Coil FOC on Snowshoes	12, 24, 96	'	n/a	$ 0.92	$ 0.92	n/a	$ -	$ -
Aerial									
	Pole Attachment		0	$ 28.80	$ 41.30	$ 70.10	$ -	$ -	$ -
	Place ADSS FOC (roadside)		'	n/a	$ 1.30	$ 1.30	n/a	$ -	$ -
15%	Aerial Make Ready per Pole		0	$ 42.00	$ 177.00	$ 219.00	$ -	$ -	$ -
5%	Place Extension Arm		0	$ 54.00	$ 59.00	$ 113.00	$ -	$ -	$ -
10%	Place Anchor & Guy		0	$ 102.00	$ 295.00	$ 397.00	$ -	$ -	$ -
2,000 '	Place Snow-shoes		0	$ 114.00	$ 177.00	$ 291.00	$ -	$ -	$ -
Splicing Items									
	Splice Case	*>144*	2	$ 558.00	$ 295.00	$ 853.00	$ 1,116.00	$ 590.00	$ 1,706.00
	Splice Trays	24 slot	8	$ 30.00	n/a	$ 30.00	$ 240.00	n/a	$ 240.00
	Fiber Splicing < 12		12	n/a	$ 47.20	$ 47.20	n/a	$ 566.40	$ 566.40
	Fiber Splicing > 96		48	n/a	$ 31.86	$ 31.86	n/a	$ 1,529.28	$ 1,529.28
	Fiber Testing (OTDR/PM)		12	n/a	$ 11.80	$ 11.80	n/a	$ 141.60	$ 141.60
	Fiber Tags	Wrap-Around	2	$ 1.32	n/a	$ 1.32	$ 3.17	n/a	$ 3.17
Fiber Lengths									
	Fiber+Slack	96	'	$ 1.032	n/a	$ 1.03	$ -	n/a	$ -
Site									
	Replace Pole w/ 130' Steel Pole		2	$ 24,360.00	$ 13,500.00	$ 37,860.00	$ 48,720.00	$ 27,000.00	$ 75,720.00
	NEMA Cabinet, UPS, Disconnect		2	$ 4,200.00	$ 400.00	$ 4,600.00	$ 8,400.00	$ 800.00	$ 9,200.00
	Edge Equipment		2	$ 1,200.00	$ 350.00	$ 1,550.00	$ 2,400.00	$ 700.00	$ 3,100.00
	AC Power Connect (Service Drop)		2	n/a	$ 1,416.00	$ 1,416.00	n/a	$ 2,832.00	$ 2,832.00
	Antenna Array		2	$ 7,500.00	n/a	$ 7,500.00	$ 15,000.00	n/a	$ 15,000.00
	Cabling System		2	$ 720.00	$ 1,200.00	$ 1,920.00	$ 1,440.00	$ 2,400.00	$ 3,840.00
	Site Installation (Wireless)		2	n/a	$ 1,500.00	$ 1,500.00	n/a	$ 3,000.00	$ 3,000.00
	Site Prep		2	n/a	$ 10,000.00	$ 10,000.00	n/a	$ 20,000.00	$ 20,000.00
				$ -	$ -	$ -	$ -	$ -	$ -
Misc.									
500 '	Install Fiber Optic Marker Sign	Fiberglass	0	$ 60.00	$ 17.70	$ 77.70	$ -	$ -	$ -
				$ -	$ -	$ -	$ -	$ -	$ -
				$ -	$ -	$ -	$ -	$ -	$ -
						Subtotal Cost:	$ 77,319.17	$ 59,559.28	$ 136,878.45

Total Material Cost: $ 77,319.17
Labor/Equip. Total: $ 59,559.28
Total Construction Cost: $ 136,878.45

Orcas Power & Light Coorperative - Unit Totals
OSP Construction Estimate
- Segment 706.3-LZ01

Aerial	Underground	Existing Duct	Poles	AP's	Submarine Cable
1,011 '	0 '	0 '	5	0	

	Unit Description	Type	Unit Quantity	Material Cost	Labor/Equip. Cost	Total Unit Cost	Material Total	Labor/Equip. Total	Ext. Total
Trenching/ Plow									
	Trench New	24" Depth	'	n/a	$ 8.20	$ 8.20	n/a	$ -	$ -
15%	Rock Adder		'	n/a	$ 13.00	$ 13.00	n/a	$ -	$ -
Conduit Placement									
	Place (2) 2" HDPE	2	'	$ 1.61	$ 0.89	$ 2.49	$ -	$ -	$ -
Locate Items									
	Warning Tape	Non-Detect	'	$ 0.04	$ 0.12	$ 0.15	$ -	$ -	$ -
	Locate Wire (#12)	Insulated/Solid	'	$ 0.18	$ 0.18	$ 0.36	$ -	$ -	$ -
Remove & Restore									
3%	General R&R		'	n/a	$ 14.16	$ 14.16	n/a	$ -	$ -
Fiber Placement in Conduit									
	Fiber Optic Cable	12, 24 ,96	'	n/a	$ 0.78	$ 0.78	n/a	$ -	$ -
Handholes									
1,000 '	HH-3 (20k)		0	$ 1,200.00	$ 550.00	$ 1,750.00	$ -	$ -	$ -
Slack Coil									
100 '	Slack Coil FOC in HH	12, 24, 96	'	n/a	$ 0.45	$ 0.45	n/a	$ -	$ -
200 '	Slack Coil FOC on Snowshoes	12, 24, 96	200 '	n/a	$ 0.92	$ 0.92	n/a	$ 184.08	$ 184.08
Aerial									
	Pole Attachment		5	$ 28.80	$ 41.30	$ 70.10	$ 144.00	$ 206.50	$ 350.50
	Place ADSS FOC (roadside)		1,011 '	n/a	$ 1.30	$ 1.30	n/a	$ 1,312.28	$ 1,312.28
15%	Aerial Make Ready per Pole		1	$ 42.00	$ 177.00	$ 219.00	$ 42.00	$ 177.00	$ 219.00
5%	Place Extension Arm		1	$ 54.00	$ 59.00	$ 113.00	$ 54.00	$ 59.00	$ 113.00
10%	Place Anchor & Guy		1	$ 102.00	$ 295.00	$ 397.00	$ 102.00	$ 295.00	$ 397.00
2,000 '	Place Snow-shoes		1	$ 114.00	$ 177.00	$ 291.00	$ 114.00	$ 177.00	$ 291.00
Splicing Items									
	Splice Case	*>144*	1	$ 558.00	$ 295.00	$ 853.00	$ 558.00	$ 295.00	$ 853.00
	Splice Trays	24 slot	4	$ 30.00	n/a	$ 30.00	$ 120.00	n/a	$ 120.00
	Fiber Splicing < 12			n/a	$ 47.20	$ 47.20	n/a	$ -	$ -
	Fiber Splicing > 96		96	n/a	$ 31.86	$ 31.86	n/a	$ 3,058.56	$ 3,058.56
	Fiber Testing (OTDR/PM)			n/a	$ 11.80	$ 11.80	n/a	$ -	$ -
	Fiber Tags	Wrap-Around	6	$ 1.32	n/a	$ 1.32	$ 7.92	n/a	$ 7.92
Fiber Lengths									
	Fiber+Slack	96	1,211 '	$ 1.032	n/a	$ 1.03	$ 1,249.75	n/a	$ 1,249.75
Site									
	Replace Pole w/ 130' Steel Pole		0	$ 24,360.00	$ 13,500.00	$ 37,860.00	$ -	$ -	$ -
	NEMA Cabinet, UPS, Disconnect		0	$ 4,200.00	$ 400.00	$ 4,600.00	$ -	$ -	$ -
	Edge Equipment		0	$ 1,200.00	$ 350.00	$ 1,550.00	$ -	$ -	$ -
	AC Power Connect (Service Drop)		0	n/a	$ 1,416.00	$ 1,416.00	n/a	$ -	$ -
	Antenna Array		0	$ 7,500.00	n/a	$ 7,500.00	$ -	n/a	$ -
	Cabling System		0	$ 720.00	$ 1,200.00	$ 1,920.00	$ -	$ -	$ -
	Site Installation (Wireless)		0	n/a	$ 1,500.00	$ 1,500.00	n/a	$ -	$ -
	Site Prep		0	n/a	$ 10,000.00	$ 10,000.00	n/a	$ -	$ -
				$ -	$ -	$ -	$ -	$ -	$ -
Misc.									
500 '	Install Fiber Optic Marker Sign	Fiberglass	0	$ 60.00	$ 17.70	$ 77.70	$ -	$ -	$ -
				$ -	$ -	$ -	$ -	$ -	$ -
				$ -	$ -	$ -	$ -	$ -	$ -
						Subtotal Cost:	$ 2,391.67	$ 5,764.42	$ 8,156.09

Total Material Cost: $ 2,391.67
Labor/Equip. Total: $ 5,764.42
Total Construction Cost: $ 8,156.09

5/1/2012

Orcas Power & Light Coorperative - Unit Totals
OSP Construction Estimate
- Segment 706.3-LZ02

Aerial	Underground	Existing Duct	Poles	AP's	Submarine Cable
0 '	287 '	5,631 '	0	1	

	Unit Description	Type	Unit Quantity	Material Cost	Labor/Equip. Cost	Total Unit Cost	Material Total	Labor/Equip. Total	Ext. Total
Trenching/ Plow									
	Trench New	24" Depth	287 '	n/a	$ 8.20	$ 8.20	n/a	$ 2,353.40	$ 2,353.40
15%	Rock Adder		43 '	n/a	$ 13.00	$ 13.00	n/a	$ 559.65	$ 559.65
Conduit Placement									
	Place (2) 2" HDPE	2	287 '	$ 1.61	$ 0.89	$ 2.49	$ 461.50	$ 254.00	$ 715.49
Locate Items									
	Warning Tape	Non-Detect	287 '	$ 0.04	$ 0.12	$ 0.15	$ 10.33	$ 33.87	$ 44.20
	Locate Wire (#12)	Insulated/Solid	287 '	$ 0.18	$ 0.18	$ 0.36	$ 51.66	$ 50.80	$ 102.46
Remove & Restore									
3%	General R&R		9 '	n/a	$ 14.16	$ 14.16	n/a	$ 127.44	$ 127.44
Fiber Placement in Conduit									
	Fiber Optic Cable	12, 24 ,96	5,918 '	n/a	$ 0.78	$ 0.78	n/a	$ 4,616.04	$ 4,616.04
Handholes									
1,000 '	HH-3 (20k)		1	$ 1,200.00	$ 550.00	$ 1,750.00	$ 1,200.00	$ 550.00	$ 1,750.00
Slack Coil									
100 '	Slack Coil FOC in HH	12, 24, 96	100 '	n/a	$ 0.45	$ 0.45	n/a	$ 44.84	$ 44.84
200 '	Slack Coil FOC on Snowshoes	12, 24, 96	'	n/a	$ 0.92	$ 0.92	n/a	$ -	$ -
Aerial									
	Pole Attachment		0	$ 28.80	$ 41.30	$ 70.10	$ -	$ -	$ -
	Place ADSS FOC (roadside)		'	n/a	$ 1.30	$ 1.30	n/a	$ -	$ -
15%	Aerial Make Ready per Pole		0	$ 42.00	$ 177.00	$ 219.00	$ -	$ -	$ -
5%	Place Extension Arm		0	$ 54.00	$ 59.00	$ 113.00	$ -	$ -	$ -
10%	Place Anchor & Guy		0	$ 102.00	$ 295.00	$ 397.00	$ -	$ -	$ -
2,000 '	Place Snow-shoes		0	$ 114.00	$ 177.00	$ 291.00	$ -	$ -	$ -
Splicing Items									
	Splice Case	*>144*	1	$ 558.00	$ 295.00	$ 853.00	$ 558.00	$ 295.00	$ 853.00
	Splice Trays	24 slot	4	$ 30.00	n/a	$ 30.00	$ 120.00	n/a	$ 120.00
	Fiber Splicing < 12		12	n/a	$ 47.20	$ 47.20	n/a	$ 566.40	$ 566.40
	Fiber Splicing > 96		12	n/a	$ 31.86	$ 31.86	n/a	$ 382.32	$ 382.32
	Fiber Testing (OTDR/PM)		6	n/a	$ 11.80	$ 11.80	n/a	$ 70.80	$ 70.80
	Fiber Tags	Wrap-Around	4	$ 1.32	n/a	$ 1.32	$ 4.75	n/a	$ 4.75
Fiber Lengths									
	Fiber+Slack	96	6,018 '	$ 1.032	n/a	$ 1.03	$ 6,210.58	n/a	$ 6,210.58
Site									
	Replace Pole w/ 130' Steel Pole		1	$ 24,360.00	$ 13,500.00	$ 37,860.00	$ 24,360.00	$ 13,500.00	$ 37,860.00
	NEMA Cabinet, UPS, Disconnect		1	$ 4,200.00	$ 400.00	$ 4,600.00	$ 4,200.00	$ 400.00	$ 4,600.00
	Edge Equipment		1	$ 1,200.00	$ 350.00	$ 1,550.00	$ 1,200.00	$ 350.00	$ 1,550.00
	AC Power Connect (Service Drop)		1	n/a	$ 1,416.00	$ 1,416.00	n/a	$ 1,416.00	$ 1,416.00
	Antenna Array		1	$ 7,500.00	n/a	$ 7,500.00	$ 7,500.00	n/a	$ 7,500.00
	Cabling System		1	$ 720.00	$ 1,200.00	$ 1,920.00	$ 720.00	$ 1,200.00	$ 1,920.00
	Site Installation (Wireless)		1	n/a	$ 1,500.00	$ 1,500.00	n/a	$ 1,500.00	$ 1,500.00
	Site Prep		1	n/a	$ 10,000.00	$ 10,000.00	n/a	$ 10,000.00	$ 10,000.00
				$ -	$ -	$ -	$ -	$ -	$ -
Misc.									
500 '	Install Fiber Optic Marker Sign	Fiberglass	1	$ 60.00	$ 17.70	$ 77.70	$ 60.00	$ 17.70	$ 77.70
				$ -	$ -	$ -	$ -	$ -	$ -
				$ -	$ -	$ -	$ -	$ -	$ -
						Subtotal Cost:	$ 46,656.82	$ 38,288.25	$ 84,945.07

Total Material Cost: $ 46,656.82
Labor/Equip. Total: $ 38,288.25
Total Construction Cost: $ 84,945.07

Orcas Power & Light Coorperative - Unit Totals
OSP Construction Estimate
- Segment 706.3-LZ03

Aerial	Underground	Existing Duct	Poles	AP's	Submarine Cable
0 '	1,861 '	0 '	0	1	

	Unit Description	Type	Unit Quantity	Material Cost	Labor/Equip. Cost	Total Unit Cost	Material Total	Labor/Equip. Total	Ext. Total
Trenching/ Plow									
	Trench New	24" Depth	1,861 '	n/a	$ 8.20	$ 8.20	n/a	$ 15,260.20	$ 15,260.20
15%	Rock Adder		279 '	n/a	$ 13.00	$ 13.00	n/a	$ 3,628.95	$ 3,628.95
Conduit Placement									
	Place (2) 2" HDPE	2	1,861 '	$ 1.61	$ 0.89	$ 2.49	$ 2,992.49	$ 1,646.99	$ 4,639.47
Locate Items									
	Warning Tape	Non-Detect	1,861 '	$ 0.04	$ 0.12	$ 0.15	$ 67.00	$ 219.60	$ 286.59
	Locate Wire (#12)	Insulated/Solid	1,861 '	$ 0.18	$ 0.18	$ 0.36	$ 334.98	$ 329.40	$ 664.38
Remove & Restore									
3%	General R&R		56 '	n/a	$ 14.16	$ 14.16	n/a	$ 792.96	$ 792.96
Fiber Placement in Conduit									
	Fiber Optic Cable	12, 24 ,96	1,861 '	n/a	$ 0.78	$ 0.78	n/a	$ 1,451.58	$ 1,451.58
Handholes									
1,000 '	HH-3 (20k)		2	$ 1,200.00	$ 550.00	$ 1,750.00	$ 2,400.00	$ 1,100.00	$ 3,500.00
Slack Coil									
100 '	Slack Coil FOC in HH	12, 24, 96	200 '	n/a	$ 0.45	$ 0.45	n/a	$ 89.68	$ 89.68
200 '	Slack Coil FOC on Snowshoes	12, 24, 96	'	n/a	$ 0.92	$ 0.92	n/a	$ -	$ -
Aerial									
	Pole Attachment		0	$ 28.80	$ 41.30	$ 70.10	$ -	$ -	$ -
	Place ADSS FOC (roadside)		'	n/a	$ 1.30	$ 1.30	n/a	$ -	$ -
15%	Aerial Make Ready per Pole		0	$ 42.00	$ 177.00	$ 219.00	$ -	$ -	$ -
5%	Place Extension Arm		0	$ 54.00	$ 59.00	$ 113.00	$ -	$ -	$ -
10%	Place Anchor & Guy		0	$ 102.00	$ 295.00	$ 397.00	$ -	$ -	$ -
2,000 '	Place Snow-shoes		0	$ 114.00	$ 177.00	$ 291.00	$ -	$ -	$ -
Splicing Items									
	Splice Case	*>144*	1	$ 558.00	$ 295.00	$ 853.00	$ 558.00	$ 295.00	$ 853.00
	Splice Trays	24 slot	4	$ 30.00	n/a	$ 30.00	$ 120.00	n/a	$ 120.00
	Fiber Splicing < 12		12	n/a	$ 47.20	$ 47.20	n/a	$ 566.40	$ 566.40
	Fiber Splicing > 96			n/a	$ 31.86	$ 31.86	n/a	$ -	$ -
	Fiber Testing (OTDR/PM)		6	n/a	$ 11.80	$ 11.80	n/a	$ 70.80	$ 70.80
	Fiber Tags	Wrap-Around	6	$ 1.32	n/a	$ 1.32	$ 7.92	n/a	$ 7.92
Fiber Lengths									
	Fiber+Slack	96	2,061 '	$ 1.032	n/a	$ 1.03	$ 2,126.95	n/a	$ 2,126.95
Site									
	Replace Pole w/ 130' Steel Pole		1	$ 24,360.00	$ 13,500.00	$ 37,860.00	$ 24,360.00	$ 13,500.00	$ 37,860.00
	NEMA Cabinet, UPS, Disconnect		1	$ 4,200.00	$ 400.00	$ 4,600.00	$ 4,200.00	$ 400.00	$ 4,600.00
	Edge Equipment		1	$ 1,200.00	$ 350.00	$ 1,550.00	$ 1,200.00	$ 350.00	$ 1,550.00
	AC Power Connect (Service Drop)		1	n/a	$ 1,416.00	$ 1,416.00	n/a	$ 1,416.00	$ 1,416.00
	Antenna Array		1	$ 7,500.00	n/a	$ 7,500.00	$ 7,500.00	n/a	$ 7,500.00
	Cabling System		1	$ 720.00	$ 1,200.00	$ 1,920.00	$ 720.00	$ 1,200.00	$ 1,920.00
	Site Installation (Wireless)		1	n/a	$ 1,500.00	$ 1,500.00	n/a	$ 1,500.00	$ 1,500.00
	Site Prep		1	n/a	$ 10,000.00	$ 10,000.00	n/a	$ 10,000.00	$ 10,000.00
				$ -	$ -	$ -	$ -	$ -	$ -
Misc.									
500 '	Install Fiber Optic Marker Sign	Fiberglass	4	$ 60.00	$ 17.70	$ 77.70	$ 240.00	$ 70.80	$ 310.80
				$ -	$ -	$ -	$ -	$ -	$ -
				$ -	$ -	$ -	$ -	$ -	$ -
						Subtotal Cost:	$ 46,827.34	$ 53,888.35	$ 100,715.69

Total Material Cost: $ 46,827.34
Labor/Equip. Total: $ 53,888.35
Total Construction Cost: $ 100,715.69

Orcas Power & Light Coorperative - Unit Totals
OSP Construction Estimate
- Segment 706.3-LZ04

Aerial	Underground	Existing Duct	Poles	AP's	Submarine Cable
0 '	7,780 '	0 '	0	1	

	Unit Description	Type	Unit Quantity	Material Cost	Labor/Equip. Cost	Total Unit Cost	Material Total	Labor/Equip. Total	Ext. Total
Trenching/ Plow									
	Trench New	24" Depth	7,780 '	n/a	$ 8.20	$ 8.20	n/a	$ 63,796.00	$ 63,796.00
15%	Rock Adder		1,167 '	n/a	$ 13.00	$ 13.00	n/a	$ 15,171.00	$ 15,171.00
Conduit Placement									
	Place (2) 2" HDPE	2	7,780 '	$ 1.61	$ 0.89	$ 2.49	$ 12,510.24	$ 6,885.30	$ 19,395.54
Locate Items									
	Warning Tape	Non-Detect	7,780 '	$ 0.04	$ 0.12	$ 0.15	$ 280.08	$ 918.04	$ 1,198.12
	Locate Wire (#12)	Insulated/Solid	7,780 '	$ 0.18	$ 0.18	$ 0.36	$ 1,400.40	$ 1,377.06	$ 2,777.46
Remove & Restore									
3%	General R&R		234 '	n/a	$ 14.16	$ 14.16	n/a	$ 3,313.44	$ 3,313.44
Fiber Placement in Conduit									
	Fiber Optic Cable	12, 24 ,96	7,780 '	n/a	$ 0.78	$ 0.78	n/a	$ 6,068.40	$ 6,068.40
Handholes									
1,000 '	HH-3 (20k)		8	$ 1,200.00	$ 550.00	$ 1,750.00	$ 9,600.00	$ 4,400.00	$ 14,000.00
Slack Coil									
100 '	Slack Coil FOC in HH	12, 24, 96	800 '	n/a	$ 0.45	$ 0.45	n/a	$ 358.72	$ 358.72
200 '	Slack Coil FOC on Snowshoes	12, 24, 96	'	n/a	$ 0.92	$ 0.92	n/a	$ -	$ -
Aerial									
	Pole Attachment		0	$ 28.80	$ 41.30	$ 70.10	$ -	$ -	$ -
	Place ADSS FOC (roadside)		'	n/a	$ 1.30	$ 1.30	n/a	$ -	$ -
15%	Aerial Make Ready per Pole		0	$ 42.00	$ 177.00	$ 219.00	$ -	$ -	$ -
5%	Place Extension Arm		0	$ 54.00	$ 59.00	$ 113.00	$ -	$ -	$ -
10%	Place Anchor & Guy		0	$ 102.00	$ 295.00	$ 397.00	$ -	$ -	$ -
2,000 '	Place Snow-shoes		0	$ 114.00	$ 177.00	$ 291.00	$ -	$ -	$ -
Splicing Items									
	Splice Case	*>144*	1	$ 558.00	$ 295.00	$ 853.00	$ 558.00	$ 295.00	$ 853.00
	Splice Trays	24 slot	4	$ 30.00	n/a	$ 30.00	$ 120.00	n/a	$ 120.00
	Fiber Splicing < 12		12	n/a	$ 47.20	$ 47.20	n/a	$ 566.40	$ 566.40
	Fiber Splicing > 96			n/a	$ 31.86	$ 31.86	n/a	$ -	$ -
	Fiber Testing (OTDR/PM)		6	n/a	$ 11.80	$ 11.80	n/a	$ 70.80	$ 70.80
	Fiber Tags	Wrap-Around	20	$ 1.32	n/a	$ 1.32	$ 26.93	n/a	$ 26.93
Fiber Lengths									
	Fiber+Slack	96	8,580 '	$ 1.032	n/a	$ 1.03	$ 8,854.56	n/a	$ 8,854.56
Site									
	Replace Pole w/ 130' Steel Pole		1	$ 24,360.00	$ 13,500.00	$ 37,860.00	$ 24,360.00	$ 13,500.00	$ 37,860.00
	NEMA Cabinet, UPS, Disconnect		1	$ 4,200.00	$ 400.00	$ 4,600.00	$ 4,200.00	$ 400.00	$ 4,600.00
	Edge Equipment		1	$ 1,200.00	$ 350.00	$ 1,550.00	$ 1,200.00	$ 350.00	$ 1,550.00
	AC Power Connect (Service Drop)		1	n/a	$ 1,416.00	$ 1,416.00	n/a	$ 1,416.00	$ 1,416.00
	Antenna Array		1	$ 7,500.00	n/a	$ 7,500.00	$ 7,500.00	n/a	$ 7,500.00
	Cabling System		1	$ 720.00	$ 1,200.00	$ 1,920.00	$ 720.00	$ 1,200.00	$ 1,920.00
	Site Installation (Wireless)		1	n/a	$ 1,500.00	$ 1,500.00	n/a	$ 1,500.00	$ 1,500.00
	Site Prep		1	n/a	$ 10,000.00	$ 10,000.00	n/a	$ 10,000.00	$ 10,000.00
				$ -	$ -	$ -	$ -	$ -	$ -
Misc.									
500 '	Install Fiber Optic Marker Sign	Fiberglass	16	$ 60.00	$ 17.70	$ 77.70	$ 960.00	$ 283.20	$ 1,243.20
				$ -	$ -	$ -	$ -	$ -	$ -
				$ -	$ -	$ -	$ -	$ -	$ -
					Subtotal Cost:		$ 72,290.21	$ 131,869.36	$ 204,159.57

Total Material Cost: $ 72,290.21
Labor/Equip. Total: $ 131,869.36
Total Construction Cost: $ 204,159.57

Orcas Power & Light Coorperative - Unit Totals
OSP Construction Estimate
- Segment 706.3-LZ05

Aerial	Underground	Existing Duct	Poles	AP's	Submarine Cable
0 '	14 '	223 '	0	1	

	Unit Description	Type	Unit Quantity	Material Cost	Labor/Equip. Cost	Total Unit Cost	Material Total	Labor/Equip. Total	Ext. Total
Trenching/ Plow									
	Trench New	24" Depth	14 '	n/a	$ 8.20	$ 8.20	n/a	$ 114.80	$ 114.80
15%	Rock Adder		2 '	n/a	$ 13.00	$ 13.00	n/a	$ 27.30	$ 27.30
Conduit Placement									
	Place (2) 2" HDPE	2	14 '	$ 1.61	$ 0.89	$ 2.49	$ 22.51	$ 12.39	$ 34.90
Locate Items									
	Warning Tape	Non-Detect	14 '	$ 0.04	$ 0.12	$ 0.15	$ 0.50	$ 1.65	$ 2.16
	Locate Wire (#12)	Insulated/Solid	14 '	$ 0.18	$ 0.18	$ 0.36	$ 2.52	$ 2.48	$ 5.00
Remove & Restore									
3%	General R&R		1 '	n/a	$ 14.16	$ 14.16	n/a	$ 14.16	$ 14.16
Fiber Placement in Conduit									
	Fiber Optic Cable	12, 24 ,96	237 '	n/a	$ 0.78	$ 0.78	n/a	$ 184.86	$ 184.86
Handholes									
1,000 '	HH-3 (20k)		1	$ 1,200.00	$ 550.00	$ 1,750.00	$ 1,200.00	$ 550.00	$ 1,750.00
Slack Coil									
100 '	Slack Coil FOC in HH	12, 24, 96	100 '	n/a	$ 0.45	$ 0.45	n/a	$ 44.84	$ 44.84
200 '	Slack Coil FOC on Snowshoes	12, 24, 96	'	n/a	$ 0.92	$ 0.92	n/a	$ -	$ -
Aerial									
	Pole Attachment		0	$ 28.80	$ 41.30	$ 70.10	$ -	$ -	$ -
	Place ADSS FOC (roadside)		'	n/a	$ 1.30	$ 1.30	n/a	$ -	$ -
15%	Aerial Make Ready per Pole		0	$ 42.00	$ 177.00	$ 219.00	$ -	$ -	$ -
5%	Place Extension Arm		0	$ 54.00	$ 59.00	$ 113.00	$ -	$ -	$ -
10%	Place Anchor & Guy		0	$ 102.00	$ 295.00	$ 397.00	$ -	$ -	$ -
2,000 '	Place Snow-shoes		0	$ 114.00	$ 177.00	$ 291.00	$ -	$ -	$ -
Splicing Items									
	Splice Case	*>144*	1	$ 558.00	$ 295.00	$ 853.00	$ 558.00	$ 295.00	$ 853.00
	Splice Trays	24 slot	4	$ 30.00	n/a	$ 30.00	$ 120.00	n/a	$ 120.00
	Fiber Splicing < 12		12	n/a	$ 47.20	$ 47.20	n/a	$ 566.40	$ 566.40
	Fiber Splicing > 96			n/a	$ 31.86	$ 31.86	n/a	$ -	$ -
	Fiber Testing (OTDR/PM)		6	n/a	$ 11.80	$ 11.80	n/a	$ 70.80	$ 70.80
	Fiber Tags	Wrap-Around	4	$ 1.32	n/a	$ 1.32	$ 4.75	n/a	$ 4.75
Fiber Lengths									
	Fiber+Slack	96	337 '	$ 1.032	n/a	$ 1.03	$ 347.78	n/a	$ 347.78
Site									
	Replace Pole w/ 130' Steel Pole		1	$ 24,360.00	$ 13,500.00	$ 37,860.00	$ 24,360.00	$ 13,500.00	$ 37,860.00
	NEMA Cabinet, UPS, Disconnect		1	$ 4,200.00	$ 400.00	$ 4,600.00	$ 4,200.00	$ 400.00	$ 4,600.00
	Edge Equipment		1	$ 1,200.00	$ 350.00	$ 1,550.00	$ 1,200.00	$ 350.00	$ 1,550.00
	AC Power Connect (Service Drop)		1	n/a	$ 1,416.00	$ 1,416.00	n/a	$ 1,416.00	$ 1,416.00
	Antenna Array		1	$ 7,500.00	n/a	$ 7,500.00	$ 7,500.00	n/a	$ 7,500.00
	Cabling System		1	$ 720.00	$ 1,200.00	$ 1,920.00	$ 720.00	$ 1,200.00	$ 1,920.00
	Site Installation (Wireless)		1	n/a	$ 1,500.00	$ 1,500.00	n/a	$ 1,500.00	$ 1,500.00
	Site Prep		1	n/a	$ 10,000.00	$ 10,000.00	n/a	$ 10,000.00	$ 10,000.00
				$ -	$ -	$ -	$ -	$ -	$ -
Misc.									
500 '	Install Fiber Optic Marker Sign	Fiberglass	1	$ 60.00	$ 17.70	$ 77.70	$ 60.00	$ 17.70	$ 77.70
				$ -	$ -	$ -	$ -	$ -	$ -
				$ -	$ -	$ -	$ -	$ -	$ -
						Subtotal Cost:	$ 40,296.07	$ 30,268.38	$ 70,564.45

Total Material Cost: $ 40,296.07
Labor/Equip. Total: $ 30,268.38
Total Construction Cost: $ 70,564.45

Orcas Power & Light Coorperative - Unit Totals
OSP Construction Estimate
- Segment 706.3-LZ06

Aerial	Underground	Existing Duct	Poles	AP's	Submarine Cable
2,648 '	1,423 '	0 '	12	1	

	Unit Description	Type	Unit Quantity	Material Cost	Labor/Equip. Cost	Total Unit Cost	Material Total	Labor/Equip. Total	Ext. Total
Trenching/ Plow									
	Trench New	24" Depth	1,423 '	n/a	$ 8.20	$ 8.20	n/a	$ 11,668.60	$ 11,668.60
15%	Rock Adder		213 '	n/a	$ 13.00	$ 13.00	n/a	$ 2,774.85	$ 2,774.85
Conduit Placement									
	Place (2) 2" HDPE	2	1,423 '	$ 1.61	$ 0.89	$ 2.49	$ 2,288.18	$ 1,259.36	$ 3,547.54
Locate Items									
	Warning Tape	Non-Detect	1,423 '	$ 0.04	$ 0.12	$ 0.15	$ 51.23	$ 167.91	$ 219.14
	Locate Wire (#12)	Insulated/Solid	1,423 '	$ 0.18	$ 0.18	$ 0.36	$ 256.14	$ 251.87	$ 508.01
Remove & Restore									
3%	General R&R		43 '	n/a	$ 14.16	$ 14.16	n/a	$ 608.88	$ 608.88
Fiber Placement in Conduit									
	Fiber Optic Cable	12, 24 ,96	1,423 '	n/a	$ 0.78	$ 0.78	n/a	$ 1,109.94	$ 1,109.94
Handholes									
1,000 '	HH-3 (20k)		2	$ 1,200.00	$ 550.00	$ 1,750.00	$ 2,400.00	$ 1,100.00	$ 3,500.00
Slack Coil									
100 '	Slack Coil FOC in HH	12, 24, 96	200 '	n/a	$ 0.45	$ 0.45	n/a	$ 89.68	$ 89.68
200 '	Slack Coil FOC on Snowshoes	12, 24, 96	400 '	n/a	$ 0.92	$ 0.92	n/a	$ 368.16	$ 368.16
Aerial									
	Pole Attachment		12	$ 28.80	$ 41.30	$ 70.10	$ 345.60	$ 495.60	$ 841.20
	Place ADSS FOC (roadside)		2,648 '	n/a	$ 1.30	$ 1.30	n/a	$ 3,437.10	$ 3,437.10
15%	Aerial Make Ready per Pole		2	$ 42.00	$ 177.00	$ 219.00	$ 84.00	$ 354.00	$ 438.00
5%	Place Extension Arm		1	$ 54.00	$ 59.00	$ 113.00	$ 54.00	$ 59.00	$ 113.00
10%	Place Anchor & Guy		2	$ 102.00	$ 295.00	$ 397.00	$ 204.00	$ 590.00	$ 794.00
2,000 '	Place Snow-shoes		2	$ 114.00	$ 177.00	$ 291.00	$ 228.00	$ 354.00	$ 582.00
Splicing Items									
	Splice Case	*>144*	1	$ 558.00	$ 295.00	$ 853.00	$ 558.00	$ 295.00	$ 853.00
	Splice Trays	24 slot	4	$ 30.00	n/a	$ 30.00	$ 120.00	n/a	$ 120.00
	Fiber Splicing < 12		12	n/a	$ 47.20	$ 47.20	n/a	$ 566.40	$ 566.40
	Fiber Splicing > 96			n/a	$ 31.86	$ 31.86	n/a	$ -	$ -
	Fiber Testing (OTDR/PM)		6	n/a	$ 11.80	$ 11.80	n/a	$ 70.80	$ 70.80
	Fiber Tags	Wrap-Around	20	$ 1.32	n/a	$ 1.32	$ 26.93	n/a	$ 26.93
Fiber Lengths									
	Fiber+Slack	96	4,671 '	$ 1.032	n/a	$ 1.03	$ 4,820.47	n/a	$ 4,820.47
Site									
	Replace Pole w/ 130' Steel Pole		1	$ 24,360.00	$ 13,500.00	$ 37,860.00	$ 24,360.00	$ 13,500.00	$ 37,860.00
	NEMA Cabinet, UPS, Disconnect		1	$ 4,200.00	$ 400.00	$ 4,600.00	$ 4,200.00	$ 400.00	$ 4,600.00
	Edge Equipment		1	$ 1,200.00	$ 350.00	$ 1,550.00	$ 1,200.00	$ 350.00	$ 1,550.00
	AC Power Connect (Service Drop)		1	n/a	$ 1,416.00	$ 1,416.00	n/a	$ 1,416.00	$ 1,416.00
	Antenna Array		1	$ 7,500.00	n/a	$ 7,500.00	$ 7,500.00	n/a	$ 7,500.00
	Cabling System		1	$ 720.00	$ 1,200.00	$ 1,920.00	$ 720.00	$ 1,200.00	$ 1,920.00
	Site Installation (Wireless)		1	n/a	$ 1,500.00	$ 1,500.00	n/a	$ 1,500.00	$ 1,500.00
	Site Prep		1	n/a	$ 10,000.00	$ 10,000.00	n/a	$ 10,000.00	$ 10,000.00
				$ -	$ -	$ -	$ -	$ -	$ -
Misc.									
500 '	Install Fiber Optic Marker Sign	Fiberglass	3	$ 60.00	$ 17.70	$ 77.70	$ 180.00	$ 53.10	$ 233.10
				$ -	$ -	$ -	$ -	$ -	$ -
				$ -	$ -	$ -	$ -	$ -	$ -
						Subtotal Cost:	$ 49,596.55	$ 54,040.25	$ 103,636.81

Total Material Cost: $ 49,596.55
Labor/Equip. Total: $ 54,040.25
Total Construction Cost: $ 103,636.81

Orcas Power & Light Coorperative - Unit Totals
OSP Construction Estimate
- Segment 706.3-LZ07

Aerial	Underground	Existing Duct	Poles	AP's	Submarine Cable
0 '	0 '	0 '	0	0	

	Unit Description	Type	Unit Quantity	Material Cost	Labor/Equip. Cost	Total Unit Cost	Material Total	Labor/Equip. Total	Ext. Total
Trenching/ Plow									
	Trench New	24" Depth	'	n/a	$ 8.20	$ 8.20	n/a	$ -	$ -
15%	Rock Adder		'	n/a	$ 13.00	$ 13.00	n/a	$ -	$ -
Conduit Placement									
	Place (2) 2" HDPE	2	'	$ 1.61	$ 0.89	$ 2.49	$ -	$ -	$ -
Locate Items									
	Warning Tape	Non-Detect	'	$ 0.04	$ 0.12	$ 0.15	$ -	$ -	$ -
	Locate Wire (#12)	Insulated/Solid	'	$ 0.18	$ 0.18	$ 0.36	$ -	$ -	$ -
Remove & Restore									
3%	General R&R		'	n/a	$ 14.16	$ 14.16	n/a	$ -	$ -
Fiber Placement in Conduit									
	Fiber Optic Cable	12, 24 ,96	'	n/a	$ 0.78	$ 0.78	n/a	$ -	$ -
Handholes									
1,000 '	HH-3 (20k)		0	$ 1,200.00	$ 550.00	$ 1,750.00	$ -	$ -	$ -
Slack Coil									
100 '	Slack Coil FOC in HH	12, 24, 96	'	n/a	$ 0.45	$ 0.45	n/a	$ -	$ -
200 '	Slack Coil FOC on Snowshoes	12, 24, 96	'	n/a	$ 0.92	$ 0.92	n/a	$ -	$ -
Aerial									
	Pole Attachment		0	$ 28.80	$ 41.30	$ 70.10	$ -	$ -	$ -
	Place ADSS FOC (roadside)		'	n/a	$ 1.30	$ 1.30	n/a	$ -	$ -
15%	Aerial Make Ready per Pole		0	$ 42.00	$ 177.00	$ 219.00	$ -	$ -	$ -
5%	Place Extension Arm		0	$ 54.00	$ 59.00	$ 113.00	$ -	$ -	$ -
10%	Place Anchor & Guy		0	$ 102.00	$ 295.00	$ 397.00	$ -	$ -	$ -
2,000 '	Place Snow-shoes		0	$ 114.00	$ 177.00	$ 291.00	$ -	$ -	$ -
Splicing Items									
	Splice Case	*>144*	4	$ 558.00	$ 295.00	$ 853.00	$ 2,232.00	$ 1,180.00	$ 3,412.00
	Splice Trays	24 slot	16	$ 30.00	n/a	$ 30.00	$ 480.00	n/a	$ 480.00
	Fiber Splicing < 12			n/a	$ 47.20	$ 47.20	n/a	$ -	$ -
	Fiber Splicing > 96		384	n/a	$ 31.86	$ 31.86	n/a	$ 12,234.24	$ 12,234.24
	Fiber Testing (OTDR/PM)		384	n/a	$ 11.80	$ 11.80	n/a	$ 4,531.20	$ 4,531.20
	Fiber Tags	Wrap-Around	0	$ 1.32	n/a	$ 1.32	$ -	n/a	$ -
Fiber Lengths									
	Fiber+Slack	96	'	$ 1.032	n/a	$ 1.03	$ -	n/a	$ -
Site									
	Replace Pole w/ 130' Steel Pole		0	$ 24,360.00	$ 13,500.00	$ 37,860.00	$ -	$ -	$ -
	NEMA Cabinet, UPS, Disconnect		0	$ 4,200.00	$ 400.00	$ 4,600.00	$ -	$ -	$ -
	Edge Equipment		0	$ 1,200.00	$ 350.00	$ 1,550.00	$ -	$ -	$ -
	AC Power Connect (Service Drop)		0	n/a	$ 1,416.00	$ 1,416.00	n/a	$ -	$ -
	Antenna Array		0	$ 7,500.00	n/a	$ 7,500.00	$ -	n/a	$ -
	Cabling System		0	$ 720.00	$ 1,200.00	$ 1,920.00	$ -	$ -	$ -
	Site Installation (Wireless)		0	n/a	$ 1,500.00	$ 1,500.00	n/a	$ -	$ -
	Site Prep		0	n/a	$ 10,000.00	$ 10,000.00	n/a	$ -	$ -
				$ -	$ -	$ -	$ -	$ -	$ -
Misc.									
500 '	Install Fiber Optic Marker Sign	Fiberglass	0	$ 60.00	$ 17.70	$ 77.70	$ -	$ -	$ -
				$ -	$ -	$ -	$ -	$ -	$ -
				$ -	$ -	$ -	$ -	$ -	$ -
						Subtotal Cost:	$ 2,712.00	$ 17,945.44	$ 20,657.44

Total Material Cost: $ 2,712.00
Labor/Equip. Total: $ 17,945.44
Total Construction Cost: $ 20,657.44

Orcas Power & Light Coorperative - Unit Totals
OSP Construction Estimate
- Segment 706.3-LZ08

Aerial	Underground	Existing Duct	Poles	AP's	Submarine Cable
0 '	4,703 '	0 '	0	2	

	Unit Description	Type	Unit Quantity	Material Cost	Labor/Equip. Cost	Total Unit Cost	Material Total	Labor/Equip. Total	Ext. Total
Trenching/ Plow									
	Trench New	24" Depth	4,703 '	n/a	$ 8.20	$ 8.20	n/a	$ 38,564.60	$ 38,564.60
15%	Rock Adder		705 '	n/a	$ 13.00	$ 13.00	n/a	$ 9,170.85	$ 9,170.85
Conduit Placement									
	Place (2) 2" HDPE	2	4,703 '	$ 1.61	$ 0.89	$ 2.49	$ 7,562.42	$ 4,162.16	$ 11,724.58
Locate Items									
	Warning Tape	Non-Detect	4,703 '	$ 0.04	$ 0.12	$ 0.15	$ 169.31	$ 554.95	$ 724.26
	Locate Wire (#12)	Insulated/Solid	4,703 '	$ 0.18	$ 0.18	$ 0.36	$ 846.54	$ 832.43	$ 1,678.97
Remove & Restore									
3%	General R&R		142 '	n/a	$ 14.16	$ 14.16	n/a	$ 2,010.72	$ 2,010.72
Fiber Placement in Conduit									
	Fiber Optic Cable	12, 24 ,96	4,703 '	n/a	$ 0.78	$ 0.78	n/a	$ 3,668.34	$ 3,668.34
Handholes									
1,000 '	HH-3 (20k)		5	$ 1,200.00	$ 550.00	$ 1,750.00	$ 6,000.00	$ 2,750.00	$ 8,750.00
Slack Coil									
100 '	Slack Coil FOC in HH	12, 24, 96	500 '	n/a	$ 0.45	$ 0.45	n/a	$ 224.20	$ 224.20
200 '	Slack Coil FOC on Snowshoes	12, 24, 96	'	n/a	$ 0.92	$ 0.92	n/a	$ -	$ -
Aerial									
	Pole Attachment		0	$ 28.80	$ 41.30	$ 70.10	$ -	$ -	$ -
	Place ADSS FOC (roadside)		'	n/a	$ 1.30	$ 1.30	n/a	$ -	$ -
15%	Aerial Make Ready per Pole		0	$ 42.00	$ 177.00	$ 219.00	$ -	$ -	$ -
5%	Place Extension Arm		0	$ 54.00	$ 59.00	$ 113.00	$ -	$ -	$ -
10%	Place Anchor & Guy		0	$ 102.00	$ 295.00	$ 397.00	$ -	$ -	$ -
2,000 '	Place Snow-shoes		0	$ 114.00	$ 177.00	$ 291.00	$ -	$ -	$ -
Splicing Items									
	Splice Case	*>144*	1	$ 558.00	$ 295.00	$ 853.00	$ 558.00	$ 295.00	$ 853.00
	Splice Trays	24 slot	4	$ 30.00	n/a	$ 30.00	$ 120.00	n/a	$ 120.00
	Fiber Splicing < 12		18	n/a	$ 47.20	$ 47.20	n/a	$ 849.60	$ 849.60
	Fiber Splicing > 96			n/a	$ 31.86	$ 31.86	n/a	$ -	$ -
	Fiber Testing (OTDR/PM)		6	n/a	$ 11.80	$ 11.80	n/a	$ 70.80	$ 70.80
	Fiber Tags	Wrap-Around	14	$ 1.32	n/a	$ 1.32	$ 19.01	n/a	$ 19.01
Fiber Lengths									
	Fiber+Slack	96	5,203 '	$ 1.032	n/a	$ 1.03	$ 5,369.50	n/a	$ 5,369.50
Site									
	Replace Pole w/ 130' Steel Pole		2	$ 24,360.00	$ 13,500.00	$ 37,860.00	$ 48,720.00	$ 27,000.00	$ 75,720.00
	NEMA Cabinet, UPS, Disconnect		2	$ 4,200.00	$ 400.00	$ 4,600.00	$ 8,400.00	$ 800.00	$ 9,200.00
	Edge Equipment		2	$ 1,200.00	$ 350.00	$ 1,550.00	$ 2,400.00	$ 700.00	$ 3,100.00
	AC Power Connect (Service Drop)		2	n/a	$ 1,416.00	$ 1,416.00	n/a	$ 2,832.00	$ 2,832.00
	Antenna Array		2	$ 7,500.00	n/a	$ 7,500.00	$ 15,000.00	n/a	$ 15,000.00
	Cabling System		2	$ 720.00	$ 1,200.00	$ 1,920.00	$ 1,440.00	$ 2,400.00	$ 3,840.00
	Site Installation (Wireless)		2	n/a	$ 1,500.00	$ 1,500.00	n/a	$ 3,000.00	$ 3,000.00
	Site Prep		2	n/a	$ 10,000.00	$ 10,000.00	n/a	$ 20,000.00	$ 20,000.00
				$ -	$ -	$ -	$ -	$ -	$ -
Misc.									
500 '	Install Fiber Optic Marker Sign	Fiberglass	10	$ 60.00	$ 17.70	$ 77.70	$ 600.00	$ 177.00	$ 777.00
				$ -	$ -	$ -	$ -	$ -	$ -
				$ -	$ -	$ -	$ -	$ -	$ -
						Subtotal Cost:	$ 97,204.78	$ 120,062.65	$ 217,267.43

Total Material Cost: **$ 97,204.78**
Labor/Equip. Total: **$ 120,062.65**
Total Construction Cost: **$ 217,267.43**

Orcas Power & Light Coorperative - Unit Totals
OSP Construction Estimate
- Segment 706.3-LZ09

Aerial	Underground	Existing Duct	Poles	AP's	Submarine Cable
2,308 '	3,255 '	436 '	11	1	

	Unit Description	Type	Unit Quantity	Material Cost	Labor/Equip. Cost	Total Unit Cost	Material Total	Labor/Equip. Total	Ext. Total
Trenching/ Plow									
	Trench New	24" Depth	3,255 '	n/a	$ 8.20	$ 8.20	n/a	$ 26,691.00	$ 26,691.00
15%	Rock Adder		488 '	n/a	$ 13.00	$ 13.00	n/a	$ 6,347.25	$ 6,347.25
Conduit Placement									
	Place (2) 2" HDPE	2	3,255 '	$ 1.61	$ 0.89	$ 2.49	$ 5,234.04	$ 2,880.68	$ 8,114.72
Locate Items									
	Warning Tape	Non-Detect	3,255 '	$ 0.04	$ 0.12	$ 0.15	$ 117.18	$ 384.09	$ 501.27
	Locate Wire (#12)	Insulated/Solid	3,255 '	$ 0.18	$ 0.18	$ 0.36	$ 585.90	$ 576.14	$ 1,162.04
Remove & Restore									
3%	General R&R		98 '	n/a	$ 14.16	$ 14.16	n/a	$ 1,387.68	$ 1,387.68
Fiber Placement in Conduit									
	Fiber Optic Cable	12, 24 ,96	3,691 '	n/a	$ 0.78	$ 0.78	n/a	$ 2,878.98	$ 2,878.98
Handholes									
1,000 '	HH-3 (20k)		4	$ 1,200.00	$ 550.00	$ 1,750.00	$ 4,800.00	$ 2,200.00	$ 7,000.00
Slack Coil									
100 '	Slack Coil FOC in HH	12, 24, 96	400 '	n/a	$ 0.45	$ 0.45	n/a	$ 179.36	$ 179.36
200 '	Slack Coil FOC on Snowshoes	12, 24, 96	400 '	n/a	$ 0.92	$ 0.92	n/a	$ 368.16	$ 368.16
Aerial									
	Pole Attachment		11	$ 28.80	$ 41.30	$ 70.10	$ 316.80	$ 454.30	$ 771.10
	Place ADSS FOC (roadside)		2,308 '	n/a	$ 1.30	$ 1.30	n/a	$ 2,995.78	$ 2,995.78
15%	Aerial Make Ready per Pole		2	$ 42.00	$ 177.00	$ 219.00	$ 84.00	$ 354.00	$ 438.00
5%	Place Extension Arm		1	$ 54.00	$ 59.00	$ 113.00	$ 54.00	$ 59.00	$ 113.00
10%	Place Anchor & Guy		2	$ 102.00	$ 295.00	$ 397.00	$ 204.00	$ 590.00	$ 794.00
2,000 '	Place Snow-shoes		2	$ 114.00	$ 177.00	$ 291.00	$ 228.00	$ 354.00	$ 582.00
Splicing Items									
	Splice Case	*>144*	1	$ 558.00	$ 295.00	$ 853.00	$ 558.00	$ 295.00	$ 853.00
	Splice Trays	24 slot	4	$ 30.00	n/a	$ 30.00	$ 120.00	n/a	$ 120.00
	Fiber Splicing < 12		12	n/a	$ 47.20	$ 47.20	n/a	$ 566.40	$ 566.40
	Fiber Splicing > 96			n/a	$ 31.86	$ 31.86	n/a	$ -	$ -
	Fiber Testing (OTDR/PM)		6	n/a	$ 11.80	$ 11.80	n/a	$ 70.80	$ 70.80
	Fiber Tags	Wrap-Around	24	$ 1.32	n/a	$ 1.32	$ 31.68	n/a	$ 31.68
Fiber Lengths									
	Fiber+Slack	96	6,799 '	$ 1.032	n/a	$ 1.03	$ 7,016.57	n/a	$ 7,016.57
Site									
	Replace Pole w/ 130' Steel Pole		1	$ 24,360.00	$ 13,500.00	$ 37,860.00	$ 24,360.00	$ 13,500.00	$ 37,860.00
	NEMA Cabinet, UPS, Disconnect		1	$ 4,200.00	$ 400.00	$ 4,600.00	$ 4,200.00	$ 400.00	$ 4,600.00
	Edge Equipment		1	$ 1,200.00	$ 350.00	$ 1,550.00	$ 1,200.00	$ 350.00	$ 1,550.00
	AC Power Connect (Service Drop)		1	n/a	$ 1,416.00	$ 1,416.00	n/a	$ 1,416.00	$ 1,416.00
	Antenna Array		1	$ 7,500.00	n/a	$ 7,500.00	$ 7,500.00	n/a	$ 7,500.00
	Cabling System		1	$ 720.00	$ 1,200.00	$ 1,920.00	$ 720.00	$ 1,200.00	$ 1,920.00
	Site Installation (Wireless)		1	n/a	$ 1,500.00	$ 1,500.00	n/a	$ 1,500.00	$ 1,500.00
	Site Prep		1	n/a	$ 10,000.00	$ 10,000.00	n/a	$ 10,000.00	$ 10,000.00
				$ -	$ -	$ -	$ -	$ -	$ -
Misc.									
500 '	Install Fiber Optic Marker Sign	Fiberglass	7	$ 60.00	$ 17.70	$ 77.70	$ 420.00	$ 123.90	$ 543.90
				$ -	$ -	$ -	$ -	$ -	$ -
				$ -	$ -	$ -	$ -	$ -	$ -
						Subtotal Cost:	$ 57,750.17	$ 78,122.51	$ 135,872.68

Total Material Cost: $ 57,750.17
Labor/Equip. Total: $ 78,122.51
Total Construction Cost: $ 135,872.68

Orcas Power & Light Coorperative - Unit Totals
OSP Construction Estimate
- Segment 706.3-LZ10

Aerial	Underground	Existing Duct	Poles	AP's	Submarine Cable
13,128 '	7,274 '	9,159 '	42	2	

	Unit Description	Type	Unit Quantity	Material Cost	Labor/Equip. Cost	Total Unit Cost	Material Total	Labor/Equip. Total	Ext. Total
Trenching/ Plow									
	Trench New	24" Depth	7,274 '	n/a	$ 8.20	$ 8.20	n/a	$ 59,646.80	$ 59,646.80
15%	Rock Adder		1,091 '	n/a	$ 13.00	$ 13.00	n/a	$ 14,184.30	$ 14,184.30
Conduit Placement									
	Place (2) 2" HDPE	2	7,274 '	$ 1.61	$ 0.89	$ 2.49	$ 11,696.59	$ 6,437.49	$ 18,134.08
Locate Items									
	Warning Tape	Non-Detect	7,274 '	$ 0.04	$ 0.12	$ 0.15	$ 261.86	$ 858.33	$ 1,120.20
	Locate Wire (#12)	Insulated/Solid	7,274 '	$ 0.18	$ 0.18	$ 0.36	$ 1,309.32	$ 1,287.50	$ 2,596.82
Remove & Restore									
3%	General R&R	Asphalt	219 '	n/a	$ 14.16	$ 14.16	n/a	$ 3,101.04	$ 3,101.04
Fiber Placement in Conduit									
	Fiber Optic Cable	12, 24 ,96	16,433 '	n/a	$ 0.78	$ 0.78	n/a	$ 12,817.74	$ 12,817.74
Handholes									
1,000 '	HH-3 (20k)		8	$ 1,200.00	$ 550.00	$ 1,750.00	$ 9,600.00	$ 4,400.00	$ 14,000.00
Slack Coil									
100 '	Slack Coil FOC in HH	12, 24, 96	800 '	n/a	$ 0.45	$ 0.45	n/a	$ 358.72	$ 358.72
200 '	Slack Coil FOC on Snowshoes	12, 24, 96	1,400 '	n/a	$ 0.92	$ 0.92	n/a	$ 1,288.56	$ 1,288.56
Aerial									
	Pole Attachment		42	$ 28.80	$ 41.30	$ 70.10	$ 1,209.60	$ 1,734.60	$ 2,944.20
	Place ADSS FOC (roadside)		13,128 '	n/a	$ 1.30	$ 1.30	n/a	$ 17,040.14	$ 17,040.14
15%	Aerial Make Ready per Pole		7	$ 42.00	$ 177.00	$ 219.00	$ 294.00	$ 1,239.00	$ 1,533.00
5%	Place Extension Arm		3	$ 54.00	$ 59.00	$ 113.00	$ 162.00	$ 177.00	$ 339.00
10%	Place Anchor & Guy		5	$ 102.00	$ 295.00	$ 397.00	$ 510.00	$ 1,475.00	$ 1,985.00
2,000 '	Place Snow-shoes		7	$ 114.00	$ 177.00	$ 291.00	$ 798.00	$ 1,239.00	$ 2,037.00
Splicing Items									
	Splice Case	*>144*	2	$ 558.00	$ 295.00	$ 853.00	$ 1,116.00	$ 590.00	$ 1,706.00
	Splice Trays	24 slot	8	$ 30.00	n/a	$ 30.00	$ 240.00	n/a	$ 240.00
	Fiber Splicing < 12		6	n/a	$ 47.20	$ 47.20	n/a	$ 283.20	$ 283.20
	Fiber Splicing > 96		192	n/a	$ 31.86	$ 31.86	n/a	$ 6,117.12	$ 6,117.12
	Fiber Testing (OTDR/PM)		12	n/a	$ 11.80	$ 11.80	n/a	$ 141.60	$ 141.60
	Fiber Tags	Wrap-Around	72	$ 1.32	n/a	$ 1.32	$ 95.04	n/a	$ 95.04
Fiber Lengths									
	Fiber+Slack	96	31,761 '	$ 1.032	n/a	$ 1.03	$ 32,777.35	n/a	$ 32,777.35
Site									
	Replace Pole w/ 130' Steel Pole		2	$ 24,360.00	$ 13,500.00	$ 37,860.00	$ 48,720.00	$ 27,000.00	$ 75,720.00
	NEMA Cabinet, UPS, Disconnect		2	$ 4,200.00	$ 400.00	$ 4,600.00	$ 8,400.00	$ 800.00	$ 9,200.00
	Edge Equipment		2	$ 1,200.00	$ 350.00	$ 1,550.00	$ 2,400.00	$ 700.00	$ 3,100.00
	AC Power Connect (Service Drop)		2	n/a	$ 1,416.00	$ 1,416.00	n/a	$ 2,832.00	$ 2,832.00
	Antenna Array		2	$ 7,500.00	n/a	$ 7,500.00	$ 15,000.00	n/a	$ 15,000.00
	Cabling System		2	$ 720.00	$ 1,200.00	$ 1,920.00	$ 1,440.00	$ 2,400.00	$ 3,840.00
	Site Installation (Wireless)		2	n/a	$ 1,500.00	$ 1,500.00	n/a	$ 3,000.00	$ 3,000.00
	Site Prep		2	n/a	$ 10,000.00	$ 10,000.00	n/a	$ 20,000.00	$ 20,000.00
				$ -	$ -	$ -	$ -	$ -	$ -
Misc.									
500 '	Install Fiber Optic Marker Sign	Fiberglass	15	$ 60.00	$ 17.70	$ 77.70	$ 900.00	$ 265.50	$ 1,165.50
				$ -	$ -	$ -	$ -	$ -	$ -
				$ -	$ -	$ -	$ -	$ -	$ -
						Subtotal Cost:	$ 136,929.77	$ 191,414.64	$ 328,344.41

Total Material Cost: $ 136,929.77
Labor/Equip. Total: $ 191,414.64
Total Construction Cost: $ 328,344.41

Orcas Power & Light Coorperative - Unit Totals
OSP Construction Estimate
- Segment 706.3-LZ11

Aerial	Underground	Existing Duct	Poles	AP's	Submarine Cable
4,164 '	5,122 '	2,137 '	20	1	

	Unit Description	Type	Unit Quantity	Material Cost	Labor/Equip. Cost	Total Unit Cost	Material Total	Labor/Equip. Total	Ext. Total
Trenching/ Plow									
	Trench New	24" Depth	5,122 '	n/a	$ 8.20	$ 8.20	n/a	$ 42,000.40	$ 42,000.40
15%	Rock Adder		768 '	n/a	$ 13.00	$ 13.00	n/a	$ 9,987.90	$ 9,987.90
Conduit Placement									
	Place (2) 2" HDPE	2	5,122 '	$ 1.61	$ 0.89	$ 2.49	$ 8,236.18	$ 4,532.97	$ 12,769.15
Locate Items									
	Warning Tape	Non-Detect	5,122 '	$ 0.04	$ 0.12	$ 0.15	$ 184.39	$ 604.40	$ 788.79
	Locate Wire (#12)	Insulated/Solid	5,122 '	$ 0.18	$ 0.18	$ 0.36	$ 921.96	$ 906.59	$ 1,828.55
Remove & Restore									
3%	General R&R		154 '	n/a	$ 14.16	$ 14.16	n/a	$ 2,180.64	$ 2,180.64
Fiber Placement in Conduit									
	Fiber Optic Cable	12, 24 ,96	7,259 '	n/a	$ 0.78	$ 0.78	n/a	$ 5,662.02	$ 5,662.02
Handholes									
1,000 '	HH-3 (20k)		6	$ 1,200.00	$ 550.00	$ 1,750.00	$ 7,200.00	$ 3,300.00	$ 10,500.00
Slack Coil									
100 '	Slack Coil FOC in HH	12, 24, 96	600 '	n/a	$ 0.45	$ 0.45	n/a	$ 269.04	$ 269.04
200 '	Slack Coil FOC on Snowshoes	12, 24, 96	600 '	n/a	$ 0.92	$ 0.92	n/a	$ 552.24	$ 552.24
Aerial									
	Pole Attachment		20	$ 28.80	$ 41.30	$ 70.10	$ 576.00	$ 826.00	$ 1,402.00
	Place ADSS FOC (roadside)		4,164 '	n/a	$ 1.30	$ 1.30	n/a	$ 5,404.87	$ 5,404.87
15%	Aerial Make Ready per Pole		3	$ 42.00	$ 177.00	$ 219.00	$ 126.00	$ 531.00	$ 657.00
5%	Place Extension Arm		1	$ 54.00	$ 59.00	$ 113.00	$ 54.00	$ 59.00	$ 113.00
10%	Place Anchor & Guy		2	$ 102.00	$ 295.00	$ 397.00	$ 204.00	$ 590.00	$ 794.00
2,000 '	Place Snow-shoes		3	$ 114.00	$ 177.00	$ 291.00	$ 342.00	$ 531.00	$ 873.00
Splicing Items									
	Splice Case	*>144*	2	$ 558.00	$ 295.00	$ 853.00	$ 1,116.00	$ 590.00	$ 1,706.00
	Splice Trays	24 slot	8	$ 30.00	n/a	$ 30.00	$ 240.00	n/a	$ 240.00
	Fiber Splicing < 12		54	n/a	$ 47.20	$ 47.20	n/a	$ 2,548.80	$ 2,548.80
	Fiber Splicing > 96			n/a	$ 31.86	$ 31.86	n/a	$ -	$ -
	Fiber Testing (OTDR/PM)		6	n/a	$ 11.80	$ 11.80	n/a	$ 70.80	$ 70.80
	Fiber Tags	Wrap-Around	40	$ 1.32	n/a	$ 1.32	$ 52.27	n/a	$ 52.27
Fiber Lengths									
	Fiber+Slack	96	12,623 '	$ 1.032	n/a	$ 1.03	$ 13,026.94	n/a	$ 13,026.94
Site									
	Replace Pole w/ 130' Steel Pole		1	$ 24,360.00	$ 13,500.00	$ 37,860.00	$ 24,360.00	$ 13,500.00	$ 37,860.00
	NEMA Cabinet, UPS, Disconnect		1	$ 4,200.00	$ 400.00	$ 4,600.00	$ 4,200.00	$ 400.00	$ 4,600.00
	Edge Equipment		1	$ 1,200.00	$ 350.00	$ 1,550.00	$ 1,200.00	$ 350.00	$ 1,550.00
	AC Power Connect (Service Drop)		1	n/a	$ 1,416.00	$ 1,416.00	n/a	$ 1,416.00	$ 1,416.00
	Antenna Array		1	$ 7,500.00	n/a	$ 7,500.00	$ 7,500.00	n/a	$ 7,500.00
	Cabling System		1	$ 720.00	$ 1,200.00	$ 1,920.00	$ 720.00	$ 1,200.00	$ 1,920.00
	Site Installation (Wireless)		1	n/a	$ 1,500.00	$ 1,500.00	n/a	$ 1,500.00	$ 1,500.00
	Site Prep		1	n/a	$ 10,000.00	$ 10,000.00	n/a	$ 10,000.00	$ 10,000.00
				$ -	$ -	$ -	$ -	$ -	$ -
Misc.									
500 '	Install Fiber Optic Marker Sign	Fiberglass	11	$ 60.00	$ 17.70	$ 77.70	$ 660.00	$ 194.70	$ 854.70
				$ -	$ -	$ -	$ -	$ -	$ -
				$ -	$ -	$ -	$ -	$ -	$ -
						Subtotal Cost:	$ 70,919.74	$ 109,708.37	$ 180,628.11

Total Material Cost: $ 70,919.74
Labor/Equip. Total: $ 109,708.37
Total Construction Cost: $ 180,628.11

Orcas Power & Light Coorperative - Unit Totals
OSP Construction Estimate
- Segment 706.3-LZ12

Aerial	Underground	Existing Duct	Poles	AP's	Submarine Cable
9,308 '	0 '	0 '	28	1	

	Unit Description	Type	Unit Quantity	Material Cost	Labor/Equip. Cost	Total Unit Cost	Material Total	Labor/Equip. Total	Ext. Total
Trenching/ Plow									
	Trench New	24" Depth	'	n/a	$ 8.20	$ 8.20	n/a	$ -	$ -
15%	Rock Adder		'	n/a	$ 13.00	$ 13.00	n/a	$ -	$ -
Conduit Placement									
	Place (2) 2" HDPE	2	'	$ 1.61	$ 0.89	$ 2.49	$ -	$ -	$ -
Locate Items									
	Warning Tape	Non-Detect	'	$ 0.04	$ 0.12	$ 0.15	$ -	$ -	$ -
	Locate Wire (#12)	Insulated/Solid	'	$ 0.18	$ 0.18	$ 0.36	$ -	$ -	$ -
Remove & Restore									
3%	General R&R		'	n/a	$ 14.16	$ 14.16	n/a	$ -	$ -
Fiber Placement in Conduit									
	Fiber Optic Cable	12, 24 ,96	'	n/a	$ 0.78	$ 0.78	n/a	$ -	$ -
Handholes									
1,000 '	HH-3 (20k)		0	$ 1,200.00	$ 550.00	$ 1,750.00	$ -	$ -	$ -
Slack Coil									
100 '	Slack Coil FOC in HH	12, 24, 96	'	n/a	$ 0.45	$ 0.45	n/a	$ -	$ -
200 '	Slack Coil FOC on Snowshoes	12, 24, 96	1,000 '	n/a	$ 0.92	$ 0.92	n/a	$ 920.40	$ 920.40
Aerial									
	Pole Attachment		28	$ 28.80	$ 41.30	$ 70.10	$ 806.40	$ 1,156.40	$ 1,962.80
	Place ADSS FOC (roadside)		9,308 '	n/a	$ 1.30	$ 1.30	n/a	$ 12,081.78	$ 12,081.78
15%	Aerial Make Ready per Pole		5	$ 42.00	$ 177.00	$ 219.00	$ 210.00	$ 885.00	$ 1,095.00
5%	Place Extension Arm		2	$ 54.00	$ 59.00	$ 113.00	$ 108.00	$ 118.00	$ 226.00
10%	Place Anchor & Guy		3	$ 102.00	$ 295.00	$ 397.00	$ 306.00	$ 885.00	$ 1,191.00
2,000 '	Place Snow-shoes		5	$ 114.00	$ 177.00	$ 291.00	$ 570.00	$ 885.00	$ 1,455.00
Splicing Items									
	Splice Case	*>144*	1	$ 558.00	$ 295.00	$ 853.00	$ 558.00	$ 295.00	$ 853.00
	Splice Trays	24 slot	4	$ 30.00	n/a	$ 30.00	$ 120.00	n/a	$ 120.00
	Fiber Splicing < 12		30	n/a	$ 47.20	$ 47.20	n/a	$ 1,416.00	$ 1,416.00
	Fiber Splicing > 96			n/a	$ 31.86	$ 31.86	n/a	$ -	$ -
	Fiber Testing (OTDR/PM)		6	n/a	$ 11.80	$ 11.80	n/a	$ 70.80	$ 70.80
	Fiber Tags	Wrap-Around	35	$ 1.32	n/a	$ 1.32	$ 45.94	n/a	$ 45.94
Fiber Lengths									
	Fiber+Slack	96	10,308 '	$ 1.032	n/a	$ 1.03	$ 10,637.86	n/a	$ 10,637.86
Site									
	Replace Pole w/ 130' Steel Pole		1	$ 24,360.00	$ 13,500.00	$ 37,860.00	$ 24,360.00	$ 13,500.00	$ 37,860.00
	NEMA Cabinet, UPS, Disconnect		1	$ 4,200.00	$ 400.00	$ 4,600.00	$ 4,200.00	$ 400.00	$ 4,600.00
	Edge Equipment		1	$ 1,200.00	$ 350.00	$ 1,550.00	$ 1,200.00	$ 350.00	$ 1,550.00
	AC Power Connect (Service Drop)		1	n/a	$ 1,416.00	$ 1,416.00	n/a	$ 1,416.00	$ 1,416.00
	Antenna Array		1	$ 7,500.00	n/a	$ 7,500.00	$ 7,500.00	n/a	$ 7,500.00
	Cabling System		1	$ 720.00	$ 1,200.00	$ 1,920.00	$ 720.00	$ 1,200.00	$ 1,920.00
	Site Installation (Wireless)		1	n/a	$ 1,500.00	$ 1,500.00	n/a	$ 1,500.00	$ 1,500.00
	Site Prep		1	n/a	$ 10,000.00	$ 10,000.00	n/a	$ 10,000.00	$ 10,000.00
				$ -	$ -	$ -	$ -	$ -	$ -
Misc.									
500 '	Install Fiber Optic Marker Sign	Fiberglass	0	$ 60.00	$ 17.70	$ 77.70	$ -	$ -	$ -
				$ -	$ -	$ -	$ -	$ -	$ -
				$ -	$ -	$ -	$ -	$ -	$ -
						Subtotal Cost:	$ 51,342.19	$ 47,079.38	$ 98,421.58

Total Material Cost: $ 51,342.19
Labor/Equip. Total: $ 47,079.38
Total Construction Cost: $ 98,421.58

Orcas Power & Light Coorperative - Unit Totals
OSP Construction Estimate
- Segment 706.3-OR01

Aerial	Underground	Existing Duct	Poles	AP's	Submarine Cable
0 '	2,250 '	0 '	0	3	

	Unit Description	Type	Unit Quantity	Material Cost	Labor/Equip. Cost	Total Unit Cost	Material Total	Labor/Equip. Total	Ext. Total
Trenching/ Plow									
	Trench New	24" Depth	2,250 '	n/a	$ 8.20	$ 8.20	n/a	$ 18,450.00	$ 18,450.00
15%	Rock Adder		338 '	n/a	$ 13.00	$ 13.00	n/a	$ 4,387.50	$ 4,387.50
Conduit Placement									
	Place (2) 2" HDPE	2	2,250 '	$ 1.61	$ 0.89	$ 2.49	$ 3,618.00	$ 1,991.25	$ 5,609.25
Locate Items									
	Warning Tape	Non-Detect	2,250 '	$ 0.04	$ 0.12	$ 0.15	$ 81.00	$ 265.50	$ 346.50
	Locate Wire (#12)	Insulated/Solid	2,250 '	$ 0.18	$ 0.18	$ 0.36	$ 405.00	$ 398.25	$ 803.25
Remove & Restore									
3%	General R&R		68 '	n/a	$ 14.16	$ 14.16	n/a	$ 962.88	$ 962.88
Fiber Placement in Conduit									
	Fiber Optic Cable	12, 24 ,96	2,250 '	n/a	$ 0.78	$ 0.78	n/a	$ 1,755.00	$ 1,755.00
Handholes									
1,000 '	HH-3 (20k)		3	$ 1,200.00	$ 550.00	$ 1,750.00	$ 3,600.00	$ 1,650.00	$ 5,250.00
Slack Coil									
100 '	Slack Coil FOC in HH	12, 24, 96	300 '	n/a	$ 0.45	$ 0.45	n/a	$ 134.52	$ 134.52
200 '	Slack Coil FOC on Snowshoes	12, 24, 96	'	n/a	$ 0.92	$ 0.92	n/a	$ -	$ -
Aerial									
	Pole Attachment		0	$ 28.80	$ 41.30	$ 70.10	$ -	$ -	$ -
	Place ADSS FOC (roadside)		'	n/a	$ 1.30	$ 1.30	n/a	$ -	$ -
15%	Aerial Make Ready per Pole		0	$ 42.00	$ 177.00	$ 219.00	$ -	$ -	$ -
5%	Place Extension Arm		0	$ 54.00	$ 59.00	$ 113.00	$ -	$ -	$ -
10%	Place Anchor & Guy		0	$ 102.00	$ 295.00	$ 397.00	$ -	$ -	$ -
2,000 '	Place Snow-shoes		0	$ 114.00	$ 177.00	$ 291.00	$ -	$ -	$ -
Splicing Items									
	Splice Case	*>144*	7	$ 558.00	$ 295.00	$ 853.00	$ 3,906.00	$ 2,065.00	$ 5,971.00
	Splice Trays	24 slot	28	$ 30.00	n/a	$ 30.00	$ 840.00	n/a	$ 840.00
	Fiber Splicing < 12		24	n/a	$ 47.20	$ 47.20	n/a	$ 1,132.80	$ 1,132.80
	Fiber Splicing > 96		396	n/a	$ 31.86	$ 31.86	n/a	$ 12,616.56	$ 12,616.56
	Fiber Testing (OTDR/PM)			n/a	$ 11.80	$ 11.80	n/a	$ -	$ -
	Fiber Tags	Wrap-Around	11	$ 1.32	n/a	$ 1.32	$ 14.26	n/a	$ 14.26
Fiber Lengths									
	Fiber+Slack	96	2,550 '	$ 1.032	n/a	$ 1.03	$ 2,631.60	n/a	$ 2,631.60
Site									
	Replace Pole w/ 130' Steel Pole		3	$ 24,360.00	$ 13,500.00	$ 37,860.00	$ 73,080.00	$ 40,500.00	$ 113,580.00
	NEMA Cabinet, UPS, Disconnect		3	$ 4,200.00	$ 400.00	$ 4,600.00	$ 12,600.00	$ 1,200.00	$ 13,800.00
	Edge Equipment		3	$ 1,200.00	$ 350.00	$ 1,550.00	$ 3,600.00	$ 1,050.00	$ 4,650.00
	AC Power Connect (Service Drop)		3	n/a	$ 1,416.00	$ 1,416.00	n/a	$ 4,248.00	$ 4,248.00
	Antenna Array		3	$ 7,500.00	n/a	$ 7,500.00	$ 22,500.00	n/a	$ 22,500.00
	Cabling System		3	$ 720.00	$ 1,200.00	$ 1,920.00	$ 2,160.00	$ 3,600.00	$ 5,760.00
	Site Installation (Wireless)		3	n/a	$ 1,500.00	$ 1,500.00	n/a	$ 4,500.00	$ 4,500.00
	Site Prep		3	n/a	$ 10,000.00	$ 10,000.00	n/a	$ 30,000.00	$ 30,000.00
				$ -	$ -	$ -	$ -	$ -	$ -
Misc.									
500 '	Install Fiber Optic Marker Sign	Fiberglass	5	$ 60.00	$ 17.70	$ 77.70	$ 300.00	$ 88.50	$ 388.50
				$ -	$ -	$ -	$ -	$ -	$ -
				$ -	$ -	$ -	$ -	$ -	$ -
						Subtotal Cost:	$ 129,335.86	$ 130,995.76	$ 260,331.62

Total Material Cost: **$ 129,335.86**
Labor/Equip. Total: **$ 130,995.76**
Total Construction Cost: **$ 260,331.62**

Orcas Power & Light Coorperative - Unit Totals
OSP Construction Estimate
- Segment 706.3-OR02

Aerial	Underground	Existing Duct	Poles	AP's	Submarine Cable
1,152 '	621 '	673 '	8	1	

	Unit Description	Type	Unit Quantity	Material Cost	Labor/Equip. Cost	Total Unit Cost	Material Total	Labor/Equip. Total	Ext. Total
Trenching/ Plow									
	Trench New	24" Depth	621 '	n/a	$ 8.20	$ 8.20	n/a	$ 5,092.20	$ 5,092.20
15%	Rock Adder		93 '	n/a	$ 13.00	$ 13.00	n/a	$ 1,210.95	$ 1,210.95
Conduit Placement									
	Place (2) 2" HDPE	2	621 '	$ 1.61	$ 0.89	$ 2.49	$ 998.57	$ 549.59	$ 1,548.15
Locate Items									
	Warning Tape	Non-Detect	621 '	$ 0.04	$ 0.12	$ 0.15	$ 22.36	$ 73.28	$ 95.63
	Locate Wire (#12)	Insulated/Solid	621 '	$ 0.18	$ 0.18	$ 0.36	$ 111.78	$ 109.92	$ 221.70
Remove & Restore									
3%	General R&R		19 '	n/a	$ 14.16	$ 14.16	n/a	$ 269.04	$ 269.04
Fiber Placement in Conduit									
	Fiber Optic Cable	12, 24 ,96	1,294 '	n/a	$ 0.78	$ 0.78	n/a	$ 1,009.32	$ 1,009.32
Handholes									
1,000 '	HH-3 (20k)		1	$ 1,200.00	$ 550.00	$ 1,750.00	$ 1,200.00	$ 550.00	$ 1,750.00
Slack Coil									
100 '	Slack Coil FOC in HH	12, 24, 96	100 '	n/a	$ 0.45	$ 0.45	n/a	$ 44.84	$ 44.84
200 '	Slack Coil FOC on Snowshoes	12, 24, 96	200 '	n/a	$ 0.92	$ 0.92	n/a	$ 184.08	$ 184.08
Aerial									
	Pole Attachment		8	$ 28.80	$ 41.30	$ 70.10	$ 230.40	$ 330.40	$ 560.80
	Place ADSS FOC (roadside)		1,152 '	n/a	$ 1.30	$ 1.30	n/a	$ 1,495.30	$ 1,495.30
15%	Aerial Make Ready per Pole		2	$ 42.00	$ 177.00	$ 219.00	$ 84.00	$ 354.00	$ 438.00
5%	Place Extension Arm		1	$ 54.00	$ 59.00	$ 113.00	$ 54.00	$ 59.00	$ 113.00
10%	Place Anchor & Guy		1	$ 102.00	$ 295.00	$ 397.00	$ 102.00	$ 295.00	$ 397.00
2,000 '	Place Snow-shoes		1	$ 114.00	$ 177.00	$ 291.00	$ 114.00	$ 177.00	$ 291.00
Splicing Items									
	Splice Case	*>144*	1	$ 558.00	$ 295.00	$ 853.00	$ 558.00	$ 295.00	$ 853.00
	Splice Trays	24 slot	4	$ 30.00	n/a	$ 30.00	$ 120.00	n/a	$ 120.00
	Fiber Splicing < 12		12	n/a	$ 47.20	$ 47.20	n/a	$ 566.40	$ 566.40
	Fiber Splicing > 96			n/a	$ 31.86	$ 31.86	n/a	$ -	$ -
	Fiber Testing (OTDR/PM)		6	n/a	$ 11.80	$ 11.80	n/a	$ 70.80	$ 70.80
	Fiber Tags	Wrap-Around	13	$ 1.32	n/a	$ 1.32	$ 17.42	n/a	$ 17.42
Fiber Lengths									
	Fiber+Slack	96	2,746 '	$ 1.032	n/a	$ 1.03	$ 2,833.87	n/a	$ 2,833.87
Site									
	Replace Pole w/ 130' Steel Pole		1	$ 24,360.00	$ 13,500.00	$ 37,860.00	$ 24,360.00	$ 13,500.00	$ 37,860.00
	NEMA Cabinet, UPS, Disconnect		1	$ 4,200.00	$ 400.00	$ 4,600.00	$ 4,200.00	$ 400.00	$ 4,600.00
	Edge Equipment		1	$ 1,200.00	$ 350.00	$ 1,550.00	$ 1,200.00	$ 350.00	$ 1,550.00
	AC Power Connect (Service Drop)		1	n/a	$ 1,416.00	$ 1,416.00	n/a	$ 1,416.00	$ 1,416.00
	Antenna Array		1	$ 7,500.00	n/a	$ 7,500.00	$ 7,500.00	n/a	$ 7,500.00
	Cabling System		1	$ 720.00	$ 1,200.00	$ 1,920.00	$ 720.00	$ 1,200.00	$ 1,920.00
	Site Installation (Wireless)		1	n/a	$ 1,500.00	$ 1,500.00	n/a	$ 1,500.00	$ 1,500.00
	Site Prep		1	n/a	$ 10,000.00	$ 10,000.00	n/a	$ 10,000.00	$ 10,000.00
				$ -	$ -	$ -	$ -	$ -	$ -
Misc.									
500 '	Install Fiber Optic Marker Sign	Fiberglass	2	$ 60.00	$ 17.70	$ 77.70	$ 120.00	$ 35.40	$ 155.40
				$ -	$ -	$ -	$ -	$ -	$ -
				$ -	$ -	$ -	$ -	$ -	$ -
						Subtotal Cost:	$ 44,546.40	$ 41,137.51	$ 85,683.91

Total Material Cost: **$ 44,546.40**
Labor/Equip. Total: **$ 41,137.51**
Total Construction Cost: **$ 85,683.91**

Orcas Power & Light Coorperative - Unit Totals
OSP Construction Estimate
- Segment 706.3-OR03

Aerial	Underground	Existing Duct	Poles	AP's	Submarine Cable
6,495 '	13,517 '	1,869 '	22	2	

	Unit Description	Type	Unit Quantity	Material Cost	Labor/Equip. Cost	Total Unit Cost	Material Total	Labor/Equip. Total	Ext. Total
Trenching/ Plow									
	Trench New	24" Depth	13,517 '	n/a	$ 8.20	$ 8.20	n/a	$ 110,839.40	$ 110,839.40
15%	Rock Adder		2,028 '	n/a	$ 13.00	$ 13.00	n/a	$ 26,358.15	$ 26,358.15
Conduit Placement									
	Place (2) 2" HDPE	2	13,517 '	$ 1.61	$ 0.89	$ 2.49	$ 21,735.34	$ 11,962.55	$ 33,697.88
Locate Items									
	Warning Tape	Non-Detect	13,517 '	$ 0.04	$ 0.12	$ 0.15	$ 486.61	$ 1,595.01	$ 2,081.62
	Locate Wire (#12)	Insulated/Solid	13,517 '	$ 0.18	$ 0.18	$ 0.36	$ 2,433.06	$ 2,392.51	$ 4,825.57
Remove & Restore									
3%	General R&R		406 '	n/a	$ 14.16	$ 14.16	n/a	$ 5,748.96	$ 5,748.96
Fiber Placement in Conduit									
	Fiber Optic Cable	12, 24 ,96	15,386 '	n/a	$ 0.78	$ 0.78	n/a	$ 12,001.08	$ 12,001.08
Handholes									
1,000 '	HH-3 (20k)		14	$ 1,200.00	$ 550.00	$ 1,750.00	$ 16,800.00	$ 7,700.00	$ 24,500.00
Slack Coil									
100 '	Slack Coil FOC in HH	12, 24, 96	1,400 '	n/a	$ 0.45	$ 0.45	n/a	$ 627.76	$ 627.76
200 '	Slack Coil FOC on Snowshoes	12, 24, 96	800 '	n/a	$ 0.92	$ 0.92	n/a	$ 736.32	$ 736.32
Aerial									
	Pole Attachment		22	$ 28.80	$ 41.30	$ 70.10	$ 633.60	$ 908.60	$ 1,542.20
	Place ADSS FOC (roadside)		6,495 '	n/a	$ 1.30	$ 1.30	n/a	$ 8,430.51	$ 8,430.51
15%	Aerial Make Ready per Pole		4	$ 42.00	$ 177.00	$ 219.00	$ 168.00	$ 708.00	$ 876.00
5%	Place Extension Arm		2	$ 54.00	$ 59.00	$ 113.00	$ 108.00	$ 118.00	$ 226.00
10%	Place Anchor & Guy		3	$ 102.00	$ 295.00	$ 397.00	$ 306.00	$ 885.00	$ 1,191.00
2,000 '	Place Snow-shoes		4	$ 114.00	$ 177.00	$ 291.00	$ 456.00	$ 708.00	$ 1,164.00
Splicing Items									
	Splice Case	*>144*	4	$ 558.00	$ 295.00	$ 853.00	$ 2,232.00	$ 1,180.00	$ 3,412.00
	Splice Trays	24 slot	16	$ 30.00	n/a	$ 30.00	$ 480.00	n/a	$ 480.00
	Fiber Splicing < 12		60	n/a	$ 47.20	$ 47.20	n/a	$ 2,832.00	$ 2,832.00
	Fiber Splicing > 96			n/a	$ 31.86	$ 31.86	n/a	$ -	$ -
	Fiber Testing (OTDR/PM)		12	n/a	$ 11.80	$ 11.80	n/a	$ 141.60	$ 141.60
	Fiber Tags	Wrap-Around	62	$ 1.32	n/a	$ 1.32	$ 82.37	n/a	$ 82.37
Fiber Lengths									
	Fiber+Slack	96	24,081 '	$ 1.032	n/a	$ 1.03	$ 24,851.59	n/a	$ 24,851.59
Site									
	Replace Pole w/ 130' Steel Pole		2	$ 24,360.00	$ 13,500.00	$ 37,860.00	$ 48,720.00	$ 27,000.00	$ 75,720.00
	NEMA Cabinet, UPS, Disconnect		2	$ 4,200.00	$ 400.00	$ 4,600.00	$ 8,400.00	$ 800.00	$ 9,200.00
	Edge Equipment		2	$ 1,200.00	$ 350.00	$ 1,550.00	$ 2,400.00	$ 700.00	$ 3,100.00
	AC Power Connect (Service Drop)		2	n/a	$ 1,416.00	$ 1,416.00	n/a	$ 2,832.00	$ 2,832.00
	Antenna Array		2	$ 7,500.00	n/a	$ 7,500.00	$ 15,000.00	n/a	$ 15,000.00
	Cabling System		2	$ 720.00	$ 1,200.00	$ 1,920.00	$ 1,440.00	$ 2,400.00	$ 3,840.00
	Site Installation (Wireless)		2	n/a	$ 1,500.00	$ 1,500.00	n/a	$ 3,000.00	$ 3,000.00
	Site Prep		2	n/a	$ 10,000.00	$ 10,000.00	n/a	$ 20,000.00	$ 20,000.00
				$ -	$ -	$ -	$ -	$ -	$ -
Misc.									
500 '	Install Fiber Optic Marker Sign	Fiberglass	28	$ 60.00	$ 17.70	$ 77.70	$ 1,680.00	$ 495.60	$ 2,175.60
				$ -	$ -	$ -	$ -	$ -	$ -
				$ -	$ -	$ -	$ -	$ -	$ -
						Subtotal Cost:	$ 148,412.57	$ 253,101.04	$ 401,513.61

Total Material Cost: $ 148,412.57
Labor/Equip. Total: $ 253,101.04
Total Construction Cost: $ 401,513.61

5/1/2012

Orcas Power & Light Coorperative - Unit Totals
OSP Construction Estimate
- Segment 706.3-OR04

Aerial	Underground	Existing Duct	Poles	AP's	Submarine Cable
0 '	6,907 '	2,029 '	0	1	

	Unit Description	Type	Unit Quantity	Material Cost	Labor/Equip. Cost	Total Unit Cost	Material Total	Labor/Equip. Total	Ext. Total
Trenching/ Plow									
	Trench New	24" Depth	6,907 '	n/a	$ 8.20	$ 8.20	n/a	$ 56,637.40	$ 56,637.40
15%	Rock Adder		1,036 '	n/a	$ 13.00	$ 13.00	n/a	$ 13,468.65	$ 13,468.65
Conduit Placement									
	Place (2) 2" HDPE	2	6,907 '	$ 1.61	$ 0.89	$ 2.49	$ 11,106.46	$ 6,112.70	$ 17,219.15
Locate Items									
	Warning Tape	Non-Detect	6,907 '	$ 0.04	$ 0.12	$ 0.15	$ 248.65	$ 815.03	$ 1,063.68
	Locate Wire (#12)	Insulated/Solid	6,907 '	$ 0.18	$ 0.18	$ 0.36	$ 1,243.26	$ 1,222.54	$ 2,465.80
Remove & Restore									
3%	General R&R		208 '	n/a	$ 14.16	$ 14.16	n/a	$ 2,945.28	$ 2,945.28
Fiber Placement in Conduit									
	Fiber Optic Cable	12, 24 ,96	8,936 '	n/a	$ 0.78	$ 0.78	n/a	$ 6,970.08	$ 6,970.08
Handholes									
1,000 '	HH-3 (20k)		7	$ 1,200.00	$ 550.00	$ 1,750.00	$ 8,400.00	$ 3,850.00	$ 12,250.00
Slack Coil									
100 '	Slack Coil FOC in HH	12, 24, 96	700 '	n/a	$ 0.45	$ 0.45	n/a	$ 313.88	$ 313.88
200 '	Slack Coil FOC on Snowshoes	12, 24, 96	'	n/a	$ 0.92	$ 0.92	n/a	$ -	$ -
Aerial									
	Pole Attachment		0	$ 28.80	$ 41.30	$ 70.10	$ -	$ -	$ -
	Place ADSS FOC (roadside)		'	n/a	$ 1.30	$ 1.30	n/a	$ -	$ -
15%	Aerial Make Ready per Pole		0	$ 42.00	$ 177.00	$ 219.00	$ -	$ -	$ -
5%	Place Extension Arm		0	$ 54.00	$ 59.00	$ 113.00	$ -	$ -	$ -
10%	Place Anchor & Guy		0	$ 102.00	$ 295.00	$ 397.00	$ -	$ -	$ -
2,000 '	Place Snow-shoes		0	$ 114.00	$ 177.00	$ 291.00	$ -	$ -	$ -
Splicing Items									
	Splice Case	*>144*	1	$ 558.00	$ 295.00	$ 853.00	$ 558.00	$ 295.00	$ 853.00
	Splice Trays	24 slot	4	$ 30.00	n/a	$ 30.00	$ 120.00	n/a	$ 120.00
	Fiber Splicing < 12		12	n/a	$ 47.20	$ 47.20	n/a	$ 566.40	$ 566.40
	Fiber Splicing > 96			n/a	$ 31.86	$ 31.86	n/a	$ -	$ -
	Fiber Testing (OTDR/PM)		6	n/a	$ 11.80	$ 11.80	n/a	$ 70.80	$ 70.80
	Fiber Tags	Wrap-Around	18	$ 1.32	n/a	$ 1.32	$ 23.76	n/a	$ 23.76
Fiber Lengths									
	Fiber+Slack	96	9,636 '	$ 1.032	n/a	$ 1.03	$ 9,944.35	n/a	$ 9,944.35
Site									
	Replace Pole w/ 130' Steel Pole		1	$ 24,360.00	$ 13,500.00	$ 37,860.00	$ 24,360.00	$ 13,500.00	$ 37,860.00
	NEMA Cabinet, UPS, Disconnect		1	$ 4,200.00	$ 400.00	$ 4,600.00	$ 4,200.00	$ 400.00	$ 4,600.00
	Edge Equipment		1	$ 1,200.00	$ 350.00	$ 1,550.00	$ 1,200.00	$ 350.00	$ 1,550.00
	AC Power Connect (Service Drop)		1	n/a	$ 1,416.00	$ 1,416.00	n/a	$ 1,416.00	$ 1,416.00
	Antenna Array		1	$ 7,500.00	n/a	$ 7,500.00	$ 7,500.00	n/a	$ 7,500.00
	Cabling System		1	$ 720.00	$ 1,200.00	$ 1,920.00	$ 720.00	$ 1,200.00	$ 1,920.00
	Site Installation (Wireless)		1	n/a	$ 1,500.00	$ 1,500.00	n/a	$ 1,500.00	$ 1,500.00
	Site Prep		1	n/a	$ 10,000.00	$ 10,000.00	n/a	$ 10,000.00	$ 10,000.00
				$ -	$ -	$ -	$ -	$ -	$ -
Misc.									
500 '	Install Fiber Optic Marker Sign	Fiberglass	14	$ 60.00	$ 17.70	$ 77.70	$ 840.00	$ 247.80	$ 1,087.80
				$ -	$ -	$ -	$ -	$ -	$ -
				$ -	$ -	$ -	$ -	$ -	$ -
					Subtotal Cost:		$ 70,464.48	$ 121,881.55	$ 192,346.03

Total Material Cost: $ 70,464.48
Labor/Equip. Total: $ 121,881.55
Total Construction Cost: $ 192,346.03

Orcas Power & Light Coorperative - Unit Totals
OSP Construction Estimate
- Segment 706.3-OR05

Aerial	Underground	Existing Duct	Poles	AP's	Submarine Cable
0 '	750 '	0 '	0	1	

	Unit Description	Type	Unit Quantity	Material Cost	Labor/Equip. Cost	Total Unit Cost	Material Total	Labor/Equip. Total	Ext. Total
Trenching/ Plow									
	Trench New	24" Depth	750 '	n/a	$ 8.20	$ 8.20	n/a	$ 6,150.00	$ 6,150.00
15%	Rock Adder		113 '	n/a	$ 13.00	$ 13.00	n/a	$ 1,462.50	$ 1,462.50
Conduit Placement									
	Place (2) 2" HDPE	2	750 '	$ 1.61	$ 0.89	$ 2.49	$ 1,206.00	$ 663.75	$ 1,869.75
Locate Items									
	Warning Tape	Non-Detect	750 '	$ 0.04	$ 0.12	$ 0.15	$ 27.00	$ 88.50	$ 115.50
	Locate Wire (#12)	Insulated/Solid	750 '	$ 0.18	$ 0.18	$ 0.36	$ 135.00	$ 132.75	$ 267.75
Remove & Restore									
3%	General R&R		23 '	n/a	$ 14.16	$ 14.16	n/a	$ 325.68	$ 325.68
Fiber Placement in Conduit									
	Fiber Optic Cable	12, 24 ,96	750 '	n/a	$ 0.78	$ 0.78	n/a	$ 585.00	$ 585.00
Handholes									
1,000 '	HH-3 (20k)		1	$ 1,200.00	$ 550.00	$ 1,750.00	$ 1,200.00	$ 550.00	$ 1,750.00
Slack Coil									
100 '	Slack Coil FOC in HH	12, 24, 96	100 '	n/a	$ 0.45	$ 0.45	n/a	$ 44.84	$ 44.84
200 '	Slack Coil FOC on Snowshoes	12, 24, 96	'	n/a	$ 0.92	$ 0.92	n/a	$ -	$ -
Aerial									
	Pole Attachment		0	$ 28.80	$ 41.30	$ 70.10	$ -	$ -	$ -
	Place ADSS FOC (roadside)		'	n/a	$ 1.30	$ 1.30	n/a	$ -	$ -
15%	Aerial Make Ready per Pole		0	$ 42.00	$ 177.00	$ 219.00	$ -	$ -	$ -
5%	Place Extension Arm		0	$ 54.00	$ 59.00	$ 113.00	$ -	$ -	$ -
10%	Place Anchor & Guy		0	$ 102.00	$ 295.00	$ 397.00	$ -	$ -	$ -
2,000 '	Place Snow-shoes		0	$ 114.00	$ 177.00	$ 291.00	$ -	$ -	$ -
Splicing Items									
	Splice Case	*>144*	1	$ 558.00	$ 295.00	$ 853.00	$ 558.00	$ 295.00	$ 853.00
	Splice Trays	24 slot	4	$ 30.00	n/a	$ 30.00	$ 120.00	n/a	$ 120.00
	Fiber Splicing < 12		12	n/a	$ 47.20	$ 47.20	n/a	$ 566.40	$ 566.40
	Fiber Splicing > 96			n/a	$ 31.86	$ 31.86	n/a	$ -	$ -
	Fiber Testing (OTDR/PM)		6	n/a	$ 11.80	$ 11.80	n/a	$ 70.80	$ 70.80
	Fiber Tags	Wrap-Around	4	$ 1.32	n/a	$ 1.32	$ 4.75	n/a	$ 4.75
Fiber Lengths									
	Fiber+Slack	96	850 '	$ 1.032	n/a	$ 1.03	$ 877.20	n/a	$ 877.20
Site									
	Replace Pole w/ 130' Steel Pole		1	$ 24,360.00	$ 13,500.00	$ 37,860.00	$ 24,360.00	$ 13,500.00	$ 37,860.00
	NEMA Cabinet, UPS, Disconnect		1	$ 4,200.00	$ 400.00	$ 4,600.00	$ 4,200.00	$ 400.00	$ 4,600.00
	Edge Equipment		1	$ 1,200.00	$ 350.00	$ 1,550.00	$ 1,200.00	$ 350.00	$ 1,550.00
	AC Power Connect (Service Drop)		1	n/a	$ 1,416.00	$ 1,416.00	n/a	$ 1,416.00	$ 1,416.00
	Antenna Array		1	$ 7,500.00	n/a	$ 7,500.00	$ 7,500.00	n/a	$ 7,500.00
	Cabling System		1	$ 720.00	$ 1,200.00	$ 1,920.00	$ 720.00	$ 1,200.00	$ 1,920.00
	Site Installation (Wireless)		1	n/a	$ 1,500.00	$ 1,500.00	n/a	$ 1,500.00	$ 1,500.00
	Site Prep		1	n/a	$ 10,000.00	$ 10,000.00	n/a	$ 10,000.00	$ 10,000.00
				$ -	$ -	$ -	$ -	$ -	$ -
Misc.									
500 '	Install Fiber Optic Marker Sign	Fiberglass	2	$ 60.00	$ 17.70	$ 77.70	$ 120.00	$ 35.40	$ 155.40
				$ -	$ -	$ -	$ -	$ -	$ -
				$ -	$ -	$ -	$ -	$ -	$ -
						Subtotal Cost:	$ 42,227.95	$ 39,336.62	$ 81,564.57

Total Material Cost: $ 42,227.95
Labor/Equip. Total: $ 39,336.62
Total Construction Cost: $ 81,564.57

Orcas Power & Light Coorperative - Unit Totals
OSP Construction Estimate
- Segment 706.3-OR06

Aerial	Underground	Existing Duct	Poles	AP's	Submarine Cable
0 '	3,218 '	5,555 '	0	2	

	Unit Description	Type	Unit Quantity	Material Cost	Labor/Equip. Cost	Total Unit Cost	Material Total	Labor/Equip. Total	Ext. Total
Trenching/ Plow									
	Trench New	24" Depth	3,218 '	n/a	$ 8.20	$ 8.20	n/a	$ 26,387.60	$ 26,387.60
15%	Rock Adder		483 '	n/a	$ 13.00	$ 13.00	n/a	$ 6,275.10	$ 6,275.10
Conduit Placement									
	Place (2) 2" HDPE	2	3,218 '	$ 1.61	$ 0.89	$ 2.49	$ 5,174.54	$ 2,847.93	$ 8,022.47
Locate Items									
	Warning Tape	Non-Detect	3,218 '	$ 0.04	$ 0.12	$ 0.15	$ 115.85	$ 379.72	$ 495.57
	Locate Wire (#12)	Insulated/Solid	3,218 '	$ 0.18	$ 0.18	$ 0.36	$ 579.24	$ 569.59	$ 1,148.83
Remove & Restore									
3%	General R&R		97 '	n/a	$ 14.16	$ 14.16	n/a	$ 1,373.52	$ 1,373.52
Fiber Placement in Conduit									
	Fiber Optic Cable	12, 24 ,96	8,773 '	n/a	$ 0.78	$ 0.78	n/a	$ 6,842.94	$ 6,842.94
Handholes									
1,000 '	HH-3 (20k)		4	$ 1,200.00	$ 550.00	$ 1,750.00	$ 4,800.00	$ 2,200.00	$ 7,000.00
Slack Coil									
100 '	Slack Coil FOC in HH	12, 24, 96	400 '	n/a	$ 0.45	$ 0.45	n/a	$ 179.36	$ 179.36
200 '	Slack Coil FOC on Snowshoes	12, 24, 96	'	n/a	$ 0.92	$ 0.92	n/a	$ -	$ -
Aerial									
	Pole Attachment		0	$ 28.80	$ 41.30	$ 70.10	$ -	$ -	$ -
	Place ADSS FOC (roadside)		'	n/a	$ 1.30	$ 1.30	n/a	$ -	$ -
15%	Aerial Make Ready per Pole		0	$ 42.00	$ 177.00	$ 219.00	$ -	$ -	$ -
5%	Place Extension Arm		0	$ 54.00	$ 59.00	$ 113.00	$ -	$ -	$ -
10%	Place Anchor & Guy		0	$ 102.00	$ 295.00	$ 397.00	$ -	$ -	$ -
2,000 '	Place Snow-shoes		0	$ 114.00	$ 177.00	$ 291.00	$ -	$ -	$ -
Splicing Items									
	Splice Case	*>144*	2	$ 558.00	$ 295.00	$ 853.00	$ 1,116.00	$ 590.00	$ 1,706.00
	Splice Trays	24 slot	8	$ 30.00	n/a	$ 30.00	$ 240.00	n/a	$ 240.00
	Fiber Splicing < 12		24	n/a	$ 47.20	$ 47.20	n/a	$ 1,132.80	$ 1,132.80
	Fiber Splicing > 96			n/a	$ 31.86	$ 31.86	n/a	$ -	$ -
	Fiber Testing (OTDR/PM)		12	n/a	$ 11.80	$ 11.80	n/a	$ 141.60	$ 141.60
	Fiber Tags	Wrap-Around	12	$ 1.32	n/a	$ 1.32	$ 15.84	n/a	$ 15.84
Fiber Lengths									
	Fiber+Slack	96	9,173 '	$ 1.032	n/a	$ 1.03	$ 9,466.54	n/a	$ 9,466.54
Site									
	Replace Pole w/ 130' Steel Pole		2	$ 24,360.00	$ 13,500.00	$ 37,860.00	$ 48,720.00	$ 27,000.00	$ 75,720.00
	NEMA Cabinet, UPS, Disconnect		2	$ 4,200.00	$ 400.00	$ 4,600.00	$ 8,400.00	$ 800.00	$ 9,200.00
	Edge Equipment		2	$ 1,200.00	$ 350.00	$ 1,550.00	$ 2,400.00	$ 700.00	$ 3,100.00
	AC Power Connect (Service Drop)		2	n/a	$ 1,416.00	$ 1,416.00	n/a	$ 2,832.00	$ 2,832.00
	Antenna Array		2	$ 7,500.00	n/a	$ 7,500.00	$ 15,000.00	n/a	$ 15,000.00
	Cabling System		2	$ 720.00	$ 1,200.00	$ 1,920.00	$ 1,440.00	$ 2,400.00	$ 3,840.00
	Site Installation (Wireless)		2	n/a	$ 1,500.00	$ 1,500.00	n/a	$ 3,000.00	$ 3,000.00
	Site Prep		2	n/a	$ 10,000.00	$ 10,000.00	n/a	$ 20,000.00	$ 20,000.00
				$ -	$ -	$ -	$ -	$ -	$ -
Misc.									
500 '	Install Fiber Optic Marker Sign	Fiberglass	7	$ 60.00	$ 17.70	$ 77.70	$ 420.00	$ 123.90	$ 543.90
				$ -	$ -	$ -	$ -	$ -	$ -
				$ -	$ -	$ -	$ -	$ -	$ -
						Subtotal Cost:	$ 97,888.01	$ 105,776.06	$ 203,664.07

Total Material Cost: $ 97,888.01
Labor/Equip. Total: $ 105,776.06
Total Construction Cost: $ 203,664.07

Orcas Power & Light Coorperative - Unit Totals
OSP Construction Estimate
- Segment 706.3-OR07

Aerial	Underground	Existing Duct	Poles	AP's	Submarine Cable
0 '	2,187 '	451 '	0	0	

	Unit Description	Type	Unit Quantity	Material Cost	Labor/Equip. Cost	Total Unit Cost	Material Total	Labor/Equip. Total	Ext. Total
Trenching/ Plow									
	Trench New/Plow Mix	24" Depth	2,187 '	n/a	$ 7.00	$ 7.00	n/a	$ 15,309.00	$ 15,309.00
5%	Rock Adder		109 '	n/a	$ 13.00	$ 13.00	n/a	$ 1,421.55	$ 1,421.55
Conduit Placement									
	Place (2) 2" HDPE	2	2,187 '	$ 1.61	$ 0.89	$ 2.49	$ 3,516.70	$ 1,935.50	$ 5,452.19
Locate Items									
	Warning Tape	Non-Detect	2,187 '	$ 0.04	$ 0.12	$ 0.15	$ 78.73	$ 258.07	$ 336.80
	Locate Wire (#12)	Insulated/Solid	2,187 '	$ 0.18	$ 0.18	$ 0.36	$ 393.66	$ 387.10	$ 780.76
Remove & Restore									
2%	General R&R		44 '	n/a	$ 14.16	$ 14.16	n/a	$ 623.04	$ 623.04
Fiber Placement in Conduit									
	Fiber Optic Cable	12, 24 ,96	2,638 '	n/a	$ 0.78	$ 0.78	n/a	$ 2,057.64	$ 2,057.64
Handholes									
1,000 '	HH-3 (20k)		3	$ 1,200.00	$ 550.00	$ 1,750.00	$ 3,600.00	$ 1,650.00	$ 5,250.00
Slack Coil									
100 '	Slack Coil FOC in HH	12, 24, 96	300 '	n/a	$ 0.45	$ 0.45	n/a	$ 134.52	$ 134.52
200 '	Slack Coil FOC on Snowshoes	12, 24, 96	'	n/a	$ 0.92	$ 0.92	n/a	$ -	$ -
Aerial									
	Pole Attachment		0	$ 28.80	$ 41.30	$ 70.10	$ -	$ -	$ -
	Place ADSS FOC (roadside)		'	n/a	$ 1.30	$ 1.30	n/a	$ -	$ -
15%	Aerial Make Ready per Pole		0	$ 42.00	$ 177.00	$ 219.00	$ -	$ -	$ -
5%	Place Extension Arm		0	$ 54.00	$ 59.00	$ 113.00	$ -	$ -	$ -
10%	Place Anchor & Guy		0	$ 102.00	$ 295.00	$ 397.00	$ -	$ -	$ -
2,000 '	Place Snow-shoes		0	$ 114.00	$ 177.00	$ 291.00	$ -	$ -	$ -
Splicing Items									
	Splice Case	*>144*	1	$ 558.00	$ 295.00	$ 853.00	$ 558.00	$ 295.00	$ 853.00
	Splice Trays	24 slot	4	$ 30.00	n/a	$ 30.00	$ 120.00	n/a	$ 120.00
	Fiber Splicing < 12		12	n/a	$ 47.20	$ 47.20	n/a	$ 566.40	$ 566.40
	Fiber Splicing > 96			n/a	$ 31.86	$ 31.86	n/a	$ -	$ -
	Fiber Testing (OTDR/PM)		6	n/a	$ 11.80	$ 11.80	n/a	$ 70.80	$ 70.80
	Fiber Tags	Wrap-Around	7	$ 1.32	n/a	$ 1.32	$ 9.50	n/a	$ 9.50
Fiber Lengths									
	Fiber+Slack	96	2,938 '	$ 1.032	n/a	$ 1.03	$ 3,032.02	n/a	$ 3,032.02
Site									
	Replace Pole w/ 130' Steel Pole		0	$ 24,360.00	$ 13,500.00	$ 37,860.00	$ -	$ -	$ -
	NEMA Cabinet, UPS, Disconnect		0	$ 4,200.00	$ 400.00	$ 4,600.00	$ -	$ -	$ -
	Edge Equipment		0	$ 1,200.00	$ 350.00	$ 1,550.00	$ -	$ -	$ -
	AC Power Connect (Service Drop)		0	n/a	$ 1,416.00	$ 1,416.00	n/a	$ -	$ -
	Antenna Array		0	$ 7,500.00	n/a	$ 7,500.00	$ -	n/a	$ -
	Cabling System		0	$ 720.00	$ 1,200.00	$ 1,920.00	$ -	$ -	$ -
	Site Installation (Wireless)		0	n/a	$ 1,500.00	$ 1,500.00	n/a	$ -	$ -
	Site Prep		0	n/a	$ 10,000.00	$ 10,000.00	n/a	$ -	$ -
				$ -	$ -	$ -	$ -	$ -	$ -
Misc.									
500 '	Install Fiber Optic Marker Sign	Fiberglass	5	$ 60.00	$ 17.70	$ 77.70	$ 300.00	$ 88.50	$ 388.50
				$ -	$ -	$ -	$ -	$ -	$ -
				$ -	$ -	$ -	$ -	$ -	$ -
						Subtotal Cost:	$ 11,608.61	$ 24,797.11	$ 36,405.72

Total Material Cost: $ 11,608.61
Labor/Equip. Total: $ 24,797.11
Total Construction Cost: $ 36,405.72

5/1/2012

Orcas Power & Light Coorperative - Unit Totals
OSP Construction Estimate
- Segment 706.3-OR08

Aerial	Underground	Existing Duct	Poles	AP's	Submarine Cable
0 '	2,643 '	2,603 '	0	1	

	Unit Description	Type	Unit Quantity	Material Cost	Labor/Equip. Cost	Total Unit Cost	Material Total	Labor/Equip. Total	Ext. Total
Trenching/ Plow									
	Trench New/Plow Mix	24" Depth	2,643 '	n/a	$ 7.00	$ 7.00	n/a	$ 18,501.00	$ 18,501.00
5%	Rock Adder		132 '	n/a	$ 13.00	$ 13.00	n/a	$ 1,717.95	$ 1,717.95
Conduit Placement									
	Place (2) 2" HDPE	2	2,643 '	$ 1.61	$ 0.89	$ 2.49	$ 4,249.94	$ 2,339.06	$ 6,589.00
Locate Items									
	Warning Tape	Non-Detect	2,643 '	$ 0.04	$ 0.12	$ 0.15	$ 95.15	$ 311.87	$ 407.02
	Locate Wire (#12)	Insulated/Solid	2,643 '	$ 0.18	$ 0.18	$ 0.36	$ 475.74	$ 467.81	$ 943.55
Remove & Restore									
3%	General R&R		80 '	n/a	$ 14.16	$ 14.16	n/a	$ 1,132.80	$ 1,132.80
Fiber Placement in Conduit									
	Fiber Optic Cable	12, 24 ,96	5,246 '	n/a	$ 0.78	$ 0.78	n/a	$ 4,091.88	$ 4,091.88
Handholes									
1,000 '	HH-3 (20k)		3	$ 1,200.00	$ 550.00	$ 1,750.00	$ 3,600.00	$ 1,650.00	$ 5,250.00
Slack Coil									
100 '	Slack Coil FOC in HH	12, 24, 96	300 '	n/a	$ 0.45	$ 0.45	n/a	$ 134.52	$ 134.52
200 '	Slack Coil FOC on Snowshoes	12, 24, 96	'	n/a	$ 0.92	$ 0.92	n/a	$ -	$ -
Aerial									
	Pole Attachment		0	$ 28.80	$ 41.30	$ 70.10	$ -	$ -	$ -
	Place ADSS FOC (roadside)		'	n/a	$ 1.30	$ 1.30	n/a	$ -	$ -
15%	Aerial Make Ready per Pole		0	$ 42.00	$ 177.00	$ 219.00	$ -	$ -	$ -
5%	Place Extension Arm		0	$ 54.00	$ 59.00	$ 113.00	$ -	$ -	$ -
10%	Place Anchor & Guy		0	$ 102.00	$ 295.00	$ 397.00	$ -	$ -	$ -
2,000 '	Place Snow-shoes		0	$ 114.00	$ 177.00	$ 291.00	$ -	$ -	$ -
Splicing Items									
	Splice Case	*>144*	1	$ 558.00	$ 295.00	$ 853.00	$ 558.00	$ 295.00	$ 853.00
	Splice Trays	24 slot	4	$ 30.00	n/a	$ 30.00	$ 120.00	n/a	$ 120.00
	Fiber Splicing < 12		12	n/a	$ 47.20	$ 47.20	n/a	$ 566.40	$ 566.40
	Fiber Splicing > 96			n/a	$ 31.86	$ 31.86	n/a	$ -	$ -
	Fiber Testing (OTDR/PM)		6	n/a	$ 11.80	$ 11.80	n/a	$ 70.80	$ 70.80
	Fiber Tags	Wrap-Around	8	$ 1.32	n/a	$ 1.32	$ 11.09	n/a	$ 11.09
Fiber Lengths									
	Fiber+Slack	96	5,546 '	$ 1.032	n/a	$ 1.03	$ 5,723.47	n/a	$ 5,723.47
Site									
	Replace Pole w/ 130' Steel Pole		1	$ 24,360.00	$ 13,500.00	$ 37,860.00	$ 24,360.00	$ 13,500.00	$ 37,860.00
	NEMA Cabinet, UPS, Disconnect		1	$ 4,200.00	$ 400.00	$ 4,600.00	$ 4,200.00	$ 400.00	$ 4,600.00
	Edge Equipment		1	$ 1,200.00	$ 350.00	$ 1,550.00	$ 1,200.00	$ 350.00	$ 1,550.00
	AC Power Connect (Service Drop)		1	n/a	$ 1,416.00	$ 1,416.00	n/a	$ 1,416.00	$ 1,416.00
	Antenna Array		1	$ 7,500.00	n/a	$ 7,500.00	$ 7,500.00	n/a	$ 7,500.00
	Cabling System		1	$ 720.00	$ 1,200.00	$ 1,920.00	$ 720.00	$ 1,200.00	$ 1,920.00
	Site Installation (Wireless)		1	n/a	$ 1,500.00	$ 1,500.00	n/a	$ 1,500.00	$ 1,500.00
	Site Prep		1	n/a	$ 10,000.00	$ 10,000.00	n/a	$ 10,000.00	$ 10,000.00
				$ -	$ -	$ -	$ -	$ -	$ -
Misc.									
500 '	Install Fiber Optic Marker Sign	Fiberglass	6	$ 60.00	$ 17.70	$ 77.70	$ 360.00	$ 106.20	$ 466.20
				$ -	$ -	$ -	$ -	$ -	$ -
				$ -	$ -	$ -	$ -	$ -	$ -
						Subtotal Cost:	$ 53,173.39	$ 59,751.29	$ 112,924.68

Total Material Cost: $ 53,173.39
Labor/Equip. Total: $ 59,751.29
Total Construction Cost: $ 112,924.68

Orcas Power & Light Coorperative - Unit Totals
OSP Construction Estimate
- Segment 706.3-OR09

Aerial	Underground	Existing Duct	Poles	AP's	Submarine Cable
3,480 '	0 '	6,333 '	11	1	

	Unit Description	Type	Unit Quantity	Material Cost	Labor/Equip. Cost	Total Unit Cost	Material Total	Labor/Equip. Total	Ext. Total
Trenching/ Plow									
	Trench New	24" Depth	'	n/a	$ 8.20	$ 8.20	n/a	$ -	$ -
15%	Rock Adder		'	n/a	$ 13.00	$ 13.00	n/a	$ -	$ -
Conduit Placement									
	Place (2) 2" HDPE	2	'	$ 1.61	$ 0.89	$ 2.49	$ -	$ -	$ -
Locate Items									
	Warning Tape	Non-Detect	'	$ 0.04	$ 0.12	$ 0.15	$ -	$ -	$ -
	Locate Wire (#12)	Insulated/Solid	'	$ 0.18	$ 0.18	$ 0.36	$ -	$ -	$ -
Remove & Restore									
3%	General R&R		'	n/a	$ 14.16	$ 14.16	n/a	$ -	$ -
Fiber Placement in Conduit									
	Fiber Optic Cable	12, 24 ,96	6,333 '	n/a	$ 0.78	$ 0.78	n/a	$ 4,939.74	$ 4,939.74
Handholes									
1,000 '	HH-3 (20k)		0	$ 1,200.00	$ 550.00	$ 1,750.00	$ -	$ -	$ -
Slack Coil									
100 '	Slack Coil FOC in HH	12, 24, 96	'	n/a	$ 0.45	$ 0.45	n/a	$ -	$ -
200 '	Slack Coil FOC on Snowshoes	12, 24, 96	400 '	n/a	$ 0.92	$ 0.92	n/a	$ 368.16	$ 368.16
Aerial									
	Pole Attachment		11	$ 28.80	$ 41.30	$ 70.10	$ 316.80	$ 454.30	$ 771.10
	Place ADSS FOC (roadside)		3,480 '	n/a	$ 1.30	$ 1.30	n/a	$ 4,517.04	$ 4,517.04
15%	Aerial Make Ready per Pole		2	$ 42.00	$ 177.00	$ 219.00	$ 84.00	$ 354.00	$ 438.00
5%	Place Extension Arm		1	$ 54.00	$ 59.00	$ 113.00	$ 54.00	$ 59.00	$ 113.00
10%	Place Anchor & Guy		2	$ 102.00	$ 295.00	$ 397.00	$ 204.00	$ 590.00	$ 794.00
2,000 '	Place Snow-shoes		2	$ 114.00	$ 177.00	$ 291.00	$ 228.00	$ 354.00	$ 582.00
Splicing Items									
	Splice Case	*>144*	1	$ 558.00	$ 295.00	$ 853.00	$ 558.00	$ 295.00	$ 853.00
	Splice Trays	24 slot	4	$ 30.00	n/a	$ 30.00	$ 120.00	n/a	$ 120.00
	Fiber Splicing < 12		30	n/a	$ 47.20	$ 47.20	n/a	$ 1,416.00	$ 1,416.00
	Fiber Splicing > 96			n/a	$ 31.86	$ 31.86	n/a	$ -	$ -
	Fiber Testing (OTDR/PM)		6	n/a	$ 11.80	$ 11.80	n/a	$ 70.80	$ 70.80
	Fiber Tags	Wrap-Around	14	$ 1.32	n/a	$ 1.32	$ 19.01	n/a	$ 19.01
Fiber Lengths									
	Fiber+Slack	96	10,213 '	$ 1.032	n/a	$ 1.03	$ 10,539.82	n/a	$ 10,539.82
Site									
	Replace Pole w/ 130' Steel Pole		1	$ 24,360.00	$ 13,500.00	$ 37,860.00	$ 24,360.00	$ 13,500.00	$ 37,860.00
	NEMA Cabinet, UPS, Disconnect		1	$ 4,200.00	$ 400.00	$ 4,600.00	$ 4,200.00	$ 400.00	$ 4,600.00
	Edge Equipment		1	$ 1,200.00	$ 350.00	$ 1,550.00	$ 1,200.00	$ 350.00	$ 1,550.00
	AC Power Connect (Service Drop)		1	n/a	$ 1,416.00	$ 1,416.00	n/a	$ 1,416.00	$ 1,416.00
	Antenna Array		1	$ 7,500.00	n/a	$ 7,500.00	$ 7,500.00	n/a	$ 7,500.00
	Cabling System		1	$ 720.00	$ 1,200.00	$ 1,920.00	$ 720.00	$ 1,200.00	$ 1,920.00
	Site Installation (Wireless)		1	n/a	$ 1,500.00	$ 1,500.00	n/a	$ 1,500.00	$ 1,500.00
	Site Prep		1	n/a	$ 10,000.00	$ 10,000.00	n/a	$ 10,000.00	$ 10,000.00
				$ -	$ -	$ -	$ -	$ -	$ -
Misc.									
500 '	Install Fiber Optic Marker Sign	Fiberglass	0	$ 60.00	$ 17.70	$ 77.70	$ -	$ -	$ -
				$ -	$ -	$ -	$ -	$ -	$ -
				$ -	$ -	$ -	$ -	$ -	$ -
						Subtotal Cost:	$ 50,103.62	$ 41,784.04	$ 91,887.66

Total Material Cost: $ 50,103.62
Labor/Equip. Total: $ 41,784.04
Total Construction Cost: $ 91,887.66

Orcas Power & Light Coorperative - Unit Totals
OSP Construction Estimate
- Segment 706.3-OR10

Aerial	Underground	Existing Duct	Poles	AP's	Submarine Cable
4,212 '	1,869 '	0 '	17	1	

	Unit Description	Type	Unit Quantity	Material Cost	Labor/Equip. Cost	Total Unit Cost	Material Total	Labor/Equip. Total	Ext. Total
Trenching/ Plow									
	Trench New	24" Depth	1,869 '	n/a	$ 8.20	$ 8.20	n/a	$ 15,325.80	$ 15,325.80
15%	Rock Adder		280 '	n/a	$ 13.00	$ 13.00	n/a	$ 3,644.55	$ 3,644.55
Conduit Placement									
	Place (2) 2" HDPE	2	1,869 '	$ 1.61	$ 0.89	$ 2.49	$ 3,005.35	$ 1,654.07	$ 4,659.42
Locate Items									
	Warning Tape	Non-Detect	1,869 '	$ 0.04	$ 0.12	$ 0.15	$ 67.28	$ 220.54	$ 287.83
	Locate Wire (#12)	Insulated/Solid	1,869 '	$ 0.18	$ 0.18	$ 0.36	$ 336.42	$ 330.81	$ 667.23
Remove & Restore									
3%	General R&R		57 '	n/a	$ 14.16	$ 14.16	n/a	$ 807.12	$ 807.12
Fiber Placement in Conduit									
	Fiber Optic Cable	12, 24 ,96	1,869 '	n/a	$ 0.78	$ 0.78	n/a	$ 1,457.82	$ 1,457.82
Handholes									
1,000 '	HH-3 (20k)		2	$ 1,200.00	$ 550.00	$ 1,750.00	$ 2,400.00	$ 1,100.00	$ 3,500.00
Slack Coil									
100 '	Slack Coil FOC in HH	12, 24, 96	200 '	n/a	$ 0.45	$ 0.45	n/a	$ 89.68	$ 89.68
200 '	Slack Coil FOC on Snowshoes	12, 24, 96	600 '	n/a	$ 0.92	$ 0.92	n/a	$ 552.24	$ 552.24
Aerial									
	Pole Attachment		17	$ 28.80	$ 41.30	$ 70.10	$ 489.60	$ 702.10	$ 1,191.70
	Place ADSS FOC (roadside)		4,212 '	n/a	$ 1.30	$ 1.30	n/a	$ 5,467.18	$ 5,467.18
15%	Aerial Make Ready per Pole		3	$ 42.00	$ 177.00	$ 219.00	$ 126.00	$ 531.00	$ 657.00
5%	Place Extension Arm		1	$ 54.00	$ 59.00	$ 113.00	$ 54.00	$ 59.00	$ 113.00
10%	Place Anchor & Guy		2	$ 102.00	$ 295.00	$ 397.00	$ 204.00	$ 590.00	$ 794.00
2,000 '	Place Snow-shoes		3	$ 114.00	$ 177.00	$ 291.00	$ 342.00	$ 531.00	$ 873.00
Splicing Items									
	Splice Case	*>144*	1	$ 558.00	$ 295.00	$ 853.00	$ 558.00	$ 295.00	$ 853.00
	Splice Trays	24 slot	4	$ 30.00	n/a	$ 30.00	$ 120.00	n/a	$ 120.00
	Fiber Splicing < 12		12	n/a	$ 47.20	$ 47.20	n/a	$ 566.40	$ 566.40
	Fiber Splicing > 96			n/a	$ 31.86	$ 31.86	n/a	$ -	$ -
	Fiber Testing (OTDR/PM)		6	n/a	$ 11.80	$ 11.80	n/a	$ 70.80	$ 70.80
	Fiber Tags	Wrap-Around	26	$ 1.32	n/a	$ 1.32	$ 34.85	n/a	$ 34.85
Fiber Lengths									
	Fiber+Slack	96	6,881 '	$ 1.032	n/a	$ 1.03	$ 7,101.19	n/a	$ 7,101.19
Site									
	Replace Pole w/ 130' Steel Pole		1	$ 24,360.00	$ 13,500.00	$ 37,860.00	$ 24,360.00	$ 13,500.00	$ 37,860.00
	NEMA Cabinet, UPS, Disconnect		1	$ 4,200.00	$ 400.00	$ 4,600.00	$ 4,200.00	$ 400.00	$ 4,600.00
	Edge Equipment		1	$ 1,200.00	$ 350.00	$ 1,550.00	$ 1,200.00	$ 350.00	$ 1,550.00
	AC Power Connect (Service Drop)		1	n/a	$ 1,416.00	$ 1,416.00	n/a	$ 1,416.00	$ 1,416.00
	Antenna Array		1	$ 7,500.00	n/a	$ 7,500.00	$ 7,500.00	n/a	$ 7,500.00
	Cabling System		1	$ 720.00	$ 1,200.00	$ 1,920.00	$ 720.00	$ 1,200.00	$ 1,920.00
	Site Installation (Wireless)		1	n/a	$ 1,500.00	$ 1,500.00	n/a	$ 1,500.00	$ 1,500.00
	Site Prep		1	n/a	$ 10,000.00	$ 10,000.00	n/a	$ 10,000.00	$ 10,000.00
				$ -	$ -	$ -	$ -	$ -	$ -
Misc.									
500 '	Install Fiber Optic Marker Sign	Fiberglass	4	$ 60.00	$ 17.70	$ 77.70	$ 240.00	$ 70.80	$ 310.80
				$ -	$ -	$ -	$ -	$ -	$ -
				$ -	$ -	$ -	$ -	$ -	$ -
						Subtotal Cost:	$ 53,058.70	$ 62,431.91	$ 115,490.60

Total Material Cost: $ 53,058.70
Labor/Equip. Total: $ 62,431.91
Total Construction Cost: $ 115,490.60

Orcas Power & Light Coorperative - Unit Totals
OSP Construction Estimate
- Segment 706.3-OR11

Aerial	Underground	Existing Duct	Poles	AP's	Submarine Cable
630 '	0 '	0 '	3	1	

	Unit Description	Type	Unit Quantity	Material Cost	Labor/Equip. Cost	Total Unit Cost	Material Total	Labor/Equip. Total	Ext. Total
Trenching/ Plow									
	Trench New	24" Depth	'	n/a	$ 8.20	$ 8.20	n/a	$ -	$ -
15%	Rock Adder		'	n/a	$ 13.00	$ 13.00	n/a	$ -	$ -
Conduit Placement									
	Place (2) 2" HDPE	2	'	$ 1.61	$ 0.89	$ 2.49	$ -	$ -	$ -
Locate Items									
	Warning Tape	Non-Detect	'	$ 0.04	$ 0.12	$ 0.15	$ -	$ -	$ -
	Locate Wire (#12)	Insulated/Solid	'	$ 0.18	$ 0.18	$ 0.36	$ -	$ -	$ -
Remove & Restore									
3%	General R&R		'	n/a	$ 14.16	$ 14.16	n/a	$ -	$ -
Fiber Placement in Conduit									
	Fiber Optic Cable	12, 24 ,96	'	n/a	$ 0.78	$ 0.78	n/a	$ -	$ -
Handholes									
1,000 '	HH-3 (20k)		0	$ 1,200.00	$ 550.00	$ 1,750.00	$ -	$ -	$ -
Slack Coil									
100 '	Slack Coil FOC in HH	12, 24, 96	'	n/a	$ 0.45	$ 0.45	n/a	$ -	$ -
200 '	Slack Coil FOC on Snowshoes	12, 24, 96	200 '	n/a	$ 0.92	$ 0.92	n/a	$ 184.08	$ 184.08
Aerial									
	Pole Attachment		3	$ 28.80	$ 41.30	$ 70.10	$ 86.40	$ 123.90	$ 210.30
	Place ADSS FOC (roadside)		630 '	n/a	$ 1.30	$ 1.30	n/a	$ 817.74	$ 817.74
15%	Aerial Make Ready per Pole		1	$ 42.00	$ 177.00	$ 219.00	$ 42.00	$ 177.00	$ 219.00
5%	Place Extension Arm		1	$ 54.00	$ 59.00	$ 113.00	$ 54.00	$ 59.00	$ 113.00
10%	Place Anchor & Guy		1	$ 102.00	$ 295.00	$ 397.00	$ 102.00	$ 295.00	$ 397.00
2,000 '	Place Snow-shoes		1	$ 114.00	$ 177.00	$ 291.00	$ 114.00	$ 177.00	$ 291.00
Splicing Items									
	Splice Case	*>144*	1	$ 558.00	$ 295.00	$ 853.00	$ 558.00	$ 295.00	$ 853.00
	Splice Trays	24 slot	4	$ 30.00	n/a	$ 30.00	$ 120.00	n/a	$ 120.00
	Fiber Splicing < 12		48	n/a	$ 47.20	$ 47.20	n/a	$ 2,265.60	$ 2,265.60
	Fiber Splicing > 96			n/a	$ 31.86	$ 31.86	n/a	$ -	$ -
	Fiber Testing (OTDR/PM)		48	n/a	$ 11.80	$ 11.80	n/a	$ 566.40	$ 566.40
	Fiber Tags	Wrap-Around	5	$ 1.32	n/a	$ 1.32	$ 6.34	n/a	$ 6.34
Fiber Lengths									
	Fiber+Slack	96	830 '	$ 1.032	n/a	$ 1.03	$ 856.56	n/a	$ 856.56
Site									
	Replace Pole w/ 130' Steel Pole		1	$ 24,360.00	$ 13,500.00	$ 37,860.00	$ 24,360.00	$ 13,500.00	$ 37,860.00
	NEMA Cabinet, UPS, Disconnect		1	$ 4,200.00	$ 400.00	$ 4,600.00	$ 4,200.00	$ 400.00	$ 4,600.00
	Edge Equipment		1	$ 1,200.00	$ 350.00	$ 1,550.00	$ 1,200.00	$ 350.00	$ 1,550.00
	AC Power Connect (Service Drop)		1	n/a	$ 1,416.00	$ 1,416.00	n/a	$ 1,416.00	$ 1,416.00
	Antenna Array		1	$ 7,500.00	n/a	$ 7,500.00	$ 7,500.00	n/a	$ 7,500.00
	Cabling System		1	$ 720.00	$ 1,200.00	$ 1,920.00	$ 720.00	$ 1,200.00	$ 1,920.00
	Site Installation (Wireless)		1	n/a	$ 1,500.00	$ 1,500.00	n/a	$ 1,500.00	$ 1,500.00
	Site Prep		1	n/a	$ 10,000.00	$ 10,000.00	n/a	$ 10,000.00	$ 10,000.00
				$ -	$ -	$ -	$ -	$ -	$ -
Misc.									
500 '	Install Fiber Optic Marker Sign	Fiberglass	0	$ 60.00	$ 17.70	$ 77.70	$ -	$ -	$ -
				$ -	$ -	$ -	$ -	$ -	$ -
				$ -	$ -	$ -	$ -	$ -	$ -
						Subtotal Cost:	$ 39,919.30	$ 33,326.72	$ 73,246.02

Total Material Cost: $ 39,919.30
Labor/Equip. Total: $ 33,326.72
Total Construction Cost: $ 73,246.02

Orcas Power & Light Coorperative - Unit Totals
OSP Construction Estimate
- Segment 706.3-OR12

Aerial	Underground	Existing Duct	Poles	AP's	Submarine Cable
	750 '	0 '	0	1	

	Unit Description	Type	Unit Quantity	Material Cost	Labor/Equip. Cost	Total Unit Cost	Material Total	Labor/Equip. Total	Ext. Total
Trenching/ Plow									
	Trench New	24" Depth	750 '	n/a	$ 8.20	$ 8.20	n/a	$ 6,150.00	$ 6,150.00
15%	Rock Adder		113 '	n/a	$ 13.00	$ 13.00	n/a	$ 1,462.50	$ 1,462.50
Conduit Placement									
	Place (2) 2" HDPE	2	750 '	$ 1.61	$ 0.89	$ 2.49	$ 1,206.00	$ 663.75	$ 1,869.75
Locate Items									
	Warning Tape	Non-Detect	750 '	$ 0.04	$ 0.12	$ 0.15	$ 27.00	$ 88.50	$ 115.50
	Locate Wire (#12)	Insulated/Solid	750 '	$ 0.18	$ 0.18	$ 0.36	$ 135.00	$ 132.75	$ 267.75
Remove & Restore									
3%	General R&R		23 '	n/a	$ 14.16	$ 14.16	n/a	$ 325.68	$ 325.68
Fiber Placement in Conduit									
	Fiber Optic Cable	12, 24 ,96	750 '	n/a	$ 0.78	$ 0.78	n/a	$ 585.00	$ 585.00
Handholes									
1,000 '	HH-3 (20k)		1	$ 1,200.00	$ 550.00	$ 1,750.00	$ 1,200.00	$ 550.00	$ 1,750.00
Slack Coil									
100 '	Slack Coil FOC in HH	12, 24, 96	100 '	n/a	$ 0.45	$ 0.45	n/a	$ 44.84	$ 44.84
200 '	Slack Coil FOC on Snowshoes	12, 24, 96	'	n/a	$ 0.92	$ 0.92	n/a	$ -	$ -
Aerial									
	Pole Attachment		0	$ 28.80	$ 41.30	$ 70.10	$ -	$ -	$ -
	Place ADSS FOC (roadside)		'	n/a	$ 1.30	$ 1.30	n/a	$ -	$ -
15%	Aerial Make Ready per Pole		0	$ 42.00	$ 177.00	$ 219.00	$ -	$ -	$ -
5%	Place Extension Arm		0	$ 54.00	$ 59.00	$ 113.00	$ -	$ -	$ -
10%	Place Anchor & Guy		0	$ 102.00	$ 295.00	$ 397.00	$ -	$ -	$ -
2,000 '	Place Snow-shoes		0	$ 114.00	$ 177.00	$ 291.00	$ -	$ -	$ -
Splicing Items									
	Splice Case	*>144*	1	$ 558.00	$ 295.00	$ 853.00	$ 558.00	$ 295.00	$ 853.00
	Splice Trays	24 slot	4	$ 30.00	n/a	$ 30.00	$ 120.00	n/a	$ 120.00
	Fiber Splicing < 12		12	n/a	$ 47.20	$ 47.20	n/a	$ 566.40	$ 566.40
	Fiber Splicing > 96			n/a	$ 31.86	$ 31.86	n/a	$ -	$ -
	Fiber Testing (OTDR/PM)		6	n/a	$ 11.80	$ 11.80	n/a	$ 70.80	$ 70.80
	Fiber Tags	Wrap-Around	4	$ 1.32	n/a	$ 1.32	$ 4.75	n/a	$ 4.75
Fiber Lengths									
	Fiber+Slack	96	850 '	$ 1.032	n/a	$ 1.03	$ 877.20	n/a	$ 877.20
Site									
	Replace Pole w/ 130' Steel Pole		1	$ 24,360.00	$ 13,500.00	$ 37,860.00	$ 24,360.00	$ 13,500.00	$ 37,860.00
	NEMA Cabinet, UPS, Disconnect		1	$ 4,200.00	$ 400.00	$ 4,600.00	$ 4,200.00	$ 400.00	$ 4,600.00
	Edge Equipment		1	$ 1,200.00	$ 350.00	$ 1,550.00	$ 1,200.00	$ 350.00	$ 1,550.00
	AC Power Connect (Service Drop)		1	n/a	$ 1,416.00	$ 1,416.00	n/a	$ 1,416.00	$ 1,416.00
	Antenna Array		1	$ 7,500.00	n/a	$ 7,500.00	$ 7,500.00	n/a	$ 7,500.00
	Cabling System		1	$ 720.00	$ 1,200.00	$ 1,920.00	$ 720.00	$ 1,200.00	$ 1,920.00
	Site Installation (Wireless)		1	n/a	$ 1,500.00	$ 1,500.00	n/a	$ 1,500.00	$ 1,500.00
	Site Prep		1	n/a	$ 10,000.00	$ 10,000.00	n/a	$ 10,000.00	$ 10,000.00
				$ -	$ -	$ -	$ -	$ -	$ -
Misc.									
500 '	Install Fiber Optic Marker Sign	Fiberglass	2	$ 60.00	$ 17.70	$ 77.70	$ 120.00	$ 35.40	$ 155.40
				$ -	$ -	$ -	$ -	$ -	$ -
				$ -	$ -	$ -	$ -	$ -	$ -
					Subtotal Cost:		$ 42,227.95	$ 39,336.62	$ 81,564.57

Total Material Cost: $ 42,227.95
Labor/Equip. Total: $ 39,336.62
Total Construction Cost: $ 81,564.57

Orcas Power & Light Coorperative - Unit Totals
OSP Construction Estimate
- Segment 706.3-OR13

Aerial	Underground	Existing Duct	Poles	AP's	Submarine Cable
826 '	29 '	874 '	5	1	

	Unit Description	Type	Unit Quantity	Material Cost	Labor/Equip. Cost	Total Unit Cost	Material Total	Labor/Equip. Total	Ext. Total
Trenching/ Plow									
	Trench New	24" Depth	29 '	n/a	$ 8.20	$ 8.20	n/a	$ 237.80	$ 237.80
15%	Rock Adder		4 '	n/a	$ 13.00	$ 13.00	n/a	$ 56.55	$ 56.55
Conduit Placement									
	Place (2) 2" HDPE	2	29 '	$ 1.61	$ 0.89	$ 2.49	$ 46.63	$ 25.67	$ 72.30
Locate Items									
	Warning Tape	Non-Detect	29 '	$ 0.04	$ 0.12	$ 0.15	$ 1.04	$ 3.42	$ 4.47
	Locate Wire (#12)	Insulated/Solid	29 '	$ 0.18	$ 0.18	$ 0.36	$ 5.22	$ 5.13	$ 10.35
Remove & Restore									
3%	General R&R		1 '	n/a	$ 14.16	$ 14.16	n/a	$ 14.16	$ 14.16
Fiber Placement in Conduit									
	Fiber Optic Cable	12, 24 ,96	903 '	n/a	$ 0.78	$ 0.78	n/a	$ 704.34	$ 704.34
Handholes									
1,000 '	HH-3 (20k)		1	$ 1,200.00	$ 550.00	$ 1,750.00	$ 1,200.00	$ 550.00	$ 1,750.00
Slack Coil									
100 '	Slack Coil FOC in HH	12, 24, 96	100 '	n/a	$ 0.45	$ 0.45	n/a	$ 44.84	$ 44.84
200 '	Slack Coil FOC on Snowshoes	12, 24, 96	200 '	n/a	$ 0.92	$ 0.92	n/a	$ 184.08	$ 184.08
Aerial									
	Pole Attachment		5	$ 28.80	$ 41.30	$ 70.10	$ 144.00	$ 206.50	$ 350.50
	Place ADSS FOC (roadside)		826 '	n/a	$ 1.30	$ 1.30	n/a	$ 1,072.15	$ 1,072.15
15%	Aerial Make Ready per Pole		1	$ 42.00	$ 177.00	$ 219.00	$ 42.00	$ 177.00	$ 219.00
5%	Place Extension Arm		1	$ 54.00	$ 59.00	$ 113.00	$ 54.00	$ 59.00	$ 113.00
10%	Place Anchor & Guy		1	$ 102.00	$ 295.00	$ 397.00	$ 102.00	$ 295.00	$ 397.00
2,000 '	Place Snow-shoes		1	$ 114.00	$ 177.00	$ 291.00	$ 114.00	$ 177.00	$ 291.00
Splicing Items									
	Splice Case	*>144*	1	$ 558.00	$ 295.00	$ 853.00	$ 558.00	$ 295.00	$ 853.00
	Splice Trays	24 slot	4	$ 30.00	n/a	$ 30.00	$ 120.00	n/a	$ 120.00
	Fiber Splicing < 12		48	n/a	$ 47.20	$ 47.20	n/a	$ 2,265.60	$ 2,265.60
	Fiber Splicing > 96			n/a	$ 31.86	$ 31.86	n/a	$ -	$ -
	Fiber Testing (OTDR/PM)		48	n/a	$ 11.80	$ 11.80	n/a	$ 566.40	$ 566.40
	Fiber Tags	Wrap-Around	10	$ 1.32	n/a	$ 1.32	$ 12.67	n/a	$ 12.67
Fiber Lengths									
	Fiber+Slack	96	2,029 '	$ 1.032	n/a	$ 1.03	$ 2,093.93	n/a	$ 2,093.93
Site									
	Replace Pole w/ 130' Steel Pole		1	$ 24,360.00	$ 13,500.00	$ 37,860.00	$ 24,360.00	$ 13,500.00	$ 37,860.00
	NEMA Cabinet, UPS, Disconnect		1	$ 4,200.00	$ 400.00	$ 4,600.00	$ 4,200.00	$ 400.00	$ 4,600.00
	Edge Equipment		1	$ 1,200.00	$ 350.00	$ 1,550.00	$ 1,200.00	$ 350.00	$ 1,550.00
	AC Power Connect (Service Drop)		1	n/a	$ 1,416.00	$ 1,416.00	n/a	$ 1,416.00	$ 1,416.00
	Antenna Array		1	$ 7,500.00	n/a	$ 7,500.00	$ 7,500.00	n/a	$ 7,500.00
	Cabling System		1	$ 720.00	$ 1,200.00	$ 1,920.00	$ 720.00	$ 1,200.00	$ 1,920.00
	Site Installation (Wireless)		1	n/a	$ 1,500.00	$ 1,500.00	n/a	$ 1,500.00	$ 1,500.00
	Site Prep		1	n/a	$ 10,000.00	$ 10,000.00	n/a	$ 10,000.00	$ 10,000.00
				$ -	$ -	$ -	$ -	$ -	$ -
Misc.									
500 '	Install Fiber Optic Marker Sign	Fiberglass	1	$ 60.00	$ 17.70	$ 77.70	$ 60.00	$ 17.70	$ 77.70
				$ -	$ -	$ -	$ -	$ -	$ -
				$ -	$ -	$ -	$ -	$ -	$ -
						Subtotal Cost:	$ 42,533.50	$ 35,323.34	$ 77,856.83

Total Material Cost: $ 42,533.50
Labor/Equip. Total: $ 35,323.34
Total Construction Cost: $ 77,856.83

Orcas Power & Light Coorperative - Unit Totals
OSP Construction Estimate
- Segment 706.3-OR14

Aerial	Underground	Existing Duct	Poles	AP's	Submarine Cable
0 '	5,821 '	0 '	0	1	

	Unit Description	Type	Unit Quantity	Material Cost	Labor/Equip. Cost	Total Unit Cost	Material Total	Labor/Equip. Total	Ext. Total
Trenching/ Plow									
	Trench New	24" Depth	5,821 '	n/a	$ 8.20	$ 8.20	n/a	$ 47,732.20	$ 47,732.20
15%	Rock Adder		873 '	n/a	$ 13.00	$ 13.00	n/a	$ 11,350.95	$ 11,350.95
Conduit Placement									
	Place (2) 2" HDPE	2	5,821 '	$ 1.61	$ 0.89	$ 2.49	$ 9,360.17	$ 5,151.59	$ 14,511.75
Locate Items									
	Warning Tape	Non-Detect	5,821 '	$ 0.04	$ 0.12	$ 0.15	$ 209.56	$ 686.88	$ 896.43
	Locate Wire (#12)	Insulated/Solid	5,821 '	$ 0.18	$ 0.18	$ 0.36	$ 1,047.78	$ 1,030.32	$ 2,078.10
Remove & Restore									
3%	General R&R		175 '	n/a	$ 14.16	$ 14.16	n/a	$ 2,478.00	$ 2,478.00
Fiber Placement in Conduit									
	Fiber Optic Cable	12, 24 ,96	5,821 '	n/a	$ 0.78	$ 0.78	n/a	$ 4,540.38	$ 4,540.38
Handholes									
1,000 '	HH-3 (20k)		6	$ 1,200.00	$ 550.00	$ 1,750.00	$ 7,200.00	$ 3,300.00	$ 10,500.00
Slack Coil									
100 '	Slack Coil FOC in HH	12, 24, 96	600 '	n/a	$ 0.45	$ 0.45	n/a	$ 269.04	$ 269.04
200 '	Slack Coil FOC on Snowshoes	12, 24, 96	'	n/a	$ 0.92	$ 0.92	n/a	$ -	$ -
Aerial									
	Pole Attachment		0	$ 28.80	$ 41.30	$ 70.10	$ -	$ -	$ -
	Place ADSS FOC (roadside)		'	n/a	$ 1.30	$ 1.30	n/a	$ -	$ -
15%	Aerial Make Ready per Pole		0	$ 42.00	$ 177.00	$ 219.00	$ -	$ -	$ -
5%	Place Extension Arm		0	$ 54.00	$ 59.00	$ 113.00	$ -	$ -	$ -
10%	Place Anchor & Guy		0	$ 102.00	$ 295.00	$ 397.00	$ -	$ -	$ -
2,000 '	Place Snow-shoes		0	$ 114.00	$ 177.00	$ 291.00	$ -	$ -	$ -
Splicing Items									
	Splice Case	*>144*	1	$ 558.00	$ 295.00	$ 853.00	$ 558.00	$ 295.00	$ 853.00
	Splice Trays	24 slot	4	$ 30.00	n/a	$ 30.00	$ 120.00	n/a	$ 120.00
	Fiber Splicing < 12		30	n/a	$ 47.20	$ 47.20	n/a	$ 1,416.00	$ 1,416.00
	Fiber Splicing > 96			n/a	$ 31.86	$ 31.86	n/a	$ -	$ -
	Fiber Testing (OTDR/PM)		6	n/a	$ 11.80	$ 11.80	n/a	$ 70.80	$ 70.80
	Fiber Tags	Wrap-Around	16	$ 1.32	n/a	$ 1.32	$ 20.59	n/a	$ 20.59
Fiber Lengths									
	Fiber+Slack	96	6,421 '	$ 1.032	n/a	$ 1.03	$ 6,626.47	n/a	$ 6,626.47
Site									
	Replace Pole w/ 130' Steel Pole		1	$ 24,360.00	$ 13,500.00	$ 37,860.00	$ 24,360.00	$ 13,500.00	$ 37,860.00
	NEMA Cabinet, UPS, Disconnect		1	$ 4,200.00	$ 400.00	$ 4,600.00	$ 4,200.00	$ 400.00	$ 4,600.00
	Edge Equipment		1	$ 1,200.00	$ 350.00	$ 1,550.00	$ 1,200.00	$ 350.00	$ 1,550.00
	AC Power Connect (Service Drop)		1	n/a	$ 1,416.00	$ 1,416.00	n/a	$ 1,416.00	$ 1,416.00
	Antenna Array		1	$ 7,500.00	n/a	$ 7,500.00	$ 7,500.00	n/a	$ 7,500.00
	Cabling System		1	$ 720.00	$ 1,200.00	$ 1,920.00	$ 720.00	$ 1,200.00	$ 1,920.00
	Site Installation (Wireless)		1	n/a	$ 1,500.00	$ 1,500.00	n/a	$ 1,500.00	$ 1,500.00
	Site Prep		1	n/a	$ 10,000.00	$ 10,000.00	n/a	$ 10,000.00	$ 10,000.00
				$ -	$ -	$ -	$ -	$ -	$ -
Misc.									
500 '	Install Fiber Optic Marker Sign	Fiberglass	12	$ 60.00	$ 17.70	$ 77.70	$ 720.00	$ 212.40	$ 932.40
				$ -	$ -	$ -	$ -	$ -	$ -
				$ -	$ -	$ -	$ -	$ -	$ -
					Subtotal Cost:		$ 63,842.57	$ 106,899.55	$ 170,742.12

Total Material Cost: $ 63,842.57
Labor/Equip. Total: $ 106,899.55
Total Construction Cost: $ 170,742.12

Orcas Power & Light Coorperative - Unit Totals
OSP Construction Estimate
- Segment 706.3-OR15

Aerial	Underground	Existing Duct	Poles	AP's	Submarine Cable
13,745 '	0 '	4,221 '	51	1	

	Unit Description	Type	Unit Quantity	Material Cost	Labor/Equip. Cost	Total Unit Cost	Material Total	Labor/Equip. Total	Ext. Total
Trenching/ Plow									
	Trench New	24" Depth	'	n/a	$ 8.20	$ 8.20	n/a	$ -	$ -
15%	Rock Adder		'	n/a	$ 13.00	$ 13.00	n/a	$ -	$ -
Conduit Placement									
	Place (2) 2" HDPE	2	'	$ 1.61	$ 0.89	$ 2.49	$ -	$ -	$ -
Locate Items									
	Warning Tape	Non-Detect	'	$ 0.04	$ 0.12	$ 0.15	$ -	$ -	$ -
	Locate Wire (#12)	Insulated/Solid	'	$ 0.18	$ 0.18	$ 0.36	$ -	$ -	$ -
Remove & Restore									
3%	General R&R		'	n/a	$ 14.16	$ 14.16	n/a	$ -	$ -
Fiber Placement in Conduit									
	Fiber Optic Cable	12, 24 ,96	4,221 '	n/a	$ 0.78	$ 0.78	n/a	$ 3,292.38	$ 3,292.38
Handholes									
1,000 '	HH-3 (20k)		0	$ 1,200.00	$ 550.00	$ 1,750.00	$ -	$ -	$ -
Slack Coil									
100 '	Slack Coil FOC in HH	12, 24, 96	'	n/a	$ 0.45	$ 0.45	n/a	$ -	$ -
200 '	Slack Coil FOC on Snowshoes	12, 24, 96	1,400 '	n/a	$ 0.92	$ 0.92	n/a	$ 1,288.56	$ 1,288.56
Aerial									
	Pole Attachment		51	$ 28.80	$ 41.30	$ 70.10	$ 1,468.80	$ 2,106.30	$ 3,575.10
	Place ADSS FOC (roadside)		13,745 '	n/a	$ 1.30	$ 1.30	n/a	$ 17,841.01	$ 17,841.01
15%	Aerial Make Ready per Pole		8	$ 42.00	$ 177.00	$ 219.00	$ 336.00	$ 1,416.00	$ 1,752.00
5%	Place Extension Arm		3	$ 54.00	$ 59.00	$ 113.00	$ 162.00	$ 177.00	$ 339.00
10%	Place Anchor & Guy		6	$ 102.00	$ 295.00	$ 397.00	$ 612.00	$ 1,770.00	$ 2,382.00
2,000 '	Place Snow-shoes		7	$ 114.00	$ 177.00	$ 291.00	$ 798.00	$ 1,239.00	$ 2,037.00
Splicing Items									
	Splice Case	*>144*	1	$ 558.00	$ 295.00	$ 853.00	$ 558.00	$ 295.00	$ 853.00
	Splice Trays	24 slot	4	$ 30.00	n/a	$ 30.00	$ 120.00	n/a	$ 120.00
	Fiber Splicing < 12		30	n/a	$ 47.20	$ 47.20	n/a	$ 1,416.00	$ 1,416.00
	Fiber Splicing > 96			n/a	$ 31.86	$ 31.86	n/a	$ -	$ -
	Fiber Testing (OTDR/PM)		6	n/a	$ 11.80	$ 11.80	n/a	$ 70.80	$ 70.80
	Fiber Tags	Wrap-Around	62	$ 1.32	n/a	$ 1.32	$ 82.37	n/a	$ 82.37
Fiber Lengths									
	Fiber+Slack	96	19,366 '	$ 1.032	n/a	$ 1.03	$ 19,985.71	n/a	$ 19,985.71
Site									
	Replace Pole w/ 130' Steel Pole		1	$ 24,360.00	$ 13,500.00	$ 37,860.00	$ 24,360.00	$ 13,500.00	$ 37,860.00
	NEMA Cabinet, UPS, Disconnect		1	$ 4,200.00	$ 400.00	$ 4,600.00	$ 4,200.00	$ 400.00	$ 4,600.00
	Edge Equipment		1	$ 1,200.00	$ 350.00	$ 1,550.00	$ 1,200.00	$ 350.00	$ 1,550.00
	AC Power Connect (Service Drop)		1	n/a	$ 1,416.00	$ 1,416.00	n/a	$ 1,416.00	$ 1,416.00
	Antenna Array		1	$ 7,500.00	n/a	$ 7,500.00	$ 7,500.00	n/a	$ 7,500.00
	Cabling System		1	$ 720.00	$ 1,200.00	$ 1,920.00	$ 720.00	$ 1,200.00	$ 1,920.00
	Site Installation (Wireless)		1	n/a	$ 1,500.00	$ 1,500.00	n/a	$ 1,500.00	$ 1,500.00
	Site Prep		1	n/a	$ 10,000.00	$ 10,000.00	n/a	$ 10,000.00	$ 10,000.00
				$ -	$ -	$ -	$ -	$ -	$ -
Misc.									
500 '	Install Fiber Optic Marker Sign	Fiberglass	0	$ 60.00	$ 17.70	$ 77.70	$ -	$ -	$ -
				$ -	$ -	$ -	$ -	$ -	$ -
				$ -	$ -	$ -	$ -	$ -	$ -
						Subtotal Cost:	$ 62,102.88	$ 59,278.05	$ 121,380.93

Total Material Cost: $ 62,102.88
Labor/Equip. Total: $ 59,278.05
Total Construction Cost: $ 121,380.93

5/1/2012

Orcas Power & Light Coorperative - Unit Totals
OSP Construction Estimate
- Segment 706.3-OR16

Aerial	Underground	Existing Duct	Poles	AP's	Submarine Cable
0 '	8,913 '	0 '	0	1	

	Unit Description	Type	Unit Quantity	Material Cost	Labor/Equip. Cost	Total Unit Cost	Material Total	Labor/Equip. Total	Ext. Total
Trenching/ Plow									
	Trench New	24" Depth	8,913 '	n/a	$ 8.20	$ 8.20	n/a	$ 73,086.60	$ 73,086.60
15%	Rock Adder		1,337 '	n/a	$ 13.00	$ 13.00	n/a	$ 17,380.35	$ 17,380.35
Conduit Placement									
	Place (2) 2" HDPE	2	8,913 '	$ 1.61	$ 0.89	$ 2.49	$ 14,332.10	$ 7,888.01	$ 22,220.11
Locate Items									
	Warning Tape	Non-Detect	8,913 '	$ 0.04	$ 0.12	$ 0.15	$ 320.87	$ 1,051.73	$ 1,372.60
	Locate Wire (#12)	Insulated/Solid	8,913 '	$ 0.18	$ 0.18	$ 0.36	$ 1,604.34	$ 1,577.60	$ 3,181.94
Remove & Restore									
3%	General R&R		268 '	n/a	$ 14.16	$ 14.16	n/a	$ 3,794.88	$ 3,794.88
Fiber Placement in Conduit									
	Fiber Optic Cable	12, 24 ,96	8,913 '	n/a	$ 0.78	$ 0.78	n/a	$ 6,952.14	$ 6,952.14
Handholes									
1,000 '	HH-3 (20k)		9	$ 1,200.00	$ 550.00	$ 1,750.00	$ 10,800.00	$ 4,950.00	$ 15,750.00
Slack Coil									
100 '	Slack Coil FOC in HH	12, 24, 96	900 '	n/a	$ 0.45	$ 0.45	n/a	$ 403.56	$ 403.56
200 '	Slack Coil FOC on Snowshoes	12, 24, 96	'	n/a	$ 0.92	$ 0.92	n/a	$ -	$ -
Aerial									
	Pole Attachment		0	$ 28.80	$ 41.30	$ 70.10	$ -	$ -	$ -
	Place ADSS FOC (roadside)		'	n/a	$ 1.30	$ 1.30	n/a	$ -	$ -
15%	Aerial Make Ready per Pole		0	$ 42.00	$ 177.00	$ 219.00	$ -	$ -	$ -
5%	Place Extension Arm		0	$ 54.00	$ 59.00	$ 113.00	$ -	$ -	$ -
10%	Place Anchor & Guy		0	$ 102.00	$ 295.00	$ 397.00	$ -	$ -	$ -
2,000 '	Place Snow-shoes		0	$ 114.00	$ 177.00	$ 291.00	$ -	$ -	$ -
Splicing Items									
	Splice Case	*>144*	1	$ 558.00	$ 295.00	$ 853.00	$ 558.00	$ 295.00	$ 853.00
	Splice Trays	24 slot	4	$ 30.00	n/a	$ 30.00	$ 120.00	n/a	$ 120.00
	Fiber Splicing < 12		12	n/a	$ 47.20	$ 47.20	n/a	$ 566.40	$ 566.40
	Fiber Splicing > 96			n/a	$ 31.86	$ 31.86	n/a	$ -	$ -
	Fiber Testing (OTDR/PM)		6	n/a	$ 11.80	$ 11.80	n/a	$ 70.80	$ 70.80
	Fiber Tags	Wrap-Around	23	$ 1.32	n/a	$ 1.32	$ 30.10	n/a	$ 30.10
Fiber Lengths									
	Fiber+Slack	96	9,813 '	$ 1.032	n/a	$ 1.03	$ 10,127.02	n/a	$ 10,127.02
Site									
	Replace Pole w/ 130' Steel Pole		1	$ 24,360.00	$ 13,500.00	$ 37,860.00	$ 24,360.00	$ 13,500.00	$ 37,860.00
	NEMA Cabinet, UPS, Disconnect		1	$ 4,200.00	$ 400.00	$ 4,600.00	$ 4,200.00	$ 400.00	$ 4,600.00
	Edge Equipment		1	$ 1,200.00	$ 350.00	$ 1,550.00	$ 1,200.00	$ 350.00	$ 1,550.00
	AC Power Connect (Service Drop)		1	n/a	$ 1,416.00	$ 1,416.00	n/a	$ 1,416.00	$ 1,416.00
	Antenna Array		1	$ 7,500.00	n/a	$ 7,500.00	$ 7,500.00	n/a	$ 7,500.00
	Cabling System		1	$ 720.00	$ 1,200.00	$ 1,920.00	$ 720.00	$ 1,200.00	$ 1,920.00
	Site Installation (Wireless)		1	n/a	$ 1,500.00	$ 1,500.00	n/a	$ 1,500.00	$ 1,500.00
	Site Prep		1	n/a	$ 10,000.00	$ 10,000.00	n/a	$ 10,000.00	$ 10,000.00
				$ -	$ -	$ -	$ -	$ -	$ -
Misc.									
500 '	Install Fiber Optic Marker Sign	Fiberglass	18	$ 60.00	$ 17.70	$ 77.70	$ 1,080.00	$ 318.60	$ 1,398.60
				$ -	$ -	$ -	$ -	$ -	$ -
				$ -	$ -	$ -	$ -	$ -	$ -
						Subtotal Cost:	$ 76,952.42	$ 146,701.67	$ 223,654.09

Total Material Cost: $ 76,952.42
Labor/Equip. Total: $ 146,701.67
Total Construction Cost: $ 223,654.09

Orcas Power & Light Coorperative - Unit Totals
OSP Construction Estimate
- Segment 706.3-OR17

Aerial	Underground	Existing Duct	Poles	AP's	Submarine Cable
2,087 '	9,741 '	5,144 '	13	1	

	Unit Description	Type	Unit Quantity	Material Cost	Labor/Equip. Cost	Total Unit Cost	Material Total	Labor/Equip. Total	Ext. Total
Trenching/ Plow									
	Trench New	24" Depth	9,741 '	n/a	$ 8.20	$ 8.20	n/a	$ 79,876.20	$ 79,876.20
15%	Rock Adder		1,461 '	n/a	$ 13.00	$ 13.00	n/a	$ 18,994.95	$ 18,994.95
Conduit Placement									
	Place (2) 2" HDPE	2	9,741 '	$ 1.61	$ 0.89	$ 2.49	$ 15,663.53	$ 8,620.79	$ 24,284.31
Locate Items									
	Warning Tape	Non-Detect	9,741 '	$ 0.04	$ 0.12	$ 0.15	$ 350.68	$ 1,149.44	$ 1,500.11
	Locate Wire (#12)	Insulated/Solid	9,741 '	$ 0.18	$ 0.18	$ 0.36	$ 1,753.38	$ 1,724.16	$ 3,477.54
Remove & Restore									
3%	General R&R		293 '	n/a	$ 14.16	$ 14.16	n/a	$ 4,148.88	$ 4,148.88
Fiber Placement in Conduit									
	Fiber Optic Cable	12, 24 ,96	14,885 '	n/a	$ 0.78	$ 0.78	n/a	$ 11,610.30	$ 11,610.30
Handholes									
1,000 '	HH-3 (20k)		10	$ 1,200.00	$ 550.00	$ 1,750.00	$ 12,000.00	$ 5,500.00	$ 17,500.00
Slack Coil									
100 '	Slack Coil FOC in HH	12, 24, 96	1,000 '	n/a	$ 0.45	$ 0.45	n/a	$ 448.40	$ 448.40
200 '	Slack Coil FOC on Snowshoes	12, 24, 96	400 '	n/a	$ 0.92	$ 0.92	n/a	$ 368.16	$ 368.16
Aerial									
	Pole Attachment		13	$ 28.80	$ 41.30	$ 70.10	$ 374.40	$ 536.90	$ 911.30
	Place ADSS FOC (roadside)		2,087 '	n/a	$ 1.30	$ 1.30	n/a	$ 2,708.93	$ 2,708.93
15%	Aerial Make Ready per Pole		2	$ 42.00	$ 177.00	$ 219.00	$ 84.00	$ 354.00	$ 438.00
5%	Place Extension Arm		1	$ 54.00	$ 59.00	$ 113.00	$ 54.00	$ 59.00	$ 113.00
10%	Place Anchor & Guy		2	$ 102.00	$ 295.00	$ 397.00	$ 204.00	$ 590.00	$ 794.00
2,000 '	Place Snow-shoes		2	$ 114.00	$ 177.00	$ 291.00	$ 228.00	$ 354.00	$ 582.00
Splicing Items									
	Splice Case	*>144*	1	$ 558.00	$ 295.00	$ 853.00	$ 558.00	$ 295.00	$ 853.00
	Splice Trays	24 slot	4	$ 30.00	n/a	$ 30.00	$ 120.00	n/a	$ 120.00
	Fiber Splicing < 12		30	n/a	$ 47.20	$ 47.20	n/a	$ 1,416.00	$ 1,416.00
	Fiber Splicing > 96			n/a	$ 31.86	$ 31.86	n/a	$ -	$ -
	Fiber Testing (OTDR/PM)		30	n/a	$ 11.80	$ 11.80	n/a	$ 354.00	$ 354.00
	Fiber Tags	Wrap-Around	41	$ 1.32	n/a	$ 1.32	$ 53.86	n/a	$ 53.86
Fiber Lengths									
	Fiber+Slack	96	18,372 '	$ 1.032	n/a	$ 1.03	$ 18,959.90	n/a	$ 18,959.90
Site									
	Replace Pole w/ 130' Steel Pole		1	$ 24,360.00	$ 13,500.00	$ 37,860.00	$ 24,360.00	$ 13,500.00	$ 37,860.00
	NEMA Cabinet, UPS, Disconnect		1	$ 4,200.00	$ 400.00	$ 4,600.00	$ 4,200.00	$ 400.00	$ 4,600.00
	Edge Equipment		1	$ 1,200.00	$ 350.00	$ 1,550.00	$ 1,200.00	$ 350.00	$ 1,550.00
	AC Power Connect (Service Drop)		1	n/a	$ 1,416.00	$ 1,416.00	n/a	$ 1,416.00	$ 1,416.00
	Antenna Array		1	$ 7,500.00	n/a	$ 7,500.00	$ 7,500.00	n/a	$ 7,500.00
	Cabling System		1	$ 720.00	$ 1,200.00	$ 1,920.00	$ 720.00	$ 1,200.00	$ 1,920.00
	Site Installation (Wireless)		1	n/a	$ 1,500.00	$ 1,500.00	n/a	$ 1,500.00	$ 1,500.00
	Site Prep		1	n/a	$ 10,000.00	$ 10,000.00	n/a	$ 10,000.00	$ 10,000.00
				$ -	$ -	$ -	$ -	$ -	$ -
Misc.									
500 '	Install Fiber Optic Marker Sign	Fiberglass	20	$ 60.00	$ 17.70	$ 77.70	$ 1,200.00	$ 354.00	$ 1,554.00
				$ -	$ -	$ -	$ -	$ -	$ -
				$ -	$ -	$ -	$ -	$ -	$ -
						Subtotal Cost:	$ 89,583.74	$ 167,829.10	$ 257,412.84

Total Material Cost: $ 89,583.74
Labor/Equip. Total: $ 167,829.10
Total Construction Cost: $ 257,412.84

Orcas Power & Light Coorperative - Unit Totals
OSP Construction Estimate
- Segment 706.3-OR18

Aerial	Underground	Existing Duct	Poles	AP's	Submarine Cable
300 '	0 '	0 '	0	1	

	Unit Description	Type	Unit Quantity	Material Cost	Labor/Equip. Cost	Total Unit Cost	Material Total	Labor/Equip. Total	Ext. Total
Trenching/ Plow									
	Trench New	24" Depth	'	n/a	$ 8.20	$ 8.20	n/a	$ -	$ -
15%	Rock Adder		'	n/a	$ 13.00	$ 13.00	n/a	$ -	$ -
Conduit Placement									
	Place (2) 2" HDPE	2	'	$ 1.61	$ 0.89	$ 2.49	$ -	$ -	$ -
Locate Items									
	Warning Tape	Non-Detect	'	$ 0.04	$ 0.12	$ 0.15	$ -	$ -	$ -
	Locate Wire (#12)	Insulated/Solid	'	$ 0.18	$ 0.18	$ 0.36	$ -	$ -	$ -
Remove & Restore									
3%	General R&R		'	n/a	$ 14.16	$ 14.16	n/a	$ -	$ -
Fiber Placement in Conduit									
	Fiber Optic Cable	12, 24 ,96	'	n/a	$ 0.78	$ 0.78	n/a	$ -	$ -
Handholes									
1,000 '	HH-3 (20k)		0	$ 1,200.00	$ 550.00	$ 1,750.00	$ -	$ -	$ -
Slack Coil									
100 '	Slack Coil FOC in HH	12, 24, 96	'	n/a	$ 0.45	$ 0.45	n/a	$ -	$ -
200 '	Slack Coil FOC on Snowshoes	12, 24, 96	200 '	n/a	$ 0.92	$ 0.92	n/a	$ 184.08	$ 184.08
Aerial									
	Pole Attachment		0	$ 28.80	$ 41.30	$ 70.10	$ -	$ -	$ -
	Place ADSS FOC (roadside)		300 '	n/a	$ 1.30	$ 1.30	n/a	$ 389.40	$ 389.40
15%	Aerial Make Ready per Pole		0	$ 42.00	$ 177.00	$ 219.00	$ -	$ -	$ -
5%	Place Extension Arm		0	$ 54.00	$ 59.00	$ 113.00	$ -	$ -	$ -
10%	Place Anchor & Guy		0	$ 102.00	$ 295.00	$ 397.00	$ -	$ -	$ -
2,000 '	Place Snow-shoes		1	$ 114.00	$ 177.00	$ 291.00	$ 114.00	$ 177.00	$ 291.00
Splicing Items									
	Splice Case	*>144*	1	$ 558.00	$ 295.00	$ 853.00	$ 558.00	$ 295.00	$ 853.00
	Splice Trays	24 slot	4	$ 30.00	n/a	$ 30.00	$ 120.00	n/a	$ 120.00
	Fiber Splicing < 12		12	n/a	$ 47.20	$ 47.20	n/a	$ 566.40	$ 566.40
	Fiber Splicing > 96			n/a	$ 31.86	$ 31.86	n/a	$ -	$ -
	Fiber Testing (OTDR/PM)		6	n/a	$ 11.80	$ 11.80	n/a	$ 70.80	$ 70.80
	Fiber Tags	Wrap-Around	1	$ 1.32	n/a	$ 1.32	$ 1.58	n/a	$ 1.58
Fiber Lengths									
	Fiber+Slack	96	500 '	$ 1.032	n/a	$ 1.03	$ 516.00	n/a	$ 516.00
Site									
	Replace Pole w/ 130' Steel Pole		1	$ 24,360.00	$ 13,500.00	$ 37,860.00	$ 24,360.00	$ 13,500.00	$ 37,860.00
	NEMA Cabinet, UPS, Disconnect		1	$ 4,200.00	$ 400.00	$ 4,600.00	$ 4,200.00	$ 400.00	$ 4,600.00
	Edge Equipment		1	$ 1,200.00	$ 350.00	$ 1,550.00	$ 1,200.00	$ 350.00	$ 1,550.00
	AC Power Connect (Service Drop)		1	n/a	$ 1,416.00	$ 1,416.00	n/a	$ 1,416.00	$ 1,416.00
	Antenna Array		1	$ 7,500.00	n/a	$ 7,500.00	$ 7,500.00	n/a	$ 7,500.00
	Cabling System		1	$ 720.00	$ 1,200.00	$ 1,920.00	$ 720.00	$ 1,200.00	$ 1,920.00
	Site Installation (Wireless)		1	n/a	$ 1,500.00	$ 1,500.00	n/a	$ 1,500.00	$ 1,500.00
	Site Prep		1	n/a	$ 10,000.00	$ 10,000.00	n/a	$ 10,000.00	$ 10,000.00
				$ -	$ -	$ -	$ -	$ -	$ -
Misc.									
500 '	Install Fiber Optic Marker Sign	Fiberglass	0	$ 60.00	$ 17.70	$ 77.70	$ -	$ -	$ -
				$ -	$ -	$ -	$ -	$ -	$ -
				$ -	$ -	$ -	$ -	$ -	$ -
					Subtotal Cost:		$ 39,289.58	$ 30,048.68	$ 69,338.26

Total Material Cost: $ 39,289.58
Labor/Equip. Total: $ 30,048.68
Total Construction Cost: $ 69,338.26

Orcas Power & Light Coorperative - Unit Totals
OSP Construction Estimate
- Segment 706.3-OR19

Aerial	Underground	Existing Duct	Poles	AP's	Submarine Cable
0 '	750 '	0 '	0	1	

	Unit Description	Type	Unit Quantity	Material Cost	Labor/Equip. Cost	Total Unit Cost	Material Total	Labor/Equip. Total	Ext. Total
Trenching/ Plow									
	Trench New	24" Depth	750 '	n/a	$ 8.20	$ 8.20	n/a	$ 6,150.00	$ 6,150.00
15%	Rock Adder		113 '	n/a	$ 13.00	$ 13.00	n/a	$ 1,462.50	$ 1,462.50
Conduit Placement									
	Place (2) 2" HDPE	2	750 '	$ 1.61	$ 0.89	$ 2.49	$ 1,206.00	$ 663.75	$ 1,869.75
Locate Items									
	Warning Tape	Non-Detect	750 '	$ 0.04	$ 0.12	$ 0.15	$ 27.00	$ 88.50	$ 115.50
	Locate Wire (#12)	Insulated/Solid	750 '	$ 0.18	$ 0.18	$ 0.36	$ 135.00	$ 132.75	$ 267.75
Remove & Restore									
3%	General R&R		23 '	n/a	$ 14.16	$ 14.16	n/a	$ 325.68	$ 325.68
Fiber Placement in Conduit									
	Fiber Optic Cable	12, 24 ,96	750 '	n/a	$ 0.78	$ 0.78	n/a	$ 585.00	$ 585.00
Handholes									
1,000 '	HH-3 (20k)		1	$ 1,200.00	$ 550.00	$ 1,750.00	$ 1,200.00	$ 550.00	$ 1,750.00
Slack Coil									
100 '	Slack Coil FOC in HH	12, 24, 96	100 '	n/a	$ 0.45	$ 0.45	n/a	$ 44.84	$ 44.84
200 '	Slack Coil FOC on Snowshoes	12, 24, 96	'	n/a	$ 0.92	$ 0.92	n/a	$ -	$ -
Aerial									
	Pole Attachment		0	$ 28.80	$ 41.30	$ 70.10	$ -	$ -	$ -
	Place ADSS FOC (roadside)		'	n/a	$ 1.30	$ 1.30	n/a	$ -	$ -
15%	Aerial Make Ready per Pole		0	$ 42.00	$ 177.00	$ 219.00	$ -	$ -	$ -
5%	Place Extension Arm		0	$ 54.00	$ 59.00	$ 113.00	$ -	$ -	$ -
10%	Place Anchor & Guy		0	$ 102.00	$ 295.00	$ 397.00	$ -	$ -	$ -
2,000 '	Place Snow-shoes		0	$ 114.00	$ 177.00	$ 291.00	$ -	$ -	$ -
Splicing Items									
	Splice Case	*>144*	1	$ 558.00	$ 295.00	$ 853.00	$ 558.00	$ 295.00	$ 853.00
	Splice Trays	24 slot	4	$ 30.00	n/a	$ 30.00	$ 120.00	n/a	$ 120.00
	Fiber Splicing < 12		12	n/a	$ 47.20	$ 47.20	n/a	$ 566.40	$ 566.40
	Fiber Splicing > 96			n/a	$ 31.86	$ 31.86	n/a	$ -	$ -
	Fiber Testing (OTDR/PM)		6	n/a	$ 11.80	$ 11.80	n/a	$ 70.80	$ 70.80
	Fiber Tags	Wrap-Around	4	$ 1.32	n/a	$ 1.32	$ 4.75	n/a	$ 4.75
Fiber Lengths									
	Fiber+Slack	96	850 '	$ 1.032	n/a	$ 1.03	$ 877.20	n/a	$ 877.20
Site									
	Replace Pole w/ 130' Steel Pole		1	$ 24,360.00	$ 13,500.00	$ 37,860.00	$ 24,360.00	$ 13,500.00	$ 37,860.00
	NEMA Cabinet, UPS, Disconnect		1	$ 4,200.00	$ 400.00	$ 4,600.00	$ 4,200.00	$ 400.00	$ 4,600.00
	Edge Equipment		1	$ 1,200.00	$ 350.00	$ 1,550.00	$ 1,200.00	$ 350.00	$ 1,550.00
	AC Power Connect (Service Drop)		1	n/a	$ 1,416.00	$ 1,416.00	n/a	$ 1,416.00	$ 1,416.00
	Antenna Array		1	$ 7,500.00	n/a	$ 7,500.00	$ 7,500.00	n/a	$ 7,500.00
	Cabling System		1	$ 720.00	$ 1,200.00	$ 1,920.00	$ 720.00	$ 1,200.00	$ 1,920.00
	Site Installation (Wireless)		1	n/a	$ 1,500.00	$ 1,500.00	n/a	$ 1,500.00	$ 1,500.00
	Site Prep		1	n/a	$ 10,000.00	$ 10,000.00	n/a	$ 10,000.00	$ 10,000.00
				$ -	$ -	$ -	$ -	$ -	$ -
Misc.									
500 '	Install Fiber Optic Marker Sign	Fiberglass	2	$ 60.00	$ 17.70	$ 77.70	$ 120.00	$ 35.40	$ 155.40
				$ -	$ -	$ -	$ -	$ -	$ -
				$ -	$ -	$ -	$ -	$ -	$ -
						Subtotal Cost:	$ 42,227.95	$ 39,336.62	$ 81,564.57

Total Material Cost: $ 42,227.95
Labor/Equip. Total: $ 39,336.62
Total Construction Cost: $ 81,564.57

Orcas Power & Light Coorperative - Unit Totals
OSP Construction Estimate
- Segment 706.3-OR20

Aerial	Underground	Existing Duct	Poles	AP's	Submarine Cable
0 '	0 '	0 '	0	1	

	Unit Description	Type	Unit Quantity	Material Cost	Labor/Equip. Cost	Total Unit Cost	Material Total	Labor/Equip. Total	Ext. Total
Trenching/ Plow									
	Trench New	24" Depth	'	n/a	$ 8.20	$ 8.20	n/a	$ -	$ -
15%	Rock Adder		'	n/a	$ 13.00	$ 13.00	n/a	$ -	$ -
Conduit Placement									
	Place (2) 2" HDPE	2	'	$ 1.61	$ 0.89	$ 2.49	$ -	$ -	$ -
Locate Items									
	Warning Tape	Non-Detect	'	$ 0.04	$ 0.12	$ 0.15	$ -	$ -	$ -
	Locate Wire (#12)	Insulated/Solid	'	$ 0.18	$ 0.18	$ 0.36	$ -	$ -	$ -
Remove & Restore									
3%	General R&R		'	n/a	$ 14.16	$ 14.16	n/a	$ -	$ -
Fiber Placement in Conduit									
	Fiber Optic Cable	12, 24 ,96	'	n/a	$ 0.78	$ 0.78	n/a	$ -	$ -
Handholes									
1,000 '	HH-3 (20k)		0	$ 1,200.00	$ 550.00	$ 1,750.00	$ -	$ -	$ -
Slack Coil									
100 '	Slack Coil FOC in HH	12, 24, 96	'	n/a	$ 0.45	$ 0.45	n/a	$ -	$ -
200 '	Slack Coil FOC on Snowshoes	12, 24, 96	'	n/a	$ 0.92	$ 0.92	n/a	$ -	$ -
Aerial									
	Pole Attachment		0	$ 28.80	$ 41.30	$ 70.10	$ -	$ -	$ -
	Place ADSS FOC (roadside)		'	n/a	$ 1.30	$ 1.30	n/a	$ -	$ -
15%	Aerial Make Ready per Pole		0	$ 42.00	$ 177.00	$ 219.00	$ -	$ -	$ -
5%	Place Extension Arm		0	$ 54.00	$ 59.00	$ 113.00	$ -	$ -	$ -
10%	Place Anchor & Guy		0	$ 102.00	$ 295.00	$ 397.00	$ -	$ -	$ -
2,000 '	Place Snow-shoes		0	$ 114.00	$ 177.00	$ 291.00	$ -	$ -	$ -
Splicing Items									
	Splice Case	*>144*	1	$ 558.00	$ 295.00	$ 853.00	$ 558.00	$ 295.00	$ 853.00
	Splice Trays	24 slot	4	$ 30.00	n/a	$ 30.00	$ 120.00	n/a	$ 120.00
	Fiber Splicing < 12		48	n/a	$ 47.20	$ 47.20	n/a	$ 2,265.60	$ 2,265.60
	Fiber Splicing > 96			n/a	$ 31.86	$ 31.86	n/a	$ -	$ -
	Fiber Testing (OTDR/PM)		48	n/a	$ 11.80	$ 11.80	n/a	$ 566.40	$ 566.40
	Fiber Tags	Wrap-Around	1	$ 1.32	n/a	$ 1.32	$ 1.58	n/a	$ 1.58
Fiber Lengths									
	Fiber+Slack	96	'	$ 1.032	n/a	$ 1.03	$ -	n/a	$ -
Site									
	Replace Pole w/ 130' Steel Pole		1	$ 24,360.00	$ 13,500.00	$ 37,860.00	$ 24,360.00	$ 13,500.00	$ 37,860.00
	NEMA Cabinet, UPS, Disconnect		1	$ 4,200.00	$ 400.00	$ 4,600.00	$ 4,200.00	$ 400.00	$ 4,600.00
	Edge Equipment		1	$ 1,200.00	$ 350.00	$ 1,550.00	$ 1,200.00	$ 350.00	$ 1,550.00
	AC Power Connect (Service Drop)		1	n/a	$ 1,416.00	$ 1,416.00	n/a	$ 1,416.00	$ 1,416.00
	Antenna Array		1	$ 7,500.00	n/a	$ 7,500.00	$ 7,500.00	n/a	$ 7,500.00
	Cabling System		1	$ 720.00	$ 1,200.00	$ 1,920.00	$ 720.00	$ 1,200.00	$ 1,920.00
	Site Installation (Wireless)		1	n/a	$ 1,500.00	$ 1,500.00	n/a	$ 1,500.00	$ 1,500.00
	Site Prep		1	n/a	$ 10,000.00	$ 10,000.00	n/a	$ 10,000.00	$ 10,000.00
				$ -	$ -	$ -	$ -	$ -	$ -
Misc.									
500 '	Install Fiber Optic Marker Sign	Fiberglass	0	$ 60.00	$ 17.70	$ 77.70	$ -	$ -	$ -
				$ -	$ -	$ -	$ -	$ -	$ -
				$ -	$ -	$ -	$ -	$ -	$ -
						Subtotal Cost:	$ 38,659.58	$ 31,493.00	$ 70,152.58

Total Material Cost: $ 38,659.58
Labor/Equip. Total: $ 31,493.00
Total Construction Cost: $ 70,152.58

Orcas Power & Light Coorperative - Unit Totals
OSP Construction Estimate
- Segment 706.3-SJ01

Aerial	Underground	Existing Duct	Poles	AP's	Submarine Cable
11,418 '	9,851 '	2,706 '	42	0	

	Unit Description	Type	Unit Quantity	Material Cost	Labor/Equip. Cost	Total Unit Cost	Material Total	Labor/Equip. Total	Ext. Total
Trenching/ Plow									
	Trench New	24" Depth	9,851 '	n/a	$ 8.20	$ 8.20	n/a	$ 80,778.20	$ 80,778.20
15%	Rock Adder		1,478 '	n/a	$ 13.00	$ 13.00	n/a	$ 19,209.45	$ 19,209.45
Conduit Placement									
	Place (2) 2" HDPE	2	9,851 '	$ 1.61	$ 0.89	$ 2.49	$ 15,840.41	$ 8,718.14	$ 24,558.54
Locate Items									
	Warning Tape	Non-Detect	9,851 '	$ 0.04	$ 0.12	$ 0.15	$ 354.64	$ 1,162.42	$ 1,517.05
	Locate Wire (#12)	Insulated/Solid	9,851 '	$ 0.18	$ 0.18	$ 0.36	$ 1,773.18	$ 1,743.63	$ 3,516.81
Remove & Restore									
3%	General R&R		296 '	n/a	$ 14.16	$ 14.16	n/a	$ 4,191.36	$ 4,191.36
Fiber Placement in Conduit									
	Fiber Optic Cable	12, 24 ,96	12,557 '	n/a	$ 0.78	$ 0.78	n/a	$ 9,794.46	$ 9,794.46
Handholes									
1,000 '	HH-3 (20k)		10	$ 1,200.00	$ 550.00	$ 1,750.00	$ 12,000.00	$ 5,500.00	$ 17,500.00
Slack Coil									
100 '	Slack Coil FOC in HH	12, 24, 96	1,000 '	n/a	$ 0.45	$ 0.45	n/a	$ 448.40	$ 448.40
200 '	Slack Coil FOC on Snowshoes	12, 24, 96	1,200 '	n/a	$ 0.92	$ 0.92	n/a	$ 1,104.48	$ 1,104.48
Aerial									
	Pole Attachment		42	$ 28.80	$ 41.30	$ 70.10	$ 1,209.60	$ 1,734.60	$ 2,944.20
	Place ADSS FOC (roadside)		11,418 '	n/a	$ 1.30	$ 1.30	n/a	$ 14,820.56	$ 14,820.56
15%	Aerial Make Ready per Pole		7	$ 42.00	$ 177.00	$ 219.00	$ 294.00	$ 1,239.00	$ 1,533.00
5%	Place Extension Arm		3	$ 54.00	$ 59.00	$ 113.00	$ 162.00	$ 177.00	$ 339.00
10%	Place Anchor & Guy		5	$ 102.00	$ 295.00	$ 397.00	$ 510.00	$ 1,475.00	$ 1,985.00
2,000 '	Place Snow-shoes		6	$ 114.00	$ 177.00	$ 291.00	$ 684.00	$ 1,062.00	$ 1,746.00
Splicing Items									
	Splice Case	*>144*	2	$ 558.00	$ 295.00	$ 853.00	$ 1,116.00	$ 590.00	$ 1,706.00
	Splice Trays	24 slot	8	$ 30.00	n/a	$ 30.00	$ 240.00	n/a	$ 240.00
	Fiber Splicing < 12			n/a	$ 47.20	$ 47.20	n/a	$ -	$ -
	Fiber Splicing > 96		192	n/a	$ 31.86	$ 31.86	n/a	$ 6,117.12	$ 6,117.12
	Fiber Testing (OTDR/PM)		96	n/a	$ 11.80	$ 11.80	n/a	$ 1,132.80	$ 1,132.80
	Fiber Tags	Wrap-Around	74	$ 1.32	n/a	$ 1.32	$ 98.21	n/a	$ 98.21
Fiber Lengths									
	Fiber+Slack	96	26,175 '	$ 1.032	n/a	$ 1.03	$ 27,012.60	n/a	$ 27,012.60
Site									
	Replace Pole w/ 130' Steel Pole		0	$ 24,360.00	$ 13,500.00	$ 37,860.00	$ -	$ -	$ -
	NEMA Cabinet, UPS, Disconnect		0	$ 4,200.00	$ 400.00	$ 4,600.00	$ -	$ -	$ -
	Edge Equipment		0	$ 1,200.00	$ 350.00	$ 1,550.00	$ -	$ -	$ -
	AC Power Connect (Service Drop)		0	n/a	$ 1,416.00	$ 1,416.00	n/a	$ -	$ -
	Antenna Array		0	$ 7,500.00	n/a	$ 7,500.00	$ -	n/a	$ -
	Cabling System		0	$ 720.00	$ 1,200.00	$ 1,920.00	$ -	$ -	$ -
	Site Installation (Wireless)		0	n/a	$ 1,500.00	$ 1,500.00	n/a	$ -	$ -
	Site Prep		0	n/a	$ 10,000.00	$ 10,000.00	n/a	$ -	$ -
				$ -	$ -	$ -	$ -	$ -	$ -
Misc.									
500 '	Install Fiber Optic Marker Sign	Fiberglass	20	$ 60.00	$ 17.70	$ 77.70	$ 1,200.00	$ 354.00	$ 1,554.00
				$ -	$ -	$ -	$ -	$ -	$ -
				$ -	$ -	$ -	$ -	$ -	$ -
						Subtotal Cost:	$ 62,494.63	$ 161,352.61	$ 223,847.25

Total Material Cost: $ 62,494.63
Labor/Equip. Total: $ 161,352.61
Total Construction Cost: $ 223,847.25

Orcas Power & Light Coorperative - Unit Totals
OSP Construction Estimate
- Segment 706.3-SJ02

Aerial	Underground	Existing Duct	Poles	AP's	Submarine Cable
8,921 '	3,386 '	16,111 '	40	1	

	Unit Description	Type	Unit Quantity	Material Cost	Labor/Equip. Cost	Total Unit Cost	Material Total	Labor/Equip. Total	Ext. Total
Trenching/ Plow									
	Trench New	24" Depth	3,386 '	n/a	$ 8.20	$ 8.20	n/a	$ 27,765.20	$ 27,765.20
15%	Rock Adder		508 '	n/a	$ 13.00	$ 13.00	n/a	$ 6,602.70	$ 6,602.70
Conduit Placement									
	Place (2) 2" HDPE	2	3,386 '	$ 1.61	$ 0.89	$ 2.49	$ 5,444.69	$ 2,996.61	$ 8,441.30
Locate Items									
	Warning Tape	Non-Detect	3,386 '	$ 0.04	$ 0.12	$ 0.15	$ 121.90	$ 399.55	$ 521.44
	Locate Wire (#12)	Insulated/Solid	3,386 '	$ 0.18	$ 0.18	$ 0.36	$ 609.48	$ 599.32	$ 1,208.80
Remove & Restore									
3%	General R&R		102 '	n/a	$ 14.16	$ 14.16	n/a	$ 1,444.32	$ 1,444.32
Fiber Placement in Conduit									
	Fiber Optic Cable	12, 24 ,96	19,497 '	n/a	$ 0.78	$ 0.78	n/a	$ 15,207.66	$ 15,207.66
Handholes									
1,000 '	HH-3 (20k)		4	$ 1,200.00	$ 550.00	$ 1,750.00	$ 4,800.00	$ 2,200.00	$ 7,000.00
Slack Coil									
100 '	Slack Coil FOC in HH	12, 24, 96	400 '	n/a	$ 0.45	$ 0.45	n/a	$ 179.36	$ 179.36
200 '	Slack Coil FOC on Snowshoes	12, 24, 96	1,000 '	n/a	$ 0.92	$ 0.92	n/a	$ 920.40	$ 920.40
Aerial									
	Pole Attachment		40	$ 28.80	$ 41.30	$ 70.10	$ 1,152.00	$ 1,652.00	$ 2,804.00
	Place ADSS FOC (roadside)		8,921 '	n/a	$ 1.30	$ 1.30	n/a	$ 11,579.46	$ 11,579.46
15%	Aerial Make Ready per Pole		6	$ 42.00	$ 177.00	$ 219.00	$ 252.00	$ 1,062.00	$ 1,314.00
5%	Place Extension Arm		2	$ 54.00	$ 59.00	$ 113.00	$ 108.00	$ 118.00	$ 226.00
10%	Place Anchor & Guy		4	$ 102.00	$ 295.00	$ 397.00	$ 408.00	$ 1,180.00	$ 1,588.00
2,000 '	Place Snow-shoes		5	$ 114.00	$ 177.00	$ 291.00	$ 570.00	$ 885.00	$ 1,455.00
Splicing Items									
	Splice Case	*>144*	3	$ 558.00	$ 295.00	$ 853.00	$ 1,674.00	$ 885.00	$ 2,559.00
	Splice Trays	24 slot	12	$ 30.00	n/a	$ 30.00	$ 360.00	n/a	$ 360.00
	Fiber Splicing < 12			n/a	$ 47.20	$ 47.20	n/a	$ -	$ -
	Fiber Splicing > 96		288	n/a	$ 31.86	$ 31.86	n/a	$ 9,175.68	$ 9,175.68
	Fiber Testing (OTDR/PM)		96	n/a	$ 11.80	$ 11.80	n/a	$ 1,132.80	$ 1,132.80
	Fiber Tags	Wrap-Around	59	$ 1.32	n/a	$ 1.32	$ 77.62	n/a	$ 77.62
Fiber Lengths									
	Fiber+Slack	96	29,818 '	$ 1.032	n/a	$ 1.03	$ 30,772.18	n/a	$ 30,772.18
Site									
	Replace Pole w/ 130' Steel Pole		1	$ 24,360.00	$ 13,500.00	$ 37,860.00	$ 24,360.00	$ 13,500.00	$ 37,860.00
	NEMA Cabinet, UPS, Disconnect		1	$ 4,200.00	$ 400.00	$ 4,600.00	$ 4,200.00	$ 400.00	$ 4,600.00
	Edge Equipment		1	$ 1,200.00	$ 350.00	$ 1,550.00	$ 1,200.00	$ 350.00	$ 1,550.00
	AC Power Connect (Service Drop)		1	n/a	$ 1,416.00	$ 1,416.00	n/a	$ 1,416.00	$ 1,416.00
	Antenna Array		1	$ 7,500.00	n/a	$ 7,500.00	$ 7,500.00	n/a	$ 7,500.00
	Cabling System		1	$ 720.00	$ 1,200.00	$ 1,920.00	$ 720.00	$ 1,200.00	$ 1,920.00
	Site Installation (Wireless)		1	n/a	$ 1,500.00	$ 1,500.00	n/a	$ 1,500.00	$ 1,500.00
	Site Prep		1	n/a	$ 10,000.00	$ 10,000.00	n/a	$ 10,000.00	$ 10,000.00
				$ -	$ -	$ -	$ -	$ -	$ -
Misc.									
500 '	Install Fiber Optic Marker Sign	Fiberglass	7	$ 60.00	$ 17.70	$ 77.70	$ 420.00	$ 123.90	$ 543.90
				$ -	$ -	$ -	$ -	$ -	$ -
				$ -	$ -	$ -	$ -	$ -	$ -
						Subtotal Cost:	$ 84,749.86	$ 114,474.96	$ 199,224.81

Total Material Cost: $ 84,749.86
Labor/Equip. Total: $ 114,474.96
Total Construction Cost: $ 199,224.81

Orcas Power & Light Coorperative - Unit Totals
OSP Construction Estimate
- Segment 706.3-SJ03

Aerial	Underground	Existing Duct	Poles	AP's	Submarine Cable
6,111 '	9,666 '	0 '	23	0	

	Unit Description	Type	Unit Quantity	Material Cost	Labor/Equip. Cost	Total Unit Cost	Material Total	Labor/Equip. Total	Ext. Total
Trenching/ Plow									
	Trench New	24" Depth	9,666 '	n/a	$ 8.20	$ 8.20	n/a	$ 79,261.20	$ 79,261.20
15%	Rock Adder		1,450 '	n/a	$ 13.00	$ 13.00	n/a	$ 18,848.70	$ 18,848.70
Conduit Placement									
	Place (2) 2" HDPE	2	9,666 '	$ 1.61	$ 0.89	$ 2.49	$ 15,542.93	$ 8,554.41	$ 24,097.34
Locate Items									
	Warning Tape	Non-Detect	9,666 '	$ 0.04	$ 0.12	$ 0.15	$ 347.98	$ 1,140.59	$ 1,488.56
	Locate Wire (#12)	Insulated/Solid	9,666 '	$ 0.18	$ 0.18	$ 0.36	$ 1,739.88	$ 1,710.88	$ 3,450.76
Remove & Restore									
3%	General R&R		290 '	n/a	$ 14.16	$ 14.16	n/a	$ 4,106.40	$ 4,106.40
Fiber Placement in Conduit									
	Fiber Optic Cable	12, 24 ,96	9,666 '	n/a	$ 0.78	$ 0.78	n/a	$ 7,539.48	$ 7,539.48
Handholes									
1,000 '	HH-3 (20k)		10	$ 1,200.00	$ 550.00	$ 1,750.00	$ 12,000.00	$ 5,500.00	$ 17,500.00
Slack Coil									
100 '	Slack Coil FOC in HH	12, 24, 96	1,000 '	n/a	$ 0.45	$ 0.45	n/a	$ 448.40	$ 448.40
200 '	Slack Coil FOC on Snowshoes	12, 24, 96	800 '	n/a	$ 0.92	$ 0.92	n/a	$ 736.32	$ 736.32
Aerial									
	Pole Attachment		23	$ 28.80	$ 41.30	$ 70.10	$ 662.40	$ 949.90	$ 1,612.30
	Place ADSS FOC (roadside)		6,111 '	n/a	$ 1.30	$ 1.30	n/a	$ 7,932.08	$ 7,932.08
15%	Aerial Make Ready per Pole		4	$ 42.00	$ 177.00	$ 219.00	$ 168.00	$ 708.00	$ 876.00
5%	Place Extension Arm		2	$ 54.00	$ 59.00	$ 113.00	$ 108.00	$ 118.00	$ 226.00
10%	Place Anchor & Guy		3	$ 102.00	$ 295.00	$ 397.00	$ 306.00	$ 885.00	$ 1,191.00
2,000 '	Place Snow-shoes		4	$ 114.00	$ 177.00	$ 291.00	$ 456.00	$ 708.00	$ 1,164.00
Splicing Items									
	Splice Case	*>144*	2	$ 558.00	$ 295.00	$ 853.00	$ 1,116.00	$ 590.00	$ 1,706.00
	Splice Trays	24 slot	8	$ 30.00	n/a	$ 30.00	$ 240.00	n/a	$ 240.00
	Fiber Splicing < 12			n/a	$ 47.20	$ 47.20	n/a	$ -	$ -
	Fiber Splicing > 96		192	n/a	$ 31.86	$ 31.86	n/a	$ 6,117.12	$ 6,117.12
	Fiber Testing (OTDR/PM)		96	n/a	$ 11.80	$ 11.80	n/a	$ 1,132.80	$ 1,132.80
	Fiber Tags	Wrap-Around	52	$ 1.32	n/a	$ 1.32	$ 68.11	n/a	$ 68.11
Fiber Lengths									
	Fiber+Slack	96	17,577 '	$ 1.032	n/a	$ 1.03	$ 18,139.46	n/a	$ 18,139.46
Site									
	Replace Pole w/ 130' Steel Pole		0	$ 24,360.00	$ 13,500.00	$ 37,860.00	$ -	$ -	$ -
	NEMA Cabinet, UPS, Disconnect		0	$ 4,200.00	$ 400.00	$ 4,600.00	$ -	$ -	$ -
	Edge Equipment		0	$ 1,200.00	$ 350.00	$ 1,550.00	$ -	$ -	$ -
	AC Power Connect (Service Drop)		0	n/a	$ 1,416.00	$ 1,416.00	n/a	$ -	$ -
	Antenna Array		0	$ 7,500.00	n/a	$ 7,500.00	$ -	n/a	$ -
	Cabling System		0	$ 720.00	$ 1,200.00	$ 1,920.00	$ -	$ -	$ -
	Site Installation (Wireless)		0	n/a	$ 1,500.00	$ 1,500.00	n/a	$ -	$ -
	Site Prep		0	n/a	$ 10,000.00	$ 10,000.00	n/a	$ -	$ -
				$ -	$ -	$ -	$ -	$ -	$ -
Misc.									
500 '	Install Fiber Optic Marker Sign	Fiberglass	20	$ 60.00	$ 17.70	$ 77.70	$ 1,200.00	$ 354.00	$ 1,554.00
				$ -	$ -	$ -	$ -	$ -	$ -
				$ -	$ -	$ -	$ -	$ -	$ -
						Subtotal Cost:	$ 52,094.76	$ 147,341.28	$ 199,436.04

Total Material Cost: $ 52,094.76
Labor/Equip. Total: $ 147,341.28
Total Construction Cost: $ 199,436.04

Orcas Power & Light Coorperative - Unit Totals
OSP Construction Estimate
- Segment 706.3-SH04

Aerial	Underground	Existing Duct	Poles	AP's	Submarine Cable
2,447 '	0 '	0 '	7	1	

	Unit Description	Type	Unit Quantity	Material Cost	Labor/Equip. Cost	Total Unit Cost	Material Total	Labor/Equip. Total	Ext. Total
Trenching/ Plow									
	Trench New	24" Depth	'	n/a	$ 8.20	$ 8.20	n/a	$ -	$ -
15%	Rock Adder		'	n/a	$ 13.00	$ 13.00	n/a	$ -	$ -
Conduit Placement									
	Place (2) 2" HDPE	2	'	$ 1.61	$ 0.89	$ 2.49	$ -	$ -	$ -
Locate Items									
	Warning Tape	Non-Detect	'	$ 0.04	$ 0.12	$ 0.15	$ -	$ -	$ -
	Locate Wire (#12)	Insulated/Solid	'	$ 0.18	$ 0.18	$ 0.36	$ -	$ -	$ -
Remove & Restore									
3%	General R&R		'	n/a	$ 14.16	$ 14.16	n/a	$ -	$ -
Fiber Placement in Conduit									
	Fiber Optic Cable	12, 24 ,96	'	n/a	$ 0.78	$ 0.78	n/a	$ -	$ -
Handholes									
1,000 '	HH-3 (20k)		0	$ 1,200.00	$ 550.00	$ 1,750.00	$ -	$ -	$ -
Slack Coil									
100 '	Slack Coil FOC in HH	12, 24, 96	'	n/a	$ 0.45	$ 0.45	n/a	$ -	$ -
200 '	Slack Coil FOC on Snowshoes	12, 24, 96	400 '	n/a	$ 0.92	$ 0.92	n/a	$ 368.16	$ 368.16
Aerial									
	Pole Attachment		7	$ 28.80	$ 41.30	$ 70.10	$ 201.60	$ 289.10	$ 490.70
	Place ADSS FOC (roadside)		2,447 '	n/a	$ 1.30	$ 1.30	n/a	$ 3,176.21	$ 3,176.21
15%	Aerial Make Ready per Pole		2	$ 42.00	$ 177.00	$ 219.00	$ 84.00	$ 354.00	$ 438.00
5%	Place Extension Arm		1	$ 54.00	$ 59.00	$ 113.00	$ 54.00	$ 59.00	$ 113.00
10%	Place Anchor & Guy		1	$ 102.00	$ 295.00	$ 397.00	$ 102.00	$ 295.00	$ 397.00
2,000 '	Place Snow-shoes		2	$ 114.00	$ 177.00	$ 291.00	$ 228.00	$ 354.00	$ 582.00
Splicing Items									
	Splice Case	*>144*	1	$ 558.00	$ 295.00	$ 853.00	$ 558.00	$ 295.00	$ 853.00
	Splice Trays	24 slot	4	$ 30.00	n/a	$ 30.00	$ 120.00	n/a	$ 120.00
	Fiber Splicing < 12		12	n/a	$ 47.20	$ 47.20	n/a	$ 566.40	$ 566.40
	Fiber Splicing > 96			n/a	$ 31.86	$ 31.86	n/a	$ -	$ -
	Fiber Testing (OTDR/PM)		6	n/a	$ 11.80	$ 11.80	n/a	$ 70.80	$ 70.80
	Fiber Tags	Wrap-Around	10	$ 1.32	n/a	$ 1.32	$ 12.67	n/a	$ 12.67
Fiber Lengths									
	Fiber+Slack	96	2,847 '	$ 1.032	n/a	$ 1.03	$ 2,938.10	n/a	$ 2,938.10
Site									
	Replace Pole w/ 130' Steel Pole		1	$ 24,360.00	$ 13,500.00	$ 37,860.00	$ 24,360.00	$ 13,500.00	$ 37,860.00
	NEMA Cabinet, UPS, Disconnect		1	$ 4,200.00	$ 400.00	$ 4,600.00	$ 4,200.00	$ 400.00	$ 4,600.00
	Edge Equipment		1	$ 1,200.00	$ 350.00	$ 1,550.00	$ 1,200.00	$ 350.00	$ 1,550.00
	AC Power Connect (Service Drop)		1	n/a	$ 1,416.00	$ 1,416.00	n/a	$ 1,416.00	$ 1,416.00
	Antenna Array		1	$ 7,500.00	n/a	$ 7,500.00	$ 7,500.00	n/a	$ 7,500.00
	Cabling System		1	$ 720.00	$ 1,200.00	$ 1,920.00	$ 720.00	$ 1,200.00	$ 1,920.00
	Site Installation (Wireless)		1	n/a	$ 1,500.00	$ 1,500.00	n/a	$ 1,500.00	$ 1,500.00
	Site Prep		1	n/a	$ 10,000.00	$ 10,000.00	n/a	$ 10,000.00	$ 10,000.00
				$ -	$ -	$ -	$ -	$ -	$ -
Misc.									
500 '	Install Fiber Optic Marker Sign	Fiberglass	0	$ 60.00	$ 17.70	$ 77.70	$ -	$ -	$ -
				$ -	$ -	$ -	$ -	$ -	$ -
				$ -	$ -	$ -	$ -	$ -	$ -
						Subtotal Cost:	$ 42,278.38	$ 34,193.67	$ 76,472.04

Total Material Cost: $ 42,278.38
Labor/Equip. Total: $ 34,193.67
Total Construction Cost: $ 76,472.04

Orcas Power & Light Coorperative - Unit Totals
OSP Construction Estimate
- Segment 706.3-SJ05

Aerial	Underground	Existing Duct	Poles	AP's	Submarine Cable
0 '	5,114 '	0 '	0	1	

	Unit Description	Type	Unit Quantity	Material Cost	Labor/Equip. Cost	Total Unit Cost	Material Total	Labor/Equip. Total	Ext. Total
Trenching/ Plow									
	Trench New	24" Depth	5,114 '	n/a	$ 8.20	$ 8.20	n/a	$ 41,934.80	$ 41,934.80
15%	Rock Adder		767 '	n/a	$ 13.00	$ 13.00	n/a	$ 9,972.30	$ 9,972.30
Conduit Placement									
	Place (2) 2" HDPE	2	5,114 '	$ 1.61	$ 0.89	$ 2.49	$ 8,223.31	$ 4,525.89	$ 12,749.20
Locate Items									
	Warning Tape	Non-Detect	5,114 '	$ 0.04	$ 0.12	$ 0.15	$ 184.10	$ 603.45	$ 787.56
	Locate Wire (#12)	Insulated/Solid	5,114 '	$ 0.18	$ 0.18	$ 0.36	$ 920.52	$ 905.18	$ 1,825.70
Remove & Restore									
3%	General R&R		154 '	n/a	$ 14.16	$ 14.16	n/a	$ 2,180.64	$ 2,180.64
Fiber Placement in Conduit									
	Fiber Optic Cable	12, 24 ,96	5,114 '	n/a	$ 0.78	$ 0.78	n/a	$ 3,988.92	$ 3,988.92
Handholes									
1,000 '	HH-3 (20k)		6	$ 1,200.00	$ 550.00	$ 1,750.00	$ 7,200.00	$ 3,300.00	$ 10,500.00
Slack Coil									
100 '	Slack Coil FOC in HH	12, 24, 96	600 '	n/a	$ 0.45	$ 0.45	n/a	$ 269.04	$ 269.04
200 '	Slack Coil FOC on Snowshoes	12, 24, 96	'	n/a	$ 0.92	$ 0.92	n/a	$ -	$ -
Aerial									
	Pole Attachment		0	$ 28.80	$ 41.30	$ 70.10	$ -	$ -	$ -
	Place ADSS FOC (roadside)		'	n/a	$ 1.30	$ 1.30	n/a	$ -	$ -
15%	Aerial Make Ready per Pole		0	$ 42.00	$ 177.00	$ 219.00	$ -	$ -	$ -
5%	Place Extension Arm		0	$ 54.00	$ 59.00	$ 113.00	$ -	$ -	$ -
10%	Place Anchor & Guy		0	$ 102.00	$ 295.00	$ 397.00	$ -	$ -	$ -
2,000 '	Place Snow-shoes		0	$ 114.00	$ 177.00	$ 291.00	$ -	$ -	$ -
Splicing Items									
	Splice Case	*>144*	1	$ 558.00	$ 295.00	$ 853.00	$ 558.00	$ 295.00	$ 853.00
	Splice Trays	24 slot	4	$ 30.00	n/a	$ 30.00	$ 120.00	n/a	$ 120.00
	Fiber Splicing < 12		12	n/a	$ 47.20	$ 47.20	n/a	$ 566.40	$ 566.40
	Fiber Splicing > 96			n/a	$ 31.86	$ 31.86	n/a	$ -	$ -
	Fiber Testing (OTDR/PM)		6	n/a	$ 11.80	$ 11.80	n/a	$ 70.80	$ 70.80
	Fiber Tags	Wrap-Around	16	$ 1.32	n/a	$ 1.32	$ 20.59	n/a	$ 20.59
Fiber Lengths									
	Fiber+Slack	96	5,714 '	$ 1.032	n/a	$ 1.03	$ 5,896.85	n/a	$ 5,896.85
Site									
	Replace Pole w/ 130' Steel Pole		1	$ 24,360.00	$ 13,500.00	$ 37,860.00	$ 24,360.00	$ 13,500.00	$ 37,860.00
	NEMA Cabinet, UPS, Disconnect		1	$ 4,200.00	$ 400.00	$ 4,600.00	$ 4,200.00	$ 400.00	$ 4,600.00
	Edge Equipment		1	$ 1,200.00	$ 350.00	$ 1,550.00	$ 1,200.00	$ 350.00	$ 1,550.00
	AC Power Connect (Service Drop)		1	n/a	$ 1,416.00	$ 1,416.00	n/a	$ 1,416.00	$ 1,416.00
	Antenna Array		1	$ 7,500.00	n/a	$ 7,500.00	$ 7,500.00	n/a	$ 7,500.00
	Cabling System		1	$ 720.00	$ 1,200.00	$ 1,920.00	$ 720.00	$ 1,200.00	$ 1,920.00
	Site Installation (Wireless)		1	n/a	$ 1,500.00	$ 1,500.00	n/a	$ 1,500.00	$ 1,500.00
	Site Prep		1	n/a	$ 10,000.00	$ 10,000.00	n/a	$ 10,000.00	$ 10,000.00
				$ -	$ -	$ -	$ -	$ -	$ -
Misc.									
500 '	Install Fiber Optic Marker Sign	Fiberglass	11	$ 60.00	$ 17.70	$ 77.70	$ 660.00	$ 194.70	$ 854.70
				$ -	$ -	$ -	$ -	$ -	$ -
				$ -	$ -	$ -	$ -	$ -	$ -
						Subtotal Cost:	$ 61,763.38	$ 97,173.12	$ 158,936.50

Total Material Cost: $ 61,763.38
Labor/Equip. Total: $ 97,173.12
Total Construction Cost: $ 158,936.50

Orcas Power & Light Coorperative - Unit Totals
OSP Construction Estimate
- Segment 706.3-SJ06

Aerial	Underground	Existing Duct	Poles	AP's	Submarine Cable
0 '	3,759 '	0 '	0	1	

	Unit Description	Type	Unit Quantity	Material Cost	Labor/Equip. Cost	Total Unit Cost	Material Total	Labor/Equip. Total	Ext. Total
Trenching/ Plow									
	Trench New	24" Depth	3,759 '	n/a	$ 8.20	$ 8.20	n/a	$ 30,823.80	$ 30,823.80
15%	Rock Adder		564 '	n/a	$ 13.00	$ 13.00	n/a	$ 7,330.05	$ 7,330.05
Conduit Placement									
	Place (2) 2" HDPE	2	3,759 '	$ 1.61	$ 0.89	$ 2.49	$ 6,044.47	$ 3,326.72	$ 9,371.19
Locate Items									
	Warning Tape	Non-Detect	3,759 '	$ 0.04	$ 0.12	$ 0.15	$ 135.32	$ 443.56	$ 578.89
	Locate Wire (#12)	Insulated/Solid	3,759 '	$ 0.18	$ 0.18	$ 0.36	$ 676.62	$ 665.34	$ 1,341.96
Remove & Restore									
3%	General R&R		113 '	n/a	$ 14.16	$ 14.16	n/a	$ 1,600.08	$ 1,600.08
Fiber Placement in Conduit									
	Fiber Optic Cable	12, 24 ,96	3,759 '	n/a	$ 0.78	$ 0.78	n/a	$ 2,932.02	$ 2,932.02
Handholes									
1,000 '	HH-3 (20k)		4	$ 1,200.00	$ 550.00	$ 1,750.00	$ 4,800.00	$ 2,200.00	$ 7,000.00
Slack Coil									
100 '	Slack Coil FOC in HH	12, 24, 96	400 '	n/a	$ 0.45	$ 0.45	n/a	$ 179.36	$ 179.36
200 '	Slack Coil FOC on Snowshoes	12, 24, 96	'	n/a	$ 0.92	$ 0.92	n/a	$ -	$ -
Aerial									
	Pole Attachment		0	$ 28.80	$ 41.30	$ 70.10	$ -	$ -	$ -
	Place ADSS FOC (roadside)		'	n/a	$ 1.30	$ 1.30	n/a	$ -	$ -
15%	Aerial Make Ready per Pole		0	$ 42.00	$ 177.00	$ 219.00	$ -	$ -	$ -
5%	Place Extension Arm		0	$ 54.00	$ 59.00	$ 113.00	$ -	$ -	$ -
10%	Place Anchor & Guy		0	$ 102.00	$ 295.00	$ 397.00	$ -	$ -	$ -
2,000 '	Place Snow-shoes		0	$ 114.00	$ 177.00	$ 291.00	$ -	$ -	$ -
Splicing Items									
	Splice Case	*>144*	1	$ 558.00	$ 295.00	$ 853.00	$ 558.00	$ 295.00	$ 853.00
	Splice Trays	24 slot	4	$ 30.00	n/a	$ 30.00	$ 120.00	n/a	$ 120.00
	Fiber Splicing < 12		12	n/a	$ 47.20	$ 47.20	n/a	$ 566.40	$ 566.40
	Fiber Splicing > 96			n/a	$ 31.86	$ 31.86	n/a	$ -	$ -
	Fiber Testing (OTDR/PM)		6	n/a	$ 11.80	$ 11.80	n/a	$ 70.80	$ 70.80
	Fiber Tags	Wrap-Around	11	$ 1.32	n/a	$ 1.32	$ 14.26	n/a	$ 14.26
Fiber Lengths									
	Fiber+Slack	96	4,159 '	$ 1.032	n/a	$ 1.03	$ 4,292.09	n/a	$ 4,292.09
Site									
	Replace Pole w/ 130' Steel Pole		1	$ 24,360.00	$ 13,500.00	$ 37,860.00	$ 24,360.00	$ 13,500.00	$ 37,860.00
	NEMA Cabinet, UPS, Disconnect		1	$ 4,200.00	$ 400.00	$ 4,600.00	$ 4,200.00	$ 400.00	$ 4,600.00
	Edge Equipment		1	$ 1,200.00	$ 350.00	$ 1,550.00	$ 1,200.00	$ 350.00	$ 1,550.00
	AC Power Connect (Service Drop)		1	n/a	$ 1,416.00	$ 1,416.00	n/a	$ 1,416.00	$ 1,416.00
	Antenna Array		1	$ 7,500.00	n/a	$ 7,500.00	$ 7,500.00	n/a	$ 7,500.00
	Cabling System		1	$ 720.00	$ 1,200.00	$ 1,920.00	$ 720.00	$ 1,200.00	$ 1,920.00
	Site Installation (Wireless)		1	n/a	$ 1,500.00	$ 1,500.00	n/a	$ 1,500.00	$ 1,500.00
	Site Prep		1	n/a	$ 10,000.00	$ 10,000.00	n/a	$ 10,000.00	$ 10,000.00
				$ -	$ -	$ -	$ -	$ -	$ -
Misc.									
500 '	Install Fiber Optic Marker Sign	Fiberglass	8	$ 60.00	$ 17.70	$ 77.70	$ 480.00	$ 141.60	$ 621.60
				$ -	$ -	$ -	$ -	$ -	$ -
				$ -	$ -	$ -	$ -	$ -	$ -
						Subtotal Cost:	$ 55,100.76	$ 78,940.73	$ 134,041.49

Total Material Cost: $ 55,100.76
Labor/Equip. Total: $ 78,940.73
Total Construction Cost: $ 134,041.49

Orcas Power & Light Coorperative - Unit Totals
OSP Construction Estimate
- Segment 706.3-SJ07

Aerial	Underground	Existing Duct	Poles	AP's	Submarine Cable
22,166 '	245 '	0 '	79	1	

	Unit Description	Type	Unit Quantity	Material Cost	Labor/Equip. Cost	Total Unit Cost	Material Total	Labor/Equip. Total	Ext. Total
Trenching/ Plow									
	Trench New	24" Depth	245 '	n/a	$ 8.20	$ 8.20	n/a	$ 2,009.00	$ 2,009.00
15%	Rock Adder		37 '	n/a	$ 13.00	$ 13.00	n/a	$ 477.75	$ 477.75
Conduit Placement									
	Place (2) 2" HDPE	2	245 '	$ 1.61	$ 0.89	$ 2.49	$ 393.96	$ 216.83	$ 610.79
Locate Items									
	Warning Tape	Non-Detect	245 '	$ 0.04	$ 0.12	$ 0.15	$ 8.82	$ 28.91	$ 37.73
	Locate Wire (#12)	Insulated/Solid	245 '	$ 0.18	$ 0.18	$ 0.36	$ 44.10	$ 43.37	$ 87.47
Remove & Restore									
3%	General R&R		8 '	n/a	$ 14.16	$ 14.16	n/a	$ 113.28	$ 113.28
Fiber Placement in Conduit									
	Fiber Optic Cable	12, 24 ,96	245 '	n/a	$ 0.78	$ 0.78	n/a	$ 191.10	$ 191.10
Handholes									
1,000 '	HH-3 (20k)		1	$ 1,200.00	$ 550.00	$ 1,750.00	$ 1,200.00	$ 550.00	$ 1,750.00
Slack Coil									
100 '	Slack Coil FOC in HH	12, 24, 96	100 '	n/a	$ 0.45	$ 0.45	n/a	$ 44.84	$ 44.84
200 '	Slack Coil FOC on Snowshoes	12, 24, 96	2,400 '	n/a	$ 0.92	$ 0.92	n/a	$ 2,208.96	$ 2,208.96
Aerial									
	Pole Attachment		79	$ 28.80	$ 41.30	$ 70.10	$ 2,275.20	$ 3,262.70	$ 5,537.90
	Place ADSS FOC (roadside)		22,166 '	n/a	$ 1.30	$ 1.30	n/a	$ 28,771.47	$ 28,771.47
15%	Aerial Make Ready per Pole		12	$ 42.00	$ 177.00	$ 219.00	$ 504.00	$ 2,124.00	$ 2,628.00
5%	Place Extension Arm		4	$ 54.00	$ 59.00	$ 113.00	$ 216.00	$ 236.00	$ 452.00
10%	Place Anchor & Guy		8	$ 102.00	$ 295.00	$ 397.00	$ 816.00	$ 2,360.00	$ 3,176.00
2,000 '	Place Snow-shoes		12	$ 114.00	$ 177.00	$ 291.00	$ 1,368.00	$ 2,124.00	$ 3,492.00
Splicing Items									
	Splice Case	*>144*	2	$ 558.00	$ 295.00	$ 853.00	$ 1,116.00	$ 590.00	$ 1,706.00
	Splice Trays	24 slot	8	$ 30.00	n/a	$ 30.00	$ 240.00	n/a	$ 240.00
	Fiber Splicing < 12		36	n/a	$ 47.20	$ 47.20	n/a	$ 1,699.20	$ 1,699.20
	Fiber Splicing > 96			n/a	$ 31.86	$ 31.86	n/a	$ -	$ -
	Fiber Testing (OTDR/PM)		6	n/a	$ 11.80	$ 11.80	n/a	$ 70.80	$ 70.80
	Fiber Tags	Wrap-Around	98	$ 1.32	n/a	$ 1.32	$ 129.89	n/a	$ 129.89
Fiber Lengths									
	Fiber+Slack	96	24,911 '	$ 1.032	n/a	$ 1.03	$ 25,708.15	n/a	$ 25,708.15
Site									
	Replace Pole w/ 130' Steel Pole		1	$ 24,360.00	$ 13,500.00	$ 37,860.00	$ 24,360.00	$ 13,500.00	$ 37,860.00
	NEMA Cabinet, UPS, Disconnect		1	$ 4,200.00	$ 400.00	$ 4,600.00	$ 4,200.00	$ 400.00	$ 4,600.00
	Edge Equipment		1	$ 1,200.00	$ 350.00	$ 1,550.00	$ 1,200.00	$ 350.00	$ 1,550.00
	AC Power Connect (Service Drop)		1	n/a	$ 1,416.00	$ 1,416.00	n/a	$ 1,416.00	$ 1,416.00
	Antenna Array		1	$ 7,500.00	n/a	$ 7,500.00	$ 7,500.00	n/a	$ 7,500.00
	Cabling System		1	$ 720.00	$ 1,200.00	$ 1,920.00	$ 720.00	$ 1,200.00	$ 1,920.00
	Site Installation (Wireless)		1	n/a	$ 1,500.00	$ 1,500.00	n/a	$ 1,500.00	$ 1,500.00
	Site Prep		1	n/a	$ 10,000.00	$ 10,000.00	n/a	$ 10,000.00	$ 10,000.00
				$ -	$ -	$ -	$ -	$ -	$ -
Misc.									
500 '	Install Fiber Optic Marker Sign	Fiberglass	1	$ 60.00	$ 17.70	$ 77.70	$ 60.00	$ 17.70	$ 77.70
				$ -	$ -	$ -	$ -	$ -	$ -
				$ -	$ -	$ -	$ -	$ -	$ -
						Subtotal Cost:	$ 72,060.12	$ 75,505.90	$ 147,566.02

Total Material Cost: **$ 72,060.12**
Labor/Equip. Total: **$ 75,505.90**
Total Construction Cost: **$ 147,566.02**

Orcas Power & Light Coorperative - Unit Totals
OSP Construction Estimate
- Segment 706.3-SJ08

Aerial	Underground	Existing Duct	Poles	AP's	Submarine Cable
5,263 '	30,936 '	1,539 '	21	2	

	Unit Description	Type	Unit Quantity	Material Cost	Labor/Equip. Cost	Total Unit Cost	Material Total	Labor/Equip. Total	Ext. Total
Trenching/ Plow									
	Trench New	24" Depth	30,936 '	n/a	$ 8.20	$ 8.20	n/a	$ 253,675.20	$ 253,675.20
15%	Rock Adder		4,640 '	n/a	$ 13.00	$ 13.00	n/a	$ 60,325.20	$ 60,325.20
Conduit Placement									
	Place (2) 2" HDPE	2	30,936 '	$ 1.61	$ 0.89	$ 2.49	$ 49,745.09	$ 27,378.36	$ 77,123.45
Locate Items									
	Warning Tape	Non-Detect	30,936 '	$ 0.04	$ 0.12	$ 0.15	$ 1,113.70	$ 3,650.45	$ 4,764.14
	Locate Wire (#12)	Insulated/Solid	30,936 '	$ 0.18	$ 0.18	$ 0.36	$ 5,568.48	$ 5,475.67	$ 11,044.15
Remove & Restore									
3%	General R&R		929 '	n/a	$ 14.16	$ 14.16	n/a	$ 13,154.64	$ 13,154.64
Fiber Placement in Conduit									
	Fiber Optic Cable	12, 24 ,96	32,475 '	n/a	$ 0.78	$ 0.78	n/a	$ 25,330.50	$ 25,330.50
Handholes									
2,000 '	HH-3 (20k)		16	$ 1,200.00	$ 550.00	$ 1,750.00	$ 19,200.00	$ 8,800.00	$ 28,000.00
Slack Coil									
100 '	Slack Coil FOC in HH	12, 24, 96	1,600 '	n/a	$ 0.45	$ 0.45	n/a	$ 717.44	$ 717.44
200 '	Slack Coil FOC on Snowshoes	12, 24, 96	600 '	n/a	$ 0.92	$ 0.92	n/a	$ 552.24	$ 552.24
Aerial									
	Pole Attachment		21	$ 28.80	$ 41.30	$ 70.10	$ 604.80	$ 867.30	$ 1,472.10
	Place ADSS FOC (roadside)		5,263 '	n/a	$ 1.30	$ 1.30	n/a	$ 6,831.37	$ 6,831.37
15%	Aerial Make Ready per Pole		4	$ 42.00	$ 177.00	$ 219.00	$ 168.00	$ 708.00	$ 876.00
5%	Place Extension Arm		2	$ 54.00	$ 59.00	$ 113.00	$ 108.00	$ 118.00	$ 226.00
10%	Place Anchor & Guy		3	$ 102.00	$ 295.00	$ 397.00	$ 306.00	$ 885.00	$ 1,191.00
2,000 '	Place Snow-shoes		3	$ 114.00	$ 177.00	$ 291.00	$ 342.00	$ 531.00	$ 873.00
Splicing Items									
	Splice Case	*>144*	2	$ 558.00	$ 295.00	$ 853.00	$ 1,116.00	$ 590.00	$ 1,706.00
	Splice Trays	24 slot	8	$ 30.00	n/a	$ 30.00	$ 240.00	n/a	$ 240.00
	Fiber Splicing < 12		18	n/a	$ 47.20	$ 47.20	n/a	$ 849.60	$ 849.60
	Fiber Splicing > 96			n/a	$ 31.86	$ 31.86	n/a	$ -	$ -
	Fiber Testing (OTDR/PM)		12	n/a	$ 11.80	$ 11.80	n/a	$ 141.60	$ 141.60
	Fiber Tags	Wrap-Around	66	$ 1.32	n/a	$ 1.32	$ 87.12	n/a	$ 87.12
Fiber Lengths									
	Fiber+Slack	96	39,938 '	$ 1.032	n/a	$ 1.03	$ 41,216.02	n/a	$ 41,216.02
Site									
	Replace Pole w/ 130' Steel Pole		2	$ 24,360.00	$ 13,500.00	$ 37,860.00	$ 48,720.00	$ 27,000.00	$ 75,720.00
	NEMA Cabinet, UPS, Disconnect		2	$ 4,200.00	$ 400.00	$ 4,600.00	$ 8,400.00	$ 800.00	$ 9,200.00
	Edge Equipment		2	$ 1,200.00	$ 350.00	$ 1,550.00	$ 2,400.00	$ 700.00	$ 3,100.00
	AC Power Connect (Service Drop)		2	n/a	$ 1,416.00	$ 1,416.00	n/a	$ 2,832.00	$ 2,832.00
	Antenna Array		2	$ 7,500.00	n/a	$ 7,500.00	$ 15,000.00	n/a	$ 15,000.00
	Cabling System		2	$ 720.00	$ 1,200.00	$ 1,920.00	$ 1,440.00	$ 2,400.00	$ 3,840.00
	Site Installation (Wireless)		2	n/a	$ 1,500.00	$ 1,500.00	n/a	$ 3,000.00	$ 3,000.00
	Site Prep		2	n/a	$ 10,000.00	$ 10,000.00	n/a	$ 20,000.00	$ 20,000.00
				$ -	$ -	$ -	$ -	$ -	$ -
Misc.									
500 '	Install Fiber Optic Marker Sign	Fiberglass	62	$ 60.00	$ 17.70	$ 77.70	$ 3,720.00	$ 1,097.40	$ 4,817.40
				$ -	$ -	$ -	$ -	$ -	$ -
				$ -	$ -	$ -	$ -	$ -	$ -
						Subtotal Cost:	$ 199,495.20	$ 468,410.97	$ 667,906.17

Total Material Cost: $ 199,495.20
Labor/Equip. Total: $ 468,410.97
Total Construction Cost: $ 667,906.17

Orcas Power & Light Coorperative - Unit Totals
OSP Construction Estimate
- Segment 706.3-SJ09

Aerial	Underground	Existing Duct	Poles	AP's	Submarine Cable
902 '	0 '	0 '	4	1	

	Unit Description	Type	Unit Quantity	Material Cost	Labor/Equip. Cost	Total Unit Cost	Material Total	Labor/Equip. Total	Ext. Total
Trenching/ Plow									
	Trench New	24" Depth	'	n/a	$ 8.20	$ 8.20	n/a	$ -	$ -
15%	Rock Adder		'	n/a	$ 13.00	$ 13.00	n/a	$ -	$ -
Conduit Placement									
	Place (2) 2" HDPE	2	'	$ 1.61	$ 0.89	$ 2.49	$ -	$ -	$ -
Locate Items									
	Warning Tape	Non-Detect	'	$ 0.04	$ 0.12	$ 0.15	$ -	$ -	$ -
	Locate Wire (#12)	Insulated/Solid	'	$ 0.18	$ 0.18	$ 0.36	$ -	$ -	$ -
Remove & Restore									
3%	General R&R		'	n/a	$ 14.16	$ 14.16	n/a	$ -	$ -
Fiber Placement in Conduit									
	Fiber Optic Cable	12, 24 ,96	'	n/a	$ 0.78	$ 0.78	n/a	$ -	$ -
Handholes									
1,000 '	HH-3 (20k)		0	$ 1,200.00	$ 550.00	$ 1,750.00	$ -	$ -	$ -
Slack Coil									
100 '	Slack Coil FOC in HH	12, 24, 96	'	n/a	$ 0.45	$ 0.45	n/a	$ -	$ -
200 '	Slack Coil FOC on Snowshoes	12, 24, 96	200 '	n/a	$ 0.92	$ 0.92	n/a	$ 184.08	$ 184.08
Aerial									
	Pole Attachment		4	$ 28.80	$ 41.30	$ 70.10	$ 115.20	$ 165.20	$ 280.40
	Place ADSS FOC (roadside)		902 '	n/a	$ 1.30	$ 1.30	n/a	$ 1,170.80	$ 1,170.80
15%	Aerial Make Ready per Pole		1	$ 42.00	$ 177.00	$ 219.00	$ 42.00	$ 177.00	$ 219.00
5%	Place Extension Arm		1	$ 54.00	$ 59.00	$ 113.00	$ 54.00	$ 59.00	$ 113.00
10%	Place Anchor & Guy		1	$ 102.00	$ 295.00	$ 397.00	$ 102.00	$ 295.00	$ 397.00
2,000 '	Place Snow-shoes		1	$ 114.00	$ 177.00	$ 291.00	$ 114.00	$ 177.00	$ 291.00
Splicing Items									
	Splice Case	*>144*	1	$ 558.00	$ 295.00	$ 853.00	$ 558.00	$ 295.00	$ 853.00
	Splice Trays	24 slot	4	$ 30.00	n/a	$ 30.00	$ 120.00	n/a	$ 120.00
	Fiber Splicing < 12		48	n/a	$ 47.20	$ 47.20	n/a	$ 2,265.60	$ 2,265.60
	Fiber Splicing > 96			n/a	$ 31.86	$ 31.86	n/a	$ -	$ -
	Fiber Testing (OTDR/PM)		24	n/a	$ 11.80	$ 11.80	n/a	$ 283.20	$ 283.20
	Fiber Tags	Wrap-Around	6	$ 1.32	n/a	$ 1.32	$ 7.92	n/a	$ 7.92
Fiber Lengths									
	Fiber+Slack	96	1,102 '	$ 1.032	n/a	$ 1.03	$ 1,137.26	n/a	$ 1,137.26
Site									
	Replace Pole w/ 130' Steel Pole		1	$ 24,360.00	$ 13,500.00	$ 37,860.00	$ 24,360.00	$ 13,500.00	$ 37,860.00
	NEMA Cabinet, UPS, Disconnect		1	$ 4,200.00	$ 400.00	$ 4,600.00	$ 4,200.00	$ 400.00	$ 4,600.00
	Edge Equipment		1	$ 1,200.00	$ 350.00	$ 1,550.00	$ 1,200.00	$ 350.00	$ 1,550.00
	AC Power Connect (Service Drop)		1	n/a	$ 1,416.00	$ 1,416.00	n/a	$ 1,416.00	$ 1,416.00
	Antenna Array		1	$ 7,500.00	n/a	$ 7,500.00	$ 7,500.00	n/a	$ 7,500.00
	Cabling System		1	$ 720.00	$ 1,200.00	$ 1,920.00	$ 720.00	$ 1,200.00	$ 1,920.00
	Site Installation (Wireless)		1	n/a	$ 1,500.00	$ 1,500.00	n/a	$ 1,500.00	$ 1,500.00
	Site Prep		1	n/a	$ 10,000.00	$ 10,000.00	n/a	$ 10,000.00	$ 10,000.00
				$ -	$ -	$ -	$ -	$ -	$ -
Misc.									
500 '	Install Fiber Optic Marker Sign	Fiberglass	0	$ 60.00	$ 17.70	$ 77.70	$ -	$ -	$ -
				$ -	$ -	$ -	$ -	$ -	$ -
				$ -	$ -	$ -	$ -	$ -	$ -
						Subtotal Cost:	$ 40,230.38	$ 33,437.88	$ 73,668.26

Total Material Cost: $ 40,230.38
Labor/Equip. Total: $ 33,437.88
Total Construction Cost: $ 73,668.26

5/1/2012

Orcas Power & Light Coorperative - Unit Totals
OSP Construction Estimate
- Segment 706.3-SJ10

Aerial	Underground	Existing Duct	Poles	AP's	Submarine Cable
0 '	324 '	0 '	0	1	

	Unit Description	Type	Unit Quantity	Material Cost	Labor/Equip. Cost	Total Unit Cost	Material Total	Labor/Equip. Total	Ext. Total
Trenching/ Plow									
	Trench New	24" Depth	324 '	n/a	$ 8.20	$ 8.20	n/a	$ 2,656.80	$ 2,656.80
15%	Rock Adder		49 '	n/a	$ 13.00	$ 13.00	n/a	$ 631.80	$ 631.80
Conduit Placement									
	Place (2) 2" HDPE	2	324 '	$ 1.61	$ 0.89	$ 2.49	$ 520.99	$ 286.74	$ 807.73
Locate Items									
	Warning Tape	Non-Detect	324 '	$ 0.04	$ 0.12	$ 0.15	$ 11.66	$ 38.23	$ 49.90
	Locate Wire (#12)	Insulated/Solid	324 '	$ 0.18	$ 0.18	$ 0.36	$ 58.32	$ 57.35	$ 115.67
Remove & Restore									
3%	General R&R		10 '	n/a	$ 14.16	$ 14.16	n/a	$ 141.60	$ 141.60
Fiber Placement in Conduit									
	Fiber Optic Cable	12, 24 ,96	324 '	n/a	$ 0.78	$ 0.78	n/a	$ 252.72	$ 252.72
Handholes									
1,000 '	HH-3 (20k)		1	$ 1,200.00	$ 550.00	$ 1,750.00	$ 1,200.00	$ 550.00	$ 1,750.00
Slack Coil									
100 '	Slack Coil FOC in HH	12, 24, 96	100 '	n/a	$ 0.45	$ 0.45	n/a	$ 44.84	$ 44.84
200 '	Slack Coil FOC on Snowshoes	12, 24, 96	'	n/a	$ 0.92	$ 0.92	n/a	$ -	$ -
Aerial									
	Pole Attachment		0	$ 28.80	$ 41.30	$ 70.10	$ -	$ -	$ -
	Place ADSS FOC (roadside)		'	n/a	$ 1.30	$ 1.30	n/a	$ -	$ -
15%	Aerial Make Ready per Pole		0	$ 42.00	$ 177.00	$ 219.00	$ -	$ -	$ -
5%	Place Extension Arm		0	$ 54.00	$ 59.00	$ 113.00	$ -	$ -	$ -
10%	Place Anchor & Guy		0	$ 102.00	$ 295.00	$ 397.00	$ -	$ -	$ -
2,000 '	Place Snow-shoes		0	$ 114.00	$ 177.00	$ 291.00	$ -	$ -	$ -
Splicing Items									
	Splice Case	*>144*	1	$ 558.00	$ 295.00	$ 853.00	$ 558.00	$ 295.00	$ 853.00
	Splice Trays	24 slot	4	$ 30.00	n/a	$ 30.00	$ 120.00	n/a	$ 120.00
	Fiber Splicing < 12		12	n/a	$ 47.20	$ 47.20	n/a	$ 566.40	$ 566.40
	Fiber Splicing > 96			n/a	$ 31.86	$ 31.86	n/a	$ -	$ -
	Fiber Testing (OTDR/PM)		6	n/a	$ 11.80	$ 11.80	n/a	$ 70.80	$ 70.80
	Fiber Tags	Wrap-Around	4	$ 1.32	n/a	$ 1.32	$ 4.75	n/a	$ 4.75
Fiber Lengths									
	Fiber+Slack	96	424 '	$ 1.032	n/a	$ 1.03	$ 437.57	n/a	$ 437.57
Site									
	Replace Pole w/ 130' Steel Pole		1	$ 24,360.00	$ 13,500.00	$ 37,860.00	$ 24,360.00	$ 13,500.00	$ 37,860.00
	NEMA Cabinet, UPS, Disconnect		1	$ 4,200.00	$ 400.00	$ 4,600.00	$ 4,200.00	$ 400.00	$ 4,600.00
	Edge Equipment		1	$ 1,200.00	$ 350.00	$ 1,550.00	$ 1,200.00	$ 350.00	$ 1,550.00
	AC Power Connect (Service Drop)		1	n/a	$ 1,416.00	$ 1,416.00	n/a	$ 1,416.00	$ 1,416.00
	Antenna Array		1	$ 7,500.00	n/a	$ 7,500.00	$ 7,500.00	n/a	$ 7,500.00
	Cabling System		1	$ 720.00	$ 1,200.00	$ 1,920.00	$ 720.00	$ 1,200.00	$ 1,920.00
	Site Installation (Wireless)		1	n/a	$ 1,500.00	$ 1,500.00	n/a	$ 1,500.00	$ 1,500.00
	Site Prep		1	n/a	$ 10,000.00	$ 10,000.00	n/a	$ 10,000.00	$ 10,000.00
				$ -	$ -	$ -	$ -	$ -	$ -
Misc.									
500 '	Install Fiber Optic Marker Sign	Fiberglass	1	$ 60.00	$ 17.70	$ 77.70	$ 60.00	$ 17.70	$ 77.70
				$ -	$ -	$ -	$ -	$ -	$ -
				$ -	$ -	$ -	$ -	$ -	$ -
						Subtotal Cost:	$ 40,951.30	$ 33,975.98	$ 74,927.28

Total Material Cost: $ 40,951.30
Labor/Equip. Total: $ 33,975.98
Total Construction Cost: $ 74,927.28

5/1/2012

Orcas Power & Light Coorperative - Unit Totals
OSP Construction Estimate
- Segment 706.3-SJ11

Aerial	Underground	Existing Duct	Poles	AP's	Submarine Cable
0 '	12,463 '	14,065 '	0	2	

	Unit Description	Type	Unit Quantity	Material Cost	Labor/Equip. Cost	Total Unit Cost	Material Total	Labor/Equip. Total	Ext. Total
Trenching/ Plow									
	Trench New	24" Depth	12,463 '	n/a	$ 8.20	$ 8.20	n/a	$ 102,196.60	$ 102,196.60
15%	Rock Adder		1,869 '	n/a	$ 13.00	$ 13.00	n/a	$ 24,302.85	$ 24,302.85
Conduit Placement									
	Place (2) 2" HDPE	2	12,463 '	$ 1.61	$ 0.89	$ 2.49	$ 20,040.50	$ 11,029.76	$ 31,070.26
Locate Items									
	Warning Tape	Non-Detect	12,463 '	$ 0.04	$ 0.12	$ 0.15	$ 448.67	$ 1,470.63	$ 1,919.30
	Locate Wire (#12)	Insulated/Solid	12,463 '	$ 0.18	$ 0.18	$ 0.36	$ 2,243.34	$ 2,205.95	$ 4,449.29
Remove & Restore									
3%	General R&R		374 '	n/a	$ 14.16	$ 14.16	n/a	$ 5,295.84	$ 5,295.84
Fiber Placement in Conduit									
	Fiber Optic Cable	12, 24 ,96	26,528 '	n/a	$ 0.78	$ 0.78	n/a	$ 20,691.84	$ 20,691.84
Handholes									
1,000 '	HH-3 (20k)		13	$ 1,200.00	$ 550.00	$ 1,750.00	$ 15,600.00	$ 7,150.00	$ 22,750.00
Slack Coil									
100 '	Slack Coil FOC in HH	12, 24, 96	1,300 '	n/a	$ 0.45	$ 0.45	n/a	$ 582.92	$ 582.92
200 '	Slack Coil FOC on Snowshoes	12, 24, 96	'	n/a	$ 0.92	$ 0.92	n/a	$ -	$ -
Aerial									
	Pole Attachment		0	$ 28.80	$ 41.30	$ 70.10	$ -	$ -	$ -
	Place ADSS FOC (roadside)		'	n/a	$ 1.30	$ 1.30	n/a	$ -	$ -
15%	Aerial Make Ready per Pole		0	$ 42.00	$ 177.00	$ 219.00	$ -	$ -	$ -
5%	Place Extension Arm		0	$ 54.00	$ 59.00	$ 113.00	$ -	$ -	$ -
10%	Place Anchor & Guy		0	$ 102.00	$ 295.00	$ 397.00	$ -	$ -	$ -
2,000 '	Place Snow-shoes		0	$ 114.00	$ 177.00	$ 291.00	$ -	$ -	$ -
Splicing Items									
	Splice Case	*>144*	2	$ 558.00	$ 295.00	$ 853.00	$ 1,116.00	$ 590.00	$ 1,706.00
	Splice Trays	24 slot	8	$ 30.00	n/a	$ 30.00	$ 240.00	n/a	$ 240.00
	Fiber Splicing < 12		30	n/a	$ 47.20	$ 47.20	n/a	$ 1,416.00	$ 1,416.00
	Fiber Splicing > 96			n/a	$ 31.86	$ 31.86	n/a	$ -	$ -
	Fiber Testing (OTDR/PM)		12	n/a	$ 11.80	$ 11.80	n/a	$ 141.60	$ 141.60
	Fiber Tags	Wrap-Around	34	$ 1.32	n/a	$ 1.32	$ 44.35	n/a	$ 44.35
Fiber Lengths									
	Fiber+Slack	96	27,828 '	$ 1.032	n/a	$ 1.03	$ 28,718.50	n/a	$ 28,718.50
Site									
	Replace Pole w/ 130' Steel Pole		2	$ 24,360.00	$ 13,500.00	$ 37,860.00	$ 48,720.00	$ 27,000.00	$ 75,720.00
	NEMA Cabinet, UPS, Disconnect		2	$ 4,200.00	$ 400.00	$ 4,600.00	$ 8,400.00	$ 800.00	$ 9,200.00
	Edge Equipment		2	$ 1,200.00	$ 350.00	$ 1,550.00	$ 2,400.00	$ 700.00	$ 3,100.00
	AC Power Connect (Service Drop)		2	n/a	$ 1,416.00	$ 1,416.00	n/a	$ 2,832.00	$ 2,832.00
	Antenna Array		2	$ 7,500.00	n/a	$ 7,500.00	$ 15,000.00	n/a	$ 15,000.00
	Cabling System		2	$ 720.00	$ 1,200.00	$ 1,920.00	$ 1,440.00	$ 2,400.00	$ 3,840.00
	Site Installation (Wireless)		2	n/a	$ 1,500.00	$ 1,500.00	n/a	$ 3,000.00	$ 3,000.00
	Site Prep		2	n/a	$ 10,000.00	$ 10,000.00	n/a	$ 20,000.00	$ 20,000.00
				$ -	$ -	$ -	$ -	$ -	$ -
Misc.									
500 '	Install Fiber Optic Marker Sign	Fiberglass	25	$ 60.00	$ 17.70	$ 77.70	$ 1,500.00	$ 442.50	$ 1,942.50
				$ -	$ -	$ -	$ -	$ -	$ -
				$ -	$ -	$ -	$ -	$ -	$ -
						Subtotal Cost:	$ 145,911.36	$ 234,248.49	$ 380,159.85

Total Material Cost: $ 145,911.36
Labor/Equip. Total: $ 234,248.49
Total Construction Cost: $ 380,159.85

Orcas Power & Light Coorperative - Unit Totals
OSP Construction Estimate
- Segment 706.3-SJ12

Aerial	Underground	Existing Duct	Poles	AP's	Submarine Cable
0 '	0 '	6,809 '	0	1	

	Unit Description	Type	Unit Quantity	Material Cost	Labor/Equip. Cost	Total Unit Cost	Material Total	Labor/Equip. Total	Ext. Total
Trenching/ Plow									
	Trench New	24" Depth	'	n/a	$ 8.20	$ 8.20	n/a	$ -	$ -
15%	Rock Adder		'	n/a	$ 13.00	$ 13.00	n/a	$ -	$ -
Conduit Placement									
	Place (2) 2" HDPE	2	'	$ 1.61	$ 0.89	$ 2.49	$ -	$ -	$ -
Locate Items									
	Warning Tape	Non-Detect	'	$ 0.04	$ 0.12	$ 0.15	$ -	$ -	$ -
	Locate Wire (#12)	Insulated/Solid	'	$ 0.18	$ 0.18	$ 0.36	$ -	$ -	$ -
Remove & Restore									
3%	General R&R		'	n/a	$ 14.16	$ 14.16	n/a	$ -	$ -
Fiber Placement in Conduit									
	Fiber Optic Cable	12, 24 ,96	6,809 '	n/a	$ 0.78	$ 0.78	n/a	$ 5,311.02	$ 5,311.02
Handholes									
1,000 '	HH-3 (20k)		0	$ 1,200.00	$ 550.00	$ 1,750.00	$ -	$ -	$ -
Slack Coil									
100 '	Slack Coil FOC in HH	12, 24, 96	'	n/a	$ 0.45	$ 0.45	n/a	$ -	$ -
200 '	Slack Coil FOC on Snowshoes	12, 24, 96	'	n/a	$ 0.92	$ 0.92	n/a	$ -	$ -
Aerial									
	Pole Attachment		0	$ 28.80	$ 41.30	$ 70.10	$ -	$ -	$ -
	Place ADSS FOC (roadside)		'	n/a	$ 1.30	$ 1.30	n/a	$ -	$ -
15%	Aerial Make Ready per Pole		0	$ 42.00	$ 177.00	$ 219.00	$ -	$ -	$ -
5%	Place Extension Arm		0	$ 54.00	$ 59.00	$ 113.00	$ -	$ -	$ -
10%	Place Anchor & Guy		0	$ 102.00	$ 295.00	$ 397.00	$ -	$ -	$ -
2,000 '	Place Snow-shoes		0	$ 114.00	$ 177.00	$ 291.00	$ -	$ -	$ -
Splicing Items									
	Splice Case	*>144*	1	$ 558.00	$ 295.00	$ 853.00	$ 558.00	$ 295.00	$ 853.00
	Splice Trays	24 slot	4	$ 30.00	n/a	$ 30.00	$ 120.00	n/a	$ 120.00
	Fiber Splicing < 12		12	n/a	$ 47.20	$ 47.20	n/a	$ 566.40	$ 566.40
	Fiber Splicing > 96			n/a	$ 31.86	$ 31.86	n/a	$ -	$ -
	Fiber Testing (OTDR/PM)		6	n/a	$ 11.80	$ 11.80	n/a	$ 70.80	$ 70.80
	Fiber Tags	Wrap-Around	1	$ 1.32	n/a	$ 1.32	$ 1.58	n/a	$ 1.58
Fiber Lengths									
	Fiber+Slack	96	6,809 '	$ 1.032	n/a	$ 1.03	$ 7,026.89	n/a	$ 7,026.89
Site									
	Replace Pole w/ 130' Steel Pole		1	$ 24,360.00	$ 13,500.00	$ 37,860.00	$ 24,360.00	$ 13,500.00	$ 37,860.00
	NEMA Cabinet, UPS, Disconnect		1	$ 4,200.00	$ 400.00	$ 4,600.00	$ 4,200.00	$ 400.00	$ 4,600.00
	Edge Equipment		1	$ 1,200.00	$ 350.00	$ 1,550.00	$ 1,200.00	$ 350.00	$ 1,550.00
	AC Power Connect (Service Drop)		1	n/a	$ 1,416.00	$ 1,416.00	n/a	$ 1,416.00	$ 1,416.00
	Antenna Array		1	$ 7,500.00	n/a	$ 7,500.00	$ 7,500.00	n/a	$ 7,500.00
	Cabling System		1	$ 720.00	$ 1,200.00	$ 1,920.00	$ 720.00	$ 1,200.00	$ 1,920.00
	Site Installation (Wireless)		1	n/a	$ 1,500.00	$ 1,500.00	n/a	$ 1,500.00	$ 1,500.00
	Site Prep		1	n/a	$ 10,000.00	$ 10,000.00	n/a	$ 10,000.00	$ 10,000.00
				$ -	$ -	$ -	$ -	$ -	$ -
Misc.									
500 '	Install Fiber Optic Marker Sign	Fiberglass	0	$ 60.00	$ 17.70	$ 77.70	$ -	$ -	$ -
				$ -	$ -	$ -	$ -	$ -	$ -
				$ -	$ -	$ -	$ -	$ -	$ -
						Subtotal Cost:	$ 45,686.47	$ 34,609.22	$ 80,295.69

Total Material Cost: $ 45,686.47
Labor/Equip. Total: $ 34,609.22
Total Construction Cost: $ 80,295.69

Orcas Power & Light Coorperative - Unit Totals
OSP Construction Estimate
- Segment 706.3-SJ13

Aerial	Underground	Existing Duct	Poles	AP's	Submarine Cable
0 '	4,604 '	0 '	0	1	

	Unit Description	Type	Unit Quantity	Material Cost	Labor/Equip. Cost	Total Unit Cost	Material Total	Labor/Equip. Total	Ext. Total
Trenching/ Plow									
	Trench New	24" Depth	4,604 '	n/a	$ 8.20	$ 8.20	n/a	$ 37,752.80	$ 37,752.80
15%	Rock Adder		691 '	n/a	$ 13.00	$ 13.00	n/a	$ 8,977.80	$ 8,977.80
Conduit Placement									
	Place (2) 2" HDPE	2	4,604 '	$ 1.61	$ 0.89	$ 2.49	$ 7,403.23	$ 4,074.54	$ 11,477.77
Locate Items									
	Warning Tape	Non-Detect	4,604 '	$ 0.04	$ 0.12	$ 0.15	$ 165.74	$ 543.27	$ 709.02
	Locate Wire (#12)	Insulated/Solid	4,604 '	$ 0.18	$ 0.18	$ 0.36	$ 828.72	$ 814.91	$ 1,643.63
Remove & Restore									
3%	General R&R		139 '	n/a	$ 14.16	$ 14.16	n/a	$ 1,968.24	$ 1,968.24
Fiber Placement in Conduit									
	Fiber Optic Cable	12, 24 ,96	4,604 '	n/a	$ 0.78	$ 0.78	n/a	$ 3,591.12	$ 3,591.12
Handholes									
1,000 '	HH-3 (20k)		5	$ 1,200.00	$ 550.00	$ 1,750.00	$ 6,000.00	$ 2,750.00	$ 8,750.00
Slack Coil									
100 '	Slack Coil FOC in HH	12, 24, 96	500 '	n/a	$ 0.45	$ 0.45	n/a	$ 224.20	$ 224.20
200 '	Slack Coil FOC on Snowshoes	12, 24, 96	'	n/a	$ 0.92	$ 0.92	n/a	$ -	$ -
Aerial									
	Pole Attachment		0	$ 28.80	$ 41.30	$ 70.10	$ -	$ -	$ -
	Place ADSS FOC (roadside)		'	n/a	$ 1.30	$ 1.30	n/a	$ -	$ -
15%	Aerial Make Ready per Pole		0	$ 42.00	$ 177.00	$ 219.00	$ -	$ -	$ -
5%	Place Extension Arm		0	$ 54.00	$ 59.00	$ 113.00	$ -	$ -	$ -
10%	Place Anchor & Guy		0	$ 102.00	$ 295.00	$ 397.00	$ -	$ -	$ -
2,000 '	Place Snow-shoes		0	$ 114.00	$ 177.00	$ 291.00	$ -	$ -	$ -
Splicing Items									
	Splice Case	*>144*	1	$ 558.00	$ 295.00	$ 853.00	$ 558.00	$ 295.00	$ 853.00
	Splice Trays	24 slot	4	$ 30.00	n/a	$ 30.00	$ 120.00	n/a	$ 120.00
	Fiber Splicing < 12		12	n/a	$ 47.20	$ 47.20	n/a	$ 566.40	$ 566.40
	Fiber Splicing > 96			n/a	$ 31.86	$ 31.86	n/a	$ -	$ -
	Fiber Testing (OTDR/PM)		6	n/a	$ 11.80	$ 11.80	n/a	$ 70.80	$ 70.80
	Fiber Tags	Wrap-Around	13	$ 1.32	n/a	$ 1.32	$ 17.42	n/a	$ 17.42
Fiber Lengths									
	Fiber+Slack	96	5,104 '	$ 1.032	n/a	$ 1.03	$ 5,267.33	n/a	$ 5,267.33
Site									
	Replace Pole w/ 130' Steel Pole		1	$ 24,360.00	$ 13,500.00	$ 37,860.00	$ 24,360.00	$ 13,500.00	$ 37,860.00
	NEMA Cabinet, UPS, Disconnect		1	$ 4,200.00	$ 400.00	$ 4,600.00	$ 4,200.00	$ 400.00	$ 4,600.00
	Edge Equipment		1	$ 1,200.00	$ 350.00	$ 1,550.00	$ 1,200.00	$ 350.00	$ 1,550.00
	AC Power Connect (Service Drop)		1	n/a	$ 1,416.00	$ 1,416.00	n/a	$ 1,416.00	$ 1,416.00
	Antenna Array		1	$ 7,500.00	n/a	$ 7,500.00	$ 7,500.00	n/a	$ 7,500.00
	Cabling System		1	$ 720.00	$ 1,200.00	$ 1,920.00	$ 720.00	$ 1,200.00	$ 1,920.00
	Site Installation (Wireless)		1	n/a	$ 1,500.00	$ 1,500.00	n/a	$ 1,500.00	$ 1,500.00
	Site Prep		1	n/a	$ 10,000.00	$ 10,000.00	n/a	$ 10,000.00	$ 10,000.00
				$ -	$ -	$ -	$ -	$ -	$ -
Misc.									
500 '	Install Fiber Optic Marker Sign	Fiberglass	10	$ 60.00	$ 17.70	$ 77.70	$ 600.00	$ 177.00	$ 777.00
				$ -	$ -	$ -	$ -	$ -	$ -
				$ -	$ -	$ -	$ -	$ -	$ -
						Subtotal Cost:	$ 58,940.45	$ 90,172.08	$ 149,112.53

Total Material Cost: $ 58,940.45
Labor/Equip. Total: $ 90,172.08
Total Construction Cost: $ 149,112.53

Orcas Power & Light Coorperative - Unit Totals
OSP Construction Estimate
- Segment 706.3-SJ14

Aerial	Underground	Existing Duct	Poles	AP's	Submarine Cable
0 '	5,432 '	0 '	0	1	

	Unit Description	Type	Unit Quantity	Material Cost	Labor/Equip. Cost	Total Unit Cost	Material Total	Labor/Equip. Total	Ext. Total
Trenching/ Plow									
	Trench New	24" Depth	5,432 '	n/a	$ 8.20	$ 8.20	n/a	$ 44,542.40	$ 44,542.40
15%	Rock Adder		815 '	n/a	$ 13.00	$ 13.00	n/a	$ 10,592.40	$ 10,592.40
Conduit Placement									
	Place (2) 2" HDPE	2	5,432 '	$ 1.61	$ 0.89	$ 2.49	$ 8,734.66	$ 4,807.32	$ 13,541.98
Locate Items									
	Warning Tape	Non-Detect	5,432 '	$ 0.04	$ 0.12	$ 0.15	$ 195.55	$ 640.98	$ 836.53
	Locate Wire (#12)	Insulated/Solid	5,432 '	$ 0.18	$ 0.18	$ 0.36	$ 977.76	$ 961.46	$ 1,939.22
Remove & Restore									
3%	General R&R		163 '	n/a	$ 14.16	$ 14.16	n/a	$ 2,308.08	$ 2,308.08
Fiber Placement in Conduit									
	Fiber Optic Cable	12, 24 ,96	5,432 '	n/a	$ 0.78	$ 0.78	n/a	$ 4,236.96	$ 4,236.96
Handholes									
1,000 '	HH-3 (20k)		6	$ 1,200.00	$ 550.00	$ 1,750.00	$ 7,200.00	$ 3,300.00	$ 10,500.00
Slack Coil									
100 '	Slack Coil FOC in HH	12, 24, 96	600 '	n/a	$ 0.45	$ 0.45	n/a	$ 269.04	$ 269.04
200 '	Slack Coil FOC on Snowshoes	12, 24, 96	'	n/a	$ 0.92	$ 0.92	n/a	$ -	$ -
Aerial									
	Pole Attachment		0	$ 28.80	$ 41.30	$ 70.10	$ -	$ -	$ -
	Place ADSS FOC (roadside)		'	n/a	$ 1.30	$ 1.30	n/a	$ -	$ -
15%	Aerial Make Ready per Pole		0	$ 42.00	$ 177.00	$ 219.00	$ -	$ -	$ -
5%	Place Extension Arm		0	$ 54.00	$ 59.00	$ 113.00	$ -	$ -	$ -
10%	Place Anchor & Guy		0	$ 102.00	$ 295.00	$ 397.00	$ -	$ -	$ -
2,000 '	Place Snow-shoes		0	$ 114.00	$ 177.00	$ 291.00	$ -	$ -	$ -
Splicing Items									
	Splice Case	*>144*	1	$ 558.00	$ 295.00	$ 853.00	$ 558.00	$ 295.00	$ 853.00
	Splice Trays	24 slot	4	$ 30.00	n/a	$ 30.00	$ 120.00	n/a	$ 120.00
	Fiber Splicing < 12		12	n/a	$ 47.20	$ 47.20	n/a	$ 566.40	$ 566.40
	Fiber Splicing > 96			n/a	$ 31.86	$ 31.86	n/a	$ -	$ -
	Fiber Testing (OTDR/PM)		6	n/a	$ 11.80	$ 11.80	n/a	$ 70.80	$ 70.80
	Fiber Tags	Wrap-Around	16	$ 1.32	n/a	$ 1.32	$ 20.59	n/a	$ 20.59
Fiber Lengths									
	Fiber+Slack	96	6,032 '	$ 1.032	n/a	$ 1.03	$ 6,225.02	n/a	$ 6,225.02
Site									
	Replace Pole w/ 130' Steel Pole		1	$ 24,360.00	$ 13,500.00	$ 37,860.00	$ 24,360.00	$ 13,500.00	$ 37,860.00
	NEMA Cabinet, UPS, Disconnect		1	$ 4,200.00	$ 400.00	$ 4,600.00	$ 4,200.00	$ 400.00	$ 4,600.00
	Edge Equipment		1	$ 1,200.00	$ 350.00	$ 1,550.00	$ 1,200.00	$ 350.00	$ 1,550.00
	AC Power Connect (Service Drop)		1	n/a	$ 1,416.00	$ 1,416.00	n/a	$ 1,416.00	$ 1,416.00
	Antenna Array		1	$ 7,500.00	n/a	$ 7,500.00	$ 7,500.00	n/a	$ 7,500.00
	Cabling System		1	$ 720.00	$ 1,200.00	$ 1,920.00	$ 720.00	$ 1,200.00	$ 1,920.00
	Site Installation (Wireless)		1	n/a	$ 1,500.00	$ 1,500.00	n/a	$ 1,500.00	$ 1,500.00
	Site Prep		1	n/a	$ 10,000.00	$ 10,000.00	n/a	$ 10,000.00	$ 10,000.00
				$ -	$ -	$ -	$ -	$ -	$ -
Misc.									
500 '	Install Fiber Optic Marker Sign	Fiberglass	11	$ 60.00	$ 17.70	$ 77.70	$ 660.00	$ 194.70	$ 854.70
				$ -	$ -	$ -	$ -	$ -	$ -
				$ -	$ -	$ -	$ -	$ -	$ -
						Subtotal Cost:	$ 62,671.58	$ 101,151.54	$ 163,823.12

Total Material Cost: $ 62,671.58
Labor/Equip. Total: $ 101,151.54
Total Construction Cost: $ 163,823.12

Orcas Power & Light Coorperative - Unit Totals
OSP Construction Estimate
- Segment 706.3-SJ15

Aerial	Underground	Existing Duct	Poles	AP's	Submarine Cable
0 '	0 '	0 '	0	3	

	Unit Description	Type	Unit Quantity	Material Cost	Labor/Equip. Cost	Total Unit Cost	Material Total	Labor/Equip. Total	Ext. Total
Trenching/ Plow									
	Trench New	24" Depth	'	n/a	$ 8.20	$ 8.20	n/a	$ -	$ -
15%	Rock Adder		'	n/a	$ 13.00	$ 13.00	n/a	$ -	$ -
Conduit Placement									
	Place (2) 2" HDPE	2	'	$ 1.61	$ 0.89	$ 2.49	$ -	$ -	$ -
Locate Items									
	Warning Tape	Non-Detect	'	$ 0.04	$ 0.12	$ 0.15	$ -	$ -	$ -
	Locate Wire (#12)	Insulated/Solid	'	$ 0.18	$ 0.18	$ 0.36	$ -	$ -	$ -
Remove & Restore									
3%	General R&R		'	n/a	$ 14.16	$ 14.16	n/a	$ -	$ -
Fiber Placement in Conduit									
	Fiber Optic Cable	12, 24 ,96	'	n/a	$ 0.78	$ 0.78	n/a	$ -	$ -
Handholes									
1,000 '	HH-3 (20k)		0	$ 1,200.00	$ 550.00	$ 1,750.00	$ -	$ -	$ -
Slack Coil									
100 '	Slack Coil FOC in HH	12, 24, 96	'	n/a	$ 0.45	$ 0.45	n/a	$ -	$ -
200 '	Slack Coil FOC on Snowshoes	12, 24, 96	'	n/a	$ 0.92	$ 0.92	n/a	$ -	$ -
Aerial									
	Pole Attachment		0	$ 28.80	$ 41.30	$ 70.10	$ -	$ -	$ -
	Place ADSS FOC (roadside)		'	n/a	$ 1.30	$ 1.30	n/a	$ -	$ -
15%	Aerial Make Ready per Pole		0	$ 42.00	$ 177.00	$ 219.00	$ -	$ -	$ -
5%	Place Extension Arm		0	$ 54.00	$ 59.00	$ 113.00	$ -	$ -	$ -
10%	Place Anchor & Guy		0	$ 102.00	$ 295.00	$ 397.00	$ -	$ -	$ -
2,000 '	Place Snow-shoes		0	$ 114.00	$ 177.00	$ 291.00	$ -	$ -	$ -
Splicing Items									
	Splice Case	*>144*	3	$ 558.00	$ 295.00	$ 853.00	$ 1,674.00	$ 885.00	$ 2,559.00
	Splice Trays	24 slot	12	$ 30.00	n/a	$ 30.00	$ 360.00	n/a	$ 360.00
	Fiber Splicing < 12			n/a	$ 47.20	$ 47.20	n/a	$ -	$ -
	Fiber Splicing > 96		108	n/a	$ 31.86	$ 31.86	n/a	$ 3,440.88	$ 3,440.88
	Fiber Testing (OTDR/PM)		144	n/a	$ 11.80	$ 11.80	n/a	$ 1,699.20	$ 1,699.20
	Fiber Tags	Wrap-Around	4	$ 1.32	n/a	$ 1.32	$ 4.75	n/a	$ 4.75
Fiber Lengths									
	Fiber+Slack	96	'	$ 1.032	n/a	$ 1.03	$ -	n/a	$ -
Site									
	Replace Pole w/ 130' Steel Pole		3	$ 24,360.00	$ 13,500.00	$ 37,860.00	$ 73,080.00	$ 40,500.00	$ 113,580.00
	NEMA Cabinet, UPS, Disconnect		3	$ 4,200.00	$ 400.00	$ 4,600.00	$ 12,600.00	$ 1,200.00	$ 13,800.00
	Edge Equipment		3	$ 1,200.00	$ 350.00	$ 1,550.00	$ 3,600.00	$ 1,050.00	$ 4,650.00
	AC Power Connect (Service Drop)		3	n/a	$ 1,416.00	$ 1,416.00	n/a	$ 4,248.00	$ 4,248.00
	Antenna Array		3	$ 7,500.00	n/a	$ 7,500.00	$ 22,500.00	n/a	$ 22,500.00
	Cabling System		3	$ 720.00	$ 1,200.00	$ 1,920.00	$ 2,160.00	$ 3,600.00	$ 5,760.00
	Site Installation (Wireless)		3	n/a	$ 1,500.00	$ 1,500.00	n/a	$ 4,500.00	$ 4,500.00
	Site Prep		3	n/a	$ 10,000.00	$ 10,000.00	n/a	$ 30,000.00	$ 30,000.00
				$ -	$ -	$ -	$ -	$ -	$ -
Misc.									
500 '	Install Fiber Optic Marker Sign	Fiberglass	0	$ 60.00	$ 17.70	$ 77.70	$ -	$ -	$ -
				$ -	$ -	$ -	$ -	$ -	$ -
				$ -	$ -	$ -	$ -	$ -	$ -
						Subtotal Cost:	$ 115,978.75	$ 91,123.08	$ 207,101.83

Total Material Cost: **$ 115,978.75**
Labor/Equip. Total: **$ 91,123.08**
Total Construction Cost: **$ 207,101.83**

Orcas Power & Light Coorperative - Unit Totals
OSP Construction Estimate
- Segment 706.3-SH01

Aerial	Underground	Existing Duct	Poles	AP's	Submarine Cable
0 '	5,763 '	1,535 '	0	1	

	Unit Description	Type	Unit Quantity	Material Cost	Labor/Equip. Cost	Total Unit Cost	Material Total	Labor/Equip. Total	Ext. Total
Trenching/ Plow									
	Trench New	24" Depth	5,763 '	n/a	$ 8.20	$ 8.20	n/a	$ 47,256.60	$ 47,256.60
15%	Rock Adder		864 '	n/a	$ 13.00	$ 13.00	n/a	$ 11,237.85	$ 11,237.85
Conduit Placement									
	Place (2) 2" HDPE	2	5,763 '	$ 1.61	$ 0.89	$ 2.49	$ 9,266.90	$ 5,100.26	$ 14,367.16
Locate Items									
	Warning Tape	Non-Detect	5,763 '	$ 0.04	$ 0.12	$ 0.15	$ 207.47	$ 680.03	$ 887.50
	Locate Wire (#12)	Insulated/Solid	5,763 '	$ 0.18	$ 0.18	$ 0.36	$ 1,037.34	$ 1,020.05	$ 2,057.39
Remove & Restore									
3%	General R&R		173 '	n/a	$ 14.16	$ 14.16	n/a	$ 2,449.68	$ 2,449.68
Fiber Placement in Conduit									
	Fiber Optic Cable	12, 24 ,96	7,298 '	n/a	$ 0.78	$ 0.78	n/a	$ 5,692.44	$ 5,692.44
Handholes									
1,000 '	HH-3 (20k)		6	$ 1,200.00	$ 550.00	$ 1,750.00	$ 7,200.00	$ 3,300.00	$ 10,500.00
Slack Coil									
100 '	Slack Coil FOC in HH	12, 24, 96	600 '	n/a	$ 0.45	$ 0.45	n/a	$ 269.04	$ 269.04
200 '	Slack Coil FOC on Snowshoes	12, 24, 96	'	n/a	$ 0.92	$ 0.92	n/a	$ -	$ -
Aerial									
	Pole Attachment		0	$ 28.80	$ 41.30	$ 70.10	$ -	$ -	$ -
	Place ADSS FOC (roadside)		'	n/a	$ 1.30	$ 1.30	n/a	$ -	$ -
15%	Aerial Make Ready per Pole		0	$ 42.00	$ 177.00	$ 219.00	$ -	$ -	$ -
5%	Place Extension Arm		0	$ 54.00	$ 59.00	$ 113.00	$ -	$ -	$ -
10%	Place Anchor & Guy		0	$ 102.00	$ 295.00	$ 397.00	$ -	$ -	$ -
2,000 '	Place Snow-shoes		0	$ 114.00	$ 177.00	$ 291.00	$ -	$ -	$ -
Splicing Items									
	Splice Case	*>144*	1	$ 558.00	$ 295.00	$ 853.00	$ 558.00	$ 295.00	$ 853.00
	Splice Trays	24 slot	4	$ 30.00	n/a	$ 30.00	$ 120.00	n/a	$ 120.00
	Fiber Splicing < 12		30	n/a	$ 47.20	$ 47.20	n/a	$ 1,416.00	$ 1,416.00
	Fiber Splicing > 96			n/a	$ 31.86	$ 31.86	n/a	$ -	$ -
	Fiber Testing (OTDR/PM)		6	n/a	$ 11.80	$ 11.80	n/a	$ 70.80	$ 70.80
	Fiber Tags	Wrap-Around	16	$ 1.32	n/a	$ 1.32	$ 20.59	n/a	$ 20.59
Fiber Lengths									
	Fiber+Slack	96	7,898 '	$ 1.032	n/a	$ 1.03	$ 8,150.74	n/a	$ 8,150.74
Site									
	Replace Pole w/ 130' Steel Pole		1	$ 24,360.00	$ 13,500.00	$ 37,860.00	$ 24,360.00	$ 13,500.00	$ 37,860.00
	NEMA Cabinet, UPS, Disconnect		1	$ 4,200.00	$ 400.00	$ 4,600.00	$ 4,200.00	$ 400.00	$ 4,600.00
	Edge Equipment		1	$ 1,200.00	$ 350.00	$ 1,550.00	$ 1,200.00	$ 350.00	$ 1,550.00
	AC Power Connect (Service Drop)		1	n/a	$ 1,416.00	$ 1,416.00	n/a	$ 1,416.00	$ 1,416.00
	Antenna Array		1	$ 7,500.00	n/a	$ 7,500.00	$ 7,500.00	n/a	$ 7,500.00
	Cabling System		1	$ 720.00	$ 1,200.00	$ 1,920.00	$ 720.00	$ 1,200.00	$ 1,920.00
	Site Installation (Wireless)		1	n/a	$ 1,500.00	$ 1,500.00	n/a	$ 1,500.00	$ 1,500.00
	Site Prep		1	n/a	$ 10,000.00	$ 10,000.00	n/a	$ 10,000.00	$ 10,000.00
				$ -	$ -	$ -	$ -	$ -	$ -
Misc.									
500 '	Install Fiber Optic Marker Sign	Fiberglass	12	$ 60.00	$ 17.70	$ 77.70	$ 720.00	$ 212.40	$ 932.40
				$ -	$ -	$ -	$ -	$ -	$ -
				$ -	$ -	$ -	$ -	$ -	$ -
					Subtotal Cost:		$ 65,261.04	$ 107,366.15	$ 172,627.19

Total Material Cost: $ 65,261.04
Labor/Equip. Total: $ 107,366.15
Total Construction Cost: $ 172,627.19

Orcas Power & Light Coorperative - Unit Totals
OSP Construction Estimate
- Segment 706.3-SH02

Aerial	Underground	Existing Duct	Poles	AP's	Submarine Cable
491 '	319 '	0 '	3	1	

	Unit Description	Type	Unit Quantity	Material Cost	Labor/Equip. Cost	Total Unit Cost	Material Total	Labor/Equip. Total	Ext. Total
Trenching/ Plow									
	Trench New	24" Depth	319 '	n/a	$ 8.20	$ 8.20	n/a	$ 2,615.80	$ 2,615.80
15%	Rock Adder		48 '	n/a	$ 13.00	$ 13.00	n/a	$ 622.05	$ 622.05
Conduit Placement									
	Place (2) 2" HDPE	2	319 '	$ 1.61	$ 0.89	$ 2.49	$ 512.95	$ 282.32	$ 795.27
Locate Items									
	Warning Tape	Non-Detect	319 '	$ 0.04	$ 0.12	$ 0.15	$ 11.48	$ 37.64	$ 49.13
	Locate Wire (#12)	Insulated/Solid	319 '	$ 0.18	$ 0.18	$ 0.36	$ 57.42	$ 56.46	$ 113.88
Remove & Restore									
3%	General R&R		10 '	n/a	$ 14.16	$ 14.16	n/a	$ 141.60	$ 141.60
Fiber Placement in Conduit									
	Fiber Optic Cable	12, 24 ,96	319 '	n/a	$ 0.78	$ 0.78	n/a	$ 248.82	$ 248.82
Handholes									
1,000 '	HH-3 (20k)		1	$ 1,200.00	$ 550.00	$ 1,750.00	$ 1,200.00	$ 550.00	$ 1,750.00
Slack Coil									
100 '	Slack Coil FOC in HH	12, 24, 96	100 '	n/a	$ 0.45	$ 0.45	n/a	$ 44.84	$ 44.84
200 '	Slack Coil FOC on Snowshoes	12, 24, 96	200 '	n/a	$ 0.92	$ 0.92	n/a	$ 184.08	$ 184.08
Aerial									
	Pole Attachment		3	$ 28.80	$ 41.30	$ 70.10	$ 86.40	$ 123.90	$ 210.30
	Place ADSS FOC (roadside)		491 '	n/a	$ 1.30	$ 1.30	n/a	$ 637.32	$ 637.32
15%	Aerial Make Ready per Pole		1	$ 42.00	$ 177.00	$ 219.00	$ 42.00	$ 177.00	$ 219.00
5%	Place Extension Arm		1	$ 54.00	$ 59.00	$ 113.00	$ 54.00	$ 59.00	$ 113.00
10%	Place Anchor & Guy		1	$ 102.00	$ 295.00	$ 397.00	$ 102.00	$ 295.00	$ 397.00
2,000 '	Place Snow-shoes		1	$ 114.00	$ 177.00	$ 291.00	$ 114.00	$ 177.00	$ 291.00
Splicing Items									
	Splice Case	*>144*	1	$ 558.00	$ 295.00	$ 853.00	$ 558.00	$ 295.00	$ 853.00
	Splice Trays	24 slot	4	$ 30.00	n/a	$ 30.00	$ 120.00	n/a	$ 120.00
	Fiber Splicing < 12		12	n/a	$ 47.20	$ 47.20	n/a	$ 566.40	$ 566.40
	Fiber Splicing > 96			n/a	$ 31.86	$ 31.86	n/a	$ -	$ -
	Fiber Testing (OTDR/PM)		6	n/a	$ 11.80	$ 11.80	n/a	$ 70.80	$ 70.80
	Fiber Tags	Wrap-Around	7	$ 1.32	n/a	$ 1.32	$ 9.50	n/a	$ 9.50
Fiber Lengths									
	Fiber+Slack	96	1,110 '	$ 1.032	n/a	$ 1.03	$ 1,145.52	n/a	$ 1,145.52
Site									
	Replace Pole w/ 130' Steel Pole		1	$ 24,360.00	$ 13,500.00	$ 37,860.00	$ 24,360.00	$ 13,500.00	$ 37,860.00
	NEMA Cabinet, UPS, Disconnect		1	$ 4,200.00	$ 400.00	$ 4,600.00	$ 4,200.00	$ 400.00	$ 4,600.00
	Edge Equipment		1	$ 1,200.00	$ 350.00	$ 1,550.00	$ 1,200.00	$ 350.00	$ 1,550.00
	AC Power Connect (Service Drop)		1	n/a	$ 1,416.00	$ 1,416.00	n/a	$ 1,416.00	$ 1,416.00
	Antenna Array		1	$ 7,500.00	n/a	$ 7,500.00	$ 7,500.00	n/a	$ 7,500.00
	Cabling System		1	$ 720.00	$ 1,200.00	$ 1,920.00	$ 720.00	$ 1,200.00	$ 1,920.00
	Site Installation (Wireless)		1	n/a	$ 1,500.00	$ 1,500.00	n/a	$ 1,500.00	$ 1,500.00
	Site Prep		1	n/a	$ 10,000.00	$ 10,000.00	n/a	$ 10,000.00	$ 10,000.00
				$ -	$ -	$ -	$ -	$ -	$ -
Misc.									
500 '	Install Fiber Optic Marker Sign	Fiberglass	1	$ 60.00	$ 17.70	$ 77.70	$ 60.00	$ 17.70	$ 77.70
				$ -	$ -	$ -	$ -	$ -	$ -
				$ -	$ -	$ -	$ -	$ -	$ -
						Subtotal Cost:	$ 42,053.28	$ 35,568.73	$ 77,622.01

Total Material Cost: $ 42,053.28
Labor/Equip. Total: $ 35,568.73
Total Construction Cost: $ 77,622.01

Orcas Power & Light Coorperative - Unit Totals
OSP Construction Estimate
- Segment 706.3-SH03

Aerial	Underground	Existing Duct	Poles	AP's	Submarine Cable
5,610 '	1,294 '	9,563 '	24	2	

	Unit Description	Type	Unit Quantity	Material Cost	Labor/Equip. Cost	Total Unit Cost	Material Total	Labor/Equip. Total	Ext. Total
Trenching/ Plow									
	Trench New	24" Depth	1,294 '	n/a	$ 8.20	$ 8.20	n/a	$ 10,610.80	$ 10,610.80
15%	Rock Adder		194 '	n/a	$ 13.00	$ 13.00	n/a	$ 2,523.30	$ 2,523.30
Conduit Placement									
	Place (2) 2" HDPE	2	1,294 '	$ 1.61	$ 0.89	$ 2.49	$ 2,080.75	$ 1,145.19	$ 3,225.94
Locate Items									
	Warning Tape	Non-Detect	1,294 '	$ 0.04	$ 0.12	$ 0.15	$ 46.58	$ 152.69	$ 199.28
	Locate Wire (#12)	Insulated/Solid	1,294 '	$ 0.18	$ 0.18	$ 0.36	$ 232.92	$ 229.04	$ 461.96
Remove & Restore									
3%	General R&R		39 '	n/a	$ 14.16	$ 14.16	n/a	$ 552.24	$ 552.24
Fiber Placement in Conduit									
	Fiber Optic Cable	12, 24 ,96	10,857 '	n/a	$ 0.78	$ 0.78	n/a	$ 8,468.46	$ 8,468.46
Handholes									
1,000 '	HH-3 (20k)		2	$ 1,200.00	$ 550.00	$ 1,750.00	$ 2,400.00	$ 1,100.00	$ 3,500.00
Slack Coil									
100 '	Slack Coil FOC in HH	12, 24, 96	200 '	n/a	$ 0.45	$ 0.45	n/a	$ 89.68	$ 89.68
200 '	Slack Coil FOC on Snowshoes	12, 24, 96	600 '	n/a	$ 0.92	$ 0.92	n/a	$ 552.24	$ 552.24
Aerial									
	Pole Attachment		24	$ 28.80	$ 41.30	$ 70.10	$ 691.20	$ 991.20	$ 1,682.40
	Place ADSS FOC (roadside)		5,610 '	n/a	$ 1.30	$ 1.30	n/a	$ 7,281.78	$ 7,281.78
15%	Aerial Make Ready per Pole		4	$ 42.00	$ 177.00	$ 219.00	$ 168.00	$ 708.00	$ 876.00
5%	Place Extension Arm		2	$ 54.00	$ 59.00	$ 113.00	$ 108.00	$ 118.00	$ 226.00
10%	Place Anchor & Guy		3	$ 102.00	$ 295.00	$ 397.00	$ 306.00	$ 885.00	$ 1,191.00
2,000 '	Place Snow-shoes		3	$ 114.00	$ 177.00	$ 291.00	$ 342.00	$ 531.00	$ 873.00
Splicing Items									
	Splice Case	*>144*	2	$ 558.00	$ 295.00	$ 853.00	$ 1,116.00	$ 590.00	$ 1,706.00
	Splice Trays	24 slot	8	$ 30.00	n/a	$ 30.00	$ 240.00	n/a	$ 240.00
	Fiber Splicing < 12		36	n/a	$ 47.20	$ 47.20	n/a	$ 1,699.20	$ 1,699.20
	Fiber Splicing > 96			n/a	$ 31.86	$ 31.86	n/a	$ -	$ -
	Fiber Testing (OTDR/PM)		12	n/a	$ 11.80	$ 11.80	n/a	$ 141.60	$ 141.60
	Fiber Tags	Wrap-Around	36	$ 1.32	n/a	$ 1.32	$ 47.52	n/a	$ 47.52
Fiber Lengths									
	Fiber+Slack	96	17,267 '	$ 1.032	n/a	$ 1.03	$ 17,819.54	n/a	$ 17,819.54
Site									
	Replace Pole w/ 130' Steel Pole		2	$ 24,360.00	$ 13,500.00	$ 37,860.00	$ 48,720.00	$ 27,000.00	$ 75,720.00
	NEMA Cabinet, UPS, Disconnect		2	$ 4,200.00	$ 400.00	$ 4,600.00	$ 8,400.00	$ 800.00	$ 9,200.00
	Edge Equipment		2	$ 1,200.00	$ 350.00	$ 1,550.00	$ 2,400.00	$ 700.00	$ 3,100.00
	AC Power Connect (Service Drop)		2	n/a	$ 1,416.00	$ 1,416.00	n/a	$ 2,832.00	$ 2,832.00
	Antenna Array		2	$ 7,500.00	n/a	$ 7,500.00	$ 15,000.00	n/a	$ 15,000.00
	Cabling System		2	$ 720.00	$ 1,200.00	$ 1,920.00	$ 1,440.00	$ 2,400.00	$ 3,840.00
	Site Installation (Wireless)		2	n/a	$ 1,500.00	$ 1,500.00	n/a	$ 3,000.00	$ 3,000.00
	Site Prep		2	n/a	$ 10,000.00	$ 10,000.00	n/a	$ 20,000.00	$ 20,000.00
				$ -	$ -	$ -	$ -	$ -	$ -
Misc.									
500 '	Install Fiber Optic Marker Sign	Fiberglass	3	$ 60.00	$ 17.70	$ 77.70	$ 180.00	$ 53.10	$ 233.10
				$ -	$ -	$ -	$ -	$ -	$ -
				$ -	$ -	$ -	$ -	$ -	$ -
						Subtotal Cost:	$ 101,738.52	$ 95,154.52	$ 196,893.04

Total Material Cost: $ 101,738.52
Labor/Equip. Total: $ 95,154.52
Total Construction Cost: $ 196,893.04

Orcas Power & Light Coorperative - Unit Totals
OSP Construction Estimate
- Segment 706.3-SH04

Aerial	Underground	Existing Duct	Poles	AP's	Submarine Cable
2,447 '	0 '	0 '	7	1	

	Unit Description	Type	Unit Quantity	Material Cost	Labor/Equip. Cost	Total Unit Cost	Material Total	Labor/Equip. Total	Ext. Total
Trenching/ Plow									
	Trench New	24" Depth	'	n/a	$ 8.20	$ 8.20	n/a	$ -	$ -
15%	Rock Adder		'	n/a	$ 13.00	$ 13.00	n/a	$ -	$ -
Conduit Placement									
	Place (2) 2" HDPE	2	'	$ 1.61	$ 0.89	$ 2.49	$ -	$ -	$ -
Locate Items									
	Warning Tape	Non-Detect	'	$ 0.04	$ 0.12	$ 0.15	$ -	$ -	$ -
	Locate Wire (#12)	Insulated/Solid	'	$ 0.18	$ 0.18	$ 0.36	$ -	$ -	$ -
Remove & Restore									
3%	General R&R		'	n/a	$ 14.16	$ 14.16	n/a	$ -	$ -
Fiber Placement in Conduit									
	Fiber Optic Cable	12, 24 ,96	'	n/a	$ 0.78	$ 0.78	n/a	$ -	$ -
Handholes									
1,000 '	HH-3 (20k)		0	$ 1,200.00	$ 550.00	$ 1,750.00	$ -	$ -	$ -
Slack Coil									
100 '	Slack Coil FOC in HH	12, 24, 96	'	n/a	$ 0.45	$ 0.45	n/a	$ -	$ -
200 '	Slack Coil FOC on Snowshoes	12, 24, 96	400 '	n/a	$ 0.92	$ 0.92	n/a	$ 368.16	$ 368.16
Aerial									
	Pole Attachment		7	$ 28.80	$ 41.30	$ 70.10	$ 201.60	$ 289.10	$ 490.70
	Place ADSS FOC (roadside)		2,447 '	n/a	$ 1.30	$ 1.30	n/a	$ 3,176.21	$ 3,176.21
15%	Aerial Make Ready per Pole		2	$ 42.00	$ 177.00	$ 219.00	$ 84.00	$ 354.00	$ 438.00
5%	Place Extension Arm		1	$ 54.00	$ 59.00	$ 113.00	$ 54.00	$ 59.00	$ 113.00
10%	Place Anchor & Guy		1	$ 102.00	$ 295.00	$ 397.00	$ 102.00	$ 295.00	$ 397.00
2,000 '	Place Snow-shoes		2	$ 114.00	$ 177.00	$ 291.00	$ 228.00	$ 354.00	$ 582.00
Splicing Items									
	Splice Case	*>144*	1	$ 558.00	$ 295.00	$ 853.00	$ 558.00	$ 295.00	$ 853.00
	Splice Trays	24 slot	4	$ 30.00	n/a	$ 30.00	$ 120.00	n/a	$ 120.00
	Fiber Splicing < 12		12	n/a	$ 47.20	$ 47.20	n/a	$ 566.40	$ 566.40
	Fiber Splicing > 96			n/a	$ 31.86	$ 31.86	n/a	$ -	$ -
	Fiber Testing (OTDR/PM)		6	n/a	$ 11.80	$ 11.80	n/a	$ 70.80	$ 70.80
	Fiber Tags	Wrap-Around	10	$ 1.32	n/a	$ 1.32	$ 12.67	n/a	$ 12.67
Fiber Lengths									
	Fiber+Slack	96	2,847 '	$ 1.032	n/a	$ 1.03	$ 2,938.10	n/a	$ 2,938.10
Site									
	Replace Pole w/ 130' Steel Pole		1	$ 24,360.00	$ 13,500.00	$ 37,860.00	$ 24,360.00	$ 13,500.00	$ 37,860.00
	NEMA Cabinet, UPS, Disconnect		1	$ 4,200.00	$ 400.00	$ 4,600.00	$ 4,200.00	$ 400.00	$ 4,600.00
	Edge Equipment		1	$ 1,200.00	$ 350.00	$ 1,550.00	$ 1,200.00	$ 350.00	$ 1,550.00
	AC Power Connect (Service Drop)		1	n/a	$ 1,416.00	$ 1,416.00	n/a	$ 1,416.00	$ 1,416.00
	Antenna Array		1	$ 7,500.00	n/a	$ 7,500.00	$ 7,500.00	n/a	$ 7,500.00
	Cabling System		1	$ 720.00	$ 1,200.00	$ 1,920.00	$ 720.00	$ 1,200.00	$ 1,920.00
	Site Installation (Wireless)		1	n/a	$ 1,500.00	$ 1,500.00	n/a	$ 1,500.00	$ 1,500.00
	Site Prep		1	n/a	$ 10,000.00	$ 10,000.00	n/a	$ 10,000.00	$ 10,000.00
				$ -	$ -	$ -	$ -	$ -	$ -
Misc.									
500 '	Install Fiber Optic Marker Sign	Fiberglass	0	$ 60.00	$ 17.70	$ 77.70	$ -	$ -	$ -
				$ -	$ -	$ -	$ -	$ -	$ -
				$ -	$ -	$ -	$ -	$ -	$ -
						Subtotal Cost:	$ 42,278.38	$ 34,193.67	$ 76,472.04

Total Material Cost: $ 42,278.38
Labor/Equip. Total: $ 34,193.67
Total Construction Cost: $ 76,472.04

5/1/2012

Orcas Power & Light Coorperative - Unit Totals
OSP Construction Estimate
- Segment 706.3-SH05

Aerial	Underground	Existing Duct	Poles	AP's	Submarine Cable
544 '	0 '	0 '	4	1	

	Unit Description	Type	Unit Quantity	Material Cost	Labor/Equip. Cost	Total Unit Cost	Material Total	Labor/Equip. Total	Ext. Total
Trenching/ Plow									
	Trench New	24" Depth	'	n/a	$ 8.20	$ 8.20	n/a	$ -	$ -
15%	Rock Adder		'	n/a	$ 13.00	$ 13.00	n/a	$ -	$ -
Conduit Placement									
	Place (2) 2" HDPE	2	'	$ 1.61	$ 0.89	$ 2.49	$ -	$ -	$ -
Locate Items									
	Warning Tape	Non-Detect	'	$ 0.04	$ 0.12	$ 0.15	$ -	$ -	$ -
	Locate Wire (#12)	Insulated/Solid	'	$ 0.18	$ 0.18	$ 0.36	$ -	$ -	$ -
Remove & Restore									
3%	General R&R		'	n/a	$ 14.16	$ 14.16	n/a	$ -	$ -
Fiber Placement in Conduit									
	Fiber Optic Cable	12, 24 ,96	'	n/a	$ 0.78	$ 0.78	n/a	$ -	$ -
Handholes									
1,000 '	HH-3 (20k)		0	$ 1,200.00	$ 550.00	$ 1,750.00	$ -	$ -	$ -
Slack Coil									
100 '	Slack Coil FOC in HH	12, 24, 96	'	n/a	$ 0.45	$ 0.45	n/a	$ -	$ -
200 '	Slack Coil FOC on Snowshoes	12, 24, 96	200 '	n/a	$ 0.92	$ 0.92	n/a	$ 184.08	$ 184.08
Aerial									
	Pole Attachment		4	$ 28.80	$ 41.30	$ 70.10	$ 115.20	$ 165.20	$ 280.40
	Place ADSS FOC (roadside)		544 '	n/a	$ 1.30	$ 1.30	n/a	$ 706.11	$ 706.11
15%	Aerial Make Ready per Pole		1	$ 42.00	$ 177.00	$ 219.00	$ 42.00	$ 177.00	$ 219.00
5%	Place Extension Arm		1	$ 54.00	$ 59.00	$ 113.00	$ 54.00	$ 59.00	$ 113.00
10%	Place Anchor & Guy		1	$ 102.00	$ 295.00	$ 397.00	$ 102.00	$ 295.00	$ 397.00
2,000 '	Place Snow-shoes		1	$ 114.00	$ 177.00	$ 291.00	$ 114.00	$ 177.00	$ 291.00
Splicing Items									
	Splice Case	*>144*	1	$ 558.00	$ 295.00	$ 853.00	$ 558.00	$ 295.00	$ 853.00
	Splice Trays	24 slot	4	$ 30.00	n/a	$ 30.00	$ 120.00	n/a	$ 120.00
	Fiber Splicing < 12		48	n/a	$ 47.20	$ 47.20	n/a	$ 2,265.60	$ 2,265.60
	Fiber Splicing > 96			n/a	$ 31.86	$ 31.86	n/a	$ -	$ -
	Fiber Testing (OTDR/PM)		48	n/a	$ 11.80	$ 11.80	n/a	$ 566.40	$ 566.40
	Fiber Tags	Wrap-Around	6	$ 1.32	n/a	$ 1.32	$ 7.92	n/a	$ 7.92
Fiber Lengths									
	Fiber+Slack	96	744 '	$ 1.032	n/a	$ 1.03	$ 767.81	n/a	$ 767.81
Site									
	Replace Pole w/ 130' Steel Pole		1	$ 24,360.00	$ 13,500.00	$ 37,860.00	$ 24,360.00	$ 13,500.00	$ 37,860.00
	NEMA Cabinet, UPS, Disconnect		1	$ 4,200.00	$ 400.00	$ 4,600.00	$ 4,200.00	$ 400.00	$ 4,600.00
	Edge Equipment		1	$ 1,200.00	$ 350.00	$ 1,550.00	$ 1,200.00	$ 350.00	$ 1,550.00
	AC Power Connect (Service Drop)		1	n/a	$ 1,416.00	$ 1,416.00	n/a	$ 1,416.00	$ 1,416.00
	Antenna Array		1	$ 7,500.00	n/a	$ 7,500.00	$ 7,500.00	n/a	$ 7,500.00
	Cabling System		1	$ 720.00	$ 1,200.00	$ 1,920.00	$ 720.00	$ 1,200.00	$ 1,920.00
	Site Installation (Wireless)		1	n/a	$ 1,500.00	$ 1,500.00	n/a	$ 1,500.00	$ 1,500.00
	Site Prep		1	n/a	$ 10,000.00	$ 10,000.00	n/a	$ 10,000.00	$ 10,000.00
				$ -	$ -	$ -	$ -	$ -	$ -
Misc.									
500 '	Install Fiber Optic Marker Sign	Fiberglass	0	$ 60.00	$ 17.70	$ 77.70	$ -	$ -	$ -
				$ -	$ -	$ -	$ -	$ -	$ -
				$ -	$ -	$ -	$ -	$ -	$ -
					Subtotal Cost:		$ 39,860.93	$ 33,256.39	$ 73,117.32

Total Material Cost: $ 39,860.93
Labor/Equip. Total: $ 33,256.39
Total Construction Cost: $ 73,117.32

Orcas Power & Light Coorperative - Unit Totals
OSP Construction Estimate
- Segment 706.3-SH06

Aerial	Underground	Existing Duct	Poles	AP's	Submarine Cable
0 '	0 '	0 '	0	0	

	Unit Description	Type	Unit Quantity	Material Cost	Labor/Equip. Cost	Total Unit Cost	Material Total	Labor/Equip. Total	Ext. Total
Trenching/ Plow									
	Trench New	24" Depth	'	n/a	$ 8.20	$ 8.20	n/a	$ -	$ -
15%	Rock Adder		'	n/a	$ 13.00	$ 13.00	n/a	$ -	$ -
Conduit Placement									
	Place (2) 2" HDPE	2	'	$ 1.61	$ 0.89	$ 2.49	$ -	$ -	$ -
Locate Items									
	Warning Tape	Non-Detect	'	$ 0.04	$ 0.12	$ 0.15	$ -	$ -	$ -
	Locate Wire (#12)	Insulated/Solid	'	$ 0.18	$ 0.18	$ 0.36	$ -	$ -	$ -
Remove & Restore									
3%	General R&R		'	n/a	$ 14.16	$ 14.16	n/a	$ -	$ -
Fiber Placement in Conduit									
	Fiber Optic Cable	12, 24 ,96	'	n/a	$ 0.78	$ 0.78	n/a	$ -	$ -
Handholes									
1,000 '	HH-3 (20k)		0	$ 1,200.00	$ 550.00	$ 1,750.00	$ -	$ -	$ -
Slack Coil									
100 '	Slack Coil FOC in HH	12, 24, 96	'	n/a	$ 0.45	$ 0.45	n/a	$ -	$ -
200 '	Slack Coil FOC on Snowshoes	12, 24, 96	'	n/a	$ 0.92	$ 0.92	n/a	$ -	$ -
Aerial									
	Pole Attachment		0	$ 28.80	$ 41.30	$ 70.10	$ -	$ -	$ -
	Place ADSS FOC (roadside)		'	n/a	$ 1.30	$ 1.30	n/a	$ -	$ -
15%	Aerial Make Ready per Pole		0	$ 42.00	$ 177.00	$ 219.00	$ -	$ -	$ -
5%	Place Extension Arm		0	$ 54.00	$ 59.00	$ 113.00	$ -	$ -	$ -
10%	Place Anchor & Guy		0	$ 102.00	$ 295.00	$ 397.00	$ -	$ -	$ -
2,000 '	Place Snow-shoes		0	$ 114.00	$ 177.00	$ 291.00	$ -	$ -	$ -
Splicing Items									
	Splice Case	*>144*	0	$ 558.00	$ 295.00	$ 853.00	$ -	$ -	$ -
	Splice Trays	24 slot	0	$ 30.00	n/a	$ 30.00	$ -	n/a	$ -
	Fiber Splicing < 12		48	n/a	$ 47.20	$ 47.20	n/a	$ 2,265.60	$ 2,265.60
	Fiber Splicing > 96			n/a	$ 31.86	$ 31.86	n/a	$ -	$ -
	Fiber Testing (OTDR/PM)			n/a	$ 11.80	$ 11.80	n/a	$ -	$ -
	Fiber Tags	Wrap-Around	0	$ 1.32	n/a	$ 1.32	$ -	n/a	$ -
Fiber Lengths									
	Fiber+Slack	96	'	$ 1.032	n/a	$ 1.03	$ -	n/a	$ -
Site									
	Replace Pole w/ 130' Steel Pole		0	$ 24,360.00	$ 13,500.00	$ 37,860.00	$ -	$ -	$ -
	NEMA Cabinet, UPS, Disconnect		0	$ 4,200.00	$ 400.00	$ 4,600.00	$ -	$ -	$ -
	Edge Equipment		0	$ 1,200.00	$ 350.00	$ 1,550.00	$ -	$ -	$ -
	AC Power Connect (Service Drop)		0	n/a	$ 1,416.00	$ 1,416.00	n/a	$ -	$ -
	Antenna Array		0	$ 7,500.00	n/a	$ 7,500.00	$ -	n/a	$ -
	Cabling System		0	$ 720.00	$ 1,200.00	$ 1,920.00	$ -	$ -	$ -
	Site Installation (Wireless)		0	n/a	$ 1,500.00	$ 1,500.00	n/a	$ -	$ -
	Site Prep		0	n/a	$ 10,000.00	$ 10,000.00	n/a	$ -	$ -
				$ -	$ -	$ -	$ -	$ -	$ -
Misc.									
500 '	Install Fiber Optic Marker Sign	Fiberglass	0	$ 60.00	$ 17.70	$ 77.70	$ -	$ -	$ -
				$ -	$ -	$ -	$ -	$ -	$ -
				$ -	$ -	$ -	$ -	$ -	$ -
						Subtotal Cost:	$ -	$ 2,265.60	$ 2,265.60

Total Material Cost: $ -
Labor/Equip. Total: $ 2,265.60
Total Construction Cost: $ 2,265.60

5/1/2012

Orcas Power & Light Coorperative - Unit Totals
OSP Construction Estimate
- Segment 706.3-DB01

Aerial	Underground	Existing Duct	Poles	AP's	Submarine Cable
0 '	0 '	0 '	0	2	

	Unit Description	Type	Unit Quantity	Material Cost	Labor/Equip. Cost	Total Unit Cost	Material Total	Labor/Equip. Total	Ext. Total
Trenching/ Plow									
	Trench New	24" Depth	'	n/a	$ 8.20	$ 8.20	n/a	$ -	$ -
0%	Rock Adder		'	n/a	$ 13.00	$ 13.00	n/a	$ -	$ -
Conduit Placement									
	Place (2) 2" HDPE	2	'	$ 1.61	$ 0.89	$ 2.49	$ -	$ -	$ -
Locate Items									
	Warning Tape	Non-Detect	'	$ 0.04	$ 0.12	$ 0.15	$ -	$ -	$ -
	Locate Wire (#12)	Insulated/Solid	'	$ 0.18	$ 0.18	$ 0.36	$ -	$ -	$ -
Remove & Restore									
0%	General R&R		'	n/a	$ 14.16	$ 14.16	n/a	$ -	$ -
Fiber Placement in Conduit									
	Fiber Optic Cable	12, 24 ,96	'	n/a	$ 0.78	$ 0.78	n/a	$ -	$ -
Handholes									
1,000 '	HH-3 (20k)		0	$ 1,200.00	$ 550.00	$ 1,750.00	$ -	$ -	$ -
Slack Coil									
100 '	Slack Coil FOC in HH	12, 24, 96	'	n/a	$ 0.45	$ 0.45	n/a	$ -	$ -
200 '	Slack Coil FOC on Snowshoes	12, 24, 96	'	n/a	$ 0.92	$ 0.92	n/a	$ -	$ -
Aerial									
	Pole Attachment		0	$ 28.80	$ 41.30	$ 70.10	$ -	$ -	$ -
	Place ADSS FOC (roadside)		'	n/a	$ 1.30	$ 1.30	n/a	$ -	$ -
15%	Aerial Make Ready per Pole		0	$ 42.00	$ 177.00	$ 219.00	$ -	$ -	$ -
5%	Place Extension Arm		0	$ 54.00	$ 59.00	$ 113.00	$ -	$ -	$ -
10%	Place Anchor & Guy		0	$ 102.00	$ 295.00	$ 397.00	$ -	$ -	$ -
2,000 '	Place Snow-shoes		0	$ 114.00	$ 177.00	$ 291.00	$ -	$ -	$ -
Splicing Items									
	Splice Case	*>144*	2	$ 558.00	$ 295.00	$ 853.00	$ 1,116.00	$ 590.00	$ 1,706.00
	Splice Trays	24 slot	8	$ 30.00	n/a	$ 30.00	$ 240.00	n/a	$ 240.00
	Fiber Splicing < 12		12	n/a	$ 47.20	$ 47.20	n/a	$ 566.40	$ 566.40
	Fiber Splicing > 96		48	n/a	$ 31.86	$ 31.86	n/a	$ 1,529.28	$ 1,529.28
	Fiber Testing (OTDR/PM)		12	n/a	$ 11.80	$ 11.80	n/a	$ 141.60	$ 141.60
	Fiber Tags	Wrap-Around	2	$ 1.32	n/a	$ 1.32	$ 3.17	n/a	$ 3.17
Fiber Lengths									
	Fiber+Slack	96	'	$ 1.032	n/a	$ 1.03	$ -	n/a	$ -
Site									
	Replace Pole w/ 130' Steel Pole		2	$ 24,360.00	$ 13,500.00	$ 37,860.00	$ 48,720.00	$ 27,000.00	$ 75,720.00
	NEMA Cabinet, UPS, Disconnect		2	$ 4,200.00	$ 400.00	$ 4,600.00	$ 8,400.00	$ 800.00	$ 9,200.00
	Edge Equipment		2	$ 1,200.00	$ 350.00	$ 1,550.00	$ 2,400.00	$ 700.00	$ 3,100.00
	AC Power Connect (Service Drop)		2	n/a	$ 1,416.00	$ 1,416.00	n/a	$ 2,832.00	$ 2,832.00
	Antenna Array		2	$ 7,500.00	n/a	$ 7,500.00	$ 15,000.00	n/a	$ 15,000.00
	Cabling System		2	$ 720.00	$ 1,200.00	$ 1,920.00	$ 1,440.00	$ 2,400.00	$ 3,840.00
	Site Installation (Wireless)		2	n/a	$ 1,500.00	$ 1,500.00	n/a	$ 3,000.00	$ 3,000.00
	Site Prep		2	n/a	$ 10,000.00	$ 10,000.00	n/a	$ 20,000.00	$ 20,000.00
				$ -	$ -	$ -	$ -	$ -	$ -
Misc.									
500 '	Install Fiber Optic Marker Sign	Fiberglass	0	$ 60.00	$ 17.70	$ 77.70	$ -	$ -	$ -
				$ -	$ -	$ -	$ -	$ -	$ -
				$ -	$ -	$ -	$ -	$ -	$ -
						Subtotal Cost:	$ 77,319.17	$ 59,559.28	$ 136,878.45

Total Material Cost: $ 77,319.17
Labor/Equip. Total: $ 59,559.28
Total Construction Cost: $ 136,878.45

U.S. DEPARTMENT OF THE INTERIOR
U. S. GEOLOGICAL SURVEY

The National Map US Topo

EASTSOUND QUADRANGLE
WASHINGTON
7.5-MINUTE SERIES

123°00' EU 57'30" 55' 122°52'30"
48°45' 42'30" 40' 48°37'30"
1140000 FEET 640000 FEET
610000 FEET
1 120 000 FEET

Boundary Pass
President Channel
Fishing Bay
Ship Bay
Massacre Bay
West Sound
Tourtleback Lake
Fowler Pond
Schaefer Lake
Ayer Reservoir
East Sound

Point Doughty
North Beach
Brandts Landing
Eastsound Marina
Terrill Beach
Point Thompson
Wiggins Head
Johnson Point
Sucia Island
Parker Reef
Orcas Island Airport
Camp Orkila
Freeman Island
Eastsound Post Office
Eastsound
Crescent Beach
Madrona Point
Beach Haven
Point Kimple
Double Hill
Lookout Hill
West Beach Resort Campground and Recreational Vehicle Park
West Beach
Kimple Beach
Woodlawn Cemetery
Fowler Reservoir Dam
Osprey Hill
Giffin Rocks
Orcas Island Golf Course
Elco Pit
Tourtleback Lake Dam
Orcas Knob
Turtleback Mountain
Crow Valley
Orcas Island
Dolphin
Rosario Hill
Ship Peak
Schaefer Lake Dam
Sea Island Shale Pit
Dolphin Bay Quarry
Skull Rock
Skull Island
Harbor Rock
Haida Point
West Sound Marina
Picnic Island
Indian Point
West Sound
Mount Woolard
Ayer Reservoir Dam

706.3-OR01
706.3-OR05
706.3-OR06
706.3-OR07
706.3-OR08
706.3-OR09
706.3-OR10
706.3-OR11
706.3-OR12
706.3-OR13
706.3-OR14
706.3-OR15
706.3-OR20

BARTEL RD
SUNSET AVE
MATIAVIEW DR
COCKERILL LN
BUCKHORN RD
PARKWOOD DR
TERRELLS BEACH RD
CONSWOOD LN
GRAFTON LN
MOUNT BAKER RD
N BEACH RD
WEBBER RD
SEAVIEW ST
BLANCHARD RD
GLENWOOD INN RD
TOEWS LN
DECK RD
GIBSONS
CAMP ORKILA RD
MAPLE LN
VIEW HAVEN RD
CEDAR HILL RD
MAIN ST
PRUNE ALY
HARBOR LN
CRESCENT BEACH DR
DOUBLE HILL RD
TERRY ST
FOREST RD
LOOKOUT LN
BEACH HAVEN RD
ENCHANTED FOREST RD
TEMPLE LN
CAUDEN LN
ENGLEHARTSON RD
RED CROSS QUARRY RD
RESIDENTS CHANNEL LN
CAS RD
INDRALAN RD
OSPREY LN
SUNDERLAND RD
KIRCHOFF LN
GRAVEL PIT RD
TALMAN LN
HAWKINS RD
CROW VALLEY RD
BILL KALLA RD
DOUGLAS RD
MCHALLIE LN
DOLPHIN BAY RD
RIDGEWAY LN
PAINTREE LN
SHOREDR
OLD HILL RD
ISLAND VIEW LN
NORDSTROM LN
SWAN RD
WILLOWWOOD RD
QUARRY LN
DEER HARBOR RD
WILDROSE LN
BETH ROSE RD
BODDINGTON LN
PATTON LN
MANNION CREEK LN
KUETH RD
HORSESHOE HWY
PINNED RD
STARBOARD HANDS RD
EASTMAN RD
MOUNT WOOLARD RD
SHANER ARMSTRONG LN
INDIAN POINT RD

Produced by the United States Geological Survey
North American Datum of 1983 (NAD83)
World Geodetic System of 1984 (WGS84). Projection and
1 000-meter grid: Universal Transverse Mercator, Zone 10U
10 000-foot ticks: Washington Coordinate System of 1983
(north zone)

Imagery.....NAIP, August 2009
Roads.....©2006-2010 Tele Atlas
Names.....GNIS, 2009
Hydrography.....National Hydrography Dataset, 2009
Contours.....National Elevation Dataset, 1999

MN 17° 15' 307 MILS
GN 0° 3' 1 MILS
UTM GRID AND 2011 MAGNETIC NORTH DECLINATION AT CENTER OF SHEET

U.S. National Grid
100,000-m Square ID: EU
Grid Zone Designation: 10U

SCALE 1:24 000
1 0.5 0 KILOMETERS 1 2
1000 500 0 METERS 1000 2000
1 0.5 0 1 MILES
1000 0 1000 2000 3000 4000 5000 6000 7000 8000 9000 10000 FEET

CONTOUR INTERVAL 20 FEET
NORTH AMERICAN VERTICAL DATUM OF 1988

This map was produced to conform with version 0.5.10 of the draft USGS Standards for 7.5-Minute Quadrangle Maps.
A metadata file associated with this product is draft version 0.5.11

WASHINGTON
QUADRANGLE LOCATION

	Sucia Island	Lummi Bay OE W
Waldron Island	Eastsound	Mount Constitution
Friday Harbor	Shaw Island	Blakely Island

ADJOINING 7.5' QUADRANGLES

ROAD CLASSIFICATION
Interstate Route
US Route
Ramp
State Route
Local Road
4WD
Interstate Route US Route State Route

EASTSOUND, WA
2011

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U.S. DEPARTMENT OF THE INTERIOR
U. S. GEOLOGICAL SURVEY

The National Map
US Topo

BLAKELY ISLAND QUADRANGLE
WASHINGTON
7.5-MINUTE SERIES

706.3-OR01
706.3-OR03
706.3-OR02
706.3-DB01
706.3-LZ04

Olga
Olga Marina
Buck Bay
Point Lawrence Rd
Mt Entrance Rd
Island Rd
Obstruction Pass Rd
Turek Dam
Buoy Bay
Twin Rocks
East Sound
Green Bank
White Beach
Deer Point Airport
Williston Rd
Meryman Rd
Deer Point Rd
Brown Rock
Lieber Haven Resort and Marina
Obstruction Pass
Deer Point
Lydia Shoal
Orcas Island
Diamond Point
Obstruction Island
Shag Rock
Peavine Pass
Spindle Rock
Blakely Island Airport
Blakely Peak
Blakely Island Shoal
Horseshoe Lake
Blakely Island
Humphrey Head
Spencers Landing Marina
Bald Bluff
Thatcher
Spencer Lake
Leo Reef Light
Swifts Bay
Flower Island
Belllingham-San Juan Islands-Anacortes-Friday Harbor
Willow Island
The Pointers
Pointer Island
Armitage Island
Black Rock
ROSARIO STRAIT
Port Stanley
Coyote Ln
West Park Ln
Bakerview Rd
Frost Island
Spencer Spit
Lawson Rock
Thatcher Pass
Lopez Island
Undertakers Reef
Fauntleroy Point
Lopez Sound
San Elmo
Decatur Island
Decatur- Jones Airport
Decatur Head
James Island State Park Boat Dock
James Island
Trump Island
Decatur Shores Airport
Decatur

122°52'30" 48°37'30" 10 000mE 11 12 50' 13 14 15 47'30" 16 1170000 FEET 17 18 122°45'
53 85 000mN 84 83 82 35' 81 80 79 78 77 32'30" 76 75 560000 FEET 74 73 72 48°30'
1 150 000 FEET

Produced by the United States Geological Survey
North American Datum of 1983 (NAD83)
World Geodetic System of 1984 (WGS84). Projection and
1 000-meter grid: Universal Transverse Mercator, Zone 10U
10 000-foot ticks: Washington Coordinate System of 1983
(north zone)

Imagery.....NAIP, August 2009
Roads.....©2006-2010 Tele Atlas
Names.....GNIS, 2009
Hydrography.....National Hydrography Dataset, 2009
Contours.....National Elevation Dataset, 1999

MN 17° 11' 306 MILS
GN 0° 8' 2 MILS
UTM GRID AND 2011 MAGNETIC NORTH DECLINATION AT CENTER OF SHEET

U.S. National Grid
100,000-m Square ID
EU
Grid Zone Designation
10U

SCALE 1:24 000

1 0.5 0 KILOMETERS 1 2
1000 500 0 METERS 1000 2000
1 0.5 0 1
MILES
1000 0 1000 2000 3000 4000 5000 6000 7000 8000 9000 10000
FEET

CONTOUR INTERVAL 20 FEET
NORTH AMERICAN VERTICAL DATUM OF 1988

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WASHINGTON
QUADRANGLE LOCATION

Eastsound	Mount Constitution	Lummi Island
Shaw Island	Blakely Island	Cypress Island
Richardson	Lopez Pass	Deception Pass

ADJOINING 7.5' QUADRANGLES

ROAD CLASSIFICATION

Interstate Route	State Route
US Route	Local Road
Ramp	4WD

Interstate Route US Route State Route

BLAKELY ISLAND, WA
2011

USGS science for a changing world

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U. S. GEOLOGICAL SURVEY

The National Map US Topo

FALSE BAY QUADRANGLE
WASHINGTON
7.5-MINUTE SERIES

Produced by the United States Geological Survey
North American Datum of 1983 (NAD83)
World Geodetic System of 1984 (WGS84). Projection and
1 000-meter grid: Universal Transverse Mercator, Zone 10U
10 000-foot ticks: Washington Coordinate System of 1983
(north zone)

Imagery.....NAIP, August 2009
Roads.....©2006-2010 Tele Atlas
Names.....GNIS, 2009
Hydrography.....National Hydrography Dataset, 2009
Contours.....National Elevation Dataset, 1999

UTM GRID AND 2011 MAGNETIC NORTH DECLINATION AT CENTER OF SHEET
GN 0° 3′ 1 MILS
MN 17° 12′ 306 MILS

U.S. National Grid
100,000-m Square ID
DU
Grid Zone Designation
10U

SCALE 1:24 000

1 0.5 0 KILOMETERS 1 2
1000 500 0 METERS 1000 2000
1 0.5 0 1
MILES
1000 0 1000 2000 3000 4000 5000 6000 7000 8000 9000 10000
FEET

CONTOUR INTERVAL 20 FEET
NORTH AMERICAN VERTICAL DATUM OF 1988

This map was produced to conform with version 0.5.10 of the draft USGS Standards for 7.5-Minute Quadrangle Maps.
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WASHINGTON

QUADRANGLE LOCATION

Roche Harbor	Friday Harbor	Shaw Island
Roche Harbor OE S	False Bay	Richardson

ADJOINING 7.5′ QUADRANGLES

ROAD CLASSIFICATION

Interstate Route	State Route
US Route	Local Road
Ramp	4WD

Interstate Route US Route State Route

FALSE BAY, WA
2011

U.S. DEPARTMENT OF THE INTERIOR
U. S. GEOLOGICAL SURVEY

The National Map US Topo

FRIDAY HARBOR QUADRANGLE
WASHINGTON
7.5-MINUTE SERIES

123°07'30" 48°37'30" 4910000mE 5' 2'30" 1110000 FEET DU 123°00' 48°37'30" 600000 FEET
560000 FEET 48°30' 1 090 000 FEET 48°30' 123°00' DU

Limestone Point
Jones Island Marina
Jones Island
Spring Passage
Fritz Point
Cayou Quay Marina
Deer Harbor Marina
Deer Harbor Post Office
Fawn Island
Steep Point
Reef Island
O'Neal Island
Bird Rock
McConnell Island
Wasp Islands
Coon Island
Yellow Island
Nob Island
Cliff Island
Low Island
Shirt Tail Reef
Neck Point
Roche Harbor Lake
Durhack Dam Number Five
Durhack Dam Number Four
Durhack Dam Number Three
Durhack Dam Number Seven
Durhack Dam Number Two
Durhack Dam Number One
Durhack Dam Number Six
Lakedale
Boyce Dam
Three Corner Lake
Sportsmans Lake
Egg Lake
Sportsman Lake Dam
Cady Mountain
San Juan Island Dam Number Two
Point Caution
Biological Hill
Schuman Dam
Oceanographic Laboratories
Lawson Lake
Lawson Lake Dam
San Juan Island Dam Number One
Erickson Dam Number Two
Erickson Dam Number One
San Juan Island
Beaverton Valley
Brown Island
Friday Harbor Seaplane Base
Friday West Airport
Friday Harbor Ferry Landing
Friday Harbor Post Office
Old American Legion Hall
Warbass Way Marina
Friday Harbor
Trout Lake
Trout Lake Storage Dam
Margos Lake
Margos Lake Dam
Burton and Louthan Dam
Sundstrom Dam
Shipyard Cove Marina
Friday Harbor Quarry
Zylstra Lake
Friday Harbor Airport
Woods Reservoir Dam
Woods Reservoir
Zylstra Dam
Little Island
Jackson Beach
Argyle
Heidenreich Dam
Little Mountain
Dinner Island
Merrifield Cove

706.3-SJ13
706.3-SJ15
706.3-SJ02
706.3-SJ06
706.3-SJ03
706.3-SJ14
706.3-SJ15
706.3-SJ15
706.3-SJ02
706.3-SJ03
706.3-SJ01
706.3-SJ10
706.3-SJ15
706.3-SJ04
706.3-SJ01
706.3-SJ01
706.3-SJ09
706.3-SJ07
706.3-SJ08
706.3-SH03

SAN JUAN DR
KELSEY CT
LIMESTONE POINT RD
BRAHAM RD
ROULEAU RD
CHANNEL RD
CREST RD
VIEW LN
SPRING POINT RD
ORCHARD DR
FRIDAY HARBOR-SIDNEY
San Juan Channel
ROCHE HARBOR RD
DUNLAP RD
DUCK SQUEEZE
BELL RD
KASNYKU LN
MISTY MEADOWS
PRIMROSE LN
DRAKE CONLEY LN
N EUREKA DR
PORPOISE LN
A DR
SEAVIEW
MILLER RD
EGG LAKE RD
THREE CORNER LAKE RD
WOODPECKER LN
WILD ROSE PATCH LN
N MARSH RD
S MARSH RD
PINE DR
RIDGEDALE RD
BIG FOOT WAY
CUTTONE RD
TERRACE DR
THREE MEADOWS LN
CADY MOUNTAIN RD
SANDWITH RD
CAPHON RD
ROLLING STAR LN
FLICKER LN
W VALLEY RD
SCOTTON RD
REDWING RD
LOWE LN
HALVORSEN RD
LOST WAY
BEAVERTON VALLEY RD
SCHAEFER DR
BRYANT LN
TUCKER AVE
UNIVERSITY RD
ANACORTES-FRIDAY HARBOR
IVAN RD
MONBERRY LN
GUARD ST
HARBOR ST
MARGUERITE PL
PARK ST
SPRING ST
FRANCIS ST
WARBASS WAY
GROVER ST
SPRUCE ST
MULLIS ST
ARGYLE AVE
WEBERWAY
CEMETERY RD
DOUGLAS RD
LITTLE RD
CATTLE POINT RD
BURTON LN
HIGH HARO DR
VALLEY FARMS RD
SAN JUAN VALLEY RD
SCHOOLHOUSE RD
EMMERLING RD
WOLD RD
PROHASKA RD
KIEHL RD
ALASKA PL
DEXTER LN
JULIE RD
STEHEKIN RD
COTTONWOOD RD
HAWTHORNE LN
OLD HOMESTEAD LN
LITTLE MOUNTAIN RD
RANCH RD
BAILER HILL RD
BULLFROG RD
HIDDEN MEADOWS LN
WOOD DUCK LN
SUNDSTROM LN
LAMPARD RD
ISLANDS INTER-ISLANDS

Produced by the United States Geological Survey
North American Datum of 1983 (NAD83)
World Geodetic System of 1984 (WGS84). Projection and 1 000-meter grid: Universal Transverse Mercator, Zone 10U
10 000-foot ticks: Washington Coordinate System of 1983 (north zone)

Imagery.....NAIP, August 2009
Roads.....©2006-2010 Tele Atlas
Names.....GNIS, 2009
Hydrography.....National Hydrography Dataset, 2009
Contours.....National Elevation Dataset, 1999

UTM GRID AND 2011 MAGNETIC NORTH DECLINATION AT CENTER OF SHEET
MN 17° 14' 306 MILS
GN 0° 3' 1 MILS

U.S. National Grid
100,000-m Square ID
DU
Grid Zone Designation
10U

SCALE 1:24 000
1 0.5 0 KILOMETERS 1 2
1000 500 0 METERS 1000 2000
1 0.5 0 1 MILES
1000 0 1000 2000 3000 4000 5000 6000 7000 8000 9000 10000 FEET

CONTOUR INTERVAL 20 FEET
NORTH AMERICAN VERTICAL DATUM OF 1988

This map was produced to conform with version 0.5.10 of the draft USGS Standards for 7.5-Minute Quadrangle Maps.
A metadata file associated with this product is draft version 0.5.11

WASHINGTON
QUADRANGLE LOCATION

Stuart Island	Waldron Island	Eastsound
Roche Harbor	Friday Harbor	Shaw Island
Roche Harbor OE S	False Bay	Richardson

ADJOINING 7.5' QUADRANGLES

ROAD CLASSIFICATION
Interstate Route
US Route
Ramp
State Route
Local Road
4WD
Interstate Route US Route State Route

FRIDAY HARBOR, WA
2011

U.S. DEPARTMENT OF THE INTERIOR
U. S. GEOLOGICAL SURVEY

The National Map US Topo

LOPEZ PASS QUADRANGLE
WASHINGTON
7.5-MINUTE SERIES

706.3-LZ08
706.3-LZ10
706.3-LZ11
706.3-LZ12

Small Island
Reads Bay
Decatur Shores Airport
White Cliff
Dot Rock
Belle Rock Light
Belle Rock
Center Island Airport
Center Island
Bird Rocks
Rim Island
Lopez Sound
Cayou Island
Lopez Pass
Ram Island
Sperry Point
Henderson Lake
Skull Island
Fortress Island
Crab Island
Hunter Bay
Shoal Bight
Mud Bay
Kellett Ledge
Cape Saint Mary
Islandale
Telegraph Bay
Mackaye Harbor
Mackaye Harbor Public Dock
Chadwick Hill
Watmough Bay
Boulder Island
Watmough Head
Hughes Bay
McArdle Bay
Aleck Bay
Aleck Rocks
Blind Island
Castle Island
Point Colville
Flint Beach
Barnacle Rock
Swirl Island
Colville Island
Davidson Rock
Davidson Rock Light
STRAIT OF JUAN DE FUCA
BELLINGHAM-VICTORIA

SATELLITE RD · BONANZA DR · ELLIOTT RD · HUNTER BAY RD · SPIELMAN RD · LEAH ROSE RD · CAPTAIN TEUSEN LN · MUD BAY RD · ISLANDALE RD · GRIMES MAKER LN · CALLE LOUIS · MACKAYE HARBOR RD · WREN RD · MCCOALEY · HUGHES BAY RD · ALECK BAY RD · HUTTON LN · HAINES RD · COLE RD · PAVEY BLVD · PAVEY PL · DOE RUN RD · FRANCIS LN · ELIZA RD · OLES LN · SPERRY RD · CHADWICK RD · WATMOUGH HEAD RD

122°52'30" 510 000mE 11 12 50' 13 14 15 47'30" 16 1170000 FEET 18 122°45'
48°30' 53 71 000mN 70 69 68 27'30" 67 66 65 64 63 25' 62 61 60 59 510000 FEET 48°22'30"
550000 FEET 53 59 000mN

1 150 000 FEET

Produced by the United States Geological Survey
North American Datum of 1983 (NAD83)
World Geodetic System of 1984 (WGS84). Projection and
1 000-meter grid: Universal Transverse Mercator, Zone 10U
10 000-foot ticks: Washington Coordinate System of 1983
(north zone)

Imagery.....NAIP, August 2009
Roads.....©2006-2010 Tele Atlas
Names.....GNIS, 2009
Hydrography.....National Hydrography Dataset, 2009
Contours.....National Elevation Dataset, 1999

MN GN 17° 9' 305 MILS 0° 8' 2 MILS
UTM GRID AND 2011 MAGNETIC NORTH DECLINATION AT CENTER OF SHEET

U.S. National Grid
100,000-m Square ID
EU
Grid Zone Designation
10U

SCALE 1:24 000

1 0.5 0 KILOMETERS 1 2
1000 500 0 METERS 1000 2000
1 0.5 0 1
MILES
1000 0 1000 2000 3000 4000 5000 6000 7000 8000 9000 10000
FEET

CONTOUR INTERVAL 20 FEET
NORTH AMERICAN VERTICAL DATUM OF 1988

This map was produced to conform with version 0.5.10 of the
draft USGS Standards for 7.5-Minute Quadrangle Maps.
A metadata file associated with this product is draft version 0.5.11

WASHINGTON
QUADRANGLE LOCATION

Shaw Island	Blakely Island	Cypress Island
Richardson	Lopez Pass	Deception Pass
	Smith Island	Oak Harbor

ADJOINING 7.5' QUADRANGLES

ROAD CLASSIFICATION

Interstate Route	State Route
US Route	Local Road
Ramp	4WD

Interstate Route · US Route · State Route

LOPEZ PASS, WA
2011

USGS science for a changing world

U.S. DEPARTMENT OF THE INTERIOR
U. S. GEOLOGICAL SURVEY

The National Map US Topo

MOUNT CONSTITUTION QUADRANGLE
WASHINGTON
7.5-MINUTE SERIES

122°52'30" 48°45' 48°42'30" 48°40' 48°37'30"
122°50' 122°47'30" 122°45'
5510000mE 5511 5512 5513 5514 5515 1170000 FEET 5517 5518
5399000mN 5398 5397 5396 5394 5393 5392 5391 5390 5389 5388 5387 600000 FEET 5386000mN
640000 FEET

Rolfe Cape
Eagle Point
Matia Island
Puffin Island
STRAIT OF GEORGIA
ROSARIO STRAIT
Buckhorn
Barnes Island
Clark Island
Lone Tree Island
The Sisters
Little Sister
Raccoon Point
Buck Mountain
Day Lake
Twin Lakes
Mount Constitution
Summit Lake
Hidden Ridge
Orcas Island
Mount Pickett
Utter Dam
Cold Spring
False Summit
Elahertys Pond
Mountain Lake
Little Summit
Rosario Hill
Cascade Lake
Cascade Lake Dam
Rosario
Rosario Resort Marina
Rosario Seaplane Base
Rosario Point
706.3-OR04
706.3-OR03
Mountain Lake Dam
Hidden Falls
Cavern Falls
Rustic Falls
Cascade Falls
Cascade Creek
Sea Acre
Kangaroo Point
Doe Bay
Peapod Rocks
South Peapod
Doe Island
Chin-Chin-Tse-Tung
Entrance Mountain
East Sound
Boyd Middle Reservoir
Boyd Middle Reservoir Dam
Boyd Lower Reservoir Dam
Boyd Lower Reservoir
Olga-Doe Bay Cemetery

1 150 000 FEET

Produced by the United States Geological Survey
North American Datum of 1983 (NAD83)
World Geodetic System of 1984 (WGS84). Projection and
1 000-meter grid: Universal Transverse Mercator, Zone 10U
10 000-foot ticks: Washington Coordinate System of 1983
(north zone)

Imagery.....NAIP, August 2009
Roads.....©2006-2010 Tele Atlas
Names.....GNIS, 2009
Hydrography.....National Hydrography Dataset, 2009
Contours.....National Elevation Dataset, 1999

GN 0° 8' 3 MILS
MN 17° 14' 306 MILS
UTM GRID AND 2011 MAGNETIC NORTH DECLINATION AT CENTER OF SHEET

U.S. National Grid
100,000-m Square ID
EU
Grid Zone Designation
10U

SCALE 1:24 000

1 0.5 0 KILOMETERS 1 2
1000 500 0 METERS 1000 2000
1 0.5 0 1
MILES
1000 0 1000 2000 3000 4000 5000 6000 7000 8000 9000 10000
FEET

CONTOUR INTERVAL 20 FEET
NORTH AMERICAN VERTICAL DATUM OF 1988

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WASHINGTON
QUADRANGLE LOCATION

Sucia Island	Lummi Bay OE W	Lummi Bay
Eastsound	Mount Constitution	Lummi Island
Shaw Island	Blakely Island	Cypress Island

ADJOINING 7.5' QUADRANGLES

ROAD CLASSIFICATION

Interstate Route
US Route
Ramp
State Route
Local Road
4WD

Interstate Route US Route State Route

MOUNT CONSTITUTION, WA
2011

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RICHARDSON QUADRANGLE
WASHINGTON
7.5-MINUTE SERIES

706.3-LZ08
706.3-LZ07
706.3-LZ09
706.3-LZ10
706.3-LZ11
706.3-SJ08

Rock Point
Big Rock
Halftide Rocks
Hope Reef
North Pacific Rock
Harbor Rock
White Cliffs
Kings Point
Shark Reef
Lopez Island Airport
Lopez Union Cemetery
Lopez Hill
Lopez Island
Durocher Dam
Oberholtzer Dam
Goodrow Dam
Deadman Island
Goose Island
Davis Point
Mount Finlayson
San Juan Island
Cattle Point
Cattle Point Light
Chicken Rock
Mummy Rocks
Buck Island
Richardson
Richardson Rock
Whale Rocks
Inner Passage
Salmon Bank
Charles Island
Geese Islets
Long Island
Secar Rock
Hall Island
Johns Point
Iceberg Island
Iceberg Point
Iowa Rock
Jones Bay
Mackaye Harbor
Outer Bay
Griffin Bay
San Juan Channel
Davis Bay
Middle Channel
STRAIT OF JUAN DE FUCA
McArthur Bank
BELLINGHAM-VICTORIA

PORT TOWNSEND-FRIDAY HARBOR

123°00' 122°52'30" 48°30' 48°22'30"
1 120 000 FEET
510000 FEET
550000 FEET

Produced by the United States Geological Survey
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1 000-meter grid: Universal Transverse Mercator, Zone 10U
10 000-foot ticks: Washington Coordinate System of 1983
(north zone)

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Roads.....©2006-2010 Tele Atlas
Names.....GNIS, 2009
Hydrography.....National Hydrography Dataset, 2009
Contours.....National Elevation Dataset, 1999

UTM GRID AND 2011 MAGNETIC NORTH DECLINATION AT CENTER OF SHEET
MN 17° 11' 305 MILS
GN 0° 3' 1 MILS

U.S. National Grid
100,000-m Square ID
EU
Grid Zone Designation
10U

SCALE 1:24 000
1 0.5 0 KILOMETERS 1 2
1000 500 0 METERS 1000 2000
1 0.5 0 1
MILES
1000 0 1000 2000 3000 4000 5000 6000 7000 8000 9000 10000
FEET

CONTOUR INTERVAL 20 FEET
NORTH AMERICAN VERTICAL DATUM OF 1988

This map was produced to conform with version 0.5.10 of the draft USGS Standards for 7.5-Minute Quadrangle Maps.
A metadata file associated with this product is draft version 0.5.11

WASHINGTON
QUADRANGLE LOCATION

Friday Harbor	Shaw Island	Blakely Island
False Bay	Richardson	Lopez Pass
		Smith Island

ADJOINING 7.5' QUADRANGLES

ROAD CLASSIFICATION
Interstate Route
US Route
Ramp
State Route
Local Road
4WD
Interstate Route US Route State Route

RICHARDSON, WA
2011

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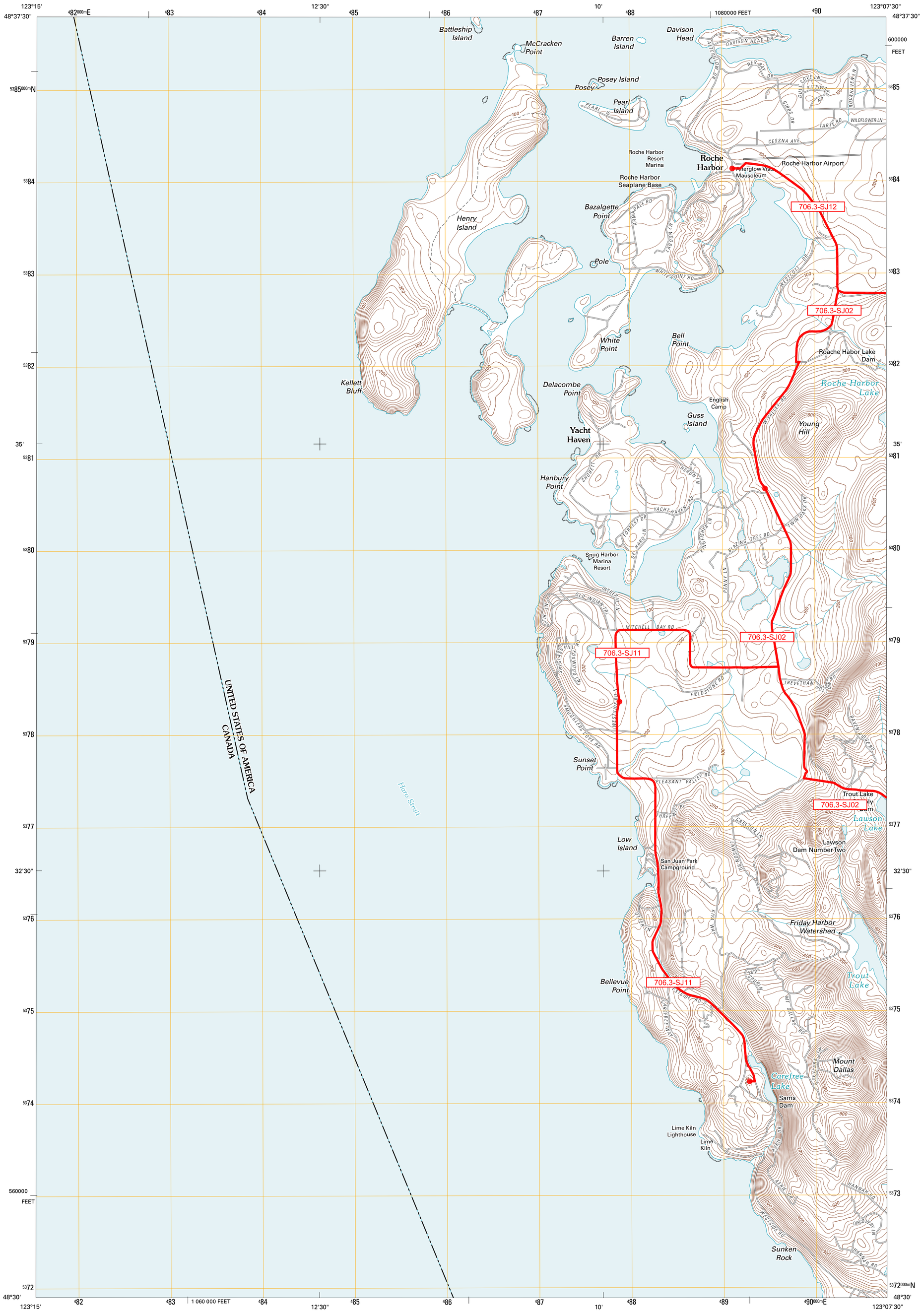
U.S. DEPARTMENT OF THE INTERIOR
U. S. GEOLOGICAL SURVEY

The National Map
US Topo

ROCHE HARBOR QUADRANGLE
WASHINGTON
7.5-MINUTE SERIES



Produced by the United States Geological Survey
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10 000-foot ticks: Washington Coordinate System of 1983
(north zone)

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Names.....GNIS, 2009
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Contours.....National Elevation Dataset, 1999

UTM GRID AND 2011 MAGNETIC NORTH DECLINATION AT CENTER OF SHEET

U.S. National Grid
100,000-m Square ID
DU
Grid Zone Designation
10U

SCALE 1:24 000

1 060 000 FEET

CONTOUR INTERVAL 20 FEET
NORTH AMERICAN VERTICAL DATUM OF 1988

This map was produced to conform with version 0.5.10 of the draft USGS Standards for 7.5-Minute Quadrangle Maps. A metadata file associated with this product is draft version 0.5.11

QUADRANGLE LOCATION

	Stuart Island	Waldron Island
	Roche Harbor	Friday Harbor
	Roche Harbor OE S	False Bay

ADJOINING 7.5' QUADRANGLES

ROAD CLASSIFICATION

Interstate Route
US Route
Ramp
State Route
Local Road
4WD

Interstate Route · US Route · State Route

ROCHE HARBOR, WA
2011

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The National Map US Topo

SHAW ISLAND QUADRANGLE
WASHINGTON
7.5-MINUTE SERIES

706.3-OR19
706.3-OR20
706.3-OR15
706.3-OR17
706.3-OR18
706.3-SH01
706.3-SH03
706.3-SH05
706.3-SH02
706.3-SH04
706.3-LZ02
706.3-LZ01
706.3-LZ03
706.3-LZ04
706.3-SJ05
706.3-LZ05
706.3-LZ06

Produced by the United States Geological Survey
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World Geodetic System of 1984 (WGS84). Projection and 1 000-meter grid: Universal Transverse Mercator, Zone 10U
10 000-foot ticks: Washington Coordinate System of 1983 (north zone)

Imagery.....NAIP, August 2009
Roads.....©2006-2010 Tele Atlas
Names.....GNIS, 2009
Hydrography.....National Hydrography Dataset, 2009
Contours.....National Elevation Dataset, 1999

UTM GRID AND 2011 MAGNETIC NORTH DECLINATION AT CENTER OF SHEET

U.S. National Grid
100,000-m Square ID: EU
Grid Zone Designation: 10U

SCALE 1:24 000

CONTOUR INTERVAL 20 FEET
NORTH AMERICAN VERTICAL DATUM OF 1988

This map was produced to conform with version 0.5.10 of the draft USGS Standards for 7.5-Minute Quadrangle Maps.
A metadata file associated with this product is draft version 0.5.11

WASHINGTON

QUADRANGLE LOCATION

Waldron Island	Eastsound	Mount Constitution
Friday Harbor	Shaw Island	Blakely Island
False Bay	Richardson	Lopez Pass

ADJOINING 7.5' QUADRANGLES

ROAD CLASSIFICATION

Interstate Route
US Route
Ramp
State Route
Local Road
4WD

SHAW ISLAND, WA
2011

U.S. DEPARTMENT OF THE INTERIOR
U. S. GEOLOGICAL SURVEY

USGS science for a changing world

The National Map US Topo

WALDRON ISLAND QUADRANGLE
WASHINGTON
7.5-MINUTE SERIES

123°07'30" 5' 2'30" 123°00'
48°45'
48°42'30"
48°40'
48°37'30"

4491000mE 92 93 94 95 96 97 1110000 FEET 99 DU

5399000mN 98 97 96 94 93 92 91 90 89 610000 FEET 88 87 86

640000 FEET

CANADA
UNITED STATES OF AMERICA

Boundary Pass
Shipjack Island
Gordon Island
Bare Island
Point Hammond
Severson Bay
Fishery Point
Waldronaire Airport
North Bay
Limberry Point
Waldron Island
Mail Bay
Sandy Point
Cowlitz Bay
Waldron
Mouatt Reef
Mount Cement
Point Disney
President Channel
White Rock
Danger Rock
Gull Rock
Flattop Island
Cactus Islands
Green Point
Speiden Channel
Lehman Pond Dam
706.3-OR16

1 090 000 FEET

Produced by the United States Geological Survey
North American Datum of 1983 (NAD83)
World Geodetic System of 1984 (WGS84). Projection and
1 000-meter grid: Universal Transverse Mercator, Zone 10U
10 000-foot ticks: Washington Coordinate System of 1983
(north zone)

Imagery.....NAIP, August 2009
Roads.....©2006-2010 Tele Atlas
Names.....GNIS, 2009
Hydrography.....National Hydrography Dataset, 2009
Contours.....National Elevation Dataset, 1999

UTM GRID AND 2011 MAGNETIC NORTH DECLINATION AT CENTER OF SHEET
MN 17° 16' 307 MILS
GN 0° 3' 1 MILS

U.S. National Grid
100,000-m Square ID
DU
Grid Zone Designation
10U

SCALE 1:24 000
1 0.5 0 KILOMETERS 1 2
1000 500 0 METERS 1000 2000
1 0.5 0 1 MILES
1000 0 1000 2000 3000 4000 5000 6000 7000 8000 9000 10000 FEET

CONTOUR INTERVAL 20 FEET
NORTH AMERICAN VERTICAL DATUM OF 1988

This map was produced to conform with version 0.5.10 of the
draft USGS Standards for 7.5-Minute Quadrangle Maps.
A metadata file associated with this product is draft version 0.5.11

WASHINGTON

QUADRANGLE LOCATION

		Sucia Island
Stuart Island	Waldron Island	Eastsound
Roche Harbor	Friday Harbor	Shaw Island

ADJOINING 7.5' QUADRANGLES

ROAD CLASSIFICATION

Interstate Route	State Route
US Route	Local Road
Ramp	4WD

Interstate Route US Route State Route

WALDRON ISLAND, WA
2011